

**Plant Propagation Protocol for *Downingia laeta***

ESRM 412 – Native Plant Production

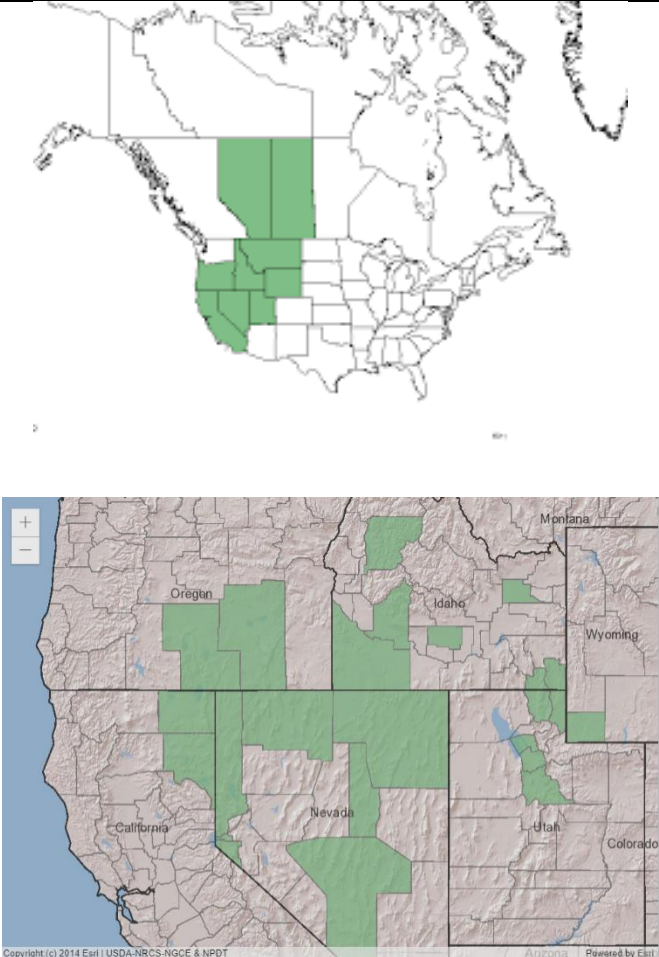
URL: <https://courses.washington.edu/esrm412/protocols/2021/DOLA2.pdf>

<b>TAXONOMY</b>	
Plant Family	Campanulaceae
Scientific Name	<i>Downingia laeta</i>
Common Name	Great Basin calicoflower
Species Scientific Name	
Scientific Name	<i>Downingia laeta</i> Greene
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	<i>Downingia brachycantha</i>
Common Name(s)	Great Basin calicoflower, Great Basin downingia, bright calicoflower, bright downingia
Species Code (as per USDA Plants database)	DOLA2

**GENERAL INFORMATION**



**2012 Jean Pawek Calflora**

<p>Geographical range</p>	
<p>Ecological distribution</p>	<p>Moist mixed grassland, cypress upland<sup>4</sup> Arid west wetlands<sup>3</sup></p>
<p>Climate and elevation range</p>	<p>1200-2200 m<sup>2</sup></p>
<p>Local habitat and abundance</p>	<p>Rare; Ditches, riverbanks, ponds, vernal pools<sup>2</sup></p>
<p>Plant strategy type / successional stage</p>	<p>Fast growing, flowers May-Jul, fruits July-early October<sup>1</sup> Related species grow best germinating in water with a 8-12 week period of inundated soil prior to flowering</p>
<p>Plant characteristics</p>	<p>Annual forb/herb, up to 20 cm. Sessile, alternate, lanceolate leaves, 5-20 mm long. Flower is on top of slender ovary, which appears as a thickened stalk. Distinguished from other wetland species by asymmetry between the 2-lobed upper and 3-lobed lower lip of the corolla. Produces many-seeded capsule, 20-45 mm long and 1-2 mm thick.<sup>1</sup> Prefers vernal pools or other environments that are inundated for germination and rapid growth, but dry during flowering and fruiting.<sup>6</sup></p>
<p><b>PROPAGATION DETAILS</b></p>	
<p>Ecotype</p>	<p><i>Downingia elegans</i> (related species, notes techniques are same for <i>D. yina</i>, another related species)</p>
<p>Propagation Goal</p>	<p>Seeds</p>

Propagation Method	Seed
Product Type	Seed
Stock Type	Plugs + field hybrid
Time to Grow	4-8 months (natural vs early greenhouse germination)
Target Specifications	Seed pod/fruit dried
Propagule Collection Instructions	Collect seed from wild populations in July-Aug. Choose abundant local populations for collection and collect sparingly to ensure enough propagules are left in the wild. Seeds ripen evenly, but retention is only moderate; the thin pods split easily and scatter seed. <sup>5</sup>
Propagule Processing/Propagule Characteristics	Pods can be easily split and seeds shaken out. Large scale cleaning can be done with a brush machine equipped with a small mesh screen mantle. An air screen mesh can be used to further clean debris. Proper respiratory protection should be used due to silica content of plant, a respiratory irritant. Seeds are small (225000 seeds per pound) <sup>5</sup>
Pre-Planting Propagule Treatments	Seeds are nondormant, germinating naturally in warm/spring temperatures in April. <sup>5</sup> Light and inundation are not required for germination, but produce better rates. <sup>6</sup>
Growing Area Preparation	Seeds were started in plugs in a greenhouse in late winter before transplanting to a field covered with weed fabric. Holes were cut in the fabric in a 1x1 ft spacing for planting. Seeds can be direct sown in field but this is not recommended due to drought stress. <sup>5</sup> Plants are adapted to fine and mid- texture soils and prefer high water retention <sup>3</sup> .  Weed exclusion is important to prevent contamination of the crop with weed seeds.
Establishment Phase Details	Plants will grow rapidly in full sun, warm temperatures, and adequate moisture. <sup>5</sup>
Length of Establishment Phase	
Active Growth Phase	
Length of Active Growth Phase	
Pollination	Pollinated by small native bees, bumblebees, and flies <sup>5</sup>
Harvesting, Storage and Shipping	Plant can yield 16-30 pounds of seed per 1/10 <sup>th</sup> acre plot. In small-scale production, plants can be cut at the base and set to dry. Any seeds loose on the weed cloth can be vacuumed and dried. For large fields with tall enough plants, seeds can be direct combined. Plants should be cleaned using a brush machine to separate out seed from debris. <sup>5</sup>
Length of Storage	Orthodox seeds can be properly stored for many years and remain viable. <sup>5</sup>
Guidelines for Outplanting / Performance on Typical Sites	Establishment rating is low by direct seeding, but high using outplanted plugs. <sup>5</sup>
Other Comments	Rare/threatened/endangered in California, requires a permit for collection

## INFORMATION SOURCES

References	<ol style="list-style-type: none"> <li>1. Great Basin Downingia — <i>Downingia laeta</i>. Montana Field Guide. Montana Natural Heritage Program. Retrieved on May 5, 2021, from <a href="http://FieldGuide.mt.gov/speciesDetail.aspx?elcode=PDCAM06080">http://FieldGuide.mt.gov/speciesDetail.aspx?elcode=PDCAM06080</a></li> <li>2. Lisa M. Schultheis 2012, <i>Downingia laeta</i>, in Jepson Flora Project (eds.) <i>Jepson eFlora</i>, <a href="https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=23279">https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=23279</a>, accessed on May 05, 2021.</li> <li>3. USDA, NRCS. 2021. The PLANTS Database (<a href="http://plants.usda.gov">http://plants.usda.gov</a>, 29 April 2021)</li> <li>4. Virtual herbarium of plants at risk in Saskatchewan: A Natural Heritage. <i>Downingia laeta</i> (n.d.). Retrieved May 06, 2021, from <a href="https://www.usask.ca/biology/rareplants_sk/root/htm/en/plants-description/downingia-laeta/r-downingia-laeta.php">https://www.usask.ca/biology/rareplants_sk/root/htm/en/plants-description/downingia-laeta/r-downingia-laeta.php</a></li> <li>5. <a href="#">Seed Production Manual for the Pacific Northwest</a> (Full doc) (PDF; 31 MB) Bartow, A. 2015. USDA-NRCS Corvallis Plant Materials Center. Corvallis, OR. December 2015. 192p. (ID# 12767).</li> <li>6. Bauder, Ellen. ECOLOGICAL MONITORING OF <i>Downingia concolor</i> ssp. <i>brevior</i> (Cuyamaca Lake downingia) AND <i>Llmanthas gracilis</i> ssp. <i>parish</i> (Parish's slender meadowfoam)</li> </ol>
Other Sources Consulted	<p><i>Downingia laeta</i> Retrieved May 5, 2021 from the Integrated Taxonomic Information System on-line database, <a href="http://www.itis.gov">http://www.itis.gov</a></p> <p>Wallis, Cliff. 2001. Proposed protocols for inventories of rare plants of the Grassland Natural Region. Alberta Sustainable Resource Development, Fish and Wildlife Service, Alberta Species at Risk Report No. 21. Edmonton, AB. 305 pp.</p> <p>POWO (2019). "Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet; <a href="http://www.plantsoftheworldonline.org/">http://www.plantsoftheworldonline.org/</a> Retrieved*."</p> <p>Shannon A. Bliss, and Paul H. Zedler. "The Germination Process in Vernal Pools: Sensitivity to Environmental Conditions and Effects on Community Structure." <i>Oecologia</i>, vol. 113, no. 1, 1998, pp. 67–73. JSTOR, <a href="http://www.jstor.org/stable/4221824">www.jstor.org/stable/4221824</a>. Accessed 6 May 2021.</p>
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