

# Intersect Treatments and Subsequent Wildfire

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```
library(sf)
library(tidyverse)
```

## 1. Data Organization

```
target_crs <- "EPSG:5070"
```

### Load Forest Tracker

This file is missing an assigned CRS and includes complex geometry types which are difficult to intersect, so this section also addresses those items.

```
#read file (since only one layer, no need to assign path first)(accessed 10/2/25)
treats <- st_read("data/CO_Forest_Tracker_2024/CO_Forest_Tracker_2024.gpkg")

## Reading layer `forest_tracker_v1_2024' from data source
##   `C:\Users\Elizabeth Buhr\OneDrive\Documents\fuels-
analysis\data\CO_Forest_Tracker_2024\CO_Forest_Tracker_2024.gpkg'
##   using driver `GPKG'
## Simple feature collection with 25579 features and 24 fields
## Geometry type: MULTISURFACE
## Dimension:      XYZM
## Bounding box:   xmin: 140265.1 ymin: 4094265 xmax: 752279.1 ymax: 4543420
```

```
## z_range:      zmin: 0 zmax: 2974.937
## m_range:      mmin: 0 mmax: 0
## CRS:          NA

#Missing crs - found from information tab in qgis (ESPG:26913)
st_crs(treats) <- 26913
treats <- st_transform(treats, target_crs) #reproject

#Simplify and clean
treats <- treats %>%
  st_zm(drop=TRUE, what = "ZM") %>% #drop third and forth dimension
  st_cast("MULTIPOLYGON") %>% #convert to simpler geometry
  st_make_valid(treats)

## Warning in st_cast.sf(., "MULTIPOLYGON"): repeating attributes for all
## sub-geometries for which they may not be constant
```

## Load MTBS Fire Perimeters

I am filtering for fires from 2015 on. Perimeter data was pre-processed by HART lab.

```
# Using perimeter data for 1984-2023, should update to include 2024
fires <- st_read("data/mtbs_perimeter_data/mtbs_perims_DD.shp") %>%
  st_transform(target_crs) %>%
  mutate(Ig_Date = as.Date(Ig_Date), year=year(Ig_Date)) %>% # convert to date
  filter(year>=2015) %>% # filter for fires that occurred in or after 2015
  filter(Incid_Type=="Wildfire") %>%
  filter(grepl("CO", Event_ID)) %>% #filter out repeated fire names in other states, maybe should use state boundary instead
  st_make_valid(fires)

## Reading layer `mtbs_perims_DD' from data source
## `C:\Users\Elizabeth Buhr\OneDrive\Documents\fuels-
## analysis\data\mtbs_perimeter_data\mtbs_perims_DD.shp'
## using driver `ESRI Shapefile'
## Simple feature collection with 30730 features and 22 fields
## Geometry type: MULTIPOLYGON
## Dimension: XY
## Bounding box: xmin: -166.1885 ymin: 17.94736 xmax: -65.33821 ymax:
## 70.15893
## Geodetic CRS: NAD83
```

## 2. Find Fires of Interest

We will find which wildfires intersect with previous treatments, then filter both the fires and treats datasets to only the relevant items. We will then save the filtered datasets for mapping.

## Intersect treatments and subsequent wildfires

```
# Intersect treatments and subsequent wildfires
intersect <- st_intersection(treats, fires) %>%
  filter(YEAR_COMP < year)

## Warning: attribute variables are assumed to be spatially constant
## throughout
## all geometries
```

## Subset fires to only those that intersect

```
# Subset Fires to only those that intersect with prior fuel treatments
fires <- fires %>%
  filter(Incid_Name %in% unique(intersect%>% pull(Incid_Name)))
```

## Subset treatments to only those that intersect

This dataset has more observations than “intersect” because “OBJECTID” is not unique (multiple polygons can have the same OBJECTID because they are part of the same project). I like seeing the whole project though, so that’s alright.

```
# Subset treatments to only those that intersect subsequent wildfire
treats <- treats %>%
  filter(OBJECTID %in% unique(intersect%>% pull(OBJECTID)))
```

## 3. Save Geopackage

```
# Save the intersection result as the first layer

st_write(
  obj = intersect,
  dsn = "fuels_analysis.gpkg",
  layer = "intersection",
  driver = "GPKG",
  delete_dsn = TRUE
)

## Deleting source `fuels_analysis.gpkg' using driver `GPKG'
## Writing layer `intersection' to data source `fuels_analysis.gpkg' using
## driver `GPKG'
## Writing 3355 features with 47 fields and geometry type Unknown (any).

# Append the subsetted fires as a new layer
st_write(
  obj = fires,
  dsn = "fuels_analysis.gpkg",
  layer = "fires_with_prior_treatment",
  driver = "GPKG",
```

```

    delete_layer= TRUE
)

## Deleting layer `fires_with_prior_treatment' failed
## Writing layer `fires_with_prior_treatment' to data source
## `fuels_analysis.gpkg' using driver `GPKG'
## Writing 44 features with 23 fields and geometry type Unknown (any).

# Append the subsetted treatments as a new Layer
st_write(
  obj = treats,
  dsn = "fuels_analysis.gpkg",
  layer = "treatments_preceding_fire",
  driver = "GPKG",
  delete_layer= TRUE
)

## Deleting layer `treatments_preceding_fire' failed
## Writing layer `treatments_preceding_fire' to data source
## `fuels_analysis.gpkg' using driver `GPKG'
## Writing 5123 features with 24 fields and geometry type Polygon.

```