

# **NATIVE PLANT SEED WEIGHTS**

## **GLACIER NATIONAL PARK**



Photo - Glacier National Park digital files

**Compiled by Jessica Wiese**

## **Native Plant Species Weights**

### Author Information

Jessica L. Wiese  
Montana State University  
Restoration Ecology Intern  
Biological Science Technician  
Glacier National Park  
West Glacier, MT 59936  
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ABSTRACT: The funding for this study has been provided through a NPS/CESU grant in order to obtain a more complete, accurate listing of restoration species weights used in Glacier National Park. This information is fundamentally important to many parks and indeed the entire Rocky Mountain Region. The knowledge of species seed weight will allow for greater accuracy in determining seed quantities required and in evaluating seed germination and establishment success when implementing revegetation work. It will also give a better understanding of the plant physiological characteristics.

Key Words: native seed weight, seeding rate, variation, weighing techniques.

**Introduction:**

The following information has been compiled in an effort to provide a more accurate seeding rate for native plants used in restoration work in Glacier National Park. The information is a summary of various publications, including government documents as well as commercial seed catalogs. Document edits were provided by Joyce Lapp, Restoration Biologist at Glacier National Park.

**Materials and Methods:**

Where published information was available, a seed weight was obtained. When there were different seed weights noted for the same species, an average was obtained and the range of weights noted with sources listed in parenthesis.

When no seed weight information was found for a species, the author weighed seed on site at Glacier National Park using AOSA Rules for testing seeds. The weights were obtained by doing 8 replications of 100 seeds, carried out to four significant digits. The number of seeds per gram was obtained by dividing 100 (the number of seeds) by the mean weight (of the 100 seed replicates). Any species not included in the list that exists as a restoration species in the park is either very experimental and rarely used in restoration, or a plant grown strictly from cuttings in our nursery. A few subalpine species were not included in this summary as there was no available seed in storage and the seed had not ripened in the field at the time of project completion. This data will be obtained after fall seed collections have been cleaned. Taxonomic nomenclature follows that used in "Flora of Glacier National Park" by Peter Lesica, published in 2002 by the Oregon State University Press of Corvallis, Oregon.

## NATIVE PLANT SPECIES LIST – Glacier National Park

	weight/lb	weight/g	weight range/lb
<b>CAREX AND RUSHES</b>			
<i>Carex athrostachya</i> Slender beak sedge	2,227,126	4910	
<i>Carex deweyana</i> Dewey's sedge	100,000	220	
<i>Carex haydeniana</i> Hayden's sedge	1220430	2691	
<i>Carex hoodii</i> Hoods sedge	525,000	1157	
<i>Carex nigricans</i> Black alpine sedge	1,220,430	2691	
<i>Carex sp.</i>	176,727	390	
<i>Carex paysonis</i> Payson's sedge	926,531	2043	
<i>Carex phaeocephala</i> Dunhead sedge	518800	1144	
<i>Carex spectabilis</i> Showy sedge	926531	2043	
<i>Juncus mertensianus</i> Merten's rush	10,000,000	22046	10,000,000-45,400,000
<i>Juncus drummondii</i> Drummonds rush	10,000,000	22046	
<i>Luzula hitchcockii</i> Smooth woodrush	886,719	1955	
<b>GRASSES</b>			
<i>Elymus caninus</i> Slender wheatgrass	136,500	301	
<i>Elymus spicatus</i> Bluebunch wheatgrass	103,000	227	70,000-159,000 (2,16)
<i>Bromus carinatus</i> Mountain brome	122,086	269	
<i>Bromus vulgaris</i> Columbia brome	110,000	243	79,6000-119,500 (4)
<i>Cinna latifolia</i> Woodreed	2,100,000	4630	
<i>Calamagrostis canadensis</i> Bluejoint reedgrass	3,837,472	8460	3,000,000-4,729,167 (4)
<i>Calamagrostis inexpansa</i> Narrow-spiked reedgrass	5,300,000	11685	
<i>Calamagrostis purpurascens</i> Purple reedgrass	530,000	1168	
<i>Calamagrostis rubescens</i> Pinegrass	2,646,000	5833	

<b>GRASSES continued</b>	<b>weight/lb</b>	<b>weight/g</b>	<b>weight range/lb</b>
<i>Danthonia intermedia</i> Timber oatgrass	373,000	822	214,000-532,000 (4,16)
<i>Deschampsia atropurpurea</i> Mountain hairgrass	1,656,934	3653	
<i>Deschampsia cespitosa</i> Tufted hairgrass	2,500,000	5512	
<i>Deschampsia elongata</i> Slender hairgrass	1,860,000	4101	
<i>Elymus glaucus</i> Blue wildrye	131,333	290	
<i>Festuca idahoensis</i> Idaho fescue	450,000	992	
<i>Festuca occidentalis</i> Western fescue	348,000	767	
<i>Festuca scabrella</i> Rough fescue	300,000	661	200,000-400,000 (2,4,13,16)
<i>Festuca subulata</i> Forest fescue	400,000	882	
<i>Hierochloa odorata</i> Sweetgrass	110,000	243	
<i>Koeleria cristata</i> Prairie junegrass	2,315,000	5104	
<i>Phleum alpinum</i> Alpine timothy	1,172,345	2585	989,378-1,300,000 (2,4,16)
<i>Poa alpina</i> Alpine bluegrass	1,034,960	2282	
<i>Poa secunda</i> Slender bluegrass	985,930	2174	925,000-1,046,860 (4,16)
<i>Poa sandbergii</i> Sandberg's bluegrass	925,000	2039	
<i>Stipa occidentalis</i> Western needlegrass	285,000	628	259,000-311,000 (4)
<i>Stipa richardsonii</i> Richardson's needlegrass	211,252	466	204,505-218,000 (4)
<i>Trisetum spicatum</i> Spike Trisetum	2,500,000	5512	

## FORBS

<i>Achillea millefolium</i> Piper yarrow	2,740,670	6042	2,277,000-2,955,800 (2,16)
<i>Adenocaulon bicolor</i> Pathfinder	363,636	802	
<i>Allium cernuum</i> Nodding onion	138,000	304	
<i>Anaphalis margaritacea</i> Pearly-everlasting	8,200,000	18078	
<i>Anemone multifida</i> Cliff anemone	363,000	800	
<i>Anemone occidentalis</i> White pasque flower	136,363	301	

<b>FORBS continued</b>	<b>weight/lb</b>	<b>weight/g</b>	<b>weight range/lb</b>
<i>Antennaria alpina</i> Alpine pussy-toes	7,500,000	16535	
<i>Antennaria microphylla</i> Rosy pussy-toes	8,000,000	17637	
<i>Antennaria neglecta</i> Field pussy-toes	6,600,000	14551	
<i>Angelica arguta</i> Sharptooth angelica	175,000	386	
<i>Aquilegia flavescens</i> Yellow columbine	400,000	882	
<i>Aralia nudicaulis</i> Wild sarsaparilla	99,000	218	
<i>Arnica cordifolia</i> Heart-leaf arnica	220,000	485	
<i>Arnica latifolia</i> Mountain arnica	450,000	992	
<i>Arnica mollis</i> Hairy arnica	475,000	1047	
<i>Arnica sororia</i> Twin arnica	4,536,000	10000	
<i>Artemisia ludoviciana</i> Old Man sage	3,750,000	8267	
<i>Artemisia frigida</i> Fringed sagewort	4,318,000	9520	4,136,000-4,500,000 (4,16)
<i>Artemisia tridentata</i> Big sagebrush	2,466,000	5437	
<i>Aster laevis</i> Smooth aster	1,377,125	3036	1,014,000-1,740,250 (4,16)
<i>Astragalus bourgovii</i> Bourgeois milkvetch	120,000	265	
<i>Campanula rotundifolia</i> Harebell	9,500,000	20944	8,000,000-11,200,000 (4)
<i>Castilleja cusickii</i> Yellow paintbrush	4,500,000	19582	
<i>Castilleja miniata</i> Scarlet paintbrush	325,000	717	
<i>Castilleja rhexifolia</i> Rhexis-leafed paintbrush	4,900,000	10803	
<i>Chrysopsis villosa</i> Hairy golden star	445,500	982	403,000-488,000 (4,16)
<i>Claytonia megarhiza</i> Alpine springbeauty	200,000	441	
<i>Clematis columbiana</i> Columbia virgin's bower	253,000	558	
<i>Crepis nana</i> Dwarf hawksbeard	800,000	1764	
<i>Dryas drummondii</i> Yellow dryad	908,000	2002	

<b>FORBS continued</b>	<b>weight/lb</b>	<b>weight/g</b>	<b>weight range/lb</b>
<i>Epilobium alpinum</i> Alpine willow-herb	959,796	2116	
<i>Epilobium angustifolium</i> Fireweed	7,125,000	15708	5,750,000-8,500,000 (13,16)
<i>Erigeron humilis</i> Alpine Woolly Daisy	900,000	1984	
<i>Erigeron peregrinus</i> Daisy, showy fleabane	899,000	1982	
<i>Erigeron compositus</i> Cut-leaf Erigeron	250,000	551	
<i>Eriogonum flavum</i> Yellow buckwheat	220,175	485	
<i>Eriogonum umbellatum</i> Sulphur buckwheat	209,500	462	
<i>Erythronium grandiflorum</i> Glacier-lily	86,083	190	
<i>Fragaria vesca</i> Strawberry	300,000	661	
<i>Fragaria virginiana</i> Strawberry	300,000	661	
<i>Gaillardia aristata</i> Blanket-flower	159,218	351	132,000-186,436 (2,4,16)
<i>Geranium viscosissimum</i> Sticky geranium	55,238	122	52,000-55,238 (2,16)
<i>Geum macrophyllum</i> Large-leaved avens	793,706	1750	
<i>Geum triflorum</i> Prairie smoke	572,777	1263	449,554-696,000 (4,16)
<i>Hedysarum boreale</i> Northern sweetvetch	63,657	140	46,313-81,000 (4)
<i>Hedysarum sulphurescens</i> Yellow sweetvetch	72,570	160	
<i>Heracleum lanatum</i> Cow-parsnip	60,425	133	44,850-76,000 (4)
<i>Heuchera cylindrical</i> Rock alumroot	7,616,938	16793	
<i>Heuchera parvifolia</i> Prairie alumroot	11,200,044	24692	
<i>Hypericum formosum</i> Western St. John's-wort	1,916,000	24692	
<i>Iliamna rivularis</i> Streambank globemallow	130,000	287	
<i>Iris missouriensis</i> Blue flag	20,479	45	19,958-21,000
<i>Liatris punctata</i> Gay feather	138,000	304	
<i>Linum perrene</i> Blue flax	295,000	650	
<i>Lomatium triternatum</i> 9-leaf biscuitroot	100,000	220	
<i>Lupinus lepidus</i> Prairie lupine	16,000	35	

<b>FORBS continued</b>	<b>weight/lb</b>	<b>weight/g</b>	<b>weight range/lb</b>
<i>Lupinus sericeus</i> Silky lupine	18,275	40	12,000-24,550 (2,16)
<i>Lychnis apetala</i> Alpine campion	1,120,000	2469	
<i>Mimulus guttatus</i> Yellow monkey-flower	4,000,000	8819	
<i>Mimulus lewisii</i> Lewis monkey flower	20,636,363	45496	
<i>Monarda fistulosa</i> Horse mint	1,385,250	3054	1272500-1498000 (2,16)
<i>Osmorhiza chilensis</i> Mountain sweet cicely	7,272	16	
<i>Oxytropis sericea</i> Yellow crazyweed	218,500	482	209,000-228,000 (4,5)
<i>Oxytropis splendens</i> Showy crazyweed	704,000	1552	
<i>Oxyria digyna</i> Mountain sorrel	1,343,195	2961	
<i>Parnassia fimbriata</i> Grass-of-Parnassus	700,000	1543	
<i>Pedicularis contorta</i> Lousewort	545,454	1203	
<i>Pedicularis groenlandica</i> Elephant Head	175,000	386	
<i>Penstemon albertinus</i> Alberta beardtongue	2,364,583	5213	
<i>Penstemon confertus</i> Yellow beardtongue	3,664,285	8078	2,700,000-4,628,571 (4,16)
<i>Penstemon ellipticus</i> Rockvine Beardtounge	2,090,909	4610	
<i>Penstemon lyallii</i> Lyll's beardtongue	1,923,729	4241	
<i>Penstemon procerus</i> Littleleaf beardtongue	12,107,000	26692	
<i>Phacelia hastata</i> Silverleaf Phacelia	153,000	337	
<i>Phacelia lyallii</i> Scorpion weed	450,000	992	
<i>Phacelia sericea</i> Silky Phacelia	450,000	992	
<i>Polemonium pulcherrimum</i> Jacob's ladder	320,000	705	
<i>Potentilla diversifolia</i> Varileaf cinquefoil	2,670,000	5886	
<i>Potentilla fruticosa</i> Shrubby cinquefoil	1,000,000	2205	
<i>Potentilla glandulosa</i> Sticky cinquefoil	3,699,000	8155	2,969,000-4,429,000 (4,16)
<i>Potentilla gracilis</i> Prairie cinquefoil	1,711,698	3774	



FORBS continued	weight/lb	weight/g	weight range/lb
<i>Potentilla nivea</i> Snow cinquefoil	3,636,363	8017	
<i>Ranunculus escholtzii</i> Alpine buttercup	25,000	55	
<i>Rhinanthus crista-galli</i> Penny rattle	299,078	659	
<i>Senecio triangularis</i> Arrowleaf groundsel	500,000	1102	
<i>Sibbaldia procumbens</i> Sibbaldia	893,701	1970	
<i>Solidago commutata</i> Canada goldenrod	4,600,000	10141	2,000,000-7,200,000 (4,16)
<i>Taraxacum lyratum</i> Alpine dandelion	562,488	1240	
<i>Thalictrum occidentale</i> Western meadowrue	160,117	353	
<i>Tiarella trifolia</i> Foamflower	1,343,970	2962	
<i>Veratrum viride</i> False hellebore	365,000	805	
<i>Veronica wormskjoldii</i> American alpine speedwell	300,000	661	
<i>Xerophyllum tenax</i> Beargrass	217,333	479	

## SHRUBS

<i>Acer glabrum</i> Rocky Mountain maple	13,430	30	
<i>Alnus incana</i> Thin-leaved alder	1,084,250	2390	
<i>Alnus commuta</i> Sitka alder	998,000	2200	
<i>Amelanchier alnifolia</i> Serviceberry	82,000	181	
<i>Arctostaphylos uva-ursi</i> Kinnikinnic, Bearberry	49,500	109	
<i>Mahonia repens</i> Oregon grape	62,000	137	
<i>Ceanothus sanguineus</i> Red-stem Ceanothus	130,000	287	41,000-58,000 (14,16)
<i>Ceanothus velutinus</i> Mountain balm	100,959	223	
<i>Cornus canadensis</i> Bunchberry	67,000	148	
<i>Cornus stolonifera</i> Red-osier dogwood	18,500	41	94,000-107,919 (14,16)
<i>Crataegus douglasii</i> Black hawthorn	21,000	46	
<i>Elaeagnus commutata</i> Silverberry, Wolf-willow	3,800	8	
<i>Holodiscus discolor</i> Oceanspray	5,307,000	11700	20,000-22,000 (14,16)

<b>SHRUBS continued</b>	<b>weight/lb</b>	<b>weight/g</b>	<b>weight range/lb</b>
<i>Kalmia microphylla</i> Mountain laurel	25,000,000	55116	
<i>Lonicera involucrata</i> Black Bearberry	335,500	740	326,500-343,500 (14,16)
<i>Lonicera utahensis</i> Utah Honeysuckle	190,000	419	
<i>Philadelphus lewisii</i> Mockorange, syringa	8,000,000	17637	
<i>Rhamnus alnifolia</i> Buckthorn	65,500	144	
<i>Ribes lacustre</i> Swamp-gooseberry	515,000	1135	
<i>Rosa woodsii</i> Wood's rose	50,967	112	35,000-65,000 (14,16)
<i>Rubus parviflorus</i> Thimbleberry	204,000	450	
<i>Rubus ideas</i> Raspberry	328,000	723	303,000-384,000
<i>Salix exigua</i> Sandbar willow	1,000,000	2205	
<i>Salix scouleriana</i> Scouler's willow	6,500,000	14330	
<i>Sambucus melanocarpa</i> Black elder	220,000	485	
<i>Shepherdia canadensis</i> Canadian buffaloberry	57,563	127	52,000-61,000 (4,5,16)
<i>Spiraea betulifolia</i> Shiny-leaved Spiraea	1,200,000	2646	
<i>Spiraea densiflora</i> Pink meadowsweet	1,000,000	2205	
<i>Symphoricarpos albus</i> Common snowberry	76,029	168	
<i>Taxus brevifolia</i> Western or Pacific yew	15,600	34	
<i>Viburnum edule</i> Moose brush	286,000	631	192,000-377,000
<i>Vaccinium caespitosum</i> Dwarf huckleberry	5,300,000	11685	
<i>Vaccinium myrtillus</i> Dwarf billberry	5,272,000	11623	
<i>Vaccinium scoparium</i> Grouseberry	1,000,000	2205	

TREES	weight/lb	weight/g	weight range/lb
<b>Conifers</b>			
<i>Abies lasiocarpa</i> Subalpine fir	37,440	83	
<i>Juniperus communis</i> Common juniper	38,000	84	36,500-40,363 (4,16)
<i>Juniperus horizontalis</i> Creeping juniper	33,800	75	30,400-38,000 (4,16)
<i>Juniperus scopulorum</i> Rocky Mtn. juniper	30,400	67	28,700-31,250 (4,16)
<i>Larix occidentalis</i> Western larch	182,270	402	143,040-221,500 (4,16)
<i>Picea engelmannii</i> Engelmann's spruce	135,040	298	
<i>Pinus albicaulis</i> Whitebark pine	3,600	8	
<i>Pinus contorta</i> Lodgepole pine	94,000	207	
<i>Pinus flexilis</i> Limber pine	4,400	10	
<i>Pinus monticola</i> Western white pine	27,040	60	
<i>Pinus ponderosa</i> Ponderosa pine	12,000	26	
<i>Pseudotsuga menziesii</i> Douglas fir	40,040	88	
<i>Thuja plicata</i> Western red cedar	414,400	914	
<i>Tsuga heterophylla</i> Western hemlock	297,600	656	
<b>Deciduous</b>			
<i>Betula glandulosa</i> Bog birch	402,000	886	
<i>Betula papyrifera</i> Paper birch	1,240,400	2735	1,100,000-1,380,800 (4,16)
<i>Populus tremuloides</i> Quaking aspen	3,600,000	7937	
<i>Populus trichocarpa</i> Black cottonwood	100,000	220	
<i>Prunus virginiana</i> Chokecherry	4971	11	
<i>Sorbus scopulina</i> Mountain ash	144,000	317	

**Conclusions:**

There is a need for accurate seeding rates and weights in order to obtain efficient and effective restoration results and to accurately monitor those results.

However, many reliable sources used in this study had a large range of seed weights for a single species. This may be due to variation in climate, whether the seed was taken from wild collections or cultivated fields, the weighing technique, and the various cleaning methods used. The higher weight is usually indicative of seeds grown under cultivation in ideal conditions. The lower weight is possibly from wild collected seed, seed collected or grown in drought conditions or other environmental factors that contribute to a less robust seed crop (5). We were diligent in combing through available literature to determine a reasonable average for the seed weight. These weights are the most accurate and up to date available at this time.

Russ Haas, NRCS Revegetation Technical Advisor to NPS is currently working on unifying a large species list that will be an excellent resource as soon as it is available to the public. It will be an updated version of Wendell Hassell's 1996 publication " *Seeding Rate Statistics for Native and Introduced Species*".

The bibliography includes information on many North American native species not listed in this document and may be of value to other restoration practitioners looking for this type of information. We would invite users or reviewers of this document to provide us input, corrections or additional information. Please send

any information or edits to Joyce Lapp, Restoration Biologist, Glacier National Park, West Glacier, MT 59936 [joyce\\_lapp@nps.gov](mailto:joyce_lapp@nps.gov), 406-888-7817.

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