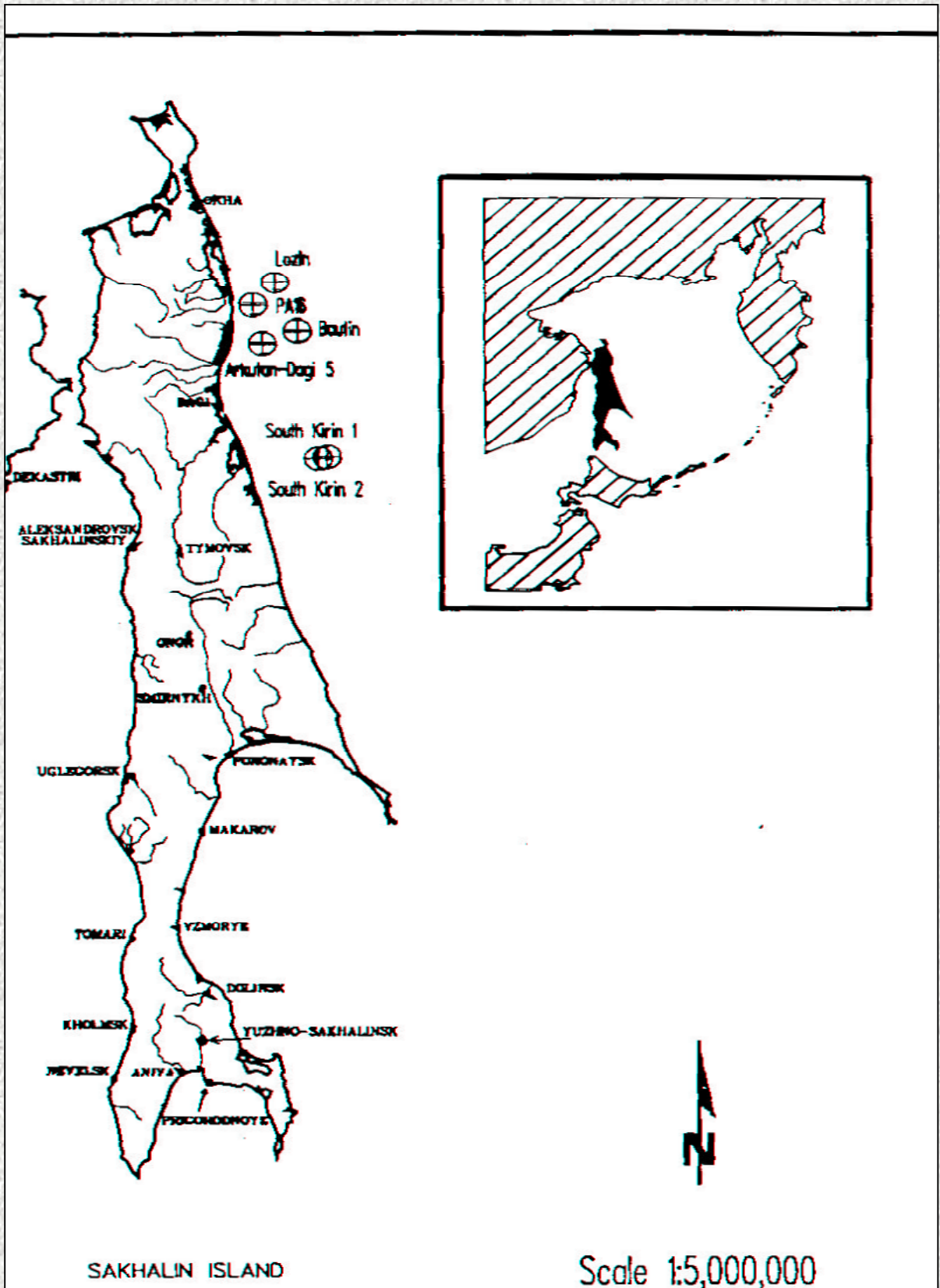


*LONG-TERM VARIABILITY OF PELAGIC FISHES
COMPOSITION IN THE TATAR STRAIT (SEA OF
JAPAN) IN CONNECTION WITH MIGRATIONS OF
SUBTROPICAL SPECIES*

A. Ya. Velikanov, SakhNIRO, Russia

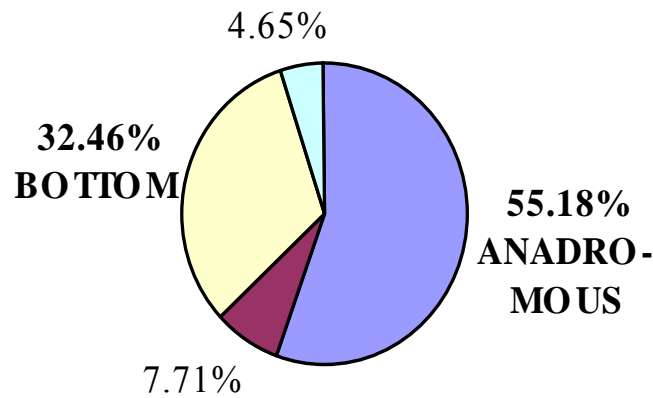
e-mail: velikanov@sakhniro.ru

The Sakhalin Island

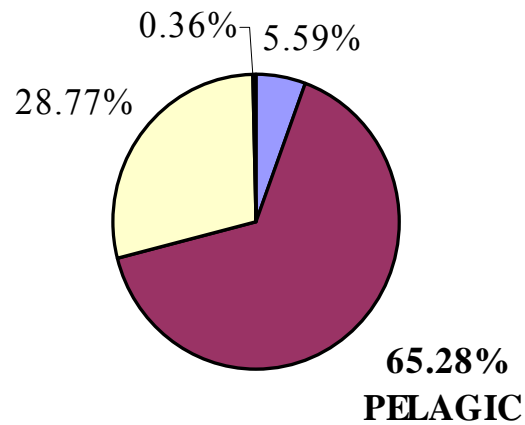


Proportion of bottom, pelagic, anadromous and deep-water fish in regions of East Sakhalin (A), West Sakhalin (B), integrally (Sakhalin and Kuril Islands) (C) in 2000-2001

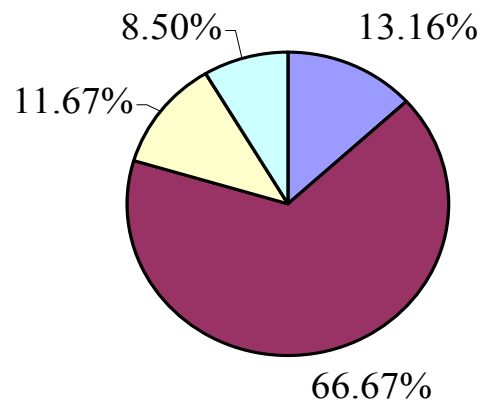
A



B



C

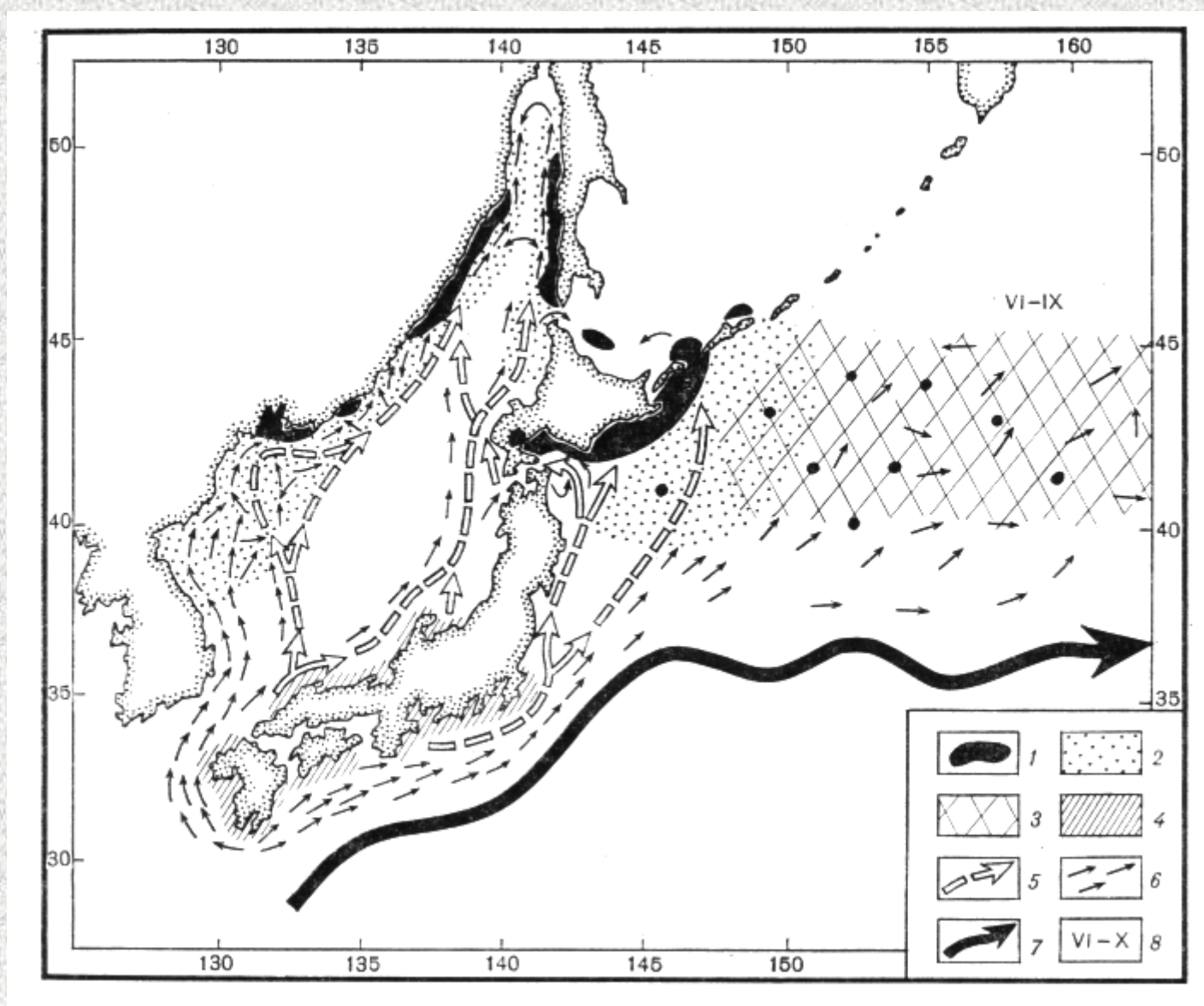


Species composition (+, species present; –, species absent) of pelagic and demersal planktivorous fish in different areas off Sakhalin Island (adapted from Lindberg, 1959; Borets, 1997).

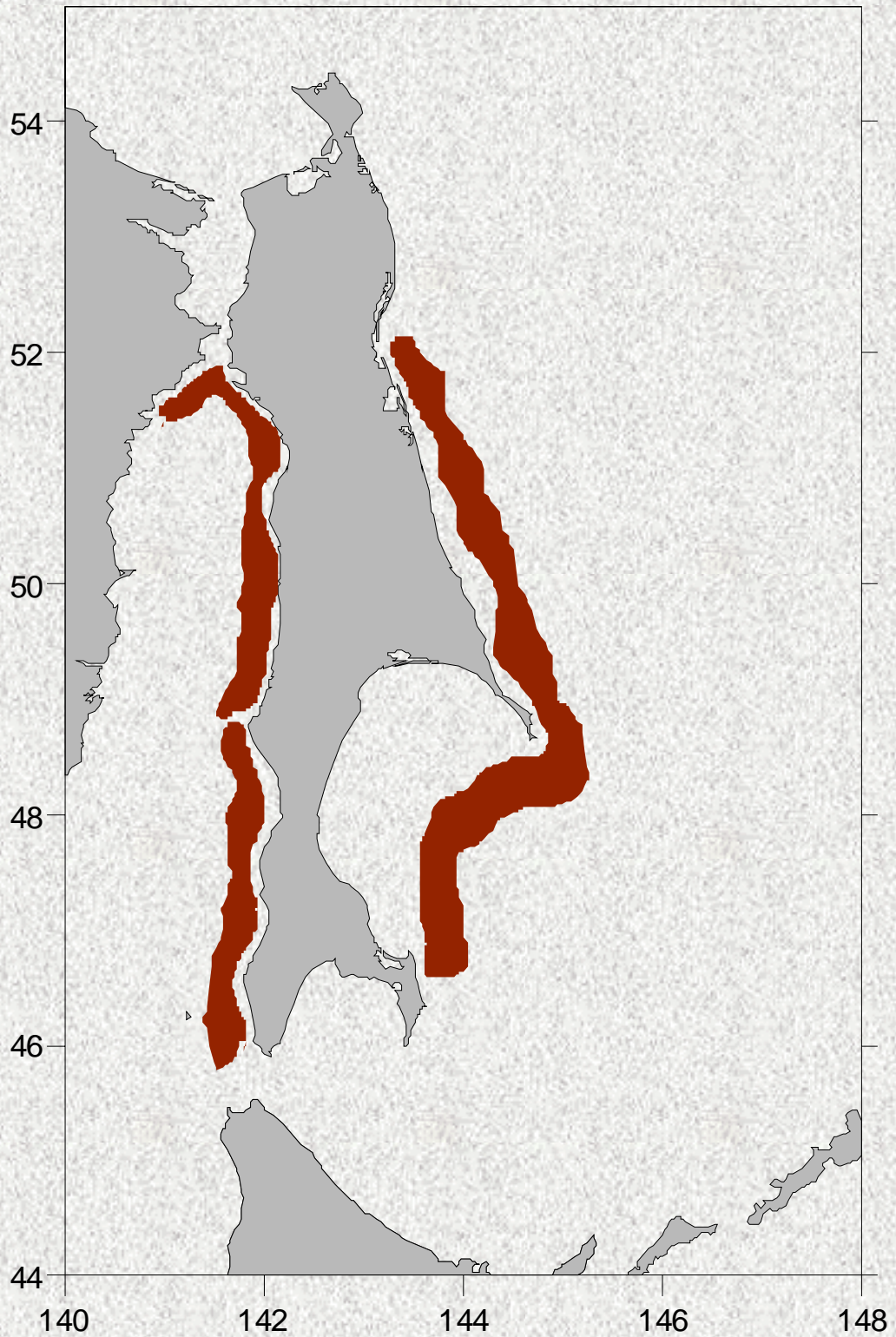
Species	North western Sakhalin	South-western Sakhalin	Aniva Bay, La Perouse Strait	South-eastern Sakhalin	North-eastern Sakhalin
PELAGIC FISH	+	+	+	+	+
<i>Clupea harengus</i>	+	+	+	+	+
<i>Sardinops sagax</i>	+	+	+	+	+
<i>Engraulis japonicus</i>	+	+	+	+	+
<i>Oncorhynchus keta</i> (juv.)	+	+	+	+	+
<i>Oncorhynchus gorbuscha</i>	+	+	+	+	+
<i>Oncorhynchus mazou</i> (juv.)	–	–	–	+	+
<i>Oncorhynchus tshawytscha</i> (juv.)	+	+	+	+	+
<i>Osmerus dentex</i>	+	+	+	+	+
<i>Hypomesus japonicus</i>	+	+	+	+	+
<i>Mallotus villosus</i>	–	–	–	+	+
<i>Leuroglossus schmidtii</i>	+	+	+	+	–
<i>Salangichthys microdon</i>	+	+	+	+	–
<i>Cololabis saira</i>	+	+	+	+	+
<i>Theragra chalcogramma</i>	+	+	+	+	+
<i>Gasterosteus acelatus acelatus</i>	+	+	+	+	–
<i>Arctoscopus japonicus</i>	–	+	+	–	–
<i>Scomber japonicus</i>	–	+	+	+	+
<i>Pleurogrammus azonus</i> (juv.)					
DEMERSAL FISH*	–	+	+	+	+
<i>Gadus macrocephalus</i> (juv.)	+	–	+	+	+
<i>Eleginus gracious</i> (juv.)	–	+	+	+	+
<i>Lumpenella longirostris</i>	+	+	+	+	+
<i>Lumpenus sagitta</i>	+	+	+	+	+
<i>Leptoclinus maculatus</i>	+	+	+	+	+
<i>Ammodytes hexapterus</i>	–	+	+	–	–
<i>Hypoptichuss dybowskii</i>	+	+	+	+	+
<i>Hexagrammus octogrammus</i> (juv.)	+	+	+	+	+
<i>Hexagrammus lagocephalus</i> (juv.)	+	+	+	+	+
<i>Blepsias cirrhosus</i>	+	+	+	+	+
<i>Hemitripterus villosus</i>	–	+	+	+	+
<i>Hemilepidotus gilberti</i> (juv.)	–	+	–	+	+
<i>Melletes papillio</i>	–	–	+	+	+
<i>Podothecus acipenserinus</i>	+	+	+	+	–
<i>Podothecus gilberti</i>	+	+	+	+	–
<i>Eumicrotremus pacificus</i>	+	+	+	+	+
<i>Hippoglossoides elassodon</i>	+	+	+	+	+
<i>Limanda sakhalinensis</i>					
Total planktivorous species	27	32	33	34	29
Pelagic	15	16	16	17	14
Demersal	12	16	17	17	15
Number of planktivorous species with biomass >10 0000 t	5	6	7–8	8	7
Number of planktivorous species with biomass >100 000 t	2	3	5	6	5

Species composition (+, species present; –, species absent) of pelagic and demersal planktivorous fish in different areas off Sakhalin Island (adapted from Lindberg, 1959; Borets, 1997).

Distribution and migrations of sardine in the Sea of Japan in the end of 1970s-early 1980s (from Dudarev, Kenya, 1986)



Distribution of Japanese anchovy near the coast of the Sakhalin Island in 2002

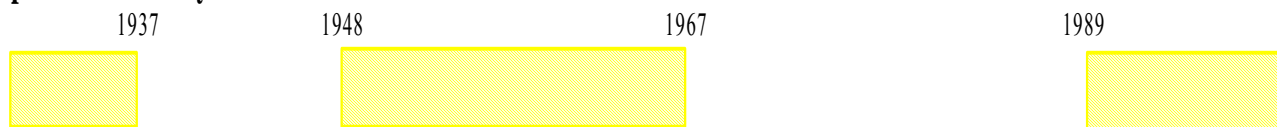


Periodicity of migrations of some subtropical fish species to the Tatar Strait in XX century

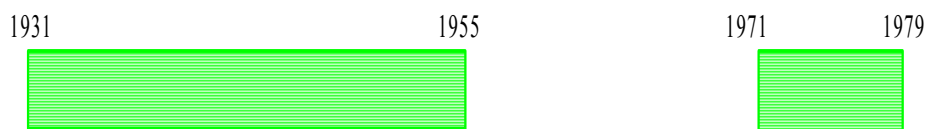
Sardine



Japanese anchovy



Pacific mackerel



Saury



1930 1940 1950 1960 1970 1980 1990 2000

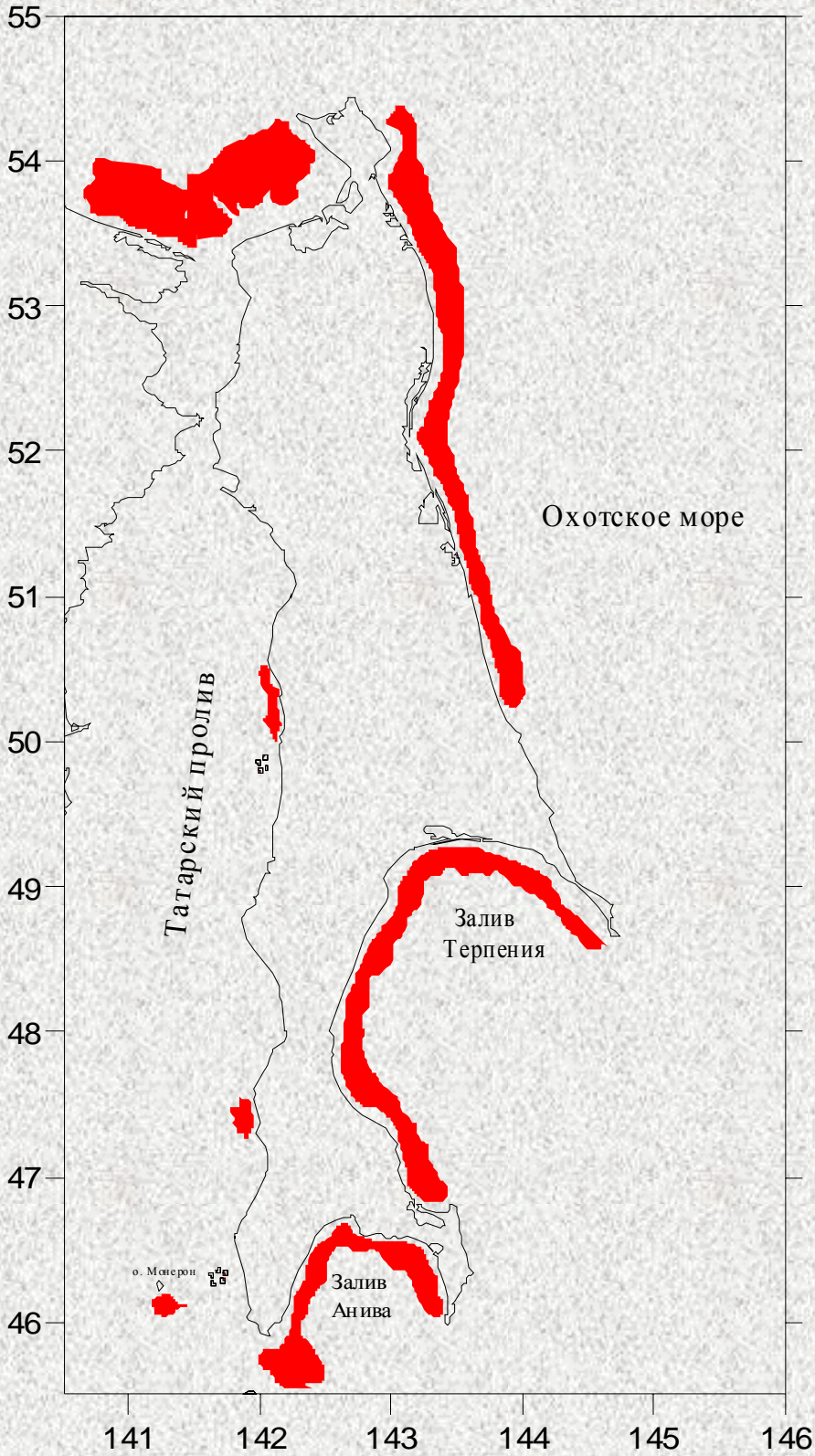
**List of warm-water fish species near the west coast of
Sakhalin Island in the XX century
(based on published data)**

Species	Years	Species	Years
Isurus oxyrinchus	1951	Oplegnathus fasciatus	1946, 1948
Lamna ditropis	1947-1949, 1950s, 1960s, 1980s	Ernogrammus hexagrammus	1947-1949
Pterothrissus gissu	1980	Scomber japonicus	1931-1955, 1973, 1977-1979
Sardinops sagax melanosticta	1932-1942, 1949- 1954, 1975-1990	Kareus bicoloratus	1947-1949, 1975
Engraulis japonicus	1934, 1948-1967, 1989-1998	Thamnaconus modestus	1975
Cololabis saira	1933-1985	Takifugu borealis	1948, 1975
Hyporhamphus sajori	1948, 1975	Lophius litulon	1975
Exocoetus volitans	1973		
Sebastes schlegeli	1948		
Coryphaena hippurus	1973		

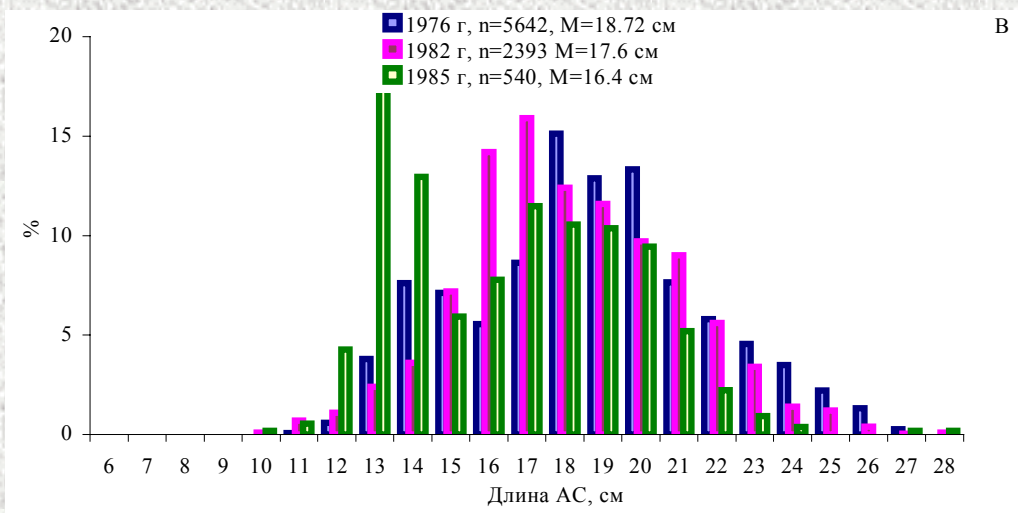
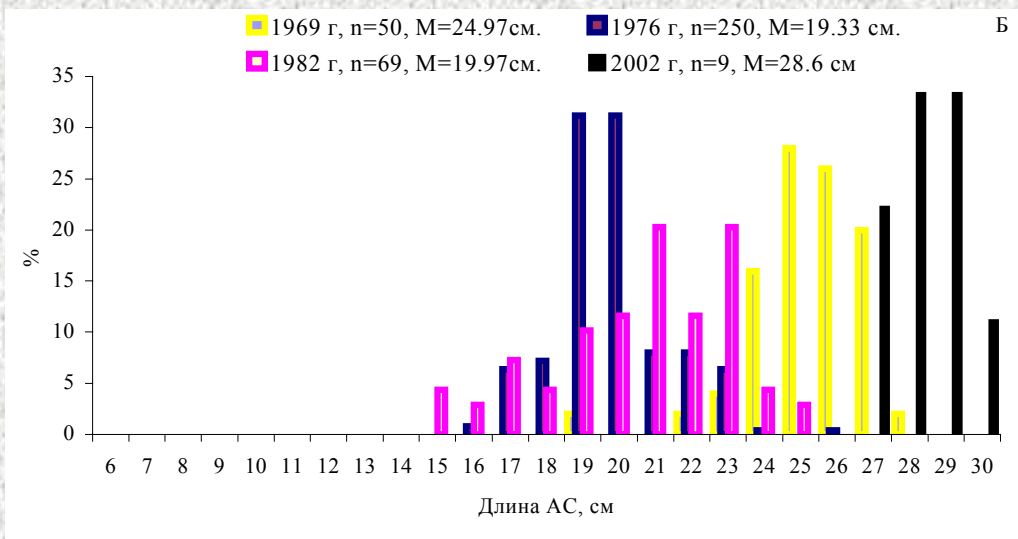
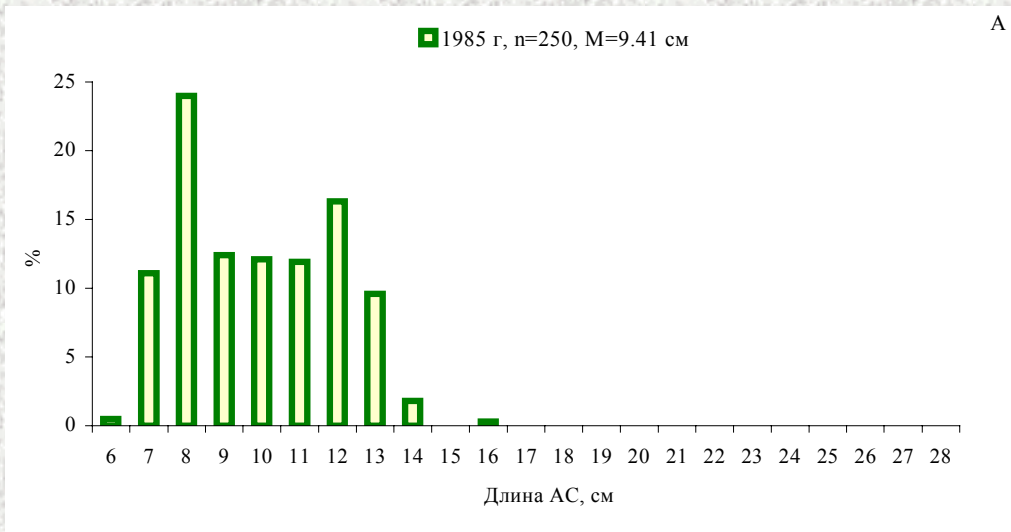
Hyperoglyphe japonica



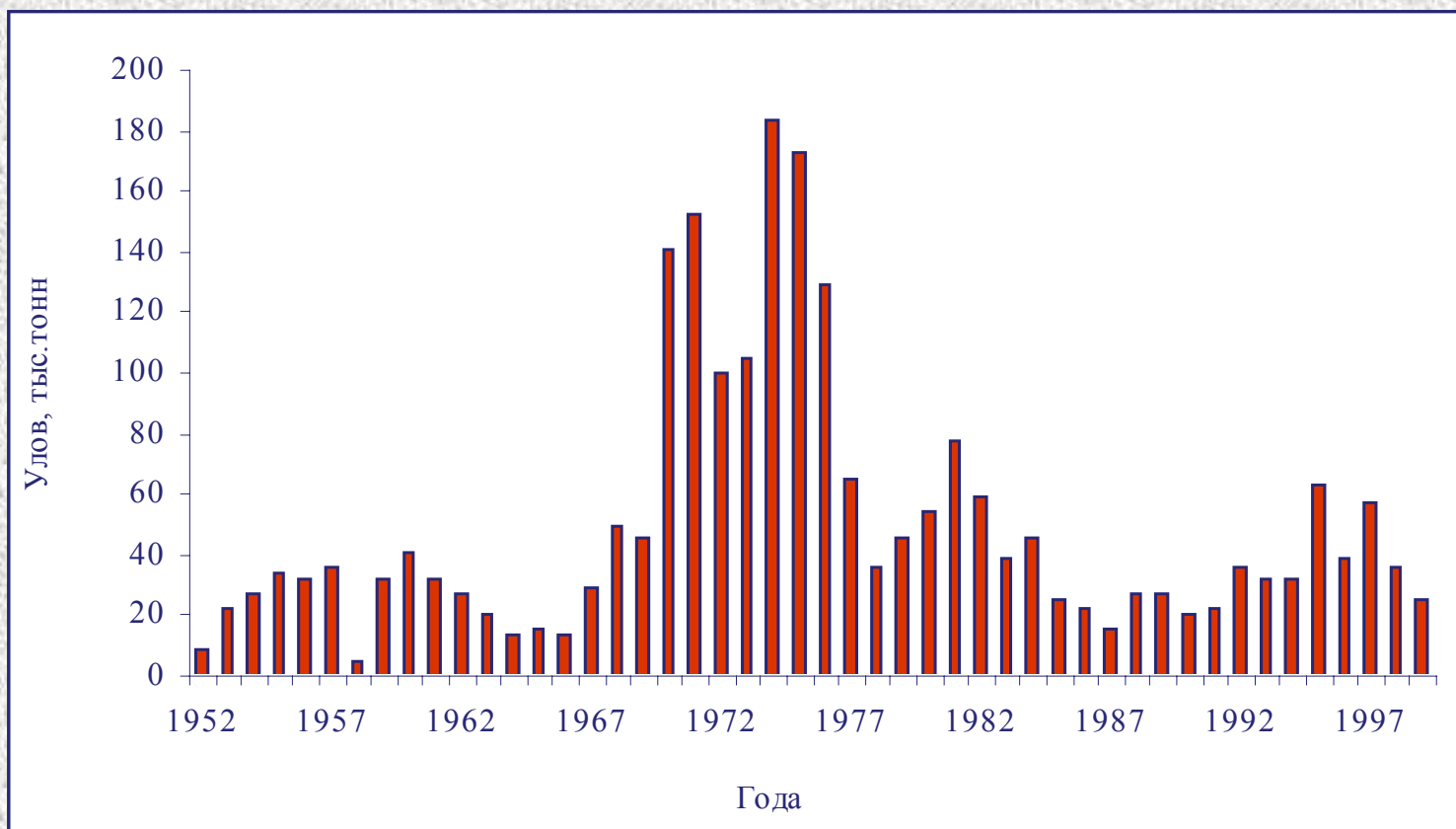
Distribution of sand-lance in the shelf waters of the Sakhalin Island



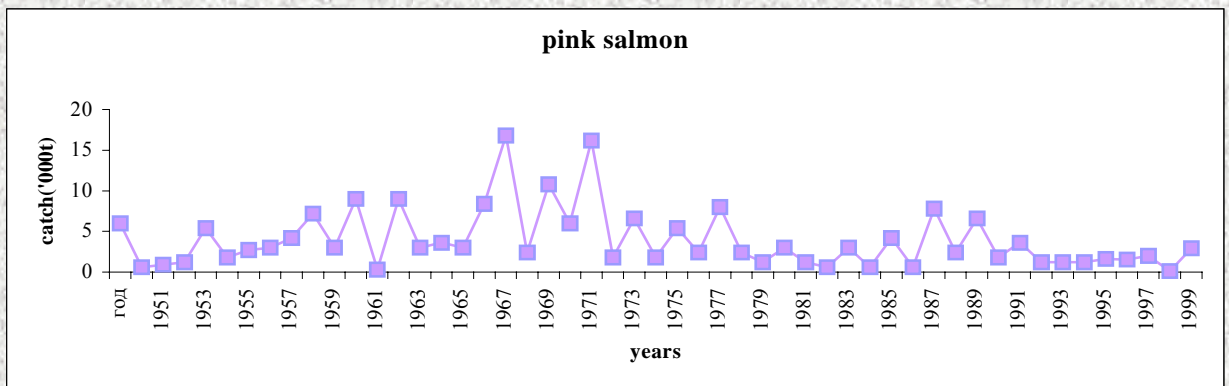
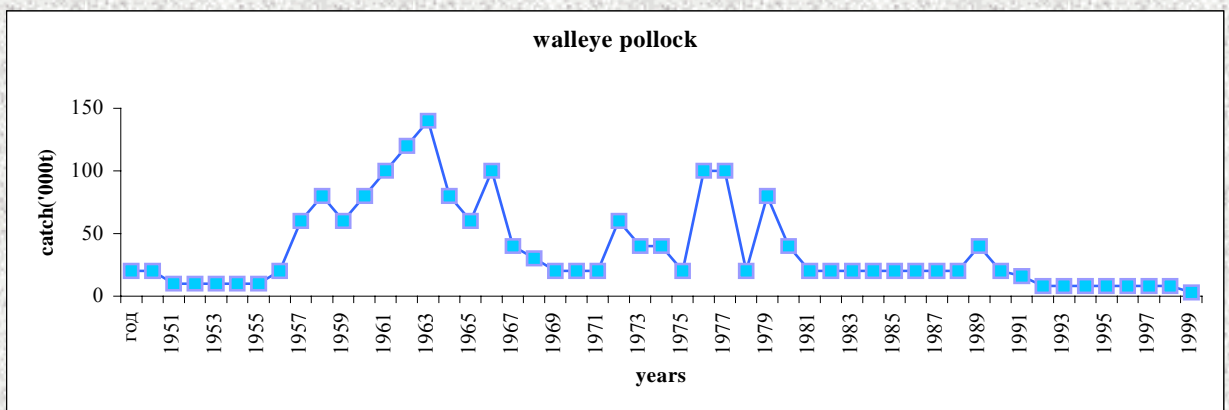
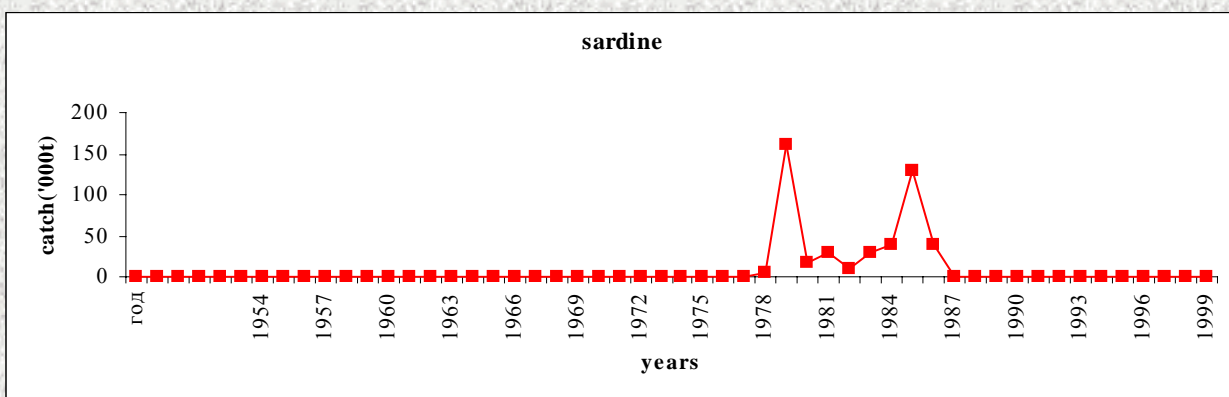
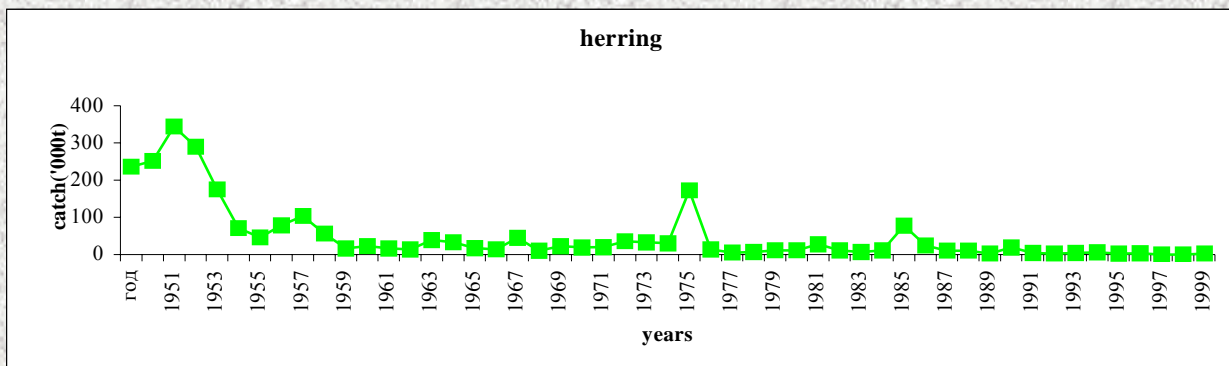
Length composition of the sand-lance in the Sakhalinskiy Bay (A), Tatar Strait (B) and in the La Perouse Strait (C)



Dynamics of sand-lance catches near the north and west coast of Hokkaido in the XX century



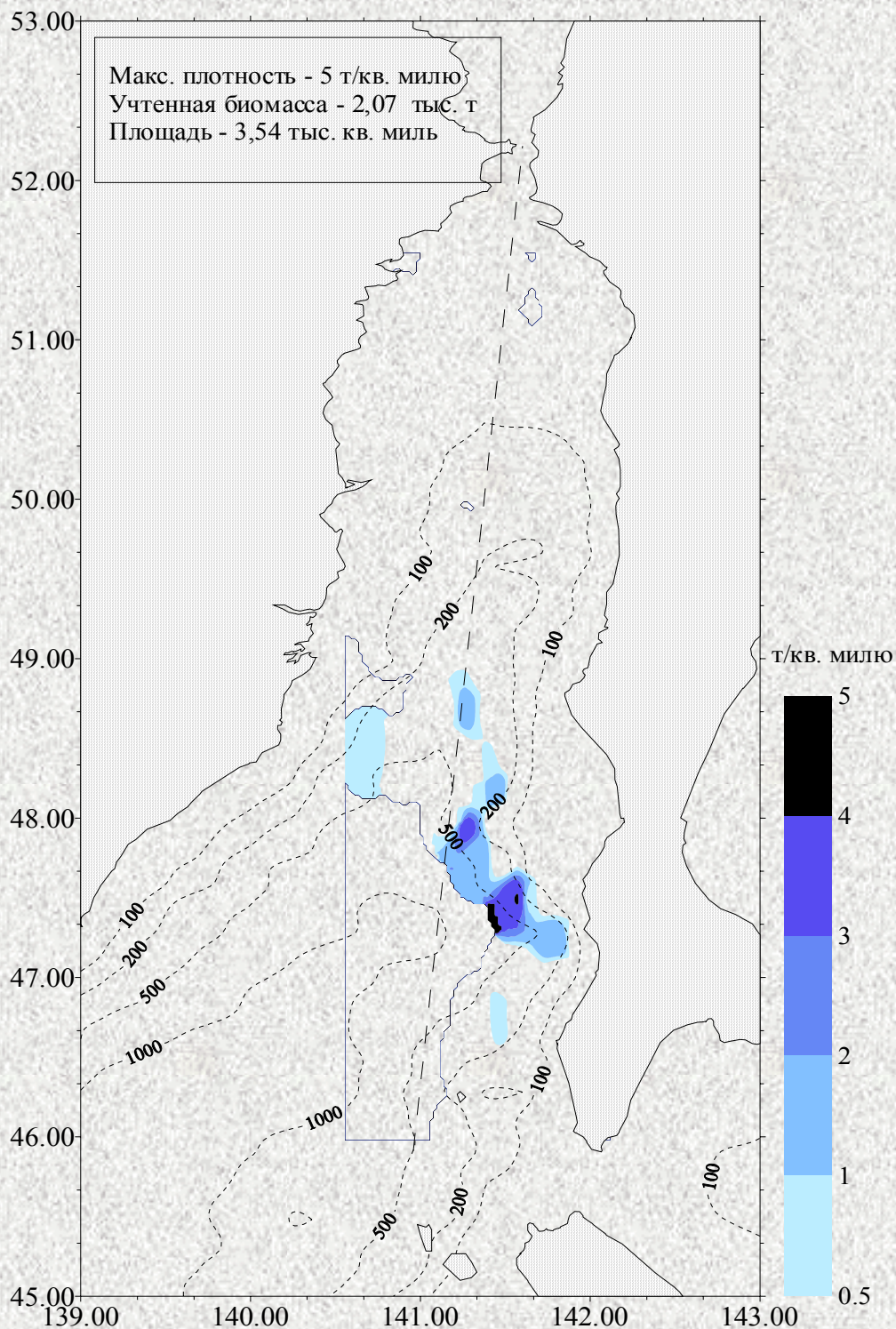
Dynamics of different pelagic fish catches near the west Sakhalin in the last half of XX century



Maximal biomass indices of some commercial marine fishes near the west Sakhalin in different years ('000 t)

Species and stocks	Years			
	1970 - 1979	1980 - 1989	1990 - 1999	2002
	Tatar Strait			
Sakhalin-Hokkaido herring	350.0	150.0	20.0	16.0
Japanese sardine	450.0	300.0	0.0	0.0
Walleye pollock	700.0	350.0	250.0	10.0
Pacific cod	15.0	30.0	24.0	10.0
Saffron cod	7.0	8.0	4.0	3.4
De Kustry herring	20.0	19.0	8.0	0.2
Yellowfin sole	8.0	19.0	28.0	16.0
Capelin	30.0	33.0	13.0	42.3
Total	1580.0	909.0	347.0	97.9
	La Perouse Strait			
Japanese sand lance	350.0	110.0	110.0	~ 50.0

Spatial distribution of biomass of walleye pollock in the Tatar Strait in May-June 2002



*Data of capelin frequency and catches during the bottom survey
in the Tatar Strait in different years*

<i>Year</i>	<i>1976</i>	<i>1977</i>	<i>1978</i>	<i>1981</i>	<i>1982</i>	<i>1983</i>	<i>1984</i>	<i>1986</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>
<i>MONTH</i>	<i>APRIL-MAY</i>	<i>APRIL -MAY</i>	<i>MAY</i>	<i>APRIL -MAY</i>	<i>APRIL -MAY</i>	<i>MAY</i>	<i>MAY</i>	<i>MAY</i>	<i>APRIL -MAY</i>	<i>APRIL -MAY</i>	<i>APRIL -MAY</i>
<i>TYPE of VESSEL</i>	<i>SRTM-500</i>	<i>SRTM- -500</i>	<i>SRTM- 500</i>	<i>SRTM- 500</i>	<i>SRTM- 500</i>	<i>SRTM- 500</i>	<i>RS- 300</i>	<i>SRTM -500</i>	<i>STR- 420</i>	<i>STR- 420</i>	<i>STR- 420</i>
<i>NUMBER of TRAWLING STATIONS</i>	87	50	66	73	34	65	76	27	75	120	147
<i>FREQUENCY, %</i>	48,0	38,0	36,4	38,4	58,8	26,2	15,8	63,0	17,3	7,6	29,2
<i>MEAN CATCH PER UNIT EFFORT (amount of fish)</i>	402	240	256	192	544	111	2735	5000	14	6	2598
<i>MEAN CATCH PER UNIT EFFORT (kg)</i>	12,7	7,0	5,6	6,5	15,8	2,8	87,5	125,0	0,44	0,15	78,2

Data of capelin spawning intensity near the west coast of Sakhalin

Island in different years

YEAR	1989	1991	1992	1995	1996	1997	1998	1999	2002
SPAWNING AREA (x'000 m2)	1902,9	2560,9	1606,1	938,9	498,24	84,618	150,85	757,21	2882,18
CONCEN- TRATION of EGGS ('000000)	<u>0,879</u> 0,031- 2,11	<u>1,2368</u> 0,054- 4,55	<u>1,556</u> 0,052- 7,35	<u>0,6366</u> 0,094- 2,69	<u>0,1791</u> 0,032- 0,98	<u>0,1465</u> 0,0106- 0,34	<u>0,0519</u> 0,0091- 0,13	<u>0,028</u> 0,009- 0,085	<u>3,803</u> 0,0075- 50,93

* Above the line – average, under the line - limits

Changing in composition of dominating fish species in the 2nd half of the XX century in the seawaters of Sakhalin Island

SPECIES	WEST SAKHALIN					EAST SAKHALIN				
	50s	60s	70s	80s	90s	50s	60s	70s	80s	90s
HERRING										
PINK SALMON										
PACIFIC CAPELIN										
WALLEYE POLLOCK										
JAPANESE SAND LANCE										
ARABESQUE GREENLING										
PACIFIC SARDINE										
JAPANESE ANCHOVY										
SAURY										
MACKEREL										
FLOUNDER										
TOTAL:	4	3	4	4	2	5	1	3	4	4