

Phase 1 – 2002 Fire Emissions Inventory

FEJF Meeting

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Essential Documentation and PPT Presentation posted at:

http://www.airsci.com/jscar/wrap2002/WRAP-2002-EI-Report_20040614.pdf

Phase 1 Fire EI

- Modeling Evaluation Emission Inventory.
 - Actual 2002 wildland fire and prescribed fire emission inventories.
 - Use of the 2018 Agricultural Burning Base Smoke Management Program emission inventory as a placeholder.
 - Primary uses:
 - to verify and enhance dispersion model performance
 - to test geographic source apportionment (modeling estimates of contribution at each Class I area from each upwind source jurisdiction).

Other Phases of 2002 Fire EI Work

- Phase 2 – Initial Modeling Apportionment Emission Inventory.
 - to complete the WRAP's Strategic Plan 2004 geographic source apportionment for the Allocation of Haze Project
- Phase 3 – Planning Baseline Period Emission Inventory.
 - fire activity data that is assessed to be representative of regional haze baseline period (2000 – 2004).
- Phase 4 – Planning 2018 Projection Year Emission Inventory.

Phase 1 – Technical Approach

- In general, 2002 technical methods consistent with the 1996 historic emission inventory.
- *NEW* Historic EI for Wildfire (WF) and Prescribed Burning (Rx) were produced.
- FEJF's 2018 Agricultural Burning (Base Smoke Management) provided as *place holder*
- Brief run-down of technical methods follows.
- EI results presented.

Executive Summary of Fire Activity and Emissions from Wildfires and Prescribed Fires in 2002 (14-state WRAP Region)

	Wildfire	Prescribed	Total
Number of fires	3,157(28%)	10,016 (72%)	13,173
Area burned (1000 acres)	6,348 (91%)	605 (9%)	6,953
Fuel consumed (1000 tons)	206,777(97%)	6,516 (3%)	213,293
PM2.5 emissions (1000 tons)	2,492 (97%)	66 (3%)	2,558

Data Quality Objectives

- A specific location for each fire event.
- A specific calendar day in 2002 for each fire event.
- A specific size for each fire event.
- Sufficient information to assign a fuel loading for each fire event.

Activity Data - Wildfire

- > 10 Acres
- NIFC – National Situation Report and ICS-209 Datasets were merged
- DOI's Fire Management Data and USDA – FS's National Interagency Fire Management Integrated Database were appended.
- Natl Situation Report/ICS-209 records supplemented on a record-by-record basis location, size, and fuel loading info.

Activity Data – Prescribed Fire

- No de minimis size cut-off
- Data requests out to State AQ and/or Forestry Departments...data rec'd from all states in the WRAP region.
- Rx fire data (DOI-1202; NIFPORS, FASTRACS) also received from federal agencies
- Effort to reconcile/augment state data with federal data

GIS Data Augmentation & QC

- Geo-referencing Fire Location by TRS & County
- GIS-based fuel loading assignments
- State & County Identifiers
- GIS QC techniques
 - Locations match with state/county identifier
 - Locations don't fall in water/urban areas

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Data QC

- Data not meeting Data Quality Objectives
 - Wildfire - 2.7 % (86 records / 18.5k acres) dropped for insufficient/inconsistent data
 - Rx fire – 8.6% (947 records / 48.7k acres) dropped for insufficient/inconsistent data
 - Most dropped due to insufficient location data

Fuel Loading & Emission Factors

- Fuel Loading
 - Modified NFDRS (to include duff & crown fuels) for WF & Rx fire
- Emission Factors (AP-42 & OAQPS report)
 - Wildfire and Rx Broadcast Burns
 - Rx Pile Burns
 - TSP; PM10; PM2.5; EC; OC; VOC; CH4; NH3; NOx; CO; SO2; PM-coarse

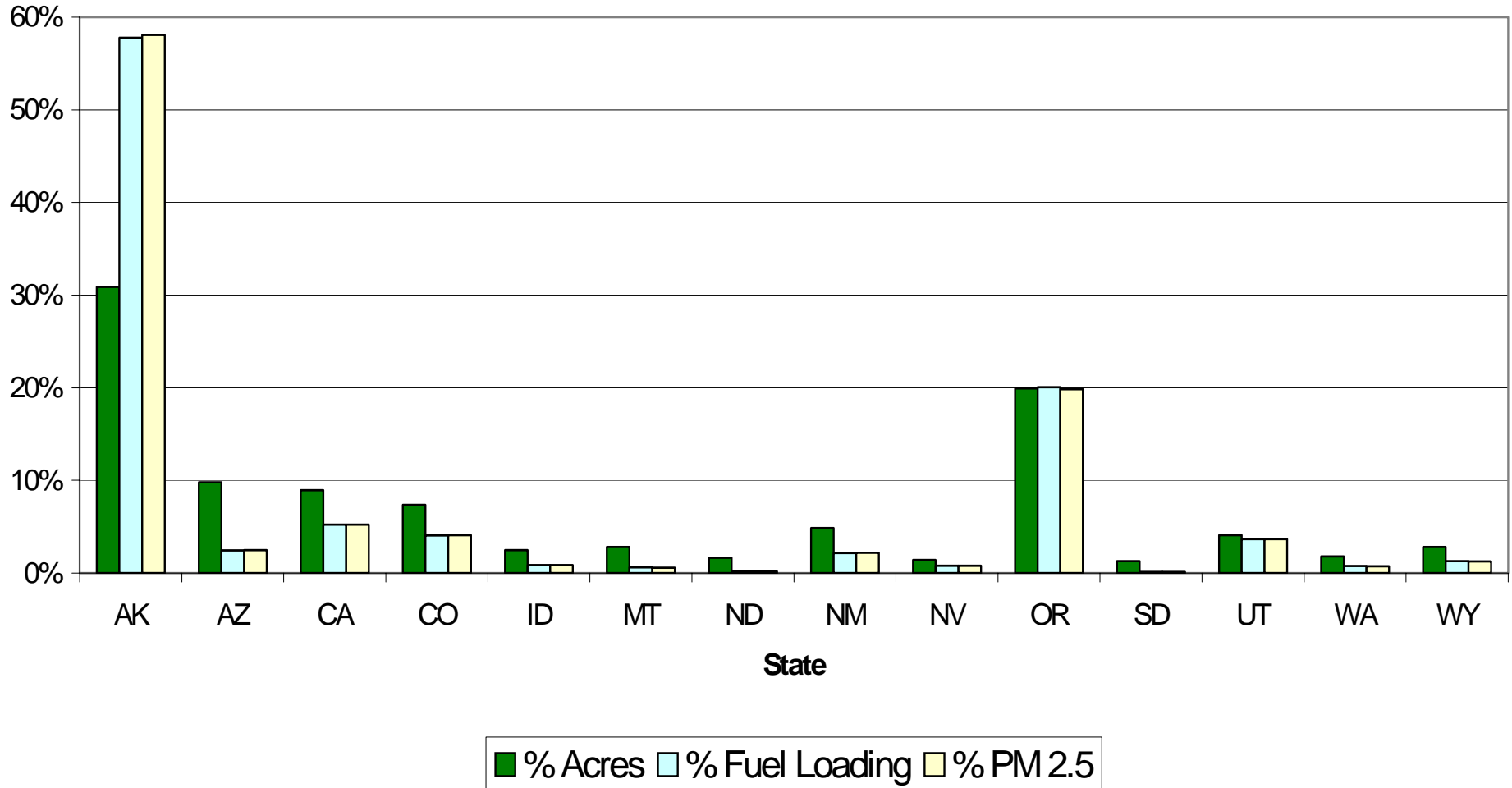
Other Technical Steps

- Daily fire growth for multi-day events
 - WF – only multi-day events >100 acres (“escapability size”) were allocated to daily events
 - “spreading oval” geometric fire growth (from FEPS) over first 2/3 of the duration provided
 - RX – total acres / no. of days
- Smoldering emissions added.
- Plume profile assignments (based on heat release and buoyant efficiencies)
 - Look-up tables, and *virtual acres* used to assign P_{TOP}, P_{BOT}, LAY_{1F}
 - P_{BOT} increased from 1996; LAY_{1F} adjusted from 1996 by 38/80

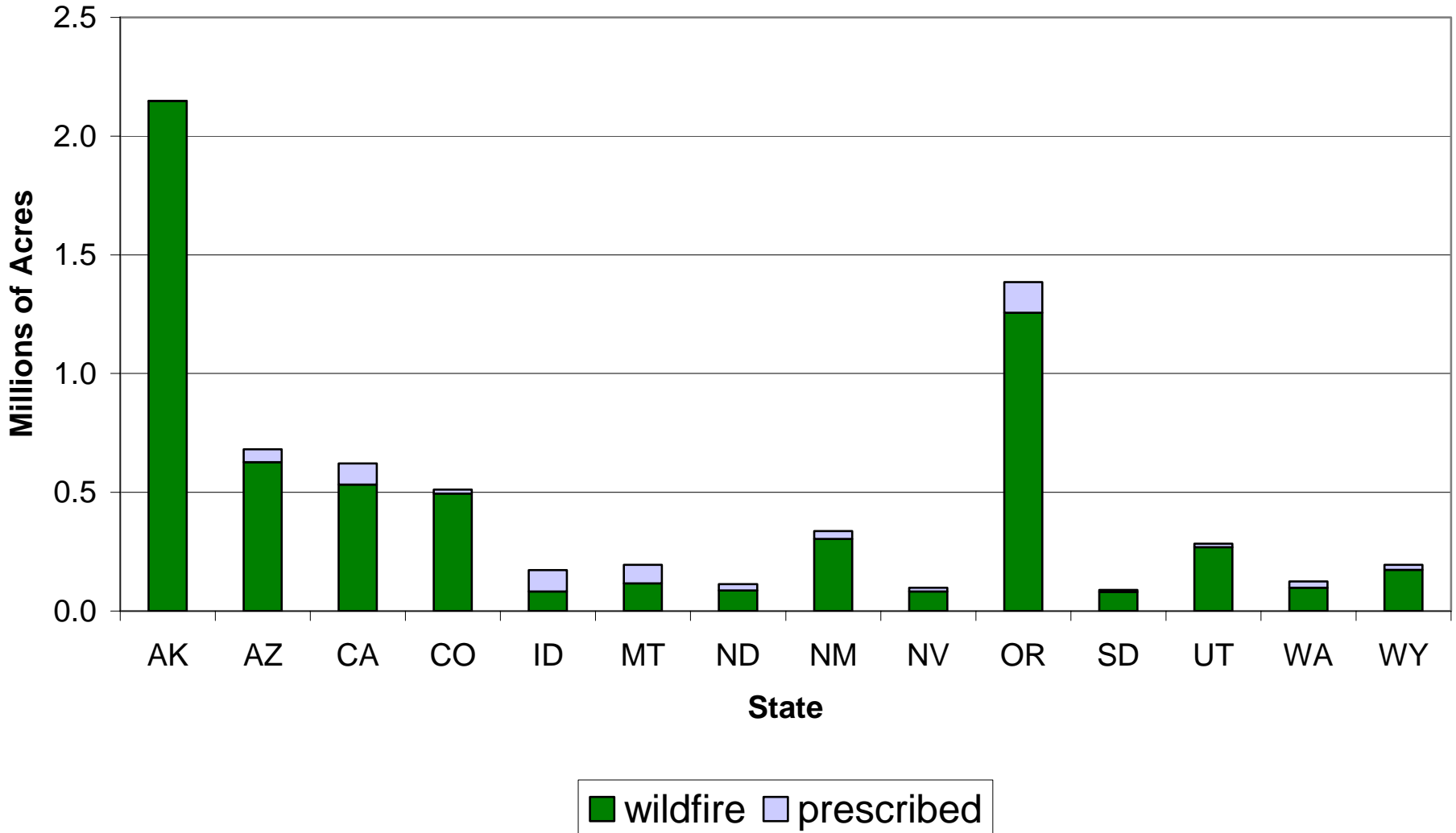
Delivery to WRAP/RMC

- On May 3, 2004 – the WF and Rx Burning emission inventories delivered to the WRAP/Regional Modeling Center
 - PT Files (formatted for the Sparse Matrix Operator Kernel Emissions “SMOKE” modeling system)
 - PTINV – general event information
 - PTDAY – daily emissions of each pollutant
 - PTHOUR – hourly plume profile assignments

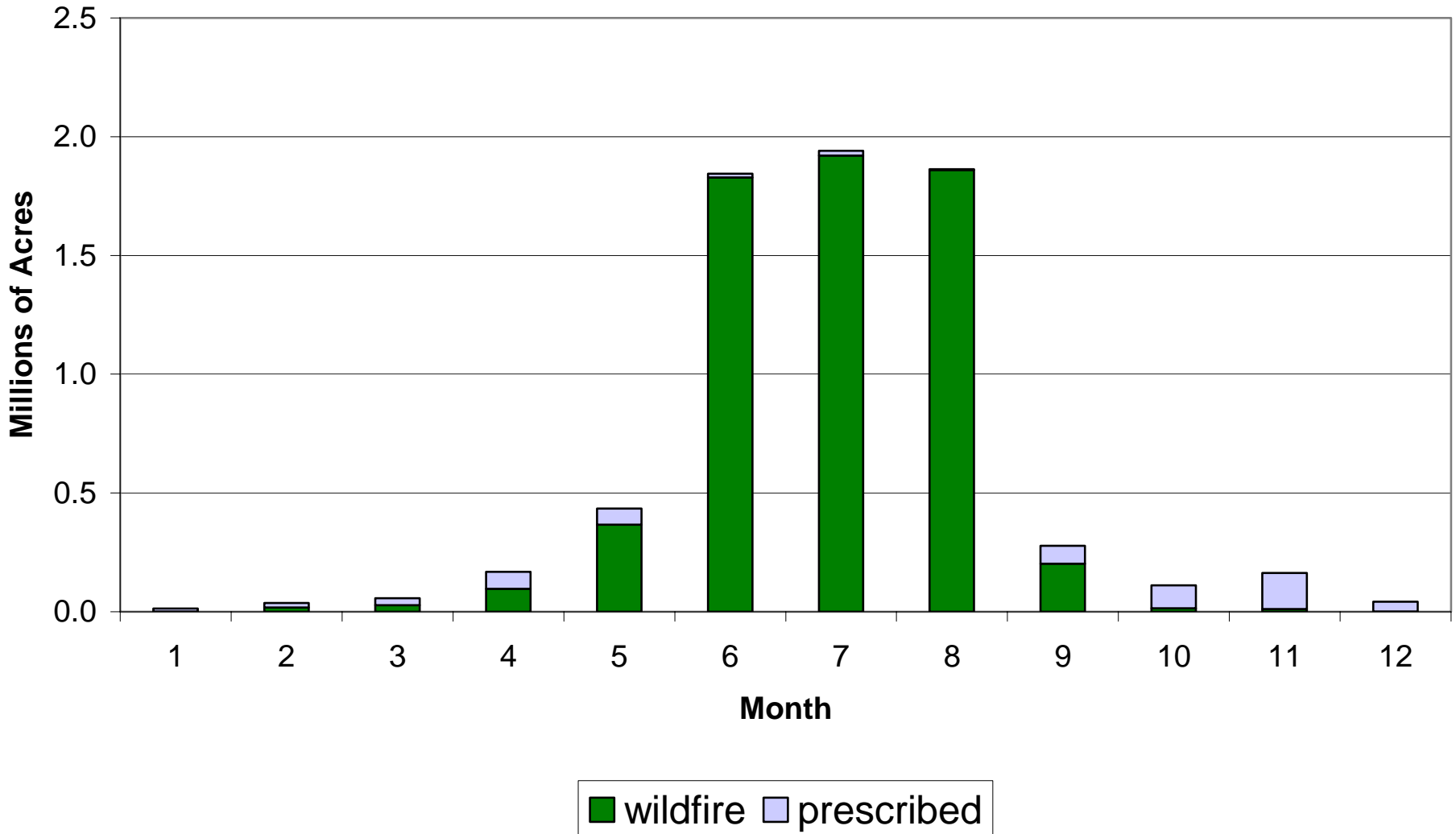
2002 Wildfire and Prescribed Fire - Combined Percentage of Totals by State



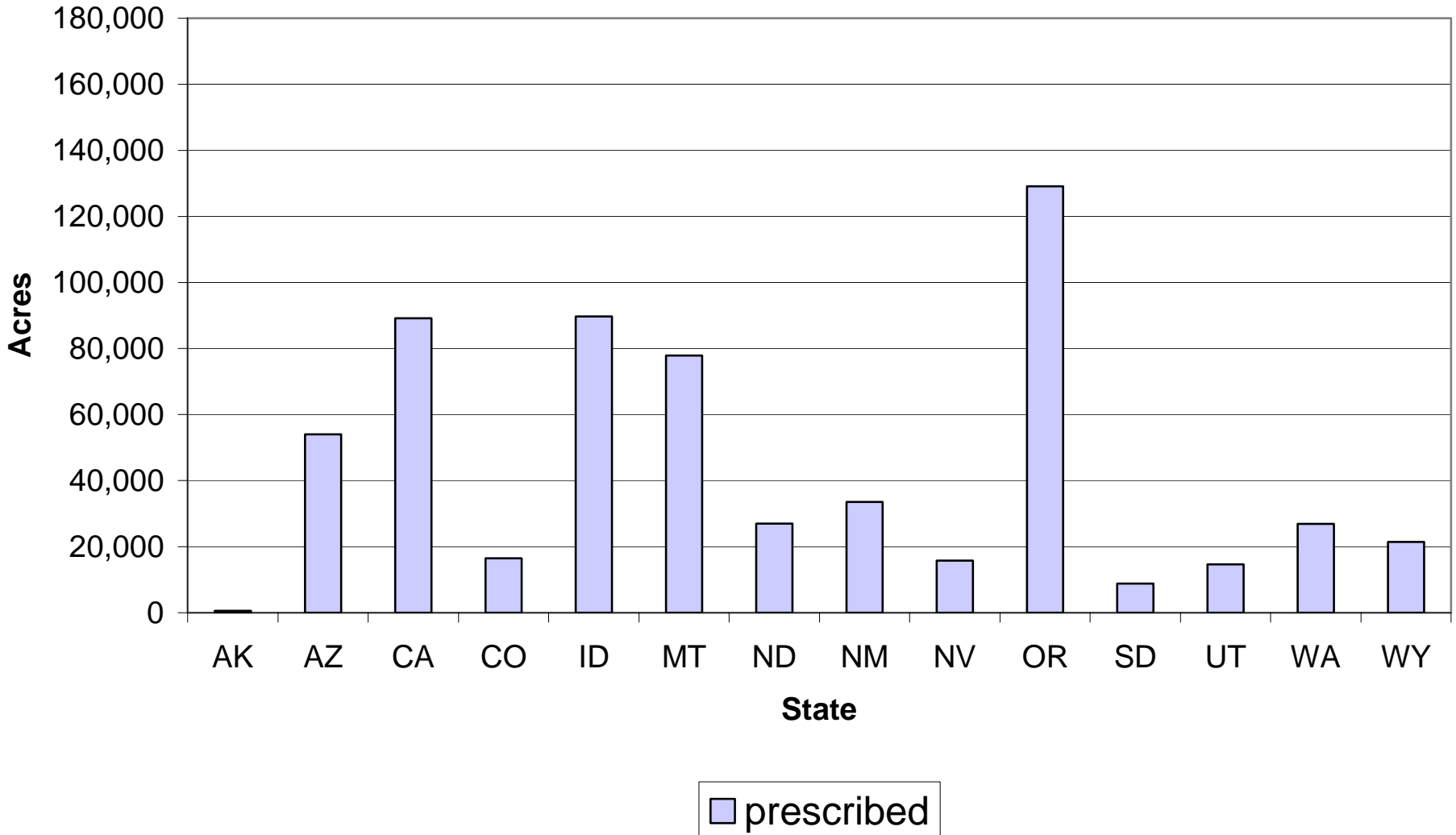
2002 Wildfire and Prescribed Fire Acres Burned by State



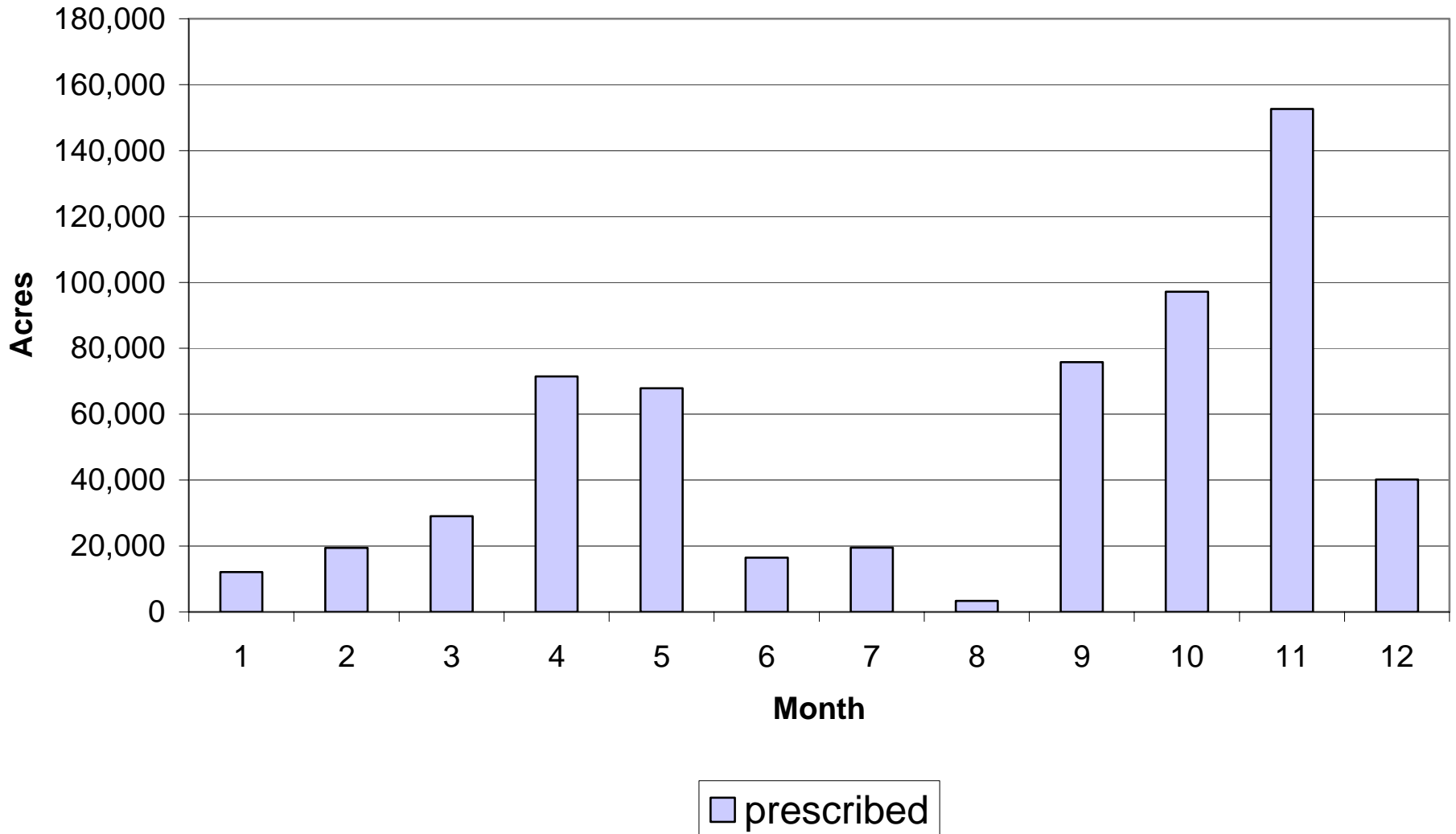
2002 Wildfire and Prescribed Fire Acres Burned by Month



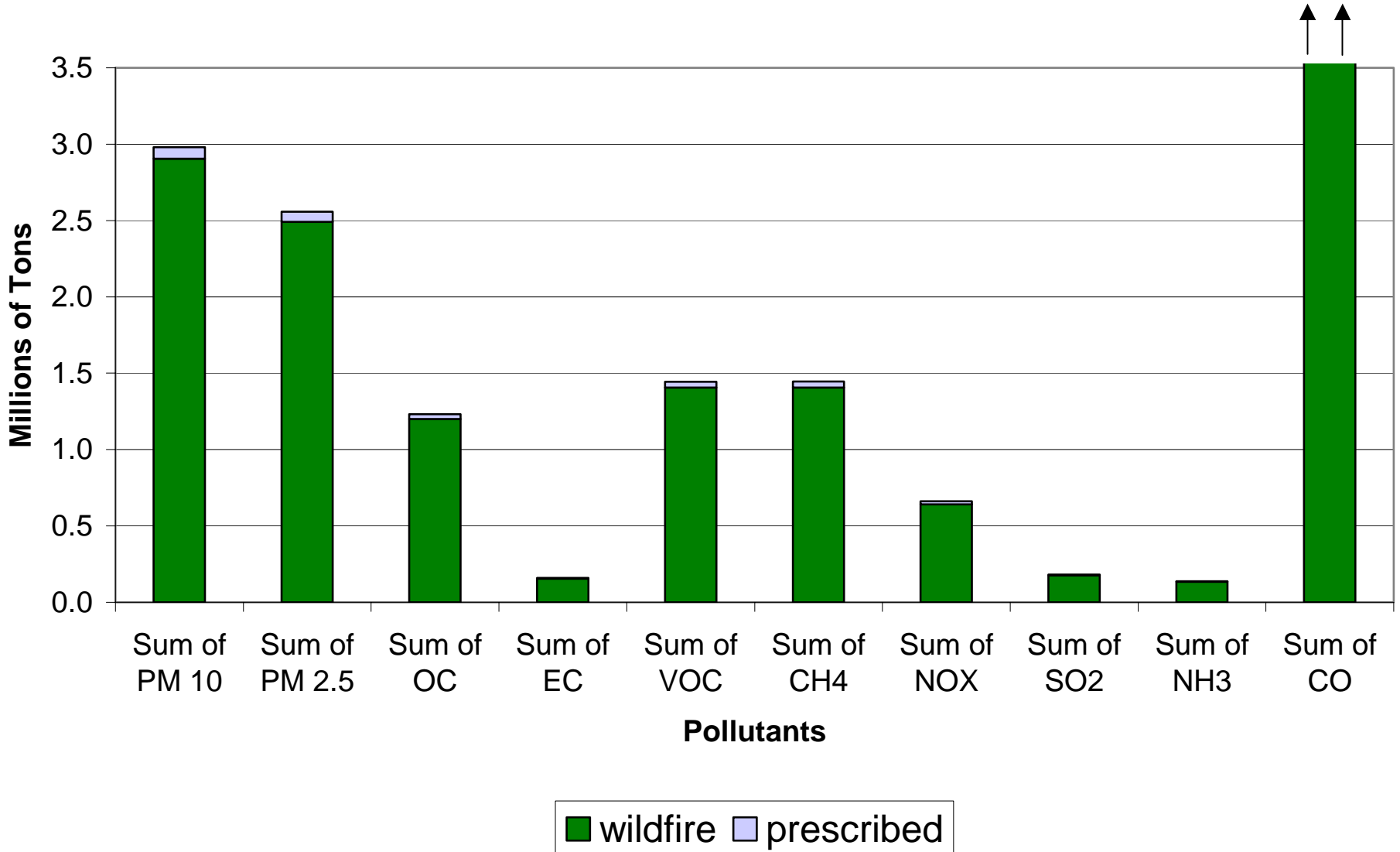
2002 Prescribed Fire Acres Burned by State



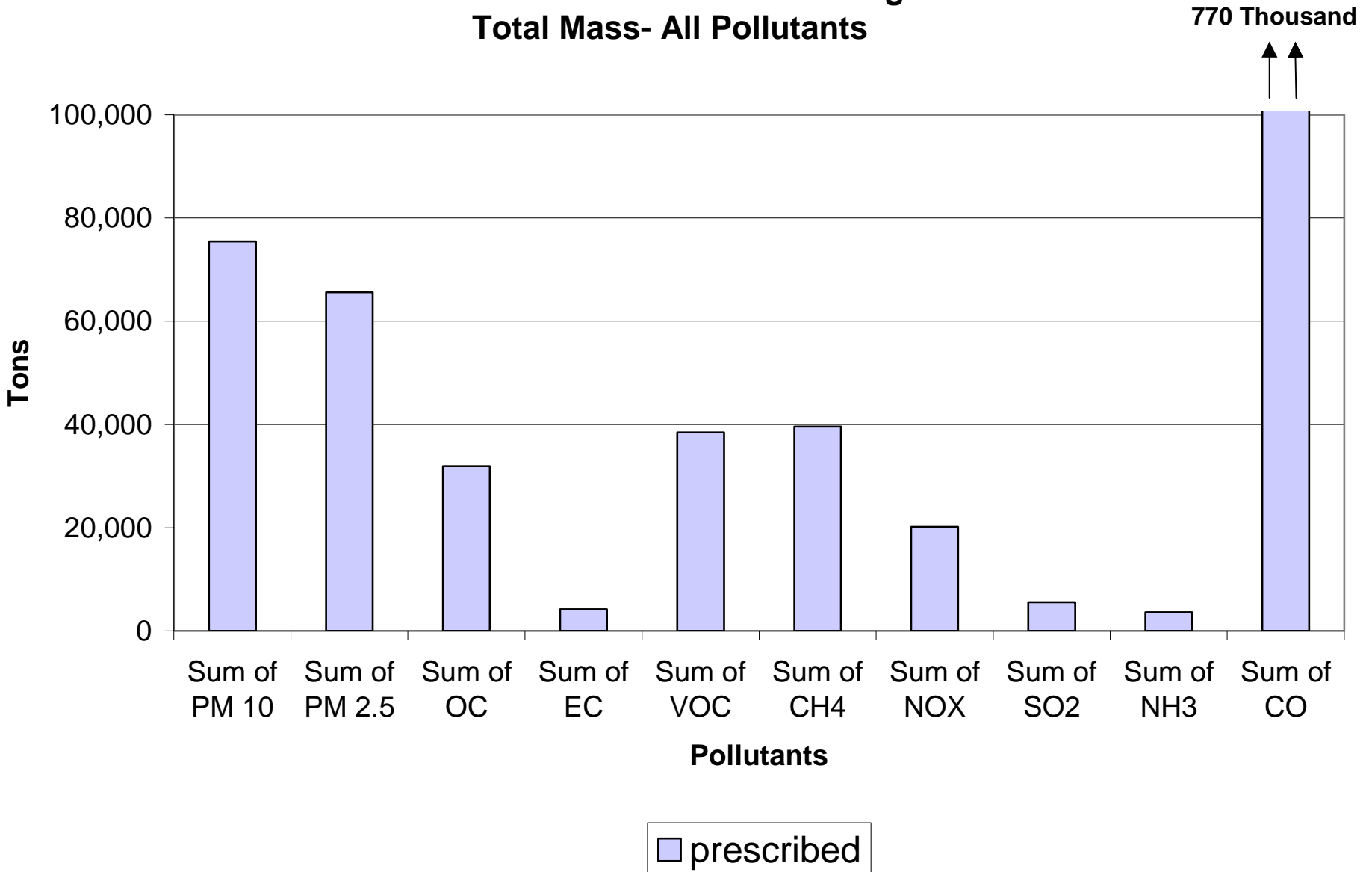
2002 Prescribed Fire Acres Burned by Month



2002 Wildfire and Prescribed Fire - WRAP Region Total Mass- All Pollutants

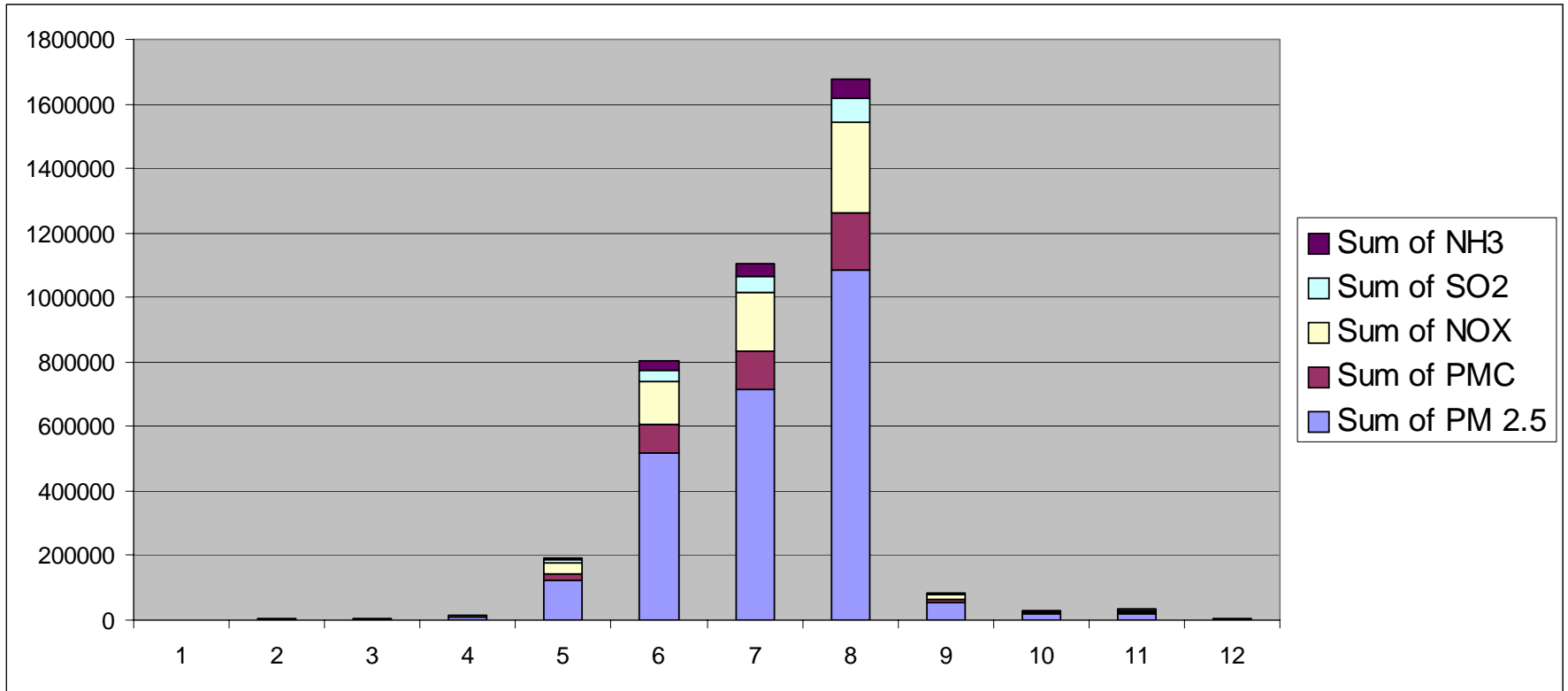


2002 Prescribed Fire - WRAP Region Total Mass- All Pollutants



2002 Wildfire and Prescribed Fire – WRAP Region

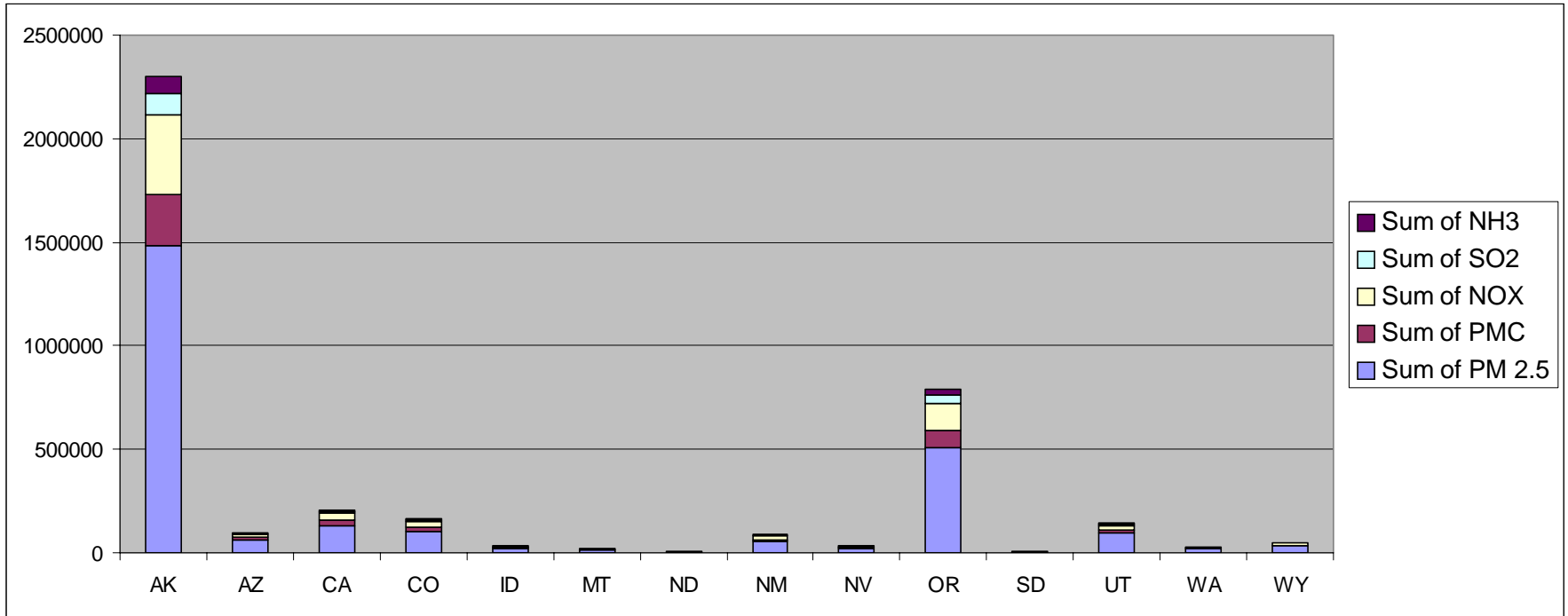
Haze Pollutants by Month (tons)



Data	1	2	3	4	5	6	7	8	9	10	11	12	Grand Total
Sum of EC	57	162	292	657	7710	32315	44428	67411	3401	1245	1310	260	159248
Sum of OC	433	1248	2259	5075	59623	249904	343574	521313	26289	9602	9981	1943	1231244
Sum of PM 2.5 -(EC+OC)	396	1177	2136	4797	56532	236975	325803	494347	24890	9033	9042	1646	1166774

2002 Wildfire and Prescribed Fire – WRAP Region

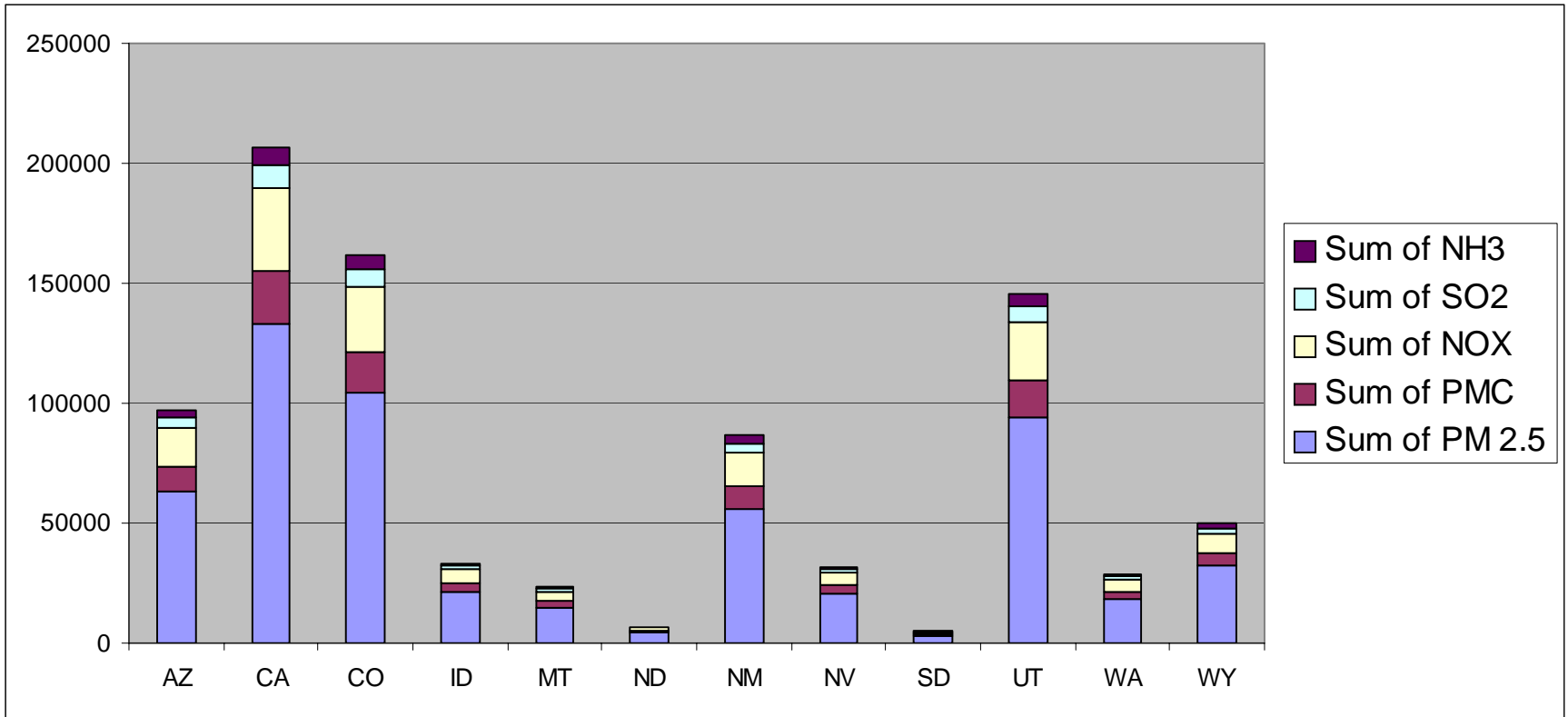
Haze Pollutants by State (tons)



Data	AK	AZ	CA	CO	ID	MT	ND	NM	NV	OR	SD	UT	WA	WY	Grand Total
Sum of EC	92418	3917	8303	6495	1341	935	279	3476	1286	31610	193	5844	1150	2001	159248
Sum of OC	714698	30288	64192	50224	10362	7211	2158	26879	9944	244277	1489	45188	8869	15464	1231244
Sum of PM 2.5 -(EC+OC)	677731	28721	60822	47608	9806	6781	2046	25476	9427	231150	1412	42834	8337	14625	1166774

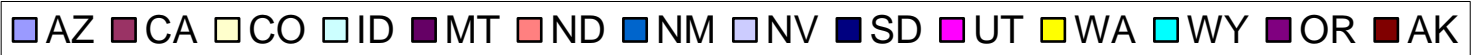
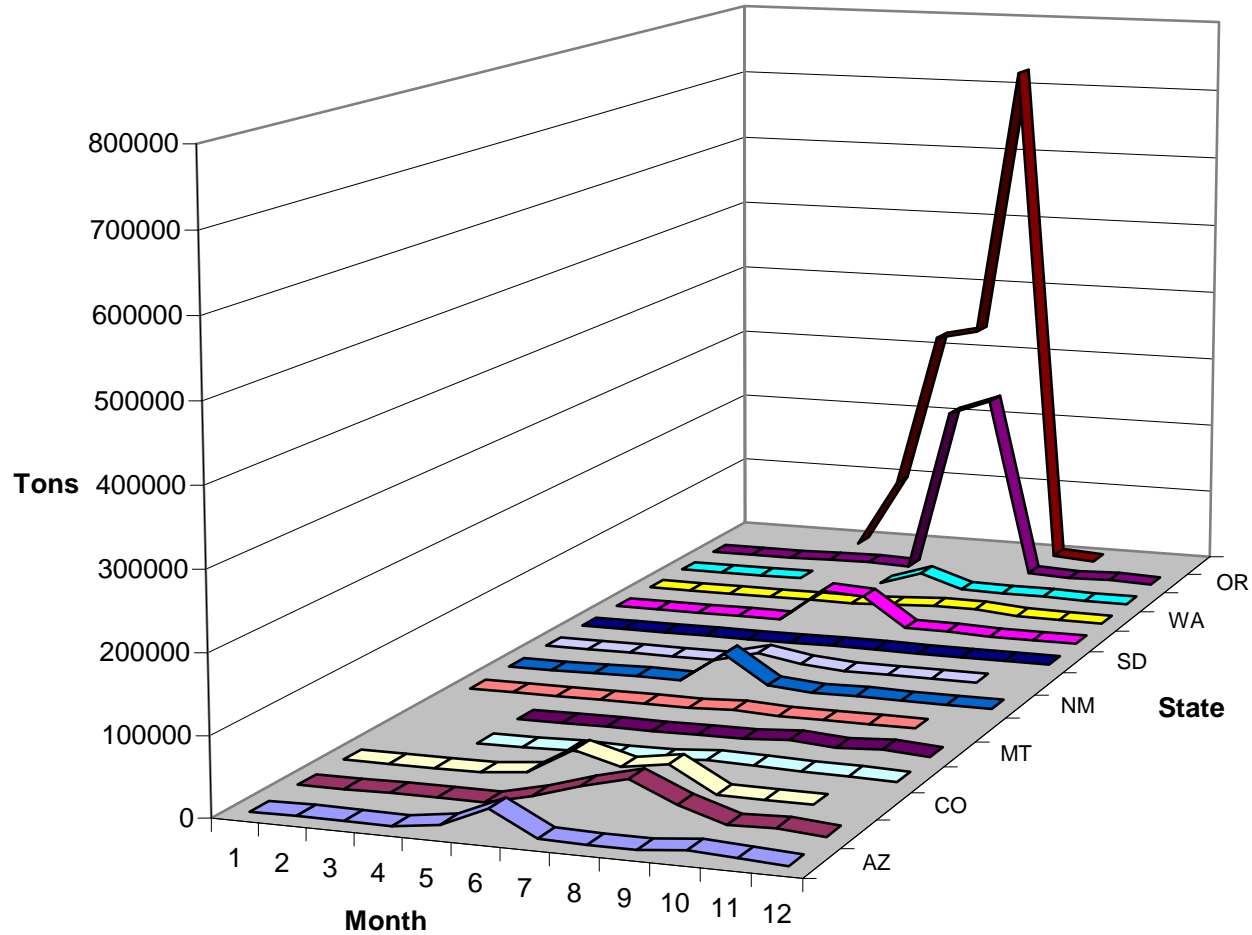
2002 Wildfire and Prescribed Fire – WRAP Region w/o AK and OR

Haze Pollutants by State (tons)

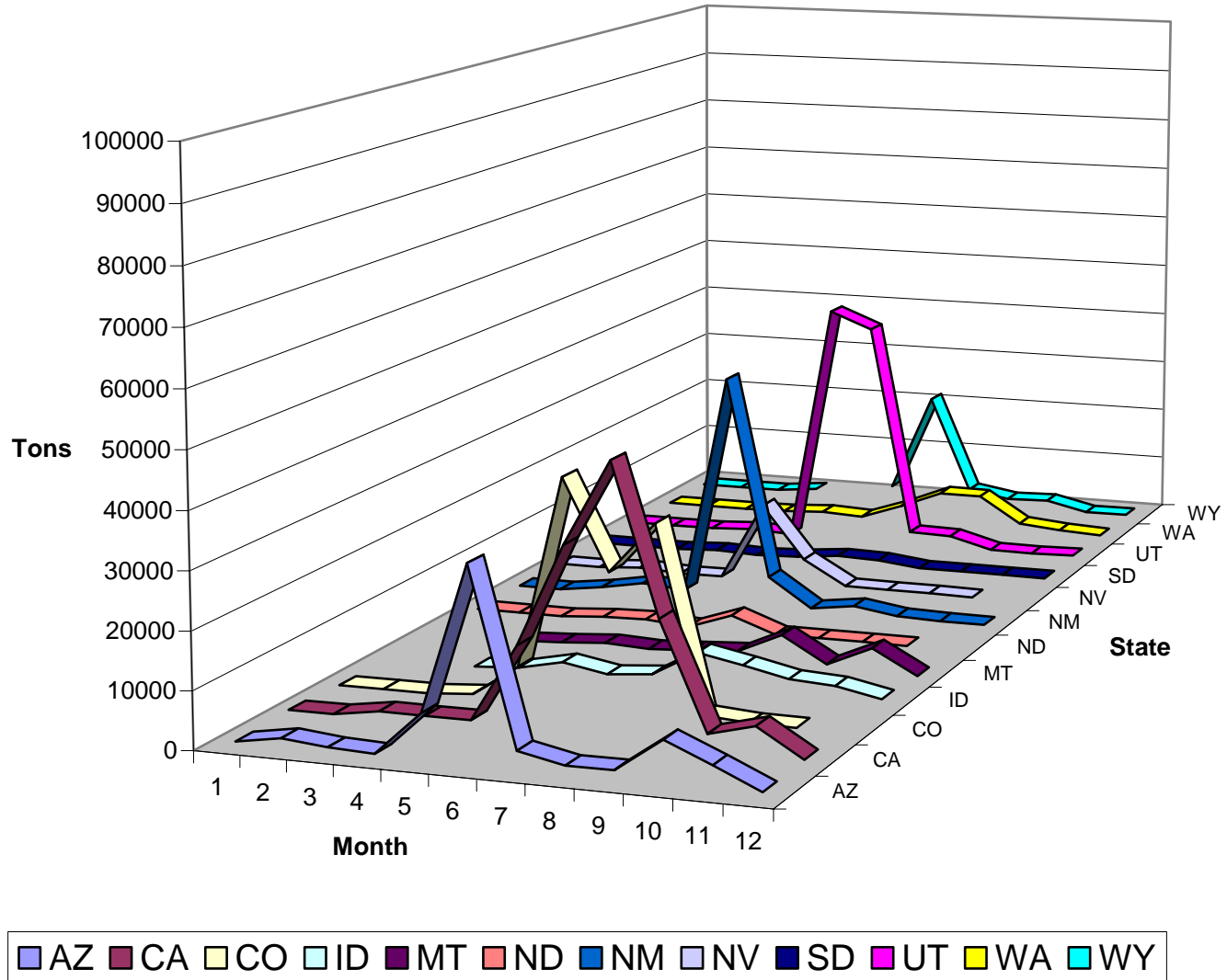


Data	AZ	CA	CO	ID	MT	ND	NM	NV	SD	UT	WA	WY	Grand Total
Sum of EC	3917	8303	6495	1341	935	279	3476	1286	193	5844	1150	2001	35220
Sum of OC	30288	64192	50224	10362	7211	2158	26879	9944	1489	45188	8869	15464	272269
Sum of PM 2.5 -(EC+OC)	28721	60822	47608	9806	6781	2046	25476	9427	1412	42834	8337	14625	257893

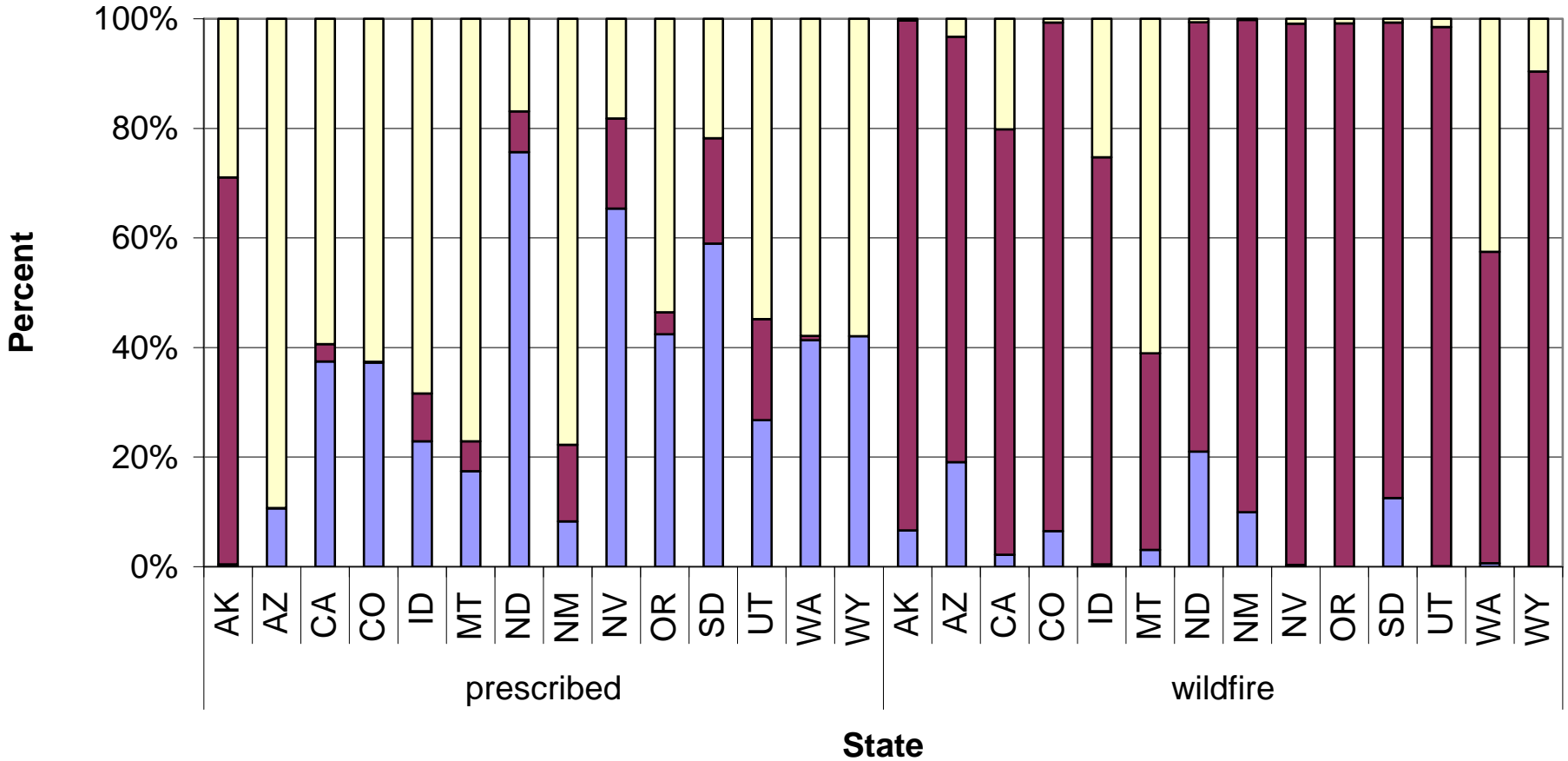
2002 Wildfire and Prescribed Fire PM 2.5 by Month and State



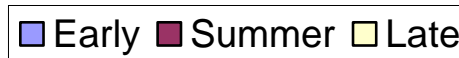
2002 Wildfire and Prescribed Fire PM 2.5 by Month and State (w/o AK & OR)



2002 Wildfire and Prescribed Fire Percent PM 2.5 Released by Season by State



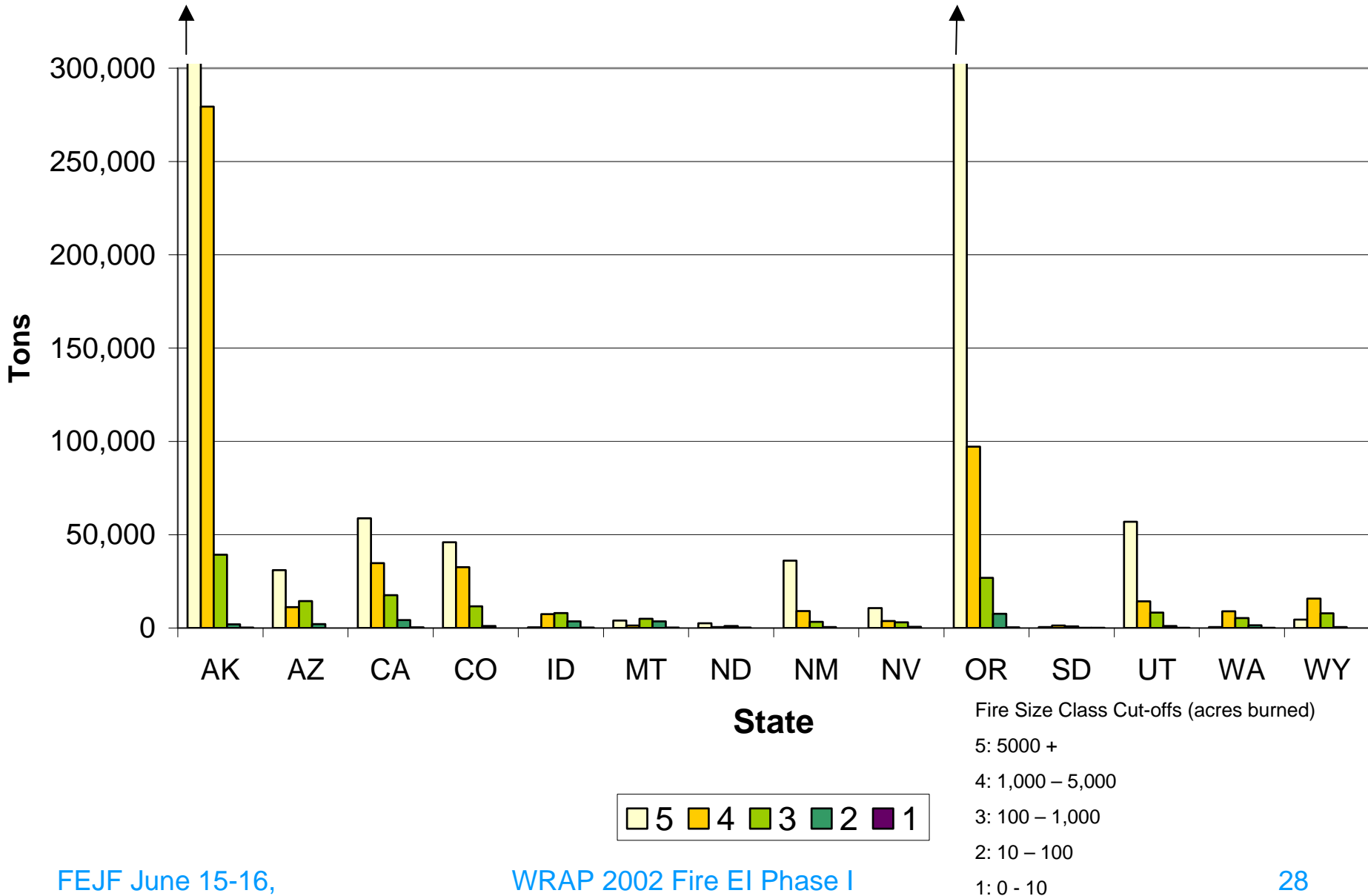
Early: January - May
Summer: June - August
Late: September - December



2002 Wildfire and Rx Fire PM 2.5 by Fire Class Size (Real Acres)

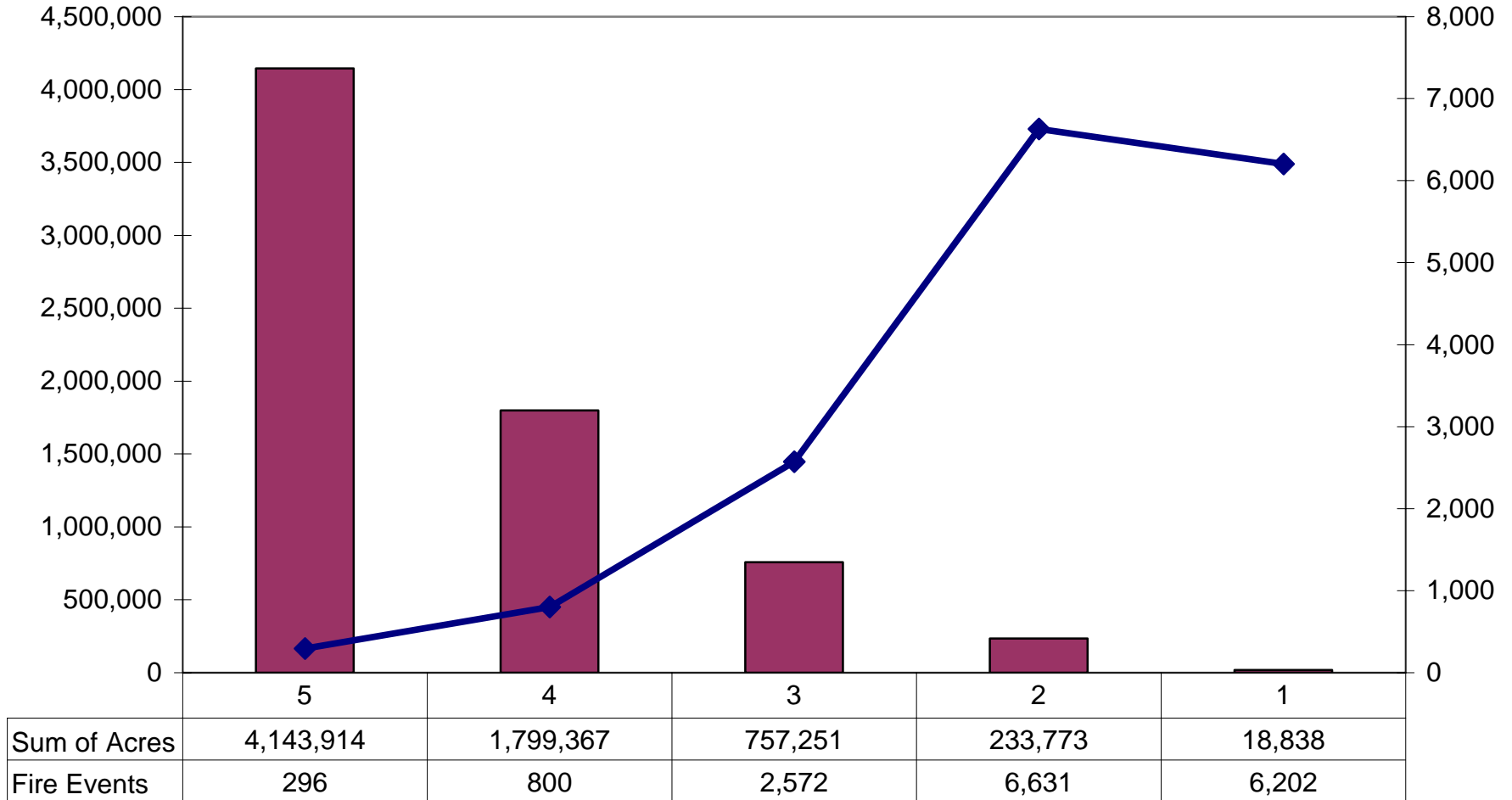
0.95 Million

0.3 Million



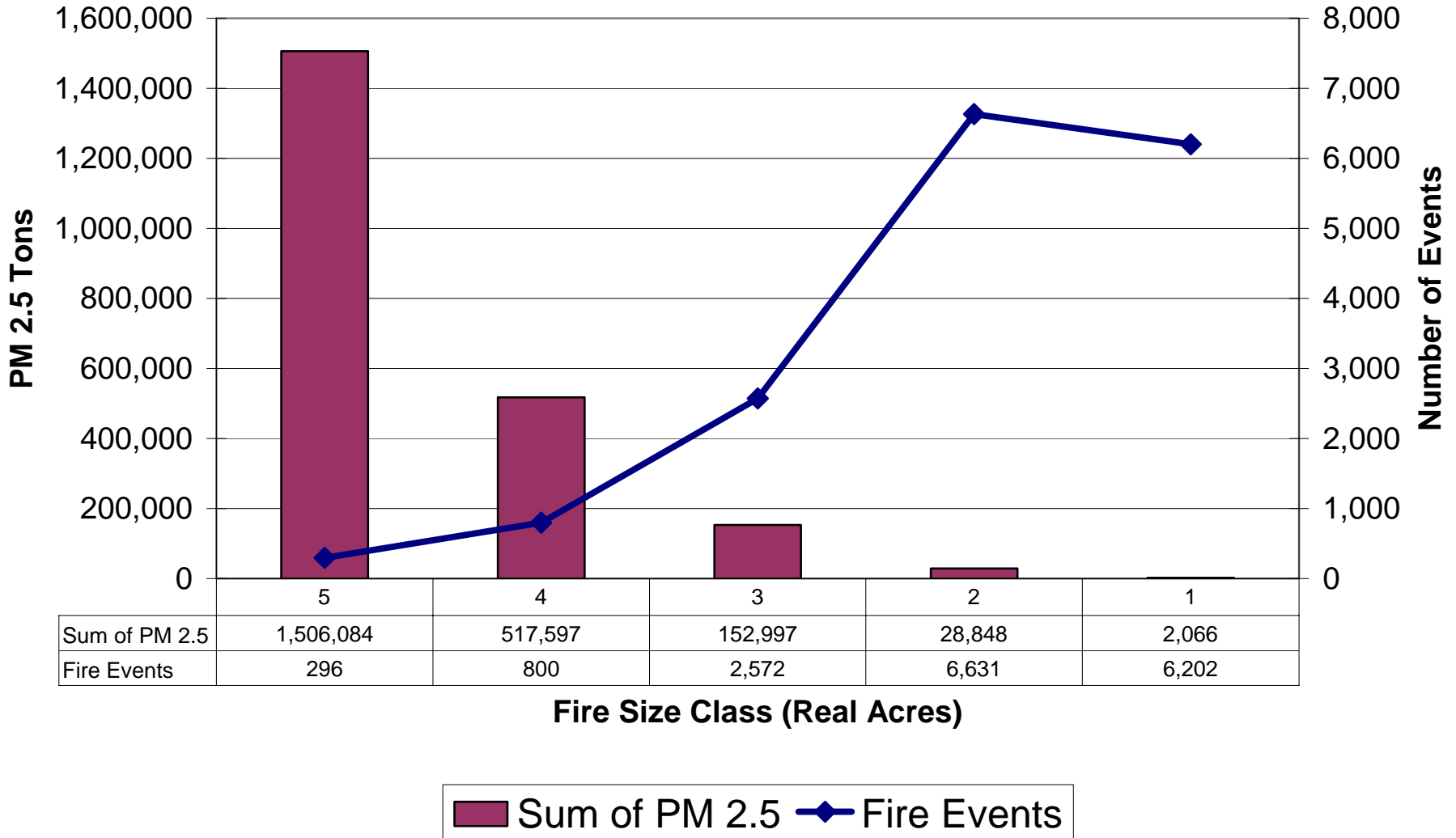
2002 Wildfire and Prescribed Fire – WRAP Region

Fire Occurrence and Acres Burned by Size Class



Sum of Acres
 Fire Events

2002 Wildfire and Prescribed Fire - WRAP Region Fire Occurrence and Emissions by Size Class



What's Next? (Phase 1)

- Phase 1
 - Essential Documentation for Phase 1 2002 EI is posted for ETT/FEJF Review
 - Will finalize in next few weeks.
 - State Ag Outreach
 - Rangeland burning methodology
- Ph. 2 – Refined/enhanced 2002 EI