

ARDC Bushfire Data Commons Forum

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Project BDC-002: Aggregating and harmonising fuel data on a national scale

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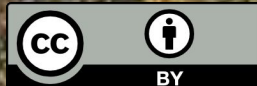


Australian Government
Department of Agriculture,
Water and the Environment



tern

Ecosystem Research Infrastructure

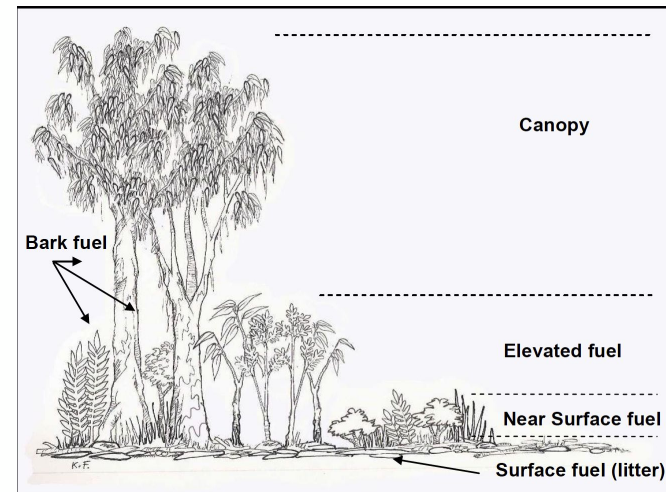
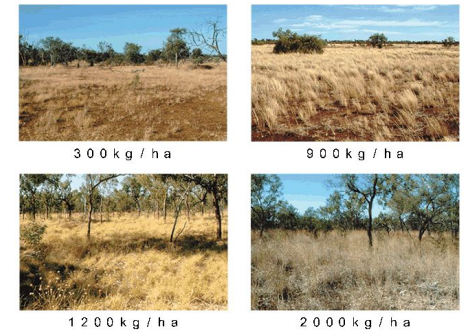


Overview - Aggregating and harmonising fuel data

1. Introduction
 - I. Fuel load
 - II. Challenges
2. Project Objectives
3. Project stakeholders and beneficiaries
4. Work plan
5. Work progress
6. Future engagement
7. Acknowledgements

Fuel load

- The total amount of combustible material in a defined space
 - Live and dead vegetation (coarse woody debris, grass, trees, fallen bark, litter and branches etc.)
 - Calculated as tonnes per ha
- Different types of fuel, e.g.,
 - Grass fuel
 - State of the grass poses significant threat
 - Grass curing
 - Forest fuel



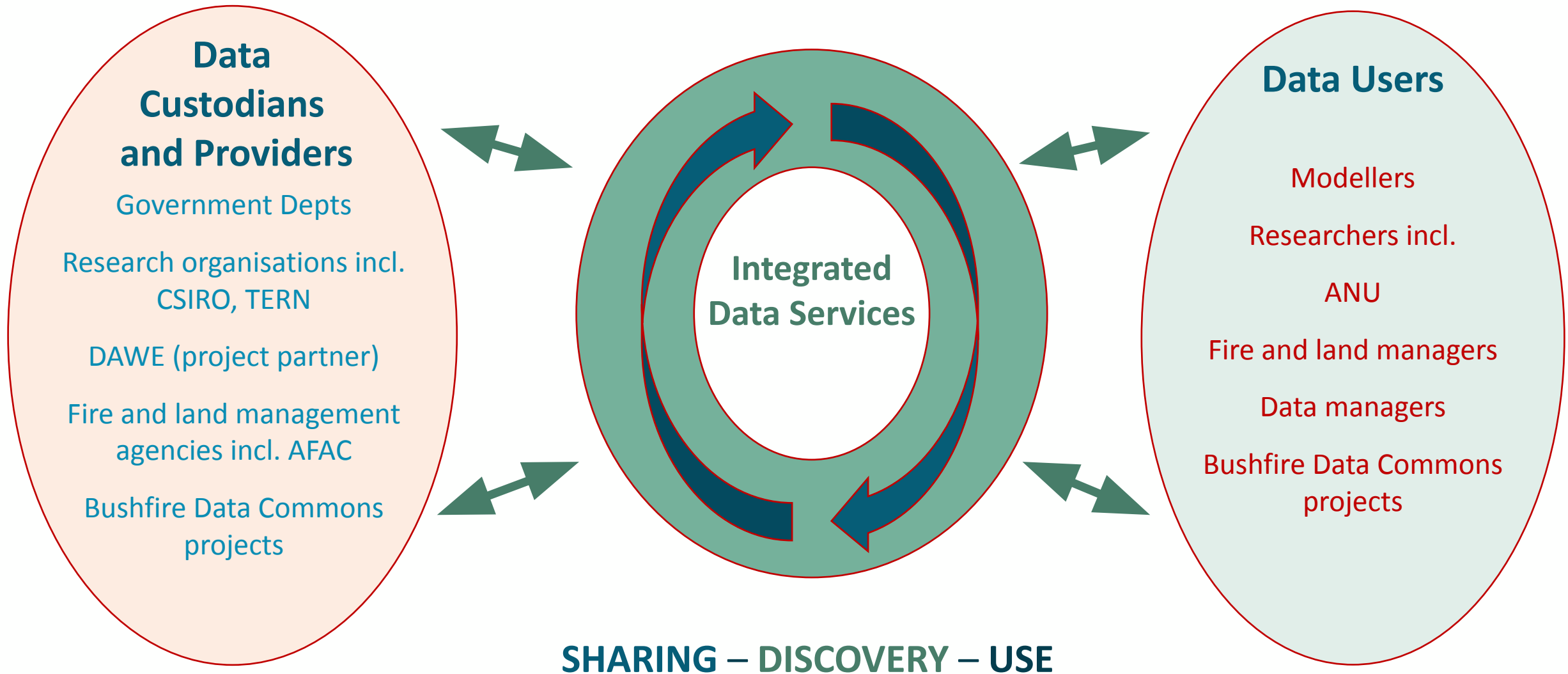
Source: Wildfire Behaviour 2014

Challenges

1. Fuel load is dynamic and requires multi-scale & multi-temporal data collection
2. Fuel load data are collected, collated and derived across jurisdictions at multiple scales
- hardly any data are openly accessible
3. Data are collected using disparate methods
4. Data are not widely accessible
5. There is no one place to search and access fuel load data
6. There are no data sharing agreements between custodians
7. There is a lack of coordination for sharing data across jurisdictions
8. There is no community standard to share and access fuel load data
9. No organisation is mandated or resourced to collate and publish the data at national scale



Project Stakeholders and Beneficiaries



Workplan

To build a Roadmap for open access to fuel load data to enable Australia-wide bushfire response and preparedness

WP1 - Undertake gap analysis:

- Identify key stakeholders in the fuel load data supply chain e.g., state agencies, Commonwealth departments and NCRIS facilities, universities, CRCs and centre of excellences.
- Investigate sources of data to cover the entire Australian landscape, and their repeatability and reliability
- Investigate current data availability, access and cost
- Investigate different sources of fuel load data e.g. field survey, sensors, lidar, remote sensing
- Identify barriers for data sharing - social, technical, political, cultural, economic, ethical, legal, financial
- Identify the needs of the users in pilots and other fuel projects

WP2 - Establish a framework for sharing fuel load data:

- Determine data supply chain including data sharing and integration
- Explore operational lead incl. 'ownership', management and publication of various 'products'
- Explore participation and commitment from major data providers
- Identify different value propositions and benefits for data sharing among different organisations
- Policies and standards for data management, sharing, citation, access
- Governance mechanisms to oversee sustainable collaborative delivery incl. shared responsibilities
- Collaboration with other fuel load and data sharing projects in the Bushfire Data Challenge

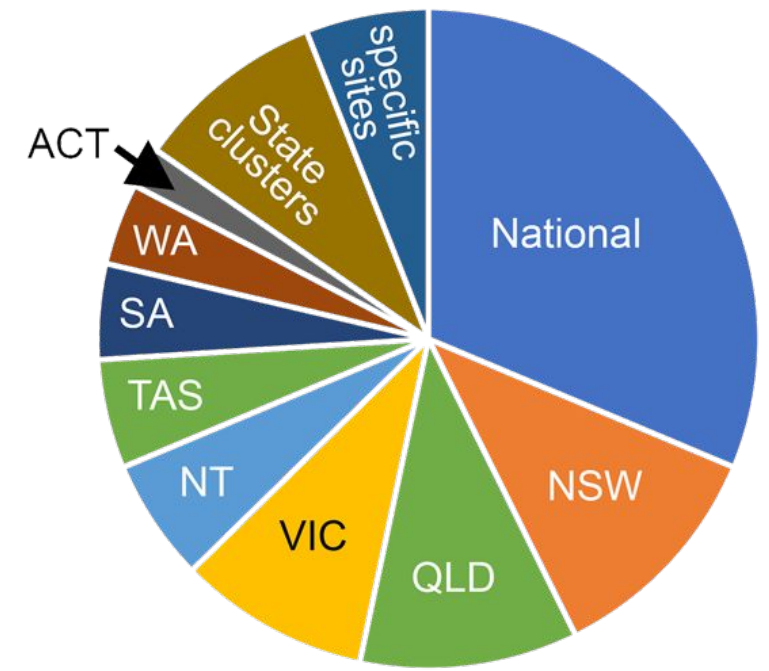
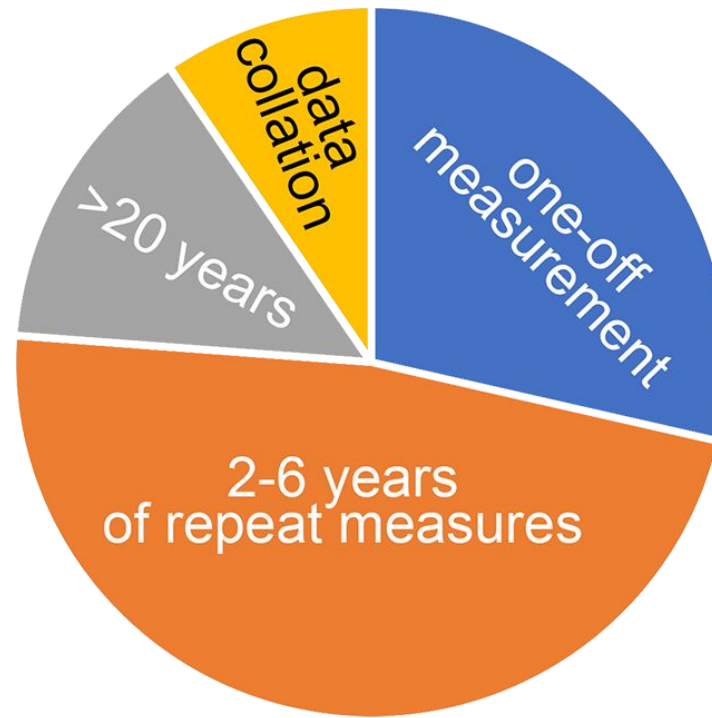
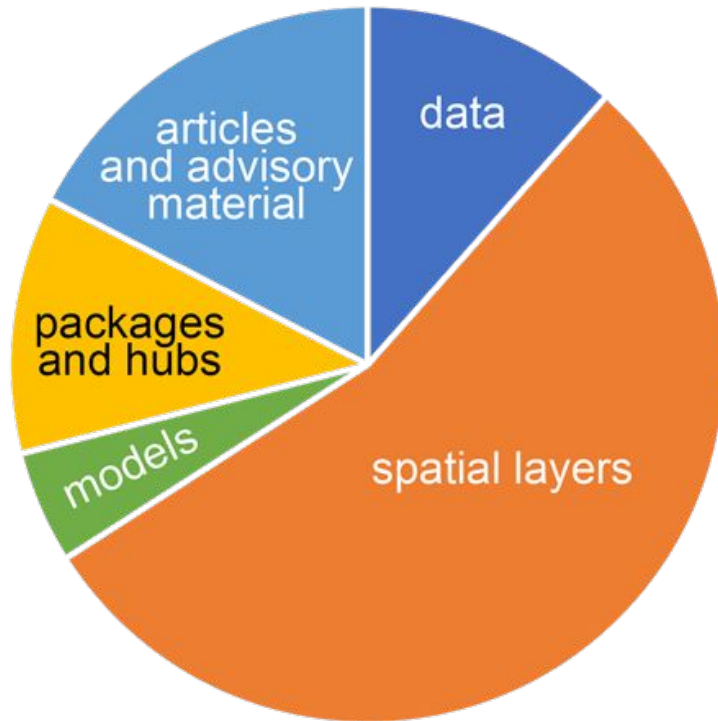
WP3-4 Comprehensive Roadmap and implementation of systems and processes to share fuel data:

- Application of data sharing framework that includes a sustainable data supply chain to ongoing publication of fuel load data
- Demonstrate a pilot implementation
 - Providing input data for Cal/Val of remote sensing product for ANU pilot
 - Access aggregated fuel load parameters data feed to SPARK framework
- Develop Integrated Data Services to enable data integration, publication and sharing
- Establish granularity and the mechanisms and pathways for data integration
- Align with data analysis capability to enable decision making

WP1 progress

Systematic analysis of existing fuel attribute data (observed and derived):

- identify the existence and custodianship of data
- identify existing fuel load and fuel-related parameters
- assess data quality characteristics (e.g., ground validation and consistency across data providers)

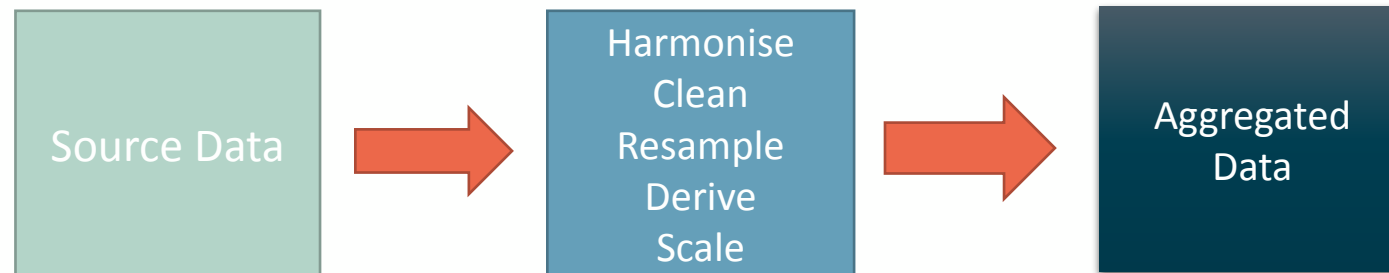


Decision Points

- After considerable stakeholder engagement
 - Focus on the observation data
 - Focus on specific parameter of use
 - Focus on data collection from research domain
 - Build a standard-based output
 - Meet the needs of the use cases.
 - Biomass was identified as a key parameter.

Project 2: Objective

Objective: build an open access data management framework to enable discovery and sharing of integrated fuel load data and fuel-related parameters to enhance Australia-wide bushfire response and preparedness



SHARING – DISCOVERY – USE

Use case

- Provide site-level biomass observation data for Calibration and Validation
- Systematic review of datasets of interest
 - Data collected at TERN
 - Long-term monitoring datasets
- Criteria for selection
 - Time-series (possibility of repeated visit)
 - Willingness to share data on open license
 - Willingness to provide data updates
 - Comply with TERN data agreement deed

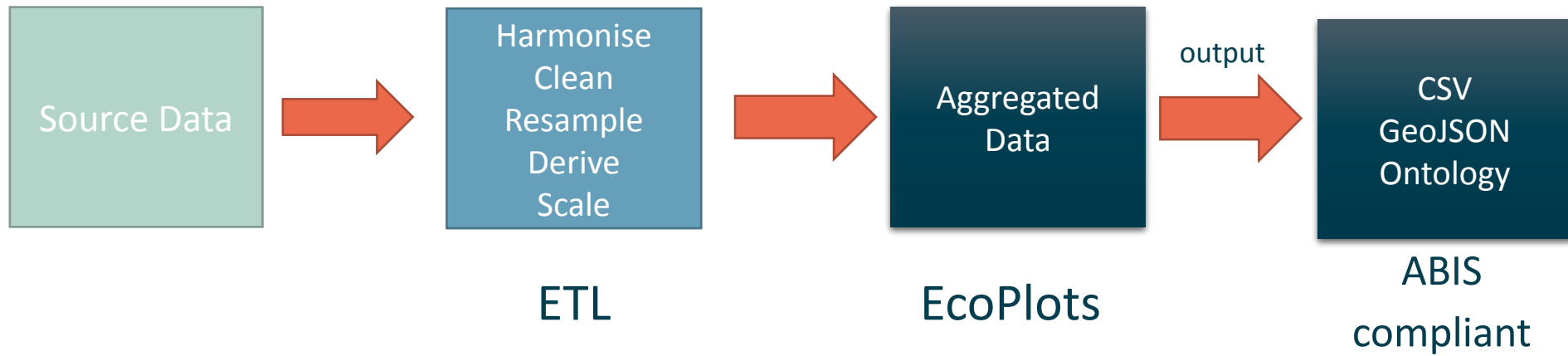
Approach

- Derive Biomass from primary observation
 - Biomass at stem, tree and site-level
- Make data part of EcoPlots - data integration platform for systematic survey data
 - Map data to Common Information model compliant to Australian Biodiversity Information Standard (ABIS)
 - Create vocabulary to represent all observable properties, procedures and attributes
 - Ingest data into EcoPlots to integrate with other datasets

Datasets ingested

- Kakadu National Park- three park Savanna
 - Stand and tree biomass
- Ausplots Forest
 - fuel load and fuel biomass
- TERN Ecosystem Processes site
 - Coarse woody debris biomass
 - Derive above ground Biomass from vegetation survey data
- NSW forest Monitoring
 - Derive stand and tree biomass

Approach



Region Types

Type of region where the site is located

Select region type

- Bioregions (6,422,337)
- Local government areas (6,426,564)
- NRM regions (6,440,697)
- States and territories (6,426,564)
- Subregions (6,422,337)
- Terrestrial CAPAD regions (3,545,481)
- WWF ecoregions (6,379,087)

Datasets

The dataset name

Select dataset

- QBEIS (1,462,476)
- TERN Surveillance Monitoring (4,137,084)
- Williams Wet Tropics Vertebrate database (872,226)

Select used procedure

Feature Type

The feature name

Select feature type

- animal occurrence (872,226)
- climate (75,432)
- fungal occurrence (183)
- geologic substrate (21,958)
- land surface (73,632)
- land surface disturbance (49,016)
- land surface substrate (536,356)
- landform (63,623)
- plant community (216,023)

Used procedure

The procedure name

Select used procedure

- ANUclimate derived rainfall data (14,972)
- ANUclimate derived solar radiation data (14,971)
- ANUclimate derived temperature data (44,635)
- Basal area sweep (35,622)
- Disturbance assessment method (115,067)
- Geology assessment method (21,958)



EcoPlots

<https://ecoplots.tern.org.au>

- Plot-based survey data platform
- Ability to search and access at individual observation
- Provide facets to search plots based on multiple geographic regions
- Search based on dataset
- Search based on feature type and attributes
- Search based on procedure used to collect data
- Search based on parameters, time range etc.
- Data download based on BagIT specification
- Download in CSV, GeoJSON and ontology format
- Provide API access to data
- Dashboard to construct API query
- All data are semantic-enabled

Data Availability

Select data source ▼

- NSW Lidar (9,045)
- QBEIS (1,840,472)
- TERN AusPlots Forest (236,764)
- TERN Ecosystem Processes (443,731)**
- TERN Surveillance Monitoring (4,422,191)
- Three Parks Savanna (525,675)
- Williams Wet Tropics Vertebrate database (872,226)

plant fuel dry biomass (192)

stand biomass (1,016)

stand standing dead tree biomass (952)

above-ground biomass (48,824)

<https://ecoplots-test.tern.org.au>

API Query Dashboard

ifrastructure

Code Generator ×

Language: python ▾ Variant: http.client ▾

Output Format: geojson ▾

```
1 import http.client
2 import json
3
4 conn = http.client.HTTPSConnection("ecoplots-test.tern.org.au")
5 payload = json.dumps({
6     "query": {
7         "region_type": [
8             "http://linked.data.gov.au/dataset/asgs2016/stateorterritory"
9         ],
10        "region": [
11            "http://linked.data.gov.au/dataset/asgs2016/stateorterritory/3"
12        ],
13        "observed_property": [
14            "http://linked.data.gov.au/def/tern-cv/245c8b4c-dd85-4925-8133-bc7477ecff43"
15        ],
16        "feature_type": [
17            "http://linked.data.gov.au/def/tern-cv/ea3a4c64-dac3-4660-809a-8ad5ced8997b"
18        ]
19    }
20 })
21 headers = {
22     'X-API-Key': 'your-api-key',
```

Copy snippet Copy query Open Swagger API

Data Format: GeoJSON ▾

URL: https://ecoplot

Request Body:

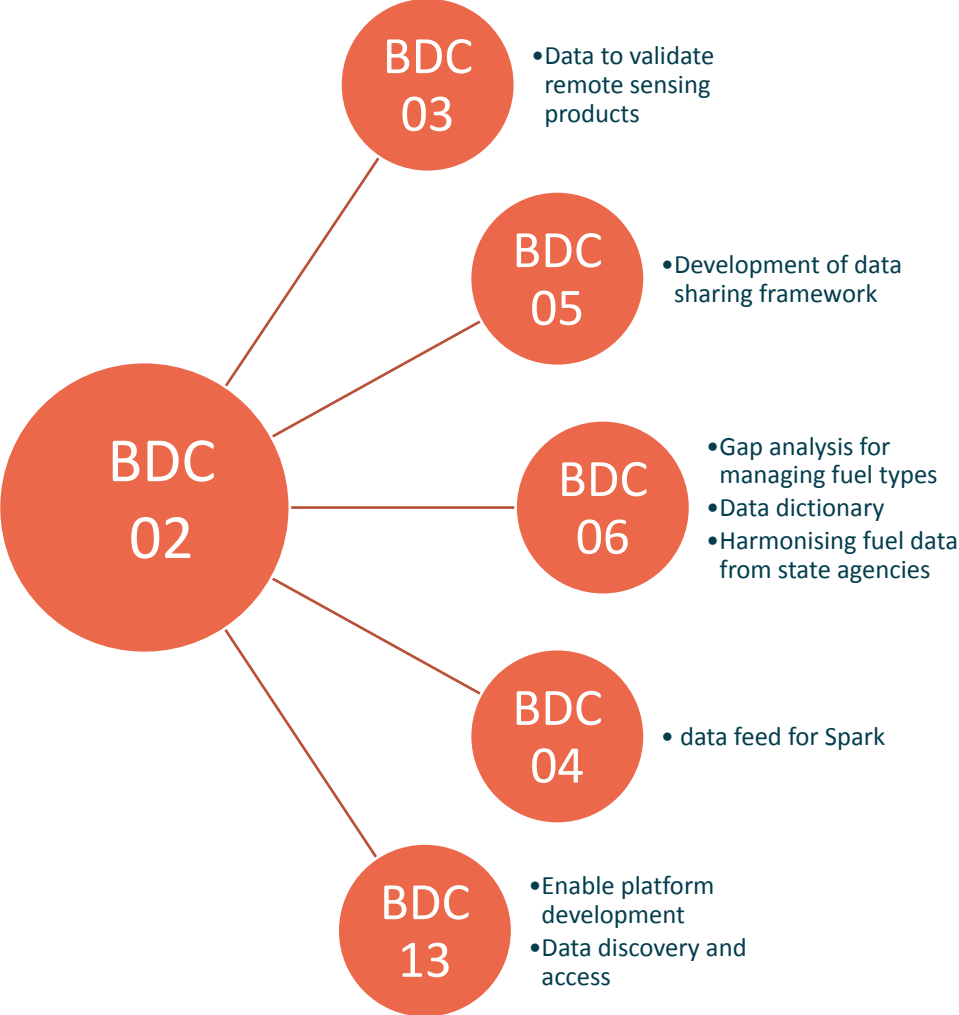
```
{
  "query": {
    "region_type": [
      "http://linked.data.gov.au/dataset/asgs2016/stateorterritory"
    ],
    "region": [
      "http://linked.data.gov.au/dataset/asgs2016/stateorterritory/3"
    ],
    "observed_property": [
      "http://linked.data.gov.au/def/tern-cv/245c8b4c-dd85-4925-8133-bc7477ecff43"
    ],
    "feature_type": [
      "http://linked.data.gov.au/def/tern-cv/ea3a4c64-dac3-4660-809a-8ad5ced8997b"
    ]
  }
}
```

</> API

Project wrapup

- Some of the datasets are in test instance of EcoPlots
 - the URI namespace needs to be approved by the linked data working group for some of the datasets
- Testing the dataset with domain scientist
- Enable data publication for dataset derived from BDC 03
- Planning to ingest more long-term monitoring datasets

Collaborations



Conclusion

- We have built a robust pipeline to ingest and integrate survey-based fuel-related data.
- Worked with several datasets and some datasets are in pipeline
- Enable both API and direct download access to data
- Flexibility to get data in GeoJSON and CSV format
- All data will be available from <https://ecoplots.tern.org.au>

Acknowledgements

The Project Partners are DCCEEW, ANU, CSIRO and AFAC through BDC fuel projects
TERN current and previous project team
ARDC Nectar Infrastructure
TERN Australia



We at TERN acknowledge the Traditional Owners and 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 institutions.

To find out more please go to tern.org.au.

