

2018 WRAP Projections - Methodology

Input Data - Gross Activity/Emissions Data

Realistic Event Sizes

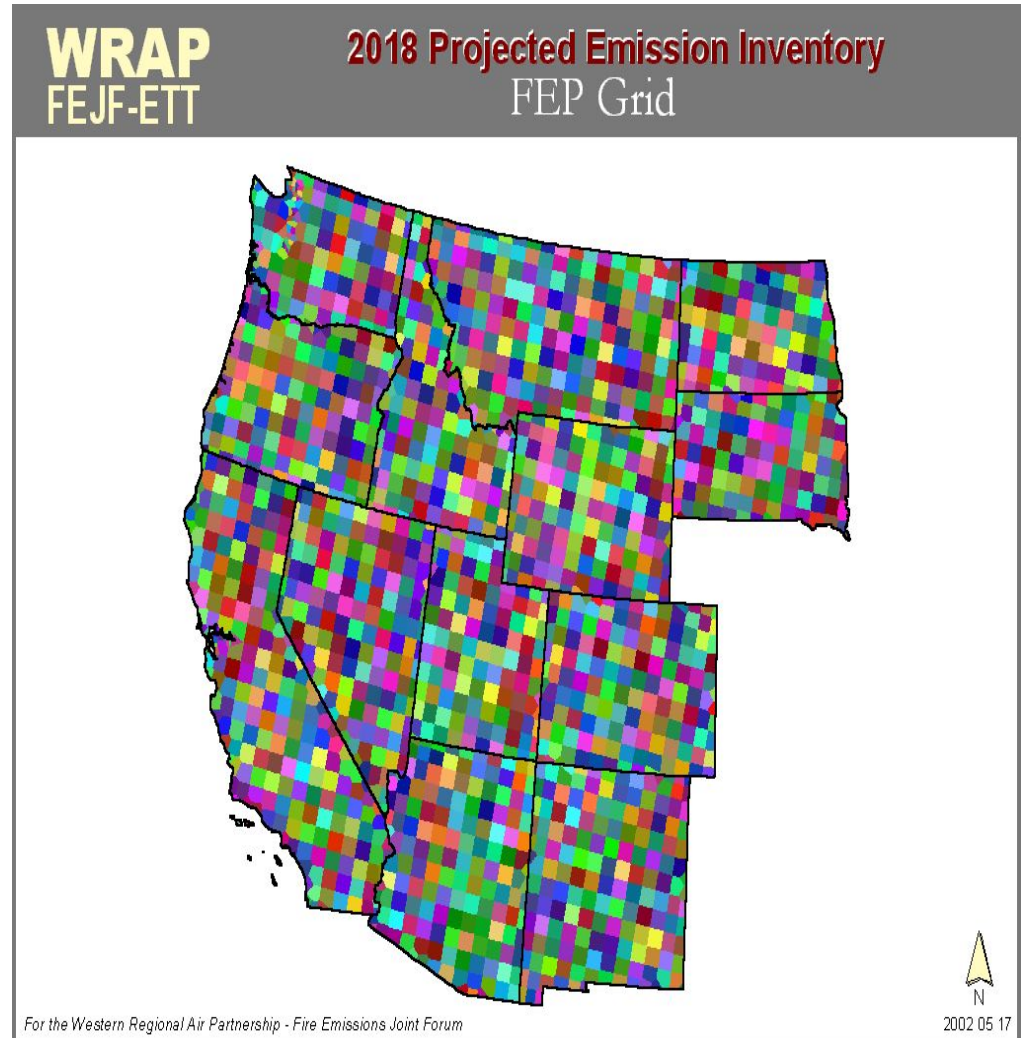
Temporal Refinement (daily)

Spatial Refinement (1 km)

Methodology – Rx Fire

- Input Data
 - 1995 FEP emissions data
 - Seasonal (Fall, Winter, Spring, Summer)
 - 50-km grid cells
 - 10-state GCVTC region (not MT, SD, ND)
 - By land owner (federal agencies (6), state/private/other)
 - All pollutants except SO₂

FEP data accepted “as is”

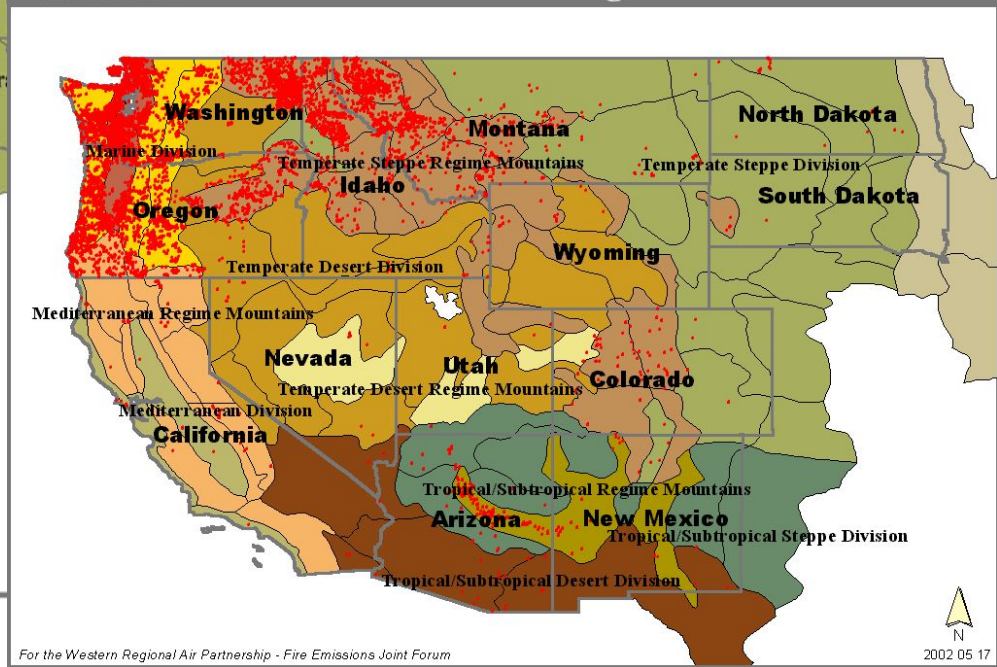


Methodology – Rx Fire

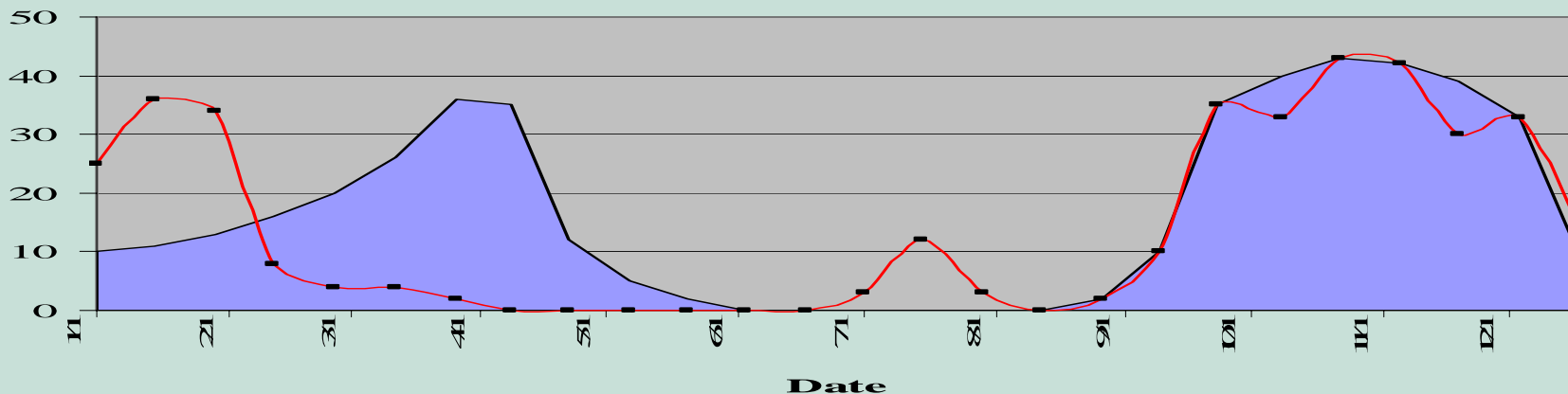
- Refinement
 - Temporal
 - Seasonal to 2-Week
 - 2-Week to daily
 - Spatial
 - 50 km grid to 1 km pixel

Temporal Refinement

- 13 states divided into terrain regions
- 3-6 regions per state
- Regions used to define unique burning schedules based on the mix of vegetation types and climatic regimes of each region
- Burning schedules used to allocate seasonal emissions into 2 week chunks
- 1996 fire occurrence was mapped for each eco-region and state combination
- 16 fire eco-region and state combinations were assigned surrogate fire occurrence profiles based on 1996 emission inventory
- Surrogate fire occurrence were adapted based on expert opinion to obtain the projected 2018 fire occurrence



**3B: Temp Desert Regime Mountains (TemDesMt)
CO/NV**



Methodology – Rx Fire

- Temporal refinement
 - Each season is comprised of 5 or 6 2-week periods

$$\frac{\# \text{ fires per 2week period}}{\# \text{ fires per quarter}} = \% \text{ emissions per 2week period}$$

- Seasonal emissions multiplied by 2-week percentage from appropriate region to get 2-week emissions

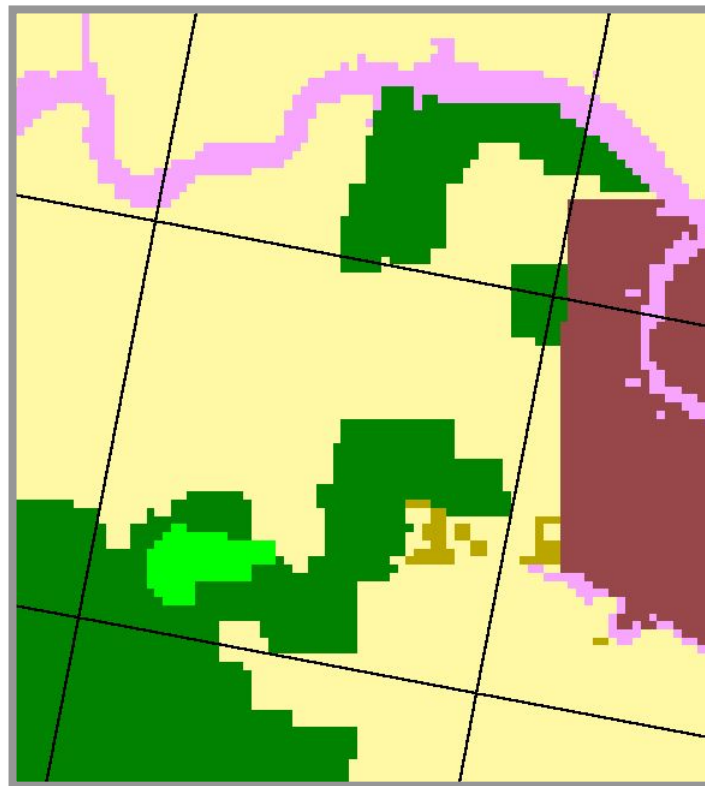
Methodology – Rx Fire

- Realistic fire sizes
 - Goal is to turn 2-week emission totals into realistically sized daily events
 - Summarize 1996 Rx data by plume class
 - PM2.5 packet sizes adjusted so that the distribution of the sizes of 2018 fires resembled the distribution of 1996 Rx fires
 - “Big” fires allocated first
 - ...to remedy a statistical goof.

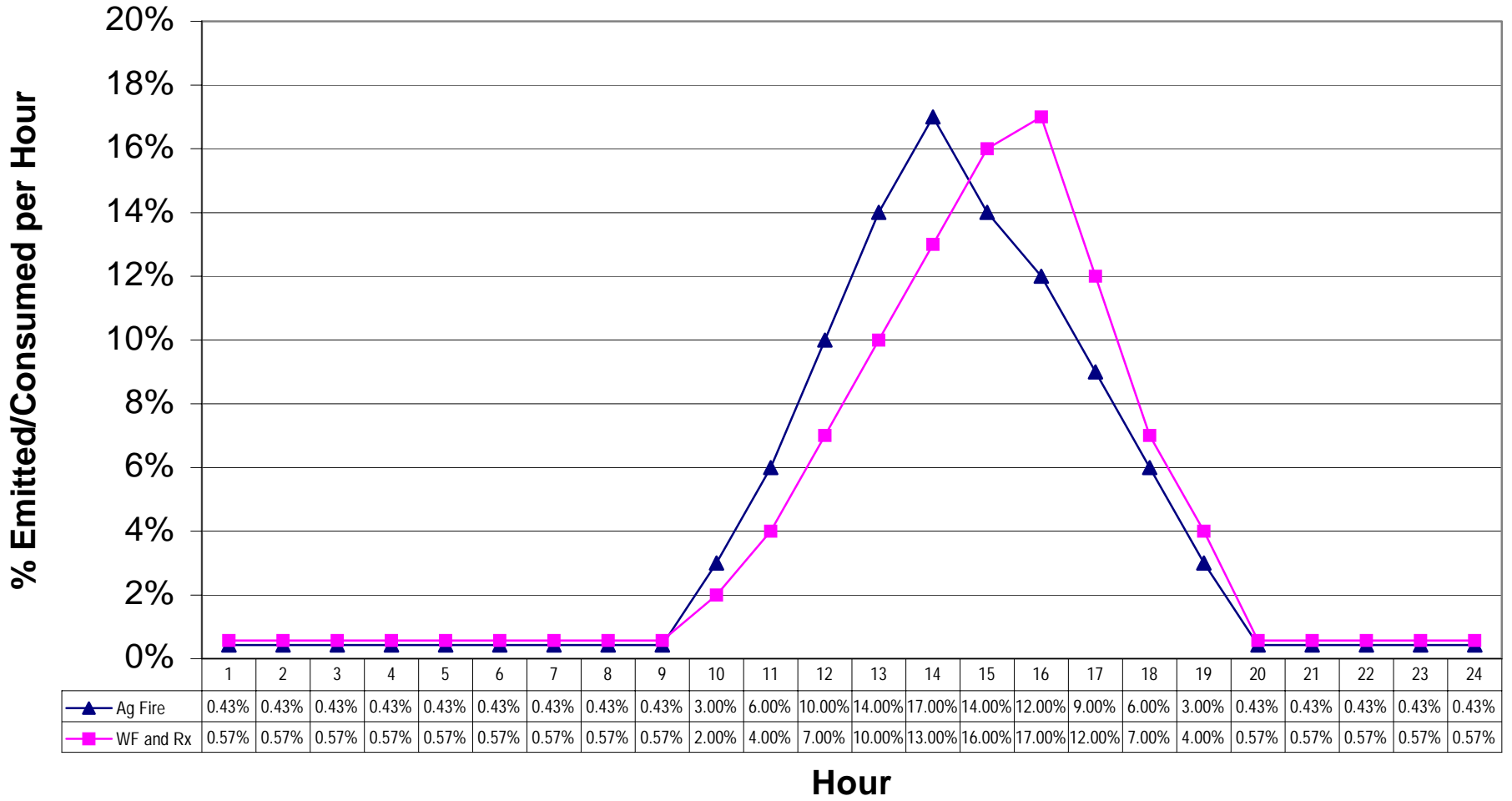
Methodology – Rx Fire

- Spatial Distribution
 - Each realistically sized emission packet
 - occurs on a specific day
 - occurs somewhere within its 50 km grid
 - “belongs” to a specific land owner
 - Each packet is randomly dropped on to a 1 km pixel owned by the land owner

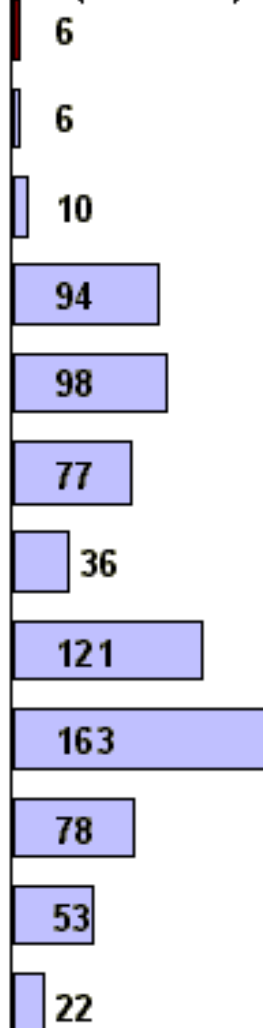
1 km resolution < 1 mile resolution required by Modeling Forum



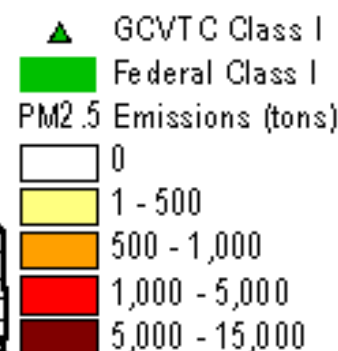
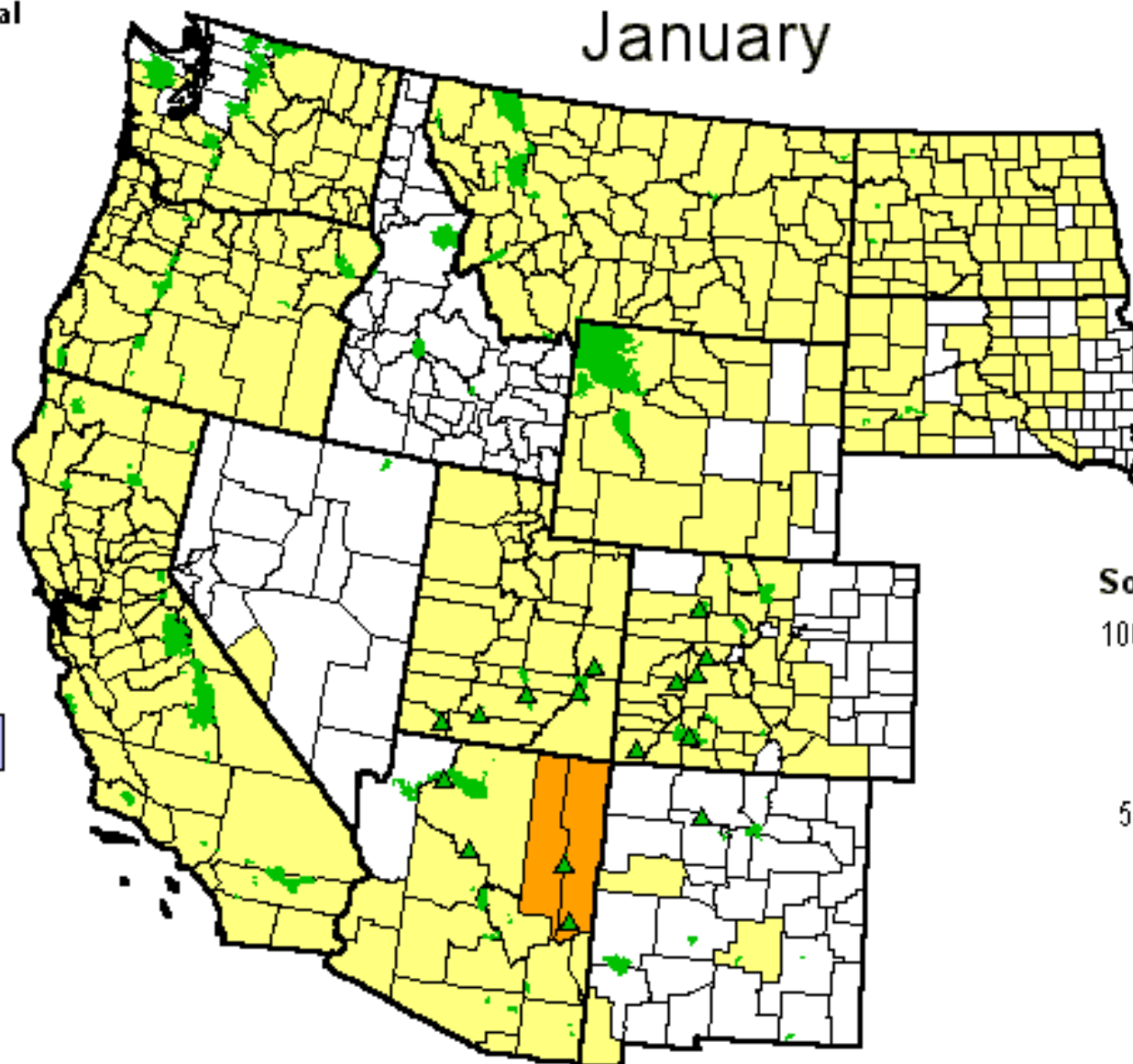
Diurnal Emissions/Consumption Profiles - Fire Sources



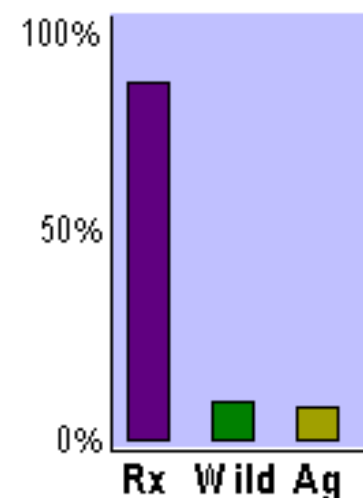
WRAP-wide Total
(1000 Tons)



January



Source Contribution



Accuracy/Omission Issues

- Fire Activity Databases (1996 WF, Rx, 2018 Ag Burning)
 - Activity data from jurisdictions without data gathering/reporting systems are omitted or under-represented.
 - Rangeland burning omitted or under-represented.
 - Accuracy of Federal Databases
 - Activity data search techniques may be constrained (e.g., time, budget)

Precision/Uncertainty Issues

- Projections (1995 FEP emission estimates)
 - Modeled/theoretical emission estimates based on combinations of field data and expert opinion (e.g., literature, survey).

Precision/Uncertainty Issues

- Event sizes
 - Establishing “realistic” fire sizes.
 - Recreating historic fire size distribution in 2018 forecasts.
- Plume characteristics
 - Combination of empirical data and expert judgment.