

TrapTracker User Guide

Version 1.0.7

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Version History

1.0.6 – This is the initial production release candidate as part of the phased rollout process.

1.0.7 – This is the latest updated version after making some minor configuration adjustments.

Purpose and Scope

The app ("TrapTracker") supports field data collection activities such as trap and bottle deployment, sample collection, and related research workflows for the Centre for Biodiversity Genomics (CBG) and its partners. The app may also be used for future biodiversity monitoring activity as approved by CBG.

System Requirements

To ensure a successful download and installation of the app from the Google play store, your Android device must be able to receive the latest Android OS updates, with the minimum supported version being Android 13 (API 33) or higher.

Installation

To download and install the app, go to the Google play store and look for "TrapTracker". You may need to search for it manually if it doesn't appear in the apps section of the play store. Note that you will need to sign in with your Google account (or create if you don't have one) to install any apps from the play store and include your payment information (required for paid apps and in-app purchases). TrapTracker is available for free. Here is the link to the Google Play Store: TrapTracker - Apps on Google Play

Notifications and App Status

During startup, the permission launcher will appear on screen asking if you want to allow notifications from the app or not. The purpose of the notifications is to alert users of any planned, ongoing/completed system maintenance, and to remind users to update the app to the latest version when an update is available.

The notifications themselves are controlled by the server and will send out alerts 24 hours in advance of any scheduled maintenance. In the event of ongoing maintenance or a required app update, you will not be able to make any calls to the server until the maintenance is complete or the app has been updated to the latest version. Once maintenance has been completed, the app will send out a notification to indicate that all systems are available.

One important note: the notifications don't control the state of the app. The app performs a status check, which is also controlled by the backend. The status check is what determines what notifications get sent out and the state of the app (whether any calls to the server are allowed or not).

To make the notification system more automatic and to allow for delivery when the app isn't running, the app uses Firebase Cloud Messaging (FCM) to automatically receive, and display notifications sent by the server. It also uses a built-in scheduling system to locally schedule future notifications that aren't due to be sent yet. Note that this feature does not survive device reboots, so any scheduled future notifications will be wiped upon device reboot, but the app still performs a periodic notification check once daily. This may result in you not receiving time-sensitive notifications for up to 24 hrs.

Account Creation and Login

For new users, you will need to agree to the Terms of Use (TOS) agreement that is listed on screen and create a new user account before you can proceed with using the app. For returning users, you have the option of logging in to an existing account, reset your password if you forgot it, or create an entirely new user account.

To create a new account, simply enter a username, a valid email, and a password. The following field validation rules apply:

- All fields are required.
- Email must be a valid format (@ symbol is required, followed by a valid domain).
- Passwords must be complex and hard to guess (10-15 characters with a combination of numbers, uppercase/lowercase letters, and special characters).

To make the login process as secure as possible, returning users attempting to login to their existing account will be authenticated using the backend server by querying the provided username and password against what was stored on the backend database during account creation.

To prevent infinite failed login attempts, a Rate Limiter has been implemented to restrict users to a maximum of 5 attempts. For each failed login attempt, the app shows how many login attempts are left. After 5 failed attempts, login is paused for 5 minutes (the login button shows a countdown); further failed attempts lengthen the pause. Use Forgot Password rather than guessing.

Once you have successfully logged in or created a new account, the main activity screen will automatically appear with your username on the header (Welcome, user).

Password Reset

If you want to login to an existing account, but can't remember your password, you can reset your password using the following steps:

- Enter the email that you used for account creation: Once the backend database verifies your email, it will send a temporary access code (random 6-digit value) to your email, which will expire in 15 minutes.
- Enter the access code sent to your email: Once the backend database validates and authenticates the access code successfully, it will generate a temporary access token which will allow you to reset your password. Note that the same security/authentication rules for account login also apply for access code verification.
- Enter a new password: You must enter a unique password and cannot reuse an old password from a previous session.
- Login to your account using the new password.

Trap Deployment

- First-time users will be required to deploy a new trap before they can deploy a bottle or select either of the collection activities since traps are the basis for all activities.
- Ideally, you would scan the barcode/QR code associated with the trap using the camera, but if it does not work the first time, you can either try again or manually type in the code. The same process applies to bottle deployment and trap/bottle collection.
- Once you are satisfied that the information on the verification screen is correct, click on the submit button to save the information to the backend database.

Bottle Deployment

- For bottle deployment, you first need to scan or manually enter an existing trap code.
- To prevent users from scanning codes for traps that haven't been deployed yet, the local storage will validate trap codes and will reject any code that doesn't exist.
- Once you've scanned the trap code, follow the same process for trap deployment to deploy a new bottle.

Bottle Collection and Trap Removal

- For bottle collection, follow the same process for bottle deployment to collect a bottle. The only difference is instead of selecting the deployment date, you select the collection date, and the optional notes fields are now located in the trap and bottle condition screens.
- After scanning an existing trap and bottle code, you will be required to select the trap and bottle condition from a dropdown list of conditions.

- For trap removal, simply follow the same process for trap deployment to remove a deployed trap. Scan the trap code and select the removal date.

Offline Usage and User Sessions

The app has been developed to support offline usage. Once you have created an account or logged in, you won't need to be actively connected to a network until you are ready to submit and sync activity information to the backend.

Each user session is controlled by temporary access tokens generated by the system after successful account creation or authentication. Once the current session expires, the system will automatically refresh the session by rotating the token on the backend.

Data Sync

There are 2 instances where the app communicates with the backend database to ensure data is saved locally, and the backend is in sync. The first instance occurs after the user successfully logs in or creates an account where pre-seeded data from the backend gets saved locally.

The other instance occurs during data submission at the end after the user verifies all the data shown on the verification screen is accurate and clicks on the submit button where activity-related data first gets saved locally, followed by a sync to the backend database.

Syncing only happens over Wi-Fi. Log in while connected to Wi-Fi before heading to the field so your trap and bottle data are downloaded to your device. Records you submit in the field are saved on your device and will sync the next time it connects to Wi-Fi.

Troubleshooting

App won't install

If the app won't install on your device, it could be due to various reasons, such as insufficient storage, compatibility issues, or an issue on the Google play store's side. Here are some basic checks you can perform:

- Check your wi-fi or cell service connection and ensure you have a stable connection before retrying.
- To check your storage space: Settings > Storage. If you see that you are running low on storage space and an option to offload unused apps exists, it's recommended you enable that option rather than having to manually delete them.

Google Play store fixes:

- Close the Google Play store by swiping away from recent apps, then reopen it.
- Clear the Play store cache: Settings > Apps > Google Play store > Storage > Clear Cache > click on “Clear Cache”.
- Remove and re-add your Google/Gmail account: Settings > Accounts > Google > Remove Account. Restart the device and sign in again.

If installing via APK file:

- Enable installation from unknown sources: Settings > Apps & Notifications > Special App Access > Install Unknown Apps, select your browser/file manager and turn on “Allow from this source”.
- If the APK file is corrupted, download a fresh version from a trusted source.

Other Causes:

- If apps install to an SD card, switch to internal storage: Settings, Storage, Default Storage Location > Internal Storage.
- Uninstall any older/conflicting version(s) of the app before reinstalling.

If none of these steps worked, ensure your device is up to date with the latest OS version or higher than Android 13 (minimum supported version), or contact your device manufacturer for technical support.

FAQ

1. **Does the app only support QR code scanning?** No. The app can scan QR codes and most common barcode types. The labels on your trap and bottles use QR codes. If a code won’t scan, you can type it manually.
2. **How does the data entry process work?** The data entry process has 2 parts: local storage using Room DB and backend database storage using PostgreSQL. Any data stored locally is primarily used for trap and bottle lookups, as well as validating trap codes and bottle codes to ensure only unique traps and bottles are deployed and collected, and to make sure users don’t scan codes for traps or bottles that haven’t been deployed. The backend database serves as the main point of reference (master database) and is also used for security and authentication tasks.
3. **How long do user sessions last for?** Each user session is controlled by encrypted access tokens that expire after 15 minutes. Once the current token expires, the backend will automatically refresh the token by validating and generating a new token with no user interaction at all. Once the token has been refreshed, the user session will remain valid for up to 1 week.
4. **How long do you have to wait before you can manually enter the trap or bottle code?** The camera timeout window lasts about 10 seconds, so if you can’t scan the code within the 10 second window, you can either try scanning again or manually enter the code.

5. **How will we know if the data has been synced successfully?** Once you click on the submit button, a sync status field will automatically appear and will show either “Enqueued” or “In Progress” to indicate that the process has started or is running. If the sync was successful, the status will show as “Complete” with green text. If for some reason it failed, the status will show as “Failed” in red text with an error message. Depending on the speed of your device and/or network connection strength, you might see “Enqueued” or “In Progress” on your screen for a few moments, but if the process is quick and your device is connected to Wi-Fi, you’ll often see “Complete” right away or within a few seconds. A sync failure would most likely indicate a system error, but the data will always be stored locally regardless of the status.

Contact Information

For any questions or concerns related to the field or Malaise traps/bottles, please contact the CBG collections unit at info@globalmalaise.org

For any technical support related to the app and its functionality, please contact traptracker.support@globalmalaise.org

Appendix A: Terms of Use (TOS)

By using this application ("the App"), you agree to the following terms:

1. Purpose and scope:
    - The app supports field data collection activity such as trap deployment, sample collection, and related research workflows for the Centre for Biodiversity Genomics (CBG) and its partners.
    - The App may also be used for future biodiversity monitoring activity as approved by CBG.
2. User Eligibility:
    - The app is intended for authorized CBG staff, collaborators, and approved project partners only.
    - Users must follow all institutional guidelines and enter accurate information.
3. Acceptable Use:
    - You agree to use the app only for legitimate project activity.
    - Misuse, including false data entry, unauthorized access to admin tools, or interfering with system operations, is strictly prohibited and may result in revoked access.
4. Data Collection:
    - The app collects information entered by users, including collector name, trap/sample codes, dates, coordinates and elevation, trap and sample conditions, and other project metadata.
    - Records may be stored on your device until a connection is available.
    - Location data is collected only when you choose to enable device-based location services.
5. Syncing and Network Use:
    - Data collected will sync when a secure internet connection is available; the default setting will be to 'Sync only on Wi-Fi'.
    - Syncing over a mobile network may use your data plan and could incur charges from your carrier.
    - Records can only be uploaded to the backend if the device is connected to a network or cell service.
6. Data Accuracy and Verification:
    - Users are responsible for reviewing and confirming data before submission.
    - Admin users may update records if corrections are required.
7. System Availability and Disclaimer:
    - CBG strives to ensure reliable operation, but the app is provided "as is."

- CBG is not responsible for data loss, delays, outages, sync issues, device limitations, or other technical problems.

8. Admin Access:
    - Certain features, such as record editing, exports, condition list management, are restricted to authorized admin users.
    - Admin actions may be logged for security and auditing purposes.
9. Termination of Access:
    - CBG may restrict or revoke access at any time for misuse, policy violations, or security concerns.
    - Users must discontinue use upon notice of termination.
10. Updates:
    - Features, workflows, and requirements may change over time.
    - Continued use of the app signifies acceptance of any updated terms.
11. Contact Information:
    - For any questions or concerns related to the field or Malaise traps/bottles, please contact the CBG collections unit at info@globalmalaise.org
    - For any technical support related to the app and its functionality, please contact traptracker.support@globalmalaise.org

Appendix B: Privacy Policy

Effective Date: September 11, 2026

Overview

TrapTracker collects and maintains information necessary to support biodiversity research and policy development. We gather only the minimum amount of personal information required to appropriately credit contributions and ensure an efficient user experience.

The use of personal information is strictly limited to the purposes outlined in this Privacy Policy, and TrapTracker does not sell personal information to third parties. We apply the same level of privacy protection for all users, regardless of their location or nationality.

Information We Collect

We collect personal and non-personal information when you interact with TrapTracker. This includes:

1. Personal Information:

This may include your name, email address, affiliation, and other details you provide when creating an account, submitting data, or engaging with our services. TrapTracker accesses your device's location services while the app is in use to capture GPS coordinates (latitude, longitude, and elevation).

Android allows you to choose between precise and approximate location when granting permission and TrapTracker will use whichever level of accuracy you select. Location data is recorded and stored only during trap deployment or removal, and it is not logged continuously or transmitted in the background.

You can change your location permission or disable locations services for TrapTracker at any time through your device settings, though this will prevent automatic coordinate capture.

2. Non-Personal Information:

This may include technical data such as an app instance ID that can be linked to a known user account, local timestamps, unique IDs, sync logs, and error messages used to diagnose connectivity and confirm successful transmission.

Records are stored on your device until data is successfully synced. This technical data is not used to identify or profile individual users and is not shared beyond what is necessary to support the sync and verification process.

How We Use Your Information

We use the collected information to:

1. Provide and maintain our services, including data submission, storage, and access. Your submitted data is synced to CBG servers automatically when a network connection is available, or manually upon request. Syncing over a mobile network may use your data plan and incur charges from your carrier. You can manage network permissions for the app through your device settings.

2. Communicate with you regarding updates, news, and research developments related to TrapTracker.

3. Analyze and improve the functionality and performance of TrapTracker.

4. Comply with legal obligations and enforce our terms of use.

Data Sharing and Disclosure

TrapTracker may share your information under the following circumstances:

1. With Your Consent:

We may share your information with third parties if you explicitly consent to such disclosure.

2. For Reporting Purposes:

TrapTracker is a publicly funded platform that facilitates biodiversity research and may share de-identified or aggregated data with funding agencies and institutions.

3. Legal Compliance:

We may disclose your information if required by law or in response to legal processes, such as subpoenas or court orders.

Location coordinates recorded during trap deployment and removal are associated with sampling sites, not with individual users. These coordinates become part of the specimen record and are initially private. Data release, including location information, is governed by the CBG Data Release Policy that sets out embargo periods, exceptions, and release schedules.

Data Security

We implement industry-standard security measures to protect the personal data we collect. While we take reasonable precautions to safeguard your information, no method of transmission or storage is completely secure. We cannot guarantee absolute security.

Data Retention

We retain your personal data for as long as necessary to fulfill the purposes outlined in this Privacy Policy, unless a longer retention period is required or permitted by law. When your data is no longer needed, we will securely delete or anonymize it.

Your Rights

You have the right to:

1. Access the personal information we hold about you.
2. Correct any inaccuracies in your personal data.
3. Request the deletion of your personal data, subject to certain exceptions such as compliance with legal obligations.

To exercise any of these rights or to inquire about our data practices, please contact traptracker.support@globalmalaise.org.

Changes to This Privacy Policy

This Privacy Policy may be updated as the app evolves. We will notify users of material changes to this policy via the app or by email. Continued use after notification constitutes acceptance.

Cookies and Analytics

TrapTracker does not use browser cookies. The app may collect anonymized usage analytics (such as feature usage frequency and crash reports) to help improve the application. This data is not used to identify individual users. If any analytics tools are used, they will be disclosed here along with options to opt out where available.

Third-Party Links

TrapTracker and related web pages may contain links to external sites. These sites are not under our control, and we are not responsible for their privacy practices. We encourage

you to review the privacy policies of any third-party sites before providing personal information.

Contact Information

For any questions or concerns related to the field or Malaise traps/bottles, please contact the CBG collections unit at info@globalmalaise.org

For any technical support related to the app and its functionality, please contact traptracker.support@globalmalaise.org

Acknowledgement

Portions of this application were developed with assistance from AI tools such as Claude Code, ChatGPT, Microsoft Copilot, Google Gemini, etc. All requirements, implementation decisions, testing, validation, and final review were completed by the author.

Glossary

Key Terms	Definition
API	Application programming interfaces are a set of rules/protocols that allow different software applications to communicate with each other. A relevant example is the app using various API endpoints to communicate with the backend server to perform different tasks.
HTTP/HTTPS	The main difference between HTTP vs HTTPS is that the 's' stands for *secure. URL connections that use HTTPS rely on 3 types of digital certificates: • Certificate Authority (CA) certificates • Server certificates • Client certificates. Anytime you see a certificate error on a webpage, it can be due to either of the following cases: • Invalid or untrusted CA authority • Invalid hostname • Revoked or expired certificate In any case, it's not recommended that you proceed forward. *Secure doesn't always mean legitimate. Hackers can create spoof websites using HTTPS.
Rate Limiter	A rate limiter is a system mechanism that controls the number of requests a user can make to the system within a specified timeframe to ensure system stability, security, and fairness. A relevant example is that the app uses a rate limiter implemented in the system to prevent infinite login attempts by the user. If the user makes an unsuccessful login attempt, they will need to wait a specific

	amount of time before they can try again. The time will exponentially increase for each failed attempt (5 min, 10 min, 15 min, etc.), and if they meet or exceed a certain threshold (e.g. 5 failed attempts), they will be temporarily locked out for the maximum defined time.
Refresh Token	Refresh tokens exist for a single reason: To prevent users from having to log back in each time their session expires. A refresh token is a longer-lasting credential issued alongside a temporary access token. When the access token expires, the backend receives the refresh token and validates it before secretly issuing a new token, all without any user interaction.