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Distribution of juvenile salmon along the eastern Sakhalin coast in late June-July 2002 by the R/V "Dmitry Peskov" cruise data

by

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ABSTRACT

Surface trawl operations and oceanographic observations have been conducted using the SakhNIRO research vessel "Dmitry Peskov" in order to describe distribution and habitat condition of juvenile pink salmon and other salmon species during their early sea life period. A study region contains shelf area and a slope of depths. The works were started in the La Perouse Strait, continued in Aniva Bay, along the shore of southeastern Sakhalin, in Terpeniya Bay, and finished near the shore of northeastern Sakhalin. A total of 112 stations have been executed during the cruise. In total, 83 juvenile pink, 149 juvenile chum, 2 juvenile masu, and 1 juvenile coho salmon were sampled. Majority of juvenile salmon (161 individuals) were caught in the southern part of the study region (Aniva Bay, La Perouse Strait, and southeastern Sakhalin). Juvenile chum salmon (*Oncorhynchus keta*) made up the base of salmon catches in this region. The second place was occupied by juvenile pink salmon (*O. gorbuscha*), the third place by masu salmon (*O. masou*). In Terpeniya Bay, 23 juvenile salmon were sampled; chum salmon dominated among them. A total of 10 juvenile salmon were sampled along the northeastern Sakhalin coast south of 51ºN; juvenile chum salmon dominated from catches too. Along the northeastern Sakhalin coast north of 51ºN, a total of 57 juvenile salmon were sampled; pink salmon made up the base of juvenile salmon catches.

INTRODUCTION

Wild and artificially-reared juvenile pink salmon form a base of the harvest of Eastern Sakhalin young salmon. The second place is occupied by chum salmon, majority of which is hatchery-reared. Masu salmon are reproduced at Sakhalin only by a natural way, and their juveniles are not abundant. The same is with coho salmon, which are reproduced both naturally and artificially, but only at one hatchery. In 2002, a total abundance of the Eastern Sakhalin juvenile pink salmon constituted 1 684 million individuals, including 115 in Aniva Bay, 559 in southeastern Sakhalin, 652 in Terpeniya Bay, 358 in northeastern Sakhalin. The eastern Sakhalin hatcheries released 138.6 million juvenile chum salmon, including 2.8 in Aniva Bay, 45.8 in southeastern Sakhalin, 50.6 in Terpeniya Bay, 39.4 in northeastern Sakhalin.

The earlier conducted SakhNIRO investigations show that the Eastern Sakhalin juvenile pink salmon after entering a sea do not stay nearby the estuaries of native rivers, but immediately move from the shore and live in the conditions of the open sea (Shershnev et al., 1982; Shubin, 1994; Shubin et al., 1996; Ivankov, 1999). In September they together with juveniles from other regions form dense aggregations in the northern part of the Okhotsk Sea (Shuntov, 1989; Karpenko et al., 1998), and in October-November in its southern part (Shuntov, 1989, 1994).

Early sea period of the Eastern Sakhalin pink salmon is not enough studied. The cause is that both in June and July we fail to find any dense aggregations of its juveniles neither near the shore nor in the open sea (Shershnev et al., 1982; Shuntov, 1989, 1994; Shubin, 1994; Shubin et al., 1996; Shuntov et al, 1995; Ueno, Shimizu, 1996; Ueno, 1997). The exception is only the Okhotsk Sea coast of the Iturup Island, where in June and July juvenile salmon aggregations were observed in bays within the zones of trap nets for salmon fishing (Kaev, Chupakhin, 2002).

The tasks of the cruise conducted by SakhNIRO along the eastern Sakhalin coast in early summer, 2002 were as follows: to study the possibility of using a mid-water rope trawl for fishing juvenile salmon less than 100 mm long; to estimate habitat conditions and distribution of juvenile pink salmon and other salmon species during their early sea period of life; to estimate a composition of ichthyocenosis of the upper epipelagial in the southwestern part of the Okhotsk Sea in early summer.

MATERIAL AND METHODS

Researches were carried out at the SakhNIRO research vessel "Dmitry Peskov" since June 29 to July 29, 2002. The region of works was the shelf area and depth slope of the eastern Sakhalin. Juvenile salmon were counted by the developed system of stations. The closest to the shore stations were executed above the inside part of the shelf zone (isobaths 30-50 m), and the remotest ones above the outside part of the shelf zone and depth slope (isobaths 150-2800 m). The works were started in the La Perouse Strait (stations 1-6), then in Aniva Bay (stations 7-12), along the shore of southeastern Sakhalin (stations 13-37), in Terpeniya Bay (stations 38-51), and were finished near the shore of northeastern Sakhalin (stations 52-112). A total of 112 stations have been executed during the cruise (Fig. 1?). For juvenile salmon fishing, a mid-water rope trawl (68/260 m) was used. The trawl codend was created of the set of nets with 10 mm, 8 mm, 6 mm, and 4 mm meshes. To bring out the head line to 0-horizon, it was supplied with the hydrodynamic dashboard of 8 m length and 0.6 m width. For horizontal opening of the trawl the V-form boards of 4.0 m^2 were used. Cables were 150 m long; if they were longer, we failed to raise the trawl to the surface. Taking into account other elements of trawl equipment, its front part was at 225 m from the ship stern. Usually, towing speed was 4.0 knots. Vertical opening was 27-28 m, horizontal – 40-44 m. Trawlings were made in the horizon of 0-30 m during daylight hours. In this report, CPUE for juvenile salmon are given according to the duration of trawl towing (0.5 of an hour), and for other fish species – 1 hour. Stations 26 and 65 (one near the southeastern shore, and another along the shore of northeastern Sakhalin) were made in the night hours. It needs to note that under a small length of cables, juvenile salmon could occur in

the ship wake that negatively affected a size of catches. In total, 83 juvenile pink salmon, 149 juvenile chum salmon, 22 juvenile masu salmon, and 1 juvenile coho salmon were sampled during the cruise.

To estimate the habitat conditions for juvenile salmon, 6 hydrological transects were done in latitude direction. Location of these transects is shown in Fig. 1B. Sounders ICTD FSI #1356, Bio-CTD FSI #1324B and Memory CTD #811 were used for measuring temperature and salinity. Sounding was conducted in the layer of 0-500 m (at shallow stations – up to the bottom).

RESULTS AND DISCUSSION

Vertical prophile of temperature and salinity throughout the shelf area and depth slope of the eastern Sakhalin on the latitude transects is shown in Fig. 2 and 3. The given temperature and salinity distribution is typical for the late June – July in this region (Pishchalnik, Bobkov, 2000). The existence of the well-developed upwelling on the shallow areas of the coast from Cape Elizabeth to Cape Terpeniya was a distinct peculiarity of the season of 2002. It should be noted that such hydrological condition is typical, but in this season we observed water temperature being 1-2° lower a standard, and water salinity being 1‰ higher a standard. This speaks in favor of a special activity of upwelling in the current year. Of the peculiarities of spatial structure of temperature and salinity fields, we should also note the occurrence of standard, rather stable eddy-makings of anticyclonic (by the higher temperature and lower salinity – sinking the waters) and cyclonic (by the lower temperature and higher salinity – raising the waters) vorticity. In the first case, these are eddies in the south of Aniva Bay, to the east of the southeastern Sakhalin coast, in the northeastern part of Terpeniya Bay, and on the line of Cape Elizabeth in the region of 144°E. In the second case, this is a series of eddy-makings on the depth slope.

The maps of vertical prophile of water temperature on transects I-VI show that on the shelf and depth slope of the eastern Sakhalin toward the south of 49°00 N, the isotherm 3°? is connected with the horizon of 30-40 m (Fig. 2-3). Due to the fact that juvenile pink salmon in the early sea life period inhabit at the temperature not lower than 3°? , we sampled almost a total layer of their possible habitat in our study region. Substantially different was the situation in the eastern part of Terpeniya Bay and northeastern Sakhalin shelf zone. In the first region the isotherm 3-4°? occurred on the horizon of 20 m. In the inside part of the northeastern Sakhalin shelf zone on the area from 49°00 to 51°00 N, 20 m horizon, there was the isotherm of 1-2°? , and on the area from 51°00 to 54°00 N it was from +1 to –1°? . At the same time, above the outside part of the shelf zone and along the total slope of depths in the northeastern Sakhalin a

thermal condition for juvenile salmon in the layer of 0-30 m was more favorable. In the region located to the south of 49°00 N, juvenile pink salmon were found only in La Perouse Strait, Aniva Bay, and at the end of southeastern Sakhalin, that is in regions with the most favorable temperature regime of the upper epipelagial. In the region located from 49°00 to 54°00 N, juvenile pink salmon were absent or they were in small numbers, and this, evidently, was directly connected with the unfavorable thermal regime of the upper epipelagial nearby the shore.

Most of all, juvenile salmon were caught in the southern part of the study region (Aniva Bay, La Perouse Strait, southeastern Sakhalin) – 161 individuals. The base of salmon catches in this region was made by juvenile chum salmon (*Oncorhynchus keta*). The second place was occupied by juvenile pink salmon (*O. gorbuscha*), the third by masu salmon (*O. masou*). In Terpeniya Bay, 23 juvenile salmon were sampled; chum juveniles dominated. Along the northeastern Sakhalin coast south of 51°00 N, 10 juvenile salmon were sampled; juvenile chum salmon dominated from catches too. Along the northeastern Sakhalin coast north of 51°00 N, 57 juvenile salmon were sampled. The base of juvenile salmon catches at this site was made by pink juveniles (Fig. 4-5).

Juvenile pink salmon were not frequent; they were observed only at 10 stations that constituted 9% of their total number. 7 of them were located in the southern part of the study region (Aniva Bay, La Perouse Strait, southeastern Sakhalin coast). These stations were located both above the shelf (isobaths 79-157 m), and above the slope of depths (isobaths 206-2881 m). Juvenile pink salmon were sampled under the sea surface temperature of 9.3-12.3°? . CPUE were small – from 1 to 10 ind./trawl. In total, 30 juvenile pink salmon were sampled in the southern part of the region. In Terpeniya Bay they were not sampled. They were not observed on the major part of the northeastern Sakhalin shelf either. In this region juvenile pink salmon were sampled only at three stations. Two of them were above the slope of depths (isobaths 995-1355 and 1302-1355 m). At each of these stations only by one fry pink salmon were sampled at the sea surface temperature of 8.4-12.3°? . The third station was located above the shelf to the east of Shmidt Peninsula (isobaths 123-131 m). On the sea surface of this region the influence of the Amur River run-off was clearly observed by the vertical salinity prophile. The sea surface temperature at this station was 10.5-12.2°? . There 51 juvenile pink salmon were sampled (Fig.5?).

In Aniva Bay, La Perouse Strait, and along the southeastern Sakhalin shore the length of juvenile pink salmon in late June and early July was 65-110 mm, weight 2-9 g (Table 1, Fig. 6). Scales of the largest fish (length 105-110 mm, weight 9 g) had 6-7 circulus. Pink juveniles caught in these regions earlier, in mid- and late June, did not exceed 50 mm by length, and 1 g by

weight (Shershnev et al., 1982; Shubin et al., 1996). In the extreme north of the study region, to the east of Shmidt Peninsula, the size-weight indices of juvenile pink salmon in late July were greater comparing to those in the south of the region – length 74-125 mm, weight 3-17 g (Table 1, Fig. 6). Scales of fish 110-125 mm long and 11-17 g weight had 10-13 circulus. It should be noted that in the 1960s of the past century, I.B. Birman (1985) observed dense aggregations of juvenile pink salmon in early August. He identified these juveniles as originated from the Amur River.

When analyzing results of the juvenile pink salmon count, the fact of discrepancy between the estimate of its harvest from the rivers of eastern Sakhalin and that from our trawl catches attracts attention. This can be explained by several causes. First, perhaps, juvenile pink salmon almost fully left the area of the eastern Sakhalin shelf. Indeed, in late July – early August juvenile pink salmon are widely distributed in the southern part of the Okhotsk Sea outside the shelf zone of Sakhalin and Kuril Islands (Shubin, ? rysin, Jukov, 1993; Shuntov, 1994; Ueno et al., 1996; Ueno, 1997). The second possible cause is a low catchability of trawls associated with their construction and equipment. Besides, perhaps, everything is associated with the behavior of juvenile pink salmon less than 100 mm long, which are almost impossible to be caught with a rope trawl. Thus, by the data of TINRO-Centre cruises, only 42 juvenile pink salmon of 8-17 cm long (mainly 10-12 cm) were sampled during the trawl survey between Sakhalin and Kuril Islands in the third decade of July, 1986, 1991 and 1992 (Shuntov, 1994). Since July 8 to August 3, 1997 the rope trawl with vertical and horizontal openings of 40 and 70 m, respectively, was used in the southern part of the Okhotsk Sea at the Japanese R/V "Sunyo-maru". Of 37 executed stations, juvenile pink salmon were observed only at 4. Only 21 fish 8.4-13.9 cm long and 5-25 g weight were sampled (Ueno, 1997).

Chum juveniles were 2 times frequent comparing to juvenile pink salmon; they were observed at 21 stations that constituted 19% of their total number. Almost all these stations were located on the area of eastern Sakhalin south of 49°00 N. In Aniva Bay, La Perouse Strait, and along southeastern Sakhalin, there were 16 such stations, or 43% of the number of stations executed in this region. In Terpeniya Bay, there were 3 stations (21%), along the northeastern Sakhalin – 2 (3%). Juvenile chum salmon were observed both above the shelf, and above the slope of depths. The greatest CPUE occurred there too (Fig. 5?). Juvenile chum salmon were sampled at the sea surface temperature of 7.9-12.2°? . CPUE varied from 1 to 15 ind./trawl. The most remote north station, where juvenile chum salmon were observed, was located 200 km to the east of Cape Terpeniya (station 58).

Length and weight of chum juveniles ranged within 80-225 mm and 3-103 g, respectively. The mean length of juveniles was 155 cm, weight – 34.9 g. 97% of juvenile chum

salmon had the length more than 110 mm and weight more than 9 g. Farther northward, size and weight of chum juveniles increased: they were larger along the southeastern Sakhalin than in Aniva Bay and La Perouse Strait, and in Terpeniya Bay they were larger than in the south-east (Fig. 7).

Table 1. Size-weight indices of juvenile pink, chum, and masu salmon from the eastern Sakhalin coastal waters in late June – July 2002

Region	Fork length (mm)			Weight (g)		
	Lim	M?s	N, ind.	Lim	M?s	N, ind.
Pink						
Aniva Bay, La Perouse Strait, southeastern Sakhalin area	65-110	88?2	27	2-9	4.5?0.4	27
Northeastern Sakhalin area	74-125	103?1	54	3-17	9.5?0.5	54
Total region	65-125	98?1	81	2-17	7.8?0.4	81
Chum						
Aniva Bay, La Perouse Strait	105-185	144?6	50	9-50	24.8?1.6	45
Southeastern Sakhalin area	80-200	157?3	68	3-70	37.0?1.8	66
Terpeniya Bay	135-225	170?5	27	21-103	46.5?5.4	27
Total region	80-225	155?0.2	145	3-103	34.9?1.4	138
Masu						
Southeastern Sakhalin area, Terpeniya Bay	135-197	166?6	14	23-84	52.1?6.0	14
Northeastern Sakhalin area	160-195	186?8	8	45-98	72.9?7.0	14
Total region	135-197	174?5	22	23-98	59.7?4.8	22

The largest chum salmon (length 225 mm, weight 103 g) was sampled on 10 July to the south-east of Terpeniya Bay (station 42). Scales of the chum juveniles sampled on 29 June to the east of La Perouse Strait (station 3) had 18 circulus. This fish was 170 mm long and 41 g weight. The release of juvenile chum salmon from the south Sakhalin hatcheries occurs in June. By the end of June – beginning of July, these juveniles usually do not exceed 100 mm by length and 10 g by weight. That is why, major juvenile chum salmon caught in late June and in early July originated, apparently, from Japan hatcheries. Being released in April or May, they can perfectly have 160-200 mm length and 40-60 g weight in late June and early July. The facts that chum salmon of Japanese origin enter the southern part of the Okhotsk Sea in late June and July are enough known (Ueno et al., 1992; Shubin, 1994; Ueno et al., 1996; Ueno 1997).

Juvenile masu salmon were observed at 14 stations that constituted 12.5% of their total number. As well as chum, juvenile masu salmon are the most frequent in Aniva Bay, La Perouse Strait, near the shore of southeastern Sakhalin, and Terpeniya Bay. In these regions they were observed at 9 stations that constituted 17.6% of the number of stations executed up to the Cape Terpeniya. Majority of stations, where juvenile masu salmon were sampled, occurred above the slope of depths. Catches of masu juveniles throughout the region were small – 1-3 ind./trawl, that corresponds to their low abundance in the rivers of eastern Sakhalin. In total, 22 juvenile masu salmon were sampled.

Length and weight of juvenile masu salmon ranged within 135-197 mm and 23-98 g, respectively. The mean length was 174 mm, weight 59.7 g. In the northeastern Sakhalin region juveniles were larger than those to the south of 49°00 N (Table 1, Fig. 8). Masu salmon were at age 1.0+ and 2.0+. Scales of the masu salmon caught on 29 June near the southeastern Sakhalin shore (length 170 mm, weight 51 g, age 2.0+) had 7-8 wide circulus of the sea zone of growth on the third annulus.

During the cruise, only 1 juvenile coho salmon (*O. kisutch*) was sampled. It happened on 5 July 2002 above the slope of depths near the southeastern Sakhalin coast (station 29) at the sea surface temperature of 9.4-9.7°? . This fish was 245 mm long and 143 g weight. It was one of the earliest catch of coho salmon in the Okhotsk Sea. This coho salmon was, perhaps, of the local origin. At Sakhalin, coho salmon are reared at one of hatcheries and then released to the Tunaycha Lake (southeastern Sakhalin), where they feed. Judging from the region, date of catch, and size-weight indices of the sampled specimen, we can suppose that it migrated from the Tunaycha Lake, where it was feeding for 2-3 years.

Besides the juvenile salmon, 45 mature pink and 15 mature chum salmon were sampled during the cruise. Adult pink salmon were observed both in the south and in the north of the study region, and adult chum salmon were mainly observed in the north. The list of other species includes 30 fish names from 19 families (Table 2). A composition of fish community from the upper epipelagial and indices of abundance for mass species of nekton in total appeared to be closer to those, which were noted earlier in the southwestern part of the Okhotsk Sea in the summer period (Shuntov et al., 1993, 1994; Radchenko et al., 1997). In the region south of 49 00 N, catch composition included, besides salmonid fishes, 2-10 (usually 4-5) species. The base of abundance and biomass was formed both by adult capelin (*Mallotus villosus catervarius)* and their juveniles, and juvenile Asian greenling (*Pleurogrammus azonus*) (Fig. 9). The third place in the community was occupied by juvenile spotted lumpsucker (*Eumicrotremus pacificus*). Juvenile

Bering wolffish (*Anarchhichas orientalis*) and sculpins from the genera *Hemilepidotus* and *Hemitripterus* were common in catches. In Terpeniya Bay the first place by abundance was often occupied by fish larvae from the genus *Lumpenus*. At five stations the catch biomass was determined by Pacific salmon sharks (*Lamna ditropis*). Walleye pollock (*Theragra chalcogramma*) larvae and juveniles, herring (*? lupea pallasii*), saffron cod (*Eleginus gracilis*), Pacific sandlance (*Ammodytes hexapterus*), and Pacific black halibut (*Reinchardtius hippoglossoides*) were not frequent. At individual stations (31, 51), dense aggregations of anchovy (*Engraulis japonicus*) were observed. Northern smoothtongue (*Leuroglossus shmidti*) was a dominant species for the upper epipelagial in night hours. To the north of Cape Terpeniya a composition of fish community was poorer: at 8 stations there was no fish catch, at 18 stations the catch consisted only of one species, and at other stations the catch consisted of 2-3 species (excluding salmonid fishes). In the northeastern Sakhalin, greenling and anchovy were not found from the catches; capelin and Pacific spiny lumpsucker occurred very rare. Adult walleye pollock and herring formed the base of catches both by abundance and by biomass, and in the region to the east of Shmidt Peninsula the adult sand lance and its juveniles as well (Fig.9). Northern smoothtongue (*Leuroglossus shmidti*) dominated from catches at the night station.

In conclusion, we need to note that the conducted study appeared to be the less effective for juvenile pink salmon: at 112 trawl stations only 83 fish were sampled, average CPUE constituted 0.7 ind./trawl. In the southern part of the region a distribution of juvenile pink salmon was connected with the area located to the south of 47°00 N. It included La Perouse Strait, Aniva Bay, extreme south-east of Sakhalin, and was characterized by the high temperature of a sea surface; along with that, a juvenile pink salmon distribution coincided with the distribution of the basic aggregations of spotted lumpsucker (*Eumicrotremus pacificus*). Only 3 pink juveniles were sampled on the area of the eastern Sakhalin shelf from 47°00 to 54°00 N. The abundant catch of juvenile pink salmon was connected, evidently, with the Amur River origin pink salmon. Studying juvenile chum salmon appeared to be more effective: 149 fish were sampled, and the average CPUE constituted 1.3 ind./trawl. We think that the overwhelming majority of the caught chum juveniles originate from Japan hatcheries. Less of all, there were sampled juvenile masu salmon (22 fish), the average CPUE constituted 0.2 ind./trawl. In contrast to pink salmon, the counted CPUE of masu salmon was in accordance with its abundance in rivers of the eastern Sakhalin.

REFERENCES

Birman I.B. 1985. Marine period of life and questions on dynamics of Pacific salmon stock. M.: Agropromizdat. 207 p. (in Russian).

Ivankov V.N., Andreeva V.V., Tyapkina N.V., Rukhlov F.N., Fadeeva N.P. 1999. Biology and feeding base of juvenile Pacific salmons during the early period of ocean life. Vladivostok. Far Eastern State University Press. 260 p. (in Russian).

Kaev A.M., Chupakhin V.M. 2002. Early sea period of pink salmon *Oncorhynchus gorbuscha* and chum salmon *?. keta* in Iturup Island // Transactions of SakhNIRO. V.4. P.116-132. (in Russian).

Karpenko V. I., Erokhin V. G., Smorodin V. P. 1998. Abundance and biology of Kamchatkan salmon during the initial year ocean residence. NPAFC Bull. ? 1. P.352-366

Pishchalnik V.M., Bobkov A.O. 2000. Oceanographic atlas of the Sakhalin shelf. Part I, 174 ?. Part II, 107 p. Yuzhno-Sakhalinsk. SakhGU Press. (in Russian).

Radchenko V.I., Mel'nikov I.V., Volkov A.F., Semenchenko A.Yu., Glebov I.I., Mikheev A.A. 1997. Environmental conditions and composition of plankton and nekton in epipelagic layer of the southern Sea of Okhotsk and adjacent Pacific waters in summer. Biologiya morya. 23: 15-25. (in Russian).

Shershnev A.P., Chupakhin V.M., Rudnev V.A. 1982. Some features of the ecology of young Sakhalin and Iturup pink salmon *Oncorhynchus gorbuscha (Walb ?um) (Salmonidae)* during marine period of life. Vopr.Ichthyologii 22: 441-448. (in Russian).

Shubin A.O., Krysin V.V., Jukov A.E. 1993. Distribution of salmon fry from the Eastern Sakhalin in the Okhotsk Sea in relation to its temperature regime. In: «The eight international symposium on Okhotsk sea and ice 1-5 February 1993». Mombetsu, Japan, ?.433-440

Shubin A.O. 1994. Peculiarities of the early sea life period for pink and chum salmon from the different areas of reproduction and its role in the formation of generations' numbers in the northeastern part of Sakhalin Island. "Taxonomy, biology, and biotechnics of salmonid fishes propogation". Materials of V All-Russian conference. Sankt-Peterburg. P. 225-228 (in Russian).

Shubin A.O., Fedotova N.A., Senchenko I.A. 1996. Distribution, food supply and feeding of pink salmon juveniles in south-eastern Sakhalin littoral waters. In: Fishery researches in Sakhalin-Kuril region and adjoining areas. Transactions of SakhNIRO. V. 1. Yuzhno-Sakhalins. P.21-33 (in Russian).

Shuntov V.P. 1989. Distribution of juvenile Pacific salmon from the genus *Oncorhynchus* in the Okhotsk Sea and adjacent waters of the Pacific Ocean. Vopr. Ichthyologii 29: 239-248 (in Russian).

Shuntov V.P., Radchenko V.I., Lapko V.V., Poltev Yu.N. 1993. Distribution of salmon in Sakhalin-Kuril waters during anadromous migrations. Vopr. Ichthyologii 33: 348-358 (in Russian).

Shuntov V.P., Lapko V.V., Nadtochiy V.V., Samko E.V. 1994. Interannual changes in ichthyosenoses of the Sakhalin-Kuril upper epipelagial. Vopr. Ichthyologii 34: 649-656 (in Russian).

Shuntov V.P., Lapko V.V., Balanov A.A., Startsev A.V. 1995. Interannual changes in anadromous migrations of salmons in the Sakhalin-Kurile region. Biologiya morya 21:116-124 (in Russian).

Ueno Y., Shimizu I., Shubin A. O. 1992. Summary of Japan-Russian cooperative salmon research aboard the research vessel «Wakashio-maru» in 1992. Report on the Research of Salmon Resources in the North Pacific Ocean in 1992. Salmon Report Series 36. P.47-52

Ueno Y., Shimizu I. 1996. Summary of Japan-Russian cooperative salmon research aboard the research vessel «Wakashio-maru» in 1995. Report on the Research of Salmon Resources in the North Pacific Ocean in 1992. Salmon Report Series 41. P.67-72

Ueno Y., Shimizu I. 1996. Summer distribution and migration routes of juvenile chum salmon (*Oncorhynchus keta*) originating from river in Japan // Bull. Nat. Res. Inst. Far Seas Fish. No 33. ?. 139-147

Ueno Y. 1997. Distribution and biological characteristics of juvenile salmon in the Sea of Okhotsk in the early-summer of 1997. NPAFC Doc. ? 267. 18 p.

Table 2. Species composition of the community and fish frequency (%) near the shores of eastern Sakhalin in early summer 2002 by the regions of fishery

Species of fishes	La Perous strait	Aniva Bay	Southeastern Sakhalin area	Terpeniya Bay	Norheastern Sakhalin area
Petromyzonidae					
Lethenteron japonicum		16.7	4.0	7.1	4.8
Sqalidae					
Lamna ditropis		33.3	8.0		
Clupeidae					
Clupea pallasii	33.3		4.0		35.5
Engraulidae					
Engrualis japonicus			4.0	14.2	1.6
Osmeridae					
Mallotus villosus catervarius	66.7	100.0	52.0	71.4	19.6
*Mallotus villosus catervarius (l)**		50.0	8.0	21.4	3.2
Bathylagidae					
Lipolagus okhotensis			4.0		
Leuroglossus schmidti			4.0		1.6
Zoarcidae					
Bothrocarina microcephala			4.0		
Stichaidae					
*Lumpenus maculatus(l)**		16.7	12.0	42.9	1.6
Gadidae					
Theragra chalcogramma			4.0	7.1	40.3
*Theragra chalcogramma (j)***	33.3	33.3	32.0	50.0	1.6
Eleginus gracilus	16.7				
Gasterosteidae					
Gasterosteus aculeatus			8.0		
Scorpaenidae					
Sebastes minor			8.0	7.1	
Ammodytidae					
*Ammodytes hexapterus (l)**			4.0	21.4	
Ammodytes hexapterus					12.9
Anarhichadidae					
Anarhichas orientalis			12.0		1.6
*Anarhichas orientalis (j)***	83.3	83.3	88.0	71.4	6.5
Hexagrammidae					
Pleurogrammus azonus	83.3	66.7	68.0	21.4	1.6
Cottidae					
Myoxocephalus jaok			4.0	21.4	1.6
Triglops sp.			4.0		
Triglops jordani					1.6
Hemilepidotus sp.	83.3	16.7	60.0	42.9	33.9
Melletes papillio					4.8
Hemitripteridae					

Blepsias bilobus					1.6
Hemitripterus villosus	50.0	83.7	48.0	78.6	1.6
Agonidae					
Podothecus acipenserinus		16.7	4.0		1.6
Podothecus sp.			8.0	21.4	3.2
Cyclopteridae					
Eumicrotremus orbis	100.0	16.7	60.0		4.8
Eumicrotremus taranetzi					1.6
Eumicrotremus pacificus	100	33.3	60.0		
Cyclopteridae sp.	16.7	16.7			
Aptocyclus ventricosus					4.8
Pleuronectidae					
*Reinchardtius hippoglossoides (l)**			8.0		1.6

(l)* –larvae

(j)** - juveniles

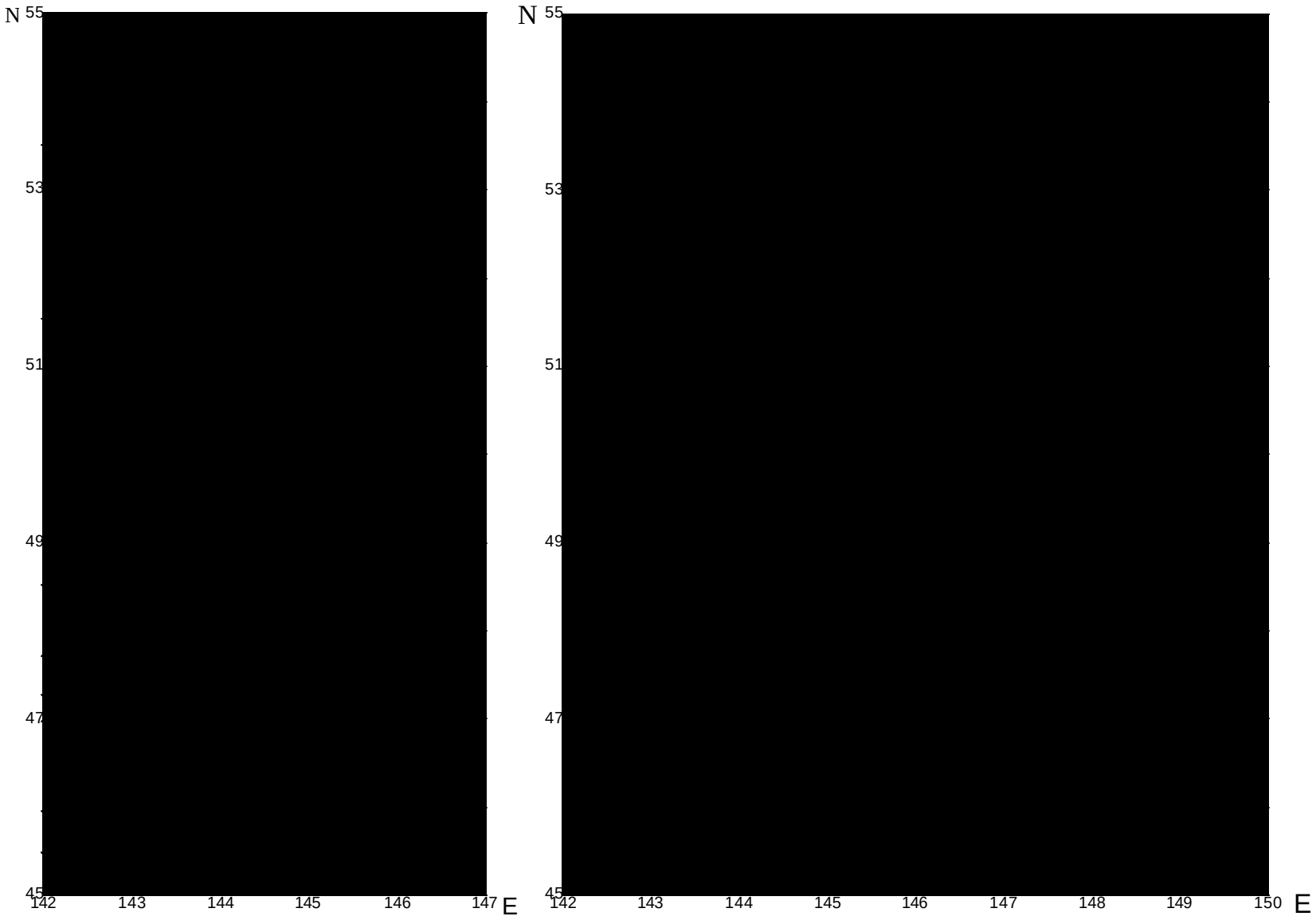

Fig. 1. Scheme of trawl stations (A) and hydrological transects (B) along Sakhalin shore in June - July 2002

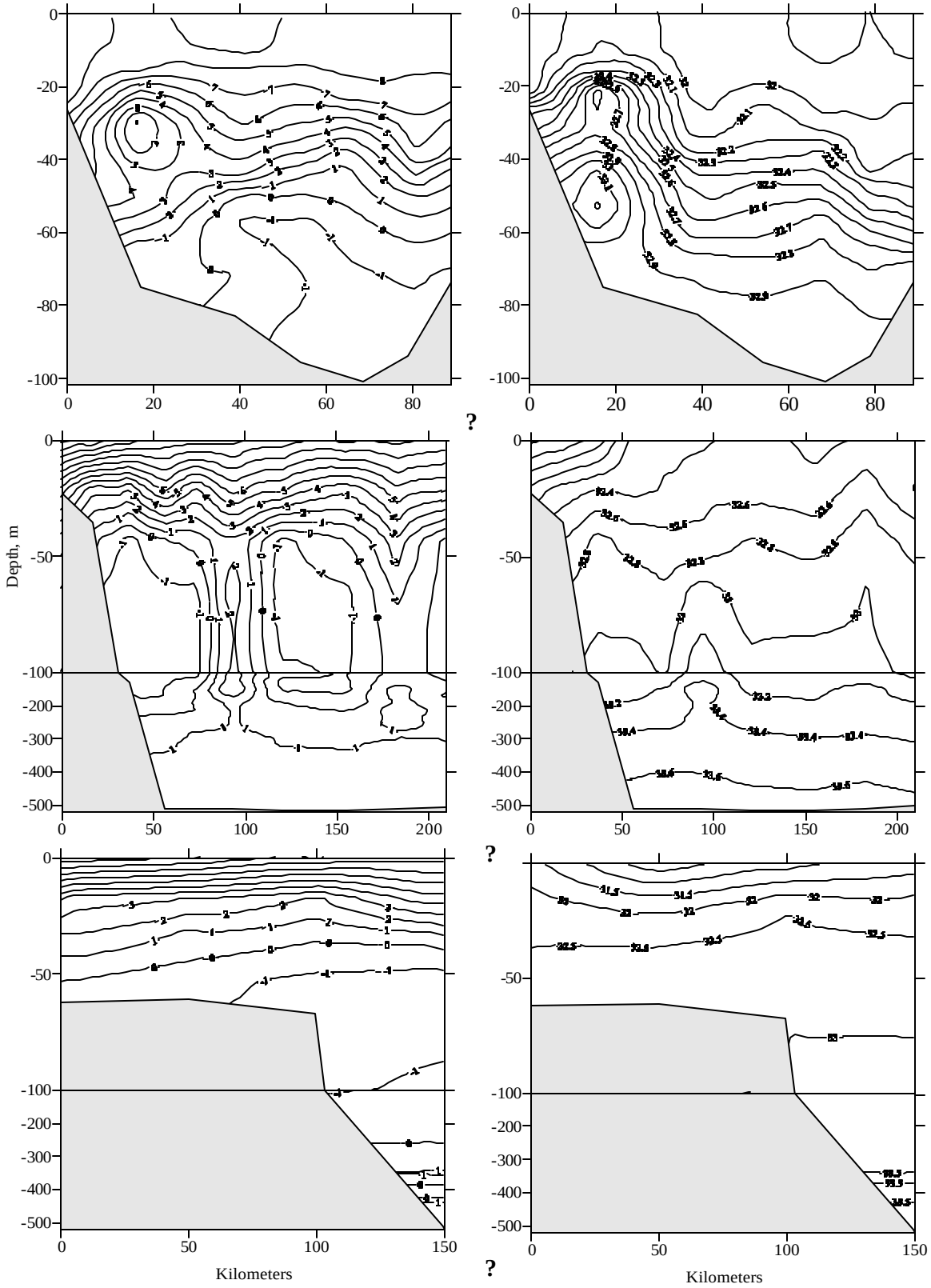

Fig. 2. Vertical prophile of temperature (left) and salinity (right) by transects I (A), II (B), and III (C). A scheme of transects in Fig. 1B.

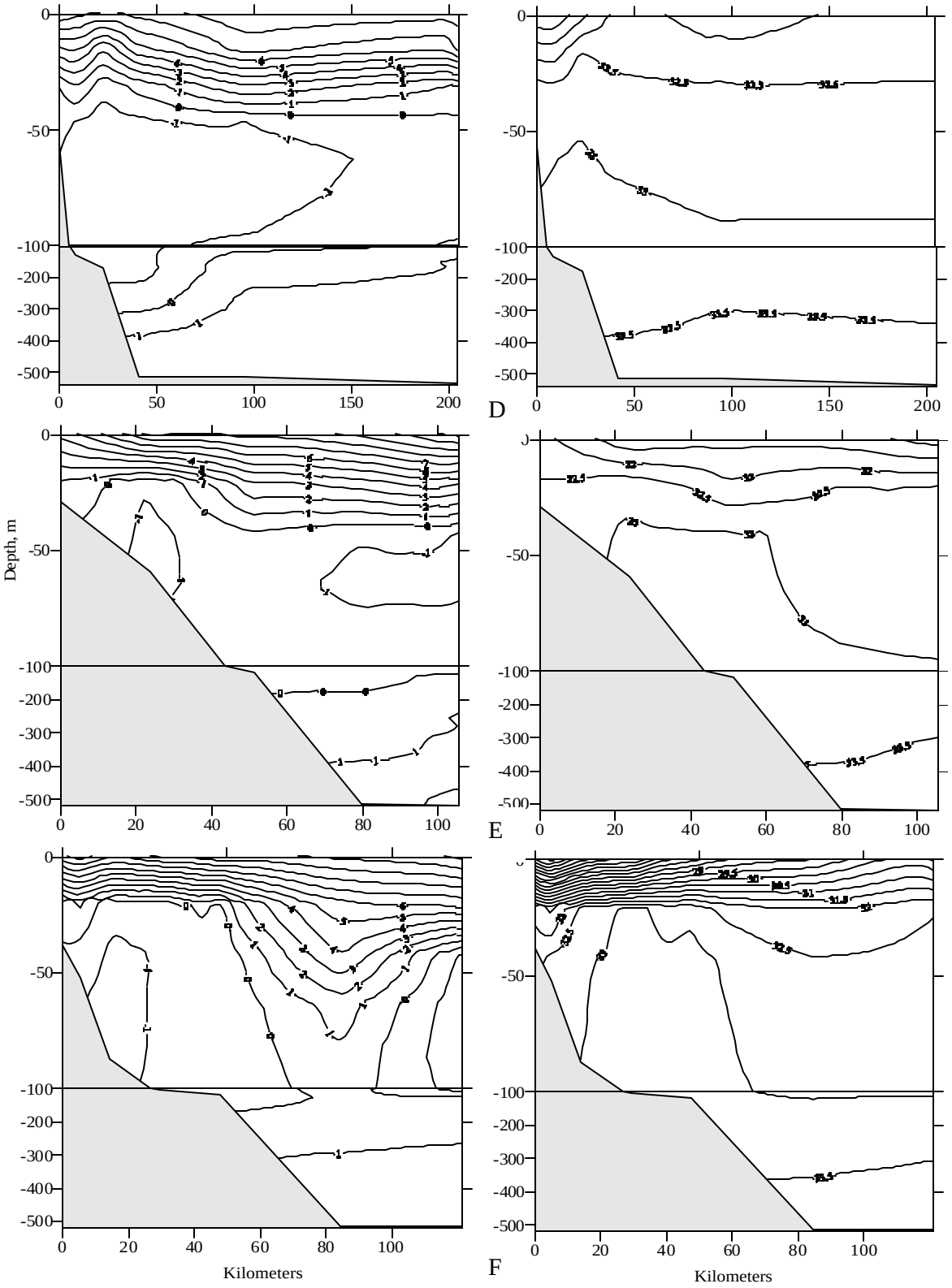

Fig. 3. Vertical prophile of temperature (left) and salinity (right) by transects IV (D), V (E), and VI (F). A scheme of transects in Fig. 1B.

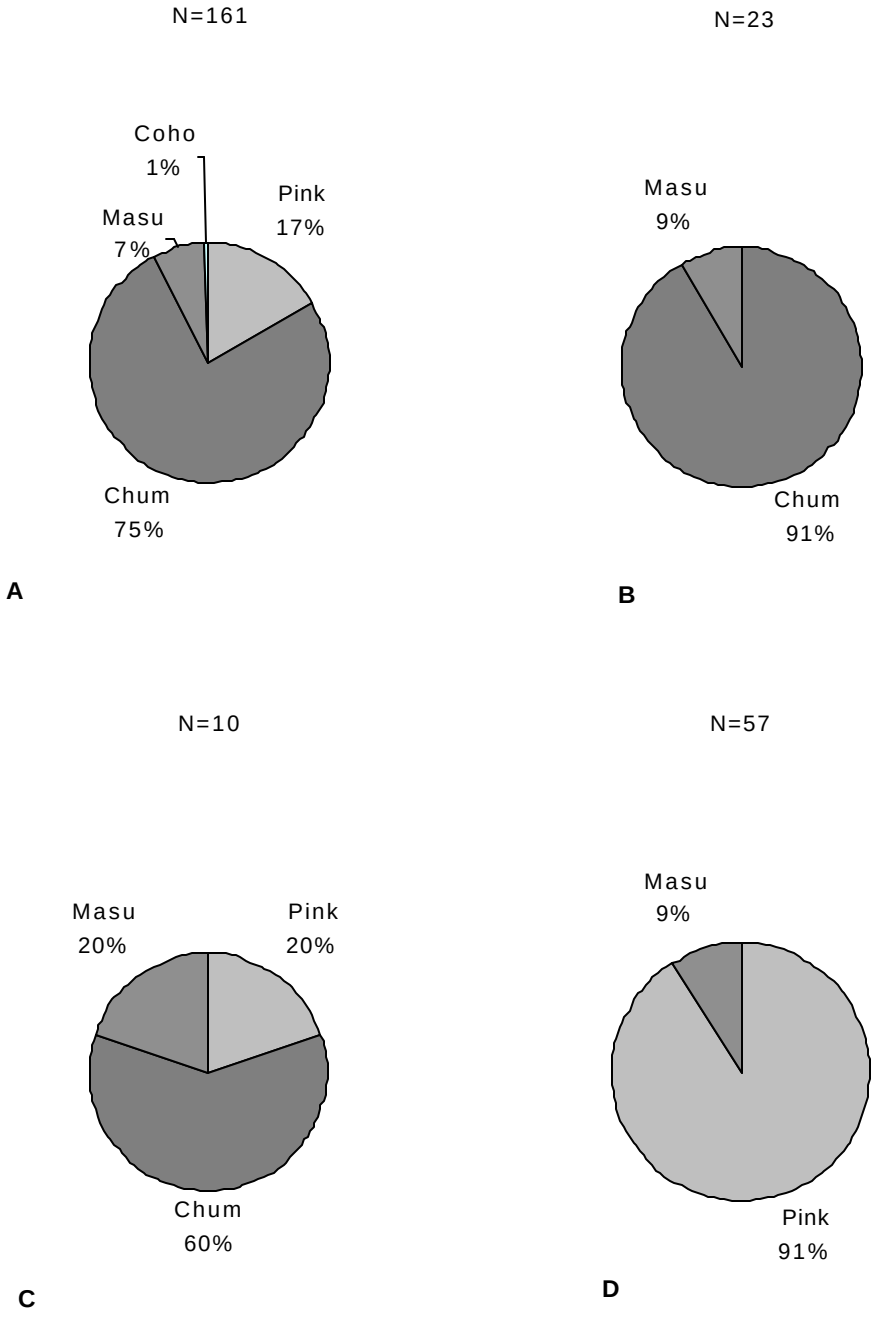

Fig. 4. Species composition of juvenile salmon from catches in Aniva Bay, La Perouse Strait, along the shore of southeastern Sakhalin (A), in Terpeniya Bay (B), and along the shore of northeastern Sakhalin to the south (C) and to the north N (D) from 51?00.

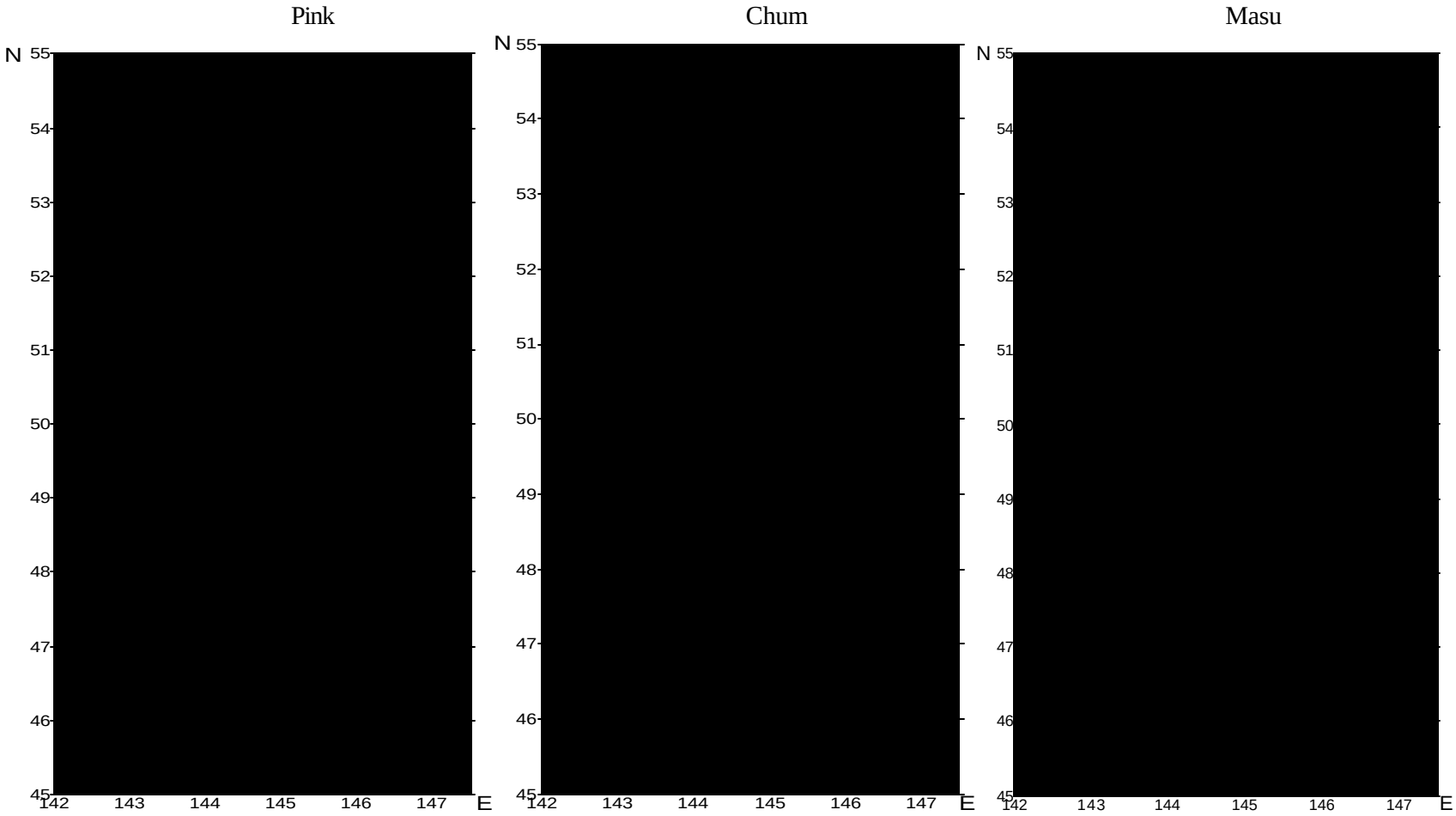

Fig. 5. Distribution and CPUE of juvenile pink, chum and masu salmon along the shore of eastern Sakhalin in early summer 2002

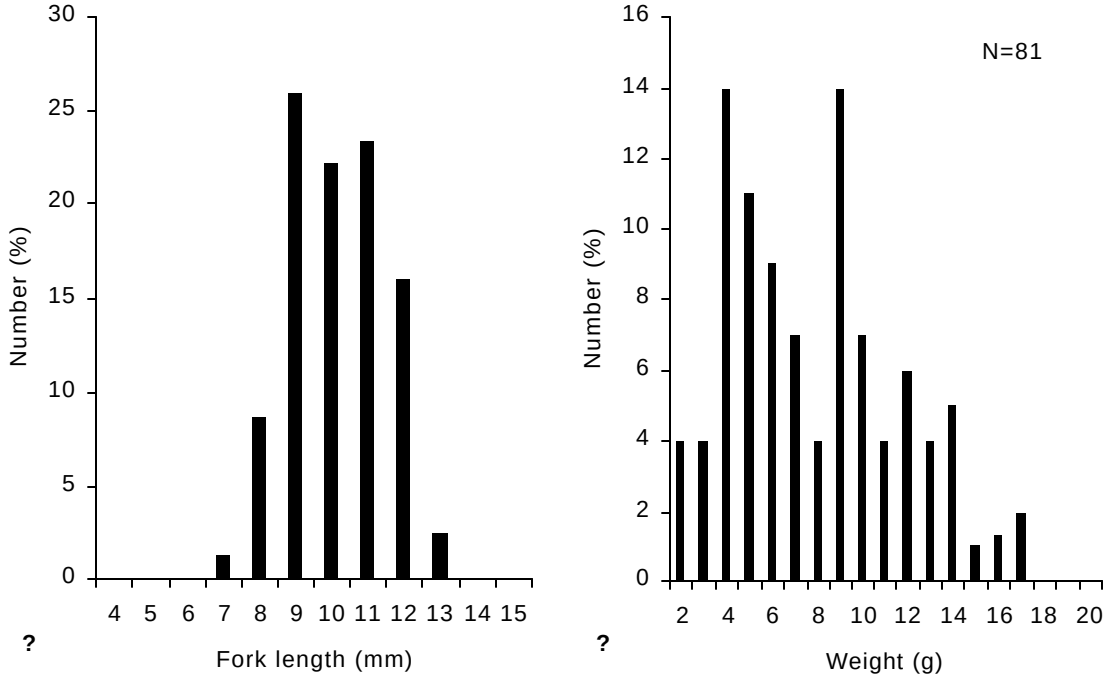

Fig. 6. Length (A) and weight (B) composition of juvenile pink salmon catches along the shore of eastern Sakhalin in late July 2002

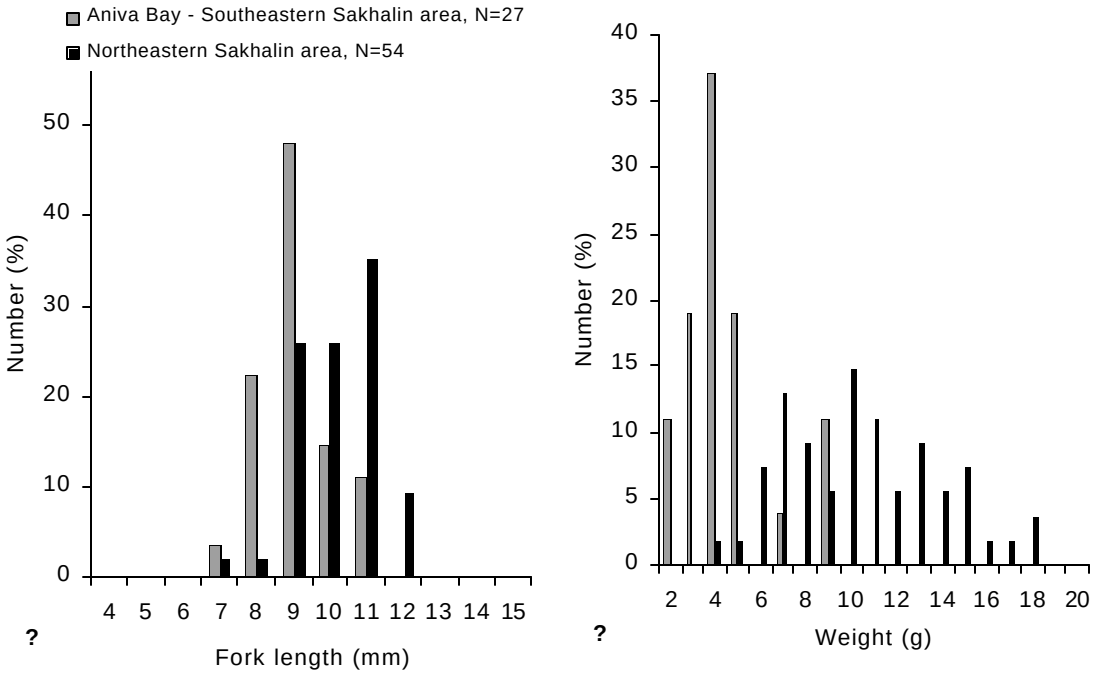

Fig. 7. Length (A) and weight (B) composition of juvenile pink salmon catches in Aniva Bay, La Perous Strait, along the shore of southeastem Sakhalin in late June - early July, and the shore of north- eastern Sakhalin in the region Schmidt Penisula in late July 2002

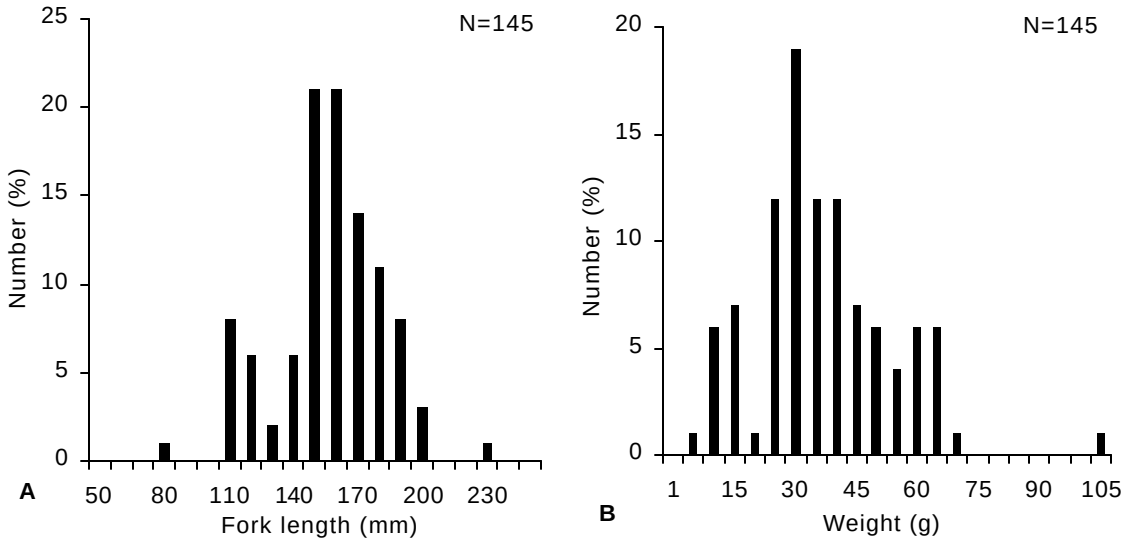

Fig. 8. Length (A) and weight (B) composition of the juvenile chum salmon catches along Sakhalin shore from Aniva Bay to Terpeniya Bay in late June and early July 2002

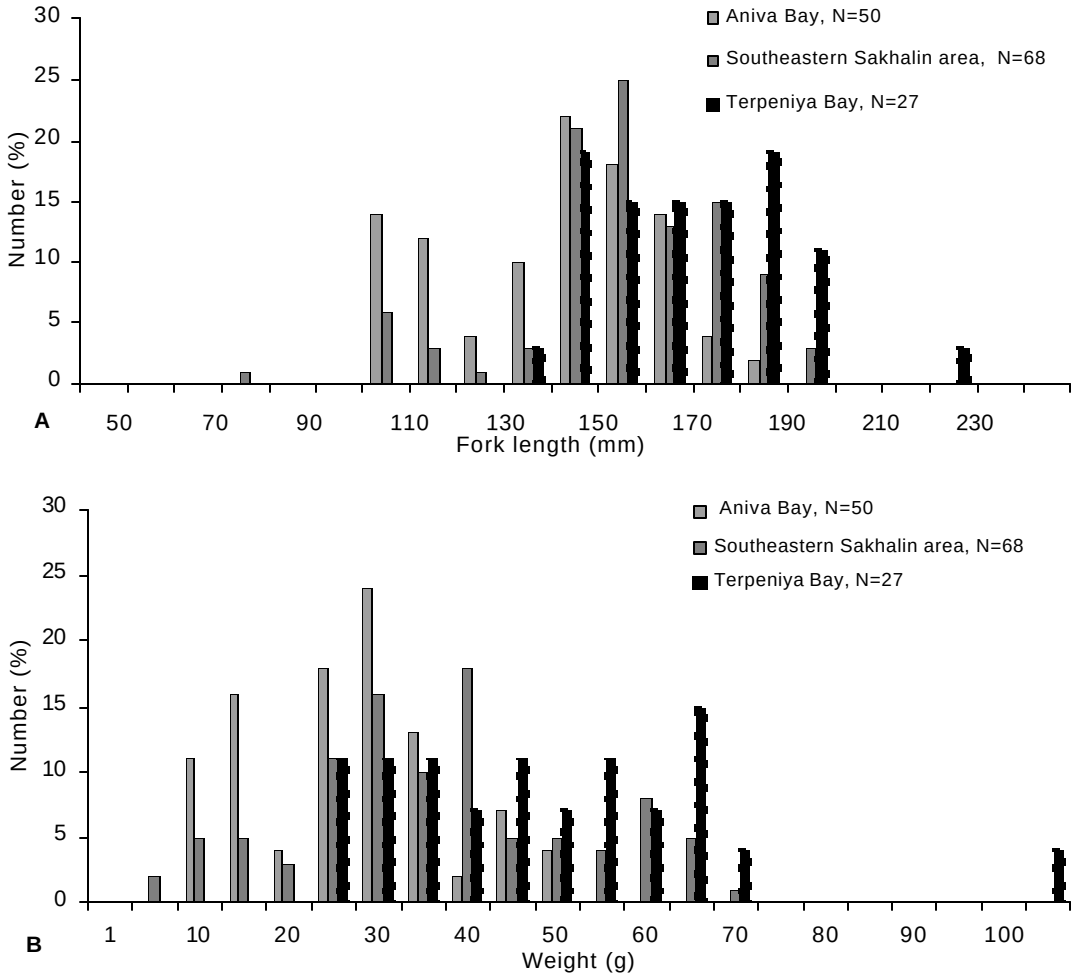

Fig. 9. Length (A) and weight (B) composition of the juvenile pink salmon catches in Aniva Bay, along the shore of southeastern Sakhalin, and Terpenia Bay in late June and early July 2002

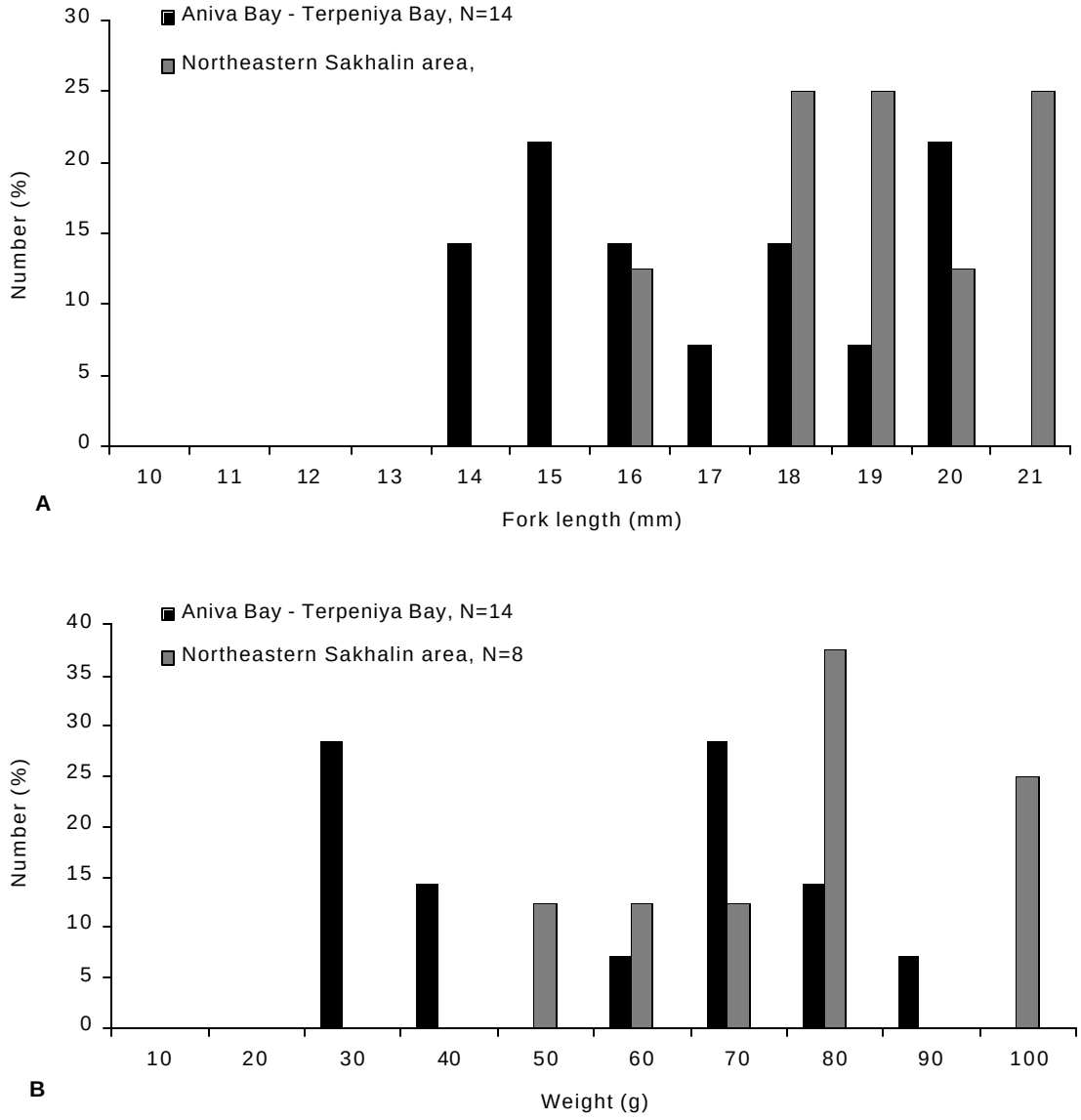

Fig. 10. Length (A) and weight (B) composition of the juvenile masu salmon catches along the shore of eastern Sakhalin in late June - July 2002

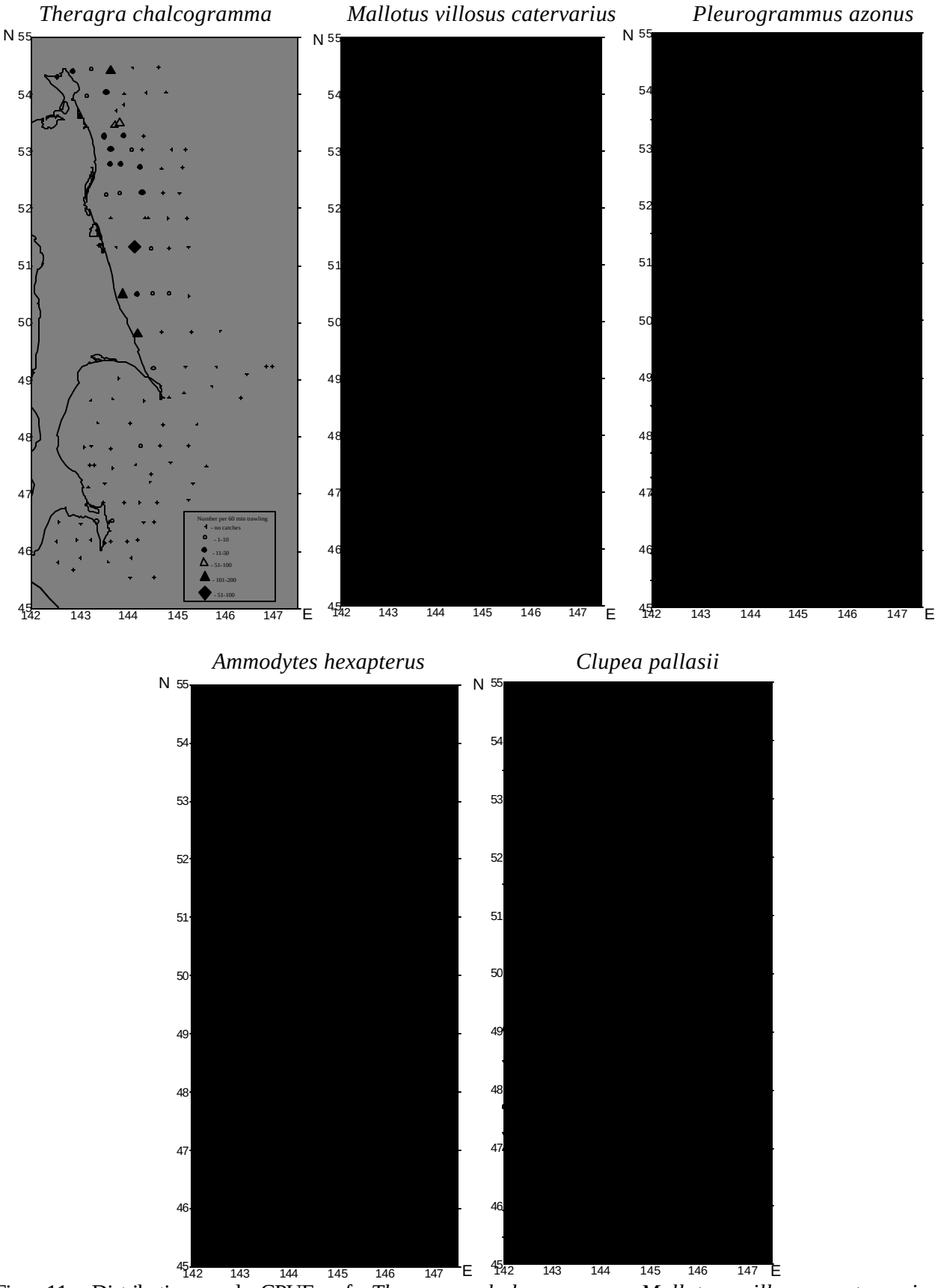

Fig. 11. Distribution and CPUE of *Theragra chalcogramma, Mallotus villosus catervarius, Pleurogrammus azonus, Ammodytes hexapterus* and *Clupea pallasii* along the shore of eastern Sakhalin in early summer 2002