Welcome to MERMAID!

MERMAID is an online-offline web application for coral reef data collection. Our mission is to develop field-ready technologies for scientists that accelerate the transformation of data to decisions for coral reef conservation. Our vision is a world where coordinated and collaborative scientific information is used for rapid evidence-based decision making to protect and manage coral reefs

We save you time so you can save coral reefs





The MERMAID Workflow

Sign up and set up your project

Sign up for a MERMAID account

Set up a project and add users

Prepare for offline use







Collect

Select a transect type

Enter site information

Enter management regime

Include benthic cover & fish species

Complete and save the transect









Export Data

Export to .csv for further analysis





Review and Submit

Review and submit data

Address any errors or warnings







How does MERMAID work?

Just like Excel, MERMAID joins you in the field with its offline capabilities. But it stands apart from Excel and other databases, 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 species with only a few keystrokes. Selecting names means saving time on 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 (csv/Excel) and can soon be used to create graphs or other reports.

The Mermaid Workflow:

1. Sign Up and Set Up a Project

- a. Sign up for an account
- b. Set up a project and add users
- c. Prepare for offline use

2. Collect Data

- a. Add new sites and management regimes
- b. Enter a transect
- c. Transect types
- d. Saving a transect

3. Submit and Review

- a. Success
- b. Warnings
- c. Errors

4. Export Data

- a. Review data
- b. Export

1. Sign up and Set up a Project

The first things to do are to create your MERMAID account and set up or join your first project.

A) Sign up for an account

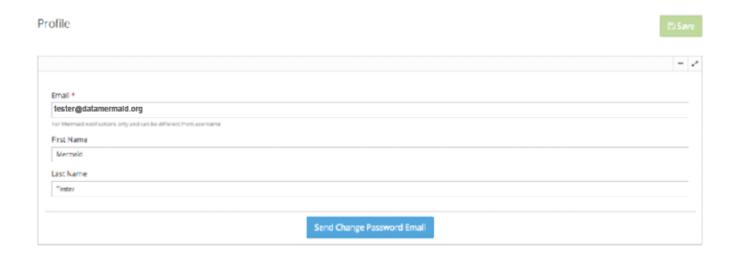
Sign up at https://collect.datamermaid.org

You can sign up using an existing Google account, or enter an email and password specific for MERMAID. Your account will be linked to your email.

Only users who have a MERMAID account can be added to a project and collect data

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 and change your email and name.



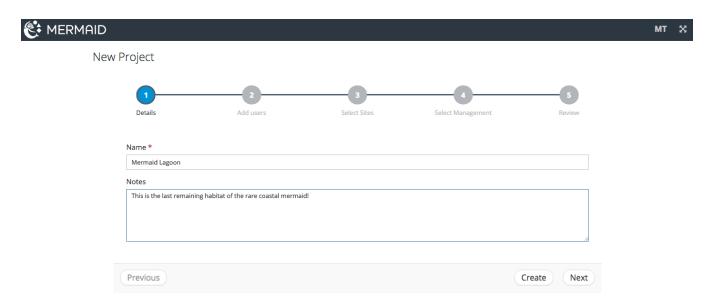
B) Set up a project and add users

A project consists of observation records that are collected within a set of sites that are under defined management regimes. Each project includes users who can collect and view data.

A new project can only be created while online. To create, click 'Start Project'

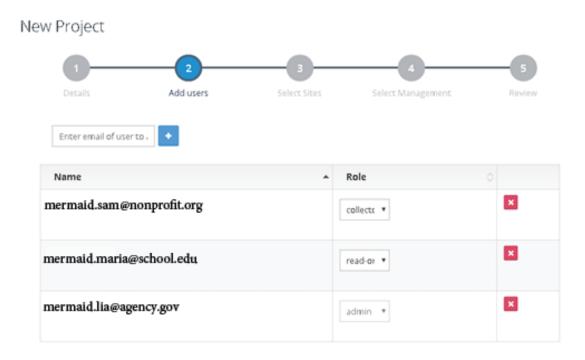
Start Project

Details



A name is required for every new project. All other information can be added or edited later.

Add users



Enter the email addresses for users involved in the project and select their roles. **All users** must be signed up for a MERMAID account before they can be added to a project.

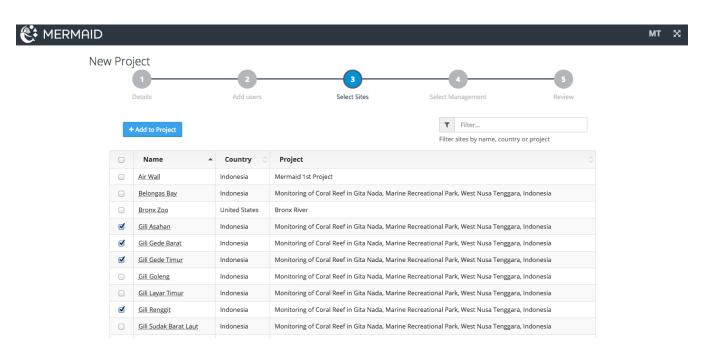
The project creator is automatically the administrator ('admin') of the project. Other users will default to the collector role when added and can be changed to admin or read-only by selecting the appropriate role from the dropdown. Additional users can be added or deleted by the administrator after 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.
- Collect: user can view, export, and analyze data, and collect new observations.
 Once a transect is submitted, 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 full administrative privileges to add and edit observations during collection and after transects have been submitted. Admin can also delete observations.
 - i.e. typically one person designated as the lead of the project

Select Sites



This is an optional step that allows you to choose from sites that are already in the MERMAID system. These may be sites that you or your organization have created before and can save you time. Hovering over the name of the site will show you additional details. If you are surveying a new site it must be added after you create your new project, so skip this step.

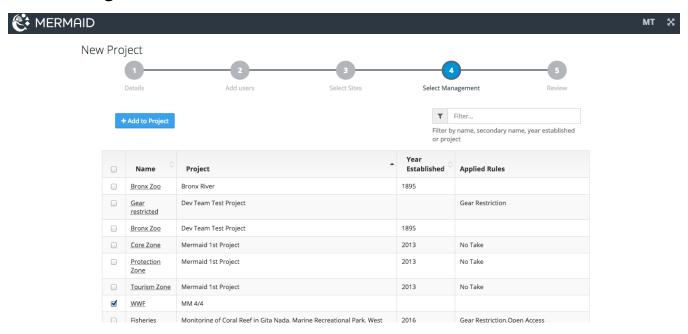
The 'Filter' bar allows you to search the list by site name, country, or project. Click the check box next to any site you would like to add to your project, then click the "Add to Project" button at the top of the page.

How to add a new site

There are two ways to add a new site to your project after it is created:

- 1) Under "Reference" in the left tollbar, navigate to the "Sites" tab. Add a new site here. see pg. 12 for more information
- 2) Within a transect, enter a new site in the site field with the "+"

Select Management



This is an optional step that allows you to choose from management types that are already in the MERMAID system. These may be management regimes that you or your organization have created before and can save you time. Hovering over the name of the management will show you additional details. If you are surveying sites with a new management regime, or if your site's management regime has been changed, it must be added after you create your new project, so skip this step.

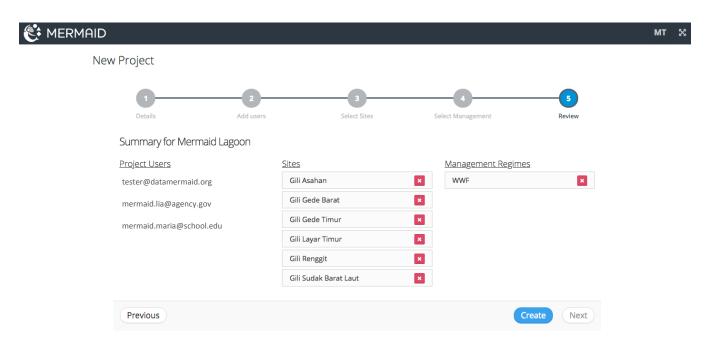
The 'Filter' bar allows you to search the list by management name, secondary name, year established, or project. Click the check box next to any management type you would like to add to your project, then click the "Add to Project" button at the top of the page.

How to add a new management regime

There are two ways to add a new management regime to your project after it is created:

- 1) Under "Reference" in the left toolbar, navigate to the "Management" tab. Add a management regime here. see pg. 12 for more information
- 2) Within a transect, enter a new site in the site field with the "+"

Review



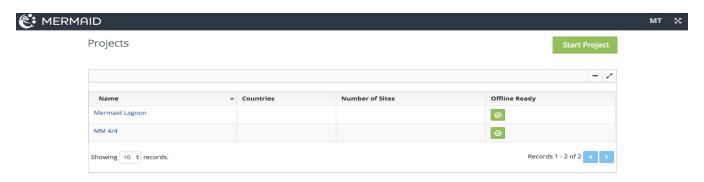
This is a summary of all the users, sites, and management regimes you selected for your project.

You can delete any of these selections by clicking , and you can return to each selection page to add additional information by selecting "Previous" at the bottom or by clicking the page names at the top.

An admin can add additional users and existing sites and management regimes to the project after it is created under the "Admin" section in the left toolbar.

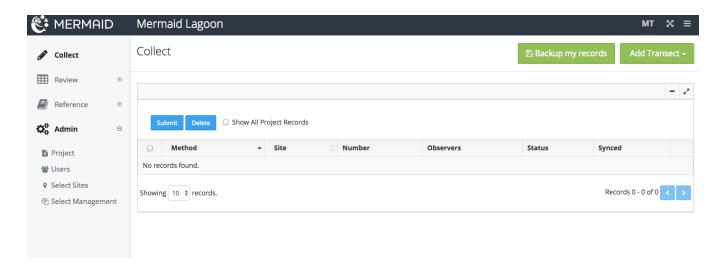
Click "Create" to complete your new project!

Projects page



Clicking the "MERMAID" icon in the header will take you to the "Projects" page at any time. The Projects page lists all the MERMAID projects you have created or have been added to as a user.

If you are an admin for a project, you can edit it by clicking on the project name and clicking "Admin" in the left menu. Here you can add additional users and create new sites and management regimes. A project can only be edited while online.



C) Prepare for Offline Use

Before heading to the field, there are a few steps that must be followed to ensure your projects are available offline.

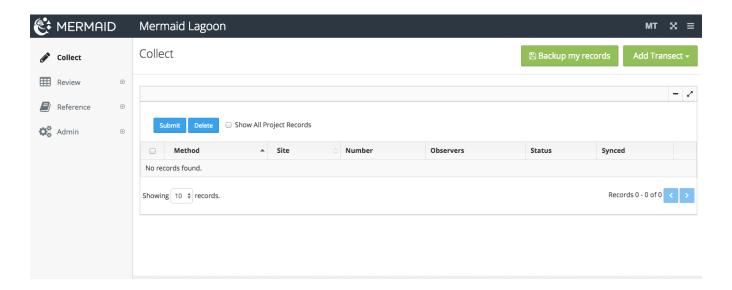
Be sure to follow each step carefully prior to your expedition:

- 1. Click the "refresh" icon in the footer to make sure you have the most up-to-date version of the app
- 2. The project admin must create the project
- 3. The project admin must add all other users as collector, read-only, or admin.

 Optionally, copy or add sites and management regimes.
- 4. Each collector who will be entering data offline should, in their project list, ensure that the cloud icon to the right of the project you will use offline is green. If it is not green, click the grey icon or simply click on the project to enter it to make sure data is available offline.
- 5. Test offline access by turning off your wifi, restarting Chrome, and entering test data to your project.

When using MERMAID offline, make sure you use the full application address: https://collect.datamermaid.org -- you **cannot** just type 'collect.datamermaid.org'.

2. Collecting Data



Select a project from your list.

The 'Collect' page is where you can collect new transect data and view the transects you have collected but not yet submitted for Review. You can also see all unsubmitted observations collected by other users in the project by clicking the "Show All Project Records" button.

Only users with 'Collector' or 'Administrator' roles can collect new transects or submit completed transects.

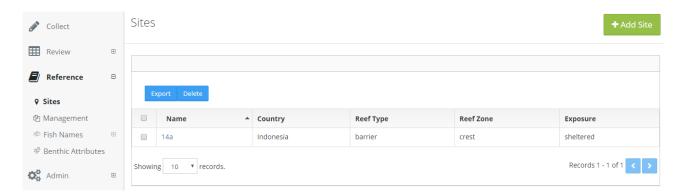
The "Backup my Records" button will export all unsubmitted transects in JSON format for saving to your local drive. This provides an additional backup that you can save to a thumb drive or email to yourself before your records are able to automatically synchronize when online using the WiFi connection.

A) Add new sites and management regimes

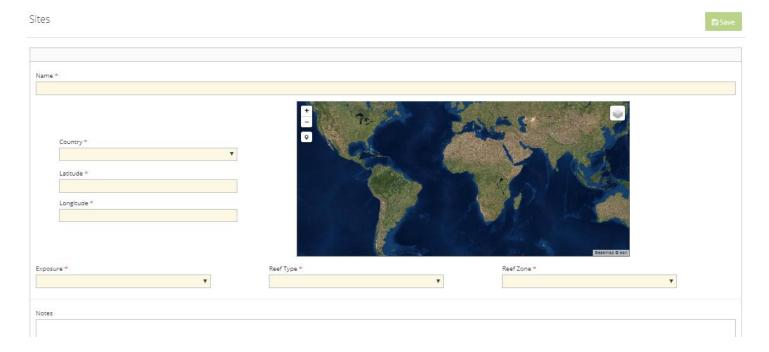
The "Reference" page in the left toolbar lists all the sites and management regimes you have assigned to your project, as well as all the benthic attributes and fish families, genera, and species and their biomass constants in the app. You can also add new sites and management regimes to your project within the Reference page:

Adding a new site

Navigate to the "Sites" tab under Reference, and select "Add Site"

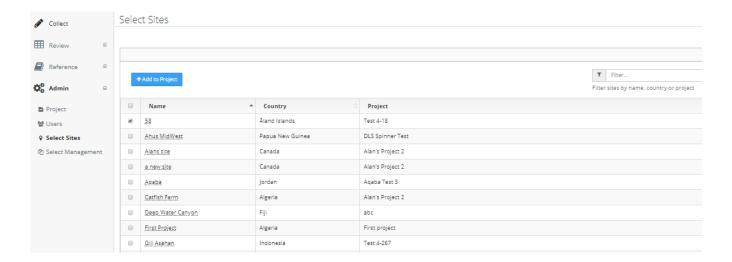


A new site requires a name, country, coordinates, and details on the exposure, reef type, and reef zone. The name can be the site's common name or unique ID. When all details have been added, save the site.



When online, a new site created by one user is shared across the project with all other users and available for them to use in transects. If you know the sites within your project in advance, it is easiest to add them while online before going to the field. Site details can be edited after creation if needed. If users need to add new sites while offline, they must ensure that all site information is identical. Identical sites within a project will sync into a single site when users return online.

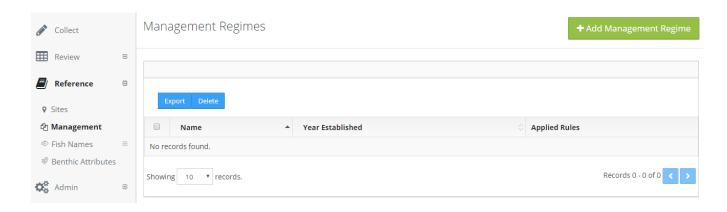
Need to add a site to your project that has already been created in a previous project? A project admin can add additional existing sites under the Admin section of the left toolbar.



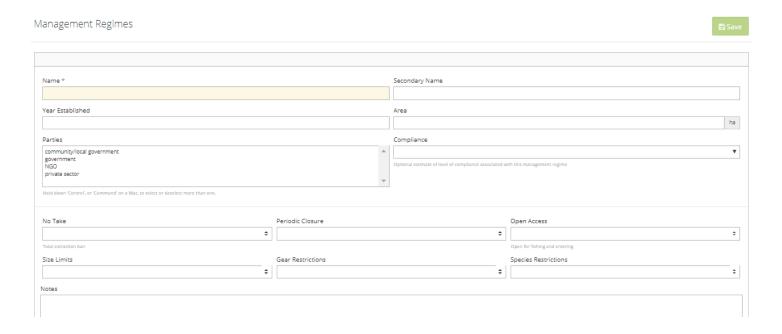
Check the boxes next to any sites you want in your project, then click the "Add to Project" button at the top of the page.

Adding a new management regime

Navigate to the "Management" tab under Reference, and select "Add Management Regime"



A new management regime requires a name. There are multiple dropdowns with yes/no options to include additional management details and restrictions. All details are optional. When the management name and any details have been added, save the site.



When online, a new management regime created by one user is shared across the project with all other users and available for them to use in transects. If you know the management regimes within your project in advance, it is easiest to add them while online before going to the field. Management regime details can be edited after creation if needed. If users need to add new management while offline, they must ensure that all

management information is identical. Identical management regimes within a project will sync into a single management regime when users return online.

Need to add a management regime to your project that has already been created in a previous project? A project admin can add additional existing management regimes under the **Admin** section of the left toolbar.



Check the boxes next to any management you want in your project, then click the "Add to Project" button at the top of the page.

New fish species and benthic attributes can be added within Reference, however this is rarely needed. Proposed attributes will be reviewed by the MERMAID science team.

B) Enter a transect



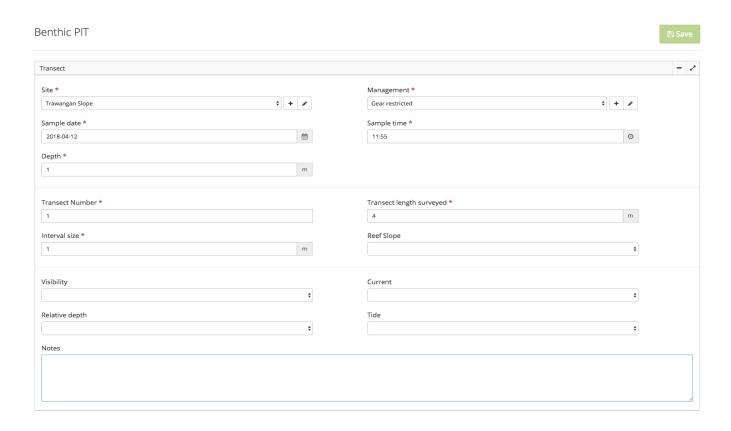
When you're ready to enter new data for a project, click "Add Transect" at the top right of the Collect page and select a transect type. There are currently four types of transects available on MERMAID: reef fish belt transects, coral point intercept (PIT) transects, coral line intercept (LIT) transects, and habitat complexity transects. These transects are similar

to methods described in the <u>Coral Reef Monitoring Protocol for Assessing Marine Protected</u>

<u>Areas</u> (Ahmadia et. al 2013).

After selecting a transect type, you must **fill in all required fields**, marked with a red asterisk. Site and Management Regimes that you added before or after creating your project will appear in the dropdown, and you can edit an existing site with the " " or enter a new site with the "+". You can also add existing and new sites and management regimes to a project in the Reference section in the left toolbar.

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

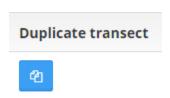


Each transect requires at least one 'observer', defined as the person or people who collected the transect observations. This is a required field, and you can choose from a drop-down list of users associated with your project. To remove an observer, click.



Once all required fields are completed, you can save the transect.

To duplicate any saved transect record, click the "Duplicate Transect" icon at the end of transect in the Collect page. This will copy all transect details but leave the observations blank.



C) Transect Types

Fish Belt transect

The fish belt transect records observations of fish abundance.

Each transect requires a transect number, length surveyed (m) and transect belt width (options: 2m, 5m or 10m).

Users can select how fish sizes are estimated underwater, using 1cm, 5cm or 10cm size bins.



Observations are recorded at the bottom of the page.

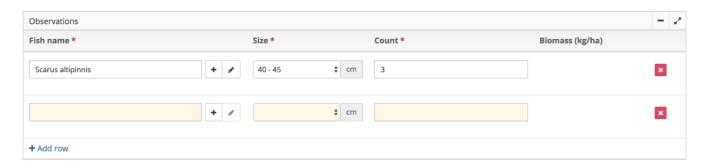
After you type the first three letters of an observed fish, MERMAID will provide a **predictive dropdown** with fish family, genus, or species. Select the fish observation by

using the 'up' or 'down' arrow keys or entering enough letters so that there is only one choice, and press the Enter or Return key.

New fish family, genus, or species can be added manually by clicking the "+", however this is rarely needed. Newly proposed fish will be reviewed by MERMAID science team.

Navigating through the observation fields is similar to navigating in Excel: use the 'tab' keys to move across to the Size and Count (abundance) columns; at the end of a row, press "Enter" to create a blank row to enter a new fish observation; press "Tab" at the end of a row to duplicate fish species from the previous row.

Biomass will automatically be calculated and displayed in the last column.



To prevent errors, MERMAID will flag the following as a warning:

- Total biomass less than 100 kg/ha or greater than 2,000 kg/ha
- Total fish count less than 10
- Total observations less than 5

Benthic LIT

This transect records observations of benthic cover from a benthic line intercept transect.

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

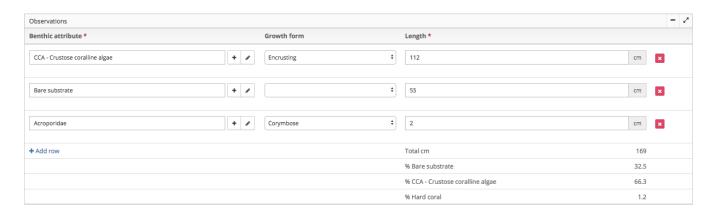


Enter the benthic observations from the transect at the bottom of the form.

MERMAID will **predict** the benthic attributes after you type the first three letters and growth forms can be selected from the dropdown list or predicted by typing the first letter.

Total length and percent cover of each benthic attribute will automatically be calculated at the bottom of the rows.

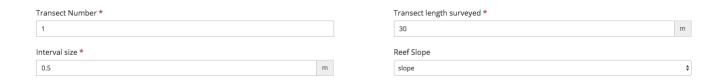
Like the fish belt method, use the 'tab' keys to move across to the attribute, growth form and length columns. At the end of the row, press Enter to create a blank row to add a new benthic attribute observation. If the same attribute is required but with a different length, press the 'Tab' key at the end of the row to duplicate the benthic attribute in the next row.



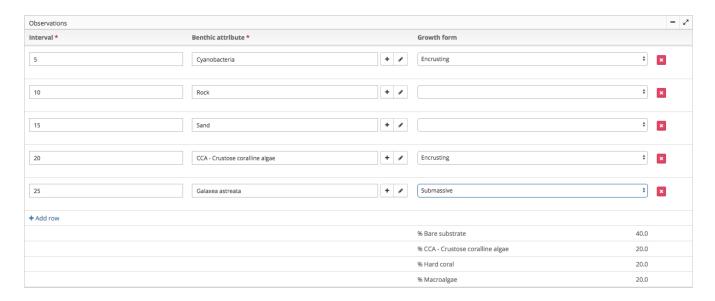
Benthic PIT

This transect records observations of benthic cover from a benthic point intercept transect (PIT) survey.

Each transect requires a transect number, the surveyed length (m), and the interval between point observations (m). E.g., counting points every 50 cm can be entered at 0.5 m in the "Interval size" box.



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



MERMAID will predict the benthic attributes after you type the first three letters and growth forms can be selected from the dropdown list or predicted by typing the first letter.

New benthic attributes can be added manually by clicking the "+", however this is rarely needed. Proposed attributes will be reviewed by the MERMAID science team.

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 attribute in the transect will automatically be calculated and displayed at the bottom of the rows.

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). The visual score ranges from 0 (flat) to 5 (highly

complex), which has been shown to be an important predictor of reef fish biomass (Darling et al. 2017).

During underwater surveys, complexity scores are assigned to one of the following categories between 0 and 5:

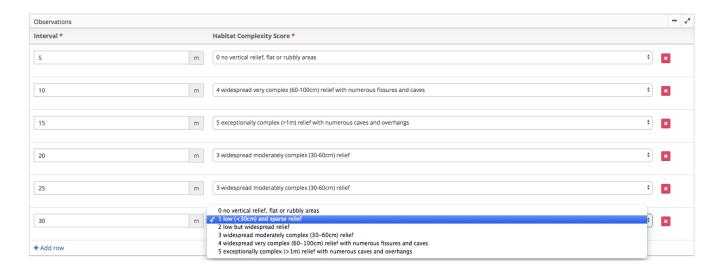
Habitat Complexity Visual Score	Relief level
0	No vertical relief, flat or rubbly areas
1	Low (<30 cm high) and sparse relief
2	Low but widespread relief
3	Widespread moderately complex (30-60cm high) relief
4	Widespread very complex (60-100 cm high) relief with numerous fissures and caves
5	Exceptionally complex (>1 m high) relief with numerous caves and overhangs

Along each transect, structural complexity can be estimated multiple times (e.g., every 5 m) to provide an average structural complexity score per transect.

To enter a habitat complexity transect, you will need to provide a transect number, the surveyed transect length (m), and the interval between complexity observations (m). E.g., assessing complexity 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.



C) Saving a transect

Once you complete all required fields you can save your transect in the upper right corner. The save button is bright green to indicate that there is information to be saved. If the button is greyed out and cannot be saved, it means the transect is already saved.

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

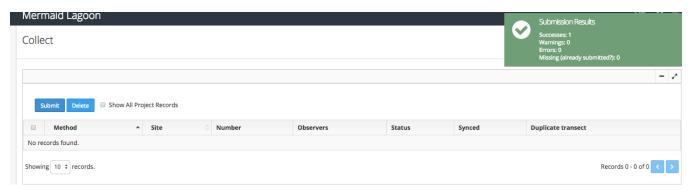
If you try to navigate away from a page with unsaved information, you will see a warning on the screen that you have unsaved data.

3. Submit and Review

Data is submitted when it is considered finalized. Submitting data moves it from the Collect page to the Review page. This shares your observations with the other users in the project, and admins can edit and delete submitted data. Submitted can then be exported as a .csv.

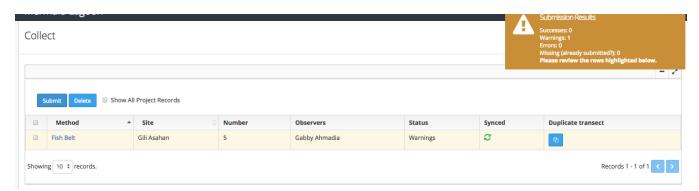
To submit data, check the boxes next to each transect that you are ready to submit and click "**Submit**" at the top of the page. You will receive one of the following notifications:

A) Success



Nice work, your transect was submitted successfully! It has been moved from the Collect page to the Review page.

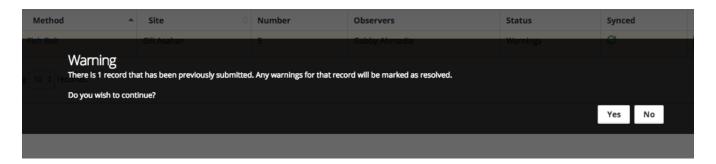
B) Warning



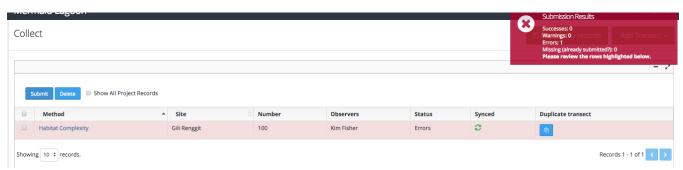
An orange warning and yellow highlight will appear if MERMAID identifies a potential issue in your transect information or data. To see the issue, click into the flagged transect and the warning(s) will be listed at the top of the page.



You can decide whether the issue is valid for your data. If the issue was due to an entry mistake, you can edit and save the transect again. If the flagged issue was not a mistake, you can return to the Collect page and resubmit the observation again. This will override the warning and all issues will be marked as resolved. Whether or not you decide to edit the issues flagged, MERMAID will notify you that you are submitting a transect that had previously been flagged with a warning.



C) Error



A red warning and red highlight will appear if MERMAID identifies an error in a transect's information or data. To see the error, click into the transect and it will be listed at the top of the page. The error must be resolved before the transect can be submitted, and it cannot be overridden.

4. Export Your Data

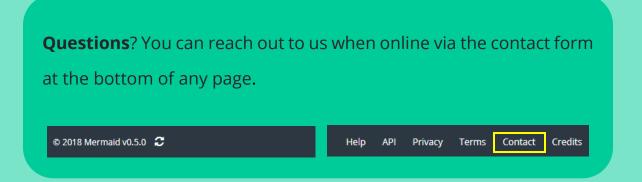
A) Review data

You can view your submitted transects in the Review tab in the toolbar.

If you are the admin for a project you can edit all data that has been submitted by you or another observer. You can also delete data. If you are an observer on a project you cannot edit submitted data and you must contact your project admin. If you are a read-only member on a project you can only see data once it has been submitted, but you cannot edit this data.

B) Export

If you would like to have your data in tabular format, you can download a .csv of your transects in Review. Check the boxes of transects that you would like to have exported, and click the "Export to CSV" button at the top of the page. All selected observations will be combined in a single file.



THANK YOU FOR USING MERMAID!