SMART for Health

Rangers Collecting Specimens Manual

This manual describes SMART for Health for Rangers Collecting Specimens and explains its proper use.

The current manual applies to SMART version 7. For more information about the Spatial Monitoring and Reporting Tool (SMART) please visit https://smartconservationtools.org/. To learn more about how to use SMART Desktop and Connect please visit https://smartconservationtools.org/.

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INTRODUCTION

The Spatial Monitoring and Reporting Tool (SMART) is an approach originally designed to support law enforcement in protected areas. SMART provides a set of technological tools: SMART Desktop, SMART Mobile, and SMART Connect. SMART Mobile is a smartphone app that supports smooth and standardized data collection in the field, keeps track of the spatiotemporal coordinates of the users and of the data being collected, allows the collection of image and audio data in the field, and allows real-time communication of data to out-of-the-field focal points through SMART Connect when internet connection is available. This real-time connection provides the opportunity to promptly react to detected events.

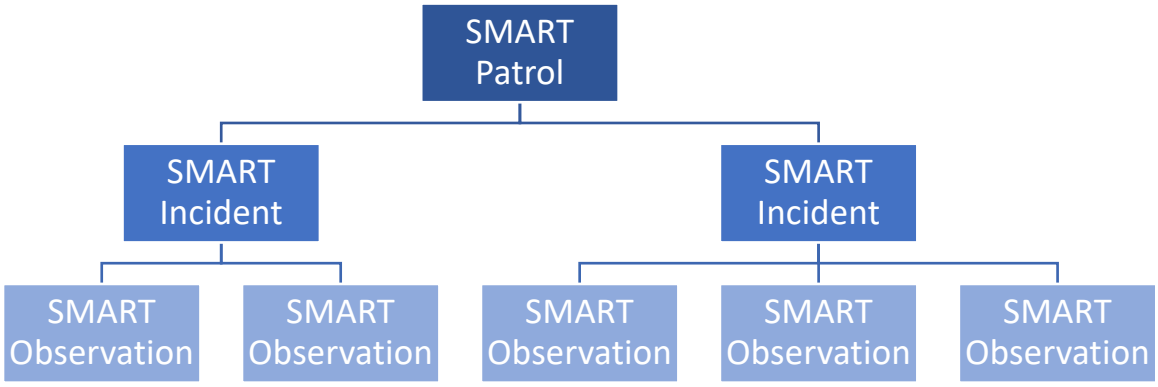
The WCS – Health Program has created a **SMART data model to track wildlife health events** and the specimens collected from these events (SMART for Health). This data model **can be extended as a "SMART Patrol Package" and installed in the SMART Mobile app** to support the collection of information from these events (e.g., wildlife mass mortalities or surveillance activities in wet markets). Here we describe how a portion of the SMART for Health data model can be used by rangers using SMART Mobile to record their observations of dead, sick, or injured wildlife and track the specimens collected when these animals are found. The purpose of this manual is to explain ranger use of **SMART for Health** in the field; therefore, the manual **does not explain** how to install SMART Desktop, Mobile, or Connect or how to load SMART for Health in the mobile devices.

In this manual, we **capitalize** nouns such as **Attributes**, **Categories**, **Event**, and others when they refer to SMART components.

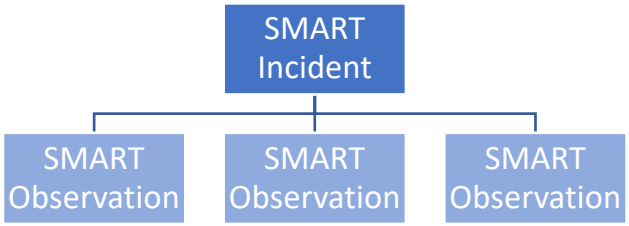
SMART FOR HEALTH STRUCTURE AND DEFINITIONS

A summary of the data structure in SMART for Health is provided below.

SMART Incidents within a SMART Patrol:



Or SMART Incidents outside of a SMART Patrol:



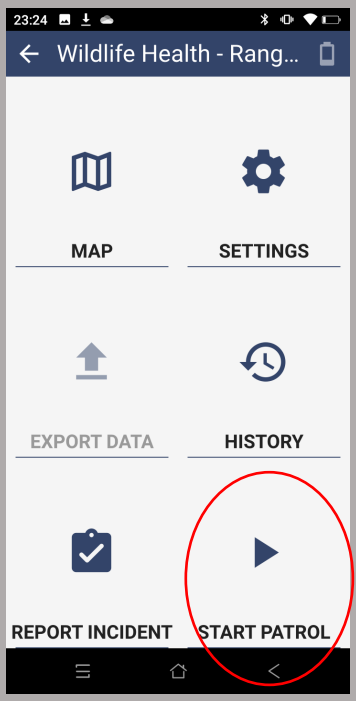
Starting at the bottom of either approach, SMART for Health facilitates the collection of field observations (**SMART Observations**) to describe the categories of information that compose a **Wildlife Health Event**. These **Events** are recorded as rangers find **dead, sick, or injured animals during their patrols.**

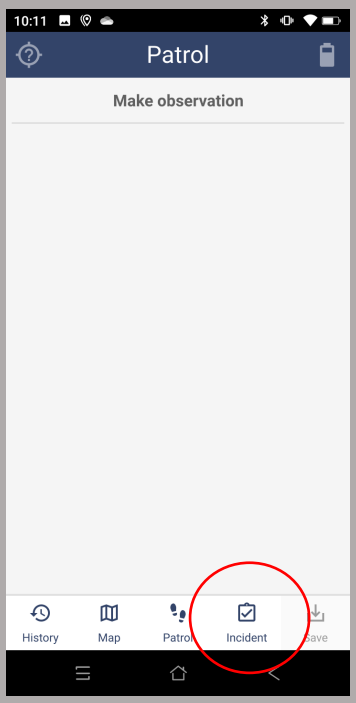
SMART PATROL

SMART Patrol is the period during which rangers are patrolling the protected areas and record data using SMART Mobile. A Patrol is initiated by clicking the "Start Patrol" button and once the information requested in the "Start Patrol" screen is completed. To document a Wildlife Health Event within a SMART Patrol, the user clicks on "Make Observation" or "Add Observation" in the "Patrol" screen.

SMART INCIDENT

SMART Incident: corresponds to a set of observations made in the field at the same location. For example, rangers patrolling a protected area find carcasses of wild boars. Depending on the preference of each protected area, **a Wildlife Health Event (see below) is documented as a SMART Incident** within a SMART Patrol or as SMART Incident outside of a SMART Patrol. To document a Wildlife Health Event out of the SMART Patrol the user clicks on the "Report Incident" button on the main screen before a Patrol is started or on the "Incident" button of the Patrol screen (see red circles)





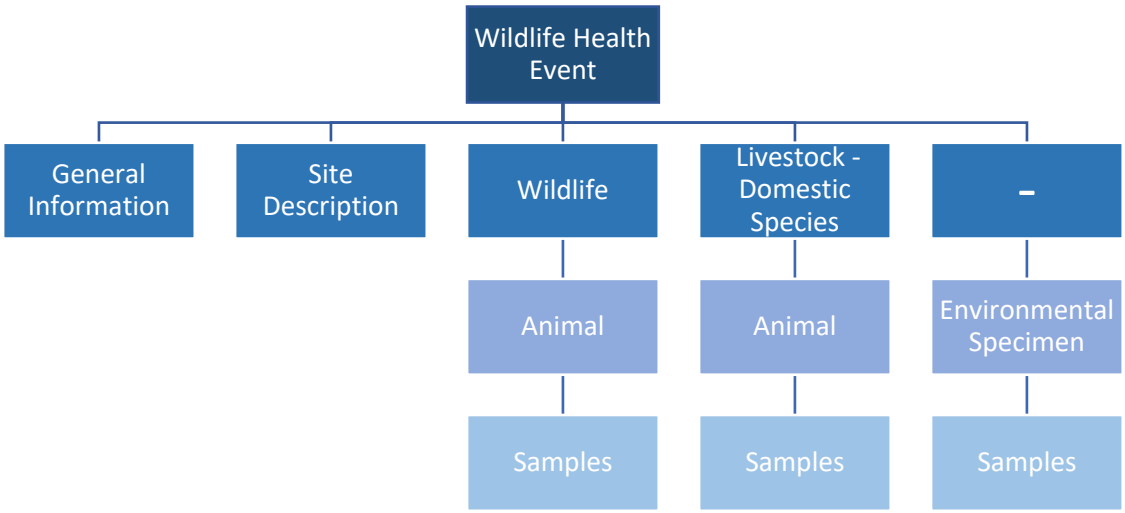
For simplicity, this manual assumes Wildlife Health Events are collected using SMART Incidents outside of a SMART Patrol.

WILDLIFE HEALTH EVENT

Wildlife Health Event: is a discrete spatiotemporal set of field findings that are relevant for the goals of wildlife health surveillance. Wildlife Health Events include the observation of sick injured, and dead animals, as well as any healthy individuals nearby. Wildlife Health Events can also include data from individual animals, the samples collected from these individual animals, and environmental specimens and samples (see diagram below).

A standalone group of healthy animals is not a Wildlife Health Event. However, when rangers find a group of dead, sick, or injured animals, the healthy animals present nearby are important to document.

Event examples include: (1) a group of dead, sick, and healthy waterfowl on the shore of a pond, (2) the identification of poisoned carnivores, and (3) an injured herbivore.



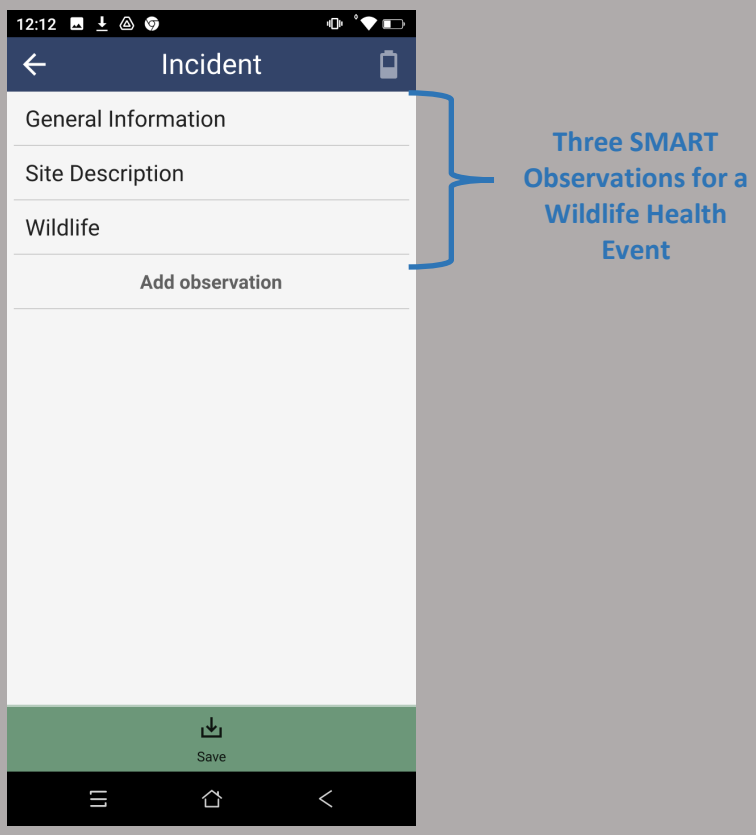
The diagram above shows the categories of information and their hierarchy within a Wildlife Health Event in SMART.

SMART OBSERVATIONS

In SMART for Health, a **SMART Observation** corresponds to information about a Wildlife Health Event. It can include the characteristics of the environment where the Event is taking place, the species observed, the type of individuals sampled, and the samples collected.

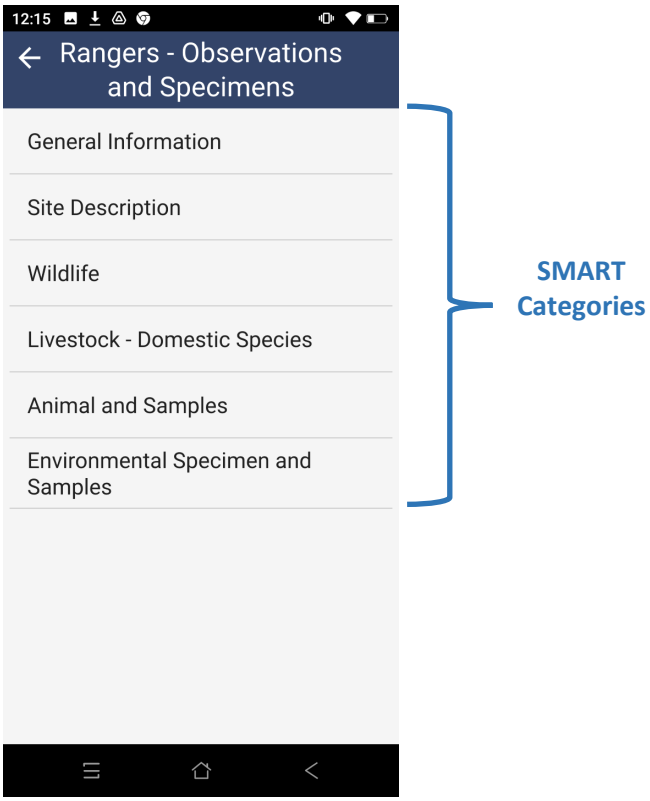
In SMART for Health, a Wildlife Health Event is documented by collecting SMART Observations. The SMART Observations of each Event are saved as a unique packages of information from the specific time when and location where the dead, sick, or injured wildlife is detected.

In SMART for Health, **Observations are recorded using SMART Categories**.



SMART CATEGORIES

A **SMART Category** is a set of **SMART Attributes** that request information about a specific category of information within a Wildlife Health Event. In the case of SMART for Health, the Categories are “Site Description”, “Wildlife”, “Livestock - Domestic Species”, “Animal and Samples”, and “Environmental Specimen and Samples”.



In SMART for Health, these Categories document different information about the Wildlife Health Event (see figure on page 6 as well):

Category	To document
General Information	The name of the protected area, the patrol leader and their affiliation
Site Description	Characteristics of the site where the Wildlife Health Event is taking place
Wildlife	The species of wildlife present at the Event
Livestock – Domestic Species	The species of domestic animals present at the Event

Animal and Samples	The characteristics of the individual animals sampled and their samples
Environmental Specimen and Samples	Tissue or material collected from the environment and its samples

DESCRIPTION OF THE SMART CATEGORIES IN SMART FOR HEALTH

General Information (Wildlife Health Event level)

This Category is used to collect information on the Protected Area where the Event is observed and the Patrol leader and their affiliation. This information must be collected because SMART independent Incidents do not receive the Patrol information.

Site Description (Wildlife Health Event level)

This Category is used to describe the environmental characteristics where the Wildlife Health Event is taking place and should be filled out only once per Event.

Wildlife (Species level)

This Category is used to describe wildlife species of the Wildlife Health Event. This Category should be use once per species observed per Event. For example, if three species of waterfowl are observed in a Wildlife Health Event, this Category should be used three times to document the species involved in the Event (once per species).

Livestock – Domestic Species (Species level)

This Category is used to describe all domestic animals observed. This Category should be used once per domestic species observed in a Wildlife Health Event.

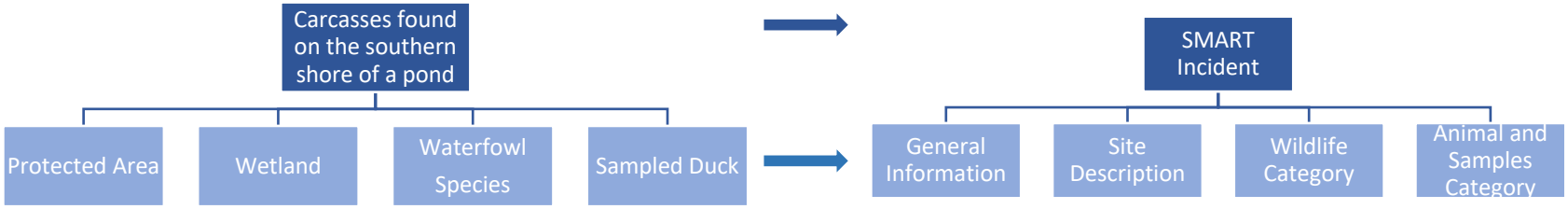
Animal and Samples (Individual and Sample level)

This Category describes specific individual animals belonging to any of the species documented for the Wildlife Health Event and the samples collected from them. Individual level data are collected **only from those animals providing samples**.

Environmental Specimen and Samples (Environmental Specimen and Environmental Sample Levels)

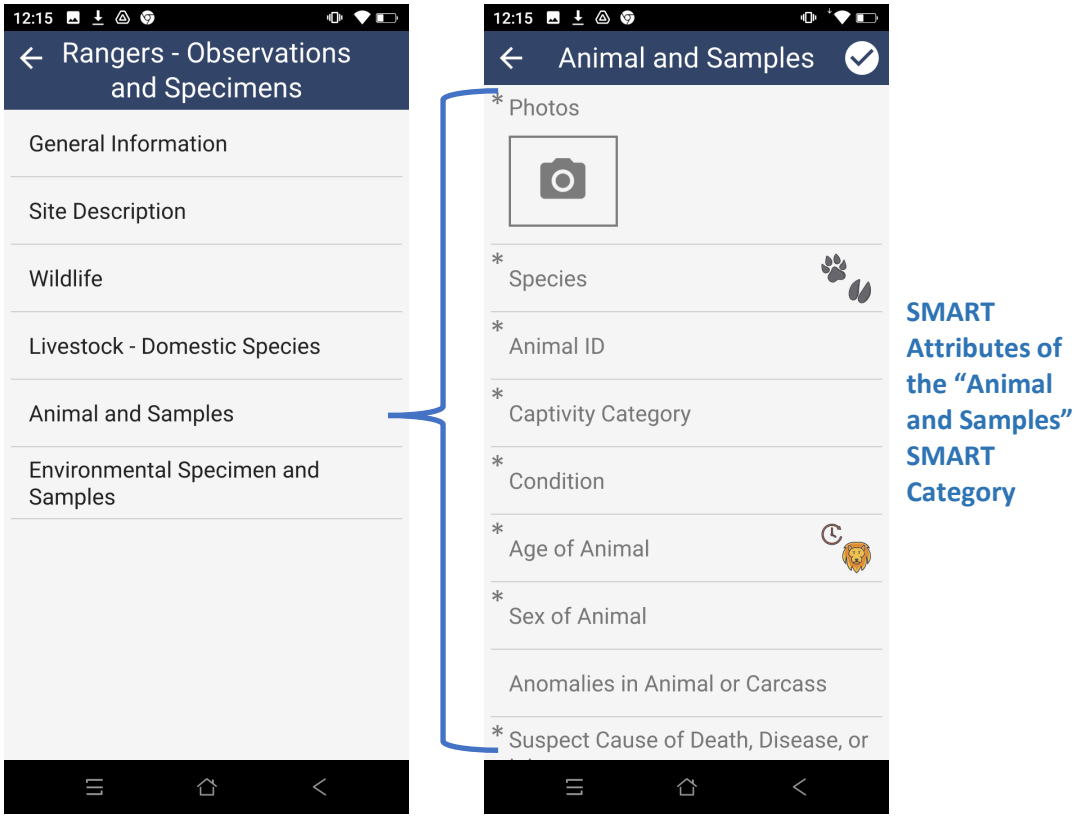
This Category describes material collected from the environment. An Environmental Specimen is a singular entity of animal or non-animal source in the environment. Animal Environmental Specimens can include **animal tissue, fluids, excreta, secretions** collected at a Wildlife Health Event **but whose specific animal source (the individual animal that supplied the material) cannot be identified**. For example, use this Category to collect samples from wild boar feces found close to a pair of dead wild boars (it is unknown if the observed wild boars are the origin of the feces or which one of them excreted them). In this case the feces are the environmental specimen and the collected pieces are the environmental samples. The information about the environmental samples are recorded using this Category as well. Non-animal environmental specimens can include **water, sediment, or soil**. In the case of water, the Environmental Specimen is the source of the water (e.g. pond, lake, river) and the Environmental Samples follow the same logic where the vial of water is the environmental sample.

In summary, the figure below shows how the structure outlined on the bottom half of page 4 maps to Observations of a Wildlife Health Event collected as an independent SMART Incident (outside of a SMART Patrol):


Carcasses found on the southern shore of a pond
Protected Area
Wetland
Waterfowl Species
Sampled Duck
SMART Incident
General Information
Site Description
Wildlife Category
Animal and Samples Category

SMART ATTRIBUTES AND SUB-ATTRIBUTES

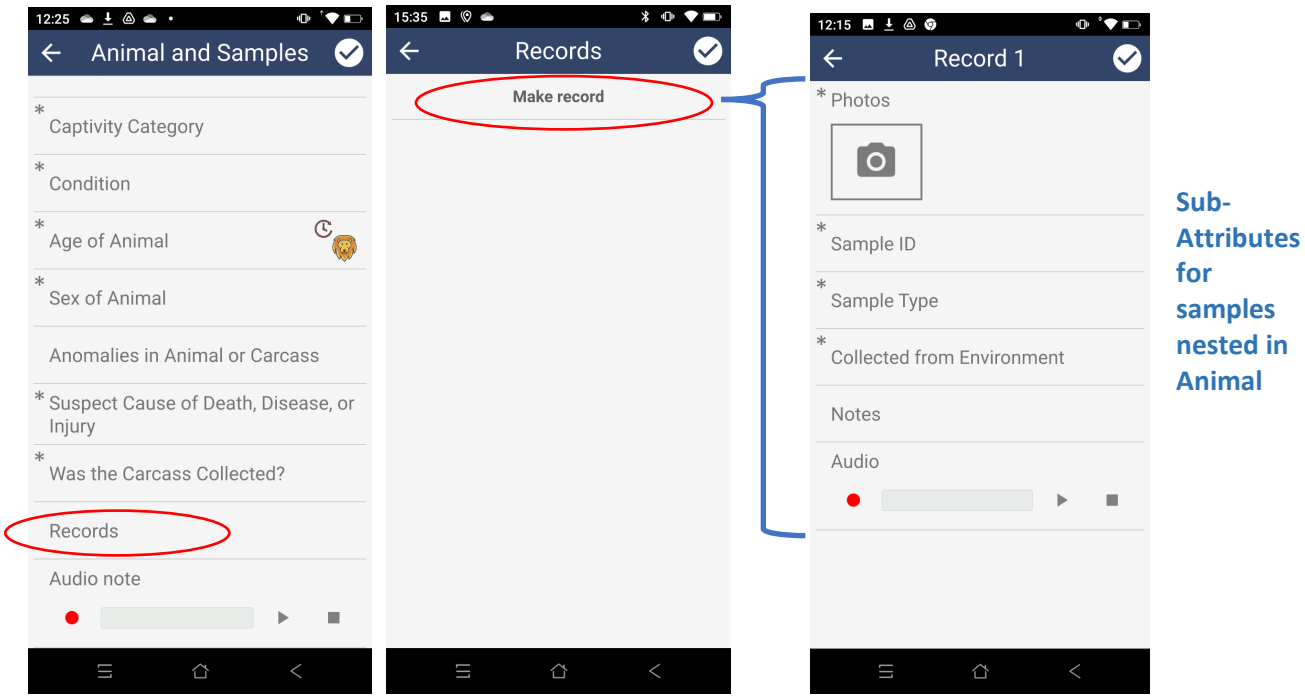
When a **Category** is selected, a set of unique **SMART Attributes** are displayed on the screen. These **Attributes** are the specific fields associated with each SMART Category. For example, once the Category "Animal and Samples" is selected, the corresponding SMART Attributes for this Category are shown. See below:



SMART Attributes of the "Animal and Samples" SMART Category

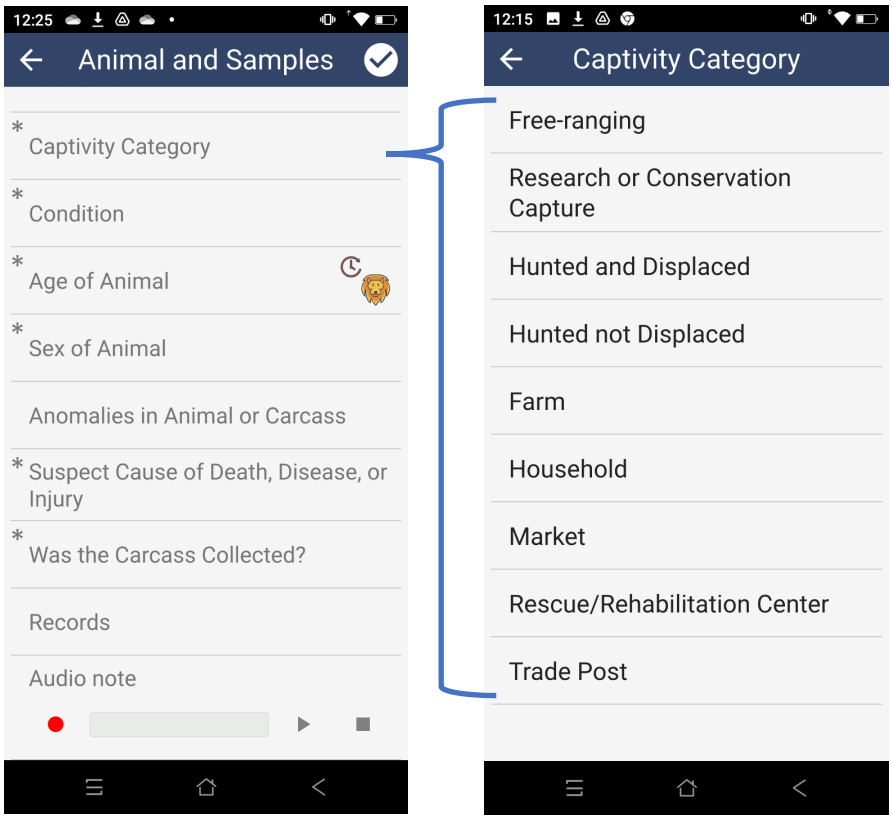
SMART Attribute: correspond to specific data items requested within a **Category**. For example, "Age of Animal", "Sex of Animal", and "Species" of the animals belonging to a species present in the Wildlife Health Event. Attributes are mandatory or optional. Mandatory Attributes are identified with a grey asterisk and they are required to complete the collection of the SMART Observation. Mandatory Attributes with missing information will turn red if the checkmark symbol on the top-right is clicked on.

Sub-Attributes behave just like Attributes. However, they are specific fields nested within an Attribute. For example, once the “Record” Attribute of the “Animal and Samples” Category is selected and “Make a record” is selected on the next screen, then the corresponding SMART Sub-Attributes that document the **samples collected from the individual animal** are shown. See below.



ATTRIBUTE AND SUB-ATTRIBUTE OPTIONS

Attribute Options are the preset choices used to answer an Attribute or Sub-Attribute. In the case of the Attribute “Sex of Animal”, the Options are “Male”, “Female”, and “Unknown”.



The description of Attributes, Sub-Attributes, and Options across the Categories used in SMART for Health is provided in the data dictionary accessible here. Sheet names of the data dictionary are labeled by Category and display the corresponding Attributes, Sub-Attributes, and Options.

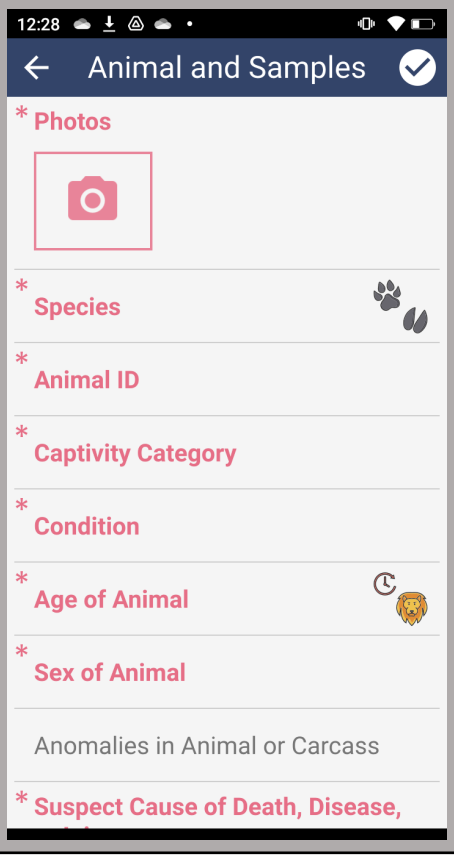
GENERAL SMART MOBILE FUNCTIONS

If the reader is a proficient SMART Mobile user, go to page 22.

CONFIRM OR DISREGARD DATA

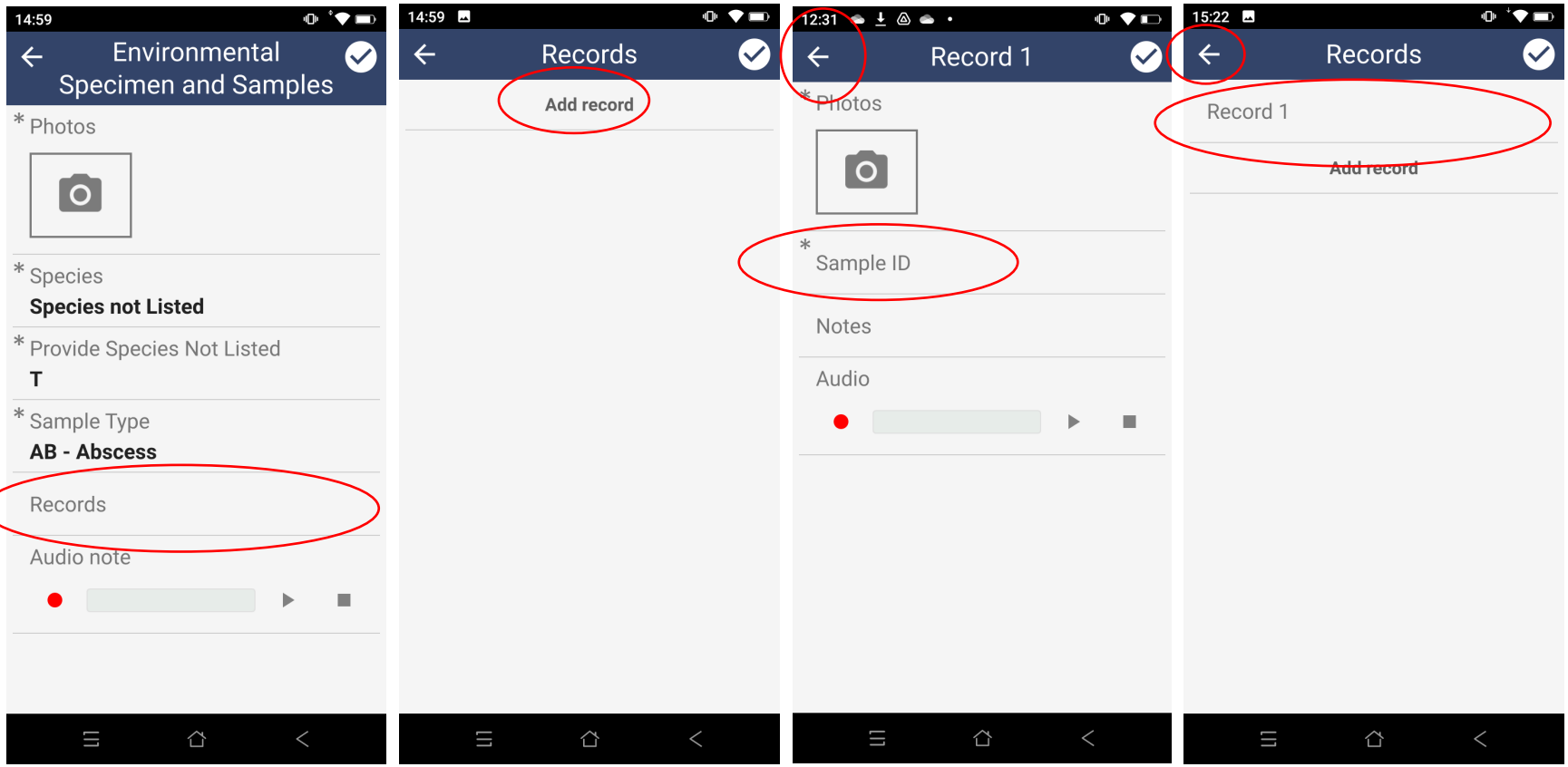
As a general rule, the checkmark sign on the screen's top right corner must be clicked to confirm the addition of data to each Attribute and to add the data in a completed Category to the Event. To skip the addition of data and return to the previous screen, select the left arrow on the top left corner.

When mandatory Attributes are not yet completed and the checkmark button is clicked on, data in the corresponding Category will not be added to the Event and the missing mandatory Attributes will turn red.

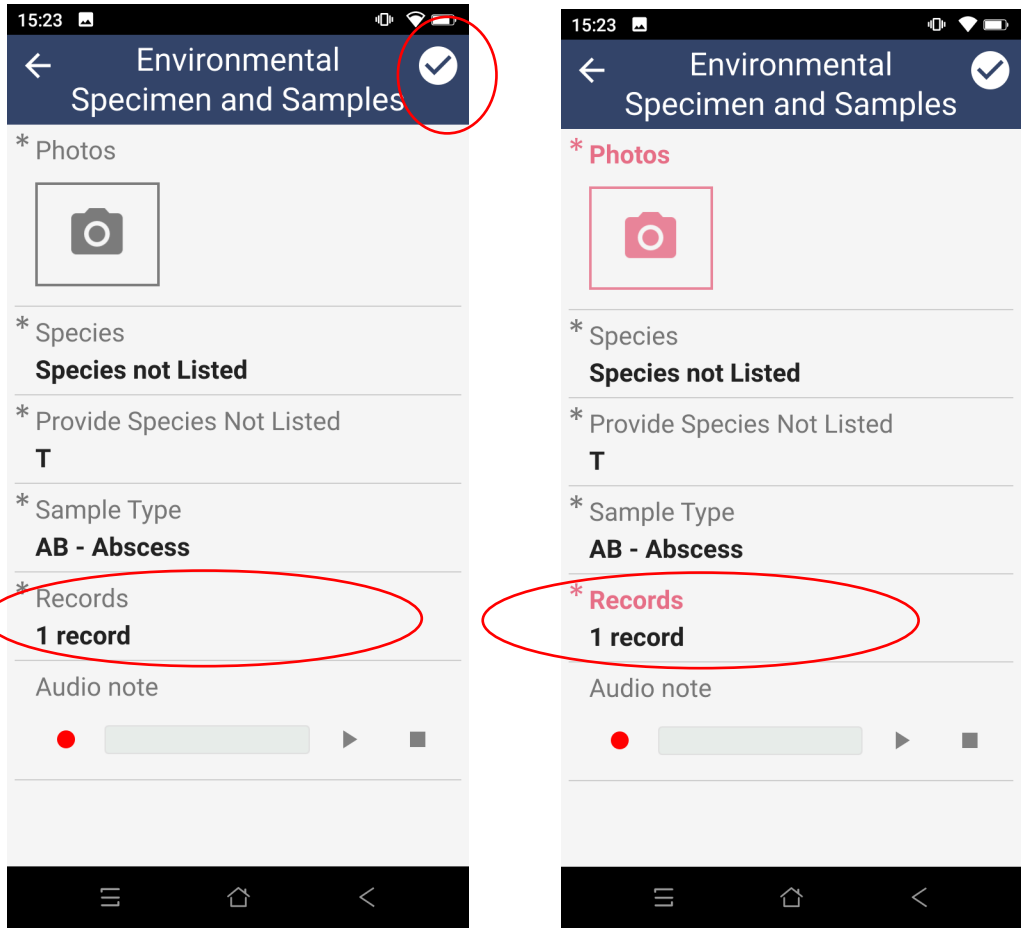


If the user clicks on the checkmark to confirm the data provided in a Category, but mandatory Attributes are empty, then it will not be possible to confirm the information and the missing mandatory Attributes will turn red.

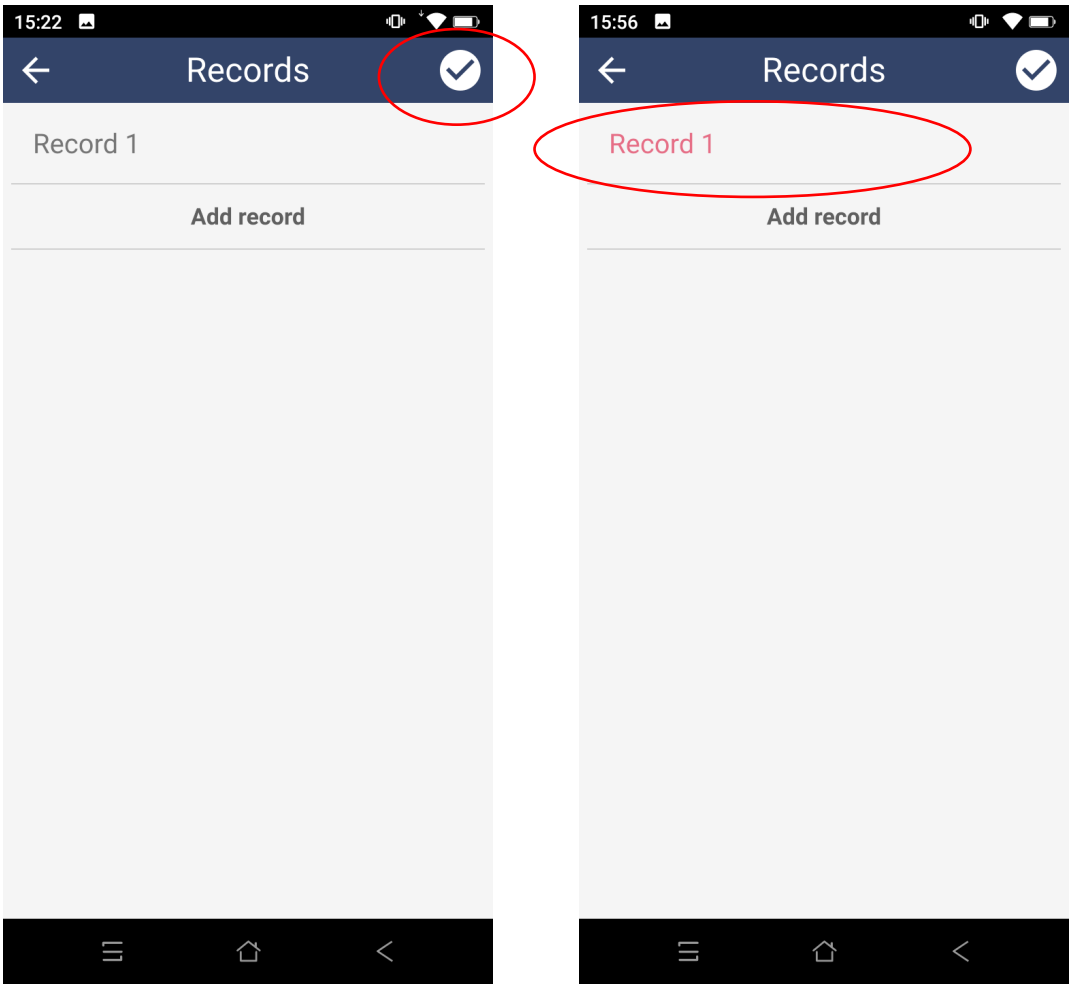
There is one special case to this functionality: Records (page 22). Once the “Records” button is clicked on and then “Add Record” is selected on the next screen, a “Record #” screen appears. Selecting the top-left arrow to leave the “Record #” screen without entering data or not entering the mandatory fields will add a record in the “Records” screen (even when the record itself has no data or mandatory fields are missing). See below:



Then, it is possible to click on the left-arrow and the user will return to the “Category” screen. The number of records provided in the “Records” Attribute will include records without data or with mandatory fields missing. However, clicking on the “Category” screen checkmark turns all incomplete mandatory fields red, including the “Records” Attribute. This step ultimately prevents a user from adding a record (a sample in the case of SMART for Health) that is missing mandatory fields.



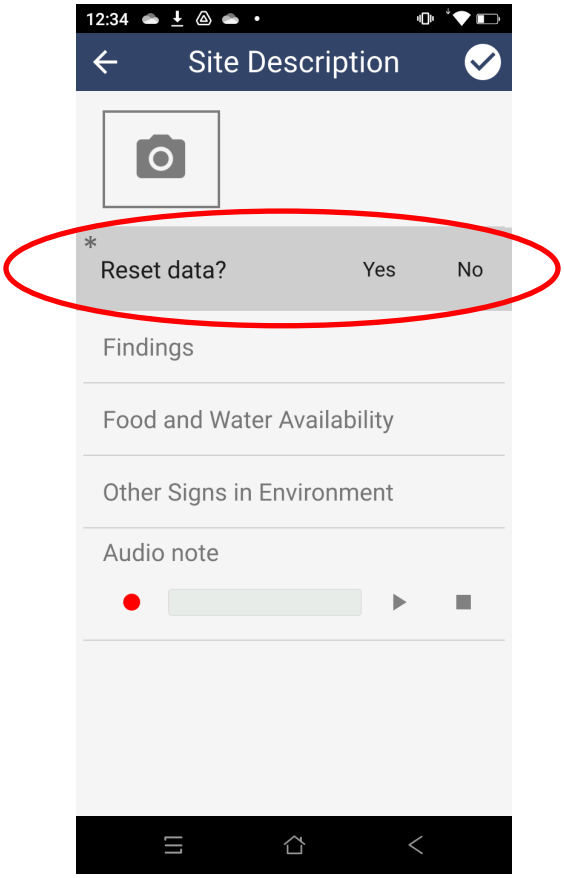
Alternatively, click on the checkmark symbol in the “Records” screen to try to confirm the addition of a record missing mandatory fields (instead of clicking on the left arrow). In this case, the record turns red and the user is prevented from returning to the “Category” screen until the data is properly edited or added.



Once back on the main “Records” screen the user can also delete the corresponding Record following the instructions on page 24.

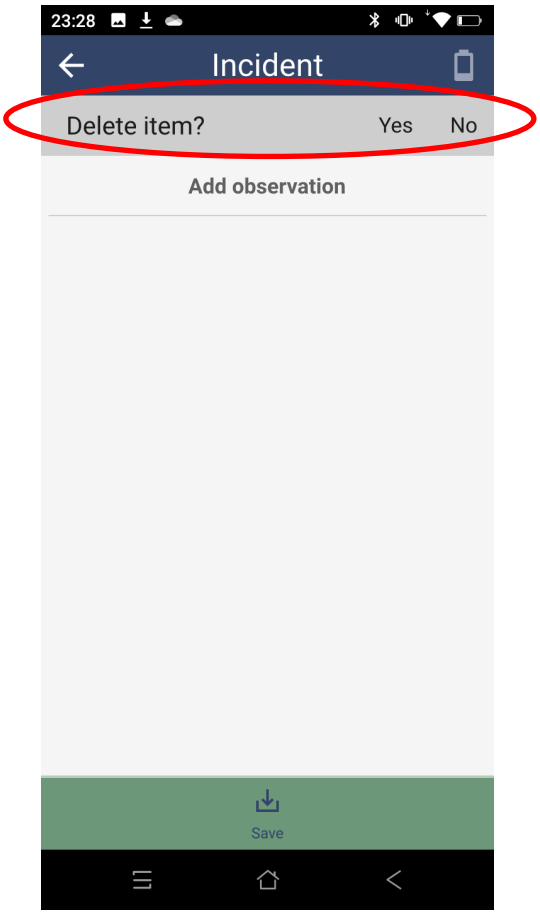
CLEAR THE DATA OF AN ATTRIBUTE

To clear the data entered in an Attribute, click and hold on the Attribute and slide the finger to the left. The question “Reset data?” will pop-up. Select “Yes” or “No” to confirm or cancel the clearance.



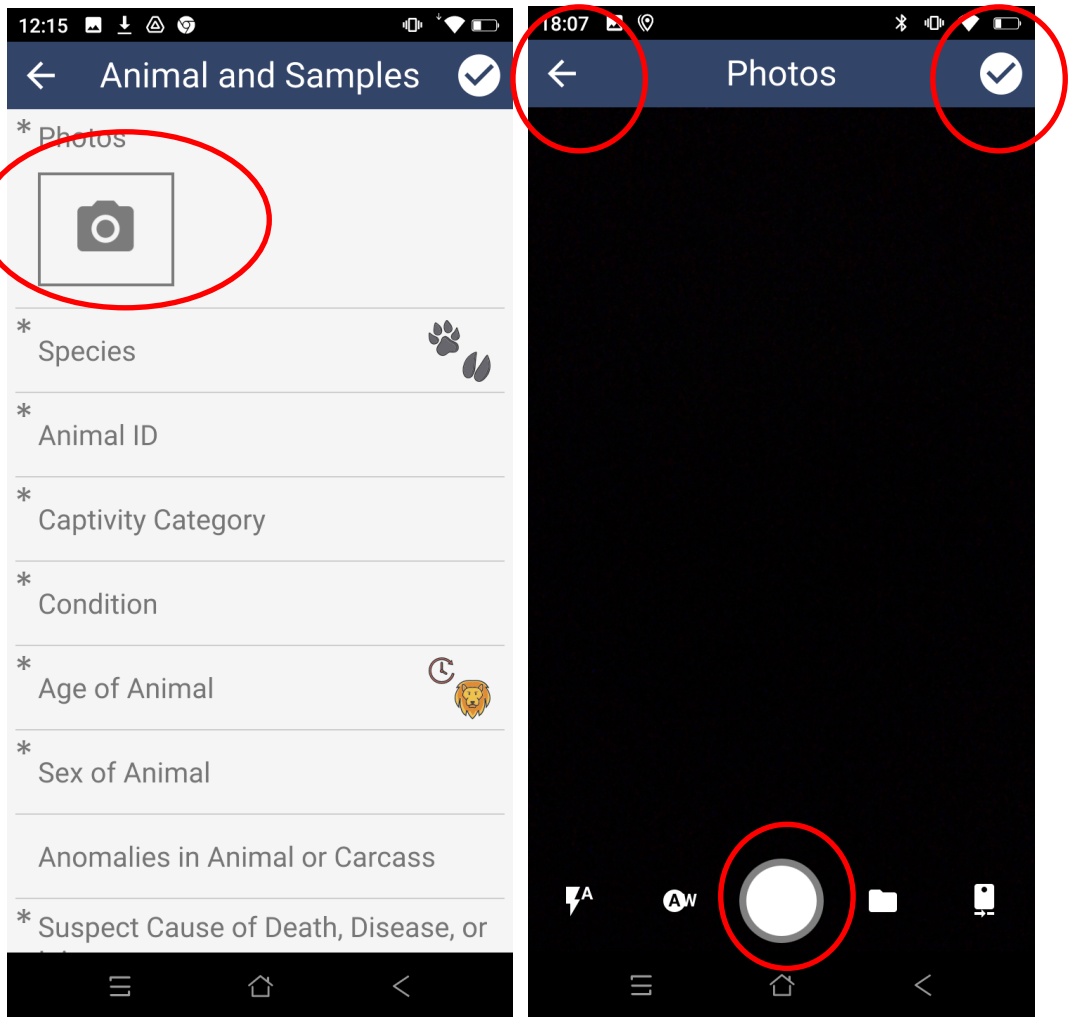
DELETE A CATEGORY ADDED TO A WILDLIFE HEALTH EVENT

Once the data for a Category has been completed and confirmed, it will be included as the part of the Wildlife Health Event's information. If the user wants to clear a specific Category that has already been added to the Wildlife Health Event, click and hold on the corresponding Category, and then, slide to the left. The question "Delete item?" will show up. Click on "Yes" or "No" to confirm or cancel the deletion.



TAKE PHOTOGRAPHS

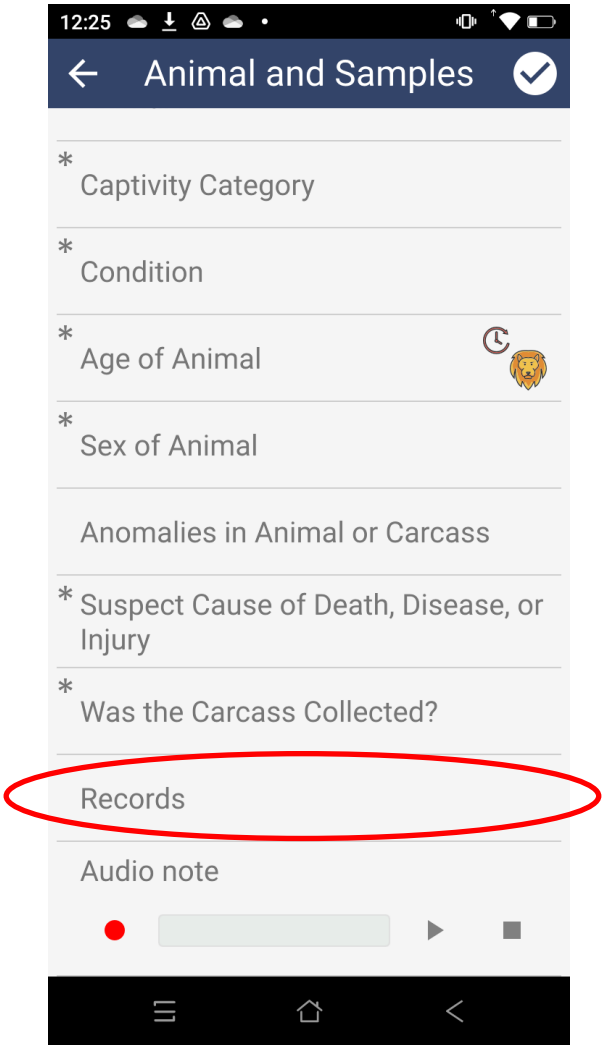
To add photographs, click on the photograph camera icon and use the smartphone as a camera. Click the large white circle bottom-center to take a photograph and then click on the checkmark to accept. The photographs will be added sequentially next to the shutter symbol. Click on top-left arrow to exit the camera. To delete a photograph already accepted, click on the photo and select the trash can.



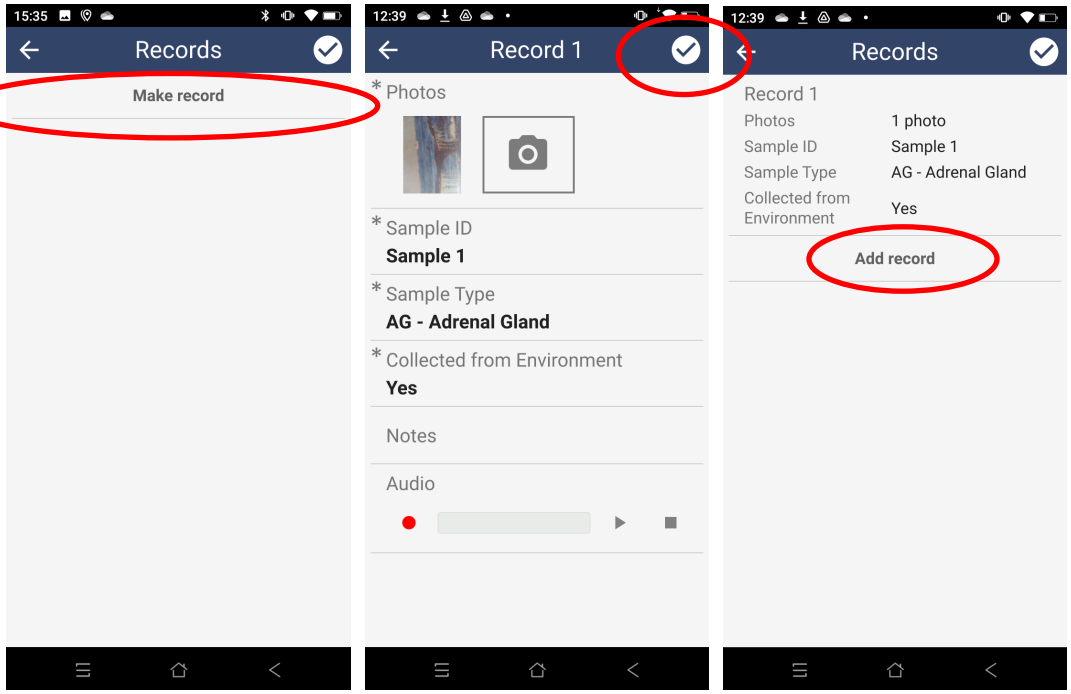
ADDING NESTED DATA

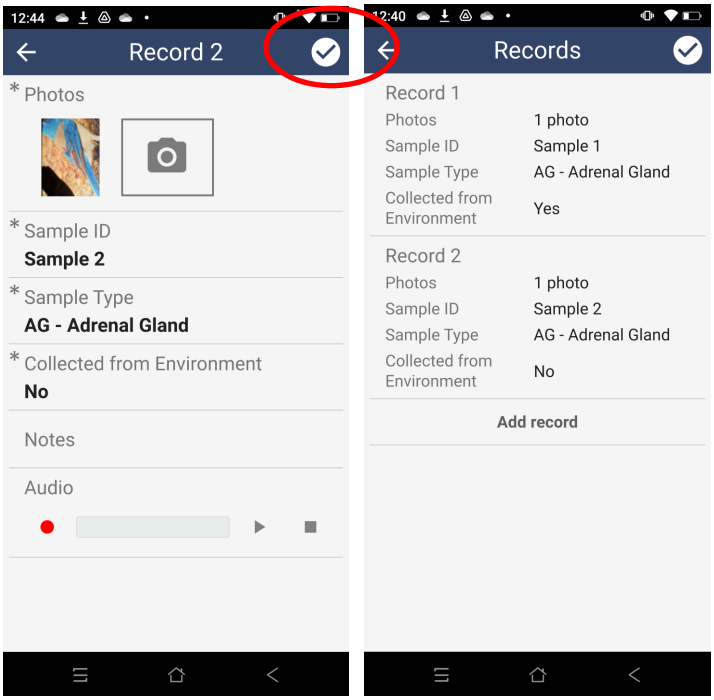
SMART allows the collection of nested data, meaning you can use a single Category (Example: Animal and Samples) to collect information about an individual and samples collected from that individual.

When a Category provides the possibility to add nested data, a “Record” Attribute will be presented on the first screen of Attributes.



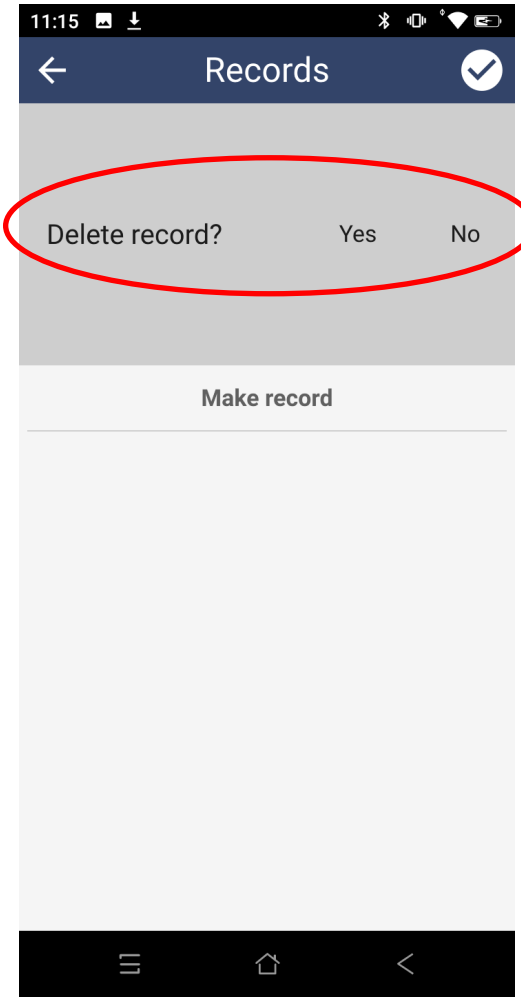
Clicking on the “Records” button from within a Category will open the “Records” screen. To add a nested record, select the “Make record” button. The Category’s second-level screen, “Record 1”, will be prompted and it contains the corresponding Sub-Attributes. Once the user completes the Sub-Attributes and clicks on the checkmark, the “Record” will be added to the list of nested “Records”. To add a second “Record” click on the “Add Record” button again (see below).





DELETE A RECORD

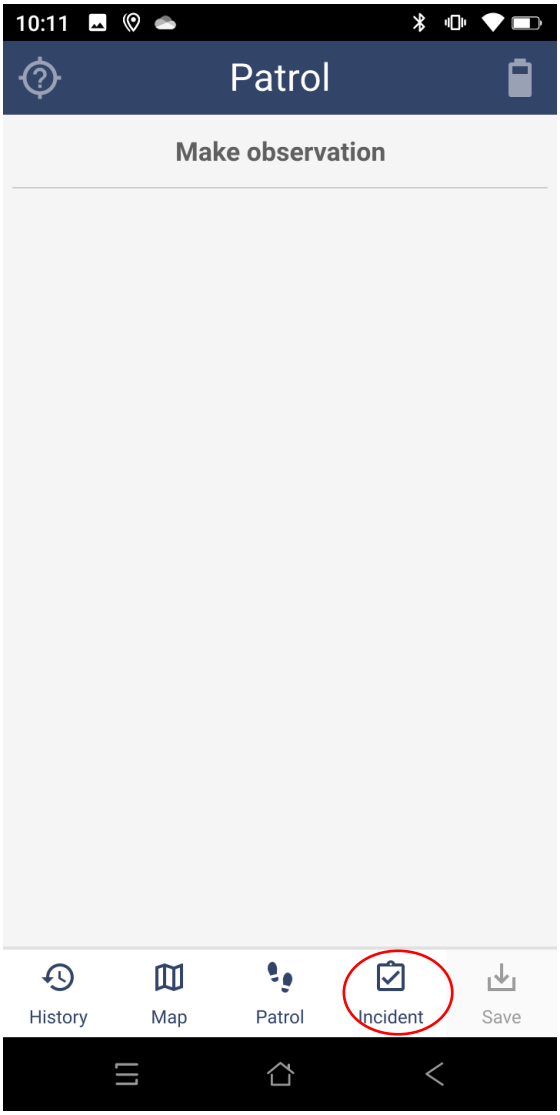
To delete a nested “Record” click and hold on the corresponding Record, and then, slide to the left. The question “Delete Record?” will show up. Click on “Yes” or “No” to confirm or cancel the deletion.



USING SMART FOR HEALTH

Now that you have gained some familiarity with the functions of SMART Mobile as well as the structure and terminology used to describe SMART for Health, the following section explains how to effectively use this data collection tool. **Here, for simplicity, it is assumed that rangers document data of Wildlife Health Events using independent SMART Incidents (i.e. outside of a SMART Patrol).**

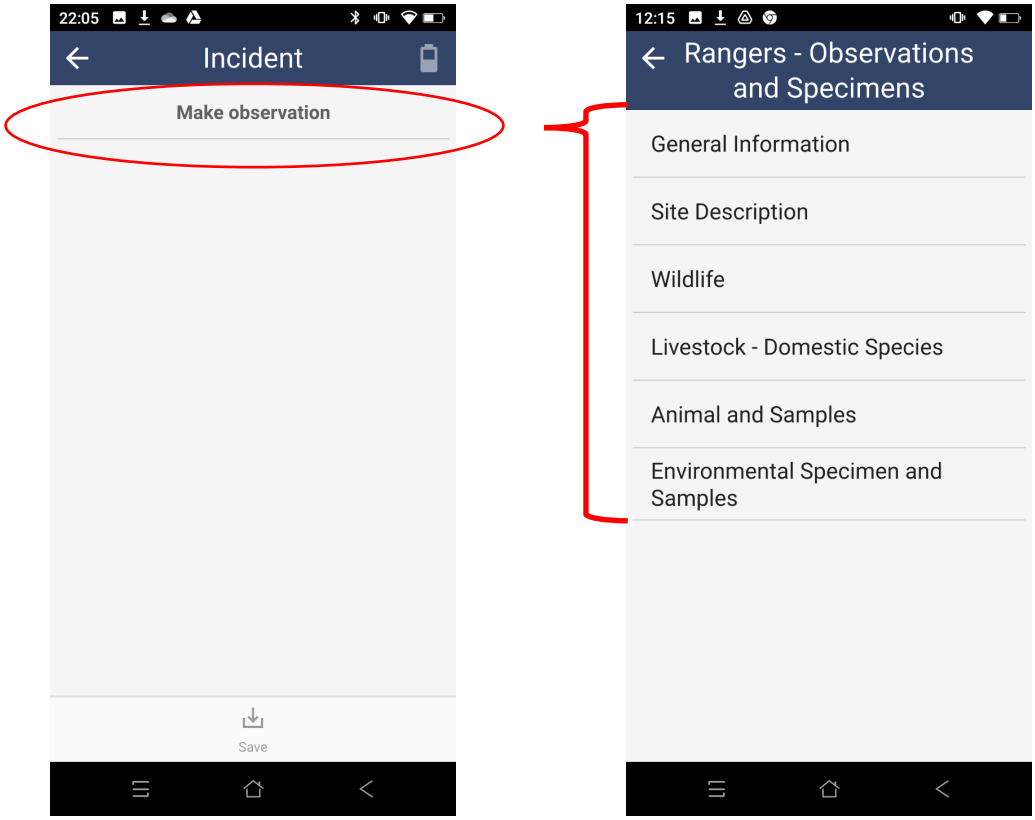
Once a Wildlife Health Event is detected during a patrol, the SMART for Health user should click on the "Incident" button of the Patrol screen.



DOCUMENT A WILDLIFE HEALTH EVENT

To document a Wildlife Health Event, SMART for Health users add Observations using the different Categories:

1. **Click on the "Make Observation"** option of the "Incident" screen. Selecting this option opens the menu of Categories:

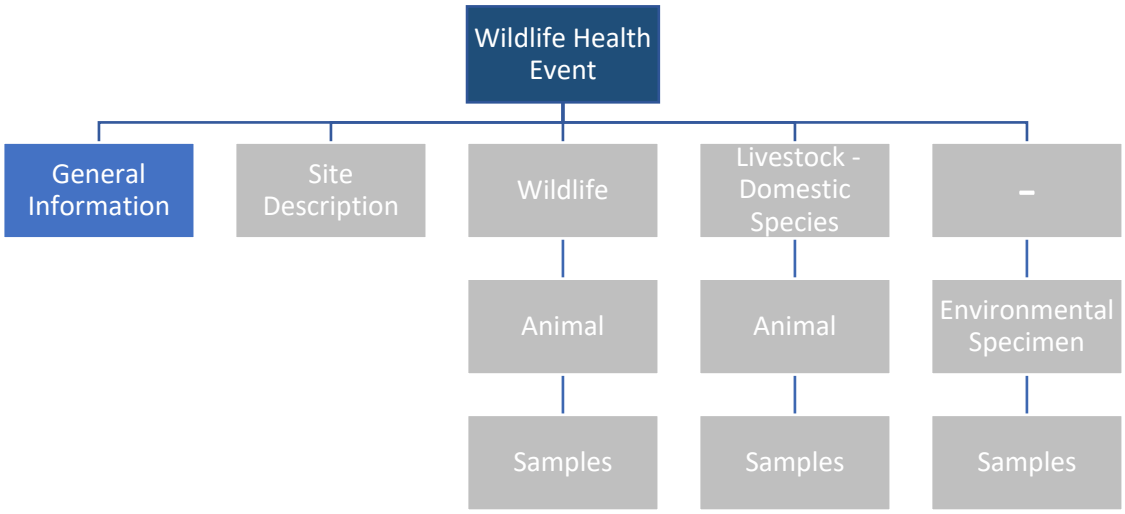


Each Category collects different types of information, including the description of the Event site, species present, and samples collected (see table below repeated from the previous section).

Category	To document
General Information	The name of the protected area, the patrol leader and its affiliation
Site Description	Characteristics of the site where the Event is taking place
Wildlife	The species of wildlife present at the Event
Livestock – Domestic Species	The species of domestic animals present at the Event
Animal and Samples	The characteristics of the individual animals sampled and their samples
Environmental Specimen and Samples	Tissue or material collected from the environment and its samples

COMPLETE THE SITE LEVEL DATA

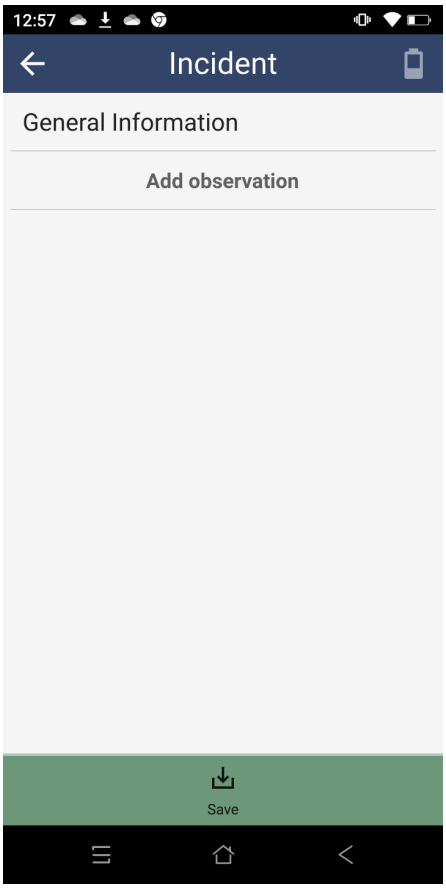
Following the diagram on page 6, the first Category within a Wildlife Health Event is the General Information:



- Click on the **General Information** Category and complete the Attributes

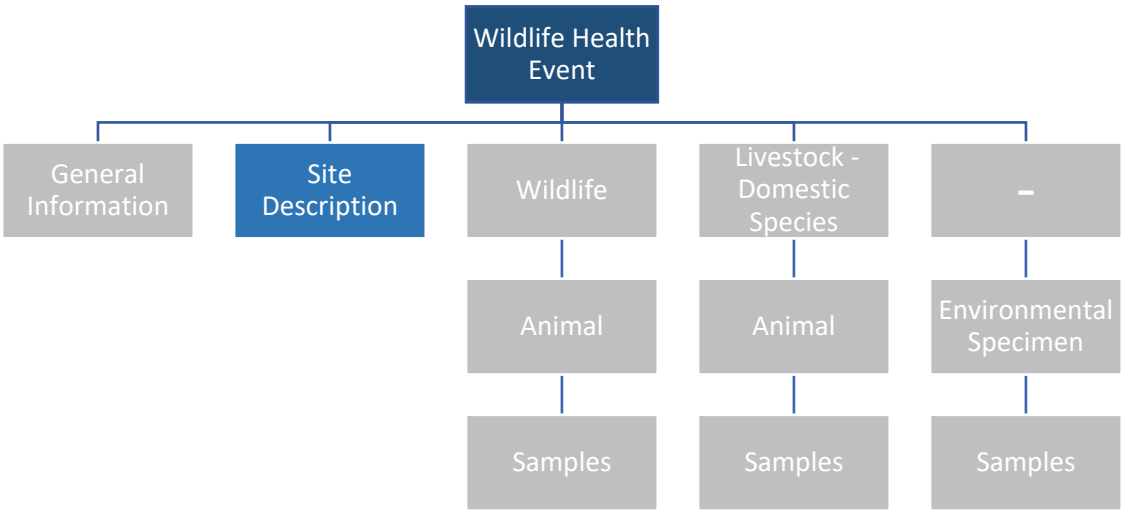
- Once the Attributes are satisfactorily completed, click on the checkmark. Clicking on the check mark will take the user back to the “Incident” screen again and the new Observation (“General Information”) will be listed for the current Event.

- If you enter but then want to exit the Category, select the top-left arrow



- Now, the screen will read “Add observation” instead of “Make observation” (see above)

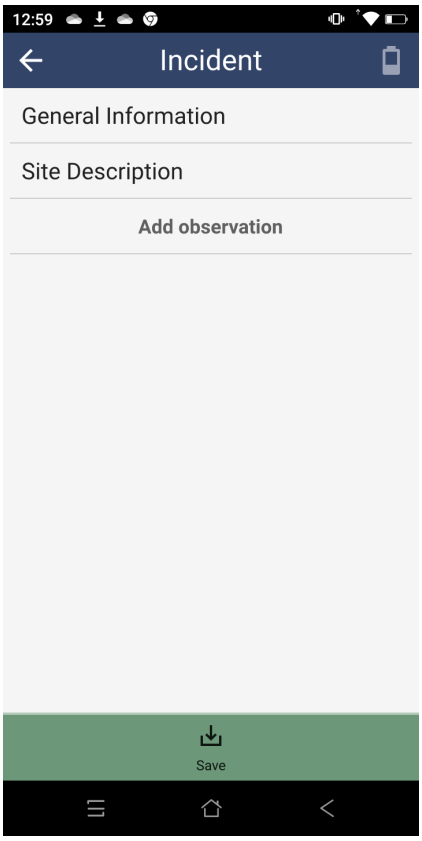
- Click “Add observation” to add more Observations to the current Event



- Click on the **Site Description** Category and fill in the various Attributes. Take photographs of the area if relevant.

- Once the Attributes are satisfactorily completed, click on the checkmark.

- If you want to cancel a completed Category, select the top-left arrow

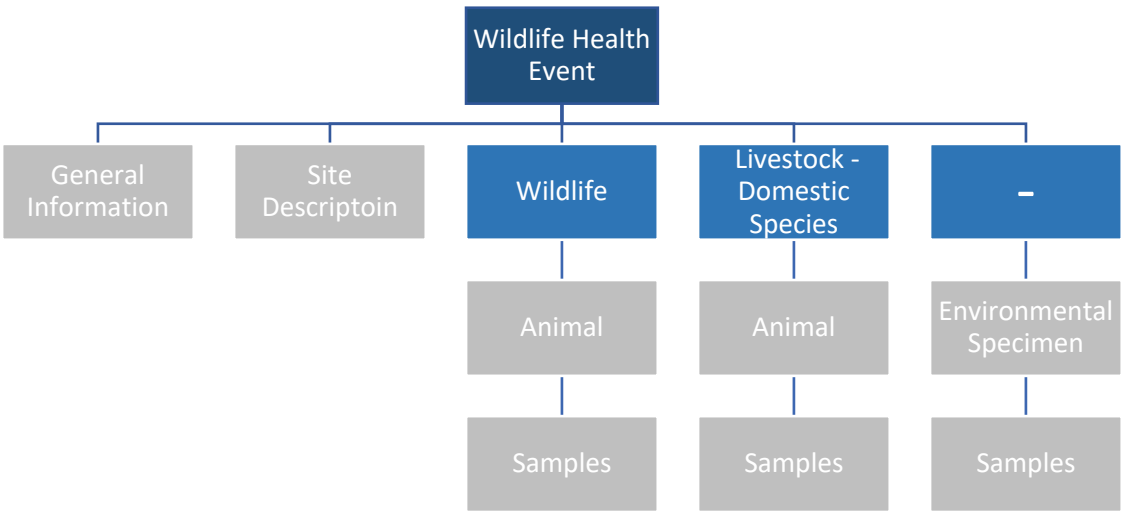


Remember, the record of a Wildlife Health Event requires the "General Information" and the "Site Description" Categories. The use of remaining Categories will depend on the user's findings and specimens collected.

COMPLETE THE SPECIES LEVEL DATA

Depending on the species observed, any number of observations involving “Wildlife” or “Livestock – Domestic Species” can be added.

Following the diagram on page 6, the “Wildlife” and/or “Livestock – Domestic Species” Categories are used within a Wildlife Health Event:



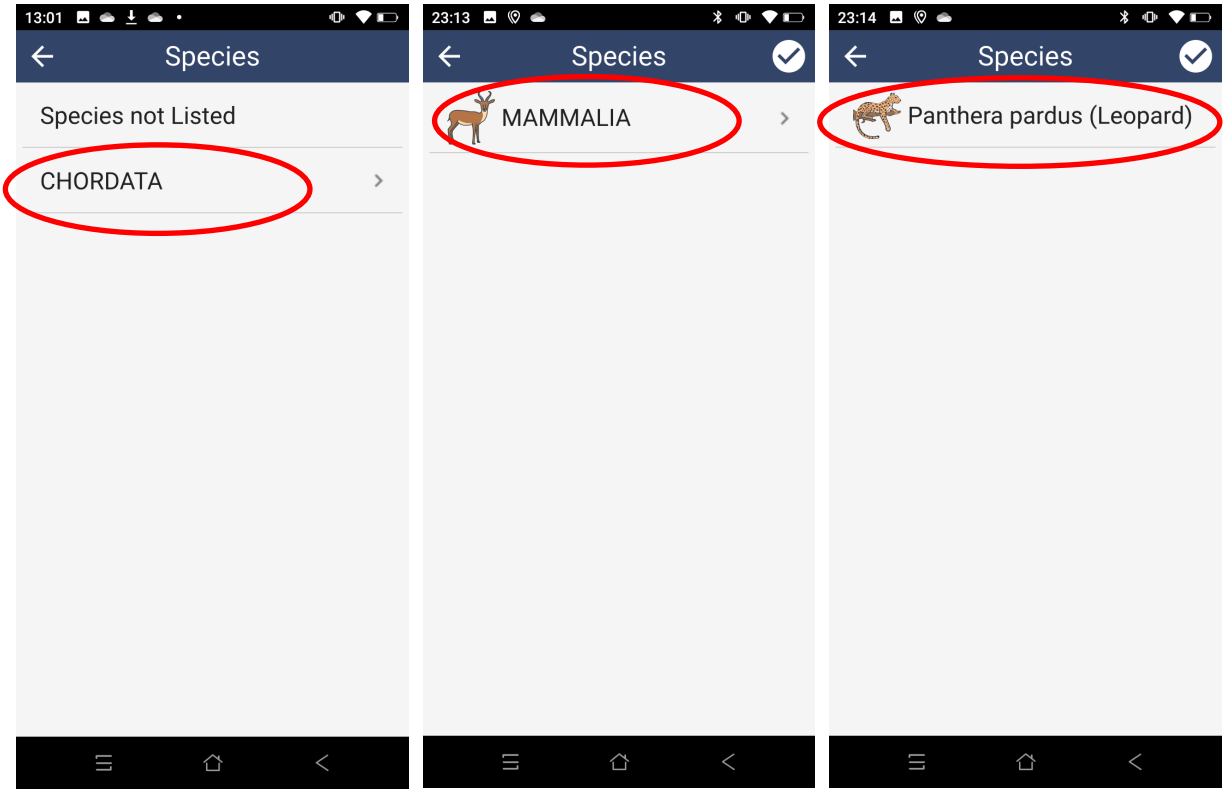
See the table below for guidance on how to use these Categories.

Category	When to use it?
Wildlife	When a species of observed animals in the Wildlife Health Event is not domestic
Livestock – Domestic Species	When a species of observed animals in the Wildlife Health Event is domestic

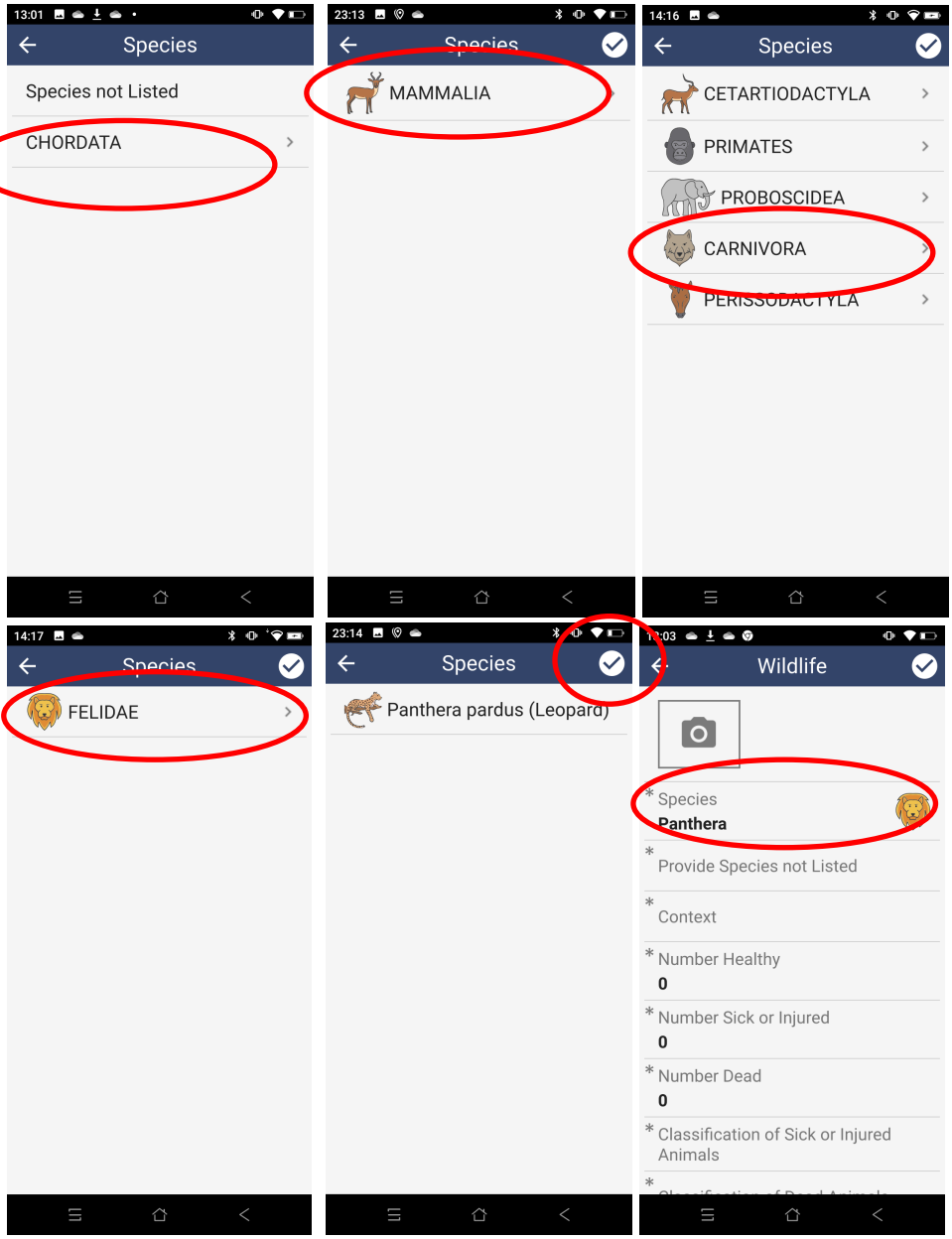
- Provide the species observed. For “Livestock – Domestic Species” select from a pre-defined list of common names. For wildlife species, the Attribute “Species” is a hierarchy that starts with “**Species not Listed**” and “**Chordata**”. If the species is known, click on “Chordata” and then

click on the corresponding taxa groups until arriving at the species and its scientific name. **Click on the species** and it will be recorded (see below).

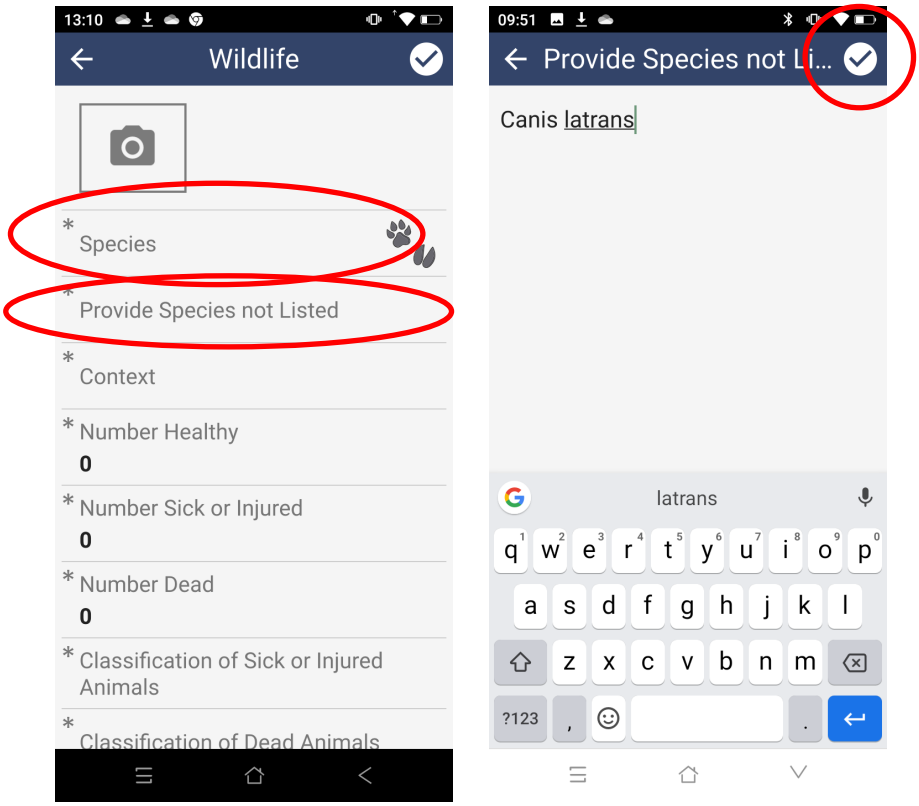
At least one animal of a species must be observed in order to record species level information ("Wildlife" or "Livestock – Domestic Species"). For example, if a single sick Batagur is observed in a Wildlife Health Event, then this species must be documented using the "Wildlife" Category **once**. If twenty Batagurs are observed in a Wildlife Health Event, then this species must be documented using the "Wildlife" Category **once.** If two wildlife species are observed in a Wildlife Health Event, then the "Wildlife" Category should be used twice to document each one of these species.



- It is also possible to record a higher-level taxon if, for example, the genus of the species is known but the full scientific name is unknown. To do this, the user moves one level lower than desired and selects the checkmark at that level. For example, if a species is identified to genus-level only, the genus is selected and in the next screen the list of species of the genus will be provided. If no scientific name is selected but **the checkmark is clicked** on (instead of a species), then only the genus will be recorded. To add the taxonomic family the user selects the checkmark when the list of genera is shown (see below).



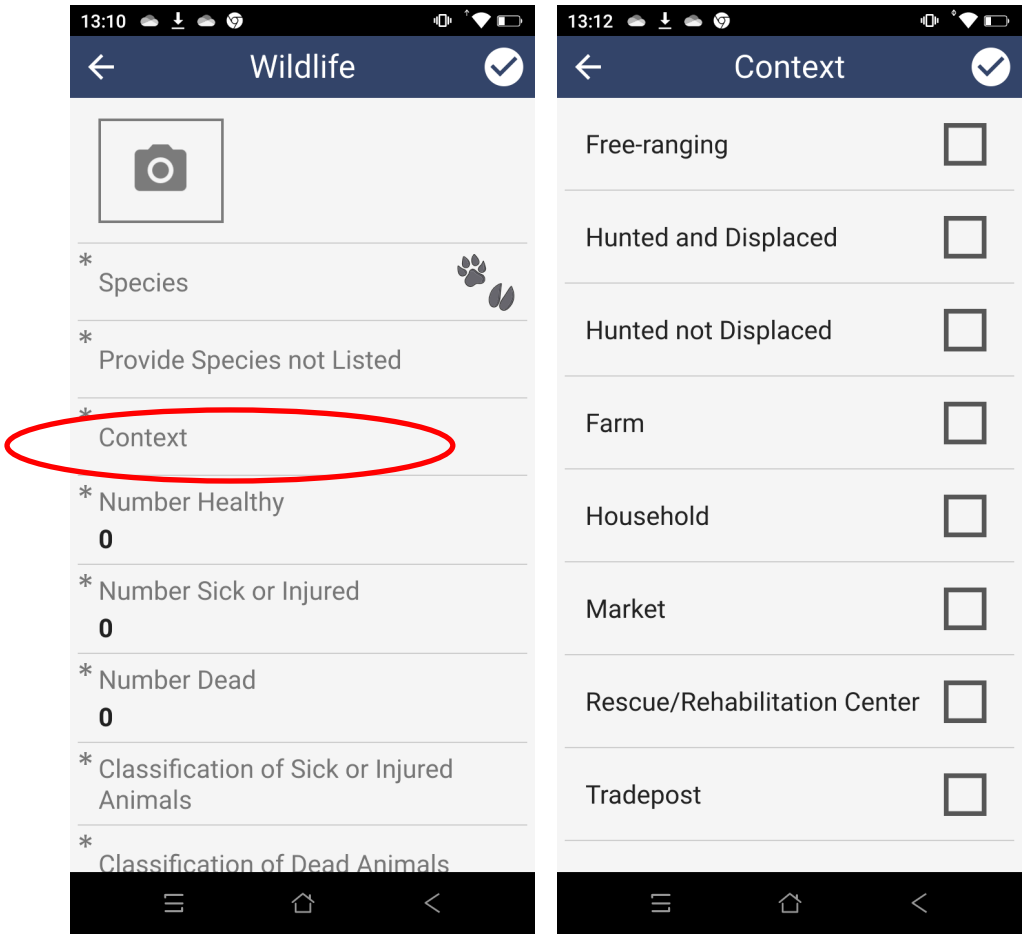
- If the species or a higher-level taxonomy is known but it is not listed, select the "**Species not Listed**" option and then use the Attribute "**Provide Species Not Listed**" to type the species common or scientific name, or any taxonomy level known (e.g. the taxonomic genus, family, order, or class). This Attribute will become available once the Option "Species not Listed" is selected in the "Species" Attribute.



- Take photographs of the animals.

- Complete the "**Context**" Attribute. This is a multi list Attribute and it is used to understand the capture, captivity, or hunting conditions of the animals within the corresponding "Wildlife", or "Livestock – Domestic Species" Categories.

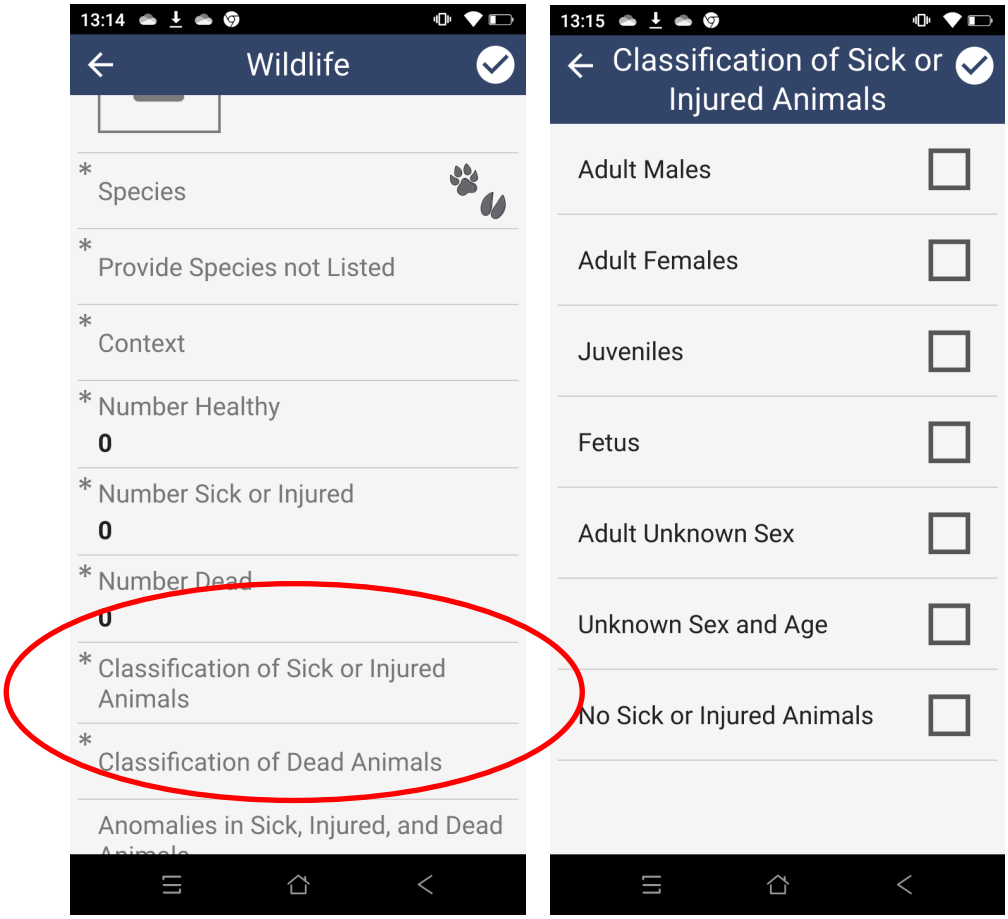
  Select "Free-ranging" if the animals of the corresponding species are not captured at all. Choose "Hunted and not Displaced" when the individuals of the species observed are hunted or captured in a trap, cage, snare, etc., or shot. Choose "Hunted and Displaced" when the individuals of the species observed are hunted or captured and moved from the original point of capture. Choose from the remaining Options ("Farm", "Household", "Zoo", etc.) when the individuals of the species observed are in a captivity facility.



For definitions of the Attributes see here.

- Provide the number of Healthy, Sick or Injured, and Dead animals belonging to the same species no matter their age or sex. **The count of individuals per health status per species must include the animals that provide samples** and that are documented using the "Animal and Samples" Category.

- The Attributes "**Classification Sick or Injured Animals" and** "**Classification Dead Animals**" to report the presence of "sick or injured" or dead animals of the observed species per age and sex (see below). If no animal is 'sick or injured' or dead, answer "No Sick or injured Animals" and "No Dead Animals", respectively.



- Complete the "**Anomalies in Sick, Injured, or Dead Animals**" Attribute by providing a description of the obvious problems observed in the animals of the corresponding species

- Complete the "**Condition Dead Animals**" Attribute which refers to the condition of the carcasses of the observed dead animals of the species recorded

- Complete the "**Potential Cause of Death, Disease, or Injury**" by providing an assessment of the suspected cause of death, disease, or injury of the animals of the recorded species

- Complete the "**Carnivore Attack**" and provide any extra information using the "**Other Relevant Information**"

The user can select multiple options for "**Condition Dead Animals**" and "**Potential Cause of Death, Disease, or Injury**" when more than one option applies. Similarly, if **no animals are dead** then **choose "No Dead Animals" for the "Condition Dead Animals"** Attribute **and** "**No Dead, Sick, or Injured Animals" for the "Potential Cause of Death, Disease, or Injury"** Attribute.

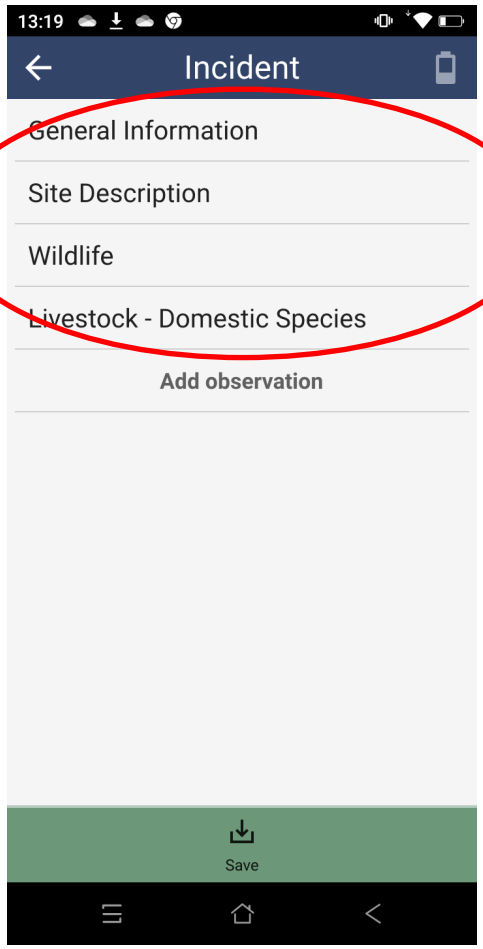
- For a definition of the Attributes and Options see here.

- If you want to cancel the completed Category, select the top-left arrow. If you are satisfied with your entry, click on the checkmark. Clicking on the checkmark will take the user back to the "Incident" screen again and the new Observation ("Wildlife" or "Livestock – Domestic Species") will be listed for the current Event.

If it is epidemiologically relevant, an Event may include livestock or domestic species! For example, rangers find a group of dead wild ungulates and they suspect the cause was an infectious disease. In the same area where they found the dead ungulates, the rangers also observed livestock roaming. In this case, the livestock could be a potential source of the suspected infectious disease for the wild ungulates.

A Wildlife Disease Event with:

- **A wildlife species (captive or not) and a livestock or domestic species (captive or not)** looks like this:


13:19
Incident
General Information
Site Description
Wildlife
Livestock - Domestic Species
Add observation
Save

COMPLETE THE INDIVIDUAL ANIMAL LEVEL DATA

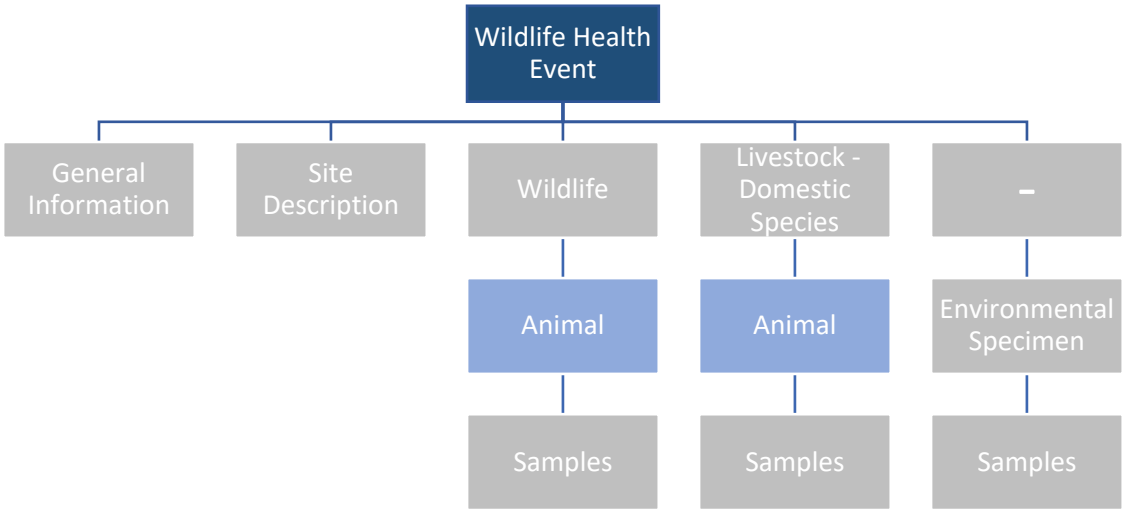
Individual Animal data is needed only for those healthy, sick or injured, and dead animals that provide samples.

Add as many "Animal and Samples" Observations as individual animals are sampled.

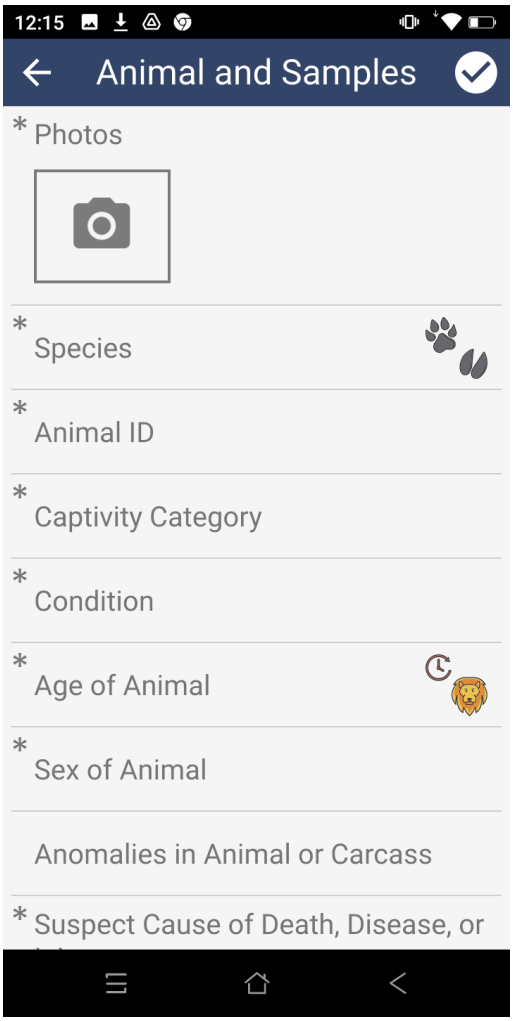
The animals that are sampled must be entered in the counts for the corresponding species at the Species level (Wildlife or Livestock – Domestic Species).

If the data from individual animal is collected, then the data at the species level for the corresponding species must ALSO be provided. For example, if samples are collected from a single Batagur, then the "Wildlife" Category must also be used to include the data at the species level. The species level data in this case will contain a single individual.

Following the figure on page 6, the "Animal and Samples" Category is used when an individual animal is sampled:



Click on the “Animal and Samples” Category and complete the Attributes requested. For a definition of the Attributes and Options see here.



- Take photographs of the individual.

It is absolutely key that the information provided for individual animals is consistent with the information collected at the species level. For example, if 5 male sick adults were recorded for a species and one individual was sampled, then the demographic information and health status provided at the individual level should match “Adult”, “Male”, and “Found Sick or Injured”. If a species includes only male sick adults, then the data at the individual level should not include a healthy juvenile female.

- The "**Species**" Attribute follows the same structure explained for "Wildlife" and "Livestock – Domestic Species". If the species is unknown, then click on "Species not Listed". Then, please use the Attribute "Provide Species not Listed", which is a text Attribute, to manually type enter the species using the common or scientific name (this Attribute will become available once the Option "Species not Listed" is selected in the "Species" Attribute).

- Complete the "**Animal ID**" field following the structure provided here or any other standard guideline of the corresponding project

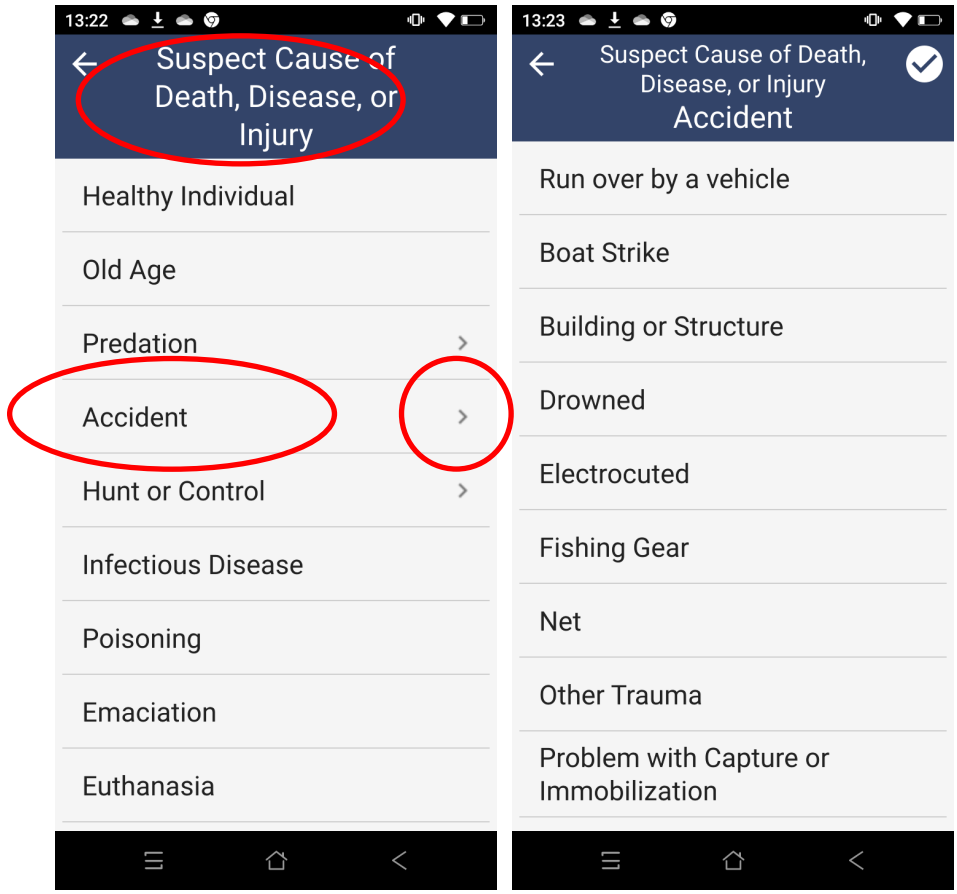
- Provide the "**Captivity Category**" of the individual animal sampled

- Complete the "**Condition**". This Attribute requests the health status at initial observation of the individual animal ("Found Dead", "Found Live Healthy", "Found Live Sick or Injured", "Unknown"). At the individual level data, animal parts found in the field are not "Dead Animals" but actually the user should select the "Animal Parts" Option.

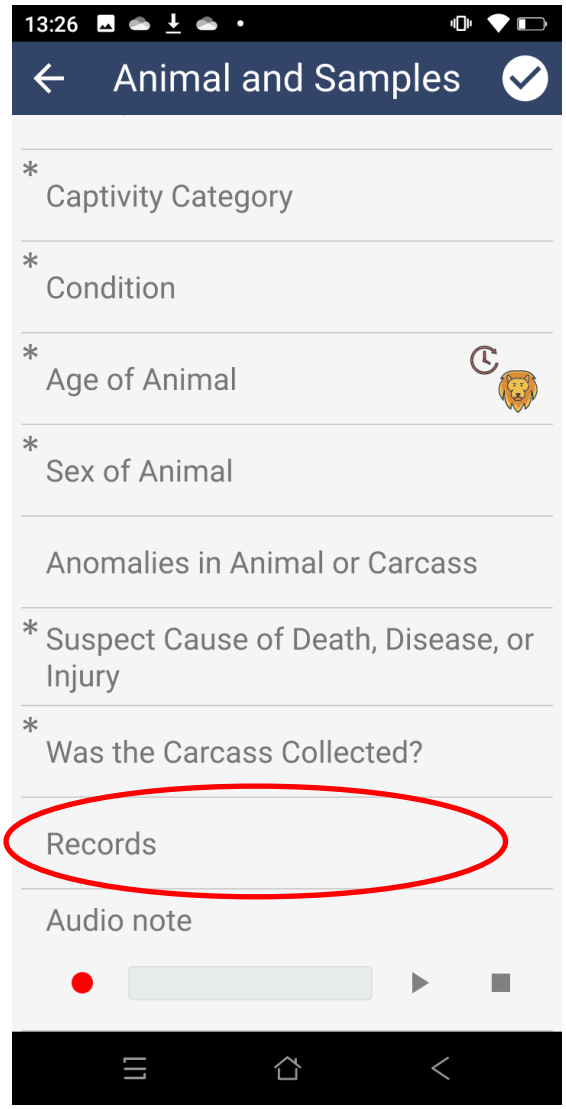
- Provide the "**Age of Animal**", and "**Sex of Animal**" of the individual animal sampled

- Provide the "**Anomalies in Animal or Carcass**" to describe obvious abnormalities observed. If the animal is healthy, leave this Attribute empty.

- The Attribute "**Suspect Cause of Death, Disease, or Injury**" is a hierarchical list so, some of the Options provided in the first screen have sub-Options (see below or the data dictionary). If the animal is not dead, sick, or injured select "**Healthy Individual**".



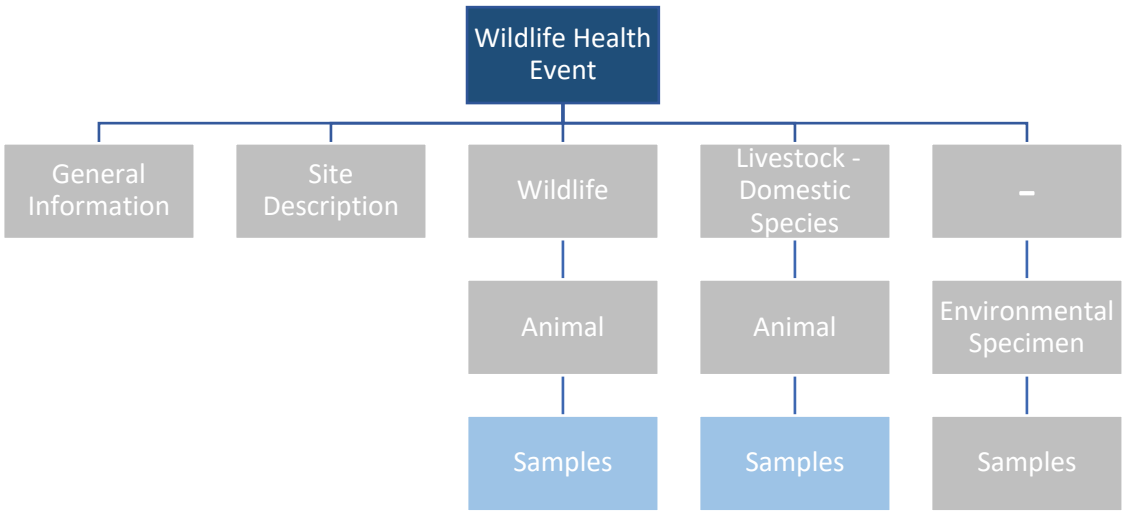
- The last Attribute for the individual animal is "**Was the Carcass Collected?**" (see below). Answer "Yes" if the sample was collected and sent to a laboratory for necropsy or sample collection, otherwise select "No". If samples from the carcass were collected in the field but the carcass is also collected for necropsy or further sample collection, then the answer to the question "**Was the carcass collected?"** is "**Yes**". Select "The Animal is not Dead" when there is not a carcass because the animal is alive.


13:26
Animal and Samples
* Captivity Category
* Condition
* Age of Animal
* Sex of Animal
Anomalies in Animal or Carcass
* Suspect Cause of Death, Disease, or Injury
* Was the Carcass Collected?
Records
Audio note

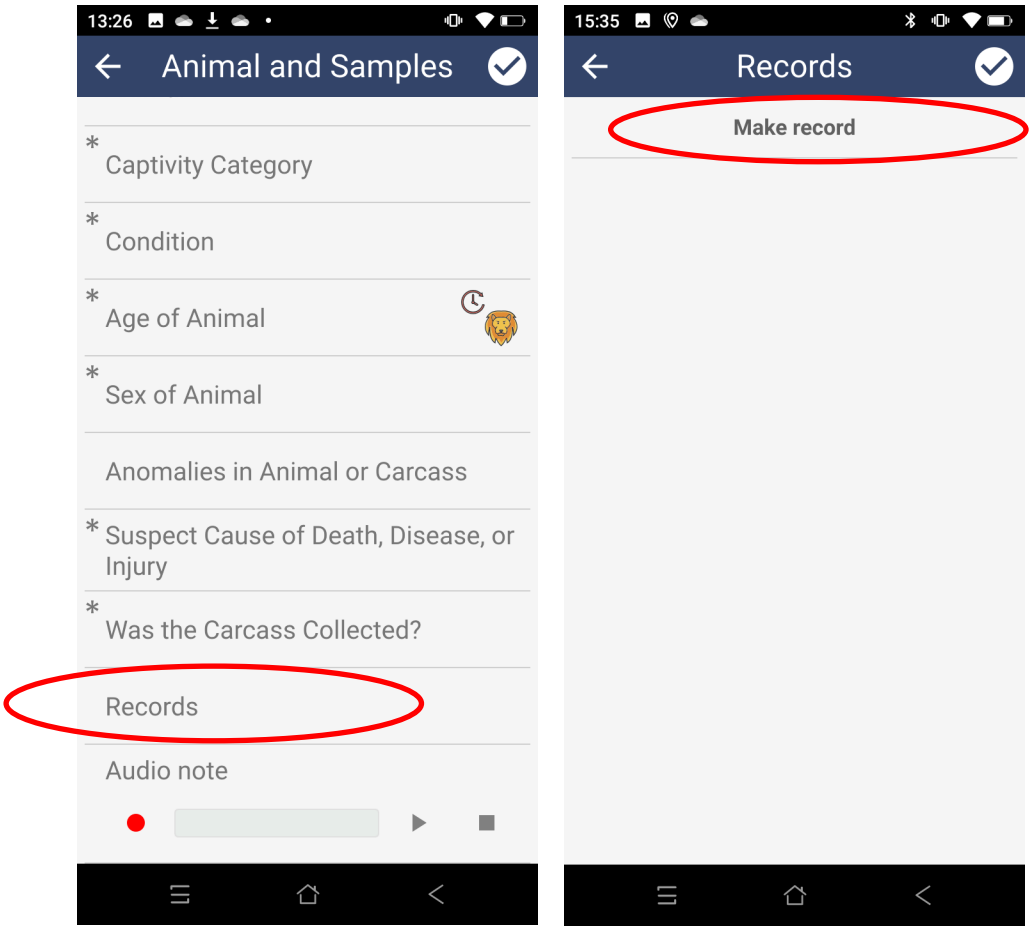
COMPLETE THE SAMPLE LEVEL DATA

If samples are collected from an animal, then the sample information can be nested in the corresponding animal using the "Records" Attribute of the "Animal and Samples" Category. This button will lead the user to the "Records" screen (secondary screen).

Following the diagram on page 6:



The "Records" button of the first "Animal and Samples" Category screen will display the "Records" screen. Clicking on "Make record" button allows the user to add data for each sample.

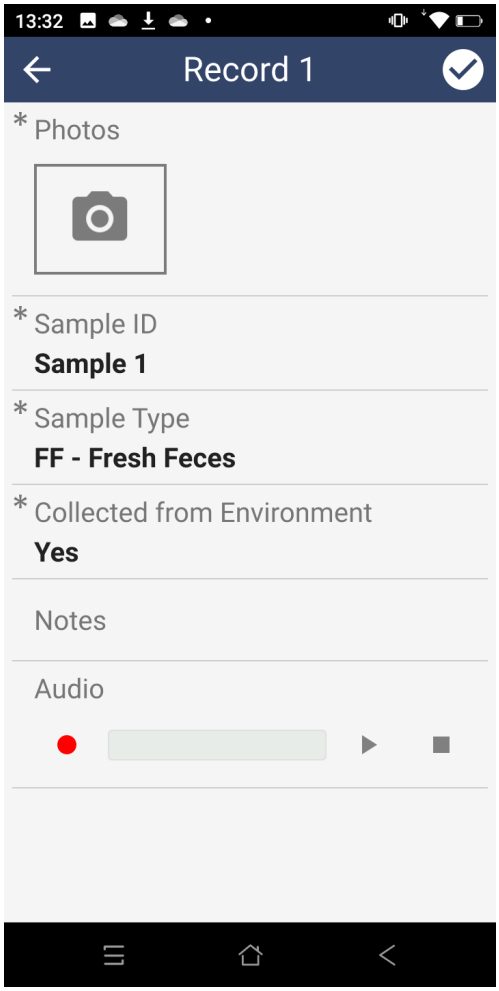

13:26
Animal and Samples
* Captivity Category
* Condition
* Age of Animal
* Sex of Animal
Anomalies in Animal or Carcass
* Suspect Cause of Death, Disease, or Injury
* Was the Carcass Collected?
Records
Audio note
15:35
Records
Make record

- Select “**Make record**” to add the data for each sample. The field “**Sample ID**” should be completed following the structure provided here or following your project’s guidelines. **Pictures of the sample and its corresponding Sample ID** can be taken supporting tracking the origin of the samples.

- Complete the “**Sample Type”**. For a list of definitions of each Sub-Attribute and their Options, see here.

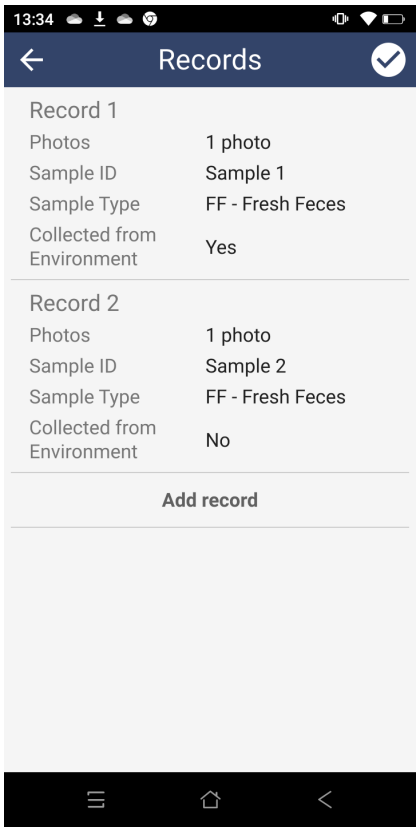
- Complete the Sub-Attribute “**Collected from the Environment**”. A “**Yes**” response indicates the sample **was not collected directly from the animal**. A “**No**” response indicates the sample **was collected directly from the animal**, (e.g., rectal swab or swabbed tissue from a carcass).

- Complete “**Notes**” to add any other detail about the collected sample



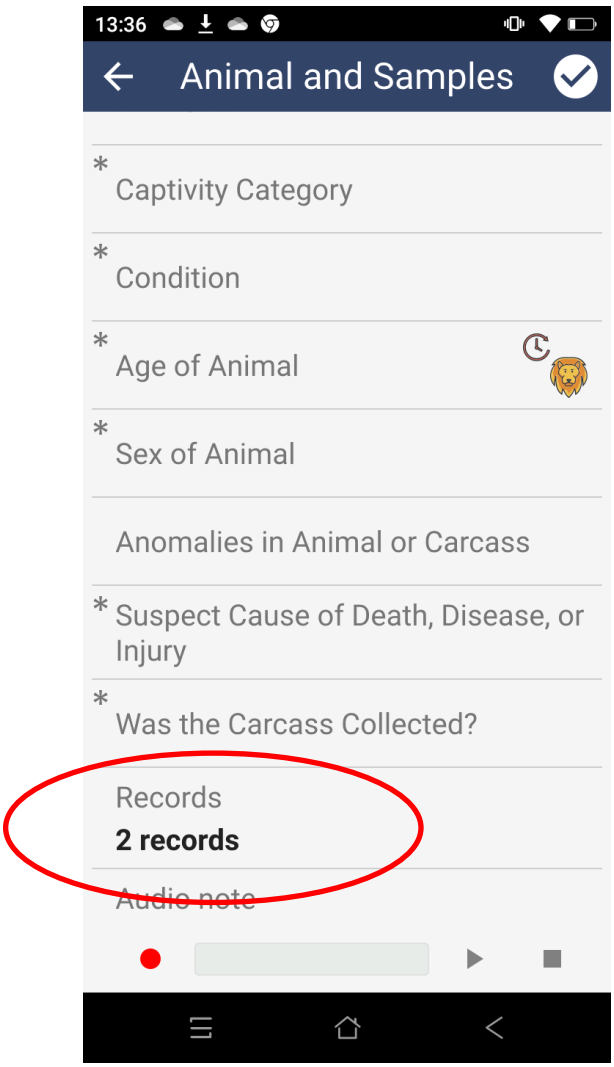
- Once the data for the first sample of the current individual animal has been provided, then click on the checkmark to confirm the Record. This first record will be included in the list of records for the current animal

- Add a new Sample by clicking “Make record” and repeat the process. A second sample (second record) will be added to the “Records” screen (see below)



- If you want to confirm the addition of the samples, click on the checkmark. If you want to leave the “Records” screen but not confirming the addition of samples, select the top-left arrow. If you want to delete a record from the list, see guidance on page 24.

- Once the data for all samples has been provided, click on the checkmark and the first screen of the “Animal and Samples” Category will indicate the number of Records (samples) included



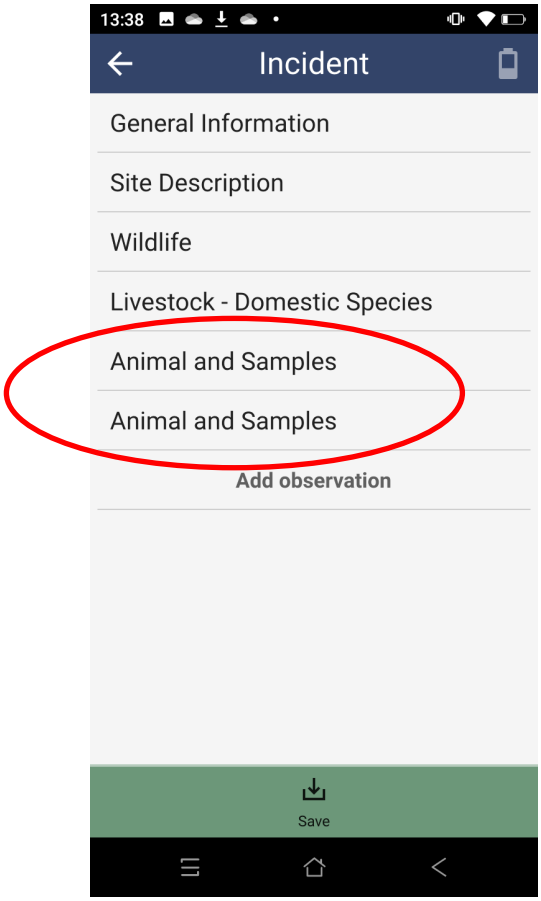
- Once the Attribute selections are completed, click on the checkmark and the new Observation (“Animal and Samples”) will be listed for the current Event. If you want to cancel the completed Category, select the top-left arrow.

The information of an individual animal has to be collected only if the individual animal is sampled.

A Wildlife Disease Event with:

- **A wildlife species (captive or not) and a livestock or domestic species (captive or not)**
- **Two sampled individuals of any of the species recorded**

looks like this:

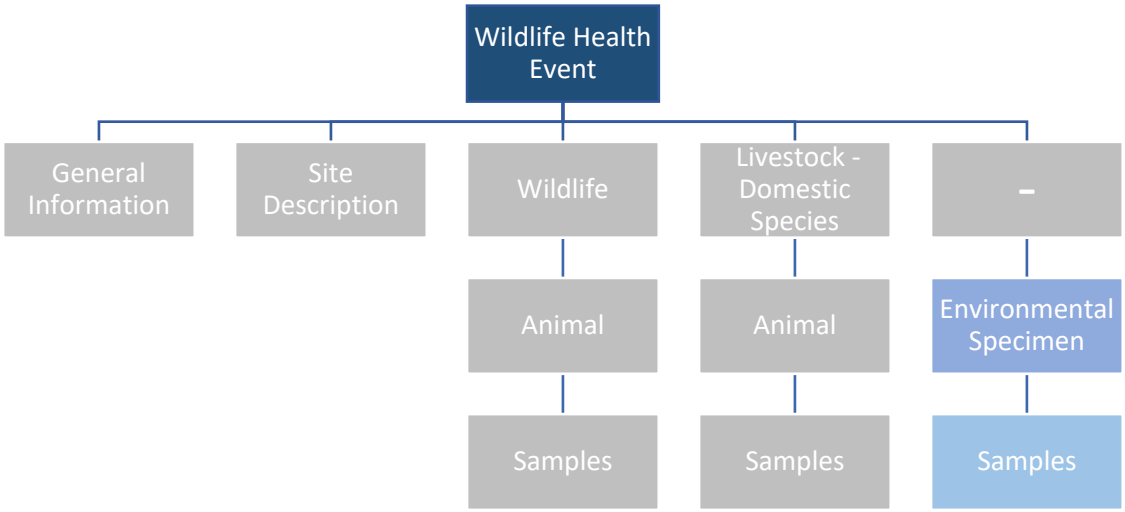


COMPLETE THE ENVIRONMENTAL SPECIMEN AND SAMPLES DATA

An Environmental Specimen is material of non-animal origin, such as water, soil, or sediment (abiotic) OR excreta/tissue of animal origin but whose animal source cannot be identified at the individual level. For example, feces found in the field but the individual animal that deposited the feces is unknown (e.g. not seen at all, or the animal dropping the feces was not observed and there are several individuals around the feces). Therefore, the demographics (sex, age) and health status of the animal are also unknown.

An Environmental Specimen is the source of the Environmental Samples. For example, two swabs could be collected from a single piece of bat guano found in the ground of a cave. The Environmental Specimen is the guano, and the Environmental Samples are the swabs with guano. The entire Environmental Specimen could be collected as a single sample. In that case, the Environmental Specimen and the Environmental Sample are equivalent but still both pieces of information (Environmental Specimen and Sample) must be provided. In the case of water, the Environmental Specimen is the source of the water (pond, lake, river, ocean shore, ocean, etc.) and the Environmental Samples follow the same logic.

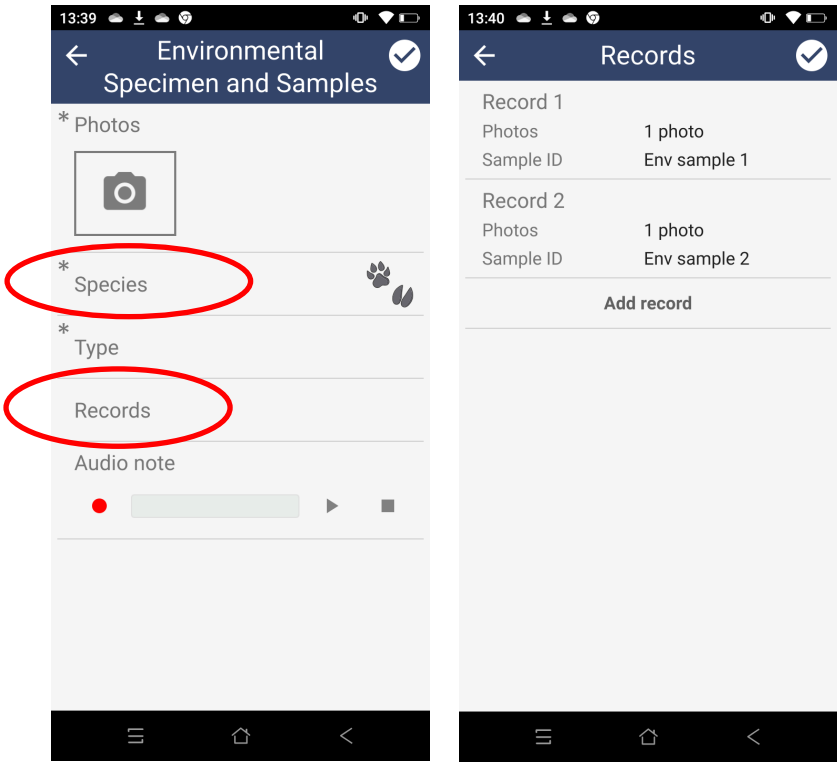
Following the diagram on page 6:



To collect data from environmental specimens and its samples, the user must use the "Environmental Specimen and Samples" Category. Similar to "Animal and Samples" Category, the "Environmental Specimen and Samples" Category has a primary screen with the Attributes to collect data for the specimen and the Option to add "Records" (Environmental Samples). A secondary screen is opened when the button "Make record" is clicked on the "Records" screen. The secondary screen has the Sub-Attributes to collect data for each sample (see next page).

- In the primary screen complete the Attributes. The "**Species"** may not be possible to identify to the lowest taxon. A higher-level taxon, such as the order, family, or genus, can be provided if possible (e.g., a cave with several bat species only, then provide the "Chiroptera" Order). In instances when the Environmental Specimen does not have an animal origin (e.g., soil, sediment, water), the user should select "**Abiotic**" in the "Species" Attribute. If the species or the known higher taxonomy level is not listed, select "Species Not Listed". The "**Provide Species not Listed**" Attribute will become available to type the common or scientific name or the known taxonomic level.

- Select the type of source or tissue of the Environmental Specimen in the "**Type**" Attribute



- Take photographs of the Environmental Specimen

- Use the “Records” button to add Environmental Samples collected from the Environmental Specimen (see above). To add a “Record” click on the “Make record” button.

- Provide the “**Sample ID**” following the structure explained here or according to your project guidelines. For a list of definitions of each Sub-Attribute and their Options, see here.

- Complete “**Notes**” to add any other detail about the collected sample

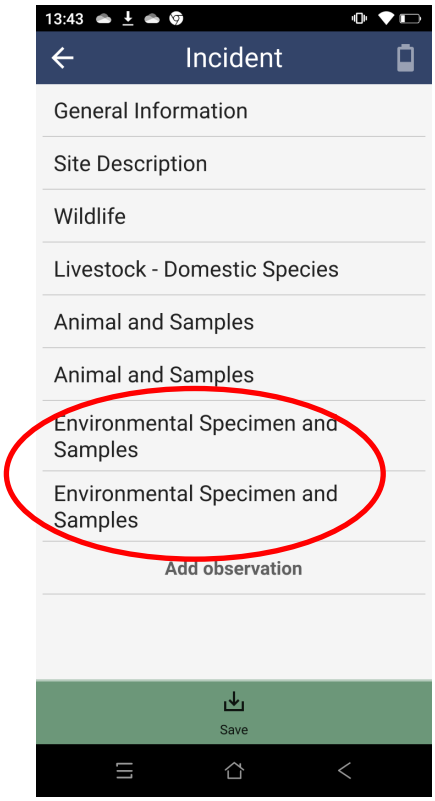
- Click on the checkmarks to confirm the addition of the Environmental Sample data

- Once the Attribute selections are completed, click on the checkmark and the new Observation (“Environmental Specimen and Samples”) will be listed for the current Wildlife Health Event. If the user wants to cancel the completed Category, select the top-left arrow, which will clear all data entered in the Category.

A Wildlife Health Event with:

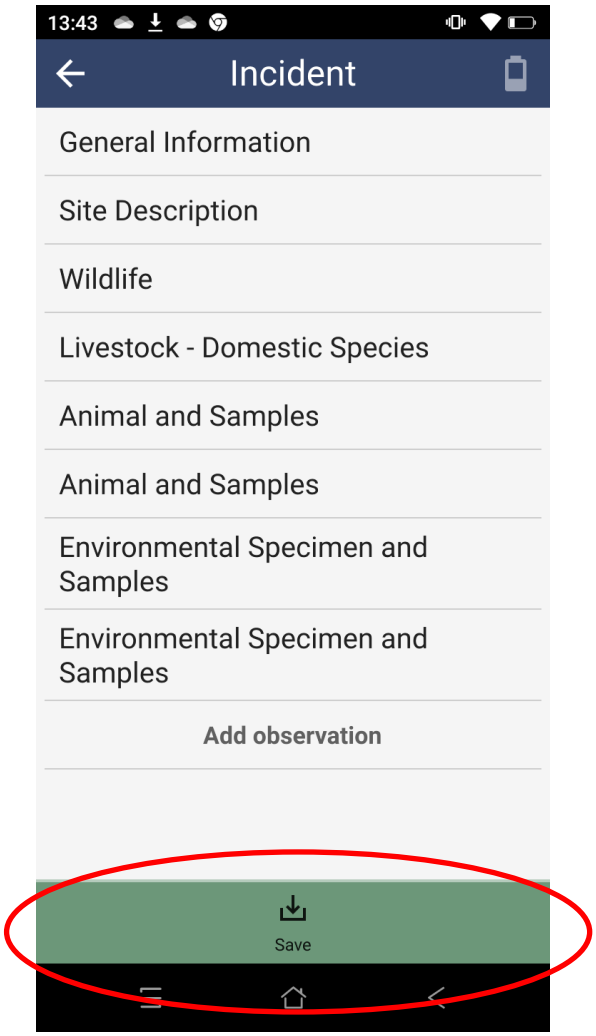
- **A wildlife species (captive or not) and a livestock or domestic species (captive or not)**
- **Two sampled individuals of any of the species recorded**
- **Two environmental specimens sampled**

looks like this:



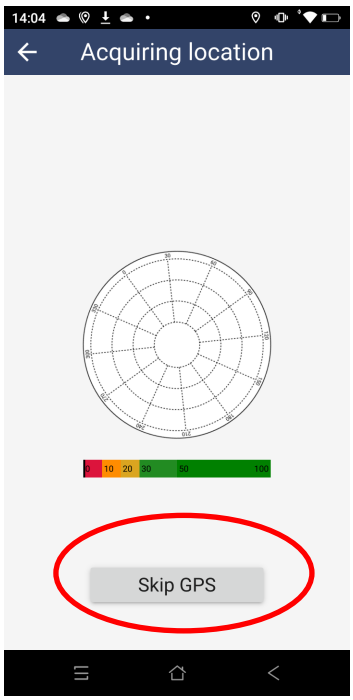
SAVE A WILDLIFE HEALTH EVENT

Once all the data of the Wildlife Health Event has been collected, click on the “Save” button of the “Incident” screen.

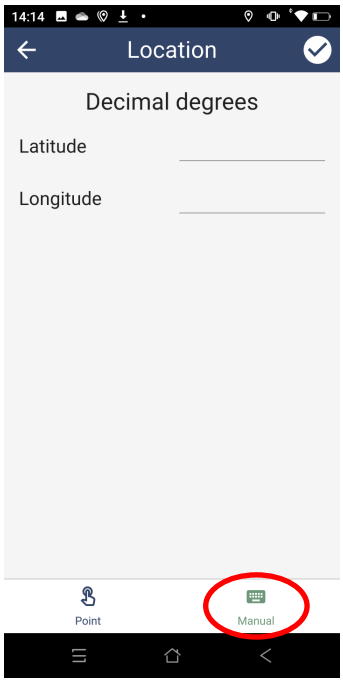


Once the “Save” button is clicked, SMART Mobile will record the position of the Wildlife Health Event and store all the data entered for the Event. Then, the screen will clear and reset to an empty “Patrol” screen with no Observations, allowing the user to continue the Patrol and collect new Wildlife Health Events as Independent Incidents.

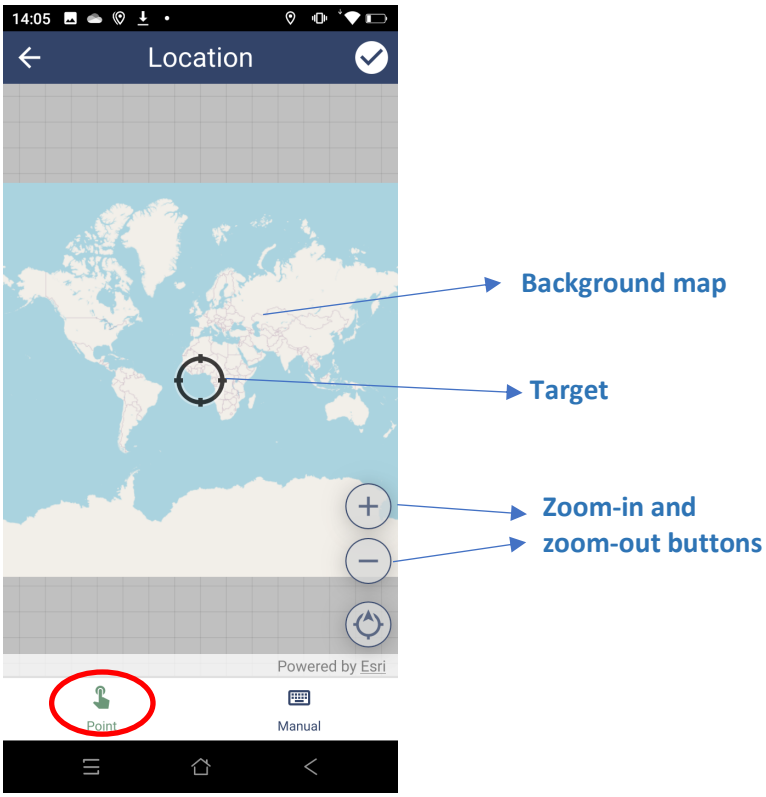
If SMART Mobile fails to record the position automatically, select the “Skip GPS” button.



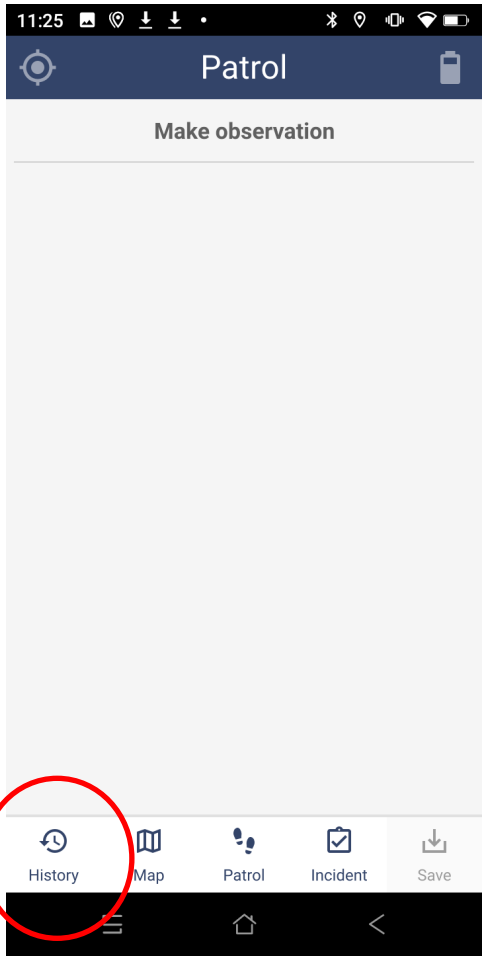
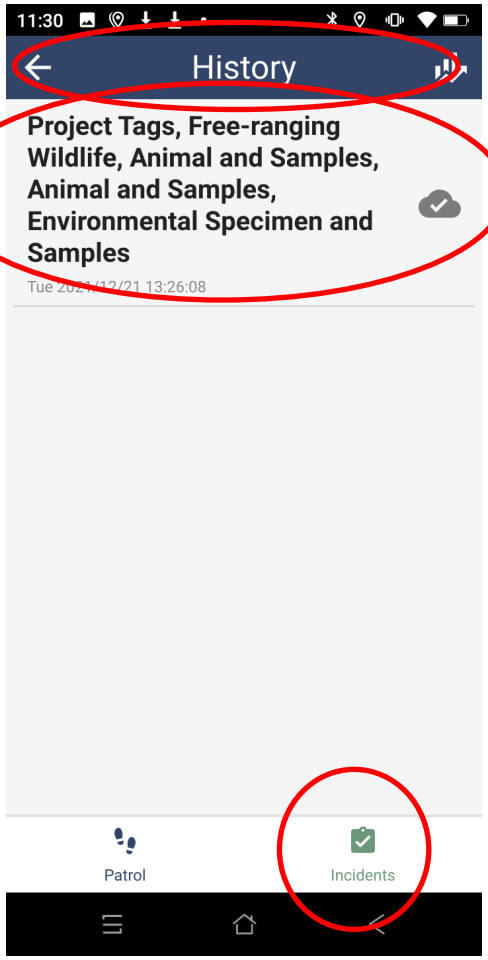
Then provide the geographical coordinates by directly entering the latitude and longitude, or by providing your approximate location in a map. For the first option, click on the “Manual” button of the “Location” screen and manually enter the coordinates provided by a GPS device:



For the second option, click on the “Point” button of the “Location” screen. Move the background map using your fingers and zoom-in and zoom-out until the target is in the desired position. Once the position is correct, click on the checkmark on the top-right corner of the screen:



It is very important to verify that the Event data are saved and stored. See below.

CONFIRM WILDLIFE HEALTH EVENT DATA WAS SAVED

To confirm data was properly saved, before starting a new Wildlife Health Event click on the “History” button of the Patrol screen. In the “History” screen, select the “Incidents” button. The “History” screen will show the Events that have been saved as Independent Incidents. The most recent Events are added to the bottom of the list. If the last Event recorded was properly saved, then the Categories used will be shown in the last item of the list (see below).