



The LifeWatch ERIC Biodiversity
& Ecosystem eScience Conference

PLOVDIV, BULGARIA

7-10 JULY 2026

A web service for animal biomass estimation from length-weight relationships at the order level

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SCIENTIFIC CONTEXT

BODY SIZE

is a **key** functional traits

influences morphological and physiological characteristics

respond differently to environmental pressures

BODY MASS

information on energy flows

useful **proxy** for

- ☐ individual energetics
- ☐ foraging behaviour
- ☐ population density
- ☐ energy use
- ☐ ecosystem services

TOWARD A METABOLIC THEORY OF ECOLOGY

JAMES H. BROWN,^{1,2,4}

with JAMES F. GILLOOLY,¹ ANDREW P. ALLEN,¹ VAN M. SAVAGE,^{2,3} AND GEOFFREY B. WEST^{2,3}

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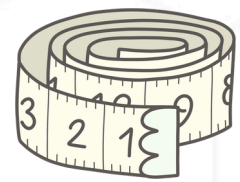
²Santa Fe Institute, 1399 Hyde Park Road, Santa Fe, New Mexico 87501 USA

³Theoretical Division, MS B285, Los Alamos National Laboratory, Los Alamos, New Mexico 87545 USA

SCIENTIFIC CONTEXT

Difficulty :

ESTIMATING BODY MASS DIRECTLY



Many organisms are too small or large for practical measurements



Procedures are time-consuming and expensive



Unnecessary mortality

Animal **biomass** remains **largely under-quantified**

POSSIBLE SOLUTION

Length-weight regressions

Power model

$$y = a(x)^b$$

y = weight

x = length

An easy way to estimate **animal biomass** using **simple length** measurements



However, they are widely dispersed throughout the existing literature and are heterogeneous and not standardised.

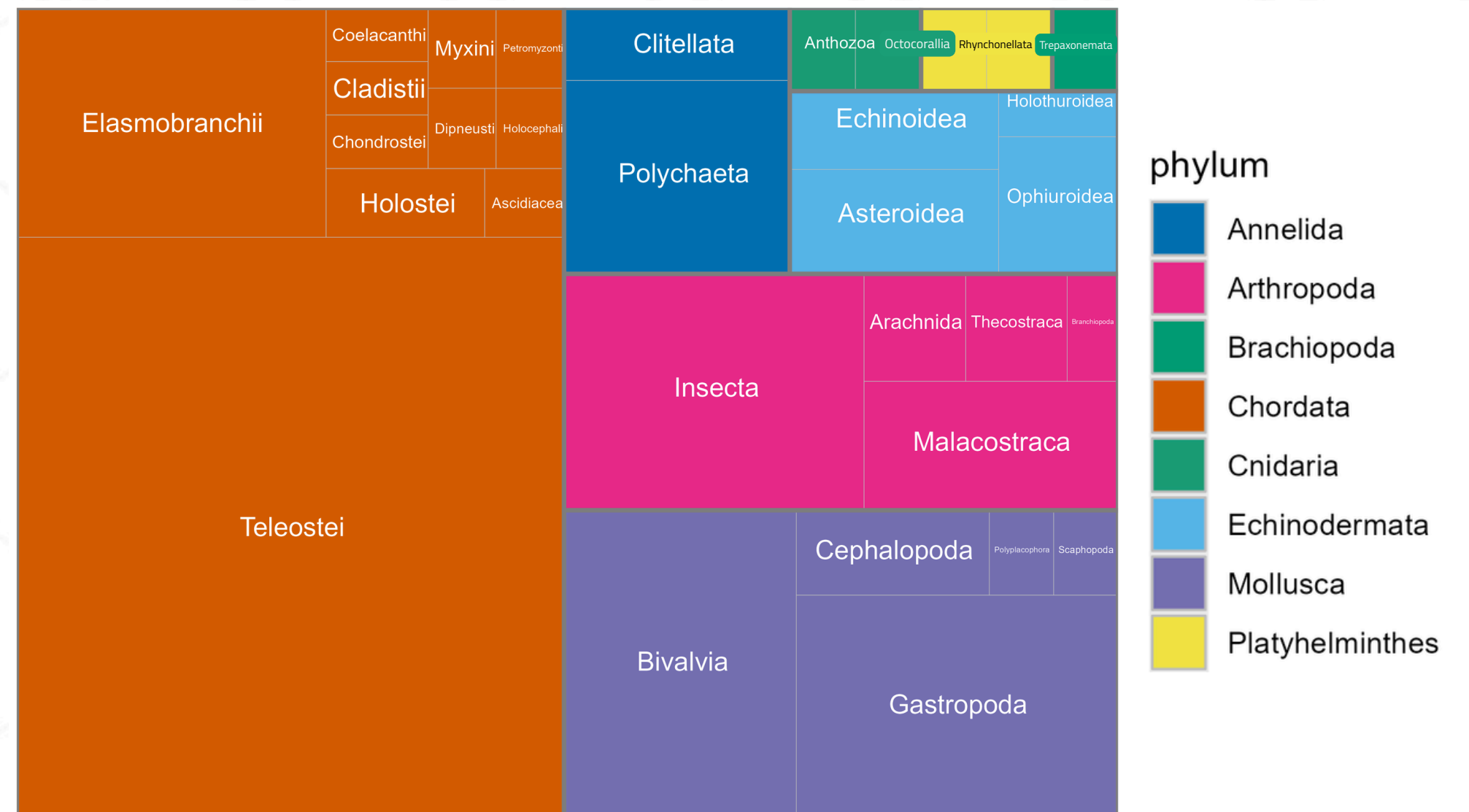
Lenght-weight regressions dataset

Literature-based dataset

Summary of taxonomic diversity

Kingdom: **Animalia**
 Number of Phyla: **8**
 Number of Classes: **31**
 Number of Orders: **152**
 Number of taxa : **7630**
 Total number of regression: **98.468**

Distribution of the number of class in each phylum



Lenght-weight regressions dataset

OVERVIEW

Taxonomic information

kingdom	phylum	class	order	family	genus	taxonRank
Animalia	Chordata	Teleostei	Gadiformes	Merlucciidae	Merluccius	species
Animalia	Chordata	Teleostei	Gadiformes	Merlucciidae	Merluccius	species

Parameter of the equation and additional data

a	b	r2	bodyWeight	bodySize	minimumBodyLength	maximumBodyLength	organismQuantity
0,0017	3.328	0,98	Dry weight	Body length	36	130	1694
0,0017	3.328	0,98	Dry weight	Body length	36	130	1694

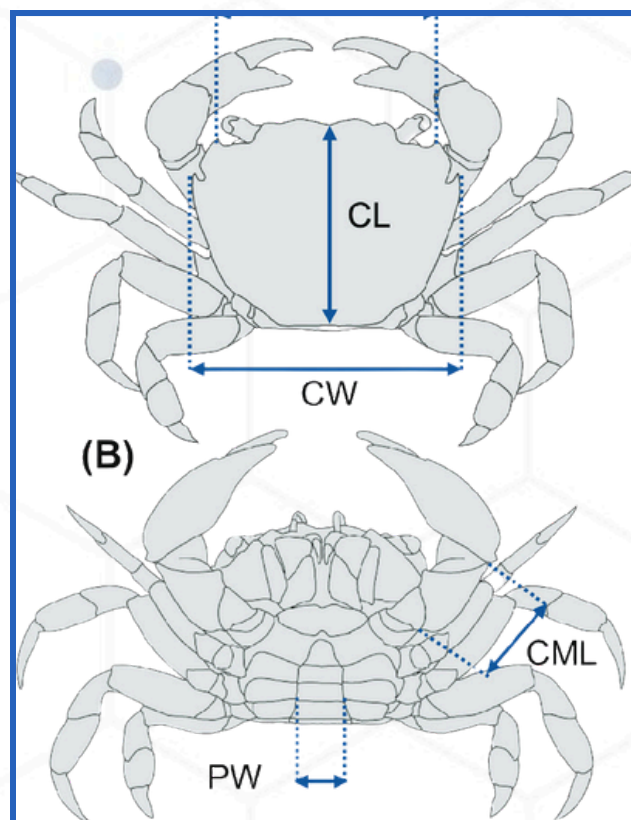
Geographic information

continent	country	locality	decimalLatitude	decimalLongitude
Oceania	New Zealand	Chatham Rise	-43.917.534	-17.618.734
Oceania	New Zealand	Chatham Rise	-43.917.534	-17.618.734

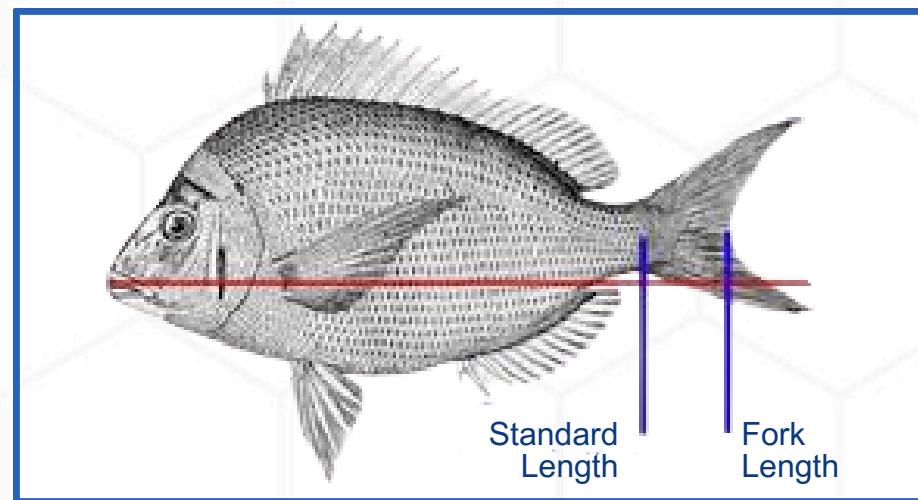
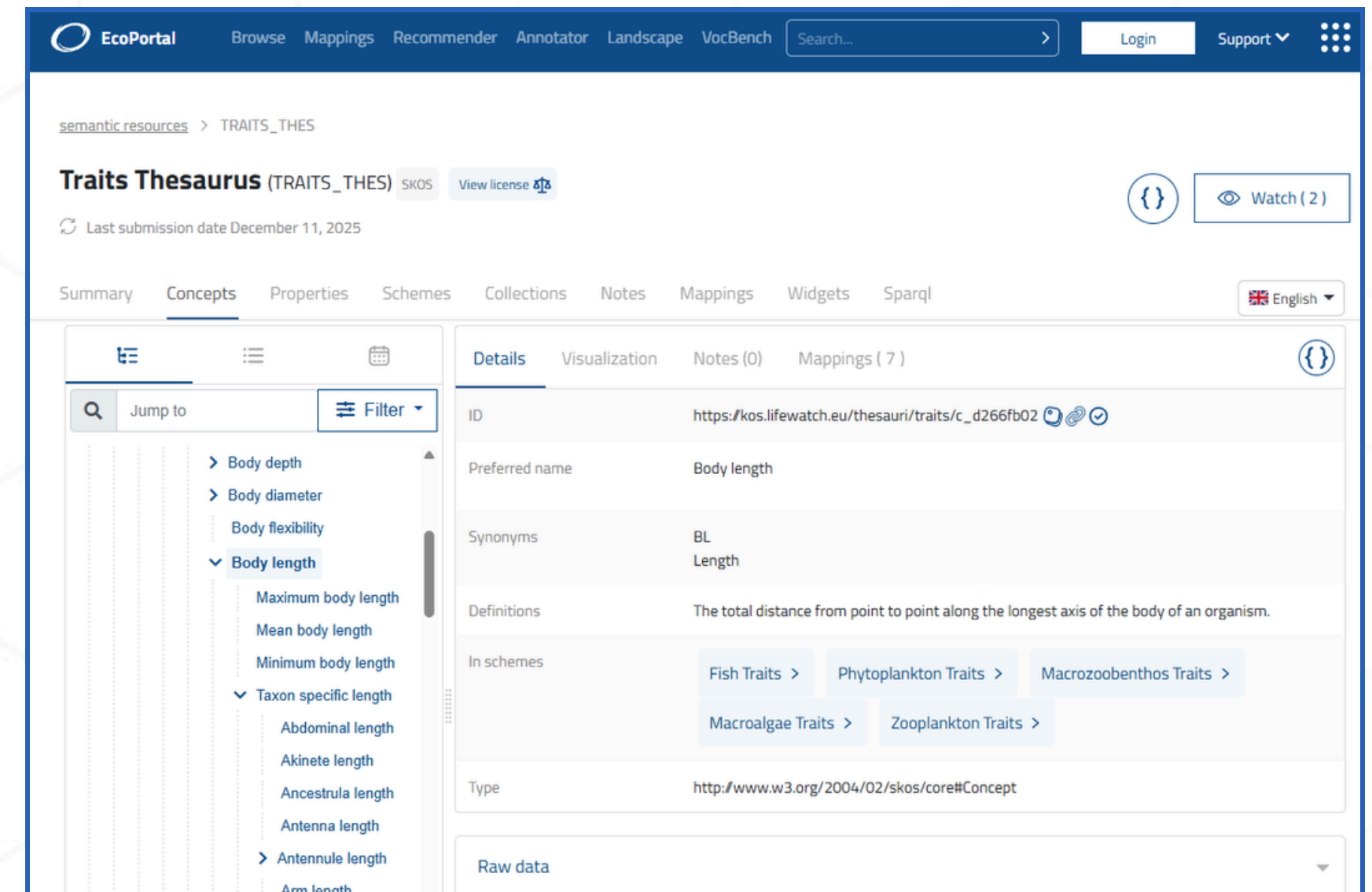
Length-weight regressions dataset

Length measurement standardization

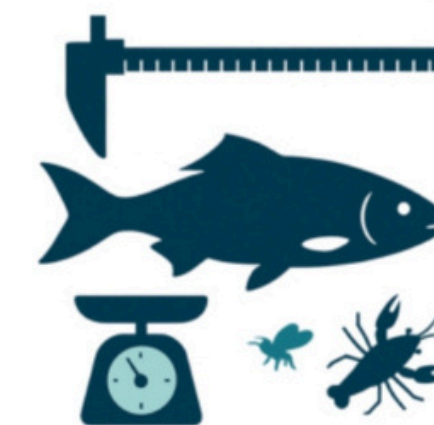
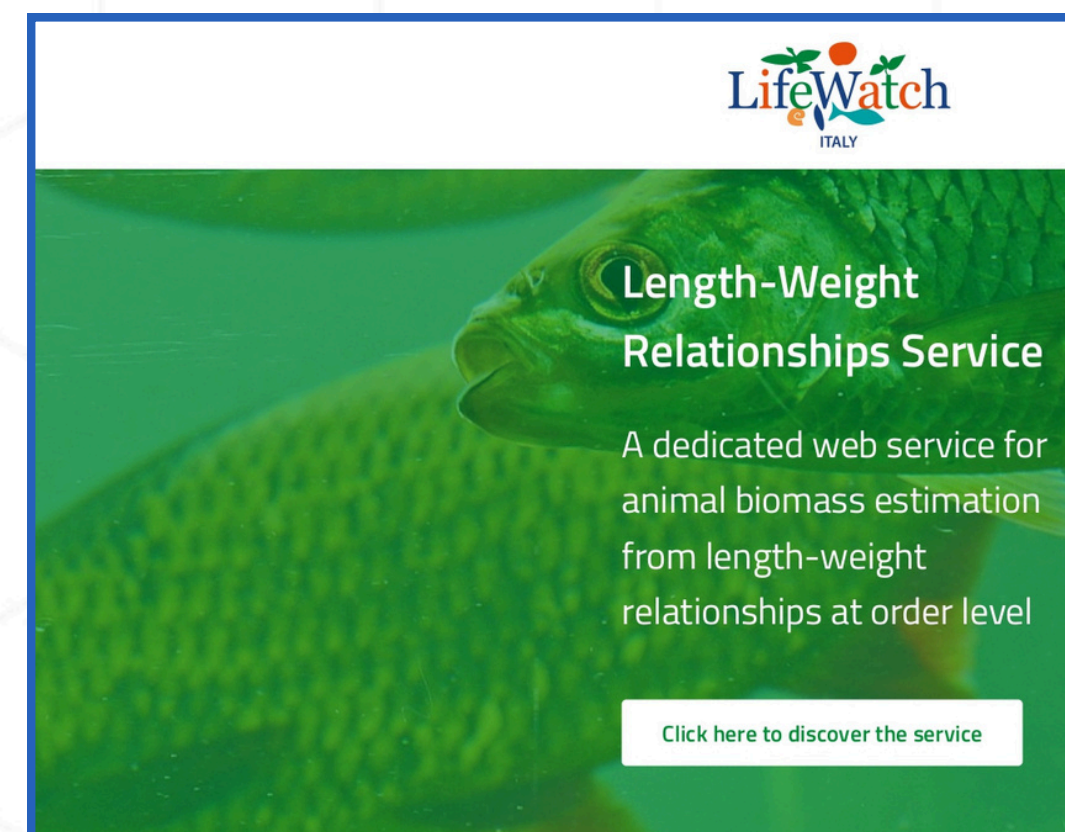
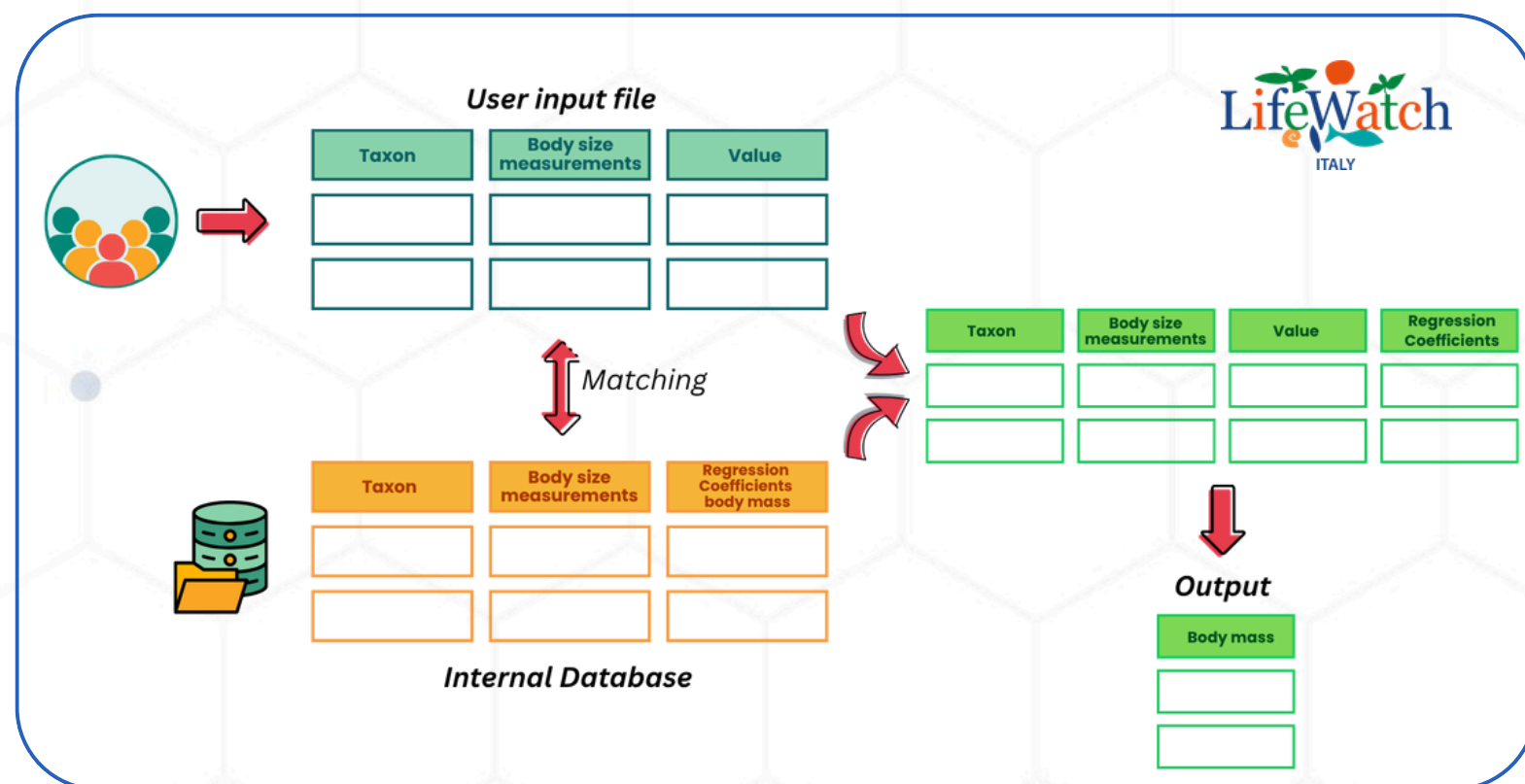
Taxon specific



10.1093/jcbiol/ruae033

Introduction of new terms in *Traits Thesaurus*



Body size is a fundamental functional trait of individuals that integrates various morphological and physiological characteristics that respond differently to environmental pressures. It enables us to get insights on energy flows upscaling from the individual to the ecosystem levels with the integrative theoretical approach of the Metabolic Theory of Ecology (MTE, Brown *et al.*, 2004).

Linking the relationship between individual body mass and metabolic rates with temperature, MTE gives also insights on the ecological responses to climate change.

- ☐ **User-friendly** interface
- ☐ **Speed up** the computational **analysis**
- ☐ Analysis can be **personalised** by users, choosing different parameters

Output at **order level**

Body_Mass_Service

[Home](#) / [Project detail view](#)

READY

Close ×

Creator: Mariantonietta La Marra Programming language: python-3.10.0 Version: 1.1

[Start project chatroom](#)

Open

Start ▶

...

Info

Abstract*

The Body Mass Service estimates individual animal body mass from body length using an extensive database of length–weight relationships aggregated at the order taxonomic level.

Keyword*

body mass, body weight, body length, body size, length–weight relationship

Category*

data processing, data analysis, data visualization

Training resource

Working Group

Help Desk Topic

Input

Name	Source	Size	Date
Database_body_length-weight_relationships.csv	LOCAL	39.88 MB	01/07/2026 15:26
Input_file.csv	LOCAL	196 Bytes	01/07/2026 15:34

[Attach new file input](#)

Select your file from your device or Data Portal

Local

Data Portal

Future implementation

CROWDSOURCING

The aim of this work is to **expand** the dataset to achieve coverage of **over 90% of animal orders**, and to explore **lower taxonomic levels**.

**JOIN US
AND BECOME PART OF THE TEAM!**



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THANK YOU!

Questions?

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