

CORVALLIS PLANT MATERIALS CENTER
NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS, OREGON
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**THE 2007 BUREAU OF LAND MANAGEMENT ANNUAL REPORT:
*WEST EUGENE WETLANDS***

I. Brief background of Project

The Corvallis Plant Materials Center (PMC) entered into an agreement in the spring of 2002 with the Bureau of Land Management (BLM) to perform seed germination trials and seed increase of native wetland and wet prairie species. The West Eugene Wetlands program has been collecting wild seed and sowing it in wetland restoration projects. Some species have been difficult to establish or have very high labor costs associated with hand collection. The PMC agreed to research and document seed propagation techniques for these species and to evaluate their potential for agronomic seed increase.



In 2007, this agreement was renewed, and three species from previous agreements were brought back to the PMC for seed increase. Seed increase was renewed on 33 of the species from the 2006 contract. This agreement will be amended and renewed through 2008.

Figure 1. *Gentiana sceptrum* flowering in a seed increase tub at the Corvallis Plant Materials Center, July 20, 2007.

Activities in 2007 included cleaning seed provided by BLM, establishing and maintaining seed increase plantings, seed harvesting and seed cleaning. Numbers of seeds per pound were also calculated for certain species upon request.

II. Accessions Included in 2007 Agreement

Table 1. Accessions included in 2007 agreement with Eugene District of the BLM.

Species	Common name	Code	Accession #	Activity in 2007 ¹
<i>Balsamorhiza deltoidea</i>	deltoid balsamroot	BADE2	9079372	pxn,sfp
<i>Carex feta</i>	greensheath sedge	CAFE4	9079315	sfp
<i>Carex languinosa</i>	wooly sedge	CALA	9079304	pxn
<i>Carex tumulicola</i>	splitawn sedge	CATU3	9079291	sfp
<i>Carex vesicaria</i>	blister sedge	CAVE6	9079316	sfp
<i>Castilleja tenuis</i>	hairy Indian paintbrush	CATE26	9079254	pxn, sfp
<i>Cicendia quadrangularis</i>	Oregon timwort	CIQU3	9079254	pxn, sfp
<i>Dichanthelium acuminatum</i>	western panicgrass	DIACF	9079303	sfp
<i>Downingia elegans</i>	elegant calicoflower	DOEL	9079432	pxn, sfp
<i>Downingia yina</i>	Cascade calicoflower	DOYI	9079433	pxn, sfp
<i>Eleocharis obtusa</i>	blunt spikerush	ELOB2	9079434	pxn, sfp
<i>Eleocharis palustris</i>	common spikerush	ELPA3	9079435	pxn, sfp
<i>Eryngium petiolatum</i>	coyote thistle	ERPE	9079431	pxn, sfp
<i>Galium trifidum</i>	threepetal bedstraw	GATR2	9079317	pxn, sfp
<i>Gentiana sceptrum</i>	king's scepter gentian	GESC	9079311	sfp
<i>Gratiola ebracteata</i>	bractless hedgehyssop	GREB	9079436	pxn, sfp
<i>Lasthenia glaberrima</i>	smooth goldfields seaside bird's-foot	LAGL3	9079293	pxn, sfp
<i>Lotus formosissimus</i>	trefoil	LOFO2	9079294	pxn, sfp
<i>Ludwigia palustris</i>	marsh seedbox	LUPA	9079297	pxn, sfp
<i>Lupinus bicolor</i>	miniature lupine	LUBI	9079250	pxn, sfp
<i>Madia glomerata</i>	mountain tarweed narrowleaf	MAGL	9079437	pxn, sfp
<i>Montia linearis</i>	minerslettuce	MOLI4	9079295	pxn, sfp
<i>Myosotis laxa</i>	bay forget-me-not	MYLA	9079253	pxn, sfp
<i>Navarettia intertexta</i>	needleleaf navarretia	NAIN2	9079378	pxn, sfp
<i>Nemophila menziesii</i>	baby blue eyes	NEME	9079379	pxn, sfp
<i>Orthocarpus bracteosus</i>	rosy owllover	ORBR	9079502	pxn, sfp
<i>Perideridia oregana</i>	Oregon yampah	PEOR6	9079256	sfp
<i>Phlox gracilis</i>	slender phlox	PHGR	9079299	pxn, sfp
<i>Pyrrocoma racemosa</i>	clustered goldenweed	PYRA	9079496	pxn, sfp
<i>Ranunculus alismaefolius</i>	plantainleaf buttercup	RAAL	9079438	pxn, sfp
<i>Rorippa curvisiliqua</i>	curvedpod yellowcress	ROCU	9079257	pxn, sfp
<i>Saxifraga oregana</i>	Oregon saxifrage	SAOR2	9079296	sfp
<i>Sidalcea virgata</i>	showy wild hollyhock	SIVI	9079305	sfp
<i>Veronica peregrina</i>	neckweed	VEPE2	9097439	pxn, sfp
<i>Veronica scutellata</i>	skullcap speedwell	VESC2	9079440	pxn, sfp

¹- sfp= seed increase, pxn= container production,

III. Germination Trials

No germination trials were performed in 2007. All the species in this year's agreement have been successfully grown by the PMC in previous years. Treatments used to produce the plants for seed increase in 2007 are listed below.

Table 2. Optimal germination treatment per species from trials conducted at Corvallis Plant Materials Center in 2007.

Species	Amt used (g)	Number of cone-tainers produced	Treatment
<i>Castilleja tenuis</i>	1	20	90-days stratification
<i>Cicendia quadrangularis</i>	15	500	Unheated greenhouse
<i>Downingia elegans</i>	7	400	Unheated greenhouse
<i>Downingia yina</i>	6	400	Unheated greenhouse
<i>Eryngium petiolatum</i>	5	300	Unheated greenhouse
<i>Galium trifidum</i>	4	300	Unheated greenhouse
<i>Gratiola ebracteata</i>	1	400	Unheated greenhouse
<i>Lasthenia glaberrima</i>	1	300	Unheated greenhouse
<i>Lotus formosissimus</i>	18	300	12 weeks stratification
<i>Lupinus bicolor</i>	25	630	scarification/inoculation
<i>Madia glomerata</i>	3	400	Heated greenhouse (80°F)
<i>Montia linearis</i>	4	300	Unheated greenhouse
<i>Myosotis laxa</i>	1	300	Heated greenhouse
<i>Navarettia intertexta</i>	3	300	Unheated greenhouse
<i>Nemophila menziesii</i>	6	300	Unheated greenhouse
<i>Orthocarpus bracteosus</i>	1	26	90-days stratification
<i>Phlox gracilis</i>	10	300	Unheated greenhouse
<i>Rorippa curvisiliqua</i>	1	300	Heated greenhouse
<i>Veronica peregrina</i>	1	300	Heated greenhouse
<i>Veronica scutellata</i>	1	300	Heated greenhouse

IV. Field Plantings

A *Sidalcea virgata* field planting was established in late spring of 2003. The plants are still recovering from flooding last winter. No weevils were detected on any of the seedheads. Plants did not seem affected by changes in soil environment due to the plastic woven weed barrier. Rodents have not become a problem in this plot.

Seed was collected weekly from June 28th to July 15th by hand-stripping mature seeds, and also by sweeping up ones that had shattered onto the ground cover. Collections were efficient and relatively little seed was lost. *S. virgata* racemes are less upright than other *sidalceas* which caused the seed to fall directly on the ground cover instead of on the

crown of the plant. The ground cover is a considerable aid in seed collection for the species and does not seem to be detrimental to plant growth or development. Ground cover needs to be cut back from the crowns of the sidalceas as they expand. Harvested seed was collected in bags and dried in an open greenhouse. It was then placed in a small brush machine containing a scarifier (sandpaper) drum. Seed was further cleaned using an air screen machine.

Seed increase of many annual species was performed this year using weed fabric techniques. Two 15' X 170' sheets of weed fabric were stapled down onto a field that had been previously sprayed with glyphosate herbicide. Small squares were cut out of the weed fabric in order to transplant the cone-tainer plants. The squares were cut slightly larger than the size of the cones. Once transplanted, plants grew quickly, flowered, and set seed. As seed ripened, it shattered onto the weed fabric.



Small, battery-powered hand vacuums were used to collect seed of *Montia linearis*, *Nemophila menziesii*, *Veronica peregrina*, *Lasthenia glaberrima*, *Phlox gracilis*, *Lupinus bicolor* and *Rorippa curvisiliqua*. Twice a week, the weed fabric in the planting would be vacuumed and the material placed in paper bags in a greenhouse.

Figure 2. *Montia linearis* seed increase plot at the Corvallis Plant Materials Center, April 10, 2007.

Plots of *Myosotis laxa*, *Galium trifidum*, *Veronica scutellata* and *Madia glomerata* were harvested once. The plants in these plots covered the weed fabric completely and held the seeds on the fabric. The plots were vacuumed only when the plants had stopped producing seed and were then removed.

Some of the plants did not drop their seed. *Navarettia intertexta*, *Downingia elegans*, *Downingia yina*, and *Eryngium petiolatum* plants were cut out of the plots after all of the plants had died and were collected in large trash barrels. The plants were then fed into a large brush machine (each species was cleaned separately) equipped with a small mesh screen mantle. The brush machine opened the seed pods and separated the seeds from the larger pieces of plant material. The seed was cleaned using an air-screen machine.

V. Seed Increase Tubs

Some perennial species were maintained in tubs in the PMC shadehouse. Plants were monitored daily for disease and pests as well as seed maturity. Plantings were watered overhead as needed.

***Carex feta* (CAFE4)**- This tub was established with spring 2004-sown seedlings. In 2006, these plants were hearty and covered with flowering stems. In the fall of 2004, more CAFE plants were transplanted into artificial ponds at the PMC. These plants had a 100% survival rate and produced a moderate amount of seed. Seed heads were clipped just as they turned from green to yellow. Seeds shatter when they still look green and immature. Seed from both tub planting and pond planting were combined. The planting in the pond is growing very well and produced the majority of this year's harvest.

***Carex tumulicola* (CATU3)**- This tub was established from cone-tainers seeded in 2003 that didn't germinate until spring of 2004. Seed heads were clipped when mature. When over 80% of seedheads were ripe at the same time, the entire tub was cut back and all the clippings were dried in a greenhouse on a tarp. After harvest, they flowered again. Production was high for such a small plot.

***Carex vesicaria* (CAVE6)**- Seedlings that were sown in the spring of 2004 were used to establish this tub. Flowering in 2006 was fair, but no seed was produced. Seed production was better in 2007, but there seems to be much less filled seed than flowering. Most seed heads were empty.



Figure 3. *Carex vesicaria* seed increase tub at the Corvallis Plant Materials Center, July 1, 2007.

***Dichanthelium acuminatum* (DIAC)**- A tub of plants was established in 2003. It flowered well in the summer of 2006. Seeds were collected by hand. A small plot was also planted into weed fabric. Seed production was good and seeds fell onto the weed fabric as they matured. Weed fabric was vacuumed once with a hand-held vacuum. Seeds collected in the vacuum filter were emptied into collection bags. When flowering had subsided, seed was cleaned with an air-screen machine. This seed collection technique was very

effective and efficient. The weed fabric plot yields more seed than the tub because the weed fabric can catch the seeds as they mature and shatter.

***Gentiana sceptrum* (GESC)**- This tub was established from seedlings sown in winter of 2003. Plants were transplanted into the tub in late summer of 2004. Approximately 10

plants were also transplanted out into a field covered with plastic woven weed barrier. Plants in the tub flowered more, grew taller, and were more vigorous overall in previous years. Plants in the field never emerged this year. Seeds were collected when capsule began to turn papery and tan.

Table 3. Recorded collection and cleaning times for seed increase tubs and plots.

Species	Harvest dates	Harvest time	Cleaning time	Amount of seed produced
<i>Carex feta</i>	July 20- Aug 29	10 hours	30 min	490 g
<i>Carex tumulicola</i>	June 22	15 min	30 min	58 g
<i>Castilleja tenuis</i>	Aug 8- Sept 15	7 hours	15 min	4 g
<i>Carex vesicaria</i>	July 3	15 min	30 min	26 g
<i>Cicendia quadrangularis</i>	April 12- May 5	3 hours	15 min	1 g
<i>Downingia elegans</i>	August 15	2 hours	2 hours	2.9 lbs
<i>Downingia yina</i>	August 21	2 hours	2 hours	2.6 lbs
<i>Eleocharis obtusa</i>	July 25-Aug 30	3 hours	1 hour	35 g
<i>Eryngium petiolatum</i>	September 26	3 hours	2 hours	3 lbs
<i>Galium trifidum</i>	September 4	1 hour	1 hour	1.9 lbs
<i>Gentiana sceptrum</i>	July 7-Aug 9	2 hours	15 min	99 g
<i>Gratiola ebracteata</i>	July 1	15 min	30 min	77 g
<i>Lasthenia glaberrima</i>	May 10	2 hours	1 hour	1.7 lbs
<i>Lupinus bicolor</i>	July 12- Aug 7	2 hours	30 min	6.5 lbs
<i>Madia glomerata</i>	October 10	2 hours	3 hours	1 lb
<i>Montia linearis</i>	May 10	1 hour	15 min	114 g
<i>Myosotis laxa</i>	July 16	1 hour	15 min	100 g
<i>Navarettia intertexta</i>	August 8	2 hours	2 hours	2 lbs
<i>Nemophila menziesii</i>	June 12- June 20	2 hours	30 min	1 lb
<i>Dichanthelium acuminatum</i>	August 24	15 min	30 min	62 g
<i>Orthocarpus bracteosus</i>	Aug 12- Sept 15	7 hours	15 min	12 g
<i>Perideridia oregana</i>	Aug 15- Sept 30	1 hour	30 min	67 g
<i>Phlox gracilis</i>	June 1- July 10	2 hours	30 min	2 lbs
<i>Pyrrocoma racemosa</i>	Sept 5- Oct 10	1 hour	1 hour	38 g
<i>Rorippa curvisiliqua</i>	Aug 28-Sept 6	2 hours	1 hour	2 lbs
<i>Saxifraga oregana</i>	May 7	30 min	15 min	16 g
<i>Sidalcea virgata</i>	June 12- July 15	1 hour	30 min	1.35 g
<i>Veronica peregrina</i>	May 18- June 20	2 hours	1 hour	1.6 lbs
<i>Veronica scutellata</i>	September 13	30 min	1 hour	25 g

***Perideridia oregana* (PEOR6)**- This tub was established in 2003 from plants that were grown in 2002. A small plot was also planted into weed fabric in 2007. The weed fabric plot seems to be more vigorous and survival is higher. Entire umbels were cut from the stems when seeds turned grayish brown and felt dry and crumbly. Seeds were left in an

open greenhouse to dry, then rubbed in a rubbing trough to break up seeds and stems. Seed was cleaned using an air-screen machine.

***Saxifraga oregana* (SAOR2)**- This tub was established in 2004. Plants flowered in early spring and seeds were collected by hand from May 7- May 12. Rain was heavy during flowering and harvest time for this tub, which decreased yields.

Additional 2006 Seed Increase Notes



Figure 4. *Eleocharis obtusa* plants in the Corvallis Plant Materials Center shadehouse, July 4, 2007.

Some species produced seed while they were in pots. *Pyrrocoma racemosa* plants were overwintered from 2006 and flowered profusely in 2007. Seeds were collected by hand as they matured. *Gratiola ebracteata* and *Eleocharis obtusa* flowered in their containers. They were too small in the spring to be transplanted out and were cared for through the summer in containers. Small battery-powered grass clippers were used to cut *G.*

ebracteata, and *E. obtusa* like a mini- swather. Seeds were dried in small bags in an open greenhouse.

Mature *Cicendia quadrangularis* capsules were cut and placed in seed collection envelopes to dry. Seeds are tiny enough to slip out of paper bags. Capsules can be separated from the seed using handscreens.

The *Balsamorhiza deltoidea*, *Lotus formosissimus*, *Ranunculus alismaefolius*, and *Eleocharis palustris* did not produce seed in 2007. These plants are being overwintered at the PMC and will be planted into seed increase plots in 2008. *L. formosissimus* plants from the previous year did not over winter. Freezing



Figure 5. *Ludwigia palustris* flowering in a seed increase tub at the Corvallis Plant Materials Center, August 3, 2007.

temperatures killed the plants in the cone-tainers.

The *Ludwigia palustris* did flower this year! As seed was maturing, the plants senesced or died, and filled seed was not produced. *Castilleja tenuis* and *Orthocarpus bracteosa* seedlings experienced severe damping off. Very few seedlings survived. These plants were potted up into gallon pots with an *Eriophyllum lanatum* plant as a host. Seed was collected by hand as the capsules matured. It was very time consuming and inefficient. Next year, seedlings will be monitored more carefully and will be transplanted into a field covered with weed fabric.



Figure 6. *Orthocarpus bracteosa* growing with *Eriophyllum lanatum* “hosts” in the Corvallis Plant Materials Center shadehouse, August 3, 2007.

VI. Plant Materials Delivery

Seed was requested for delivery in late August in order to be available for fall sowing on restoration sites. Some plantings were still producing seed at this time. Seeds from plantings that had completed seed production for the season were picked up by BLM staff on September 7, 2007. Some of the later ripening seed and some dormant plants were picked up by BLM staff on October 2 and 11, 2007. All remaining seed lots are being stored at the PMC seed storage facilities until requested.

Table 4. Seed delivered to BLM staff in the fall of 2007.

Species	Amount of seed produced	Date delivered	Notes
<i>Carex feta</i>	131 g	7-Sep	Produced in 2006
<i>Carex feta</i>	490 g	2-Oct	
<i>Carex tumulicola</i>	58 g	11-Oct	
<i>Castilleja tenuis</i>	4 g	2-Oct	
<i>Carex vesicaria</i>	26 g	11-Oct	
<i>Downingia elegans</i>	2.9 lbs	7-Sep	
<i>Downingia yina</i>	2.6 lbs	7-Sep	
<i>Eleocharis obtusa</i>	35 g	7-Sep	
<i>Eryngium petiolatum</i>	3 lbs	11-Oct	
<i>Galium trifidum</i>	1.9 lbs	2-Oct	
<i>Gentiana sceptrum</i>	99 g	2-Oct	
<i>Gratiola ebracteata</i>	77 g	7-Sep	
<i>Lasthenia glaberrima</i>	1.7 lbs	7-Sep	
<i>Lupinus bicolor</i>	6.5 lbs	7-Sep	
<i>Madia glomerata</i>	16 lbs	7-Sep	Produced in 2006
<i>Montia linearis</i>	114 g	7-Sep	
<i>Myosotis laxa</i>	100 g	7-Sep	
<i>Navarettia intertexta</i>	2 lbs	7-Sep	
<i>Nemophila menziesii</i>	1 lb	7-Sep	
<i>Dichanthelium acuminatum</i>	62 g	2-Oct	
<i>Orthocarpus bracteosus</i>	12 g	2-Oct	
<i>Perideridia oregana</i>	42 g	7-Sep	Produced in 2006
<i>Phlox gracilis</i>	2 lbs	7-Sep	
<i>Rorippa curvisiliqua</i>	2 lbs	2-Oct	
<i>Saxifraga oregana</i>	16 g	7-Sep	
<i>Sidalcea virgata</i>	1.35 g	7-Sep	
<i>Veronica peregrina</i>	1.6 lbs	7-Sep	