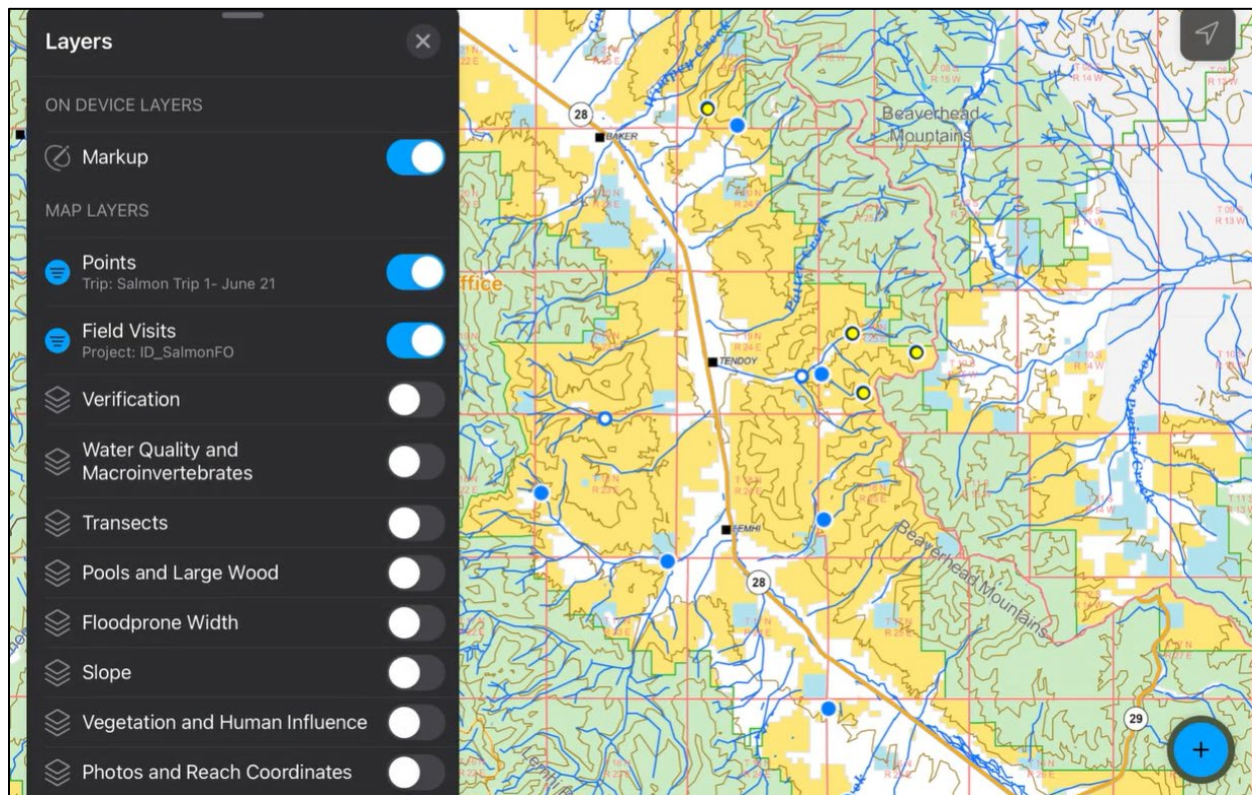




BLM Lotic Assessment, Inventory, and Monitoring (AIM)

Technology Manual

2026 Field Season



Produced by BLM National Operations Center (NOC) – 4/2026

VERSION 3.0

National AIM Data Submission Disclaimer

The National AIM team reserves the right to reject data or require data collectors to transcribe it into a new form for the submission to be accepted. Rejected data will be deleted from the system and will not be stored in the AIM database or made available elsewhere. Situations where this action may be necessary include but are not limited to:

- All data was collected in the opposite orientation (transects flip-flopped).
- Forms are not filled out properly (ex: Data collector A collects canopy and streambed particles while data collector B does macroinvertebrates. They then launch a second transects form to collect thalweg, channel dimensions and bank stability and cover).
- Data was accidentally collected in the training service or a previous years' service.
- Data was intentionally collected on Paper Data Sheets rather than in the Survey123 forms.
- Data was collected in a manner that deviates from the National AIM teams approved methods (E.g., channel dimensions require 2 data collectors for accurate measurements, however data was collected with one person and a tree stake).
- All data will be rejected if it was collected by an individual that did not attend a Lotic AIM Field Methods training or an approved (by the National AIM team) alternate training method prior to data collection.

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MANUAL OVERVIEW

All lotic AIM data (including photos and GPS coordinates) must be collected electronically using an iPad (see the Lotic AIM Gear List on the [BLM Library](#) for requirements). Lotic AIM data collection utilizes two main iPad applications: ArcGIS Survey123 and ArcGIS Field Maps. Survey123 is used to record all lotic AIM field data, while Field Maps is used to navigate to point coordinates and to record basic field visit information such as the evaluation status. Data collected in the Survey123 and Field Maps applications are then synced to ArcGIS Online and instantly displayed in our webmaps and dashboards that are used to manage designs and QC data.

Microsoft Teams is also utilized and will serve as a way for data collectors to share files and communicate with project leads, data collector managers, and the National AIM Team during the field season.

This manual will detail how to set up and use each of the above applications. Figure 1 outlines the overview of the process from how to download and set up applications, communicate with the AIM team, prepare to field visit points by creating electronic maps and updating Survey123 forms, and finally collect and submit field data. Users may test Field Maps or Survey123 at any time using the links to the “Practice” webmaps listed on the BLM Natl Lotic AIM AGOL group home page.

If questions remain after reading this protocol and reviewing the frequently asked questions appendix, please reach out to your contract/agreement lead, BLM Project Lead, or State Lead. If you need additional support, please contact the appropriate National AIM Team member:

- Design related questions: Janet Miller (jlmler@blm.gov)
- General project coordination and implementation support: State Lead and Meghan Krott (mkrott@blm.gov)
- Technology and applications questions (e.g., iPad, Field Maps, Survey123): Logan Shank (lshank@blm.gov)
- If someone from the list above is not available and there is an immediate issue, please contact Logan Shank (lshank@blm.gov).

HOW TO USE THIS MANUAL

This manual is organized by workflow so that it can be easily referenced throughout the season. Data collectors are the primary target audience, and this manual is not recommended to be read from cover to cover. Rather, use the clickable table of contents to find the appropriate section. Each main section in the table of contents is also hyperlinked in Figure 1, which gives a summary of the electronic data collection workflow.

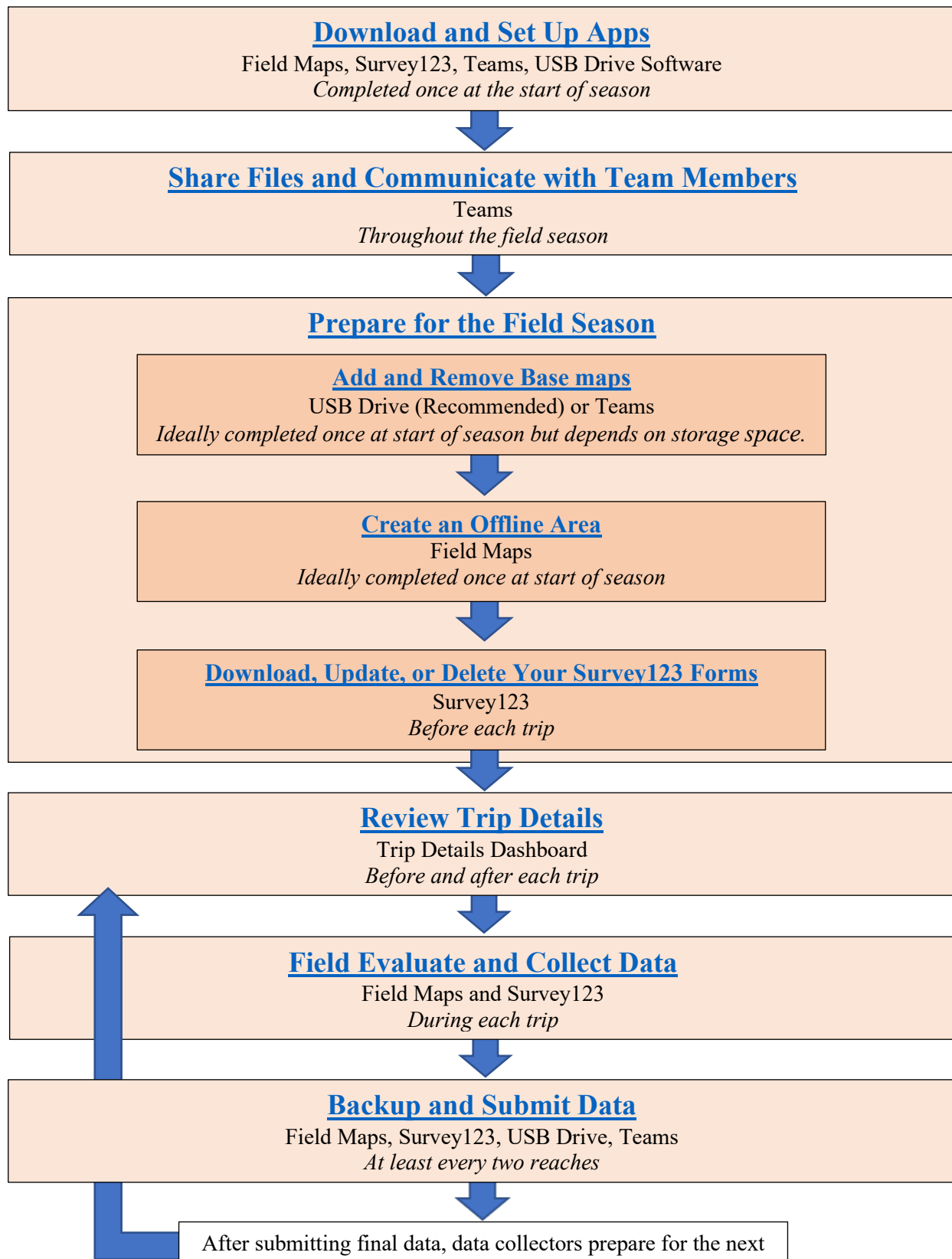


Figure 1. Summary of the electronic data collection and management workflow. For each step utilized applications and frequency of completion are specified.

DOWNLOAD AND SET UP APPS

Overview

iPads and data collection applications should be set up at least two weeks prior to field training so that data collectors can use the device and follow along during pre-training videos. The time needed to set up a device varies but may take one hour for the first device. Prior to downloading applications, iPads should be double checked to ensure that they have the proper updates and settings. This section will cover the six applications to download from the Apple Store, explain how to log in, and adjust the settings required before these applications can be used.

If you are reusing an iPad from a previous season, the National AIM team recommends factory resetting your device prior to the upcoming training session. For more information on how to factory reset your device, see the FAQ section.

Review iPad Setup and Settings

- You must have a “Cellular + Wi-Fi” model iPad that is in compliance with all of the information presented in the iPad Requirements for Lotic AIM Data Collection document.
- Prior to attending training, ensure your iPad is updated to the latest available version of iOS (at least iOS version 26 or more). After completing training, please avoid updating your iOS further unless directed to do so by the National Lotic AIM Team. If you need to update your iOS, go to Settings, “General”, and then “Software Update”.
- Ensure your iPad has a data plan and is cellularly enabled. If your iPad does not have a data plan, it must at least be a “Cellular + Wi-Fi__33” model. This model allows GPS coordinates to work without a data plan, note that Wi-Fi is required for downloading, syncing, and submitting data.
- Ensure you have a waterproof case for your iPad.
- The iPad battery typically lasts for approximately one reach worth of data collection and iPads will overheat if the temperature gets above 95 degrees. Therefore, care should be taken to maximize battery life and keep iPads out of direct sunlight. Battery backup packs are required to ensure that iPads do not die prematurely.
- Review your settings.
 - Ensure you know how to save battery life by decreasing screen brightness, setting airplane mode on, and turning off Bluetooth.
 - Be aware that battery saving settings, such as turning the screen off after 1 minute, should be turned off when running any processes that take a long time, most iPad processes only run when the screen is on and active.

Download Applications

Use the Apple App Store to download the following applications:

- ArcGIS Field Maps
- ArcGIS Survey123
- Microsoft Teams
- Microsoft Authenticator (used to access Microsoft Teams)
- Application to interact with flash drive (varies depending on the flash drive but SanDisk iXpand Drive is used as an example in this document)

- Recommended but not required
 - Adobe PDF reader
 - Email specific application

Sign-in to Applications

Microsoft Teams

1. If you already have a Microsoft Teams account, sign-in and skip to Step 3.
2. If you do not have a Teams account, install Microsoft Teams app on your device. Then open the Teams app and click “Sign up for free”. Follow the on-screen steps to create an account. Once you have created a free Microsoft Teams account, sign into the app.
3. Install Microsoft Authenticator app on your device. But do **NOT** set anything up yet in Authenticator, this step will be done later.
4. Once you have signed into Teams, email Meghan Krott (mkrott@blm.gov) with the email address you used for Microsoft Teams, and she will then add you to the Lotic AIM Field Work Team. The user **MUST** sign into their Teams account on an iPad, phone, or computer before emailing Meghan.
5. Once you have been added to the Lotic AIM Field Work Team, you will get an auto generated email from Microsoft sent to the email linked to your Teams account letting you know that you have been added to a Team. Be sure to check both inbox and spam folders for this email.
6. In the email, click “Open Microsoft Teams”.
7. The link in the email will open a browser on your device to walk you through the next steps. The first screen in this process is titled "Permissions requested by: DOI...". Click “Accept” on this page.
8. The next step is to install the Microsoft Authenticator app, if you have not done so already. Once the Microsoft Authenticator app is installed on your device, select “Next”.
9. DOI will then need more information to ensure the associated account is secure. On the screen titled “More information required”, select “Next”.
10. Next, you need to set up your Microsoft Authenticator account in the app and pair your Authenticator app to Teams. On the “Set up your account in the app” screen, select “Pair your account to the app by clicking this link.” Then follow the steps below to set up Authenticator.
11. If you have not previously accepted the “DOI terms of use”, then you will need to read and accept the terms. Click on the “Guest Access” text to expand the passage. Read it and then click “Accept”.
12. Upon login and once user has authenticated to the DOI resource, user will see a screen indicating more information is needed, click “Next”.
13. Begin Microsoft Authenticator setup. Click “Next” on the Microsoft Authenticator screen. You must use Microsoft Authenticator, do not try to use a different authenticator app.
14. On the “Set up your account” screen, select “Next”.
15. Launch Authenticator and click the + button on the top right of the screen to add your account.
16. Select the type of account, either “Personal account” or “Work or school account”.
17. Select "Sign in with Microsoft": and follow the prompts.

18. Authenticator will then prompt individual to enter the value on the computer screen in the Authenticator prompt. Once entered, hit "Yes".
19. A confirmation screen will appear. Click "Next".
20. You should receive a "Success!" message. Click "Done".
21. Once Authenticator set up is complete, you will be returned to Teams and will need to select "Next". Teams will then open and display the Lotic Fieldwork Team.
22. User will need to log into Teams at a minimum of every 60 days to prevent their account from being inactive and locked by DOI.

Field Maps and Survey123

Determine what type of account you need based on the "[Guidance to Getting Access to Aquatic AIM Field Tools](#)" instructions. Follow the links at the bottom of the page to create a GeoPlatform account if necessary. Once your account has been successfully created and your role modified by BLM IT staff (GeoPlatform accounts only), use the following instructions to sign into Field Maps and Survey123 on your iPad. These apps are only available to users with GeoPlatform or BLM-EGIS accounts.

1. Sign in to Field Maps
 - a. Locate and open "ArcGIS Field Maps". Once the app opens, select the button for "Sign in with ArcGIS Enterprise". In the popup window asking for your Enterprise URL, enter "geoplatform.maps.arcgis.com" or "blm-egis.maps.arcgis.com" and hit "ok".

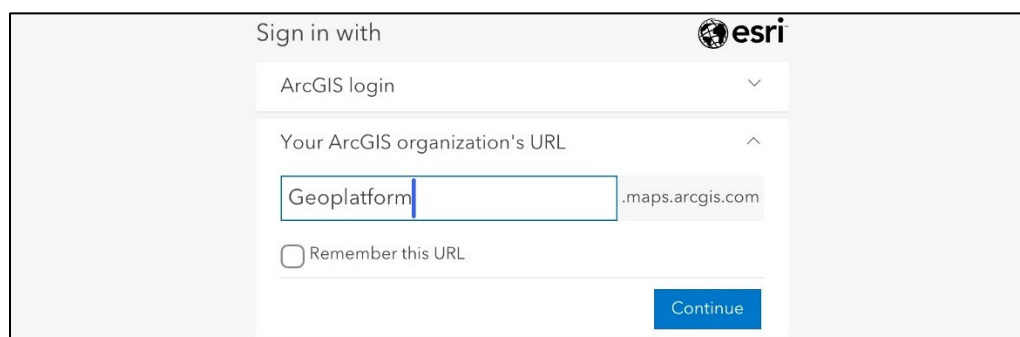


- b. A new screen will appear, click the blue button "GeoPlatform Login.gov Account" and enter the Login.gov credentials that you set up during the Geoplatform account set up process. If you are a BLM-EGIS user, the blue button will say "DOI Account" and will direct you to sign in using Microsoft Authenticator.
 - c. On the following page, Geoplatform users will need to utilize a second authentication method to verify their account and finish signing in.



2. Sign in to Survey123

- a. Launch the “Survey123” app and click “Sign into ArcGIS Online.” On the following page, locate and click the dropdown that says, “Your ArcGIS organizations URL.” In the available text box enter “geoplatform”. BLM-EGIS users should enter "BLM-EGIS" in the text box.
- b. On the following page, Geoplatform users will need to sign into your Login.gov account. To sign in, follow the guidance provided above in the linked flowchart. BLM-EGIS users will be redirected to Microsoft Authenticator to complete their sign in.



ArcGIS Online (AGOL)

Throughout the field season data collectors are expected to assist with data review and QC. All lotic AIM data QC workflows utilize dashboards in ArcGIS Online. Data collectors will exclusively use the Trip Details Dashboard to access content stored in the other dashboards. More information on the Trip Details Dashboard will be presented later in this manual. Data collectors will use the same credentials they use to sign in to Field Maps and Survey123 to sign in to ArcGIS Online. For more information on data review and QC, please see the [Lotic Data Management and QAQC Protocol](#).

To sign in to ArcGIS dashboards on your iPad:

1. Locate and open “Safari”, navigate to geoplatform.maps.arcgis.com.
2. In the upper right-hand corner, select “Sign In”.
3. On the following page, enter your GeoPlatform credentials.
4. Finally, select and complete the multi-factor authentication.

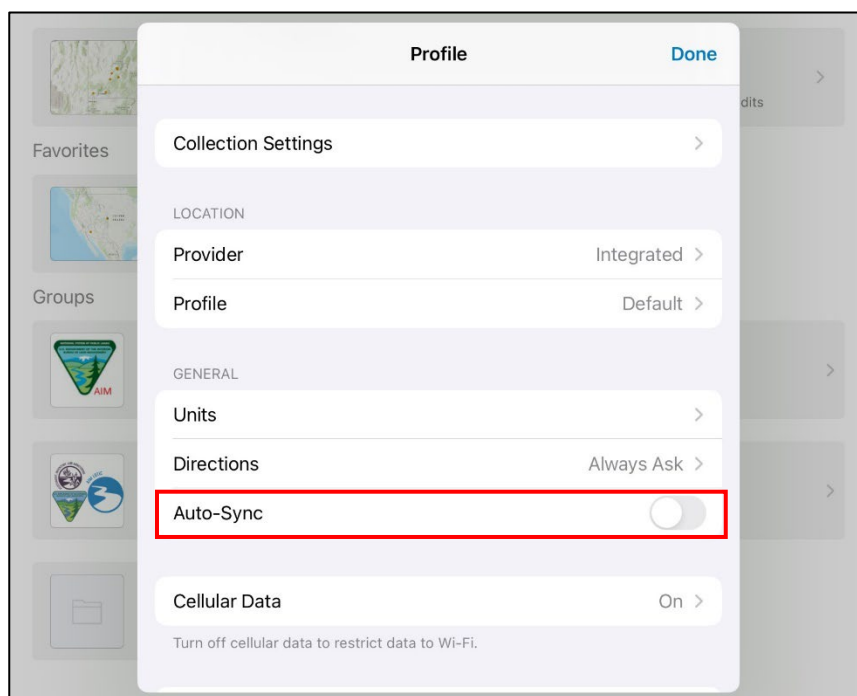
Other Setup

Disable Field Maps Auto-Sync, Check Cell Data Usage

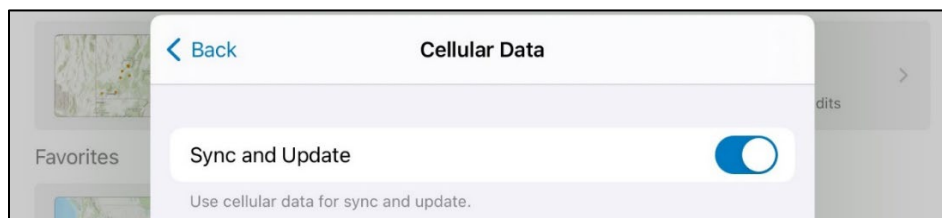
The first time that users open Field Maps they must disable Auto-Sync. Auto-Sync is a feature in Field Maps that tries to automatically sync maps and data continuously. This works great if you are in an urban environment; however, it presents some issues when you are working in the backcountry. When you come across cell service, you do not want your Field Maps app to stall trying to send and receive new data. Syncing is covered later in this document; however, it should be noted that syncing should only occur when the user has a strong, stable, reliable internet connection.

To disable auto-sync:

1. On the main screen of Field Maps, locate the “Account” icon in the upper left-hand corner. In the popup, scroll down until you locate “Auto-Sync”. Click the slider button to turn off.



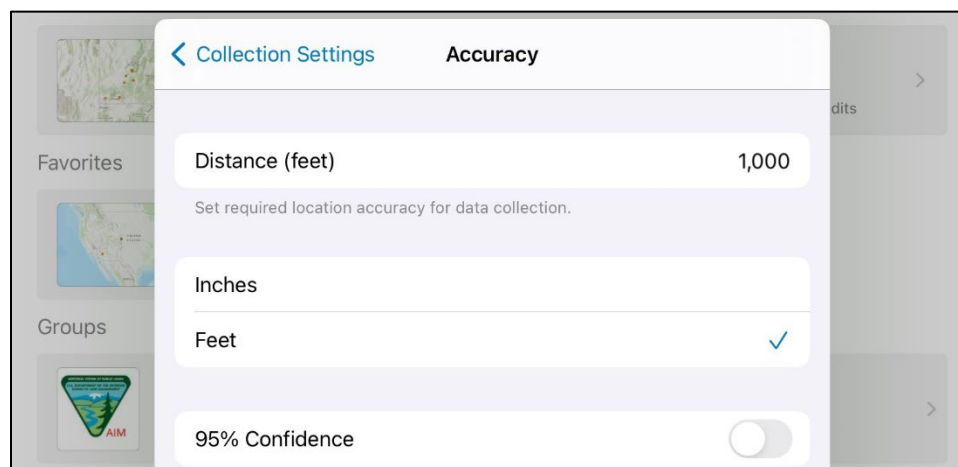
2. While on this page, you may also want to turn on “Cellular Data” if you intend on syncing data using your cellular provider. If this is turned off, you can only sync and download data when connected to a Wi-Fi signal.



Check Collection Settings in Field Maps

Field Maps allows users to specify GPS accuracy thresholds which must be met in order to collect data. We recommend maximizing this threshold so you can collect data regardless of GPS accuracy which could be affected by canyon walls, trees, or other obstructions.

1. On the main screen of Field Maps, locate the “Account” icon in the upper left-hand corner.
2. In the popup, choose the second option “Collection Settings.” On the following page select the first option “Accuracy.”
3. Click “Distance (feet)”, delete the default value of 30, and type in 1000.



Disable Survey123 Auto Update

Disabling the Survey123 app store auto update feature is CRITICAL for successful data collection throughout the field season.

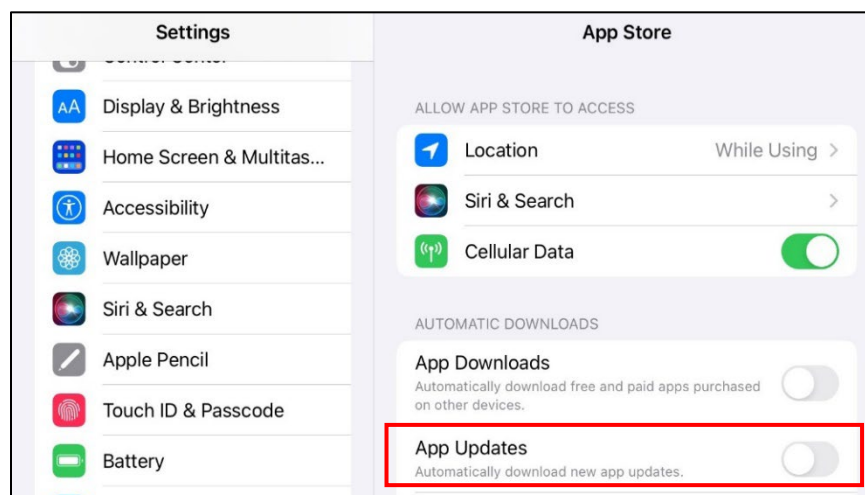
Esri periodically releases new versions of Survey123 throughout the year. By default, your device will try to automatically update your app to this latest version like any other app. Our forms have been created and tested for the version of Survey123 that is available to the public at the time of training. Updating this version could change how the app works and break our forms completely preventing any data collection. **If this occurs, DO NOT count on the National AIM Team to fix this problem overnight.** Users are UNABLE to download older versions of Survey123 than what is available in the app store so there is no going back. This is a BIG DEAL and should not be taken lightly. If data collectors accidentally update their app, they risk being sidelined for a week while we rebuild the entire project from scratch. The National AIM Team will send out a message to all users on Teams if and when users should update their version of Survey123.

It is essential that the individual setting up the iPads for their data collectors knows to change this setting. It is also very important that all data collectors are aware of this as well, so they know not to tinker with these settings.

To disable Automatic Updates:

1. Go to your iPad’s “Settings” application.
2. On the left side of your screen, locate “App Store”.

- Under “Automatic Downloads”, ensure that “App Updates” is disabled.



To update other applications on your device, you need to manually select it from the App Store. As a reminder, do not update Survey123 unless advised by the National AIM Team.

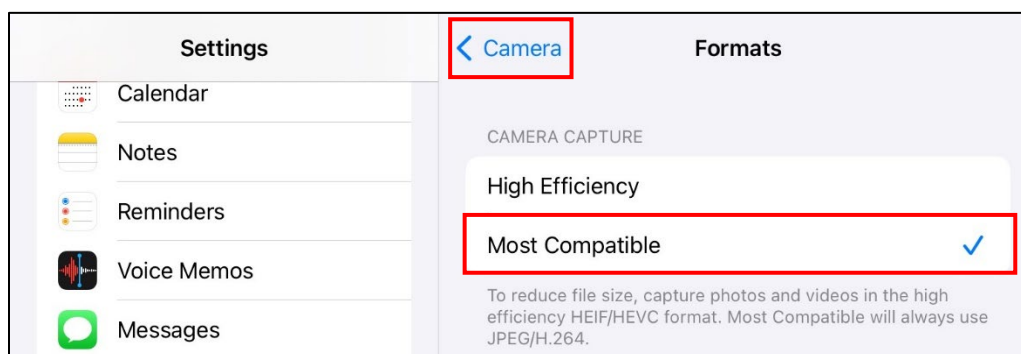
To update apps:

- Go to the Apple App Store on your iPad.
- Click the “profile” icon in the upper right corner, it may have a red number on it.
- Locate the “Available Updates” section. DO NOT HIT the “Update All” button.
- You can update apps manually by hitting the “Update” button next to each item.

Set Photo Format

Due to the various ways that photos can be collected in the field, it is crucial that your iPad is set up to capture photos in the proper format in order for the National AIM Team to extract each photo’s location and orientation at the end of the season.

- Go to the Settings on your iPad.
- On the left, scroll down until you locate the “Camera” option.
- Select “Formats”.
- Ensure that “Most Compatible” is selected.



SHARE FILES AND COMMUNICATE WITH TEAM MEMBERS

Overview

Microsoft Teams will be used throughout the field season to share files and communicate with team members. The "Posts" (or "Chat") feature should be used to send messages to anyone within a given state or to anyone on the National AIM Team. This means that state leads, project leads, contract/agreement holder leads, data collector managers, and data collectors will all need to have access to Teams.

Teams Channel and File Organization

The AIM Lotic Field Work Team is structured as follows:

- General Channel: This channel is for communicating with the National Lotic AIM Team.
 - Posts: Chat should be used for everything that is nationally applicable.
 - The NOC will use this for field updates e.g., "Server went down, please resubmit any data and photos submitted yesterday (May 1st)".
 - You can also post questions or photos for the NOC to review e.g., "This link no longer works, can someone point me to the correct one".
 - Files: This tab will be used to store Critical Documents and Tools files that links to many of the needed protocols and tools for Lotic AIM Implementation.
- State and National Lotic AIM Channels:
 - Posts: These channels should be used for any project or state level communication.
 - For example: "We're seeing a lot of reaches like this (photo) and want to see if others are having trouble identifying bankfull in these systems".
 - Files: This tab is essentially a "SharePoint file explorer" nested in the Teams application. Each channel is slightly different so there may be extra/missing folders depending on the group. In general, the following folders can be found in this tab:
 - Base maps: A place to store and retrieve area-specific base maps.
 - Vegetation and Geomorphic Guides: Contains resources on botany, species ID, and physical features of the area.
 - Archive: Contains historic documents from previous iterations of that project.
 - Project-specific folders:
 - *Backup File:* This folder should be used to organize, and store backed up data and, if desired, photos and other data/information. We recommend implementing a file organization structure to keep these files tidy. An example is a folder for each "Trip" with subsequent folders for each "Field visit" utilizing both Point ID and Stream Name in the folder name.
 - *Mid and End Season Checks:* This folder should be used to store Check-In and Project Close-Out notes, files, any photos, and any other documents that are pertinent to these meetings.

- *MIM*: This folder should be used to organize, back up and store MIM data sheets if MIM data is being collected.
- *Other Files*: This folder should be used for data collectors to organize and store files not directly related to one of the other folders.
 - BLM SharePoint: For BLM users ONLY and links to the National AIM SharePoint.
- Training Channel: Contains information about training including agenda and site locations.
- Boating Channel: Similar structure to the State and National Lotic AIM channels, this channel includes a folder to save “Reach Set Up” files.

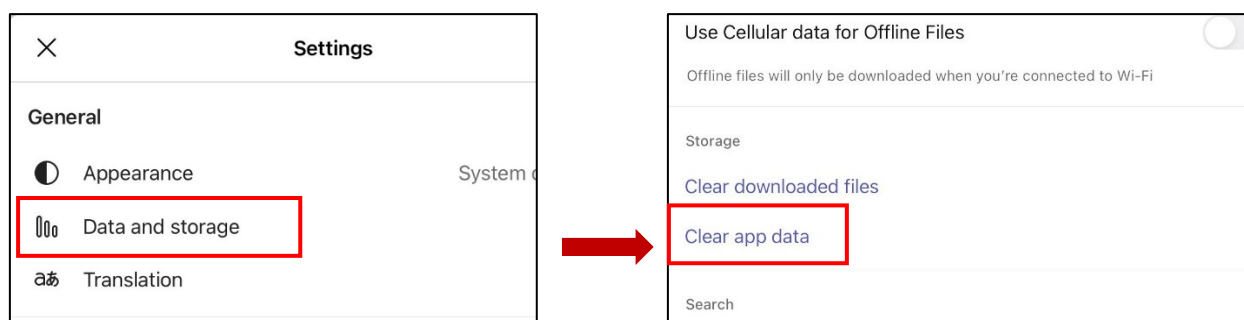
Teams Chat Tips

- To tag a specific person type “@” and then start typing their email or name. This sends them an email to let them know they were tagged in a post.
- Be professional –all posts are recorded by the BLM, as are all emails. Chats are generally preferred over emails so that all involved parties can stay up to date on the questions, issues, or successes of the season.

Clear Teams Cache on iPad

When documents are opened or shared in Teams, the application creates data caches on your iPad’s memory which serve little purpose and slow down your iPad. We recommend clearing the cache often as part of your pre- or post-trip process.

1. Open Teams and click the profile icon in the upper left-hand corner of your screen.
2. Select “Settings” on the left side, under “General”, select “Data and storage”.
3. Click “Clear app data”, the page will reload, and you can close the pop-up screen.



PREPARE FOR THE FIELD SEASON

Overview

Data collectors will use the Field Maps application and provided map layers to navigate to sample reaches and track which points have and have not been visited throughout a field season. Ensure data collectors can navigate offline in Field Maps by using informative base maps and offline areas. A ‘base map’ is the underlying reference map that integrates many different layers into one. The BLM provides base maps that are more useful than the Esri default as they contain information such as land ownership, roads, topography, gates, etc. Once downloaded, these can be viewed in Field Maps with any online or offline map. An ‘offline map’ or ‘offline area’ is a small section of a web map that is downloaded to a device for offline use.

The final step of preparing for the field season is to ensure that you have the latest Lotic Survey123 forms downloaded to your device. Forms only need to be downloaded to your iPad once at the beginning of the field season. Periodically, the National AIM team will update dropdown lists or make small tweaks to checks in the forms. To ensure that data collectors are always using the most up to date forms, routinely check Survey123 and download form updates whenever they are available.

BLM Base Maps

Data collectors will be supplied with tile package (.tpk or .tpkx) or vector tile package (.vtpk) base maps that were created by each BLM state for field data collectors to use while navigating in the back country. Additionally, mobile map packages (.mmpk) have been created for each BLM state that allow data collectors to view NHD attributes such as stream order while in the field. The user will need to download these base maps, ideally once, at the beginning of the field season, but it depends on available iPad storage and the spatial extent of your trip.

Add

There are two ways that a user can add base maps to their iPad for use in Field Maps:

1. USB thumb drive (Recommended)
 - Requires an iPad compatible flash drive, but all base maps should be loaded onto the external drive at the beginning of the season.
 - This approach is ideal for data collectors that are working across large areas or will be working in areas with poor cell service/Wi-Fi accessibility so that base maps can be switched out at any time during a field trip.
2. Teams
 - Requires very good cell service to download new maps.
 - This approach is ideal for data collectors that have good cell service/Wi-Fi accessibility.

Option 1: USB Drive (recommended)

1. Most iPad compatible USB drives will require you to download their software to interact with data on the USB drive. In the example below, a SanDisk USB drive is used, so the SanDisk “iXpand Drive” application was downloaded. The first time you plug your USB drive into your iPad, it should give you a pop up prompting you to download their software.

2. Plug the USB drive into a computer and transfer the base map Vector Tile Package (.tpk or .vtpk) or Mobile Map Package (.mmpk) to the device from Teams (or another file location). When you are done, safely disconnect the USB drive from the computer.
3. Plug the USB drive into your iPad and open your USB drives file management app (in this example case, SanDisk “iXpand Drive”).
4. Click “Copy Files” and on the following screen hit “Copy Files From iXpand Drive”
5. Navigate the file structure on your USB drive and locate the base maps you added.
6. Click the base map or maps that you want to transfer to your device and then click “Copy to iPad” at the bottom of the screen. You will get a pop up that says it cannot transfer the base map to your Photos app. Click Ok.
7. When your download is complete, it will give you another popup saying that it was successful. You can now close this application.
8. Open the Files application on your iPad and make sure you have the “On My iPad” directory open. There should be a folder called “iXpand Drive” in this directory along with the “Field Maps” folder. Select the “iXpand Drive” folder and then the “Downloads” sub folder.
9. Click and hold the file for the base map you want to add to Field Maps. In the dropdown, select “Move”. A popup will appear asking where you want to move the base map to. Select the “Field Maps” folder and hit “Move.”

Option 2: Teams

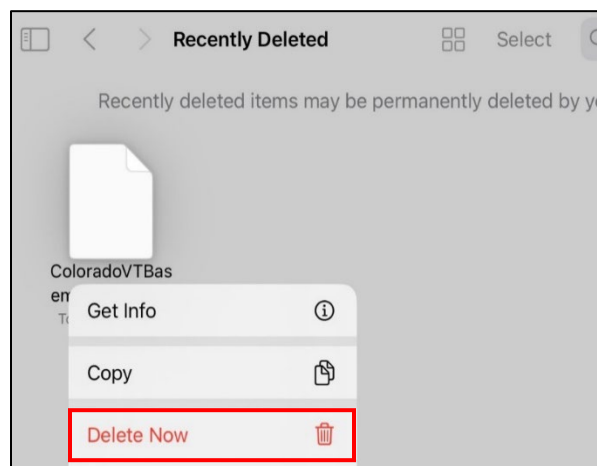
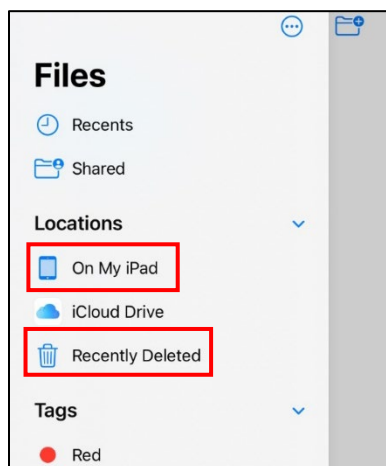
1. Within the Teams app, locate the AIM Lotic Field Work Team.
2. Locate the General Channel and click the “Files” tab. Next open the “Basemaps” folder.
3. Identify the base map you want to download.
4. Click the three dots to the right of the base map and select “Send a copy.” A popup will appear saying “Downloading”. This might take 15-20 mins to download per base map. **DO NOT let your iPad go to sleep or the download will say it lost internet and quit.**
5. When the download completes, a window will popup asking what you want to do with the file. Select “Save to Files”.
6. In the next popup, it will ask you where you want to save your file. Go to “On My iPad” and select the “Field Maps” folder (ignore the “basemaps” folder for now). Save the Vector Tile Package and Mobile Map Package base maps here by clicking “Save” in the upper right-hand corner of the popup.
7. Repeat steps 4-6 to add any additional base maps.
8. You now have a Vector Tile Package (.tpk or .vtpk) or Mobile Map Package (.mmpk) on your iPad for offline use.

Remove

If data collectors are working over a large geographic area and utilizing multiple base maps, storage space on the iPad may become a concern; remove base maps to free up space for data collection.

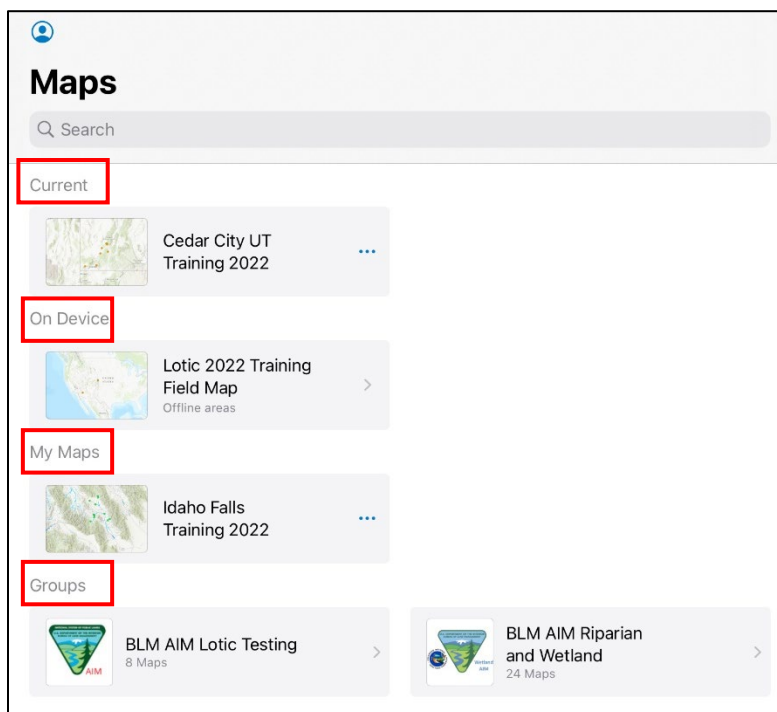
1. Locate the Files app on your iPad and open it.
2. Navigate to “On My iPad” by selecting the square blue icon in the upper left-hand corner.
3. Select the “Field Maps” folder and then select the “basemaps” folder.
4. Identify which base map you’d like to remove, then tap and hold down on the file until a popup window appears, select “Delete”.

5. You have now deleted your base map from Field Maps but not the device. Click the “Files” button (square blue icon) and select “Recently Deleted”.
6. In the following window, click and hold the files you want to delete, select “Delete Now”.
7. The base map has now been completely deleted from the device. Alternatively, if you want to delete all of the base maps on the device, hold down and delete the “basemaps” folder. This folder will be re-created once you download a new base map.



Field Map Layout

Prior to creating an offline area, users should orient themselves with Field Map’s menu items.



- Current: Displays the last map that you opened in Field Maps.
- On Device: A list of all maps that you have downloaded onto your device to take offline.

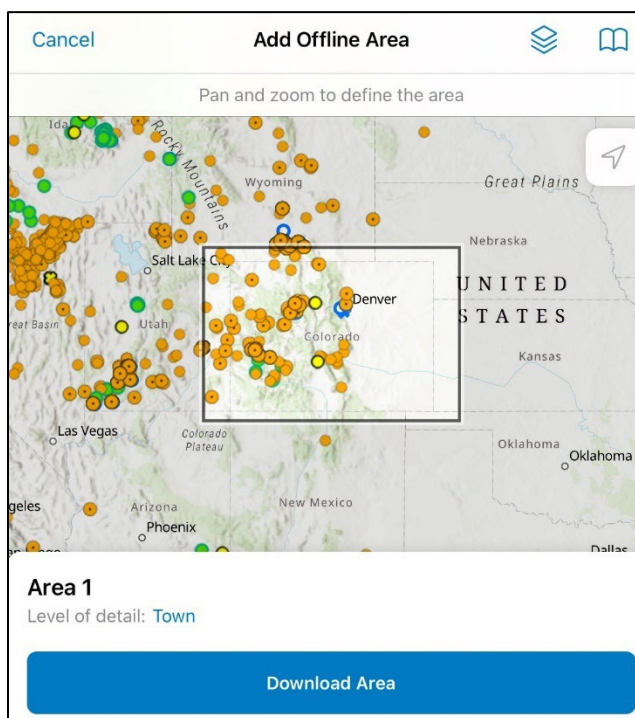
- My Maps: A list of maps saved to your GeoPlatform account.
- Groups: A list of AGOL Groups that your profile belongs to. Clicking a group, for instance the BLM Natl Lotic AIM Group, you will see all maps that are part of the group. *Only Field Eval maps are set to be taken offline.*

Offline Areas

Data collectors should use Field Maps to create one offline area encompassing their entire project, so they navigate to all field visits without internet connection. In doing this, users create a “cache” of the Points and Field Visits services for a given area that can be used offline and then synced when cellular service is obtained. BLM base maps that have been added to the device can be used with offline areas.

Add Offline Area

1. To take a map offline, open Field Maps and locate the “Groups” section on the main page. Go to “BLM Natl Lotic AIM” and locate the “Lotic 2026 Field Map”.
2. Click the three dots (“...”) on the right and select “Add Offline Area”.
3. In the popup, select the appropriate “Level of Detail” to adjust the size of the black bounding box **so it encompasses the entire project, state, or region that you will be sampling**.
 - a. If you don’t see the black box on the map, zoom in or out until it is visible.
 - b. It is okay to take the whole state offline, as seen in the screenshot below where the entire state of Colorado is selected.
4. Select “Download Area” when you are ready.



Update/Sync

You should update your offline area before leaving for a trip, upon returning from a trip, or whenever you come across reliable internet service just in case the project lead or data collector manager has edited the Points layer since your last sync. **Internet service is required to update offline areas.**

1. Click the three dots next to the offline area you want to update.
2. Click “Sync”, ensure you do not lose internet at this point.
3. When finished, your map should say it was updated “just now”.

Rename

You may want to rename your offline area to something more meaningful.

1. To do this, click the three dots next to the offline area you want to rename.
2. Click “Rename Area” and enter a new name.
3. Click “OK”.

Remove Area

You may remove offline areas when they are not in use to save space or to stay organized.

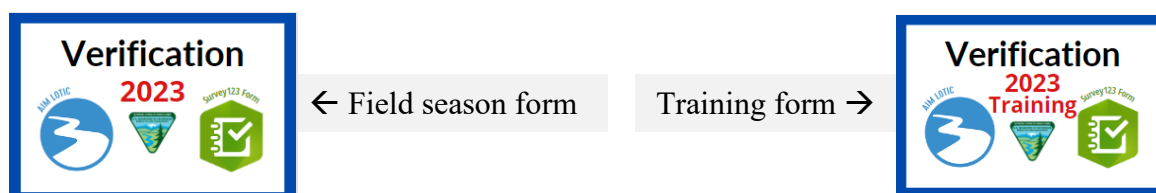
Remember that any un-synced edits will be lost.

1. Ensure you have stable internet service before proceeding. Deleting offline areas while disconnected will result in orphaned replicas on the server that will decrease performance for everyone.
2. Click the Lotic Field Map “Offline areas” under the “On Device” section.
Tap the three dots “...” next to the area to be deleted, select “Remove Area”, and then “Remove”.

Survey123 Forms

Before leaving on a trip, data collectors need to download data collection forms using the Survey123 application. In an ideal world, data collectors would download each form at the start of the season and never have to update them. However, situations may arise where data collectors need to update forms or download new ones. The National AIM Team will utilize Teams to broadcast announcements to all users when updates are required.

There are two categories of Survey123 forms: training and final/field season. Training forms mirror the field season forms in appearance and functionality, but they save information to a different database, this allows users to practice Lotic AIM workflows with no impact to the final field season data. Training forms can be distinguished from final field season forms by their names and thumbnails which include the word “Training”. Upon completion of a Lotic AIM Field Methods Training, data collectors should remove training forms from their iPads and download the field season forms to use for the upcoming field season. **Do not record actual field season data in the training forms.**



The Lotic Calibration Form is a standalone form that data collectors should download onto their devices. This form is used at training to track calibration to ensure that trainers are accurately teaching the field methods and that data collectors are showing improvement throughout the week. Upon completion of a Lotic Field Methods Training, data collectors should continue to use the Lotic Calibration Form whenever they conduct local project area calibrations. For more information on Calibration, please see the [Lotic Data Management Protocol](#).

Download

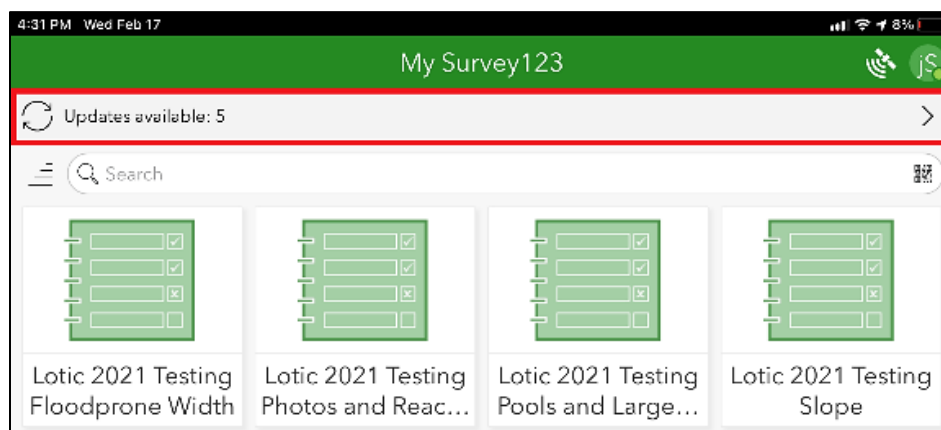
1. Once you successfully login to Survey123 for the first time, click the “Download Surveys” button at the bottom of the window. This button will only appear here if you do not have any downloaded surveys. You can also download surveys at any time by clicking your profile icon in the upper right-hand corner and selecting “Download Surveys”.
2. On the next page type “Lotic 2026” into the search bar. Download the forms below by clicking on the cloud icon on the right side of each form. Only download the Boating Transects form if you are on a Boating data collection team. Once the form has been downloaded the icon changes from a cloud to a refresh icon.
 - a. Lotic AIM Forms:
 - i. Verification
 - ii. Water Quality and Macroinvertebrates
 - iii. Photos
 - iv. Transects
 - v. Pools and Large Wood
 - vi. Floodprone Width
 - vii. Slope
 - viii. Vegetation and Human Influence
 - ix. QC Comments
 - x. Not Sampled
 - xi. Cross Section (only needed for those collecting surveyed cross sections)
 - xii. Boating Transects (Should only be used for boatable reaches)
 - xiii. Calibration (Necessary for training and local calibration)- note: forms say 2024 for year.

Update

Periodically, small glitches may appear in the forms or dropdown lists (e.g., data collector names needing to be changed). The National AIM Team will fix these errors through updates; updating your existing forms does not require you to delete and redownload anything. **Data collectors must check for and apply updates to forms before leaving on each trip to the field.**

1. In Survey123, click on the circle with the profile icon in the upper right corner of the screen.
2. Click “Download Surveys” and navigate to the form you would like to update.
3. Once you have found the correct form, click the refresh icon to the right of the form.
 - a. Alternatively, at the bottom of the screen you may see a “Download updates” button if updates are available for your forms.

- b. If the application freezes and the download takes more than a couple minutes, force close the Survey123 app. Relaunch it and either download the updated forms manually or try “Download updates” again.
4. Sometimes you will see a notification at the top of the main survey screen letting you know there are updates available, click this notification to see all available updates.



Delete

Users should NEVER delete forms or data/photos from their device unless advised to do so by the National AIM Team. Even if a new form is released, users should withhold from removing the original version until advised to do so. The National AIM Team will broadcast a message on Teams alerting users if they need to delete a certain form and use a new one.

1. On the My Surveys page, tap the form you want to delete.
2. From the form information page, click the menu icon in the upper right corner.
3. Click “Delete Survey”.
4. In the following popup, select Delete. **Deleting a form will delete all associated data so ensure everything has been backed up before proceeding.**

Delete Sent Surveys and Drafts

It is highly recommended that users try to keep all of their sent and draft forms in Survey123 throughout the entire season. Realistically however, some users may start running short on device storage space later in the season. If this is the case, users can delete sent forms to clean up Survey123. Users should ensure that all data has been sent and backed up on their USB device prior to deleting any sent forms. Photos should never be deleted. If you have unsent drafts, ensure that they are junk data and not something outstanding that you forgot about before deleting.

1. On the My Surveys page, click the form you want to delete.
2. From the form page, click either “Outbox” or “Drafts”.
3. Once you have found the correct form, click the trashcan icon to the right of the form.
4. On the warning page, click “Yes” to permanently delete the form.
5. Deleting a form will delete all associated data as well, be sure you have submitted/sent everything associated with that form before deleting it.

Error Logging

If you encounter an issue while using Field Maps (e.g., the app is not downloading offline areas or is automatically closing), enable Error Logging and replicate the issue. Then, view or share the recent Log report to determine the issue and possible fixes. If you are not encountering any errors, “Logging” should be off.

1. Navigate to the main screen of Field Maps and click your account icon in the upper left-hand corner. In the following window, scroll down and select “Troubleshooting”.
2. Ensure that the “Logging” slider bar is not grayed out and switched “On”.
3. Replicate what you did to receive the error the first time. Once you encounter your error, return to the “Troubleshooting” page, and click “View Logs”.
4. The “Log” page does what its name implies and keeps a log of Field Maps communications with the server and its geodatabases. If you need the National AIM Teams assistance interpreting the logs, click the “export” button, and share them via Teams or email to Logan Shank (lshank@blm.gov).
5. When you are done, turn “Logging” off again.

REVIEW TRIP DETAILS

Overview

Prior to leaving on each trip, data collectors should prepare by reviewing trip assignments, notes, and previous visit information (if applicable). This information can all be located using the Trip Details Dashboard. This dashboard was developed with data collectors in mind and has been configured to work on iPads providing data collectors with a one stop shop for all pre- and post-trip information. This tool provides data collectors with access to trip assignments, access planning resources, sampled reach information, unresolved errors, and tools to create PDF topo maps for offline navigation and monumenting reaches.

Data collectors can access the Trip Details Dashboard on their iPad using Safari or any other preferred internet browser. In your internet browser, sign into AGOL and access the BLM Natl Lotic AIM group. From the list of current field season tools, open the Trip Details Dashboard. Once opened, it is recommended to bookmark this dashboard so that it is easier to open later. This tool requires network connectivity and will not work in offline environments. Information displayed within the dashboard can easily be downloaded or captured in a screenshot.

More information on general use of the Data Review and Error Review Dashboards and their workflows can be found in the [Lotic Data Management Protocol](#).

Review Trip Assignments and Details

Data Collectors should review Trip Assignments before leaving on each trip. This is essential to ensuring that data collectors have all the information they need before heading into the field. If questions arise during this step, consult with your Data Collector Manager or Project Lead before heading into the field.

1. At the top of the page, use the Project Selector to set your project. Next choose your upcoming trip using the Trip Selector.

2. Open the Trip Assignment tab. This tab will display all the points assigned to your selected trip.
3. Review each reach carefully. Consider taking screenshots of this page if you want to have this information available offline.
 - a. Ensure you are familiar with the types of points you are sampling (Base, Oversample, or Targeted), the Strata they fall in, and the order in which they should be visited.
 - b. Review the office evaluators information and notes.
 - c. Ensure that if you need special permission to access the reach, all necessary information is recorded in the Contact Info for Access comments.
 - d. Determine if there is any special order that the points should be visited, or instructions on what point to replace another point with if it were to be field rejected using the Trip Notes field.
 - e. Review all Contingent and Supplemental methods that should be collected.
 - f. Determine if there are any merged points. Merged points will have warning flags that appear. If you do not see warning flags, your point has not been merged.
 - i. If your point has been merged, navigate to the Design Coordinates, but once at the coordinates check your location in Field Maps and ensure that the reach is set up such that the F transect is aligned with the point location in Field Maps.
4. To evaluate access, select a point from the list in the Trip Assignment tab and then proceed to the Map tab. This tab will be zoomed to the selected point.
 - a. Use the basemap selector in the upper right to switch between basemaps (imagery, topo, navigation, dark, etc.).
 - b. Use the layer selector in the upper right to turn on Surface Management Agency (SMA) layers to evaluate land ownership.
5. In the Trip Assignments tab, if a point has been previously evaluated, select the visit, and then navigate to the Revisit Information tab. The Revisit Information tab will be filtered to only display information from the selected reach. Review each past visit carefully.
 - a. Determine if the reach was sampled or not.
 - i. If the reach was not sampled, review the reason not sampled and access comments. Note that just because a point was rejected in the past doesn't mean that the point can be instantly rejected now. Always field visit the points assigned to you in your trip regardless of past sample statuses.
 - ii. If the reach was sampled, review the protocol type used, the field status, protocol reach length, typical bankfull widths (or wetted for boating) and available access comments.
 - b. After reviewing past visit information, click the blue hyperlink in each box to open available revisit packets on SharePoint. These will open in a new tab.
 - i. If you want to download revisit packets to take them in the field, download them from the browser interface. Only download what you need for your current trip.
 - ii. After your trip, delete all unneeded revisit packets that were previously downloaded. These are always available for viewing or re-downloading using the dashboard.

6. If any questions arise related to your upcoming trip, reach out to your Data Collector Manager or Project Lead immediately to ensure all questions are answered before leaving for the field.

View Unresolved Errors

It is imperative that errors are resolved in a timely manner to ensure that details about sampled reaches and their data are not lost or forgotten and that preliminary indicators can be computed each month for Project Leads to review. The Trip Details Dashboard provides data collectors with an easy one stop location to access and respond to all outstanding errors. Errors are only displayed in the Trip Details Dashboard if they are unresolved and are awaiting a response from data collectors. Ensure that all errors are resolved on a weekly basis before leaving for your next trip.

1. At the top of the page, use the Project Selector to set your project.
2. Navigate to the Sampled Reaches and Unresolved Errors tab. The left side of the page will display a list of any points with unresolved errors that require the data collector's immediate attention.
3. To view and respond to unresolved errors, click the hyperlink to open the Error Review Dashboard in a new tab.
4. Once opened, the Error Review Dashboard will open and zoom to the selected point with the unresolved errors.
5. In the "Unresolved Errors" section on the right side of the page, select the error.
6. Review the "Transactional Dialog" box below the list of errors. This will contain a list of all previous responses to the selected error.
7. Below the map, select the "Respond to Known Errors" tab to open the QC Comments form and pull in the information from the selected error in step 5.
8. Provide your feedback in the next available section. Ensure that you update who needs to respond to your error. If you think you have resolved the issue and provided an adequate response, direct the error towards your data collector manager so that they can review, approve, and resolve the error.
9. When done, close the Error Review Dashboard tab and return to the Trip Details Dashboard. Locate the next available error and continue through the same process starting back at step 3.

View Sampled Reach Information

It is crucial that data collectors have easy access to Data Summary PDFs and photos after their data has been submitted. This is especially true during one-month check ins, end of season calls, weekly trip debriefs with Data Collector Managers or Project Leads and any time data collectors are responding to unresolved errors.

1. At the top of the page, use the Project Selector to set your project.
2. Navigate to the Sampled Reaches and Unresolved Errors tab. The right side of the page will display a list of sampled field visits organized by Field Eval Date.
3. Locate the visit you are interested in. You can use the search bar at the top of the pane to search for key words such as data collection crew name, trip, stream name or PointID.
4. Clicking the Data Summary PDF hyperlink will open the Data Summary PDF in a new tab of your browser.

5. Clicking the Data Review Dashboard hyperlink will open the Data Review Dashboard in a new tab and zoom you to the selected point.
6. Once opened, select the Point from the list on the left-hand side of the page. This will cause all elements in the dashboard to update to the selected Point.
7. Photos and photo comments can be viewed using the Photo pane on the right side of the page. In the upper right corner of this pane is a small “Expand” box. Click this to make this pane full screen.
8. When done, close the Data Review Dashboard tab and return to the Trip Details Dashboard. Locate the next reach you are interested in and continue through the same process starting back at step 3.

Create Offline Topo Maps for Navigation and Monumentation

Having access to high quality PDF maps for offline navigation in the back country can be a tremendously helpful way of supplementing the state supplied tile package or vector tile package Field Maps base maps. The USGS topoBuilder web-application has been integrated into this dashboard providing data collectors with an easy one stop shop for creating all of their offline PDF maps.

Basic use information will be provided below. For more detailed instructions, locate the “User Guide” link in the upper right-hand corner of the topoBuilder Application.

1. Navigate to the USGS topoBuilder tab.
2. The left side of the page contains 3 key steps that need to be completed to run the application.
3. Step 1 - Map Types: This option allows you to select what type of mapping product you want used. Currently there is only one option (7.5 Minute Topo), and it is the default.
4. Step 2 – Maps: This step lets you specify the areas you want maps created for and the layers you want included on those maps.
 - a. Zoom in on the map to the area you are interested in. Note that you can enter Lat/Longs using the search bar in the upper right.
 - b. In the upper left corner of the map, specify if you want to select based on mapping grids, or if you want to select a custom area.
 - c. On the map, select the area you want to create a map for. The pane on the left side of the screen will update once you make a selection on the map. (This application can create multiple PDFs at once. For more information, reference the USGS User Guide mentioned above).
 - d. In the pane on the left, check the box next to 7.5-Minute Topo.
 - e. Hit “Edit Layers” and turn off whatever information you do not want on your map. This may take a few attempts to determine exactly what you want to see. When your finished hit “Save”.
 - i. Recommended layers to leave on: Geographic Names, Structures, Hydrography, Terrain Contours, Orthoimage
 - ii. Optional layers: Transportation, Wetlands, Public Land Survey
 - f. Next select “Go to Cart”.
5. Step 3 – Cart: This step is the checkout phase where you submit your request to USGS to be processed.
 - a. When you’re ready, hit “Checkout” and enter your email.

- b. Your request is now submitted. USGS states that maps are often delivered within 24hrs-5 business days. Through testing, these requests appear to take around 10-15 minutes to be delivered. The more maps you request, the longer they may take to process. Do not put this off until the day you are scheduled to leave on your next trip.

FIELD EVALUATE AND COLLECT DATA

Overview

Once they navigate to a point, data collectors evaluate the reach to determine if it is sampleable. This information is recorded as a 'field visit' within Field Maps (see step 5 in the for more information on sample statuses); field visits can be edited at any time. All field data is recorded in forms using Survey123 which must be launched from Field Maps using hyperlinks located within the field visit record. Note that Lotic AIM Survey123 forms contain checks and warnings which may prevent users from moving on or entering nonsensical data.

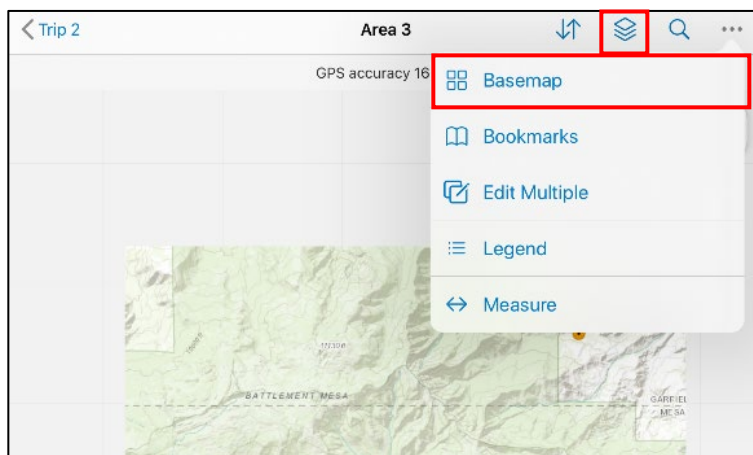
Filter an Offline Area in Field Maps

Offline areas created by data collectors could contain up to 1,000+ points. Knowing how to filter the Points Layer in an offline area is critical to ensuring that designs are properly implemented and that data collectors are visiting the correct points throughout the season. The following steps will walk you through how to filter the Points Layer by Trip to create a Trip Map.

1. Locate and open an offline area. In the upper right-hand corner of Field Maps locate the 'stacked squares' icon i.e., "Layers".
2. In the Layers list, click the small blue filter icon to the left of the Points Layer. This icon is only available if the layer is blue/toggled on.
3. In the Filter window, select the Trip field to filter by.
4. You will be asked to choose a value. Using the search bar, begin typing the name of your trip to quickly narrow the list of options. Select a trip once you have located it and click "Done". The Points layer in your offline area is now filtered by the Trip column.
 - a. Select the wrong trip to filter by? Simply choose another one from the list. Only one trip can be selected at a time.
 - b. Want to clear your filters? Hit the "Clear Selection" or "Reset" buttons.
 - c. You can filter a second field like "EvalStatus" by repeating the actions in step 3.

Change Base Maps and Navigate to a Point in Field Maps

Data collectors can load the BLM-provided base maps into Field Maps to navigate to a point and can also get directions to a point if cell service can be obtained.



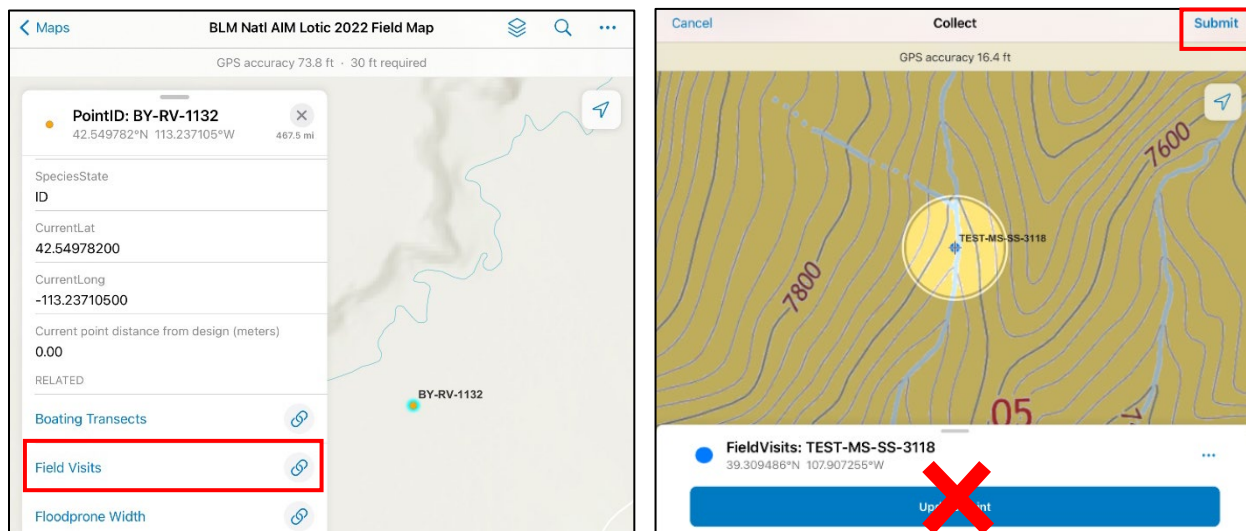
1. Open Field Maps and select the map that contains the point you want to visit.
2. To turn on a base map, click the three dots in the upper right-hand corner of the screen and select “base map” from the dropdown.
3. Click on a base map to turn it on or toggle back and forth. You may have to pan or zoom to a certain place to find your BLM base map, only one base map can be viewed at a time.
4. To get directions to the point, locate the Point that you want to visit and click it. In the Point Attributes that pop up on the left side of the screen, scroll to the bottom. Click the “Directions” button. This will send the Points coordinates to another app such as Apple Maps or Google Maps for navigation. This feature requires cell service to identify a route.

Create a Field Visit in Field Maps

Each time you visit a point in the field you will need to create a field visit in Field Maps.

1. While standing at the point coordinates on the stream bank, click the associated point on the map from the Points Layer. Scroll down and click the “Field Visits” button.
2. On the next screen click “Add”. Ensure you are standing on the bank and that your location on the map looks correct. If not, you can move the crosshairs manually. However, the user should use the GPS coordinates by default.
3. Choose a status from the available options.
4. Fill out all of the required information such as Project, Data Collector Leader, Field Eval Date and Typical Bankfull Widths to document your field visit.
 - a. Always fill in the proper ‘FieldEvalDate’ so that we can generate an EvaluationID for your visit. This field should never be left blank.
 - b. Always ensure that you select the same Project from the Field Visit dropdown that your point is listed under in the Points layer. A discrepancy in Projects will lead to data not appearing in the Lotic AIM dashboards after it has been submitted.

5. **DO NOT** select “**Update Point**”, this will move your Field Visit point away from the F transect to wherever you are when you click the button. Use this button only if you weren’t standing at F when you originally opened your form.
6. When you are done recording your Field Visit, hit the “**Submit**” button in the upper right-hand corner of the screen.

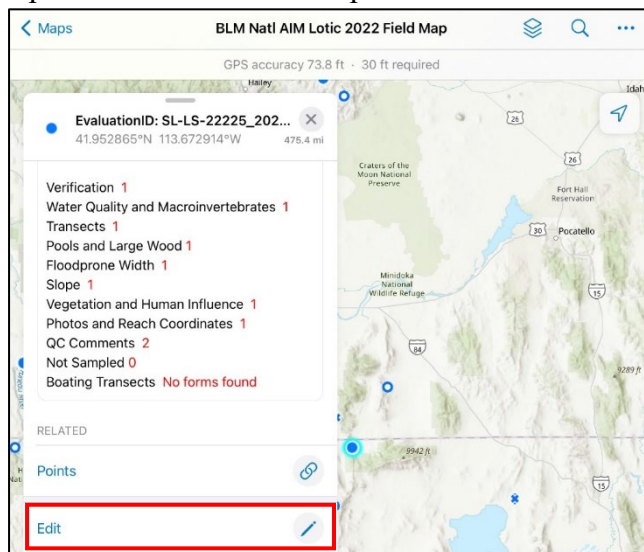


Edit a Field Visit in Field Maps

You may need to edit a field visit. For example, you may have selected the wrong project from the dropdown when it was created or forgot to update your Field Eval Status to Partial Sample when a late afternoon thunderstorm kept you from finishing a full reach. Do not edit any other layers aside from Field Visits.

1. Launch the map containing the Point that you visited. Click the point and scroll down to the bottom of the attribute list and click “Field Visits”.
2. Click the recorded Field Visit. Scroll to the bottom of the attribute list and click the “Edit” button.

- When you are finished making your edit, hit “Submit”. If this is an offline area, be sure to sync changes to push them to the web map.



Collect Data Using Survey123

Field data collectors will use Survey123 for all Lotic AIM data collection. Survey123 is a form-based data collection application developed by Esri that is fully integrated with their enterprise suite of software products. Data collected in the Survey123 application syncs to ArcGIS Online and can be viewed in our web maps and dashboards. The following sections walk new users through the general use of Survey123 and form layouts, and things to note about each of the eleven Lotic AIM Survey123 forms.

Launch Survey 123 Forms from Field Maps

- Once you have created and submitted a Field Visit using Field Maps, you can begin launching forms. **Always launch forms from Field Maps and not Survey123.**
- To launch a form, click the Field Visits on the map you want to open, in the popup there will be a list of forms you can launch.
- Verify that you filled in a Field Evaluation Date. If the date is null or incorrect, fix it before launching any forms. It is crucial that the correct EvaluationID is passed into all the forms.
- Click on the form you want to launch. The form will automatically open in Survey123 and populate PointID, EvaluationID and other needed information.
- The first page of every form is the Form Setup page. This page is where PointID is recorded, and where a user can set up certain sampling parameters that dictate how the data collection section of the form is configured (e.g., whether you are collecting core or additional contingent methods such as Pool Tail Fines). Most of these fields should be pre-populated based off the Field Visit that you launched the form from. Ensure that everything populated correctly and correct it if it is wrong by manually making a different selection.

6. While on the first page of the form, check that your location is correct and update your GPS if needed.
 - a. To update your GPS, click the target like symbol to the left of the coordinates.
 - b. To ensure your GPS is working properly and to check accuracy, click the Location Status button in the upper right.
7. Each form should be fully completed before moving on to the next form and you cannot have multiple forms open at once.

10:09 AM Thu Apr 16 5G @ 100%

Map Area 2

GPS accuracy 70 ft

NOC-ES-0002NOC-ES-0002_2026-03-23
 45.927954°N 112.511322°W 54.2 ft

Edit Copy Related More

PointID: NOC-ES-0002
 EvaluationID: NOC-ES-0002_2026-03-23
 FieldEvalDate: 3/23/2026, 13:33
 Project: MT_ButteFO

[Launch Verification](#)
[Launch Water Quality and Macroinvertebrates](#)
[Launch Transects](#)
[Launch Pools and Large Wood](#)
[Launch Floodprone Width](#)
[Launch Slope](#)
[Launch Vegetation and Human Influence](#)
[Launch Photos and Reach Coordinates](#)
[Launch QC Comments](#)
[Launch Surveyed Cross Section](#)

-----If Not Sampled Section-----
[Launch Not Sampled](#)

Form Layout and Elements

The following screenshots highlight commonly referred to terms and sections of forms that users should be aware of while using Survey123.

The screenshot displays the Survey123 form interface with the following elements:

- Header:** A green bar at the top containing a close button (X), a left arrow, the text "Close form", the title "Transects", a right arrow, a location icon, and a menu icon (three horizontal lines).
- Page Header:** "Data Collection Page" on the left and "Location status" on the right.
- Transects Section:** A section titled "Transects" with a red "A" and "Transect: A" label. It includes radio buttons for "Dry", "Wet", and "Not Collected".
- Thalweg Section:** A section titled "Thalweg" containing a table of "Thalweg Stations".

Measurement #	Thalweg Depth (cm)	Flow?	Too Deep?	Angle
1		☒ Yes ☐ No	☐ Yes ☒ No	

 Below the table is a "Repeat bar for Thalweg" with "1 of 8" and a right arrow.
- Transect Repeat Bar:** A bar with a trash icon, "Delete transect", "Repeat bar for Transect", "1 of 1", and "Add transect" with a plus icon. It also includes "Thalweg Repeat" and "Transect Repeat Bar" labels.
- Comments Section:** A section titled "Comments Section" with two text areas:
 - Channel Dimensions and Bank Angle and Cover and Stability Comments:** Includes instructions to justify values and record special situations.
 - Canopy Cover and Streambed Particles and Thalweg Comments:** Includes instructions to justify values and record streambed particles, thalweg measurements, and canopy measurements.
- Footer:** A green bar at the bottom with a left arrow, "Previous page", "2 of 3", "Next page", and a right arrow.

Repeat Bars

Repeat bars are located at the bottom of a section and represent a way to collect certain data multiple times. To add a repeat, click the “+” button on the right side of the repeat bar, to delete a repeat click the trashcan button on the left side of the bar. There can be multiple repeat bars on a page, always double-check you are using the correct repeat bar by utilizing the drop-down arrows for each section.

Refresh Values Button

The refresh value button is a small circular arrow icon that appears next to a data field. In cases where a cell value is incorrect, pushing this button will “refresh” the form’s equation, which may return a default value.

Transects

☐ Dry
 ☒ Wet
 ☐ Not Collected

▶ Channel Dimensions

▶ Bank Stability Cover and Angle

▶ Canopy Cover

▼ Streambed Particles

Streambed Particles Collected? *

☒ Yes ☐ No

▼ Particles

Fines (Smooth-Silt/Clay/Muck)=1, Sand (Gritty)=2, Hardpan (Firm, car)=4097

Non Meas Size 1 ☐ Fines ☐ Sand ☐ Hardpan ☐ Bedrock	Meas Size 1 	Location 1 ☐ Wet ☐ Dry Middle ☒ Dry Edge
Non Meas Size 2 ☐ Fines ☐ Sand ☐ Hardpan ☐ Bedrock	Meas Size 2 	Location 2 ☒ Wet ☐ Dry Middle ☐ Dry Edge
Non Meas Size 3 ☐ Fines ☐ Sand ☐ Hardpan ☐ Bedrock	Meas Size 3 	Location 3 ☒ Wet ☐ Dry Middle ☐ Dry Edge

Refresh Values button does not appear when default value 'Wet' is selected

Select Buttons

Both the white circle and the area surrounding the text act as the button (as shown by the red box outlined below). Always be mindful of your taps when you are filling out a form.

Data Checks and Warnings

The forms were built with various data checks and warnings to catch errors before submitting.

Types of Checks and When They Are Run

- **Warning/Note:** Warning and Note checks run immediately if an entered value does not meet certain criteria. For example, pH is typically between 6.5-8.5, if you entered a 9, you would receive an error right away alerting you that your value is high. In addition to these text warnings, some errors are also displayed by a red circle while validated values are displayed as a green check mark.

- **Constraints:** If a check is a constraint, it will alert you of a data error when you try to add another repeat or try to send the form (e.g., bankfull height must be less than or equal to bench height). If your values do not meet this logical requirement, you will be alerted and returned to this question when you try to advance to your next repeat.
 - Remember, the error message will not appear until you:
 - Add another repeat (grey bar)
 - Send the form (checkmark in the bottom right)
 - Errors are flagged one at a time. You have to fix the first error and then try to move on/submit, if there are more issues, Survey123 will flag the next error in sequence. The form will continue flagging errors in this way until all errors are fixed.

Types of Value Checks:

Legal values

- Certain fields have specific ranges of possible values.
- If you enter a value that is not within the range of legal values, a warning will pop up in red stating the value is outside the acceptable range.
- If you try to submit the form, it will take you back to the page containing the error and highlight the incorrect field. You will not be able to submit the form without changing the incorrect value.

The screenshot shows a form field for "Temperature Celsius". Above the input field, there is a red error message: "Temp must be between 0 and 100". The input field itself contains the value "250". Below the input field, there is a red warning message: "Warning this is outside the typical range of 5-30 for Temp, check that your value is correct".

Typical values

- Certain fields (particularly water quality) have ranges that are not very likely to occur in nature.
- If you enter a value that is not within range, a warning will pop up in red stating the value is outside the typical range.
- You will be able to submit the form, but it is best practice to make a comment justifying this value. Also use the water quality flag fields to best explain the circumstances.

Logical values

- Certain fields (particularly channel dimensions) have logical data checks that look for things that cannot occur based on the field protocol definitions. For example, errors are displayed if any of the following conditions are not met: Bench height $\geq$ Bankfull height, Bankfull Width $\geq$ Wetted Width, or Total Reach Length $\geq$ Total Pool Length. A red circle will appear immediately as a warning. Additionally, you will see a warning when you try to add another repeat or try to send the form. You will not be able to add another repeat or submit the form until you have fixed the issue.

Required and Missing data

- Required fields are denoted by red asterisks * in the form. If you see this next to a question, you will be unable to proceed to the next repeat (e.g., transect) until you provide an answer.
- In some parts of the form, required fields will be triggered based on how you answered a previous question. An example of this is Canopy Cover: if you say that it is "Collected", each of the 6 fields become required. If you say "No" the fields are no longer required. The user can then fill out some of the values but leave some blank if they are not collectable.
- **AVOID CLICKING 'NOT COLLECTED'** after collecting data. Doing so will delete any previously collected data.

Summary Pages

Many of the complex forms have summary pages on the last page of the form. These pages highlight commonly missed data issues that users can easily overlook as well as some basic calculations and counts. Users can navigate to this page at any time during data collection and review the summary data for what they have been able to accomplish. It is highly recommended that users reference the Form Summary Page periodically while filling out a form so that issues can be caught early and addressed rather than at the end of a reach when it is harder to locate and correct the issue. Be aware that some of these built in checks can break if a form is saved to drafts.

Send or Save Forms in Outbox

If you are completely done with a form, review the summary page and ensure that everything is filled out and well documented. Select the check mark in the bottom right corner:

- a. Send now: Sends all forms to the National AIM Team. This option is only available if you have Wi-Fi or a cellular connection; if you don't have service, save your forms in the Outbox (option c).



- b. Continue this survey: Returns to the form so the user can continue logging information.
- c. Save this survey in the Outbox: Saves completed form in Outbox, do this after completing a form and if there is no cell service or Wi-Fi. When you finish the reach and attain cell service, follow the below “Submitting forms from Outbox” instructions.

After saving the form in your outbox proceed to the next form. Remember when opening a new form, **DO NOT** click on the form in My Surveys, go back to Field Maps and launch the appropriate form from the Field Visits layer.

Saving Forms in Drafts

Forms should always be completed start to finish and saving a form to drafts should only be used with caution when necessary (e.g., iPad is about to die, Survey123 or your iPad suddenly begins to act sluggish, emergency situations). **Do not save forms in drafts in order to jump to another form.** Forms may be saved in drafts with caution if you follow the guidance below and make sure to fully complete repeats before saving.

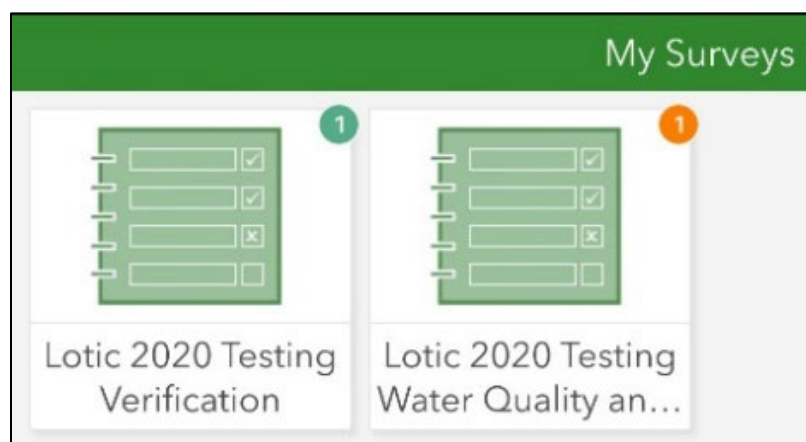
To save a form in Drafts:

1. If you are saving Verification or Water Quality and Macroinvertebrate forms proceed to step 2. All other forms contain repeats and will require special attention before being saved in drafts. Use the following guidance to ensure you have properly completed each repeat.

- a. If you finished with your current repeat and HAVE NOT hit the + to add your next repeat, proceed to 2.
- b. If you are in the middle of a repeat, you must complete your current repeat all the way before proceeding to 2. Remember, DO NOT hit the + when you finish your current repeat.
- c. If you just finished a repeat and accidentally hit the +, delete the last repeat you added using the trash can icon. This should return you to your last filled out repeat. You can proceed to 2.

Forms with Repeats	Forms without Repeats
Photos	Verification
Transects	Water Quality and Macroinvertebrates
Pools and Large Wood	QC Comments
Floodprone Width	
Slope	
Vegetation and Human Influence	
Not Sampled	
Boating Transects	

2. From any page of the form, click the X in the upper left corner. A popup window will open asking what you would like to do with the form. Click “Save in Drafts”.
3. To resume any partially completed form, from the Survey123 app go to the My Surveys page. Draft forms will have an orange circle with a number indicating the number of drafts.



4. Click on the form you want to resume. At the bottom of the page click “Drafts”.
5. Click the draft you want to open. Always check that you opened the correct draft by checking the PointID.
6. After continuing with data collection, if the form begins to act up, review the list of quirks below, or continue data collection in a new form.
 - a. Close out of your current form and do not save changes.
 - b. Open it back up and send it to your outbox.

- Return to your Field Visit in Field Maps and launch a second form.
- Mark the transects collected in the first form as Not Collected.
- Collect the remaining data in this second form.
- Launch a QC Comments form from your Field Visit and alert the National AIM team so that the data can be merged.

If you get interrupted (e.g., need to collect data across two days or a storm rolls in) while completing a form DO NOT save the forms in drafts. Instead, record any uncollected data as “Not Collected”. Then the next day or sampling event, start a new form. Finish data collection, marking any data that was collected in the previous form as “Not Collected” and add a note clearly explaining that the data needs merged. Then notify the National AIM Team that this occurred by recording an error in the QC Comments form. This should be a rare occurrence!

Save as a Draft Example

In the example below, on the left it is perfectly fine to save the form as a draft since the repeat has been finished off completely. In the example on the right, the user accidentally hit the + button to add a 2nd repeat. To save this to drafts, the user should delete the 2nd repeat and then save it with the 1st repeat completely filled out. This general rule applies to any repeats.

The image displays two side-by-side screenshots of a mobile application form titled "Photos and Reach Coordinates".

Left Screenshot: The form is at the "1 of 1" repeat stage. A green callout box states: "This repeat is filled out completely, you". The "Photo Name" field contains the text: "___BankErosionFeature_TransectB_Upstream_LeftBank_1". The "Photo Comments" field contains: "Example of typical erosional feature observed at the reach".

Right Screenshot: The form is at the "2 of 2" repeat stage. An orange callout box states: "This repeat is NOT filled out completely, you must delete or finish". The "Photo Name" field contains the text: "___Transect__2". The "Photo Comments" field is empty. A red box highlights the trash icon at the bottom left of the repeat section.

Bugs Associated with Drafts

Saving forms in drafts is not perfect and may introduce bugs when you reopen the form. The following guidance will provide work arounds for when these issues are encountered in the field. If the following guidance does not correct the issue, return to your field visit, launch another form and continue data collection there marking all transects collected in the first form as Not Collected. Be sure to record a QC Comment alerting the National AIM Team to the issue so that the two forms can be merged together.

- Opps went too far (Bank Repeats) – If you open a form from a draft and your bank repeat is stuck on “Opps went too far” rather than “Left” or “Right”, make a note of any data recorded at that transect. Next delete the entire transect and re-add it. Fill in any data that you made note of. The Bank Repeat should now be reset to 1/1 “Left”. **ONLY USE THIS if the repeat that glitched is the last repeat in the series (e.g., 5/5 or 7/7 not 4/5 or 3/7).** If it is not, then all data will shift one transect and some data may be lost! If this is the case, make a note of what the correct Left/Right bank data should be and submit a QC Comments form along with your data.
- Missing Repeats – If you open a form from a draft and you are missing a repeat (e.g., thalweg group is showing but the data entry section is gone) add the next repeat and then return to the repeat you were initially on. This should jog the forms memory and get the repeat to appear. If this does not fix the issue launch a new form from your field visit to continue data collection.
- Calculation Issues (Floodprone Width) – If you open your floodprone width form from a draft and you need to change one of your floodprone measurements, you will notice that the sum of your 3 measurements will not update. In order to get this to properly update, make a note of your data and the lat/long of your measurement and hit “Not Collected” at the top of the form. This will wipe all data and reset this floodprone location. Next hit “Collected” and re-enter your data.
- Calculation Issues (Summary Statistics) – If you open a form from a draft, you may notice that not all of the summary statistics information is updating properly. There currently is not a fix for this issue. If you need to save a form in drafts, be even more cautious than normal while entering the remaining data.

For more details on form specifics, see [Appendix A](#).

BACKUP AND SUBMIT DATA

Overview

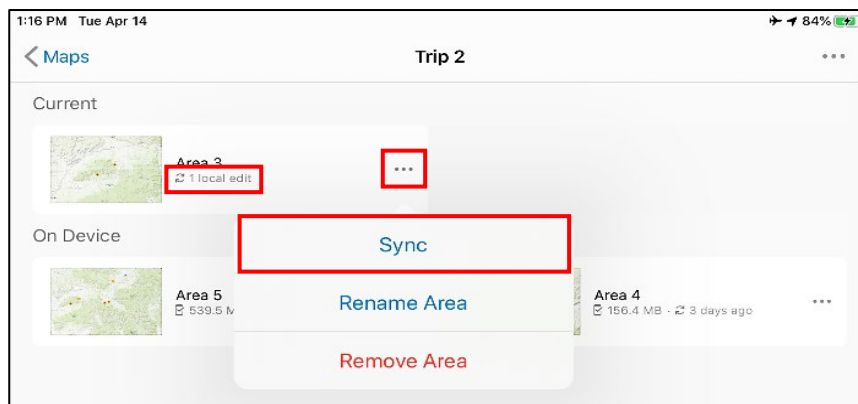
Data collectors must backup Survey123 data at least every two reaches using a USB flash drive device. Backups will allow data recovery if, for example, the iPad is lost or stolen. Data collectors should sync Field Maps and Survey123 data to the Office and Field Eval Webmaps once they are back from their trip or are at a location where strong reliable internet access (4G or Wi-Fi) is available. Syncing data to the Office and Field Webmaps allows project leads, data collector managers, and the National AIM Team to view this data. Syncing maps in Field Maps also ensures that data collectors are getting the latest information about reaches prior to visiting them.

Field Maps

You do not need to backup Field Maps to a USB flash drive device, this data is easy to recreate in the event it is lost. If your device breaks during a trip before you were able to sync your offline area in Field Maps, you will need to go back into Field Maps while your device is connected to the internet and recreate the sites that were lost. This can also be accomplished by recreating the missing Field Visits in the Field or Data Review Webmaps. Ensure that the location of the Field Visit is correct and that the Field Evaluation date matches the date you were at the site collecting the data. Furthermore, ensure the remaining fields are properly filled out.

Sync Field Visits to the Office Webmap

1. To sync Field Visit data after every two reaches, obtain internet service. Then open the “On Device” section of Field Maps on your iPad.
2. Maps with outstanding data on the iPad that have not been synced will display the number of local edits (i.e., field visits). Click the three dots next to a map.



3. In the popup list, select “Sync”.
 - a. If the device syncs correctly, the “refresh” icon displaying the last sync date should state “Just Now”.
 - b. If the sync fails, there will be a red exclamation mark.
 - i. Click the three dots next to the map that failed to sync and review the “Sync failure message”.
 - ii. If you are just driving back from the field and turned Airplane mode off, the app may not immediately recognize that it has service again. If you receive a failure message that related to not having network connectivity, force close Field Maps and reopen it. If you have service, Field Maps should now recognize it and allow you to sync.

Survey123

Backing Up Survey123 Form Data

Data collectors may wish to back up their Survey123 data daily to ensure that it can be submitted even if their device breaks or Survey123 crashes. At a minimum, data must be backed up after every 2 reaches.

To create a backup:

1. Open the Files app on your iPad and open your Survey123 folder.

2. Click and hold the “ArcGIS” folder until the popup appears with more options. Click Compress. This will create a zipped copy of this folder directory.
3. Click and hold the .zip file you created and give the file a more logical name.
4. Next, using your USB drive, transfer your zipped file to your external storage device. It is recommended that users do this each night after sampling a reach. If the user backs up their data each night, they can simply keep replacing the previous backup they had so that they only have one backup file.

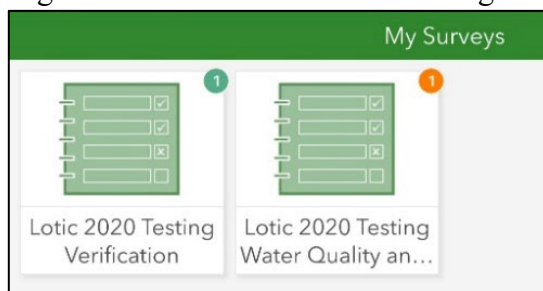
Submitting Forms

Because most of your data will be collected in areas without cellular service or Wi-Fi, you will be saving your forms in the Outbox. Once you’ve returned to an area with cellular service or Wi-Fi you will need to submit all forms waiting in the Outbox. Only send data if you are done with all forms and finished collecting data at the reach. **DO NOT submit a partial set of forms.**

Be sure you have a strong and reliable Wi-Fi or cellular connection before attempting to submit data. If you have any doubts about the quality or reliability of your connection, please hold off and submit later when a stronger signal can be obtained. The Photos and Reach Coordinates form is much larger than the other forms and may require stronger Wi-Fi. There is a day delay between when you sync data and when the data summary PDF is posted on the Data Review Dashboard, but photos will appear instantaneously. If there is a tight window to discuss the data summaries with your data collector manager or project lead (see Step 3 below), try to sync all forms except Photos and Reach Coordinates in the field ASAP before returning from your trip.

Follow the directions below to submit forms from the Outbox:

1. From the My Surveys page, click on the form you want to submit. Forms waiting in the Outbox will have a green circle with number indicating the number of forms in the Outbox.



2. At the bottom of the form page, click “Outbox”.
3. In the bottom right corner of the Outbox page, click “Send”. The form or forms have now been submitted.
4. **NEVER edit and resubmit a form that has already been submitted.** See the following section for more information on how to record data changes and edits.

Once the forms have been sent and you have an internet connection, open Field Maps on your iPad and click on your Field Visits. Scroll down past the hyperlinks to launch your Survey123 forms to the Form Count section. Here you will see the names of all the forms and a count of the associated records. If a form was not submitted, you will notice that it says “No forms found” rather than a 1. If it says, “More than one form found” and you do not remember having to launch a second form to finish data collection, then you probably launched the form from the wrong Field Visit point. If this is the case, be sure to log an issue using the QC Comments form (see FAQ section below) so that the National AIM Team can fix this. This functionality is only available once your forms have been submitted and you have taken your Field Maps application back online.

JC-TR-1000_2021-01-12
29.563927°N 98.524227°W 1,818 ft

Form Counts
This section only works after a sync

- Verification **1**
- Water Quality and Macroinvertebrates **More than one form found**
- Transects **1**
- Pools and Large Wood **More than one form found**
- Floodprone Width **1**
- Slope **1**
- Vegetation and Human Influence **More than one form found**
- Photos and Reach Coordinates **1**
- Known Errors **No forms found**

RELATED

How to document and record edits

Lotic AIM has strict workflows in place for tracking and implementing edits once data collectors have submitted data. Once data is submitted, data collectors should NEVER re-enter a form, apply edits to the data and resubmit the form. All edits, no matter how trivial or minor they may be, MUST be recorded using the QC Comments form. For more information on documenting edits, see the [Lotic Data Management Protocol](#).

APPENDIX A. Detailed Form Descriptions

This appendix outlines key elements of each Survey 123 form.

Verification

Overview: The verification form is used to record general reach info and the source coordinates we use to identify the F transect. This form must be submitted for every sampled reach for data to be accepted.

- Ideally this form is filled out first once a site has been determined to be sampleable and a reach has been set up. In some rare situations, what first appeared to be a full sample might end up being a partial sample or interrupted flow later in the day. When the Verification form is launched from a field visit, it will pull over whatever status is recorded in the Field Visit. Therefore, you might want to hold off and save this form as one of the last ones you fill out at a reach. That way, if status were to change through the course of the day, you can always fix that in your Field Visit, then launch the form and pull over the “final” field status. Alternatively, you can fill this out first and then go back into the form to update the status that was passed over based off an identical dropdown list.
- The coordinates in this map are the official “master” copy of the sampled F coordinates. Therefore, it is extremely important to be standing mid channel at F when you record these coordinates on page 2.
- When recording coordinates, hold down the cross hairs for a few seconds until you see a count begin to tick upwards each second. Wait until the count has reached 10-20 and tap the cross hairs again. This will take a GPS location each second and average them all together to improve its accuracy.

Water Quality and Macroinvertebrates

Overview: The Water Quality and Macroinvertebrates form is used to track all water quality and macroinvertebrate data.

- Pages for TNTP and Turbidity will only appear if the user specified that those contingent indicators were supposed to be collected on Page 1.
- It can take a while to sort bugs and get them all in jars. Consider saving a draft of the form and going back in to fill out the number of jars before submitting, but DO NOT put a value in this field until you have counted the number of final jars. Leave it blank until you are finished putting bugs into jars. This way if you do forget you should notice it in your Draft box and when you try to send it to your outbox, the app will notify you there is a blank required field for # of bug jars.
- The Calibration and Sonde page needs to be filled out completely by the user. We require data collectors to fill out the model and serial number of their YSI on this page. This allows us to track YSIs in case there are issues. However, to prevent typing this tedious data each time, try to use “Set as favorite answers” and apply those answers to each reach.
 - Open a blank Water Quality and Macroinvertebrate form from Survey123. (Do not launch this from a field visit for this purpose.)

- Fill out ONLY the Instrument Model and Instrument Serial Number
- Go to the menu button in the top right and click “Set as favorite answers” and then save the form in drafts.
- Then launch a form from your Field Visits layer in Field Maps.
- When the form opens, go to page 2 where your YSI information exists. Click the menu button and then click “Paste answers from favorites” and this should fill out ONLY the instrument model and the serial number. You can proceed with filling out the form.

Transects

Overview: The Transects form is the bread and butter of the Lotic AIM Survey Forms. This is a large form with lots of checks, so it can be slow to load and progress through transect repeats. Be very careful to avoid unnecessary screen touches since some of the select buttons have large clickable areas that extend to the edge of the screen.

- The Data Collection Page of the transect form is set up as one big repeat, starting at A, then moving on to XA, then AB, then B, all the way to XK. In total, this repeat can contain a maximum of 32 transect repeats. Transect repeats are added by clicking the plus button at the bottom of the screen. **Trying to add all transects at once and then working from K-A is likely to break the form!**
- Once the “Transect is...” question is filled in, the methods to be collected populate below. For side channels, side channel type must be first selected before filling in the transects status. You must fill in the “Transect is” for all transects prior to finishing the form even if a transect was not collected.
- To collect a method, select the dropdown arrow next to each group.
- Once you have completed that method at that transect, select the group heading again to hide the data.

This makes it easier to identify the transect repeat later if you are clicking through multiple transects and reduces the chance of accidentally clicking something and changing a value while moving around within the form.

The screenshot shows the 'Transects' form on a mobile device. The top bar is green with the title 'Transects'. Below the title is the 'Data Collection Page' header. The form is organized into several sections: 'Transects' (with a dropdown for 'Transect A'), 'Thalweg' (with a dropdown for 'Thalweg Stations'), and 'Comments Section'. The 'Thalweg Stations' section contains a table with columns for 'Measurement #', 'Thalweg Depth (cm)', 'Flow?', 'Too Deep?', and 'Angle'. The 'Flow?' and 'Too Deep?' columns have radio buttons for 'Yes' and 'No'. The 'Comments Section' has a text area for 'Channel Dimensions and Bank Angle and Cover and Stability Comments'. The page is labeled '1 of 8' and '1 of 1'.

- Within a nested repeat such as Bank Stability and Cover, if you hit the + too many times (more than once), the red text will switch to blue and state “oops went too far delete repeat 3”. Ensure you are on repeat 3 and hit the trashcan icon to delete it.
- For Streambed Particles, you must have at least 5 “Wet” or “Dry Middle” particles per transect. If the user records too many “Dry Edge” particles, extra particles will be added to the bottom of the grid to a maximum number of 15 particles per transect so that a minimum of 5 “Wet” or “Dry Middle” can be achieved
- Thalweg data often asks you to “add 7 records”. When you do this, it starts displaying thalweg at measurement #2. Don’t forget to go back and fill in measurement 1!
- Summary Page
 - Review the summary page as needed (e.g., after every group of transect repeats A, XA, AB) throughout sampling to try and catch any accidental data errors. It can be overwhelming to review the Summary Page after completing the entire form since it is a pain to sift through 32 repeats looking for an error.
 - Transects and Side Channels Summary: The goal of this section is to ensure that every transects status field is filled out properly and suggests if your overall Field Eval status is accurate based off your selections.

▼ Transects and Side Channels Summary			
Count of transects that were and were not collected Total possible: Main transects-11, Mid transects-10, Side channels-11. Total in form 32.			
Count of Blank Transects main and mid 2 - Transects are missing the Status field, please fill in	Count of Wet Transects main and mid 0	Count of Dry Transects main and mid 0	Count of Not Collected Transects Main only 0
Count of Blank Side channels 1 - All side channel transects must be major, minor, dry, or absent, please fill in.	Count of Wet Side Channels 0	Count of Dry Side Channels 0	Count of Not Collected Side Channels 0

- Channel Dimension Summary: The goal of this section is to highlight anything that you might have accidentally hit “Not Collected” for (since it is on the right side of the screen and easy to accidentally tap while scrolling) as well as to try and identify any outliers.

▼ Channel Dimension Summary				
COLLECTED main, mid, and side channel transects				
Count Not Collected Wetted Width 0	Min Wetted Width 	WettedWidthAvg 	Max Wetted Width 	NA
Count Not Collected Bankfull Width 0	Min Bankfull Width 	Bankfull Width Avg 	Max Bankfull Width 	Bankfull Width Outlier Check Looks good
Count Not Collected Bankfull Height 0	Min Bankfull Height 	Bankfull Height Avg 	Max Bankfull Height 	Bankfull Height Outlier Check Looks good
Count Not Collected Bench Height 0	Min Bench Height 	Bench Height Avg 	Max Bench Height 	NA

- **Bank Stability Summary:** This section, first and foremost, makes sure you did not miss any banks. Ensure that the number of plots is always divisible by 2 when you complete a transect. If not, you forgot to add a right bank somewhere. The other fields in the form should be gut checked to make sure you agree with the recorded data.

▼ Bank Stability Summary			
Collected at all main mid and side channel transects 42 Possible (Main + Mid) + 22 Possible Extra (If side channels exist)			
Bank Stability Plots Collected 0	Bank Stability Warning Looks good	Stable Banks (Absent) 0	Unstable Banks 0
Erosional Banks 0	Depositional Banks 0	Depositional to Erosional Warning Looks good	Bank Plots >50% Covered 0
Acute Banks 0	Obtuse Banks 0	Bank Angle Warning 0 - Bank angle was collected at 10 or fewer banks please collect more if possible.	

- **Canopy Cover and Sediment Summary:** This section highlights the completeness of Canopy Cover and Streambed Particles data. The first box counts how many transects you selected “Yes” for canopy cover (indicating that every measurement was collected). Any transect that you said “No” will be removed from this number, even if you collected a few measurements. Next are two counts related to Substrate. The first is a count of particles that are marked as wet (either “Wet” or “Dry – Middle”) as well as the count of particles that have recorded B-axis measurements. These may provide warnings until the minimum allowable sample size is met.

▼ Canopy Cover and Sediment Summary	
Canopy and Sediment Totals Canopy total possible is 11; +1 per side channel if present. Total wet particles possible is 210 for main and mid; 10 extra per side channel if present. Note for AK Total wet particles possible is 160; 5 extra per side channel if present.	
Transects with Fully Collected Canopy partially collected canopy values not included 3 - Some or all canopy was not collected at more than half the transects	Wet Particle 0
Number of Particles with Measurements 0 - Please try to collect more streambed particles, you have less than 50% of the data.	

- **Comments Section:** Use this section to make any additional notes of atypical values, why something was not collected, or why warnings are present.
- **It is highly recommended that the user completes the Transects form start to finish in one sitting.** Due to the size of the form and the iPad you are using, you may encounter issues and need to save this form in drafts. Be sure that if you absolutely must save the form in drafts that you complete your current transect repeat page completely and do not move on to the next repeat. If midway through Transect J it starts to rain, ensure that Transect J is completely finished and filled out as complete as possible (use not collected flags if something was not collected) and then DO NOT hit the + to add Transect XJ. Instead, once the current Transect Repeat Page is complete you may save to drafts. See the saving in drafts section for information on the risks of this approach and common bugs that occur when you try to re-enter your draft. Alternatively, you can mark the remaining

transects as Not Collected, then launch a new form from your field visit to complete sampling with. Be sure to add comments indicating that forms should be merged.

Pools and Large Wood

Overview: This form is used to record all large wood and pools data (including pool tail fines if applicable).

- If this form begins to act up on users, it is recommended to submit this as two separate forms. Ensure Pool Reach Length and status are correct in the first form containing all of the pools data. Launch a second form from your field visit and record Large Wood in that form. Record a QC Comments form alerting the National AIM team to this so that they can merge the data.
- In the Large Wood section of the Summary Page, there is a warning that is displayed if you record >20 pieces of wood at a reach. In terms of BLM lands, this much large wood is unusual but not uncalled for. If you see this appear on your summary page, this is just meant to be a gut check before you hit send. Ignore this warning if there truly is >20 pieces of wood at the reach.

Floodprone Width

Overview: This form is used to record your two Floodprone width (FPW) measurements in addition to your required Floodprone Width photos.

- Once you have taken your first FPW photo, proceed to Page 3. You will return to Page 2 after you complete Page 3. Do not add a 2nd repeat to the Photos Repeat yet.
- Users may record Floodprone Widths greater than their Max, in these cases the Max value will override what data collectors recorded in the 3 boxes.
- Review the Entrenchment Ratios for your 2 locations. If there is a difference in ratios, there will be a warning in red. Follow the warnings instructions and document why a difference could occur between the two locations to cause them to have different degrees of entrenchment.
- If you only use one of the three floodprone measurement boxes, ensure the other two have 0's in them. Do not leave these blank or your entrenchment class on the summary page will show NaN.
- It is ok to save this form in your drafts and then revisit it later. For instance, you collect your first FPW when you are standing at the first location and then collect your second location later in the day when you are on that end of the reach. Just make sure everything is completely filled out and that your photo repeat does not have any blank records in it before saving to drafts.
- When recording coordinates, hold down the cross hairs for a few seconds until you see a count begin to tick upwards each second. Wait until the count has reached 10-20 and tap the cross hairs again. This will take a GPS location each second and average them all together to improve its accuracy.

Slope

Overview: This form is used to collect all slope data.

- If you move on and fill out a 3rd pass and then find an obvious error in your pass 1 or 2 data, please delete your pass 3 data completely before fixing the error in 1 or 2. This way we are not getting completely pointless data that we then need to sift through. This also will prevent any confusion during data review and QC.
- If you save this form to drafts and then notice an issue, you will need to delete all shots in the pass with the incorrect value and then re-enter them all before the calculations will update.

Vegetation and Human Influence

Overview: This form is used to collect all AIM related vegetation and human data, including presence/absence of noxious and native herbaceous and woody species, vegetive complexity and human influence.

- This form was set up so that if data collectors have a dedicated veg person with their own iPad (likely collecting greenline methods as well) that they can record this on their own device while the other two members work on other data collection with their main AIM iPad. Users collecting this on a second device should consult the FAQ section for how to launch and submit this form on a second device.
- Similar to the transects form, the user will add repeats to move from A to XA to B to XB and so on until you reach repeat 22 which is XK. However, unlike the transects form, users may start by adding all 22 repeats first and then start collecting data wherever they want. Any blank transects will be caught on the summary page.
- Be sure to double check that your species selection saves. Sometimes clicking the species name is easier than hitting the check boxes. If you hit “Not Collected” or “None” and then make a subsequent choice, it will give you an error when you add the right bank repeat.
- Occasionally a user will proceed to a side channel and notice that the Veg Complexity repeat is already on 2/2 but it says, “Left Bank”. If users encounter this issue, they should scroll back up and say the side channel was not collected. Next proceed to your next repeat. For example, if you encountered the issue on XA, proceed to B. Once the next transect is added, return to your previous transect that had the issue. Now say the transect is collected and scroll down to the Veg Complexity section. The repeat should now be reset to 1/1 starting on Left Bank.
- For Veg Complexity Canopy and Understory groups, checks have been implemented so that only logical combinations of values can be submitted. If “None” is selected, it assumes your selections are both 0’s and makes it so that the associated Big Tree/Small Tree and Understory Woody/Non-Woody are locked down and un-editable. If a value besides 0 is recorded, you will get an error; however, it at first appears that this error cannot be fixed since the cells are locked down. To correct this, unselect the associated choice of “None” on the left most column, then fix your numerical values so they are both 0 before reselecting “None”.

Photos and Reach Coordinates

Overview: As its name suggests, this form is used to record reach photos and coordinates.

- Users may want to take photos on second device because of issues with jumping back and forth between this form and other forms. This is particularly the case if you want to take photos while filling in large forms with lots of repeats such as the transects form. If users download both Field Maps and Survey123 on their phones, they may use phones to record photos. This is the only form that can be used on a phone to help alleviate workflows and reduce extra passes/jumping between forms. See the FAQ section for more detail on how to use two devices and submit this form from your phone.
- It is ok to save this form in drafts, as long as you observe the guidance listed in this document discussing how and when to save draft. Ensure that if you save, you do not have any extra blank repeats in your photo repeat table.
- Ensure that your iPad is set up following the guidance above in the Download and Set Up Apps section of this document.
- When recording coordinates, hold down the cross hairs for a few seconds until you see a count begin to tick upwards each second. Wait until the count has reached 10-20 and tap the cross hairs again. This will take a GPS location each second and average them all together to improve its accuracy.
- For the critical concept and bank stability and cover photos, you will need to make a copy of the photo and then draw lines on the photos. Follow the directions below to draw on the photos:
 - In Survey123:
 - Click the pencil icon in the center of the page.
 - Take photo.
 - In the green bar at the bottom of the screen, hit the painter's pallet.
 - Select the color you want from the list of choices.
 - If you need to swap colors, click the painter's pallet again.
 - To use standard shapes such as squares and rectangles to draw the bank stability and cover plot dimensions, click the "head" icon to turn it black. Then draw an approximate square or circle. Once you are done drawing the shape, it will correct it for you to be an exact square or circle.
 - Click the check mark in the lower right when you are finished.
 - Photos may also be taken in the iPad's photos application. Use the following instructions to mark up photos in the iPad's photos application:
 - Open the Camera app on your iPad and take your photo. Then open it in the Photos app.
 - In the upper right-hand corner hit "Edit", next hit the "..." icon in the upper right and select "Mark Up". Use the color pallet at the bottom of the page to change colors.
 - To use standard shapes such as squares and rectangles to draw the bank stability and cover plot dimensions, click the "+" button.
 - Once your photo is marked up, hit "Done" in the upper right-hand corner. Hit "Done" again in the next window.
 - Return to the Photos form of Survey123.

- Click the pencil icon in the center of the page. The camera will open. Hit the “<” icon in the upper left to go back.
- This page should be grey with a green bar at the top and bottom of the page. Select the folder icon at the bottom. In the popup, select “Photos”.
- Click the photo you want to attach. It will be added and return you to the previous page.
- Select the check mark in the bottom right-hand corner of the screen when you are finished.

Not Sampled

Overview: The Not Sampled form is used to collect general reach information and photos at all field rejected reaches.

- This form is essentially a combination of the verification and photo forms and must be submitted to document field rejected reaches.
- Always remember to record good access comments for future data collectors that may visit this location.
- Always remember to take photos. If you spend the time to visit a point, ensure that you are documenting it. This is all still data even if it is rejected.

QC Comments

Overview: This form is used to track all QC information for a given visit throughout the field season. Users should never attempt to edit their own data after it has been submitted. If errors or edits are identified after the data collectors have submitted data, use the QC Comments form to record this information so that the National AIM team can make the necessary changes for you. This form can be launched from your Field Visits in Field Maps. After data is submitted, it can also be located and launched from each of the Lotic AIM Dashboards and within each Data Summary PDF. Data collectors will respond to unresolved errors using a web version of this form embedded in the Error Review Dashboard.

- To Log an Error:
 - Launch the QC Comments form from the locations listed above.
 - Select “Log an issue”.
 - Select “Data” and then choose a Category from the list of options.
 - Under Issue Explanation, record the error.
 - Under “Who needs to review this error” select the appropriate party that should respond to this error.
 - If you:
 - do not have an immediate resolution to the error you are recording, hit submit.
 - have an immediate resolution to the error you are recording, select “Yes” in the appropriate box.
 - Under Issue Reviewer, enter your name. Do not use initials.
 - Under Resolution OR Comments, record what the resolution or data edit is to the error you recorded.

- Under Resolved, select “Yes”, and submit the form. Selecting Yes in this question que’s it up for the National AIM team to apply the edit.
- When responding to an existing error in the Error Review Dashboard using the web version of this form:
 - Update Who needs to review this error to whoever should review the response you are about to record.
 - Scroll to the bottom of the page and locate the Log another response question. Change this from “No” to “Yes”.
 - Under Issue Reviewer, enter your name; do not use initials.
 - Under Date Reviewed, select the date if it does not automatically populate in the web browser.
 - Under Resolution OR Comments, record your comment or what the resolution should be.
 - If the error still needs to be reviewed by someone else before it is marked as resolved, go ahead and submit the form.
 - If you feel that a resolution has been reached, an edit has been identified, or an issue has thoroughly been documented, locate Resolved, select “Yes”, & Submit.

Surveyed Cross Sections

Overview: This form is used to record the heights of features along a tape stretched perpendicular across the channel. The heights and distances recorded can then be plotted out on an X, Y plane to depict a cross section image of the stream channel.

- **Benchmark:** Benchmark is a reference height to compare your foresights to. The industry standard for Cross Section benchmarks is 100m and is defaulted in your form. Users may change this if necessary (e.g., a USGS survey control point of known elevation is located near your cross section) however general guidance is to leave this value as the default 100m.
- **Units:** Users who have collected Cross Sections in the past may be used to being able to collect this data in either Meters or Feet. Upon integration into the Lotic AIM framework, all units have been defaulted to Meters. Do not record data in feet.
- **Profile station** is used to note the nearest transect to your left bank end point. Multiple cross sections can be collected at a given reach and Profile station can be used to differentiate them from one another.
- **Station Comments** field should be used to document a narrative of how the cross section is laid out. Ensure that your comment includes a description of your monumenting feature and benchmark and a description of the orientation and distance from your benchmark and monumenting feature to your left bank end point. This comment will be provided to future crews recollecting this cross section so the more information you provide them the better. This field should never be left blank.
- **Bankfull Height Checks:** Once both Left and Right Bankfulls have been added to the form, users will notice a section at the bottom of the page comparing the percent difference of the 2 bankfull heights. Always ensure that both of your bankfulls are recorded at similar elevations. If situations exist where you believe bankfull may be

slightly different on both left and right bank, be sure to take additional photos and add additional comments to justify your decision.

- **Backsight Validation:** Upon completing all of your cross sections shots, a final backsight reading is needed to ensure that your survey equipment is stable and has not shifted. To validate your backsight, return to your original benchmark and record a second backsight on the final page of the form. If your two backsights are within 1% of one another, then you will be allowed to save and close the form. If your backsights are not within 1% of another, your survey gear was bumped during data collection and all data must be recollected. Close your form, return to field maps and launch another form from your field visit to recollect your cross section.

APPENDIX B. Frequent Asked Questions and Troubleshooting

1. Q: How do I launch forms if Field Maps is not working for some reason?

A: Field Maps has been known to sign users out of the app occasionally, forcing users to obtain a cellular connection to sign back in and access their offline areas. If users encounter this issue and obtaining a cellular connection is prohibitive, launch forms directly from Survey123 using the following instructions to proceed:

- Users should exhibit extreme caution when filling out the first page of every form to ensure that the correct information is recorded. Filling this out incorrectly can lead to multiple headaches for everyone involved with implementation.
- Upon returning from the field, users should log back into Field Maps and create their missing field visits. It is extremely important that your Field Visit location is where you sampled and not your house. Furthermore, be sure that your FieldEvalDate matches the date you visited the reach.
- As a good rule of thumb, data collectors should sign out and back into their accounts in both Survey123 and Field Maps prior to leaving for a hitch or trip.

2. Q: How do I collect data using two devices?

A: Data collectors collecting greenline data and data collectors in Alaska may frequently need to collect data using two devices. Other data collectors may want to collect photos on a different device. Use the following guidance to collect data on a second device:

- Once started, an individual form must be completed on the same device. You cannot split data across multiple devices for the same form! You can only collect different forms on different devices.
- Ensure both devices have Field Maps and Survey123 properly installed and signed into. Before leaving for the field, create an offline area on both devices that contains all the points needed for the trip.
- The field visit in Field Maps should be created and fully filled in on both devices. Ensure the date for the field visit matches exactly on both devices, including average widths and the 'Field Evaluation Status'.
- Submit forms and sync your offline area as normal on both devices.
- As long as all information is identical between the 2 field visits, the National AIM Team will automatically delete the duplicated field visit so only one field visit appears on the webmap.

3. Q: What should I do if repeats are not displaying the correct number or any number?

A: This may occur if you save a form in drafts prior to properly finishing a repeat. If this is the case, you will need to save this form and following instructions in question 6 below to recover this data. Then start a new form and only fill in data that you had not collected yet. Some transects that were already collected will need to be marked as "Not Collected" in the new form. Ensure that proper comments have been made in the form noting what transects from that form should be omitted and can be found in the second broken form. Users should also "Log an Issue" using the QC Comments form indicating that data will need to be merged from 2 forms.

This may also occur sometimes on the Veg Complexity or Thalweg sections in the following cases:

- Occasionally a user will proceed to a side channel and notice that the Veg Complexity repeat is already on 2/2 but says “Left Bank”. If users encounter this issue, they should scroll back up and say the side channel was not collected. Next proceed to your next repeat. For example, if you encountered the issue on XA, proceed to B. Once the next transect is added, return to your previous transect that had the issue. Now say the transect is collected and scroll down to the Veg Complexity section. The repeat should now be reset to 1/1 starting on Left Bank.
 - Thalweg data frequently asks you to “add 7 records”. When you do this, it starts displaying thalweg at measurement #2. Don’t forget to go back and fill in measurement 1!
4. Q: What do I do if I get interrupted collecting data and have to return to a form later and it is not one of the approved forms to save in drafts?
 A: If you get interrupted (e.g., have to collect data across two days or a storm rolls in) completing forms such as Pools and Large Wood or Transects, DO NOT save these forms in drafts. Instead, record any uncollected data as “Not Collected”. Then the next day or sampling event, start a new form launched from a Field Visit. Finish data collection, marking any data that was collected in the previous form as “Not Collected”. Ensure that proper comments have been made in the form noting what transects from that form should be omitted and can be found in the second form. Users should also “Log an Issue” using the QC Comments form indicating that data will need to be merged from 2 forms. This should be a rare occurrence!
 5. Q: How and when do I backup my data?
 A: After finishing each form, the raw data is saved directly to the iPad’s memory using either the “Save in Outbox” or “Save as Draft” options. Ideally, each night data collectors will back up all data they collected that day to their USB drive so that the data is stored somewhere besides the iPad. At a minimum, data collectors should do this after every 2 or 3 reaches. This process only takes a few minutes to accomplish. When data collectors return from their Trip or reliable Wi-Fi is available, they should submit all data from Survey123 and Field Maps using the send/sync buttons.
 6. Q: I am attempting to send my Transects form to my Outbox and am getting an error that says “Required: Record 2 Error”
 A: Proceed to the repeat indicated in the error. In this case you would navigate to the 2nd repeat which corresponds to transect XA. Once on XA, then proceed to the Summary Page and try to send your form again.
 7. Q: What do I do if the form won’t send or save in my outbox?
 A: First try all troubleshooting possibilities such as ensuring all fields have been filled in properly. If it is a single field that is causing the problem, consider recording the data for this field as “Not Collected” and then recording the data in comments. If multiple fields are causing issues, save the form as a draft (even if it is a larger form such as Transects or Pools and Large Wood), back up your Survey123 data to a USB drive, and upload the data to Teams. Then email Logan Shank (lshank@blm.gov) to notify him of the issue.

- To back data up to Teams, open Teams and navigate to the Backup Files folder within your state's Channel. Click the add button at the bottom of the screen and find the file for your most recent backup that you saved to your USB drive.
 - Some users may not have this add button. If that is the case, click "More" and select the Crew SharePoint. Select "Open In Browser". This will launch your iPads internet browser and redirect you to your states external SharePoint site. Sign in using your Teams credentials. These are the same files you see in Teams using the "Files" tab.
 - Navigate to the folder you want to upload files to and select "Upload" then "Files". This may need to be done twice for SharePoint to respond. In the following popup, select "Browse". This will redirect you to your iPads "Files" app. Select the files or folder you want to upload and hit upload.
 - Close out of SharePoint and return to your states Channel in Teams. Go to the "Files" tab and ensure that your upload is in the folder you specified.
 - If the above options fail, users will need to use a computer to upload the files to Teams. If data collectors do not have access to a computer, contact your manager to coordinate sending them your USB drive. DO NOT ask your Project Lead to upload this data. DOI strictly prohibits using any non-DOI furnished USB devices on a DOI Government Furnished Equipment including any BLM computers.
8. Q: What do I do if I get a failure message when I try to upload data?
A: In the very unlikely event that you receive a failure message when trying to submit final data, try again with a better cellular or Wi-Fi connection. Periodically throughout the season, Esri or GeoPlatform may implement updates to their servers which have the potential to disrupt service. The National AIM Team will always try to warn all users of planned service disruptions, however if you just get back from a trip on the day the disruption takes place and cannot submit, just wait few hours or a day and try again. If issues persist, contact Logan Shank (lshank@blm.gov).
9. Q: What do I do if I notice a minor Field Maps of Survey 123 quirk that isn't covered in this protocol or want to call the National AIM Teams attention to a specific data error after I submit data?
A: Open the Field Visit and then open the "QC Comments" form. Log the issue as a technology or data issue as appropriate. Submit this form just as you would any other form.
10. Q: When is it OK to delete data?
A: Ideally, data collectors would keep all data and photos collected in Survey123 on their device for the entire field season. Unfortunately, we realize that some users might start to run out of space on their iPad, forcing them to delete already submitted data. Before deleting any data from your iPad
- Verify that everything is backed up to your USB drive
 - Verify that the backup on your USB drive is also backed up on Teams
 - Using the Data Review Dashboard, ensure that all data was submitted and is visible on the map. If you do not see it on the map or reported in the data summary PDFs, it means that we do not have your data.

After confirming all of the above, it is safe to delete data from the iPad. Backups should NEVER be deleted from your USB. Remember that all backups should include the entire MySurveys folder so that we ensure that both data and photos are being backed up.

11. Q: What do I do if my iPad cracks or is overheating?

A: If your iPad cracks, make sure that you keep it as waterproof as possible. Put packing tape over the crack to keep water out and to keep the glass in place. Call your supervisor to let them know what happened ASAP to determine if a replacement iPad is needed.

If your iPad starts to overheat, you may notice that it starts to get slow and quirky. You may be in danger of losing data.

- If you have a waterproof case, cool the iPad off by placing it carefully on top the stream or splashing it with water. Make sure the case is still watertight before attempting this (check that the gasket is still intact, there are not cracks or breaks in the case, and all plugs units are closed off).
- If you do not have a waterproof case, try shutting the screen off and keeping the iPad screen facing down in the shade.

12. Q: How long do the iPad batteries last and how do I save battery life?

A: Battery life should last for most of the time it takes to collect data at a reach, but you may frequently need to use battery backups. Survey123 drains the battery life much more than the previous data collection application. Therefore, battery backup packs are REQUIRED. If your battery dies in the middle of any forms that have not been saved in drafts or in your outbox. The data WILL be LOST. To save battery life:

- Close unused apps on a regular basis to conserve battery life.
 - Click the “Home” button twice and “flick” or “swipe” up for each app you want to close.
 - Keep screen brightness as low as possible.
 - Turn Wi-Fi and Bluetooth off whenever not needed.

13. Q: What do I do if the iPad GPS is not working, or I get a message saying the coordinates have poor accuracy?

- Press and hold the crosshairs for a few seconds until it starts to count up every second. Let this run for 10-20 seconds and then tap the crosshairs again. This will take a GPS location every second and average them all together to improve accuracy.
- Ensure that you have properly set up for Field Maps GPS settings to allow for low accuracy coordinates (see pg. 10).
- Wi-Fi does not need to be on to use GPS. Even on Airplane mode with everything turned off (cellular, Bluetooth, and Wi-Fi), your device can still track your location.
- If GPS coordinates still cannot be obtained using the iPad due to low accuracy/signal, an external GPS may be used, but these external GPS coordinates must be entered into a notes field in Survey123 since the geopoint questions are not manually editable aside from hitting the crosshairs. This method should only be utilized by data collectors working in narrow confined slot canyons. Data collectors should still use the crosshairs to record a coordinate in the form even if it is very incorrect.

14. Q: I went to review a data summary PDF, but the PDF is not displaying data from the data collector's forms.

- The data collectors likely sync'd their Field Visits to the server on a different date than they synced their Survey123 data. The script runs each night looking for new Field Visits to create PDFs for. If there is no associated survey data that was submitted on the same day that the Field Visit was synced, the PDF will have a lot of blank fields. After the PDF script runs, it updates the PDFgenerate field back to No.
- To correct this issue, change the PDFgenerate field in the Field Visit layer back to "Yes" using the "Update Eval Status" webmap in the Data Review Dashboard. The scripts will run over night generating a new PDF with the correct data and should be available online the following morning.
- If there is no data summary PDF on the dashboard and data collectors claim they submitted all their data:
 - i. First check that they submitted a Field Visit. If there is no Field Visit, there will not be a PDF.
 - ii. Next, using the "Update Eval Status" webmap in the Data Review Dashboard, check and make sure that the EvaluationIDs in the data collectors submitted forms match the StaticEvaluationID field in the Field Visit layer. If they do not, "Log an Issue" using the QC Comments form indicating that EvaluationIDs do not match and need to be corrected. Provide an immediate resolution and mark as resolved so the National AIM Team can make the identified edits and generate a new Data Summary PDF.

15. Q: What do I do if section of the form is not present when I add another repeat?

A: Occasionally during testing, in particular in Vegetation and Human Influences, certain groups would disappear from the forms Data page (ex: Veg Complexity and Human Influences). If you experience this issue, fill out everything that you can on the page that is experiencing the issue. Next add the next repeat. Sometimes this will trigger the missing required to run which will make the missing section reappear. If not, on the following transect, mark the status as not collected and return to the previous transect. If the missing groups are still not displaying properly in the form, follow guidance above in #4 to mark everything else in the form as Not Collected, add a comment noting that the form broke, and launch a second form to continue on with data collection. Users should also "Log an Issue" using the QC Comments form indicating that data will need to be merged from 2 forms so that the National AIM Team can begin recombining the data.

16. Q: How do I reset my iPad to factory settings?

A: The National AIM team recommends factory resetting an iPad between each field season to ensure that new data collectors are handed a device with as much performance and available storage space as possible. To do this, open the "Settings" app and chose "General" from the list on the left. Next, locate "Transfer or Reset iPad". At the bottom of the page hit "Reset" and follow the prompts to reset the device.

APPENDIX C. Checklists

iPad Setup (Pre-Training)

Data collector managers should ensure the following checklist has been completed prior to data collectors receiving their iPads at training.

- If using a previously used iPad, has it been reset to factory settings?
- Is Survey123, Field Maps and Microsoft Teams Installed?
- Have you installed software to back up data?
- Have iPad settings been updated? (Disabling auto-update and changing photo format)
- Are there any basemaps that need loaded onto flash drives or side loaded onto the iPad itself?
- Do you have a plan in place to get iPads to data collectors before training so that they can create an offline area? Data collectors **MUST** come to training prepared with downloaded Offline Areas based off the Training Field Map.
- Have all the Training Survey123 forms been downloaded?
- Has the Lotic Calibration Survey123 form been downloaded?
- Do all data collectors have GeoPlatform accounts and Microsoft Teams access?
- Have you downloaded a PDF version of the TR 1735-2 Lotic AIM Field Methods?
- Have you downloaded a PDF version of the Lotic Technology Manual?
- Have you downloaded a PDF version of the Lotic Evaluation and Design Management Protocol?
- Have you downloaded a PDF version of the Lotic Data Management Protocol?
- Have you downloaded PDF versions of other important materials? (e.g., YSI Manuals, Calibration Logs, InReach User Manuals)
- Are there any other user specific applications that need to be installed? (e.g., OnX)
- If data collectors are working on a revisit design, do you have Revisit Packets downloaded?

Pre-Trip Checklist

Data collectors should ensure the following checklist has been completed before leaving on each Trip.

- Do you have an offline area downloaded using Field Maps based off the field season Field Map?
- Have you synced your offline area recently to pick up the most up to date information and trip assignments?
- Do you have basemaps downloaded to your device or saved on a flash drive?
- Do you have all of the field season Survey123 forms downloaded?
- Have you checked to see if there are any form updates that should be downloaded?
- Have you checked your iPads storage recently? Do you have any backups on your device that could be offloaded to Teams? Does your Teams app need its cache purged? Can anything be offloaded to your flash drive?
- Have you checked Teams to see if there are any updates you need to be aware of?
- Have you reviewed your Trip assignment using the Trip Details Dashboard? Have you reviewed sampling order, Office Eval Comments, Access Comments, etc.? Do any

reaches need special landowner permission to access and has that been obtained? Have all of your questions been answered?

- Have you checked to see if there are any unresolved errors in the dashboard that need responded to before leaving service for multiple days?

Post-Trip Checklist

Data collectors should ensure the following checklist has been completed upon returning from each Trip.

- Have you synced Field Maps?
- Have you submitted all Survey123 data?
- Are there any known data issues that need to be documented using QC Comments?
- Do any of your forms need to be merged? (Form glitched and data collectors had to continue data collection in a second form)
- Are there any PointID/EvaluationID issues that the National AIM team should be aware of so that we can correct it?
- Have you made plans to review data from your Trip with your Data Collector Manager or Project Lead using the Data Review Dashboard?
- Have you allocated time to review unresolved errors in the Error Review Dashboard?
- Have you reviewed the Points assigned to you on your upcoming Trip? Do you have any questions that need to be answered before you leave?
- Is there any equipment that needs to be repaired/replaced?
- How is your iPads storage looking? Do you need to do any periodic clean up?
- Do you need to swap basemaps out before your next Trip?
- Have you ensured all of your next Trips points are contained within your offline area?
- Are your Bug and WQ samples being reviewed and properly archived after each trip? Remember to review labels, ensure jars are properly sealed, and that all Bug and WQ samples are taped into 2 separate bundle based on the EvaluationID. (Ex: If you have 4 bug jars and 3 WQ jars, tape the 4 bug jars together so they cannot be separated once they enter storage. Do the same thing with WQ.)