



The BIMS Handbook



The Biodiversity Information Management System.
Kartoza Pty (Ltd.) and the Freshwater Research Centre
2022



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1 Home

1.1 Biodiversity Information Management System



Welcome to the Biodiversity Information Management System (BIMS) home page!

BIMS is a platform for managing and visualising biodiversity data.

All of the source code for the platform is open source, and it uses popular open source tooling such as Postgres/PostGIS, GeoServer, Django, Python as building blocks for the platform.

1.1.1 Introduction

Freshwater Biodiversity Information System (FBIS) is an open-access, online platform for serving, hosting, analysing, visualising and sharing freshwater biodiversity data in South Africa. The overall purpose of the platform is to support data-driven freshwater decision-making and management in South Africa.

The system currently accepts and serves data on species occurrence, abundance and associated habitat and abiotic parameters, for anurans, fish, invertebrates, algae, odonate adults and wetland plants. It also accepts and serves water temperature time series data and physico-chemical data.

System design and functionality was strongly informed by data and reporting needs of key end-user groups, including water resource managers, biodiversity and conservation managers and planners, scientific researchers, and environmental consultants. Future expansion of FBIS aims to increase the diversity of data accessed, data flow, geographic coverage and strategically embed FBIS into South Africa's main freshwater decision-making pipelines.

Platform development was funded by the JRS Biodiversity Foundation through two grants: 2017-2020 (Phase 1) and 2021-2024 (Phase 2). The platform was developed by the Freshwater Research Centre in partnership with Kartozia and the South African National Biodiversity Institute.

A scientific article has been published in the African Journal of Aquatic Science and is available [here](#). The citation for the article is:

Dallas HF, Shelton JM, Sutton T, Tri Ciputra D, Kajee M and Job N. 2021. Development of a freshwater biodiversity information system for evaluating long-term change in rivers in South Africa. African Journal of Aquatic Science. doi.org/10.2989/16085914.2021.1982672

The link to the FBIS site: <https://freshwaterbiodiversity.org/>





1.1 Contributor covenant code of conduct

1.1.1 Our pledge

In the interest of fostering an open and welcoming environment, we as contributors and maintainers pledge to making participation in our project and our community a harassment-free experience for everyone, regardless of age, body size, disability, ethnicity, gender identity and expression, level of experience, education, socio-economic status, nationality, personal appearance, race, religion, or sexual identity and orientation.

1.1.2 Our standards

Examples of behaviour that contributes to creating a positive environment include:

- Using welcoming and inclusive language
- Being respectful of differing viewpoints and experiences
- Gracefully accepting constructive criticism
- Focusing on what is best for the community
- Showing empathy towards other community members

Examples of unacceptable behaviour by participants include:

- The use of sexualized language or imagery and unwelcome sexual attention or advances
- Trolling, insulting/derogatory comments, and personal or political attacks
- Public or private harassment
- Publishing others' private information, such as a physical or electronic address, without explicit permission
- Other conduct which could reasonably be considered inappropriate in a professional setting

1.1.3 Our responsibilities

Project maintainers are responsible for clarifying the standards of acceptable behaviour and are expected to take appropriate and fair corrective action in response to any instances of unacceptable behaviour.

Project maintainers have the right and responsibility to remove, edit, or reject comments, commits, code, wiki edits, issues, and other contributions that are not aligned to this Code of Conduct, or to ban temporarily or permanently any contributor for other behaviors that they deem inappropriate, threatening, offensive, or harmful.

1.1.4 Scope

This Code of Conduct applies both within project spaces and in public spaces when an individual is representing the project or its community. Examples of representing a project or community include using an official project e-mail address, posting via an official social media account, or acting as an appointed representative at an online or offline event. Representation of a project may be further defined and clarified by project maintainers.

1.1.5 Enforcement

Instances of abusive, harassing, or otherwise unacceptable behaviour may be reported by contacting the project team. All complaints will be reviewed and investigated and will result in a response that is deemed necessary and appropriate to the circumstances. The project team is obligated to maintain confidentiality with regard to the reporter of an incident. Further details of specific enforcement policies may be posted separately.

Project maintainers who do not follow or enforce the Code of Conduct in good faith may face temporary or permanent repercussions as determined by other members of the project's leadership.

1.1.6 Attribution

This Code of Conduct is adapted from the [Contributor Covenant](https://www.contributor-covenant.org/version/1/4/code-of-conduct.html), version 1.4, available at <https://www.contributor-covenant.org/version/1/4/code-of-conduct.html>





1.1 Running Instances

1.1.1 Running instances of BIMS

Examples of running instances of the Biodiversity Information Management System (BIMS) are:

- **[FBIS](#)**: The Freshwater Biodiversity Information System, South Africa.
- **[RBIS](#)**: The Rwanda Biodiversity Information System, Rwanda.
- **[ORBIS](#)**: The Okavango Repository for BiodiverSity Data, Botswana



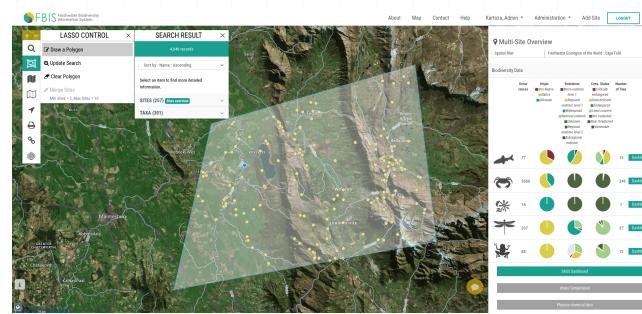


1.1.1 FBIS



Web Site: <https://freshwaterbiodiversity.org/>

The Freshwater Biodiversity Information System (FBIS), South Africa.



The FBIS serves as a community platform for inventory and maintenance of freshwater biodiversity data with an end goal to assist the evaluation of long-term change in river biodiversity and ecosystem condition in South Africa.

This project is funded by the JRS Biodiversity Foundation and SANBI, and implemented by the FRC and Kartoza.

By signing up and creating an account you will be able to (1) explore the map, (2) query the data in the system, (3) download maps, data, graphs and reports and (4) create a site and upload data. If you do not sign up, you will still have access to all the above functions except the ability to upload data.

The FBIS v3 release includes access to FBIS, a FBIS v3 user manual (accessed via the 'Help' tab on the top bar of the site) and a short 'how to' video series available [here](#).

These aids should help you to navigate your way around the system and test out the main functions, features and work flows, as well as flag any issues you pick up on while testing.

Any questions can be directed to fbis@frcsa.org.za.

We look forward to receiving your feedback!

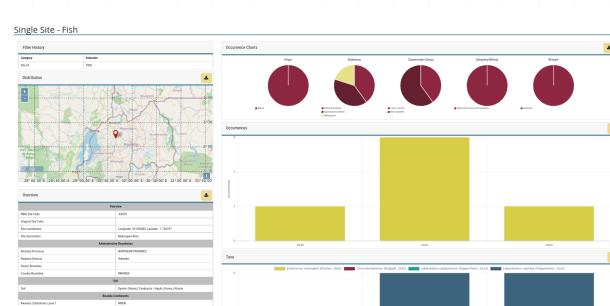




1.1.1 RBIS

Web Site: <https://rbis.ur.ac.rw/>

We are CoEB - the Center of Excellence in Biodiversity and Natural Resource Management, Rwanda



CoEB is a Rwandan Government institution that functions as a consortium of governmental and non-governmental organizations, bringing together expertise and skills to produce information needed for effective policy and science-driven economic transformation. The Center is hosted at University of Rwanda and works in three areas: research and monitoring, bioprospecting, and conservation education and awareness raising.

The Center plays a catalytic and coordinating role to ensure sharing of scientific knowledge and expertise for evidence-based decisions in conservation, natural resource management and climate resiliency. We provide leadership, best practices, research, support and training in the domain of biodiversity, natural resource management, and impacts of climate change on ecosystems and livelihoods. The goal is to encourage, enable and support stakeholders to generate and apply knowledge on biodiversity and natural resources for sustainable development. We address the need for data for national reporting requirements (CBD, NDC, etc.) and to inform existing indicators of global biodiversity trends, such as the Living Planet Index from WWF, the Red List Index, GEO BON Species Protection Index, and the need for data in land use planning decisions, restoration projects, and ecosystem health and services provisioning.

A biodiversity information system takes biodiversity observation records that are stored in a variety of sources and formats and puts them into a standardized format on a viewing platform to enable stakeholders to access and use the information.

Biodiversity data for Rwanda have been scattered and difficult to access, but are critical to understanding patterns of biodiversity distribution, ecosystem functioning, and early detection of environmental change. Species records can provide indication of climate change impacts, pollution effects, and guide development, land use planning, tourism opportunities, and monitoring of restoration efforts. An information system puts data at your fingertips for national reporting requirement needs like the CBD and NDC. The system effectively links research to conservation and policy.

With funding from the JRS Biodiversity Foundation <https://jrsbiodiversity.org/> we are developing the first national biodiversity information system for Rwanda. We call it the Rwanda Biodiversity Information System or RBIS. Thanks to generous collaboration from data holders who graciously shared their data sets, including independent researchers, NGOs and government institutions, we have already mobilized more than 30,000 biodiversity data records.

We begin the RBIS with a focus on biodiversity data in freshwater ecosystems. We have mobilized data on odonates, anurans, and birds, thanks to the generous data sharing by data holders. Our aim is to demonstrate the power of the RBIS to inform wetlands and catchment management using biodiversity data to indicate ecosystem health. We will eventually scale the RBIS up to include all ecosystems in Rwanda.

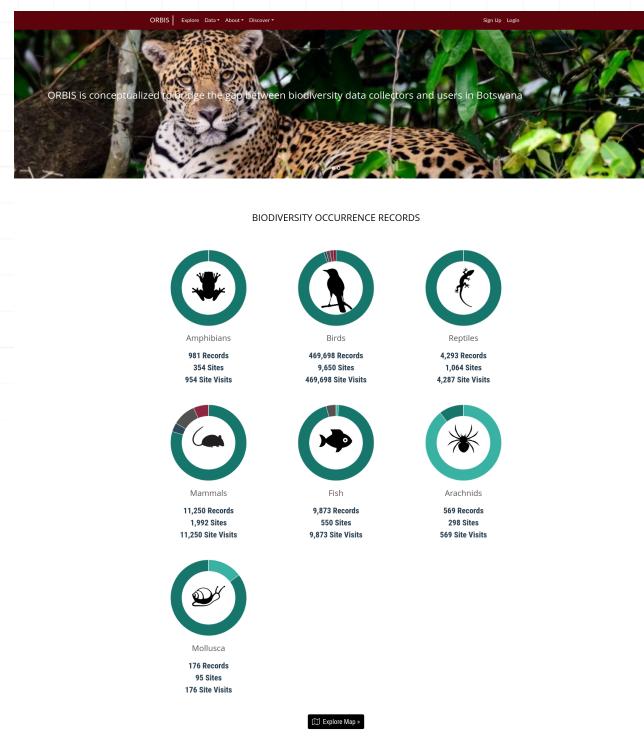
When you enter the Explore button, you will see the base map of Rwanda and you can begin to explore and query the system for information. We hope you find this resource valuable and we welcome your feedback.

For more information, contact us at: coeb1@ur.ac.rw



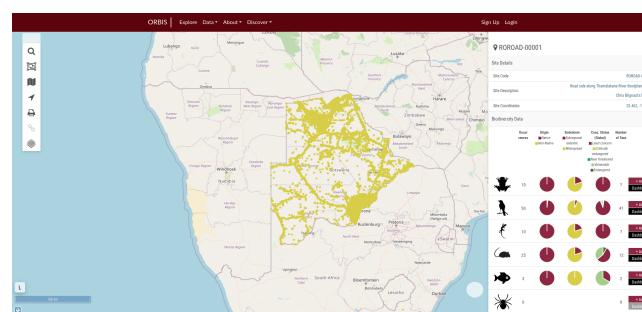


1.1.1 ORBIS



Web Site: <https://orbis.kartoza.com>

The Okavango Repository for BiodiverSity Data (ORBIS), Botswana



The **Okavango Repository for Biodiversity Data** (ORBIS) is conceptualised to bridge the gap between biodiversity data collectors and users in Botswana, with an emphasis on policymakers responsible for conservation management decisions.

Through continued engagement with stakeholders via the ORBIS reference group and capacity-building activities, ORBIS will improve the pathways from biodiversity data to policies, ensuring that stakeholders are empowered to make evidence-based decisions relating to biodiversity management.

For more information, contact us at: ebennett@ub.ac.bw



1 Users

1.1 User documentation

This is the homepage for all user related documentation.

The user content is divided into three sections:

- The [quickstart tutorial](#), which aims to get you familiar with the basics of platform in around 5 minutes.
- The [user guide](#), which describes common workflows in a tutorial format.
- The [user manual](#), which describes each page of the user interface and what the various options on that page do.



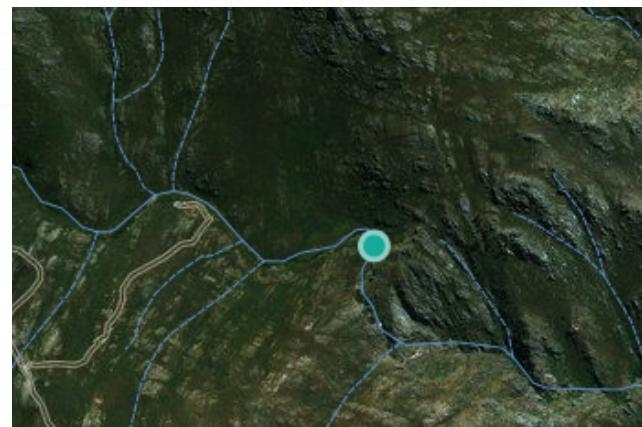


1.1 Quickstart

1.1.1 Quickstart

1.1.1.1 Key concepts

Site: A specific location along a river course where sampling or assessments take place.



FBIS Site-code: A unique name given to each site made up of:

- Two characters representing the secondary catchment code e.g. G1
- Four characters representing the river name e.g. JONK. This is currently derived from the 1:500 000 DWS rivers layer. If the river does not have a name on this layer, then the nearest river name is taken. For this reason it is important for a user to add the Original river name on the Site form if the river is unnamed (e.g. a small tributary).
- A hyphen i.e. –
- Five characters representing the nearest place name e.g. SIMONS. In many cases these five characters are replaced by a numeric value where a place name has not been identified. The Original Site Code and Original River Name from the original study are also provided.
- The site code is generated automatically unless the user as a standard name.

X3SABI-HOXAN	
Site Details	
Site Code	X3SABI-HOXAN
Site Description	Hoxane, bottom roadbridge from R338 from KNP
Site Coordinates	31.718,-25.619
SA Ecoregion Level 1	3 LOWVELD
Geomorphological zone	Lower foothill
River	SABIRIVER

G2EERS-JONIKE	
Site Details	
Site Code	G2EERS-JONIKE
Site Description	Mountain stream in Jenkensvlei State Forest
Site Coordinates	18.973, -33.994
SA Ecoregion Level 1	19 SOUTHERN HIGHLAND MOUNTAINS
Geomorphological zone	Mountain stream
River	Fente

River: This is currently derived from the 1:500 000 DWS rivers layer. If the river does not have a name on this layer, then the nearest river name is taken. For this reason it is important for a user to add the Original river name on the Site form if the river is unnamed (e.g. a small tributary). (See section 11.1 Create a site).

Occurrence record: One collection record for a taxon at a given site. This record may optionally include abundance data.

Occurrence Data				
Taxon	Occurrences	Origin	Endemism	Cons. Status
Galaxias zebratus (Castelnau, 1861)	1	Native	Regional endemic level 1	Data deficient
Pseudobarbus burchelli (Smith, 1841)	1	Native	Micro-endemic level 1	Critically endangered
Download as CSV				

Search: The process whereby free-form text is entered into the search box and the matching records are shown on the map.





The screenshot shows the BIMS Handbook search interface. On the left, there's a sidebar with icons for filters, biodiversity module, abiotic module, and data sources. The main search bar contains the query "Galaxias zebratus". The results page displays the same search term and a count of 693 records. A dropdown menu allows sorting by name (descending). Below the search bar, there are links for "SITES (564)" and "TAXA (1)".

Filters: Often used in conjunction with search, filtering allows you to narrow down the result set based on predefined spatial, temporal and biological criteria, such as province, date, species, etc.

This screenshot shows the expanded filter section of the BIMS Handbook search interface. It includes a sidebar with icons for filters, biodiversity module, abiotic module, data sources, validation status, temporal, spatial, ecological category (SASS), origin and endemism, conservation status global, reference category, study reference, owner, and decision support tool. The sidebar also features a small map and the word "Lambe".

Biodiversity Module: A higher taxonomic grouping of taxa (and thus their related collection records). Modules can have their own dashboard implementations and data capture forms to capture information specific to the kind of taxa in the module grouping.





BIODIVERSITY MODULE



APPLY

CLEAR

Abiotic Module: A module serving abiotic data including water temperature time series data and physico-chemical data.

ABIOTIC MODULE

Water Temperature (time series)

Physico-chemistry

APPLY

CLEAR

1.1.1.2 Signing up

Visit freshwaterbiodiversity.org to login, sign up and explore. Complete the **Sign Up** to register to use FBIS, including details of your organisation and role in the freshwater community.





Tracking change in South Africa's Freshwater Biodiversity

LOGIN SIGN UP EXPLORE

SIGN UP

E-mail:

First Name:

Last Name:

Organization/Institution:

Role:

Researcher

Water Resource Manager

Passive Researcher

Consultant

Conservation Planner

Citizen

- upper case letter
- numeric character

1.1.1.3 Logging in

Navigate to freshwaterbiodiversity.org, and then on the landing page click on **Log In** in the top navigation bar.

About Map Contact Help

LOG IN

SIGN UP

You will be redirected to the Login Page. Fill in your email address and password and then click on **Login**





LOG IN

E-mail:

example@example.com

Password:

Password

Remember Me:

[Forgot Password](#)

LOGIN





1.1 Guide

1.1.1 User guide

Welcome to the BIMS user guide. In this section of the documentation, we aim to show users how to utilise the platform effectively, customise their profiles and so forth. This guide aims to provide details on key aspects of FBIS and expand on its functionality. It is accompanied by a series of video clips that demonstrate various workflows that users are likely to need (a short video tutorial series is available ([here](#))).

Here is a brief overview of the content provided here:

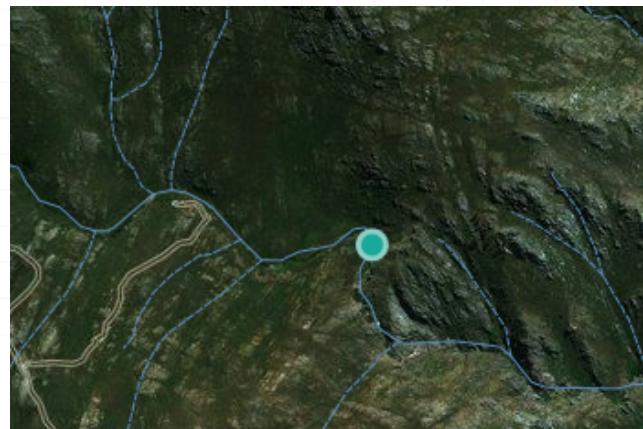
- [**Key Concepts:**](#) This section explains some of the key concepts of the platform.
- [**Registering:**](#) This page will show you how to register on the platform and then how to log in.
- [**Map interface:**](#) This section gives an overview of the map interface.
- [**Search:**](#) This section describes the search functionalities of the platform.
- [**Filtering:**](#) This documentation explains the types of filtering available.
- [**Mapping:**](#) This documentation describes the functionalities of mapping on the platform.
- [**Biodiversity Data:**](#) This section of documentation explains the biodiversity data for the platform.
- [**Overview Panels:**](#) This section explains the overview panels on the platform.
- [**Dashboards:**](#) These pages provide an over of the dashboard components of the platform.
- [**Data Upload:**](#) This documentation describes how to utilise the data upload forms.
- [**References:**](#) This page provides the references used to create the guide.





1.1.1 Key concepts

Site: A specific location along a river course where sampling or assessments take place.



FBIS Site-code: A unique name given to each site made up of:

- Two characters representing the secondary catchment code e.g. G1
- Four characters representing the river name e.g. JONK. This is currently derived from the 1:500 000 DWS rivers layer. If the river does not have a name on this layer, then the nearest river name is taken. For this reason it is important for a user to add the Original river name on the Site form if the river is unnamed (e.g. a small tributary).
- A hyphen i.e. -
- Five characters representing the nearest place name e.g. SIMONS. In many cases these five characters are replaced by a numeric value where a place name has not been identified. The Original Site Code and Original River Name from the original study are also provided.
- The site code is generated automatically unless the user sets a standard name.

X3SABI-HOXAN		G2EERS-JONKE	
Site Details		Site Details	
Site Code	X3SABI-HOXAN	Site Code	G2EERS-JONKE
Site Description	Hoxane, below mouthbridge from K308 from KNP	Site Description	Mountain stream in Jenkerstek State Forest
Site Coordinates	31.218,-25.019	Site Coordinates	18.973, 31.994
SA Ecoregion Level 1	3 LOWVELD	SA Ecoregion Level 1	19 SOUTHERN FOLIAGE MOUNTAINS
Geomorphological zone	Lower Foothill	Geomorphological zone	Mountain stream
River	SABIRIVER	River	Entate

River: This is currently derived from the 1:500 000 DWS rivers layer. If the river does not have a name on this layer, then the nearest river name is taken. For this reason it is important for a user to add the Original river name on the Site form if the river is unnamed (e.g. a small tributary). (See section 11.1 Create a site).

Occurrence record: One collection record for a taxon at a given site. This record may optionally include abundance data.

Occurrence Data				
Taxon	Occurrences	Origin	Endemism	Cons. Status
Galaxias zebratus (Castelnau, 1861)	1	Native	Regional endemic level 1	Data deficient
Pseudobarbus burchelli (Smith, 1841)	1	Native	Micro-endemic level 1	Critically endangered
Download as CSV				

Search: The process whereby free-form text is entered into the search box and the matching records are shown on the map.





The screenshot shows the BIMS Handbook search interface. On the left, there's a sidebar with icons for filters, biodiversity module, abiotic module, and data sources. The main search bar contains the query "Galaxias zebratus". The search result panel shows "Galaxias zebratus" with "693 records". It includes a dropdown for sorting by name (descending), a note to select an item for more detailed information, and links for "SITES (564)" and "TAXA (1)".

Filters: Often used in conjunction with search, filtering allows you to narrow down the result set based on predefined spatial, temporal and biological criteria, such as province, date, species, etc.

This screenshot shows the search interface with the filter sidebar expanded. The sidebar lists various filter categories: BIODIVERSITY MODULE, ABIOTIC MODULE, DATA SOURCES, VALIDATION STATUS, TEMPORAL, SPATIAL, ECOLOGICAL CATEGORY (SASS), ORIGIN AND ENDEMISM, CONSERVATION STATUS GLOBAL, REFERENCE CATEGORY, STUDY REFERENCE, OWNER, and DECISION SUPPORT TOOL. Each category has a corresponding icon and a dropdown arrow. The background shows a map of a river system.

Biodiversity Module: A higher taxonomic grouping of taxa (and thus their related collection records). Modules can have their own dashboard implementations and data capture forms to capture information specific to the kind of taxa in the module grouping.





BIODIVERSITY MODULE



APPLY

CLEAR

Abiotic Module: A module serving abiotic data including water temperature time series data and physico-chemical data.

ABIOTIC MODULE

Water Temperature (time series)

Physico-chemistry

APPLY

CLEAR





1.1.1 Registering and logging in

1.1.1.1 Signing up

Visit freshwaterbiodiversity.org to login, sign up and explore. Complete the **Sign Up** to register to use FBIS, including details of your organisation and role in the freshwater community.

The screenshot shows the 'SIGN UP' page of the website. At the top, there is a banner with the text 'Tracking change in South Africa's Freshwater Biodiversity' and three buttons: 'LOGIN', 'SIGN UP' (which is highlighted in yellow), and 'EXPLORE'. Below the banner, the 'SIGN UP' heading is displayed. The form consists of several input fields: 'E-mail:' with a placeholder 'E-mail address', 'First Name:' with a blank input field, 'Last Name:' with a blank input field, 'Organization/Institution:' with a blank input field, 'Role:' with a dropdown menu currently set to 'Researcher' (which is also highlighted in blue), and a password field with a placeholder 'Password'. A tooltip for the password field provides instructions: 'Password must contain at least 8 characters, including: • upper case letter • numeric character'. Below the password field is another 'Password' input field.

1.1.1.2 Logging in

Navigate to freshwaterbiodiversity.org, and then on the landing page click on **Log In** in the top navigation bar.

About Map Contact Help

LOG IN

SIGN UP

You will be redirected to the Login Page. Fill in your email address and password and then click on **Login**





LOG IN

E-mail:

example@example.com

Password:

Password

Remember Me:

[Forgot Password](#)

LOGIN





1.1.1 Overview of the map interface

1.1.1.1 Navigation bar

About Map Contact Help Helen ▾ Administration ▾ Add Site

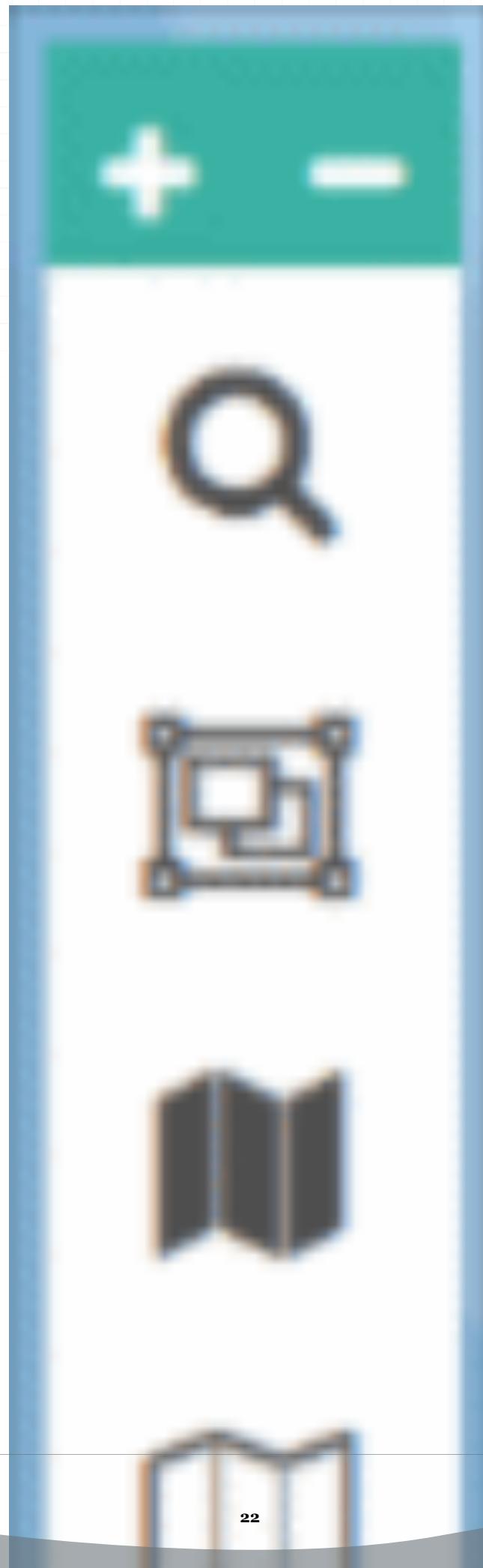
LOGOUT

- **About** provides details of the FBIS, including the funders and partners.
- **Map** is where you explore the data.
- **Contact** to send us a query or question.
- **Help** provides access to a User Manual and video tutorials demonstrating FBIS functionality.
- “**Your Name**” is for editing your profile and viewing your contributions.
- **Add Site** is a shortcut to add a new site and associated data to FBIS.

1.1.1.2 Tool bar

This is what the tool bar looks like as a whole.







Below is a breakdown of the buttons of the tool bar:

Button	Description
	Zoom in and out on the map
	Search and filter records
	Lasso Control to select and group specific sites using a polygons
	Turning on and changing transparency of layers
	Select third party data (MiniSASS and water quality data served by InWARDS)
	Locate options using coordinates and farm codes
	Print a PNG of your map
	Copy a shareable link for your map
	Change the base map. Options include Bing Satellite Hybrid, Terrain, Topography, Aerial photograph or Plain B & W.





1.1.1 Search

FBIS supports search auto-completion based on FBIS site code, taxon name (scientific) and river name. With this implementation it is very easy to, for example, quickly extract all of the sites along a given river as per the example shown below (Figure 2).

Accessed by: Clicking on the magnifying glass search icon and then entering a taxon name, FBIS site code or river name into the search box. A user can search using **Taxon Rank** (species, genus, family or order) as well as Taxon, which is the lowest taxon provided in a study reference (Figure 3).

To clear search criteria use "Reset".



Search based on river name:

SEARCH RESULT

BERGIVER 961 records

BERGIVER

SEARCH

FILTERS

MODULE

DATA SOURCES

VALIDATION STATUS

TEMPORAL

SPATIAL

ECOLOGICAL CATEGORY (SASS)

ORIGIN AND ENDENISM

CONSERVATION STATUS

REFERENCE CATEGORY

STUDY REFERENCE

COLLECTOR/OWNER

Search based on Taxon Name and Rank, showing Order Ephemeroptera, Family Teloganoididae, Genus Lestagella and Species Lestagella penicillata:

SEARCH RESULT

Ephemeroptera 4000+ records

Ephemeroptera

SEARCH

FILTERS

MODULE

DATA SOURCES

VALIDATION STATUS

TEMPORAL

SPATIAL

ECOLOGICAL CATEGORY (SASS)

ORIGIN AND ENDENISM

CONSERVATION STATUS

REFERENCE CATEGORY

STUDY REFERENCE

SEARCH RESULT

Teloganoididae 2151 records

Teloganoididae

SEARCH

FILTERS

MODULE

DATA SOURCES

VALIDATION STATUS

TEMPORAL

SPATIAL

ECOLOGICAL CATEGORY (SASS)

ORIGIN AND ENDENISM

CONSERVATION STATUS

REFERENCE CATEGORY

STUDY REFERENCE

SEARCH RESULT

Lestagella 112 records

Lestagella

SEARCH

FILTERS

MODULE

DATA SOURCES

VALIDATION STATUS

TEMPORAL

SPATIAL

ECOLOGICAL CATEGORY (SASS)

ORIGIN AND ENDENISM

CONSERVATION STATUS

REFERENCE CATEGORY

STUDY REFERENCE

SEARCH RESULT

Lestagella penicillata 5-11 records

Lestagella penicillata

SEARCH

FILTERS

MODULE

DATA SOURCES

VALIDATION STATUS

TEMPORAL

SPATIAL

ECOLOGICAL CATEGORY (SASS)

ORIGIN AND ENDENISM

CONSERVATION STATUS

REFERENCE CATEGORY

STUDY REFERENCE



1.1.1 Filtering

Two types of filters are supported on FBIS: Contextual filters, which filter based on the site or collection record attributes in the database, and map based filters which operate by selection of sites on the map.

1.1.1.1 Contextual filters

One of the key technologies ‘under the hood’ in FBIS is the use of Kartozza’s GeoContext service. GeoContext provides a way to, in a single query, obtain contextual data for any geographical point across multiple Open Geospatial Consortium (OGC) web services (WMS, WFS). The results are aggregated into a single document and made available to FBIS which then stores this aggregate data as properties of a site. Having this rich collection of GeoContext data for each site allows us to filter the records shown on the map and in dashboards in fairly arbitrary ways. For example, selecting only records from a given catchment or ecoregion. A description of each filter is provided in Table 1.

Filtering is done using a hierarchical ‘tree view’ in the filter panel (Figure 4). Tree nodes can be expanded or collapsed and selecting a specific node or set of nodes will allow you to apply the selected filters to the records displayed on the map and search result areas as shown below:

Example of some of the filters available for querying the data.





SEARCH



Refine your search by using the filters below.

FILTERS

BIODIVERSITY MODULE

ABIOTIC MODULE

DATA SOURCES

VALIDATION STATUS

TEMPORAL

SPATIAL

ECOLOGICAL CATEGORY (SASS)

ORIGIN AND ENDEMISM

CONSERVATION STATUS

REFERENCE CATEGORY

STUDY REFERENCE

OWNER

DECISION SUPPORT TOOL

To apply the filter click **Apply**; to clear the click **Clear**.





Apply Clear

Table 1. Details of the filters provided in FBIS





Filter	Description
	Biodiversity module: Filter records for fish, invertebrates, algae, adult odonates or anuran only by clicking the appropriate icon. To filter records for sites that have more than one biodiversity module (e.g. fish and invertebrates), use the Shift Click function to select multiple modules.
	Abiotic module: Filter records for sites that have water temperature time series data, or physico-chemical data.
	Data sources: The default setting in FBIS is all data collated specifically for FBIS, existing GBIF records and existing Virtual Museum records are provided. Uncheck those sources that you do not want records for. Note that neither GBIF or Virtual Museum data have not been validated by the FBIS team.
	Validation status: The default setting in FBIS is that all Validated, unvalidated, SASS Accredited and Non SASS Accredited data are provided. Validated data have been checked by FBIS admin and /or designated expert, while unvalidated data have not been checked. SASS Accredited and Non SASS Accredited relates specifically to whether the assessor was SASS accredited at the time of doing the SASS assessment. Filter records by checking the relevant boxes to include specific data only.
	Temporal: Filter records using the sliding scale to specify year(s), and/or check specific months.
	Spatial: Thirteen spatial filters are currently provided for users to filter the records shown on the map and in dashboards. For example, selecting only records from a given province, catchment or SA ecoregion. Further details are provided in section 7.2 . The current list of spatial filters lodged in FBIS include: <ul style="list-style-type: none">- Geomorphological Zones- Freshwater Ecoregions of the World- South African Province and Neighbouring Country- Management Area- Catchments- SA Ecoregions- National and Provincial Critical Biodiversity Areas- National Freshwater Ecosystem Priority Areas- Strategic Water Source Areas- National Biodiversity Assessments 2018- Hydrological Regions- Thermal Framework
	Ecological category (SASS): Filter records based on ecological categories, interpreted from SASS data interpretation guidelines of Dallas (2007).
	Origin and endemism: Filter records based on origin: native or non-native, where non-native includes both alien and extralimital taxa. Filter records based on endemism, where taxa are divided into eight categories as follows: <ul style="list-style-type: none">- Micro-endemic level 2 (Endemic to a single river or wetland)- Micro-endemic level 1 (Endemic to less than 5 rivers or wetlands)- Regional endemic level 2 (Endemic to a single primary catchment)- Regional endemic level 1 (Endemic to a single Freshwater Ecoregion (e.g. CFE), more than one primary catchment)- National endemic (Endemic to South Africa, occurs in more than one Freshwater Ecoregion within SA)- Subregional endemic (Endemic to southern Africa)- Widespread (Occurs beyond southern Africa)- Unknown (Endemism is unknown)
	Conservation status: Derived from the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species, a user may filter records based on global conservation status.

Filter

Description

Biodiversity module: Filter records for fish, invertebrates, algae, adult odonates or anuran only by clicking the appropriate icon. To filter records for sites that have more than one biodiversity module (e.g. fish and invertebrates), use the Shift Click function to select multiple modules.

Abiotic module: Filter records for sites that have water temperature time series data, or physico-chemical data.

Data sources: The default setting in FBIS is all data collated specifically for FBIS, existing GBIF records and existing Virtual Museum records are provided. Uncheck those sources that you do not want records for. Note that neither GBIF or Virtual Museum data have not been validated by the FBIS team.

Validation status: The default setting in FBIS is that all Validated, unvalidated, SASS Accredited and Non SASS Accredited data are provided. Validated data have been checked by FBIS admin and /or designated expert, while unvalidated data have not been checked. SASS Accredited and Non SASS Accredited relates specifically to whether the assessor was SASS accredited at the time of doing the SASS assessment. Filter records by checking the relevant boxes to include specific data only.

Temporal: Filter records using the sliding scale to specify year(s), and/or check specific months.

Spatial: Thirteen spatial filters are currently provided for users to filter the records shown on the map and in dashboards. For example, selecting only records from a given province, catchment or SA ecoregion. Further details are provided in [section 7.2](#). The current list of spatial filters lodged in FBIS include:

- Geomorphological Zones
- Freshwater Ecoregions of the World
- South African Province and Neighbouring Country
- Management Area
- Catchments
- SA Ecoregions
- National and Provincial Critical Biodiversity Areas
- National Freshwater Ecosystem Priority Areas
- Strategic Water Source Areas
- National Biodiversity Assessments 2018
- Hydrological Regions
- Thermal Framework

Ecological category (SASS): Filter records based on ecological categories, interpreted from SASS data interpretation guidelines of Dallas (2007).

Origin and endemism: Filter records based on origin: native or non-native, where non-native includes both alien and extralimital taxa. Filter records based on endemism, where taxa are divided into eight categories as follows:

- Micro-endemic level 2 (Endemic to a single river or wetland)
- Micro-endemic level 1 (Endemic to less than 5 rivers or wetlands)
- Regional endemic level 2 (Endemic to a single primary catchment)
- Regional endemic level 1 (Endemic to a single Freshwater Ecoregion (e.g. CFE), more than one primary catchment)
- National endemic (Endemic to South Africa, occurs in more than one Freshwater Ecoregion within SA)
- Subregional endemic (Endemic to southern Africa)
- Widespread (Occurs beyond southern Africa)
- Unknown (Endemism is unknown)

Conservation status: Derived from the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species, a user may filter records based on global conservation status.





Filter Description

Reference category: Filter records based on type of reference.

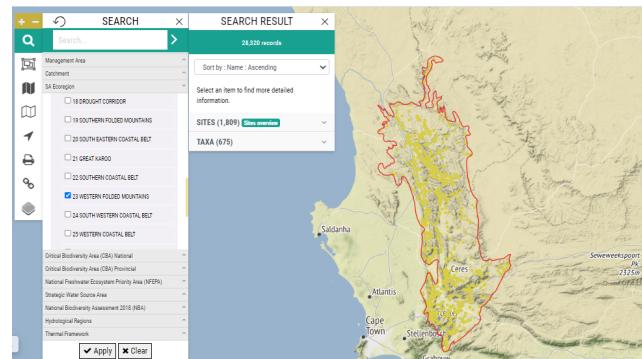
Study reference: Filter records by selecting a specific study reference.

Owner: Filter records collected by a specific person.

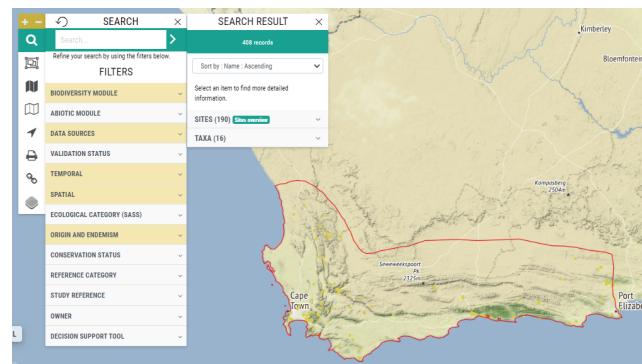
Decision support tool: Filter records that have been used to support management and conservation decision making by contributing to a specific Decision Support Tool.

Applying a filter returns a subset of the data based on your filter criteria, for example records in SA Ecoregion = Western Folded Mountains. When a filter is in effect, you will see a yellow highlight of the 'drawers' which have filter options enabled (highlighted in yellow). The filter system only displays filter options for categories that have sites associated. For example, if you do not see an option in the 'Provinces' filter for Northern Cape, it means we do not have any data (sites) for that province.

Filtering sites to show only those in SA Ecoregion = Western Folded Mountains:



Highlighting drawers where a filter condition is active:



1.1.1.2 Map based filtering

Sites may also be selected by using Lasso Control. This feature allows the user to draw a polygon around specific sites to include in dashboards. By clicking "Update search" the user will see the search results for all the sites in the polygon. Note that to close your lasso selection you must click on the starting point again. The "Merge sites" feature allows the administrator to merge the data from the sites in the polygon into one site. The clear Polygon, resets to zero.

Drawing a polygon to select and group sites:







1.1.1 Mapping

1.1.1.1 Spatial Layers

Spatial layers, which may be turned on and off in the FBIS map, function as background layers upon which biodiversity data are displayed. Often spatial layers are used for generating geocontext data. Geocontext data are contextual data for any geographical point, sourced from relevant spatial layers and aggregated as properties of a site. Spatial layers served in FBIS are based on stakeholder discussions and user requirement assessments. Layers are used both as contextual underlays (e.g. "show catchment boundaries in the background of the map") on the interactive web map and as the basis for filtering biodiversity data (see section 6.1, e.g. "show me all sites in catchment G2"). The current list of spatial layers lodged in FBIS is enumerated below.

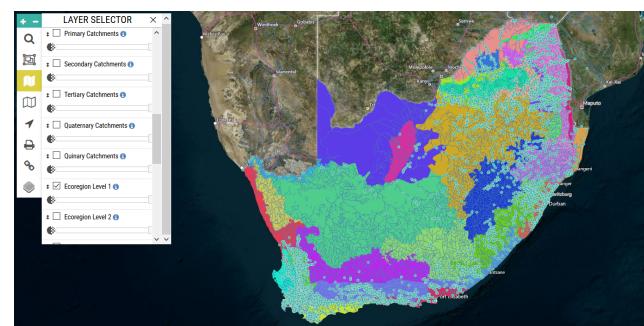
- Sites
- Rivers
- Dams
- Geomorphological Zones
- Freshwater Ecoregions of the World
- Water Management Areas
- Sub Water Management Areas
- River Management Units (currently only Western Cape)
- Catchments (Primary, Secondary, Tertiary, Quaternary, Quinary)
- SA Ecoregions (Ecoregion Level 1, Ecoregion Level 2)
- Fish sanctuaries
- National Critical Biodiversity Areas
- Protected areas
- National Freshwater Ecosystem Priority Areas
- National Ecological Support Areas
- Strategic Water Source Areas
- Land Use Classes
- Hydrological Regions
- Hydrological Region Flow Type
- Thermal Framework

Each layer may be turned on by checking the relevant box, and the transparency of each layer may be increased or decreased using the slider (Figure 8).



The order of layers in the side panel can also be adjusted by dragging layers up and down with the mouse. Layers at the top of the layer list will be shown in the foreground.

Selection of spatial layers for displaying biodiversity data:



To view the metadata for each layer, click on the blue source 'i' button.

Map layer metadata display in FBIS Version 3:





The screenshot shows a 'LAYER SELECTOR' interface with various icons on the left and a list of layers on the right. The 'Ecoregion Level 1' layer is highlighted with a yellow background.

- Quaternary Catchments [i](#)
- Quinary Catchments [i](#)
- Ecoregion Level 1 [i](#)
- Ecoregion Level 2 [i](#)

Ecoregions (Level I, version 2005) for South Africa derived from terrain and vegetation, with some consideration of altitude, rainfall, runoff variability, air temperature, geology, soil. Data Source: Department of Water and Sanitation: 2011





1.1.1 Biodiversity Data

In FBIS we have provision for freshwater fish, invertebrate, algal, adult odonate, anuran and wetland plant data, as well as SASS (invertebrate) data. Biodiversity data served include data collated for FBIS, data harvested from GBIF and data harvested from the Virtual Museum.

DATA SOURCES

FBIS [i](#)

GBIF [i](#)

VIRTUAL MUSEUM [i](#)

1.1.1.1 Taxonomy

A Master List of Species or Taxa has been created for each biodiversity module. In each case, best available information has been used, and consultation with relevant experts undertaken where possible. It is envisaged that these lists will be updated as new data are included and new species described.

1.1.1.2 FBIS Fish data

FRC has collated and cleaned fish data (23,243 records from scientific papers, reports, theses, and other unpublished datasets) for South Africa, which are now being served by the FBIS. An additional 22,312 records are harvested from GBIF. These data are primarily from the South African Institute for Aquatic Biodiversity. The fish data include formally described native and non-native species that occur in South Africa. Primary and secondary freshwater species, as well as diadromous species, are included, but marine species are excluded.

1.1.1.3 FBIS Invertebrate data

Legacy data from the Biobase (Dallas et al. 1999) for South Africa and collated and cleaned invertebrate data from scientific papers, reports, theses, and other unpublished datasets, are now being served by the FBIS. 255,326 records of invertebrates (including SASS data, see section 8.4) are thus served in FBIS. An additional 78,758 records are harvested from GBIF.

1.1.1.4 SASS (invertebrate) Data

Approximately 10,000 records of SASS data from the legacy Rivers Database (River Health Programme, 2007) were imported into FBIS. Data from 12,961 SASS assessments are currently served on FBIS.

Note:

Note: SASS data imported from the Rivers database have not yet been thoroughly corrected or validated. Errors in the original Rivers Database will systematically be checked in FBIS V3. Please advise us of any errors that you note during your exploration (fbis@frcsa.org.za).

1.1.1.5 FBIS Algal data





Collated and cleaned algal data (approximately 6,152 records from scientific papers, reports, theses, and other unpublished datasets) for South Africa, are now being served by the FBIS. An additional 6,260 records are harvested from GBIF.

1.1.1.6 Odonate adult data

Odonate adult data currently served on FBIS is sourced from the Virtual Museum (99,302records).

1.1.1.7 Anuran data

Anuran data currently served on FBIS is sourced from collated and cleaned data (5 records from Unpublished data), from GBIF (28,252 records) and from the Virtual Museum (8873 records).





1.1.1 Overview panels

The overview panels - visible on the side of the map - are used for quick visualisation / summaries of single taxon, single-site and multi-site search results.

1.1.1.1 Single taxon overview panel

The single taxon overview panel provides an at-a-glance overview of records for the taxon, and the taxon's origin, endemism and conservation status. It also includes an outbound link to the IUCN status page for that taxon, and fetches specimen images from GBIF if available.

By clicking **Open Dashboard**, the user can then open the Dashboard to see further information on the taxon.

Single taxon overview panel:





X

Overview

Species details

Taxon	Pseudobarbus bungi (Boulenger, 1911)
Common Name	Unknown
Occurrences	166
Number of Sites	136
Taxon Rank	SPECIES

Origin

Native	Non-Native	Unknown

Endemism

Micro-endemic	Micro-endemic	Regional endemic	Regional endemic	Unknown	Widespread
level 1	level 2	level 1	level 2		

Conservation Status

NE	DD	LC	NT	VU	EN (Endangered)	CR	EW	EX
----	----	----	----	----	-----------------	----	----	----

[IUCN species page](#)

Images



[OPEN DASHBOARD](#)

1.1.1.2 Single-site overview panel

For single-sites, we display summary data, including useful context information (GeoContext-derived data) such as the Geomorphological Zone and Ecoregions (Figure 13). The number of occurrences for each module (fish, invertebrates, algae, odonate adults and anura), pie charts showing the proportion of taxa in each Origin (see section 10.1.8), Endemism (see section 10.1.9) and Conservation Status (see section 10.1.10) category, as well as number of taxa is shown for each group.

The “dashboards and forms” on the overview panel provides onward links to available fish, invertebrate, algal and SASS dashboards (see Section 10) and forms for uploading data (see Section 11). Temperature and rainfall charts (data for which is also harvested from GeoContext) can be found at the bottom of the panel. See below which illustrates the bottom section of the overview panel.

Single-site overview panel - top:





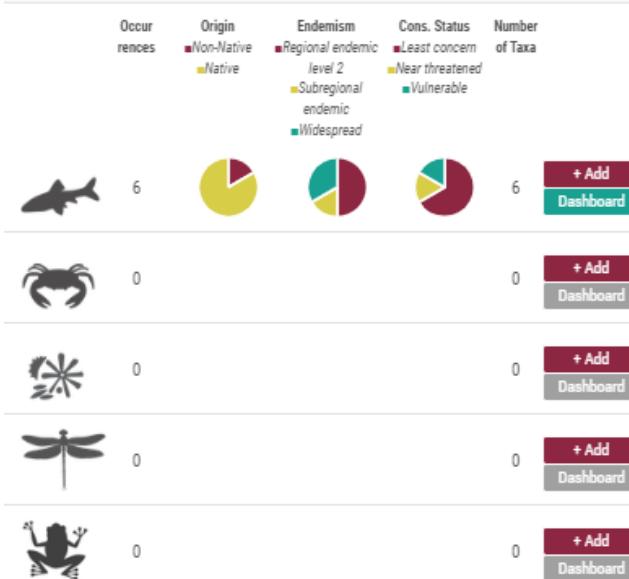
📍 D3DWAR-00006

Edit

Site Details

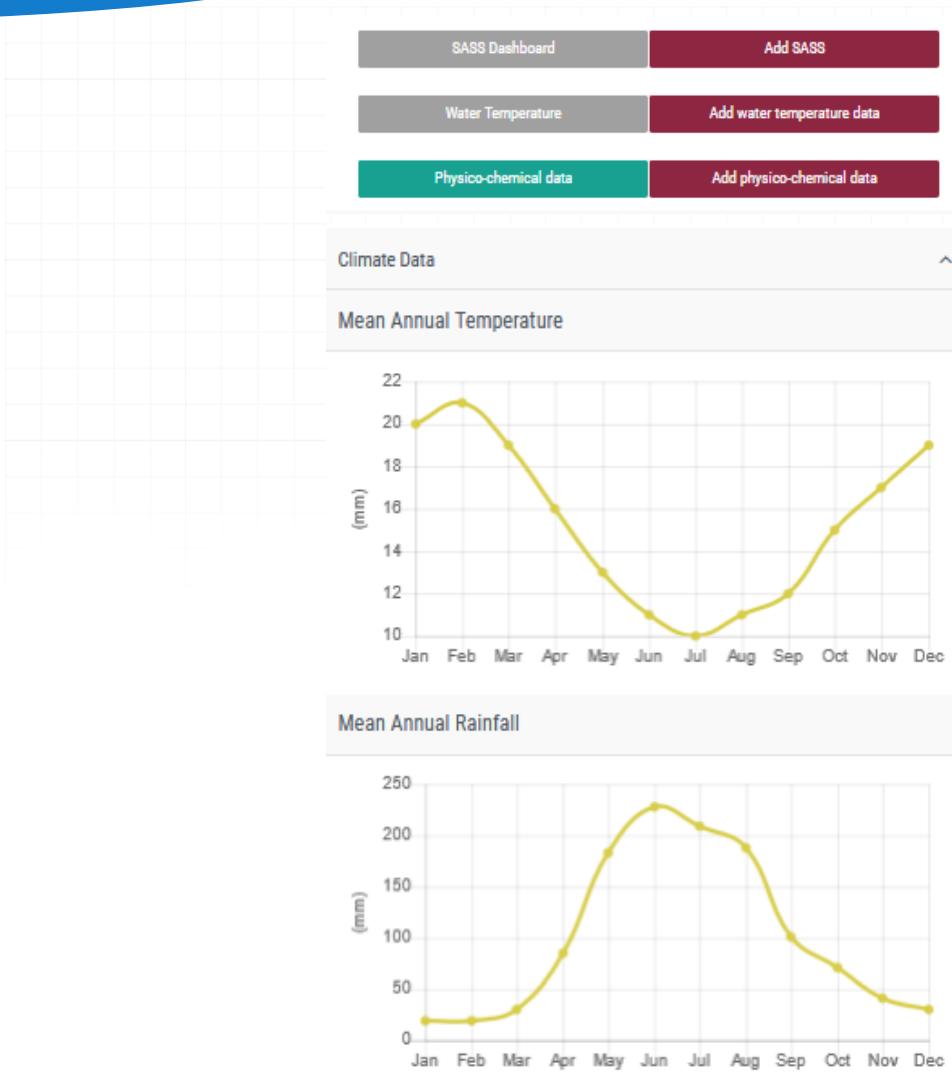
Site Code	D3DWAR-00006
Site Description	Dam
Site Coordinates	25.302, -30.372
SA Ecoregion Level 1	26 NAMA KAROO
Geomorphological class	-
SA Ecoregion Level 2	26.03
River	Orange River

Biodiversity Data



Single-site overview panel - Bottom:





1.1.1.3 Multi-site overview panel

For multiple sites, 'multi-sites', we display the filter history for selecting records, but not the detailed contextual site information found in the single-site overview panel because these data will not be the same across all the sites in a multi-site. The number of occurrences and number of sites for each module (fish, invertebrates and algae), pie charts showing the proportion of taxa in each Origin (see section 10.1.8), Endemism (see section 10.1.9) and Conservation Status (see section 10.1.10) category, as well as number of taxa is shown for each group.

The "dashboards" on the overview panel provide onward links to available biodiversity and abiotic (see Section 10), where you are able to also drill down to the detailed multi-site dashboards for each module.

Multi-site overview panel:





📍 Multi-Site Overview

Filter History

Category	Selection
Search Query	DUTOITSRIVIER
Data Source	FBIS, GBIF, VIRTUAL_MUSEUM

Biodiversity Data

Occurrences	Origin	Endemism	Cons. Status (Global)	Number of Taxa
	Native	Micro-endemic level 1	Critically endangered	
	Unknown	Regional endemic level 1	Data deficient	
		Unknown	Least concern	
		Widespread	Not evaluated	
		National endemic	Endangered	
			Near threatened	
			Vulnerable	



[SASS Dashboard](#)

[Water Temperature](#)

[Physico-chemical data](#)





1.1.1 Dashboards

1.1.1.1 Dashboards

Dashboards are a key component of FBIS - they provide tabular and graphical (via charts and maps) breakdowns and visualisations of taxa encountered at sites. Beyond simply enumerating taxa, the dashboards also show aggregate information such as trends over time, conservation status, site sensitivity etc.

FBIS has seven dashboard visualisations:

1. Taxon dashboard
2. Single-site biodiversity dashboards
3. Multi-site biodiversity dashboards
4. Single-site SASS dashboard
5. Multi-site SASS dashboard
6. Water temperature dashboard
7. Physico-chemical dashboard

In the following sections we provide a brief overview of the key dashboard components and then of the different dashboards:

- [**Key Dashboard Components:**](#) A brief description of the different dashboard components.
- [**SASS Dashboard components:**](#) A brief description of the SASS dashboard components.
- [**Taxon dashboard:**](#) A brief description of the Taxon dashboard.
- [**Single-site biodiversity dashboards:**](#) A brief description of the Single-site biodiversity dashboards.
- [**Multi-site biodiversity dashboards:**](#) A brief description of the Multi-site biodiversity dashboards.
- [**Single-site SASS dashboard:**](#) A brief description of the Single-site SASS dashboard.
- [**Multi-site SASS dashboard:**](#) A brief description of the Multi-site SASS dashboard.
- [**Water temperature dashboard:**](#) A brief description of the Water temperature dashboard.
- [**Physico-chemical dashboard:**](#) A brief description of the Physico-chemical dashboard.





1.1.1.2 Key dashboard components

Below we provide a brief description of the different dashboard components. **Note** that whenever a component includes a



symbol in the component header, clicking that icon will download a graphic file 'snapshot' of that component. This approach allows you to quickly grab any elements you need from the dashboard and include them in your reports. We took this approach over producing a full PDF report so that you have the flexibility of choosing which specific elements of the dashboard to use in your papers and reports.

More detailed data downloads are available via the

[Download as CSV](#)

button.

Filter history

The filter history component is intended to make it clear how the data displayed in the dashboard have been filtered and what specific search criteria have been applied.

The filter history component details what search and filter query were active when generating the current dashboard report.

Filter History	
Category	Selection
Search Query	DUTOITSRIVIER
Data Source	FBIS
Spatial filter	Tertiary Catchment Area : H60

This component is present in these dashboards:

- Taxon dashboard
- Single-site biodiversity dashboards
- Multi-site biodiversity dashboards
- Multi-site SASS dashboard

Map

The map provides a cartographic representation of the selected site or sites used when generating the dashboard report. The map includes a scale bar and a graticule with graticule labels so that the viewer may orientate themselves as to the location of the data depicted on the map. Note that the background map is © OpenStreetMap and contributors and is used with permission. This attribution (© OpenStreetMap and contributors) should be included anywhere the downloaded map image is published.

The distribution component of the dashboards shows selected sites on a map.





This component is present in these dashboards:

- Taxon dashboard
- Single-site biodiversity dashboards
- Multi-site biodiversity dashboards
- Single-site SASS dashboard
- Multi-site SASS dashboard
- Water temperature dashboard
- Physico-chemical dashboard

Site photograph(s)

Photographs of the site are provided when available. These can be scrolled through if more than one is available. Future versions of FBIS will include a date stamp.



This component is present in these dashboards:

- Taxon dashboard
- Single-site biodiversity dashboards
- Single-site SASS dashboard
- Water temperature dashboard
- Physico-chemical dashboard

Overview

The overview component of the dashboard provides a detailed situational analysis for a site.





Overview	
Site Details	
FBIS Site Code	G1BERG-00257
Original Site Code	BRM2
Site coordinates	Longitude: 19.050213, Latitude: -33.894035
Site description	Immediately downstream of Berg River Dam
River and Geomorphological Zone	
Original River Name	Berg
River	BERGRIVIER
Geomorphological zone	Upper foothill
Refined Geomorphological zone	Upper foothill
Catchments	
Primary	Region G
Secondary	G1
Tertiary	G10
Quaternary	G10A
Quinary	G10A3
Management Areas	
Water Management Area	19 - Berg
Sub Water Management Area	Upper Berg
River Management Unit	Upper Berg
Ecoregion and Province	
SA Ecoregion Level 1	24 SOUTH WESTERN COASTAL BELT
SA Ecoregion Level 2	24.06
Freshwater Ecoregion	Cape Fold
Province	Western Cape
Species and Occurrences	
Number of Taxa	4
Number of Occurrences	14
Origin	
Non-Native	5
Native	9
Endemism	
Regional Endemic Level 1	5
Regional Endemic Level 2	4
Widespread	5
Conservation Status	
Data Deficient	10
Endangered	4

The overview component provides context information (from GeoContext) and biodiversity status tabular breakdown of the site (or sites) being reported on (based on the currently applied filters and search query). The overview is broken down into different sections:

- Site details
- River and geomorphological zone
- Catchments
- Water Management Areas
- Ecoregion and province
- Species and occurrences. For single-site dashboards, the site count is not shown.
- Origin (number of native versus non-native species)
- Endemism
- Conservation status

For multi-site dashboards, a reduced version of the overview panel is shown. This is because many of the items listed above are not relevant in the context of a multi-site dashboard.

Simplified version of the overview panel used for multi-site dashboards.





Overview	
Species and Occurrences	
Number of Taxa	6
Number of Sites	47
Occurrences	75
Origin	
Non-Native	1
Native	74
Endemism	
Micro-endemic Level 1	37
Regional Endemic Level 1	37
Widespread	1
Conservation Status	
Critically Endangered	33
Data Deficient	37
Endangered	4
Near Threatened	1

This component is present in these dashboards:

- Taxon dashboard
- Single-site biodiversity dashboards
- Multi-site biodiversity dashboards
- Single-site SASS dashboard
- Water temperature dashboard (excluding biodiversity aspects)
- Physico-chemical dashboard (excluding biodiversity aspects)

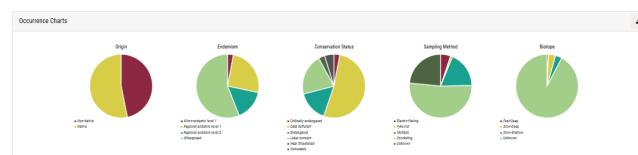
Occurrence charts

The occurrence pie charts summarise the following details for the taxa recorded at the site or sites (Figure 19):

- Origin
- Endemism
- Conservation status
- Sampling method
- Biotope

Note there is a paucity of sampling method data lodged in the database. The FBIS encourages users to capture the sampling method (and effort) so we have included it as a data capture and reporting element, even though the sampling method will often be unpopulated.

Occurrence chart dashboard component.



All of the pie charts have tooltips enabled - hovering the mouse over a particular pie segment will show the details for that segment.

This component is present in these dashboards:

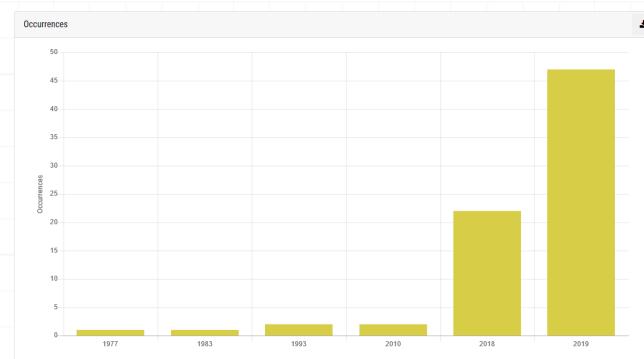
- Taxon dashboard
- Single-site biodiversity dashboards
- Multi-site biodiversity dashboards

Occurrences

The occurrences chart provides a breakdown of the number of observation records (across all taxa) recorded over time (aggregated by year).

Occurrences chart showing recorded observations over time.





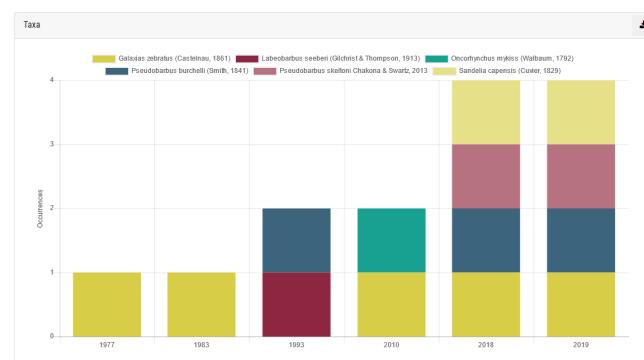
This component is present in these dashboards:

- Taxon dashboard
- Single-site biodiversity dashboards
- Multi-site biodiversity dashboards

Taxa

The taxa chart breaks down the occurrences per year by taxa as a stacked bar chart. The chart is interactive: clicking on a legend item will remove that taxon from the chart.

Occurrences chart showing recorded taxa over time.



This component is present in these dashboards:

- Single-site biodiversity dashboards
- Multi-site biodiversity dashboards

Origin

The origin chart breaks down the occurrence data by origin (native vs. non-native vs. translocated status) per year. The chart is interactive: clicking on a legend item will remove that origin status from the chart.

This component is present in these dashboards:

- Single-site biodiversity dashboards
- Multi-site biodiversity dashboards

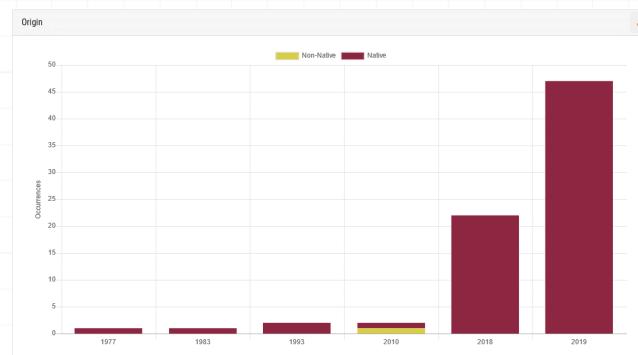
Origin has only been captured for fish and for some invertebrates, and will be updated as information becomes available.

Origin categories:

- Native: (or indigenous) means a taxon occurring within its natural range (past or present) and dispersal potential (i.e. within the range it occupies naturally or could occupy without direct or indirect introduction or care by humans).
- Non-Native: a category that includes both alien and extrazonal taxa.

Origin chart.

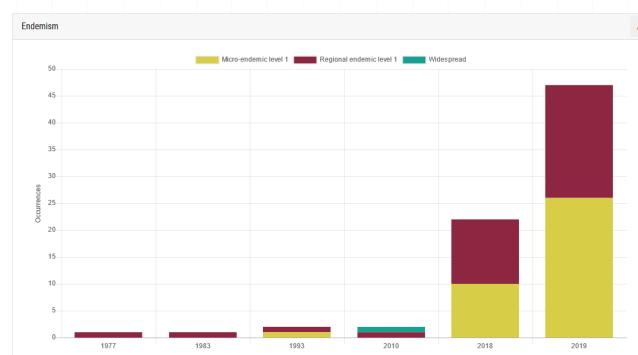




Endemism

This component provides a breakdown of the occurrence data based on the endemism status of the taxa recorded.

Figure 23: Endemism chart.



Endemism categories:

- Micro-endemic level 2 (Endemic to a single river or wetland)
- Micro-endemic level 1 (Endemic to less than 5 rivers or wetlands)
- Regional endemic level 2 (Endemic to a single primary catchment)
- Regional endemic level 1 (Endemic to a single Freshwater Ecoregion (e.g. CFE), more than one primary catchment)
- National endemic (Endemic to South Africa, occurs in more than one Freshwater Ecoregion within SA)
- Subregional endemic (Endemic to southern Africa)
- Widespread (Occurs beyond southern Africa)
- Unknown (Endemism is unknown)

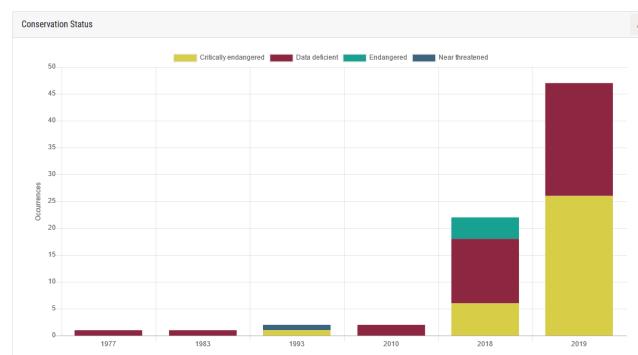
Endemism has only been captured for fish and some invertebrates, and will be updated as information becomes available.

This component is present in these dashboards:

- Single-site biodiversity dashboards
- Multi-site biodiversity dashboards

Conservation status

Conservation status chart.



This component provides a breakdown of occurrences, aggregated by year, according to the conservation status (based on IUCN categories) of the taxa recorded. The IUCN Red List of Threatened Species website (IUCN Red List, 2020) classifies species into six main categories based on their extinction risk. Clicking on the legend entry will hide or show that category from the chart.





Conservation status has only been captured for fish as conservation status has not yet been evaluated for invertebrates or algae. It will be updated as information becomes available.

Conservation status categories:

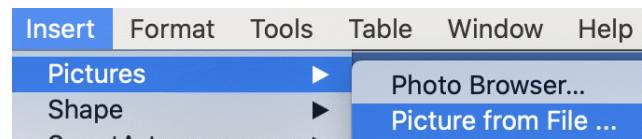
- Not evaluated
 - Data deficient
 - Least concern
 - Near threatened
 - Vulnerable
 - Endangered
 - Critically endang.

This component is present in these dashboards:

- Single-site biodiversity dashboards
 - Multi-site biodiversity dashboards

A general note for all charts When downloading a chart using the icon, the resulting downloaded file will be saved to your device as an 'SVG' (Scalable Vector Graphic) file or in some cases a .png file. This file can be arbitrarily resized and maintain its quality, allowing it to be used in print publications or large format printing projects.

To use the SVG, use the **Insert** -> **Pictures** -> **From File** option in Word or Excel. Once added it to your document, you can resize the frame and the quality will be preserved.



Occurrence data

Tabular summary of occurrence data.

Taxon	Occurrences	Origin	Endemism	Cons. Status
<i>Galaxias zebratus</i> (Castelnau, 1861)	19	Native	Regional endemic level 1	Data deficient
<i>Labeobarbus seeberi</i> (Gilchrist & Thompson, 1913)	1	Native	Regional endemic level 1	Near threatened
<i>Oncorhynchus mykiss</i> (Walbaum, 1792)	1	Non-Native	Widespread	Data deficient
<i>Pseudobarbus burchelli</i> (Smith, 1864)	33	Native	Micro-endemic level 1	Critically endangered
<i>Pseudobarbus skeletoni</i> Chalazon & Swartz, 2013	4	Native	Micro-endemic level 1	Endangered
<i>Sandelia capensis</i> (Olivier, 1829)	17	Native	Regional endemic level 1	Data deficient

This module provides a tabular summary of occurrence data. The data are aggregated per taxon (giving a total count of recorded occurrences for that taxon). Additional columns indicate the origin, endemism and conservation status for each taxon.

The download link will provide a Comma Separated Values (CSV) file which can easily be opened in a spreadsheet application like Microsoft Excel, or a GIS application like QGIS. The CSV document also includes the individual records (not aggregated as in the summary table) with all associated spatial and abiotic data for each occurrence record.

CSV Download example.

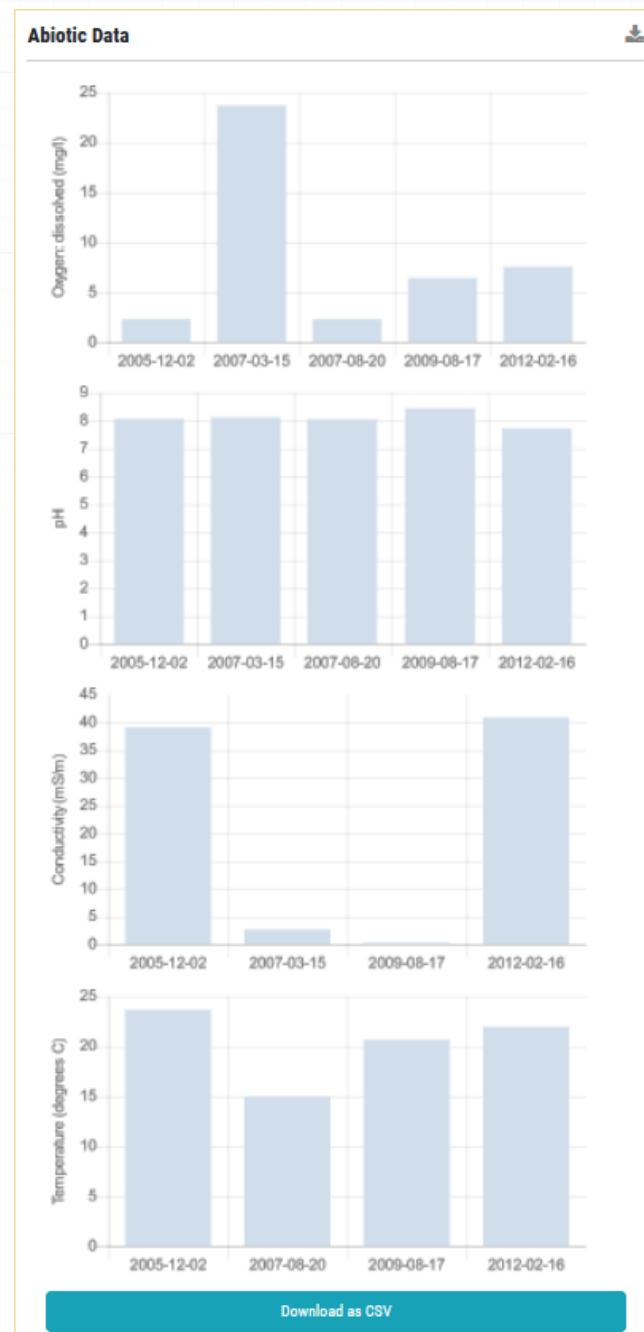
This component is present in these dashboards:

- Taxon dashboard
 - Single-site biodiversity dashboards
 - Multi-site biodiversity dashboards

Abiotic data graphs

Physico-chemical data are provided as graphs for four variables. All other abiotic data collected at the same time as the survey may be downloaded in the CSV document.

Abiotic data charts.



This component is present in these dashboards:

- Single-site biodiversity dashboards
- Single-site SASS dashboard

Metadata Table

All metadata associated with occurrence records are provided in a metadata table. Sources of biodiversity data have been categorised into one of the following five categories: peer-reviewed scientific articles, theses, published reports, databases and unpublished data. Links to the citation are provided via DOI, URL or as a PDF for published reports, if available.

Metadata table example.





Metadata Table						
Reference Category	Author(s)	Year	Title	Source	DOI/URL	Note
Peer-reviewed scientific article	T. L. Pearson	1993	A 1925 judgment of the Cape High Court of Justice on the validity of a Bill which would confer on the Minister of Agriculture, Water and Forestry the power to prohibit the importation of certain species of fish.	Transactions of the Royal Society of South Africa	10.1080/02534189309450221	
Database	-	-	Cape flora Database of FloraOnline Database, 2015	Cape flora Database of FloraOnline Database, 2015		
Database	-	-	Department of Water and Sanitation Aquatic Fish Database, 2014	Department of Water and Sanitation Aquatic Fish Database, 2014		
Published report or thesis	Walter A.J.	2002	Biological and geographical aspects related to the occurrence of alien freshwater fish in the confluence of the Orange and Vaal Rivers	http://hdl.handle.net/10210/36600		
Published report or thesis	Hann J.B.	2002	Assessing the risk of invasion of river health in rivers of the Western Cape	http://hdl.handle.net/10210/13274		
Peer-reviewed scientific article	Alfonso Winkel, Leon Hugo, Barbara Stewart, Steven Oppen	2004	Extreme events of ecological importance among freshwater fish in South Africa: the case of the 1998–1999 El Niño	African Journal of Aquatic Science	10.2981/ARVAT.040020	
Peer-reviewed scientific article	Gordon Moore, Paul A. King, Sean J. Rossouw,	2013	An evaluation of the current status and potential spread of Black Bass invasions in South Africa	Biological Invasions	10.1007/s10531-013-0505-0	
Published report or thesis	Over T	2010		http://hdl.handle.net/10427/3504		

This component is present in these dashboards:

- Single-site biodiversity dashboards
- Multi-site biodiversity dashboards
- Single-site SASS dashboard
- Multi-site SASS dashboard
- Water temperature dashboard





1.1.1.3 SASS Dashboard components

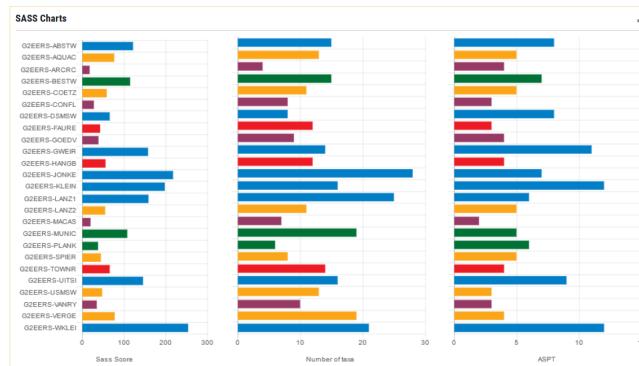
SASS Charts

This component shows a collection of SASS Charts indicating the SASS Score, Number of Taxa and ASPT (Average Score Per Taxon) for each site (in the case of the single-site SASS dashboard) or a group of sites (in the case of a multi-site SASS dashboard). The numbers shown are for the most recent survey for each site. In the multi-site version, the display order of sites is currently not significant. The charts are colour-coded according to the ecological category.

SASS Charts for a single-site showing changes in SASS metrics and ecological category over time



Multi-site SASS charts showing the most recent survey in at each site.



This component is present in these dashboards:

- Single-site SASS dashboard
- Multi-site SASS dashboard





SASS Summary

The SASS Summary component is a table that provides a detailed breakdown of the latest SASS surveys for a collection of sites selected by the user. The table provides detailed information about the SASS surveys carried out at each site. The numbers in parentheses show the minimum/maximum value for each site. The whole table can be downloaded as a CSV document to be opened in a spreadsheet application.

SASS Summary table.

SASS Summary								Download summary data :	Download as CSV
Site Code	Average (min-max) SASS Score	Average (min-max) Number of Taxa	Average (min-max) ASPT	Number of assessments	Latest SASS Score	Latest Number of Taxa	Latest ASPT	Date of latest SASS assessment	
GZERS-JONKE	137(83-223)	16(9-27)	8.49(6.46-10.29)	16	151	16	9	29-07-2014	
GZERS-ABSTW	69(59-85)	16(14-19)	4.26(4.07-4.47)	15	61	15	4	01-04-1995	
GZERS-BESTW	43(30-55)	11(9-14)	3.77(3.33-4.18)	14	55	14	3	01-03-1994	
GZERS-KLEIN	103(103-103)	16(16-16)	6.44(6.44-6.44)	16	103	16	6	01-04-1995	
GZERS-LANZ1	111(65-159)	18(10-25)	6.32(6.11-6.50)	25	159	25	6	01-10-2004	
GZERS-UTSI	73(73-73)	16(16-16)	4.56(4.56-4.56)	16	73	16	4	01-04-1995	
GZERS-LANZ2	58(55-61)	11(10-11)	5.55(5.00-6.10)	11	55	11	5	22-10-2000	
GZERS-GWEIR	81(81-81)	14(14-14)	5.79(5.79-5.79)	14	81	14	5	01-10-1995	
GLANZ-LANZ1	61(61-61)	10(10-10)	6.10(6.10-6.10)	10	61	10	6	01-10-1994	
GLANZ-LANZ2	47(47-47)	9(9-9)	5.22(5.22-5.22)	9	47	9	5	01-10-1994	

This component is present in this dashboard:

- Multi-site SASS dashboard

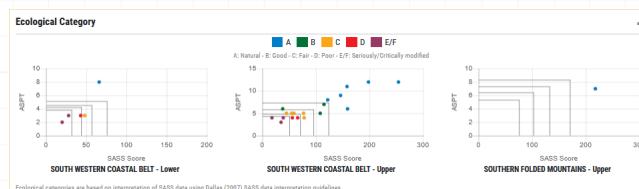
Ecological category

The ecological category component represents the condition of a collection of sites or a single-site (Figure 33) selected by the user. In the former case, the plots show the last recorded SASS survey's ecological category for each site. In the latter case, the plot shows the history of SASS surveys over time. For the multi-site plots the charts are separated by ecoregion and, due to space constraints, only the first three ecoregions are provided on the report. The Y-Axis represents the ASPT value for each site, the X-Axis represents the SASS score. The scatterplot points are colour coded according to their ecological category (which is a factor of the ASPT value and SASS Score). The meanings of these ecological category are described in the table below:

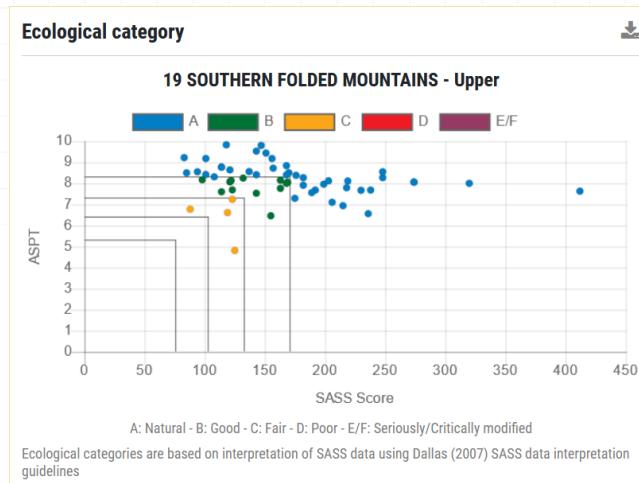
Ecological Category	Ecological Category Name
A	Natural
B	Good
C	Fair
D	Poor
E	Seriously modified
F	Critically modified

Multi-site ecological category scatterplots.





Single-site ecological category scatterplots.



This component is present in these dashboards:

- Single-site SASS dashboard
- Multi-site SASS dashboard

SASS Taxa per biotope

The SASS Taxa per biotope dashboard component is again rendered slightly differently depending on whether the dashboard is a multi-site SASS dashboard or a single-site SASS dashboard. It provides a tabular display in format similar to the SASS data capture sheet familiar to any certified SASS data collector. The table lists SASS scores per biotope and per taxon. In cases where no biotope recordings have been made for a given taxon in the original SASS survey, those taxa rows are omitted from the report. In the multi-site rendering, the table includes a column group for each site consisting of: sensitivity weighting, stones [S], vegetation [V], gravel, sand and mud [G] and the site score. In multi-site dashboards, the SASS Taxa per biotope displayed represent the latest SASS survey per site and the date of the most recent survey is indicated under the site code.

Multi-site SASS taxa per biotope table.

Taxa	Sensitivity Weighting	Download all SASS data : Download as CSV																
		A1NGOT-PUANE 16-02-2012			A2APIE-PRETO 26-11-2012			A2BLO-KROMD 29-11-2012			A2BLO-BIEFT 29-11-2012			A2BL 28-1				
		S	V	G	Site	S	V	G	Site	S	V	G	Site	S	V	G	Site	S
PORIFERA	PORIFERA	S																
PLATHELMINTHES	TURBELLARIA	S																
ANNELIDA	OLIGODCHAETA	1			A	A	A		A	A								
	HIRUDINEA	3																
CRUSTACEA	POTAMONAUTIDAE	3	A	A	A													
	ATYIDAE	8	A	A														
	PALEMONIDAE	10																
ADACINIDA	HYDACINIDA	8			A	A												
PLECOPTERA	PERLIDAE	12																
EPHEMEROPTERA	BAETIDAE 1 SP	4																
	BAETIDAE 2 SP	6	B	B	A	B	B	A										
	BAETIDAE > 2 SP	12																
	CAENIDAE	6	A	A	B	B		1	1									
	HEPTAGNIIDAE	13																
	LEPTOPLEBIIDAE	13																
	TRICORYTHIDAE	9																
	PROSOPISTOMATIDAE	15							1	1								
	TELOGANGIODAE	12																
ODONATA	LESTIDAE	8																
	CHLOROCYPHIDAE	10			A	A												
	SYNlestidae/CHLOROLESTIDAE	8			A	A												
	COENAGRIONIDAE	4			B	B		1	1									
	LIBELLULIDAE	4																
	ASIMINIDAE	8																
	GOMPHIDAE	6			A	A	B	B										
	CORNULIIDAE	8																

For single-sites, only the most recent survey is displayed as illustrated below. Both configurations provide the ability to download the table as editable text (CSV) data for further analysis offline.

Single-site SASS taxa per biotope table.





Taxa	Sensitivity Weighting	A1NGOT-PUANE			A2APIE-PRETO			A2BLLOU-KROMD			A2BLLOU-BIETF			A2B-1				
		S	V	G	Site	S	V	G	Site	S	V	G	Site	S	V	G	Site	S
PORIFERA	PORIFERA	5																
PLATYHELMINTHES	TURBELLARIA	3																
ANNELIDA	OLIGODCHAETA	1			A	A	A	A										
	HIRUDINEA	3																
CRUSTACEA	POTAMONAUTIDAE	3	A	A	A						A	A	A	A	1	A		
	ATYIDAE	8		A	A													
	PALAEMONIDAE	10																
ARACHNIDA	HYDRACARINA	8		A	A													
PLECOPTERA	PERLIDAE	12																
EPHEMEROPTERA	BAETIDAE 1 SP	4					A											
	BAETIDAE 2 SP	6	B	B	B	B	B	A			B	A	B	B	A	B	B	
	BAETIDAE 3 SP	12																
	CAENIDAE	6	A	A	B	B	1	1			A	A		A	A			
	HEPTAGENIIDAE	13																
	LEPTOPHLEBIIDAE	13																
	TRICORYTHIDAE	9																
	PROSOPISTOMATIDAE	15						1	1									
	TELOGANOIDIDAE	12																
ODONATA	LESTIDAE	8																
	CHLOROCYPHIDAE	10		A	A						1	1						
	SYNlestidae/CHLOROLESTIDAE	8		A	A													
	COENAGRIONIDAE	4		B	B	1	1			A	A							
	LIBELLULIDAE	4																
	AESCHINIDAE	8																
	GOMPHIDAE	6	A	A	B	B												
	CORDULIIDAE	8																

This component is present in these dashboards:

- Single-site SASS dashboard
- Multi-site SASS dashboard

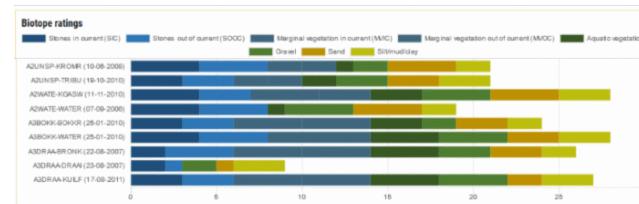
Biotope ratings



Note: SASS versions 1 to 4 did not require biotope ratings, and therefore data associated with this method will not have biotope ratings.

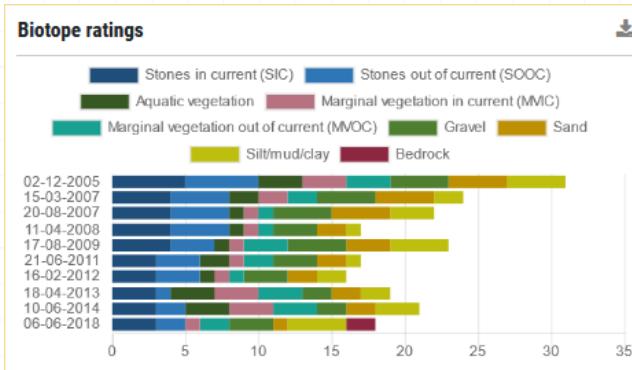
The SASS biotope ratings dashboard component is also rendered slightly differently depending on whether the dashboard is a multi-site SASS dashboard or a single-site SASS dashboard. It provides a stacked graph display showing the biotope rating for each recorded SASS survey. In the multi-site rendering, the chart includes an entry on the Y-Axis for each SASS survey site. In the case of single-site dashboard, the Y-Axis contains an entry for each date on which a SASS survey was carried out. In both permutations, the X-Axis represents the cumulative biotope rating across different biotopes.

Multi-site biotope ratings graph.



Single-site biotope ratings graph.





This component is present in these dashboards:

- Single-site SASS dashboard
- Multi-site SASS dashboard

SASS Record Summary

This dashboard component summarises the SASS Score, Number of Taxa and ASPT values for all SASS surveys at a given site. It also shows the total count of SASS records and the data range of those records. The data presented in the table can be downloaded as a CSV file for offline use.

SASS single-site dashboard summary.

Number of SASS records	10
Earliest record	December 2, 2005
Latest record	June 6, 2018
Metrics Data	
Metric	
SASS Score	179
Number of Taxa	29
ASPT	6.16
Download summary data : Download as CSV	

This component is present in this dashboard:

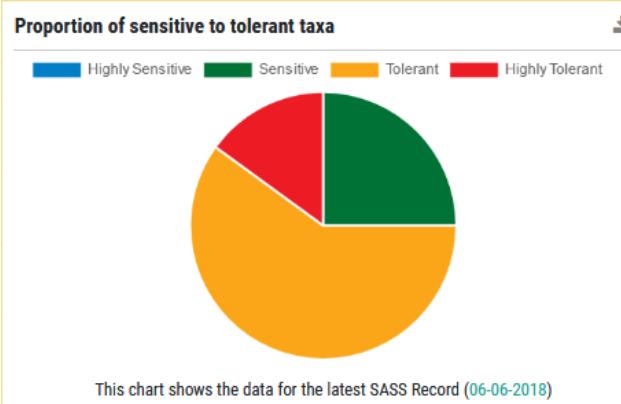
- Single-site SASS dashboard

Proportion of sensitive to tolerant taxa

This component, presented as a pie chart, provides a visualisation of the proportion of taxa in different sensitivity categories. These data are derived from the latest SASS survey for a given site. It is based on the following categorisation of SASS sensitivity weightings: Highly tolerant (1 to 3), Tolerant (4 to 7), Sensitive (8 to 11), Highly sensitive (12 to 15).

Single-site SASS visualisation of taxon sensitivity.





This component is present in these dashboards:

- Single-site SASS dashboard

SASS Records

This component, presented as a table, provides a summary of previously conducted SASS surveys for a site. The data can also be downloaded for offline use (as a CSV file). The table provides a 'drill down' link for each record which will take the user to the actual completed SASS survey data sheet for that row.

This component is present in these dashboards:

- Single-site SASS dashboard

Summary table for SASS surveys for a site.

SASS Records			
Date	SASS5/SASS4 Score	Number of Taxa	ASPT
02-12-2005	248	40	6.20
15-03-2007	210	34	6.18
20-08-2007	197	34	5.79
11-04-2008	211	34	6.21
17-08-2009	177	29	6.10
21-06-2011	197	31	6.35
16-02-2012	176	28	6.29
18-04-2013	143	22	6.50
10-06-2014	114	18	6.33
06-06-2018	113	20	5.65

Download all SASS data for this site : [Download as CSV](#)

Read-only view of a SASS form for a site.





Date	02/16/2012					
Owner	M. Ross					
Source Reference	<input type="radio"/> Unpublished at the time of collection <input checked="" type="radio"/> Database River Database 2012					
Site Image						
Biotopes Sampled	0	1	2	3	4	5
Stones in current	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stones out of current	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bedrock	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aquatic vegetation	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Marginal vegetation in current	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Marginal vegetation out of current	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gravel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sand	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Silt/mud/clay	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Taxa	Stones	Vegetation	Gravel, sand, mud	Total		
POLYPERA	A				A	
CLISOCHASTA	A				A	
POTAMONAUTIDAE	E				E	
ATYIDAE		A			A	
BATITIDAE + 1 SP	E	A	A		E	
CANIIDAE	E	A	A		E	
LEPTOPALECIDAE	A	A	A		E	
TRICORYTHIDAE	A				A	
CHLOROCYPRIDAE	A				A	
COENAGRIONIDAE		A			A	
ASCHIINAE	A				A	
GOMPHIDAE	E	A	E		E	
GERIIDAE	E	E	E		E	
VELVETIDAE/VELVILIDAE	E	E	E		E	
EDONIDAE	I				I	
HYDROPSYCHIDAE + 1 SP			A			
HYDROPSYCHIDAE + 2 SP	E				E	
PHLOPOTAMIDAE	I				I	
HYDROPTILIDAE	A	A			A	
DYSSEDONAGNATOIDAE	A				A	
GYRINIDAE	A		A		A	
ATHERICIDAE	A				A	
CRATOPOGONIDAE	A		A		A	
CHIRONOMIDAE	A	A	A		E	
DIULIDAE	A				A	
SMILIIDAE	A	A	A		A	
TABANIDAE			I		I	
TRIULIDAE			I		I	
ANCYLIDAE	A				A	
BASS Score	154	66	32	175		
Number of Taxa	24	11	10	35		
ABPF	6.4	6.2	5.5	6.3		





1.1.1.4 Taxon dashboard

This dashboard provides details of a single taxon or species. It is presented whenever an interaction (search / filter / click on map) results in a single taxon being highlighted. For demonstration purposes we have generated it for a fish species, although the same applies for invertebrate and algal species as well.

Single taxon dashboard.

Taxon Dashboard

Paracobitis bergi (Boulengé, 1881)
long-nose goby

Distribution

Description

Species

Type: Paracobitis bergi (Boulengé, 1881)
King George's River
AFRICA
South Africa
Berg River

Names and Taxonomy

King George's River
Berg River
Cape
Africa
Gobies
Teleostei
Species: Paracobitis bergi (Boulengé, 1881)

Origin

Conservation Status

Images

Metadata Table

Reference Category	Author(s)	Year	Title	Source	DOI/URL	Notes
Peer-reviewed scientific article	S. M. Oberholser, D. Impson, J. Hall	1929	Present status and numerical changes in the fish fauna of the Berg River, South Africa	Transactions of the Royal Society of South Africa	10.1080/00322381909451104	-
Peer-reviewed scientific article	SJ Woodford, ND Impson	2004	A preliminary assessment of the impact of alien rainbow trout (<i>Oncorhynchus mykiss</i>) on indigenous fishes of the upper Berg River, Western Cape Province, South Africa	African Journal of Aquatic Science	10.2989/1608069031409503799	-





1.1.1.5 Single-site biodiversity dashboards

This biodiversity dashboard is a collation of all the dashboard components marked as 'single-site dashboard' above. For demonstration purposes we have generated it for a fish species, although the same applies for invertebrate, algal, adult odonate, anuran and plants species as well. It is presented to the user whenever an interaction (search / filter / click on map) results in a single-site being highlighted. See below for an example.

Single-site fish dashboard part 1.



Single-site fish dashboard part 2.

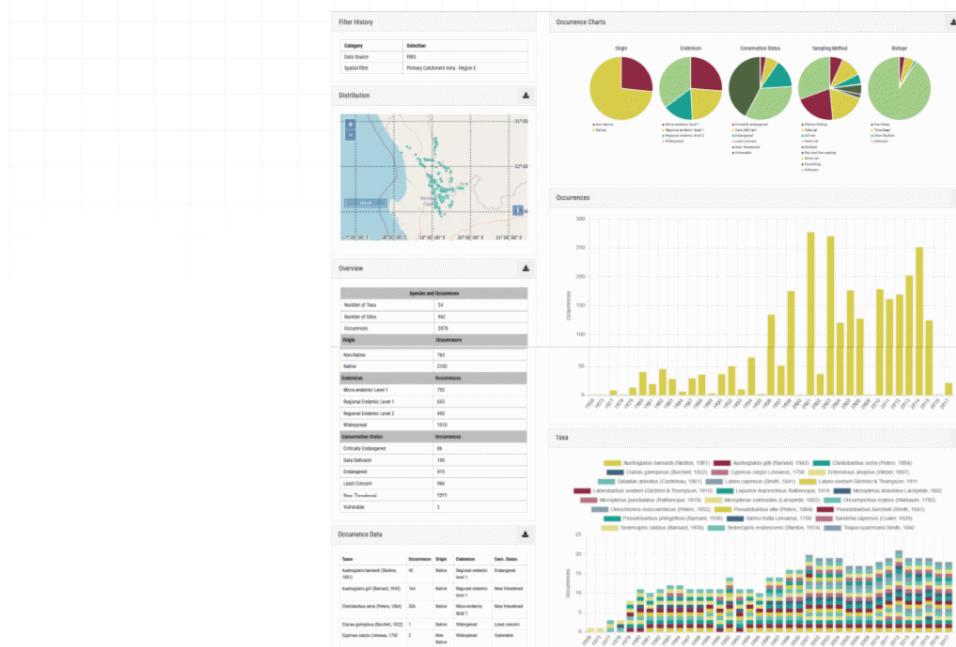




1.1.1.6 Multi-site biodiversity dashboards

This biodiversity dashboard is a collation of all the dashboard components marked as 'multi-site dashboard' above. For demonstration purposes we have generated it for a fish species, although the same applies for invertebrate, algal, adult odonate and anuran species as well. It is presented to the user whenever an interaction (search / filter / click on map) results in multiple sites being highlighted. See below for an example – note only the first section has been shown as the remainder are the same as the single-site dashboard.

Multi-site fish dashboard

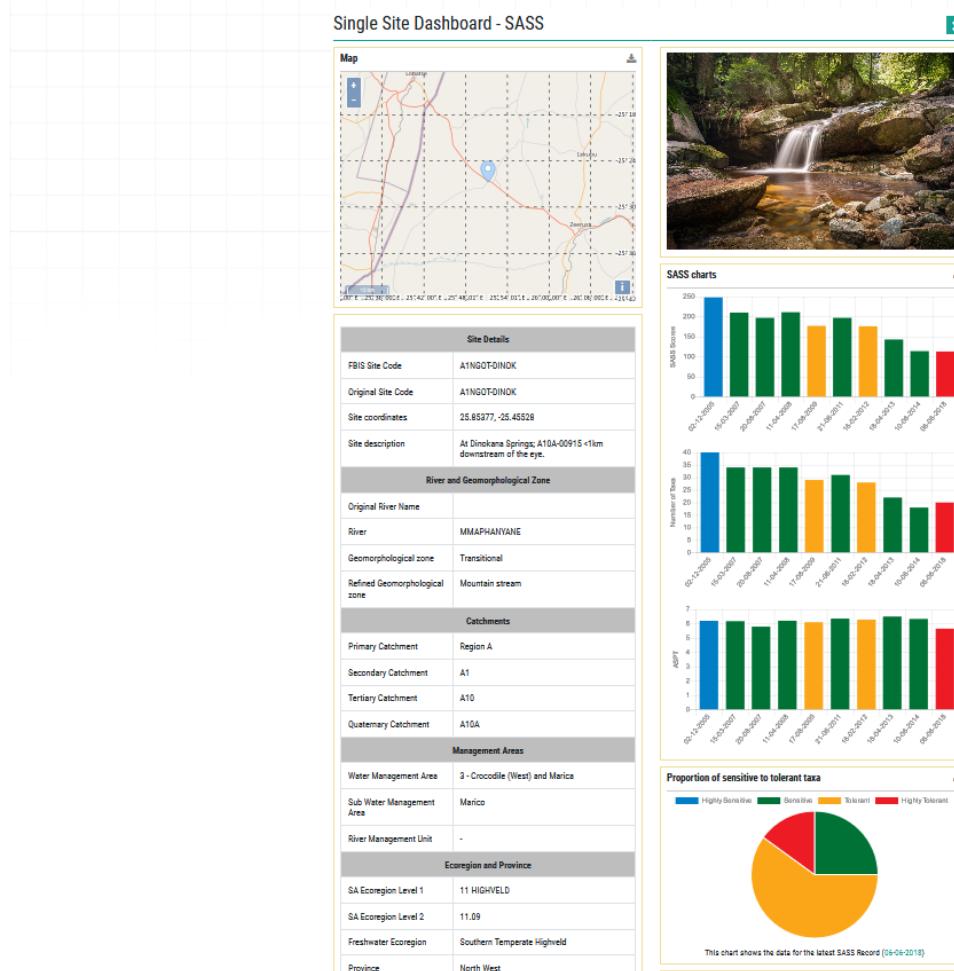




1.1.1.7 Single-site SASS dashboard

This dashboard is a collation of all the dashboard components marked as 'single-site SASS dashboard' above. It is presented to the user whenever an interaction (search / filter / click on map) results in a single-site SASS being highlighted. See below.

SASS Single-site dashboard – Part 1.



SASS Single-site dashboard – Part 2.





Single Site Dashboard - SASS

Map

Site Details

FBIS Site Code	A1NGOTONOK
Original Site Code	A1NGOTONOK
Site coordinates	25.65377, -25.45528
Site description	At Dinokana Springs; A10A-00915 1km downstream of the eye.

River and Geomorphological Zone

Original River Name	MMAPHANYANE
River	MMAPHANYANE
Geomorphological zone	Transitional
Refined Geomorphological zone	Mountain stream

Catchments

Primary Catchment	Region A
Secondary Catchment	A1
Tertiary Catchment	A10
Quaternary Catchment	A10A

Management Areas

Water Management Area	3 - Crocodile (West) and Marico
Sub Water Management Area	Marico
River Management Unit	-

Ecoregion and Province

SA Ecoregion Level 1	11 HIGHVELD
SA Ecoregion Level 2	11.09
Freshwater Ecoregion	Southern Temperate Highveld
Province	North West

SASS charts

Proportion of sensitive to tolerant taxa

This chart shows the data for the latest SASS Record (06-06-2018)

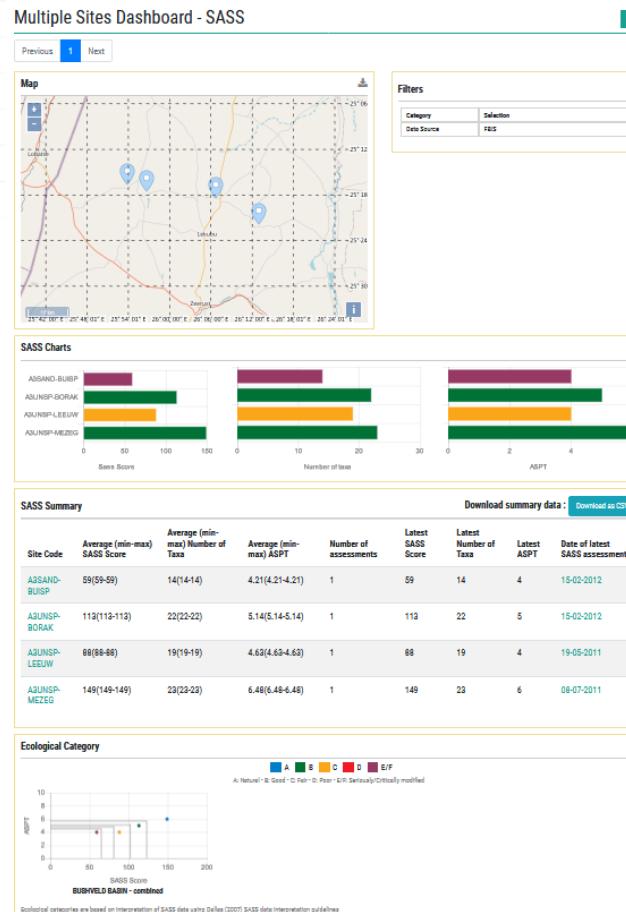




1.1.1.8 Multi-site SASS dashboard

This dashboard is a collation of all the dashboard components marked as 'multi-site SASS dashboard' above. It is presented to the user whenever an interaction (search / filter / click on map) results in multiple sites containing SASS data being highlighted. See below.

SASS Multi-site dashboard – Part 1.

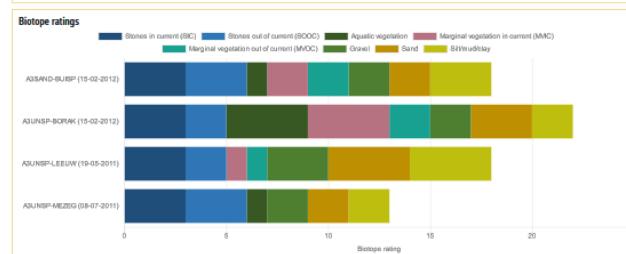


SASS Single-site dashboard – Part 2.





Taxa	Sensitivity Weighting	A3BAND-BUSP 15-02-2012				A3UNSP-BORAK 15-02-2012				A3UNSP-LEEUW 19-05-2011				A3UNSP-MEZE9 08-07-2011				
		S	V	0	Bla	S	V	0	Bla	S	V	0	Bla	S	V	0	Bla	
PLATYHELMINTHES	TURBELLARIA	3																
ANELIDA	OLIGOCHETA	1	1		A	A								1	1	A		
	HIRUDINEA	3															1	
CRUSTACEA	AMPHIPODA	13															1	1
	POTAMOGENETIDAE	3	A	A	A	B	A	A	A	A				A	A			
HEMEROPTERA	BAETIDAE 1 SP	4	A	A		B												
	BAETIDAE 2 SP	6				B	B	B	B	B	B	B	C	B	A	A		
	BAETIDAE 2+2 SP	12																B
	LEPTOPHLEBIIDAE	9																
ODONATA	SYNlestidae/CHLOROLESTIDAE	8																
	CORNAZONIDAE	4		A	1	A	B	B	B	C	1	A		A	A	A	A	A
	PROTONEURIDAE	8																A
	AESCHNIDAE	8																A
	UBELLULIDAE	4	A	A		B	B	B	A	A	B	B	B	A	A	B		
HEMIPTERA	CORIXIDAE	3	B	B	B	A	B	B	B									A
	GERRIDAE	5																A
	HYDROMETRIDAE	6																A
	VELIIDAE/MEDOVILIDAE	5	A	B		B	B	B	B		A	A	B	A	A	A	A	
TRICHOPTERA	HYDROPTILIDAE	5		A	A													
	LEPISOSTOMATIDAE	10																A
COLEOPTERA	DYTISODAE/NOTERIDAE	5																B
	CYRINIDAE	5																B
	SORTIDA	12																A
DIPTERA	HYDRAENIDAE	8																A
	CHIRONOMIDAE	2		A	B	B	A	A	A	A	A	A	A	B	A	A	B	
	GASTROPODA	6																A
	BASB Score	13	31	13	32	45	61	53	70	22	36	26	51	60	89	49	100	
	Number of Taxa	4	8	5	9	9	12	11	13	5	8	6	11	12	12	9	16	
	ABP	3.25	3.88	2.60	3.56	5.00	5.08	4.82	5.38	4.40	4.50	4.33	4.64	5.00	6.67	5.44	6.25	



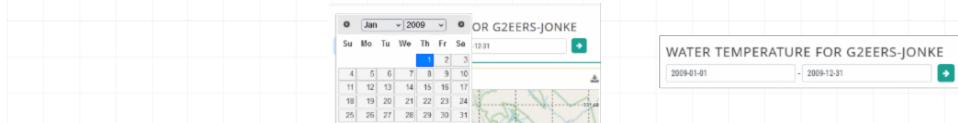
Metadata Table						
Reference Category	Author/s	Year	Title	Source	DOI/URL	Notes
Database	-	-	Rivers Database 2015	Rivers Database 2015	-	-



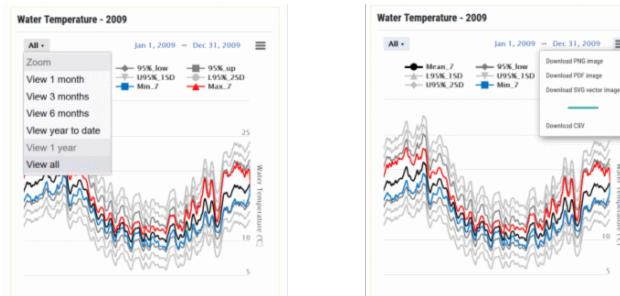


1.1.1.9 Water temperature time series dashboard

This dashboard includes some of the components in the biodiversity dashboards such as map, site photograph and overview, which provides geocontext data for the site, and metadata. The water temperature data is shown for one year at a time, so the user need to first select the day, month and year for the start and end of the data series. Note: it is not possible to select data for longer than 1 year, and the start and end year need to be the same.

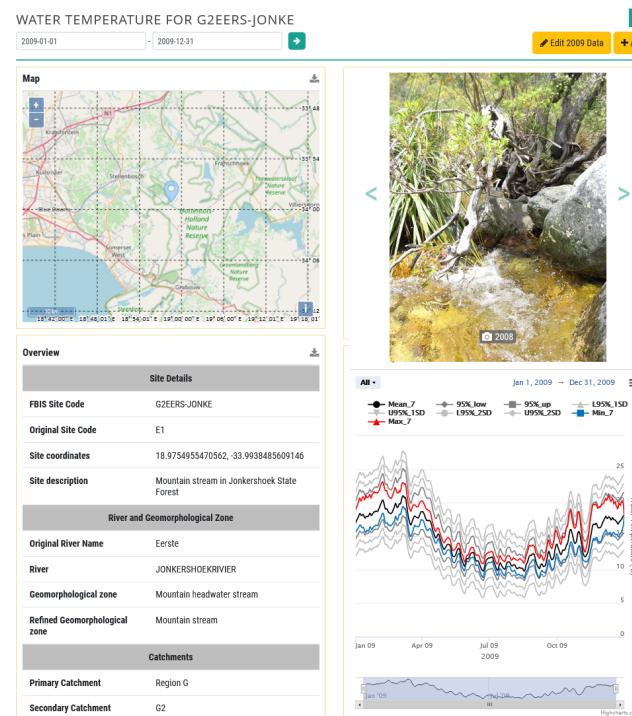


A thermograph is provided for the site based on the one year of water temperature data time series specified. Sub-daily data are transformed into daily data and plotted as smoothed daily temperature means based on a seven-day moving average, and smoothed daily range using daily minima and maxima. For Reference thermograph the reference condition thermal envelope plus one and two standard deviations are shown. Further manipulation of the time series is possible using the All dropdown (view 1 month, 3 months, 6 months etc) and the graph may be downloaded in different formats.



Tables of thermal metrics and monthly magnitudes (mean, minimum, maximum and range) are provided. The user is referred to Dallas and Rivers-Moore (2019, 2022) for more details. Thermal metrics describe an annual thermal regime using broad descriptive statistics, such as mean annual temperature, annual coefficient of variability, predictability and maximum daily range, as well as water temperature events in terms of their magnitude, frequency, duration of extreme events (Rivers-Moore et al. 2013).

Water temperature dashboard – Part 1.



Water temperature dashboard – Part 2.





Tertiary Catchment	G22			
Quaternary Catchment	G22F			
Management Areas				
Water Management Area	19 - Berg			
Sub Water Management Area	Greater Cape Town			
River Management Unit	Upper Berg			
Ecoregion and Province				
SA Ecoregion Level 1	19 SOUTHERN FOLDED MOUNTAINS			
SA Ecoregion Level 2	19.04			
Freshwater Ecoregion	Cape Fold			
Province				
Monthly magnitudes - 2009				
Monthly magnitudes	Mean	Min	Max	Range
Jan	17.91	16.04	20.44	4.40
Feb	19.19	17.21	21.76	4.55
Mar	18.78	17.19	20.68	3.49
Apr	16.70	15.61	17.97	2.35
May	12.58	11.75	13.51	1.76
Jun	11.34	10.66	12.16	1.49
Jul	10.98	10.24	11.91	1.67
Aug	10.76	9.75	12.02	2.28
Sep	11.25	10.07	12.72	2.65
Oct	13.85	12.22	16.08	3.87
Nov	14.79	13.12	17.04	3.92
Dec	17.31	15.16	20.11	4.94

Thermal Metrics - 2009	
Annual descriptive statistics	
Mean Annual temperature (MAT)	14.59
Standard deviation of MAT	3.42
Annual coefficient of variability	23.43
Mean of annual range	3.10
Standard deviation of annual range	1.64
Mean of annual minima	13.22
Mean of annual maxima	16.33
Magnitudes of extreme water temperature conditions	
Mean_7	21.05
Min_7	8.75
Min_30	9.48
Min_90	9.87
Max_7	23.11
Max_30	21.88
Max_90	21.63
Frequency and duration (successive days exceeding thresholds) of extreme water temperature conditions	
Mean_7cnt	70
Min_7cnt	166
Max_7cnt	0
Mean_7dur	54
Min_7dur	130
Max_7dur	0

Metadata Table

Reference Category	Author/s	Year	Title	Source	DOI/URL	Notes
Published report or thesis	Helen Dallas & Nick Rivers-Moore	2012	Water temperatures and the ecological Reserve.	Water Research Commission Report KV 1799/1/12, Water Research Commission, Pretoria, South Africa.	Download	-

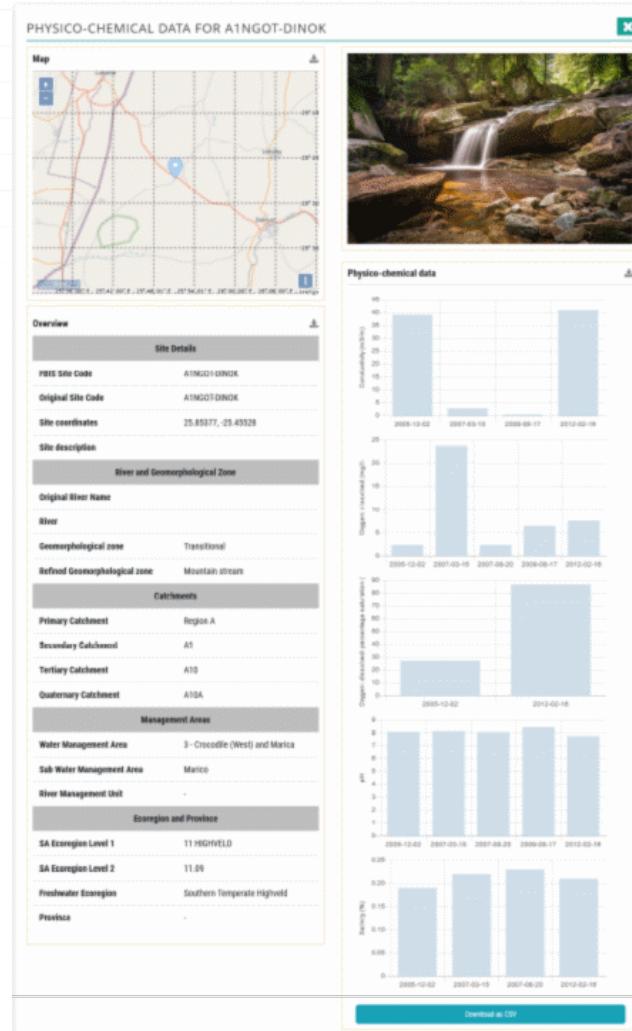




1.1.1.10 Physico-chemical dashboard

This dashboard includes some of the components in the biodiversity dashboards such as map, site photograph and overview, which provides geocontext data for the site. All data are shown as bar charts per variable and data can be downloaded as csv a file.

Physico-chemical (abiotic) dashboard.





1.1.1 Data Upload Forms

Data upload forms have been created for creating a site, capturing biodiversity data, SASS data, water temperature time series data and physico-chemical data.

1.1.1.1 Create a site

A site is added using the **Add Site** on the navigation bar. The **Add a location site** forms then opens.

Add Site button to create a new site.

About Map Contact Help Helen Administration Add Site **LOGOUT**

The Add Site form

The screenshot shows the 'ADD A LOCATION SITE' form. At the top is a map of southern Africa with a yellow polygon representing the site location. Below the map are several input fields: 'Latitude*' and 'Longitude*', both with input boxes and 'Update coordinate' and 'Fetch River Name' buttons; 'River Name' and 'Original River Name' input boxes; 'Site Code*' with a note about naming conventions and a 'Generate site code' button; 'Original Site Code' input box; 'Geomorphological Zone' and 'Refined Geomorphological Zone' dropdown menus; 'Site Description' input box; 'Owner' dropdown menu set to 'A Swanepoel'; 'Site Image' field with 'Choose File' and 'No file chosen' buttons; and a checkbox for agreeing to data sharing. At the bottom is a green 'ADD' button.

The user should fill in the new site details on this form.

- Coordinates can either be manually entered, or the site can be selected on the map and this will auto-populate the latitude and longitude.
- River Name is auto-generated based on the closest river to the selected site location (click fetch river name) If the user specifies the Original River Name, then this will be used. This is useful for tributaries that are not named on the 1: 500 000 DWS river map, where the names are derived.
- A site code can be auto-generated (click generate site code) or the user can fill in their own site code using the standard described. Original Site Code can be added if known.
- The geomorphological zone is auto-generated from the geomorphological zone layer (from a DTM) currently in FBIS. A user can update this by adding a Refined Geomorphological Zone, which is the ground-truthed zone and is programmed to override the geomorphological zone derived from the DTM.
- Add a site description of the site (optional).
- The owner field will auto-populate to the logged in user. It may be assigned to someone else if the data capturer is not the owner by using the dropdown list. Site image(s) can be uploaded.
- Add a site image (optional).
- Lastly, the user has to agree to the data being shared via the FBIS platform for visualisation and download by registered FBIS users.

Biodiversity data, SASS data, water temperature and physico-chemical data may be added to the newly created site by clicking the appropriate button. The user will then be taken to the relevant form (Figures 53, 54, 55, 56, 60 and 61) to enter the data.





Add fish, add invertebrate data, add SASS data, add algal data, add odonate adults data, add anura data, add water temperature data and add physico-chemical data buttons.

Add Fish data	Add Invertebrates data	Add Algae data	Add Odonate Adults data
Add Anura data	Add SASS data	Add water temperature data	Add physico-chemical data

1.1.1.2 Adding fish data

A fish data upload form allows for the capture of fish occurrence data as well as associated abundance, biotopes (broad, specific, substratum), sampling method and effort. Through this form, we hope to encourage collectors to also record abundance, biotope type, sampling method and effort so we developed the form with these capabilities.

Details as follows:

- Broad biotope: Unspecified, Mixed, Slow-Shallow, Slow-Deep, Fast-Shallow, Fast-Deep
- Specific biotope: Unspecified, Mixed, Backwater, Bedrock, Cascade, Chute, Detritus, Pool, Rapid, Riffle, Run, Slackwater, Waterfall
- Substratum: Unspecified, Mixed, Bedrock, Boulder, Cobble, Detritus, Gravel, Pebble, Sand, Silt/Mud/Clay
- Sampling method: Unspecified, Multiple, Electro-fishing, Fyke net, Gill net, Hand net, Rod and line angling, Seine net, Snorkelling, Underwater video analysis
- Sampling effort measure: Time (min), Area (m²), Replicates
- Abundance measure: Number, Percentage Abundance, Density (m²)
- Record type: Visual observation, Photographic record, Specimen record, Acoustic survey, DNS sample

We also added 'smart' logic that pre-populates the form with taxa that have previously been identified in the local area, and then it is up to the user to check (or not check) the boxes associated with each taxon. If the taxon you need to add a record for is not listed, you can also add an existing or new taxon on this form, by clicking Add Taxon, and typing a few letters of the taxon.

Taxa
clar
Clarias gariepinus
Clarias ngamensis
Clarias theodorae

If the taxon name is not in the list, then the user can also add a New Taxon by clicking Add New Taxon. This opens up a new sub-form where you type in the name of the taxon, which then links to GBIF and the taxon is returned. By clicking Add this taxon is then added to FBIS. Final approval of this new taxon requires validation by the FBIS administrators.





Add New Taxon

pseudobarbus burgi	<input type="button" value="Find"/>
Pseudobarbus burgi (Boulenger, 1911)	Canonical Name Pseudobarbus burgi Rank SPECIES Source GBIF Stored <input checked="" type="checkbox"/> + ADD

After adding fish data, the user has the option to add **Abiotic data** (optional) (see section 11.6), followed by **Adding Source reference for records** (see section 11.9).

Fish data form.

Add Fish data for site J1ANYS-00015



Latitude: -33.5084235511 Longitude: 29.7641601562

Date:

Owner: Helen Dallas
Please select the Owner, if you are the data capturer and not the Owner

Broad Biotope: Not specified

Specific Biotope: Not specified

Substratum: Not specified

Sampling Method: Not specified

Sampling Effort: Not specified

Site Image: No file selected.

Taxa	Observed	Abundance	Number
Anguilla marmorata	<input type="checkbox"/>	0	<input type="checkbox"/>
Anguilla mossambica	<input type="checkbox"/>	0	<input type="checkbox"/>
Chelobatrus capensis	<input type="checkbox"/>	0	<input type="checkbox"/>
Clarias gariepinus	<input type="checkbox"/>	0	<input type="checkbox"/>
Cyprinus carpio	<input type="checkbox"/>	0	<input type="checkbox"/>
Enteromius anoplus	<input type="checkbox"/>	0	<input type="checkbox"/>
Enteromius lineomaculatus	<input type="checkbox"/>	0	<input type="checkbox"/>
Galaxias zebra	<input type="checkbox"/>	0	<input type="checkbox"/>
Labeo capensis	<input type="checkbox"/>	0	<input type="checkbox"/>
Labeo umbratus	<input type="checkbox"/>	0	<input type="checkbox"/>
Labeobarbus aeneus	<input type="checkbox"/>	0	<input type="checkbox"/>
Lepomis macrochirus	<input type="checkbox"/>	0	<input type="checkbox"/>
Micropterus dolomieu	<input type="checkbox"/>	0	<input type="checkbox"/>
Micropterus punctulatus	<input type="checkbox"/>	0	<input type="checkbox"/>
Micropterus salmoides	<input type="checkbox"/>	0	<input type="checkbox"/>
Oncorhynchus mykiss	<input type="checkbox"/>	0	<input type="checkbox"/>
Oreochromis mossambicus	<input type="checkbox"/>	0	<input type="checkbox"/>
Pseudobarbus fer	<input type="checkbox"/>	0	<input type="checkbox"/>
Pseudobarbus asper	<input type="checkbox"/>	0	<input type="checkbox"/>
Pseudobarbus burchelli	<input type="checkbox"/>	0	<input type="checkbox"/>
Pseudobarbus tenuis	<input type="checkbox"/>	0	<input type="checkbox"/>
Salmo trutta	<input type="checkbox"/>	0	<input type="checkbox"/>
Sandelia capensis	<input type="checkbox"/>	0	<input type="checkbox"/>
Tilapia sparrmanii	<input type="checkbox"/>	0	<input type="checkbox"/>

I agree to these data being shared via the FBIS platform for visualisation and download by registered FBIS users

1.1.1.3 Adding invertebrate data





An invertebrate data upload form allows for the capture of invertebrate occurrence data as well as associated abundance, biotopes (broad, specific, substratum), sampling method and effort. Through this form, we hope to encourage collectors to also record abundance, biotope type, sampling method and effort so we developed the form with these capabilities.

Details as follows:

- Broad biotope: Unspecified, Mixed, Stones In Current, Stones Out Of Current, Marginal Vegetation, Aquatic Vegetation, Gravel/Sand/Mud
- Specific biotope: Unspecified, Mixed, Backwater, Bedrock, Cascade, Chute, Detritus, Pool, Rapid, Riffle, Run, Slackwater, Waterfall
- Substratum: Unspecified, Mixed, Bedrock, Boulder, Cobble, Detritus, Gravel, Pebble, Sand, Silt/Mud/Clay
- Sampling method: Unspecified, Multiple, Baited Line, Box/Surber, Drift Net, Hand Net, Kick Net, Light Trap, Stone
- Sampling effort measure: Time (min), Area (m²), Replicates
- Abundance measure: Number, Percentage Abundance, Density (m²)
- Record type: Visual observation, Photographic record, Specimen record, Acoustic survey, DNS sample

We also added 'smart' logic that pre-populates the form with taxa that have previously been identified in the local area, and then it is up to the user to check (or not check) the boxes associated with each taxon. If the taxon you need to add a record for is not listed, you can also add an existing or new taxon on this form, in the same way as for fish.

After adding invertebrate data, the user has the option to add **Abiotic data** (optional) (see section 11.6), followed by **Adding Source reference for records** (see section 11.9).

Invertebrate data form.

Taxa	Observed	Abundance	Number
Ablabesmyia	<input type="checkbox"/>	0	
Acanthiops	<input type="checkbox"/>	0	
Acanthocyclops	<input type="checkbox"/>	0	
Acentrella	<input type="checkbox"/>	0	
Acentrella capensis	<input type="checkbox"/>	0	

1.1.1.4 Adding algal data

An algal data upload form allows for the capture of algal occurrence data as well as associated abundance, biotopes (broad, specific, substratum), sampling method and effort. Through this form, we hope to encourage collectors to also record abundance, biotope type, sampling method and effort so we developed the form with these capabilities. In addition, for algae, we have included details related to the curation process, and allowed for capture of biomass (Chlorophyll A and Ash Free Dry Mass) and the autotrophic index value.

Details as follows:

- Broad biotope: Unspecified, Mixed, Stones In Current, Stones Out Of Current, Marginal Vegetation, Aquatic Vegetation, Gravel/Sand/Mud, Artificial substrate
- Specific biotope: Unspecified, Mixed, Backwater, Bedrock, Cascade, Chute, Detritus, Pool, Rapid, Riffle, Run, Slackwater, Waterfall
- Substratum: Unspecified, Mixed, Bedrock, Boulder, Cobble, Detritus, Gravel, Pebble, Sand, Silt/Mud/Clay
- Sampling method: Unspecified, Multiple, Scrubbing, Soft Bottom, Vegetation, In situ
- Sampling effort measure: Time (min), Area (m²), Replicates
- Abundance measure: Percentage Abundance, Species valve/frustule count, Density (cells/m²), Density (cells/mL)
- Curation process: Acid cleaned, Frozen, Preserved lugols
- Biomass indicator: CHLA-B: Whole cobble, Soft Bottom, In situ, Artificial substrate
- Biomass indicator: AFDM-B: Whole cobble, Soft Bottom, Artificial substrate





We also added ‘smart’ logic that pre-populates the form with taxa that have previously been identified in the local area, and then it is up to the user to check (or not check) the boxes associated with each taxon. If the taxon you need to add a record for is not listed, you can also add an existing or new taxon on this form, in the same way as for fish.

After adding algal data, the user has the option to add **Abiotic data** (optional) (see section 11.6), followed by **Adding Source reference for records** (see section 11.9).

Algal data form.

Add Algae data for site A1NGOT-DINOK

Latitude: -25.45528 Longitude: 25.85377 Update Coordinate

Date: _____

Owner: Helen Dallas
Please select the Owner; if you are the data capturer and not the Owner

Broad Biotope: Not specified

Specific Biotope: Not specified

Substratum: Not specified

Sampling Method: Not specified

Sampling Effort: Not specified

Curation Process: Not specified

Site Image: Browse... No file selected.

Biomass

Indicators	Sampling details	Measurement	
Chl A	CHLA-B	Whole cobble	mg/m ²
AFDM	AFDM-B	Whole cobble	mg/m ²
Autotrophic Index (AI)			

Add Taxon Add New Taxon

Taxa	Observed	Abundance	Species valve/frustule count
Achnanthidium	<input type="checkbox"/>	0	
Achnanthidium catenatum	<input type="checkbox"/>	0	
Achnanthidium eutrophilum	<input type="checkbox"/>	0	
Achnanthidium saprophyllum	<input type="checkbox"/>	0	
Amphora montana	<input type="checkbox"/>	0	

1.1.1.5 Adding anuran data

An anuran data upload form allows for the capture of anuran occurrence data as well as associated abundance, biotopes (broad, specific, substratum), sampling method and effort. Through this form, we hope to encourage collectors to also record abundance, biotope type, sampling method and effort so we developed the form with these capabilities.

Details as follows:

- Broad biotope: Unspecified, Mixed, Stones In Current, Stones Out Of Current, Marginal Vegetation, Aquatic Vegetation, Gravel/Sand/Mud
- Specific biotope: Unspecified, Mixed, Backwater, Bedrock, Cascade, Chute, Detritus, Pool, Rapid, Riffle, Run, Slackwater, Waterfall
- Substratum: Unspecified, Mixed, Bedrock, Boulder, Cobble, Detritus, Gravel, Pebble, Sand, Silt/Mud/Clay
- Sampling method: Unspecified, Electro-fishing, Hand net, Active acoustic survey, Passive acoustic survey, Baited trapping, Visual observation, Non-baited trapping, Photographic record
- Sampling effort measure: Time (min), Area (m²), Replicates
- Abundance measure: Number, Percentage Abundance, Density (m²)

We also added ‘smart’ logic that pre-populates the form with taxa that have previously been identified in the local area, and then it is up to the user to check (or not check) the boxes associated with each taxon. If the taxon you need to add a record for is not listed, you can also add an existing or new taxon on this form, in the same way as for fish.





After adding invertebrate data, the user has the option to add **Abiotic data** (optional) (see section 11.6), followed by **Adding Source reference for records** (see section 11.9).

1.1.1.6 Adding SASS data

A standard SASS data capture form, which is based on the field datasheet, facilitates the capture of SASS data. The form includes validation and is designed to streamline the process of digital capture of SASS data and also to reduce the possibility for errors when calculating SASS metrics. All standard SASS sampling protocols have been included such as rating biotopes and adding abundances for taxa per biotope. It will constrain user input to valid entries, to auto-calculate the SASS score for each taxon (with allowances for overriding of abundances at site level where appropriate) and will auto-calculate the overall SASS, Number of Taxa and ASPT for the survey. The owner is the person who undertook the SASS assessment, and if accredited at the time, it should be recorded.

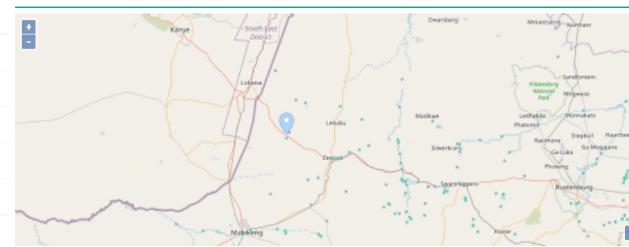
After adding SASS data, the user has the option to add **Abiotic data** (optional) (see section 11.6), followed by **Adding Source reference for records** (see section 11.9).

SASS data form - Part 1.





Add SASS record for site A1NGOT-DINOK X



Latitude Longitude

Date

Owner
Please select the Owner, if you are the data capturer and not the Owner

Accredited at the time of collection

Site Image No file selected.

Biotopes Sampled	0	1	2	3	4	5
Stones in current	<input type="radio"/>					
Stones out of current	<input type="radio"/>					
Bedrock	<input type="radio"/>					
Aquatic vegetation	<input type="radio"/>					
Marginal vegetation in current	<input type="radio"/>					
Marginal vegetation out of current	<input type="radio"/>					
Gravel	<input type="radio"/>					
Sand	<input type="radio"/>					
Silt/mud/clay	<input type="radio"/>					

SASS data form – Part 2.





Taxa		Stones	Vegetation	Gravel, sand, mud	Site
PORIFERA	PORIFERA				
COELENTERATA	COELENTERATA				
PLATHELMINTHES	TURBELLARIA				
ANNELIDA	OLIGOCHAETA				
	HIRUDINEA				
CRUSTACEA	AMPHIPODA				
	POTAMONAUTIDAE				
	ATYIDAE				
	PALAEMONIDAE				
ARACHNIDA	HYDRACARINA				
PLECOPTERA	NOTONEMOURIDAE				
	PERLIDAE				
EPHEMEROPTERA	BAETIDAE 1 SP				
	BAETIDAE 2 SP				
	BAETIDAE > 2 SP				
	CAENIDAE				
	EPHEMERIDAE				
	HEPTAGENIIDAE				
	LEPTOPHLEBIIDAE				
	OLIGONEURIIDAE				
	POLYMITARCYIDAE				
	PROSOPISTOMATIDAE				
	TELOGANODIDAE				
	TRICORYTHIDAE				
ODONATA	CALOPTERYGIDAE				
	CHLOROCYPHIDAE				
	SYNLESTIDAE/CHLOROLESTIDAE				
	COENAGRIONIDAE				
	LESTIDAE				
	PLATYCHIEMIDAE				
	PROTONURIDAE				
	AESHNIDAE				
	CORULIDAE				
	GOMPHIDAE				
	LIBELLULIDAE				
LEPIDOPTERA	CRAMBIDAE (PYRALIDAE)				
	BELOSTOMATIDAE				
HEMIPTERA	CORIXIDAE				
	GERRIDAE				
	HYDROMETRIDAE				
	NAUCORIDAE				
	NEPIDAE				
	NOTONECTIDAE				
	PLEIDAE				
	VELIIDAE/MESOVELIIDAE				
MEGALOPTERA	CORYDALIDAE				
	SIALIDAE				
TRICHOPTERA	DIPSEUDOPSISIDAE				
	ECNOMIDAE				
	HYDROPSYCHIDAE 1 SP				
	HYDROPSYCHIDAE 2 SP				
	HYDROPSYCHIDAE > 2 SP				
	PHILopotamidae				
	POLYCENTROPODIDAE				
	PSYCHOMYIIDAE/XIPHOCENTRINIDAE				
	BARBAROCHTHONIDAE				

SASS data form – Part 3.





CALAMOCERATIDAE				
GLOSSOSOMATIDAE				
HYDROPTILIDAE				
HYDROSALPINGIDAE				
LEPIDOSTOMATIDAE				
LEPTOCERIDAE				
PETROTHRINICIDAE				
PISULIIDAE				
SERICOSTOMATIDAE				
COLEOPTERA	DYTISCIDAE/NOTERIDAE			
ELMIDAE/DRYOPIDAE				
GYRINIDAE				
HALIPUDAE				
SCIRTIIDAE				
HYDRAENIDAE				
HYDROPHILIDAE				
LIMNICHIDAE				
PSEPHENIDAE				
DIPTERA	ATHERICIDAE			
	BLEPHAROCERIDAE			
	CERATOPOGONIDAE			
	CHIRONOMIDAE			
	CELIIDIAE			
	DIXIDAE			
	EMPODIDAE			
	EPHYDRIIDAE			
	MUSCIDAE			
	PSYCHODIDAE			
	SIMULIIDAE			
	SYRPHIDAE			
	TABANIDAE			
	TIPILODIAE			
GASTROPODA	ANCYLIDAE			
	BULININAE			
	HYDROBIIDAE			
	LYMNAEIDAE			
	PHYSIDAE			
	PLANORBINAЕ			
	THIARIIDAE			
	VIVIPARIDAE			
PELECYPODA	CORBICULIDAE			
	SPHÄRIDIIDAE			
	UNIONIDAE			
SASS Score	0	0	0	0
Number of Taxa	0	0	0	0
ASPT	0.0	0.0	0.0	0.0

Other biota:

Comments/Observations:

 agree to these data being shared via the FBIS platform for visualisation and download by registered FBIS users

1.1.1.7 Adding abiotic data

Once occurrence or SASS data have been captured the user has the option to add associated abiotic data that was collected at the same time as the survey data. This is done using the Add new abiotic data form. Five variables have been categorised namely, water surface width, water level, water turbidity, canopy cover and embeddedness. The remaining variables are added by checking the Measured box and adding the value of each variable. Note all units have been standardised and users need to convert to these standard unit before capturing the data. Minimum and maximum values have also been included for data integrity checks.

Adding abiotic data.





Add New Abiotic Data For J1ANYS-00015 (2020-06-09)

Water surface width	Not specified
Water level	Not specified
Water turbidity	Not specified
Canopy cover	Not specified
Embeddement	Not specified
Alkalinity: phenolphthalein (meq/l)	<input type="checkbox"/> Measured Value: Min = 0.0, Max = 500.0
Alkalinity: total (meq/l)	<input type="checkbox"/> Measured Value: Min = 0.01, Max = 5.0
Aluminum (mg/l)	<input type="checkbox"/> Measured Value: Min = 0.02, Max = 320.0
Arsenic (mg/l)	<input type="checkbox"/> Measured Value: Min = 0.03, Max = 0.5
Ash Free Dry Mass: benthic (mg/m ²)	<input type="checkbox"/> Measured Value: Min = 0.0, Max = 500000.0
Ash Free Dry Mass: water column (mg/l)	<input type="checkbox"/> Measured Value: Min = 0.0, Max = 500000.0
Barium (mg/l)	<input type="checkbox"/> Measured Value: Min = 0.0, Max = 0.5
Beryllium (mg/l)	<input type="checkbox"/> Measured Value: Min = 0.0, Max = 0.01
Bicarbonate (mg/l)	<input type="checkbox"/> Measured Value: Min = 0.0, Max = 500.0
Biological Oxygen Demand (mg/l (5 days))	<input type="checkbox"/> Measured Value: Min = 0.0, Max = 600.0
Boron (mg/l)	<input type="checkbox"/> Measured Value: Min = 0.0, Max = 0.5
Cadmium (mg/l)	<input type="checkbox"/> Measured Value: Min = 0.0, Max = 0.15
Calcium (mg/l)	<input type="checkbox"/> Measured Value: Min = 0.0, Max = 500.0
Carbon: dissolved organic (mg/l)	<input type="checkbox"/> Measured Value: Min = 0.0, Max = 120.0

1.1.1.8 Adding Source reference for records

All data added to FBIS needs metadata associated with it. The user needs to select the Reference category, and then follow the relevant upload form to add the details of the database, DOI, report / thesis details, and URL or PDF.

Adding the source reference for the records.

Source reference for records

Reference Category	<input type="text" value="Not specified"/> <input checked="" type="text" value="Not specified"/> <input type="text" value="Database"/> <input type="text" value="Peer-reviewed scientific article"/> <input type="text" value="Published report or thesis"/> <input type="text" value="Unpublished data"/>
--------------------	---

Peer-reviewed scientific articles Select the reference category and insert the DOI or URL and click the search button. The citation is then retrieved via an online citation management system and inserted. Click Submit to save.

Source reference for records

Reference Category	<input type="text" value="Peer-reviewed scientific article"/>
DOI/URL	10.2999/16085914.2012.753401 Wey O, Ellender B, Woodford D, and Jordaan M 2013 "Fish distributions in the Rondebosch River, Cape Floristic Region, South Africa, and the immediate impact of intensive treatment in an invaded reach" African Journal of Aquatic Science vol. 38, pp. 201-209. <input type="button" value="Search"/>
Notes	If these data appear in other study references please specify those study references.
<input type="button" value="Submit"/>	

Published reports and theses Select the reference category and select from the dropdown list of titles, if the published report or thesis is already uploaded, or select "Upload new" to add a new published report or thesis.





Source reference for records

Reference Category: Published report or thesis

Study Reference: Effects of catchment management on physical river condition, chemistry, hydrogeomorphology and ecosystem service provision in small coastal rivers of the Western Cape

Author: Chantel Petersen | Year: 2019 | Title: Effects of catchment management on physical river condition, chemistry, hydrogeomorphology and ecosystem service provision in small coastal rivers of the Western Cape

Notes: If these data appear in other study references, please specify those study references.

When uploading a new published report or thesis, complete the fields using the format indicated including Author(s), Year, Source, Title, Description (if desired) and Url or upload file. Confirm that you are owner of the document being added and Upload. This is then submitted.

Upload New Document

Author(s): H.F. Dallas
E.g. W.C. Smith, F.D Brown & C.B Kleynhans

Year: 1995

Source: MSc Thesis, Department of Zoology, University of Cape Town
E.g. Water Research Commission Report

Title: System) as a tool for the rapid bioassessment of water quality

Description: (Leave blank if no description)

Provide url
 Upload a file

Url: <https://open.uct.ac.za/handle/11427/21180>

I hereby confirm that I am the owner of these data and/or document and agree to these being shared via the FBIS platform for download by registered FBIS users.

Source reference for records

Reference Category: Published report or thesis

Study Reference: An evaluation of SASS (South African Scoring System) as a tool for the rapid bioassessment of water quality

Author: H.F. Dallas | Year: 1995 | Title: An evaluation of SASS (South African Scoring System) as a tool for the rapid bioassessment of water quality

Notes: If these data appear in other study references, please specify those study references.

Databases Select the reference category and select from the dropdown list of database, if the database is already created, or select "Add new" to add a new database.





Source reference for records

Reference Category Database

Database

Notes

South African National Parks Fish Database
Ecotone Freshwater Consultants
Mpumalanga Tourism and Parks Agency
Limpopo Department of Environmental Affairs, Fish Database
Gauteng Department of Agriculture and Rural Development
Ecosun Fish database
Clean Stream Biological Services database
The Biodiversity Company SASS and fish Database
Department of Water and Sanitation, 2016
River Data 2015
Department of Water and Sanitation Regional Fish Database, 2016
Cape Nature State of Biodiversity Database, 2019
FRC monitoring data
Global Biodiversity Information Facility (GBIF)
OrnithoMap Virtual Museum, FitzPatrick Institute of African Ornithology, University of Cape Town, 2021
Nepf fish database
Groenvadersbos Conservancy Fish and SASS Database

Add New ...

When adding a new database, complete the name and provide a description. Add the url if it exists and click create. Add notes if desired.

New Database Record

Name National Fish Database

Description The national database for fish survey data collected by the national conservation authority.

Url

Close Create

Source reference for records

Reference Category Database

Database National Fish Database

Notes Select database from the list of database provided or click "Add New" to add another database.

Provide any additional information about the database. E.g. The year created, the host, etc.

Submit

Unpublished data Select the reference category and select from the dropdown list under notes. If the unpublished dataset exists, select the unpublished dataset name, or if the unpublished dataset needs to be created, select "Add new" to add a new unpublished dataset. In the notes, add the name of the person, details of the study and date if possible or applicable.

Source reference for records

Reference Category Unpublished data

Notes

Data provided by Mike Coke of Natal Parks Board/EKZN Wildlife
River EcoStatus Monitoring Programme
Northern Cape Department of Environment and Nature Conservation, 2018
Paul Fouche Unpublished Data
Data collected during SASS accreditation assessment
Rivers of Life Inkomati Fish Study, 2020
Olifants-Doring Fish Survey, 2001
Aquatic biomonitoring data
AfriDev Consultants
The Nature Conservancy (TNC) data - baseline study

Add New ...

New Unpublished Data

Note Helen Dallas, unpublished SASS data, 2021

Source Name

Close Create

1.1.1.9 Adding water temperature data





A data capture form has been added for uploading water temperature time series data. The user needs to follow the following steps:

- Select the Owner if not the logged in owner
- Select the logging interval (0.5h, 1h, 2h, 3h, 24h)
- Start time and end time
- Date format
- Upload file as a csv, with the following column headers: Date Time; Water temperature (see excel sheet below)
- Add site image
- Select Source Reference by using search filter and selecting.
- Click "I agree to these data being shared via the FBIS platform for visualisation and download by registered FBIS users" and Submit

Format of excel file for preparing water temperature data.

	A	B	C
1	Date Time	Water temperature	
2	19/11/2008 00:00	18.01	
3	19/11/2008 01:00	17.867	
4	19/11/2008 02:00	17.677	
5	19/11/2008 03:00	17.51	
6	19/11/2008 04:00	17.32	
7	19/11/2008 05:00	17.177	
8	19/11/2008 06:00	17.011	
9	19/11/2008 07:00	16.939	
10	19/11/2008 08:00	16.987	
11	19/11/2008 09:00	17.106	
12	19/11/2008 10:00	17.344	
13	19/11/2008 11:00	17.701	
14	19/11/2008 12:00	18.129	
15	19/11/2008 13:00	18.58	
16	19/11/2008 14:00	18.985	
17	19/11/2008 15:00	19.27	
18	19/11/2008 16:00	19.46	
19	19/11/2008 17:00	19.555	
20	19/11/2008 18:00	19.603	
21	19/11/2008 19:00	19.555	
22	19/11/2008 20:00	19.46	
23	19/11/2008 21:00	19.341	
24	19/11/2008 22:00	19.199	
25	19/11/2008 23:00	19.032	
26	20/11/2008 00:00	18.842	
27	20/11/2008 01:00	18.675	
28	20/11/2008 02:00	18.500	

Adding water temperature data.





ADD WATER TEMPERATURE DATA FOR SITE E1ROND-KEURB

Latitude: -32.266896190591 | Longitude: 18.9704968924925

Owner: Helen Dallas
Please select the Owner, if you are the data capturer and not the Owner

Logging interval: 1h

Start Time: 00:00

End Time: 23:00

Date Format: DD/MM/YYYY

Browse... E1ROND-KEURB_18_11_2008 to 10_02_2011.csv

Site Image: Browse... IMG_0377 E1ROND-KEURB 2 CHANNELS.JPG

Selected Source Reference: (Published report or thesis) - Water temperatures and the ecological Reserve.

Choose Source Reference

Search:

Published report or thesis:

Author(s):

Published report or thesis:

Published report or thesis:

+ Add Source Reference

I agree to these data being shared via the FBIS platform for visualisation and download by registered FBIS users

Upload

1.1.1.10 Adding physico-chemical data

A data capture form has been added for uploading physico-chemical data. The user needs to follow the following steps:

- Select the Date
- Select the Owner
- Select Source Reference by using search filter and selecting.
- Add specific variables by checking the Measured box and adding the value of each variable. Note all units have been standardised and users need to convert to these standard unit before capturing the data. Minimum and maximum values have also been included for data integrity checks.
- Click "I agree to these data being shared via the FBIS platform for visualisation and download by registered FBIS users" and Submit

Adding physico-chemical data.







1.1.1 References

- Dallas HF, Janssens MP & Day JA. 1999. An aquatic macroinvertebrate and chemical database for riverine ecosystems. Water SA 25 (1): 1-8.
- Dallas HF and Rivers-Moore NA. 2019. Dallas HF and Rivers-Moore NA. 2019. Environmental water temperature guidelines for perennial rivers in South Africa. Volume 2: A technical manual for setting water temperature targets. Water Research Commission Report no. TT 799/2/19. Water Research Commission, Pretoria, South Africa.
- Dallas HF and Rivers-Moore NA. 2022. A protocol and tools for setting environmental water temperature guidelines for perennial rivers in South Africa. African Journal of Aquatic Science. DOI: 10.2989/16085914.2021.1982673
- River Health Programme. 2007. Rivers Database. Department of Water Affairs and Forestry, Pretoria, South Africa.
- Rivers-Moore NA, Dallas HF & Morris C. 2013a. Towards setting environmental water temperature guidelines: A South African example. Journal of Environmental Management 128: 380-392.





1.1 Manual

1.1.1 User manual

This section of the documentation describes every page in the application and what the various components of that page do. The manual is intended to function as a reference for the application. For narrative / workflow based tutorials, you may prefer to work through our [user guide](#).





1 Administrators

1.1 BIMS Administration Guide

This section contains all documentation relevant to administration procedures.

The content is divided into four sections:

- [**Biodiversity Data**](#), which provides a guide for biodiversity data administrators to mobilize and ingest biodiversity data.
- [**Working with GeoServer**](#), which guides administrators through the process of publishing spatial data in GeoServer and how to do basic cartography.
- [**GIS Data in BIMS**](#), which describes the high level concepts of the GeoContext subsystem.
- [**Customisation**](#), which guides administrators through customising their BIMS instance.





1.1 Biodiversity Data

1.1.1 Administration of biodiversity data

This section provides a guide for biodiversity data administrators to mobilize and ingest biodiversity data. The steps outlined are sequential and each provides details on the process and key considerations.

 **Note:**

Only registered users with super user status, typically the site administrators, are able to view the administration sections and undertake the following steps related to the mobilization and ingestion of biodiversity data.

The sections covered include:

- [**FBIS Data Management Guidelines:**](#) These documents serve as a guideline for the management of freshwater biodiversity data in the Freshwater Biodiversity Information System (FBIS).
- [**Preparing and checking a Master List of Taxa before uploading:**](#) This section highlights issues and specific checks to improve accuracy of the Master List.
- [**Uploading a new Taxon Group \(Module\) and adding a Master List:**](#) This document explains the steps that super users can follow to upload a new taxon group and an associated master list.
- [**Harvesting GBIF Data:**](#) This section outlines the steps for harvesting GBIF data.
- [**Managing taxa in Taxon Management:**](#) This documentation describes a specific administration module has been developed to allow administrators to manage taxa within the information system.
- [**Preparing and checking an Occurrence Data File before uploading:**](#) This page serves as a guideline for preparing an occurrence data file for upload.
- [**Uploading Occurrence Data:**](#) This section describes the steps required for uploading occurrence data.
- [**Managing Source references:**](#) This document pertains to a module that allows administrators to manage metadata and citations associated with each biological occurrence record.
- [**Adding a site and biodiversity data:**](#) This section explains how an administrator or user adds a site and data to a site.
- [**Adding physico-chemical data:**](#) This section explains how an administrator, or user, adds physico-chemical data to a site or prepares an excel template for bulk uploading of physico-chemical data for multiple sites and or sampling dates.
- [**Managing BIMS Admin tables:**](#) This document is a list of actions related to the Site Administration including the BIMS table management that an administrator (super user status) may need to edit or check.
- [**Validating records \(occurrence data\) and new taxa:**](#) This section explains the process when a user adds data to RBIS, and how the administrator views, checks and validates the occurrence record or new taxon.





1.1.1 FBIS data management guidelines

Data management guide for the Freshwater Biodiversity Information System (FBIS): a platform for housing and serving freshwater biodiversity data.

1.1.1.1 Introduction

These documents serve as a guideline for the management of freshwater biodiversity data in the Freshwater Biodiversity Information System (FBIS). It provides an overview of the recommended steps, processes and systems for sourcing, extracting, consolidating, uploading and serving biodiversity data in an information system such as FBIS. It is based on the experiences gained and systems developed during the development of the Freshwater Biodiversity Information System (FBIS) in South Africa (Freshwater Biodiversity Information System. 2020. FBIS Version 3; Dallas et al. 2022).

1.1.1.2 Managing data consolidation

Establishing what data are available in a country is the first step in the data process. To assist with the managing of data we recommend developing a DataSet Tracker.

Setting up a DataSet Tracker

Often the amount of data available for consolidation into an information system, exceeds the amount of data that can actually be consolidated based on time and financial constraints. It is thus critical that the FBIS data team prioritise the data for FBIS. This is best done through consultation with the end-users and stakeholders of FBIS. To manage the prioritisation of data and keep track of progress, a DataSet Tracker is used. This is an excel spreadsheet that keeps track of the data available for inclusion in FBIS, and importantly allows for prioritisation of each data set into FBIS.

The DataSet Tracker provides a list and details of data sets identified by the FBIS team and stakeholders, which are being considered for inclusion in the FBIS. Data are best divided into four broad categories, namely:

- **Biodiversity data** (e.g. wetland birds, wetland plants, fish, invertebrates, algae etc.)
- **Abiotic data** (e.g. hydrological data, physico-chemical data, wetland condition data, etc.)
- **Spatial data** (used for filters and / or spatial layers; e.g. Rivers and dams, Provinces, Freshwater Ecoregions of the World, Water Management Areas, etc.)
- **Third Party data** (existing hydrological or water quality data sites, GBIF, etc.)

For each category, the FBIS team needs to specify the following:

- Component (specify component)
- Details (provide details of data set, e.g. number of records, type of records etc)
- Accessibility (who has the data, is it freely available, is a MOU required?)
- Data priority ranking (ranking based on user workshop to evaluate the relative importance of different data sets, where 1 = high priority, 2 = medium and 3 = low; these rankings can also be linked to FBIS versions)
- Spatial scale (specify if the data are regional or national)
- Progress (record progress on obtaining data and inclusion in FBIS)

A DataSet Tracker template has been generated for FBIS ([FBIS DataSet Tracker Template.xlsx](#)). For spatial data it is important to indicate if this layer is to be used as a filter, spatial layer, or both (see details in [Spatial Data](#)).

Using GitHub for managing data consolidation

Data sourcing, extraction and consolidation requires careful, accurate and concise work to ensure quality data. A robust system for managing the data consolidation process is recommended. [GitHub](#) is an excellent tool for managing this process as it allows multiple team members to work together in one project, which allows for easy management of workflows for data consolidation. A screenshot of the FBIS Data Management project on GitHub is provided (Figure 1). Using GitHub one can:

- Create a “ticket”/ “issue” for each data set to be consolidated
- Assign each “ticket” to a team member
- Label each issue with an appropriate label such as bird data, fish data, algal data, etc.
- Easily see when a ticket is “In progress”, “Done” and “Checked and Signed off” by a senior staffer.

The FBIS will be introduced to GitHub for managing both the technical and data side of the FBIS project.

Figure 1. Example of data management workflow in GitHub





1.1.1.3 Types of data

Biodiversity data

Biodiversity data is the primary currency of FBIS. The lowest unit is an occurrence record for a **Taxon** taken at a **Site** (identified by a latitude / longitude) on a particular **Sampling Date** (so Taxon, location and date – these are mandatory attributes for each record). For some taxa extra attributes may be included such as habitat or biotope. Additional data may be associated with each occurrence record, although this is often dependent on the group (birds, fish, invertebrates, wetland plants, algae) being focused on, and may vary somewhat from one group to another. For each occurrence record, **Presence = 1** indicates that the species was recorded at a site on a particular sampling date. In addition, we have included the option to include sampling method, sampling effort, abundance measure, and abundance for each; as well as a number of abiotic parameters associated with each occurrence record (see [Abiotic data](#)). Further details are provided in [Data Upload Templates](#).

Creating Taxonomic Master Lists

A taxonomic Master List is a list of all species and/or taxa within a particular group such as birds, fish, invertebrates, wetland plants, algae, etc. For some groups a species list is easy to produce as species level is commonly identified in studies (e.g. birds, fish). For other groups, the taxonomic level (family, genus, species etc) varies considerably from study to study, and thus it is recommended that the lowest taxonomic level is used and that Taxon is used in preference to Species (e.g. invertebrates, algae).

The purpose of the Master List is threefold:

1. To provide a comprehensive and up to date list of species/taxa for a specific group in a specific region. This needs to be done during the initial development of an information system such as FBIS, but once the system is up and running, then the further updating of the Taxonomic backbone is done using GBIF and user-defined taxonomic uploads.
2. To facilitate downloading of data from the Global Biodiversity Information Facility's (GBIF), thereby ensuring that the correct taxa are included on the information system.
3. To provide the taxonomic hierarchy for taxa not yet on GBIF.

The generation of a Master List requires consultation with available resources, relevant publications and experts. A Master List is intended to be an updatable resource, improved and added to as new data and studies are published, or new taxa are described. If no species lists are available for a country then the GBIF Taxonomic Master List may be generated by extracting data from GBIF. This Master List should then ideally be checked and validated for accuracy by the FBIS team.





The format of the Master List is important to ensure consistency for ingestion of data into the information system. The following columns are included in the Master Lists, provided as excel file template that will be used for each FBIS group ([Master List Template final for FBIS Generic 2022_08_01.xlsx](#)). It is recommended that all columns be populated, with black compulsory and blue optional (explanations given in parenthesis):





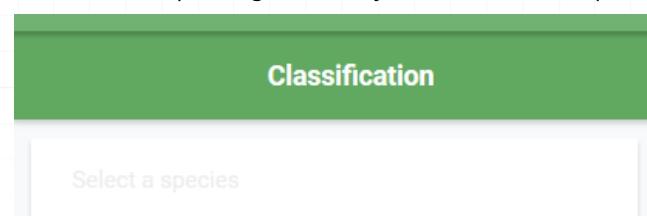
- On GBIF (Yes or No if the taxon is on GBIF)
- GBIF Link (link to GBIF taxon)
- Taxon Rank
- Kingdom
- Phylum
- Class
- **SubClass**
- Order
- Family
- **SubFamily**
- Genus
- Species
- **SubSpecies**
- **Variety**
- Taxon
- Scientific name and authority
- Taxonomic status
- Origin (Native, Non-native, Unknown)
- Endemism (Endemism categories):
 - Micro-endemic level 2 (Endemic to a single river or wetland)
 - Micro-endemic level 1 (Endemic to less than 5 rivers or wetlands)
 - Regional endemic level 2 (Endemic to a single primary catchment)
 - Regional endemic level 1 (Endemic to a single Freshwater Ecoregion, more than one primary catchment)
 - National endemic (Endemic to South Africa, occurs in more than one Freshwater Ecoregion within Botswana)
 - Subregional endemic (Endemic to southern Africa)
 - Widespread (Occurs beyond southern Africa)
 - Unknown (Endemism is unknown)
- Global Conservation status The IUCN Red List of Threatened Species website (IUCN Red List, 2020) classifies species into eight main categories based on their extinction risk. Each species was classified:
 - Extinct
 - Critically Endangered
 - Endangered
 - Vulnerable
 - Near Threatened
 - Least Concern
 - Data Deficient
 - Not Evaluated
- National Conservation status The SANBI National Red List Categories (SANBI, 2020) classifies species into 12 main categories based on their extinction risk. Each species was classified as:
 - Extinct
 - Extinct in the Wild
 - Regionally Extinct
 - Critically Endangered, Possibly Extinct
 - Critically Endangered
 - Endangered
 - Vulnerable
 - Near Threatened
 - Critically Rare
 - Rare
 - Declining
 - Data Deficient - Insufficient Information
 - Data Deficient - Taxonomically Problematic Not Evaluated
 - Least Concern
 - **Common Name**
 - **Former scientific names**
 - **Division (algae only)**





- Growth form (algae only)
- Water dependence (anurans only)
- BDI Link (anurans only)
- Wetland Indicator Status (plants only)
- SANBI RedList Links

A separate Master List of Species / Taxa needs to be created for each group for which biodiversity data are served on FBIS. The Master List is ideally created before the consolidation of data so that the correct GBIF Taxonomic Backbone (<https://www.gbif.org/dataset/d7ddbf4-2cf0-4f39-9b2a-bb099caa36c>) is used for the data consolidation files. The taxonomy from GBIF should be used when the taxon is on GBIF. The FBIS team can check if the taxon is on GBIF using the following link: <https://www.gbif.org/species/1> and insert the relevant species, genus, family etc. in the "Select a species" box.



It is important that the correct **Taxon Rank** should always be used to ensure correct uploading of the data files into FBIS.

Note: It is recommended that significant time and resources are used to generate and refine the master list for each group (birds, fish, invertebrates etc) as much as possible before proceeding with data collation. This is the list around-which all of the occurrence data will pivot: the more accurate it is at the start, the more time you save in the long run when collating the biodiversity data for those taxa.

Sources of biodiversity data

Multiple sources of taxon occurrence data generally exist, although this is highly dependent on the country. Potential sources of biodiversity data include the following study reference categories:

- Peer-reviewed scientific articles
- Theses
- Published reports
- Databases
- Unpublished data

The following sections provide details of the recommended processes for sourcing taxon occurrence data from the different sources.

Peer-reviewed scientific article

Data from peer-reviewed scientific articles are best sourced by undertaking a literature search using Google Scholar. To ensure that relevant papers are identified, appropriate search term combination should be used. For example, for all native freshwater fishes in South Africa: "Genus species" & "South Africa" (where "Genus species" represents the scientific name for each taxon). Relevant articles are identified based on their titles, abstracts and methods section. The first 500 search results returned by Google Scholar should be assessed for relevancy. Each relevant article should be inspected for GPS coordinates – if these are not provided then the article may be catalogued but not included for data extraction (see [Extracting data and preparing bulk data for uploading into FBIS](#)).

Note: It is important that search terms are clearly-defined and consistent, so that the process is repeatable and defensible.

Thesis

University theses are easily searched using relevant university search engines. Often local experts also know of relevant theses and can be contacted directly. Where possible, electronic data should be sourced directly from individuals, as this saves significant time that would otherwise be occupied in transcription of paper to digital records during data consolidation.

Published report

Technical and consultancy reports are often difficult to source and requires knowledge of local experts who have undertaken relevant studies. Where possible, electronic data should be sourced directly from individuals, as this saves significant time during data consolidation.

Database

Identify and contact relevant organisations who may have data to share that is already in a database. Data sharing agreements may be needed depending on the organisation.

Unpublished data





Identify individuals who may have data to share. Where possible, electronic data should be sourced directly from individuals, as this saves significant time during data consolidation.

Generation of a Knowledge Database for each group

A Knowledge Database is a record of all study references from which data have been extracted for a particular group (e.g. birds, fish, wetland plants, invertebrates, algae, etc.). It is a useful record of all peer-reviewed scientific articles, theses and published reports for a group and each record should ideally be linked to a GitHub ticket to keep track of the data extraction (see [Using GitHub for managing data consolidation](#)). An example of a Knowledge Database has been generated ([FBIS Knowledge Database Example Template.xlsx](#)).

The following columns are included in the Knowledge Database, provided as excel file template that will be used for each FBIS group.

- Data captured (Yes / No)
- Data capturer (Name of person that entered the data)
- Author(s) (Study author(s))
- Year (Publication Year)
- Title (Publication Title)
- Source (Publication Source)
- Reference Category (peer-reviewed scientific article, thesis, published report, database, unpublished data)
- Electronic Copy (Yes / No)
- Electronic Data (Yes / No)
- Notes (Relevant notes)
- GitHub Ticket Number (Link to ticket/issue on GitHub)

Abiotic data

Whilst abiotic data are not the main currency for FBIS, it is extremely useful to provide associated abiotic data when these have been collected concurrently with biotic data. For this reason, a number of abiotic spatial layers may be served, and a number of abiotic parameters may be included in the Data Upload Templates. These include aspects related to sampling method and effort, abundance, habitat/biotope, flow and physico-chemistry. Abiotic data associated with biodiversity data are included in the [Data Upload Templates](#). Examples are given below. These abiotic factors may need to be adapted depending on the taxonomic group being dealt with – for example bird abiotic data may need different habitat related attributes. These can easily be added in the administration section.

- Sampling method
- Sampling effort measure
- Sampling effort value
- Abundance measure
- Abundance value
- Broad biotope
- Specific biotope
- Substratum
- Water Level
- Water Turbidity
- Embeddedness
- Depth
- Near Bed Velocity
- Conductivity
- PH
- Dissolved Oxygen
- Dissolved Oxygen
- Temperature
- Turbidity

Spatial data

Spatial data often take the form of shapefiles containing geometries representing physical properties or landscape features (e.g. catchments, habitat types etc.) and that have attribute data associated with them. These spatial layers may be hidden/shown for visualisation on the map by a user, while the data in these layers may be used to facilitate spatial filters which are used to select a subset of records based on the filter specified. Spatial layers and filters may be the same, although not always as it is dependent on the data attributes.





Selection of spatial filters and geocontext data

Geocontext data are contextual data for any geographical point, sourced from relevant spatial layers and aggregated as properties of a site. Often spatial layers are used for generating geocontext data. The examples below are the spatial filters used in FBIS (see [Setting up a Dataset Tracker](#)).

- Geomorphological Zone
- Freshwater Ecoregions of the World
- Province
- Management Area
- Catchment
- Ecoregion
- National Critical Biodiversity Areas
- National Freshwater Ecosystem Priority Area
- Strategic Water Source Area
- National Biodiversity Assessment 2018

Selection of spatial layers

Spatial layers, which may be turned on and off in the FBIS map, function as background layers upon which biodiversity data are displayed. The examples below are the spatial layers used in FBIS.

- Administrative boundaries
- Rivers
- Dams
- Geomorphological zones
- Freshwater Ecoregions of the World
- Water Management Areas
- Sub Water Management Areas
- River Management Units
- Catchments (Primary, Secondary, Tertiary, Quaternary, Quinary)
- SA Ecoregions (Ecoregion Level 1, Ecoregion Level 2)
- National Critical Biodiversity areas
- Protected areas
- National Freshwater Ecosystem Priority Areas
- Strategic Water Source Areas
- Land Use Classes

Third party data

Where databases and data platforms already exist, it is recommended that links (APIs) be created to access these data from the platform. Third party databases that FBIS links to includes data from Global Biodiversity Information Facility (GBIF) (taxonomy, diatom, invertebrate and fish data), the IUCN Red List of Threatened Species database, the [MinisASS database](#), which provides citizen science river health data, and DWS water quality database accessed via the Integrated Water Resources Decision Support System (InWaRDS 2020), and a 'knowledge database', which serves as a catalogue of metadata for all occurrence records. Data from certain modules of the Virtual Museum (Fitzpatrick Institute of African Ornithology, University of Cape Town 2021) are also included. GBIF and Virtual Museum data are harvested and served in FBIS, as a separate Data Source that complements collated data. In FBIS, freshwater species occurrence data available for South Africa in GBIF includes periodically-updated data from the South African Institute for Aquatic Biodiversity (SAIAB), as well as 'Research Grade' iNaturalist data (i.e. records from non-captive individuals, with a picture, locality and date, and with two or more IDs in agreement at species level). Invertebrate data includes both aquatic and aerial stages. The FBIS team need to provide guidance on the taxonomic groups for which GBIF data should be harvested, and should be based on the Master Lists (see [Creating Taxonomic Master Lists](#)).

1.1.1.4 Extracting data and preparing bulk data for uploading into FBIS

FBIS includes data capture forms for adding sites, fish, invertebrate and algae data, as well as associated abiotic data. However, these forms are intended for the capture of individual site visits, and at times, especially during the development phase of an information system, it is useful to be able to upload large amounts of data at a time. To ensure that bulk data are readily ingested into FBIS, a standardised **Data Upload Template** needs to be produced for each group. This will ensure that data are cleaned and provided in a standardised manner so that the data uploading process runs smoothly and so that the resultant FBIS platform serves quality data.





Data Extraction

Data extracted from peer-reviewed articles, theses and published reports need to be standardised to allow for comparison of data amongst studies. Each article/thesis/report needs to be inspected for GPS coordinates. Publications without GPS coordinates cannot be included in the information system. All relevant information, as specified in Table 1, [Data Upload Templates](#), pertaining to the occurrence record is then extracted from the publication and added to the Data Upload Template for the relevant group.

Data Upload Templates

Standardised data upload templates in excel have been generated for four biodiversity groups, namely anurans, fish, invertebrates and algae. Additional upload templates may be added as new biodiversity modules are added. These templates include a number of dropdown attributes. It is critical that all taxa in the Data Upload file for a particular biodiversity group are present in the Master List of Taxa for that group. If not, the upload process will not work. For this reason, it is recommended that where possible dropdown lists are used in the Data Upload files to ensure that all data entered in the sheet is valid. As an example, the Master List of fish species in South Africa has been included as dropdown list for the FBIS Fish Data Upload Template.

The following data upload templates are provided:

- [FBIS Fish Data Upload Template.xlsx](#)
- [FBIS Algae Data Upload Template.xlsx](#)
- [FBIS Invertebrate Data Upload Template.xlsx](#)
- [FBIS Anuran Data Upload Template.xlsx](#)

Many of the columns are the same for each group, although some additional columns are included for algae, and the dropdown options (e.g. biotopes) sometimes vary amongst groups. The common columns used in each group are given in Table 1. Relevant dropdown lists are provided in each template and additional group-specific columns are included in the relevant templates.





Table 1. Column headers with details used in data upload templates





Column Header	Details
UUID	A unique identifier for each record. Drag and copy the formula down.
Original River or Wetland name Name	Name given in study reference
Original Site Code	Site Code given in study reference
FBIS Site Code	Leave blank (autogenerated)
Site description	Description given in study reference
Refined Geomorphological Zone	As given in study reference (if available) - Select from dropdown options
Latitude	Decimal degrees with "-" in front & "," for decimal point
Longitude	Decimal degrees with "," for decimal point
Sampling Date	yyyy/mm/dd
Kingdom	Not necessary to fill in as they are derived from the Master Lists
Phylum	Not necessary to fill in as they are derived from the Master Lists
Class	Not necessary to fill in as they are derived from the Master Lists
Order	Not necessary to fill in as they are derived from the Master Lists
Family	Not necessary to fill in as they are derived from the Master Lists
Genus	Not necessary to fill in as they are derived from the Master Lists
Species	Not necessary to fill in as they are derived from the Master Lists
Taxon	
Taxon rank	Select from dropdown options
Present	Fill in with "1"
Sampling method	Select from dropdown options
Sampling effort measure	Select from dropdown options
Sampling effort value	
Abundance measure	Select from dropdown options





Column Header	Details
Abundance value	Leave blank if only presence data
Record type	Select from dropdown options
Broad biotope	Select from dropdown options
Specific biotope	Select from dropdown options
Substratum	Select from dropdown options
Water Level	Select from dropdown options
Water Turbidity	Select from dropdown options
Embeddedness	Select from dropdown options
Depth	Depth (m)
Near Bed Velocity	Near Bed Velocity (m/s)
COND	Conductivity (mS/cm)
PH	PH
DOPER	Dissolved Oxygen (%)
DO	Dissolved Oxygen (mg/L)
TEMP	Temperature (deg C)
TURB	Turbidity (NTU)
Collector/Owner	Full name
Collector/Owner Institute	Institute of collector/owner
Author(s)	Surname + Initials
Year	Year of study
Source	Source of data if from thesis or database
Title	Title of data source if thesis or published report
Reference category	Select from dropdown options





Column Header	Details
URL	Thesis handle, or article link if no DOI available
DOI	DOI for reference (e.g. 10.2989/16085914.2018.1491385)
Document Upload Link	Link to "Documents" page on FBIS after uploading PDF of published report
Notes	Any details related to sampling, species, life form etc.

1.1.1.5 Managing citations and documents

All biodiversity data served on FBIS need to have associated Metadata (Figure 2). A Source Reference Management system have been incorporated in FBIS. This metadata allows the users to establish exactly where the data originated from and to navigate to the study reference if desired. As per [Sources of biodiversity data](#), five types of study references are served, namely peer-reviewed scientific articles, theses, published reports, databases and unpublished data. This is described in a separate document: Managing Source References.

Figure 2. Metadata Table

Metadata Table						
Reference Category	Authors	Year	Title	Source	DOI/URL	Notes
Published report or thesis	Shelton JM	2013	Impact of non-native rainbow trout on stream food webs in the Cape Floristic Region, South Africa integrating evidence from surveys and experiments	-	http://hdl.handle.net/21407/1199	-

1.1.1.6 References

Dallas HF, Shelton JM, Sutton T, Tri Ciputra D, Kajee M and Job N. 2022. The Freshwater Biodiversity Information System (FBIS) – mobilising data for evaluating long-term change in South African rivers, African Journal of Aquatic Science 47(3): 291-306, DOI: 10.2989/16085914.2021.1982672

Freshwater Biodiversity Information System (FBIS). 2022. Downloaded from <https://freshwaterbiodiversity.org> on [current date]

Freshwater Biodiversity Information System (FBIS). 2022. FBIS User Manual. Prepared by the Freshwater Research Centre and Kartozia.





1.1.1 Preparing and checking a Master List of Taxa before uploading

A taxonomic Master List is a list of all species and/or taxa within a particular group such as birds, fish, invertebrates, wetland plants, algae, etc. This section highlights issues and specific checks to improve accuracy of the Master List. The format of the Master List is important to ensure consistency for ingestion of data into the information system. The columns included in the Master Lists are detailed in the Data Management Guidelines.

 **Note:**

Only registered users with super user status are able to do this, typically the administrators.

1.1.1.1 Creating a Master List

A taxonomic Master List is a list of all species and/or taxa within a particular group such as birds, fish, invertebrates, wetland plants, algae, etc. For some groups a species list is easy to produce as species level is commonly identified in studies (e.g. birds, fish). For other groups, the taxonomic level (family, genus, species etc) varies considerably from study to study, and thus it is recommended that the lowest taxonomic level is used and that Taxon is used in preference to Species (e.g. invertebrates, algae).

The purpose of the Master List is threefold:

1. To provide a comprehensive and up to date list of species/taxa for a specific group in a specific region. This needs to be done during the initial development of an information system such as FBIS or FBIS, but once the system is up and running, then the further updating of the Taxonomic backbone is done using GBIF and user-defined taxonomic uploads.
2. To facilitate downloading of data from the Global Biodiversity Information Facility's (GBIF), thereby ensuring that the correct taxa are included on the information system.
3. To provide the taxonomic hierarchy for taxa not yet on GBIF.

The generation of a Master List requires consultation with available resources, relevant publications and experts. A Master List is intended to be an updatable resource, improved and added to as new data and studies are published, or new taxa are described. If no species lists are available for a country then the GBIF Taxonomic Master List may be generated by extracting data from GBIF. This Master List should then ideally be checked and validated for accuracy by the FBIS team.

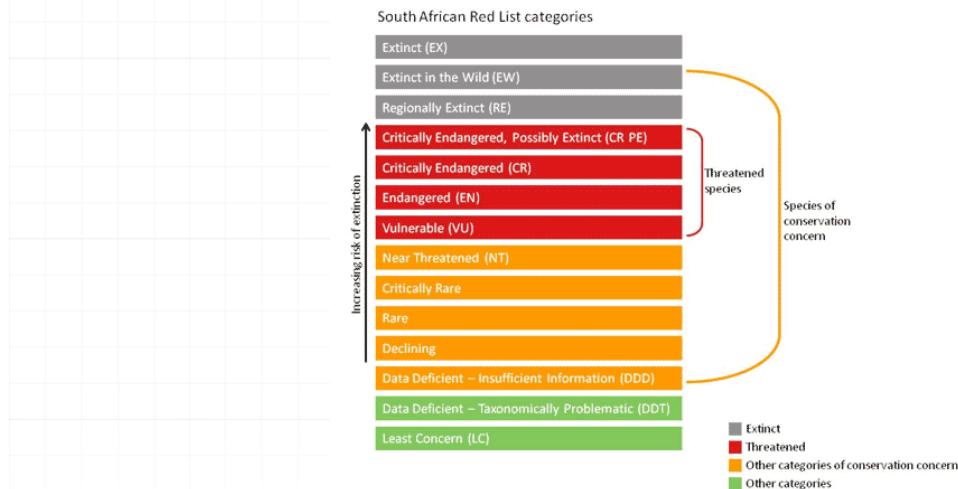




The format of the Master List is important to ensure consistency for ingestion of data into the information system. The following columns are included in the Master Lists, provided as excel file template that will be used for each FBIS group (**FBIS Master List of Taxa Template.xlsx**). It is recommended that all columns be populated, with black compulsory and blue optional (explanations given in parenthesis):

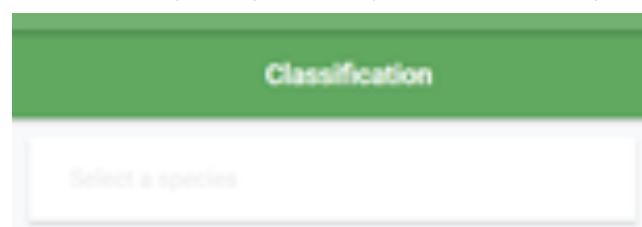
- On GBIF (Yes or No if the taxon is on GBIF)
- GBIF URL (link to GBIF taxon)
- Country records (Yes, No, unknown – records in the country of interest)
- Comments (Details such as other countries if unknown or No above)
- Source (Details of the publication source for this taxon)
- Taxon Rank
- Kingdom
- Phylum
- Class
- **SubClass**
- Order
- Family
- **SubFamily**
- Genus
- Species
- **SubSpecies**
- **Variety**
- Taxon
- Scientific name and authority
- Origin (Native, Non-native, Unknown)
- Endemism (Endemism categories):
 - Micro-endemic level 2 (Endemic to a single river or wetland)
 - Micro-endemic level 1 (Endemic to less than 5 rivers or wetlands)
 - Regional endemic level 2 (Endemic to a single primary catchment)
 - Regional endemic level 1 (Endemic to a single Freshwater Ecoregion (e.g. CFE), more than one primary catchment)
 - National endemic (Endemic to South Africa, occurs in more than one Freshwater Ecoregion within SA)
 - Subregional endemic (Endemic to southern Africa)
 - Widespread (Occurs beyond southern Africa)
 - Unknown (Endemism is unknown)
- Conservation status (Global) - The IUCN Red List of Threatened Species website (IUCN Red List, 2020)) classifies species into six main categories based on their extinction risk.
 - Extinct
 - Critically Endangered
 - Endangered
 - Vulnerable
 - Near Threatened
 - Least Concern
 - Data Deficient
 - Not Evaluated
- **Conservation status (Global) - This is the red list specific to South Africa based on SANBI's categorisation and classification. See <http://redlist.sanbi.org/> and <http://redlist.sanbi.org/redcat.php>**





* Common name * Former scientific names

A separate Master List of Species/Taxa needs to be created for each group for which biodiversity data are served on FBIS. The Master List is ideally created before the consolidation of data so that the correct GBIF Taxonomic Backbone (<https://www.gbif.org/dataset/d7ddbf4-2cf0-4f39-9b2a-bb099caae36c>) is used for the data consolidation files. The taxonomy from GBIF should be used when the taxon is on GBIF. The FBIS team can check if the taxon is on GBIF using the following link: <https://www.gbif.org/species/1> and insert the relevant species, genus, family etc. in the "Select a species" box.



Taxa that are not on GBIF may be included in a Master List but the Source (Details of the publication source for this taxon) needs to be provided. Unfortunately several taxa may be missing from GBIF which, while it is the best available, is not always 100% correct.

There is also another platform that is useful, the Freshwater Animal Diversity Assessment (FADA) Project (<http://fada.biodiversity.be/>). FADA is the taxonomic backbone for its Freshwater Biodiversity Data Portal. One is able to consult and download FADA data, although it is not always up to date.

Important notes and common errors:

It is important that the correct **Taxon Rank** is always used to ensure correct uploading of the data files. Taxon Rank is case sensitive so **Species** will upload but **species** will fail. Always ensure the correct Taxon Rank is applied by using the dropdown list. There should be no spaces in SubClass, SubOrder, SubFamily, SubSpecies.

The column **On GBIF**: If the taxon is on GBIF, this must be Yes, then it is not necessary to add the GBIF URL. However, it is recommended that the GBIF URL be added to ensure the correct taxon is added. However, if the taxon is not on GBIF, then this must be No. Always include the full taxonomic hierarchy for all taxa (Kingdom, Phylum, Class, Order, etc.).

Note: It is recommended that significant time and resources are used to generate and refine the master list for each group (birds, fish, invertebrates etc) as much as possible before proceeding with data collation. This is the list around which all of the occurrence data will pivot: the more accurate it is at the start, the more time you save in the long run when collating the biodiversity data for those taxa.

1.1.1.2 Checking a Master List for accuracy

To ensure the Master list is accurate, several steps should be taken before uploading taxonomic data. After consolidating the master list, you should check the following:

Apply filters for checking the data by highlighting the header row, clicking **Data, Filter**. All columns should be checked for consistencies and typos. Systematically work from column A to W. In particular, check consistency of the Taxon Rank and taxonomic hierarchy (Kingdom, Phylum, Class, Order, Family, Genus, Species, SubSpecies, Taxon).





It is important to **check the GBIF taxonomy for accepted names and synonyms**. For example, in the avian master list, *Ardea alba* - is the accepted name, whereas *Casmerodus albus* is the synonym. Preferably only accepted names should be included in the Master List of Taxa.

Species	Accepted name <i>Ardea alba</i> Linnaeus, 1758
	Synonym ≡ <i>Casmerodius albus</i> (Linnaeus, 1758)

Taxa should be **checked for duplicates** by highlighting the Taxon column, and from the Home Menu, selecting **Conditional Formatting, Highlight Cells Rules, Duplicate Values**.

GBIF URLs should also be **checked for duplicates** by highlighting the **GBIF URL** column, and from the Home Menu, selecting **Conditional Formatting, Highlight Cells Rules, Duplicate Values**.

Note: All taxa can be updated after ingestion through the Taxon Management section.

Delete blank rows and columns. Lastly, ensure that there are no extra blank rows or columns, by deleting them.

1.1.1.3 Adding additional attributes for a specific taxon group

It may be desirable to add attributes for specific taxon groups such as "Water dependence" (Highly dependent, Moderately dependent, Minimally dependent, Terrestrial). These additional attributes are assigned to each taxon during the uploading of the master lists as long as the additional attribute is added in Taxon Management before uploading.



This is done in the Edit Module form, Add attribute. The attribute needs to match the attribute column header in your Master List for uploading.

Edit Module

Label:

Logo:  No file selected.

Water dependence





1.1.1 Uploading a new Taxon Group (Module) and adding a Master List of Taxa for the Taxon Group

Only registered users with **super user status** are able to do this, typically the administrators.

1.1.1.1 Steps

Click on your name and select **Upload Taxonomic Data**



Click Add new – to add a new Taxon Group

Upload Taxonomic data

You can download the template here : [Download Template](#)

Note : Duplicates will be detected and update the existing data

Taxon Group: Fish

Upload csv here: Browse... | No file selected.

Upload

Add the new taxon group by adding the Taxon Group name and selecting the logo using the “Browse”

Add new taxon group

Name: Birds

Logo: Browse... Birds.png

Close Add

Select the new Taxon Group using the dropdown and browse to the file containing the Master List of Taxa for the Taxon Group, click upload.

Upload Taxonomic data

You can download the template here : [Download Template](#)

Note : Duplicates will be detected and update the existing data

Taxon Group: Anura

Upload csv here: Browse... Frog Master List - for FBIS upload - 7 Feb 2022.csv

Upload

Note:

Note: The Excel file needs to be saved as a csv using the following option:





↑ C: > A_Work > Freshwater Research Centre > Projects Current > JRS Rwanda Collaboration > Data Management > Bird data
RBIS Bird Master List 2020_10_02 Final for RBIS V1
CSV UTF-8 (Comma delimited) (*.csv)
[More options...](#)

Progress is shown:

Upload Taxonomic data

You can download the template here : [Download Template](#)

Current progress :

CSV file taxa-file/Frog_Master_List_- for_FBIS_upload_- 7_Feb_2022.csv
Uploaded at July 29, 2022, 1:47 p.m.
Progress : 112/134



A Success File will indicate taxa uploaded to the system. An **Error** file will give details of taxa not uploaded. The last column in this csv file provides an indication of the reason the taxon was not uploaded. The administrator then needs to check the data and correct before uploading again.

CSV file taxa-file/Master_List_of_Adult_Odonata_Final_for_FBIS_2022_03_24.csv
Uploaded at March 24, 2022, 8:37 a.m.
Result : Finished

Once the Master List of Taxa has been added it can be viewed in the Taxon Management section. An **Error File** provides details of the problem in the last column of the csv. Once these have been corrected, the file can be uploaded again.

CSV file taxa-file/Master_List_of_Adult_Odonata_Final_for_FBIS_2022_03_24.csv
Uploaded at March 24, 2022, 8:37 a.m.
Result : Finished

New taxa may be added individually using the **Taxon Management**, or if there are multiple new taxa to be added, then the steps can be repeated, to upload the additional new taxa for the Taxon Group.





1.1.1 Harvesting GBIF data

All existing taxon occurrence data are harvested per Taxon Group from the Global Biodiversity Information Facility (GBIF). This section outlines the steps for harvesting GBIF data.

Only registered users with **super user status** are able to do this, typically the administrators .

The Master List of Taxa for a Taxon Group is used to facilitate harvesting of data from GBIF, thereby ensuring that the correct taxa are included on the information system.

1.1.1.1 Steps

Click on your profile and select **Harvest from GBIF**.



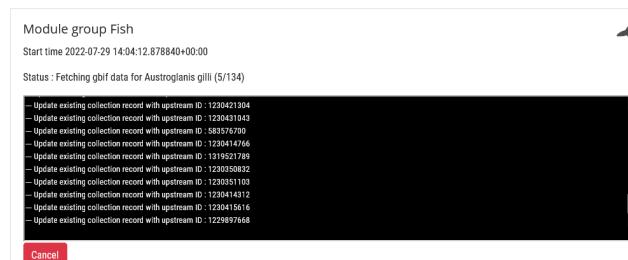
Select the Taxon Group using the dropdown and click Start harvesting.

Harvest GBIF data

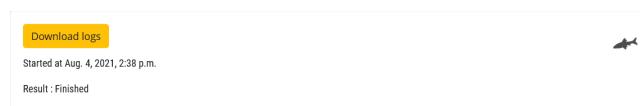
Note : Duplicates will be detected and update the existing data

Taxon Group: Fish

You can keep track of progress. The more taxa in the master list, the longer the time needed for harvesting data from GBIF. You can keep it running in the background and continue with other work as it harvests the data.



You can view the GBIF data harvested via the **Download Logs**.





1.1.1 Managing taxa in Taxon Management

A specific administration module has been developed to allow administrators to manage taxa within the information system. The taxa shown in Taxon Management are those taxa that have been uploaded via the “Upload Taxonomic Data”.

The screenshot shows the 'TAXON MANAGEMENT' section of the Freshwater Biodiversity Information System (FBIS). At the top, there are four boxes displaying taxon counts: Fish (Total taxonomy: 100), Invertebrates (Total taxonomy: 100), Odonate Adults (Total taxonomy: 100), and Anura (Total taxonomy: 100). Below these are search and filter tools. On the right, a sidebar provides links to various administrative functions such as Source References, Edit Dashboard, Validate Records, and Admin Page. A yellow circular icon with a question mark is located in the bottom right corner of the main content area.

Only registered users with super user status are able to access Taxon Administration, typically the administrators .

1.1.1.1 Taxon Management allows you to do the following

- Updating the Taxon Group Name and logo
- Searching for a specific taxon
- Sorting taxa
- Filtering taxa
- Checking and/or changing a taxon's origin, endemism, conservation status and common name
- Checking the GBIF link
- Checking the IUCN link
- Adding a new taxon
- Removing a taxon from the taxon group
- Viewing records associated with the taxon
- Downloading all taxa in a group as a CSV file
- Adding images of a taxon
- Adding additional attributes specific to a taxon group

Updating the Taxon Group Name and logo – Edit Module

The name of the Taxon Group and logo can be updated easily by highlighting the group, and clicking “Edit”, then typing the new name in “Label”, and browsing to the correct logo.







Avians

Total taxonomy : 483

[Edit](#)

Edit Module

Label:

Logo:
 [Browse...](#) No file selected.

[Close](#) [Save](#)

Searching for a specific taxon

- Search for a specific taxon within a taxon group.

The taxon is then shown:

Taxon Name		Rank	Cons. Status	Origin	Endemism	Records	Import date	Action
Diplacodes luminans	Diplacodes luminans Koenig, 1893	SPECIES	Least concern	Native	Widespread	7	2021-04-20	Remove From Group Edit

Sorting taxa

- Taxa can be sorted using up arrow, by each of the headers given below.

Taxon Name   Rank   Cons. Status   Origin   Endemism   Records   Import date   Action

Filtering taxa

- Filter for specific taxa – by Taxonomic Rank, Conservation Status, Origin and/or Endemism category. The number of taxa returned is shown.

Taxon name	Search	Filters	Clear	Total Taxa : 2	Add A Taxon	Download As Csv	
Rank	<input checked="" type="checkbox"/> SPECIES	Endemism	 	Records	 	Import date	
Cons. Status	<input checked="" type="checkbox"/> Vulnerable	Import date	 	Action	 		
Origin	<input checked="" type="checkbox"/> Native	Action					
Endemism							

Checking and/or changing a taxon's origin, endemism, conservation status and common name

Click "Edit" to open up a pop up, which allows you to edit the details of a taxon.



Several fields (indicated with a red arrow) can be edited and changed if they are incorrect including, GBIF Key, Scientific Name, Canonical Name, Legacy Canonical Name, Taxonomic Rank, Vernacular or common name, Taxonomic status, Parent taxon, National Conservation Status (SANBI Red Listing), Global Conservation Status (IUCN Red Listing), Endemism and Origin. Most of these are auto-populated when a taxon is uploaded using the Master List or added as a new Taxon in Taxon Management.

Checking the GBIF link

Click the "GBIF" to link to the species on GBIF:

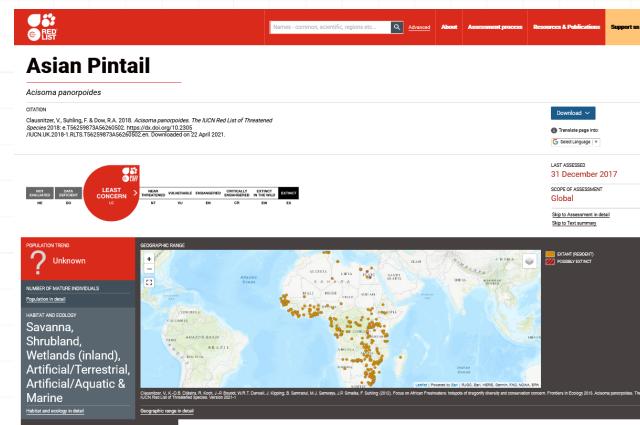
Acisoma panorpoides

Acisoma panorpoides Rambur, 1842



Checking the IUCN link

Click the "GBIF" to link to the species on GBIF:



Adding a new Taxon

If a new taxon needs to be added to the group, click the “Add a Taxon” button, type in the species name, and click “Find”.

Add A Taxon

If the Taxon is on GBIF it will provide the link to the GBIF taxonomic backbone, then click “Add” to confirm the addition of the new taxon to the taxon group.

Add New Taxon

Scientific Name	Canonical Name	Rank	Source	Stored	Action
Lestagelia penicillata (Barnard, 1940)	Lestagelia penicillata	SPECIES			+ ADD

Close

If the taxon is not on GBIF, the administrator may add the new taxon, after which they must assign it to the appropriate Family and indicate the taxonomic rank. Note only genus and or species may be added.

Add New Taxon

Family	Taxon Name	Rank	Action
Libellulidae	New speciesA	SPECIES	+ ADD

This is an autocomplete search, if the family does not exist in the system, please add it first.

Close

Then edit details of the taxon by following the [Checking and/or changing a taxon's origin, endemism, conservation status and common name](#) process.

Removing a taxon from the taxon group

This needs to be used with caution. If data are associated with the taxon, then you will not be able to delete the taxon.



Remove From Group

Viewing records associated with the taxon

Click on the magnifying glass symbol, to return the records associated with a specific taxon.

Downloading all taxa in a group as a CSV file

Click on the CSV button to download the CSV file of all taxa within a taxon group, or the subset of taxa selected using the filters.

Download As Csv

These can then be viewed in excel.

ID	Rank	Accepted name	Kingdom	Order	Genus	Species	Taxon	Scientific name and authority	Origin	Endemism	Conservation status
2	SPECIES	Arenula Anthropoda	Insecta	Diptera	Sternoptyx		Sternopygidae	Sternopygia jacksoni	Native	Widespread	NT
3	SPECIES	Arenula Anthropoda	Insecta	Diptera	Pseudodipteridae		Pseudodipteridae	Pseudodipteridae sp.	Native	Regional endemic level 2	NE
5	SPECIES	Arenula Anthropoda	Insecta	Diptera	Chloropidae		Chloropidae	Polydora glabraevelutina	Native	Non-native non-invasive	LC
6	SPECIES	Arenula Anthropoda	Insecta	Diptera	Chloropidae	poli	Chloropidae	Chloropidae poli	Native	Widespread	LC
7	SPECIES	Arenula Anthropoda	Insecta	Diptera	Acrotonidae		Acrotonidae	Acrotona fumiferana	Native	Non-native non-invasive	LC
8	SPECIES	Arenula Anthropoda	Insecta	Diptera	Acrotonidae	luteola	Acrotonidae	Acrotona luteola	Native	Widespread	LC
9	SPECIES	Arenula Anthropoda	Insecta	Diptera	Acrotonidae	viridula	Acrotonidae	Acrotona viridula	Native	Widespread	LC
10	SPECIES	Arenula Anthropoda	Insecta	Diptera	Athetidae		Athetidae	Athetis rota	Native	Widespread	LC
11	SPECIES	Arenula Anthropoda	Insecta	Diptera	Athetidae	rotundata	Athetidae	Athetis rotundata	Native	Regional endemic level 1	LC
12	SPECIES	Arenula Anthropoda	Insecta	Diptera	Alcalyptratae		Alcalyptratae	Alcalyptratae sp.	Native	Widespread	LC
13	SPECIES	Arenula Anthropoda	Insecta	Diptera	Alcalyptratae	pedicellata	Alcalyptratae	Alcalyptratae pedicellata	Native	Regional endemic level 1	LC
14	SPECIES	Arenula Anthropoda	Insecta	Diptera	Alacanthidae		Alacanthidae	Alacanthidae sp.	Native	Widespread	LC
15	SPECIES	Arenula Anthropoda	Insecta	Diptera	Alacanthidae	scutellaris	Alacanthidae	Alacanthidae scutellaris	Native	Widespread	LC
16	SPECIES	Arenula Anthropoda	Insecta	Diptera	Agricoleptidae		Agricoleptidae	Agricoleptidae sp.	Native	Widespread	LC
17	SPECIES	Arenula Anthropoda	Insecta	Diptera	Agricoleptidae	invenusta	Agricoleptidae	Agricoleptidae invenusta	Native	Widespread	LC
18	SPECIES	Arenula Anthropoda	Insecta	Diptera	Agricoleptidae	paradoxa	Agricoleptidae	Agricoleptidae paradoxa	Native	Regional endemic level 1	VU
19	SPECIES	Arenula Anthropoda	Insecta	Diptera	Chloropidae		Chloropidae	Chloropidae pauli	Native	Widespread	LC
20	SPECIES	Arenula Anthropoda	Insecta	Diptera	Chloropidae	luteola	Chloropidae	Chloropidae luteola	Native	Widespread	LC
21	SPECIES	Arenula Anthropoda	Insecta	Diptera	Alex strigosa		Alex strigosa	Alex strigosa	Native	Widespread	LC
22	SPECIES	Arenula Anthropoda	Insecta	Diptera	Alex spinipes		Alex spinipes	Alex spinipes	Native	Widespread	LC
23	SPECIES	Arenula Anthropoda	Insecta	Diptera	Alex triotis		Alex triotis	Alex triotis	Native	Widespread	LC
24	SPECIES	Arenula Anthropoda	Insecta	Diptera	Alex tristis		Alex tristis	Alex tristis	Native	Widespread	LC
25	SPECIES	Arenula Anthropoda	Insecta	Diptera	Aldrichomyia	maculipennis	Aldrichomyia	Aldrichomyia maculipennis	Native	Regional endemic level 1	LC
26	SPECIES	Arenula Anthropoda	Insecta	Diptera	Aldrichomyia	pedicellata	Aldrichomyia	Aldrichomyia pedicellata	Native	Regional endemic level 1	LC
27	SPECIES	Arenula Anthropoda	Insecta	Diptera	Aldrichomyia	sp.	Aldrichomyia	Aldrichomyia sp.	Native	Widespread	LC
28	SPECIES	Arenula Anthropoda	Insecta	Diptera	Batrachyphrynidae		Batrachyphrynidae	Batrachyphrynidae sp.	Native	Widespread	LC
29	SPECIES	Arenula Anthropoda	Insecta	Diptera	Ceratopogonidae	gallorensis	Ceratopogonidae	Ceratopogonidae gallorensis	Native	Widespread	LC

Adding images of a taxon

By default images of a taxon are harvested from GBIF if they exists. In some instances an administrator may want to add images of a taxon themselves. To do this:

- Open Taxon Management
- Select the Taxon Group
- Select the Taxon and click Edit

- Go to the bottom of the "Change Taxonomy" form and add an image by browsing to the file. This image will then replace any GBIF image. Several images may be added for a taxon if desired.
- Click "Save".





Taxon images

Taxon image

No file selected.

No file selected.

No file selected.

Add another taxon image

Adding additional attributes specific to a taxon group

It may be desirable to add attributes for specific taxon groups such as "Water dependence" (Highly dependent, Moderately dependent, Minimally dependent, Terrestrial). These additional attributes are assigned to each taxon during the uploading of the master lists as long as the additional attribute is added in Taxon Management before uploading. This is done in the Edit Module form, Add attribute. The attribute needs to match the attribute column header in your Master List for uploading.

Edit Module

Label:

Logo:  No file selected.

Water dependence

You can add taxon specific attributes to a taxon group by adding additional column to the Master list and uploading , or individually by adding to the "**Change Taxonomy**" form:

- Open Taxon Management
- Select the Taxon Group
- Select the Taxon and click Edit





1.1.1 Preparing and checking an Occurrence Data File before uploading

1.1.1.1 Extracting data and preparing bulk data for uploading into FBIS

FBIS includes data capture forms for adding sites, fish, invertebrate and algae data, as well as associated abiotic data. However, these forms are intended for the capture of individual site visits, and at times, especially during the development phase of an information system, it is useful to be able to upload large amounts of data at a time. To ensure that bulk data are readily uploaded into FBIS, a standardised **Data Upload Template** needs to be produced for each group. This will ensure that data are cleaned and provided in a standardised manner so that the data uploading process runs smoothly and so that the resultant FBIS platform serves quality data.

1.1.1.2 Data Upload Templates

Standardised data upload templates in excel have been generated for four biodiversity groups, namely anurans, fish, invertebrates and algae. Additional upload templates may be added as new biodiversity modules are added. These templates include a number of dropdown attributes. It is critical that all taxa in the Data Upload file for a particular biodiversity group are present in the Master List of Taxa for that group. If not, the upload process will not work. For this reason, it is recommended that where possible dropdown lists are used in the Data Upload files to ensure that all data entered in the sheet are valid. As an example, the Master List of fish species in South Africa has been included as dropdown list for the FBIS Fish Data Upload Template.

The following data upload templates are provided:

- [FBIS Fish Data Upload Template.xlsx](#)
- [FBIS Algae Data Upload Template.xlsx](#)
- [FBIS Invertebrate Data Upload Template.xlsx](#)
- [FBIS Anuran Data Upload Template.xlsx](#)

Many of the columns are the same for each group, although some additional columns are included for algae, and the dropdown options (e.g. biotopes) sometimes vary amongst groups. The common columns used in each group are given in Table 1.

Relevant dropdown lists are provided in each template and additional group-specific columns are included in the relevant templates. **Those column headers in red have to be filled in the occurrence upload file. See section on Check the Source Reference for details of which columns are relevant for different reference categories.** Those column headers shaded green use dropdown lists in the excel file. These can be modified in the Admin page (BIMS).





Table 1. Column headers with details used in data upload templates





Column Header	Details
UUID	A unique identifier for each record. Drag and copy the formula down.
Original River or Wetland Name	Name given in study reference
Original Site Code	Site Code given in study reference
Site Code	Leave blank (autogenerated)
Site description	Description given in study reference
Refined Geomorphological Zone	As given in study reference (if available) - Select from dropdown options
Latitude	Decimal degrees with "-" in front & "," for decimal point
Longitude	Decimal degrees with "," for decimal point
Sampling Date	yyyy/mm/dd
Kingdom	Not necessary to fill in as they are derived from the Master Lists
Phylum	Not necessary to fill in as they are derived from the Master Lists
Class	Not necessary to fill in as they are derived from the Master Lists
Order	Not necessary to fill in as they are derived from the Master Lists
Family	Not necessary to fill in as they are derived from the Master Lists
Genus	Not necessary to fill in as they are derived from the Master Lists
Species	Not necessary to fill in as they are derived from the Master Lists
Taxon	
Taxon rank	Select from dropdown options
Present	Fill in with "1"
Sampling method	Select from dropdown options
Sampling effort measure	Select from dropdown options
Sampling effort value	
Abundance measure	Select from dropdown options





Column Header	Details
Abundance value	Leave blank if only presence data
Record type	Select from dropdown options
Broad biotope	Select from dropdown options
Specific biotope	Select from dropdown options
Substratum	Select from dropdown options
Water Level	Select from dropdown options
Water Turbidity	Select from dropdown options
Embeddedness	Select from dropdown options
Depth	Depth (m)
Near Bed Velocity	Near Bed Velocity (m/s)
COND	Conductivity (mS/cm)
PH	PH
DOPER	Dissolved Oxygen (%)
DO	Dissolved Oxygen (mg/L)
TEMP	Temperature (deg C)
TURB	Turbidity (NTU)
Collector/Owner	Full name
Collector/Owner Institute	Institute of collector/owner
Author(s)	Surname + Initials
Year	Year of study
Source	Source of data if from thesis or database
Title	Title of data source if thesis or published report
Reference category	Select from dropdown options





Column Header	Details
URL	Thesis handle, or article link if no DOI available
DOI	DOI for reference (e.g. 10.2989/16085914.2018.1491385)
Document Upload Link	Link to "Documents" page on FIBbio after uploading PDF of published report
Notes	Any details related to sampling, species, life form etc.

It is recommended that separate data upload files be created for each Source Reference, with each linked to a GitHub ticket. This ensures accurate management of data preparation and management.

1.1.1.3 Preparing and checking an Occurrence Data File

To ensure that data are accurate, several steps should be taken before uploading occurrence data. After consolidating the occurrence data in the data file, you should check the following:

Apply filters for checking the data by highlighting the header row, clicking Data, Filter

	A1	B1	C1	D1	E1	F1	G1	H1	I1	J1	K1
	Land	Original Wetland	Original Site Col.	MSA Site Col.	Site description		Refined Geographical	Zoological	Latitude	Longitude	Geographic
1	McLabs FGS-462-2	Refr. Bokh 951154			Agape		3,44553	29,4446	2021/1/12	-1,44609	20,4446
2	WLS24N-533-481	Refr. Bokh 951154			Agape		-1,44609	20,4446	2021/1/12	-1,44609	20,4446
3	WLS24N-533-481	Refr. Bokh 951154			Agape		-1,44609	20,4446	2021/1/12	-1,44609	20,4446
4	WLS24N-533-481	Refr. Bokh 951154			Agape		-1,44609	20,4446	2021/1/12	-1,44609	20,4446
5	WLS24N-533-481	Refr. Bokh 951154			Agape		-1,44609	20,4446	2021/1/12	-1,44609	20,4446

UUID: This is a unique id for each occurrence record. It needs to be copied and pasted so that the formula used to generate it is saved as a number.

The UUID formula is available here:



Code:

```
=LOWER(CONCATENATE(DEC2HEX(RANDBETWEEN(0,POWER(16,8)),8),"-",DEC2HEX(RANDBETWEEN(0,POWER(16,4)),4),  
DEC2HEX(RANDBETWEEN(0,POWER(16,3)),3),"-",DEC2HEX(RANDBETWEEN(8,11)),DEC2HEX(RANDBETWEEN(0,POWER(16,2)),2),  
"-",DEC2HEX(RANDBETWEEN(0,POWER(16,8)),8),DEC2HEX(RANDBETWEEN(0,POWER(16,4)),4)))
```

Systematically check each column using the dropdown arrows, and look for inconsistencies. Some common issues include, #num in UUID column instead of the UUID, incorrect spelling in the **Site description** column (e.g. Gakiriro wetland, Gakiriowetland), latitude with missing “-” (e.g. 2.60059 as latitude is incorrect – should be -2.60059), longitude.

Also check that all sites fall within the country boundary so that Site Codes may be generated correctly and geocontext data harvested for each site.



E

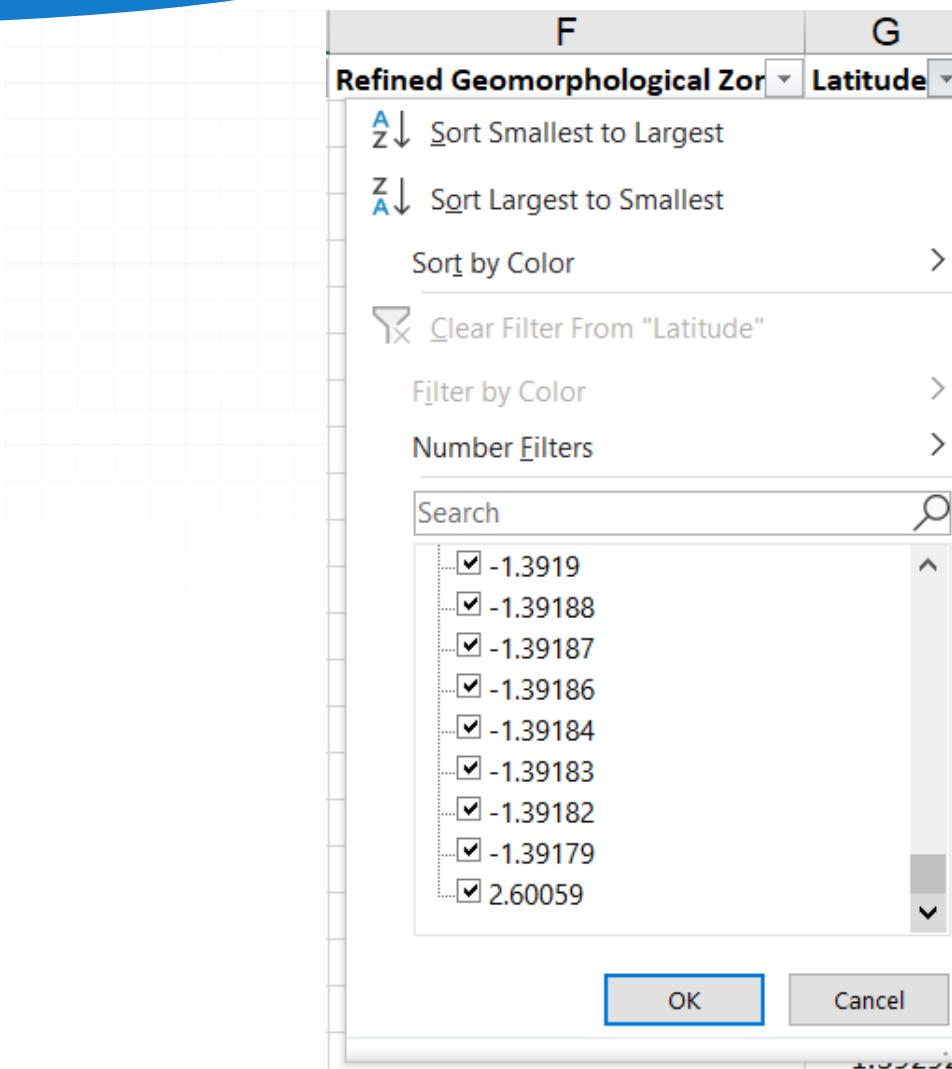
Site description

Ngez... A↓ Sort A to Z
Ngez... Z↓ Sort Z to A
Ngez... A↓ Sort by Color >
Ngez... Clear Filter From "Site description"
Ngez... Filter by Color >
Ngez... Text Filters >

Search

(Select All)
 Bugesera district-Mugesera wetland
 Bumbogo wetland
 Gahanga wetland
 Gakiriro wetland
 Gakirirowetland
 Gasindikira
 Gatenga wetland
 Cikendo wetland (Former industrial area)

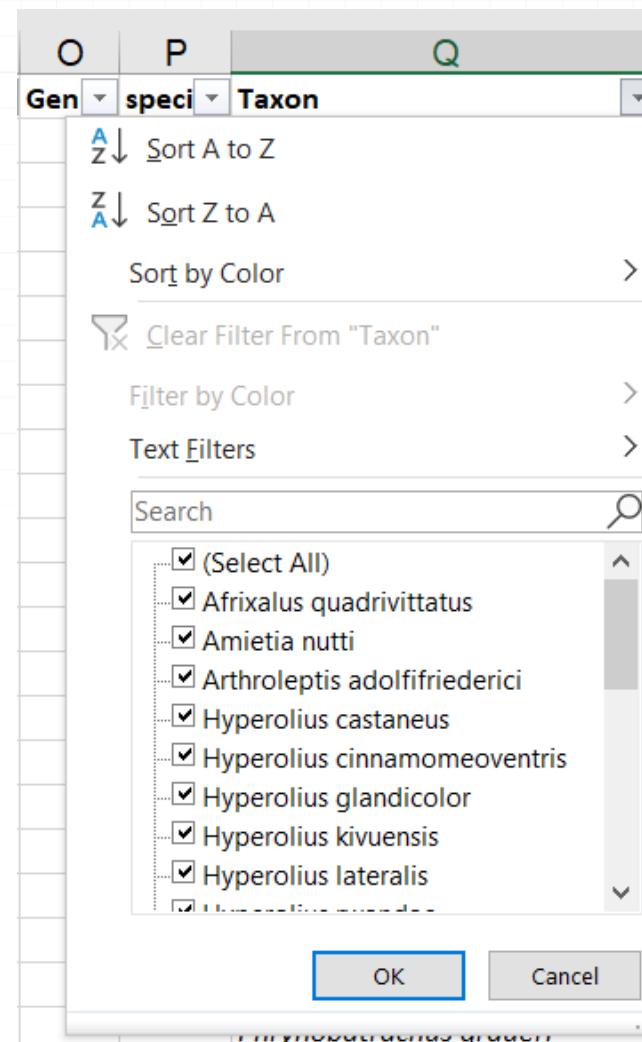




Check that the sampling date is in the correct format: yyyy/mm/dd. If the format is not correct then the upload will not work.

Check that all taxa are correct and are present in the Master List. If the dropdown of master taxa list was used then this should not be an issue. Check that the Taxon rank is correct. It is important that the correct Taxon Rank is always used to ensure correct uploading of the data files. Taxon Rank is case sensitive so Species will upload but species will fail. Always ensure the correct Taxon Rank is applied by using the dropdown list. There should be no spaces in SubClass, SubOrder, SubFamily, SubSpecies.





Check presence is all "1", check sampling method is correct.





Taxon	R	S
Alopocher	Sort Smallest to Largest	
Threskiorr	Sort Largest to Smallest	
Bostrychia	Sort by Color >	
Ardeola ra		
Apalis cine		
Ardea mel		
Ardea goli		
Ardea pur		
Scopus un		
Microcarb		
Phalacroco		
Pandion h		
Polyboroid		
Gypohiera		
Lophaetus		
Clanga po		
Milvus aeg		
Haliaeetus		
Buteo aug		
Burhinus v		
Pluvialis squatarola	Species	1





S T

Prese Sampling method

1 A↓ Sort A to Z

1 Z↓ Sort Z to A

1 Sort by Color >

1 Clear Filter From "Sampling method"

1 Filter by Color >

1 Text Filters >

1 Search

1 (Select All)

1 Active search method

1 Visual and bioacoustic survey

1 Visual Encounter Survey method

1 Visual survey and Bioacoustic samplir

1 < >

1 OK Cancel

1 Visual Encounter Survey, method

Check Collector/Owner and Collector/Owner Institute. Ideally CAPITALS should not be used, First name Surname if known.
Do not use middle initial and punctuation.



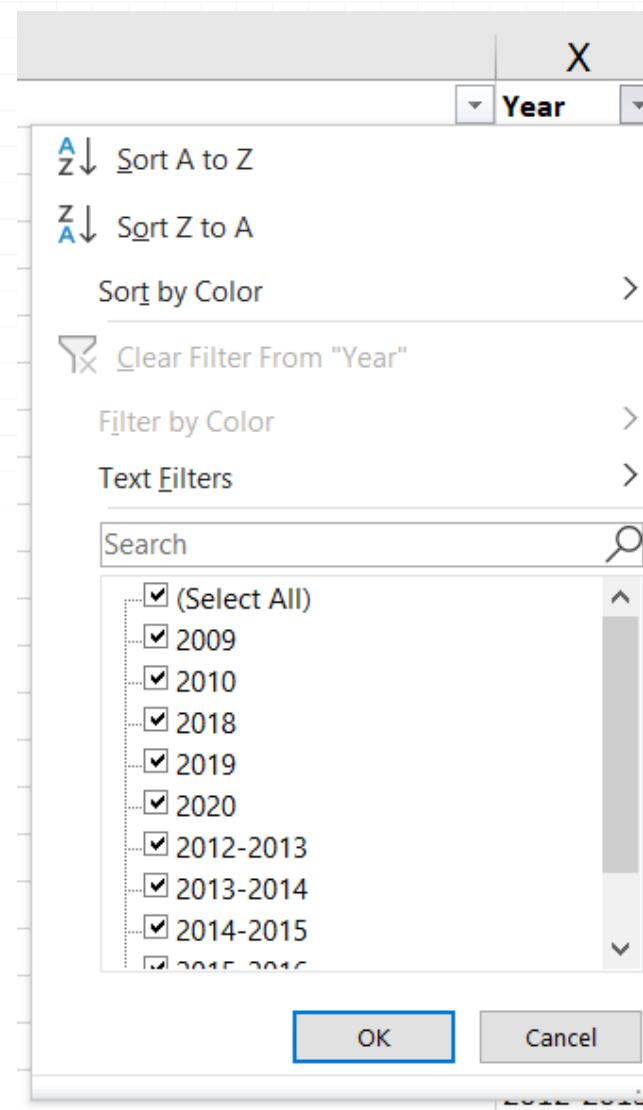


Check the Source Reference (Author(s), Year, Source, Title, Reference category, URL, DOI, Document Upload Link). For each study reference type, you need to populate the following columns:

- Peer-reviewed scientific article (Collector/Owner; Collector/Owner Institute; Author(s); Year; Source; Title; DOI or URL (if DOI is not available)). For Peer-reviewed scientific article the Source is the Journal, For Peer-reviewed scientific article the Title is the title of the article.
 - Published report (Collector/Owner; Collector/Owner Institute; Author(s); Year; Source; Title; URL or Document Upload Link). Note the Document Upload Link is obtained after the report is added.
 - Thesis (Collector/Owner; Collector/Owner Institute; Author(s); Year; Source; Title; URL or Document Upload Link)
 - Database (Collector/Owner; Collector/Owner Institute; Author(s); Year; Source)
 - Unpublished data (Collector/Owner; Collector/Owner Institute; Author(s); Year; Source)

Check format of Author(s). It needs to be: Surname + Initials, no punctuation. (e.g. Tumushimire L, Mindje M, Sinsch U & Dehling JM not Lambert Tumushimire, Mapendo MINDJE, Prof. Ulrich Sinsch & Julian Maxmillian Dehling). It is important to get the authors correct (e.g. Sinsch Ulrich and Dehling, J. Maximilian, Lümkemann Katrin, Rosar Katharina, Christiane Schwarz should be Sinsch U, Lümkemann K, Rosar K, Schwarz C & Dehling M as per the doi).

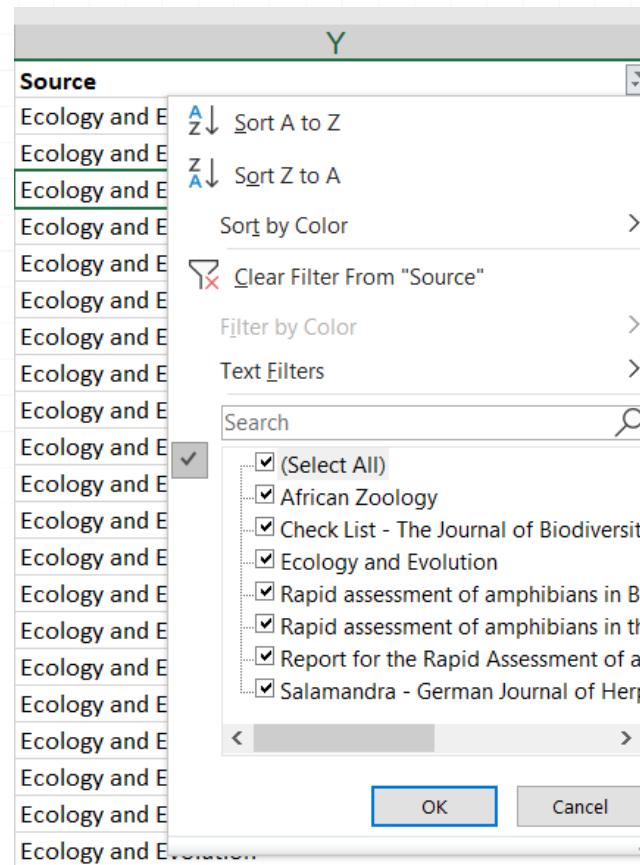
Check the Date: This is the publication date (so 2012-2013 should be 2019 as this is when the article was published - Ecology and Evolution. 2019. Same with all other data from this study).



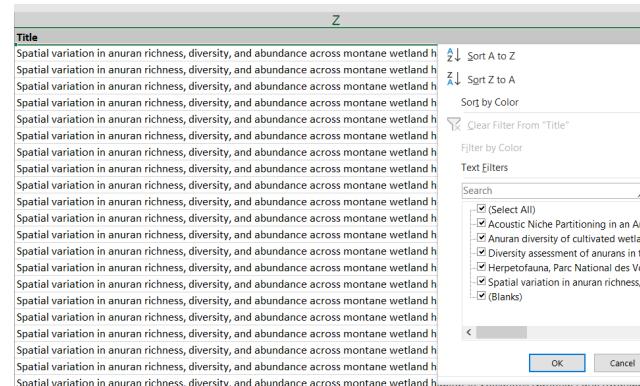
Check the Source. Please note when to include source or not, and what to include. (e.g. Mindje, M., Tumushimire, L., & Sinsch, U. (2020). Diversity assessment of anurans in the Mugesera wetland (eastern Rwanda): impact of habitat disturbance and partial recovery. *Salamandra*, 56, 27-38. Should be **Salamandra**)

- For Peer-reviewed scientific articles - the Source is the Journal.
- For Published Reports and Theses - the Source is the publisher of the Report.
- For Unpublished Data - the source is the title of the study.





Check the Title. For Peer-reviewed scientific article the Title is the title of the article, for Published reports or theses, it is the title of the thesis. Unpublished data don't need a title.



Check all Reference Categories are correct: options include:

- Database
- Peer-reviewed scientific article
- Published report
- Thesis
- Unpublished data





The screenshot shows a Microsoft Excel filter dialog box overlaid on a table. The table has columns labeled N, AO, AP, and AQ, with sub-labels 'Title', 'Reference c...', and 'URL'. The filter dialog includes:

- Sort options: Sort A to Z (A↓), Sort Z to A (Z↓), Sort by Color.
- Filter options: Clear Filter From "Reference category", Filter by Color, Text Filters.
- A search bar with placeholder "Search" and a magnifying glass icon.
- A checkbox group:
 - (Select All)
 - Database
 - Peer-reviewed scientific article
 - Published report
 - Thesis
 - Unpublished data
- Buttons at the bottom: OK (highlighted in blue) and Cancel.

search Cor Tracking move Published report

Check URL and DOI. Use a DOI if it is available, URL – only needed for Peer-reviewed scientific article if there is no DOI. For the DOI you only need to include the number part, so 10.1080/15627020.2012.11407524, not <https://doi.org/10.1080/15627020.2012.11407524>.





AB	
URL	Sort A to Z Sort Z to A Sort by Color > Clear Filter From "URL"
	Filter by Color > Text Filters >
	<input type="text" value="Search"/> 
	<input checked="" type="checkbox"/> (Select All) <input checked="" type="checkbox"/> http://www.salamandra-journal.com/ <input checked="" type="checkbox"/> http://www.salamandra-journal.com/ <input checked="" type="checkbox"/> https://onlinelibrary.wiley.com/doi/p <input checked="" type="checkbox"/> https://www.biotaxa.org/cl/article/vie <input checked="" type="checkbox"/> (Blanks)
	OK Cancel
AC	
DOI	Sort A to Z Sort Z to A Sort by Color > Clear Filter From "DOI"
	Filter by Color > Text Filters >
	<input type="text" value="Search"/> 
	<input checked="" type="checkbox"/> (Select All) <input checked="" type="checkbox"/> 10.1080/15627020.2012.11407524 <input checked="" type="checkbox"/> (Blanks)
	OK Cancel

Check the document upload link is correct. Note the Document Upload Link is obtained after the report is added. Reports are only uploaded when there is no DOI or URL to link the data to.



Checking for duplicate occurrence records. Use this formula for checking for duplicates. This is a combination of Site description, latitude, longitude, sampling date, Taxon, sampling method, author, year, source and title. Copy and paste the formula below into a new column at the end and name it "Duplicate check".

Code:

```
=CONCATENATE(E2,G2,H2,I2,Q2,T2,W2,X2,Y2,Z2)
```

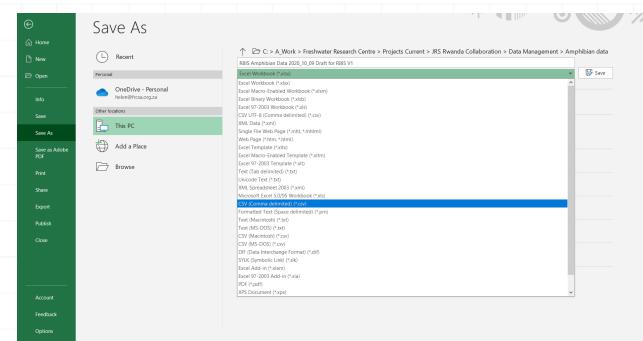
Then copy and paste the formula down to the end of the data rows. Then Highlight the column, and from the Home menu, select **Conditional Formatting, Highlight Cells Rules, Duplicate Values**.

Any duplicates will be highlighted. Check and delete duplicate occurrence records. Then delete the Duplicate Check column.

Delete blank rows and columns. Lastly, ensure that there are no extra blank rows or columns, by deleting them.

Remove the data filter, save the file in excel, and save the file as csv file.



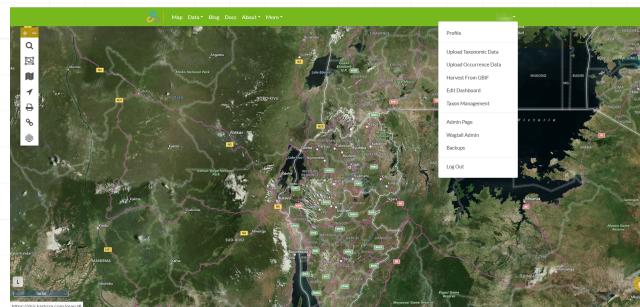




1.1.1 Occurrence data uploading

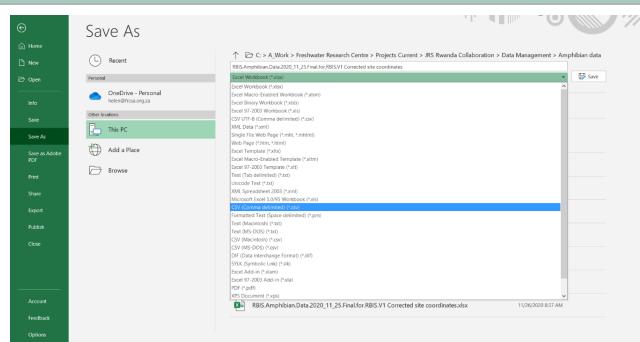
1.1.1.1 Steps

Click on your profile and select **Upload Occurrence Data**



Select the Taxon Group using the dropdown and browse to the file containing the occurrence data for the taxon group, click upload

Note: The Excel file needs to be saved as a csv using the following option:



Progress is shown:

A **Success** file will indicate occurrence records uploaded to the system. An **Error** file will give details of occurrence records not uploaded. The last column in this csv file provides an indication of the reason the occurrence record was not uploaded. The administrator then needs to check the data and correct before uploading again.



Common errors:

- Taxon not in Master list
- Taxon Rank incorrect

Occurrence records may be updated by uploaded corrected records in the csv file. As long as the UUID is the same then the old occurrence record will be updated.

New occurrence records may be added by repeating the steps from (4), to upload the additional occurrence records for the Taxon Group.

Note that once the occurrence data has been uploaded, geocontext data (i.e. information about the site such as province, catchment etc.) are automatically populated for each site. This takes time and it is recommended that the next step (i.e. harvesting from GBIF), is done at least 24 hours after uploading occurrence data.





1.1.1 Managing Source references

A specific administration module has been developed to allow administrators to manage metadata and citations associated with each biological occurrence record.

The screenshot shows the 'EXPLORE SOURCE REFERENCES | 513 RESULTS' page. The search bar contains 'Department of Water and Sanitation, 2016'. The results table includes columns for Type, Author(s), and DOI URL. One result is highlighted: 'Department of Water and Sanitation, 2016' by 'Department of Water and Sanitation, 2016' from 2016. The DOI URL is listed as 'http://hdl.handle.net/11427/6189'.

Only registered users with super user status are able to access **Source References**, typically the administrators.

All biodiversity data served need to have associated Metadata, which is visible in the metadata table in the dashboards. This metadata allows the users to establish exactly where the data originated from and to navigate to the study reference if desired.

Metadata Table						
Reference Category	Authors	Year	Title	Source	DOI/URL	Notes
Published report or thesis	Shelton JM	2013	Impacts of non-native rainbow trout on stream food webs in the Cape Floristic Region, South Africa: integrating evidence from surveys and experiments	-	http://hdl.handle.net/11427/6189	-

1.1.1.1 Types of source references

Multiple sources of taxon occurrence data generally exist, although this is highly dependent on the country. Potential sources of biodiversity data include the following source reference categories:

- Peer-reviewed scientific articles
- Theses
- Published reports
- Databases
- Unpublished data

The following sections provide details of the recommended processes for sourcing taxon occurrence data from the different reference categories. This is done by all users adding data and by administrators.

Peer-reviewed scientific article

Data from peer-reviewed scientific articles are best sourced by undertaking a literature search using Google Scholar. To ensure that relevant papers are identified, appropriate search term combination should be used. For example, for all native freshwater fishes in South Africa: "Genus species" & "South Africa" (where "Genus species" represents the scientific name for each taxon). It is important that search terms are clearly-defined and consistent, so that the process is repeatable and defensible.

Thesis

University theses are easily searched using relevant university search engines. Often local experts also know of relevant theses and can be contacted directly. Where possible, electronic data should be sourced directly from individuals, as this saves significant time that would otherwise be occupied in transcription of paper to digital records during data consolidation.

Published report

Technical and consultancy reports are often difficult to source and requires knowledge of local experts who have undertaken relevant studies. Where possible, electronic data should be sourced directly from individuals, as this saves significant time during data consolidation.

Database

Identify and contact relevant organisations who may have data to share that is already in a database. Data sharing agreements may be needed depending on the organisation. For organisation that regularly add data it is useful to set up a database in the organisation's name.

Unpublished data

Identify individuals who may have data to share. Where possible, electronic data should be sourced directly from individuals, as this saves significant time during data consolidation.



Source reference system can store either an electronic document (e.g. by attaching a PDF to the document record) or a link to an online resource (URL). The order of preference should be:

1. Use DOI based citations wherever possible (in which case the URL attribute described below should not be needed).
2. Use documents with references to external resources (i.e. a URL that points to a published PDF on a web site).
3. Used documents with attached PDF as a last resort (this will require first uploading the document in the document management system and then providing the link to the uploaded document in the metadata table described below).

1.1.1.2 Adding source references to occurrence data

Source references are either added when data are added using the data capture forms on FBIS, or when uploading occurrence data using the data upload excel file. (See **Preparing and checking an Occurrence Data File before uploading**).

Adding a source reference using data capture forms

When adding data, three data capture forms are shown in sequence, namely 1) an occurrence record form, where you capture which taxa were present; 2) an abiotic data form where you capture physico-chemical and other abiotic data; and 3) a source reference for records form, where you capture the source reference or metadata for the biological record.

Source reference for records

Reference Category

DOI/URL

Notes

Submit

Peer-reviewed scientific articles

Select the reference category and insert the DOI or URL and click the search button. The citation is then retrieved via an online citation management system and inserted. Click Submit to save.

Source reference for records

Reference Category

DOI/URL

Notes

Submit

Published reports and theses

Select the reference category and select from the dropdown list of titles, if the published report or thesis is already uploaded, or select "Upload New" to add a new published report or thesis.

Source reference for records

Reference Category

Study Reference

Notes

Submit

When uploading a new published report or thesis, complete the fields using the format indicated including Author(s), Year, Source, Title, Description (if desired) and Url or upload file. Confirm that you are owner of the document being added and Upload. This is then submitted.





Upload New Document

Author(s) H.F. Dallas
E.g. W.C. Smith, F.D Brown & C.B Kleynhans

Year 1995

Source MSc Thesis, Department of Zoology, University of Cape Town
E.g. Water Research Commission Report

Title System) as a tool for the rapid bioassessment of water quality

Description

Provide url
 Upload a file

Url <https://open.uct.ac.za/handle/11427/21180>

I hereby confirm that I am the owner of these data and/or document and agree to these being shared via the FBIS platform for download by registered FBIS users.

Close **Upload**

Source reference for records

Reference Category Published report or thesis

Study Reference An evaluation of SASS (South African Scoring System) as a tool for the rapid bioassessment of water quality
Select the study reference from the list provided or click "Upload New" to upload a new document.

Author	Year	Title
H.F. Dallas	1995	An evaluation of SASS (South African Scoring System) as a tool for the rapid bioassessment of water quality

Notes If these data appear in other study references, please specify those study references.

Submit

Databases

Select the reference category and select from the dropdown list of databases, if the database is already created, or select "Add new" to add a new database.

FBIS Freshwater Biodiversity Information System

Source reference for records

Reference Category Database

Database

- South African National Parks Fish Database
- Ecomine Freshwater Consultants
- Mpumalanga Tourism and Parks Agency
- Limpopo Department of Environment Affairs, Free State
- Gauteng Department of Agriculture and Rural Development
- Eastern Free database
- Department of Environmental Services database
- The Biodiversity Company SASSI and FAO Database
- Department of Water and Sanitation, 2014
- Western Cape Fish Database
- Department of Water and Sanitation Regional Fish Database, 2016
- Cape Natural State of Biodiversity Database, 2019
- Facebook
- Global Biodiversity Information Facility (GBIF)
- Observatory Virtual Museum, FitzPatrick Institute of African Ornithology, University of Cape Town, 2021
- National Biodiversity Institute
- Grasshoppers Consumers Fish and SASSI Database

Add New

When adding a new database, complete the name and provide a description. Add the url if it exists and click create. Add notes if desired.



New Database Record

Name	National Fish Database
Description	The national database for fish survey data collected by the national conservation authority.
Url	

Create

Source reference for records

Reference Category	Database
Database	National Fish Database Select database from the list of database provided or click "Add New" to add another database.
Notes	Provide any additional information about the database. E.g. The year created, the host, etc.

Submit

Unpublished data

Select the reference category and select from the dropdown list under notes. If the unpublished dataset exists, select the unpublished dataset name, or if the unpublished dataset needs to be created, select "Add new" to add a new unpublished dataset. In the notes, add the name of the person, details of the study and date if possible or applicable.

Source reference for records

Reference Category	Unpublished data
Notes	<ul style="list-style-type: none">- Data provided by Mike Coke of Natal Parks Board/EKZN WildlifeRiver EcoStatus Monitoring ProgrammeNorthern Cape Department of Environment and Nature Conservation, 2018Paul Fouche Unpublished DataData collected during SASS accreditation assessmentRivers of Life Inkonkanti Fish Study, 2020Olfants-Doring Fish Survey, 2001Aquatic biomonitoring dataAfriDev ConsultantsThe Nature Conservancy (TNC) data - baseline study

New Unpublished Data

Note	Helen Dallas, unpublished SASS data, 2021
Source Name	

Create

1.1.1.3 Adding a source reference using occurrence upload excel files

Where data are uploaded using the Data Upload Templates, the data capturer needs to specify the following:

- **Author(s):** Surname + Initials
- **Year:** Year of study
- **Source:** Details such as journal name, report, thesis, database and unpublished data.
- **Title:** Title of the report, thesis, database or unpublished dataset.
- **Reference category:** Select from dropdown options
- **URL:** Thesis handle, or article link if no DOI available
- **DOI:** DOI for reference (e.g. 10.2989/16085914.2018.1491385) – the citation for articles with DOIs is done automatically.
- **Document Upload Link:** Link to "Source Reference" page after uploading PDF or URL of published report or thesis.

When adding occurrence data using the upload excel files, the following columns are populated for each reference category:





Using Source References as an administrator

Errors can arise when source references are added to the information system by users. These can be picked up and fixed by undertaking various filters, checking and edits, including those listed below.





- Search for a reference type or category

Search



Type

- Unpublished 0
- Database 0
- Published report or thesis 175
- Peer-reviewed scientific article 0

Author(s)

Search for an author

Apply

- Search by author(s)

Author(s)

- Helen Dallas
- Nick Rivers-Moore

Apply

- Search using free text





EXPLORE SOURCE REFERENCES | 17 RESULTS

Kruger

+ Add Source Reference

Type

Unpublished	0
Database	0
Published report or thesis	11
Peer-reviewed scientific article	6

Author(s)

Search for an author

Apply

PEER-REVIEWED SCIENTIFIC ARTICLE

The spatial ecology of adult Labeobarbus marequensis and their response to flow and habitat variability in the Crocodile River, Kruger National Park
Source : African Journal of Aquatic Science
2018 | Matthew Burnett, Gordon O'Brien, Victor Wepener & D Pienaar
13 records

PEER-REVIEWED SCIENTIFIC ARTICLE

The description of a new diplozoid species, Paradiplozoon krugerense n. sp., from Labeo rosae Steindachner, 1894 and Labeo congoro Peters, 1852 in the Kruger National Park, South Africa with notes on the effect of water quality on its infection variables
Source : Hydrobiologia
2016 | Quinton Marco Dos Santos & A. Avenant-Oldevald

Once the source reference has been found, it can be updated, deleted (only if there are not records associated with it), and the Document ID can be copied. This is needed when uploading occurrence records using the excel template.

PUBLISHED REPORT OR THESIS

A baseline survey of channel geomorphology with particular reference to the effects of sediment characteristics on ecosystem health in the Tsitsa River, Eastern Cape, South Africa
Source : MSc Thesis, Rhodes University, South Africa

2017 | Nicholaus Huchzermeyer | Copy Document ID

65 records

By clicking on the records button you can check exactly which sites and data are linked to the source reference.



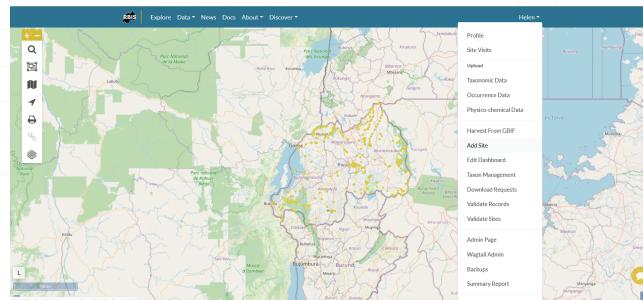


1.1.1 Adding a site and biodiversity data

This section explains how an administrator or user adds a site and data to a site.

1.1.1.1 Adding a site

An administrator or user can add a new site using the Add Site button on the menu bar.



This opens the Add a Location Site form:

ADD A LOCATION SITE

Latitude* Longitude* Update coordinate

Site Code* Generate site code

Original Site Code

Site Description

Owner Please select the Owner, if you are the data capturer and not the Owner

Site Image Click the save button after choosing the file to upload a new image.

I agree to these data being shared via the RBIS platform for visualisation and download by registered RBIS users

ADD

The user then adds the latitude and longitude by inserting the co-ordinates or clicking on correct location on the map, click Generate Site Code. This is automated and includes the Catchment + Province ID +District ID + Site count.

Site code generator	RBIS (Catchment + Province ID + District ID + Site count) <input type="button" value="▼"/>
How site code generated	

An original site code can also be added if this was included in the source reference, as well as a description of the site. The owner is specified using the dropdown if the logged in user is not the owner. Site images can be added. Lastly, the user agrees to these data being shared via the RBIS platform for visualisation and download by registered RBIS users, and click Add. The new site is thus created.

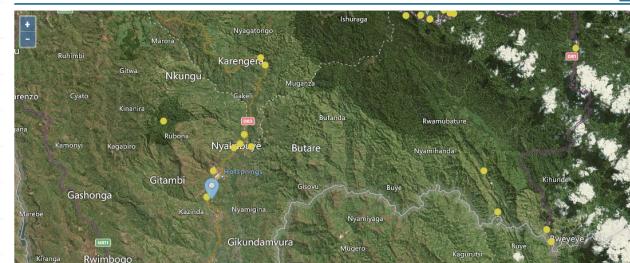
1.1.1.2 Adding new biodiversity records

New occurrence data can be added from both the site form and by using the + Add on the side panel.





UPDATE A LOCATION SITE CRUS1306-00030



Add Bird data Add Fish data Add Doblante data Add Plant data
Add Invertebrate data Add Amphibian data Add Reptile data Add Mammal data

Biodiversity Data

Occurrences	Origin	Endemism	Cons. Status (Global)	Number of Taxa	
0	■ Native	■ Widespread (more than one Freshwater Ecoregion)	■ Not evaluated	0	+ Add Dashboard
0				0	+ Add Dashboard
0				0	+ Add Dashboard
1				1	+ Add Dashboard
0				0	+ Add Dashboard
0				0	+ Add Dashboard
0				0	+ Add Dashboard
0				0	+ Add Dashboard
0				0	+ Add Dashboard
0				0	+ Add Dashboard

Clicking Add on either, opens the data capture form for a specific biodiversity module. The administrator or user needs to add the Date, specify the owner, and select the broad biotope, specific biotope, substratum, sampling method, sampling effort and record type using the relevant dropdowns. Note that only options specified in the Administrations tables are available for selection here (see separate documentation on Managing BIMS Admin tables). If this information is not available then it is left blank. A site image can be added.





ADD FISH DATA FOR SITE NNYU3302-00035

Latitude: 1° 19' 0" N Longitude: 29° 45' 0" E Update Coordinate

Date: [Input field]

Owner: Helen Dallas
Please select the Owner; if you are the data capturer and not the Owner

Broad Biotope: Not specified

Specific Biotope: Not specified

Substratum: Not specified

Sampling Method: Not specified

Sampling Effort: Not specified

Record type: Not specified

Site Image: [Browse... No file selected.]

Occurrence data is then added. The taxa included in the form include all taxa recorded within a 25km radius of the site as a default. The user then needs to check the box, and add a number recorded. If abundance has not been recorded then this is left blank. The user can add abundance as number, percentage abundance and density (m²) by changing the selection in the Abundance dropdown.

Add Taxon Add New Taxon

Taxa	Observed	Abundance	Number
Clarias gariepinus	<input checked="" type="checkbox"/>	3	[<input type="button" value=""/>
Clarias lioccephalus	<input type="checkbox"/>	0	[<input type="button" value=""/>
Coptodon rendalli	<input checked="" type="checkbox"/>	10	[<input type="button" value=""/>
Enteromius aplocheilogramma	<input type="checkbox"/>	0	[<input type="button" value=""/>

If the species observed is not shown in the default list, then the user can click Add Taxon, which links to the master list for the taxon group, or Add New Taxon, which open GBIF and allows the administrator or user to select a species in GBIF. After completion of the data, the user agrees to these data being shared via the RBIS platform for visualisation and download by registered RBIS users, and clicks Next, and Submit.

I agree to these data being shared via the RBIS platform for visualisation and download by registered RBIS users

This opens the Abiotic form, which is populated using the dropdowns, check boxes and value fields. If no abiotic or physico-chemical data have been recorded then these fields are left blank. Units for measurement are specified for each and the user needs to convert their physico-chemical data to the correct unit before adding values. After completion of the data, the user agrees to these data being shared via the RBIS platform for visualisation and download by registered RBIS users, and clicks Next, and Submit.

ADD NEW ABIOTIC DATA FOR NNYU3302-00035 (2022-08-22)

Water surface width	5-10 m
Water level	Moderate flow
Water turbidity	Opaque
Canopy cover	Open
Embeddedness	26-50
Conductivity (mS/m)	Measured 17.5 Min = 1.0, Max = 500.0
Oxygen dissolved (mg/l)	Measured 7.8 Min = 1.0, Max = 15.0
pH (pH Unit)	Measured 6.5 Min = 2.0, Max = 10.0

The last form is for adding the Source Reference



Source reference for records

Reference Category: Peer-reviewed scientific article

DOI/URL: Not specified

Moss: Database

Peer-reviewed scientific article

Published report or thesis

Unpublished data

Confirm Submit

Are you sure you want to submit this source reference?

Then confirm Submit





1.1.1 Adding physico-chemical data

This section explains how an administrator or user adds physico-chemical data to a site or prepares an excel template for bulk uploading of physico-chemical data for multiple sites and or sampling dates. In either case it is important to note that physico-chemical data can only be added for a specific variable, if that variable already exists in the Admin/Bims/Chemistry units table. If the variable is missing from this table, it will not show in the list and the upload will fail. This is described in detail in a separate document: [11. Managing BIMS Admin tables](#)

1.1.1.1 Adding physico-chemical data to a single site

A data capture form has been added for uploading physico-chemical data to a single site. The user needs to follow the following steps:

- Select the Date
- Select the Owner
- Select Source Reference by using search filter and selecting.
- Add specific variables by checking the **Measured** box and adding the value of each variable. Note all units have been standardised and users need to convert to these standard unit before capturing the data. Minimum and maximum values have also been included for data integrity checks.
- Click "I agree to these data being shared via the RBIS platform for visualisation and download by registered FBIS/RBIS users" and Submit.

Adding physico-chemical data.





ADD PHYSICO-CHEMICAL DATA FOR SITE NNYU3302-00035

Latitude: -1.9 Longitude: 29.45

Date: 09/26/2022

Owner: Helen Dallas
Please select the Owner; if you are the data capturer and not the Owner

Selected Source Reference: (Unpublished data) - Testing physico-chemical data

Choose Source Reference

Testing physico-chemical data	Q
Unpublished	▼

Author(s)

Search for an author
Apply

+ Add Source Reference

1

Physico-chemical data

Conductivity (mS/m)	<input checked="" type="checkbox"/> Measured: 43.1 Min = 1.0, Max = 500.0
Oxygen: dissolved (mg/l)	<input checked="" type="checkbox"/> Measured: 9.8 Min = 1.0, Max = 15.0
pH (pH unit)	<input checked="" type="checkbox"/> Measured: 6.7 Min = 2.0, Max = 10.0

I agree to these data being shared via the RBIS platform for visualisation and download by registered RBIS users

Submit

1.1.1.2 Preparing and checking a physico-chemical data file before uploading

A physico-chemical template has been created for uploading physico-chemical records for multiple sites and sampling dates. Each line represents a unique Site-Sampling date. The template provided includes the full list of variables currently in the FBIS system, however these can be modified for the needs of the RBIS.





Here is the full list of columns included in the physico-chemical template. It resembles the occurrence data upload template for the more generic column headers.

UUID
Original Wetland Name
Original Site Code
Site Code
Site description
Latitude
Longitude
Sampling Date
Collector/Owner
Collector/Owner Institute
Author(s)
Year
Source
Title
Reference category
URL
DOI
Document Upload Link
Notes





Proceeding this is each variable (with the header as the **Chem code**), each in a separate column. Here is the master list of physico-chemical variables currently in FBIS, giving the Chem code, description and unit of measurement.





Chem code	Chem description	Unit
AL	Aluminium	mg/l
AS	Arsenic	mg/l
B	Boron	mg/l
BA	Barium	mg/l
BE	Beryllium	mg/l
BOD	Biological Oxygen Demand	mg/l (5 days)
CA	Calcium	mg/l
CACO3	Total hardness	mg/l
CD	Cadmium	mg/l
CL	Chloride	mg/l
CO	Cobolt	mg/l
CO3	Carbonate	mg/l
COD	Chemical Oxygen Demand	mg/l
COL	Colour	APHA units
COND	Conductivity	mS/m
CR	Chromium	mg/l
CU	Copper	mg/l
DIN	Nitrogen: dissolved inorganic ($\text{NH}_4^+ + \text{NO}_3^- + \text{NO}_2^-$)-N	mg/l
DO	Oxygen: dissolved	mg/l
DOC	Carbon: dissolved organic	mg/l
DON	Nitrogen: dissolved organic	mg/l
DOPER	Oxygen: dissolved: percentage saturation	%
ECOLI	Coliforms: Escherichia coli (E. coli)	Cfu/100ml





Chem code	Chem description	Unit
F	Fluoride	mg/l
FAECAL C	Coliforms: Total faecal coliforms	Cfu/100ml
FE	Iron	mg/l
HCO3	Bicarbonate	mg/l
HG	Mercury	mg/l
K	Potassium	mg/l
KJN	Nitrogen: kjeldahl	mg/l
MG	Magnesium	mg/l
MN	Manganese	mg/l
MO	Molybdenum	mg/l
NA	Sodium	mg/l
NH3-N	Nitrogen: ammonia	mg/l
NH4-N	Nitrogen: ammonium	mg/l
NI	Nickel	mg/l
NO2-N	Nitrogen: nitrite	mg/l
NO2+NO3-N	Nitrogen: Nitrate + nitrite	mg/l
NO3-N	Nitrogen: nitrate	mg/l
PB	Lead	mg/l
pH	pH	
PHALK	Alkalinity: phenolphthalein	meq/l
PHEN	Phenols	mg/l
PO4-P	Phosphorus: orthophosphate	mg/l
POM	Particulate organic matter	mg/l





Chem code	Chem description	Unit
SALINITY	Salinity	%
SD	Secchi depth	m
SIO2	Silica	mg/l
SIO4	Orthosilicate	mg/l
SO4	Sulphate	mg/l
SR	Strontium	mg/l
SRP	Phosphorus: soluble reactive	mg/l
TAL	Alkalinity: total	meq/l
TDS	Total dissolved solids	mg/l
TEMP	Temperature	deg C
TI	Titanium	mg/l
TIC	Carbon: total inorganic	mg/l
TIN	Nitrogen: total inorganic	mg/l
TOC	Carbon: total organic	mg/l
TORGS	Total suspended solids: organics	mg/l
TORGS%	Total suspended solids: organic fraction (%)	%
TOT-N	Nitrogen: total	mg/l
TOT-P	Phosphorus: total	mg/l
TSS	Total suspended solids	mg/l
TURB	Turbidity	NTU
V	Vanadium	mg/l
ZN	Zinc	mg/l
ZR	Zirconium	mg/l





The data is added to the physico-chemical template and checked for accuracy in the same way that biodiversity occurrence data are checked prior to uploading. To ensure that data are accurate, several steps should be taken before uploading physico-chemical data. After consolidating the physico-chemical data in the data file, you should check the following:

Apply filters for checking the data by highlighting the header row, clicking Data, Filter

UUID. This is a unique id for each occurrence record. It needs to be copied and pasted so that the formula used to generate it is saved as a number. See below for guidance. <https://docs.rbis.kartoza.com/batch-importing-taxon-occurrence-data-bims/dealing-unique-identifiers/>

The UUID formula is available here:

Code:

```
=LOWER(CONCATENATE(DEC2HEX(RANDBETWEEN(0,POWER(16,8)),8),"-",DEC2HEX(RANDBETWEEN(0,POWER(16,4)),4),DEC2HEX(RANDBETWEEN(0,POWER(16,3)),3),"-",DEC2HEX(RANDBETWEEN(8,11)),DEC2HEX(RANDBETWEEN(0,POWER(16,2)),2),"-",DEC2HEX(RANDBETWEEN(0,POWER(16,8)),8),DEC2HEX(RANDBETWEEN(0,POWER(16,4)),4)))
```

Systematically check each column using the dropdown arrows, and look for inconsistencies. Some common issues include, #num in UUID column instead of the UUID, incorrect spelling in the **Site description** column (e.g. Gakiriro wetland, Gakirirowetland), latitude with missing “-” (e.g. 2.60059 as latitude is incorrect – should be -2.60059), longitude.

Also check that all sites fall within the country boundary so that Site Codes may be generated correctly and geocontext data harvested for each site.





E

Site description

Ngez... A↓ Sort A to Z
Ngez... Z↓ Sort Z to A
Ngez... A↓ Sort by Color >
Ngez... Clear Filter From "Site description"
Ngez... Filter by Color >
Ngez... Text Filters >

Search

(Select All)
 Bugesera district-Mugesera wetland
 Bumbogo wetland
 Gahanga wetland
 Gakiriro wetland
 Gakirirowetland
 Gasindikira
 Gatenga wetland
 Cikendo wetland (Former industrial area)





F G

Refined Geomorphological Zon Latitude

A ↓ Sort Smallest to Largest

Z ↓ Sort Largest to Smallest

Sort by Color >

Clear Filter From "Latitude"

Filter by Color >

Number Filters >

Search

-1.3919
-1.39188
-1.39187
-1.39186
-1.39184
-1.39183
-1.39182
-1.39179
2.60059

OK Cancel

Check Sampling date is in the correct format : yyyy/mm/dd

Check that all Chem codes are correct and are present in the Chemistry units table. New variables can be added. See Managing BIMS Admin tables – Chemistry tables.

Chemistry units

3 total

<input type="checkbox"/>	Chem code	Chem description	Chem unit	Show in abiotic list	Minimum	Maximum
<input type="checkbox"/>	COND	Conductivity	mS/m	<input checked="" type="checkbox"/>	1.0	500.0
<input type="checkbox"/>	PH	pH	pH unit	<input checked="" type="checkbox"/>	2.0	10.0
<input type="checkbox"/>	DO	Oxygen: dissolved	mg/l	<input checked="" type="checkbox"/>	1.0	15.0

3 total

Check that all variables have been converted to their correct unit of measurement.

Check Collector/Owner and Collector/Owner Institute. Ideally CAPITALS should not be used, First name Surname if known. Do not use middle initial and punctuation.



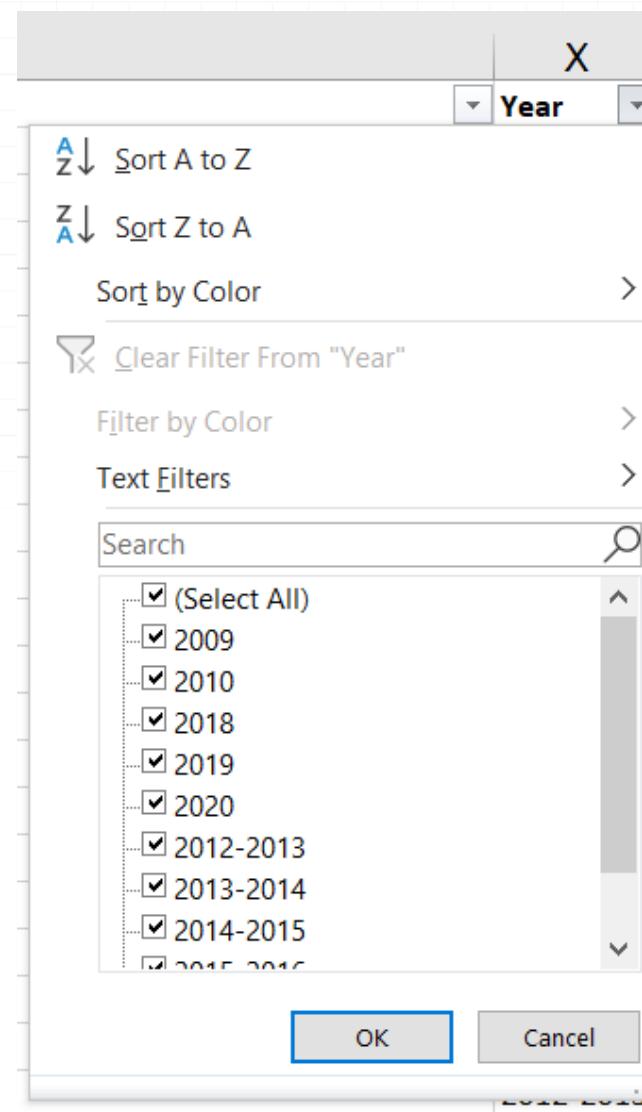


Check the metadata (Author(s), Year, Source, Title, Reference category, URL, DOI, Document Upload Link). For each study reference type, you need to populate the following columns:

- Peer-reviewed scientific article (Collector/Owner; Collector/Owner Institute; Author(s); Year; Source; Title; DOI or URL (if DOI is not available)). For Peer-reviewed scientific article the Source is the Journal, For Peer-reviewed scientific article the Title is the title of the article.
 - Published report (Collector/Owner; Collector/Owner Institute; Author(s); Year; Source; Title; URL or Document Upload Link). Note the Document Upload Link is obtained after the report is added.
 - Thesis (Collector/Owner; Collector/Owner Institute; Author(s); Year; Source; Title; URL or Document Upload Link)
 - Database (Collector/Owner; Collector/Owner Institute; Author(s); Year; Source)
 - Unpublished data (Collector/Owner; Collector/Owner Institute; Author(s); Year; Source)

Check format of Author(s). It needs to be: Surname + Initials, no punctuation. (e.g. Tumushimire L, Mindje M, Sinsch U & Dehling JM not Lambert Tumushimire, Mapendo MINDJE, Prof. Ulrich Sinsch & Julian Maxmillian Dehling). It is important to get the authors correct (e.g. Sinsch Ulrich and Dehling, J. Maximilian, Lümkemann Katrin, Rosar Katharina, Christiane Schwarz should be Sinsch U, Lümkemann K, Rosar K, Schwarz C & Dehling M as per the doi).

Check the Date: This is the publication date (so 2012-2013 should be 2019 as this is when the article was published - Ecology and Evolution. 2019. Same with all other data from this study).



Check the Source. Please note when to include source or not, and what to include. (e.g. Mindje, M., Tumushimire, L., & Sinsch, U. (2020). Diversity assessment of anurans in the Mugesera wetland (eastern Rwanda): impact of habitat disturbance and partial recovery. *Salamandra*, 56, 27-38. Should be **Salamandra**)

- For Peer-reviewed scientific articles - the Source is the Journal.
- For Published Reports and Theses - the Source is the publisher of the Report.
- For Unpublished Data - the source is the title of the study.





Source

A ↓ Sort A to Z

Z ↓ Sort Z to A

A ↓ Sort by Color >

Clear Filter From "Source"

Filter by Color >

Text Filters >

Search

(Select All)

African Zoology

Check List - The Journal of Biodiversit

Ecology and Evolution

Rapid assessment of amphibians in B

Rapid assessment of amphibians in th

Report for the Rapid Assessment of a

Salamandra - German Journal of Herp

OK Cancel

Check the Title. For Peer-reviewed scientific article the Title is the title of the article, for Published reports or theses, it is the title of the thesis. Unpublished data don't need a title.

Title

A ↓ Sort A to Z

Z ↓ Sort Z to A

Sort by Color >

Clear Filter From "Title"

Filter by Color >

Text Filters >

Search

(Select All)

Acoustic Niche Partitioning in An

Anuran diversity of cultivated wetlan

Diversity assessment of anurans in the

Herpetofauna, Parc National des Volc

Spatial variation in anuran richness, d

(Blanks)

OK Cancel

Check all Reference Categories are correct: options include:

- Database
- Peer-reviewed scientific article
- Published report
- Thesis
- Unpublished data





The screenshot shows a software interface with a context menu open over a list of items. The menu includes options like 'Sort A to Z', 'Sort Z to A', 'Sort by Color', 'Clear Filter From "Reference category"', 'Filter by Color', 'Text Filters', and a search bar. Below the search bar is a filter panel with checkboxes for categories: '(Select All)', 'Database', 'Peer-reviewed scientific article', 'Published report' (which is checked), 'Thesis', and 'Unpublished data'. At the bottom of the filter panel are 'OK' and 'Cancel' buttons.

Search

(Select All)

Database

Peer-reviewed scientific article

Published report

Thesis

Unpublished data

OK Cancel

research Cor Tracking move Published report

Check URL and DOI. Use a DOI if it is available, URL – only needed for Peer-reviewed scientific article if there is no DOI. For the DOI you only need to include the number part, so 10.1080/15627020.2012.11407524, not <https://doi.org/10.1080/15627020.2012.11407524>.





Check the document upload link is correct. Note the Document Upload Link is obtained after the report is added. Reports are only uploaded when there is no DOI or URL to link the data to.

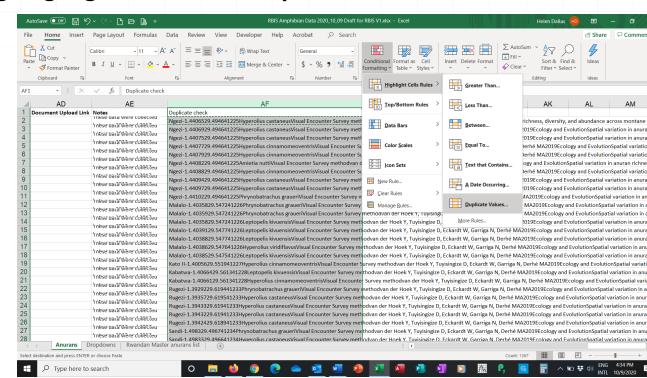


[Checking for duplicate occurrence records](#). Use this formula for checking for duplicates. This is a combination of Site description, latitude, longitude, sampling date, Chem code, author, year, source and title. Copy and paste the formula below into a new column at the end and name it "Duplicate check".

 **Code:**

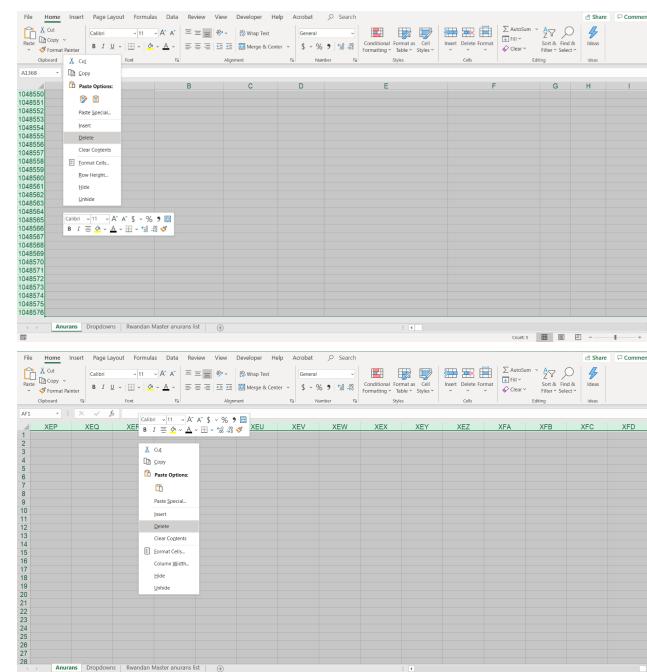
```
=CONCATENATE(E2,G2,H2,I2,Q2,T2,W2,X2,Y2,Z2)
```

Then copy and paste the formula down to the end of the data rows. Then Highlight the column, and from the Home menu, select **Conditional Formatting**, **Highlight Cells Rules**, **Duplicate Values**.



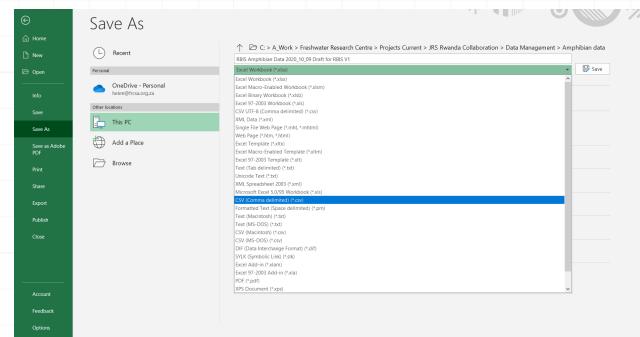
Any duplicates will be highlighted. Check and delete duplicate occurrence records. Then delete the Duplicate Check column.

Delete blank rows and columns. Lastly, ensure that there are no extra blank rows or columns, by deleting them.



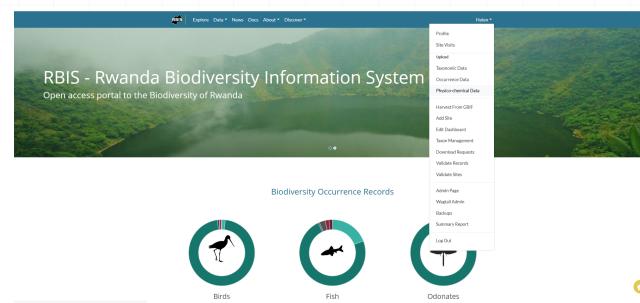
Remove the data filter, save the file in excel, and save the file as csv file.



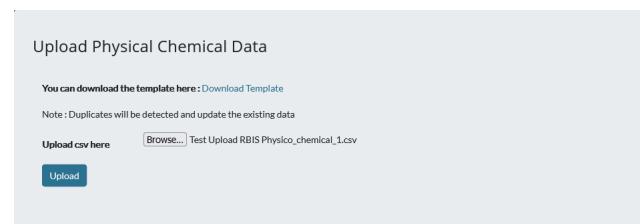


1.1.1.3 Uploading a physico-chemical data file

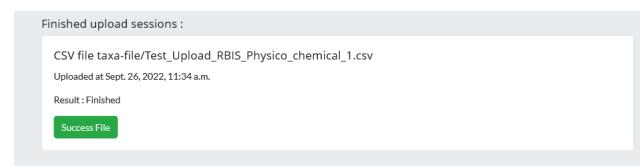
Go to Profile - Upload Physico-chemical data



This opens the Upload Physical Chemical Data form. Browse to the correct file and click upload.



On completion the following success file is shown.





1.1.1 Managing BIMS Admin tables

Several backend tables can be updated and managed by administrators, including the Biodiversity Information Management System (BIMS), and are accessible via the Admin Page. Provided here, is a list of actions related to the Site Administration including the BIMS table management that an administrator (super user status) may need to edit or check. Currently, only the tables that the administrator needs to be able to revise have been described, and not all the tables in the Site Administration and BIMS. They are described chronologically as they appear in Site Administration. This document will continually need to be updated as new administration functions are added.

Link to specific sub-sections in BIMS as well as other admin tasks:

Managing BIMS Admin tables

- [Managing BIMS Admin tables](#)
- [BIMS - Biotopes](#)
- [BIMS - Chemistry units](#)
- [BIMS - Download request purposes](#)
- [BIMS - Download requests](#)
- [BIMS - Endemism](#)
- [BIMS - FBIS UUIDs](#)
- [BIMS - IUCN Conservation status](#)
- [BIMS - Location context filter group orders](#)
- [BIMS - Location context filter order](#)
- [BIMS - Location context groups](#)
- [BIMS - Location context filters](#)
- [BIMS - Location sites](#)
- [BIMS - Non-biodiversity layers](#)
- [BIMS - Notifications](#)
- [BIMS - Sampling methods](#)
- [BIMS - Site settings](#)
- [BIMS - Source references](#)
- [BIMS - Taxa](#)
- [BIMS - Taxon groups](#)
- [Flat pages](#)
 - [Flat pages - about us](#)
 - [Flat pages - citation guidelines](#)
 - [Flat pages - Help \(FBIS only\)](#)
- [People](#)
 - [People - Users](#)

1.1.1.1 BIMS - Biotopes





Here you manage the broad biotope categories, description and order; the specific biotope categories, description and order; and the substratum. These biotopes are initially populated by the biodiversity data upload files, where each biotope is specified in the dropdowns. Details are provided below. Certain biotopes and substrata may be associated with one or more modules. As more biodiversity modules are added, it may be necessary for the administrator to update biotopes.





Module	Broad Biotope	Specific Biotope	Substratum
All	Unspecified		
All	Mixed		
Algae, invertebrates, anurans	Stones In Current		
algae, invertebrates, anurans	Stones Out Of Current		
algae, invertebrates, anurans	Marginal Vegetation		
algae, invertebrates, anurans	Aquatic Vegetation		
algae, invertebrates, anurans	Gravel/Sand/Mud		
algae, invertebrates	Artificial substrate		
Fish only	Slow-Shallow		
Fish only	Slow-Deep		
Fish only	Fast-Shallow		
Fish only	Fast-Deep		
All		Backwater	
All		Bedrock	
All		Cascade	
All		Chute	
All		Detritus	
All		Mixed	
All		Pool	
All		Rapid	
All		Riffle	
All		Run	
All		Slackwater	





Module	Broad Biotope	Specific Biotope	Substratum
All		Unspecified	
All		Waterfall	
All			Unspecified
All			Mixed
All			Bedrock
All			Boulder
All			Cobble
All			Detritus
All			Gravel
All			Pebble
All			Sand
All			Silt/Mud/Clay

If these have not been included in the data occurrence upload files, then they are blank. New biotopes can be added by clicking the “+ Add biotope”.

1.1.1.2 BIMS - Chemistry units

Here you manage the physico-chemical data including the Chem Code (NB this needs to match the column in the physico-chemical data upload template), chem description, chem unit, whether the variable needs to be shown in abiotic form (abiotic list), minimum and maximum values. New chemistry units can be added by clicking the “+ Add chemistry unit”.

Chem code	Chem description	Chem unit	Min value	Max value	Abiotic
ACM-B	Acid Free Dry Mass, surface	mgH ₂ O	0	6.00000	
ACM-W	Acid Free Dry Mass, water column	mgH ₂ O	0	6.00000	
AI	Alkalinity	mgH ₂ O	0.00	20.0	
AS	Alkalinity	mgH ₂ O	0.00	1.0	
AT	Ammonium	mgH ₂ O	0.00	0.2	
BT	Boron	mgH ₂ O	0.00	0.05	
CH	Chloride	mgH ₂ O	0.00	0.05	
DE	Dissolved	mgH ₂ O	0.00	0.01	
DO	Dissolved Oxygen Dissolved	mgH ₂ O	0.00	0.000	
CA	Calcium	mgH ₂ O	0.00	500.0	
GAZ00	Methane, Methane	mgH ₂ O	0.00	0.000	
GS	Calcareous	mgH ₂ O	0.00	0.00	
OMA-B	Micronutrient & Sulfide	mgH ₂ O	0.00	0.000	
OMA-W	Micronutrient & water column	mgH ₂ O	0.00	0.000	
OL	Oxygen	mgH ₂ O	0.00	0.000	
OS	Osmolal	mgH ₂ O	0.00	0.000	
OSO	Conductivity	mgH ₂ O	0.00	500.0	
ODO	Chemical Oxygen Demand	mgH ₂ O	0.00	0.000	

Changes can be made to each variable by clicking on the relevant Chem code and editing the appropriate field. Here one can also specify the number of decimal places.





1.1.1.3 BIMS - Download request purposes

Here you manage the download request purposes that a user chooses when requesting a download of a graph or csv file. New purposes can be added by selecting "Add download request purpose" and the sort order can be updated.

Purpose

- Scientific Article
- Report
- Thesis
- Proposal
- Presentation
- No specific use
- Admin - data quality checking

1.1.1.4 BIMS - Download requests

Here you can see all download requests from users, including details of the requester, resource type (csv, table, chart), resource name and purpose (as specified in the download request purposes). One can find out further details of the request by clicking on the Request date link, which opens up a second form. This is useful to track the progress of the large request downloads.





Change Download request

Requester	478	<input type="text"/> Helen_Dallas
Request date	2022-09-27	<input type="text"/> 07:23:58
Resource type	Csv	<input type="button"/>
Resource name	Occurrence Data	
Taxon	<input type="text"/>	
Location site	<input type="text"/>	
Survey	<input type="text"/>	
Purpose	Scientific Article	
Dashboard url	<pre>https://freshwaterbiodiversity.org/map/tafs-detail?taxon=&search=&siteId=&collector=&category=&yearFrom=&yearTo=&minYear=&maxYear=&status=&category=&spatialInfo=&reference=&academic=&conservationStatus=&modules=&validated=&sourceCollection=%22gbif%22&bioticCode=&ecologicalCategory=&ranks=&siteOpen=&orderByName=&polygon=&thermalModule=&date=</pre>	
Request file	<input type="button"/> Browse... No file selected. Only csv file	
Notes	<input type="text"/>	
<input checked="" type="checkbox"/> Processing <input type="checkbox"/> Approved <input type="checkbox"/> Rejected		
Request category	<input type="text"/>	
Rejection message	<input type="text"/>	
Progress	7100/28252	

Download requests

	Request date	Requester	Resource type	Resource name	Purpose
<input type="checkbox"/>	Sept. 27, 2022, 7:23 a.m.	Helen_Dallas	Csv	Occurrence Data	Scientific Article
<input type="checkbox"/>	Sept. 27, 2022, 7:23 a.m.	Helen_Dallas	Csv	Occurrence Data	Scientific Article
<input type="checkbox"/>	Sept. 26, 2022, 6:09 p.m.	Lorainmarl_den_Boogert	Csv	Occurrence Data	Report
<input type="checkbox"/>	Sept. 26, 2022, 6:09 p.m.	Lorainmarl_den_Boogert	Table	Site Overview	Report
<input type="checkbox"/>	Sept. 26, 2022, 6:09 p.m.	Lorainmarl_den_Boogert	Table	Occurrence data	Report
<input type="checkbox"/>	Sept. 26, 2022, 2:31 p.m.	Lorainmarl_den_Boogert	Table	SASS Taxa per biotope - 2021-06-10	Report
<input type="checkbox"/>	Sept. 26, 2022, 2:31 p.m.	Lorainmarl_den_Boogert	Csv	SASS data for XZELAN-ROODE	Scientific Article
<input type="checkbox"/>	Sept. 26, 2022, 2:29 p.m.	Lorainmarl_den_Boogert	Table	Occurrence data	Report
<input type="checkbox"/>	Sept. 26, 2022, 2:28 p.m.	Lorainmarl_den_Boogert	Table	Site Overview	Report
<input type="checkbox"/>	Sept. 26, 2022, 2:24 p.m.	Lorainmarl_den_Boogert	Table	Occurrence data	Report
<input type="checkbox"/>	Sept. 26, 2022, 2:24 p.m.	Lorainmarl_den_Boogert	Table	Site Overview	Report
<input type="checkbox"/>	Sept. 26, 2022, 2:20 p.m.	Lorainmarl_den_Boogert	Table	Occurrence data	Report
<input type="checkbox"/>	Sept. 26, 2022, 2:19 p.m.	Lorainmarl_den_Boogert	Table	Site Overview	Report
<input type="checkbox"/>	Sept. 26, 2022, 2:16 p.m.	Lorainmarl_den_Boogert	Table	Site Overview	Report

1.1.1.5 BIMS - Endemism

Here you manage the endemism categories including the Name (what is shown on the dashboard), description and display order. The endemism categories are added during the uploading of the taxonomic master lists. Note that if the description is used in the master list, then this will be shown on the side panel and / or dashboard. It is important to always upload the Name only.

Endemisms			
#	Name	Description	Display order
<input type="checkbox"/>	Micro-endemic level 2	Endemic to a single river or wetland	1
<input type="checkbox"/>	Micro-endemic level 1	Endemic to less than 1 river or wetland	2
<input type="checkbox"/>	Regional endemic level 2	Endemic to a single primary catchment	3
<input type="checkbox"/>	Regional endemic level 1	Endemic to a single river/wetland system (e.g. CFC), more than one primary catchments	4
<input type="checkbox"/>	National endemic	Endemic to South Africa, occurs in more than one freshwater Ecoregion within SA	5
<input type="checkbox"/>	Subregional endemic	Endemic to southern Africa	6
<input type="checkbox"/>	Widespread	Occurs beyond southern Africa	7
<input type="checkbox"/>	Unknown	Endemism is unknown	8

Each endemism category can be edited by clicking on the Name



1.1.1.6 BIMS - FBIS UUIDs

Here you can view all the uuids - this is a unique id for each occurrence record. It also allows the administrator to delete a specific record based on it uuid.

Fbis uuids					
	Uuid	Content type	Content object		
<input type="checkbox"/>	01405568-42af-4720-bfab-ab0af92b9382	user	dale_cobban		
<input type="checkbox"/>	014a2b3f-e370-462e-8a50-8e8b6d5ec7f5	user	shaddai_daniel		
<input type="checkbox"/>	0216dad2-ecd7-40fc-a424-a7681f2b852c	user	rhys_williams		
<input type="checkbox"/>	02edbe54-b099-49b8-97e7-b7d42b95adbe	user	kate_snaddon		
<input type="checkbox"/>	0419f080-f62c-4b64-98ef-ace21b75fb44	user	natalie_degger		

1.1.1.7 BIMS - IUCN Conservation status

Here you can manage the Conservation status categories for global and national. Global is pulled down from the IUCN, while national is from SANBI. Status's only applicable to national need to be opened and national checked. To change a status click on category.

IUCN Status					
	method	Sensitive	Iucn colour	National	Total species
<input type="checkbox"/>	Critically Rare	✗			1
<input type="checkbox"/>	Critically Endangered, Possibly Extinct	✗			2
<input type="checkbox"/>	Data Deficient - Taxonomically Problematic	✗			7
<input type="checkbox"/>	Data Deficient - Insufficient Information	✗			8
<input type="checkbox"/>	Rare	✗			37
<input type="checkbox"/>	Extinct	✗			1
<input type="checkbox"/>	Not evaluated	✗			3143
<input type="checkbox"/>	Data deficient	✗			30
<input type="checkbox"/>	Critically endangered	✓			36
<input type="checkbox"/>	Vulnerable	✓			90
<input type="checkbox"/>	Near threatened	✗			52
<input type="checkbox"/>	Endangered	✓			70
<input type="checkbox"/>	Least concern	✗			1185

Change IUCN Status

Category	<input type="text" value="Critically Rare"/>
<input type="checkbox"/> Sensitive	
Colour	<input type="text" value="009106"/>
<input checked="" type="checkbox"/> National	

1.1.1.8 BIMS - Location context filter group orders





Here you can manage the spatial layers shown in the side panel and dashboards, as well as the display and filter orders. This is done by clicking on the ID link, which opens up a separate form for each spatial layer.

Location context filter group orders

ID	Link to filter	Link to group	Filter display order	Group display order	▲ Show in dashboard	Show in side panel
54	Geomorphological Zone	Geomorphological zone	1	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Freshwater Ecoregion of the World	Freshwater Ecoregion of the World	2	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	South African Province and Neighboring Country	SA Province and SADC boundaries	3	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Management Area	Water Management Area	4	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Management Area	Sub Water Management Areas	4	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
40	Management Area	River Management Units	4	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Catchment	Primary Catchment Area	5	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Catchment	Secondary Catchment Area	5	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Catchment	Tertiary Catchment Area	5	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Catchment	Quaternary Catchment Area	5	4	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Catchment	Quarry Catchment Area	5	5	<input type="checkbox"/>	<input type="checkbox"/>

Change location context filter group order

Group	Freshwater Ecoregion of the World	→ +
Filter	Freshwater Ecoregion of the World	→ +
Group display order	1	
<input checked="" type="checkbox"/> Show in dashboard Show this location context group in dashboard		
<input type="checkbox"/> Show in side panel Show this location context group in side panel		

1.1.1.9 BIMS - Location context filter order

Here you can change the display order of the spatial filters.

SPATIAL

- Geomorphological Zone
- Freshwater Ecoregion Of The World
- South African Province And Neighboring Country
- Management Area
- Catchment
- SA Ecoregion
- Critical Biodiversity Area (CBA) National
- Critical Biodiversity Area (CBA) Provincial
- National Freshwater Ecosystem Priority Area (NFEPA)
- Strategic Water Source Area
- National Biodiversity Assessment 2018 (NBA)
- Hydrological Regions
- Thermal Framework

1.1.1.10 BIMS - Location context groups

Here you can manage the spatial layers and groups, which relate to geocontext. Each layer can be opened to view detail.





Change location context group

Name	Hydrological Regions
Key	hydrological_regions
Geocontext group key	hydrological_regions
Group key from geocontext	
<input checked="" type="checkbox"/> Verified	
Layer name	hydrological_regions_dd
Name of the layer (for border)	
Wms url	https://maps.kartoza.com/geoserver/wfs
WMS URL of the layer (for border)	
Wms format	image/png
WMS format of the layer (for border)	
Layer identifier	hydrological_name
Identifier to retrieve the desired value (for border)	

1.1.1.11 BIMS - Location context filters

Here you manage what is seen on the Side panel and Dashboard for a single site. Information included in the dashboards is indicated with a green tick.

This screenshot shows a list of location context filters. Each item has a checkbox next to its name and a numerical display order. A 'Display order' column is present to the right of the list. A search bar at the bottom allows filtering by ID.

ID	Name	Display order
1	Quaternary Catchment Area	1
2	Geographical Area	2
3	Protected Areas of the World	3
4	South African Province and Neighboring Country	4
5	Management Area	5
6	Catchment	6
7	Mitigation	7
8	Critical Biodiversity Area (CBA) National	8
9	Critical Biodiversity Area (CBA) Provincial	9
10	National Freshwater Ecosystem Priority Area (NFEPA)	10
11	Strategic Water Source Area	11
12	National Biodiversity Assessment 2019 (NBA)	12
13	Hydrological Region	13
14	Thematic Framework	14

To change what is displayed click the ID Number and check or uncheck the box for each. Note that there are some extra aspects that still need clarifying related to order etc.

Change location context filter group order

Group	Quaternary Catchment Area
Filter	Catchment
Group display order	4
<input checked="" type="checkbox"/> Show in dashboard Show this location context group in dashboard	
<input type="checkbox"/> Show in side panel Show this location context group in side panel	

1.1.1.12 BIMS - Location sites

Here you can view sites, filter for specific site and update site codes.

This screenshot shows a list of location sites. Each site has a checkbox and a 'Decoded data percentage' column indicating the level of data availability. A 'Delete selected location sites' button is located at the bottom left.

ID	Name	Decoded data percentage
-0-00014	PointObservation	99% -
-0-00013	PointObservation	99% -
-0-00012	PointObservation	99% -
-0-00011	PointObservation	99% -
-0-00010	PointObservation	99% -
-0-00009	PointObservation	99% -
-0-00008	PointObservation	99% -
-0-00007	PointObservation	99% -
-0-00006	PointObservation	99% -
-0-00005	PointObservation	99% -
-0-00004	PointObservation	99% -
-0-00003	PointObservation	99% -
-0-00002	PointObservation	99% -
-0-00001	PointObservation	99% -

Here we are also able to update the geocontext data for each site or selection of sites.





Name	Site code	Location type	Get context	Detailed data percentage	Indicator theme
RISPAU-00032	RISPAU-00032	PunktObersiedl	S90+420,POINT(24 47827787178 -02 061220980877)	88%	
LIMED-00006	LIMED-00006	PunktObersiedl	S90+420,POINT(24 3230306806360 -03 0212121646)	98%	
KODUNA-00001	KODUNA-00001	PunktObersiedl	S90+420,POINT(24 4270370370882 04 080111428181)	98%	
MUDUN-TRAIN	MUDUN-TIAN	PunktObersiedl	S90+420,POINT(25 90870564524 34 087289800016)	98%	
MUDUN-DONKE	MUDUN-DONKE	PunktObersiedl	S90+420,POINT(25 90870564524 34 0881762642)	98%	
MUDUN-SEONG	MUDUN-SEONG	PunktObersiedl	S90+420,POINT(25 90870564524 34 0881032487)	98%	
GUTTS-00005	GUTTS-00005	PunktObersiedl	S90+420,POINT(19 448070558342 30 0910507250)	100%	
MUDUN-TRAIN	MUDUN-TIAN	PunktObersiedl	S90+420,POINT(25 9050958454 34 0890175241)	98%	
HYNON-BNALL	HYNON-BNALL	PunktObersiedl	S90+420,POINT(25 4470340584401 34 09102080001)	48%	
WISBUL-00001	WISBUL-00001	PunktObersiedl	S90+420,POINT(25 898426 25 102222)	100%	
No locality from GBIF		PunktObersiedl	S90+420,POINT(25 440000 24 80)	64%	
Whitton Game Reserve, Essex	WGL-00007	PunktObersiedl	S90+420,POINT(25 98770598800 34 1010102487)	8%	
New River, Tees River	EU-00016	PunktObersiedl	S90+420,POINT(19 280544 32 889051)	9%	

1.1.1.13 BIMS - Non-biodiversity layers

Here you manage the order that spatial layers are shown. This includes viewing and/or editing the order, name, wms url and Wms layer name. By clicking on the order, the details of the layer can be viewed and edited. Only administrators experienced in geocontext and GGIS should edit this as it links directly to these components.

Order	Name	Wms url	Wms layer name	Wms
1	Rivers	http://maps.kartoza.com/geoserver/wms	karotza_rivers	✓
2	Oceans	http://maps.kartoza.com/geoserver/wms	karotza_oceans	✓
3	Geographical Zones	http://maps.kartoza.com/geoserver/wms	karotza_protection	✓
4	Administrative divisions	http://maps.kartoza.com/geoserver/wms	karotza_municipalities_ukraine	✓
5	Administrative divisions of the world	http://maps.kartoza.com/geoserver/wms	karotza_municipalities_world	✓
6	Water Management Areas	http://maps.kartoza.com/geoserver/wms	karotza_water_management_areas	✓
7	Soil Water Management Areas	http://maps.kartoza.com/geoserver/wms	karotza_soil_water	✓
8	Point Management Units	http://maps.kartoza.com/geoserver/wms	karotza_point_management_units	✓
10	Primary Catchments	http://maps.kartoza.com/geoserver/wms	karotza_prime_catchment_area	✓
11	Secondary Catchments	http://maps.kartoza.com/geoserver/wms	karotza_secondary_catchment_area	✓
12	Tertiary Catchments	http://maps.kartoza.com/geoserver/wms	karotza_tertiary_catchment_area	✓
13	Quaternary Catchments	http://maps.kartoza.com/geoserver/wms	karotza_quaternary_catchment_area	✓
14	Outline Countries	http://maps.kartoza.com/geoserver/wms	karotza_outline_countries	✓
15	Coastline level 1	http://maps.kartoza.com/geoserver/wms	karotza_coastline_1	✓
16	Coastline level 2	http://maps.kartoza.com/geoserver/wms	karotza_coastline_2	✓

Change non biodiversity layer

Name: Water Management Areas

Wms url: https://maps.kartoza.com/geoserver/wms

Wms layer name: karotza_water_management_areas

Wms format: image/png

Get feature format: text/plain

1.1.1.14 BIMS - Notifications

To Be Updated

1.1.1.15 BIMS - Sampling methods

Here you manage the sampling methods used for collection of biodiversity occurrence data. These sampling methods are initially populated by the biodiversity data upload files, where each sampling method is specified in the dropdowns. Details are provided below.





For each sampling method the administrator needs to select the taxon group or groups that the method is associated with and certain sampling methods may be associated with one or more taxon groups / modules. As more biodiversity modules are added, it may be necessary for the administrator to update the sampling methods.

Module	Sampling method
Invertebrates only	Baited Line
Invertebrates only	Box/Surber
Invertebrates only	Drift Net
Invertebrates only	Kick Net
Invertebrates only	Light Trap
Invertebrates only	Stone
Invertebrates, fish	Hand Net
Fish only	Fyke net
Fish only	Gill net
Fish only	Rod and line angling
Fish only	Seine net
Fish only	Snorkelling
Fish, anurans	Underwater video analysis
Fish, anurans	Electro-fishing
Fish, anurans	Visual survey
Anurans	Active acoustic survey
Anurans	Passive acoustic survey
Anurans	Baited trapping
Anurans	Non-baited survey
All	Unspecified
All	Multiple





Changes can be made to each sampling method by clicking on the Sampling method and editing the name, order and Taxon group it is appropriate to. To select more than one taxon group click Control Select simultaneously. If these have not been included in the data occurrence upload files, then they are blank. New sampling methods can be added by clicking the “+ Add sampling method”.

We have also added functionality to merge sampling methods, in the event that the same sampling method is added, but with a slight variation. For example:

<input checked="" type="checkbox"/>	Photographic Record	-		
<input checked="" type="checkbox"/>	Photographic Record	-		Odonate Adults, Anura

To merge these two or more sampling methods, first you need to verify the correct one, by opening the method and ticking the verify box.

Then you use the select “Merge sampling methods” and click go.

1.1.1.16 BIMS - Site settings

Here you manage several components related to the setting of the site (i.e. webpage, url for the information systems, e.g. FBIS, RBIS, ORBIS etc.). Details of the sections that an administrator can change are provided below.

Site notice can be changed in the Site settings section.

You can specify the `readme` file that is bundled with the downloaded occurrence data.





Readme download No file selected.
README that bundled with the downloaded occurrence data

You can specify the taxonomic upload template for the Master lists. This is then downloadable on the Upload – Taxonomic data.

Taxonomic upload template Currently: FBIS_Master_List_Template_final_for_FBIS_Generic_2022_08_16.xlsx
 Clear
Change: No file selected.
File template for taxonomic uploader

You can specify the occurrence upload template for the occurrence data. This is then downloadable on the Upload – Occurrence data.

Occurrence upload template Currently: FBIS_Generic_Data-upload_Template_with_latest_dropdowns_2022_06_09.xlsx
 Clear
Change: No file selected.
File template for occurrence uploader

You can view and/or edit the disclaimer form text and disclaimer doc text.

Disclaimer form text I agree to these data being shared via the FBIS platform for visualisation and download by registered FBIS users
Disclaimer doc text I hereby confirm that I am the owner of these data and/or document and agree to these being shared via the FBIS platform

You can enable or disable the third party layer as not all information systems have links to third party data

Show third party layer
Show third party layer selector in Map screen

 **FBIS** Freshwater Biodiversity Information System

THIRD PARTY LAYER

+	-	X
	<input type="checkbox"/> MiniSASS MiniSASS is a citizen science tool which can be used by anyone to monitor the health of a river. The data are served with permission from http://www.minisass.org/en/ , and further information about the tool is available via this website.	
	<input type="checkbox"/> InWARDS Water Quality InWaRDS is a Decision-support for integrated water resources management developed by AWARD (the Association for Water and Rural Development). The data are served with permission, and further information is available via their website: http://award.org.za/index.php/focus-areas/water/the-inwards-decision-support-for-integrated-water-resources-management-in-the-olifants/	

You can enable or disable sass as not all information systems have sass data

Enable sass
Enable or disable SASS

You can enable or disable water temperature data as not all information systems have water temperature data





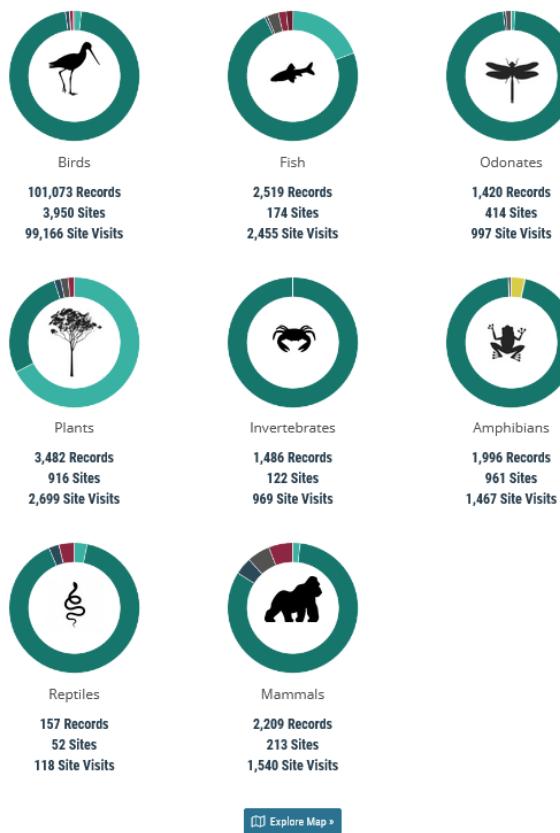
Enable water temperature
Enable or disable Water Temperature data

You can enable or disable download request approval. If this is disabled then the user can download the data without waiting for approval from the administrator.

Enable download request approval
Download requests must be approved by the staff before they are sent to users

You can enable or disable the module summary on the landing page dashboard. This is not applicable to FBIS, only RBIS and ORBIS.

Show module summary on dashboard
Show summative figure for data by taxon group



[Explore Map >](#)

You can enable or disable the remove all occurrence tool in Taxon Management. This should never be activated on the live/production site as clicking the Remove all button, will delete all the occurrence data for the module. It can be enabled on the testing site as this allows administrators to practice the creation of new modules, uploading of taxonomic master lists and the uploading of occurrence data.

Enable remove all occurrences tool
Enable tool to remove all occurrences for a taxon group

Invertebrates
Total taxonomy :
[Edit](#) [Remove All](#)

You can view and/or edit the copyright text that is visible at the bottom of the landing page.

Copyright text

Copyright © Freshwater Research Centre and Kartozia

1.1.1.17 BIMS - Source references

Generally it is easiest to manage source references (i.e. the metadata associated with each occurrence record).





However, on occasions, issues arise whereby the source reference is duplicated, possibly because of a small typo during data capture. In the Admin - Source references – section it is possible to merge two source references. One does this by finding the two relevant source reference, opening the correct one and selecting "Verify", the checking the box next to the two (or more) references to be merged, and using the Merge from the dropdown lists, the Go. Note that the Source reference needs to be the same type to be able to merge.

1.1.1.18 BIMS - Taxa

Here you manage all aspects related taxa within the information system. Most of this is done easily within Taxon Management, but there are some actions that can only be done within this table, including deleting a taxon (this cannot be done if occurrence data are associated with it), merging taxa and updating taxa (when one taxon is a synonym of another).

The table includes the Canonical Name (also referred to as the "true name"), the Link to gbif, the Scientific Name, the Taxonomic Rank, the Parent, the Import date, the Taxonomic Status, the Legacy Canonical Name, and whether the taxon has been Verified. Ultimately all taxa in the information system should be verified.

Clicking on the canonical name opens up the Change Taxonomy form for the selected species. Note that this is same as that accessed within Taxon Management.





A search field and filters are also included to assist you to navigate.

To delete a taxon, click the check box, and select Delete selected taxon, and click GO

There is a check, and if you click, Yes, I am sure, then the taxon will be deleted

Sometimes errors are picked up in the taxa, for example there are two taxa that are the same. One needs to merge these taxa. Prior to merging, the correct taxon needs to be checked and the verified button checked. Then to merge the two taxa, click the check box, and select Merge taxa, and click GO .

Updating is used when one wants to update a synonym with the accepted name. Prior to updating, the accepted taxon needs to be checked and the verified button checked. Then to update the synonym, click the check box of both taxa, and select Update taxa, and click GO. This functionality is currently being refined.

1.1.1.19 BIMS - Taxon groups





Here you manage the taxon groups added to the information systems. To note is the need to add the singular name so that it is correct in the Add XXXX data form.

BIMS Admin Page

Home > BIMS > Taxon groups

Taxon groups

9 total

Change taxon group

Name: Birds
Singular name: Bird

Add Fish data | Add Invertebrates data | Add Algae data | Add Odonate Adults data

1.1.1.20 Flat pages

This is access outside of the BIMS section, in Flat Pages. From here you can update the "About us", Citation guidelines and Help page.

Flat pages

3 total		
	URL	Title
<input type="checkbox"/>	/about_us/	About
<input type="checkbox"/>	/citation-guidelines/	Citation guidelines
<input type="checkbox"/>	/help/	Help

3 total

Flat pages - about us

Text for the About Us on the menu bar can be modified here: <https://freshwaterbiodiversity.org/admin/flatpages/flatpage/3/change/>

Flat pages - citation guidelines

[Home](#) | [Map](#) | [Documents & Reports](#) | [Contact](#) | [Citation](#)

Text for the Citation on the landing page can be modified here: <https://freshwaterbiodiversity.org/admin/flatpages/flatpage/3/change/>

Flat pages - Help (FBIS only)

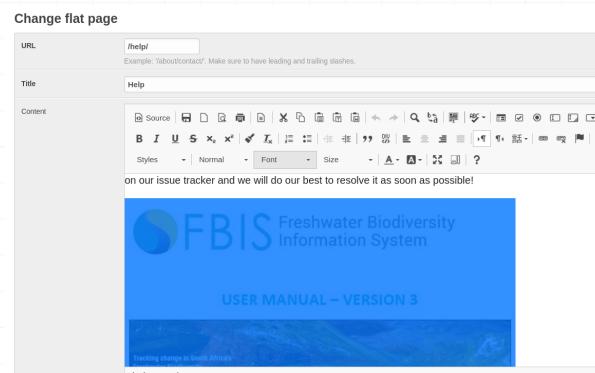
Text for the Help on the menu bar can be modified here: <https://freshwaterbiodiversity.org/admin/flatpages/flatpage/2/change/>



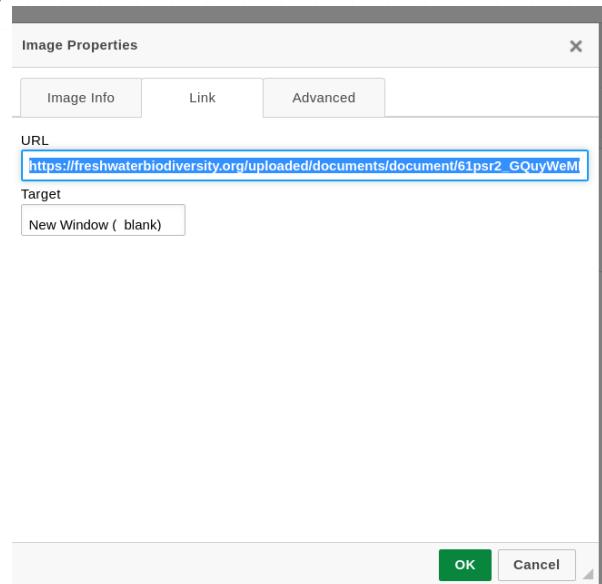


Here's how to update the link to the FBIS manual:

- open this page <https://freshwaterbiodiversity.org/admin/flatpages/flatpage/2/change>
- double click the user manual



- open the Link tab, and change the url



- click **Ok**, and then click **Save**

Get the url for the FBIS Manual by opening Source References and right clicking the green title, and choose 'Copy link address'. Then insert this url into the URL in the Link tab and save.

1.1.1.21 People

People - Users



Details of all users are visible here and can be edited as needed. When a user first registers they are activated by clicking the Permission – Active box.

Several filters have been included to manage and find users





Filter ▾

Staff status
All ▾

Superuser status
All ▾

Active
All ▾

Groups
All ▾

Sass accredited status
All ▾

User has email address
All ▾

Organization Name
All ▾

Signed up
All ▾

Role
All ▾

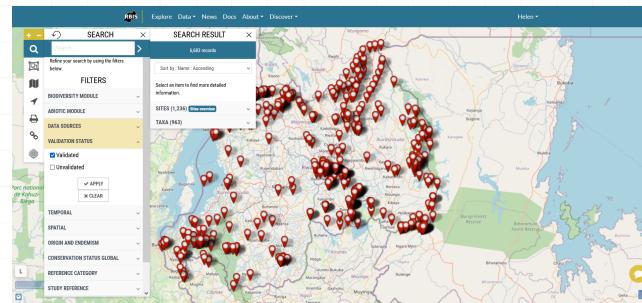




1.1.1 Validating records (occurrence data) and new taxa

This section explains the process when a user adds data to RBIS, and how the administrator views, checks and validates the occurrence record or new taxon.

Data served on the platform includes both validated and unvalidated data, where validated implies some degree of checking that the record is accurate. The user is able to select one or the other using the filter:



All data added to platform by administrators using the Upload Occurrence data template, is given the status of validated on the assumption that the administrator has checked the data prior to uploading.

However, when a user adds data directly to the platform, this data remains unvalidated until the administrator checks the data.

1.1.1.1 Validating new biodiversity occurrence records

When a user adds new occurrence data, the data is automatically assigned an unvalidated status. The administrator is sent an email alerting them to the new record.

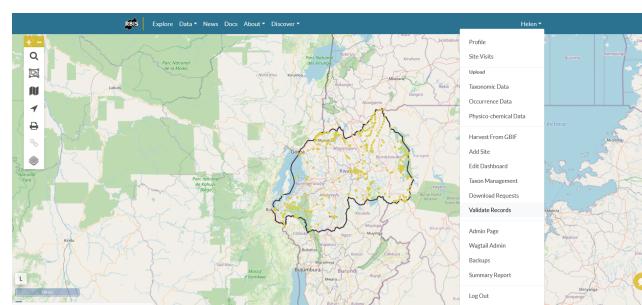
Dear Validator,

The following site visit is ready to be reviewed:
testing.rbis.kartoza.com/site-visit/detail/257939/

Go to the following link to validate the data:
testing.rbis.kartoza.com/site-visit/list/?&inReview=True

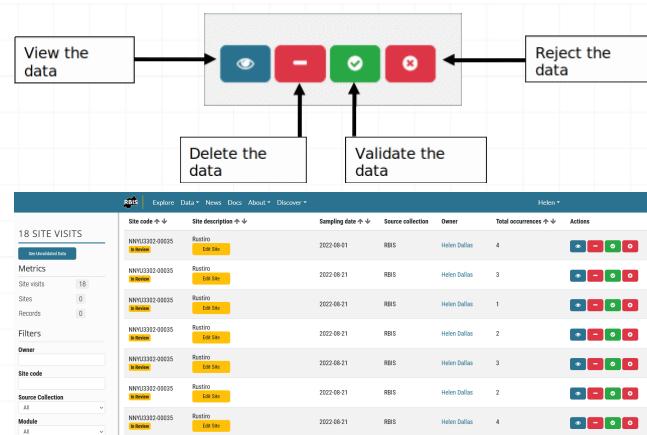
Sincerely,
BIMS Team.

This unvalidated record is also added to the Validate Records form, which the administrator has access to.



This form includes functionality to **See Unvalidated data**, and filter by Owner, Site Code, Source Collection or Module. The administrator can then undertake the following actions, using these buttons





Biodiversity Record System								
18 SITE VISITS		Habitat						
Metrics		Site code ↑↓	Site description ↑↓	Sampling date ↑↓	Source collection	Owner	Total occurrences ↑↓	Actions
Site visits	18	NNV13322-00025	Rustico Est. San	2022-09-01	RBS	Helen Dallas	4	
Sites	0	NNV13322-00026	Rustico Est. San	2022-09-01	RBS	Helen Dallas	3	
Records	0	NNV13322-00025	Rustico Est. San	2022-09-01	RBS	Helen Dallas	1	
Filters		NNV13322-00026	Rustico Est. San	2022-09-01	RBS	Helen Dallas	2	
Owner		NNV13322-00025	Rustico Est. San	2022-09-01	RBS	Helen Dallas	3	
Site code		NNV13322-00026	Rustico Est. San	2022-09-01	RBS	Helen Dallas	2	
Source Collection	All	NNV13322-00025	Rustico Est. San	2022-09-01	RBS	Helen Dallas	4	
Module	All	NNV13322-00026	Rustico Est. San	2022-09-01	RBS	Helen Dallas	4	

1.1.1.2 In summary

Viewing: the data is viewed by the administrator and checked for accuracy in terms of all entries including the taxa recorded. If a taxon is outside of its expected geographical range, then the administrator would reject the data with a reason to the person who uploaded the data.

Reject: the data is rejected and the user receives an email notification with the reason. The user then has the opportunity to edit their data and resubmit for validation.

Validate: the data is validated by the administrator if everything is correct.

Delete: this is only used when data have been accidentally added to a site but is generally easier done via the data forms.

1.1.1.3 Validating a new taxon

Generally a user should not need to add a new taxon often as the master lists for each biodiversity module are updated and represent the full expected checklist of species for a country. However, in the event that the user records a new taxon not currently in the master list, they are able to add this taxon to the information system. This new taxon then goes through a validation process by the administrator, and the new taxon is either accepted or rejected (with reasons).

The administrator receives a message alerting them to a new taxon that has been added. They then follow the link and validate the taxon, then accepting or rejecting it with reasons, which are provided by email to the user who uploaded the new taxon.

You have received the following notice from testing.rbis.kartoza.com:
A new Taxonomy has been added by Helen_Dallas:
Taxonomy : Lestagella penicillata
Rank : SPECIES
You can see the data by following this link: <http://testing.rbis.kartoza.com/taxa-management/?&selected=9&validated=False/>

Follow the link to Taxon Management:

TAXON MANAGEMENT						
Birds Total taxonomy : 523 	Fish Total taxonomy : 94 	Odonates Total taxonomy : 99 				
Plants Total taxonomy : 505 	Invertebrates Total taxonomy : 79 	Amphibians Total taxonomy : 58 				
Reptiles Total taxonomy : 29 	Mammals Total taxonomy : 61 					
<input type="text" value="Q Taxon name"/> <input type="button" value="Search"/> <input type="button" value="Filters"/> <input type="button" value="Total Taxa: 1"/> Taxon Name ↑↓ Rank ↑↓ Cons. Status (Global) Origin ↑↓ Endemism ↑↓ Records ↑↓ Import date ↑↓ Action						
Lestagella penicillata Lestagella penicillata (Barnard, 1940) SPECIES Not evaluated Unknown - 1 Q 2022-11-08 <input type="button" value="Validate"/> <input type="button" value="Reject"/>						

Check the taxon, and if it is acceptable to add to the Master List, then click Validate. Note the administrators may need to seek expert taxonomic input. The user receives an email indicating that the data has been approved.

If it is not acceptable, the Reject the taxon. An email will be sent to the user who uploaded the records, with reasons for the rejection.





Note: A new occurrence record (site visit) cannot be validated if the new taxon has not been validated. On Validate records it is shown as an **Unvalidated taxon**. First the administrator must validate the taxon by following the link in the email, or by clicking on the **Validate Taxon** button below. The taxon is then either validated or rejected. Once the new taxon has been validated, then the record can be validated.

Before the taxon is validated:

NNYU3207-00013	Unvalidated Taxon	Edit Site	2022-11-08	RBIS	Helen Dallas 1	
----------------	-----------------------------------	---------------------------	------------	------	----------------	--

After the taxon is validated:

NNYU3207-00013	Is Review	Edit Site	2022-11-08	RBIS	Helen Dallas 1	
----------------	---------------------------	---------------------------	------------	------	----------------	--





1.1 Working with GeoServer

1.1.1 GeoServer Publishing Guide

This document guides users through the process of publishing spatial data (from a PostgreSQL database or raster data) in GeoServer and how to do basic cartography. This training material is broken up into the following sections:

1. [GeoServer Overview](#)
2. [Loading layers into a PostgreSQL database](#)
3. [Publishing layers in GeoServer](#)
4. [Styling layers in GeoServer](#)
5. [Visualising GeoServer layers in QGIS](#)





1.1.1 Introduction to Geoserver

[GeoServer](#) is a Java based open source software server which has the ability to share and edit geospatial data in open standard format. GeoServer allows a user to add, remove, edit and control geospatial content through a web browser, which can generate different OGC standard services such as WMS, WCS, WFS, and SLD etc. The main objective and purpose of GeoServer is to offer potential to create maps and share data in compliance with OGC standards.

1.1.1.1 Why use GeoServer?

- Implements **OGC compliant standards**.
- **Open Source** – freely available to download and use.
- **Integrates** with existing applications and APIs such as Google Earth and ESRI ArcGIS.
- **Community support** relating to developing, troubleshooting and software tutorials.
- Frequent **upgrades** and development, improving the functionality, quality and ease of use.

1.1.1.2 Main features and capabilities

- Implements the **OGC standards** in compliance with the OGC standard specifications.
- Easy to use **web configuration tool**.
- Support for **PostGIS**, Shapefile, ArcSDE, DB2 and Oracle.
- Supports a wide range of **raster and vector** formats (GeoTiff, ESRI Shapefiles, PNG, JPG, KML, GML).
- Google Earth support.
- Integrates with **OpenLayers**, GeoWebCache and GeoTools.
- User Interface supports **multiple languages** (English, French, German, Russian etc.)
- **Flexibility** in controlling and setting up GeoServer, tailoring it to the users requirements.

The diagram below shows the workflow relating to ingesting data into GeoServer and previewing the data.





Create Workspace



Create Store



Create Layer



**Create Styles
(optional)**



**Create Layer Groups
(optional)**



Preview Layers

Content above available from [learning geoserver](#).





1.1.1 Loading spatial data

Spatial data consist of vector and raster data. In this guide we will explain the process of loading vector data into a PostgreSQL database.

Note:

We assume users have a running instance of QGIS on their machines. If you do not have a running version you can download and install an appropriate [QGIS version](#) based on your architecture. Also acquire the credentials for the database from your database administrator.

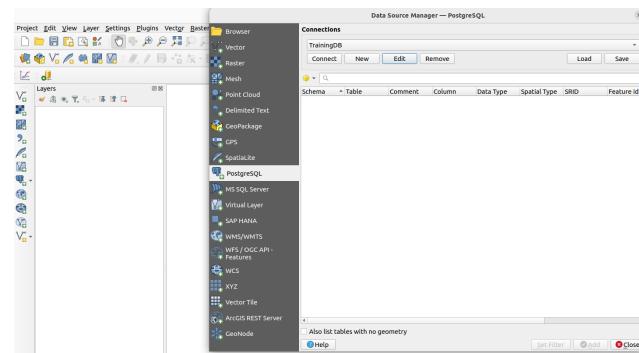
There are various ways to load vector data into the database but, we will concentrate on the easier methods. This usually involves the following:

- Define a database connection - this is a once off task.
- Loading the data through various methods i.e Drag and Drop or Database Manager.

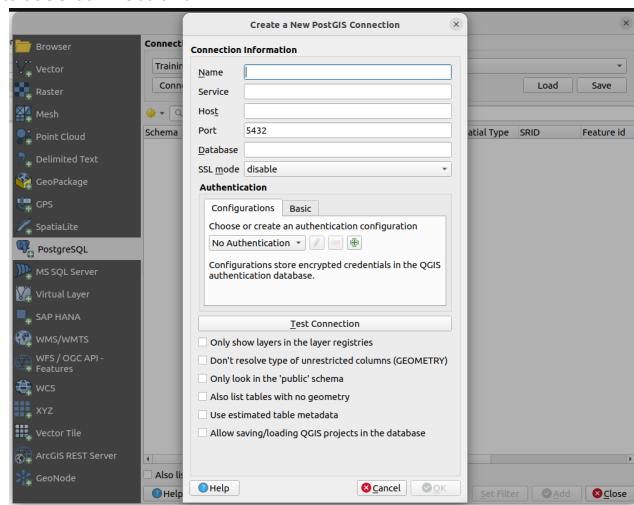
1.1.1.1 Setup PostgreSQL Connection Parameters

Step 1. Open QGIS Desktop.

Step 2. On your icons toolbar click the PostgreSQL icon to add layer or alternatively click on the **Layers Menu > Data Source Manager > PostgreSQL**

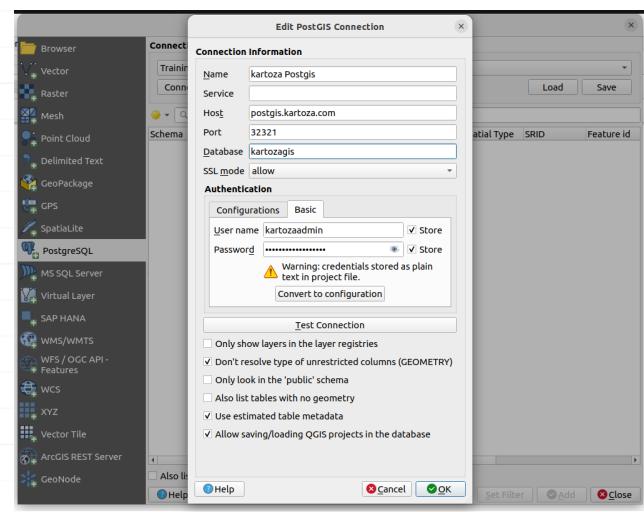


Step 3. Click to create a new database connection.



Step 4. Populate the dialogue with your user credentials.



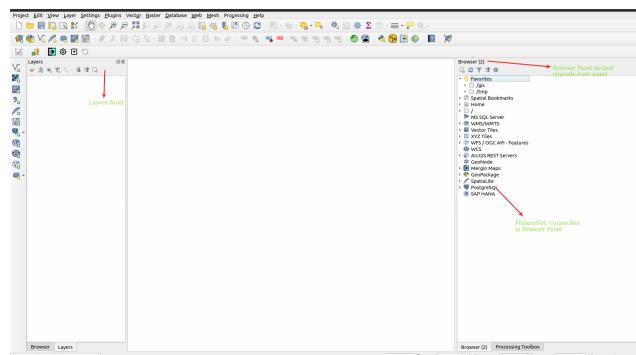


Step 5. Save your connection parameters.

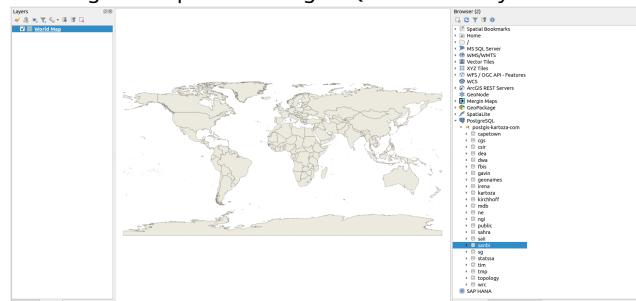
1.1.1.2 Loading Spatial Data

Using the QGIS Browser

All panels in QGIS can be docked and arranged based per user's needs. It is encouraged to dock your layers and browser panel on opposite sides in QGIS.



Step 1. Load your vector layers into QGIS. **Step 2.** Open the browser tab that you have docked on the opposite end of the layer panel. **Step 3.** In the browser panel navigate to open the PostgreSQL connection you defined earlier on.



Step 4. Select the appropriate schema from your PostgreSQL connection. **Step 5.** Drag the layer from the layers panel dropping it onto the selected schema in the browser panel. **Step 6.** Wait for the layer to complete loading.

After loading the layer it will be available in the selected schema and ready to use in GeoServer.

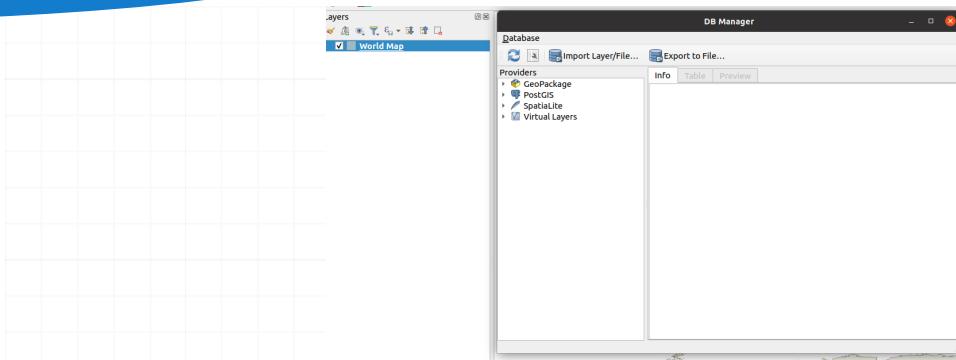
Using DBManager

When using this method it is assumed a user has already defined a database connection.

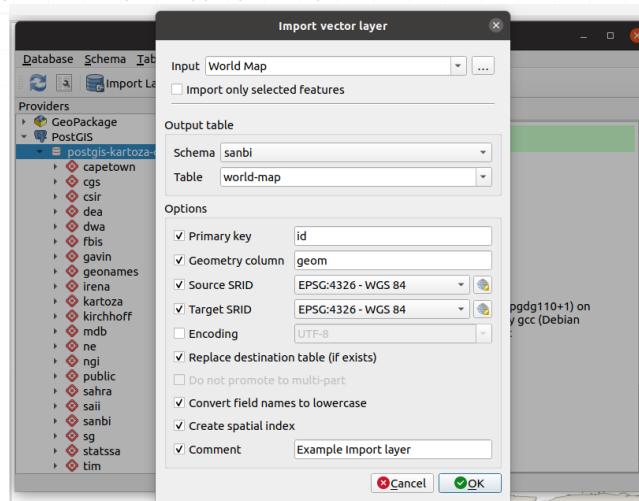
Step 1. Navigate to the Database Menu in QGIS and from the drop down choose **DB Manager**.

Database Menu > DB Manager





Step 2. Select your PostgreSQL connection. **Step 3.** Click on the **Import Layer/File** on top of the DB Manager dialogue. **Step 4.** Populate the import layer dialogue choosing the appropriate options.



Step 5. Accent the values and wait for the layer to be loaded.



The QGIS processing tool also provides other options to load spatial data into a PostgreSQL database. Those tools also provide the users with the option to do bulk inserts of multi layers simultaneously.





1.1.1 Publishing vector data in GeoServer

GeoServer can publish vector data from various sources i.e shapefile, geopackage. In our use case we already have spatial data stored in a relational database and, we will be publishing this data to GeoServer. A relational database has a lot of advantages over the traditional formats i.e shapefile hence our preference to load the data into the database firstly.

The process of publishing vector data in GeoServer involves the following steps:

- Creation of a workspace
- Defining a store (In our case a PostgreSQL connection)
- Publishing the layers

Since the GeoServer we are using in being used in production we have already defined the first two steps (for vector data) and will not be focusing on them here. For Raster data we will be defining step 2 and step 3 for the publishing work-flow.

1.1.1.1 Publishing PostgreSQL Vector data

Step 1. Login to the Geoserver instance i.e [Local GeoServer](#) using the credentials that have been shared with you.

Step 2. Click on the layer menu option **A** on the image below.

Layers

Manage the layers being published by GeoServer

Add a new layer → B

Remove selected layers

Type	Title
12 Km Route	
22 Km Route	
Five km Route	
Marathon Route	
Medical Facilities	
10 km Route	

Step 3. Click on option **B** shown on the image above.

Step 4. Choose a store you want to publish the layer from. This should be the **sanbigis** store.

New Layer

Add a new layer

Add layer from: Choose One

Step 5. Select the appropriate layer you wish to publish.

Step 6. On the **Data** tab edit the following properties.





The screenshot shows the 'Edit Layer' interface for the 'sanbi:country' layer. The left sidebar includes links for About & Status, Data, Services, Settings, and Security. The main area has tabs for Data, Publishing, Dimensions, and Tile Caching. Under the Publishing tab, there are fields for Title (set to 'country'), Abstract (empty), and Keywords (with 'country' listed under Current Keywords). There are also sections for Features, New Keyword, Vocabulary, and Add Keyword.

to the publishing tab:

Property	Description
Name	name this will be identified with
Title	Friendly name
Abstract	Add short description about the layer
Bounding Boxes	choose compute from data and compute from native bounds

Then select an appropriate style to use with your layer.

The screenshot shows the 'Edit Layer' interface with the 'Publishing' tab selected. Under 'WMS Settings', there are checkboxes for 'Queryable' (checked) and 'Opaque' (unchecked). The 'Default Style' dropdown is set to 'polygon'. Below this, there are sections for 'Additional Styles' (listing several options like 'seige15km_route', 'kartoza20m_contours', etc.) and 'Available Styles' (listing the same options with checkboxes). A 'Selected Styles' section is also present.

Step 7. Save your changes and your layer will be visible within GeoServer.

1.1.1.2 Publishing Raster data

In order to publish raster data, you will need to upload the files onto the server where your GeoServer instance is hosted. This is usually done by the Administrator or you can do it yourself if the Resource Browser plugin is installed.

Step 1. Make sure the layers you need to publish are already stored on a folder visible within GeoServer data directory.

Step 2. Click on **Stores** in the **Data** side menu.

Step 3. Add a new store selecting the appropriate raster data type. The preferred format is Geotiff.





New data source
Choose the type of data source you wish to configure

Vector Data Sources

- CSV - Comma delimited text file
- Directory of shapefiles (shapefile) - Takes a directory of shapefiles and exposes it as a data store
- H2 - H2 Embedded Database (JNDI)
- MySQL - MySQL Server - Microsoft SQL Server
- Microsoft SQL Server (TDS Driver) - Microsoft SQL Server (TDS Driver) (JNDI)
- Microsoft SQL Server (JDBC Driver) - MySQL Database (JNDI)
- MySQL (JNDI) - MySQL Database (JNDI)
- Oracle - Oracle Database (JNDI)
- PostGIS - PostGIS Database (JNDI)
- PostgreSQL - PostgreSQL Database (JNDI)
- Shapefile - Allows access to a Shapefile or containing Feature information
- Shapefile - ESRI(tm) Shapefiles (*.shp)
- Teradata (JNDI) - Teradata Database (JNDI)
- Web Feature Service - Provides access to the features published a Web Feature Service, and the ability to perform transactions on the server (when supported / allowed).

Services

- WMS
- WCS
- WFS
- CSW
- WPS

Settings

- Global
- Contact Information
- Raster Access

Title Caching

- Caching Defaults
- Local
- Disk Quota
- Bliddstone

Security

- Settings
- Authentication
- Passwords
- User Groups, Roles
- Data
- Services
- Java Security

Monitor

- Activity

Step 4. Fill in the raster dialogue as depicted below:

Add Raster Data Source

Description

GeoTIFF
Tagged Image File Format with Geographic information

Basic Store Info

Workspace * Select sanbi or appropriate schema

Data Source Name * L1_LCC_99 Give a unique name

Description

Enabled

Connection Parameters

URL * Browse to where your resource is located

Step 5. Save the values in the dialogue and proceed to publish the layer.

Step 6. On the **Data** tab edit the following properties.

Property	Description
Name	name this will be identified with
Title	Friendly name
Abstract	Add short description about the layer

Step 7. On the publishing tab choose the appropriate style and the layer will be visible in GeoServer.





1.1.1 Cartography

GeoServer provides a couple of ways to symbolize vector and raster data. The most common way is by using SLD (Styled Layer Descriptor) which is an OGC standard. GeoServer also adds some flavour to the format which enriches how to symbolize vector/raster data. Other less common ways to symbolize data include using CSS(Cascading style sheets) and YSLD.

There are various open source software which allows you to export SLD natively. Since we are familiar with QGIS we will use it as our de facto Desktop GIS system.



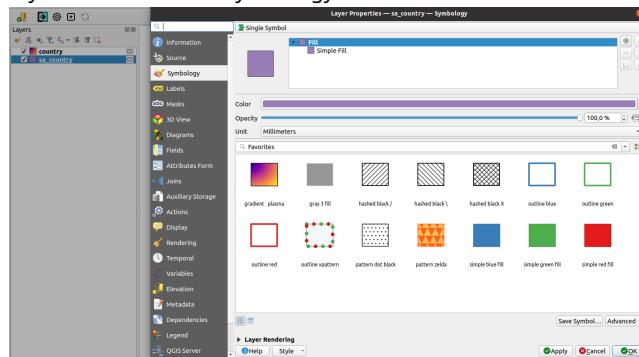
Note:

Although QGIS can export SLD it does not produce a 1-1 mapping of the rich cartography that is available in QGIS. It is recommended to use simple styles when your goal is to use the SLD exporter from QGIS.

1.1.1.1 Styling Vector layers in QGIS

Step 1. Load your vector layers in QGIS.

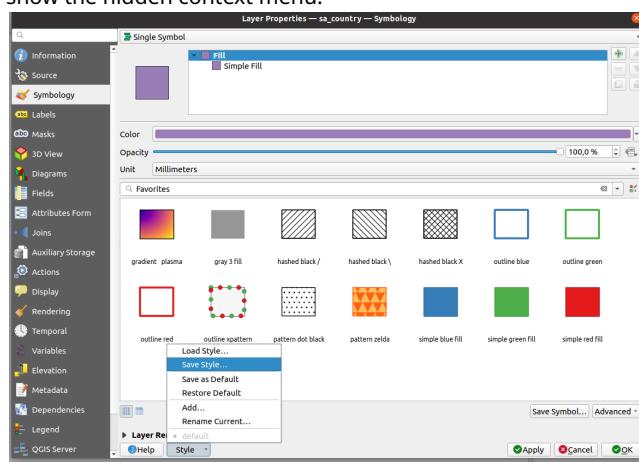
Step 2. Right-click on the vector layer and choose the symbology tab.



Step 3. Select an appropriate style from the options. Be thoughtful of all the cartographic rules and the limitations of the exporter when choosing a style.

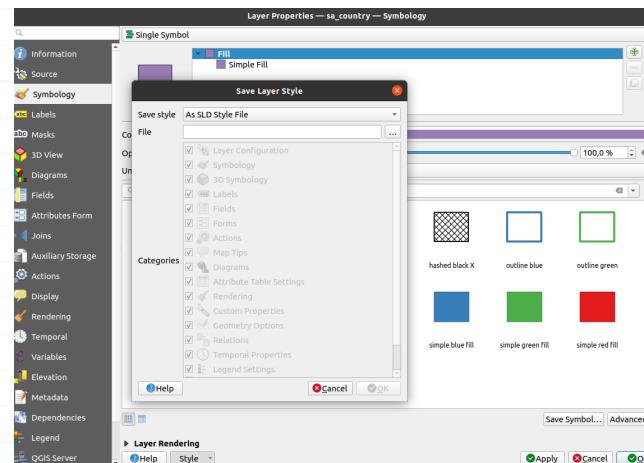
Step 4. If you are satisfied with your result click **Apply**.

Step 5. Click on the **Style** link to show the hidden context menu.



Step 6. Save your style as SLD.





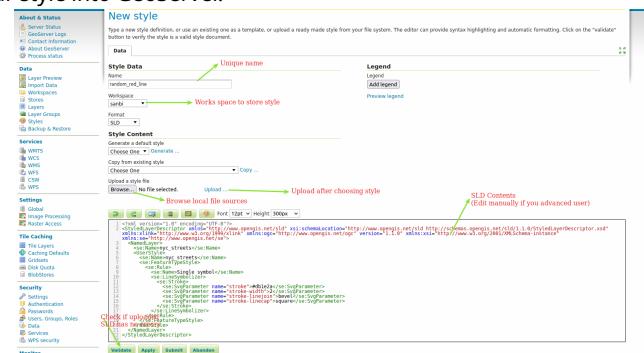
Step 7. Export the SLD to disk and wait to upload to GeoServer.

1.1.1.2 Publishing style in GeoServer

Step 1. Navigate to GeoServer and click on the style tab.

Step 2. Click to Add New Style.

Step 3. Browse and upload your style into GeoServer.

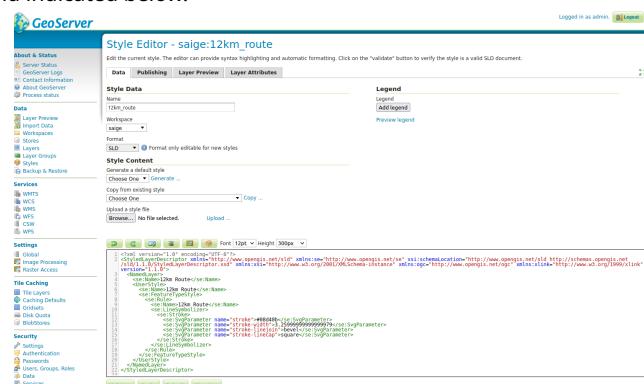


Step 4. Submit your results and this will take you back to your style.

Step 5. Use the search box at the top of the style to identify the name of the style you created above.



Step 6. Open the style again and indicated below.



Step 7. Select the layer you want to associate your style with.



There are two options:

- **Default style** - Visible when you preview the map.
- **Associated style** - Visible when you change the URL for a GetMap / Getlegend request



Step 8. Submit your results

 **Note:**

This process applies to also styling raster data.





1.1.1 Visualising layers in QGIS

QGIS provides native ways to interact with services coming from GeoServer. Both services are OGC compliant and can communicate using the following protocols:

- WFS (Web Feature Service) - renders vector features.
- WMS (Web Map Service) - renders as raster data.
- WCS (Web Coverage Service) - render the raw raster data.
- WMTS (Web Map Tile Service)
- OGC API

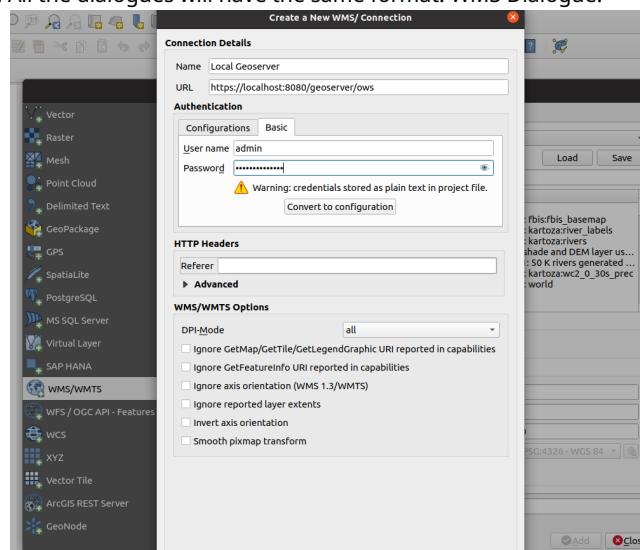
For each protocol, QGIS provides a native way to interact and authenticate against.

1.1.1.1 Loading OGC Protocols in QGIS

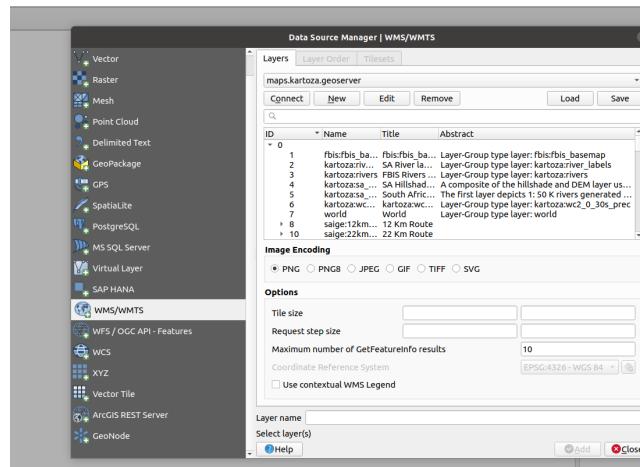
Step 1. Activate the Data Source Manager.

Step 2. Select the protocol you need to define and add a new connection.

Step 3. Populate the dialogues. All the dialogues will have the same format. WMS Dialogue:



Step 4. Click connect to preview the resources available on the server.



Step 5. Select a layer to load into Geoserver and start interacting with it.

Repeat the above procedure for each service types.





1.1 GIS Data in BIMS

1.1.1 GIS data in BIMS

1.1.1.1 Working with GeoContext Data

1. [Overview of the GeoContext System](#)
2. [GeoContext and Visualisation Layers](#)
3. [Working with GeoContext Data](#)
4. [Harvesting GeoContext Data](#)

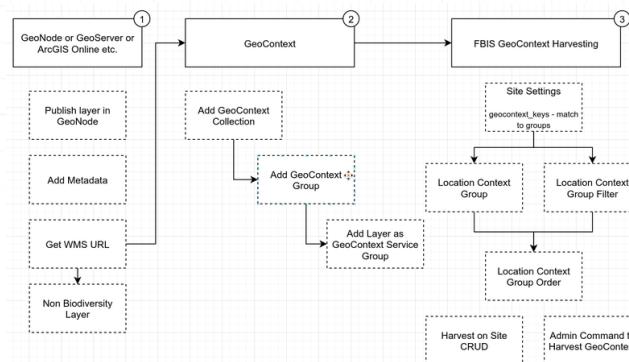




1.1.1 Overview of GeoContext Management

In this guide we will explain the high level concepts of the GeoContext subsystem which is used to derive location related data for each occurrence record added to RBIS.

GeoContext is an independent service, available at <https://geocontext.kartoza.com/>. The purpose of GeoContext is to harvest data for point locations from a range of online databases. GeoContext allows you to register WMS/WFS/WCS layers in groups which in turn can be registered in a collection. You can then pass it a point locality and it will query every layer in the collection, returning a set of values, one for each layer under the point location.



As you can see from the above diagram, the workflow consist of three parts:

- 1) Publishing layers under e.g. WMS
- 2) Registering layers, groups and collections in the GeoContext service
- 3) Registering the GeoContext service(s) with BIMS

This tutorial will lead you through all of these steps. We expect that you are already familiar with platforms such as GeoNode, GeoServer and concepts such as OGC services. We also expect that you are familiar with and understand the basic operations and management of BIMS.

The following YouTube video walks through the steps described in this section of the documentation in detail with examples. If you are viewing this as a PDF or on the web, you can click on the image below to open the YouTube video.

Working with GeoContext layers in FBIS



Tim Sutton
info@kartoza.com





1.1.1 Publishing GeoContext and Visualisation Layers

This subsection describes how to publish layers as WMS (Web Mapping Services) for use by GeoContext or as Visualisation layers. BIMS deploys with an instance of GeoNode that can be used for publishing these layers, but you can use any standards compliant web mapping server for this purpose.

1

GeoNode or GeoServer or
ArcGIS Online etc.

First let us define the terms 'GeoContext Layer' and 'Visualisation Layer':

1. **GeoContext** layers are layers that you publish online as an OGC web service with the explicit intention that these layers are harvested by the <https://staging.geocontext.kartoza.com> GeoContext service.
2. **Visualisation** layers are used in the layer selector in BIMS and allow the user to add map overlays in the BIMS map view - for example to show soil types or catchment boundaries on the map.

In the next steps we will show you how to publish both of these types of layers.

1.1.1.1 Publishing a layer in GeoNode

This article gives a short explanation of how to publish a layer in GeoNode. This is one way to provide a layer in GeoContext yourself.

1

GeoNode or GeoServer or
ArcGIS Online etc.

Publish layer in
GeoNode



To publish a layer from GeoNode you can follow this guide : https://docs.geonode.org/en/master/usage/managing_layers/uploading_layers.html

1.1.1.2 Adding metadata to your published layer

The guide shows you how to add metadata to the layer you have published.





1

GeoNode or GeoServer or
ArcGIS Online etc.

Publish layer in
GeoNode

Add Metadata

To add metadata to the layer in GeoNode please follow this guide : https://docs.geonode.org/en/master/usage/managing_layers/layer_metadata.html.

1.1.1.3 Discovering the WMS URL for a published layer

In this guide we show you how to find out the WMS URL for a published layer so that the layer can be published in GeoContext or as a GeoContext layer.





1

GeoNode or GeoServer or
ArcGIS Online etc.

Publish layer in
GeoNode

Add Metadata

Get WMS URL

Discovering the WMS URL for a map service requires that you have a platform where you can browse the services. This could be done through a GIS client such as QGIS or on a web interface such as GeoNode or GeoServer. For this example we will show you the workflow in GeoNode.

First browse to the map layer in GeoNode that you want to publish in BIMS:

Title	LULC_2018_
License	Not Specified
Abstract	No abstract provided
Publication Date	Aug. 25, 2020, 1:46 p.m.
Type	Raster Data
Keywords	GeoTIFF, LULC_2018_, WCS
Regions	Global
Responsible	numaurice

Next click on the metadata detail button to view the metadata for the layer.





Metadata Detail

On the metadata page you will see a long list of information about the layer. First make a note of the "Title" of the layer e.g.:

 Note:

LULC_2018_

Now scroll down until you find the section called "References" and then look for the heading "OGC WMS: geonode Service". Right click on the service link and choose "Copy link location" from your browser's context menu.

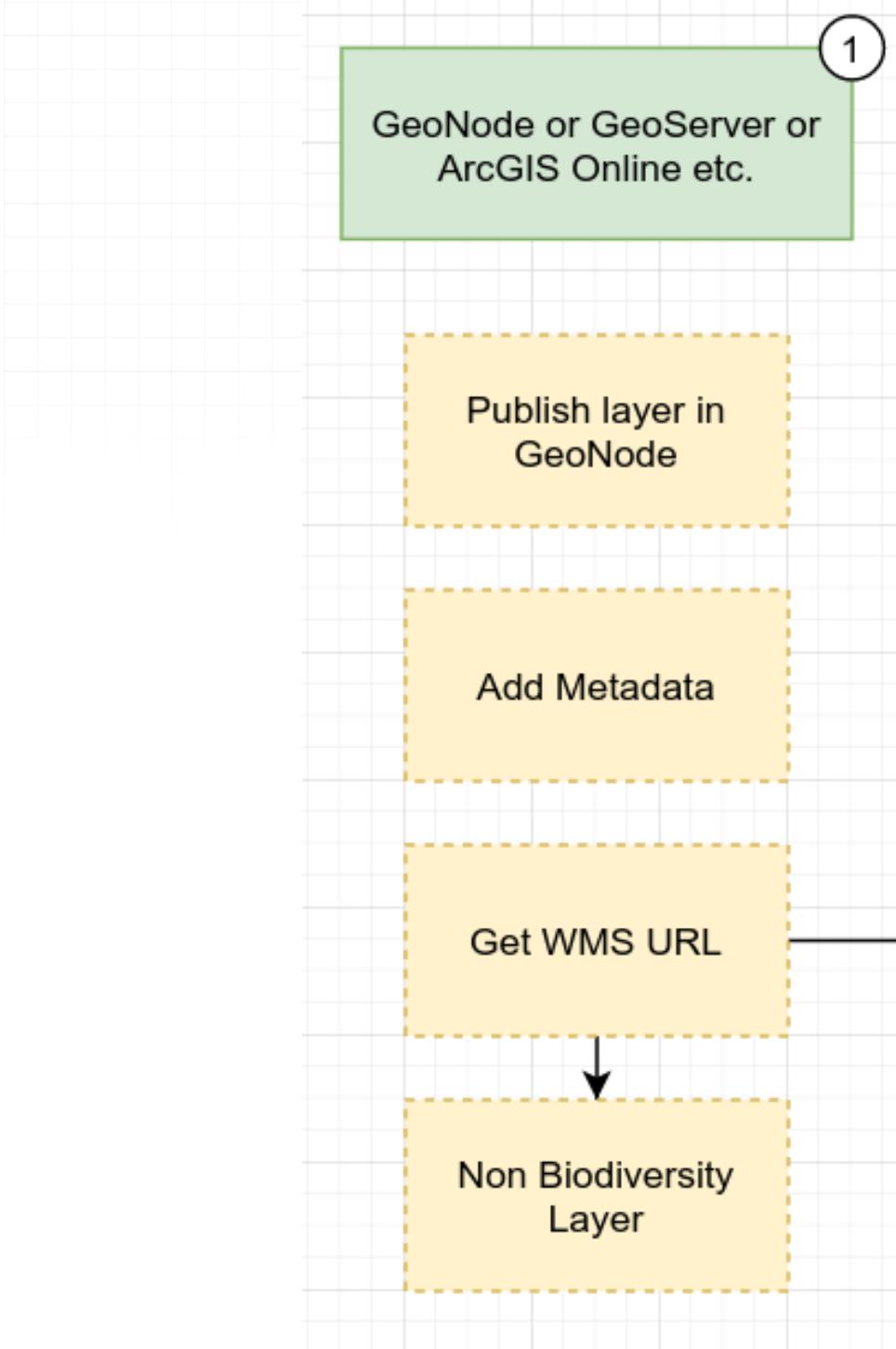
Save the service URL that is now in your clipboard e.g.:

<https://geonode.rbis.kartoza.com/geoserver/ows>

1.1.1.4 Adding a non-biodiversity layer to FBIS

In this guide we will show you how to publish a non-biodiversity layer in FBIS. Non-biodiversity layers can be displayed on top of the base map in FBIS to provide insights about the spatial situation of collection sites.





In order to add a layer to the FBIS, follow these steps :

- Go to admin page
- Click non biodiversity layer section
- Click Add non biodiversity layer button at the top right
- Fill out these required fields (see Discovering the WMS URL for a published layer):
 - Name - The name of the layer, will be displayed in the Layer Selector
 - WMS url - WMS url for this layer (if you're using GeoNode to host the layer you can try following link : {geonode_url}/geoserver/wms)
 - WMS layer name - Layer name from layer provider (e.g. geonode:layer_name)
 - WMS format - Format of the wms, default is in image/png
 - Get feature format - Output format of the GetFeature function, the default is in text/plain
- Click Save button at the bottom right
- To set the order in which the layers are displayed on the filter click these buttons :

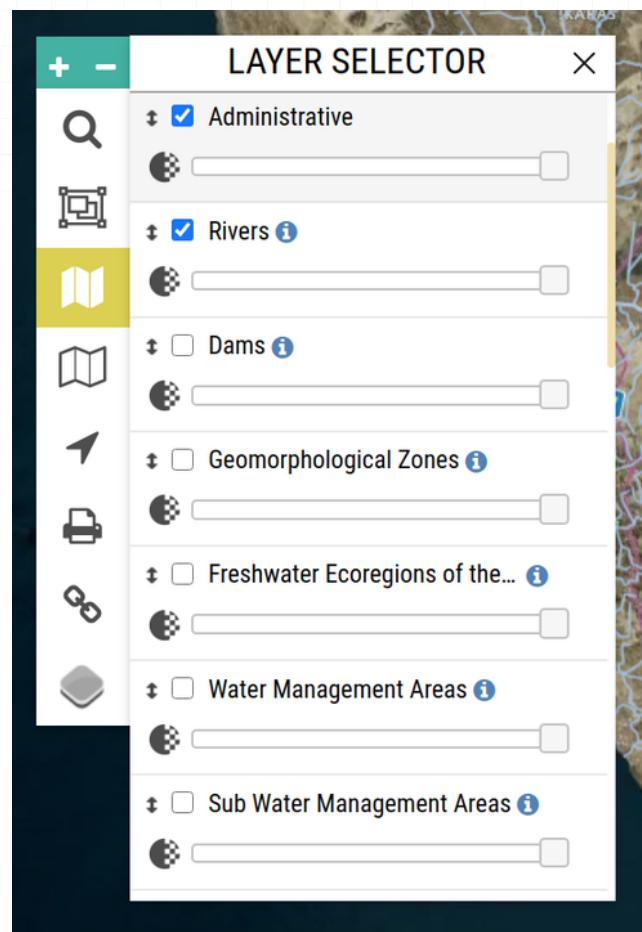




Non biodiversity layers

Order		Name	Wms url	Wms layer name	Move
1		Rivers	https://maps.kartoza.com/geoserver/wms	kartoza.sa_rivers	
2		Dams	https://maps.kartoza.com/geoserver/wms	kartoza.dams500g	
3		Geomorphological Zones	https://maps.kartoza.com/geoserver/kartoza/lems	kartoza.geomclass	
4		Freshwater Ecoregions of the World	https://maps.kartoza.com/geoserver/wms	kartoza.freshwater_ecoregions_of_the_world	Move up the layer Move down the layer
5		Administrative Provinces	https://maps.kartoza.com/geoserver/wms	kartoza.sa_provinces	
6		Water Management Areas	https://maps.kartoza.com/geoserver/wms	kartoza.water_management_areas	

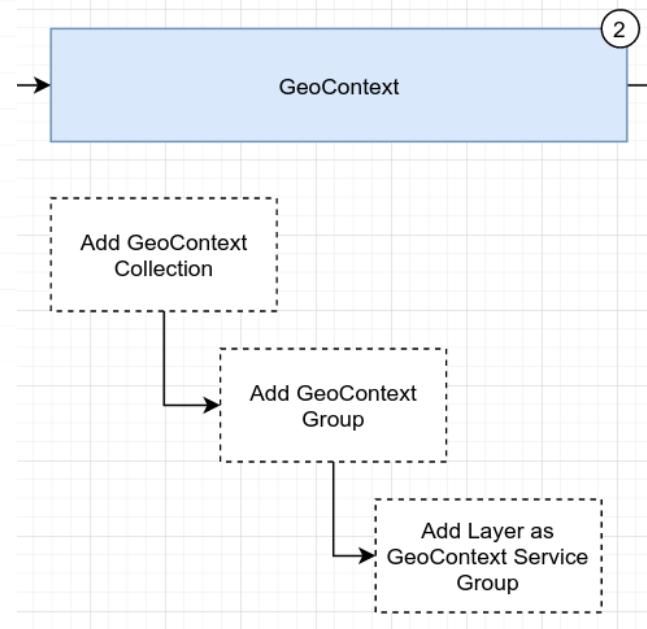
These layers will appear in the Layer Selector on the map page.





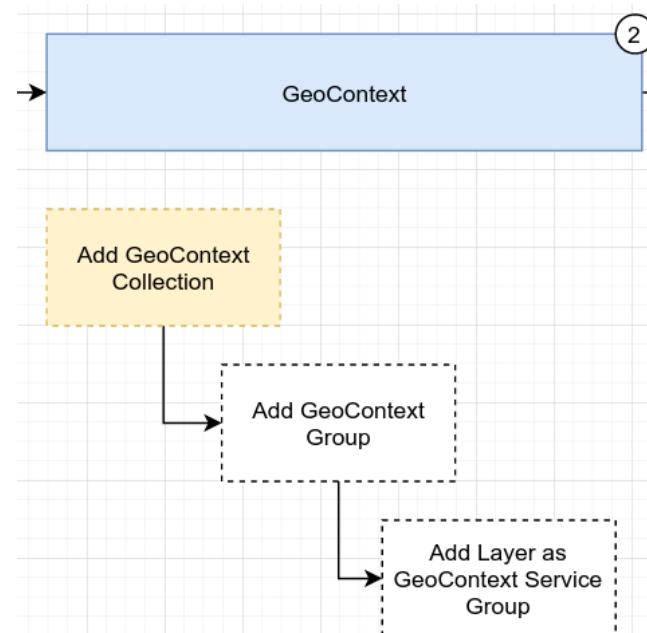
1.1.1 Working with GeoContext Data

In this article we explain the concept of the GeoContext platform and how layers are published to it in BIMS.



1.1.1.1 Creating a GeoContext Collection

A GeoContext collection is a set up web map services that can be queried in order to discover habitat or other relevant spatial data for a site.



From GeoContext collection [admin page](#) click **Add collection button** to create a new collection





+ Add collection

Search icon

Description

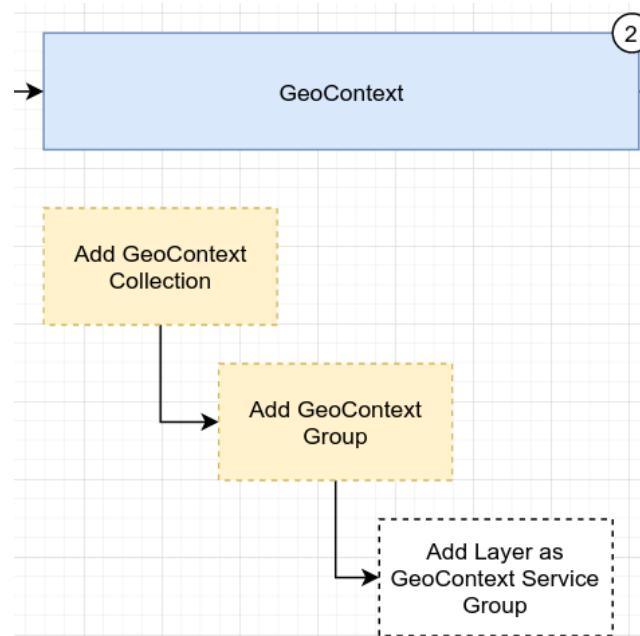
Fill out the required fields :

- Key - Key of the collection
- Name - Name of the collection

Click **Save** when you're done

1.1.1.2 Adding a GeoContext Group

A GeoContext group is a subset of layers from a GeoContext collection that form a logical group, usually based around a theme such as temperature, political regions etc.



Adding groups to existing collection

- From the [GeoContext Collection](#) admin page, open the collection that you want to add groups to.
- From the Context groups section click **Add another collection group** link
- Find existing group that you want to add to the group.
- If you want to create a new group, click + sign next to the dropdown. See **Adding new Group** to learn how to create a new group from scratch.

Collection groups		
Context group	Order	
Administrative Boundary	0	
Cadastre	1	
-----	0	
Add another collection groups		Create a new group

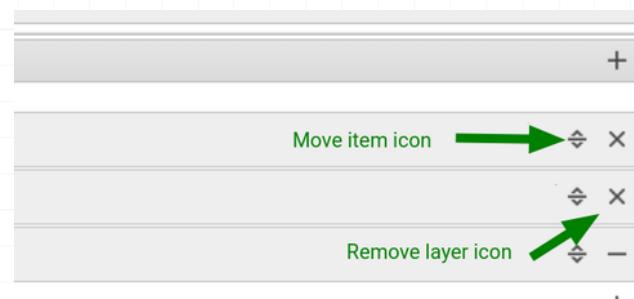
You can arrange the group order as follows:

- Update the order text manually
- Or move the group by dragging the move item icon that is located on the far right before the x sign





In order to remove group from the group just click the x sign



Adding a new Group

You can create a new group from the context group page or directly from layer admin page.

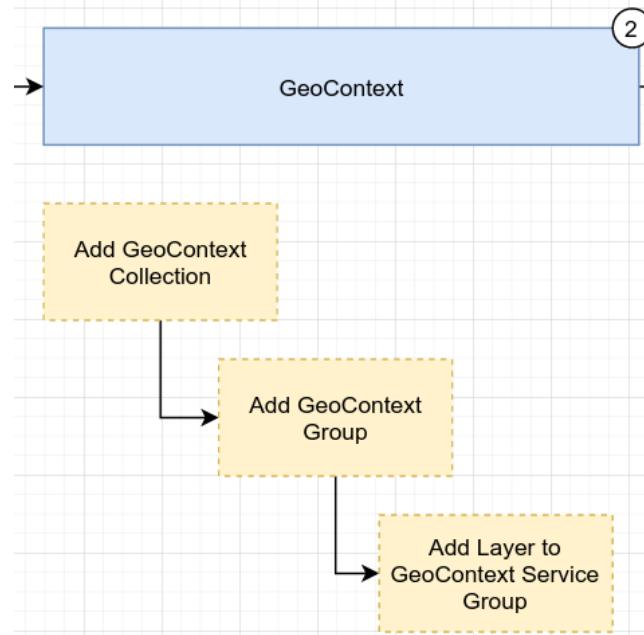
In order to create new group you need to fill out the required fields:

- **Key** - Key of the context group, this will be used in the bims to fetch the GeoContext data via API
- **Name** - Name of the group
- **Group Type** - Type of the group to determine the UI, choose Graph if this group depicting data over a time period. (e.g. monthly average temperature)

See other existing groups for guidance.

1.1.1.3 Adding a layer to a GeoContext group

In this section we describe how you add a layer to a GeoContext group. A layer is a Web Mapping Service intended to make spatial information available over the internet, covering a specific thematic topic e.g. average annual temperature in March



Adding Layers to an Existing GeoContext Group

- From the [GeoContext group](#) admin page, open the group that you want to add layers to.
- From the Context group services section click **Add another context group service** link
- Find existing layer that you want to add to the group.
- If you want to create a new layer, click + sign next to the dropdown. See **Adding new Layer** to learn how to create a new layer from scratch.





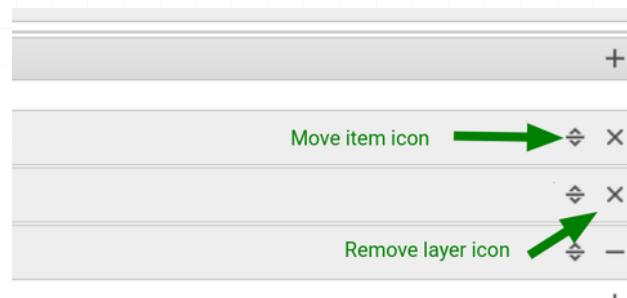
Context group services		Order
Context service registry	Rwanda Catchments Level 2	0
Context service registry	Rwanda Catchments Level 1	1
Context service registry	0

Add another context group services

You can arrange the layer order as follows:

- Update the order text manually
- Or move the layer by dragging the move item icon that is located on the far right before the x sign

In order to remove layer from the group just click the x sign



Click **Save** when you're done updating the group.

Adding a new Layer

You can create a new layer from the context group page or directly from layer admin page.

In order to create new layer you need to fill out the required fields:

- **Key**
- **Name**
- **Url** - Url of the layer service, e.g. if you use Geoserver then you can try following link :
`{geoserver_host}/geoserver/wfs`
- **Query Type** - Query type of the layer; usually we use WFS
- **Layer name** - Required name of the actual layer/feature to retrieve (Property name).
- **Layer typename** - Layer type name to get the context.
- **Service version** - Version of the service (e.g. WMS 1.1.0, WFS 2.0.0).

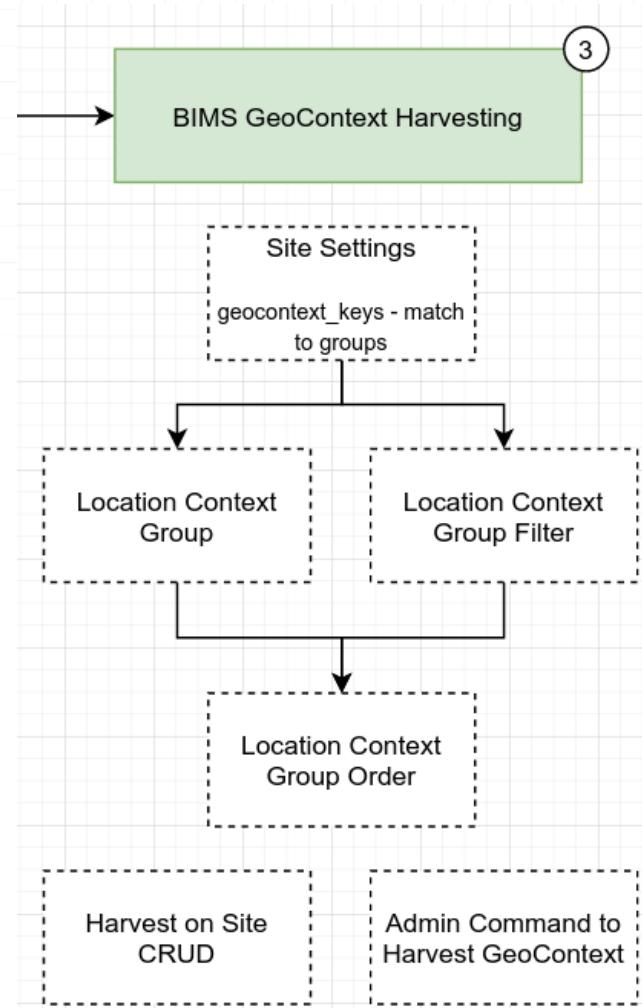
See other existing layers for guidance.





1.1.1 Harvesting GeoContext Data in BIMS

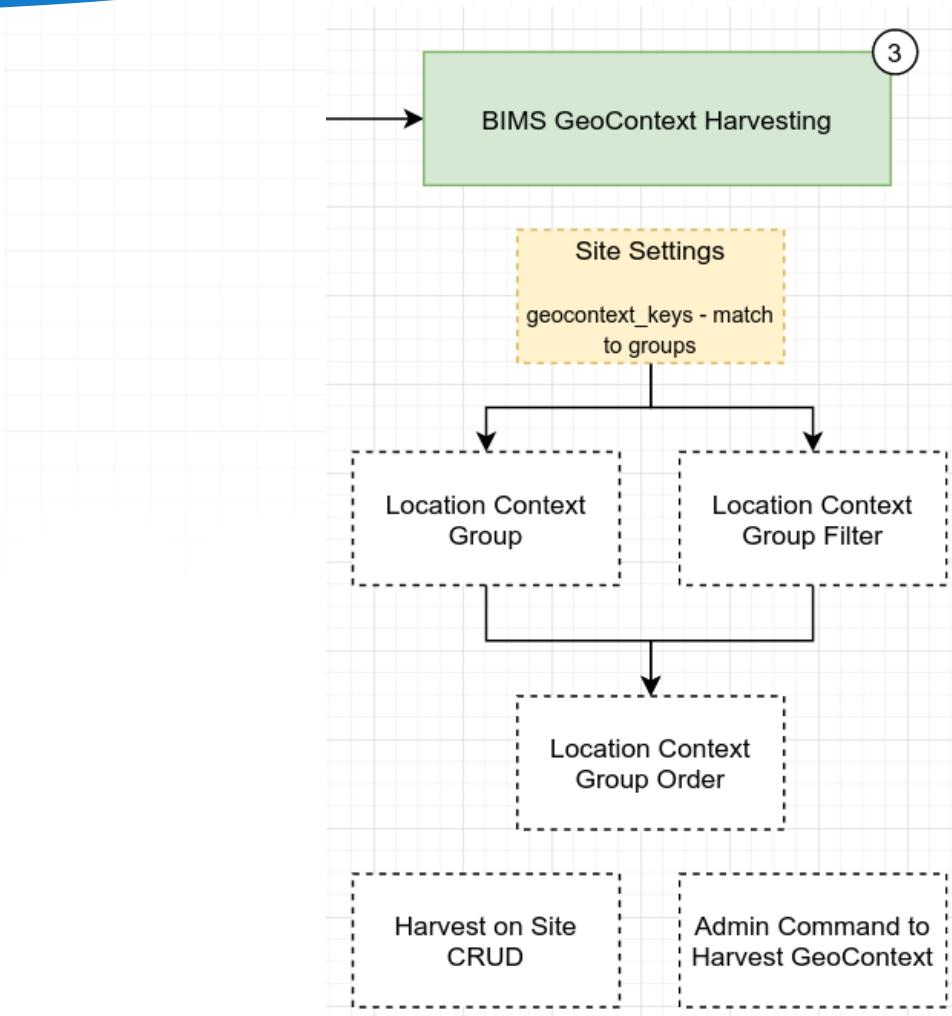
In this section we explain the process of configuring BIMS to harvest GeoContext data from a GeoContext server for a collection of layers.



1.1.1.1 Configuring geocontext settings for GeoContext

This section describes how to configure your geocontext settings to harvest GeoContext data for each site.





Open geocontext settings in admin page Find Geocontext group keys field

Change geocontext setting

Sites	testing healthyrivers.kartoza.com	+
Hold down "Control", or "Command" On a Mac, to select more than one.		
Geocontext url	https://geocontext.kartoza.com/	
Full URL for GeoContext service (include http:// and ends with /).		
GeoContext Group Keys	river,catchment,areas,group,water,management,area,geomorphological,group,freshwater,ecoregion,of,the,world,river,region,group,province,national,freshwater,ecosystem,priority,area,national,biodiversity,assessment,2018,strategic,water,source,areas,national,cbas,group,hydrological,regions,thermal,framework,monthly,average,temperature,group	
Geocontext group keys that will be fetched from GeoContext, separated by commas.		

- Add the GeoContext group keys in this field, use commas to separate multiple keys
- Click **Save** when you're done
- Now the system will check these keys to fetch GeoContext data for new sites

 **Note:**

Make sure that the key exists in the GeoContext, to check you can use this api :

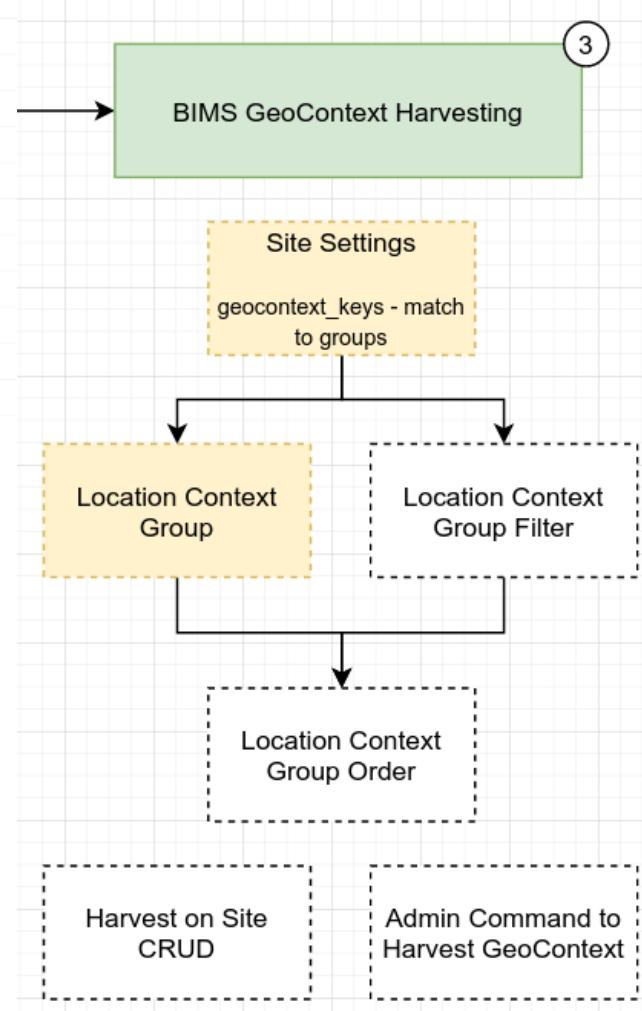
https://staging.geocontext.kartoza.com/api/v1/geocontext/value/group/1/1/{geocontext_key}
and change the geocontext_key in the url with the key you want to check

1.1.1.2 Creating a Location Context Group in BIMS





In this section we explain how to create a location context group in the django admin interface for BIMS.



)

To create a Location Context Group in BIMS, you need to know what layers are returned from the GeoContext group.

For instance, we want to create Location Context Group for Rwanda Catchments.

First, check the output from GeoContext with this API : https://staging.geocontext.kartoza.com/api/v2/query?registry=group&key=river_catchment_areas_group&x=24&y=-29&outformat=json

Note : Change river_catchment_areas_group in the url with GeoContext group you want to add.

You will receive this data from GeoContext :





```

{
  "key": "river_catchment_group",
  "value": "3",
  "name": "River Catchments in South Africa",
  "description": "Layer that depicts the various categories of river catchments in South Africa",
  "group_type": "text",
  "service_registry_values": [
    {
      "key": "primary_catchment_area",
      "value": "Region C",
      "name": "Primary Catchment Area",
      "description": null,
      "query_type": "WFS"
    },
    {
      "key": "secondary_catchment_area",
      "value": "CSZ",
      "name": "Secondary Catchment Area",
      "description": null,
      "query_type": "WFS"
    },
    {
      "key": "tertiary_catchment_area",
      "value": "CSZ",
      "name": "Tertiary Catchment Area",
      "description": null,
      "query_type": "WFS"
    },
    {
      "key": "quaternary_catchment_area",
      "value": "CSZ",
      "name": "Quaternary Catchment Area",
      "description": null,
      "query_type": "WFS"
    }
  ]
}

```

There are two service registry values (layers), so you need to add them both to the Location Context Group to display all those layers in the filter.

To add those layers please follow these steps :

Note : We will use this data for the following steps

```
{
  "key": "rwanda_catchments_level_1",
  "value": "3",
  "name": "Rwanda Catchments Level 1",
  "description": null,
  "query_type": "WFS"
}
```

- Open Location Context Groups admin page
- Click Add location context group button at the top right corner
- Fill out these fields :
 - **Name** - Name of the layer, Rwanda Catchments Level 1
 - **Key** - Layer key, rwanda_catchments_level_1
 - **Geocontext group key** - Group key from GeoContext, rwanda_catchments
- Click **Save**

Then you need to do the same thing for other layer.

Add location context group

Name	<input type="text"/>
Key	<input type="text"/>
Geocontext group key	<input type="text"/> Group key from geocontext
Layer name	<input type="text"/>
<input type="checkbox"/> Verified	

```
{
  "key": "rwanda_catchments",
  "name": "Rwanda Catchments Data",
  "graphable": false,
  "service_registry_values": [
    {
      "key": "rwanda_catchments_level_2",
      "value": "6",
      "name": "Rwanda Catchments Level 2",
      "description": null,
      "query_type": "WFS"
    },
    {
      "key": "rwanda_catchments_level_1",
      "value": "3",
      "name": "Rwanda Catchments Level 1",
      "description": null,
      "query_type": "WFS"
    }
  ]
}
```

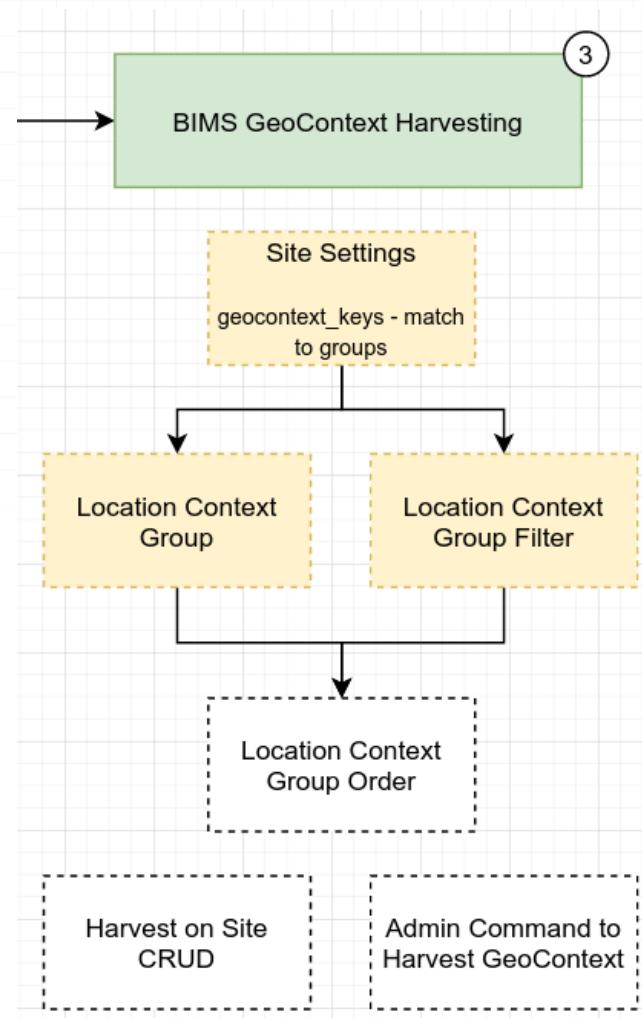
If you've done it correctly, then you will have two new layers in Location Context Group admin page :

Location context groups				
2 total				
<input type="checkbox"/>	Name	Key	Geocontext group key	Layer name
<input type="checkbox"/>	Rwanda Catchments Level 2	rwanda_catchments_level_2	rwanda_catchments	X
<input type="checkbox"/>	Rwanda Catchments Level 1	rwanda_catchments_level_1	rwanda_catchments	O

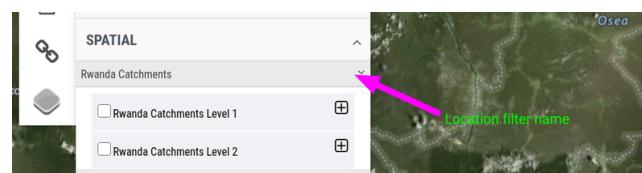
1.1.1.3 Creating a Location Context Group Filter in BIMS

In this section we explain how to create a Location Context Filter in BIMS.





Location context filter is just the filter name for the spatial filter on the Map page.



To add groups (Rwanda Catchments Level 1 & Rwanda Catchment Level 2) to the Location context filter please follow this guide.

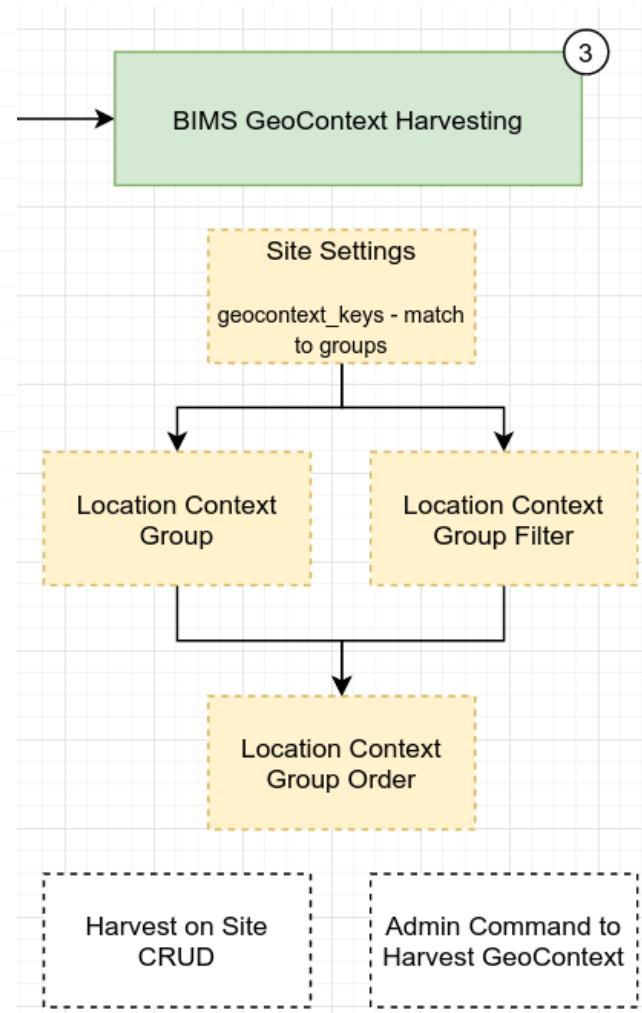
To add new Location context filter please follow these steps :

- Open the Location context filter admin page
- Click Add location context filter button at the top right
- Fill up these required fields :
- **Name** - Name of the location context filter
- **Display order** - Order of this location context filter
- Click **Save** when you've done

1.1.1.4 Configuring the order of Location Context Groups

In this section we describe the process of sorting Location Context Groups to control the order in which they appear in BIMS.

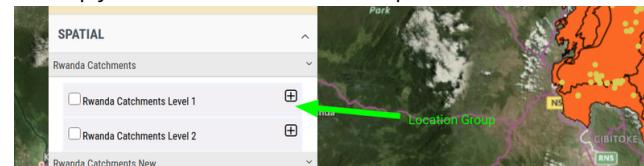




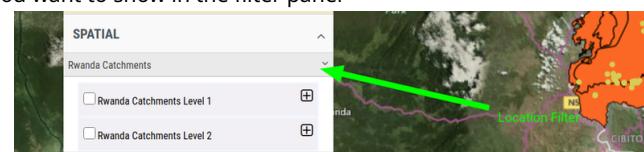
To do this guide, you need to add Location Context Group and Location Context Group Filter beforehand.

Open the admin page for Location Context Filter Group Order Click Add location context group order button at the top right Fill up these fields :

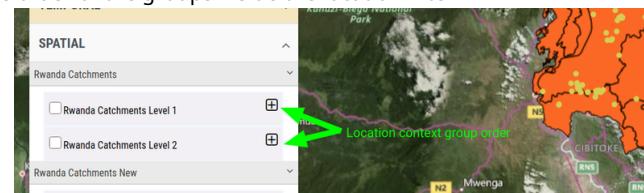
Group - Choose Location Context Group you want to show in the filter panel



Filter - Choose Location Filter you want to show in the filter panel



Group display order - This is the order of the groups inside the location filter



Show in dashboard (optional) - Whether to show this data in the dashboard or not





Overview	
Download	
Refined Geomorphological zone	Rwanda Catchments
Rwanda Catchments Level 1	20
Rwanda Catchments Level 2	-
Species and Occurrences	

Show in side panel (optional) - Whether to show this data in the side panel or not

 Unknown X Edit

Site Details

Site Code	Unknown
Site Description	Unknown
Site Coordinates	30.093, -1.93
Rwanda Catchments Level 1	20
Rwanda Catchments Level 2	-
River	Unknown

Biodiversity Data

Occurrences	4
Origin	Native

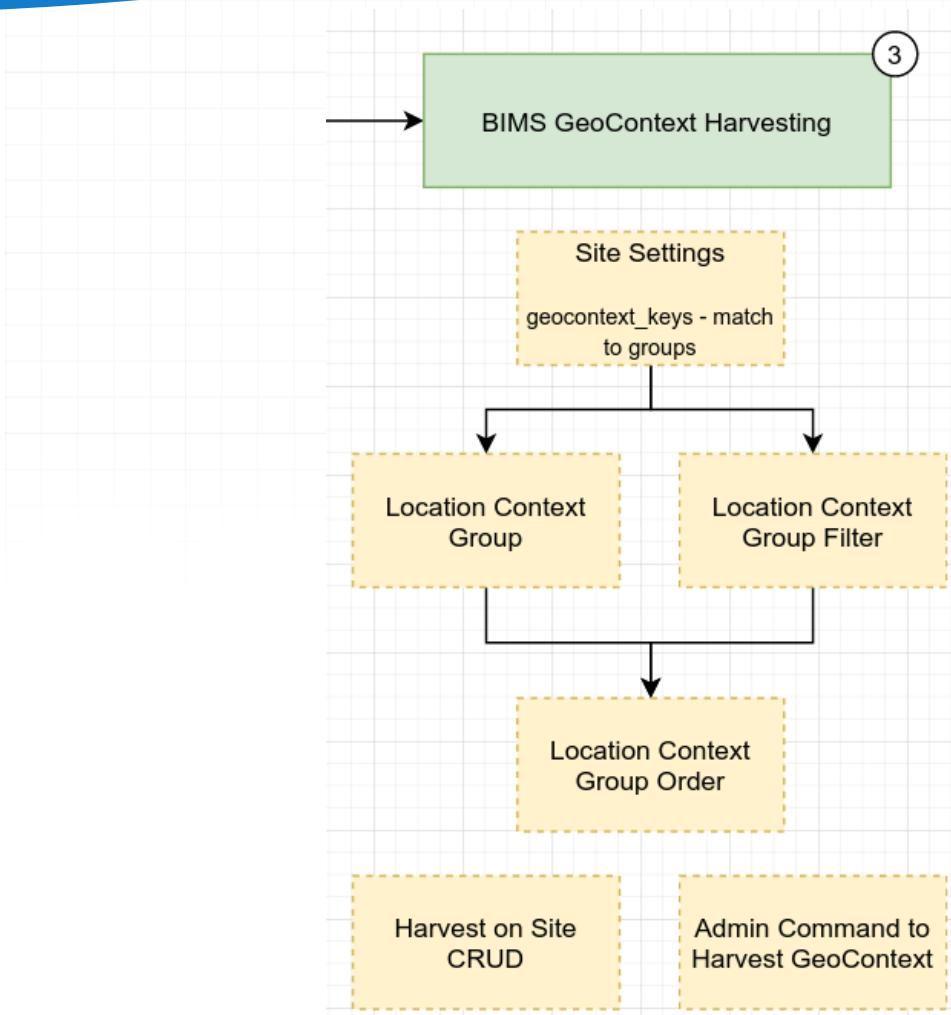


Click **Save** when you've done.

1.1.1.5 Updating GeoContext data for sites using the admin panel

In this article we describe the process of updating the GeoContext data in one or more sites using the admin panel.





To update GeoContext data for existing sites please follow these steps :

- Open Location Sites admin page
- Select the sites you want to update the geocontext data





Location sites

54078 total		1	2	3	4	...	540
<input type="checkbox"/>	Name	Site code	L	F	F	F	F
<input checked="" type="checkbox"/>	H7GROO-MAING	H7GROO-MAING					
<input checked="" type="checkbox"/>	H7BUFF-FROGM	H7BUFF-FROGM					
<input type="checkbox"/>	B2WILG-00137	B2WILG-00137					
<input type="checkbox"/>	B2WILG-00136	B2WILG-00136					
<input type="checkbox"/>	B2WILG-00135	B2WILG-00135					
<input type="checkbox"/>	H7GROO-	H7GROO-					

- Select 'Update location context data for selected sites in background.' in the dropdown located at the bottom of the page

<input type="checkbox"/>	H7HUIS-BWINE	H7HUIS-BWINE	PointObservation	SRID=4326;POINT (20.713118791482 -33.9106144257697)
<input type="checkbox"/>	X3SAND-00101	X3SAND-00101	PointObservation	SRID=4326;POINT (31.237167 -24.721861)
<input type="checkbox"/>	X3MARI-00041	X3MARI-00041	PointObservation	SRID=4326;POINT (31.084694 -24.885389)
<input type="checkbox"/>	H7HUIS-UPDON	H7HUIS-UPDON	PointObservation	SRID=4326;POINT (20.753707051228 -33.9218769366534)

Update location context data for selected sites in background. ▾ 2 of 100 selected Go

- Click **Go**. The system will try to update the geocontext data in the background
- To see the geocontext status open one of the previously selected location sites, scroll down to location context section to view all geocontext data and check if your geocontext data has been retrieved :

Location contexts			
Value	Group	Fetch time	
Region H	47	Primary Catchment Area	2022-07-13
H7	49	Secondary Catchment Area	2022-07-13
H70	46	Tertiary Catchment Area	2022-07-13
H70D	48	Quaternary Catchment Area	2022-07-13
H70D3	50	Quinary Catchment Area	2022-07-13





1.1 Customisation

1.1.1 Customisation

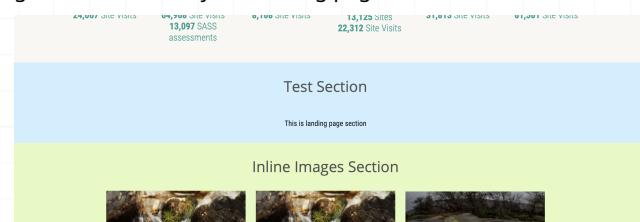
1. [Adding Inline Images](#)
2. [Adding Landing Page Sections](#)
3. [Embedding Videos on the Landing Page](#)





1.1.1 Adding a Landing Page Section

This guide will help you in adding a new section to your landing page.



- Navigate to Bims Theme in Admin



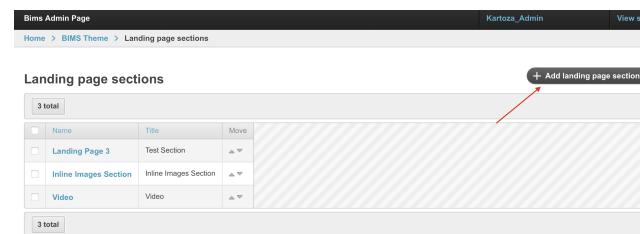
BIMS Theme administration

BIMS Theme	
Carousel Headers	+
Custom Themes	+
Landing page section contents	+
Landing page sections	+
Menu items	+
Partners	+

- Ensure that there is at least one custom theme enabled. To check this, proceed to 'Custom Theme' and see if a record is present and enabled. If not, you can create a new one.



- Let's create a new landing page section. Navigate to 'Landing page sections', and click 'Add new section'.



- (1) Name the new section (note that this name will not appear on the landing page).
- (2) Optionally, add a title that will be displayed on the landing page.
- (3) Set the background color for the section.

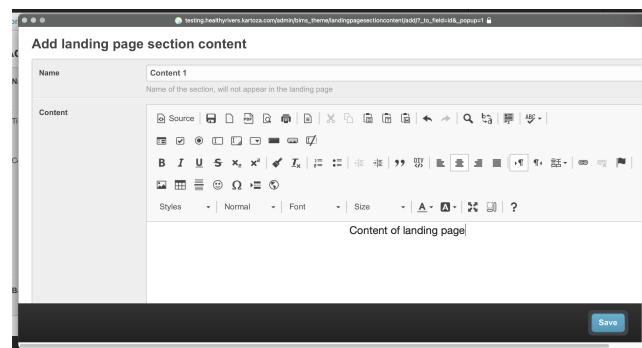




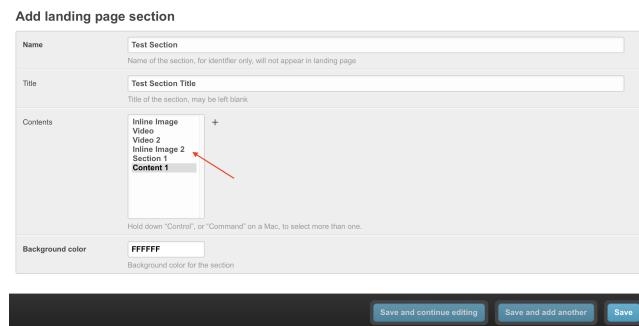
Add landing page section

Name	1 Test Section Name of the section, for identifier only, will not appear in landing page
Title	2 Test Section Title Title of the section, may be left blank
Contents	3 Test Section Inline Image Video Video 2 Inline Image 2 Section 1 Hold down "Control", or "Command" on a Mac, to select more than one.
Background color	3 FFFFFF Background color for the section

- Click 'Save and continue editing'. This will allow you to add content to the section afterwards.
- If you have previously created landing page section content, you can select it in the content field. If not, you can add a new one by clicking the plus button.
- Once you have finished editing the new content, click 'Save'. Remember, you can always update this later.



- Be sure to select at least one content here.



- Click 'Save'. The next step is to add this section to your theme. Navigate to 'Custom Themes' and select the enabled theme.
- Scroll to 'Landing page sections' and select your new section. If you want to select more than one section, hold down the Control key (or Command on a Mac).



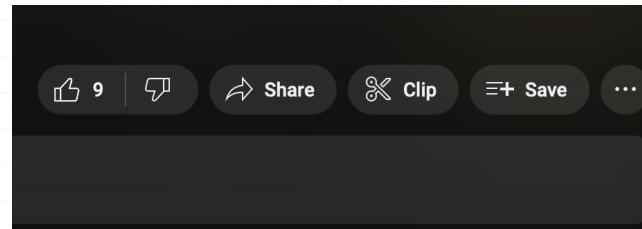
- Finally, click 'Save'. Your new landing page section should now be visible.



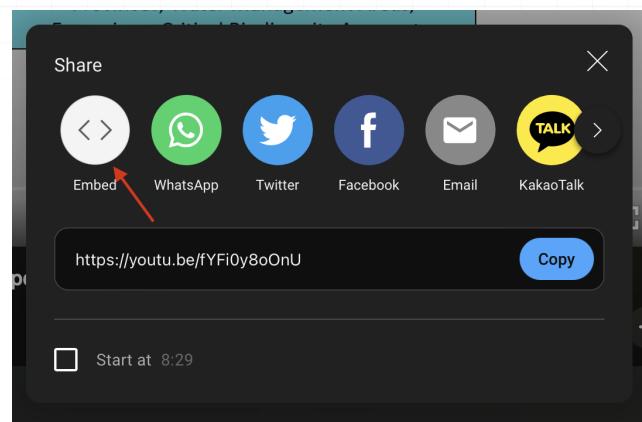


1.1.1 Embedding Youtube Video on the Landing Page

- First, select the YouTube video you wish to show on the landing page
 - Click the 'Share' button under the video



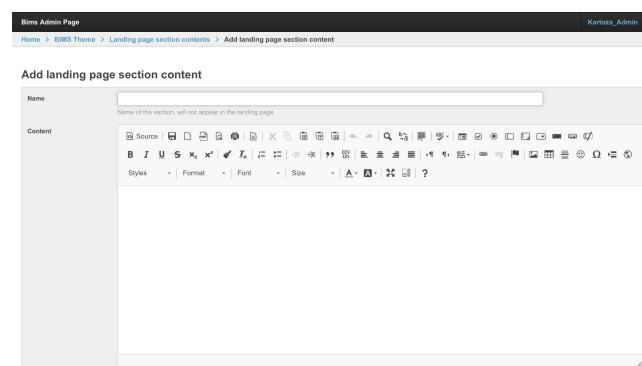
- In the popup, click the 'Embed' button



Click the 'Copy' button on the bottom right. This action copies the video's embed code to your clipboard.



- Now, navigate to the admin page and open the landing page section editor.



- Click on 'Source'



Add landing page section content

Name **Video**
Name of the section, will not appear in the landing page

Content

Source |

B I U S x x² | |

Styles | Format | Font

- Paste the copied embed code into the 'Source' editor using Ctrl+V (or Cmd+V for Mac)

Name **Video**
Name of the section, will not appear in the landing page

Content

Source |

B I U S x x² | |

Styles | Format | Font | Size | ?

```
<iframe width="560" height="315" src="https://www.youtube.com/embed/fT9IBygSch0" title="YouTube video player" frameborder="0" allow="autoplay clipboard-write encrypted-media gyroscope picture-in-picture" webkitallowfullscreen></iframe>
```

- Click 'Source' again. You should now see an iframe containing the video player

Name **Video**
Name of the section, will not appear in the landing page

Content

Source |

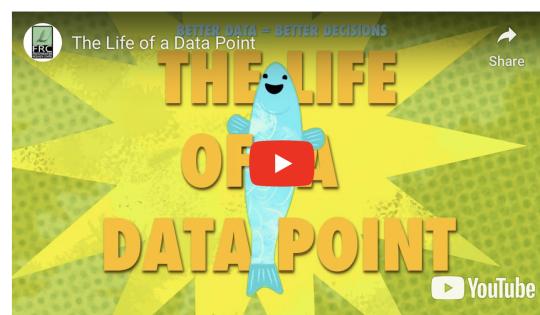
B I U S x x² | |

Styles | Format | Font | Size | ?

IFRAME

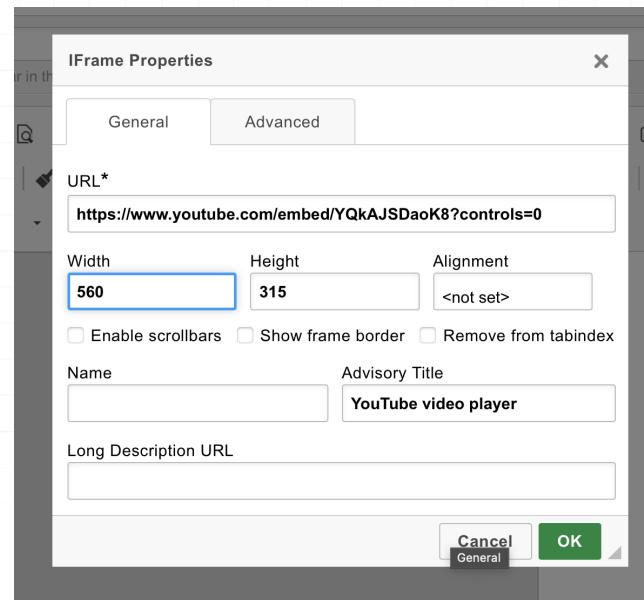
- Once the landing page content is added to the current theme, your video will appear on your landing page like this

Video



- To adjust the video size, double-click the iframe. A popup will appear where you can edit the width and height of the video player. Click 'OK' when done, and then 'Save'

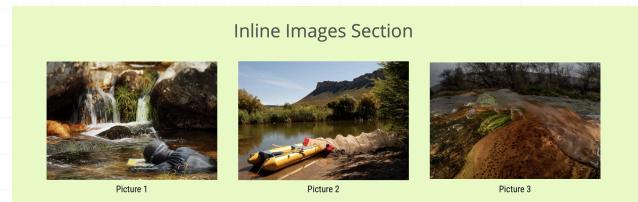




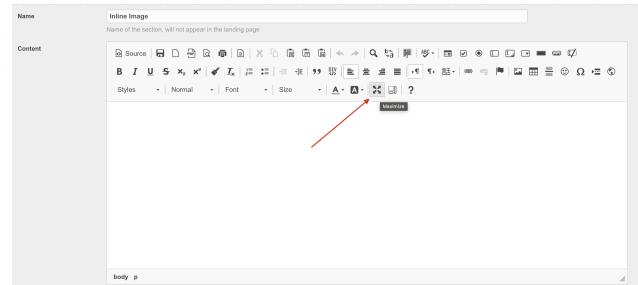


1.1.1 Adding Inline Images on the Landing Page

This guide will help you display images inline, just like the one below:



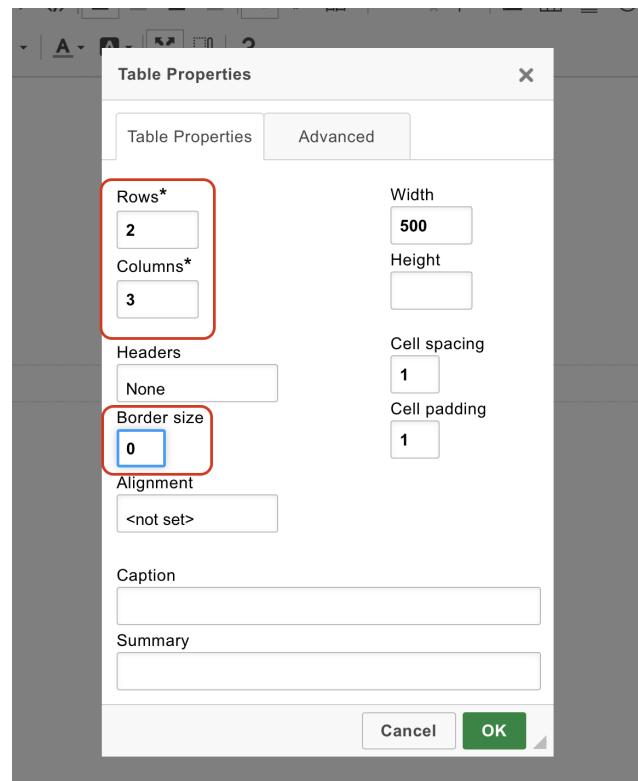
- Start by navigating to the section editor on the landing page. Once there, create a new section.
- To facilitate the upcoming steps, switch the editor to full-screen mode. Click on 'maximize' to do this.



- Next, click on the 'Table' button.



- For this example, we want to showcase three inline images, each with its title underneath. To do this, create a table with 3 columns and 2 rows. Ensure the border width is set to 0.



- Start with the titles so you can easily add images later. Click on the 2nd row and input the corresponding text.





To switch to the next column, simply press the 'Tab' key on your keyboard.

- To centralize the text and images in the table, select all contents by pressing **Ctrl+A** (**Cmd+A** for Mac). Then, click the 'center alignment' option.

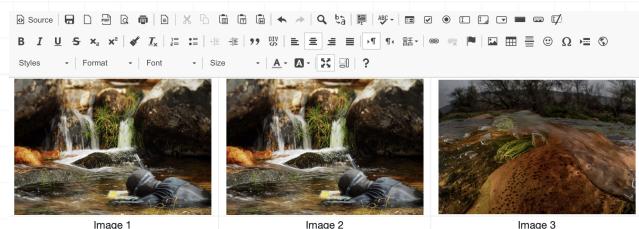
- Now, let's add the images. Click on the first row and select the 'Image' icon.

- Navigate to the 'Upload' tab, choose the desired image file, then click on 'Send it to the Server'.

- Once the image is uploaded, the 'Image Info' tab will open. Set the image width to 300 (to avoid the image taking up the whole screen) and the HSpace (horizontal padding) to 10.

- Follow the same steps for the other two columns. Your table should look something like this:





- Click on 'Maximize' once more to exit the full-screen mode. Click 'Save' to preserve your changes.
- Verify that the newly created landing page section has been added to the current theme. This will ensure your changes are visible on the landing page.





1 Developers

1.1 BIMS developer documentation

This is the homepage for all developer related documentation.

- The [developer guide](#), which describes common workflows for developers in a tutorial format. This includes instructions on how to set up your developer environment, check out the code, run it locally etc.
- The [api guide](#), which describes common workflows for using the restful API.
- The [api manual](#), which describes each API endpoint and its parameters, return values etc. This section is autogenerated.
- The [documentation guide](#), which describes how to add to the project documentation.





1.1 Guide

1.1.1 Developer guide

In this section of the documentation, we aim to onboard developers onto the process of setting up a developer workstation, understanding the system architecture, contributing back to the project and so forth. Here is a brief overview of the content provided here:

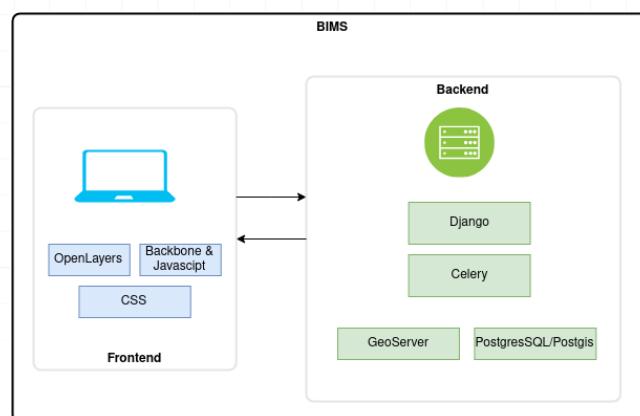
- **Architecture:** - Here we outline the system architecture using ER Diagrams, Software Component Diagrams etc.
- **Prerequisites:** - An overview of the software that needs to be installed before you can start.
- **Cloning:** - In this section we cover how to make a local working copy on your own machine.
- **IDE Setup:** - Here we walk through setting up your IDE.
- **Building:** - This covers tasks related to building the application so you can test it in your browser.
- **Workflows:** - Examples of typical workflows for adding features, fixing bugs etc.



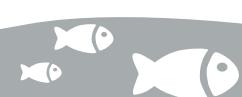


1.1.1 System architecture

1.1.1.1 BIMS Architecture



Logo	Name	Notes
	GeoServer	An open-source server written in Java that allows users to share, process and edit geospatial data. GeoServer implements industry-standard OGC protocols such as Web Feature Service (WFS), Web Map Service (WMS), and Web Coverage Service (WCS). Additional formats and publication options are available as extensions, including Web Processing Service (WPS) and Web Map Tile Services (WMTS).
	Django	BIMS is based on Django, which is a high-level python web framework. Django follows the model-template-views architecture pattern.
	Celery	Celery is a simple, flexible, and reliable distributed system to process vast amounts of messages, while providing operations with the tools required to maintain such a system. It's a task queue with focus on real-time processing, while also supporting task scheduling. BIMS uses Celery for handling background tasks.
	PostgreSQL	PostgreSQL is a powerful, open source object-relational database system with over 35 years of active development that has earned it a strong reputation for reliability, feature robustness, and performance. PostgreSQL helps to make up the database that stores and manages both the spatial data and information for BIMS.
	PostGIS	PostGIS extends the capabilities of the PostgreSQL relational database by adding support storing, indexing and querying geographic data. PostGIS helps to make up the database that stores and manages both the spatial data and information for BIMS.
	OpenLayers	OpenLayers makes it easy to put a dynamic map in any web page. It can display map tiles, vector data and markers loaded from any source. OpenLayers has been developed to further the use of geographic information of all kinds. It is completely free, Open Source JavaScript, released under the 2-clause BSD License (also known as the FreeBSD). It is used for map interactions and geospatial operations in BIMS.
	Backbone.js	Backbone.js is a JavaScript rich-client web app framework based on the model-view-controller design paradigm. BIMS uses it to provide specific front-end functionality..
	Cascading Style Sheets	CSS is a style sheet language used for describing the presentation of the page HTML in BIMS.





1.1.1.2 Software Architecture Overview

Python/Django

BIMS is written with Django. It includes few apps to build the user interfaces. Several Python libraries are used in BIMS to realize its specific functionality.

BIMS Apps

- `bims` : BIMS core functionality

Stores the core functionalities used in the ensemble of the BIMS application

- `td_biblio` : Bibliography

Manages the bibliography in BIMS

- `scripts` : BIMS scripts

Series of commands used to automatically manipulate (manage, remove, clean, or add) data in BIMS

- `bims_theme` : BIMS theme

Manages the BIMS theme, like the logo, the section in landing page, and the menu.

- `mobile` : API for BIMS mobile application

Stores the functionalities used in the BIMS mobile application

BIMS Modules

- Taxonomy
- SASS
- Physico-chemistry
- Water Temperature

Libraries

There are multiple Python libraries used in BIMS, like:

- Django REST framework

BIMS provides Web APIs by using the [django rest framework](#)

`bims.api_views`

`bims.api_urls.py`

- Celery

BIMS uses [celery](#) for handling background tasks.

`bims.tasks`

JavaScript

BIMS uses several JavaScript libraries to provide specific functionality in the front-end. They are found at

`bims/static/js/libs`

- `Backbone.js`: used in the map filters

- `Highcharts`: used for the charts

- `OpenLayers`: used for the web mapping

Settings

The Django settings for BIMS can be found in `core.settings`

Docker/docker-compose

Testing Framework

`bims/tests` : Tests are used to test separate units of the written code and to determine if the code works as expected.

BIMS uses [factory boy](#) library for test framework.

1.1.1.3 Data Model





A [model](#) is the single, definitive source of information about your data. It contains the essential fields and behaviors of the data that you're storing. Generally, each model maps to a single database table.

As a platform for managing and visualizing biodiversity data, the following models are often used in BIMS:

bims.models.biological_collection_record
bims.models.taxonomy
bims.models.location_site





1.1.1 Project prerequisites

In this section we cover any tools that need to be on your system so that you can have a local development environment.

1.1.1.1 Understanding Open Source

The term **open-source** refers to any computer program in which the source code is openly available for anyone to use, modify at their convenience, or contribute to, whether they are users or other developers.

Open-source software is released under an open-source license so that any interested party can either view or modify the source code.

There are many open-source projects on GitHub or GitLab, where you can access repositories and become part of the community by contributing to the projects. For example, Linux, BIMS, or QGIS.

1.1.1.2 Overview

 If you already have all of the above criteria met, you can move on to [Cloning](#) to check out the code.





1.1.1 Checking out the code

This section outlines the process of checking out the code for local development.

🚩 Make sure you have gone through the [Prerequisites Section](#) before following these notes.

Git Code check out <https://github.com/kartoza/django-bims.git>

Code:

```
`git clone https://github.com/kartoza/django-bims.git`
```

📋 **Which branch to use?**: Note that we deploy our staging work from the `develop` branch and our production environment from the `main` branch. If you are planning on contributing improvements to the project, please submit them against the `develop` branch.

📝 Now that you have the code checked out, move on to the [IDE Setup](#) documentation.





1.1.1 Debugging

1.1.1.1 Run BIMS

VSCode

In VSCode, to run, and debug the application use the following command:

```
python manage.py runserver 0.0.0.0:8000
```

In the ports tab, you should see the `8000` port. Click on the local port address and open it in your browser.

PyCharm

In PyCharm, you can run the server using the green triangle next to the Django server label in the run configurations pull down menu. Debug mode will also work and you will be able to step through views etc., as you work.

1.1.1.2 Debugging BIMS in the Browser

[Debugging](#) is the process of finding and resolving bugs within a script. All current browsers provide support for debugging tools. In Firefox, or Chrome, right-click and select **Inspect** on your application. To debug it, you will use the following tools:

- **Inspector** or **Elements**: to examine and modify the HTML and CSS
- **Console**: to view messages logged by the application and error messages.
- **Debugger** or **Sources**: to set breakpoints and watchpoints in your application's JavaScript, and examine and modify the application's state.

Debugging BIMS's Python

During the development make sure `DEBUG=True` in `core.settings.dev.py`

Logging

Logging is defined in `core.settings.contrib.py` by the variable `LOGGING`

In your code you can use `logging` like this:

```
logger.info('Csv %s is already being processed by another worker', path_file)
```

Now that you have your IDE set up, we can move on to [building the project](#).





1.1.1 Building the Django-BIMS dev environment

1.1.1.1 Docker and VSCode

An easy way to set up a local development environment is with Docker and VSCode. In this approach you need to:

- Install the [Visual Studio Code Dev Containers](#) extension in your VSCode
- Click on the Remote status bar in the bottom-left, and then choose **Open Folder in Container** which will cause a new VSCode window to open.
- Go to the `development` folder, select `docker-compose.dev.yml`, and then select the service `dev`. This will take some time as it builds all of the services.
- Now the message **Dev Containers: Existing Docker Compose (Extent)** will appear in the bottom-left corner of the window, and in the VSCode terminal you are going to see: `root@dev : /home/web/django_project#`

1.1.1.2 Setup PyCharm to work with a remote Docker development environment

For deployment we use Docker, so you need to have Docker running on the host.

Build and run your development Docker image

This image extends the production one, adding ssh to it.

Linux and MacOS:



Create a remote interpreter in PyCharm

Open the project in PyCharm and then do the following steps:

- Go to File -> Settings
- Then go to Project Interpreter
- Click on the gear icon next to Project Interpreter
- Click on Add remote...

Now use these credentials:

- SSH Credentials (tick the box)
- Host: localhost
- Port: (use the ssh port specified in the docker-compose.yml file)
- User name: root
- Auth type: password (and tick `save password`)
- Password: docker
- Python interpreter path: `/usr/local/bin/python`

When prompted about the host authenticity, click `Yes`. After the python interpreter is setup, set its path mapping:

- Local path: `<path to your git repo>` (where your django project located)
- Remote path: `/home/web/django_project`

After that you should see something like this:

`<Project root>/django_project -> /home/web/django_project`





In settings, Django support:

- Tick to enable Django support.
- Set the Django project root to the path on your host that contains the Django code e.g. <path to code base> (where your django project located)
- Set the settings option to your settings profile e.g. `core/settings/dev_docker.py`. If you need to use custom settings, copy this file e.g. `dev_docker_tim.py` and make your modifications in your personalised copy. The first import of your custom file should import from `dev_docker`.
- Manage script (leave default)

Create the Django Run Configuration

- Go to Run -> Edit configurations
- Click the + icon in the top left corner
- Choose `Django server` from the popup list

Now set these options:

- **Name:** Django Server
- **Host:** 0.0.0
- **Port:** (use the http port specified in the docker-compose.yml file, e.g. 8080) *
- **Run browser** If checked, it will open the url after you click run. You should be able to access the running projects on 0.0.0.0:63302 (the port that was mapped to 8080)
- **Additional options:** `--settings=core.settings.dev_docker`
- **Run browser:** Optionally set this to your IP address (MacOS/Linux) or your specific IP address (Windows) followed by the port forward address for port 8080 that was specified in your `docker-compose.yml` file. For example:
`http://0.0.0.0:63302`.
- **Environment vars:** Leave as default unless you need to add something to the env
- **Python interpreter:** Ensure it is set to your remote interpreter (It should be set to that by default)
- **Interpreter options:** Leave blank
- **Path mappings:** Here you need to indicate equivalent paths between your host filesystem and the filesystem in the remote (Docker) host. Click the ellipsis and add a run that points to your git checkout on your local host and the /home/web directory in the Docker host. e.g.
- **Local path:** <path to your git repo> /django_project
- **Remote path:** /home/web/django_project
- Click `OK` to save your run configuration

1.1.1.3 Setup a Database

Now that you have the application, and need a database to work with, you will need to restore the backup to your local database.

- Restore Database:

 **Code:**

```
docker cp PG_bims_gis.30-September-2022.dmp bims_dev_db:/tmp/PG_bims_gis.30-September-2022.dmp
docker exec -it bims_dev_db /bin/bash
cd tmp/
pg_restore -d gis -p 5432 -U docker -h localhost -1 PG_bims_gis.30-September-2022.dmp
```





1.1.1 Developer workflows

The source code of django-bims is hosted on [GitHub](#). You need a personal account on GitHub to be able to create repositories or collaborate on other projects.

1.1.1.1 Getting Upstream Code

In an open-source project, users must properly integrate their contributions with other contributions. To ensure that all contributors are pulling from the same place, you need to copy the upstream repository into a user's account, and git provides an option called **fork**.

A screenshot of a GitHub repository page for 'kartoza/django-bims'. The page shows a list of pull requests. At the top right, there is a 'Fork' button with a red circle around it. The repository has 16 forks and 5 stars.

Generally, after cloning the project, you have a remote **origin**:

Code:

```
git remote -v
origin  git@github.com:kartoza/django-bims.git (fetch)
origin  git@github.com:kartoza/django-bims.git (fetch)
```

The **upstream** refers to the original repository, and the **origin** refers to the forked repository. With the remote command, you can easily add, rename or remove a remote source:

Code:

```
git remote rename origin upstream
```

Verify that you have **upstream** now:

Code:

```
git remote -v
upstream  git@github.com:kartoza/django-bims.git (fetch)
upstream  git@github.com:kartoza/django-bims.git (push)
```





To add the remote **origin** execute the following command:

 **Code:**

```
git remote add origin git@github.com:yourusername/django-bims.git
```

To check that the **origin** is added:

 **Code:**

```
git remote -v
origin  git@github.com:Fanevanjanahary/django-bims.git (fetch)
origin  git@github.com:Fanevanjanahary/django-bims.git (push)
upstream  git@github.com:kartoza/django-bims.git (fetch)
upstream  git@github.com:kartoza/django-bims.git (push)
```

Sync the Latest Code from Upstream

To keep your local code and the original repository in sync, you can fetch the latest version of the **upstream** repository. You can use these commands every time you want to get updates:

 **Code:**

```
git pull upstream main
```

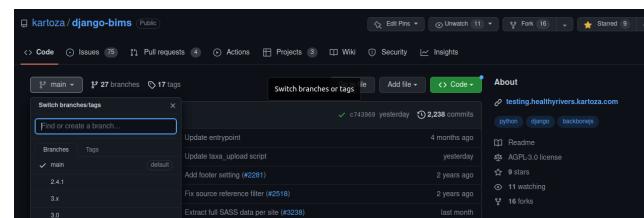
or

 **Code:**

```
git fetch upstream
```

Working with Branches

A branch is used to isolate development work without affecting other work in the repository. A repository contains one default branch and can have multiple other branches.



In **django-bims** the default branch is **main**.





A branch allows you to develop features and fix bugs. Generally, you create a new branch from an existing one, usually from the default one.

To list all branches:



Code:

```
git branch
  csv_download
  filter
  gbif-link
  landing_page
  main
  sa_province
  sampling_method
  sass
  sorted_dropdown
* taxon_rank_variety
  unvalidated
  update_site_code
  upstream
  wt
```

To create a new branch:



Code:

```
git branch new_feature
```

To work on the new branch, switch to it and make your changes:



Code:

```
git checkout new_feature
```

Or if the branch does not exist, use this command to create it:



Code:

```
git checkout -b new_feature
```

You can merge a branch into another upstream branch using a Pull Request.





Pull Request (PR)

A Pull Request, or PR, is a way for a developer to tell other collaborators about the change they have made.

The screenshot shows a GitHub pull request page. At the top, it says "add gbif link in site dashboard #3135". Below this, there are tabs for "Code" (highlighted in red), "Issues" (also highlighted in red), "Pull requests", "Actions", "Projects", "Wiki", "Security", and "Insights". The "Issues" tab is active, showing a single issue: "add gbif link in site dashboard" (Issue #3089). The issue details show the PR is being merged into the "kartozasite" branch from the "kartozajanuary/gbif-test" branch. The PR has 150 approvals and 19 reviews. The PR's description is visible in the main content area.

Once you have submitted a PR, other contributors can review your work. You can push commits from your local branch to your existing PR.

Ticket

A ticket identifies and tracks issues in the repository. In GitHub, an issue refers to a ticket. A ticket typically should be created to:

- Record any bugs encountered in the application
- Propose any feature or enhancement
- Define whether it is a coding or non-coding task

The screenshot shows a GitHub repository page for "kartoz / django-bims". The navigation bar has tabs for "Code" (highlighted in red), "Issues" (also highlighted in red), "Pull requests", "Actions", "Projects", "Wiki", "Security", and "Insights". The "Issues" tab is active, showing a list of 76 issues. One specific issue is highlighted: "dimasciput Update taxa_upload.py (#3249)". The issue details show it was updated 10 hours ago by "dimasciput". The list includes various issues such as "adapters", "api_views", "custom_admin", "download", "enums", "fixtures", "forms", and "helpers".

Any PRs submitted to a repository must be linked to a ticket.

[Open new ticket](#)

When you open a ticket, it should be structured:





We need a feature to add a call/song/ for species #2913

mmindje opened this issue on Jan 25 · 1 comment

mmindje commented on Jan 25

We need a feature to add a call/song/ for species like frogs or birds on the individual species dashboard the way we can now add image to the species?

That is to help us add more birds songs for instance that were soon receiving from the Planet Bird song project

mmindje added the **Nature-request** label on Jan 25

mmindje assigned dimascpit on Jan 25

mmindje added this to Attention needed Kartoza in RBIS - Rwanda Biodiversity Information System on Jan 25

We need a feature to add a call/song/ for species #2913

mmindje opened this issue on Jan 25 · 1 comment

mmindje moved this from Review to Attention needed Kartoza in RBIS - Rwanda Biodiversity Information System on Feb 3

helendasllas moved this from Attention needed Kartoza to Backlog in RBIS - Rwanda Biodiversity Information System on Apr 22

dimascpit added the **SIZE 2** label on Jun 2

1. Title: it must be precise, clear, and as explicit as possible.
2. Description: it should be straightforward but sufficient to describe the exact scope of work and the desired outcome.
You can share a screenshot or a gif of the application as an additional explanation in the description. You can also include other tickets or a PR as a reference.
3. Tag or label: this is optional but can be very beneficial. A ticket can have multiple labels like:
bug: something isn't working
enhancement: new feature or request
Dashboards: the key development is on the dashboard
Data upload: the key development is on data upload
etc.
4. Size: it is a label to set the time required to achieve a task or a ticket.
SIZE 2 means you need to spend 2 hours to complete a task
SIZE 5 means 5 hours are required.

Project board

A Project Board is a feature of GitHub that you can use to organize tickets and track the work that needs to be done on the project. The Project Board is also used to manage workflow across a repository. You can create a Project Board for a specific feature, work on a project, or even a sprint and release.

Issues 75 Pull requests 0 Actions Projects 0

Code Issues Pull requests Actions Projects

main · django-bims / bims /

dimascpit Update taxa_upload.py (v2249) · 6 hours ago · History

adapters · Updates from develop (#2973) · 8 months ago

api_views · Integrate validation to taxonomy model (#3225) · 9 days ago

custom_admin · Fix generate_spatial_scale_filter (#3086) · 5 months ago

download · Update csv downloads to include new columns (#3201) · 2 months ago

enums · Add variety in taxon rank (#3247) · 2 days ago

fixtures · Update abiotic form to include categorical variables (#1910) · 3 years ago

forms · Update origin implementation (#2550) · 2 years ago

helpers · Fix download duplicate records (#2682) · 16 months ago

The Project Board is comprised of issues, pull requests, and notes that are categorized as cards in columns. You can customize columns on the board based on your process. You can drag and drop cards to reorder them in a column or move them to a different column. A column represents the status of an issue.

RBIS - Rwanda Biodiversity Information System

To-do Ready In progress Review Done

mmindje commented on Jan 25 · 1 comment

We need a feature to add a call/song/ for species

mmindje commented on Jan 25 · 1 comment

We need a feature to add a call/song/ for species like frogs or birds on the individual species dashboard the way we can now add image to the species?

That is to help us add more birds songs for instance that were soon receiving from the Planet Bird song project

mmindje added the **Nature-request** label on Jan 25

mmindje assigned dimascpit on Jan 25

mmindje added this to Attention needed Kartoza in RBIS - Rwanda Biodiversity Information System on Jan 25

We need a feature to add a call/song/ for species #2913

mmindje opened this issue on Jan 25 · 1 comment

mmindje moved this from Review to Attention needed Kartoza in RBIS - Rwanda Biodiversity Information System on Feb 3

helendasllas moved this from Attention needed Kartoza to Backlog in RBIS - Rwanda Biodiversity Information System on Apr 22

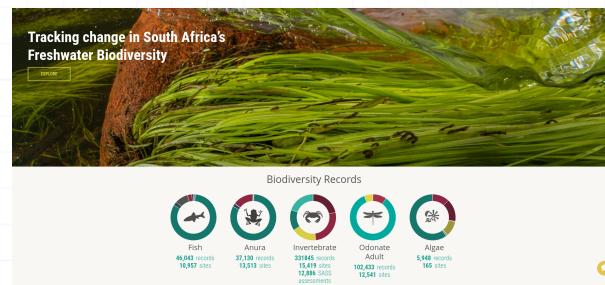
dimascpit added the **SIZE 2** label on Jun 2



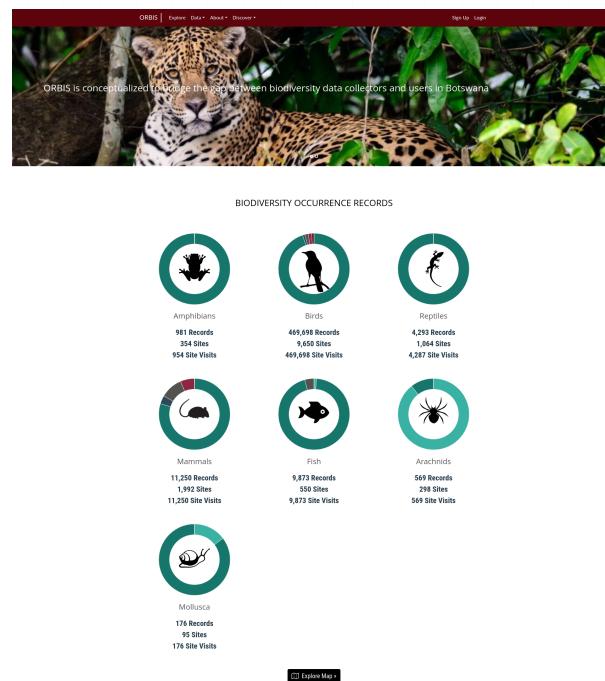
1.1.1 Key development areas

Landing page

* FBIS



* Okavango Repository for Biodiversity Data (ORBIS)



News

This is our first run through of the new web site!

PARTNERS



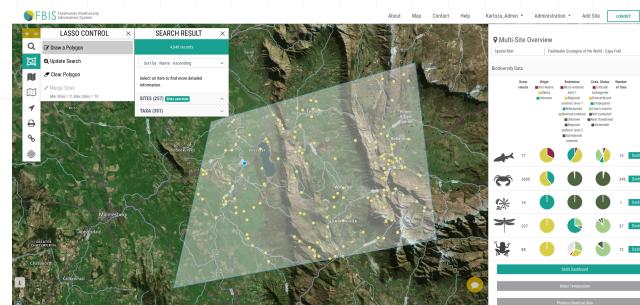
Copyright © University of Johannesburg, freshwater Research Centre and Kartoza 2012
Version - FinalPDF (2012-07-01)

* RBIS

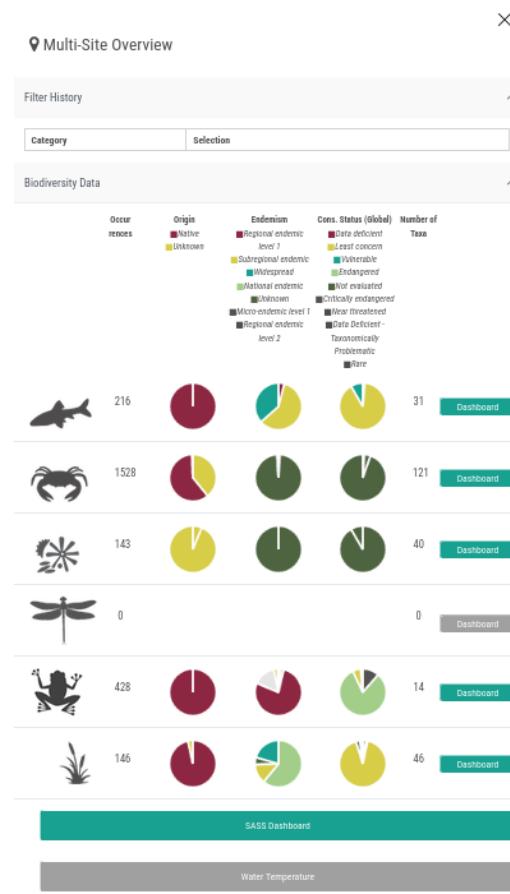




Main map page

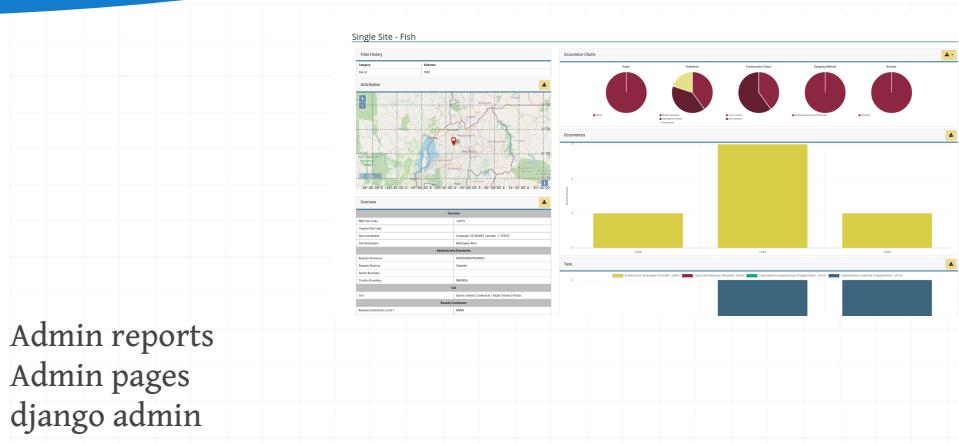


Side panel

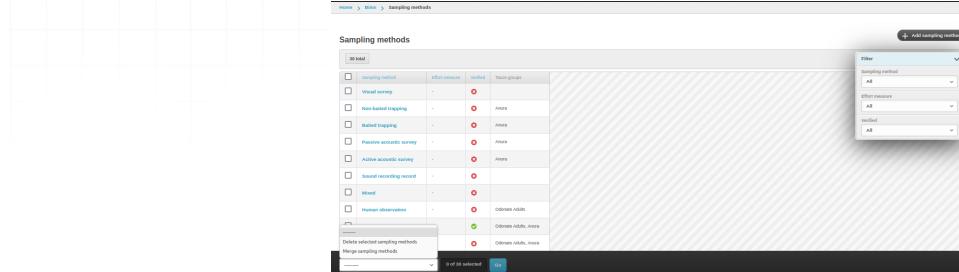


Dashboards

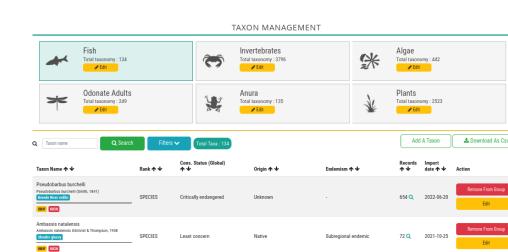




Admin reports
Admin pages
django admin



Taxonomy management



Occurrence data management

This screenshot shows the 'Upload Occurrence Data' form. It includes fields for 'Taxon Group' (set to Fish), 'Link to taxon management', and a file upload area. A note at the top states: 'You can download the template here: [Download Template](#). Note: Duplicates will be detected and update the existing data.'





1.1 Documentation

1.1.1 Documentation

In this section of the documentation, we explain how to work with the documentation. The content is organised as follows:

- **Overview:** Here we outline the documentation system and the standard workflows needed.
- **Context help:** Here we outline the procedure for adding context help into the application and linking it to this documentation tree.





1.1.1 Documentation overview

This section provides an overview of how the documentation system works.

1.1.1.1 Background

Welcome to the instructions for those wishing to contribute to our documentation!

Our documentation system is based on the popular [mkdocs](#) system. We encourage you to read the upstream documentation from mkdocs for the finer details of how mkdocs. In particular, read [this page](#) before you get to work. Mkdocs is not hard, but it may feel initially a little different if you are used to creating your documentation in word.

We use mkdocs because it has some great and useful features. Most especially:

- The code and the documentation are versioned together. This means that for whatever version of the code we have in our production release, we can be sure the documentation matches that release. We can also look back at changes over time through the version history when needed.
- It can render beautiful static (not needing a backend server) web sites with great features like search, styling, intuitive navigation etc.
- It can optionally render PDF documents from the same source markdown.
- An ecosystem of plugins and themes makes mkdocs really flexible and extensible.

Some terminology

In our documentation, we have organised the information using a specific nomenclature:

- **guide:** A guide is a multi-step workflow / tutorial that leads your through common activities.
- **manual:** A collection of documents that describe each part of the project in a matter of fact way without presupposing any specific workflow is being undertaken.

For each of the main topic areas (user, admin, developer, devops, api user) we provide guides and manuals as is appropriate.

Organisation

The documentation is broadly organised in the following structure. This structure may change over time as sections are added / moved / removed:

```
Code:  
  
src  
└── about  
└── administrator  
    ├── guide  
    └── manual  
└── developer  
    ├── documentation  
    ├── guide  
    └── manual  
└── devops  
    ├── guide  
    └── manual  
└── user  
    ├── api  
    ├── guide  
    ├── manual  
    └── quickstart
```

1.1.1.2 File naming conventions





Please follow these conventions when writing your documentation:

1. Write file names in all lower case, with hyphens separating words (no spaces). e.g. **important-file.md** not **Important File.md** or other deviations.
2. Place the image files in the img folder adjacent to your content.
3. Do not abbreviate any words in file names - but try to use terse, descriptive names.
4. Place your content into the appropriate place as outline in the structure above.
5. Each file should only one level one heading e.g. **# Page title**
6. Headings and subheadings should be written as a terse phrase starting with a capital letter and subsequent words in lower case unless they are proper nouns. Do not place a colon after the heading.
7. Use unicode number markers to reference numbers in images e.g. **1**
8. Every heading / sub-heading should have a single line underneath it summarising the content that will follow. This sentence will be used in the help center in the application to give the user a reference point for the text that will follow. It also makes the help text more consistent and readable.
9. For every section that images, the first image will be used as the thumbnail if the heading is referenced from the application.

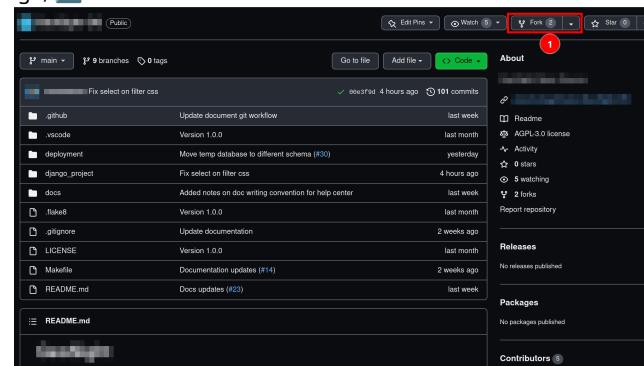
1.1.1.3 Contributing to the documentation



Note: The repo name in the images below is blurred out, you should work against the [PROJECT_NAME] repository when following these notes.

To start adding to the documentation navigate to the [home page](#) of the repository.

Once on the repository home page, **1** click on Fork



On the next page **1** Make sure your github account is selected as the owner and **2** make sure the "Copy the main branch only" option is ticked as you will only need the main branch.





Create a new fork

A fork is a copy of a repository. Forking a repository allows you to freely experiment with changes without affecting the original project. View existing forks.

Required fields are marked with an asterisk (*).

Owner * Repository name *

1 Choose an owner / [REDACTED]

By default, forks are named the same as their upstream repository. You can customize the name to distinguish it further.

Description (optional)

2 Copy the main branch only Contribute back to [REDACTED] by adding your own branch. Learn more.

Create fork

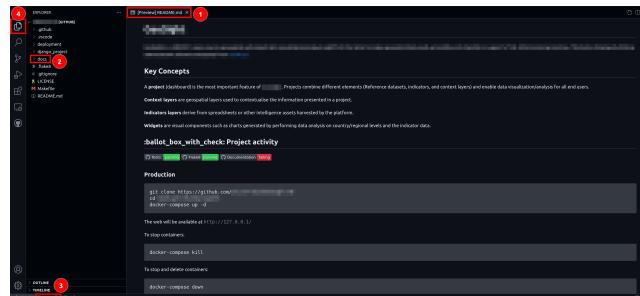
Once you have forked the repository, ensure that you are working in the main branch.



Once you are in your fork of the repository, click on . on your keyboard. This will open a web editor where you can begin adding to, or editing, the documentation.

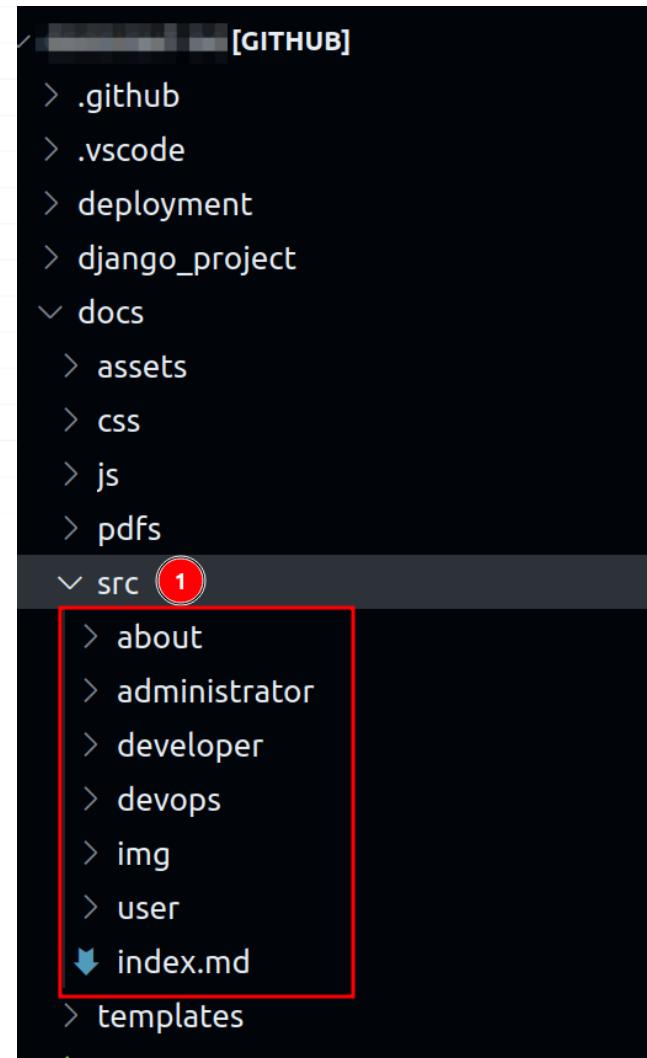


Once the editor loads, you will be greeted by 1 a preview of the project's README.txt. 2 Click on the docs directory in the menu on the left, this will expand the directory. To confirm that you are working in the right branch 3 it will say main in the bottom left of the editor.

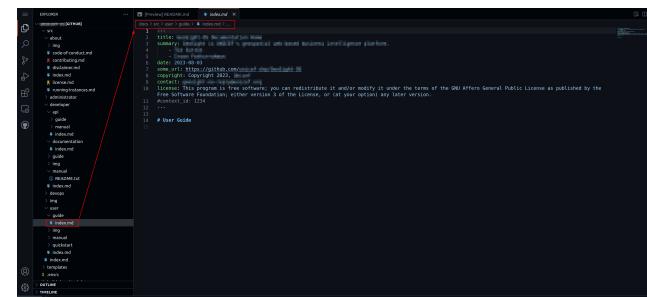


Once you have expanded the docs directory, 1 click on the SRC directory. All sub-directories within the SRC directory contain the files that become the documentation. Each sub-directory contains an index.md file that is required for the building of the documentation and static site. If you add a new sub-directory into any folder it must also contain a populated index.md file.



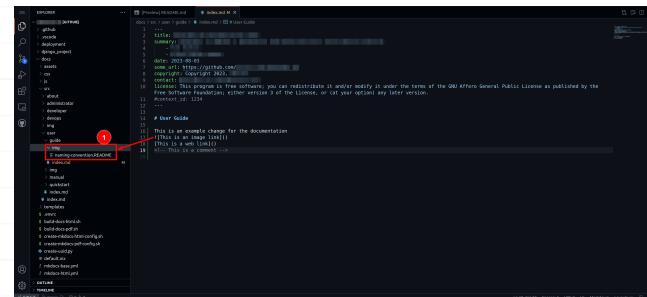


Once you have chosen which section of documentation you would like to edit (e.g. user/guide/index.md), click on the file and it will open in the web editor.

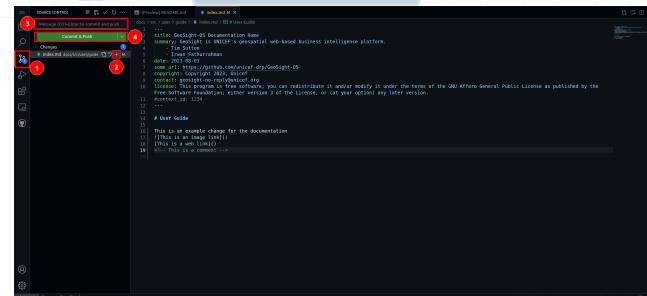


Once you have the file open, you can start adding to the documentation using [Markdown](#) syntax. If you need to add images to your documentation, add them to the relative `img` sub-directories following the naming conventions set out in the `naming-convention README` within the `img` folders.

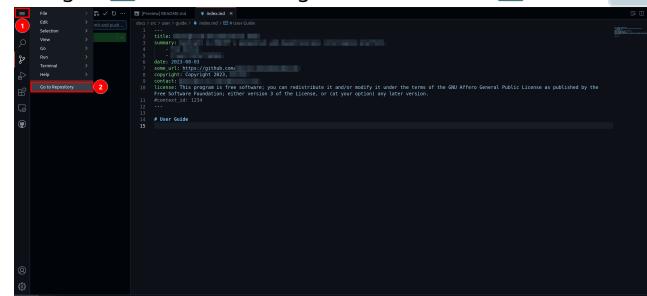




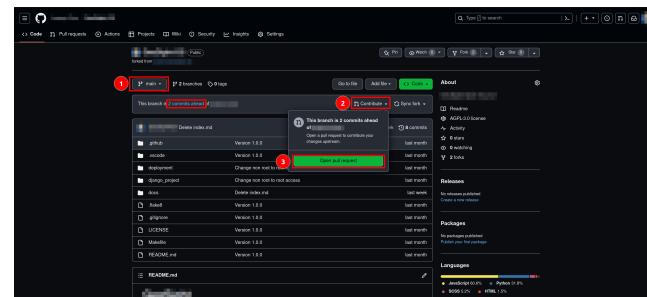
When you have completed making additions to (or editing) the documentation, **1** click on the source control tab then **2** click on the **plus** symbol next to the changes you are finished with to stage them, **3** add a commit message that is associated with the work you have done, and the **4** Click on **Commit & Push**



Once you have committed your changes, **1** Click on the burger menu and then **2** click on **Go To Repository**

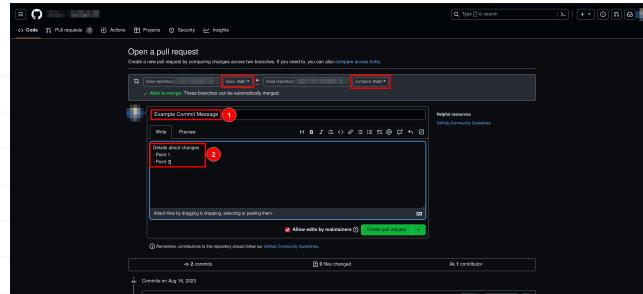


Your fork of the repository will be opened in a new tab within your browser, navigate to that tab. Once there **1** ensure you are on the **main**, you should see how many commits ahead of the upstream branch you are, then **2** click on **Contribute -> Open pull request**.



On the next screen, **1** give your pull request a meaningful title, **2** give additional details regarding changes made in the larger text box, then **3** click on **Create pull request**. Also ensure you are creating a pull request to the upstream **main** branch from your **main** branch.

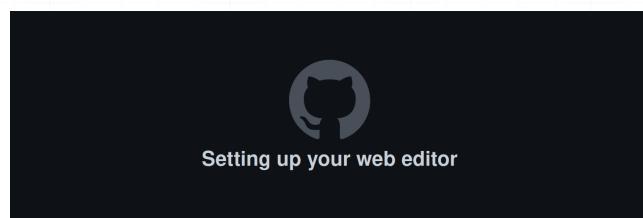




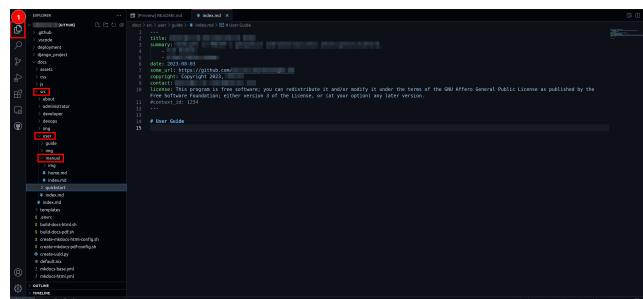
Once your pull request is opened you need to wait for it to be merged before you can open a new one.

1.1.1.4 Creating new files

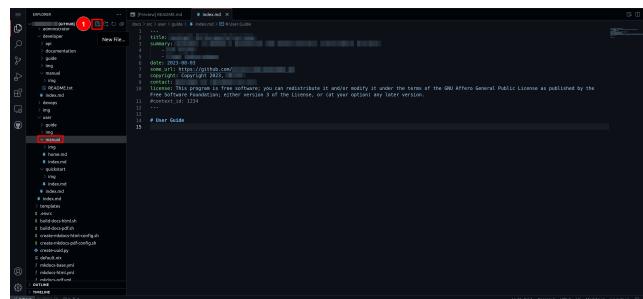
Open the Web Editor by clicking on `.` on your keyboard when you are on your fork of the repository. The screen below should appear until the editor loads.



Navigate to the relative subfolder within the `SRC` folder to which you would like to add a new file. (e.g. `SRC -> user -> manual`). Also ensure that you are in the `Explorer` tab **1** of the web editor.



Once you have selected a subfolder, click on the `New File...` button **1** to the right of the repository name.



Give your file a meaningful name (following the [File naming conventions](#) from above) and end the file name with `.md` to ensure that the file is saved as a markdown file. Once you have given your file a name, click `Enter` on your keyboard to finish creating it.







```
git:(~/Desktop) % touch README.md
```

Once you have created a new file, you can start adding to the documentation using [Markdown](#) syntax. You must add a header section to each new file! Please read the [Page metadata](#) section below regarding adding the standard header to new files.

If you need to add images to your documentation, add them to the relative `img` subfolders following the naming conventions set out in the `naming-convention README` within the `img` subfolders (e.g. images for the User Guide would be added to the `user/guide/img/` subfolder 1). Adding images is explained further in the [Uploading images / media](#) section further down the page.

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ProcessGutenberg.py
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python3 ProcessGutenberg.py
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ProcessGutenberg.py
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titles.txt
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3 little
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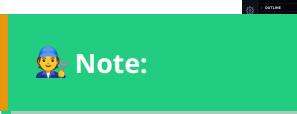
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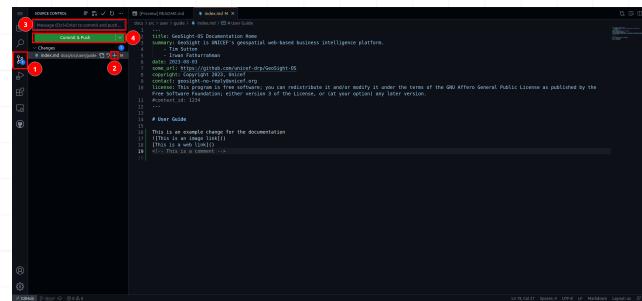
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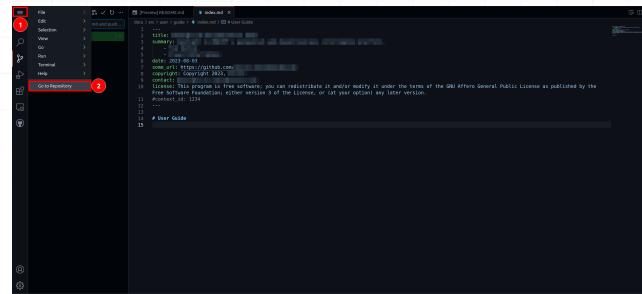
Hint: You can click on the `naming-convention README` file to view it and, in turn, read the image naming conventions. Just remember to switch back to the document that you are working on.

When you have completed making additions to (or editing) the documentation, click on the source control tab **1**, then click on the **plus** symbol **2** next to the changes you are finished with to stage them, add a commit message **3** that is associated with the work you have done, and then click on **Commit & Push** **4**.

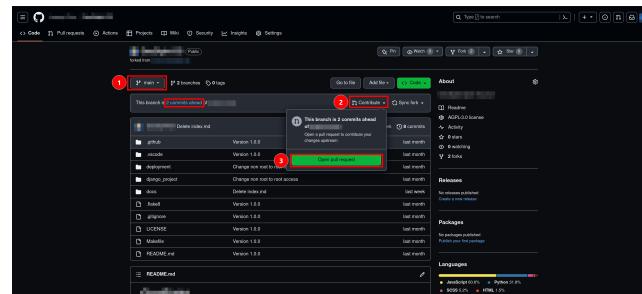


```
git commit -m "Initial commit" > README.md
[master 123456] Initial commit
 1 file changed, 1 insertion(+)
 create mode 100644 README.md
```

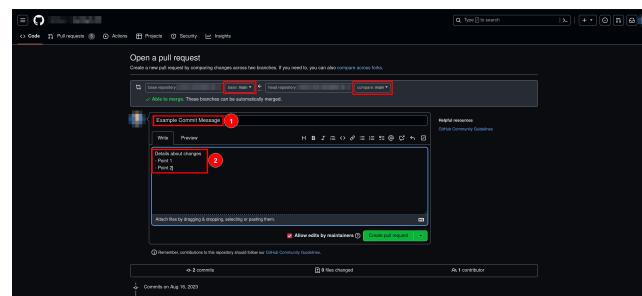
Once you have committed your changes, Click on the burger menu **1** and then click on **Go To Repository** **2**.



Your fork of the repository will be opened in a new tab within your browser, navigate to that tab (your browser might block pop ups, so you might need to manually open the pop up to get back to your fork of the repository). Once there, ensure you are on the **main** branch **1** (you should see how many commits ahead of the upstream branch you are), then click on **Contribute** **2** -> **Open pull request** **3**.



On the next screen, give your pull request a meaningful title **1**, give additional details regarding changes made in the larger text box **2**, then click on **Create pull request** **3**. Also ensure you are creating a pull request to the upstream **main** branch from your **main** branch.



Once your pull request is opened you need to wait for it to be merged before you can open a new one.





Page metadata

Whenever you create a new file, you should add the standard header to the top of the file:

Code:

```
---
```

```
title: PROJECT_TITLE
summary: PROJECT_SUMMARY
  - PERSON_1
  - PERSON_2
date: DATE
some_url: PROJECT_GITHUB_URL
copyright: Copyright 2023, PROJECT_OWNER
contact: PROJECT_CONTACT
license: This program is free software; you can redistribute it and/or modify it under the terms
#context_id: 1234
---
```

The summary can be updated to include your name for documents you contribute to.

The context_id is used to create a unique permalink to this document, and is optional. See further down in this document for more details.

Navigation

All pages need to be added to the 'Nav' section of the `mkdocs-base.yml` file. This will ensure that it is available in the menus and that mkdocs renders without errors. For example, if you wish to add a new page to the User Guide area, in Nav you would add a line like this:

- Navigating the map: `user/guide/map-navigation.md`

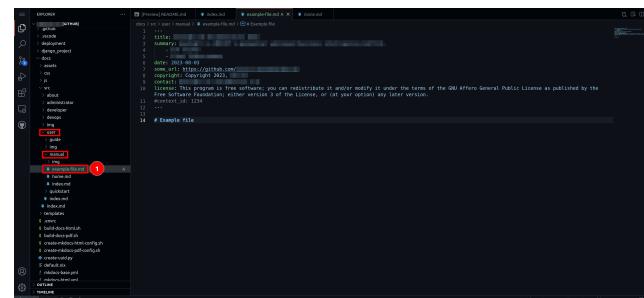
Sometimes you may not wish to have the new page displayed in the menu system (this can be useful when, for example, it is accessed via a link in another page). In these cases, leave the menu entry part blank e.g.

- `": user/guide/map-navigation.md`

Mkdocs will still generate the page but it will not be added to the menu.

Editing the 'nav' section

Once you have created a new file (e.g. `user/manual/example-file.md` [1](#)), you will need to add it to the site navigation.



To edit the site navigation, click on `docs/mkdocs-base.yml` [1](#).





In the `mkdocs-base.yml`, scroll down to the `nav` section and add the file path to the relevant section. E.g.,

`user/manual/example-file.md` would be added to `Users -> Manual` as

- Example file: user/manual/example-file.md **1.** Ensure your added page has the correct indentation in the `nav` section, otherwise the site will not build.



```
    <uses-permission android:name="android.permission.INTERNET" />
    <uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION" />
    <uses-permission android:name="android.permission.ACCESS_FINE_LOCATION" />
    <uses-permission android:name="com.google.android.providers.gsf.permission.READ_GSERVICES" />
    <uses-permission android:name="com.google.android.providers.gsf.permission.WRITE_GSERVICES" />
    <uses-permission android:name="com.google.android.providers.gsf.permission.READ_GSERVICES" />
    <uses-permission android:name="com.google.android.providers.gsf.permission.WRITE_GSERVICES" />
```

If you have added a page but do not want it to show up in the site navigation, then instead of a page name just put " ". E.g.

- "": user/manual/example-file.md 1



```
.\app\src\main\java\com\example\abacode\ui\activity\MainActivity.java
```

```
1 package com.example.abacode.ui.activity;
2
3 import android.os.Bundle;
4 import android.view.View;
5 import android.widget.Button;
6 import android.widget.EditText;
7 import android.widget.Toast;
8
9 import androidx.appcompat.app.AppCompatActivity;
10
11 import com.example.abacode.R;
12
13 public class MainActivity extends AppCompatActivity {
14
15     private EditText etEmail;
16     private EditText etPassword;
17     private Button btnLogin;
18
19     @Override
20     protected void onCreate(Bundle savedInstanceState) {
21         super.onCreate(savedInstanceState);
22         setContentView(R.layout.activity_main);
23
24         etEmail = findViewById(R.id.et_email);
25         etPassword = findViewById(R.id.et_password);
26         btnLogin = findViewById(R.id.btn_login);
27
28         btnLogin.setOnClickListener(new View.OnClickListener() {
29             @Override
30             public void onClick(View v) {
31                 String email = etEmail.getText().toString();
32                 String password = etPassword.getText().toString();
33
34                 if (email.isEmpty() || password.isEmpty()) {
35                     Toast.makeText(MainActivity.this, "Please enter both fields", Toast.LENGTH_SHORT).show();
36                 } else {
37                     // Perform login logic here
38                     // ...
39                 }
40             }
41         });
42     }
43 }
```

1.1.1.5 Uploading images / media

Note: If you wish to upload a gif, or a small video, you can follow the same steps as below (GitHub does limit the upload size to 10 MB).

All folders and subfolders should contain an **img** subfolder (e.g. `user/guide/img/`) containing a

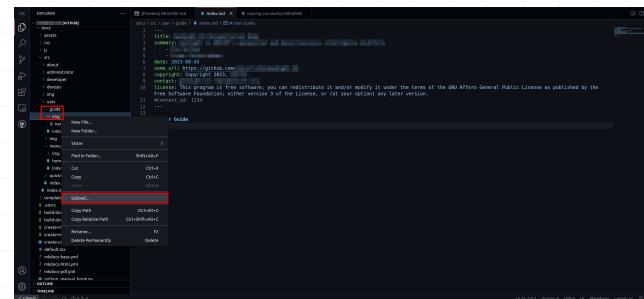
`naming-convention README`. If you add a new folder, then you should add a new `img` subfolder and copy a `naming-convention README` from another existing `img` subfolder into your newly created folder.



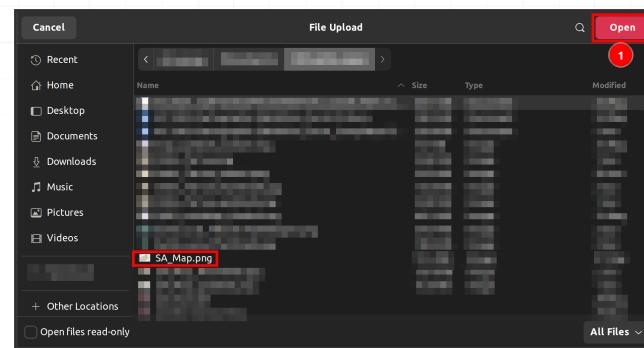
```
[GITHUB]
docs
  assets
  css
  js
src
  about
  administrator
  developer
  devops
  img
user
  guide
    img
      naming-convention README
    index.md
  img
  manual
    img
    home.md
    index.md
    quickstart
    index.md
    index.md
  templates
  .envrc
  build-docs-html.sh
  build-docs-pdf.sh
  create-mkdocs-html-config.sh
  create-mkdocs-pdf-config.sh
  create-uuid.py
  default.nix
  mkdocs-base.yml
  mkdocs-html.yml
  mkdocs-pdf.yml
  python_manual_hook.py
```

To upload an image, right-click on the relative `img` subfolder and select `upload` from the menu that appears.

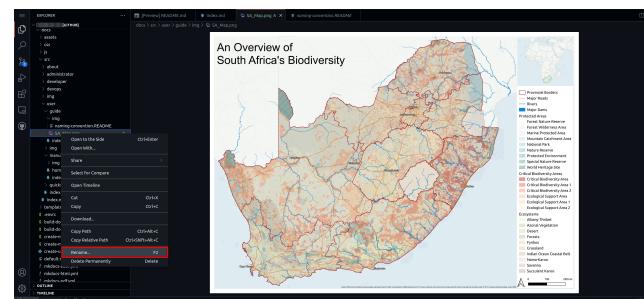




Select an image from your computer, using the file explore that opens, and then click on the **Open** Button **1** (The attached screenshot is from a Linux machine however, Windows also has an open button).



If your image does not follow the naming conventions, right-click on the image, click on **Rename . . .** on the menu that appears, and then give your image an appropriate name.



Useful tools for capturing images and screencasts are: Peek (For screencasts), Flasheshot (For images), Shutter (For images), and Lightshot (For images)

1.1.1.6 Technical notes

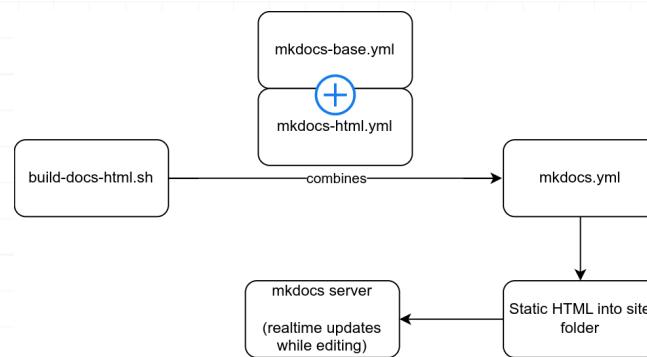
Working locally

If you want to work with the documentation locally (i.e. directly on your PC), you need to follow this general process:

1. Install python
2. Install pip
3. Install virtualenv (`pip install virtualenv`)
4. Make the docs folder your working directory (`cd docs`)
5. Create the virtual env in the docs folder (`python -m venv env`)
6. Activate the venv (`source env/bin/activate`)
7. Install the python modules listed in docs/requirements.txt (`pip install -r requirements.txt`)
8. If you are on Linux or macOS, open the docs directory in a shell and run `build-docs-html.sh`
9. In the docs directory, run `mkdocs serve`
10. Open your web browser at <https://localhost:8000> to view the rendered docs.

Note that `mkdocs serve` will dynamically re-render the docs any time you make a change. The process above is illustrated in the diagram below:





Hooks

We implement two hooks (plugins for mkdocs that are invoked during the docs rendering process).

- **uuid_redirects_hook.py** - this is used to handle page redirects from a uuid - see below for more details
- **python_manual_hook.py** - this is used to auto-generate the reference guide for the python modules, classes and functions that make up the code base for this project.

Permalinks for user and administration documents

If you are a developer, you should be aware of the workflow for creating user and administrator documentation for each page you create.

Every page should have a help link on it that leads to the appropriate manual page. The workflow for doing this is:

1. Generate a new page UUID using the provided python utility e.g. `./create-uuid.py`
2. Create a new page in the appropriate manual section e.g. `docs/src/user/manual/login.md`
3. In the metadata section at the top of the page, add the context id e.g.
`context_id: V4cVEFd2TmwYJVb5HvWRwa`
4. In your django view, set up your help button to point to the site url and your context id. e.g.
`https://siteurl/V4cVEFd2TmwYJVb5HvWRwa`

Whenever the user visits the page using the UUID URL, they will be redirected to the correct page e.g.

`https://siteurl/login/`. This system protects us from file renaming and reorganising on the site, and ensures that the help link will always remain valid.

Generating PDFS

To generate PDFS, `cd` into `PROJECT_NAME/docs` and then run `./build-docs-pdf` in a local terminal

Generating static site locally

To generate HTML, `cd` into `PROJECT_NAME/docs` and then run `./build-docs-html` in a local terminal. You can then run `mkdocs serve` to generate the static site on your local host, if there is a port conflict you can specify the port using the `-a` flag e.g `mkdocs serve -a 127.0.0.1:8001`.



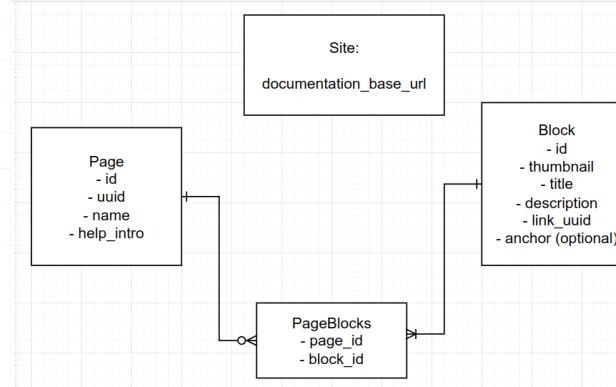


1.1.1 Context help

This section describes how the context help system works.

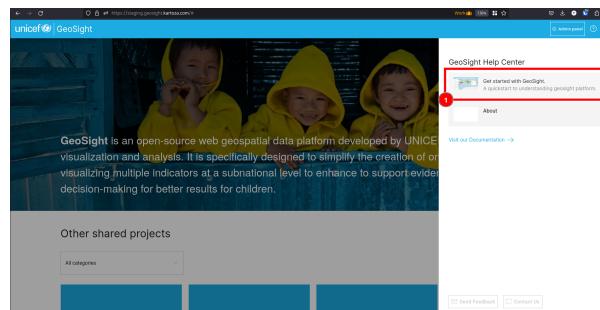
1.1.1.1 Overview

The context help system provides an integration between the web application and the documentation.

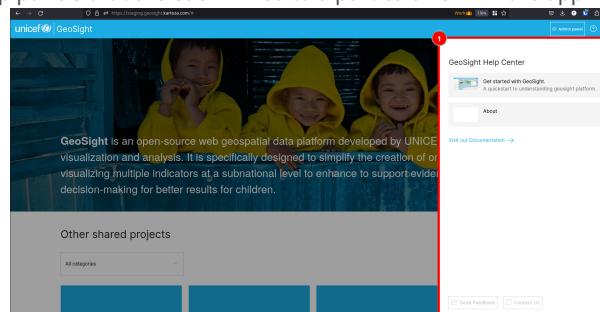


The following concepts are used:

- **Site:** This is the area for globally setting options relating to the context help system.
- **Blocks:** These are small components displayed as blocks 1 in the context help panel. Each block links to a section in the help documentation.



- **Pages:** These are context help panels that are each linked to a particular URL in the application.



- **Page Blocks:** These are links between pages and their constituent blocks. Each page can have many blocks and each block can be used in many pages.

1.1.1.2 Triggering context help





There are three ways to trigger context help:

1. From the top nav bar

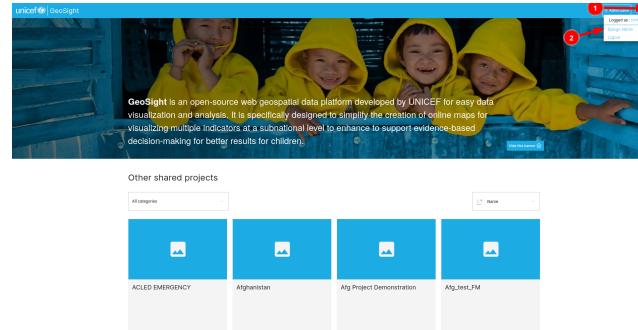


2. From the side panel

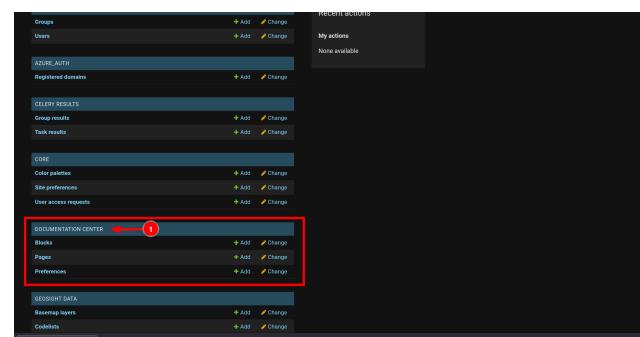
3. Next to widgets (not implemented yet)

1.1.1.3 Managing context help

We manage the context help system from django admin. You need to be a staff user to do this and have been granted read/write/update permissions on the documentation center related tables. First open your user menu **1** and then the Django Admin area **2**.



Next we can drill into the documentation center to see only the relevant admin activities **1**.



1.1.1.4 Site preferences

Our first activity is to edit the site preferences **1**.





Django administration

Home | Documentation center

Documentation center administration

DOCUMENTATION CENTER

- Blocks
- Pages
- Preferences

WELCOME, TM | VIEW SITE | CHANGE PASSWORD | LOG OUT

Here our goal is to set the documentation base url for the context help system 1. Use the URL for your documentation project i.e. <https://unicef-drp.github.io/GeoSight-OS>

Django administration

Home | Documentation center | Preferences | Preferences

AUTHENTICATION AND AUTHORIZATION

- Groups
- Users
- AZURE_AUTH
- Registered domains
- CELERY RESULTS
- Group results
- Task results
- CORE
- Color palettes
- Site preferences
- User access requests

DOCUMENTATION CENTER

- Blocks
- Pages
- Preferences

Change preferences

Preferences

Documentation base set: 1

HISTORY

Delete

Save and add another | Save and continue editing | **SAVE**

WELCOME, TM | VIEW SITE | CHANGE PASSWORD | LOG OUT

1.1.1.5 Managing Pages

Next we need to create pages for each application end point where we want to include context sensitive help. First select pages 1 from the documentation center menu:

Django administration

Home | Documentation center

Documentation center administration

DOCUMENTATION CENTER

- Blocks
- Pages 1
- Preferences

WELCOME, TM | VIEW SITE | CHANGE PASSWORD | LOG OUT

Now you can edit an existing page 1 or add a new one 2:

Django administration

Home | Documentation center | Pages

AUTHENTICATION AND AUTHORIZATION

- Groups
- Users
- AZURE_AUTH
- Registered domains
- CELERY RESULTS
- Group results
- Task results
- CORE
- Color palettes
- Site preferences
- User access requests

DOCUMENTATION CENTER

- Blocks
- Pages
- Preferences

Select page to change

Actions: 0 of 1 selected

NAME global

1 page

ADD PAGE + 2

WELCOME, TM | VIEW SITE | CHANGE PASSWORD | LOG OUT

The page properties you can set are going to determine how the context help panel appears in the application when triggering the help panel 1:





Here is a detailed breakdown of the options:

- 1 Name:** A symbolic name for you to easily recognise what the context help is about
- 2 Relative page url:** This is the relative path to our application page (see underline in image above) e.g. /admin/importer/
- 3 Url:** This is where the documentation is, relative to the documentation base URL. For example if your docs base URL is at: <https://unicef-drp.github.io/GeoSight-OS/> your help context document relative URL is /administrator/guide/. This will trigger the content panel link **3** above to point to this page.
- 4 Title:** This will be displayed as **1** above in the context help panel.
- 5 Intro:** This will be shown as lead-in text for the context help panel. See **2** above.

On the page form you can also manage the blocks that appear in the context help.

1.1.1.6 Managing blocks

You can view and manage existing blocks from the documentation center **1** or add a new block **2**. We first create a block then go back to the page to add it to the page.

We can also create a new block directly from within a page.

- To set a block link within the page use **1**
- To set the order in which the block appears in the help panel use **2**. For ordering, lower number blocks will be listed before higher number blocks. It is up to you to ensure that each number used for ordering is unique.
- To create a new block component for a page, use **3** and then go and choose or create the actual block content.





This screenshot shows the 'PAGE BLOCKS' section of the documentation center. It lists several blocks, each with a title, description, and a delete icon. At the bottom left, there is a button labeled 'Add another Page block' with a red arrow pointing to it.

Let's create a new block within the context of an existing page (this is the more normal workflow).

This screenshot shows a modal dialog for adding a new page block. It includes fields for 'Relative Documentation URL', 'Title', 'Anchor', 'Thumbnail', and 'Description'. At the bottom left of the dialog, there is a button labeled 'Add another Page block' with a red arrow pointing to it.

Because we have created it within the page form, the block form appears as a popup window. We can deal with the form components as follows:

- **The relative url** **1** (based on the the documentation site wide base url preference) to the documentation page
- **The anchor** **2** - this is optional and should point to a heading / subheading within the page if populated.
- **The title** **3** - title for the block. This is automatically filled in from the page unless you specify an override title. Normally you would leave this blank.
- **The thumbnail** **4** for the block. This is automatically linked to the first image below the anchor in the help document. Usually you would leave this blank.
- **Description** **5** for the block. This will be automatically populated from the first paragraph in the linked help documentation.

⚠️ As you can see, the block definition requires only minimal information - the URL and optionally the anchor on the page. Anything else you specify here will override information harvested from the page and likely make your documentation more difficult to maintain.

This screenshot shows a modal dialog for adding a new page block. It includes fields for 'Relative Documentation URL', 'Title', 'Anchor', 'Thumbnail', and 'Description'. At the bottom left of the dialog, there is a button labeled 'Add another Page block' with a red arrow pointing to it.

1.1.1.7 Page Blocks

Generally we will not directly use the PageBlocks management area - use the Page manager to add and remove blocks from your page.

1.1.1.8 Conclusion and notes

The system for context help has been designed in a generic way. That means that you can use any web site where you can reference content with page links and anchors.

🚫 One word of caution. Do not use a web site as your documentation source if you do not control that site. The content from the help site is pulled directly into your application, which could put you in a compromising position if the content is not 'on message' for your organisation.





1.1 API

1.1.1 API documentation

This is the homepage for all API related documentation.

- The [api guide](#), which describes common workflows for using the restful API.
- The [api manual](#), which describes each API endpoint and its parameters, return values etc. This section is autogenerated.





1.1.1 API manual





1.1.1 API guide





1 DevOps

1.1 DevOps documentation

This section contains all documentation relevant to DevOps procedures.

The devops content is divided into three sections:

- The [devops guide](#), which describes common workflows for deployment and management of running instances in a tutorial format.
- The [devops manual](#), which provides links and references to deployment configuration files, frameworks and deployment systems used etc.





1.1 Guide

1.1.1 DevOps guide

In this section of the documentation, we aim to onboard developers onto the process of setting up a developer workstation, understanding the system architecture, contributing back to the project and so forth. Here is a brief overview of the content provided here:

- [Deploying to Production](#): - Here we outline the steps to deploy BIMS to a production server.





1.1.1 Deploying into the server

1.1.1.1 Preparing the server

 **Code:**

```
ssh usernamr@server_ip  
sudo apt install docker-compose docker.io git make nginx
```

1.1.1.2 BIMS

Getting the code source

 **Code:**

```
cd ../  
sudo mkdir bims  
sudo chown kartoza:kartoza bims  
cd bims  
git clone https://github.com/kartoza/django-bims.git
```

Build docker images

 **Code:**

```
cd deployment  
cp docker-compose.override.template.yml docker-compose.override.yml  
cd ../  
make web
```

1.1.1.3 GeoContext

Getting the code source

 **Code:**

```
cd bims  
git clone https://github.com/kartoza/geocontext.git
```





Build docker images

 **Code:**

```
cd geocontext/deployment  
make build  
make start-web
```

1.1.1.4 NGINX Configuration





1.1 Manual

1.1.1 DevOps documentation

1.1.1.1 Containers used

1.1.1.2 SDLC

1.1.1.3 Continuous integration

1.1.1.4 Testing deployments

1.1.1.5 Backend orchestration

Deployments
Kubernetes





1 About

1.1 Contributing

1.1.1 Pull Request Steps

This project is open source, so you can create a pull request(PR) after you fix issues. Get a local copy of the plugins checked out for development using the following process.

1.1.1.1 Pull Request

Before uploading your PR, run test one last time to check if there are any errors. If it has no errors, commit and then push it!

For more information on PR's steps, please see links in the Contributing section.

1.1.1.2 Commit messages





Please make this project more fun and easy to scan by using emoji prefixes for your commit messages (see [GitMoji](#)).





Commit type	Emoji
Initial commit	🎉 :tada:
Version tag	🔖 :bookmark:
New feature	✨ :sparkles:
Bugfix	🐛 :bug:
Metadata	💻 :card_index:
Documentation	📚 :books:
Documenting source code	💡 :bulb:
Performance	🐎 :racehorse:
Cosmetic	💄 :lipstick:
Tests	🚨 :rotating_light:
Adding a test	✓ :white_check_mark:
Make a test pass	✓ :heavy_check_mark:
General update	⚡ :zap:
Improve format/structure	🎨 :art:
Refactor code	🔨 :hammer:
Removing code/files	🔥 :fire:
Continuous Integration	💚 :green_heart:
Security	🔒 :lock:
Upgrading dependencies	⬆️ :arrow_up:
Downgrading dependencies	⬇️ :arrow_down:





Commit type	Emoji
Lint	👕 :shirt:
Translation	👽 :alien:
Text	📝 :pencil:
Critical hotfix	🚑 :ambulance:
Deploying stuff	🚀 :rocket:
Fixing on MacOS	🍎 :apple:
Fixing on Linux	🐧 :penguin:
Fixing on Windows	🏁 :checkered_flag:
Work in progress	🚧 :construction:
Adding CI build system	👷 :construction_worker:
Analytics or tracking code	📈 :chart_with_upwards_trend:
Removing a dependency	➖ :heavy_minus_sign:
Adding a dependency	➕ :heavy_plus_sign:
Docker	🐳 :whale:
Configuration files	🔧 :wrench:
Package.json in JS	📦 :package:
Merging branches	🔀 :twisted_rightwards_arrows:
Bad code / need improv.	💩 :hankey:
Reverting changes	⏪ :rewind:
Breaking changes	💥 :boom:





Commit type	Emoji
Code review changes	🔥 :ok_hand:
Accessibility	♿ :wheelchair:
Move/rename repository	🚚 :truck:
Other	Be creative

1.1.2 🗣 Contributing

- [Code of Conduct](#)
- [Contributing Guideline](#)
- [Commit Convention](#)
- [Issue Guidelines](#)





1.1 Citations

1.1.1 Citation guidelines

Data accessed through the FBIS are free for all—but not free of obligations. Under the terms of the FBIS data users agreement, users who download individual datasets or search results and use them in research or policy agree to cite them using the referencing information provided in the metadata for each data record.

Good citation practices ensure scientific transparency and reproducibility by guiding other researchers to the original sources of information. They also reward data-publishing institutions and individuals by reinforcing the value of sharing open data and demonstrating its impact to their stakeholders and funders.

Users are strongly encouraged to cite data retrieved from the FBIS network according to the recommended citation:

Freshwater Biodiversity Information System (FBIS). 2022. Downloaded from <https://freshwaterbiodiversity.org> on [current date].



Note: Users also need to cite the individual source references that they have used, which are available in the metadata table provided on the detailed dashboards.

To cite the scientific article published in the African Journal of Aquatic Science.

Dallas HF, Shelton JM, Sutton T, Tri Ciputra D, Kajee M and Job N. 2021. Development of a freshwater biodiversity information system for evaluating long-term change in rivers in South Africa. *African Journal of Aquatic Science*. doi.org/10.2989/16085914.2021.1982672

To cite the User Manual:

Freshwater Biodiversity Information System (FBIS). 2022. FBIS User Manual. Prepared by the Freshwater Research Centre and Kartozia.

Website:

freshwaterbiodiversity.org





1.1.2 Citation examples

Kajee Mohammed, Henry Dominic A. W., Dallas Helen F., Griffiths Charles L., Pegg Josephine, Van der Colff Dewidinie, Impson Dean, Chakona Albert, Raimondo Domitilla C., Job Nancy M., Paxton Bruce R., Jordaan Martine S., Bills Roger, Roux Francois, Zengeya Tsungai A., Hoffman Andre, Rivers-Moore Nick, Shelton Jeremy M. (2023) **How the Freshwater Biodiversity Information System (FBIS) is supporting national freshwater fish conservation decisions in South Africa**, Frontiers in Environmental Science, Vol 11, DOI: DOI=10.3389/fenvs.2023.1122223

<https://www.frontiersin.org/articles/10.3389/fenvs.2023.1122223>

Helen Dallas, Jeremy Shelton, Tim Sutton, Dimas Tri Cuptura, Mohammed Kajee & Nancy Job (2022) **The Freshwater Biodiversity Information System (FBIS) – mobilising data for evaluating long-term change in South African rivers**, African Journal of Aquatic Science, 47:3, 291-306, DOI: 10.2989/16085914.2021.1982672

<https://www.tandfonline.com/doi/abs/10.2989/16085914.2021.1982672>

Kajee, Mohammed, Helen F. Dallas, Aneri Swanepoel, Charles L. Griffiths, and Jeremy M. Shelton. 2023. "The Freshwater Biodiversity Information System (FBIS) Fish Data: A Georeferenced Dataset of Freshwater Fishes Occurring in South Africa". Journal of Limnology 82 (s1).

<https://doi.org/10.4081/jlimnol.2023.2133>.

The past and current distribution of native and non-native fish in the Kowie River catchment, Makhanda, Eastern Cape Dumisani Khosa, Josie South, Ncumisa Y. Matam, Lubabalo Mofu, Ryan J. Wasserman and Olaf L.F. Weyl Knowl. Manag. Aquat. Ecosyst., 424 (2023) 3

<https://doi.org/10.1051/kmae/2022026>

1.1.2.1 About the FBIS





Helen Dallas, Jeremy Shelton, Tim Sutton, Dimas Tri Ciptura, Mohammed Kajee & Nancy Job (2022) The Freshwater Biodiversity Information System (FBIS) – mobilising data for evaluating long-term change in South African rivers. African Journal of Aquatic Science, 47:3, 291-306, DOI: 10.2989/16085914.2021.1982672 <https://www.tandfonline.com/>

1.1.2.2 Papers using FBIS data

Kajee Mohammed, Henry Dominic A. W., Dallas Helen F., Griffiths Charles L., Pegg Josephine, Van der Colff Dewidine, Impson Dean, Chakona Albert, Raimondo Domitilla C., Job Nancy M., Paxton Bruce R., Jordaan Martine S., Bills Roger, Roux Francois, Zengeya Tsungai A., Hoffman Andre, Rivers-Moore Nick, Shelton Jeremy M. (2023) How the Freshwater Biodiversity Information System (FBIS) is supporting national freshwater fish conservation decisions in South Africa. Frontiers in Environmental Science, Vol 11, DOI: DOI=10.3389/fenvs.2023.1122223 <https://www.frontiersin.org/>

Kajee, Mohammed, Helen F. Dallas, Aneri Swanepoel, Charles L. Griffiths, and Jeremy M. Shelton. 2023. The Freshwater Biodiversity Information System (FBIS) Fish Data: A Georeferenced Dataset of Freshwater Fishes Occurring in South Africa. Journal of Limnology 82 (s1). <https://doi.org/10.4081/>

Dumisani Khosa, Josie South, Ncumisa Y. Matam, Lubabalo Mofu, Ryan J. Wasserman and Olaf L.F. Weyl. The past and current distribution of native and non-native fish in the Kowie River catchment, Makhanda, Eastern Cape. Knowl. Manag. Aquat. Ecosyst., 424 (2023) 3 <https://doi.org/10.1051/kmae/>

Céline C. Hanzen, Martyn C. Lucas, Olaf L.F. Weyl, Sean M. Marr, Gordon O'Brien, Colleen T. Downs (2022). Slippery customers for conservation: Distribution and decline of anguillid eels in South Africa. Volume32, Issue 8, Pages 1277-1290. [https://doi.org/10.1002/aqc.](https://doi.org/10.1002/aqc)

Mahomed Desai, Celine Hanzen, Colleen T. Downs, Gordon C. O'Brien (2021) Environmental drivers of ichthyofauna community composition of the river ecosystems draining the Lake St. Lucia basin, South Africa. Hydrobiologia 848:3539–3554 <https://doi.org/10.1007/>

1.1.2.3 Environmental Impact Assessments using FBIS data

Toni Belcher (2022) Aquatic Biodiversity Impact Assessment: Farm 1441, Jonkershoek, Stellenbosch in the Western Cape.

1.1.3 Publications citing FBIS and FBIS data

1.1.3.1 Peer-review articles

Dallas HF, Shelton JM, Sutton T, Tri Ciputra D, Kajee M and Job N. 2022. The Freshwater Biodiversity Information System (FBIS) – mobilising data for evaluating long-term change in South African rivers, African Journal of Aquatic Science 47(3): 291-306, DOI: 10.2989/16085914.2021.1982672

Desai M, Hanzen C, Downs CT, O'Brien GC. 2021. Environmental drivers of ichthyofauna community composition of the river ecosystems draining the Lake St. Lucia basin, South Africa. Hydrobiologia 848:3539–3554 <https://doi.org/10.1007/s10750-021-04609-7>





Khosa D, South J, Matam NY, Mofu L, Wasserman RJ and Weyl OLF. 2023. The past and current distribution of native and non-native fish in the Kowie River catchment, Makhanda, Eastern Cape. *Knowl. Manag. Aquat. Ecosyst.*, 424. DOI: <https://doi.org/10.1051/kmae/2022026>

Hanzen CC, Lucas MC, Weyl OLF, Marr SM, O'Brien G and Downs CT. 2022. Slippery customers for conservation: Distribution and decline of anguillid eels in South Africa. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 32: 1277– 1290. <https://doi.org/10.1002/aqc.3823>

Kajee M, Henry DAW, Dallas HF, Griffiths CL, Pegg J, Ven der Coll D, Impson D, Chakona A, Raimondo DC, Job NM, Paxton BR, Jordaan MS, Bills R, Roux F, Zengeya TA, Hoffman A, Rivers-Moore N, Shelton JM. 2023. How the Freshwater Biodiversity Information System (FBIS) is supporting national freshwater fish conservation decisions in South Africa. *Frontiers in Environmental Science*. Vol 11, <https://www.frontiersin.org/articles/10.3389/fenvs.2023.1122223>

Kajee M, Dallas HF, Swanepoel A, Griffiths CL, and Shelton JM. 2023. The Freshwater Biodiversity Information System (FBIS) Fish Data: A Georeferenced Dataset of Freshwater Fishes Occurring in South Africa. *Journal of Limnology* 82 (s1). <https://doi.org/10.4081/jlimnol.2023.2133>

King J and Palmer C. 2022. Perspectives on Protecting African freshwater Ecosystems in the Anthropocene. *African Journal of Aquatic Science*. 47(3): iii-vi.

1.1.3.2 Government products

The Department of Forestry Fisheries and Environment (DFFE) National Environmental Screening Tool Aquatic Biodiversity Sensitivity Layers. 2023.

Shelton J, Jordaan M, Dallas H, van der Colff D, Kajee M, Impson D, Henry D, Khosa D, Raimondo D, Job N, Chakona A. 2023. The Department of Forestry Fisheries and Environment (DFFE) Environmental Assessment Protocols: Freshwater fish fauna.

1.1.3.3 Science and policy briefs

GEO BON and FWBON, 2022. Inland Waters in the Post-2020 Global Biodiversity Framework. Available from <https://geobon.org/science-briefs/>.

1.1.3.4 Reports, books and book chapters

Day JA and BR Davies. 2022. Vanishing Waters (3rd ed.) Water research Commission Special Report SR 160/22, Water Research Commission, Pretoria, South Africa.

Fry C. 2021. A field guide to freshwater macroinvertebrates of southern Africa. Jacana Press. South Africa.

Machingura J, Coetzee J, Dallas H, Day B, Day J, Hay D, Skelton P, Thirion C and Uys M. 2021. The evolution of ecosystem research – from biodiversity to biosassessments. Chapter 7 In: WRC@50: Celebrating a half century of excellence (Eds. Day JA, Day B and Reizenberg J). Water Research Commission Report no. SP 148/21, Water Research Commission, Pretoria, South Africa.





Turak E, Van Deventer H, Pienaar M, Walters M, Dallas H, etc. In prep. Collection and management of biological records must support protection and restoration goals for freshwater species and ecosystems.

1.1.3.5 Technical and consultancy reports

Note:

Note: Numerous consultants use the data from FBIS in their reports. Not all correctly cite the FBIS yet.

CapeNature 2022. Field Report 4/2022. Jonkershoek Nature Reserve Eerste River winter monitoring report. Unpublished internal report. Field report. CapeNature 2022. Field Report 10/2022. Jonkershoek Nature Reserve Eerste River autumn monitoring report. Unpublished internal report. Field report.

Toni Belcher (2022) Aquatic Biodiversity Impact Assessment: Farm 1441, Jonkershoek, Stellenbosch in the Western Cape.

CapeNature, 30/03/2022, Field Report: River survey of the Outeniqua Nature Reserve Complex, Unpublished internal report, Biodiversity Capabilities: Technical Report.

CapeNature 2023. Field Report 2/2023. Kogelberg Nature Reserve annual SASS monitoring report. Unpublished internal report. Field report.

City of Cape Town. In prep. Hout Bay River – State of the Rivers report. Scientific Services. City of Cape Town.

Erasmus P. 2022. Basic Assessment Report For The Proposed Prospecting Activities On Various Farms, In The Magisterial District Of Blouberg And Mogalakwena, Limpopo Province For Sylvania Northern Mining (Pty) Ltd For the following Minerals: Chrome Ore, Cobalt, Copper Ore, Gold Ore, Nickel Ore, Platinum Group Metals Located on the Farms: Altona 696 LR, Gillemberg 861 LR, Non Plus Ultra 683 LR, Teneriffe 682 LR, Aurora 397 LR and Nonnenwerth 421 LR, in the Magisterial Districts of there Blouberg and Mogalakwena, Limpopo Province DMRE Reference Number: LP30/5/1/1/2/14710PR. Prescali Environmental Consultants (Pty) Ltd. Pretoria

Erasmus P. 2022. Basic Assessment Report For The Proposed Prospecting Activities On Various Farms, In The Magisterial District Of Blouberg And Mogalakwena, Limpopo Province For Sylvania Northern Mining (Pty) Ltd For the following Minerals: Chrome Ore, Cobalt, Copper Ore, Gold Ore, Nickel Ore, Platinum Group Metals Located on the Farm: Portion 2 of the Farm Schaffhausen 689 LR, in the Magisterial District of Blouberg, Limpopo Province DMRE Reference Number: LP30/5/1/1/2/14728PR. Prescali Environmental Consultants (Pty) Ltd. Pretoria

Erasmus P. 2023. Desktop Surface Water Assessment Report for Kegakilwe Trading (Pty) Ltd - situated on Portion 0 of the Farm Mooikloof 150 and Portion 5 of the Farm Oatlands 151 within the Waterberg District in the Limpopo Province. Prescali Environmental Consultants (Pty) Ltd. Pretoria.

Erasmus P. 2022. Desktop Surface Water Assessment Report for Maditse Investments - situated on the Farms Tabana 133 LR, Boekenhoutfontein 108 LR and Prairie 107 LR within the Waterberg District in the Limpopo Province. Prescali Environmental Consultants (Pty) Ltd. Pretoria.





Erasmus P. 2022. Surface Water Assessment Report for Mofenyi Mining - Modjadji situated on Modjadji No. 1 934-LT within the Mopanie District in the Limpopo Province. Prescali Environmental Consultants (Pty) Ltd. Pretoria.

Erasmus P. 2022. Desktop Surface Water Assessment Report for Regison Mining (Pty) Ltd - situated on the Farms Greater Giyani 891 LT and Mariyeta 246 LT within the Mopani District in the Limpopo Province. Prescali Environmental Consultants (Pty) Ltd. Pretoria.

Fry, C. 2022. A field guide to freshwater macroinvertebrates in southern Africa. Jacana Media. South Africa.

Quale L. 2020. State of Strategic Water Source Areas Monitoring and Reporting Framework, and Information Platform – Southern Drakensberg Pilot. Institute for Natural Resources, South Africa.

Rivers-Moore NA and Kajee M. 2020. Pilot study on the use of the Freshwater Biodiversity Information System (FBIS) as a tool to extract data for climate change impacts on aquatic species distribution models. Freshwater Research Centre, Cape Town, South Africa.

1.1.3.6 Theses

Kajee. M. In prep. Trajectories of change in South Africa's freshwater fish fauna. PhD Thesis. University of Cape Town.

1.1.3.7 Conference presentations and talks

Dallas HF and Rivers-Moore NA. 2019. Environmental water temperature guidelines for perennial rivers: A protocol and tools for setting water temperature targets in South Africa. Southern African Society for Southern Africa Conference, Limpopo July 2019.

Dallas HF and Shelton JM. 2017. Building freshwater information systems to last: A freshwater biodiversity information system for evaluating long-term change in rivers in the Cape Floristic Region, South Africa. JRS Biodiversity Symposium, Johannesburg, South Africa.

Dallas HF, Shelton J, Olsen T, Sutton T and Ciputra D. 2019. Developing a freshwater biodiversity information system for evaluating long-term change in South African rivers. Southern African Society for Southern Africa Conference, Limpopo July 2019.

Dallas HF, Shelton J, Sutton T, Tri Cuptura D, Kajee M, Job N. 2021. The Freshwater Biodiversity Information System (FBIS) – a user-driven information system for mobilising, visualising and reporting biodiversity data in South Africa. Southern African Society for Southern Africa Conference, Virtual conference November 2021.

Dallas HF, Shelton J, Sutton T, Tri Cuptura D, Kajee M, Job N. 2021. Biodiversity data at your fingertips: the Freshwater Biodiversity Information System (FBIS). National Wetlands Indaba, Virtual conference October 2021.

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