TERN Ecological Monitoring

Methods Training 2026

Session 4. 3:30 – 5:00 pm

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Agenda Session 4

01	Samples – vegetation and soils
02	Data
03	Tech
04	The plan for this week
05	Safety

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Samples – Vegetation & Soils

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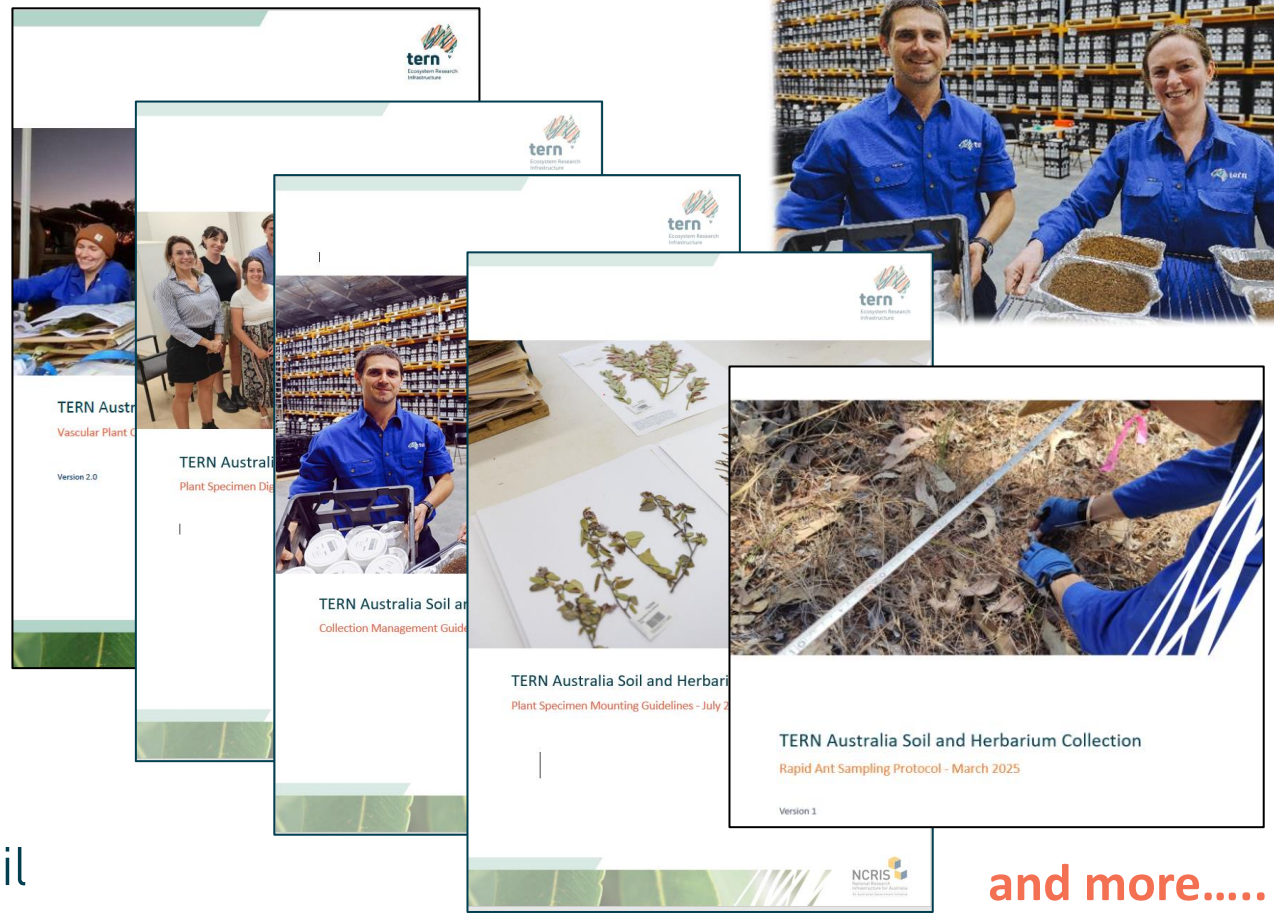
TERN Australia Soil & Herbarium Collection

- Officially opened December 2022
- Purpose built facility
- Climate controlled
- Pest management plan
- CA12 accreditation
- Available for loan
- Donation and Exchange program
- Almost 200,000 plant and soil samples

Guidelines Series



and more.....

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Sample Types

- Plant voucher specimens **60,000**
- Plant tissue samples **80,000**
- Soil pit samples **6,000**
- Soil subsite samples **35,000**
- Soil metagenomic samples **10,000**

Supplemented with contextual data…

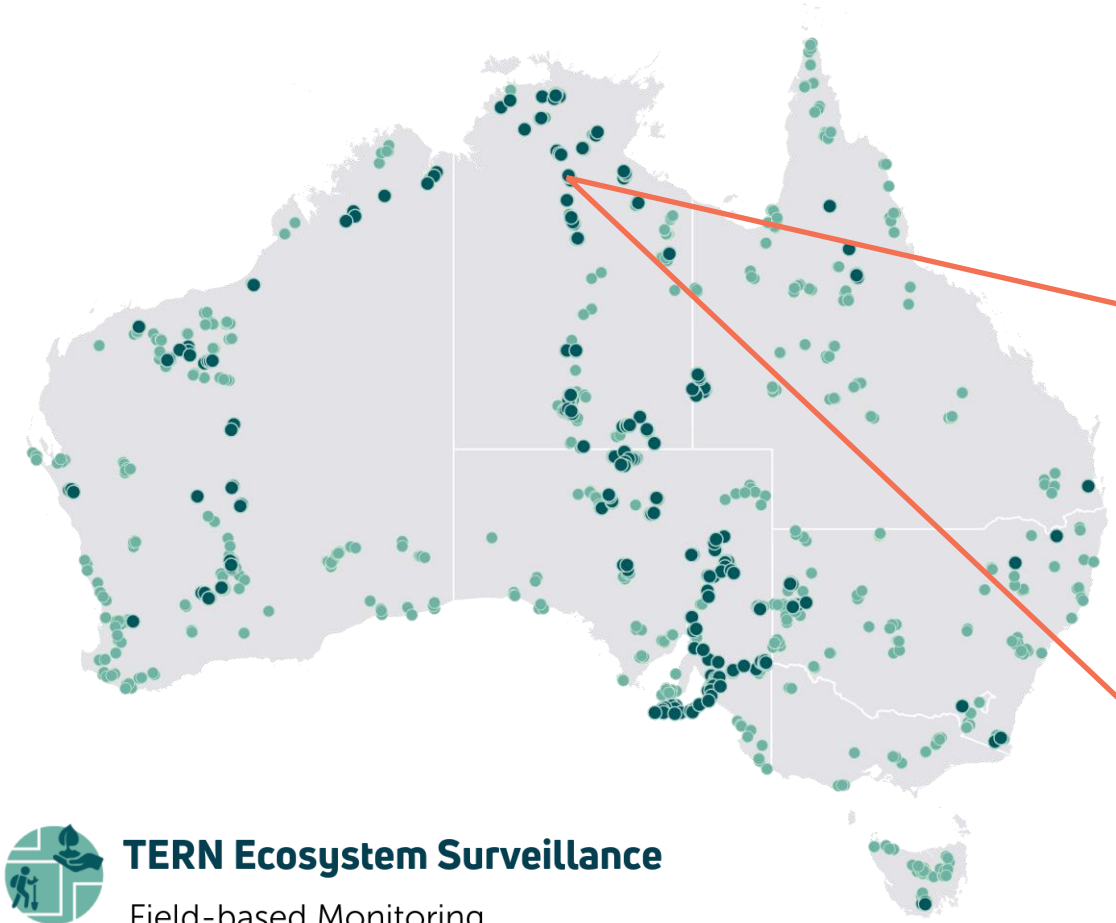
- Site location and description
- Site photos and panoramas
- Vegetation structure and composition
- Floristic inventory
- Basal area
- Soil characterisation
- Geomorphology
- Substrate








Plots and transects



- 1,000+ x 1ha plots
- 410 plot revisits
- Representative of Australia's major biomes

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Plant Specimens and Samples

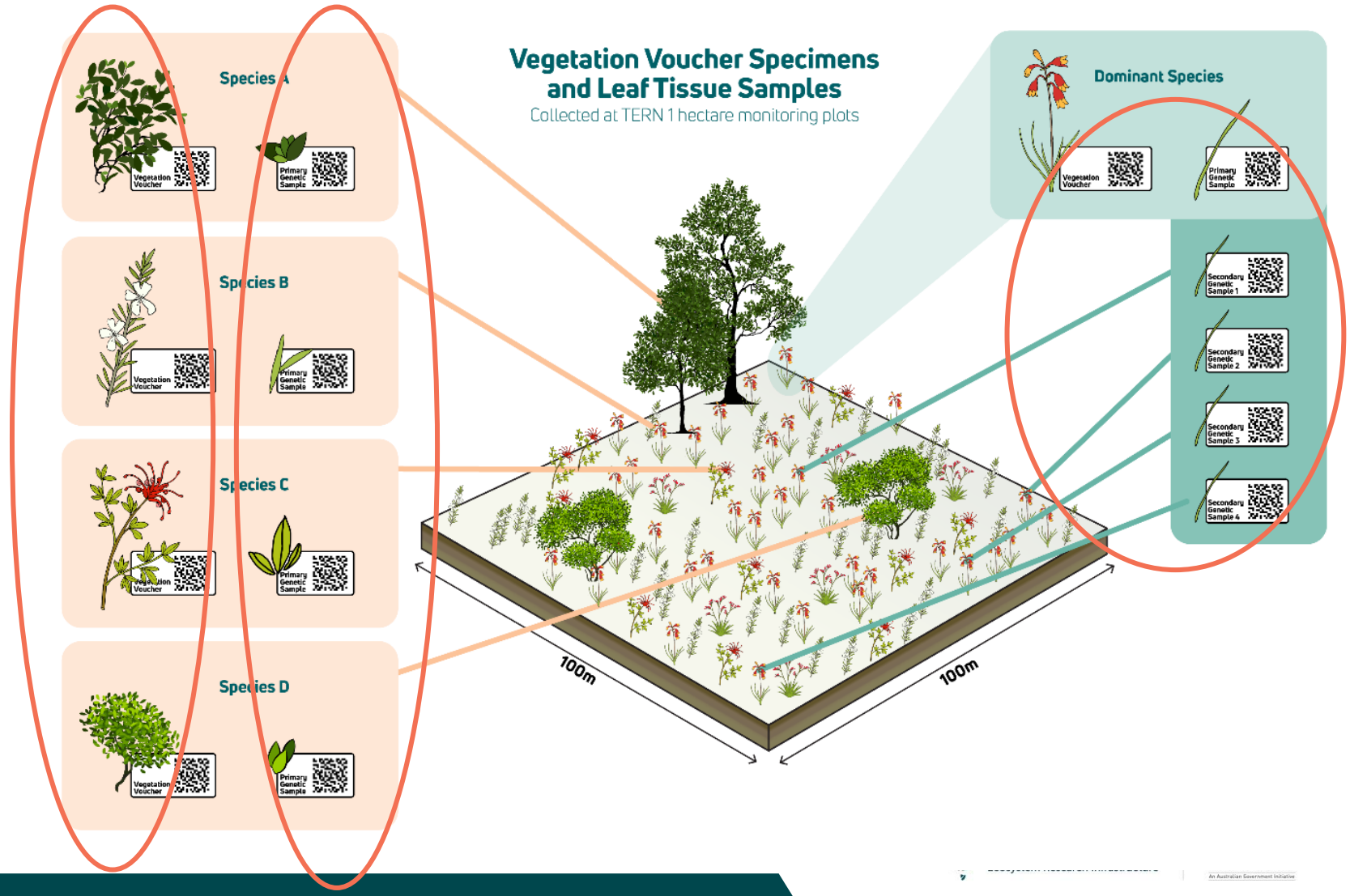
- Herbarium specimen collection
  - Plant voucher specimen
  - Plant tissue sample
- Dominant species

Plant voucher specimen

- Taxonomy
- Phylogenetics
- Ecological
- Traits

Plant tissue sample

- Genomics
- Molecular
- Isotope analyses
- Population genetics



Plant voucher specimens

- Representative specimen of each species in a plot
- Vascular plants pressed and dried
- Fertile if possible
- Enough material for a duplicate
- Barcode label affixed to main specimen
- State herbarium for determination
- Archival material, mounted, imaged, frozen
- Stored in cool room 17°C
- Exchange program with herbaria

Veg Barcode: SAA013719 **Scientific Name:** *Acacia rupicola*

Collector: Brad Bianco Nature Conservation Society South Australia
Determiner: Martin O'Leary, SA Herbarium

Collection date: 30/Sep/2020 **Determination date** 4/Jan/2021

Coordinates: -35.172109, 136.947135 **State / IBRA Region:** Eyre Yorke Block

Growth form: Heath-shrub **Phenology:**

Site Name / Location: SAAEYB0012 / 8.7km north of Marion Bay, 46.0km south west of Warooka.

Determiner comment

Structural Summary: Eucalyptus diversifolia low Mallee woodland to tall open shrubland with Eucalyptus oleosa subsp. ampliata, Eucalyptus porosa and Eucalyptus rugosa (4.5-5m). Lower mid storey is dominated by Templetonia retusa (1.5m) with Beyeria lechenaultii and Acacia

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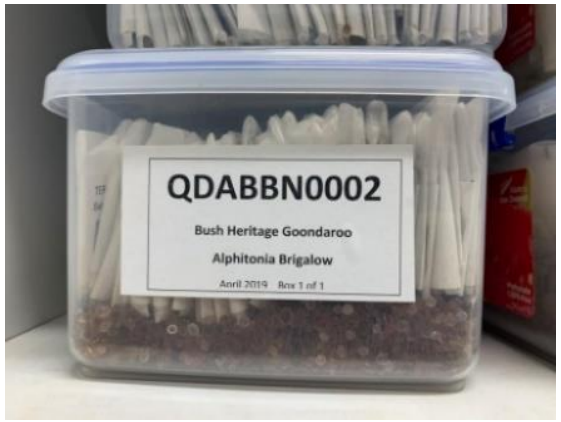
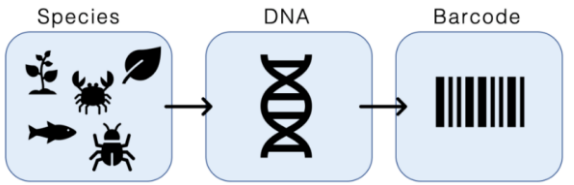
Plant tissue samples

- Destructive sampled from each plant voucher specimen
- Dominant species collected from 4 individuals
- Placed in synthetic tea filter bag with barcode label affixed
- Airtight container with Silica Gel to absorb moisture
- Airtight containers stored in cool room 17°C
- Silica Gel monitored and replenished when required





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Soil samples

Soil pit

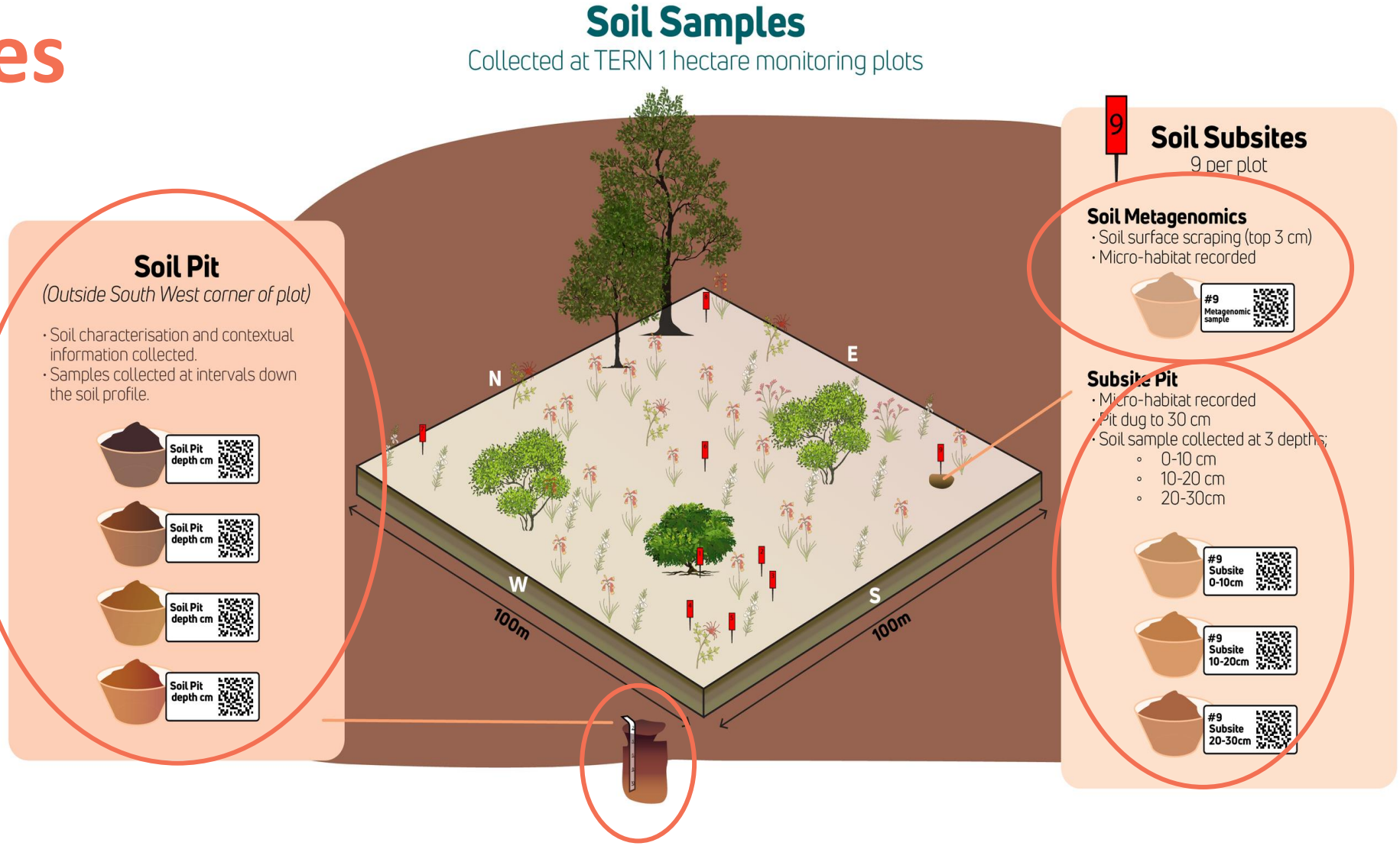
+ Soil classification
+ Bulk density
+ pH & EC
+ Physical analysis
+ Chemical analysis

Soil subsite

+ Microhabitat
+ Physical analysis
+ Chemical analysis

Soil metagenomics

+ Microhabitat
+ Top layer of soil
+ Biological analysis



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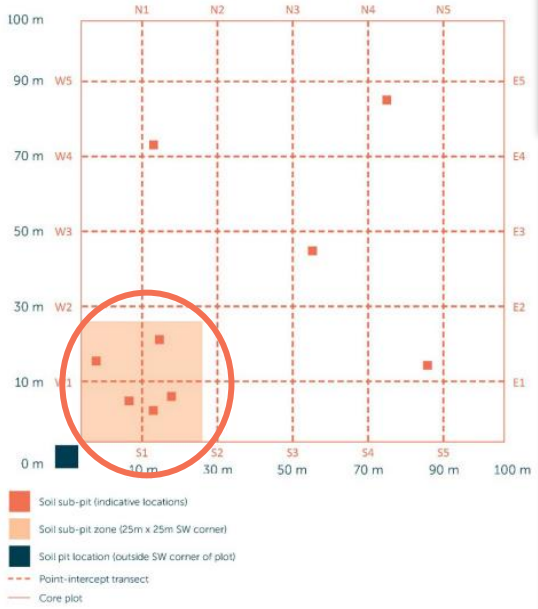
Soil pit samples

- Pit dug outside SW corner (~1 m)
- Collected at intervals down the profile
- 500g soil for each sample
- Oven dried at 40°C for 48 hours
- Sieved (2 mm sieve) and ground in lab
- Stored in sealed screw top containers
- Unique barcode per sample
- Kept at ambient temperature
- Arranged by plot location
- Containers in crates on pallet racking

Soil subsite samples

- Collected at 9 locations across the plot
- Pit to 30 cm, 10 cm incremental samples
- 500g soil sample for each increment
- Oven dried at 40°C for 48 hours
- Sieved (2mm sieve) and ground in lab
- Stored in sealed screw top containers
- Unique barcode per sample
- Total 27 subsite samples per plot
- Kept at ambient temperature
- Arranged by plot location
- Containers in crates on pallet racking



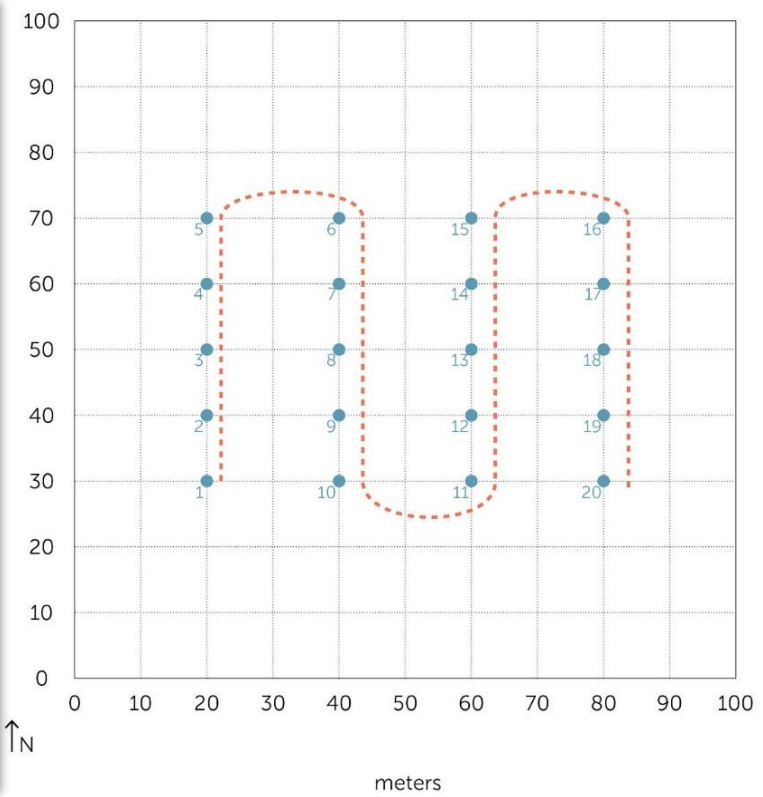
Soil metagenomic samples

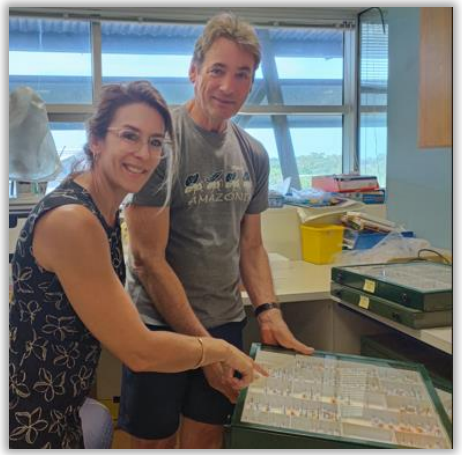
- Top layer of soil at each subsite (9)
- 200 g soil sample for each subsite
- Soil stored in calico bag
- Calico bag placed in sealed plastic bag containing Silica Gel
- Silica Gel monitored and replaced when required
- Stored in cool room 17°C

Invertebrates - Ants

NEW to the collection…

- Attract and rapidly capture dominant ant species
- Plot layout – 20 points within plot
- Fish based cat food with honey
- Baited vial flush with ground left for 15-30 mins
- Plug vial with ethanol dowsed cotton wool
- Processed, pinned and barcoded by Dr Alan Anderson (CDU)
- Leg samples to BOLD for DNA extraction & CO1 sequencing
- Unvouchered samples stored in a WET collection at TERN Australia Soil and Herbarium Collection





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Accessing TERN data

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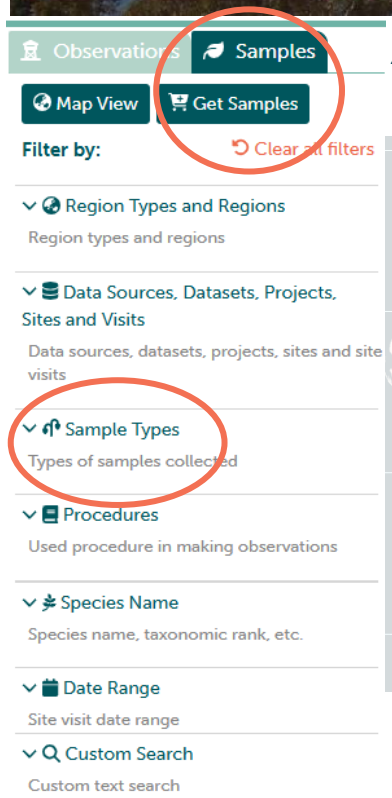
Data considerations

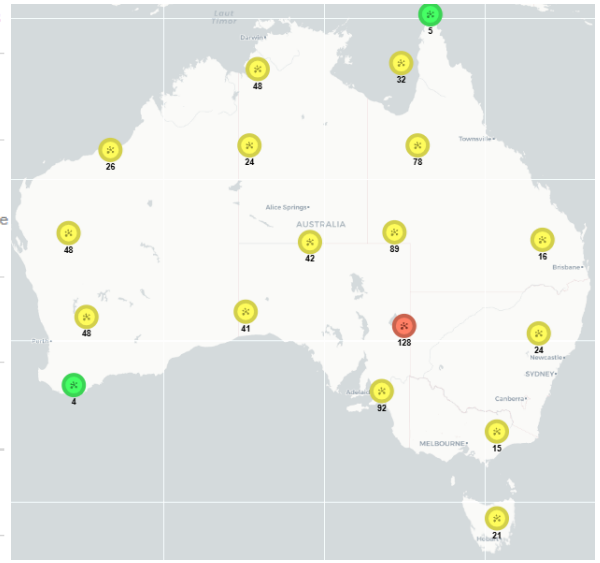
FAIR Data Principles: Findable, Accessible, Interoperable, and Reusable

- Recording data consistently
  - Standardised fields
  - Controlled vocabularies
  - Completeness
  - Accurately
  - Repeatable
  - Comparable
- How is data being collected
- What will the final data output look like
- Storage of data
  - Relational Database / Spreadsheet / Shapefile
  - Recognised data repository
  - Findable and accessible
- Metadata
  - What are you collecting
  - Who collected it
  - How was it collected
  - When was it collected
  - How can it be accessed and who can access it

Accessing TERN Samples



Additionally, users can search for specimen samples and request access to these samples for further research



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EXPRESSION OF INTEREST

This pdf file is auto-generated from TERN EcoPlots.

NTAARP0001

EOI ID:	3044669c4a7c11f08b56d27469d1b743
Created by:	Donna Lewis
Created on:	2025-06-16 06:36:09.467747
Record Last Modified:	2025-06-16 06:48:24.592969

Description:

Applicant Details

First Name * Surname *

Applicant Details (Custodian)

Is this applicant intended to act as Specimen Custodian? *

Sample Types	List of the Sites / Plots	List of the Specimens / Samples
Soil Metagenomic Sample	1 site: ntaarp0001	9 samples: Site visit id: 20160602 (9 rows); Sample name: AUG011156, AUG011159, AUG011158, AUG011157, AUG011160, AUG011161, AUG011164, AUG011163, AUG011162
Soil Pit Sample	1 site: ntaarp0001	4 samples: Site visit id: 20160602 (4 rows); Sample name: NTA054397, NTA054396, NTA054398, NTA054395
Soil Subsite Sample	1 site: ntaarp0001	27 samples: Site visit id: 20160602 (27 rows); Sample name: NTA054405, NTA054412, NTA054403, NTA054408

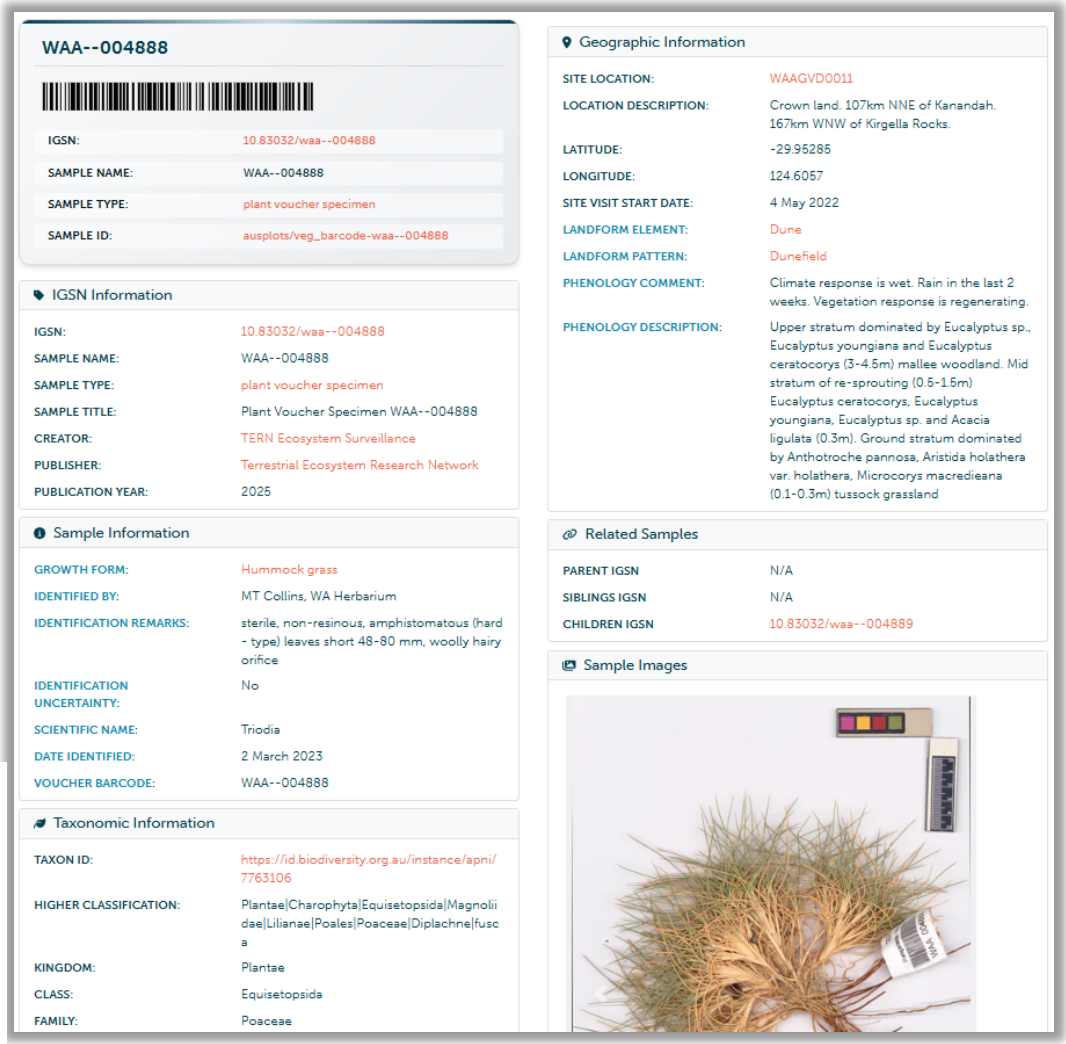
Accessing TERN Samples

EcoPlots

My sample requests

Title	Description	Status	Request Date	Package Status	Download	Actions
NTAARP0001		Submitted	16/06/2025	Ready for download		

- plant_tissue_sample_3044669c4a7c11f08b56d27469d1b743
- plant_voucher_specimen_3044669c4a7c11f08b56d27469d1b743
- sample_eoi_3044669c4a7c11f08b56d27469d1b743
- sample_eoi_form_3044669c4a7c11f08b56d27469d1b743
- sample_sitevisit_3044669c4a7c11f08b56d27469d1b743
- soil_metagenomic_sample_3044669c4a7c11f08b56d27469d1b74
- soil_pit_sample_3044669c4a7c11f08b56d27469d1b743
- soil_subsite_sample_3044669c4a7c11f08b56d27469d1b743



WAA--004888

IGSN:	10.83032/waa--004888
SAMPLE NAME:	WAA--004888
SAMPLE TYPE:	plant voucher specimen
SAMPLE ID:	ausplots/veg_barcode-waa--004888

IGSN Information

IGSN:	10.83032/waa--004888
SAMPLE NAME:	WAA--004888
SAMPLE TYPE:	plant voucher specimen
SAMPLE TITLE:	Plant Voucher Specimen WAA--004888
CREATOR:	TERN Ecosystem Surveillance
PUBLISHER:	Terrestrial Ecosystem Research Network
PUBLICATION YEAR:	2025

Sample Information

GROWTH FORM:	Hummock grass
IDENTIFIED BY:	MT Collins, WA Herbarium
IDENTIFICATION REMARKS:	sterile, non-resinous, amphistomatous (hard - type) leaves short 48-80 mm, woolly hairy orifice
IDENTIFICATION UNCERTAINTY:	No
SCIENTIFIC NAME:	Triodia
DATE IDENTIFIED:	2 March 2023
VOUCHER BARCODE:	WAA--004888

Taxonomic Information

TAXON ID:	https://id.biodiversity.org.au/instance/apni/7763106
HIGHER CLASSIFICATION:	Plantae|Charophyta|Equisetopsida|Magnoliidae|Lilianae|Poales|Poaceae|Diplachne|fusca
KINGDOM:	Plantae
CLASS:	Equisetopsida
FAMILY:	Poaceae

Geographic Information

SITE LOCATION:	WAAGVD0011
LOCATION DESCRIPTION:	Crown land. 107km NNE of Kanandah. 167km WNW of Kirgella Rocks.
LATITUDE:	-29.95285
LONGITUDE:	124.6057
SITE VISIT START DATE:	4 May 2022
LANDFORM ELEMENT:	Dune
LANDFORM PATTERN:	Dunefield
PHENOLOGY COMMENT:	Climate response is wet. Rain in the last 2 weeks. Vegetation response is regenerating.
PHENOLOGY DESCRIPTION:	Upper stratum dominated by Eucalyptus sp., Eucalyptus youngiana and Eucalyptus ceratocorys (3-4.5m) mallee woodland. Mid stratum of re-sprouting (0.5-1.5m) Eucalyptus ceratocorys, Eucalyptus youngiana, Eucalyptus sp. and Acacia ligulata (0.3m). Ground stratum dominated by Anthotroche pannosa, Aristida holathera var. holathera, Microcorys macredieana (0.1-0.3m) tussock grassland

Related Samples

PARENT IGSN	N/A
SIBLINGS IGSN	N/A
CHILDREN IGSN	10.83032/waa--004889

Sample Images

ecoplots.tern.org.au

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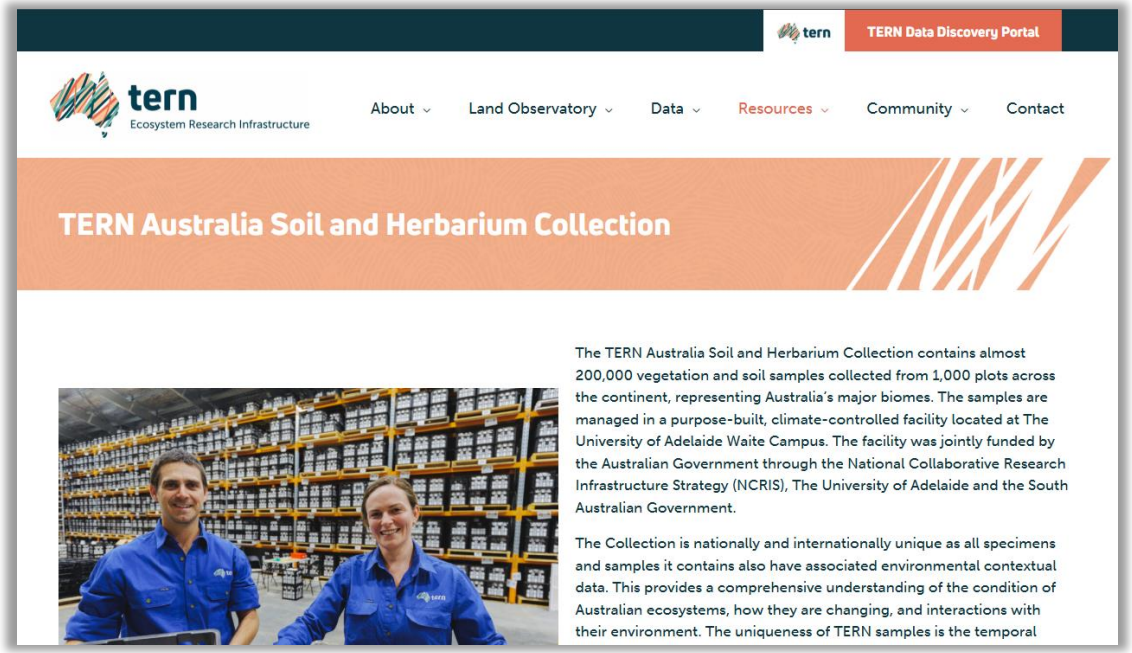
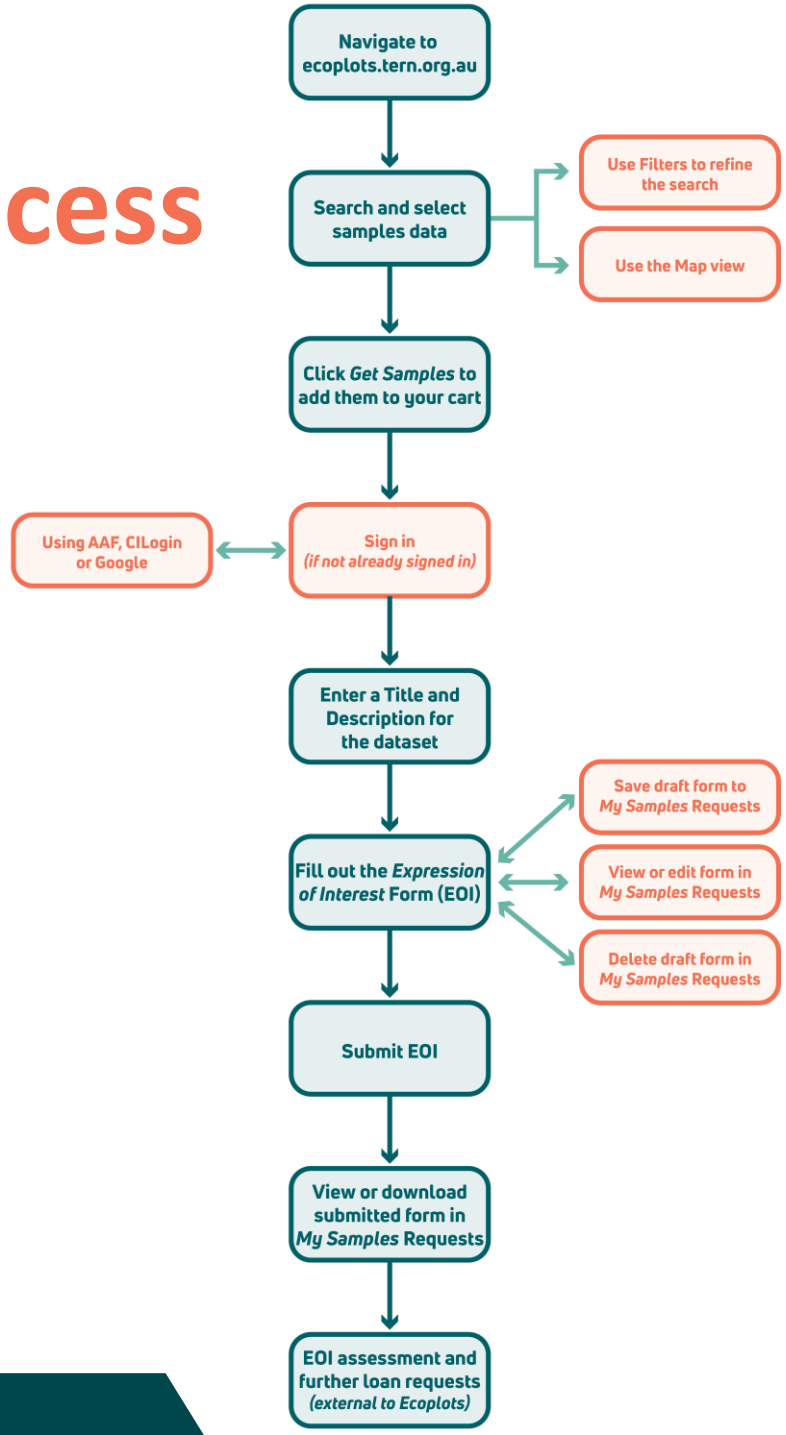
TERN samples use request process

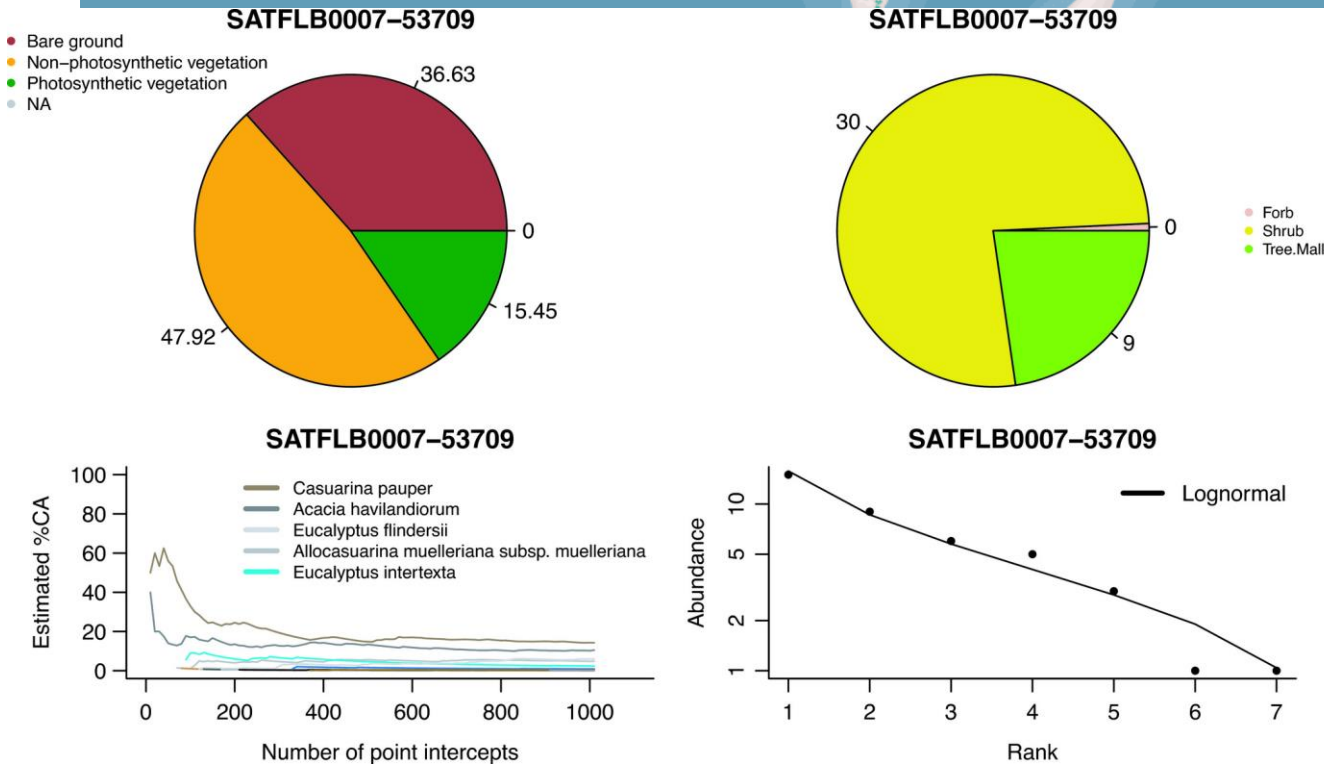
- EcoPlots Sample User Guide
- Sample Use Guidelines / Agreement
- Sample request process
- **www.tern.org.au/soil-and-herbarium-collection**





TERN AusPlotsR Package

- Live extraction, preparation, visualisation and analysis of TERN Ecosystem Surveillance monitoring data.
- Accessed via AusPlotsR package in Gitlab
- Includes functions for:
  - Extracting raw survey data for all plots TERN Plots
  - Using this raw data to calculate metrics such as:
    - Species Cover
    - Fractional Cover
    - Basal area



Example of data presentation panels for a single plot visit using *ausplots_visual*: (a) fractional vegetation cover; (b) the relative abundance of plant growth forms; (c) cumulative estimates of percent cover by species as point intercept hits are taken across the plot (Guerin et al. 2017); (d) Whittaker plot (Whittaker 1965) of species' relative abundance fitted with a lognormal SAD curve

Setting up the Monitor App

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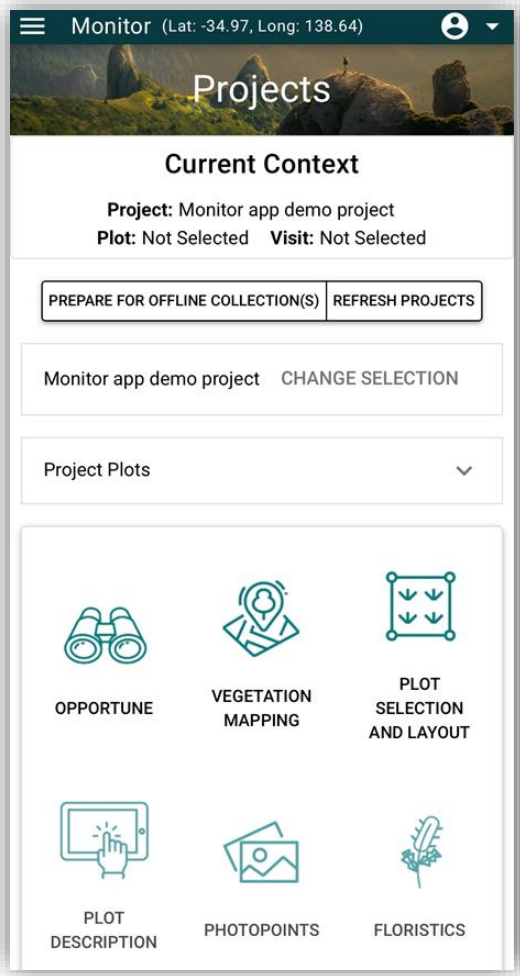
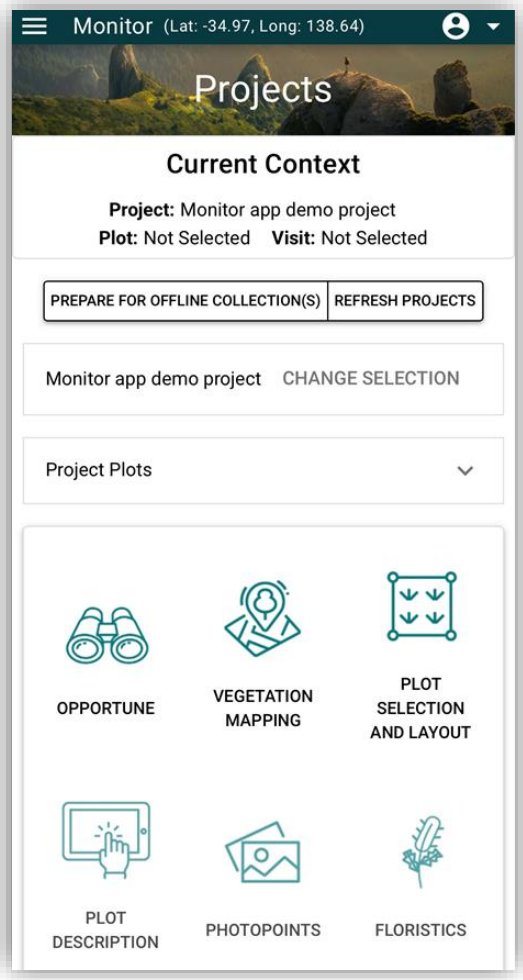
Monitor

- Field Data Collection App
  - The EMSA Modules and Protocols outline standardised methodologies for surveying
  - Monitor captures in-field data entry for those surveys.
- Saves time on data entry
- Restricts data to ‘picklists’ or ‘data type’ with certain restrictions
- Standardises terminology



Using the Monitor App

- Progressive Web App (PWA)
- Developed for use on **Android devices**
- Optimised to be used with Chrome (please don't use Samsung Internet)
- It's an entirely offline app
- Staging Platform, Production Platform, Training Platform



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Steps for installing the Monitor Training PWA

training.app.paratoo.tern.org.au

- Open **training.app.paratoo.tern.org.au** in the Chrome browser on your device
  - If prompted by a pop up to ‘install’ follow the link
- Select the ⋮ icon in the top right of the browser
- Select **add to home screen** or **install**
- If prompted, select “**install**” again
- Close the chrome browser
- Open the Monitor app via the icon
- Select **register with an invitation code**

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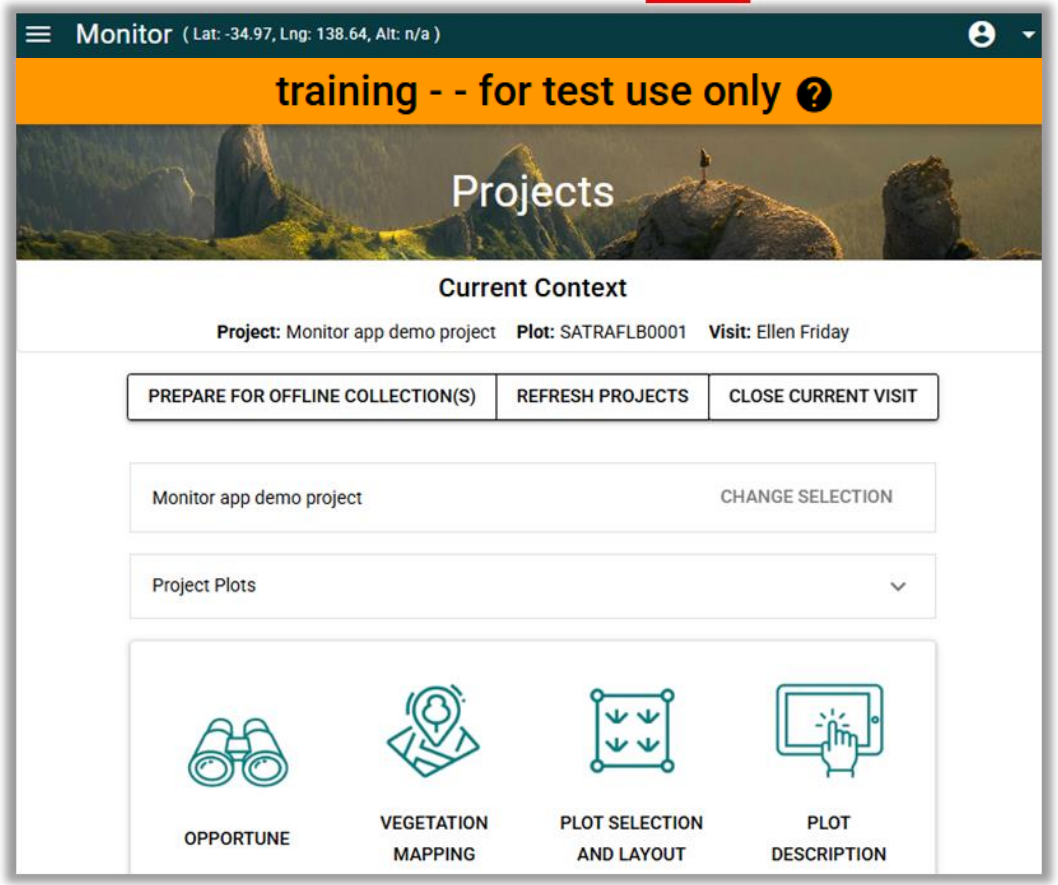
Register as a User for Monitor Training

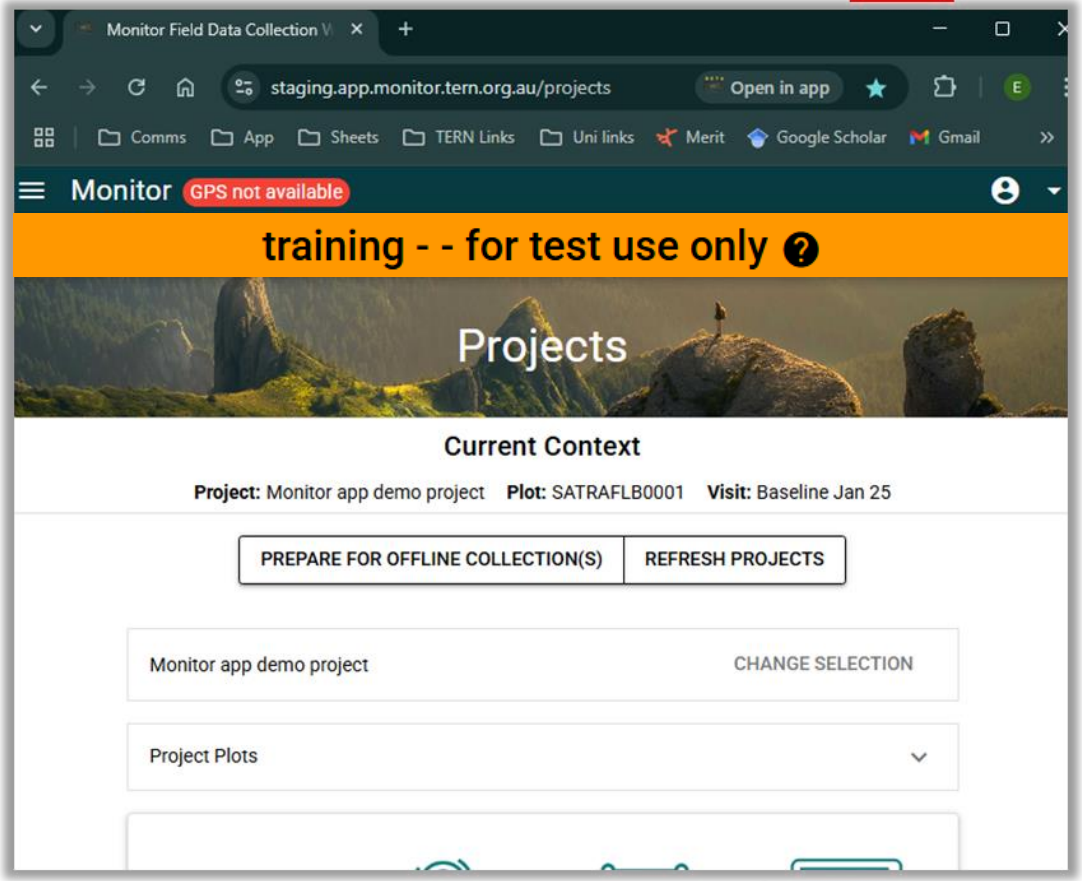
- Select **Register with an invitation code**
- Enter the invitation code**: COLLECTOR_CAL_AUGUST**
- Create a **Username**
- Enter your **Email Address**
  - (this will only be used as login details we won't send you spam emails)
- Create a **Password**
- Select **Register**

Installing the Progressive Web App

PWA ☑



Internet Browser ☒



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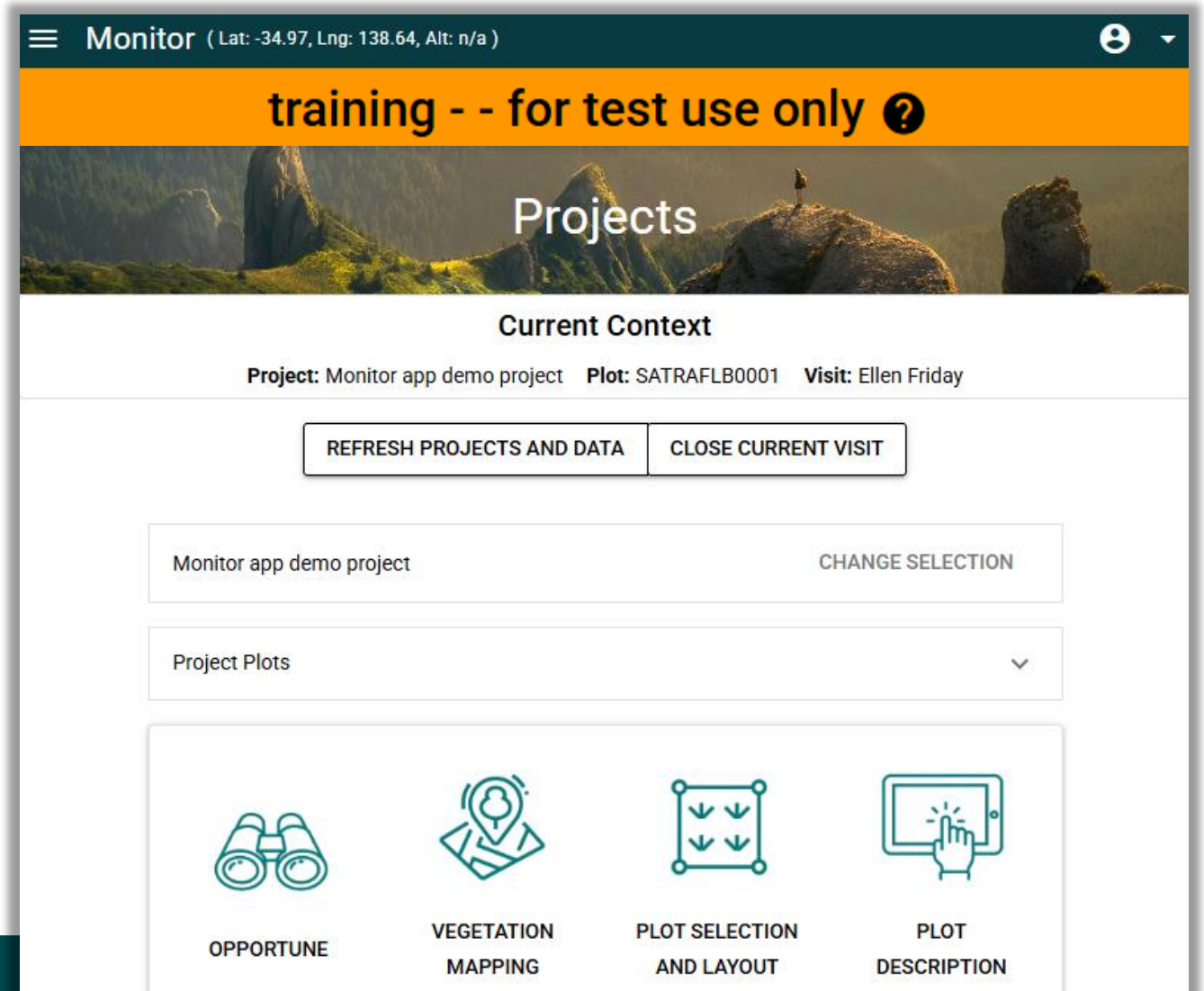
Navigating the Monitor App

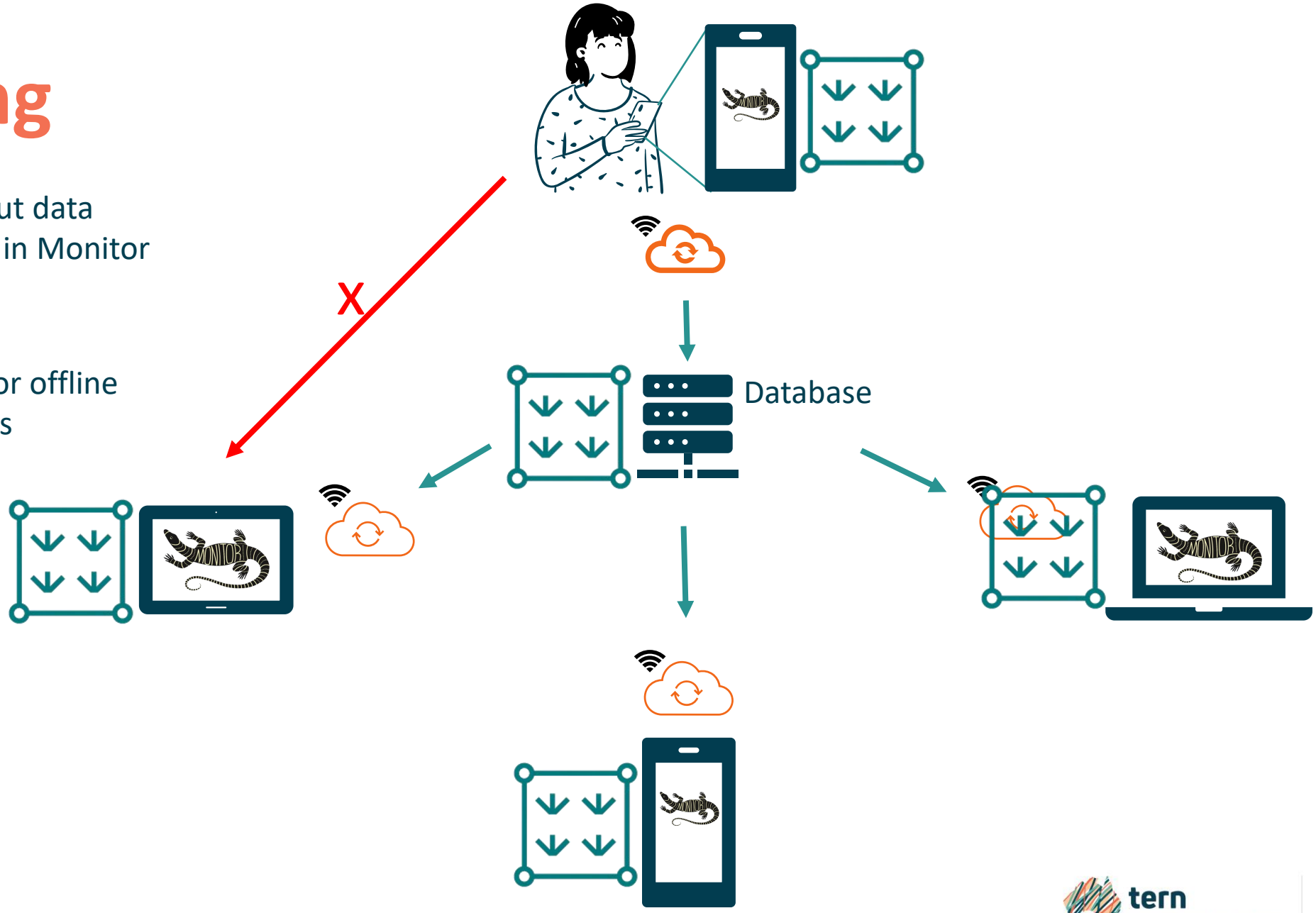


Syncing

Plot Layout data collected in Monitor

Sync

Prepare for offline collections



Plan for the week

- 3 Groups
  - 1 day doing Soils (With Ben)
  - 1 day doing Vegetation (With Sal and Megan)
  - 1 day doing Site Characterisation (With Ellen and Huy)

TEAM·ALLOCATION¶

Ecology·Course·Teams¶

¶

ALPHA¤	BETA¤	CHARLIE¤
Nicola¤	Amy¤	Tingting¤
Elliese¤	Ayman¤	Elise¤
Chris¤	Carla¤	Katrina¤
Louise¤	Clem¤	Scott¤
Zara¤	Roxane¤	Michael¤
Tanmay¤	Tomo¤	Charlie¤

¶

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Rotations¶

Field·Day¤	ALPHA¤	BETA¤	CHARLIE¤
Monday¤	Vegetation¤	Soils¤	Site· Characterisation¤
Tuesday¤	Soils¤	Site¶ Characterisation¤	Vegetation¤
Wednesday¤	Site· Characterisation¤	Vegetation¤	Soils¤

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We at TERN acknowledge the Traditional Custodians throughout Australia, New Zealand and all nations. We honour their profound connections to land, water, biodiversity and culture and pay our respects to their Elders past, present and emerging.

TERN is enabled by NCRIS.
Our work is a result of collaborative partnerships with many universities and research institutions.
To find out more please go to **tern.org.au.**