MSFD GUIDING IMPROVEMENTS IN THE BLACK SEA
INTEGRATED MONITORING SYSTEM (MISIS)

DESCRIPTOR 2: NON-INDIGENOUS SPECIES

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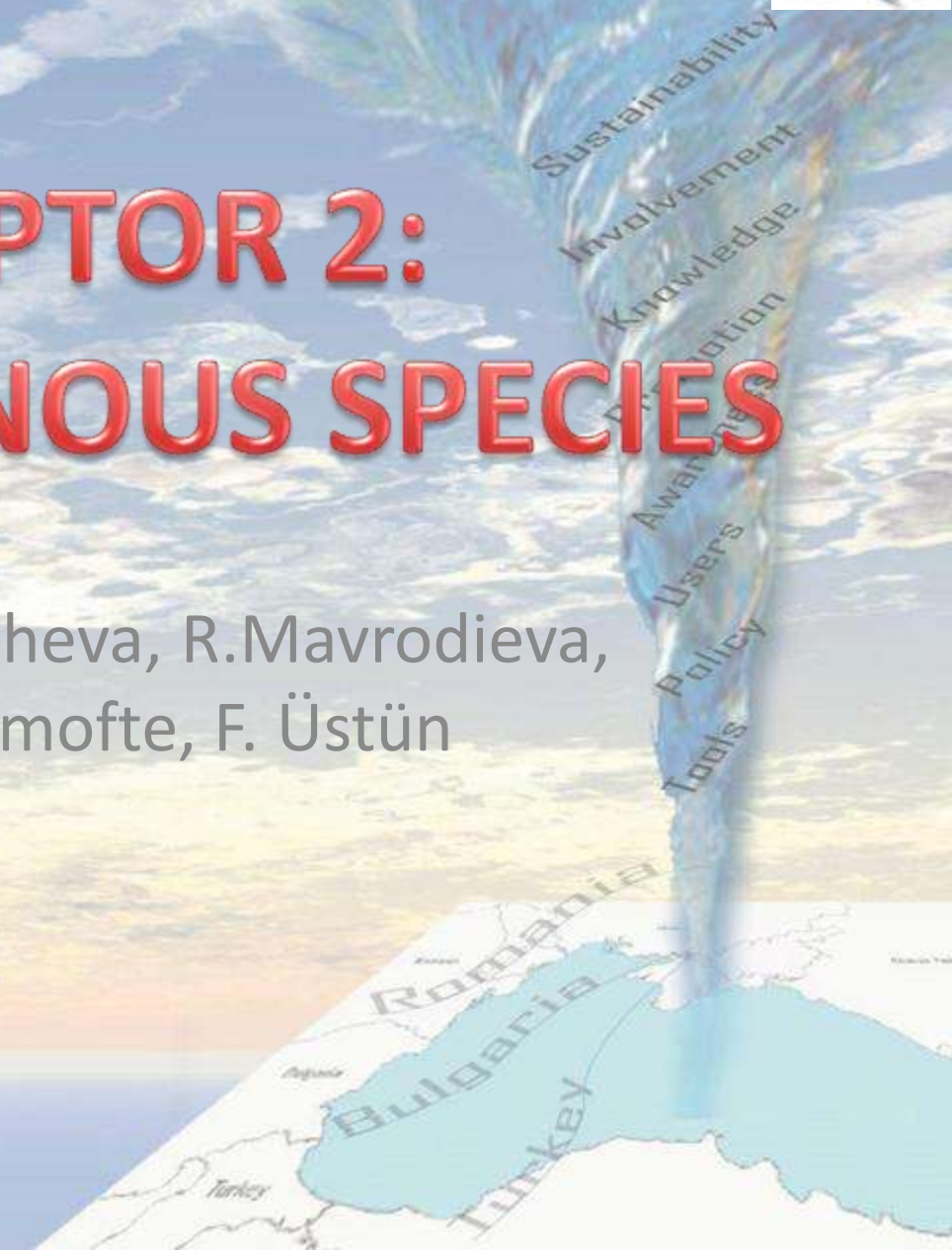


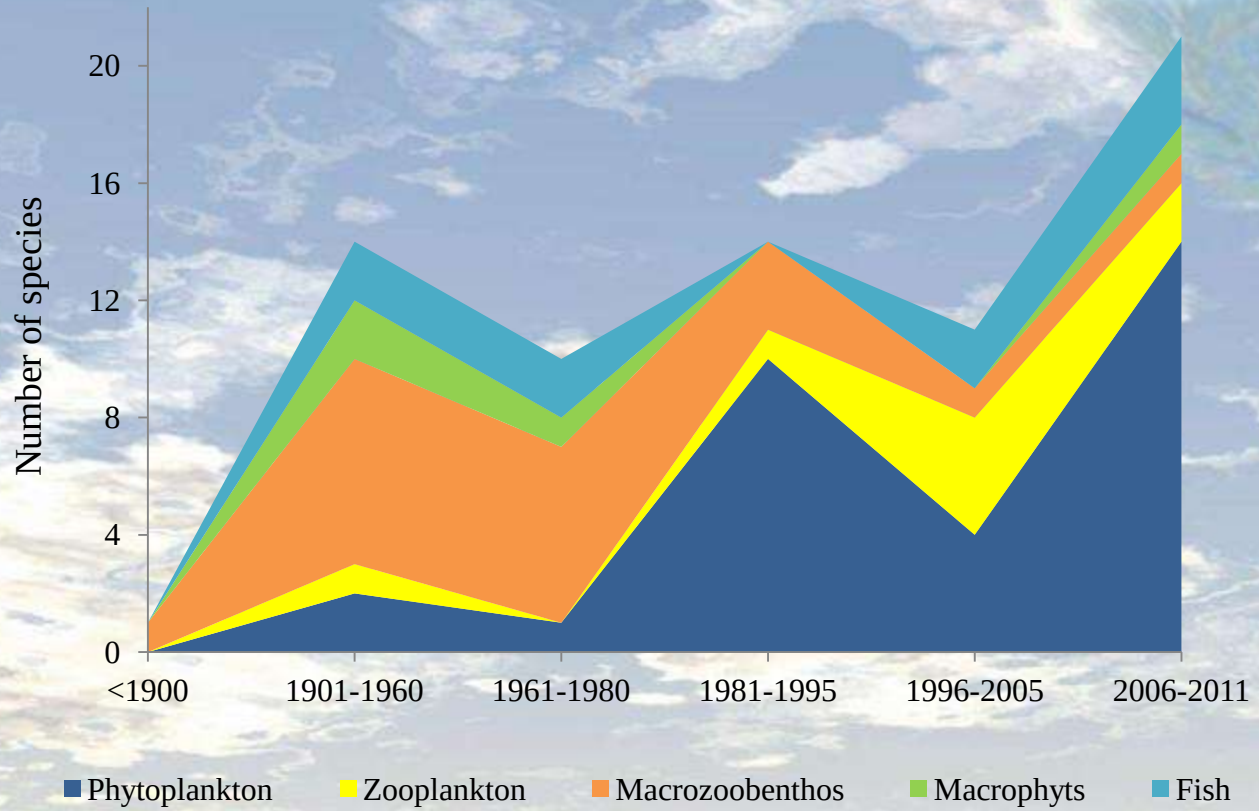
MISIS Project Workshop – Final meeting 24-26th, 2014,
Danube Delta, Romania

Background

- The introduction of non-native species respectively invasive species in marine waters is among the four highest risks for the marine environment

- Invaders induced considerable changes in the structure and dynamics of marine ecosystems and the food web by outcompeting original inhabitants, have striking impacts on the proportions of native species and the ecosystem resilience and health

- Once a marine organism has been introduced to its new environment, it is nearly impossible to eradicate the unwanted organism, if it has established to the area. The presence of NIS in itself indicates some degree of deviation from the pristine ecological status.



Sustainability
Involvement
Knowledge
Promotion
Awareness
Users
Policy
Tools

❑ As many as 217 introduced species have been recorded in the Black Sea until 2006, only in the decade 1996-2005 a total of 48 non-indigenous species were listed, the most numerous in the plankton community: phytoplankton (16) and zooplankton (8) (TDA, 2007). During 2006-2011 a total of 21 new alien species were registered along the Bulgarian coast, 14 phytoplankton (cysts are not included), two zooplankton, one zoobenthic, three fish and one macrophyts (Initial Assessment Report of Bulgaria, 2013)

❑ Nearly 10 % of the established alien species in the Black Sea are considered to be highly invasive and 16 % as moderately invasive.

❑ Two highly invasive as *Rapana ven*osa and *Mnemiopsis leid*yi have become central to the Black Sea with their notorious detrimental effect on the ecosystem. Besides the negative effect, Rapana becomes economically important in Bulgaria, contributing around 50% of the total catch, and constituting about 50% of export of marine and freshwater organisms and products. This economic importance must be taken into account in the formulation of GES, since the elimination of Rapana population is economically undesirable. Still a question stays whether *R.venosa* population should be managed applying the same principles of sustainable exploitation of native species with levels of quotas, size limits and etc.

Photos: *L. Klisurov*

Marine Strategy Framework Directive

GES: Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems

Criteria:

2.1.1 *Trends in abundance, temporal occurrence and spatial distribution in the wild of non-indigenous species, particularly invasive non indigenous species, notably in risk areas, in relation to the main vectors and pathways of spreading of such species*

2.2.1 *Ratio between invasive non-indigenous species and native species in some well-studied taxonomic groups (e.g. fish, macroalgae, molluscs) that may provide a measure of change in species composition (e.g. further to the displacement of native species)*

2.2.2 *Impacts of non-indigenous invasive species at the level of species, habitats and ecosystem, where feasible*

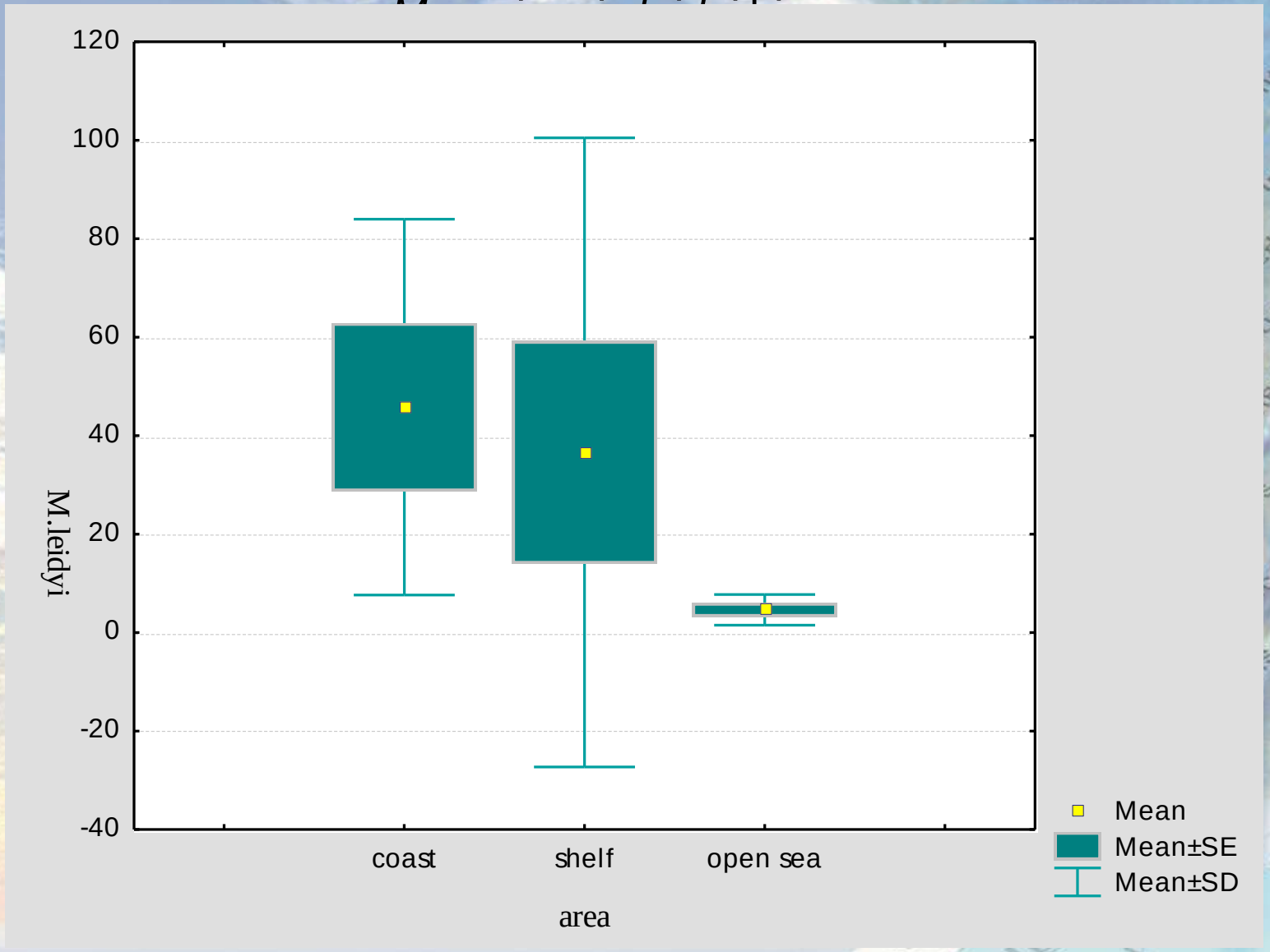
Indicators

Mnemiopsis leidyi biomass [g.m^{-3}] (to criteria 2.1.1) - threshold 4 g.m^{-3} or 120 g.m^{-2} (Vinogradov et al, 2005)

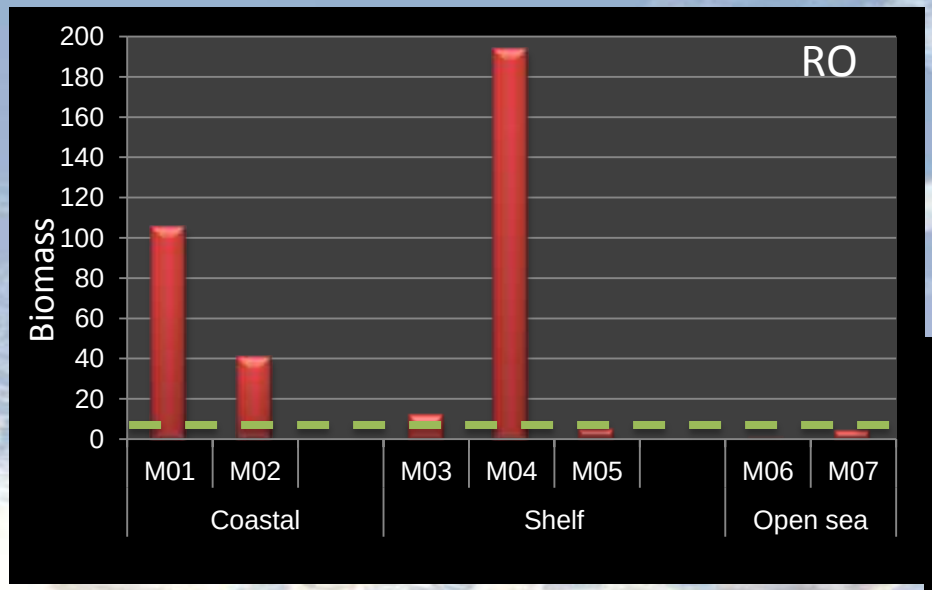
Stable decreasing trend of *M.leidyi* biomass with lower value than threshold (to criteria 2.1.1)

Ratio between non-native species and native species (to criteria 2.2.1) – threshold 10% (expert judgement)

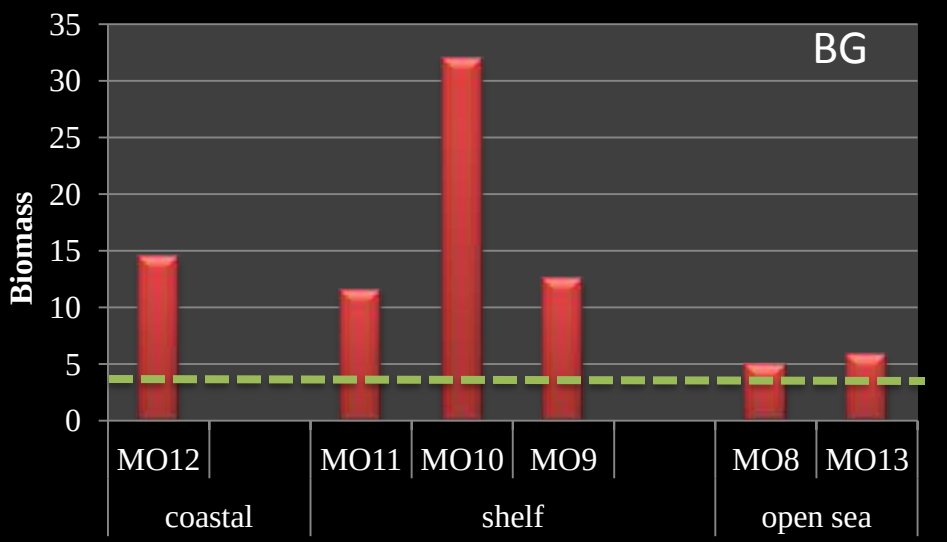
Joint cruise survey

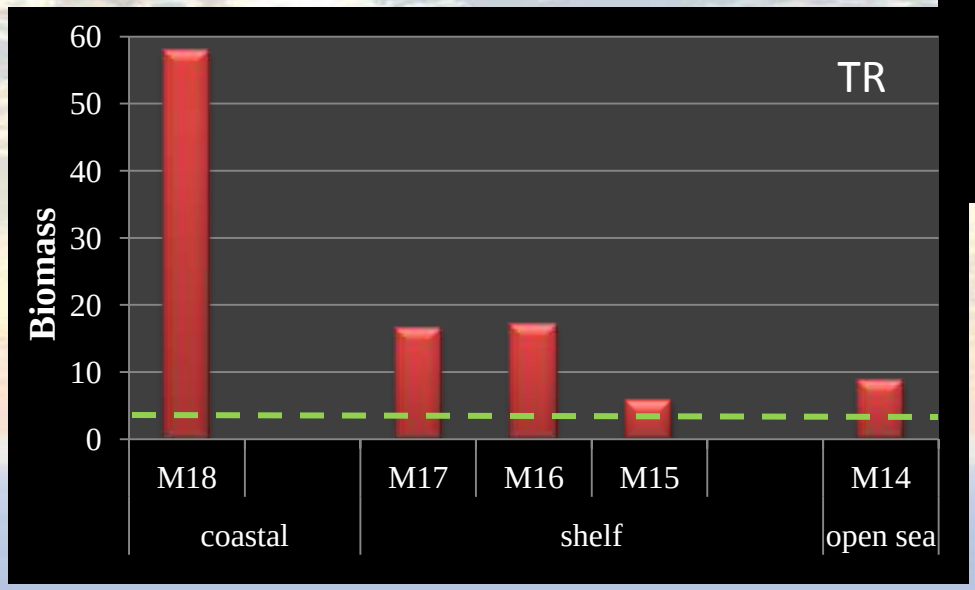


Large variability in biomass of M.leidyi (from 0.1 to 193 g.m-3) is demonstrated in the shelf area. Open sea maintains low biomass values in three transects.



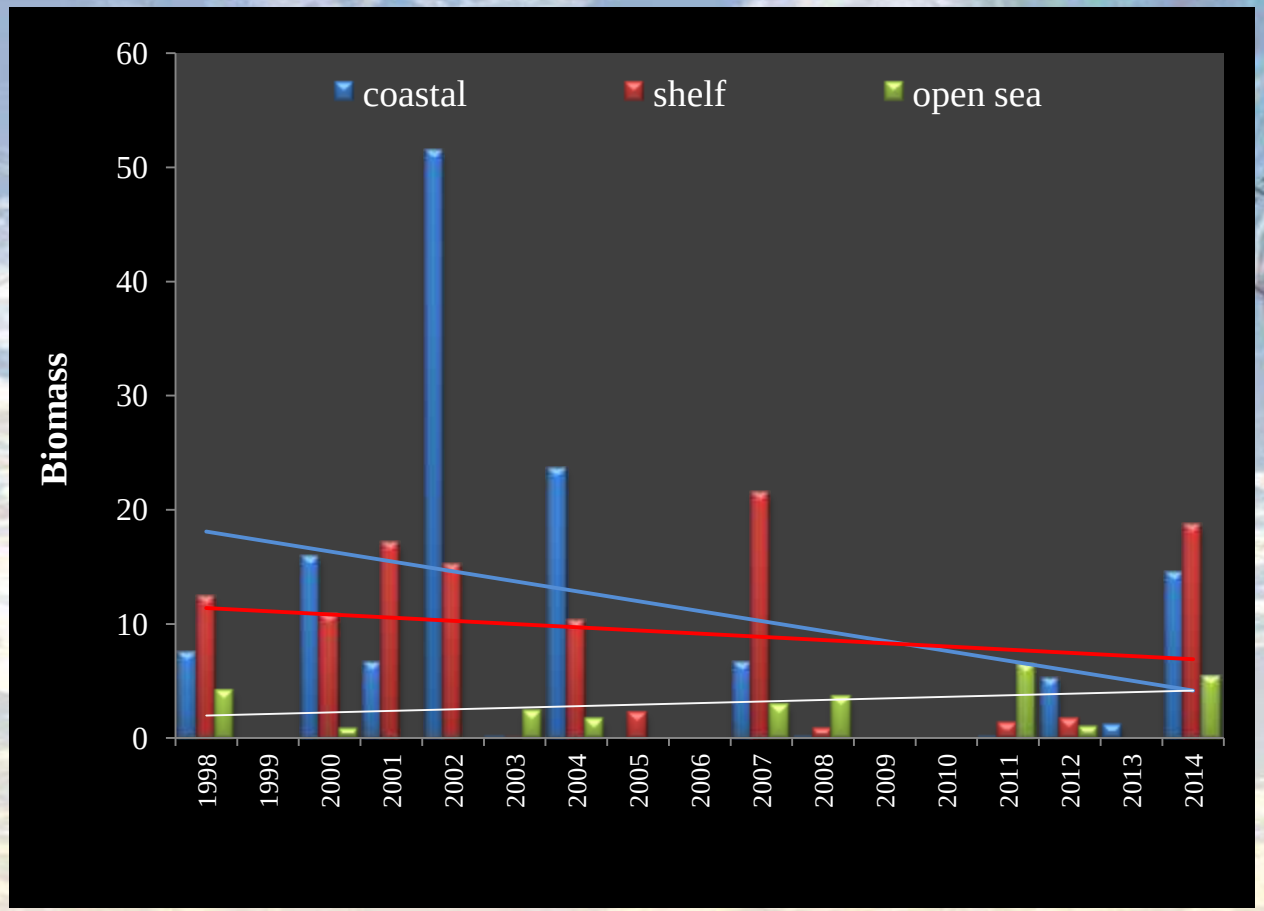
Consumption rates (more than 20 % of zooplankton biomass per day) result in a sharp reduction of the prey abundance (Mihneva, 2012).





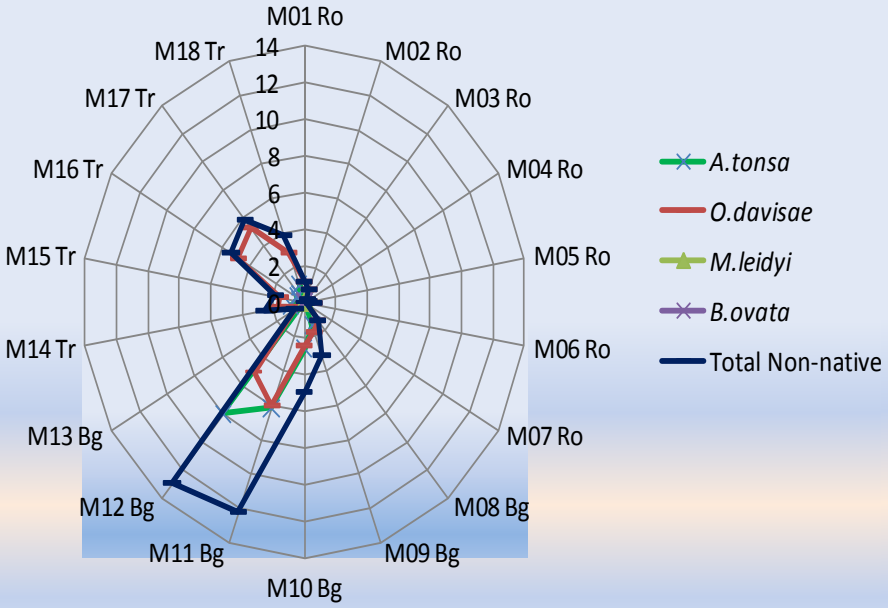
On the base of calculated critical biomass of ctenophore *M.leidyi* that does not affect mesozooplankton abundance it was identified **4 g.m^{-3}** or **120 g.m^{-2}** (Vinogradov et al. 2005) as a threshold for GES. Obviously, recorded concentrations exceeded the threshold.

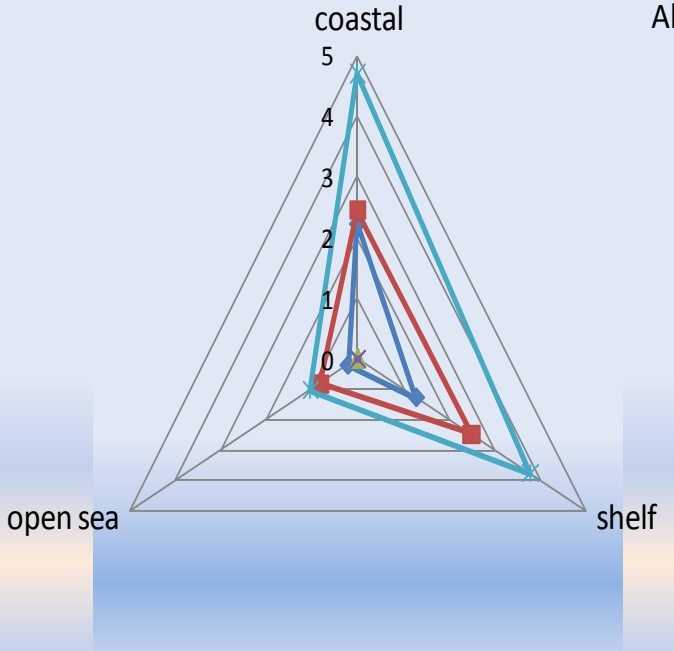
Stable decreasing trend of *M.leidyi* biomass [g.m^{-3}]



Coastal and shelf area presented large biomass fluctuations and higher values in comparison with open sea. Due to irregular monitoring and missing data, trend could not be identify. After 2003 *M.leidyi* biomass decreased with range from 0.1 to 24 g.m^{-3}. However, Mnemiopsis still is controlling factor for mesozooplankton community development in summer.

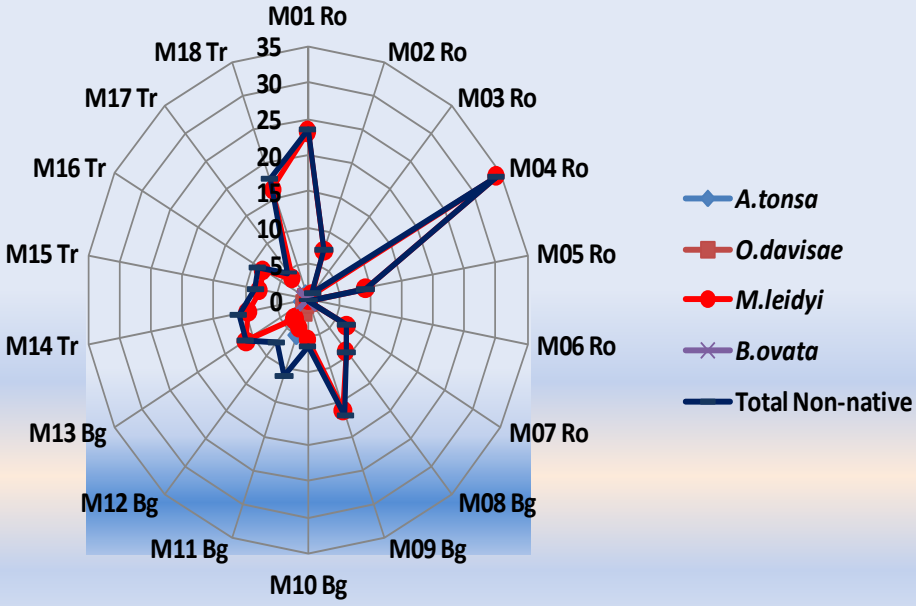
Ratio between non-native and native zooplankton species (to criteria 2.2.1) – threshold 10%

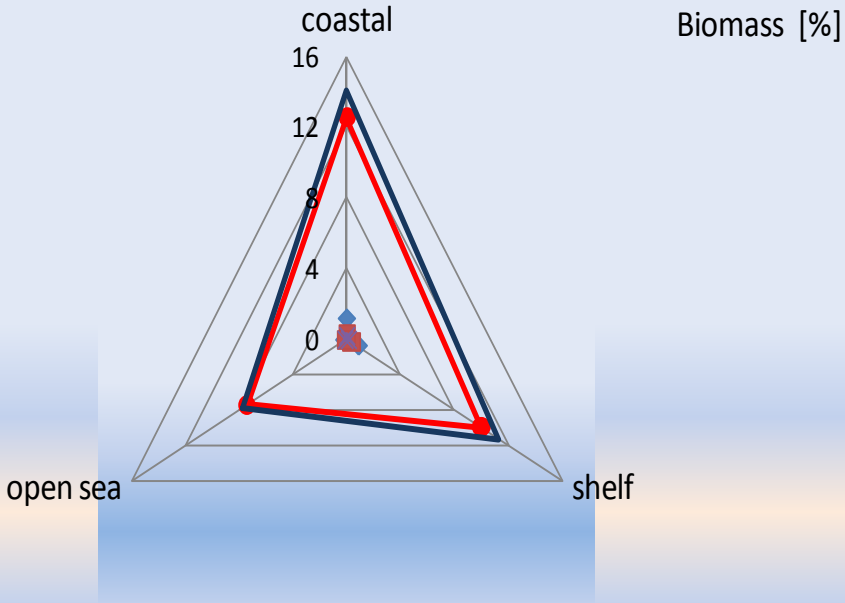




Copepods - *A.tonsa* and *O.davisae* and cthenophors - *M.leidyi* and *B.ovata* are non-native species identified in plankton fauna community during the cruise survey. Only in two stations in front of Bulgaria abundance of alien (mainly copepod) species exceed the threshold of 10% (12-13%).

Ratio between non-native species and native species (to criteria 2.2.1) – threshold 10%

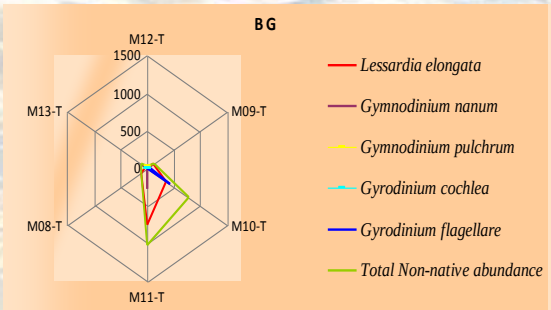


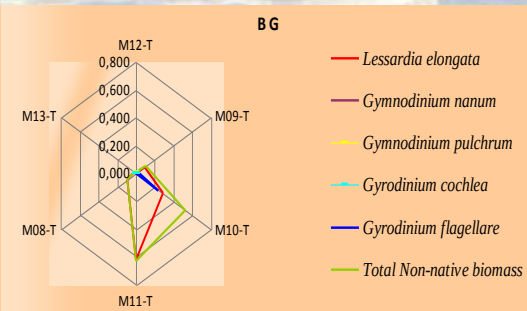


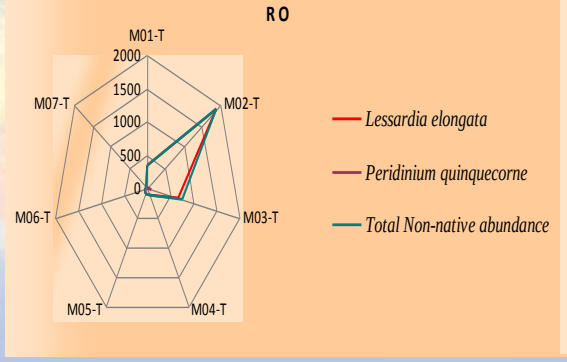
Ratio of non-native species biomass to native in 39% of observations is over than the indicator threshold as a consequence of *M.leidyi* dominance. Zooplankton community structure at coastal and shelf areas is characterized with comb jelly prevalence in biomass.

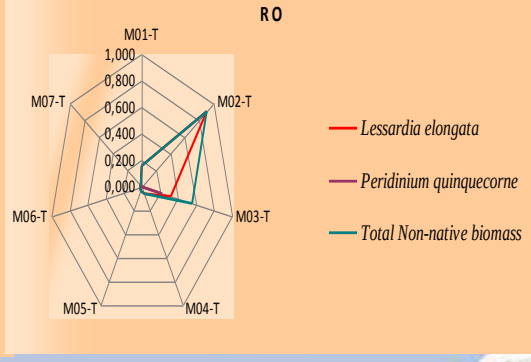
Phytoplankton

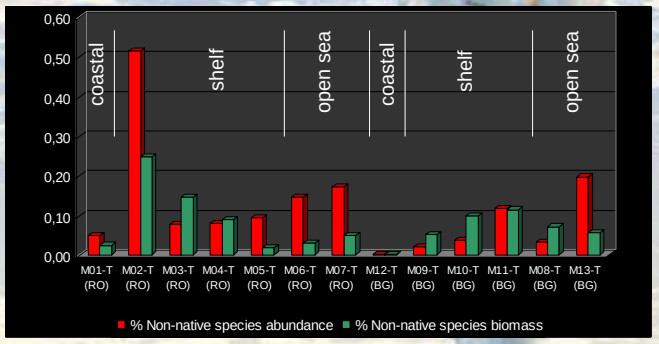
The non-native species were assessed based on the Non-native phytoplankton species list for the Black Sea, produced in the CBD AG. Out of the 52 species listed, during MISIS cruise 6 were observed, all from class Dinophyceae: 2 species in RO (*Lessardia elongata, Peridinium quinquecorne*) and 5 species in BG waters *(Lessardia elongata, Gymnodinium nanum, Gymnodinium pulchrum, Gyrodinium cochlea, Gyrodinium flagellare*) and none in Turkish waters. The proportion of the non-native species assemblage was low (< 1%) both in the abundance and biomass of the community not exceeding the threshold of 10 % proposed in the BG IA Report.



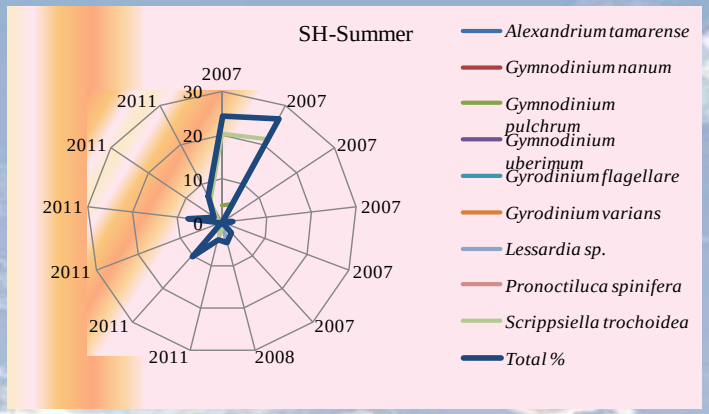


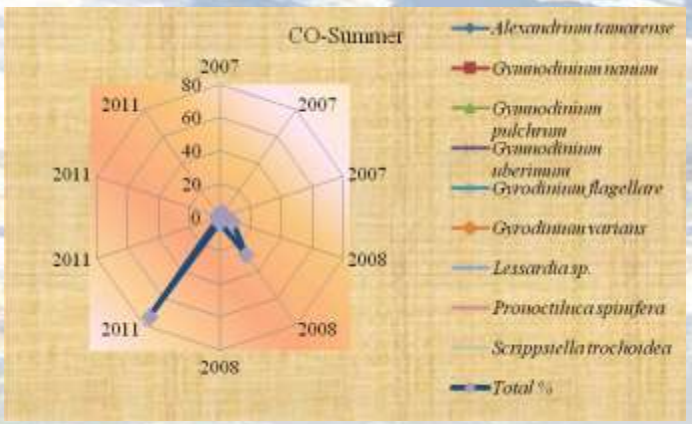


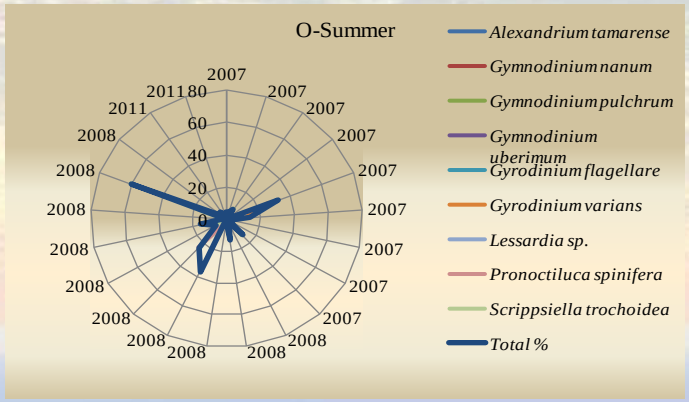




Maximum abundance was measured at shelf station (M02-T) in RO transect and in the open sea station (M13-T) in BG transect, the species Lessardia elongata being present in all stations.







The assessment based on data for the period 2007-2011 in the BG pelagic habitats provide evidence of a number of cases when the proportion of non-native species in the phytoplankton community structure contributed to more than 60% in the total biomass suggesting that the problem should not be neglected

Gaps and recommendations

- - lack of specific monitoring strategy for NIS with relevant frequency and the degree of deficiency of scientific knowledge
- - regular monitoring of abundance, biomass, temporal occurrence, impact of non-native species which are already established
- - development of appropriate indicators for benthic community
- - monitoring of ballast water