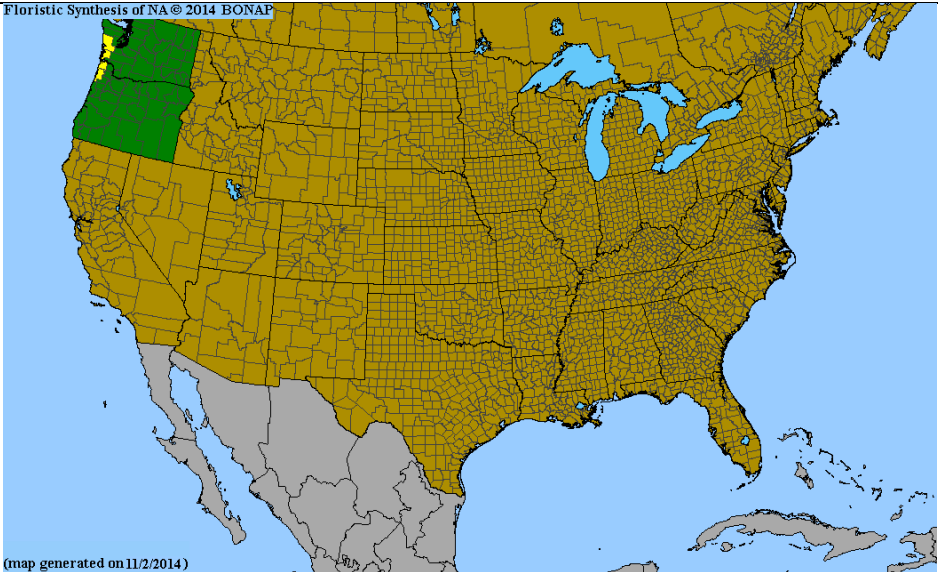


Plant Propagation Protocol for *Dodecatheon austrofrigidum*

ESRM 412 – Native Plant Production

URL: <https://courses.washington.edu/esrm412/protocols/2024/DOAU.pdf>

TAXONOMY	
Plant Family	
Scientific Name	Primulaceae ¹ .
Common Name	Primrose Family ¹ .
Species Scientific Name	
Scientific Name	<i>Primula austrofrigida</i> (K.L. Chambers) A.R. Mast & Reveal ² . [Note: taxonomic merge of <i>Dodecatheon</i> into <i>Primula</i> is not universally accepted; document will proceed with the “outdated” binomial still in most common usage as reflected by the current USDA symbol.]
Varieties	N/A
Sub-species	N/A
Cultivar	N/A
Common Synonym(s)	<i>Dodecatheon austrofrigidum</i> K.L. Chambers ¹
Common Name(s)	Frigid shooting star, Tillamook shooting star ¹ .
Species Code (as per USDA Plants database)	DOAU ³ .
GENERAL INFORMATION	
Geographical range	<p>Floristic Synthesis of NA © 2014 BONAP</p>  <p>(map generated on 11/2/2014)</p> <p>Map sourced from the Biota of North America Program (BONAP)⁴. Dark green indicates that species is present in state; yellow indicates that species is present and rare in county.</p>

Ecological distribution	Moist sites in meadows, forest, riparian. Most populations are in Coast Ranges of northwest Oregon and the Willapa Hills of southwest Washington, but one outlying population exists on Mount Colonel Bob in northeast Grays Harbor County ⁶ .
Climate and elevation range	<i>Dodecatheon austrofrigidum</i> sites are situated in the mild coastal climate between the central Olympic Peninsula and northwestern Oregon ¹ . Sites in the Willapa Hills of Washington and all sites known in Oregon are situated in USDA Hardiness Zone 8A, corresponding to winter average lows of 10-15 degrees Fahrenheit with only exceptional dips below; the site at Mount Colonel Bob is more comparable to USDA Hardiness Zone 7A, corresponding to winter average lows of 5-10 degrees Fahrenheit with only exceptional dips below ⁷ . Summer temperatures for lower elevation sites range between 50 and 75 degrees Fahrenheit, with occasional heat waves; <i>Dodecatheon austrofrigidum</i> occurs in a climate with low summer rainfall, wherein precipitation peaks in the early winter ⁸ . This species has been recorded between 30 – 1200 meters in elevation ⁶ .
Local habitat and abundance	High-elevation moist grassy turf; in forest, moist basaltic slopes, mossy cliff-faces near waterfalls or streamlets ⁶ . Generally associated with other species that prefer these more vertical seep-like habitats, such as <i>Filipendula occidentalis</i> , <i>Pinguicula macroceras</i> , <i>Parnassia palustris</i> , <i>Arnica amplexicaulis</i> , <i>Carex macrochaeta</i> , and <i>Stenanthium occidentale</i> ⁹ . At the type locality, the species grew with <i>Cascadia nuttallii</i> , <i>Saxifraga mertensiana</i> , and <i>Erythranthe guttata</i> , species often found at seeps ⁶ . In Tillamook County, Oregon, the species occurs occasionally along rivers on basalt rock faces between the winter and summer water marks, where seeds from higher-elevation populations washed downslope and tethered to cracks in the rock ⁶ .
Plant strategy type / successional stage	Seral in moist lithosere habitats ⁶ .
Plant characteristics	Clumping, herbaceous forb ¹ . Basal rosette of ovate to elliptical leaves, tapering to petiole base ⁶ . Leaf margins are dentate to denticulate, varying by population ² . Flower stems up to 45cm high, with a bracteate umbel of 1-7 pedicelled flowers. 5 reflexed lobes are lavender to magenta, grading to white corolla tube ⁶ . Protruding maroon filament tube, anthers and stigma ¹ . Distinguished from similar species in genus by dentate leaf margins, lack of yellow in corolla tube; differences in stigmas, capsules, seeds and seedling morphology ⁶ . Similar floral morphology to <i>Dodecatheon frigidum</i> , but vastly disjunct in geographical range and differs from <i>D. frigidum</i> in other morphological characteristics as well as genetics ⁶ . <i>D. austrofrigidum</i>

can be distinguished from the similar *D. pulchellum* in flower by the filaments being fused into a tube in *D. austrofrigidum*¹⁰.



	<i>Dodecatheon austrofrigidum</i> , nursery-raised specimen in cultivation (own photos).
PROPAGATION DETAILS: FROM SEED	
Ecotype	N/A
Propagation Goal	Plants.
Propagation Method	Seed.
Product Type	Container (plug).
Stock Type	Seeds.
Time to Grow	8 months ¹² .
Target Specifications	Firm, well-rooted plug ¹² in 10in ³ Ray Leach Super cell ¹¹ .
Propagule Collection Instructions	<p>[NOTE: This information is based on <i>Dodecatheon pulchellum</i>, a closely-related species growing in similar conditions.]</p> <p>Small brown seeds are collected in June from split capsules, stored at room temperature until cleaning¹¹.</p>
Propagule Processing/Propagule Characteristics	<p>[NOTE: This information is based on <i>Dodecatheon pulchellum</i>, a closely-related species growing in similar conditions.]</p> <p>Capsules are easily crushed, seed is processed in air column separator. Storage at 40 degrees Fahrenheit, 40% humidity¹¹.</p>
Pre-Planting Propagule Treatments	<p>[NOTE: This information is based on <i>Dodecatheon pulchellum</i>, a closely-related species growing in similar conditions.]</p> <p>Extended cold, moist stratification is required, beginning in late fall; seed sown directly into cells in November and top-dressed with thin layer of pea gravel¹¹.</p>
Growing Area Preparation / Annual Practices for Perennial Crops	<p>[NOTE: This information is based on <i>Dodecatheon pulchellum</i>, a closely-related species growing in similar conditions.]</p> <p>Containers watered deeply and placed outside over winter season, watering only when particularly dry¹¹.</p>
Establishment Phase Details	<p>[NOTE: This information is based on <i>Dodecatheon pulchellum</i>, a closely-related species growing in similar conditions.]</p> <p>Plants begin to emerge in March; germination occurs over a 3–4-week period¹¹.</p>
Length of Establishment Phase	<p>[NOTE: This information is based on <i>Dodecatheon pulchellum</i>, a closely-related species growing in similar conditions.]</p> <p>4 months¹¹.</p>
Active Growth Phase	[NOTE: This information is based on <i>Dodecatheon pulchellum</i> , a closely-related species growing in similar conditions.]

	<p>Even moisture and regular water-soluble fertilizer provided throughout growing season from March to June; plants moved into lath house for summer, may go dormant after flowering if moisture is low¹¹. Development is rapid, seedlings are root-tight in container within 4 weeks¹².</p>
Length of Active Growth Phase	<p>[NOTE: This information is based on <i>Dodecatheon pulchellum</i>, a closely-related species growing in similar conditions.]</p> <p>2 months, until end of flowering¹¹.</p>
Hardening Phase	<p>[NOTE: This information is based on <i>Dodecatheon pulchellum</i>, a closely-related species growing in similar conditions.]</p> <p>Taper off fertilization in September, decrease watering in preparation for dormancy. No other hardening required¹¹.</p>
Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	<p>[NOTE: This information is based on <i>Dodecatheon pulchellum</i>, a closely-related species growing in similar conditions.]</p> <p>Dormant plants in containers should be protected by thin foam layer for insulation from extreme cold; foam layer should be removed at the end of winter, as temperatures begin to rise¹¹.</p>
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	<p>[NOTE: This information is based on <i>Dodecatheon pulchellum</i>, a closely-related species growing in similar conditions.]</p> <p>Outplanting in late fall; plugs should be checked in spring to ensure that the upper portion of plug is not exposed by frost heaving. Flowering should commence in the following season for the most developed plants¹³.</p>
Other Comments	<p>This species is listed as endangered by the Washington Natural Heritage Program and ranked as Sensitive by the BLM¹⁴. Permits should be obtained for collection at all sites. Wild collection should be from seed only, as transplanted mature specimens have a low survival rate¹³.</p> <p>Vegetative propagation is also possible. Buds with developed root systems can be divided from main rosette in February or early March, planting divisions ½" in depth; the largest of these divisions are capable of blooming within the same growing season (Urs Baltensperger, Edelweiss Perennials, Inc. in Canby, OR; personal communication, April 2024).</p>

	However, for restoration purposes, seed propagation is preferred for the maintenance of genetic diversity in this endangered and localized species.
INFORMATION SOURCES	
References	<ol style="list-style-type: none"> 1. Giblin, D., Legler, B. (n.d.). <i>Primula austrofrigidum</i> – <i>Burke Herbarium Image Collection</i>. Retrieved May 7, 2024, from https://burkeherbarium.org/imagecollection/taxon.php?Taxon=Primula%20austrofrigidum 2. Reveal, J. L. (n.d.). <i>Dodecatheon austrofrigidum</i> – <i>Flora of North America</i>. Retrieved May 7, 2024, from http://dev.semanticfna.org/Dodecatheon_austrofrigidum 3. United States Department of Agriculture, Natural Resources Conservation Service. (n.d.). <i>Dodecatheon austrofrigidum</i> – <i>USDA Plants Database</i>. Retrieved May 7, 2024, from https://plants.usda.gov/home/plantProfile?symbol=DOAU 4. Kartesz, J.T., The Biota of North America Program (BONAP). (2015). <i>Dodecatheon austrofrigidum</i> – <i>North American Plant Atlas</i>. Retrieved May 7, 2024 from https://bonap.net/Napa/TaxonMaps/Genus/County/Dodecatheon 5. NatureServe Explorer. (n.d.). <i>Dodecatheon austrofrigidum</i>. Retrieved May 7, 2024 from https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.153712/Dodecatheon_austrofrigidum 6. Chambers, K. L. (2006). <i>A New Species Of Dodecatheon (Primulaceae) From The Northern Coast Range Of Oregon And Washington</i>. Retrieved May 7, 2024 from https://www.biodiversitylibrary.org/partpdf/163774 7. United States Department of Agriculture. (n.d.). <i>2023 USDA Plant Hardiness Zone Map</i>. Retrieved May 7, 2024 from https://planthardiness.ars.usda.gov/ 8. National Oceanic and Atmospheric Administration, National Weather Service. (n.d.). <i>NOWData – NOAA Online Weather Data</i>. Retrieved May 7, 2024 from https://www.weather.gov/wrh/climate?wfo=sew 9. Herbarium specimen. U.S.A., Washington, Pacific County: In permanent seep on steep (60%), north-facing basalt outcrop. Locality withheld, elevation 1800 ft. Cathy L. Maxwell 1670 with James Powell, 29 May 2011. WTU 389343. Retrieved May 7, 2024 from https://www.burkeherbarium.org/imagecollection/taxonmap.php?Taxon=Primula%20austrofrigidum&SourcePage=taxon

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