# Reconstructing the Annual Disturbance Legend: A Record of Change

## Introduction:

The LANDFIRE (LF) Disturbance legend was overdue for a significant overhaul.  Previous updates were usually incremental, addressing specific needs like refining class definitions or incorporating new datasets (e.g., Burned Area, modeled data used for filling gaps, and Alaska-specific classes).  While initially helpful, the cumulative impact of these changes led to a fragmented legend.  A comprehensive update is now complete.  The revised legend was the result of multiple discussions and collaboration among key LANDFIRE team members followed by independent reviews from external users with familiarity with LF disturbance legend.  This document highlights the significant changes made to the legend, providing context and rationale.  Our goal is to reduce disruption and confusion transitioning from legends of the past.

## Key Modifications:

- **Two unique legends**:
    - The primary legend is representative of the preliminary (PDist) and final Disturbance (Dist) legends of the past.  It categorizes data from Fire Program, Events, and Remote Sensing of Landscape Change (RLSC) according to disturbance type. Severities are assigned based on change statistics derived from satellite imagery.  Severity assigned by data providers is not available in this legend.
    - The Limited disturbance (LDist) is an early-release product that's provided for pre-season fire planning.  It's considered limited because it only includes data available near the time of release and excludes satellite-detected disturbances (includes Fire Program and Events only).  This legend has specific class values that do not overlap other disturbance products.  Severities in LDist are assigned based solely on disturbance type, with the majority classified as low.
- **Legend Class Values**: To avoid confusion from reused or modified classes, the legend class values have been reset to a 2000 series for PDist and Dist legends. Previously, values ranged from 11 to 1133.  Class values for LDist will not change from LF2023.
- **Removal of Alaska-specific classes**: This reduces redundancy and streamlines the legend.
- **Logical Class Reorganization**: To improve clarity and provide more logical groupings.
- **Field Name Adjustments**: To provide only essential information and eliminate unnecessary redundancy.

## Detailed Legend Modifications:

The following describes more specifically what has changed between past legends (e.g., 2023) and the current legend in no order:

- **Date Fields**: To enhance clarity and address user feedback, we've added fiscal year (FISCAL_YR) and (CALENDAR_YR) fields while removing the Dist_YEAR field. The data itself represents the

fiscal year of disturbance, but the calendar year attribute is added to help users compile the data by calendar year on their own.

- **Confidence Fields**:  The TYPE_CONFIDENCE and SEV_CONFIDENCE fields were eliminated as they were based on arbitrary assignments and likely offered little value.
- **Source Fields:**  The Source fields are provided to help users understand how a disturbance or treatment was assigned.  To provide clearer information we've streamlined the Source fields. Redundant SOURCE3 and SOURCE4 fields, often containing NA or duplicate SEV_SOURCE data, have been removed. For added clarity, SOURCE1 and SOURCE2 have been renamed to PRIMARY_SOURCE and SECONDARY_SOURCE, respectively.
- **Fire Program Classes**: The fire program classes (11-234) have remained mostly stable since LF 2011.  The changes include:
    - **Class reordering**: To prioritize higher-value data, the class order has been adjusted.   For instance, "Water" now occupies the top position (class value 2001) as it overrides fire program pixels when overlapping.  Likewise, "Decision Tree Modeled" classes follow the data source they were modeled from to retain data/legend continuity.
    - **Removal of Focal Filling**: Focal filling has been replaced with modeled data for improved accuracy. In areas where MTBS, BARC, RAVG, or NPS fire data contain cloud cover gaps, LANDFIRE's decision-tree modeled data will be used to represent fire severity.
    - **National Park Service Fire data**: When requested by a National Park Service unit, or interagency partner program, USGS EROS maps wildland fires smaller than 1,000 acres in the western United States or 500 acres in the eastern United States.  These data will now be included in LANDFIRE annual disturbance products.  Because they are mapped with the same processes as MTBS data they are placed immediately after MTBS data and before BARC and RAVG data.
    - **Prescribed Fire**:  Prescribed fire has been included to distinguish it from wildfire.  The majority of MTBS-designated prescribed fires occur in the Flint Hills of central Kansas and Oklahoma.  This area employs a different methodology than MTBS-mapped wildfires by utilizing modelling techniques and higher resolution Sentinel 2 imagery (when available) instead of the differenced normalized burn ratio to address the unique characteristics of the prairie biome.
- **Protected Area Dataset (PAD):** The PAD, previously integrated into the disturbance legend, has been removed. Class values were formerly assigned based on PAD's GAP Status field to differentiate between managed and natural disturbances captured by remotely sensed data. Recent discussions with PAD leadership revealed inconsistencies in class definitions, rendering the data less reliable for LANDFIRE purposes than assumed. Users requiring PAD data can access the latest information directly from the PAD website (https://www.usgs.gov/programs/gap-analysis-project/science/protected-areas).
- **Buffered Classes:** To accurately transition fuel-based models over disturbed landscapes, understanding disturbance cause or type is crucial. Previously, "Unknown" disturbances detected from satellite imagery were assigned unique classifications if they were near a known event. This approach was intended to infer a potential disturbance cause to assist in the fuel model transition and offer insights to users. However, to avoid misinterpretation, all classes and references to disturbances near events have been removed.
- **New Event Classes:** To improve fuel model transitions, we've added new event classes: "Mechanical Add" and "Mechanical Remove." These complement the existing "Other

Mechanical" class, which previously only categorized disturbances as removals. By differentiating between additions and removals, we can more accurately model fuel changes when such information is available. Events lacking sufficient detail to determine whether they're additions or removals will now be assigned to the newly labeled "Unknown Mechanical" class.

- **New "No Severity" Class:** Previously, a "Low" severity was assigned to events like insect infestations, diseases, prescribed fires, and chemical/natural treatments even though the imagery indicated no change. Severity is a required parameter for fuels transitions, hence the assignment of low when no severity was indicated. To accurately reflect image-based severity and simplify the legend, the "No Severity" class is now included in the annual disturbance product. Note: the "No Severity" class will continue to receive a "Low Severity" fuel disturbance assignment in the FDist product, where applicable.
- **Unknown Classes**: Removing PAD data eliminated the "Unknown" RSLC classes overlapping Burned Area (BA) data and PAD data. The six remaining class values represent RSLC disturbances that don't intersect anything (i.e., Event or BA data) and RSLC disturbances that overlap only BA data.

## Summary:

The LANDFIRE Disturbance legend has undergone a comprehensive revision, informed by collaboration with key LANDFIRE team members and feedback from external reviewers familiar with LF. This overhaul aims to streamline the legend for users by eliminating unnecessary information, enhancing clarity, and reducing the total number of classes. We believe this will make the transition easier for existing users.

For any questions regarding the updated legend, feel free to reach out to LANDFIRE Help at: https://www.landfire.gov/help