

Activities report WoRMS data management team (DMT) 2016

WoRMS 2016 in numbers

- 6.521 extant marine species added, of which 1.663 were published in 2016
- 53 new editors
- 142.712 taxonomic edits/additions, including bulk edits
- On average 391 taxonomic edit actions per day, including bulk edits

- 1,418,950 visitors
- 110,803,690 hits
- 1.7 TB data traffic
- 9,560 taxon matches
- 99.77% uptime

At the end of 2016, WoRMS contains almost than 555.000 taxon names.

Steering Committee (SC)

- Organisation of the elections of new member of the SC (Summer 2016)
- WoRMS Steering Committee meeting (June 16, VLIZ, Oostende)
- WoRMS Steering Committee meeting (December 14, virtual)

WoRMS editors

During 2016, 53 new editors (both taxonomic and thematic) have joined the WoRMS editorial board and are helping to make WoRMS more complete.

WoRMS Data Management Team

The DMT welcomed two new members in 2016. Sofie Vranken will help out with the content and support towards users and editors, while Kevin Verfaillie will provide technical support. Sofie is replacing Aina Trias-Verbeek who left the team at the end of 2015, while Kevin is replacing Lorenzo Bovit, who changed jobs in 2016.

WoRMS website

- The online manual is regularly updated, keeping track with new tools and functionalities. Specifically for 2016, a section was added on how to create Identification Keys in WoRMS.

- The WoRMS twitter account (WRMarineSpecies) has more than 2.000 followers.

- 62 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.
- In 2016, 20 new users were registered, who have download access to WoRMS in 2016.

WoRMS outreach

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

- 6-8 April: EGI conference, Opening science in Europe and in the World
- 12-14 April: Catalogue of Life Global Team meeting
- 2-5 May: 6th ODIP Workshop
- 23 May: LifeWatch Infrastructure User Meeting
- 25 May: 5th IODE Steering Group meeting for OBIS
- 10 June: GBIF-France 10th birthday
- 15 June: AquaRES user workshop & follow-up committee meeting
- 17 June: EMODnet Traits workshop
- 22-26 August: International Diatom Symposium
- 20-22 September: Register of Antarctic Species (RAS) workshop
- 26-30 September: European Marine Biology Symposium (EMBS)
- 20 October: 40 years of Tropical Deep Sea Benthos Expeditions
- 25-28 October: OBIS INDEEP training and workshop
- 9-11 November: Names in November meeting
- 1-2 December: Arctic Traits workshop

In December 2016, a series of **news messages** was sent out on “**Aristotle and marine biodiversity**”. These stories did not only link the work of Aristotle to the World Register of Marine Species, but also to other ongoing initiatives such as EurOBIS and LifeWatch. The stories were posted on the LifeWatch.be website (<http://www.lifewatch.be/en/2016-news-aristotle>) and were spread through several channels:

- WoRMS: news , twitter, editor mailing list & communication contacts received through editors
- LifeWatch Belgium: news & twitter
- LifeWatch Greece: news, Facebook, mailing lists
- VLIZ: news, Twitter , Facebook & mailing lists
- POGO: news
- Marine Board: news
- IRMEDIN -Iranian Marine Environmental Data & Network: news
- Encyclopedia of Life (EoL): Facebook
- Several mailing lists

Since early 2016, users and the public at large can now make **financial contributions to support the work of the WoRMS editors**. This can be done through the recently established VLIZ philanthropy programme, where ‘Support the WoRMS Editors’ has been recognized as a philanthropy project. Gifts dedicated to this project will be used to support the work of WoRMS editors. This will include

help in filling gaps in coverage, participation in international workshops and meetings, expanding the content and enhancing the quality of taxonomic databases, engaging personnel for verification of taxonomic information and purchase of scientific literature.

In February 2016, the **first WoRMS Achievement Award** was announced. The objective of this award is to recognize an editor or group of editors that promoted an outstanding contribution to the development or content of the WoRMS and/or its associated databases. The winner of this first edition was Philippe Bouchet. The award was granted to Philippe not only in recognition of his recent involvement in the creation of MolluscaBase, but also for his long-standing involvement in biodiversity databasing both within and outside of WoRMS.

WoRMS content

- During 2016, the DMT has invested a lot of time in trying to **complete the environment flags** for all accepted species within WoRMS. This action was done in collaboration with the editors (assigning environment flags at a higher level, with inheritance to species level) or by the DMT in cases where the editors agreed to this (too little time to do this themselves) or where there is no active editor available. Originally, there were 102.387 accepted species without environment information. This has now been brought back to 3.866 accepted species publicly accessible and another 20.737 species in quarantine. The DMT will continue to work on this, hoping to soon be able to present an environment flag for all accepted species within WoRMS.
- The **World list of Ctenophora** in WoRMS was synchronized with the externally hosted Global Species Database “Phylum Ctenophora: list of all valid species names”, maintained by Claudia Mills.
- During 2016, several actions were undertaken to create deep-links between WoRMS and the **images of the type collection** held at the MNHN. This was done for the Crustacea type collection (1.224 specimen images) and the Mollusca type collection (5.178 images).
- WoRMS added 12.246 **deep-links to Global Biotic Interactions** (GloBI), an infrastructure and data service that aggregates or combines existing biotic interaction datasets to provide easy access to biotic interaction data.
- One year after the passing of **Michael Türkay**, the DMT got access to his **personal distribution data on Decapoda**. After consultation with the Steering Committee, it was decided to upload this legacy data into WoRMS. This resulted in the addition of 4.372 distribution records.
- The DMT assisted in **several major updates of WoRMS groups**: 135 new names and 110 updated species of marine **Heteroptera** in collaboration with Dan Polhemus; 100 newly added species and 402 newly added distribution records from a taxonomic review of Drilliidae (**Mollusca**); 3.862 new references added to **NeMys**, from the literature database of Dr. Duane Hope and facilitated by editor Jon Norenburg; the implementation of the names of higher **Decapoda** taxa, based on a publication by editor Gary Poore; 140 new fossil species of **Ostracoda**, based on the publication

by C-Hu & H-Tao of 2008; addition of the systematics of fossil **ghost shrimps**, based on the publication of Hyžný & Klompmaker (2015); addition of 943 **Brachyura** names and 1.326 updates initiated by editors Peter Davie & Peter Ng.

- **Encyclopedia of Life (EoL)** has synchronized its content with WoRMS. This resulted in an update of 357.000 EoL names, now also deep-linked to WoRMS. The **Global Names Index (GNI)** has also updated its content with the latest WoRMS version (November 2016). This resulted in an addition/update of 680.000 GNI names.
- A Dutch website on plants and animals that wash ashore (“beach discoveries”) is relying on WoRMS for the correct name and full classification of the species it is displaying.
- During 2016, initial steps were taken to create a **World Decapoda Database**. Involved editors are currently working on the Decapoda content, hoping to be able to launch a Decapoda portal in 2017.
- As a result of the **LifeWatch sponsored workshops** during 2016, a lot of additional data has been added to WoRMS and its subregisters. The **Ostracoda** Register e.g. has now implemented a compromise higher classification and has assigned several Incertae sedis taxa to its correct higher classification. And in follow-up of the **Asciadiacea** workshop, 714 PDFs were uploaded, allowing users and editors easy access to relevant literature. The reports – including a full overview of the accomplishments – is available on the WoRMS activities page.
- The **LifeWatch sponsored data grants** that were initiated in the second half of 2015, were all successfully ended in 2016. All 17 reports are available through the WoRMS activities page (www.marinespecies.org/activities.php). In total, more than 3.400 names were newly added to WoRMS. Some highlights: update of all Oniscidae (Isopoda) species and the addition of 3.800 distributions; 303 original references added to Asellota (Isopoda) and 1.234 type localities for Isopoda entered into the database.
- The **World List of Tardigrada** is now available through a separate GSD. This Tardigrada Database contains all data on the systematic and distribution of marine, freshwater and terrestrial species. Already, the systematic and distribution of marine species have been checked and updated; via a LifeWatch support grant obtained through WoRMS. The freshwater and terrestrial species are still under revision but will be available soon.
- The Flanders Marine Institute (VLIZ) assigned a **DOI for WoRMS** (DOI=Digital Object Identifier) through DataCite, a leading global non-profit organization that provides DOIs for research data. DataCite now stores the associated metadata of WoRMS and – in the future - will disseminate this to other initiatives like the Data Citation Index (Thomson Reuters) who in their turn will link the dataset (WoRMS) to all publications citing it. Assigning a DOI to WoRMS also attests that it answers to certain quality standards and contains the necessary information to make it useable by other scientists.

- The **Chinese Register of Marine Species** – ChaRMS – was launched in May. It contains 18,209 species from the seas around China and has an Editorial Committee of 38 scientists. The establishment of ChaRMS began with the support of the late LIU Ruiyu who led publication of the book listing some 23,000 species from China which formed the foundation for ChaRMS.
- The World Database of Free-Living Marine Nematodes (**NeMys**) has launched two new **identification keys**. These polytomous keys were added in the framework of the long run aims put forward in the 2015 workshop: a key to the species of the genus *Rhynchonema* based on the publications of Bezerra et al. (2014) and Datta et al. (2015), and a key to identify the family Monhysteridae at genus level according to Fonseca and Decraemer (2008).
- The **Hong-Kong Register of Marine Species** – HKRMS – was launched after months of preparations. The HKRMS aims to provide a globally accessible platform for taxonomic information of marine species recorded in Hong Kong waters, for research purposes, but also for biodiversity education and the sustainable management of marine resources. The database has been checked by taxonomic experts of WoRMS as a procedure of quality assurance. A team of 5 thematic editors has been put together, in which each editor carries responsibility for a specific group of taxa.
- Although the **AquaRES project** ended officially a few months ago, there are still actions going on to make both FADA and WoRMS more complete and to allow for a good synchronization between these two taxonomic databases. In addition, the request came to set up a **Register of Antarctic Species (RAS)**, including all non-marine Antarctic Species as an extension of the already existing Register of Antarctic Marine Species (RAMS). An initial workshop to accomplish this took place earlier this year. The first non-marine data are being added to the database.
- In the framework of LifeWatch Greece, a series of publications on the **species checklists in the Greek marine waters** became available. The information was compiled under the Greek Taxon Information System (GTIS) and has now also been added to WoRMS for the 7 available Greek checklists. This includes Cyanobacteria, Porifera, Cumacea, Mysida & Lophogastrida, Bryozoa, Brachiopoda & Ascidiacea.

WoRMS technical developments

- A new RSS feed was made available, to follow the latest specimen additions.
- A new web service was developed. Users are now able to **retrieve distributions** from WoRMS, through the function `getAphiaDistributionsByID()`. This web service was developed in the framework of the AquaRES project.
- Through the **AquaCache**, it is now possible to compare marine and freshwater global taxon lists and check whether their higher classification, spelling and environment information is the same in both databases. See: <http://aquacache.lifewatch.be/>.

- **PESI** – in which the European Register of Marine Species is available – has been added to the **taxon match** services of LifeWatch. See: www.lifewatch.be/data-services
- Aphia now also has a **RESTful web service**. The function calls are identical to the existing SOAP web service. The RESTful web-service is implemented via the Slim framework and Swagger UI as a front end. The SOAP services will remain in place and the DMT will continue to maintain them, in synchronization with the new REST services.
- **Continuous technical support** to the many users of WoRMS through 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, deep-links...).

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 through the **organization of editor-workshops**. A call was launched to all the WoRMS editors during August 2015, to organize workshops between February and May 2016. 6 applications for workshops were received, of which 4 were granted.
- From the 15th until 17th of February 2016, **Ascidiacea** experts from around the world met at the Flanders Marine Institute (VLIZ). The meeting brought together all of the WoRMS Ascidiacea editors and a special guest: the world-renowned ascidian taxonomist Françoise Monniot. This unique event heralded the first time that all Ascidiacea editors came together in one place. The first objective was to revise the contents of the Ascidiacea World Database. The team tackled knowledge gaps and issues identified prior to the workshop. In addition, many species records, distribution and taxonomic issues were resolved during the workshop.
- On February 22-25, eight experts on **marine and anchialine cave faunas** gathered at the Flanders Marine Institute (VLIZ), for the first editor workshop of the World Register of marine Cave Species (WoRCS). Its editorial team took this opportunity to make editorial agreements and discuss future

plans and options in person. The general aim is to create a comprehensive taxonomic and ecological database of species known from marine and anchialine cave environments worldwide. This database allows for an accurate assessment of the diversity and distribution of such faunas, and provides information vital for evidence-based conservation. During the workshop, no less than 900 species known to occur in cave environments have been added to the database.

- On April 4-5, 22 of the 32 **Amphipoda** editors met in Oostende, to further complete the World Amphipoda Database (WAD). During their 2-day workshop, the focus was largely on hands-on, providing the editors with the tools and experience to actively complete their World Register. Several available tools and functionalities were demonstrated, helping editors to more easily edit using the online interface. The group took time to discuss editing guidelines and ongoing Amphipoda initiatives. A list of priorities was put forward and agreed upon, aligned with the priorities put forward by the WoRMS SC.
- From May 17th until 20th, 7 **Ostracoda** editors joined forces during their first workshop in Oostende. Ten goals were put forward, among which to decide on the higher level taxonomy to be used within the WoRMS Ostracoda and to plan the integration of several existing databases (e.g. fossil Myodocope Database) and good quality SEM and optic microscope photos.

Aphia database

Over the last year, several actions have taken place on the level of Aphia– the database & infrastructure 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 **Interim Register of Marine and Non-Marine Genera (IRMNG)** was updated with content of WoRMS. The last update of WoRMS to IRMNG dated from March 2013. The update resulted in:
 - o the addition of 2.281 WoRMS genera to IRMNG
 - o 43.291 updates of existing IRMNG taxa based on WoRMS information. The updates mostly considered authorities, higher classification and environment flags.
 - o 71.132 deep-links were made from IRMNG to WoRMS.In addition, a (dynamic) list of all genus homonyms has been made available through the IRMNG website. A paper on the history, current status and future plans of IRMNG is in preparation.
- The manager of the global millipede species catalogue has contacted the Data Management Team to ask if Aphia could become the new home of this database. The DMT has responded positively to this, and is currently in the process of integrating a full taxonomic list of all Diplopoda into Aphia. This Register will be known as **MilliBase**. There are good contacts with the editor of the marine Myriapoda (to which the Diplopoda belong) within WoRMS, whom supports this initiative.
- The DMT has been approached by the manager of the **Global Compositae Checklist (GCC)**, to integrate this database into the Aphia platform. The DMT has agreed to this. During 2016, a comparison between the structure of the two databases has been made. The initiation of the actual integration is planned for 2017.