Lineage on the development of the *Fires in Australia's forests 2011–16 (2018)* dataset for publication in the *Australia's State of the Forests Report 2018* (SOFR 2018).

Fires in Australia's Forests 2011–16 (2018) is a continental spatial dataset of the extent and frequency of planned and unplanned fires in forest in the five financial years between July 2011 and June 2016, assembled for *Australia's State of the Forests Report 2018*. It was developed from multiple fire area datasets contributed by state and territory government agencies, after consultation with Australia's Forest Fire Management Group. The fire dataset is then combined with forest cover information sourced from the *Forests of Australia (2018)* dataset, and forest tenure information sourced from the *Tenure of Australia's Forests (2018)* dataset.

Fires in Australia's forests 2011–16 (2018) dataset was developed from the following state and territory (jurisdictional) fire datasets:

- Fire scars for all land cover types detected by the MODIS satellite and mapped by Northern Australia Fire Information (NAFI). This dataset is available from the NAFI website and covers the Northern Territory and Queensland jurisdictions.
- Fire scars for all land cover types detected by the Landsat satellite and mapped by the Queensland Statewide Landcover and Trees Study (SLATS) team. This dataset covers the whole of Queensland.
- Fire scars for all land cover types mapped or digitised from aerial photography and provided by the following agencies, for their respective jurisdictions:
    - Australian Capital Territory Environment, Planning and Sustainable Development Directorate
    - New South Wales Rural Fires Service
    - Primary Industries and Regions South Australia
    - Sustainable Timber Tasmania
    - Victorian Department of Environment, Land, Water and Planning
    - Western Australian Parks and Wildlife Service

The jurisdictions provided advice on how to use the data, in terms of interpreting the attributes and assigning planned or unplanned to fire records.

Northern Territory

The method to derive a fire dataset that identifies the type of fire (planned or unplanned) and the financial year in which the fire occurred for the reporting period *2011–12* to *2015–16* for the Northern Territory is summarised as follows:

1. Downloaded raster data from NAFI website (https://www.firenorth.org.au/nafi3/)
2. Separated data by financial year which resulted in five rasters of fire scars, one for each of the financial years in the reporting period 2011–12 to 2015-16.
3. Attributed each raster of fire scars with the date of fire (day, month and year) of the fire in the original dataset.
4. Allocated the fires in each raster to planned or unplanned fire type based on advice provided by Northern Territory Department of Environment and Natural Resources: ***planned*** fires occur between January and June, ***unplanned*** fires occur between July and December.
5. Where input data indicated that a cell (pixel) was burnt on multiple occasions in any one financial year, only the first fire and its fire type (***planned*** or ***unplanned***) was considered, and all subsequent fires occurring on that cell during that financial year were disregarded. For this reason the derived fire dataset may underestimate the cumulative area of forest burnt in the Northern Territory.
6. Combined the individual rasters to create an interim fire dataset for the reporting period *2011–12* to *2015–16* that included **year of fire** by **type of fire**.

7. Reprojected the interim fire dataset to standard NFI GDA 1994 Albers equal-area projection and resampled to 100m cell size.
8. Masked or clipped the interim fire dataset to the standard NFI Northern Territory boundary (also known as **NT Snapgrid**) and allocated the NODATA areas within the mask boundary a value of -999.
9. Combined the resulting Northern Territory fire raster with the *Forest of Australia (2018)* and *Tenure of Australia's Forests (2018)* datasets.
10. Added the following attributes to the new Northern Territory forest fire raster and calculated their values:
    a) ALL_FIRE_BY_TYPE (summation of individual financial year fires between 2011–12 and 2015–16)
    b) X_BURNT_P (number of times an area was burnt by planned fire between 2011–12 and 2015–16)
    c) X_BURNT_U (number of times an area was burnt by unplanned fire between 2011–12 and 2015–16)
    d) TOTAL_X_BURNT (number of times an area was burnt by planned or unplanned fires between 2011–12 and 2015–16)
    e) FOREST_BURNT (identifies where a forest area was burnt ("YES") or not ("NO") between 2011–12 and 2015–16)
    f) CUMMULAT_PF_AREA (cumulative area burnt by planned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
    g) CUMMULAT_UF_AREA (cumulative area burnt by unplanned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
    h) PLAN_UNPLAN_BOTH (identifies what type(s) of fire affected a forest area (*planned* or *unplanned* or *both*) between 2011–12 and 2015–16)

<u>Queensland</u>

The method to derive a fire dataset to identify the type of fire (***planned*** or ***unplanned***), and the financial year in which the fire occurred, for the reporting period ***2011–12*** to ***2015–16*** for Queensland is summarised in the steps below.

The fire dataset was derived from the geodatabase provided by Queensland Parks and Wildlife Service (QPWS). The geodatabase identified fire scars by date (day, month and year) and by source (fire scars detected by the Landsat satellite and mapped by the Queensland SLATS team, and fire scars detected by the MODIS satellite and mapped by NAFI). In some instances the Landsat and MODIS satellites detected the same fire (fires overlapping spatially for the same date of fire), and in some instances they detected different fires (fires not overlapping spatially for the same date of fire).

1. Prepared and ran a **Python** script that converted geodatabase feature classes (by month by financial year) to monthly rasters using the polygon to raster tool with the COMBINED_AREA option in ArcGIS.
2. Combined the monthly rasters in financial years: 2011–12, 2012–13, 2013–14, 2014–15 and 2015–16.
3. Prepared and ran a **Python** script on the combined monthly rasters from step 2 above to identify fires occurring within three months or less of another within the same cell. For example, if a cell was burnt in July (beginning of the financial year), any fires recorded for the same cell in the months of August, September or October were considered to be the same fire. Similarly, if a cell was burnt in August, the same cell was excluded from being assessed as burnt in September or October or November.
4. Allocated the type of fire in each raster to planned or unplanned based on advice provided by QPWS, where a fire is considered to be ***planned*** if it occurs between January and July, and ***unplanned*** if it occurs between August and December. Where input data indicated that a cell (pixel) was burnt on multiple occasions in any one financial year, only the first fire and fire type (***planned*** or ***unplanned***) was considered and all subsequent fires that occurred on that cell during that financial year were

disregarded. For this reason the derived fire dataset may underestimate the cumulative area of forest burnt in Queensland.

5. Combined the five individual financial year rasters to create an interim fire dataset that includes the attributes **year of fire** by **type of fire**.
6. Reprojected the interim fire dataset to standard NFI GDA 1994 Albers equal-area projection and resampled to 100m cell size
7. Masked or clipped the interim fire dataset to the standard NFI Queensland boundary (also known as **Qld Snapgrid**) and allocated the NODATA areas within the mask boundary a value of -999.
8. Combined the resulting Queensland fire raster with the *Forest of Australia (2018)* and *Tenure of Australia's Forests (2018)* datasets.
9. Added the following attributes to the new Queensland forest fire raster and calculated their values:
   a) ALL_FIRE_BY_TYPE (summation of individual financial year fires between 2011–12 and 2015–16)
   b) X_BURNT_P (number of times an area was burnt by planned fire between 2011–12 and 2015–16)
   c) X_BURNT_U (number of times an area was burnt by unplanned fire between 2011–12 and 2015–16)
   d) TOTAL_X_BURNT (number of times an area was burnt by planned or unplanned fires between 2011–12 and 2015–16)
   e) FOREST_BURNT (identifies where a forest area was burnt ("YES") or not ("NO") between 2011–12 and 2015–16)
   f) CUMMULAT_PF_AREA (cumulative area burnt by planned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
   g) CUMMULAT_UF_AREA (cumulative area burnt by unplanned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
   h) PLAN_UNPLAN_BOTH (identifies what type(s) of fire affected a forest area (*planned* or *unplanned* or *both*) between 2011–12 and 2015–16

New South Wales

The method to derive a fire dataset that identifies the type of fire (***planned*** or ***unplanned***) and the financial year in which the fire occurred for the reporting period ***2011–12*** to ***2015–16*** for New South Wales is summarised as follows:

1. Sourced fire datasets from the NSW Rural Fire Service. The dataset was derived from hand digitizing of fire scars from aerial photography and GPS coordinates. The dataset contained ***planned*** fires and ***unplanned*** fires (wildfires).
2. Reprojected the fire vector dataset to standard NFI GDA 1994 Albers equal-area projection.
3. Separated data by financial year, which resulted in ten vector datasets of fire, five for ***planned*** fire for each financial year and five for ***unplanned*** fire for each financial year (financial years between 2011–12 and 2015–16, inclusive).
4. Converted the vector datasets to rasters using the polygon to raster tool with the COMBINED_AREA option in ArcGIS and resampled to 100m cell size.
5. Combined the ten individual rasters (fire type by year) into an interim state-wide fire dataset
   o Where input data indicated that a forest cell or pixel was burnt on multiple occasions in any one financial year, only the first fire and fire type (***planned*** or ***unplanned***) was considered and all subsequent fires occurring during that financial year were not considered. For this reason the derived fire dataset may underestimate the cumulative area of forest burnt in New South Wales.
6. Combined the resulting NSW fire raster with the *Forest of Australia (2018)* and *Tenure of Australia's Forests (2018)* datasets.
7. Allocated the NODATA areas within the mask boundary a value of -999.

8. Added the following attributes to the new NSW forest fire raster and calculated their values:
   a) ALL_FIRE_BY_TYPE (summation of individual financial year fires between 2011–12 and 2015–16)
   b) X_BURNT_P (number of times an area was burnt by planned fire between 2011–12 and 2015–16)
   c) X_BURNT_U (number of times an area was burnt by unplanned fire between 2011–12 and 2015–16)
   d) TOTAL_X_BURNT (number of times an area was burnt by planned or unplanned fires between 2011–12 and 2015–16)
   e) FOREST_BURNT (identifies where a forest area was burnt ("YES") or not ("NO") between 2011–12 and 2015–16)
   f) CUMMULAT_PF_AREA (cumulative area burnt by planned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
   g) CUMMULAT_UF_AREA (cumulative area burnt by unplanned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
   h) PLAN_UNPLAN_BOTH (identifies what type(s) of fire affected a forest area (*planned* or *unplanned* or *both*) between 2011–12 and 2015–16

Australian Capital Territory

The method to derive a fire dataset that identifies the type of fire (***planned*** or ***unplanned***) and the financial year in which the fire occurred for the reporting period ***2011–12*** to ***2015–16*** for the Australian Capital Territory (ACT) is summarised as follows:

1. Sourced fire dataset from the Environment, Planning and Sustainable Development Directorate. The dataset was derived through hand digitizing of fire scars from aerial photography and GPS coordinates.
2. Reprojected the fire vector dataset to standard NFI GDA 1994 Albers equal-area projection.
3. Converted the original shapefile from multipart polygons to single part polygons and then to rasters using the polygon to raster tool with the COMBINED_AREA option in ArcGIS and resampled to 100m cell size.
4. Separated data by financial year and ***planned*/*unplanned*** fire, which resulted in ten vector datasets of fire, five for ***planned*** fire for each financial year and five for ***unplanned*** fire, for each financial year (financial years between 2011–12 and 2015–16, inclusive). Fire type was assigned using the ignition source attribute.
5. Combined the ten individual rasters (fire type by year) into an interim territory-wide fire dataset
   o Where input data indicated that a forest cell or pixel was burnt on multiple occasions in any one financial year, only the first fire and fire type (***planned*** or ***unplanned***) was considered and all subsequent fires occurring during that financial year were not considered. For this reason the derived fire dataset may underestimate the cumulative area of forest burnt in the ACT.
6. Allocated the NODATA areas within the mask boundary a value of -999.
7. Combined the resulting ACT fire raster with the *Forest of Australia (2018)* and *Tenure of Australia's Forests (2018)* datasets.
8. Added the following attributes to the new ACT forest fire raster and calculated their values:
   a) ALL_FIRE_BY_TYPE (summation of individual financial year fires between 2011–12 and 2015–16)
   b) X_BURNT_P (number of times an area was burnt by planned fire between 2011–12 and 2015–16)
   c) X_BURNT_U (number of times an area was burnt by unplanned fire between 2011–12 and 2015–16)
   d) TOTAL_X_BURNT (number of times an area was burnt by planned or unplanned fires between 2011–12 and 2015–16)

  e) FOREST_BURNT (identifies where a forest area was burnt ("YES") or not ("NO") between 2011–12 and 2015–16)
  f) CUMMULAT_PF_AREA (cumulative area burnt by planned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
  g) CUMMULAT_UF_AREA (cumulative area burnt by unplanned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
  h) PLAN_UNPLAN_BOTH (identifies what type(s) of fire affected a forest area (*planned* or *unplanned* or *both*) between 2011–12 and 2015–16

Victoria

The method to derive a fire dataset that identifies the type of fire (***planned*** or ***unplanned***) and the financial year in which the fire occurred for the reporting period ***2011–12*** to ***2015–16*** for Victoria is summarised as follows:

1. Sourced fire dataset from the Department of Environment, Land, Water and Planning. The dataset was derived through hand digitizing of fire scars from aerial photography and GPS coordinates.
2. Reprojected the fire vector dataset to standard NFI GDA 1994 Albers equal-area projection.
3. Converted the original shapefile from multipart polygons to single part polygons and then to rasters using the polygon to raster tool with the COMBINED_AREA option in ArcGIS and resampled to 100m cell size.
4. Separated data by financial year using the 'START_DATE' attribute, which resulted in fire vector datasets of fire, one for each of the reporting financial periods (financial years between 2011–12 and 2015–16, inclusive).
5. Separated data by fire type, ***planned*** and ***unplanned*** using the FIRE_TYPE attribute, and excluded fires that had the value of 'unburnt' for the attribute FIRE_SVRTY.
6. Combined the ten individual rasters (fire type by year) into an interim state-wide fire dataset
    o Where input data indicated that a forest cell or pixel was burnt on multiple occasions in any one financial year, only the first fire and fire type (***planned*** or ***unplanned***) was considered and all subsequent fires occurring during that financial year were not considered. For this reason the derived fire dataset may underestimate the cumulative area of forest burnt in Victoria.
7. Allocated the NODATA areas within the mask boundary a value of -999.
8. Combined the resulting Victoria fire raster with the *Forest of Australia (2018)* and *Tenure of Australia's Forests (2018)* datasets.
9. Added the following attributes to the new Victorian forest fire raster and calculated their values:
    a) ALL_FIRE_BY_TYPE (summation of individual financial year fires between 2011–12 and 2015–16)
    b) X_BURNT_P (number of times an area was burnt by planned fire between 2011–12 and 2015–16)
    c) X_BURNT_U (number of times an area was burnt by unplanned fire between 2011–12 and 2015–16)
    d) TOTAL_X_BURNT (number of times an area was burnt by planned or unplanned fires between 2011–12 and 2015–16)
    e) FOREST_BURNT (identifies where a forest area was burnt ("YES") or not ("NO") between 2011–12 and 2015–16)
    f) CUMMULAT_PF_AREA (cumulative area burnt by planned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
    g) CUMMULAT_UF_AREA (cumulative area burnt by unplanned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
    h) PLAN_UNPLAN_BOTH (identifies what type(s) of fire affected a forest area (*planned* or *unplanned* or *both*) between 2011–12 and 2015–16

Tasmania

The method to derive a fire dataset that identifies the type of fire (***planned*** or ***unplanned***) and the financial year in which the fire occurred for the reporting period ***2011–12*** to ***2015–16*** for Tasmania is summarised as follows:

1. Sourced fire datasets from the Department of Primary Industries, Parks, Water and Environment. The dataset was derived through hand digitizing of fire scars from aerial photography and GPS coordinates.
2. Reprojected the fire vector dataset to standard NFI GDA 1994 Albers equal-area projection.
3. Separated data by financial year and ***planned***/***unplanned*** fire, resulting in ten vector datasets of fire, five for ***planned*** fire for each financial year and five for ***unplanned*** fire for each financial year (financial years between 2011–12 and 2015–16, inclusive).
4. Converted the ten vectors to rasters using the polygon to raster tool with the COMBINED_AREA option in ArcGIS and resampled to 100m cell size.
5. Combined the ten individual rasters (fire type by year) into an interim state-wide fire dataset
     - Where input data indicated that a forest cell or pixel was burnt on multiple occasions in any one financial year, only the first fire and fire type (***planned*** or ***unplanned***) was considered and all subsequent fires occurring during that financial year were not considered. For this reason the derived fire dataset may underestimate the cumulative area of forest burnt in Tasmania.
6. Allocated the NODATA areas within the mask boundary a value of -999.
7. Combined the resulting Tasmania fire raster with the *Forest of Australia (2018)* and *Tenure of Australia's Forests (2018)* datasets.
8. Added the following attributes to raster and calculated their values:
     a) ALL_FIRE_BY_TYPE (summation of individual financial year fires between 2011–12 and 2015–16)
     b) X_BURNT_P (number of times an area was burnt by planned fire between 2011–12 and 2015–16)
     c) X_BURNT_U (number of times an area was burnt by unplanned fire between 2011–12 and 2015–16)
     d) TOTAL_X_BURNT (number of times an area was burnt by planned or unplanned fires between 2011–12 and 2015–16)
     e) FOREST_BURNT (identifies where a forest area was burnt ("YES") or not ("NO") between 2011–12 and 2015–16)
     f) CUMMULAT_PF_AREA (cumulative area burnt by planned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
     g) CUMMULAT_UF_AREA (cumulative area burnt by unplanned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
     h) PLAN_UNPLAN_BOTH (identifies what type(s) of fire affected a forest area (*planned* or *unplanned* or *both*) between 2011–12 and 2015–16

South Australia

The method to derive a fire dataset that identifies the type of fire (***planned*** or ***unplanned***) and the financial year in which the fire occurred for the reporting period ***2011–12*** to ***2015–16*** for South Australia is summarised as follows:

1. Sourced fire datasets from the Department of Environment, Water and Natural Resources. The dataset was derived through hand digitizing of fire scars from aerial photography and GPS coordinates.
2. Reprojected the fire vector dataset to standard NFI GDA 1994 Albers equal-area projection.
3. Converted the vectors to rasters using the polygon to raster tool with the COMBINED_AREA option in ArcGIS and resampled to 100m cell size.

4. Separated data by financial year and **planned**/**unplanned** fire, resulting in ten vector datasets of fire, five for **planned** fire for each financial year and five for **unplanned** fire for each financial year (financial years between 2011–12 and 2015–16, inclusive).
5. Combined the ten individual rasters (fire type by year) into an interim state-wide fire dataset
   - Where input data indicated that a forest cell or pixel was burnt on multiple occasions in any one financial year, only the first fire and fire type (**planned** or **unplanned**) was considered and all subsequent fires occurring during that financial year were not considered. For this reason the derived fire dataset may underestimate the cumulative area of forest burnt in South Australia.
6. Allocated the NODATA areas within the mask boundary a value of -999.
7. Combined the resulting South Australia fire raster with the *Forest of Australia (2018)* and *Tenure of Australia's Forests (2018)* datasets.
8. Added the following attributes to raster and calculated their values:
   a) ALL_FIRE_BY_TYPE (summation of individual financial year fires between 2011–12 and 2015–16)
   b) X_BURNT_P (number of times an area was burnt by planned fire between 2011–12 and 2015–16)
   c) X_BURNT_U (number of times an area was burnt by unplanned fire between 2011–12 and 2015–16)
   d) TOTAL_X_BURNT (number of times an area was burnt by planned or unplanned fires between 2011–12 and 2015–16)
   e) FOREST_BURNT (identifies where a forest area was burnt ("YES") or not ("NO") between 2011–12 and 2015–16)
   f) CUMMULAT_PF_AREA (cumulative area burnt by planned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
   g) CUMMULAT_UF_AREA (cumulative area burnt by unplanned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
   h) PLAN_UNPLAN_BOTH (identifies what type(s) of fire affected a forest area (*planned* or *unplanned* or *both*) between 2011–12 and 2015–16

<u>Western Australia</u>

The method to derive a fire dataset that identifies the type of fire (**planned** or **unplanned**) and the financial year in which the fire occurred for the reporting period ***2011–12*** to ***2015–16*** for Western Australia is summarised as follows:

1. Sourced fire datasets from the Department of Conservation, Biodiversity and Attraction. The dataset was derived through hand digitizing of fire scars from aerial photography and GPS coordinates.
2. Reprojected the fire vector dataset to standard NFI GDA 1994 Albers equal-area projection.
3. Separated data by financial year and **planned**/**unplanned** fire, resulting in ten vector datasets of fire, five for **planned** fire for each financial year and five for **unplanned** fire for each financial year (financial years between 2011–12 and 2015–16, inclusive).
   - Unknown burn type were not excluded because only a few hectares of forest were impacted
4. Converted the vector datasets to rasters using the polygon to raster tool with the COMBINED_AREA option in ArcGIS and resampled to 100m cell size.
5. Combined the ten individual rasters (fire type by year) into an interim state-wide fire dataset
   - Where input data indicated that a forest cell or pixel was burnt on multiple occasions in any one financial year, only the first fire and fire type (**planned** or **unplanned**) was considered and all subsequent fires occurring during that financial year were not considered. For this reason the derived fire dataset may underestimate the cumulative area of forest burnt in Western Australia.
6. Allocated the NODATA areas within the mask boundary a value of -999.

7. Combined the resulting Western Australian fire raster with the *Forest of Australia (2018)* and *Tenure of Australia's Forests (2018)* datasets.
8. Added the following attributes to the new Western Australian forest fire raster and calculated their values:
   a) ALL_FIRE_BY_TYPE (summation of individual financial year fires between 2011–12 and 2015–16)
   b) X_BURNT_P (number of times an area was burnt by planned fire between 2011–12 and 2015–16)
   c) X_BURNT_U (number of times an area was burnt by unplanned fire between 2011–12 and 2015–16)
   d) TOTAL_X_BURNT (number of times an area was burnt by planned or unplanned fires between 2011–12 and 2015–16)
   e) FOREST_BURNT (identifies where a forest area was burnt ("YES") or not ("NO") between 2011–12 and 2015–16)
   f) CUMMULAT_PF_AREA (cumulative area burnt by planned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
   g) CUMMULAT_UF_AREA (cumulative area burnt by unplanned fire, counting fire occurring in each year financial separately, between 2011–12 and 2015–16)
   h) PLAN_UNPLAN_BOTH (identifies what type(s) of fire affected a forest area (*planned* or *unplanned* or *both*) between 2011–12 and 2015–16
9. Statistics for northern and southern Western Australia were derived by separating WA by the Tropic of Capricorn.

Australia dataset

The final forest fire rasters for each state and territory were combined into a national coverage titled *Fires in Australia's forests 2011–2016 (2018)* using the lookup tool in ArcGIS to give the final attributes of:

   a) STATE
   b) TEN_TYPE (Tenure type)
   c) FIRE_2011_12 (planned, unplanned or no fire)
   d) FIRE_2012_13 (planned, unplanned or no fire)
   e) FIRE_2013_14 (planned, unplanned or no fire)
   f) FIRE_2014_15 (planned, unplanned or no fire)
   g) FIRE_2015_16 (planned, unplanned or no fire)
   h) ALL_FIRE_BY_TYPE (summation of individual financial year fires between 2011–12 and 2015–16)
   i) X_BURNT_P (number of times an area was burnt by planned fire between 2011–12 and 2015–16)
   j) X_BURNT_U (number of times an area was burnt by unplanned fire between 2011–12 and 2015–16)
   k) TOTAL_X_BURNT (number of times an area was burnt by planned or unplanned fires between 2011–12 and 2015–16)
   l) FOREST_BURNT (identifies where a forest area was burnt ("YES") or not ("NO") between 2011–12 and 2015–16)
   m) CUMMULAT_PF_AREA (cumulative area burnt by planned fire, counting fire occurring in each financial year separately, between 2011–12 and 2015–16)
   n) CUMMULAT_UF_AREA (cumulative area burnt by unplanned fire, counting fire occurring in each financial year separately, between 2011–12 and 2015–16)
   o) PLAN_UNPLAN_BOTH (identifies what type(s) of fire affected a forest area (*planned* or *unplanned* or *both*) between 2011–12 and 2015–16