# EMODNet Biology
# Integrating biological trait data into WoRMS for European nematodes

# Final Report

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# 1 Introduction

Marine free-living nematodes are generally the dominant taxon within the smaller interstitial meiofauna marine sediments. They can reach very high densities (up to $10^6$ ind m$^{-2)}$ and are considered a very diverse group within the marine benthos. So far, 6900 species have been described, it is estimated that 50000 species still need to be discovered (Appeltans et al. 2012).

As marine nematodes are very small, their biomass cannot be estimated directly. Therefore, nematode biomass is calculated from their length, and their width according to

$$B = \frac{L \ x \ W^2}{1.6 * 10^6}$$

Where B=biomass (μg wet weight), L= nematode length (μm) and W= maximum body width (μm) (Andrassy 1956).

Within this project, species-specific information on length and width of free-living marine nematodes is added to EMODNeT, allowing end-users to calculate nematode biomass. We used the taxonomical literature, as nematode species descriptions provide information on the length of a species. Information on body with is either directly provided, or it can be calculated from the taxonomical information. For this pilot project, we used the nematode species list for European waters, as provided by the MANUELA database (Vandepitte et al. 2009). This list includes 874 accepted species, and 70 species that are currently unaccepted.

# 2 Methodology

During a kick-off meeting (22 October 2014), it was decided that this pilot project would aim to provide a range of values for length and width, allowing the end-user to calculate biomass ranges or average biomass per species. As most species descriptions provide length and width values for multiple individuals, the correct information needs to be selected from the papers. Correct information includes the maximum and minimum length of a species, with corresponding body with; and the maximum and minimum body width and corresponding length values. This will allow the end user to estimate the range in individual biomass for the species of interest, rather than providing a possible biased averaged value.

For every species from the MANUELA list, the available taxonomical literature in WoRMS/NeMys is used as a source for information. When multiple papers are available (redescriptions), the information from the additional papers is used as well. In addition to the trait data, taxonomic data (Authority), gender (Male-Female), geographic data (geographic area), notes on the habitat and full reference of the literature source are added to an excel file, prepared by the EMODNeT-Biology team. This excel file is updated daily, saved on hard disk at Ghent University, and added to a shared dropbox folder.

# 3 Progress

So far, information for 583 species was added to the database, resulting in 4805 lines of information. Several species had more than one description (i.e *Chromadora nudicapitata* has been (re)described in 14 papers, resulting in 68 lines of information. We used 221 literature sources, all references were added to the database. In case one author described more than one paper in a certain year, this was made clear in the database. This enables a correct match of the data with the corresponding literature source.

For certain species, the information availale in NeMys was not up to date, or the information available in Nemys was not sufficient for the purpose of this project. Problems and solutions included: (1) part of the decription was available in NeMys, but the length and width information were lacking. We then checked the paper version of NeMys (available in the marine filing cabinet of the Marine Biology Research Group at Ghent University). Hence, these data are added to the trait database. (2) The species was not mentioned in NeMys. This is noted in the database. These species should be added, a task to discussed with the newly installed editor group for the marine free-living nematodes in WoRMS. (3) The species is mentioned in NeMys, but a pdf file with information is completely lacking. When present in the nematode filing cabinet, the relevant data is added to the trait database. This issue will also be discussed with the WoRMS nematode editor team. (4) The species is mentioned in NeMys and the relevant trait data are available as well. However, complimentary information (i.e. geographic area) is lacking. When information was lacking, we used "NA" as entry for the trait database. (5) The pdf with the relevant information is available in NeMys, however this information is not linked with the species record. This means that the information can be retrieved through an indirect search. The relevant information is added to the trait database, and the link to the PDF is mentioned in the database .This can help the WorMS management team to improve WoRMS/NeMys.

The list of European nematodes, derived from the MANUELA database consists of 945 species. At the moment, information for 583 species is added to the database. We hired a newly graduated Master of Science, for 2 months (= 40 working days). It was estimated that the database could be completed within this two months, corresponding to the compilation of information of about 25 species per day. This number proved to be an overestimate. There are several reasons for this: (1) while the use of NeMys is straightforward after a certain learning time, it seems to be rather complicated for someone who is not familiar with NeMys. The indirect search for information that was expected to be directly coupled to the species records is a good example where experience with NeMys does not slow down the work flow considerably.  For this project, the learning curve was rather steep (Month 1), after which the efficiency increased. (2) When information was not available in NeMys, an exhaustive search for the correct information was done. Obviously, this is time consuming. (3) The information on the relevant traits is not uniform. In some case, the information is provided straightforward, in some case the information needs to be calculated. In very old papers, the notation is different, and the units of notation were unclear. Month 1 was used to get insight in the different methods of reporting. During Month 2, no new methods for reporting were encountered. (4) there are different languages used for describing nematode species (English, French, German, Russian, Chinese…). This slows down the compilation of the full set of records that needed for the compilation of the dataset, especially when it came to entering the information on the habitat in a uniform (English) manner.

After Month 2, the work was continued by a more experienced scientist, trained in nematode identification and familiar with NeMys since its earliest development. While this was not done on a regular basis, the amount of data compiled per unit of time was considerably higher (i.e. 25 species in 4 hours).

# 4   Outlook

The databases will be further updated, until the trait information for the European nematodes has been finalised. This will be done before the EMODNeT Biology Trait workshop, planned early June. At that workshop, experiences with data compilation will be presented, and a case study will be presented where a possible use of this trait dataset will be illustrated.

Further compilation of data by a scientist trained in nematode identification and being familiar with NeMys.

Adding the trait information for the entire set of described free-living nematodes (6900 species, see above) will only be possible when hiring an experienced scientist for a longer period. However, the newly installed WoRMS editor group for marine free-living nematodes could be involved in this process. We advice to  provide the editors with a tool that would enable them to add the traits to WoRMS/NeMys when adding/updating information in NeMys. A direct coupling with EMODNeT would then be beneficial for both data system.