Littoral chironomids and oligochaetes in the subalpine Lake Maggiore: a first dataset

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ABSTRACT

A dataset of 227 oligochaetes and 373 chironomids occurrence records from the subalpine Lake Maggiore, a large and deep temperate lake in Northern-Western Italy and Switzerland was developed within the Interreg Italy-Switzerland 2014-2020 Parchi Verbano Ticino Project (ID:481668) funded by the European Regional Development Fund (ERDF). The lake belongs to the national (LTER-Italy), European (LTER-Europe) and International (ILTER) long-term ecological research networks. Data were collected during the summer-autumn period in 2019-2021. Chironomids (Insecta, Diptera) and oligochaetes (Annelida, Clitellata) were identified to genus/species gr./species level by the authors. All 600 occurrence records are georeferenced and organised in a standardised Darwin Core Archive format. These data gathered along the littoral of Lake Maggiore will contribute to the development of common implementation strategies for shared and sustainable water management level of the lake, with particular reference to the protected natural areas (sites belonging to Natura 2000 network in Italy and to the Emerald Network in Switzerland). The authors strongly believe in the great potential of open access occurrence records in biogeographical studies and ecological research in the context of global environmental changes. For that reason, the dataset has been uploaded to the Global Biodiversity Information Facility (GBIF), an intergovernmental free and open access biodiversity data infrastructure.

INTRODUCTION

Lake Maggiore belongs to the National, European and International Long-Term Ecological Research networks (LTER) as a part of the site "IT-08 Southern Alpine lakes" (http://www.lteritalia.it/). It is the second largest freshwater basin in Italy, with an area of 212.2 km^2 and a watershed of 6599 km^2, with very intensive extreme precipitation events especially in the last decade (Saidi *et al*., 2020). Lake Maggiore (North-Western Italy and Switzerland) is an example of a temperate and deep subalpine lake under water-level regulation regime (from mid March to mid September) through the Miorina dam situated at the River Ticino outlet. The dam was built to maintain the level of the lake to meet the needs of the stakeholders in water demand for potable, touristic and hydroelectric power uses.

In 2019, the INTERREG Italy-Switzerland Cooperation Program Parks Verbano Ticino Project was launched as an outcome of the Technical Table instituted in 2015 to respond to the increased water demand by stakeholders. One of the overall objectives of the Project is the assessment of the effects of human made water-level fluctuations on macro- and meio-fauna along the shores of Lake Maggiore (Boggero *et al.*, 2022). Collected data will contribute to a common implementation strategy for sustainable and shared water management particularly focused on the protected natural areas (sites belonging to Natura 2000 network in Italy and to the Emerald Network in Switzerland).

Summary statistics

The data set was developed at CNR-IRSA and organised in a systematic and coherent way according to Darwin Core Standards. It refers to only components of the macro-

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fauna and includes occurrence records of chironomids (Insecta, Arthropoda, Diptera, Chironomidae) and oligochaetes (Annelida, Clitellata) at three sampling sites located in three protected areas: two sites in Italy (Fondo Toce – FT and Sesto Calende - SC) and one in Switzerland (Magadino – MA) covering an ideal North-South axis of the lake (Tab. 1; Fig. 1). The dataset includes 600 records of occurrence of which 227 Annelida (oligochaetes) and 373 Arthropoda (chironomids) including 336 records at species level, 184 at genus level, 73 records at subfamily level (Fig. 2).

Dataset description

The dataset includes 23 columns with each row containing a record of a chironomid or oligochaete taxon with taxonomy information according to the Darwin Core Standard (Wieczorek *et al.*, 2012). The 23 columns represent the event ID number, the occurrence ID, the basis of record, the event date, the scientific name of the species, taxon rank, 10 columns refer to kingdom, phylum, the subdivision of each phylum into classes, of each class into orders, of each order into families, of each family into subfamilies, into tribe (only for chironomids), into genera, and of each genus into species. Then, geographic coordinates, unit of measure and reference system, country code, locality, organism count, and organism quantity type (Tab. 2).

The "eventID" is a combination of SamplingSite: Habitat: ReplicateNumber (see Tab. 1 for abbreviation). The "occurrenceID" is a combination of Publishing Organization: SamplingSite: Habitat: ReplicateNumber: Species.

Data set citation: Zaupa S, Boggero A, Kamburska L (2023): Chironomids and oligochaetes in the subalpine Lake Maggiore littoral area: a first dataset. v1.7. Consiglio Nazionale delle Ricerche - Istituto di Ricerca sulle Acque. Dataset/Occurrence.
Distribution link: GBIF: https://www.gbif. org/dataset/dca04d98-5cbc-4765-a2a7-8a2085259acd; https://doi.org/10.15468/sh5kzm
Data format version: 1.7
Character encoding: UTF-8
Data format: csv
Date of creation: 20 December 2022
Date of last revision: 10 January 2023
Date of publication: 11 January 2023
Language: English
Licence of use: both access and use are free to any user (CC-BY 4.0). The authors would appreciate users providing a link to the original dataset GBIF (https://doi.org/10.15468/sh5kzm) and citing the present paper when using the data, and/or to consider the data set authors for co-authorship. Stakeholders interested in additional information can contact authors *via* information provided in the metadata.

Update policy

GBIF policy rules. Future changes to the dataset due to quality control activities might change its content or structure.

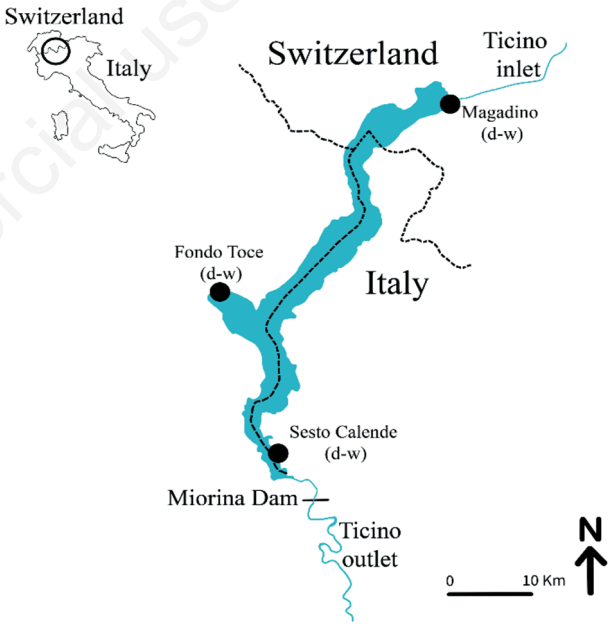

Fig. 1. Lake Maggiore: sampling sites (black point) along the coast and type of habitat: d-dry, w-wet (after Boggero *et al.*, 2022).

Tab. 1. Geographic coordinates (WGS 84 decimal degrees) of the sampling sites in Lake Maggiore and abbreviation used in the data set.

Sampling site habitat	Abbreviation in the data set	Replicate number	Country code	Lake code	Latitude N	Longitude E
Bolle di Magadino -dry	MA:D	R1, R2, R3	CH	LM	46.1504444444444	8.85707222222222
Bolle di Magadino -wet	MA:W	R1, R2, R3	CH	LM	46.1601305555556	8.85447777777778
Fondo Toce -dry	FT:D	R1, R2, R3	IT	LM	45.9362861111111	8.49082222222222
Fondo Toce -wet	FT:W	R1, R2, R3	IT	LM	45.9353	8.49296944444444
Sesto Calende -dry	SC:D	R1, R2, R3	IT	LM	45.7536222222222	8.59136388888889
Sesto Calende -wet	SC:W	R1, R2, R3	IT	LM	45.7516194444444	8.59318611111111

Metadata language: English
Metadata managers: Silvia Zaupa (silvia.zaupa@gmail.com), Lyudmila Kamburska (lyudmila.kamburska@irsa.cnr.it)

Geographic coverage

Lake Maggiore. Data were georeferenced directly on site according to WGS84 datum.

Bounding box: latitude 45.722039 - 46.179841, longitude 8.481792 - 8.860820.
Biogeographic region: Alpine (EEA, 2017)
Country: Italy, Switzerland
Locality: Lake Maggiore
Geographical subdivisions: Lombardy and Piedmont regions, Italy; Canton Tessin, Switzerland.
Quality control for geographic data: Reliability of coordinates was checked in Google maps. Geographic coor-

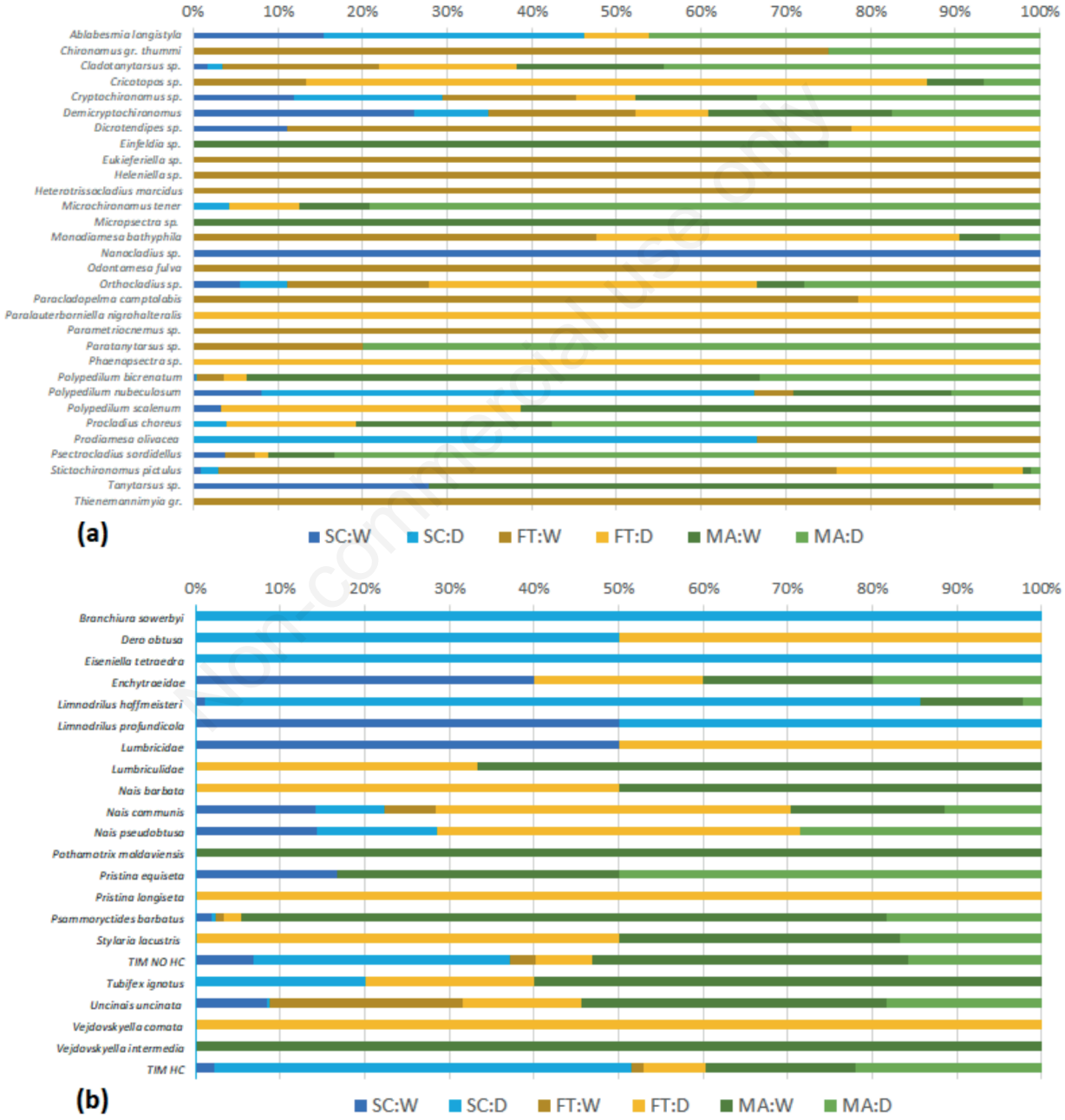

Fig. 2. Relative abundance of chironomids (a) and oligochaetes (b) taxa retrieved from occurrence data set at 6 georeferenced points (MA:W, MA:D, FT:W, FT:D, SC:W, SC:D). For abbreviation see Tab. 1.

dinate format, coordinates within country/provincial boundaries, and the absence of anomalous ASCII characters in the dataset were also double checked.

Taxonomic coverage

The data set represents the two dominant taxonomic groups among macroinvertebrates in Lake Maggiore, chironomids and oligochaetes. The list presents taxa arranged according to the Fauna Europaea classification (2004), where genera and species are listed alphabetically within each family or genus (de Jong *et al.*, 2014; de Jong, 2016).

Taxonomic ranks: Data from species, genus, family, order and class rank were included in the dataset.

Study extent

The dataset comprises only occurrence and number of individual records of chironomids and oligochaetes, while data of other taxa present in irrelevant number in the samples (e.g., Ceratopogonidae, Ephemeroptera, Plecoptera, Bivalvia) were not included.

Sampling design

Macroinvertebrates sampling was performed following the standard sampling methodologies developed within NIVA and, more recently, ICP WATERS Manuals and Programmes (NIVA 1987; ICP Waters Programme Centre 1996, 2010). Semi-quantitative macroinvertebrate samples were taken in July, August and September during the period 2019-2021. In total, 100 samples for macroinvertebrates were collected through a handle-net (250 µm) along the shores at depths comprised between 50 and 120 cm and then fixed with ethanol (80%) and placed in plastic bottles. Samples were collected at three sites: Magadino (MA), Fondo Toce (FT) and Sesto Calende (SC). Per each site, two habitats with different conditions were monitored: a permanently flooded habitat (namely wet - W in the dataset) and a habitat occasionally subjected to drought during low water levels (or dry - D in the dataset). In each habitat three spatial replicates (R1, R2 and R3) were taken at different depths along a diagonal transect to a maximum depth of 120 cm. The dataset refers to 6 georeferenced points (MA:W, MA:D, FT:W, FT:D, SC:W, SC:D) and triplicate data (R1, R2, R3) per each georeferenced point (see Tab. 1 for all abbreviations in details).

Tab. 2. Description of the dataset available in GBIF with specific information relative to column labels and respective description in the csv file.

Column label	Column description
eventID	Unique identifier for the record within the dataset (SamplingSite:HabitatReplicate)
occurrenceID	Unique identifier for the record within GBIF database (CNR:IRSA:SampligSite:HabitatReplicate:Species)
basisOfRecord	The specific nature of the data record (PreservedSpecimen)
eventDate	The sampling date
scientificName	The full scientific name
taxonRank	Taxonomic rank of the most specific name in the scientific name
kingdom	Full scientific name of the kingdom in which the taxon is classified
phylum	Full scientific name of the phylum in which the taxon is classified
subphylum	Full scientific name of the subphylum in which the taxon is classified
class	Full scientific name of the class in which the taxon is classified
order	Full scientific name of the order in which the taxon is classified
family	Full scientific name of the family in which the taxon is classified
subfamily	Full scientific name of the subfamily in which the taxon is classified
tribe	Full scientific name of the tribe in which the taxon is classified
genus	Full scientific name of the genus in which the taxon is classified
species	Full scientific name of the species in which the taxon is currently classified
decimalLatitude	Geographic latitude (in decimal degrees, using the spatial reference system in geodeticDatum)
decimalLongitude	Geographic longitude (in decimal degrees, using the spatial reference system in geodeticDatum)
geodeticDatum	Spatial Reference System (SRS) to locate geographical water bodies or their habitats (WGS84)
countryCode	The standard code of the country in which the sampling location occurs (IT, CH)
Locality	The specific description of the place (Lake Maggiore)
organismQuantity	Value for the quantity of organism
organismQuantityType	Type of quantification system used for the quantity of the organisms (individuals)

Taxonomic methods

In the laboratory, the whole samples were sorted under a stereo-microscope and all organisms were subdivided into main taxonomic groups using Italian macroinvertebrate identification guides (AA VV, 1977-1985). Species identification was performed by preparing Faure slides mounts of head for chironomid larvae, and front end of oligochaetes with chaetae distribution and genital apparatus. Identification was performed to species level whenever possible, using relevant taxonomic keys (e.g. chironomids: Andersen *et al.*, 2013; oligochaetes: Timm, 2009). The genus level was considered when available material (presence of immature or poorly preserved specimens) hinders species identification. No adults were collected, and no pupae were found with the sampling method adopted.
Taxon specialists: Angela Boggero, Silvia Zaupa.
Basis of record: preserved specimens.
Quality control for taxonomic data: Record validation and cleaning were based on data check for spelling errors, data standardization (check of nomenclatural changes or synonyms), and data cleaning and validation for taxonomic reliability and taxonomic consistency using Fauna Europaea (de Jong *et al*., 2014; de Jong, 2016).

Management details

Project title: Chironomids and oligochaetes in the subalpine Lake Maggiore littoral area: a first dataset_INTERREG_PVT
Database managers: Angela Boggero, Lyudmila Kamburska
Temporal coverage: July, August, September in the period 2019-2021
IT specialists: Silvia Zaupa, Lyudmila Kamburska
Funding grants: Data were gathered within the framework of the Project INTERREG "Parchi Verbano Ticino" (ID: 481668) aimed to grasp the consequences of water level management on the littoral lake ecosystems.

Data and code availability

All georeferenced data are available at GBIF: https://doi.org/10.15468/sh5kzm

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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