Introduction of Species into the Northwestern Sea of Japan

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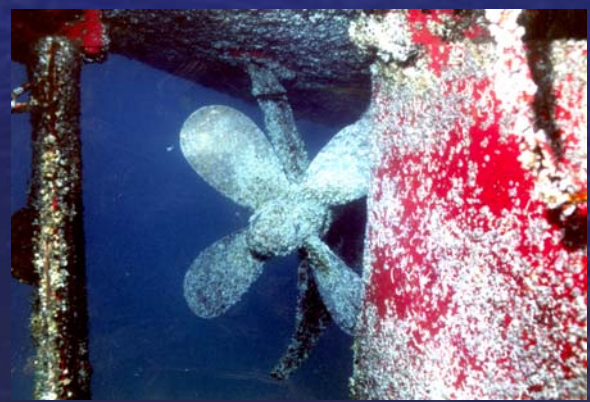
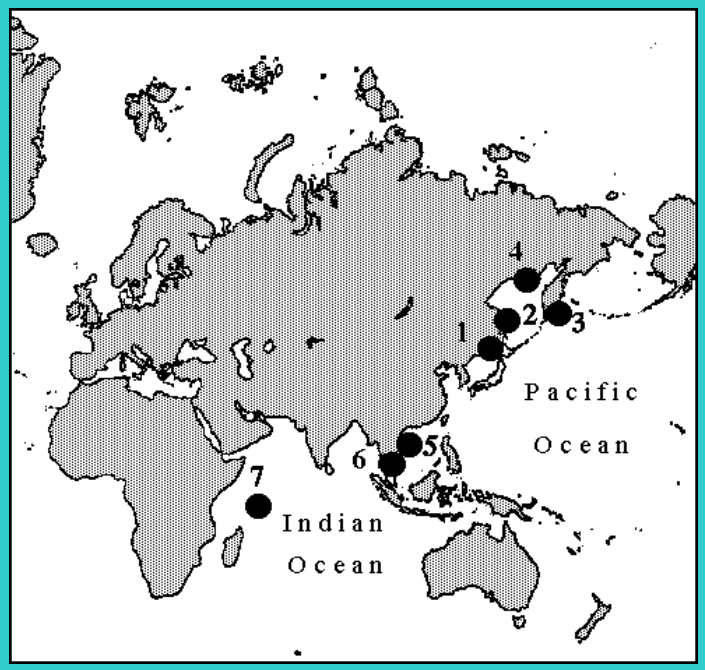
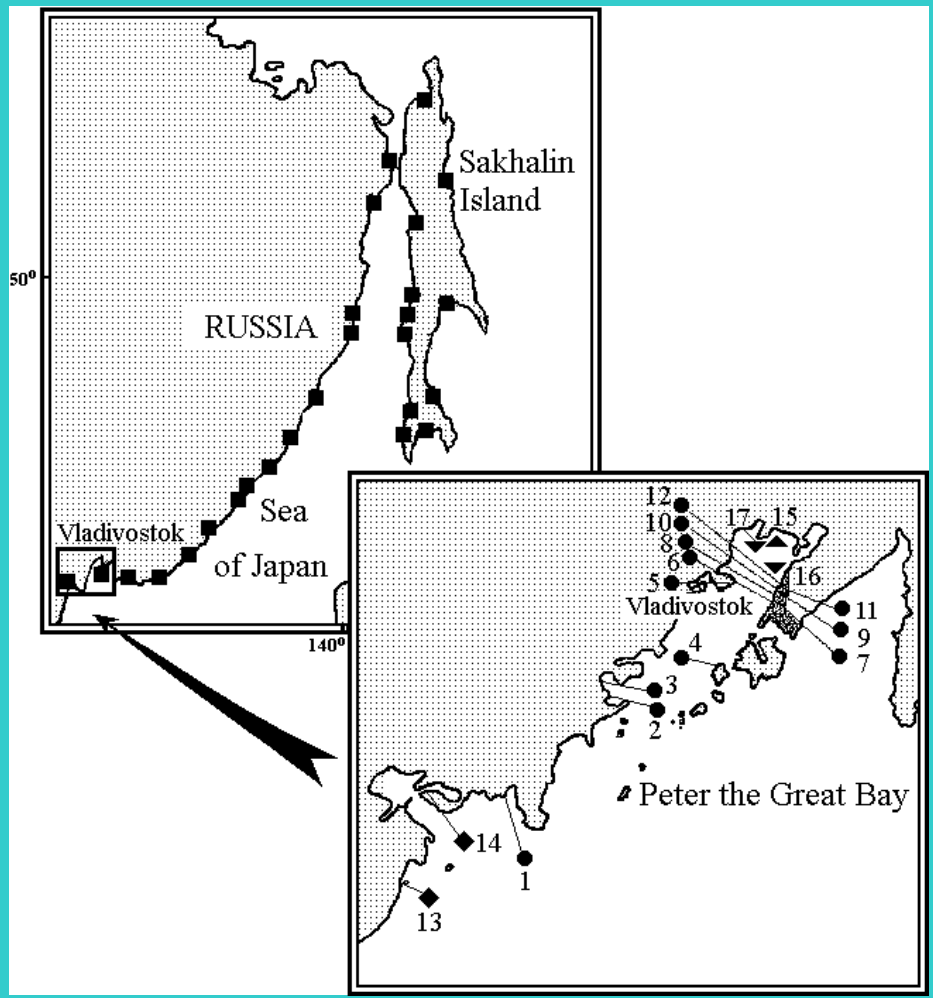




Schematic map of the area of fouling research conducted by the Institute of Marine Biology during 1975-2000

600 ships

300 hydrotechnical structures



Schematic map of the fouling research area during 2000-2005

Basic research methods

Using SCUBA-diving

Investigations in dry dock

Experimental plates

In cooling system TEPS-2

The material was identified by specialists of high qualification:

IMB FEB RAS (Vladivostok)

TINRO-center (Vladivostok)

FE University (Vladivostok)

Sankt-Peterburg University

ZIN RAS (Sankt-Peterburg)

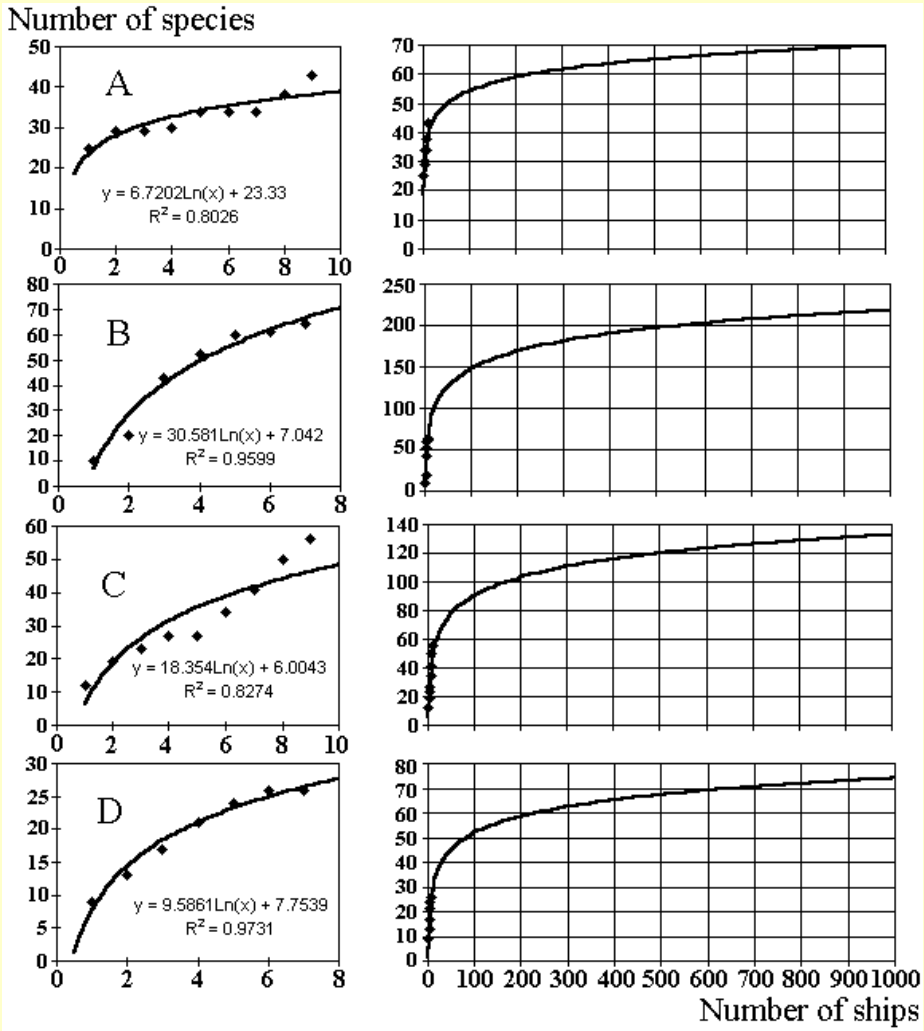
KIEP FEB RAS (Petropavlovsk-Kamchatsky)

Moscow University

IBUM (Sevastopol, Ukraine)

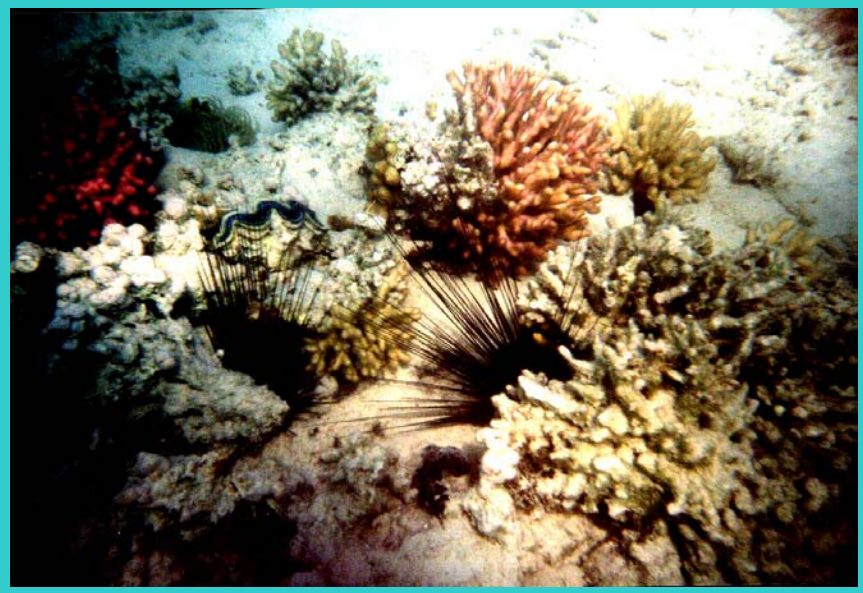
IMI NCNI (Nha Trang, Vietnam)

Our data



Prognosis for 1000 objects

Actual and theoretical variation of fouling species in fishing area: A – Ohotomorsky, North part, B - Yuzhno-Kurilsky, North part, C – Yuzhno-Kurilsky, South part, D - Yaponomorsky



Main features of an invader (Zevina et al., 1975):

1) wide distribution of this species in the current century;

2) its repeated occurrence in ports where foreign-going ships come;

3) occurrence of a species in a new place on coasting ships;

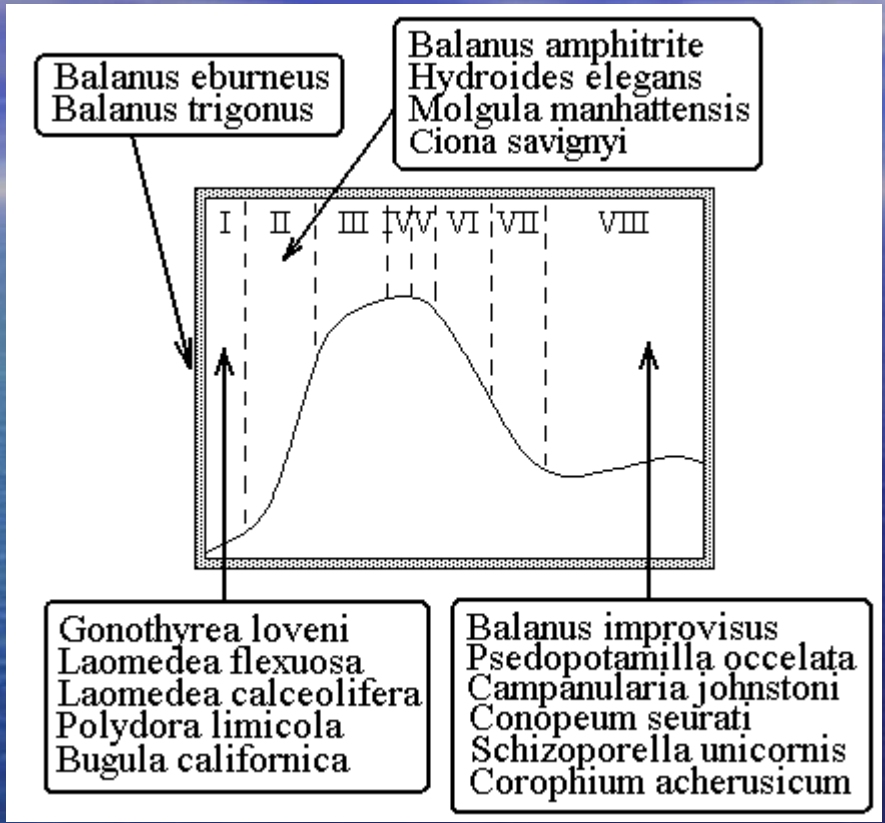
4) eurybiontness of a species.

The number of invaders found at GloBallast Programme Demonstration Sites during basic testing:

China – 4
India – 1
Iran – 1
RSA – 8 (4 new species)
Brazil – 1
Ukraine – 29 (19 new species)

RUSSIA (there is no demonstration sites) – 17

The moment of introduction; no development



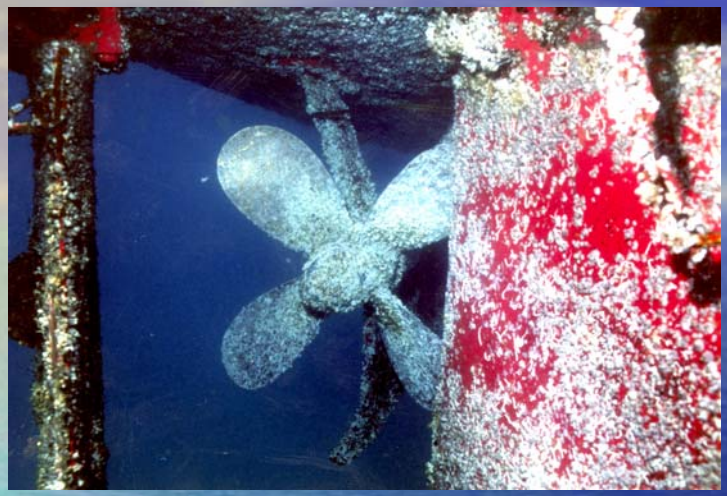
II stage of heavy reproduction

I phase of insignificant development

VIII stage of naturalization

Main groups of introduced species at different stages of acclimatization in Peter the Great Bay (the scheme shows hypothetical curve of quantitative development of invader in new natural habitat (by: Zenkevich, 1940).

Stages of Balanus improvisus naturalization

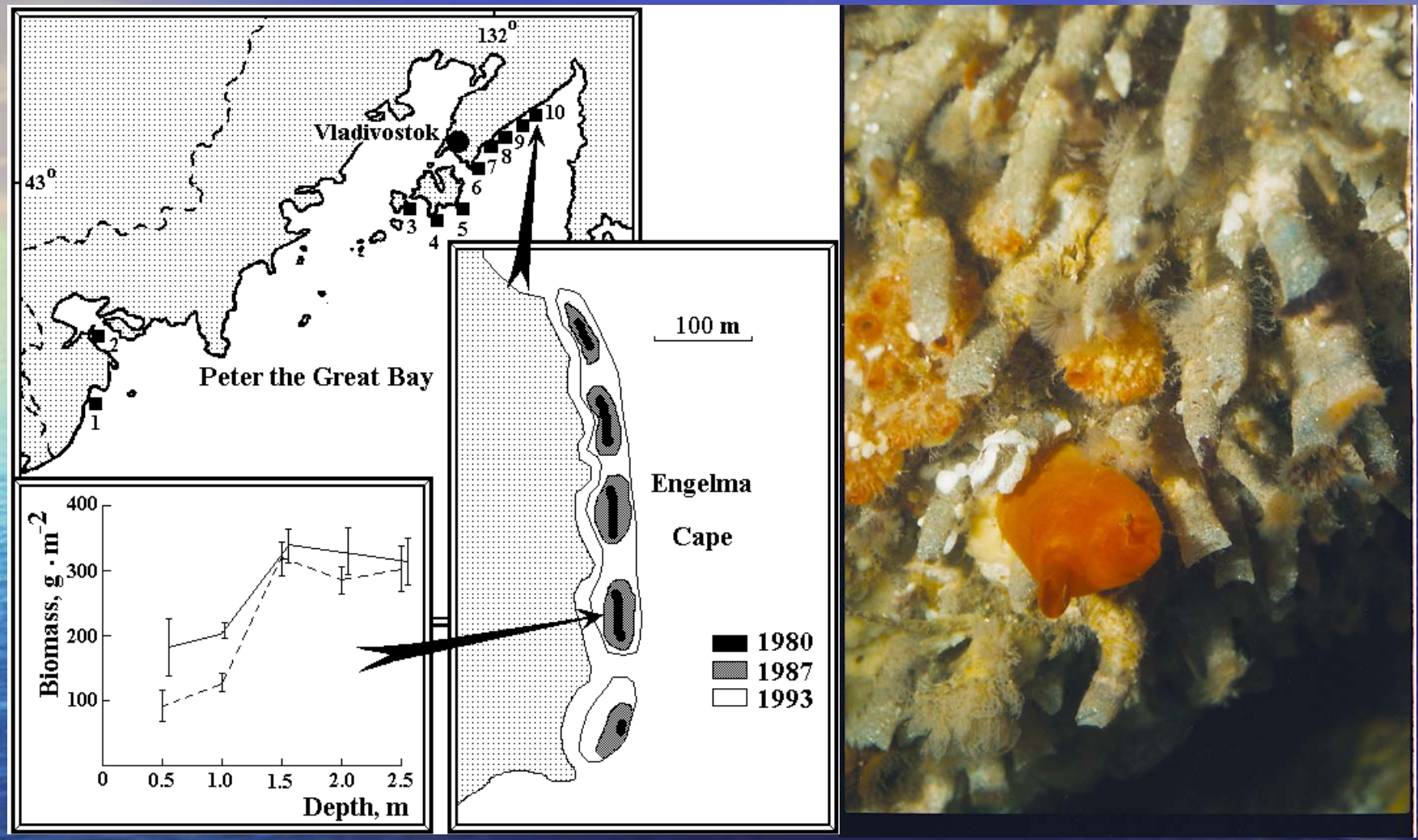


Fouling of ship
(antifouling cover!)

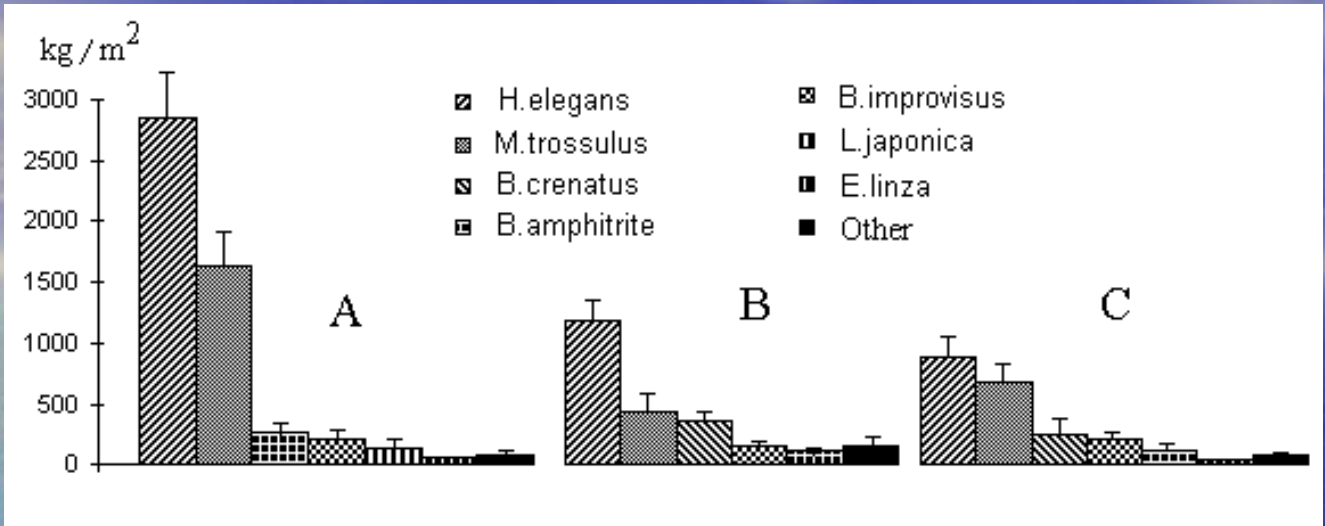
Epibiont of seagrass

Epibiont of laminaria

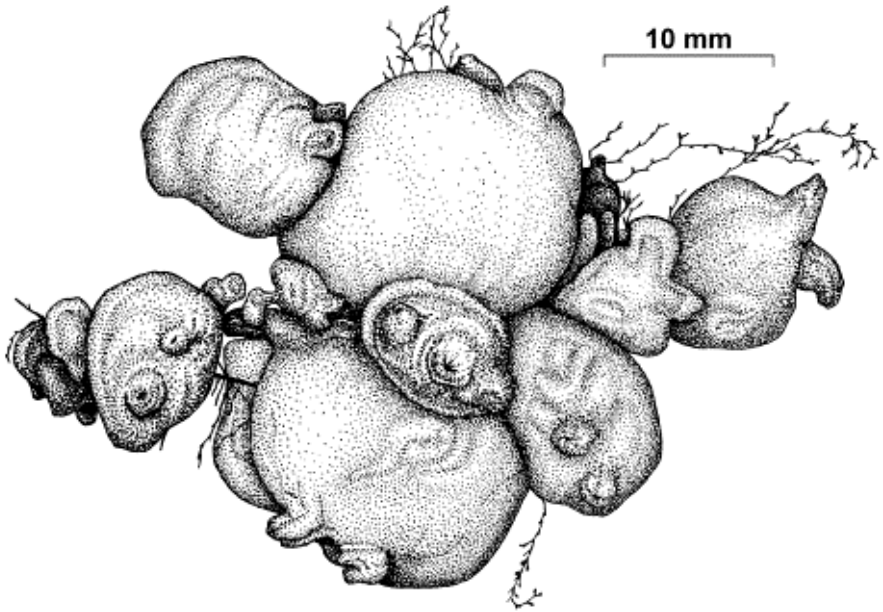
Benthos

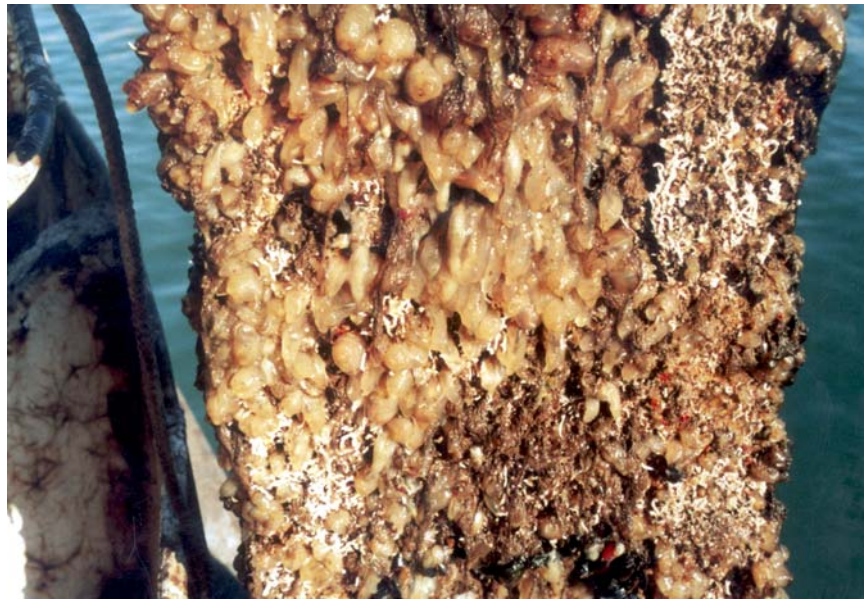


Process of naturalization of Pseudopotamilla occelata in Peter the Great Bay



Structure of Hydroides elegans community on coasters in Golden Horn Inlet. A - laid up ships; B - ships that spend 70% time in Golden Horn Inlet; C - ships that spend 20% time in Golden Horn Inlet.

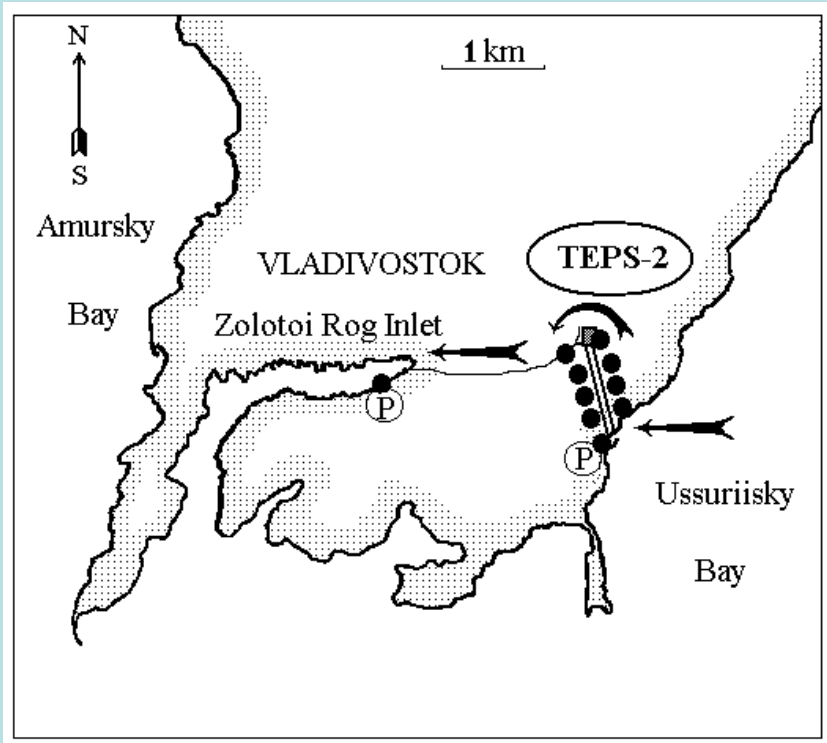




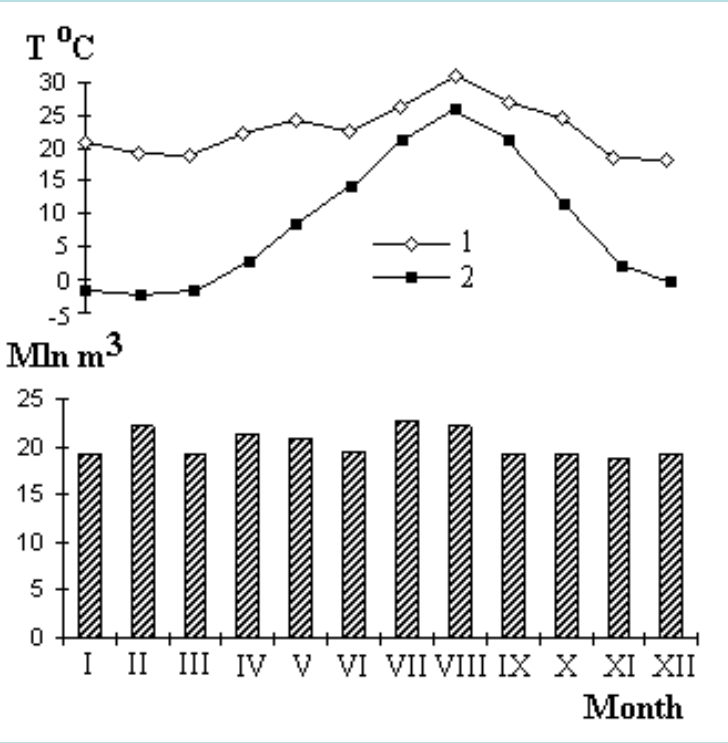
MOLGULA MANHATTENSIS (DE KAY, 1843), invader in Golden Horn Inlet

Danger for aquaculture!
Ciona intestinalis (in Canada)

Ciona savignyi is already in Peter the Great Bay



Schematic map of the fouling research at TEPS-2



Changes of water temperature and volume at the water discharge place after passing through the cooling system of TEPS-2 in Vladivostok in 1998: 1 - water temperature at the water discharge place, 2 - control temperature

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Invasion of Japanese shores by the NE Pacific barnacle *Balanus glandula* and its ecological and biogeographical impact

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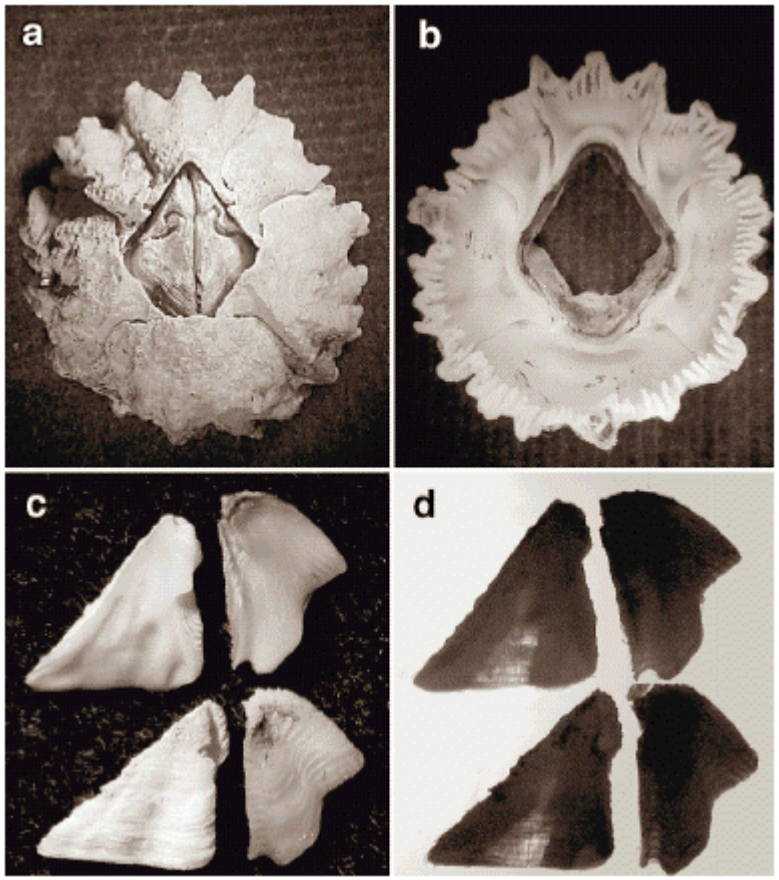

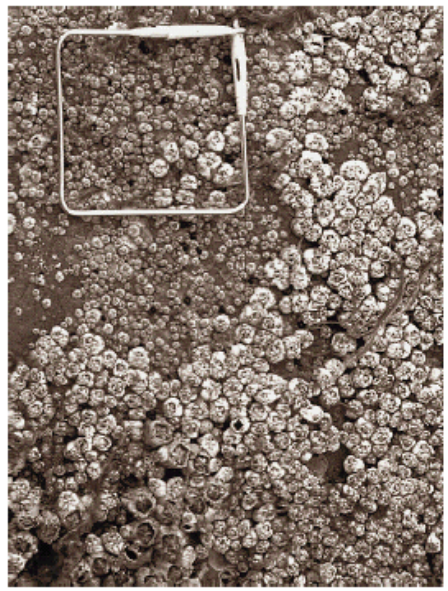

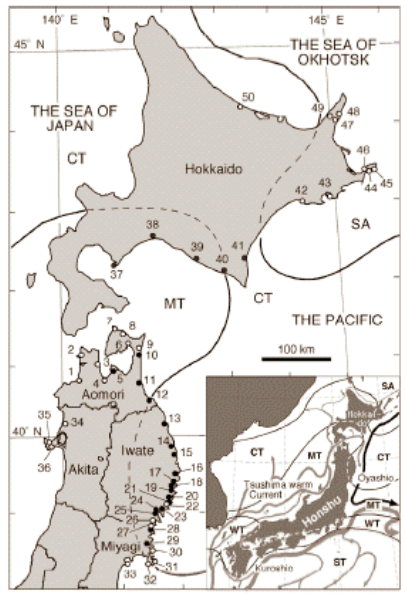

We are waiting for

Balanus glandula

in Peter the Great Bay

Conclusions:

1. The most important ecological problem of the present time is introduction of species. It is substantially caused by rapid development of navigation and transportation of exotic species by means of fouling and ballast water.

2. The demonstration sites of GloBallast Programme were organized in Brazil, India, Iran, China, Ukraine and Republic of South Africa. These sites are absent in Russia.

3. Examination of 600 ships of various operation modes in various regions of the World Ocean by the Institute of Marine Biology FEB RAS allowed us to reveal 17 species of invaders, introduced to the Northwestern part of the Sea of Japan by means of ship fouling and ballast water. It is necessary to continue the study of invaders in Peter the Great Bay.

4. The problem of introduction of exotic species by ship fouling is much more urgent than introduction of species by means of ballast water.

5. In case of allocation of oil terminal in Perevoznaya Bight (Peter the Great Bay) the problem of introduction of exotic species by means of ballast water and tankers fouling will inevitably arise.

Thank you!