



FishBase - SeaLifeBase Symposium

30 years of FishBase – 15 years of SeaLifeBase

6-7 September 2021

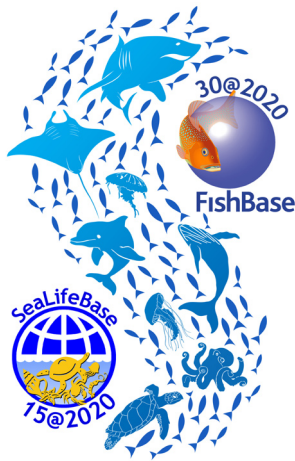
Muséum national d'Histoire naturelle, Paris, France



Programme

Monday, September 6, 2021

TIME	EVENT	PLACE
09:30 - 09:55	Check-in: Control of sanitary passes, delivery of badges, registration, payment <i>Chair: Patrice Pruvost</i>	Hall Auditorium
10:00 - 10:15	Welcome – Gildas illien, Patrice Pruvost	Auditorium GG
10:15 - 10:30	Film: Presentation of FishBase and SeaLifeBase – Deng Palomares	Auditorium GG
10:30 - 11:00	Why do fish reach first maturity when they do? – Daniel Pauly	Auditorium GG
11:00 - 11:30	Creating a Portal for Video Data on FishBase: the BRUVS tool – Jessica Meeuwig	Visioconference
11:30 - 12:00	Priors in FishBase – Rainer Froese, Rodolfo Reyes and Vina Angelica Parducho	Visioconference
12:00 - 12:30	African freshwater fish diversity and human utilisation: a happy marriage or conflicting extremes? – Jos Snoeks	Auditorium GG
12:30 - 14:00	Lunch <i>Chair: Philippe Béarez</i>	
14:00 - 14:20	History of the computerisation of the fish collection and its collaboration with FishBase – Patrice Pruvost	Auditorium GG
14:20 - 14:40	Ecocentric fisheries management in the European Seas (EcoScope project) – Athanassios Tsikliras	Auditorium GG
14:40 - 15:00	Reaching into new user groups for FishBase – Cornelia Nauen	Auditorium GG
15:00 - 15:20	Important characteristics to become a successful freshwater fish invader – Camille Bernery	Auditorium GG
15:20 - 15:50	Coffee break <i>Chair: Fabrice Teletchea</i>	Hall Auditorium
15:50 - 16:10	Why and how French Public Aquariums and FishBase can work together to improve the knowledge on Fish? – Fabrice Teletchea	Auditorium GG
16:10 - 16:30	Educational use of Fishbase by public aquaria – Marie Bournonville	Auditorium GG
16:30 - 16:50	Onset of collaboration between Fishbase and aquaria : the example of the Museum Aquarium of Nancy – Dominique Chardard	Auditorium GG
16:50 - 17:10	The Tropical Aquarium, development and promotion of research and conservation missions – Charles Fusari	Auditorium GG
18:00 - 19:00	Visit to the Tropical Aquarium at the Porte Dorée	
19:00 - 21:00	Cocktail at the Aquarium de la Porte Dorée	



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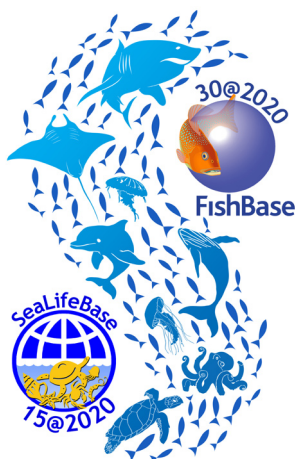
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Tuesday, September 7, 2021

TIME	EVENT	PLACE
	<i>Chair: Philippe Keith</i>	
09:30 - 09:50	Counting fish species: importance, methods, improvements – Nicolas Bailly	<i>Auditorium GG</i>
09:50 - 10:10	Catalog of Fishes – Ronald Fricke	<i>Auditorium GG</i>
10:10 - 10:30	WoRMS and its relation with FishBase and SeaLifeBase – Stefanie Dekeyzer	<i>Visioconference</i>
10:30 - 10:50	AFORO Shape Analysis of Fish Otoliths – Antoni Lombarte	<i>Auditorium GG</i>
10:50 - 11:10	Coffee break	<i>Hall Auditorium</i>
	<i>Chair: Guillaume Lecointre</i>	
11:10 - 11:30	The use of FishBase data by researchers of IFREMER institute– Kélig Mahé	<i>Visioconference</i>
11:30 - 11:50	Fishbase / fishipedia share aquatic knowledge together – Adrien Falzon	<i>Auditorium GG</i>
11:50 - 12:10	The use of FishBase data by fair-fish through its FishEthoBase and Fish Test – Rahel Salathé	<i>Auditorium GG</i>
12:10 - 12:30	The importance of genetic diversity in commercial fish species and a simple detection of decline – Celia Schunter	<i>Visioconference</i>
12:30 - 14:00	Lunch	
	<i>Chair: Boris Leroy</i>	
14:00 - 14:20	Storefish 2.0: a database on the reproductive strategies of teleost fishes – Fabrice Teletchea	<i>Auditorium GG</i>
14:20 - 14:40	Pre-Columbian Caribbean palaeofisheries – Sandrine Grouard	<i>Auditorium GG</i>
14:40 - 15:00	Development of a positive list identifying the fish species authorized to be kept in Wallonia (Belgium) – Marie Bournonville	<i>Auditorium GG</i>
15:00 - 15:20	Coffee break	<i>Hall Auditorium</i>
15:20 - 15:40	Improving reproducibility of Environmental Niche Modeling studies for marine invertebrates by using databases of pictures and deep learning – Alexis Martin	<i>Auditorium GG</i>
15:40 - 16:00	Reported trends in global inland freshwater capture and culture finfisheries vary by human development index including the tendency to identify species caught – Peter Sorensen	<i>Visioconference</i>
16:00 - 16:20	Measuring the scientific impact of FishBase using citation analysis – Austin Humphries	<i>Visioconference</i>



Abstract book

Symposium organised by the Muséum national d'Histoire naturelle

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Muséum Aquarium de Nancy (MAN)

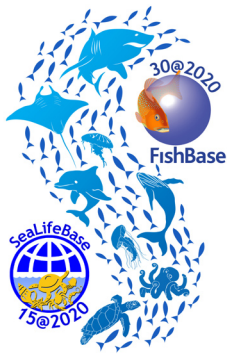
Partnerships

Muséum national d'Histoire naturelle (Paris)

Société Française d'Ichtyologie (SFI)

Aquarium Tropical de la Porte Dorée (Paris)

Aquariums de France



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Abstracts are listed in alphabetical order of first author. The speaker's name is underlined

Monday, September 6, 2021 – 15:00-15:20

Important characteristics to become a successful freshwater fish invader

Camille BERNERY¹, Céline BELLARD², Franck COURCHAMP³, Sébastien BROSSE⁴, Boris LEROY⁵

¹ Ecologie Systématique et Evolution, AgroParisTech, Université Paris-Saclay, Centre National de la Recherche Scientifique : UMR8079, France

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³ Ecologie, Systématique et Evolution (ESE), Université Paris-Sud, Orsay, France

⁴ Laboratoire Evolution et Diversité Biologique (EDB), Université Paul Sabatier - Toulouse III, France

⁵ Biologie des Organismes et Ecosystèmes Aquatiques, Muséum national d'Histoire naturelle, France

Freshwater fish species are among the main introduced taxa, and these introductions occur in all biogeographic realms. Introduced fishes are known to cause important ecological and socioeconomic impacts if they establish and become invasive. Predicting current and future trends in invasions is necessary to inform management policies, but such predictions require understanding the drivers influencing the invasion success. The characteristics of invasive fishes, especially concerning the introduction and the impact step, are still poorly known. For the first time at the global scale, we investigated characteristics associated with the introduction success, establishment success and impacts of 840 freshwater fishes through the study of 14 variables. Specifically, we used comparative analyses and GLMs to investigate the role of variables pertaining to species life-history traits and ecosystems characteristics, as well as socio-economic drivers such as introduction pathways. Our results showed that the most successful species had different traits depending on the introduction pathway. In addition, several drivers explained the establishment success independently of the considered pathway, such as the number of introduction pathways and diet and a high level of parental care. The impact success is explained only by the number of pathway and the major native region. Our results provide important insights into the main drivers of freshwater fish invasions at a worldwide scale.

Tuesday, September 7, 2021 – 14:40-15:00

Development of a positive list identifying the fish species authorized to be kept in Wallonia (Belgium)

Marie BOURNONVILLE¹

¹ Aquarium-Muséum universitaire de Liège, Belgium

In Belgium, the possession of certain taxa as pets is regulated at the regional level by positive lists. Those lists identify the species authorized to be held by individuals without specific authorization.

In Wallonia, positive lists already exist for mammals and reptiles. In 2019, a work group was created to identify fish species suitable for home aquaria. This group includes representatives of pet trade, animal protection associations and shelters, a veterinarian specializing in fish and a biologist specializing in aquaculture. The group was coordinated by a member of the Walloon public administration and a representative of the Walloon animal welfare council.

This presentation will discuss eligibility criteria and how the working group uses FishBase to assess species.



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Monday, September 6, 2021 – 16:10-16:30

Educational use of Fishbase by public aquaria

Marie BOURNONVILLE¹, Jérôme MOURIN², Thomas ZIEGLER³, Attila VARGA⁴, Isabel KOCH⁵, Fabian SCHMIDT⁶, Milena MIČIĆ⁷, Amalia MARTÍNEZ DE MURGUÍA⁸

¹ Aquarium-Muséum universitaire de Liège, Belgium

² UCA, Aquarium de Lyon, France

³ Kölner Zoo, Germany

⁴ Sóstó Zoo, Hungary

⁵ Wilhelma Zoologisch-Botanischer Garten Stuttgart, Germany

⁶ Zoo Basel, Switzerland

⁷ Aquarium Pula, Croatia

⁸ Aquarium Donostia, San Sebastián, Spain

In the 21st century, zoos and aquaria work is oriented towards the goals of education, research and conservation. Public aquaria aim to educate their visitors about the aquatic world and to raise awareness about the importance of nature conservation and the threats that aquatic ecosystems face.

To fulfill this mission, public aquaria need to have access to accurate and verified scientific information. When it comes to fish, FishBase is the most renowned resource.

A survey carried out among French and European public aquaria revealed the most sought-after data on FishBase and the most frequent uses, which are made of it.

Monday, September 6, 2021 – 16:30-16:50

Onset of collaboration between Fishbase and aquaria: the example of the Museum Aquarium of Nancy

Dominique CHARDARD^{1,2}, Christian WILLIG¹, Nicolas BAILLY³, Rachel ATANACIO³, Laurent FORDOXCEL¹, Sandra DELAUNAY¹, Pierre-Antoine GERARD¹, Fabrice TELETCHEA^{4,5}

¹ Université de Lorraine – UR Animal et Fonctionnalités des Produits Animaux, France

² Muséum Aquarium de Nancy, France

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⁵ Q-Quatics (Vice-Chair)

Though collaborations between aquaria and FishBase provide mutual benefits, contacts established by the past never led to effective relations. Indeed, aquaria hold numerous data on housed species such as pictures, morphometric data, morphologic variations, comportment, longevity, data on reproduction and life stages. The aim of the Museum Aquarium of Nancy is to set up a collaboration with FishBase bearing in mind this could serve as an example even a modus operandi for data collecting and formatting for other aquaria. Due to historic background in aquariology research, the Museum Aquarium of Nancy has a photo library of 3455 pictures, so the collaboration started with the dispatching of pictures to FishBase. The first part of the library (15% of pictures) has been evaluated for interest and 205 pictures with associated data have been sent for on-line release. With this effective onset of collaboration, we further look to work on the dispatching of published data (the MAN edited a review between 1974 and 1999) and data collected on alive or formaldehyde conserved specimens.



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Tuesday, September 7, 2021 – 10:10-10:30

WoRMS and its relation with FishBase and SeaLifeBase

Stefanie DEKEYZER¹, Leen VANDEPITTE¹, Wim DECOCK¹, Khadija BOUIRIG¹, Bart VANHOORNE¹, Nicolas BAILLY², Maria Lourdes PALOMARES²

¹ Flanders Marine Institute (VLIZ), Belgium

² University of British Columbia, Canada, and Quantitative Aquatics, Inc. (Q-quatics)

The World Register of Marine Species (WoRMS) aims to provide the most authoritative list of names of all marine species globally, ever published. WoRMS was established in 2007 and is a global, open-access inventory of names of marine taxa. WoRMS is managed within Aphia, an infrastructure designed to capture taxonomic and related data and information, and includes an online editing environment. Through this editing environment, experts can update and maintain the content of the database in a timely fashion. A network of more than 450 editors across the globe is helping to keep the content of WoRMS up-to-date. This is done in close collaboration with the WoRMS Data Management Team (DMT) at the Flanders Marine Institute (VLIZ) in Belgium, where the database is hosted.

There where taxonomic databases already exist (referred to as externally hosted and managed species databases), a collaboration is sought rather than a duplication of the work. This is the case for *e.g.* FishBase and SeaLifeBase. FishBase covers all fishes of the world, whereas SeaLifeBase covers all marine organisms of the world, with an emphasis on the exploited species and their ecosystems. In 2018, the collaboration between WoRMS, FishBase and SeaLifeBase was formalized in a Memorandum of Understanding (MoU).

WoRMS recognizes FishBase as a key provider of taxonomic, biological, ecological and other life traits data for fish. So instead of compiling its own list of fishes, WoRMS is collaborating with FishBase to share the FishBase taxonomy within WoRMS. For this purpose, a semi-automatic synchronization tool, the FishBase harvester, was developed, allowing to reflect the FishBase content through WoRMS as closely as possible. For each FishBase taxon available through WoRMS, a deep-link is created to the related FishBase page and due recognition is provided to FishBase as the information provider. In case fish-related questions are sent to the DMT, these are immediately forwarded to the FishBase team for their consideration. The DMT will never make changes to content coming from an external species database without explicit permission of the external provider.

SeaLifeBase recognizes WoRMS as a key provider of taxonomic data of marine species other fish. WoRMS provides standard, detailed and referenced taxonomic information on non-fish aquatic organisms to SeaLifeBase. Furthermore, SeaLifeBase and WoRMS will exchange a number of life traits data, *i.e.* biological, ecological and distributional information.

WoRMS is part of the LifeWatch Species Information Backbone (LW-SIBb), which aims at bringing together taxonomic and species-related data and at filling the gaps in our knowledge. LifeWatch, the E-Science European Infrastructure for Biodiversity and Ecosystem Research, is a distributed virtual laboratory, which is used for different aspects of biodiversity research. The Species Information Backbone of LifeWatch aims at bringing together taxonomic and species-related data and at filling the gaps in our knowledge.

Tuesday, September 7, 2021 – 11:30-11:50

Fishbase/ Fishipedia share aquatic knowledge together

Adrien FALZON¹, Benoit CHARTER¹

¹ Fishipedia

The last decades have seen internet's development and with its passionate people, allowing access to knowledge.

Fishbase is a source of data for scientists and marine biologist students. It is today a reference in terms of scientific



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database on fish. From our point of view all these informations had to be accessible to the general public. Fishipedia is willing to be the link between the general public and scientific data on aquatic fauna.

Our goal is to:

- Raise awareness by giving freely access to information on marine biodiversity.
- Connecting a wide audience, divers, aquarists and scientists.
- Innovate by developing new learning tools and participative science.
- And finally protect species and ecosystems by publishing independent surveys and participating in conservation projects. We are very pleased and honoured to have recently developed more strength in our relations by creating back links from both websites.

Again and in the name of Fishipedia We are very happy to celebrate Fishbase's thirtieth anniversary. We hope our partnership is long and prosperous.

Tuesday, September 7, 2021 – 09:50-10:10

Eschmeyer's Catalog of Fishes and FishBase: The future path for a unique global list of recent fishes

Ronald FRICKE¹, Nicolas BAILLY²

¹ Staatliches Museum fuer Naturkunde in Stuttgart, Germany

² University of British Columbia, Canada

A brief overview on the history of Eschmeyer's Catalog of Fishes (formerly Catalog of Fishes) is presented. The Catalog was founded in 1981. A printed catalogue of the genera of Recent fishes was published in 1990, a species catalogue was published in 1998. In 2010, a family catalogue was published by van der Laan *et al.* Since the late 1990s, the Catalog is available online, and is updated monthly. The Catalog currently comprises a total of 35,955 valid fish species and their synonyms. New species are continuously added; in 2020 there were 359 new species described, while in the current (August 2021) edition we already provide 227 new species in 2021.

Eschmeyer's Catalog of Fishes is the basis for classification in FishBase, but due to database discrepancies, the update of FishBase has been slow, and changes may be implemented up to two years after their appearance in the Catalog. On the other hand, the Catalog has only two active editors; it is in need of restructuring so that its future maintenance and editing is guaranteed.

Therefore, we are currently working on an NSF grant proposal to partly merge the two big fish databases, with the following objectives:

- harmonising the database structures for easy update of the taxonomy in FishBase;
- creating an electronic literature database of both ECoF and FishBase references for internal use by the editors;
- opening ECoF for additional editors (under supervision of a chief editor).

Monday, September 6, 2021 – 11:30-12:00

Priors in FishBase

Rainer FROESE¹, Rodolfo REYES Jr², Vina Angelica PARDUCHO³

¹ Helmholtz Centre for Ocean Research, Germany

² FishBase Information and Research Group, Inc.

³ Q-quatics

Combining new data with existing or prior knowledge is the state of the art in applied analyses such as assessments of population biomass, growth and mortality. Given the strong influence that prior information has on the results of such analyses, it is of paramount importance that such information is objective and informative. FishBase and SeaLifeBase are



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global compilations of relevant data that can be used to construct such priors by intelligent aggregation, by correlation with related traits, or by a combination of both approaches. This presentation will show how priors in FishBase are derived, with examples for length-weight relationships which are used widely to transfer length observations into estimates of biomass, and for the intrinsic rate of population increase, which is also widely used in data-limited stock assessments.

Monday, September 6, 2021 – 16:50-17:10

The Tropical Aquarium, development and promotion of research and conservation missions

Charles FUSARI¹

¹ Aquarium Tropical de la Porte Dorée, France

The Tropical Aquarium has reopened after just over a year of renovation, allowing visitors to enjoy a more comfortable visit. However, changes in this historic place are ongoing. The global context of biodiversity loss is forcing us to revisit our role as a zoological institution and to consider how we can actively participate in species conservation in a coordinated effort, using our skills and facilities.

Tuesday, September 7, 2021 – 14:20-14:40

Pre-Columbian Caribbean palaeofisheries

Sandrine GROUARD¹, Sophia PERDIKARIS, Irv QUITMYER, Noémie TOMADINI

¹ Archéozoologie, archéobotanique : sociétés, pratiques et environnements, Muséum national d'Histoire naturelle, Centre National de la Recherche Scientifique : UMR7209, France

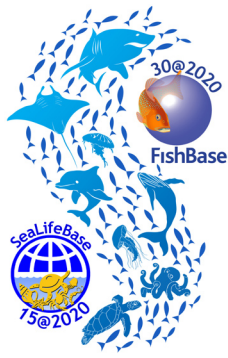
In this contribution, we present a synthesis of pre-Columbian Caribbean palaeofisheries and examine the interrelationships of exploitation according to size for eight fish families, in a diachronic perspective for the Lesser Antilles.

Indeed, zooarchaeological ichthyofauna from the pre-Columbian times (5000 BCE-1500 CE) in the Lesser Antilles provided almost 400,000 identified fish remains at the species, genus or family level. These specimens originate from 142 assemblages and 11 major islands: Saint-Martin, Barbuda, Antigua (including Long Island), Guadeloupe (Grande-Terre, Basse-Terre, Les Saintes, Islets from Cul-de-Sac-Marin, la Désirade, Petite Terre, and Marie-Galante), and Martinique.

Among them, the skeletal remains of Holocentridae, Serranidae, Carangidae, Lutjanidae, Haemulidae, Scaridae, Acanthuridae, and Scombridae bones were measured, and biometric constants were applied. Equations were calculated from 563 modern osteological specimens, which provided reconstructed standard, fork, total lengths (SL, FL, TL), and body mass (BM) of fish.

During the pre-Columbian period in the Caribbean, the length distribution curves possibly represent anthropogenic selections that follow statistical Normal, Poisson, or Bimodal distributions. Through times, coral reef fish became increasingly important in subsistence, but mangroves and lagoons were overfished at the end of the chronological sequence. Moreover, fish sizes from all ecosystems decreased over time.

From the estimates of zooarchaeological fish size and the ethnoarchaeological, historical, ethnographical, and biological sources, it was possible to infer the various strategies and equipment used by the Amerindian fishermen. It is likely that the same triad of practices (hooks/lines, nets, and traps) survived the passage of time and emerged to be among the most popular fishing techniques used by modern fishermen in the Lesser Antilles.



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Tuesday, September 7, 2021 – 16:00-16:20

Measuring the scientific impact of FishBase using citation analysis

Austin HUMPHRIES¹

¹ University of Rhode Island, USA

Citation analysis was developed in the 1960s as a way to find resources. It has been used in more recent times to track the impact of scholarly work and scholars. Quantifying such metrics are useful for professional advancement, policy decisions, and setting future research agendas. FishBase is an online database containing information on more than 30,000 species. Researchers have used FishBase for a variety of purposes over the last 30 years, yet little is known about the specifics of these uses, geographical scope, and temporal trends in usage. We examine all resources that have cited FishBase from 1991-2020 and analyze these data using a variety of metrics. Preliminary results suggest FishBase usage is concentrated in the global North and has increased linearly through time.

Tuesday, September 7, 2021 – 10:30-10:50

AFORO: Shape Analysis of Fish Otolith

Antoni LOMBARTE¹, Emili GARCIA-LADONA¹

¹ Institut de Ciències del Mar, CSIC, Spain

Otolith morphology is a way of providing information on species, phylogeny, ecological, biological parameters and geographic origin. The sagitta otolith shape variability has been related to genetic, ontogenetic and environmental factors and their species-specific shape properties has been used in stomach contents studies and in descriptions of fossil fauna and archeological sites. Ontogenetic otolith shape changes during fish growth has been described and used to identify age in commercial species and sex and maturity stage. So, an automatic system able to describe and identify otolith shapes can be of general use for sex, age, populations and species identification studies, and give necessary and relevant information in ecological studies. Since 2002, AFORO (Shape analysis of otoliths) website offers an open online catalogue of otolith images and its associated shape analysis through pattern recognition techniques applying Elliptic Fourier analysis (EFA), wavelet analysis (WT) and basic morphometrics. The database is regularly updated and at present it contains a total of 7221 high-resolution images corresponding to worldwide 2371 species and 261 families. This site also allows searching and identifying directly using query images of otoliths. The automatic classification system of the otoliths in basis to sacular outline has been built using wavelet transform algorithms. Wavelet transform representation allows quantifying the irregularities of the contour and determining its precise position. These properties make these techniques suitable for pattern recognition purposes as species recognition. AFORO included also 3D images and a dynamic table of otolith length vs fish length relationship.

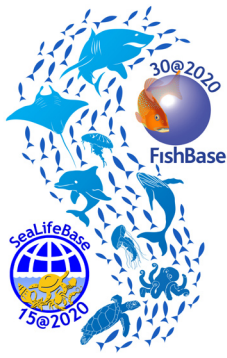
Tuesday, September 7, 2021 – 11:10-11:30

The use of FishBase data by researchers of IFREMER institute

Kélig MAHÉ¹

¹ IFREMER, Département Ressources Biologiques et Environnement, France

A review of the use of the database was carried out between 1999 and 2021. Over this period, 219 documents refer to FishBase. These include 135 publications (121 referenced in Web of Science) and 59 reports. The annual number of documents using FishBase has increased steadily to about 20 per year in recent years. Amongst IFREMER researchers and technicians, 223 (*i.e.* 15% of IFREMER) have used FishBase data. Data extracted from FishBase have been used mainly to obtain information to describe one or more species, to compare results obtained on a population with other popula-



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tions within a species, or to feed databases or models studying fish communities. These analyses are also used for studies of geographical and temporal patterns. A recent example is the study of coelacanth growth published in 2021. From the new ageing methodology applied on the scales, we showed that the maximal age of the coelacanth was underestimated by a factor of 5. These new growth data were compared from auximetric plot and life-history traits with other marine fish species (1,383 populations distributed across 1,313 species extracted from FishBase). This use of FishBase data has reinforced the importance of these new results on coelacanth.

Tuesday, September 7, 2021 – 15:20-15:40

Improving reproducibility of Environmental Niche Modeling studies for marine invertebrates by using databases of pictures and deep learning

Alexis MARTIN¹, Nicolas ROSSET², Yann GOUSSEAU², Jonathan BLETTERY³, Agnès DETTAÏ³, Marc ELÉAUME⁴

¹ Biologie des Organismes et Ecosystèmes Aquatiques (BOREA), Muséum national d'Histoire naturelle, France

² Telecom Paris, Télécom ParisTech, France

³ Muséum national d'Histoire naturelle, France

⁴ Institut de Systématique, Évolution, Biodiversité – UMR 7205, France

To face the challenge of improving reproducibility of Ecoregionalisation studies and Ecological Niche Modeling for Southern Ocean benthic marine invertebrates, we developed a dedicated framework. This framework is based on the photographing on the field of all the observed organisms in association to the recording of the sampling effort. The storage of these images within a database constitutes the main key element of reproducibility: given the possibility of going back to the observation raw data for taxa identification checking, quality evaluation and corrections, modeling results can be fully assessed, criticized, recalculated or compared. The framework includes also two supplementary parallel process to improve reproducibility, based on the DNA barcoding techniques and the deep learning approach. We present the development of this framework, started in 2015 in the context of the scientific monitoring of the French Southern Ocean fisheries. This case study aims at providing a proof of concept and constitutes a methodological proposal for the scientific communities involved in benthic marine invertebrates ecology, or teams involved in fisheries and marine protected areas monitoring programs.

Monday, September 6, 2021 – 14:20-14:40

Creating a Portal for Video Data on FishBase: the BRUVS tool

Jessica MEEUWIG¹,

¹ Marine Futures Lab, University of Western Australia

Baited remote underwater video systems (BRUVS) have been deployed for over 20 years as a standardised method to identify, count and measure fish in coastal habitats. More recently, BRUVS have been modified for deployment in open ocean systems. BRUVS are a non-lethal tool that documents the status of marine wildlife consistently, providing benchmarks that address a key set of challenges with respect to ocean management, including documenting outcomes of large marine protected areas.

Key to ocean science and management is equitable, open access to data, a principle long-upheld and delivered upon by FishBase. To allow greater access to data on fish populations derived from BRUVS, a BRUVS Tool has been created on FishBase. Data from pelagic surveys has now been uploaded, with a total of over 7,000 samples comprising 137,000 individual animals from 302 taxa collected from 70 surveys at 34 locations. This presentation will highlight key aspects of the BRUVS tool in relation to its integration and use within FishBase. Plans to upload more than 500,000 records of benthic fish will also be described.



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Monday, September 6, 2021 – 14:40-15:00

Know your fish – venturing further with the FishBase Guide App

Cornelia NAUEN¹, Maria PALOMARES², Josephine RIUS-BARILE³

¹ Mundus maris asbl

² Institute for the Oceans and Fisheries, UBC, Canada

³ Quantitative Aquatics, INC

FishBase is the most comprehensive repository of scientifically validated information about fish species. Being free to access, it had some 1.75 million visits from 620,000 unique visitors in January 2020 and similar numbers of about 0.7 million users per month throughout the years. This is impressive for a scientific database. But even though it contains large datasets for a wide range of potential applications for understanding, conserving and managing marine and freshwater biodiversity and its use in fisheries, aquaculture and ornamentals, most users take advantage of only a small fraction of the possibilities. Here we present an app to broaden the usefulness of FishBase to wide swaths of people who may not already have strong affinities to the use of scientific results, but who may – as consumers of fish – want to buy responsibly or – as producers and operators in fish value chains – provide assurances to consumers that their product is environmentally safe. The app is designed to be minimalistic in demand of prior biological knowledge and does not require navigating the website directly. It provides three pieces of key information in visual form: a picture of the fish indicating length at first maturity, optimum length and a combined vulnerability index for sustainable resource use. The information can be searched by using a local name (potentially in any language) and country on a mobile phone. If more information is subsequently wanted, the app connects to the species summary page on the FishBase website. The emphasis on visual displays makes it also a candidate for applications in education and with groups of people with little formal education.

Monday, September 6, 2021 – 10:30-11:00

Why do fish reach first maturity when they do?

Daniel Pauly¹

¹ Sea Around Us

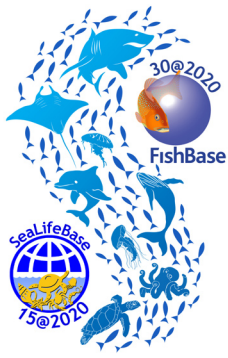
The standard response to the question “why do fish reach first maturity when they do” is that, at some point (size or age), they perceive environmental stimuli, which are converted via the pituitary and the hypothalamus into triggers for a hormonal cascade leading to gonadal maturation and the release of gametes. Yet, the question rarely asked is why fully formed young fish do not respond to the environmental stimuli that the adults react to by maturing and spawning. This question requires an answer, from ichthyologists and/or physiologists, *e.g.*, in the form of a heuristic that individual fish can use. This applies even if the explanation provided here, which builds on a causal mechanism for the juvenile-to-adult transition proposed in 1984, and in which respiratory stress hits a threshold (due to oxygen supply through the gills not keeping up with the oxygen demand of the body) should be considered inadequate.

Monday, September 6, 2021 – 14:00-14:20

History of the computerisation of the fish collection and its collaboration with FishBase

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While the first specimens arrive at the MNHN's fish collection in the middle of the 18th century, the computerisation of this collection started in the early 1980s.

The fish collection was chosen as a pilot project to create the first scientific management database for the MNHN collections.

The initial estimate was 80,000 lots of fish. In 1986, 30,000 specimens were already computerised, now 138,000 lots are registered.

This early computerisation, and its publication on the Internet, was the origin of the collaboration with Fishbase.

A first project, in 1996-1997, allowed us to compare and update the taxonomic tables of CoF, FishBase and GICiM. In a second step, we transmitted 78,000 data to FishBase. This set of data has been very useful for FishBase to obtain many georeferenced occurrences.

The evolution of the structure of GICiM has made it possible to manage more and more data, which now allows us to analyse the origin of the collection but also the use made of it for more than thirty years.

Tuesday, September 7, 2021 – 12:10-12:30

The importance of genetic diversity in commercial fish species and a simple detection of decline

Celia SCHUNTER¹, Natalia PETIT-MARTY¹

¹ Swire Institute of Marine Science, The University of Hong Kong

Overfishing has produced declines in the population sizes of fish species. Population genetics theoretical predictions indicate that declines in population sizes will produce genetic diversity loss by the effect of the genetic drift (*i.e.* random sampling of the gametes). As genetic diversity is the raw material of natural selection, which allows species to adapt to new environmental conditions, its loss will decrease the species' adaptive potentials. The objective of our study is to create an early detection tool to evaluate the conservation status of commercial fish according to their levels of nucleotide diversity in COI mitochondrial gene. The level of nucleotide diversity in the COI mitochondrial gene can be used as a proxy of the species' conservation status because it shows significant differences between threatened species and non-threatened species assessed by IUCN based on population census ($n = 1260$ species). Therefore, we sampled different fish species in the Fujian region, China by trawling and evaluate the COI genetic diversity and show that genetic diversity in just one gene to be a good indicator of fish population exploitations levels. We suggest incorporating genetic diversity estimates into fisheries population management as a tool and a predictor of population decline.

Monday, September 6, 2021 – 12:00-12:30

African freshwater fish diversity and human utilisation: a happy marriage or conflicting extremes?

JOS SNOEKS¹

¹ Royal Museum for Central Africa, Tervuren and Leuven University, Belgium

The diversity of Africa's fresh and brackish water fishes is very rich (> 3580) and is characterised by a high endemism. However, still many hundreds of species need to be described. The FishBase-for-Africa programme of the Royal Museum of Central Africa (Tervuren, Belgium) is the largest initiative to make published information on these fishes publicly available. This goes hand in hand with a long-time collaborative effort to assess the IUCN red list status of the African fresh and brackish water fishes. Currently more than a quarter of those fishes for which enough data are available, are considered to be threatened.



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In various African water bodies several anthropogenic pressures are threatening not only the survival of this unique natural treasure but also the livelihoods of many people that are dependent upon fishes as the main source of animal proteins.

Published fisheries statistics by country are not very informative, as some examples will show. In addition, they do not take into account most of the artisanal fisheries. Because of their important role in local economies of poor and middle-income households, fish have been described as a bank in the river (and lake). Yet, detailed catch statistics are lacking and, if existing, are only seldomly reported and analysed in international peer-reviewed publications. And even then they often lack sufficient taxonomic detail to allow a crucial insight into what is happening.

Documented concepts from marine fisheries such as ‘the tragedy of the commons’, ‘shifting baselines’ and ‘fishing down the food web’ also apply to African continental waters and some cases will be discussed.

Tuesday, September 7, 2021 – 15:40-16:00

Reported trends in global inland freshwater capture and culture finfisheries vary by human development index including the tendency to identify species caught

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² Institute for the Oceans and Fisheries, University of British Columbia, ,Canada

This study examined inland finfish capture and culture data reported to the FAO between 1950 and 2015 to describe trends and how these might correlate with socioeconomic factors described by the human development index (HDI). Reported global inland capture finfisheries have been rising rapidly since 1950 driven by the least-developed nations that now dominate this sector, while capture fisheries have plateaued in moderately-developed countries and are declining in well-developed countries. While well-developed countries are identifying most captured fishes, lesser-developed countries are not. The production of cultured finfish has been increasing in most countries irrespective of HDI, and in China in particular, with nearly all species being identified. These results support trends previously described in regional analyses and suggest that future work should consider socioeconomic factors and catch reconstruction aided by diet analysis to more fully understand trends in global inland capture fisheries.

Tuesday, September 7, 2021 – 11:50-12:10

The use of FishBase data by fair-fish through its FishEthoBase and Fish Test

Billo Heinzpeter STUDER^{1,2}, Jenny VOLSTORF^{1,2}, Rahel SALATHÉ¹

¹ Fair-fish international association

² Fish Ethology and Welfare Group

From its start in 2000, the Swiss based fair-fish association has gladly referred to data from FishBase to substantiate its comments on the state of so many commercially used fish stocks.

The FishEthoBase – <http://fishethobase.net>

Apart from marine ecology and a fair fish trade, fair-fish’s major concern is the fate of the fishes we eat, extracted from the wild or raised in farms. After years of fruitless struggle with the Swiss federal veterinary authorities for stricter requirements in aquaculture, the idea arose to build a database that collects and interprets ethological findings, species by species, and based on it provide suggestions how to improve fish welfare in practice. In 2012, when we asked Rainer Froese for his opinion on the, he encouraged us to go ahead, and at al follow-up meeting in late 2015, we discussed the achievements reached so far and received some important hints from Froese how to proceed.

So far, the FishEthoBase describes almost 60 species by 10 core criteria: home range, depth range, migration, reproduction, aggregation, aggression, substrate and shelter, stress, malformation, and stunning prior to slaughter. Our assessment



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is based on referenced studies in the wild, in the lab, and under farming conditions. It leads to a risk assessment scoring the Likelihood of the individuals of a given species to experience welfare under basic farming conditions (High or Low), the Potential of welfare under improved conditions (High, Medium, Low), and the Certainty of our findings (High, Medium, Low). The sum of the High scores in the 10 criteria yields an overall FishEthoScore, which allows to compare the welfare situation across various species.

The fish test – <http://fishtest.net>

In contrast to the FishEthoBase, designed for an audience in academia, field, and advocacy, our fish test aims mainly at providing guidance to concerned consumers and market players. Different from usual fish guides, which only refer to the state of fish stocks and the presence of certification schemes, the fish test embraces also the method by which a fish has been caught, and the frequency of the consumer's fish intake.

The fish test is fuelled by data from FishBase, provided to us, under agreement, as regular updates by Q-quatics, including the state of fish stocks, applied fishing methods and certification schemes. For the latter, we refer also to the current indications by Marine Stewardship Council and Friend of the Sea.

For the fishing methods, tempt to make an assessment of the harm caused by a given method to the animals and their environment based on fishcount.org.uk, literature, and own experience in artisanal fisheries. Since the latest reform of the EU's Common Fisheries Policy, the fishing method applied has to be declared to the consumer, albeit in a vague and misleading way, as *e.g.* "line caught" is everything from handling to long lines measuring up to 100 km. By assessing the harm of each method, the fish test is pursuing two objectives: to urge the retailers to apply more appropriate catch method declarations (which is possible under EU regulations) and to give consumers an idea which fish might have suffered less strongly and/or less long. Even though this assessment can only provide an indication of potential, it does make sense to suggest a preference for fish caught by less harmful methods as there is evidence that these methods are also less harmful to the environment.

As to fish consumption, we refer to reasonable assumptions on the total volume of fish available in a sustainable way, from fisheries and aquaculture. For the Western hemisphere this reduces the number of fish meals to once a month max (whereas more than once a week is the global average today). The fish test wants to draw the consumer's attention to the fact that even if his/her choice turns out to be "green", it may be put at risk as well by excessive consumption.

Tuesday, September 7, 2021 – 14:00-14:20

Storefish 2.0: a database on the reproductive strategies of teleost fishes

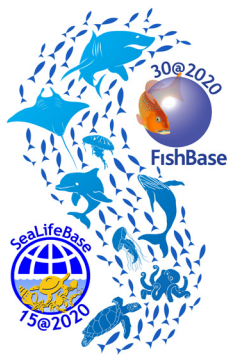
Fabrice TELETCHÉA¹, Paul VENTURELLI², Stéphane TELETCHÉA³

¹ Université de Lorraine, Q-quatics

² Ball State University, USA

³ Université de Nantes, France

In 2005, a research program was launched to evaluate the possibility of extrapolating zootechnical knowledge acquired on one fish species to others to promote the diversification of production in aquaculture. Because the control of reproduction is a prerequisite for domesticating new species, this program was first focused on this biological function. This resulted in a new database that contains information on up to 50 reproductive traits from ~1200 references for 80 freshwater, mostly European, species. The STOREFISH (STrategies Of REproduction in FISH) database was published in 2007, and then released online in 2020 to facilitate data visualization and utilization (www.storefish.org). In the past two years, efforts to extend STOREFISH involved students in the United States and France. Data from nearly 800 references allowed increasing STOREFISH to 7,442 records (55% increase) for 368 species (360% increase) and 41 families (116% increase). Data were from mostly North American species, and focused on 14 egg and larval traits. The increased sample size improved the strength of and insight gained from relationships between oocyte diameter, larval size, development time, and temperature. In the meantime, new tools were developed to perform bivariate analyses on-line. We anticipate



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that this updated and expanded database will continue to grow, and be useful for freshwater biodiversity research, conservation, assessment, management, and aquaculture, in closer link with FishBase.

Monday, September 6, 2021 – 15:50-16:10

Why and how French Public Aquariums and FishBase can work together to improve the knowledge on Fish?

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² Q-QUATICS (Vice-Chair)

³ Océanopolis

⁴ Union des Conservateurs d'Aquarium (Président)

Public aquaria have evolved over the last decades from exhibiting animals primarily for public enjoyment to conservation organizations whose missions are to inspire and contribute significantly to wildlife conservation. One increasing issue is to reduce the collection of wild specimens and promote breeding programmes in captivity. In France and Belgium, over 25 public aquariums participate to the Union of Aquarium Curators, whose four main goals are to amaze, inform, educate and increase awareness of the public. Over 100 fish species are bred today in those institutions, among which 52 marine tropical teleost species, 12 marine temperate teleost species, 19 freshwater teleost species, 24 marine elasmobranchii species, and 3 freshwater elasmobranchii species. Yet, because those institutions do not publish their results in the research literature, this unique information is not available. One solution to highlight the work performed within public aquaria and share the knowledge in a curated and rapid way with the scientific community is to build a strong and sustainable partnership with FishBase. Based on a recent survey, most curators agree to develop this new partnership, which will notably require the designation of a FishBase representative within each aquarium, who would be in charge of collecting and sharing data with FishBase. Such unique data, particularly for less-studied, and often threatened, species, will be useful for various applications (length/weight relationships, comparative biology, conservation programmes). In the end, French public aquaria could be recognized globally as key partners in wildlife conservation and biodiversity studies.

Monday, September 6, 2021 – 11:00-11:30

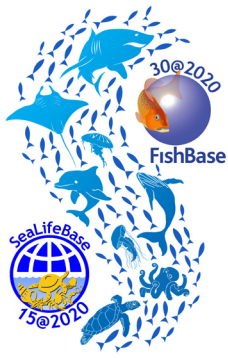
EcoScape fisheries management in the European Seas (EcoScape project)

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² University of Rhode Island, Department of Fisheries, Animal and Veterinary Science, USA

The EcoScape project will develop an interoperable platform and a robust decision-making toolbox, available through a single public portal, to promote an efficient, ecosystem-based approach to the management of fisheries. It will be guided by policy makers and scientific advisory bodies, and address ecosystem degradation and the anthropogenic impact that are causing fisheries to be unsustainably exploited in several European Seas. The EcoScape Platform will organise and homogenise climatic, oceanographic, biogeochemical, biological and fisheries datasets for European Seas to a common standard type and format that will be available to the users through interactive mapping layers. The EcoScape Toolbox, a scoring system linked to the platform, will host ecosystem models, socio-economic indicators, fisheries and ecosystem assessment tools that can be used to examine and develop fisheries management and marine policy scenarios as well as maritime spatial planning simulations. Various groups of end-users and stakeholders will be involved in the design, development and operation of both the platform and the toolbox. Novel assessment methods for data-poor fisheries, including non-commercial species, as well as for biodiversity and the conservation status of protected megafauna, will be used to



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assess the status of all ecosystem components across European Seas and test new technologies for evaluating the environmental, anthropogenic and climatic impact on ecosystems and fisheries. A series of sophisticated capacity building tools, such as online courses, documentary films, webinars and games, will be available to stakeholders through the EcoScope Academy. By filling these knowledge gaps and developing new methods and tools, the EcoScope project will provide an effective toolbox to decision makers and end-users that will be adaptive to their capacity, needs and data availability. The toolbox will incorporate methods for dealing with uncertainty and deep uncertainty; thus, it will promote efficient, holistic, sustainable, ecosystem-based fisheries management that will aid towards restoring fisheries sustainability and ensuring balance between food security and healthy seas.