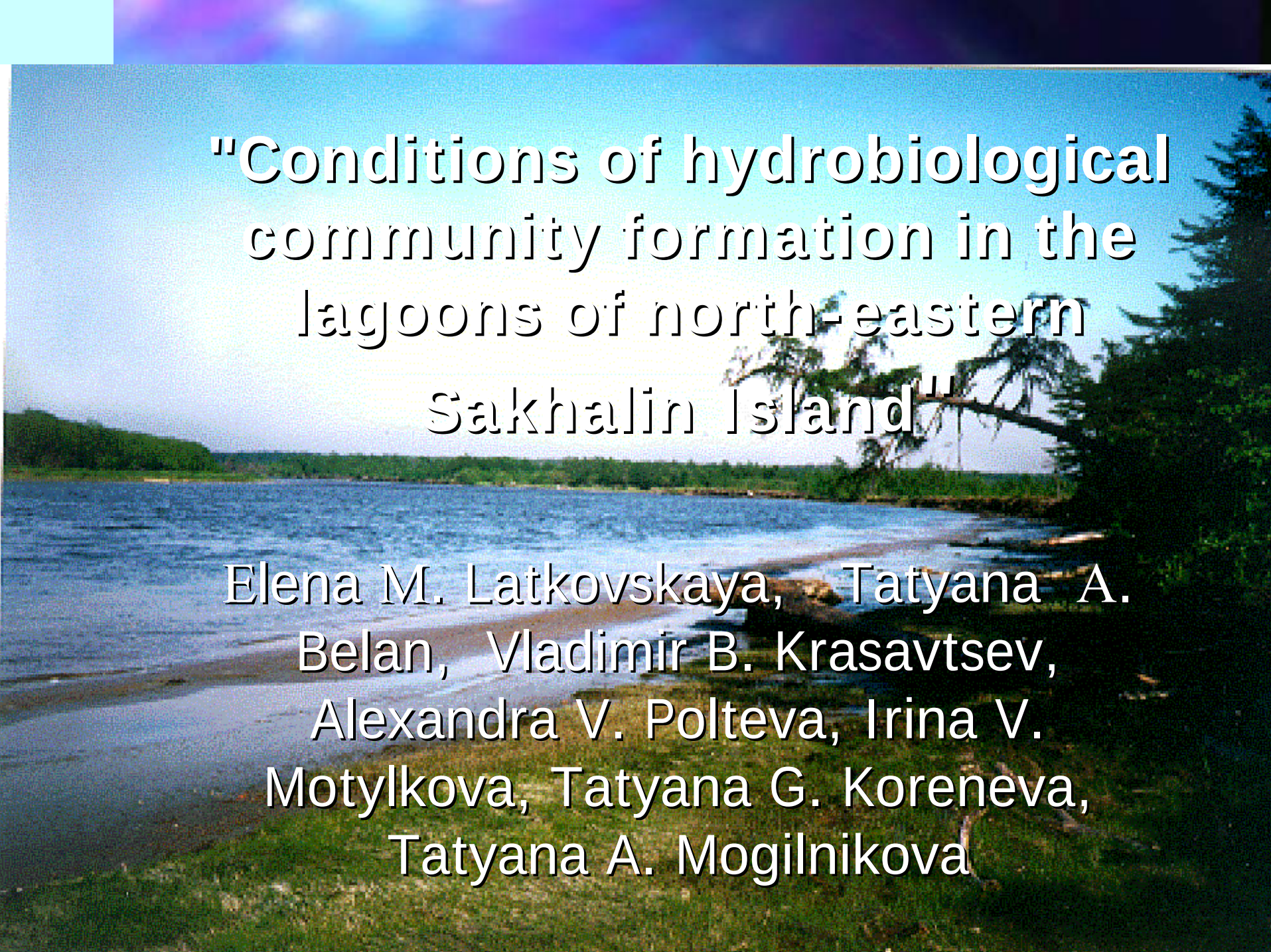




"Conditions of hydrobiological community formation in the lagoons of north-eastern Sakhalin Island"

Elena M. Latkovskaya, Tatyana A. Belan, Vladimir B. Krasavtsev, Alexandra V. Polteva, Irina V. Motylkova, Tatyana G. Koreneva, Tatyana A. Mogilnikova

Ecological observations were conducted in 1995-2001

The objective- the study of the abiotic and biotic components of ecosystems and evaluation of influence of main environmental factors on formation of biological communities

Period	Sampling areas	Expedition
1995 (June, September)	Nyyskiy	SakhNIRO
1996 (June, August)	Nyyskiy, Nabil, Chayvo, Pilitun	SakhNIRO
1997 (June, September)	Nyyskiy, Chayvo, Nabil	SakhNIRO
1998 (June, September)	Nyyskiy	SakhNIRO
1999 (June-July)	Pilitun, Chayvo, Nyyskiy, Nabil	SakhNIRO+ ECS (Ecological company of Sakhalin)
2000 (July)	Lunskiy, Nyyskiy	SakhNIRO
2001 (September)	CHayvo	SakhNIRO

The Complex studies in the bays included:

hydrological and hydrochemical researches;

The Study of plankton community parameters;

The Study of granulometric composition of the sediment;

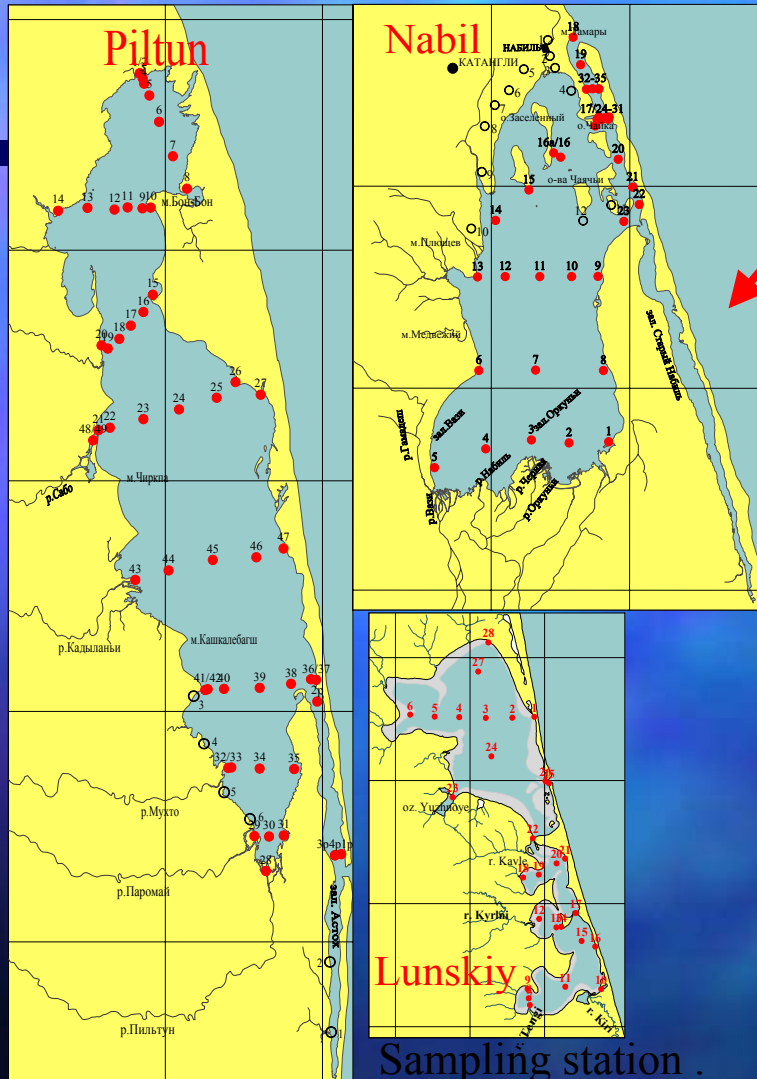
The Study of benthic communities;

Ichthyological researches;

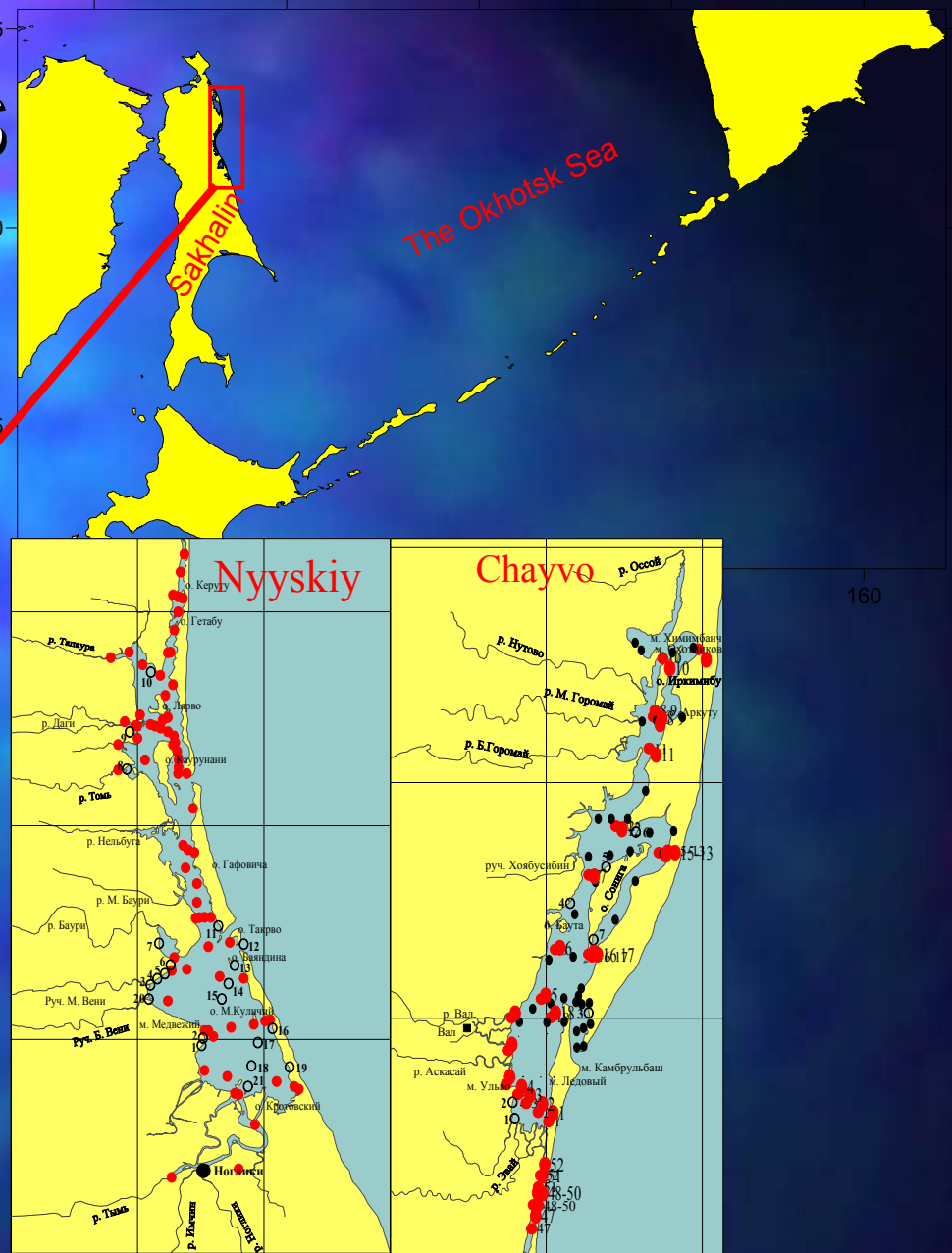
Microbiological researches;

The Study of the contents of pollutants in the water, sediment and hydrobiont's tissue.

Sampling areas



Sampling station .

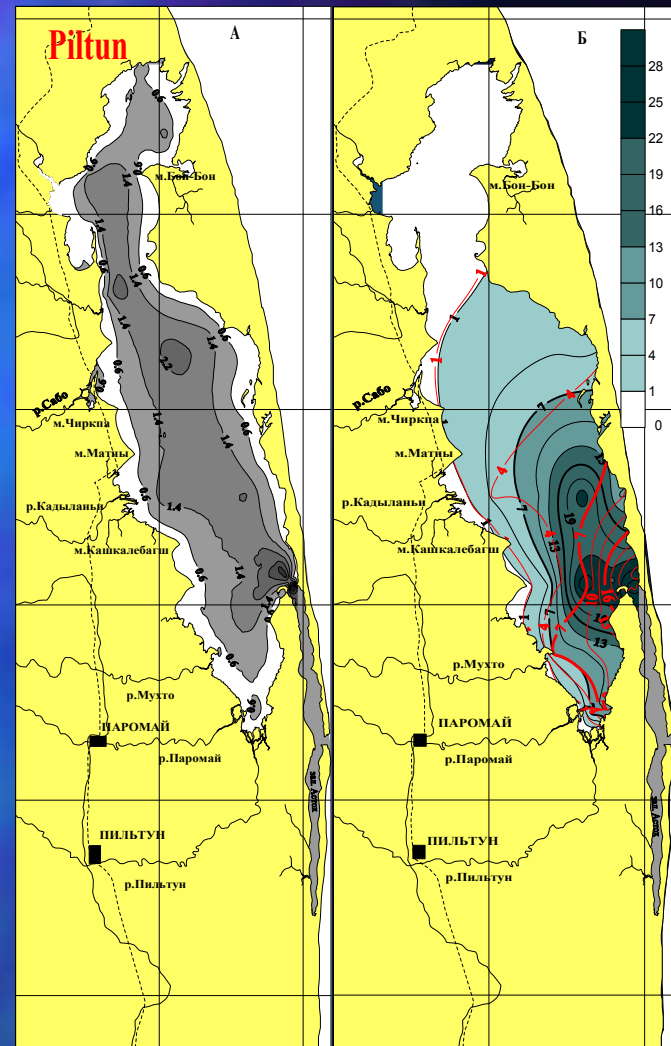
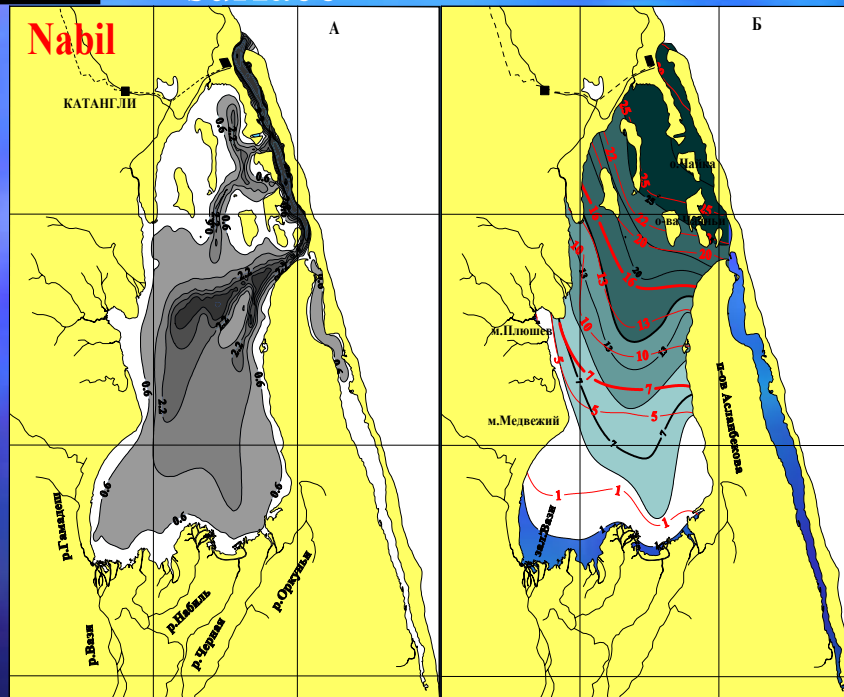


Data: SakhNIRO+ECS

Bathymetric map (A) and Bottom and surface salinity (B) on tide in Piltun and Nabil

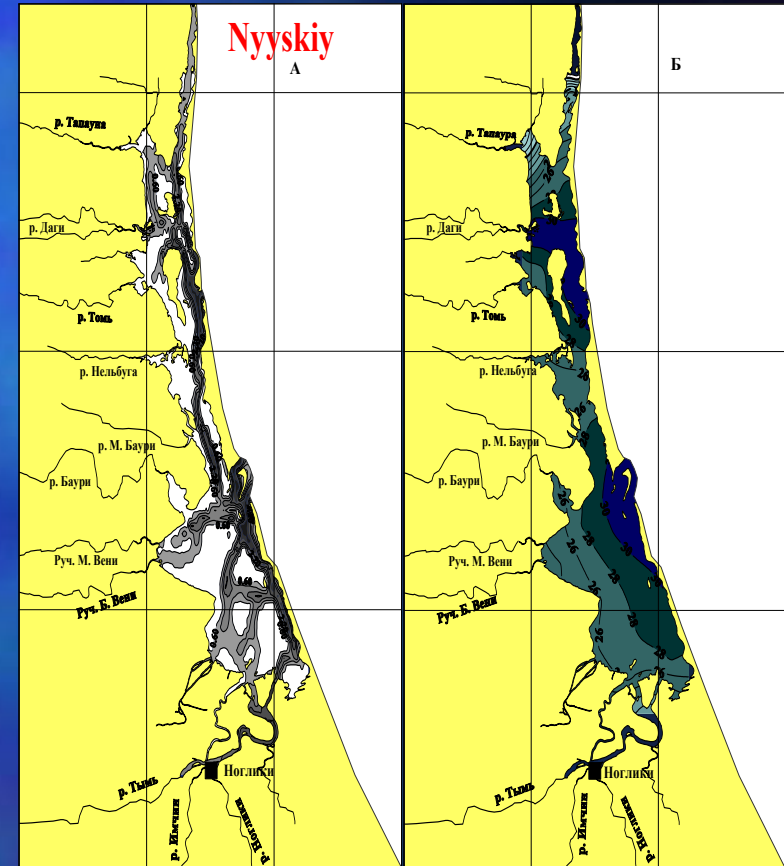
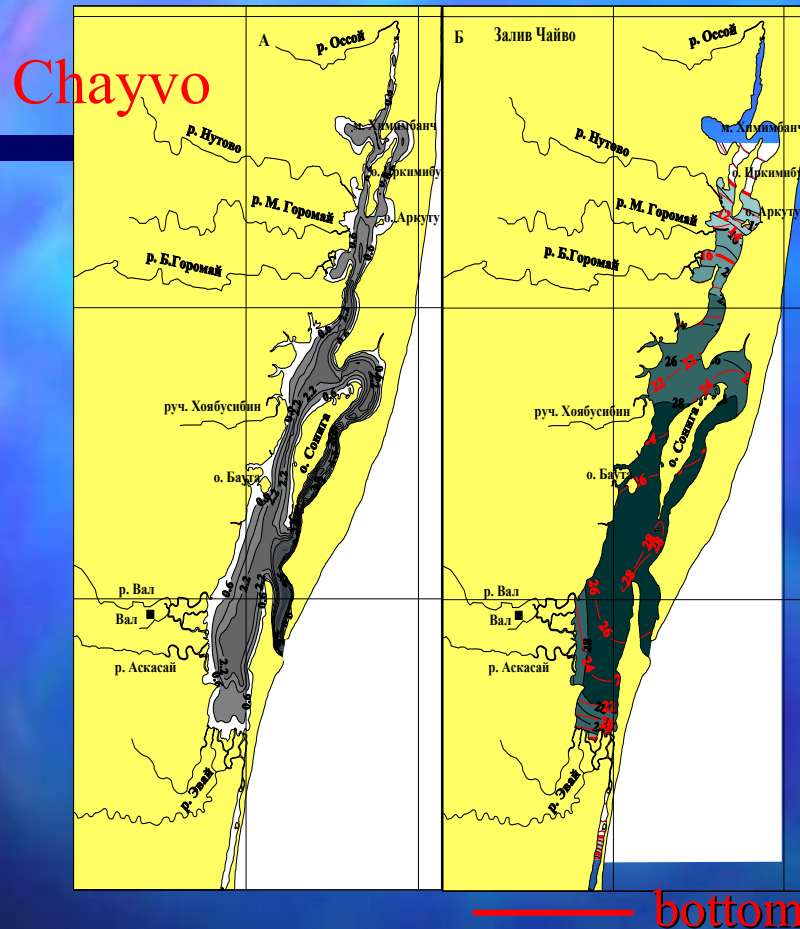
— bottom

surface



The Piltun and Nabil are wide with long narrow entrances.
 The depth varies from 0.6 to 2 m, 1.2 m in average
 The marine water doesn't cover all area of this Bay on high tide.

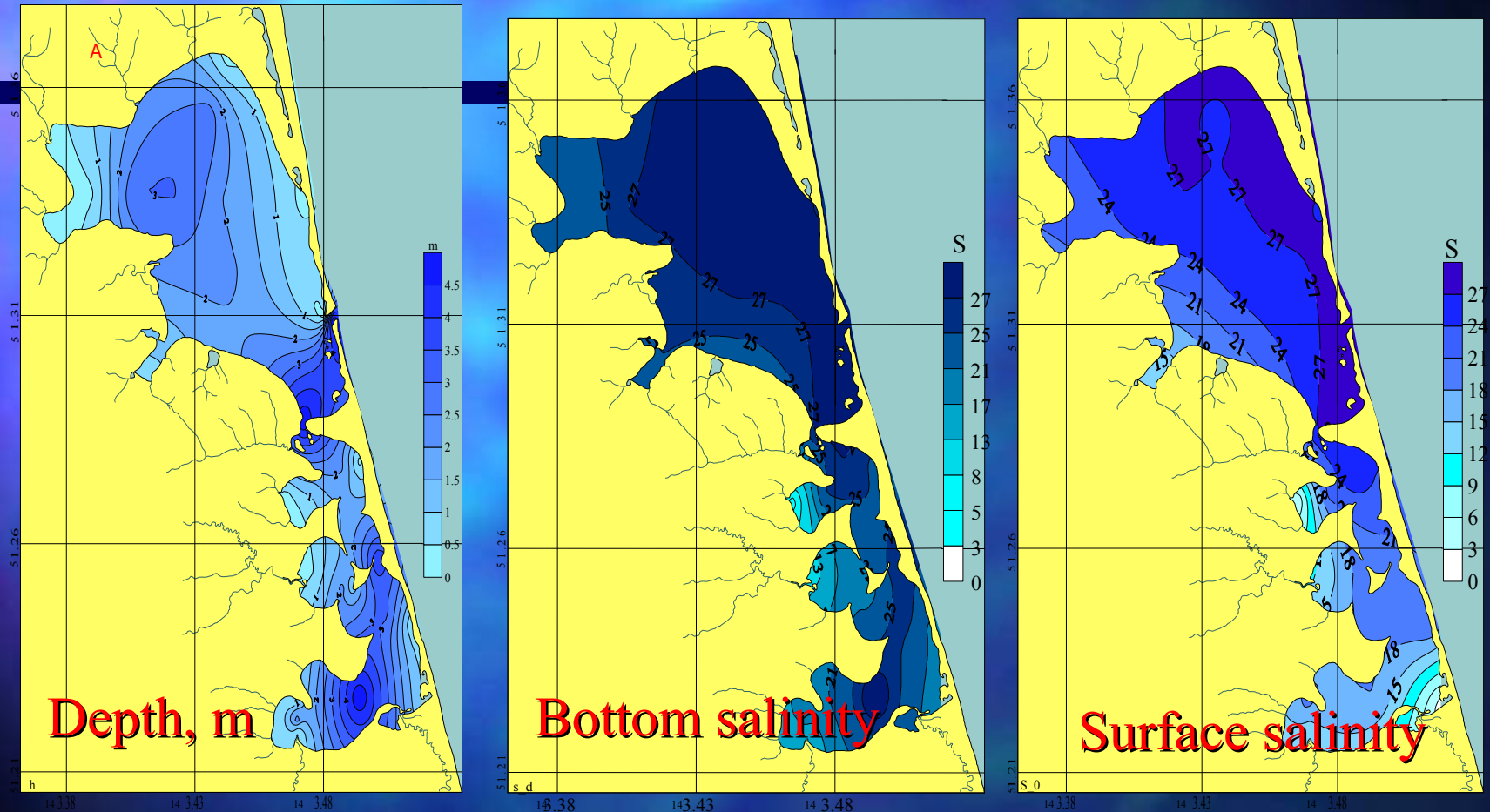
Bathymetric map (A) and Bottom and surface salinity (B) on tide in Chayvo and Nyyskiy Bays



The Chayvo and Nyyskiy are narrow with short wide entrances.
 The depth varies from 0.6 to 2 m, 1.5 m in average
 The marine water covers practically all area of these Bays on high tide.

Data: SakhNIRO+ECS

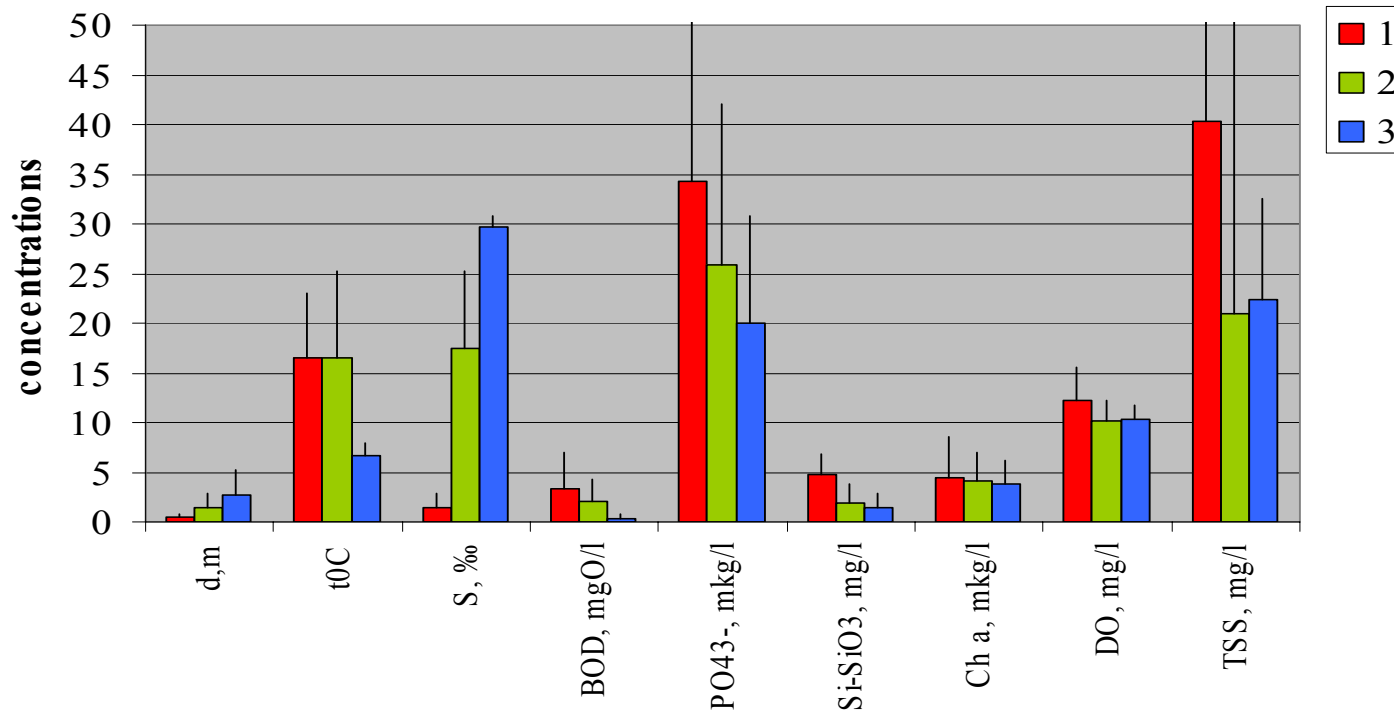
Bathymetric scheme (A) and Bottom and surface salinity (B) in Lunskiy Bay



The Lunskiy is the smallest, deepest and the most salinity at any phase of tide.

Data: SakhNIRO+ECS

The main parameters of different types of water in north-eastern Sakhalin lagoons

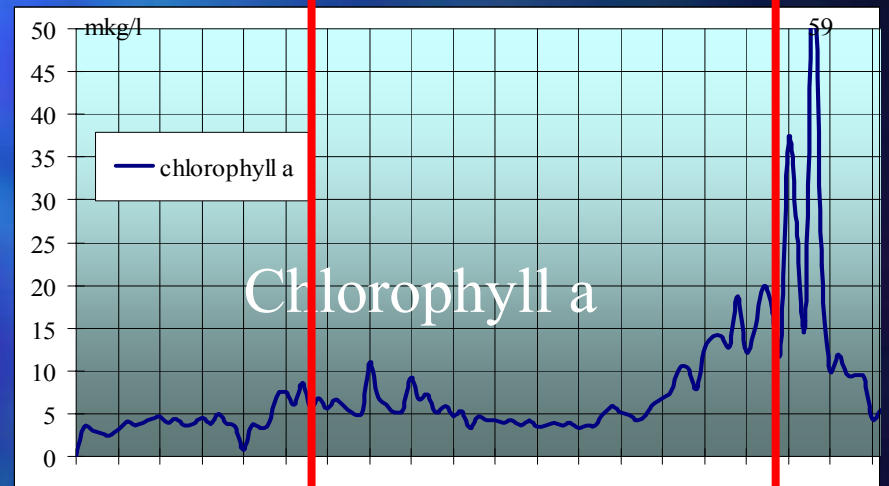
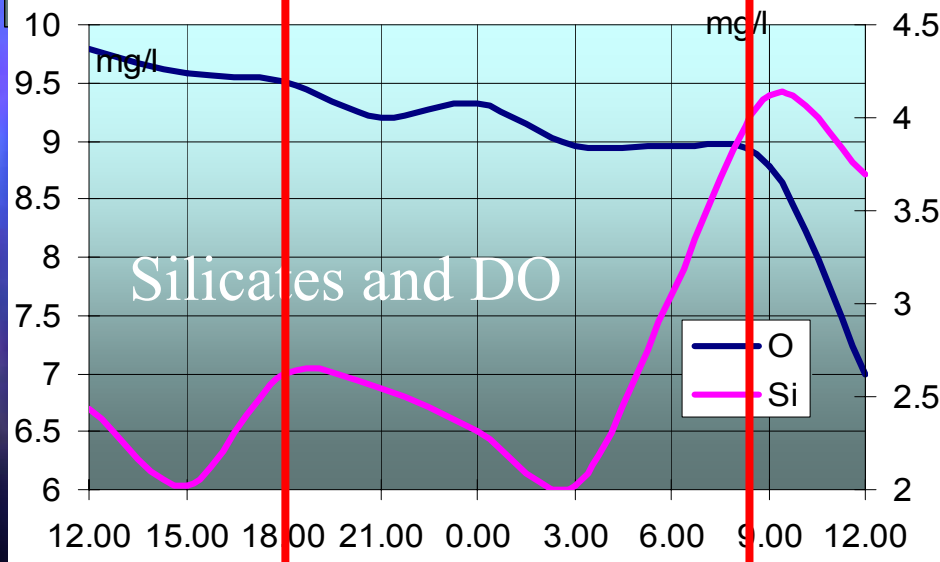
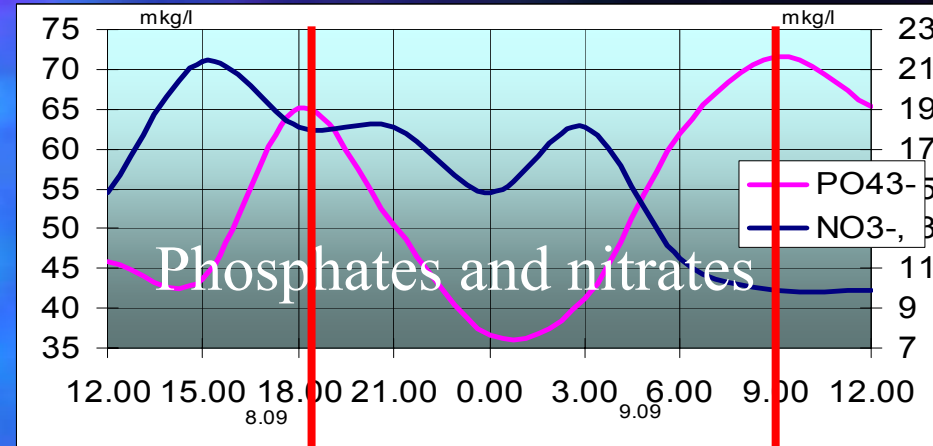
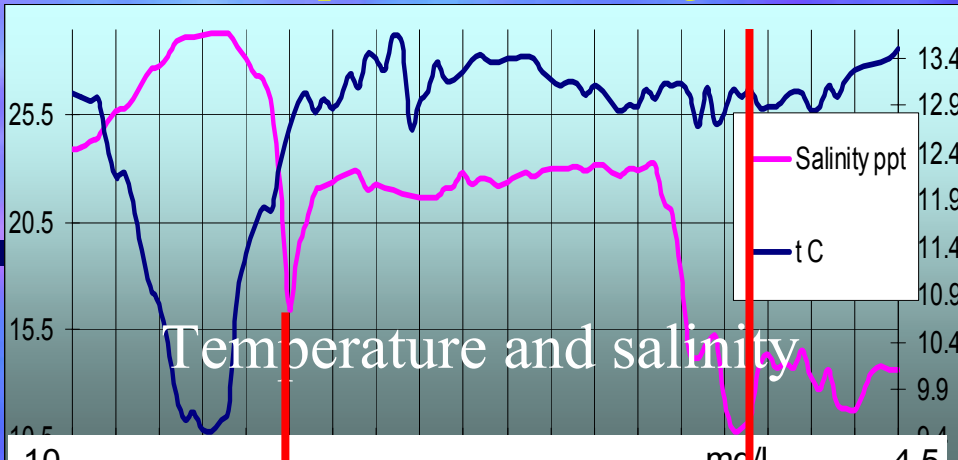


1- in the rivers and in the its mouths (The highest concentrations of BOD, Silicates, Phosphates, TSS)

2- in lagoons

3- near entrances and tidal channels

Water parameters during 24 hours in Chayvo Bay 8-9 September, 2001



Low tide

Low tide

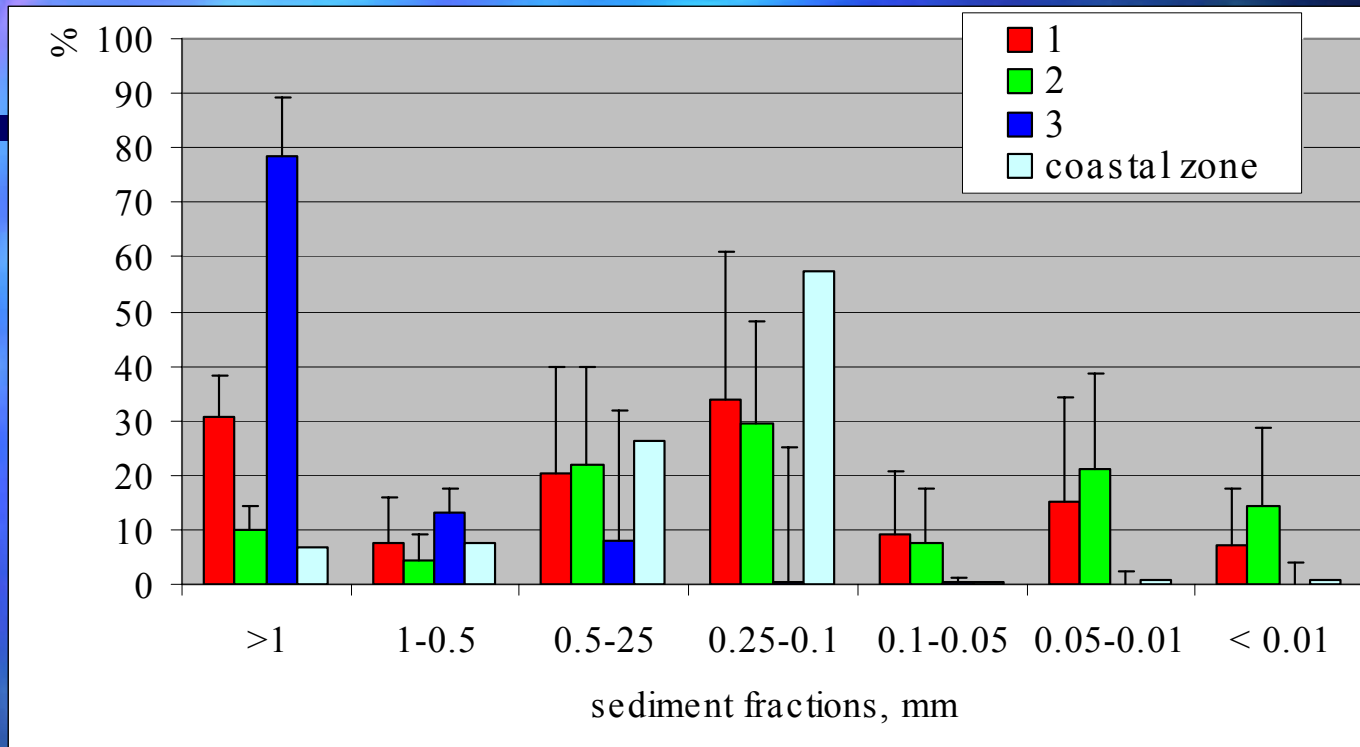
Low tide

Low tide

The water on low tide brings from the bays more amount of phosphates, silicates, and chlorophyll. The seawater is enrichment by dissolved oxygen (DO) and nitrates

Data: SakhNIRO+ECS

The grain size distribution of upper sediment layer in north-eastern Sakhalin lagoons



1- in the rivers and in the mouths (gravel and middle sand are predominant here)

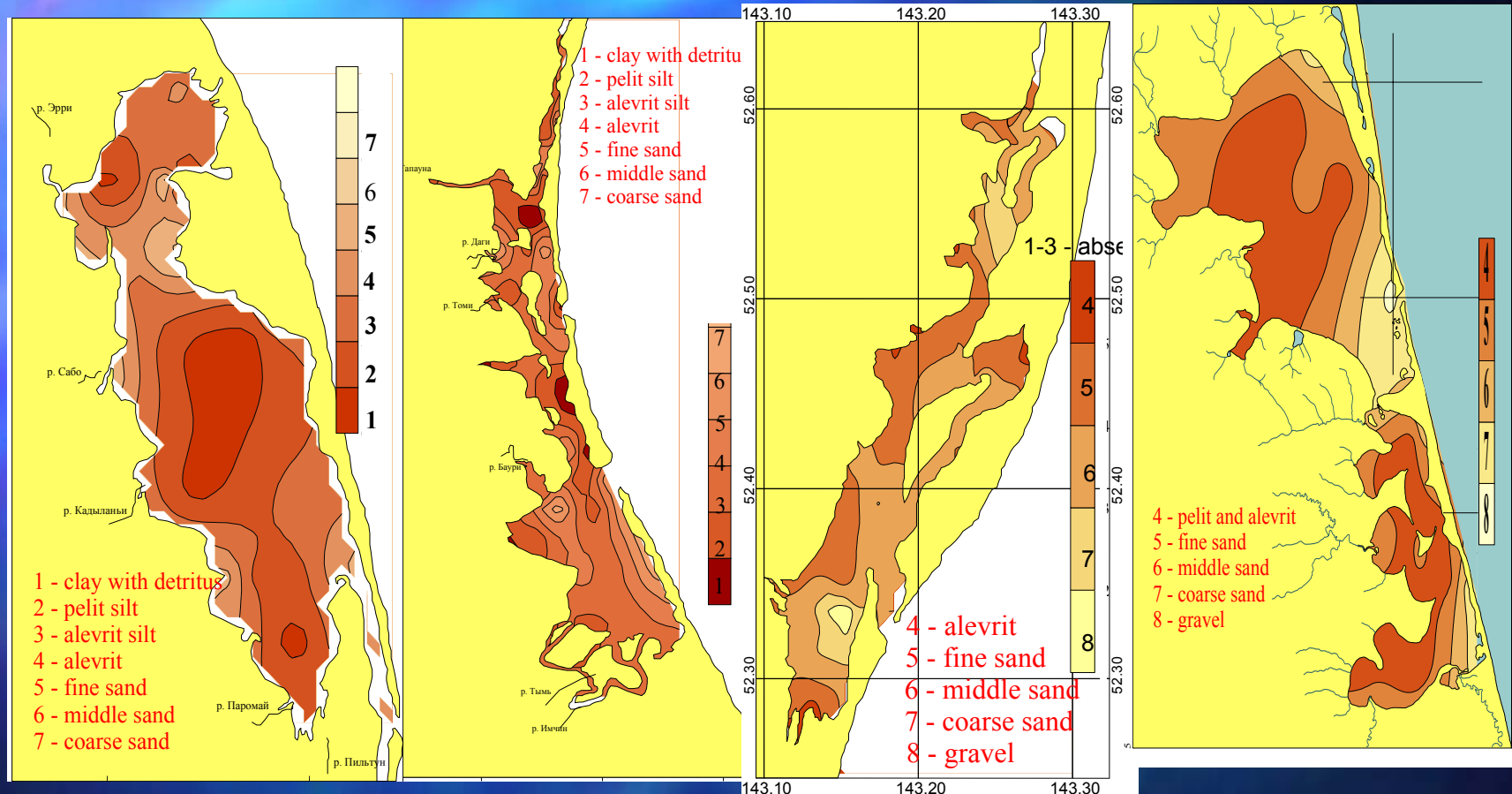
2- in lagoons (silty sand and silt)

3- near entrances and channels (gravel)

The fine and middle grain sand are dominant on the nearest shelf (not far from entrances) and their percentage are higher, than inside the bays

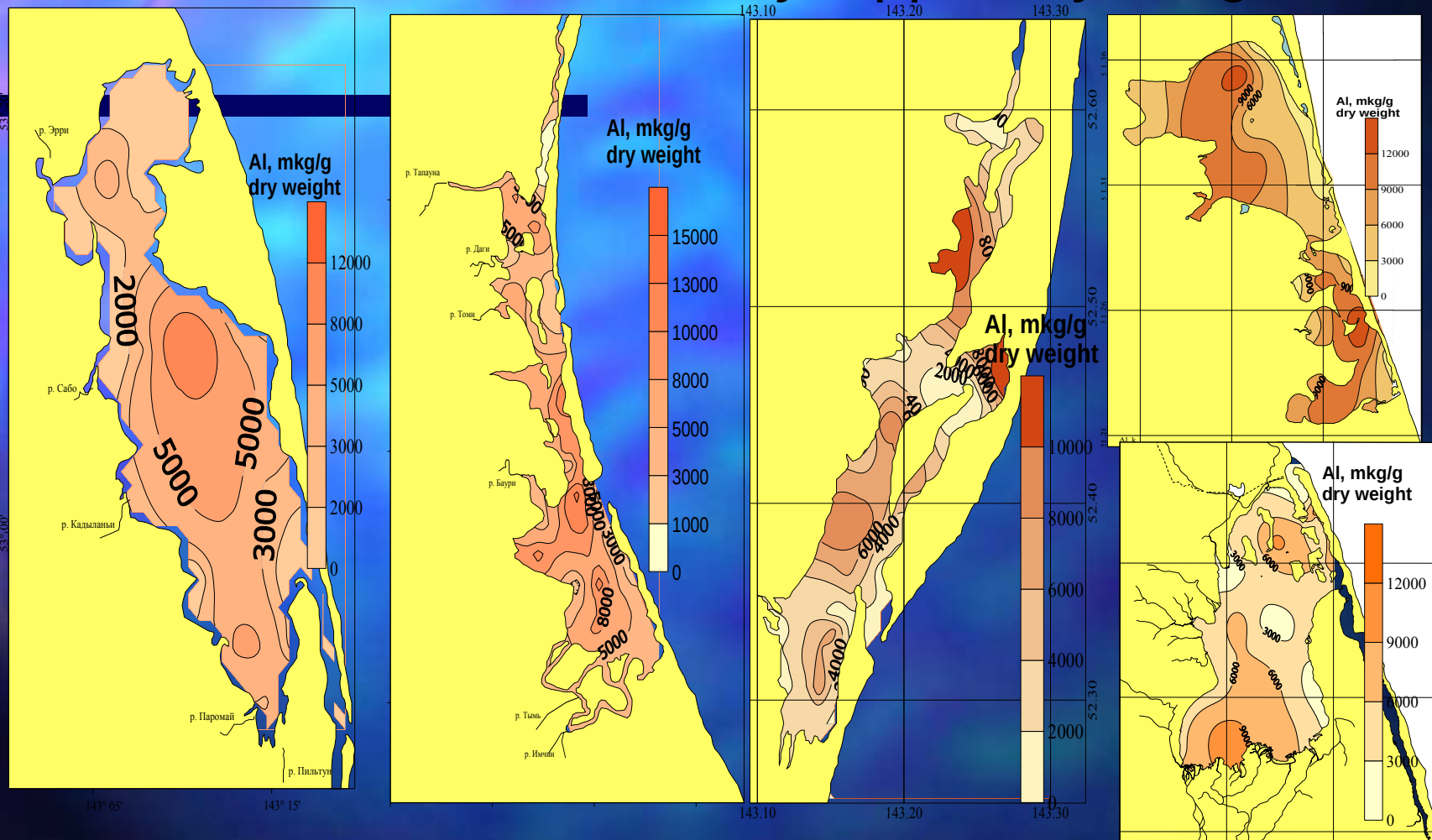
Data: SakhNIRO+ECS

Bottom sediments of the Bays



There are 8 main type of sediments, but
Not all of them are presented in each lagoon

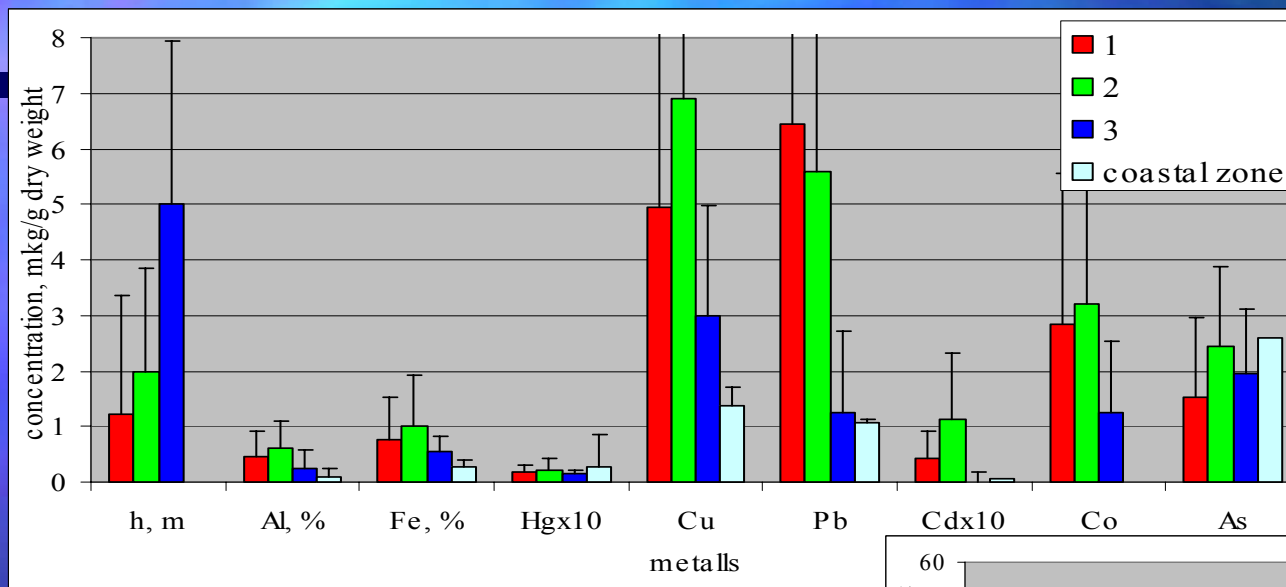
Distribution of Al in upper layer of bottom sediment of the Bays, ppm dry weight



The zone of this metal accumulations is very close to distribution of fine sediment

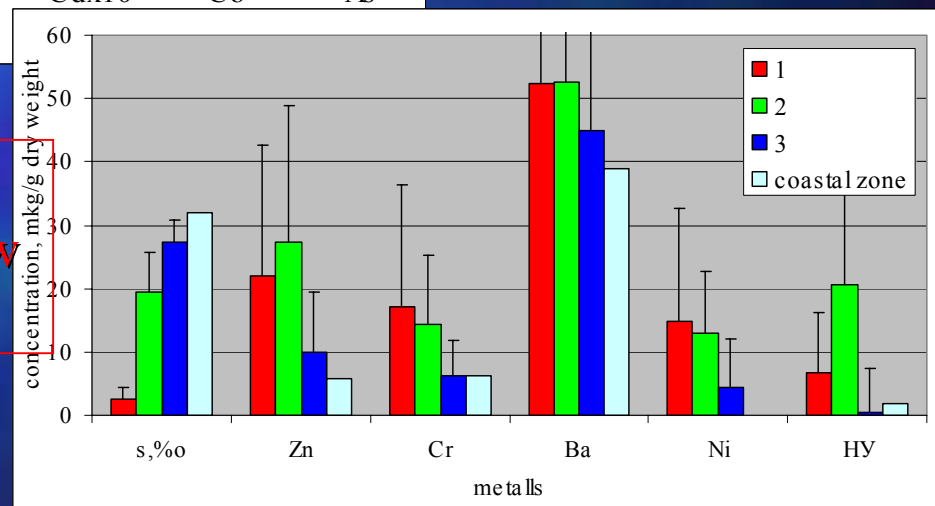
Data: SakhNIRO+ECS

The concentration of metals and total petroleum Hydrocarbons (HY) in upper sediment layer in the north-eastern Sakhalin lagoons



1- in the rivers and in the mouths
2- in lagoons
3- near entrances and channels

The concentration of most elements (except As and Hg) and NY were below in marine areas and nearest shelf



Data: SakhNIRO+ECS; Lab analysis:
TINRO-center, Kovekovdova L. T.

Metal concentrations in the upper layer of bottom sediment of Bays, ppm dry weight

Bays		Al	Fe	Zn	V	Ni	Cr	Cu	Pb	Co	Cd	Hg
Chayvo	Mean	6414	8643	24.2	28.7	16.6	20.5	6.87	3.13	3.29	0.050	0.011
	SD	5799	4994	20.4	15.1	12.1	15.0	3.95	3.34	2.24	0.000	0.010
Nabil	Mean	4996	6520	21.8	21.7	16.3	17.7	5.89	1.46	2.65	0.081	0.013
	SD	3583	3451	15.5	8.2	17.2	18.4	3.53	1.65	2.43	0.082	0.007
Nyyskiy	Mean	8300	8131	28.2	21.1	11.1	12.6	5.83	2.88	2.92	0.089	0.010
	SD	4395	5892	20.2	6.6	9.2	10.2	3.64	2.68	2.29	0.066	0.004
Piltun	Mean	2718	4429	13.6	20.0	11.4	11.7	4.38	1.15	1.46	0.053	0.010
	SD	1950	3456	11.3	0.0	12.5	9.7	1.95	1.27	1.25	0.012	0.005
Lunskiy	Mean	3839	15490	36.6	29.5	12.7	16.1	10.52	9.85	4.64	0.208	0.042
	SD	4507	12470	25.3	20.7	9.2	10.8	8.00	7.18	2.44	0.171	0.034

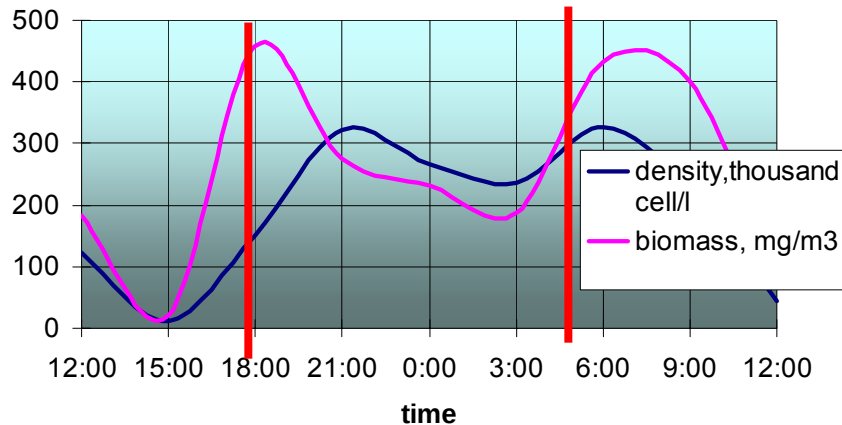
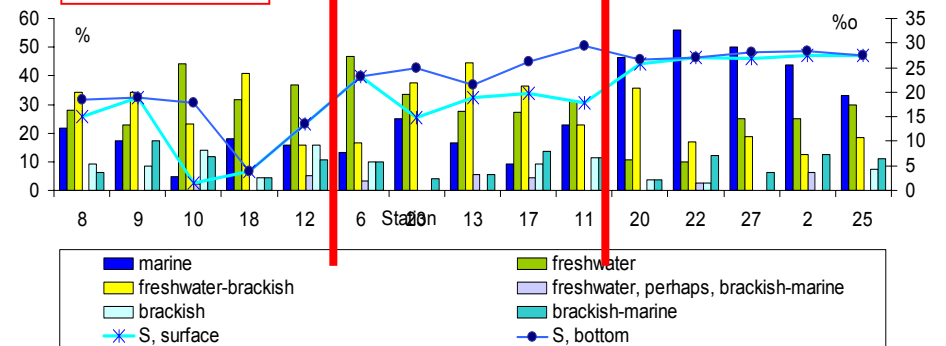
Ratio of ecological groups of phytoplankton in surface water of different sampling areas

Lunskiy

Near rivers

Central parts of bay

Near entrance

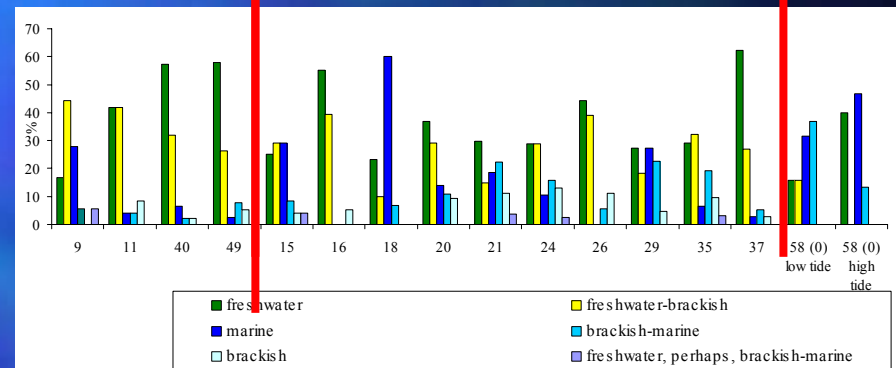


Chayvo

Near rivers

Central parts of bay

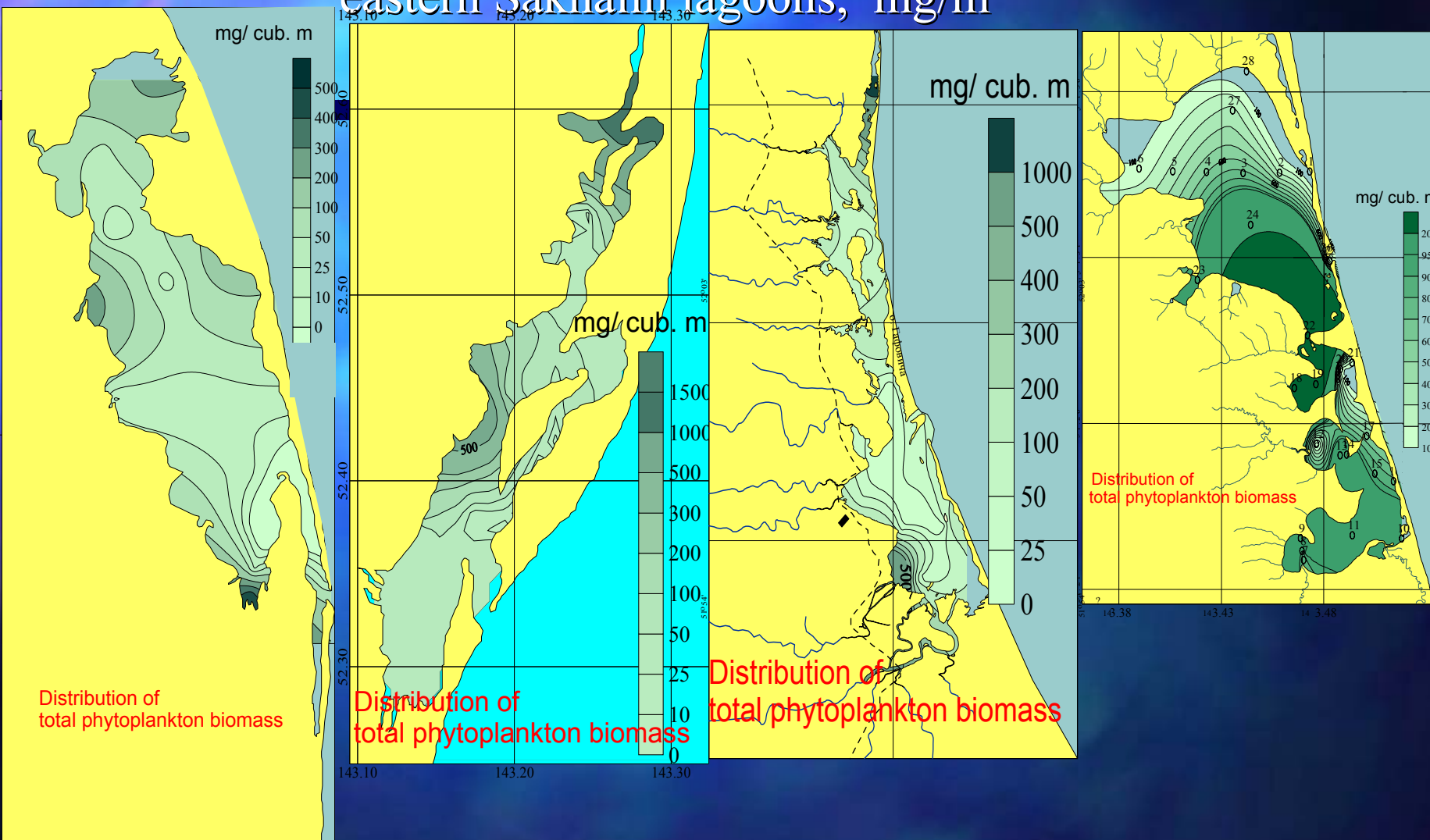
Near entrance



The dynamic of phytoplankton density and biomass during 24 hours in Chayvo

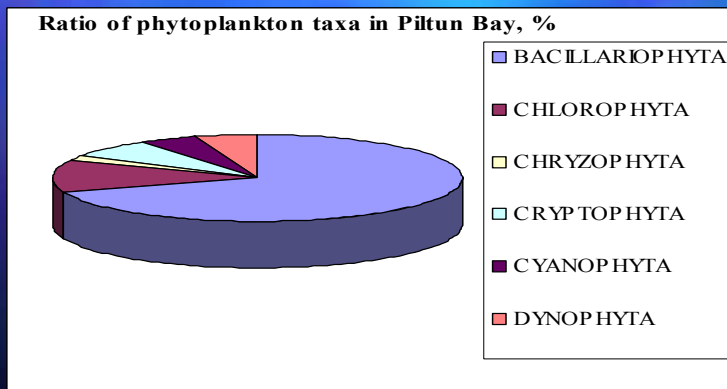
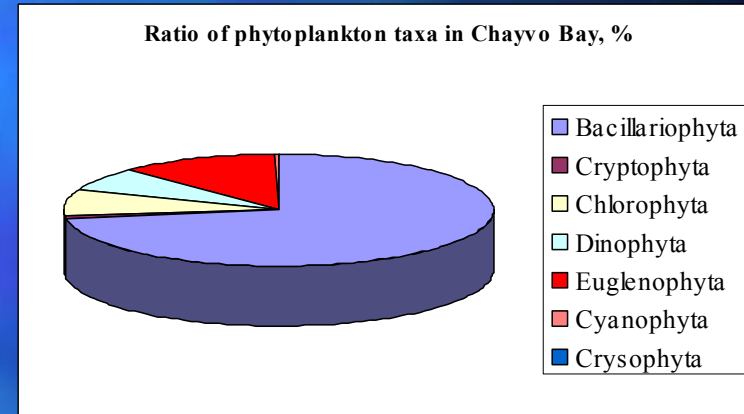
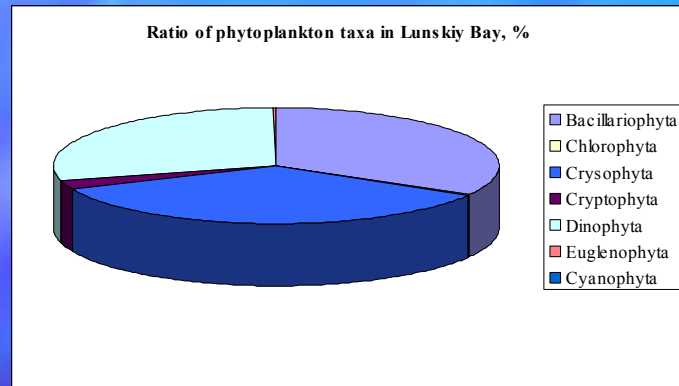
-the quantity is increasing on low tide

Distribution of Total biomass of phytoplankton in the north-eastern Sakhalin lagoons, mg/m^3



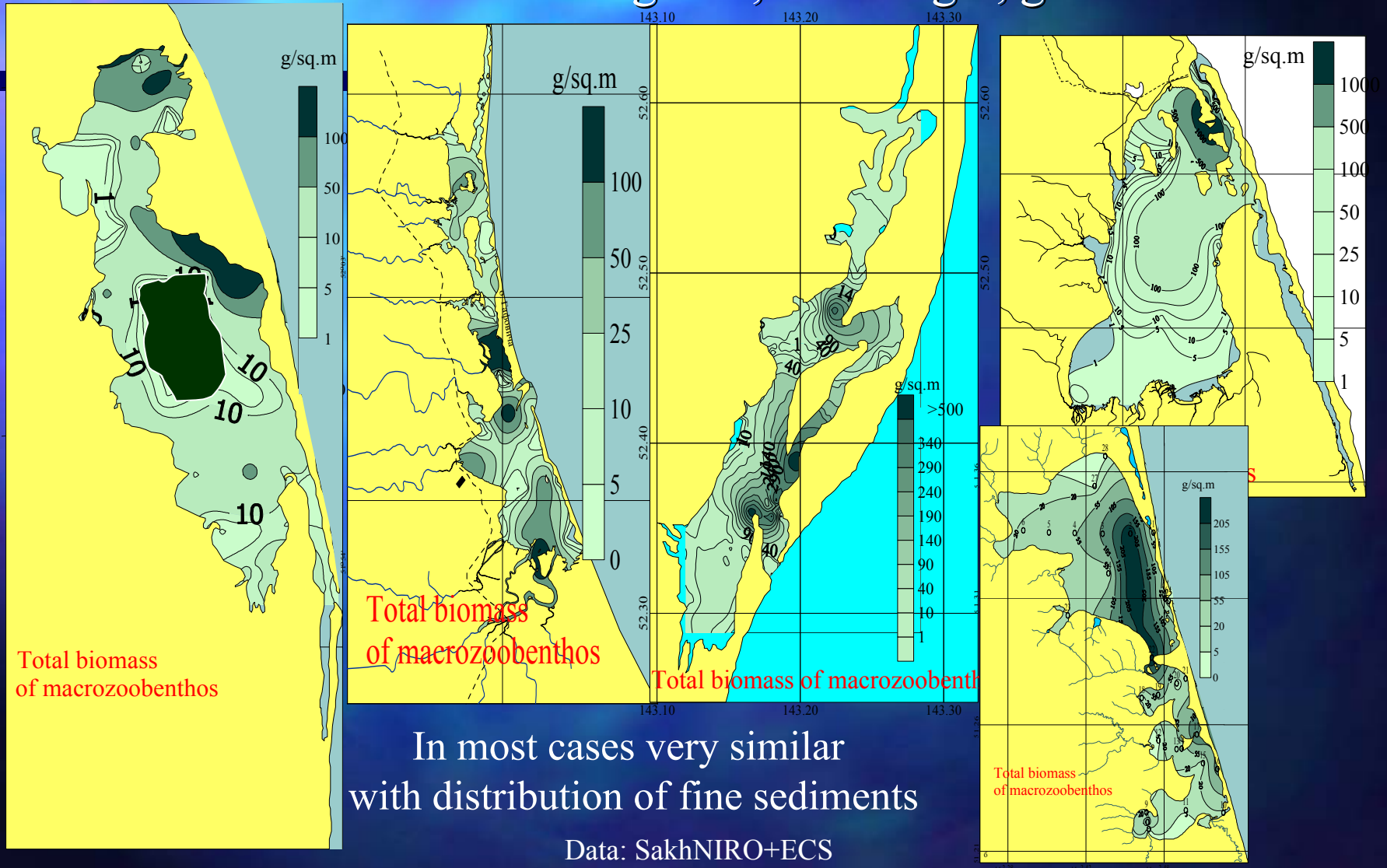
Data: SakhNIRO+ECS

Ratio of phytoplankton taxonomic groups biomass in the north-eastern Sakhalin lagoons, %



- Diatoms dominated over the whole Bays
- In Piltun the part of fresh water green and green-blue algae was increased
- In Lunskiy – golden and dinoflagellates were more abundant
- In Chayvo – Euglenophyta share was higher

Distribution of the Total biomass of macrozoobenthos in the north-eastern Sakhalin lagoons, wet weight, g/m²

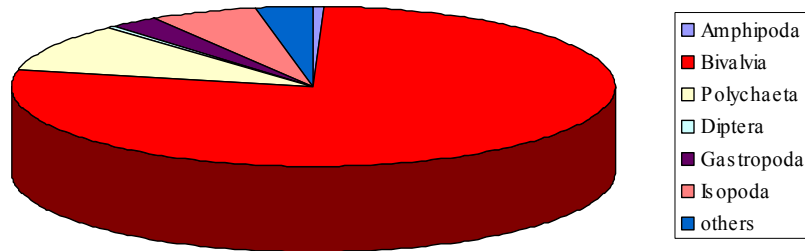


In most cases very similar
with distribution of fine sediments

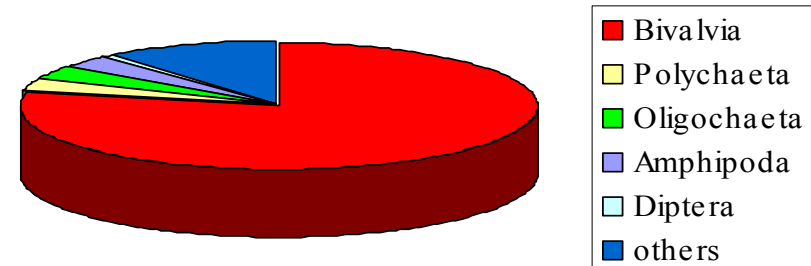
Data: SakhNIRO+ECS

Ratio of macrozoobenthic taxonomic groups in the north-eastern Sakhalin lagoons

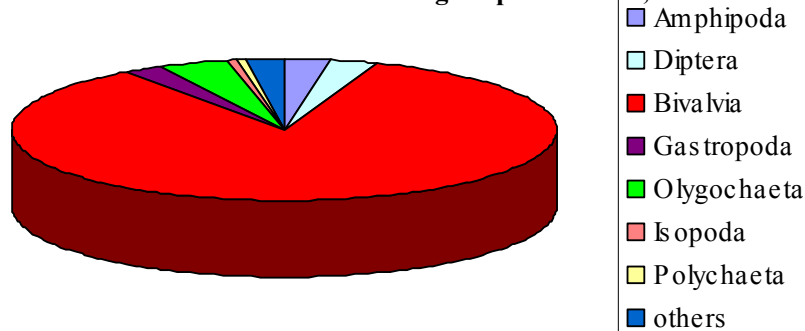
Ratio of biomass macrozoobenthic groups in Chayvo, %



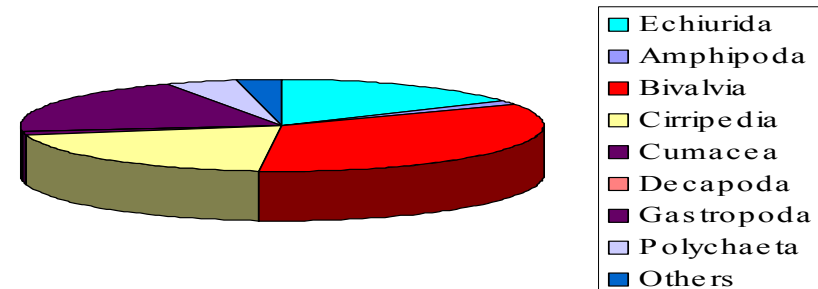
Ratio of biomass macrozoobenthic groups in Nyyskiy Bay, %



Ratio of biomass macrozoobenthic groups in Piltun, %



Ratio of biomass macrozoobenthic groups in Lunskiy, %

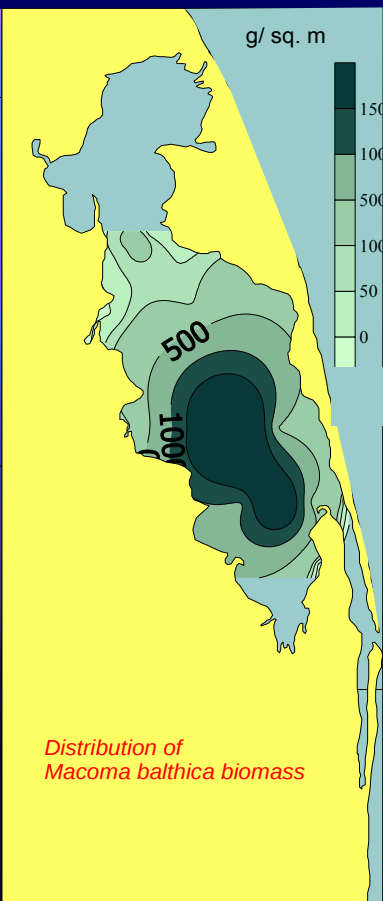


- Bivalve (*Macoma balthica*, *Liocyma fluctuosa*) were more abundant in all bays
- In Lunskiy – Cumacea, Polychaeta, Cirripedia and Echiurida were significant
- In Nyyskiy and Piltun – oligochaets had visible biomass.

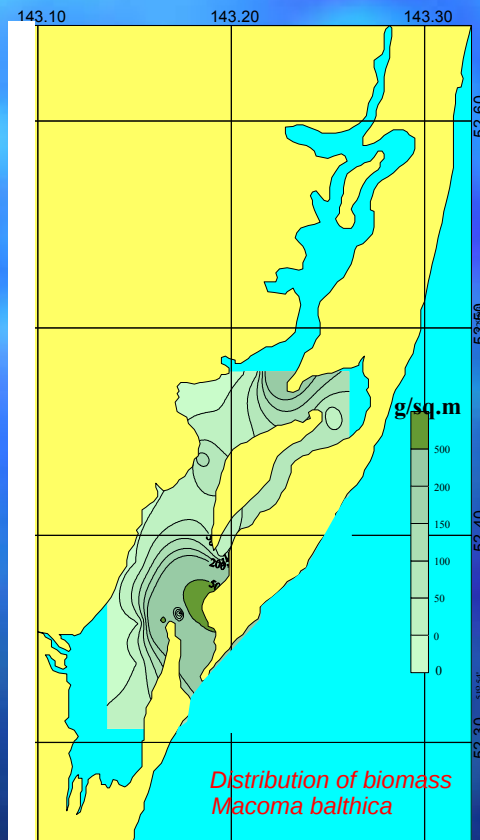
Data: SakhNIRO+ECS

Distribution of the biomass of Macoma balthica, wet weight, g/m²

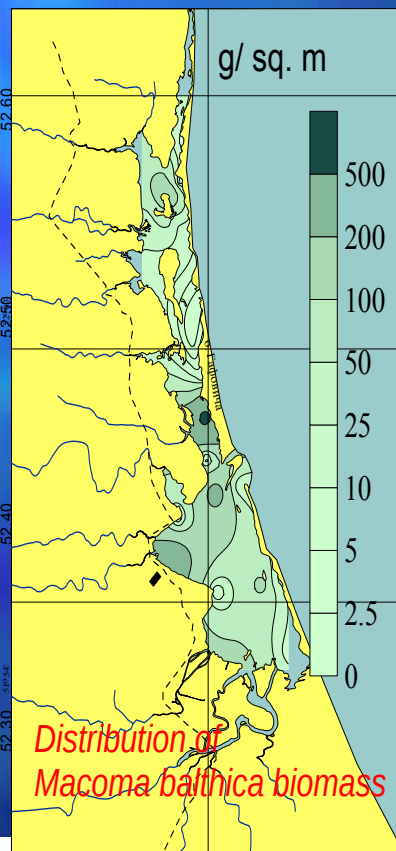
Piltun



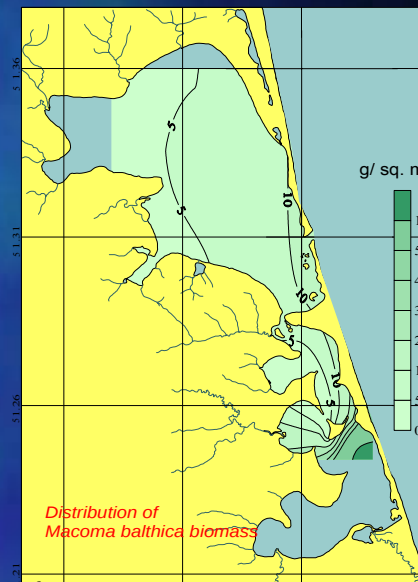
Chayvo



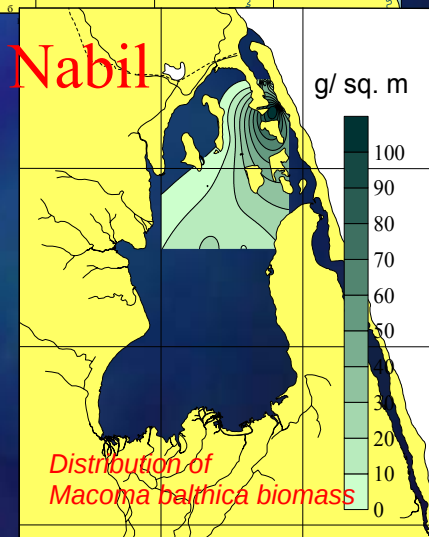
Nyyskiy



Lunskiy



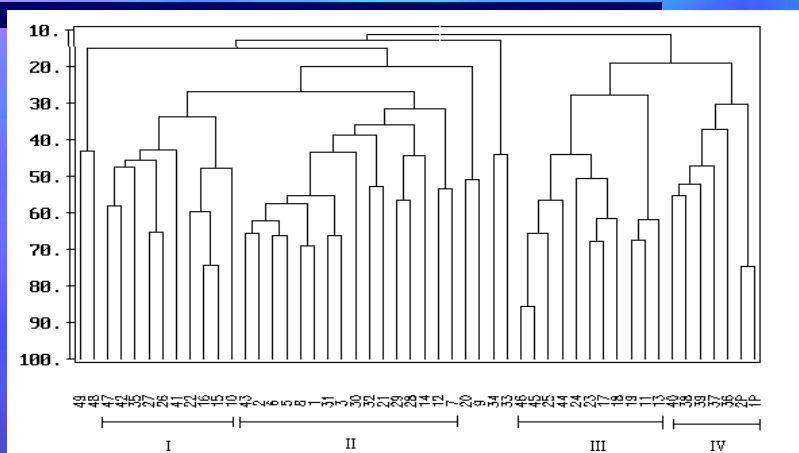
Nabil



Data: SakhNIRO+ECS

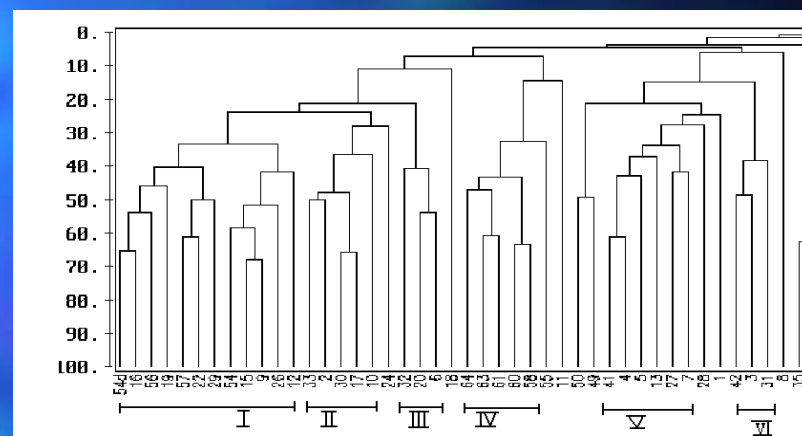
Bottom Community structure of Chayvo and Piltun Bays

Piltun



Communities	Station	Dominant species	Biomass,	Density,	H
I	10, 15, 16, 22, 26, 27, 35, 41, 42, 47	<i>Kamaka kutchae</i> + <i>Eogammarus kyqi</i>	8.2 ± 11.8	7524.6 ± 6076.5	0.92 ± 0.75
II	1, 2, 5, 6, 7, 8, 12, 14, 21, 28, 29, 30, 31, 32, 43	<i>K. kutchae</i>	4.4 ± 4.4	4652.7 ± 3489.8	1.74 ± 0.70
III	11, 13, 17, 18, 19, 23, 24, 25, 44, 45, 46	<i>Corbicula sirotski</i> + <i>Macoma balthica</i> + (<i>Potamocarbula amurensis</i>)	123.2 ± 86.7	4234.8 ± 4467.4	1.41 ± 0.68
IV	1P, 2P, 36, 37, 38, 39, 40	<i>M. baltica</i> + <i>Liocyma fluctuosa</i>	174.7 ± 289.8	2817.4 ± 1442.5	1.98 ± 0.51

Chayvo



Community	Station	Dominant species	Biomass, g/m ²	Density,	H
				ind/m ²	
I	9, 12, 15, 16, 19, 26, 22, 29, 54, 56, 57	<i>Macoma baltica</i> + <i>Liocyma fluctuosa</i>	89	2982 ± 2921	2.28 ± 0.63
II	2, 10, 17, 30, 33	<i>Macoma baltica</i>	33.8	798 ± 605	2.12 ± 0.6
III	6, 20, 32	<i>Macoma baltica</i> + <i>Hediste diversicolor</i>	27.5	980 ± 968	1.48 ± 1.09
IV	64, 63, 61, 60, 58, 55	<i>Nephtys caeca</i> + <i>Spio filicornis</i>	4.62	9800 ± 19423	1.42 ± 0.80
V	41, 4, 5, 13, 27, 7	<i>K. kutchae</i>	мар.41	1138 ± 200	0.62 ± 0.5
VI	42, 3, 31	<i>N. awatchensis</i> + <i>Amphiporidae</i> gen. sp.	1.82	723 ± 1058	0.76 ± 0.66

Data: SakhNIRO+ECS

Conclusion

1. The environmental conditions allow to divide the Bays on three groups. The Lunskiy affected on the biggest influence of marine water, the Piltun and Nabil – the lowest. Chayvo and Nyyskiy have intermediate position.
2. Three types of water were detected in the bays.
3. The bays are geochemical barrier for suspend solids and metals.
4. The hydrodynamic conditions are more important factor, which forms different types of pelagic and benthic communities. Peculiar phytoplankton communities are formed near the river mouths under an influence of river run-off.
5. Benthic communities in brackish water have higher biomass and species diversity than both fresh and marine communities.
6. Fresh water benthic communities have the widest spreading in Piltun. The brackish water benthic communities covered the most area of Nyyskiy, Chayvo and Lunskiy bays.
7. Relatively high content of some trace metals in lagoons are the result of natural geochemical conditions with terrestrial concentrations of metals.