NEW DATA ON THE ICHTHYOFAUNA COMPOSITION IN THE WHITE SEA

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The paper presents the up-to-date information on the composition of the White Sea ichthyofauna, updated from literature sources and the results of regular studies conducted by the Russian Federal Research Institute of Fisheries and Oceanography, Northern Branch in 1980−2023. During more than 40 years of trawl and coastal surveys, 64 species (subspecies) of pisciformes and fishes have been recorded in catches. Five species are listed for the White Sea for the first time: the freshwater species, the silver bream *Blicca bjoerkna* and burbot *Lota lota*; marine species, the pale eelpout *Lycodes pallidus*, the snakeblenny *Lumpenus lampretaeformis* and northern wolffish *Anarhichas denticulatus*. The presence of the merling *Merlangius merlangus* in the White Sea was confirmed. Taking into account literature data, the White Sea ichthyofauna includes 86 species and subspecies from 33 families (54 marine species, 14 anadromous and semi-anadromous species, and 18 freshwater species entering brackish waters). The marine ichthyofauna is basically represented by 17 families: Petromyzontidae, Clupeidae, Osmeridae, Coregonidae, Salmonidae, Gadidae, Gasterosteidae, Cottidae, Agonidae, Cyclopteridae, Liparidae, Zoarcidae, Stichaeidae, Pholidae, Anarhichadidae, Ammodytidae and Pleuronectidae. Representatives of the other families are few or rare, or occur in low salinity estuarine areas. The catches of some species have not been recorded for half a century. The group of commercial fish species includes 23 species; Clupeidae, Osmeridae, Coregonidae, Salmonidae, Gadidae, and Pleuronectidae form the basis of fishery.

Keywords: ichthyofauna, species composition, rare species, White Sea.

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INTRODUCTION

Research on the ichthyofauna of the White Sea has more than two centuries of history. The first publications containing scientific information on the fish fauna of the sea date back to the early-mid 19th century (Lepekhin, 1805; Danilevsky, 1862). Materials on the White Sea ichthyofauna were fragmentarily supplemented during scientific and commercial expeditions studying the Murman coast (1898-1908) and a number of later expeditions (Layus, 1995). The obtained information on White Sea fish was included in the "Guide to the fish of the Barents, White and Kara Seas" by Knipovich (1926), a compilation on the fauna of the White Sea by Deryugin (1928), and works by Berg (1948, 1949a, 1949b) on freshwater fish. A complete list of White Sea fish (53 species) as of the mid-20th century was published in the "Guide to the fish of the northern seas of the USSR" by Andriyashev (1954), but it did not include freshwater fish that enter the desalinated zones of the bays, as well as a number of semi-anadromous species. The compilation by Altukhov et al. (1958) on the fish of the White Sea provides a more complete list of 68 species, including freshwater fish that occur in desalinated bays. In the work on the biological resources of the White Sea (Rass, 1995), the list of fish from Andriyashev's work (1954) is reproduced, taking into account the changed nomenclature of species names (Andriyashev, Chernova, 1994). In the publication analyzing the diversity and structure of the ichthyofauna of the northern seas of Russia (Karamushko, 2013), a systematic list of the White Sea ichthyofauna is not provided, only the total number of fish species (subspecies) is given – 82 (of which 50 are marine). In other publications of a faunistic nature, covering the adjacent or wider Arctic region, a smaller number of fish species is indicated for the White Sea. In the "Atlas-guide to the fish of the Barents Sea" (Dolgov, 2012), judging by the maps and species essays provided, up to 19 species are found in the Voronka of the White Sea. In the annotated catalog of fish of the seas of Russia (Parin et al., 2014), marine, freshwater, anadromous and semi-anadromous fish belonging to 73 species (or subspecies) are noted for the White Sea. In the compilation on marine fish of the entire Arctic region (Mecklenburg et al., 2018), during the preparation of which Russian-language sources were

summarized by A.V. Dolgov (Polar Branch of the All-Russian Research Institute of Fisheries and Oceanography) and O.V. Karamushko (Murmansk Marine Biological Institute of the Russian Academy of Sciences), 45 species of only marine fish are indicated for the White Sea. The variability of literature data on the composition of the White Sea ichthyofauna is, therefore, quite large. Considering this circumstance, as well as the probability of changes in fish ranges against the background of climatic changes that have occurred throughout the Barents Sea region over the past decades (Trofimov et al., 2018), the need to clarify the current composition of the White Sea ichthyofauna is obvious.

Since 1980, the Northern Branch of the All-Russian Research Institute of Fisheries and Oceanography (hereinafter - the Northern Branch of VNIRO) has been conducting regular studies of commercial ichthyofauna in the White Sea using trawl and coastal fishing. The purpose of our work is to update information on the species composition of the White Sea ichthyofauna based on the compilation of information from literary sources and analysis of long-term data from the Northern Branch of VNIRO.

MATERIALS AND METHODS

The material was based on data obtained in 1980-2023 during coastal expeditions and trawl surveys of the Northern Branch of VNIRO in the White Sea. Research over this more than 40-year period covered the most productive areas - mainly the Kandalaksha, Onega, Dvina, and Mezen Bays, as well as the eastern part of the Funnel (figure), while the deep-water basin of the Basin and the western waters of the Throat and Funnel were not surveyed. The location and number of trawl stations varied somewhat from year to year depending on the objectives of the voyages and weather conditions, but to ensure data comparability, stations were always located in the same areas.

For collecting ichthyological material on scientific vessels, a bottom trawl designed by the White Sea State Fishing Base with a horizontal opening of 14 m, vertical opening of 5 m, and a mesh

size in the codend of 16 mm was used. Trawling was performed for 15-30 minutes at an average speed of 3 knots.

Various fishing gear was used at coastal stations. In all parts of the White Sea, fyke nets with a codend mesh size of 12-24 mm and multi-mesh gillnet sets (nets connected in a line with mesh sizes of 16, 20, 30 mm, and so on) were used. In the Onega Bay coastal zone, a beam trawl with a horizontal opening of 2 m, height of 0.5 m, and codend mesh size of 14 mm was also used.

The systematic position of species, their Latin nomenclature and Russian names are adopted (unless specified otherwise) according to the annotated catalog of fishes of the seas of Russia (Parin et al., 2014). The same applies to categories of biotopic affiliation and characteristics related to habitat and migration patterns of fish: freshwater, brackish-water, marine, diadromous (anadromous, catadromous) or semi-diadromous species. Exceptions are some Russian names: for *Anguilla anguilla* (accepted as "European river eel" instead of "river eel," in contrast to the American river eel *A. rostrata*) and for *Scomber scombrus* ("Atlantic mackerel" instead of "mackerel," in contrast to the Atlantic chub mackerel *S. colias*). The traditional northern name for smelt *Osmerus dentex* is "Asian smelt," and in the Yenisei River it is known as "zubatka" (Berg, 1948; Andriyashev, 1954); therefore, for the White Sea smelt, instead of the name "toothed smelt" (Parin et al., 2014), we use "Asian toothed smelt" as proposed by Dorofeeva (2010). For *Gymnocanthus tricuspis* we accept the traditional " Arctic helmet sculpin" instead of " Arctic staghorn sculpin" . The name of the Danish zoologist Johan Fabricius (Johan Christian Fabricius, 1745-1808) , after whom the prickleback fish *Lumpenus fabricii* is named, is not Latinized when translated into Russian – "Lumpen Fabricii" (not "Fabriciusa"). The Latin " et auctorum" (et auct.) means "and subsequent authors" (who repeat information from the original source).

Based on frequency and regularity of occurrence, fish are categorized (according to Semushin, Novoselov, 2009) as: constantly occurring in the White Sea (common); rarely or singularly occurring; not recorded for half a century or more. For freshwater fish, the category "occurrence" refers to the

frequency of their catches in low-salinity White Sea waters (for example, European perch *Perca fluviatilis* – common; ruffe *Gymnocephalus cernua* – rare).

The term "commercial" refers to a species used in fisheries (industrial or recreational) in the White Sea; if a species is not caught in the White Sea but is commercially fished in other regions, the term "commercial" is placed in parentheses in the final list.

The analysis of the White Sea fish belonging to zoogeographical complexes was not among the objectives of this work, since an objective analysis of such materials is only possible in the context of understanding the physical and geographical features of the main bays, the Basin and the Throat of the sea, which is beyond the scope of this article.

When compiling the final list of fish, the following data were used. From Andriyashev's work (1954), in addition to the 53 species in the list (pp. 522-531), the Cheshsko-Pechora herring *Clupea pallasii suworovi* and Arctic cisco *Coregonus autumnalis* indicated by the author for the Mezen Bay (pp. 82, 103) were also included. From other compilations, species confirmed by findings and indicated for the White Sea in species essays and range maps were included (Dolgov, 2012; Parin et al., 2014; Mecklenburg et al., 2018). Three records not confirmed by catches were excluded. Thus, the Atlantic spiny lumpsucker *Eumicrotremus spinosus* is indicated for the White Sea (Parin et al., 2014. P. 312) based on Andriyashev's compilation (1954) as the primary source, but in the latter (p. 445) this species is noted only for waters north of the Kanin Peninsula, but not for the White Sea. In another work (Mecklenburg et al., 2018. P. 386), the snakeblenny *Lumpenus lampretaeformis* is indicated for the White Sea - on the range map and with reference to the same primary source (Andriyashev, 1954. P. 247), but in the latter work, the species is not noted for this sea. The Atlantic halibut *Hippoglossus hippoglossus* is indicated for the White Sea only on the map of its range (Mecklenburg, 2018), while in the species essay, specific findings of this species in the White Sea (or references to them) are not provided. We are not aware of any published data on catches of these species in the White Sea.

Attempts to introduce chum salmon *Oncorhynchus keta* in the 1940s and 1960s were unsuccessful (Petryashov et al., 2002). Steelhead trout *Parasalmo* (= *Oncorhynchus*) *mykiss* , an object of marine aquaculture, can escape from fish farm cages (Dolgov, 2012; Parin et al., 2014). These alien species are not included in this work.

The following notations are adopted: *TL* – absolute body length (from the tip of the snout to the end of the caudal fin), *SL* – standard length (the same, to the base of the caudal fin rays).

Materials from expeditions and trawl surveys of the Northern Branch of VNIRO were compiled by A.V. Semushin, G.V. Fuks, and A.S. Bezborodov; the nomenclature part of the work was done by N.V. Chernova.

RESULTS AND DISCUSSION

Species composition

Data from the Northern Branch of VNIRO . Over more than 40 years of trawl and coastal research, 64 species and subspecies have been recorded in the ichthyofauna of marine waters (including the White Sea Funnel); of these, 42 are marine, 9 are anadromous and semi-anadromous, and 13 are freshwater species that enter brackish waters.

Most species have been previously noted in the White Sea ichthyofauna. Five species are indicated for the sea for the first time. Two freshwater species – white bream *Blicca bjoerkna* and burbot *Lota lota* – were caught in the freshened innermost parts of the bays. Three marine species were noted in bottom trawl catches. Pale eelpout *Lycodes pallidus* was caught in autumn 2020 in the area of the Winter Coast of Dvina Bay at a depth of 39 m (1 specimen *TL* 22 cm). Snakeblenny was encountered in autumn 2008 in Onega Bay (2 specimens *TL* 8 and 9 cm); northern wolffish *Anarhichas denticulatus* was caught in the same location in autumn 2011 (1 specimen *TL* 65 cm). Additionally, new catches confirm the presence of whiting *Merlangius merlangus* in the White Sea,

which was only recently reported for Chupa Bay (Chernova, 2023): it was recorded in Dvina Bay in May 2015 and in June and August 2023; *TL* of the preserved specimen was 15 cm.

Fifteen species known from literature data were absent from the catches of the Northern Branch of VNIRO (1980-2023). Among marine fish, the basking shark *Cetorhinus maximus* and Greenland shark *Somniosus microcephalus* were not recorded, the nearly extinct in the north Atlantic sturgeon *Acipenser sturio* was not encountered, as well as warm-water species previously registered during periods of significant warming - opah *Lampris guttatus* , garfish *Belone belone* and Atlantic saury *Scomberesox saurus* . The absence of species from another group in the collections was due to the fact that they are characteristic of the central deep-water areas of the White Sea, which were not covered by the research: Atlantic poacher *Leptagonus decagonus* , Yugor's eelpout *Lycodes jugoricus* , spotted snake blenny *Leptoclinus maculatus* . The semi-anadromous Arctic cisco (rare in the White Sea) and the White Sea cisco *C. sardinella marisalbi* were not recorded in the catches. Among freshwater fish, some cyprinids (Cyprinidae) were absent from the collections: gudgeon *Gobio gobio* , crucian carp *Carassius carassius* , common minnow *Phoxinus phoxinus* , as well as stone loach *Barbatula barbatula* , European eel and European Alpine bullhead *Alpinocottus poecilopus* .

Complete list of fish of the White Sea . The list compiled from literature sources and data from the Northern Branch of VNIRO includes 86 species and subspecies from 33 families (Table 1). Below are comments on species composition, catches of rare fish, and nomenclature changes.

Table 1. List of cyclostomes and fish registered in the White Sea according to literature sources and data from the Northern Branch of the All-Russian Research Institute of Fisheries and Oceanography

Species	Characteristics				Source of information						Note
	I	II	III	IV	1	2	3	4	5	6	
Family Petromyzontidae - lampreys											
1. *Lethenteron camtschaticum* (Tilesius, 1811) – Pacific lamprey	An	nbp	Com	Comm	+[1]	+[1]		+		+	
Family Cetorhinidae – basking sharks											
2. *Cetorhinus maximus* (Gunnerus, 1765) – basking shark	M	ep	Rare	(Comm)					+[2]		Absent from catches for more than half a century
Family Squalidae – dogfish sharks											
3. *Squalus acanthias* Linnaeus, 1758 – spiny dogfish	M	bp	C	(Comm)	+	+		+	+	+	
Family Somniosidae – sleeper sharks											
4. *Somniosus microcephalus* (Bloch et Schneider, 1801) – Greenland shark	M	bp	C	(Comm)	+	+		+[3]	+		Absent from catches for more than half a century
Family Rajidae – skates											
5. *Amblyraja radiata* (Donovan, 1808) – starry ray	M	d	Com	(Comm)	+[4]	+[4]		+	+	+	
Family Acipenseridae – sturgeons											
6. *Acipenser ruthenus* Linnaeus, 1758 – sterlet	F	bp	C	RB				+		+	
7. *Acipenser sturio* Linnaeus, 1758 – Atlantic sturgeon	An	bp	R	RB				+[5]			Absent from catches for more than half a century
Family Anguillidae – freshwater eels											
8. *Anguilla anguilla* (Linnaeus, 1758) – European eel	Ka	bp	C	RB	+	+		+			Absent from catches for more than half a century
Family Clupeidae – herrings											
9. *Clupea harengus* Linnaeus, 1758 – Atlantic herring	M	np	Com	Comm	+	+		+	+	+	
10. *Clupea pallasii marisalbi* Knipowitsch, 1926 – White Sea herring	M	np	Com	Comm	+[6]	+[7]	+[8]	+	+[9]	+[9]	
11. *Clupea pallasii suworovi* Svetovidov, 1973 – Cheshsko-Pechora herring	M	np	Co	Comm	+[10]		+[11]	+	+[12]	+[12]	
Family Cyprinidae – carps											
12. *Abramis brama* (Linnaeus, 1758) – bream	F	bp	R	Comm		+		+		+	

13. *Ballerus sapa* (Pallas, 1814) [13]– white-eye bream	F	bp	R	Comm				+		+	
14. *Blicca bjoerkna* (Linnaeus, 1758) [13]– silver bream	F	bp	Si	Comm						+	In the delta of the Northern Dvina River
15. *Carassius carassius* (Linnaeus, 1758) – crucian carp	F	litt	R	Comm		+					Absent in catches for more than half a century
16. *Gobio gobio* (Linnaeus, 1758) – common gudgeon	F	litt	Si	Ncom		+		+ [14]			Absent in catches for more than half a century
17. *Leuciscus idus* (Linnaeus, 1758) – ide	F	bp	R	Comm		+		+		+	
18. *Leuciscus leuciscus* (Linnaeus, 1758) – common dace	F	bp	R	Ncom		+		+		+	
19. *Phoxinus phoxinus* (Linnaeus, 1758) – common minnow	F	litt	R	Ncom		+					Absent in catches for more than half a century
20. *Rutilus rutilus* (Linnaeus, 1758) – roach	F	bp	R	Comm		+		+		+	
Family Nemacheilidae – stone loaches											
21. *Barbatula barbatula* (Linnaeus, 1758) – stone loach	F	litt	R	Ncom		+ [15]		+			
Family Osmeridae – smelts											
22. *Mallotus villosus* (Müller, 1776) – capelin	M	nsp	Co	Comm	+	+	+	+	+	+	
23. *Osmerus dentex* Steindachner et Kner, 1870 – Asian toothed smelt	An	ner	Com	Comm	+ [16]	+ [16]	+ [17]	+		+	
Family Coregonidae – whitefishes											
24. *Coregonus autumnalis* (Pallas, 1776) – Arctic cisco	An	ner	R	Comm	+ [18]	+		+			
25. *Coregonus pallasii* Valenciennes, 1848 – Pallas's whitefish	P, An	bp	Ind	Comm				+ [19]		+ [20]	
26. *Coregonus widegreni* Malmgren, 1863 – Valaam whitefish [21]	P, An	bp	Ind	Comm				+		+ [20]	
27. *Coregonus pidschian* (Gmelin, 1789) – humpback whitefish	An	bp	Com	Comm	+ [22]	+ [23]		+		+	
28. *Coregonus sardinella* Valenciennes, 1848 – Siberian cisco	An	ner	Com	Comm	+ [24]	+ [24]		+ [25]			
29. *Stenodus leucichthys nelma* (Pallas, 1773) – nelma	Ppr	ner	R	RB	+	+		+		+	
Family Salmonidae – salmonids											
30. *Oncorhynchus gorbuscha* (Walbaum, 1792) – pink salmon	An	e	Com	Comm			+	+		+	Successfully introduced species
31. *Salmo salar* Linnaeus, 1758 – Atlantic salmon	An	e	Com	Comm	+	+	+	+		+	
32. *Salmo trutta* Linnaeus, 1758 – brown trout	An, P	e	Com	Comm	+	+	+	+		+	

33. *Salvelinus alpinus* (Linnaeus, 1758) – Arctic char	An, P	ner	R	Comm		+		+		+	
Family Esocidae – pikes											
34. *Esox lucius* Linnaeus, 1758 – pike	F	cs	Co	Comm		+				+	
Family Lampridae – opahs											
35. *Lampris guttatus* (Brünnich, 1788) – opah	M	emp	R	(Comm)	+	+		+	+		Absent from catches for more than half a century
Family Gadidae – cods											
36. *Boreogadus saida* (Lepechin, 1774) – polar cod	M	cp	Co	Comm	+	+	+	+	+	+	
37. *Eleginus nawaga* (Walbaum, 1792) – navaga	M	cs	Co	Comm	+	+	+[26]	+	+	+	
38. *Gadus morhua* Linnaeus, 1758 – Atlantic cod	M	cs	Co	Comm	+[27]	+	+	+	+	+	
39. *Gadus morhua marisalbi* Derjugin, 1920 – White Sea cod	M	cs	Co	Comm	+	+		+		+	
40. *Melanogrammus aeglefinus* (Linnaeus, 1758) – haddock	M	cs	Co	Comm	+	+	+	+	+	+	
41. *Merlangius merlangus* (Linnaeus, 1758) – whiting	M	cs	R	(Comm)						+[28]	In Chupa Bay of Kandalaksha Gulf[29]
42. *Pollachius virens* (Linnaeus, 1758) – saithe	M	irr	R	(Comm)	+	+		+	+	+	
Family Lotidae – burbots											
43. *Lota lota* (Linnaeus, 1758) – burbot	F	coa	R	Comm						+	In the Northern Dvina River delta
Family Belonidae – needlefishes											
44. *Belone belone* (Linnaeus, 1761) – garfish	M	irr	R	(Comm)	+	+		+	+		
Family Scomberesocidae – sauries											
45. *Scomberesox saurus* (Walbaum, 1792) – Atlantic saury	M	e	Un	(Comm)	+	+		+	+		
Family Gasterosteidae – sticklebacks											
46. *Gasterosteus aculeatus* Linnaeus, 1758 – three-spined stickleback	M, F, B	np	Co	Non-c	+	+		+		+	
47. *Pungitius pungitius* (Linnaeus, 1758) – nine-spined stickleback	F, B	bp	Co	Non-c	+	+		+		+	
Family Sebastidae – rockfishes											
48. *Sebastes norvegicus* (Ascanius, 1772) – golden redfish	M	bp	Co	Comm	+[30]	+[30]	+	+	+	+	
Family Cottidae – sculpins											
49. *Cottus gobio* Linnaeus, 1758 – European bullhead	F	benth	R	Non-c				+[31]		+	
50. *Alpinocottus poecilopus* (Heckel, 1837)[32] – Alpine bullhead	F	benth	R	Non-c				+[31]			

51. *Gymnocanthus tricuspis* (Reinhardt, 1830) – Arctic staghorn sculpin	M	benth	Co	Non-c	+	+		+	+	+	
52. *Icelus bicornis* (Reinhardt, 1840) – twohorn sculpin	M	benth	Co	Non-c	+	+		+	+	+	
53. *Myoxocephalus quadricornis* (Linnaeus, 1758) – fourhorn sculpin	M, B, F	benth	Co	Non-c	+[33]	+		+	+	+	
54. *Myoxocephalus scorpius* (Linnaeus, 1758) – shorthorn sculpin	M	benth	Co	Non-c	+	+		+	+	+	
55. *Triglops murrayi* Günther, 1888 – moustache sculpin	M	benth	Co	Non-c	+	+		+	+	+	
56. *Triglops pingelii* Reinhardt, 1837 – ribbed sculpin	M	near-bottom	Com	Irreg	+	+		+	+	+	
Family Agonidae – poachers											
57. *Agonus cataphractus* (Linnaeus, 1758) – hooknose	M	near-bottom	Com	Irreg	+	+		+	+	+	
58. *Aspidophoroides olrikii* Lütken, 1877 – Arctic alligatorfish	M	near-bottom	Com	Irreg	+[34]	+[34]		+	+	+	
59. *Leptagonus decagonus* (Bloch et Schneider, 1801) – Atlantic poacher	M	near-bottom	Com	Irreg	+	+		+	+		
Family Cyclopteridae – lumpfishes											
60. *Cyclopterus lumpus* Linnaeus, 1758 – lumpfish	M	pelagic	Com	(Comm)	+	+	+	+	+	+	
Family Liparidae – snailfishes											
61. *Liparis bathyarcticus* Parr, 1931 – Arctic snailfish	M	pelagic	–	Irreg					+[35]		
62. *Liparis* cf. *fabricii* Krøyer, 1847 – gelatinous snailfish	M	pelagic	Com	Irreg	+[36]	+[36]		+	+		
63. *Liparis liparis* (Linnaeus, 1766) – striped seasnail	M	near-bottom	Com	Irreg	+	+		+			
64. *Liparis tunicatus* Reinhardt, 1836 – Greenland seasnail	M	near-bottom	–	Irreg				+[37]	+		
Family Percidae – perches											
65. *Gymnocephalus cernua* (Linnaeus, 1758) – ruffe	F	pelagic	R	Comm		+		+		+	
66. *Perca fluviatilis* Linnaeus, 1758 – European perch	F	pelagic	Com	Comm		+				+	
Family Zoarcidae – eelpouts											
67. *Lycodes jugoricus* Knipowitsch, 1906 – Jugor eelpout	M	b	Com	Irr	+	+		+	+		
68. *Lycodes marisalbi* Knipowitsch, 1906 – White Sea eelpout	M	b	Com	Irr	+[38]	+		+	+	+	
69. *Lycodes pallidus* Collett, 1879 – pale eelpout	M	b	Rar	Irr						+	1 specimen in Dvina Bay
70. *Lycodes polaris* (Sabine, 1824) – polar eelpout	M	b	Com	Irr	+	+		+	+	+	

71. *Zoarces viviparus* (Linnaeus, 1758) – European eelpout	M	b	Com	Irr	+	+		+	+	+	
Family Stichaeidae – pricklebacks												
72. *Anisarchus medius* (Reinhardt, 1837) – stout eelblenny	M	bent	Com	Irr	+[39]	+[39]		+	+	+	
73. *Leptoclinus maculatus* (Fries, 1838) – spotted snake blenny	M	bent	Com	Irr	+	+		+	+		
74. *Lumpenus fabricii* Reinhardt, 1836 – slender eelblenny	M	bent	Com	Irr	+	+		+	+	+	
75. *Lumpenus lampretaeformis* (Walbaum, 1792) – snake blenny	M	bent	Rar	Irr						+	Singular in Onega Bay
Family Pholidae – gunnels												
76. *Pholis gunnellus* (Linnaeus, 1758) – rock gunnel	M	b	Com	Irr	+	+			+	+	
Family Anarhichadidae – wolffish												
77. *Anarhichas denticulatus* Krøyer, 1845 – northern wolffish, blue catfish	M	bent	Rar	(Comm)						+	1 specimen in Onega Bay
78. *Anarhichas lupus marisalbi* Barsukov, 1956 – White Sea striped wolffish	M	benthic	Com	Comm	+	+	+[40]	+[40]	+	+	
79. *Anarhichas minor* Olafsen, 1772 – spotted wolffish	M	benthic	Com	Comm		+		+[41]		+	
Family Ammodytidae – sand lances												
80. *Ammodytes marinus* Raitt, 1934 – lesser sand eel	M	pelagic	Com	Non-comm	+[42]	+[42]		+	+	+	
Family Scombridae – mackerels												
81. *Scomber scombrus* Linnaeus, 1758 – Atlantic mackerel	M	pelagic	Rare	(Comm)	+	+		+	+	+	Caught in 2003 in Gridina Bay [43]
Family Pleuronectidae – flounders												
82. *Hippoglossoides platessoides* (Fabricius, 1780) – American plaice	M	bottom	Com	Comm		+	+	+	+	+	
83. *Limanda limanda* (Linnaeus, 1758) – common dab	M	bottom	Com	Comm	+	+	+	+	+	+	
84. *Liopsetta glacialis* (Pallas, 1776) – Arctic flounder	M	bottom	Com	Comm	+	+	+	+	+	+	
85. *Platichthys flesus* (Linnaeus, 1758) – European flounder	M, F	bottom	Com	Comm	+[44]	+[44]	+	+	+	+	
86. *Pleuronectes platessa* Linnaeus, 1758 – European plaice	M	bottom	Com	Comm	+[45]	+	+	+	+	+	
Total					55	68	19	73	45	64	

Note. I – ecological status, II – biotope affiliation, III – occurrence, IV – fishery importance. 1 – Andriyashev, 1954; 2 – Altukhov et al., 1958; 3 – Dolgov, 2012; 4 – Parin et al., 2014; 5 – Mecklenburg et al., 2018; 6 – data from the Northern Branch of the All-Russian Research Institute of Fisheries and Oceanography for 1980–2023. An – anadromous, Ka – catadromous, M – marine,

P – freshwater, Ppr – semi-migratory, S – brackish water; bp – benthopelagic, d – demersal, kp – cryopelagic, nbp – neritobenthopelagic, ner – neritic, np – neritopelagic, prid – near-bottom, e – epipelagic, emp – epimesopelagic; Ed – solitary, I – extinct, Ob – common, R – rare, "–" – no data; KK – included in Red Books (prohibited for fishing), Nepr – non-commercial, Prom – commercial in the White Sea basin, (Prom) – commercial outside the sea. For rare species, the primary sources of their catches are given in footnotes. [1] Listed as *Lampetra japonica* (Martens, 1868); [2] Tambovtsev, 1965, 1966; Konstantinov, Nizovtsev, 1979; [3] Mukhomediyarov, 1963; [4] as *Raja radiata* Donovan, 1808; [5] Kandalaksha Bay (Lagunov, Konstantinov, 1954); [6] as *Clupea harengus pallasi* natio *maris-albi* Berg, 1923 (*maris-albi* – former spelling); [7] as *Clupea harengus pallasi* natio *maris-albi* Berg, 1923 (p. 52), but in the list – as *Clupea harengus* natio *maris-albi* Berg, 1923; [8] as *Clupea pallasii marisalbi* Berg, 1923; [9] as *Clupea pallasii* Valenciennes, 1847; [10] as *Clupea harengus pallasi* natio *suworowi* Rabinerson, 1927 (absent in the table, but mentioned in the text (p. 82) for the Mezen Bay); [11] as *Clupea pallasii suworowi* Rabinerson, 1927; [12] as *Clupea pallasii* Valenciennes, 1847; [13] silver bream and white-eye bream were included in the genus *Abramis* Cuvier, 1816 (Parin et al., 2014), now they are considered within the genera *Blicca* Heckel, 1843 and *Ballerus* Heckel, 1843 respectively (Fricke et al., 2023), which is confirmed by molecular genetic data (Perea et al., 2010); [14] in the White Sea – in coastal waters with very low salinity; [15] as *Nemachilus barbatulus* (Linnaeus 1758); [16] as *Osmerus eperlanus dentex* natio *dvinensis* Smitt, 1882; [17] as *Osmerus eperlanus* (Linnaeus, 1758); [18] mentioned in the text (p. 103) for the Mezen Bay; [19] Pallas' whitefish, or Neva many-rakered whitefish, indicated at the mouth of the Kem River; [20] as *Coregonus lavaretus* Linnaeus, 1758 (= *C. pallasii* + *C. widegreni*); [21] few-rakered whitefish, indicated as common in the Keret River estuary and Dvina Bay; [22] as *C. lavaretus pidschian* natio *pidschianoides* Pravdin, 1931 (p. 106) and as *C. lavaretus pidschian* in the list (p. 524); [23] as *C. lavaretus pidschian* natio *pidschianoides* Pravdin, 1931; [24] as *Coregonus sardinella maris-albi* Berg; [25] as *Coregonus sardinella* Valenciennes; [26] as *Eleginus navaga* (Pallas, 1811); [27] "forma *hiemalis* Taliev, 1931, but Atlantic cod also enters" (p. 525); [28] singular in Dvina Bay; [29] singular (Chernova, 2023); [30] as *Sebastes marinus* (Linnaeus 1758); [31] delta of the Northern Dvina River; [32] previously known as *Cottus poecilopus* (Heckel, 1837); [33] as *Myoxocephalus quadricornis labradoricus* (Girard, 1850); [34] as *Ulcina olriki* (Lütken, 1886); [35] 3 specimens from the White Sea (Chernova, 2008); [36] as *Liparis koefoedi* Parr, 1932; [37] specimens from the White Sea (Chernova, 2008); [38] as *Lycodes pallidus maris-albi* Knipowitsch, 1906; [39] as *Lumpenus medius* (Reinhardt,

1837); [40] as *Anarhichas lupus* Linnaeus, 1758; [41] indicated with a question mark; [42] as *Ammodytes hexapterus marinus* Raitt, 1934; [43] Fuks, 2005; [44] as *Pleuronectes flesus bogdanovi* Sandberg, 1878; [45] as *Platessa platessa* (Linnaeus, 1758).

Among the fish-like creatures, the Pacific lamprey *Lethenteron camtschaticum* (Petromyzontidae) is quite common, previously widely known in the White Sea as the Arctic lamprey *Lampetra japonica* .

All three shark species occur in the White Sea individually or rarely. The basking shark was caught off the Tersky Coast in Sosnovaya Bay (in 1964) and in the Kandalaksha Gulf: in Kolvitsa Bay (in autumn 1964) and in Pitkul Bay (in July 1967) (Tambovtsev, 1965, 1966; Konstantinov, Nizovtsev, 1979); its appearance in the White Sea was associated with strong summer warming of waters. The Greenland shark was reported in the Voronka near the western coast of the Kanin Peninsula (Novikov, 1964); a large specimen weighing 550 kg was caught in autumn 1948 off the Karelian coast north of the Gridina River (Nikolaev, 1951; Altukhov et al., 1958; et auct.). Entries of the spiny dogfish *Squalus acanthias* into the White Sea were confirmed by its catches, according to the Northern Branch of VNIRO, in the area of Yagry Island in the inner part of the Dvina Bay in 2016.

The Atlantic sturgeon was caught on July 25, 1953, in the Kandalaksha Gulf opposite the mouth of the Umba River (a female 170 cm long, weighing 25 kg, at the age of 13 years) (Lagunov, Konstantinov, 1954). This species, which has practically disappeared in the north, is included in the Red Books of the Russian Federation (2021) and the Republic of Karelia (2007). We retain its traditional name here, although based on molecular genetic data, it is suggested that the sturgeon in the Baltic and Barents Seas was replaced by the American sturgeon *A. oxyrinchus* , which colonized the Eastern Atlantic in historical times (Parin et al., 2014).

The European eel (up to 96 cm long) was caught in 1915 in the Northern Dvina River below Arkhangelsk; it was also reported in the Sysola River, a tributary of the Vychegda River (Novikov, 1964). This catadromous species reproduces in the Sargasso Sea; its juveniles are sometimes carried into the White Sea, from where they migrate to rivers, where they live until the beginning of the reverse migration to marine waters.

The Pacific herring *Clupea pallasii* is represented in the White Sea by two subspecies: the White Sea herring *C. pallasii marisalbi* and the Cheshsko-Pechora herring (Andriyashev, 1954; Parin et al., 2014). The typical Pacific herring *C. pallasii pallasii* , found east of the Gulf of Ob, is absent here (Parin et al., 2014).

Freshwater fish: common bream *Abramis brama* , white-eye bream *Ballerus sapa* , Prussian carp, common gudgeon, ide *Leuciscus idus* , common dace *L. leuciscus* , common minnow, roach *Rutilus rutilus* (Cyprinidae), stone loach (Nemacheilidae), European Alpine bullhead (Cottidae), European perch, common ruffe (Percidae), pike *Esox lucius* (Esocidae) and burbot *Lota lota* (Lotidae) are found in small numbers along with marine fish in the most freshened parts of the bays (Parin et al., 2014; our data). There are reports of captures of European bullhead *Cottus gobio* and European Alpine bullhead *Alpinocottus poecilopus* (Cottidae) in the delta of the Northern Dvina River (Parin et al., 2014). Note that the Alpine bullhead, formerly known as *Cottus poecilopus* , was assigned to the new genus *Alpinocottus* recently (Bogdanov, 2023).

The anadromous White Sea smelt inhabits coastal marine waters, which was previously identified according to the nomenclature of its time as *Osmerus eperlanus dentex* natio *dvinensis* (Andriyashev, 1954), i.e., it was considered an infrasubspecific form (race) of the Asian smelt *O. eperlanus dentex* . The latter was considered as a subspecies of the European smelt *O. eperlanus* , then was regarded as a subspecies of the American smelt *O. mordax dentex* (Dorofeeva, 2010), and is currently considered as a separate species *O. dentex* (Parin et al., 2014). Due to such taxonomic

changes, the White Sea smelt has been reported in publications of different periods as part of three different species: *O. eperlanus* , *O. mordax* or *O. dentex* . According to current data (Parin et al., 2014; Semenova et al., 2019; Semenova et al., 2021), the White Sea smelt is considered as part of the Asian toothed smelt *O. dentex* . At the same time, it differs from the typical *O. dentex* inhabiting coastal waters of the Arctic seas east of the Kara Bay in several morphological characteristics and genetically (Andriyashev, 1954; Dorofeeva, 2010; Semenova et al., 2021). It has also been shown that populations of anadromous White Sea smelt from the Kandalaksha Bay, Onega Bay, and Dvina, Mezen and Pechora Bays represent local stocks that are significantly genetically isolated from each other (Semenova et al., 2019; Semenova et al., 2021).

Our list does not include the European smelt *O. eperlanus* , although in the annotated catalog this species is indicated for the White Sea basin as common not only in fresh but also in marine waters (Parin et al., 2014). Judging by the cited literature, this view is based on the inclusion in the synonymy (and composition) of the European smelt of the species *O. dvinensis* , described from material of anadromous smelt from the Northern Dvina River (Smitt, 1883). However, this does not correspond to modern concepts, according to which *O. eperlanus* in the European North is exclusively a freshwater lake-river species that inhabits lakes of the White Sea basin and the Pechora River (Kudersky, 1977), and has recently been found in a freshwater lake on Kolguev Island (Artamonova et al., 2020). Asian smelt feeds in the marine waters of this region (Kirpichnikov, 1935; Klyukanov, 1969), as evidenced by molecular genetic studies (Sendek et al., 2005; Skurikhina et al., 2018; Semenova et al., 2019).

The common White Sea whitefish was traditionally classified as the species *C. lavaretus* . Currently, it is believed that the range of *C. lavaretus* is limited to lakes in France and Switzerland, and it is absent from the fauna of Russia (Parin et al., 2014; Fricke et al., 2023). For the White Sea, it has been proposed (Parin et al., 2014) to classify anadromous many-rakered whitefish (the mouth

of the Kem River) as the species *C. pallasii* , and few-rakered whitefish (estuary of the Keret River, Dvina Bay) as the species *C. widegreni* . In the research practice of the Northern Branch of VNIRO, many-rakered and few-rakered whitefish were not distinguished.

Peled whitefish, previously considered a subspecies of common whitefish (*C. lavaretus pidschian*), is now considered as a separate species *C. pidschian* (Parin et al., 2014). The peled whitefish of the White and Barents seas, slightly different from its typical form (from the Gulf of Ob), was previously distinguished as natio *pidschianoides* .

The migratory cisco of the White Sea has traditionally been considered as *C. sardinella marisalbi* ; it differs slightly from the typical Siberian form *C. sardinella* , distributed from the Kara River eastward (Andriyashev, 1954). The status of the White Sea cisco remains debatable - in some works it is attributed to the European cisco *C. albula* , in others - to the Siberian *C. sardinella* (Fricke et al., 2023), or considered a hybrid between them (Parin et al., 2014). We retain its traditional name here.

Pink salmon *Oncorhynchus gorbuscha* is a successfully introduced Pacific species in the Barents Sea-White Sea region; it reproduces here and is currently used in commercial fishing.

The opah is a very rare species in the White Sea. A specimen 98 cm long was caught in the Kandalaksha Bay near the village of Umba (Knipowitsch 1900. P. 244; Andriyashev, 1954; et auct.), a specimen 127 cm long was caught in August 1963 at the border of the Mezen Bay near Cape Voronov (Novikov, 1964).

The European garfish has been recorded in isolated cases: near the coast of Bolshoy Solovetsky Island in 1948 (2 specimens) (Tambovtsev, 1949), in Gridina Bay (1 specimen) (Nikolaev, 1951); in the Dvina Bay near the village of Lopshenga in 1938 (1 specimen) and in the Sukhoe More area in 1953 (1 specimen) (Novikov, 1964); at the mouth of the Yugina River (1 specimen) (Dolgov, Zabavnikov, 2021). Near the village of Lopshenga, garfish was also caught in

summer 2023 (http://www.kenozero.ru/o-parke/materialy/novosti/v-onezhskom-pomore-obnaruzhili-tropicheskuyu-rybu/. Version. 24.03.2024).

Single specimens of Atlantic saury were caught during the warm season in Gridina Bay (Nikolaev, 1951) and in Pongoma Bay (in the same catch with herring in September 1950) (Novikov, 1964).

In the White Sea, three forms of cod are distinguished. "Winter" cod (*Gadus morhua* forma *hiemalis*) with a length of up to 40-50 cm approaches the shores in large numbers during autumn and winter periods, but does not reproduce in the White Sea. Resident, or coastal cod, pertuy (*G. morhua marisalbi*), a small (up to 35-40 cm) form, permanently inhabits coastal areas and reproduces near shores in March-May under the ice. Large oceanic cod (*G. morhua*) up to 100-110 cm occasionally enters from the Barents Sea in small numbers. Currently, the "winter" cod is considered an infrasubspecific form of Atlantic cod *G. morhua* (Parin et al., 2014).

Arctic cod *Boreogadus saida* was described by Lepekhin (Lepechin, 1774) from the White Sea. During the research years of the Northern Branch of VNIRO, it was found in autumn - occasionally in bottom trawl catches in the Basin near the Tersky Coast and in small numbers in the Dvina Bay (both in bottom trawl catches and in stationary traps).

Whiting was recorded in Chupa Bay of the Kandalaksha Gulf in September 2013 and in August 2017 (Chernova, 2023), and 4 more specimens were caught in 2023 in the inner part of the Dvina Bay by employees of the Northern Branch of VNIRO.

Golden redfish *Sebastes norvegicus* was previously known in the Barents Sea region under the name *S. marinus* . In the White Sea, immature juveniles are found, which are carried by currents from the Barents Sea at early developmental stages (Parin et al., 2014).

Mackerel was caught in Gridina Bay, the Kem River area, and Sorokskaya Bay (Nikolaev, 1951), as well as in Chupa Bay (Mukhomediyarov, 1963). In 2003, it was caught again in Gridina Bay (Fuks, 2005).

Four species of snailfish have been recorded in the White Sea: black-bellied snailfish *Liparis* cf. *fabricii* (previously *L. koefoedi*), European snailfish *L. liparis* and two species that were previously not distinguished from the latter - Arctic snailfish *L. bathyarcticus* and Greenland snailfish *L. tunicatus.* Of these, *L.* cf. *fabricii* and " *L. liparis* " are recorded in the Kandalaksha, Onega, Dvina, and Mezen Bays (Altukhov, 1979). According to one of the authors of this work (N.V. Chernova), *L. bathyarcticus* was identified in collections from the Kandalaksha Bay (Cape Kuzokotsky area, 3 specimens *SL* 50-140 mm); specimens of *L. tunicatus TL* 92-139 mm were found in collections of the research vessel "Professor Boyko", performed in the Kandalaksha Bay (Knyazhaya Bay, October 2011, 4 specimens) and in the northeastern part of the Onega Bay (September 2011, 1 specimen). Liparids of the genus *Liparis* (*TL* 4-18 cm), not identified to species level, were occasionally found in catches of the Northern Branch of VNIRO in all areas of the White Sea, with the highest numbers in the Onega Bay.

The ranges of several fish species characteristic of the Barents Sea fauna - Atlantic long rough dab *Glyptocephalus cynoglossus* , European lemon sole *Microstomus kitt* , Atlantic halibut, extend to areas adjacent to the northern part of the White Sea Throat (Dolgov, 2012), but their catches in the White Sea waters have not been registered (at least, we are not aware of them).

The White Sea ichthyofauna consists of 54 marine species, 14 anadromous and semi-anadromous species, and 18 freshwater species that enter brackish waters (Table 2).

Table 2. Ichthyofauna structure by family composition and ecological status of White Sea fish and fish-like vertebrates

Family	Number of species

	total	marine	anadromous and semi-anadromous	freshwater, entering brackish waters
1. Petromyzontidae	1		1	
2. Cetorhinidae	1	1		
3. Squalidae	1	1		
4. Somniosidae	1	1		
5. Rajidae	1	1		
6. Acipenseridae	2		1	1
7. Anguillidae	1		1	
8. Clupeidae	3	3		
9. Cyprinidae	9			9
10. Nemacheilidae	1			1
11. Osmeridae	2	1	1	
12. Coregonidae	6		6	
13. Salmonidae	4		4	
14. Esocidae	1			1
15. Lampridae	1	1		
16. Gadidae	7	7		
17. Lotidae	1			1
18. Belonidae	1	1		
19. Scomberesocidae	1	1		
20. Gasterosteidae	2	1		1
21. Sebastidae	1	1		
22. Cottidae	8	6		2
23. Agonidae	3	3		
24. Cyclopteridae	1	1		
25. Liparidae	4	4		
26. Percidae	2			2
27. Zoarcidae	5	5		
28. Stichaeidae	4	4		
29. Pholidae	1	1		
30. Anarhichadidae	3	3		
31. Ammodytidae	1	1		
32. Scombridae	1	1		
33. Pleuronectidae	5	5		
Total	86	54	14	18

Note. Families represented by common or mass species that form the basis of the White Sea ichthyofauna are highlighted in gray.

The basis of the marine ichthyofauna consists of common or abundant cyclostomes and fish in the White Sea from 17 families: Petromyzontidae, Clupeidae, Osmeridae, Coregonidae, Salmonidae, Gadidae, Gasterosteidae, Cottidae, Agonidae, Cyclopteridae, Liparidae, Zoarcidae,

Stichaeidae, Pholidae, Anarhichadidae, Ammodytidae and Pleuronectidae. Representatives of the other 16 families in the White Sea are few in number or rare, or are found in low-salinity estuary areas (Cyprinidae, Percidae, Esocidae and Nemacheilidae).

Occurrence

Among marine fish, three groups can be distinguished: 1) species permanently occurring in the White Sea; 2) species occurring singly or rarely; 3) species not recorded for half a century or more.

P e r m a n e n t l y occurring in the White Sea are 23 species from the group of commercial cyclostomes and fish: Pacific lamprey, Atlantic herring *C. harengus* , White Sea and Cheshsko-Pechora herrings, capelin *Mallotus villosus* , Asian toothed smelt, common whitefish (*Coregonus lavaretus*), humpback whitefish, inconnu *Stenodus leucichthys nelma* , pink salmon, Atlantic salmon *Salmo salar* , Arctic char *Salvelinus alpinus* , navaga *Eleginus nawaga* , Atlantic *Gadus morhua* and White Sea *Gadus morhua marisalbi* cod, haddock *Melanogrammus aeglefinus* , saithe *Pollachius virens* , lumpfish *Cyclopterus lumpus* , White Sea striped wolffish *A. lupus marisalbi* , dab *Limanda limanda* , Arctic *Liopsetta glacialis* and European *Platichthys flesus* flounder. To this group of fish we also include polar cod; it is most common, apparently, during cold climatic periods.

From non-commercial species, this group includes thorny skate *Amblyraja radiata* , three-spined stickleback *Gasterosteus aculeatus* and nine-spined stickleback *Pungitius pungitius* , Arctic staghorn sculpin, Atlantic two-horned icefish *Icelus bicornis* , four-horned sculpin *Myoxocephalus quadricornis* , shorthorn sculpin *M. scorpius* , Atlantic *Triglops murrayi* and ribbed *T. pingelii* sculpins, European *Agonus cataphractus* , Arctic *Aspidophoroides olrikii* and longnose poachers, as well as snailfishes (four species), White Sea *Lycodes marisalbi* and polar *L. polaris* eelpouts,

European eelpout *Zoarces viviparus* , daubed shanny, rock gunnel *Pholis gunnellus* and lesser sand eel *Ammodytes marinus* (22 species in total).

In estuarine zones and the Northern Dvina River delta, freshwater species are more or less regularly found: sterlet *Acipenser ruthenus* , bream, white bream, white-eye bream, ide, dace, roach, stone loach, pike, burbot, European bullhead and alpine bullhead, European perch and ruffe (14 in total).

In total, 58 species of jawless fish and fish are permanently found in the White Sea (39 marine, four anadromous and semi-anadromous, 15 freshwater species that enter brackish waters).

The following species are rarely or occasionally encountered in the White Sea: spiny dogfish, garfish, saury, whiting, golden redfish, shumaginsky and pale eelpouts, spotted wolffish *A. minor* and blue wolffish, mackerel, spotted snake blenny, stout eelblenny *Anisarchus medius* , snakeblenny, American plaice *Hippoglossoides platessoides* and European plaice *Pleuronectes platessa* (15 species). Some of them are caught in areas adjacent to the Barents Sea, where they are a common element of the fauna (spotted and blue wolffish, European plaice and dab). Some fish enter from the Barents Sea or are carried by currents mainly during warm periods (spiny dogfish, garfish, barracuda pike, whiting, golden redfish). Other species (Yogor and pale eelpouts, spotted snake blenny, medium lumpenus, snakeblenny) are rarely recorded in the catches of the Northern Branch of VNIRO, as they mostly inhabit areas not covered by research (central part of the Basin).

The list of fish registered at different times in the White Sea includes eight species that have been absent from catches for more than half a century: basking shark, Greenland shark, Atlantic sturgeon, European eel, common gudgeon, Prussian carp, common minnow, and opah.

Fish species listed in the Red Books

Four White Sea fish species are included in the Red Books of the Russian Federation subjects of the White Sea basin - Russian Federation (2021), Murmansk Region (2014), Republic of Karelia (2020), Arkhangelsk Region (2020), and Nenets Autonomous Okrug (2020): Atlantic sturgeon, sterlet, nelma, and European eel (Table 3).

Table 3. White Sea fish species included in the Red Books, their category and status

Species [1]	Red Book	Category and status
Atlantic sturgeon *Acipenser sturio*	Russian Federation, 2021	0 - probably extinct population in Russia; IE - extinct population in the Russian Federation; I priority of conservation measures
	Republic of Karelia, 2020	1 (CR) - Critically endangered
Sterlet *Acipenser ruthenus*	Republic of Karelia, 2020	1 (CR) - Critically endangered
Nelma *Stenodus leucichthys nelma* (populations of the European part of Russia)	Russian Federation, 2021	2 - populations declining in numbers and/or distribution; V - vulnerable populations; II priority of conservation measures.
	Republic of Karelia, 2020	1 (CR) – Critically endangered
	Nenets Autonomous Okrug [2], 2020	7 – population of the European part of Russia (excluding the population of the Pechora River basin), listed in the Red Book of the Russian Federation, in the Nenets Autonomous Okrug is out of danger
	Arkhangelsk Oblast, 2020	7 – species that is not threatened with extinction
European eel *Anguilla anguilla*	Russian Federation, 2021	1 – endangered species; E – endangered; III priority of conservation measures
	Arkhangelsk Oblast, 2020	4 – species with undefined current status and category
	Nenets Autonomous Okrug, 2020	4 – species with undefined status, requiring protection

Note. [1] Alpine bullhead *Cottus poecilopus* (= *Alpinocottus poecilopus*) was included in the Red Book of the Republic of Karelia (2007), but was not included in its next edition (2020). Common bullhead *Cottus gobio* was included in the Red Book of Arkhangelsk Oblast (2008), but was not included in its 2nd edition (2020). Sea trout *Salmo trutta trutta* (anadromous and resident forms) was included in the Red Book of Murmansk Oblast (2003), but was not included in its 2nd edition (2014). [2] In the Nenets Autonomous Okrug, it inhabits the White Sea areas of the Kanin Peninsula.

CONCLUSION

According to the data of the Northern Branch of VNIRO for more than 40 years of trawl and coastal marine collections in the White Sea, 64 species (subspecies) of fish-like animals and fish have been registered in the catches. Most of them were previously known in the White Sea. Five species are indicated for the sea for the first time: pale eelpout *Lycodes pallidus* , snakeblenny *Lumpenus lampretaeformis* , northern wolffish *Anarhichas denticulatus* (marine fish), white bream *Blicca bjoerkna* and burbot *Lota lota* (freshwater fish). New catches confirmed the presence of whiting *Merlangius merlangus* in the White Sea and the entry of Atlantic mackerel *Scomber scombrus* .

Taking into account the results of literature analysis and nomenclature changes, the modern ichthyofauna of the White Sea includes 86 species (subspecies) from 33 families: marine – 54 species, anadromous and semi-anadromous – 14, freshwater species entering estuarine zones – 18. These include common species, rare and singularly occurring species, as well as fish that have not been caught for half a century.

The basis of marine ichthyofauna consists of common and abundant species from 17 families, totaling 58 species (39 marine, 4 anadromous and semi-anadromous, 15 freshwater species entering brackish waters), of which 23 species are commercially important.

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COMPLIANCE WITH ETHICAL STANDARDS

This work used existing research results on ichthyofauna (information from literature and the Northern Branch of VNIRO). Permission for such analytical studies is not required.

CONFLICT OF INTEREST

The authors of this work declare that they have no conflict of interest.

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FIGURE CAPTION

Layout of trawl (●) and coastal (●) stations conducted by the Northern Branch of the All-Russian Research Institute of Fisheries and Oceanography in the White Sea during 1980–2023.