

**PALOUSE-CLEARWATER ENVIRONMENTAL INSTITUTE  
SPALDING'S CATCHFLY (*SILENE SPALDINGII*) COLLECTION AND  
PROPAGATION PROJECT PROTOCOL**

**Seed Collection: 10/21/2007**

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*Kramer Prairie, WA. Photo: Tracy Brown, PCEI*

Seed was collected from Kramer Prairie, a Palouse Prairie remnant, located southwest of Colton, WA. Plants were identified in two distinct patches within the remnant. These patches will be referred to as the "ridgeline patch" and the "lower meadow patch". The plants were still green and many were not ready for collection. Over 300 *Silene spaldingii* capsules were counted in total at both patches. Capsules were counted if they looked like they were flowering or in condition that appeared as if they contained seed. Using this total number as a guideline, 10% of the capsules were collected.

Only one capsule was taken from an individual plant. The capsules were then opened and seed deposited into a small envelope for storage and transport. Each capsule appeared to have 50+ seeds.

Once the 30 capsule goal was achieved, it was determined that additional seeds could be collected from the upper ridgeline site since there were many more plants not included in the original 300 capsule count. Collection protocol was as follows: for every 10 capsules counted that were ready to set seed, 1 capsule was collected. A total of 41 capsules were collected at the Kramer Prairie site. A total of 15 capsules were collected at the Pitt Cemetery.

The seeds were then taken back to the Palouse-Clearwater Environmental Institute's (PCEI) office located in Moscow, Idaho where they were cleaned and counted. A total of 3,188 seeds were counted 388 seeds will be kept at the PCEI site for propagation and 2,800 were delivered to Washington State University. Juanita Lichthardt collected an additional 1,530 seeds from Pitt Cemetery. Of those seeds, 330 will be propagated at PCEI and the additional 1,200 seeds were delivered to the Washington State University Plant Materials Center for propagation.



*Flowering Spalding's Catchfly. Tracy Brown, PCEI*

Lichthardt completed additional collecting on August 3<sup>rd</sup> at Upper Steptoe Canyon site where she collected 600 seeds and on August 17<sup>th</sup> at Genesee South site where 406 seeds were collected. PCEI will propagate 200 seeds from the Upper Steptoe Canyon site and 6 seeds from the Genesee South site. WSU received 155 seeds from Upper Steptoe Canyon and 400 seeds from Genesee South.

**Total seed collected: 5,724**

**PCEI to propagate: 924 (465 seeds each for 2007 and 459 for 2008 propagation trials)**

**WSU to propagate: 4800**

**Plants identified during seed collection:**

*Balsamorhiza sagittata* Arrowleaf balsamroot

*Helianthella uniflora* Little sunflower

*Geum triflorum* Prairie smoke

*Hieracium albertinum* Western hawkweed

*Lithospermum calycosum* Stoneseed

*Pseudoroegneria spicata* Bluebunch wheatgrass

*Festuca idahoensis* Idaho fescue

*Symphoricarpos albus* Common snowberry

*Amelanchier alnifolia* Serviceberry

*Rosa nutkana* Nootka rose

*Rosa woodsii* Woods rose

*Gentiana affinis* Prairie gentian

*Agastache* sp. Horse Mint

*Potentilla glandulosa* Sticky cinquefoil

*Perideridia gairdneri* Yampah

*Prunus virginiana* Chokecherry

*Poa pratensis* Kentucky bluegrass

*Dipsacus fullonum* Teasel

*Bromus inermis* Smooth brome

*Centaurea solstitialis* Yellow starthistle

*Cirsium vulgare* Bull thistle



*Rosa woodsii*, Woods Rose. Tracy Brown,

**Seed Propagation Trials**

A color-coded sticker system keeps seeds, sites, and methods distinct in greenhouse, nursery, and refrigerated stratification trials throughout the catchfly propagation project.

- 4 Sites—Outdoor nursery stratification trials conducted
- 3 Sites—Refrigerated cold-stratification trials conducted

**Site 1**—Kramer, 193 total seeds 2007

**Site 2**—Pitt, 165 total seeds 2007

**Site 3**—Upper Steptoe Canyon, 100 total seeds 2007

**Site 4**—Genesee, 6 total seeds 2007 (only)

**Methods:**



Propagation Materials. Sara Cucksey, PCEI

**A:** Overnight soak using filtered water in glass jars, sowed directly into 20 in<sup>3</sup> 5 X 9 plug Styroblocs.

**B:** 80-day moist stratification 40-45 °F

**C:** 60-day moist stratification at 40-45 °F

**D:** 48-day moist stratification at 40-45 °F

**Method A: 11/13/2007**

After an overnight soak in filtered water, *S. spaldingii* seeds were sowed directly into 20 in<sup>3</sup> 5 X 9 plug Styroblocs and placed in the PCEI Learning Nursery for natural climatic stratification.

1. Soil mix components used are one part Native Soil: one part Coir fiber particles: one part Sand.
2. For initial sowing, 20 in<sup>3</sup> 5 X 9 Styroblocs used.
3. Seeds planted, separated by site and method.
4. Six grams of crushed marbled stone used on top of seed to help it adhere to soil and aid in prevention of seed removal by wind or water.
5. Each Styrobloc labeled with a wooden stake with site and trial indicated by colored sticker.

**6. Total seeds sowed in Trial A: 148**

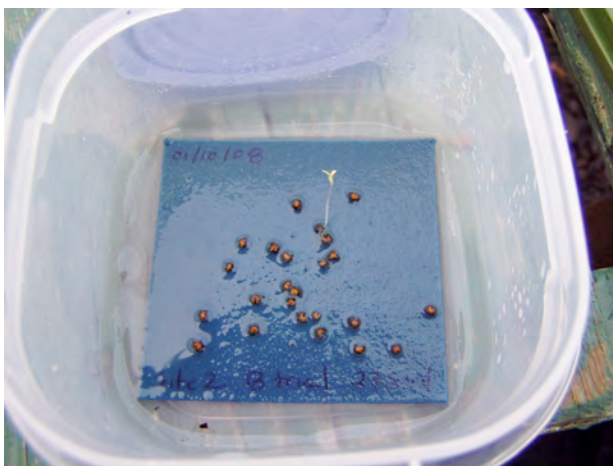


Sowing *S. spaldingii* seeds. Tracy Brown, PCEI

**Table 1: Method 'A' Seed count**

<b>Site 1 Kramer Prairie</b>	<b>Site 2 Pitt Cemetery</b>	<b>Site 3 Upper Steptoe Butte</b>	<b>Site 4 Genesee</b>
100 seeds	82 seeds	50 seeds	6 seeds

**Method B: 1/11/2007**



*S. spaldingii* seeds and sprout on germination paper. Sara Cucksey, PCEI

Using a ≈ 2" X 2" square of germination paper, catchfly seeds were separated into the pre-determined seed amounts (Table 2). A drawer in the PCEI refrigerator was allocated for the Catchfly project seed stratification trials. A thermometer was placed in the drawer with the seed for accurate record keeping of weekly temperatures. The seeds were placed on the germination paper in plastic containers with lids. Each trial and site was kept distinct with the color-coded system.

1. Paper placed in bottom of plastic container.
2. Containers labeled with color coded sticker system as well as the germination paper.
3. Using a spray bottle the seeds were soaked with a fine mist of filtered water.
4. Containers were sealed and placed in the refrigerator.

5. Each container was checked bi-weekly for moisture content, germination and mold development.

**6. Total seeds sown in Method B: 74**

**Table 2: Method 'A' Seed count**

Site 1 Kramer Prairie	Site 2 Pitt Cemetery	Site 3 Upper Steptoe Butte
31 seeds	27 seeds	16 seeds

**Method C: 01/02/2008**

Using a  $\approx 2'' \times 2''$  square of germination paper, catchfly seeds were separated into the pre-determined seed amounts (Table 3). A drawer in the PCEI refrigerator was allocated for the Catchfly project seed stratification trials. A thermometer was placed in the drawer with the seed for accurate record keeping of weekly temperatures. The seeds were placed on the germination paper in plastic containers with lids. Each trial and site was kept distinct with the color-coded system.

1. Paper placed in bottom of plastic container.
2. Containers labeled with color coded sticker system as well as the germination paper.
3. Using a spray bottle the seeds were soaked with a fine mist of filtered water.
4. Containers were sealed and placed in the refrigerator.
5. Each container was checked bi-weekly for moisture content and mold development.



*S. spaldingii* sowing equipment. Sara Cucksey, PCEI

**6. Total seeds sown in Method C: 68**

**Table 3: Method 'C' Seed count**

Site 1 Kramer Prairie	Site 2 Pitt Cemetery	Site 3 Upper Steptoe Butte
31 seeds	22 seeds	15 seeds

**Method D: 2/20/2008**

Using a  $\approx 2'' \times 2''$  square of germination paper, catchfly seeds were separated into the pre-determined seed amounts (Table 4). A drawer in the PCEI refrigerator was allocated for the Catchfly project seed stratification trials. A thermometer was placed in the drawer with the seed for accurate record keeping of weekly temperatures. The seeds were placed on the germination paper in plastic containers with lids. Each trial and site was kept distinct with the color-coded system.

1. Paper placed in bottom of plastic container.

2. Containers labeled with color coded sticker system as well as the germination paper.
3. Using a spray bottle the seeds were soaked with a fine mist of filtered water.
4. Containers were sealed and placed in the refrigerator.
5. Each container was checked bi-weekly for moisture content and mold development.
- 6. Total Seeds for Trial: 74**

**Table 4: Method 'D' Seed count**

Site 1 Kramer Prairie	Site 2 Pitt Cemetery	Site 3 Upper Steptoe Butte
27 seeds	16 seeds	31 seeds

### **Seedling Transplants from Cold Stratification Trial Sprouts: 3/20/2008**

To improve success of seedlings germinated in refrigerated stratification trials each sprout was carefully transplanted to a 20 in<sup>3</sup> 5 X 9 Styroblocks and labeled by site and trial. These seedlings are kept in the PCEI greenhouse and watered daily to promote vegetative growth in soil medium. A total of 14 sprouts were transplanted into Styroblocks.

**Table 5: Cold Stratification Trial Transplants**

Trial	Site 1 Kramer Prairie	Site 2 Pitt Cemetery	Site 3 Upper Steptoe Butte
<b>B</b>	1 sprout		2 sprouts
<b>C</b>	4 sprouts	1 sprout	
<b>D</b>	2 sprouts	3 sprouts	

### **Sowing Refrigerator Cold Stratification Trials: 4/9/2008**

The Refrigerator Cold Stratification Temperature ranged between 40- 45 °F throughout the trial. Due to unforeseen issues in soil mix component availability, the original soil mixture was modified to two parts native soil: two parts compost: two parts mulching bark: one part sand.

1. 20 in<sup>3</sup> 5 X 9 Styroblocks used for initial propagation.
2. Seeds planted, separated by site, and stratification trial.
3. 6 grams of crushed marbled stone used on top of seed to help it adhere to soil and aid in prevention of seed removal by wind or water.
4. Each Styroblock is labeled with a wooden stake and a color-coded sticker, 9 Styroblocks used in Stratification Trial sowing.
5. The Styroblocks were placed in the PCEI learning nursery to harden and germinate in natural climatic conditions.



PCEI Volunteers sow *S. spaldingii* seed. Sara Cucksey, PCEI

- 6. Total seeds sown from Refrigerated Cold Stratification Methods: 201**
- 7. Total sprouts transplanted from Refrigerated Cold Stratification Methods: 6**

**Table 6: Cold Stratification Trial Sowing and Transplants**

<b>Trial</b>	<b>Site 1 Kramer Prairie</b>	<b>Site 2 Pitt Cemetery</b>	<b>Site 3 Upper Steptoe Butte</b>
<b>B</b>	29 seeds, 2 sprouts	22 seeds	19 seeds
<b>C</b>	19 seeds, 2 sprouts	21 seeds, 2 sprouts	18 seeds
<b>D</b>	31 seeds	25 seeds	17 seeds

The seeds sowed were placed outside to germinate. The Styroblocks are monitored for seedling eruption and water needs. Native soil was used in our soil mix to mimic the soil characteristics of collection sites. When *S. spaldingii* vegetative and root growth are established, these plants will be transplanted to the ITD established mitigation site. Because a native soil component was used there is potential for the presence weed emergence and competition.

**2008-2009 Catchfly Seed Treatments, Planting and Germination Counts**

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PCEI saved a portion of *S. spaldingii* seed collected from sites in 2007 to stagger the germination and planting. For the 2009 growing season, a total of 334 seeds and 70 seed fragments that were scarified or stratified and planted into styroblocks to germinate (Table 7). The seeds were separated by collection site. This year we did not employ a site tracking system, as the color-coded sticker system used in 2008 did not withstand seasonal weathering and watering, thus proving difficult to track. Nineteen rosettes are growing from the 364 seeds sowed, a 5% germination rate.

**Table 7: Seed Treatments to planting for 2009 growing season**

<b>Treatment</b>	<b>Kramer Prairie</b>	<b>Pitt Cemetery</b>	<b>Upper Steptoe Butte</b>	<b>Total Seeds</b>
<b>24-hour soak to styroblock</b>	90	65	35	174 seeds 50 Fragments
<b>46-Day Stratification to styroblock</b>	90	65	35	160 seeds 20 Fragments

**11/05/2008**

Total of 174 seeds from all sites were scarified in cold water for 24 hours, there were 50 seed fragments counted that were also scarified and planted, for a total of 224 potential plants.

**11/06/2008**

Catchfly seeds were placed 2 per cell in styroblocks with 6 grams of pea gravel. These seeds were placed in the PCEI Learning nursery to stratify naturally through the winter and early spring months. These seeds will begin to be watered in early spring 2009.

A total of *S. spaldingii* seeds were divided into what looked like viable seed and seed fragments. There 160 seeds considered viable, and approximately 20 seed fragments due to size or form. The seeds were divided into two groups of 80 seeds. Using a  $\approx 2'' \times 2''$  wetted square of germination paper in plastic lidded containers the seeds were stratified in a drawer in the PCEI refrigerator from March 3, 2009 to April 17, 2009 for a 46 day stratification between 39 °F and 44 °F. Each container was checked weekly to insure adequate moisture, mold presence, and for sprout germination.

1. Paper placed in bottom of plastic container.
2. Containers labeled
3. Using a pipette the paper was soaked with filtered water.
4. Containers were sealed and placed in the refrigerator.
5. Each container was checked weekly for moisture content, mold development, and sprout germination.
6. **Total Seeds for stratification: 160 seeds 20 fragments**

- 03/03/2009: All three containers had moist germination paper.
- 03/12/2009: Each container moist, no sprouts
- 03/19/2009: Each container was moistened with filtered water using a pipette, no sprouts
- 03/24/2009: All containers moist, 7 sprouts in seeds, 1 sprout in fragments
- 03/30/2009: Each container was moistened with filtered water using a pipette, 2 sprouts in the fragments, and 10 sprouts in the seeds.
- 04/10/2009: All containers moist, 2 sprouts in fragments, 11 sprouts in seeds

## **2009-2010 Catchfly propagation and maintenance**

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### **03/03/2009**

The remaining seeds from the Kramer, Pitt, and USC collection sites were mixed together. A total of 160 seeds and 20 seed fragments were divided into 8 separate containers for germination. Like previous germination processes each container had moistened blue propagation paper. The containers were labeled and placed in the PCEI fridge for germination.

### **03/12/2009**

Each seed container was checked for moisture and misted if needed. No sprouts recorded.

### **03/19/2010**

Each seed container was checked for moisture and misted. No sprouts recorded.



*S. spaldingii* seedling in styroblock cell. Sara Cucksey, PCEI

**3/24/2009**

All containers moist. One possible sprout in the fragments container, 7 sprouts combined in all other containers.

**3/30/2009**

Two sprouts observed in the fragments container and water was added. Ten sprouts were noted in the remaining containers and each container was misted. Total of 12 sprouts observed.

**4/10/2009**

A total of 13 sprouts germinated in the refrigerator trials. These nascent seedlings will be planted and cared for in the nursery.

**04/17/2009**

Catchfly seeds from refrigerated stratification were placed 2 per cell in styroblocks with 6 grams of pea gravel. A total of 180 seeds sowed. These seeds were placed in the PCEI Learning nursery and checked watered daily. These plants and seeds will be checked twice per day and watered accordingly throughout the growing season.

**05/12/2009**

A total of 19 catchfly seedlings found actively growing in styroblocks. Throughout the growing season the seedlings will be watered and weeded. Empty styroblock cells will be monitored for emergence. Because we chose to consolidate collection sites, a correlation to seed viability and collection site will not be derived. The remainder of the season will entail watering and observing growth of the catchfly seedlings and weeding the cells of known undesirable species.

**11/19/2009**

Zach Funkhouser and Juanita Lichtardt came to PCEI to discuss the Catchfly project. We set a potential planting date for October 2010. The planting sites are still to be determined.

## **2010 Catchfly propagation and maintenance**

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**03/26/2010**

Catchfly seedlings were transplanted from styroblocks to 1-gallon pots. The roots on the plants were very robust. In total, 27 catchfly seedlings were transplanted. The styroblocks will be monitored for emergence throughout the growing season. The pots will be maintained and monitored by PCEI staff throughout the growing season.



**08/11/2010**

Catchfly seedlings were inadvertently fertilized with Down To Earth Liquid All Purpose 4-3-3 while fertilizing the entire nursery for the season. After the fertilizer application, a significant decline in the catchfly seedlings was noticed. While the fertilizer was all natural and applied at a very low dosage, the sensitivity of the plant was a concern. After a few weeks, about 3 plants recovered and showed above ground growth. Every effort was made to promote the seedlings.

*S. spaldingii* root establishment during transplant. Sara Cucksey, PCEI

### 11/04/2010

PCEI Manages the Rose Creek Nature Preserve near Albion, Washington. Juanita Lichtardt and PCEI staff decided this was an appropriate setting to plant the catchfly seedlings. It also provides PCEI and project constituents access to monitor planting success. All seedlings transplanted from styroblocks to 1-gallon pots were planted at the Rose Creek Nature Preserve. Each individual plant was marked with a pin flag to track growth and survival. The population will be monitored over time.

### 11/11/2010—From Juanita Lichtardt, Idaho Natural Heritage Program



*S. spaldingii* seedling in 1-gallon pot. Juanita Lichtardt, Natural Heritage Program.

PCEI's watershed crew planted out the contents of 32, 1-gal pots at Rose Creek Preserve on 4 November 2010. All pots had contained Spalding's catchfly plants at one time, although only 8 were showing above-ground growth at the time of planting. Plants originated from a pool of seed collected at Kramer Prairie, Pitt Cemetery, Steptoe Canyon, and Genesee.

All plants consisted of rosettes of numerous leaves, the largest 1.5-4 cm long; some leaves had holes, but were otherwise green and healthy looking (Figure 1). They were planted on the lower slope of a western aspect, in eight clusters of 3 to 6 pots each. One wire flag per pot was

inserted to mark them. A GPS waypoint was taken at each cluster. On 9 November I returned with six more pots, three with above-ground growth. I planted two with above-ground growth on a slightly more northerly slope than the previous planting; I lost the third seedling. I planted contents of the remaining three pots at the previous site. I checked the earlier plantings and 8 plants were still evident and looked like they had at the time of planting. In all, the contents of 37 pots were planted at Rose Creek Preserve, including 10 with above-ground growth.



*S. spaldingii* showing large root. Juanita Lichtardt, Natural Heritage Program.

The Idaho fescue-bluebunch wheatgrass community into which the seedlings were planted appeared to be in good condition. However, the nearby upper slope is dominated by medusahead (*Taeniatherum caput-medusae*) and there is some teasel (*Dipsacus sylvestris*) in the vicinity. A cursory listing of native species at the site includes yarrow (*Achillea millefolium*), nettle-leaf horsemint (*Agastache urticifolia*), bluebunch wheatgrass (*Pseudoroegneria spicata*), arrowleaf balsamroot (*Balsamorhiza sagittata*), Idaho fescue (*Festuca idahoensis*), Palouse thistle (*Cirsium brevifolium*), black hawthorn (*Crataegus douglasii*), prairie smoke (*Geum triflorum*), little sunflower (*Helianthella uniflora*), houndstongue hawkweed (*Hieracium cynoglossoides*), lupine (*Lupinus* sp.), Oregon grape (*Mahonia repens*), ponderosa pine (*Pinus ponderosa*; widely spaced), slender cinquefoil (*Potentilla gracilis*), Palouse goldenweed (*Pyrocoma liatrifomis*), and goldenrod (*Solidago missouriensis*). The following weeds were observed: St. Johnswort (*Hypericum perforatum*), Kentucky bluegrass (*Poa pratensis*), unknown *Aster* sp., planted junipers (*Juniperus* sp.), teasel (*Dipsacus sylvestris*), and ventenata (*Ventenata dubia*).



Site 1; AmeriCorps members Zach Johnson and Adam Hein stand at the furthest clusters of plants. Site 2 is just beyond, and to the right of the ponderosa tree. . Juanita Lichtardt, Natural Heritage Program.