

# Agronomy Technical Note 69 - Wind Erosion Equation (Annual Method) on Rangeland

NM-NRCS

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This note is to be used to estimate annual wind erosion annual method using the WEQ NAM part 502 method where native vegetation is in the field. It is **not** to be **used for RMS planning on rangeland**. It can be used when sodbusting land to estimate a before erosion rate and can be used to see if current vegetation meets T.

## TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

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### A GUIDE FOR CONVERTING RANGELAND VEGETATION TO SMALL GRAIN EQUIVALENTS

This technical note is to be used as a supplement to the National Resources Inventory (NRI 1981-82) instruction Section N, Wind Erosion, Data.

In using the wind erosion equation (WEE) to determine the soil loss by wind on rangelands, the vegetative cover must be converted to small grain equivalents. When western rangelands are properly managed, vegetation is generally adequate to control wind erosion. Areas receiving 12 inches or more of average annual precipitation and those range sites producing more than 1,000 pounds of average annual air dry vegetation per acre generally will not have a wind erosion problem if they are properly managed.

Natural plant communities produce various proportions of grass, forbs, and shrubs. A variety of species complement each other and, when properly managed, generally curtail wind erosion. In areas of less than 12 inches average annual precipitation and where vegetation is not properly managed, wind erosion can become a serious problem.

Vegetative communities in the western states which may require the use of the WEE are the Great Basin sagebrush areas, saltbush-greasewood, creosote bush, cactus-shrub, grama-tobosa-creosote bush, and other areas which have sparse plant cover and have not been properly managed.

To use the following table, estimate the total vegetation produced per acre and, determine the percent composition by species, then convert to flat small grain equivalent. Mixtures of species generally have a combined effect greater than the sum of the individual effects (see reference). As a rule of thumb, 75 to 125 pounds of plant growth can be expected for each inch of water available in the soil even though the site may be in a low ecological condition. If a conversion is needed for a plant not listed on the table, use a similar species.

The figures in the table are based on the current total production of leaves and twig growth. The Woody materials (trunks, branches, and stems) are not included in the table. Wood material of deciduous species such as shimer oak and mesquite may have a significant effect on wind erosion, depending density and height. Fallen leaves provide some mulch cover which provides some protection from wind erosion. Until we have better data, use a direct ratio for litter to flat small grain; i.e. 200 pounds of litter equals 200 pounds small grain residue.

The effect of rock fragments (stones and desert pavement) is provided for in the "I" factor of the equation.

Other than those grass plants indicated, the conversion equivalents are estimates by the author and are intended to be used to attain an approximation of potential wind erosion under average conditions. Field testing and research are needed to improve these estimates so that the conversion guide will be more reliable. As field use is made of this table, suggestions for improvement should be sent to the range conservationist at the technical service center.

## Guide for Converting Range Vegetation to Equivalent Quantity of Flat Small Grain Residue

### Pounds per acre of Range Vegetation

<b>Grass Plants</b>	<b>50</b>	<b>100</b>	<b>200</b>	<b>300</b>	<b>400</b>	<b>500</b>	<b>600</b>	<b>700</b>	<b>800</b>	<b>900</b>	<b>1000</b>
<b>1</b> *Buffalograss, burrograss Inland saltgrass	320	720	1630	2630							
<b>2</b> *Big bluestem	45	110	280	480	705	950	1215	1495	1785	2090	2410
<b>3</b> *Western wheatgrass, creeping wildrye & sideoats grama	155	245	775	1240	1740	2260	2795	3345			
<b>4</b> *Little bluestem	45	110	285	495	735	995	1280	1580	1900	2230	2575
<b>5</b> *Blue grams, threadleaf sedge & perennial threeawn	110	235	490	760	1040	1325	1610	1905			
<b>6</b> Galleta & tobosa	150	300	800	1200	1700	2600					
<b>7</b> Bottlebrush squirreltail, needleandthread, & thurber needlegrass	70	150	300	600	800	1200					
<b>8</b> Alkali sacaton	60	150	400	800	1400	2200	2800	3600			
<b>9</b> Bluebunch wheatgrasa	50	120	300	550	850	1150	1500	1900	2300	2600	3000
<b>10</b> Idaho fescue	100	200	400	900	1500	2300					
<b>11</b> Indian ricegrass	100	175	300	600	900	1400					
<b>12</b> Crested wheatgrass	130	300	600	900	1300	1800	2400	3100	4000		
<b>13</b> Cheatgrass	100	200	300	600	800	1000	1200	1600	2000	2500	3000

\*Lyles Leon and Bruce E. Allison, "Range Grasses and Their Small Grain Equivalents for Wind Erosion Control," Journal of Range Management, Vol. 33 No. 2, March 1980, pp. 143-146.

NOTE: Other grass species equivalents were estimated by comparing the growth characteristics with the tested species.

**Pounds per acre of Range Vegetation <sup>1/</sup>**

<b>Forbs</b>		<b>50</b>	<b>100</b>	<b>200</b>	<b>300</b>	<b>400</b>	<b>500</b>	<b>600</b>	<b>700</b>	<b>800</b>	<b>900</b>	<b>1000</b>
<b>1</b>	Perennial forbs	50	100	300	500							
<b>2</b>	Annual forbs	50	100	200	300	500	800	1000				

**Shrubs**

<b>1</b>	Big sagebrush	30	70	300	750	1100	1500	2000	2600	3200	4000	
<b>2</b>	Low sagebrush	50	150	450	900	1600	2200	2900	3600			
<b>3</b>	Greasewood & 4-wing saltbush	20	60	250	450	800	1250	1800	2400	3000		
<b>4</b>	Tall and low rabbitbrush	30	70	350	800	1200	1700	2200	2800	3400		
<b>5</b>	Shadscale	30	70	300	500	850	1300					
<b>6</b>	Creosote bush	20	70	250	400	600	800	1000				
<b>7</b>	Mesquite	20	80	200	300	500	700	800	1000	1500	2000	3000
<b>8</b>	Juniper	40	90	180	300	450	800	950	1300	2000	2700	36050
<b>9</b>	Cholla 2/	0	50	100	250	350	500	700	950	1300		
<b>10</b>	Yucca 2/	0	70	150	250	400	600	750	000	1400	1800	
<b>11</b>	Winterfat	40	100	300	500	800	1400	1800	2300	3000		
<b>12</b>	Litter 3/	50	100	200	300	400	509	600	700	300	900	1000

<sup>1/</sup> Total leaf and twig growth-air dry weight. Woody production not included in these weight figures,

<sup>2/</sup> Include all leaf and fibrous material.

<sup>3/</sup> Litter should, include leaves, twigs and seems up to 1/2 inch in diameter.

For deciduous shrub" estimate foliage production at time of wind erosion hazard.

The forb and shrub small grain equivalents are personal judgment only. No research data is available to support these figures.

Examples of determining “v” for use in the wind erosion equation.

Range site: Loamy – 8-10” p.z. fair condition

Bluebunch wheatgrass	-	50#/acre	=	80
Cheatgrass	-	100#/acre	=	200
Annual forbs	-	50#/acre	=	50
Big sagebrush	-	500#/acre	=	1500
Litter	-	300#/acre	=	<u>300</u>
		v	=	2130

Range site: Basalt hills 2-7” p.z. fair condition

Perennial threawn	-	20#/acre	=	28
Sixweeks grama	-	80#/acre	=	160 (use cheatgrass)
Annual forbs	-	20#/acre	=	20
Creosote bush*	-	250#/acre	=	325
Litter	-	50#/acre	=	<u>50</u>
		v	=	583

\*current and accumulated production

Range site: Loamy 12-16” p.z. <sup>1/</sup> poor condition

Cheatgrass	-	300#/acre	=	600
Big sagebrush	-	700#/acre	=	2600
Litter	-	400#/acre	=	<u>400</u>
		v	=	3600

<sup>1/</sup> Little if any wind erosion should occur on this site.