

Getting Started with the Urban Wildlife Information Network Application

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Application Authentication

Login

In order to access the application, you must have a Google account and will need to be added by a user that already has access (See Settings → Users to give users access). Once these two requirements are met, you can login to the app by clicking 'Login' in the upper right corner of the landing page (Figure 1).



Figure 1. Landing page for users not logged in

When the login button is clicked, a Google Login dialog box will appear on the screen. Follow the instructions to login to your google account. If you are already logged into google on your browser, the dialog box may not appear and you will instead be logged in automatically. To log into a different account on the UWIN app, you will need to log out of your google account on your browser before clicking the 'Login' button. Once logged in, you should see a navigation bar on the left hand side and your google icon in the upper right corner (Figure 2).

After logging in, the application will maintain the user's current role, and this role will give permissions across the site until the user logs out. If the user's role changes at any time by an admin, these changes will also not take effect until the user logs in again.



Figure 2. Landing page for logged in user

Edit Profile

To edit your profile, click your profile icon in the upper right corner to open the account menu. Select 'Edit Profile' from the menu (Figure 3). You will be redirected to the edit profile page.

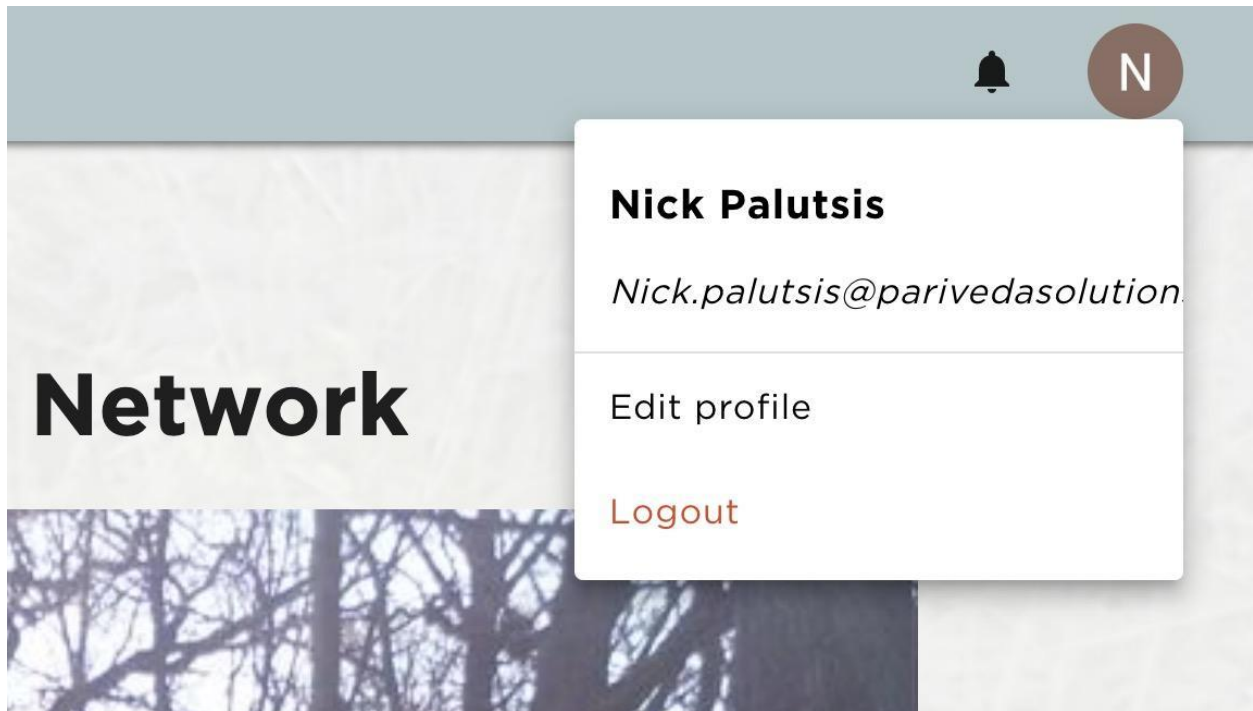


Figure 3. Account Menu

Once on the edit profile page, you may edit your first name, last name, or email. Click 'Submit' when finished. After the new data has been saved, you should see text indicating that your information was changed (Figure 4).

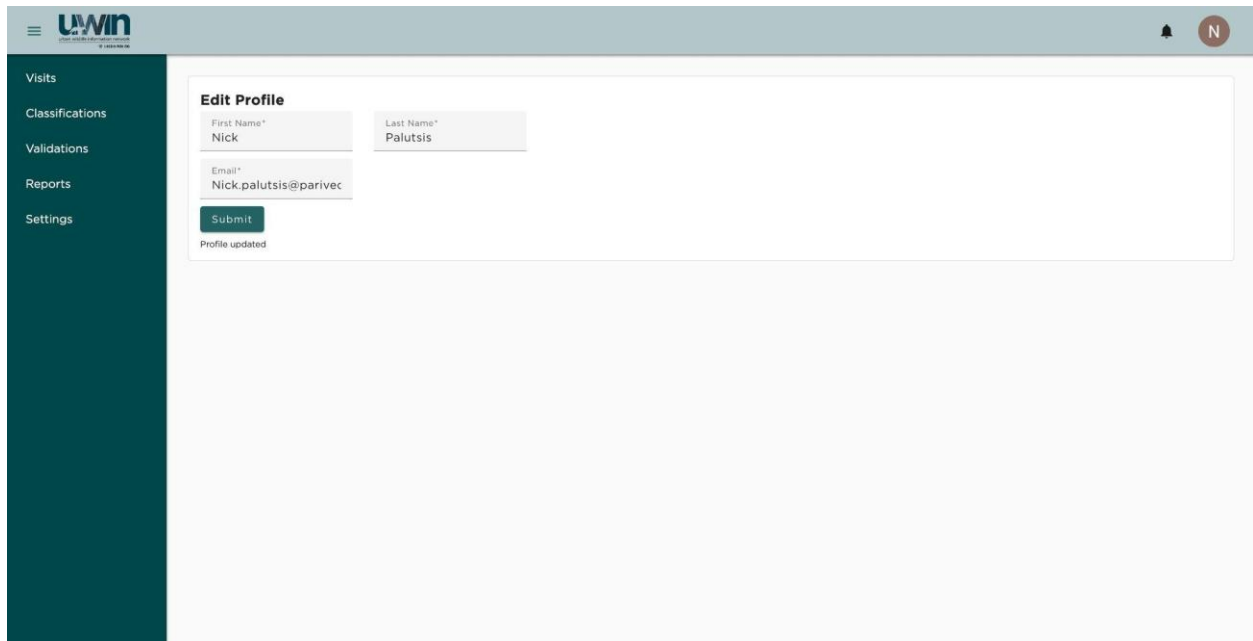


Figure 4. Edit Profile page after completed updates

Logout

At any point while using the app, select the the profile icon in the upper right corner and click 'Logout' from the account menu (Figure 3). You will be logged out and redirected to the landing page for users not logged in (Figure 1).

Settings (Data Entry)

The settings page allows you to enter data involved in the urban wildlife tracking process. To do so, simply click one of the options in the settings menu (Figure 5) and you will be redirected to the data entry page for that component. 'Study Areas' represent the different cities and areas of UWIN Partners, for example, "Chicago, IL". Users can be added, edited, and inactivated/deleted on the 'Users' page. On this page, you can also make observer groups (groups of users that can be filtered as well as inactivated/deleted all at once). Locations of recording equipment can be documented in 'Locations' (formerly 'Camera Locations') and any landowner information associated with that location can be edited on the 'Landowners' page. There may be multiple locations that correspond to one landowner. For instance, "Cook County" may be the landowner of multiple different locations. Individual camera information is recorded under 'Cameras' and the different models of cameras used in the study are stored in 'Camera Types'. The same pattern of type/model is applied to Audio Recording Units ('ARUs') and 'Microphones'. 'Visit Actions' are any actions that can be performed at a visit, such as 'Replaced batteries' or 'Placed camera'. The list of possible species that can be selected while tagging

photos can be edited in the 'Species' page and the details for each species can be edited on the 'Species Details' page. Note: this list only applies to photo tagging. Editing this list does not affect audio detections. By default, each new added species will have 'N/A' listed under details. Any lures used at the camera traps can be added in the 'Lures' page. Lastly, the settings for the machine learning users, such as the confidence threshold required for each species and whether or not the model should be trusted, can be adjusted on the 'Machine Learning' page. **However, we do not recommend using the Machine Learning tool. This application costs money, and has not been fully tested.**

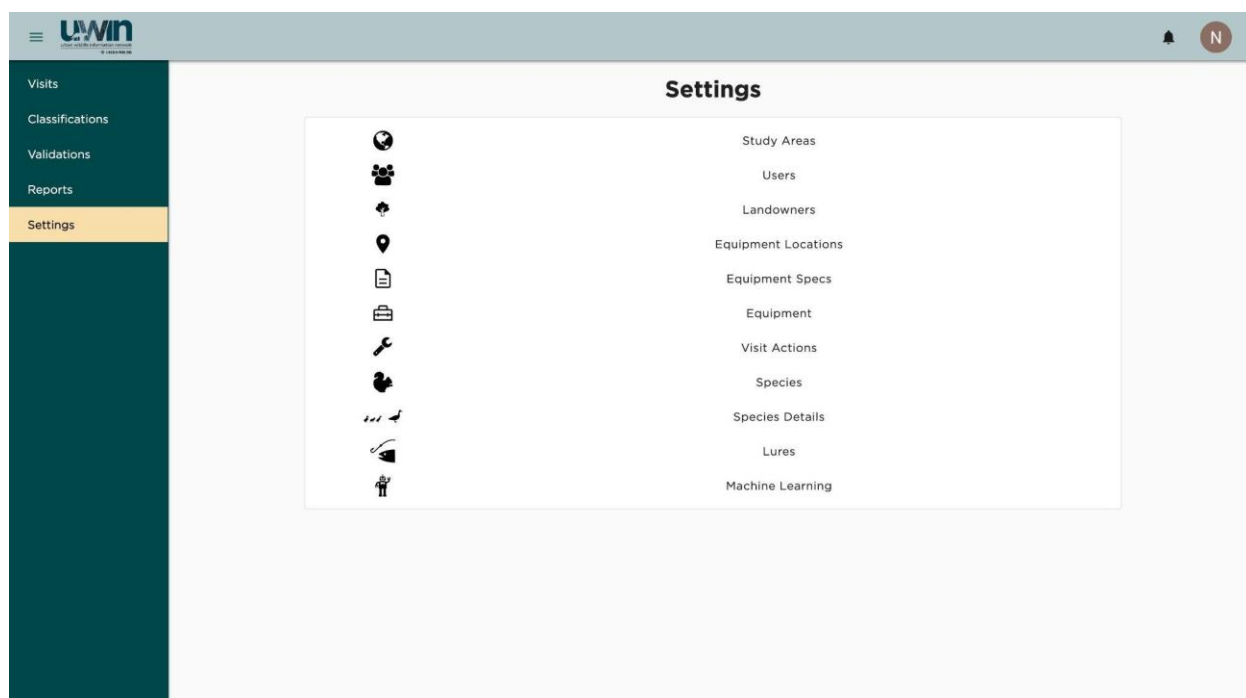


Figure 5. Settings page

Study Areas

The Study Areas page allows you to edit your study area (Figure 6). You may change the area name, number of viewers required per photo, if detections require validation, and if the machine learning models are to be trusted (We recommend not selecting this option, as the Machine Learning tool has not been properly tested). The number of viewers required per photo is a number that indicates how many people should classify the photo before it is ready for validation. If the number of viewers is more than one, the photos will automatically need to be validated because any discrepancies in tagging will need to be resolved. If there is one required viewer for the study area, validation is optional. If 'Needs Validation' is left unchecked in this scenario then the validation process will not occur and each photo will be simply be tagged once then archived.

Back to Settings

Edit Study Area

Area Name
Test Site

Area Abbr
FAKE

Region

Timezone

Number of Viewers
2

Needs Validation Trust ML

Submit

Figure 6. Edit Study Area page

Users

The Users page displays a table of all current users associated with your study area (Figure 7). The filter text box allows filtering on any column of the table. Columns may also be sorted by clicking the appropriate header.

Back to Settings

Users
















Filter

Observer Group
All Groups

Add Observer Group

Add User

Show Inactive Users

First Name	Last Name	Email	Group	Status	Role	Actions
Tester1	Test1	alanahat1234@gmail.com	N/A	Active	Observer	  
Tester3	Test3	criakay@umich.edu	N/A	Active	Observer	  
Guy	Fieri	masonlongshotfidino@gmail.com	N/A	Active	Researcher	  
Mason	Test Account	masonlongshotfidino2@gmail.com	N/A	Active	Researcher	  
Dragon	Dad	dragondad22@gmail.com	N/A	Active	Area Admin	  

Items per page: 5 1 - 5 of 18

Figure 7. Users page

You may inactivate or delete a user by clicking the respective buttons on that user's row in the table. Inactivating a user retains all of their detections and allows for any incomplete work to be reassigned to other users. You may only delete a user who has not generated any detections in the system, and if you attempt to delete a user

with detections or photo group data you will be prompted to deactivate the user instead.

By clicking the 'Add User' button in the top right you are brought to the Add User page where you may add a new user whose role is at a level below yours to your current study area (the level progression is Global Admin > Area Admin > Researcher > Observer) (Figure 8). The new user is required to be given a first name, last name, Google email address, and a role for the study area. You may optionally add the user to an observer group.

Feature	Global Admin	Area Admin
Sonic Pipeline	X	X
Reports (all study areas)	X	
Reports (assigned study area)		

Figure 8. Add User page

You can only edit, deactivate, or delete a user that has a role below your own. If they are below you, you can edit a user by clicking 'Edit' on the row associated to that user. Doing so will bring you to the edit user page (Figure 9). The edit user page is similar to the add user page and allows you to set the user's name, email, role, and participation in an observer group.

Back to Settings

Edit User

First Name*
Tester1

Last Name*
Test1

Email*
alanahat1234@gmail.c

Area*
Test Site

Role*
Observer

Add to Observer Group?

Figure 9. Edit User page

Clicking 'Add Observer Group' prompts you to create an observer group by adding a name and selecting any users you would like associated with the group (Figure 10).

Add Observer Group

Observer Group*
Pariveda

Select	First Name	Last Name	Email	Group	Status	Role
<input type="checkbox"/>	Tester1	Test1	alanahat1234@gmail.com	N/A	Active	Observer
<input type="checkbox"/>	Tester3	Test3	criakay@umich.edu	N/A	Active	Observer
<input type="checkbox"/>	Guy	Fieri	masonlongshotfidino@gmail.com	N/A	Active	Researcher
<input type="checkbox"/>	Mason	Test Account	masonlongshotfidino2@gmail.com	N/A	Active	Researcher
<input type="checkbox"/>	Dragon	Dad	dragondad22@gmail.com	N/A	Active	Area Admin

Items per page: 5 1 - 5 of 18

Figure 10. Add observer group

Landowners

The Landowners page displays a table of all current landowners associated with your study area (Figure 11). The filter text box allows filtering on any column of the table. Columns may also be sorted by clicking the appropriate header.

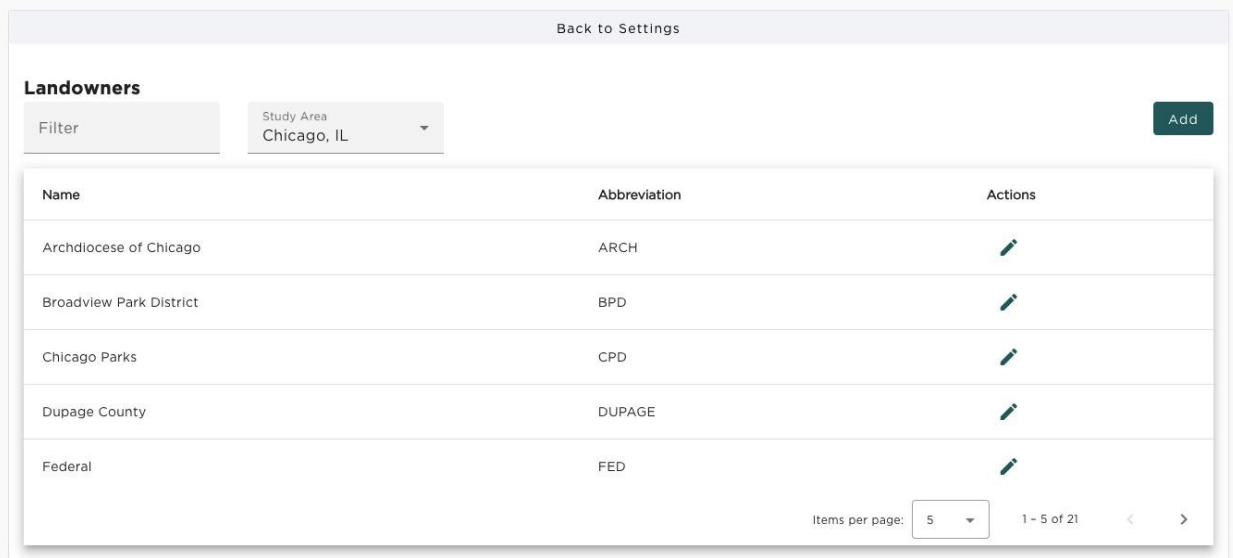


Figure 11. Landowners page

You may edit a landowner by clicking 'Edit' on the row associated with that landowner. You will be brought to the Edit Landowner page (Figure 12) where you may alter the landowner's full name or abbreviation. A landowner may also be removed from the study area if they are not associated with any locations.

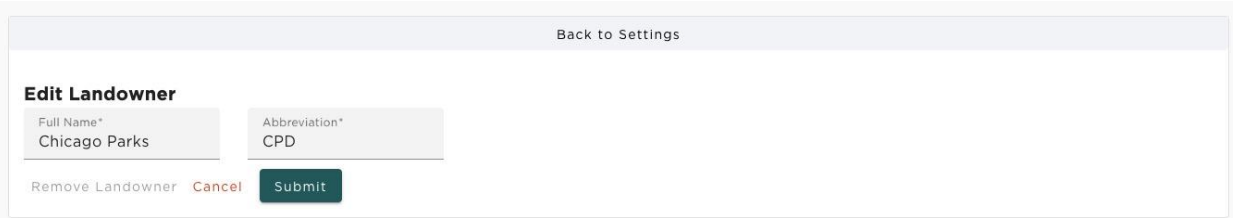


Figure 12. Edit Landowner page.

You may add a new landowner by clicking the blue 'Add' button in the top right corner. This will bring you to the Add Landowner page (Figure 13) where you may enter the full name and abbreviation of a new landowner.

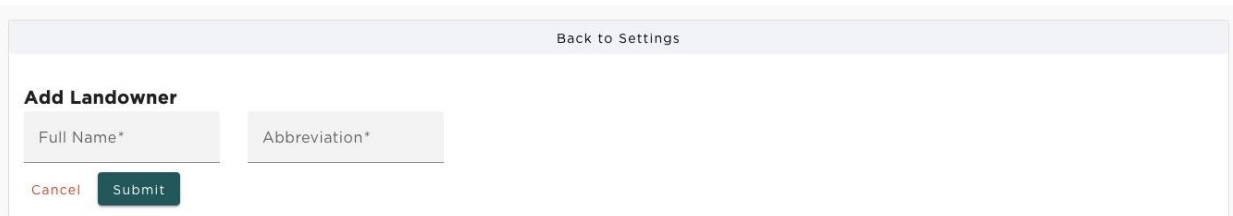


Figure 13. Add Landowner page

Equipment Locations

The Equipment Locations page displays a table of all equipment locations associated with your current study area (Figure 14). The filter text box allows filtering on any column of the table. Columns may also be sorted by clicking the appropriate header.

Full Name	Abbreviation	Landowner	Actions
Marian Byrnes	C04-MBP1	Chicago Parks	
Beaubien Woods	C05-BEA1	Cook County	
Big Marsh (Lone Tree)	C05-BMP1	Chicago Parks	
Big Marsh (Bike Park)	C05-BMP2	Chicago Parks	
Eggers Woods	C05-EGG1	Cook County	

Figure 14. Equipment Locations page

You have the ability to add new locations by clicking the 'Add' button in the upper-right, or you can edit an existing location by clicking 'Edit' on its row in the table. Either option will open a new page (Figures 15 & 16) where you may alter the landowner, location name, abbreviation, timezone, and GPS coordinates.

Add a Location

Landowner*

Full Name* Abbreviation*

Default Timezone
America/Chicago

Latitude* Longitude*

Cancel

Figure 15. Add a Location

Back to Settings

Edit a Location

Landowner*
Chicago Parks

Full Name*
Marian Byrnes

Abbreviation*
C04-MBP1

Default Timezone
America/Chicago

Latitude*
41.7131

Longitude*
-87.5734

Remove Location Cancel Submit

Figure 16. Edit a Location with visits associated (so it cannot be deleted)

Equipment Specs

The Equipment Specs page displays tables for all current equipment models (Figure 17) in order to select a type for each individual device. Using the selector at the top of the page you can alternate between viewing camera, ARU, and microphone models. The filter text box allows filtering on any column of the table. Columns may also be sorted by clicking the appropriate header. **All the equipment specs on this page are shared across all cities. As such, please do not delete any entries on this table.**

Back to Settings

Equipment Specs

Cameras ARUs Microphones Add

Filter

Manufacturer	Model #	Camera Type	Man. Year	Actions
Bushnell	119435	Trophy Cam XLT	2010	
Bushnell	119436	Trophy Cam XLT	2011	
Bushnell	119537C	Trophy Cam HD	2013	
Bushnell	119636C	Trophy Cam Essential	2014	
Bushnell	119836C	Trophy Cam HD Essential E2	2016	

Items per page: 5 1 - 5 of 60 < >

Figure 17. Equipment Specs page

You may edit an equipment spec by clicking 'Edit' on the row associated with that model. You will be brought to a new page (Figure 18) where you may alter the manufacturer, model number, type name, and manufacture year.

Back to Settings

Edit Camera Type

Manufacturer*
Bushnell

Model Number*
119435

Camera Type*
Trophy Cam XLT

Manufacture Year*
2010

Remove Camera Cancel Submit

Figure 18. Edit Equipment Spec Page

You may add a new equipment spec by clicking the 'Add' button in the top right corner. The page will open the appropriate form to add a new camera, ARU, or microphone model (Figure 19) depending on which type of hardware was selected on the left. This will bring up a similar form (Figure 19) where you may enter the manufacturer, model number, type name, and manufacture year for a new type of hardware.

Back to Settings

Add Camera Type

Manufacturer*

Model Number*

Camera Type*

Manufacture Year*

Cancel Submit

Figure 19. Add Equipment Spec page

Equipment

The Equipment page displays tables for all current cameras, ARUs, and microphones associated with your current study area (Figure 20). You can use the selector at the top of the page to toggle between the three classes of hardware. The filter text box allows filtering on any column of the table. Columns may also be sorted by clicking the appropriate header.

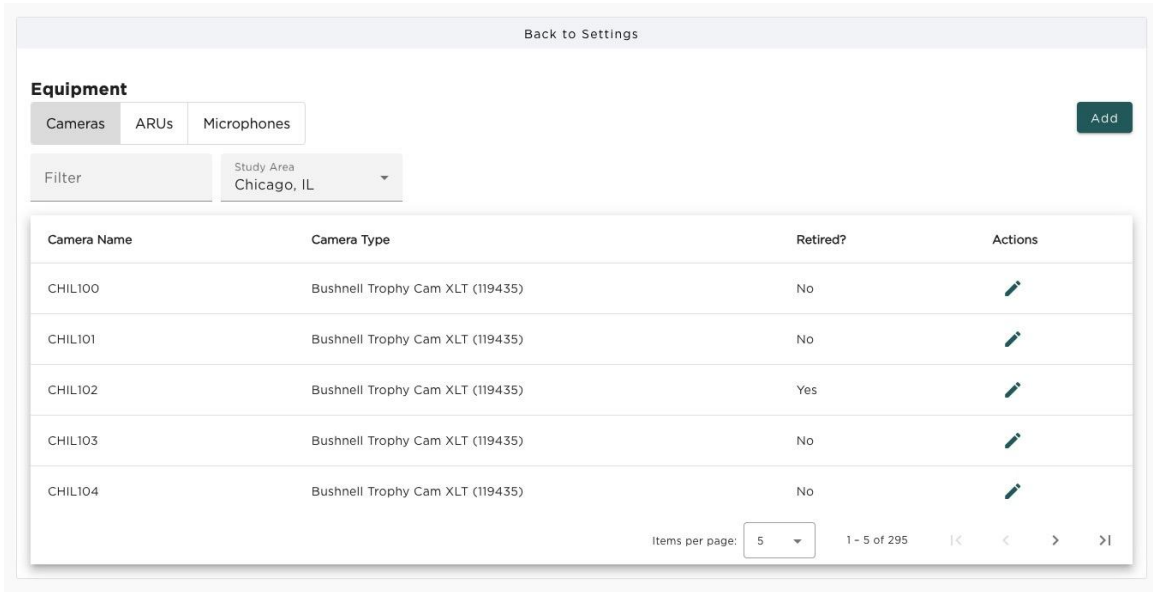


Figure 20. Equipment page

You may edit the details for a particular piece of equipment by clicking 'Edit' on the row associated with a camera, ARU, or microphone. You will be brought to the appropriate form (Figure 21) where you may alter its name, type, and whether or not the equipment has been retired or is no longer in use. A device may also be removed if it is not associated with any visits.

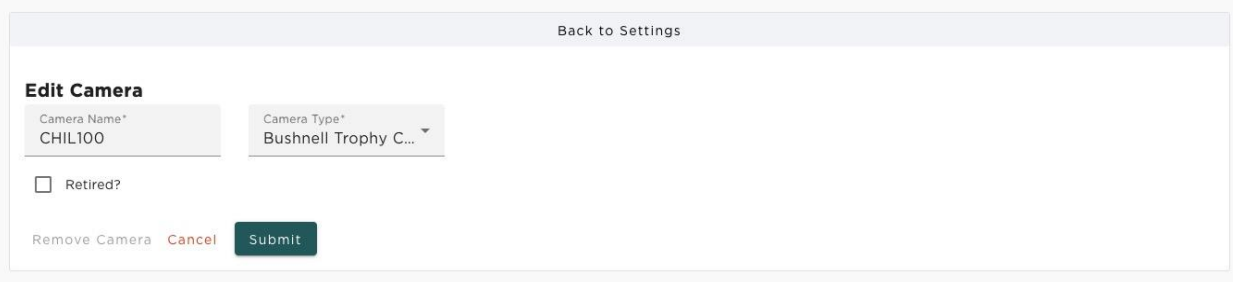


Figure 21. Edit Equipment Page

You may add a new device by clicking the 'Add' button in the top right corner. This will bring you to the form to add a new piece of equipment (Figure 22) where you may enter the equipment name, type, and whether or not it has been retired for a new device.

Back to Settings

Add Camera

Camera Name* Camera Type* ▼

Retired?

Cancel Submit

Figure 22. Add Camera Type page

Visit Actions

The Visit Actions page displays a table of all current visit actions that can occur on a visit (Figure 23). The filter text box allows filtering on any column of the table. Columns may also be sorted by clicking the appropriate header.

Back to Settings

Visit Actions

Filter Add

Action Name	Actions
Baited first time	
Downloaded images	
Moved camera	
No Action	
Placed camera	

Items per page: 5 1 - 5 of 14 < >

Figure 23. Visit Actions page

You may edit a visit action by clicking 'Edit' on the row associated with that visit action. You will be brought to the Edit Visit Action page (Figure 24) where you may alter the visit action name. A visit action may also be removed if it is not associated with any visits.

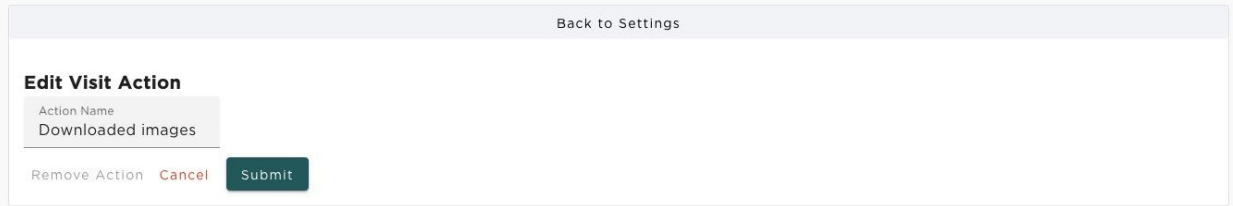


Figure 24. Edit Visit Actions Page

You may add a new visit action by clicking the blue 'Add' button in the top right corner. This will bring you to the Add Visit Action page (Figure 25) where you may enter the action name.

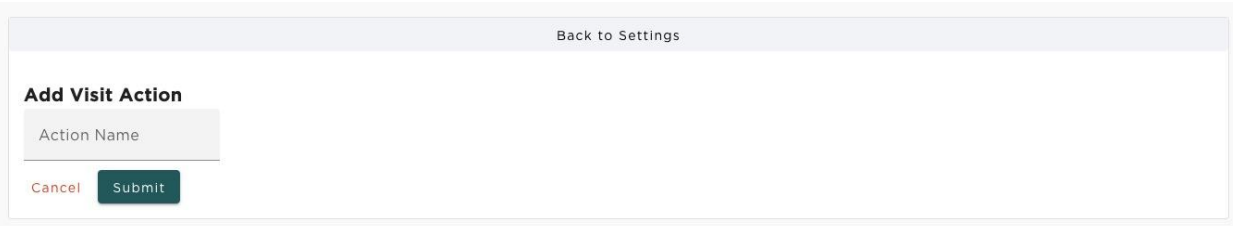


Figure 25. Add Visit Action page

Species

The Species page (Figure 26) displays a table of all current species that can be detected in a photo. Please note that the species used for classifying recordings are not displayed in this table because users do not have control over the species defined in the BirdNET machine learning model. The filter text box above the table allows filtering on any column in the table. Columns may also be sorted by clicking the appropriate header. The Species' table is shared between all cities. This is to ensure consistency in the language used to tag images. **As such, please do not delete any entries on this table.**

Back to Settings

Master Species List

Filter Regional Species List Add

Common Name	Genus	Species	Short Name	Actions
(Domesticated) Dog	Canine	Golden Doodle	Doggo	
Albert's Towhee	Melozone	aberti	Albert's Towhee	
allegHENY woodrat	Neotoma	Magister	a. woodrat	
Allens Hummingbird	Selasphorus	sasin	Allens Hummingbird	
American Badger	Taxidea	taxus	badger	

Items per page: 5 1 - 5 of 324 < >

Figure 26. Species page

You may edit a species by clicking ‘Edit’ on the row associated with that species. You will be brought to the Edit Species page (Figure 27) where you may alter the common name, genus, species, and short name of the species. The short name is what will be displayed throughout the app when selecting species. A species may be removed if there are currently no detections of that species in a photo. If there are, a dialog box will open (Figure 28) giving you options for deleting a species with associated detections. You may select to remove all detections of that species then remove the species itself. Otherwise, you have the option to change all detections of a certain species to a different species, which can be selected from the dialog box drop-down. The most common use case for changing all detections of one species to another is when observer enters a new species such as “Red-winged Blackbird” while tagging, but you want only the more general species of “bird”. You can select to remove the species “Red-winged Blackbird” and, when prompted by the dialog, select to change all detections to “bird”.

Back to Settings

Edit a Species

Common Name*
allegHENY woodrat

Genus
Neotoma

Species
Magister

Short Name*
a. woodrat

Cancel Submit

Figure 27. Edit Species Page

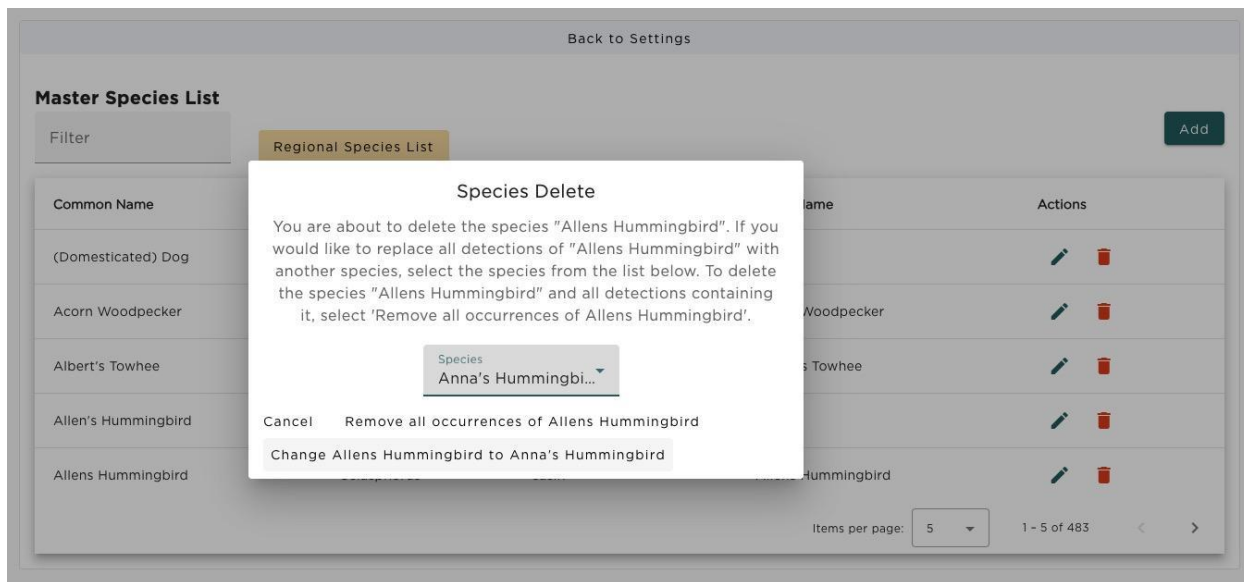


Figure 28. Species with associated detections Delete Dialog

You may add a new species by clicking the blue 'Add' button in the top right corner. This will bring you to the Add Species page (Figure 29) where you may enter the species common name, genus, species, and short name.

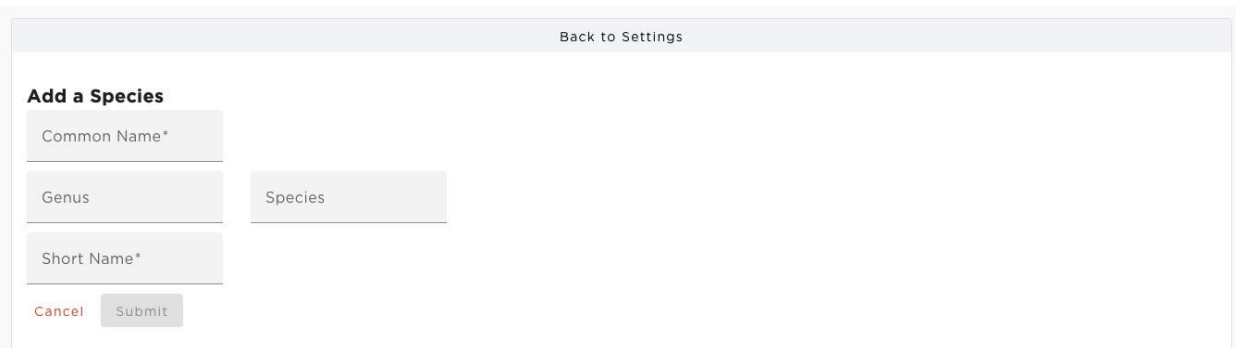


Figure 29. Add Species page

Species Details

The Species Details page displays a table of all details that can be used for classification and the number of species associated with each detail (Figure 30). Clicking on the dropdown in the species column displays all the species that are currently associated with the corresponding detail. Each detail also has an "Edit" button under the action column to change the species that are associated with it.

Back to Settings

Species Details

Filter Add

Detail	Species	Actions
Antlerless	1 Species	
antlers	Close	
	White-tailed deer	
	Deer (cannot ID)	
	Mule deer	
Carrying Food	2 Species	
carrying prey	20 Species	
collar	2 Species	

Items per page: 5 1 - 5 of 58

Figure 30. Species Details table

Clicking the blue “Add” button in the top right corner displays a form with a text input to set the detail text as well as a dropdown to select all species that you would like to associate the new detail with (Figure 31).

Back to Settings

Add Species Detail

Detail Text* Species*

Cancel Submit

Figure 31. Add a species detail

Clicking the “Edit” button displays a form with a text area to edit the detail text and a dropdown to select or deselect the species that should be associated with the detail (Figure 32). If there are no existing detections where the detail is used, there is also an button to delete the detail entirely.

Back to Settings

Edit Species Detail

Detail Text* Species*

Injured 1 Species Selected

Delete Detail Cancel Submit

Figure 32. Editing a species detail that does not have detections

If you choose to edit a species detail, there is a possibility that there will already be detections using that detail. In such a case, the “Delete Detail” button will be disabled, since there are existing detections that depend on the detail. Similarly, the species dropdown will have some options that are disabled to prevent removing a species that already has a detection using the selected detail. You will only be able to edit the detail text, add a species, or remove a species that does not have detections with the given detail (Figure 33).

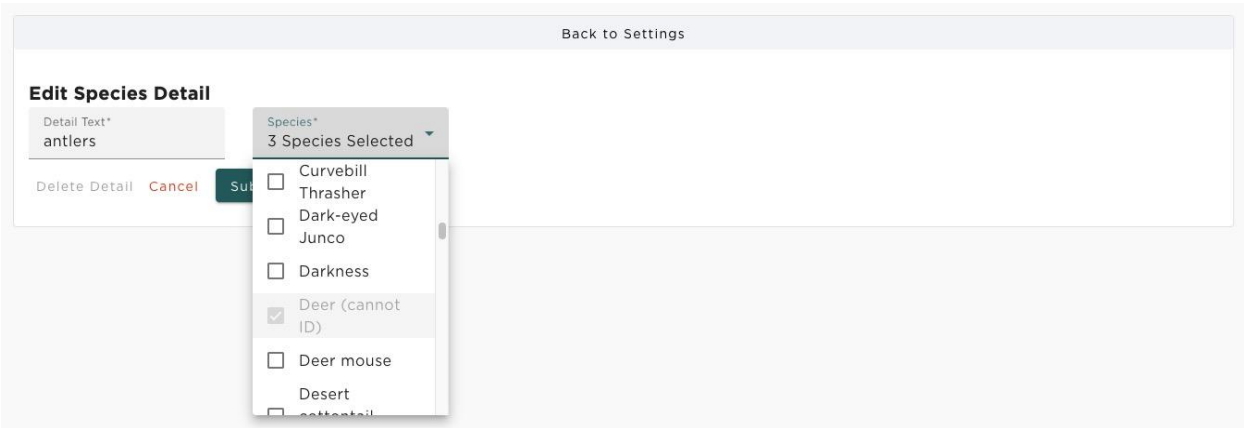


Figure 33. Editing a species detail that has detections

Lures

The Lures page displays a table of all lures available for use at camera locations (Figure 34). Each lure has an option to edit the lure name, or to delete the lure. When the “Edit” button is clicked, a form will open to allow changing the lure name. When the “Delete” button is clicked, a dialog will open to confirm the deletion.

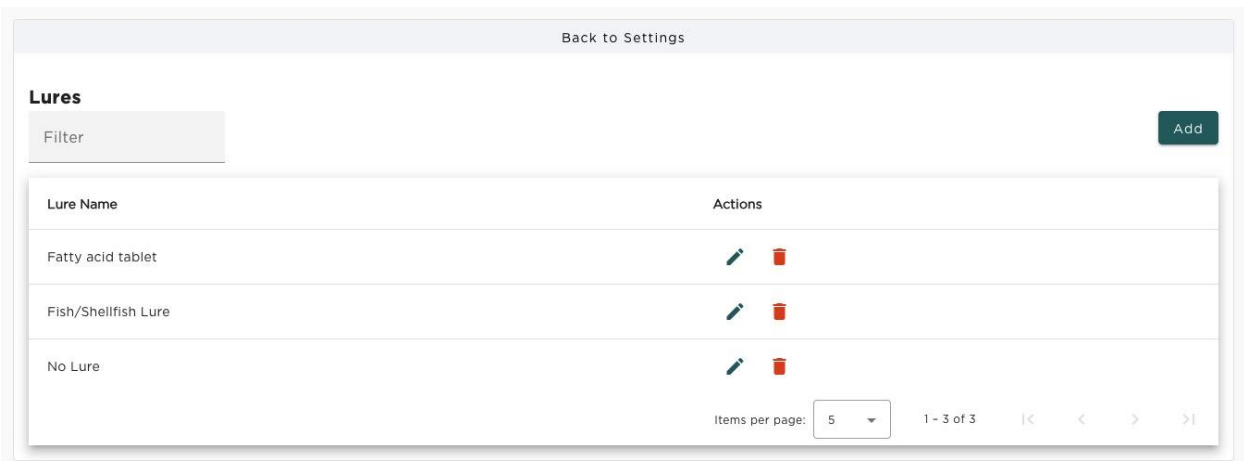
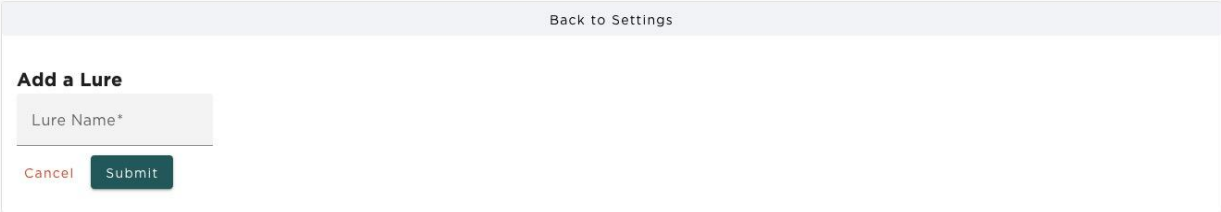


Figure 34. Lures table

Clicking the “Add” button will open a form to add a new lure (Figure 35). Simply enter the name of the lure and submit to create a new entry.



The screenshot shows a web form titled "Add a Lure". At the top right of the form area is a link that says "Back to Settings". Below the title, there is a text input field with the placeholder text "Lure Name*". At the bottom left of the form are two buttons: a red "Cancel" button and a dark green "Submit" button.

Figure 35. Add a new lure

Visits and File Uploads

Once the underlying settings have been configured, users will be able to add visits to associate their equipment with a specific location, and they can then upload media files that were captured on these devices. By default, all study areas will be able to upload photos for classification and validation. However, only study areas that have been licensed by a global admin may upload audio files to get processed through the sonic pipeline. If a study area is not licensed, then the button to initiate a recording upload will be disabled. Please contact an administrator for more details on how to configure your study area for sonic pipeline use.

Visits

By selecting the “Visits” option on the left-hand navigation bar, you will be taken to the Visits page. Here you can see a table, which can be sorted based on any of the table headings (Figure 36). Use the filter bar to search for particular sites, dates, cameras, or audio recording units (ARUs).

A visit must be added before you can import photos or recordings from that location. By clicking “Add”, you will be directed to a form where you can fill out data for a new visit (Figure 37). Each visit is associated with a specific site location, and three types of visits are typically logged for each season and site. A “set” which is when you first set up the camera. A “check” is when you check the camera during the season. A “pull” is generally done at the end of the season when you take it down from the location. You will also need to associate a camera or ARU to the visit. If you use a new camera or new ARU for a visit then you will have to go into the settings page to add a new camera or new ARU. Some of the data fields will be prefilled to the most commonly used options. For example, camera sensitivity will be preset to normal, condition is preset to Undisturbed/Operable, Lure will be set to “No Lure” tablet.

Once all of the information required is filled out for the visit, click submit, and that visit will be updated to the database and will show on the table. If you made a mistake when creating a visit or want to update active start and end dates as well as photo dates, you can click “edit” in the corresponding row of the visit which will direct you to the edit page (Figure 38). If you want to just review the visit information but not change anything, you can click “view” and it will bring up all of the information tied to that visit. The edit and view pages are very similar except you cannot edit a visit on the view page. Once a visit is added, the user can go ahead and import photos obtained from that visit.

The screenshot shows the UWIN web application interface. On the left is a dark green sidebar with navigation options: Visits (highlighted), Classifications, Validations, Reports, and Settings. The main content area is titled 'Visits' and features a 'Filter' dropdown set to 'Study Area: Chicago, IL' and an 'Add' button. Below this is a table with the following data:

Location	Visit Date	Type	Camera	ARU	# of Photos	# of Recordings	Actions
C04-MBP1: Marian Byrnes	Aug 2, 2023	Check	CHIL100	testaroo	2	0	[View] [Edit] [Import]
R10-FRM2: Fermi	Jun 29, 2023	Check	CHIL401	--	0	0	[View] [Edit] [Import]
R10-FRM1: Fermi	Jun 29, 2023	Check	CHIL319	--	0	0	[View] [Edit] [Import]
R07-FSPI: Four Seasons Park	May 30, 2023	Pull	CHIL187	--	51	0	[View] [Edit] [Import]
R07-GOF1: Glen Oak Forest Preserve	May 30, 2023	Pull	CHIL399	--	193	0	[View] [Edit] [Import]
R08-WBK1: Willowbrook	May 30, 2023	Pull	CHIL130	--	23	0	[View] [Edit] [Import]
R08-VLG1: Village Links GC	May 30, 2023	Pull	CHIL161	--	234	0	[View] [Edit] [Import]
R08-PAP1: Panfish Park	May 30, 2023	Pull	CHIL341	--	999	0	[View] [Edit] [Import]
R09-SM11: St. Michael's Cemetery	May 30, 2023	Pull	CHIL376	--	217	0	[View] [Edit] [Import]
R09-LIM2: Lincoln Marsh	May 30, 2023	Pull	CHIL252	--	379	0	[View] [Edit] [Import]

At the bottom right of the table, there is a pagination control showing 'Items per page: 10' and '1 - 10 of 7958'.

Figure 36. Viewing Visits table on Visit's Page

Add a Visit

Location*

Visit Date

Visit Type* Action*

Camera

Camera Name

ARU

ARU Name

Comments

Figure 37. Adding a Visit

Edit Visit

Location*

Visit Date

Visit Type*

Action 1* Action 2

Active Start Date Active End Date

First photo date: Thu Apr 13 2023 Last photo date: Tue May 30 2023

New Start Date

Camera

Camera Name

Sensitivity* Condition* Lure*

ARU

ARU Name

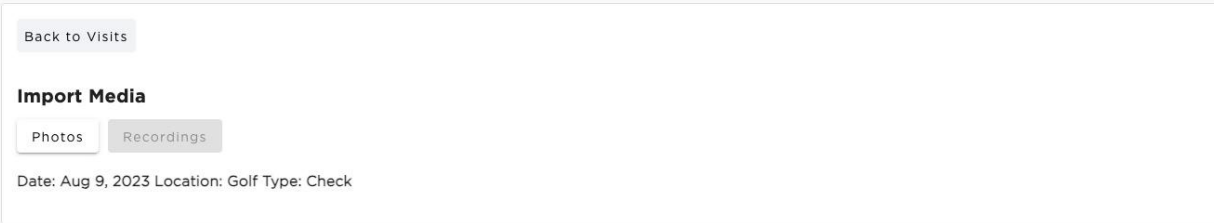
Comments

(times on this page are in the America/Chicago timezone)

Figure 38. Editing a Visit

Importing Media

You can import photos and recordings for a visit by clicking the “Upload files” button for the corresponding row in the table. This will bring you to the Import Media page (Figure 39). After confirming the visit listed is the visit you want to upload media to, select the type of media you would like to upload: photos or recordings. Note, you will only be able to upload photos for a visit that has a camera associated with it, and you will only be able to upload recordings for visits with an ARU and microphone. After selecting either option, a file browser for your operating system will open. Select the files you would like to upload and click “Open”. After loading the files in, the dates of the first and last files in the group will be pulled off the metadata associated with the files (Figure 40). These will be used to set the Active Start and Active End dates of the group of files. The Active Start and Active End dates are the dates when the device was active recording viable data. For scenarios when the device may have been tampered with or malfunctioning during a certain time period, the Active Start and Active End dates can be adjusted to make sure the malfunctioned photos/recordings are not included in reporting. In another scenario, you may notice that the dates on the files are incorrect. If this is the case, there is an option to select a new start date and time for the files. You can type a new start date or select the calendar icon to pick a date with the datepicker. You may also type the time or select it using the timepicker by clicking the ‘Time’ button. When the files are submitted, the first file date will be set to the date selected and every file after the first will be adjusted accordingly so that, if the second file in the group was taken 2 days after the first, this will not change once the dates of each file are adjusted. When you are satisfied with the Active Start and Active End dates and have made adjustments for the new file start time, you may click ‘Upload’ to begin uploading the files to google cloud storage.



Back to Visits

Import Media

Photos Recordings

Date: Aug 9, 2023 Location: Golf Type: Check

Figure 39. Import Photos page before photos selected

The screenshot shows a web interface for importing photos. At the top left, there is a 'Back to Visits' link. Below it, the 'Import Media' section indicates '4 photos selected' and includes a 'Clear all' button. The 'Choose Active Dates' section features two date pickers: 'Active Start Date' and 'Active End Date', both set to '5/20/2023'. The 'Adjust file datetime' section shows 'First file date: Sat May 20 2023' and 'Last file date: Sat May 20 2023'. It includes a 'New Start Date' picker set to '5/20/2023' and a time selector set to '01:18 PM'. A dark green 'Upload' button is positioned below these settings. A warning message at the bottom states: 'The webpage may briefly become unresponsive if you are adjusting the date/time of an import with over 1000 images. If this occurs please wait for the upload process to configure (i.e., do not kill the page).'

Figure 40. Import Photos page after photos selected

When the upload begins, the notifications bell in the top right of the page will show a ringing bell. If you click on the notifications bell, you can see your current uploads and their progress (Figure 41). If some uploads fail, you can retry the failed uploads by clicking 'Retry' for the associated upload. If you try to leave the page while files are being uploaded or there are failed file uploads, the browser will inform you that there is unsaved data on the page. *It is not recommended that you leave the page when files have failed or are being uploaded as those files will be lost and will not be uploaded to cloud storage.*

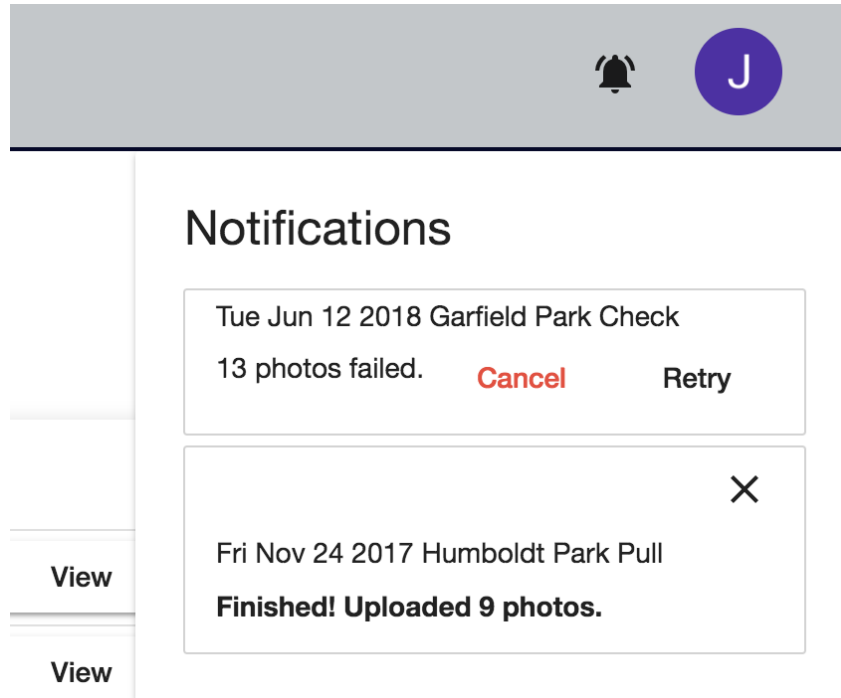


Figure 41. Notifications Menu with one failed upload and one success

During the upload process, the application will check if a file had previously been uploaded. If a duplicate file is detected, the upload for that particular file will be skipped, and a notification listing which files were skipped will be displayed. This allows users to upload a large batch of files without fear of uploading duplicates in case they were already uploaded by another user or in the unlikely event that a previous upload only succeeded for a subset of the files.

Once files have been uploaded, the number of photos and recordings associated with the visit will be listed on the Visits table. It is key to double check this number aligns with the number of photos expected to be uploaded. This column does not automatically refresh. **You must hit the refresh page button after uploading files to view the most recent count of photos or recordings.**

Classification

The purpose of this page is to display all photo groups that have been assigned to the current user for classification. You can navigate to the classifications page by selecting the “Classify” tab on the navigation bar on the left hand side of the screen. The landing page will display a table of any photo groups that have currently been assigned to you for classification, along with a button to begin tagging those photos (Figure 42).

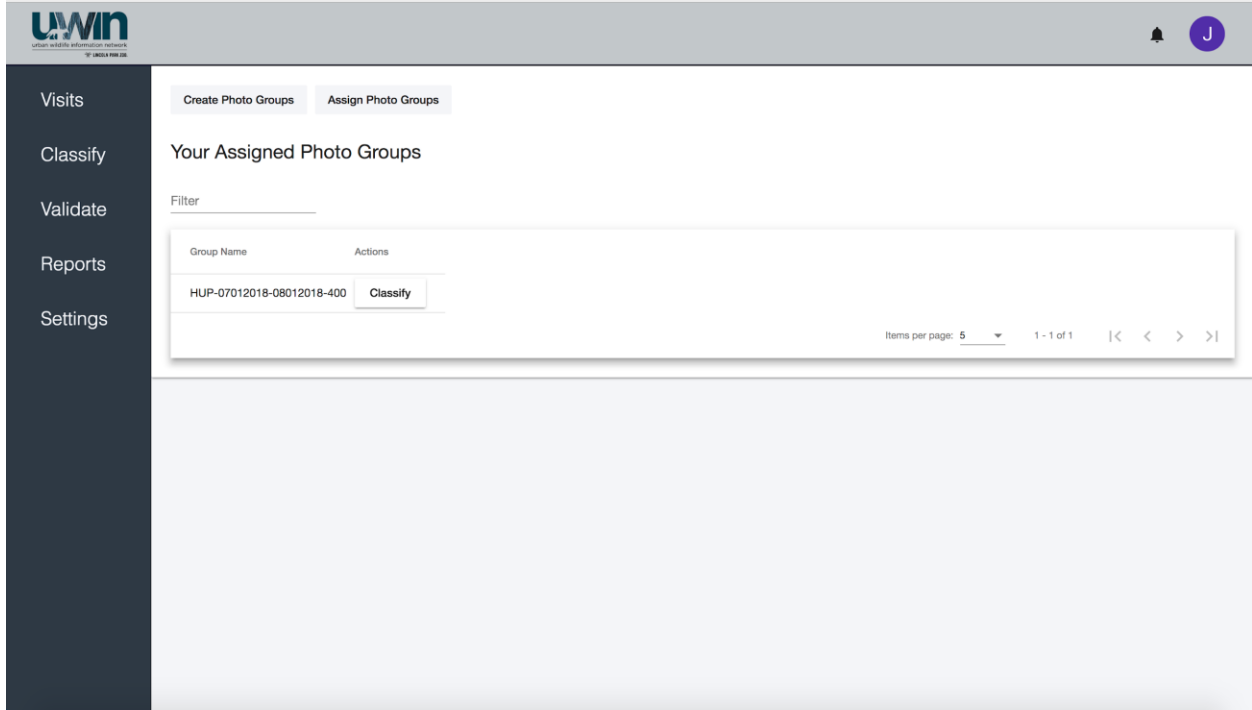


Figure 42. Classify landing page

Create Photo Groups

The purpose of this page is to create groups of photos from all the photos associated with a single visit. You can navigate to this page by clicking the “Create Photo Groups” button at the top of the Classify landing page. To begin creating photo groups, a visit must first be searched for and selected. The Create Photo Groups page has a dropdown to select a specific location, as well as an optional date filter to narrow down your visits search to a specific timeframe. Once the “Get Visits” button has been clicked, all visits that are associated with the selected location and optional timeframe are shown (Figure 43). Clicking on the name of a visit will allow you to select it and create photo groups from the photos that are associated with that visit.

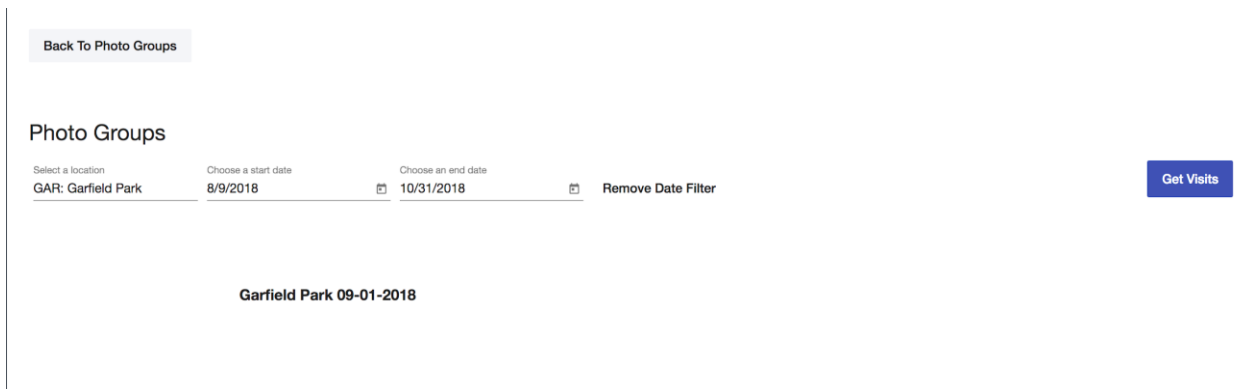


Figure 43. Get visits based on location and timeframe

Once a visit has been selected, the number of photos associated with it will be displayed along with a text box for you to enter the number of groups you wish to create (Figure 44). Once a number has been entered and submitted, the photos will be divided as evenly as possible among the number of groups, with any remainder being added to the last group made.

The screenshot shows a web interface for managing photo groups. At the top left is a button labeled "Back To Photo Groups". Below it is the heading "Photo Groups". There are three filter sections: "Select a location" with a dropdown menu showing "GAR: Garfield Park"; "Choose a start date" with a date picker showing "8/9/2018"; and "Choose an end date" with a date picker showing "10/31/2018". To the right of these filters is a "Remove Date Filter" button and a blue "Get Visits" button. Below the filters, it says "27 Photos in Garfield Park 09-01-2018". Underneath is a form labeled "Enter number of groups" with a text input field containing the number "3", and "Submit" and "Cancel" buttons.

Figure 44. Enter the number of photo groups to make

Assign Photo Groups

The purpose of this page is to assign existing photo groups to specific users for classification. You can navigate to this page by clicking the “Assign Photo Groups” button, which can be found both at the top of the Classify landing page as well as on the Create Photo Groups page after the groups have been created. This page will display a dropdown of study areas, a dropdown of users to assign, and an optional observer groups filter to populate the users dropdown with users in a specific observer group. A table of all photo groups associated with a study area will also be displayed, showing the group ID, name, and number of users currently assigned to the group (Figure 45). If the number of users currently assigned to a group equals the number of viewers for the selected study area, you will not be able to select the group for further assignments. From the users dropdown, you can select multiple users (including machine learning users) until the number selected equals the number of viewers associated with the selected study area. From the table, you can select as many photo groups as you wish to assign to the selected users.

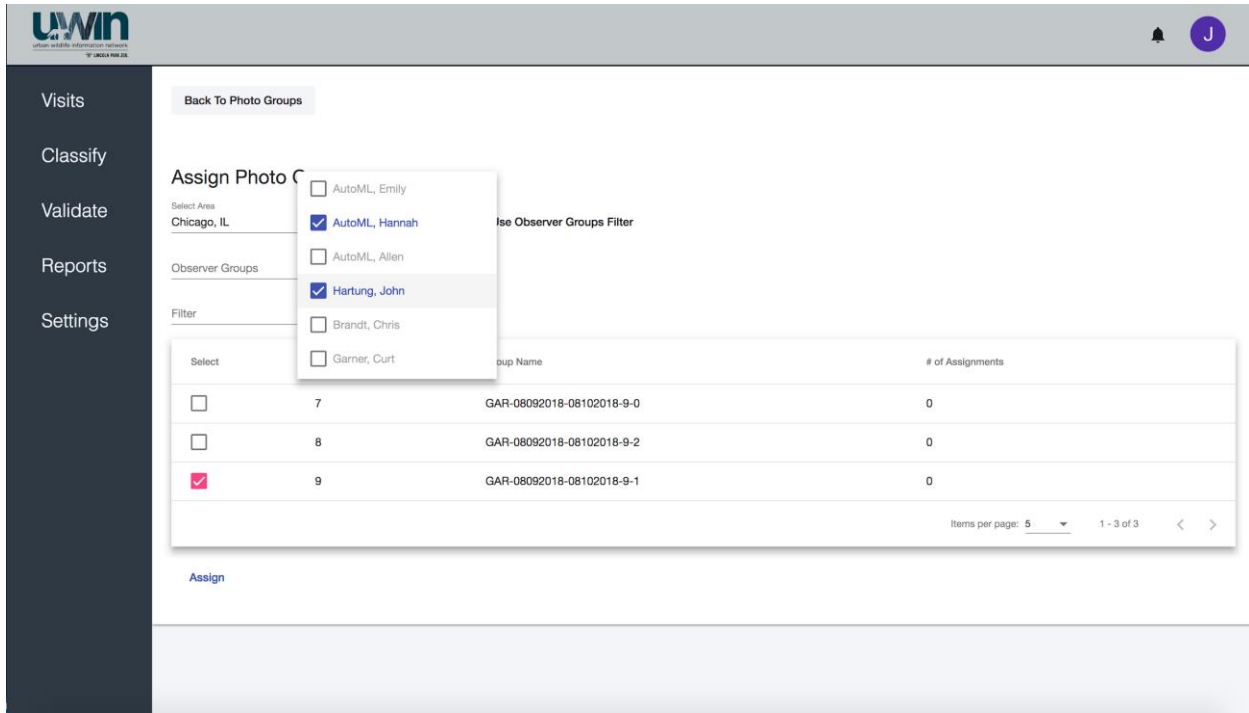


Figure 45. Assign selected photo group to selected users

Tagging

The purpose of this page is to classify each photo in an assigned photo group with any relevant species. You can navigate to this page by clicking the “Classify” button for a specific photo group on the Classify landing page. The page will display dropdowns to select species, the number of individuals, and any details applicable to the photo; the combination of these dropdowns together will represent a detection (Figure 46). The species dropdown lists the common name of all species; once an option is selected, the short name of the species will be displayed as the dropdown value. With both the species and the number of individuals, you are able to type directly on the dropdown to help filter your search. In line with the dropdowns are buttons to remove the corresponding detection; however, every photo must have at least one detection. Clicking on the “Add Another Detection” button will add another set of dropdowns in the case that there are multiple species in the photo. Clicking the “Save & Next” button will save the current tags and display the next photo in the photo group along with a blank set of dropdowns to start a new detection. Clicking the “Previous” button will display the previous photo along with all tags that have been saved with that photo; you can edit these tags by simply selecting different dropdown values, removing a specific detection, or adding another detection. The “Use Previous Photo’s Tags” button will be disabled on the first photo only; clicking it at any other time will automatically pre-fill the current dropdowns with the same values from the previous photo. Below the current photo is a textbox to leave an

optional comment on the photo, as well as a checkbox to highlight the photo if you find the photo particularly interesting. Highlighted photos will be able to be seen again in the Highlight Report.

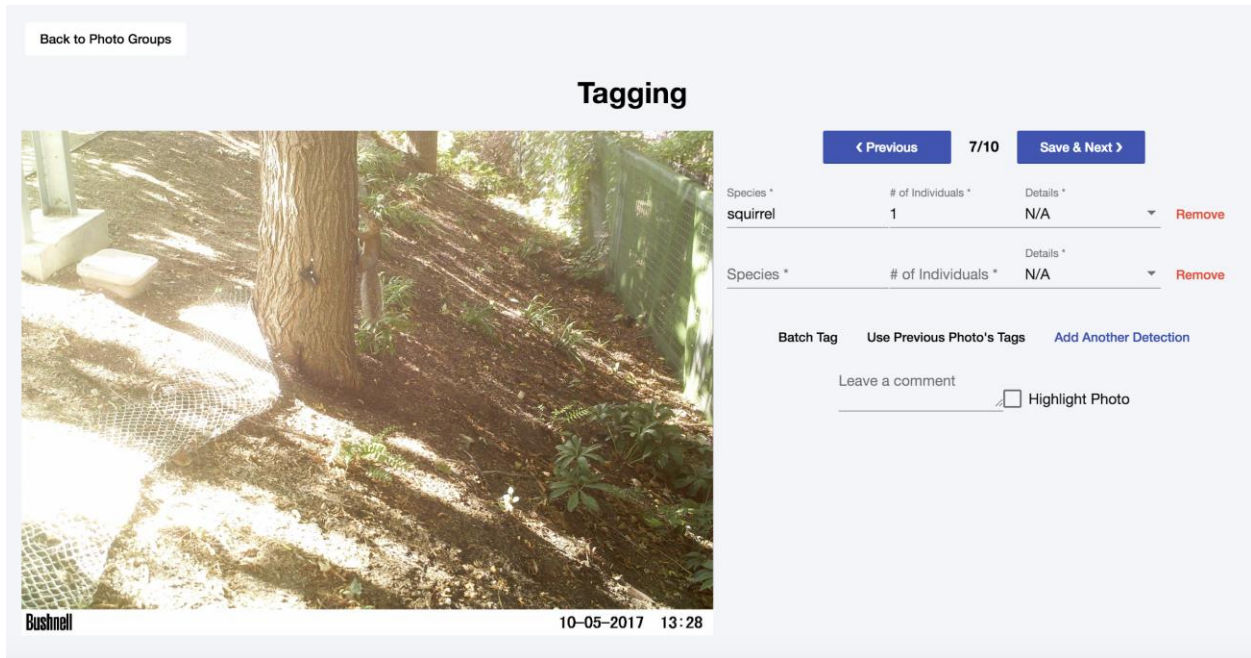


Figure 46. Tagging page

In the case that you see a new species that is not included in the species dropdown, the last entry in the dropdown is an “Add new species” option. When this option is selected, a dialog will open with a form to add a new species (Figure 47). Once the form is submitted, the dropdown will automatically be set to the short name of the newly added species.

Add a Species

Common Name *

Genus

Species

Short Name *

Figure 47. Add a Species Dialog

Once you have tagged all photos in the photo group, a dialog will open informing you that the photo group has been completed and whether a user should confirm that (Figure 48). Clicking “Yes” will return you to the Classify landing page (Figure 42).

Are you sure you want to submit your detections for this photo group?

No

Yes

Figure 48. Completion dialog

Batch Tagging

The purpose of this page is to tag large quantities of photos at once, given that they all have the same tag (e.g. all photos are empty). You can navigate to this page by clicking the “Batch Tag” button on the Tagging page. This page will display 3 photos at a time, starting with the last photo you viewed on the Tagging page (Figure 49). The next 3 photos in the group will be displayed each time you click “Load More Photos” until all the remaining photos in the group are displayed on the page. You can select or deselect photos by simply clicking on the photo; a selected photo will have a purple border around it. The “Select a range of photos” button allows you to quickly select a large portion of photos to tag; once the button is clicked, you will be prompted to select the first photo and the last photo, and all photos that are in between will automatically be selected.

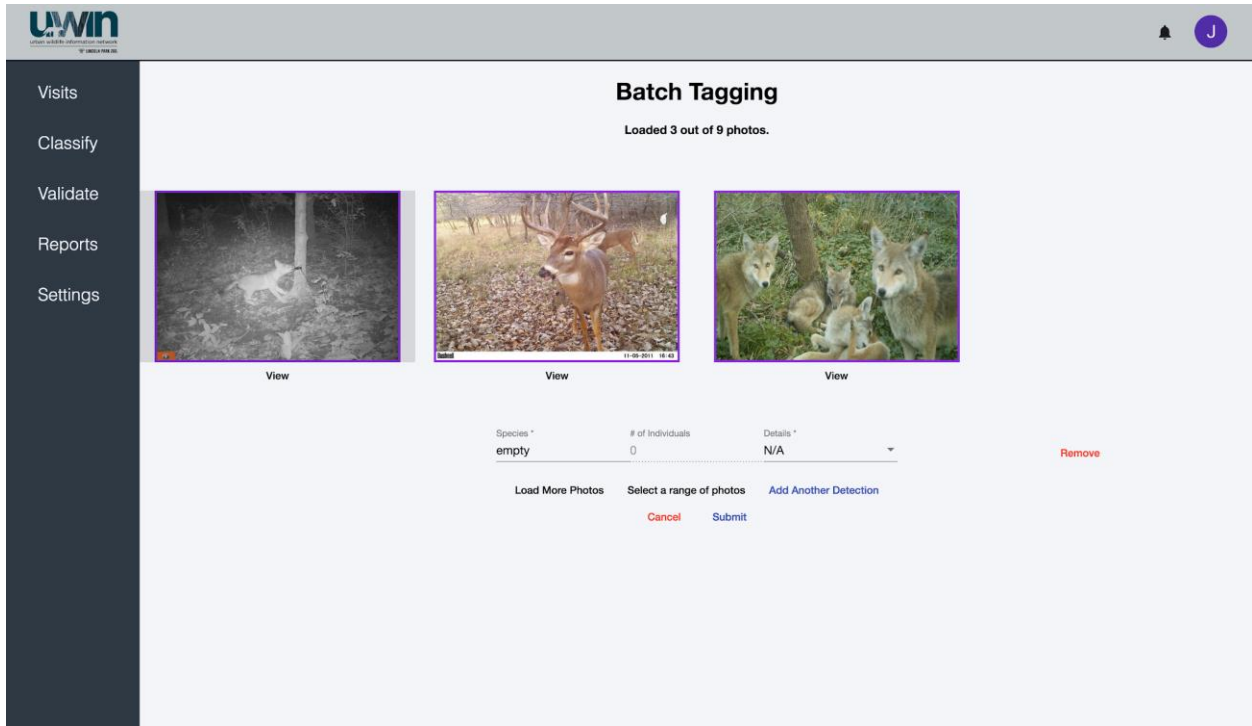


Figure 49. Batch tagging page

Beneath each photo is a “View” button; when clicked, a dialog will open displaying a larger version of the photo, allowing you to examine it more thoroughly (Figure 50). The dialog also has Next and Previous buttons to navigate through the photos, as well as a button to select or deselect the current photo.

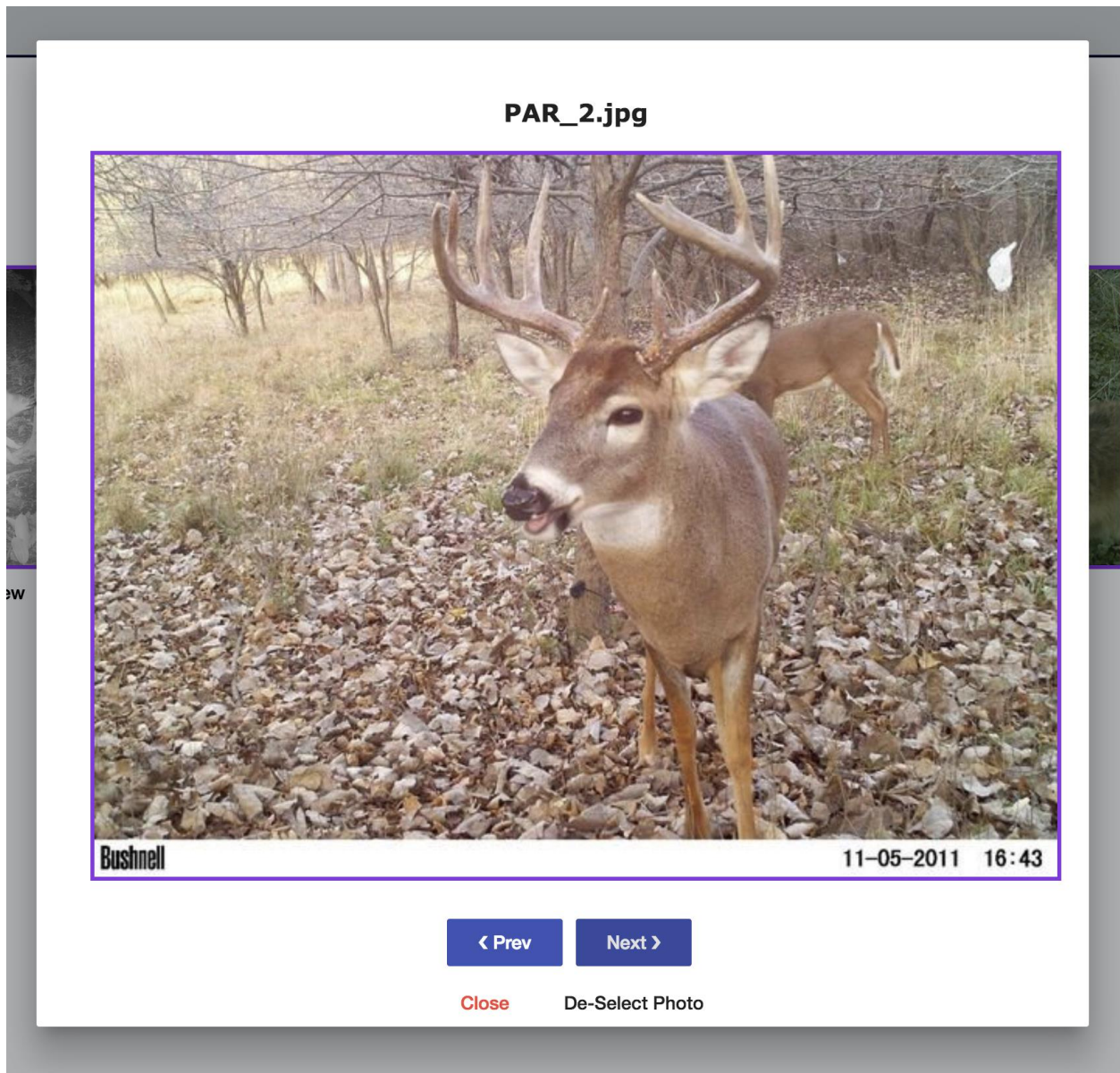


Figure 50. Dialog to view a photo more closely

Once the tags have been submitted for all selected photos, you will return to the Tagging page on the first photo in the group that does not yet have tags. If, after batch tagging, all photos have been tagged, a dialog will ask you if the photo group is finished (Figure 48 above).

Audio Classification

Audio classification is handled differently from photo classification. To classify bird songs in audio recordings, the UWIN app relies on the BirdNET classification model from Cornell ([ref](#)). To improve the performance of this BirdNET model, the UWIN app

first runs some pre-processing on uploaded recordings. After a researcher uploads a recording into the UWIN app, the recording is first stored in the cloud. Next, the UWIN app will split the recording into 3 second intervals and run a track isolation program (“MixIT”) on each three second interval. This track isolation program further splits each 3 second recording into 5 tracks—the initial “raw” 3 second recording and 4 “isolated tracks” which serve to highlight different frequencies in the recording, so that one powerful sound (like a car horn) doesn’t cover up any bird songs. After pre-processing, BirdNET analyzes these five recordings and the UWIN app stores all detections it finds in the UWIN database along with their confidence—a percentage value BirdNET assigns to each detection to display how likely it is that the recording’s bird song matches the detected bird. BirdNET will also create a spectrogram for any recording or isolated track that contains a detection. After these steps are complete, the classifications are ready to be validated by users.

Photo vs Recording validation screen

Photos Validation

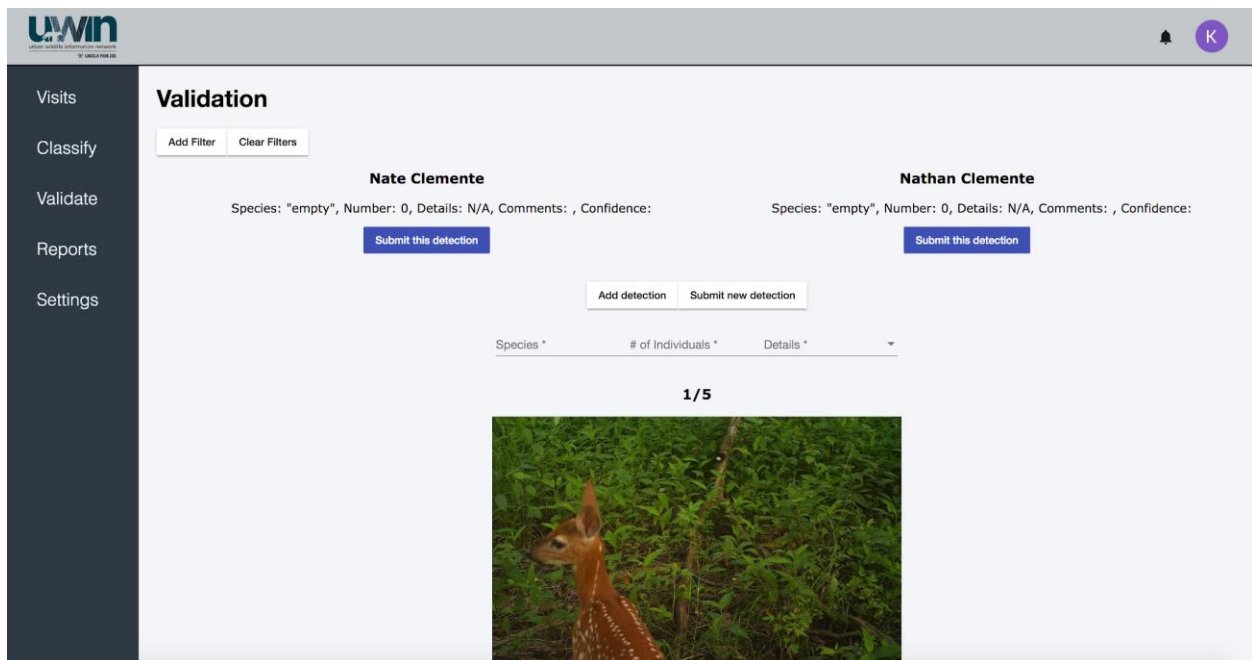


Figure 51. Validation flow

You are able to navigate to this portion of the app by selecting the tab of the left hand side named “Validate”. From here, you will see a loading spinner while all the photos that need validation are being retrieved. If there are no photos needing validation, you will be given a notification that there are no photos to review. Above

the picture (Figure 51), you can see that it shows you the total number of photos that need to be reviewed as well as the index of the current photo you are on. As an area admin, you will only be able to validate the photos in your specific area, and you will only be able to validate photos that you haven't previously seen.

Filtering

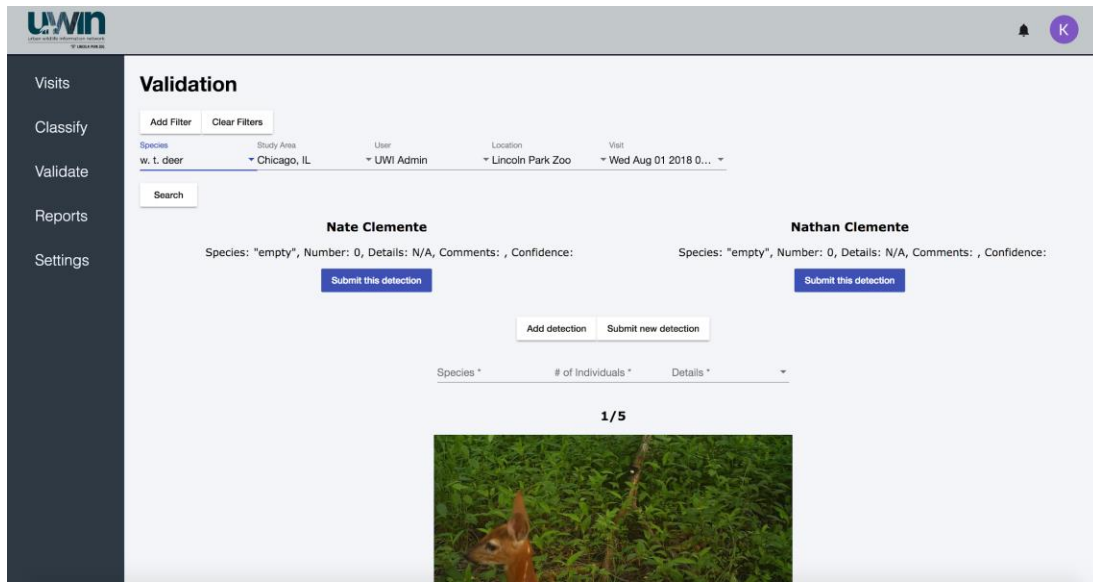
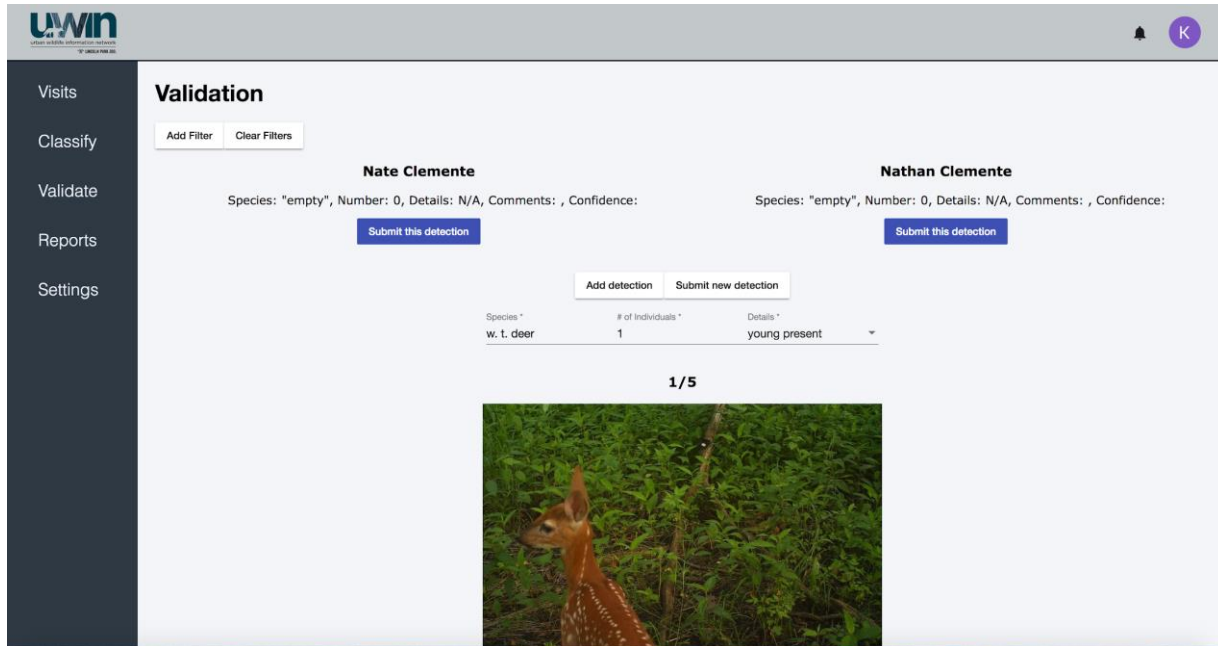


Figure 52. Dialog to view a photo more closely

In order to only retrieve the photos that contain a certain species, were tagged by a specific user, or are from a specific location or visit, you can select the “Add Filter” button in the top left hand corner of the page. The purpose of this option is to allow you to prioritize the validation of certain groups of photos over others. Upon clicking “Add Filter”, four dropdowns will appear (Figure 52). Your study area will be prefilled to the study area you are a part of. If you select a location, a fifth dropdown will appear to allow you to choose a specific visit from that location. This dropdown changes dynamically based on the location you select. Once you have selected your filters, you can select the “Search” button to retrieve the photos matching that filter. To remove this filter, select the “Clear Filters” button to have the page pull all photos that need validation regardless of filter and return the page to a state that looks like the first photo under validation.

Validating



Depending on how many viewers your study area specified per photo and if you have chosen an ML user to tag the photo, your screen may look a little different than this. Under the filtering buttons, you will see two detections listed, but if you have set a different number of viewers per photo you will see that many detections. The purpose of showing these detections is to allow you to choose which detection, if any, are correct. This will allow the system to run reports on your observers and see how well they are tagging.

To verify one detection over another, you can select the purple “Submit this detection” button underneath the details of the detection. This will confirm that detection as correct, mark the others as incorrect, and take you to the next photo.

If neither of the previous detections are correct, you can enter your own detection as well, and this section looks similar to the tagging form you saw in the classify section. This is done in the dropdowns below the “Add detection” and “Submit new detection” buttons. As in tagging, you can type on the line for species to filter and choose the species you want, or you can add your own species. You will then select the number of individuals that you see as well as any applicable details that apply to the species in the photo. If there are no special details for a particular species, you will enter an “N/A” here. The types of details that are available are dynamically updated based on which species you select. For example: selecting “w. t. deer” will show details “N/A” and “young present” but selecting “dog” will show details “N/A” and “off leash”. If there are more than one species is present or if the same species is present but with a different detail, select the “Add Detection” button to add another

and follow the same process for filling out this form as before. You will not be able to submit your own detection if not all of the fields in the tagging form have been filled out, if you enter multiple detections that have identical fields, or if you enter a detection that matches a previous detection. This ensures that the observer reports have an accurate count of percentage of detections that were confirmed correct. Once your detection is finished, select the “Submit new detection” button to confirm your detection as correct, mark the others as incorrect, and take you to the next photo.

Once you go to the next photo, you are not able to return and fix a validated detection, so ensure you haven’t made any errors before you submit your own detection or a previous detection.

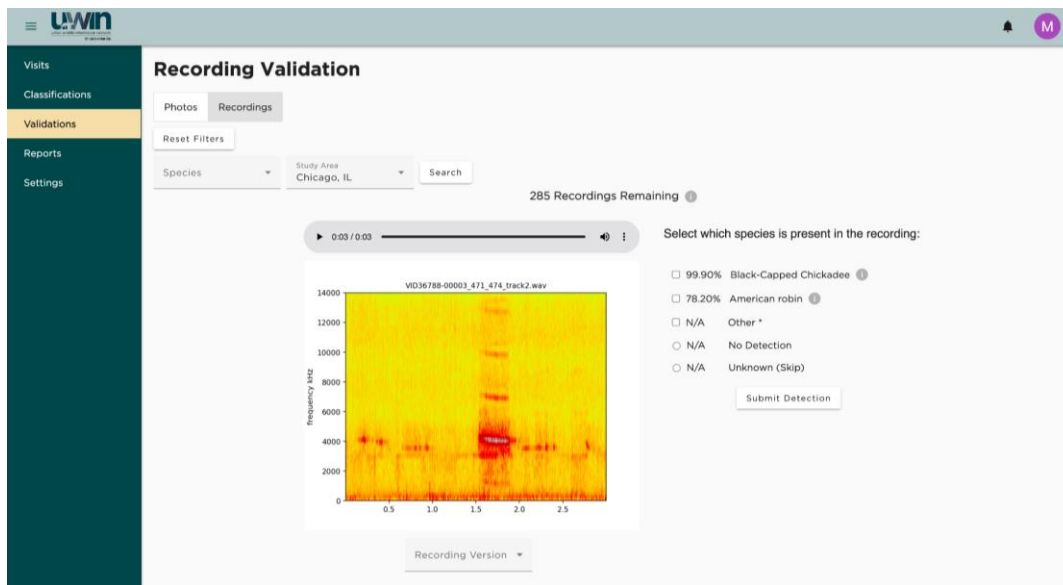
Recordings Validation

The recordings validation page was added to the UWIN app in summer 2023. This is where researchers can manually validate the detections made by the BirdNET classification model. By default, users will be able to validate all recording detections within their study area. To navigate to the recordings validation page, click on “Validation” in the side-bar, and then a new page will prompt you to select either “Photos” or “Recordings” to validate. Once on the page, users will see the spectrogram, audio file, and detection options for each 3 second recording that contained a bird detection. Users will have the option to select any **Explicitly state you can select multiple species per recording + example** species BirdNET has detected within the 3 second recording and/or input their own “Other” species. Users can also select No Detection if they believe no birds were captured in the recording or select “Unknown (skip)” if they aren’t sure what birds they are hearing. If the user selects No Detection, then the recording will be classified as not having any birds and if the user selects Unknown (skip) then nothing will be saved and users will continue to be able to validate the recording. Users can also toggle between tracks within the same 3 second recording—which will update the embedded recording and spectrogram (if one exists for the track) on the page. Toggling tracks will not change species detection options as the values displayed are the maximum confidence intervals found across all 5 tracks (e.g. if BirdNET outputs a 82% bluebird

from the raw track and a 96% bluebird on isolated track 3, then 96% will be displayed for the 3 second recording).

Filtering

Any user can filter by Species, and only Global Admin can filter by Study Area. The Species dropdown displays the common name along with frequency of occurrences that species appears in the BirdNET detections. The number associated with the common name in the dropdown comes from looking at each isolated track returned



from the database, checking if there is a corresponding detection for that track, and then keeping track of the time each unique species appears in the detections. This number is deceiving because tracks that come from the same 3 second interval may have 3 detections with American Robin. Only the Robin detection with the highest confidence will appear in that validation selection list, but the 3 Robin detections will count towards the number that appears for “Robin” in the dropdown. Once the user makes a selection in the Species dropdown, upon clicking the Search button, the page will only reload and only display the isolated tracks that have the selected Species as one of the available options in the selection list.

Reports

You can navigate to the reporting dashboard to access all of the report generators by clicking on the “Reports” tab on the left navigation bar. This reports dashboard is accessible to every user level. Each user will only have access to data associated to their associated study area.

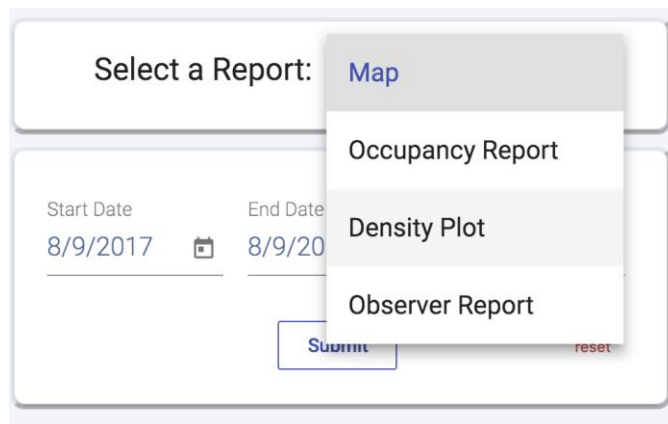
Overview Section

On the top left of the reports dashboard is the overview section. This is where you will see quick facts about your study area. This includes the number of locations generated by the finding the number of locations where a species was detected during the start date and end date on the filter. The number of species is generated by finding the number of unique species detected filtered by the start date, end date and the selected species on the filter. This number does not include species tag “other”, “empty” or “not empty”. The number does include humans. Another quick fact is the number of detections which is generated by finding the number of valid/confirmed detections based on every parameter listed in the filter. These parameters include the start date, end date, selected locations, selected species, and selected users. The last quick fact is the number of total photos. This is the total number of photos taken during the active start and active end dates for all visits for that study Area. This section is dynamic meaning anytime the filter input is changed and you click submit, all of the quick facts except for total photos will update. You can also hover over each quick fact to see how each quick fact is generated.

Report Changer and Filter

You can toggle between different reports by selecting the report in the report selector drop down menu. The report selector is preset to show the “Map”. There are different filter parameters for each report so on the selection of a report, the filter underneath will change accordingly. For example the filter will only show start date, end date, and the multiselect species drop down when the “Map” is selected, but

when “Density Plot” is selected then the start date, end date, and the single select species drop down will be shown. The filter is designed to not allow you to click submit until all necessary parameters are filled. If the user entered an incorrect date, then it will show an error on that exact date. This filter will catch if the start date is after the end date, or if the user decides to type in the date, then it will catch whether or not the date is in a valid format. Once all the parameters are in the correct format, the submit button turns blue, and you click submit then the report area on the right will generate and show the report. The one exception for this is the occupancy and multi-seasonal occupancy report. This report will be downloaded to a csv file instead of being shown on the right side of the dashboard. The filter parameters also persist between reports meaning if you submit a changed start and end date on the map filter and change the report to the occupancy report then those same start and end dates will be prefilled. Same goes for the species selector and the locations selector.



Map

An empty map will automatically show as a default when the report dashboard loads. After setting search filters, the map is used to see all of the different locations within the study area which are shown with red, blue, or yellow points. The blue points mean that there are *photo* detections at that location during the time span selected in the filter and also for the species detected in the filter. The red points mean that there are *recording* detections at that location during the time span selected in the filter. The yellow points mean that there are *both* photo and recording detections at that location during the time span selected in the filter. If there are no species detected at the location based on the filter parameters then the point will be gray. This is so you can visually see which species are detected in which areas during a certain timespan. Each one of these location points are clickable. When clicked an info window pops up with an overview of the location. This overview includes the location abbreviation, the landowner for the location, and the

number of unique species detected at that location. This number is also based on the filter parameters.

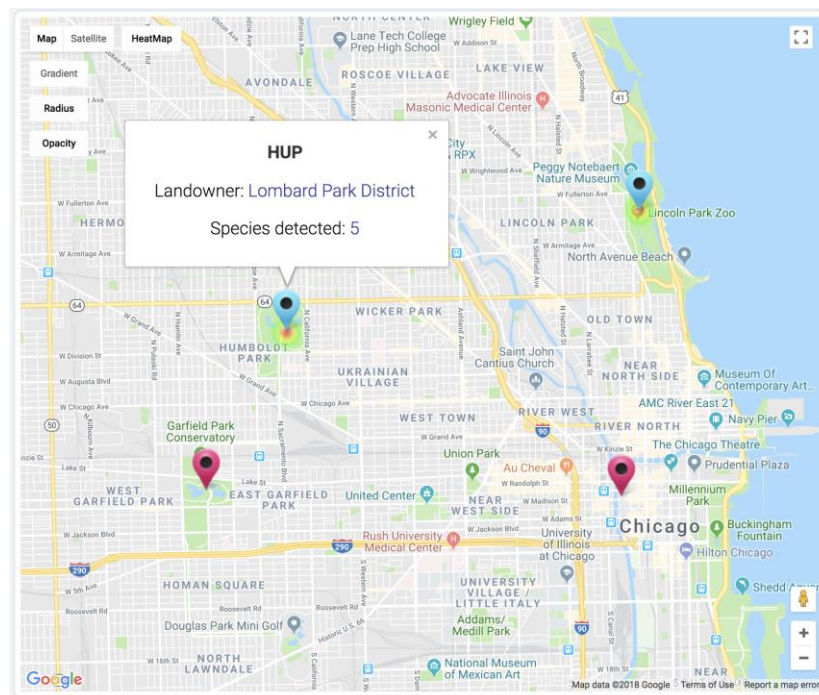
Another feature to this map is the ability to toggle on and off the heat map. This heat map shows where the detections are found. The darker the color, the more detections in that area. The top left of the map are the controls for the heat map. Clicking "HeatMap" will turn the layer on and off. There are also options to customize the heat map as well which include "gradient", "radius", and "opacity". Gradient changes the colors of the heat map, this is preset to green meaning less detections and a red center meaning more detections. Radius changes the size of the heat map detections. This will be used to more easily see areas where the detections are low. The opacity button changes the heat map to be more visible or less visible. It is preset to be less visible so it doesn't over crowd the map on the initial load, but when clicked the heatmap will be a brighter, non see-through color to more easily view the heatmap.

Also in the upper left hand side of the map is the ability to customize the look of the map. It is preset to show the classic map background, but you can change between terrain view, satellite view and showing/hiding map labels. You can zoom in and out of the map by using two fingers to scroll while the mouse is hovered over the map or you can use the "+" and "-" buttons to zoom in and out. The final feature of the map is the ability to see canopy coverage by using the google maps street view built into this map. Using the little man on the bottom right side of the map you can click and drag him on the location points to see the street view of that location. On the top

right of the map you will see a square icon. Clicking this icon will make the map full screen.

Occupancy Report

The occupancy report will generate a csv file that shows if a species was detected at a certain date at a certain location. Unlike the other reports, when you click “generate csv”, the report will be generated and automatically saved in your downloads instead of showing on the right side of the report dashboard. You can choose to generate this report for multiple species, multiple locations, and for



multiple seasons. You can also select whether you'd like to generate the report based on camera- or audio- based detections. To create a multi-seasonal occupancy report you can click the “Seasonal” button on the bottom left side of the filter section. Here the filter will change showing the ability to add seasons. To create seasons, the user will choose the start date for each season and then choose the number of days each season should be. The user is not able to click submit until all fields are filled out correctly. For example each season has to start in sequential order, users can't add another season unless the season start date is filled for the previous season. The number of days also can't surpass the difference between season start dates to eliminate overlap. The number of days will also prefill to the maximum number of days aloud. The picture above shows what a generated multi-seasonal occupancy will look like. “NA” means that the camera at that location was not active during that date. “0” means the camera was active, but there was no

detections. "1" means the camera was active and there was a detection during that date.

Seasons Leg	Start Date	End Date							
Season 1	8/9/17	11/6/17							
Season 2	12/9/17	3/8/18							
Season 3	3/9/18	6/6/18							
Species	Season	Site	Day_1	Day_2	Day_3	Day_4	Day_5	Day_6	
beaver	1	GAR	0	0	0	0	0	0	
beaver	1	HUP	0	0	0	0	0	0	
beaver	1	LPZ	0	0	0	0	0	0	
beaver	1	Par	NA	NA	NA	NA	NA	NA	NA
beaver	2	GAR	0	0	0	0	0	0	
beaver	2	HUP	NA	NA	NA	NA	NA	NA	NA
beaver	2	LPZ	0	0	0	0	0	0	
beaver	2	Par	NA	NA	NA	NA	NA	NA	NA
beaver	3	GAR	0	0	0	0	0	0	
beaver	3	HUP	NA	NA	NA	NA	NA	NA	NA
beaver	3	LPZ	0	0	0	0	0	0	
beaver	3	Par	NA	NA	NA	NA	NA	NA	NA
bird	1	GAR	0	0	0	0	0	0	
bird	1	HUP	0	0	0	0	0	0	
bird	1	LPZ	0	0	0	0	0	0	
bird	1	Par	NA	NA	NA	NA	NA	NA	NA

Species Timestamp

The species timestamp report presents relevant metadata for each species detection found in the filtered range. Users select whether they want photo or recording data and then can define a date range, species list, location list, and validation criteria for the resulting report.

1	PhotoNari	Timestamp (UTC)	Species	SpeciesDt	Count	Status	SiteAbbr	Latitude	Longitude	Visit ID	Visit Datetime (UTC)	Lure	Camera Sensitivity
634	VID32875-00	2022-10-22T09:12:11.000Z	White-tailed deer	N/A	1	unconfirmed	S06-CBW2	41.7288	-87.8925	32875	2022-11-04T19:30:00.00	No Lure	Normal
635	VID32875-00	2022-10-22T09:52:18.000Z	Virginia opossum	N/A	1	unconfirmed	S06-CBW2	41.7288	-87.8925	32875	2022-11-04T19:30:00.00	No Lure	Normal
636	VID32875-00	2022-10-22T12:54:56.000Z	Tree squirrel (cannot IC)	N/A	1	unconfirmed	S06-CBW2	41.7288	-87.8925	32875	2022-11-04T19:30:00.00	No Lure	Normal
637	VID32875-00	2022-10-22T14:47:03.000Z	Eastern gray squirrel	N/A	1	unconfirmed	S06-CBW2	41.7288	-87.8925	32875	2022-11-04T19:30:00.00	No Lure	Normal
638	VID32875-00	2022-10-22T14:52:18.000Z	Eastern gray squirrel	N/A	1	unconfirmed	S06-CBW2	41.7288	-87.8925	32875	2022-11-04T19:30:00.00	No Lure	Normal
639	VID32875-00	2022-10-22T14:53:18.000Z	Eastern gray squirrel	N/A	1	unconfirmed	S06-CBW2	41.7288	-87.8925	32875	2022-11-04T19:30:00.00	No Lure	Normal

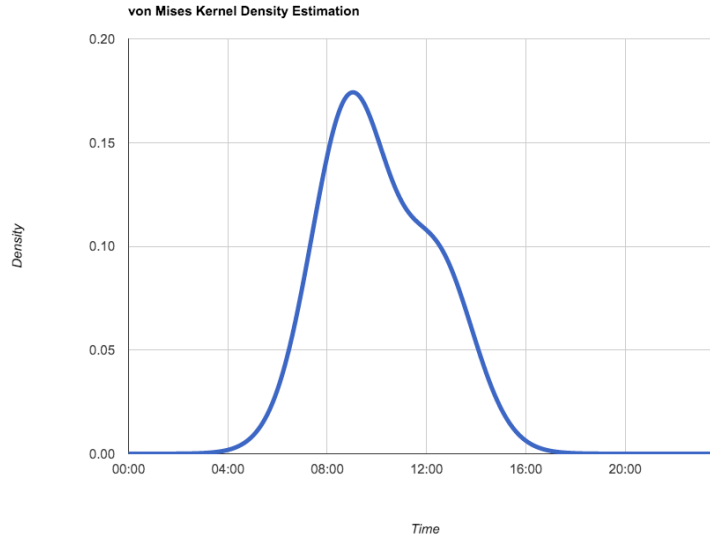
An example species timestamp report

Density Plot

The density plot is a line graph that shows the probability of a species being detected by camera traps during the start and end dates in the study area at a certain time of day using the Von Mises Density index. The y-axis shows the Von Mises index between 0 and 1. The x-axis shows the time of day using military time. If you would like to export the raw data then you can do so by clicking "Generate CSV" at the top of the report.

Density Plot
Species: woodchuck

Generate CSV



Observer Report

The observer report presents data regarding how accurately an observer is tagging photos as well as their progress in completing their assigned photo groups. The filter works for this section as well if you want to specify which dates you want to look at detections between or if you only want to see a subset of users. All of this data is neatly presented in a data table that acts like the tables you saw in the data entry

pages. You also have the ability to download a CSV file of the data by selecting the purple “Generate CSV” button.

Highlight Report

TODO

Observers Report

[Generate CSV](#)

Filter

First Name	Last Name	Correct Detections	Total Detections	Percentage Correct	Assigned Photo Groups	Completed Photo Groups
Jesse	Kaffenberger0	0	0	0	0	0
Emily	AutoML	0	0	0	0	0
Joe	Kimlinger	0	0	0	0	0
Kendyll	Kraus	0	0	0	0	0
Jason	Ryan	0	0	0	0	0

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Appendix

ML Validation Algorithm

Note: *This application is for future use only. The Machine Learning tool has not been fully tested, and has additional costs associated with its use.*

Currently only Emily (empty/other) and Hannah (empty/human/other) users are valid assigned users. Allen is for future validation configuration.

Study Area Configuration	If a group is assigned to a ML user	If no ML user is assigned
1 Viewer, no validation, don't trust ML	N/A, can't assign ML if no validation process	User's tag gets confirmed correct

1 Viewer, no validation, trust ML	N/A, can't assign ML if no validation process	User's tag gets confirmed correct
1 Viewer, requires validation, don't trust ML	All ML tags will be validated by another party	All tags will be validated by another party
1 Viewer, requires validation, trust ML	All Emily and Hannah ML tags that meet the area's confidence threshold (which if <i>null</i> will not be met) will get confirmed correct All Allen ML tags will be validated by another party	All tags will be validated by another party
2+ Viewers, no validation, don't trust ML	N/A, 2 viewers should require validation process	N/A, 2 viewers should require validation process
2+ Viewers, no validation, trust ML	N/A, 2 viewers should require validation process	N/A, 2 viewers should require validation process
2+ Viewers, requires validation, don't trust ML	All ML tags are compared to the other viewer's tags and will be validated by another party. This allows a researcher to confirm details and number of individuals, which can't be detected by ML	Mismatched tags (species, details, and number of individuals) will be validated by another party All other matches will be confirmed correct during the validation process

<p>2+ Viewers, requires validation, trust ML</p>	<p>All Emily and Hannah ML tags that meet the area's confidence threshold (which if <i>null</i> will not be met) will be compared to the other viewer's tags, and if the same, will be confirmed correct. Since details and number of individuals can't be detected by ML, they will be pulled from the other detection. This info is also not as important for empty or human tags.</p> <p>All other ML tags, whether mismatched species or below confidence threshold, will be validated by another party</p>	<p>Mismatched tags (species, details, and number of individuals) will be validated by another party</p> <p>All other matches will be confirmed correct during the validation process</p>
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