Building a prescribed fire database for the western United States

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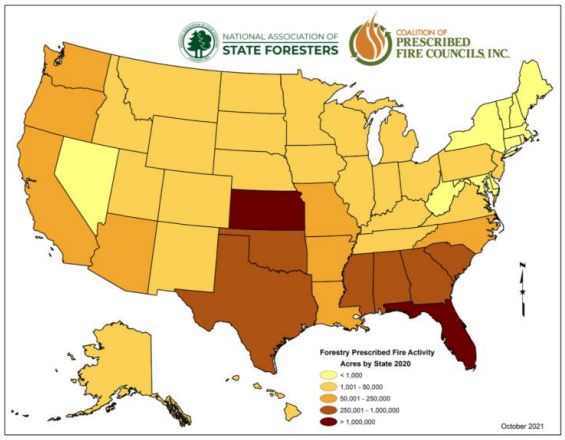
The Nature Conservancy

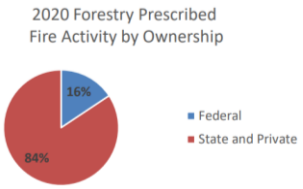


Background

Prescribed fire use on all ownerships, 2020



Limited information on when and where prescribed fires occur on private land.



Figures: 2021 National Prescribed Fire Use Survey Report, Coalition of Prescribed Fire Councils and the National Association of State Foresters

- Interested in fuel tx effectiveness when encountered by wildfire > need info on treatments
- Several federal systems track treatments
- No reporting system for all burns; no known public repository for burning on private lands
- Info from rx fire use report provides coarse level estimate at state and regional level (map)
- Decided to build a database based on public records

Interested in an all lands approach b/c:

- Data suggests that US-wide most prescribed burning is happening on state and private land (pie chart)
- Private lands transmit a lot of wildfire to national forests (Downing et al. 2022)

Report info: 2021-National-Rx-Fire-Use-Report_FINAL.pdf (prescribedfire.net)
-1.5 m acres fed burning; 7.9 acres state and private
-report uses the best info available from state forestry agencies; based on a survey of rx fire use data collected in 2020

-survey data covered all federal, state, and private rx burning activity that occurred specifically on forestlands and rangelands.
-Map from figure 2 in the report

Downing et al: s41598-022-06002-3.pdf ; paper on transmission of fire to Nat. Forest land

Objective

Create an all-lands prescribed fire records database for 11 western states

State	Information tracked				Years of data												
	Permitted acres	Requested acres	Completed acres	Burn type	pre-2010	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AZ																		
CA																		
CO																		
ID																		
MT																		
NM																		
NV																		
OR																		
UT																		
WA																		
WY																		

- Create an rx fire records database to get more complete picture of fire use in the West
- Used public records requests to get state permits
- Gathered ~275k records
- Characteristics…(table)

Methods

- Cleaning
- Standardizing
- Calculating variables:
  - Unique burns: state, year, location, burn type, number, name
  - Planned acres: permitted acres if available, else max requested

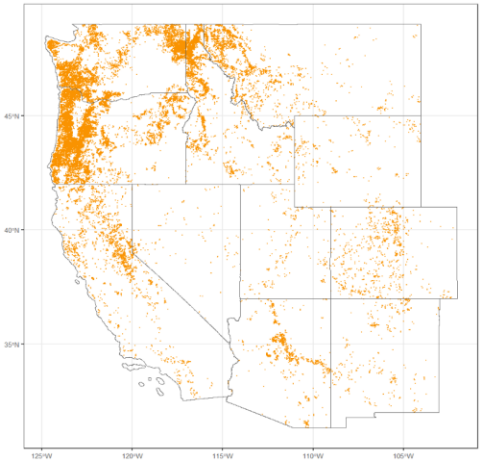
Database attributes
Date
Latitude/Longitude
Acres permitted
Acres requested
Acres completed
Pile volume
Burn name
Burn type
Entity requesting

1. cleaning: fixed lat/lons, removed duplicate records
2. Standardizing – classified as burn/pile, removed ag and barrel burning, limited to overlapping years
3. Calculating variables of interest

- Results presented are to provide insight into trends; not exact numbers
- Caution against comparing numbers between states b/c I didn't try to control for different reporting requirements in different states
  - States track rx burns for different reasons in different ways; I couldn't resolve all of these differences
  - E.g. CA only requires reporting to PFIRS for fires >10ac; other states have emissions thresholds for reporting, ID seems to collect everything in the same system (including backyard barrel burning)

Results

Planned and completed burns 2017-2022



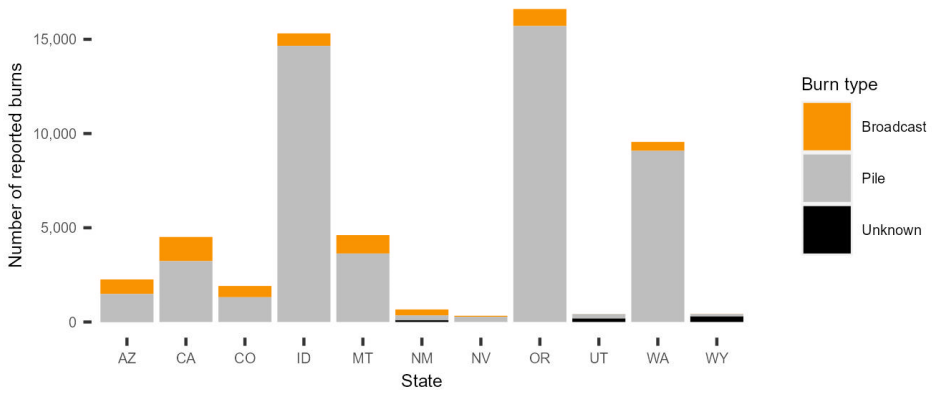
Westwide –	
Piles	49,992
Broadcast	6,065
Unknown	575
Total	56,632

Draft interactive map:
https://koriblankenship.github.io/StateRx/map.html

- Geographic patterns
- Break down of the points

Results

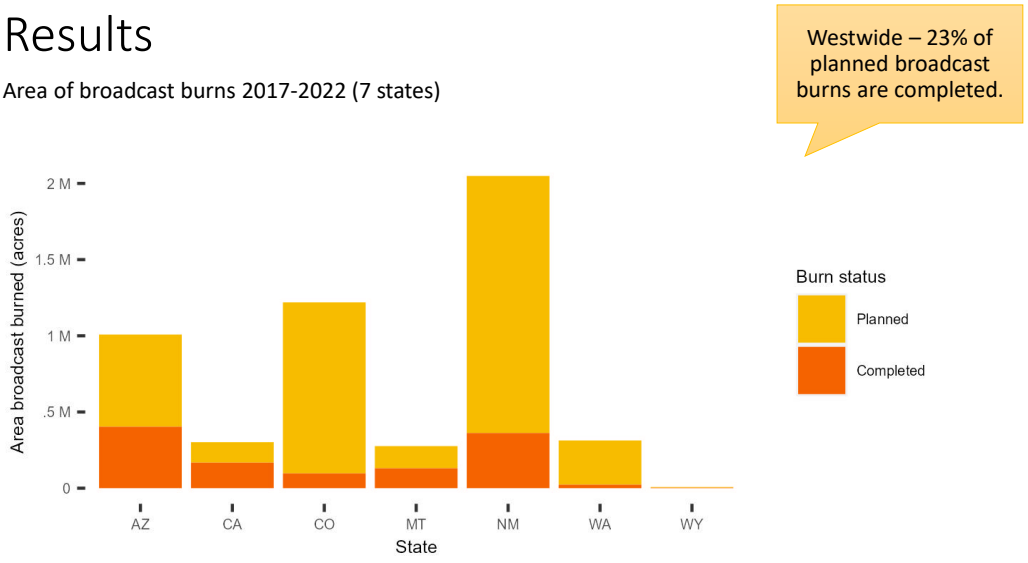
Number of reported burns 2017-2022 (11 states)



- Reporting requirements differ from state to state: CA may be missing piles b/c of min 10 ac threshold for reporting

Results

Area of broadcast burns 2017-2022 (7 states)



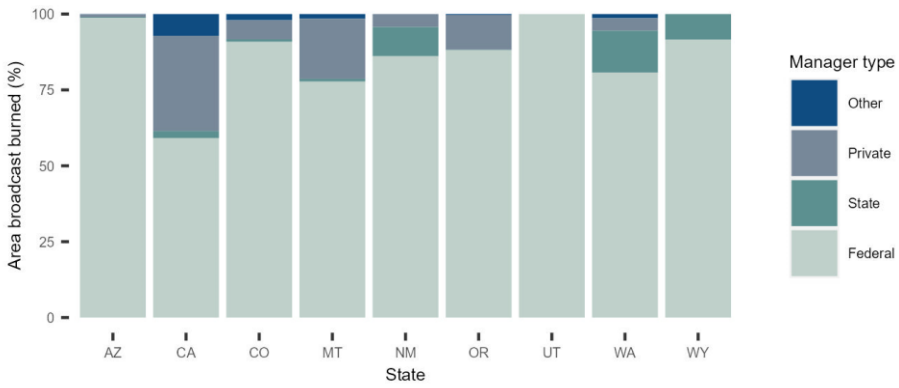
- In some states I can't calculate planned or completed; 7 states shown
- Only reporting here for broadcast burns b/c tracking piles is more complicated
    - Piles reported in: acres, emissions volume, # piles, linear feet, etc
    - Piles are often not tracked consistently w/ in a state

Notes

- Total of 1,345,896 acres westwide over 7 years; ~192,271 per year
- Planned acres calculated as: permitted acres if available, otherwise max requested acres

Results

Percent area broadcast burned by land manager 2017-2022 (9 states)



Westwide - 86% of the area broadcast burned is on federal lands.

- this is for completed broadcast burns

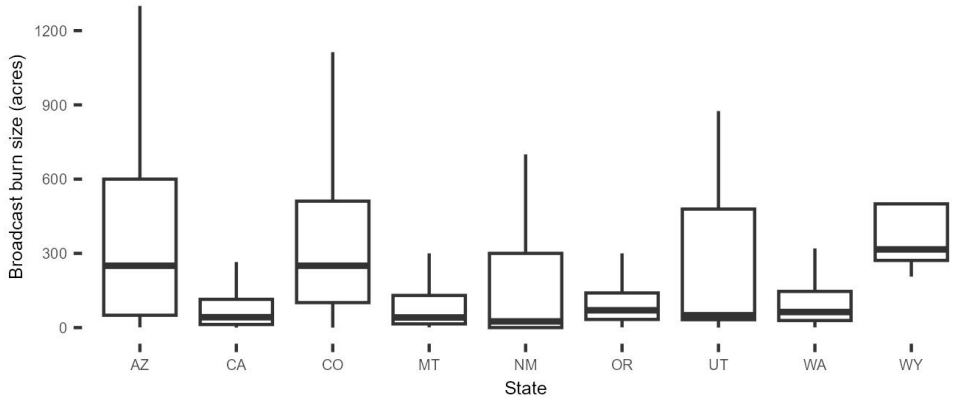
NOTES

- ~9% is private, the 2nd largest land ownership

Results

Size of completed broadcast burns 2017-2022 (9 states)

Westwide - median completed broadcast burn size is 70 acres (mean = 331 acres).



- Median fire size is notable higher in AZ, CO, WY
- Some 10,000+ acre burns bring the mean burn size up to 331 acres
- Did not display outliers here b/c that makes it hard to see the box n' whiskers, skewed data

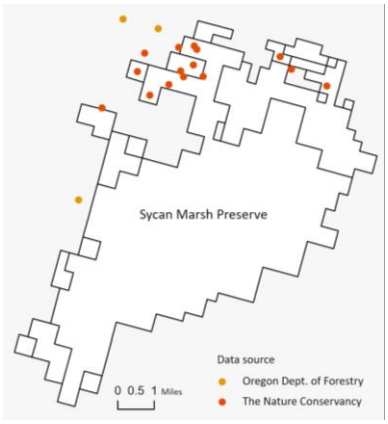
Summary

- More pile than broadcast burn records.
- More broadcast burns are planned than completed.
- Majority of broadcast burns occur on federal lands in the West.
- Broadcast burns are relatively small in size.

- Data are incomplete, not perfect; w/o focusing on exact numbers, some trends emerge
- General trends…2017-2022, in the West

Next steps

Example of public records missing data on private land



Prescribed fire on The Nature Conservancy's Sycan Marsh Preserve, OR.

- Build complete TNC rx database to estimate completeness of private land data
- Example: ODF doesn't have many TNC burns
- Validation: imagery, other data sources (NFPORS, FACTS, SIT 209, Inform)
- Other work in the database: e.g. maybe quantifying pile burning in a standard way

Opportunities

- Leverage existing records systems to better understand completeness of Prescribed Fire Records Database.
- Integrate Prescribed Fire Records Database with remotely sensed products to validate burn completeness and understand remote detection of prescribed fire.

Black Mountain Lookout tree, OR.

- An important take away from this effort is that our understanding of prescribed burning is limited due to lack of data consistency and completeness.
- Picture: metaphor for how far we've come w/ wildfire intel; hopeful for advancement in Rx fire intel w/ efforts like SWERI, Timmons

1. Validate our database with existing treatment tracking systems; especially federal (FACTS, NFPORS),
2. Use products (e.g. usgs burned area, fired) to
    1. validate if burns in our database occurred
    2. Improve our understanding of what burns can be remotely sensed