

# **Building a Legacy Dataset**

## **The USGS Combined Wildland Fire Dataset for the United States**

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**Inter-Tribal Monitoring Data Annual Meeting**  
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# Thank you to our 33 team members!

## Federal Agencies



## Universities



## States



# So Many Acronyms

Acronym	Full Name
BLM	Bureau of Land Management
BLM VTRT	BLM Vegetation Treatment Dataset
GeoMac	Geospatial Multi-Agency Coordiantion
LTDL	Land Treatment Digital Library
MTBS	Monitoring Trends in Burn Severity
NFPORS	National Fire Plan Operations and Reporting System
NIFC	National Interagency Fire Center
NPS	National Park Service
QC	Quality Control (post collection data cleanup)
Rx	Prescribed Fires
USFS	United States Forest Service
USGS	U.S. Geological Survey
WFTT	Wildland Fire Trends Tool

# Data Management Note – Building Teams

- Recognize we are not experts in everything
  - Leverage others to improve the dataset
  - Engage, listen, and learn
- Let the group grow and adapt
  - Be willing to let others invite members
- Large groups are harder to manage
  - Have an agenda and stick to it
  - Record meetings
  - Utilize sub-groups when necessary



# Fires – An Introduction

- Wildfires are essential to many ecosystems
- Within the last 40 years, in some ecosystems,
  - Wildfires have grown in number, size, frequency, and severity
  - Burning in ecosystems not adapted to new fire regimes
  - Threat to life, property, and ecosystems
- A changing climate and fire prone invasive species will only worsen the situation in the future



Photo by the National Interagency Fire Center



# Identifying a Need

Dozens of existing datasets, but all have **limitations**

- Year range (GeoMac, MTBS)
- Geographic location (state datasets)
- Duplicate polygons (NIFC)
- Geospatial accuracy (circle fires, projections)
- Minimum fire size requirements (MTBS)
- Attributes are inconsistent or missing

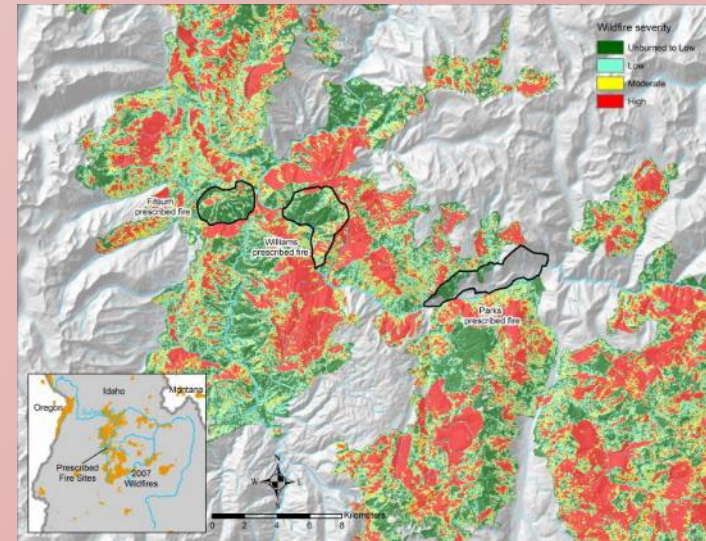


Figure from Arkle, Pilliod, and Welty 2012

# How is the USGS dataset different?

- ✓ Merges all existing fire datasets
- ✓ Removes duplicate polygons
- ✓ Removes estimated or unknown year fires
- ✓ Combines and append important attributes from all polygons
- ✓ QC's and flags fires that may contain errors
- ✓ Creates scripts to automate as much of the process as possible
- ✓ Fills in the missing gaps by digitizing older fires for a more complete dataset



Photo by the National Interagency Fire Center

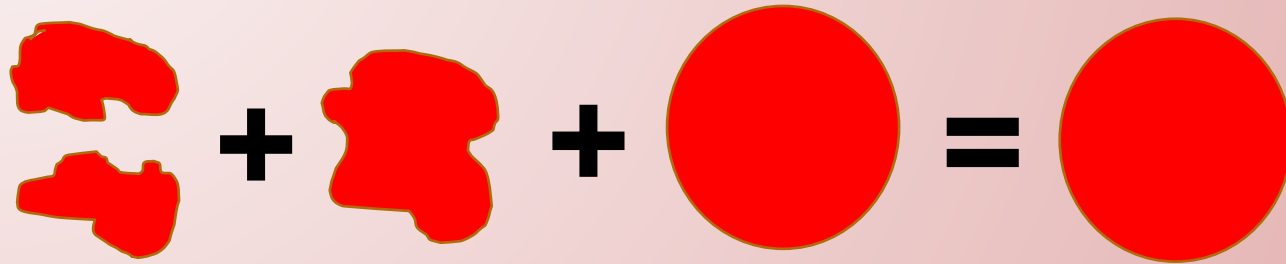


# Data Management Note - Automation

- Automation can be very helpful when working with and managing datasets
  - Humans can't catch everything and we are really slow
  - Datasets have outgrown Excel
- Two main approaches
  - Utilize existing software
  - Custom scripts



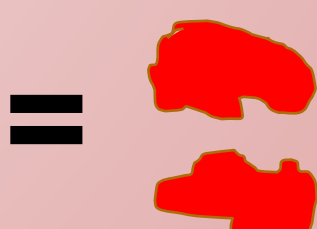
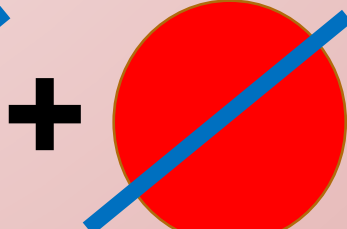
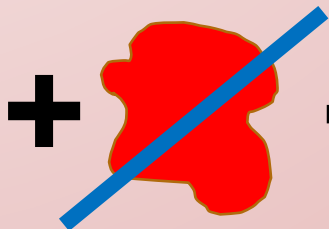
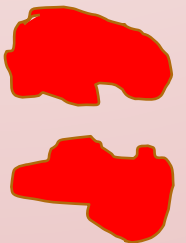
# Making the Fire Boundary - A Tiered Approach



**Tier 1**

**Tier 2**

**Tier 3**



## Tiers

1. NIFC Interagency
2. MTBS Wildfires
3. National and local fire layers (32 layers):  
GeoMac, NIFC, NPS, USFS, California, Idaho)
4. GeoMac Annual
5. Land Treatment Digital Library Wildfires
6. MTBS Rx fires
7. LTDL, NFPORs, State Rx
8. BLM VTRT

# Adding Attributes From Multiple Datasets

## Attributes are critical

- We gave every dataset a consistent set of attributes

Fire Name

Fire Cause

Dates

Fire Codes & IDs

Source Datasets

- Append and merge attributes from all intersecting fires
- Used “Attribute (n)” method to combine identical attributes from multiple datasets

Listed Fire  
Names

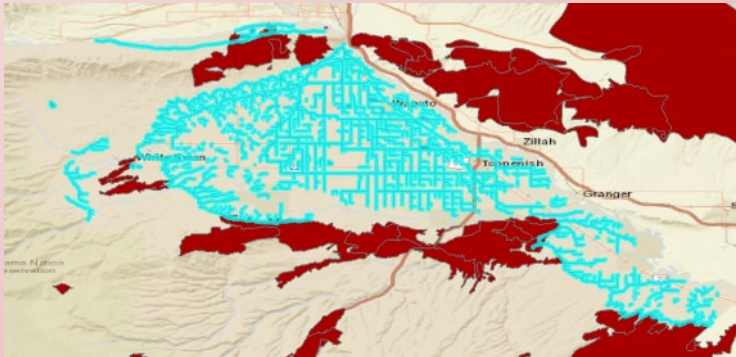
SODA (9), GIVENS (4), POISON (3), ELEPHANT (3), SCOUT (3), Soda (12)

- Added additional flag and description fields

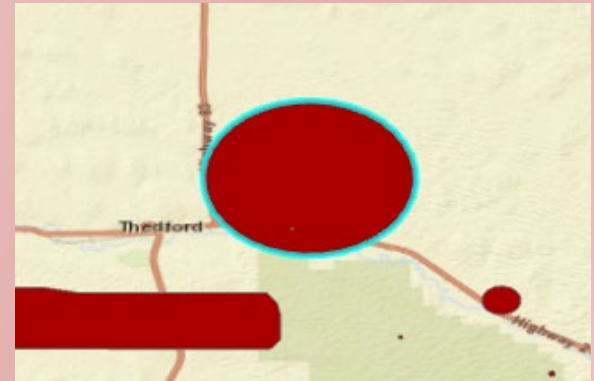
# Identifying Errors and Issues

## Error checks to flag potential issues

- Wildfire and prescribed fire notices
- Polygon with wildfire and prescribed burn
- Fires that overlap >10% within 1 or 2 years
- A measure of the polygon circle-ness



Circle-ness = 0.000017



Circle-ness = 0.99

# Data Management Note - Limitations



- “Blobbing” can still occur
- Better polygons can be lost in subsequent tiers
- Two fires rarely overlap within the same year
- Attribute combination can limit analysis
- Errors can be carried through from the original data
- Our assumptions can introduce new errors
- Data before 1984 is incomplete

# The Combined Dataset

- 135,061 fire polygons
- 98,449 Wildfires
  - 1835 – 2020
- 36,612 Prescribed Burns
  - 1944 – 2020



<https://doi.org/10.5066/P9ZXGFY3>





# Mapping

<https://doi.org/10.5066/P9ZXGFY3>



## Fire Year

1835 - 1903

1904 - 1923

1924 - 1943

1944 - 1963

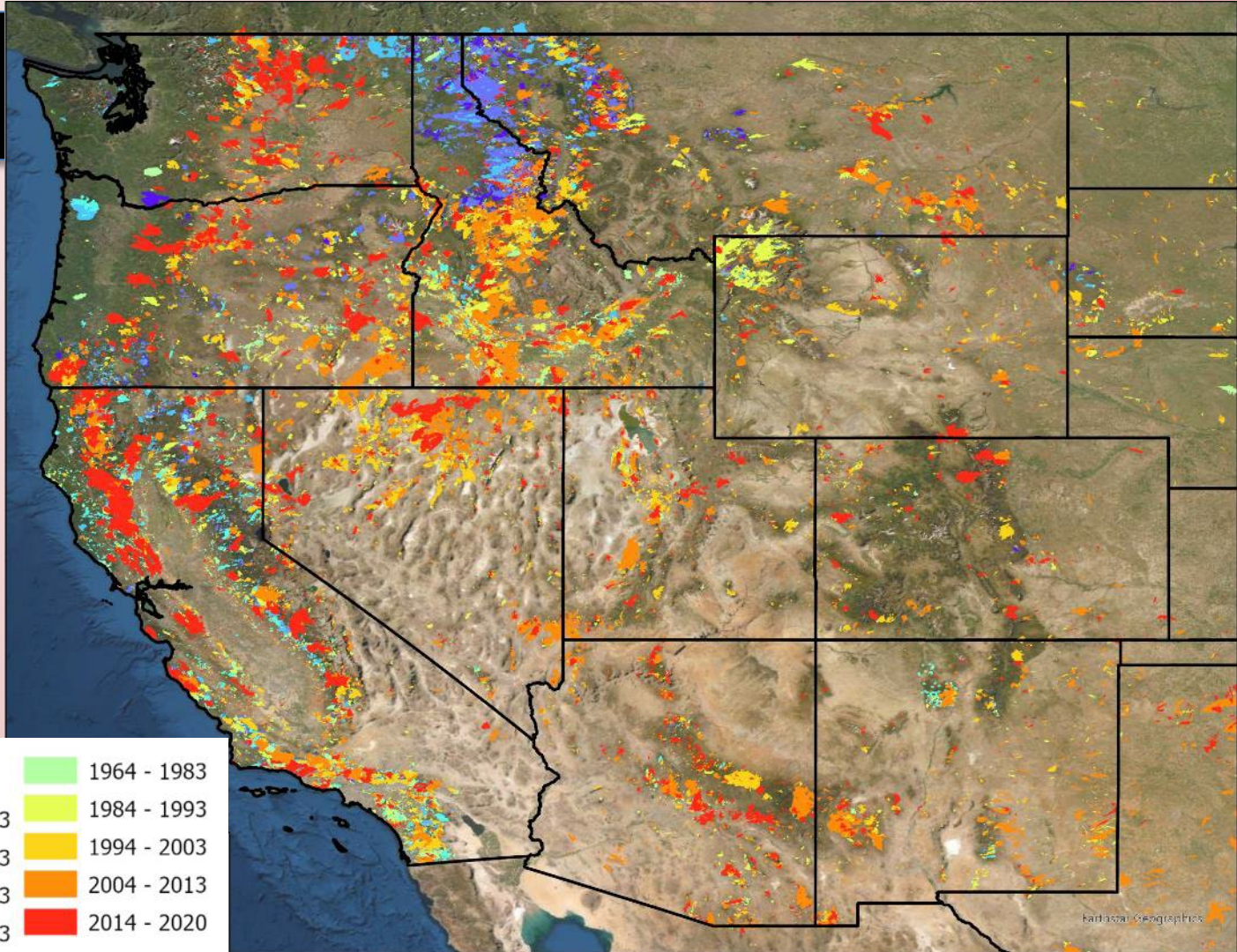
1964 - 1983

1984 - 1993

1994 - 2003

2004 - 2013

2014 - 2020



# Data Management Note - Products


## Products in the release

- Merged wildland fire dataset
- Overlapping fires
- Circle flags
- Wildfire/Prescribed fire flags
- Summary rasters
- Complete metadata






## Products utilizing the data

- Wildland Fire Trends Tool
- Land Treatment Exploration Tool
- Many more



Attached Files 

Click on title to download individual files attached to this item.

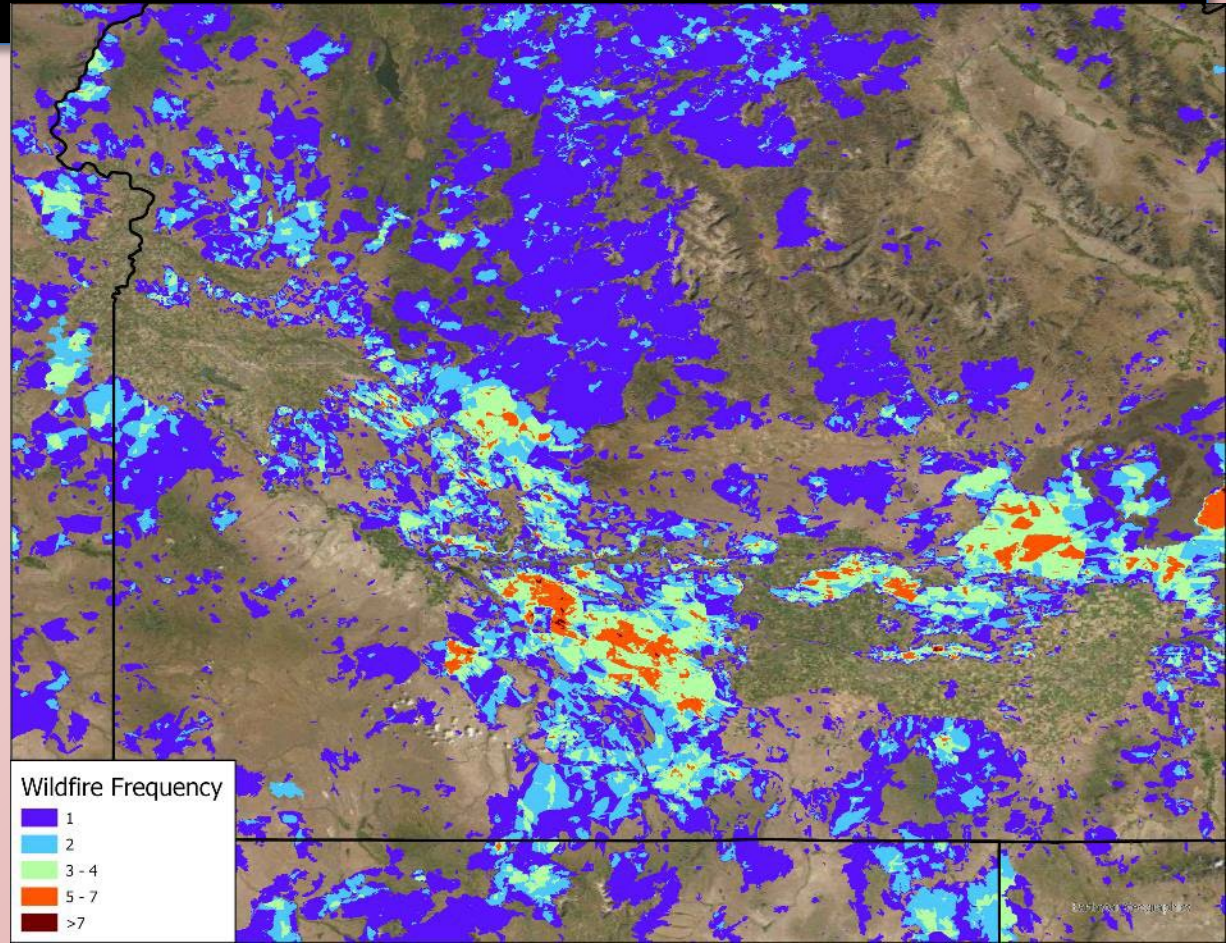
 <a href="#">Wildland_Fire_Polygon_Metadata.xml</a> <i>Original FGDC Metadata</i>
 <a href="#">Fire_Feature_Data_Pro2_8_Geodatabase.zip</a> "Wildland Fire Polygons Fire Feature Data ArcGIS Pro 2.8 Geodatabase"
 <a href="#">Fire_Feature_Data_ArcMap10x.gdb.zip</a> "Wildland Fire Polygons Fire Feature Data ArcMap 10x Geodatabase"
 <a href="#">CSV Attribute Table Exports.zip</a> "Wildland Fire Polygons CSV Attribute Table Exports"
 <a href="#">GeoJSON Files.zip</a> "Wildland Fire Polygons Fire Feature Data Open Source GeoJSON Files"

Example of the various polygon dataset formats users can download



# Summary Rasters

1. Count of all fires
2. Count of prescribed burns
3. Count of wildfires
4. First year a wildfire burned
5. Most recent year a wildfire burned



# Data Management Note - Metadata

- One of the most critical components of any dataset
- There are no shortcuts here
- Take your time and do it right
- Multiple software products to help you
  - <https://www.usgs.gov/data-management/metadata-creation>
  - USGS Metadata Wizard
  - Multiple online products

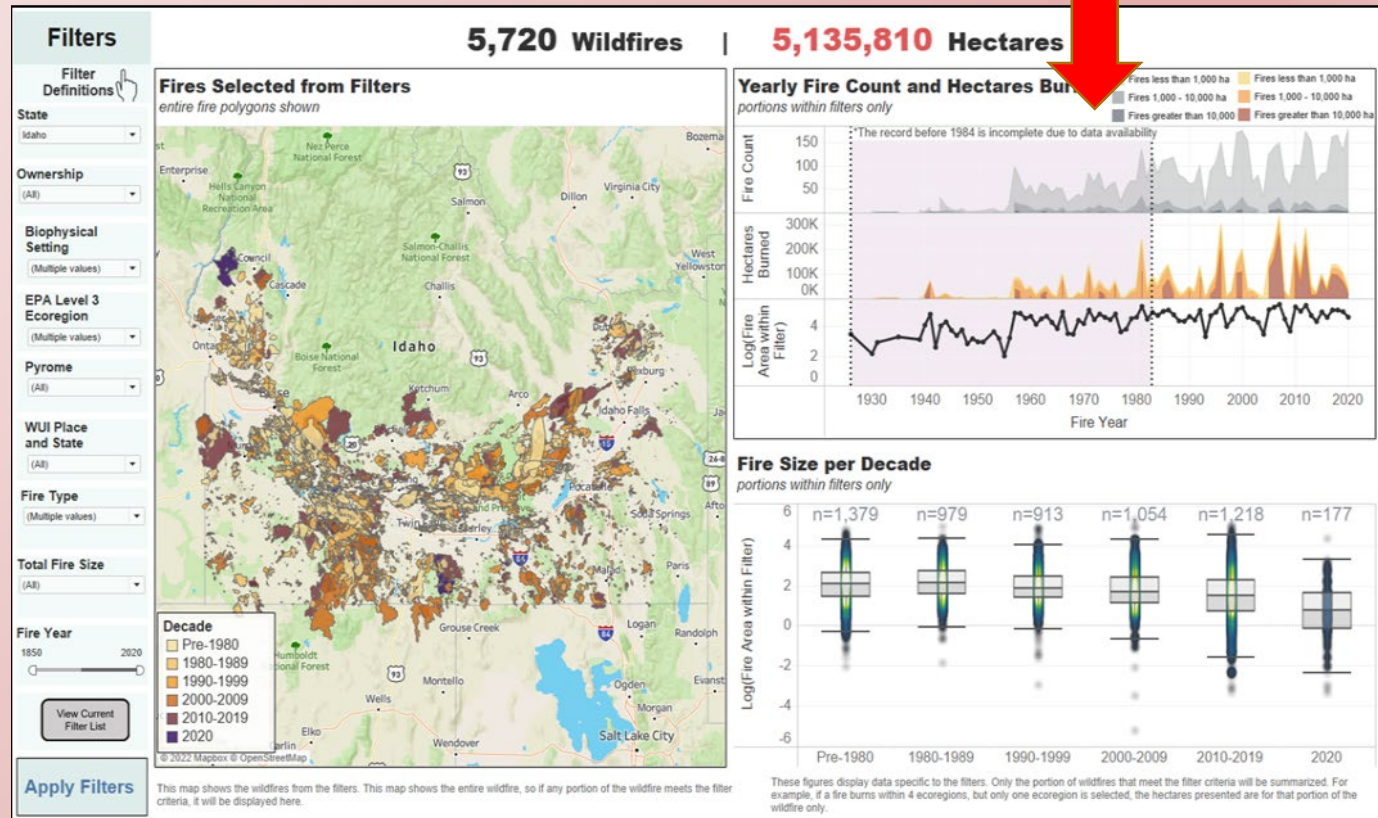


# The Wildland Fire Trends Tool

<https://geonarrative.usgs.gov/wftt/>



- Filter on
  - Time period
  - Political or ecological boundaries
  - Vegetation types







# Data Management Note - Lessons

- Don't be afraid to try
- Start somewhere
  - Be willing to adapt
  - Embrace change
- Solve one problem at a time
- Use scripts to create the data and check for error
- Never go it alone
- Identify and flag errors and inconsistencies
- Give stakeholders ownership
- Utilize the expertise of others

# Questions and Discussion



Download the data –  
<https://doi.org/10.5066/P9ZXGFY3>

Welty, J.L., and Jeffries, M.I., 2021, Combined wildfire datasets for the United States and certain territories, 1800s-Present: U.S. Geological Survey data release, <https://doi.org/10.5066/P9ZXGFY3>.

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