TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

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Wind Erosion Forces in California

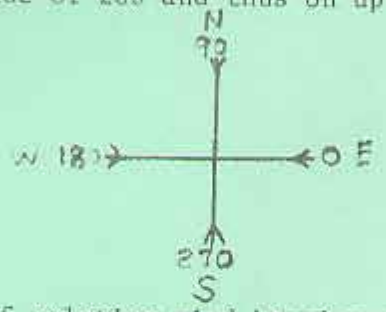
The material following is taken largely from ARS Agricultural Handbook No. 346 "Wind Erosion Forces in the United States and Their Use in Predicting Soil Loss", April 1968. Much of the Data presented in the handbook is from 18 recording stations in California. The purpose of this technical note is to present the material in a form more conveniently usable by SCS technicians in California.

Recent research by the Environmental Protection Agency has revealed that farming operations in California suspend dust particles in the atmosphere sufficiently to seriously degrade air quality. This places a new dimension on wind erosion control that we need to consider in providing conservation services to farm operators. While information provided in AH-346 does not relate directly to this problem, the data presented in the Appendix for California locations should be helpful to technicians in determining the dimension of wind erosion forces in their work areas.

The table following includes 3 terms that must be understood for the information to have meaning:

Magnitude represents a scale of from approximately 1 (little erosive force) to about 1500 (maximum erosive force) as characterized by measurements made within the United States. The numerical value considers both wind velocities and duration such that a magnitude of 100 has half the erosive force (soil moving potential) as a magnitude of 200 and thus on up the scale.

Direction indicates the direction from which the erosive wind comes. This is measured in degrees from due east as indicated by the adjacent figure. Thus, "0" indicates wind dominantly from due east, "90" from due north, etc.



Preponderance is a numerical indication of relative wind barrier effectiveness such that "1" means that no barrier alignment is more effectice than another; "2" indicates that a barrier across the wind direction shown by the table will be twice as effective as one constructed parallel to the wind direction. Similarly, a preponderance of "6" tells us that a wind barrier placed across the wind direction will be six times as effective

as one placed parallel. Preponderance tells us then whether we can get effective wind erosion control from barriers or whether we should resort to soil ground covers. In interpreting data from the table, it is important to use figures only for those months when wind erosion is known to be a local problem.

Even though data is provided for only 18 California stations, field office personnel should find information provided by adjacent stations closely comparable to their local wind conditions. Some field offices may be at locations suggesting that they use means extracted from two or more of the reporting stations to represent their local conditions.

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Enclosure

TABLE 1.—*Relative magnitude, prevailing wind erosion direction,[1] and preponderance of wind erosion forces in prevailing wind erosion direction for 212 locations in 39 States by months*—Continued

Item	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Palmdale, Calif. (Jan. 1934 – Dec. 1941; Nov. 1948 – Nov. 1952)												
Magnitude	210	267	326	349	407	368	285	216	176	179	148	158
Direction	23	45	23	45	45	45	45	45	45	45	22	45
Preponderance	1.8	2.1	1.6	2.0	2.4	4.2	5.7	5.0	4.3	2.4	1.9	1.7
Riverside, Calif. (Jan. 1933 – Dec. 1934; Feb., Apr. – June 1935; Feb. 1936 – July 1941; Sept. 1941 – May 1953)												
Magnitude	68	74	80	94	107	119	124	112	81	53	50	58
Direction	67	112	157	157	157	157	135	157	157	157	23	21
Preponderance	1.2	1.2	1.6	2.0	2.5	2.8	3.6	3.7	3.1	2.3	1.1	1.4
Salinas, Calif. (Aug. 1941 – Dec. 1944)												
Magnitude	275	169	166	207	140	160	156	146	103	91	116	152
Direction	135	135	135	157	158	158	157	135	135	135	135	135
Preponderance	6.8	4.5	3.5	2.8	3.0	3.3	3.4	3.2	4.2	3.0	4.2	5.3
San Diego, Calif. (Jan. 1951 – Dec. 1960)												
Magnitude	73	81	105	96	66	37	19	20	24	34	81	57
Direction	90	90	90	68	22	67	157	22	157	67	90	113
Preponderance	1.5	1.5	1.4	1.3	1.1	1.2	1.3	1.1	1.5	1.4	1.4	1.3
San Miguel Island, Calif. (Feb. 1940 – June 1942)												
Magnitude	427	721	1,142	1,417	1,627	1,626	854	1,095	713	640	616	709
Direction	113	113	113	113	135	135	157	135	135	157	156	113
Preponderance	2.8	4.0	2.6	4.0	3.2	4.1	5.4	2.6	2.6	4.6	3.5	3.6
Santa Rosa, Calif. (Apr. 1943 – Dec. 1945)												
Magnitude	36	106	109	131	96	109	93	72	36	53	27	55
Direction	135	90	68	135	68	111	90	112	90	90	90	90
Preponderance	3.1	1.9	1.6	1.6	1.4	1.4	2.7	2.1	1.6	1.7	1.5	4.8
Stockton, Calif. (Feb. 1941 – June 1946)												
Magnitude	80	105	125	110	158	185	56	54	49	52	33	76
Direction	35	134	135	135	180	180	180	180	158	135	135	135
Preponderance	4.0	2.2	2.5	2.0	1.7	2.4	3.1	2.9	2.5	3.7	2.1	2.3
Thermal, Calif. (July 1943 – Feb. 1945)												
Magnitude	17	95	127	214	176	238	115	103	95	53	40	21
Direction	113	113	113	113	113	113	113	113	113	113	113	135
Preponderance	2.4	2.6	2.3	4.3	3.0	4.4	3.7	4.3	4.1	2.6	2.8	3.4
Victorville, Calif. (Jan. 1942 – Feb. 1946; May–Sept. 1948; Sept. 1950 – June 1957)												
Magnitude	224	311	392	413	342	283	159	147	134	145	192	218
Direction	77	180	19	180	180	45	90	90	90	22	22	22
Preponderance	1.1	1.2	1.3	1.4	1.3	1.1	2.0	1.8	1.4	1.2	1.3	1.4

TABLE 1.—*Relative magnitude, prevailing wind erosion direction,*[1] *and preponderance of wind erosion forces in prevailing wind erosion direction for 212 locations in 39 States by months*—Continued

Item	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Arcata, Calif. (Dec. 1949 – Nov. 1958)												
Magnitude	159	154	183	172	192	140	80	54	53	81	93	126
Direction	135	135	135	135	135	135	135	135	135	114	135	135
Preponderance	2.3	2.8	3.3	3.9	4.4	6.6	6.0	5.0	3.6	2.1	3.1	2.5
Bishop, Calif. (Jan. 1948 – Jan. 1957)												
Magnitude	170	234	409	299	305	256	170	176	175	242	222	161
Direction	90	90	90	90	90	90	112	90	90	90	90	90
Preponderance	4.1	4.0	3.2	2.6	2.0	2.4	2.1	2.3	2.5	3.6	5.7	3.9
Blythe, Calif. (Aug. 1942 – May 1944)												
Magnitude	110	108	172	132	226	216	136	166	59	103	127	90
Direction	90	90	90	45	90	45	90	90	90	67	90	113
Preponderance	2.3	2.4	2.2	2.3	1.4	2.1	1.9	3.9	1.8	1.9	4.2	1.9
China Lake, Calif. (Apr. 1945 – Dec. 1959)												
Magnitude	290	370	539	553	504	431	282	274	241	272	236	194
Direction	67	45	45	45	45	45	45	67	45	45	45	45
Preponderance	1.8	1.7	1.7	1.6	1.8	2.0	2.1	2.4	2.4	1.9	1.6	1.7
El Centro, Calif. (Feb. 1945 – Apr. 1946; Nov. 1946 – Feb. 1958)												
Magnitude	155	203	299	344	393	311	92	90	101	128	142	117
Direction	22	22	22	22	22	180	180	180	180	180	180	22
Preponderance	1.6	2.0	2.9	3.6	3.8	3.7	2.1	2.3	2.6	4.1	1.6	1.4
Fort Bragg, Calif. (June 1943 – May 1945)												
Magnitude	135	237	180	182	103	102	44	65	51	56	80	103
Direction	157	135	135	135	113	135	112	113	113	135	157	135
Preponderance	2.3	2.3	2.3	4.3	4.1	4.5	3.9	3.7	4.5	3.6	1.7	1.6
Fresno, Calif. (May 1950 – Apr. 1955)												
Magnitude	70	65	92	73	111	77	27	17	27	52	36	79
Direction	113	135	135	135	135	157	157	157	135	112	135	135
Preponderance	2.7	2.9	3.1	2.6	2.2	4.6	4.2	3.1	2.4	1.9	2.0	2.0
Marysville, Calif. (Aug. 1943 – Oct. 1944)												
Magnitude	141	187	188	121	131	195	101	61	47	54	36	150
Direction	113	135	135	135	135	135	135	113	135	135	135	112
Preponderance	3.3	4.3	3.0	3.2	6.4	4.6	3.6	3.2	4.9	4.6	9.3	1.9
Merced, Calif. (Jan. 1942 – Nov. 1946; Dec. 1947 – Dec. 1952)												
Magnitude	103	96	173	141	127	137	69	49	55	58	52	91
Direction	135	135	113	113	113	113	113	113	113	113	135	135
Preponderance	3.8	3.5	3.3	4.2	3.3	3.6	4.0	4.0	3.6	3.6	3.5	4.1