

National Park Service



EXPERIENCE
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AMERICA

Reductions in Emissions of SO₂ from TransAlta Centralia Generation Plant and Improvements in Air Quality at Mount Rainier National Park

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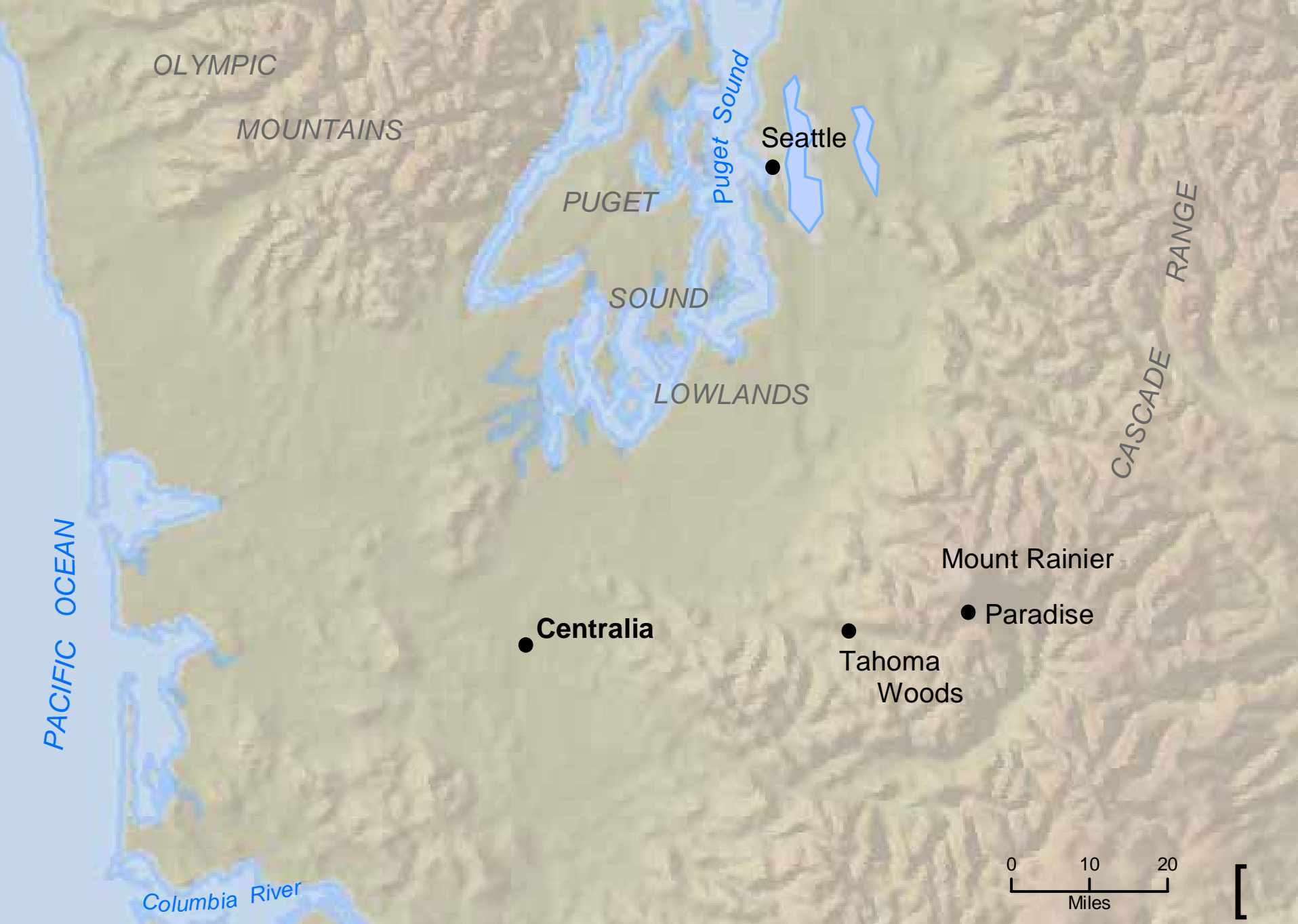
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Background Information

- Centralia Power Plant (TransAlta)
 - 2 boiler/steam turbine units
 - 1340 megawatts power
 - 65,000-88,000 tons SO₂/year
- Mount Rainier National Park
 - 50 miles east of Centralia
 - Mandatory Class 1 area under the CAA

Emissions Reductions Negotiated in the 1990s

- PREVENT study (Pacific Northwest Regional Visibility Experiment Using Natural Tracers)
- NPS, USFS, EPA, Ecology, SWCAA, PSCAA, seven plant owners, and others
- 10,000 tons SO₂/year by December 31, 2002
 - Scrubber operational on unit 2 on 10/22/2001
 - Scrubber operational on unit 1 on 07/27/2002
- NO_x, particulate, and CO emission reductions, as well



OLYMPIC
MOUNTAINS

PUGET

SOUND

LOWLANDS

Puget Sound

Seattle

CASCADE
RANGE

Mount Rainier

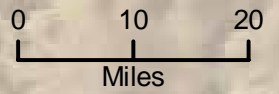
Centralia

Tahoma
Woods

Paradise

PACIFIC OCEAN

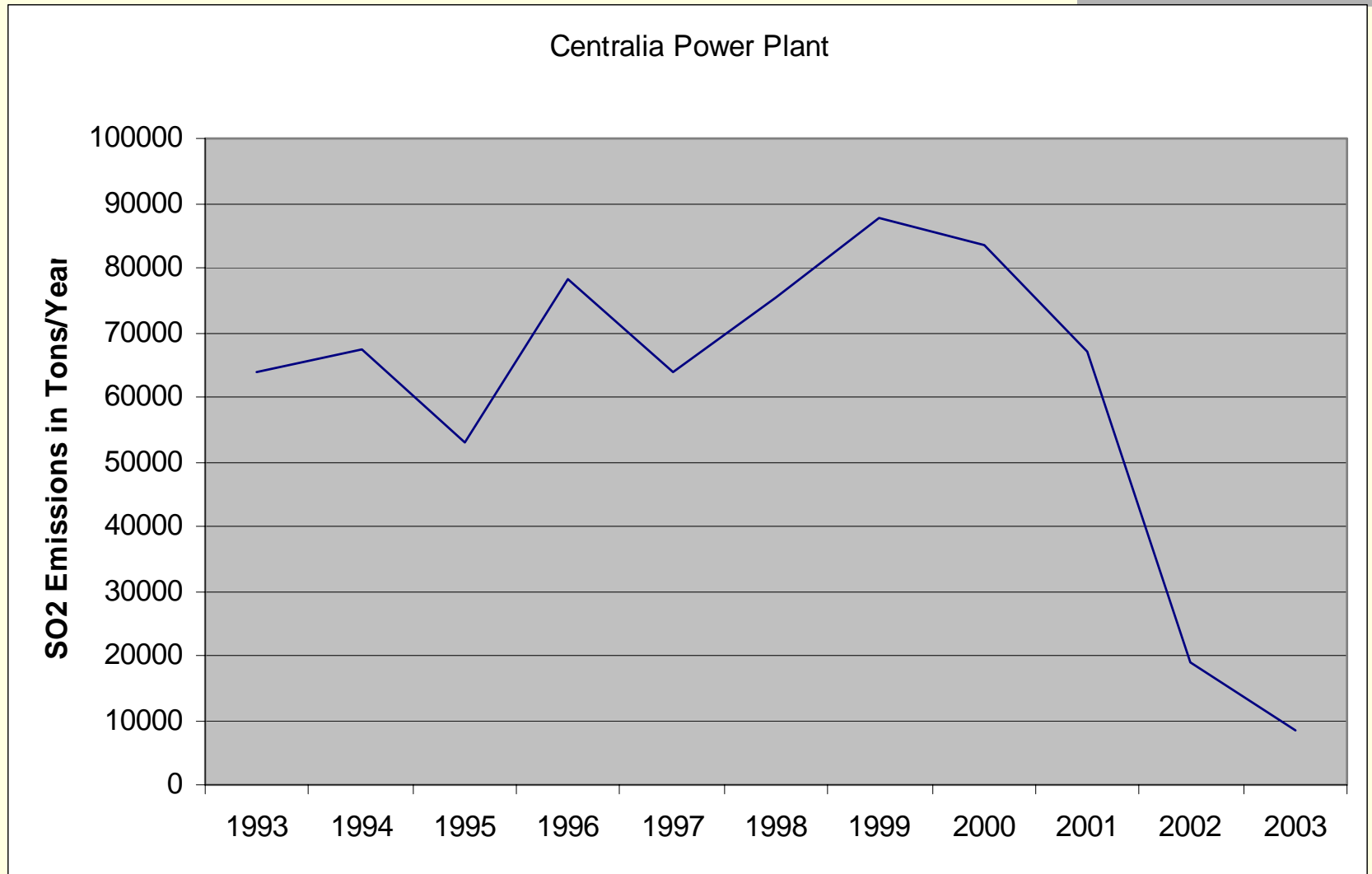
Columbia River



PREVENT Conclusions

- Sulfur levels tend to be episodic, especially at Paradise where concentrations occasionally approach zero
- Tahoma Woods affected by urban-transportation sources from Puget Sound as well as Centralia and levels tend to stay elevated
- Other coal fired power plants also contribute to elevated sulfur levels at both Paradise and Tahoma Woods

Changes in Centralia SO2 Emissions



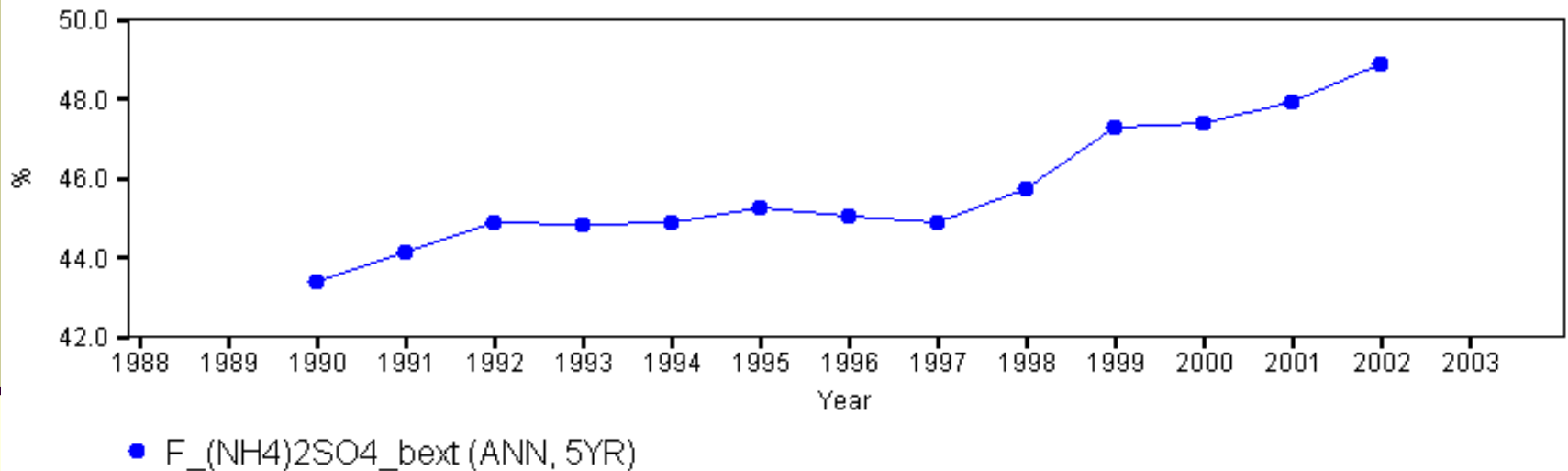
Limitations in Data

- SO2 inventory for Centralia based on CEMs
- SO2 inventory for other sources generally based on emission estimates

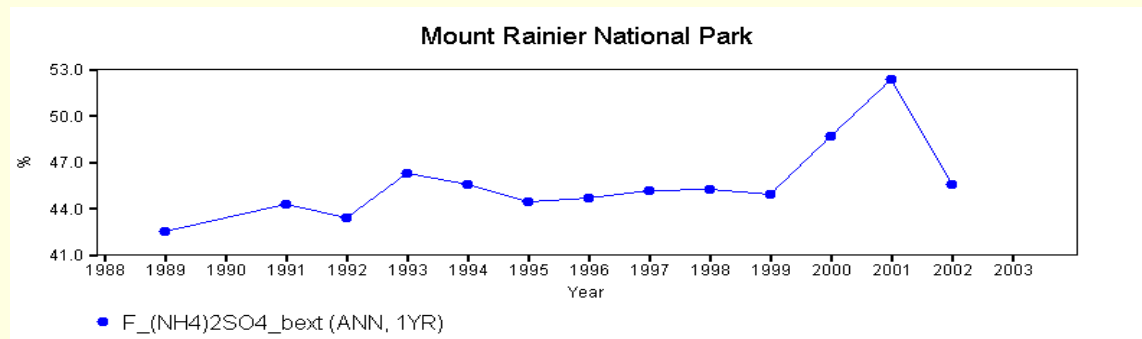
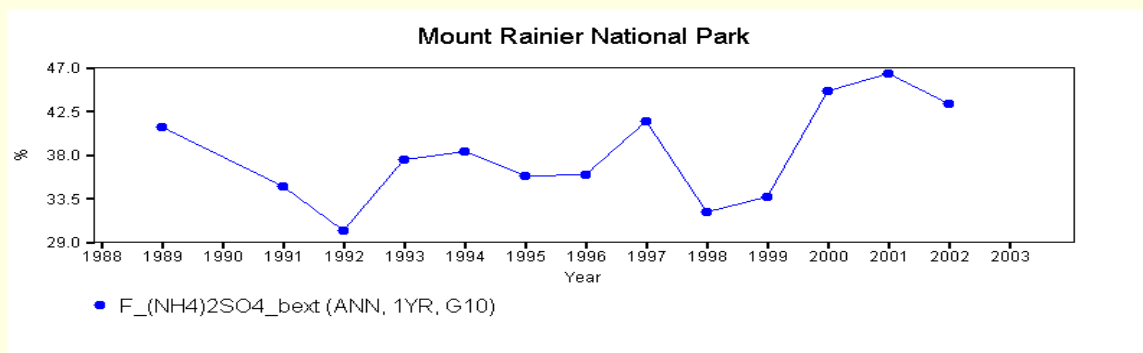
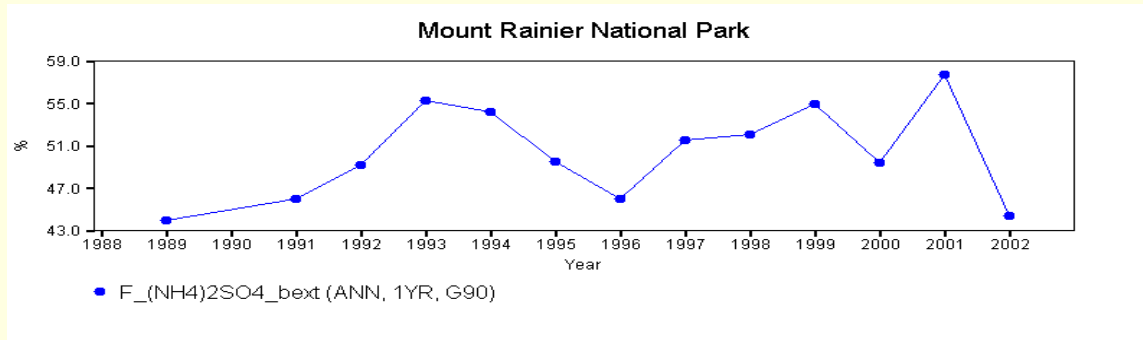
- Only permanent site monitoring SO2 related emissions is at Tahoma Woods (1380 feet)
 - IMPROVE
 - NADP
 - CASTNet
- Best “signal” from Centralia measured at Paradise (5400 feet) not Tahoma Woods
- Effects episodic but data is in annual averages
- Monitoring data only available through 2002 (maximum emissions reductions occurred after 07/2002)

Trend in Contribution of Sulfate to Visibility Extinction as a Five Year Running Average

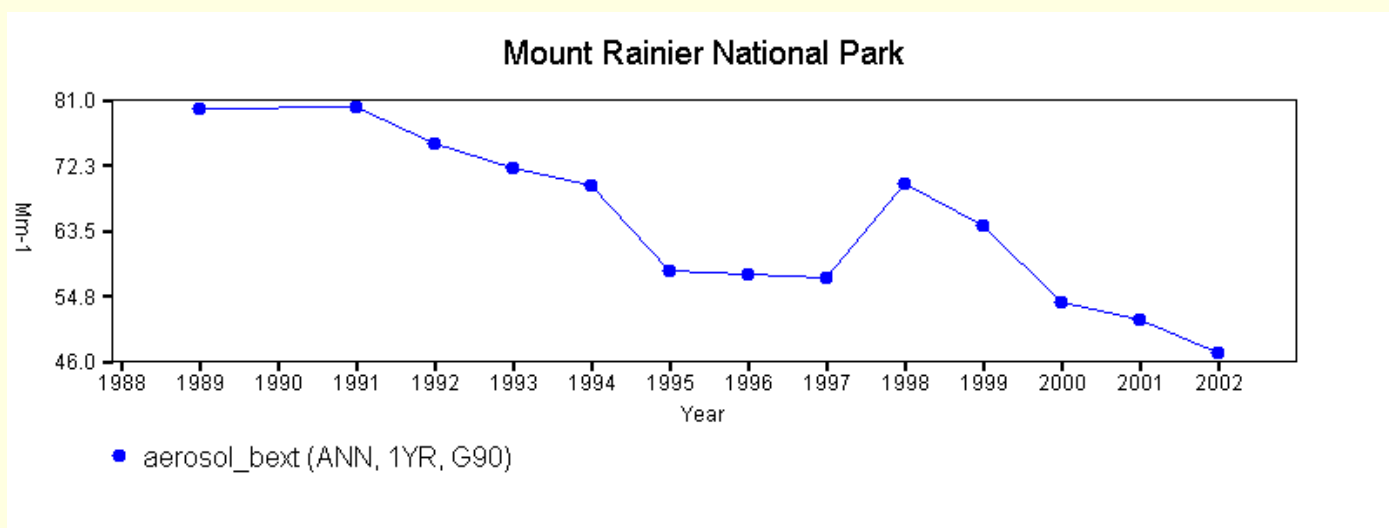
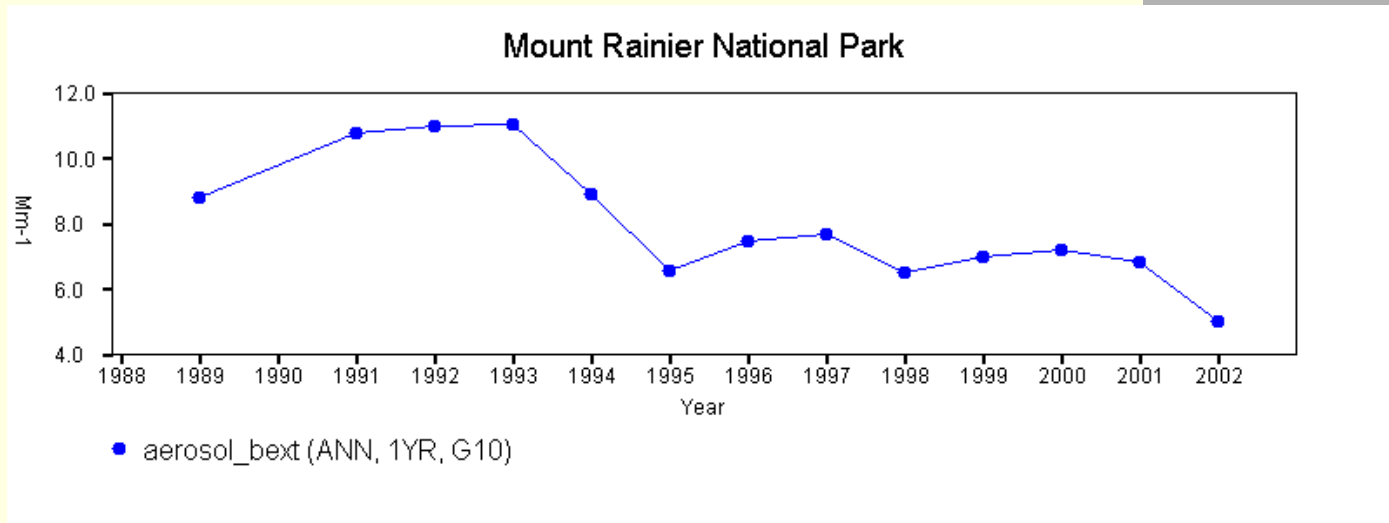
Mount Rainier National Park



Annual Average Percent Sulfate Contribution to Visibility Extinction



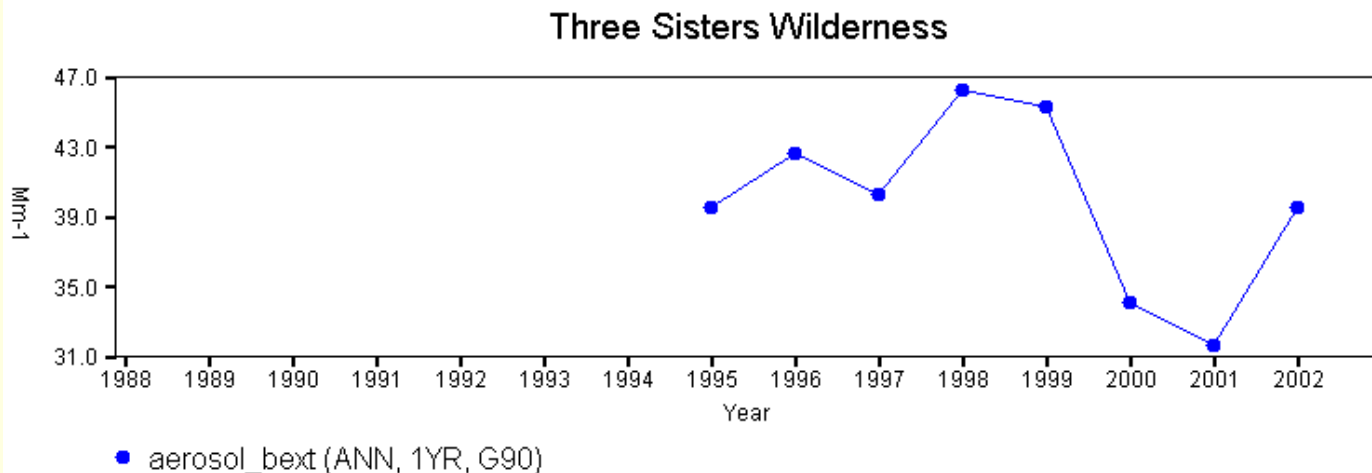
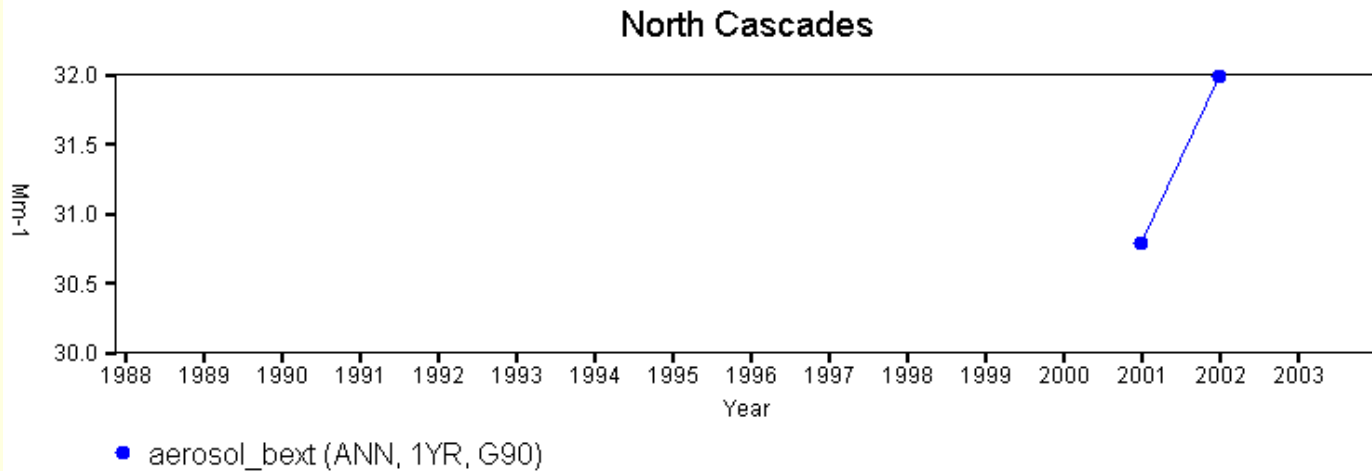
Trend in Annual Average Visibility Extinction on the 20% Best & 20% Worst Days



Coincidence?

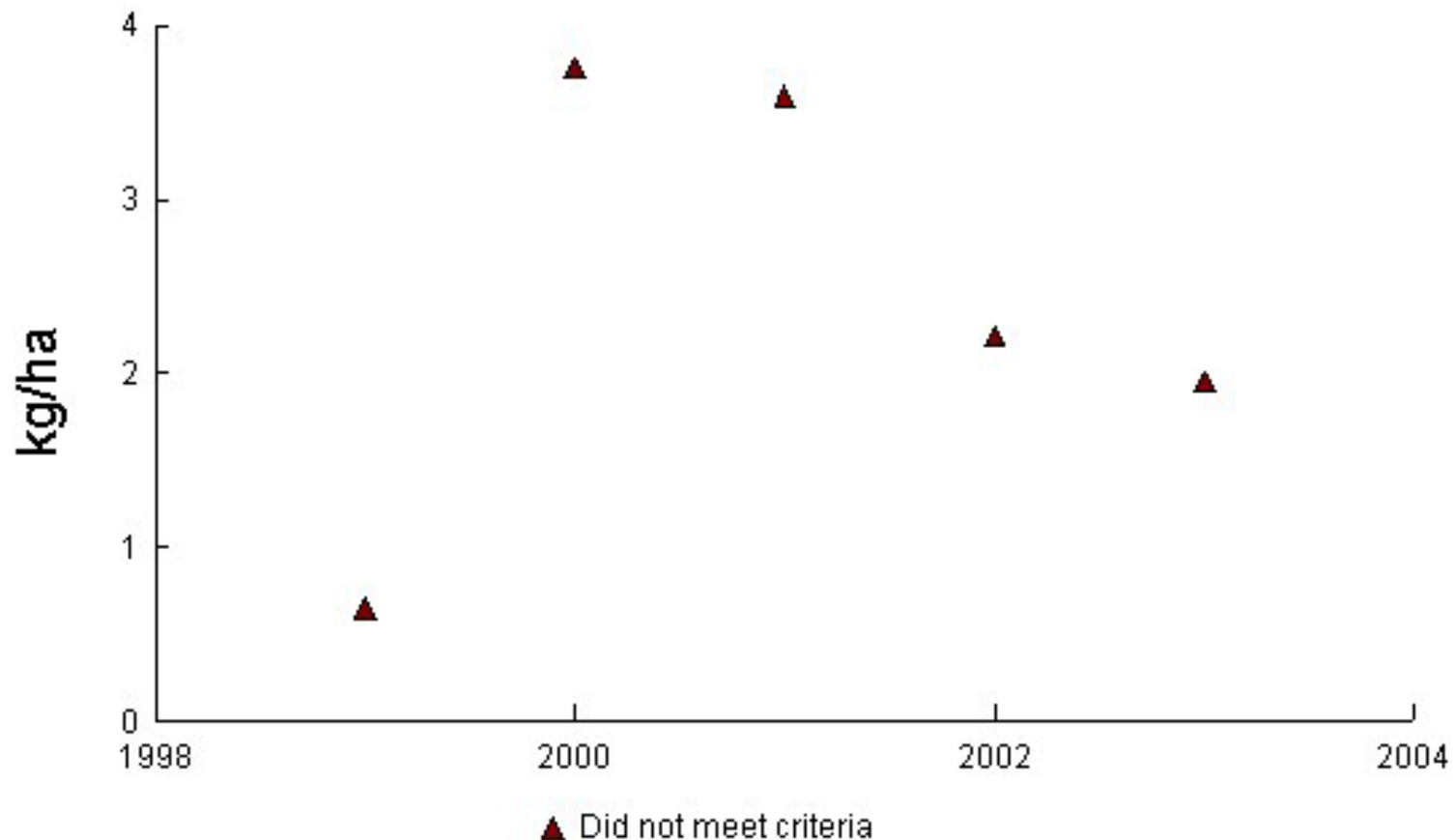
- Most IMPROVE sites in WA, OR, and ID showed improvement on the 20% best days in 2002 (except Starkey and Hell's Canyon)
- Was 2002 just a good year?
- Did the emissions reductions from Centralia result in widespread improvement?
- Only Mount Rainier NP showed improvement on the 20% worst days
- All other NW sites showed marked degradation on the 20% worst days.

Trend in Annual Visibility Extinction on 20% Worst Days at Other NW Sites

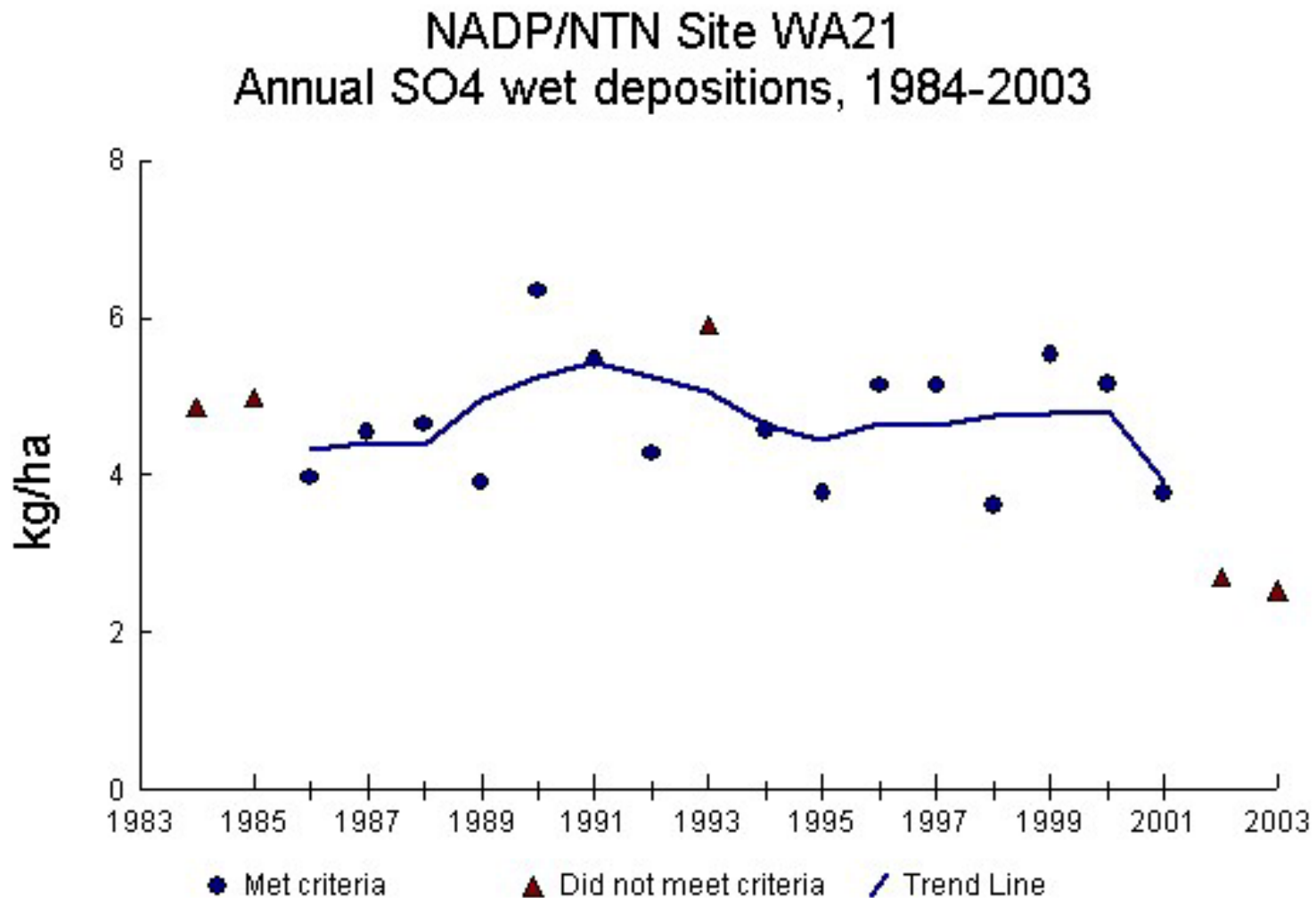


Wet Sulfate Deposition at Tahoma Woods

NADP/NTN Site WA99
Annual SO₄ wet depositions, 1999-2003

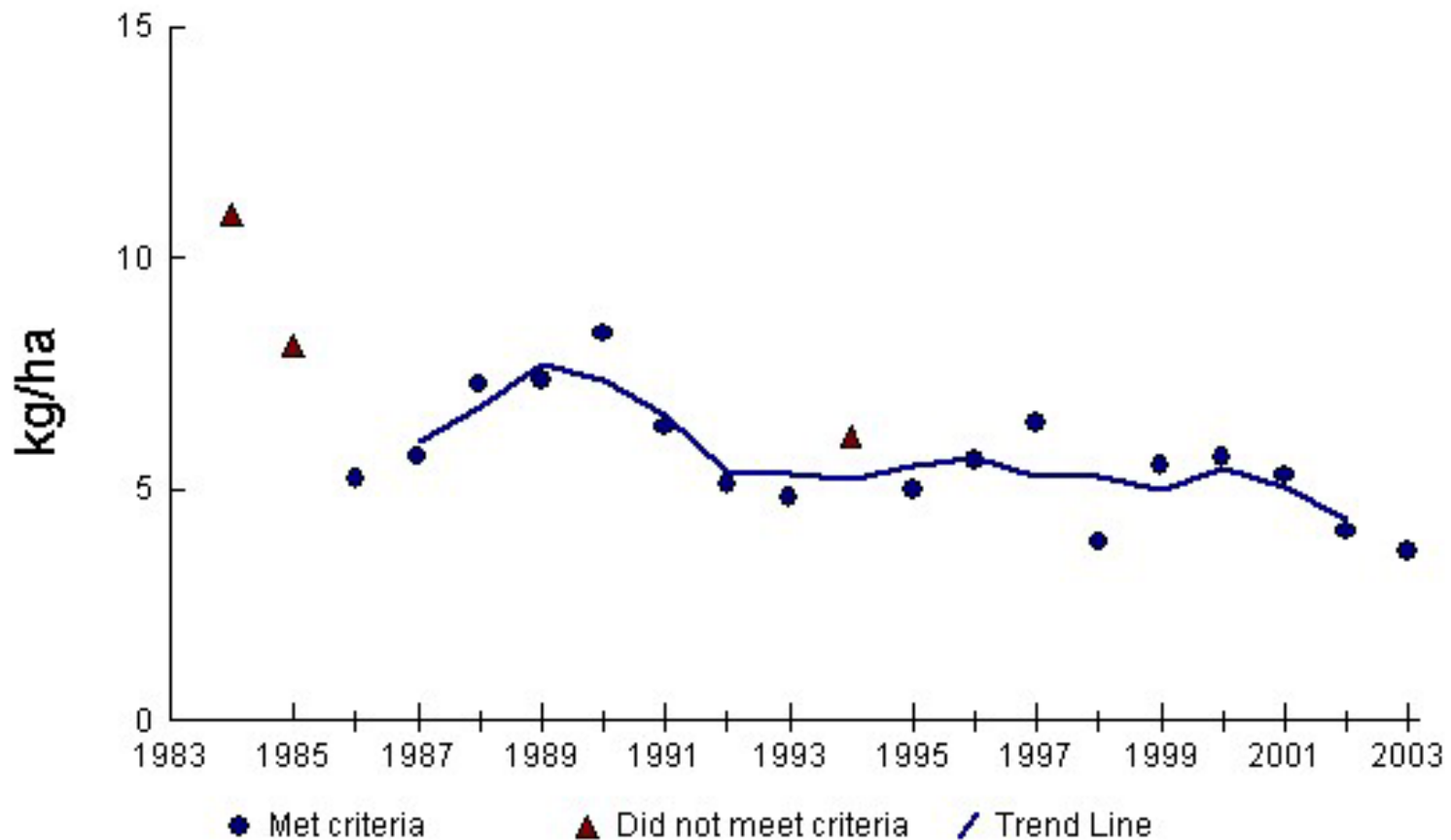


Wet Sulfate Deposition at Pack Forest



Wet Sulfate Deposition at North Cascades NP

NADP/NTN Site WA19
Annual SO₄ wet depositions, 1984-2003



Coincidence?

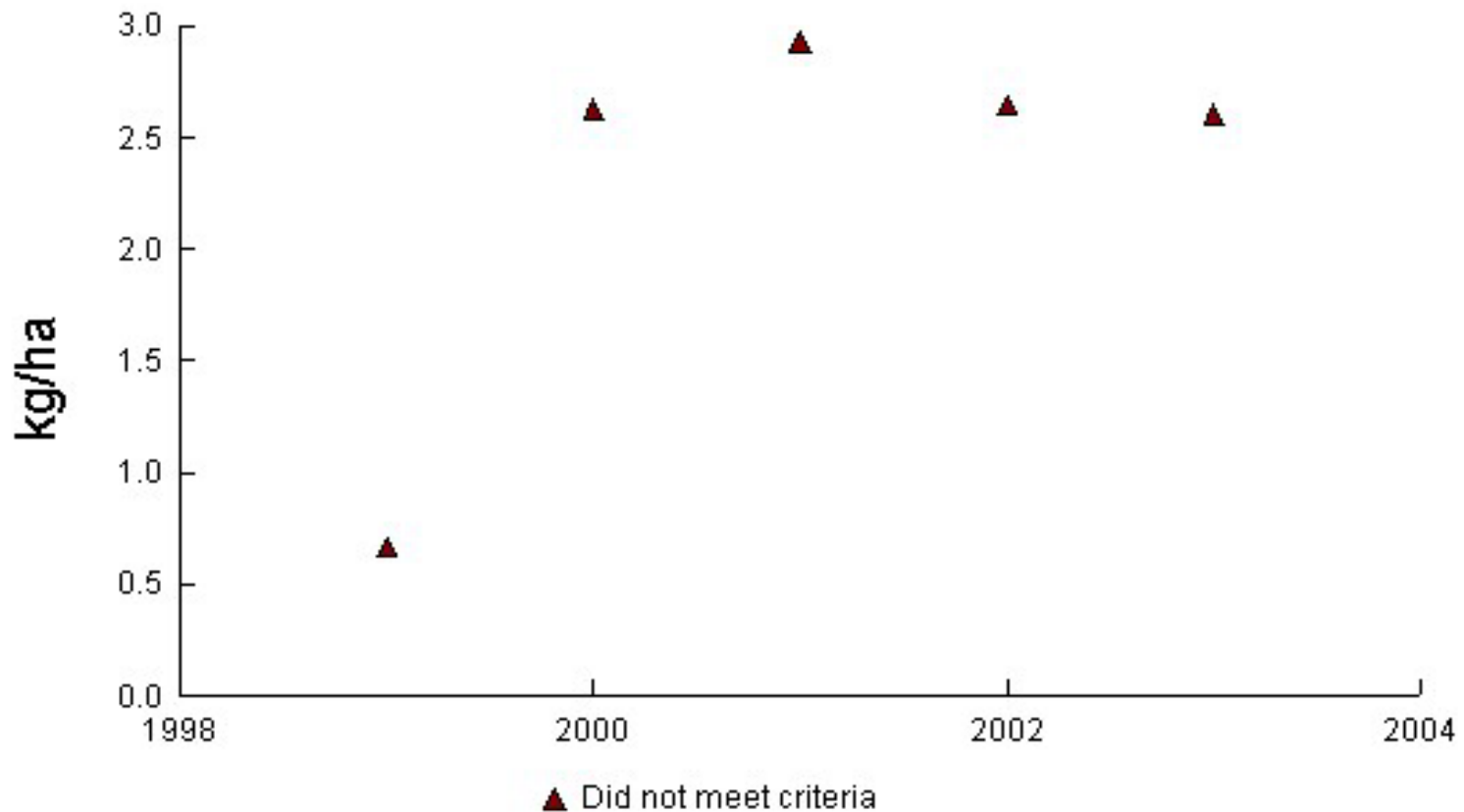
- Data from Mount Rainier NP and Pack Forest did not meet completeness criteria
- Several other large SO₂ emitters ceased operations around 1999 including pulp and paper mills and aluminum smelters. Are reductions in sulfate deposition due to:
 - Emissions reductions from Centralia
 - Statewide reductions
 - Puget Sound region reductions
 - All of the above

What About Wet Nitrate Deposition?

	1999	2000	2001	2002	2003
NOx Tons per Year	21,555	20066	17790	15,528	17,531

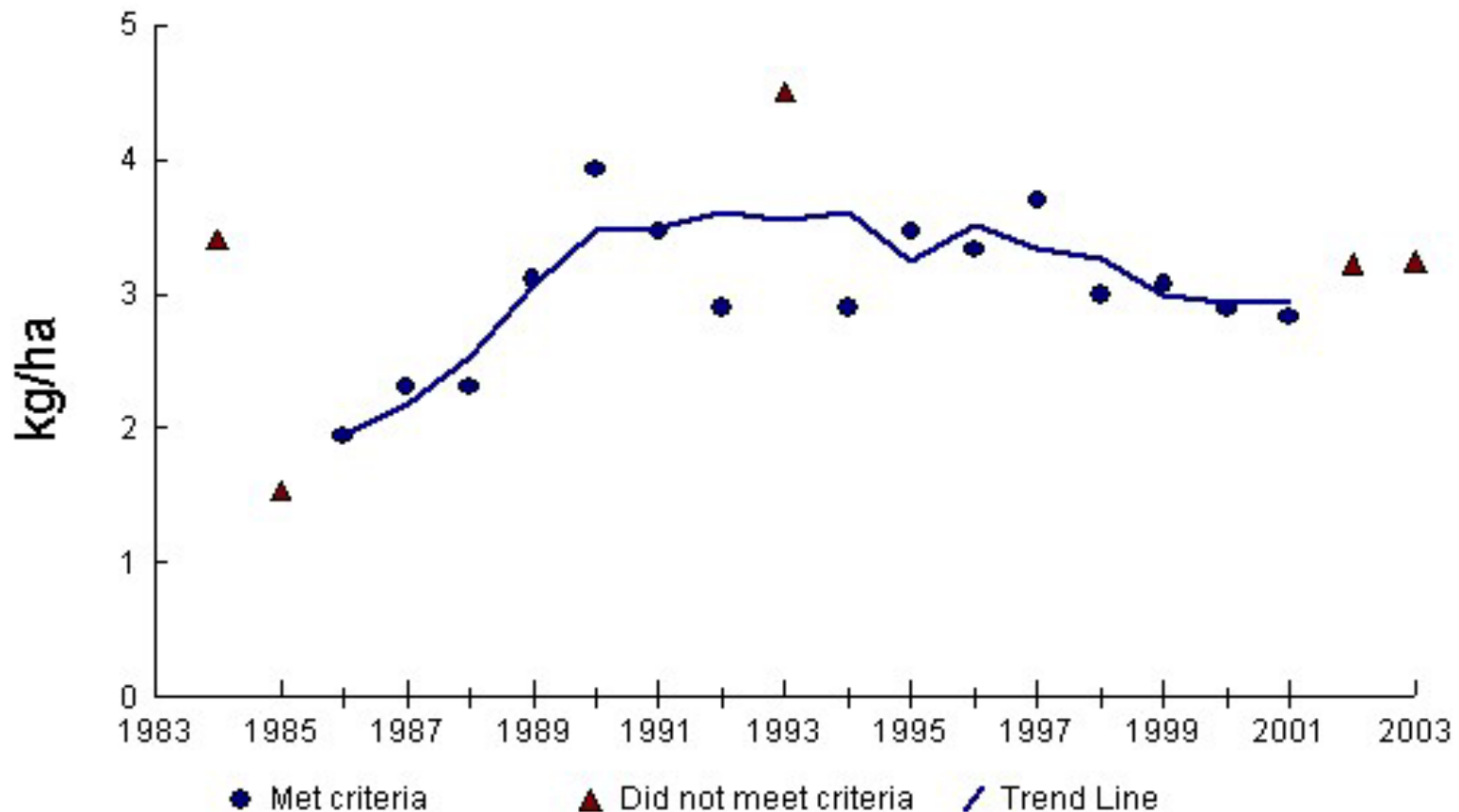
Wet Nitrate Deposition at Tahoma Woods

NADP/NTN Site WA99
Annual NO₃ wet depositions, 1999-2003



Wet Nitrate Deposition at Pack Forest

NADP/NTN Site WA21
Annual NO₃ wet depositions, 1984-2003



Summary and Conclusions

- Despite significant emission reductions from Centralia, we wouldn't necessarily measure improvement in air quality monitored at Tahoma Woods
 - Tahoma Woods influenced more by Puget Sound
 - Impacts from Centralia are episodic
 - Don't even have data for 2003 for visibility
- Nonetheless, visibility and wet sulfur deposition at Tahoma Woods show improvement in 2002 (and 2003 for wet dep)
 - No corresponding improvement on 20% worst days at other NW sites
 - No improvement in wet nitrate deposition
- Other explanations are possible – e.g., reductions in SO₂ from other sources
- Data is insufficient to reach any conclusion regarding trends or causality

