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Progress report on number of records encoded in relevant databases for the project purposes reported yearly (M51)

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BIOFRESH

Biodiversity of Freshwater Ecosystems: Status, Trends, Pressures, and Conservation Priorities

Project no. 226874

Large scale collaborative project

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In case the report consists of the delivery of materials (guidelines, manuscripts, etc)

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Introduction

This deliverable corresponds to Task 3.2 of WP3 to encode the data and information following the data requirements of the research workpackages 4-7 (see D3.1). The project BioFresh spent 9% of its total budget for acquisition of new data and tools to be linked to the portal – the Contingency Fund – that is reported elsewhere. This is the third and last report under the task T3.2.

Some efforts were primarily reported in the first and second reports, and goals and background are not reported here again.

Note: The title of the first report was "Report on the data encoding" as taken from the workpackage description in the DoW. The title of the present one is taken from the list of deliverables in the DoW.

Odonata occurrences data (contingency fund)

For details on Odonata occurrence data work, see D3.2a.

Further results on Odonata occurrences in this 3rd period:

- 6,485 records (for 779 species) were added for a final total of 33,963 occurrences.
- 193 species were added for a final total of 2,526 species.
- 59 additional references were used for a final total of 472 over about 2,000 that were scrutinized: many references did not have geocoordinates, but only locality names. Those with many geocoordinated data were privileged.
- The dataset was delivered to IUCN in April 2013.
- The creation of a metadatabase entry on this dataset and the inclusion of this dataset in the platform (work still in progress) remain to be done after a final validation.

Delay

All along the project we have suffered of the turn-over of staff dedicated to that task, specifically hired for the digitisation work. The learning curve is significant (3 to 4 weeks to be completely productive, to get the idiosyncrasies for the group including in the related publication, each domain in taxonomy has its own particularities, and its geography), so in the end, the permanent staff had to finish the encoding which was not planned at the beginning.

Other digitization efforts for partners

During the 3rd period, two other datasets were entered:

- **Plecoptera**: 688 occurrences for 110 species from 72 publications; dataset sent to BOKU in July 2013.
- **Aquatic plants**: 98 maps for 123 aquatic plants of the northern hemisphere were digitized. The distribution ranges were extracted as polygons. The dataset was sent to IUCN in November 2013.

Other and regular data encoding, mainly on freshwater fishes

Species traits will be taken more into account in many initiatives in Europe for biodiversity (pers. comm., from EEA/Topic Center for Biodiversity), which was confirmed during the symposium Water Lives in Brussels in January 2014. FishBase and freshwaterecology.info should join their efforts to oncrease the coverage of all freshwater species. The results below show numbers of data encoding in FishBase during BioFresh, and the current status of freshwater fish species traits coverage.

Results

Table 1. – Data encoding effort on freshwater fishes of the world as record numbers per major topic of interest for BioFresh (=data type relevant to WPs4-7 needs). Entered: new records; modified: records corrected or updated. Period: 01/11/2012-30/04/1014; BioFresh: 01/11/2009-30/04/2014. Percentage: Total number of records entered during BioFresh over the total number of freshwater species (as of 30 April 2014) in the world.

Records	**Entered**				**Modified**			
Topics	**Period**	**BioFresh**	**Total**	**%**	**Period**	**BioFresh**	**Total**	**%**
Species	404	1390	16932	8%	3863	6967	14107	49%
Stocks	418	1385	16600	8%	1800	3910	12398	32%
Synonyms	910	3050	45742	7%	3090	10370	42244	25%
OccurrencesLit	214	6684	11895	56%	8	321	575	56%
Country	957	3155	44773	7%	3527	7363	30974	24%
Ecosystem	3659	9586	45651	21%	5468	10091	11481	88%
FAO areas	503	1545	19824	8%	529	1164	3194	36%
Introductions	109	220	4244	5%	286	1016	3648	28%
Ecology	129	224	4093	5%	151	195	1546	13%
Morphology	883	1826	7131	26%	1292	1716	3037	57%
Diet	0	28	2129	1%	3	305	620	49%
Growth	35	262	2980	9%	2955	2955	2955	100%
Maturity	101	473	2973	16%	68	372	666	56%
Reproduction	201	565	4441	13%	122	430	1182	36%
Fecundity	55	184	1605	11%	29	118	531	22%
Spawning	53	226	3037	7%	68	314	985	32%
References	1095	2766	14883	19%	516	1343	2706	50%
Biblio citations	7659	23054	226345	10%	10326	27569	150346	18%
Common names	638	6842	98710	6%	2141	16203	56988	28%
Length frequency	0	51	514	10%	2	22	202	11%
Length-length	3	24	7067	0%	42	90	117	77%
Length-weight	99	883	3916	23%	50	1310	1310	100%
Predators	36	68	1677	4%	31	34	418	8%
Totals	18161	64491	587162		36367	94178	342230	

The total of records entered in FishBase including taxonomy/nomenclature, distribution and traits altogether during the reporting period is around 18,000, and 65,000 since the beginning of BioFresh. There was a significant increase during the third period after the end of the data entry for Odonata.

BioFresh (2009-2014) has covered 18% of the lifespan of FishBase that started in 1990 (4.5 years over 24.5 years).The percentage of the new references encoded during the project reflects that percentage (19%). But the results are variable between the topics. The percentage of records entered reflects 1) the topics of interest of BioFresh (ecosystem, occurrence, reproduction, …), and 2) the rhythm of new publications (species, stocks, country, FAO area).

The percentages of modified records are much higher, which shows that BioFresh had a strong impact on the quality control of data that were checked. The higher percentages reflect some targeted efforts (morphology, length-weight and length-length relationships, growth, ecosystem, maturity, …).

Gap analysis

This matrix can also be read as a gap analysis on the knowledge about distribution and species traits. If one compares the total number of freshwater species (16,932 as of 30 April 2014) with the total number of records entered, one can see the amount of lacking knowledge. In the following table, this is expressed as a percentage values.

Table 2. – Gap analysis about the species traits knowledge of freshwater species. Percentage: Total number of records entered by topic over the total number of freshwater species (as of 30 April 2014) in the world. Note that in some cases, the percentage should be lower because some species may have several records for one topic (e.g., the length-X relationships).

	Records	Percent
Species	16932	100%
Introductions	4244	25%
Ecology	4093	24%
Morphology	7131	42%
Diet	2129	13%
Growth	2980	18%
Maturity	2973	18%
Reproduction	4441	26%
Fecundity	1605	9%
Spawning	3037	18%
Length length	7067	42%
Length weight	3916	23%
Predators	1677	10%

For the species traits the average information available is 27%. It means that globally we know some details only about a quarter of all freshwater fish species. This knowledge is higher in Europe and North America.

During BioFresh two major works on freshwater fish taxonomy were published by Kottelat on loaches and fishes of Southeast Asia. They are still being entered in FishBase to update the taxonomy and the nomenclature.

Kottelat, M., 2012. Conspectus cobitidum*: an inventory of the loaches of the world (Teleostei: Cypriniformes: Cobitoidei). The Raffles Bulletin of Zoology, Suppl. (26):1-199.

Kottelat, M., 2013. The fishes of the inland waters of Southeast Asia: a catalogue and core bibliography of the fishes known to occur in freshwaters, mangroves and estuaries. The Raffles Bulletin of Zoology 2013 (Suppl. 27):1-663.

Western Palearctic fishes

Goal modified

After comparison of the database structure mentioned in the previous report, we realized that FishBase was a possible host accepting some simplifications, and thus a new database was not necessary. Instead, a dedicated interface was designed, still accessing the same back end as FishBase global. A filter selects the European countries and their species.

Figure 1. – Interface for European fish species.

The interface, currently restricted to freshwater species, is available from the search page of FishBase under the regional interfaces section: http://www.fishbase.org/search.php?region=europe

Future extensions will include:

- Selection of marine or freshwater or all species.
- Selection of European or Western Palearctic regions.

Data entry

The filtering of freshwater species for Europe has required reviewing of all species reported from Russia and Turkey to differentiate the species that occur only in the European or only in the Asian parts of these 2 countries that are across continents.

- Russia: 445 freshwater species in total, 270 in the European part, 226 in the Asian part.
- Turkey: 330 freshwater species in total, 91 in the European part, 320 in the Asian part.

European Freshwater Fish occurrence data

Printed maps with point data from national atlases were provided mid November 2012 by FVB.IGB. All maps were digitized, and a dedicated methodology to extract coordinates was established. The dataset is being integrated in the portal, to be delivered to GBIF.

In total, 475 maps were scanned from 10 national faunas of European and Near East countries. About 15,000 occurrence data were extracted from the maps for 150 species. The characteristic of these occurrence data is that the date of occurrence is the date of the publication of the atlas. So their use and interpretation of results must be carefully evaluated.

Quality control of country occurrences

The country list by species web page in FishBase has been improved by displaying a map showing occurrence and threat statuses and habitat by country with icons that were specifically designed. BioFresh is mentioned at the bottom of the page.

The maps are available for each species from the species summary page. For example for the northern European pike, *Esox lucius*, see Figs. 2-3:
http://www.fishbase.org/Country/CountryList.php?GenusName=Esox&SpeciesName=lucius
Use the following if temporarily the map does not show up:
http://www.fishbase.ca/Country/CountryList.php?GenusName=Esox&SpeciesName=lucius

These maps could be used for quality control (planned for FishBase in May 2014). For the pike for instance, we can notice that the species is reported in FishBase neither from Kaliningrad region nor from Belarus. References can be then searched to complete the dataset for the pike. In the interface, users can send their comments, and indicate if a report is wrong or missing in their country. This is a second type of quality control driven by citizen science. Similar interfaces could be developed for ecosystems, ecoregions, and any other geographic area, like protected areas.

Mapping occurrences by countries has always been tricky, especially in large countries: maps need to be used with caution. As step of quality control we give a copy of the text behind the link at the top left of the map: How to read the map (see Annex).

These maps could be linked from the BioFresh Atlas as the atlas will not include species maps in general.

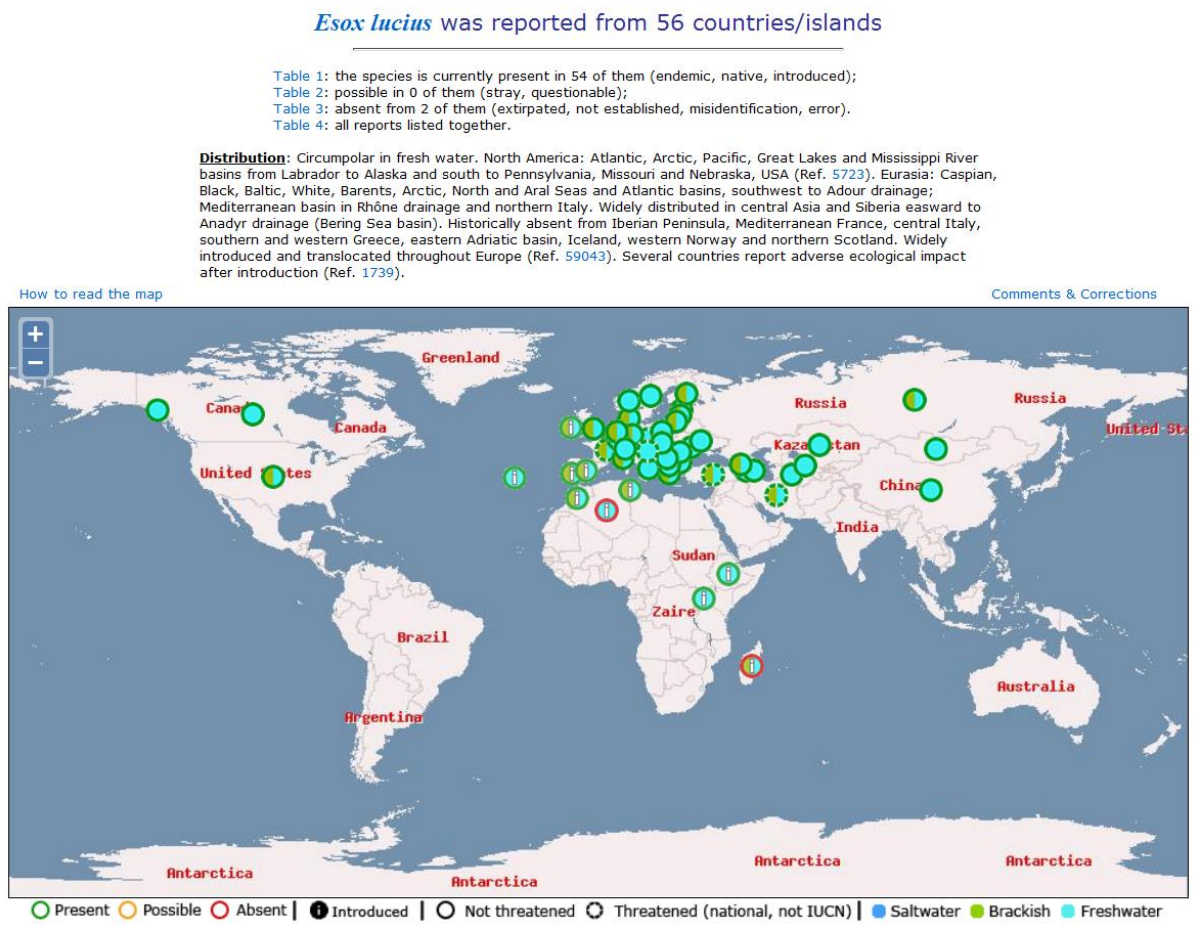

Figure 2.

Figure 3.

Figures 2-3. – Map of countries where the European northern pike (*Esox lucius*) was reported. See the legend below the map for explanations. 2: World view; 3: European view.

ANNEX
How to read the country map per species

How to read the map

The literature species report in a country is represented by an icon (a circle) in the middle of the country polygon.
Important: a report in the literature does not necessarily mean that the species is currently present in the country! There are errors in literature, misidentifications, and some species have been locally or globally extirpated or eradicated.

The patterns and colours of the icon give 4 additional indications (see the legend under the map for the signification of the different colours and patterns):

- Presence status: the colour of the ring (green: Present; orange: Possible; red: Absent)
- Introduction status: a white 'i' in the middle of the circle indicates that the species has been introduced, if the presence ring is green it means that the species established itself or that we don't know the current presence status, if the presence ring is red it means that the species did not established itself.
- Threatened status: the pattern of the ring (not dashed: not threatened or no information; dashed: any status indicating that the species has a national threat). Important: This is the national threatened status, not the global IUCN one.
- Salinity status = milieu: the colours in the middle circle (blue: Marine; green: Brackish; light blue: Freshwater; marron: Land).

How to interpret the map

- The icon in a country polygon indicates that the species has been reported at least once in the country, BUT NOT NECESSARILY that it is present IN THE ENTIRE COUNTRY.
- It is particularly the case for large countries such as Brazil, USA, Canada, Russia, China, India, Indonesia, Australia, etc.
- For example, a number of freshwater species present in western European countries are also present in the western part of Russia, but not beyond the Ural mountains. Still the icon for Russia is placed in its Asian part.
- The icon is placed approximately in the middle of the country, even for the species that are marine only.
- For marine species, it does not mean either that the species is present in all oceanic coasts of the countries (e.g., Atlantic and Pacific for USA and Canada).
- So the map needs to be interpreted carefully, but we think it helps to give a quick view of the distribution by country, in a better way than the textual list of countries when it is over a dozen countries.