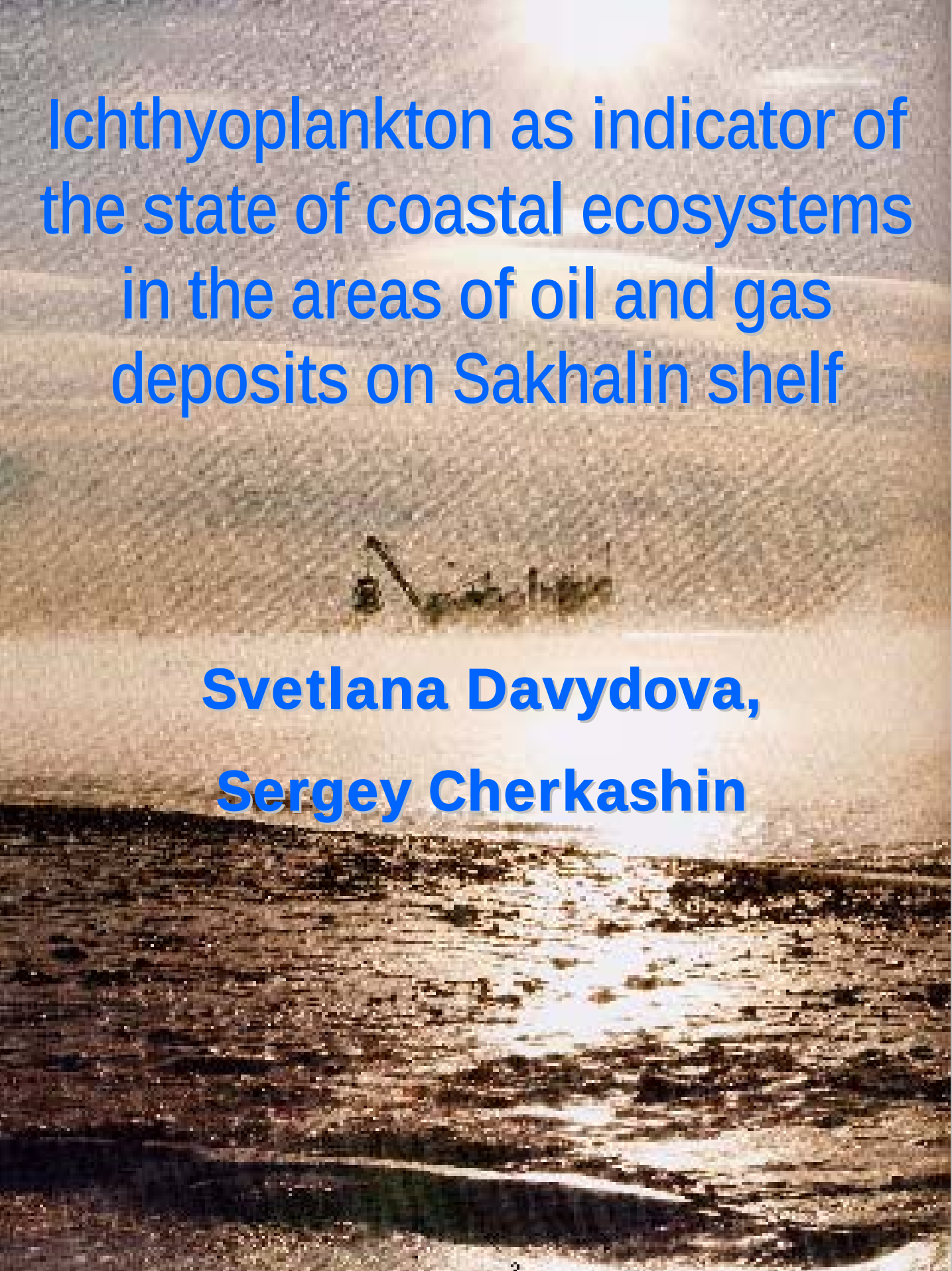
Ichthyoplankton as indicator of the state of coastal ecosystems in the areas of oil and gas deposits on Sakhalin shelf

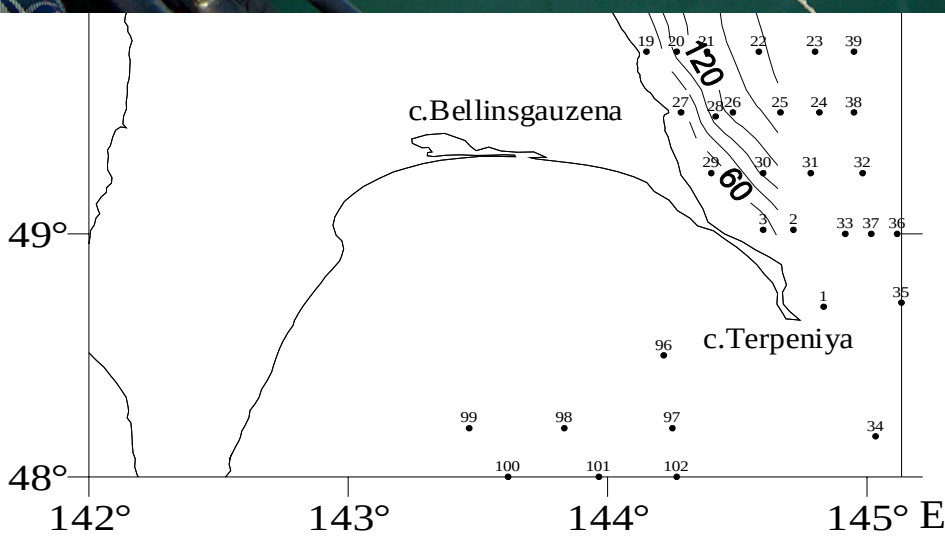


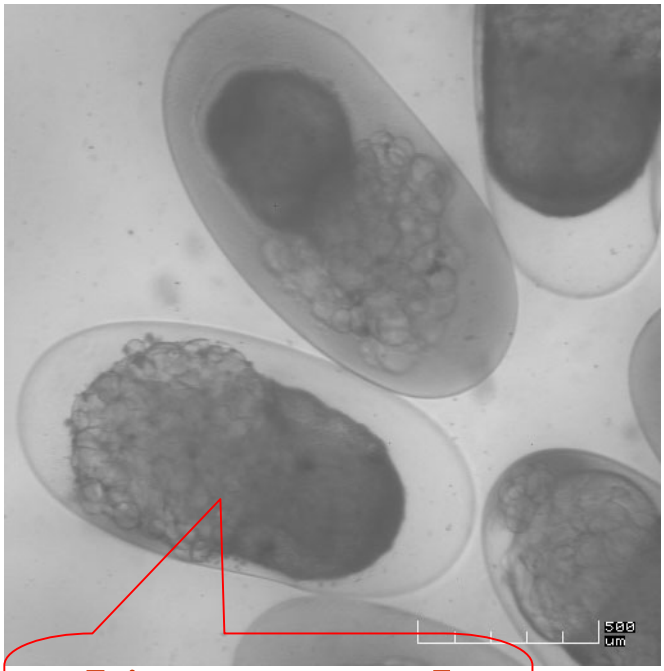
Svetlana Davydova,

Sergey Cherkashin

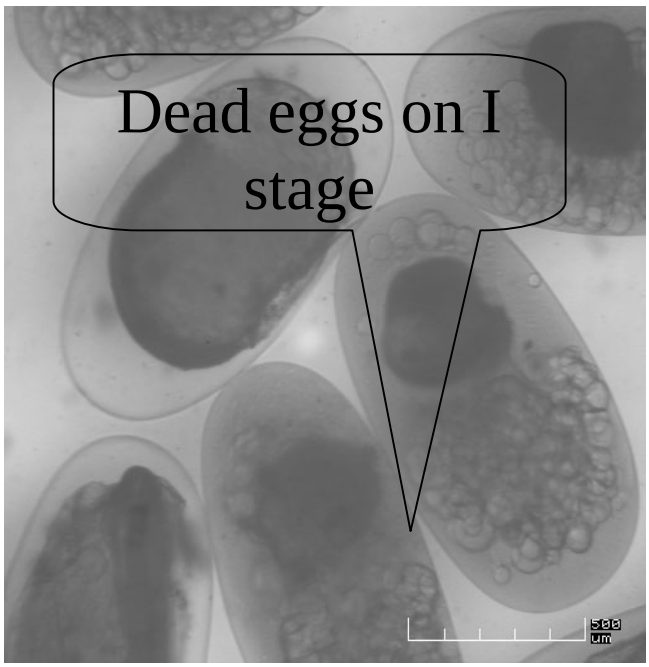
eastern shelf of the Sakhalin Island were have been provided.

For report we used date collected in July of 2002 during scientific survey of TINRO-centre in the area along the east coast the Sakhalin Island bounded 48°00 N and 54°30 N. Eggs and larvae of fishes were collected by the nekton net (d-0.80 m).





Live eggs on I stage

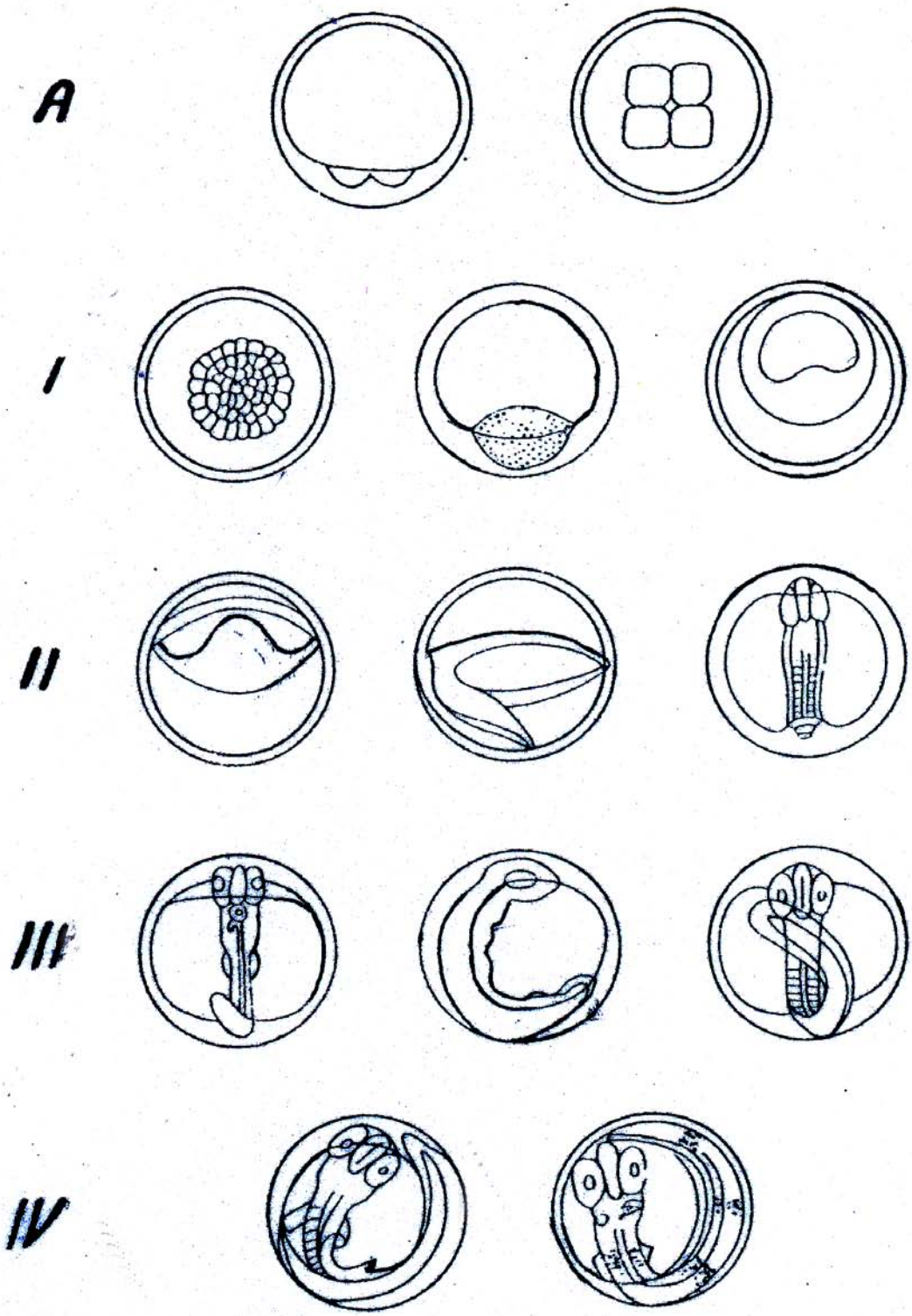


Dead eggs on I stage

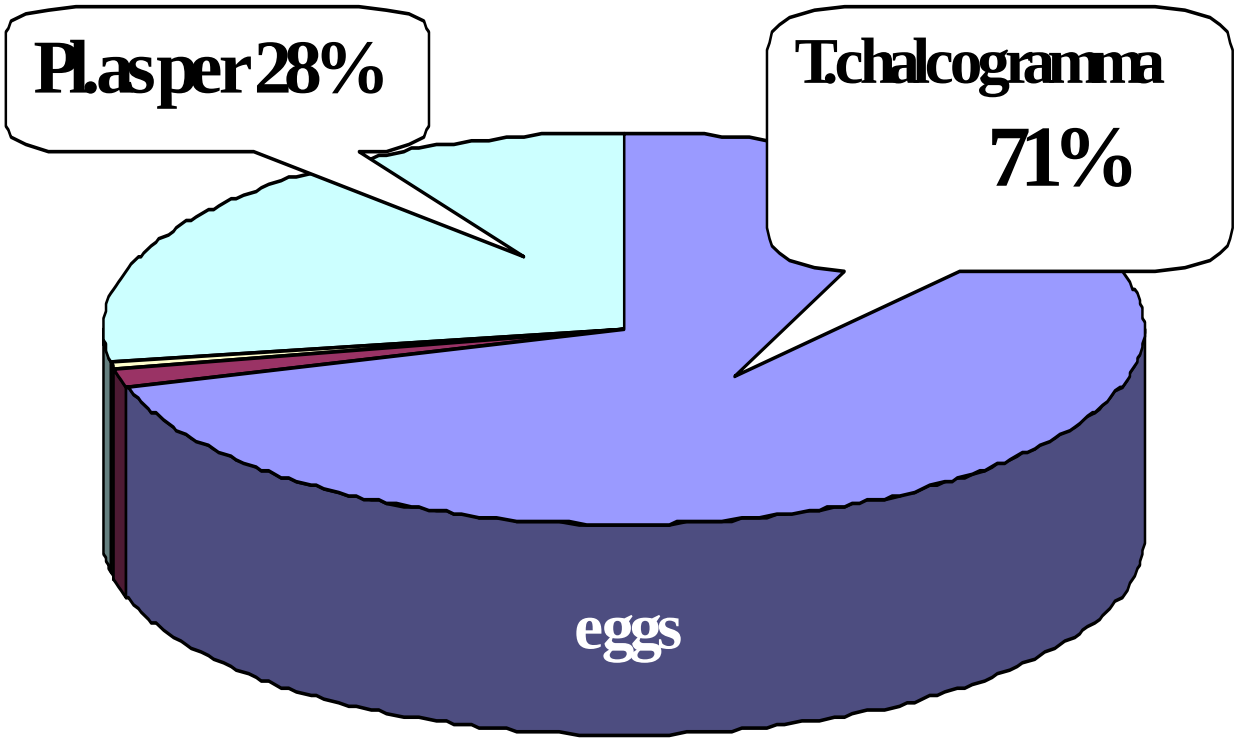
Live eggs on III stage

Dead eggs on III stage

The total catch and number of eggs on the different stages of development of each species were calculated in samples, with dividing all eggs into “live” and “dead”. The main criterion of “dead” eggs is destruction of internal structure in account of breaking of yolk membranes and falling out of the yolk granules, turbidity of eggs membranes. The germinal disk or developing embryo is deformed and shifted off the normal position and clenched (on Dechnik, 1960).

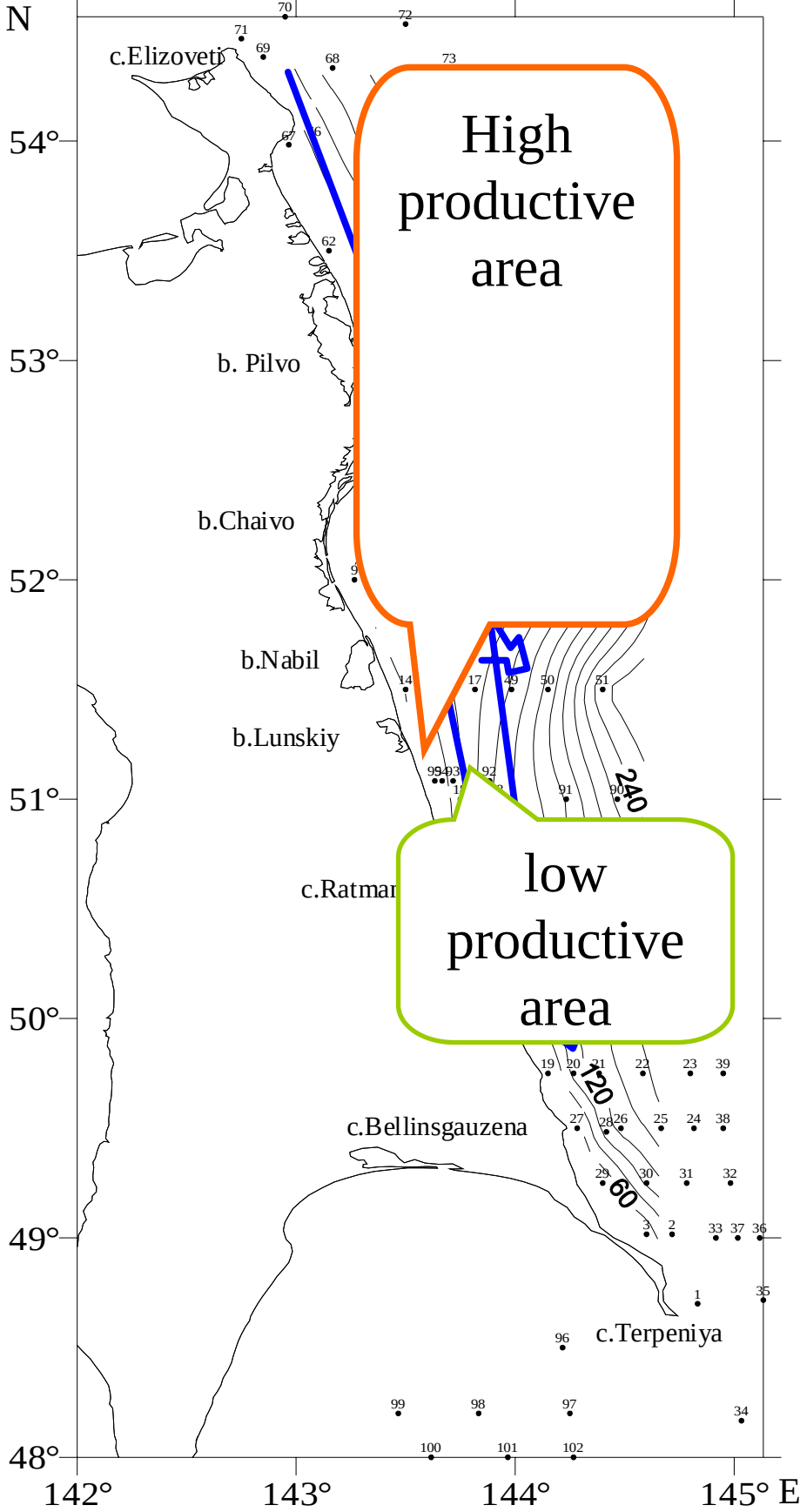


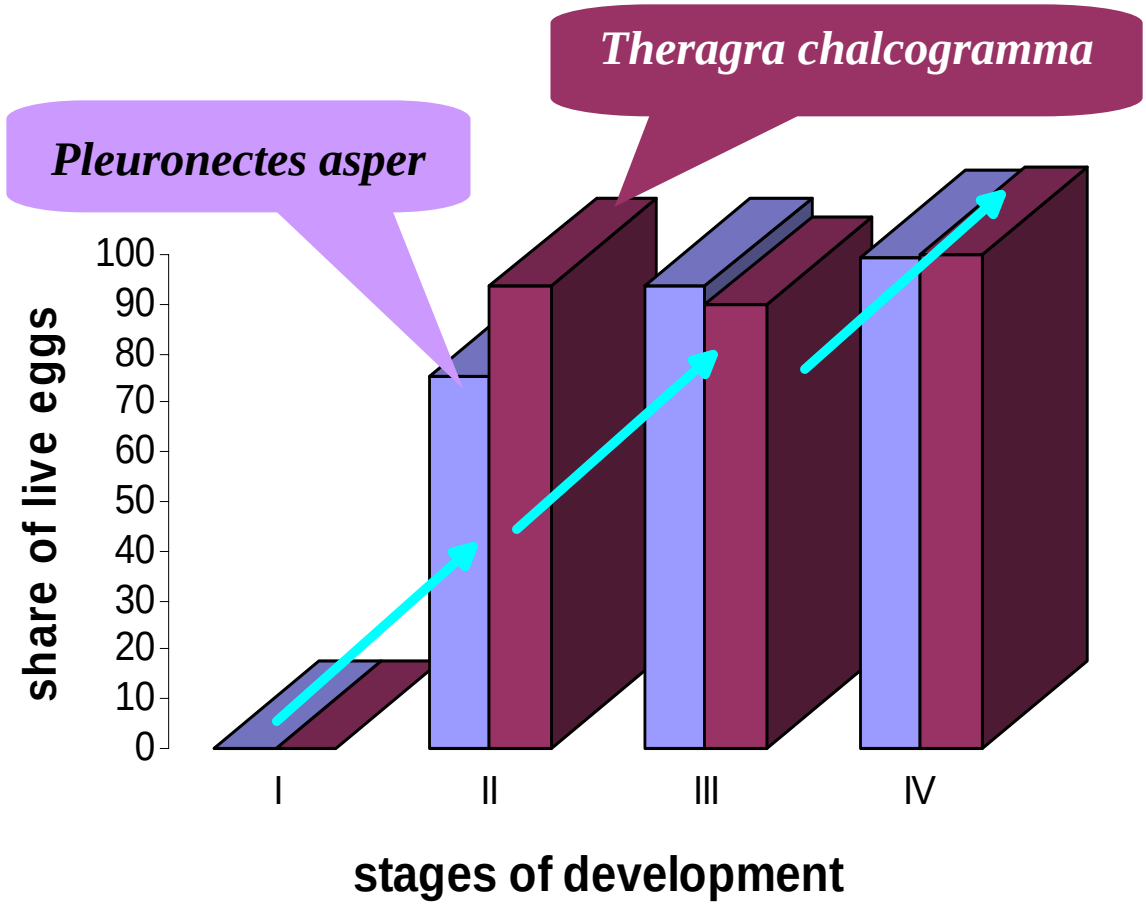
Stages of development were determined according to classification of Rass (1949)



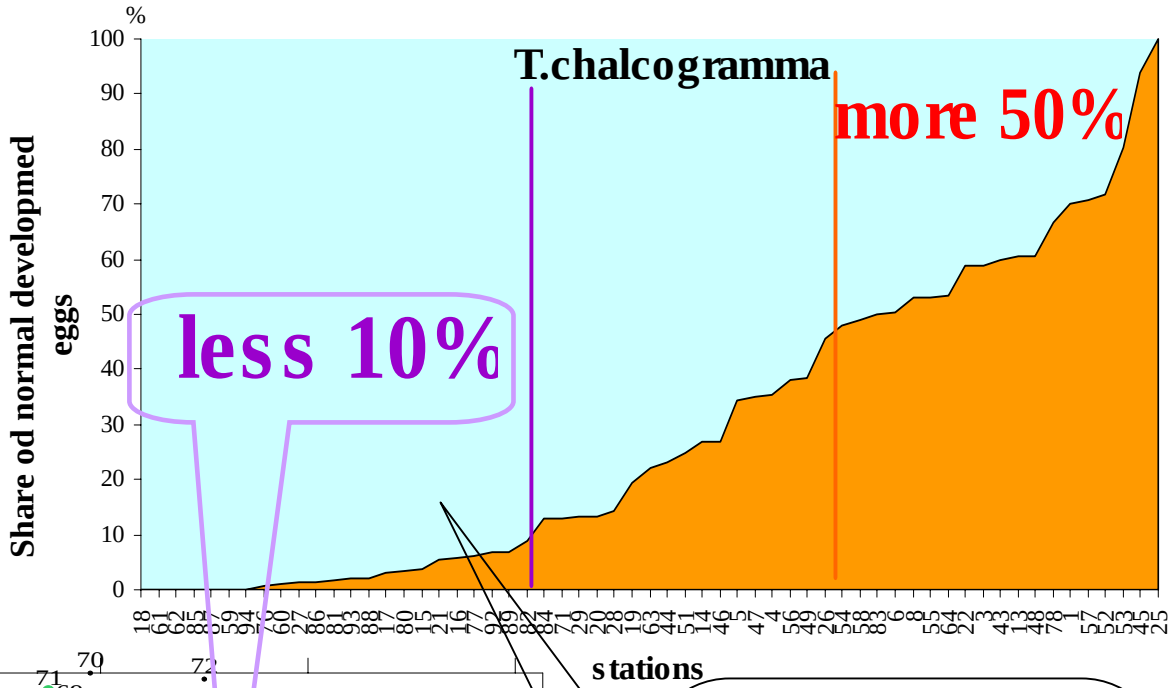
Eggs and larvae of 16 species-representatives boreal ichthyofauna presented ichthyoplankton community on the eastern shelf of the Sakhalin Island. Eggs of walleye pollock *Theragra chalcogramma* and yellow-fin sole *Pleuronectes asper* prevailed in catches.

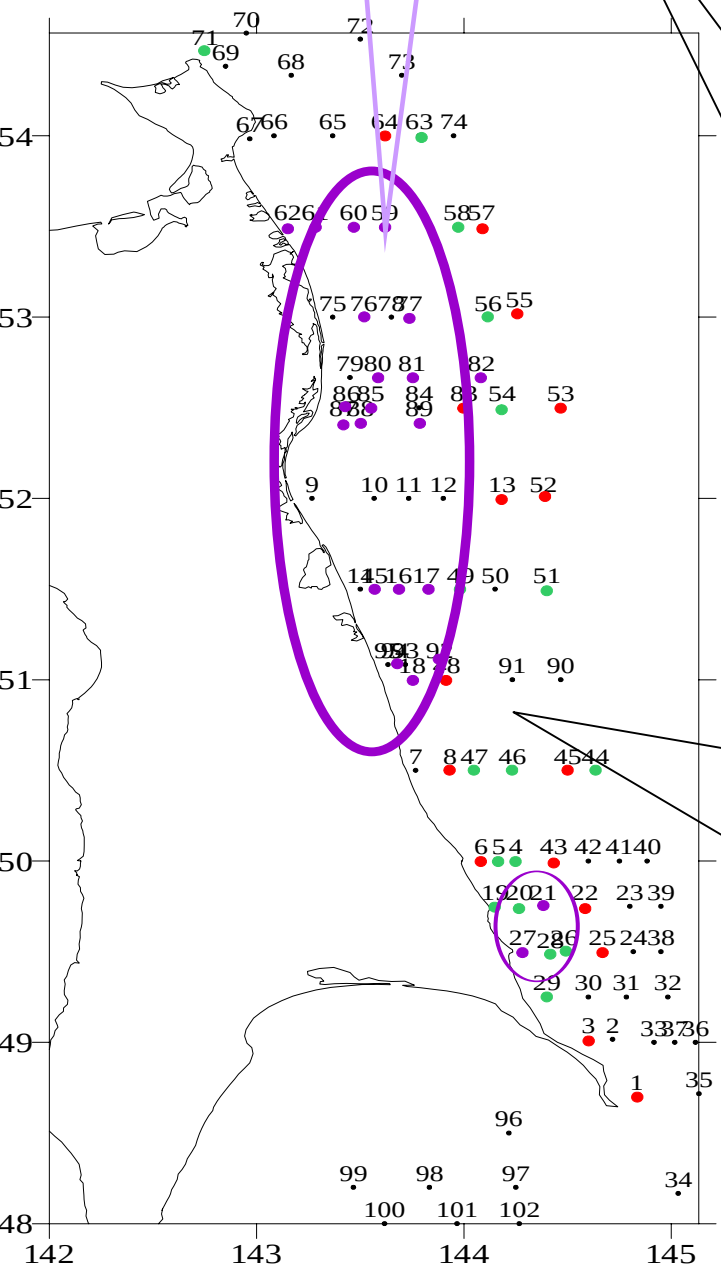
On the basis of comparison of the currents speeds and duration of embryogenesis we concluded that the eggs of fishes caught during survey was spawned in the shelf water of the Sakhalin Island directly and more northern part of the Okhotsk Sea also. The drift of passive migrants along the east coast of the Sakhalin Island with gradual moving to open waters was confirmed by the spatial distribution of eggs and larvae practically all species.). The shelf northward of 51°00 N was high productive zone because it is widest and so actively used by fishes for reproduction, narrow shelf from 50°00 N to 51°00 N was low productive area.





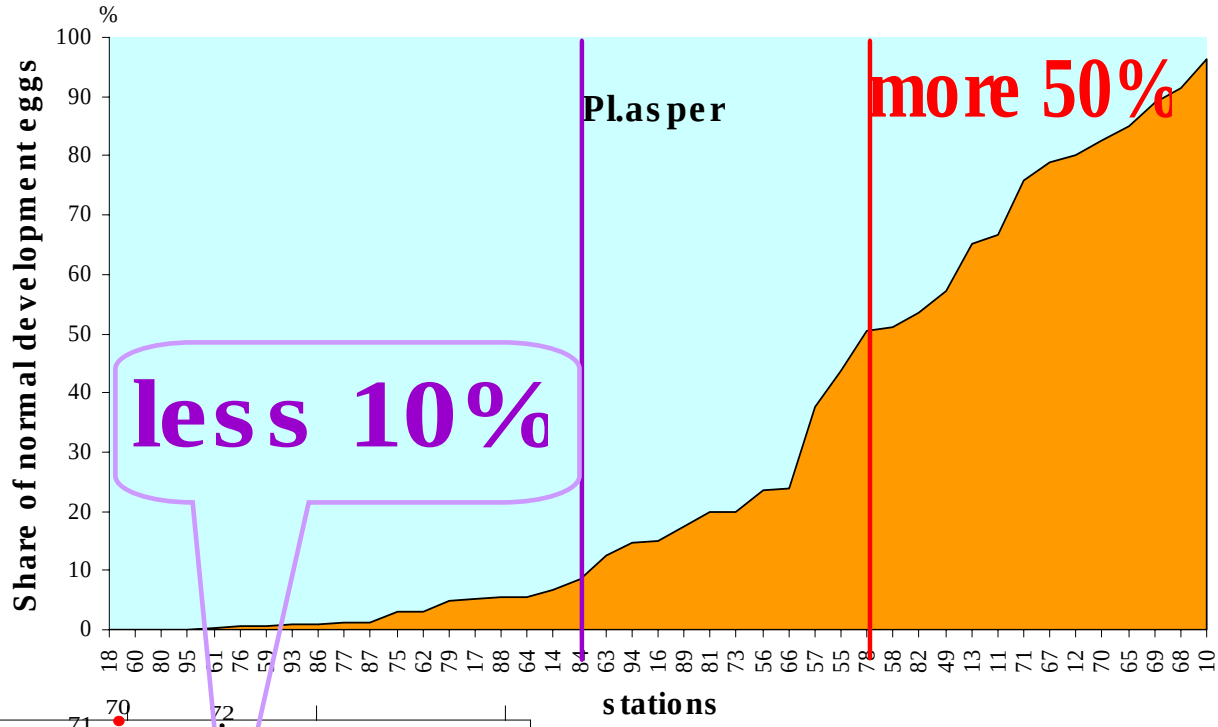
The minimal share of live eggs was market on first stage, maximum (practically 100%) - on forth stage . It is natural phenomenon because during the embryo development one of the most sensitive to influence of environmental factors is period from fertilization to beginning of gastrulation that coincides with first stage of eggs according to Rass classification (1946).

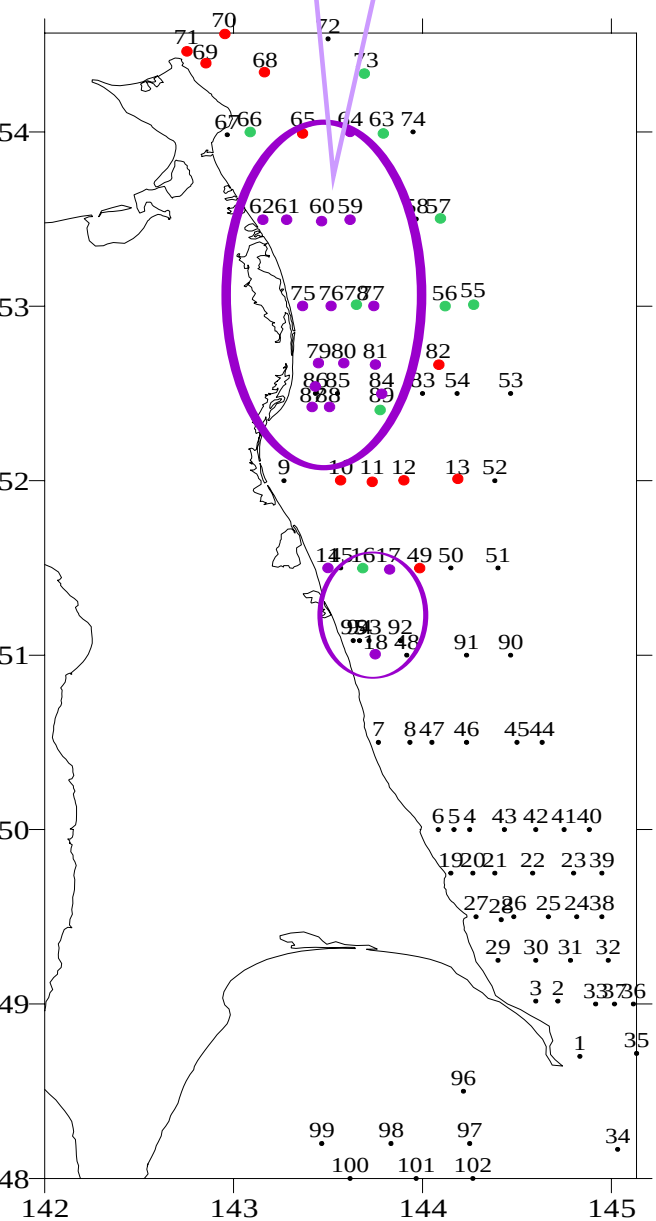




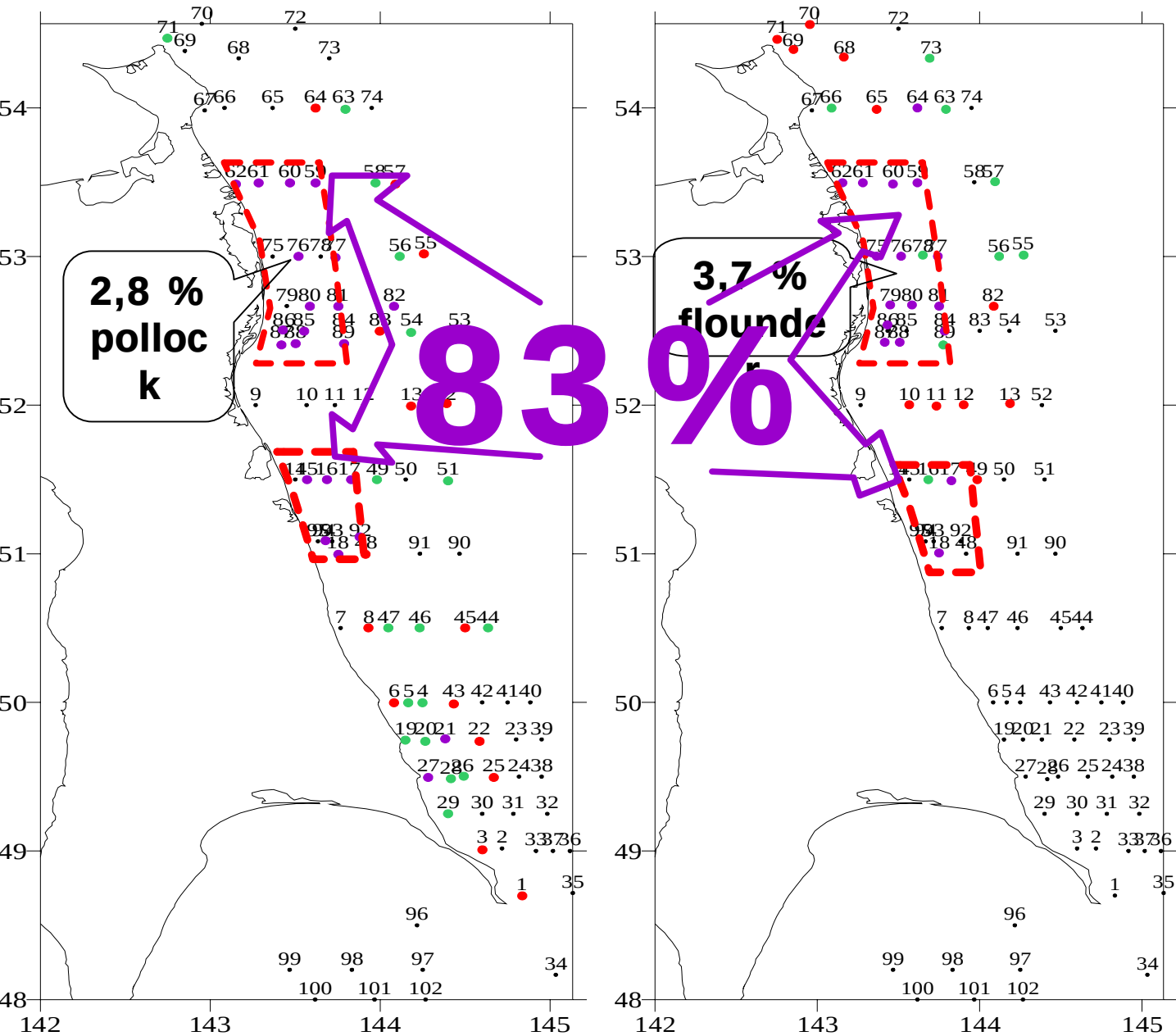
Every catch of **indicator species** was sorted to increase of share of normally developing eggs (without division on the different stages). Then we separated stations where this parameter was less than 10 % and called them – **unfavorable stations**

All data were put on the scheme of stations. Comparison of proportion eggs both species on the different stages along of shelf indicated that samples contained only 50 % (and less) live individuals were presented by eggs on first stages basically.





If high number of dead eggs in samples each species is consequence of influence a similar complex factors, areas with high rate of the dead eggs for both species should be coincide.

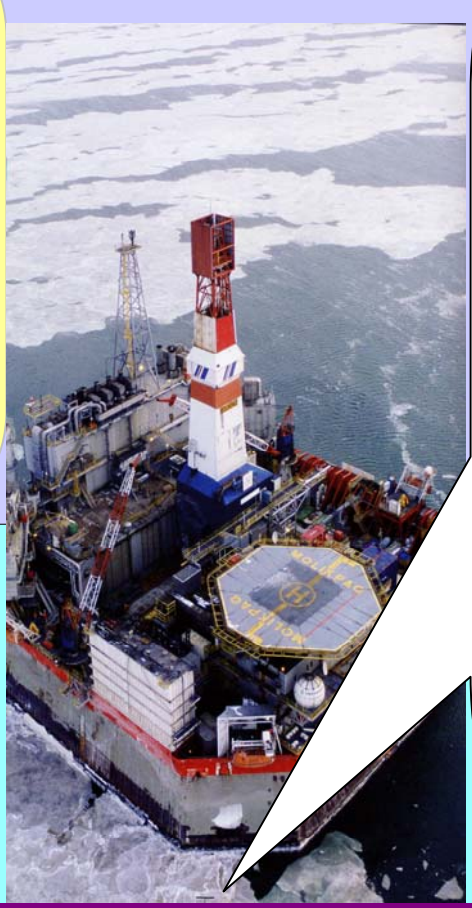


Then unfavorable stations were marked by outline. This “anomalous zones” were compared for number identical stations. As a result, 83% number of anomaly stations with share of dead eggs more 90% was similar for both species. Such high similarity of areas with high share of dead eggs yellow-fin sole and pollock can testify about common factors causing egg’s mortality. The share of normally developing eggs in “anomalous zones” was 2,8 % (for pollock) and 3,7 % (for flounder), although for all water area this parameter was higher in 10 times. We marked that samples with maximum number of "dead" eggs of both species were coincided with oil and gas deposits on the north and northeast shelf

Also on the shallow zone some oil hydrocarbons can be accumulating in appear layers of water.

Inborn impurity of on the eastern shelf of the Sakhalin Island determine relatively high level of concentration of metals in the different components of coastal ecosystems. For example, the average content of lead in surface water of northern and central part of the eastern shelf of the Sakhalin Island reached 2,7–3,3 mcg/l.

Eggs and larvae



During well drilling every stationary platform can become source of regular multi–component pollution. There are produced waters, components of drilling mud including barite, mineral oil, lubricating oils, heavy metals, emulsifier, biocide and other toxic elements.

Though we analyzed data only one year and received preliminary results but it is necessary to note that revealing of areas with low share of normally developing embryos at one or several species can be cause for regular ecological researches.

Thank you !

500 um