Opportunities for updating forest offset protocols: tree-level model of CONUS and fire risk modeling

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Two datasets that present opportunities:

Carbon estimates: TreeMap: a tree-level model of forests of CONUS

Fire risk: Fire likelihood and intensity from FSim, the Large Fire Simulator

TreeMap is a tree-level model of the forests of CONUS

Main ingredients:
FIA plots & LANDFIRE data

CN=
175742190010854

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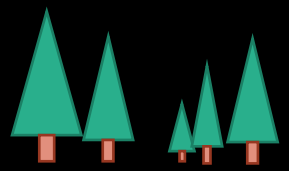
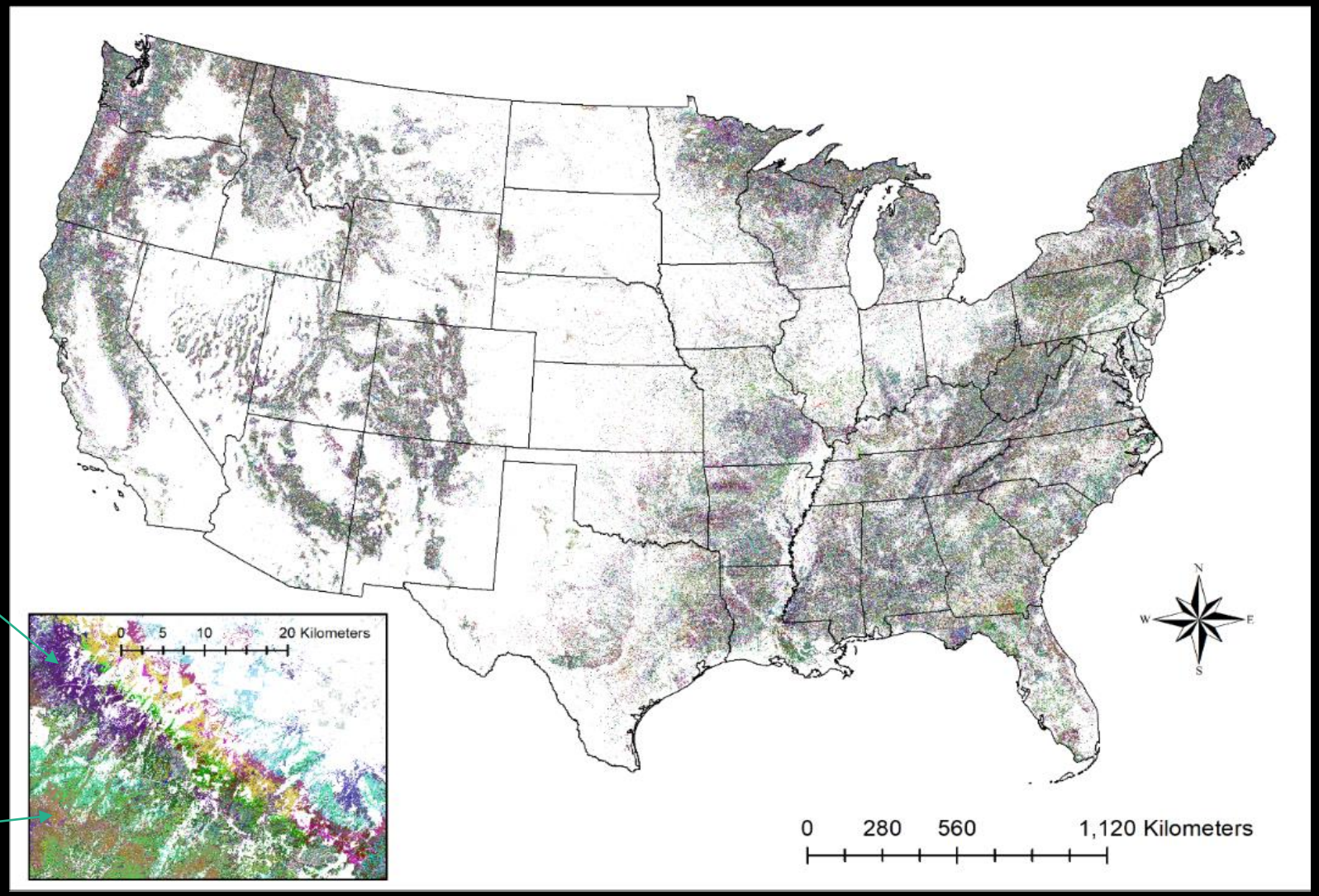
264159709489998

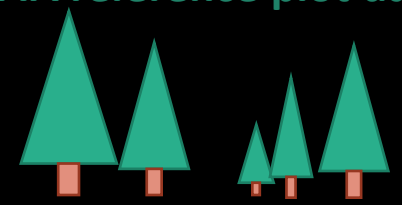




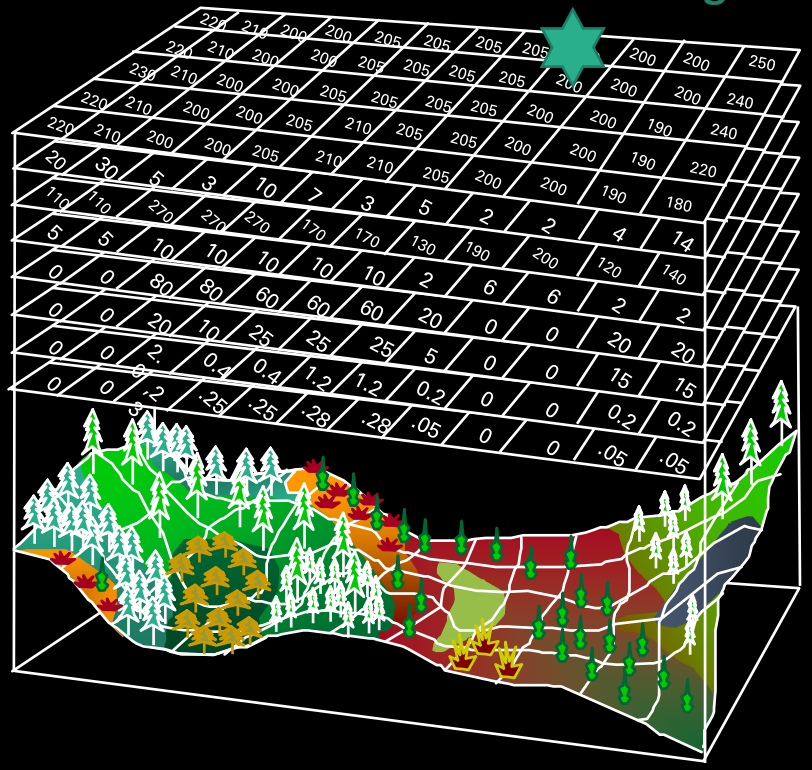
Methods: yaImpute in R = modified Random Forests

PREDICTOR VARIABLES

FIA reference plot data



Location { Latitude, Longitude



Landfire gridded target data (30m)

- Elevation, Slope, Aspect } Topography
- Forest Cover, Forest Height, Existing Vegetation Group } Vegetation
- Photosynthetically Active Radiation, Precipitation, Relative Humidity, Maximum Temperature, Minimum Temperature, Vapor Pressure Deficit } Biophysical variables
- Disturbance year, Disturbance code } Disturbance

RESPONSE VARIABLES

- Forest Cover
- Forest Height
- Existing Vegetation Group
- Disturbance code (c2016 version)

TreeMap combines LANDFIRE and FIA to make a new dataset

- Strengths of LANDFIRE
  - National vegetation, disturbance, topography, and biophysical data at 30x30m resolution
- Strengths of FIA
  - Tree-level detail at a network of plots measured using same protocol across the country
    - Tree height, species, status (live or dead), DBH, etc.
- TreeMap takes the strengths of two publicly-available and respected sources of forest data (LANDFIRE and FIA) and combines them to produce a national model with tree-level detail

TreeMap versions

- c2008 for western US

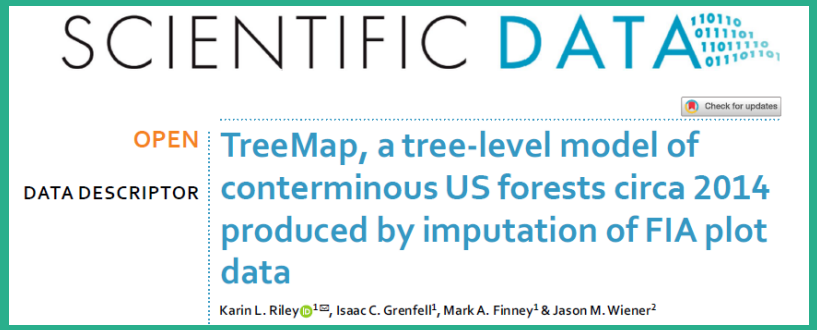

esa ECOSPHERE

Mapping forest vegetation for the western United States using modified random forests imputation of FIA forest plots

Karin L. Riley,[1,]† Isaac C. Grenfell,[2] and Mark A. Finney[2]

  - Dataset in Research Data Archive:
  - https://doi.org/10.2737/RDS-2018-0003

- c2014 for continental US


SCIENTIFIC DATA

OPEN

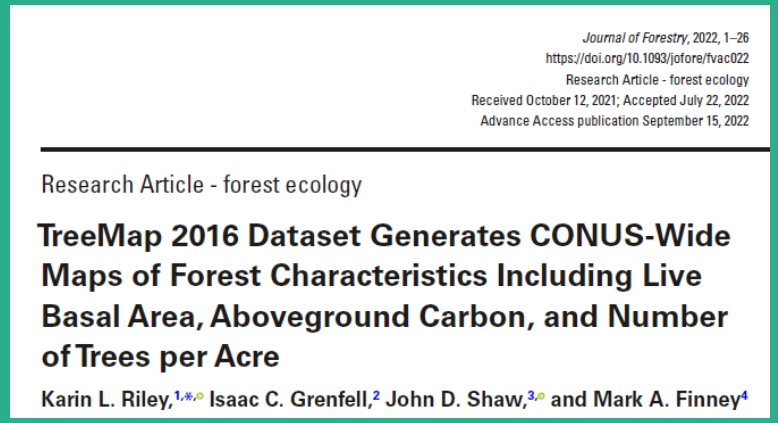
DATA DESCRIPTOR

TreeMap, a tree-level model of conterminous US forests circa 2014 produced by imputation of FIA plot data

Karin L. Riley[1], Isaac C. Grenfell[1], Mark A. Finney[1] & Jason M. Wiener[2]

  - Dataset in Research Data Archive:
  - https://www.fs.usda.gov/rds/archive/catalog/RDS-2019-0026

- c2016 for continental US, with disturbance as a response variable to boost accuracy with which disturbed plots are imputed to disturbed areas


Journal of Forestry, 2022, 1–26
https://doi.org/10.1093/jofore/fvac022
Research Article - forest ecology
Received October 12, 2021; Accepted July 22, 2022
Advance Access publication September 15, 2022

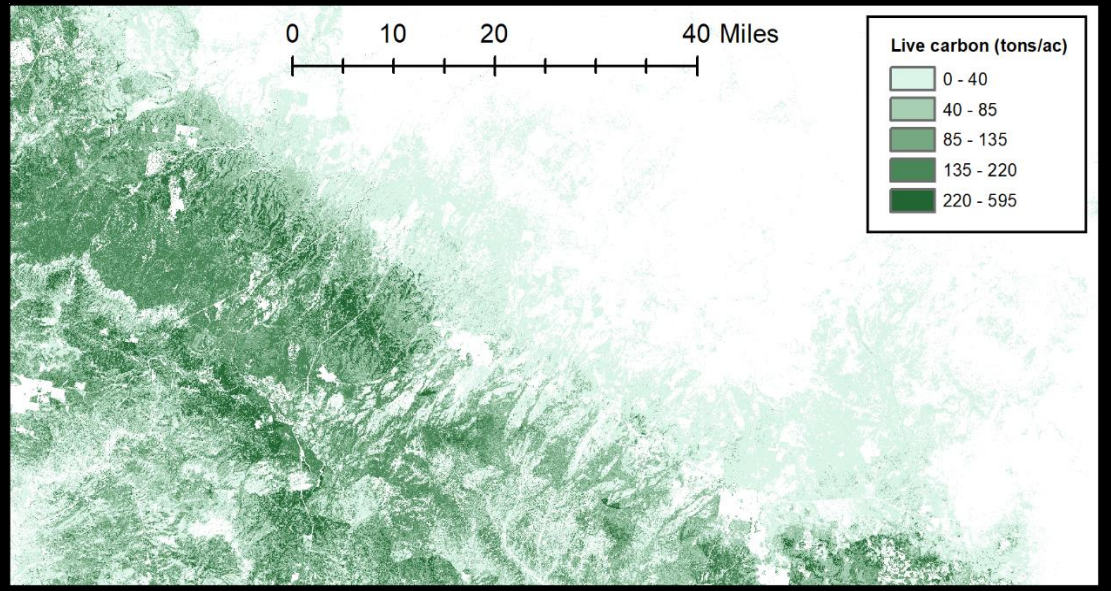
Research Article - forest ecology

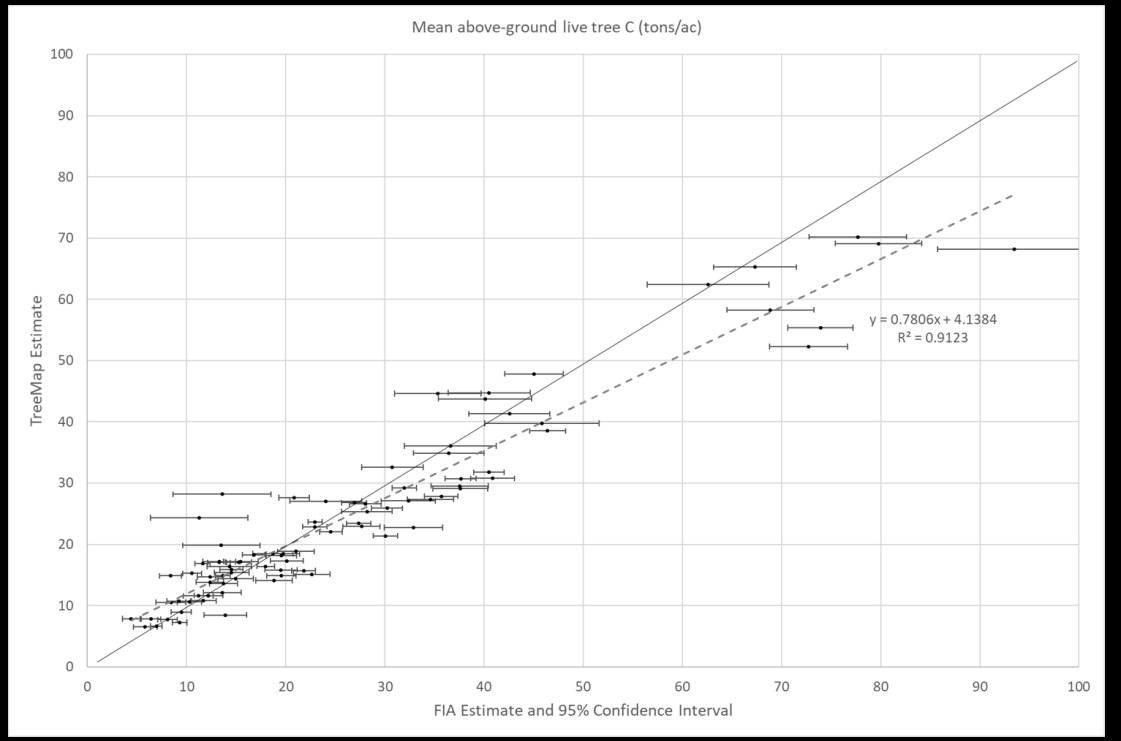
TreeMap 2016 Dataset Generates CONUS-Wide Maps of Forest Characteristics Including Live Basal Area, Aboveground Carbon, and Number of Trees per Acre

Karin L. Riley,[1,*,] Isaac C. Grenfell,[2] John D. Shaw,[3,] and Mark A. Finney[4]

  - Dataset in Research Data Archive: https://www.fs.usda.gov/rds/archive/Catalog/RDS-2021-0074

Estimates of carbon can be made by summing carbon in individual trees, from pixel-level to National Forest or state





Fire risk: FSim: the Large Fire Simulator

OBSERVATIONS

Landscape maps (LANDFIRE)

Weather observations

Fire records (1992-2020) (Karen Short)

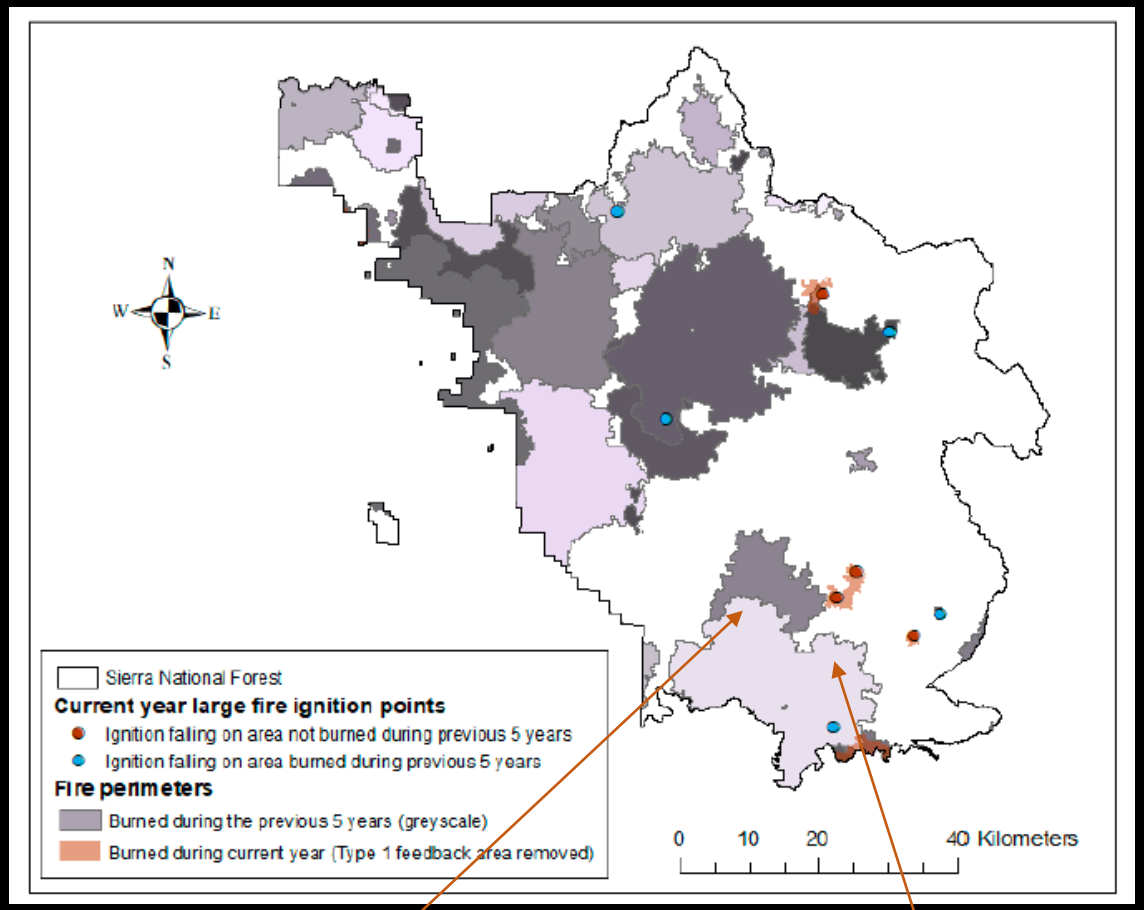
Fire containment records

SIMULATIONS

FSim: 10,000+ years of fire simulation

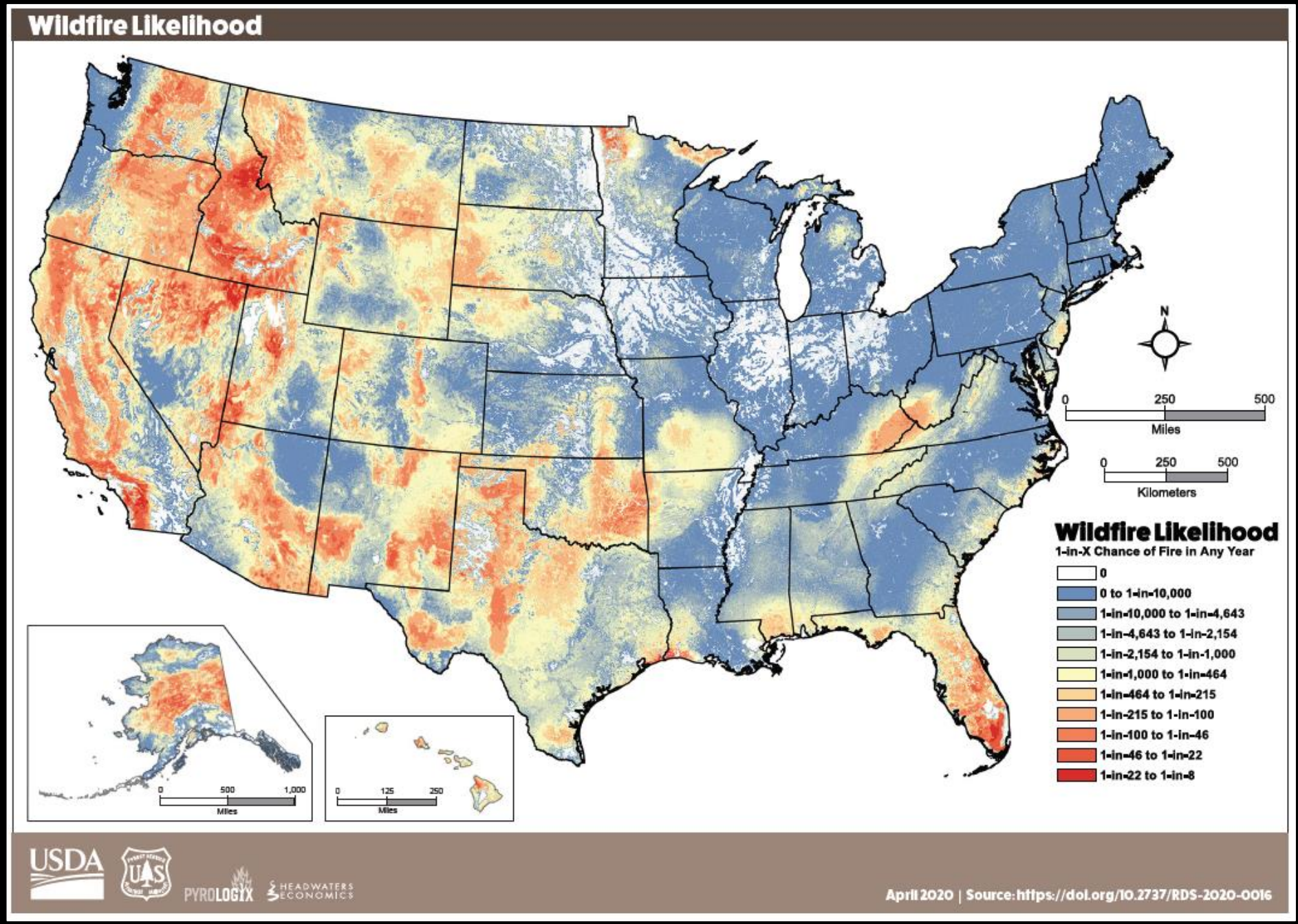
- Ignition
- Weather
- Fire spread
- Containment

SUBSET OF 5 OUT OF 10,000 YEARS OF FIRES



Fire likelihood = 2 out of 5

Fire likelihood = 1 out of 5



Flame length/intensity probability

- 0-2’
- 2-4’
- 4-6’
- 6-8’
- 8-12’
- 12’+

FSim resources

Stoch Environ Res Risk Assess (2011) 25:973–1000
DOI 10.1007/s00477-011-0462-z

ORIGINAL PAPER

A simulation of probabilistic wildfire risk components for the continental United States

Mark A. Finney · Charles W. McHugh · Isaac C. Grenfell · Karin L. Riley · Karen C. Short

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Publication Details

Title: Spatial datasets of probabilistic wildfire risk components for the United States (270m) (2nd Edition) GIS
Author(s): Short, Karen C.; Finney, Mark A.; Vogler, Kevin C.; Scott, Joe H.; Gilbertson-Day, Julie W.; Grenfell, Isaac C.
Publication Year: 2020
How to Cite: These data were collected using funding from the U.S. Government and can be used without additional permissions or fees. If you use these data in a publication, presentation, or other research product please use the following citation:

> Short, Karen C.; Finney, Mark A.; Vogler, Kevin C.; Scott, Joe H.; Gilbertson-Day, Julie W.; Grenfell, Isaac C. 2020. Spatial datasets of probabilistic wildfire risk components for the United States (270m). 2nd Edition. Fort Collins, CO: Forest Service Research Data Archive. https://doi.org/10.2737/RDS-2016-0034-2

c2014 currently being updated to c2020 landscape and weather


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