Welcome!

Welcome to the MERMAID Documentation. Here we will walk you through how to use MERMAID.

MERMAID is an open-source application that collects and manages real-time coral reef health data, developed in partnership between the WCS, WWF, and Sparkgeo.

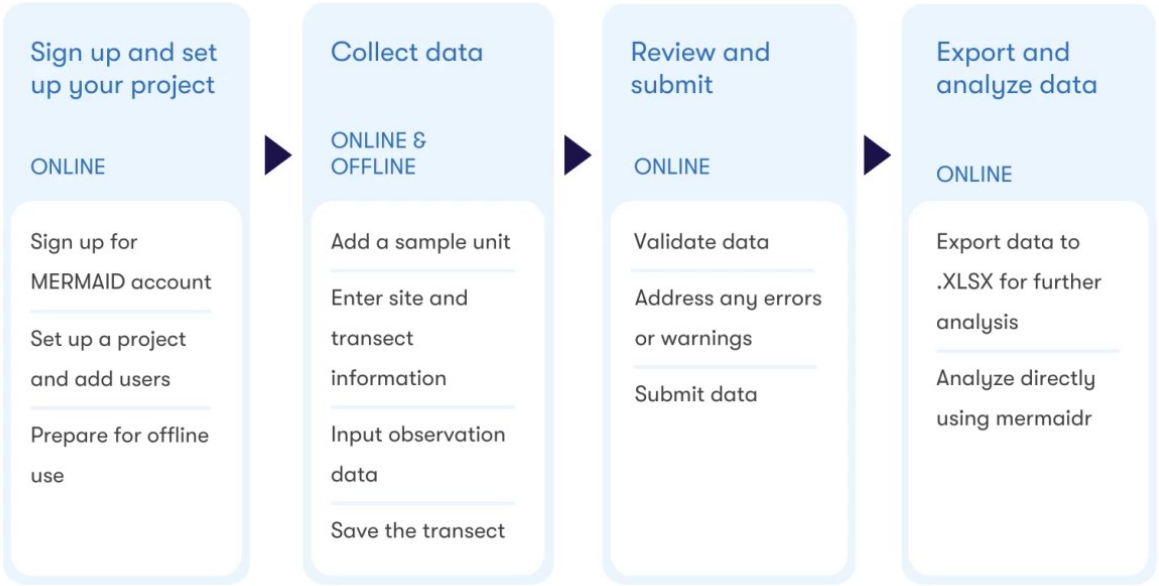
With MERMAID, scientists input their observations straight into the platform using the Web app. MERMAID does the job of tagging and sorting data, avoiding duplicates, standardizing scientific names and summarizing critical indicators.

We save you time so you can save coral reefs!

MERMAID joins you in the field with its o -line capabilities, but it stands apart from Excel or personal database apps like Access because it requires virtually zero post-entry data clean up!

Users can select reef fish and coral names from a standard list of taxa with only a few keystrokes; MERMAID will autocomplete the rest. Selecting names means saving time typing in species names or cleaning up typos of misspelled species names.

MERMAID also allows you to calculate reef fish biomass while you type, or see your total coral cover as soon as you have finished entering a transect. When you have finished collecting data, it can be exported to standard field reports (Excel) and used to create graphs or other reports. You can also analyze your data by accessing it directly from MERMAID using the mermaidr package.



The MERMAID workflow

The MERMAID workflow:

Sign up and set up a project

a Sign up for an account

b Set up a project and add users

c Prepare for o -line use

Collect data

a Select a transect type

b Enter site information

c Enter management regime

d Include benthic attributes and fish species

e Complete and save the transect

Review and submit

a Validate data

b Address errors and warnings

c Submit data

Export and analyze data

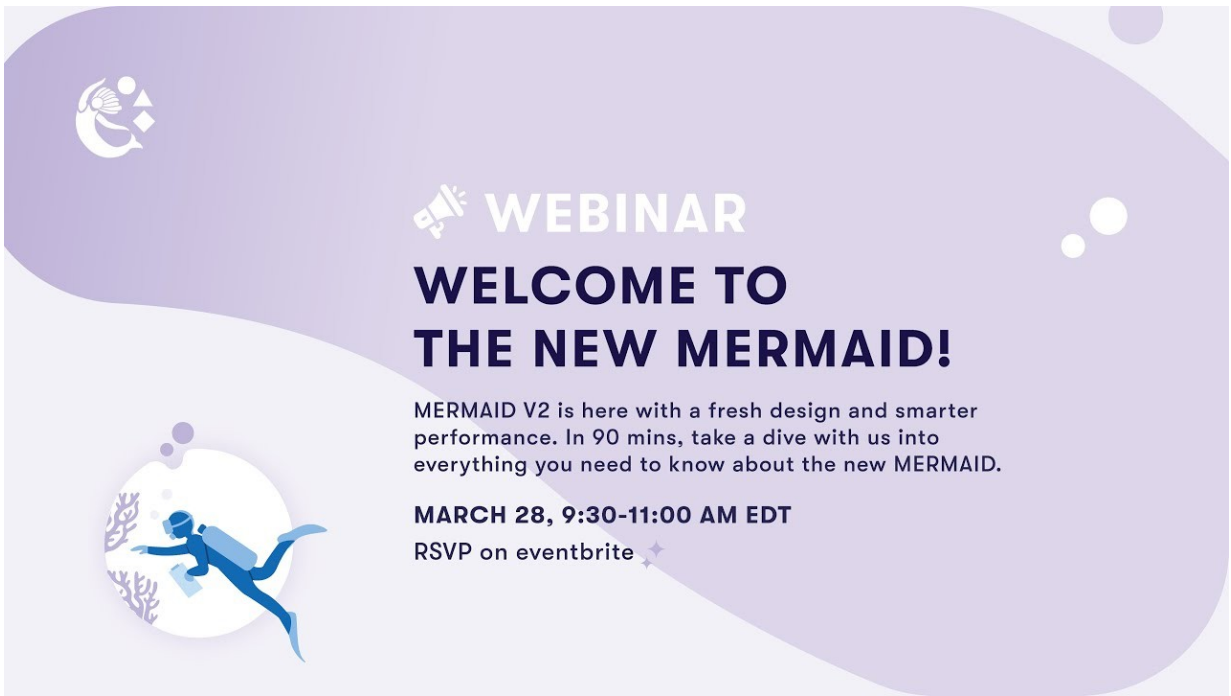
a Export to .XLSX for further analysis

b Analyze directly using mermaidr

Questions? You can reach out to us when online via the Contact link at the bottom of the app. An o -line (pdf) version of this documentation is also available in the same area.

A Deeper Dive into MERMAID V2

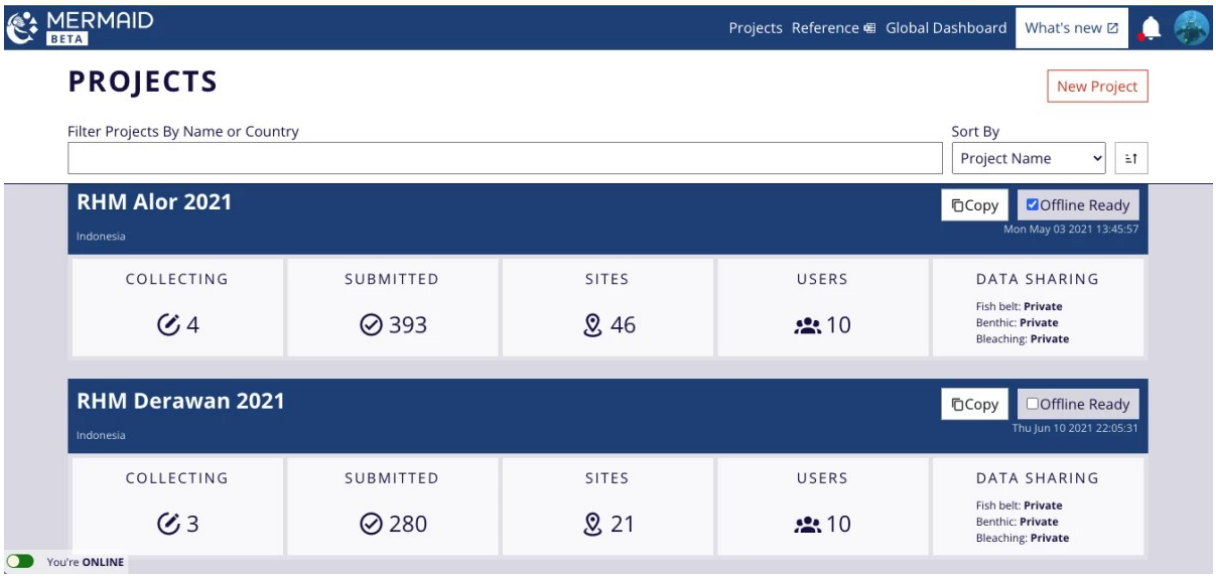
MERMAID has a fresh design and smarter performance. Dive into everything you need to know about the new MERMAID!



Take a tour of MERMAID version 2 in our latest webinar

The Projects Page

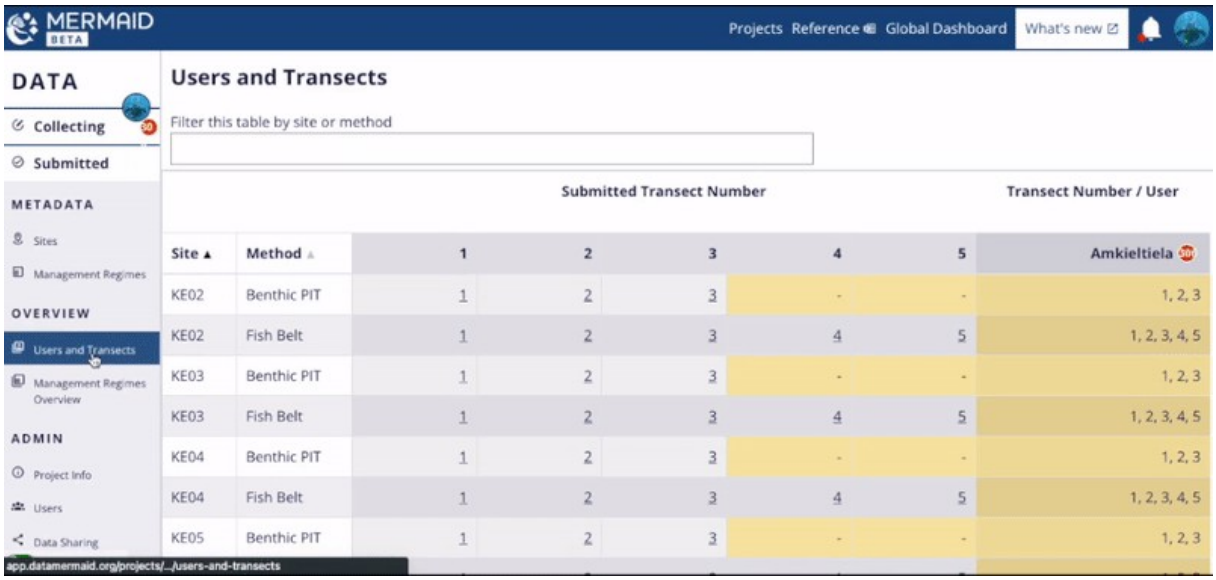
The Projects Page provides a complete summary of what is happening in each project: the number of **submitted and unsubmitted sample units**, the total number of **sites with data**, the number of **users added** to the project, and how the per-protocol **data sharing policies** have been set. **Click on each to go directly to the specific project page**; for example, you can access a project's Submitted data page by clicking **Submitted**. MERMAID Version 2 also added an **all-new notification area in the menu** (the "bell") that informs you of the latest updates from MERMAID and your projects. Close to the notification button, you can find the **Reference** button which you can access from any page. Now, you can download References in XLSX format and have all the benthic and fish data in one document. Each project also includes the **Copy** project and **O -line Ready** buttons from MERMAID Version 1.



The Project Page shows a summary of each project and provide easy access to certain pages

The Overview Page

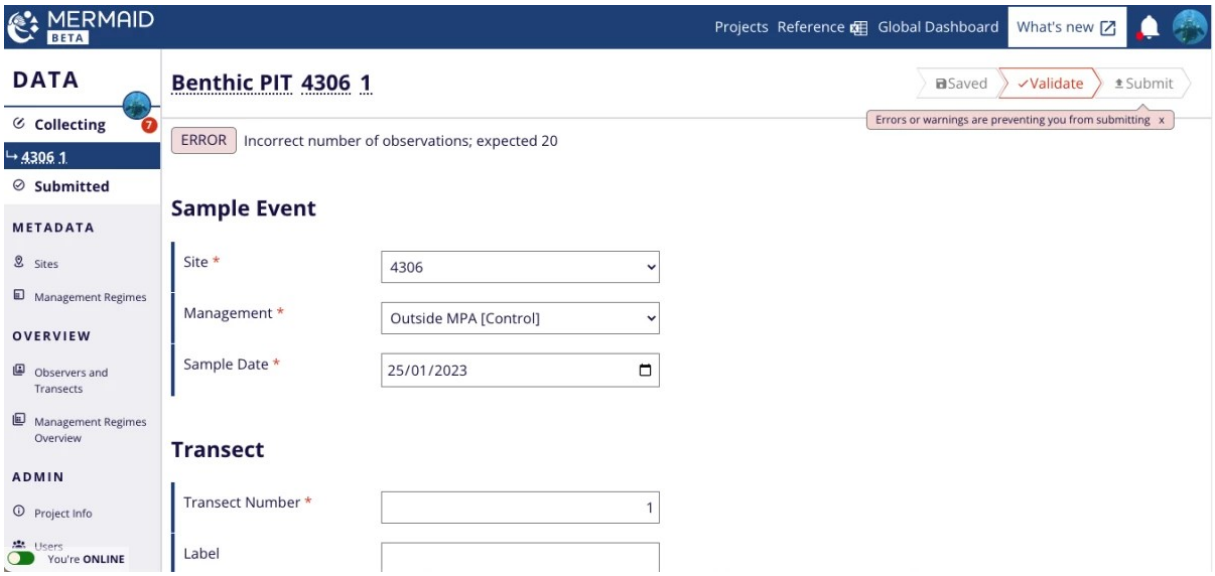
As a data manager, you might want to see at a glance all the data that has been submitted as well as who to chase for unsubmitted data. MERMAID Version 2 understands you. It now has **Overview** pages that allow you to inspect the number of **submitted sample units** per method for each site as well as **who has not yet submitted** which sample units, and make sure that **sites are associated with the right management regimes**. Clicking on any sample unit number provides you with direct access to that sample unit. To make changes, the sample unit **must be moved** from the Submitted to the Collecting page. **Re-validation is required before submitting** the updated sample unit. This means no more unexpected site changes or other unintended errors.



The Overview Page showing submitted and unsubmitted data

The Collecting Page

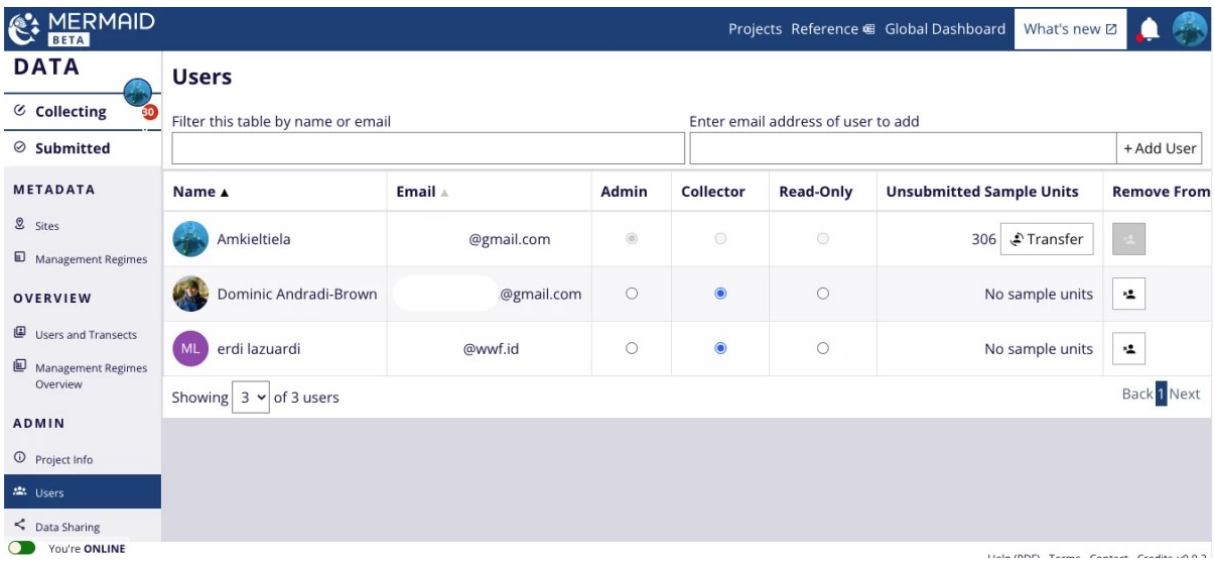
The new Collecting Page is designed to allow users **to handle warnings and errors more easily**. It also shows a reminder of why a sample unit cannot be submitted, to help you address problems more quickly. Messages are easier to read and appear next to the field where the problem is. MERMAID Version 2 also deals with site and management regime duplications in a smarter way; Version 1 would check for duplication every time a site or management regime was saved, whereas **in Version 2, duplication is checked only with sample unit validation, and only against submitted sample units** -- a more efficient and more relevant process. The **photo transect method** is now available in MERMAID Version 2 to store your **photo classification results**. On the Submitted page, the Export to XSLX button now produces a single file with data aggregated to sample unit and sample event levels as well as raw observations.



The Benthic PIT collecting page with errors detected after validation.

The Users Page

The new Users page provides **more detailed information on users** in the project, for teams of any size. MERMAID Version 2 supports **filtering users by name or email address**. Admins can also **change roles, add and remove users without going to another page, and access the user's email addresses** for easy contact.



The Users Page where you can access all necessary information about the users within a project.

See our MERMAID Version 2 announcement. If you have any questions or want to learn more about MERMAID Version 2, contact us.

Getting started

SIGNING UP

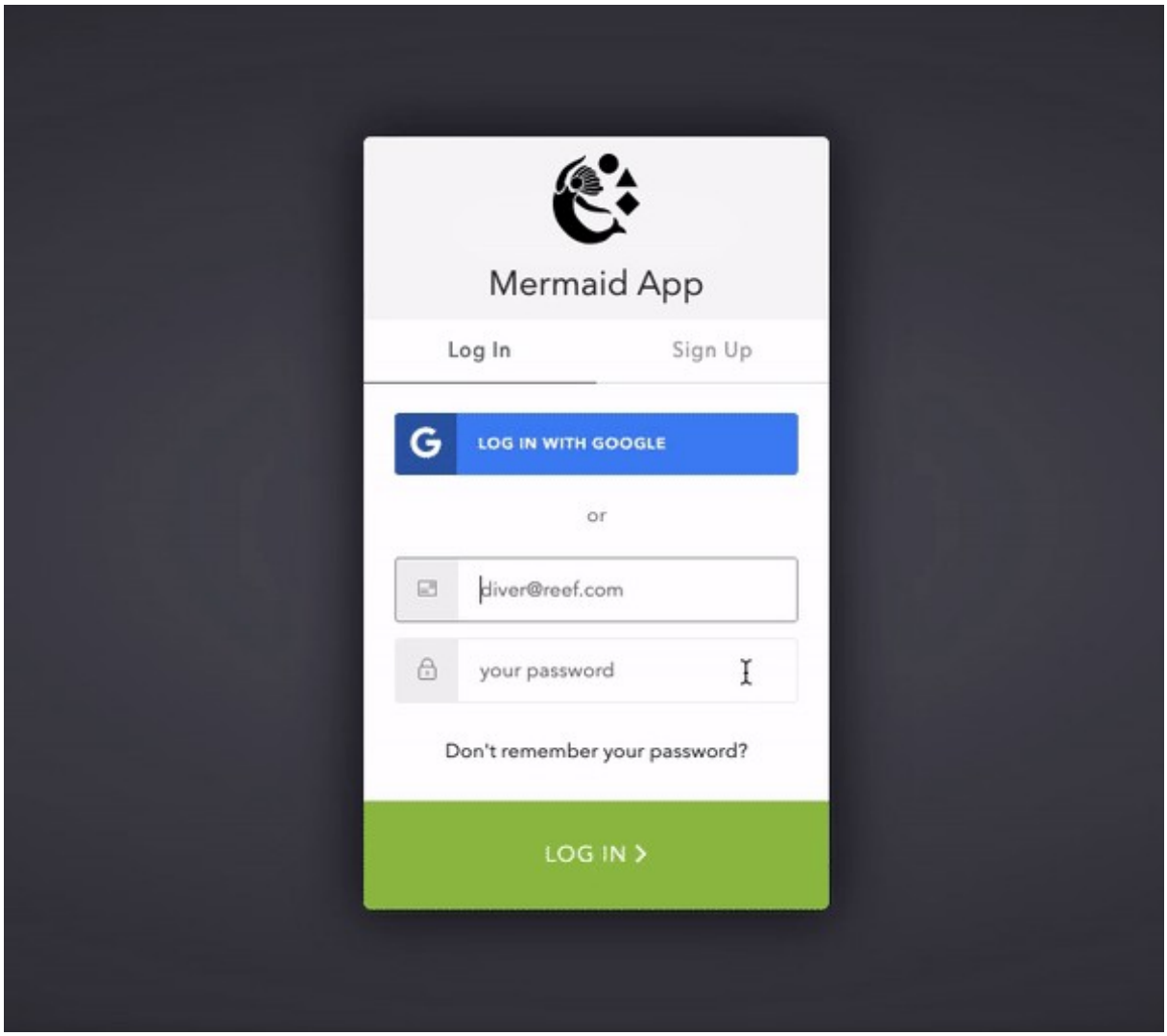
To use MERMAID, you need to sign up at https://app.datamermaid.org.

You can 'sign up with Google' to use an existing Gmail account and associated password, or enter a different email and create a password specific to MERMAID. Your account will be linked to your email.

Only users who have a MERMAID account can collect data on MERMAID. Emails not associated with MERMAID accounts can be specified by other users as Sample Unit observers; but without an account you cannot interact with the data.

MERMAID is only officially supported on Google Chrome, Firefox, and Edge browsers, and may not fully work with other browsers, like Explorer or Safari.

After signing up you will receive a confirmation email to verify your new account. You can access your profile information by clicking on the avatar in the upper right corner of any page. Here you can view your email and name, and change your MERMAID account name.



The Sign Up page where you create your MERMAID account

If you forget your unique password for MERMAID, click 'Don’t remember your password?' on the login page to receive an email with a link to reset your password.

If you signed up for MERMAID using Google and forget your Gmail password, you must reset your password through Google.

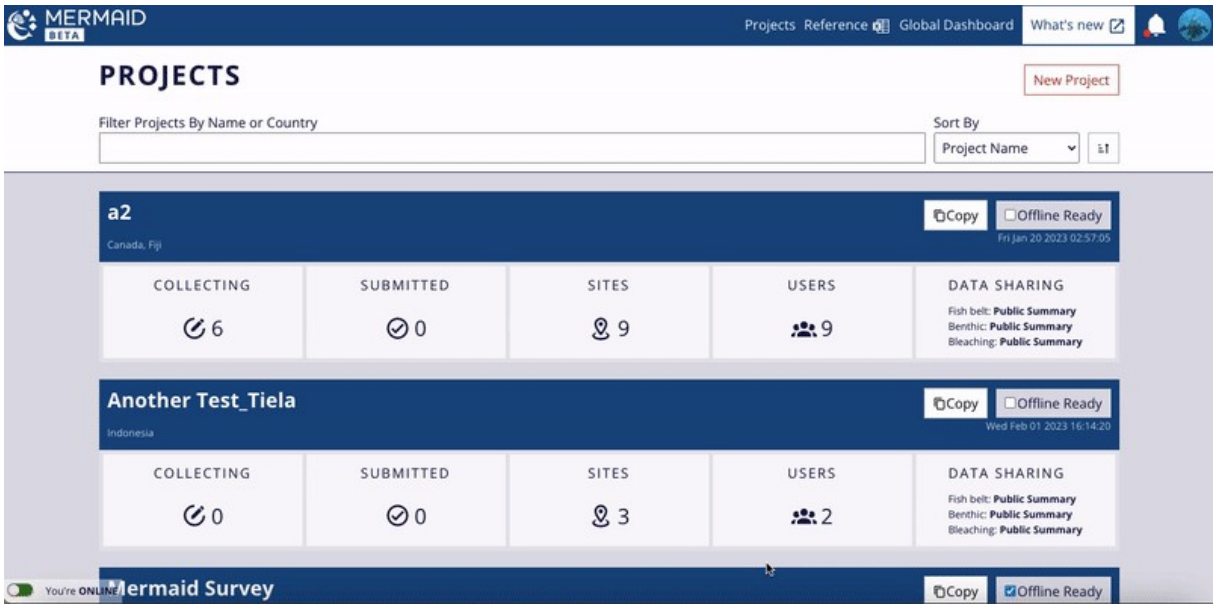
SETTING UP A NEW PROJECT

A project consists of a set of observations collected in sample units (transect/quadrat/etc.) surveyed at particular sites, on particular dates, associated with management regimes. All data, data sharing, and user access in MERMAID is

organized by project. It is up to you to decide how to organize your observations; many users define a project as containing the data from a single expedition.

A new project can only be created while online. To create, click the red ‘New Project’ button, enter a project name, then click “**Create Project**” to complete your new MERMAID project. A name is required for every new project. All other information can be added using "**Project Info**" in the lefthand menu.

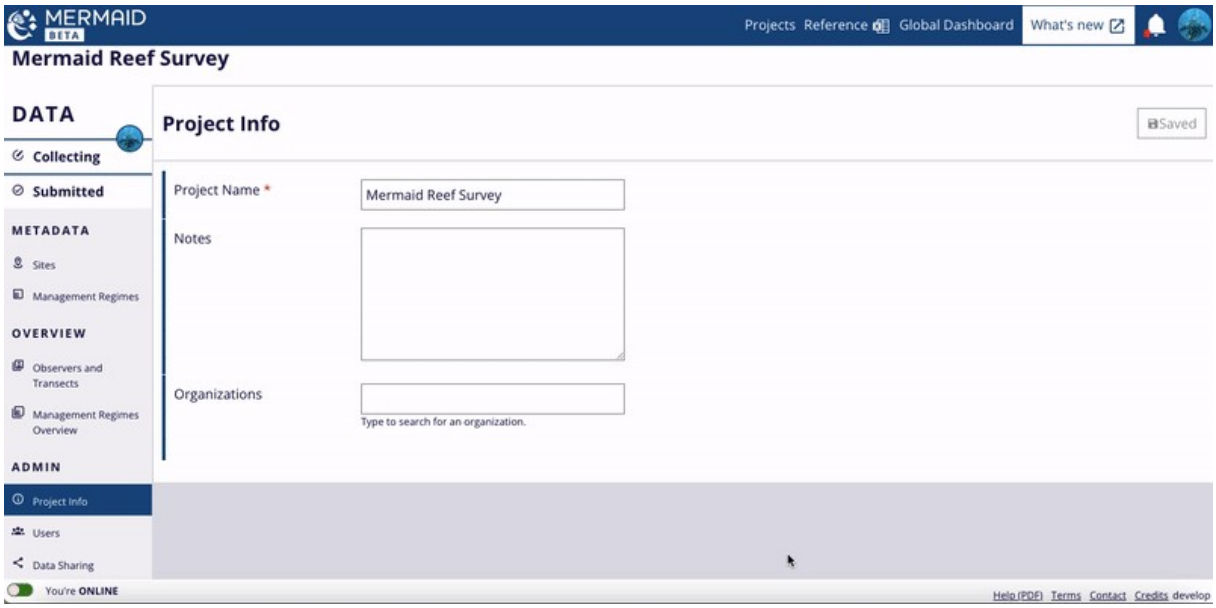
After a project is created, add users, sites, and management regimes while online.



Create a new project by clicking the 'New Project' button and typing the project name

1. Add Users:

Enter the email addresses for users involved in the project and select their roles. **Users should be signed up for a MERMAID account before they can be added a project.** In MERMAID Version 2, you can add an email that has not yet been associated with an account, but that project user's name will appear as '(pending user)' and they will not be able to access MERMAID until they associate that email with an account.



The User Page where you can add, remove, or change user's role in a project

The project creator is automatically the administrator ('admin') of the project
Other users will default to the collector role when added and can be changed to admin or read-only by selecting the appropriate role from the available options. Additional users can be added or deleted by the administrator after a project is created.

The scope of each role is as follows:

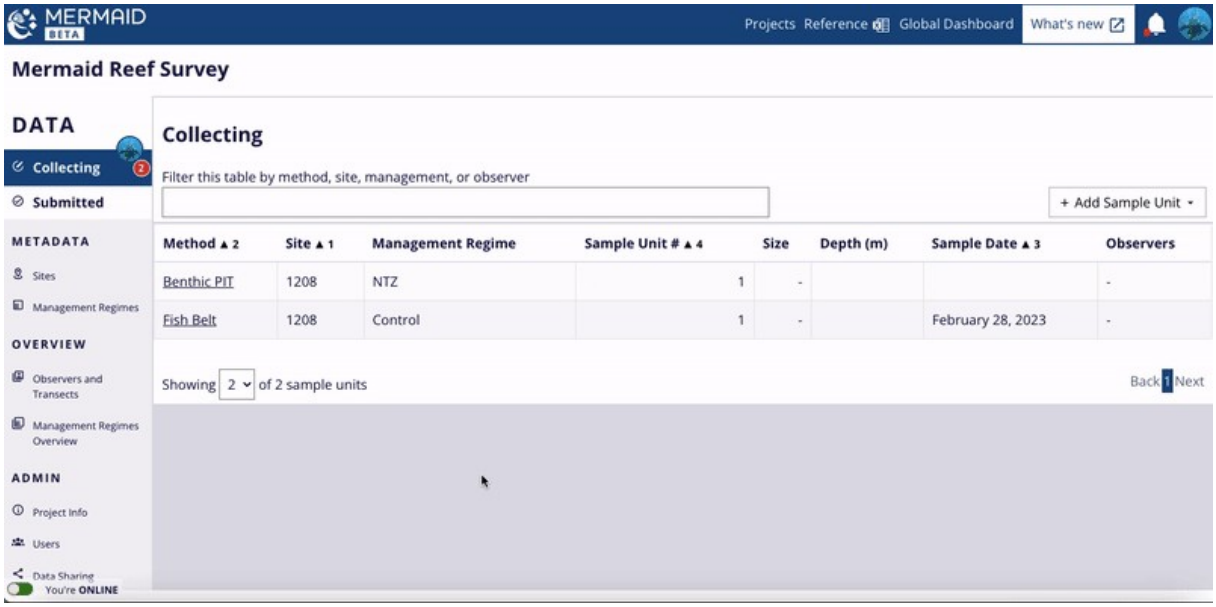
- **Read-Only:** user can only view, export, and analyze data in the analysis tools, but cannot collect new observations.
  - i.e. a project manager who is in charge of writing reports or analyses but is not collecting data in the field

- **Collector:** user can view, export, and analyze data, and collect new observations. Once a transect is submitted, the user can no longer edit or delete observations.
  - i.e. a member of the project team who is tasked with collecting data

- **Admin:** user has all Collector privileges, and can additionally change project information and data sharing, add and remove project users, transfer unsubmitted sample units between project users, and un-submit sample units for further editing.

- i.e. typically one person designated as the lead of the project

If a user must leave a project or reaches the end of their position, their data can be transferred to other users within a project. This can be done within a project through the "**Users**" tab. Simply select ‘Transfer’ for the user that will be removed from the project, then indicate the user from the project to whom you would like to transfer the unsubmitted sample units. Users can also be removed from a project on this page. **If a user still has unsubmitted sample units on their “collecting” page, b sure to transfer records prior to removing them from the project.**



Transfer unsubmitted sample unit(s) to other admin or collector on the User Page

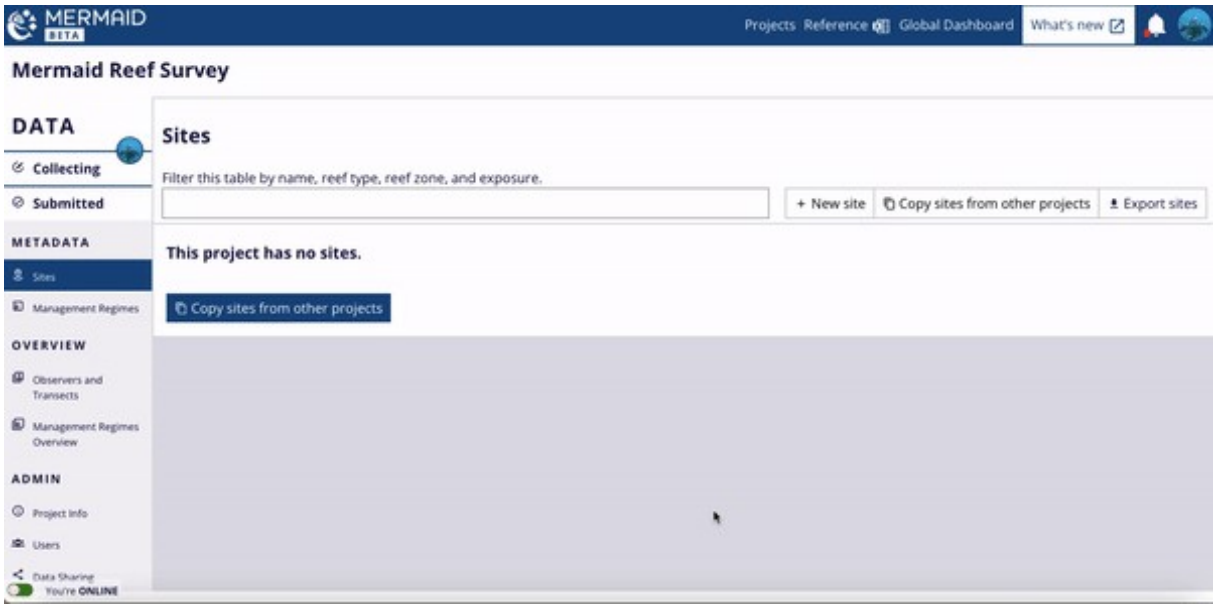
2. Add Sites:

Adding sites to a project is done after the project has been created, by selecting the **"Sites"** item under **"METADATA"** in the lefthand menu within a project. Once on the sites page, there are two ways to add a site to a project:

Create a new site using the **"+ New site"** button at the top right of the page, fill in the details and click the 'Save' button on the top right of the page.

Choose from sites that are already in the MERMAID system using the **"Copy sites from other projects"** button next to the create new site button. These may be sites that you or your organization are monitoring and have used before in previous surveys. The search bar allows you to filter the list by site name,

project name, or country. Click the check box next to any site you would like to add to your project, then click the **“Copy selected sites to project”** button at the bottom of the dialog. A map at the bottom of the dialog also displays where the site is located with a red dot.



Adding site(s) to a project by copying from existing sites in MERMAID

3. Add Management Regime:

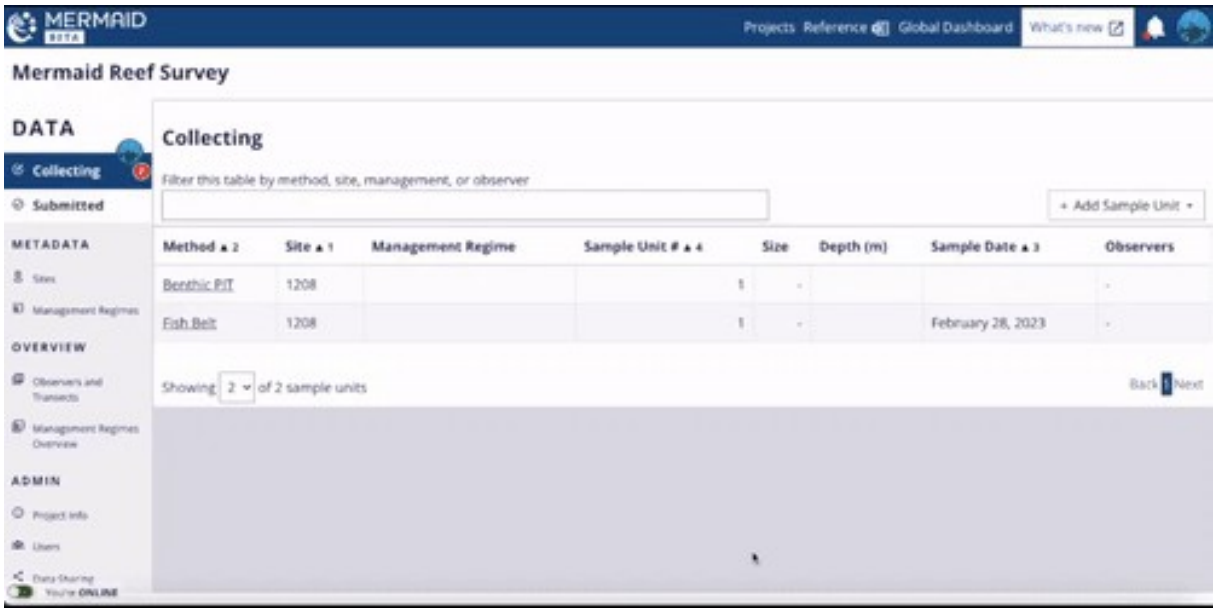
A **management regime** categorizes the regulations and restrictions placed on an area in which a survey site is located, on the date of the survey. These may be management regimes for sites that you or your organization are monitoring or have used in previous surveys. To add management regimes, navigate to **"Management Regimes"** in the lefthand menu within a project.

If you are surveying sites with a new management regime, or if your site’s management regime has changed, it must be added after creating your new project.

There are two ways to add management regimes to a project:

Create a new management regimes using the **"+ New MR"** button at the top right of the page, fill in all the details, and then click 'Save' on the top right of the page.

Choose from existing management regimes in the MERMAID system using **"Copy MRs from other projects". You can save time by selecting and adding previous management regimes to your project here.** The 'Filter' bar allows you to search the list by management name, project name, or year. Click the check box next to any management type you would like to add to your project, then click the "**Copy selected MRs to project**" button at the bottom of the dialog.



Adding management regime(s) by selecting from existing management regimes in MERMAID

4. Data Sharing:

MERMAID is committed to working collectively as a community of researchers and reef managers to use the power of data to make faster, better decisions. Coral reef monitoring data is collected with the intent of advancing coral reef science and improving management. We recognize the time and effort it takes to collect data and your sense of ownership. While not required, we hope you choose to make your data available to fuel new discoveries and inform conservation solutions.

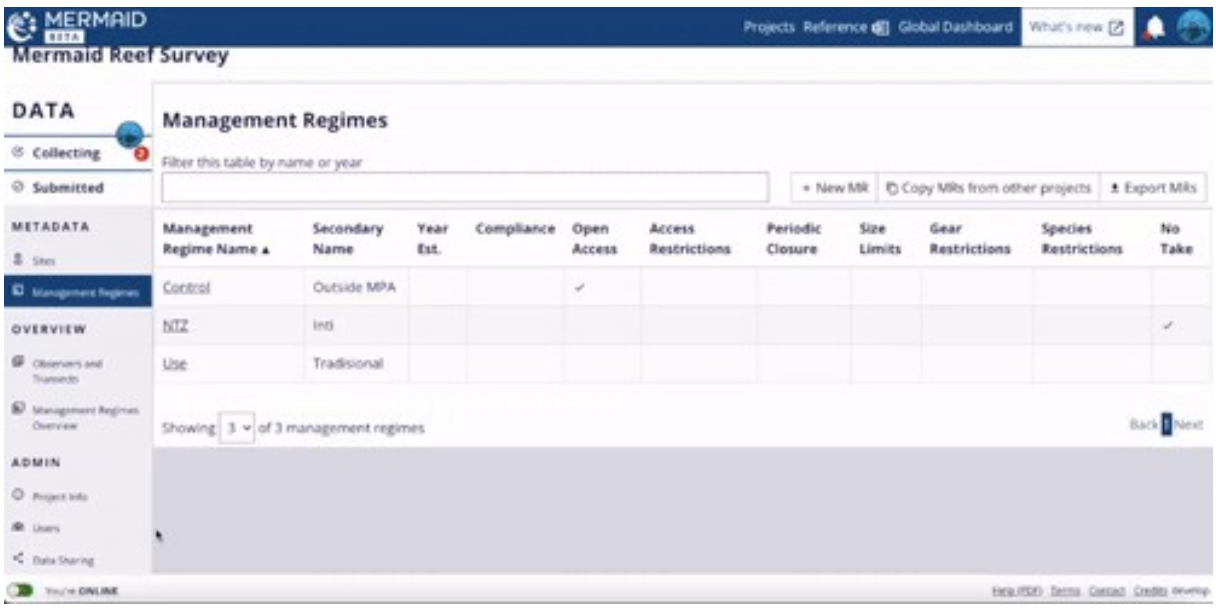
Choosing a data policy for your project determines how much of your project's data can be shared with other users to facilitate global collaboration and understanding

of coral reef health via future global dashboard features in MERMAID. It can be chosen independently for different survey methods, so that fish and benthic data can have different levels of sharing. Your data policy level can be changed at any time after creating a project.

The three policy levels are:

- **Public summary** – Collected observations are private, but site-level summary statistics are public, along with metadata for the project, protocol, and site. This option is the default.
- **Public** – All collected observations are public.
- **Private** – Collected observations and site-level summary statistics are private, but metadata for project, protocol, and site, including site location and type and count of sample unit at each site, are public.

If you are creating a project to practice using MERMAID or train others, you can indicate this with the 'This is a test project' checkbox at the bottom of the page. Data added for a test project will be omitted from all public reporting.



Set your data sharing options or assign a project as a test project on the Data Sharing Page

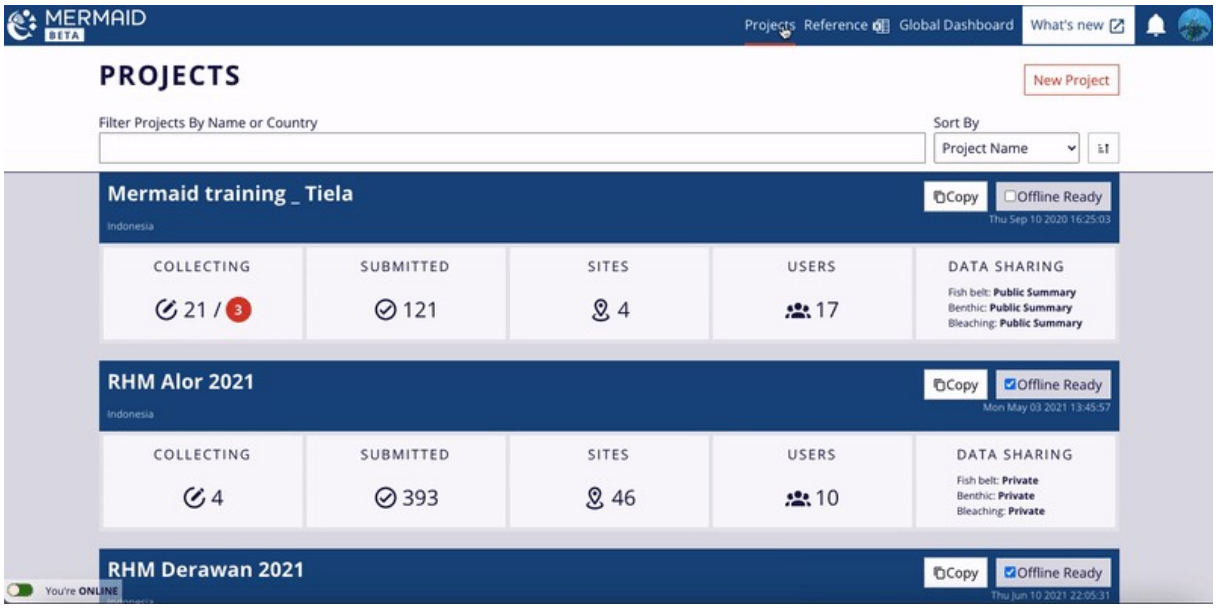
Now your project is ready to be used!

THE PROJECTS PAGE

The Projects page lists all the MERMAID projects of which you are a part, in any role (admin, collector, or read-only).

Click the top-left “MERMAID” icon or “Projects” in the top navigation bar of any page to go to your main Projects page.

Project details can only be edited while online.



You can access common project pages directly by clicking each item under each project. For example, if you click **COLLECTING**, you will be directed to that project's **Collecting** page. In this way, the Projects page provides easy access to directly start entering data, review submitted sample units, manage your sites, remove or add additional users, and change your data sharing settings for each project.

Use the filter bar to search the projects by name or country. You can also download a Reference xlsx file containing the fish and benthic attributes used in MERMAID, go

to the Global Dashboard, view the What's New page, and check updates using the notification (bell) icon.

PREPARING FOR OFFLINE USE

Before heading to the field, there are a few steps that must be followed to ensure you are able to enter data in the.

Be sure to follow each step carefully prior to your expedition **while connected to the internet**:

All project members create accounts

A project admin creates the project

The project admin must add all other users to the project. Optionally, copy or add sites and management regimes before going to the field.

Ensure that the 'One Ready' button to the right of each project in the project list that you will use has a checked sign. If it is not checked, click the 'O ine Ready' button to make sure data is available to

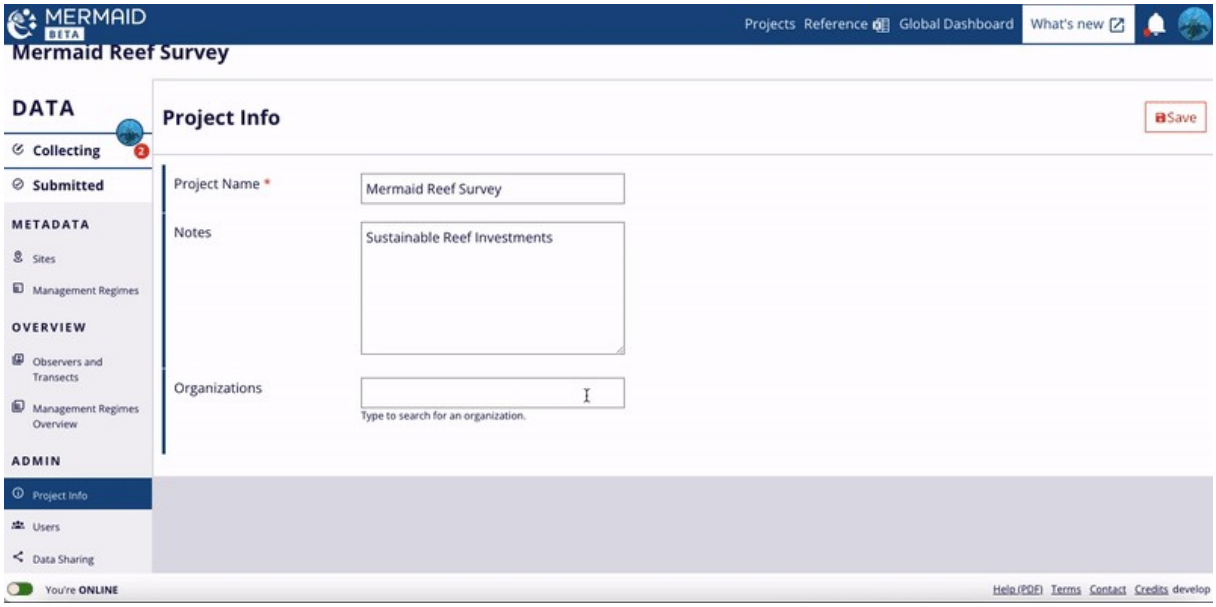
Test o ine access by clicking the 'You're ONLINE' toggle on the bottom left of all pages so that it reads 'You're OFFLINE', turning o your Wi-Fi, restarting Chrome, and entering test data into your project.

Ensure that you and all other project members are logged in to MERMAID and can access the project with all the latest sites and management regimes, then toggle the 'You're ONLINE' button to 'You're OFFLINE'. **Do not sign out of your MERMAID account.** Now your project is ready to be used and it is safe to turn o your computer.

GLOBAL FUND FOR CORAL REEFS

MERMAID supports the Global Fund for Coral Reefs, a blended finance instrument to mobilize action and resources to protect and restore coral reef ecosystems. To set up

a GFCR project, simply add 'Global Fund for Coral Reefs' as an organization on your project's 'Project info' page. Projects support multiple organizations.

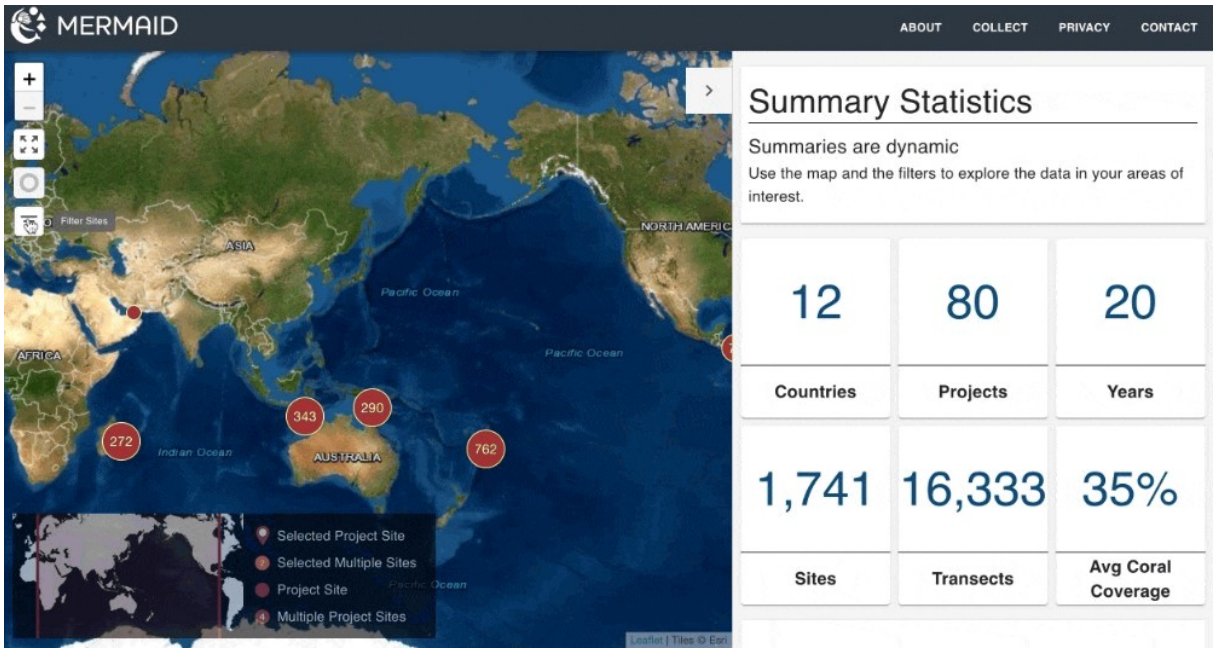


To view all projects tagged with Global Fund for Coral Reefs:

1. Go to the MERMAID dashboard

2. Select the 'filter' icon on the left toolbar

3. Filter organization to 'Global Fund for Coral Reefs'


MERMAID
ABOUT
COLLECT
PRIVACY
CONTACT
Filter Sites
ASIA
NORTH AMERIC
Pacific Ocean
Pacific Ocean
AFRICA
Indian Ocean
AUSTRALIA
343
290
272
762
Selected Project Site
Selected Multiple Sites
Project Site
Multiple Project Sites
Summary Statistics
Summaries are dynamic
Use the map and the filters to explore the data in your areas of interest.
12
Countries
80
Projects
20
Years
1,741
Sites
16,333
Transects
35%
Avg Coral Coverage

Collecting data

PROCESS AND DEFINITIONS

The data collection process

All information entered in MERMAID goes through validation before becoming live, scientifically valid data. When entering information from your dive sheets, whether online or o ine, you work with transects and quadrats that are **only visible to you**, in the "**Collecting**" area of a project.

When you are online and ready to commit your observations, you validate each sample unit individually, and once all warnings and errors are addressed, submit it. Only then does the sample unit become visible to all project members in the "**Submitted**" area of the project. It is also part of all exported xlsx files, and available via authenticated mermaidr access. If the project's data sharing policy for that sample unit is not "private", the sample unit will also be available to non-project members, accessible via the MERMAID dashboard.

Definitions

- **Site**: A place, defined per-project as a unique set of latitude and longitude coordinates with a name and other attributes, where data is collected
- **Management Regime**: A set of rules in effect at the time of data collection governing coral reef resources, with a name and other optional attributes.
- **Sample event**: An episode of data collection occurring at a Site on a date, with a Management Regime in place. The unique combination of Site, date, and Management Regime defines a Sample Event, which is used for the aggregated calculation of sample unit-level survey results.
- **Sample unit**: A group of observations collected as part of a particular survey protocol, at a given place on a given date (sample event). Because many survey protocols define a transect, "sample unit" is often used interchangably with "transect" but is more general, including, for example, collections of bleaching quadrats.

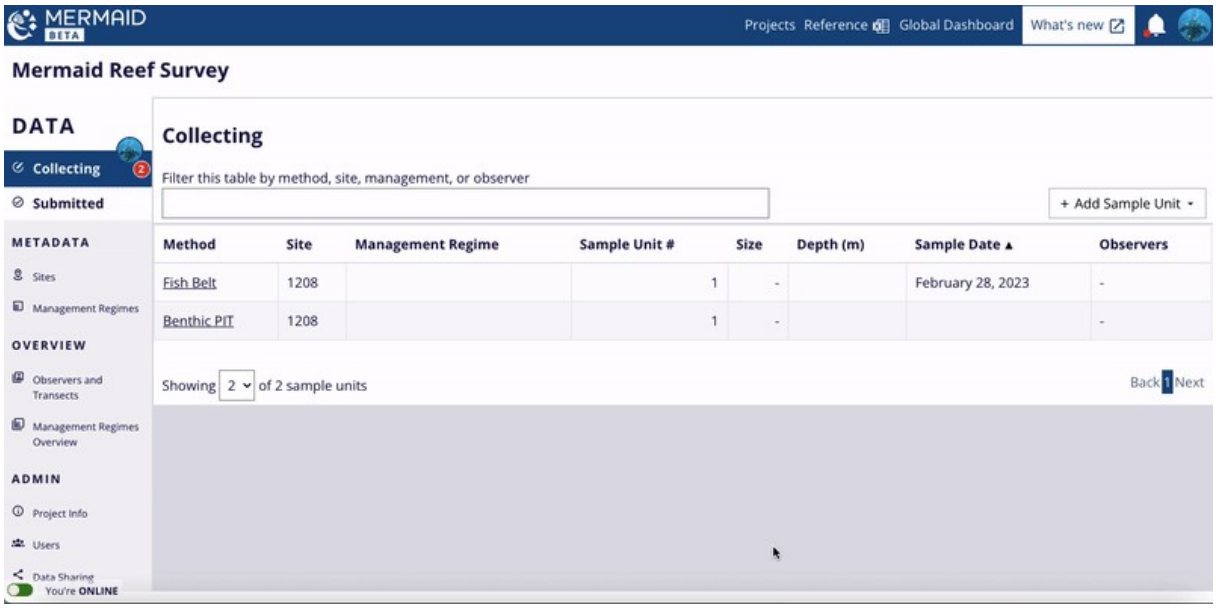
- **Observation**: an individual measurement of an observable phenomenon collected as part of a sample unit, for example a benthic attribute at a point along a benthic Point Intercept Transect.
- **Validation**: The MERMAID online process all sample units must undergo before becoming scientifically valid data.
- **Error**: a validation issue prohibiting submission because it violates fundamental survey protocol definitions; for example, a transect cannot be submitted without a defined length.
- **Warning**: a validation issue that flags an unusual value, such as a fish size greater than previously recorded. Warnings can be addressed by changing the relevant value or by indicating that the warning should be ignored.

THE COLLECTING PAGE

The ‘Collecting’ page is where you can add new sample unit observations and view other observations that you have already collected and saved but not yet submitted.

Select a project from your list to enter the project’s "Collecting” page, or directly click the "Collecting" tab on the Project Page.

The red number next to the “Collecting” tab in the lefthand menu indicates the number of records you have collected and saved but not yet submitted. The search bar allows you to filter the records by method, site name, managment regime, or observer name. Click on the table headers to sort based on your preference.

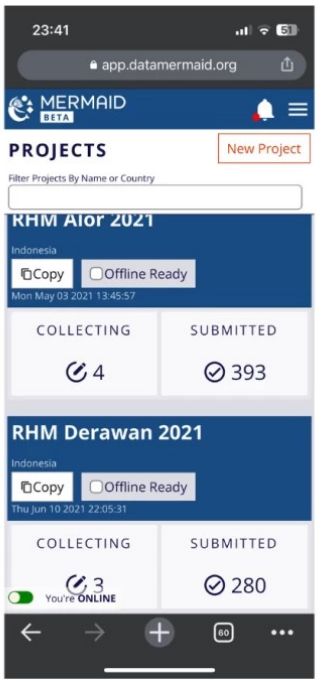


Only users with ‘Collector’ or ‘Administrator’ roles can collect and submit new observations; ‘Read-only’ users cannot collect sample units.

A sample unit requires validation prior to submission. Validation will ensure that all data in a sample unit are correct. If not, an error or warning will appear on top of the page and next to the issue that need to be resolved.

Observations can be added both online and offline, but they can only be validated and submitted when connected to the internet.

MERMAID Version 2 also provides an improved experience to record data using a mobile phone.



ADDING NEW SITES AND MANAGEMENT REGIMES

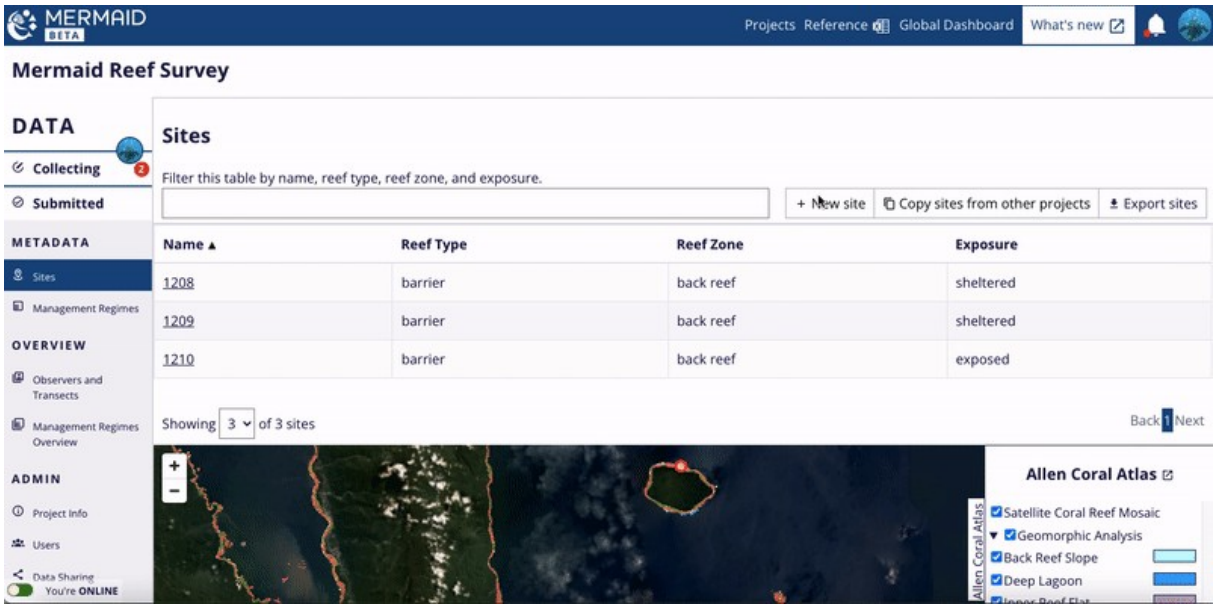
In the lefthand menu you can find "Sites" and "Management Regimes". Here admins and collectors can add a new site or management regime to a project. A site is a unique latitude and longitude, with accompanying attributes; a management regime is the area (including MPAs, OECMs, or open access zones) defined by a set of rules in eect at the time of data collection.

Adding a new site

Navigate to the “Sites” tab and select “+ New site”

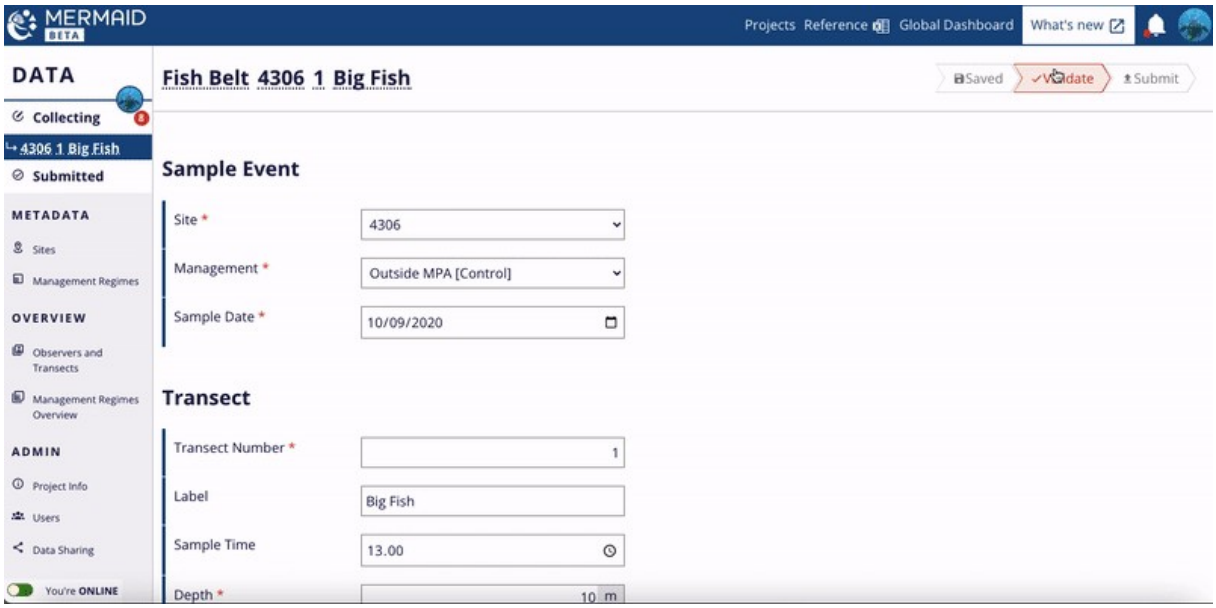
A new site requires a name, country, coordinates, and details on the exposure, reef type, and reef zone. The name can be the site’s common name or unique ID. When all details have been added, save the site.

In the “Sites” tab you can choose “**Copy sites from other projects**” to add existing sites and their metadata from other MERMAID projects.



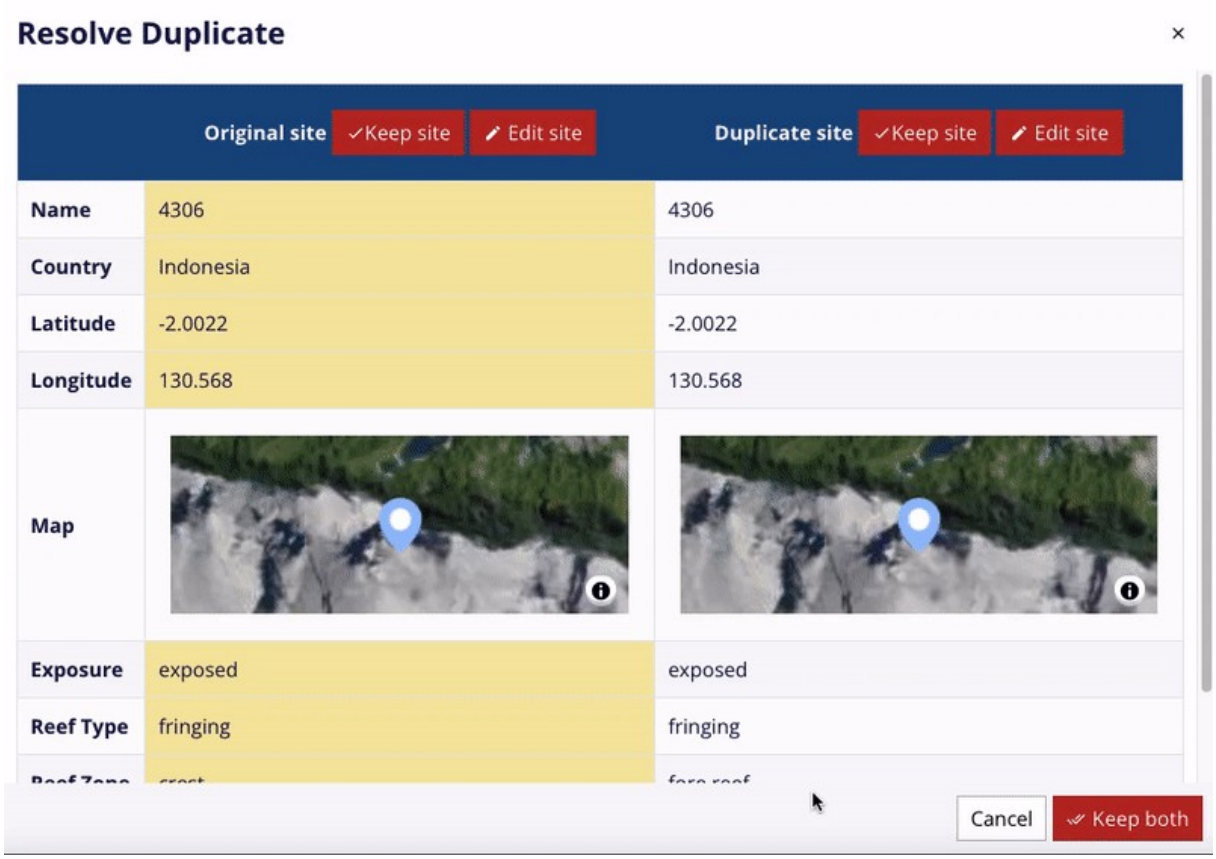
A new site created by one user is shared across the project with all other users and available for them to use in observations. Best practice is to plan the sampling sites for your project in advance and add them before going to the field.

If multiple new sites have identical coordinates, they will be flagged as **duplicate sites if used in submitted sample units**. In other words, MERMAID will detect duplicate sites only if used in a project. If this happens, for example because multiple team members add the same site while you will see a warning after you hit the "Validate" button next to the "Site" field within a sample unit that says “Site: Similar records detected”. Click “Resolve” to decide whether to merge the duplicate sites or keep them separate.



A dialog box will show you which sites are considered duplicates. Here you can decide whether to keep one site and merge it with the duplicate sites, or to edit a site and change the metadata to indicate that they actually are separate, unique sites. **Unique sites must have distinct coordinates.**

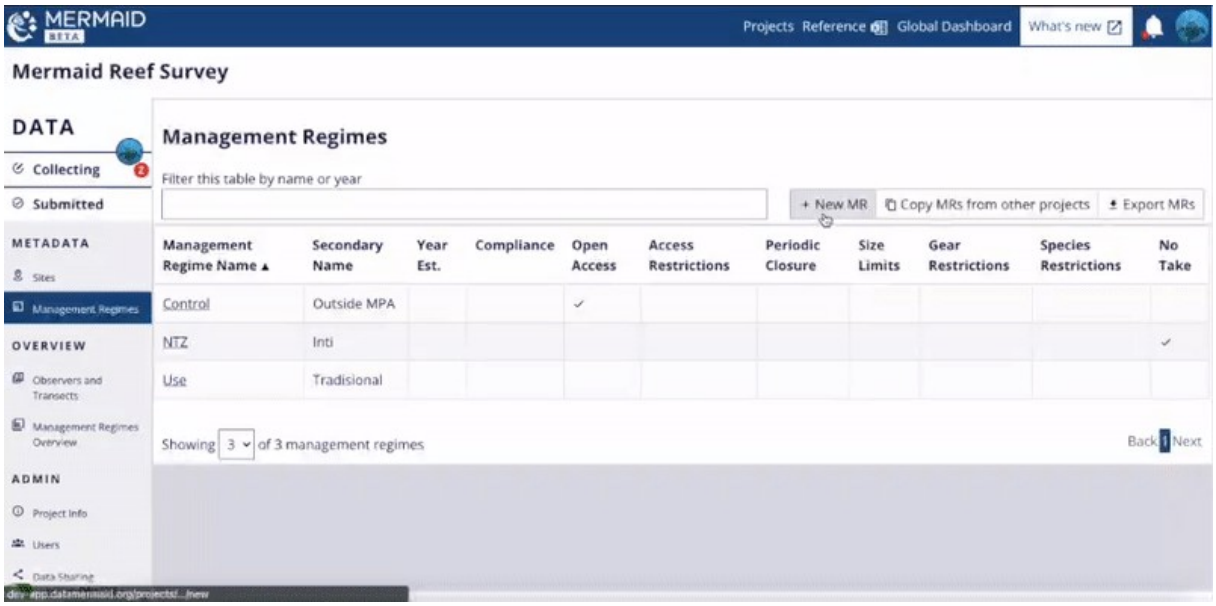
If you choose to keep a site, the site that will be merged with the site you chose to keep will be highlighted in yellow. Select “Merge” to confirm.



When sites have been merged, the sites will be updated with the single merged site, and this merged site will automatically be assigned to all sample units that were using the duplicate sites. All observation data will be preserved.

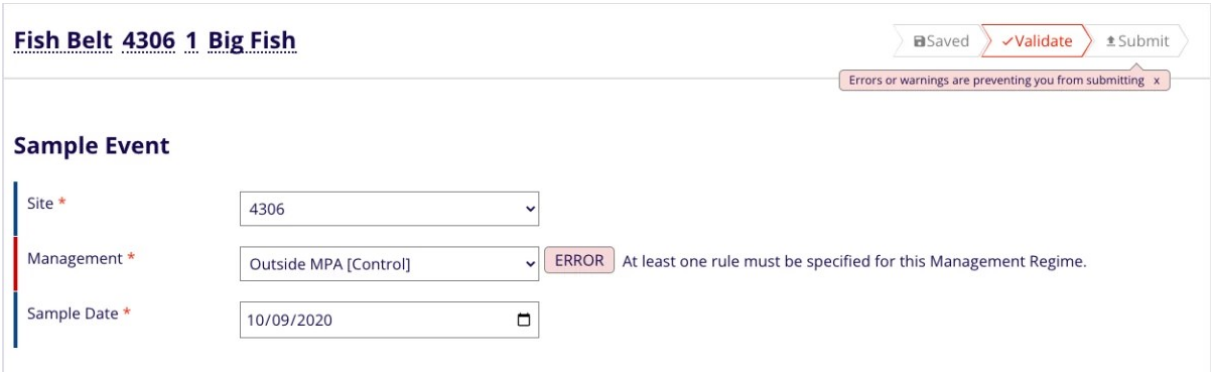
Adding a new management regime

Navigate to the “Management Regimes” tab and select **“+ New MR”**



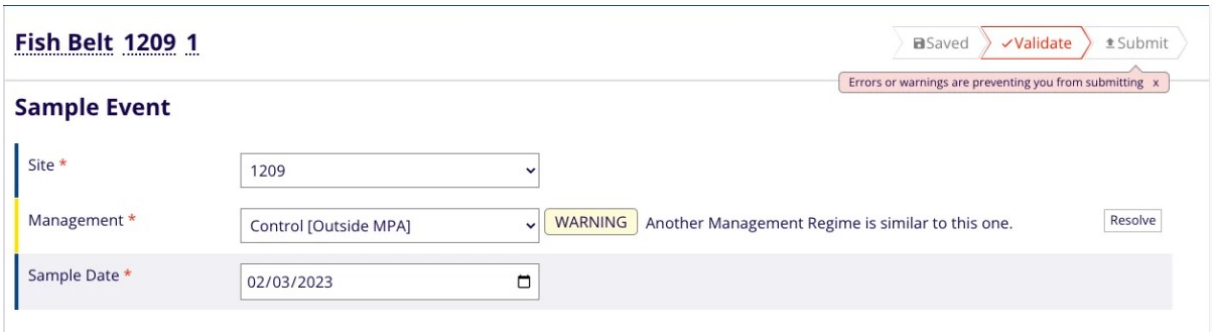
A new management regime requires a name and at least one rule; all other details are optional. "Open Access" is the default for the "Rules". When you are finished, save the management regime. You can also delete using the “Delete Management Regime” button at the bottom of the page. **Only saved management regime can be deleted.**
On the “Management Regimes” page you can also choose “**Copy MRs from other projects**” to add existing management regimes and their metadata from other MERMAID projects.

A new management regime created by one user is shared across the project with all other users and is available for them to use in observations. Best practice is to know the management regimes within your project in advance and add them while online, before going to the field. Management regime details can be edited after creation if needed.

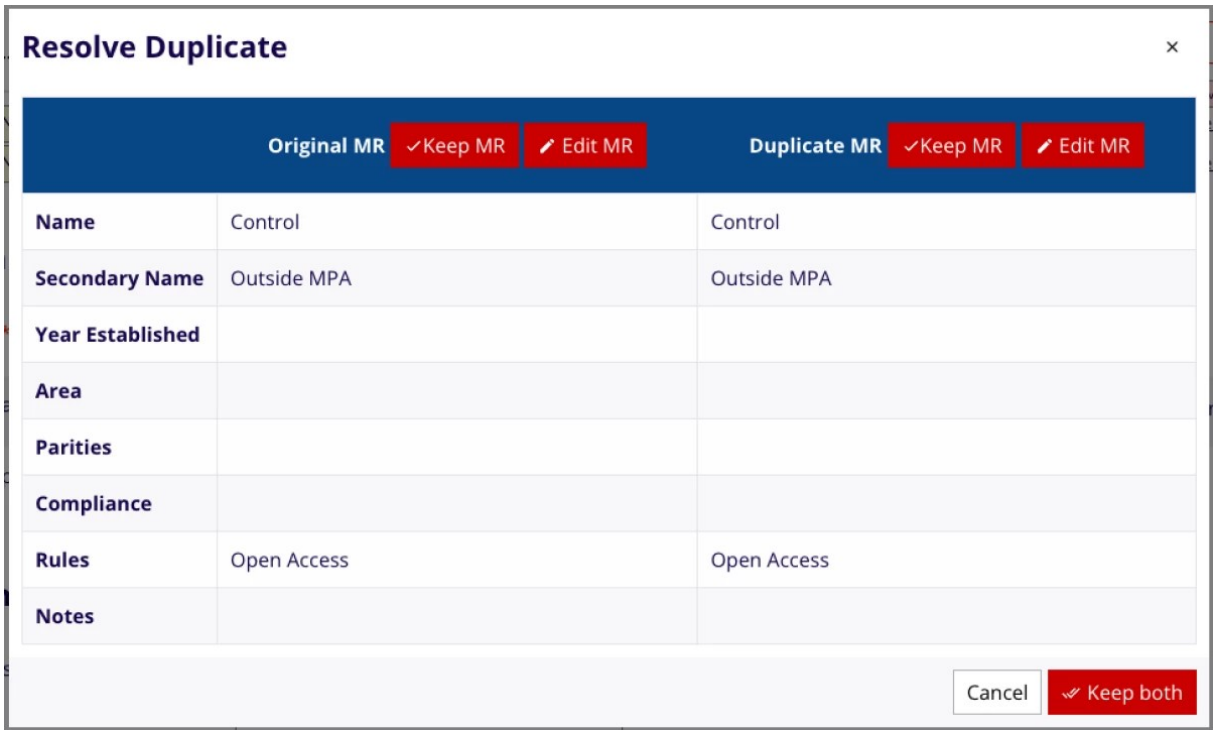


Multiple management regimes with identical names will be flagged as **duplicate management regimes**. If this happens, you will see a warning next to the "Management" filed that says “Another Management Regime is similar to this one”.

These management regimes can be merged or kept separate. Click “Resolve” button to decide whether to merge the duplicate management regimes or keep them separate.



A dialog box will show you which management regimes are considered duplicates. Here you can decide whether to keep just one management regime or to edit a management regime and change the metadata to indicate that they actually are separate, unique management regimes. Unique management regimes must have di erent names.

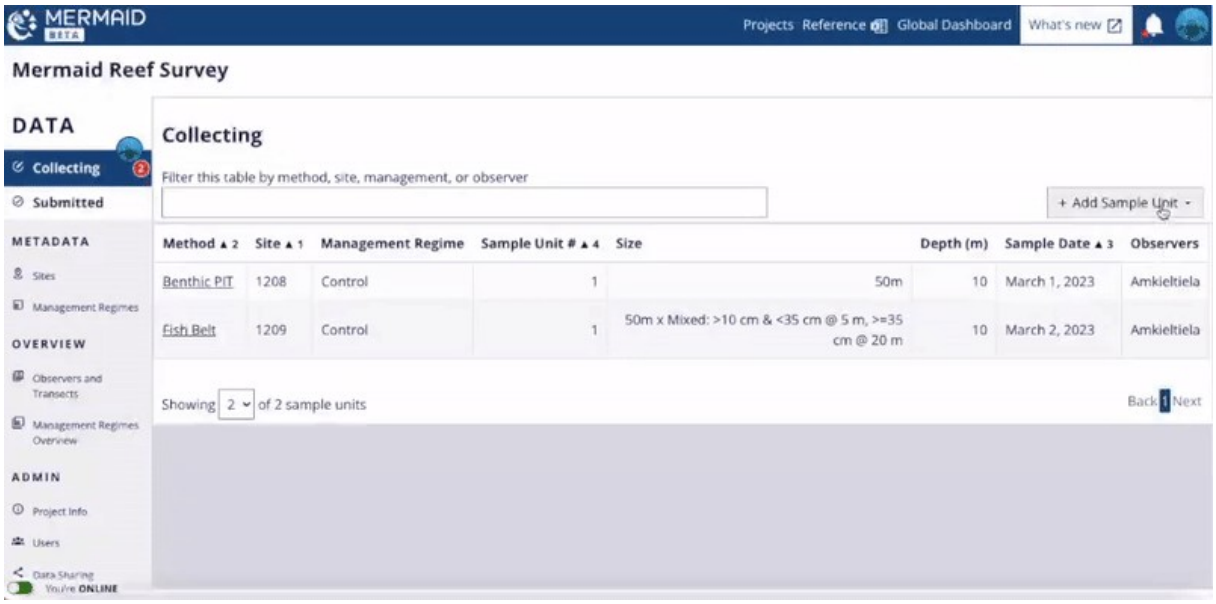


If you want to keep just one management regime, select the “Keep MR” button. The duplicate management regime(s) that will be merged with the management regime you choose to keep will be highlighted in yellow. This merged management regime will now be assigned to all sample units that had been associated with the duplicate management regime. All observation data will be preserved. If you want to keep both management regimes, select “Keep both”.

ENTERING A TRANSECT

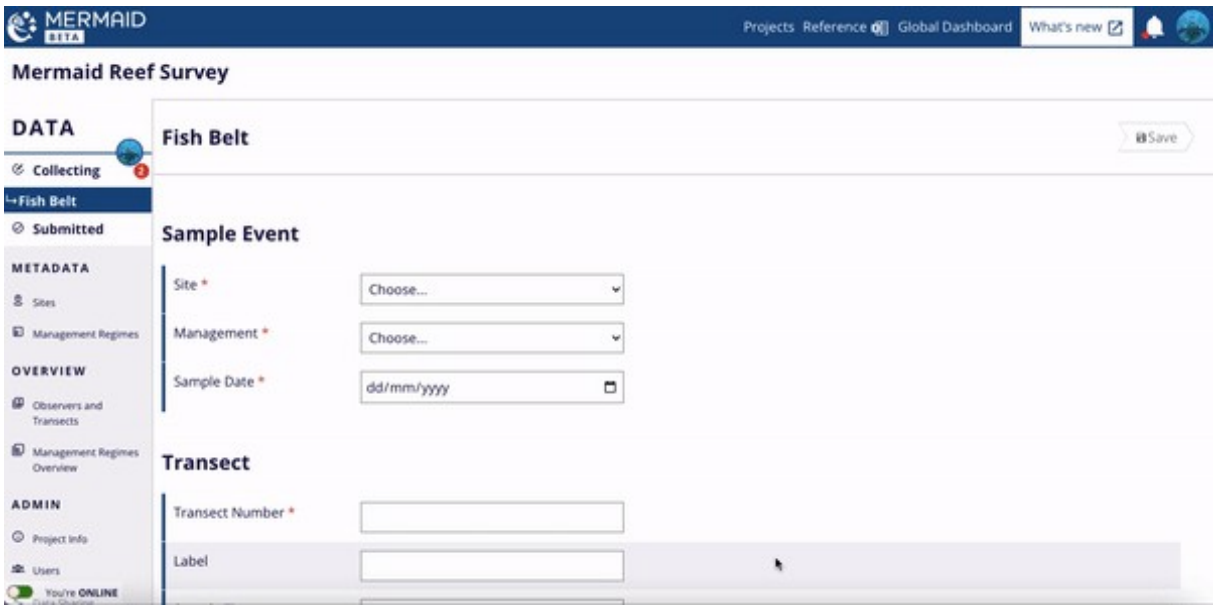
When you’re ready to enter new data for a project, click “+ **Add Sample Unit**” at the top right of the Collecting page and select a method.

There are six methods available in MERMAID: fish belt transects, benthic point intercept (PIT) transects, benthic line intercept (LIT) transects, habitat complexity transects, bleaching quadrat collections, and benthic photo quadrat transects. These transects are similar to methods described in the Coral Reef Monitoring Protocol for Assessing Marine Protected Areas (Ahmadia et. al 2013) (Appendix 2). The benthic photo quadrat transect currently stores your photo identification results only.

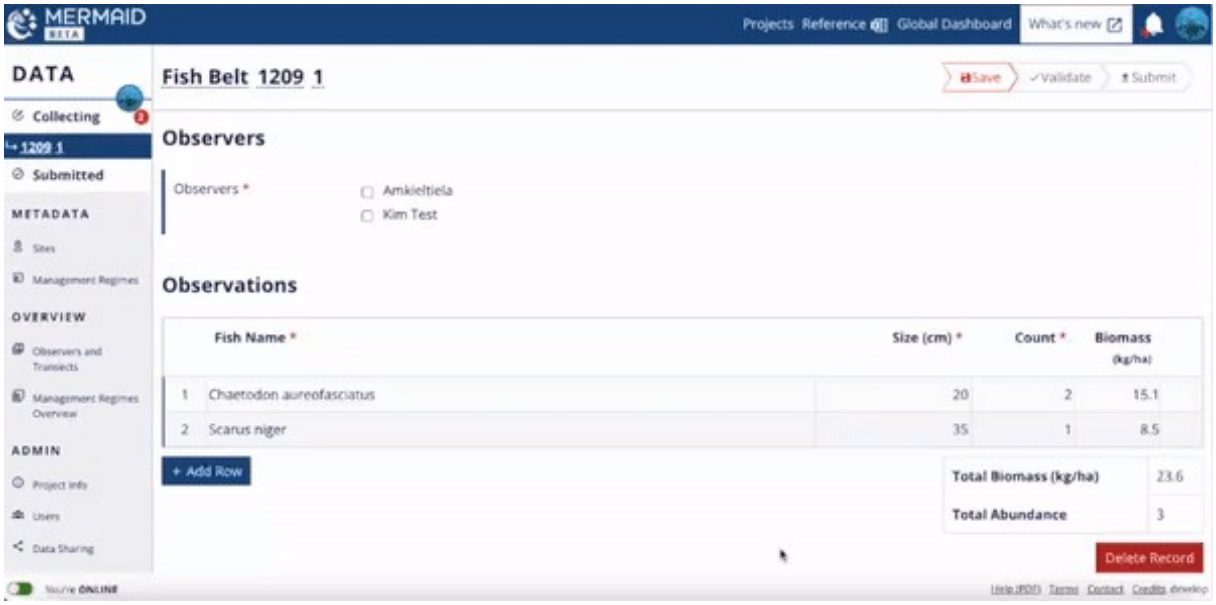


After selecting a method, you must **fill in all required fields**, marked with a red asterisk. Sites and Management Regimes that you added previously will appear in the dropdowns.

Optional transect information includes label, sample time, reef slope, visibility, current, relative depth, tide, and any notes.



Each transect requires at least one ‘observer’, defined as a person who collected transect observations. This is a required field, and you can choose from the available list of users associated with your project. To remove an observer, uncheck the box next to the observer's name.



You can save a transect any time, online or offline. A disabled Save button indicates that no data have changed since the last time you saved the transect.

When online, you can validate and submit the transect. Offline, only the ‘Save’ button will appear.

Deleting a Transect

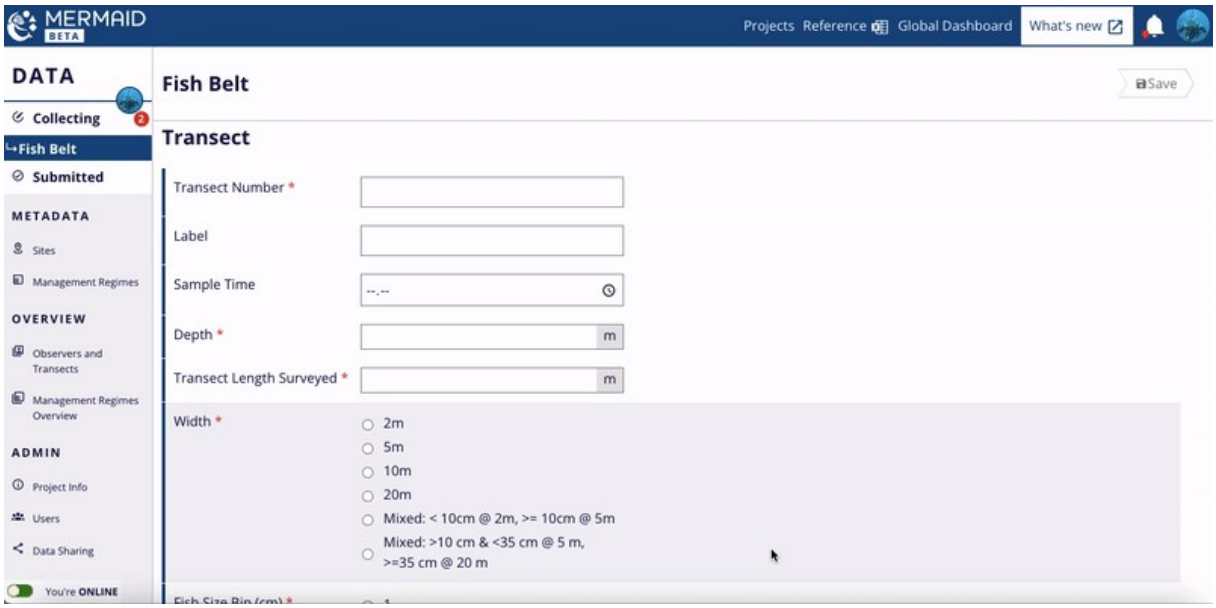
If you wish to delete a transect, click the "Delete Record" button at the bottom of any unsubmitted Sample Unit in Collecting. This will permanently remove the record and its observations from MERMAID, so be sure that you want to remove it before confirming.

SAMPLE UNIT TYPES

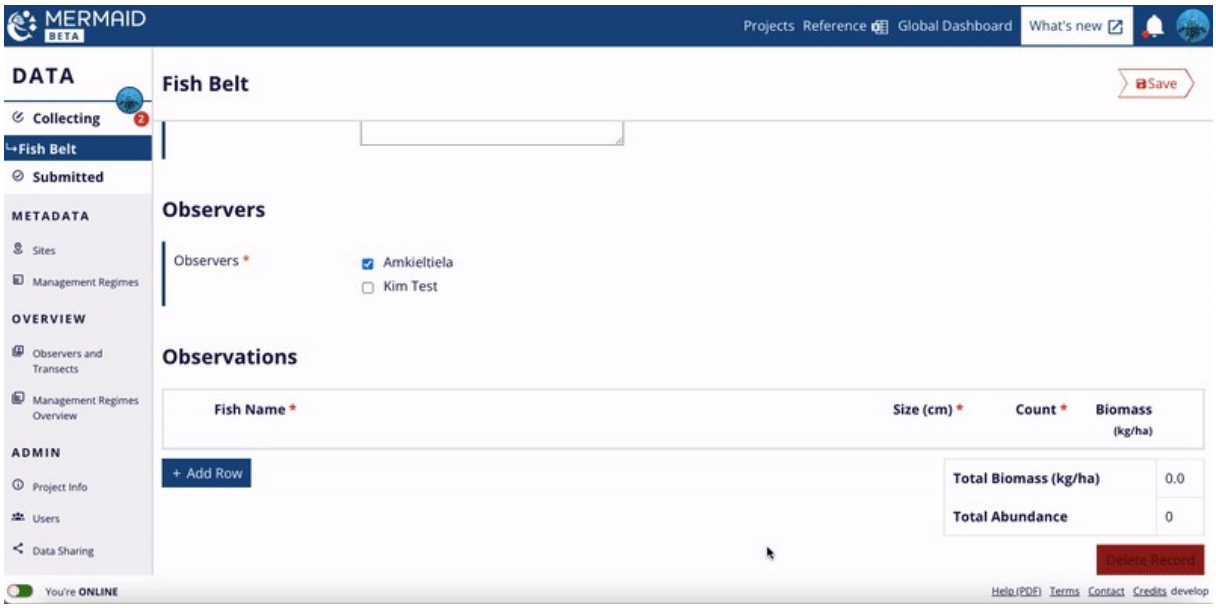
Fish belt transect

The fish belt transect records observations of fish size and abundance.

Each transect requires a transect number, depth (m), length surveyed (m), and transect belt width (options: 2m, 5m, 10m, 20 m, or mixed). Users can select how fish sizes are estimated underwater, using 1cm, 5cm, or 10cm size bins. Specialized irregular size bin schemes are also available for particular organizational definitions. The “label” field can be used to indicate a special type of fish belt transect, such as long-swim.



Observations are recorded at the bottom of the page.



After typing any three letters of an observed fish family, genus, or species, MERMAID will provide a **predictive dropdown** with names. This ensures all spelling is correct and consistent. Select the fish family, genus, or species to use for an observation by using the ‘up’ or ‘down’ arrow keys or entering more letters so that there is only one choice and press the 'Enter'/'Return' or 'Tab' key to select a name.

All fish names come from Fishbase. They can be found in the “Reference” icon at the header of any page. A new fish family, genus, or species can be proposed to the MERMAID science team for approval and addition. Proposing a genus-level "Genus spp." fish is unnecessary, because all genera are also available directly for observation.

Biomass will automatically be calculated in the last column.

To prevent errors in data entry, MERMAID will issue warnings and errors for fish belt transects like:

- Total biomass less than 50 kg/ha
- Total biomass greater than 5000 kg/ha
- Total observations less than 5

- Fish larger than maximum observed size

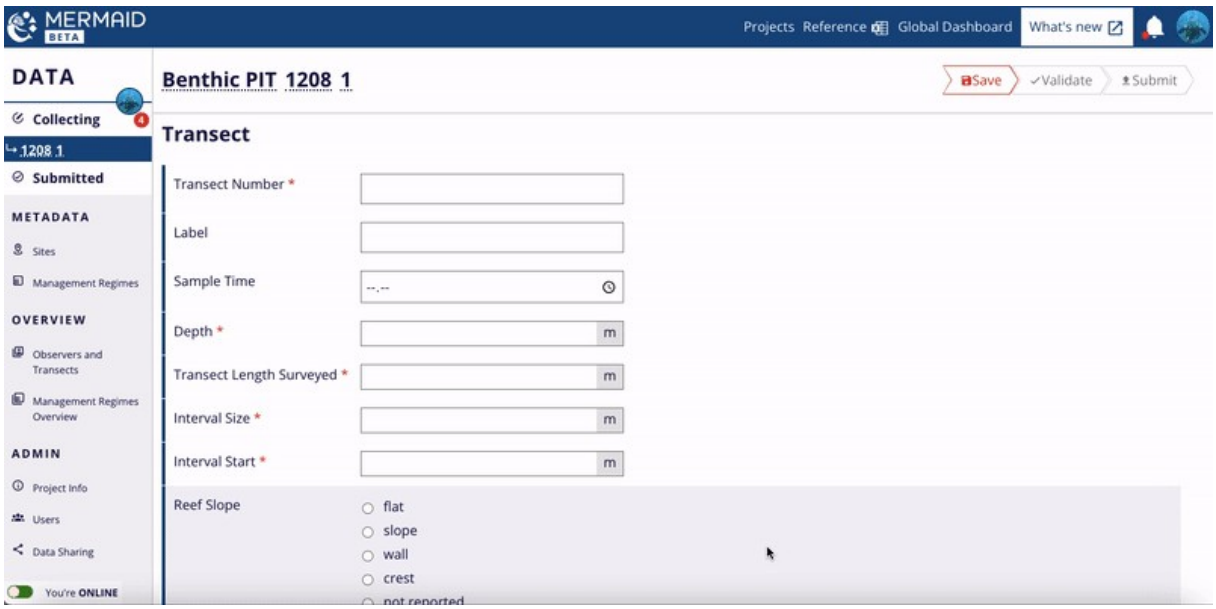
NAVIGATION TIP

Navigating through the observation fields is similar to navigating in Excel: use the ‘Tab’ key to move across to the Size and Count (abundance) columns; at the end of a row, press 'Enter'/'Return' to create a blank row and enter a new fish observation; press “Tab” at the end of a row to duplicate fish species from the last row.

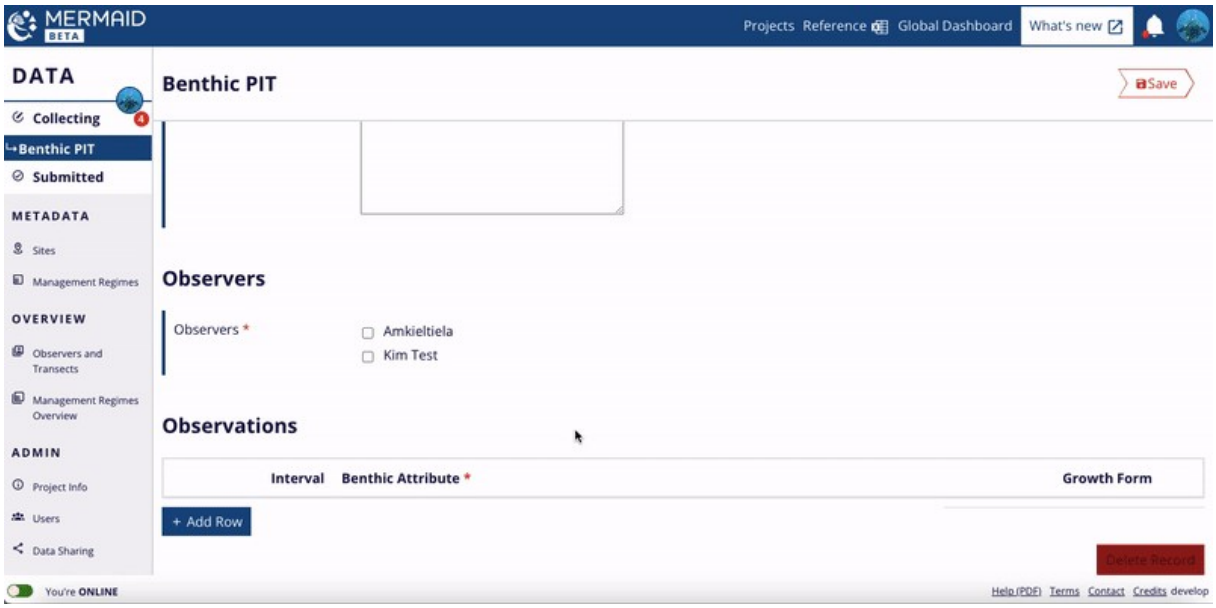
Benthic point transect (PIT)

The benthic point intercept transect (PIT) records observations of benthic cover at regular intervals along a transect.

Each transect requires a transect number, depth, the surveyed transect length (m), the interval between point observations (m), and the interval point where you start to record your data (m). For example, points counted every 50 cm can be entered as 0.5m in the “Interval size” field.



Enter the benthic attribute observed at each point at the bottom of the page.



After typing any three letters of an observed benthic attribute, MERMAID will provide a predictive dropdown with names. This ensures that all spelling is correct and consistent. Select the benthic attribute by using the ‘up’ or ‘down’ arrow keys on your keyboard or with your mouse, or entering more letters so that there is only one choice, and then pressing the 'Enter'/'Return' or 'Tab' key to select a name. Growth forms can be selected from the dropdown list or predicted by typing.

Available benthic attributes can be found using the “Reference” icon at the header of any page.New benthic attributes can be proposed to the MERMAID science team for approval and addition.

The number of rows should equal the total number of expected points based on your transect length and interval size. You will receive a warning if the number of entered rows does not match this.

The percent cover of each benthic category along the transect will automatically be calculated and displayed at the bottom of the rows. All benthic attributes belong hierarchically to a small number of top-level benthic categories commonly used for analysis, such as "hard coral".

NAVIGATION TIP

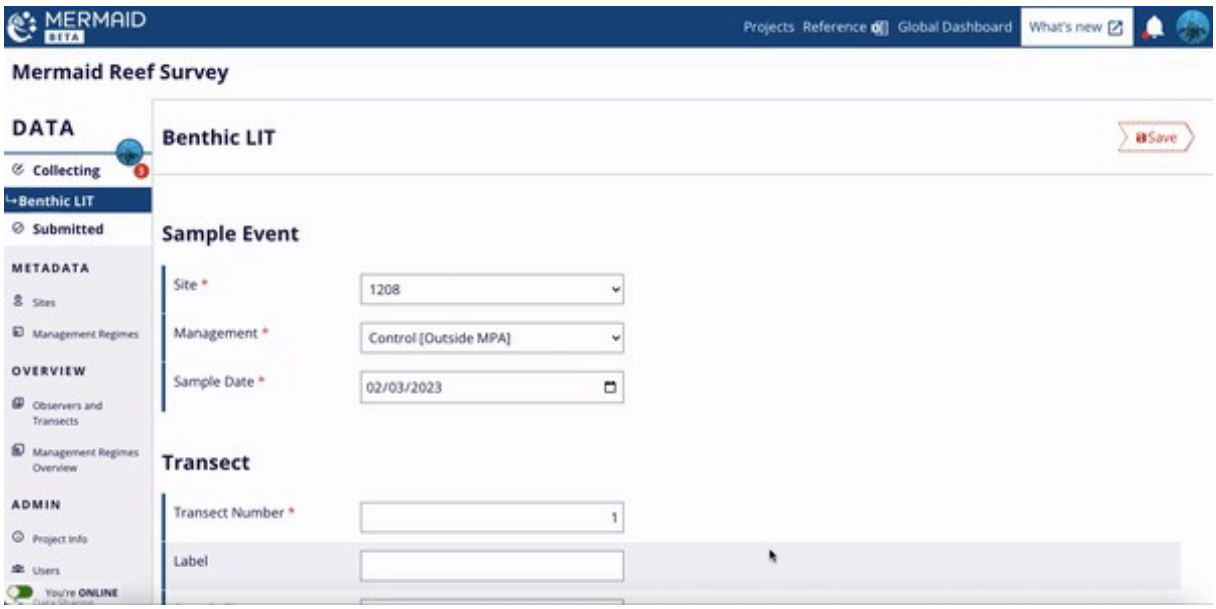
Use the ‘Tab’ key to move across to the attribute and growth form columns. At the end of the row, press 'Enter'/'Return' to create a blank row and add a new benthic

attribute observation. Press the 'Tab' key at the end of the row to duplicate the benthic attribute in the next row.

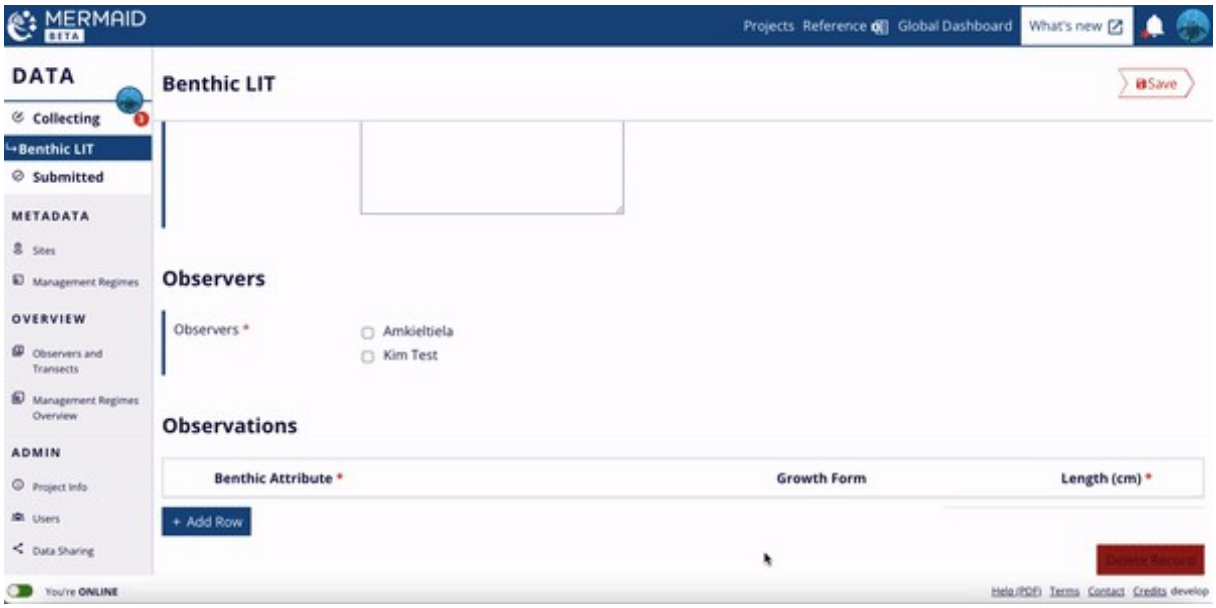
Benthic line transect (LIT)

The benthic line intercept transect (LIT) records observations of benthic cover length along a transect.

Each transect requires a transect number, depth (m), and the surveyed transect length (m).



Enter the benthic observations from the transect at the bottom of the form.



After typing any three letters of an observed benthic attribute, MERMAID will provide a predictive dropdown with names. This ensures that all spelling is correct and consistent. Select the benthic attribute by using the ‘up’ or ‘down’ arrow keys on your keyboard or with your mouse, or entering more letters so that there is only one choice, and then pressing the 'Enter'/'Return' or 'Tab' key to select a name. Growth forms can be selected from the dropdown list or predicted by typing.

Available benthic attributes can be found using the “Reference” icon at the header of any page.New benthic attributes can be proposed to the MERMAID science team for approval and addition

The sum of the observation lengths entered should equal the total transect length. You will receive a warning if not.

The percent cover of each benthic category along the transect will automatically be calculated and displayed at the bottom of the rows. All benthic attributes belong hierarchically to a small number of top-level benthic categories commonly used for analysis, such as "hard coral".

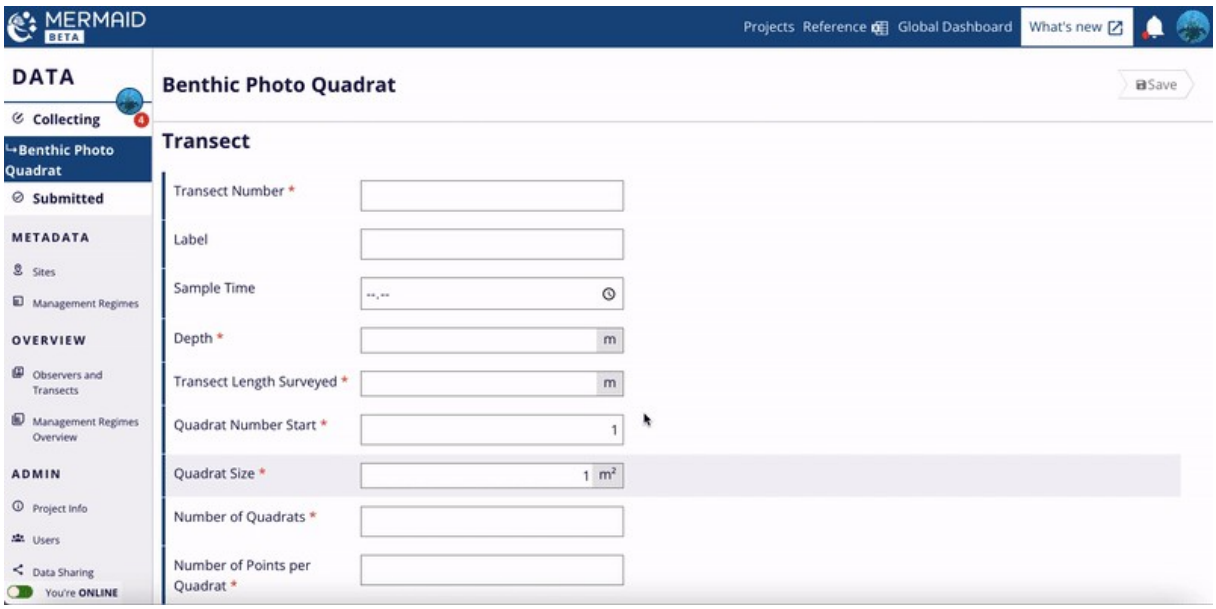
NAVIGATION TIP

Use the ‘Tab’ key to move across to the attribute, growth form, and length columns. At the end of the row, press 'Enter'/'Return' to create a blank row and add a new benthic attribute observation. If the same attribute is observed but with a different length, press the ‘Tab’ key at the end of the row to duplicate the benthic attribute in the next row.

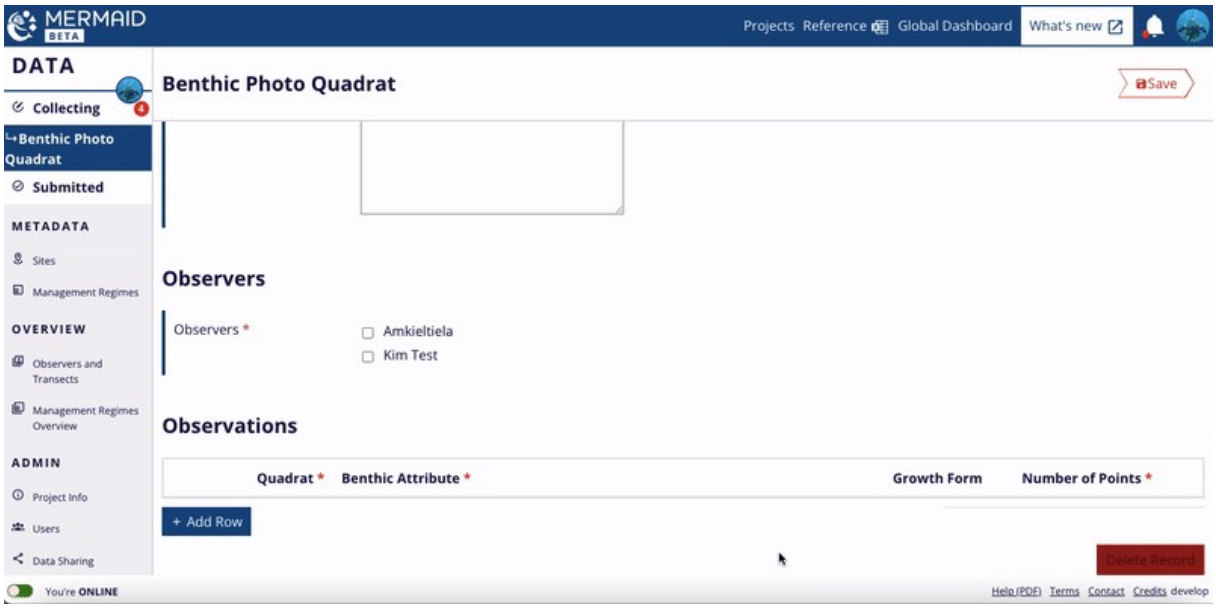
Benthic Photo Quadrat

This sample unit records the results of photo identification from benthic photo quadrats along a transect.

Each transect requires a transect number, depth (m), surveyed transect length (m), the starting quadrat number, the quadrat size (m2), the number of quadrats, and the number of points per quadrat.



Enter the photo identification results from the photo quadrat observations at the bottom of the form.



Each observation must record the total number of points identified as a particular benthic attribute in a particular photo quadrat.

After typing any three letters of an observed benthic attribute, MERMAID will provide a predictive dropdown with names. This ensures that all spelling is correct and consistent. Select the benthic attribute by using the ‘up’ or ‘down’ arrow keys on your keyboard or with your mouse, or entering more letters so that there is only one choice, and then pressing the 'Enter'/'Return' or 'Tab' key to select a name. Growth forms can be selected from the dropdown list or predicted by typing.

Available benthic attributes can be found using the “Reference” icon at the header of any page.New benthic attributes can be proposed to the MERMAID science team for approval and addition

The sum of the points in the observations entered for that quadrat must equal the total number of points entered at the transect level above.

The percent cover of each benthic category along the transect will automatically be calculated and displayed at the bottom of the rows. All benthic attributes belong hierarchically to a small number of top-level benthic categories commonly used for analysis, such as "hard coral".

NAVIGATION TIP

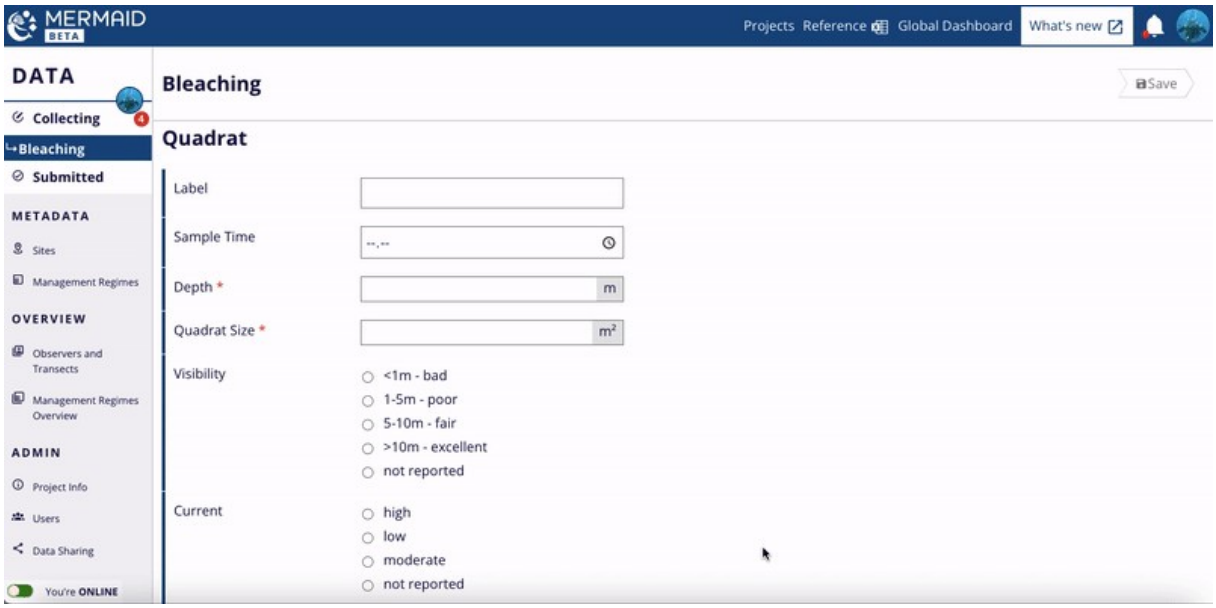
Use the ‘Tab’ key to move across to the attribute, growth form, and number of points columns. At the end of the row, press 'Enter'/'Return' to create a blank row and add a new benthic attribute observation. Press the 'Tab' key at the end of the row to duplicate the benthic attribute in the next row.

Coral bleaching

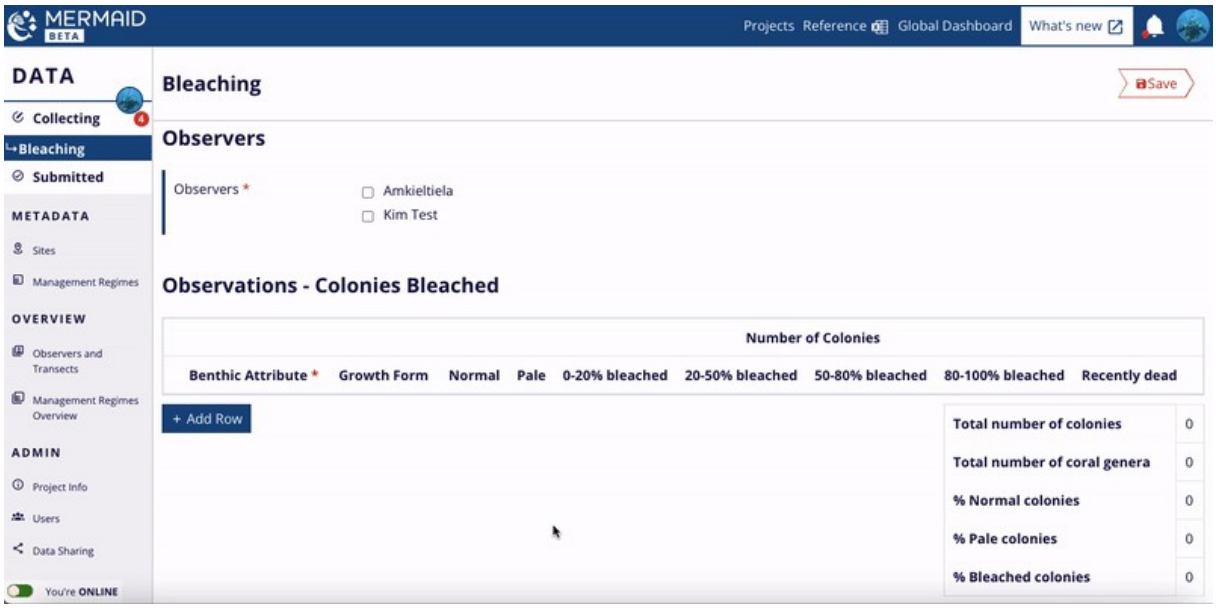
This rapid assessment field method can be used to quantify coral bleaching for dierent genera of hard corals.

In this rapid assessment field method, the sample unit is a collection of quadrats observed for coral bleaching on a single dive/snorkel. The method is described in detail here.

First, observers choose a consistent quadrat size (typically 1 to 2 m2) to use on the survey. During a survey, an observer records information from a set of quadrats, typically ~15-20 quadrats. Within a quadrat, an observer first counts the number of coral colonies for each hard coral genus and classifies each colony within 7 categories of bleaching severity: normal, pale, 0-20% bleached, 20-50% bleached, 50-80% bleached, 80-100% , and recently dead. After recording the coral colonies, the observer then visually estimates the cover of three main benthic groups within the quadrat: hard coral, macroalgae, and soft coral. Then, the observer swims a set distance (e.g., 10 fin kicks) to begin the next quadrat.



In MERMAID, observations from the surveys are recorded in 2 sections. The 'colonies bleached' sections records the total number of colonies in each bleaching category for each genus. The 'percent cover' section records the % cover of hard coral, macroalgae, and soft coral for each quadrat.



NAVIGATION TIP

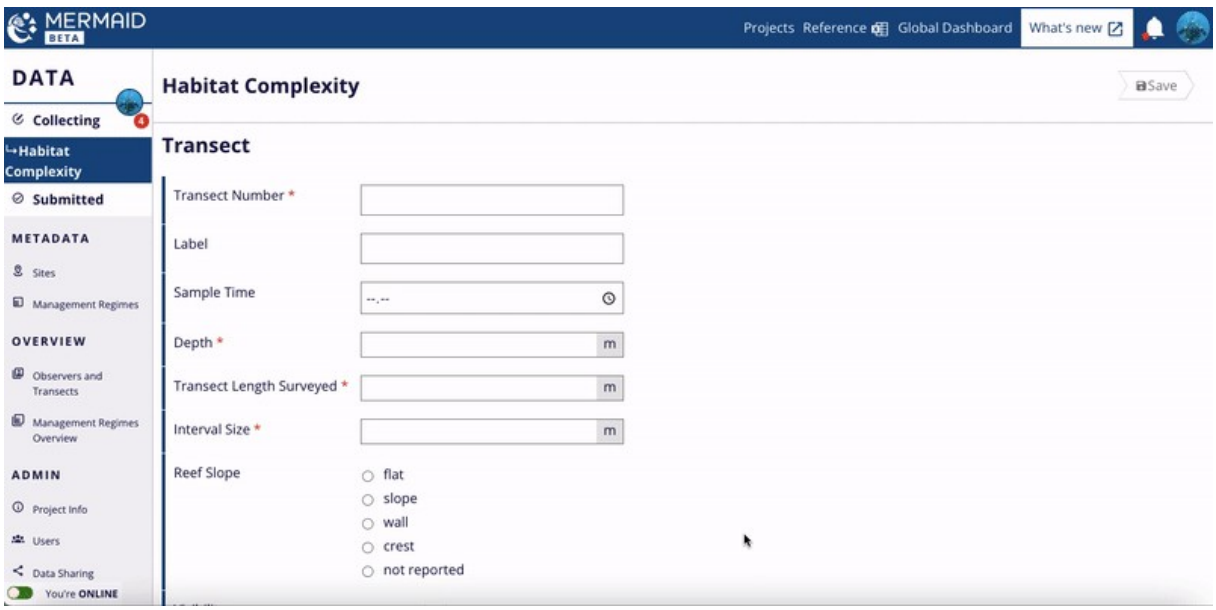
Use the 'Tab' key to move across the colonies bleached and percent cover columns. At the end of the row, press 'Enter'/'Return' key to create a blank row to add the next

complexity observation. If the same bleaching or percent cover is observed at the next interval, press the 'Tab' key at the end of the row to duplicate.

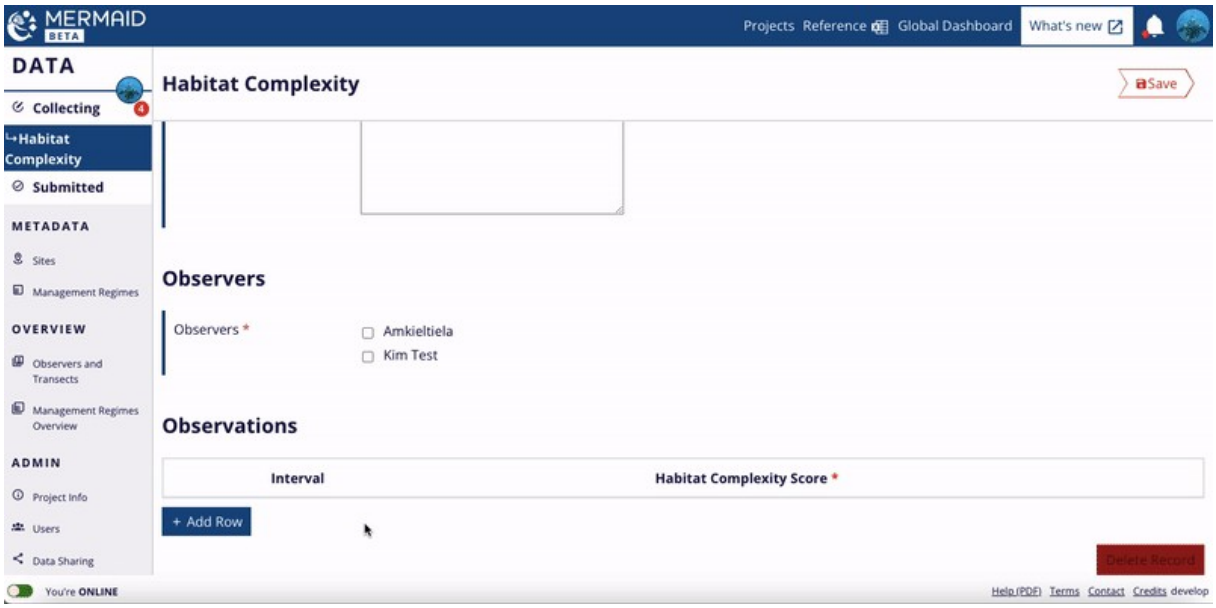
Habitat complexity

This transect records observations of benthic habitat complexity on a scale of 0 to 5, based on the methodology proposed in Wilson et al. (2007) and described in Darling et al. (2017) and Gurney and Darling (2017) (Appendix 2).

To enter a habitat complexity transect, you will need to provide a transect number, depth (m), the surveyed transect length (m), and the interval between complexity observations (m). For example, assessing complexity every 5 m can be entered at ‘5 m’ in the “Interval size” box.



Enter the habitat complexity score at each interval at the bottom of the page. You must have as many rows of observations as you do intervals in the transect length.



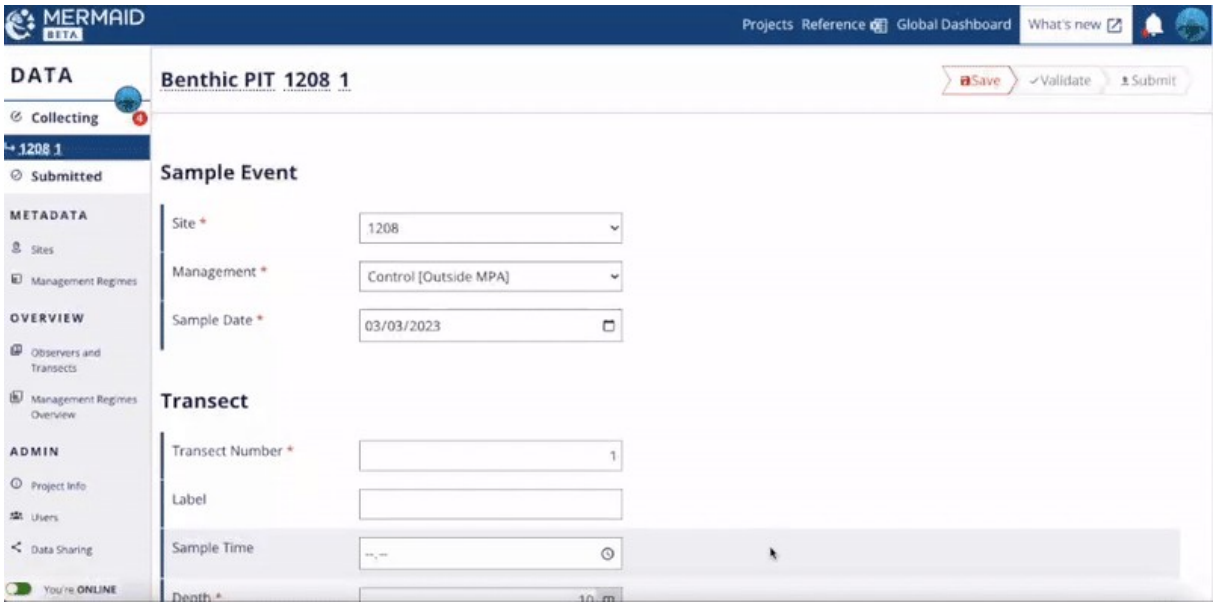
NAVIGATION TIP

Use the 'Tab' key to move across the interval and habitat complexity score columns. At the end of the row, press 'Enter'/'Return' key to create a blank row and add the next complexity observation. If the same habitat complexity is observed at the next interval, press the 'Tab' key at the end of the row to duplicate the previous row.

SAVING A TRANSECT

Once you enter any new information into a transect, you can save it using the button in the upper right corner of the page.

The save button is bright red when there is new information to be saved. If the button is gray and says “Saved”, you have already saved the transect and there is no new information to be saved.



After saving, you can always return to the transect to add or change data and information and resave.

If you try to navigate away from a page with unsaved information, you will see a warning on the screen that you have unsaved data – choose “Cancel” to stay on the transect and save; choose “Ok” to leave the transect unsaved.

Once you validate and successfully submit your transect, you can no longer edit it. If you need to edit a submitted transect, a project admin must un-submit it; if you are not the project admin, they will then need to transfer it to you for editing.

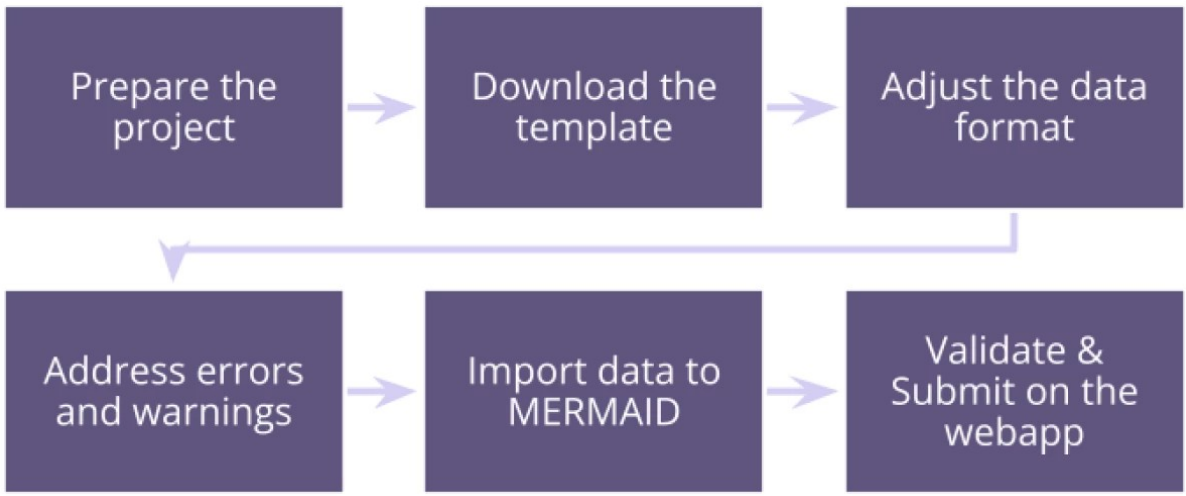
All sample units are always saved on your computer. Any time you are online, MERMAID also saves to a backed-up database in the Cloud.

INGESTING LEGACY DATA USING MERMAIDR

Legacy data can now be ingested to MERMAID using the mermaidr R package.

If you are new to MERMAID but have data from past surveys in other formats, you may be trying to figure out how to import your legacy data into MERMAID. The mermaidr package is a way to ingest your old data into MERMAID. **However, the ingestion process requires a fair amount of time to prepare your data in the correct format**.

Ingesting data should only be used for legacy data. For an ongoing project, it is easier to use the app directly.



The ingestion workflow

Steps for ingestion using the mermaidr package:

Create a project in MERMAID with sites, management regimes, and users added.

Adjust your data format to the MERMAID template. You can download the template for each method using the `mermaid_import_get_template_and_options` function from the mermaidr package. More information on how to use it can be seen here.

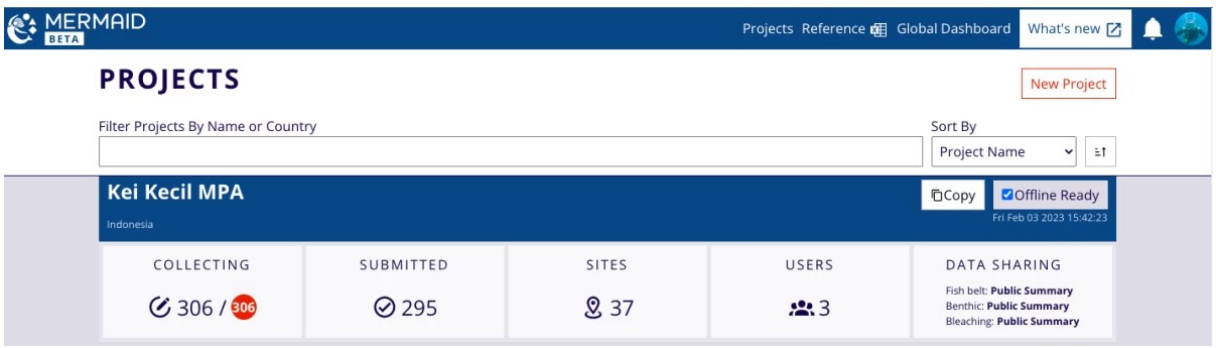
Ensure the mandatory fields are filled. Mandatory fields include an asterix (*) sign in the column name.

Check each field to make sure it matches allowed field options for importing data for a given method. To check each field, use the mermaid_import_check_options function from the mermaidr package. More information and example on how to use it can be seen here. A field that matches will produce a green check sign.

After all fields have passed the checking process, you can import your data using the mermaid_import_project_data function from the mermaidr package. Detailed information and an example can be seen here.

All ingested data will appear on the Collecting page. These data will need to go through the regular validation and submission process.

Unsubmitted ingested transects appear on the Collecting page of the user who did the ingesting. To transfer unsubmitted sample units to another user, a project admin can use the project's Users page.



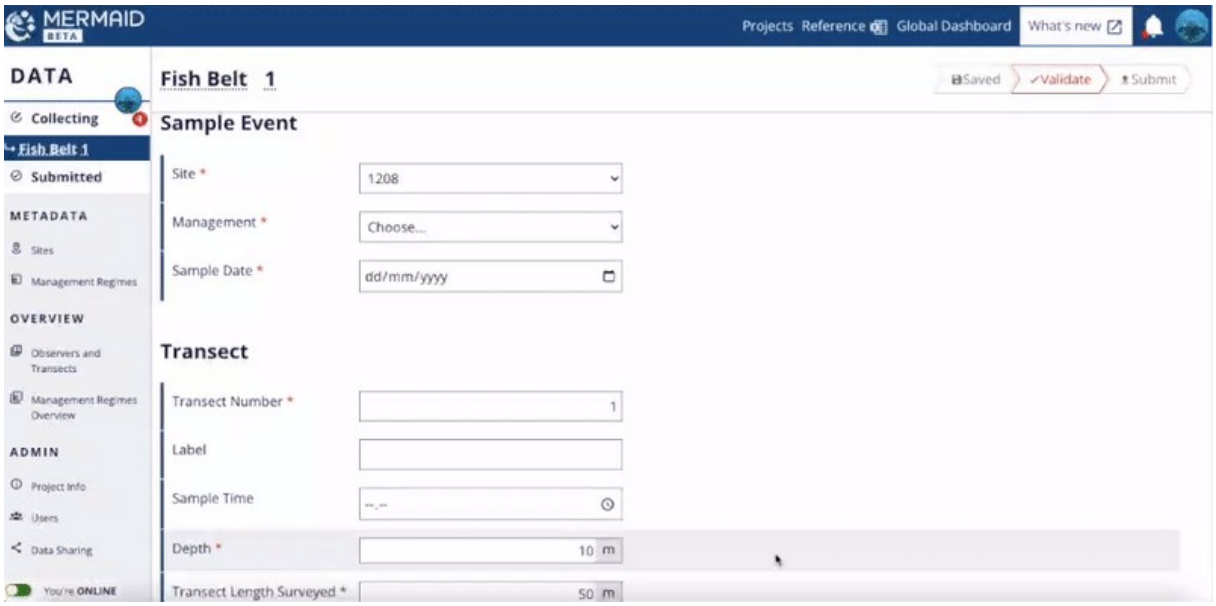
The ingested data will appear on the Collecting Page where you can access it directly from the Project Page

Validating data

After your data has been saved, it can be validated. Validation is the “proofreading” of the sample unit information and observations. This is where mistakes and outliers are caught and brought to your attention to correct.

Validation can only be done online.

After saving a transect, **click the activated red “Validate” button to validate your transect.**

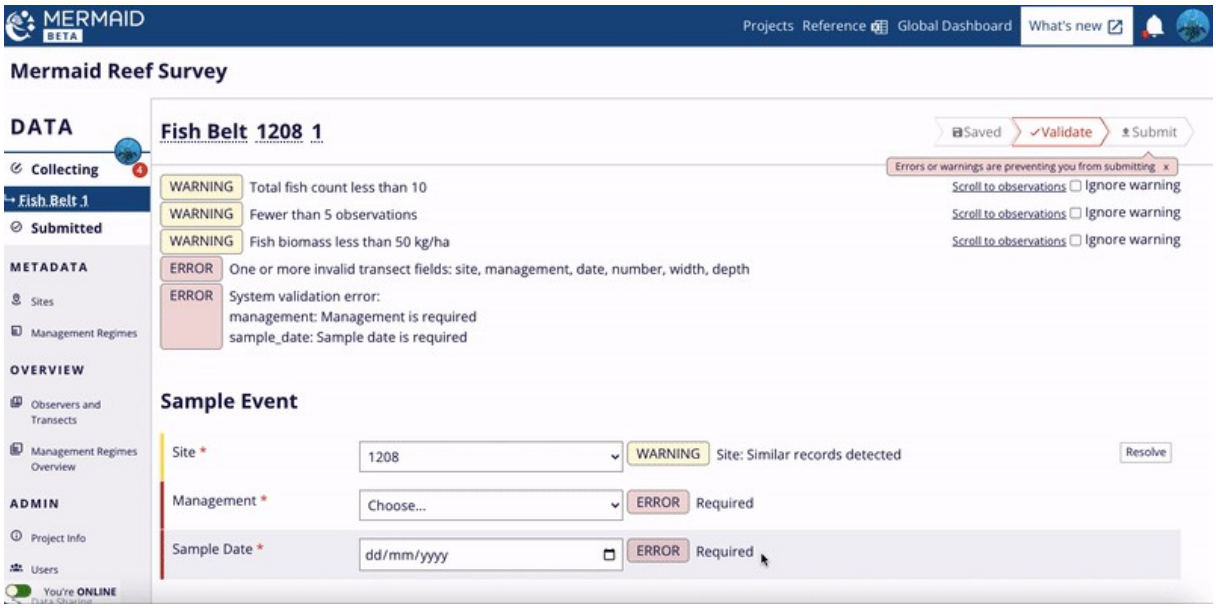


After successfully validating a transect and resolving any errors or warnings, the Validate button will be grayed out and the Submit button will be activated in red. After validating, you will receive one of the following results:

A. Success!

Nice work, your sample unit was validated successfully! There are no errors with the data and it is ready to submit.

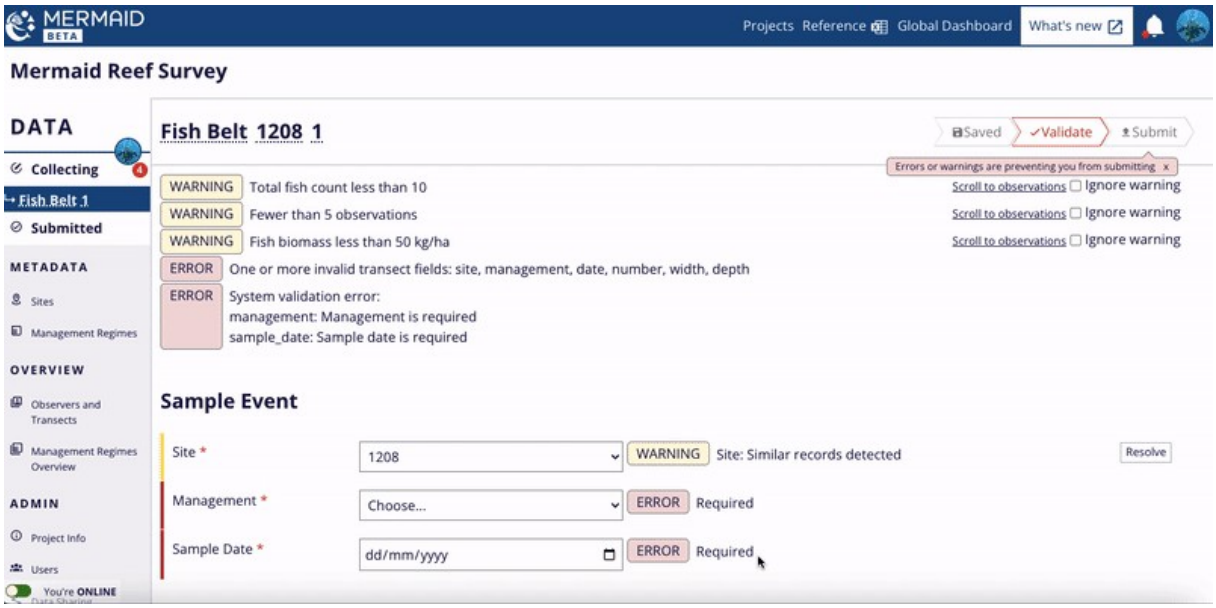
B. Warnings



A yellow warning will appear at the top of the page or by and individual form field if MERMAID identifies a potential issue in your transect information. Warnings are validations that identify entered data that are possible, but unusual.

You can decide whether each warning can safely be ignored for your data. If the issue resulted from a data entry mistake, you can correct the data in the field, or in some cases by clicking a “Resolve” button to open a dialog where you can add or change the information. Click “update” to incorporate your changes into the transect. You can also navigate to fields with issues by clicking 'Scroll to observations' next to the warning.
After addressing warnings, resave the transect and validate again. Repeat the process for any additional warnings that are identified. If you don’t believe a warning is accurate for your transect, you can disregard it by clicking the 'Ignore warning' checkbox next to the warning.

C. Errors



A red warning message will appear if MERMAID identifies an error in a sample unit's information or observations. Errors must be resolved before a transect can be submitted; they cannot be ignored. To address each error, scroll down to the field that has the 'ERROR' notice and directly change the information.

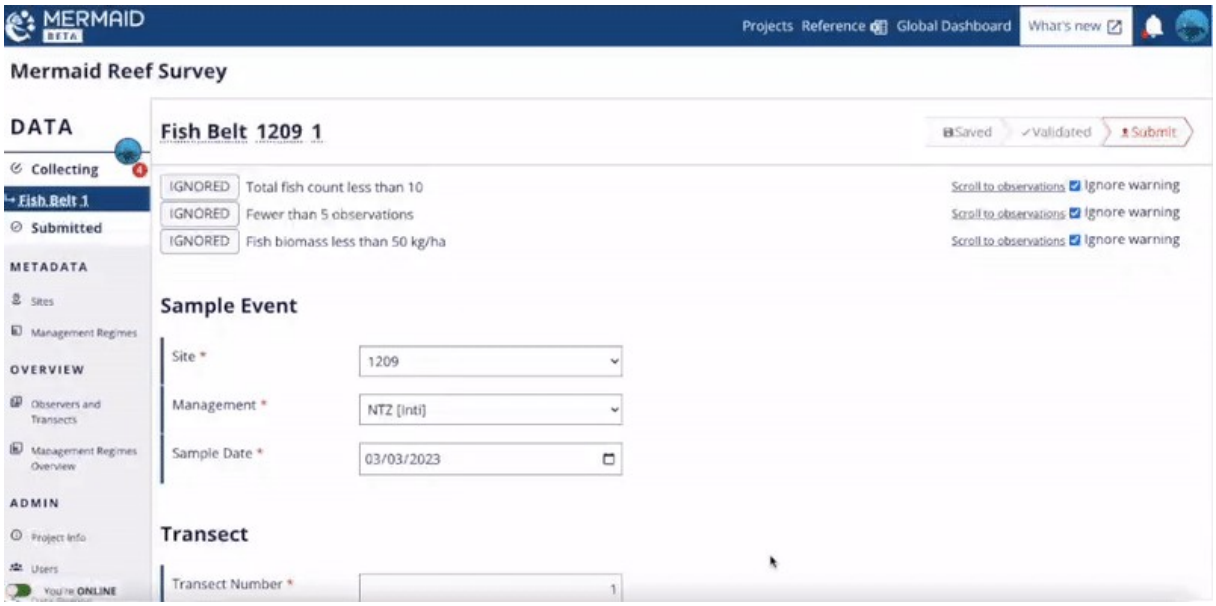
After resolving all errors, resave the transect and validate again. Repeat the process for any additional errors that are identified, until all 'ERROR' notices have disappeared.

D. Submit data

When you are finished entering data for a sample unit and have resolved all Errors and Warnings, you can Submit the sample unit.

After submitting data, admin users can still edit the transect or return a transect to the observer, so as a collector, make sure your data are finalized and clean before submitting! **Submitting data can only be done when online.**

To submit data, select the red button in a validated transect that says **"Submit"**.



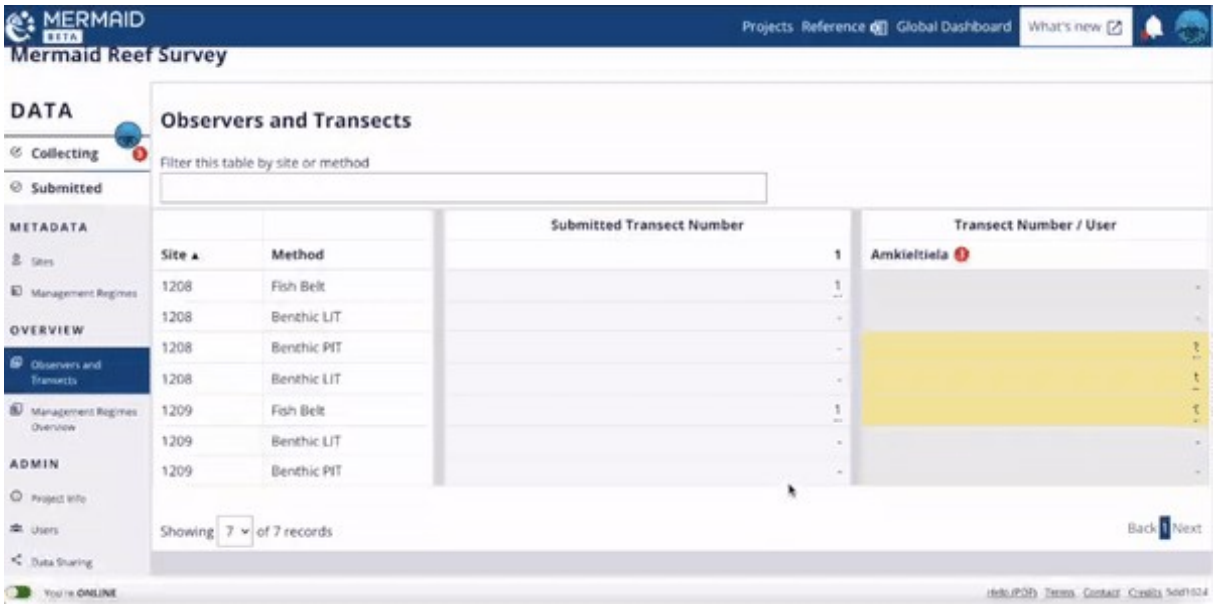
Submitting data moves it from the "Collecting" page to the "Submitted" page. This shares your observations with the other users in the project (and depending on Data Sharing settings, potentially with the world). Within the “Submitted” page, admins can edit or delete transects or return them to their original observers for further editing.

If you are a read-only member on a project you can see data once it has been submitted and you can export it, but you cannot edit this data while it is in MERMAID.

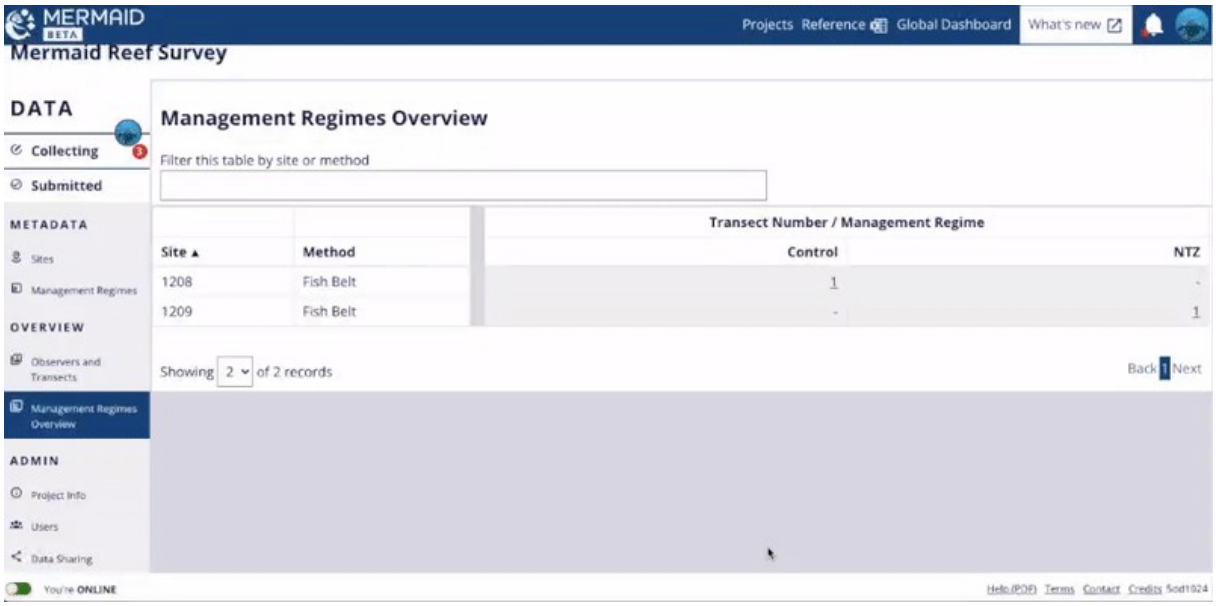
The Overview page

The OVERVIEW area provides project-level views of how a project is progressing and easy ways to find out who to chase for missing data.

The 'Observers and Transects' page summarizes the number of submitted and unsubmitted transect(s) per site and method. Hover over each transect number to see detailed information including who was the last person editing the transect, who were the observer(s) collecting the transect, site name, management regime, and collecting date. You can also head to the submitted transect by clicking the 'View Submitted Sample Unit'.



The 'Management Regimes Overview' summarizes the number of submitted (not unsubmitted) sample units per management regime. **Management regimes that have no submitted transects will not appear in the 'Management Regimes Overview' table.** You can click on the transect number to jump to the submitted sample unit information.


MERMAID
BETA
Projects
Reference
Global Dashboard
What's new
Mermaid Reef Survey
DATA
Collecting
3
Submitted
METADATA
Sites
Management Regimes
OVERVIEW
Observers and Transects
Management Regimes Overview
ADMIN
Project Info
Users
Data Sharing
Management Regimes Overview
Filter this table by site or method
Transect Number / Management Regime
Site ▲
Method
Control
NTZ
1208
Fish Belt
1
-
1209
Fish Belt
-
1
Showing 2 of 2 records
Back 1 Next
You're ONLINE
Help (PDF)
Terms
Contact
Credits
5cd1024

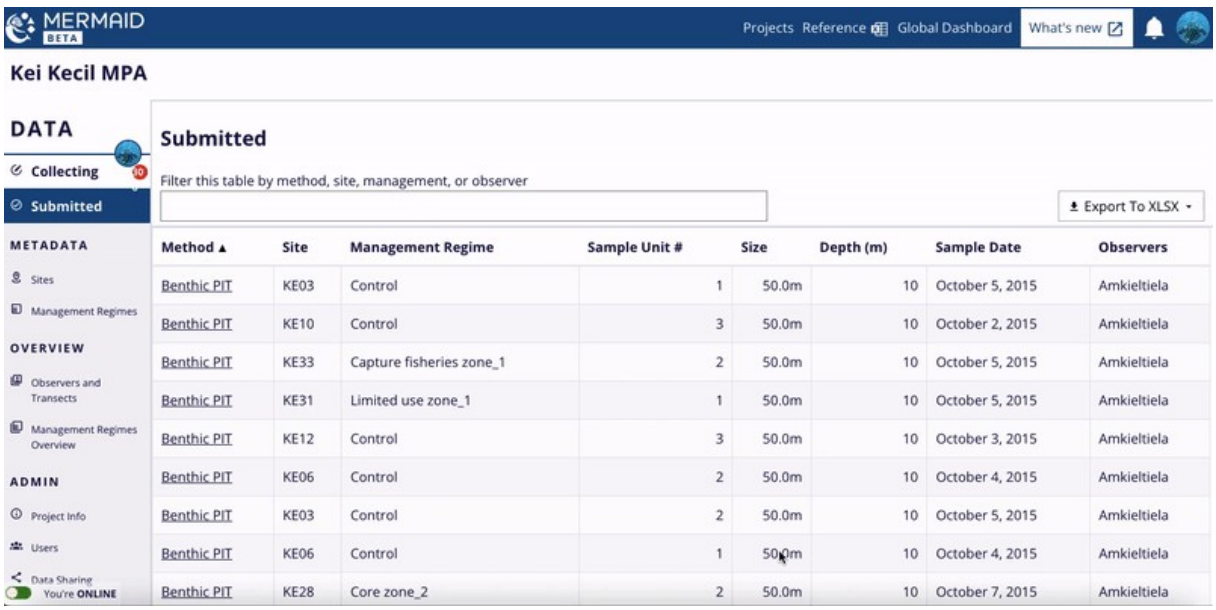
Accessing data

EXPORT TO XLSX

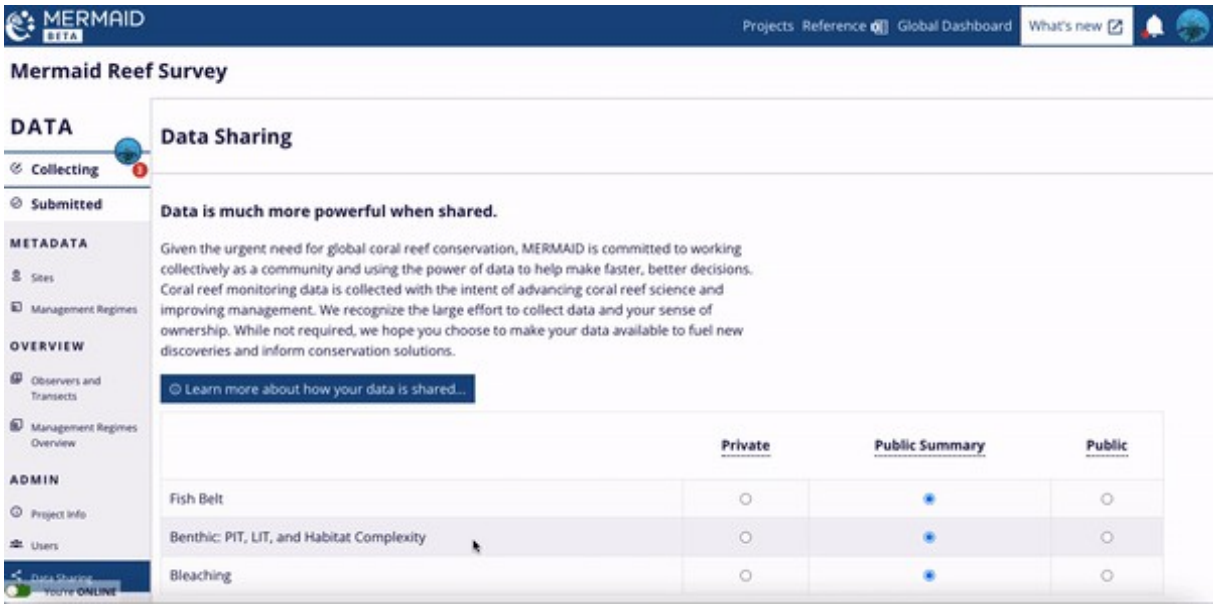
Submitted transects can be exported to a tabular format in a .xlsx file for further analysis by clicking the ‘Export To XLSX’ button.

Data can only be exported when online and after transects have been submitted. **Data in a test project will not be exported.**

Make sure that the project is not a test project. Select which method you would like to download. All records of each sample unit with the same method will be combined into a single spreadsheet. This will begin downloading a .xlsx to your computer. All user levels (admin, observer, and read-only) can export data from a project.



To change a project from a "Test Project" to an actual project, click "Data Sharing" in the lefthand menu. Scroll down and uncheck the 'This is a test project' checkbox. **Wait approximately 20 minutes for the data to sync with the server,** and then you can export your data.



Questions? You can reach out to us when online via the Contact link at the bottom of any page. An online (pdf) version of this documentation is also available in the same area.

R PACKAGE

MERMAID has a helpful R package for accessing and importing your data.

Although Excel or similar programs work for basic analyses, many scientists use programs like R (often in the RStudio environment) for larger datasets or more sophisticated analyses. **The mermaidr** is an R package specifically for working with MERMAID data and enables you to access your data from MERMAID, compile datasets from multiple MERMAID projects, and ingest legacy data into MERMAID.

If you would like more information and detailed instructions on usage, you can see the package website. You can also find a helpful list of package functions here. We

also prepared an example of using the mermaidr package for analysis, which is demonstrated here. More information on how to ingest legacy data into MERMAID can be found in the Ingesting legacy data using R studio page.

If you are new to the R programming language, our new R users guide is a great place to start! If you find yourself stuck, please don't hesitate to ask for help.

API

All access to MERMAID data, including that done by mermaidr, the MERMAID web application, and the dashboard, is done through an Application Programming Interface (API). If you need custom access to data, for example because you are creating a map or writing your own tool, you can use API documentation here as a guide. The documentation includes a getting started page on how to use the Insomnia API client file included with the MERMAID API code repository to access all API endpoints.