

# Scales of influencing of building of navigable channel on Bistroe arm in Ukrainian part of Danube delta on water ecosystem (marine part)

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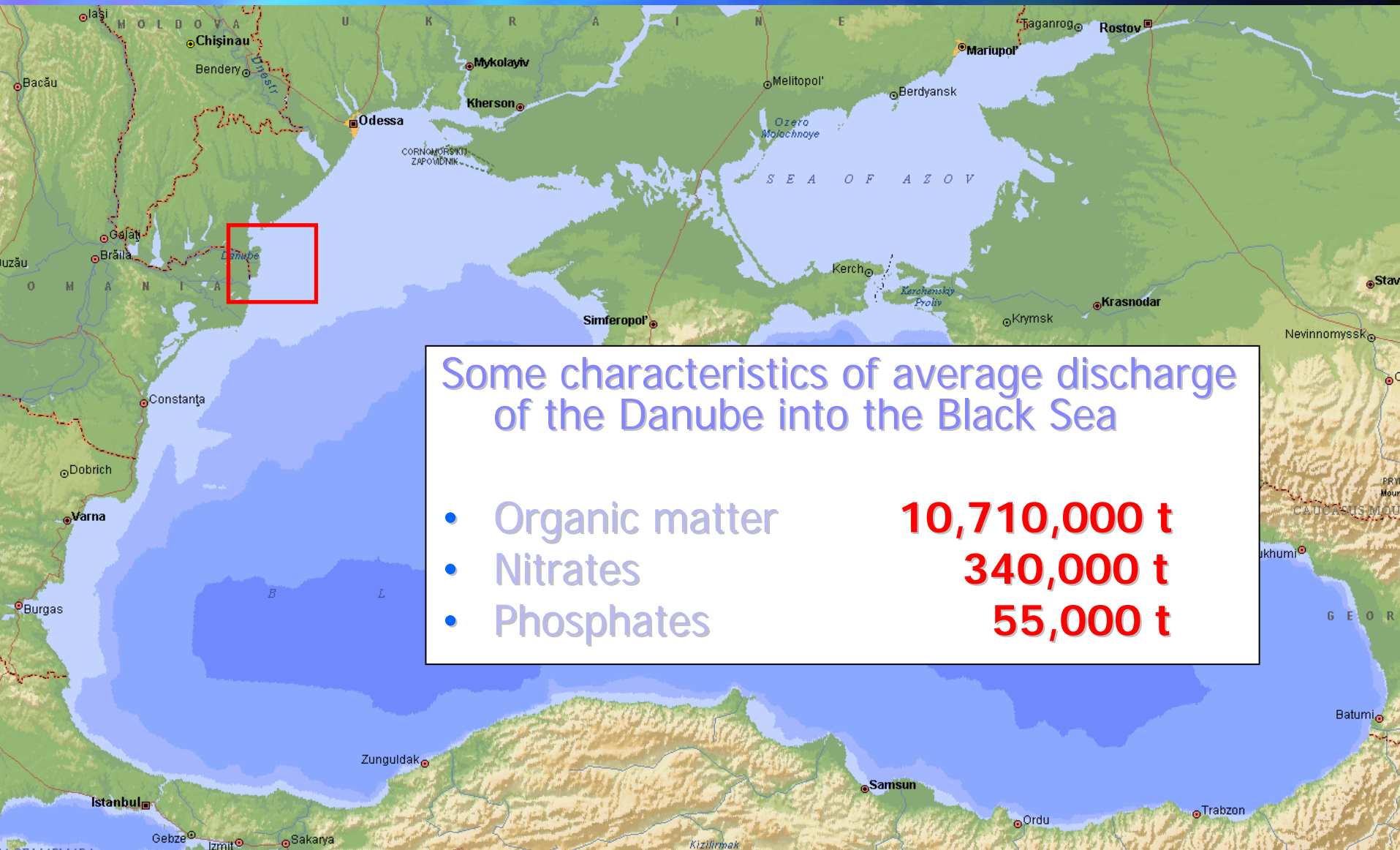




# **Influence of navigation on ecological safety**



# Investigated area



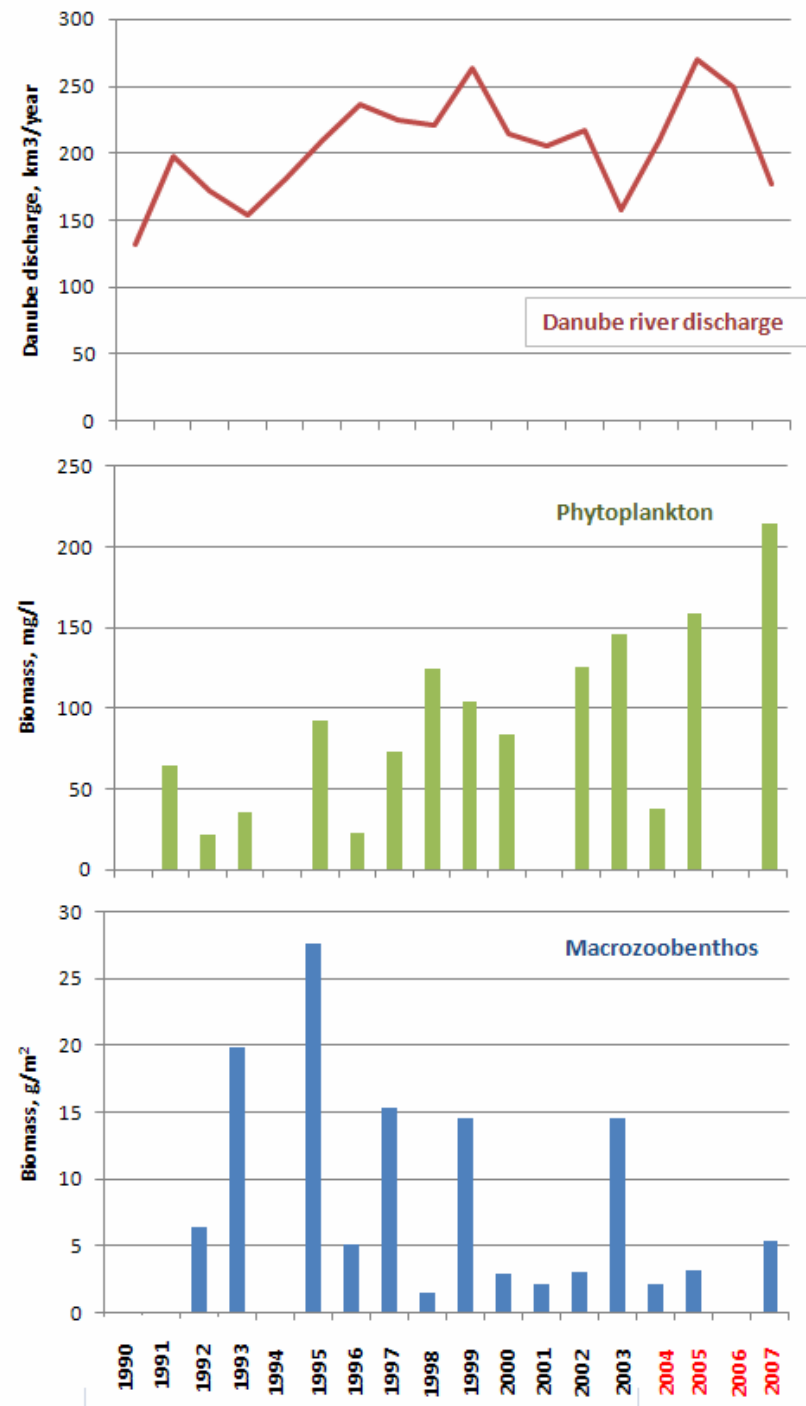
## Some characteristics of average discharge of the Danube into the Black Sea

- Organic matter **10,710,000 t**
- Nitrates **340,000 t**
- Phosphates **55,000 t**

# Dependence of pelagic and benthic communities in Ukrainian part of the Danube avandelta

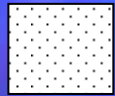
## Long-term trends:

- ✓ Increasing Danube discharge
- ✓ Increasing phytoplankton biomass
- ✓ Decreasing zoobenthos biomass



# Distribution of meiobenthos number in front of Ukrainian part of the Danube Delta

Number,  $10^3 \text{ ind/m}^2$



13-100



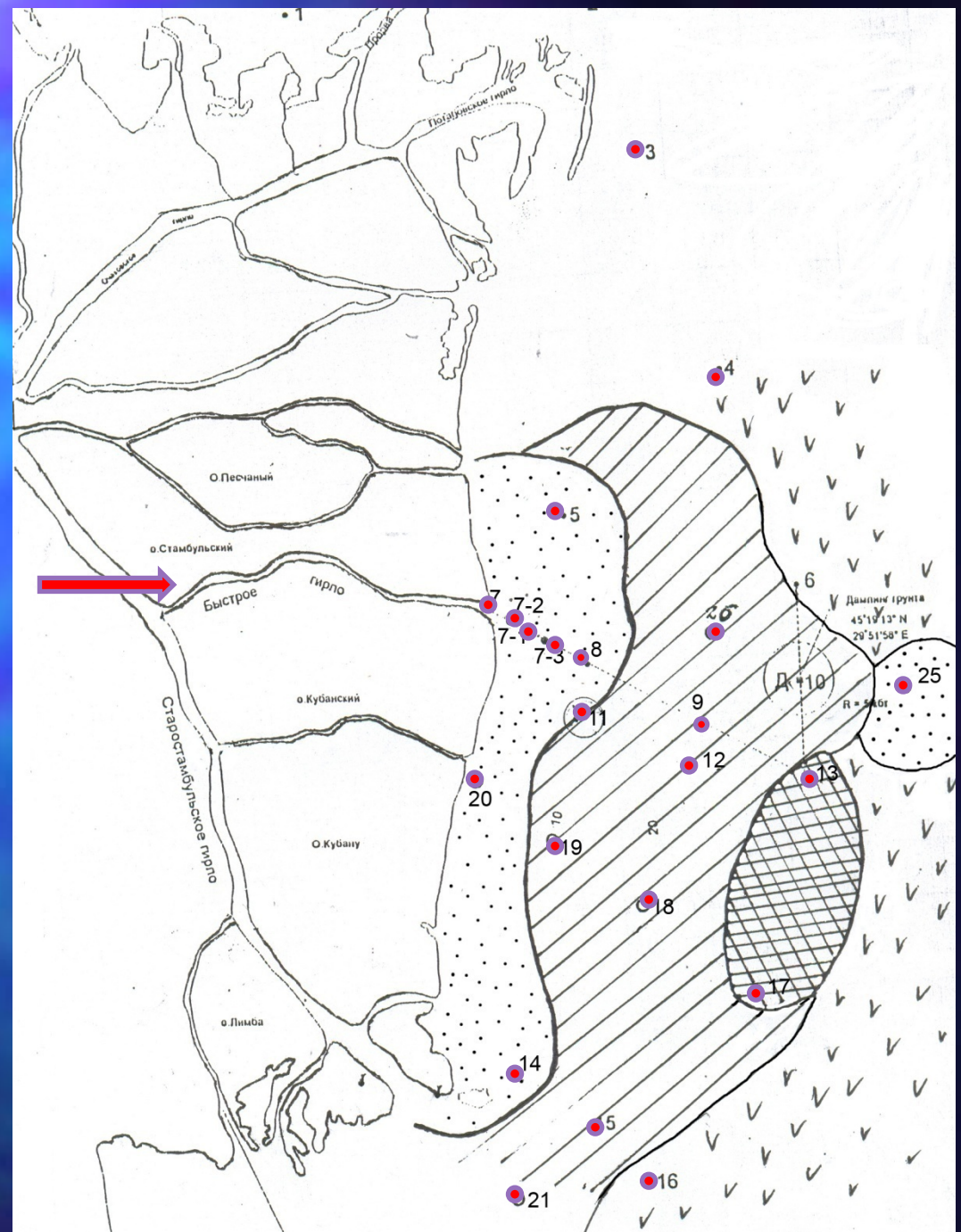
101-105



151-400



401-1000





Cline of the sea water penetrate into the Delta  
near the bottom up to 3 (max 16,8) km

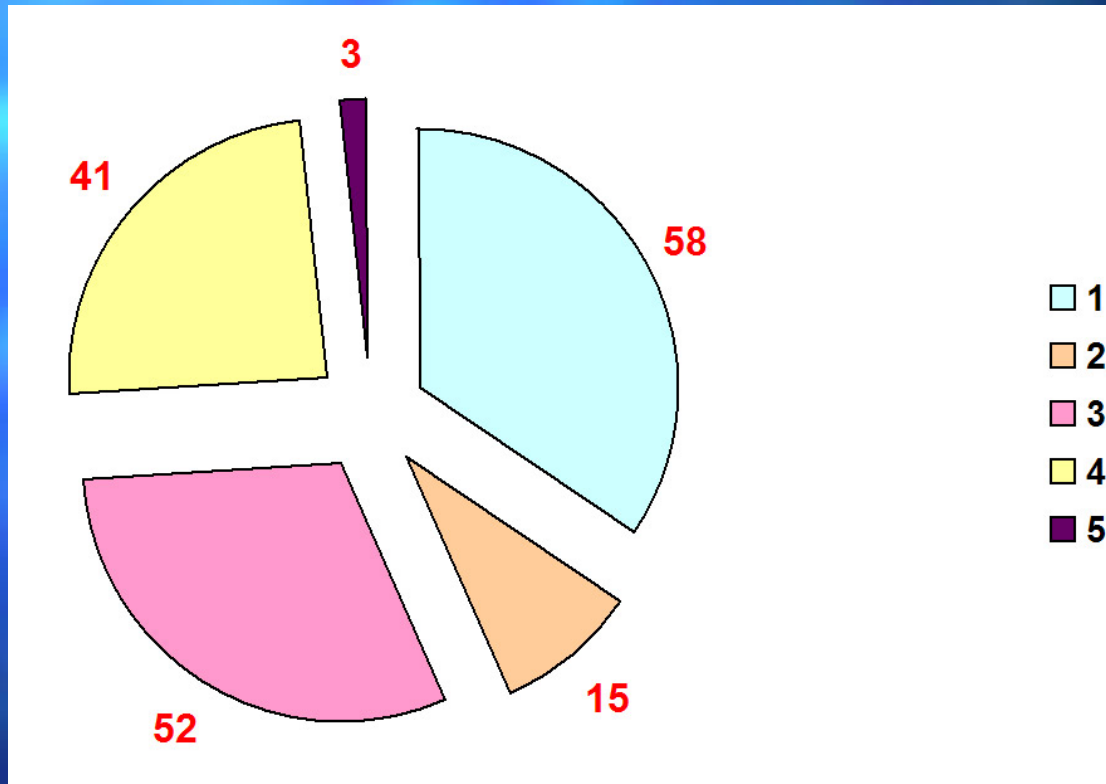
### Consequences:

- Mass mortality of fresh water zoobenthos.
- Death of the fresh water fishes during wintering on deepest zones of the Delta.



**Introduce species**

On the base of analyses of 162 references there are 240 introduce aquatic species in Ukraine (169 distant aliens and 71 neighboring aliens)



Ratio of life forms of distant alien species (biological composition of distant alien species of Ukrainian aquatic ecosystems): 1 – Plankton, 2 – Fouling, 3 – Benthos, 4 – Nekton, 5 – Parasites



# Number of species that were registered near the Ukrainian part of the Danube delta

Group of organisms	Number of the species
Algae	17
Higher plants	2
Invertebrates	18
Fish	4
<b>TOTALY</b>	<b>41</b>



**Rainbow comb jelly, *Mnemiopsis leidyi***

**Aggressive species**



**Sunfish, *Lepomis gibbosus***

# Introduced species that are mass in present time



**Soft-shelled clam, *Mya arenaria***

Average number 132 ind·m<sup>-2</sup>, biomass 24,6 g·m<sup>-2</sup>

*M. arenaria* is the reason of essential degradation of community of native species (small bivalve molluscs *Lentidium mediterraneum*). Total area of this community decrease in 4-5 time. *L. mediterraneum* is an important forage resources of **35 fish species**.



**Clam, *Anadara inaequalis***

Average number 86 ind·m<sup>-2</sup>, biomass 92,6 g·m<sup>-2</sup>

# Conclusion

- In comparison with large-scale impact of Danube influence of building of channel is carried by local character on marine ecosystem.
- Near Ukrainian part of the Danube Delta was registered 41 alien species (1/6 species that founded in Ukrainian waters); this fact confirm the necessity of monitoring of invasive species, assessment of their possible impact on native populations and communities.



# Thank you for attention

