BLACK SEA BIOLOGICAL DIVERSITY

UKRAINE

BLACK SEA ENVIRONMENTAL SERIES VOL: 7

Ukrainian National Report

BLACK SEA ENVIRONMENTAL SERIES

The Black Sea Environmental Series consists of thematic regional studies undertaken as part of a programme for improved management of the Black Sea environment. The Black Sea Environmental Programme (BSEP) was initiated in June 1993 at the urgent request of the governments of Bulgaria, Georgia, Romania, Russia, Turkey and Ukraine. The BSEP, funded by the Global Environment Facility and a number of collateral donors, is managed by the United Nations Development Programme (through UNOPS) in close cooperation with the World Bank and the United Nations Environment Programme, and donors. It closely coordinates the work of governmental and international experts, specialist UN Agencies, and national and international NGOs. The BSEP sets out to provide a sustainable basis for managing the Black Sea through capacity building, environmental assessment, the development and harmonization of policy and legislation, and by facilitating appropriate environmental investments. It was instrumental in assisting the Black Sea governments to develop the Black Sea Strategic Action Plan, signed by the six Ministers of the Environment on 31 October, 1996. The Action Plan sets out a pragmatic strategy for rehabilitating and protecting the Black Sea in the coming to decades. The Black Sea Environmental Series is brought to a wider audience in order to provide a baseline of peer-reviewed quantitative information on the Black Sea which can be employed by managers, researchers and teachers. The studies also serve as case histories for the eventual application of concepts agreed at the 1992 Rio de Janerio "Earth Summit" and which are embodied in "Agenda 21". Widely considered as the most damaged sea on our planet, the Black Sea should serve as an example to future generations of mankind's ability to understand, save and protect an internationally shared resource.

GEF Black Sea Environmental Programme

Black Sea Biological Diversity

Ukraine

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Prepared in

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United Nations Publications • New York

Black Sea Biological Diversity
Ukraine

ISBN 92-1-126098-1
United Nations Publications Sales No. E.98.III.B.19
Black Sea Environmental Series, Volume 7

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The World Bank
United Nations Development Programme
United Nations Environment Programme

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Acknowledgements

This book has been made possible by the Global Environmental Facility (GEF) Black Sea Environmental Programme (BSEP) and the Ministry of Environmental Protection and Nuclear Safety of Ukraine which chose the Odessa Branch of the Institute of Biology of the Southern Seas, National Academy of Sciences of Ukraine, as a National Focal Point for Biodiversity and has allowed it to summarise a large amount of long term data from other institutions as well.

The compilers would like to thank Dr. Laurence D. Mee and Dr. Vladimir O. Mamaev from the BSEP Programme Coordination Unit and A. Meriwether Wilson, World Bank Biodiversity Advisor for valuable suggestions, ideas and the organisation of helpful workshop meetings.

We are also very grateful to all the specialists from the contributing institutions whose material were used for this National Report.

We thank A. Zaginailo, N. Chilikina, N. Kopitina, I. Kulakova, L. Garlitskaya for their technical help in preparing the manuscript.

Special thanks to Dr. V. Lisovskaya for most of the translation and to Mr. Gareth Jenkins for editing and Ms. Figen Canakci for formatting and page layout.

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Introduction

The main objective of this study is to give a general, systematic overview of the biodiversity of the Ukrainian waters of the Black Sea and Azov Sea which will then serve as a scientific basis for the preparation of national and regional strategies for the conservation, sustenance and utilisation of the biological resources of the sea and coastal water bodies. The main tasks are:

- to determine the main categories of biotopes (habitats), their boundaries and other main determining parameters of the environment;
- to describe the structure and species composition of the main living forms: i.e. plankton, nekton, benthos;
- to describe the characteristics of key species: background, dominants and edificators of communities, endemics, relicts, invasive and introduced species;
- to describe the characteristics of rare, endangered and protected species; to determine the biodiversity features of the biotopes in the Ukrainian part of the Azov Sea;
- to describe the characteristics of the main biocoenoses of the selected biotopes of the Black Sea;
- to assess the contemporary changes in the ecosystem of the Black Sea according to the criterion of biodiversity;
- to describe the characteristics of the protected territories and the representative flora and fauna of the coastal zone of the Black and Azov Seas;
- to detail activities implemented conducted for the conservation of biodiversity and recommendations for its further protection and amelioration.

Executive Summary

The length of the Ukrainian Black Sea coastline is 1,628 km. Ukrainian territorial waters extend 12 nautical miles off the coast and cover an area of approximately 24,850 km2. The area of the rest of the shelf up to the 200m isobath is equivalent to 55,750 km2 or 57% of the total Black Sea shelf.

There are 14 main limans and estuaries with a total area of 1,952 km2. The water salinity ranges from 0.3 to 296.0 ppt. There are eight gulfs with a total area of 1,770 km2 and a salinity of 3.0-18.5 ppt. The main rivers are the Danube, Dnestr, southern Bug, Ingulets and Dnepr.

The main rivers entering the Ukrainian Black Sea are the Danube, Dnestr and Dnepr. They have a combined drainage area of 1,400,000 km2, accounting for two thirds of the whole catchment basin. The annual river runoff of these rivers is about 243.8 km2.

The low water levels of the Crimean rivers, which have an average annual river runoff of 0.88 km2, means that they do not have a significant impact on the shelf ecosystems.

The Ukrainian coast of the Black Sea and the Azov Sea is rich in different kinds of wetlands, such as marine, brackish-water and freshwater. Fourteen of them have varying degrees of protection. Some of the wetlands are large (Eastern Sivash - 165,000 ha. Karkinitsky and Dzharylgach Bays - 87,000 ha, Tendrovsky Bay - 38,000 ha): others are smaller (Krivaya Bay and Krivoi Peninsula - 1,400 ha, the coast from Chernomorsk to Cape Uret in Crimea - 9,600 ha). There are a total of 19 marine wetlands in Ukraine, of which 11 are in the Black Sea and eight in the Azov Sea. They have a total combined area of 635,000 ha.

The area of the main Ukrainian northwestern shelf north from Cape Tarkhankut to Zmeiny Island is 48,600 km2 and the water volume 1,150 km3 at an average depth of 23.7m. The sediment is made up of clay, sand and shells.

Among the many islands of the Black Sea only three are of any size. These are the islands of Berezan (Schmidt), Zmeiny and Kefken.

Zmeiny island is the only one to be located far off shore at a distance of 35 km from the mainland. It has an area of almost 18 hectares and a coastline of 1,970m.

A total of 4,289 plant and animals species have been recorded in the Ukrainian Black Sea. They include: bacteria (25 genera), fungi (175 species), phytoplankton (471 species), zooplankton (1,061 species), microphytobenthos (346 species), macrophytobenthos (258 species), higher aquatic plants (159 species), meiobenthos (497 species), macrozoobenthos (875 species), fish (154 species), marine mammals (4 species), and marine and freshwater parasites (264 species) in 84 bird species and four species of marine mammals.

The main benthic biocoenoses are: the bivalve *Modiolus phaseolinus* (55-225m on silty sediments, 31-85 taxa, 1.7-230.0 g.m-2); the polychaeta *Terebellides stroemi* (50-100m on silty sediments, 27 taxa, 0.2-17.6 g.m-2); the polychaeta *Melinna palmata* (12-35m on silty and silty-sandy sediments, 47 species, 30 g.m-2, on average); the bivalve *Gouldia minima* (20-50m on silty- sandy sediments, 106 species, 7.5-12.0 g.m-2); the bivalve *Venus gallina* (7-30m, on sandy sediments, 140 species, 8-1,010 g.m-2); the mussel Mytilus galloprovincialis (0-55m, on silt, sand and all types of hard substrates, 105 species, 1-65,300 g.m-2), the soft-shelled clam *Mya arenaria* (1-26m, on sandy and silty-sandy sediments, 76 species, 38-2.400 g.m-2); the bivalve *Lentidium mediterraneum* (0-20m, on sandy sediments in shallow-water low salinity areas, 40 species, 47.4-114.0 g.m-2); the red alga *Phyllophora* (10-60m, 118 species of invertebrates and 47 species of fish, average biomass 1,360.7 g.m-2); the sea-grass *Zostera* (0.2-12 on sandy and silty-sandy sediments, 70 species, 850-4,260 g.m-2); the brown alga *Cystoseira* (0-15m, on rocky substrates, species, 470-3,960 g.m-2).

Since the 1950s the volumes of nutrients and organic substances introduced into the northwestern shelf of the Black Sea by the Danube, Dnestr and Dnepr rivers have increased about tenfold. The northwestern shelf has now become the largest hypertrophic area in the whole Mediterranean Basin, which stretches from the Straits of Gibraltar to the Azov Sea. The chain of biological consequences of this excess nutrient run-off can be summarized as follows:

Phytoplankton Blooms

The immediate consequence is an outburst of phytoplankton, especially dinoflagellates, euglenoids, and different species of picoplankton. The most vivid examples of such phytoplankton blooms occur on the northwestern shelf. In the 1950s the share of peridinians in the total phytoplankton biomass was 18.8%, but in the 1980s it reached 54.4%. Red tides caused by blooms of peridinians have become common phenomena on the northwestern shelf.

Blooms of One-celled Animals and Jellyfish

Another consequence of phytoplankton enrichment has been the increase in the number of some herbivore and detritivore zooplankton species. The most typical forms are the flagellate *Noctiluca scintillans,* the infusorian *Mesodinium rubrum,* the jellyfish *Amelia aurita,* some rotatorians, the cladoceran *Pleopis polyphemoides* and the copepod *Acartia clausi.*

The Decline in Populations of Large Planktonic Crustaceans

The populations of relatively large pelagic crustaceans, including carnivores, mixotrophes and even herbivores, began to decline; e.g. populations of the neustonic Pontellidae, *Centropages kroyeri,* the zoea and megalopa of crab etc. This effect could be explained by the concentration of toxicants in the surface microlayer. The decrease in crab populations can be assumed to be due to hypoxic conditions on the shelf.

Decreasing Water Transparency and the Reduction in Benthic Macrophyte Communities

A decline in water transparency causes a weakening of the photosynthesis of bottom algae due to low light penetration and a reduction of the shelf macrophytocoenosis, except for those very shallow forms close to the edge of the sea. This change has been typified by the degradation of Zernov's Phyllophora field. The red *Phyllophora* has practically disappeared and the northwestern shelf has, as a result, lost an important habitat for marine invertebrates and fish and a rich source of oxygen.

Hypoxia and Mass Mortalities of Bottom Animals

Sedimentation on the shelf of large amounts of dead phytoplankton is a result of cultural eutrophication. The decomposition of this organic material causes hypoxia and even anoxia in the near-bottom layers of water. The formation of large hypoxic areas is a new phenomenon in the Black Sea ecosystem, first recorded in August - September 1973 on the northwestern shelf. In more recent years, cases of mass mortality of benthic organisms from hypoxia have become commonplace; the scales depending on the meteorological, hydrological, hydrochemical and biological peculiarities of each summer season. The biological losses due to hypoxia on the northwestern shelf are estimated at 100-200 t of organisms per square kilometre of bottom area. The total biological losses over 18 years (1973-1990) are estimated at 60 million t, including 5 million t of fish, both young and adult, comprising both commercial and non-commercial species.

Decreases in the Invertebrate Standing Stock

As a result of hypoxia, silting and other factors, the standing stock of Black Sea organisms has decreased markedly. In the early 1960s, the total mussel biomass on the northwestern shelf was about 10 million t. In the 1980s, the mussel biomass had fallen to a little over 3 million t, with juveniles predominating. The oyster *Ostrea edulis* is very sensitive to silting and has now almost completely disappeared from the northwestern shelf where, in the late 1950s, there were once more than 50 million individuals. The populations of crabs, hermit crabs, ghost shrimps (Callianassa), and bottom fish such as turbot, which were also very common on the northwestern shelf until the 1960s, have also practically disappeared.

Increases in the Populations of Fish Inhabiting the Shallow Sub-littoral Zone

Over the last 5-7 years, there has been a noticeable increase in the population of small shore fish like the silverside, *Altherina mochon pontica,* the sand lance *Gymnammodites cicerellus,* the transparent goby *Aphia minuta,* the blenny *Blennius tentacularis* and other species immune to predation by *Mnemiopsis leidyi.* In the 1980s a new inhabitant of the shallows became acclimatised to the Black Sea, the grey mullet *Mugil so-iuy,* which originates in the Amur river estuary and the brackish water areas of the .

The main direct human impact on the biodiversity of the Black Sea is the accidental introduction of species from elsewhere in the ballast and bilge waters of sea-going ships and the international introduction of exotic commercial invertebrates and fish. The largest changes to the Black Sea biocoenoses took place as a result of the penetration and autoacclimatisation of new species such as the gastropod *Rapana thomasina* (first recorded in 1947), the bivalve molluscs *Mya arenaria* and *Scapharca inaequivalvis* (1966 and 1982 respectively), and the comb jelly *Mnemiopsis leidyi* (1982).

The following commercial marine organisms are common to the Ukrainian Black Sea and marine wetlands: the red algae *Phyllophora* (five species, *Ph. nervosa, Ph. brodiaei, Ph. pseudoceranoides, Ph. membranifolia,* and *Ph. traiii),* the sea grasses *Zostera* (two species, *Z. marina* and *Z nana),* molluscs *(Mytilus galloprovincialis* and *Rapana thomasiana),* crustaceans *(Artemia salina,* the amphipod *Pseudogammarus maeoticus,* the crayfishes, *Astacus astacus, Pontastacus leptodactilis, P. pipachypus, P. cubanicus, P. eichwaldi,* the shrimps *Palaemon adspersus, P. elegans,* and *Crangon crangon),* the insects *(Chironomus plumosus* and *Ch. salinarius)* and fish. In 1960-1970 there were 26 species of commercial fish; in 1980-1995 only six *(Sprattus sprattus phalericus, Alosa kesleri pontica, Engraulis encrasicholus ponticus, Merlangius merlangus euxinus,Trachurus mediterraneusponticus,* and *Mugilso-iuy).*

There are four reserves in the Ukrainian coastal zone: the Dunaiskie Plavni Nature Reserve (14,851 ha, 78 Red Data Book species), the Chernomorsky Natural Biosphere Reserve (87,348 ha, 126 Red Data Book species), the Mys Martyan Reserve (240 ha) and the Karadag Nature Reserve (2,856 ha).

Proposals have been made for activities on the protection of biodiversity on local, national and regional levels.

1

Physical-Geographical and Socio-Economic Profile of the Ukrainian Black Sea

The length of the Ukrainian Black Sea coast is 1,628 km (Shuisky, 1989), which is approximately 37% of sea's entire coastline. Ukraine's territorial waters extend 12 nautical miles off shore and cover a total area of 24,850 km^2. The area of the remainder of the shelf up to the 200 m isobath is equivalent to 55,750 km^2 or 57% of the whole shelf (Zaitsev. 1992). Ukraine also has 1,207 km of coastline on the Azov Sea (Shuisky, 1989). The main geographical features of Ukraine, such as gulfs and bays, rivers, estuaries, islands, reserves, cities and wetlands, are shown on the general map (Fig. 1).

The main rivers entering the northwestern Black Sea are the Danube, Dnestr and Dnepr, which have a total drainage area of 1,400,000 km^2, making up two thirds of the whole catchment basin, and an annual runoff of about 243.8 km^2. The Crimean rivers, such as the Alma, Kacha and Balbek, have a total mean annual river runoff of only 0.88 km2 and do not have a significant influence on the shelf ecosystems.

The population of coastal cities of Ukraine makes up 36% of the total population of the whole Black Sea coast.

The most common types of coasts are shown in Fig. 2. The northwestern Black Sea coast is characterised by a diversity of marine water bodies such as deltas, estuaries, limans, lagoons and wetlands (Fig. 1) and a commensurate variety of marine, brackish and freshwater plant and animal species which are influenced by a wide range of environmental conditions (Table 1, 2).

The Ukrainian northwestern shelf north of Cape Tarkhankut covers an area of 48,600 km^2, with a total water volume of 1,150 km^3 at an depth of 23.7 m. The sediment is made up of clay, sand and shells. The central part of the shelf is occupied by Zernov's Phyllophora field of red algae, primarily *Phyllophora nervosa.* The shallow water is covered by seaweed, such as *Zostera marina.*

Table 1. Some Characteristics of Ukrainian Limans and Estuaries

Water Bodies	Area, km^2	Depth, m		Temperature, C °		Salinity, ‰		Bottom
		Ave.	Max.	Winter	Summer	Min.	Max.	
Sasyk, liman	200	1.5	3.9	0	26	1.2	2.5	muddy
Shagany, liman	74	1.3	2.2	0	27	17	35	muddy
Alibey, liman	72	1.4	2.5	0	27	16	39	muddy
Burnas, liman	23	1.0	2.1	0	27	16	38	muddy
Shabolat, liman	30	1.0	2.2	0	26	8	24	muddy
Dnestrovsky, estuary	360	1.3	2.7	0	25	0.3	16	sandy
Sukhoy, liman	30	5.0	12	0	25	5	17	sandy muddy
Hadjibeysky, liman	70	5.0	13.5	0	26	1.5	4	muddy
Kuyalnik, liman	58	3.0	7.0	-1.0	27	50.0	296	muddy
Dofinovsky, liman	7	0.8	1.8	0	27	5	27	muddy
Adzhalyk, liman	8	1.5	7	0	26	8	13	sandy muddy
Tiligulsky, liman	160	4.5	21	0	25	0.4	14	sandy muddy
Berezansky, liman	60	3.3	15	0	25	3	13	muddy
Dneprovsko-Bugsky, estuary	800	65	12	0	25	1.3	14	muddy sandy

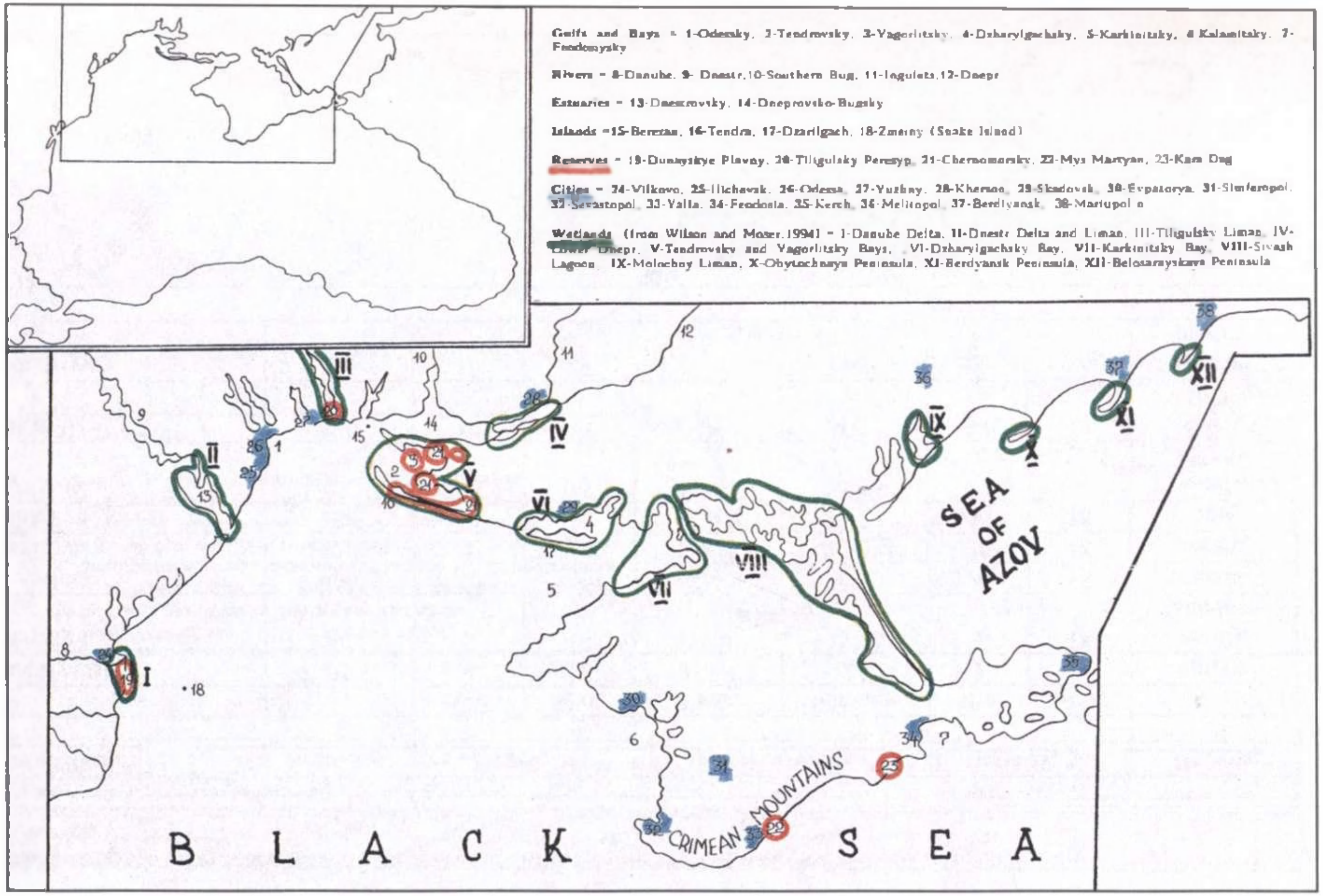


Fig. 1 General map of the Ukrainian sectors of the Black Sea and the Sea of Azov.

Table 2. Some Characteristics of the Largest Gulfs Along the Ukrainian Coast of the Black Sea

Water Bodies	Area, km^2	Depth, m		Temperature, C °		Salinity, ‰		Bottom
		Ave.	Max.	Winter	Summer	Min.	Max.	
Zhebriyansky	95	4	12	0 +4	26	3	14	muddy
Odessky	40	5	14	0 +4	25-26	3	18	sandy muddy
Yagorlitsky	400	2	5	0 +3	26-27	26	18	sandy
Tendrovsky	320	2	10	0 +5	26-27	20	18	sandy
Dzharilgatsky	160	2	10	0 +5	26-27	26	18	sandy
Karkinitsky	15	12	36	1 +4,5	24-26	27	18,5	sandy muddy
Kalamitsky	530	10	30	0,7 +5	24-25	27	18	sandy muddy
Feodosiysky	210	10	29	4 6	24-26	26	18	sandy muddy

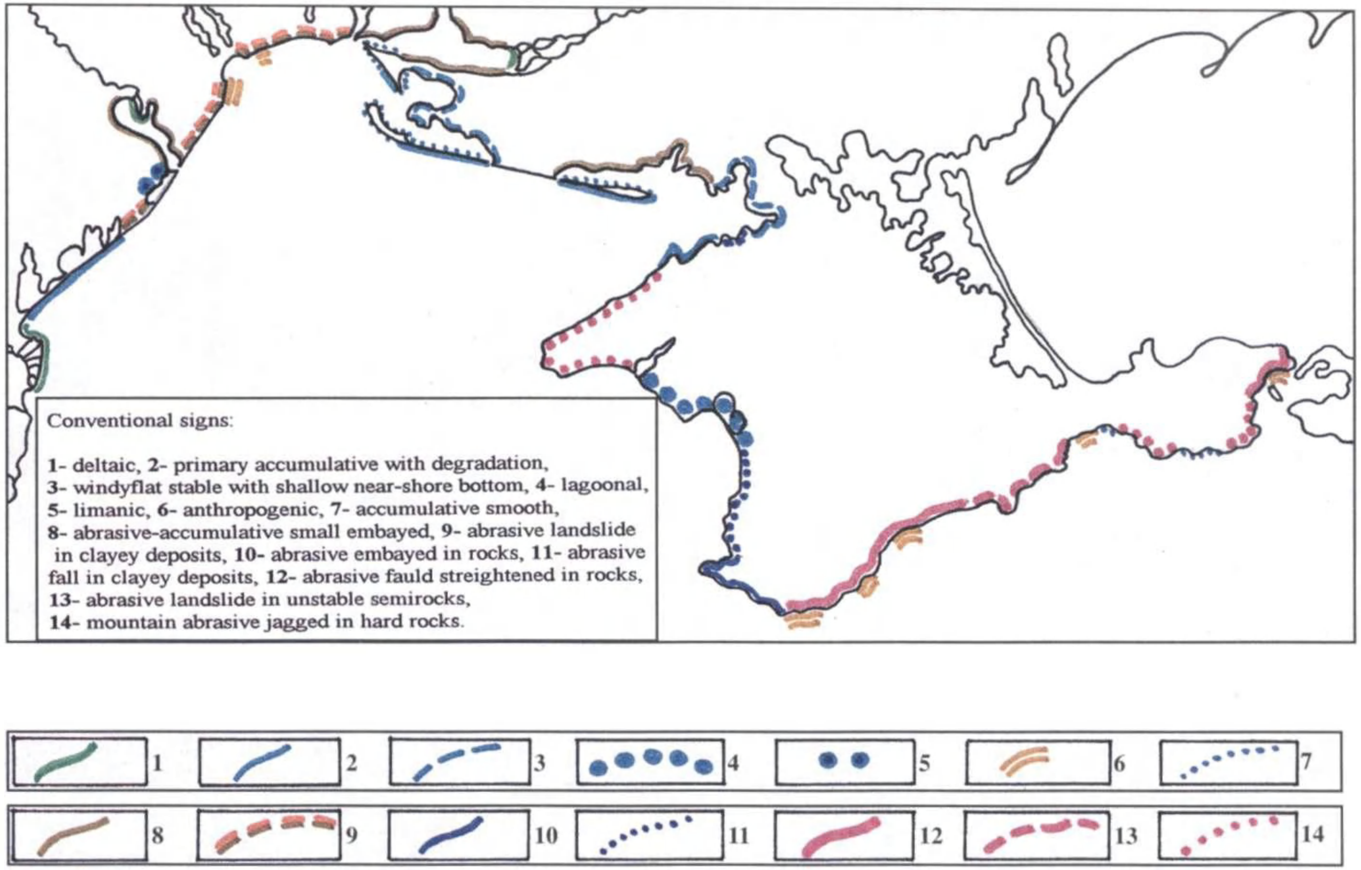


Fig. 2 Sea coast types of the Ukrainian sector of the Black Sea (Yu. D. Shuisky, 1990)

I. Habitats on the Northwestern and Crimean Shelves of the Black Sea

The Ukrainian Black Sea possesses a unique diversity of biotopes and environmental conditions and a particularly rich variety of plants and animals in the pelagic and benthic zones.

In terms of salinity the marine pelagic zone can be divided into three main categories (Table 3). River water proper is observed only in the river mouths of the Dnepr. South Bug. Dnestr and Danube. In the sea it usually reaches a salinity of 6-8 ppt. This water mass is widespread in the northwest of the sea. not only in the Dneprovsko-Bugsk) and Dnestrovsky limans but also several miles out to sea. Л strip of river water borders the Danube delta south of Zhebriansky Bay. During stormy weather, the river water mixes with the underlying marine waters and salinity levels rise. After the storm abates, the continuing river runoff restores the upper water layers to their former state. Freshwater organisms enter the northwestern Black Sea with the river water.

In the northwestern Black Sea the hydrological characteristics of the surface water mass vary considerably, with temperatures ranging from 26 to 10 C°, salinity from 10 to 18.5 ppt. transparency from 3-4 m to 18-20 m. and colour from blue-green to yellow-green. But there is less variety in the waters off the southern Crimean coast, where the salinity is 17-18 ppt. the transparency 14-22 m, and the colour changes from blue-green to ЬILie. In winter the water temperature drops to less than 7-8 C . The surface water is the main biotope for the Mediterranean immigrants which make up most of the Black Sea flora and fauna.

Bottom water tills the lowest pail of the shelf zone from the picnocline to the seabed. The salinity in the centre of this water mass is equal to 19.5 ppt. the temperature ranges from - 0.20 C° in the winter to 13.5 C° in the autumn. The lowest water levels are mainly inhabited by boreal-atlantic (Celtic) relicts which have remained in the Black Sea from the last glacial period, although it is not clear how the) survived the freshened New Euxinian period. Today they are mostly thermophobic, although some are eurythermic. These include invertebrates such as *Calanus helgolandictts, Pseudoculanus elongatus,* fish such as the Black Sea sprat. *Sprattus sprattus phalerictis,* the whiting. *Merlangus mcrlangus euxinus* and the flounder *Platichthys flesus luscus.*

Flic Ukrainian Black Sea coast also has a variety of shore and beach types (Fig. 2) and. as a result, a wide range oF environmental conditions in the supralittoral. pseudolittoral and upper sublittoral zones.

Sand) beaches of different granulometric composition ranging from tine to coarse granules, both together with clay and detritus on delta shores or without clay and detritus along the marine shores of the Tendra or Dzarylgach islands, predominate along the northwestern coast. The beaches along the rocky Crimean coast are composed of pebbles or gravel and. less frequently, of sand deposited by wave action. All of these geological features have an impact on the formation of marginal benthic communities (Fig. 3. 4).

Table 3. Characteristics of water masses of the northwestern Black Sea according to the season of the year (Bolshakov, 1970)

Season	Water mass	Layer, m	Temperature, C°	Salinity, ppt	Transparency, m
Spring	River	0-5	6-10	0-6	0.3-0.5
	Surface	0-10	6-10	12-18	3-17
	Bottom	10-bottom	3-7	17-19.5	-
Summer	River	0-5	22-26	0-6	0.1-0.2
	Surface	0-15	22-26	12-18	3-10
	Bottom	15-bottom	6-12	18-19	-
Autumn	River	0-5	8-10	0-6	0.1-0.3
	Surface	0-bottom	10-16	14-18	3-18
	Bottom	none	none	none	none
Winter	River	0-5	-0.2...2.0	0-6	?
	Surface	none	none	none	none
	Bottom	0-bottom	-1.6...3.0	14-19	?

In parts ot'the upper sublittoral zone there are small areas of sediments with specific properties and inhabitants: for example, the coarse grained "amphioxus" sand, which is inhabited by the famous sand lance and organisms harvested as food, can be found near the shores of Karkinitsky Bay. Cape Foros and in a lew other places in the Black Sea.

At depths of more than 10 m the seabed is composed mainly of silty sands, shells and silt in different proportions. In some places there are banks or elevations on the shelf bottom. The largest are: Odesskaya and Shaganskaya along the northwestern coast and Bakalskaya in the north west of the Crimean peninsula. Biocoenoses of mussels and. less frequently, oysters develop and fish malacophages accumulate on the banks.

Populations of Pontic or Ponto-Caspian relicts are mainly concentrated in shallow water regions where all the water levels, from the surface to the seabed, are dominated by river water. In the previous geological epoch these organisms inhabited the mildly saline New Euxinian basin, which occupied the area now covered by the Black Sea. Today they have found shelter in the Dnestrovsky and Dneprovsko-Bugsky limans. in the freshened estuarine regions and in the Azov and Caspian seas.

Invertebrate brackish-water relicts include polychaetes of the genus *Hypaniu.* molluscs of genera *Monodacna,* and *Adacna* united into one *Hypanis* genus, the amphipod *Pontogammarus maeoticus,* the mysids *Hemimysis scrraia. Paramysis intermedia* and cumaceans of the genera *Pierocuina* and *Pseitdocuma.* Relict fish species include the sturgeons Acipenseridae. the anadromous shad of the genus *Alosci* and the Black Sea kilka *Clupconella caltriventris cultriventris.* Pontic relicts occur in the sea and far from the coast (sturgeons and shad, for example, winter at great depths). However, their main biotopes. especially at the early stages of ontogenesis, are located in areas dominated by river water.

The remaining benthic regions are inhabited by many communities of marine organisms. Some of the biocoenoses of the Ukrainian shelf are the largest of their kind in the Black Sea according to area, biological diversity and abundance of population and biomass. For example, the *Phyllophora* biocoenosis in the centre of the northwestern shelf recently occupied an area exceeding 10,000 km^2. The mussel biocoenosis occupies a similar area. In the 1960s the total biomass of this mollusc accounted for 97.5% of the entire mussel stock from the mouth of the Danube to the Coruch river estuary in Georgia (Ivanov, 1963). At the time almost 56% of the total biomass of the Black Sea forage macrozoobenthos was situated on the northwestern shelf (Zakutsky, Vinogradov, 1967). Most of the Black Sea stock of the eelgrass Zostera was produced at the apex of Karkinitsky Bay and in Dzharylgachsky Bay (Vozhinskaya et al. 1971).

The south Crimean coast has a subtropical climate. Almost 70% of the territorial plants species here have ranges more or less equivalent to the Mediterranean tloristic region (Molchanov, Yuschenko, 1987). In winter the temperature of the sea water is about 7-8 C°, which permits the development of thermophilic species. The macrophytes include the red algae Laurencia papilosa and Gigartina acicularis (Zinova, 1967). Thermophilic fish, which are common in the Mediterranean but rare in the Black Sea, are represented by species as the blue damsel-fish *Chromis chromis {Pomacentridae),* the bogue *Boops boops,* the puntazzo *Puntazzo puntazzo (Sparidae)* and the lettered perch *Serranus scriba (Serranidae).*

In addition to the river deltas and their marshes there are also many coastal water bodies along the Ukrainian Black Sea coast, such as limans, lagoons and lakes, which have a wide range of environmental conditions for aquatic organisms (Fig. 5). They differ in size (from 800 km^2 for the Dneprovsko-Bugsky liman to small lagoons less than one hectare in size), in maximum depth (from 27 m for Donuzlav lake to half a metre in the microlagoons), in salinity (from fresh water to ultrahaline lakes and limans), in degree of isolation from the sea (from the open Dnestrovsky and Dnepro-Bugsky limans to completely closed lagoons and lakes with a water level lower than the sea), in the chemical composition of the water and in types of sediment.

It is very difficult to give a precise figure for the total number of water bodies as many of them are so shallow that they dry up in the summer. Only some of the marine water bodies have names designating them on geographical maps and published data on their morphometric characteristics. Others are only named on detailed maps; while most lack names altogether or are described as "a group" of lakes, such as the Kinbumsky, Tendrovsky and Kerchensky lakes. There are approximately 1,000 small lakes and lagoons along the Ukrainian Black Sea coast, mostly in the northwest. There are at least 400 lakes in the Kinburn peninsula (Andriash, 1990).

Pontic relicts prevail in the fresh and brackish coastal water bodies. Only a few halophilic species survive in the ultrahaline water bodies in large numbers and biomass. They include the diatom alga *Dunaliella salina,* the insect *Chironomus salinarius* and the crustacean *Artemia salina.*

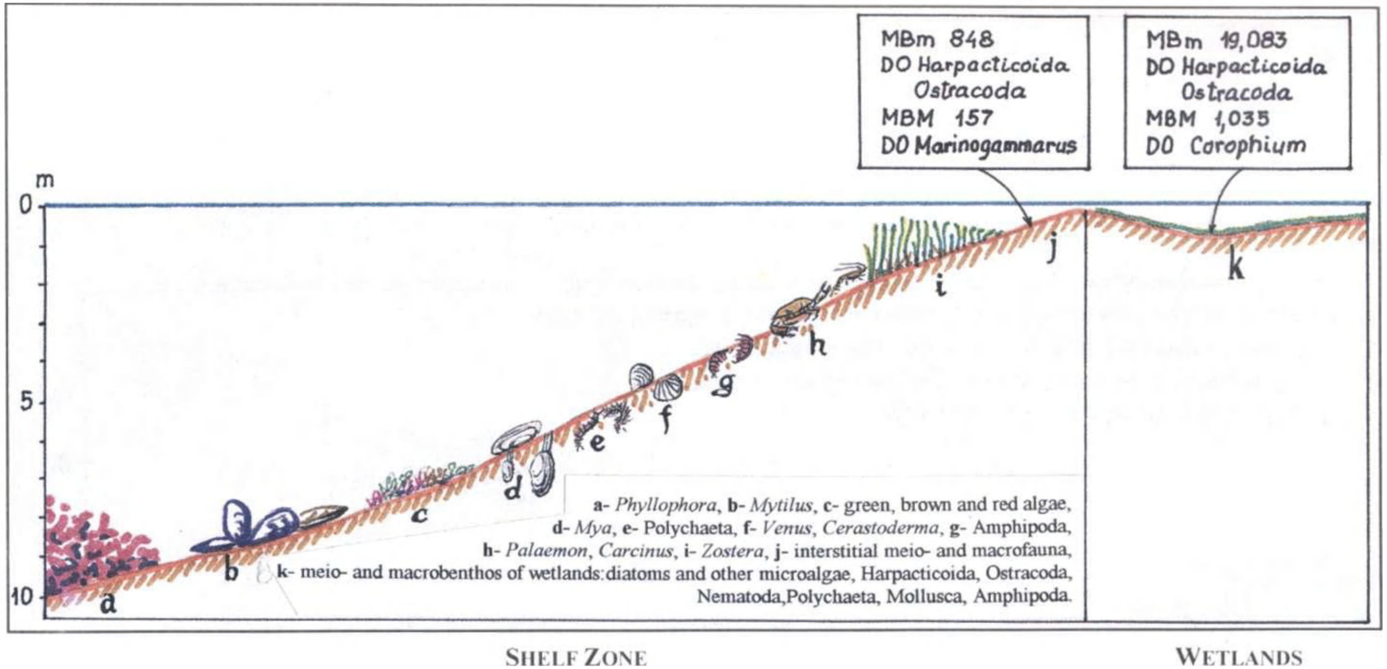


Fig. 3 Transect of a sandy beach in the northwestern Black Sea (Tendra area).

- MBm - mean biomass of meiobenthos (mg.m^{-2})
- MBM – mean biomass of macrobenthos (mg.m^{-2}).
- DO - dominant organisms

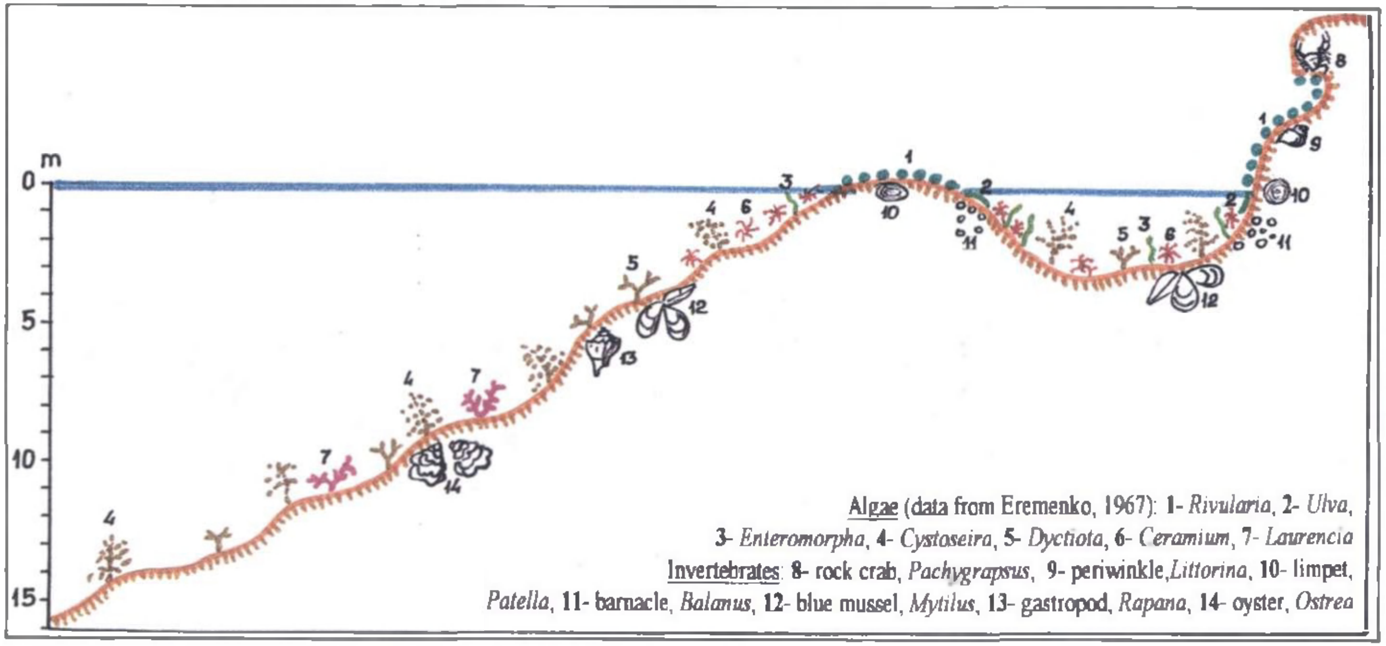


Fig. 4 Transect of a rocky shore in the northwestern Black Sea (Cape Tarkhancut area).

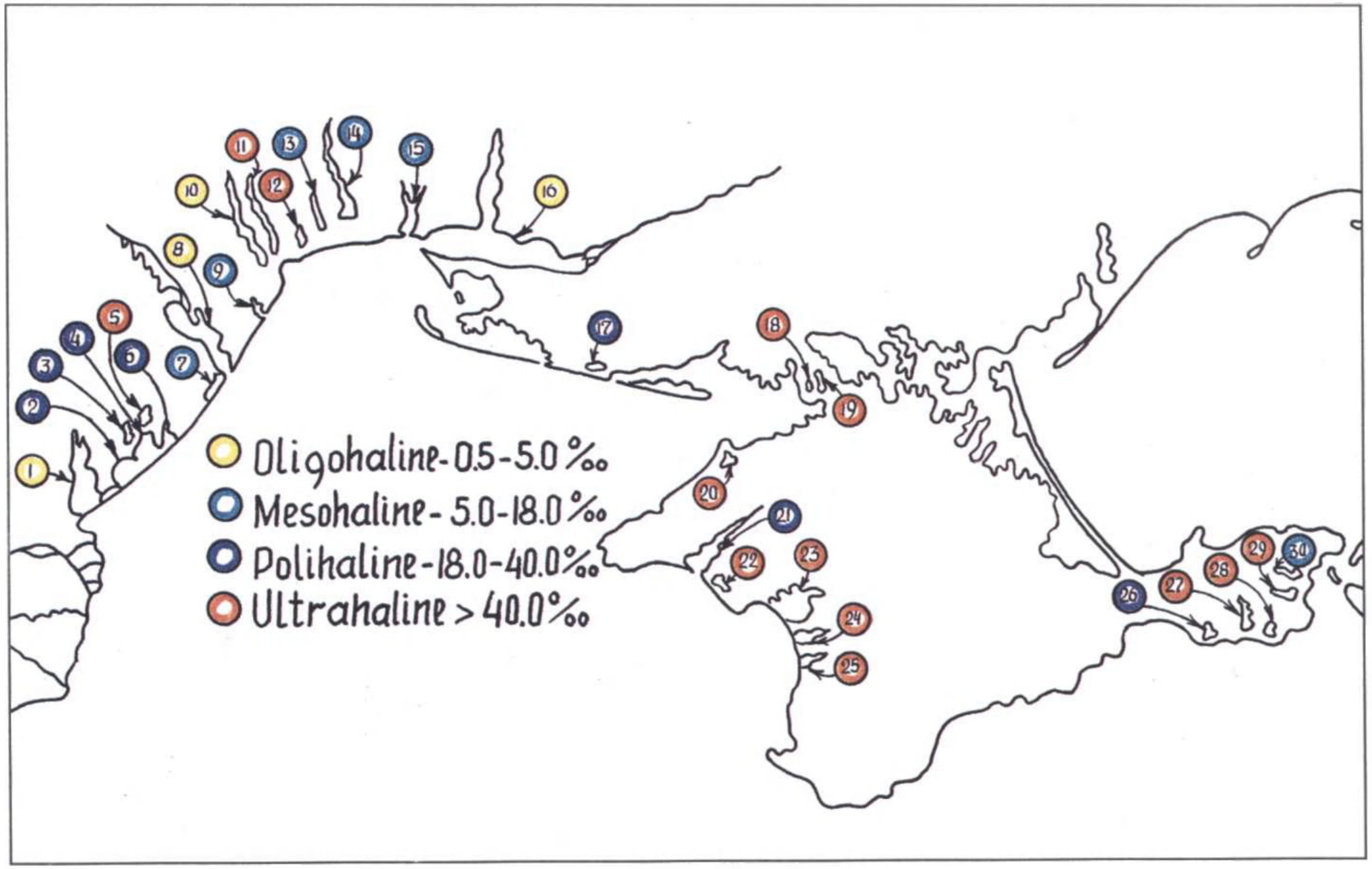


Fig. 5. The salinity of main water bodies of the Ukrainian Black Sea coast. (Names and characteristics are given in Table 3).

Water bodies with an intermediate salinity of up to 40-50 ppt often have a high biological diversity, with large numbers and biomass. For example, the microlagoons of the Tendra lakes (Tendrovsky Bar) exceed adjacent areas of the upper sublittoral of Tendrovsky Bay in biomass and abundance (Fig. 3).

This is the main reason that the fry of so many fish species, including mullet, gobies and turbot, are attracted to shallow water lagoons to feed. The same water bodies in marine wetlands serve as the primary food resource for a large number of waterfowl and aquatic birds.

Table 4. Coastal water bodies of the Ukrainian Black Sea coast

Name	Liman, lake (I, o)	Area km^2	Maximum depth, m	Salinity Ppt
Sasyk (Kunduk)	1	205	3.9	2-3
Shaganyl	1	74	2.0	14-35
Karachaus	1	15	2.0	20-40
Alibey	1	72	2.5	15-36
Khadzhider	1	9.8	1.2	20-140
Burn as	1	23	1.6	10-30
Budaksky (Shabolat)	1	30	2.2	12-15
Dnestrovsky	1	360	2.7	1-14
Sukhoi	1	10	15.0	14-17
Khadzhibeisky	1	70	14.0	1-3
Kuyalnitsky	1	60	3.0	120-250
Dophinovsky (B.Adzhalyksky)	1	7	2.5	10-40
Grigorievsky(M.Adzhalyksky)	1	8	15.0	10-15
Tiligulsky	1	160	21.0	2-12
Berezansky	1	60	14.0	0.3-15
Dneprovsko-Bugsky	1	800	12.0	1-14
Ustrichnoie	0	3.5	3.0	16-25
Staroie (Tusly)	0	12.5	0.8	250-350
Krasnoie	0	24.5	1.0	120-300
Bakalskoie	0	7.1	0.9	40-110
Donuzlav	0	48	27.0	10-40
Oiburskoie	0	5	1.3	50-170
Sasyk	0	71	1.2	90-160
Sakskoie)	0	9.7	1.5	40-150
Kizyl Yar	0	6.9	0.5	40-250
Kachik	0	4.5	0.8	20-40

Uzunlarskoie	0	21.2	0.3	150-260
Opukskoie (Koyaskoie	0	18.7	0.5	40-180
Tobechikskoie	0	18.7	0.5	40-180
Kamish Burunskoie	0	3.6	1.0	8-1 1

The northwestern and Crimean shelves of the Black Sea, together with their numerous coastal water bodies, contain a very high biodiversity of marine, brackish, freshwater and coastal territorial plant and animal species. However, in the last 20-30 years, conditions on both the northwestern and Crimean shelves and in the Black Sea region as a whole, have changed significantly as a result of anthropogenic factors. The change has been most marked in the shallow waters of the northwestern Black Sea.

II. Marine Islands

Among the many islands of the Black Sea only three are of any size. These are the islands of Berezan (Schmidt), Zmeiny and Kefken.

Zmeiny island is the only one to be located far off shore at a distance of 35 km from the mainland. It has an area of almost 18 hectares and a coastline of 1,970m. The island is quadrangular in shape with a peninsula in the northeast corner (Fig. 6). It is 440 m in length from north to south and 414 m in breadth and from west to east. At its longest, along a north-eastern-west axis running through the peninsula, the island is 662 m (Kohler, 1827). Its shores vary in height from 10 m to 22 m. The highest elevation is in the centre of the island at about 40 m.

The island is surrounded by a fringe of underwater rocks and has a lighthouse. The first scientific data on Zmeiny island has been found in the proceedings of the St. Petersburg Academy of Sciences, provided by N. Kohler (1827) and A. Nordmann (1844), a well-known naturalist and professor at Richilieu Lycee in Odessa.

During the 20th century there were some publications by Romanian scientists about the island (Borza, 1927; Calinescu, 1931; Bacesascu, 1961). In 1959 G. A. Solyanik (1959) a former researcher at the Odessa Biological Station (now Odessa Branch of IBSS) published the results of research carried out in August-November 1956.

The following marine organisms have been recorded near to the shore of the island: brown algae *Cystoseria barbata* (Calinescu, 1931; Solyanik, 1959), *Phyllophora brodiaei* (Solyanik, 1959) and other microphytes.

The fauna included the rock crab *Eriphia verrucosa* and the marble crab *Pachygrapsus marmoratus* (Calinescu, 1931; Solyanik, 1959), which are both in the Red Data Book of Ukraine.

Today these species are completely absent from the northwestern coast of the Black Sea. There are also references to mussels, actineans and fish of the Serranus genus. Biologists in the area have also reported finding the oyster *Ostrea edulis*. According to A.

Nordmann (1844) the monk seal was observed close to the island in 1841. An article by N. E. Solyanik (1959) also noted that fishermen from Vilkovo reported seeing the monk seal.

Today *Monachus monachus* is one of the species registered in the International Red Data Book. Since the 1950s there have been no hydrological surveys on or around the island.

Scientific expeditions organised by the Odessa Branch of the IBSS (1970-1991) and samples from stations located 400-500 m from the island recorded a great diversity of benthos, plankton and fish species characteristic of the northwestern Black Sea.

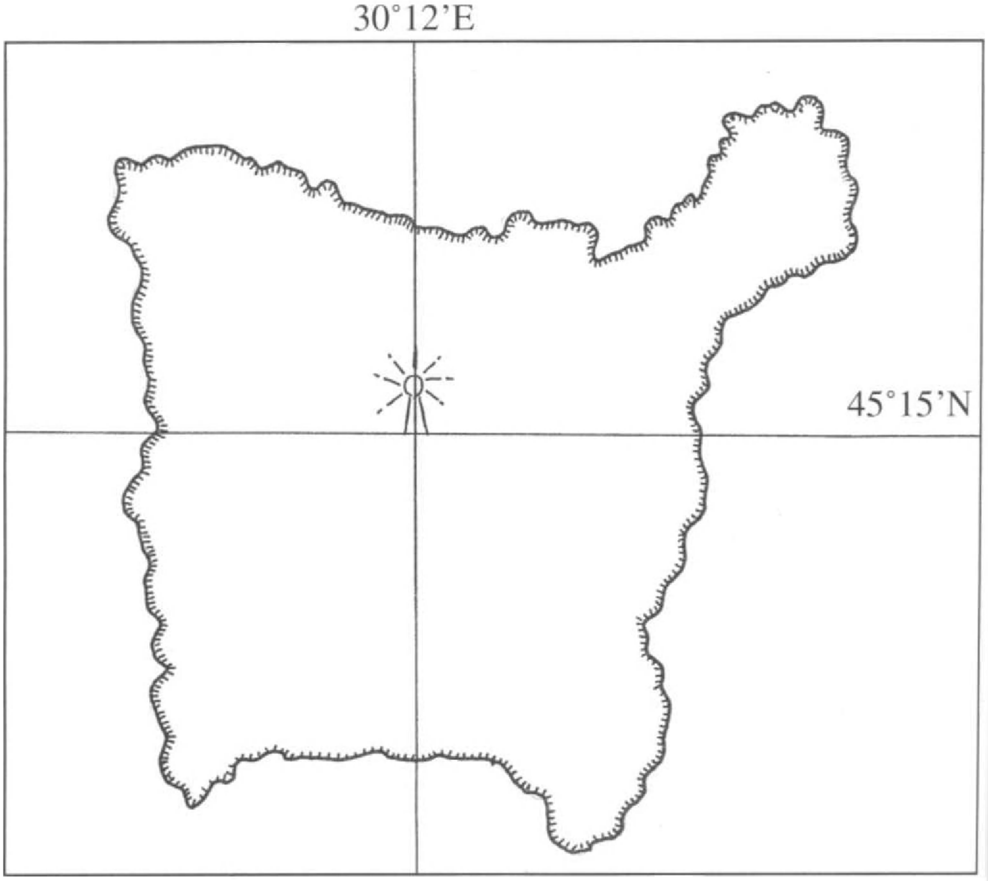


Fig. 6 Zmeiny Island with lighthouse.

2

Bacteria

I. Northwestern Black Sea

Saprophyte bacteria are the most numerous microorganisms in the water column and bottom sediments of marine water bodies. They are responsible for the primary breakdown of organic matter. In recent years increasing eutrophication of the sea water has resulted in a decrease both in the ratio of the total amount of microorganisms and the volume of saprophyte. In the 1960s the ratio was 100,000 for the bacterioplankton of the northwestern Black Sea. Today the figure is approximately 100 for both the bacterioplankton and the bacteriobenthos.

Studies of the composition of saprophyte bacteria in the Black Sea have shown that the greatest biodiversity is in deep water areas and the least in northwestern Black Sea (Lebedeva, 1979). In the 1960s, 560 strains of bacteria were registered in the northwestern Black Sea, of which non spore bearing rods made up 43%, cocci 39% and spore bearing 18% (Tsyban, 1970). A list of the genera identified is given in Annex I, Table 6. According to A. Tsyban (1970) only 60% of the cultures collected were of true marine bacteria. The rest, such as cocci and spore bearing rods, entered the sea in runoff from the mainland.

In the 1970s significant changes were recorded in the qualitative composition of the saprophyte bacterioplankton (Nizhegorodova, Teplinskaya, 1984; Teplinskaya et al., 1984) which became even more pronounced in the 1990s (Teplinskaya, 1994). It was observed that the eutrophication of the sea had led to an increase in the number and frequency of cocci and spore bearing rods which were resistant to unfavourable environmental conditions (Table 7).

Towards the end of the 1970s the qualitative diversity of saprophyte bacterioplankton in northwestern Black Sea was four times higher than in the 1960s (Table 6). This was probably related to the increasing eutrophication of the entire northwestern Black Sea after 1973 when the rise in the volume of organic runoff from the mainland, as well as river runoff, created favourable conditions for the development of bacteria, creating a polyfermentative system transforming different organic compounds of allochtonic origin.

Bacteria of the genus *Bacillus* were constantly present in the near surface layers of the northwestern Black Sea. This is a result of the high resistance of spore bearing forms to significant changes in environmental conditions in the interface of water and atmosphere. If the spore forms are not truly marine, then it is possible to measure the scale of the microbial runoff from the mainland which concentrates in the near surface layer. Natural bacterial communities develop in the near bottom layers where the volume of contaminants is insignificant.

In the 1970s the saprophyte bacterioplankton of the northwestern Black Sea had a high level of biochemical activity. About 21.4% of the isolated cultures were antagonistic to *Escherichia coli* isolated from water in this area (Nizhegorodova & Teplinskaya, 1984). This is a very important factor in the self purification of the marine environment. Bacterial antagonists were represented by spore bearing (31.7%), non spore bearing rods (45%) and cocci (23.3%). The greatest number of antagonistic cultures were those of the *Bacillus* genus, followed by *Micrococcus, Photobacterium* and *Pseudomonas.* The degree both of antagonistic activity and the range of action was higher in cultures isolated from near estuarine and coastal areas where there are conditions suppressing or, in some cases inhibiting, the growth of bacterioplankton entering the sea with the runoff of bacterial coli groups.

Table 5. Long term changes in bacterial community quantities (order of magnitude) of the northwestern Black Sea in the water body (WB) and in bottom sediments (BS) during the summer period

Time period	WB, cells.mg-'		BS, cells.ml'	
	General Quantity	Quantity of Saprophytes	General Quantity	Quantity of Saprophytes
Early 1960s	10^4	10	[illegible]	9
Late 1970s	10^4	10'-10	10'	НГ
Late 1980s	10^s	10'	10^s-10"	10'
Early 1990s	10'	10'	10"-10"	10'

Table 6. Qualitative Diversity of Bacterioneuston (I) and Bacterioplankton (II) in Off-shore (S) and Coastal (C) Areas in the North-western Black Sea

Genera	Till 1975		1977-1975		Contemporary Period	
Micrococcus Cohn,1872	S C	S C	S	S	S C	S C
Bacillus Cohn,1872	S	S	S	S	S C	S C
Sporolactobacillus Kitahoga,1969	C	C	M	M	S C	S C
Lactobacillus Beljerink,1901			S	S	S C	
Pseudomonas Migula,1894	S C	S C	S C	S	S	
Xantomonas Doerson,1939	C	C	S	S		
Chromobacterium Bergonzini,1881	S	S	S	S		
Flavobacterium Bergey,1923			S	S	S C	
Acetobacter Beijerink,1898			S	S	S C	S C
Alcaligenes Castellani et Chalmas,1919			S	S		
Sarcina Goodsir,1842	S	S	S	S		
Bacterium Elhenbery,1957	S	S				
Listeria Pizic,1940	C	C	S	S	S C	
Planococcus Migula,1894	C	C	S	S	S C	S C
Corynebacterium Lehmunn et Neumann,1896	C	C	S	S		
Arthrobacter Conn et Dimmick,1947	C	C	S	S		
Neisseria Trevisan 1885			S	S	S C	S C
Streptococcus Rosenbach,1884			S	S		
Cellulomonas Bergey et all 1973			S	S		
Kurthia Trevisan 1885			S	S	S C	S C
Microbacterium Oria-Jensen 1919			S	S		
Vibrio Pacini,1854			S	S		
Aeromonas Kluyver et van Niel,1936			S	S	S C	
Photobacterium Beiyerinck,1889			S	S		
Lucibacterium Hendrie,1970			S	S		

Note: To 1975 S - 1963-1964 Tsyban, 1970 C - 1973-1975 Teplinskaya et al. 1984

During studies conducted in 1980 to 1986 N. Kovaleva (1988) established that *Micrococcus* and *Bacillus* genera dominated throughout the year in the coastal waters of Odessa Bay, while *Flavobacterium* and *Pseudomonas* were frequent.

During the early 1990s, after a long period of continuous anthropogenic loads on the ecosystem, more profound irreversible changes began to take place in the bacterial community (Teplinskaya, 1994).

The number of genera decreased (Table 6). Differences in the structure of bacterioplankton in the coastal, estuarine and open waters of the northwestern Black Sea disappeared and genera uniting spore bearing rods became predominant (Table 7).

Table 7. Long term dynamics of the morphological composition of saprophyte bacterioplankton of the northwestern Black Sea

Period of observation	**References**	**Morphological groups, %**		
		Cocci	non spore bearing rods	Spore bearing rods
1963 -1964	Tsyban, 1970	39	43	18
1973 - 1980	Teplinskaya, et al, 1984	13	59	28
1990 -1994	Teplinskaya, 1994	17	42	41

An analysis of saprophyte bacterioplankton identified 254 stations of spore bearing and non spore bearing rods and cocci (Nizhegorodova, Teplinskaya, 1984). The morphological composition of the bacteria was determined by close proximity to the river runoff and the granulometric composition of sediments.

At' a distance from the mouth, the proportion of spore bearing rods and cocci diminished and the amount of non spore bearing rods increased.

Spore bearing rods predominated in grey silt. In silty fine grained sand the ratio of spore bearing and non spore bearing rods was the same; while the morphological composition of saprophyte bacteria in the upper layer of the sediment was closely linked with surface runoff.

The most common mass saprophyte bacteria were representatives of the *Bacillus, Micrococcus* and *Pseudomonas* genera, with a frequency varying between 12% and 19%. In the near estuarine areas *Bacillus* and *Micrococcus* were most common.

During the 1970s *Pseudomonas* was present in 30-40% of relatively clean areas such Tendra Island and Cape Tarkhankut.

II. The Ukrainian Sector of the Azov Sea

Variations in the total number of bacterioplankton in the Azov Sea is closely tied to changes in the hydrological regime (Tolokonnikova, 1991). Before 1983 the index was tens of millions of cells per 1 ml of water, although it subsequently fell to 1,100,000 cells.ml-1. The amount of saprophyte bacteria decreased to one third of its previous level. After 1983 it averaged 2,000 cells.ml"¹.

There were also qualitative changes. In the last decade rod shaped forms (55%) have become dominant. In 1963-1968 they made up only 31%> of the total.

The amount of bacteria in bottom sediments changes according to salinity and in an inverse relationship to the volume of bacterioplankton. In 1983-1086 the total volume of the bacteriobenthos was 1.2-2.3.109.cells.g"'. Levels of saprophyte bacteria peaked during high salinization (2.109.cells.g"¹ in the Azov Sea).

III. Areas Influenced by River Runoff

Changes in the structure of bacterial communities in areas influenced by river runoff can be analysed using the bacterioplankton of the Danube delta as an example. An analysis of multiyear data has produced the following conclusions:The total volume of bacterioplankton in the estuarine part of the Danube and Kiliya delta is influenced by the runoff from tributaries and winter-spring floods. Multiyear investigations have shown that the amount of bacteria in the waters of the Danube waters varied from 2 to 63,000,000 cells.ml"¹.Biomass indices change according to the season (2 - 8 mg.1"¹ in plankton, 0.1 - 16 mg.g"¹ in benthos. The calculated bacterial expenditures were 6 - 38 kg.s"'.The monthly bacterial runoff was 14 - 103,000 and reached a maximum during floods.

Heterotrophic bacteria account for a significant proportion of the bacterial communities in the Danube (tens of thousands cells.ml"¹). About 980 cultures of heterotrophic forms were isolated from the water and 460 from the sediments. The highest species diversity was observed near the towns of Izmail and Vilkovo and where the Danube enters the sea, including: *Bacterium, Chromobacterium, Micrococcus, Bacillus, Pseudomonas, Mycobacterium, Sarcina* and *Neisseira.*

Microflora oxidizing oil products were represented by two classes, three orders, six genera and 26 species. Forty two per cent of them belonged to the *Pseudomonas* genus, followed by *Bacterium,* and *Micrococcus.* Fifty five strains were isolated.

The following bacterial antagonists producing antibiotic substances were isolated in the waters of the Danube: *Saccharomyces cerevisiae* and *Candida albicans,* together with marine species such as *Pseudomonas turcosa* and *Bacterium salivarius.* Some species of bacteria were widespread (e.g. *B. agile, B. nitrijicans, Sarcina flava* and *Micrococcus albus);* others were rare (e.g. *Planococcus casei* et al.).

Isolated cultures of heterotrophic bacteria demonstrated antogonistic properties to 33 test microbes. In the sediments of the river bed there were more bacterial antagonists to *Staph, aureus,* less to *B. mycoides* and *C. albiceus* and least of all to *Escherichia coli.*

Eighty six per cent of the plankton bacteria in the Danube produced biologically active substances and vitamins (80% in the marine part, 70% in the sea water). On average there were 65% heterotrophs.

Actinomycetes were present in large quantities. They are typical soil microorganisms and probably entered the Danube through terrigenic runoff. Their numbers varied from 72,000 cells.m"¹ in the high-water period to 50,000 cells.m"¹ during floods. During the 1950s there were virtually no actinomycetes or proactinomycetes. However, within a decade 27 were recorded in the plankton.

The bacterioplankton of the Dnestr and Dnestrovsky limans is quantitatively similar to bacterioplankton the Danube; although the numbers of saprophyte bacteria are even higher. During January-March 1994 there were (0.45-10.0). 103 cells.ml"¹, which corresponds with the data of N. Potapova (1992) for the same period in 1970-1987. Levels peaked during the summer at (18-24).106 cells.ml"¹.

An analysis of the recent changes in the bacterioplankton of the Dneprovsko-Bugsky liman has shown 3-5 fold increase in numbers compared the early 1980s, from (1-11).]06 cells.ml"¹ (Rossova, 1989) to (31-37). 106 cells.ml"¹ in 1992. The volume of saprophyte bacteria in the bottom sediments varies at (86.5-110.0).103 cells.g"'. Levels peak in the summer (Fig. 7).

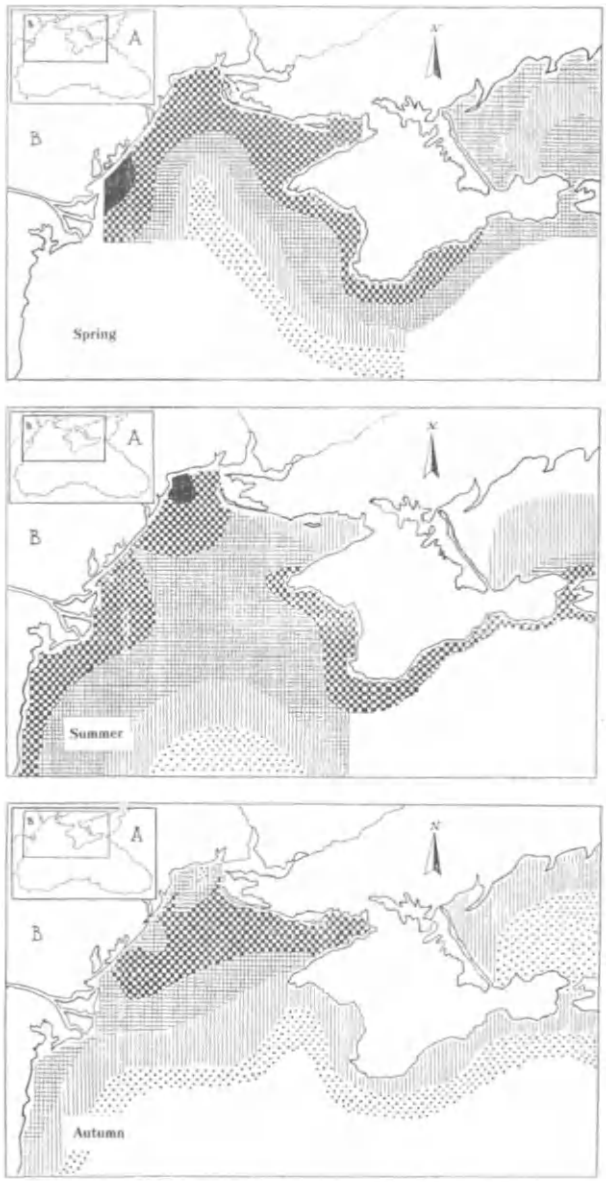


Fig. 7 Average statistical distribution of bacterioplankton biomass (B, $mg.m^{-3}$) during the period 1973-1993.

Conventional signs:

2,0-2,2 2,3-2,5 2,6-2,8 2,9-3,1 3,2-3,4 lg B

3

Phytoplankton and Fungi

The large rivers, such as the Dnestr, Dnepr and Danube, which enter the northwestern Black Sea provide it with a constant supply of freshwater species of phytoplankton. A total of 501 taxa of algae have been recorded in the Ukrainian part of the Danube, comprising: blue-green (Cyanobacteria), Euglenoidea, Dinophyta, Chrysophyta, Diatoms, and green algae. Green algae predominate (up to 35%), followed by diatom algae (up to 30%), blue-green algae (15%) and, in some areas, euglenae (13%). The other algae play an insignificant role.

The leading complex of phytoplankton is comprised of typical plankton algae from the Centrophicae class, Volvococcophiceae and, especially, Chlorococcophiceae such as *Dictyosphaerium pulhellum, Hyaloraphidium contortum, Ankistrodesmus acticularis, Coelastrum microporum, Crucigenia irregularis, Lagerheimia genevensis, Micractinium pusillum* and *Oocytstis borgei.*

The most widespread of the other green algae are the Volvococcophiceae, including the numerous *Chlamydomonos globosa* and *C. reinchardii.* Other species from this class include *Eudorina elegans, Pandorina morum* and *Phacus lenticarus.* Blue-green algae are widely represented by species of the genus *Oscillatoria (O. geminata, O. limosa, O. planctonica, O. tenuis* and *O. ucrainica),* the genus Anabaena together with Aphanizomenon and Microcystis. Rare phytoplankton species in the Danube include *Mallamonas allorgei, M. elliptica, M. longiseta, Dactylococcpsis raphidioides* and / *pannonica* from the chrysophyta and the diatoms *Stephanodiscus subsalsus* and *S. subtilis.*

Many brackish water and marine species of algae can be found in the arms of the Danube Kiliya delta, including diatoms as *Chaetoceros, Coscinodiscus, Nitzschia* and *Cyclotella caspia.* The presence of sea water influences the phytoplankton composition not only in the Kiliya delta but also in the river bed where freshwater species account for 87% of the total compared with 60% in the estuary. Phytoplankton numbers in the Danube vary from 250 to 12,700 cells.Γ', while the biomass ranges from 0.2 to 9.2 g.m"' (data for the 1970s).

Near Danube Limans

The number of species of algae in the phytoplankton of the near Danube limans was limited at approximately 100 species, mostly blue-green, diatoms and green algae. More rare were the chlorophyta, euglena and dinophyta. The dominant species included: *Anabaena flos-aquae, Aphanizomenon flos-aquae, Anabaena scheremetievi, Nitzschia acicularis, Melosira italica, Gyrosigma acuminatum, Melosira granulata* and *Nitzschia sigmoidea.* Their numbers ranged from 5 to 438,000 cells.l^{-1} and their biomass varied from 0.012 to 0.377 g.m^{-3}.

The lower Dnestr and Dnestrovsky Limans

A total of 265 species and 3,335 taxa have been recorded in the lower Dnestr and Dnestrovsky limans. Diatoms accounted for the largest number of species at 95. followed by green algae (83), blue-green algae (33), dinophyta (29), euglenophyta (19). chrysophyta (4) and xanthophyta (2). The leading species were: *Cyclotella meneghiniana, Melosira granulata, M. italica, Stephanodiscus hantzschii, S. subtilis, Surirella globosa, Actinastrum hantzschii, Dictiosphaerium pulchellum* and *Scenedesmus quadricauda.* Large numbers of marine dinophytes species were recorded in the liman, while euglena predominated in the lower Dnestr near the village of Mayaki. In winter *Synura uvella* was the most widespread of the Chrysophyta with numbers ranging from 64 to 8,250,000 cells.l^{-1} and its biomass from 70.8 to 4,350 mg.m^{-3}.

Phytoplankton Species Diversity in the Northwestern Black Sea

Detailed studies of the species diversity of phytoplankton in the northwestern Black Sea goes back over one hundred years (Sredinsky, 1873; Merezhkovsky, 1902-1903; Lebedev. 1916: Aksentyev, 1926; Konoplev, 1938; Proshkina-Lavrenko, 1955, 1963; Ivanov, 1962, 1963, 1965, 1967, 1982). The characteristic feature of phytoplankton in this area of the Black Sea is that it includes both marine and freshwater species. The latter enter the sea in the river runoff from the Danube, Dnepr and Dnestr. Of the 372 species of algae recorded in the area in 1954-1960 almost 52% were freshwater and freshwater brackish species (lvanov, 1967). The largest number of freshwater species (46) were recorded in the estuarine areas. In shallow water areas 31% of the plankton was composed of benthos and overgrowths resulting from vertical mixing of water masses. The composition of open sea plankton was similar to that of the sea as a whole, albeit poorer in terms of the number of marine species.

There was a difference between the composition of the phytoplankton in the near Danube and near Dnestrovsko-Bugsky areas. In the latter there was a large number of blue-green and other freshwater systematic groups introduced into the sea with the river runoff. In areas influenced by Danube water the composition of freshwater species was more limited because the high turbidity of Danube waters hinders the development of phytoplankton. The species diversity ofthe Dnestr area is similar, but poorer.

Diatoms account for the largest greatest number of species of phytoplankton in the northwestern Black Sea (Table 8), particularly *Chaetoceros* (33 species). Mass species include *Ch. socialis, Ch. curvisetus* and *Ch. affinis.* There was only a small number of Nitzschia (17). although there were significant quantities of *N. seriata.* There were also some *Synedra* species (15).

Table 8. Species diversity of phytoplankton (number of species) of the northwestern Black Sea in 1954-1960* and 1973-1994

Systematic groups	**1954-1960**	**1973-1994**
Bacillariophyta	180	1 16
Pyrrophyta	76	104
Chlorophyta	62	52
Cyanophyta	24	30
Chrysophyta	17	20
Euglenophyta	12	2
Xanthophyta	1	2
Total	**372**	**326**

**According to A.Ivanov (1967)*

The genera *Coscinodiscus* and *Melosira* accounted for the same number of species and subspecies (13) although they differed in composition. In the spring there were mass developments of Melosira granulata and *M. italica* in the freshwater areas of the sea.

Other genera were represented by only 1-4 species although they nevertheless accounted for a significant proportion of the total phytoplankton. Spring phytoplankton mass species included *Sceletonema costatum, Thalassiosira parva* + *Th. subsalina* and *Detonula confervaceae.* Summer phytoplankton included Rhizosolenia calcar - avis and *Cyclotella caspia;* while species such as *Thalassionema nitzschioides* maintained almost constant populations throughout all the seasons.

In 1954-1960 the pyrrophyta ranked second after the diatoms in terms of the number of species. The genera *Peridinium* (29) accounted for the largest number of species, including *P. knipowitschii, P. steini* and *P. mimtsculum.* The most widespread were *Prorocentrum cordata (Exuviaella cordata), Pr. micans, Pr. compressa, Ceratium Jurat. C.ftisus* and.C *tripos.*

Freshwater blue-green and green algae developed in large quantities in near estuarine areas, mostly in the near Dneprovsko-Bugsky region. They included *Ankistrodesmus acicularis* var. *mirubilis Dictiosphaerium pulchaellum* and *Scenedesmus quadricauda.* The freshwater *Microcytis aeruginosa* and *Aphanizomenon flos-aquae* bloomed almost annually in the summer and autumn. Coccolithophorida and silicoflagellata are present in large numbers in the Black Sea but are rarely encountered in the northwest of the sea. During studies covering 21 years (1973-1994) up to 326 species of phytoplankton algae belonging to seven orders were recorded in the northwestern Black Sea and in the shallow waters of the Sukhoi and Grigorievsky limans, which had been converted into ports.

In recent years there has been a decrease in the species composition of the diatoms, which currently account for 36% of the total phytoplankton; in 1954-1960 they accounted for 48%. But the appearance of new species of *Chaetoceros (Ch. coronatus* and *Ch. karianus)* has meant that there has been no reduction in the number of species. Mass species include: *Ch. socialis, Ch. compressus* and *Ch. insignis.* However, the number and frequency of the former mass species of *Ch. curvisetus* have declined.

The species composition of the genera following *Chaetoceros,* such as *Nitzschia, Synedra* and *Coscinodiscus,* has also decreased. These include species such as *Nitzschia seriata* and *Cylindrotheca closterium (Nitzschia closterium)* and the freshwater *Melosira granulata,* which appear in large numbers in the spring near the Danube's zone of influence. There has recently been a decline in the numbers and frequency of the mass species *Thalassionema nitzschioides* and *Rhizosolenia calcar - avis,* which can be ascribed to benthos and fouling. Nevertheless, new species have occurred. For example. *Sceletonema subsaltum* has developed in large numbers in the zone of influence of the river runoff. It should be noted that there are transition forms from *Sc. subsalsum* to *Sc. costatum,* which often causes difficulties in identification.

Species of *Sceletonema costatum, Nitzschia seriata, Cylindrotheca closterium, Cerataulina pelagica* and *C bergonii* have been recorded. The development of other diatoms is seasonal. Freshwater species of *Stephanodiscus hantzschii* and *Melosira granulata* were encountered in spring and early summer, while marine *Leptocylindrus danicus, Rhizosolenia calcar - avis,* and *Ditylum brightwellii* were observed in the autumn. In the last 40 years the species diversity of *Pyrrophyta* algae has increased from 20.4% to 34% (1954-1969). New representatives of *Cryptophyta,* the heterotroph *Hillea 'fusiformis* and *Cryptomonas acuta,* were encountered in the area in large numbers, although, as this group is difficult to identify, it is possible that there may be more species.

The genus *Peridinium* accounts for the largest number of peridinian species for (27 species, including the new species *P. breve* and *P. brevipes).* Others which were previously limited in numbers have become mass species, such as *Heterocapsa triquetra {Peridinium triquetrum)* and *Scripsie/la trochoidea (Peridinium trochoideum).*

There has been an increase in the species diversity of genera of *Gymnodinium (*15 compared with 5 in 1954-1960), *Gyrodinium* (6 compared with 3) and *Glenodinium* (10 compared with 6). Species such a *Glenodinium najadeum, Gl. lenticula, Gyrodinium adriaticum* and *G. cornutum* were often encountered en masse. The species diversity of the Goniaulax genus has increased and *G. polyedra* has recently become a mass species. However, peridinian species new to the northwestern Black Sea, such as *Protoceratium reticulatum* and *Cladopyxix setigera,* were encountered only rarely.

Pyrrophyta algae, whose diversity increases during the warmer months, are represented by *Prorocentum cordata, Scripsiella trochoidea,* and recently by *Heterocapsa triquetra.* But there has been a decline in the species diversity of green algae entering the sea with river runoff. Many species of the genera *Peridiastrum* and *Oocystis* have not been recorded in the sea. New marine species include *Poropila dubia.* Green algae of the genera *Ankistrodesmus* and *Scenedesmus* were able to spread in large numbers over most of the northwestern shelf. There has been an increase in the species diversity of freshwater blue-green algae, including new small cellular species of the genera *Gleocapsa* and *Merismopedia.* Unlike green algae, the distribution of blue-green algae has been limited to estuarine areas. No significant changes in *Chlorophyta* have been recorded. However, recently the presence of *Coccolithus huxleyi* has resulted in water blooming; while in April 1993 blooming was caused by *Dinobryon sp. Euglena* algae were represented by two species, *Eutreptia viridis* and *E. lancvii,* whose presence is an indication of the water quality as they flourish in water with high levels of decaying organic matter.

There was a change in the ecological structure of phytoplankton, with an increase in marine, brackish-marine and brackish water species to constitute 65% of all species. Changes in species diversity were noted in the phytoplankton near the Crimean peninsula (Georgieva, Senichkina, personal communication). In the 1970s mass species such as *Cyclotella caspia, Thalassionema nitzschioides* and *Exuviaella compressa* were extremely rare. However, new *Distephanus* and *Pyrrophyta* species have appeared. They include *Achrodina sulcata, Pronoctiluca acuta, Pr. pelagica, Hillea fusiformis, Peridinium palatimim,* a uracsere *Pterosperma cristatum, Meringosphaera mediterrane* and *Planktoniella sol.*

Along the Crimean coast from Karadag to Sevastopol (1938-1992) the total phytoplankton numbers were 3.106 - 3.109 cells.m^{-3} and the biomass - 5-1,829 mg.m^{-3}.

The progressive eutrophication of the marine environment has led a decrease in the numbers of species of diatoms sensitive to rising concentrations of contaminants and an increase in peridinians, not only autotrophs but also heterotrophs and myxotrophs.

Fig. 8 gives the average phytoplankton biomass over the period 1973-1993 in the oxygen 0-100 m layer. The figures are based on studies by IBSS (Georgieva, Senichkina, personal communication, Kovalev et al., 1993) and its Odessa Branch (Nesterova, personal communication, Volovik et al., 1993).

Fungi

Research on marine mycology near the Ukrainian coast was conducted by N. Ya. Artemchuk from 1962 to 1972 and L. M. Bagriy-Shakhmatova (Zelezinskaya) from 1966. At present marine mycology is being studied at the Institute of Botany, National Academy of Sciences of Ukraine, by L. M. Bagry-Shakhmatova and at the Odessa Branch of the Institute of Biology of the Southern Seas by A. A. Andrienko and N. I. Kopytina.

175 representatives of marine mycobiota have been recorded along the Ukrainian coast, including 159 species belonging to the higher fungi, such as classes of Ascomycetes, Basidomycetes and Deuteromycetes, and 16 species of lower fungi such as

Chytriodiomycetes, Oomycetes and Zygomycetes. Only 69 species are obligate marine. Most of the lower, and some of the higher, genera of fungi *(Penicillium, Aspergillus* etc.) were first described as representatives of terrestrial biotopes and freshwater habitats. Almost all of the lower fungi (except the order Peronosporales) are parasites of marine plants and hydrobionts (Artemchuk, 1981). For example, there was an epizooty of the plankton *Penilia avirostris* caused by the *Hyphochytrium peniliae* (Artemchuk. Zelezinskaya, 1969; Zelezinskaya, 1969, 1972), which infected eggs of two species of Black Sea barnacles with the fungi *Saprolegnia monoica Pringsheim* (Rzhepishevsky, Artemchuk, 1970).

Table 6 illustrates the distribution of marine mycobiota according to data from the following authors: Zelezinskaya, 1965, 1976, 1979; Artemchuk, Zelezinskaya, 1969; Rzhepishevsky, Artemchuk, 1970; Artemchuk, 1973, 1974, 1979, 1981; Bagriy-Shakhmatova, 1983, 1985, 1985b, 1988, 1989,1991; Andrienko, Kopytina, 1992-1994.

A total of 87 species of higher marine fungi (15 species of ascomycetes and 72 deuteromycetes) and 14 species of lower marine fungi have been recorded along the Crimean peninsula. Only one species of lower fungi and 57 species of higher fungi (33 ascomycetes, 22 deuteromycetes and 2 basidomycetes) have been recorded in the northwestern Black Sea.

Research has shown that there are 49 species of higher marine fungi in the Grigorievsky liman, 29 in the Sukhoi, 3 in the Khadzhibei, 1 in the Berezansky and 3 in the Tendrovsky Bay. Of these species three from the class Ascomycetes *(Dryosphaera navigans,* Koch et E. B. G. Jones, 1988; *Halosaphiea hamata Johnson,* Jones, Moss, 1988; and *Leptosphaeria avicenniae,* J. et E. Kohlm, 1965) and five species from the class Deuteromycetes *(Cirrenalia fusca,* Schmidt, 1969; C. pseudomacrocephala, Kohlm, 1979; *Graphium sp.* and *Vesicularia maritima,* binder, 1944; and *Zalerion varium,* Anastasiou, 1963) were recorded in the Black Sea for the first time.

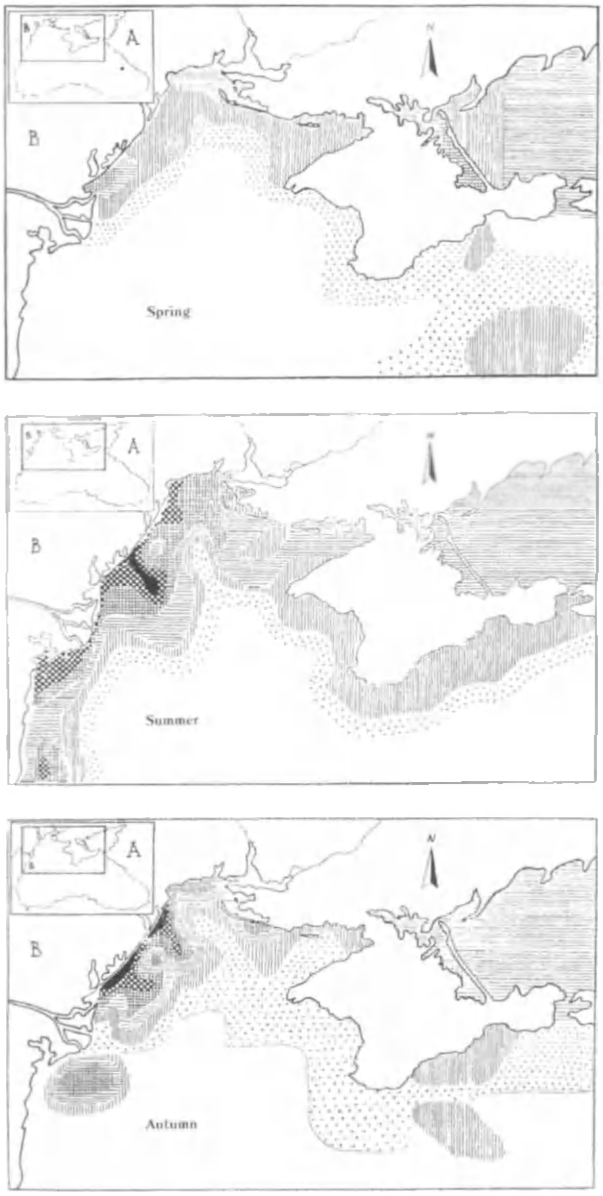


Fig. 8 Average statistical distribution of phytoplankton biomass (B. $mg.m^{-3}$) during the period 1973-1993.

4

Zooplankton General Characteristics

There are 1,070 species of zooplankton in the brackish water and freshwater coastal waterbodies of Ukraine, including Rotifera, Copepoda and Cladocera. There are 233 species of marine pelagic invertebrates in coastal and open water waters (Annex I, Table 3). Although the total number of freshwater zooplankton species exceeds the number of marine species, the latter has a greater diversity in large taxonomic groups. From 25% to 52% of the species composition is made up of Rotifera, Cladocera and Copepoda. The highest levels of biodiversity of marine zooplankton in Ukraine waters is in the northwestern Black Sea (Table 9). Horizontal distribution. River run off has a significant impact on the horizontal distribution of zooplankton. The outflow of nutrients in rivers is due to the development of phytoplankton in estuarine areas of the sea which in turn explains the formation of regular accumulations of zooplankton in the Danube-Dnepr interfluve (DDI). In freshwater ecosystems the zooplankton biomass rarely reached 1 g.m-3. But in estuarine areas the biomass exceeded 175 g.m'^{3}, primarily because of the development of *Noctiluca miliaris* = *N. scintillans* (Zaitsev et al., 1987).

The biomass of the zooplankton of open waters, including *N. miliaris* and *Pleurobrachia rhodopis* in the main oxygen layer of 0-100 m, has been estimated at 0.4 g.m-3 (Kovalev et al., 1993). Biomass levels peak in autumn, a phenomenon which has been attributed to the large pelagic invertebrates *Calanus ponticus, Pleurobrachia rhodopis* and *Sagitta setosa* which increase in numbers as the result of the development of the epiplanktonic biocoenosis. In the winter the decline in temperatures and river runoff in the northwestern Black Sea means that there is a greater decrease in the development of zooplankton than in open waters.

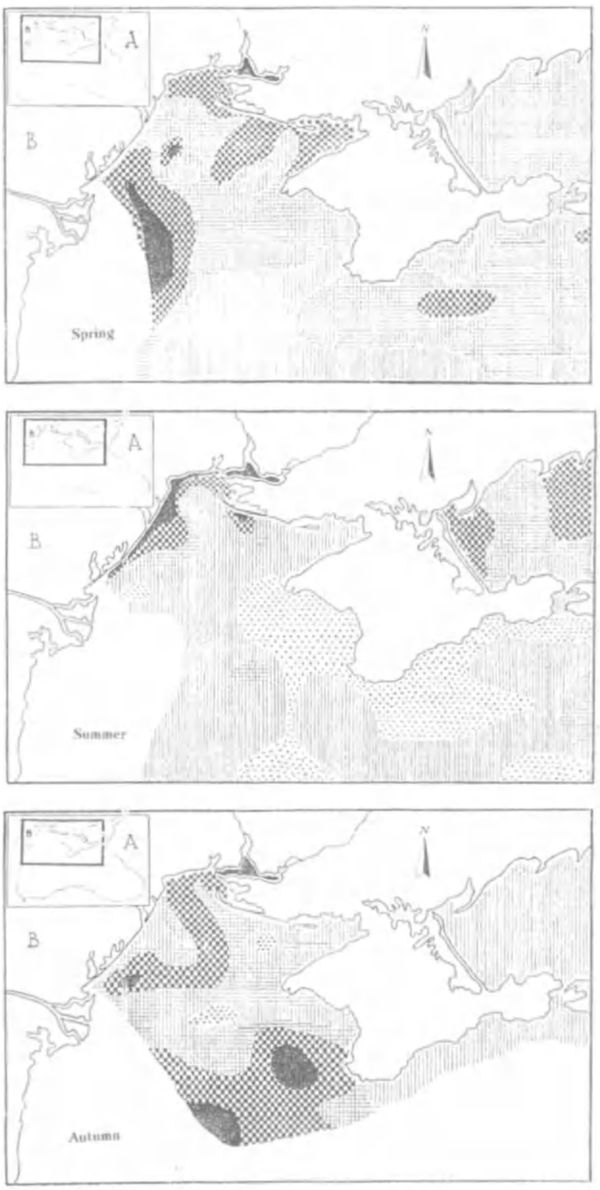


Fig. 9 Average statistical distribution of mesozooplankton biomass (B, mg.m-3) during the period 1973-1993.

Conventional signs:

1,0-1,4 1,5–1,9 2,0-2,4 2,5-2,9 > 3,0 lg B

Table 9. Distribution of the species composition of the marine mesozooplankton by main taxonomic groups in Ukrainian sea waters

Species	Till 1975 (NWBS)	Contemporary state		
		NWBS	SAL	CA
PROTOZOA	25	24	5	15
Flagellata	1	1	1	1
Sarcodina	-	-	-	1
Infusoria	24	23	4	13
COELENTERATA	14	11	6	6
Hydrozoa	11	8	3	4
Scyphozoa	2	2	2	2
Nematoda	1	1	1	-
CTENOPHORA	1	2	2	2
Nemertini	1	-	-	-
NEMATHELMINTHES	42	44	8	1
Rotatoria	42	44	8	1
ANNELIDA	12	11	4	13
Polychaeta, larvae	12	11	4	13
TENTACULATA	3	3	-	2
Bryozoa, larvae	2	2	-	1
Phoronidea	1	1	-	1
ARTROPODA	93	59	20	29
CRUSTACEA	76	42	15	20
Cladocera	17	17	5	5
Calanoida	15	12	7	7
Monstrilloida	2	-	-	2
Cyclopoida	6	5	2	1
Harpacticoida	32	4	-	2
Ostracoda	1	1	1	-
Cirripedia	3	3	1	3
MALACOSTRACA	17	17	4	9
Decapoda	9	9	-	9
Mysidacea	3	3	1	-
Cumacea	1	1	1	-
Isopoda	3	3	1	-
Amphipoda	1	1	1	-
MOLLUSCA	4	4	2	6
Gastropoda, larvae	2	2	-	5

Bivalvia, larvae	2	2	2	1
CHORDATA	2	2	1	2
Ascidiacea	1	1	-	1
Appendicularia	1	1	1	1
CHAETOGNATHA	2	1	1	1
ACRANIA	1	-	-	-

Table 10. Biological diversity of zooplankton in Black Sea coastal and open sea waters

Habitats	**Number of species**			
	Copepoda	Cladocera	Rotifera	Varia
Lake type				
DD	92	65	200	?
DL	32	27	170	?
S	23	31	63	?
Estuary type				
TE	38	7	16	?
DE	31	50	114	19
BTK	24	12	16	14
DBE	75	84	104	6
Marine type				
NWBS	23	17	44	77
CS	12	5	1	59

Habitats: DD - Danube Delta; DL - Danube Lakes (Kagul, Yalpug, Kugurlui, Kartal, Safyan, Kotlabukh, Kitay); S - Sasyk water body; TE - Tuzlov limans (Burnas, Alibey, Shagany); DE • Dnestrovsky liman; BTK - Berezansky, Tiligulsky and Khadzhibeisky limans; DBE - Dneprovsko-Bugsky liman; NWBS - northwestern Black Sea shelf; CS - Crimean zone.

During the warmer weather the highest biodiversity and quantitative zooplankton indices were observed in coastal waters in the transformation zones of river waters. Here the abundance and biomass of invertebrates is 10 fold greater than in open waters, due to the development of protozoa, rotifers and benthic invertebrate larvae. The latter account for 20% to 43% of the total zooplankton. Larvae of more than 30 species of invertebrates have been discovered in the plankton of the northwestern Black Sea alone. The most numerous are larvae of *Balanus improvisus* (up to 106 ind.m"^{3}), *Mya arenaria* (up to 38.103 ind.m"^{5}), *Mytilus galloprovincialis* (up to 10.103 ind.m'^{2}) and *Nereis succinea* (up to 3.103 ind. m"^{2}). Larvae mostly develop in the 8-22 C° temperature range. The average distribution of meroplankton in the surface 0-10 m layer (the zone of maximum accumulation) is almost the same and is determined by the distribution of parent forms (Fig. 10, Fig. 11) (Alexandrov, Polischuk, 1994). Near the Crimean coast the maximum concentrations of benthic larvae are an order higher than in the northwestern Black Sea (Murina, Kazankova, 1987).

The characteristics of zooplankton in different habitats in the coastal and open waters of the Black Sea basin are shown in Table 11.

Table 11. Numbers (N, 103 ind.nr^) and biomass (B, g.nr^) of mass species of zooplankton in the main habitats of Black Sea coastal and open sea waters.

Habitats	**Mass species**	**Maximum value**	
		N	B
DD	Acanthocyclops robustus	120	1.80
	Brachionus calyciflorus	80	0.75
	Bosmina longirostris	70	0.70
	Brachionus angularis	40	0.10
	Keratella quadrata	34	0.10
	Alona costata	6	0.22
	Simocephalus vetulus	5	0.40
DL	Brachionus angularis	4900	0.60
	B. calyciflorus	1200	1.50
S	Daphnia magna	180	12.40
	Diaphanosoma dubia	140	6.50
TE	Acaritia clausi	120	2.50
DE	Diaphanosoma brachyurum	300	5.40
	Brachionus calyciflorus	130	0.90
	Asplanchna priodonta	52	1.00
BTH	Calanipeda aquae-dulcis	200	5.00
	Moina brachyata	40	2.00
	Acartia clausi	30	0.20
	Heterocope caspia	8	3.00
DBE	Brachionus calyciflorus	650	5.30
	Acartia clausi	200	1.50
	Cercopagis pengoi	140	2.50

	Podonevadne trigona	38	0.60
MN	Noctiluca scintillans (=miliaris)	52	2.48
	Favella ehrenbergi	13	0.06
	Acartia clausi	3	0.06
EP	Noctiluca scintillans	2620	227.00
	Synchaeta baltica	620	1.42
	Bivalvia, larvae	50	0.15
	Polychaeta, larvae	15	0.09
	Balanus, larvae	12	0.07
	Acartia clausi	5	0.07
	Mnemiopsis sp	0.07	310.00
BP	Pseudocalanus elongatus	8.9	0.13
	Noctiluca scintillans	6.7	0.69
	Sagitta setosa	0.6	0.04
	Calanus ponticus (=C.helgolandicus)	0.5	0.03
	Pleurobrachia rhodopis (=P.pileus)	0.2	1.44

Habitats: DD - Danube Delta: DL - Danube Lakes (Kagul, Yalpug, Kugurlui, Kartal, Safyan, Kotlabukh, Kitay); S - Sasyk water body; TE - Tuzlov estuaries (Burnas, Alibey, Shagany); DE - Dnestrovsky estuary; BTK - Berezansky, Tiligulsky and Khadzhibeisky estuaries; DBE - Dneprovsko-Bugsky estuary; MN - marine neustone; EP - epipelogic zone; BP - bathypelagic zone.

Vertical Distribution

The lower boundary of zooplankton distribution corresponds to the upper boundary of the hydrogen sulphide layer. The highest zooplankton concentrations are in either the surface 10 m layer or in the thermocline layer (from 20 to 40 m), depending on the season. High levels have also been observed at depths of 120-150 m on the coastal margin of the circular current up to 60 m in the centre of the western part of the sea. The lower boundary coincides with the isooxygen of 0.4-0.5 ml O^2. The highest concentrations consist of characteristic representatives of bathypelagic organisms: such as *Pleurobrachia rhodopis, Calanus ponticus, Pseudocalanus elongatus* and *Sagitta setosa* (Table 11). These species are normally distributed in layers. The upper layer consists of the comb-jelly *P. rhodopis.* The central layer is made up of *C. ponticus* and the lowest layer of *S. setosa* and females of *P. elongatus* up to 0.2 g.m"^{2} (Kovalev et al., 1993).

Individual members of the epiplankton community, such as *Noctiluca scintillans, Synchaeta baltica, Acartia clausi,* larvae of benthic invertebrates and the introduced comb-jelly *Mnemiopsis sp.,* live above the thermocline (Table 11).

The daily vertical migrations made by bathyplankton specimens into the upper near surface layer and the homogenic structure of the populations of copepod species above and under the thermocline have led numerous authors (Vodyanitsky, 1954; Kovalev et al.,

1993) to come to the conclusion that the division into epiplankton and bathyplankton is conditional and that it would be more accurate to refer to a single community, an entity of pelagic organisms in all of the inhabited layers of the Black Sea.

However, it is in the Black Sea that the neuston biocoenosis was first discovered and described in the near surface microlayer of 0-5 cm. Neuston organisms are characterized by specific morpho-physiological adaptations (Zaitsev, 1970). Typical specimens of planktonic invertebrates in the Black Sea neuston include copepods from the *Pontellidae* family, such as *Pontella mediterranean Anomalocerapotersoni* and *Labidocera brunescens.* The neuston of the near surface biotope is the first to be influenced by anthropogenic activities whose consequences are transmitted via the land or atmosphere. This explains the disappearance of the narrow neritic species *R. runescens* and the sharp decline in numbers and the movement of the range of *P. mediterranea* and *A. patersoni* into open areas of the sea. Today the neuston community is represented by epiplanktonic species of *N. scintillans (+miliaris), A. clausi* and *F. ehrenbergi* (Table 11), as well as the early stages of fish and benthic invertebrates.

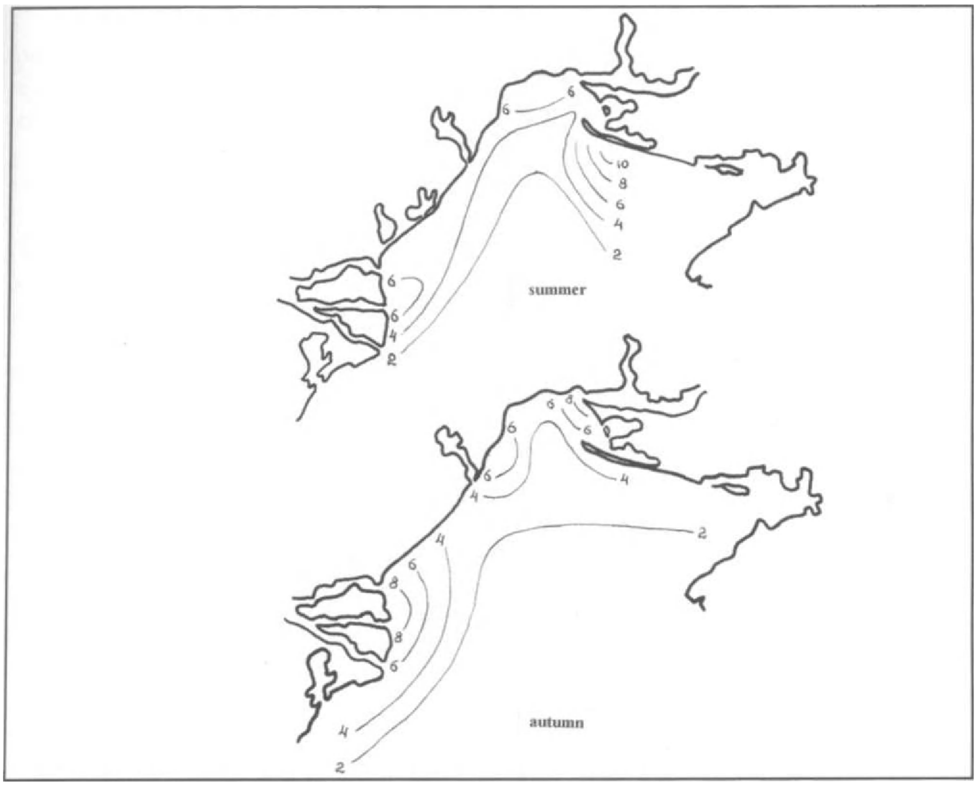


Fig. 10 Spatial distribution (number, 10^ ind.m"3) of the bivalvia larvae in northwestern part of the Black Sea (0-10 m. layer).

The most significant changes in the structure (Annex I, Table 3) and quantitative development of zooplankton have been observed as a result of eutrophication. In addition to a sharp decline in the abundance of a number of species *(Penilia avirostris, Evadne nordmani, E. spinofera* and *Centropages ponticus)* there has been a sharp increase in zooplankton specimens such as *N. scintillans, A. clausi* and *Pl. polyphemoides.*

In summer 1986, at a distance of 25-30 miles from the mouth of the Danube, extremely high concentrations of *N. scintillans,* ranging from 10 to 559 mg.m^{-3}, were registered over an area of 100 km^2 (Zaitsev et al. 1988).

Eutrophication and the decline in standing stocks of plankton feeding fish produced a sudden increase in the numbers of the jellyfish *Aurelia aurita* throughout the Black Sea basin, especially in the northwestern Black Sea. *A. aurita* populations peaked at the beginning of the 1980s when the average biomass reached 47 g.m^{-3} and standing stocks in the northwestern Black Sea reached 82.106 tons wet weight. In 1990 the average biomass of jellyfish declined eight fold (Zaitsev, Polischuk, 1984).

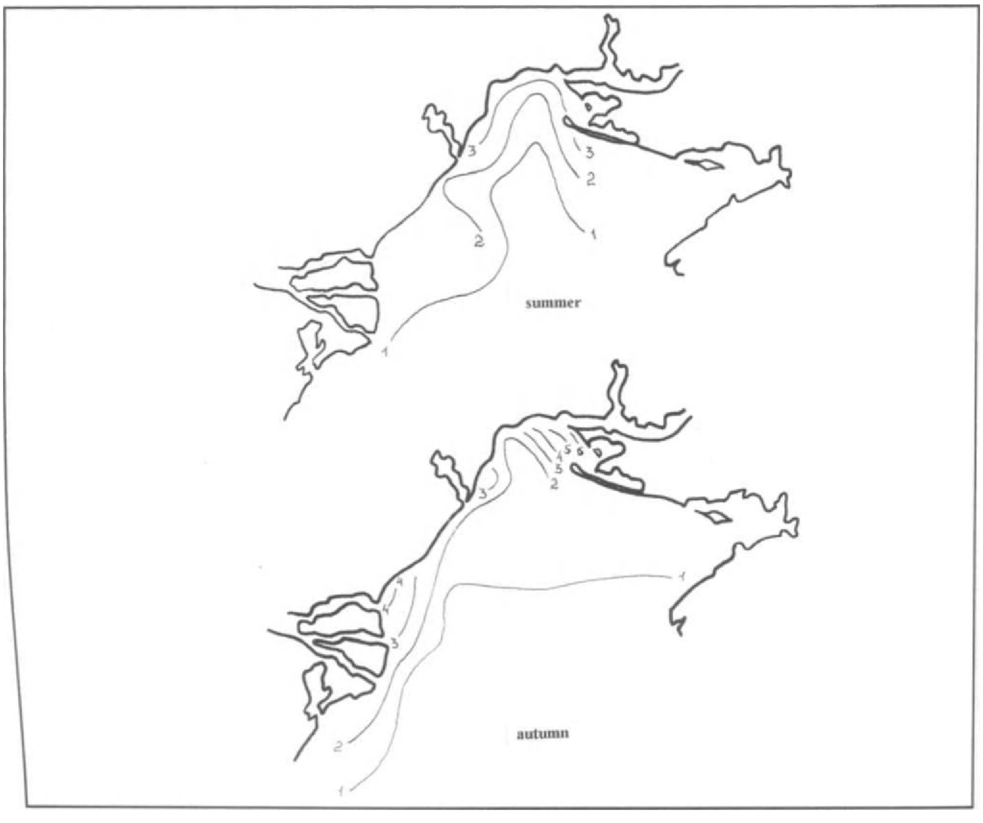


Fig. 11 Spatial distribution (number, 10^ ind.m"') of the polychaeta larvae in northwestern part of the Black Sea (0-10m. layer).

In 1987 in the open waters opposite the Crimean peninsula single specimens of a species of comb-jelly new to the Black Sea, the introduced *Mnemiopsis sp.* (Zaitsev et al., 1988), were discovered. By 1990 it had become a mass species (Vinogradov et al., 1990) and currently has a significant impact on the state of the pelagic ecosystem of the Black Sea and Azov Sea.Characteristics of the contemporary state of the main pelagic predators.

Pleurobrachia rhodopis

The comb-jelly *Pleurobrachia rhodopis* forms part of the bathyplankton complex and, for most of the year, stays in the lower layers of the oxygen zone. However, it reproduces in the upper layer, which is rich in forage zooplankton, and to which specimens sometimes migrate. This is a constant process and is accompanied by severe grazing of copepods. In the northwestern shallow waters, as in all of the coastal zone, *Pleurobrachia rhodopis* is encountered only during strong stable winds when the water masses of the cold intermediate layer reach the coast.

The maximum concentrations of *Pleurobrachia rhodopis* are found in the main productive zone (Table 10). However, in this zone accumulations of forage zooplankton and predators are divided vertically, mixing only at night during the migration of the comb-jelly to the surface.

Mnemiopsis sp.

The highest concentrations of the comb-jelly *Mnemiopsis sp.* are found in the shallow coastal zone. Populations reach their highest levels in the northwestern Black Sea (Fig. 12). Unlike *Pleurobrachia rhodopis,* in 1992-93 populations of *Mnemiopsis sp.* fell in the spring-summer period and peaked in autumn-early winter. In zones inhabited by both species, Mnemiopsis sp. populations were always vertically separated from those of Pleurobrachia, as a result of the two grazing on different complexes of zooplankton.

Sagitta setosa

The biomass of *S. setosa* is 1-2 orders lower than that of the comb-jelly. Its distribution is similar to that of *P. rhodopis* with concentrations reaching their highest levels in the main productive zone. However, unlike *Pleurobrachia rhodopis, Chaetognatha* make regular migrations from the lower layers of the oxycline to the surface in the evening, returning to the lower levels during the day. They also have different seasonal cycles. *Pleurobrachia rhodopis* reaches its highest biomass from May to September, while *Chaetognatha* biomasses peak in the winter and early spring.

The introduction of *Mnemiopsis sp.* produced a division of the pelagic community into two subsystems separated spatially, in depth and in their periods of maximum development: namely the coastal subsystem of *Mnemiopsis sp.* which is functionally tied to epiplankton forage organisms; and the main Black Sea current zone of *Pleurobrachia rhodopis,* the main consumer of bathyplankton. Chaetognaths form a link between the two subsystems and, where there is coexistence, facilitating the transfer of secondary production from surface layers to deeper water and vice versa.

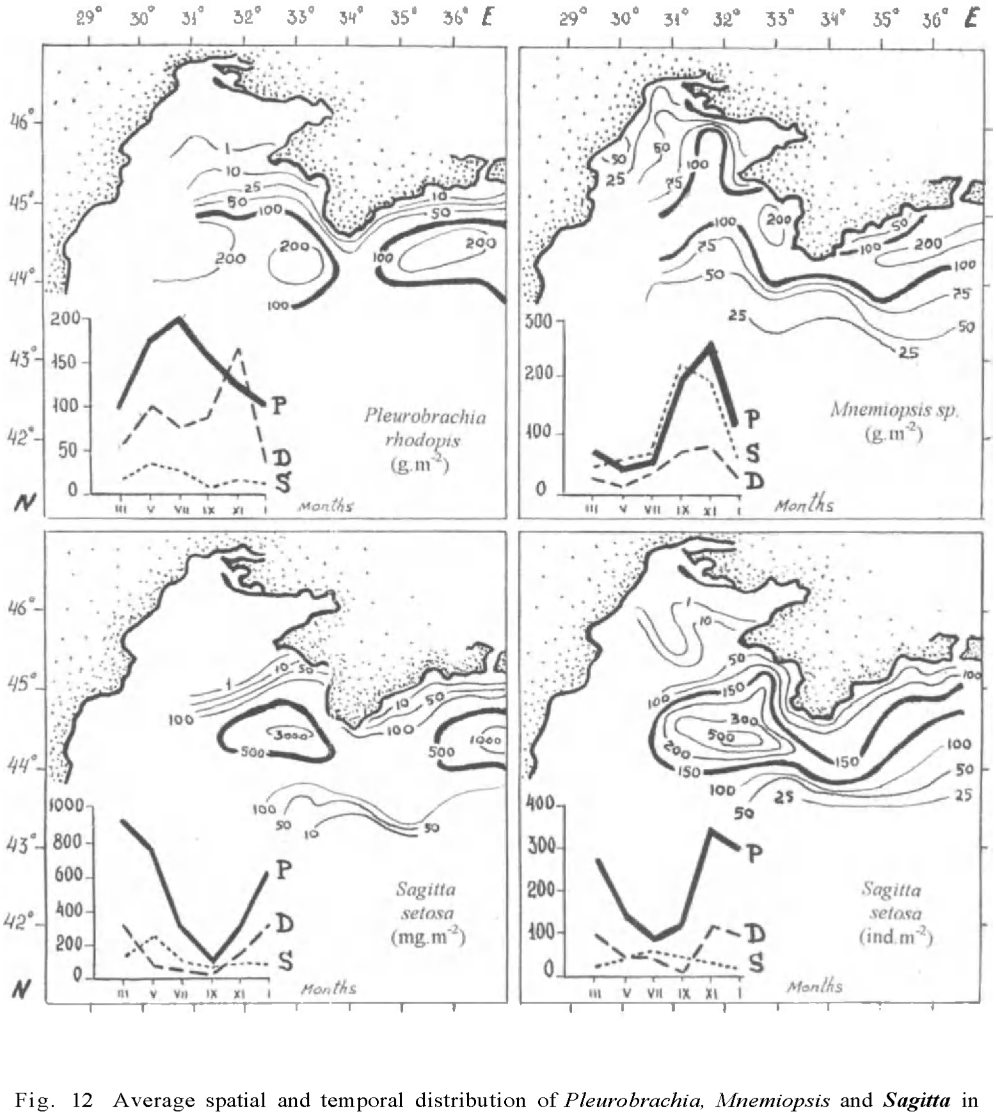


Fig. 12 Average spatial and temporal distribution of *Pleurobrachia, Mnemiopsis* and ***Sagitta*** in Ukrainian Black Sea area in 1992-1993.

D - divergence zone, P - zone of high productivity, S - shelf zone.

5

Phytobenthos

I. Microphytobenthos

At present there is considerable data on the microalgal population of hard (artificial and natural) and soft substrates of the Black Sea and the adjacent limans (Pogrebnyak 1965, Kuvaeva 1963, Kucherova 1957, 1970, 1975, Proshkina-Lavrenko 1955, 1963, Bodeanu 1979, Guslyakov 1978, 1981, 1991, Gerasimyuk 1992, Guslyakov et al. 1992). However, systematic investigations of the microphytobenthos are still relatively rare and have been limited to certain areas of the Black Sea shelf. There has been no theoretical justification of the production processes at the level of benthic microscopic algae; nor have objective methods been formulated for determining the processes.

Nevertheless, preliminary data show that the production of microalgae in the sea may significantly exceed the production of macrophytobenthos. The solution of this problem would contribute to an integrated assessment of the structural-functional organization of the coastal Black Sea ecosystem and ways of regulating it.

A total of 136 species of microalgae have been recorded in Ukrainian Black Sea coastal waters. Pennata form the basis of the benthic Black Sea microflora, particularly two orders - with and without a raphe (Annex I, Table 4).

The distribution of diatom algae on soft substrates in the northwestern Black Sea resembles a mosaic (Fig. 13). The highest levels were recorded during an autumn expedition in 1992 in Odessa and Tendrovsky bays (19,110 . 10^6 cells . m^{-2} and 1,415.7 . 10^6 cells . m^{-2}, correspondingly). The lowest levels were recorded near the Danube estuary (11.5-52.2 . 10^6 cells. m^{-2}), opposite the Dnestrovsky liman (8.6-37.6 . 10^6 cells. m^{-2}), on the cross section of Yuzhniy port and Dnepro-Bugsky liman (63.7-95.7 . 10^6 cells . m^{-2}) and in the southern part of Tendrovsky Bay (65.5-95.7 . 10^6 cells . m^{-2}). There were also localized areas with very low levels near the Danube estuary. There was even greater diversity in the biomass figures. The largest area with the greatest biomass is near Tendrovsky Bay (2.8-5.5 g . m^{-2}), in the northern part of the Dnepro-Bugsky liman (4.28 g . m^{-2}) and near the Odessa coast (2 g . m^{-2}).

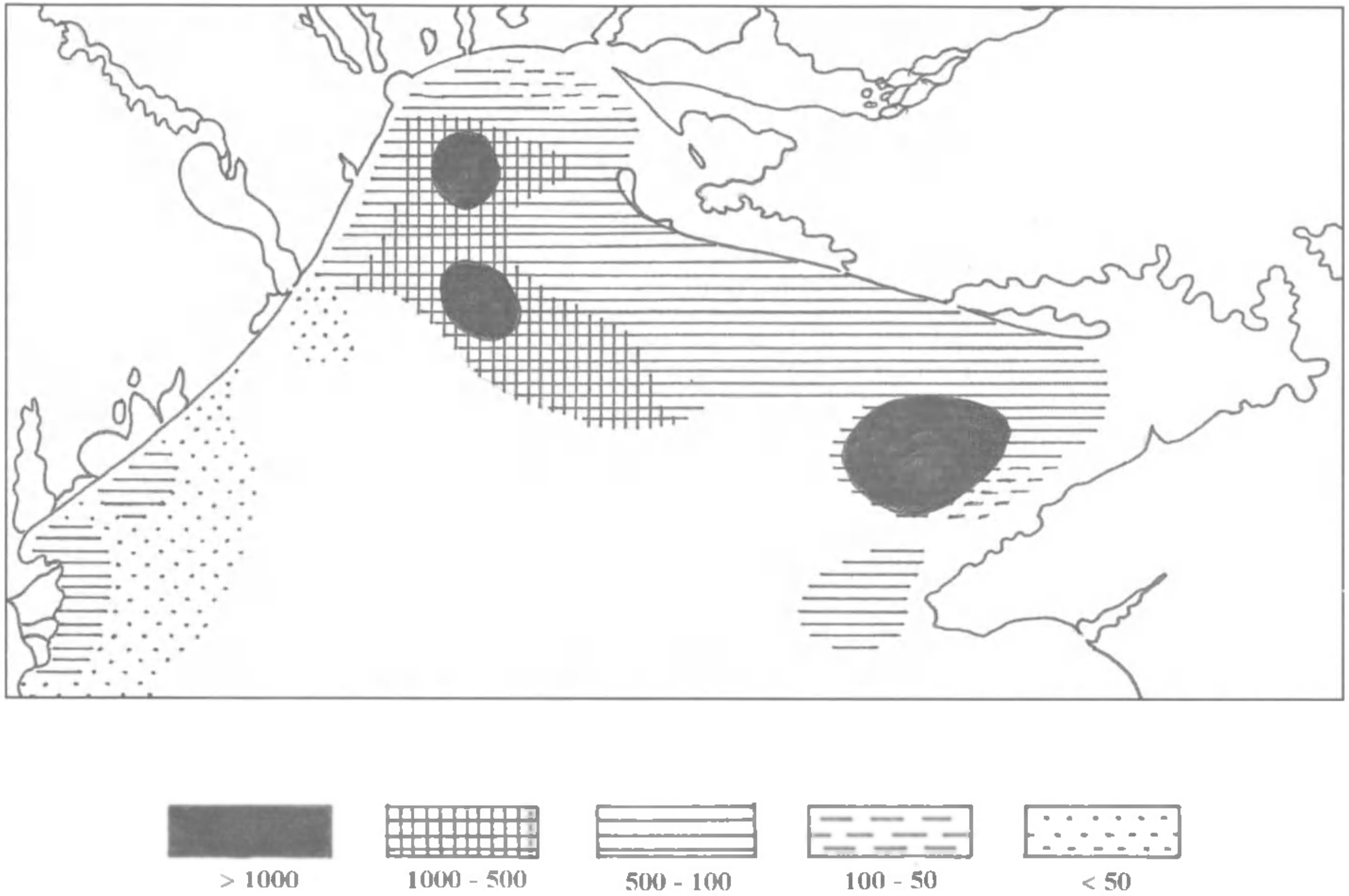


Fig. 13 Numbers (10^6 cells.m^{-2}) of benthic diatoms on the northwestern shelf of the Black sea.

Low biomass values have been recorded near the Danube estuary (0.03-0.29 g . m"^{2}) between the Dnestrovsky and Sukhoi limans (0.11-0.52 g . m"^{2}), near Yuzhniy port (0.33-0.79 g . m"^{2}) in the western part of Tendrovsky Bay (0.33-0.4 g . m"^{2}) and seaward opposite the Odessa coast (0.72-0.57 g . m"^{2}).

In the Danube, and in some areas of the Dnestr, the microphytobenthos biomass is composed of pelagic species. High mortality levels have meant that in these areas both the species biodiversity and biomass of benthic forms remain low.

As of 1994, 98 taxa of phytobenthos algae had been recorded in the Ukrainian part of the Danube, two thirds of them diatoms, including: *Diatoma vulgare, Melosira varians, Cymbella ventricosa, C. tumida, C. parva, Gomphonema parvulum* and *Nitzschia intermedia.* The filamentous green algae with large biomasses in the bays of the delta include *Cladophora glomerata* and *Oedogonium sp.* Blue-green algae on the bottom include large biomasses of *Phormidium ambiguum, Lyngbya major* and *Oscillatoria geminata.* The biomass of the phytobenthos varies from 0.025 to 0.154 g.m"^{3}.

The phytobenthos of the near Danube limans comprises 80 species. Diatoms predominate, being supplemented in the summer by blue-green and chlorophyta depositing from plankton. The maximum indices are 857,000 cells. 10 cm"^{2} and 0.50 mg. 10 cm"^{2}.

The phytobenthos of the lower Dnestr and Dnestrovsky limans is made up of blue-green, dinophyta, cryptophyta, euglenophyta, chrysophyta, xanthophyta diatoms and green algae. There are 219 taxa and 207 species. Diatoms and green algae dominate the benthic algocoenoses, including: *Melosira italica, Melosira varians, Stephanodiscus astraea, S. hantzschii, Navicula cryptocephala, N. viridula, N. cuspidata, N. hungarica, N. gastrum, N. tuscula, N. anglica, Pinnularia braunii, P. major, Cembella cuspidata, C. gracilis, C. lanceolata, C. lata, C. tumida, C. turgida, Scenodesmus acuminatum, S. quadricauda, S. apiculatum* and *S. opolinensis.* (Annex I, Table I). In 1986 the average biomass was 0.2 g.m'", rising to 0.9 g.m'^{3} in 1987.

In terms of density and biomass, diatom numbers on the sandy beaches of the Tiligulsky liman peak at 0.9 106 cells.g'^{1} of sand or 0.9 mg.g"^{1} of sand. In the summer the figures for both abundance and biomass begin to decline and fall still further in autumn and winter. In May on Dzharylagach island the "blooming" of the sand can usually be observed on wide areas of sandy beaches in the hygro and epipsammon zones. Studies of the microphytes of the limestone near Sevastopol showed that the biomass peaked at 1,885.6 g.m'^{2} in the spring.

II. Macrophytobenthos

Anthropogenic Dynamics of Black Sea Phytocoenoses

The Black Sea flora of higher algae (Chlorophyta, Phaetophyta and Rhodophyta) is of Atlantic origin representing an impoverished flora of the Mediterranean Sea. Fluctuating temperatures and salinity over a period of several centuries have produced a slow transformation of the flora and vegetation of the Black Sea. In the 19th and 20th centuries the Black Sea flora lost some of its tropical and subtropical species. But arctic boreal species, which had disappeared from the Mediterranean, remained in the Black Sea in deep water or in the coastal zone as seasonal winter forms.

In addition to these slow naturally occurring changes there have also been a series of rapid transformations, particularly in this century, caused by anthropogenic factors, many of which can be observed during a single generation of observations. The first information to appear in the literature on anthropogenic changes in Black Sea bottom vegetation was published in 1930 (N. Morozova-Vodyanitskaya, 1930). Other algologists subsequently studied the subject in some depth (Pogrebnyak, 1965; Kalugina-Gutnik, 1975; Eremenko, 1977; Kaminer, 1987 et al.).

The most significant anthropogenic changes in the bottom fauna were noted in the 1960s in coastal waters. The marginal phytocoenoses, which serve as indices of the state of the ecosystem as a whole, were the first to give an indication of the critical situation.

In the Sevastopol and Novorossiisk bays the original biocoenoses have been squeezed out by meso and polysaprobic biocoenoses. The biomass and standing crop of *Cystoseira* have declined, while the biomasses of *Enteromorpha, Viva* and *Cladophoru* have increased. In the 1970s-1980s the pollution of coastal waters began to have an impact on the flora of offshore waters near Karadag.

Over the last 30 years the eutrophication of coastal waters has significantly altered the structure of marine vegetation. According to A. Kalugina-Gutnik (1985), the standing crop of *Cystoseira* along the Crimean and Caucasian shores dropped by an average of 60%. The *Viva* biomass increased threefold in polluted bays and the area covered by the *Viva phytocoenoses* grew more than tenfold. While the frequency and dispersal range of a number of oligosaprobic species decreased.

Changes in the vegetation in the sublittoral zone at depths of 40-60 m were observed much later, in the mid 1960s. Zernov's Phyllophora Field (ZPF) which once covered an area of 1,100 km^ and which in 1964 had a standing crop of 4,100,000 t (Kalugina, Lachko, 1968) has now almost disappeared. K. Kaminer calculated that in 1984 only 420,000 t of the phyllophora remained. The process of degradation is continuing. According to data compiled by A. Kalugina-Gutnik, of the 36 species of algae in ZPF only nine remain (1989). Populations of oligosaprobes (species of *Lithothamnion, Sphacelaria saxatilis* etc) have disappeared completely.

However, *Phyllophora brodiaei* and *Polysiphonia elongata,* which were previously restricted to a limited range, have become widespread, occupying the ecological niche vacated by mass mortalities in populations of *P. nervosa.* Where *P. brodiaei* has disappeared it has not been replaced by other species and the areas, such as the western part of ZPF, remain bare and lifeless. As a rule, the original perennial phytocoenoses have been replaced by populations with short lifespans. The phyllophora field beyond the Bakalsky Bar of Karkinitsky Bay displays similar characteristics. The main reason for the degradation is the eutrophication of the water masses, a process which has accelerated in recent years (Zaitsev, 1983).

These anthropogenic changes are most dramatic in the northwestern Black Sea. Long before the first signs of the degradation of the phyllophora became evident, it was possible to study the structural changes in the marginal phytocoenoses under anthropogenic pressure from disturbances in the sediment (anti-landslide construction) and eutrophication (Eremenko, 1974 etc).

Anthropogenic activities have had a marked impact on the structure and dynamics of the phytobenthos of the Dnestr-Dnepr interfluve. The species composition of the simplified phytocoenosis in the interfluve is four times poorer than in the Black Sea (Annex I, Table 5). Even though the water is of marine origin a brackish-marine group of macrophytes predominate, while boreal and arctic-boreal groups rank first in terms of biomass and the number of species. The percentage of polysaprobionts in the phytobenthos is half the figure for the Black Sea as a whole. Over a period of 25-30 years 14 species of macrophytes have disappeared from the interfluve, including red and brown algae such as: *Cystoseira barbata, f. hoppi, Stilophora rhizoides, Dilophus fasciola, Chondrea dasyphylla, C. tenuissima, Melobesia farinosa* and *Leuthesia difformis;* while another 16 species have become rare.

The disappearance of *Cystoseira* has changed the coastal vegetation and its phytocoenosis has been gradually replaced by that of *Ceramium*. In contrast to the Crimean and Caucasian shores, the dominant phytocoenoses are those of *Ceramium elegans, C rubrum, Enteromorpha intestinalis, E. prolifera, Cladophora vagavunda* and *Polysiphonia denudata.*

But the impoverishment of biodiversity has recently stabilised. The list of species which have disappeared or become rare is not rising. Indeed, during the 1990s species which had once been considered rare became more common, including species of red and brown algae such as: *Polysiphonia sanquinea, Pylaiella littoralis* and *Punctuaria latifolia.* This change has been attributed to long multiyear variations in the floristic composition and to a process of self regulation in the ecosystem.

One of the most significant features of anthropogenic regression today is the substitution of oligosaprobiont and P-mesosaprobiont species by a-mesosaprobiont and polysaprobiont species with a shorter life cycle and a high growth rate.

An analysis of the changes in marginal phytocoenoses in the interfluve has shown that, in addition to a decline in the total number of species, over a period of 20 years the proportion of oligosaprobionts has fallen to 11%, while the proportion of polysaprobionts has increased from 20 to 35% (Annex I, Table 6). These changes demonstrate the increasing eutrophication of the northwestern Black Sea. It is significant that there are no oligosaprobionts among the dominants and subdominants of the phytocoenoses. Mesosaprobionts and polysaprobionts each account for 50% of the dominant species.

Since the 1960s there has been an increase in the distribution and biomass of such polysaprobionts as *Urospora penicilliformis* and *Enteromorpha prolifera.* Regressive anthropogenic succession occurs in coastal areas and in the limans, particularly Grigorievsky and Sukhoi.

A full list of the macrophytobenthos species found in the Ukrainian Black Sea is given in Annex I, Table 7.

III. Higher Aquatic Plants

Modern studies of hydrobionts have been conducted according to organismic, population and phytostromatic (chorological) factors. In addition, the structures of growth have been measured using remote control methods and estimates made of the areas and standing stocks.

A total of 159 species of hydromacrophytes and hygromacrophytes have been recorded in the floristically-rich Danube estuary. The flora of the area is diverse. The estuary is the only part of the former Soviet Union where the northern Balkan ash *Fraxinus pallisae* can be found. Recently, reed and water chestnut species have been recorded by Ukrainian botanists. Since 1976 large quantities of free floating aquatic plants from the Asolaceae family have been discovered.

Higher aquatic plants are represented by numerous groups composed of biocoenoses of different types, which makes their structure easier to explain at a chorological level, when combinations of, rather than individual, phytocoenoses are studied. Eight groups of mesocombinations have been identified.

The first group of mesocombinations occupies the conuses of outflows and alluvial deposits of delta areas. These habitats have a shallow depth (0.5-1 m) and a good water exchange. Mineralization of the water does not exceed 0.2-0.3 ppt. Associations of Sparganium erectum and certain species of cat's tails *(Typhia angustifolia, T. grossheimii Pobed* and *T. laxmanii)* are linked with a layer of water chestnuts *(Trapa natans)*. Associations of *Scirpus lacustris* on silted sand with shells are characteristic of parts of the Dnestrovsky and Dneprovsky limans.

The second group of mesocombinations is composed of the vegetation of newly formed bays with a moderate water exchange. In freshwater bays with moderate sedimentation, mineralization of the water does not exceed 1 ppt, and associations of water chestnuts *T. natans* predominate. *Nymphoides peltata,* the water lily *Nymphaciae alba* and *Ceratophyllum demersum* are encountered only in Potapovsky and Tsiganka on the Danube. A holophyte mesocombination can be found in brackish water areas (4-5 ppt salinity) with the water milfoil *Myriophyllum spicatum,* the pondweed *Potamogeton pectinatus* and *Schoenoplektus triqueter*. Such areas are devoid of vegetation with floating leaves, which is typical of mesocombinations on the grey silts specific to the Kiliya delta of the Danube.

The third group of mesocombinations is linked to vegetation in long existing bays with a poor water exchange and intensive autochthonic siltation (e.g. Anankin, Delukov Chepirkin, Rybachiy). The isolation of the vegetation means that it is less subject to other influences and itself serves as an ambient factor. Plant cover is represented by a combination of the water lily, narrow leafed and dark green cat's tails and, rarely, the water chestnut. This type of mesocombination is characteristic of the flood plains of all three estuarine areas.

The fourth group of mesocombinations is characteristic of isolated bays with a hyperaccumulation of autochtonic organic matter. *Stratiotes aloides* and the dark green hornwort *Ceratophyllum* dominate in this type of habitats. As a rule, there are fewer water lily coenoses in large water bodies.

The fifth group includes vegetation of the most elevated parts of the remains of autochtonic plant material. The densest are the swamp communities of reeds, reeds with water plants and narrow leafed cat's tail. These are not only characteristic of the reed islands of all three estuarine areas, but also of the freshwater upper parts of the Tiligulsky and Berezansky limans.

The sixth group of mesocombinations is linked to the vegetation of freshened shallow waters with significant wave action. These include communities of *Najas, Potamogeton nodosus* in the marine part of the Lebyazhye shallows, and Zhelezny Bay.

The seventh group includes brackish water parts of the coast, overgrown by eel-grass *Zostera marina, Zannichellia, Potamogeton pectinatus* and *Ruppia spiralis.* Such mesocombinations are characteristic of the greater part of Tiligulsky and Berezansky limans.

This eighth group of mesocombinations occupies newly formed bays with alluvial deposits and moderate water exchange, such as can be found in the front margin of the Dnepr delta, where the dominant communities are *Nymphoides peltata* (41.2%), the water lily (24.2%) and *Ceratophyllum demersum* (13%).

The total area of the plant cover of the Danube delta, not including the reed groups, is 155 ha. The dry plant mass totals 1,163 tons. Water plants are comparatively sparse in the Dnestr liman. However, they produce about 70,000 tons of organic matter. In the Dnepro-Bugsky liman overhanging growths account for more than 4,000 ha, while the standing crop totals 24,800 tons of dry plant mass.

IV. Meiobenthos

A special study of the meiobenthos of the Ukrainian shelf of the Black Sea was launched at the end of the 1960s (Kiseleva, 1965). Different groups in the meiobenthos have been studied, but biodiversity investigations only conducted for some of them.

The first monograph on the biodiversity and ecology of contemporary foraminifers was published by V. Yanko in 1987. The numerous works which appeared prior to the 1960s cannot be used for comparative analysis because dyes were not used for the identification of foraminifer species living today. But relatively complete lists are available for foraminifers in the northwestern Black Sea and the Azov Sea today (Vorobyova, Yanko, 1986, 1990). Biodiversity is related to factors such as salinity, the type of sediments and the amount of organic matter. There are 36 different species on the northwestern shelf, and 18 in the Azov Sea. The maximum density of foraminifers may reach 4,000,000 - 5,000,000 ind.m"². *Ammonia tepida* is a mass species.

The first studies of the Black Sea nematode fauna were conducted by 1. Philipyev (1918-1921, 1921) in the area around Sevastopol and the southern Crimean coast. These studies were supplemented by research by T. Platonova's (1968). The species composition of the nematodes living on the western Crimean coast was first described by M. Kiseleva (1965). Further detailed investigations of the northwestern (Karkinitsky Bay), southwestern (Cape Nukull, Donuzlav - Cape Tarkhankut), southern (Yaltinsky Bay near Alushta) and eastern (Cape Meganom, Karadag Reserve) Crimean coasts and Sivash lagoon were conducted by N. Sergeeva (1972, 1973, 1974, 1976, 1979, 1981, 1984). The first studies of the northwest were conducted by A. Paramonov (1926). In the 1980s there were comprehensive studies of the species composition of the Danube-Dnester interfluve, the Pridneprovsko-Bugsky area, Odessa, Egorlitsky and Tendrovsky bays in the Sukhoi and Grigorievsky limans and the Azov Sea (Kulakova, Vorobyova, 1987; Kulakova, 1989; Vorobyova, Zaitsev, Kulakova, 1992, Philipyev, 1922, Vorobyova, Kulakova, 1990).

The only nematodes included in the faunistic list of free-living nematodes are those which have not been identified as a species. Many in this group require additional study and description. The nematode fauna of the Black Sea comprises 250 species.

Most of the free living nematodes are euribionts, inhabiting diverse biotopes across the entire Black Sea shelf. Average densities are: 22,000-49,000 specimens.m^{-2} in the sand biotope; 80,000-20,000 specimens.m^{-2} in silty sand biotopes; and 100,000-120,000 specimens.m^{-2} in silty biotopes. The highest nematodes densities (2,000,000-3,000,000 specimens.m^{-2}) have been recorded in the Crimea, in Donuzlav, Balaklava Bay, and in the northwestern part of Odessa Bay. The dominant or mass species are: *Sabatieria abyssalis, S. pulchra, Terschellingia longicaudata, Sphaerolaimus dispar, Axonolaimus setosus* and *Mesotheristus setosus.*

Representatives of the Gastrotricha class are widespread in the alluvial deposits of Black Sea beaches, where they mostly inhabit fine grained sands. Gastrotrichs are encountered in the interstitial zone throughout most of the year. Their numbers vary widely, reaching a maximum of 395.100 specimens.cm^{-3} (Vorobyova, Zaitsev, Kulakova, 1992).

The suborder Harpacticoida is one of the most numerous and faunistically diverse groups of the Black Sea meiobenthos. Its members inhabit all of the bottom biotopes and are often encountered in plankton in shallow waters. The faunistic composition and population dynamics of Harpacticoids have been most completely described for the Crimean shores (Kosyakina, 1936; Griga, 1961-1964, 1969). The identification of the faunistic composition of Harpacticoids communities in growths and sediments began in 1976. More than 100 species have been recorded, of which six are new to the Black Sea (Kolesnikova, 1979, 1981, 1983, 1991). In 1990 Vorobyova and Kulakova published a list of Harpacticoid species in the Azov Sea. There have also been multiyear studies of the species diversity and population dynamics of Harpacticoids in the pseudo- and supralittoral zones of sandy beaches in Odessa (Vorobyova, 1984; Vorobyova, Zaitsev, Kulakova, 1992). In 1974 Monchenko published a survey of the Harpacticoids of the southern shore of the Dnestrovo-Bugsky interfluve, the Dnestrovsky liman and mouth of the Danube.

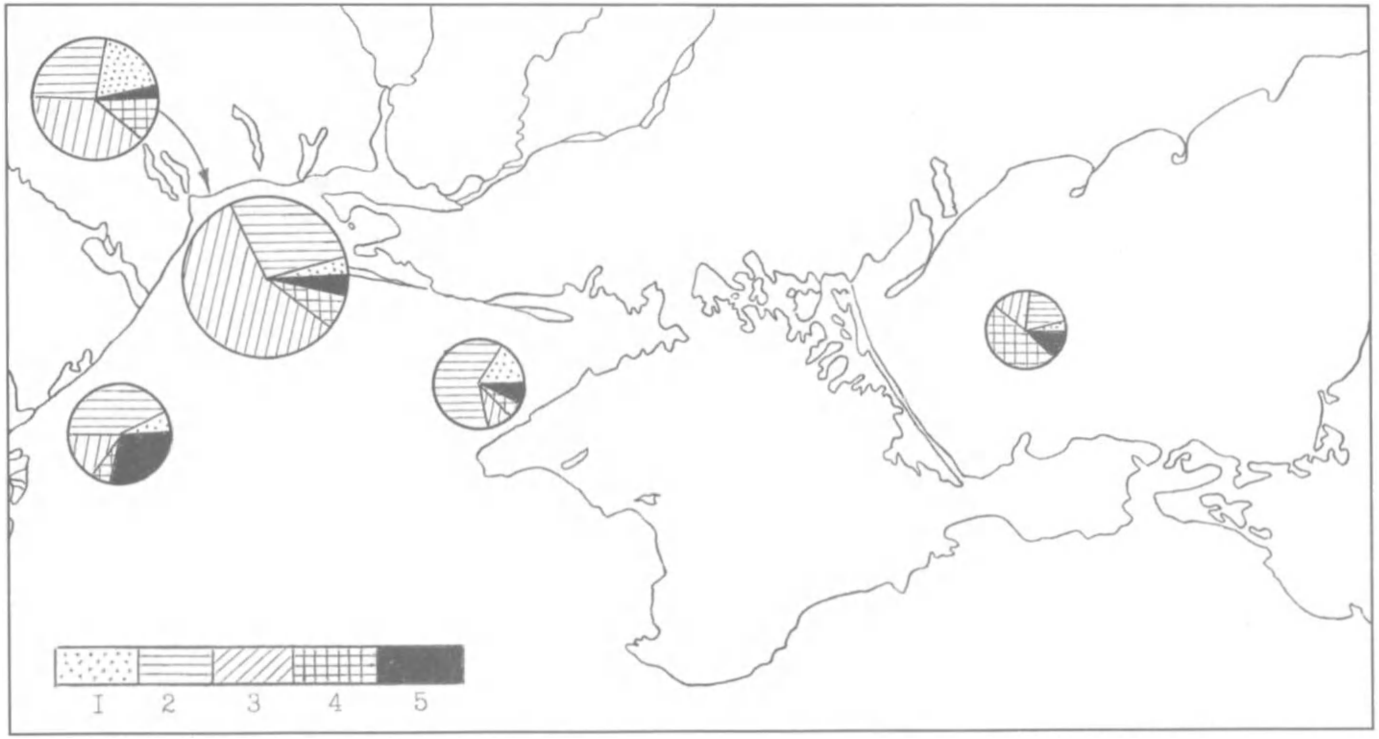


Fig. 14 Taxonomic groups of meiobenthos in the shelf zone of the Black Sea and the Sea of Azov.

1. Foraminefera. 2. Nematoda. 3. Harpacticoida. 4. Other groups. 5. Pseudomeiobenthos

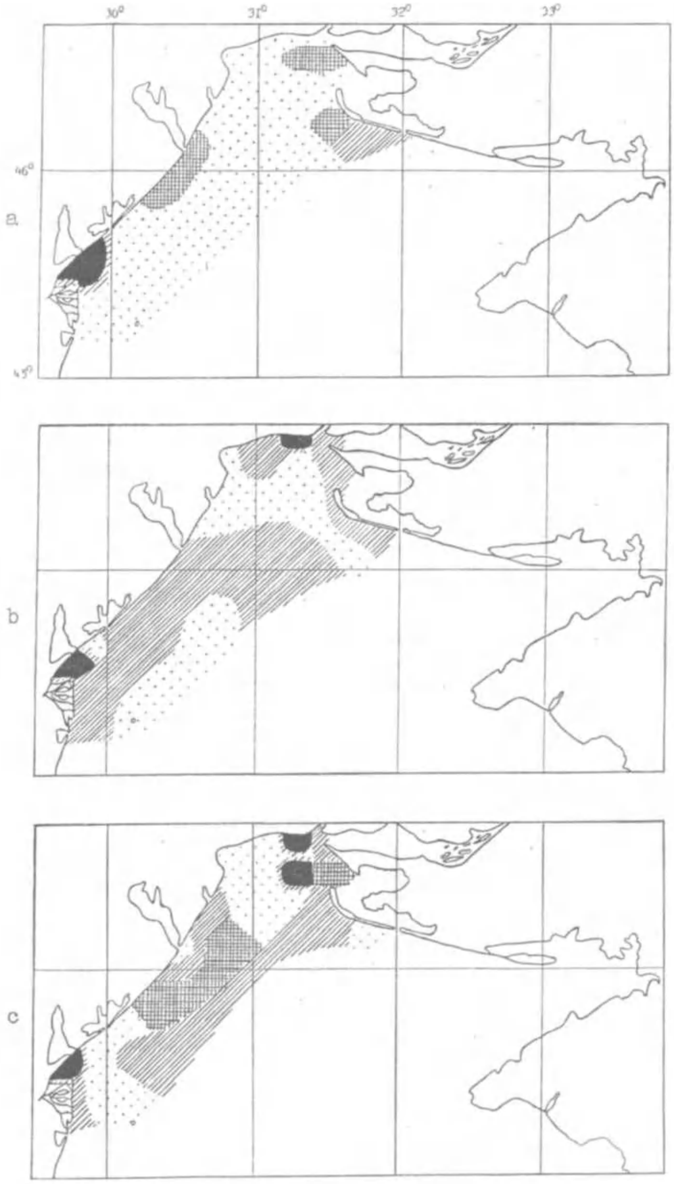
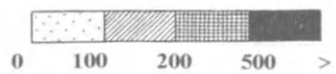


Fig. 15 Numbers (ind.m^{-3}) of meiobenthos in spring a - summer b - and autumn c - seasons.



The species diversity of ostracods on the northwestern shelf of the Black Sea was studied by Shornikov (1964, 1966, 1967). But in the last 20 years surveys of ostracods have been restricted to the biotope of sandy beach deposits (in the pseudosupralittoral) where seven species have been identified (Vorobyova, Zaitsev, Kulakova, 1992) The main aggregations are characteristic of coarse grained sands. They are encountered throughout the year with numbers peaking in May to October at around 36,000 ind.m^{-2}.

The first data on the akarofauna of the Ukrainian shores were published by Makkaveeva (1961, 1965), who investigated marine ticks of the Crimean coast and in adjacent macrophyte growths near Sevastopol. Ten species of Halacarida were identified. Studies of the akarofauna of the northwestern Black Sea and the Odessa Bay began in the 1970s. In 1979 Vorobyova and Yaroshenko identified 17 species of marine ticks while in 1988 Vorobyova and Kulakova identified 12 soil ticks in the interstitial area of sandy beaches. Halacarids make up from 0.2 to 1.2% of the meiobenthos, although the figure can be even higher in the upper sublittoral (0-1.5 m) in some areas of the northwestern Black Sea.

Studies of species diversity and the qualitative indices of meiobenthos, which in bottom biocoenoses are highly sensitive to changes in the environment, may help in evaluating the processes which have taken place in the past ten years and forecasting the consequences.

The first stage in the study of the meiobenthos of the northwestern Black Sea is the analysis of the distribution of different meiobenthos representatives according to environmental factors (temperature, salinity, depth, sediment type). Table 13 shows significant variations in population densities at various depths during different seasons. The maximum values were observed during the summer in silty sediments.

The species composition of the meiobenthos varies with different levels of eutrophication (Fig. 14). The spatial distribution of the quantitative indices of the meiobenthos is heterogeneous and may vary from 10 to 5,000,000 specimens m^{-2}. The highest values are observed during the mass development of foraminifers, particularly near "blooming" zones of phytoplankton in the near surface sea layers and the subsequent sedimentation of the algae at the bottom (Fig. 15).

Nematodes and foraminifers currently dominate the northwestern Black Sea. In the coastal area influenced by the Dnepr runoff and around Odessa Bay they account for 87.5-100% of the total. There have been significant changes in recent years. Of the permanent representatives, apart from nematodes, only harpacticoids and foraminifers can be found in large numbers under favourable conditions. Ostracods, halacarids, turbellarians, gastrotrichs, kinorhynchs are rare. Hypoxia and the resultant mass mortalities cause not only significant changes in the percentages of eumeiobenthos specimens, but reduce the proportion of the pseudomeiobenthos in the total number and biomass of organisms. Thus, in the Odessa area the moiety of the temporary component is less than 1.9% in the summer and 1% in the autumn. The meiofauna is only represented by three groups. Nematodes account for 65.7-84.2% of the total, rising to 100% in some areas. The heavy silting and low oxygen levels mean that most mollusc larvae which fall to the bottom perish (Vorobyova, 1990).

Thus, the species composition (Annex I, Table 8) and the qualitative indices of the meiobenthos are formed under the influence of natural environmental factors and undergo marked changes influenced by eutrophication and other anthropogenic factors.

Table 13. Average numbers (N, ind.m~2 and biomass B, mg.m~2) of the meiobenthos at different depths

Group		**<10m**	**10-15m**	**15-20m**	**<25m**
		SPRING			
Foraminifera	N	75025	104020	127343	177720
	B	39,0	54,0	66,2	92,4
Nematoda	N	163350	200425	296093	310688
	B	62,0	76,1	112,5	118,0
Harpacticoida	N	35450	20700	124062	83541
	B	354,5	207,0	1240,6	835,4
Other groups	N	1200	5135	3437	520
	B	46,9	163,9	131,8	20.8
Eumeiobenthos	N	275025	330280	550935	572469
	B	502,4	501,0	1551,1	1066,6
Pseudomeiobenthos	N	3000	3000	2187	3625
	B	155,0	69,5	138,1	49,4
Meiobenthos	N	278025	333280	553122	576094
	B	657,4	570.5	1689,2	1116,0
		SUMMER			
Foraminifera	N	8125	22200	20580	5530
	B	4,2	11,5	10.7	2,9
Nematoda	N	960833	279000	706275	187544
	B	365,1	106,0	268,4	71,2
Harpacticoida	N	599500	215000	420750	35862
	B	5995,0	2150.0	4207,5	358,6
Other groups	N	4555	21950	9250	7106
	B	42,6	599,3	286,7	180.1
Eumeiobenthos	N	1573013	538150	1156855	236042
	B	6006,9	2866,8	4773,3	615,7
Pseudomeiobenthos	N	26250	23250	16925	3193
	B	972,0	681,7	885,4	172,2
Meiobenthos	N	1599263	561400	1173780	239235
	B	6978,9	3548,5	5658,7	787,9
		AUTUMN			
Foraminifera	N	1850	416	6750	3750

	B	0.9	0.2	3.5	1,9
Nematoda	N	199850	137916	185770	507714
	B	75,9	52,4	70.5	192,9
Harpacticoida	N	31725	205000	72500	70142
	B	317,2	2050.0	725,0	701,4
Other groups	N	0	0	O	O
	B	0	O	O	O
Eumeiobenthos	N	265150	343332	265020	581606
	B	394,0	2102,6	799,0	896,2
Pseudomeiobenthos	N	9550	4583	4200	6642
	B	257,5	169,5	159,2	108,4
Meiobenthos	N	274700	347915	269220	588248
	B	615,5	2272,1	958,2	1004,6

V. Macrozoobenthos

The biological diversity of marine water bodies depends on many interrelated factors, such as salinity, type of sediment, oxygen regime and temperature.

The average salinity of the Black Sea is 18 ppt compared with 37 ppt in the Mediterranean. The species diversity of free living, multicellular organisms is 3.1 fold lower at 1,707 compared with 5,281 in the Mediterranean (Mordukhai-Boltovskoi, 1972). The average salinity of the Azov Sea is still lower (11 ppt) which explains an even lower diversity of species, a total of 350. This difference in salinity is because there is an upper limit of mesohaline waters between the Black Sea and Azov Sea averaging 15 ppt, which is very important for fauna. The Azov Sea is within the limits of the brackish water zone and differs from genuine marine waters in its impoverished fauna and its domination by species ready for osmoregulation.

Until the early 1970s the species composition and quantitative distribution of the macrozoobenthos can be characterized as seasonally stable with comparatively small annual fluctuations in density and biomass. But abrupt changes were observed in the macrobenthos, particularly in the freshened areas of northwestern Black Sea, in the early 1970s. The first mass mortality of benthic fauna was registered in the Dnestrovsky-Danube interfluve (DDI) in September 1973 (Salsky, 1977).

About 875 macrozoobenthos taxa have been identified on the Ukrainian Azov Sea-Black Sea shelf. In the last 20 years, 243 taxa have been recorded in the northwestern Black Sea and 312 near the Crimean coast. The fauna of the coastal areas is poor with 101 species being recorded in marine waters and 402 in freshwater areas (Tables 14. 16 and Annex I, Table 9). The macrobenthos of the Azov Sea includes 136 taxa (36 worms, 60 crustaceans, 23 molluscs and 17 others) (Vorobyov, 1949). The species composition of the macrozoobenthos of the Azov Sea was 4.1 times poorer than that of the Ukrainian Black Sea shelf.

Eutrophication is the most important of the complex of anthropogenic factors affecting the marine biota, causing periodical mortalities of benthic fauna due to a lack of oxygen (hypoxia).

Table 14. Temporal changes in the species diversity of the macrozoobenthos on the Ukrainian Black Sea shelf

Main systematic groups	**Till 1975**	**Contemporary state**			
		NWBS	Crimea	Coastal water bodies	
				salt	fresh
Worms	205	59	103	22	57
Crustaceans	202	91	89	50	68
Molluscs	186	69	89	21	72
Insecta	204	5	1	5	200
Others	78	19	29	J	5
Total	**875**	**243**	**312**	**101**	**402**

In the past two decades shelf the areas subject to hypoxia have spread from the near estuarine waters toward the centre of the sea. In some years the hypoxic areas have covered 66% of the northwestern Black Sea at depths of 10-40 m (Zaitsev et al, 1985). The time period for mass mortalities varies from one to three months.

The qualitative composition of the fauna is impoverished in the hypoxic zone as the result of the mortalities of species most sensitive to oxygen deficiency, such as crustaceans and other motile forms of epifauna.

Another result of eutrophication is a decline in water transparency, which has led to a degradation of macrophytes and a decrease in the numbers of corresponding phytophil hydrobionts. Some of the autochtonic benthic species were unable to adapt to changing environmental conditions and their range and their frequency has diminished significantly. At the same time the disturbed conditions have enabled opportunistic species such as *Nereis succinea* and *Spio filicornis* to flourish.

The species composition of the macrozoobenthos in the coastal zone of the sea changed more than the macrobenthos in deep water areas. Significant changes have occurred at the biocoenosis level. In the 1980s almost all the biocoenoses of the polychaete *Melinna palmata* disappeared, even though in the 1970s it had been widespread as the *Melinna clay* biocoenosis on the northwestern shelf (Losovskaya, Rytikova, 1987). Melinna's low productivity and lack of a pelagic stage of development meant that it was replaced by the *Mya arenaria* biocoenosis. At present this biocoenosis occupies large areas of the coast from Tendrovsky Bay in the east to the Danube delta in the west (Vorobyova, Sinegub, 1989). In 1983 a new biocoenosis of the polychaete *N. succinea* (Zolotarev, 1987) formed in the northwestern Black Sea. The oligochaetes biocoenosis was first recorded near the coast of Odessa in August 1994. *Nereis* and Oligochaetae biocoenoses are temporary. During the interim recovery period of the macrozoobenthos that follows mass mortalities, the areas previously occupied by *Nereis* and Oligochaetae biocoenoses are filled by mussel or clam biocoenoses.

There are currently 14 main biocoenoses on the Ukrainian Black Sea shelf. In the 1950s there were 12 benthic biocoenoses in the Azov Sea (Vorobyov, 1949). But hypereutrophication has transformed the structure of benthic biocoenoses. In 1992 there were only four biocoenoses in the Azov Sea, all of them new, namely: *Abra - Cerastoderma, Mya - Cerastoderma,* Mytilidae - *Balanus* and Cerastoderma - *Mytilaster* (Alyomov, 1994).

However, there are "oases of biodiversity," where the composition of the fauna has remained virtually unchanged since the 19th century. One of these "oases" is the coastal zone (up to 20 m) of Zmeiny island which accounts for almost 0.01% of the area of the Dnestrovsky-Danube interfluve. Up to 72 taxa can be found here, compared with 71 in all of the rest of Dnestrovsky-Danube interfluve (Table 15).

Table 15. Macrozoobenthos species numbers in the Dnestrovsky-Danube (DD)area of the Black Sea 1957-1984.

Main systematic groups	**Number of species**				**Index**
	DDM without Zmeiny island	Zmeiny island	Total	Common **to** both	of community of species
Worms	19	21	25	15	60.0
Crustaceans	24	21	36	9	25.0
Molluscs	23	22	31	14	45.2
Others	5	8	8	5	62.5
Total	71	72	100	43	43.0

The Zmeiny Island area is characterized by favourable environmental conditions. None of the mass mortalities observed elsewhere were observed here. The fauna of these areas differs to such an extent that the coefficient of community is equal to only 43%. Similar cases on the Ukrainian shelf of the Black Sea - Azov Sea basin include: Egorlitsky Bay (96 macrobenthos taxa), the Karadag coastal zone of (69) and Kerch Strait (111) (Table 16).

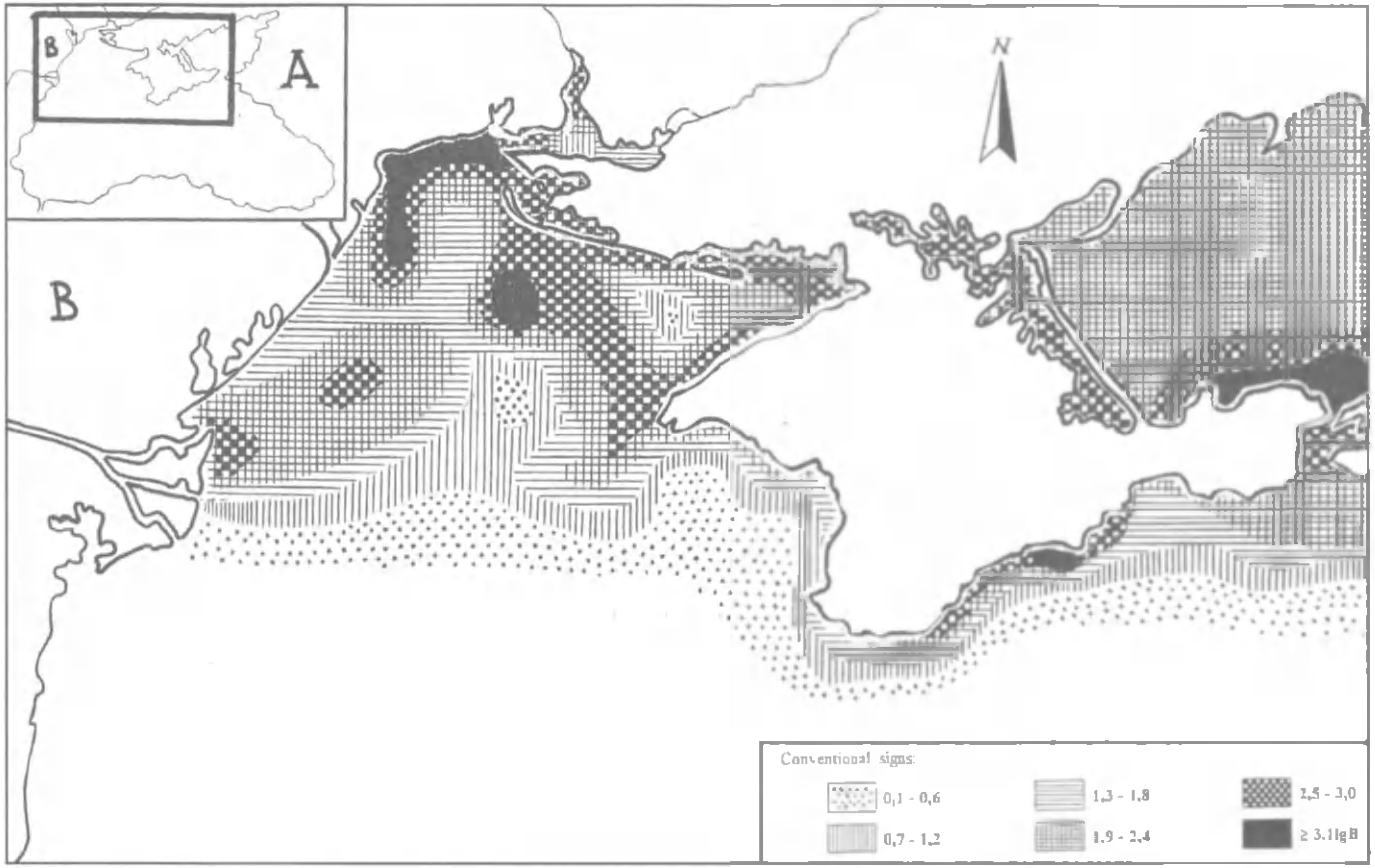


Fig. 16 Average annual distribution of macrozoobenthic biomass (B. g.m^{-3}) for the period 1984-1994.

Table 16. Macrozoobenthos diversity in different Ukrainian marine areas

Main systematic groups	Area and time of study		
	Egorlitsky Bay, 1988	Karadag, 1976-1978	Kerch Strait, 1989
Worms	29	25	39
Crustaceans	33	38	29
Molluscs	26	17	32
Others	8	9	11
Total	96	89	111

Egorlitsky Bay is shallow with a maximum depth of 6 metres and characterized by diverse biotopes and the mass development of macrophytes and higher aquatic plants and fungi. The Karadag region, one of the cleanest areas in the sea, is situated in the eastern part of the Crimea far from industrial centres and sources of freshening. High salinity (17.7-18.3 ppt), stable hydrological conditions, numerous cliffs and rocks, and macrophyte fouling promoted the development of copious fauna, some of which (e.g. polychaetes) are only encountered here.

A feature of the Kerch strait is that there are two parallel currents from the Azov Sea to the Black Sea and back. As a result no mortalities are evident in the bay, while the diversity of biotopes, the presence of macrophytes and the high aeration of the water have led to the development of a rich fauna. Fig. 16 gives the quantitative distribution of macrozoobenthos in the Ukrainian waters of the Black Sea and Azov Sea.

Table 17. Specific composition of the main taxonomic groups of the marine macrozoobenthos

Species	**Till 1975**	**Contemporary State Areas**			
		NWBS	Crimea	Water Bodies	
				Marine	Brackish
Porifera	22	3	7	-	-
Coelenterata	29	8	8	2	-
VERMES	205	59	104	22	57
Turbel laria	26	1	2	1	4

Nemertini	13	3	2	1	-
Polychaeta	114	54	99	15	5
Oligochaeta	37	1	1	5	33
Hirudinea	15	-	-	-	15
Bryozoa	13	1	2	1	5
Phoronidea	2	1	2	-	-
CRUSTACEA	202	91	89	50	68
Phyllopoda	1	-	-	1	-
Cirripedia	5	1	2	1	-
Decapoda	37	17	30	5	7
Mysidacea	20	6	2	5	9
Cumacea	22	12	9	6	12
Anisopoda	2	2	2	-	-
Isopoda	18	10	9	3	3
Amphipoda	93	42	32	29	37
Pantopoda	4	1	3	-	-
MOLLUSCA	186	69	89	21	72
Loricata	2	1	2	-	-
Gastropoda	116	32	43	12	55
Bivalvia	68	36	44	9	17
Echinodermata	5	2	4	-	-
Tunicata	7	4	6	-	-
INSECTA	204	5	1	5	200
Odonata	15	-	-	-	15
Ephemeroptera	9	-	-	-	9
Hemiptera-Heteroptera	19	-	-	-	19
Coleoptera	63	-	-	2	63
Megaloptera	1	-	-	-	1
Trichoptera	20	-	-	-	20
Lepidoptera	5	-	-	5	-
Culicidae	3	-	-	-	3
Chironomidae	61	5	1	3	57
Heleidae	5	-	-	-	5
Stratiomyidae	2	-	-	-	2
Ephidridae	1	-	-	-	1
Total	**875**	**243**	**312**	**101**	**402**

* Northwestern Black Sea

Ichthyofauna

I. General Characteristics of the Ichthyofauna of the Ukrainian Black Sea

The species composition of the fish and fishery resources of the Ukrainian Black Sea shelf is determined by the regional characteristics of the ecosystem and by common seasonal and long-term processes occurring in the Azov Sea-Black Sea basin due to natural causes and anthropogenic influences. The ichthyofauna of the Ukrainian Black Sea shelf currently consists of 154 species and subspecies of fish (Annex I, Table 10). A few species of fish, which are occasionally found in this part of the sea (e.g. *Euthynnus alleteratus, Xiphias gladius,* et al.), have not been included in the list.

The Ukrainian Black Sea shelf can be divided into two large areas, namely: the northwestern Black Sea from Cape Tarkhankut to the Danube; and the waters washing the coast of Crimea from Cape Tarkhankut to the Kerch Strait. The qualitative differences in the ichthyofauna of the two areas are determined primarily by differences in water salinity and average annual temperatures.

A significant freshening of waters in the northwestern Black Sea caused by river runoff from the Danube, Dnestr, South Bug, Dnepr and smaller rivers explains the appearance of freshwater and anadromous fish in limans and near estuarine areas and on the shelf. These fish breed in fresh water and include completely freshwater fish, mostly Cyprinidae and Cobitidae, which move down the rivers or enter the sea from irrigation canals. Semianadromous fish can be combined into one group; i.e. those which feed in fresh waters limited by the 10-12 ppt isohaline. The more common freshwater anadromous and semianadromous carps found on the shelf include: the *Vimba vimba n. carinata,* the royal fish *Chalcalburunus chalcoides danubica,* the bream *Abramis brama,* the common carp *Cyprinus carpio,* the sabrefish *Pelecus cultratus,* the roach *Rutilus rutilus hechkeli,* the catfish *Silurus glanis,* the pike *Esox lucius,* and the pike-perch *Lucioperca lucioperca.* During high water in the Dnepr some freshwater fish sometimes enter Odessa Bay.

Recently the grass carp *Ctenopharyngodon idella* and the silver carp *Hypophthalmichthys molitrix* have been often found in areas of Karkinitsky Bay and Dzharilgachsky Bay adjacent to outfalls from irrigation systems. In some situations about 10 species of freshwater fish can be found in the sea. Commercial fish such as the anadromous members of the sturgeon Acipenseridae family and the herring Clupeidae family play an important role in this part of the sea.

Brackish species account for a large number of the fish species in the limans and freshwater areas of the northwestern Black Sea. These include: the Black Sea kilca *Clupeonella cultriventris cultriventris, Percarina demidoffi* and a large group of gobies (Gobiidae). There is also a group of temperate marine species consisting of eight species of Boreal-Atlantic relicts, the remnants of glacial fauna, namely: the piked dogfish *Squalus acanthias,* the thornback ray *Raja clavata,* the sprat *Sprattus sprattus phalericus,* the flounder *Platichthys flesus luscus,* the Black Sea whiting *Merlangius merlangus euxinus,* the three-spined stickleback *Gasterosteus aculeatus,* the salmon *Salmo trutta labrax,* and the eel *Anguilla anguilla.*

The largest mass group of fish species in Ukrainian coastal waters is composed of marine thermophilic fish, including euryhaline forms entering fresh waters such as pipefish (Syngnathidae) and mullet (Mugilidae). Most of these fish are Mediterranean immigrants. Some of them have developed into a special Black Sea subspecies differing in some morphological characteristics and dimensions from the Mediterranean species. Most of these marine thermophilic species can be found near the Crimean coast, but some migrate into the northwestern Black Sea during spring-summer-autumn. The families with the largest number of species are: mullets (Mugilidae), porgies (Sparidae), wrasses (Labridae), blennies (Blennidae) and gobies (Gobiidae). The composition of the ichthyofauna in the near Danube, near Dnestr and near Dnepr regions of the northwestern Black Sea differs significantly.

The mullet *Mugil so-iuy,* which was introduced from far eastern waters, is one of the species that has recently become acclimatised to Ukrainian coastal waters. It has often been found in limans and in the sea and may be of commercial importance.

One specimen of *Chromogoluus quadrivittatus* (described by V. I. Pinchuk) was discovered near Odessa. Since it was encountered with several specimens of *Benthophiloides brauneri* it is assumed that is part of the ichthyofauna of this area. The species composition of fish in Karkinitsky Bay is also area specific. In summer the temperature of the water reaches 23-26 C° and the salinity 18-19 ppt. As a result some fish which are not normally found in northern waters, such as species from the Sparidae, Labridae, Centracanthidae and Gobiesocidae families, enter Karkinitsky Bay. The most commonly encountered species are the blue damsel fish *Chromis chromis,* the sea bach *Arnoglossus kessleri,* and the sting ray *Dasyatis pastinata.* Sturgeons feed in Karkinitsky Bay. The construction of irrigation systems has also led to the introduction of freshwater fish. Fish which inhabit the rocky bottom of the southern and southeastern coasts of the Crimea can be found near the rocky coast of Cape Tarkhankut.

The main *Phyllophora* field of Zernov, which is located in the central zone of the northwestern Black Sea, also has distinct ichthyofaunic characteristics.. Although the area of the sea bottom covered by *Phyllophora* has declined significantly over the last 30 years, the species composition of the fish in the field has changed little. Species can be found which are normally closely associated with overgrowths of aquatic plants and the typical inhabitants of the sandy, muddy-sandy and sandy-shelf sediments which prevail throughout the northwestern Black Sea. The most common species include the dragonets Callionymidae and the two-spotted clingfish *Diplecogaster bimaculata euxinica.* Some of the inhabitants acquire a typical reddish-brown colouring to their fins and body.

The species most characteristic of the northwestern Black Sea are gobies, herrings and sturgeons. Other common species include: the silverside *Atherina boyeri,* the red mullet *Mullus barbatus ponticus,* the greater weever *Trachinus draco,* the common stargazer *Uranoscopus scaber,* the flounder *P. flesus luscus,* the piked dogfish *S. acanthias,* the anchovy *Engraulis encrasicholus ponticus,* the sprat *S. sprattus phalericus,* and the Black Sea horse mackerel *Trachurus mediterraneus ponticus.*

Seasonal changes in water temperatures have a significant impact on the qualitative composition and dispersal of fish in northwestern Black Sea. In the autumn the majority of fish species migrate from the coastal zone and return in the spring. The northwestern Black Sea plays an important role in the spawning and feeding of fish species migrating into this area.

Fish migrating from the Sea of Marmara are also very important. In the 1960s these included commercially important species such as the bonito *Sarda sarda,* the mackerel *Scomber scombrus,* and the blue fish *Pomatomus saltator.*

The qualitative and quantitative composition of the northwestern Black Sea has undergone considerable changes in the last ten years. There has been a decline in the standing stocks of large long-living commercial fish, such as sturgeons, the turbot *Psetta maeotica,* large herrings and large gobies. Short cycle species now appear more frequently in commercial catches. The annual mass mortalities of hydrobionts as a result of excessive eutrophication has had a negative impact on the ichthyofauna of the Ukrainian shelf.There are many thermophilic fish in the coastal waters of the Crimea, which is why its marine ichthyofauna is more diverse than that of the northwestern Black Sea. The presence of cliffs and rocks creates favourable conditions for fish families such as pipefishes, wrasses, porgies, blennies, gobies, dragonets (Callionymidae), and clingfishes (Gobiesocidae).

In terms of ichthyofaunic species composition, the waters near the Crimean coast can be divided into three main areas, namely: from Cape Tarkhankut to Sevastopol; from Sevastopol to Koktebel; and from Koktebel to Kerch. The first and third regions include high numbers of species which are characteristic of low salinity. The largest number of marine species of fish of marine origin occur in the region from Sevastopol to Koktebel.

It should be emphasized that the species composition has become impoverished in some regions of the Ukrainian Black Sea shelf. For example, the seahorse *Hippocampus ramulosus,* the straight-nosed pipefish *Nerophis ophidion* and the dotted dragonet *Callionymuss risso* have almost disappeared from the region adjacent to Odessa. In spite of the decline in standing stock, the most important species in terms of the volume of the commercial fish catch are: the anchovy *E. encrasicolus ponticus,* the Black Sea sprat, the horse mackerel *T. mediterraneus ponticus,* the silverside *A. boyeri,* the whiting *M.*

merlangus euxinus, the piked dogfish 5. *acanthias,* the Black Sea shad *Alosa kessleri pontica,* mullets (Mugilidae), gobies (Gobiidae), and the Black Sea *turbot P. maeotica.*

II. Ichthyofauna of the Black Sea and Azov Sea Estuaries

Fish from six ecological groups can be found, either temporarily or permanently, in the estuaries of the Black Sea and Azov Sea. Fish species vary according to salinity and other ecological conditions.

Brackish water fish can be found in low salinity areas of the Black Sea and Azov Sea and in the estuaries of large, medium-sized and small rivers in their basins (e.g. the Danube, Dnestr, Dnepr, South Bug and Molochny). Semianadromous fish which feed in B-mesohaline waters (up to 5.0-8.0 ppt) but move to fresh water to breed, can be found in the freshened parts of estuaries and the lower reaches of rivers.

Marine fish can be found in the Black Sea and in some Black Sea coastal limans (and Sivash lagoons) in two categories of brackish waters (a-mesohaline 5.01-18 ppt and polyhaline 18.01-30 ppt) and two categories of salt water (euhaline, 30.01-40.00 ppt, and ultrahaline, more than 40 ppt).

Anadromous fish continuously live and feed in the Black Sea and Azov Sea in brackish waters with a high salinity (a-mesohaline and polyhaline), but migrate to the fresh waters of the Danube, Dnestr, Dnepr, South Bug, Don and Kuban rivers to breed. Most of the anadromous fish of Ukraine make anadromous migrations to feed and migrate from marine water to fresh water to breed. The only exception is the eel *Anguilla anguilla,* which makes catadromous breeding migrations. In its adult form it makes breeding migrations from fresh water and Ukrainian waters to the Sargasso Sea across the breadth of the Atlantic Ocean, using one of two routes: from the rivers of the Vistula basin (West Bug) through the Baltic Sea; and from rivers of the basins of the Danube, Dnestr, South Bug, Dnepr and Don (Siversky Donets) through the Black Sea.

Bony fish, which can be found in the open Black Sea (such as the pike dogfish Squalus acanthias, the thornback ray *Raja clavata* and the common stingray, *(Dasyatis pastinaca),* are not found in the estuarine areas of Ukrainian rivers and estuaries. The only bony fish which can be found in these waters are the subclass Actinopterygii, which are represented by a small, but ancient and very valuable, gourmet group of ganoid fish, the order of sturgeon-like fish.

The Acipenseridae sturgeon family comprises six species, including five anadromous species (the great sturgeon *Huso huso,* the spiny sturgeon *Acipenser nudiventris,* the Russian sturgeon *A. guldenstadti colchicus,* the Atlantic sturgeon *A. sturio,* and the starred sturgeon *A. stellatus)* and one freshwater species, the sterlet *A. ruthenm.* All six species are classed as disappearing, rare or endangered.

The Clupeidae herring family has five representatives: the Black Sea shad *Alosa kessleri pontica,* the anadromous form; the marine Black Sea shad, the brackish form; the Caspian shad *A. caspia nordmanni,* a semianadromous species; the sprat *Sprattus sprattus* *phalericus,* a marine species; and the Black Sea kilka *Clupeonella cultriventris cultriventris,* which is adapted to different salinities.

The Salmonidae family is represented by the anadromous Black Sea salmon *Salmo trutta labrax;* the Umbridae family by the freshwater European mudminnow *Umbra krameri;* and the Esocidae family by the freshwater pike *Esox lucius.*

A total of 34 species from the Cyprinidae family can be found in the Ukrainian Black Sea, of which the Black Sea roach *Rutilusfrisii,* the long-whiskered gudgeon Gobio uranoscopus, and the barbel *Barbus barbus boristhenicus* are classed as endangered. The following species should also be included in the Ukrainian Red Data Book: the Agam chub *Leuciscus agamicus,* the chub *E cephalus,* the dominub *E boristhenicus,* the undermouth Chondrostorma nasus, the Dnestr long-whiskered gudgeon *Gobio kessleri,* the barbel *Barbus barbus,* the vimba *Vimba vimba,* and the sabrefish *Pelecus cultratus.* There are also three acclimatised species, namely: the grass carp *Ctenopharyngodon idella,* the silver carp *Hypophthalmichthys molitrix* and the stone moroco *Pseudorasbora parva.*

The Siluridae family is represented by the catfish *Siluris glanus,* a semianadromous, freshwater form. The Anguillidae family is represented by the catadromous European eel *Anguilla anguilla.* The Gasterosteidae family has two representatives: the brackish southern nine-spined stickleback *Pungitius platygaster platygaster,* and the three-spined stickleback *Gastrosteus aculeatus,* which inhabit waters of different salinity. There is one representative of the Centarchidae family, the freshwater common sunfish *Lepomis gibbosus,* which was introduced from North America.

There are seven representatives of the Percidae family, including the pike-perch *Lucioperca lucioperca* and the Volga zander *Lucioperca volgensis,* which have semianadromous and freshwater forms, the sea zander *Stizostedion marinus,* the percarina *Percarina demidoffi,* the river perch *Percafluviatilis,* the ruffe *Acerina shraetser,* and the Don ruffe *Acerina acerina.* The sea zander is under threat of extinction, while the ruffe and the Don ruffe are included in the Ukrainian Red Book Data Book. The Pleuronectidae family is represented by only species, Platichthys flesus luscus, which can be found in water of varying salinity.

III. Marine Mammals

The mammals of the Black Sea are represented by the monk seal *Monachus monachus* and three species of dolphins, the bottlenosed dolphin *Tursiops trucatus ponticus,* the common dolphin *Delphinus delphis ponticus* and the harbour porpoise *Phocaena phocaena relicta.*

The high mobility and long migrations of dolphins means that it is difficult to make accurate estimates of their numbers in specific national waters in the Black Sea. The following data is for the whole of the Black Sea.

In the 1950's there were almost one million dolphins in the Black Sea. According to L. Zenkevich (1963), they consumed almost 5 x 105 tonnes of fish annually. In the mid-1960s the dolphin population had fallen to 3 x 105 animals. In 1966 the capture of dolphins was prohibited in the USSR, Romania and Bulgaria. The Turkish catch of dolphins ceased in 1983.

In 1983 and 1984 a combined ship and air survey estimated the Black Sea dolphin population at 60,000-100,000 animals (Vinogradov, Simonov, 1989). In 1987 a four-ship survey by Turkish scientists counted 51,226 animals in a 60 km zone along the southern coast ofthe Black Sea (Celikkale et al., 1989). The main species (59.1%) was the common dolphin, followed by bottlenosed dolphins (32.5%), and harbour porpoises (8.41%). An extrapolation to the entire Black Sea would suggest a total Black Sea dolphin population of 454,440.

Such a discrepancy in the estimates of dolphin numbers can be explained by the different methods used (the Turkish survey did not include aerial observations), and by the different concentrations of dolphins in the southern and northern waters of the Black Sea. Dolphins are much more abundant in the southern zone than in the northern and central Black Sea. For example, at the end of September 1991, a cruise by the research vessel "Professor Vodyanitsky" from Yalta in the Crimea to Varna in Bulgaria (about 600 km) only encountered 3-4 dolphins. However, it is clear that the 1987 estimate of a then current dolphin population of 500,000 individuals was a considerable exaggeration (Zaitsev, 1993).

IV. Parasites

The main freshwater biotopes investigated for the presence of parasitofauna are shown in Table 18. The greatest biodiversity of parasites was observed in the lower reaches and the delta of the Dnepr and the estuarine part of the Danube (Table 19). The dominant hydrobiont parasite species were trematodes (Table 20). The parasites and commensals of the most common Black Sea invertebrates are shown in Table 21.

The extent of research on the parasitofauna of marine hydrobionts of different taxonomic groups and fish-eating birds varies significantly and is closely related to their economic value (fish, commercial species of molluscs, some bird species and marine mammals) or the role of these organisms in the life cycles of the above-mentioned animals.

The most extensive data is on the parasites of 84 species of marine birds (Reshetnikova, 1955; Radulescu, 1970; Gaevskaya et al., 1975) for the helminthofauna of 45 species of fish-eating birds and 4 species of marine mammals. Trematodes, monogenea, cestoda and nematodes are the most frequent parasites of marine fish.

The parasitofauna of marine invertebrates has been less studied, except for molluscs *(Mytilus galloprovincialis* and *Ostrea edulis)* used in mariculture, for which more than 15 species of parasites, commensals and shell-borers (Kholodkovskaya, 1989, Gaevskaya et al., 1990) have been identified, including pathogenic species for molluscs, such as,: *Steinhausia mytilovum, Protoeces maculatus* and *Cliona vastiftca* (Table 21). The helminthofauna of other species of bivalves and gastropods *(Hydrobia, Rissoa, Mytilaster, Abra)* includes 10 species of larval trematodes (Dolgikh, 1970) ascribed to six families and two orders, namely: *Bucephalidae* (1), *Diplostomatidae* (1), *Acanthocolpidae* (1), *Fellodistomatidae* (3), *Halporidae* (1), and *Hemiroidae* (4 species).

The diversity of the parasitofauna of molluscs in different regions of the sea is determined by hydrobiological, hydrochemical and hydrological conditions, and is most diverse in coastal areas, shallow water lagoons and salt limans.

From the 1980s onwards anthropogenic factors have had a significant impact on changes in the parasitofauna of molluscs.

Table 18. The main habitats of the freshwater parasites of the Ukrainian Black Sea

Area	Biotope	Boundaries
Lower reaches and delta of Dnepr	Wetlands freshwater River	Coastal River bed zones
Dneprovsko-Bugsky liman	Wetlands freshwater Littoral freshwater Littoral brackish water	Eastern part, left bank of the central part Coastal zone of the right bank, eastern and central parts Coastal zones of the Bug-sky liman and western part of the Dneprovsky liman
Liman of the northwestern part of the Black Sea	Wetlands freshwater Wetlands brackish water	Upper reaches and coastal zones of the limans of Kagul, Yalpug, Katlabukh, Safyan, Kugurliy Upper reaches and coastal zones of Berezansky and Bugsky limans
Estuarine part of the Danube	Wetlands main River	Coastal and wetland zones River bed zones of the lower reaches of the delta.

	Littoral brackish water	Littoral and kuts of the front edge of the delta
Dnestrovsky estuarine area	Wetlands	Wetland zones of the lower Dnestr reaches and coastal zones of the upper part of the Dneprovsky liman
	River	The river bed zones of the lower reaches of the Dnestr
	Littoral	Coastal zones of the lower reaches and limans

Table 19. Total number of freshwater parasites

Area	**Number of registered species**	**Degree of confidence**	**Number of proposed species**
The lower reaches and delta of Dnepr	239	High	about 300
Dneprovsko-Bugsky liman	178	Medium	@ 250
Limans of the northwestern Black Sea	158	Medium	@250
The estuarine part of the Danube	248 (Kiliya delta)	High	@350
The Dnestrovsky estuarine area	68	Medium	@250
Total	about 250	Medium	(a) 300

Table 20. The dominant species of hydrobiont parasites in the freshwater area.

Dominant species	Area			
	1	2	3	4
Sphaerostomum bramae	+		+	
Plagioporus scrjabini	+		+	
Apophallus muhlingi	+		+	
Sanguinicola inermis	+		+	
Rhipidicotyle illense	+			
Bucephalus polymorphus	+			+
Crowcrocaecum skrjabini	+			+
Aspidogaster limacoides	+			+
Dactylogyrus simplicimalleata	+			
D. similis	+			
Posthodiplostomum cuticola	+	+	+	+
Ligula intestinal is	+	+	+	
Asymphylodora imitans		+	+ '	+
Pleurogenoides medians			+	
Echinoparhyphium echinatoide		+	+	
Maritrema subdolum			+	
Polymorphus magnus		+	+	
Dactylogyrus ex tens us		+	+	
Myxobolus ellipsoides		+	+	
Caryophyllaeus laticeps		–	–	
Paradiplozoon homoion		+	+	
Diplozoon paradoxum		+	+	+
Acanthocephalus anguillae		+	+	
Phyllodistomum elongatum		+		+
Ergasilus sieboldi		+		

. Lower reaches and delta of Danube
2. Near Danube limans
3. Estuarine part of the Danube
4. Dnestrovsky estuarine area.

Table 21. List of parasites, commensals and shell-boring organisms of Black Sea mussels and oysters

Species	**Molluscs**	**Area**		
Mastigophora		1	2	3
Hexamita nelsoni	*Mytilus galloprovincialis*		+	
Sporozoea				
Nematopsis legeri	*M. galloprovincialis, Ostrea edulis*		(+)	+
Microsporidia				
Steinhausia mytilovum	*M. galloprovincialis*		+	+
Peritricha				
Ancistrum mytili	*M. galloprovincialis 0. edulis*	+	+	+
Peniculistoma mytili	*M. galloprovincialis O. edulis*	+	+	+
Gargarius gargarius	*M. galloprovincialis*		+	
Raabella helensis	*M. galloprovincialis*		+	
Porifera				
*C Пona vastifica**	*M galloprovincialis*			+
Plathelminthes				
Urastoma cyprinae	*M. galloprovincialis 0. edulis*	+	+	+
Proctoeces maculatus	*M. galloprovincialis*		+	+
Parvatrema duboisi	*M galloprovincialis*		+	+
Annelides_				
*Polydora ciliata**	*M. galloprovincialis O. edulis*		+	+
Mollusca				
*Gastrochaena dubia**	*M. galloprovincialis 0. edulis*			+
*Petricola lithophaga**	*M. galloprovincialis 0. edulis*			+

1. open waters of the northwestern Black Sea at depths exceeding 10 m
2. coastal waters of the northwestern Black Sea, limans, bays
3. coastal waters of the Crimea

* shell-borers

(*) Cape Tarkhankut

V. Main Benthic Biocoenoses

Bottom communities are classified according to biotope (Zernov, 1913; Zenkevich, 1963; Bacescu et al., 1991; Marinov, 1990) or species-dominants or edificators (Konstantinov, 1979; Kiseleva, 1981). It is the latter criterion which has been used below, as it is believed that the description of communities more fully illustrates the adaptation of species and their populations to changing environmental conditions.

The quantitative development of dominant species may indicate a zone in the biotope with a characteristic community. The main location of the community is where the dominant species has a maximum density index compared with other areas. The index is calculated according to the formula $\sqrt{bp}$, where b is the biomass in $g.m^{-2}$ and p is the frequency in percent.

Today there is no consensus of opinion as to the number of bottom communities either on the Ukrainian shelf or in the Black Sea as a whole. This may be explained by the spatial heterogeneity of the distribution of different communities and a considerable diversity of environmental conditions.

The differences in environmental conditions in the benthos on the northwestern and Crimean shelves (from Cape Tarkhankut to Kerch Strait) result in the biocoenoses having significantly different species compositions and quantitative characteristics. The main reasons for this are the diverse thermohalinity, amplitudes of temperature and variations in salinity. Fig. 17 gives a detailed description of the communities on the northwestern shelf and Fig. 17a a description of communities on the Crimean shelf. The communities have been named after their dominant species.

The *Modiolus phaseolinus* Biocoenosis

Modiolus phaseolinus is a bivalve mollusc living at depths of 55-125 m on silty sediments called phaseolina sediments. In terms of depth it is the lowest biocoenosis on the Black Sea northwestern shelf

The community comprises 31 taxa. Its density (D) varies from 24-2,170 $ind.m^{-2}$ of phaseolina and its biomass (B) from 3-230 $g.m^{-2}$. The mass species of the biocoenosis are: *Amphiura stepanovi* (D = 8-210 $ind.m^{-2}$, B = 0.1-0.8 $g.m^{-2}$), *Mytilus galloprovincialis* (D = 4-290 $ind.m^{-2}$, B = 32.4-122.0 $g.m^{-2}$), and *Prionospio cirrifera* (D = 4-50 $ind.m^{-2}$, B = 0.01-0.04 $g.m^{-2}$).

The biocoenosis of the Crimean shelf comprises 85 taxa (D = 80-3,320 $ind.m^{-2}$, B = 1.7-147.5 $g.m^{-2}$). The mass species are: *Amphiura stepanovi* (D = 20-120 $ind.m^{-2}$, B = 0.3-2.0 $g.m^{-2}$) and *Terebellides stroemi* (D = 40-200 $ind.m^{-2}$, B=0.7-2.7 $g.m^{-2}$).

Particularly in its upper levels, the phaseolina biocoenosis serves as a feeding ground for large adult species of some benthic fish, including the great sturgeon, turbot and whiting (Vinogradov, 1959; Zaitsev, personal observations underwater in 1985).

The Polychaeta *Terebellides stroemi* Biocoenosis

The Polychaeta *Terebellides stroemi* biocoenosis has been observed at depths of 50-100 m on exclusively silty sediments near the shelf west and southeast of Crimea. Sergeeva reported 27 taxa. The density of the *Terebellides stroemi* biocoenosis varied from 36-384 ind.m-2 and its biomass from 0.2-17.6 g.m"^{2}). The mass species were: *Nephthys hombergii* (D = 8-100 ind.m"^{2}, B = 0.1-1.7 g.m"^{2}), *Aricidea claudiae* (D = 4-76 ind.m"^{2}, B = 0.002-0.03 g.m"^{2}), *Oligochaeta sp.* (D = 4-8 ind.m"^{2}, B = 0.002-0.008 g.m"^{2}), *Iphinoe maeotica* (D = 4-20 ind.m"^{2}, B = 0.004-0.024 g.m"^{2}) and *Amphiura stepanovi* (D = 4-40 ind.m"^{2}, B = 0.03-0.43 g.m"^{2}). The mass species sometimes also include the bivalve mollusc *Abra nitida milachewichi.*

The Polychaeta *Melinna palmata* Biocoenosis

The Polychaeta *Melinna palmata* biocoenosis is composed of the polychaete *M. palmata.* This biocoenosis is widespread on the northwestern shelf. It is located at a depth of 12-35 m on silty and silty-sandy sediments. The average density and biomass of the macrozoobenthos is 290 ind.m"^{2} and 30 g.m"^{2} respectively. The dominant species, *M. palmata,* accounts for 19-27% of the total biomass of the community (Zambriborsch et al., 1973). The biocoenosis includes 47 animal species. The mass species are: *N. hombergii, Nereis diversicolor, Ampelisca diadema* and *Abra nitida milachewichi.*

Sturgeons winter in the melinna sediment zone to the south of Odessa bank, the so-called "starred sturgeon hole", where they feed on the melinna (Vinogradov, 1959). Since the 1980s there has been an increase in the area covered by the biocoenoses in Karkinitsky Bay (Zolotarev, Povchun, 1986; Zolotarev et al., 1991).

The mollusc *Gouldia minima* Biocoenosis

The biocoenosis of the bivalve mollusc *G. minima* occupies small areas on silty-sandy sediments of the Crimean Shelf at depths of 20-50 m. Up to 106 species have been recorded (Kiseleva, 1981). The density and biomass of *G. minima* in the biocoenosis are 90-180 ind.m"^{2} and 7.5-12.0 g.m"^{2} respectively. The mass species are: the bivalve mollusc *Lucinella divaricata* (D = 12-150 ind.m"^{2}, B = 0.03-0.60 g.m"^{2}); and the gastropod *Tritia reticulata* (D = 7-14 ind.m"^{2}, B = 3.0-5.5 g.m"^{2}) (N. Sergeeva, personal communication).

The mollusc *Venus gallina* Biocoenosis

The mollusc *Venus gallina* biocoenosis is found on sandy sediments mostly on the Crimean Shelf, and at depths of 7-30 m on the northwestern shelf in Karkinitsky Bay.

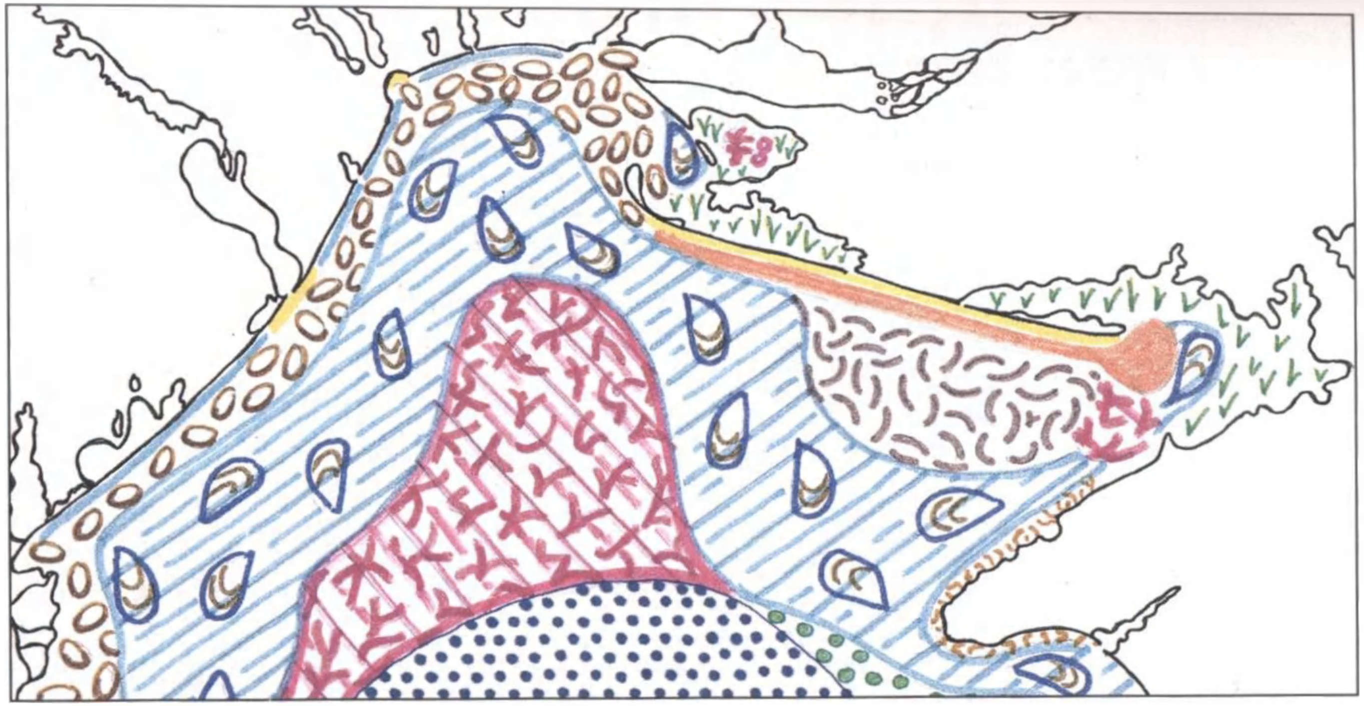


Fig. 17 Benthis biocoenoses of the Ukrainian shelf of the Black Sea (northwestern part). Conventional signs in Fig. 17a.

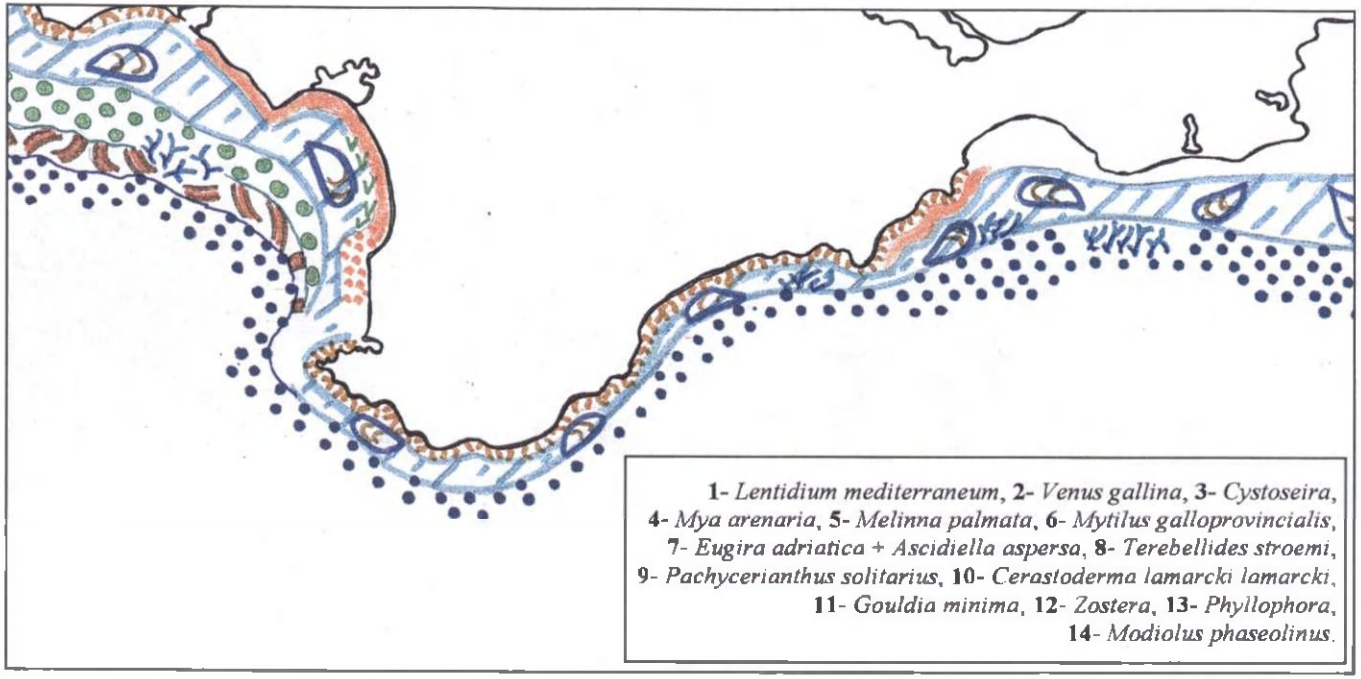
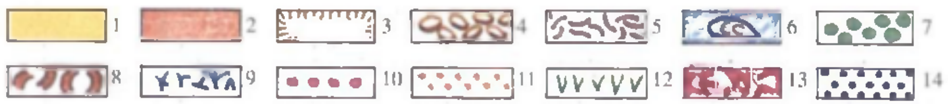


Fig. 17a Benthis biocoenoses of the Ukrainian shelf of the Black Sea. (Crimean shelf)



Crimean shelf

The density and biomass of *V. gallina* in the biocoenosis are 90-400 ind.m"^{2} and 27-1010 g.m-2 respectively. The mass species are: the bivalve molluscs *Gouldia minima* (D = 130-390 ind.m^{2}, B = 6.5-24.0 g.m'^{2}) and *Spisula subtruncata* (N = 8-165 ind.m"^{2}, B = 1.3-24.0 g.m'^{2}) (N. Sergeeva). There are 140 species (Kiseleva, 1981)

The high populations of polychaetes and small molluscs provide food for fish such as the striped mullet, the gurnard and some goby species.

Northwestern shelf

The density and biomass of *V. gallina* in the biocoenosis are 10-800 ind.m"^{2} and 8-1000 g.m-2 respectively. The total number of macrozoobenthos species in the community is 5-7. The mass species are: ophyura *Amphiura stepanovi* (D = 8-210 ind.m"^{2}, B = 0.1-1.8 g.m'^{2}), *Mytilus galloprovincialis* (D = 4-290 ind.m"^{2}, B = 32-122 g.m'^{2}), the polychaeta *Prionospio cirrifera* (D = 4-50 ind.m"^{2}, B = 0.1-0.04 g.m"^{2}) and the sponge *Spongia sp.* (B = 0.2-1.4 g.m'^{2}).

The mussel *Mytilus galloprovincialis* Biocoenosis

The dominant species is the bivalve mollusc *M. galloprovincialis,* which is the most widespread mussel in the Black Sea macrozoobenthos and plays an important role in the functioning of the shelf ecosystem. It is distributed across wide areas at depths from the spray zone to 55 m, inhabiting natural (silts, sands, shells, rocks) and artificial substrates (concrete, metal, synthetic materials).

On the Crimean shelf its density and biomass are 50-1,500 ind.m"^{2} and 115-3,100 g.m'^{2}) respectively (Sergeeva). On the northwestern shelf the figures are D = 10-54,000 ind.m'^{2} and B = 1-18,000 g.m"^{2} respectively (Sinegub). Particularly high densities have been observed on the anthropogenic substrates elevated above the bottom. On concrete shoreline reinforcements in Odessa Bay the average density and biomass of mussels were 14,200 ind.m'^{2} and 18.9 kg.m'^{2}. (maximum D = 17,200 ind.m'^{2} and B = 36.2 kg.m'^{2}) (Alexandrov, 1991). Even higher indices were discovered in Karkinitsky Bay on the supports of marine stationary platforms used for extracting gas. The average density and biomass were 15,500 ind.m"^{2} and 28.3 kg.m"^{2} (maximum D = 30,750 ind.m"^{2} and B = 65.3 kg.m"^{2} (Zolotarev et al.).

On the northwestern shelf the mass species of the biocoenosis are: the bivalve mollusc *Mya arenaria* (D = 10-2,400 ind.m"^{2}, B = 0.3-890 g.m"^{2}), the barnacle *Balanus improvisus* (D = 10-2,000 ind.m"^{2}, B = 0.3-220.0 g.m"^{2}), the polychaetes *Nereis succinea* (D = 10-1,600 ind.m"^{2}, B = 0.2-75.0 g.m"^{2}), *Polydora ciliata limicola* (D = 10-1200 ind.m"^{2}, B = 0.1-1.0 g.m"^{2}), *Prionopsio cirrifera* (D = 10-5,000 ind.m"^{2}, B = 0.1-5.2 g.m"^{2}). A total of 84 species of macrozoobenthos have been recorded.

On the Crimean shelf the mass species are: the mollusc *Modiolus adriaticus* (D = 30-130 ind.m"², B = 34.6-96.2 g.m"²) and the polychaete *Terebellides stroemi* (D = 31-142 ind.m"², B = 1.3-13.3 g.m"²). The biocoenosis consists of 105 animal species.

The mollusc biocoenosis plays an important role in providing food resources to benthic feeding fish, including turbots, flounders gobies and sturgeons. The predatory mollusc Rapana thomasiana is frequently encountered, particularly on the Crimean Shelf.

The mollusc *Mya arenaria* Biocoenosis

The bivalve mollusc *Mya arenaria* biocoenosis can be found on sandy and silty-sandy sediments at depths of 1-16 m (Zambriborsch et al., 1979), sometimes at 26 m (Ivanov, 1973), mainly dispersing in fresh waters.

M. arenaria was first recorded in the Black Sea in 1966 (Beshevli, Kalyagin, 1967). It squeezed out the aborigenic biocoenosis of the bivalve mollusc *Lentidium mediterraneum.* It is now most widespread in the estuarine regions of the northwestern Black Sea.

The density and biomass of *M. arenaria* varies in the range of 600-33,600 ind.nr and 240-2400 g.m"². The dominant species accounts for an average of 80% of the total (Kiseleva, 1988), rising to 96% in the river runoff regions such as the Danube-Dnester interfluve (Chichkin, Medinets, 1994).

I. Sinegub identified 76 macrozoobenthos species. The main species are the polychaetes *Nereis succinea* (D = 10-2,100 ind.m"², B = 0.01-60.0 g.m"²) and the Polydora *ciliata limicola* (D = 10-1800 ind.m"², B = 0.01 -0.67 g.m"²).

The *M. arenaria* biocoenosis has been observed in marine bays (e.g. in the central part of Tendrovsky Bay). According to D. Chernyakov, it is encountered at depths of 8-IO m in the biotope of silty limestone. It includes 12 macrozoobenthos. The average density and biomass are 3,000 ind.m-2 and 38 g.m-2 respectively.

The mollusc *Lentidium mediterraneum* Biocoenosis

The dominant species *L. mediterraneum (=Corbulomia maeotica)* is encountered on sandy sediments in shallow waters (from the spray zone to 20 m) mostly in the freshened areas of the northwestern shelf.

Up to 30 individuals of 1-3 mm barnacles encrust the shells of one *Lentidium.* The total volume of barnacles may exceed the volume of the mollusc by a factor of five or more, which in summer results in mass stranding of the molluscs on the shore.

The density and biomass of *L. mediterraneum* vary in the range of 5,000-145,000 ind.m-2 and 60-90 g.m"² (Grinbart, 1949; Zakutsky, 1963, Kiseleva, 1981, Sinegub, 1993). The biomass of the dominant species accounts for 79-98% of the entire community (Kiseleva, 1981, Sinegub, 1993). Up to 30 macrozoobenthos species have been recorded in the biocoenosis.

In the fresh water areas of the northwestern shelf (e.g. Odessa Bay) the mass species are: the mollusc *Cerastoderma glaucum* (D = 80-90 ind.m"², B = 0.3-27.3 g.m"²), the amphipod *Ampelisca diadema* (D = 960-1760 ind.m^{-2}, B = 2-4 g.m^{-2}), the polychaeta *Nereis succinea* (D = 70-120 ind.m^{-2}, B = 1-2 g.m^{-2}) and the cumacean *Iphinoe maeotica* (D = 30-110 ind.m^{-2}, B = 0.02-0.10g.m^{-2}) grow. In the saline areas (e.g. Karkinitsky Bay) the mass species are: the gastropod mollusc *Hydrobia ventrosa* (D = 7,000 ind.m^{-2}, B = 10-20 g.m^{-2}), the polychaete *Nephthys hombergii* (D = 40 ind.m^{-2}, B = 3-5 g.m^{-2}) and the bivalve mollusc *Spisula subtruncata* (D = 50 ind.m^{-2}, B=3-5 g.m^{-2}). Ten macrozoobenthos species were found in freshened waters and 40 species in saline waters.

The *L. mediterraneum* biocoenosis is an important feeding ground for fish (Bacesco et al., 1957). Since the introduction of *M. arenaria* into the Black Sea the best examples of the *I. mediterraneum* biocoenosis have been in Odessa Bay (up to 5 km^2) and in near estuarine areas (Sinegub, 1993).

The alga ***Phyllophora*** Biocoenosis

The alga *Phyllophora* biocoenosis is mostly concentrated on silty-shelly sediments over an area of about 15,000 km^2 (at a depth of 20-60 m) known as Zernov's Phyllophora Field. The dominant species is the red algae P. nervosa. The same biocoenosis can also be found in the central part of Egorlitsky Bay, in the eastern part of Karkinitsky Bay (small phyllophora field) over an area of 150 km^2 (at a depth of 10-20 m). Accumulations of this seaweed have been observed in the coastal waters of the Tarkhankut peninsula and from Donuzlav Lake to Evpatorijsky Lake.

The total standing crops of algae are: 200,000 t in Zernov's Phyllophora Field; 180,000 t in the small phyllophora field; and 40,000 t opposite west Crimea. In addition to the dominant species there are three other species of phyllophora: *P. brodieri, P. pseudoceranoides* and *P. trallii* (Kalugina-Gutnik, 1979). There are 118 species of invertebrates in the phyllophora (Vinogradov, Zakutsky, 1967) and 47 species of fish (Vinogradov, 1067). The mass macrozoobenthos species in Zernov's Phyllophora Field are: the bivalve molluscs *Mytilus galloprovincialis* (D = 380 ind.m^{-2}, B = 210 g.m^{-2}), *Mytilaster lineatus* (D = 6 ind.m^{-2}, B = 210 g.m^{-2}), the gastropod *Rissoa parva* (D = 10 ind.m^{-2}, B = 0.2 g.m^{-2}), the barnacle *Balanus improvisus* (D = 7 ind.m^{-2}, B = 0.2 g.m^{-2}), the polychaeta *Nereis succinea* (D = 52 ind.m^{-2}, B = 3.1 g.m^{-2}) (T. Mikhailova).

In Egorlitsky Bay the mass species of the Phyllophora biocoenosis are: the bivalve mollusc *Mytilaster lineatus* (D = 11,000 ind.m^{-2}, B = 600 g.m^{-2}), the polychaetes *Nereis zonata* (D = 1,400 ind.m^{-2}, B = 21 g.m^{-2}), *Platynereis dumerilii* (D = 1,200 ind.m^{-2}, B = 11 g.m^{-2}) (D. Chernyakov, personal communication). The characteristic macrozoobenthos species are: *Bittium reticulatum, Harmothoe imbricata, Balanus improvisus* and *Synisoma capito.*

A commercial standing crop of *Phyllophora* is currently available only in the small phyllophora field in Karkinitsky Bay. In 1993 it totaled 182,000 t, while the recommended harvest did not exceed 9,000 t. From Donuzlav Lake to the city of Evpatoria the standing crop is estimated at 40,000 t with a permissible harvest of 4,000 t (Bryantsev, 1994).

The seagrass *Zostera* Biocoenosis

The dominant species of the *Zostera* biocoenosis are *Zostera marina* and *Z. noltii* (a total of 5 species of the genus Zostera). The biocoenosis can be found on silty-sandy sediments at depths of 0.2 to 12 m. It forms dense growths in bays and limans.

The distribution of Zostera in coastal areas has declined in recent years as the result of anthropogenic influences, especially on the northwestern shelf and in the bays of Crimea. An exception is the Kerch Strait, where hydrological-hydrochemical conditions remain favourable for the development of sea weeds. The average biomass of *Zostera* was 5,058 $g.m^{-2}$, and its density 433 $ind.m^{-2}$. In other areas of the Ukrainian shelf the *Zostera* biomass and abundance varied from 750-4,000 $g.m^{-2}$ and 260-800 $ind.m^{-2}$ respectively (Milchakova, personal communication). There are 17-40 species of algae in the Zostera biocoenosis, which account for from 1 to 30% of the phytocoenosis biomass. The dominant species are: *Viva rigida, Chaetomorpha chlorotica, Ectocarpus confervoides, Laurencia obtusa* and *Gracilaria verrucosa* (Kalugina-Gutnik, 1974; Milchanova, 1988). The total number of macrozoobenthos species varies from 24 in the kut part of Karkinitsky Bay (northwestern shelf) to 70 in Kazachey Bay near Sevastopol (CS). In the freshened area of the northwestern shelf the biocoenosis contains the crabs Macropipus holsatus and Rhithropanopeus harrisi tridentata and the prawns Palaemon adspersus and P. elegans. In the shallow water of the east of Tendrovsky Bay, which is where *Zostera* occurs in the greatest quantities, the mass species in the biocoenosis are: the molluscs *Abra ovata* (D = 1,100-10500 ind.m-2, B = 50-200 g.m-2) and *Hydrobiidae* (D = 2850-19,100 ind.m-2, B = 13-90 g.m-2). There are 36 species in the biocoenosis. The total density and biomass are 6,300-20,700 ind.m-2 and 100-260 g.m-2 respectively (D. Chernyakov, personal communication). The mass species of the biocoenosis on the Crimean shelf are: the gastropod molluscs *Mohrensterniaparva* (B = 4 $g.m^{-2}$), *Bittium reticulatum* (B = 60 $g.m^{-2}$), and the bivalve mollusc *Mytilaster lineatus* (B = 500 $g.m^{-2}$). The fish of the Syngnathidae family are characteristic of this biocoenosis.

The alga *Cystoseira* Biocoenosis

The dominant species in the *Cystoseira* biocoenosis is the brown alga *Cystoseira barbata,* which develops on rocky substrates from the spray zone to a depth of 15 m. The C. *barbata* biocoenosis once occupied the entire rocky coast of Ukraine but today occurs only on the Crimean Shelf and possibly near Zmeiny island (Solyanik, 1959).

The mass species are: the molluscs *Mytilaster lineatus* (D = 50-6,800 $ind.m^{-2}$, B = 200-690 $g.m^{-2}$) and *Rissoa splendida;* the amphipods *Amphythoe vaillanti* and *Caprella acantifera;* and the polychaetes *Grubea clavata.* The average density and biomass of the macrozoobenthos in the biocoenosis are 13,000-35,000 $ind.m^{-2}$ and 370-960 $g.m^{-2}$ respectively. A total of 23 species were recorded in the biocoenosis on the Crimean shelf, including representatives of the ichthyofauna of the Labridae family and the blue damselftsh *Chromis chromis.* The epiphython of *Cystoseira* is described in detail by E. Makkaveeva (1979). Other common species include: the polychaetes Nereis succinea, Nephthys hombergii and *Terebellides stroemi;* the molluscs *Mytilaster lineatus, Cerastoderma glaucum, Irus irus, Polititapes aurea, Donacilla cornea* and *Pilar rudis.* There are a few biocoenoses where rare species predominate, such as *Amphioxus (Branchiostoma) lanceolata,* which colonized coarse "amphioxus" sand near Cape Foros (Crimean shelf), the hydroid *Pachycerianthus solitarius,* and the ascidians *Eugyra adriatica* and *Ascidiella aspersa.* The distribution of the main benthic biocoenoses on the Ukrainian shelf is given in Fig. 17.

VI. Marine Wetlands

The Ukrainian coast of the Black Sea and the Azov Sea is rich in different kinds of wetlands, marine, brackish-water and freshwater. Some of them are large: e.g. Eastern Sivash (165,000 ha); Karkinitsky Bay and Dzharylgach Bay (87,000 ha); and Tendrovsky Bay (38,000 ha). Others are small in area: e.g. Krivaya Bay and Krivoi Peninsula (1400 ha); the seaside from Chernomorsk to Cape Uret in the Crimea (9,600 ha). There are a total of 19 marine wetlands in Ukraine (Fig. 18), of which 11 are in the Black Sea and eight in the Azov Sea. The total area of these wetlands is approximately 635,000 ha.

In addition to their ecological important the wetlands of the Black Sea basin also provide valuable goods and services for local people. These include: flood control, the retention of pollutants and sediments, support for commercial fisheries, recreational potential and the provision of important habitats for wildlife, including many endangered species. The main geological, morphometrical and ecological characteristics are shown in Annex I, Table 11. The threatened species of plants and birds and the protected areas in the Ukrainian marine wetlands are shown in Tables 22-23-24.

Table **22.** Rare plants of the Ukrainian marine wetlands

Species of plants	**Category of protection**	**№ of wetland***
Utysopogon gryilus	I	1, 2, 9, 1U
Ctadium mariscus	II	1,2,10
Damasonium alisma	I	15
Elitrigia stipifolia	II	15,18
Epibctcb is palustris	III	1,7
Eremogone cephalotes	II	5,6
Mursitea quaarifolia	I	1,2
Leucojum aestivum		1,7
Glanium flavum	I	16
Orchis palustris	II	1,7,10
Trapa natans	II	1,2,5,7
Sal v in i a natans		1,2,5,7
Aldrovanda vesiulosa	III	1.2,5,7

* name of wetland see legend Fig. 18

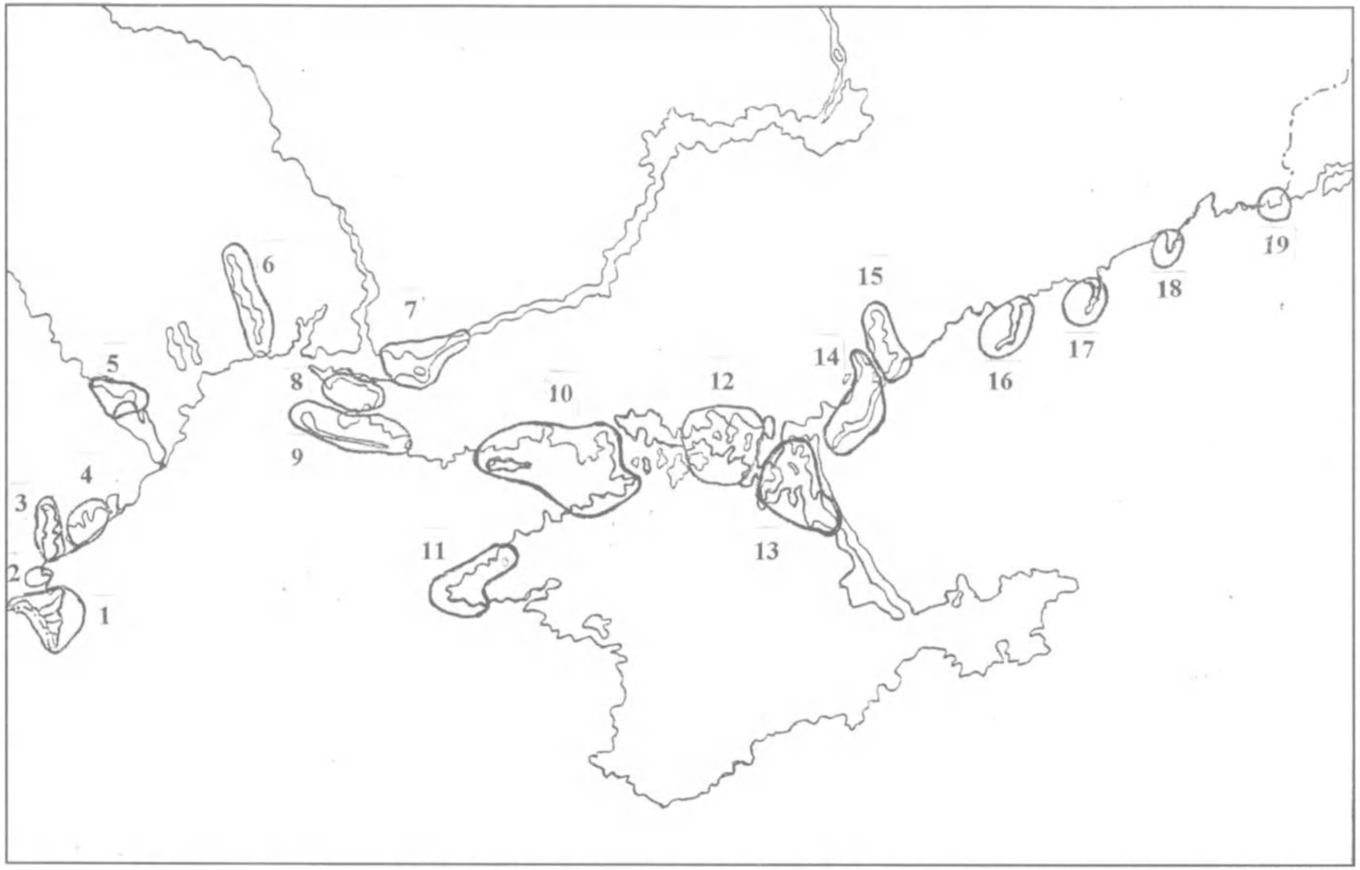


Fig. 18 Ukrainian major coastal wetland areas in the Black Sea and the Sea of Azov.

Table 23. Rare species of birds breeding in Ukrainian marine wetlands

Species of Birds	Wetlands* (pairs of breeding birds)	Wetlands* (number of individuals during seasonal accumulations)
Pelecanus onocrotalus	-	1(2,100); 3(2,000); 4(120); 5(500); 8(45); 9(30)
Pelecanus crispus	1(3)	1(25); 5 (800)
Phalacrocorax aristotelis	11 (350-500)	
Phalacrocorax pygmeus	1(700); 5 (20)	1(1 300)
Platalea leucorodia	1(800); 2 (350); 5 (20)	
Plegadis falcinellus	1(300); 5 (300-2,000); 6 (200); 13 (500)	
Egretta alba	2 (400); 5 (300); 7 (350-700); 10 (200-700); 13 (500); 15 (10); 16 (120); 17 (70); 18 (9-20); 19 (8-15)	6 (900); 18 (100); 19 (260)
Egretta garzetta	10 (500-970); 13 (500); 17 (40)	9 (76,000)
Ciconia ciconia	1(7)	
Ciconia nigra	-	1(10); 5(130); 9(10)
Grus grus		1(100); 8-9(300); 13 (2,000); 12 (100-300)
Anthropoides virgo		4 (10); 8-9(30)
Otis tarda		1(10); 8 (10)
Branta ruficolis	—	1-3-4 (2,000)
Casarca ferruginea	1(?)	1 (60); 8 (10)
Somateria mollissima	8 (700)	
Aythya ferina	2 (1,800); 3 (170)	3 (18,000); 6 (5,000); 7 (6,000); 8 (25,000-40,000); 9 (60,000); 10 (7,900)
Aythya niroca	1(130); 5(20)	1(100); 5 (50)

Netta rufina	2 (400)	12-13 (3,000)
Tadorna tadorna	6 (70); 10(70)	12-13 (12,000)
Pandion halia¸tus	-	1(5); 5(5); 9(2-3)
Haliaeetus albicilla	1(?)	1(8); 3-4(14); 8-9(55)
Charadrius alexandrinus	4(30); 6(35)	
Charadrius dubius	6(15)	
Himantopus himantopus	1(15); 4(80-90); 5(5); 6(10); 13(600-800); 14(20); 15(250); 17(10-26)	
Recurvirostra avoseta	4(100); 6(100); 9(250); 13(500-600); 14(60); 15(50-250)	4(1,300); 13(50)
Haemotopus ostralegus	1(5)	
Numenius phaeopus		1(600)
Glareola pratincola	3(60); 4(60); 8-9(50-60); 16-17-18-19(200);	
Glareola nordnanni	8-9(4-25);	
Larus ichthyaetus	12(115-245); 13(360)	10(300)
Larus genei	6(10); 9(6,800-37,450); 10(300); 12(1,000 -1,300); 13(850)	12-13(200)
Larus melanocephalus	6(120); 12(2,000); 13(450)	
Apus melba	11(10)	

* name of wetland see legend Fig. 18

Table 24. Protected areas of Ukrainian marine wetlands

N° of wetland	Existing protected territories
1	Part of wetland (9,000 ha) — in the state reserve "Dunajskije Plavni"
2	—
3	—
4	—
5	Part of the territory — in the game reserve "Urochische Dnestrovskije Plavni"; Liman — the Game Reserve of the Military Society of Fishermen and Hunters (MSFH)
6	Two Ornithological Game Reserves in the Lower ("Tiligulskaja Peresyp", "Nizovje Tiligulskogo Limana"("Lower Tiligulski Liman"); the hunting economy of the Society of Fishermen and Hunters (SFH) — in the Upper Liman
7	Ichthyological Game Reserve "Krasnaja Hatka"; some of SFH and MSFH
8	Greater part — in the State Biosphere Reserve "Chernomorski"
9	In the State Biosphere Reserve "Chernomorski"
10	Reserve "Lebjazije Ostrova" ("Swan's Islands"); Kolonchakskije Islands — in the Game Reserve
11	Game Reserve
12	—
13	—
14	Fedotova Peninsula and the Upper Liman — Game Reserves
15	One hydrological protected area; three Ornithological Game Reserves — "Altashirski", "Rodionovski", "Stepanovskaja Kosa"("Stepanovskaja Peninsula")
16	Game Reserve
17	State Game Reserve
18	Game Reserve
19	Ornithological Game Reserve "Krivokoski Liman"; State Nature Memorial "Krivaja Kosa" ("Curved Peninsula")

7

Current State of Biodiversity and Trends in Biological Processes

I. The Impact of Eutrophication on Marine Flora and Fauna

The state of the Black Sea ecosystem was predetermined by the geographical and geopolitical situation of its drainage basin. Of all the European semi-enclosed and coastal seas, the Black Sea and the Azov Sea are the most isolated from the ocean. Their drainage basin includes the territories of many countries, has an area of 2.2 million km^2 (Fig. 19), and is inhabited by at least 162 million people (Mee, 1992). The catchment areas of the Black Sea and Azov Sea are rich in land-based sources of different pollutants, which are transported into the sea by about 300 rivers, the principal among which are the Danube, Dnestr and Dnepr which flow into the northwestern Black Sea.

Until the early 1960s, the northwestern shelf was biologically the richest and most productive region of the Black Sea, including: the immense meadow of red algae "Zernov's Phyllophora field", in the central part of the northwestern shelf; extensive fields of the sea grasses *Zostera sp.* in shallow bays; large quantities of molluscs (e.g. the blue mussel *Mytilus galloprovincialis* and the oyster *Ostrea edulis),* bottom crustaceans (e.g. amphipods, mysids, shrimps - *Crangon crangon, Palaemon adspersus, P. elegans,* crabs - *Carcinus mediterraneus* and *Macropipus arquatus)* plus abundant phytoplankton and zooplankton, all of which in turn created favourable conditions for many species of both adult and young bottom and pelagic fish.

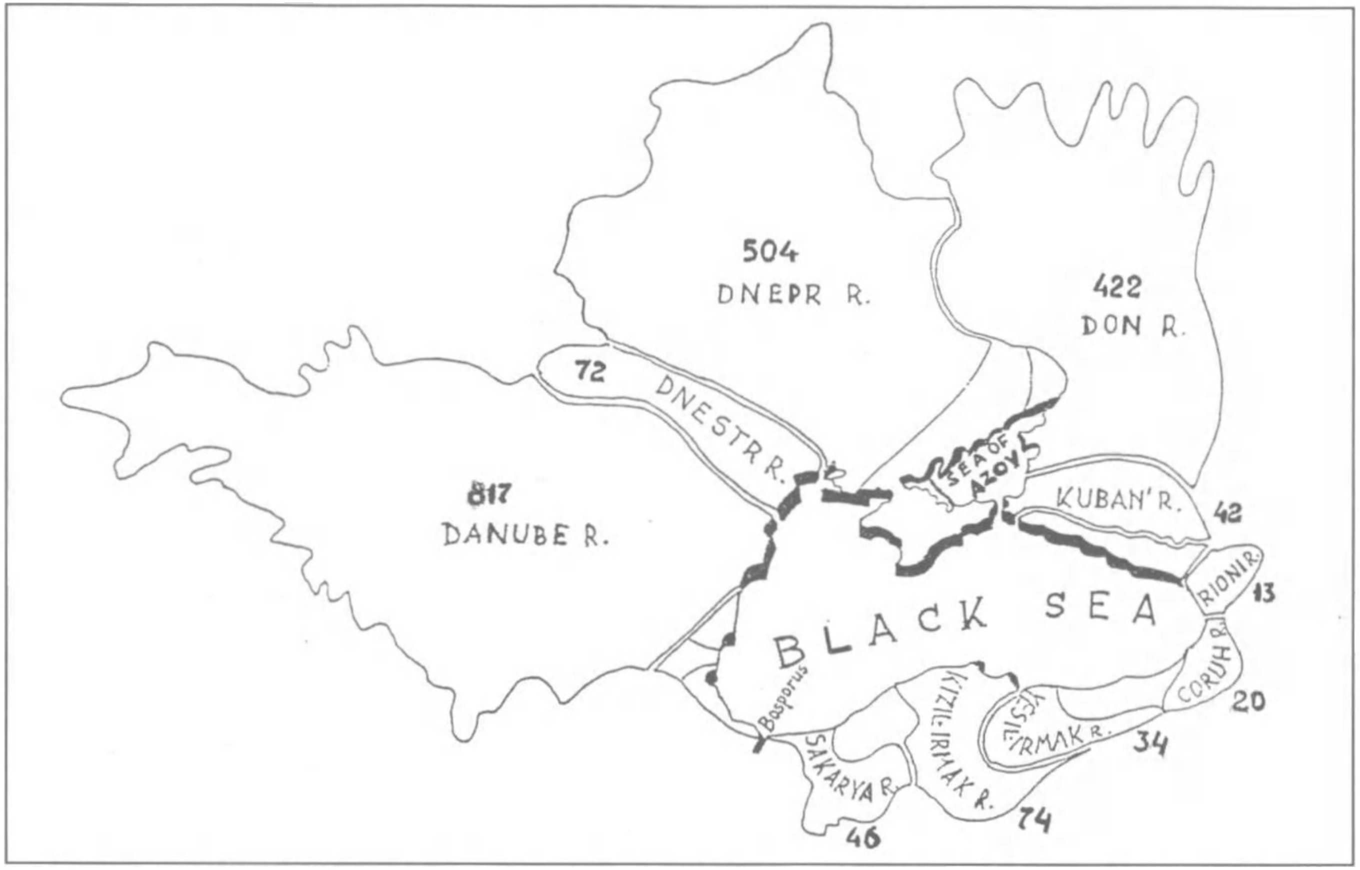


Fig. 19 Drainage basins of ten principal Black Sea rivers (areas, ths km^2).

The most numerous of these fish were: flatfishes *(Psetta maeotica, Platichthys flesus Inserts* and *Solea lascaris);* gobies *(Neogobius melanostomus* and *Mesogobius bactrachocephalus);* the thornback *Raja clavata;* the stingray *Dasiatis pastinaca;* the whiting *Odontogadus merlangus euxinus;* and sturgeons *(Huso huso, Acipenser stellatus* and *A. guldenstadti colchicus).* The pelagic fish of the northwestern shelf included: the anadromous Black Sea shad *Alosa kessleri pontica;* the bonito *Sarda sarda;* the horse mackerel *Trachurus mediterraneus ponticus;* and grey mullets *(Mugil cephalus, Lisa uurata* and *L. saliens).*

Different authors (Almazov, 1962 and 1967, Zaitsev et al., 1987) have estimated that the amounts of nutrients and organic substances introduced by the Danube, Dnestr and Dnepr rivers onto the northwestern shelf increased approximately tenfold between the 1950s and the 1980s. The northwestern shelf is the largest hypertrophic area in the entire Mediterranean Basin from the Straits of Gibraltar to the west to the Azov Sea to the east.

The chain of biological consequences of this excess nutrient run-off can be characterized as follows:

Phytoplankton Blooms

The immediate consequence is an outburst of phytoplankton, especially dinoflagellates, euglenoids, and different species of picoplankton. The most striking examples of such phytoplankton blooms occur on the northwestern shelf (Table 25).

Table 25. Average biomass of phytoplankton during the blooming period on the northwestern shelf of the Black Sea

Period	Average biomass (mg. ^{3})	Author
1950s	670	Ivanov, 1967
1960s	1,030	Mashtakova, 1971
1970s	18,690	Nesterova, 1987
1980s	30,000	Nesterova, Terenko, 1987

In the 1950s peridinians accounted for 18.8% of the total phytoplankton biomass (Ivanov, 1967). By the 1980s its share had risen to 54.4% (Nesterova, 1987). Red tides caused by blooms of peridinians have become common phenomena on the northwestern shelf (Nesterova, 1979).

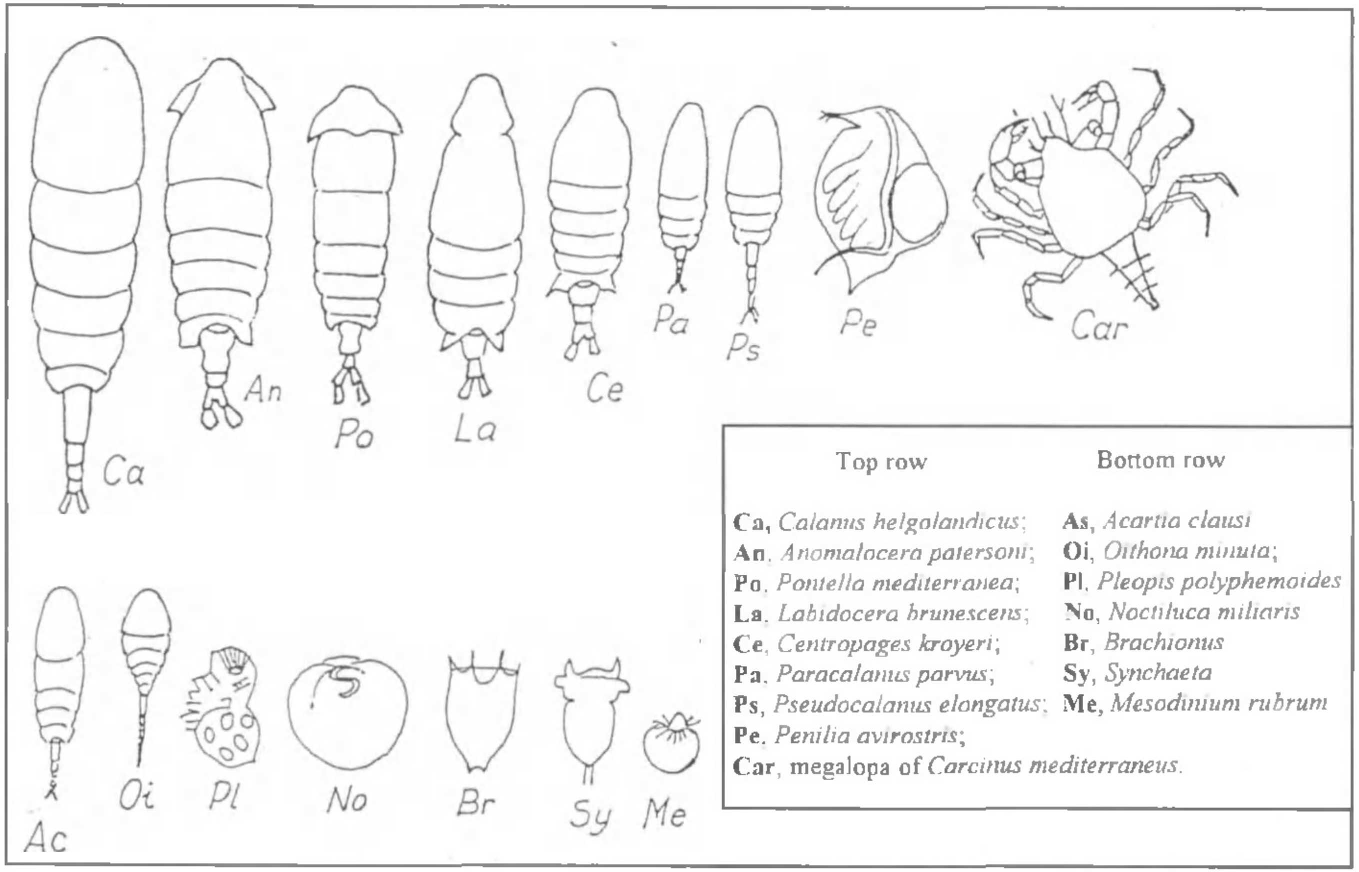


Fig. 20 Top row: the large size planktonic organisms that dominated Black Sea coastal waters until the 1960s.
Bottom row: the small size planktonic organisms that replaced the larger species and dominated coastal waters in the 1980s.

Blooms of One-celled Animals and Jellyfish

One of the consequences of phytoplankton enrichment has been an increase in the number of some herbivore and detritivore zooplankton species. The most typical are: the flagellate *Noctiluca scintillans;* the infusorian *Mesodinium rubrum;* the jellyfish *Amelia aurita;* some rotatorians; the cladoceran *Pleopis polyphemoides;* and the copepod *Acartia clausi.*

The Decline in Populations of Large Planktonic Crustaceans

In contrast to the above, the populations of relatively large pelagic crustaceans, including carnivores, mixotrophes and even herbivores, have begun to decline: e.g. the neustonic Pontellidae, *Centropages kroyeri,* and the zoea and megalopa of crabs. This can be explained by the concentration of toxicants in the surface microlayer. The decline in crab populations is assumed to be due to hypoxic conditions on the shelf. But the reason for the decrease in the populations of the planktonic *Calanus* and *Pseudocalanus* is not yet fully clear, although the general trend has been for a decline in populations of large planktonic speoies and an increase in the numbers of smaller species (Fig. 20). This has affected the zooplankton which serve as food for marine fish. (Zaitsev, 1992).

Decreasing Water Transparency and the Reduction of Benthic Macrophyte Communities

Another important consequence of eutrophication, phytoplankton blooms, and a sharp increase in the number of some zooplankton species, has been the decline in water transparency in the Black Sea, and a corresponding change in the compensation depth of the water column. A decline in water transparency causes a weakening of the photosynthesis of bottom algae due to low light penetration and a reduction in the shelf macrophytocoenosis, except for those very shallow forms close to the edge of the sea. A typical example has been the degradation of Zernov's Phyllophora field (Fig. 21). In the late 1960s this community occupied 11,000 km^2 of the northwestern shelf at depths of 20 m to the north and 60 m to the south. The community was composed of three species of red algae, *Phyllophora nervosa, P. brodiaei* and *P. membranifolia,* and a dozen species of invertebrates which were either attached to or lived amongst the algae: e.g. sponges, hydrozoans, bryozoans, molluscs, polychaetes, barnacles, amphipods, isopods, shrimps, crabs and ascidians. More than 40 species of fishes were associated with the *Phyllophora* biocoenosis for feeding, reproduction or hibernation (Vinogradov, 1967). Many invertebrates in this community (e.g. the sponges *Mycale syrinx* and *Haliclona ascidia,* the isopods *Idotea baltica basteri* and *Synisoma capita,* amphipods *Gammarus locusta, Caprella acantifera, Phtisica marina,* and the decapods *Crangon crangon* and *Macropus arquatus)* are protectively coloured against a red or reddish background making them animals almost invisible to predators and prey. The same colouring can be found in several fish species such as the clingfish *Lepadogaster lepadogaster* and *L. candollei,* the shore rockling *Gaidropsarus mediterraneus,* the wrasses *Crenilabrus quinquemaculatus* and

Ctenolaprus rupestris and the gobies *M. batrachocephalus* and *N. melanostomus.* Even some pelagic fish in this community differ from specimens inhabiting other biotopes by having red or reddish fins (e.g. the Black Sea shad and mackerel). A drastic reduction of *Phyllophora* meadows began in the 1970s. By the mid 1980s the surface area of the community had declined tenfold (Zaitsev, 1992), the specifically coloured *Phyllophora* fauna had practically disappeared and the northwestern shelf had, as a result, lost an important habitat for marine invertebrates and fish as well as a rich source of oxygen.

Hypoxia and the Mass Mortality of Bottom Animals

Another important consequence of the eutrophication of the Black Sea has been THE sedimentation of large amounts of dead phytoplankton to the shelf as a result of THE increased biomass of pelagic microphytes. The decomposition of this organic material causes hypoxia and even anoxia in the near-bottom water layers. The formation of large hypoxic areas is a new phenomenon in the Black Sea ecosystem, which was first recorded in August - September 1973 on the northwestern shelf. Later hypoxia-induced mass mortalities of benthic invertebrates and fishes were recorded over a surface area of 3,500 km2 between the Danube river delta and the Dnestr river estuary (Salsky. 1977, and Zaitsev, 1977). In more recent years, hypoxia-induced mass mortalities of benthic organisms have become ordinary phenomena, their scale dependent on the meteorological, hydrological, hydrochemical and biological peculiarities of each summer season (Table 26). On the northwestern shelf the biological losses caused by hypoxia are estimated at 100-200 t of organisms per square kilometre of sea bottom. Over the period 1973-1990 THE total biological losses are estimated at 60 million t, including 5 million t ofyoung and adult fish from both commercial and non-commercial species. The most common victims OF hypoxia include molluscs, barnacles, crustaceans and bottom fishes. Some pelagic species, such as anchovy and mackerel, are sometimes affected by hypoxia, although the mechanism by which this happens is not yet fully understood.

Table 26. Surface areas (103 **km^**) of hypoxic zones on the northwestern Black Sea shelf in 1973-1990.

Year	Surface area	Year	Surface area	Year	Surface area
1973	3.5	1979	15.0	1985	5.0
1974	12.0	1980	30.0	1986	8.0
1975	10.0	1981	17.0	1987	9.0
1976	3.0	1982	12.0	1988	12.0
1977	11.0	1983	35.0	1989	20.0
1978	30.0	1984	10.0	1990	40.0

The decomposition on the sea bottom of large quantities of dead animals, usually at depths of 8-10 to 40m, produces hydrogen sulphide in hypoxic areas. In fact, there are two hydrogen sulphide zones in the Black Sea (Zaitsev, 1992): one comprises the entire deep water column, the upper limits of which are around 70-80m below the surface in the centre of the sea; the other is on the northwestern shelf at depths of 8-10m to 35-40m. The former was one of the specific ecological features of the Black Sea, even prior to eutrophication. The second zone first appeared in the early 1970s as a result of the anthropogenic eutrophication of the northwestern shelf and is temporary, occurring in summer-autumn, usually for a duration of one to three weeks.

Decreases in the Invertebrate Standing Stock

The standing stock of Black Sea organisms has decreased considerably as a result of hypoxia, silting and other factors. The total biomass of Phyllophora on the northwestern shelf fell from 9 million t in the late 1960s to 0.3 million t in the mid 1980s (Zaitsev, 1992). In the early 1960s the total biomass of the blue mussel on the northwestern shelf was about 10 million t. By the 1980s the figure had been cut by two thirds and the population was dominated by juveniles. The oyster *Ostrea edulis* is very sensitive to silting, and has now almost completely disappeared from the northwestern shelf where, in the late 1950s, it numbered more than 50 million individuals (Zaitsev, Vinogradov, 1967). The populations of crabs, hermit crabs, ghost shrimps *(Callianassd),* and bottom fish such as turbot, which were very common on the northwestern shelf until the 1960s, have also virtually disappeared.

Increases in the Populations of Fish Inhabiting the Shallow Sub-littoral Zone

Since the late 1980s there has been a sizable increase in populations of small shore fish such as the silverside Altherina mochon pontic, the sand lance *Gymnammodites cicerellus,* the transparent goby, *Aphia minuta,* the blenny *Blennius tentacularis* and other species immune to predation by *Mnemiopsis leidyi.*

In the 1980s a species became acclimatised to the shallow waters of the Black Sea, namely the grey mullet *Mugil so-iuy,* which originated in the Amur river estuary and the brackish water areas of the Sea of Japan. During the 1970s and 1980s *Mugil so-iuy* fry were air transported to the Molochnaya river estuary in the Azov Sea and the Dnester river estuary in the Black Sea (Gorelov, Esipova, 1992). The initial attempts were unsuccessful but *Mugil so-iuy* eventually became acclimatised and has bred successfully, particularly in the Azov Sea. According to S. P. Volovik (personal communication), an estimated 90 million fry were produced in 1989 and another 50 million in 1990. Both adults and young fish are very numerous along the South Crimean coast. Adult specimens winter along the southern Black Sea coasts and can also be found near Trabzon in January-February (S. Unsal, personal communication). If *Mugil so-iuy* eggs and larvae prove to be immune to predation by *Mnemiopsis leidyi,* this very euryhaline .md eurythermous mullet could become one of the abundant near-shore fish species of the Black Sea and Azov Sea.

Fig. 21 Progressive reduction of the Zernov's "Phyllophora field" on the northwestern shelf in 1950s (........), 1960s (-..-..-), 1970s (------) and 1980s (________).

II. Direct Human Impact on Species Diversity

There are a number of anthropogenic influences on Black Sea biodiversity. One is the introduction of allochthonous organisms for the biological control of some local species. For example, the minnow *Gambusia qffinis* was introduced in 1925 from Italy in an attempt to eradicate mosquitoes in the Kolkhida wetlands. *Gambusia offinis* can now be found in river mouths and other low salinity areas of the Black Sea.

The pump kingseed *Lepomis gibbosum* was introduced from North America into Europe as a brightly colored aquarium fish. It spread to fresh-water ponds and rivers and is now common in the Danube delta and other brackish-water areas and can also be found in the northwestern NW Black Sea. In the Danube delta and estuaries it feeds on fish eggs and larvae.

The main direct human impact on the biodiversity of the Black Sea is the accidental introduction of species from elsewhere in the ballast and bilge waters of ocean going ships, in fouling communities, and in the international introduction of exotic commercial fish and invertebrates. Fig 22 contains a schematic diagram charting the introduction of exotic species into the Black Sea.

There have only been two successful examples of the intentional introduction of exotic species: *Mugil so-iuy* has now become a mass commercial fish, while *Crassostrea gigas* is cultured in some areas along the Caucasian and Crimean coasts.

Ecological Consequences of Changes in the Biodiversity of the Black Sea

The most recent changes in the Black Sea bottom biocoenoses which as a result of the penetration and autoacclimatisation of exotic species have been caused by the introduction of the gastropod *Rapana thomasina,* the bivalve molluscs *Mya arenaria* and *Scapharca tnaequivalvis,* and the comb jelly *Mnemiopsis sp.*

Rapana thomasiana

This large predatory mollusc from the Sea of Japan was first discovered in the Black Sea in 1947 in Novorossisky Bay (Drapkin, 1953). It did not have any serious competitors and, as a result, it dispersed along the Caucasian and Crimean coasts, appearing in the Azov Sea, and reaching Romanian, Bulgarian and Turkish waters (Chukhchin, 1984; Cvetkov. Marinov, 1986).

Rapana thomasiana is very fertile and tolerant of significant freshening, the contamination of water and oxygen deficiency. The wide distribution of a new, highly adaptive predatory mollusc in the Black Sea has significantly changed the structure of many bottom biocoenoses. Populations of large bivalve molluscs, such as *Mytilus galloprovincialis, Ostrea edulis* and *Pecten ponticus* have fallen considerably at several sites (Chukchin, 1984). The gastropod *Rapana thomasiana* has also had an impact on the biocoenoses of soft sediments, feeding on *Venus gallina, Gouldia minima, Pilar rudis,* and other small bivalve molluscs.

Populations of *Rapana thomasiana* are comparatively low in the northwestern Black Sea and it has had little impact on the marine ecosystem in the region. The reasons for the low *Rapana thomasiana* populations on the northwestern shelf are unknown. There are abundant food resources and the levels of water contamination are lower than in some other sites where the mollusc is very common.

Mya arenaria

This bivalve mollusc, which is a native of the north Atlantic, was first observed in the Black Sea in 1966, on the Ukrainian shelf off Odessa (Beshevli, Koljagin, 1967). Within

15 years *Mya arenaria* had become abundant in the northwestern and western Black Sea and in the Azov Sea (Cvetkov, Marinov, 1986; Ivanov, 1986). It is particularly numerous on muddy sediments in coastal zones where its biomass exceeds 1 kg.m^{-2}. In some areas this soft clam has become the dominant species of the new biocoenosis.

Mya arenaria populations appear to have peaked in the northwestern Black Sea in 1982, when its frequency was 71.7% at an average density of 58 ind.m^{-2} (Ivanov, 1986). Its distribution was subsequently limited by the almost annual mass mortalities of benthic fauna across wide areas between the Danube and Dnester estuaries. In 1981-1992 its average density near the Dneprovsko-Bugsky liman estuary varied from 2 to 310 ind.m^{-2}.

On the other hand, the modern processes which have introduced silt to the bottom substrate have favoured an increase in the distribution of *Mya arenaria* populations. For instance, its distribution expanded rapidly in Karkinitsky Bay in the 1980s, when there was interdeposition of silt particles after intensive bottom trawling on the northwestern shelf (Zaitsev, 1993). As a result, new *Mya arenaria* biocoenoses have formed in Karkinitsky Bay and the species has also entered other communities where the dominant species were the bivalve molluscs *Mytilus galloprovincialis, Abra nitida,* and *Venus gallina.*

Scapharca inaequivalvis (Cunearca cornea)

This bivalve mollusc, which is a member of the Indo-Pacific fauna, was first discovered in the Black Sea in 1968 on the Caucasian shelf (Zaika et al., 1992). Over the next 15 years it spread to the inshore waters of Romania (Gomoiu, 1984) and Bulgaria (Cvetkov, Marinov, 1986), near the Danube estuary, along the Caucasian coast, to the Kerch Strait (Zolotarev, Zolotarev, 1987) and Azov Sea.

Scapharca inaequivalvis reaches a length of 5.7 cm and an agglomeration of large specimens has a mass of 60-80 g. It inhabits soft muddy, sandy-muddy, shelly-sandy sediments mostly at depths of up to 30 m, becoming an element in biocoenoses and squeezing out some native molluscs. In the Kerch Strait its frequency reached 49% at an average density of 3.5 ind.m^{-2} and a biomass of 67 g.m^{-2} (Ivanov, 1991). In some regions its biomass exceeded 200 g.m^{-2} and it became the dominant species.

In the northwestern Black Sea *Scapharca inaequivalvis* is only found in muddy sediments near the Danube estuary (Zhebriyansky Bay) along with the bivalve mollusc M. arenaria, another autoacclimatisant. The density of the introduced clam is 0.6-5.0 ind.m^{-2} at a biomass of 1.5-10 g.m^{-2}. Outside Zhebryansky Bay. There have been several observations of Scapharca inaequivalvis connected with the *M. galloprovincialis* biocoenosis (e.g. Zmeiny Island and Shaganskaya Bank). But the annual mass mortalities of bottom fauna in the region appear to have prevented the further dispersal of the new clam in the coastal region between the Danube and Dnestr estuaries. In the Azov Sea, S. *inaequivalvis* has been discovered in the biocoenosis of the bivalve mollusc *Cerastoderma lamarcki.* In 1990 it had reached a mean density of up to 2.6 ind.m^{-2} and a biomass of up to 26 g.m^{-2}.

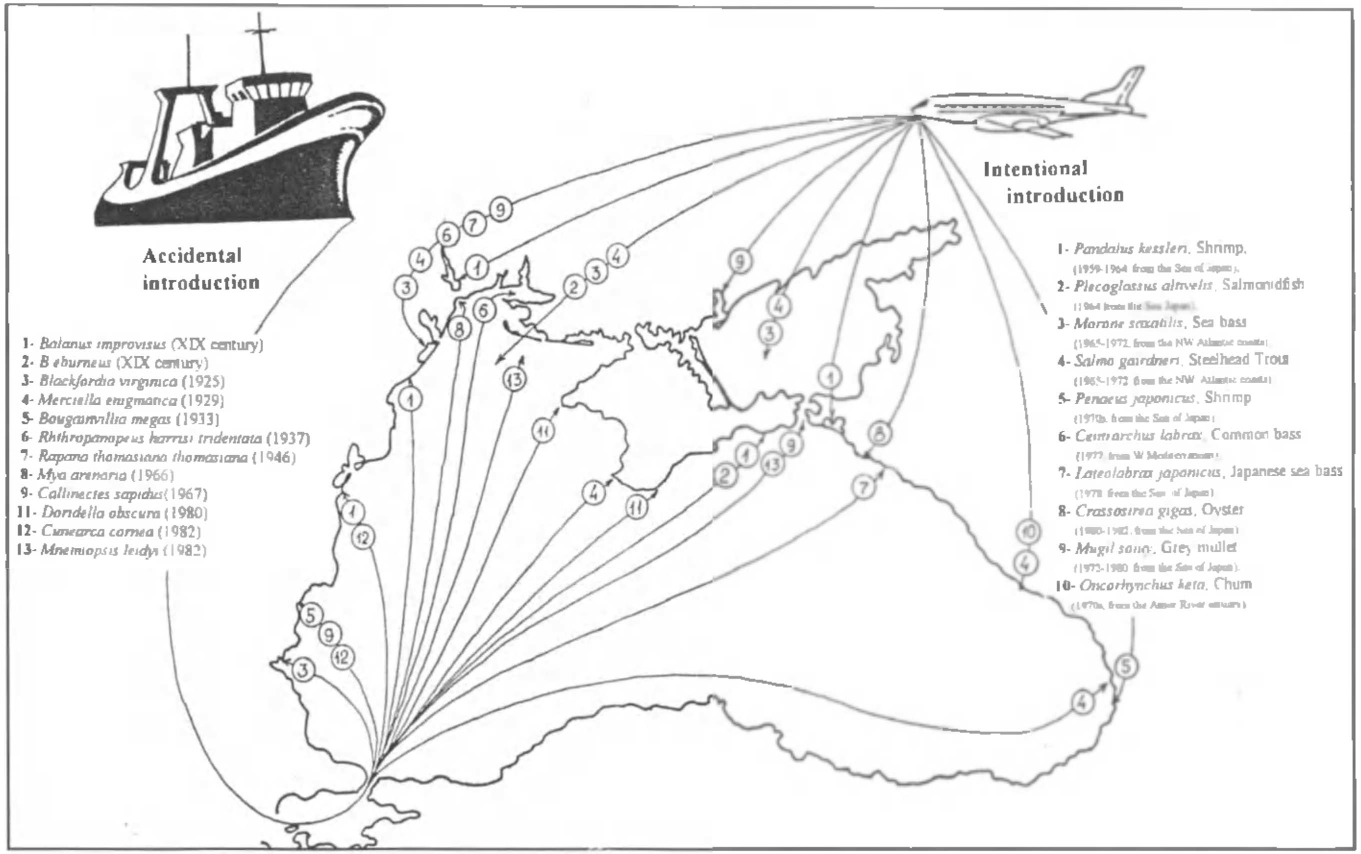


Fig. 22 Introduction of exotic species into the Black Sea.

S. inaequivalvis has thus become a widespread species in the Black Sea and changed the structure of many benthic biocoenoses. Its introduction into the Black Sea and the Azov Sea has demonstrated its high adaptive capability. Most notably, it has remained alive under hypoxic conditions, when other benthic invertebrates have died. *S. inaequivalvis's* high adaptive potential will undoubtedly promote its further penetration.

Mnemioposis sp.

The comb jelly *Mnemioposis sp.* was introduced from the eastern seaboard of North America, probably in ballast waters. It was first encountered in the Black Sea in 1982. Within five years it had spread throughout the northwestern, central and northeastern Black Sea. In 1989 its average concentration reached 1.5 $kg.m^{-2}$ in off-shore areas and 3 $kg.m^{-2}$ in the near shore. Its total biomass in the Black Sea was estimated at 780,000,000 tons (Shushkina et al., 1990).

Mnemioposis sp. actively grazes infusorians, copepods, acartia, sagitta, balanus nauplii, and the larvae of fish, bivalve and gastropod molluscs (Sergeeva et al., 1990; Tsikhon-Lukanina, Reznichenko, 1991). The intensive development of a new consumer of zooplankton produced a rapid transformation of the species and trophic structures of the pelagic communities of the Black Sea. As a result, the biomass of several copepod species declined 2-3 fold and sagitta more than 10 fold. The total biomass of mezoplankton feed for *Mnemioposis sp.* declined five fold in comparison with 1978 (Shushkina et al., 1990). A decrease in the abundance of zooplankton may, in turn, have produced an increase in the concentrations of phytoplankton it consumes.

The results of the transformation of the pelagic communities triggered by the introduction of *Mnemioposis sp.* are probably broader than in former investigations and may have far reaching consequences. One consequence may be changes in the structure of bottom communities as the result of the decimation of the larvae of many bottom benthic animals.

Summary

It is clear that the unintentional introduction of new species is a significant factor in recent changes in the Black Sea ecosystem. The intense development of some introduced animals was the result of their high adaptive capability. On the other hand, the impoverishment of Black Sea ecosystem's fauna composition and the low level of competitive interrelations has also played a role in the successful colonization of autoacclimatisants. Given the current state of the Black Sea ecosystem, new introduced species may soon appear, particularly euryhaline and estuarine species.

The most likely donor area for the further dispersal of marine organisms is the northwestern Pacific Ocean. This region has been the source for introduced species in other areas of the Pacific Ocean (Garlton, 1987) and in the northern Adriatic (Sacchi et al, 1987). The molluscs *Raphana thomasiana, Scapharca inaequivalvis* and *Crassostrea gigas* and the polychaete *Polydora limicola* all have their origin here and perhaps are the first examples of the successful "pacificization" of the benthic fauna of the Black Sea.

Phytoplankton blooms

Shallow waters, copious river runoff and the specific hydrological and hydrochemical regimes of the northwestern Black Sea, all create favourable conditions for the intense development of phytoplankton and the "blooming" of one or several species of algae.

According to A. Ivanov (1962), in the 1950s-1960s the number of species producing blooms was not large, comprising ten marine species (nine diatom and one peridinian) and eight freshwater species (three diatom, four blue-green and one green). In April to September blooms spread over 9% of the entire northwestern Black Sea.

The eutrophication of the northwestern Black Sea was accompanied by an increase in blooming and in the numbers of species of different taxa (Table 27) causing them (Nesterova, 1987).

In addition to the 14 species of diatoms which bloom at present, two peridinians. two chrysophytes and one euglenea also participate. In the zone of influence of the river runoff there are three diatoms, 10 blue-green and one green species.

In 1973-1994 the blooming which began in March continued until November. The initiators of blooming in the spring were usually representatives of phytoplankton in the cold part of the year, e.g. *Sceletonema costatum* and *Chaetoceros socialis.* Their maximum numbers did not exceed those in the reported literature data (Ivanov, 1967) and new species such as *Stephanodiscus hantzschii, Chaetoceros karianus* and *Dinobryon sp.* appeared (Table 27). *Stephanodiscus hantzschii* recorded the lowest numbers of cells for the spring period at 20-400,000 cells.l^{-1}.

Spring blooming occurred in coastal waters between the estuaries of the Dneprovsko-Bugsky liman and the Danube (Fig. 23). Summer blooms had the highest numbers and coverage, as well as the most serious impact on marine biota, particularly blooms of the peridinian *Prorocentrum cordata* and the diatom *Cerataulina pelagica.*

In the 1950s and 1960s Prorocentrum cordata bloomed twice, reaching a maximum density of 3,000,000 cells.l^{-1} (Ivanov, 1967). In September 1973, in the Dnestrovsky-Danube interfluve, *Prorocentrum cordata* caused a "red tide", the first of its kind in the northwestern Black Sea. Rusty-red coloured spots appeared on the marine surface and the maximum abundance was 13,000,000 cells.1-1 (Nesterova, 1979).

The neritic diatom alga *Cerataulina pelagica,* which was a mass phytoplankton species in the 1950-1960s, with a maximum abundance of 300,000 cell.l^{-1} (Ivanov, 1967), first bloomed in the Dnestrovsky-Danube interfluve in September 1975 (Nesterova, 1981).

Since then these species have bloomed in the northwestern Black Sea almost annually, with *Prorocentrum cordata* blooming in early summer, followed by blooms of *Cerataulina pelagica.*

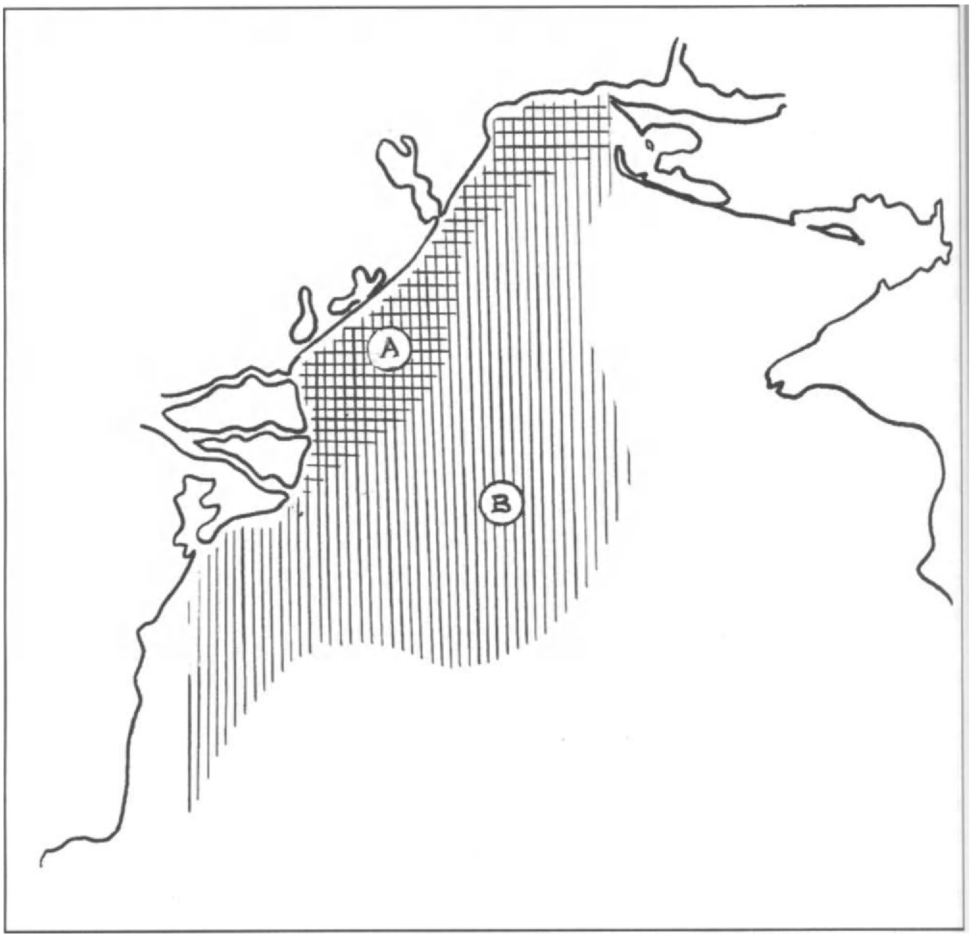


Fig. 23 Zones of blooming of phytoplankton in the Northwestern part of the Black Sea in 1973-1993: A - Spring and autumn periods, B - Summer period.

One feature of the blooms of the species mentioned above is that they extend over a significant area of the sea.

In 1973-1975 the areas covered by the blooms near the coast increased (Fig. 23). In summer 1978 the area covered by *Cerataulina pelagica* blooms shifted towards the centre of the northwestern shelf. In 1979-1980 *Prorocentrum cordata* blooms covered 57% of the northwestern shelf.

At the same time the indices of the species undergoing blooms increased: e.g. in 1973 the figure for *Prorocentrum cordata* was 1973 13,000,000 cells.l^{-1}; in 1974 139,000,000 cells.l^{-1}; and in 1979 a northwestern shelf record of 224,000,000 cells.l^{-1}. The same increase was observed in the figures for *Cerataulina pelagica,* which rose from 16,000,000 cells.1-' in 1975 to 37,000,000 ceHs.1" in 1978 (Nesterova, 1985, 1987).

There were also occasional blooms of other species (i.e. *Nitzschia tenuirostris, Coccolithus huxleyi, Chaetoceros insignis, Rhizosolenia fragilissima* and *Heterocapsa iriquetra)* which were not normally considered to be blooming species. The numbers of others (e.g. *Cyclotella caspia* and *Sceletonema costatum)* decreased (Table 26).

The species diversity of the minute freshwater blue-green and green algae increased and produced very frequent blooms of water in the Pridneprovsko-Bugsky liman; many of the species were blooming for the first time. The freshwater diatoms *Meloseira granulata* and *Stephanodiscus hantzschii* bloomed in the zone of influence of the waters of the Danube. There were frequent blooms of blue-green algae near the estuary of the Dnestrovsky liman (Nesterova, 1977), the first time they had been observed since the 1950-1960s (Ivanov, 1967).

Blooms of the diatoms *Nitzschia seriata, Cerataulina pelagica, Thalassiosira parva* + *Th. subsalina* and *Sceletonema costatum* occurred off the northwestern coast in October-November (Table 28). At the same time, *Oscillatoria kesseleri* bloomed in the estuary of the Dnepro-Bugsky liman. The highest figures were for a bloom of *Sceletonema costatum* (20 400,000 cells.!"').

In the last five years the intensity of the blooming has decreased and the area covered has shrunk to 8% (Table 28). In July 1989 the maximum *Prorocentrum cordata* concentrations were 12,000,000 cells.1'; and in August 1991 the highest concentration of *Cerataulina pelagica* was 5 500,000 cells.1''.

It is quite possible that observations made towards the end of the 1980s and beginning of the 1990s coincided with the end of the vegetation period of the species which caused blooming over wide expanses of the sea. In August 1991 *Cerataulina* ***pelagica*** was mostly composed of single cells or chains of small numbers of cells, which is uncharacteristic for this species.

The highest concentrations of blooming species occur in the upper 10 m. layer, except for *Heterocaspia triquetra* which achieves peak concentrations on the seabed. When blooms of different species occur simultaneously, the species predominate in different layers.

During 1992-1994 there were constant blooms in the Sukhoi and Grigorievsky limans, which have served as marine ports for the last 20 years. But the blooms did not extend to adjacent areas of the Black Sea; where there were blooms in these areas they were of other species. In summer-autumn there were blooms of the diatoms *Sceletonema costatum, Nitzschia seriata* and *Cerataulina pelagica* in the Sukhoi liman.

In Grigorievsky liman there were blooms of the euglenoid *Eutreptia lanovii* in February 1993 and of the diatom *Cylindrotheca closterium* in August 1994 (see Table 27). An increase in the discharges of ballast water from ships and ship-sourced contaminants in limans and the adjacent sea can result in the appearance of new species of microphyte toxic to humans and animals.

Table 27. Maximum numbers (million cells.l-1) of phytoplankton species causing blooms

Species	Northwestern Black Sea		Crimean Coast	
	Till 1973	1973 - 1994	Till 1973	1973 - 1994
Marine				
Thalassiosira parva+Th.subsalina	26.0	54.0-	-	-
Sceletonema subsalsum	-	1.9	-	-
Sc. costatum	32.0	20.4	-	20-22
Cyclotella caspia	5.2	1.7	>1	-
Leptocylindrus danicus	72.0	28.0	-	-
L. minimus	6.0	16.0	-	-
Rhizosolenia fragilissima	0.2	3.6	2	2
Rh. Alata	-	-	>0.6	>0.6
Rh. calcar avis	-	-	>0.6	>0.6
Chaetoceros karianus	-	3.0	-	-
Ch. socialis	5.4	4.6	20	-
Ch. insignis	-	1.7	-	-
Cerataulina pelagica	0.4	37.0	~4	-
Cylindrotheca closterium	-	16.0	-	-
Nitzschia tenuirostris	-	28.6	-	-
N. delicatissima	-	-	-	2
N. seriata	1.0	2.8	-	-
N. pungens	-	-	-	>1

Asterionella japonica	-	-	-	~2
Prorocentrum cordata	3.3	224.0	-	-
Heterocapsa triquetra	-	18.0	-	-
Coccolithus huxleyi	-	5.0	-	4.0
Dinobryon sp.	-	4.0	-	-
Eutreptia lanovii	-	1.7	-	-
Freshwater				
Melosira granulata	1.8	1.0	-	-
Stephanodiscus hantzschii	-	20.8	-	-
Diatoma elongatum	0.8	4.2	-	-
Microcystis aeruginosa	3.3	15.0	-	-
M. pulverea f. incerta	-	94.8	-	-
Gleocapsa minor	-	2.6	-	-
G. minima	-	4.4	-	-
Merismopedia minima	-	22.0	-	-
M. tenuissima	4.5	8.2	-	-
M. punctata	-	2.8	-	-
Aphanizomenon flos-aquae	0.9	34.0	-	-
Anabaena spiroides	-	6.3	-	-
Oscillatoria kisselevi	-	143.0	-	-
Scenedesmus obliquus	-	26.0	-	-

Table 28. Dynamics of changes in the zones (percentage of the total area of the northwestern shelf) of blooms in the northwestern Black Sea in 1973-1993

Year	Area of bloom (%)		
	Spring	Summer	Autumn
1973	-	-	10-.5
1974	-	10.1	
1975	15.5	18.3	13.2
1976	-	-	18.3
1977	6.0	16.7	7.6
1978	-	33.0	
1979	-	57.0	
1980	-	51.5	
1981	-	-	2.0
1982	-	8.5	6.0
1983	4.2		
1984	3.3		
1985	-	-	16.5
1986	-	26.1	
1989	-	8.0	
1991	-	12.8	
1992	-	12.1	
1993	11.7		

Small organisms fare better in media rich in minerals and organic matter as the ratio of the surface to volume is higher. Research has shown that the average volume of cells of bloom species has declined since the 1950s and 1960s.

Prior to anthropogenic eutrophication, the average volume of cells was 1,700 um^3. As anthropogenic eutrophication rose, the average volume decreased to 1,000 um^3.

As the result of blooming, especially of *Prorocentrum cordata,* sanitary-biological indices indicated a worsening of water quality in the northwestern Black Sea, the development of hypoxia in the near bottom layers and mass mortalities of benthic organisms and fish (Nesterova, 1979).

III. Commercial Species

Fisheries

Until 1985-1986 the Black Sea countries' total catch continued to increase, reaching 700,000 t. But after 1986 the catch went into sharp decline. About 77% of the total catch was composed of small pelagic fish such as the anchovy and the sprat. In the late 1980s on the northwestern shelf the anchovy catch declined at least tenfold, while in the Azov Sea anchovy fishing ceased completely after 1989 (Zaitsev, 1993).

The biodiversity of commercial fish of the Black Sea has decreased considerably during the last three decades (Table 29).

Table 29. Commercial fish of the Ukrainian Black Sea (Zaitsev, 1992)

In 1960-1970	**In 1980-1990**
Squalus acanthias	*Sprattus sprattus phalericus*
Raja clavata	*Alosa kessleri pontica*
Dasyatis pastinaca	*Engraulis encrasicholus*
Acipenser stellatus ponticus	*Odontogadus merlangus euxinus*
Huso huso	*Trachurus mediterraneus ponticus*
Acipenser guldenstadti colchicus	
Sprattus sprattus phalericus	
Alosa kessleri pontica	
Engraulis encrasicholus ponticus	
Belone belone euxini	
Odontogadus merlangus euxinus	
Mugil cephalus	
Mugil auratus	
Mugil saliens	
Atherina mochon pontica	
Pomatomus saltatrix	
Trachurus mediterraneus ponticus	
Mullus harbatus ponticus	
Sarda sarda	
Scomber scombrus	
Gobius batrachocephalus	
Gohius melanostomus	

Gobius cephalarges	
Gobius fluviatilis	
Psetta maeotica	
Platichthys flesus luscus	

Mytilus galloprovincialis

At the beginning of the 1960s, about 9,360,000 tons (97.5%) of the total mussel biomass of 9,600,000 tons on the Black Sea shelf from the Danube to Batumi was concentrated in the Ukrainian waters of the northwestern part of the Black Sea (Ivanov, 1963).

During active mussel harvesting in 1975-1980 the area of the mussel fields on the northwestern shelf exceeded 20,000 km^2 while the total stock was estimated at 6,000,000 tons (Samishev et al, 1986). But both the total stock (down by 30%) and the area covered by the mussel fields were considerably smaller than in the 1960s. The decline accelerated during the 1980s when the mollusc stock fell by a half.

An analysis of changes in the population characteristics of mussels in the northwestern shelf of the Black Sea in 1984-1994 has shown that parameters such as the average density of populations, biomass, average age and maximum life span decreased more than twofold. But more recently there has been a rejuvenation of the mussel population and the moiety ofjuvenile specimens has increased. The death coefficient of molluscs has more than doubled since 1984. There have also been striking changes in the mussels' absolute reproduction rate. Over the period 1984-1994 the rate has declined almost tenfold. But in recent years mussel populations have begin to stabilize, although there is no indication that the population will return to its former state.

There is considerable demand for mussel raw material for nutritional and medicinal purposes, which has prompted the growing of mussels in farms at different sites along the Ukrainian Black Sea coast. The largest farms are located in Kalamitsky Bay and Karkinitsky Bay (Scientific-Technological Centre for the Use of Natural Resources of the Shelf of the National Academy of Sciences of Ukraine - STC "Shelf, Sevastopol), and in the Kerch Strait (Scientific-Industrial Amalgamation Kerchmollusc, Kerch).

The collectors of the STC "Shelf marine farms produce a harvest of up to 2,000 tons per annum. The mussels fall off the collectors create a mussel bank at the bottom of Kalamitsky Bay. This bank has changed the local ecosystem and resulted in an increase in biodiversity, particularly the numbers of algae, invertebrates and fish.

The National Agency of Marine Investigations and Technology of Ukraine has initiated a long term government programme entitled "Mollusc", which has already made a considerable contribution to mussel aquaculture in the country. The programme's objective is to develop the best technology for the intensive farming of mussels in specific areas of the Black Sea and Azov Sea.

Rapana thomasiana

First discovered in the Black Sea in 1947 off Novorossiisk (Drapkin, 1953), Rapana thomasiana has been observed in large quantities off Sevastopol and Yalta since 1954.

Rapana lives on sandy and rocky bottoms at depths of 3 to 35 m in a coastal strip I-3 km in width. Densities are low in shallow waters up to 6 m in depth, averaging two specimens. 100 m^{-2}. The maximum concentrations have observed at depths of 8-10 m along the edge of a mass mussel settlement, where *Rapana* densities reach 12 ind.m^{-2}.

The Crimean coast is *Rapana's* main habitat in Ukraine. It is almost never found in the northwestern Black Sea or the Azov Sea. For the last 30 years no records have been kept on the abundance of Rapana on the Crimean coast. However, according to a personal communication by a leading research associate, Rubenstein YugNIRO (Kerch), there has been a slight increase in numbers. *Rapana* is used for food. One kilogram of boiled, frozen *Rapana* meat costs US$ 5-10. Its large shell, which can be up to 100 mm high, is used in souvenirs.

Ostrea edulis

Until the First World War, oysters were grown for commercial purposes in different areas of the Black Sea including the northwest. One of the most famous factories was the Schtoltse plant near Sevastopol. However, in 1914 severe storms destroyed the equipment used for rearing molluscs and production came to a halt.

In the 1970s there was a significant decline in the standing stock of oysters in the northwestern Black Sea, although experiments on farming them were reintroduced. In addition to the Black Sea oyster Ostrea edulis, attempts were made to grow the gigantic far eastern oyster *Crassostrea gigas* in Kerch, Karadag, in the salt lake Donuzlav.

The sharp decrease in the natural populations of Black Sea oysters, has resulted in *Ostrea edulis* being registered in the Red Data Book of Ukraine.

Chironomidae

The larvae of two species of *Chironomus plumosus,* which can be found in brackish water up to 10-11 ppt, and C. *salinarius,* from salty water up to 50 ppt and more, are caught in significant quantities using old-fashioned methods and sold as food for aquarium fish. Their main habitats are coastal brackish water bodies, salt lakes and limans. Larvae are caught the whole year round. The price is US$ 1-4 per kg.

Artemia

The brackish water shrimp *Artemia salina* can be found in large numbers in southern Ukraine. The eggs used in fishing are obtained in Kuyalnitsky liman (Odessa) and in Sivash lagoon in the Crimea. Artemia eggs cost US$ 50-80 per kg (dry weight).

Amphipoda

Amphipods are used as food for aquarium fish. In certain areas of the northwestern Black Sea pseudolittoral the biomass of the amphipod *Pseudogammarus maeoticus* reaches 2-3 $kg.m^{-2}$. These amphipods are sold for commercial purposes at US$ 1-2 per kg.

Decapoda

A long time ago some of the decapoda of the northwestern Black Sea were caught for commercial purposes, including the freshwater crayfish. In Ukraine there are unique water bodies where they have been caught. Until 1955 an average of 250 tons per annum, or 12.5% of the world catch, were taken in the Dnestrovsky liman; while up to 13% was caught in the near Danube area (Brodsky, 1981).

However, in recent years changing ecological conditions have resulted in a decline in the catch of freshwater crayfish. There is no reliable data on the catch over the last few years. The Dnestrovsky and Dneprovsko-Bugsky limans in the lower reaches of the Danube contain five species of crayfish, namely: *Astacus astacus, Pontastacus leptodactilis, P. Pipachypus, P. cubanicus* and *P. eichwaldi.* In 1995 in Odessa the price of crayfish was US$ 1.

The shrimps *Palaemon adspersus, P. elegans* and *Crangon crangon* are caught in the limans, bays and near the Black Sea coast using old-fashioned methods. In 1995 in Odessa the price of shrimps was US$ 8 per kg (wet weight).

Marine plants

The main Black Sea commercial plants are red algal species of the genus *Phyllophora (P. nervosa, P. brodiaei, P. pseudoceranoides, P. membranifolia* and *P. trailii)* and the sea grasses *Zostera marina* and *Z. nana.*

Phyllophora

In the 1960s the total standing crop of *Phyllophora* in an area of 11,000 km^2 in Zernov's field in the centre of the northwestern Black Sea reached 6,400,000 tons. In 1984 it dropped to 420,000 tons and in 1990 to 100,000 tons (Kalugina-Gutnik, 1994). The hauling and processing of *Phyllophora* for agaroid is carried out by the Odessa plant established in 1927. The drastic fall in the standing crop has meant that the algae is now taken from a small *Phyllophora* field in Karkinitsky Bay.

Zostera

In the 1960s standing crops of *Zostera* in the Tendrovsky, Egorlitgky, Karkinitsky and Dzharylgachsky bays reached 1,100,000 tons. Towards the end of the 1980s the figure had fallen to 500,000 tons (Kalugina-Gutnik, 1994).

8

Protected Areas and Species in the Ukrainian Coastal Zone

I. Dunaiskie Plavni Reserve

The Danube Delta is the largest and the most intact wetland complex in Europe, occupying an area of about 600,000 ha, of which 150,000 ha are in Ukraine and 442,000 ha in Romania. The Danube River flows into the Black Sea through three channels, of which the Kiliysky carries two-thirds of its annual river runoff.

The Dunaiskie Plavni State Reserve (DPR) is located where the Kiliysky enters the Black Sea, on islands in the delta and in the coastal strip. It was established in April 1981, although a sanctuary regime had already been introduced in different parts of the reserve in 1967. In 1973 the Dunaiskie Branch of the Chernomorsky State Reserve was established on 3,158 ha of islands and 4,600 ha of Black Sea waters. In 1978 the total area of the Dunaiskie Reserve was 14,851 ha.

According to the Ramsar Convention, since 1975 the reserve has been included among wetlands of international significance. The biosphere significance of the Ukrainian Danube delta is primarily based on the following:

- The diversity of marine, freshwater and terrestrial biotopes, a network of canals, arms and river tributaries, swamps and lakes with reed growths, flood plains, alluvial islands and forests on elevated sites, meadows, pastures and dunes. The water area of the delta is increased by the nearby lakes to the north (Fig. 24);
- A significant diversity of aquatic and terrestrial plants and animals, with more than 1.500 species of plants and more than 5.000 species of animals;

- The high indices of bioproductivity. There are dense growths not only of common plants such as reeds, bulrushes, sedges and willows, but also rare protected species such as the water chestnut, salvinia and buckthorn.

There are regular microalgae blooms in the Danube avandelta reaching a biomass of tens and even hundreds of grams per cubic metre. Up to 50,000 specimens.m^{-2} of the relict amphipod *Pontogammarus maeoticus* have been discovered in the pseudolittoral zone of the DPR. The reserve also provides exceptionally favourable feeding conditions for fish, waterfowl and aquatic birds. During one three-hour observation by Yu. Zaitsev from 12:00 to 15:00, about 80 freshwater fish (8 species) and 50 gray mullet fry *Mugil saliens* passed through a 50 cm arm of the Kiliysky channel of the Danube delta. The Danube delta is a traditional area for fisheries. The high fish productivity of the Ukrainian part of the delta is confirmed by the fact that pelicans nesting in Romanian territory fly each year to the DPR to feed.

The largest colony in Europe of another protected species of aquatic birds, the spoonbill Platalea leucorodia, also gathers in the reserve. During the colder months up to 100,000 migratory aquatic birds from all over Europe, including the northern swan *Cygnus cygnus* and some species of geese, winter in the DPR.

The DPR is also home to some rare trees. The Danube water chestnut *Trapa danubialis* is an endemic of the Danube, while the water chestnut *Trapa natans* has been entered in the Red Data Book of Ukraine (Fig. 25). *Salvinia natans* has also been included in the Red Data Book of Ukraine (Zaitsev, 1990).

The DPR's phytoplankton includes 800 species of marine, brackish and freshwater unicellular algae. There are 50 species of phytobenthos macrophytes. But the soft sediments and high water turbidity mean that there are almost no macrophytes in the sea. Dense growths of Zostera marina can only be found in very shallow water in the marine embayments of the delta.

The marine zooplankton includes large numbers and a high biomass of the infusorian *Mezodinium rubrum,* the protozoan *Noctiluca miliaris (N. scintillans),* rotatoria and the jellyfish *Aurelia aurita.*

The zoobenthos is comprised of about 250 species. Molluscs such as the freshwater Unionidae, Limnaeidae, *Viviparus,* the marine *Mya arenaria* and *Lenthidium Mediterranean* are quite numerous, as are crustaceans, polychaetes and insect larvae. The reserve contains more than 100 species of fish, plus nine amphibian species, seven reptile species, 225 bird species and 25 species of mammals (Voloshkevich et al., 1987).

Another reason why the DPR needs protection is that it includes the avandelta and adjacent waters containing the widest brackish area of the sea, with specific fauna and flora. Characteristic species of the Danube avandelta include the Danube shad *Alosa kessleri pontica* and six species of sturgeons, four of which have been registered in the Red Data Book of Ukraine, namely: *Acipenser ruthenus, A. nudiventris, A. sturio* and *Huso huso ponticus.*

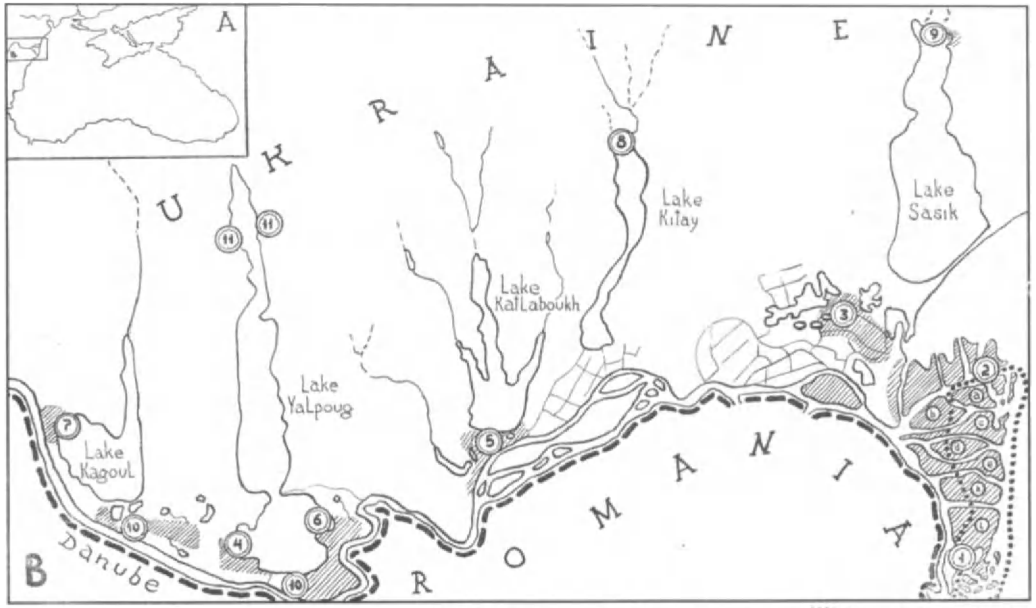


Fig. 24 Ukrainian Danube delta area.

wetland areas, international boundaries, Dunaiskiye Plavny Reserve

Legend

Islands: a) Poludeny, b) Ochakovsky, c) Ankudinov, d) Peschany, e) Stambulsky, k) Kubansky, 1)Kubanu

1. Southern part of Kiliya Branch delta
2. Northern part of Kiliya Branch delta
3. Stentsovsko-Zherbrijanskye plavny
4. Western part of Kugurluy Lake
5. Nekrasovsko-Bogatyianksyke plavny
6. Eastern part of Kugurluy Lake
7. Lake Kagul plavny
8. Upper part of Kitay Lake
9. Upper part of Sasik Lake with rivers deltas
10. Near Danube River forest
11. Upper parts of Yalpug Lake with steppe communities

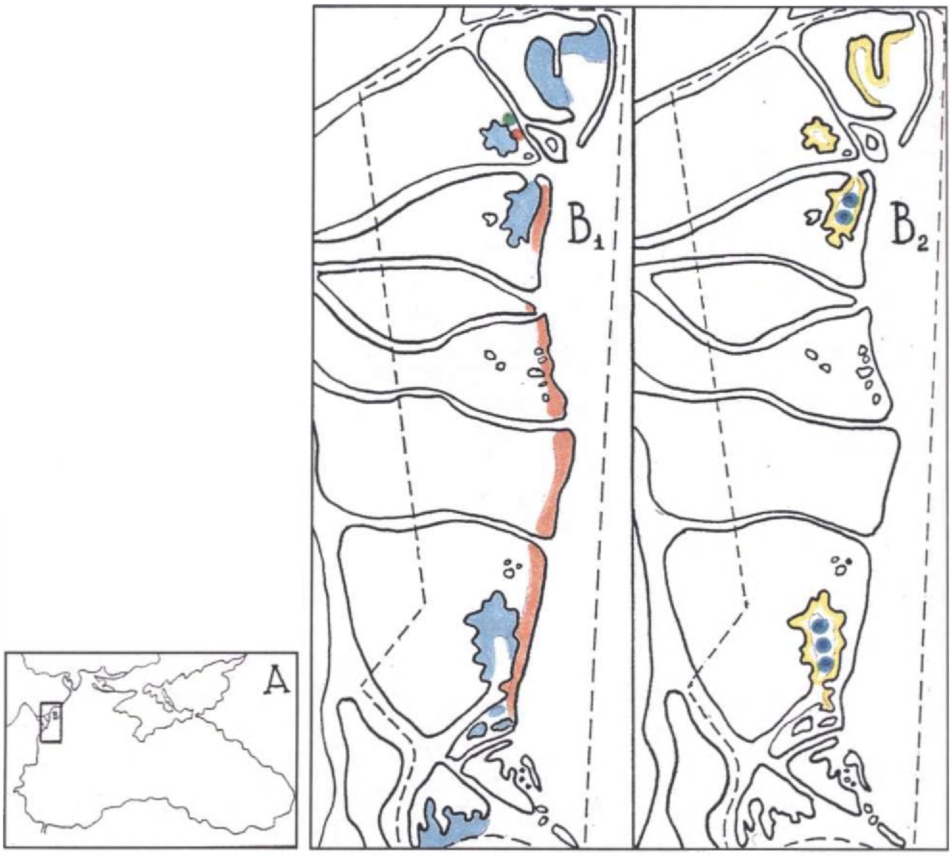


Fig. 25 Distribution of some rare plant species of Danube Plavny Reserve (B).

B₁
- *Trapa natans L.*
- *Leucojum aestivum L.*
- *Orchis palustris Jacq.*
- *Hyppophae rhamnoides L*

B₂
- *Salvinia natans (L.) All.*
- *Nymphoides peltata (C.G.Gmel) O.Kunz.*

— — — — reserve boundary

There are three species of Black Sea dolphins in the marine part of the reserve, namely: *Delphinus delphis ponticus. Phocaena phocaena relicta* and *Tursiops tritneatus ponticus* which is included in the Red Data Book of Ukraine. Another rare mammal species is the monk seal *Monachus monachus.*

Although the reserve was only established recently, it has already begun to produce positive results. The areas covered by rare species of aquatic plants have increased: the water chestnut and *salvinia* fivefold, the buckthorn three to fourfold. The number of bird species has risen from 170 in 1981 to 225 in 1987. including an increase in those recorded in the Red Data Book of Ukraine from 5 to 13. Two pairs of white-tailed eagles have nested on artificial platforms set up by researchers in the tops of trees.

In 1993 the DPR signed a cooperative agreement with the World Wildlife Fund. In 1994 the Global Environment Trust Fund allocated USS 1.500,000 for the implementation of a project on the "Conservation of Biodiversity in the Ukrainian Part of the Danube Delta". The aim of the project is to set up a management structure and expand the protected zones in the Ukrainian part of the Danube delta. Later the protected zone will be expanded to 34.000 hectares and plans made for a biosphere reserve on an area of 67.000 ha.

II. Chernomorsky Biosphere Reserve

The Chernomorsky Biosphere Reserve (CBR) was created in 1927 and reorganized in 1983 as a biosphere reserve confirmed by a UNESCO certificate. The CBR is situated in the northwestern coastal area of the Black Sea. near Prichernomorya, south of the Dneprovsko-Btigsky liman (Fig. 26). The total area of the reserve is 87.348 ha including a reserve core of 57,048 ha and a buffer zone (Egorlitsky Bay) of 30,300 ha. Five mainland areas are included in the reserve core: three forest steppes, namely ivano-Rybalchansky (3.200 ha). Solenoozernsky (2,300 ha) and Volyzhin Les (203 ha): and two coastal areas: Egorlitsky Kut (840 ha) and Potievsky (1.064 ha). The reserve also includes the islands of Tendrovsky Bay and Egorlitsky Bay. namely: Dolgy (470 ha), Krugly (8 ha). Konskie (27 ha). Orlov (28 ha), Babin (6 ha), Smaleny (8 ha): as well as a large part of the Tendrovsky Spit (1.289 ha). The eastern (shallow water) part of Tendrovsky Bay covering 36,628 was added to the reserve core in 1975. In addition, when the Chernomorsky State Reserve was transformed into a biosphere and became an ornithological sanctuary of considerable significance. Egorlitsky Bay was included as a buffer zone (see Fig. 26). The total water area of the reserve, including the one kilometre strips along Tendrovsky Spit (=Tendra Island), Dolgy and Krugly islands, is 78.100 ha. There is an area of 1.000 sq. km of wetlands adjacent to the reserve which was awarded international status under the Ramsar Convention in 1971. The CBR is subject to powerful anthropogenic pressure from the regulation and withdrawal of fresh water runoff through the Dnepro-Bugsky liman. and agricultural activity, the erosion of Nizhnedneprovsky sands, recreational development, and a general worsening of the ecological situation in the northwestern Black Sea. Irrigation has caused the greatest damage to the protected nature reserve. The main culprits are rice paddies in the Krasnoznamenskaya irrigation system.

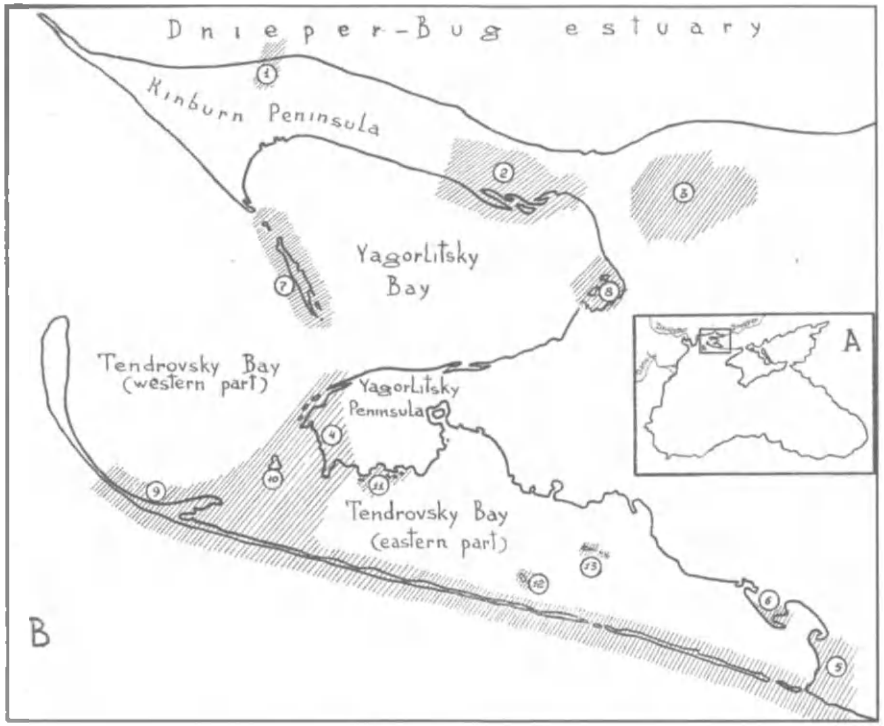


Fig. 26 Chernomorsky Bioshpere Reserve (cross-hatches).

Legend

1. Volyzhin Les
2. Solenoozerny
3. Ivano-Rybalchansky
4. Yagorlitsky Kut
5. Potievsky
6. Otievskaya Strelka
7. Dolgy and Krugly Islands
8. Konskye Islands
9. Tendra Island
10. Orlov Island
11. Sibirskye Islands
12. Smaleny Island
13. Babin Island

The terrestrial reserve flora includes 185 species of fungi, including higher basidiomycetes (101 species), phytotrophic obligate fungal parasites (84). lichens (75) and mosses (61). The higher plant species include 728 species from four phyla. 92 families and 348 genera.

The fresh water bodies of the reserve contain 35 species of Euglenophyta (Vetrova. 1992). According I. Pogrebnyak (1965). there are 97 species of macrophytes in the marine water bodies, including seven species of higher plants. Today Tendrovsky Bay and Egorlitsky Bay contain 57 species of macrophytes including Chlorophyta (21 species). Charophyta (5). Phaeophyta (13) and Rhodophyta (29).

The marine water macrozoobenthos comprises 187 species of invertebrates, including Porifera (10 species). Actinaria (2). Polychaeta (68). Crustacea (64). Mollusc;! (37) and Ascidiacea (5) (Pinchuk. Chernyakov. 1989; Pinchuk. Chernyakov. Aleksenko. 1992: Alekseev. 1992: Pinchuk. 1989; Komarova, 1986. unpublished, data of Chernyakov. Pinchuk, Rubenstein).

The fauna of the reserve consists of 4.000 species. The terrestrial invertebrates include 173 species of spiders and 25 species of terrestrial molluscs. The total number of terrestrial invertebrates (excluding insects) exceeds 800.

The ichthyofauna includes 78 species, comprising three species of Chondrichthyes and 75 species of Osteichthyes (Vinogradov. I960: Pinchuk. 1987. unpublished data of Pinchuk and Tkachenko). There are also five species of amphibians and nine species of reptilians (Kotenko, 1977). The ornithofauna consists of 303 bird species pertaining to 20 orders, including I 10 species of nesting birds.

The contemporary fauna also includes 49 species of terrestrial and three species of aquatic mammals from six orders and 14 families (Selyunina. 1992). The names of the protected species of the DPR and CBR included in the Red Data Book of Ukraine are shown in Annex I. Table 12.

The State of the Marine Ecosystem in the Chernomorsky Biosphere Reserve in the Western (deep water) part of Tendrovsky Bay

The benthic biocoenoses are dominated by short-lived forms such as *Nereis succinea* or the young of eurybiotic species of bivalve molluscs. The only organism which can tolerate a lack of oxygen is *Mya arenaria.* which is a more or less stable component of benthic populations. The composition and structure of the bottom communities illustrates the constant pressure of mass mortalities. Only in the upper part of the sublittoral zone to a depth of 2 metres can favourable ecological conditions be found.

About one quarter of the area of the eastern part of Tendrovsky Bay consists of shallow water up to a depth of one metre. The average depth is 1.5 metres, the maximum not more than 4 m. Aquatic plants flourish in these shallow water areas. The densest growths are made up of Charophyta (south and east shallow waters, silty part of the bottom of the bay), *Potamogeton pectinatits L.* (the lower part of the northern and southern slopes). *Zostera marina L.* (the bottom near the islands of Babin and Smaleny) and *Zostera nolle (Cavol)* (northeastern shallow waters). Mixed growths of macrophytes are characteristic of the coastal strip up to a depth of 0.8 - 10 m.

The dominant species in the zoobenthos are small gastropod molluscs of the Hydrobiidae family (average abundance 1.580 - 2.000 ind.m², biomass 3.3 - 4.3 g.nr, frequency 96%), the bivalve mollusc ***Mytilaster lineatus*** (average abundance 250 - 360 specimens.m'², biomass 17.8 - 25.4 g.m . frequency 68%). The molluscs ***Abra ovata*** and ***Polititapes aurea*** dominate the silty sediments. Hie bottom communities of the eastern part of the Tendrovsky Bay were badly damaged by the severe winters of 1984 - 1985 and 1986 - 1987. At the time of writing they appeared to be undergoing a process of recovery. The total standing stock of the zoobenthos has increased from 10.000 t (1987) to 48.000 t (1993).

At depths greater than 3.5 m the central part of Egorlitsky Bay is dominated b) communities of the red alga ***Phyllophora nervosa.*** The distribution of this algae is limited by silt in the west and shallow water in the north, east and south. According to unpublished data from N. Volsky, in July 1992 the standing stock of ***Phyllophora*** was 63.400 ± 14,400 t. The reserve's ***Phyllophora*** community has high average densities (16.000 ind.m"²) and biomass (up to 800 g.m"²).

There are 52 species in the zoobenthos. On the southern and northern slopes of the bay at depths of 3.5 m there are large growths of higher plants, mainly ***Zostera marina mi Potamogeton pectinatits.*** Until recently this was the site of a ***Chant intermedia A. Br.*** association. However, in 1992 the association almost completely disappeared from the bottom community (Eremenko. Minicheva, 1992).

The ***Mytilaster lineatus*** biocoenosis. which includes 56 zoobenthos species, is found at a depth of up to 3.5 m on sediments lacking vegetation. The average density of the dominant species is 4.600 specimens² and its biomass 480 g.m"².

Significant areas of the western and eastern margins of the water body are covered by a biocoenosis of silty sediments with *Abra ovata.* The biocoenosis comprises 41 macrozoobenthos species. The average density is 2.100 ind.m-2 and the biomass 400 g.m'².

In spite of seemingly favourable conditions in Egorlitsky Bay. there are signs of anthropogenic eutrophication. Eutrophicated Tendrovsky waters entering Egorlitsky Bay are involved in the central cyclonic circulation leading to an intense accumulation of suspended particles and the siltation of extensive shelly areas on the edge of the cyclone in the west of the bay. This phenomenon was responsible for mass mortalities in the Egorlitsky oyster banks at the end of the 1970s and the beginning of the 1980s. Further siltation led to a gradual accumulation of silt sliding down the slope in the central part of the water body (unpublished data, I. Rubinstein). One result of these anthropogenic factors has been the appearance of the pelophilic benthos forms that can be seen today.

Egorlitsky Bay is in the best ecological condition. Anthropogenic factors have onl\ influenced some benthic groups and the natural structure of the bottom community has not been disturbed. But in the eastern part of Tendrovsky Bay these processes have had far reaching results and the structure of the community has been altered. However, the biological productivity of the benthos has recently increased and there appears no reason to suggest that the process will not continue. But the western part of Tendrovsky Bay is in worse condition and the changes there appear irreversible. There has been a sharp decline in the productivity of the benthic community and mass mortalities.

III. Mys Martyan Reserve

The state reserve "Mys Martyan" was created to conserve the grove of evergreen relicts of Mediterranean flora and endemics and the Black Sea coastal area in accordance with the Ukrainian Council of Ministers' Order on "The organization of new state reserves and the expansion of the Chernomorsky State Reserve" of 20 February. 1973. It is part of the Nikitsky Botanical Garden of the National Academy of Sciences of Ukraine. The total area of the Mys Martyan Reserve is 240 ha. including 120 ha of forest land and 120 ha of the Black Sea. The land and waters of the reserve are not subject to economic activity and serve only for scientific investigations conducted without disturbing the reserve regime.

The reserve preserves in a natural state an entire oak-forest ecosystem typical of the southern Crimean coast, conserving the gene fund of living organisms, facilitating the study of the natural processes and dynamics of the coastal marine complex as an example of interaction between land and sea. and acting as a reservat from which territories with economic activity beyond the reserve are enriched.

The phytobenthos of the reserve has been studied since 1973. The most characteristic benthic vegetation of the upper sublittoral of Mys Maryan is the phytocoenosis of *Cystoseria crinita* and *C barbata.* C *crinita* is distributed through the reserve at depths of 0 to 14 m. The maximum density of growth (1.000 - 2.000 specimens per nr of bottom) forms two belts at depths of 0-3 m and 4-6 m respectively.

Growths of C *barbata* are found at depths of 2 to 14 m. In the eastern pan of the reserve they begin at the spray zone. It should be noted that the dispersal of *Cystoseira* is determined by the boundary of stationary substrates. The highest densities are at depths of 5-7 in.

The thallomas of *Cystoseira* are strongly encrusted with macro and microepiphy tes. Many epiphytes are characteristic of a certain part of the *Cystoseira thalloma:* for example, to the branches, axial parts or the foot. Species such as *Corynophlaea, Eetoearpus. Ceramium, Kylinia* and *Acrochaetium* grow densely on the terminal branches of *Cystoseira. Laurencia coronopus* and *Sphacellaria cirrhoscr,* and. to a lesser degree. *Porphyra leueosticta* and *Chaetomorpha flourish* on the axial part of the thalloma. while *Corallina granifera* and *Apoglossum ruseifolium* grow on rocks and on the feet and thalloma of *('ystoseira.*

The species composition and amount of epiphytes varies through the year. Epiphytes reach maximum qualitative and quantitative parameters in areas protected from waves. The mass species (more than 100 g.m"[2] biomass) in this community include: *Phyllophora* nervosa (1.839 g.m"[2]), *Cladostephus verticilatus* (879 g.m'"). *Polysiphonia suhitlifera* (681 g.m"[2]), *Corallina granifera* (486 g.m"[2]), *Ceramium pec/icillalum* (435 g.m). *Laurencia pinnatifida* (303 g.m"[2]) and *Codium vermillara* (189 g.m"").

There are two widely represented associations in the tipper sublittoral belt, namely as ('. *crinita* + *C barbata* and ('. *barbata* + *C. crinita.* Epiphytes are characteristically attached to different parts of the thalloma. In the *C. barbata* + *C. crinita* association the epiphytes are more developed than in the *C. crinita* - *C'. barbata* association.

Red algae are the dominant species in the *Cystoseira* phytocoenoses. followed by brow n and green algae.

There is a greater diversity of zooplankton in the reserve (74 species) than in the recreational areas (66 species). The rare animal species include: the siphon jellyfish *Lucernaria campanula,* the polychate *Nematonereis unicornis,* the molluscs *Acanlhochilona cascicttlaris. Tergipes lergipes* and *Area noae* and the isopod *Gnathiu haeeseoi.*

Phytocoenoses of the Pseudolittoral

The algal macrophytes of the pseudolittoral belt make up an independent ecological group. The pseudolittoral belt is subject to large quantities of dissolved, precipitating pollutants, atmospheric precipitation, and shore leaching which often carry contaminants. As a rule the algae inhabiting the pseudolittoral are smaller in size than analogous species in the sublittoral.

The vegetation in the reserve's pseudolittoral is arranged like a belt, reaching a maximum width of 60 cm in rocky places and cliff overhangs. Depending on the time of the year, the coverage of the algal growth ranges from 60-100%. On pebble beaches with single large rocks the algal growth cover averages around 10%). falling to 1-3%) in the winter. The phytocoenoses of the pseudolittoral are characterized by a mosaic distribution of macrophytes. poly dominancy and a succession of dominating species during the year. In the cold months the dominant species are: *Seytosyphon lomentaria* (maximum biomass of 1.486.67 g.m). *Petalonia zoslerifolia* (maximum biomass of 997.47 g.m") and *Eclocarpits eonfervoides* (maximum biomass of 508.20 g.m"²). During the summer the biomasses of *Ceramiam eilialitm* and *DHophus fasciola* increase from 131.33 g.m to 927.57 g.m"² and from 196.07 g.m"² to 555.23 g.m"² respectively. In spring the biomass of *Enteromorpha iniestinalis* can reach 341.60 g.m"². rising to 678.60 g.m on pebble beaches. In the summer *L. pinnaiiftda* can reach 3.78 - 56.23 g.m"².

The average biomass of the pseudolittoral phytocoenoses of rocky areas is 1.714.76 g.m"². of cliff overhang 2.168.63 g.m"² and of pebble beaches 1.228.38 g.m"².

The Mys Martyan pseudolittoral phytocoenoses contains the following rare species: *Ulotrix imp/exa, Blidingia minima. Chaetotuorpha gracilis. Cladophoropsis memhranaceu. Ervlhroe/adia subintegra, ilelminthora divaricate/, Ceramittm tentiissitmtm. ('. deslongchampii, C'. secundalum. Pterosiphonia pennala* and *Herposiphonia secunda.*

Up to 83 species of algae macrophytes have been discovered in the reserve's pseudolittoral belt, including 19 Chlorophyta species, Phaeophyta 16 species and Rhodophyta48 species. (I. I. Pogrebnyak and I. 1. Maslov, 1980: I. I. Maslov, 1984. 1985: I. I. Maslov. T. V. Belich. 1993. 1993b: and T. V. Belich, 1993. 1993b.)

Phytocoenoses of Marine Grasses

There are two higher aquatic plants in the coastal waters of Mys Martyan. namely the sea grasses *Zoslera marina L.* and *Zostera no/lii Погнеш. Zostera* communities inhabit sandy sediments with shell admixtures to a depth of 8-9 m. The communities are contiguous monodominant growths of Z. *marina* and Z *noliii.* There is an insignificant intermingling ofthe thalloma of one species into the other algal cover only near the contact zones.

The vegetative thallomas of Z *marina* attain peak biomass and densities in the second half of summer. In August Z. *marina* biomass and density averaged 742.2 g.m-2 (47.4% of which were submerged organs) and 316.67 specimens.m-2 respectively. The average length of the thalloma was 32.3 cm with a 4.1 mm leaf width. In September the thallomas grew to an average of 37.03 cm with a leafwidth of 4.28 mm.

Z *noliii* achieves peak biomass and density at the beginning of autumn, reaching an average of 380.21 $g.m^{-2}$ (36.7% of which were submerged organs) and 825 specimens. ».m'· respectively. The length of the thallomas was 31.97 cm with a leaf width of 1.94 mm.

The different timing of peak values for Z. *noliii* and Z *manna* may be the result of adaptive factors when the two species reside together in mixed oligodominant biocoenoses.

In *Zostera* coenoses there are 677 species of algal macrophytes (18 species of Chlorophyta. 12 of Phaeophyta and 37 of Rhodophyta). The number of species *in **Z.*** *marina* communities varies from 17-38. while in Z. *noliii* communities the number varies between 14-35. The algal biomass of Z. marina phytocoenoses varies from 2.04 g.m ~ to 56.21 $g.m''^{2}$ (0.33-7.55% of the biomass of all vegetation) and of Z. noltii from 1.67 $g.m^{-2}$ to 75.92 $g.m^{-2}$ (0.6 - 3 1.63%). Both parameters have two peaks: in June and in September. The dominant species by peak biomass levels during the season are: *Chonclria lenuissima* (43.75 $g.m''^{2}$), *Eciocarpus confervoides* (35.42 $g.m''^{2}$), *Cladophora albida* (32.08 $g.m^{2}$), *Polysiphonia subulıfera* (12.6 g.m˙). *Cladostephus verticilatus* (8.33 g.m˙). *Ceramium pedicellatum* (6.08 $g.m''^{2}$) and *Kylina vigratula* (5.83 g.m"").

Almost all algae in the biocoenoses develop like epiphytes on the leaves and roots of zoostera. *Pseudulvella nadsonii. Pringsheimiella soutata, Goniotrichum elegans, Ralfsia verrucosa* and *Melohesia lejolisii* have been observed on rhizomes and roots.

A comparison of the flora of the algal and zostera communities of the sublittoral belt shows that many species of algae prefer sea grass thallomas as a substrate and are almost never found beyond the limits of algal growths.

Nature conservation measures in the Crimea have resulted in the creation of a system of protected marine water areas, consisting of 26 reserve marine complexes along the coast of the peninsula. Most marine reservats are classed as nature heritage of local significance. They occupy more than 30.000 ha. Many are used for recreational and commercial purposes. There are few state reserves. Given the conditions prevailing along the southern Crimean coast, which is under constant anthropogenic influence, the most effective method of protecting the gene fund of bottom vegetation is the complete protection of separate unique marine areas.

IV. The Karadag State Reserve

The Karadag State Reserve (KSR) is located on the southeastern coast of the Crimean peninsula between the cities of Feodosyia and Sudak. which was formally declared a state reserve in 1979. Today it covers an area of 2.855.7 ha. including 2046.1 ha of land and 809.1 ha of the Black Sea.

The reserve was established to protect the mountainous mass of volcanic origin rock, which rises to a height of 577 m. Karadag is a mineralogical nature museum (more than 100 minerals have been discovered) in which steppe, forest-steppe, coastal and marine biogeocoenoses are closely grouped together in a small area.

The reserve contains about 1.035 species of plants, including 200 rare and endemic species. 35 species of mammals. 177 species of birds and 107 species of marine fish. Karadag also contains 169 species of macrophyte algae, of which 42 are green, 41 brown and 86 red (Kalugina-Gutnik, 1984). The zooplankton consists of 108 species, the most numerous of which are copepods (35 species), decapods (13 species) and tintinnids (27 species) (Murina, Zagorodnaya, 1989). The benthos is dominated by ***Cystoseira, Venus, Mytilus, Terehellicla*** and ***Phaseolina*** biocoenoses (Makkaveeva, 1989). Marine mammals include three species of dolphins: ***Delphimis delphis ponticus, Tursiops truncatus ponticus*** and ***Phocaena phocaena relic/a.***

9

Public Awareness in Environmental Protection and the Mass Media

The oldest non-governmental environmental protection organization in Ukraine is the Society of Hunters and Fishermen (USHF) founded in 1920 and the Society for Conservation of Nature (USCN) created in 1946. Regional organizations for the former have been established in Vinnitsa. Dnepropetrovsk. Zhitomir, Zakarpatia, Kirovograd, Nikolaev and Odessa oblasts, and for the latter in Vinnitsa. Volyn, Dnepropetrovsk, Zhitomir, Zakarpatia, Kirovograd. Kherson. Khmelnitsky oblasts and the Crimea.

The objective of the USHF is to unite all those involved in sport and game hunting and fishing and to regulate these activities according to common rules. The USHF once had branches in almost every institute of learning and factory, but today it faces severe difficulties in finding sponsors to finance nature protection activities.

However, in the past ten years a number of other ecological associations have appeared which have targeted ecologically hazardous industrial facilities. They include the "Zeleni Svit" (Green World) association and the "Green Party ".

Regional "Zeleni Svit" organizations have been set up in the following cities: Vinnitsa. Lutsk, Dnepropetrovsk. Nikopol. Krivoi Rog. Uzhgorod. Ivano-Frankovsk, Kiev. Nikolaev. Rovno. Sumy. Ternopol. Kharkov. Cherkassy and Chernovtsy. There are blanches of the Green Party in Nikopol, Svetlovodsk. Odessa, Ternopol and Cherkassy.

There are also local ecological unions which seek to raise public awareness of ecologically vulnerable natural complexes. These include "Citizens for the Cleanliness of the Environment" (Pavlograd. Dnepropetrovsk oblast), Ecofund "Pridneprovie" (Dnepropetrovsk), the regional association "Vozrozhdenia" (Krivoi Rog), the Ecofund of Crimea "For the Survival of the Peoples of Crimea", the "Lion Society" (Lvov), the "Fund for Natural History and Ecology" (Odessa Zoo), the "Puzanov Fund for the Protection and Salvage of Wild Life" (Odessa), the "Public Committee for the Control of Environmental Protection", Zdolbunov (Rovno oblast). the Ecocentre "Ozon" (Kharkov) and the Dzharylgach Society (Skadovsk, Kherson oblast).

The first ecological journal "Ridna Priroda", which is published by the USHF and the Society for Conservation of Nature, was founded in 1971. The journal includes official reports and articles on environmental protection issues in Ukraine and conservation work by public organizations and state agencies and establishments.

Since 1990 there has been a steady' increase in the number of readers of the popular scientific journal "Usie Zhivoe". which is published by the Odessa Zoo and the Fund for Natural History and Ecology.

A number of newspapers have also been printed on nature conservation topics. These include "Dnipro-Slavutich" (Dnepropetrovsk). "Ecologia i zdorovie" (Dnepropetrovsk), "Zeleni Svit" (Kiev). "Dzherela" (Sumy). "Nash Kray" (Donetsk) and "Krinitsa" (Alchevsk, Lugansk oblast).

10

Recommendations

It is recommended that the following measures be carried out.

Local Level

- To regulate the population density of the water chestnut in the Danube delta by harvesting the nuts for economic uses.
- To restore the traditional system of burning out reeds in parts of the Danube islands.
- To organise the cleaning and dredging of silted canals and overgrown tributaries on the sea coast of the Danube delta.
- To cease planting monocultures of pine on the Kinburn peninsula and to form park type sparse forests by rogueing out existing pine stands.
- To convert the rice growing areas adjacent to protected territories (Kiliya district. Odessa region. Skadovsk district. Kherson region and Crimea) to closed water use technology.
- To minimize the use of pesticides and other toxic substances on farm lands close to protected territories and aquatic areas.
- To encourage the use of mariculture to grow mussels on the shelf of the sea because of the damage caused to benthic biocoenoses by hypoxia.
- To formulate and implement a new technology to control the quality of coastal waters using hydrobiological amelioration based on the construction of "artificial reefs".
- To restore the biological diversity and recreational conditions of urbanized areas of coastal waters by managing the productive properties of aquatic ecosystems.

National Level

The protection and restoration of biological diversity necessitates an increase in the network of protected territories and water areas. In addition to existing reserves, the following areas on the Ukrainian Black Sea and Azov Sea coasts should be granted protected zone status:

- The Tuzlov group of limans (Shagany, Alibei and Burnas) including the creation of game reserves in the upper part of Alibei and near Trikhatki village.
- Zhebriyanovskye Plavni and Lake Sasyk should be included in the Biosphere Reserve "Dunaiskie Plavni".
- Lower Dnestr (the area between rivers of Dnestr and Turunchuk, the northern part of Dnestr Liman) should become a national park.
- Tiligulsky Liman should become a regional landscape park.
- Yagorlitsky Bay and Tendrovsky Bay. The area of the Yagorlitsky Kut should be increased from 840 to 5.550 ha. a reserve regime established in the western part of Tendrovskaya Bar. including Yagorlitsky Bay as a part of the reserve core.
- Karkinitsky and Dzhary Igachsky Bays should become a marine reserve.
- The seaside from Chernomorsk to Cape Uret (Crimea) should become a national park.
- Central Sivash and Eastern Sivash should become a national park "Azovo-Sivashsky".
- Utlyuksky Liman should become a game reserve.
- Obitochny Bay and Obitochaya Bar and Berdyansk) Bay and Berdyanskaya Bar should become protected areas.
- Belosaraysky Bay and Belosaray skaya Bar should become a game reserve.
- Krivoi Bay and Krivaya Bar should become a game reserve.

Given the exceptional significance of the Black Sea and the Azov Sea wetlands (Yagorlitsky, Tendrovsky, Dzhary Igashcky. Karkinitsky bays and the Sivash lagoon complex areas) for the protection of biodiversity and Red Data Book species, special studies need to be conducted. This research can be carried out by the Odessa Branch of the IT3SS. Chernomorsky Reserve. Kinburn Peninsula Regional Landscape Park and Azov Black Sea Ornithological Station. Melitopol. The research should include the following:

- An inventory of species of marine plants and animals in the wetlands and marine coastal shallow waters of the northwestern Black Sea and the Azov Sea:
- An evaluation of the current state of the benthic and pelagic biocoenoses under different habitat conditions:
- An evaluation of the current populations of mass and rare species of invertebrates and algae:
- Research into the peculiarities of morphological differentiation and genetic structure of populations of different mass and rare species;
- The identification of areas where natural resources are in a critical state and marine areas vital to of the sea for conservation of biodiversity;
- An examination of the functioning of marginal biocoenoses in the Black Sea and the Azov Sea and their significance in the trophic relations offish and birds.

Regular biological and ecological monitoring of coastal waters should be considered the main source of information on the state of. and changes in. the marine environment. The complete network of stations for observations and measurements should include the following:

- Danube avandelta:

- Tsarigradskoie headwater of the Dnestr liman;
- Bolshoi Fontan Cape;
- the apex of the Kinburn Bar in the Dneprovsko-Bugsky liman:
- Tendrovskaya Bar. western end:
- Dzharylgach Island, eastern end:
- Cape Tarkhankut;
- Kape Khersones:
- Cape Martyan;
- Cape Karagach near Karadag;
- Kerch Strait;
- Eastern Sivash;
- Biryuchy Island, western end;
- Berdyanskaya Bar, apex.

A necessary requirement when conducting any kind of economic activity is to carry out compensatory measures for conservation of nature. The Cabinet of Ministers Decree No. 867 of 21 October 1993 on decreasing pollution in the northwestern Black Sea near Odessa foresees the establishment of one fish rearing plant for *Mugil so-iny* and another for sturgeons in the Danube delta. There are also plans to utilise microbiological cleaning technology to remove oil pollution etc. from the marine environment.

Regional Level

Recommendations include:

- Giving the Dunaiskie Plavni State Reserve the status of a biosphere and include it in the UNESCO List of Biosphere Reserves. A proposal to change the status of the reserve was approved at the International Conference on Biosphere Reserves in Seville, 20-25 March. 1995.
- Representatives of Ukraine and Romania should prepare a proposal to create a common Transboundary Biosphere Reserve in the Danube delta on the basis of the Dunaiskie Plavni Reserve in Ukraine and the Danube Delta Biosphere Reserve in Romania. Specialists from Ukraine and Romania also put forward a proposal to this effect in Seville.
- It has been suggested that a branch of the Dunaiskie Plavni Reserve should be established on Zmeiny Island (Ukraine) in order to protect migrating birds from eastern Europe and rare Black Sea plant and animal species (including the monk seal).
- Official lists of rare and protected species of flora and fauna should be compiled by specialists from the littoral states for inclusion in a Black Sea Red Data Book in order to improve international cooperation in protecting and enriching the biodiversity of the Black Sea and Azov Sea.

Annex I - Data Tables for Individual Species Referred to in the Main Text

No	Name of the Tables	Chapter
1	List of Phytoplankton Species	j
2	List of Fungi Species	3
j*	List of Zooplankton Species	4
4	List of Microphytobenthos Species	5
5	Floristic Composition of Higher Algae of the Northwestern Part of the Шаек Sea	4
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7	List of Macrophytobenthos Species	-l
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13	List of Species of Flora and Fauna Entered in the Red Data Book of Ukraine and Protected on Reserve Territories	8

Table 1. List of Phytoplankton Species

Species	Marine		Fresh Water		Estuaries	
	A	B	A	B	A	B
BACILLARIOPHYTA						
Melosira granulata (Ehr.) Ralfs, 1861	-	-	M	M	-	-
M. granulata var. angustissimalO.Mull.) llust.. 192^-1966	-	-	+	s	-	-
M granulata var. curvata(Grun) llust.	-	-	+	-	-	-
M. italica (Ehr.) Kutz ,1844	-	-	M	s	-	-
-var іспшучіша i(iriin) (> Mull. 1904	-	-	+	-	-	-
M Juergensii Ag.. 1824	+	S	-	-	-	-
M.moniliformis ((). Mull.) Ag.. 1824	+	s	-	-	-	-
-var. subglobosa Grun, 1878	+	s	-	-	-	-
M. nummuloides (Dilhv) Ag.. 1824	+	-	-	-	-	-
M. sulcata I Ehr.l Kutz.. 1844	+	s	-	-	-	-
SI. varians Ag.. 181'	-	-	+	-	-	-
Podosira hormoides (Mont.) Kutz. IS44	+	-	-	-	-	-
1 lyalodiscus scoticus (Kutz.) Grun., 1880	.	s	-	-	-	-
II. amhic/uus Grun . I8~9	+	-	-	-	-	-
Sceletonema costatum (Grev.J CI., I8~8	M	M	-	-	M	-
Sc. subsalsum I A. CI.) Bethge. /928	-	M	-	-	-	-
Thalassiosira aculeata Pr.-Lavr. 1956	-	s	-	-	-	-
Th. coronijera Pr.-Lavr., 1955	+	-	-	-	-	-
Eh. decipiens (Giun.) Jorg 1905	+	s	-	-	s	-
111 exeentrica tElir i (7 1445-1944	+	s	-	-	-	-

-var. fasciculata llust. 192'-193'	+	-	-	-	-	-
Th. ornata Pr.-Lavr.	+	-	-	-	-	-
Th. parva Pr.-Lavr. 1955	M	M	-	-	s	-
Th. subsalina Pr.-Lavr. 1955	M	M	-	-	s	-
Cyclotella Kutzingiana (Thwait)	-	-	+	-	-	-
C. meneghiniana Ktz 1844	-	-	+	s	-	-
C. casp/a Gran. 18~H	M	M	-	-	M	-
Stcphanodiscits astrea (Ehr.) Grun. 1880	-	-	+	s	-	-
-var. iiiiiuttulus (Kutz) Grun. 1880-1885	-	-	+	-	-	-
St. hantzschii Grun. 1880	-	-	+		s	-
Coscinoiliscus apiculatus Ehr. IS44	+	-	-	-	-	-
C.gigas Ehr. 1841	+	s	-	-	-	-
('.granti .lough. 1905	+	s	-	-	s	-
-var. aralensis (Ostf.) llust. 192'-193'	+	-	-	-	-	-
C. Janischii AS. lH'4-193'	+	s	-	-	-	-
(' Joncsianus (Grev) **(1st/** *1915*	+	s	-	-	-	-
-var. coiiiinutatus (Grun.) llust. 192'-193'	+	-	-	-	-	-
C. lacustris Grun. 1880	+	s	-	-	-	-
C. 1 meatus Ehr. 1838	+	s	-	-	-	-
C. perforatus Ehr. 1844	+	s	-	-	-	-
-var. cellulosus Grun ISS4	+	-	-	-	-	-
-var. pavillardii (Eortii) llust. 192'-193'	+	s	-	-	-	-
C. radiants Ehr. 1839	+	s	-	-	-	-
Actinophychus undulattts (Rail.) Ra/fs.1861	+	-	-	-	-	-
Asteromphalus robustus Castr.	+	-	-	-	-	-
Actinocyclus Ehrenbergii Ralfs . 1861	+	-	-	-	-	-

-var. crassus C/T.Sin.; llust.. 192'-193'		-	-	-	-	-
-var. tend Ins (Breb.) Must., 192'-193'	+	-	-	-	-	-
Detonula cinfervacea (CI.) Gran, 1900	+	s	-	-	-	-
Leptocylindrus minimus Gran ,. 1915	+	s	-	-	M	-
/.. danicus CI.. 1889	M	M	-	-	s	-
Rhizosolenia fragilissima Bergon 1903	+	M	-	-	s	-
Rh. alata Rhightw., 1858	+	s	o	-	-	-
Rh.calcar avis M.Schultze 1858	M	M	-	-	s	-
Bacteriastrum hyalinum Laud, 1864	-	I.S	-	-	-	-
Chaetoceros ahnormis Pr.-Lavr. 1953	-	s	-	-	-	-
Ch. a/finis Laud.. 1864	+	M	-	-	s	-
C/i. affinis f.schuttii (CI.) Pr.-Lavr. 1894	+	s	-	-	-	-
Ch. affinis f. willei (Gran.) llust.. 192'-193'	+	s	-	-	-	-
Ch. anastomosans Grun ,. 1880-1885	+	-	-	-	-	-
Ch. borgei l.emm.. 1903-1904	+	s	-	-	-	-
Ch. ceratosporum Ostf, 1910	f	-	-	-	-	-
Ch. compressus Laud..189~	-	M	-	-	-	-
Ch. coronatus Gran, 189~	-	s	-	-	-	-
Ch. curvisetus CI.. 1889	M	M	-	-	s	-
Ch. danicus CI., 1889	+	s	-	-	s	-
Ch. densusCI., 1901	+	s	-	-	s	-
Ch. dubius Pr.-Lavr., 1955	-	s	-	-	s	-
Ch. Jullax Pr.-Lavr, 1955	+	-	-	-	-	-
Ch gracilis Schutl.,1905	+	-	-	-	-	-
Ch. heterovalvatus Schutt. 1953	+	s	-	-	-	-
Ch. holsaticus Schutt., 1895	+	s	-	-	-	-

Ch. insignis Pr.-Lavr., 1955	+	M	-	-	M	-
Ch. karianus Grim., 1880	-	M	-	-	s	-
Ch. laciniosus Schutt, 1895	+	s	-	-	-	-
Ch. lamleri Ralfs, 1864		-	-	-	-	-
Ch. lorenzianus Grun., 1863	+	s	-	-	s	-
-var.solitarius Pr.-Lavr., 1956	+	s	-	-	-	-
-var. suhsalinus Pr.-I.asvr.. 1956	+	s	-	-	-	-
Ch. muelleri **Leiluii** *. 1898*	+	s	-	-	s	-
Ch. paulsenii Ostf, 1901	+	s	-	-	-	-
Ch. peruvianus Brightw., 1856	+	s	-	-	s	-
Ch. rigidus Ostf., 1901	+	M	-	-	s	-
Ch. scabrosus Pr.-Lavr.. 1956	+	s	-	-	-	-
Ch. seiracanthus Gran., 189'	+	s	-	-	-	-
('h. septentrionalis Ostf. 1895	+	s	-	-	-	-
Ch. similis CI., 1896	+	M	-	-	s	-
Ch. similis/.' solilarius Pr.-Lavr.. 1955	+	M	-	-	s	-
Ch. simplex Ostf, 1901	+	s	-	-	s	-
-var. calcintrans Pauls . 1905	+	s	-	-	-	-
Ch. socialis Laud.. IS64	M	M	-	-	M	-
Ch. socialisf. radians (Schutt.) Pr.-Lavr., 1953	M	M	-	-	M	-
Ch. subti/is CI., 1896	+	s	-	-	-	-
-var. abnormisf. si mpex Pr.-Lavr., 1961	+	s	-	-	-	-
Ch. subsecundus (Grun.) llust.. 192'-193'	+	s	-	-	-	-
Ch. teres CI.. 1896	+	s	-	-	-	-
Ch. wighamii Brightw., 1856	+	s	-	-	-	-
Ditylum brightwellii (West,) Grun.. 1880-1885	+	M	-	-	M	-

Biddulphia mobiliensis Bail, 1845	+	s	-	-	-	-
Cerataulina pelagicafCerataulina bergonii) (CI.) Perag., 1892	M	M	-	-	M	-
llcmiaulus hauckii Grun 188(1- 1885	+	-	-	-	-	-
Diatoma vulgare Bory 1828	-	-	M	M	-	-
1) elongation ll.yngb.) Ag.. 1824	-	-	E.M	\l	-	-
Fragilaria crotonensis Kill	-	-	+	s	-	-
/•'. capucina 1 h'sni.	-	-	+	-	-	-
F. construens I Ehr.l Grun, 1862	-	-	+	-	-	-
Synedra actinastroides Lemm	-	s	-	-	-	-
S. acus Kutz	-	-	+	-	-	-
S. bacillus Greg , 185'	-	-	+	-	-	-
S. berolinensis Lemm	-	-	-	s	-	-
S. eryslallina (Ag.) Kulz. 1844	+	-	-	-	-	-
S. curvata Pr.-Lavr.. 1951	+	s	-	-	-	-
S. fulgens (Grew) IΓ*Sin.*	+	-	-	-	-	-
S. Gaillonii (Bory) Ehr. 1830	-	s	-	-	-	-
S. tabulata (Ag.) Kutz . 1844	+	s	-	-	-	-
S. ulna (Mtzsch.) Ehr, 1838	-	-	+	s	-	-
-var. aecpialis (Kutz.) llust	-	-	+	-	-	-
-var. biceps (Kulz.) Schonf	-	-	+	-	-	-
-var danica (Kulz.) Grun	-	-	+	-	-	-
S. undulata Bailly. 1853	-	-	+	-	-	-
S. vaucheriae Kulz (S. minulissimal	-	-	+	-	-	-
Thalassionema nilzschioides Grun.,, 1880-1885	M	S-0	-	-	M	-
Asterionella formosa 1 lass.	-	-	+	s	-	-
-t xracillima (1 lantzsch.) lleih.	-	-	+	-	-	-

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Rhabdonema adriaticum Kulz., 1844		S	-	-	-	-
Striatella delicatula (Kutz) Grun. 186'	+	S	-	-	-	-
S. unipunctata Lyngb. 1832	+	s	-	-	-	-
Grammatophora marina (Lyngb.) Kutz , 1844	+	s	-	-	-	-
G. oceanica (Ehr.) Grun., 1881	+	-	-	-	-	-
G. serpentina (Ralfs) Ehr., 1844	+	s	-	-	-	-
Licmophora gracilis (Ehr.) Grun.. 186'	+	-	-	-	-	-
L. Ehrenbergii (Kulz) Grun.. 186'	+	s	-	-	s	-
Cocconeis scutellum Ehr., 1838	+	s	-	-	s	-
-var. parva Grun.. 188(1 1885	+	-	-	-	-	-
-var. minutissima Grun, 1880-1885	+	-	-	-	-	-
C. pediculus Ehr., 1838	-	-	+	-	-	-
Achnanthes hrevipes Ag., 1824	+	s	-	-	s	-
-var. intermedia (Kulz.) CI., 1895		-	-	-	-	-
-var. parvula (Kulz.) CI.. 1895	+	-	-	-	-	-
.1. longipes Ag., 1832	+	s	-	-	-	-
Rhoicosphaenia curvata (Kulz) Grun.. 186'	-	-	+	s	-	-
Xavicula cryptocephala Kutz.	+	-	-	s	-	-
X. Ivra Ehr.. 1844	+	-	-	-	-	-
N. menisculum Scliuiu. 186'	+	-	-	-	-	-
X. palpebralis Breb , 1853-1856	+	-	-	-	-	-
X. pennala var. pontica Mer.. 1902	+	-	-	-	-	-
Gyrosigma ascuminatum (Kulz) Rabenh.	-	-	+	M	-	-
G. distortum (IV. Sm.)						
-var. Parkeri llarr.	-	-	+	-	-	-
G. Kutzingii (Grun.) CI.	-	-	+	-	-	-

Pleurosigma angulalum lOueck.i IV.Sin.. 1853-1856	1	-	-	-	-	-
P elongatum IT. Sm.. 1852	+	S	-	-	-	-
*P. formosum IT. Sin .1*52.*	+	-	-	-	-	-
P rigulum IT Sin.. 1853-1856	+	-	-	-	-	-
Amphiprora alula Kulz.. 1844	+	s	-	-	-	-
.1. paludosa IT. Sin.. 1853-1856	-	s	-	-	-	-
. Imphora bigibba Grun. I8~ 1	-	s	-	-	-	-
A. granulata var. cuslala Pr.-Lavr. 1963	-	s	-	-	-	-
A. Inalina Kulz.. 1844	+	s	-	-	-	-
A. injle.xa llirebl III. Smith. I8'3	-	s	-	-	-	-
A. prolans Greg.. 185'	-	s	-	-	-	-
-var. aculeata Perag. 189'-191)8	-	s	+	-	-	-
('ymhella cvmhi/ornus Agarclh. 1930.	-	s	-	-	-	-
Ilanlzschia amphio.xys lT.hr.1 Grun.	-	-	+	-	-	-
liacillaria paratlo.xa Gmelin. 1 ~88	-	-	-	s	-	-
Nitzschia acicularis IT. Sin. 1853-1856	-	-	+	-	-	-
N. apiculata (Greg.) 1880	-	-	+	-	-	-
N. delicatissimu CI.. I89~	+		-	-	s	-
N. holsatica llust. 1924	-	-	+	-	-	-
N. hitngarica Grun..1862	-	-	+	-	-	-
X. intermedia Hantzsch.	-	s	-	-	-	-
N. longissima llirebl Ral/sl86l	-	-	·	s	s	-
N. palea [illegible] *Sm.*	-	-	+	-	-	-
X. punctata (IT.Sm.I Grun. 1880	+	-	-	-	-	-
N pungens var. atlantica CI... (1882)	+	s	-	-	-	-
X reversa IT. Sm. /853	+	-	-	-	-	-

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JT, seriata CI.. I8S3	+	M	-	-	M	-
X. sigma (Ktz.) IV. Sm.. 1853-1856	-	-	+	-	-	-
X. sigmoidea (Ehr.) IV. Sm.. 1853-1856	-	-	+	-	s	-
X. tenuirostris Мег.. 1902	+	s	-	-	-	-
X. trvblionella llantzsch.	-	-	+	-	-	-
-var. levidensis (IV.Sm.) Crruii.	-	-	+	-	-	-
X. vemicularis (Kutz.) Grun	-	-	+	-	-	-
Cylindrotheca closterium (Ehr.) Retain. Lew in (1853) (Xilzschia closterium)	+	fvl	-	-	M	-
Campylodiseus echeneis Ehr., 1840	-	-	+	-	-	-
C.lliurettii lireb., 1854	+	-	-	-	-	-
-var. lineolatum Pr.-Lavr., 1955	+	-	-	-	-	-
Gomphonema olivaceum (Lyngb.) Kt:., 1833-1836	-	-	+	-	-	-
-var. minutissimum Grun.	-	-	+	-	-	-
Enithemia sore.x Kutz	f	-	-	-	-	-
Cymatopleura solea (Breb.) IV. Sm.	+	-	-	-	-	-
Surirella gemma Ehr., 1839	+	-	-	-	-	-
S. oval is breb, 1844	+	-	-	-	-	-
S. ovata Kutz. 1839	+	-	-	-	-	-
PYRROPHYTA						
Cryptomonaclineae						
Cryptomonas acuta Butch.	-	s	-	-	-	-
Ililleafusıforme Schill 1925	-	M	-	-	s	-
Dinoplagellatae						
Prorocentrum balticum (Lohm.) Hasle, 1908	+	s	-	-	-	-
Pr. compressa (Ostf) 1889	+	M	-	-	s	-

Pr. cordata (Ostf) 1901	M	M	-	-	M	-
Exuviaella cordata						
Pr. marina Gien. 1881	-	s	-	-	-	-
Pr. maximum Schill.	+	-	-	-	-	-
Pr. micans Ehr. 1833	+	M	-	-	M	-
Pr. obtusion Ostf. 1908	-	s	-	-	-	-
Pr. perforatus Gran. 1915	-	s	-	-	-	-
Pr. sailedIum Sch. 19011	-	s	-	-	-	-
Pr. vaginula (Stan.) Schutt 1883	-	s	-	-	-	-
Phalacroma rotundaluin (Clap.) et l.achm.) Ko/, et Michener 1859	+	s	-	-	M	-
Dynophysis acuminata Clap et Eaclim. 1859	-	s	-	-	-	-
1). acuta Ehr. 1839						
1). baltica (Paulsen) Ko/, et Skogsberg 1900	+	s	-	-	-	-
IX eaudata Kent. 1881	+	s	-	-	s	-
I), norvegica Clap, el l.achm.1859	+	-	-	-	-	-
IX fori i i Pav/I. 1916	+	-	-	-	-	-
IX levanderi H'olos:,1928	+	-	-	-	-	-
IX ovum Schutt 1895	+	s	-	-	-	-
D. sacculus Stein 1883	+	s	-	-	s	-
IX sphaerica Stein 1883	+	s	-	-		-
Oxyrrlus marina Duj 1841	+	s	-	-	-	-
Gymnodinium agile Ko/, et Sw. 1921	-	s	-	-	-	-
G. agiliforme Schill 1928	-	s	-	-	-	-
G. fuscum (Ehr.) Stein 1834	-	s	-	-	-	-
G. /urns Schill. 1895	+	s	-	-	-	-
G najadeum Schill 1928	+	M	-	-	s	-

G. neapolitanum Schill. 1928	+	S	-	-	-	-
G minor Lebour 191'	-	s	-	-	-	-
G rlwmhoides Schutt 1895	-	s	-	-	-	-
G. simplex tl.ohm.) Ko/ et Sw. 191)8	-	s	-	-	-	-
G. splendens Lebour 1925	+	M	-	-	s	-
G. sulcatum Kof et Sw.	+	-	-	-	-	-
G. wulfii Schill. 1916	-	s	-	-	-	-
Gyrodmium adriaticum Schill	-	M	-	-	S	-
G. britannia Kof. u Swazy 1921	-	s	-	-	-	-
G. cornulum (Pouchet) Kof. u Sw. 1921	-	M	-	-	s	-
G. fusil or me Kof. et Swezy 1910	+	s	-	-	s	-
G lachn nni i Menu i Ko/ el Suez\ 19III	+	s	-	-	-	-
G nasulum (ll'ulff) Schill.	+	-	-	-	-	-
G. spirale (Bergh.) Kof. el Swezy 1881	-	s	-	-	s	-
Polvkrikos sehwarzi Bulschli 18'3	-	s	-	-	-	-
I'aulsenella chaelоceralis 1 Paulsen) Challon 1911	+	-	-	-	-	-
Ellobiopsis chatloni Caullery. 1910	+	-	-	-	-	-
Pyrophacus horologycuin Stein 1883	+	s	-	-	s	-
Glenodinium apiculalum l.achm. 1901	+	-	-	-	-	-
G behningi (lind.l Kissel. 192'	+	-	-	-	-	-
G. caspicum (Ostf.) Schill.. 1901	+	s	-	-	-	-
G. danicum Pauls 190'	-	s	-	-	-	-
G. foliaceum Stein 1883	-	s	-	-	-	-
G leniicula i Bergh i Schill I W	+	M	-	-	S	-
G. paululum Lind. 192S	+	s	-	-	-	-
G. pilida (Ostf) Schill. 1908	+	s	-	-	-	-

G. oculatum Stein 1883	-	s	-	-	-	-
G. penardii Lemm. 1900	-	M	-	-	-	-
G. penardiforme (Lind.) Schill. 1918	-	M	-	-	-	-
G. pidvisculns (Ehr.) Stein 1830	-	s	-	-	-	-
Cocholodinium citron Kof. et Swezy, 1921	-	s	-	-	-	-
Pronoctiluca acuta (Lohm.) Schill, 1912	-	s	-	-	-	-
Pr pelagica Lab.-Don, 1888-1889	-	s	-	-	-	-
.Imphidinium aculuiu Lohm.	-	s	-	-	-	-
A. acutissimum Schill. 1928	-	s	-	-	-	-
A. crassum Lohm. 1908	+	s	-	-	-	-
A. longum Lohm. 1908	-	s	-	-	-	-
A. operculatum Clap, et Laschm. 1859-61	-	s	-	-	-	-
A. phaeocysticola Lebour 1925	-	s	-	-	-	-
Peridinium achromaticum Levander 1902	+	s	-	-	-	-
P. aciculiferum Lemm. 1900	+	-	-	-	-	-
P. bipes Stein 1883	-	s	-	-	-	-
P. breve Pauls 190-	-	s	-	-	-	-
P. brevipes Pauls 1908	-	s	-	-	-	-
P. bulla Slew, 1910	+	-	-	-	-	-
P. claudicans O.Pauls. 190'	+	s	-	-	-	-
P. conicum (Gran.) Ostf. et Schmidt. 1901	+	s	-	-	-	-
P. conicum f. concava Metz 1933	+	-	-	-	-	-
P. crassipes Kof. 190'	+	s	-	-	-	-
P. c i actum (OF.Mull) Ehr. 1"3	+	s	-	-	-	-
P. depression Bail. 1855	+	s	-	-	-	-
P. diabolus C'l. l900	+	-	-	-	-	-

/'. divergens Ehr. 1840	t-	s	-	-	-	_
P. e.xceniricum Pauls 191Г	+	-	-	-	-	-
P. globulus Stein 1883	+	s	-	-	s	-
-var. quarnerense Schroder 1901	+	s	-	-	-	-
-var. ovatuin (Pouch.) Schill ISS3	+	-	-	-	-	-
P. grand Ostf 1906	+	s	-	-	s	-
P. grand f mile(Pavil) Schill. 1916	-	s	-	-	-	-
P.inconspicum Lemm 1899	+	s	-	-	-	-
P. knipowitzschii Cssat. 192"	+	s	-	-	-	-
P latum Pauls. 1904	+	-	-	-	-	-
-var.halophyla (1.indent.) 192~	i	-	-	-	-	-
-var concavilalerale Kisselew 1935	+	-	-	-	-	-
P. longispimun Ko/. 1883	+	s - o	-	-	-	-
P. miniilum Ko/. 190"	+	-	-	-	-	-
P. minusculum Pavil. 1904	+	s - o	-	-	s	-
P. oceanicum l'an-1 lo/fcn 189"	+	-	-	-	-	-
P. orhiculare Pauls 190"	+	-	-	-	-	-
P. pedunculatum Schutt 1895	+	s	-	-	-	-
P. pellucidum (liergh.) Schutt. IS8I	+	s	-	-	-	-
P pentagonum (iron. 1902	+	s	-	-	-	-
P. solidicorne Mangin 1926	-	s	-	-	-	-
P. spinıferum Schill. 1911	+	s	-	-	-	-
P. sphaericum Окамит 1912	+	s	-	-	-	-
P. steinii ./org. 1899	+	s	-	-	s	-
1 leterocapsa triquetra (Ehr.) Lebour 1840	+	M	-	-	M	-
P. triquetrum						

Scripsiella trochoidea (Stein) 1883	+	M	-	-	s	-
P.trochoideum						
Goniaidax cochlea Meunier 191(1	-	S	-	-	-	-
(j. diacantha (Meunier) Schill	-	s	-	-	-	-
G. die gens is Kof. 1911	+	s	-	-	-	-
G digitate (I'ouchel.) Ko/ 1883	-	s	-	-	-	-
G. minima Matz 1933	-	s - o	-	-	s	-
G. orientalis hind. 1924	-	s	-	-	-	-
G. polyedra Stein. 1883	+	M	-	-	s	-
G. polygramina Stein. 1883	+	s - o	-	-	-	-
G. scrippsae Kof 1911	+	s	-	-	s	-
G. spinifera (Clap, et l.achm.) Diesing 1838-1861	-	s	-	-	-	-
G. Iriacantha Jorg. 1899	-	s	-	-	-	-
I'rotoceratium reticulation (Clap, et l.achm.) liiitschti 1839	-	s	-	-	-	-
Ceratium furca (Ehr.) Clap et l.achm. 1833	+	+	-	-	s	-
C.fiisus (Ehr.) Ditj. 1834	+	s - o	-	-	s	-
C tripos (O.K.Mull.) Sitzsch. Г"6	+	s - o	-	-	s	-
Goniodoma polyedricum (Pouch.) Jorg. 1883	-	+	-	-	-	-
('ladopy.xi.x setifera Lohm.	-	+	-	-	-	-
Massartia vorlicello (Stein.) Schill. 1878	-	+	-	-	-	-
CHLOROPHYTA						
Golenkia radiata Chod.	-	-	-	s	-	-
Schroediria setigera Smith.	-	-	+	s	-	-
Pediastritm horyanum (Tttrp) Menegh. (1840)	-	-	+	s	-	-
-var. longicorne Racib. 1889	-	-	+	s	-	-

P. duplex Meyeu 1829	-	-	t	S	-	-
P. telras (Ehr.) Rolfs 1H44	-	-	+	-	-	-
-var. tetraodon (Corda)	-	-	+	-	-	-
Telraedron caudatum (Corda) Hans 1888	-	-	+	s	-	-
T incus (led.) G.M Smith	-	-	+	s	-	-
T. schmidlei (Schroed.) Lemm Rahh. 1S6S	-	-	+	-	-	-
Lagerheimia ciliata (l.agerh.) Chodat. 1895	-	-	+	s	-	-
L. cptaclriseta (Lemm.) G.M. Smithl92()	-	-	+	-	-	-
Oocyst is Borgei Snow 1903	-	-	+	s	-	-
0. crassa Wittrock 1880	-	-	+	s	-	-
O. elliptiea West. 1892	-	-	+	s	-	-
O Sovae-Semliae Wide 189'	-	-	+	-	-	-
0. parva W. et W 1898	-	-	+	-	-	-
O. solitaria Willi: 18'9	-	-	+	s	-	-
O. submarina Lagerh. 1886	-	-	+	-	-	-
Ankistrodesmus acicularis (Al. Braun) Korschik 1953	-	-	+	s	-	s
A. acicularis var. mirahilis (W. et W.) Korseh.	-	-	+	s	-	-
A. angustus Bern.	-	-	+	s	-	-
A arcuatus Korseh. 1953	-	-	+	\I	-	s-o
A. Bibrajanus (Reinsch.) Korschik	-	-	+	s	-	-
A. convolutus Corda 1839	-	-	+	M	-	s-o
A. Braunii (Naeg.J Brunn 1915	-	-	+	-	-	-
A. faleatus (Corda Rolfs) 1848	-	-	+	s	-	-
A. longissimus tl.emm.) Wide	-	-	+	s	-	-
-var aciculasris (Chad.) Brunnth.	-	-	+	s	-	-
A. spirale (Turner) Lemm. 1908	-	-	+	s	-	-

Kirchneriella cuntorla (Schmidlc) Hold	-	-	+	S	-	-
K. lunaris (Kirchn.) Moeb.1894	-	-	+	s	-	s
Dictyosphaerium ehrenhergianum Xag. 1849	-	-	+	s	-	-
IX pule hell u in Wood 18'4	-	-	+	s-o	-	-
Coelastrum носторонни Xagl855	-	-	+	s	-	s
G. sphaericum Xag. 1849	-	-	+	s	-	-
Crucigenia apicuhila (Lemm.) Selmddle	-	-	+	s	-	-
('. irregularis Wide	-	-	+	-	-	-
C. rectangiilaris (A.Br.) 1891	-	-	I	s	-	-
C. (elrapedia (Kirchn.) W.I902	-	-	+	s	-	-
Telraslrum glohrum (Roll) Ahlstr. el Tiff.	-	-	+	-	-	-
T. midtisetitm (Schmidle)	-	-	+	-	-	-
T.slraurogeniejorme I.Sehoed.) l.eium.	-		+	-	-	-
T. lunaris Korschik	-	-	+	s-o	-	-
T. Wisconsiensis G.S.Smith.	-	-	+	-	-	-
Aclinaslrum hantzschii l.agerh. 1882	-	-	+	M	-	s
Scenedesnnts acuiuinalus (l.agerh.) Chodal. 1902	-	-	+	M	-	-
-var. hiserialus Reinh. 1953	-	-	+	s	-	-
S.aculiformis Schrod I89~	-	-	+	-	-	-
S. arcuatus Lemm. IS99	-	-		s	-	-
-var. platydiscay G.M.Smith	-	-	-	s	-	-
S. bjugatus (Turp.) l.agerh. 1893	-	-	+	s	-	-
-var. bijgatus (Turp.) l.agerh. 1893	-	-	+	s	-	-
S. obliquus (Turp.) Kutz. 1938	-	-	+	s	-	-
-var. alternans Chrystjuk. 1953	-	-	+	s	-	-
-var. obliquus Kutz.. 1833	-	-	-	s	-	-

S. opoliensis Lemm						
-var. alalus	-	-	+	s	-	-
-var. asymmetica	-	-	+	s	-	-
-var. carinatus Lemm	-	-	+	-	-	-
S. quadricauda (Turp.) Hrehsl /835	-	-	+	M	-	s
-var. abudans Kirchn.	-	-	+	s	-	-
-var. armatus (Chad.) Deditss	-	-	+	-	-	-
-var. eualternans Pr.-Lavr	-	-	+	-	-	-
-var. setosusus Kirchn.	-	-	+	-	-	-
S. tetradesmiformis (Wolosz.) Chad.	-	-	+	s	-	-
Mieractinium pusdlum /•/•. 1858	-	-	+	s	-	-
M. quadriselum (Lemm.) CM. Smith 1918	-	-	+	s	-	-
Parailoxia mullisela Swir.	-	-	+	-	-	-
If*estella holhvoides* **(II.11** *est.) de Wild. 189'*	-	-	+	s	-	-
Dunaliella salina Tend.	-	-	-	s	-	-
Poropila dubia Schill /925	-	-	-	s	-	-
CYANOPHYCEAE						
Synechococcus elongatus Sag.	-	-	+	-	-	-
Svnechocvstis salina ll'isl. 1924	-	-	-	s	-	-
Daclyloeoccupsis irregularis (i. M.Smith 1922	-	-	+	-	-	-
\licroc\stis aeruginosa Kutz.. 1845	-	-	M	M	-	-
M. aeruginosa f. aeruginosa Kutz. IS45	-	-	M	M	-	-
M. ichihvohlahe Kutz 1845	-	-	-	s	-	-
M. pulverea (Wood) Elenk. 1938	-	-	+	M	-	-
M. pulverea f.holsatica (Lemm.) Elenk. /938	1		-	M	-	-

C

.\/. pulvereaf. incerla (Lemm.) Elenk 1938	-	-	+	M	-	-
Aphanothece stagnina (Spreng.) Al. Braun 1865	-	-	-	s	-	-
Gleocapsa limnetica (Lemm.) Hollerh. 1938	-	-	-	M	-	s
G. minima (Keissl.) Hollerh. 1938	-	-	+	M	-	s
G. minorf. minor (Kutz.) Holler), ampl 1938	-	-	-	M	-	s
G. miiuita (Kutz.) Hollerh. 1938	-	-	-	M	-	s
G.lurgidaf. lurgicla (Kutz) Hollerh. 1938	-	-	-	s	-	-
Merismopeclia elegans Al. Braun 1848	-	-	-	M	-	-
XL glauca (Ehr.) Xag. 1849	-	-	+	M	-	-
\l. glauca /. mcditerranea (Xag.) Collins	-	-	+	M	-	-
M. minima G. Beck 1897	-	-	+	M	-	s
M. punctata Meyen 1839	-	-	+	M	-	-
M. tenuissima Lemm. 1898	-	-	1	M	-	-
Coelospltaerium kutzingianum Xag. 1849	-	-	+	-	-	-
Gomphosphaeria aponino Kutz 1846	-	-	-	s	-	-
Anabaenaflos-aquae (Lyngb.) Breb. 1835	-	-	+	-	-	-
A. Kisselevii Pr.-Lavr.	-	-	+	-	-	-
. 1 kisseleviana Elenk.	-	-	+	-	-	-
A knipowitschii Ussatsch.192'	-	-	+	-	-	-
A Scheremetievi Elenk.	-	-	+	-	-	-
A. spiroicles K/eb. 1895	-	-	+	s	-	-
A. spiroidesf. contractu!Kleb.) Elenk.. 1938	-	-	+	s	-	-
Aphanizomenon flos-aquae (L.) Ralfs	-	-	M	M	-	-
Xodularia spumigena Meri 1822	-	-	-	s	-	-
Oscillatoria kisselevi Anissim	-	-	+	M	-	M
O. nigro-viridis Thwail	-	-		-	-	-

0 planktonica Wolosz	-	-	+	M		M
O. tenuis Ag. IS 13	-	-	+	s	-	
Spirulina laxissinia G.S. I84~	-	-	+	s	-	s
S. meneghiniana Zanard 1847	-	-	+	s	-	
S. tenuissima Kutz. 1836	-	-	+	s	-	
l.vngbya con/ervotdes Ag.	-	-	+	-	-	-
CHRYSOPHYTA						
Chrysomonadinae						
Dinobryon pelltteidum Lev.	+	-	-	-	-	
Mallomonas lilloensis Conr.	+	-	-	-		
Phaeocystis globosa Lagerh.	+	-	-	-		
Prymnesium parvum'i 'arter	-	S	-	-		
Cocclithoplwridae						
. Icanlhoica ucLinlhos Schill 1925	+	s	-	-		
A. iptattrospina Lohm. 1963	-	s	-	-	-	
Syracosphaera mediterranea Lohm	-	s	-			
Pontosphaera haeckellt Lohm.	+	-	-	-		
P. hu.xlevi Lohm.. 1925	+	M	-	-	s	
P. nigra Schill. 1926	+	s	-			
Caliprtosphaera oblonga Lohm., 1902	+	s	-	-		
Rhabdosphaera hispida Lohm. 1912	+	s	-	-		
Rlongistylis Schill. 1925	+	s	-	-		
R.stylifer Lohm. 1902	+	s	-	-		
R tuhulosa Schill. 1925	+	s	-	-		
Lohmannosphaera subclause! Gran et Braarud	+	-	-	-	-	-

Coccolithus pelagians I.ohm. 1912	-	S	-	-	-	-
Coccolithophora fragilis Lohm.	+	-	-	-	-	-
Ebriacae						
Ebria tripartita (Schum.l I.emml86~	-	s	-	-	s	-
Hermesium aclriaticum l.achm.	+	s	-	-	-	-
Silicoflagellatae						
Dictioclutfibula Ehr. 1839	+	s	-	-	-	-
Distephamts speculum Ehr . Hack.. 188'	+	s	-	-	-	-
-var. octonarius Del/., 1932	+	s	-	-	-	-
-var. speculum /Ehr.) Hack.. 18,8'	+	s	-	-	-	-
Eiiglcnophvta						
Euglena charkoviensis Swir. 1913	-	-	+	-	-	-
E. granulata (Kleh.) Schmitz 1883	-	-	+	-	-	-
E. pisciformis Klebs 1883	-	-	+	-	-	-
E. proximo Dang. 1901	-	-	+	-	-	-
Eutreptia lanovii Sleuer 1904	+	M	-	-	M	-
E. viriclis I'ertv /852	+	s	-	-	M	-
I'hacvs pvrum (Ehr.) Stein 1831	-	-	+	-	-	-
Trachelomonas fluviatilis 1909	-	-	+	-	-	-
Strombomonas longa (Swir.) Popova 1955	-	-	+	-	-	-
Volvocaceae						
Ptermonas torta Korschik	-	-	+	-	-	-
Gonium pectorale Mull.	-	-	+	-	-	-
Pandorina монии Borv	-	-	+	-	-	-
Eudorina elegans Ehrenb. 1832	-	-	+	-	-	-
Chloromonas cuneata Schill.	-	-	+	-	-	-

('hlainydoblepharis knollii Schill		-	-	-	-	-
Pterospermales						
Pterosperma crislatttm Schill.. 1925	-	S	-	-	s	-
P Jorgensii Schill. 1925	-	S	-	-	-	-
\anthophyta						
Meringosphaera mcditerroneo Lohm.. I9I~	+	s	-	-	s	-
M. mem Schill., 1925	-	s	-	-	-	-

Legend

A - A.I.Ivanov. 1962.1964.1965
B - D.A.Nesterova. 1973-1994
M - mass species
S sparce
I - introduced
E - endemic
O - often
S-() - sparce-often

Table 2. List of Fungi Species

Species	Till 1975	Contemporary State Areas				Biblio.
		NWBS	('rimea	Water Bodies		
				Marine	Brackish	
Kl. CHYTRIDIOMYCETES						
1 lyplwchytrium pendicle Artemch. et Zelezin.. 1969	+	-	+	-	-	5.6.16
Kl. OOMYCETES						
l.eptolegnia pontica Artemchuk. 196S	+	-	-	-	-	5.2(1
Thraustochvlriiim glohosum Kohav- aslii et Ookuho	+	-	i	-	-	1.2.5
lii. vi.surgen.se 'Iken	+	-	t	-	-	1.2.5
Schizochytrium aggregation Goldstein	+	-	+	-	-	1.2.5
Lagenidiopsis arctica Artemchuk, 19~3	+	-	-	-	-	1.5
Kl.ZYGOMYCETES						
h'lucor globosum Fischer	+	-	+	-	-	1.3.5
M.circinelloides van Tieghem, IH"5	+	-	1	-	-	1.3.5
M.racemosus Fre.sein	+	-	+	-	-	1.3.5
M.albo-ater Xauniov. 1915	+	-	+	-	-	1.3.5
Actinomucor elegans (Eidan) Binjamin et Hesseltine	+	-	+	-	-	1.3.5
Absidia spinosa Lendner	i	-	+	-	-	1.3.5
Rhizopus nigricans Ehrenberg	+		+	-	-	1.3.5

Rh.cohnii(Colm) Berlese et Toni	+	-	+	-	-	1.3.5
Syncephalastrum racemosus Colic.	+	-	+	-	-	1.3.5
Mortierella spp.	+	-		-	-	1.3.5
Kl. ASCOMYCETES						
Amylocarpus encephaloides Currey, 1857-1859	-	S\	-	-	-	13.17
Arenariomyces trifurcatus llohnk ex E.B.C.Jones. I9S3	-	M	+	Adzh. Sukh	-	7.8.11.12.17
Chaetomium glohosum Kunze	+	-	+	-	-	1.3.5
Ch.indicum Corda	+	-	+	-	-	1.3.5
Ch.olivaceum Cooke et Ellis	i	-	1	-	-	1.3.5
Ch.minitum Krzem.a Badura	+	-	+	-	-	1.3.5
Ch.heteropilium Artemch.. 1973	+	-	+	-	-	1.3.5
Chaetomium spp.	+	-	+	-	-	1.3.5
('eriosporopsis ealvplrata Kohlm.. 1960	-	S	+	Adzh	-	7.8.13.14
('.halima kinder. 1944	-	M	+	Adzh. Sukh	-	7.8.10.13
Ceircumveslita (Kohlm/ Kohlm. J1953). 19"2	-	Sv	-	Adzh	-	7.13
C.tubulifera (Kohl) Kirk in Kohlm.. 195"	-	+	+	Adzh. Sukh	-	7.8.13.14
Crinigera maritima Schmidt. 1969	-	+	-	-	-	15
Carhosphaerella leptosphaerioides Schmidt. 1969	-	+	-	Adzh. Sukh	-	8.9
Corollospora maritima Werdermann, 1922	-	M	-	Adzh. Sukh	-	7.8.1 1.13.17
Clacera Under in Barhoorn & hinder. 1944	-	+	-	Adzh. Sukh	-	8.9
Cpulchaella Kohlm..Schmidt et Scur 196"	-	+	-	-	-	10.13
Drxosphaera navigans Koch.et E.B.G.Jones, 1988	-	+	-	Adzh	-	8
Emericellopsis maritima Beljak, emend.Arlenchuk. I9~3	+	S\	+	-	-	1.5
Elalosphaeria appendicttlata kinder in Barghoorn unci kinder.	-			Adzh. Sukh	-	S.I3. 17.18
Halosaphiea hamata Johnson, Jones Moss, 1988		+	-	Adzh	-	X
Halosphaeriopsis mediosetigera Crihh et T. W.Johnson, 1958	-	+	+	Adzh	-	7.8.13.18

lluligcna elaterofora Kohlm.. 1961	-	+	-	Adzh. Sukh		8.9
l.iiulra sp.	-	Sv	-	-	-	13.14
Lulworthia sp.	-	+	+	Adzh. Sukh	-	7.8.10.13
I.eptosphaeria olhopunclala (ll'eslendorpi Saccardo. ISS3	-	+	-	Adzh	K had	8.13.17
1. a\ icenniae .1 et I: Kohlm . / 965	-	S	-	Adzh	-	8
l.neomaritima Gessner u Kohlm.. I9~6	-	+	-	Adzh	K had	S. 13
l.oraemaris Under and liarghoorn and lander. 1944	-	+	-	Adzh. Sukh	-	8.13.18
Microlhelia Under! Kohlm.. I9~l	-	Sv	-	-	-	13.18
Nais inomala Kohlm.. 1962	-	+	+	Adzh	-	7.8.13.18
I'leospora pelagica Johnson. 1956	-	s	-	Adzh. Sukh	-	8
P.pelvetia Sutherland. 1915	-	s	-	Adzh. Sukh	-	8.13
I'leospora sp.	-	+	-	Adzh. Sukh	-	8.13
Reinispora galerita Tuhaki. I96S	-	S\	-	-	-	15
R.maritima hinder. 1944	-	+	-	Adzh	-	8.13
R.ipiadriremis (llohnk) Kohlm., 195' <I9~2)	-	+	-	Adzh. Sukh	-	8.13
R.stellata Kohlm.. 1961)	-	s	-	Adzh	-	15
R.pilleata Kohl. 1963	-	Sv	-	-	-	15
KI.DEUTERMYCETES						
. Ispergillus glaiicns l.n.e.x hi:	+	-	+	-	-	1.3.5
Asperg.herhariorum think) Thorn	+	-	+	-	-	1.3.5
. Isperg./innigatits Ireseniits	+	-	+	-	-	1.3.5
Isperg iilliuceits Thom et Citreh. emend. Fennel el Harelip	+	-	+	-	-	1.3.5
. Isperg.ochraceits It'dhehn	+	-	+	-	-	1.4.5
. Is/,erg.niger ran Tieghem	+	-	-	-	-	1.5
. Is/K'rg.caih/ichis Link ex Fi:	+	-	+	-	-	1.3.5

Asperg.flavus kink ex 1-i:	+		+	-	-	1.3.5
Asperg.oryzae (Ahlhurg) Colin.	+	-	ı	-	-	1.3.5
Asperg. wentii Wehmer	+	-	+	-	-	1.3.5
. Isperg. versicolor i \ itillj Tiraboski	+	-	-	-	-	1.5
. Isperg.svdowii Bainier el Sartory	+	-	+	-	-	1.3.5
. Isperg. ustus (Bainier) Thorn el Church	+	-	+	-	-	1.3.5
Asperg.flavipes Bainier el Sartory	f	-	+	-	-	1.4.5
Aureobasidiuin pullulans tile Bazy) Arnaucl	+	-	-	-	-	1.5
Alternaria tenuis Sees ex Fries	+	-	ı	-	-	1.3.5
Al.tenuissima Ih'r) Wiltsh	+	-	-	-	-	1.5
Al.maritima Suth.. 1916	+	+	-	Adzh. Sukh		1.3.5. 8.13
Bolrvlis cinerea Persoon ex Fries	+	-	+	-	-	1.3.5
B.pilulifera Saccordo	+	-	f	-	-	1.3.5
('epludosporium charlicola Lindau	+	-	-	-	-	1.5
('.acremonium C 'orda	+	-	-	-	-	1.5
('.rosetini Oudemans	+	-		-	-	1.3.5
Catrum (Corda) Pidopl	+	-	+	-	-	1.3.5
('coremioides Bailie	+	-	-	-	-	1.5
('irrenalia fusca Schmidt, 1969	-	+	+	-	-	7.8
C.macrocephala (Kohlm.) Meyers el Moore. I960 Tendr	-	M	+	Adzh. Sukh	-	7.8.20
(' pseudomacrocephala Kohlm.. 19"9	-	+	-	Adzh	-	8
Cliocladium penicilloides ('orda	+	-	f	-	-	1.3.5
C'lioclad.zaleskii Pidopl.	+	-	+	-	-	1.3.5
('liocladium sp. 1	+	-	+	-	-	1.3.5
Cladosporium algarum Cooke et Massee. 1916	+	+	-	Adzh. Sukh	-	1.5.8.13
Cl.herbarum (persoon)l.ink ex Tries		-	-	-		1.5

4 -
- J

('lavariopsis biilhosa (Anastasiou) XakagiriA Tuhaki. 1985	-	+	+	Adzh	-	7
Cremasteria cvimiulis \levers. Moore. 1960	-		-	Ad/li	-	8
Curvularia paleseens Boetlipi 1933	+	-	f	-	-	1.3.5
Dendrypliiella salina iSuth) high, el Xicot. 1964 8,13	+	+	+	Adzh. Sukh	-	1.3.5.
Pen arenaria Xicol, 1958 Sukh	-	+	-	Adzh	-	8.20
Diplodia oraemaris hinder. 1944	-	+	-	Adzh. Sukh	Her	8.18
D.thalassis Artemch. 1980	+	-	-	-	-	1.5
Diplodia sp. 1 (Ĭ.C.Ilygher.Johnson. Sparrow. 196/ Tendr	+	-	-	-	-	1.5
Epicoceiini maritiinum Sut/i.. /9/6	-	Sv	-	-	-	19
Fusidium eleganllilltni Pidopl.	+	-	-	-	-	1.5
Fusarium gihhosum App.et ИV. emend llilai	i	-	+	-	-	1.3.5
h'.samhucinum Fuckel	+	-	+	-	-	1.3.5
F.culmorum (Smith) Sad	+	-	-	-	-	1.5
h.iupiaeductumlRadek et Rahh) pr.p) l.agerheim	I	-	-	-	-	1.3.5
F oxysporum Schlecht. emend Snyd. et flans	+	-	+	-	-	1.3.5
h monili/orme Sheldon	i	-	-	-	-	1.5
F.solanilMart)App.et Hi:var argillaceumlfnBilai	+	-	+	-	-	1.3.5
Geotrichum candidum Link ex Persoon	+	-	-	-	-	1.5
Graphiiim sp.	-	+	-	Adzh. Sukh	-	8
1 lehninlhosporiiim hondarzewii Pidopl.	+	-	-	-	-	15
II. halodes Drechsler.1923	-	+	-	-	Khad	20
llumicola alopallonella Mever i Moore Am.. I960	-	+	+	Adzh	-	7.8
Macrosporium lamiuariaiiuin Suth.. 1916	+	-	+	-	-	1.3.5
Monodietys pelagiea(Johiison) Jones. 1963	-		+	Adzh. Sukli	-	8.13.15
Mycodone uhnariac Potehnja	+	-	+	-	-	1.3.5
Monosporium acuminatum Bonorden	+	-	+	-	-	1.3.5

.1/. minutissiitm ***Rivolta***	+	-	+	-	-	1.3.5
Oospora lactisfh'r/s. iSaccardo	+	-	-	-	-	1.5
Papularia rosea Greben el Kusnets	+	-	+	-	-	1.3
P sphaerospermalPersoon)von lloliner	+	-	+	-	-	1.3
llohnel algicola Artemch., 198(1	+	-	+	-	-	1.5
Papitlaspora halima Anastasiou, 1 963	-	i	+	Adzh. Sukh	-	8.15
Penicilliiim alhidum Sopp.	+	-	+	-	-	1.3.5
Pen.cvclopium IVeslling	+	-	+	-	-	1.3
Pen.chermesinum Biourge	+	-	-	-	-	1.3.5
Pen.charlesii Smih	+	-	+	-	-	1.3
Pen.citrinum ***Thorn***	i	-	+	-	-	1.3.5
Pen. corvlophvlnm Dierckx	+	-	+	-	-	1.3.5
Pen.commune Thorn.	+	-	+	-	-	1.3.5
Pen.deeumhens Thorn.	I	-	-	-	-	1.3.5
/'en. expansion! I. inkjThom.	+	-	-	-	-	1.3.5
Pen.frequentans Wesling	+	-	+	-	-	1.3.5
I'en./uniculosiim Thorn.	+	-	+	-	-	1.3.5
Pendanoso-coerideum Thorn	+	-	+	-	-	1.3.5
Pen.puheruluin Bainier	+	-	f	-	-	13
Pen. raciborskii Zaleski	+	-	4-	-	-	1.3.5
Pen.restriction Gilaman el Abbot	+	-	+	-	-	1.3
Pen.rugidosuin Thorn	+	-	+	-	-	1.3
Pen.steski Zaleski	+	-	+	-	-	1.3.5
Pen.sloloni/eruiu Thorn	+	-	+•	-	-	1.3.5
Pen variahile Sipp.	+	-	1	-	-	1.3.5
Pen. viridicalum Westling	+	-	i	-	-	1.5.3

Pen.restriction (Шаман el Abbot	+	-	+	-	-	1.3.5
Pen. waksmanii Zaleski	+	-	+	-	-	1.3.5
Periconia falina Marshal	+	-	-	-	-	1.5
P.proli/icu Anaslasioii. 1963	-	+	+	Adzh. Sukh	-	7.8.19
Phoina capitttlum Pawar.Malhur el 1 hirumalachar	+	-	-	-	-	1.5
P.herharum U'eslend	+	-	-	-	-	1.3
P.gerbarum U'eslend	+	-	-	-	-	1.5
I'.humicola Ciliiuin el Abbott	+	-	-	-	-	1.5
P.multipara Pawar.Malhur el 1 hirumalachar	+	-	-	-	-	1.5
Seopulariopsiss brevicaulis tSaeelHa/nier	+	-	+	-	-	1.3
Sepedonium ehrysospermum IHulliardlh'ries	+	-	-	-	-	1.5
Sepedonium sp. 1	+	-	-	-	-	1.5
Spicaria divarciatalThomidilman et Caiman el Abbott	+	-	-	-	-	1.3.5
S violaeera Abbott	+	-	-	-	-	1.3.5
Stachvholrxs alternans lionorden	+	-	-	-	-	1.5
Stemphvliuin iiiaritiiinun Johnson	+	-	-	-	-	1.3.5
Trichoderma album Preu.ss	+	-	+	-	-	1.3.5
Tr.koningii Oudemans	+	-	+	-	-	1.3.5
Tr.viride Persoon ex Pries	+	-	+	-	-	1.3.5
1 rilirachium album Under	+	-	+	-	-	1.3.5
Trichocladiuin aehrasporum Meyers.Moore. I')" 1	-	+	+	Adzh. Sukh. Tendr	-	7.8.15
Tr/ehosporium /u hum Komyschko	+	-	+	-	-	1.3.5
I nigricans SaccJ.lignicola .Sit///.	+	-	+	-	-	1.3.5
1 richolhecium roseum kink ex Pries	+	-	+	-	-	1.3.5
Torula convulala liar:	+	-	-	-	-	1.5
1 erticil/ium album!Preussl Pidopl	+	-	-	-	-	1.5

1 *eelhtlosae 1)aszewska*	+	-	-	-	-	1.5
V.albo-atrwn Retake et Bertold	+	-	+	-	-	1.3.5
1 *'.lateritium Berkeley*	+	-	+	-	-	1.3.5
I'esicnlaria marina Schmidt, I9~9	-	+	-	Adzh	-	7.2(1
Zalerion maritima Under, 1944	-	+	-	Adzh. Sukh. Yauor	-	7.20
/.. variant . Inasiasitm. 1963	-	M	+	Adzh. Sukh	-	7.8
KI.BASIDIOMYCETES						
Digitatiapora marina Doguel. 1962	-	s	-	Adzh. Sukh	-	8.13.14
Ma vibrissa Moore et Meyers. 1959	-	M	-	Adzh	-	8.19

Legend

M - mass species

S - rare species

S\ - disappearing species

Adzh - Adzhalyk (Grigorievsky) liman

Her - Berezansky liman

Khad - Khadzhibaisky liman

Sukh - Sukhoi liman

Tendr - Tendro\ sky bay

Yagor - Yagorlitsky bay

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Table 3. List of Zooplankton Species

Species	ПШ 1975 (NWBS)	Contemporary State				
		Marine waters			Brackish waters	
		NWBS	SAL	CA	DD	DE
PROTOZOA						
Flagellata						
Xoclilucct miliaris Suriray. IS 16	NI-BM 3.7.X	МП 2	+ M	EB		
Sarcoclina						
Streblus perlucidall leron-Allen el Earlaml. 19/3}	-	-	-	V.		
Infuzoria						
Coxliella helix (Clap, el l.aeh.l. Brandt, 190'	NEB 3.6.X	S 2	-	EB		
V.helix var. eoehleala Brand/. I91Г	NEB 3.6	S	-	-		
C.anmdata (l)aday). Brandt. 1SS5	NEB 3.6.X	S 2	-	EB		
C.undulatospiralis (Dolgo- polskaja, 194(1/	-	ES 2	-	-		
(' decipiens (Jorg., 1924)	-	ES 2	+	-		
h'avella ehrenhergi (Clap, et l.aeh.l.Kofa.Camp. IS5S	\ 1 H 3.6.S	+ 2	+	EB		
Helicostomella sitbidata(Ehrenherg),Jorgetisen, 1924	NEB 3.6.X	S	-	EB		
Metacylis mereschkowskii Kof.aX 'amp.. 1881	NEB 3.6.X	- 2	-	1 B		
Mjorgensenii (Cleve.1902). Kof.a.C amp.. 1924.192"	NEB 3.6	-	-	-		
M mediterraiiea var.neapo- hiana Mereschk, 1981	-	1 s 2	-	-		
Stenosemella nivalis (Meunier. 1910). Kof. a. Camp	EB 3.6	S	-	EB		
S.ventricosa (Clap, el l.aeh.. 1858). Jorgensen	EB 3.6.8	S	-	-		

Tintinnopsis tallica Unmeet, 1896	NE 3.6.S	S 2	-	EB		
T.beroidea Stein em i.ntz.. Sr.. em Jorgensen. ISS4	NE 3.6.8	s	-	-		
T.campanulafEhrenberg), Daday, 1840	NEB 3.6.8	S 2	+	EB		
T.compressa Daday, 188'	NE 3.6		-	-		
T.cvlindrica Daday. 1886	NE 3.6.8	+	-	EB		
T.luhianeoi Daday. 1886	NEB 3.6.8	S 2	-	EB		
T.meunieri Kofoidet Campbell. 1929	NE 3.6.8	S	-	-		
T.tubulosa l.avandcr. Kofoid et Campbell. 1900	NEB 3.6.8	S	+	EB		
1 rossoliuu \lorozovska\ei. 1 90S	NE 3.6	-	-	-		
T.kojoidi llada, /932	NE 3.6	s	-	-		
T.urnula Meunier, 1910	NE 3.6	-	-	-		
T.mintiiadl'ailes, 1925)	-	ES 2	-	-		
T.karajacensis (Brandt. 1908)	IB s	S 2	-	EB		
T.davidoYi Daday. ISSO	IB 8	-	-	EB		
'i sithacnta Jorgensen, 1899	E 8	-	-			
Tinlinnidiuin mucicola ('let l.acli.. 1858	E 8	S 2	-	-		
1 'orticella sp. Unite, 1 '58	-	ES 2	-	-		
Zoolliamnius sp. Ehrenberg, 1838	-	ES 2	-	-		
COELENTERATA						
Hydrozoa						
Black/oi-dia Virginia! \la\er. 1910	E 3.8	S	-	-		
('ampanularia johnstoni (. II- der), 1856	E 3.8	: 2	-	-		
('oryinorpba nutans M Sars. 1835	E 3	S	-	-		
Corvne tubulosa M.Sars. 1835	i: 3.8	• 2	+	E		

Cordylophora caspia Pallas, l~~0	**E 8**	**S 2**	-	-		
(ladonema radiatum Ditjardin, 1843	**E 3.8**	-	-	-		
Eleutheria dichotoma Ouatre- /ages, 1842	**E 3.8**	-	-	**-**		
1 hill-actinia carnea (M.Sars). 1846	1 **3.8**	**S**	i	**i:**		
Moerisia maeotica (Ostroumov, 1896)	**E 3.8**	-	-	E		
Ohelia longissima (Pallas, 1 ~66)	**E 3.8**	**+ 2**	+	-		
Rathkea octopnnctata (M SarsJ, 1835	**E 3.8**	**S**	-	**i:**		
Nematoda						
Nematoda sp. Rudolphi, 18(18	**E 8**	**S 2**	+	-		
Scyphozoa						
Aurelia aurita (Lamarck. 1 58)	**Eli 3.8**	**M 2**	+	**EB**		
Rhizostoma pulmo (Macri, I "Si	**EB 3.8**	**+ 2**		**EB**		
CTENOPHORA						
Mnemiopsis mccradyi Mayer. 1900	-	**EM** 10	+	**El**		
Pleurobrachia rhodopis ('hun. 1880	**EBM 3.8**	**+ 2**	+	**B**		
NEMERTINI						
Nemertini						
Xemertini sp..larvae (pilidium)	**E 3.8**		-			
NEMATHELMINTHES						
Rotatoria						

Asplanchna prioclonla (iosse. IS50	i: 3.x	S 2	+	-	-	-
A.p.priodonta Gosse	-	-	-	-	+	+
A.p.tridentata Grander et I'arezuk	-	-	-	-	+	-
A.p.hehetica Imhof	-	-	-	-	+	+
A.sieboldi 1Leydig)	-	-	-	-	+	+
A.girodi de Guerne	-	-	-	-	+	+
A.herricki de Guerne	-	-	-	-	+	-
AJienriella l.angliaus	-	-	-	-	+	-
A.brig/itvelli Gosse	-	-	-	-	+	+
Asp	-	-	-	-	+	-
Asplaneluiopus mulliceps iSchrank)	-	-	-	-	+	+
Asplanchnoptts syrinx 1 L.hrenherg)	-	-	-	-	+	+
Aseoinorphella volvoeieola 1 Plate)	-	-	-	-	-	+
Aseoinorpha minima llojsten	-	-	-	-	+	+
A.saltans Hartsch	-	-	-	-	+	-
. i.agilis Zacharias	-	-	-	-	+	-
A.ecaudis Pertv	-	-	-	-	+	-
Alherlia nitidis Bonsjiold	-	-	-	-	+	-
. tdntrusor Gosse	-	-	-	-		-
Aspelta mollis Kudeseu	-	-	-	-	+	-
Anuraeopsis Jissa 1 Gosse)	-	-	-	-	+	+
. tdinela oculata Milne	-	-	-	-	+	-
. t.vaga Davis	-	-	-	-	+	-
A.vaga minor Bryce	-	-	-	-	+	-
A.vaga major Bryce	-	-	-	-	+	-

. \ elonyiata Roelewalel	-	-	-	-	+	-
A.barbata Janson	-	-	-	-	+	-
Alrochus tenlaciileilns II ierzejski	-	-	-	-	+	-
Beauchampia crucigera (Dutroehet)	-	-	-	-	+	-
Bipalpus hudsoni Imhof	-	-	-	-	+	
brachionus pliceitilis (O. F.Midler, 1 ~86)	K 3.8	+	-	-	+	+
Hp rotundıformis Tschugunoff	-	-	-	-	+	-
B.epiaelrielentalus Hermann. I~~83	E 3.8	M 2	+	-	+	+
B.q.quadridentatus Hermann	-	-	-	-	+	+
B.q.melheni Barrels et Daday	-	-	-	-	i	+
B e\.brexispinus F.hrenherg	-	-	-	-	+	+
B c{. ancylognatus Schmarda	-	-	-	-	+	+
B.q.cluniohriculeiris Skorikov	-	-	-	-	+	+
B.q.rhenanus hauler horn	-	-	-	-	+	*y*
B.q.hyphalmiros Tschugunoff	-	-	-	-	+	-
B.q.divergens Tschugunoff	-	-	-	-	+	-
B.q.enlzi (Franco)	-	-	-	-	+	-
B.q.zernovi 1 oronkov	-	-	-	-	+	-
B.q.hyphalmyros I'schugunox. 1921	-	ES 2	-	-	-	-
B calyciflorus Vall..]-66	ı 3.X	M 2	+	-	+	-
Be.calyciflorus Valias	-	-	-	-	+	+
B. c. var. amphiceros Fhrenherg. 1838	E X	S 2	-	+	-	-
B.c.elorcas Gosse	-	-	-	-	+	+
II c.elorcas spinosus ll'erzejski	-	-	-	-	+	+
B.c.anuraeıformis Brehm	-	-	-	-	+	.

B.c.amphiceros forficula Rudescu	-	-	-	-	+	+
B. c. spinosus Wierzejski	-	-	-	-	+	+
B.angularis Gosse, 1851	E3	+	-	+	-	-
B. a. angularis (iosse	-	-	-	-	+	+
B.a.aestivus Skorikov	-	-	-	-	+	-
B.a.bidens Plate	-	-	-	-	+	+
B.asplunclmoides ('huriii, 194'	i- 3	S	-	-	-	-
B. urceolaris 0.F.Midler, 1~~3	K 8	s	+	-	-	-
B urceus (Linnaeus)	-	-	-	-	+	-
Bu. urceus Linnaeus. 1 ~5S	-	ES 2	-	-	+	+
B u.sericus Rousselet	-	-	-	-	+	+
B.leydigii Conn	-	-	-	-	+	+
B.l.quadratus Pousse lei	-		-	-	+	+
B 1 rolUlldllS *BollSSelel*	-	-	-	-	+	+
B.l.lridenlalus Zernov	-	-	-	-	+	+
B.I.I triparlilus l.eissling	-	-	-	-	+	+
B.heunini l.eissling	-	-	-	-	+	+
B.rubens 1'hrenherg	-	-	-	-	+	+
B.bidenlala Anderson	-	-	-	-	+	
B.nilsoni Ahlslrom	-	-	-	-	+	+
B.faleatus Zacharias	-	-	-	-	+	-
B. hudapestmensis Daday	-	-	-	-	+	+
B.b.punctalus Пempe!	-	-	-	-	+	-
B. b. lineatus Skorikov	-	-	-	-	+	+
B.forficula Wierzejski	-	-	-	-	+	-

B.J. woronkowi E adeew	-	-	-	-		-
B.f.minor \ 'oronkow	-	-	-	-	+	-
B.f.inegalis Rodewald	-	-	-	-	+	-
B.J.reducla Grese	-	-	-	-	+	-
B.f.semireducta Rodewald	-	-	-	-	+	-
B.f.divergens 1 adeew	-	-	-	-	+	-
B.diversicornis 1Daday)	-	-	-	-	+	+
B. d. diversieornis (Daday)	-	-	-	-	+	+
B.d.homoceros (11 ierzejskn	-	-	-	-	+	+
Bryceela tenella Bryce	-	-	-	-	+	-
('ephalodella niegaloceplialu (ilascotl	-	-	-	-	+	-
('.m.compressa Dormer	-	-	-	-	+	-
('.eva Gosse	-	-	-	-	+	-
('Jorjicala Ehrenherg	-	-	-	-	+	-
G.limosa Wuljerl	-	-	-	-	+	-
C.temdsela Burn	-	-	-	-	+	-
('.lenuior Gosse	-	-	-	-	+	-
C pachyodon Wulfert	-	-	-	-	+	-
C '.slerea Gosse	-	-	-	-	+	-
C.s.minor Donner	-	-	-	-	+	-
('.armata Rudescu	-	-	-	-	+	-
('.catellina Mueller	-	-	-	-	+	-
('.c.volvocicola Zawadowski	-	-	-	-	+	-
('.c.major Zawadowski	-	-	-	-	+	-
C'. c. botezati Rodewald	-	-	-	-	+	-

C.fluviatilis Zawadowski	-	-	-	-		-
C.gusideaci Rodewald	-	-	-	-	+	-
C. gracilis Ehrenberg	-	-	-	-	-	-
C.globata Gosse	-	-	-	-	+	-
C.gibboides Wuljerl	-	-	-	-	+	-
C.panarista Myers	-	-	-	-	+	-
C.remand Wiszniewski	-	-	-	-	+	-
C.exigua Gosse	-	-	-	-	+	-
C.ventripes Dixon-Nuttall	-	-	-	-	+	-
G.auriculata Mueller	-	-	-	-	+	-
Gdelieata Wuljerl	-	-	-	-	+	-
C.hoodi Gosse	-	-	-	-	+	-
('.derbvi Dixon-Xultall el h'reemann	-	-	-	-	+	-
C. tinea conspicua Donner	-	-	-	-	+	-
C. oxydaelyla Wulfer	-	-	-	-		-
C '.gihha (Ehrenberg)	-	-	-	-	+	+
Colurella adriatica Ehrb., IHII	E 3.8	-	-	-	+	+
('.monodactylos Althaus, 195~	E 3	-	-	-	-	-
C.colurus (Ehrbg.,1830)	E 8	-	-	-	+	-
C. obtttsa Gosse	-	-	-	-	+	-
C.o.clausa Hatter	-	-	-	-	+	-
C.o.aperta Hatter	-	-	-	-	+	-
C.sinistra Carlin	-	-	-	-	+	-
CJtindenburgi Sidнecкe	-	-	-	-	+	-
C.dicentra Gosse	-	-	-	-	+	-

C.colitrus compressa Lucks	-	-	-	-	+	-
('.uncinate/ (Mueller)	-	-	-	-	+	-
('. i/.bicuspidata /Ehrenberg)	-	-	-	-	+	-
('.u.dejlexu (Ehrenherg)	-	-	-	-	+	-
Cpaludosa Carlin	-	-	-	-	+	-
C.tesselata Glascott	-	-	-	-	+	-
('.gastracantha Elauer	-	-	-	-	+	-
('onochilus hipocrepis (Schrank)	-	-	-	-	+	+
('. unicornis Rousselet	-	-	-	-	+	-
('onochih)ides deltaicus Rudescu	-	-	-	-	+	-
('.coenobasis Skorikow	-	-	-	-	+	-
('.mutans (Seligo)	-	-	-	-	+	-
('.dossuarius Hudson	-	-	-	-	+	-
('ollothecu edeniata l('ollins)	-	-	-	-	+	-
('pelagica Rousselet	-	-	-	-	+	-
('. balatonica 1 arga	-	-	-	-	+	-
C.I i heru Zacharias	-	-	-	-	+	-
('.mutabilis Hudson	-	-	-	-	+	-
('.u/rochoides Wierzejski	-	-	-	-	+	-
C.calva Hudson	-	-	-	-	+	-
C.hoodi Hudson	-	-	-	-	+	-
('.trilohata ('oilins	-	-	-	-	+	-
('.algicolu Hudson	-	-	-	-	+	-
('. biljingeri Berlins	-	-	-	-	+	-
C.ambigua Hudson	-	-	-	-	+	-

('.roliilcila Seheslyen el 1 arga	-	-	-	-	+	-
C'campanulata Dobie	-	-	-	-	+	-
C. cyclops ('ubill	-	-	-	-	+	-
('.омакі Ehrenberg	-	-	-	-	+	-
C. омакі cornula Dobie	-	-	-	-	+	-
C.omata natans Tschugunoff	-	-	-	-	+	-
('.heptabrachiata Schoch	-	-	-	-	+	-
('.heptabrachiata diadema I'elr	-	-	-	-	+	-
('hroinogasier oralis iHergendall	-	-	-	-	+	-
Cupelopagis vorax l.eydig	-	-	-	-	+	-
Diple.propatida Gosse	-	-	-	-	+	-
Diplois daviesiae Gosse	-	-	-	-	+	-
Dieranophorus graudis I Ehrenberg)	-	-	-	-	+	-
1). uiicinalus Milne	-	-	-	-	+	-
1 > u minor KovtiU link	-	-	-	-	+	-
D.hauerianus hauerianus II iszniewski	-	-	-	-	+	-
D. h. bruchygnathiis IT iszniewski	-	-	-	-	+	-
D he rentes Wiszniewski	-	-	-	-	+	-
D.leptodon Wiszniewski	-	-	-	-	+	-
D.luetkeni liergendal	-	-	-	-	i	-
IXforcipalus (\Inciter)	-	-	-	-	+	-
D.roslralus Dixon-Xuiial el Freeman	-	-	-	-	+	-
D.caudaius (Ehrenberg)	-	-	-	-	+	-
D.arlamus lepsii Rodewald	-	-	-	-	+	-
D.rosa Gosse	-	-	-	-	+	-

D.proclestes Honing el Myers	-	-	-	-	+	-
Dissotroeho mocroslyla (Ehrenberg)	-	-	-	-	+	-
D.oeulealo aculeata 1Ehrenberg)	-	-	-	-	+	-
Dnlophaga delagei de Heauchainp	-	-	-	-	+	-
Enccnlruin marinuni (Du/ardin. IS-fh	E 3	S	-	-	+	-
E.muslella (Mueller)	-	-	-	-	+	-
E plication Eyferth	-	-	-	-	+	-
Elutetiae Iteming el Myers	-	-	-	-	+	-
E.grande Western	-	-	-	-	+	-
E.putorius Wulfert	-	-	-	-	+	-
Ejelis Mueller	-	-	-	-	+	-
E.sutor Wiszniewski	-	-	-	-	+	-
E.martes Wuljerl	-	-	-	-	+	-
E.rousseleti Eie-I'eilersen	-	-	-	-		-
E.saundersiae saundersiae IHudson)	-	-	-	-	+	-
E Intra Wuljerl	-	-	-	-	·	-
Enteroplea lacuslris Ehrenberg	-	-	-	-	+	-
Eosphoro ehrenhergi Weber et Mantel	-	-	-	-	+	-
E.najas Ehrenberg	-	-	-	-	+	-
E.thoa Honing el myers	-	-	-	-	+	-
E.thoa ihoides Wuljerl	-	-	-	-	+	-
Epiphanes senta (Mueller)	-	-	-	-	+	-
E. brachionus (Ehrenberg)	-	-	-	-	+	+
E.b.spinosus (Rousselet)	-	-	-	-	+	-
E clavulula (Ehrenberg)	-	-	-	-	+	+

E.macroura (Barrois et Daday)	-	-	-	-	+	-
Erignadia clastopis Hudson el Gosse	-	-	-	-	+	-
Euchlanis dilatata Eliren- erg, 1832	[•, 3.8	S	-	-	+	-
E.d.ddatata Ehrenberg	-	-	-	-	+	+
E. d. macrura Ehrenberg	-	-	-	-	+	-
E.d.lucksiana 1 latter	-	-	-	-	+	-
E.d unisetata I.e\•</ig	-	-	-	-	+	-
E.deflexa Gosse	-	-	-	-	+	+
Elrii/ttelra Ehrenberg	-	-	-	-	+	-
Et.hyalina l.eydig	-	-	-	-	+	-
E.lvra Hudson	-	-	-	-	+	-
E.parva Rousselel	-	-	-	-	+	-
E ineisa (\uiin	-	-	-	-	+	-
E.pyriforiius Gosse	-	-	-	-	+	-
E.alata 1 'oronkow	-	-	-	-	+	-
E.oropha Gosse	-	-	-	-	+	-
E.inenela Myers	-	-	-	-	+	-
E.calpidia (Myers)	-	-	-	-	+	-
E.eontorta (Wulfert)	-	-	-	-	+	-
E.phryne Myers	-	-	-	-	+	-
Eudaclylola eudactylota Gosse	-	-	-	-	+	-
Embata coiiiiueiisalis Western	-	-	-	-	+	-
E.parasitica (liglioli	-	-	-	-	+	-
Filinia longiseta (Ehrenberg. IS34)	E 3	S 2	+	-	+	+
E. 1. longiseta (Ehrenberg)	-	-	-	-	+	+

F. brachiata (Pousse let)	-	-	-	-	-	+ •
F. major Colditz	-	-	-	-	+	-
F.passa (Mueller)	-	-	-	-	+	-
F. terminal is (Plate, 1886)	E 3	S	-	-	+	+
F.ringens (l.inne)	-	-	-	-	+	-
F.aseta Fadeew	-	-	-	-	+	-
F.cornuta IVeisse	-	-	-	-	+	-
Fe.eornuta IVeisse	-	-	-	-	+	-
F.c.m onoarthra So κ olowa	-	-	-	-	+	-
Floscularia milicerta (Ehrenberg)	-	-	-	-	+	-
F.jamts (Hudson)	-	-	-	-	+	-
κ coin/era (Hudson)	-	-	-	-		-
Gaslropus stylijer Imhoj	-	-	-	-	+	-
Habrolrocha eollaris Ehrenberg	-	-	-	-	+	-
II.gracilis Montet	-	-	-	-	+	-
11.g.gracilis Montet	-	-	-	-	+	-
H.g.quadridens Schulte	-	-	-	-	+	-
I/.lata Bryce	-	-	-	-	+	-
ll.tr i pits Muray	-	-	-	-	+	-
H bidens Gosse	-	-	-	-	+	-
H.rosa Donner	-	-	-	-	+	-
H.constricta Dujardin	-	-	-	-	+	-
H. augusticollis (Murray)	-	-	-	-	+	-
H.crenata (Murray)	-	-	-	-	+	-
Ik c. crenata (Murray)	-	-	-	-	+	-

H.c.sphagnophila Pawlowski	-	-	-	-		-
II elegans (Milne)	-	-	-	-	+	-
11.spicule/ Bryce	-	-	-	-	+	-
l/urringia eupe>elei Gosse	-	-	-	-	+	-
1 lexarlhrei jennica (l.evaneler)	-	-	-	-	+	-
II. oxyurus (Zernov)	-	-	-	-	+	-
H.mollis (Bartos)	-	-	-	-		+
1 l.mira (Hudson)	-	-	-	-	+	-
llura aurita Ehrenberg	-	-	-	-	+	-
1.aurita intermedia Wuljerl	-	-	-	-	+	-
l.viridis Stenroos	-	-	-	-	+	-
l.myersi Wulfert	-	-	-	-	+	-
Keratella cruciformis (Thompson, 1H92)	E 3	S	-	-	-	-
*K.cochlearis (Gosse. **ES5**1)*	E 3.8	+ 2	y	-	+	+
K.cochlearis cochlearis (Gosse)	-	-	-	-	+	+
K electa (Gosse)	-	-	-	-	.	+
K c. t.punctata (Lauterhorn)	-	-	-	-	+	-
к c. 1. major (Lauterhorn)	-	-	-	-	+	-
*k.c.macracantlia **1** Lauterhorn)*	-	-	-	-	+	-
K.c.m.micracantha (Lauterhorn)	-	-	-	-	I	-
k.c.iii.liiherculata (Lauterhorn)	-	-	-	-	+	-
к. c. leptacantha (Lauterhorn)	-	-	-	-	+	-
k.c.hispielei (Lauterhorn)	-	-	-	-	t	-
K.c.robusta (Lauterhorn)	-	-	-	-	+	-
k. irregularis (Lauterhorn)	-	-	-	-	+	-

K.i.irregularis (Lauterhorn i	-	-	-	-	+	-
K.i.connectens (Lauterhorn)	-	-	-	-	+	-
K.i.angulıfera (Lauterhorn)	-	-	-	-	+	-
K.quadrata (Midler. 1 ~S'l	E 3.8	+ 2	+	-	+	+
K q.quadrata (Midler. 1 ~86)	i: 8	S 2	-	-	+	+
K.q.frenzeli (Eckstein, 1895)	-	ES 2	-	-	+	
K.q.reticulata (Carlin, 1943)	-	ES 2	-	-	+	f
K.q plalei f laegersk/oehl)	-	-	-	-	+	-
K.q.divergens 1 *'oigt*	-	-	-	-	+	-
K.q.disperse! ('arlin	-	-	-	-	+	-
K.tropica (Apstein)	-	-	-	-	+	+
K.I ospina I'adeev	-	-	-	-	+	-
K t.tropica (Apstein. 190')	-	ES 2	-	-	+	+
K.I rediicla hadeev. 192'	-	ES 2	-	-		+
K.seiridata ciirvicornis Ky/ov	-	-	-	-	+	-
K.ticinensis (('allerio)	-	-	-	-	+	-
K. volga (Ehrenberg)	-	-	-	-	+	+
K. v. valga (Ehrenberg)	-	-	-	-	+	+
K v. monospina Klausener	-	-	-	-	+	+
K.v.heterospina 1 Klausener)	-	-	-	-	+	+
K.v.hreluui Klausener	-	-	-	-	+	-
K. lestudo Ehrenberg	-	-	-	-	+	+
K.hiemalis ('arlin	-	-	-	-		-
Kellicotlia longispina (Kellicott. 18'9)	1 3.8	S	-	-	+	-
l.ocinularia flosculosa (Mueller)	-	-	-	-	+	-

Limnias ceratophylli Schrank	-	-	-	-	+	-
L.milicerta Weisse	-	-	-	-	+	-
Lindia tondosa Dujardin	-	-	-	-	+	-
L.truncata Jennings	-	-	-	-	+	-
l.ecane obtusa (Murray)	-	-	-	-	+	-
LJigona (DunlopJ	-	-	-	-	+	-
I.J! ex i lis Gosse	-	-	-	-	+	+
I.arcula llarring	-	-	-	-	+	-
/.. ungulala (Gosse)	-	-	-	-	+	+
L.affinis 1.cylinder	-	-	-	-	+	-
1. tenuiseta llarring	-	-	-	-	+	-
1.subtil is llarring	-	-	-	-	+	-
L.grandis Murray)Murray, 1913)		-	-	-	+	-
l.liornemanni Ehrenberg	-	-	-	-	+	-
L.Hyphema llarring el Myars	-	-	-	-	+	-
I. nana Murray	-	-	-	-	+	-
1.magna iSlenroos)	-	-	-	-	+	-
E. ludwigii (Eckstein)	-	-	-	-	+	-
L.ohioensis (1 lerriek)	-	-	-	-	+	-
h.inermis Brvce	-	-	-	-	+	-
l.puinila Rousselet	-	-	-	-	+	-
L.gissensis Eckstein	-	-	-	-		-
h.kluchor Tarnogradsky	-	-	-	-	+	-
L.agilis bryce	-	-	-	-	+	-
L.elasma llarring el Myers	-	-	-	-	+	-

cs

L.quadridentata (Ehrenberg)	-	-	-	-	+	f
l.py mi for mis Da c lay	-	-	-	-	+	-
/.. hamala (Stokes)	-	-	-	-	+	-
L.closterocerca (Schmarda)	-	-	-	-	+	+
l.copeus llarring el Myers	-	-	-	-	+	-
Lpsaiuiiiopliila Wiszniewski	-	-	-	-	+	-
L.crenata llarring	-	-	-	-	+	-
1.. bulla Gosse	-	-	-	-	+	+
L.slenroosi 1 Meissue ri	-	-	-	-	+	+
L.galeata bryce	-	-	-	-	+	
I..comma Mueller	-	-	-	-	+	+
I., lunaris Ehrenberg	-	-	-	-	+	-
1. llialera llarring el Myers	-	-	-	-	+	-
L.lainellala Daday	-	-	-	-	+	-
L.hifurca Bryce	-	-	-	-	+	-
L.furcala Murray	-	-	-	-	+	-
L.plesia Myers	-	-	-	-	+	-
L.curvicornis (Murray)	-	-	-	-	+	-
L.hastata (Murray)	-	-	-	-	+	-
l. verecunda (Murray)	-	-	-	-	+	-
I,.unditlata 1 latter	-	-	-	-	+	-
1. copeis (llarring el Myers)	-	-	-	-	+	-
L.pygmaea (Daday)	-	-	-	-	+	-
L.luna lima (Mueller)	-	-	-	-	*y*	+
1. 1. balatonica 1 arga	-	-	-	-	+	-

L.l.presumpta Ahlstrom	-	-	-	-	+	-
Lepadella parasita Hatter	-	-	-	-	+	-
L.astscicola Hotter	-	-	-	-	+	-
L.lata Wieszniewski	-	-	-	-	+	-
L.l.sinuata Wieszniewski	-	-	-	-	+	-
L.raja Wiszniewski	-	-	-	-	+	-
h. branchico/a flatter	-	-	-	-	+	-
L. boreal is llarring	-	-	-	-	+	-
Lquadricarinata (Stenroos)	-	-	-	-	+	-
l.q.oeloeariitalo Wnl/erl	-	-	-	-	+	-
L. ovalis (Mueller)	-	-	-	-	+	+
E.elliptica Wuljerl	-	-	-	-	+	-
L.patella (Mueller)	-	-	-	-	+	+
L.p.patella (Mueller)	-	-	-	-	+	-
L.p.similis (Lucks)	-	-	-	-	+	-
k.p.marine Rodewald	-	-	-	-	+	-
h. cry phaea Ilarring	-	-	-	-	+	-
1..dactyliscta (Stenroos)	-	-	-	-	+	-
L.minuta Montet	-	-	-	-	+	-
L.costata Wuljerl	-	-	-	-	+	-
L.rhomboides (Gosse)	-	-	-	-	+	-
L. ampltilropis llarring	-	-	-	-	+	-
/.. triptera Ehrenberg	-	-	-	-	+	-
[..acuminata (Ehrenberg)	-	-	-	-	+	+
L.nympha Donner	-	-	-	-	+	-

–]

h.ehrenhergi Perty	-	-	-	-	+	-
L.haueri Rodewald	-	-	-	-	+	-
1..quinquecoststa (Lucks)	-	-	-	-	+	-
Lophocharis lepadelloides Rodewald	-	-	-	-	+	-
L.salpina (Ehrenberg)	-	-	-	-	+	-
L. oxysternon (Gosse)	-	-	-	-	+	-
Maerochaetus collinsii Gosse	-	-	-	-	+	-
M.subquadrattts Perty	-	-	-	-	+	-
Metadiaschiza trigona Rousselet	-	-	-	-	+	-
Monommata aegttalis Ehrenberg	-	-	-	-	+	-
M.dentala Wulfert	-	-	-	-	+	-
M.appendleulata Stenroos	-	-	-	-	+	-
M.granchs Tessin	-	-	-	-	+	-
Mdongisela Mueller	-	-	-	-	+	-
Ma st i a Myers	-	-	-	-	+	-
Microeodides chlaena (Gosse)	-	-	-	-		-
Mlcrocodon clavus Ehrenberg	-	-	-	-	+	-
Mniobia incrassata (Muray)	-	-	-	-	+	-
\ 1. scarlatina (Ehrenberg)	-	-	-	-	+	-
M.granulosa Bartos m. magna (Plate)	-	-	-	-	+	-
M. russeola (Zelinka)	-	-	-	-	+	-
M. tetraodon (Ehrenberg)	-	-	-	-	+	-
,\/. .vi *inhiotiea (Zelinka)*	-	-	-	-	-i	-
Maerotraehela mullispinosa Thompson	-	-	-	-	+	-
M. hi If ringer i Bryce	-	-	-	-	.	-

M.plicata plicata (Bryce)	-	-	-	-	+	-
M.p.hiruiulinella (Murray)	-	-	-	-	+	-
M.nana nana (Bryce)	-	-	-	-	+	-
M. ehrenbergii (Janson)	-	-	-	-	+	-
,\I cpiadricornifera \Blue	-	-	-	-	+	-
M.papillosa Thompson	-	-	-	-	+	-
\1. mullispinosa Thompson	-	-	-	-	+	-
\1 m. mullispinosa Thompson	-	-	-	-	+	-
M.m.brevispinosa (Murray}	-	-	-	-	+	-
Mzickendrahti (Richlers)	-	-	-	-	+	-
M.z.digitata Bartos	-	-	-	-	+	-
Mytilina miitica (Perty)	-	-	-	-	+	-
M.bicarinata (Perty)	-	-	-	-	+	-
Mmueronata (Mueller)	-	-	-	-	+	-
Mm iiiucronala (Mueller)	-	-	-	-	+	+
Mm spongera (Ehrenberg)	-	-	-	-	+	+
\1. ventral is (Ehrenberg)	-	-	-	-	+	-
M v. ventralis lEhrenberg)	-	-	-	-	+	-
Mv.redueta (Ehrenberg)	-	-	-	-	+	-
M. v. brevispiiia (Ehrenberg)	-	-	-	-	+	-
\l macracantha (Gosse)	-	-	-	-	+	-
Mvitlens 1Eevaiuler)	-	-	-	-	+	-
M.crassipes (Lucks)	-	-	-	-	+	-
M.trigone! (Gosse)	-	-	-	-	+	-
Solholea se/uamu/lei (Mueller)	-	-	-	-	+	-

N.squamulla squamulla (Mueller)	-	-	-	-	+	+
X s.frigida Jaschnov	-	-	-	-	+	-
Sotholca acuminata (Ehrenberg. 1832)	к з	S 2	-	-		
X.a.acuminata (Ehrenberg)	-	-	-	-	+	+
X.a.e.xtensa Oloffson.1918	-	ES 2	-	-	+	-
A.*striata (OF.Midler. 1 '86)*	E 3.8	E.	-	-	+	-
X. c/netura Skorikow	-	-	-	-	+	-
X.lahis Gosse	-	-	-	-	+	-
X.foliaeea 1 Ehrenberg)	-	-	-	-	+	-
Xotommata diasema Myers	-	-	-	-	+	-
X. copeus Ehrenberg	-	-	-	-	+	-
A *pachyura (Gosse)*	-	-	-	-	+	-
\ *brachy out Ehrenberg*	-	-	-	-		-
N.cerberus Gosse	-	-	-	-	+	-
X.glyphura Wuljerl	-	-	-	-	+	-
X.pseudocerberus de Hcatichamp	-	-	-	-	+	-
X.silpha **(iossc**	-	-	-	-	+	-
X. tripus Ehrenberg	-	-	-	-	+	-
X. eollaris (Ehrenberg)	-	-	-	-	+	-
X.saccigera Ehrenberg	-	-	-	-	+	-
X.aurita (Mueller)	-	-	-	-	+	-
X.cyrtopus Gosse	-	-	-	-	+	-
X.doneta llarring et Myers	-	-	-	-	·	-
Farad.hudsoni (Glascott)	-	-	-	-	+	
Philodina cilrina Ehrenberg	-	-	-	-	+	-

Ph. megalotrocha Ehrenberg	-	-	-	-	+	-
Ph. acuticornis Murray	-	-	-	-	+	-
Ph. a. oc/i as a Milne	-	-	-	-	+	-
Ph.eryihrophtahna Ehrenberg	-	-	-	-	+	-
Ph.eristata Donner	-	-	-	-	+	-
Ph. brevipes Murray	-	-	-	-	+	-
1'h. vorax (Janson)	-	-	-	-	+	-
Ph.striata Rodewald	-	-	-	-	+	-
Ph.tridentctta Rodewald	-	-	-	-	+	-
Ph.plena Bryce	-	-	-	-	+	-
Ph.roseola Ehrbr.,1832	E 8	-	-	-	+	+
I'leiiretra hrycei (Weber)	-	-	-	-	+	-
P. cos tat a (Bart os)	-	-	-	-	+	-
Pleurotrocha petromyzon Ehrenberg	-	-	-	-	+	-
P. constricta Ehrenberg	-	-	-	-	+	-
Plalyias polyacanlhus (Ehrenberg)	-	-	-	-	4	-
P.patulits (Mueller)	-	-	-	-	+	+
P.p.palulus (Mueller)	-	-	-	-	+	+
P.p. halatonicus 1 *'arga*	-	-	-	-	+	-
P.p.leopoldi (Oye)	-	-	-	-	+	-
P.quadricornis quadricornis (Ehrenberg)	-	-	-	-	+	+
P. cp hrevispinus (Daday)	-	-	-	-		+
Ploesoma truncation (Levander)	-	-	-	-	+	+
P.tenticulare Harrick	-	-	-	-	+	-
P.lynceus Ehrenberg	-	-	-	-	+	-

Ploesoma triacanthum (Bergendal)	-	-	-	-	+	-
Polvarthra remata Skorikov, 1896	1 3	S	-	-		
P.vulgaris C arlin, /943	E 3.8	s	-	-	+	+
P. dolichoptera Idelson	-	-	-	-	+	+
/'.minor \ oigi	-	-	-	-	+	-
P major Burckhardt	-	-	-	-	+	+
P. euryptera Wierzejski	-	-	-	-	+	ı
I'.longiremis Carlin	-	-	-	-	+	-
P.proloba Wulfert	-	-	-	-	+	-
P.pseudoproloha A/hurtova	-	-	-	-	+	-
P.sp	-	-	-	-	+	-
Postclausa minor Rousselet	-	-	-	-	+	-
P.hyptopus (Ehrenberg)	-	-	-	-	+	-
Pompholyx eomplanata Crosse	-	-	-	-	+	-
/'.sulcata Hudson	-	-	-	-	+	+
Proales reinhardti (Ehrb.. 1834)	E 3.8	s	-	-		
P doliaris Rousselet	-	-	-	-	+	-
P. wernecki (Ehrenberg)	-	-	-	-	+	-
P.halophila Remane	-	-	-	-	t	-
P dafnicola (Thompson)	-	-	-	-	+	-
P. paras i to (Ehrenberg)	-	-	-	-	+	-
P.uroglenae de Beauchamp	-	-	-	-	+	-
P.minima Montet	-	-	-	-	+	-
P.brevipes llarring et Myers	-	-	-	-	+	-
1'.similis de Beauchamp	-	-	-	-	+	-

P.fallaciosa Wulfert	-	-	-	-	+	-
P. clecipiens (Ehrenberg)	-	-	-	-	+	-
P.sordida Gosse	-	-	-	-	+	-
P.theodora (Gosse)	-	-	-	-	+	-
P.mieropus (Gosse)	-	-	-	-	+	+
Pseudoharringia similis Fadeew	-	-	-	-	+	-
Ptygura spongicola Berlins	-	-	-	-	+	-
P.milieerta Ehrenberg	-	-	-	-	+	-
P.milicerta mucicola Ke/licott	-	-	-	-	+	-
P.velata Gosse	-	-	-	-	+	-
P.pilulaC 'ubitt	-	-	-	-	+	-
P.crystctllina Ehrenberg	-	-	-	-		-
P.longipes Wills	-	-	-	-	+	-
PJongicornis socialis Weber	-	-	-	-	+	-
Rhinoglena frontalis Ehrenberg	-	-	-	-	+	-
Resticula gelida Hairing el Myers	-	-	-	-	+	-
R. melandocus Gosse	-	-	-	-	+	-
Rotaria neptunia Ehrenberg	-	-	-	-	+	+
Rlrisecala (Weber)	-	-	-	-	+	-
R.tridens Montet	-	-	-	-	+	-
R.elongata Weber	-	-	-	-	+	-
R.gracilicauda (Bory de St. Vincent)	-	-	-	-	+	-
R. c/tr/na Ehrenberg	-	-	-	-	+	-
R. macroceros Gosse	-	-	-	-	+	-
R macrura Ehrenberg	-	-	-	-	+	-

R. rotatoria Pallas	-	-	-	-	+	+
R.sordida Western	-	-	-	-	+	-
R. magna-calcarata Parsons	-	-	-	-	+	-
R.socialis Kellicott	-	-	-	-	+	-
R. neptunoida Plarring	-	-	-	-	+	-
R.tardigrada Phrbg., 1832	I- 8	-	-	-		-
Scandium longieaudum (Mueller/	-	-	-	-	+	-
Sinantherina socialis Linne	-	-	-	-	+	-
Scptatinella rostrum Schmarda	-	-	-	-	+	-
S.tridentata mutica Ehrenberg	-	-	-	-	+	-
S lerdigi '/.acharias	-	-	-	-	+	-
S. hi/urea Bolton	-	-	-	-	+	-
Stephanoceros Jimbrialus Goldfuss	-	-	-	-	+	-
Synchaeta pectinata Ehrenberg, 1832	E 3.8	S 2	-	-		
S. striata Wierzejski, 1893	E 3	S 2	-	-	+	+
S.rora.x Rousselet. 1902	E 3.8	S 2	-	-	+	-
S. littoral is Rousselet, 1902	E 3.8	S 2	-	-	+	-
S. baltica Ehrenberg, 1834	E 8	M 2	+	-	+	-
S.monopus Plate, 1889	-	+E 2	-	-	+	-
S.grimpei Remane. 1929	-	liS 2	-	-	-	-
S.oblonga Ehrenberg. 1831	-	ES 2	-	-	+	+
S.cecilia Rousselet, 1902	-	ES 2	-	-	+	-
S. triophthalma Lauterhorn, 1894	E 8	S 2	-	-		
S. longipes Gosse	-	-	-	-	+	-
S.curvata Lie-Petlersen	-	-	-	-	+	-

S.ceciliafusipes Buchhoh	-	-	-	-	+	-
S grandis Zacharias	-	-	-	-	+	-
S.kitina Rousselet	-	-	-	-	+	-
S.tremula Mueller	-	-	-	-	+	+
S.tavina Hood	-	-	-	-	+	-
S.gyrina Hood	-	-	-	-	+	-
S.rasehni Rudesett	-	-	-	-	+	-
S.sp. Ehrenberg, 1832	-	-	-	E	+	-
S.neapolitana Rousselet. 1902	i: 8	S	-	-	+	-
Taphrocampa selenura Gosse	-	-	-	-	+	-
T.ctnnidosa Gosse		-	-	-	i	-
Taphrocampa selenura Gosse	-	-	-	-	i	-
T.anmdosa Gosse	-	-	-	-	i	-
Trichocerca capuchin tiller:, et V.ach., 1893)	E 8	s	-	-	-	-
T.marina (Daday, 1890)	E 8	s	-	-	-	-
T.raltus (O.T.Midler..1"6)	E 8	s	-	-	+	+
T elongata tGosse)	-	-	-	-	+	-
1 lophoessa ((iosse)	-	-	-	-	+	-
T.gracilis (Tessin)	-	-	-	-	1	-
T.bicristata (Gosse)	-	-	-	-	+	-
T.cylindrica (Imhof)	-	-	-	-	+	+
T.jenningsi (Woigt)	-	-	-	-		-
T.iigris (Mueller)	-	-	-	-		-
T.leniiior (Gosse)	-	-	-	-	+	+
T.fusıformis (1.cylinder)	-	-	-	-	+	-

co

T. terms (Gosse)	-	-	-	-	+	-
T.similis (Wierzejskı)	-	-	-	-	+	-
T.birostris (Minkiewicz)	-	-	-	-	+	-
T.scipio (Hudson et Gosse)	-	-	-	-	+	-
T. longiseta (Schrank)	-	-	-	-	+	-
T.sejunctipes (Gosse)	-	-	-	-	+	-
T.rattus (Mueller)	-	-	-	-	+	-
T. r. earinata (Ehrenberg)	-	-	-	-	+	+
T.r.minor E'adeew	-	-	-	-	+	-
TJnermis (hinder)	-	-	-	-	(	-
T.sty/ata (Gosse)	-	-	-	-	+	-
I'.pusdla (Jennings)	-	-	-	-	+	-
T.parvula ('arlin	-	-	-	-	+	-
Edixon-nuttidli (Jennings)	-	-	-	-	+	+
T'.brachyura (Gosse)	-	-	-	-	+	-
T.rousselet! 1 oigt	-	-	-	-	+	-
T.sulcata (Jennings)	-	-	-	-	+	-
T.cavia (Gosse)	-	-	-	-	+	-
T. uncinate 1 'oigt	-	-	-	-	+	-
T. intermedia (Stenroos)	-	-	-	-	+	-
T.porcellus (Gosse)	-	-	-	-	+	-
T. inermis (Under)	-	-	-	-	+	-
T.taurocephala (llauer)	-	-	-	-	+	-
T. weberi Jennings	-	-	-	-	+	-
7'.vernalis (Hauer)	-	-	-	-	+	-

Tesludinella patina (Hermann, I ***S3)***	E 8	-	-	-		
T.p.patina (Hermann)	-	-	-	-	+	+
T.p.intermedia (Anderson)	-	-	-	-	+	-
T.parva Terret:	-	-	-	-	+	-
T.mucronala (Gosse)	-	-	-	-	+	-
T.truncata Gosse	-	-	-	-	+	-
T. elliptica Ehrenberg	-	-	-	-	+	-
T.sphagnicola Rude sen	-	-	-	-	+	-
T.clypeata ((lh.Mulh.l~S6/	E 8	-	-	-	+	-
Tetramastix opoliensis Zacharias	-	-	-	-		-
To brevispina Ahlstrom	-	-	-	-	+	-
Trichoma truncata (Whiteieztte)	-	-	-	-	+	-
'/'. t.truncata (Whitelegge)	-	-	-	-	+	-
T.t.aspinosa (Rodewald)	-	-	-	-	+	-
T.t.longispina (Rodewald/	-	-	-	-	+	-
T.pocillum (Mueller)	-	-	-	-	+	-
T.p pocillum (Mueller)	-	-	-	-	+	+
T.p.hergi (Meissner)	-	-	-	-	+	-
T.similis (Stenroos)	-	-	-	-	+	-
T.lelractis (Ehrenberg)	-	-	-	-	+	-
T.t.lelractis (Ehrenberg/	-	-	-	-	+	-
'/'. t.paupera (Ehrenberg)	-	-	-	-	+	-
T.curta (Skoricov)	-	-	-	-	+	-
Triple plicata l.evunder	-	-	-	-	+	-
T.p.razelmi Rodewald	-	-		-	+	

c

Trochosphaera solstitialis Thorpe	-	-	-	-	+	-
Wierzejskiella sabulosa Wieszniewski	-	-	-	-	+	-
Wolga spinifera l'Western!	-	-	-	-	+	-
ANNELIDA						
Polychaeta,larvae						
Aonides oxyeephala (Sors. 1872)	-	-	-	E	-	-
('apitella eapitata (Fabricius. 1 ~80)	1 X	s	-	E	-	-
Glyeera tridaetylu Schmarda. 1861	1 3	s	-		-	-
Harmothoe imhricata (l.inne. I'6'l	I X	M	+	E	-	-
l.agis (Peetinaria) koreni Malmgren. 1865	1 8	s	-	E	-	-
Magelona rosea Moore. 190'	l 3	s	-		-	-
Mierospio meeznikowianus (Cktparede. 1869)	l 8	s	-		-	-
Neanthes (Xereis) succinea keuckart. 184'	l X	M	+	E	-	-
Nereis succinea keuckart ('Itiaje. 182')	-	-	-	E	-	-
Nerinides Iridenlala Southern. 1914	-	-	-	E	-	-
Nephthys hombergii Aud. M. Edw.	-	+	-	-	-	-
Polydora ciliata (Johnston. 1838)	E X	M	+	E	-	-
Polygorditts neapolilantts var. ponticus Zalensky. 1882	E 3	-	-	-	-	-
Spio filicornis (Mtller. 1 "(>)	E 8	+	M 2	E	-	-
Prtonospio mahngreni Claperede. 1868	-	-	-	E	-	-
P.cirrifera 117'.	-	+	-	-	-	-
Pholoe svnopbthahnica Cktparede. 1868	1. X	M	-	E	-	-
Phyllodoce tuberculata Bobretzky. 1868	E 8	s	-	-	-	-
Ph.mucosa Oersted	-	+	-	-	-	-

Pygospio elegans Clap.	-	+	-	-	-	-
Scolelepis fuliganosa (Claparede. 1868)	-	-	-	E	-	-
1 *'igtorniella zaikai*	-	-	-	B	-	-
Olygochaeta						
Aeolosomatidae						
Caetogaler diastrophits (Gruithuisen)	-	-	-	-	+	-
t 'haetogaster setosus Svetlov, 1925	-	-	-	-	+	-
llomoehaeta naidina Bretscher. 1896	-	-	-	-	+	-
Sots pseudobtusa Piquet. 1906	-	-	-	-	+	-
X.eliuguis Mueller. I"3	-	-	-	-	+	-
N.pardalis Piquet. 1906	-	-	-	-	+	-
Pristina Phreuherg. 1828	-	-	-	-		-
P.papillosa Cernosvilov. 1935	-	-	-	-	+	-
TEINTACULATA						
Bryozoa						
Bryozoa sp..larvae (cyphonautes)	NE 3	Sx	-	-	-	-
Lepralia pallasiana (Moll . 1803)	NE 7	Sx	-	E	-	-
Л *tembranipora sp.*	-	+	-	-	-	-
Phoroniclea						
Phoronis euxinicola (S.- Long.. 190)	E 3	S	-	E	-	-
ARTROPODA						
Crustacea						
Cladocera						

Acroperus harpae (Baird)	-	-	-	-	+	+
Alona affinis Leydig	-	-	-	-	+	+
A.quadrangularis (Mueller)	-	-	-	-	+	+
A.rectangnla Sars	-	-	-	-	+	+
A.r.reetangula Sars	-	-	-	-	+	-
A.r.pulchra Hellich	-	-	-	-	+	-
A.r.caucasica Schiklejew	-	-	-	-	+	-
A.r.riehardi Slingelin	-	-	-	-	+	-
Л. intermedia Sars	-	-	-	-	+	-
A.weltneri Keilhaek	-	-	-	-	+	-
A.eostata Sars	-	-	-	-	+	-
A.guttata Sars	-	-	-	-	+	+
A.g.tubereulata kutz.	-	-	-	-	+	-
A.davidi Richard	-	-	-	-	+	-
Alonella nana (Baird)	-	-	-	-	+	+
A. exigua (Lilljeborg)	-	-	-	-	+	-
A.excisa (Fischer)	-	-	-	-	+	-
A.rostrata (koeh)	-	-	-	-	+	-
Alonopsis elongata (Sars)	-	-	-	-	+	-
A.ambigua lilljeborg	-	-	-	-	+	-
Anchistropus emarginatus Sars	-	-	-	-	+	-
Bosmina longiroslris (O.F. Midler. 1'85)	F. 3	S 2	-	-	+	+
B. 1. simil is (Li I Ije h org)	-	-	-	-	+	+
B.l.pellucida Stingelin	-	-	-	-	+	+
B. I.cornuta (./urine)	-	-	-	-	+	-

B. 1. curvirostris Fisher	-	-	-	-	+	-
B. 1. brevicomis Hellich	-	-	-	-	+	-
B.l.typica (Mueller)	-	-	-	-	.	-
B.coregoni Baird, I85~	E3	S	-	-	+	+
B. c. longicornis Schoedler	-	-	-	-	+	-
Be.humilis Lilljeborg	-	-	-	-	+	-
B.longispina Leydig	-	-	-	-	+	-
Bunops serrieaudata (Daday)	-	-	-	-	+	-
('amplacercus rectiroslris Schoedler	-	-	-	-	+	+
C.r. hiserralus Schoedler	-	-	-	-	+	-
C. lilljehorgi Schoedler	-	-	-	-	+	+
Ceriodaphnia affinis Lilljeborg	-	-	-	-	I	-
C '.pidchella Sars	-	-	-	-	*i*	+
('.quadrangula (Mueller)	-	-	-	-	+	-
C.q.hainata Sars	-	-	-	-	+	-
('.reticulata (Jurine)	-	-	-	-	+	+
C.r.typiea (Jurine)	-	-	-	-	+	-
C.r.kurzii Stingelin	-	-	-	-	+	-
C.megalops Sars	-	-	-	-	+	-
C'. laticaudata Mueller	-	-	-	-	+	-
('rotunda Sars	-	-	-	-	+	-
('setosa Motile	-	-	-	-	+	-
(ercopagis pengoi (Ostromov, 1891)	E 3	s	-	-	+	-
C.tenera Sars						+
Comigerius inaeoticus inaeoticus (Pengo. IS~9)	R 3	S 2	-	-	+	+

Chydorus sphaericus (O.F. Midler, l~S5)	E 3	S	+	-	-	-
Ch.latus Sars	-	-	-	-	+	-
Covalis Kur:	-	-	-	-	+	-
('.piger Sars	-	-	-	-	+	-
('.gibbus Lilljeborg	-	-	-	-	+	-
Cglohosus baird	-	-	-	-	+	+
Daplmia pules (De (leer)	-	-	-	-	+	+
!)./>.middendoijiana Fischer	-	-	-	-	+	-
D.p.tenehrosa Sars	-	-	-		+	-
D.p.ohtusa Kutz.					+	-
Daplmia longispina (O.F.Midler, l~85)	E 3	S 2	-	-	+	+
I). 1.longispina (Mueller)	-	-	-	-	+	-
D.I.littoralis Sars	-	-	-	-	+	-
D.gateala Sars	-	-	-	-	+	-
1) hyalina (Leydigl	-	-	-	-	+	+
D.h lacuslris Sars	-	-	-	-	+	-
D.cueulata Sars, IH62	E 3	S	-	-	+	+
D.c.cucullata (Sars)	-	-	-	-	+	-
D.c.apicata Kutz.	-	-	-	-	+	-
D.c.berolinensis Schoedler	-	-	-	-	+	-
D. c. kahlbergensis Schoedler	-	-	-	-	+	-
D.c. incerta Richard	-	-	-	-	+	-
D.cristata Sars	-	-	-	-	-	-
D.atkinsoni Baird	-	-	-	-	+	-
D. magna Straits	-	-	-	-	+	-

D.carinata King	-	-	-	-	4	+
Dcurvirostris Eyhnann	-	-	-	-	+	-
D similis Claus	-	-	-	-	+	-
Diaphanosoma brachiurum (Lievin, 1848)	E 3	S	-	-	+	+
1). b. leuchtenhergianum Fischer	-	-	-	-	+	-
D.ihthia Manitilova	-	-	-	-	+	-
Disparalona rostrata (Koch)					+	+
Dunhevedia crassa king					+	+
Evadne spinijero Oh.Midler, 186~	EM 3.8	s	-	E	+	-
E.nordmanni Loven, 1836	1-M 3.8	Sx	+	-	-	-
Ewycercus lomellalits (\luellcn	-	-	-	-	ı	+
Graptoleberis testudinaria (Fischer)	-	-	-	-	+	+
llyocryplus soriliclus I Lievin)	-	-	-	-	+	+
Lagilis Kurz	-	-	-	-	+	+
l.acutifrons Sars	-	-	-	-	+	-
Kurzia latissima Kurz	-	-	-	-	+	-
Lathonuru ••ectirostris (Mueller)	-	-	-	-	+	-
Latonopsis hospitus Naidenow	-	-	-	-	+	-
Leptodora kindtii (Focke, 1844)	E 3	s	-	-	-	-
Leydigia leviligu 11 eydig)	-	-	-	-		+
L.acanthocercoides (Fisher)	-	-	-	-	+	+
Macrothrix rosea (Jurine)	-	-	-	-	+	+
Mdaticornis (Jurine)	-	-	-	-	+•	+
Mhirsutieorius Xorinan el Brady	-	-	-	-	+	-
M.daday Behning	-	-	-	-	+	-

M.spinosa King	-	-	-	-	+	-
M.s.schauinslandi Sars	-	-	-	-	+	-
Moina reciirostrisll.eudig. I860)	-	ES 2	-	-	+	+
Moina r.lilljeborgii Schoedler	-	-	-	-	+	-
M.macrocopa (Straus)	-	-	-	-	+	-
M.micrura Hellich	-	-	-	-	+	+
Mmicrophtalma Sars	-	-	-	-	+	-
M.brachiata (Jurine)	-	-	-	-	+	-
Monospilus tlispar Sars	-	-	-	-	+	+
Oxyurella lenuieaudis (Sars)	-	-	-	-	+	+
Penilia avirostris Dana, IS49	EM 3.8	Sx 2	-	EI	+	+
Pleopis polypltenwides (I.euckart, 1859)	EM 3.8	M 2	+M	E	+	+
P.lergestina (Clans. 18")	E 3.8	Sx	-	E	+	-
Podon intermedins Lilljeborg, 1853	E 3.8	-	-	-	-	-
Pdeuckarli G.O.Sars,l862	E 3.8	S 2	+	-	-	-
Pleuroxus aduneus (Jurine)	-	-	-	-	+	+
P. truncatus (Mueller)	-	-	-	-	+	+
P. uneinalus Baird	-	-	-	-	+	-
P.trigonellus (Mueller)	-	-	-	-	+	-
P.slriatus Schoedler	-	-	-	-	+	
P laevis Sars	-	-	-	-	+	+
Podonevadne trigone! ().(). Sars, I89~	E 3	+	+	I k	+	+
Polyphemus pcdieulus (Linne)	-	-	-	-	+	+
Rhvncholalona fale at a (Sars)	-	-	-	-	+	-
Scapholeheris mneronala 1 Mueller)	-	-	-	-	+	+

S. m. cornuta (Schoedler)	-	-	-	-	-	+
S.m.)'route laevi (Mueller)	-	-	-	-	+	-
S. microcephala Lilljeborg	-	-	-	-	+	-
S.kingi Sars	-	-	-	-	+	-
S.aurita (Fischer)	-	-	-	-	+	-
Sida cristallina (Mueller)	-	-	-	-	+	+
Simocephalus vetulus (Mueller)	-	-	-	-	+	+
S.v.spinosulus Stingelin	-	-	-	-	+	-
S. elizabethae (King)	-	-	-	-	+	-
S. serrulatus (Koch)	-	-	-	-	+	+
S. s. rotundifrons Brehin	-	-	-	-	+	-
S.s.produetifrons Stingelin	-	-	-	-	+	-
S.expinosus (Koch)	-	-	-	-	+	-
S.e.congener Schoedler	-	-	-	-	+	-
Wlassiczia pannonica Daday	-	-	-	-	+	-
Copepoda						
Calanoida						
Acartia clausi (iieshrecht, ISS9	**NEBM 3.7**	**M 2**	**M**	**EB**	+	+
A hi/ilosa Ciieshrechl	-	-	-	-	+	-
Acanthodiaptomus denlicornis (Wierzejskı)	-	-	-	-	+	+
Anomalocerapalersoni Templeton, 183'	**E 3.8.9**	-	-	-	-	-
Arctodiaptomus wierzeisky (Richard)	-	-	-	-	+	-
A saltans (Daday)	-	-	-	-	+	-
Ahacillifer (Koelhel)	-	-	-	-	+	-
Aacutilobatus Sars	-	-	-	-	+	-

A.dudichi valachicus Banarescu, Serban	-	-	-	-	+	-
***A.dentifer** Smirnov*	-	-	-	-	+	-
A.kerkyrensis (Pesta)	-	-	-	-		-
Calanipedu atptae dulcisfkneczagin. IS~3)	I:R 3	S 2	-	ER	+	+
Calanus euxinus (helgolandicus. ponticus) kuruwaev	I-BM 3.8	+	+	EB	-	-
*Centropages ponticus **Karaw.**, 1895*	NEM 3.7.8	Sx 2	+	E	-	-
Diaptomus gracilis Sars. IS62	E 3	S 2	-	-	+	+
D.salinus Daday. 1885	E 3	S 2	-	-	-	-
1). castor Jurine	-	-	-	-	+	-
D.incrassalus Sars	-	-	-	-	+	-
Eudiuptoinus gracilis (Sars)	-	-	-	-	+	+-
E.gractloides Lilljeborg	-	-	-	-	+	+
Ecoeruleus 1Fischer)	-	-	-	-	+	-
F. e. vulgaris tScluneil)	-	-	-	-	+	-
F. vulgaris (Schmeil)	-	-	-	-	+	-
E. intermedins (Steuer)	-	-	-	-	+	-
Eurytemora velox Lilljeborg, 1853	E 3	S 2	-	-	+	+
F.ajjinis (Poppe. 1880)	E 3	+ 2	+	-	+	
Eurytemora lacustris Poppe	-	-	-	-	+	-
E. hirundoides Xordquist	-	-	-	-	+	-
E.grimmi Sars	-	-	-	-	+	-
1 lemidiaptomus umhlyodon tMarenzeller)	-	-	-	-	+	-
1 leterocope casino Sars. 189~	ER 3	+	+	-	+	i
l.abidoeera brunescens Czernjavsky. 1868	NE 3.8.9	-	-	-	-	-
Lovenula alluaudi (de Guerne et Richard)	-	-	-	-	+	

Mixodiaptomus kupehvieseri (Brelnni	-	-	-	-	.	-
Paradiaptomits sp.	-	-	-	-	+	-
Paracalanus parvus (Clans. 1863)	I'M 3.7.8	- 2	+	E	+	+
Paracartia latisetosa (Erie:., 18~3)	E 3.8	-	-	-	-	-
Pontella mediterranea Clans. 1863	NE 3.8.9	Sx	-	E	-	-
Pseudocalanus elongatus (Boeck, I8~2j	EBM 3.8	+ 2	+	EB	+	+
Cyclopoida						
Aeanlhoeyclops vernalis (Fischer. 1853)	-	ES 2	-	-	+	+
A.robustus Sars	-	-	-	-	+	+
A.gigas ((laus)	-	-	-	-	+	-
A.viridis (Jurine)	-	-	-	-	+	+
A.oligolriehus Monehenko	-	-	-	-	+	-
('yelops vieinus (I Ijan., I8~5)	E 3	S 2	-	-	+	+
C si re nuns h'isch., 1851	1 3	S 2	-	-	+	+
('.s.slreinius lFischer)	-	-	-	-	+	+
(';furcifer C 'laus	-	-	-	-	+	-
('iiisignis ('laus	-	-	-	-	+	-
Cvclopina gracilis Claus, 1863	E 3.8	S 2	+	-	-	-
Diacyclops hicuspidatus (Claus)					+	+
D.b.bicuspidatus (Claus)	-	-	-	-	+	-
D. b. odessana (Schmankevitsch)	-	-	-	-	+	-
D.nanus (Sars)	-	-	-	-	+	-
D.bisetosus (Rehber)	-	-	-	-	i	-
D.languidus (Sars)	-	-	-	-	+	-
D. languidoides (Lilljeborg)	-	-	-	-	+	-

1).cohabitants Monchenko	-	-	-	-	+	-
IX crasslcauclls (Sars)	-	-	-	-	+	-
Eucyclops serrulalus (Fischer)	-	-	-	-	+	+
E.s.proximus Lilljeborg	-	-	-	-	+	-
E. macruroides 1 Lilljeborg)	-	-	-	-	+	-
E.m.denticulatus (Graeter)	-	-	-	-	+	-
/•.'. macrurus (Sars)	-	-	-	-	+	-
1. speratus 1 Lilljeborg)	-	-	-	-	+	-
h.uryte loirgicauda Filhilippi. 1843	F. 3	-	-	-	-	-
Ectocyclopsphaleralus (Koch.)	-	-	-	-	+	-
1 lalieyclops magnieeps (Lilljeborg)	-	-	-	-	+	+
ILneglectus Kiejer	-	-	-	-	+	-
ILir neglect us Kiejer	-	-	-	-	+	-
Macrocyclops albidus (Jurine)	-	-	-	-	+	-
MJuscus (Jurine)	-	-	-	-	+	+
\ 1 distinct us I Richard)	-	-	-	-	+	-
Microcyclops hicolor Sars	-	-	-	-	+	-
XL varicans (Sars)	-	-	-	-	+	+
Mv.ruhellus /Lilljeborg)	-	-	-	-	+	-
M.gracills (LiIIjehoi-g)	-	-	-	-	+	-
Xietacyclops minimis (laus	-	-	-	-	+	+
\l.planus Kiurney)	-	-	-	-	+	-
Xlesocyclops leuckarli l('laus)	-	-	-	-	+	+
Oithona minula /Kricz.. IS~3)	Nl-M 3.7.8	. 2	-	-	+	·!·
1) -.omits < lotis 1S63	IBM 3.8	+ 2	+	EB	+	+·

Thermocyclops crassus (Fischer)	-	-	-	-	+	+
'/'.oithonoides (Sars)	-	-	-	-	+	+
T.d\bowskii (kande)	-	-	-	-	+	-
Tropocyclops prasinatus (Jurine)	-	-	-	-	+	-
Paracyclops fimbriatus (Fischer)	-	-	-	-	+	+
P.f.chiltoni (Thomson)	-	-	-	-	+	-
P.poppei (Renberg)	-	-	-	-	+	-
P.affinis (Sars)	-	-	-	-	+	-
Monstrilloida						
Cymhasoma longispinosus (Bourne, IS90)	-	-	-	E	-	-
Monstrilla grandis Giesbr., 1892	E 3.8	-	-	E	-	-
Mhelgolandica Claus, 1863	i: 3.8	-	-	-	-	-
Harpacticoida						
Ameira parvulla (('laus, 1866)	]: 8	-	-	-	+	-
Amphiaseus similis (Claus, 1866)	E 8	-	-	-	-	-
Asellopsis sarmatica Jacubi- siak, 1938	E 8	-	-	-	+	-
Atthevella erassa (Sars)	-	-	-	-	+	-
A.trispinosa (Brady)	-	-	-	-	+	-
Bryocamplus minutus (Claus)	-	-	-	-	+	-
B.pygmaeus (Sars)	-	-	-	-	+	-
B.zschokkei (Schmeil)	-	-	-	-	+	-
('anthocamptus staphylinusfJurine, 1820)	E 3.8	-	-	-	+	-
Canuella perplexa T. et A.Scott, 1893	E 3.8	S	-	-	+	-
Cfurcigera Sars	-	-	-	-	+	-
Cletocamptus retrogressus Schmankewisch, 18~5	E 3.8	-	-	-	-	-

('.conjluens iScluneil. 1894)	Ę 8	-	-	-	+	-
('lelocles lenuipes Scott	-	-	-	-	+	-
Dactylopodia tisboides (Claus. 1863)	ŀ 8	-	-	-	-	-
Diarthrodes minutus (Claus)	-	-	-	-	+	-
Ectinosoma abrau (Kriczagin. 18")	E 8	-	-	-	+	+
E.melauipeus Bocck. 1864		-	-	-	+	-
h'.curticorne Boa к	-	-	-	-	+	-
Elaphoidella gracilis (Sarsi	-	-	-	-	+	-
I'..bidens-coronata (Sars)	-	-	-	-	+	-
E.elaphoides (Chappuis)	-	-	-	-	+	-
Epectophanes richardi Mrazek	-	-	-	-	+	-
Erhydrosona longifurcaluiu Sars	-	-	-	-	t	-
Enhydrosoma gariensis Curacy. 1930	E 5	-	-	-	+	-
E.caeri Raibaut. 1965	E 5	-	-	-	+	-
1 larpaclicus gracilis Claus. 1863	E 3.8	-	-	-	+	-
ll.lilloralis Sars. 1910	E 3	-	-	-	-	-
llunitremis kroyer. 1842	E 3.8	-	-	-	+	-
H.Jlexus Brady et Robertson	-	-	-	-	+	-
1 larpacticella inopinala Sars	-	-	-	-	+	-
llorsiella hrevicornis tDouue. 1904)	E 8	-	-	-	+	-
Harpacticoida sp.sp.G.O. Sars. 1862	E 3	S 2	-	-	-	-
l.aopbonle setosa Boeek. 1864	E 8	-	-	-	-	-
Limnocletodos helming/ Borutzky	-	-	-	-	+	-
Longipediapontica Kriczagin, 18"	-	-	-	E	-	-
Mesochra pygmaea i(laus. 1863)	и 8	-	-	-	-	-

M.aestuarii Gurney, 1921	1, *is*	-	-	-	+	-
M.lillijeborgi Bocck. 1853	E 8	-	-	-	-	-
M.xeiiopoda Monard	-	-	-	-		-
M.armoricanu Monord	-	-	-	-	+	-
Microartridion Idterale (Poppe. 1881)	E 3.8	-	-			
M. fed lax Perkins. 1956	E 5			-	+	-
Metis ignea Pliilippi. 1843	E 8	-	-	-	-	-
M.i.lialmyricola Marcus et Par	-	-	-	-	+	-
Sannopus palustris Brady	-	-	-	-	+	-
Xitocra elongata Marcus. 1968	E 4	S	-	-	-	-
X.lacusIris (Schiiiankeviscli. 18'5)	E 3	-	-		-	-
X liihcrnica (Brady. 1880/	E 8	s	-	-	ı	ı
X.h.incerta (Richard)	-	-	-	-	+	-
X.typica Boeck	-	-	-	-	+•	-
Л lacuslris (Schmankewitsch)	-	-	-	-	+	-
X.l.sinoe Marcus et Por	-	-	-	-	t	-
Xitocrella kossivigi (Xoodll	-	-	-	-	·	-
Onychocamptus inohaiiiiiied Blanchard el Richard.	E 3	-	-	-	+	-
Phyllognathopus paludosus (Mrazek)	-	-	-	-	+•	-
P viguieri (Май/ко:)	-	-	-	-	+	-
Schtzopera neglecta .leal	-	-	-	-	+	-
S.grimalschii Jakuhisiak	-	-	-	-	*r*	-
S.jugurtha (Blanchard el Richard)	-	-	-	-	*y*	-
S.coinpacta hint	-	-	-	-	+	-
S.borutzkyi Montschenko	-	-	-	-	4	-

S.kunzi. [post.196'	i: i	-	-		-	-
S. varnensis . [post.. 196 7	i: i	-	-	-	-	-
Sailc/licl/iim longicauda (I'liilippi. 1840)	E S	-	-	-	-	-
Stenhelta paluslris (Brady)	-	-	-	-	+	-
S.tethvnensls Monard	-	-	-	-	+	-
Tishe lustriana Marcus					+	-
Tisbefurcata (Baird.183') E 3.8 8 2					+	-
T.sp. Lang.	-	-	-	E	-	-
Viguierella paludosa (Mrazek)	-	-	-	-	+	-
Ostracoda						
Ostracoda sp.sp. I.atrcillc. 1816	E 3	S 2	+	-	-	-
Balanus eburneus Gournetts Gould. 1841	E 8	S	-	E	-	-
B.improvisus Darvin	N E 3.S	M 2	+•	E	-	-
I'eiruca spengleri Darwin. 1854	E	S	-	E	-	-
('impcdia Nauplii	i	+	-	-	+	-
Malacostraca						
Decapoda						
Athanas niteseens Leach. 1814	E 8	S	-	E	-	-
Galianassa peslai De-Man. 1929	I S	s	-	E	-	-
('raineon crangon ll.inne. 1 '58)	E 8	s	-	E	-	-
Diogenes piigdalor Hons. 1828	E 8	s	-	E	-	-
llippolyle sp. Leach. 1814	E 8	s	-	E	-	-
I'iluinnus hirtellus tlinnaeus. 1 '58)	i; 8	s	-	|•	-	-
I'isidia lougimana (Risso, 1815)	E 8	s	-	E	-	-
Xanllio poressa lOlivi, 1 ~92)	E 8	s	-	E	-	-

L'pogebiapusilia (Petagna, 1 92)	**I- 8**	**S 2**		E		-
Mysidacea						
Gastrosaccits sanctus (\'an Beneden, 1861)	**E 3.8**	**S**	-	-	-	-
Mesopodopsis slabheri t 1 *an Beneden. 1861)*	**E 3.8**	s	+	-	-	-
Paramisis kroyeri ('zerniavsky, 1882	**E 3.8**	s	-	-	-	-
Cumacea						
Iphinoe maeotica (Sowinskyi, 1893)	**ER3.8**	s	+	-	-	-
Isopoda						
Idolea baltica basleri Audouin. 182~	**E 8**	**S 2**	+	-	-	-
I.ostroumovi Sowinskyi, 1895	**NE 3.9**	**S**	-	-	-	-
Synisoma capita (Railike. I83~)	**E 8**	**S 2**	-	-	-	-
Amphipoda						
Amphipoda sp.	**EB 3**	**S**	+	-	-	-
MOLLUSCA						
Gastropoda (larvae)						
Bit Hum reticulation (Costa. I~99)	E	s	-	E	-	-
llaminoea navicula (Costa. 1"8)	-	-	-	E	-	-
himopontia capitala (Midler, l"3)	-	-	-	i:	-	-
Rissoa splendida Eichwald. 1830	1.	s	-	E	-	-
Tergipes tergipes (Forskal, 1 7~5)	-	-	-	E	-	-
Bivalvia (larvae)						
Borneo Candidas 1..	-	+	-	-	-	-
Bivalvia sp.sp.	**NE 3**	**M 2**	+	-	-	-
('ardium sp.	-	+	-	-	-	-

l'pogebiapusilla (Pelagna, Г92)	E 8	S 2	-	E	-	-
Mysidacea						
Gastrosaccus sanctus (fan beneden. 18611	E 3.8	S	-	-	-	-
Me.sopodopsis slabheri (I an beneden. 1861)	E 3.8	S	+	-	-	-
Paramisis kroveri Czerniavskv. 1882	E 3.8	s	-	-	-	-
Cumacea						
Iphinoe maeotica (Sowinskyi. 1893)	ER 3.8	s	+	-	-	-
Isopoda						
Idolea baltica hasten Audoiiin. 182'	1 8	S 2	+	-	-	-
l.ostroumovi Sowinskyi. 1895	NE 3.9	s	-	-	-	-
Synisonia eapilo (Ratlike. 183')	E 8	S2	-	-	-	-
Amphipoda						
Amphipoda sp.	EB 3	S	+	-	-	-
MOLIUSCA						
Gastropoda (larvae)						
Bittium reticulation K'osta. 1799)	E	S	-	E	-	-
Haminoea navicula (Costa. 1778)	-	-	-	E	-	-
himopoiuia capitata (Mullet: 1"3)	-	-	-	E	-	-
Rissoa splendida Eiehwald. 1830	E	s	-	E	-	-
Tergipes tergipes (Forskal. I"5)	-	-	-	E	-	-
ISi\ alvia (larvae)						
Borneo candidus I..	-	+	-	-	-	-
Bivalvia sp.sp.	NE 3	M 2	+	-	-	-
('ardium sp.	-	+	-	-	-	-

/Ireissena polymorph	-	+	-	-	-	-
Modiolus adrialicus (Lam.)	-	+	-	-	-	-
Mya arenaria (l.J	-	+	-	-	-	-
Mytilus galloprovincialis Lamarck. 1819	NE 3.8	M	+	E		
Mytilaster lineatus (Ginelin	-	+	-	-	-	-
Ostrea edulis (1..I	-	+	-	-	-	-
Teredo navalis 1.	-	+	-	-	-	-
1 *nio sp.*	-	-	-	-	-	-
CHORDATA						
Appendicularia						
Ascidiacca (larvae)						
. tseidiacea Lamarck. 1916	E 3	Sx	-	E	-	-
Oikopleura dioica Lob., IS~2	NEM 3.7.8	M 2	+	E	-	-
CHAETOGNATHA						
Sagitta selosa Midler. 184	[illegible]	+ 2	+ EB		-	
Spadella cephaloptera (IT. Bttsch, 1851)		-	-	-	-	-
ACRANIA						
AmphioMis lanceolalus (Pallas. 1 (!)	E 3	-	-	-	-	-

Note: * - Parchuk G.V. (unpublished)

Legend

NWBS - Northwestern part of the Black Sea
SAL - Sukhoi and Adzhalyk (Grigorievsky) limans
CA - Crimea sea area
1)1) - Danube delta
DE - Dnestr estuary
I) - dominant
M - mass
S - sparse

S\ - disappearing

1 - introduced species, immigrants
R - relict
N - neuston
E - epiplancton
B - bathyplankton
+ - present
- - absent
I-1 I - bibliography

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Table 4. List of Microphytobenthos Species

Species	Sea		Estuaries	
	NWBS	Crimea	Fresh water	Sea
Achnanthes brevipes Agardh, *IS24*	M	\l	-	M
A. delicatula iKuizi Grunow, *1880*	S	-	M	O-M
A. dispar *C/eve. 1891*	s	s	-	-
A. hungarica Grunow, *18'4*	s	-	S-O	-
A. lanceolate! (Breh.) Grunow. *ISSO*	s	-	M	s
A longipes Agardh. *IS32*	M	M	-	M
A. lyreita Pr.-I.avrrenko. *1961*	s	-	-	-
A. manıfera Brim. *1893-1896*	s	s	-	-
A. pinnata Hustedt, *1922*	s	s	-	s
A. pseudogroonleindlca llendey. *1964*	R.S	-	-	-
A. strand Hustedt. *1932*	I.S	-	-	-
*A Irieon**/usa** I'**an l.amlingliain.*** *196"*	I.S	I.S	-	s
Actinoeyeliis ehrenbergii Rolfs. *1861*	0	M	-	s
Actinoptyclins itndiilalns (Bail.) Rolfs. *IS6I*	s	s	-	-
Amphora acuta Gregoiy, *I85~*	s	s	-	-
A. acutiuscula Kutzing, *IS44*	s-o	-	-	0
A. angularis Gregoiy. *IS55*	s	s	-	-
A. aspera Petit, *18"*	s	s	-	-
A. higibba Grunow, *18~1*	s	s	-	-
A. caroliniana Gıffen, *1980*	S-( )	s-o	-	s

A. chadjibeiensis Gusljakow, 1992	S	-	s	s
A. cqffeaeformis (Ag.) Kutzing, 1844	M	s-o	-	s-o
A. commutata Grunow, 1880-1885	S	s	-	S-()
A costata IV. Smith, 1853-1856	s	s	-	-
A. castellata Gıffen, 1963	s	-	-	s-o
A. a asset Gregory, I85~	s-o	0	-	-
A. cuneata Clew, 1876	I.S	I.S	-	-
A. delicatissimu Krasske. 1930	s	s	-	s
Amphora c/uhia Gregory. 185'	s	s	-	-
A. exigua Gregory. 185"	s-o	s-o	-	s
A. eunotia Cleve, I8~3	0	0	-	-
A. genkalii Gusljakow, 198"	R.S	-	-	-
A graejjii (Grun.) Cleve. 1894-1895	s	s	-	-
A. hyalina var hyalina Kutzing. 1S44	s-o	O-M	-	s-o
-var. delieatula I'r. kavrenko. 1963	s-o	0	-	s
A. ineonspieua I'r.-l.avrenko. 1963				
A. karajevae Gusljakow, 198"	s	s	-	-
A. laevis Gregory. 185"	s	s-o	-	s
A. libyea Ehrenberg, 1854	s	s	-	s
A. lineolata Ehrenberg. 1834	s	s	-	s
A. lydiae Gusljakow, I9S~	s	-	-	s
A. macilenla Gregory, 185"	s	s	-	-
-var. maeojica I'r - kavrenko. /963	s	s	-	s
A. makarovae Gusljakow, 198"	s	s	-	s
A. obtusa Gregory 1856-185"	s	0	-	s

A. ocellata Dokin 1861	S	s	-	s
A. ostrearia Brebisson, 1849	S-O	s-o	-	s
-var. vitrea Cleve. 1868	s-o	s-o	-	s
A. oralis Kutzing. 1844	s	s	s-o	s
. i parvula Pr. Lavrenko, 1963	-	s	-	-
A pediculus iKulzj Grunow. 18~5	o	-	s-o	s
A. pogrebn/akovii Gusljakow. 1992	s	-	s	s
A pontica Gusljakow. 1992	s	-	-	s
A. proschkiniana Gusljakow. 1992	s	-	-	s
A. proteus Gregory. I85~	*o*	0	-	s
A. robusta Gregory. I85~	s	s	-	s
A. suhacutiseula Sehoeman. 19'2	I.S	-	-	I.S
A suhangularis Hustedt. 1955	I.S	-	-	I.S
A. sublaevis Hustedt, 1955	I.S	-	-	I.S
A. tenuissima Hustedt, 1955	I.S	-	-	I.S
A. terror is l.ltrenherg. 1853	s	s	-	s
A. topaschevskii Gusljakow, 1992	s	-	-	s
A. llunnensis **1** *Mover) . 1. ('leve- latter. /932*	s	-	s-o	s
A. truncata (Greg.) Cleve, 1894-1895	s	s	-	-
Anaulus minimis Grunow. 1880-1885	s	-	-	-
Anorlltoneis e.xcentrica (l)onkin) Grunow. 186"	I.S	I.S	-	I.S
A. Itummii Hustedt. 1955	I.S	-	-	-
Ardissonia huculus (Greg.) Grunow. 1880	s	s	-	-
A crystolina l.lg.) Grunow. 1880	s-o	s-o	-	-
Asterionella formosa 11 assail 1850	s	-	s-o	S-O

Aulacosiragranulata (Ehr.) Simonsen. 19~9	S-O	-	-	-
Auliscus sculptus (W. Sm.) Ralfs. IH61	S	s	-	-
. \uricula insccta (Grim.) Cle- ve. 1894-/895	S	s	-	-
A.intermedia (Lewis) Cleve. 1894-1895	S	s	-	-
Hacillaria paradoxa (dentin, I "88	S-O	s-o	-	-
H. socialis (Greg.) Grunow, 1891-1894	s	-	-	s
liacleiiastrum liyalinmm Lauder. 1864	o	o	-	-
Berkeleya inicans (Lyngb.) Grunow. 1868	o	M	-	-
H. rulilans (Trenlep.) Grunow. 188(1	M	O-M	-	-
И (Xavicula) seopulorumlHreh. et Kutz) Cox. 1982	o	M	-	-
Biddulpliia aurita (Lyngb.) Rrebisson et Godey, 1839	-	s	-	-
-var. obtusa (Kutz.) Hustedt. 192"-193'	-	s	-	-
li. rostrata Hustedt. 192"-193"	-	s	-	-
-var. alala I'r.-Lav- renko. 1961	s	-	-	-
li subaequa (Kutz.) Ralfs. 1861	s	-	-	-
Rrehissonia hoeekii tEhr) Grunow. I860	s	s	-	s
Caloneis amphishaena (Horyi Cleve. 1894	s-o	s	s	s-o
C densestriata (Pr.-Lavr.) Gusljakow, 1992	s	s	-	-
C formosa (Greg.) Cleve var. densestriata I'r.-l.avrenko	-	s	-	-
C oregoniea (Ehr.l Petriek. 1966	s	-	-	-
C liber (W. Sm.) Cleve. 1894-1895	s-o	o	-	-
C probabilis (A. Sm.) Cleve. 1894	s	s	-	-
C subsalina (l)onk.) Ilendcy. 1951	o	s	-	s-o
('ampilodiscus daemelianus Grunow, I8~4	s	s	-	-
C decor us Hrehisson. 1854	s	s	-	-

r

(' echeneis Ehrenberg. 1840	S	s	-	s
C. eximius Gregory, 185"	-	I.S	-	-
C. impressus Grunow, IH"	-	I.S	-	-
C. ralfsii W. Smith, 1853-1856	-	S	-	-
C. thuretii Brebisson, 1854	S-O	o	-	-
-var. lineolatus Pr.- l.avrcnko. 1955	s	S	-	s
Chaetoceros simplex Ostenjeld, 1901	s-o	s	-	s
C subsecundus (Grun.) Hustedt. 192"-193'	S-O	s-o	-	s
Climaconeis (Amphora) injlexa (Breb.et Kutz.) Cox. 1982	s-o	s	-	s
C. scopulorioicles (llust.) Cox, 1982	s	-	-	-
Climacosphenia moniligera Ehrenberg, 1841	I.S	-	-	-
Coeconeis costata Gregory, 1855	o-s	o-s	-	o-s
Cdirupta Gregoiy. 185'	I.S	-	-	-
-var. Jlexella (Jan et Rahh.) Gronow. 1880-1885	I.S	-	-	-
C disculus (Schum.) Cleve. 1895	s	s	-	-
C distans Gregory, 185"	s	s	-	s
C. engelhrechtii Cholnoky 1955	I.S	-	-	-
C kujalnizkensis Gusljakow el Gerasimuk, 1992	M	-	-	s
C maxima (Grun.) Peragallo. 189'	s	s	-	-
C molesla Kutzing. 1844	s	M-O	-	-
-var. crucijera Grunow. 18~4	-	s	-	-
C. nolata Pel it, 18"	s	M-O	-	-
C cptarnerensis Grunow, 18~4	s	s	-	-
('. pediculus Ehrenberg. 1838	M-O	s	-	M
C pellucida Grunow: 1862	-	s	-	-

C. placentula Ehrenberg, 1838	O	s	-	o
-var. englypla Grunow. 1884	M	o-s	-	o-s
-var. lineal (Ehr.) Cleve. 1894-1895	s	-	-	o
-var intermedia (llerih. el I'erag.) Cleve 1894-1895	s	s	-	s
C plaeenluloides Gusljakow. 1992	s	-	-	s
C. pseudodebesii Pr.-Lavrenko, 1963	-	s	-	-
C pseudoniorginato Gregory. 185"	s	s	-	-
C quarnerensis Grunow. I8~4	-	s	-	-
C seulellum Ehrenberg, 1838	M	M	-	M
C stauroneiformis (I'll.) Okuuo, 1952	s-o	s-o	-	-
Coscinodiscus grand Cough. 1905	s	s	-	s
C janischii A.Schmidt. 18'4-193~	s	s	-	s
C jonesianus (Grew) Osten/eld. 1915	s	s	-	-
C nitidis Gregoiy. 185~	-	s	-	-
('. radialus Ehrenberg. 1839	R.S-O	R.S-O	-	s
Cvelotella easpia Grunow. IS'S	s-o	-	-	s-o
C kutzingiana Thwaites, 1848	s-o	s	-	s-o
C meneghiniana Kutzing. 1844	s-o	S-O	-	s
C. operculata (Ag.l Kutzing. 1833	s	-	s	o
('. striata Grunow. 1880	s	-	o	s
Cymatopleura elliptica (Breb.J IV. Smith. 1851	s	-	o	s
C librile (Ehr.) Pantoczek, 1902	s	-	o	s
Cymbella angusta (Greg.) Gusljakow, 1992	s-o	s	-	s
-var. kujalnitzkensis Gusljakow et Gerasimuk, /992	o	-	-	s-o
C areas (Greg.) Gusljakow, 1992	o	o-s		

C. fistula (Пemp.) Kircher, 18~8	S-O	-	s-o	s
C. cymbelloides (Greg.) Gusljakow. 1992	s	s	s	s
C. cymbıformis Agardh. 1830	-	-	s	-
C. helvetica Kutzing, 1844	s	-	s	-
C. lanceolala (Ehr.) Van Heurek, 1880-1885	-	-	S-O	-
C. odessana Gusljakow, 1992	s-o	s	-	s
C. prostrate! tllerk.) Brun, 1880	-	-	s-o	-
C. pusilla Grunow. 18~s	-	s	-	-
C tumida (Breb.) Van Heurek. 1880-1885	-	-	s-o	-
C.turgida (Greg) Cleve. 1894-1895	-	-	S-O	-
Dieiloma elongation (Lyngb.) Agardh. 1824	s-o	s	0	-
D. vulgare Bory. 1828	o	s	s	s
-vai\ linearis Bore, 1828	s-o	s	s-o	s
-var. breve Grunow,1862	s	s	s-o	s
1). hiemalefhyngb.) lleiberg, 1863	-	s	-	-
Dimeregrammajulvum (Greg.) Ralfs, 1861	-	s	-	-
1). minor (Greg.) Ralfs, 1861	s	s-o	-	-
Diploneis bombus Ehrenberg, 1844	s	s	-	-
1). chersonensis (Grun.) Cleve. 1894-1895	s	R.S-O	-	-
D. crabro Ehr. var. crabro Ehrenberg, 1854	s-o	s	-	-
D. didyma Ehrenberg, 1854	s-o	s	-	-
D.fusea (Greg.) Cleve, 1894-1895	s-o	-	-	-
1). gemmata (Grev.) var. pristiophora (Jan.) Cleve, 1894-1895	-	s	-	-
D. litoralis (Donk.) Cleve, 1894	s	-	-	-
D. notahilis (Grev.) Cleve, 1894-1895	s	s	-	-

-var. nolabilis Cleve. 1894-1895	-	s	-	-
-var. tenera I'r.-I.avrenko. 1963	s	s	-	-
1). oblongella (Xaegeli el kutz) Cleve-Etiler. 1922	s	-	-	-
I), oculata tlireh.) Cleve. 1894	s	s	-	-
IXpapula (.I.S.I ('leve var. papula ('leve. 1894-1895	-	s	-	-
1). smithii (I3reb.) Cleve. 1894-1895 var. smithii	S-O	s	-	-
-var. punulla (Grun.) Hustedt. 192"-193"	s-o	s	-	-
IX. splendida (Greg.) Cleve. 1894-1895	-	s	-	s
IXsubadvena Hustedt. 192"-193"	I.S	I.S	-	-
1). vaeillans t.l.S) Cleve. 1894-1895	-	s	-	-
Entomoneis (Amphiprora) alala (Ehr) Ehrenberg. 1845	s-o	s	-	s
E. palttdasa (II'. Sin.) I'atriekel Reuner. 19 5	s	s	-	s
-var. duplex Grunow, 1880	s-o	s	-	s
Epithemia sorex kutzing. 1844	s	-	-	s
/;. turgida (Ehr.) kutzing. 1844	s	-	s	s
1' construerii (Ehr i Grunow. 1862	s	-	-	-
Gomphoneina acuminatum Ehrenberg. 1836	s-o	-	o	s
-var tttrris (Ehr.) Cleve. 1894				
G constriction Erenherg. 1830				
-var capitation, Grunow. 1880				
G. domnieiae Gusljakow. 1981	o-s	s	o	s
G. olivaceum (Lyngb.) kutzing. 1833-1836	s	-	o	s
C parvuliim kutzing. 1849	s	-	M	s
Grammatophora marina (Lvngb.l kutzing. 1844	o	M	-	-
G. serpentina (Ralfs) Ehrenberg. IH44		M-O	-	o

Gyrosigma altenuslum ı Kutz. > Kilheilhorst. /894-1X95	S	s	-	-
G. balticum (Ehr.) Rabenhorst. 1853	O	s	-	s
G eximium (Phw.) Rover. 192"	S-O	s	-	o
G fasciola (Ehr.) Griffdth et Henfrey. 1856	s-o	s	-	s
G prolongation (W.Sm.) Griffith et Henfrey. 1856	s	s	-	-
G spenceri (W.Sm.) Griffith el Henfrey. 1856	o	S-O	-	-
llaslea subagnita (Pr.-Lavr.) Makarova el Karajeva. 19~3	o	o	-	s
Hantzschia crassa Pentocsek. 19(12	s	s	-	o
-var. oblusa Wislonch et Poretzkv. 1924	s	s	-	o
11. virgata (Roper) Grunow. 188(1	s-o	s	-	o
llaslea (Xavictila) suhangilalPr.-Lavr.) Karajeva	-	s	-	-
Hyaloiliseus amhiquus Grunow. 1889-1895	-	s	-	-
II solicits (Kutz.) Grunow. I8~9	s	s	-	s
Lyre/la ahrupla (l)onk.) Gusljakow et Karajeva. 1992	s	s	-	-
L. dissipala (llust.) Gusljakow et Karajeva. /992	I.S	I.S	-	-
L. forcipaia (Grev.) Gusljakow et Karajeva. 1992	s	s-o	-	s-o
/.. hennedyi (W.Sm.) Gusljakow et Karajeva, 1992	s	o-s	-	-
L. inatiingens (Simon- sen) Gusljakow el Karaeva. 1992	S.I	-	-	-
h. bra (Ehr.) Karajeva. 1983	s	0	-	s
-var. allanliea (A.S.) Gusljakoq et Karajeva. 1992	s	o	-	-
-var. elliplica (A.S.) Gusljakow et Karajeva. 1992	s	o	-	-
h pvgmaeu (Kutz.) Makarova et Karajeva. 19S"	o	s	-	o
I. rudıformis (Hust.) Gusljakow el Karajeva, 1992	I.S	I.S	-	-
L. suhforciputa Illust. I Gusljakow el Karajeva. 1992	S.I	S.I	-	-
l.tcmaphora ahbreviata Agard, 1831	o	O-M	-	-

/,. communis tlleih.i Grunow, 1881	M-O	()-S	-	-
1. ctalmatico (Kutz.) Grunow. 186~	O-S	0	-	-
1. ehrenhergii (Kutz.) Grunow. 186"	()-S	M	-	-
L. gracilis (Kutz.) Grunow. 186"	M	M	-	s-o
l.grandis (Kutz.) Grunow. 1880-1885	s	s-o	-	-
1.. hastata Mereschkowsky, 1901	s-o	S-O	-	-
1.. ovulum Mereschkowsky. 1902	s	s	-	-
L. parailoxa Agard. 1836	s	o-s	-	-
-var. parailoxa	-	s	-	-
Mastogloia angulala Lewis. 1861	s	s-o	-	-
Mapieulata W. Smith. 1853-1856	-	s	-	-
M. hahljikiana Grunow. 18~4 1958	s	s	-	-
XI. binotata (Grun) Cleve.. 1894-1895	s	s-o	-	s
M. braunii Grunow, 1863	s	s	-	s
M. erueicula (Grun.) Cleve. 1895	s-o	0	-	s
M. ervthraea Grunow. 1860	s	s	-	-
-var. biocellala Grunow. 18"	s	s	-	-
M. ignorata Hustedt, 192'-193"	-	s	-	-
XL lahuensis Cleve. 18~4-1959	s	s	-	-
M. lanceolala (Ago Kutzing. 1844	s	s	-	-
M. ovulum Hustedt. 1933	s	s-o	-	s
\1. parailoxa Grunow. I8~8	s-o	s-o	-	-
-var. tenera I'r - kavrenko. 1963	-	s	-	-
XI. pumilla (Grun.) Cleve. 1894-1895				
M pusilla Grunow, lfS~8	s-o	o	-	-

-var. subrhombica Pr.-Lavrenko, 1963	S	s	-	s
M. smithii Phwaites. 1853-1X56	s	s	-	s
M tenera Hustedt. 1933	s	s	-	-
Melosira monilıformis (O.Mull.) Agardh. 1824	M	|	-	o
-var octogona (Grun.). Hustedt.192'	s	s	-	s
-varsubglobosa (Grun.). Hustedt. I92~	M	o	-	s
Xarieula agnita Hustedt. 1955	s	-	-	s
X. eaneellata Donkln, I8"l-I8'2	s	-	-	s
X. capitata Ehrenberg, 1838	s	-	-	-
X. eineta (Ehr.) Ralfs. 1861	s	s	-	-
X. eryptoeephala Kutzing. 1844	M	o	-	M
\ erueigera ill' Sm i < leve 1X94-1X95	s	s	-	-
X. cuspidata Kutzing, 1844	s	s	-	-
X. digito-radiala (Greg.) Ralfs. 1861	s	o	-	s
-var.eyprinus (Ehr.) It'. Smidth. 1853-1X56	-	s	-	-
X. directa W. Smith. 1853-1856	o	o	-	s
X. distans (IV.Sm.) Ralfs. 1842-1949	s	-	-	-
X. gomphonematoides Gusljakow, 1992	o	-	-	o
X. gothlandiea Grunow. 1880-1885	s	s	-	-
X. glabriuscula Hustedt. 1X33	-	-	-	s
-var. ellipsoidalis Pr.-Lavrenko, 1963	s	s	-	-
X. grevilleana. 1lender. 1964				
-rar. pararhomhiea (Pr.-Lavr), Gusljakow, et Gerasimuk. 1992				
-var. remotiva (Pr.-I.avi-.) Gusljakow et Gerasimuk, 1992	s	s	-	-
X. halophila iGrun.) Cleve, 1894	s	-	s	s

-var. convergens Pr.-Lavrenko, 1963	S	-	-	-
X. hamidifera Онтом; 1880	-	s	-	-
-var. plicata Pr.-Lavrenko. 1963	S	s	-	-
\. humerosa Brebisson, 1853-1856	s	-	-	s
X. meniscnlux Schumann. 186~	s	s	-	s
X mutica kutzing, 1844	s-o	-	s	o
X. ostrearia Turpin. 1824	-	s	-	-
X palpchralis Brebisson, 1853-1856	s	s	-	s
-var. scmiplena (Greg.) Cleve. /894-1895	s-o	s	-	o
X pennala var. politico Meresclikovsky. /902	M	o	-	-
X. peregrina (Ehr.) kutzing. 1844	O-M	s	o	s
X. Pi Cleve. 1893-1896	s	s	-	-
X. racliosa kutzing. 1844	s	s	-	s
X. ramosissima (Ag.) Cleve. /894-/895	M	M	-	M
X. reinhanltii (Grun.) Cleve. 1894-1895	s	-	-	s
X. rhynchocephala kutzing. 1844	s	-	s	-
X. rostellala kutzing. 1844	s	-	-	-
X. rombica Gregory, 1885	s	s	-	-
X. salinarum Grunow. 1880	M	o-s	s	o
X. septata Pr.-Lavrenko. 1963	s	-	-	-
X. speetahilis Gregory, 185~	-	s	-	-
X. spicttla (llickeh) Cleve. 1891	M-O	-	O-M	s
V. *sithrosiellala llusleclt. 1955*	S.I	S.I	-	s
X versicolor (Grun.) Cleve. 1894-1895	s	s	-	s
Xeossynedra delicatissimatPr.-liter.I (iusljakow, 1992	M-O	s	-	s

Sitzschia acuminata (W.Sm.) Grunow, ISSO	O-S	o-s	-	()
X. amphibia Grunow. IS62	0	s	-	M-S
X annularis W. Smith. IS53-IS54	s	s	-	S
X. angustata (W. Sm.) Grunow. 1980	s	-	-	-
X. apiculata (Grag.) Grunow. ISSO	o-s	s	-	-
X. (Cylindroiheca)elosleriurn (Ehr.) W.Smith 1855-1856	-	s	-	-
X. communis Rcdienh, IS48-IS60	s	-	-	0
-var. ahhrcviata Grunow. ISSO	0	s	-	0
X. commutata Grunow, ISSO	s	-	-	-
X. constricta (Greg.) Grunow, 1880	s	s	-	s
X circumsula (Hail) Grunow. 1880	s-o	s	-	s
\ *delicatissima Cleve. 189'*	0	()	-	O-S
V. *dissipata (Kutz.) Grunow. 1882*	s	s	-	s
X. distans Gregory, 185'	s	-	-	-
X. frustulum (Kutz.) Grunow. ISSO	s	-	-	-
-var suhsulina Hustedt. 1930	s	-	-	-
X. hungarica Grunow. 1862				
X. hybrida Grunow. 1980	M	0	-	s
X. intermedia Hantzsch, ISSO	s	-	-	-
X kutzingiana Hilse, 1860	0	s	-	0
X. lanceolata W. Smith, 1853-1856	0	s	-	-
-var.minima 1'. Heurek. 1880-1885	-	s	-	-
-var. minor Γ. *Heurek. 1880-1885*	-	s	-	-
X. levidensis (W. Sm.) Grunow. 1880-1883	s	s	-	s
X lorenziana Grunow. ISSO	s	-	-	-

JI' *longissima (Breb.) Ralfs 1842-/849*	O-S	-	-	-
N. marginulata Grunow, 1880	s	-	-	-
N. microcephala Grunow, 1880	o-s	s	-	-
N. navlcularis (Breb.) Grunow, 1880				
N. obtusa W. Smith, 1853-1856	s	s	-	-
-var. scalpeliformis Grunow, 1880	s	s	s-o	s
N. ovalis Arnott, 1880	o	-	-	-
N. panduriformis Gregory, 185"				
N. punctata (W.Sm.) Grunow, 1880	s	0	-	s
-var. coartat Grunow, 1880	s	0	-	-
-var. minutissima l'oret- zky, 1940	s	s	-	-
-var. punctata Grunow, 1880	-	s	-	-
N. reversa W. Smith. 1853-/856	s-o	s	-	M-S
V. *rupestris Pr.-Lavrenko, /963*	M-O	-	-	s-o
N. sigma W. Smith, 1853	s-o	s	-	s
N. sigmatöformis Hustedt, 1955	s	s	-	s
N. tenuirostris Mere, 1902	s	s	-	-
N trvhlionella Hantzsch, 1864	s-o	-	-	s
-var.debilis (Am.) Grunow. 1880	0	-	-	s
N. vidovichii (Grun.) Peraga- do. 189"-1908	-	s	-	-
N. vitrea Normann, 1861	-	s	-	-
Opephora marina (Greg.) Petit, 1881	s-o	s	-	-
O. martyi Heriboud, /902	o	s	-	o
Para/ia sulcata (Ehr.) Cleve, I8~3	0	s-o	-	s
Pinnularia ambigua Cleve, 1894-1895	s	s		-

P. interrupta W.Sm. var. crassior Grunow, 1891	S-O	s	-	-
P. quadralarea (A.S.) Cleve. 1894-1895	S	-	-	-
Plagiotropis elegans (W.Sm.) Reimer. 1966	S	s	-	-
P. lepidoptera (Greg.) Reimer. 1966	s	s	-	-
Pleurosigma angulation (Queek.) W. Smith. 1853-1856	s	s	-	-
P. elongation W Smith. 1852	S-O	s	-	-
P. formosum W. Smith, 1852	s-o	s	-	-
P. rigidum W Smith. 1853- 1856	s	s	-	-
P. lewis Smith. 1853-1856		s-o	-	o-s
Pleroncola hyalina (Kutz.) Gusljakow. 1992	M	M-O	-	M
Psammodiscus nitidus (Greg.) Rondel Maun. 19~8	0	o	-	s-o
Rhabdonema adrialieum Kutzing, 1844	s	M	-	-
R. arcuatum (Lyngb.) Kutzing, 1844	S.1	S.I	-	-
Rhoicosphenia eurvala (Kutz.) Grunow, 1867	M	s	-	-
R marina (W.Sm.) M Schmidt IS'4-1958	-	s	-	-
Rhopalodia gibba (Ehr.) (). Midler, 189"	s	s	-	-
R gihherula (Ehr.) O.Midler. 189"	o	s	-	-
R. muscidus (Kutz.) 0. Midler. 1899	o	s	-	-
Sceletonema costatum (Grev.) Cleve. IS"8	м	M-O	-	M-O
Stauroneis anceps Ehreherg. 1841	s	-	s	-
S. constrieta (Ehr.) Cleve. 1894-1895	O-M	-	-	o
S. phoenicenteron Ehrenberg. 1841	s	-	-	s-o
S. salina W. Smith. 1853- 1856	S-O	s	-	-
S. wislouchii Poretzsky et Anissimova, 1933	-	-	0	-
Staurosirellapinnata (Ehr.) Williams et Rouna. 198"	s	s	0	s-o

Stephanidiscus hantzschii Ehrenberg, 1844	S-O	s	-	s-o
Striatella delicatula (Kutz.) Grunow. 1880-1885	s-o	M	-	0
S. interrupta (Ehr.) Ileiberg. 1863	S	s-o	-	-
S. unipunctata (Lyngb.) Agard, 1832	S	s	-	s
Surirella fasluosa Ehrenberg, 1893				
8 gemma Ehrenberg. 1839	-	s	-	-
S. oralis Brebisson. 1844	O-S	s	-	s
S. ovata Kutzing, 1844	0	s	-	s
-гаг. pinnaia (II'.Sm.) Hustedt. 1930	o-s	-	-	-
-var. salina (IV.Sm.) Hustedt. 1930	0	-	-	s
S. pandttra I'eragallo, 189"-1908	s	s	-	-
S slrialula Turpin, 1828	s	-	-	-
S. subtil is Pr.-Lavrenko, 1963	s	s	-	-
Synedra fascicttlata (Ag.) Kutzing.				
S. gaillonii (Bory) Ehrenberg, 1830				
S. pulehella (Ralfs) Kutzing				
S. ulna (Sitzseh.) Ehrenberg. 1838				
Thalassionema nitzschioides Grunow, 1880-1885	s-o	s	-	-
Thalassiosira baltica (Grun.) Oslenfeld. 1901	s-o	s	-	-
T. ineerta Makarova, 1961	s	s	-	-
T. parva Pr.-Lavrenko, 1955	o	s	-	-
Toxarium undulatum Bailer, 1853	0	0	-	-
Trachyneis aspera (Ehr.) Cleve. 1894-1895	0	0	-	-
1'riceralium antediluvianum(Ehr.) Grunow, 18~0	s	s	-	-

Legend:

M - mass species
S - sparse
1 - introduced
E - endemic
O - often
S-O - sparse-often

Table 5. Floristic Composition of Higher Algae of the Northwestern Part of the Black Sea

	Number of Species					
	Odessa Bay*	Coastal Areas from the Danube to Dnepr	Egorlitsky Tendrovsky Dzhagarylgashsky Bay	Karkinitsky Bay	Total in Northwestern Black Sea	In Black Sea (Kalugina, 1979)
Cloropyta	35 / 48.5	36/43.0	29 / 27.1	34 / 25.1	51	85
Charophyta	-	-	8/7.5	8 / 5.8	8	-
Phaeophy ta	11 / 15.3	16/ 19.0	26 / 24.3	35 /26.1	38	77
Rhodophy a	26/36.1	32 / 38.0	44/41.1	57/42.6	71	142
Total amount of species	**72**	**84**	**107**	**134**	**168**	**304**

Data for last 15 years, from 1965 to 1991- 1995 species unknown.

Table 6. Changes in the volume of phytosaprobes in the coastal waters near Odessa (1965-1991).

	Number of species	%	Number of species	%	Number of species	%	Total number of	
	1965		1978		1991 1992		known species	%
Poly saprobes	12	20	12	24	13	35	16	19
Mesosaprobes	31	50	28	56	20	54	44	52
Oligosaprobes	18	30	10	20	4	1 1	25	29
Total amount of species	**61**	**71.8**	**50**	**58.8**	**37**	**43.5**	**85**	**100**

* In comparison to 1965 only 60.7% species have been registered in 1991.

Table 7. List of Macrophytobenthos Species

Species	Till 1975	Contemporary State Areas			
		NWBS*	Crimea	Water Bodies	
				Marine	Brackish
CHLOROPHYTA					
Prasinoeladus nuiriiuis (Cienk.) It'aern.. 1952	-	-	R	-	-
Ulothrixflacca (Dillw.J Thw: 1863	R	R	R	R	-
I '.tenuissima Kutz., 1833	R	R	-	R	R
C.Pseudoflaeea With. 1901	At	At	-	At	Al
IJ.implexa (Kutz.) Kutz.. 1849	At	At	R	Al	At
U.tenerrima (Kutz.) Kutz.. 1843	R	R	R	R	R
Pilintci rimosa Kutz.. 1843	-	-	R	-	-
(haetophorapiriformis (Roth.) Ag., 1812	-	-	R	-	-
I Ivella lens (Crouan) Crouan. 1859	R	R	R	-	-
Pseudulvi 11 a nadsonii Rochl., 1932	-	-	R	-	-
Pringsheimiella scutata (Reinke) Marschew, 1924	R	R	At	R	R
Holhoeoleon pili/erum Pringsh.. 1862	R	-	R	R	-
Phaeophila dendroides (Crouan) Hall., 1902	R	R	R	R	-
Ph.engleri Reinke., 1889	-	-	R	-	-
Eetoehaete leptoehaete (Hither.) Wide.. 1909	-	-	R	-	-
E.wittroekii (Utile) Kyi in. /938	-	-	R	-	-
Entocladia viridis Reinke. I8~9	At	At	At	At	R
E.perjoranee (Hither) Levi:. 193~	-	-	R	-	-

Epicladia pontica Rochl., 1939	-	-	R	-	-
Monostroma oxyspermam (Kutz.) Doty., 194"	-	R	-	-	-
M.fuscum (Post, et Rupr) Il'iltr., 1866	R	R	-	R	-
Capsosiphon fulvescens (Ap.i Setch. et Gardn., 1920	-	-	R	-	-
Blidingia minima (\ag.) Kylin., 194"	-	-	R	-	-
Percursariapercursa (.lg.) Bory.. 1828	R	R	-	R	-
Enteromorpha prolıfera (O.Mull) J.Ag.. 1882	R	At	R	Al	-
E.Ahlneriana (Bliding)., 1933	R	At	R	JII	-
E.fle.xuosa (IVulf) J.Ag., 1882-1883	At	At	At	At	-
E.clathrata (Roth.) Grew. 1830	At	At	Al	At	At
E.crinita (Roth.) J.Ag., 1882	-	-	R	-	-
E./inza (E.)J.Ag.. 1882-1883	1.	1.	1	At	-
E.compressa (E.) Grev., 1830	At	I.	L	I,	L.
E. intestinal is (E.) Link, 1820	I.	L	L	1.	I.
E.maeotica Pr.-Lavr., 1945	R	R	R	R	-
1 Iva rigida Ag.. 1822	At	R	I.	At	-
Chlorocystis reinhardii (Gardn) A.1.in.. 1885	-	-	R	-	-
Gomontia polyrrhiza (Lagerh.) Born, el Flah., 1888	At	R	R	-	-
Chaetomorpha crassa (Ag.) Knlz., 1845	-	-	R	-	-
Ch.aerea (Dillw) Knlz., 1849	I.	At	At	Al	-
Ch.llnmim (Mont.) Kutz., 1845	Al	At	At	At	-
('h.chlorotica (Mont.) kutz.. 1849	At	At	At	At	At
Ch.capillaris (Ktttz.)Borg., 1925	-	-	R	-	-
Ch.gracilis Kutz., 1845	-	-	R	-	-
Ch.zernovii Worbnich., 1925	R	R	-		

Rhizoclonium riparium (Roth.) Ham., 1849	-	-	R	-	-
Rh.tortttosum (Dillw.) Kutz., 1845	-	-	R	-	-
Rh.implexum (Dillw.) Kutz.. 1845	At	At	R	At	At
' Rh.lueroglyphicum (A.) Kutz.. 1845	At	R	R	-	-
Stigeoclonium temte Kutz.. 1843	R	R	-	R	R
Cladophora coelothrix Kutz.. 1843	-	-	R	-	-
('.echinus (Bias.) Kutz.. 1849	-	-	R	-	-
C.sericea (lluds.) Kutz.. 1843	Al	At	R	At	JII
C.albida (lluds.) Kutz., 1849	At	At	At	At	-
C.liniformis Kutz.. 1849	-	-	R	-	-
C.laetevirens (Dillw.) Kutz.. 1843	At	At	-	At	-
C.vadorum (Aresch.) Kutz.. 1849	-	-	R	-	-
C.vagahunda (I..) Hock.. 1963	1	1.	I	1.	-
C.dolmatica Kutz.. 1843	-	-	I.	-	-
C.siwaschensis ('.Meyer.. 1922	-	-	-	Al	-
(gloiuerato (I. t Kutz . 1X43	-	-	-	R	1.
C.ciystaltina (Roth.) Kutz.. 1843	-	-	At	-	-
Urosporapenicilliformis (Roth.) Aresch.. 1866	At	I,	At	At	At
Acrosiphonia centralis (Lyngb.) (Kjellm., 1893	R	R	R	-	-
Spongomorpha lanosa (Roth) Kutz., 1845	R	R	-	R	-
Cladophoropsis membranacea (Ag.) Borg., 1905	-	-	R	-	-
Siphonocladus pusillus (Kutz.) Поиск., 1885	-	-	R	-	-
Bryopsisplumosa (lluds.) Ag., 1822	AI	L	I.		-
B.adrialica (J.Ag.) Menegh., 1856	-	-	R	-	-
B.halbisiana Lamour.. 1813	-	-	R	-	-

B.hypnoides Lamour., 1809	At	R	At	Al	-
B. corymbosa J. Ag., 1842	-	-	R	-	-
Derbesia lamourouxii (G.Ag.) Sol., 184~	-	-	R	-	-
Codiam vermdara (Olivı) Delle Chiaje, 1829	-	-	At	-	-
Ostreobium queckettH Born, et blah., 1889	R	-	R	-	-
\ 'aucheria litorea Llofm- Bang et Ag., 1823	R	R	-	R	-
PHAEOPHYTA					
Pylaiella littoral is **(I..)** *Kjellm.. 18"2*	At	R	R	R	-
Ectocarpus arahicus h'ig. et De Sot., 1851	At	R	Al	R	-
E.confervoides (Roth.) he .lolls, 1863	At	At	At	At	R
E.penicillatus (Ag.) Kjellm.. 1890	-	-	R	-	-
E.fasciculatus, 1841	R	R	At	R	-
E.dasycarpus Knck, 1891	-	-	R	-	-
E.siliculosus (Dillw.) Lyngb, 1819	At	R	At	R	-
E.hiemalis Crouan, 1852	At	R	R	R	-
h'eldmannia leheli (Aresch.) Ilameh, 1939	-	-	R	-	-
F.irregularis (Kutz.) Hamel, 1939	-	-	At	-	-
F.paradoxa (Mont.) Hamel. 1939	-	-	R	-	-
Entonema oligosporum (Stromf) Kylin.. 194"	-	-	R	-	-
E.parasiticum (Sauv.) Hamel. 1939	R	R	R	-	-
E.effusion (Kylin) Kylin. 194"	-	-	R	-	-
Phaeostroma hertholdii Kuck, 1895	-	-	R	-	-
Myrionema strangulans Grev., 182"	-	-	R	-	-
yi.seriatum (Reinke) Kylin., 194"	-	-	R	-	-

.1/.halt/cum (Reinke) hos/ie, 1894	-	-	R	-	-
[scocvelus orbicularis I.IAg.) \lagn.. IS"4	K	R	R	R	-
I'seudolilhoclerma extension fCrouan) S.Lund., 1959	K	R	R	-	-
Ralfsiu verrucosa (Aresch.) J.Ag . IS4S	R	R	1	-	-
Streblonema spliaericuni Derb. et Sol.. 1S51	-	-	R	-	-
S. tenuissimttm 1 lauck., 1SS5	-	-	R	-	-
Mvriactula rivulariae tSulir) heldin.. 193"	ЛI	R	At	-	-
M.arabica (Kut:.) heldin.. 193"	-	-	R	-	-
Elachista scutulata (Sm.) Duby.. 1830	-	-	R	-	-
L.fucieola (Veil.) Aresch.. IS42	-	-	R	-	-
l.eatltesia dıfformis (I.) Aresch.. 184"	At	-	R	R	-
Corynophlaea uinhellala (Ag.) Kut:.. 1843	R	R	1.	-	-
C.flaccida Kut:., 1858	-	-	At	-	-
Cylindrocarpus microscopicus Crouan, 1851	-	-	R	-	-
l.iehinannia leveillei J.Ag.. /842	-	-	R	-	-
Cladosiphon mediterraneus Kut:.. 1843	-	-	R	R	-
Ccontortus t'Lhur.) Kylin.. /940	-	R	R	-	-
Eudesme virescens iCarm) J.Ag. 1880-1881	-	-	R	-	-
Sperinaloclinus paradoxus (Roth.) Kut:.. 1S43	-	-	R	-	-
Stilophoru rhi:odes (Ehrh.) J.Ag.. 1841	At	-	1.	-	-
S.tuberculosa (Horn.) Reinke. 1889	-	-	At	-	-
Sereia /ilıformis (J.Ag.). 1845	-	-	1,	-	-
Zanardiniaprototypus Xardo . 1S4I	At	R	I.	-	-
Arlhrocladia villosa (lluds.) Duby.. IS30	-	-	At	-	-
Acinetospora crinita (Conu.) Konuu.. 1953	-	-	R	-	-

Diciyota dichotoma (Huds.) Lamour., 1809	-	-	-	At	-
D.linearis (Ag.) Grew. 1830	-	-	R	-	-
Dilophusfasciola (Roth.) Howe.. 1914	At	-	I.	-	-
D.spiralis (Mont.) Hamel.. 1931	-	-	R	-	-
Padinapavonia (1.) (hull., 1828	-	-	L	-	-
Sphacelaria cirrhosa (Roth.) Ag.. 1824	-	-	I,	R	-
S.saxatilis (Киек.) Sauw. 1900	-	-	At	-	-
Stypoeaulon seoparium (I..) Kutz.. 1843	-	-	At	-	-
Gladostephtts vertieillatus (Light/.) Ag.. 181"	R	-	I.	-	-
C.spongiosis (Light/.) Ag.. 1828	-	-	K	-	-
Choristocatpus tenellus (Kutz) Y.anard., I860	-	-	K	-	-
Sc\ tosiphon lomentaria (Lyngb.) J.Ag., 1848	At	At	L	-	-
Petalonia zosterifolia (Reinke) Kutz. 1898	-	R	R	-	-
Desmotriehum undulatum (J.Ag.) Reinke.. 1889	At	R	R	R	-
Punetaria lalifolia Grew., 1830	-	At	R	-	-
P.plantaguinea (Roth.) Grew. 1830	-	-	R	-	-
Striaria attenuate! (Ag.) Grew, 1828	R	R	At	-	-
Slielyosiphon sori ferns tReinke I Rosenw. 1935	-	-	R	-	-
S.adriatieus Kutz., 1843	-	-	At	-	-
Giraudya sphaeelarioides Derb. et Sol.. 1851	-	-	At	-	-
Myriotriehia repens (Поиск.) Karsak.. /892	-	-	R	-	-
Asperococcus bullosas 1.amour . 1813	-	-	R	-	-
Cystoseira barbata (Good, el Wood.) Ag.. 1821	1.	-	1.	At	-
('.crinita iDesf.) Hon.. 1832	-	-	I.	-	-
Desmarestia viridis (Mull.). Lain.,1813	-	t.	-	-	-

RHODOPHYTA					
Asterocytis ramosa (Tim.) Gobi.. 18~9	R	R	R	R	-
A.wol/eana (Tlansg.) l.agerh, 1886	R	R	R	-	-
Goniotrichum elegcois (Chauw.) Zanarcl.. I84~	R	R	R	R	-
Eryllvocludiu suhoilegra Rosenw. 1909	-	-	R	-	-
E.carnea (Dillw.) .J.Ag. 1882-1883	-	-	At	-	-
E.invesliens (Zanarcl.) Horn.. 1892	-	-	R	-	-
E.reflexa (Crouan) Thur.	-	-	R	-	-
Bangia fuseopurpurea (Dillw.) lyngb . 1819	L	L	I.	-	-
B.atropurpurea (Roth.) Ag.. 1824	R	R	-	-	Al
I'orphyra leucosticta Thur., 1863	L	I.	1.	-	-
Kylinia inicroseopiea (Nag) Kylin.. 1944	R	R	R	-	-
K.parvula (Kylin) Kylin.. 1944	-	-	R	-	-
K.hattersiana (Hamel.) Kylin.. 1944	-	-	R	-	-
K.humilis (Rosenw.) Papenf., 194'	-	-	R	-	-
K.seeunclala (Lyngh.) Papenf,. 194'	At	At	Al	At	-
K.vigralula (llarv.) Papenf, 194"	L	At	L	-	-
Aeroehaetium thuretii (Born.) Coll. et lien'.. 19l~	-	-	At	-	-
A.davwsii fDillw.) Nag.. 1861	-	-	R	-	-
A.savianum (Menegh.) Nag., 1861	-	-	R	-	-
Rhodoehoiion penieilli/ormc (Kjellm) Rosenw. 1898	-	-	R	-	-
Rh.purpureum (Light/.) Rosenv.. 1900	-	-	R	-	-
Rh.velutinum (Hauek.) Hamel, 1928	-	-	R	-	-
Audouinella memhranaeea (Magn.) Papenf, 1945	-	-	R	-	-

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Xemalion helminthoides (Yell) Batt., 1902	-	-	At	-	-
Gelidium crinale (Turn.) Lcimour., 1825	-	-	1.	-	-
G.latıfolium (Grev.) Born et Thur., 18~6	-	-	1.	-	-
Pteroclodiapinnata (Huds.) Papenf, 1950	R	-	R	-	-
Gelidiella antipai Сект., 1938	-	-	R	-	-
Peyssonnelia rubra (Grev.) J.Ag., 1851	-	-	L	-	-
P.dubyi Crouan.. 1844	R	-	At	-	-
Hddenbrandtia prototypus Sardo., 1834	-	-	R	-	-
Phymatolithon polymorphum (L.) Foslie., 1899	-	-	R	-	-
hilhothamnion lenormandi (Aresch.) h'eslie. 1895	-	-	I.	-	-
P.pdithon memranaceum (lisp.) Ileydr. 189"	-	-	L	-	-
Dermatolithon cvstoseirae (Поиск.) Huve, 1962	R	-	1	-	-
D.puslulatuin (humour.) Foslie., 1899	-	-	R	-	-
Melobesia farinosa Lamour., 1816	L	R	L	R	R
M.lejolisii Rosan., 1866	-	-	At	-	-
M.minutula. 1905	-	-	R	-	-
Choreonema thurelii (Born.) Schmil:.. 1889	-	-	R	-	-
Corallina officinalis L., 1 "56	-	-	1.	-	-
Cmediterranea Aresch., 1852	-	-	1	-	-
C.granıfera Ell. et Soland. 1"86	-	-	At	-	-
Jania ruhens (L.) Lamour., 1816	-	-	At	-	-
(irateloupia dicholoma J.Ag.. 1842	-	-	I.	-	-
Cruoriopsis rosenvingii Borg.. 1929	-	-	At	-	-
Gracilaria verrucosa (lluds.) Papenf, 1950	-	-	L	-	-
C, dura (Ag.) J.Ag.. 1842	-	-	At	-	-

Sphaerococcus corono. (Good, et Wood.) Stackh., 1 "95-18111	-	-	R		-
Furcellariafastigiata (lluds.) Lamour.. 1813	-	-f	R	-	-
Cystoclonium purpureum tlluds.) Bat!., 1902	-	-	R	-	-
llvpnea musciformis (Will/.) Lamour.. 1813	-	-	R	-	-
Pltvdophora brodiaei (Turn.) .1. Ig . 1842	Al**		-	-	-
P.pseudoceranoides (Gniel.) Near, et Tayl., I9~l	Al.....	At**	-	-	-
P.nervosa tl)(') Grev.. 1830	1.**	I **	I.	-	-
P.lraillii Holm, et Bait. 1890	-	-	R	-	-
Gigartina acicularis (ll'u/.) Lamour., 1813	-	-	R	-	-
G.teedii i Roth) Lamour.. 18/3	-	-	R	-	-
Lomenlaria articulate! (lluds.) Lyngb., 1819	-	-	R	-	-
L.clavellosa (Turn.) Gad. 1863	At	K	JII	-	-
L.uiictnata Menegli.. 1840	-	-	R	-	-
L.compressa (Kut:.) Kylin.. 1931	-	-	R	-	-
L.jirma (.J.Ag.) Kylin.. 1931	-	-	R	-	-
Chylocladia squarrosa (Kut:) l.e Job's.. 1863	-	-	R	-	-
Cli.re/le.xa (Cliaiiv.) I.enorm.. 1841	-	-	R	-	-
Aiililhamnion plumula (Ell.) Thur., 1863	-	-	At	-	-
A.crueialum (Ag.) Nag.. 1861	R	R	At	-	-
A. lenuissimiim (Поиск.) Schiff	R	***R***	R	-	-
(eramium lenuissimiim (Lyngb.) J.Ag.. 1851	Al	At	R	Al	Al
('. deslongcliampii ('hauv.. 1826-1831	-	-	R	-	-
C.slriclum Grev. el llarv.. 1851	R	R	At	-	-
G.diaphaniim (l.iglil/.) Roth.. 1806	1.	I	I.	-	Al
C.elegans Duel. 1809	1.	1	At	R	-

C.ciliatum (Elı) Duel., 1809	-	-	1.	-	-
C.arborescens J.Ag.. 1893-1894	-	-	At	-	-
C.circiimalum (Kutz.) J.Ag.. 1851	R	R	At	-	-
C.rubrum (lluds.) Ag, 1810-1812	L	L	L	Al	-
C.pedicellatum (Duby) J.Ag.. 1893-/894	R	R	At	-	-
C.secundatum Lyngb., /819	-	-	R	-	-
Callithamnion coryinbosum (.1.1: Smith.I Lyngb.. 1819	At	At	At	At	-
C.granulatum (Duel) Ag.. 1828	R	-	R	-	-
Seirospora interrupta (J E.Smith.) Sehmitz.. 1893	-	-	R	-	-
Compsolhttmniongracillimum (linn:) Sag., 1861	-	-	R	-	-
Griffithsia Jlosculosa (Ell.) halt 1902	-	-	R	-	-
Spermothamnion striatum (Ag.) Ardiss.. 1883	-	-	At	-	-
Lejolisia mediterranea Born., 1859	-	-	R	-	-
llypoglossum vroodwardii Kutz., 1843	-	-	R	-	-
Apoglossum ruseifoliiim (Turn.) J.Ag.. 1898	-	-	L	-	-
Sitophyllum punctatum (Staekh.) Grev.. 1830	-	-	At	-	-
Dasyapedicellate (Ag.) Ag.. 1824	R	R	At	-	-
Darhuseula IDillw:) Ag. 1828	-	-	R	-	-
Dasyopsis apieulata (Ag.) A/in.. 1828-1835	-	-	At	-	-
llelerosiphonia plumosa (E.I '.) Hail.. 1902	-	-	R	-	-
Polysiphoniapttlvinata Kutz., 1863	-	-	R	-	-
P.breviarticulata (Ag.) Zanarcl. 1841	-	-	R	-	-
P.violacea iRolh.) Grev.. 1849	-	-	R	-	-
P.sangiunea (Ag.) Zanard., 1841	-	Al	R	-	-
P.spinulosa Grev., 1824	R	R	R	R	R

P.elongate/ /lluds.i Han:. /833	L	At	L	R	
P.denudata (Dillw.) Kutz.. 1849	L	At	L	At	-
P.suhlifera (Ag.) Han:. 1834	At	At	1,	-	-
P.nigrescens (Dillw.) Grev., 1833	-	-	R	-	-
P.opaca (Ag.) V.anard. 1841	At	Al	1.	R	-
Alsidiuin eorallinu/n Ag.. I82~	-	-	R	-	-
Pterosiphoniapennata (Roth.) h'alkenh.. 1901	-	-	K	-	-
Dipterosiphonia rigens (Sehoush.) h'alkenh.. 1901	-	-	R	-	-
l/ei-posiphonia lenella (Ag.) Sag . 1846	-	-	R	-	-
l.ophosiphonia ohseuici (Ag 1 h'alkenh.. 1901	At	At	At	At	-
1 reptahunda iSuhr i Kylin 1956	-	-	Al	-	-
Ghondria tenuissi/na (Good, el Wood.) Ag. 1523	At	-	1.	-	-
G.dasyphylla (Wood.) Ag.. 1822	R	-	At	-	-
Laurencia papillosa (k'orsk.t Grev.. 1830	-	-	L	-	-
L.panieulata J.Ag.. 1863	-	-	At	-	-
l.eoronopus J.Ag., 1863	-	-	1.	-	-
L.hvhrida (DC.) I.enonn . 1830	-	-	At	-	-
L.ohtusa (Hitds.) Lamour.. 1813	-	-	L	-	-
L.pinnatijida iConel) Lamour., 1813	-	-	R	-	-

Note: * - Northwestern Black Sea - not including Egorlitsky and Tendrovsky Bays, hut included in Crimea because of lloristic similarity.

Freswater limans - Dneprovsky. Dnestrovsky.
Saltwater - Sukhoi. Grigirievsky. Kuyalnik. Tiligulsky

** - Encountered only in Zernov's Phyllophora field, absent in coastal /one

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Table 8. List of Meiobenthos Species

Species	Till 1975	Contemporary State Areas		
	(NWBS)	NW'BS	Crimea	Sea oΓ Azov
FORAMINIFERA				
Ammobacidites ponticus Mikludevich. 1968	-	+	-	-
Discummino imperspica Janko, 19'4	-	ɫ	-	+
Eggerella scabra Williamson, 1858	-	+	-	-
(yclogyra planorhis Schultze, 1854	-	+	-	-
Quinqueloctllina ex gr. hicornis Walker el Jacob. 1826	-	+	-	-
O.laevigata cl'Orbigny. 1826	-	+	-	-
O semiuulum l.inne, l~6~	-	+	-	+
Massilina seeans cl'Orbigny. 1826	+		-	-
Ortliomorphina ca/amorpba Reus. 1X66	-	+	-	-
l.agena vulgaris Williamson. 1858	-	4	-	-
Esosvrinx jalzkoi Janko, 19~4	-	+	-	-
Laringosigma williamsoni Michaleviclt, 1968	-	+	-	-
Entolingulina Jeplanala Janko, 19~9	-	+	-	-
Fissurina ex gr. soliila Segtienza.	-	+	-	-
I'ara/issurina aventricosa Bollovskoj, 1981)	-	+	-	-
I'.clzemeuliniea Janko. 9~9	-	+	-	-
P. ex gr lateralis Cuslnnan, 1839	-	+	-	-
Aubignyna perlucicla Heron-Allen et Earlancl. 1913	-	+	-	+

Rosalind catesbyana d'Orbigny, 1839	-	i	_	
Rosalina sp.	-	+	-	-
\onion matagordamts (iishman. 1939	-	+	-	+
Sonion sp	-	+	-	-
Ammonia ammoniformis d'Orbigny. 1826	-	+	-	-
A.compacla llojker	-	+	-	-
. l.novoeuxinica Janko. I9~9	-	+	-	+
A.parasovica Stschedrina el Mayer, I9~5	-	+	-	+
A.lepida (iishman. 1928	-	+	-	+
Canalifera parkerae Janko. 19"4	-	+	-	+
I'orosoiionion marie obi Rogdanowich,	-	+	-	-
I'.maiicohi poiiliciim Janko. 19~9	-	-	-	+
I'.snhgranosiis ligger, 185'	-	+	-	-
1 laynesina anglica Murray. 1965	-	+	-	+
h.lphidium caspieum Mayer. I9"9	-	+	-	+
E.caspicum arovicuiu Janko.	-	-	-	+
E.ponticum Dolgopolskuju el I'ditli. 1931	-	+	-	+
(iihroelphidium percursum Janko, I9~4	-	+	-	-
(' poeyonum d'Orbigny. 1839	-	+	-	+
Mayerella brolzkajae Mayer el Janko. 1968	-	+	-	+
i'rochammina iiijiala (Montagu, 1808)	+	-	-	+
Milidinmiiid fused Brad)	-	-	-	+

TURBELLARIA				
NEMATODA				
Areolaimus ponticus Filipjev 1922	-	+	+	-
A.-osterae (Filipjev 1918)	-	-	+	-
Acmaeolaimus diplopeltoides Fil. 1918	-	-	+	-
Diplopeltis cirrhotics (Eberth 1865)	-	+	+	-
Diplopcllula onusto (IVieser 1956)	-	-	+	+
Campylaimus siwaschensis Sergeeva 1981	-	-	-	+
C.ponticus Sergeeva 1981	-	+	1	+
I'arodontophora epiadristicha (Stekhoven 1950)	-	-	+	-
A.xonolalnius setosus Filipjev 1918	-	III	III	+
A ponticus Filipjev 1918	-	III	+	+
A.arcuattis (Stekhoven 1950)	-	-	+	-
Leptolaimus steineri (Filipjev 1922)	-	+	+	-
Camacolaimus bathycola Filipjev 1922	-	-	+	-
C.dolichocercus Filipjev 1922	-	-	+	-
Odonthophora angustilainius (Filipjev 1918)	-	+	+	-
Southerniella conicauda (Stekhoven 1950)	-	-	+	-
Syringolaimus caspersi Gerlach 1951	-	-	+	-
Terschellingia pontica Filipjev 1918	-	III	+	-
Tdongicaudata De Man 1907	+	in	III	III
Metalinhoinoeus zosterae Filipjev 1918	+		+	-
M.typicus De Man 19(T	-	-	+	-

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Linhomoeus hirsutus Bastion 1865	-	-	+	-
Antycyclus iniquus (Wieser 1959)	-	-	+	-
Paralinhomoeus filijormis (Filipjev 1918)	-	+	+	-
P.tenuicaudatus (Biitschli 18'4)	-	-	+	-
P.deeonineki Groza-Rojancovski 19"2	-	-	+	-
Sphaeroccphahtm crassicanda Filipjev 1918	-	+	+	+
Fleutherolaimus longus Filipjev 1922	-	+	+	+
Sphaerolaimus dispar hilipjev 1918	-	-	+	-
Sph.macrocirculus Filipjev 1918	-	+	+	+
Sph.gracilis De Man 1906	-	m	+	+
Sph.ostreae Filipjev 1918	-	m	+	+
Sphdiorrendus Sergeeva 1981	-	-	+	-
Sph.minutus Vitiello 19" 1	-	-	+	-
Sph.megainphis Wieser 1956	-	-	+	-
Prosphaerolaimus eurypharynx Filipjev 1918	-	-	+	+
Disconema alaima Filipjev 1918	-	-	+	-
Monhystera longicapitata Filipjev 1922	-	+	+	-
M.parva iBaslian 1865)	-	+	+	+
Mcollaris Filipjev 1922	-	+	+	-
M.ampulucauda Paramonov 1926	-	+	+	-
M.attenuala Filipjev 1922	-	+	+	-
M.jlliformis Bastion 1865	-	+	-	-
M.rotnndicapitala hilipjev 1922	-	m	m	+
M.coniea Filipjev 1922	-	m	+	in
Paramonohystera elliptica Filipjev 1918	-	+	+	-

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Theristus latissimus Filipjev 1922	+	+	+	-
Th. littoral is Filipjev 1922	-	+	+	+
Th.acer Bastion 1865	-	-	+	-
Th.sobulicola (Filipjev 1918)	-	+	in	+
Fh.euxinus (Filipjev 1918)	-	+	+	-
Cvlindrotheristus longicaudatus (hilipjev 1922)	+	Ill	+	Ill
C.maeoticus (hilipjev 1922)	-	m	+	+
C.oxycereus (De Man 1888)	-	+	+	-
Mesotheristus setosus (Butschli 18"4)	+	+	+	-
Cobbia trioclonta hilipjev 1918	-	-	+	-
Sleineria pontica Croza-Rojancovski 19'2	-	-	+	-
Melachromadora cystoseira hilipjev 1918	-	-	+	-
Mmacroutero hilipjev 1918	-	in	in	-
Spirinio sahulicola (hilipjev 1918)	-	+	+	-
S.parasilifera (Bastion 1865)	-	-	+	-
Onyx perjectus Cobb 1891	-	-	+	-
Microlaimus kaurii Wieser 1954	-	+	+	-
Bolbolaitnus murinoe (Sergeeva 19~~6)	-	+	+	-
Desmodora pontica Filipjev 1922	-	+	+	-
Dconica I'itiello I9~l	-	-	+	-
Ceramonema annulala (Filipjev 1922)	-	-	+	-
('hromaspirina pool tea Filipjev 1918	-	-	+	-
Monoposthia eostata (Bastion 1865)	-	-	+	-
Draconema ponlicum Filipjev 1918	-	-	+	-
D.cephalatum Cobb 1913	-	-	+	-

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Comesoma stenocephalum Filipjev 1918	-	-	+	-
Paracomesoma dubium /Filipjev 1918)	-	-	+	-
Sabatieria abyssal is /Filipjev 1918)	-	+	m	+
S.longicaudata Filipjev 1922	-	-	+	-
S.quadripopillata hilipjev 1922	-	+	+	+
S.pulchra (G.Schneider 1906)	+		in	+
S.asperu/n Sergeeva I9~3	-	-	+	-
('hromadorita gracilis 1 hilipjev 1922)	-	+	+	+
Chdeuckaiii (De Man I8"6)	-	+	+	+
Ch.de/naniana Filipjev 1922	-	-	+	-
Diehromadara cephalata iSleiner 1916)	+	+	+	+
('hromadora midicapilala Haslian 1865	-	+	+	+
Neochromadora poecilosomoides /Filipjev 1918)	-	-	m	+
S sabulicola /Filipjev 1918)	-	+	+	-
Pomponema mullipapillaluin 1 hilipjev 1922)	-	-	+	-
Ptycholaimellusponticus (hilipjev 1922)	-	-	+	+
I'rochroiiittdoro megodonla hilipjev 1922	-	-	+	-
Prochromadorella hrachyura Stekhoven 1950	-	-	+	-
P.mediterranea (Mieoletzky 1922)	-	in	+	+
Chromadoiina ohlusa Filipjev 1918	-	+	+	-
Spilophorella euxina hilipjev 1918	-	+	+	-
S.paradoxa (De Man 1888)	+	+	+	-
Chromadorella ntytilicola hilipjev 1918	-	+	+	+
Euchromadora striata (Eherth 1863)	-	-	+	-
Seolonchus corcundits iGerlach 1956)	-	-	+	-

Gyatholaiinus gracilis (Eberth 1863)	-	+	+	+
Paracanthonchus caecas (Bastian 1865)	-	m	in	+
Cohbionema acrocerca Filipjev 1922	-	+	+	-
C.cylindrolaimoides Stekhoven 1950	-		+	-
Ethmolaimus multipapillatus Paramonov 1926	-	+	-	-
Halichoanolaimus dolichurus Saweljev 1912	-	+	+	-
H.robustus (Bastian 1865)	-	-	+	-
1 llukjanovae Sergeeva 19~3	-	-	+	-
l.atroneina ej. piratieum ll'ieser 1959	-	-	+	-
Cheironeluis vorax Cobb 191~	-	-	+	-
Ih'sinoscolex tenuisela Filipjev 1922	-	+	+	-
D.minutus Claparede 1863	+	-	+	-
(Jiiadrieoina earvcrieits (hilipjev 1922/	-	-	+	-
Odorieala hilipjev 1922	-	-	+	-
O. media (Reinhard 1881)	-		t	-
O.steineri Filipjev 1922	-	-	+	-
O.reinhardi hilipjev 1922		-	+	-
0.pontica hilipjev 1922	-	-	+	-
Tricoma nematoides (Greeff 1869)		-	+	-
Tplatycephala hilipjev 1922	-	-	+	-
T.bacescui (Pahet Andriescu 1963)	-	-	+	-
Anticoma acuminata (Eberth 1863)	+	+	+	-
A platonovae Sergeeva 19~2	-	-		-
l.eptosomatum punctatum (Eberth 1863)	-	+	+	-
l.bacillatiiin (Eberth 1863)	-	+	+	-

L.elongatum Bastian 1865	-	-	+	-
Leptosomatides euxinus hilipjev 1918	-	+	+	-
Oxystomina elongata (Biitschli 1874)	-	+	+	+
O.clavicauda (Filipjev 1918)	-	+	+	-
O.cf nidrosiensis Allgen 1933	-	-	+	-
().propria Sergeeva I9"3	-	-	+	-
O. unguieulata Stekhoven 1935	-	-	+	-
O.breviceps Sergeeva 1973	-	-	+	-
Nemanema ftlıformis (Filipjev 1918)	-	-	+	-
Thalassoalaimus mediterraneus I'itiello 19"0	-	-	+	-
Ilalalaimus pontieum Filipjev 1922	-	+	+	-
H.anne Sergeeva 19"'2	-		+	-
H. wodjanizkii Sergeeva 19~2	-	+	+	+
1l.hrevispieulum Sergeeva 19~3	-	-	+	-
ll.jtdtensis Sergeeva I9"3	-	-	+	-
Ponlonema zernovi (hilipjev 1916)	-	+	+	-
Oncholai.ncllus mediterraneus Stekhoven 1942	-	-	+	+
Rhahdoiiemania pontica Flalonova 1965	-	+	+	+
I'hanoderma albidum Bastian 1865	-	+	+	-
Ph.tuberculatum (Fberih 1863/	-	-	+	-
Pelagonema ohtusicauda Filipjev 1918	-	+	+	-
Pandolaimus ponticus (Sergeeva 19~2)	-	-		-
Anoplostoma viviparum (Bastion 1865)	+	+	+	+
A.brevispiculum Sergeeva 19"4	-	-	+	-
Eurystomina assimilis (De Man 18~6)	+	+	+	+

E.Jilispiculum Cieiiach **/95-/**	-	-		-
Symplocostomaponticum hilipjev 1918	-	+	+	-
S.lenuicolle (Eberth 1863)	+	+	+	-
Polygastrophora hexabulba (Filipjev 1918)	-	-	+	-
P.pentabulba Sergeeva 19"4	-	-	+	-
(atalaimus sabulicola (hilipjev 1918)	+	+	+	-
('.longicaudalus Sergeeva I9~4	-	-	+	-
Euthoracostoinopsis filipjevi Sergeeva 19'4	-	-	+	-
Enoploides disparilis Sergeeva I9~4	-	-	+	-
EJiirsiitus hilipjev 1918	-	4	+	-
E.hrevis Filipjev 1918	-	+	+	+
Eeirrhalus Filipjev 1918	-	+	+	-
E.ainphioxi hilipjev 1918	-	+	+	-
E.ponticus Sergeeva 19~4	-	-	+	-
Enoplus quadridentatus Berlin 1853	+	III	+	-
E.inaeoticus hilipjev 1916	-	III	+	-
Elittoralis Filipjev 1918	-	+	+	-
Mesacantldon conicum i hilipjev 1918)	-	-	+	-
Mdielerospieulum Sergeeva 19"4	-	-	+	-
Oxyonchus dubius (hilipjev 1918)	-	-	+	-
Epacanlhion nadjae Sergeeva 19~4	-	-	+	-
Paramesaeanthion Iruncum I'itiello 19~1	-	-	+	-
*Tripyioides marinus (Butschli 18"***4)**	-	+	+	+
Bathylaimus australis (i>hh ***IS94***	-	+	+	-
B.coЬЫ Filipjev 1922	-	+	+	-

Halanonchus bulletins Geiiach 1964	-	-	+	-
Metoneholaimus demani l/uz Slrassen 1X94)	-	+	m	+
Pruoncholaimus eberth! (hilipjev 1918)	-	-	+	-
P.banyalensis Inglis 1962	-	-	+	-
Oncholaimus dujardinil De Man I8~6	-	+	+	+
O.brevicaudatus hilipjev 1918	+	+	+	-
O.compyloeercoides Con.et Stekhoven 1933	-	+	+	+
Viscosia glabra (Bastian 1865)	-	+	+	+
1 *.minor hilipjev 1918*	+	+	+	+
Y.eobbi hilipjev 1918	-	+		+
V elongata hilipjev 1922	-	+	+	+
Wminudonta lltiello 19"l)	-	-	+	-
Dorylaimus filipjevi Geiiach 1951	-	-	+	-
Dorvlaimus sp.	-	-	+	-
GASTROTRICHA				
Xenotrichula heauchampi Levi, 1950	-	+	-	-
Turbanella cornuta Remane, 1925	-	+	-	-
P.pontica Valkanov, 195"	-	+	-	-
KINORHYNCHA				
Pycnophyes clentatus (Reinhardt, 188')	+	-	-	-
P.ponticus (Reinhardt, 188')	+	-	-	-
('entroderes spinosus (Reinh.. 18811	+	-	-	-
Eehinoderes dubius (Reinh.. 188')	+	-	-	-

Echinoderes sp.	+	-	-	-
OLIGOCHAETA				
POLYCHAETA				
CYCLOPOIDA				
('yclopinoides littoralis (Brady. I8~2)	-	+	+	+
('yclopinatus eximius (Monchenko, 1981)	-	+	+	-
Cvclopina gracilis ('laus. 1863	-	+	-	+
('.pontica Monchenko. 19	-	-	+	-
C.esilis Brian. 1938	-	+	+	+
('.parapsaiuinophila Monchenko. 1980	-	+	+	-
('. hadzii I'etkovski. 1955	-	+	+	+
('. ohlivia Monchenko. 1981	-	-	+	-
Euryte longicauda Phi/ippi. 1843	+	+	+	-
Euryte sp.	-	-	+	-
Neocyclops remanei vicinus Herhst. 1955	-	+	+	-
Halicyclops magniceps ('/.ill, 1853)	-	+	+	+
ll.neglectus Kiejer, 1935	-	+	+	+
H.seplentnonalis Kiejer, 1935	-	-	+	+
ll.hrevispinosus meridionalis Herhst. 1953	-	+	+	+
H.rotundipes Kiejer, 1935	-	+	+	+
H.validus Monchenko, 19"4	-	+	-	+
H.cryptus Monchenko, 1979	-	-	-	+

H.cryptus secundus Monchenko, 1982	-	-	-	+
Smirnoviella redncta Monchenko, 19"	-	+	-	-
Colpoeyclops longispinosus (Monchenko. I9~4)	-	+	-	-
C.duleis Monchenko, 1977	-	+	-	-
Paracyclops ddatatus ivanegai Monchenko, 1977	-	+	-	-
HARPACTICOIDA				
Longipedia pontica Kriczagin, 1877	-	-	+	-
Canueda perplexa T.el A.Scott. 1893	+	+	m	+
('JurcigeraSens, 1903	-	-	+	+
Eetinosoma sarsi lioeck. I8~2	-	-	+	-
E.abrau (Kriczagin). 18"	+	+	-	+
E.melanicepsBoeck, 1864	+	m	m	-
Pseudohradio minor (T.el A.Scott. 1894)	-	-	+	-
Horsiella hrevicornix (Douwe, 1904)	+	-	-	-
Microarthridion liltorale (Poppe. 1881)	+	-	m	-
Ilarpacticusjlexits Brady et Robertson, 1873	-	-	+	+
II.gracilis (Tans, 1863	+	+	+	-
II. littoral isSars, 1910	-	in	in	-
H.compsonyx Monard, 1926	-	-	+	-
H.uniremis Kroyer.1842	+	-	-	+
Tisbe furcata (Baird. 183')	+	m	in	+
T.dilatata Kite, 1949	-	-	+	-
Tisbe sp.	-	-	m	-
Scutellidium longicaudata (Philippi, 1840)	+	-	in	-

lilicl/a pa/lidula Sars. 1905	-	-	+	-
Porcellidium viride (Philippi,1840)	-	-	+	-
Alteutha typica Czerniavsky, 1868	-	-	+	-
Tegasles longtmanus (Claus. 1863/	-	-	ııı	-
Thalestris longimana Claus. 1863	-	-	+	-
Tli.rufoviolaseeiis ('laus, I860	-	-	+	-
Parathaleslris harpaclicoides (Claus. 1863)	-	-	+	-
P.clausi (Norman, 1868)	-	-	+	-
Phvllothaleslris mvsis Claus. 1863	-	-	+	-
Rlivnchothalestris rufocincta (Brady, 1880)	-	-	+	-
Diarthrodes pygmaeus (Tel A.Scott, 1895)	-	-	+	-
1).ponticus (Kriczagin. I8"3)	-	-	+	-
D.ininutus (I 'laus. 1863)	-	-	+	-
D.nobilis (Baird, 1845)	-	-	+	-
Dactvlopodia tisboides /('laus. 1863)	+	-	ııı	-
Paradactylopodia latipes (Bocck. 1864)	-	-	+	-
P.brevicomis (Claus, /866)	-	-	+	-
Eudactvlopus spectahilis (Brian. 1923)	-	-	+	-
Dactylopodella flava (Claus. 1866)	-	-	+	-
Stenhelia normani T.Scott. 1905	-	-	+	-
S.elisabethae Por, 1960	-	-	+	-
S.tethysensis Monard, 1928	-	-	+	-
S.reftexa Brady et Robertson, 1880	-	-	ııı	-
Diosaccus lenuieornis (Clans. 1863)	-	-	+	-
Amphiasens sinitatus Sars.) 906	-	-	+	-

Amphiascopsis thalestroides (Sars, 1911)	-	-	+	-
Ainonarclia similis (('laus, 1866/	+	-	-	-
A.normani (Brady, I8~2l	-	-	+	-
Paramphiascopsis longirostris (Claus, 1863/	-	-	+	-
Bulhampluascus imus (Brady. I8"2)	-	-	+	-
I'yphlamphiascus confusus (T.Scott, 1902)	-	-	+	-
Ampluascoides subdebilis (Wilier. 1935)	-	-	+	-
A.neglecta (S or man et T.Scott,1905)	-	-	+	-
A. debit is (Giesbrechl, 1881)	-	-	+	-
Haloschizopera pontarchis Par. 1959	-	-	m	-
H.junodi (Monard, 1935)	-	-	+	-
II mathoi (Monard. 1935)	-	-	+	-
Paramphiaseoides rarareusis (T.Scott, 1903)	-	-	+	-
Robertgurneya similis (A.Scott, 1896)	-	-	+	-
Prostrate (Curner. 192")	-	-	+	-
R.ecaudata (Monard. 1936)	-	-	+	-
Metis ignea Philippi, 1843	+	+	+	+
Aineira parvttla ((laus. I860)	+	+	+	+
A.scold brevicomis Monard, 1928	-	-	+	-
Proameira simplex (Norman et T.Scott, 1905)	-	-	+	-
Nitocra lacuslris (Sclunankevitsch, 18~5)	+	+	-	+
N.liibernica (Brady. 1880)	+	-	+	+
N.pusilla Sars, 1911	-	+	-	-
N.spinipes Bocck, 1864	-	+	-	-
N.affinis Curney. 192"	-	+	-	-

Psyllocamptus propinquus (T.Scott, 1895)	-	-	+	-
Ameiropsis longicornis Sars, 1907	-	-	+	-
Stenocopia longicaudata pontica Griga, 1964	-	-	+	-
('anthocainptus staphylinus (Jurine. 1820)	+	-	-	-
Mesochra pygmaea (('laus. 1863)	+	-	m	-
M.rapiens (Schmeil, 1894)	-	-	+	-
M.lilljeborgi Boeck.1853	+	-	-	-
Maestuarii Gurney; 1921	+	-	-	-
Phyllopodopsyllus hradii (T.Scott, 1892)	-	-	+	-
Stenocaris pontica Chappuis et Serhan, 1953	-	+	-	-
Arenopontia suhterranea Kunz. 193"	-	+	-	-
Paralcptaslacus spinicauda Iriseta, Sodl, 1954	+	+	-	-
('letodes longicaudatus (lioeck, I8~2)	-	-	+	-
C.limicola Brady, 18"2	-	-	+	-
C.tenuipes T.Scott. 1896	-	-	+	+
Enhydrosoma caeni Raibeut, 1965	-	-		-
Esarsi (T.Scott, 1904)	-	-	+	-
Cletocamptus retrogressus Schmaukevilsch, 18"5	+	-	-	-
C.conjluens (Schmeil. 1894)	+	-	-	+
Rluzothrix curvata Brady; 1880	-	-	+	-
Eurycletodes lotus (T.Scott, 1892)	-	-	+	-
E.parasimilis Poz, 1959	-	-	+	-
Esimilis (T.Scott, 1895)	-	-	+	-
Limnocletodes behningi Borutzky, 1926	-	-	-	+
Stylicletodes longicaudatus (Brady, 1880)	-	-	+	-

Heteropsyllus dimorphus Рог, 1959	-	-	+	-
Laophonte setosa Boeek, 1864	+	-	m	-
L.elongate var. Iriardculata Monard, 1928	-	-	+	-
L.brevıfurca Sars, 1920	-	-	+	-
L.longicaudata (Boeck, 1864)	-	-	-	+
Heterolaophonte stromi i Baird. 1834)	-	-	in	-
Il.uneinala (Czcrniavskv, 1868)	-	-	+	-
Paranychocamptus leuke Pot; 1959	-	-	+	-
Paralaophonte hrevirostris (Claus, 1863)	-	-	+	-
Asellopsis sarmalica Jakubisiak, 1938	+	-	-	-
Onychocuinptus mohctmmed Blanchard et Richard, 1891	+	-	-	-
h'.sola typhlops var. pontica Par. 1959	-	-	+	-
Normanella mucronata reducia Xoodl, 1955	-	-	+	-
Лininuta (Boeck, I8'2)	-	-	+	-
.X.serrata for, 1959	-	-	+	-
haophonlhodes bicornis A.Scott. 1896	-	-	+	-
Microarthridion fallax, Perkins, 1956	-	+	-	-
Enhvdrosoma caeni. Radiant, 1965	+	+	-	-
P. garienis, Gurney, 1930	+	+	-	-
Rohertsonia monarch (Klie. 193~)	+	+	-	-
Schizopera borutzkyi, Montshenko, 196"	+	+	-	-
S.jugurta, (Blanchard et Richard) 1891	+	+	-	-
S.negleeta, Acatova, 1935	+	+	-	-

OSTRACODA				
Polycope frequens G. IГ Midler. 1894	-	-	+	-
Bairdia raripilu G. W. Midler. 1894	-	-	+	-
Darwimda stevensoni (Brady el Robertson, I8~0)	-	-	y	-
Aglaioeypris compliniato (Brady el Robertson, 1869)	-	-	+	-
Candona schweyeri Sehornikov. 1964	-	+	+	-
C.angulata /.' meridionalis Petkovski, 1958	-	+	-	-
Candonopsis kingsleii /Brady el Robertson. I8'l)	-	+	-	4-
Cyprinolus salina (Brady. 1868)	-	+	-	4-
Eueypns injlala (G.O.Sars. 1903)	-	+	y	-
Cypridopsis aeuleala (Costa. 1,84")	-		1	+
Potamoeypris sleuari Kite. 1935	-	+	+	+
Ponloc\ there tchernjawskii Duhowsky, 1939	-	-	+	-
P.baceseoi (('aroion, 1960)	-	-	+	+
Cvprideis torosa var. litloralis Brady. 1864	-	+	+	+
C.torosa var. torosa (Jones, 1850)	-	+	+	+
Cytheridea acuminata (Bosquet. 1852)	-	+	-	4-
CytheromorphaJuscata (Brady. 1869)	-	+	-	-
Microcylheriira nigrescens G. W. Midler, 1894	-	-	+	+
MJulvoides Duhowsky. 1939	-	y	+	+
heptocy there longu (Segadaev. 1955)	-	+	+	-
1. cvmhula (hivenlal. 1929)	-	+	-	-
L.pedi/ormis Sehornikov. 1966	-	+	-	-
k.gracilloides Sehornikov. 1964	-	+	-	-

L.relicta Sehornikov. 1964	-	+	-	-
L.fabaeformis (G. W.Midler, 1894)	-	-	+	-
L.roiuoso (Rome. 1942)	-	-	+	-
L.multipunctata multipunctala (Seguenza, 1884)	-	+	+	+
L.devexa Sehornikov, 1966	-	+	-	+
h.maeal/eiui (Hradv el Roheiison. I8"(ll	-	-	+	-
L nitida Sehornikov. 1966	-	-	+	-
Ldiislriana Caraion. 1964	-	+	+	+
Lrara (Gil'.Midler. 1894)	-	+	-	-
L.lopaliei Sehornikov. 1964	-		+	+
L.quinqueluberculata (Schweyer. 1949)	-	+	+	-
I haeuana (l.ivenlal. 1929,	-	1	+	-
('allisloeylhere abjecta Sehornikov. 1966	-	-		-
C.crispata (Brady. 1866)	-	-	+	-
(' /lavido/usca Ritggieri, 1953	-	+	+	-
C.dıffusa (G. II.Midler, 1894)	+	+	+	-
G.inediterranea (G. IV.Midler. 1894)	-	+	+	-
Carinoeythereis carinala (Roemer, 1838)	-	-	+	-
G.rubra (G. W. Midler, 1894)	-	+	+	-
Aurila duhowsky i n.sp.	-	-	+	-
Heteroeythereis reticulata n.sp.	-	-	+	-
Ivrrhenocythere amnicola donetziensis Duhowsky, 1926	-	-	+	-
I rocythereis margaritıfera (G. IV. Midler. 1894/	-	-	+	-
Cytheroma variabilis (G. IV.Midler. 1894)	-	-	+	-
('.karadaginis Duhowsky. 1939	-	-	+	-

('.marinovi n.sp.	-	-	+	-
Ponlocytheroina arenaria Marinov. 1963	-	-	+	-
l.oxoconcha rhoinhoidea (Fischer, 1855)	+	+	+	-
k.hulgarica Caraion, 1961	+	+	+	+
/..pontica Klie. 193~	+	+	+	+
1. elliptiea Hrady.1868	-	+	+	+
L.lepida Slepanaitys, 1962	+	+	-	+
/.granulata G.O.Sars, 1866	+	+	+	-
1. aesluarii Marinov. 1963	-	+	+	+
1. glohosa Sehornikov. 1965	-	-	+	-
I..nana Marinov, 1962	-	-	+	+
h.rennata Sehornikov, 1965	-	+	+	-
L.immodtilata Slepanaitys, 1962	-	+	+	-
Loxocauda mulleri sp.nov.	-	-	+	-
I'araeytheridae paulii Dubowsky, 1939	-	+	+	-
1 leinicylherura hulgarica (klie 193~)	-	+	+	-
lindens ((/.IV.Midler. 1894)	-	-	+	-
I'seudocylherura pontica 1 hihowsky, 1939	-	-	+	-
hevocytheriira pontica (Marinov. 1962)	-	-	-	+
1. remanei (Marinov. 1964)	-	-	+	-
Semicytherura virgata n.sp.	-	+	+	+
S.euxinica (('araion. 196'")	-	+	+	+
S. calainilica sp. n	-	+	+	-
Cylherura venlriangulata n.sp.	-	-		+
Xesloleberis deeipiens (j. IV.\luller. 1H94	-	+	+	-

X.cornelii ('uruion. 1963	+	+	+	-
X.acutipenis ('araion, 1963	-	-	+	-
X.aurantia (Baird. 1838)	-	+	+	+
Microcytherc longianteiinata Marinov. 1962	-	+	-	-
Parvocythere hartmanni Marinov, 1962	-	+	-	-
Bythocvthere turgido CO.Sars. IS66	-	-	+	-
Sclerochilus gewemulleri Dubowsky, 1939	-	-	+	-
S.dubowskvi Marinov. 1962	-	-	+	-
Paracytherois agigensis ('araion. 1963	-	-	+	-
('\ literals cepa Klie 1 93 '	+	+	+	+
('pseudovitrea psetidovtlrea Dubowsky, 1939	-	-	f	-
C.earcinilica Marinov. 1964	-	-	+	-
('planus sp u.	-	-	+	-
C.valcanovi Klie. 193"	+	+	+	-
Csuccinoides Dubowsky, 1939	-	-	+	-
('niger Sehornikov 1965	-	-	+	-
Parado.xosloma intermedium (j.It.Midler, 1X94	-	+	+	+
P.naviculitm Sehornikov. 1965	-	-	+	-
P.ponticum Klie. 1942	-	-	+	-
P.simile C. II'.Midler. 1S94	-	-	+	-
P.variabile (Baird. IS35i	-	-	+	-
P.tauricum Sehornikov. 1965	-	-	+	-
P.convexum Sehornikov. 1965	-	-	+	+
P.guttatum Sehornikov. 1965	-	-	+	-

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. tgaue ehevrcuxi (Trouessart. 1889)	-	+	+	-
Agauopsis brevipalpus (Trouessart, 1889)	-	+	+	-
Lohmannella falcata (Hodge, 1863)	-	+	-	-
Copidognathus brevirostris I lets, 192~	-	-	+	-
C.ponteitxinus I'iets, 1928	-	in	+	-
C.ponteuxinus var. pectiniger Motas et Soares, 1940	-	+	-	-
C.magnipalpus var. ponticus I'iets, 1936	-	+	-	-
C.magnipalpus var. serratisetus I'iets, 1928	-	+	-	-
('.rhodosdgma (Gosse, 1855)	-	-	+	-
Roinhognathus not ops (Gosse. 1855)	-	m	-	-
Rii. mangiroslris Trouessart, 1889	-	-	+	-
Rh.dentieulalus Soeolov, 1952	-	+	-	-
Rh.pascens (l.ohmann, 1889)	-	m	-	-
llalacarellus hexaeanthus I'iets.192"	-	+	-	-
H.basteri var. affinis Trouessart, 1896	-	+	+	-
H. procerus I'iets, 192"	-	+	-	-
H.capuzinus l.ohmann. 1893	-	+	-	-
II.floridearum (Lohmann, 1889)	-	+	-	-
H.longipes Trouessart, 1888	-	+	-	-
Halacarus sp.	-	+	-	-
Pontarachna pontica 1 lets, 1928	-	-	+	-
P.punctulum Philippi. 1840	-	-	+	-
Litarachna divergens Walter, 1925	-	-	+	-

Rhodacarus olgae Scherbak, 19~4	-	+	-	-
Rhodocaropsis inexpectatus Willman, 1935	-	m	-	-
Mediorhodacarus tetranodulus g.sp. Scherbak, 19~6	-	+	-	-
Tyrophagus putrescentiae Sclirank, 1888	-	+	-	-
llalolaelaps nodosus WHIman. 1952	-	in	-	-
ll.saproincisus Hyatt, 1956	-	+	-	-
Hydrogamasns sp. Trouessart, 1891)	-	+	-	-
Typhlodroiiius soliger Rib.. 1916	-	+	-	-
Brevipalpus obovalus Dauuadiru. 1975	-	+	-	-
Hypoaspis aculifer Canestriiu.. 1883	-	+	-	-
1 l.heselbausi Oudeinmans. 1900	-	+	-	-
'Tetranectins carpini Oudeiiiinans. 191)2	-	+	-	-
GASTROPODA				
BIVALVIA				

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Table 9. List of Macrozoobenthos

Species	Till 1975	Contemporary state Areas			
		NWBS	Crimea	water bodies	
				salty	fresh
PORIFERA					
Sycon ciliatum (Fahricius. I8~0)	+	-	+	-	-
S. setosum (Schmidt, IS62)	+	-	+	-	-
Suberites carnosus (Johnston, 1848)	+	-	+	-	-
S. prototipus (Swartschewsky, 1905)	E	-	-	-	-
Cliona vastiftca Hancock, IS4S	+	-	-	-	-
Mycale syrinx (Schmidt, 1862)		-	-	-	-
l.issodcndorix variisclera (Swartschewsky. 1905)	E	-	-	-	-
llymedesmia hrondsledi billion. 1930	+	-	-	-	-
1 hdicliondria panicea (('alias, 1 766)	+	-	+	-	-
llymeniacidon sangninea (Grant) liowerhank. 1826	+	-	-	-	-
llaliclona atpiaeductus (Schmidt. 1862)	+	-	-	-	-
II *gracilis (Miklueho-Maklay, 1870)*	+	-	-	-	-
II *ascidia (Schmidt. I8~0)*	+	-	+	-	-
II *cinerea (Grant. I82~)*	+	-	-	-	-
II *implexa (Schmidt. 1868)*	+	+	+	-	-
II *pallida (liowerhank. I860)*	+	-	-	-	-
II *jlavescens (Topsenl. 1894)*	+	-	-	-	
llalielonissa digitala (Schmidt. ***1866)***	+	+	-	-	-

Petrosia dura (Schmidt. 1X62)	+	-	-	-	-
Dysidea fragilis (Montagu, ISIS)	+	+	+	-	-
Halisarca dujardini Johnston. IS42	+	-	-	-	-
Spongia lacustris (h.)	+	-	-	-	+
COELENTERATA					
Protohydra leuckartii Greet". 1870	+	-	-	-	+
Cordylophora caspia (Pallas. 1770)	R	-	-	-	+
Rathkea octopunctata (M.Sars, 1835)	+	-	-	-	-
1 [ydractinia carnea (M.Sars. 1846)	+	-	+	-	-
Bougainvillia megas (Kinne. 1956)	+	-	-	-	+
(or\ morplia nutans M.Sars. 1 S35	+	-	+	-	-
Tubularia simplex Alder. 1862	+	-	-	-	-
C'ladonema radiatum Dujardin. 1X43	+	-	-	-	-
Comic tubulosa (M.Sars. 1X35)	+	-	-	-	-
Eudcndrium ramosum (1... I75X)	+	-	-	-	-
Campanularia integriformis Markt.-Turn., 1X90	+	-	-	-	-
C.johnstoni (Alder. 1X56)	+	-	+	-	-
C. volubilis(L., 1758)	+	-	-	-	-
Obelia gelatinosa (Pallas. 1766)	+	+	-	-	-
0. loveni (Allman. 1859)	+	-	-	-	-
O. longissima (Pallas. 1766)	+	+	-	+	-
Blackfordia virginica Mayer. 1910	+	-	-	-	-
Campanulina lacerata (Johnston. 1847)	+	-	-	-	-
Sertularella pol\/onias (I..1758)	+	-	-	-	-

Plumularia halecioides Alder. 1859	+	-	-	-	-
Aglaophenia pluma (L., 1758)	+	+	-	-	-
Moeresia maeotica (Ostroumow. 1896)	+	-	-	-	-
Lucernaria campanula Lamouroux, 1815	+	+	+	-	-
I'achx cerianthus solitarius (Rapp. 1829)	+	+	+	-	-
Actinia equina (L.. 1766)	+	+	+	+	-
Actinothoe clavata (llmoni, 1830)	+	+	+	-	-
1 ,d\\ arsia claparedi Pane. 1869	+	+	+	-	-
1l\ dra \ ulgaris Pallas. 1 766	+	-	-	-	+
Pelmatohydra oligactis	+	-	-	-	+
TURBELLARIA					
Aphanastoma diversicolor (lersted	+	-	-	-	-
Promesosloma bilinealum Per.	+	-	-	-	-
Proxenetes plebeius Bekl.	+	-	-	-	-
P. lictor Bekl.	+	-	-	-	-
Polycyslis intubata (ir. var.erythrea Bekl.	+	-	-	-	-
P. tripalmata Bekl.	+	-	-	-	-
Phaenocora salinarum (dr.) var. subsalsa Bekl.	+	-	-	-	-
Solenopharynx obecatus Per.	+	-	-	-	-
Koinocystis spinosa Bekl.	+	-	-	-	-
Phonorhynchus mamertimus (Gr.)	+	-	-	-	-
Plagiastomum giardi (O. Schm.)	+	-	-	-	-
Monoophorum graffi Beauch.	+	-	-	-	-
M. eatinosum Bekl.	+	-	-	-	-

M. granulosum Bekl.	+	-	-	-	-
Monocelis lineata (O.F.Muller)	+	-	-	-	-
M. longipes Cir.	+	-	-	-	-
M. agilis ((iragg)	+	-	-	-	-
M. aff. unipunctata (Fabricius)	+	-	-	-	-
Procenodes lobata (). Schm.	+	-	-	-	-
Dendrocoelum lacleum (O.F.Muller)	+	-	-	-	+
U. ingulensis	+	-	-	-	i
Leptoplana tremellaris (O.F.Muller)	+	-	+	-	-
St\ lochus tauricus Yacubova	+	-	-	-	-
Stylochoplana maculata (Ouatrefages)	+	-	-	-	-
Paleodendrocoelum romanodanubialis Codreanu	+	-	-	-	+
Turbellaria g. sp.	+	+	+	+	+
NEMERTINI					
Cephalotrix linearis iRatlike, 1799)	+	-	-	-	-
Linens laeteus (Rathke, 1843)	+	-	-	-	-
Cerebratulus ventrosuleatus Burger, 1892	+	+	-	-	-
C. marginalus /Renter, 1804)	+	-	+	. -	-
Micrura faseiolata Ehrenberg, 1831	+	+	-	-	-
Emplectoneina graeile (Johnston, 183~)	+	-	-	-	-
Prosorehoehinus elaparedi Keferstein. 1862	+	-	-	-	-
8 Oerstedia dorsalis lAbildgard. 1806) -	+	-	-	-	-
Amphiponts pulcher (Johnston, 1828) + - -	+	-	-	-	-
Tetrastenima melanoeephalum /Johnston. 183")	+	-	-	-	-

Prostoma graecense (Bohmig, 1892)	+	-	-	-	-
Malacobdellagrossa (O.F.Muller, l~~6)	+	-	-	-	-
Nemertini g.sp.	+	+	+	+	-
POLYCHAETA					
Phvllodoce paretli (Hlainvil/e. 1849)	+	+	+	-	-
Ph. tuberculoid Bobretzky, 1868	+	+	+	-	-
Ph. nana Saint-Joseph, 1901	+	-	+	-	-
Ph. lineata (Claparede. 1870)	+	+	+	-	-
Ph. maculata (I... 1 ~58)	+	+	+	-	-
Ph. mucosa Oersted, 1843	+	+	+	+	-
Fulalia viridis (Midler, 1863)	+	+	+	-	-
li. sanguined (Oersted, 1843)	+	-	+	-	-
hi limbata Claparede, 1868	+	-	+	-	-
li. macroeeros Grube, 1860	+	-	+	-	-
liteone picta OuatreJages. 1865	+	+	+	-	-
Mystides limbata (Saint-Joseph, 1888)	+	-	S	-	-
Harmothoe imhricata (L., 1767)	+	+	+	+	-
11. reticulata Claparede, 1870	+	+	+	+	-
Lagisca extenuata (Grube, 1840)	+	-	s	-	-
Sthenelais boa (Johnston, 1865)	+	-	+	-	-
Pholoe synophthalmica Claparede, 1868	+	+	+	-	-
Praegeria remola Southern, 1914	+	-	s	-	-
G/vcera tridactvla Schmarda. 1861	+	.	+	-	-
G. alba Ratlike, 18~0	+	+	+	-	-

Goniada bobretzkii Annenkova, 1929	E	-	+	-	-
Syllis gracilis Grube, 1840	+	+	+	-	-
S. prolifera Krohn, 1852	+	+	-	-	-
S. variegata Grube, 1863	+	-	s	-	-
S. hyalina Grube. 1863	+	-	+	-	-
Syllides longicirrata Oersted. 1843	+	-	s	-	-
Pterosyllis formosa Claparede. 1863	+	-	-	-	-
I'ionosyllis pulligera Knohn. 1852	+	-	+	-	-
Exogone gemmifera Pagebstecheri, 1884	+	+	+	-	-
Sphaerosyllis erinaceus ('laparede, 1863	+	+	-	-	-
S. hulbosa Southern, 1914	+	-	+	-	-
Gritbea limbata Claparede, 1868	+	+	+	-	-
G. elavata (Claparede, 1863)	+	+	+	-	-
Autolyttts aurantiacus Claparede, 1868	+	-	s	-	-
Microphthalmia similis bobretzky. 1870	+	+	-	-	-
M.jrogilis Bobretzky, 1870	+	-	+	-	-
l.ycastopsis pontica (Bobretzky. 18~2)	+	+	+	-	-
Nereis succinea keuckart. 1847	+	M	+	+	+
N. diversicolor O.F.Muller, 1~"6	+	M	+	+	+
N. rava Ehlers, 1868	+	s	-	-	-
N. zonula Malmgren, 186~	+	+	+	-	-
N. fucata (Savigny, 1821)1	+	-	+	-	-
N. longissima (Johnston, 1865)	+	-	+	-	-
Perinereis cultrifera (Grube, 1840)	+	+	+	-	-
Platynereis dumerilii (Audouin et M -Edwards, 18341	+	+	+	-	-

Nephthys hombergii Audouin et M.-Edwards, 1834	+	+	+	+	-
N. cirrosa Ehlers, 1868	+	+	+	+	-
N. eiliata (O.F Midler. 1"6)	+	-	+	-	-
Micronephthys stammeri (Augener. 1932)	+	+	+	-	-
Sphaerodoritm elaparedii Greeff, 1866	+	-	-	-	
Eunice villain (Delle Ghiaje, 1841)	+	+	+	-	-
l.vsidice ninella Audouin el M-Edwards, 1834	+	-	+	-	-
Nemalonereis unicornis (Grube, 1840)	+	-	s	-	-
Slauroeephidus ke/ersleini Mcintosh. 1X69	+	+	+	-	-
S. rudolphd (Delle Ghiaje. 1841)	+	+	+		-
S. rubrovillatus Grube. 1855	f	-	+	-	-
Nerinides Iridenlala Southern. 1914	+	+	+	-	-
N. cantahra Riojo. 1919	+	-	-	-	-
Aricidea lalreillii Audouin et M.-Edwards, 1834	+	-	-		
Nainereis laevigata (Grube. 1851)	+	-	+	-	-
Scolelepis eiliata Kejerslein. 1862	+	-	+		
S. fuliginoso Claparede, 1868	+	-	+		
haoniee eirrato Sars, 1861	+	-	-	-	-
A anodes paucibranchiola Southern. 1914	+	+	+		
A oxyeephalo (Sars. 18'21	+	-	+	-	-
Microspio mecznikowianus (Claparede. 1869)	+	-	+	-	-
Serine eirratidus (Delia ('hiaje. 182')	+	+	+	-	-
Spio fdicornis (O.F.Muller. I "6)	+	+		+	-
I'\gospio elegans Claparede. 1863	+	-	+	-	-
Rolydora eiliata (Johnston. 1838)	+	-	+	-	-

P. eiliata limicola Annenkova, 1934	+	M	-	+	-
Prionospio cirrifera Wiren, 1883	+	+	+	-	-
P. mahngreni Claparede. 1868	+	-	+	-	-
Magelona minuta Eliasson. 1962	+	-	+	-	-
Aricidea claudiae Laubier, 1965	+	+	+	-	-
Audouinia tentaculata (Montagu. 1828)	+	-	+	-	-
Tharix marioni (Saint-Joseph, 1894)	+	-	s	-	-
Heterocirrus caput-esocis Saint Joseph. 1894	+	-	-	-	+
1 leterocirrus sp.	+	-	+	-	-
Ophelia bicornis Savigny, 1820	+	-	-	-	-
O. limanica (Rathke, 1843)	+	-	+	-	-
Polyophthahnus pictus (l)ujardin. 1839)	+	-	+	-	-
Heteromastus fdiformis (Claparede, 1864)	+	+	+	+	-
Capitella capitata europaea Wuliao-hing, 1964	+	+	+	+	-
Capilomastus minimus (Langerhans, 1880)	+	+	+	+	-
Xolomastus pröfundus Pisig. 188"	+	-	+	-	-
Arenico/a marina (L., 1 "58)	+	-	+	-	-
A. grubii Claparede, 1863	+	-	+	-	-
Clymene collar is (Claparede, 1868)	+	-	+	-	-
90 heiochone clypeata Saint-Joseph, 1894	+	+	+	-	-
Sabellaria taurica (Rathke, 183~)	+	+	+	-	-
Pectinaria belgica Pallas. I "8	+	+	+	-	-
P. koreni Malmgren, 1865	+	+	+	-	-
Melinna palmata Grube, 1869	+	M	+	+	-
Hypania invalida (Grube, 1860)	R	M	-	+	+

Hypaniola kowalewskii (Grimm, 18")	R	M	-	-	+
Terebellides stroemi Sars. 1861	+	M	+	-	-
Amphitrite gracilis (Grube. 1866)	+	+	+	-	-
Polycirrus caliendrum ('laparede. 186V	+	+		-	-
P.juhatus Bobretzky, 1868	+	-	+	-	-
Pabricia sahella (Ehrenberg. 183")	+	+	-	+	-
Manajuncia caspica Annenkova, 1929	R	-	-	-	-
Oriopsis armandi (Claparede. IS64)	+	-	+	-	-
Vermiliopsis infundibulum (Philippi, 1844)	+	-	-	-	-
Pomatoceros triqueter (1... 1 "6")	+	!	+	-	-
Spirorbispusilla Rathke. 183"	+	+	+	-	-
S. corrugatus Montagu. 1803	+	-	+	-	-
S. militaris (Claparede. 1868)	+	-	+	-	-
S. pagenslecheri Ouatrejages. 1865	+	-	+	-	-
Protodrilus flavoeapitatus (1 Ijanin, 18"")	+	-	+	-	-
P. purpureas (Schneider. 1868)	+	-	t	-	-
Nerilla antennata Schmidt. 185~	+	-	+	-	-
Saccocirrus papillocercus Bobretzky, 18" 1	+	-	+	-	-
Polygordius neapolitanus Fraipont var. ponticus Zalensky, 1882	+	-	+	-	-
OLIGOCHAETA					
Stylaria lacustris (I... 1 "6")	+	-	-	-	+
Enehytraeus albidus llenle. 183"	+	-	-	-	+
E vermicularis Grimm, 18~6	+	-	-	-	-
Paranais litoralis (Midler. 1~84)	+	-	-	-	-

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/'. simplex Urate. 1936	R	-	-	-	+
P. mullisetosa Finogenova	1.	-	-	-	+
P.friet Urate. 1941	R	-	-	<	+
Ilyodrilus easpicus (Lastockin, 193")	R	-	-	-	-
1. heuscheri Bretscher. 1900	+	-	-	-	+
S'ais elingius Muller, l~~3 + - - *	+	-	-	+	+
.V. barbata Muller. Γ~3	+	-	-	-	+
\ variabilis tl'iguet. 1906,	+	-	-	-	+
Ophidonais serpentina (Muller, 1"3)	+	-	-	-	+
('haetogaster limnaei Baer, I82~	+	-	-	-	+
Isiieliaeliiles mieliaelseni 11'.astockin, 1936)	+	-	-	-	+
1. newaensis (Mieliaelsen)	+	-	-	-	+
Limnodritus hoffmeisteri (laparede, IS62	+	M	-	-	+
L he/vet tens Piguet, 1913	+	-	-	-	+
1. udekemiamts Claparede, 1862	+	M	-	-	+
L. pröfundicola (\'errillj	+	-	-	-	+
1. claparedeanus Panel. 1868	+	-	-	-	+
Pntamothrix hammoniensis (Mieliaelsen. 1901)	+	M	-	-	+
P. moldaviensis I'ejdavsky et Mrazek. 1902	+	-	-	-	+
Psammoryetides harhatus (Grube, IH61)	+	-	-	-	+
P alhieola (Mieliaelsen. 1901)	+	-	-	-	+
P. dcscrticolu /Grimm. IS~8)	R	-	-	M	+
P. dcserticala ssp. lastoekini	M	-	-	-	+
Tubifex lutifex 1Muller, 1 "3)	M	-	-	-	+
1. costatus /Claparede, IS63)	+	-	-	-	+

Tubificoides svirencccovi Jaroschenko, 1948	i;	-	-	+	+
Eiseniella tetraedra (Savigny, 1826)	+	-	-	-	+
. [ulodrilus limnobius Bretscher, 1899	+	-	-	-	+
Branchiura sowerbyi Beddard, 1892	+	-	-	-	+
Pelosco/ex ferox (Eisen, 1879)	+	-	-	-	+
P. svlrenkoi (Jaroschenko. 1948)	+	-	-	-	+
Proppapus volki Michaelsen, 1915	+	-	-	-	+
Oligochaeta g. sp.	+	+	+	+	-
HIRUDINEA					
P/scicola geomelra (I.., 1 61)	+	-	-	-	+
P. fasciata (Kollar, 1842)	E	-	-	-	
Erpobdella octoculata (I... 1758)	+	-	-	-	+
E. lineata (OPMuller)	+	-	-	-	+
Glossiphonia complanata (I... 1~58)	+	-	-	-	+
G. heleroclila (I... Г6I)	+	-	-	-	+
('aspiobdella JadeJewi (Epspein. 1961)	R	-	-	-	+
('ystobranchus fasciatus (Kollar, 1842)	+	-	-	-	+
Herpobdella nigricollis (Brandes, 1900)	+	-	-	-	i
II. octoculata (1... 1758)	+	-	-	-	+
Hirudo medicinalis L.. 1~58	+	-	-	-	+
Haemopis sanguisuga (I... 1 '58)	+	-	-	-	+
Hemiclepsis marginata (O.F.Muller, 1 ~~4)	+	-	-	-	+
Batracobdellapaludosa (('arena. 1823)	+	-	-	-	+
Haementeria costala (O.F.Muller, 1846)	+	-	-	-	+

BRYOZOA					
('onopciini senrati l('ami. 1928)	+	M	+	+	-
Membranipora pilosa (I... I~6~)	+	-	-	-	-
\l zostericola (Sorilman. 1840)	+	-	-	-	-
Lepralia turgenevi fOstroumow, 1886)	+	-	-	-	-
/.. pallasiana (Moll. 1803)	+	-	-	-	-
Schizoporella auriculala llassall. IS4I	+	-	-	-	-
Scrupocellaria bertholletii Aud. var. capreolus Hell., 186"					
Howcrhankia gracilis l.eidi. 1855	+	-	+	-	-
I'lumalella Jiuigosa 1'a lias	+	-	-	-	+
P. emarginata Allman	+	-	-	-	+
P. frulicosa Allman	+	-	-	-	1
P. repens I... 1767	+	-	-	-	+
Palludicella articulaia (Ehren.)	+	-	-	-	+
PHORONIDEA					
Phoronis euxinicola Saint-Long. 190"	+	+	+	-	-
Phoronidca g. sp.	-	-	+	-	-

PHYLLOPODA					
Artemia salina L., 1 58	+	-	-	+	-
CIRRIPED1A					
Balanus improvisus Darwin, 1854	+	M	+	+	-
B. ebumeus Gould, 1841	+	-	+	-	-
B. amphitrile hawaiensis Brocb.	+	-	-	-	-
Chthamalus stellatus (Poll, 1791)	+	-	-	-	-
Verruca spengleri Darwin, 1854	+	-	-	-	-
DECAPODA					
llyppolylc longirostris fCzemiavsky, 1869)	+	+	+	-	-
11. biennis Leach, 1815	+	-	+	-	-
Lysmata seticaudata (Risso, 1816)	+	-	+	-	-
Alpheus dentipes Guerin. 1832	+	-	s	-	-
Alhanas nitescens Leach, 1814	+	+	+	-	-
Palaemon elegans Rathke. 183~	+	+	+	+	-
P. adspersus Rathke, 183"	+	+	+	+	-
Crangon crangon ft.., 1 "58)	+	+	+	+	-
Pontophilus trispinosus Hailstone, 1835	+	-	s	-	-
P. fasciatus Risso, 1816	+	-	s	-	-
Processa edulis Risso. 1816	+	-	s	-	-
Astacus astacus L., 1 "58	+	-	-	-	+
Pontastacus leptodactilus Eschscholtz, 1823	R	-	-	-	+

P. pachypus Rathke, 183"	+	-	-	-	+
P. cubanicus Birslein et W'uiogradow, 1934	+	-	-	-	+
P. eichwaldi hcssarabicus Hrodski. 196"	+	-	-	-	+
Homarus gammarus L., 1~58	+	-	s	-	-
l'pogebiapusilla tPetagna. I~92)	+	+	+	-	-
I" Callianassapeslai De-Man. /939	+	+	+	-	-
18 C. tnoteata (Hard el Bonnier. /890	+	-	+	-	-
19 Diogenes pugilator Rous, 1828	+	+	+	-	-
C/ihanarius erythropus hatreille. IS/8	+	-	+	-	-
Pisidia longimana (Risso. 1815)	+	+	+	-	-
Maeropodia longirostris (Fabricius, l~98)	+	-	s	-	-
M. roslrala (1... Г61)	+	-	s	-	-
Pirimela dentieulala Montagu, 180S	+	+	s	-	-
Carcimts aesluarii (mediterraneus) Sordo. 184"	+	+	+	+	-
Maeropipus areuattts (Leach. 1S14)	+	s	+	-	-
\1 depurator (h., 1~~6)	+	+	+	-	-
M holsalus Fabricius, 1~98	+	-	-	-	-
Piiumnus hirlellus (1... Г58)	+	s	+	-	-
Friphia verrucosa L'orskid. I"5	+	-	s	-	-
Xanllio poressa (Olivi. 1 "92)	+	s	+	-	-
Rhithropanopeus harrisi Iridentata (Mailland. 18"4)	1	+	+	+	-
Brachvnotus se.xdenlalus Risso. 182"	+	+	+	-	-
Pachygrapsus marmoralus (Fabricius, 1 ~93)	+	-	s	-	-
Portumnus talipes (Pennant. 1)	+	-	s	-	-
Potamon tauricum Czerniavsky, 1884	+	-	-	-	s

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ANISOPODA					
Apseudopsis ostroumovi Bacescu et Carausu. 194	y	+	+	-	-
Leptoehelia savignyi (Kroyer, 1842)	+	+	+	-	-
ISOPODA					
Limnoria tuberculata Sowinsky, 1884	+	-	-	-	-
Eurydice spinigera Hansen. 1890	+	+	-	-	-
E. racovdzai Baceseo. 1949		+	+	-	-
/•;. dolt/us i Monod, 1930	+	+	+	-	-
Xaesa hidenlala (Adams. 1800)	+	-	+	-	-
Sphaeroma serralum (Fabricius, 1 ~8')	+	-	+	-	-
S. pulehelliim (Colosi, 1921)	+	M	+	+	-
Cymodoce erythraea euxiniea Baceseo. 1959	E	-	+	-	-
Idotea baltica basteri Audouin. 182"	+	M	+	+	-
Synisoma capita (Rathke. 183")	+	+	+	-	-
Tylos ponticus Orebnitzky. 18"4	+	+	-	-	-
Jaera sarsi 1 *'alkanov, 1936*	+	M	-	+	+
J. sarsi caspica Kesselyak	+	-	-	-	+
J. nordmanni (Rathke, 183")	+	-	-	-	-
Ligia italica Fabricius, 1 "98	+	+	+	-	-
Onathia monodi Bacescu, 1960	+	+	+	-	-
G. o.xyurae (Lilljeborg, 1853)	+	-	+	-	-
Asellus aquaticus L., 1 "58	+	-	-	-	+

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CUMACEA					
Schizorhynclnts eudoix'lloides (CO.Sars, 1894)	R	+	-	+	+
Seh.seabriusculus (C,.O Sars, 1894)	R	-	-	-	M
Sch. scahricidas typica (GO.Sars, 1895)	R	-	-	-	+
I'terociuna rostrala (GO.Sars, 1894)	K	+	-	-	+
P pectinata (Sowinskyi. 1894)	R	+	-	+	M
PsL'udocuma eiliata GO.Sars, 18"9	+	-	+	-	-
/' longicormspontica Hoivscii, 19.VI	+	-	+	-	-
8 P. cercaroides Sars	+	-	-	-	+
9 P. tenuicauda (Sars. 1893)	R	-	-	-	+
lo/goeuina lelnmitopliora Derzliavin. 1912	R	-	-	-	+
Slenociana gracilis (Sars)	R	-	-	-	M
S. graciloules (Sars)	R	+	-	+	M
S. levis (G. O Sars. 1914)	R	-	-	-	+
('aspiocuma campylaspoides Sars, 189"	R	-	-	+	+
Boclotriu arenosa mediterranea (Slener. 1938)	+	+	+	+	-
Iphinoe maeotica /Sowinskyi. 1893)	K	+	+	+	-
1. tenella GO Sars. 1873	+	+	+	-	-
1. elisac Bacescu. 1950	i:	+	+	-	-
Cuinopsis goodsiri (Pan Beneden. 1868)	+	+	+	-	-
Cumella limicola GO.Sars, I8~9	+	+	+	-	-
C pygmaea euxinica Bacescu. 1950	E	+	-	-	-
Eudorella Iruncatula (Bale, 1856)	+	+	+	-	-

Callinectes sapidus Rcithhun, 1896	I	-	S	-	-
MYSIDACEA					
Siriella jaltensis jaltensis (zerniavsky, 1868	+	-	+	-	-
Gastrosaccus sanctus (Van Beneden, 1861)	+	+	-	-	-
Leptomysis sardica pontica (Czerniavsky, 1882)	+	-	+	-	-
Hemimysis anomala GO.Sars, 1907	R	-	-	-	-
11. lamornae pontica Czerniavsky, 1882	E	-	-	+	-
Diamysis hahirensis meeznikmii (Czerniavsky, 1882)	+	+	-	+	-
D. pengoi (Czerniavsky, 1882)	E	-	-	-	+
Mesopodopsis slabheri (I 'an Beneden. 1861)	+	+	-	-	-
Limnomysis henedeni Czerniavsky, 1882	R	-	-	-	+
Paramysis lacustris (Czerniavsky. 1882)	R	+	-	-	-
P. lacustris tanaiea (Martynov. 1924)	+	-	-	-	+
P. nil sky i (Czerniavsky, 1882)	R	-	-	-	+
P. kroyeri (Czerniavsky, 1882)	E	+	-	+	-
P. agigensis Bacescu, 1940	E	-	-	+	-
P. intermedia (Czerniavsky, 1882)	R	-	-	-	+
P. pontica Bacescu, 1940	E	+	-	+	-
P. sarsi Derzhavin, 1925	+	-	-	-	+
P. baeri Czerniavsky	+	-	-	-	+
P. baeri hispinosa Martinov. 1924	R	-	-	-	+
Katamysis warpachovvskyi Czerniavsky. 1882	R	-	-	-	+

AMPHIPODA					
Orchomene humilis (A.Costa, 1853)	+	+	+	-	-
Ampelisca diadema . **1** *(Oslo, 1853*	+	+	+	+	-
Bothyporeia guilliamsoniana (Hale. 185")	+	+	-	-	
Slenothoe monocidoides (Montagu. 1815)	+	+	+	+	-
Perioculoides longimonus (Bate et Weslwood, 1868)	i	+	+	+	-
Apherusa bispinosa (Bale. 185")	+	+	+	-	-
Synekelidiuin inoculation Stabbing, 1906	+	+	+	-	-
Monocidoides gibbosum ('hevreux. 1900	+	+	+	-	-
Xotolropis gultatus (A.Costa. 1851)	+	+	+	-	-
Canunarus sitbtypicus Slock, 1966	t	+	-	-	-
C. oei/uicauda Mart, 1931	+	+	-	+	-
C. insensihilis Slock. 1966	+	+	i	+	-
Ci. lacustris (it).Sars	+	-	-	-	+
(i. zadcinchi Sexton, 1912		-	-	-	+
Marmogc. nnarus morinus Leach, 1815	+	-	-	-	-
M. olivii M.-Edwards, 1830	+	+	+	+	-
Caiuniarellus carinalus (Rathke, 183")	E	-	-	-	-
Megaluropus agilis lloek, 1889	+	-	-	-	-
Media palmetto (Montagu. 1804)	+	+	+	+	-
Cardiophilus baeri GO.Sars, 1896	к	+	+	+	+
Chaetogammarus ischnas (Stehhing. 1898)	R	-	-	-	M
Ch ischnus hehningi Martynov, 1919	R	+	-	-	-
Ch. placidus GO.Sars. 1895	к	-	-	+	+

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Ch. warpachowskyi (CO.Sars. 1894)	R	-	-	+	+
Niphargoides deminutus (Stebbing)	R	-	-	-	+
S. intermedins S.Carausu. 1943	R	-	-	-	\I
N. spinicaudalus S.Carausu. 1943	R	-	-	-	+
N. vcdaehieus Dohreanu et Manolaeke. 1933	R	-	-	-	+
Amathdlina pusilia CO.Sars	+	-	-	-	+
A. eristata G.O.Sars, 1894	+	-	-	-	+
Iphigenella aiulrusowi CO.Sars. 1896	R	-	-	-	}
Gmelina costata (G.O.Sars. 1894)	+	-	-	-	+
C. costata aestuarica S.Carausu. 1943	R	-	-	-	+
G. pusilia GO.Sars. 1896	R	-	-	-	+
35 Gmelinopsis tuherculata G.O.Sars, 1896	R	-	-	-	+
Dikerogammarus vdlosus (Sowinskyi, 1894)	R	+	-	+	+
I), haemobaphes (Eichwald, 1841)	R	-	-	+	M
I) haemobaphesfluviatilis A. Martynov. 1919	R	-	-	-	+
I'ontogammarus inaeoticus (Sowinskyi. 1894)	R	M	-	+	+
P. erassus (G.O.Sars. 1894)	R	-	-	-	M
P obesus (G.O.Sars. 1896)	R	-	-	-	+
P. subnudus (G.O.Sars, 1896)	R	-	-	-	+
P. rohustoides (Grimm, 1894)	R	-	-	+	\I
P. ahhreviatus (Sars)	R	-	-	-	+
P. sarsi (Sowinskyi. /898)	R	-	-	+	+
P weidmani (G.O.Sars. 1896)	R	-	-	+	+
Stenogammarus com/>ressus G.O.Sars. 1894	R	-	-	+	+
S macrurus (G.O.Sars, 1894)	R	-	-	-	+

S. similis (G.O.Sars, 1894,	R	-	-	+	+
Tritaeta gibbosa (Bate, 1862)	+	-	-	-	-
Dexamine spinosa (Montagu. 1813)	+	+	+	+	-
Orehestia gammarella (Pallas, 1~66,	+	-	-	-	-
O. montagui Audouin, 1826	+	+	-	-	-
O. bottae M.-Edwards, 1840	+	+	-	+	-
Talorchestia deshayesii (Audouin, 1826)	+	+	-	-	-
1 hale pontica Rathke, 183~	+	+	+	-	-
11. perieri (Lucas, 1846)	+	-	+	+	-
11. prevostii (M.-Edwards. 1830)	+	-	-	-	-
II. dollfusi Clievreux, 1911	+	-	+	-	-
Coremapus versiculatus (Bate. /856)	+	+	-	-	-
Microdeutopus grylloialpa . IX 'osta, 1853	+	+	+	+	-
M. stations Delia **1** *(die. 1893*	+	-	-	-	
\1. damnoniensis /Bale. 1850)	+	+	+	-	-
M. anomalus (Rathke, 1843)	+	+	+	-	-
Microprotopus minutus Sowinskyi, 1893	E	+	-	+	-
Mcgamphopus commits Sorman. 1809	+	+	-	-	-
Biancolina funiculus (Stebbing, 18~4)	+	-	+	-	-
Pleonexes gummaroides Bate, 185"	+	-	+	-	-
Amphithoe vailland Lucas, 1846	+	+	+	+	-
Grubia crassicornis (A. Costa, 185~)	+	-	-	-	-
Siphonoecetes del/aval let Stebbing. 1899	+	-	-	-	-
Jassa ocia (Bate, 1862)	+	+	+	+	-
Erichthonius difformis M.-Edwards, 1830	+	+	+	+	-

Corophium crass/come Bruzelius, 1859	+	+	+	-	-
C. bonelli (M.-Edwards, 1830)	y	+	-	+	-
C. runcicorne Delia Ialle, 1893	y	+	+	-	-
C. robustum G.O.Sars, 1895	R	-	-	-	M
C curvispinum G.O.Sars, 1895	R	-	-	+	M
('. orientalis (Shellcnherg/Stock, 1960/	R	-	-	+	-
C. validator (Pallas, Г66/	R	+	-	+	M
C nobile G.O.Sars. 1S95	R	+	-	-	M
C. maeoticum Sowinskyi, 1898	R	+	-	-	+
C imicronatuin Sowinskyi, 1894	R	-	-	-	+
C. chelicome G.O.Sars, 1895	R	-	-	-	M
Chelura terebrans Philippi, IS39	+	-	-	-	-
Phtisica marina Slabber, 1 "8	+	+	+	-	-
Pseudoprotella phasma (Montagu, 1804)	+	-	+	-	-
Caprella acanti/era Leach, 1814	+	-	+	-	-
C. aeanti/era variabilis A.Cora usu et S.Carausu, 1959	+	+	-	-	-
G. aeanti/era jerox (Czerinavski, 1868) +	+	+	+	-	-
('. liparotensis Holler, 1879	+	-	+	-	-
C. donilevskyi Ciernjavski, 1868	+	-	-	-	-
C. mitts Mayer, 1890	+	-	+	-	-
PA1NTOPODA					
Callipallene brevirosris /Johnston. I83~)	+	-	-	-	-
C. phantoma (Dohrn, 1881/	+	+	+	-	-
Anoplodactylus petiolalus /kfoyer. 1844)	+	-	+	-	-

B. leaehi (Seheppard. 1823)	+	-	-	-	+
Boristhenia naticina (Menke)	+	-	-	-	+
Choanomphalus rossmaessleri lSchmidt)	+	-	-	-	+
Lithoglyphus naticoides Pfeıffer, 1828	+	-	-	-	ΙΥΙ
Turricaspia variabilis (Eichwald, 1838)	R	-	-	-	+
1. caspla lincta (Milaclievitch. 1908)	R	-	-	-	+
Truncatella subcylindriea (1... 1 "58)	+	+	+	-	-
T. montagui I.owe, 1831	+	+	-	-	-
Melaraphe neritoides (h.,l~5~)	+	-	+	-	-
Caecum elegans Perejaslavtsevu, 1891	+	-		-	-
('alvptraea chalcosis /1... 1 '58)	+	+	+	-	-
Cerithidium pusillum (Jeffreys, 1856)	+	+		-	-
Billiiim reticidalitm (('osla, 1 ~99)	+	i	+	-	-
Ceriihium vulgatum Bruguiere, 1789	+	-	+	-	-
('erilhiopsis minima (Brasilia, 1864)	+	+	+	-	-
(' suhulata (Wood. 1850)	+	-	-	-	-
C tubercularis (Montagu, 1803)	+	-	+	-	+
Triphora perversa (L., 1'58)	+	+	+	-	+
T. parva (Milaehcvitch, 1909)	+	+		-	+
P. obestda Buccpioy, Daittzenberg et Dollfus, 1884	+	-	-	-	+
Tritia reticulata (L., 1 ~58)	+	+	+	-	-
Sana neritea (L.,1 '58)	+	-	+	-	+
S. donovani (Risso, 1826)	+	-	+	-	+
Rapana thomasiana thomasiana Crosse. 1861	I	+	+	-	+
1 rophonopsis breviata (Jeffreys, 1882)	+	-	-	-	+

H. *aciculina (Bourguignat, I8~6)*	E	-	-	4-	-
II. salinasii ((alcara et Arciclas, 1845,	E	-	-	+	-
H. *procerula paladilche Paladilche, 1869*	1	-	-	+	-
H *ventrosa Montagu*	+	-	-	+	+
Samisalsa modessieri (Bourguignat, 1876)	E	-	-	-	+
Pseudopaludinella arenalum I Bourguignat. 1876)	E	-	-	-	+
P. leneumiera (Bourguignat. 1S~6)	E	-	-	-	+
Fagotia esperi Ferussac, 1832	E	-	-	-	+
F. acicularis Ferussac. 1832	E	-	-	-	+
Physa taslei Bourguignat. infill	E	-	-	-	+
Lymnaea stagnalis L.. I~58	+	-	-	-	+
L. auricularia ***I...*** *I~5H*	+	-	-	-	+
Radix ovata tDraparnaud, 1805)	+	-	-	-	+
R. lagotis (Scdrank, 1803)	+	-	-	-	+
R pereger (). F. Muller, 1 "4)	+	-	-	-	+
Galba (Stagnicola) palustris (O.F.Muller, 1 "4)	f	-	-	-	+
G. glabra (O.F.Muller, 1774)	+	-	-	-	+
G. truncatula (O.F.Muller, 1774)	+	-	-	-	+
Physa loiiliualis ***(I...*** *1 ~58,*	+	-	-	-	+
Ph. acuta Draparnaud, 1805	+	-	-	-	+
Planorbis carinatus O.F.Midler. 17'4	+	-	-	-	+
P planorbis (L. Γ58)	+	-	-	+	+
Planorbarius grandis I... 1 ~58	+	-	-	-	+
P. corneus (1... 1 ~58)	+	-	-	-	+
AncylusJluviatilis O.F.Muller, (L., Γ58)	+	-	-	-	+

Anisus se/iienigiralus (Rossmacsslci; 1835)	+	-	-	-	+
A. spirorbis (L., 1758)	+	-	-	-	+
A. (Spiralina) vortex (1... l~58)	+	-	-	-	+
A. (S.) vorticulus (Troschel. 1834)	+	-	-	-	+
A. (Bathyomphalus) contorius (I... 1~58)	+	-	-	-	+
. trmigar crista (L., 1 ~58)	+	-	-	-	+
G. gredleri (Rich) (livelier, 1853	+	-	-	-	+
Segmentina nitida (O.F.Midler, 1 "41	+	-	-	-	+
Acroloxus lacustris (i., 1 ~58)	+	-	-	-	+
Succinea putris L., 1758	+	-	-	-	+
S elegans Risco. 1826	+	-	-	-	+
S oblonga Draparnaud, 1801	+	-	-	-	+
I'ertigo antivertigo (Draparnaud, 18(11)	+	-	-	-	f
Goniodiscus ruderalus Stader. 1820	1	-	-	-	+
Oxycbilus gletber (Stud.) Fer. 1822	+	-	-	-	+
Zenobiella incarnata O.F.Muller, 1 "4	+	-	-	-	+
Viviparus ater (Stag.)	+	-	-	-	+
V. contectus (Millet. 1813)	+	-	-	-	+
1'. viviparus I... 1 ~58	+	-	-	-	M
Valvata piscinalis (Mull)	+	-	-	-	M
1'. planorbulina Palodilne	+	-	-	-	+
Г. *pulcbetla Studer. 1820*	+	-	-	-	+
Г *cristata O.F.Muller, I"4*	+	-	-	-	+
V. naticina Meke, 1845	+	-	-	-	+
Bithynia tentaculata (1... 1 '58)	+	-	-	-	+

lanystylum coniroslre (Dohrn, 1881)	+	-	+	-	-
LORICATA					
Lepidochitona cinerea (L., 1 6)	+	+	+	-	-
Acanthochitona fascicularis (L., 1767)	+	-	S	-	-
GASTROPODA					
Patella tarenlina Salts, 1 "93	+	-	+	-	-
Tricolia pull a (P., 1~58)	+	+	+	-	-
Gihbula dixarieata (I... l~58)	+	+	+	-	-
G. albida (Gmelin, I "90)	+	-	+	-	-
G adrtaltea tPltilippi. IS44)	+	+	+	-	-
Theodoxus jluviatilis (P., 1~58)	+	+	-	-	+
P. euxinus (Glessin, 1885)	R	+	-	-	-
T. danubialis G.Pfeiffer, 1821	E	-	-	+	+
Rissoa splendida Eichwald, 1830	+	+	+	-	-
R. xenusta Plulippt, 1844	+	+	-	-	-
R. ruftlabrum Alder, 1815	+	-	-	-	-
R. membranacea Adams, 1797	+	+	+	+	-
Mohrensternia parva (('osta, 1 ~~9)	+	+	+	-	-
XI. lineolata (Xltehaud, 1882)	+	+	+	+	-
Sella valvatoides Xldaehevitch, 1909	+	+	+	+	-
Hydrobia leneumicra (Bourguignat, I8~6)	+	-	+	-	-
11. maritima Xldaehevitch, 1916	+	-	-	-	-
H. acuta (Draparnaud, 1805)	+	+	+	+	-

Cytharella costata (Pennant, 1 ~6~i	+	+	-	-	+
Bela nebula (Montagu, 1803)	+	-	-	-	+
Odostomia rissoides Hartley, 1844	+	+	-	-	+
(). pallida (Montagu, 1803)	+	-	+	-	+
0. albella (Loven.J	+	-	+	-	+
O plieata (Montagu. 1809)	+	-	-	-	+
Chrysalltda incerta Milachevitch. 1916	+	-	-	-	+
Parthenina terebellum (Philippi, 1844)	+	+	+	-	+
1' interslincla i Montagu, 1803)	+	-	-	-	+
Turbonilla delicata (Monlerosato. I8~8)	+	-	-	-	+
T. pusilla (Philippi, 1844)	+	-	-	-	+
Belonidium acicttla (Philippi, 1844/	+	-	-	-	-\
Balcis incurva (Renieri, 1804)	+	-	+	-	i
(lathrus aitnulatus (Milachevitch, 1909)	+	-	+	-	+
Retusa trwtcatella (l.oeard, 1892)	+	+	+	+	+
R slriatula (Forbes. 1843)	+	-	+	-	+
(yltchnina variabilis (Milachevitch, 1909)	+	+	+	-	+
C. rohagliana (Fischer, 186')	+	-	+	-	+
Doto coronata (Gmelin, 1890)	+	-	+	-	+
Tenellia adspersa (\ordntan, 1845)	+	+	+	+	+
Tergipes lergipes (Forskal, 1 ~~5)	+	-	-	-	-f
Doridella ohscura I'errill. 18~0	+	1	1	-	+
Ovatella myosolis (Draparnaiul. 1801)	+	4	+	-	+

BIVALVIA					
Gastrochaena dahia (Pennant, 1)	+	-	+	-	+
Galaeteda lactea (L,, 1758)	+	+	+	-	+
Cunearca cornea (Reeve, 1844)	+	I	1	-	+
Mytilaster lineatus (Gmelin, 1 ~90)	+	M	+	+	+
Mytilus galloprovincialis Lamarck, 1819	+	M	+	+	+
Modiolus phaseolinus (Philippi, 1844)	+	+	+	-	1
M. adriaticus (Lamarck. 1819)	+	+	+	-	+
Ostrea edulis I... 1 "58	+	-	s	-	
O lamellosa Rrocchi. 1814	+	-	-	-	+
Flexopecten ponticus (Bucquoy. Daulzenberg et Doll/us. 1889)	f	s	+	-	+
Thraeia papyracea (Poli, 1791)	+	-	s	-	+
l.ueinella divaricala (L..1 "58)	+	+	+	-	+
Loupes lucinalis (Lamarck.1818)	+	+	+	-	+
Mysella hidentata (Montagu. 1803)	+	+	+	-	+
Erycina nitida (Lurton, 1822)	+	-	+	-	+
Donax trunculus 1... 1 "58	+	-	+	-	+
1). semistriatus Poli. I~91	+	-	+	-	+
Acanthocardia paucicostata (Sowerby, 1859)	+	+	+	-	+
('erastoderma glaucum Poirel, 1 "89	+	+	+	+	+
C. lamarcki lamarcki (Reeve. 1844)	+	+	-	-	+
C. clodiense (Renieri. 1804)	+	+	-	+	+
Parvieardium exigium (Gmelin. 1 ~90)	+	+	+	-	+
Plagioeardium simile 1 Milachevitch. 1909)	+	+	+	-	+

P. papillosum (Poli, Г81)	+	+	-	-	+
Hypanis colorala (Eichwald, 1829)	Rr	-	-	-	+
II. pontica (Eiclrwald, 1838)	R	-	-	-	+
II. plicata relicta (Milachevitch, 1916)	R	-	-	-	+
Couklia minima (Montagu. 1803)	+	+	+	-	+
Pilar rudis (Poli. Г91)	+	+	+	-	+
Irus irus (1... 1 ~58)	+	+	+	-	+
('hamelea gallina (1... 1 '58)	+	+	+	-	+
Polititapes aurea tCnnclin. I '90)	+	+	+	-	+
P. petalina (Lamarck. 1818)	+	+	+	-	+
Petricola lithopltaga (Retzius, 1 '86)	+	-	+	-	+
Spisula triangula (Renieri. 1804)	+	+	+	-	4
S. subtruncata (Costa, l~~8)	+	+	+	-	+
Mactra slultorum (L, 1 758)	+	-	S	-	+
Domicilii! cornea (Poli. I~91)	+	-	-	-	+
A bra ovatu (Philippi. 1836)	+	+	+	+	-
A. nitida milachewichi Xevesskaja, 1963	+	+	+	+	+
A. alba occitanica (Recluz, 1843)	+	+	+	-	+
A renieri (Broun, 1836)	+	+	+	-	+
(iaslrana Jragilis (I... 1 ~58)	+	+	H	-	+
Moerella donacina (I...I '58)	+	+	+	-	+
M. tenuis (Costa, 1 8)	+	+	+	-	+
Fuhitlinii fabula (Gronovius, l'8l)	+	-		-	f
Dreissena polvmorpha polymorpha (Pallas, 1" 1)	R	-	-	-	\1
D. rosloformis bugensis (Andrusov, 189')	R	-	-	-	M

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Solen vagina I... / "58	y	-	-	-	+
Mya arenaria L.. 1 "58	I	|	-	-	+
Lentidium mediterraneum (Costa, 1829)	+	M	-	-	+
I'holas daetylus L.I ~58	+	-	-	-	+
Barnea Candida (1... I ~58)	+	-	-	-	+
Teredo utriculus Cmelin, 1 "90	+	-	-	-	+
T. naval is L.,l "58	+	-	-	-	+
(niopictorum (I... l~58)	+	-	-	-	+
I '. pictorum ponderosum Spilzi in Rossmaessler, 1844	+	-	-	-	+
V. conns boryst/ienieus Kohelt, 18~9	E	-	-	-	+
I '. tuiuidus I'liilipsson, 1 ~88	+	-	-	-	+
Colletopterum ponderosum rumanicum Bourguignat. 1880	E	-	-	-	+
('. subcirculare platlenicum tSerain. 1881)	E	-	-	-	+
Anodonta eygnea (1... I"58)	+	-	-	-	+
A. piscinalis Silsson, 1822	+	-	-	-	i
A. subcircularis C/essin	+	-	-	-	+
Pseudoanadonta complanata (Ziegler in Rossmaessler, 1835)	E	-	-	-	f
P elongata tanousi Bourguignat, 1880	E	-	-	-	+
Pisidium oblusale (Lam.) Jenvns. 1X45	+	-	-	-	+
P. milium Held.. 1836	+	-	-	-	+
ECHINODERMATA					
Slereoderma kirscbhergi I Heller. 1868)	+	-	-	-	4-
Leplosynapta inhaerens (O.Muller, l~~6)	+	-	-	-	+
Oestergrenia sp.	+	-	-	-	+

Synapta hispida Heller. 1868	+	-	-	-	+
Amphiura stepanovi Djakonov, 1954	+	-	-	-	+
TUNICATA					
Eugyra adriatica Drasche, 1884	+	-	+	-	+
Ctenicella appendiculatci (Heller, I8'~i	+	+	+	-	+
Molgula euprocla Drasche. 1884	+	-	+	-	f
Botryllus schlosseri (Pallas, 1776)	+	-	-	-	+
Ascidiella uspersa (Midler. 1 ~~6)	+	+	+	-	+
Ciona intestinalis ~6~)	+	+		-	+
Diplosoma listerianum (Milne - Edwards, 1841)	+	-	-	-	+
ODONATA					
Platyonemispennipes (Pallas, I''I)	+	-	-	-	+
Lestes sponsa Hanseman, 1823	+	-	-	-	!
Ischmira elegans Ian c/er Linden, 1820	+	-	-	-	+
L pumilio Charpenlier, 1825	+	-	-	-	+
Enallagma cyathigerum Charpentier, 1840	+	-	-	-	+
Coenagrion scitulum Rambur. 1842	+	-	-	-	+
Erylhroma najas Hanseman, 1823	+	-	-	-	+
Aeschna isosceles Midler. 1 ~6~	+	-	-	-	+
Anax imperator Leach, 1815	+	-	-	-	+
Gomphns flavipes ('harpentier. 1825	+	-	-	-	+
(i. vulgatissiinus /.., l~58	+	-	-	-	+
Libellula quadrimacidata L., 1 ~58	+	-	-	-	+

Crocothemis erythrea Brulle, 1832	+	-	-	-	+
Sympetrumflaveolum L., 1758	+	-	-	-	+
S. meridionale Selys, 1841	+	-	-	-	+
EPHEMEROPTERA					
Palingenia suhlonglcaiida (Oliver, 1 "91)	+	-	-	-	+
Caenis macrura Stephens, 1835	+	-	-	-	+
C. horaria (I.., 1758)	+	-	-	-	-f
C. laetect Pictet, 1843-1845	+	-	-	-	+
Cloen dipterum (I... I~6l)	+	-	-	-	+
C. rufulum (Muller, 1776)	+	-	-	-	+
Procleon bifidum (Pengtsson, 1912)	+	-	-	-	+
lleplagenia Jlava Rostock, 18"	+	-	-	-	+
11. corulans Rostock, 18"	+	-	-	-	+
HEMIPTERA-HETEROPTERA					
Cymatia eoleoprata (P., 1 "6)	+	-	-	-	+
Mieronecta meridionaiis (Costa. I860)	+	-	-	-	+
Sigara linnei (h'ieh.. 1848)	+	-	-	-	+
S. transversa 1 h'ieh.. 1848)	+	-	-	-	+
S. lateralis (Leach, 1818)	+	-	-	-	+
S iugusiris h'ieh . IS4S	+	-	-	-	+
S. striata (I... 1 5)	+	-	-	-	+
S. fallen! (Pieh., 1848)	+	-	-	-	+
S'epa cinerea I... 1~58	+	-	-	_	+

Ranatra linearis (1... I'58)	+	-	-	-	+
llyocoris cimicoides (I... 1 '58)	+	-	-	-	+
Notonecta glauca L.. 1 ~58	+	-	-	-	+
N. lutea .\ killer. 1 "6	+	-	-	-	+
Flea leachi Mac dreg el Kirk. 1899	+	-	-	-	+
P. minutissiina Leach	+	-	-	-	+
Mesovelia furcata Mills. 1852	+	-	-	-	+
Microvelia schneicleri (Scholtz. 1846)	+	-	-	-	+
(ierris ihoracicus Schuinin. 1832	+	-	-	-	+
G. argentalus Schuinin. 1832	+	-	-	-	+
COLEOPRATA					
Peltodytes caesiis (Duftschmid, 1805)	+	-	-	-	+
Bemhidion assimile Civil	+	-	-	-	
7 achys hislrialus Pk.	+	-	-	-	+
Haliplus ru/icollis (De Geer, I 4)	+	-	-	-	+
H. fluvial, I is Aube. 1836	+	-	-	-	+
H. variegatus Sturm, 1834	+	-	-	-	+
N. Crassicornis (Midler, 1"6)	+	-	-	-	+
Л clavicornis (l)e deer. I"6)	+	-	-	-	+
Laccophilus hyalinus (De Geer, 1"4)	+	-	-	-	+
1. variegatus (German. 1812)	+	-	-	-	+
Hyphydrus ovatus (I... 1'61)	+	-	-	-	+
llydrovatus cuspidatus (Kunze, 1818)	+	-	-	-	+
Bidessus unistrialus (Schrank. 1~8I)	+	-	-	-	+

Hydrotus inaequalis (Fabricius. 1 /	+	-	-	-	+
H versicolor (Schaller, 1 ~83)	+	-	-	-	+
Coelambus impressopunctatus (Schaller. 1~83)	+	-	-	-	+
C. parallelogrunanus (Ahrens. IHI2)	+	-	-	-	+
Uydropus irislis (Paykull. 1 "98)	+	-	-	-	+
II. ahscurus Sturm. 1835	+	-	-	-	+
Hydaticus seminiger (De Geer, 1 "~4>	+	-	-	-	+
Graphoderes catereus (I... 1 ~58)	+	-	-	-	+
Gaurodytes bipustulatus I... I "58	+	-	-	-	+
Dytiscus marginalis (I... 1 "58)	+	-	-	-	+
1) latissimus /.., / 758	+	-	-	-	+
Helophorus hrevipalpis lied	+	-	-	-	+
Gyrinits easpius \ leucines. 1832	+	-	-	-	+
G. marinus Gyllenhal, 1808	+	-	-	-	+
llydrochus elengatiis Schall.	+	-	-	-	+
Ochihehius puslllus Steph.	+	-	-	-	+
O. marinus Pk.	+	-	-	-	+
(). meredionalls Rosenh.	+	-	-	-	+
Spercheus emarginatus Schall.	+	-	-	-	+
lierosus spinosns Steph.	+	-	-	-	+
li. signalicollis Charp.	+	-	-	-	+
B. luridus L.	+	-	-	-	+
Hydrous piceus /..	+	-	-	-	+
Linozenus niger /.schach.		-	-	-	+
Hydrohius fuscipes /..	+	-	-	-	

Anacaena globulus I'k.	+	-	-	-	+
A. limbata Fabricius	+	. -	-	-	+
Paracymus aeneus Germ.	+	-	-	-	+
Enoehrus minulus Fabricius	+	-	-	-	+
F. frontalis F.r.	+	-	-	-	+
E. testaceus Fabricius	+	-	-	-	+
F bicolor Fabricius	+	-	-	-	+
C ymbiotlyta marginellus Fabricius	+	-	-	-	+
Laccobius minutus L.	+	-	-	-	+
Chaetarthria seminulum llhsl.	+	-	-	-	+
Limnebius truncatellus T/inh.					
I., picinus Marsh	+	-	-	-	+
Bryaxis longicornis Leach	+	-	-	-	+
Driops auriculatus Geoffr.	+	-	-	-	+
Paramecosoma melanocephalum llhsl.	+	-	-	-	+
Galerucella nymphaeala 1.					
Aphlhona iiolacea Koch.	+	-	-	-	+
Longitarsus anchusae Pk.	+	-	-	-	+
Psylliodes clulcamare Koch.	+	-	-	-	+
Sitona crmilus llbst.	+	-	-	-	+
S. humeralis Steph.					
Alophus triguttatus Fabricius	+	-	-	-	+
Phylobius canaliculatus Labricius	+	-	-	-	+
Solaris aelhiops Fabricius	+	-	-	-	+
Thrvogenes scirrhosus Gyll.	+	-	-	-	+

MEGALOPTERA					
Sialis hilaria F.	+	-	-	-	+
TRICHOPTERA					
Agraylea multipiinctata Curtis	+	-	-	-	+
Hydroptila maclachlani Klapalek, 1893	+	-	-	-	+
Oxvelhira costalis Curtis					
l.eoichiton fagesii Guitterd	+	-	-	-	+
Tinodes waeneri!.., 1~58	+	-	-	-	+
Ecnomus tenedus (Rambur)	+	-	-	-	+
Cyrnus flavidus McL.	+	-	-	-	+
Psychomyia pusilla l-'ahricius					
Polycentropus flavomaculatus Pictet, 1834	+	-	-	-	+
Neuroclipsis himaculata /..	+	-	-	-	+
('hacmatopsyche lepida (PictetJ	+	-	-	-	+
1 lydropsyche bulgaromanorum (Bolt, and Kum.)	+	-	-	-	+
11. ornatula McLachlan					
II. pedlucidida Curtis	+	-	-	-	+
Grammotaulius nitidus Muder	+	-	-	-	+
Limnophilus decipiens Kolenati	+	-	-	-	+
Triaenodes bicolor Curtis	+	-	-	-	+
Uecetis intima Mcl.achkm					
O. ochracea Curtis	+	-	-	-	+
O. furva Rambur	+	-	-	-	+

LEPIDOPTERA					
Paraponix stratiotata P	+	-	-	-	+
Nymphula nymphaeata L.					
N. stagnate: Donn.	+	-	-	-	+
(alaclysta lemnala L.	+	-	-	-	+
Acentropus niveus Oliv.	+	-	-	-	+
CULIC 1DAE					
Anopheles inaeiilipennis Meigen					
('nle.x modestns Piealhi	+	-	-	-	+
('. pipiens I..	+	-	-	-	+
CHIRONOMIDAE					
('rteotopus vitripennis (Meigen. PS IS)	+	+	-	-	+
C ex gr.silveslris (Pahrieias, l~94l					
C.exgr. algarum Kiefjer. 1911	+	-	-	-	+
Mierocrieotopus hieolor (Zetterstedt, IS43)	+	-	-	-	+
1 Italaggomyio frauenfeldi (Shiner. 1850) -	+	+	-	-	+
('lunio marinus (Holiday. 1855)	+	+	+-	-	+
C. ponticus Michaitovo. 1980	+	+	-	-	-
Proeladius jerrugineus Kieffer. 1919	+	-	-	-	M
P. ehoreus (Meigen)	+	-	-	-	+
P. nigriventris Kiefjer	+	-	-	-	+
Cryptochironomus delectus Kieffer. 1921	+	-	-	-	M

C. ex gr. confiingciis Kieffer					
C. ex gr. fuscimanus Kieffer	+	-	-	-	+
('ryptoladopelma viridu/a 1 Fabricius I	+	-	-	-	+
Demicryptochironomus mineral us (Zetterstedt)	+	-	-	-	+
1 larnichia fuscimana Kieffer	+	-	-	-	M
II. burganadzeae (f'schernovski)					
l.eplocliironontits lener (Kieffer, 1921)	+	-	-	-	+
Parachironomus pararoslratus llarnisch. 1923	+	-	-	-	+
('liironoimis plumosus (L.,1 ~58)	+	-	-	-	M
(li. fl.sal i nar ins Kieffer. 1921	+	+	-	-	+
('h. J.I. halop/iilus Kieffer					
('/?. /.'/. lluimini Kieffer	+	-	-	-	+
Ch.f l. semireduclus ken:	+	-	-	-	+
('h. dorsalis \leigen	+	-	-	-	+
Limnochironomus ex gr.ncrrosus (Siacger. 1839)	1	-	-	-	M
I., ex gr. tritomas Kieffer, 1916	+	-	-	-	+
hhlm-ltmiiuimus uupar 4 ulkcr. 1 S'.Vf	+	-	-	-	+
/:'. slackelbergi Goetghebuer	+	-	-	-	+
F. ex gr. sigiialicoruis Kieffer	+	-	-	-	+
I'olypedilitin nuheculosum (Meigen. 1818)	+	-	-	-	+
P. bicreiialuin Kieffer. 1921	+	-	-	-	+
P. scalaenum (Schranck. 1803)	+	-	-	-	+
P. conviction Walker. 1856	+	-	-	-	+
P. brevianthennatum I'scliernovskij, 1949	+	-	-	-	+
Cladotanytarsus ex gr. mancusl Walker. 1856)	+	-	-	-	+

Paratanytarsus gr. lauterborni Kieffer. 1909	+	-	-	-	+
P. inopterus (Walker)	+	-	-	-	+
P. lauterborni Kiefjer	+	-	-	-	+
Rheotantarsus gr. exinutts Johansen	+	-	-	-	+
lam tarsus reruovi Olivary. 1 955	E	-	-	+	+
I. ex gr. gregarius Kieffer	+	-	-	-	+
T. ex gr. lauterborni Kieffer	+	-	-	-	+
P. ex gr. lobatıfrons Kieffer	+	-	-	-	+
P. borysthenicus Olivary, 1955	+	-	-	-	+
Tanypus vilipeiuus Kieffer	+	-	-	-	+
Penlapediluin exectum Kieffer					
P. sondens (Wan der Walp)	+	-	-	-	+
Anatopynia plumipes Fries	+	-	-	-	+
Ablabesmia ex gr. monillis L	+	-	-	-	+
Einfeldia carbonaria (Meigen)	+	-	-	-	+
E.f l. pagana Meigen					
Glyptotendipcs gtaueus Meigen	+	-	-	-	+
G. ex gr. gripekoveni Kieffer	+	-	-	-	+
G. ex gr. mancanianus Edwards	+	-	-	-	+
G. ex gr. paripes	+	-	-	-	+
G. ex gr. polytomus Kieffer					
Pseelroeladius ex gr. dilatalus Kieffer	+	-	-	-	+
Pelopia punetipennis Meigen	+	-	-	-	+
Trissoeladius gr/seipennis Goelg/iebuer. 1913	+	-	-	-	+
Eukiefferiella luspida Edwards. 1929	+	-	-	-	+

HELEIDAE					
Culicoides nubeculosus Meigen, 1818	+	-	-	-	+
Probezzia sp.	+	-	-	-	+
Palpomyia sp.	+	-	-	-	+
Sphaeromias piclus Meigen	+	-	-	-	+
S. candidatus Loew	+	-	-	-	+
STRATIOMYIDAE					
Slratiomyia sp.	+	-	-	-	+
Eulalia sp.	+	-	-	-	+
EPHYDRIDAE					
Ephydra sp.	+	-	-	-	+

Table 10. List of Fish Species

Species	**Till 1975**	**Contemporary State Areas**				**Bibliography**
		NWBS	Crimea	Water Bodies		
				Marine	Brackish	
Squalidae						
Squalus acanthias /.., / ~58	+	+	+		S	1.2.6.7.8
Rajidae						
Raja clavata P. / ~58'	+	+	+			1.2.6.7.8
Dasyatidae						
/)asyatis pastinaca /.., / ~58	+	+	+			1.2.6.7.8
Acipenseridac						
Huso huso /.., / ~58	+	s	s	+	+	1.2.6.7.8
Acipenser nudiventris, Lovetzky, 1828	+	+	+			1.2.6.7.8
A ruthemus /.., / '58	S	s				1.2.6.7.8
A.gUldenstadti colchicus ΓMarti, 1940	+	s	s	S	S	1.2.6.7.8
A.sturio I... 1 '58	s	s	s	s	s	1.2.6.7.8
A.stellatus Pallas. 1 "1	s	s	s			1.2.6.7.8
Clupeidae						
Clupeonella cultriventris cultriventris (Xordiiiann. 1840)	M	M	s	s	M	1.2.3.6.7.8
Sordino pilchardus (Walbaum, 1 '92)	s		s			7.8
Sprattus sprattus phalericus (Risso. 1826)	M	M	M	M		1.2.3.4. 6.7.8
. llosa caspia nordmanni Antipa, 1906	+	s	+	s	+	1.2.6.7.8
. [kessleri pontica (Eichwald, 1838)	+	+	+	s	+	12 6,- 8
A.Jolox nilotieo ((ieoffroy, 1829)	S\		Sv			6.7.8

A.caspia tanaica (Grimm, 1901)	Sv		S\			**6.7.8**
Engraulidae						
Engrciulis encrasicolus ponticus Aleksandrov, 1927	M	M	M	s		1.**2.3**.4. **5.6.7.8**
E.encrasicolus maeolicits Pusanov. 1926			+			**7.8**
Salmonidae						
Salmo tnitta labrax Pallas. 1811	s	s	s	s	s	1.**2.6.7.8**
Esocidae						
I'.sox lucius /.., /~58	Sv	Sv			Sv	**1.2.6**
Cyprinidae						
Abramis braiua (L.J '58)	Sv	Sv			+	**1.2.6**
A.salpa (Pallas.1811)	Sv	Sv			+	**1.2.6**
Aspiits aspius (1... 1 ~58)	Sv	Sv			+	**1.2.6**
Alburmts alburnus (L.J ~58)	Sv	Sv			+	**1.2.6**
Blieca hjorna (L.J '58)	Sv	Sv			+	**1.2.6**
Carassius carassius (L.J '58)	Sv	Sv			+	**1.2.6**
(yprinus carpio (1... 1 '58)	Sv	Sv			+	**1.2.6**
Chalcalbitrims chalcoides damibius (Antipa, 1909)	s	S			+	
Hypophthalmichthys molitrix (I 'alenciennes, 1844)	Sv	Sv			+	**1.2.6**
Pelecus cultratus (L., 1 ~58)	Sv	Sv			+	**1.2.6**
Rutilus rutilus fl... 1 "58)	S\	S\			+	**1.2.6**
R.rutilus heckeli Nordmann, 1840	s	S\			+	**1.2.6**
R.jrisii (Nordmann, 1840)	Sv	Sv			+	**1.2.6**
Scardinius erythophthalmns (1... 1 ~58)	S\	S\			+	**1.2.6**
Leiicaspius delineatns (Meckel, 1843)	S\	S\			+	**1.2.6**
Leuciscus idus (L. 1 ~58)	S\	Sv			+	**1.2.6**

Tinea tinea I... 1 "58	Sv	Sv			+	1.2.6
1 *"nnba vimba vimba n.cariata (Pallets. 1811)*	Sv	Sv			+	1.2.6
Ctenopharyngodon idella 1 alenciennes, 1844)	Sv	Sv			+	1.2.6
Cobitidae						
Misgurnus lassilis P. 1 "58	Sv	Sv			+	1.2.6
('obitis giants P. 1 ~58	Sv	Sv			+	
Anguillidae						
Anguilla anguilla II...I ~58)	S	S	s	s	s	1.2.6.7.X
Congridae						
('anger conger (I.. 1 ~58)	Sv		Sv			7.8
Belonidae						
Belone belone eu.xini (iu/ilher. 1866	+	+	+	+		1.2.3.6.7.8
Gadidac						
(uddropsurus mediterraneus 11,.. 1 ~58)	s	s	s			1.2.3.6.7.8
Meiiangtus merlangius euxinus tSordmann, 1840)						
l.ota lota.. 1 "58	+	+	+	s		1.2.3.6.7.8
Gasterosteidae						
(iasterosteus aculeatus 1... 1 '58	+	+	+	.	+	1.2.3.6.7.8
Pungilius platygaster platygaster IKessle. 1859)	+	+	+	+	+	1.2.3.6.7.8
Syngnathidae						
Hippocampus ramulosus /Peach. 18")	+•	s	s	s	s	1.2.3.6.7.8
Seroplus ophidian /T., 1 "58)	+	+	+	+		1.2.3.6.7.8
Svngnathus abaster Risso. 1810	M	M	M	+	s	1.2.3.6.7.8
S.phlegon schmidti Popov ,'Vjs	s	s	s			1.2.3.6.7.8
S.tenuirostris Rathke. 183"	s	s	s			1.2.7.8

S.iyphle L..1'58	M	M	M	+	Sv	**1.2.3. 6.7.8**
S.variegatus Pallas, 1811	S	s	s			**2.6.7.8**
Zeidae						
Zeus faher puugio 1 *aleiicieiines. 1835*	Sv		S\			**1.2.7.8**
Sphyraenidae						
Sphyraena spyraena 1... / 758	S\	Sv	S\			**7.8**
Mugilidae						
Mugil cephalus 1... 1 '58	Sv	Sv	Sv	+	Sv	**1.2.3.4.6.7.8**
M.soiuv Ilasilewskv, 1855	+	+	+	+		
Liza ramada (Risso, 1810)	S		s			**7.8**
L.aurala (Risso. 1810)	M	+	+	+		**1.2.3.6.7.8**
L. sa/iens (Risso. 1810)	M	+	+	+		**1.2.3.4.6.7.8**
Atherinidae						
Alherina boveri Risso. 1810	M	M	M	M	S	**1.2.3. 6.7.8**
A.bonaparlei lioulenger. 190'	s		s			**2.7.8**
A.hepselus **/..,** ***/*** *'58*	+		+			**2.7.8**
Percidae						
Percarina deinidofji Sordnuuui. 1858	+	+	+	+		**1.2.6.7.8**
Slizostedion niarinus ((’uvier. 1830)	+	+	+	+		**1.2.6.7.8**
l.ucioperea lucioperca (1.1 ~58)	Sv	Sv			+	**1.2**
I'erca /luvialilis 1 . i ~5S	Sv	Sv				**1.2**
Accriua sehraelser **/.,** ***/*** *'58*	S\	S\			+	**1.2**
Serranidae						
Dicentrarcluis lahrax (1... 1 '59)	S			s		**1.2.7.8**
Serranus scriha ***(1***... *1 ~58)*	S	S	s			**1.2.7.8**

Centrarehidae						
Lepomis gibbosus **I..**, **I** *~58*	S\	Sv			s	**1**.2.7.8
Pomatomidae						
Pomatomus saltulor ~58)	+	S\	Sv			**1**.2.3.**4**.6.7.8
Carangidae						
Saucrates ductor (1... 1 "58)	Sv	Sv				2.7.8
Trachurus trachurus (I.., 1 '58)	S	s				7.8
'/'. mediterraneus ponticus Aleev, 1956	fvI	M	M	+		**1**.2.3.**4**.6.7.8
Sciaenidae						
Seiaena umbra **I..**, *1 ~5S*	S	s	s			**1**.2.6.7.8
I mbrina eirrisa (1...1 ~5S)	s	s	s			**1**.2.6.7.8
Sparidae						
Hoops hoops (L.J '58)	s	s				7.8
Diplodus annularis (L. 1 "58)	s	s	s			**1**.2.7.8
D.sargus (L.J ~ 58)	Sv		Sv			7.8
Pagellus eiylhrinus (1... 1 '58)	Sv		Sv			2.7.8
Puntazzo puntazzo (Gmelin, 1 ~89)	S		s			7.8
Denle.x denies (I... 1 ~58)	Sv		Sv			2.7.8
Centracanthidae						
Spicara Jlexuosa Rajinesque, 1811	+	s	+			7.8
Mullidae						
Mulltts barbatus ponticus Pssipov. 192'	M	+	+	s		**1**.2.3.**4**.6.7.8
Pomacentridae						
Chromis chromis (1... 1 58)	+	+	+			**1**.2.6.7.8

Labridae						
Ctenolabrus rupestris (L.,1 "58)	+	s	+			1.2.6.7.8
Labrus viridis I... 1 ~58	S	+				1.2.6.7.8
Synipliodns cinercns (Bonnatciic. 1 ~K8)	+	+	+			1.2.6.7.8
S.occllatus (Forsskal. I "5}	+	+	+	+		1.2.6.7.8
S.scinu (i'orsskal, 1 ~~51	+	+				7.8
S.roissali (Risso, 1810)	+	s	s	s		2.6.7.8
S.tinea L.,1758	+	s	+			2.6.7.8
Trachinidae						
Trachinus draco I... 1 "58	+	+	+			1.2.3.4.6.7.8
Uranoscopidae						
Uranoscopus scaber /.., / ~58	+	+	+			1.2.6.7.8
Blenniidae						
Rlcnnins occllaris I... 1 '58	Sv		S\			7.8
B.pavo Risso. 1810	S		s			7.8
B.sangiiinolentns I'allas. IS 1 /	+	+	+			2.7.8
B.sphynx Valenciennes, 1836	+	+	+			2.7.8
B.tentacttlaris Britnnich. 1 "68	+	+	+			2.7.8
B.zvoninnfi Kolomhalovic, 1893	s	s	s			2.7.8
('oryphoblennius galerila (L., 1 ~58)	s	s				2.7.8
Tripterygidae						
Tripterygion triplcronottts i Risso Isllii	Sv					7.8

Ophidiidae						
Ophidian rochei Mailer, IH45	+	+	+			1.2.3.7.8
Ammodvtidae						
Gvmnammodyies eicerelus (Rajlnesque, 1810)	Fvl	+	+			*1.2.0.'.**
Callionymidae						
Callionvnius helenus Risso, 1826	+	s	s			1.2.4.6.7.S
C.pusillits Delaroche.1809	S	Sv	Sv			1.2.6.7.8
Scombridae						
Sarda sarda lllloeh, 1 ~93)	+	Sv	Sv			1.2.3.6.7.8
Scomber scomber 1... 1 '58	M	Sv	Sv			1.2.6.7.8
Sjaponnicus lloulluxn, 1 ~64	S\	Sv	S\			2.7.8
Thunnus tinnitus 1... 1 '58	S\	Sv	Sv			2.7.8
Gobiidae						
Aphia minuta (Risso, 1810)	+ .	+	+	+		1.2.6.7.8
Renlhophiloides slellalus (Sauvage, 18 " ')	s	s	s			1.2.6.7.8
B hrauneri liellng el lljin. 192'	s	s	s			6.7.8
('aspiosoma caspium (Kessler, 18")	+	s	+			1.2.6.7.8
('hromogohius ipiadriviltaliislSteindachner, IS'O)	Sv	Sv				
Gobius auralus Risso. 1810	Sv		Sv			7.8
G.hucchichi Sleindaehner. 1810	Sv		Sv			2.7.8
G.cobitis Ratios. 1811	+	+	+	+		2.7.8
G niger 1... 1 '58	+	+	+	+		1.2.6.7.8
G.ophiocepltalus Pallas. 1811	+	+	+	+	s	1.2.6.7.8
kniponitschia georghievi Pinchuk, 19"	s	s	s	s		2.7.8
Mcsogobius batrochocephalustPallas. 18111	+	+	+	+	+	1.2.6.7.8

Xeogohins eephalarges (Pallas. 181 ll	+	+	+	+	+	1.2.6.7.8
X.cephalargoides Pincluik. I9~6	S	s	s			7
X./Iiiviattlis (Pallas. 1811)	M	M	+	+	+	1.2.6.7.8
X.gymnotrachehis (kessler. I85~)	+	+	+	s		2.6.7.8
X.kessleri (Guther, 1861)	s	s	s	s		6.7.8
X.melanostonuts (Pallas. /811)	M	M	+	+	+	6.7.8
X.platyrostris (Pallas. 1811)	s	s	s			6.7.8
X.ratan fXordmaitn. 1840)	+	+	+	+	+	2.6.7.8
\ svrimtit (Xordinaiin. 1840)	s	s	s	s	s	6.7.8
Pomatosshislus caitcasiciis(ka\vrajsk\) lierg, 1916	+	+	+	+		1.2.6. 7.8
P.marmoratns (Risso. 1810)	+	+	+	+		6.7.8
P.minutus elongatus (Cattestyini. 1861)	+	+	+			1.2.6.7.8
Prolerorhinus martiioratitsfPallas. 1811)	+	+	+	s		1.2.6.7.8
Seorpaenidae						
Scorpaena parens 1.., 1 "58	+	*p*	+			1.2.6.7.8
S.nolata Rajinesipte, 1810	s	s	s			6.7.8
Triglidae						
Aspitrigla cticulus (1... 1 ~58)	Sv		Sv			6.7.8
Trigla Interna 1... 1 "58	s	s	s			1.2.6.7.8
('ephalacaitthidae						
Cephalacantlms vol Hans I... 1 "58	Sv		Sv			7
Both id ac						
Aiiioglossas kessleri Schmidt. 1915	s	s	s			2.6.7.8
Scophthalmidae						
Pselta maeolica (Pallas, 1811)	+	+	+	+		1.2.6.7.8

Scophthalmus rhombus ft... I~58)	S	s	s			**6.7.8**
Pleuronectidae						
Platlehthys flesus luscusl Pallas, 1811)	+	+	+	+	+	**1.2.6.7.8**
Soleidae						
Solea vulgaris Quensel, 1806	s		s			**6.7**
S.iiasula (Pallas, 1811)	s	s	s			**1.2.6.7.8**
(iohiesoeidae						
Dipleeogaster blmacu/ala euxinica (Murgoci, 1940)	s	Sv	s			**2.6.7.8**
Lepadogaster cundollei Risso, 1810	s		s			**2.6.7.8**
I..lepadogaster Lepadogaster (Bonnaterre, 1 ~88)	s		s			**2.6.7.8**
l.ophddae						
1.ophites piseatorius 1... 1 ~58	S\	Sv	Sv			**2.6.7.8**

Legend

M - mass

S - rare

Sv - disappearing

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Table 11. Characteristics of the main Marine Wetlands of Ukraine

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs)	Season accumulations of birds (max, individuals) 3	Proposed category 4
32 800	A river delta	II - Ph.a.. T.н.. T.I.. Car.a.. Car.p.. Car.acu. III - Ph.a.. Ta.. T.1., P.p.. P.per., Tr.n.. N.I. N.a.. S.l. Л.C.. AT. IV - I..m.. L.g.. II.p.. P.d. V - A.s., A.g.. A.p.. El.r.. 11 m.	C.o.(60). A.a.(150). A.p.(220), F.a.(350). I.e.(200-3000). S.h.(2200)	C.o.(500). A.a.(1 400). P.o.(2 100). P.c.(7 000). p.p.d зон). A.p.(23 000). A.q.(6 000)	i
10 000	Л Hood-land marsh in the river delta	II - Ph.a.. Ta.. IT. Car.a.. Carp.. Car.acu. III - Ph.a.. T.a., T.1., P.p.. P.per.. Tr.n.. N.I. N.a.. S.l. A . c A.f. IV - L.m., L.g., II.p.. P.d. V - A.s.. A.g.. A.p.. I-Ir.. I.l.m.	Co.(250). A.l'.(1 800). N.r.(400), F.a.(3 000). P.crs.(1 200). PI.(350). E.a.(400)	Pepsi 1 500). C.o.(2 000). A.p.(20 000)	i
21 000	A reservoir in the plaee oh a half-closed estuary	Ill - Ph.a.. *Q.m.,* P.p.. P.per.	P.ers.(130). S.h.(4 500). F. a.(500). A.f.(170), L.c.(250), G. p.(60)	P.O.(2 000). Co.(6 000). A.alb.(20 000). Л.p.(15 000). A.f.(18 000), A.ful.(12 000). M.a.(3 000). 1 л.(14 000),	i

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs) ^	Season accumulations of birds (max, individuals) 3	Proposed category 4
				L.c.(4 000)	
19 000	Half-closed estuaries of small rivers	III - Z.m.. R.m.. P.p.. Ph..a.. B.m. IV - S.c.. S.p.. S.s.. L.g.. L.s.. Art.s.	I.e.(2 800). S.a.(25). G. p.(60), H. h.(40), V.v.(11O). Ca.(30)	A.a.(700), A.alb.(13 000). A.p.(25 000). R.a.(1 300). C.alp.(5 500). L.c.(18 000)	i
27 600	A river delta with channels and Hood-land lakes: an estuary of half-closed type	II - T.p.. C'aiw.. tar.a.. Ph.a.. T.к. Г.a. III - Ph.a.. T.к. Г.a.. 1 r n . N.I.. N.a.m N.p.. S.n. VII - C.a.. (..:.. B.I.. P.a.. A.pec.	N.n.(2 500). E. a.(350), P.c.(2 000). F. a.(2 700). A.p.(200). A.a.(I3O). P.Г.O 300). P.crs.(300). Co.(60). I..r.(6()-120)	A.p.(4 000). F.a.(5 000). C.o.(140-I60). A.a.(200). N.n.(3 000). Л.c.(25 000). L.r.(5 000). A.q.(1 500)	i
1 1 000	An estuary of half-closed t\ pe	III - Z.m.. R.m. P.p.. Cel. IV - P.S.. L.s., L.gm.. K.p.. S.c.. S.p.. S.s. VI - B.m.. P.cL Art.s.. A.I.	S.h.(3 500). T.t.(400). F.a.(430), P.crs.(250), IM" (200). S.a.(120)	A.p.(15 000). A.f.(5 000). F.a.(7 000). F.a.(9()0). A.alb.(8 000). L.r.(17 000). L.m.(7 000).	i

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs) 3	Season accumulations of birds (max, individuals) ^	Proposed category 4
				L.e.(5 000). P.crs.(1 200)	
26 000	A river delta	II - 1 1 . 1 . . Ph.a.. Car.acu.. Car.o. III - Tr.n.. N.p.. P.nat.. P.п.. S.n. VII - A.d.. Asp.e.. 1 .a.. C.n.. Th.b.	P.c.(4 500). A.cin.(1 800). N.n.(450). E.a.(350-700). F.a(500-900). P. crs. (200-400)	P.c(10 000). F.a.(90 000). A.p.(30 000). A.ful.(5 000). A.f.(6 000). M.s.(300)	i
34 000	A sea ha\	III - R.m.. /.p.. C.d.. N.m.. P.p.. Ph.a.. T.lax.. S.l. IV - S.e.. Arts.. S.p.. Пл.. 1 .-. V11 - 1. -. S.c. Cb.. Ce.	S.m.(700). L.c.(4 000). S.h.(1 500). P.c(270)	P.c.(15 000). F.a.(50 000). Co.(10 000). A.p.(80 000). F.g.(40 000). A.m.(50 000). P.pug.(6 000). C.alp.(5 000)	i
38 000	A sea bay	II - Ph.a.. S.I.. S.t. III - Z.m., R.m.. C.d.. N.m.. P.p.. P.per. IV - S.c. S.p.. Art.s.. Пр.. II \ V11 - L.sab.. Cp.. 1г.т.. Arg.s.. S.s.. Cт.. Ce.	L.m.(5 250 -33 600). L.g.(6 800 -37 450). T.s.(8 300 -28 800). F.a.(120), P.crs.(150). R.a.(250)	l'.a.(400 000). C.o.(11 000). A.p.(100 000). A.f.(60 000). A.m.(25 000-40 000). A.alb.(15 000-40 000). A.a.(400-2 000). P.pug.(10 000).	i

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs) ^	Season accumulations of birds (max, individuals) 3	Proposed category
				A.cin.(5 000). E.g.(76 000)	
87 000	Sea bays	III - Z.m.. Re., /..p.. C.d.. N.m.. P.p. IV - S.c. S.p.. L.g.. 1 in.. P.d. VII - I..sab.. Cp.. Ce.. Art.sco.. Art.p.. P.I.m.	L.c.(K) 000). L.m.(6 000 -17 000). L.g.(300). S.h.d 000). S.a.(150). G.n.(40). T.s.(5 000). A.cin.(1 200). ll.c(200-570). 1.a.(200-700). E.g. (500-970). P.c(1 400 -2 400). M.s.(90). T. tad. (70)	P.c(2 500). E.a.(37 500). A.p.(17 000-43 000). A.pen.d 500). A.1.(7 900). A.m.(700). 1.lad.dOO). C.c.(900). 1 ,c.(6 000). L.i.(300). L.r.&L.m.(25000). E.g.(400). E.a.(800)	i
9 600	A sea. rocky coast		P.a.(500). C1i\.(120). ().o.(70). A.aps.(200). A.mel.(IO)	A.m.-numerous A.fill.-n umerous A.p.-ordinary A.f.-ordinary (i. a.-ordinary P. crs.-scanty P.n.-scanty	n
80 000	A salt lake with distilled bays and \cry intended coastal line, with a ureal	1 - Ph.a.. T.lax.. S.I.. S.t. III - / пі.. / ії . R.m. IV - U.S.. S.s.. C т . . Пл.. II.p.. S.c. L.g.. L.s.	L.c.(3 800). L.i.(245). L.m.(2 000). L.g.(1 300). d.n.(2()0). S.h.(300).	L.mel.&L.r.& L.m.&L.g.(8 000). C.n.&C.I.(2 000). V.v.&P.lob.&	i

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs) 3	Season accumulations of birds (max, individuals) 3	Proposed category 4
	number of saline drops	V - .1m.. .1g.. Art.p.. P.d.. Bin.. Tin . T.b. Vll L.sab.. .Arg.s.. Ce.. Arte.	P.c.(550). A.ciп.(20)	C.sp.(3 000). Co.(500). G.g.(100-300). 1 tad.(500). A.cin.&E.a.& E.g.(300)	
165 000	A sail lake with distilled bays and very intended coastal line, with a great number of saline drops	1 - Pl.a.. T.lax.. ST. St. III - / in . / п.. R.m. IV - Il.s.. S.s.. Cт.. 11.v.. II.p.. S.e.. L.g. L.s. V - .1 in., .l.g.. Art.p.. P.d. Km.. 1 in . T.b. VII - l.sab.. Arg.s.. Co.. Arte.	L.c.(11 600). L.i.(360). L.g.(850). L.mel.(450). Il.e.(470). S.h.(2 800). S.a.(360). G.n.(1 15). T.s.(4700). P.c.(7 860). A.cm.(800). P. 1.(500). E. a.(500). L.g.(500). A.pur.(200). N.n.(200). Co.(80). F. a.(500). 1l.h.(600-800). R.a.(600). 1.1.(500) .Anas spp. & Aythya spp.(700)	P.pug.(43 500). Calp.(127 600) Cm.(26 700). T.t.(11 800). A.alb.(200 000). A.p.(65 000). 1 lad.(12 000). A.pen.(65 000). A.acu.(35 000) l..r.(12 500)	i
26 000	An Azov Sea ba\ of estuary type	III - /.r.: . /.p.. k.e. IV - S.e.. S.s.. L.g. Vll - L.sab.. Co.. Art.p.. Car.a.	L. c.(60). S.h.(lOO). T.t.(200),	A.a.(200-3 000). A.p.(9 000- 14 000).	n

Area of wetland (ha)	Type of wetland	Mass species of plants	Main species of breeding birds (max, pairs) 3	Season accumulations of birds (max, individuals) 3	Proposed category[4]
		Elm., .l.g.. J.m.	R.a.(60). j H.h.(20). A.cin.(20). A.pur.(15)	C.o.(I6OOO). A.alb.(22 000). A.m.(3 000). F.a.(18 000). L.c.(7 000). Anas spp.-ordinarv P.c.-ordinary A.ein.-ordinary E.a.-ordinary ('.sp.-ordinary	
22 400	An estuary at the mouth of Moloch-nava river	III - Z.m.. /..p.. Re. IV - S.c.. S.s.. E.g. VII - E.sab.. C.e.. Art.p.. Car.c. El.m.. .I.e.. J.m.	A.ein.(800). A.alb.(250). P.crs.(250). A.p.(50). G.h.(300). L.c.(5500). P.c.(3OOO). V.v.(80). R.a.(50-250)	A.alb.(25 000-40 000). A.p.(25 000-30 000). A.m.(80 000-100 000). L.c.(5 000-10 000). Kr.(5 000-15 000). F.a.(15 000-ro 000). C.o.(2 000-5 000). Jl.a.(K) 000-12 000). P.crs.(5 000-	

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs) ^	Season accumulations of birds (max, individuals) 3	Proposed category
				12 000). M.a.(5 000- 12 000). P.n.(5 000-10 000)	
20 000	A bay in the Azov Sea	II - Ph.a.. B in.. S.l.. S.s. IV - S.e.. L.m.. S.m. V - ll.vul.. Ce.. P.a.. .l.g.. P.g. V11 - E.m., L.r.. L.t.. Arg.s.. S.s.. E.s . 1.d.. Car.c.	P.c.O 330). L.c.(230). E.a.(120). T.1.(26-100)	A.m.(6 000). A.p.(7 000). A.alb.(5 000)	i
1 800	A bay in the Azov Sea and delta of small ri\er	1 - Ph.a.. T.lax.. S.I.. S.t. Ш - /.m.. C.d.. P.p.. N.m. IV - Arts.. L.m.. Пр.. II v P.d..P.c V11 - L.sab.. E.m.. Cp.. (i.e.. (i.g.. Ce.. Arg.s.. Car.c. G.p.	T.s.(800). P.c(1 200). S.h.(600). E.a.(70). E.g.(40)	A.p.&A.n.& Л.П1.&Л.Г.& A.alb.&...(40 000)	i
2 000	A bay in the Azov Sea	I - Ph.a.. T.lax.. S.I.. S.t. Ш - Air... C.d.. P.p.. N.m. IV - Arts.. L.m.. Пр.. II v. P.d.P.c V11 - L.sab.. L.m.. Cp.. (i.e.. (i.g.. C c . Arg.s.. Car.c. G.p.	S.h.(700-2 000). T.s.(500-1 000). S.a.(lOO). T.t.(50). H.h.(25)	L.r.&L.c.& P.pug.&C.l.& C.n.&...(! 000)	i
1 400	A bay in the Azov Sea	1 - Ph.a.. T.lax.. S.L. S.t. Ш - /.m.. C.d.. P.p.. N.m. IV - Art.s.. L.m.. II.p.. Пл.. P.d..P.c VII - L.sab.. E.m.. Cp.. G.c. G.g..	S.h.(12 000). T.s.(5 000). L.r.(200). 1.t.-numerous. K.a.-numerous.	L.r.(5 000-10 000). L.c.(5 000). L.m.(7 000). S.h.(5 000).	i

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs) 3	Season accumulations of birds (max, individuals) 3	Proposed category 4
		C.e.. Arg.s.. Car.c (i.p.	11.h.-numerous,	C.n.(2 500). C.l.(1 000). C.sp.dcw thous.)	

* name of wetland sec legend Fig. 18

• I (Grass-marshy complex). II (Marshy complex). Ill (Water complex). IV (Galophytes complex). V (Meadow complex). VI (Meadow-galophytc complex). VII (Psammophy tes complex):

A.c. - *Azolla coroliniana;* A.d. - *Agropyron dosyanthum;* A.f. - *Azolla fdiculoides;* A.g. - *Agrostis gigenthea;* A.1. - *Aeluropus Httoralis,* A.p. - *Alopecurus pratensis:* A.pec. - *Agropyron pectinatus:* A.s. - *Agrostis stolonifera;* Arg.s. - *Argusio sibirico;* Arl.c. - *Artemisia comprestis;* Art.p. - I *pontiaca;* Art.s. - *A. santoniaca;* Art.sco. - *A scorparia;* Asp.c. - *Asperylla cynanchica;* B.m. - *Bolboschoenus maritimus:* B.t. - *Bromopsis imermis:* C.a. - *Centaurea arenaria;* C.b. - C. *borystenica;* C.d. - *Ceratophyllum demersum;* C.e. - *Calamagrostis epigeios;* Cm. - *Camphorosma monspliaca.* Cn. - *Cerastium nerainicum; C.p.* - *Crampe pontica;* Car.a. - *Cares acutiformes:* Car.acu. - C. *acuta:* Car.c. - C *colchica:* Car.o. - C *omskiniana;* Car.p. - C *pseudocyperus;* Car.v. - C. *vesicoria;* B.a. - *Euphorbia agraria;* E.d. - *Ephedra distachia;* E.m. - *Erymgium maritimum;* E.s. - *Euphorbia seguierana;* El.r. - *Elytrygia repens,* El.m - /-'. *moeotica:* E.v. - *Festuca valesiaca;* G.c. - *Glycyrrhisa cehinata;* G.g. - G. *glabra:* G.p. - *Gypsophila paniculata;* G.t. - G. *tasligiata;* II.p. - *Halimione pedunculata;* I l.s. - *I lalocncmum strobilaceum;* Пл. - *Holimione verrucifera;* H.vul. - *Holschenus vulgare;* .l.g. - *./uncus gerardii;* J.m. - *./ maritimus:* K.p. - *Kochia prostrata:* E.g. - *Limonium gmelinii;* E.m. - *Limonium ineveri; l.s.* - *Leymus racemosus;* L.s. - *Limonium suffriticosum:* L.sab. - *Leymus sahulosus:* L.t. - *l.actuca tatarica:* N.a. - *Nymphae alba;* N.I. - *Nyphar lutea;* N.m. - *Najas marina;* N.p. - *Nymphoides peltata;* I'.a. - Poa *angttstifolia;* P.c. - *Plantago cornuti;* P.d. - *Puccinellia distans;* P.g. - P. *giganthea;* P.n. - *Potamogeton nodosus;* P.p. - P. *pectinatus;* P.S. - *Plantago salsa;* Ph.a. - *Phragmites australis;* P.nat. - *Potamogeton nutans;* P.per. - P. *perfoliatus;* R.e. - *Ruppia eirrhosa;* R.m. - *Ruppia maritima;* S.c. - *Syrenia cona:* S.c. - *Salicornia europaea;* S.l. - *Scirpus lacustris;* Sin. - *Suaeda maritima;* S.n. - *Salvinia natans:* S.p. - *Suaeda prostrata:* S.s. - *Salsola soda:* S.t. - *Scirpus tabernaemontanii;* Г.a. - *Турка angustifolia;* T.b. - *Triglochium hessarabicum;* T.I. -

Typha latifolia; T.lax. - *T. laxmanii:* l.m. - *Triglochin maritimum;* T.p. - *Thelepleris palustris:* Th.b. - *Thymus borysthenicus;* Tr.n. - *Trapa natans; L.m.* - *Zostera marina:* Z.n. - *Z. noetii:* Z.p. - *Zannichellia palustris.*

3 — A.a. - *Anser anser;* A.acu. - ,//;av *acuta:* A.alb. - *Anscr albifrons:* A.aps. - .1/w.v «/>«*•; A.c. - .I/M.V *crecca:* A.cin. - *Ardea cincrca:* A.f. - *Aythya ferina;* A.ful. - *Aythya fuligula:* A.m. - *Aythya mania:* A.mel. - Т/л/л- *melba:* A n . - *Aythya nyroca;* A.p. - . *platyrhynchos:* A.pen. - d/jas *penelope:* A.pur. - *Ardea purpurea:* A.q. - .-ІЛЛІ *querquedlda:* C.a. - *Cltaradrius alexandrinus:* (.".alp. - *Calidris alpina:* C c . - *Cygrtus cygnus:* C.I. - *Chlidonias leucoptera:* C.liv. - *Columba livia:* C m . - *Calidris minuta:* C.n. - *Chlidonias nigra:* C o , - *Cygnus olor:* Csp. - *Calidris spp.:* E.a. - *Egretta alba:* E.g. - *Egretla garzetta:* E.a. - *Eulica atra:* G.a. - *Gavia arctica:* G.C. - *Gallinula chloropus:* (i.g. - GVII.V sjn/.v: G.n. - *Gelochelidon nilotica:* G.p. - *G/areola pratincola:* II.e. - *Hydroprogne caspia:* II.h. - *Himantopus himantopus:* L.c. - Ля/та *cachinnans:* E.g. - /.«пи *genet:* L.i. - *l.arus ichthyajtis;* L.m. - *Larus mintttus:* L.mel. - *l.arus melanocephalus:* L.r. - *l.arus ridihiindus:* M.a. - *Mergus albellus:* M.S. - *Mergus serrator:* N.n. - *Sycticorax nycticorax:* N.r. - Л'e/to *rujina:* O.o. - *Oenanthe oenanthe:* P.a. - *Phalacrocorax aristotelis:* Г.e. - *Phalacrocorax carho:* Peps. - *Pelecanus crispus:* P.ers. - *Podiceps cristalus:* P.Г. - *I'legadis falcinellus:* P.I. - *Plalalea leucorodia:* P.lob. - *Phalaropus lobutus:* P.n. - *Podiccps nigricollts:* P.O. - *Pelecanus onocrotalus:* P.p. - *Phalacrocorax pygmaeus:* P.pug. - *Philomachus pttgnax:* R.a. - *Recurvirostra avosetta:* S.a. - *Sterna albifrons:* S.h. - *Sterna hiruiido:* S.m. - *Somateria* mollissima: T.s. - *Ihalasseus sandvicensis:* T.t. - *Tringa totanus:* T.tad. - *Tadorna ladorna:* V.v. - *I'anelltis vanellus.*

4 i - international: n - national.

Table 12. List of Species of Flora and Fauna Entered in the Red Data Book of Ukraine and Protected on Reserve Territories

Species	Reserves	
	DP*	CB**
PLANTS		
('hara tenuissima	-	+
Ih'lula horvslhenica Kink.	-	f
('ctitaurca hrcviceps ll/ui	+	+
l.eiicojuiii aeslivuin 1.	-	+
Tulipa schrcnkii Regcl.	-	i
Pulsatilla nigricians Slorck	-	+
Ornitliogatlutii amp/ii/olium Y.ahar	-	4
Stipa horvstlwnica Klok.	-	+
S. capi 1 lata/..	-	+
Chrvsopogon grvllus (1.) Trin.	-	+
Aslrodaucus littoral is (Bieh.l Drudc	-	+
Orchis picta I.oiscl	-	
O.coriophora /..	-	+
O.morio L.	-	+
O.nerviilosa Sacalo	-	+
O.fragrans Pollini	-	
().palustris Jacg.	f	+

O.laxifora Lam.	-	
Allium scvthicum /.oz.		
Trapa natans	+	-
Nymphoides peltala	+	-
Salvinia natans	<	-
ANIMALS		
Crustacea		
/ pogehia pusilia Pelagna. 1 '92	-	
Pachvgrapsus marmaralus Labrieius, l~93	-	+
('arcinus aesluarii Sarda. IS4~	-	
Insecta		
P.mpusa fasciuta Bridle. IS36	-	+
E.pennieornia 1 Pallas. I~S6)	-	·
Bradvporus multilurbereulala 1 Piseher-lTaldbeim. IS33)	-	+
Saga peda 1 Pallas. 1 '86,	-	t
Galosoma sveophanla 1 Linnaeus. 1 '58)	-	+
Lueanus cervus Linnaeus. 1 '58	-	
Seolia maeulala Drum. I~~3	-	+
Salanas gigas pversmann. 1S55	+	+
Pudia pavonia 1 Linnaeus). 1 '58	-	+
p.spini (Denis el Sclujjcrmuller. 1 "5)	-	+
Aglia lau (Linnaeus). 1 '58	-	f
Prosperpinus prosperpina (Pallas), 1 "2	-	f
Gallimorpha quadripunctata (Poda. I'64)	-	+

l.imcntitis populi (Linnaeus. 1 "58)	-	+
Astitoides sponsa Linne. 1~6~	-	
I'apilio macluion (Linnaeus. 1 ~58)	+	+
Iphiclides podaltritts (Linnaeus. 1 "58)	+	
Zervnthis polixena lDenis. Schiffennuller. I"5)	-	+
Zegris cuplieme (I'.sper, 1805)	-	+
Acherontia alropos (Linnaeus. 1 ~58)	+	+
Anax imperalor Leach. 1815	-	+
('ordulegaster annulatus annulalus (Lalreide. 1805)	-	+
Iris polvsliclica 11'iscer-ll'aldlteini, 1833)	-	
Hipparchia slalilinus (Hufnagel, l~66)	-	+
Xvlocopa valga (ierstaecker. I8~2	-	i-
Osinodciina ercmita	+	-
.\ leogopis scohricornis		-
Hoinhus laesus	+	-
('alloplerix splendens taurica. Selvs. 1853	-	+
(' virgo (Linnaeus. I~58)	-	+
C 'eralophvlus polyceros (Pallas. 1" 1)	-	+
l.eucomigus candidalus (Pallas. I~~l)	-	+
Utetheisapidchella /Linnaeus, l~58)	-	+
Mollusca		
Oslrea edidis l.inneus. 1 '58	-	
Pisces		
Huso huso poiuicus Salnicov, 1934	+	+
\ *Salmo initio labrax Pallas, 1814*	+	+

Hippocampus guttulatus microstephanus Salastenenko, 193'	-	+
Xlorone labrax (Linnaeus, 1758)	-	+
Trigla lucerna Linnaeus, 1 ~58	+	+
Lophius piscatorius Linnaeus, 1 ~58	-	+
Acipenser nudiventris Lovetzky, 1828	+	+
Acipenser sturio	t	-
A.ruthenus		-
llueho hueho	+	-
Umbra krameri	+	-
Rutilus frisii	+	-
(iobto uranoseopus	+	-
Zingel zingel	+	-
Z streher	+	-
Civmnoeephalus schraetser	I	-
Neogobius cephalarges	+	-
Reptilia		
hdaplie quatuorlineata, (Ratios, 1814)	-	+
(jo/ither jaqularis, Gmelin, 1 "89	-	+
Coronella austriaco, haurentl, 1768	-	+
Vipera ursini, Christoph, 1861	-	+
Aves		
Pelecanus onocrotalus, Linnaeus, 1 D8	+	+
P. crispus. Bruch, 1832	+	+
Ardeola ralloides (Scopoli, 1~69)	+	+
Plalalea leucorodia, Linnaeus, 1 "58	+	+

Plegadis falcinellus (Linnaeus. 1 ~66l	+	+
Ciconia nigra (Linnaeus. I~58)	+	+
Rujihrenta ruficollis (Pallas. I~69)		+
Cvgnus bewickii. Yarrele. 185(1	+	+
Tadorna ferruginea (Pallas. 1 ~46)	+	+
Avthva nvroca (Culdenstadl. 1"0)	+	+
Bucepliala clangula (Linnaeus. 1 ~58)	+	+
Soniateria mollissiina (Linnaeus. I ~58)	+	+
Mergus serralor. Linnaeus. 1 '58	+	+
Pandion haliaelus (Linnaeus. 1 ~58)	+	+
Circus cvaneus (Linnaeus. 1"66)	ı	+
Cinacrourus (S.C.Celin. I~~l)	+	+
Buteo rufinus (Cretrsckmar, 182')	-	+
Circaetus gallicus (Gmelin, l~88)	-	+
Hieraaelus pennants (Gmelin. 1 "88)		
Aquila гapax (Pemnunek. 1828)	-	+
A.clanga. Pallas. 1811	+	+
A.pomarina C **1.** *lire/on. 1831*	+	+
A.heliaea. Savigny: 1809	+	+
A. ebrvsaelos. (Linnaeus. I~58)	+	+
llaliaeelus alhicilla (Linnaeus, 1 '58)	+	+
Gypsjulvus (Hablizl, I'83)	-	·
Laleo cherrug. Grow 1834	+	
F.peregrinus, Punslall. l~~l	+	+
F.naumanni. Pluseker, 1818	+	1

Grus grits, (Linnaeus, 1 ~58)	+	+
Anthropoides virgo. Linnaeus, I "58	+	+
Otis tarda, Linnaeus, 1 ~58	4	+
O.tetra.x (Linnaeus, 1~58)	+	+
Burliinus oedicnemus (Linnaeus, l~58)	+	+
*('haradridus alexandrinus. Linnaeus, ! "5^*	+•	4
Himantopus himantopus. (Linnaeus, 1758)	+	+
1 laeinantoptis ostralegus, Linnaeus. 1 ~58	+	4
Lringa stagnatilis (Bechstein. 1803)	i	+
Xtimenius tenuirostris. I'ieil/ol. 181"	+	4
X.arquata, (Linnaeus. 1~58)	+	+
X.phaeopus. (Linnaeus. 1 ~58)	+	4
(ilareola pratincola. 1 Linnaeus, 1 ~66)	+	1
G.nordmanni, Xordinann. 1842	+	4
l.arus icltt/tvaetus. /'alius, 1~~3	+	+
1 Ivdroprogne caspia, (Pallas, 1""0)	+	+
Bubo huho, (Linnaeus, 1 ~58)	+•	+
Tyto a/ha (Scopoli, 1 "69)	-	+
Lanius e.xcuhitor. Linnaeus, 1 "58	+	+
I..senator. Linnaeus, 1 "58	+	+
Monticola saxatilis, (Linnaeus, 1766)	-	+
Emberiza melanocephala, Scopoli, 1~69	-	+
Stiirnus roseus. (Linnaeus. 1~58)	-	+
Acrocephalus paludicola, (\ "teillot. 181")	+	+
Regulus ignicapillus (Temminick, 1820)	+	+

Phalacrocorax /ngmae (Pallas. I"3)	+	-
P.arestotelis (Linnaeus. I~6I)	+	-
Oxvnra lencocephala	+	-
Mihtts milviis	+	-
Strix nralensis	+	-
Pastor rosens	+	-
Mammalia		
Mvctaltts leisleri. Kulil, 1818	-	4
Sieista snblilis. Pallas. 1 ~33	-	+
Allactaga jaculus, Pallas. 1 "8	-	+
Seirtopoda telinn'fah-jcini. Lichtenstein. 1823	-	4
Spalax arenarius. Reshetnik, 1939	-	4
Muslella erminea. Linnaeus, l~58	-	+
M.lulreola. Linnaeus, l"6l	-	+
l.tttra Intra. Linnaeus. I~58	-	·
Meles meles, Linnaeus. 1 ~58	-	+
Lurstops o uueatus ponticus. Harahasclt. 194(1	-	4
Phoeoena phoeoena relicta Abel. 1905	-	4
Delphinus deipltis pottlieus Barahash-Sikiforv. 1935	-	4
Mottachus inonaeltus. Hermann. I~"9		-

Note: D1'* - Dunaiskie Plavni Reserve
CB** - Chernomorsk) Biosphere Reserve

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For millennia, the waters of the Black Sea have supported a rich and diverse marine life. However, in recent decades the Black Sea has come under severe threat due to the combined impacts of eutrophication, anoxia, and chemical, biological and bacterial pollution. The various anthropogenic impacts are causing significant changes in the distribution and community composition of marine and coastal species. The Black Sea Environmental Programme has sponsored a series of detailed national assessment reports examining the scientific evidence for changes in the coastal and marine biological diversity of each Black Sea country. The main objective of present report is to give a systematic overview of the biodiversity of the Ukrainian waters of the Black and Azov Seas which will then serve as a scientific basis for the preparation of national and regional strategies for the conservation, and sustainable use of the natural ecosystems of the sea and coastal water bodies.

92-1-126098-1

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