Ozone and SO2 Sensitive Vascular Plants

	A	B	C	D	E	F
1	**RESEARCH SUMMARY**					
2						
3	Region 2 SO2 sensitive plants					Family
4	Type of Injury: Visible, foliage			*Acer glabrum*	Maple, Rocky Mountain	Aceraceae
5				*Acer negundo interius*	Manitoba Maple	Aceraceae
6				*Alnus tenuifolia*	Alder, thinleaf	Betulaceae
7				*Amelanchier alnifolia*	Serviceberry, Saskatoon	Roseaceae
8				*Amelanchier utahensis*	Serviceberry, Utah	Roseaceae
9				*Corylus cornuta rostrata*	Hazel, beaked	Corylaceae
10				*Populus tremuloides*	Aspen, trembling	Salicaceae
11				*Prunus emarginata*	Cherry, bitter	Roseaceae
12	[Davis and Wilhour, 1976, in Bunin, 1990. "Sensitivities of Colorado					
13	and Wyoming Wilderness Area Vascular Plants to Sulfur Dioxide,					
14	Nitrogen Dioxice, and Ozone: an Overview." Prepared for USDA					
15	Forest Service Region 2, Lakewood CO.]					
16						
17	Visible injury with increasing ozone					
18		*Abies concolor*	Fir, White			Pinaceae
19		*Abies lasiocarpa*	Fir, Subalpine			Pinaceae
20		*Pinus ponderosa*	Pine, Ponderosa	(not sure which ssp)		Pinaceae
21	[Miller, Dunn et al., 1989. "Testing the Sensitivity of Five Western					
22	Conifer Species to Sulfur Dioxide Alone, Ozone Alone, and Ozone					
23	Followed by Acidic Fog". Pacific Southwest Forest and Range					
24	Experiment Station, Forest Service. Riverside CA.]					
25						
26	Ozone Effects					
27	Type of Injury: Growth Reduction	*Pinus jeffreyi Grev. and Balif.*	Pine, Jeffrey			Pinaceae
28	[Peterson, Arbaugh et. al., 1987. "Evidence of Growth Reduction in					
29	Ozone-injured Jeffrey Pine	(Pinus jeffreyi)				
30	in Sequoia and Kings Canyon National Parks." APCA Journal, Vol. 37, No. 8. Sept. 1987.]					
31						
32	Ozone Effects on tree growth and vigor (CA)					
33		*Pinus ponderosa*	Pine, Ponderosa			Pinaceae
34	**Significant correlation between ozone and growth not demonstrated**					
35	[Peterson, et. al, 1989. "The Effects of Ozone Stress on Tree Growth and Vigor in the					
36	Sierra Nevada of California, USA." Proc. 14th Int. Meeting for Specialists in Air					
37	Pollution Effects on Forest Ecosystems, Interlaken, Switzerland Oct. 2-8, 1988.]					
38						
39	Negative Ozone Effects on photosynthesis (Field and Lab, all concetrations:CA)					
40		*Acer saccharum*	Maple, Sugar			Aceraceae
41		*Glycine max cv.*	Hodgson (soybean)			
42		*Pinus strobus*				Pinaceae
43		*Populus deltoides X trichocarpa*	Poplar, Hybrid			Salicaceae
44		*Quercus rubra*	Oak, Northern Red			Fagaceae
45		*Trifolium repens cv.*	Clover, Arlington Red			Fabaceae
46						
47						
48						

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49	**RESEARCH SUMMARY**					
50	Negative Ozone Effects on photosynthesis continued					
51		*Triticum aestivum cv.*	Wheat, Winter (Vona)			Poaceae
52						
53	Simulated acidic rain was tested on Acer saccharum, Pinus strobus and Quercus rubra. No negative effect on					
54	photosynthesis was observed. Reich, P. B. and Amundson, R. G., 1985. "Ambient Levels of Ozone Reduce Net Photosynthesis in Tree and					
55	Crop Species." Science, Vol. 230, pp 566-570, November, 1985.					
56						
57	Ozone sensitive plants in W. US-potential bioindicators					
58	Injury: study assessed physiological,	*Pysocarpus sp.*	Ninebark			
59	growth, biomass and visible injuries.	*Prunus virginiana*	Chokecherry			
60	Species are rated sensitive based	*Amelanchier alnifolia*	Saskatoon Serviceberry	(only defoliation was significant effect. Not good bioindicator)		
61	on combination of these impacts.	*Artemesia sp.*	Sagebrush	(significant neg responses, but not good indicator)		
62		*Rubus parviflorus (small)*	Thimbleberry			
63		*Vaccinium sp.*	(different species)			
64						
65	Mavity, E., Stratton, D., and Berrang, P.(no date) "Effects of Ozone on Several Species of Plants which are Native ot the Western US"					
66	USDA Forest Service, Center for Forest Environmental Studies, Dry Branch, GA					
67						
68	Ozone/SO2 sensitive trees and shrubs	*Acer negundo*	boxelder	*Agropyron smithii*	western wheatgrass	
69	Injury:species determined sensitive	*Abeis concolor*	white Fir			
70	by one or more of the following impacts:	*Amelanchier alniflia*	serviceberry			
71	cellular, visible, biochemistry, growth,	*Arctostaphylos uva-ursi*	red bearberry			
72	disease resistance..	*Artemisia tridentata*	big sagebrush			
73	x	*Artemisia sp.*				
74		*Gleditsia triacanthos*	honey-locust			
75	x	*Physocarpus monogynus*	mountain ninebark			
76		*Picea pungens*	blue Spruce			
77		*Pinus ponderosa var. scopulorum*	ponderosa pine			
78		*Pinus ponderosa var. ponderosa*	ponderosa pine			
79	x	*Populus tremuloides*	quaking Aspen			
80		*Potentilla fruticosa*	golden hardhack			
81	x	*Prunus virginiana*	choke cherry			
82		*Pseudotsuga menziesii*	Douglas fir			
83		*Quercus gambelii*	Gambel oak			
84	x	*Rhus trilobata*	squawberry			
85		*Rosa woodsii*	Woods' rose			
86		*Rubus parviflorus*	thimbleberry			
87		*Salix gooddingii*	Goodding's willow			
88		*Toxicodentron radicans*	eastern poison ivy			
89	x	*Vaccinium sp.*				
90						
91	x-very sensitive					
92	Binkley, D. et al, "Status of Air Quality and Related Values in Class I National Parks and Monuments of the Colorado Plateau"					