NPAFC
Doc. 813
Rev. _____

Knowledge Base and Catalogue of Salmons abundance of the northwestern part of Japan (East) Sea

by

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submitted to the

North Pacific Anadromous Fish Commission

by

Russia

October 2004

THIS PAPER MAY BE CITED IN THE FOLLOWING MANNER:
GIS and Atlas of Salmons spatial-temporal distribution in the northwestern part of Japan (East) Sea (NPAFC Doc. 812). 22 pp.
Pacific Research Fisheries Centre (TINRO-center), 4, Shevchenko Alley, Vladivostok, 690600, Russia

Abstract

In order to improve informational provision of the northwestern part of Japan (East) Sea nekton resource investigations database of a lot of trawl stations, performed in this region from 80th to the present time, was developed. On its basis informational product of higher level was prepared. It can be named as knowledge bases of hydrobionts resources, as this base contains not raw primary data, but the results of their statistical and cartographic treatment. The calculations are made on the data of 34 scientific-research cruises in the sea within the period from February 10, 1981 to November 26, 2003 (2345 trawl stations). The abundance and biomass information is summarized for 8 biostatistical regions, for different seasons and vertical zones of the sea, and grouped into three periods (1981-1990, 1991-1995 and 1996-2003), which differ in climate-oceanological conditions and status of biological resources. A catalogue of tables entitled "Nekton of the northwestern part of Japan (East) Sea. Abundance, biomass and species ratio" will soon be published in Russian language. 142 tables of unabridged edition of it contain information on 170 species and groups of nekton, inhabiting in the sea pelagial.

This document is prepared with use of the same base and same methods, but it contains only the data on pink, chum, cherry, and coho salmons (79 tables). That is why it can be considered as a "Tabular Catalogue of Salmon Abundance in the northwestern part of Japan (East) Sea". Materials of the included tables enable to estimate not only density of the population, but also total stock of any salmon species in this area.

In order to improve informational provision of bioresource investigations in the Far-Eastern seas of Russia, a database of trawl stations, performed in this region from 1980 to the present time, was developed in the Laboratory of the Applied Biocenology, TINRO-Center (Dulepova, Volvenko, 2002; Volvenko, 2003a). Later on it is planned to prepare informational products of higher level on its basis. They can be named as knowledge bases of hydrobionts resources, as these bases will contain not raw primary data, but the results of their statistical and cartographic treatment. This work has been conducted in two directions: 1) description of peculiarities of animal spatial-temporal distribution; 2) estimation of species composition, occurrence, population density and total stock of biological resources.

At present 2 block of this project, describing nekton of the Okhotsk and Japan (East) Seas, is ready. In accordance with the first direction a GIS, containing electronic maps of nekton distribution, is prepared, the "Atlas of quantitative distribution of nekton species in the Okhotsk Sea" (2003) is published, and "Atlas of quantitative distribution of nekton species in the northwestern part of the Japan Sea" (2004) is in press. In accordance with the second direction a knowledge base with statistical tables of different parameters of all nekton species abundance was created. A catalogue of tables entitled "Nekton of the Okhotsk Sea. Abundance, biomass and species ratio" (2003) is published, and "Nekton of the northwestern part of the Japan (East) Sea. Abundance, biomass and species ratio" (2004) is in press.

Materials and methods, used for creation of the abundance, biomass and species ratio tables, are almost identical to those, used for creation of GIS and the Atlas (see, for example, Volvenko, 2003a, b, c). At the same time, these informational products describe nekton resources in different ways. The Atlas shows peculiarities of spatial distribution of commercial and the most abundant species throughout the sea area. The tables contain detailed information on composition and abundance of the all nekton. Information like that cannot be integrated by 1x1-degree quadrangles, used for Atlas preparation, firstly, because of the limited capacity of the book – it will not hold tens of thousands of tables, and, secondly, because of the lack of initial data – small samples sizes in many quadrangles would have made estimation of most species abundance statistically insignificant. That is why information in the tables for Japan (East) Sea is integrated by the following 8 regions (Fig. 1):

1 – northern part of the Tatar Strait,
2 – southwestern Sakhalin,
3 – northern deep-water,
4 – northern Primorsky,
5 – southern Primorsky,
6 – Peter the Great Bay,
7 – central deep-water,
8 – northern Korean.

This zoning of the Sea (the scheme was published for the first time: Volvenko, 2003d) was performed taking into account general scheme of the surface water circulation, bottom relief and location of water mass modifications, identified by temperature-salinity characteristics. Borders of these regions are marked on every map of the Atlas. Their morphometric characteristics are described in detail in above mentioned paper (Volvenko, 2003d).

Another feature of the tables is more careful, in comparison with Atlas, selection of initial data. The data of 34 scientific-research and fishery-research cruises in the Japan (East) Sea within the period from 1981 to 2003, during which at least one valuable pelagic trawling was made, were used when creating the maps. The following trawlings were not considered as valuable: 1) emergency, 2) technical or adjustment, 3) purely fishery, 4) lasting for more than 3.5 hours or not more than 10 minutes (if in the latter case the trawl was taken out without a catch), and 5) conducted in epipelagic water layers (the depth of headrope towing is down to 200 m) with a speed not less than 3 knots. After quality control the number of sampling was equal to 2483 trawl stations. In order to make the tables, we had to exclude additionally fishery-research trawlings and aiming trawlings by echo records. The matter is that the majority of them contain reliable information only on the most abundant commercial objects, which substantially distorts the real ratio of species abundance. So, sampling amount reduced to 2345 stations (Fig. 1, Table 1).

Number and biomass of every species or intraspecific/interspecific group of animals per caught area unit – a square kilometer – (in ind./km^2 and kg/km^2) for every trawl station were calculated by formula, described in detail and justified by Volvenko (2003b), and then summarized by

the 8 above-mentioned regions. Besides, in order to reveal peculiarities of spatial-temporal distribution of hydrobionts, three more classification and basic data selection principles were introduced:

A) According to the trawled water layers they are subdivided into:

1) epipelagic - the depth of headrope towing down to 200 m,
2) upper epipelagic - the depth of headrope towing down to 25 m,
3) mesopelagic - the depth of headrope towing down not less than 200 m.

B) According to seasons[1] they are subdivided into:

1) summer - sampled from June 1 to September 15,
2) autumn - sampled from September 16 to November 31,
3) winter - sampled from December 1 to March 31,
4) spring - sampled from April 1 to May 31.

C) According to years they are subdivided into three long-term periods:

1) the eighties - 1981-1990,
2) the first half of the nineties - 1991-1995,
3) from the second half of the nineties to the present - 1996-2003.

In accordance with this classification 192 tables were obtained. Those of them, calculated on the basis of data of less than 10 trawling stations, are not published. Sampling sizes for the rest 142 tables are given in their titles.

The materials of these tables enable to estimate total stock of any nekton bioresource in the northwestern part of the Japan (East) Sea. Using the area method, applied in this work, values of absolute hydrobionts abundance can be calculated approximately[2] by multiplication of mean density (ind./km^2 and kg/km^2) by a region area (thousand km^2). The result is obtained in thousands individuals and in tons, respectively. For this it is necessary to use Table 2. It gives areas of the regions, calculated (Volvenko, 2003d) using ArcView GIS 3.2 in four equal-area cartographic projections: Albers conic, Lambert cylindrical, Lambert azimuthal and Sanson-Flamsteed sinusoidal (see, for example, Map projections…, 1994). Peculiarities of these projections poorly affect the result of these calculations, that is why Table 2 gives only average values of four calculation variants.

142 tables of unabridged edition of the tabular guide "Nekton of the northwestern part of the Japan (East) Sea. Abundance, biomass and species ratio" (2004) contain information on 170 species and groups of nekton, inhabiting in the sea pelagial. This document contains only the data on pink, chum, cherry, and coho salmons. That is why it can be considered as a "Tabular Catalogue of Salmon Abundance in the northwestern part of Japan (East) Sea".

In the conclusion I shall notice, that the numerous opponents of catchability coefficient application easily can recount the given here data on their own manners, as in third columns of the tables 3-81 the meaning of coefficient (k) is given. For this purpose there is enough multiplication on it any of density parameters - number or biomass. Others, who basically does not deny necessity of catchability coefficient introduction, but disagree with the accepted here meanings of it, also easily can recount density, multiplying it on our coefficient, and then having divided on their own.

[1] In this case not calendar but biological seasons of the sea are meant (see Shuntov, 2001).
[2] About limitations of the area method see Volvenko (2000).

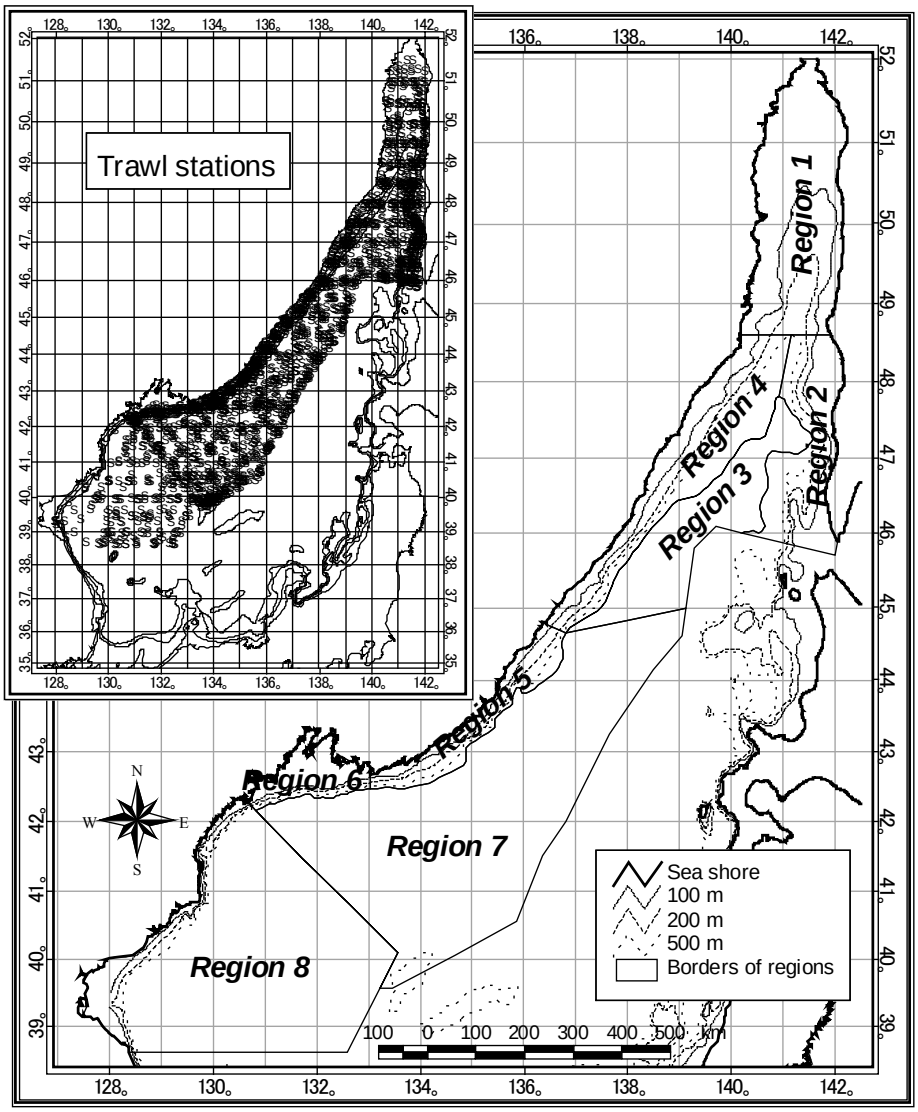

Fig. 1. Standard regions of averaging biostatistical information in the Japan (East) Sea and spatial distribution of 2345 trawl stations made in 34 research cruises during 10-feb-81 – 26-nov-03

Table 1

A list of selected cruises, with indication of a sampling size, conducted in the Japan (East) Sea from 1981 till 2003

Date		Trawler	Number of stations
starting	ending		
10-Feb-81	15-Feb-81	BATM "Babaevsk"	6
26-Aug-81	19-Sep-81	BATM "Pulkovsky Meredian"	17
19-Mar-82	20-Mar-82	BMRT "Mys Teahiy"	2
23-Jul-82	12-Sep-82	BATM "Pioner Nikolaeva"	48
24-Jan-84	28-Jan-84	RTM "Shantar"	2
12-Jul-84	10-Aug-84	STM "Ochakov"	17
25-Nov-84	08-Dec-84	RTMS "Gissar"	26
06-Jun-85	01-Oct-85	RTMS "Novodrutsk"	313
12-Oct-85	17-Nov-85	BMRT "Mys Babushkina"	4
20-Dec-85	20-Feb-86	BATM "Pioner Nikolaeva"	67
30-Apr-86	02-May-86	SRTM "Lesozavodsk"	5
02-Jun-86	06-Jun-86	SRTM "Shursha"	20
28-Jun-86	22-Jul-86	BATM "Babaevsk"	75
04-Oct-86	08-Oct-86	BMRT "Prof. Deryugin"	8
30-Jul-87	09-Sep-87	RTMS "Gissar"	45
15-Oct-87	15-Oct-87	SRTM "Antiya"	2
16-Mar-88	18-Mar-88	STM "Prof. Levanidov"	4
11-Apr-88	28-Aug-88	RTMS "Novoulyanovsk"	11
10-May-88	28-Aug-88	STM "Prof. Soldatov"	297
02-Jul-88	02-Jul-88	RTMS "Novokotovsk"	1
16-Mar-89	10-May-89	SRTM "Lesozavodsk"	19
29-Apr-89	16-May-89	SRTM "Gorniy"	46
26-Jun-89	28-Oct-89	STM "Prof. Kizevetter"	284
10-Apr-90	10-May-90	SRTM "Tamga"	29
17-Apr-90	16-May-90	SRTM "Antiya"	14
23-Jul-90	28-Aug-90	STM "Prof. Kizevetter"	148
07-Sep-90	07-Sep-90	RTMS "Gissar"	2
25-Oct-90	28-Nov-90	STM "Prof. Kaganovsky"	28
29-Jan-91	15-May-91	STM "Prof. Levanidov"	349
06-May-91	27-May-91	SRTM "Gorniy"	43
06-Oct-93	25-Oct-93	STM "Prof. Levanidov"	47
27-Sep-95	21-Nov-95	STM "TINRO"	202
31-Aug-97	15-Sep-97	STM "Prof. Levanidov"	60
03-Nov-03	26-Nov-03	STM "Prof. Kaganovsky"	104

Table 2

Water surface area (thousand km^2) in standard biostatistical regions of the Japan (East) Sea (see Fig. 1)

Region #	Epipelagic and upper epipelagic water layers (area of the entire region)	Mesopelagic water layers (water surface area above the depths ≥ 200 m)
1	39,50	3,74
2	24,82	11,28
3	30,79	30,79
4	34,65	17,64
5	15,42	7,44
6	11,00	1,85
7	142,93	142,93
8	127,51	115,53

Table 3

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 1 (number of trawl stations 202)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	6	2.97%	7.232	67.947	1.043 ± 0.483	1.663	11.780	0.208 ± 0.092
Oncorhynchus gorbuscha	> 30 cm	0.30	16	7.92%	7.579	587.750	10.062 ± 4.383	4.674	753.140	9.080 ± 4.293
Oncorhynchus keta	≤ 30 cm	0.40	1	0.50%	16.191	16.191	0.080 ± 0.080	0.486	0.486	0.002 ± 0.002
Oncorhynchus keta	> 30 cm	0.30	4	1.98%	21.580	43.038	0.658 ± 0.336	14.675	28.405	0.448 ± 0.228
Oncorhynchus masou	≤ 30 cm	0.40	4	1.98%	5.126	13.093	0.153 ± 0.083	0.713	1.538	0.024 ± 0.012
Oncorhynchus masou	> 30 cm	0.30	8	3.96%	10.455	43.975	0.739 ± 0.297	7.157	105.442	1.189 ± 0.587

Table 4

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 2 (number of trawl stations 289)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	10	3.46%	16.815	1380.362	8.302 ± 5.015	1.345	154.619	1.044 ± 0.579
Oncorhynchus gorbuscha	> 30 cm	0.30	25	8.65%	4.837	2900.186	17.465 ± 10.346	2.803	3480.223	19.827 ± 12.377
Oncorhynchus keta	≤ 30 cm	0.40	2	0.69%	18.970	82.665	0.352 ± 0.294	1.391	14.880	0.056 ± 0.052
Oncorhynchus keta	> 30 cm	0.30	5	1.73%	29.327	420.788	2.443 ± 1.552	37.536	360.675	2.438 ± 1.410
Oncorhynchus masou	≤ 30 cm	0.40	2	0.69%	18.270	19.987	0.132 ± 0.094	0.822	6.644	0.026 ± 0.023
Oncorhynchus masou	> 30 cm	0.30	11	3.81%	6.799	110.816	1.208 ± 0.498	3.199	64.431	0.841 ± 0.337

Table 5

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 3 (number of trawl stations 143)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	9	6.29%	10.148	3788.232	69.482 ± 38.036	1.938	661.704	11.331 ± 6.209
Oncorhynchus gorbuscha	> 30 cm	0.30	22	15.38%	6.482	1070.723	20.648 ± 8.677	4.856	1234.521	22.745 ± 9.872
Oncorhynchus keta	≤ 30 cm	0.40	1	0.70%	34.360	34.360	0.240 ± 0.241	5.704	5.704	0.040 ± 0.040
Oncorhynchus keta	> 30 cm	0.30	3	2.10%	9.636	22.781	0.378 ± 0.230	12.366	27.946	0.475 ± 0.287
Oncorhynchus masou	> 30 cm	0.30	17	11.89%	6.454	240.531	4.272 ± 1.903	4.400	176.706	2.963 ± 1.379

Table 6

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 4 (number of trawl stations 288)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	25	8.68%	8.379	7076.903	58.632 ± 28.014	1.091	880.986	8.114 ± 3.722
Oncorhynchus gorbuscha	> 30 cm	0.30	31	10.76%	3.027	1186.920	10.066 ± 4.649	2.725	1114.251	10.637 ± 4.621

Oncorhynchus keta	≤ 30 cm	0.40	1	0.35%	48.362	48.362	0.168 ± 0.168	5.997	5.997	0.021 ± 0.021
Oncorhynchus keta	> 30 cm	0.30	1	0.35%	26.709	26.709	0.093 ± 0.093	66.773	66.773	0.232 ± 0.232
Oncorhynchus masou	> 30 cm	0.30	14	4.86%	6.471	306.016	3.108 ± 1.514	3.662	160.539	1.895 ± 0.812

Table 7

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 5 (number of trawl stations 250)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	6	2.40%	54.502	4151.991	26.989 ± 17.563	7.107	647.287	4.110 ± 2.720
Oncorhynchus gorbuscha	> 30 cm	0.30	8	3.20%	23.850	128.873	2.189 ± 0.880	28.620	135.226	2.412 ± 0.936
Oncorhynchus keta	> 30 cm	0.30	1	0.40%	26.201	26.201	0.105 ± 0.105	78.602	78.602	0.314 ± 0.315
Oncorhynchus masou	> 30 cm	0.30	1	0.40%	25.409	25.409	0.102 ± 0.102	60.981	60.981	0.244 ± 0.244

Table 8

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 7 (number of trawl stations 586)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	21	3.58%	7.909	1962.582	10.282 ± 3.972	1.447	357.730	1.913 ± 0.725
Oncorhynchus gorbuscha	> 30 cm	0.30	62	10.58%	5.260	1402.867	17.374 ± 4.171	2.829	1247.702	16.729 ± 4.109
Oncorhynchus keta	> 30 cm	0.30	3	0.51%	8.984	104.003	0.224 ± 0.181	41.325	62.402	0.281 ± 0.164
Oncorhynchus kisutch	> 30 cm	0.30	1	0.17%	6.568	6.568	0.011 ± 0.011	11.264	11.264	0.019 ± 0.019
Oncorhynchus masou	≤ 30 cm	0.40	1	0.17%	9.229	9.229	0.016 ± 0.016	3.055	3.055	0.005 ± 0.005
Oncorhynchus masou	> 30 cm	0.30	12	2.05%	6.548	25.718	0.275 ± 0.086	4.203	27.360	0.277 ± 0.090

Table 9

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 8 (number of trawl stations 165)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	1	0.61%	6.987	6.987	0.042 ± 0.042	1.048	1.048	0.006 ± 0.006
Oncorhynchus gorbuscha	> 30 cm	0.30	6	3.64%	13.135	404.336	6.837 ± 3.309	11.888	307.617	5.593 ± 2.743

Table 10

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 1 (number of trawl stations 143)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	6	4.20%	7.232	67.947	1.473 ± 0.680	1.663	11.780	0.293 ± 0.130
Oncorhynchus gorbuscha	> 30 cm	0.30	16	11.19%	7.579	587.750	14.213 ± 6.170	4.674	753.140	12.826 ± 6.048
Oncorhynchus keta	≤ 30 cm	0.40	1	0.70%	16.191	16.191	0.113 ± 0.114	0.486	0.486	0.003 ± 0.003

Oncorhynchus keta	> 30 cm	0.30	4	2.80%	21.580	43.038	0.929 ± 0.474	14.675	28.405	0.632 ± 0.322
Oncorhynchus masou	≤ 30 cm	0.40	4	2.80%	5.126	13.093	0.217 ± 0.117	0.713	1.538	0.034 ± 0.017
Oncorhynchus masou	> 30 cm	0.30	8	5.59%	10.455	43.975	1.044 ± 0.418	7.157	105.442	1.680 ± 0.827

Table 11

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 2 (number of trawl stations 212)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	10	4.72%	16.815	1380.362	11.317 ± 6.833	1.345	154.619	1.424 ± 0.789
Oncorhynchus gorbuscha	> 30 cm	0.30	22	10.38%	4.837	2900.186	23.593 ± 14.097	4.353	3480.223	26.934 ± 16.867
Oncorhynchus keta	≤ 30 cm	0.40	1	0.47%	82.665	82.665	0.390 ± 0.391	14.880	14.880	0.070 ± 0.070
Oncorhynchus keta	> 30 cm	0.30	5	2.36%	29.327	420.788	3.330 ± 2.114	37.536	360.675	3.324 ± 1.920
Oncorhynchus masou	≤ 30 cm	0.40	2	0.94%	18.270	19.987	0.180 ± 0.128	0.822	6.644	0.035 ± 0.032
Oncorhynchus masou	> 30 cm	0.30	9	4.25%	11.903	110.816	1.577 ± 0.676	5.811	64.431	1.092 ± 0.457

Table 12

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 3 (number of trawl stations 128)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	9	7.03%	10.148	3788.232	77.624 ± 42.469	1.938	661.704	12.659 ± 6.933
Oncorhynchus gorbuscha	> 30 cm	0.30	19	14.84%	9.239	1070.723	22.460 ± 9.682	4.856	1234.521	25.010 ± 11.018
Oncorhynchus keta	≤ 30 cm	0.40	1	0.78%	34.360	34.360	0.268 ± 0.269	5.704	5.704	0.045 ± 0.045
Oncorhynchus keta	> 30 cm	0.30	3	2.34%	9.636	22.781	0.423 ± 0.256	12.366	27.946	0.530 ± 0.321
Oncorhynchus masou	> 30 cm	0.30	13	10.16%	11.453	240.531	4.519 ± 2.123	5.850	176.706	3.094 ± 1.538

Table 13

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 4 (number of trawl stations 240)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	24	10.00%	8.379	7076.903	70.291 ± 33.589	1.091	880.986	9.728 ± 4.462
Oncorhynchus gorbuscha	> 30 cm	0.30	31	12.92%	3.027	1186.920	12.079 ± 5.574	2.725	1114.251	12.764 ± 5.539
Oncorhynchus keta	≤ 30 cm	0.40	1	0.42%	48.362	48.362	0.202 ± 0.202	5.997	5.997	0.025 ± 0.025
Oncorhynchus keta	> 30 cm	0.30	1	0.42%	26.709	26.709	0.111 ± 0.112	66.773	66.773	0.278 ± 0.279
Oncorhynchus masou	> 30 cm	0.30	10	4.17%	12.549	306.016	3.603 ± 1.816	13.049	160.539	2.187 ± 0.973

Table 14

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 5 (number of trawl stations 187)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	6	3.21%	54.502	4151.991	36.082 ± 23.474	7.107	647.287	5.494 ± 3.636
Oncorhynchus gorbuscha	> 30 cm	0.30	8	4.28%	23.850	128.873	2.926 ± 1.174	28.620	135.226	3.224 ± 1.248

Table 15

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 7 (number of trawl stations 497)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	16	3.22%	7.909	1962.582	9.930 ± 4.564	1.447	357.730	1.707 ± 0.815
Oncorhynchus gorbuscha	> 30 cm	0.30	41	8.25%	5.260	1402.867	17.873 ± 4.875	4.355	1247.702	17.635 ± 4.816
Oncorhynchus keta	> 30 cm	0.30	3	0.60%	8.984	104.003	0.264 ± 0.213	41.325	62.402	0.331 ± 0.194
Oncorhynchus masou	≤ 30 cm	0.40	1	0.20%	9.229	9.229	0.019 ± 0.019	3.055	3.055	0.006 ± 0.006
Oncorhynchus masou	> 30 cm	0.30	6	1.21%	10.545	22.800	0.168 ± 0.071	5.379	27.360	0.171 ± 0.080

Table 16

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-2003. Region # 8 (number of trawl stations 124)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	5	4.03%	125.368	404.336	8.992 ± 4.394	77.310	307.617	7.347 ± 3.642

Table 17

Salmon abundance in epipelagic water layer in summer. The data of the years 1981-2003. Region # 1 (number of trawl stations 91)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	3	3.30%	23.773	43.542	1.008 ± 0.605	5.943	9.797	0.246 ± 0.145
Oncorhynchus gorbuscha	> 30 cm	0.30	11	12.09%	7.579	587.750	20.336 ± 9.569	8.337	753.140	19.084 ± 9.459
Oncorhynchus keta	≤ 30 cm	0.40	1	1.10%	16.191	16.191	0.178 ± 0.179	0.486	0.486	0.005 ± 0.005
Oncorhynchus keta	> 30 cm	0.30	4	4.40%	21.580	43.038	1.460 ± 0.743	14.675	28.405	0.994 ± 0.504
Oncorhynchus masou	≤ 30 cm	0.40	4	4.40%	5.126	13.093	0.341 ± 0.183	0.713	1.538	0.053 ± 0.027
Oncorhynchus masou	> 30 cm	0.30	3	3.30%	21.519	43.975	0.957 ± 0.586	8.635	105.442	1.459 ± 1.184

Table 18

Salmon abundance in epipelagic water layer in summer. The data of the years 1981-2003. Region # 2 (number of trawl stations 159)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	21	13.21%	4.837	2900.186	31.165 ± 18.785	4.353	3480.223	35.803 ± 22.480
Oncorhynchus keta	≤ 30 cm	0.40	1	0.63%	82.665	82.665	0.520 ± 0.522	14.880	14.880	0.094 ± 0.094
Oncorhynchus keta	> 30 cm	0.30	5	3.14%	29.327	420.788	4.440 ± 2.818	37.536	360.675	4.432 ± 2.559
Oncorhynchus masou	≤ 30 cm	0.40	1	0.63%	18.270	18.270	0.115 ± 0.115	0.822	0.822	0.005 ± 0.005

Table 19

Salmon abundance in epipelagic water layer in summer. The data of the years 1981-2003. Region # 3 (number of trawl stations 96)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	19	19.79%	9.239	1070.723	29.947 ± 12.851	4.856	1234.521	33.346 ± 14.628
Oncorhynchus keta	> 30 cm	0.30	3	3.13%	9.636	22.781	0.564 ± 0.341	12.366	27.946	0.707 ± 0.427

Table 20

Salmon abundance in epipelagic water layer in summer. The data of the years 1981-2003. Region # 4 (number of trawl stations 172)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	28	16.28%	3.027	1186.920	16.002 ± 7.741	2.725	1114.251	16.932 ± 7.679
Oncorhynchus keta	> 30 cm	0.30	1	0.58%	26.709	26.709	0.155 ± 0.156	66.773	66.773	0.388 ± 0.389

Table 21

Salmon abundance in epipelagic water layer in summer. The data of the years 1981-2003. Region # 5 (number of trawl stations 151)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	8	5.30%	23.850	128.873	3.624 ± 1.449	28.620	135.226	3.993 ± 1.540
Oncorhynchus masou	> 30 cm	0.30	1	0.66%	25.409	25.409	0.168 ± 0.169	60.981	60.981	0.404 ± 0.405

Table 22

Salmon abundance in epipelagic water layer in summer. The data of the years 1981-2003. Region # 7 (number of trawl stations 356)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	26	7.30%	5.260	958.686	11.321 ± 4.102	4.355	1172.952	12.575 ± 4.770

Table 23

Salmon abundance in upper epipelagic water layer in summer. The data of the years 1981-2003. Region # 1 (number of trawl stations 82)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	3	3.66%	23.773	43.542	1.119 ± 0.671	5.943	9.797	0.272 ± 0.160
Oncorhynchus gorbuscha	> 30 cm	0.30	11	13.41%	7.579	587.750	22.568 ± 10.603	8.337	753.140	21.179 ± 10.483
Oncorhynchus keta	≤ 30 cm	0.40	1	1.22%	16.191	16.191	0.197 ± 0.199	0.486	0.486	0.006 ± 0.006
Oncorhynchus keta	> 30 cm	0.30	4	4.88%	21.580	43.038	1.621 ± 0.823	14.675	28.405	1.103 ± 0.558
Oncorhynchus masou	≤ 30 cm	0.40	4	4.88%	5.126	13.093	0.378 ± 0.202	0.713	1.538	0.059 ± 0.030
Oncorhynchus masou	> 30 cm	0.30	3	3.66%	21.519	43.975	1.062 ± 0.650	8.635	105.442	1.619 ± 1.314

Table 24

Salmon abundance in upper epipelagic water layer in summer. The data of the years 1981-2003. Region # 2 (number of trawl stations 150)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	21	14.00%	4.837	2900.186	33.035 ± 19.909	4.353	3480.223	37.951 ± 23.826
Oncorhynchus keta	≤ 30 cm	0.40	1	0.67%	82.665	82.665	0.551 ± 0.553	14.880	14.880	0.099 ± 0.100
Oncorhynchus keta	> 30 cm	0.30	5	3.33%	29.327	420.788	4.706 ± 2.987	37.536	360.675	4.698 ± 2.712
Oncorhynchus masou	≤ 30 cm	0.40	1	0.67%	18.270	18.270	0.122 ± 0.122	0.822	0.822	0.005 ± 0.005

Table 25

Salmon abundance in upper epipelagic water layer in summer. The data of the years 1981-2003. Region # 3 (number of trawl stations 93)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	19	20.43%	9.239	1070.723	30.913 ± 13.258	4.856	1234.521	34.422 ± 15.092
Oncorhynchus keta	> 30 cm	0.30	3	3.23%	9.636	22.781	0.582 ± 0.352	12.366	27.946	0.730 ± 0.441

Table 26

Salmon abundance in upper epipelagic water layer in summer. The data of the years 1981-2003. Region # 4 (number of trawl stations 157)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	28	17.83%	3.027	1186.920	17.531 ± 8.475	2.725	1114.251	18.550 ± 8.406
Oncorhynchus keta	> 30 cm	0.30	1	0.64%	26.709	26.709	0.170 ± 0.171	66.773	66.773	0.425 ± 0.427

Table 27

Salmon abundance in upper epipelagic water layer in summer. The data of the years 1981-2003. Region # 5 (number of trawl stations 133)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	8	6.02%	23.850	128.873	4.114 ± 1.642	28.620	135.226	4.534 ± 1.745

Table 28

Salmon abundance in upper epipelagic water layer in summer. The data of the years 1981-2003. Region # 7 (number of trawl stations 337)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	26	7.72%	5.260	958.686	11.959 ± 4.331	4.355	1172.952	13.284 ± 5.037

Table 29

Salmon abundance in epipelagic water layer in autumn. The data of the years 1981-2003. Region # 1 (number of trawl stations 45)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	3	6.67%	7.232	67.947	2.641 ± 1.799	1.663	11.780	0.436 ± 0.297
Oncorhynchus gorbuscha	> 30 cm	0.30	5	11.11%	7.789	127.176	4.042 ± 2.906	4.674	46.801	2.167 ± 1.274
Oncorhynchus masou	> 30 cm	0.30	5	11.11%	10.455	17.652	1.382 ± 0.611	7.157	30.528	2.387 ± 1.113

Table 30

Salmon abundance in epipelagic water layer in autumn. The data of the years 1981-2003. Region # 2 (number of trawl stations 53)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	10	18.87%	16.815	1380.362	45.270 ± 27.176	1.345	154.619	5.695 ± 3.126
Oncorhynchus gorbuscha	> 30 cm	0.30	1	1.89%	46.467	46.467	0.877 ± 0.885	17.425	17.425	0.329 ± 0.332
Oncorhynchus keta	≤ 30 cm	0.40	1	1.89%	18.970	18.970	0.358 ± 0.361	1.391	1.391	0.026 ± 0.026
Oncorhynchus masou	≤ 30 cm	0.40	1	1.89%	19.987	19.987	0.377 ± 0.381	6.644	6.644	0.125 ± 0.127
Oncorhynchus masou	> 30 cm	0.30	9	16.98%	8.146	110.816	5.192 ± 2.354	3.199	53.413	3.213 ± 1.340

Table 31

Salmon abundance in epipelagic water layer in autumn. The data of the years 1981-2003. Region # 3 (number of trawl stations 35)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	9	25.71%	10.148	3788.232	283.882 ± 152.945	1.938	661.704	46.297 ± 24.971
Oncorhynchus keta	≤ 30 cm	0.40	1	2.86%	34.360	34.360	0.982 ± 0.996	5.704	5.704	0.163 ± 0.165
Oncorhynchus masou	> 30 cm	0.30	13	37.14%	11.453	240.531	16.528 ± 7.542	5.850	176.706	11.315 ± 5.496

Table 32

Salmon abundance in epipelagic water layer in autumn. The data of the years 1981-2003. Region # 4 (number of trawl stations 82)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	25	30.49%	8.379	7076.903	205.928 ± 97.330	1.091	880.986	28.497 ± 12.909
Oncorhynchus gorbuscha	> 30 cm	0.30	3	3.66%	9.483	114.356	1.788 ± 1.430	6.638	134.940	1.843 ± 1.659
Oncorhynchus keta	≤ 30 cm	0.40	1	1.22%	48.362	48.362	0.590 ± 0.593	5.997	5.997	0.073 ± 0.074
Oncorhynchus masou	> 30 cm	0.30	11	13.41%	11.114	306.016	10.680 ± 5.269	8.114	160.539	6.499 ± 2.811

Table 33

Salmon abundance in epipelagic water layer in autumn. The data of the years 1981-2003. Region # 5 (number of trawl stations 57)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	6	10.53%	54.502	4151.991	118.374 ± 76.823	7.107	647.287	18.024 ± 11.906
Oncorhynchus keta	> 30 cm	0.30	1	1.75%	26.201	26.201	0.460 ± 0.464	78.602	78.602	1.379 ± 1.391

Table 34

Salmon abundance in epipelagic water layer in autumn. The data of the years 1981-2003. Region # 7 (number of trawl stations 142)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	16	11.27%	7.909	1962.582	34.755 ± 15.862	1.447	357.730	5.975 ± 2.834
Oncorhynchus keta	> 30 cm	0.30	2	1.41%	8.984	18.141	0.191 ± 0.143	41.325	60.772	0.719 ± 0.518
Oncorhynchus masou	≤ 30 cm	0.40	1	0.70%	9.229	9.229	0.065 ± 0.065	3.055	3.055	0.022 ± 0.022
Oncorhynchus masou	> 30 cm	0.30	5	3.52%	10.545	13.183	0.429 ± 0.190	5.379	19.853	0.406 ± 0.200

Table 35

Salmon abundance in upper epipelagic water layer in autumn. The data of the years 1981-2003. Region # 1 (number of trawl stations 38)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	3	7.89%	7.232	67.947	3.128 ± 2.129	1.663	11.780	0.516 ± 0.352
Oncorhynchus gorbuscha	> 30 cm	0.30	5	13.16%	7.789	127.176	4.787 ± 3.441	4.674	46.801	2.566 ± 1.506
Oncorhynchus masou	> 30 cm	0.30	5	13.16%	10.455	17.652	1.637 ± 0.719	7.157	30.528	2.827 ± 1.311

Table 36

Salmon abundance in upper epipelagic water layer in autumn. The data of the years 1981-2003. Region # 2 (number of trawl stations 43)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	10	23.26%	16.815	1380.362	55.797 ± 33.433	1.345	154.619	7.019 ± 3.841
Oncorhynchus gorbuscha	> 30 cm	0.30	1	2.33%	46.467	46.467	1.081 ± 1.093	17.425	17.425	0.405 ± 0.410
Oncorhynchus masou	≤ 30 cm	0.40	1	2.33%	19.987	19.987	0.465 ± 0.470	6.644	6.644	0.155 ± 0.156
Oncorhynchus masou	> 30 cm	0.30	8	18.60%	11.903	110.816	6.210 ± 2.886	5.811	53.413	3.885 ± 1.639

Table 37

Salmon abundance in upper epipelagic water layer in autumn. The data of the years 1981-2003. Region # 3 (number of trawl stations 35)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	9	25.71%	10.148	3788.232	283.882 ± 152.945	1.938	661.704	46.297 ± 24.971
Oncorhynchus keta	≤ 30 cm	0.40	1	2.86%	34.360	34.360	0.982 ± 0.996	5.704	5.704	0.163 ± 0.165
Oncorhynchus masou	> 30 cm	0.30	13	37.14%	11.453	240.531	16.528 ± 7.542	5.850	176.706	11.315 ± 5.496

Table 38

Salmon abundance in upper epipelagic water layer in autumn. The data of the years 1981-2003. Region # 4 (number of trawl stations 70)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	24	34.29%	8.379	7076.903	240.999 ± 113.715	1.091	880.986	33.354 ± 15.076
Oncorhynchus gorbuscha	> 30 cm	0.30	3	4.29%	9.483	114.356	2.095 ± 1.676	6.638	134.940	2.159 ± 1.945
Oncorhynchus keta	≤ 30 cm	0.40	1	1.43%	48.362	48.362	0.691 ± 0.696	5.997	5.997	0.086 ± 0.086
Oncorhynchus masou	> 30 cm	0.30	10	14.29%	12.549	306.016	12.352 ± 6.161	13.049	160.539	7.497 ± 3.282

Table 39

Salmon abundance in upper epipelagic water layer in autumn. The data of the years 1981-2003. Region # 5 (number of trawl stations 39)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	6	15.38%	54.502	4151.991	173.008 ± 112.080	7.107	647.287	26.343 ± 17.376

Table 40

Salmon abundance in upper epipelagic water layer in autumn. The data of the years 1981-2003. Region # 7 (number of trawl stations 137)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	16	11.68%	7.909	1962.582	36.024 ± 16.435	1.447	357.730	6.193 ± 2.936
Oncorhynchus keta	> 30 cm	0.30	2	1.46%	8.984	18.141	0.198 ± 0.148	41.325	60.772	0.745 ± 0.537

Oncorhynchus masou	≤ 30 cm	0.40	1	0.73%	9.229	9.229	0.067 ± 0.068	3.055	3.055	0.022 ± 0.022
Oncorhynchus masou	> 30 cm	0.30	5	3.65%	10.545	13.183	0.445 ± 0.197	5.379	19.853	0.421 ± 0.208

Table 41

Salmon abundance in epipelagic water layer in winter. The data of the years 1981-2003. Region # 2 (number of trawl stations 28)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus gorbuscha	> 30 cm	0.30	3	10.71%	7.097	19.643	1.634 ± 0.996	2.803	9.509	0.712 ± 0.442
Oncorhynchus masou	> 30 cm	0.30	2	7.14%	6.799	67.291	2.646 ± 2.451	8.329	64.431	2.599 ± 2.352

Table 42

Salmon abundance in epipelagic water layer in winter. The data of the years 1981-2003. Region # 4 (number of trawl stations 27)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus masou	> 30 cm	0.30	3	11.11%	6.471	6.482	0.720 ± 0.407	3.662	4.922	0.477 ± 0.272

Table 43

Salmon abundance in epipelagic water layer in winter. The data of the years 1981-2003. Region # 7 (number of trawl stations 34)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	5	14.71%	87.131	377.100	32.066 ± 15.261	27.180	91.084	8.018 ± 3.746
Oncorhynchus gorbuscha	> 30 cm	0.30	4	11.76%	5.518	45.332	2.252 ± 1.462	2.829	16.708	0.935 ± 0.562
Oncorhynchus masou	> 30 cm	0.30	2	5.88%	19.428	25.718	1.328 ± 0.948	16.967	22.664	1.166 ± 0.833

Table 44

Salmon abundance in epipelagic water layer in winter. The data of the years 1981-2003. Region # 8 (number of trawl stations 25)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	1	4.00%	6.987	6.987	0.279 ± 0.285	1.048	1.048	0.042 ± 0.043

Table 45

Salmon abundance in upper epipelagic water layer in winter. The data of the years 1981-2003. Region # 2 (number of trawl stations 10)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus masou	> 30 cm	0.30	1	10.00%	67.291	67.291	6.729 ± 7.093	64.431	64.431	6.443 ± 6.792

Table 46

Salmon abundance in epipelagic water layer in spring. The data of the years 1981-2003. Region # 7 (number of trawl stations 54)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	32	59.26%	6.402	1402.867	112.484 ± 34.168	5.761	1247.702	98.052 ± 29.832
Oncorhynchus keta	> 30 cm	0.30	1	1.85%	104.003	104.003	1.926 ± 1.944	62.402	62.402	1.156 ± 1.166
Oncorhynchus kisutch	> 30 cm	0.30	1	1.85%	6.568	6.568	0.122 ± 0.123	11.264	11.264	0.209 ± 0.211
Oncorhynchus masou	> 30 cm	0.30	5	9.26%	6.548	22.800	1.025 ± 0.519	4.203	27.360	1.207 ± 0.632

Table 47

Salmon abundance in epipelagic water layer in spring. The data of the years 1981-2003. Region # 8 (number of trawl stations 48)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	6	12.50%	13.135	404.336	23.504 ± 11.173	11.888	307.617	19.226 ± 9.268

Table 48

Salmon abundance in upper epipelagic water layer in spring. The data of the years 1981-2003. Region # 7 (number of trawl stations 23)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	15	65.22%	22.800	1402.867	210.982 ± 76.287	34.200	1247.702	186.417 ± 66.451
Oncorhynchus keta	> 30 cm	0.30	1	4.35%	104.003	104.003	4.522 ± 4.623	62.402	62.402	2.713 ± 2.774
Oncorhynchus masou	> 30 cm	0.30	1	4.35%	22.800	22.800	0.991 ± 1.014	27.360	27.360	1.190 ± 1.216

Table 49

Salmon abundance in upper epipelagic water layer in spring. The data of the years 1981-2003. Region # 8 (number of trawl stations 38)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	5	13.16%	125.368	404.336	29.343 ± 14.028	77.310	307.617	23.973 ± 11.641

Table 50

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 1 (number of trawl stations 146)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	4	2.74%	7.232	43.542	0.678 ± 0.381	1.663	9.797	0.164 ± 0.091
Oncorhynchus gorbuscha	> 30 cm	0.30	16	10.96%	7.579	587.750	13.921 ± 6.044	4.674	753.140	12.563 ± 5.925
Oncorhynchus keta	≤ 30 cm	0.40	1	0.68%	16.191	16.191	0.111 ± 0.111	0.486	0.486	0.003 ± 0.003
Oncorhynchus keta	> 30 cm	0.30	4	2.74%	21.580	43.038	0.910 ± 0.465	14.675	28.405	0.619 ± 0.315
Oncorhynchus masou	≤ 30 cm	0.40	4	2.74%	5.126	13.093	0.212 ± 0.114	0.713	1.538	0.033 ± 0.017

Oncorhynchus masou	> 30 cm	0.30	3	2.05%	21.519	43.975	0.596 ± 0.366	8.635	105.442	0.909 ± 0.737

Table 51

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 2 (number of trawl stations 210)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	2	0.95%	16.815	18.239	0.167 ± 0.118	1.345	2.553	0.019 ± 0.014
Oncorhynchus gorbuscha	> 30 cm	0.30	23	10.95%	4.837	2900.186	23.908 ± 14.231	4.353	3480.223	27.236 ± 17.027
Oncorhynchus keta	≤ 30 cm	0.40	1	0.48%	82.665	82.665	0.394 ± 0.395	14.880	14.880	0.071 ± 0.071
Oncorhynchus keta	> 30 cm	0.30	5	2.38%	29.327	420.788	3.362 ± 2.135	37.536	360.675	3.356 ± 1.939
Oncorhynchus masou	≤ 30 cm	0.40	1	0.48%	18.270	18.270	0.087 ± 0.087	0.822	0.822	0.004 ± 0.004

Table 52

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 3 (number of trawl stations 107)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus gorbuscha	> 30 cm	0.30	19	17.76%	9.239	1070.723	26.869 ± 11.552	4.856	1234.521	29.918 ± 13.147
Oncorhynchus keta	> 30 cm	0.30	3	2.80%	9.636	22.781	0.506 ± 0.306	12.366	27.946	0.634 ± 0.383

Table 53

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 4 (number of trawl stations 210)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	2	0.95%	18.778	104.158	0.585 ± 0.505	3.943	16.145	0.096 ± 0.079
Oncorhynchus gorbuscha	> 30 cm	0.30	31	14.76%	3.027	1186.920	13.805 ± 6.365	2.725	1114.251	14.588 ± 6.324
Oncorhynchus keta	> 30 cm	0.30	1	0.48%	26.709	26.709	0.127 ± 0.127	66.773	66.773	0.318 ± 0.319

Table 54

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 5 (number of trawl stations 189)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus gorbuscha	> 30 cm	0.30	8	4.23%	23.850	128.873	2.895 ± 1.161	28.620	135.226	3.190 ± 1.235
Oncorhynchus keta	> 30 cm	0.30	1	0.53%	26.201	26.201	0.139 ± 0.139	78.602	78.602	0.416 ± 0.417
Oncorhynchus masou	> 30 cm	0.30	1	0.53%	25.409	25.409	0.134 ± 0.135	60.981	60.981	0.323 ± 0.324

Table 55

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 7 (number of trawl stations 381)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	41	10.76%	5.260	1402.867	23.315 ± 6.337	4.355	1247.702	23.004 ± 6.260
Oncorhynchus keta	> 30 cm	0.30	1	0.26%	104.003	104.003	0.273 ± 0.273	62.402	62.402	0.164 ± 0.164
Oncorhynchus masou	> 30 cm	0.30	1	0.26%	22.800	22.800	0.060 ± 0.060	27.360	27.360	0.072 ± 0.072

Table 56

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 8 (number of trawl stations 105)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	1	0.95%	6.987	6.987	0.067 ± 0.067	1.048	1.048	0.010 ± 0.010
Oncorhynchus gorbuscha	> 30 cm	0.30	5	4.76%	125.368	404.336	10.619 ± 5.181	77.310	307.617	8.676 ± 4.294

Table 57

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 1 (number of trawl stations 121)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	4	3.31%	7.232	43.542	0.818 ± 0.459	1.663	9.797	0.198 ± 0.110
Oncorhynchus gorbuscha	> 30 cm	0.30	16	13.22%	7.579	587.750	16.797 ± 7.276	4.674	753.140	15.159 ± 7.137
Oncorhynchus keta	≤ 30 cm	0.40	1	0.83%	16.191	16.191	0.134 ± 0.134	0.486	0.486	0.004 ± 0.004
Oncorhynchus keta	> 30 cm	0.30	4	3.31%	21.580	43.038	1.098 ± 0.560	14.675	28.405	0.747 ± 0.380
Oncorhynchus masou	≤ 30 cm	0.40	4	3.31%	5.126	13.093	0.256 ± 0.138	0.713	1.538	0.040 ± 0.020
Oncorhynchus masou	> 30 cm	0.30	3	2.48%	21.519	43.975	0.720 ± 0.441	8.635	105.442	1.097 ± 0.890

Table 58

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 2 (number of trawl stations 178)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	2	1.12%	16.815	18.239	0.197 ± 0.139	1.345	2.553	0.022 ± 0.016
Oncorhynchus gorbuscha	> 30 cm	0.30	22	12.36%	4.837	2900.186	28.099 ± 16.784	4.353	3480.223	32.079 ± 20.084
Oncorhynchus keta	≤ 30 cm	0.40	1	0.56%	82.665	82.665	0.464 ± 0.466	14.880	14.880	0.084 ± 0.084
Oncorhynchus keta	> 30 cm	0.30	5	2.81%	29.327	420.788	3.966 ± 2.518	37.536	360.675	3.959 ± 2.286
Oncorhynchus masou	≤ 30 cm	0.40	1	0.56%	18.270	18.270	0.103 ± 0.103	0.822	0.822	0.005 ± 0.005

Table 59

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 3 (number of trawl stations 104)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	19	18.27%	9.239	1070.723	27.644 ± 11.879	4.856	1234.521	30.781 ± 13.521
Oncorhynchus keta	> 30 cm	0.30	3	2.88%	9.636	22.781	0.520 ± 0.315	12.366	27.946	0.653 ± 0.394

Table 60

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 4 (number of trawl stations 195)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	2	1.03%	18.778	104.158	0.630 ± 0.544	3.943	16.145	0.103 ± 0.085
Oncorhynchus gorbuscha	> 30 cm	0.30	31	15.90%	3.027	1186.920	14.867 ± 6.851	2.725	1114.251	15.710 ± 6.807
Oncorhynchus keta	> 30 cm	0.30	1	0.51%	26.709	26.709	0.137 ± 0.137	66.773	66.773	0.342 ± 0.343

Table 61

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 5 (number of trawl stations 159)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	8	5.03%	23.850	128.873	3.441 ± 1.377	28.620	135.226	3.792 ± 1.464

Table 62

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 7 (number of trawl stations 352)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	41	11.65%	5.260	1402.867	25.236 ± 6.851	4.355	1247.702	24.899 ± 6.767
Oncorhynchus keta	> 30 cm	0.30	1	0.28%	104.003	104.003	0.295 ± 0.296	62.402	62.402	0.177 ± 0.178
Oncorhynchus masou	> 30 cm	0.30	1	0.28%	22.800	22.800	0.065 ± 0.065	27.360	27.360	0.078 ± 0.078

Table 63

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1981-1990. Region # 8 (number of trawl stations 71)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	5	7.04%	125.368	404.336	15.705 ± 7.621	77.310	307.617	12.831 ± 6.319

Table 64

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1991-1995. Region # 1 (number of trawl stations 52)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus masou	> 30 cm	0.30	1	1.92%	17.652	17.652	0.339 ± 0.343	24.890	24.890	0.479 ± 0.483

Table 65

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1991-1995. Region # 2 (number of trawl stations 63)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	3	4.76%	29.981	173.270	3.984 ± 2.894	4.597	25.589	0.581 ± 0.425
Oncorhynchus gorbuscha	> 30 cm	0.30	2	3.17%	7.097	19.643	0.424 ± 0.332	2.803	7.628	0.166 ± 0.129
Oncorhynchus keta	≤ 30 cm	0.40	1	1.59%	18.970	18.970	0.301 ± 0.304	1.391	1.391	0.022 ± 0.022
Oncorhynchus masou	≤ 30 cm	0.40	1	1.59%	19.987	19.987	0.317 ± 0.320	6.644	6.644	0.105 ± 0.106
Oncorhynchus masou	> 30 cm	0.30	5	7.94%	6.799	110.816	3.555 ± 2.108	3.199	64.431	2.323 ± 1.353

Table 66

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1991-1995. Region # 3 (number of trawl stations 18)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	> 30 cm	0.30	3	16.67%	6.482	39.214	4.322 ± 2.805	8.427	29.364	2.851 ± 1.832
Oncorhynchus masou	> 30 cm	0.30	5	27.78%	6.454	54.681	4.839 ± 3.147	4.400	24.825	2.918 ± 1.530

Table 67

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1991-1995. Region # 4 (number of trawl stations 58)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	8	13.79%	16.181	7076.903	164.931 ± 125.512	1.958	880.986	21.120 ± 15.680
Oncorhynchus keta	≤ 30 cm	0.40	1	1.72%	48.362	48.362	0.834 ± 0.841	5.997	5.997	0.103 ± 0.104
Oncorhynchus masou	> 30 cm	0.30	10	17.24%	6.471	306.016	9.258 ± 5.580	3.662	149.830	5.657 ± 2.860

Table 68

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1991-1995. Region # 7 (number of trawl stations 114)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	5	4.39%	87.131	377.100	9.563 ± 4.667	27.180	91.084	2.391 ± 1.147
Oncorhynchus gorbuscha	> 30 cm	0.30	21	18.42%	5.518	163.688	11.387 ± 2.933	2.829	143.980	9.114 ± 2.398
Oncorhynchus keta	> 30 cm	0.30	2	1.75%	8.984	18.141	0.238 ± 0.178	41.325	60.772	0.896 ± 0.645

Oncorhynchus kisutch	> 30 cm	0.30	1	0.88%	6.568	6.568	0.058 ± 0.058	11.264	11.264	0.099 ± 0.099
Oncorhynchus masou	> 30 cm	0.30	6	5.26%	6.548	25.718	0.682 ± 0.317	4.203	22.664	0.679 ± 0.306

Table 69

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1991-1995. Region # 8 (number of trawl stations 54)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus gorbuscha	> 30 cm	0.30	1	1.85%	13.135	13.135	0.243 ± 0.246	11.888	11.888	0.220 ± 0.222

Table 70

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1991-1995. Region # 1 (number of trawl stations 18)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus masou	> 30 cm	0.30	1	5.56%	17.652	17.652	0.981 ± 1.009	24.890	24.890	1.383 ± 1.423

Table 71

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1991-1995. Region # 2 (number of trawl stations 19)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	3	15.79%	29.981	173.270	13.211 ± 9.604	4.597	25.589	1.926 ± 1.413
Oncorhynchus masou	≤ 30 cm	0.40	1	5.26%	19.987	19.987	1.052 ± 1.081	6.644	6.644	0.350 ± 0.359
Oncorhynchus masou	> 30 cm	0.30	3	15.79%	30.888	110.816	11.000 ± 6.908	16.989	64.431	7.096 ± 4.422

Table 72

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1991-1995. Region # 4 (number of trawl stations 25)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	7	28.00%	25.330	7076.903	381.993 ± 291.998	3.631	880.986	48.919 ± 36.439
Oncorhynchus keta	≤ 30 cm	0.40	1	4.00%	48.362	48.362	1.934 ± 1.974	5.997	5.997	0.240 ± 0.245
Oncorhynchus masou	> 30 cm	0.30	6	24.00%	15.173	306.016	20.257 ± 12.886	13.049	149.830	12.283 ± 6.526

Table 73

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1991-1995. Region # 7 (number of trawl stations 56)

Salmon species	Size group	k	Occurrence stn. number	share	Number, ind./km^2 minimal	maximal	average	Biomass, kg/km^2 minimal	maximal	average
Oncorhynchus keta	> 30 cm	0.30	2	3.57%	8.984	18.141	0.484 ± 0.362	41.325	60.772	1.823 ± 1.313

Table 74

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1996-2003. Region # 2 (number of trawl stations 16)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	5	31.25%	69.885	1380.362	132.077 ± 89.260	12.265	154.619	16.332 ± 10.144
Oncorhynchus masou	> 30 cm	0.30	6	37.50%	11.903	36.183	7.832 ± 3.078	5.811	38.371	6.042 ± 2.720

Table 75

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1996-2003. Region # 3 (number of trawl stations 18)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	9	50.00%	10.148	3788.232	551.992 ± 290.432	1.938	661.704	90.022 ± 47.423
Oncorhynchus keta	≤ 30 cm	0.40	1	5.56%	34.360	34.360	1.909 ± 1.964	5.704	5.704	0.317 ± 0.326
Oncorhynchus masou	> 30 cm	0.30	12	66.67%	11.453	240.531	29.101 ± 14.055	5.850	176.706	20.623 ± 10.378

Table 76

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1996-2003. Region # 4 (number of trawl stations 20)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	15	75.00%	8.379	3219.761	359.858 ± 168.664	1.091	529.248	54.586 ± 27.621
Oncorhynchus masou	> 30 cm	0.30	4	20.00%	12.549	289.196	17.910 ± 14.802	13.104	160.539	10.885 ± 8.248

Table 77

Salmon abundance in epipelagic water layer irrespective of a season. The data of the years 1996-2003. Region # 7 (number of trawl stations 91)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	16	17.58%	7.909	1962.582	54.234 ± 24.610	1.447	357.730	9.323 ± 4.400
Oncorhynchus masou	≤ 30 cm	0.40	1	1.10%	9.229	9.229	0.101 ± 0.102	3.055	3.055	0.034 ± 0.034
Oncorhynchus masou	> 30 cm	0.30	5	5.49%	10.545	13.183	0.669 ± 0.295	5.379	19.853	0.634 ± 0.312

Table 78

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1996-2003. Region # 2 (number of trawl stations 15)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	5	33.33%	69.885	1380.362	140.882 ± 95.138	12.265	154.619	17.421 ± 10.801
Oncorhynchus masou	> 30 cm	0.30	6	40.00%	11.903	36.183	8.354 ± 3.247	5.811	38.371	6.445 ± 2.880

Table 79

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1996-2003. Region # 3 (number of trawl stations 18)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	9	50.00%	10.148	3788.232	551.992 ± 290.432	1.938	661.704	90.022 ± 47.423
Oncorhynchus keta	≤ 30 cm	0.40	1	5.56%	34.360	34.360	1.909 ± 1.964	5.704	5.704	0.317 ± 0.326
Oncorhynchus masou	> 30 cm	0.30	12	66.67%	11.453	240.531	29.101 ± 14.055	5.850	176.706	20.623 ± 10.378

Table 80

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1996-2003. Region # 4 (number of trawl stations 20)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	15	75.00%	8.379	3219.761	359.858 ± 168.664	1.091	529.248	54.586 ± 27.621
Oncorhynchus masou	> 30 cm	0.30	4	20.00%	12.549	289.196	17.910 ± 14.802	13.104	160.539	10.885 ± 8.248

Table 81

Salmon abundance in upper epipelagic water layer irrespective of a season. The data of the years 1996-2003. Region # 7 (number of trawl stations 89)

Salmon species	Size group	k	Occurrence stn. number	Occurrence stn. share	Number, ind./km^2 minimal	Number, ind./km^2 maximal	Number, ind./km^2 average	Biomass, kg/km^2 minimal	Biomass, kg/km^2 maximal	Biomass, kg/km^2 average
Oncorhynchus gorbuscha	≤ 30 cm	0.40	16	17.98%	7.909	1962.582	55.452 ± 25.154	1.447	357.730	9.533 ± 4.497
Oncorhynchus masou	≤ 30 cm	0.40	1	1.12%	9.229	9.229	0.104 ± 0.104	3.055	3.055	0.034 ± 0.035
Oncorhynchus masou	> 30 cm	0.30	5	5.62%	10.545	13.183	0.684 ± 0.302	5.379	19.853	0.648 ± 0.318

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