



Environmental Analysis Program

Pomona College
Biogeochemistry Laboratory

SOP-F602

iNaturalist for Biodiversity Documentation

Standard Operating Procedure

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Table of contents

1 Purpose	2
2 Scope	2
3 Responsibilities	2
4 Definitions	2
5 Safety and Hazards	3
6 Required Materials	3
7 Procedure	4
7.1 Account Setup	4
7.2 Making High-Quality Observations	4
7.2.1 Photography Tips	4
7.2.2 Recording the Observation	5
7.3 Bulk Uploading Observations via CSV	5
7.3.1 Preparing the CSV	6
7.3.2 Importing	6
7.4 Contributing Identifications	7
7.5 Creating and Managing Projects	7
7.5.1 Creating a Collection Project	8
7.5.2 Creating a Traditional Project	8
8 Data Quality Considerations	9
9 Data Export and Analysis	9
9.1 Exporting from iNaturalist	9
9.2 Exporting from GBIF	10
9.3 Using <code>rinat</code> in R	10
10 Citing iNaturalist Data	10
11 Responsible Use	10
12 References	11

13 Training Record

1. Purpose

This SOP describes how to use iNaturalist (<https://www.inaturalist.org>) as a standardized tool for documenting biodiversity at EA Program field sites. iNaturalist is a community science platform that combines field observation, AI-assisted species identification, and expert community verification into a single workflow (ueda2024?). Observations that receive community agreement on identification reach “Research Grade” status and are automatically shared with the Global Biodiversity Information Facility (GBIF), making them part of the global scientific record (Global Biodiversity Information Facility, 2024).

Community science platforms like iNaturalist generate large volumes of occurrence data, but the scientific value of those data depends critically on the quality of individual observations, including photographic evidence, spatial accuracy, and taxonomic verification (Dickinson et al., 2010). When data quality is maintained, iNaturalist records can support large-scale biodiversity monitoring and contribute meaningfully to national and international biodiversity assessments (Callaghan et al., 2021; Chandler et al., 2017). This SOP covers making high-quality observations, creating and managing collaborative projects for EA Program research, and exporting data for analysis in R.

2. Scope

- **Applies to:** All EA Program biodiversity surveys, species inventories, and community science activities where iNaturalist is used to document plant, animal, fungal, or other organism occurrences
- **Does not apply to:** Quantitative vegetation transect surveys (SOP-F603); camera trap image processing (SOP-F620); formal specimen collection requiring voucher preparation; eDNA sampling
- **Location:** All EA Program field sites and campus

3. Responsibilities

Role	Responsibility
PI / Field Lead	Create and administer iNaturalist projects; review data quality
Project Admin	Manage project settings, curate observations, invite members
Trained Personnel	Make observations per this SOP; contribute identifications
New Students	Create an account and complete training before using iNaturalist for research data

4. Definitions

- **Observation:** A record of an encounter with an individual organism at a specific place and time, documented with at least one photo or sound recording.

- **Research Grade:** An observation that has a date, location, photo or sound, and community agreement on the identification (at least two-thirds of identifiers agree at the species level). Research Grade observations are shared with GBIF (Global Biodiversity Information Facility, 2024).
- **Needs ID:** An observation that has not yet received enough community identifications to reach Research Grade. These records are scientifically useful but carry higher taxonomic uncertainty.
- **Casual:** An observation that is missing date, location, or evidence (photo/sound), or that the community has voted as not meeting quality standards. Casual observations are excluded from most research exports.
- **Collection Project:** A project that automatically includes all observations matching defined criteria (taxa, place, users, dates, quality grade). No manual curation needed.
- **Traditional Project:** A project where observations must be added manually by members. Can require custom observation fields. Requires the creator to have at least 50 verifiable observations.
- **Umbrella Project:** A project that aggregates observations from multiple other projects. Useful for coordinating across sites or taxa.
- **Observation Field:** A custom data field that can be attached to observations (e.g., “habitat type,” “number of individuals,” “flowering status”). Only Traditional Projects can require observation fields.
- **Computer Vision (CV) Model:** The machine learning model trained on iNaturalist’s community-verified image database that suggests identifications for new observations. The model is retrained periodically and performs best for taxa and regions with large training datasets; accuracy declines for rare, under-photographed, or morphologically cryptic taxa (Ioarie2023?).
- **Taxon Geoprivacy:** An automatic system that obscures the coordinates of observations for threatened, endangered, or sensitive species to protect them from collection or disturbance.
- **Coordinate Uncertainty:** The estimated spatial accuracy of the GPS location, expressed as a radius in meters. High uncertainty (greater than 1000 m) reduces the value of occurrence records for fine-scale spatial analyses.

5. Safety and Hazards

Standard field safety applies when making observations in the field. Refer to [SOP-F001 Field Safety](#). Additional considerations specific to iNaturalist use:

- **Location privacy:** iNaturalist observations include GPS coordinates by default. Be aware that your location is visible to other users unless you obscure or hide it. Do not post observations from private residences without obscuring the location.
- **Sensitive species:** iNaturalist automatically obscures the locations of threatened and endangered species (“taxon geoprivacy”). Do not override this obscuring for sensitive taxa.
- **Disturbance:** Do not disturb, handle, or collect organisms solely for an iNaturalist photo. Photograph organisms in situ where possible.

6. Required Materials

Item	Notes
Smartphone with iNaturalist app	iOS or Android; free download
iNaturalist account	Free at https://www.inaturalist.org
Camera (optional)	For higher-quality photos; phone camera is sufficient for most uses
Field notebook	For recording additional data not captured in iNaturalist
GPS unit (optional)	Phone GPS is usually adequate

7. Procedure

7.1. Account Setup

1. Go to <https://www.inaturalist.org> or download the iNaturalist app
2. Create an account using your Claremont email address
3. In your profile settings:
 - Set your default photo license to **CC-BY** or **CC-BY-NC** (this allows your photos to be used in research with attribution)
 - Set your default observation license to **CC0** or **CC-BY** (this allows your observation data to be shared with GBIF)
 - Set your default location to “open” (you can obscure individual observations as needed)
4. Send your iNaturalist username to the project administrator so you can be added to the EA Program project

! License Settings Matter for Research

Observations with “All Rights Reserved” licenses are excluded from GBIF exports and many research datasets. For EA Program work, always use a Creative Commons license. CC-BY is recommended.

7.2. Making High-Quality Observations

A useful iNaturalist observation needs four things: a photo (or sound), a date, a location, and enough visual detail for identification. Follow these guidelines to maximize the chances of reaching Research Grade.

7.2.1. Photography Tips

1. Take multiple photos of each organism from different angles:
 - **Plants:** Whole plant habit, close-up of leaves (both sides), flowers or fruit, stem, bark (for trees)

- **Insects:** Dorsal view (top), lateral view (side), close-up of head and wing venation if possible
 - **Birds:** Best angle available; include habitat context if possible
 - **Fungi:** Top of cap, underside (gills/pores), stem, habitat context
2. Include something for scale (a finger, a coin, a ruler) when practical
 3. Photograph the organism in its natural position; do not relocate it
 4. For plants, photograph vegetative and reproductive structures together if both are present
 5. Ensure the photo is in focus and adequately lit

7.2.2. Recording the Observation

6. Open the iNaturalist app and tap the camera icon to start a new observation
7. Take photos directly in the app, or select photos from your camera roll
8. The app will suggest an identification using its computer vision

(CV) model (**loarie2023?**). Accept the suggestion if it looks correct, or refine the identification manually. When in doubt, identify to the broadest level you are confident in (e.g., “Plants” or “Oaks” rather than guessing a specific species). The CV model performs best for common, well-photographed taxa in North America and Europe; for under-represented groups (e.g., lichens, mosses, many invertebrate families), manual identification by the observer or community identifiers is essential.

9. Verify that the date and location are correct. The app captures these automatically from the photo metadata, but check that the GPS pin is accurate on the map. If coordinate uncertainty exceeds 500 m, manually reposition the pin.
10. Add any relevant notes in the “Notes” field (habitat, behavior, abundance, associated species)
11. If the observation is part of a Traditional Project, add it to the project before submitting (see Section 7.4)
12. Tap **Submit**

Sound Observations

For birds, frogs, and insects, a sound recording can be as useful as (or more useful than) a photo. The iNaturalist app can record audio directly. Hold the phone steady and minimize background noise.

7.3. Bulk Uploading Observations via CSV

For observations recorded outside the app (for example, transcribed from a field notebook, exported from another platform, or compiled in a spreadsheet during data entry), iNaturalist accepts a bulk CSV import. This is useful when you have many records to create at once and do not want to enter them one at a time. The importer creates the observation records only; it does not upload photos or sound files, so media must be attached afterward (see below).

7.3.1. Preparing the CSV

1. Build the spreadsheet with up to eight columns, in this order. Only the taxon column is mandatory.

Column	Format / example	Notes
Taxon name	text (e.g., <i>Quercus agrifolia</i>)	Mandatory. Use the scientific name for reliable matching.
Date observed	YYYY-MM-DD HH:MM	Use day-level precision or finer for research use.
Description	text	Free-text notes (habitat, behavior, abundance).
Place name	text	Optional named locality.
Latitude	decimal degrees (34.1064)	Use a decimal point, not a comma.
Longitude	decimal degrees (-117.7120)	Use a decimal point, not a comma.
Tags	tag,tag	Comma-separated tags.
Geoprivacy	open, obscured, or private	Set to obscured for sensitive taxa.

2. Keep the file under 10,000 rows. Split larger datasets into multiple files.
3. Wrap any field that contains a comma in double quotes so it is not misread as a column break.
4. Confirm that coordinates use decimal points. Spreadsheets configured for some locales export decimal commas, which the importer rejects.

7.3.2. Importing

1. Go to the import page at https://www.inaturalist.org/observations/import#csv_import (or from the upload page, click **More import options** and choose **CSV**).
2. Choose your file and upload it.
3. Open **Edit Observations** to review the created records. Use **Batch Edit** to select multiple observations, attach photos or sound files, and apply a shared location from the map.
4. Verify dates, coordinates, and identifications, then save.

CSV Imports Do Not Include Media

The CSV importer creates observation records without photos or sounds. An observation with no media cannot reach Research Grade and is treated as Casual, so it will be excluded from most research exports and from GBIF. Attach media through Batch Edit after import if the records are intended for analysis.

Large or Photo-Linked Datasets: Use the API

For large batches, or when you need to match many photos to the correct records automatically, the spreadsheet importer becomes impractical. In those cases, script the upload against the iNaturalist API (<https://api.inaturalist.org>). The `rinat` package is read-only (it retrieves data but does not create observations), so creating observations programmatically requires

direct authenticated calls, for example with `httr2` in R:

```
library(httr2)

# Requires an OAuth API token from your iNaturalist account.
# Create the observation, then POST the photo to /observation_photos
# using the returned observation id. See the API reference for the
# full request schema before running against your account.
```

Test any upload script on a handful of records first, and never use it to create observations for organisms you did not personally encounter (see Responsible Use).

7.4. Contributing Identifications

Identifying other people’s observations is as valuable as making your own. It builds community expertise, helps observations reach Research Grade, and improves the CV model.

1. Go to the **Identify** tab on the website (or use the Explore page and filter by “Needs ID”)
2. Filter by your area of expertise (taxa, location)
3. Add your identification. Agree with the existing suggestion if correct, or provide a different identification with a brief explanation.
4. Use the “Compare” tool to check similar species
5. Mark observations as “No, it’s as good as it can be” only if the evidence is genuinely insufficient for identification

7.5. Creating and Managing Projects

iNaturalist offers three project types. Choose based on your research needs:

Feature	Collection Project	Traditional Project	Umbrella Project
Observations added	Automatically (by filter criteria)	Manually by members	From member projects
Custom observation fields	No	Yes (can be required)	No
Creator requirements	Any user	50+ verifiable observations	Any user
Best for	Site-based inventories, class bioblitzes	Projects needing custom data fields	Multi-site or multi-taxon coordination
Obscured coordinate access	Yes (with Trust enabled)	Yes (with member permission)	No (via member projects)

7.5.1. Creating a Collection Project

This is the recommended type for most EA Program site inventories and class projects. Observations matching your criteria are included automatically.

1. Go to <https://www.inaturalist.org/projects/new>
2. Click **Get Started** under Collection Projects
3. Fill in the project details:
 - **Title:** Use a descriptive name (e.g., “EA Program – Bernard Field Station Biodiversity 2025”)
 - **Icon:** Upload the EA Program logo or a representative photo
 - **Banner:** Upload a site photo
 - **Description:** Explain the project’s purpose, study site, and time frame
4. Set the project requirements (filters):
 - **Place:** Select the iNaturalist Place for your study area. If one does not exist, create a custom Place by drawing a boundary on the map (Community > Places > Add a New Place).
 - **Taxa:** Leave blank to include all organisms, or restrict to specific groups (e.g., Plantae, Aves)
 - **Users:** Leave blank to include anyone, or list specific usernames for a closed team
 - **Date range:** Set start and end dates if the project covers a specific period (e.g., a class semester or field season)
 - **Quality grade:** Select “Research Grade” and “Needs ID” for most research projects
5. Under **Trust** (optional but recommended for research): enable Trust to allow project admins to access the true coordinates of observations with obscured or private locations. Members must individually opt in to share their coordinates.
6. Click **Save**

Creating a Custom Place

If your study area (e.g., the Bernard Field Station, a specific watershed) does not exist as an iNaturalist Place, create one:

1. Go to <https://www.inaturalist.org/places/new>
2. Name the place (e.g., “Bernard Field Station, Claremont, CA”)
3. Draw the boundary on the map using the polygon tool
4. Save

The place will be available as a filter in your Collection Project. Note that very small places (e.g., a single backyard) work better with Traditional Projects because GPS accuracy and obscured coordinates can cause observations to fall outside tiny boundaries.

7.5.2. Creating a Traditional Project

Use when you need custom observation fields or when the study area is too small for reliable GPS-based filtering.

1. You must have at least 50 verifiable observations on your account
2. Go to <https://www.inaturalist.org/projects/new>
3. Look for the small text link at the bottom of the page: “click here to create a traditional project”
4. Fill in the project details (title, icon, banner, description)
5. Set the membership model:
 - **Open:** Anyone can join
 - **Invite-only:** Only users you invite can join (recommended for research teams)
6. Set the submission model:
 - **Any member:** All members can add observations
 - **Project curators:** Only curators can add observations (recommended when the PI needs to control data quality)
7. Add observation fields if needed (e.g., “Habitat type,” “Transect number,” “Number of individuals”).

8. Data Quality Considerations

iNaturalist data are heterogeneous in quality because they are generated by observers with widely varying skill levels, equipment, and motivations (Dickinson et al., 2010). For EA Program research, apply the following data quality filters when exporting records for analysis:

- **Quality grade:** Use Research Grade observations only for quantitative analyses. Needs ID observations can supplement species inventories but carry higher misidentification risk.
- **Coordinate uncertainty:** Exclude records with positional accuracy greater than 1000 m unless the analysis does not require fine spatial resolution.
- **Date precision:** Exclude records without day-level date precision for phenological analyses.
- **Taxonomic verification:** For critical analyses, manually verify identifications against the photographic evidence, especially for taxa where the CV model is known to struggle (e.g., grasses, juvenile insects, sterile plants).
- **Spatial bias:** iNaturalist data are spatially biased toward accessible, human-frequented areas (trails, roads, urban parks). This bias must be acknowledged and, where possible, corrected for in species distribution models (Callaghan et al., 2021).

These filters should be documented in the methods section of any publication or report using iNaturalist-derived data.

9. Data Export and Analysis

9.1. Exporting from iNaturalist

1. Go to the **Explore** page and filter to your project, place, or taxa of interest
2. Click **Filters** to narrow results
3. Click **Download** (bottom of the page) to download a CSV file

9.2. Exporting from GBIF

For Research Grade observations that have been shared with GBIF:

1. Go to <https://www.gbif.org/occurrence/search>
2. Filter by dataset (search for “iNaturalist”), location, and taxa
3. Click **Download** and select the desired format
4. GBIF assigns a DOI to every download; cite the DOI in your publications

9.3. Using `rinat` in R

The `rinat` package provides programmatic access to iNaturalist data ([barve2025?](#)):

```
library(rinat)

# Get observations from a specific project
obs <- get_inat_obs_project("ea-program-bfs-biodiversity-2025",
                           type = "observations")

# Get observations by taxon and place
birds <- get_inat_obs(taxon_name = "Aves",
                     place_id = 12345,
                     quality = "research",
                     maxresults = 500)
```

10. Citing iNaturalist Data

- **Platform citation:** iNaturalist. Available at: <https://www.inaturalist.org>. Accessed [date].
- **GBIF download citation:** Use the DOI provided with the GBIF download.
- **Individual observations:** Cite by observation URL (e.g., <https://www.inaturalist.org/observations/123456>) when referencing specific records.

When using iNaturalist data in publications, describe the data quality filters applied (e.g., Research Grade only, coordinate uncertainty threshold) and acknowledge the community identifiers whose expertise validated the records (Chandler et al., 2017; Dickinson et al., 2010).

11. Responsible Use

- Respect copyright: each user retains ownership of their observations and photos. Your rights to use them are governed by the license the user selected. Most iNaturalist photos use CC-BY-NC.
- Do not create observations for specimens you did not personally encounter (no uploading photos from field guides, the internet, or other people’s cameras)
- Do not harass, collect, or relocate organisms for the purpose of getting a better photo

- For sensitive species (rare plants, nesting sites), manually obscure the location even if iNaturalist does not do so automatically
- Follow iNaturalist's Community Guidelines: <https://www.inaturalist.org/pages/community+guidelines>

Student Use

Before assigning students to use iNaturalist, read the iNaturalist Teacher's Guide (<https://www.inaturalist.org/pages/teacher's+guide>). The majority of low-quality observations and inappropriate content on iNaturalist comes from poorly managed class assignments. Set clear expectations, demonstrate proper technique, and monitor student contributions. Structured class projects with specific data quality goals produce better scientific outcomes and learning (Aristeidou & Herodotou, 2020).

12. References

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13. Training Record

Before using iNaturalist for EA Program research data, personnel must:

1. Read this SOP in full
2. Create an iNaturalist account with appropriate license settings (Section 7.1)
3. Make at least 10 observations that reach Research Grade (or “Needs ID” with correct identifications added by the community)
4. Contribute at least 10 identifications to other users' observations
5. Demonstrate familiarity with the project type relevant to their research (Collection or Traditional)
6. Be signed off by the PI or project lead