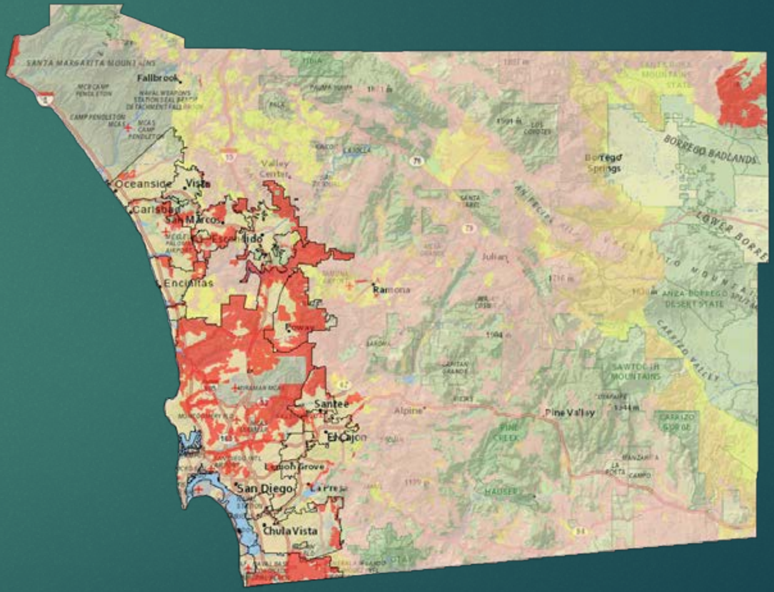
Fire Hazard Severity Zone Remap

Using Localized Severe Fire Weather Inputs in Statewide Hazard Mapping in California

Board of Forestry April 7, 2021



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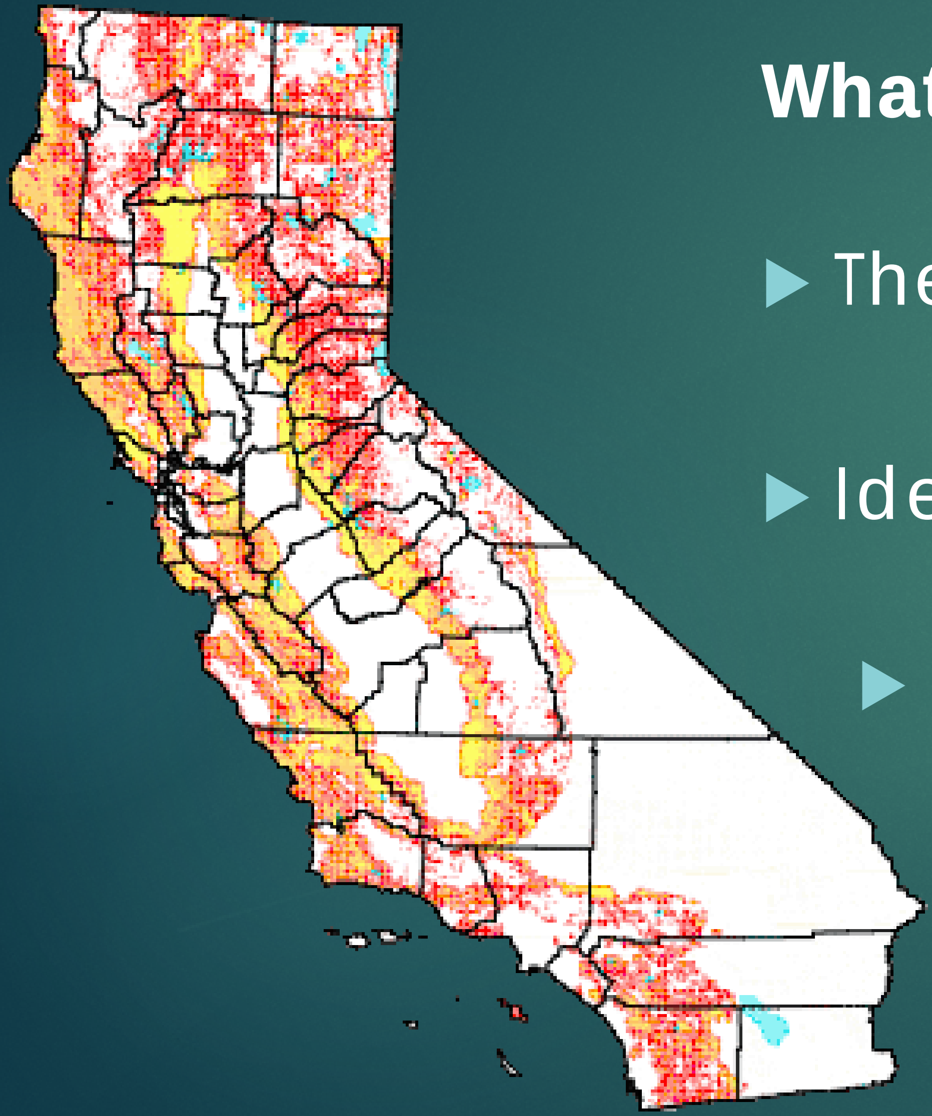

What are the Zones?

- The maps are required by law
- Identify levels of fire hazard
  - 3 Levels (Moderate, High, & Very High)
    - all 3 in State Responsibility Area
    - Only Very High in Local Responsibility Area

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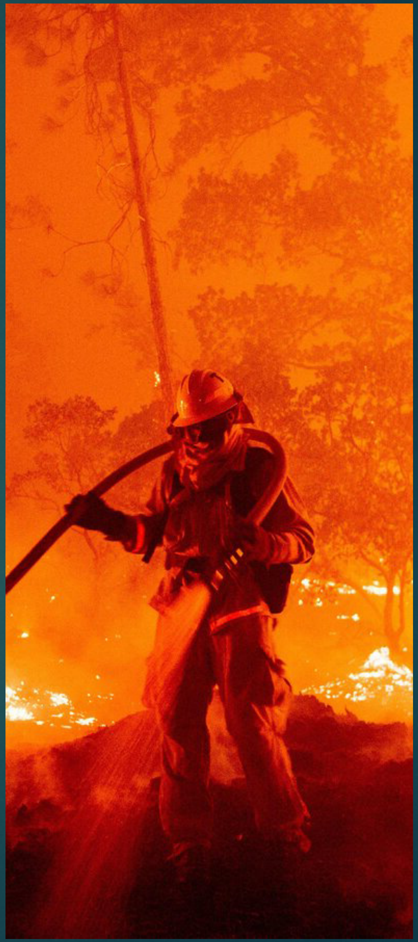
How are the zones determined?

- Developed using a science-based model that assigns a hazard score based on the factors that influence fire likelihood and fire behavior.
- Factors: fire history, vegetation, topography, climate, ember production and movement



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What is the map for?

- Building standards for new construction in the Wildland-Urban Interface
- Natural hazard real estate disclosure
- Property development standards such as road widths, water supply and signage
- Consideration in city and county general plans

Fire Hazard Severity Zone Remap

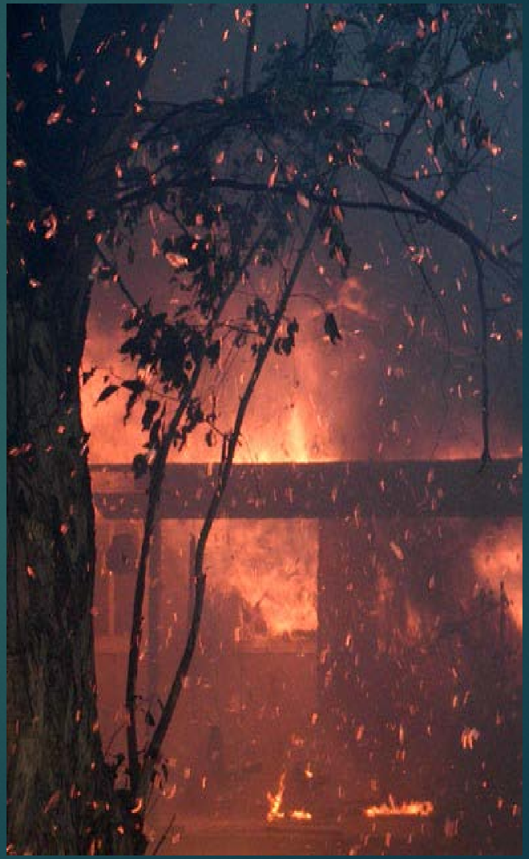
Remap Objectives:

- Update the scientific factors that determine the hazard ratings including new local climate data and improved fire spread modeling.
- Provide opportunity for validation in the modeling
- Publish approved State Responsibility Area map
- Publish and submit Local Responsibility Area maps

Fire Hazard Severity Zone Remap

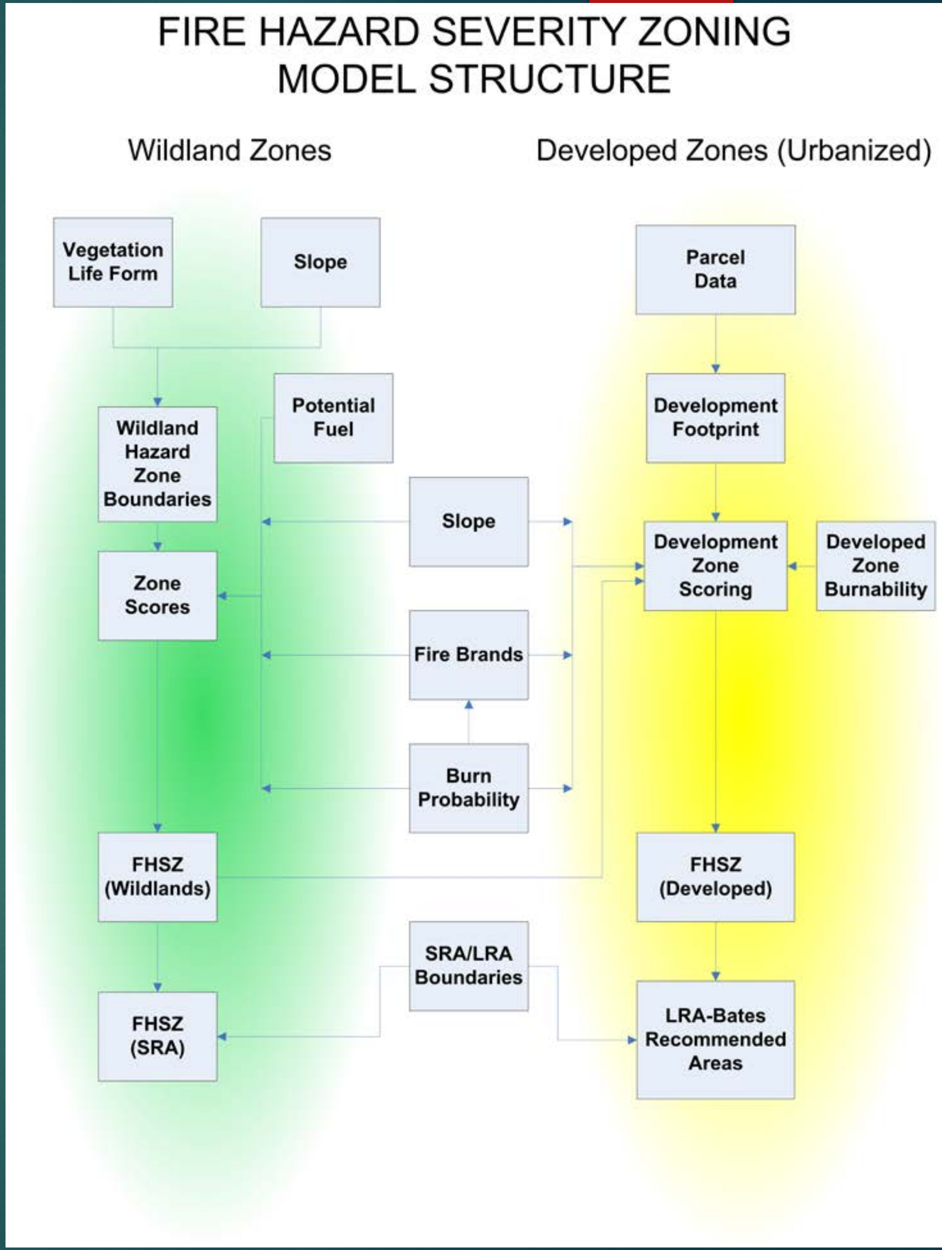
Timeline:

- Current maps were developed in 2007-2010.
- Over the past several years staff have been building the new science model.
- Summer 2021 – Adopt map in State Responsibility Areas (SRA) into regulations.
- Fall 2021 – Begin Local Responsibility Area(LRA) remap

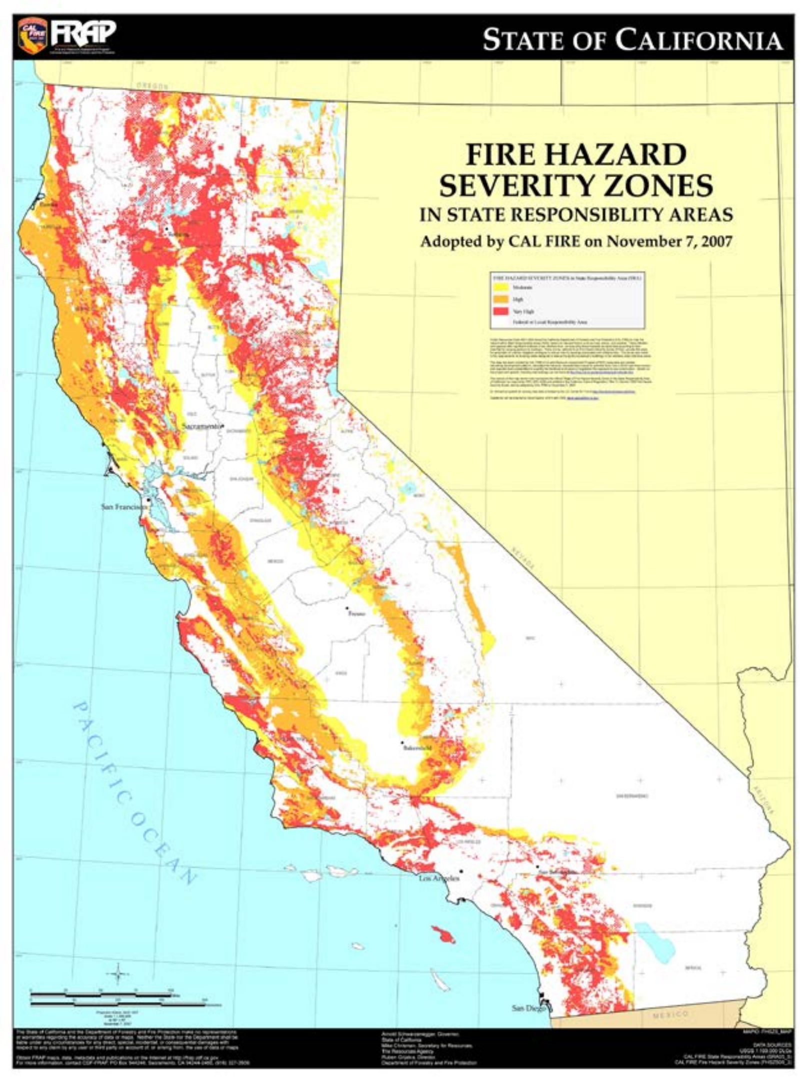


2007 Model

- Wildland centric but zones non-wildland developed (urbanized) areas
- Hazard = probability x Intensity
- Uses climax fuel construct
- Uniform fire weather
- Urban model included simplified firebrand distribution model and urban vegetation factors
- Scaled to produce VH bands from roughly 0.25-1 km in depth.



Model Results/Performance



SRA

Very High 12.5 M acres

High 10.6 M acres

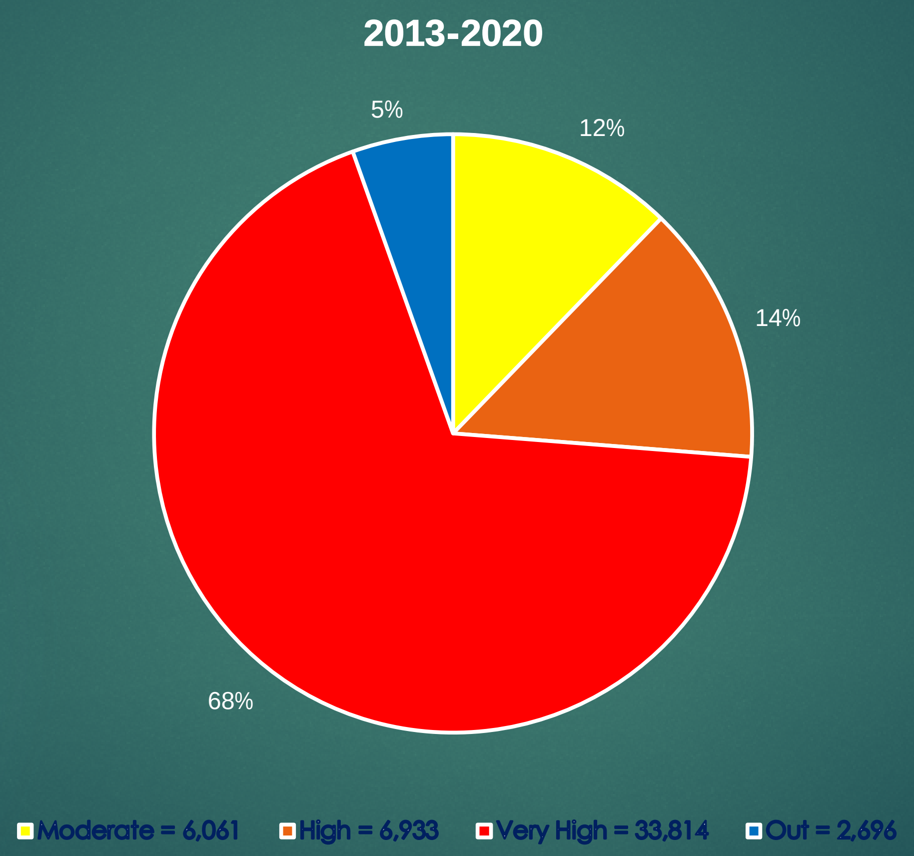
Moderate 7.9 M acres

LRA VH 865,000 acres

~190 jurisdictions adopting zones

Structure Damage by FHSZ class

N= 49,504

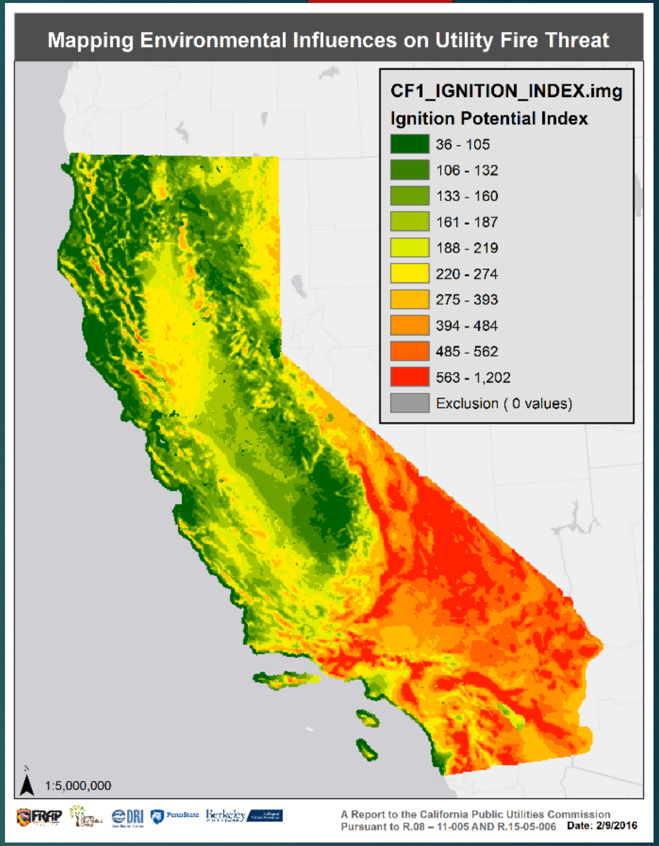


New Updates

- Updated burn probabilities for wildland areas (inclusive of 2020 fires)
- Updated fire environment footprints (urban/developed)
- Updated Vegetation density for urban areas
- Inclusion of slope in the urban zoning model
- Localized fire weather used in both wildland and urban models
- New firebrand production and transport model using discrete local wind vector distributions

Bringing Local Weather In

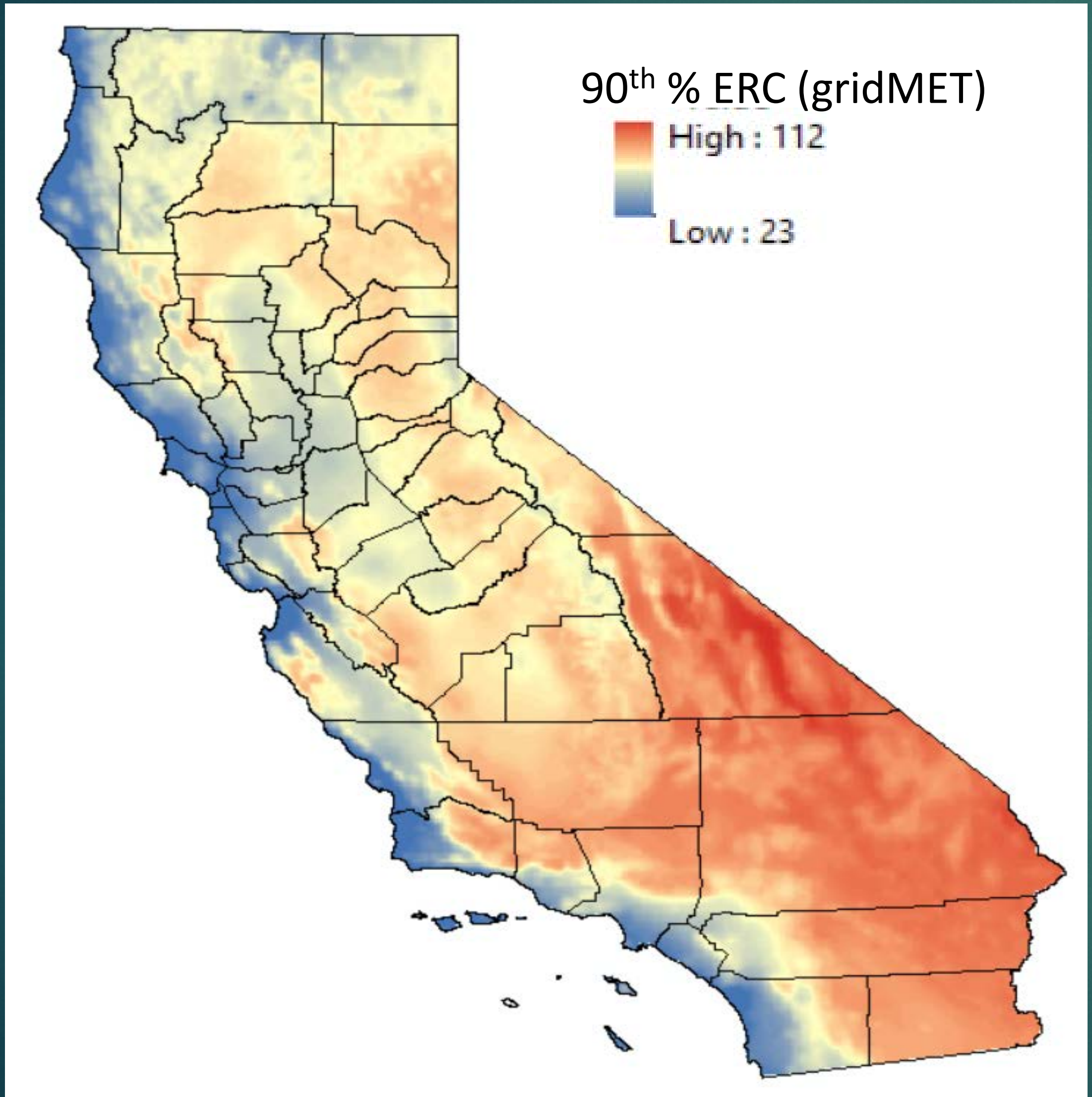
- Data Provided by Desert Research Institute using standard fire forecast settings (same as provided to GACC forecasts)
- Weather Research and Forecasting (WRF) reanalysis
  - 2003-2018 (16 years)
  - 2km grid resolution
  - Hourly; 24 hours; 365 days
  - Main fire weather variables subject to bias correction process
  - Quantile filters applied to cell-based (local) populations
  - 90th %tile Energy Release Component (ERC -G) dryness -- ~36 driest days per year
  - 95th%tile Fosberg Fire Weather Index (FWI) – for those driest days, select top 5% hourly records (dry and windy!) ~600 records for each cell

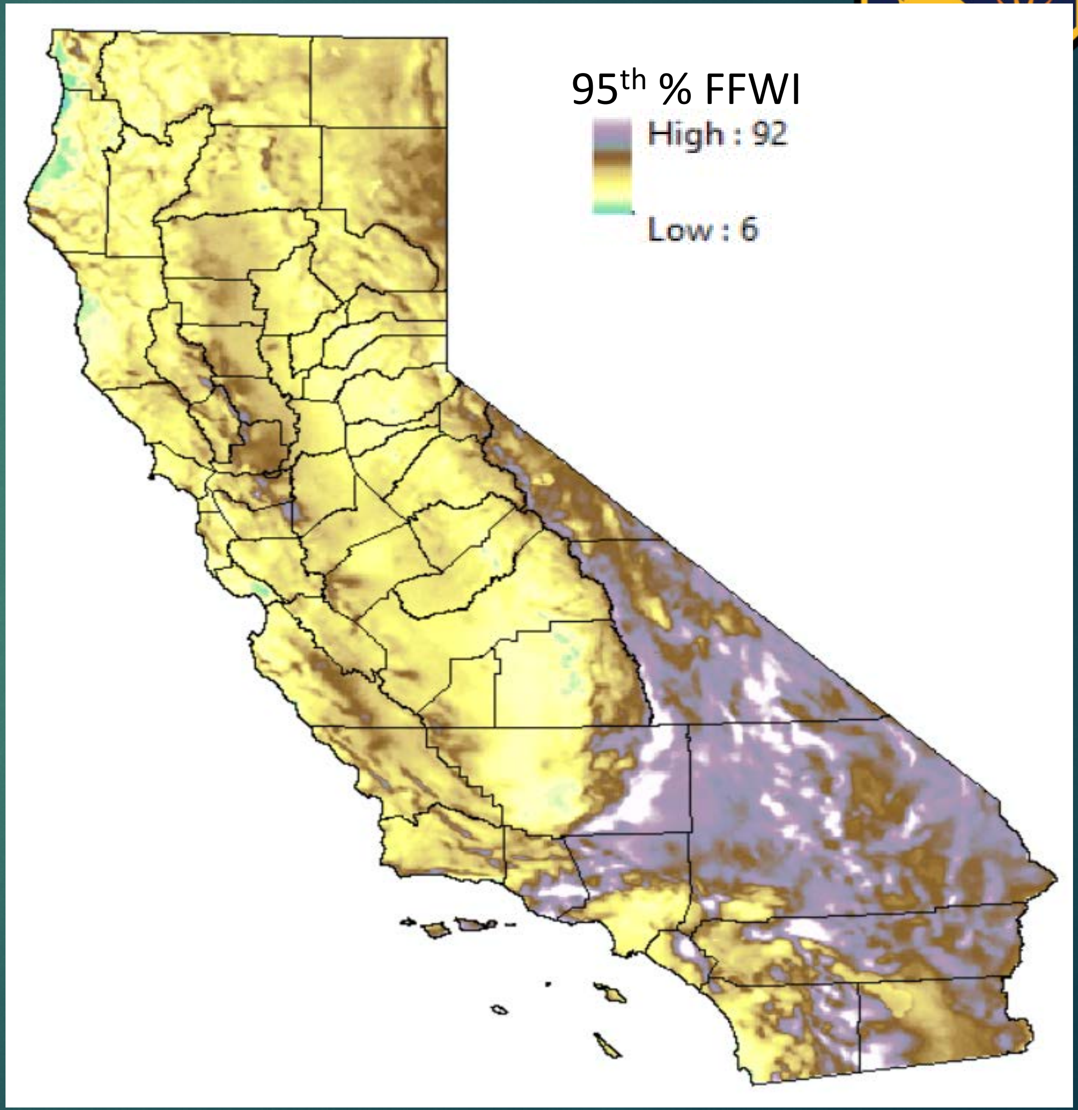


Weather filtering mechanics

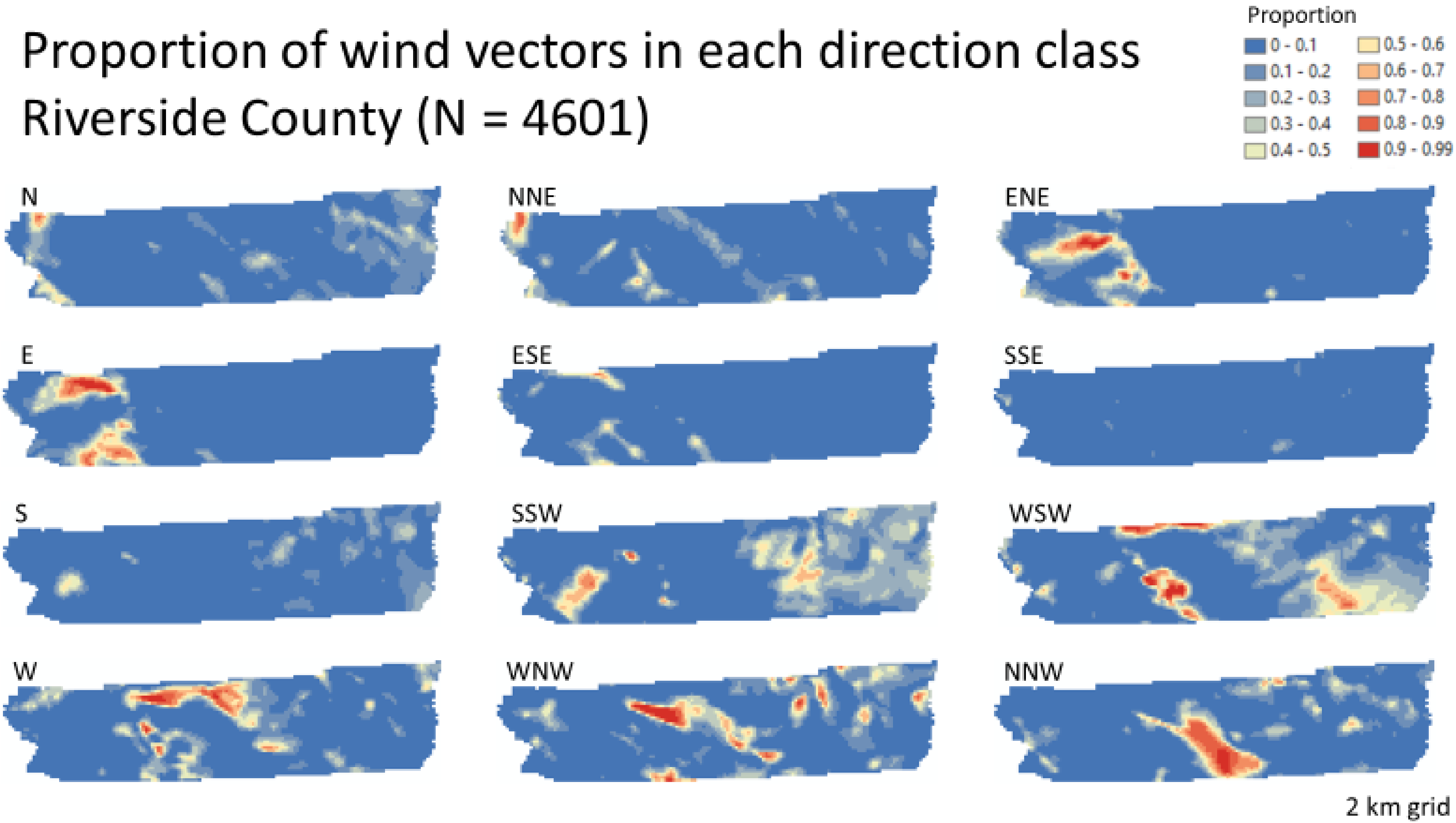
- ERC-G as dryness filter --~72 driest days per year
- For all those dry days, we selected the top 5% of hourly FFWI values
- 95%tile value FFWI used to modify wildland intensity scores based on stock weather inputs (3,4,5,70% moisture content, 7 mph windspeed)
- All winds in the final selection set were translated into wind vector classes and associated frequency distributions
- 10 mph speed classes; 12 azimuth classes

Creating a severe fire weather selection se

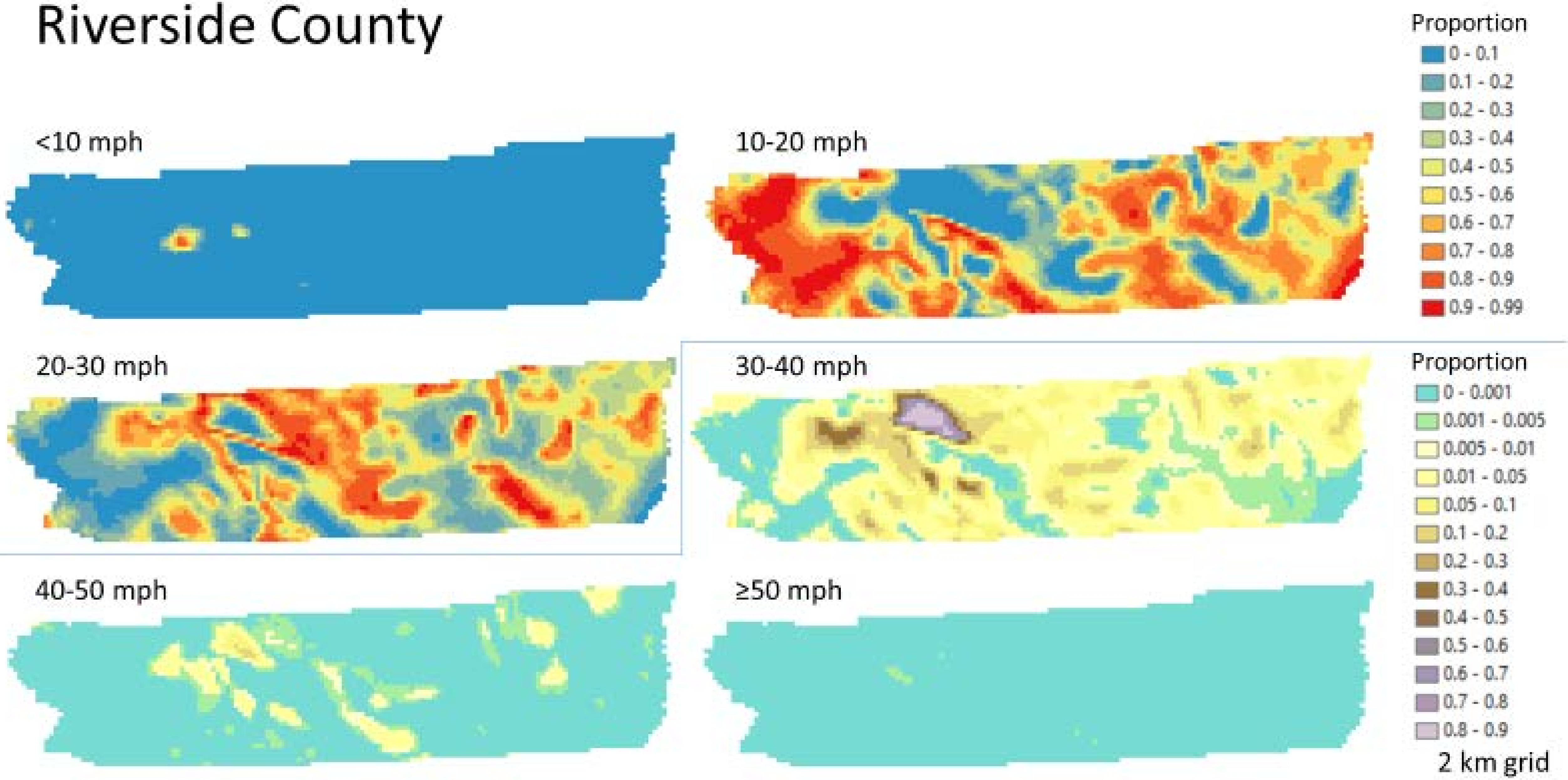




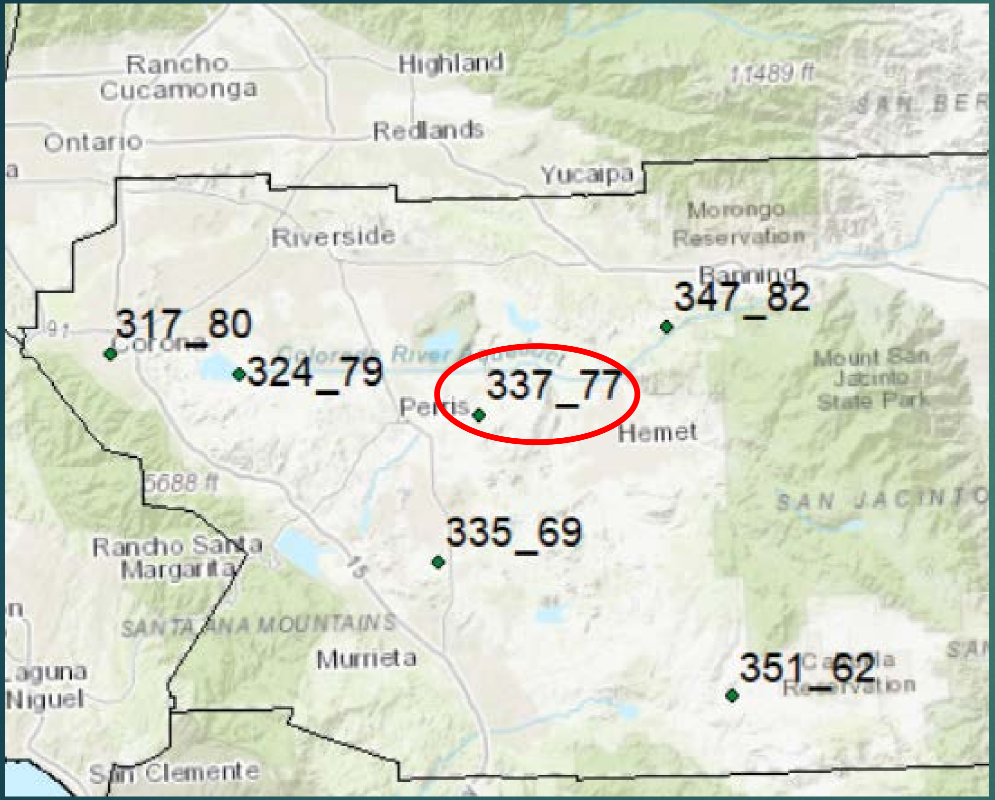
Proportion of wind vectors in each direction class
Riverside County (N = 4601)

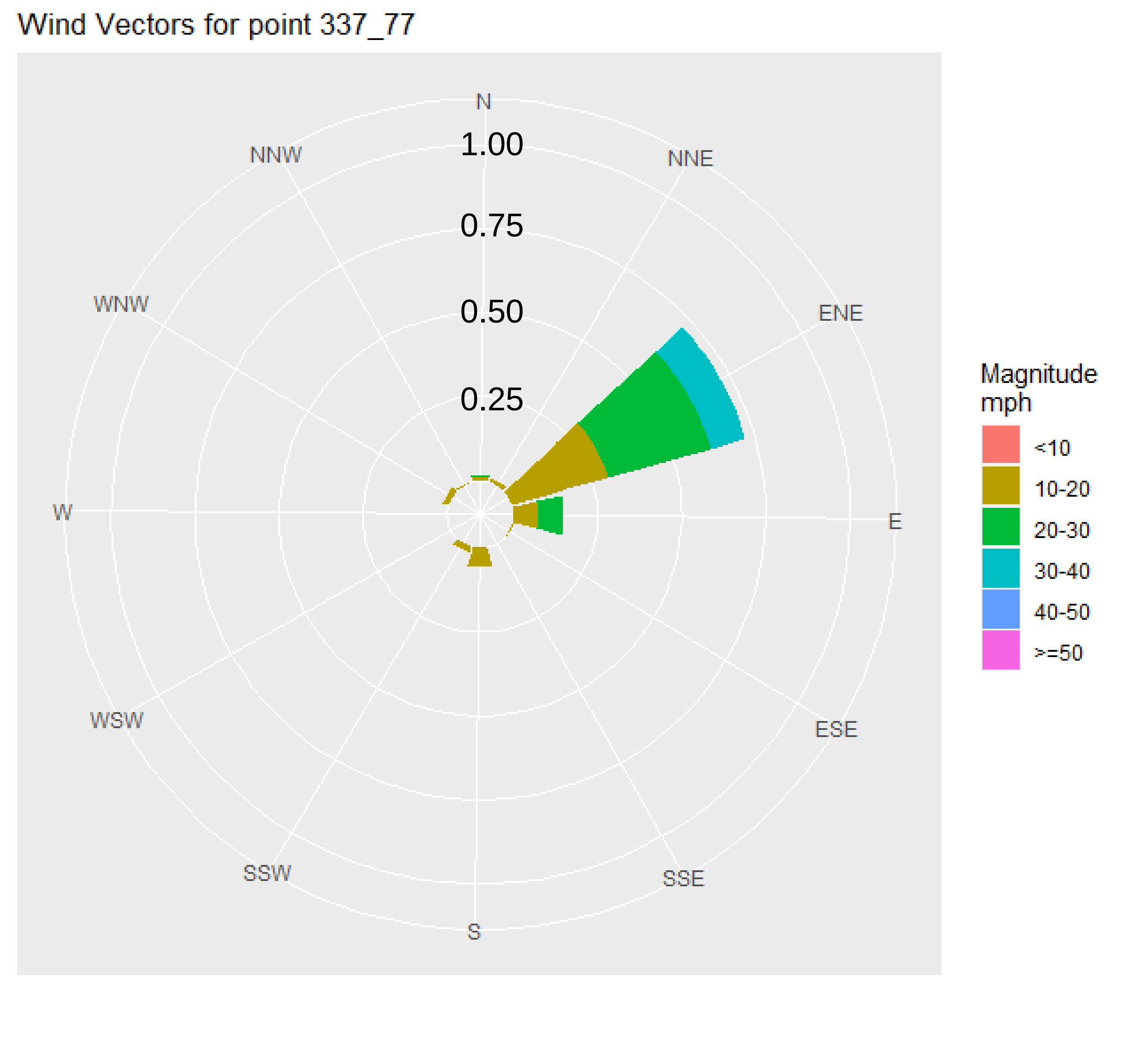


Proportion of wind vectors in each magnitude class
Riverside County



Example: WRF Cell wind distributions





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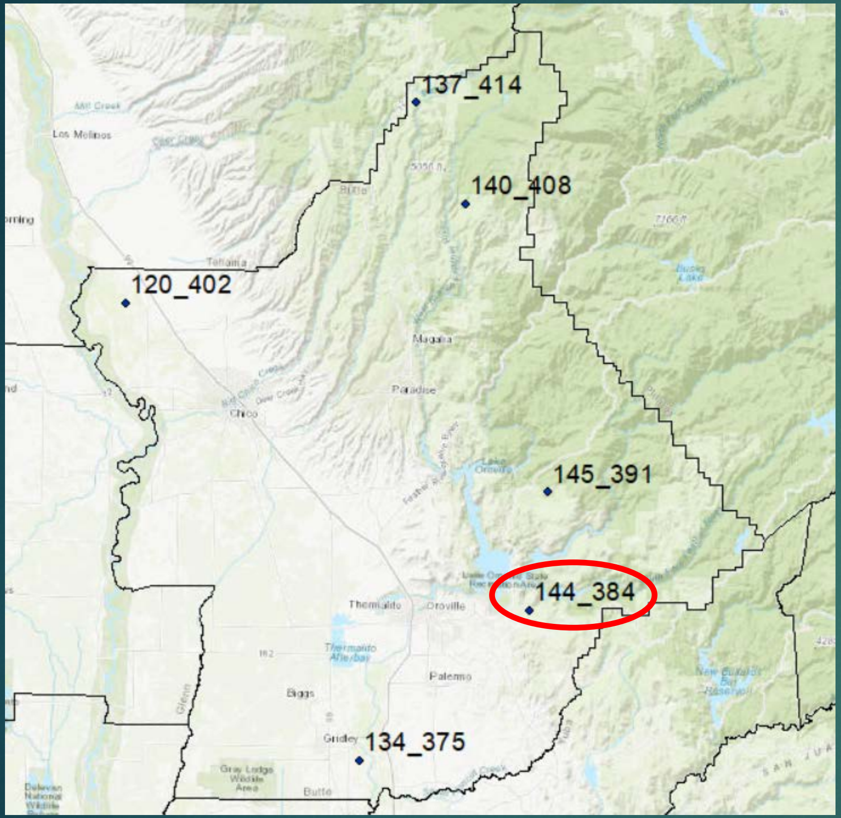
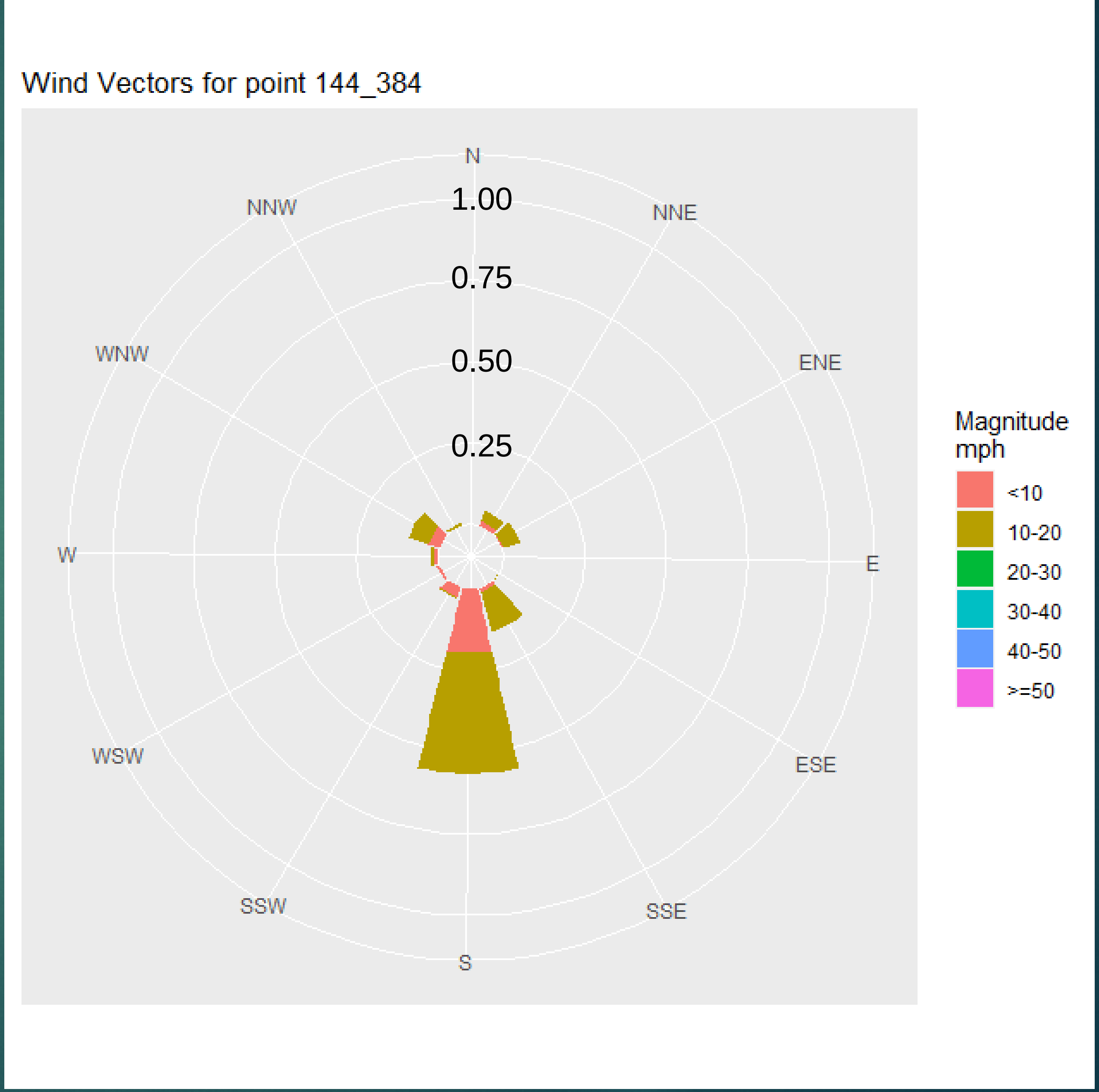
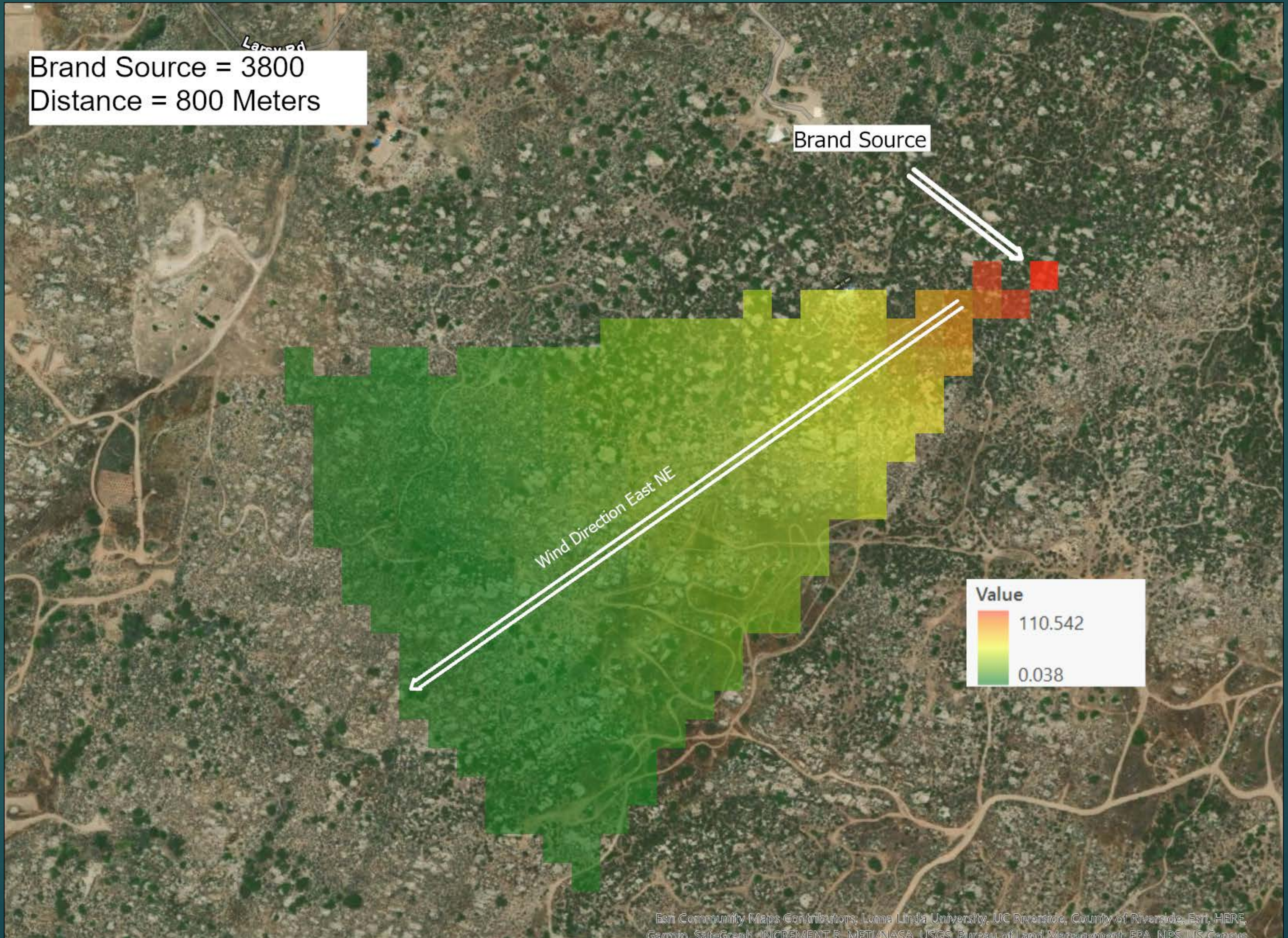




Firebrands

- Cell-based generation of brands lofted based on fuel type and fire intensity
- Number lofted = (brand_loft) x p(fire) x (scaling factor)
- Firebrand transport derived from focal-sum kernel that distributes the source brands downwind according to generalized negative exponential decay and scatter pattern
- Kernels for 100, 200, 400, 800, and 1500m maximal distance
- Orientation of kernels follows wind vector distribution
- Total of 60 size/direction kernels
- Kernel assignment depends on winds, fuels, and fire type (crown vs surface line-fire)

Single Vector – 800m/East NE wind



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Questions…