

## Activities report WoRMS data management team (DMT) 2015

### WoRMS 2015 in numbers

- 6.457 extant marine species added, of which 1.587 were published in 2015
- 79 new editors
- 196.229 taxonomic edits/additions, including bulk edits
- On average 767 taxonomic edit actions per day, including bulk edits
  
- 1,245,203 visitors
- 112,174,328 hits
- 1.4 TB data traffic
- 11,171 taxon matches
- 99.9% uptime

In 2015, the number of 230.000 accepted marine species names in WoRMS was crossed, of which 96% has been checked by a taxonomic editor. At the end of 2015, WoRMS contains more than 535.000 taxon names.

### Steering Committee (SC)

- Organisation of the elections of new member of the SC (summer)
- WoRMS Steering Committee meeting (June 8, HCMR, Crete)
- WoRMS Steering Committee meeting (December 16, virtual)
  
- A **Terms of Reference (ToR)** was introduced, explaining the relationship between the Steering Committee (SC), the editorial Board and the Data Management Team (DMT) of WoRMS and its associated databases. This ToR was sent out to all editors and is also shown upon login for new editors or editors who have not yet completed this.

### WoRMS editors

During 2015, 79 new editors (both taxonomic and thematic) have joined the WoRMS editorial board and are helping to make WoRMS more complete.

A number of editors have retired from the WoRMS editorial board:

- Buz Wilson (Isopoda)
- Marilyn Schotte (Isopoda)
- Daphne Fautin (Hexacorallia)

Sadly, also 3 WoRMS editors have passed away in the last year:

- Roger Bamber - [www.marinespecies.org/news.php?p=show&id=4118](http://www.marinespecies.org/news.php?p=show&id=4118)

- Kristian Fauchald - [www.marinespecies.org/news.php?p=show&id=4152](http://www.marinespecies.org/news.php?p=show&id=4152)
- Michael Türkay - <http://lebenswege.faz.net/unternehmensnachrufe/michael-turkay/43565914>

### WoRMS website

- The online manual is regularly updated, keeping track with new tools and functionalities.
- The WoRMS twitter account (WRMarineSpecies) has more than 1.500 followers.
- 58 institutes and/or organizations are currently using the web services of WoRMS and/or are providing deep links to WoRMS. This is the number that we are aware of, there might be more that have not yet informed us of their usage of WoRMS.

### WoRMS outreach

WoRMS has been (re)presented by the DMT at several occasions:

- 31 march – 1 april: Catalogue of Life Global Team meeting
- 15-17 april: FixO3 workshop: an introduction and practical use of European marine data infrastructures
- 9-12 june: EMODnet Biological and Ecological Traits of marine species Workshop
- 30 aug – 4 september: Aquatic Biodiversity and Ecosystems Conference (ABEC)
- 21-25 september: European Marine Biology Symposium (EMBS)
- 28-30 september: AquaRES workshop
- 20-22 october: EMODnet Open Conference: Consolidating the Foundations, Building the Future & EMODnet Jamboree
- 26-27 november: LifeWatch Data Analysis Workshop
- 30 nov – 4 dec: OBIS training course: Marine Biogeographic Data Management (contributing and using OBIS)
- In March 2015, there was a **press release on WoRMS** titled “Four newly discovered marine species added to world list WoRMS every day”. This release was picked up enthusiastically by the press worldwide. This translated in 434 online news messages and 18 articles in printed magazines in 59 countries and 21 languages. Members of the Steering Committee also gave 15 radio- and television interviews. Following the press release, the DMT could see an increased activity on WoRMS by the many WoRMS editors. Immediate results included some new editors who came on board and a new batch of African distribution information that was delivered by the AfReMaS-team.

### WoRMS content

- Early 2014, a call for applications for **small, targeted data grants to fill the taxonomic gaps** was launched. Through the **LifeWatch** project, a dedicated budget was made available to allow editors to apply for a such a small grant, with a focus on completing and verifying the taxonomic information within their group of expertise. For groups that were already nearing completion, a grant could be requested to document e.g. the original descriptions, add information on type

localities or focus on the addition of synonym names. In total, 16 LifeWatch grants were assigned covering a wide taxonomic variety: Mollusca, Gastrotricha, Polychaeta, Hirudinea, parasitic Nematoda, Pisces, Echinodermata, Copepoda, Isopoda and Digenea. Through these grants, **6.778 new names could be added to WoRMS** and a taxonomic revision of 18.947 names already in WoRMS has been made. In addition, 1.843 references of original descriptions were added. An overview of these data grants – with their goals and a final report – is available through the WoRMS website ([www.marinespecies.org/activities.php](http://www.marinespecies.org/activities.php)).

- On February 24-26, experts on **free-living marine nematodes** have gathered at the Flanders Marine Institute (VLIZ), host institute of the World Register of Marine Species (WoRMS), to give the re-named **NeMys** a kick-start and to discuss future plans. Following the transfer of the World Database of Free-living Marine Nematodes – NeMys - to WoRMS in November 2014, a diverse editorial team was composed and plans were made to bring this team together for a kick-start of the re-named NeMys and to discuss the future plans. This NeMys workshop offered the editorial team the opportunity to make editorial agreements and discuss future plans and options in person. In addition, the Data Management team organized a one-day-hands-on training, teaching the editors how to work with the online editing interface. The gaps and issues that were identified prior to the workshop will be tackled by the team in the coming year. No less than 123 new Nematode species have been added to the database during the workshop and the higher classification was re-organized to comply with the latest accepted taxonomic standards for this group. (<http://www.nemys.ugent.be/news.php?p=show&id=4083>).
- The **World Register of Introduced Marine Species (WRIMS)** was officially launched in March. WRIMS lists the known alien marine species worldwide, with an indication of the region in which they are considered to be alien. To date, the Register contains 1.637 alien species and it keeps on growing. During 2015, a call was launched for additional editors who wanted to collaborate on WRIMS, and the editorial network grew further to (currently) 20 members. The DMT has been heavily involved in the quality control of the WRIMS data, uploading of new information and re-directing user feedback to the WRIMS editorial board. Early 2016, part of the WRIMS editors will come together for a dedicated workshop, deciding on how WRIMS can further grow towards the future. ([www.marinespecies.org/introduced](http://www.marinespecies.org/introduced)).
- 447 **deep links to AquaNIS** - the information system on Aquatic Non-Indigenous and Cryptogenic Species - were added to WoRMS/WRIMS.
- **MolluscaBase** was officially **launched** in the summer of 2015. The story of MolluscaBase started in 2014 when the initial preparations were made, including a workshop bringing together the experts and the import of both CLEMAM and FreshGen. During 2015, the integration of the **Indo-Pacific Mollusca** database was initiated, which contains an estimated 25.000 species names belonging to this region, including summary data on their distribution and ecology. In addition, about 3.400 **New Zealand Cenozoic and New Zealand Recent terrestrial Mollusca** were added. The **Recent North American land and freshwater molluscs** were also added, in collaboration with the National Science Foundation-supported Invert-E-Base project. Other import actions are in the pipeline and will probably be completed during 2016. ([www.molluscabase.org](http://www.molluscabase.org) & [www.marinespecies.org/news.php?p=show&id=4270](http://www.marinespecies.org/news.php?p=show&id=4270)).

- 109 **deep links to OPK – Opisthobranchs** were added to WoRMS/MolluscaBase. OPK contains information on Mediterranean and Iberian opisthobranch molluscs.
- WoRMS/MolluscaBase now shows 1.034 **image links of Mollusca type specimens** deposited in the online collections of the Te Papa Museum of New Zealand.
- Since the start of WoRMS, the DMT has had a close collaboration with Daphne Fautin and her **Hexacorallians of the World Database**, specifically for the **Actiniaria** and the **Corallimorpharia**. For these two groups, WoRMS depended on the Hexacorallian database of Daphne, and regular synchronisations from the Hexacorallian database to WoRMS were performed. Early 2015, Daphne has retired and the WoRMS DMT has performed a final synchronization with her database and – in agreement with Daphne – has appointed a new taxonomic editor who can continue her work, but now through WoRMS. The synchronization action resulted in 2.056 new names for WoRMS, mostly synonyms.
- WoRMS was synchronized with the **Integrated Taxonomic Information system (ITIS)**; WoRMS is now including more than 123.000 deep links to ITIS.
- **ITIS** has updated its **Asteroidea** information based on the list available in WoRMS.
- During the June meeting of the WoRMS Steering Committee, it was unanimously decided that the **environment flag** in WoRMS should become mandatory information and that completing this in WoRMS should be seen as a high priority. To fill the environment gap, the DMT has already taken several actions – in collaboration with the responsible editors – and has already been able to document the environment flag of almost 13.000 accepted species, spread over several groups (Chaetognatha, Pycnogonida, Ascidiacea, Holothuroidea, Sipuncula, Echiura, Asteroidea, Crinoidea, Orthonectida, Stomatopoda, Foraminifera, Amphipoda, Isopoda & Polychaeta). During 2016, the DMT – in collaboration with the editors – will further work on this and aims to complete this task by the end of the year.
- **Hypotrachia** had long been identified as a gap in WoRMS. This gap has now largely been dealt with, as the DMT has extracted species information on this group from a series of monographs on this group, authored by Helmut Berger. Although the information in WoRMS is now up-to-date through this data management action, the group still lacks an editor.
- Nicolas Bailly – data manager of FishBase – and the DMT have met to discuss the **optimization of the synchronization of WoRMS with FishBase**. Web services have been developed to make the synchronization more easy and (partly) automated. Content-wise, several issues have been identified and solved, e.g. documenting the authorship for fish genera. In the long term, the developed web services will not only allow an easy synchronization for the taxonomy, but also to show the available distribution information in FishBase through WoRMS.

- One of the content priorities put forward by the Steering Committee is **to document the type species**. One of the responsible Copepoda editors has already taken action on this and has documented the type species for all 2.106 Copepoda genera.
- About 20.000 **references** for the World **Ostracoda** Database have been added to WoRMS.
- 3.111 **distribution records** for the **Isopoda** have been uploaded. These were extracted from a 2012 publication by 2 of the responsible editors: Poore, G. C. B.; Bruce, N. L. (2012). Global Diversity of Marine Isopods (Except Asellota and Crustacean Symbionts). *PLoS ONE*. 7(8): e43529. ([www.marinespecies.org/aphia.php?p=sourcedetails&id=164869](http://www.marinespecies.org/aphia.php?p=sourcedetails&id=164869)).
- The collaboration with **Encyclopedia of Life (EoL)** continues. WoRMS has added 14.175 deep links to EoL, bringing the total to 224.004. In addition, WoRMS is now also providing synonyms for display in EoL.
- The **Chinese Register of Marine Species (ChaRMS)** has been developed further. There are now almost 20.000 taxon links available. The editorial board has also been expanded and now contains 38 thematic editors. (<http://www.marinespecies.org/charms/>).
- Preparations to create a **Hong-Kong Register of Marine Species (HKRMS)** are ongoing. The Register is based on a marine species inventory of the region of Hong Kong and currently contains 5.580 species. A number of taxa is still under revision by the WoRMS taxonomic editors. We expect this Register to be launched in the first half of 2016.
- The **synchronization and collaboration with AlgaeBase** continues. During 2015, 9.162 (sub)species and 260 genera from AlgaeBase were added to WoRMS. Meanwhile, AlgaeBase has started to develop a number of web services that will facilitate the data exchange to WoRMS. The DMT is closely involved in this process, testing these services and providing feedback. The developed web services will also be offered to other data systems that collaborate with AlgaeBase.
- There is a strong and continuous collaboration between the **Ocean Biogeographic Information System (OBIS)** and WoRMS. OBIS has officially adopted WoRMS as its taxonomic backbone, and aims to match all its taxa names with WoRMS. The DMT is helping to clean the OBIS taxon list and during 2014, a lot of non-matching lists were sent out to the WoRMS editors, asking them to check these names and (a) add them to WoRMS if it would be a validly published name or (b) let us know why a name should not be added to WoRMS (e.g. unknown combination). Many editors have been really helpful in this enormous task, thus helping to improve the quality of the taxonomic data in OBIS and making WoRMS more complete.
- A **higher level Classification of all living organisms** has been published by Ruggiero *et al.* This paper provides a management classification for all living organisms and will form the basis for the Catalogue of Life higher classification. It was agreed by the Steering Committee that a comparison should be made between this paper and the higher classification in WoRMS. Where inconsistencies appear, the DMT will consult with the responsible editors to see what needs to be

done. If no editor is available for a group, it was agreed that the classification by Ruggiero *et al.* should be followed. (<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0119248>).

- Following the **AquaRES workshop** – held in September, in Brussels – a number of **new editors** have joined WoRMS and plan to not only complete some of the marine groups in WoRMS, but also to document their **freshwater** relatives in the database. To avoid duplication of work and overlap, these groups will no longer be managed in FADA (the Freshwater Animal Diversity Assessment), but a regular data flow from WoRMS to FADA will be set up.
- **PANGAEA** – Data Publisher for Earth and Environmental Science – will check how they can contribute to the documentation of **fossil marine taxa** in WoRMS. PANGAEA is currently exploring possibilities and the WoRMS DMT will then consult with the responsible editors on how WoRMS can benefit from this. This action is part of the EMODnet Biology project.
- In the framework of the **EMODnet Biology** project, several **traits** have been uploaded to the database. So far, the focus has been on ‘**species importance to society**’, including e.g. the IUCN Red List and traits related to **body sizes**. During 2015, the following body size information was added to WoRMS: 695 body size records for 507 macro-algae, 252 body size records for 151 Mysida species and 611 body size records for 118 marine mammal (sub)species. Currently, 8.377 accepted species have at least 1 body size record attached to them. Trait information related to body sizes is further being added and this in collaboration with the responsible taxonomic editors.

### WoRMS technical developments

- A “**checklist publication tool**” has been created, in analogy with the tool available in the Fresh Water Animal Diversity Assessment (FADA) database. This tool allows editors to easily create a taxonomic checklist on the fly and help them prepare a checklist for publication. Several options are available to include or exclude specific information. This tool was developed in the framework of the AquaRES project.
- The **documentation and linking of ‘original name’** has been made possible. This had been requested several times in the past by the editorial board. The DMT has done a preliminary screening of the WoRMS content to identify possible original names and has indicated these as such and linked them. A very conservative approach has been followed by the DMT. It is now up to the editors to complete this work.
- The earlier launched “**Journal importer**” (2014) can now also handle **Zoosystematics and Evolution**, another Pensoft Journal. The Journal importer now allows you to semi-automatically import (newly) published names coming from the following journals: ZooBank, ZooKeys (Pensoft), Biodiversity Data Journal (Pensoft) & Zoosystematics and Evolution (Pensoft).
- **WoRMS type localities** are now exported to the Ocean Biogeographic Information System (**OBIS**). This was requested by OBIS and positively evaluated by the Steering Committee. The DMT has

created a first export of all holotype information in WoRMS where latitude-longitude values were available. The DMT aims to regularly update this dataset.

The dataset will soon be available through OBIS: "WoRMS Editorial Board (2015). *Type locality distributions from the World Register of Marine Species*. Available from <http://www.marinespecies.org> at VLIZ. Accessed on YYYY-MM-DD."

- In the framework of the AquaRES project, a tool has been created to "visually" add multiple distributions per species: "**distribution map entry tool**". This had long been on the "most wanted new tool list" of some editors. The tool is accessible in parallel with the "add distribution" link. You can now visually select a number of regions (geo-units) from one of the following standards: IHO, EEZ, Marine Regions, MEOW, TDWG and FADA regions. Clicking a region will highlight it in red on the map, several regions can be selected at once, all linked to the same source. In the future, other geo-unit standards can be added.
- **Multiple fossil ranges** can now be added in one single action. Previously, several ranges from the same source had to be entered one-by-one. This new functionality allows a more rapid entry of fossil ranges for a single species from the same source.
- Minor improvements have been made to the **web service**. The correct usage of the function `getAphiaID` is now ensured.
- The term '**interim unpublished**' has been introduced in the pick lists of available statuses. This term refers to the unavailable online names under ICZN Article 8.
- **Continuous technical support** to the many users of WoRMS through [info@marinespecies.org](mailto:info@marinespecies.org). this support includes fixing minor bugs brought to our attention, help in modifying specific scripts for R which link to the WoRMS database, help in setting up the possibility for batch uploads of information (e.g. images, deeplinks...).

### **Actions financially supported by LifeWatch**

*LifeWatch is the E-Science European Infrastructure for Biodiversity and Ecosystem Research. It is a distributed virtual laboratory which will be used for different aspects of biodiversity research. All of the above mentioned work was supported by staff members provided by VLIZ as part of the Flemish contribution to LifeWatch and is funded by the Hercules Foundation.*

*The taxonomic backbone of LifeWatch aims at bringing together taxonomic and species-related data and at filling the gaps in our knowledge. In addition, it gives support to taxonomic experts by providing them logistic and financial support for meetings and workshops related to expanding the content and enhancing the quality of taxonomic databases. As WoRMS is a major player in this taxonomic backbone, funds can be made available to support the further development of WoRMS and its related databases, both on the content and technical level.*

- Through LifeWatch, the Flanders Marine Institute had a budget available to financially support editors to address a number of priority gaps within WoRMS. This could be done either through **data grants** or through the **organization of editor-workshops**. A call was launched to all the WoRMS editors during August and proved very successful. 20 applications for grants and 6 applications for workshops were received, of which respectively 17 and 4 were granted. The results of all the data grants will be available by the end of June 2016. The 4 workshops will take place at the Flanders Marine Institute between February and May 2016. ([www.marinespecies.org/news.php?p=show&id=4241](http://www.marinespecies.org/news.php?p=show&id=4241)).
- On February 24-26, experts on free-living marine nematodes (**NeMys**) have gathered at the Flanders Marine Institute (VLIZ), host institute of the World Register of Marine Species (WoRMS), to give the re-newed NeMys a kick-start and to discuss future plans. The organization of this workshop was financed by LifeWatch and supported by the Flanders Marine Institute. ([www.marinespecies.org/news.php?p=show&id=4083](http://www.marinespecies.org/news.php?p=show&id=4083)).
- On March 31st and April 1st, the **Global Team of the Catalogue of Life (CoL)** met at the Flanders Marine Institute (VLIZ) in Oostende, where they discussed the way forward for the Catalogue of Life. This meeting was supported by LifeWatch. Back-to-back with this meeting, a mini-symposium was organized, offering a discussion platform to users, providers and related networks and initiatives to the Catalogue of Life. ([www.marinespecies.org/news.php?p=show&id=4124](http://www.marinespecies.org/news.php?p=show&id=4124)).

## Aphia database

Over the last year, several actions have taken place on the level of the Aphia database – the database behind the World Register of Marine Species and its associated global, thematic and regional databases. A number of these actions are not visible through WoRMS, but have their own interface or purposes. A brief overview of these will be presented here.

- The integration of the **Interim Register of Marine and Non-marine Genera (IRMNG)** has been completed. During 2015, a first bulk upload – provided by Tony Rees – has been added to the database. This re-newed IRMNG database is expected to be released early 2016. IRMNG has been integrated into the Aphia database structure, but the IRMNG content will not show through WoRMS. There are however plans to compare IRMNG and WoRMS, to see how both resources can complete each other.
- The WoRMS DMT has been invited to submit a **manuscript on the Aphia database**. The paper entitled “How Aphia – the platform behind several online and taxonomically oriented databases – can serve both the taxonomic community and the field of biodiversity informatics” is part of the Special Issue “Research tools and methods for marine species acquisition and identification” published by the Journal of Marine Science and Engineering (JMSE). The paper is published as Open Access. ([www.marinespecies.org/news.php?p=show&id=4396](http://www.marinespecies.org/news.php?p=show&id=4396) & [www.mdpi.com/2077-1312/3/4/1448](http://www.mdpi.com/2077-1312/3/4/1448)).