Mesozooplankton guideline

Borys Aleksandrov
Zooplankton manual will be divided on 3 parts

- **microzooplankton** 20-200 μm (A. Kurilov)
- **mesozooplankton** 0.2-20 mm (A. Korshenko, B. Aleksandrov)
- **macrozooplankton** > 20 mm (T. Shiganova)

Peculiarities of micro- and macrozooplankton check lists
Participants of Zooplankton manual discussion (15 AG CBD – 12.10.2012)

- Alexandra Gubanova - Institute of Biology of the Southern Seas, NANU
- Elena Arashkevich - Shirshov Institute of Oceanology, RAS
- George Zodiatis – Oceanography Center, University of Cyprus
- Aleksander Korshenko - State Oceanographic Institute
- Borys Aleksandrov - Odessa branch IBSS
Elena Arashkevich corrections

- mesh size 180-200 μm (WP-2)
- fish trawl with mesh size 5-10 mm for protection the net
- Correction table 1 (exclude column with angles >60°)
- Annex 1 correction (*Spadella cephaloptera* - excluded)
- Annex 2 Taxonomic references - updated
- Annex 3 (neuston species) – ???
- Annex 4 Exotic species - excluded
- Annex 5 Will be updated by modern statistical approaches and programs
- Annex 6 Will be improved
Instead 150 μm Mr. George Zodiatis have proposed:

- **100-120 μm** for the brackish waters with dominance of the small rotifers (NWBS)
- **180-200 μm** open sea area, Bosporus area

**100-180 μm**

Necessity to have the table with correction coefficient for the nets with different mesh size
Corrections in Table 1

Determination of wire length \((L, m)\) on winch meter to reach standard horizons for net hauls on the base of angle of wire

<table>
<thead>
<tr>
<th>Standard horizons of vertical net hauls ((H, m))</th>
<th>Angle of the wire ((\beta))</th>
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<tbody>
<tr>
<td>(5^\circ)</td>
<td>(10^\circ)</td>
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<td>251</td>
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<tr>
<td>300</td>
<td>301</td>
</tr>
</tbody>
</table>

If the wire angle exceeds 45°, the sample should be discarded, so angles up to 60° must be deleted (E. Arashkevich).
To add the flowmeter to standardized equipment as the best way to identify the total volume of the water coming through the net.

**Digital Flowmeter**
for determination of the amount of water passing through a plankton net.
• A sample volume of **100-150-200 ml** could be most suitable for the further analysis and storage.

• Besides stempel-pipette have been proposed Folsom or Motoda splitters for counting large animals and fish eggs (Mr. George Zodiatis).
Plankton splitters

Folsom's Plankton Sample Divider
for dividing a larger amount of plankton into an amount suitable for examination; dividing the sample into two halves in one operation.

Motodo plankton sample splitter
for multiple fractionations upon a single sample since a “half – sample” is always retained within the console.
References (to add the literatures)


Annexes (corrections)
Corrections of E. Arashkevich: the Annex 1 does not represent the real pattern of zooplankton composition and distribution. According to the table one can think that the Ukrainian waters of the Black Sea is mainly inhabited with the fresh- and brackishwater species, and the Turkish waters – with the Mediterranean species. My suggestion is to use the geographical approach (not national) for species distribution. For example, the follow regions could be distinguished in the Black Sea: the deep-sea waters, estuaries, bays, the regions influenced by Bosporus and so on. Besides it is necessary to indicate the mass species, common species, scarce species, and species met in the single case.
The list of species should be checked with the World Register of Marine Species since some taxa are not valid. Besides there is a benthic chaethognatha Spadella cephaloptera (!) in the list of zooplankton species. I also think that such elements as Calanus sp. or Acartia sp. are not informative (E. Arashkevich).


For the Check List of species, each of them should be classified as belonging to one of the categories: common, normal, rare (Minutes 15th CBD AG).

The Zooplankton Check List will be amended based on the collected comments and distributed to all participants in the workshop for official approval (Minutes 15th CBD AG).
Corrections in Annex 1

- *Noctiluca scintillans*
- Hydrozoa – 11 (excluded)
- Meroplankton (Nemirtni, Polychaeta, Bryozoa, Phoronidea, Cirripedia, Decapoda, Gastropoda, Bivalvia, Ascidiacea) – 9 taxons (full list of adult species see in Macrozoobenthos Chapter). The same taxons see in Chapter Microzooplankton.
- Rotatoria – full list of species (16) see in chapter Microzooplankton.
- Cladocera – 28
- Calanoida – 14
- Cyclopoida – 3
- Monstrilloida – 1
- Harpacticoda – 1
- Mysidacea – 2
- Cumacea – 1
- Isopoda – 1
- Appendicularia (*Oikopleura dioica*) - 1
- Chaetognatha – 2 (transported to the Macrozooplankton chapter)

Initial list – 243 taxons
Included – 60 taxons
Excluded - 29 pass to Micro- and Macro-
New guideline for identification of Black Sea mesozooplankton, and especially for Copepods, is very much needed. All available manuals are very old (Minutes 15th CBD AG).

The Expert Pool (zooplankton experts) will be checked for contact details and whether all the experts in the region are included - a task for Mr. Korshenko (Minutes 15th CBD AG).
Could not be considered as indicators of environmental conditions (E. Arashkevich):

- **Neuston** organisms, because they are extremely rare in the zooplankton samples (*to add in manual the description neuston net*).

- **Larvae of the benthic animals**, because they are mostly distributed near shore since the regions deeper than 200 m the bottom is $H_2S$ contaminated (*not agree*).

- **Pelagic isopods** that are also very seldom in the standard zooplankton catches.
Zooneustone (horizontal holes)

The guideline text correction in:

- 2. Purposes of zooplankton monitoring
- Add figure with neuston net
- 3.5 Sampling procedure
- 8.1 Use of standardized equipment (neustone net with characteristics)

современные методы количественной оценки распределения морского планктона. - м.: наука, 1983.
16th Meeting of the BSC Advisory Group on Conservation of Biodiversity (AG CBD)
October 6th, 2011, Istanbul, Turkey

- BG – Ms. Kremena Stefanova, IO BAS, Varna
- GE – Ms. Meri Khalvashi, BS Monitoring Centre, Batumi
- RO – Mr. Florin Timofte, NIMRD, Constanta
- TR – Ms. Melek Isilinibilir & Mr. Noyan Yilmaz, Istanbul University
- UA – Mr. Borys Aleksandrov
Annex 3. Zooplankton indicators of environmental status

An indicator taxon can be defined as one that is of narrow ecological amplitude with respect to one or more environmental factors and which is, when present, therefore indicative of a particular environmental condition or set of conditions.

Indicator taxa can be divided into three groups:
- indicators of total pollution (mainly chemical pollution),
- indicators of organic pollution (eutrophication),
- indicators of damaged ecosystems (exotic species).
A3.1 Indicators of total (chemical) pollution

These are organisms that decrease in number (mass mortality or stop reproduction activity) as the result of changing of environmental conditions.

Typical representatives of this group are neuston organisms inhabiting the upper sea layer. In the Black Sea these include copepods of the Pontelidae family (*Pontella mediterranea, Anomalocera patersoni, Labidocera brunescens*), *Centropages kroyeri pontica*; pelagic isopod (*Idothea ostrooumovi*), larvae of bottom invertebrates (shrimps and crabs) and fish fry (*Liza saliens, Lisa aurata, Mugil cephalus; Solea, Callionymus, Belone*, etc.) (Zaitsev, 1979, 1997; Zaitsev & Mamaev, 1997).
A3.2 Indicators of nutrient/organic enrichment (eutrophication)

These are the organisms that increase their abundance with the increasing concentration of nutrients, dissolve and particulate organic matter. According to the results of the Workshop on developing indicators of Eutrophication for the Black Sea; PIU, Istanbul, 25-30 September 2000 (Support for the regional activity centre for pollution monitoring and assessment, Odessa, Ukraine, EU TACIS Project: ENVRSUS9602: Phase 2), there have been identified the indicators of eutrophication which can be successfully applied in monitoring programmes. In particular:

- Total mesozooplankton biomass, mg·m⁻³
- Biomass of *Noctiluca scintillans* in total mesozooplankton, %
- Number of neustonic copepods (Pontelidae Family), ind·m⁻³
- Number of Polychaeta larvae in total number of meroplankton, %
- Specific production of dominant species, d⁻¹ (**)
Annex 3. Zooplankton indicators of environmental status

A3.2 Indicators of nutrient/organic enrichment (eutrophication)

Others:

- Ratio between total biomass of phyto- and zooplankton.
- Average biomass of jellyfish Aurelia aurita, g·m⁻²
- Total biomass of exotic combjelly species (Mnemiopsis leidyi and Beroe ovata), g·m⁻²
- Number of eggs and larvae of fish with special attention to commercially exploited fish, ind·m⁻³
A3.3.1 Indicators of worsening conditions

An increase in number/density of the following organisms indicates a worsening of environment conditions:

- FLAGELLATA (MASTIGOPHORA) *Noctiluca scintillans* (=*N. miliaris*)
- SCYPHOMEDUSA (*Aurelia aurita*, *Rhizostoma pulmo*)
- CLADOCERA (*Pleopsis polyphemoides*)
A3.3.2 Indicators of improving conditions

An increase in number/density of the following organisms indicates an improvement in environmental conditions:

- **CALANOIDA** (*Pontella mediterranea, Anomalocera patersoni, Labidocera brunescens, Centropages kroyeri pontica*)
- **ISOPODA** (*Idothea ostroumovi*)
- **CLADOCERA** (*Penilia avirostris, Pleopis tergestina, Evadne spinifera*)
- **MONSTRILOIDA** (*Monstrilla grandism Monstrilla helgolandica, Monstrilla longiremis*)
- **DECAPODA, zoea** (Macrura – shrimps, Brachiura – crabs)
- **CYCLOPOIDA** (*Oithona minuta*)
The species found in the isolated instances and specific locations cannot be considered as the members of the Black Sea zooplankton community (E. Arashkevich).

Annex 4 should include references, year of registration, and a category of status (Minutes 15\textsuperscript{th} CBD AG): \textit{casual, established, cryptogenic, invasive} and \textit{introduced}.

The list of exotic species will be again distributed for further check of doubtful species (Minutes 15\textsuperscript{th} CBD AG).

**Annex 4 have been excluded**
All citations are old; there are a lot of modern statistical approaches and programs (E. Arashkevich).

This annex have been prepared by A. Korshenko and he will improve it.
There are **some mistakes** in formulas for identification of zooplankton biomass (E. Arashkevich).

It would be much more useful to use **dry weight** and **carbon weight** instead of caloricity (E. Arashkevich).

In common practice for calculation of zooplankton biomass use the tables of constant weight; it is source of coarse mistakes.

Annex 6 have been improved.
Thank you for your attention