Diarrhetic shellfish toxins in Primorye, Russian Federation

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Introduction

Shellfish toxins including DSTs have an enormous economic and health impact in APEC countries but are not currently regulated or monitored in Russia. The rapidly expanding mariculture and recreational zones along the coast of Primorye demonstrates the necessity of monitoring for toxin producing algae and seafood contamination by phycotoxins, especially for diarrhetic shellfish toxins (DSTs).

Material and methods

During **2008-2010** monitoring of DSTs various mollusks in Peter the Great Bay were collected.

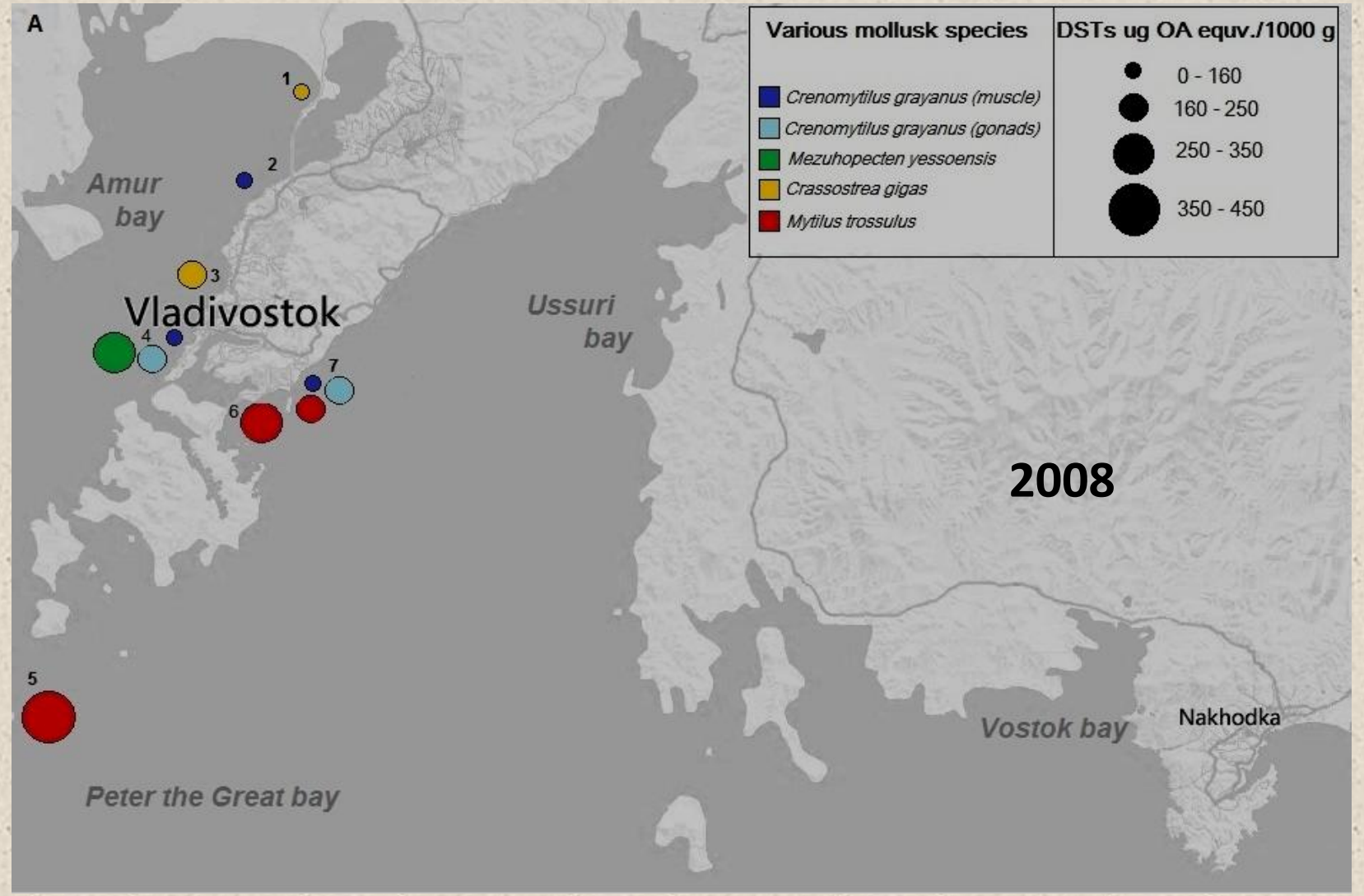
The total of **144** samples of *Crenomytilus grayanus* were collected at the monitoring station in Amur bay ($131^0$47’23”/$43^0$10’33”) during the period **from July 2011 till September 2012**. The shellfish was opened by cutting the abductor mussel and rinsed inside with distilled water. Digestive glands of mussels collected on the same date were combined and frozen at -20°C prior the extraction.

The total of **105** samples of *Crenomytilus grayanus* were collected in the Peter the Great Bay during the *Dinophysis acuminata* outbreak at **July 2012**. There were 3 stations 3 sites in Ussury Bay, 3 sites in Amur Bay, 4 sites near Russian Island, 3 sites near Popov Island, 2 sites near Reineke Island and 1 site near Rikorda Island. The shellfish was opened by cutting the abductor mussel and rinsed inside with distilled water. Digestive glands of mussels collected at the same place on the same date were combined and frozen at -20°C prior the extraction.

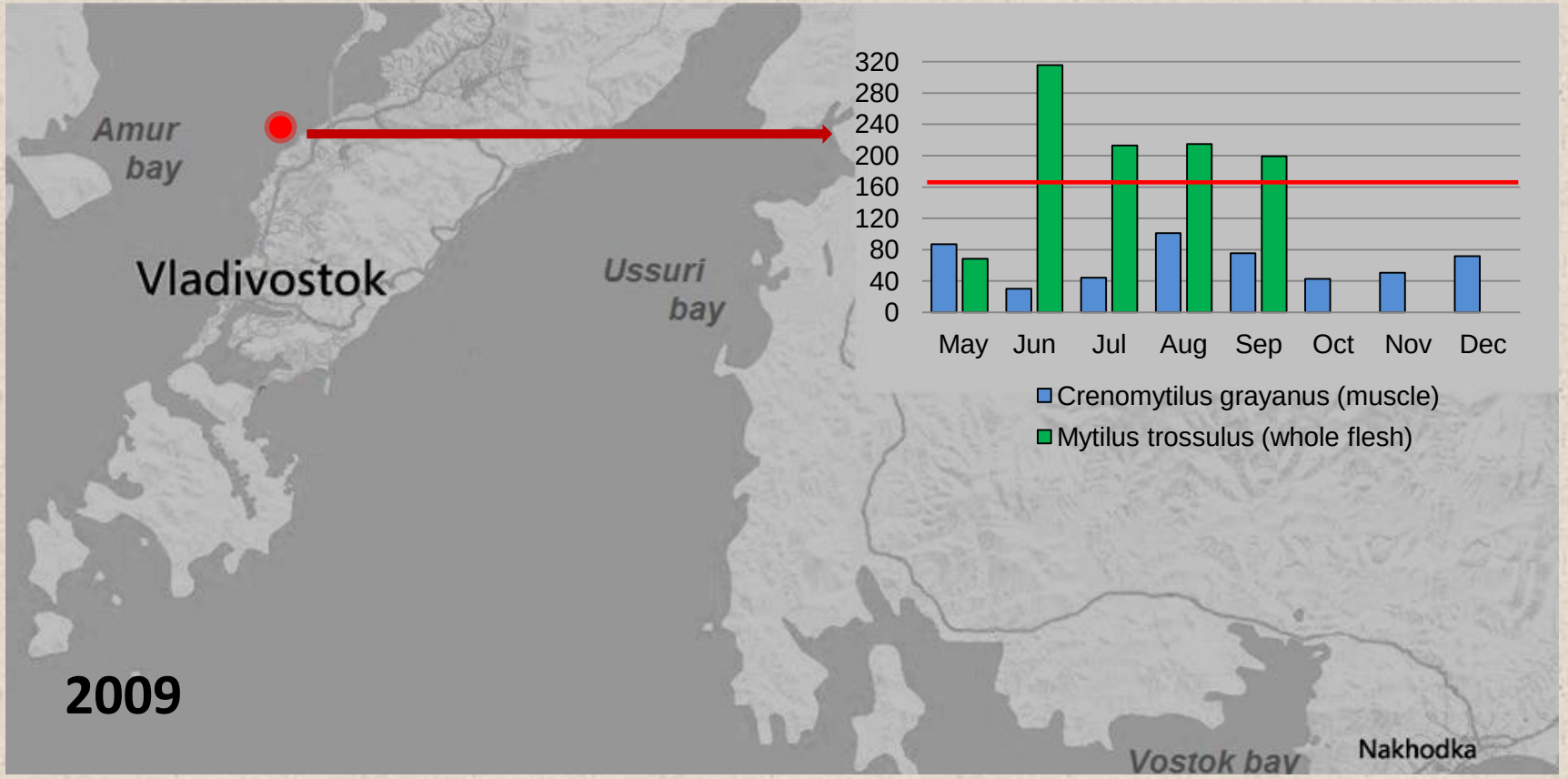
For determination of total DSP content in digestive gland of *Crenomytilus grayanus* the Okadaic acid ELISA kit of Abraxis was used.

DSTs were detected by liquid chromatography tandem mass spectrometry (LC-MS/MS) by NOAA

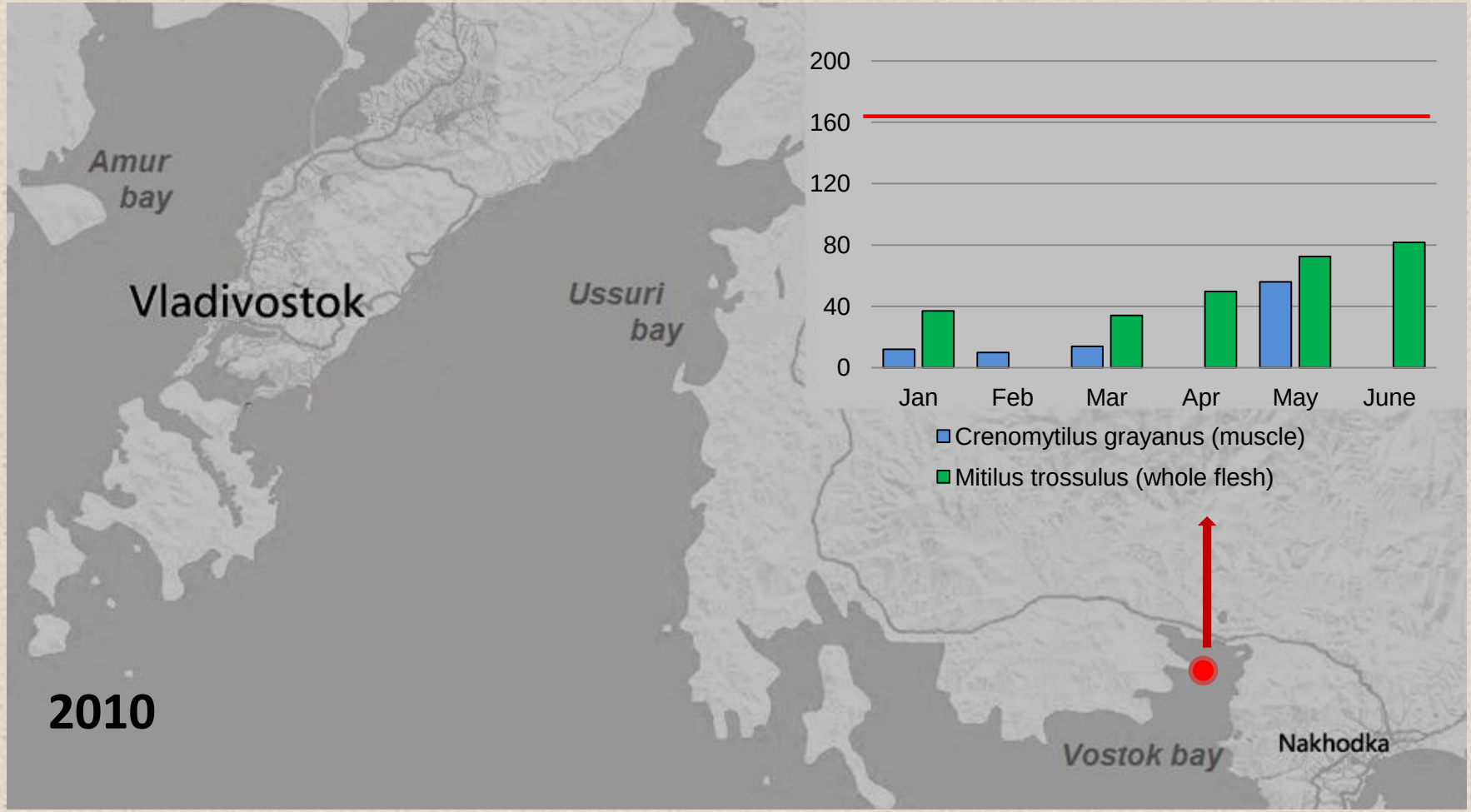
- 2008-2010 - monitoring of DSTs in Amurskii Bay and Vostok Bay
- These aquatic areas were selected for the monitoring due to following reasons: highly used for mariculture and recreation purposes, these areas provide different water exchange conditions, the microalgae profile of these areas is different.



DSTs in different mollusks in µg/kg during 2008.

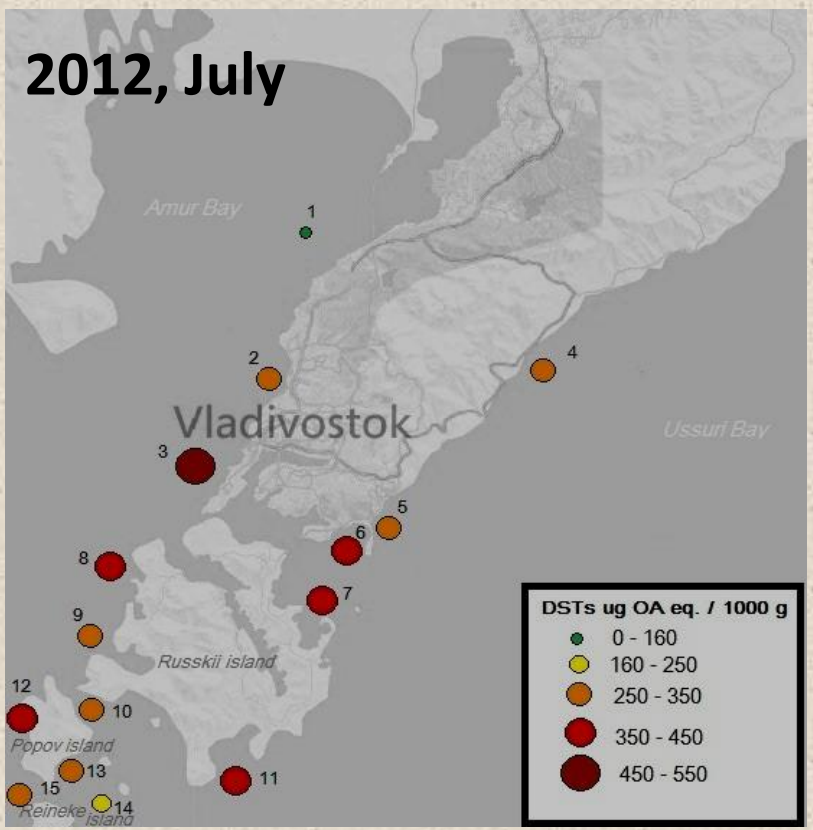


In 2009 the monitoring was focused on IMB monitoring station and two types of mollusks *Mytilus trossulus* and *Crenomytilus grayanus* were collected. The results shows that in muscle of *C. grayanus* the concentration of DSTs never reached the guidance level .



In 2010 the same strategy of monitoring was applied to Vostok Bay. The concentration of DSTs in *Crenomytilus grayanus* didn't exceeded the guidance level.

The concentration of toxins in *Mytilus trossulus* was also low and didn't grow significantly in June 2010



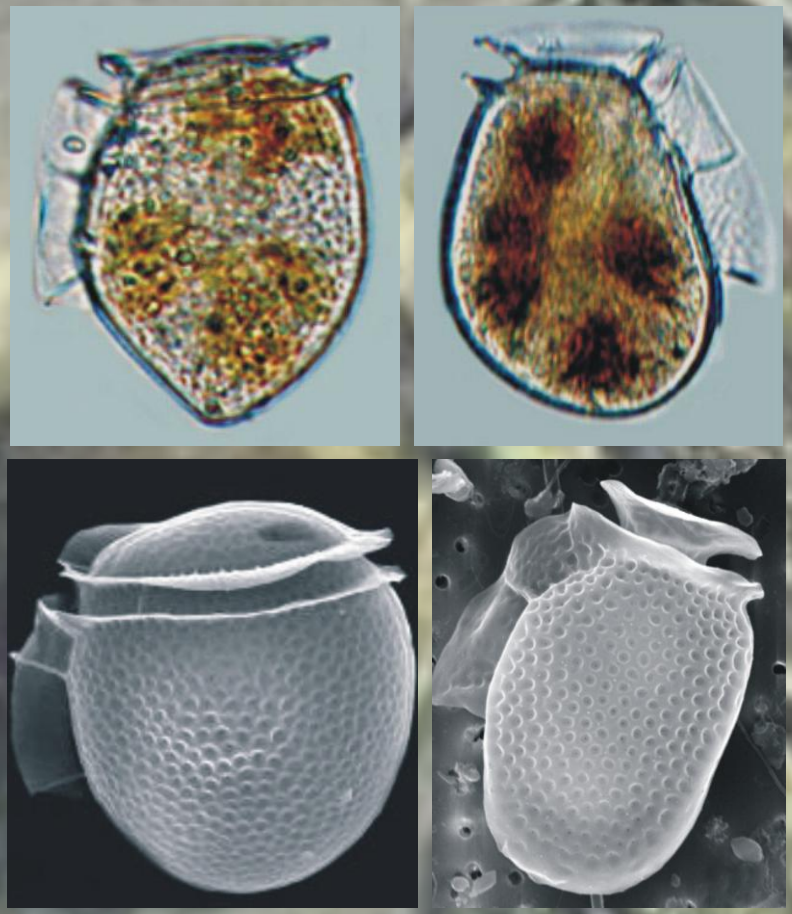
The samples of *Crenomytilus grayanus* were taken during the period of relatively high *Dinophyisis* presence in July 2012. Peter the Great Bay has different locations that can be characterized as open water locations and separated locations between islands. Stations were planned in order to cover all specific characteristics of Peter the Great Bay.

Analysis of stations near the islands showed that the highest concentrations of DSTs were observed in areas that have access to open water such as stations 6,7,8,11,12. The excess of guidance level was in 3 times. The stations that were situated between islands can be characterized with lower level of DSTs in mollusks tissue – excess in 2 times on stations 2,4,5,9,10,13,18.

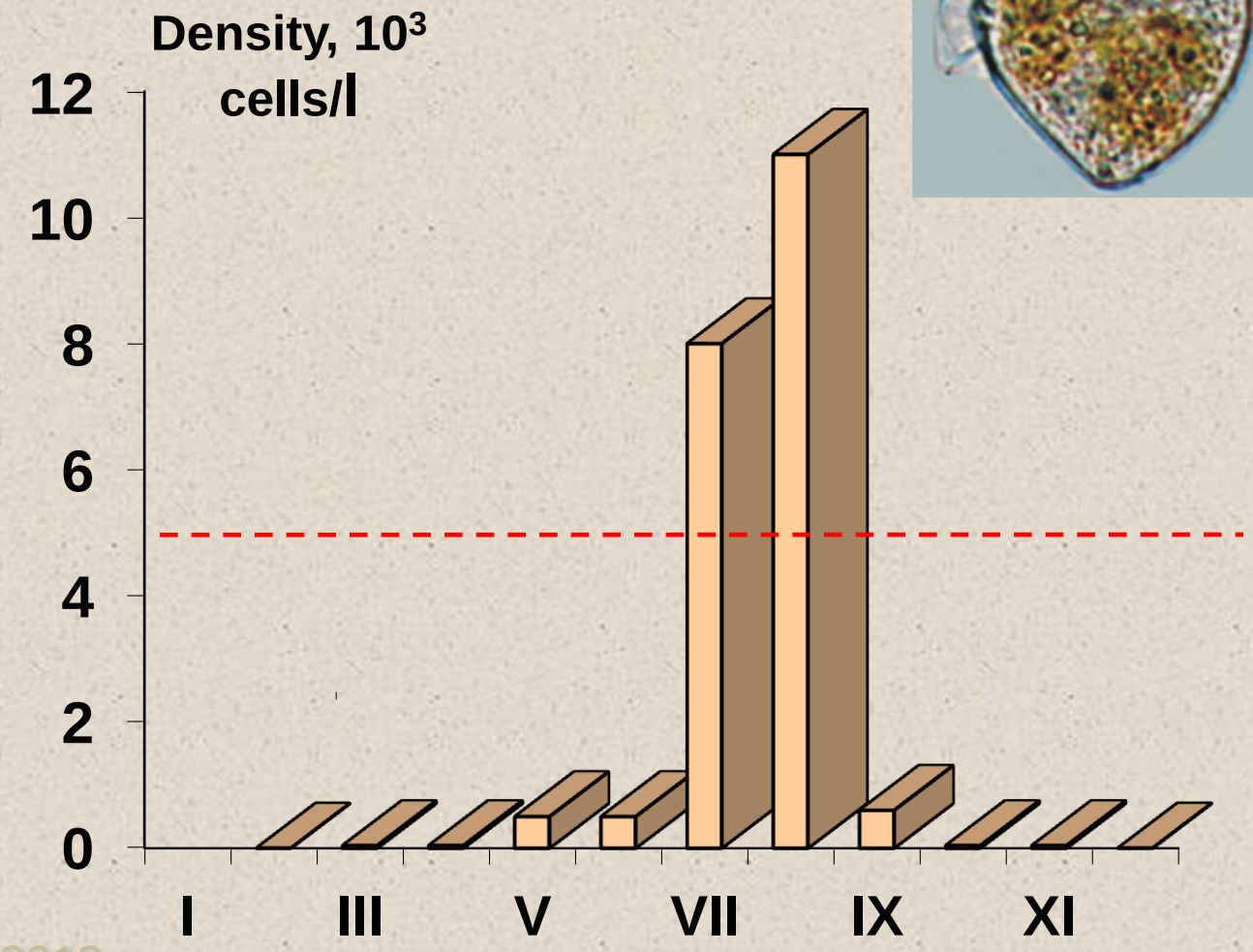
- Routine monitoring of phytoplankton carried out since 1997 showed that the species of the genus *Dinophysis* which are known as producers of DSTs is common and abundant in the coastal waters of Primorye. Concentration of *Dinophysis* spp. in the summer-autumn period can exceed the reportedly harmful level at which many countries prohibit production and marketing of shellfish, as their use may be associated with diarrhetic shellfish poisoning (DSP).

Dinophysis from Russian waters

- *D. acuminata*
- *D. acuta*
- *D. caudata*
- *D. infundibula*
- *D. fortii*
- *D. norvegica*
- *D. ovum*
- *D. rotundata*
- *D. sacculus*



Seasonal dynamic of *Dinophysis* spp. in Peter the Great Bay



Conclusion

- The analysis of DSTs in mussels from various areas of Primorye showed the excess of DSTs in almost all sites with the maximum of 56.3 µg/100 g.
- These data demonstrated the necessity of governmental monitoring of diarrhetic shellfish toxins (DSTs) in Primorye for the protection of human health.

Thank you for attention!