

A large, sleek shark with a greyish-blue back and white belly swims horizontally across the upper half of the frame. Below it, a diverse coral reef is teeming with life. The reef is composed of various types of coral, including branching and table corals, in shades of white, tan, and light blue. Numerous small, colorful fish, including yellow tangs, orange and pink surgeonfish, and blue tangs, are scattered throughout the scene, swimming in the clear blue water. The background is a deep, clear blue, suggesting a healthy, deep-sea environment.

Species360
Research
Request
Instructions

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The Species360 Conservation Science Alliance (CSA)

For more than 50 years, the contributions of Species360 members have created the world's largest database on animals under human care. We strive to make these data available to support all those who want to conserve species, improve animal care, and advance science. We also work to process and analyze these data to provide critical information to our members and the conservation community. Data sharing is at the core of Species360's mission, and the Species360 Conservation Science Alliance (CSA) provides a collaborative platform for data science collaborations. The CSA aims to maximize the positive impact and responsible use of the member-contributed data in the Species360 Zoological Information Management System (ZIMS). Therefore, with the support of the Conservation Science Alliance Science team, accessing this data through the **Research Request** process is available to all community members (fees may apply) to enhance zoo, aquarium, and conservation research.

In addition to data services, we offer you the opportunity to be affiliated with the Species360 Conservation Science Alliance and to use the Species360 Conservation Alliance as one of your affiliations when publishing your manuscript. By being affiliated with the Species360 Conservation Science Alliance, you will have access to its global professional network, including academic researchers and experts from the zoo, aquarium, and conservation community. This invaluable resource can help you understand the complexity and biases of the data. To support your research, you will also have access to the knowledge and experience of Species360 team members, who have a deep understanding of the data in ZIMS. As an affiliate member of the Species360 Conservation Science Alliance, your work, once published, will be promoted on the Species360 Conservation Science Alliance website and in our newsletter.

In collaboration with the Population Biology Team, the Department of Biology, and the Department of Mathematics (IMADA) at the University of Southern Denmark, Species360 has developed tools to extract, clean, aggregate, and anonymize data from ZIMS for Husbandry. This allows Species360 to provide data in an accessible format while ensuring the anonymity of our members.

The following instructions are designed to inform researchers on how to obtain ZIMS data, either data that is openly available, data available through a membership/subscription, or data available through a Research Request.

For further information on any topics discussed here, please contact Species360 support via support@species360.org indicating "Research Request: *title of your project*" in the subject line.

How to access ZIMS data

As a Species360 member, you have unlimited access to your own data in ZIMS. To obtain data in ZIMS that is not owned by your institution, you will need permission from the owning institution, i.e., the institution that entered the data.

Some specific data can be obtained by Species360 members and non-members, such as *Species Holdings* and aggregated data sets such as *Species360 Global Resources*. These are outlined below.

You can also submit a research request for data that is not available through memberships, Species360 Insights subscriptions or Global Resources.

Species Holdings

Species Holdings data includes the number of living individuals per member institution at the time of extraction. The *Species Holdings* data includes information on each individual's sex (female, male, or unknown), whether it is kept in a group, and the geographic information along with the member association for the institution.

You do not need a formal Research Request to access this data. Requests from non-Species360 members are limited to five genera every two weeks. If your research requires more than five genera, please see the Species360 [Insights](#) section. To request the *Species Holdings* data, please complete the below form.

[Species Holdings](#)

Species360 Insights Subscription

Species360 offers an Insights Program subscription so your institution can access a variety of data in ZIMS without submitting a Research Request. Get more information on Species360's *Insights subscription* benefits [here](#). This program provides veterinarians, medical labs, colleges, universities, research centres, students and others with access to aggregated ZIMS data and analytics for a low annual fee. The data is anonymous to the individual animal, group, enclosure, and institution, and reflects global collections for over 25,000 species. As an Insights subscriber, you can look up as many *Species Holdings* as wanted.

For information on how to become an Insights subscriber or on which types of data you can access through it, visit our [website](#) or send inquiries to support@species360.org including the phrase *Insights Program* in the subject line.

Husbandry data (Research Request data)

This data is extracted from ZIMS Husbandry and corresponds to anonymized data from the ZIMS Animals Module. Animals in private collections are not included in the husbandry extract. All data is fully anonymized and only includes data since 1 January 1980, to ensure data quality. Data before 1 January 1980 can be requested but requires special approval. This extraction does not include any medical data nor any studbook data; see separate sections. To apply for the husbandry data, go to the [Research Request Instructions](#) section.

Medical data

Species360 members have access to aggregated Global Medical Resources in ZIMS as part of their membership. These reports provide important aggregated data and analysis on areas such as anaesthesia dosages, physiological norms, and expected test results. These reports are also available through the [Species360 Insights](#) subscription; see the Species360 *Insights* section for more information.

We currently cannot support Research Requests concerning ZIMS for Medical data, except for physiological norms. Although we have an established extraction process for husbandry data, we do not have a cleaning process for medical data. The development of the extraction and cleaning tools required for this is part of our future plan, but presently we have no funding or timeline for developing

this resource. If you are interested in helping us fund plans for extracting ZIMS for Medical data, please contact the Species360 Support team at support@species360.org.

Studbook data

Studbooks are overseen by the regional and national associations (WAZA, EAZA, AZA, ZAA Australasia etc), and as such we cannot grant access to this data without the regional association's approval. We encourage you to reach out to the association directly.

Research Request Instructions

Husbandry data access

To obtain extracted and cleaned data from ZIMS for Husbandry, please complete a Research Request form following the guidelines below. Every Research Request is submitted to the Species360 Research Committee and then to the Species360 Board of Trustees for approval. For any other inquiries regarding data, please contact support@species360.org and include the phrase *Data Question* in the subject line.

[Research Request](#)

How to complete a research request

To specify the data required for your project, you must identify the necessary data and the target species. The online submission form requires details of the data needed, including the following information:

Sex, time frame, Minimum sample size per species, Minimum age of individuals, Maximum age of individuals, Geographic scope and if you are requesting data only on *captive- or wild-born individuals*.

To clarify the species for which data is being sought, use the 'Species List' Excel file where you mark the species for which you are requesting data with a "Yes" in the 'Requested' column. Upload this file with the online form.

Species list datafile

binSpecies	Class	Order	Family	sample.size	Requested
Gastrotheca cornuta	Amphibia	Anura	Amphignatho	large	No
Gastrotheca elicioi	Amphibia	Anura	Amphignatho	small	Yes
Gastrotheca litonedis	Amphibia	Anura	Amphignatho	small	No
Gastrotheca lojana	Amphibia	Anura	Amphignatho	small	No
Gastrotheca marsupiata	Amphibia	Anura	Amphignatho	medium	No
Gastrotheca nicefori	Amphibia	Anura	Amphignatho	small	No
Gastrotheca orophylax	Amphibia	Anura	Amphignatho	small	No
Gastrotheca peruana	Amphibia	Anura	Amphignatho	medium	No
Gastrotheca plumbea	Amphibia	Anura	Amphignatho	small	No
Gastrotheca pseustes	Amphibia	Anura	Amphignatho	medium	No
Gastrotheca riobambae	Amphibia	Anura	Amphignatho	large	No
Gastrotheca testudinea	Amphibia	Anura	Amphignatho	small	No
Gastrotheca turnerorum	Amphibia	Anura	Amphignatho	small	No
Gastrotheca yacuri	Amphibia	Anura	Amphignatho	small	No
Mannophryne herminae	Amphibia	Anura	Aromobatida	medium	No
Mannophryne trinitatis	Amphibia	Anura	Aromobatida	large	No
Arthroleptis bivittatus	Amphibia	Anura	Arthroleptida	small	No
Arthroleptis pyrrhoscelis	Amphibia	Anura	Arthroleptida	small	No
Arthroleptis stenodactylus	Amphibia	Anura	Arthroleptida	medium	No
Trichobatrachus robustus	Amphibia	Anura	Arthroleptida	small	No
Amietophrynus gutturalis	Amphibia	Anura	Bufonidae	small	No
Amietophrynus pantherinus	Amphibia	Anura	Bufonidae	small	No
Amietophrynus pardalis	Amphibia	Anura	Bufonidae	small	No
Amietophrynus regularis	Amphibia	Anura	Bufonidae	medium	No
Amietophrynus xeros	Amphibia	Anura	Bufonidae	small	No
Anaxyrus americanus	Amphibia	Anura	Bufonidae	large	No
Anaxyrus baxteri	Amphibia	Anura	Bufonidae	large	No
Anaxyrus boreas	Amphibia	Anura	Bufonidae	large	Yes
Anaxyrus californicus	Amphibia	Anura	Bufonidae	medium	No

Figure 1: The sample size refers to the total number of individuals recorded in ZIMS since 1 January 1980. The sample size is indicated to be either *small* (10 or fewer individuals), *medium* (10-50 individuals) or *large* (more than 50 individuals).

Husbandry data description

The following section describes the raw structure of the data for researchers to better understand how the received data table has been created.

The raw data is extracted by a query directly from the ZIMS database. All data is then fully anonymized and only includes data since 1 January 1980, to ensure data quality. Data before 1 January 1980 is only available upon special request and requires approval. Animals in private collections are not included in the husbandry extract.

The Species360 Science team has developed a standardized cleaning process that is always performed for the ‘core’ and the ‘weight’ data before distribution to researchers. We aim to develop the same for the other data resources. Following the data cleaning, the different data tables (see Table 1) will be merged by the Species360 Science team. Therefore, you will only receive one data file. For more information about how this is done, see the [data structure](#) section further below.

Table 1: Overview of the different datasets used to create the requested data table through the Research Request process.

Data table name	Variables included	Limitations / Cleaning
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Core (Basic information)	Basic information about an animal, includes: Anonymized animal ID, taxonomy, birth and death dates, sex, and birth type (wild/captive)	Has gone through the standardized cleaning process. Outliers are detected and marked for individuals' lifespans.
Contraception	Anonymized animal ID, Contraception method, Date of contraception and status	Has not gone through a standardized cleaning process. Data only from husbandry, only high-level data, no specific methods, not from medical
Institutions	Anonymized Institution ID, Latitudes and Country	Has not gone through a standardized cleaning process. Raw data with a lot of missing data, especially for non-ZIMS members. Only latitudes or countries can be provided to guarantee anonymity.
Lengths	Anonymized animal ID, Measurement type, measurement value and Date of measurement	Has not gone through a standardized cleaning process. Raw data as recorded in ZIMS, non-standardized units and measurement types
Institutional Animal Transfers	Anonymized animal ID, Physical holder history, Date of transport, Sending and receiving institution	Has not gone through a standardized cleaning process. Raw data as recorded in ZIMS, non-matching duplicates in the data due to incongruencies between entries of sender versus receiver
Parents	Anonymized animal ID, Parent ID, Parent Sex and Parent Probability	Has not gone through a standardized cleaning process. Raw data as recorded in ZIMS
Weights	Standardized body weights per age and Date of measurement	Has gone through the standardized cleaning process. Outliers are detected and marked

1. Core Data

The Core Data Table contains essential information on individuals within Species360 member institutions. It includes each individual's anonymized ID, taxonomic information (Latin binomial species name, Family, Order, Class), the animal's birth and death dates (if available), sex (female, male, unknown), and birth type (zoo-born, wild-born, unknown). The Core Data has been cleaned and standardized through a process developed and maintained by Species360's Science team.

Limitations: Data has been thoroughly cleaned by the Species360 Science Team, but potential data limitations persist due to varying record-keeping quality across institutions. Detailed documentation on the data cleaning protocol can be obtained upon request. For example, birth and death dates may be highly uncertain for wild-born, confiscated, or individuals born at non-Species360 member institutions.

2. Contraception Data

The Contraception Data Table provides essential details on an individual's contraception status, encompassing the contraception date, method (e.g., surgical or hormonal), and status (active or inactive).

Limitations: This data is raw, unprocessed, and uncleaned, directly extracted from ZIMS. As a result, data entry errors, duplicate entries, and incongruencies may occur. Moreover, this data is extracted from Husbandry records only, rendering it incomplete as contraception can also be recorded in the ZIMS for Medical module. However, medical data is currently unavailable for research requests (see below: Medical data).

3. Institutions

The Institutions Data Table contains geographic information for both Species360 members and non-members, encompassing each institution's country and latitude. However, the institutions remained anonymous. The Institution Data can be linked to the Core Data Table to obtain latitude and country information of each animal's first and last holding institution, as well as to the Institutional Animal Transfers Data Table to obtain an animal's physical holder history.

Limitations: This data is raw, unprocessed, and uncleaned, directly extracted from ZIMS. As a result, data entry errors, duplicate entries, and incongruencies may occur. Data is restricted to high-level geographic resolution (latitude, country) to ensure member anonymity (refer to Data Privacy Policy [here](#)). Please note that data may be incomplete, especially for non-ZIMS member institutions or smaller institutions where geographical information might not be available.

4. Lengths

The Lengths Data Table contains information regarding animal length measurements. It includes the animal's anonymized ID, the date of measurement, the type of measurement, and the measurement unit.

Limitations: This data is raw, unprocessed, and uncleaned, directly extracted from ZIMS. As a result, data entry errors, duplicate entries, and incongruencies may occur. Moreover, length data measurements are raw non-standardized data. They include a large number of different measurements (e.g. tail length, head length, snout-vent length, etc.), as well as different units of measurement (centimetres, inches, meters, etc.). Outliers may be an issue in the dataset due to data entry errors (e.g. entries with incorrect units).

5. Institutional Animal Transfers

The Institutional Animal Transfers Data Table contains information regarding an animal's physical movement history, detailing its transfers across institutions. It includes the animal's ID, as well as anonymized institution IDs of the sending and receiving institutions and the transaction date. Besides including physical moves across institutions, it also includes major life events, such as birth and death. By linking this data to the institution table through anonymized IDs, additional information on the latitude and the destination country of the animal can be obtained.

Limitations: This data is raw, unprocessed, and uncleaned, directly extracted from ZIMS. As a result, data entry errors, duplicate entries since both births and deaths are considered as a transfer, and incongruencies in transaction dates or sending/receiving institutions may occur. Such errors may occur when transactions are entered with conflicting dates/times by both the recipient and sender, which can be common with long-distance animal moves.

6. Parent Data

The Parent Data Table contains essential details on an individual's parentage, including the individual's anonymized ID, the anonymized IDs of their parents, their sexes (dam/sire), and the parent probability expressed in percentages. Further offspring and parent information, such as the parents' age at offspring birth, can be obtained by linking this table to the core data table using corresponding animal IDs.

Limitations: This data is raw, unprocessed, and uncleaned, directly extracted from ZIMS. As a result, data entry errors, duplicate entries, and incongruencies may occur.

7. Weights

The Weights Data Table comprises standardized live weight measurements (in kg), measurement dates, and corresponding animal ages at measurement. The Weights Data has been cleaned and standardized through a process developed and maintained by the Science Team of Species360.

Limitations: To ensure data accuracy, statistical outliers have been removed using a moving window and interquartile ranges across ages. Analyses were performed on records available after 1 January 1980. In addition, all weight measures are taken from individuals in ZIMS, thus these results may not represent weight values in the natural habitat of the species.

Data Structure

The following section describes the structure of the data, for researchers to better understand how the received data table has been created.

The husbandry data consists of several data tables. One of these tables consists of the ‘core’ data which provides the data backbone and contains one row for each animal registered in ZIMS alongside basic information, such as the species taxonomy. Separate data tables then provide additional information, such as weight measurements or parentage data. Data tables are relational, which means they can be linked via unique identifiers (IDs) (see Figure 2). As previously mentioned, this linkage between data tables will be performed by the Species360 Science team. Therefore, you will only receive one data file.

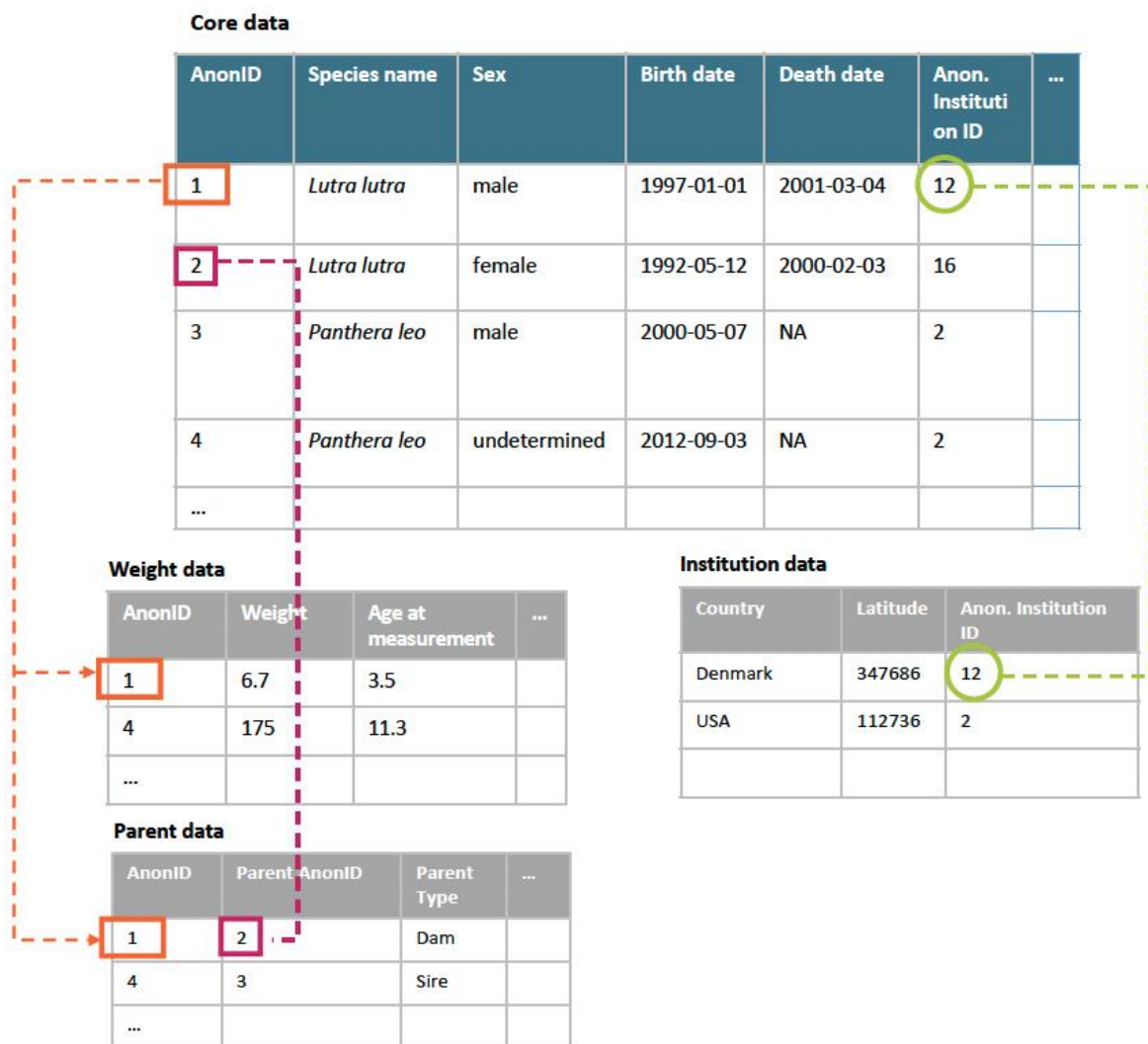


Figure 2. The core data table (top) contains basic information for all animals in ZIMS, with each row corresponding to a unique individual identified by an anonymized ID (AnonID). Additional data tables, such as weight measurements and parent information, are linked to the core table via AnonIDs (orange). Parent data can also be linked back to the core through ParentAnonID (pink). Latitudes and

country information of animal first and last holding institutions are obtained from the institution’s data table and linked to the core via anonymized institution IDs (green).

Research Request Review Process

Timeline

The timeline below helps you determine when you might expect to receive the data you ask for, based on when your submission was received. To help with the process, please try to ensure you have included as much detail as possible in your research request to prevent follow-up questions.

- S (Submission) should take place a month before R1, R2, R3 or R4 to be included in the first coming cohort of requests with a maximum capacity of 10 requests per cohort.
- R (Research Committee meeting) will take place 1.5 months before Q1, Q2, Q3 and Q4
- Q (Quarterly Board Meetings) takes place four times a year.
- D (Data extraction or Rejection) will take place in the month following Q1, Q2, Q3 and Q4

Consequently, it takes typically from three to six months between submitting a data request and receiving the data, if the research request has been accepted.

Process and Cohorts			Year 1			Year 2												Year 3		
			10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03
Cohort 1	Submission of Research Requests	Receiving the RR	S1																	
	Research Committee Meeting	Recommendation to Board	R1																	
	Board of Trustees Meeting	Validation and final outcome			Q1															
	Response to Researchers	Data extraction or Rejection			D1															
Cohort 2	Submission of Research Requests	Receiving the RR		S2																
	Research Committee Meeting	Recommendation to Board		R2																
	Board of Trustees Meeting	Validation and final outcome			Q2															
	Response to Researchers	Data extraction or Rejection			D2															
Cohort 3	Submission of Research Requests	Receiving the RR			S3															
	Research Committee Meeting	Recommendation to Board			R3															
	Board of Trustees Meeting	Validation and final outcome				Q3														
	Response to Researchers	Data extraction or Rejection				D3														
Cohort 4	Submission of Research Requests	Receiving the RR					S4													
	Research Committee Meeting	Recommendation to Board					R4													
	Board of Trustees Meeting	Validation and final outcome						Q4												
	Response to Researchers	Data extraction or Rejection							D4											
Cohort 1	Submission of Research Requests	Receiving the RR											S1							
	Research Committee Meeting	Recommendation to Board											R1							
	Board of Trustees Meeting	Validation and final outcome												Q1						
	Response to Researchers	Data extraction or Rejection													D1					

Data Use Agreement

When your Research Request has been accepted, you will receive a Data Use Agreement that you will have to sign before receiving any data. This agreement confirms that you and your collaborators will only use the data sent to you for the scientific study indicated in your request. You must agree not to share the raw data anywhere, implying that you will not be able to submit the raw data along with your manuscript, even if it is required by the journal where you submit your study for publication. Finally, we require that you acknowledge and credit the Species360 members (see the [How to acknowledge](#) section).

Disclaimer

The Core Data and Weights Data have undergone cleaning and standardization by the Science Team at Species360. However, the other datasets mentioned in this document are in their unprocessed form, extracted directly from ZIMS. This means they may contain data entry mistakes, repetitions, and inconsistencies.

All data originates from individuals recorded in ZIMS, which may not reflect the natural habitat conditions of the species.

The data, exclusively derived from individuals managed under human care, could have inherent biases due to varying husbandry and management practices across different species, time periods, countries, and institutions. These biases are discussed in the Research Committee meetings for each research request. To better understand the data, we recommend consulting with the Species360 Science Team and/or Support Team via support@species360.org indicating “Research Request: *title of your project*” in the subject line.

The data provided through the Research Request process cannot be made publicly available or published anywhere else despite it potentially being required from the journals; see the [Acknowledgements section](#).

How to acknowledge

How to cite ZIMS

In publications, please state the Research Request number in the methods section, such as “Data were obtained from Species360’s Zoological Information Management System (ZIMS) obtained via data request #[request number].”

Species360 Zoological Information Management System (ZIMS) (2023), zims.Species360.org. [Date of download: 2023-12-04]

Acknowledgements

We require acknowledgement of the Species360 Conservation Science Alliance, which manages and supports the Research Request process to ensure ZIMS data access to the research community.

Here is suggested text you can use in the Acknowledgments section of your manuscript:

“This research was made possible by the worldwide information network of zoo and aquarium members of Species360. Access to the data has been made possible thanks to the support of the Species360 Science Team serving the Conservation Science Alliance, which ensures a process for the research community to explore the data recorded by more than 1,300 zoological institutions globally to advance knowledge and research on animals. The raw data that support the findings of this study were provided by Species360 via the Research Request #[request number]. Restrictions apply to the availability of these data, which were used under license for this study. It is possible to obtain the data used for this study for replication purposes from Species360 following a successful research request, quoting #[request number].”

Data Privacy Policy

If you would like to learn more about Species360’s data privacy policy, please click [here](#).