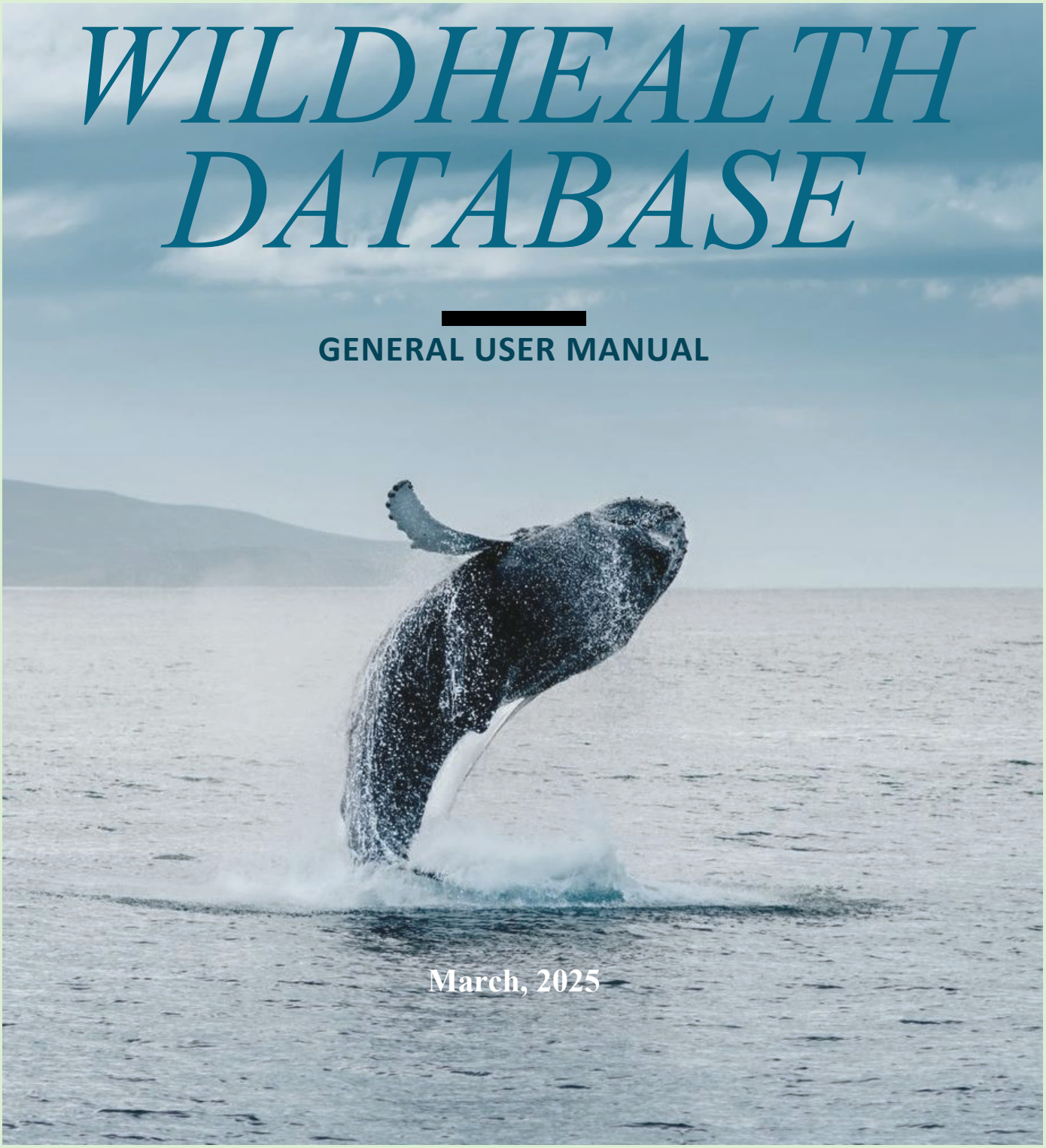
WILDHEALTH DATABASE

GENERAL USER MANUAL



March, 2025

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The WildHealth Database – WHeDB

WHeDB stands for "WildHealth Database" and it is a user-friendly web-based database designed to manage wildlife health data. Data in WHeDB are structured following a versatile data model created by the Data Task Force within the **Wildlife Health Intelligence Network** (WHIN), a global community of practice for growing wildlife health surveillance. WHeDB can effectively manage data generated by wildlife health surveillance systems, research, and public initiatives under one structure. Examples include typical morbidity/mortality investigations, opportunistic findings such as reports of dead animals by the public or in social media; testing of samples from captured, marked, and recaptured animals; multilevel study designs; and transect survey observations among others. WHeDB is maintained by Wildlife Conservation Society's Health and Conservation Technology Programs, based in Bronx, New York, United States.

In this manual, we Capitalize and **bold** nouns such as **Projects**, **Surveillance Activities**, **Field Visits**, **Locations**, **Events**, **Sources**, and **Specimens** when they refer to specific WHeDB data units.

This manual focuses on general user functionalities. To learn more about administrator account functionalities, refer to the "WHeDB Administrator Account Manual" (*under construction*)**.**

Structure of the Wildlife Health Data in WHeDB and Data Units

This manual provides a summary of the data structure in WHeDB. For a full description, visit the website describing the data model (link). Briefly, WHeDB has "data units": **Project**, **Surveillance Activity**, **Field Visit**, **Location**, **Event**, **Source Record**, **Collection**, **Specimen**, **Diagnostic**, and **Interpretation**, and **Clusters**. **Projects** identify a specific project leader and information. Under **Projects** are **Surveillance Activities** that are executed following a methodology documented in a

standard metadata format. **Surveillance Activities** are conducted through **Field Visits** that encompass a period during which **Locations** (i.e. study sites) are surveyed. These **Locations** contain **Events**, epidemiological units with a spatiotemporal coordinate that can contain four types of **Sources**:

- Groups of animals of the same species (*Group*)
- Individual animals (*Animal*)
- Collections of arthropods (*Arthropod*)
- Environmental sample collection (i.e., water or feces; *Environmental*)

Sources at time *t* are **Source Records** that can be obtained through a **Collection** that involves an effort to obtain information during an **Event** (i.e. mist net) or not.

Locations, **Events**, and **Sources** can be grouped in further temporal and spatial **Clusters** when needed, based on the specific requirements of a study design. What **Location**, **Event**, and other **Cluster** data units represent must be documented for and consistently applied within each **Surveillance Activity,** but these data units can vary among **Surveillance Activities**.

The four categories of **Sources** provide **Specimens** cross-sectionally or longitudinally. **Necropsy** of animal carcasses can be documented. Live or dead **Animals** and **Specimens** can be tested using **Diagnostics** for biological (i.e. pathogens), physical (entanglement), chemical (i.e. heavy metals), and physiological (i.e. cardiomegaly) targets. **Diagnostics** can be conducted in a **Laboratory**. **Specimens** and **Diagnostics** can generate new **Specimens** if they are pooled or if their products are used in subsequent tests, respectively. Finally, each **Diagnostic**, tested **Specimen**, and tested **Source** (directly or through **Specimens**) receives an **Interpretation** for the target of interest

following documented case definitions. The data model also supports the administration of **Specimen** or carcass storage or and shipments.

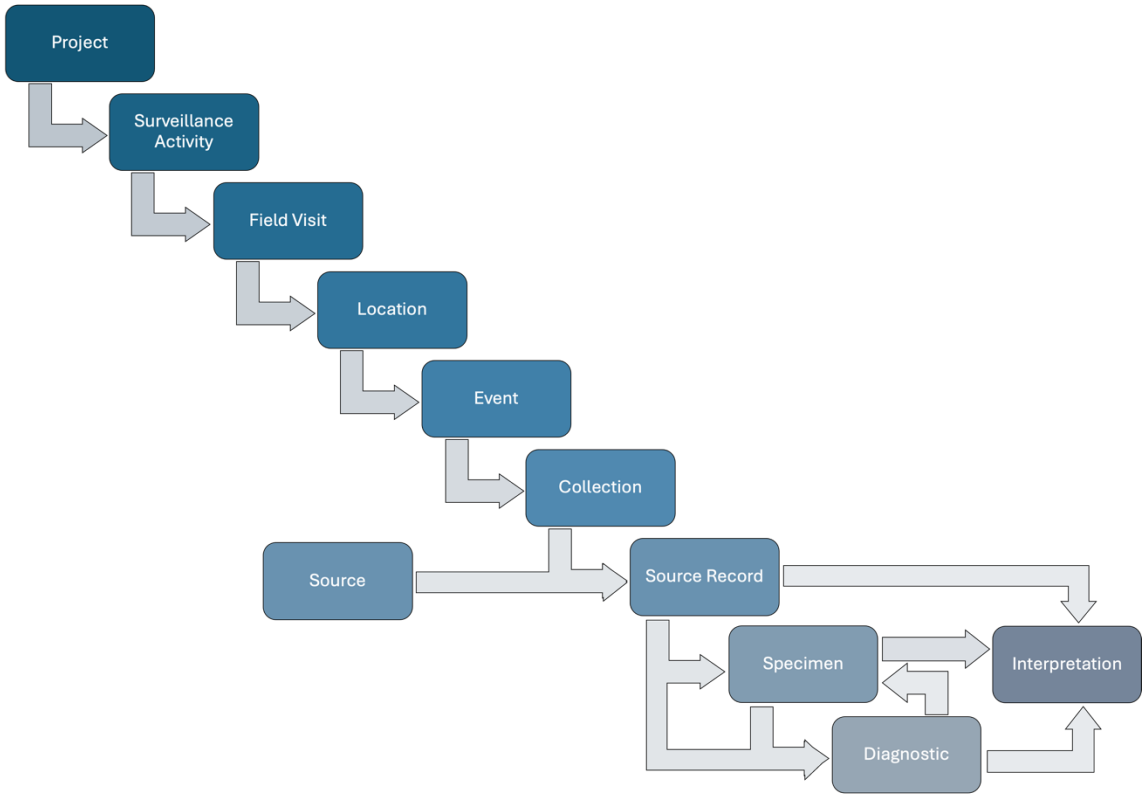


Figure 1. Basic structure of the Wildlife Health Intelligence Network (WHIN) data model.

Depending on the study design, **Surveillance Activities** may only contain **Field Visits** up to **Source Records** (i.e. mortality observations). It is also possible that a **Surveillance Activity** contains **Specimens** and **Diagnostics** only or **Source Records**, **Specimens**, and **Diagnostics** only. In the first case, stored **Specimens** collected under a previous **Surveillance Activity** are used in a second **Surveillance Activity** and tested for health hazards. In the second case, a stored carcass collected under a previous **Surveillance Activity** generates new **Specimens** that are tested for health hazards.

The data structure allows for cases when **Field Visits** or **Locations** end without any **Event; Events**, **Collections**, and **Sources** end without any **Source Record; Source Records** end up without any

Specimen; Specimens end up without any **Diagnostics;** and **Diagnostics** end up without an **Interpretation**.

For other potential options and the full set of relationships among these data units please visit the WHeDB data model manual (link).

We encourage a modular approach for each system implementing WHeDB, starting with the foundational frame and only adding additional components as needed.

Account Types

WHeDB has four types of accounts: **General Administration**, **Organization Administrator**, and **General User**.

General Administrator Account (*under construction*)

These accounts are assigned internally by the Wildlife Conservation Society. There are two **General Administrators** (see WHeDB website [*under construction*] to learn more). **General Administrators** support the maintenance of the database across all accounts linked to at least one **Organization** (see below), they authorize the creation of **Organization** accounts (see next), establish **Organization Administrators** based on requests (see below), and communicate with **Organization Administrators** to solve technical issues, report updates and bugs, etc.

Organization Account (*under construction*)

The first step to begin using WHeDB is to request an **Organization** account. **Organization a**ccounts contain as many **Projects** as needed, and they can only be accessed by authorized

Organization Administrators and **General Users**. **Organization** accounts manage data for their **Surveillance Activities**.

Organization Administrator (*under construction*)

Organization Administrators can view, edit, delete, and export all data controlled by the corresponding **Organization** (all data across all **Organization Projects**). **Organization Administrators** can accept or reject **General Users** (see below) under the corresponding **Organization. Organization Administrators** can assign **General User** different data permissions (i.e. view, edit, delete, export) from **Projects** to **Interpretations** per **Surveillance Activity** within the **Organization** account. **Organization Administrators** can also modify these permissions, authorize the creation of new **Projects** under the corresponding **Organization** account**,** communicate with **General Administrators,** restore deleted data (see below), and access data changes logs (see below). Two **Organization Administrators** per **Organization** account are accepted. For more details see "**WHeDB Administrator Account Manual"** (*under construction*).

General User (*under construction*)

General User accounts belong to specific individuals. **General Users** are granted data view, edit, delete, and export permissions from **Projects** to **Interpretations** per **Surveillance Activity** within the **Organization,** by **Organization Administrators**. **General Users** can also receive "Project Creation" permissions. Therefore, **General Users** can be granted data viewing permissions for **Surveillance Activity** 1 in Project A; export permissions for **Surveillance Activity** 2 in **Project** A;

no access to **Project** B data; and have edit data permissions for all **Surveillance Activities** in **Project** C.

General Users must be granted access to an **Organization**; however, the same **General User** can be accepted in several **Organizations** and be upgraded to **Organization Administrator** by current **Organization Administrators**.

Creating and Modifying Accounts (*under construction*)

Organization Account

General Administrators review new **Organization** requests. To request a new **Organization**, a representative or individual completes the 'Organization request form' (*under construction*) which includes contact information for an **Organization Administrator**. The representative or individual requesting the **Organization** account will be contacted via email as soon as possible. Once created the **Organization Administrator** listed in the request form takes control of the **Organization** account.

WHeDB is designed to remain accessible and sustainable as a public good to encourage widespread use. Critically, when local funding is unavailable, Global South users will be accommodated at no charge, subject to reasonable usage limits. Global South users with funding are encouraged to share their capacity to support database maintenance and ensure the long-term use and storage of data.

Organization Administrator Account

These accounts are established by **General Administrators** based on petitions made by the **Organization** representative or individual requesting the new **Organization Account** (see above). **General Users** with access to the corresponding **Organization** can be upgraded to **Organization**

Administrators by existing **Organization Administrators**. **Organization Administrators** can also be converted to **General Users**.

Instructions to convert an **Organization Administrator** to a **General User** are given in "**WHeDB Administrator Account Manual"** (*under construction*).

General User Account

To create a new **General User** for a specific **Organization,** the individual interested in having a **General User** account completes the "Insert title of form (*under construction*)". Once the form is submitted, the individual receives an email with the subject, "WHeDB Organization Access Request Confirmation". The request is reviewed by the corresponding **Organization Administrator**. Once approved by the Administrator, the new **General User** will receive a second email with the subject, "Your Access to the [**Organization** name] WHeDB Account Has Been Accepted". This second email confirms the account is ready to be used.

General Users can be authorized to access other **Organizations.** To obtain access authorization to other **Organizations, General Users** must follow these steps (*under construction*):

General User access and permission to each **Organization** are set by the respective **Organization Administrators.**

Instructions to upgrade a **General User** to an **Organization Administrator** are provided in the "**WHeDB Administrator Account Manual"** (*under construction*).

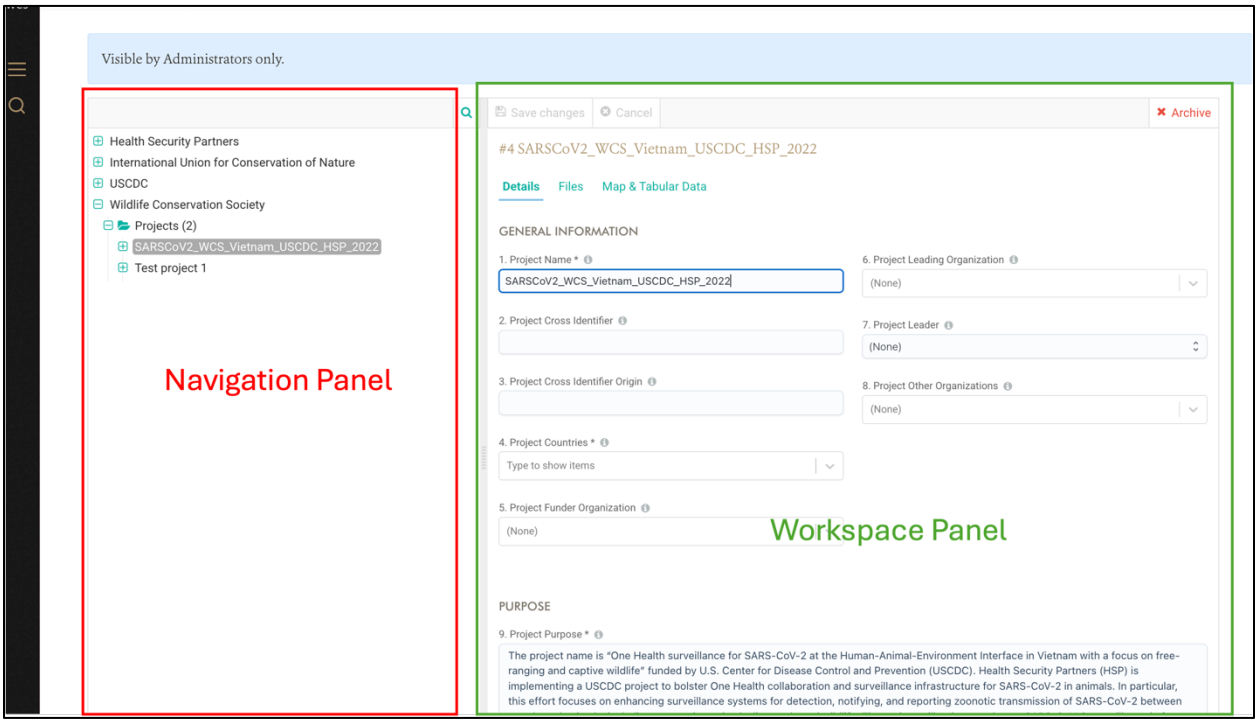
General Users Navigating the WildHealth Database

Logging in to the Web-based User Interface (*under construction*)

Organization Administrators and approved **General Users** access WHeDB by opening this link on a Chrome web browser and providing their username and password. WHeDB software is optimized for Chrome and may not work on other browsers:

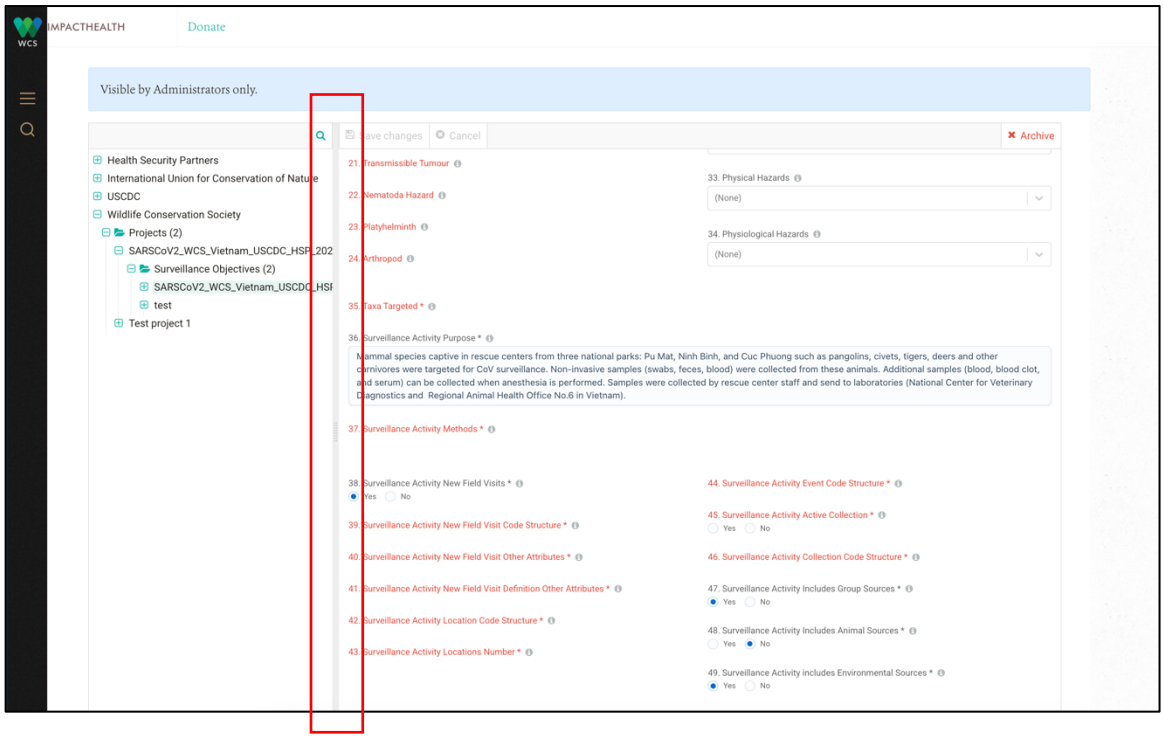
Initial Screen

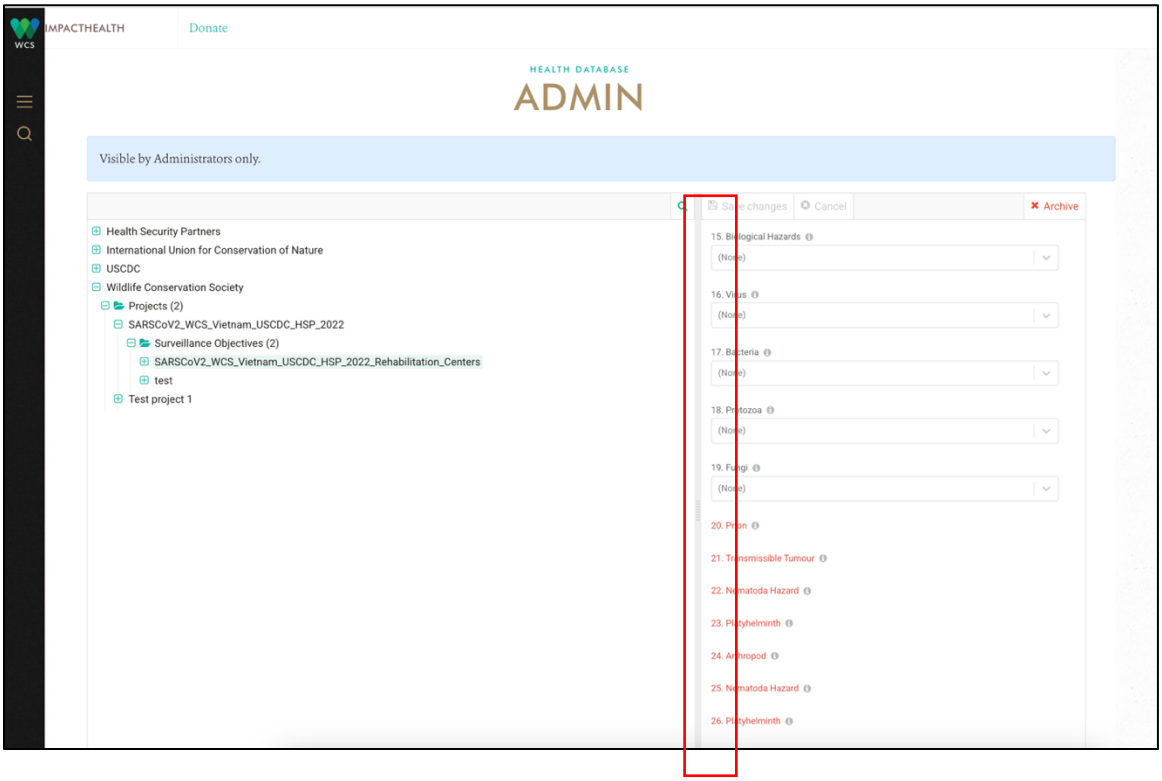
Once successfully logged on, the Graphical User Interface (GUI) appears. The GUI has two panels that are **always available**. On the left side of the screen is the **Navigation Panel** (red frame in the image below). On the right side is the **Workspace** (green frame in the image below):



The **Navigation Panel** shows all the **Organizations** that a user has access to. The relative size of the **Navigation** and **Workspace Panels** can be adjusted by selecting the divider bar separating

the two panels (red frame in the figure below) and dragging it to the left or right. Compare the two images below:





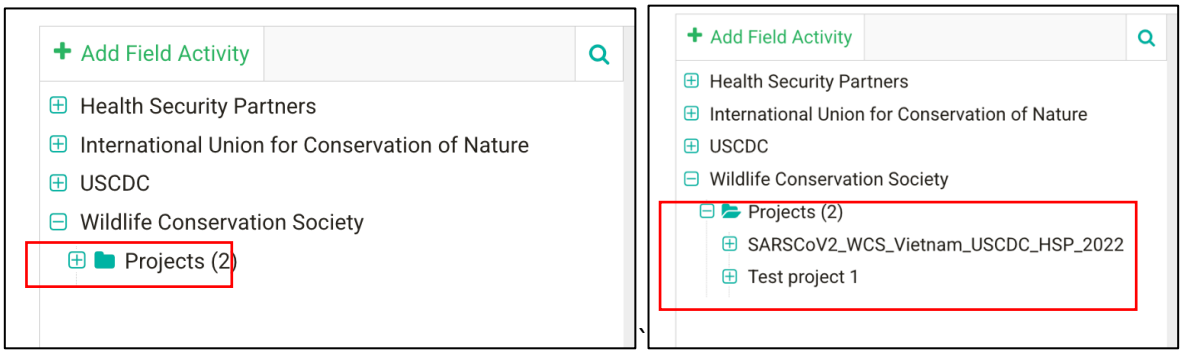
Horizontal and vertical scroll bars appear to aid independent navigation of the **Navigation** and **Workspace Panels.**

The Navigation Panel

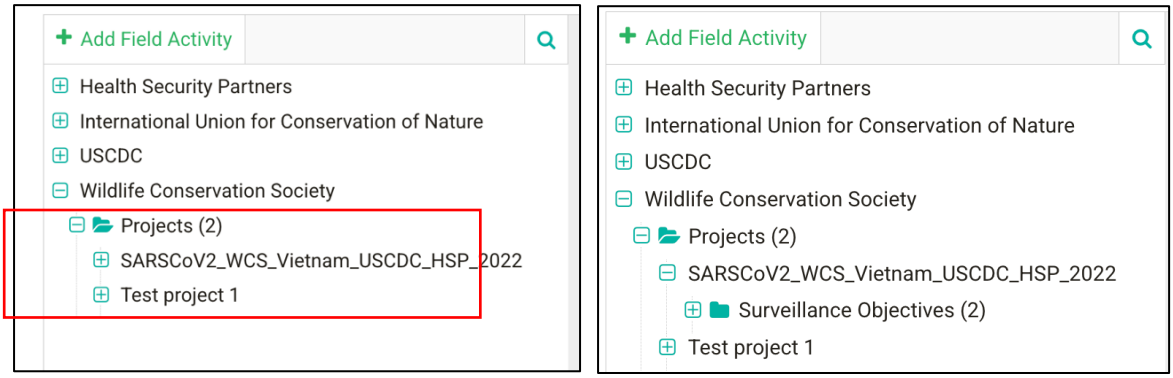
The **Navigation Panel** has a tree hierarchy. This tree begins with a display of the **Organizations** to which an individual has access. Within, each **Organization** has a **Projects** folder that contains tthe **Projects** belonging to the corresponding **Organization**. Each **Project** contains a **Surveillance Activities** folder that contains the **Surveillance Activities** of each **Project**. The tree continues with each **Surveillance Activity** containing a **Field Visits** folder, each **Field Visit** containing a **Locations** folder, an **Event** folder nested in each **Location**, etc. following the structure explained above.

The number in parenthesis at the right of each folder name indicates the number of data units included. For example, “Projects (2)” label indicates that the “**Projects**” folder contains two **Project** units (see image below). The “+” icon to the right of each folder in the **Navigation Panel**

indicates that the contents of the folder are not displayed. To open the content of a folder, select the folder icon. Once a folder is opened, the "+" icon switches to a "-" icon, and the contents are displayed:



Similarly, to reveal folders under a specific data unit, select the "+" icon. The icon switches to a "-" icon and contents are displayed:



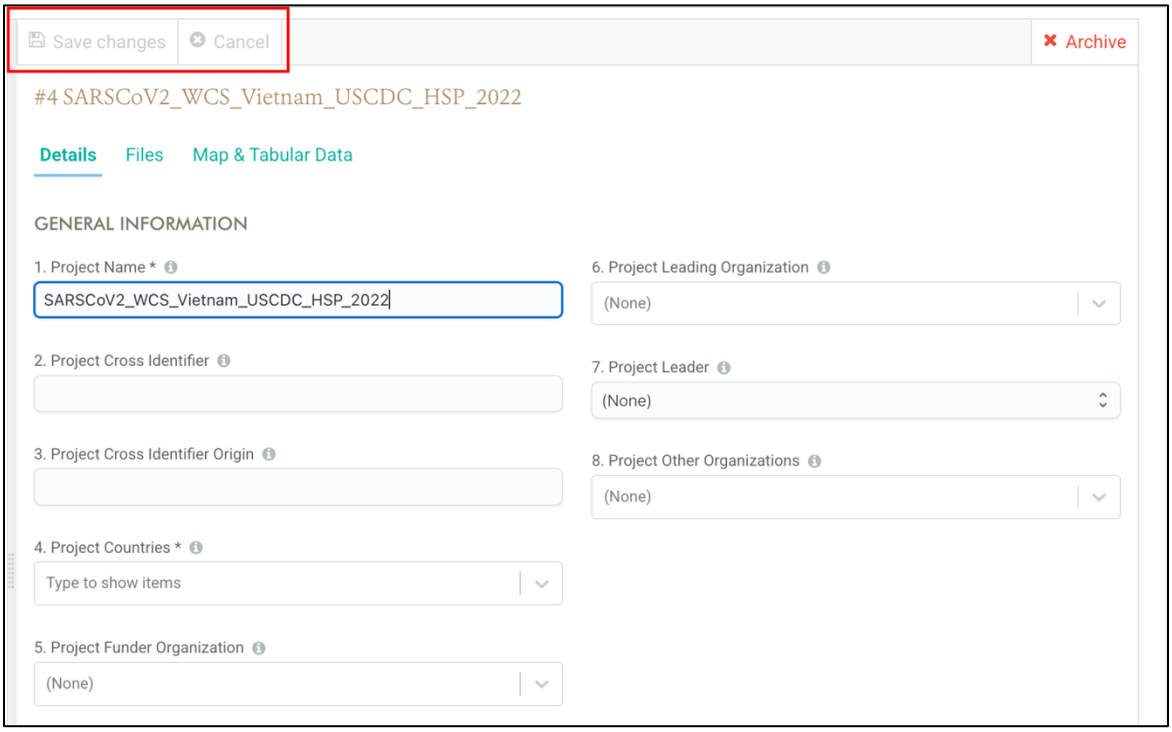
On selection of a data unit within any folder in the **Navigation Panel**, the "Details", "Files", and "Map & Tabular Data" tabs are displayed in the **Workspace Panel**.

The Workspace Panel

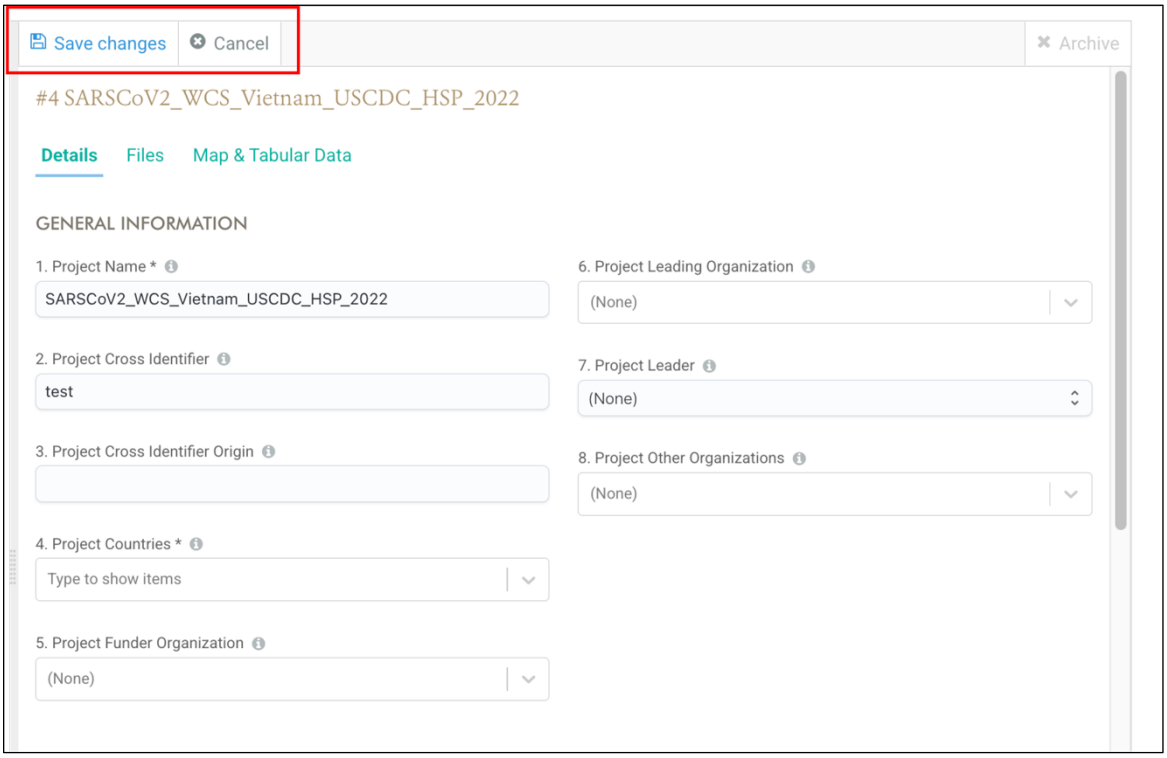
The **Workspace Panel** has the buttons “Save changes” and “Cancel” on the top left. These buttons are always displayed and are inactive or active depending on the addition or modification of data units.

The button “Save changes” is grey when inactive and blue when active. The “Cancel” button is grey when inactive and dark grey when active. These buttons are inactive by default but become active when:

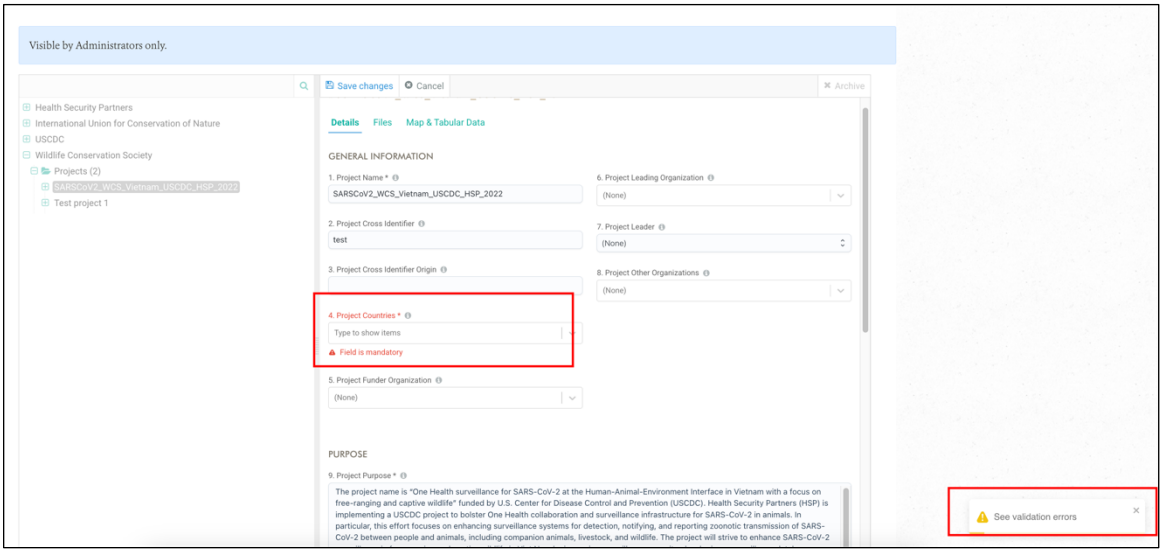
- A **field** of an existing data unit is modified, or a new file is added to an existing data unit (see “Manipulating Data to WHeDB” section below). Compare the red frame in the two images below showing the switch from inactive to active buttons. The first image shows a saved data unit as currently stored with inactive buttons:



In the second image below, **field** 2 has been modified and the buttons are now active:

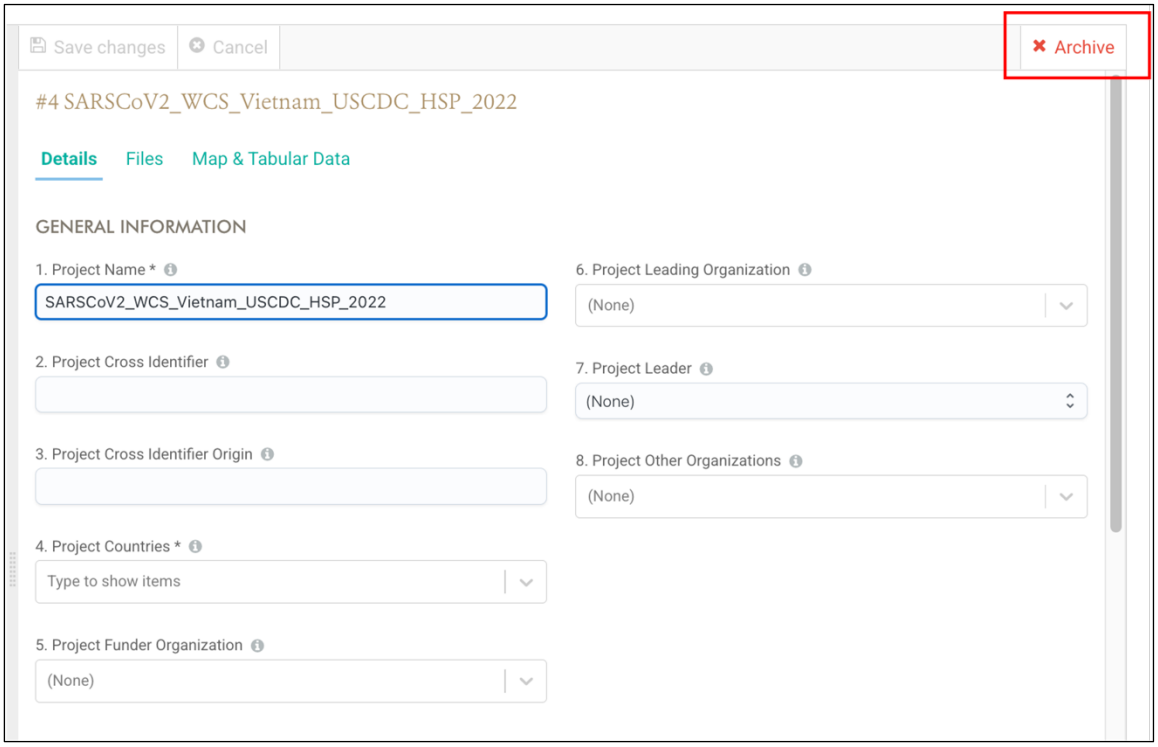


- A new data unit is being created but not saved yet (see "Manipulating Data to WHeDB" section below). Although the "Save changes" button is active, an error message will appear if mandatory **fields** are not completed:

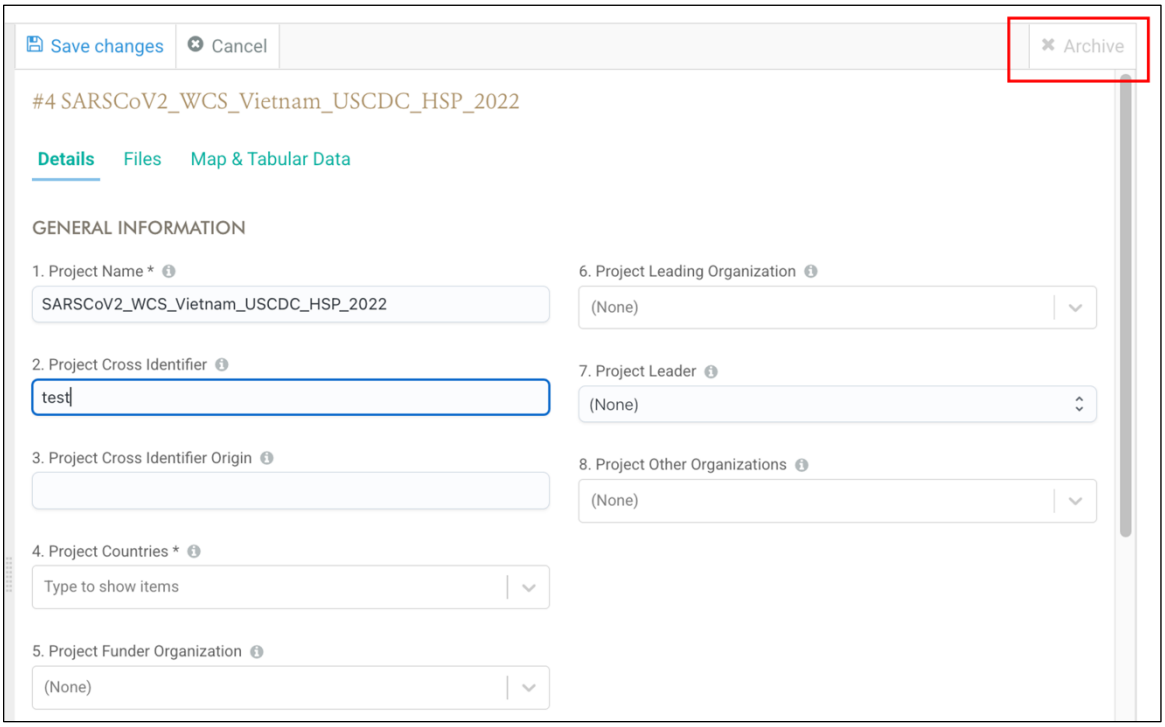


The **Workspace Panel** also has an "Archive" button on the top right. This button is only displayed when working on existing data units. This button is active (red) when:

- An existing data unit is opened, and it has not been modified (no editing of **fields**, or addition or removal of files):



This button is inactive (grey) when an existing data unit has been modified but these changes have not yet been saved:

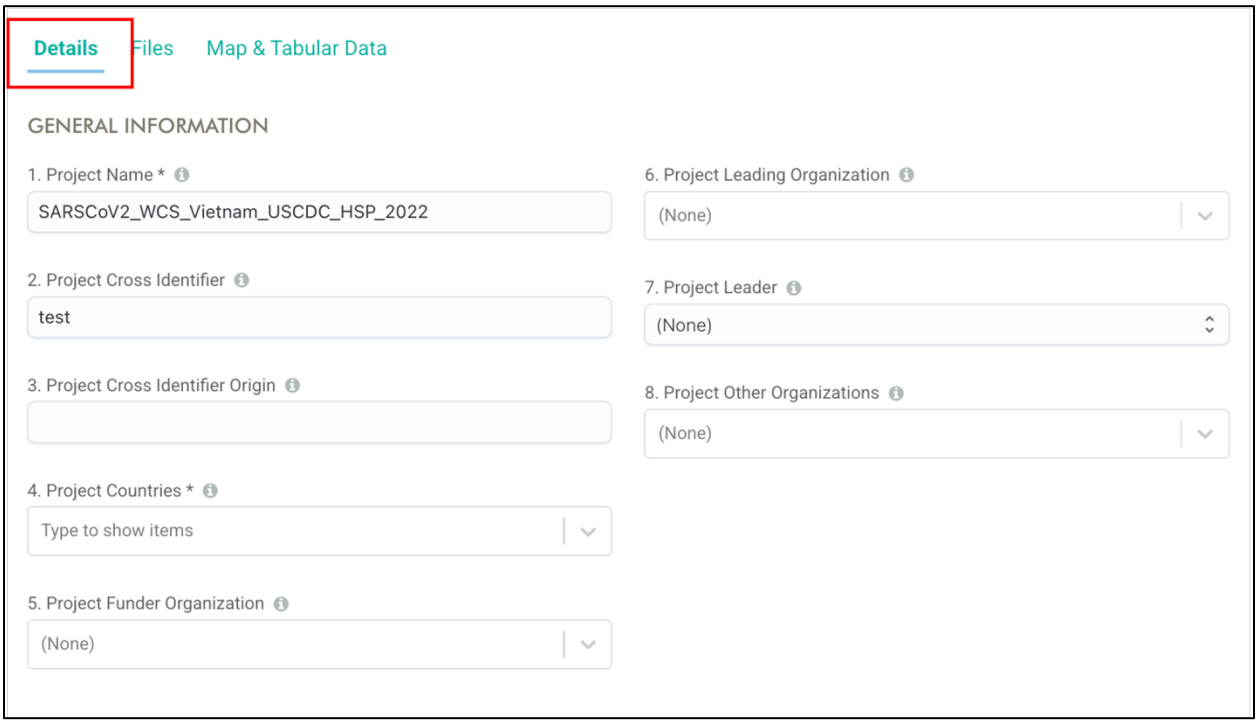


The “Archive” button does not appear when a new data unit is being created.

The **Workspace Panel’s** three tabs: “Details”, “Files” and “Map & Tabular Data” are described in the next sections.

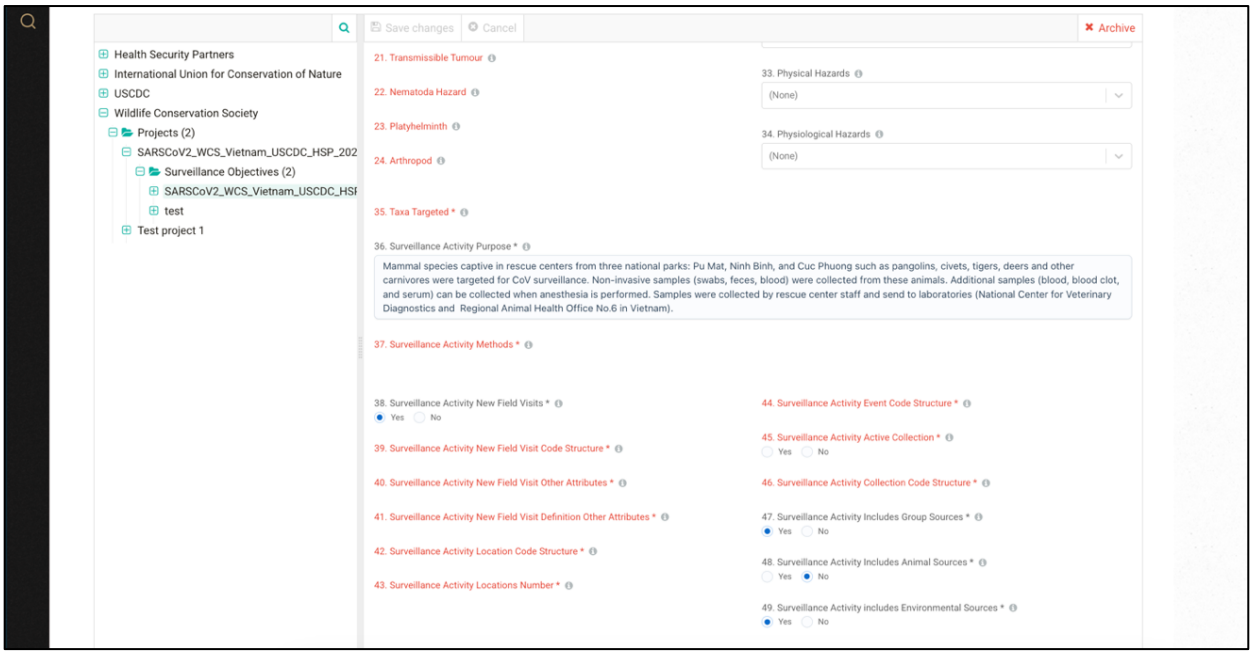
The Workspace Panel - Details Tab

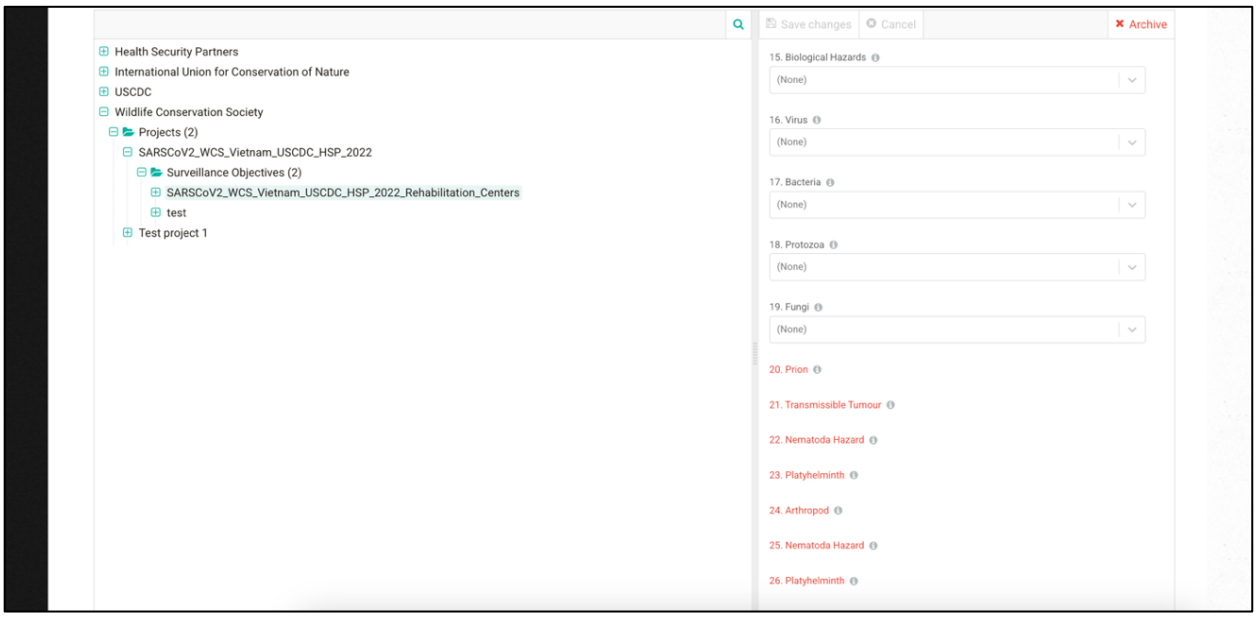
The “Details” tab (red frame below) contains the variables that characterize each data unit. Existing data units contain filled **fields** whereas new unit **fields** will be blank:



Users navigate across this tab by scrolling up and down. **Fields** are editable (active) or not. Non-active **fields** are grey and cannot be editable (read only; *under construction*). Read only **fields** may occur when a user does not have edit permission or when there are dependencies (i.e., if a **Project** does not have chemical hazards, then it is not possible to select a specific toxin. See

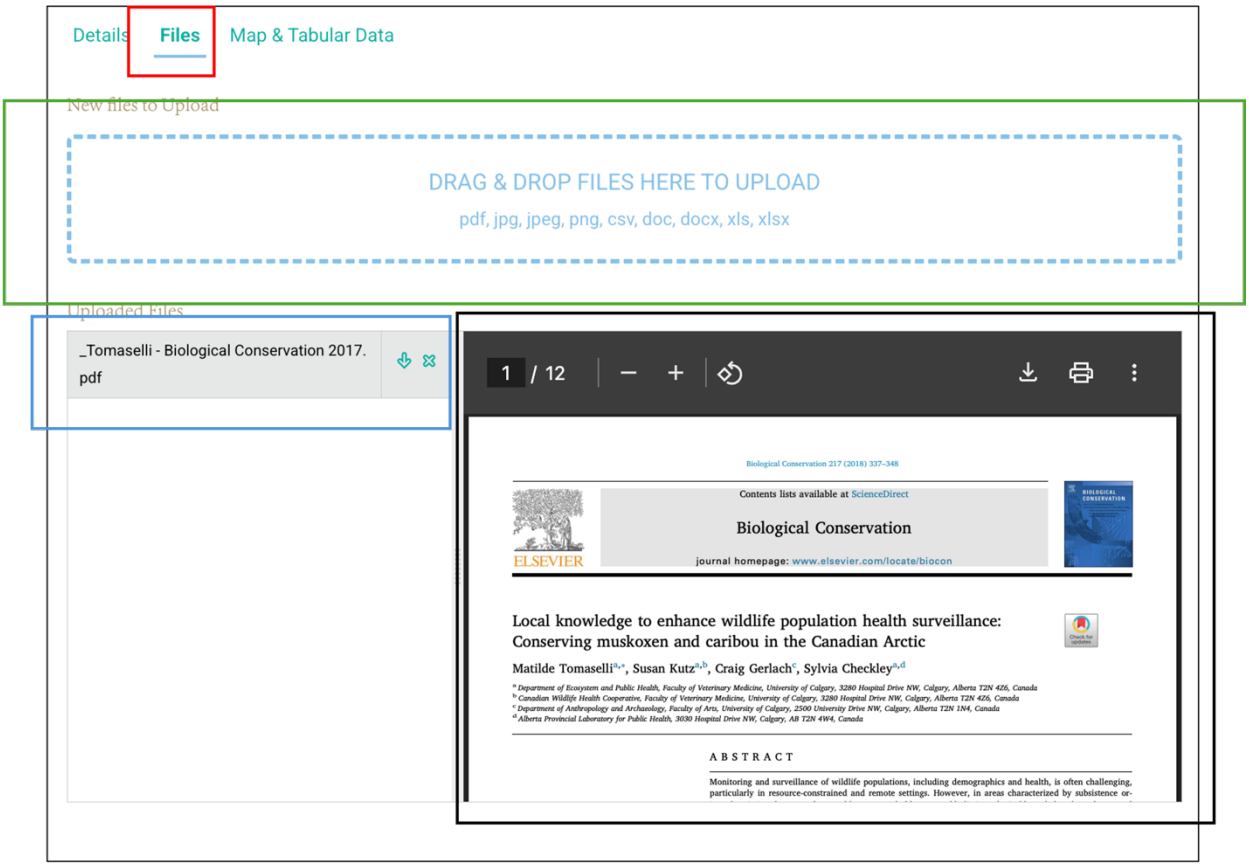
"Mandatory and Conditional Fields" below). **Fields** are logically ordered; the order is retained even as the **Workspace Panel** is modified. Compare the two images below:





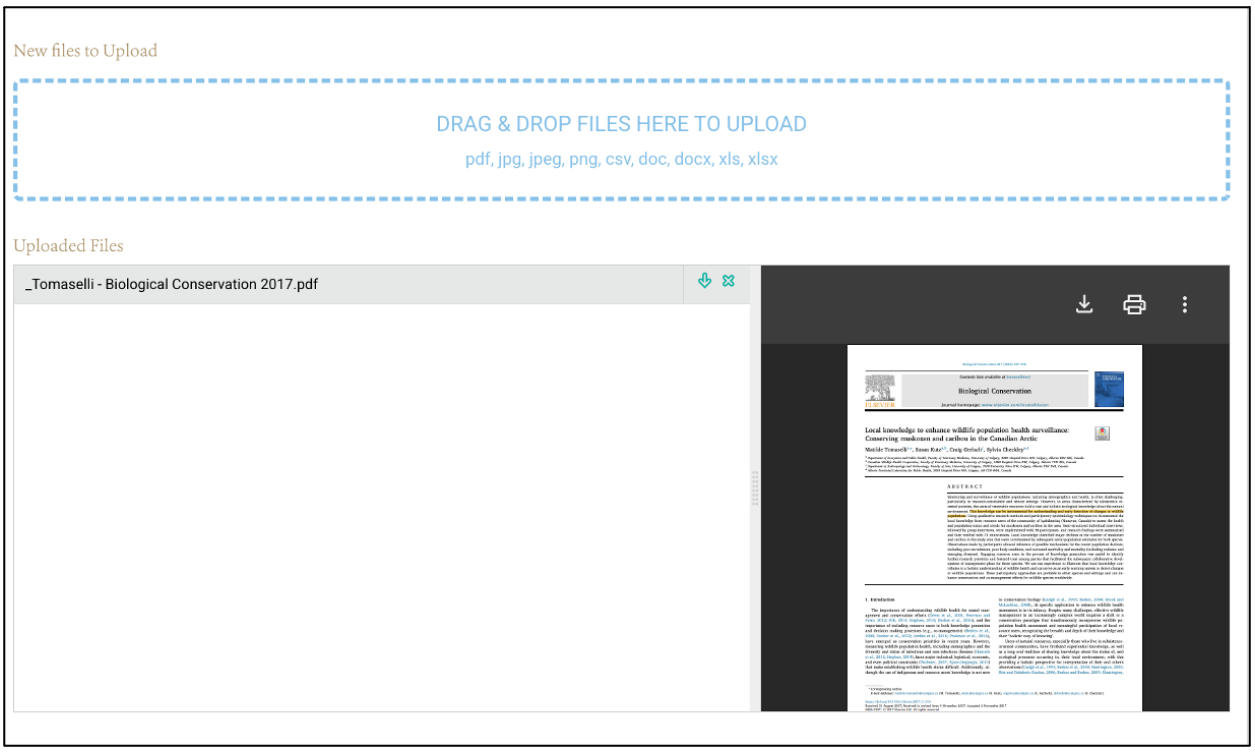
The Workspace Panel - Files Tab

The “Files” tab receives and stores files associated with the selected data unit. WHeDB supports many file extensions (e.g. images, pictures, videos, pdf, docx, xlsx, csv, json, shp, etc). When files have been added to a data unit, the “Files” tab lists them in the “Uploaded Files” area (blue solid frame in the image below). The “Drop the Files to Upload” area attaches files (green frame in the image below) to the selected data unit (see “Adding a New Data Unit” section below).



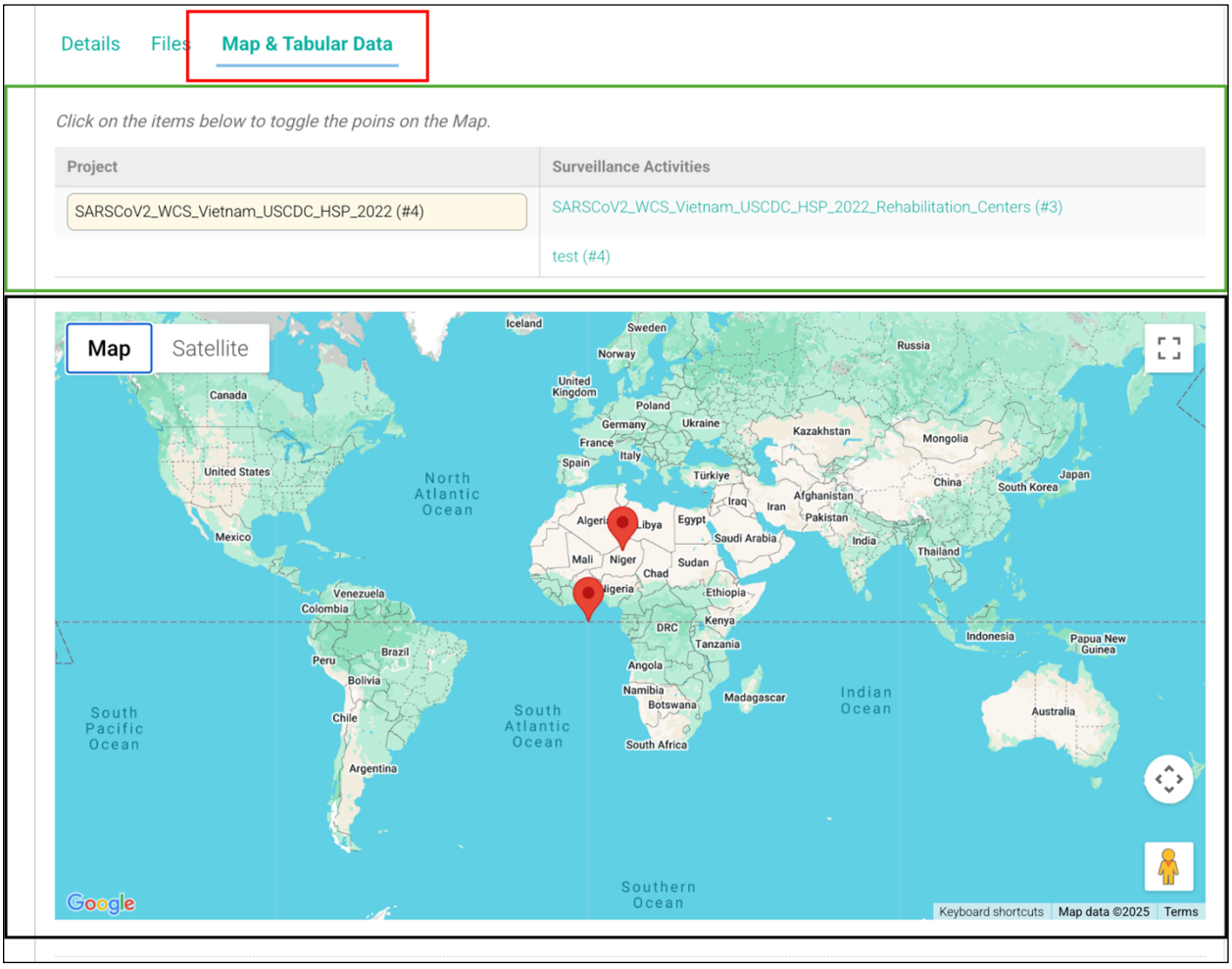
The “Preview” tool displays a file (black frame in the image below) selected from the list of uploaded files. When no files are associated with the data unit, the “Uploaded Files” area and the “Preview” tool are not displayed.

The relative size of the “Uploaded Files” and “Preview” tool can be modified by selecting and dragging the bar separating them to the left or right. Compare the two images below:



The Workspace Panel - Map & Tabular Data Tab

The “Map & Tabular Data” tab displays a data unit’s spatial data (black frame in the image below) and tabular information with the relationships with the corresponding parent and children data units:



For a **Project**, the Map shows all **Events** across its **Surveillance Activities**, while the Table shows the *Project ID* and the corresponding *Surveillance Activity IDs*. The tabular data at the **Specimens** level include the IDs of its parents: the *Project ID*, *Surveillance Activity ID*, *Field Visit ID*, *Location ID*, *Collection ID*, *Event ID*, and *Source Record ID*. It also shows the *Specimen ID*; and finally, its children, *Diagnostics ID*.

The specific content displayed for each data unit is shown below in Table 1:

Table 1. Specific fields shown in the table in the "Map & Tabular data" tab of data units, per data unit.

Data Unit	Columns
Project	Project ID
	Project Name
	Surveillance Activity Names
Surveillance Activity	Project ID
	Project Name
	Surveillance Activity ID
	Surveillance Activities Name
	Field Visit Names
Field Visit	Project Name
	Surveillance Activity Name
	Field Visit ID
	Field Visit Name
	Field Visit Star Date
	Field Visit End Date
	Location Cluster Names
	Location Names
Location	Project Name
	Surveillance Activity Name
	Field Visit Name
	Location Cluster Names
	Location ID
	Location Name
	Event Cluster Names
	Event IDs
Event	Project Name
	Surveillance Activity Name
	Field Visit Name
	Location Cluster Names
	Location Name
	Event Cluster Names
	Event ID
	Event Date

	Collection IDs
	Source IDs
Collection	Project Name
	Surveillance Activity Name
	Field Visit Name
	Location Cluster Names
	Location Name
	Event Cluster Names
	Event ID
	Event Date
	Collection ID
	Collection Method
	Source IDs
Source Record	Project Name
	Surveillance Activity Name
	Field Visit Name
	Location Cluster Names
	Location Name
	Event Cluster Names
	Event ID
	Event Date
	Collection ID
	Source ID
	Source Type
	Source Record Cluster Names
	Record Number
	Initial Health Status
	Necropsy ID
	Specimen IDs
	Specimen Type
Specimen	Project Name
	Surveillance Activity Name
	Field Visit Name
	Location Cluster Names
	Location Name
	Event Cluster Names
	Event ID
	Event Date
	Collection ID
	Source ID

	Source Type
	Source Record Cluster Names
	Record Number
	Specimen ID
	Specimen Type
	Diagnostic IDs
	Diagnostic Targeted Hazard
	Diagnostic Result
	Project Name
	Surveillance Activity Name
	Field Visit Name
	Location Cluster Names
	Location Name
	Event Cluster Names
	Event ID
	Collection ID
	Source ID
Diagnostics	Source Type
	Source Record Cluster Names
	Record Number
	Specimen ID
	Diagnostic IDs
	Diagnostic Targeted Hazard
	Diagnostic Result
	Diagnostic Date Sent
	Diagnostic Date Received
	Diagnostic Result

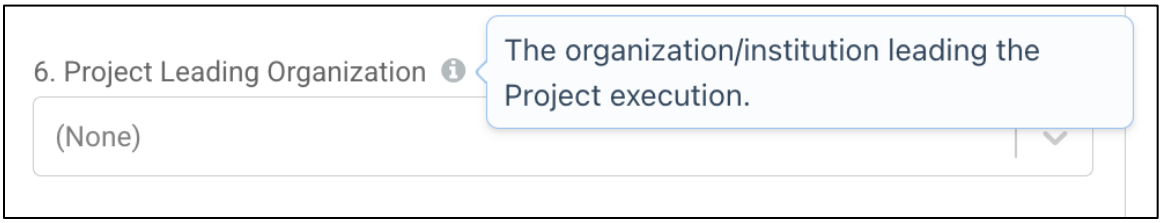
The data displayed in this tab cannot be directly modified. The content of the “Map & Tabular Data” changes based on the data unit’s content in the “Details” tabs.

System and User-Provided Identifiers

Data units in WHeDB, from **Organizations** to **Interpretations**, have at least one identifier. All data units receive an "ID", a system-based identifier unique for each data unit. This **field** is automatically assigned by the database once a data unit is saved. "Code" **fields** (i.e., Surveillance Activity Code) are user-provided identifiers for those data units. "Name" **fields** are a third type of identifiers for specific data units (see online Data Dictionary) that receive a user-provided name of a data unit (i.e., "Field Activity Name").

Field Definitions

In addition to the data model dictionary, the definition of each field can be found in the GUI. To view the definition, select the "i" or information icon that appears to the right of each field header:



Data Types for Fields in WHeDB

WHeDB supports different data types for **fields**. This allows WHeDB to accommodate the wide range of variables associated with wildlife health surveillance.

Integer

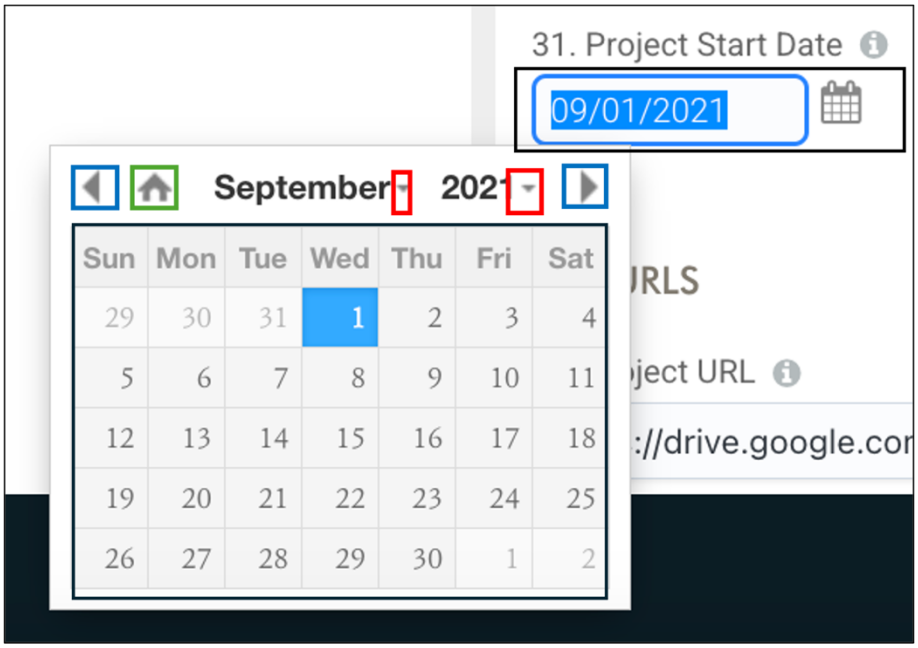
These **fields** require an integer number. Integer fields have up and down arrows to increase and decrease the value, or it can also be entered directly. For example, the number of adult male individuals observed sick or injured in a Group Source (*under construction*):

Floating

These **fields** expect a non-integer number. Non-Integer **fields** must be entered directly. For example, the number of traps-hours in a night (*under construction*):

Date

These **fields** require a date. The date can be entered directly using the mm/dd/yyyy format. Alternatively, the date can be entered using the calendar icon to the right of the **field**. For example, the "Start Date" of a **Project**:

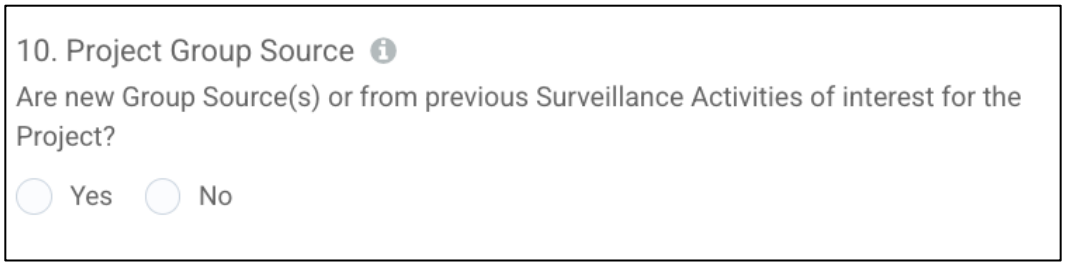


After selecting the calendar icon, a calendar appears. The left and right arrows (blue frame in the image above) change the month sequentially backward and forward in time, respectively. The down arrows (red frame in the image above) help select a specific month and year. The home icon (green frame in the image above) resets the calendar to the current date. Enter the specific date by navigating to the correct month, year, and date and selecting it (black frame in the image above). The database will display an error message when the month value is larger than 12 and

when the day value exceeds the possible number for the corresponding month (i.e., February 30th).

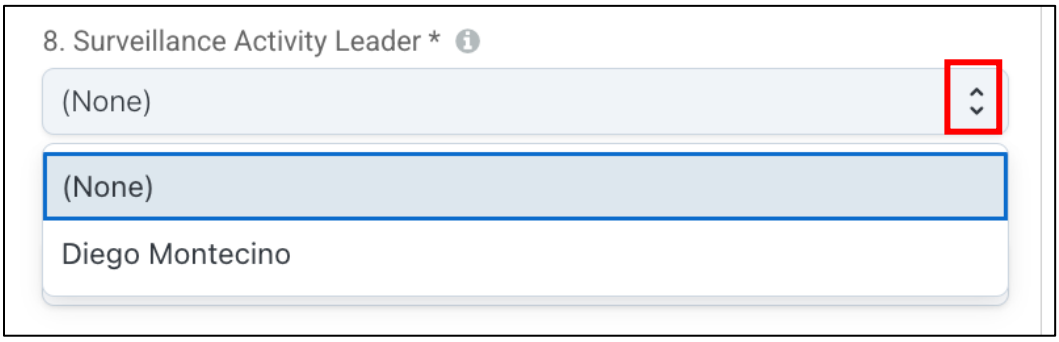
Boolean

These **fields** request a "Yes" or "No" answer. For example, the **field** "Project Group Source" of the "Project" **fields**:



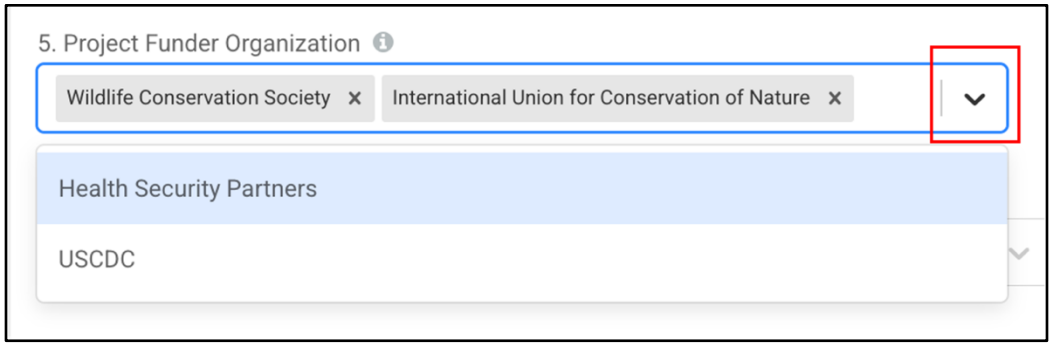
Single-choice List

These **fields** are completed by selecting one response from a list of fixed options. These **fields** have navigation arrows on the right that when selected open a list of options. Select a response from the list using the cursor. For example, the "Surveillance Activity Leader" **field** of **Surveillance Activities** (the red frame indicates the navigation arrows):



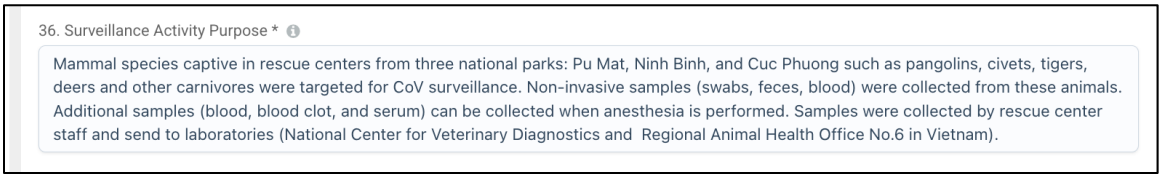
Multi-choice List

These **fields** accommodate one or more responses from a list of fixed options. These **fields** have a down arrow icon on the right. After selecting that icon, a list of options appears. One or more responses can be selected using the cursor. For example, the "Project Funder Organization" **field** of **Project** (the red frame indicates the up and down arrow):



Text

These f**ields** are text boxes and are used for long-form or free text written response. For example, the "Surveillance Activity Purpose" **field** of **Surveillance Activities**:



Active, Conditional, and Mandatory Fields in WHeDB

Active Fields

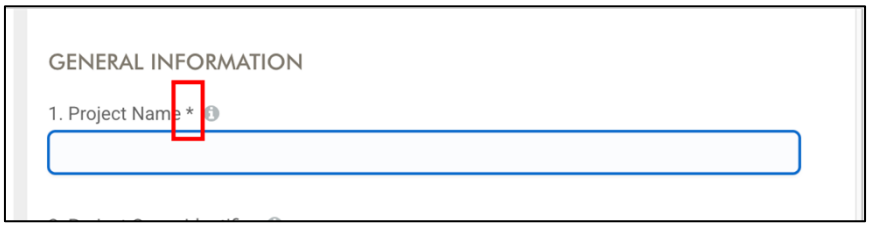
Fields in the "Details" tab that can be edited are active. Not active or read only fields are grey in color. This may be the case if a user does not have edit permission or because of field dependencies (see next).

Conditional Fields

Some **fields** are inactive until previous **fields** are answered or receive a specific response. These Conditional **fields** minimize data entry by only requesting the additional specific details when required (i.e., if a **Project** does not include chemical hazards, then the specific toxin **field** remains inactive).

Mandatory Fields

Mandatory **fields** are indicated with an asterisk:



Active Mandatory **fields** must be completed to save changes to the data.

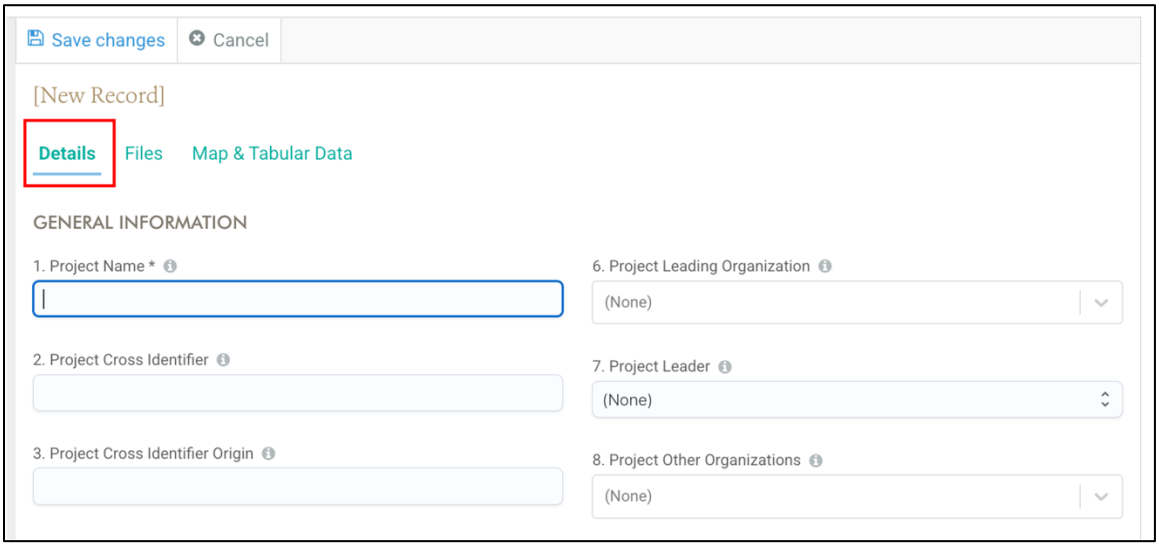
Adding Data in WHeDB

Adding a New Data Unit

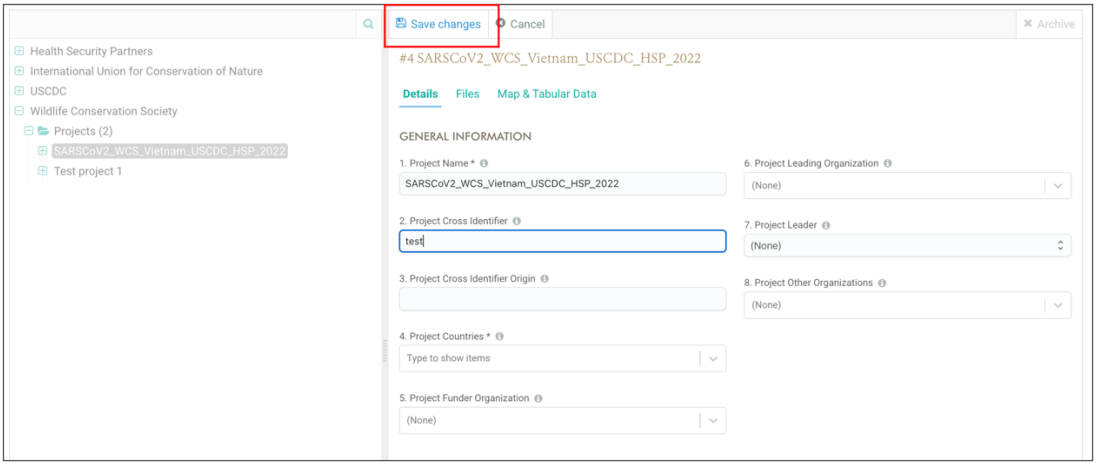
The addition of data to WHeDB follows the same process across all data units. To add data units:

- Navigate to the data unit folder where are a new unit is to be added
- Select its folder icon and a "+ Add [data unit name]" button will appear in the top left corner of the **Navigation Panel** (i.e., "Add Project"):

- Select the button and a “New Record” with the three fixed tabs: “Details”, “Files”, and “Map and Tabular data” appears in the **Workspace Panel**. The “Details” tab is first by default (see red frame in the image below). As the data unit is new, all the **fields** in this tab are empty:

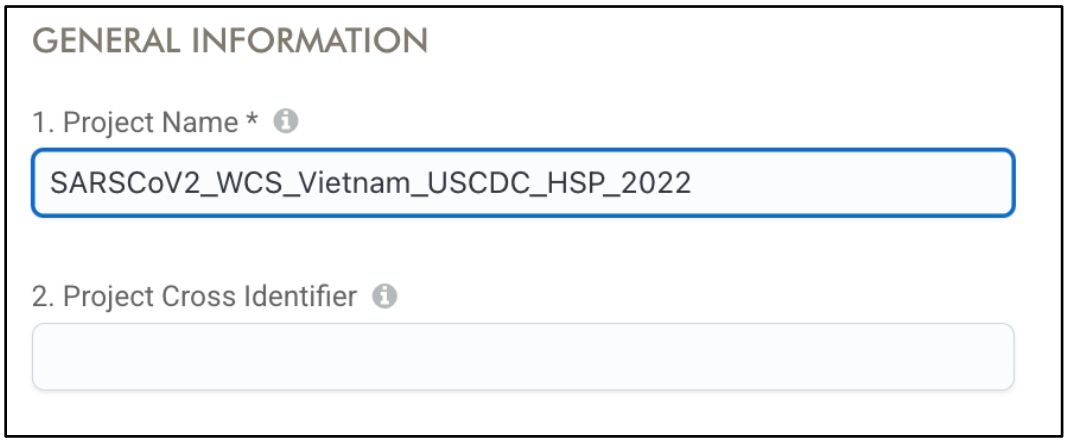


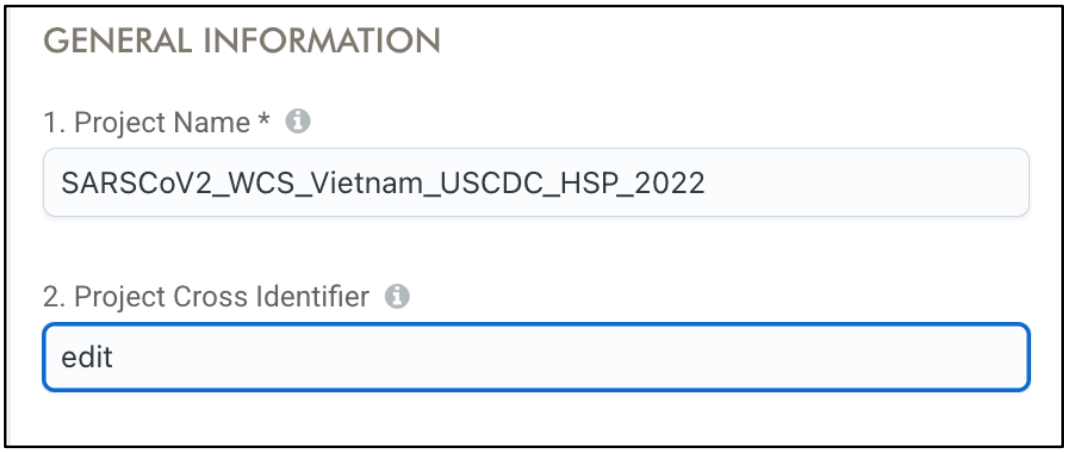
Once the mandatory **fields** are completed, the new data unit can be saved by selecting “Save Changes”, located in the top left of the **Workspace Panel**:



- Adding a new data unit requires completion of the mandatory **fields**. Nonmandatory **fields** can be completed, and files can be added (see next section) after the creation of the data unit, during the creation of the data unit, or not added at all.

- Active **fields** that are being completed or edited are highlighted with a blue frame. Compare the **fields** in the images below:



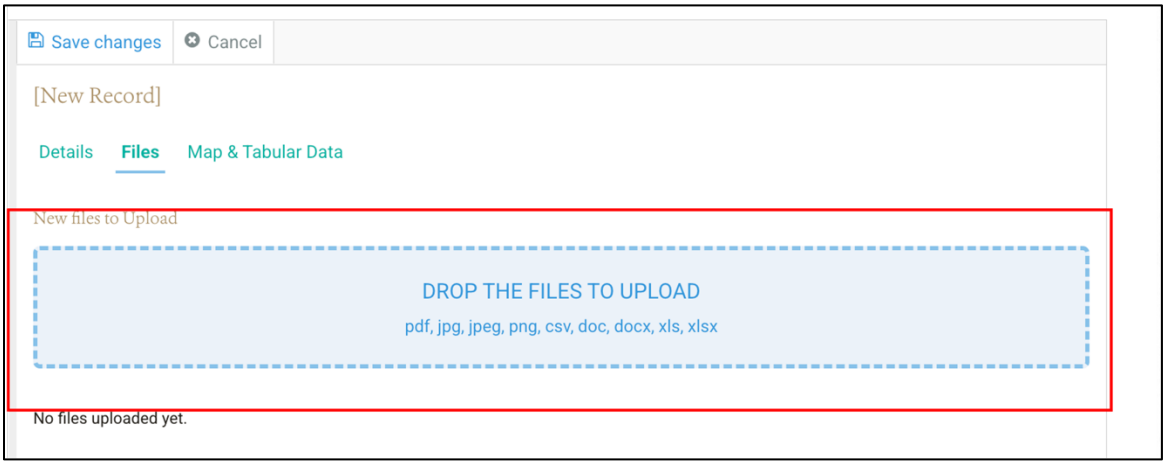


Adding Files to a Data Unit

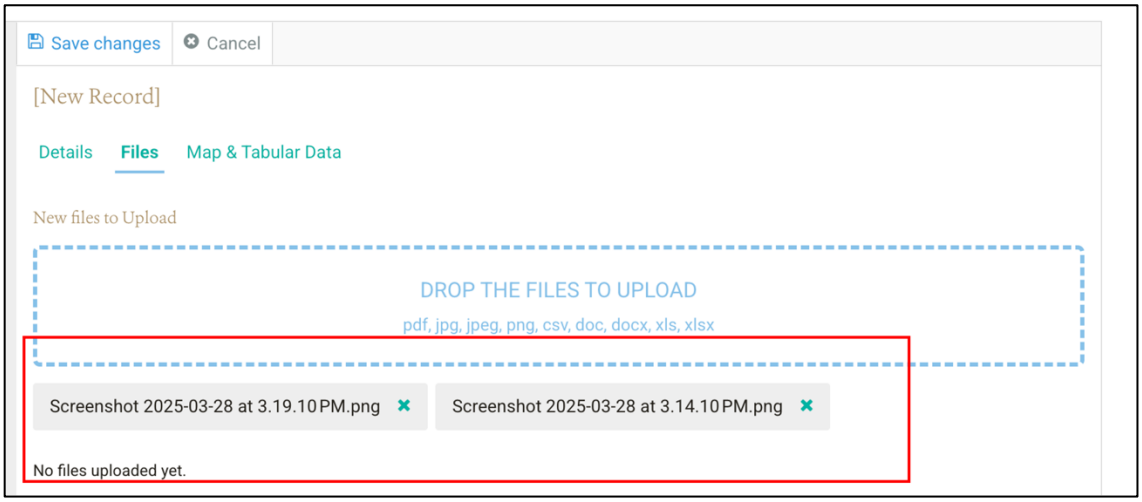
To add files to a data unit:

- Navigate to the “Files” tab by selecting the “Files” button of the **Workspace Panel**. Initially, the “Files” tab will only show a “Drop the Files to Upload” box bordered with a light-blue dashed contour (red frame in the image below):

- Upon moving the cursor to the “Drop the Files to Upload” the area will turn light blue. Select anywhere in the box, an explorer window to browse files on the computer will open:

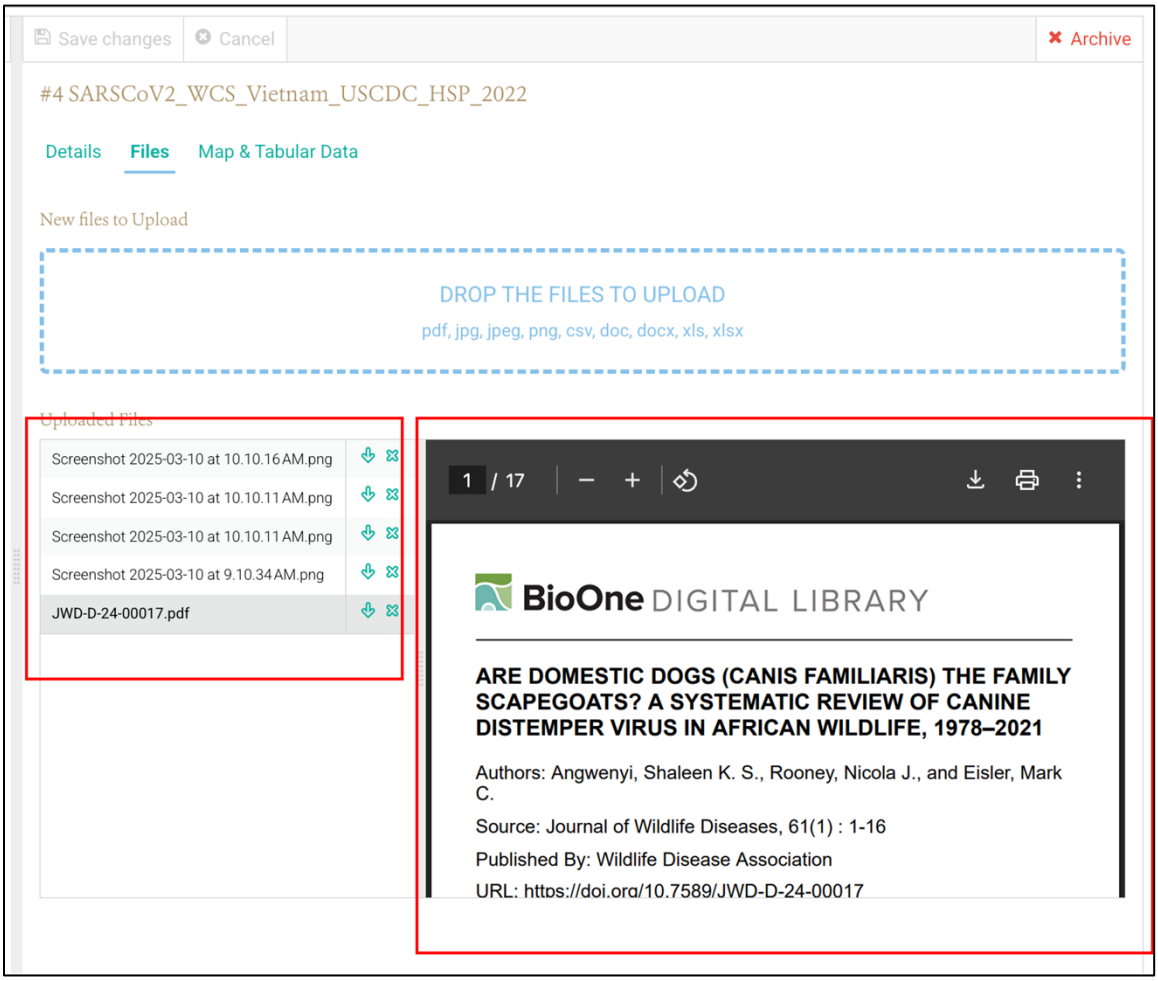


- Select the file to upload followed by the “Open” button of the explorer window. A list will appear with the new file(s) uploaded displayed directly below the “Drop the Files to Upload” box. **These files are not yet saved in WHe-DB** but are rather queued for the user to confirm they are the correct files before saving:



Alternatively, drag the files to upload from your computer and drop them in the "Drop the files to Upload" area.

- **To save the files, select the "Save changes" button in the upper left corner of the Workspace Panel.** The list of the uploaded files attached to the data unit is displayed to the left of the **Workspace Panel** (the "Upload Files" area). Once one or more files are saved to a data unit the "Preview" tool will appear to the right of the **Workspace Panel**. A selected file ("Upload Files" area in the red frame on the image below) that has a compatible extension will appear in the "Preview" tool. The selected file will have a darker grey file name than others is the list.



- The "**Save** changes" button is inactive (grey) when all files are saved. Add new or additional files to any data unit following the steps provided above.

Adding a New Project to an Organization

To add a new **Project** to an **Organization**, navigate to the **Project** folder under the corresponding **Organization**, select the folder and then click "Add Project" in the top left corner of the **Navigation Panel**. Complete the mandatory **fields** in the **Workspace Panel** and select the "Save Changes" button. Most **Project fields** are metadata. The definition of each **field** is provided in the online Data Dictionary here or by selecting the "i" icon or information to the right of the **field** names in the "Details" tab.

Adding a New Surveillance Activity to a Project

To add a new **Surveillance Activity** to a **Project**, navigate to the **Surveillance Activity** folder under the corresponding **Project**, select the folder and then "Add Surveillance Activity" in the top left corner of the **Navigation Panel**. The addition of a **Surveillance Activity** is the most time–consuming step of data entry. These **fields** are also the most important because they document the methods employed to conduct the activity, including **Source**-specific metadata and **Cluster** specific metadata.

Therefore, the addition of a **Surveillance Activity** is broken into three parts. The first part captures information about who, when, where, what, why, and how of the **Surveillance Activity** (*under construction*):

The second part documents the specific methods and information was collected for each **Source** type. A **Surveillance Activity** can include between one to four different types of **Sources** (*Group*, *Animal*, *Environmental*, and *Arthropod* **Sources**). Each **Source** type included in the **Surveillance Activity** requires completion of a specific set of **fields** (*under construction*):

The third part is only necessary when **Source Records**, **Events**, or **Locations** are nested or grouped in either spatial or temporal clusters in the **Surveillance Activity**. When used these **fields** help document the structure of the **Clusters.**

In the case of Source Records: (*under construction*)

In the case of Events: (*under construction*)

In the case of Locations: (*under construction*)

The data dictionary and the “i” or information icon provide additional guidance on completing the **fields** in part three.

Adding a New Field Visit to a Surveillance Activity

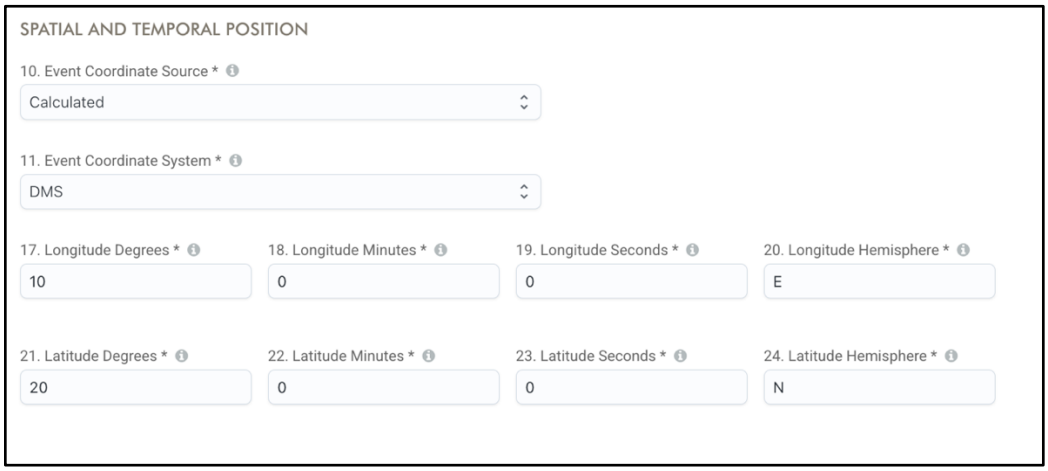
To add a new **Field Visit** to a **Surveillance Activity**, follow the instructions in “Adding a New Data Unit”.

Adding a New Location to a Field Visit

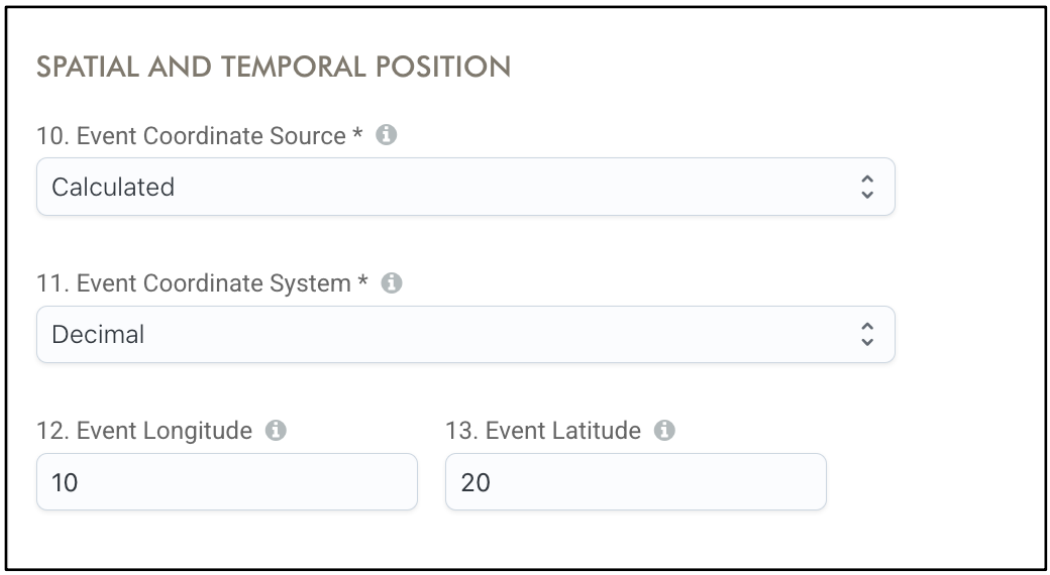
To add a new **Location** to a **Field Visit**, follow the instructions in “Adding a New Data Unit”.

Adding an New Event to a Location

The **Event** data contains the spatial and temporal coordinates. Coordinates can be entered in decimal degrees (DD); degrees, minutes, and seconds (DMS); or Universal Transverse Mercator (UTM). The coordinate system selected will determine what spatial coordinate information is required. For DMS:



For DD:

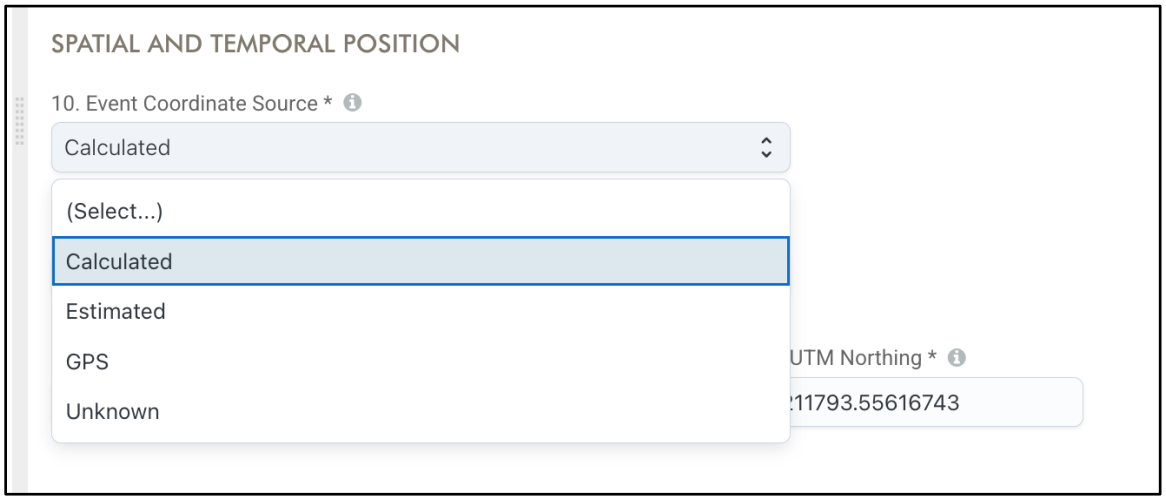


For UTM:

The database documents the original coordinate system and automatically converts to the other coordinate systems.

The red pin on the map in the “Map & Tabular Data” tab can be moved to a new location using the cursor and the left button of the mouse (select the pin, then drag and drop the pin at the new desired location). Moving the pin modifies the associated **fields**, including the latitude, longitude, country, etc (*under construction*).

The **field** "Event Coordinate Source" documents the accuracy of the spatial coordinates. For example, if the coordinates were obtained with a GPS device, calculated based on the distance to a site with known coordinates, or estimated by pointing a site in a digital map and recovering the coordinates returned by the digital map (i.e., Google Earth or moving the pin in the database map to a specific site):

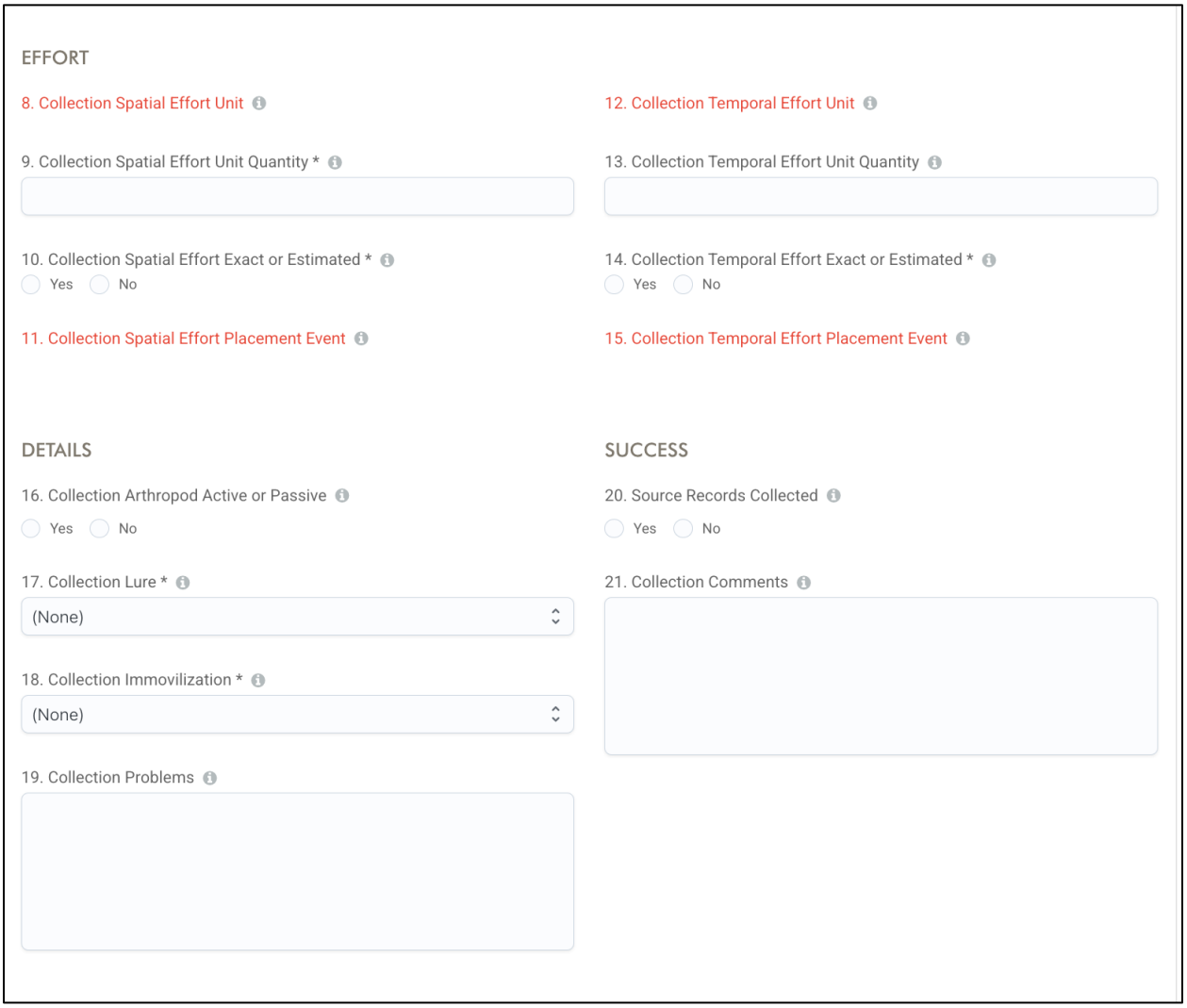


Adding a Collection to an Event

Collections are added to **Events** when there is an "effort" to obtain **Sources Records** from the **field**. A **Collection** can include a spatial effort (i.e., the distance travelled to the site of an **Event)**, and a temporal effort (i.e., the time a trap is deployed) to obtain **Source Records**. Opportunistic findings do not have an effort. A temporal effort **can either begin or end** at the time an **Event** starts (i.e., hours since the **Event** starting time). The spatial effort **can either begin or end** at the spatial coordinates of the **Event** (i.e., distance walked to the latitude/longitude of the **Event**). **Collections** occur at an **Event**, but an **Event** can contain several **Collections** (i.e., two mosquito traps, a mist net, and an air filter at the "same" **Event**).

When an **Event** contains **Collections**, a series of **fields** to document the effort to obtain **Source Records** are available, including the effort unit (i.e., meters, hours, etc.), the effort quantity (a

number), and the spatial and temporal position of the effort with respect to the **Event** spatio-temporal coordinates (i.e., since the **Event** started):



For more details, refer to the Data Model Manual (here).

Adding Source Records to a Collection or Event

Source Records are added to a **Collection** data unit if an effort is involved. Otherwise, the **Source Records** are added directly to the corresponding **Event**. To add a **Source Record** in both cases**,** it is necessary to complete a set of **fields** common across **Source** types and then a series of **Source**-type-specific fields. These specific fields are active after selecting the type of **Source** being added.

For example, for **Group Source Records**, the number of individuals per species, health status, sex, and age are displayed and active (*under construction*):

For **Animal Source Records**, vaccination, carcass condition, carcass action, and identification markers are displayed and active (*under construction*):

For **Environmental Source Records**, the species of origin, the quantity metric, and the quantity are displayed and active (*under construction*):

For **Arthropod Source Records** the number of arthropods per age, sex, and condition of the females; and the accuracy of the number reported are displayed and active (*under construction*):

Adding a Carcass to a Necropsy

(*under construction*)

Adding a Necropsy to a Carcass

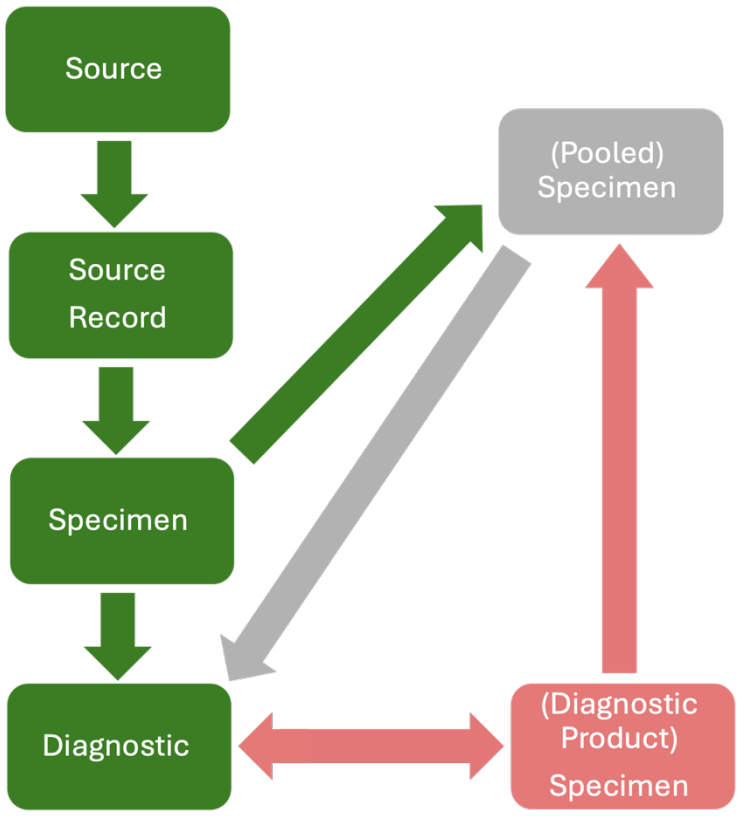
(*under construction*)

Adding Specimens to a Source Record

Specimens are used for **Diagnostics**. **Specimens** originate from the following:

- A sampled **Source Record** (i.e., an oral swab from an individual animal; the **Specimen** within the green boxes in figure below)
- A **Diagnostic Product** created by running a **Diagnostic** on a **Specimen** that can be used in further **Diagnostics** (i.e., cDNA created from RNA in a sample; the **Specimens** within the pink boxes in the figure below)

- **Other Specimens** (Pooled Specimen). For example, different **Specimens** from the same or multiple **Source Records** are mixed (grey boxes in figure below)**:**



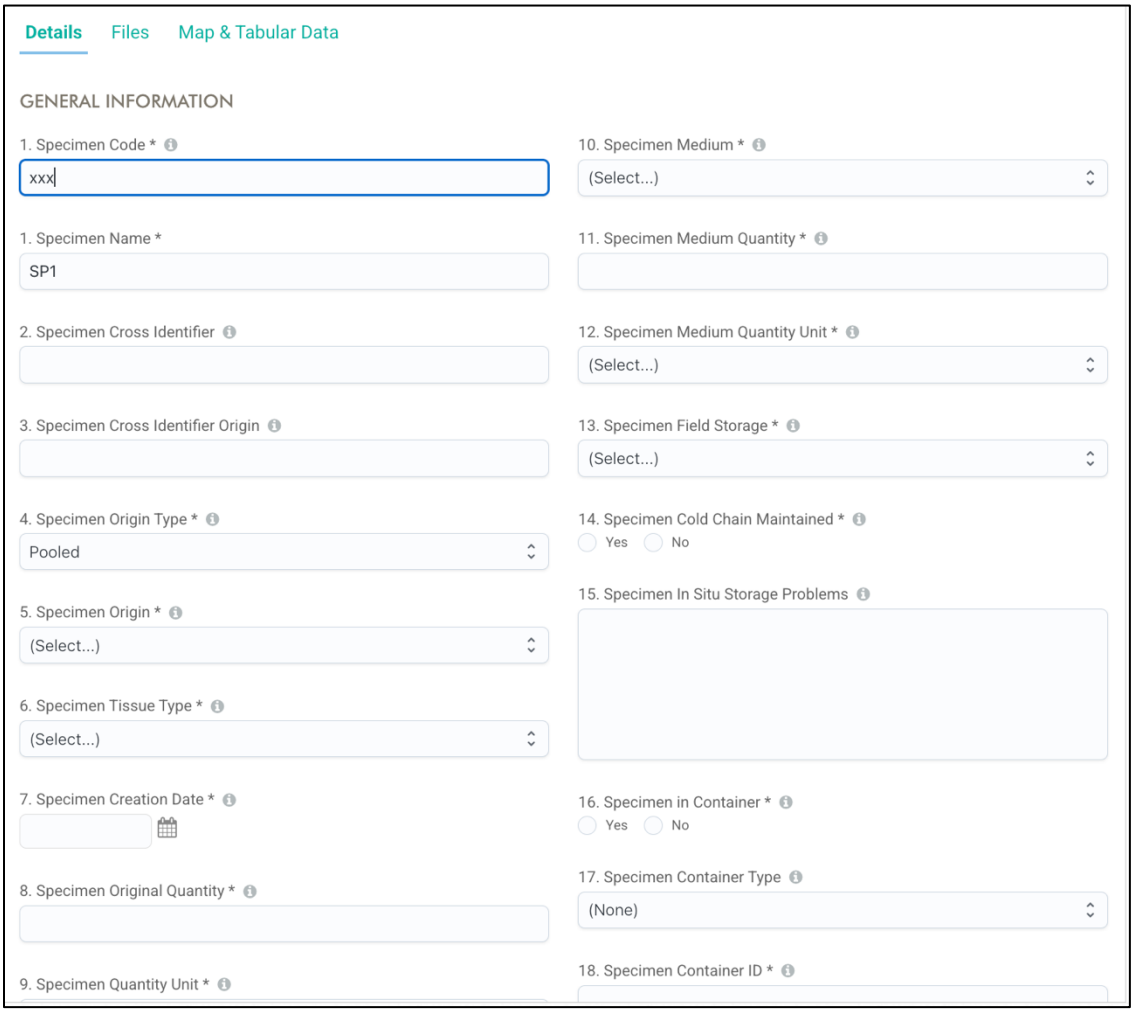
Notably, a **Specimen** that includes different tissue from the same **Source Record,** but the different tissues have not been entered in the database as individual **Specimens** is not a Pooled Specimen, but a **Specimen** of "mixed tissue" type.

Each **Specimen** belongs to one or more **Source Record(s)** depending on its origin. In WHeDB, **Specimens** originating directly from a **Source Record** are in the folder called "Specimens from Source Records" (*under construction*):

Specimens originating from a **Diagnostic Product** are in the folder called "Specimen from Diagnostic Products" (*under construction*):

Pooled Specimens belong to each **Source Record** involved in their generation. Consequently, in **WHeDB**, a Pooled Specimen can be found in the "Pooled Specimens" folder under either the "Specimens from Source Records" folder and/or "Specimen from Diagnostic Products" folder of each **Source Records** involved in the generation of the Pooled Specimen (*under construction*):

Specimens' characteristics include the type (**Source Record**, **Diagnostic Product**, or Pooled Specimen), the tissue type, the quantity, and **fields** associated with its current storage and shipment processes:



Adding Specimens to a Source Record – From Source Records

Specimens are added to a **Source Record** data unit, specifically to the "Specimens from Source Records" folder if they were taken directly from the **Source** (i.e., "oral swab"). Navigate to the "Specimens from Source Records" folder under the corresponding **Specimen**, select the folder and then click "Add Specimen" in the top left corner of the **Navigation Panel**. Complete the mandatory fields in the **Workspace Panel** and select the "Save Changes" button.

Adding Specimens to a Source Record – From Diagnostic Products

Specimens are added to a **Source Record** data unit, specifically to the "Specimens from Diagnostic Products" folder if they are a product of a **Diagnostic** conducted with a **Specimen** directly collected from a **Source Record** (i.e., cDNA generated after the genetic material in an "oral swab" is amplified after a RT-PCR **Diagnostic**). Navigate to the "Specimens from Diagnostic Products" folder under the corresponding **Specimen**, select the folder and then click "Add Specimen" in the top left corner of the **Navigation Panel**. Complete the mandatory **fields** in the **Workspace Panel** and select the "Save Changes" button (*under construction*).

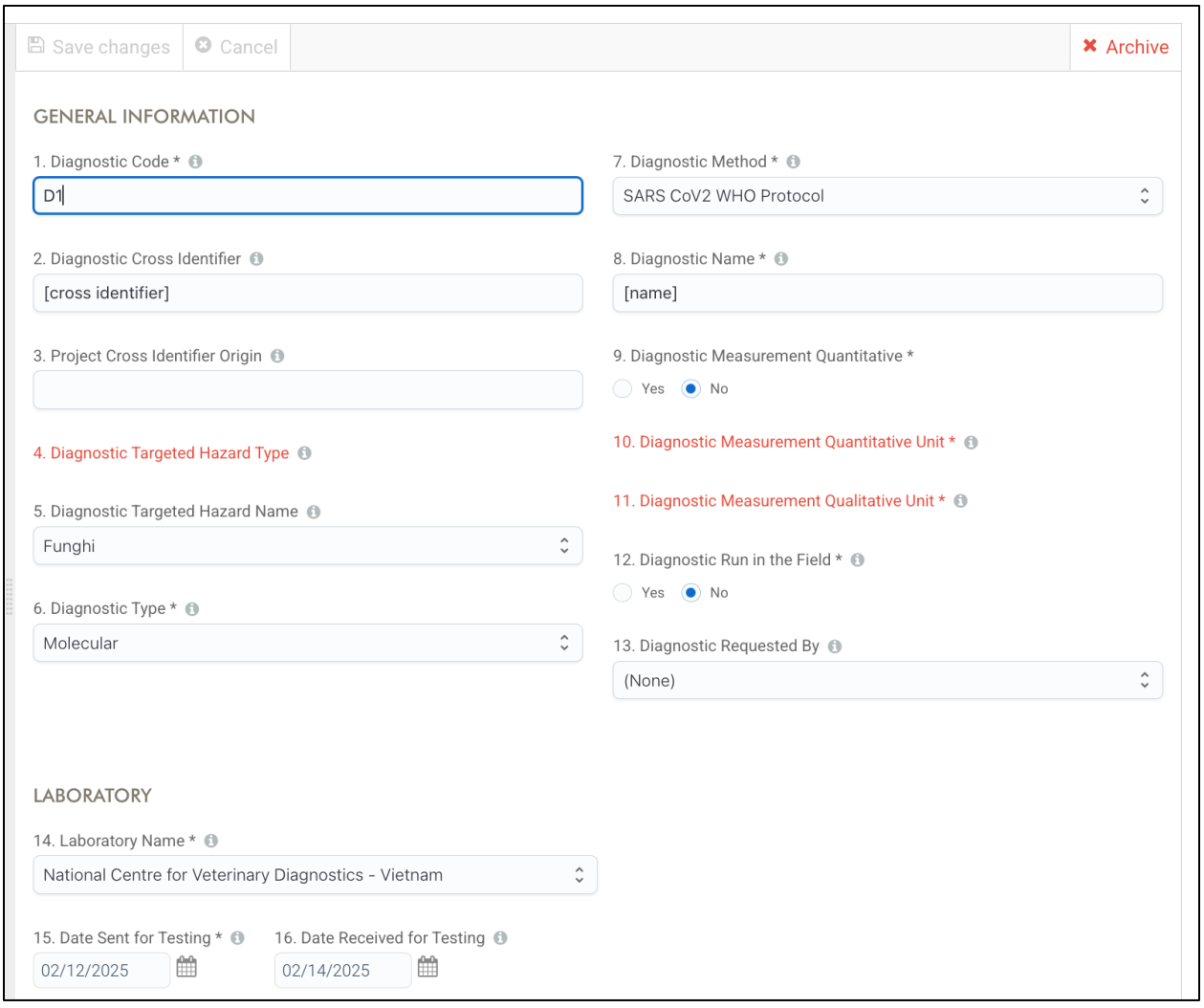
Adding Pooled Specimens to a Source Record – Pooled Specimens

In the database, Pooled Specimen parents are the **Specimens** included in the Pooled Specimens. Therefore, a Pooled Specimen data unit must be added to the corresponding "Pool Specimen" folder of each **Specimens** from **Source Records** or from **Diagnostic Products** that provide content for the new pooled specimen. In the figure above, the Pooled Specimen (grey box) should be added to the "Specimens from Source Records" folder of the "Source Record" in the green box, and also to the "Specimens from Diagnostic Product" folder of this **Source Record** (the **Diagnostic Product Specimen** in the pink box also creates the Pooled Specimen).

To add a Pooled Specimen, select the correct folder and then click "Add Pooled Specimen" in the top left corner of the **Navigation Panel**. Complete the mandatory fields in the **Workspace Panel** and select the "Save Changes" button (*under construction*).

Adding Diagnostics to a Specimen

To add a **Diagnostic** to a **Specimen**, navigate to the "Diagnostic" folder under either the "Specimens from Source Records", "Specimens from Diagnostic Products", or "Pooled Specimens" folder, select the folder and then click "Add Diagnostic" in the top left corner of the **Navigation Panel**. Complete the mandatory fields in the **Workspace Panel** and select the "Save Changes" button. **Diagnostic** information includes the type and name of the diagnostic test, the targeted hazard (i.e., "Virus"), and the hazard name (i.e, "SARS-CoV_2"; *under construction*):



Uploading a file to support the output of a **Diagnostic** is best practice and strongly encouraged. For example, an electrophoresis gel image of amplified genetic products, including negative and positive controls, alongside a ladder showing bands in the expected wells and sizes:

Adding Diagnostics to Group or Animal Source Records

Diagnostics can be added directly to a *Group or Animal* **Source**. For example, a hazard can be evaluated in a group of toads (i.e., skin disease, other). An **Animal Source** can undergo an MRI or another **Diagnostic** based on a whole individual. To add a **Diagnostic** to a *Group* or *Animal* **Source Record**, navigate to the "Diagnostics" folder linked to the **Source Record** directly, select the folder and then click "Add Diagnostic" in the top left corner of the **Navigation Panel**. Complete the

mandatory fields in the **Workspace Panel** and select the "Save Changes" button (*under construction*).

Adding an Interpretation to a Diagnostic (*under construction*)

Adding an Interpretation to a Specimen (*under construction*)

Adding an Interpretation to a Source Record (*under construction*)

Adding Existing Data Units to Other Surveillance Activities

Surveillance Activities might use existing data units that belong to other **Surveillance Activities**. For example, a new **Surveillance Activity** could test archived **Specimens** for SARS-CoV-2 from another **Surveillance Activity** that was originally only focused on HPAIV. In this case, the **Specimens** are added to this new **Surveillance Activity** (i.e., now testing the **Specimens** for SARS-CoV-2).

Another example is the sampling of the same bats but for two different objectives: different diagnostics tests. In this case, a single **Field Visit**, **Location**, **Event**, **Collection**, **Source Record**, and **Specimen** belong to two different **Surveillance Activities**, whilst the **Diagnostics** for the first objective and the **Diagnostics** associated with the second objective belong to one of the **Surveillance Activities** (see "Complexities" in the Data Model Manual for more details).

To add existing data units to a new **Surveillance Activity** (*under construction*):

- Create the new **Surveillance Activity** that will use the existing data
- Navigate to the new **Surveillance Activity** in the **Navigation Panel**

- Navigate to the data unit folder corresponding to the data unit level to be added to the new **Surveillance Activity** (i.e., navigate to the "Specimen" folder under the new **Surveillance Activity**)
- Select the corresponding folder
- Select the activated button "Add [data unit name]" (i.e., "Add Specimen") on the top left of the **Navigation Panel**
- Start typing the Specimen Code of the archived **Specimen**
- Select the correct Specimen Code
- Save changes by selecting the "Save changes" button in the top left corner of the **Workspace Panel**

Adding a Source directly to a Surveillance Activity

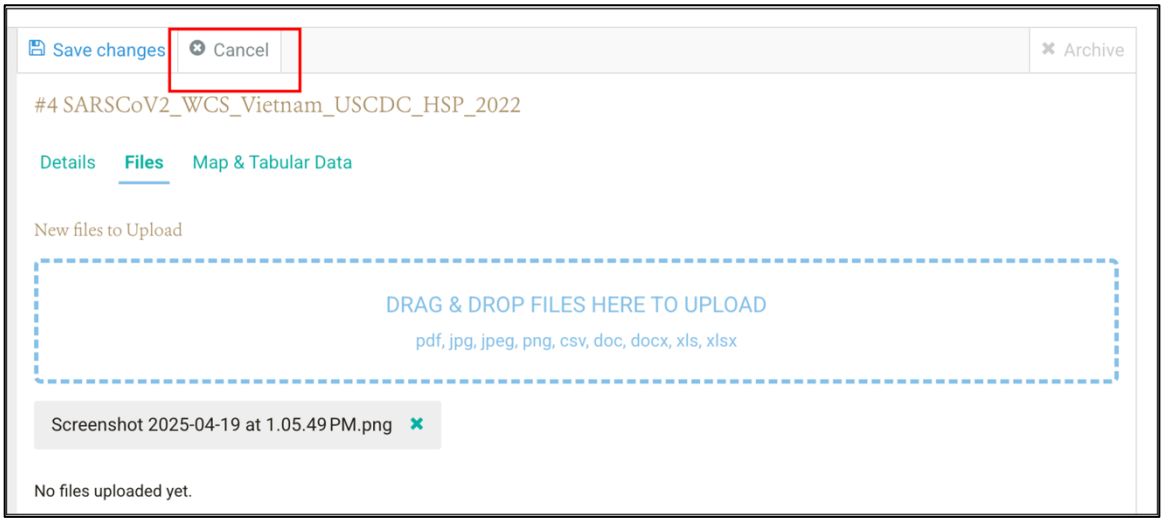
If the **Surveillance Activity** involves a mark-recapture methodology, i.e., released marked *Animal* **Sources** that are then recaptured during **Field Visits** of the **Surveillance Activity**, it is possible that some marked **Sources** are never recaptured. In this case, the **Sources** will not be linked to any **Field Visit**, **Location**, **Event**, or **Collection** but they still need to be linked to the corresponding **Surveillance Activity**. To add a **Source** directly to a **Surveillance Activity** without any other data unit (no **Field Visit**, **Location**, **Event**, etc.), the user navigates to the "Source" folder under the corresponding **Surveillance Activity** and adds the corresponding **Source** data unit following the guidance in section "Adding a New Data Unit" (*under construction*).

Cancelling the Addition of Data in WHeDB

Cancelling the Addition of a Data Unit

To cancel the addition of a data unit,

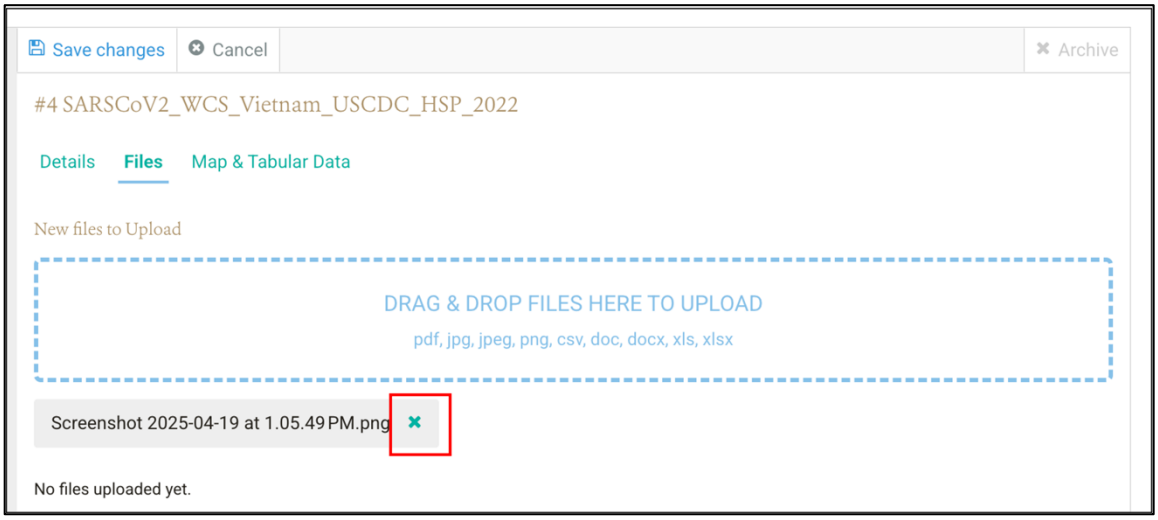
- Select the "Cancel" button above the **Workspace Panel** at any time **before the data unit is created.** The data unit is created only after the "Save Changes" is selected:



Cancelling the Addition of a File to a Data Unit

To cancel the addition of a specific file to a data unit,

- Find it in the list of files below the “Drop the Files to Upload” box and select the “X” or cancel button on the right of the file name (red frame in the image below):



The file will be removed from the list.

Clustering Data Units in WHeDB (*under construction*)

Clustering Locations

If **Locations** are grouped in either spatial units, nested or non-nested, that are smaller than the corresponding **Field Visit**, or in temporal units, they can be assigned to **Clusters.** The **fields** to add the **Location** to the corresponding **Clusters** will be active after reporting the grouping of **Locations** in the corresponding **Surveillance Activity:**

To include a **Location** in nested spatial **Clusters**

To include a **Location** in a non-nested spatial **Clusters**

To include a **Location** in nested temporal **Clusters**

To include a **Location** in a non-nested temporal **Clusters**

Clustering Events

If **Events** are grouped in either spatial units, nested or non-nested, that are smaller than the corresponding **Locations**, or in temporal units, they can be assigned to **Clusters.** The **fields** to add the **Event** to the corresponding **Clusters** will be active after reporting the grouping of **Events** in the corresponding **Surveillance Activity:**

To include an **Event** in nested spatial **Clusters**

To include an **Event** in a non-nested spatial **Clusters**

To include an **Event** in nested temporal **Clusters**

To include an **Event** in a non-nested temporal **Clusters**

Clustering Source Records

If **Source Records** are grouped in either spatial units, nested or non-nested, that are smaller than the corresponding **Event**, or in temporal units, they can be assigned to **Clusters.** The **fields** to add the **Source Record** to the corresponding **Clusters** will be active after reporting the grouping of **Source Record** in the corresponding **Surveillance Activity:**

Clusters of **Source Records** can contain **Source Records** of any type.

To include a **Source Record** in nested spatial **Clusters**

To include a **Source Record** in a non-nested spatial **Clusters**

To include a **Source Record** in nested temporal **Clusters**

To include a **Source Record** in a non-nested temporal **Clusters**

Viewing Data in WHeDB

To view specific data, navigate through the data units in the **Navigation Panel** until finding the data unit of interest. View either the data unit fields, files, the contextual information, or the spatial distribution of a specific data unit in the "Map and Tabular Data" tab of the **Workspace Panel**.

Quick Search (*under construction*)

Editing Data in WHeDB

Editing a Data Unit

To edit the **fields** of a data unit or modify the files associated with a data unit, users with editing permissions navigate through the data units in the **Navigation Panel** until finding the data unit of interest. Then, follow the instructions provided in section “Adding a New Data Unit in WHeDB”. Once the edits are completed, select the “Save Changes” button on the top left of the **Navigation Panel**. Edits made can be cancelled if the changes made have not been saved. To cancel follow the instructions provided in section “Cancelling the Addition of a Data Unit in WHeDB”.

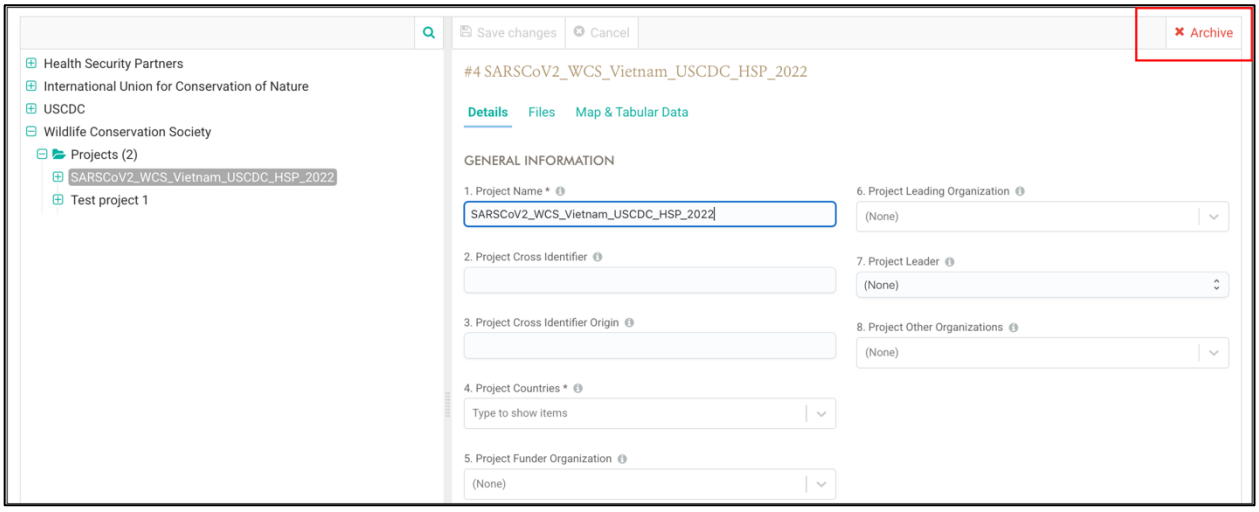
Editing Files of a Data Unit

To add new or additional files to a data unit, follow the instructions provided in the section, “Adding Files to a Data Unit”. To cancel the addition of files, follow the instructions provided in the section “Cancelling the Addition of a File to a Data Unit in WHeDB”. To delete files uploaded or saved to a data unit, see the next section.

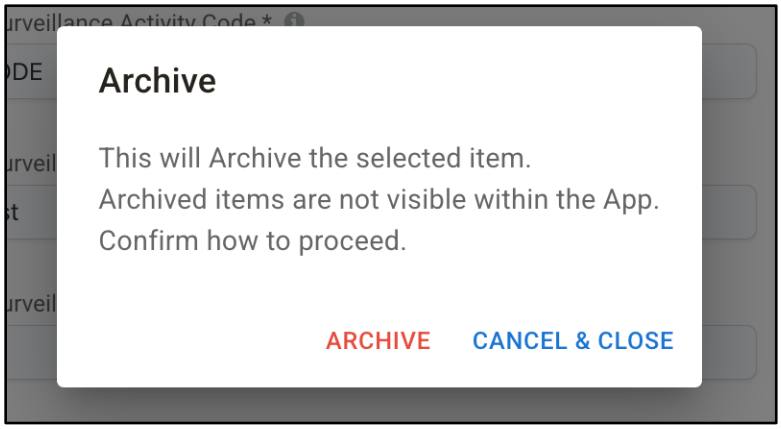
Deleting Data in WHeDB

Deleting a Data Unit

To delete a data unit, navigate to the corresponding data unit using the **Navigation Panel** and select it. The **Workspace Panel** has an “Archived” button on the top right corner (red frame in the image below):



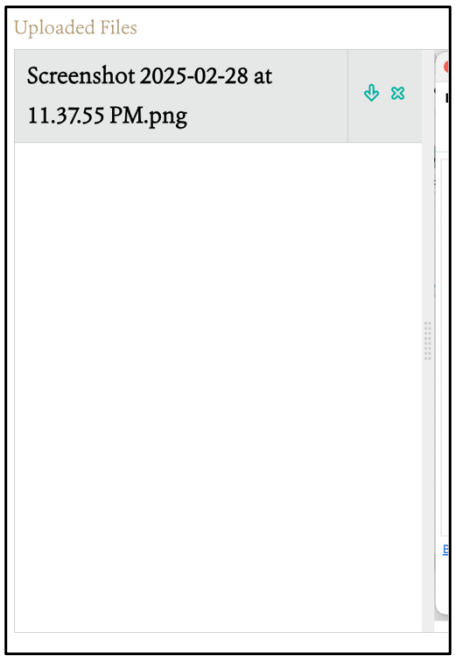
To delete the data unit, select the “Archive” button. A window will pop-up to confirm the action to ‘Archive’ or to “Cancel & Close” the deletion of the data unit:



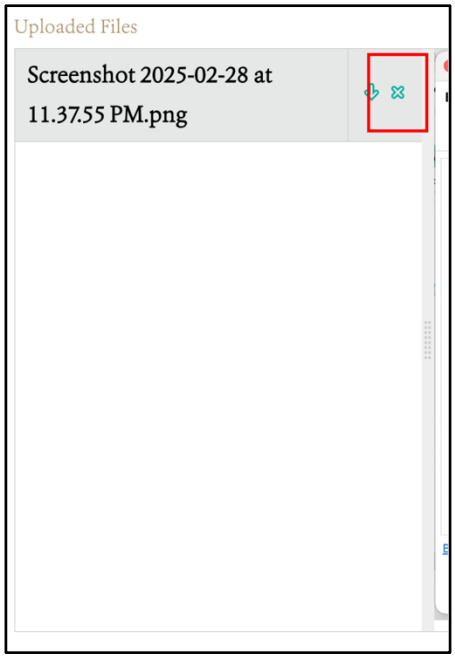
Confirm the archiving of the data unit by selecting “Archive” or “Cancel & Close” to cancel the archiving of the data unit

Deleting Files of a Data Unit

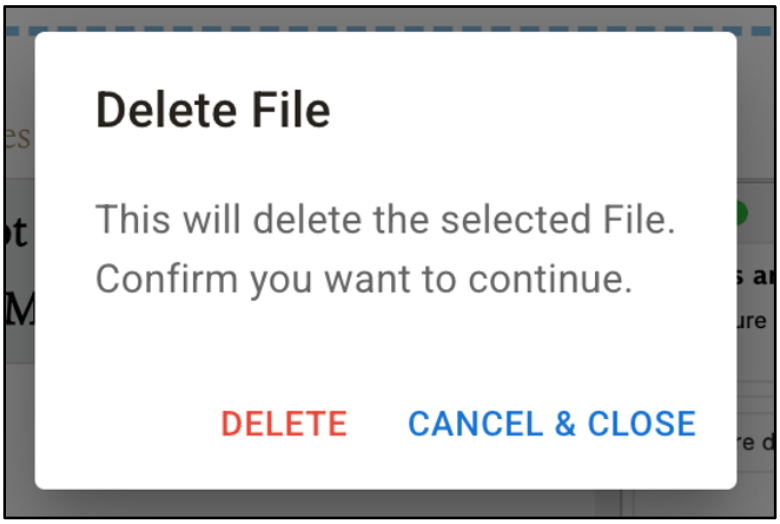
To delete files of a data unit, navigate to the corresponding data unit using the **Navigation Panel** and open. Then, open the “Files” tab in the **Workspace Panel** and find the “Uploaded Files”:



To delete the file, select the “X” button to the right of the file name:



A window will pop-up to confirm or cancel the deletion of the data unit. Confirm the deletion of the file by selecting “Delete” or “Cancel & Close” to cancel the deletion of the file:



Exporting Data from WHeDB (*under construction*)

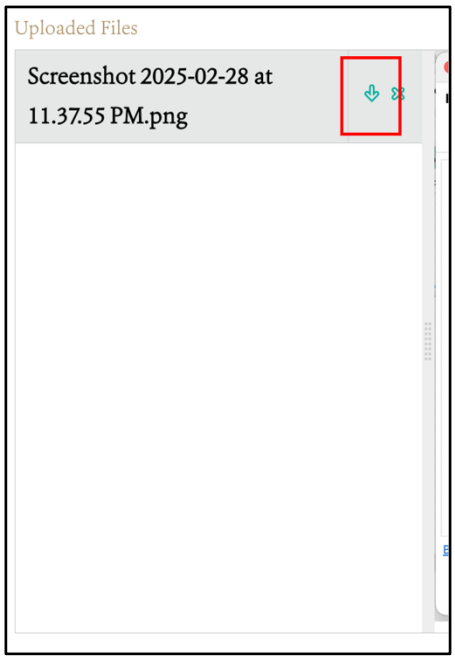
Exporting Data Table

Data from archived data units are not exported.

Downloading Files

Files associated with data units can be downloaded. To download files of data units, navigate to the corresponding data unit using the **Navigation Panel** and open Then, open the “Files” tab in the **Workspace Panel** and find the “Uploaded Files”.

To download a file, select the down arrow icon to the right of the file name:



A window to browse the download location and name the file will pop-up.

Closing an Organization Account

Organization Accounts can be closed for two reasons: i) one of the **Account Administrator** requests the **Organization Account** to be closed or ii) the **Organization Account** has been inactive for four years. In the first case, the **General Administrators** of WHeDB will reach the second **Account Administrator**, if any, to confirm the account closure. In the second case, the **General**

Administrators of WHeDB will try to reach the **Account Administrators** to confirm or cancel the closing of the account.

Data of closed accounts is archived and not **deleted.** Data from an **Organization Account** that is closed are embargoed following the details provided in the "FAIR and CARE" section below.

Data Safety and Security

- Data safety, security, and ownership are safeguarded through strict data compartmentalization across **Organization Accounts** administered by **Organization Administrators**.
- **Organization Administrators** access the **Organization** account after a two-factor authentication access process.
- **Organization Administrators** authorize **General Users** into **Organization** accounts.
- **General User** accounts are also independent and accessed after a two-factor authentication access process.
- **General Users** have different permissions granted by the **Organization Administrator** to view, edit, delete, and export data. These permissions are set by **Surveillance Activity**.
- All changes made in the data units (addition, edition, deletion, file uploading) are automatically documented in logs that are accessible by the corresponding **Organization Administrators** (see **"WHeDB Administrator Account Manual")**. If needed, the data can be reverted to a previous state by following these logs.
- "Deleted" data is archived and not deleted from the system (not hard deletion). It is possible to restore data units. To accomplish the restoration, **Organization**

Administrators need to contact **WHeDB General Administrators** (see **"WHeDB Administrator Account Manual")**.

- Data is physically stored in (*under construction*).
- Data in WHeDB is under License X following the "**WHeDB Organization Account Terms of Reference**" (*under construction*).

FAIR and CARE Principles

General Aspects

Beyond proper collection, annotation, and archival, WHeDB promotes data stewardship, the notion of "long-term care" of valuable digital assets, with the goal that they should be discovered and re-used for downstream investigations, either alone, or in combination with newly generated data. The **FAIR** (Findability, Accessibility, Interoperability, and Reusability) Principles (here) are a guideline for those wishing to enhance the reusability of their data holdings. Table 2 summarizes how WHeDB supports the FAIR Principles:

Table 2. Mapping of FAIR principles adapted from Wilkinson et al. to WHe-DB functionalities.

Principle	Sub-Principle	How WHe-DB supports
To be Findable	(meta)data are assigned a globally unique and persistent identifier	Surveillance Activity system-based identifier and user-based code
	Data are described with rich metadata	Surveillance Activity extensive metadata
	metadata clearly and explicitly include the identifier of the data it describes	WHeDB complies with this sub-principle
	(meta)data are registered or indexed in a searchable resource	Data and metadata can be searched in WHeDB using the Surveillance Activity Identifier or the Code
To be Accessible	(meta)data are retrievable by their identifier using a standardized communications protocol	WHeDB supports this sub-principle

	The protocol is open, free, and universally implementable	Yes, for Global South users without funding. API to be developed
	The protocol allows for an authentication and authorization procedure, where necessary	WHeDB complies with this sub-principle
	Metadata are accessible, even when the data are no longer available	Yes, data is archived including its metadata
To be Interoperable	(meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.	Long term goal is to develop such language for wildlife health surveillance through the Wildlife Health Intelligence Network including an ontology
	(meta)data use vocabularies that follow FAIR principles	Yes, the data dictionary is available online
	(meta)data include qualified references to other (meta)data	Yes, this is the goal of cross-identifier fields in WHeDB data units
To be Reusable	meta(data) are richly described with a plurality of accurate and relevant attributes	Yes, as more metadata is provided at the Surveillance Activity level, it will be possible to identify and propose more accurate and relevant attributes
	(meta)data are released with a clear and accessible data usage license	Yes, the metadata and data are accessible depending on their administrators. Data from closed accounts is available after embargo under a ... license. The data license is established in the Surveillance Activity metadata (*under construction*)
	(meta)data are associated with detailed provenance	WHeDB keeps record of all data changes and archives deleted data
	(meta)data meet domain-relevant community standards	Metadata and data structure is supported by the Wildlife Health Intelligence Network

The **CARE** (Collective Benefit, Authority to Control, Responsibility, and Ethics) Principles for Indigenous Data Governance (here) are designed to complement the **FAIR** Principles and guide the inclusion of Indigenous Peoples in data processes that strengthen Indigenous control for improved discovery, access, use, reuse, and attribution in contemporary data landscapes. The **CARE** Principles (Table 3) are people and purpose-oriented, reflecting the crucial role of data in advancing Indigenous innovation and self-determination.

Table 3. Mapping of CARE principles adapted from Carroll et al. to WHe-DB functionalities.

Principle	Sub-Principle	How WHe-DB supports
Collective Benefit	For inclusive development and innovation	NA
	For improved governance and citizen engagement	NA
	For equitable outcomes	NA
Authority to Control	Recognizing rights and interests	NA
	Data for governance	Data in WHeDB that are relevant to Indigenous People world views and empower self-determination and effective self-governance are available and accessible to Indigenous nations and communities by requiring database users to accept this condition in the Terms of Use.
	Governance of Data	WHeDB is free of cost for Indigenous Communities establishing their own Organization Account
Responsibility	For positive relationships	NA
	For expanding capability and capacity	WHeDB is free of cost for Indigenous Communities establishing their own Organization Account
	For Indigenous languages and worldviews	WHeDB can be translated to any language
Ethics	For minimizing harm and maximizing benefit	NA
	For justice	NA
	For future use	Availability of Indigenous data in WHeDB controlled under an Organization Account of an Indigenous Community or Individual depends on the corresponding Organization Account administrators. Indigenous data not administered by an Indigenous Community or Individual can only be shared with the authorization of the Indigenous community sourcing the data.

		Indigenous data from closed Organization Accounts can be embargoed by the indigenous communities that generated or that sourced the data. The embargo can only be lifted by the corresponding community to be available for specific individuals, groups, other communities, or the general public.

Specific Aspects (*under construction*)

Organizations share basic information about their **Surveillance Activities** in a public inventory on the WHeDB website. The inventory contains the (objective, target species, study sites, the person responsible, and contact information.

Moreover, **Organizations** can decide to keep data of Surveillance Activities:

- Restricted to themselves
- Available to other selected individuals
- Publicly available

Organization data will remain archived if the corresponding **Organization Account** is closed (see "Closing an Organization Account" above). The corresponding data are embargoed according to agreed terms of the **Organization** or for a maximum number of years. When the embargo is lifted, the **Surveillance Activities** will be available in public inventory on the WHeDB website and data from these **Surveillance Activities** can be provided to interested parties upon request to **WHeDB**

General Administrators. Special conditions apply for human identification data, if any, and indigenous data following the conditions outlined above (Table 3).