California Wildfire and Landscape Resilience Interagency Tracking System
Data Conversion and Reporting Methods

Introduction

The California Wildfire and Landscape Resilience Interagency Tracking System (Tracking System) developed for the California Wildfire and Forest Resilience Task Force (Task Force), assembles data on wildfire and landscape resilience management activities from diverse federal, state, and other sources. This document describes the tools used to transform these diverse datasets into the Tracking System template. Broadly, data are first standardized into the Task Force schema (v5.2 August 2023), then reference data are used to enrich the imported data with attributes for vegetation cover type, land ownership type, county, and whether the feature is located within the wildland-urban interface (WUI) from reference data. The Draft Tracking System Data Comparison sheet details how attributes are mapped (translated) from the original dataset into the Task Force schema. The Fuels-Treatments Crosswalk sheet is used as a lookup table which contains the resiliency/fuels treatments attributes from the source dataset and their corresponding activity, objective, and residue fate attributes.

The datasets are incorporated as activity features (flat file). In the final step, the activities flat file is transformed to the Project, Treatment, Activity relational database format. The CNRA Treatment Tracker feature classes and attributes excluded from the transformation because their native format matches the Task Force ITS format. They are appended to the relational database after the flat file is transformed.

The process was developed using ESRI ArcGIS Pro and converted to Python scripts for automation on an enterprise GIS system. Final products will be available via an ESRI ArcGIS Portal, Web Mapping Application, Web Map Service, and Dashboard. A Git Repository will be available which will contain all of the tools described below as python scripts.

The Tracking System is designed to produce two primary reports: the Activities Report and the Footprint Report. The Activities Report is designed to report on the level of effort (in acres) for activities undertaken by the various reporting agencies. Activities can overlap, particularly between years.

Activity acres can be summarized by:

- Agency
- Administering Organization
- Implementing Organization
- Ownership

- County
- In Wildland-Urban Interface (WUI)
- Task Force Region
- Broad Vegetation Type
- Activity Status

- Primary Objective
- Activity Category
- Activity
- Year

The Footprints Report removes overlaps from activities occurring on the same piece of land (e.g., thinning, then prescribed burning) during a specified time period. The Footprints Report is designed to report the acres of land (geographic area) affected by treatments. The report removes overlaps between years when a report is generated for multiple years of treatments. For example, if a county reported a footprint area of 600 acres in 2021 and 600 acres in 2022, the combined 2021-2022 report will likely show a total less than 1200 acres (i.e. 800 acres). Although a Treatment polygon defines an area where Activities will be completed, only a portion of that Treatment area may receive work during a particular time period. Because the Activity data are non-spatial, the Footprint analysis uses the acreage of single largest Activity occurring within that Treatment area polygon in order to conservatively estimate the geographic area affected in that period.

Because the analysis for the Footprints Reports dissolves potentially overlapping activities into a single data layer, this limits the number of attributes available to summarize the data. Treatments can be summarized by spatial intersection (overlayed) with other geographic data layers (county, land ownership, vegetation type, Task Force Regions, and WUI), but not by non-spatial attributes such as Activity Category, Objective, or Administering Organization.
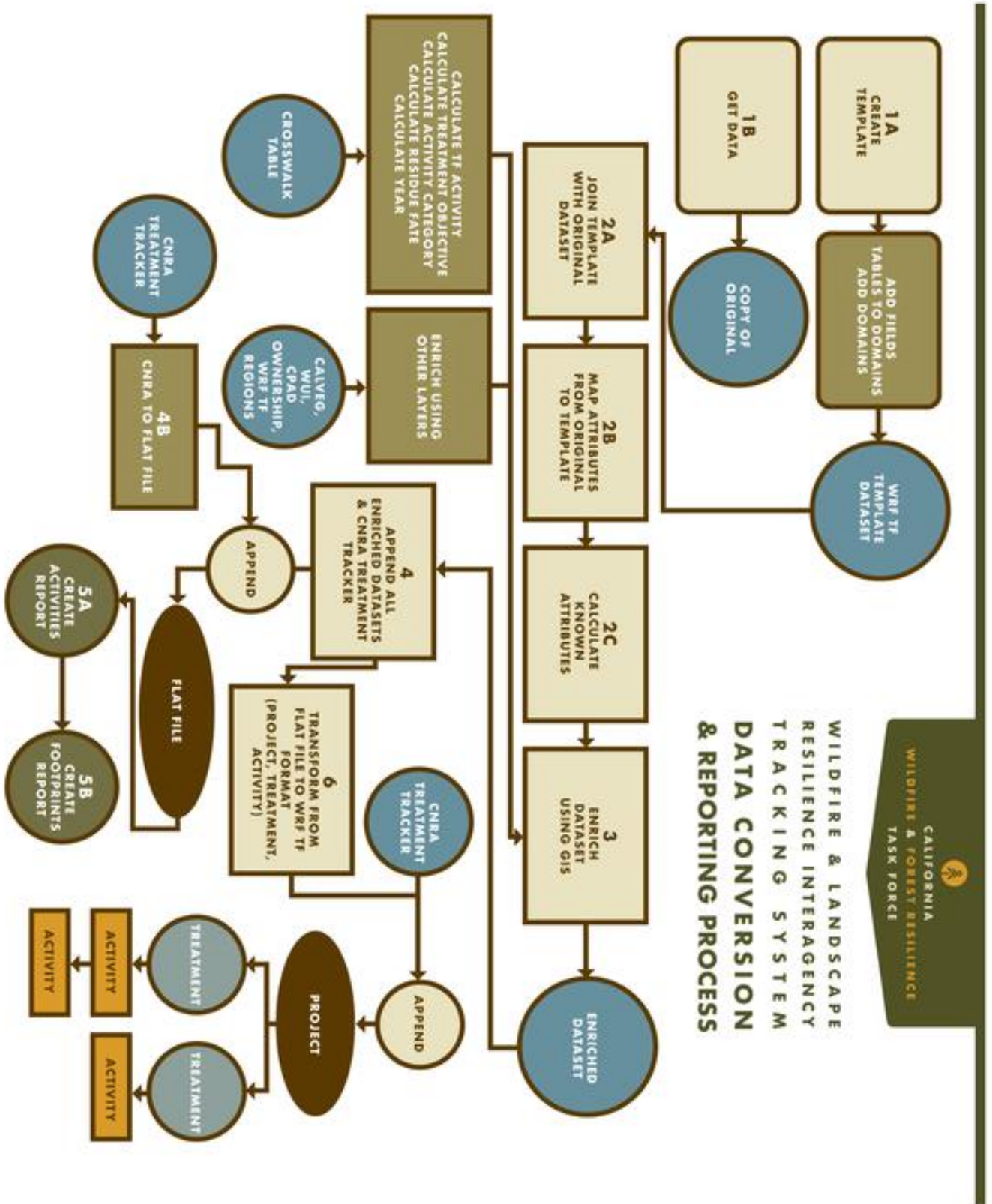
Figure 1: Map of Data Processing Methods.

Step 1. Setup

Get raw data and create the Tracking System template.

Tool 1a-Template

Usage: Creates a TASK FORCE template featureclass for standardization

Description: Creates a featureclass

Geoprocessing tools: "Create Feature Class"

Subroutines: "Add Fields", Tables to Domains, Add Domains

Tags: Create Featureclass, Template, Add Fields, Domains

Comments: See Task Force schema

Tool 1b-Get Data

Usage: Acquire working copies of data from source databases (e.g., USFS Enterprise Data Warehouse)

Description: Download copy of data from sources. Place the working copy of the data into a feature dataset. Projects all data into NAD 1983 California Teale Albers, Meter (EPSG 3310)

Geoprocessing tools: "Select", "Copy Features"

Subroutines: None

Tags: Download, Original

Comments: A separate python script is used to download features from a throttled feature service. Downloaded data have the date in the file title to verify data vintage. Original copies of datasets are useful for validation.

Step 2. Data Conversion

This step joins the Task Force Template with original datasets. Populates the template fields using attributes from the original dataset. Populates fields with known attributes. Populates fields using GIS methods to create an enriched dataset. See Draft Tracking System Data Comparison for field Map.

Tool - USFS Common Attributes

Usage: Feature dataset to templates.

Description: Standardizes USFS FACTS polygons into the TASK FORCE data schema as a single flat featureclass.

Geoprocessing tools: "Select by Attribute", "Copy Features", "Repair Geometry", "Dissolve", "Calculate Field"

Subroutines:

Tags: USFS,

Comments:

Tool - NFPORS Hazardous Fuels Treatments

Usage: Feature dataset to templates.

Description: Standardizes NFPORS (National Fire Plan Operations and Reporting System) Fuels Treatments polygons and NFPORS Current FY Treatments points for the Bureau of Indian Affairs and U.S. Fish and Wildlife Service into the TASK FORCE Template as single flat featureclasses.

Geoprocessing tools: "Append", "Alter Field", "Calculate Field", "Calculate Geometry Attributes", "Clip", "Define Projection", "Delete Field", "Dissolve", "Repair Geometry", and "Select".

Subroutines:

Tags: NFPORS, National Fire Plan Operations and Reporting System, DOI, Department of Interior, USFWS, BIA

Comments:

Tool - CalTrans Vegetation Control Activities

Usage: Feature dataset to templates.

Description: Standardizes CalTrans Vegetation Control Statewide Polyline and Point Activities into the Task Force data schema as flat feature classes.

Geoprocessing tools: "Feature to Point", "Copy Features", "Alter Field", "Repair Geometry", "Calculate Field", "Calculate Geometry Attributes", "Delete Field"

Subroutines:

Tags: CalTrans

Comments:

Tool – Prescribed Fire Information Reporting System (PFIRS)

Usage: Feature dataset to templates.

Description: Standardizes PFIRS_2018_2022 points into the TASK FORCE data schema as a single flat featureclass.

Geoprocessing tools: "Select Layer By Attributes", "Copy Features", "Alter Field", "Calculate Field", "Select Layer By Location", "Delete Rows", "Delete Field"

Subroutines:

Tags: PFIRS, Prescribed Burns

Comments:

Tool - NPS

Usage: Feature dataset to templates.

Description: Standardizes National Park Service (NPS) flat fuels polygons into the TASK FORCE data schema as a single flat featureclass.

Geoprocessing tools: "Select", "Repair Geometry", "Pairwise Clip", "Pairwise Dissolve", "Alter Field", "Calculate Field", "Delete Field", "Select", "Copy Features"

Subroutines:

Tags: NPS

Comments:

Tool - BLM

Usage: Feature dataset to templates.

Description: Translates the Bureau of Land Management BLM_20220627 polygons from WRF TF data schema V1 into V3 as a single flat featureclass.

Geoprocessing tools: "Clip", "Repair Geometry", "Alter Field", "Calculate Field", "Add Fields (multiple)", "Copy Features"

Subroutines:

Tags: BLM

Comments:

Tool - Utilities

Usage: Feature dataset to templates.

Description: Standardizes vegetation treatment points, lines, and polygons from PG&E, SCE, SDGE, and OEIS into the TASK FORCE data schema as flat point, line, and polygon featureclasses.

Geoprocessing tools: "Clip", "Dissolve", "Repair Geometry", "Alter Field", "Calculate Field", "Add Fields (multiple)", "Copy Features"

Subroutines:

Tags: Utilities, Electric, Gas, Pacific Gas and Electric, PG&E, Southern California Edison, SCE, San Diego Gas and Electric, SDGE, California Office of Energy Infrastructure Safety, OEIS

Comments: For points, the tool dissolves the point featureclass to a multi-point featureclass then separates records by activity: tree trim count, tree trim acreage, tree removal count, tree removal acreage. Activity acres for pole-brushing is assigned as 0.0018030 acres per pole (10 foot diameter). Liberty Utilities dataset is processed separately. An iteration process may be implemented in the future to facilitate and speed up point data processing due to the large number of points in the datasets.

3. Enrichments

See Draft Tracking System Data Comparison for field Map. And Fuels-Treatments Crosswalk for conversion of activities to TASK FORCE activities, objectives, and residue fates.

Tool - Enrichment

Usage: Add attributes to the standardized datasets. There are separate, but equivalent tools for points, lines and polygons.

Description: Adds dominant vegetation type, WUI, Ownership, Task Force Region, County, Activity Description, Activity Category, Primary Objective, Residue Fate, Year, and Geometry attributes to the dataset

Geoprocessing tools: "Calculate Field", "Copy Features", "Features to Points", "Select Layer By Attributes", "Select Layer By Location", "Summarize Within", "Join Features", "Add Join", "Remove Join", "Delete Field", "Select"

Subroutines: Standardize Unit Domains, Calculate Activity, Calculate Primary Objective, Calculate Activity Category, Calculate Residue Fate

Tags: Enrichment

Comments: Calculate Activity, Objective, and Residue Fate utilizes the [Fuels-Treatments Crosswalk](). Calculate Category; see Domain Definitions in the [CNRA Schema sheet]().

Tool - CPAD Own Merge

Usage: Ownership layer for California

Description: Appends additional ownership layers to the California Protected Areas Database (CPAD) to create a layer with statewide coverage. Adds County attributes.

Geoprocessing tools: "Reclassify", "Raster to Polygon", "Repair Geometry", "Intersect"

Subroutines:

Tags: Ownership

Comments: Datasets used: California Protected Areas Database, Native American Indian Reservations, Federal Military Installations, California Tahoe Conservancy, Forest Ownership, and USA Counties.

4. Appending Datasets

Tool - Append

Usage: Combine all the enriched datasets into point, line, and polygon feature classes.

Description:

Geoprocessing tools: "Create Feature Class", "Append", "Select"

Subroutines:

Tags: Append

Comments:

Tool - CNRA to Flat File

Usage: Feature dataset to templates.

Description: Many to one join between Treatments feature layer and Project Layer and Activities Table.

Geoprocessing tools: "Select", "Table to Table", "Repair Geometry", "Table Select", "Pairwise Clip", "Add Fields (multiple)", "Dissolve", "Calculate Field", "Select Layer By Attribute", "Add Join", "Remove Join", "Delete Field", "Copy Features"

Subroutines:

Tags: CNRA

Comments:

5. Reports

Tool - Activities Report

Usage: Generates tabular report of activities

Description: Appends point, line, and polygon tables into a single excel table. Appends the CNRA Flat File for the purpose of creating the Activities Report. Excel pivot tables are used to generate final summary reports.

Geoprocessing tools: "Table to Table", "Append", "Create Table", "Select Layer by Attribute", "Table to Excel"

Subroutines:

Tags: Activities Report

Comments: In the future, python scripts and/or ESRI Report Builder will be used to create summary reports.

Tool - Footprints Report

Usage: Generates tabular report of activity footprints

Description: Creates buffers of points and lines from reported activity acres. Combines buffered features and polygon features before dissolving footprints. Footprints are attributed by Task Force Region, Ownership, County, and Vegetation Type. Final results are exported into an excel report.

Geoprocessing tools: "Add Field", "Calculate Field", "Select Layer by Attribute", "Create Feature Class", "Buffer", "Copy Features", "Append", "Dissolve", "Identity", "Delete Field", "Calculate Geometry Attributes", "Table to Table", "Table to Excel"

Subroutines:

Tags: Footprints Report

Comments: Separates projects with federal land ownership and summarizes by Federal Fiscal Year. Separates projects with non-federal land ownership and summarizes by State Fiscal Year.

6. Transforming Data

Usage: Transforms the flat file point, line, and polygon featureclasses into the TASK FORCE Template schema: Project featureclasses, Treatment featureclasses, and Activities table.

Description: Most datasets are activity of treatment level datasets. They are single feature datasets. The TASK FORCE is a relational database. This tool separates the attributes and features into the TASK FORCE relational database template. The CNRA database is a relational database and is appended after the flat file is transformed.

Geoprocessing tools: "Select", "Dissolve", "Calculate Feld", "Frequency", "Add Join", "Remove Join", "Delete Field", "Create Relationship Class", "Table to Table", "Append"

Subroutines:

Tags: Project, Treatment, Activities, Relationship Class

Comments:

12. Data Sources

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