

## Plant Propagation Protocol for *Dodecatheon hendersonii*

ESRM 412 – Native Plant Production

Protocol URL: <https://courses.washington.edu/esrm412/protocols/DOHE.pdf>



Photo taken by Virginia Skilton

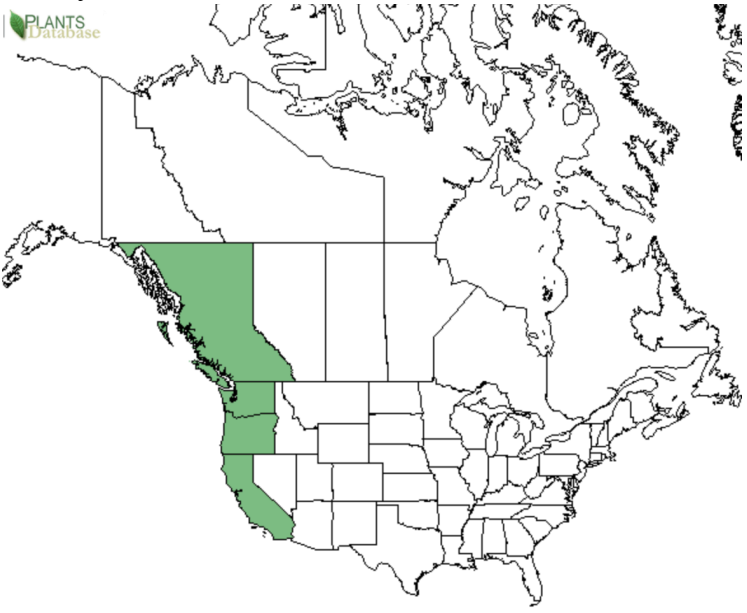
Source: <http://linnet.geog.ubc.ca/ShowDBImage/ShowStandard.aspx?index=1934>

<b>TAXONOMY</b>	
<b>Plant Family</b>	
Scientific Name	Primulaceae <sup>11</sup>
Common Name	Primrose family <sup>11</sup>
<b>Species Scientific Name</b>	
Scientific Name	<i>Dodecatheon hendersonii</i> A. Gray <sup>11</sup>
Varieties	None recognized in the USDA Plants Database <sup>11</sup>
Sub-species	<i>Dodecatheon hendersonii</i> A. Gray <i>ssp. cruciatum</i> (Greene) H.J. Thomp. <i>Dodecatheon hendersonii</i> A. Gray <i>ssp. hansenii</i> (Greene) Kartesz <i>Dodecatheon hendersonii</i> A. Gray <i>ssp. hendersonii</i> <i>Dodecatheon hendersonii</i> A. Gray <i>ssp. parvifolium</i> (R. Knuth) H.J. Thomp. <sup>11</sup>
Cultivar	n/a
Common Synonym(s)	<i>Dodecatheon hansenii</i> (Greene) H.J. Thompson <sup>10</sup> <i>Dodecatheon hendersonii</i> A. Gray var. <i>hansenii</i> (Greene)  <i>Primula hendersonii</i> (A. Gray) Mast & Reveal <sup>5</sup>

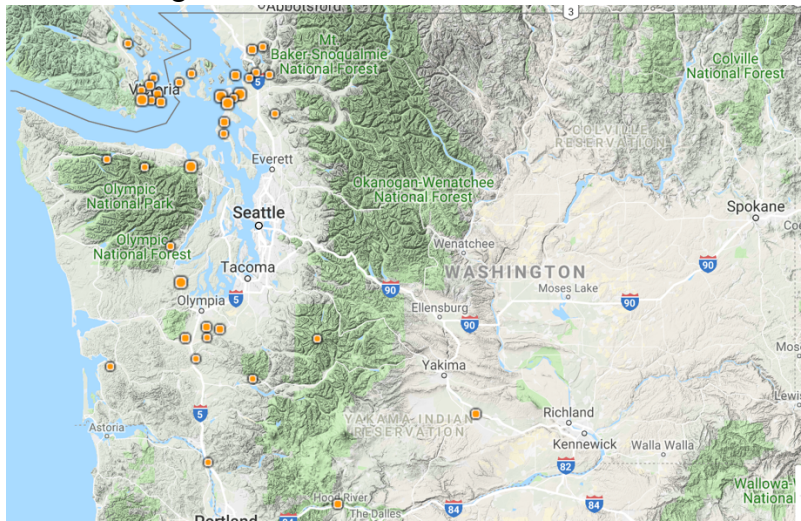
Common Name(s)	Broad-leaved shooting star Henderson's shooting star Mosquito bills <sup>10</sup> Slimpod <sup>4</sup>
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Species Code (as per USDA Plants database)	DOHE <sup>11</sup>
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**GENERAL INFORMATION**

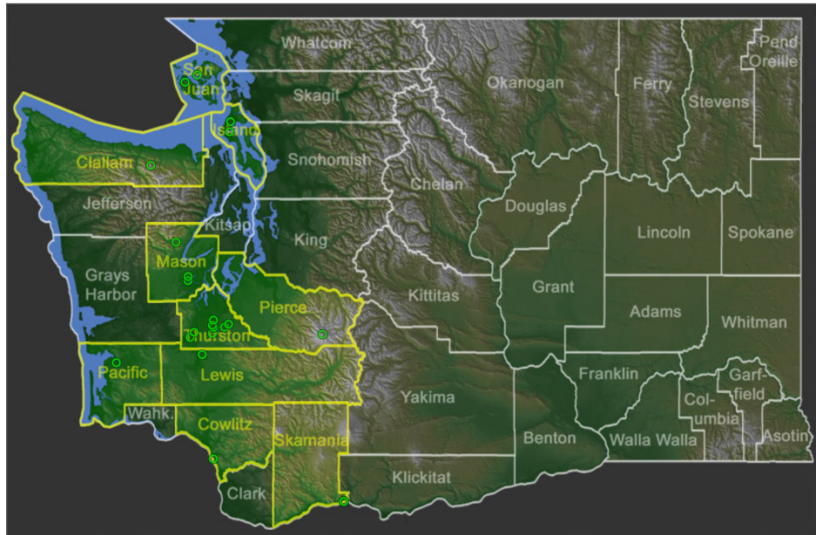
Geographical range	<p><u>North American distribution</u> This species occurs west of the Cascade crest in Washington, in British Columbia and south to California.<sup>5</sup> 396 herbaria specimens from British Columbia, Washington, Oregon, and California have been catalogued in the Consortium of Pacific Northwest Herbaria. The first dated catalogue is from 1877 and the most recent was catalogued in 2017.<sup>1</sup> This species occurs from southern Vancouver Island in the coastal ranges to west-central California (southern limit San Benito County) and is disjunct into the San Bernardino Mountains in Southern California. To the east, this species is found on the Siskiyou Mountains and in the Sierra Nevada of California to Tulare County.<sup>10</sup></p>  <p>Map from USDA Plant Database<sup>11</sup></p> <p><u>Washington state distribution</u> This species is native to Washington state. The Consortium of Pacific Northwest Herbaria have catalogued 66 specimens</p>
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from Washington state between 1877 and 2009.<sup>1</sup>



Map from Consortium of Pacific Northwest Herbaria Specimen database<sup>1</sup>

The University of Washington Burke Museum WTU Herbarium has catalogued 28 specimens collected from 10 counties in Washington: San Juan, Island, Clallam, Mason, Thurston, Pierce, Pacific, Lewis, Cowlitz, and Skamania.<sup>5</sup>



Map from WTU Image collection: Plants of Washington<sup>5</sup>

Ecological distribution	This species occurs in mesic to dry meadows and grasslands, as well as in Garry oak and conifer woodlands in partial sun to shade in the northwest and Rocky Mountains. <sup>4,6</sup>
Climate and elevation range	This species grows at a range of elevations from sea level in British Columbia to 6233ft in California. <sup>2</sup>  This species thrives in cool mesothermal climates. <sup>4</sup>
Local habitat and abundance	This species is found in communities with prairies grasses and forbs, as well as with oak woodland shrubs. It is commonly

	<p>found in moist areas in the remnant prairies and oak woodlands of the South Puget Sound in Washington.<sup>3</sup></p> <p>Thrives in moist, often saline meadows, on wet coastal bluffs and in stream banks.<sup>9</sup></p> <p>In California this species has been observed with <i>Quercus</i>, <i>Arctostaphylos</i>, and <i>Cynoglossum grande</i> Dougl. Ex Lehm.<sup>7</sup></p> <p>In coastal locations this species occurs in maritime and sub maritime cool mesothermal climates on moderately dry to fresh, nitrogen rich soils. It is found spottily in open-canopy forests and in meadow-like communities where early spring moisture is followed by mid-summer drought. Its occurrence decreases with increasing latitude, elevation, precipitation, and continentality. In Canada it is found at average slope gradient of 26% and average elevation of 485ft.<sup>4</sup></p>
Plant strategy type / successional stage	<p>This prairie species is not a specialist and can be considered weedy in habit.<sup>3</sup></p> <p>This species can tolerate low water conditions.<sup>4</sup></p>
Plant characteristics	<p>Perennial forb with basal rosettes of broad, rounded leaves. Leaves subtend a naked flowering stem that grows between 6-16 inches tall. Flowers are pink or purple with 4 to 5 petals that are swept backward, with the beak-like stamens and stigma oriented forward and downward. Flowers nod in clusters at the top of the stem. Summer deciduous. Flowers occur in March through May. Requires summer dry period.<sup>4</sup></p> <p>Seedlings require 3-5 years to flower.<sup>8</sup></p>
<b>PROPAGATION DETAILS</b>	
<b>Seed, as described by Drake, Deanne, et al.<sup>3</sup></b>	
Ecotype	Seed collected by Nature Conservancy volunteers from 16 sites at the Ft. Lewis prairies in the South Puget Sound. Precipitation the year of collection was 45.6 inches and growing season temperatures were not unusually warm.
Propagation Goal	Germinants
Propagation Method	Seed
Product Type	Seedlings in flats
Stock Type	Standard flats
Time to Grow	Information not provided.
Target Specifications	Information not provided.
Propagule Collection Instructions	Seeds were collected during the summer and fall of 1995. Seeds were stored in paper bags at room temperature for 6 months prior to being shipped and stored under refrigeration.

	Testing took place within a year of collection between March and May of 1996.
Propagule Processing/Propagule Characteristics	Seeds were stored for 6 months before germination trial. No specific information on seedlings density provided.
Pre-Planting Propagule Treatments	This study found 59% germination rate after 5 days when seeds were stratified for 12 weeks in cold, moist, sterile, inorganic soil mix at 2-6° C before being spread on packed sterile soil in standard flats and incubated outside at temperatures between 9-18°C. After 6 weeks stratification in the same conditions a 37.3% germination rate was observed. Germination rate was significantly lower when seeds were planted in flats incubated at higher temperatures. Seeds were stratified in small plastic containers loosely wrapped in plastic.
Growing Area Preparation / Annual Practices for Perennial Crops	Seeds were spread on packed sterile soil in standard sized flats and covered with approximately 0.2 inches of soil. No further information about area preparation was provided.
Establishment Phase Details	An average of 5 days from seeding to germination was observed in the 12-week cold stratification treatment and 25 days to germination after 6-week stratification.
Length of Establishment Phase	Information not provided.
Active Growth Phase	Information not provided.
Length of Active Growth Phase	Information not provided.
Hardening Phase	Information not provided.
Length of Hardening Phase	Information not provided.
Harvesting, Storage and Shipping	Information not provided.
Length of Storage	Information not provided.
Guidelines for Outplanting / Performance on Typical Sites	Information not provided.
Other Comments	Higher germination in cool conditions. Outdoor propagation provides more “natural” environment for physiological acclimatization and enhances germination in this species.
<b>PROPAGATION DETAILS</b>	
<b>Vegetative, as described by Pettinger and Costanzo, and the USDA-NRCS Corvallis Plant Materials Center Staff.<sup>8, 12</sup></b>	
Ecotype	Information not provided.
Propagation Goal	Plants
Propagation Method	Vegetative
Product Type	Information not provided.
Stock Type	Information not provided.
Time to Grow	Bulbils should develop roots in the first year. <sup>8</sup>

Target Specifications	Information not provided.
Propagule Collection Instructions	In fall and early spring tiny white bulbils can be removed around crown of plant and potted up just below the soil line and kept moist. <sup>8</sup>  Dig and divide in fall. <sup>12</sup>
Propagule Processing/Propagule Characteristics	No information provided.
Pre-Planting Propagule Treatments	Information not provided.
Growing Area Preparation / Annual Practices for Perennial Crops	Information not provided.
Establishment Phase Details	Bulbil transplants will develop roots in the first year and should reach maturity in the third year. <sup>8</sup>
Length of Establishment Phase	Information not provided.
Active Growth Phase	Between 3 and 5 years. <sup>8</sup>
Length of Active Growth Phase	Information not provided.
Hardening Phase	Information not provided.
Length of Hardening Phase	Information not provided.
Harvesting, Storage and Shipping	Information not provided.
Length of Storage	Information not provided.
Guidelines for Outplanting / Performance on Typical Sites	3-5 years to flower maturity. <sup>8</sup>  Use large tubers for out planting and return all little ones back in production area to continue to grow. <sup>12</sup>
Other Comments	Although this species grows from small rice-like bulblets it is also easily grown from seed. This species can be slow to develop but applying additional water through the dormant summer season can speed up development and time to flowering. Plants will thrive in location that receives spring moisture followed by dry summer in sun to semi shade. Combine with <i>Camassia quamash</i> , <i>Fritillaria affinis</i> , <i>Erythronium oregonum</i> , and <i>ranunculus occidentalis</i> . <sup>8</sup>
<b>INFORMATION SOURCES</b>	
References	See below
Other Sources Consulted	See below
Protocol Author	Kyra Matin
Date Protocol Created or Updated	07/31/18

## References:

- <sup>1</sup>“Dodecatheon hendersonii.” *Consortium of Pacific Northwest Herbaria Specimen Database*, Consortium of Pacific Northwest Herbaria, 2018, <http://www.pnwherbaria.org/data/results.php?DisplayAs=WebPage&ExcludeCultivated=Y&GroupBy=ungrouped&SortBy=Year&SortOrder=DESC&SearchAllHerbaria=Y&QueryCount=1&IncludeSynonyms1=Y&Genus1=dodecatheon&Species1=hendersonii&Zoom=4&Lat=55&Lng=-135&PolygonCount=0> Accessed 12 July 2018.
- <sup>2</sup>“Dodecatheon hendersonii A. Gray, Bot. Gaz. 11:233. 1886” *Flora of North America*, [www.efloras.org/florataxon.aspx?flora\\_id=1&taxon\\_id=250092201](http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=250092201). Accessed 21 July 2018
- <sup>3</sup>Drake, Deanne, et al. “Techniques to Promote Germination of Seed from Puget Sound Prairies.” *Restoration & Management Notes*, vol. 16, no. 1, 1998, pp. 33–40. *JSTOR*, [www.jstor.org/stable/43440023](http://www.jstor.org/stable/43440023). Accessed 12 July 2018.
- <sup>4</sup>Frenneman, Jamie. “Dodecatheon hendersonii.” Klinkenberg, Brian. (Editor) *BC: Electronic Atlas of the Plants of British Columbia E-Flora, Lab for Advanced Spatial Analysis, department of Geography, University of British Columbia, Vancouver, 2017*, <http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Dodecatheon%20hendersonii>. Accessed 12 July 2018.
- <sup>5</sup>Giblin, David and Legler, Ben. “Dodecatheon hendersonii.” *WTU Image Collection: Plants of Washington*, Burke Museum of Natural History and Culture, 2018, <http://biology.burke.washington.edu/herbarium/imagecollection.php>. Accessed 12 July 2018.
- <sup>6</sup>Johnson, Lorraine, and Andrew Leyerle. *100 Easy-to-Grow Native Plants for Canadian Gardens*. Douglas & McIntyre Ltd., 2017.
- <sup>7</sup>Macior, Lazarus Walter. “Floral Resource Sharing by Bumblebees and Hummingbirds in Pedicularis (Scrophulariaceae) Pollination.” *Bulletin of the Torrey Botanical Club*, vol. 113, no. 2, 1986, pp. 101–109. *JSTOR*, [www.jstor.org/stable/2995932](http://www.jstor.org/stable/2995932). Accessed 12 July 2018.
- <sup>8</sup>Pettinger, April, and Brenda Costanzo. *Native Plants in the Coastal Garden: a Guide for Gardeners in the Pacific Northwest*. Timber Press, 2003.
- <sup>9</sup>Pojar, Jim, and Andy MacKinnon. *Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia & Alaska*. 2<sup>nd</sup> ed., B.C. Ministry of Forest and Lone Pine Publishing, 2004.
- <sup>10</sup>University of Washington Herbarium. “Washington Flora Checklist.” Burke Museum, Burke Museum, 2010, <https://biology.burke.washington.edu/herbarium/waflora/checklist.php?Taxon=Dodecatheon%20hendersonii&ID=7299>. Accessed 12 July 2018.
- <sup>11</sup>USDA, NRCS “Dodecatheon hendersonii A. Gray mosquito bills.” *The PLANTS Database*, National Plant Data Team, Greensboro, NC 27401-4901 USA, 2018, <https://plants.sc.egov.usda.gov/core/profile?symbol=DOHE>. Accessed 12 July 2018.
- <sup>12</sup>Young-Mathews, A., Bartow, A., Ross, Tyler., East, V., Duncan, B., and Friddle, M.. “Propagation of Herbaceous Plants for the Willamette Valley.” *United States Department of Agriculture, Natural Resources Conservation Service*, 2016,

[http://www.luckiamutelwc.org/uploads/8/8/3/5/8835330/powerpoint\\_slides.pdf](http://www.luckiamutelwc.org/uploads/8/8/3/5/8835330/powerpoint_slides.pdf)  
Accessed 31 July 2018.

### **Other Sources Consulted:**

Kruckeberg, Arthur R. *Gardening with Native Plants of the Pacific Northwest: an Illustrated Guide*. University of Washington Press, 1996.

Lyons, C., W. Merilees. *Trees and Shrubs to Know in Washington and British Columbia*. Lone Pine Publishing. 1956.

Rose, Robin, et al. *Propagation of Pacific Northwest Native Plants*. Oregon State University Press, 1998.

### **Previous Protocol for *Dodecatheon hendersonii*:**

#### Plant Data Sheet

Species *Dodecatheon hendersonii*, Broad-leaved shooting star



Range

Washington, Oregon, California, Nevada

Climate, elevation



Grows in wet and mild climate at low elevations.

Local occurrence (where, how common)

Commonly found on South Puget Sound Prairies.

Habitat preferences

Well drained soils.

Plant strategy type/successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)

Stress-tolerator.

Associated species

*Dodecathion pulchellum*, *Balsamorhiza deltoidea*, and other prairie species.

Other common names include:

Mosquito Bills

May be collected as:

Seeds.

Collection restrictions or guidelines

None specified.

Seed germination (needs dormancy breaking?)

Requires cool stratification for at least 6 weeks but has better % germination if left for 12 weeks. Store in moist, sterile, inorganic soil mix at 2-6°C for six or twelve weeks.

Seed life (can be stored, short shelf-life, long shelf-life)

Not specified.

Recommended seed storage conditions

Propagation recommendations (plant seeds, vegetative parts, cuttings, etc.)

Seeds.

Soil or medium requirements (inoculum necessary?)

None specified.

Installation form (form, potential for successful outcomes, cost)

Seeding or plant installation.

Recommended planting density  
Not found.

Care requirements after installed (water weekly, water once etc.)  
None specified.

Normal rate of growth or spread; lifespan

Sources cited

Drake Deanne, Kern Ewing, and Patrick Dunn, 1998. Techniques to Promote Germination of Seed from Puget Sound Prairies. Restoration & Management Notes 16:1 Summer.

<http://www.rook.org/earl/bwca/nature/grass/carexros.html>

[www.horticulture.com](http://www.horticulture.com)

[www.mrgrow.com](http://www.mrgrow.com)

[www.botany.com](http://www.botany.com)

Pojar, Jim and Andrew MacKinnon. 1994. Plants of the Pacific Northwest Coast Washington, Oregon British Columbia & Alaska. BC Ministry of Forests and Lone Pine Publishing, Vancouver, British Columbia, Canada 527 p.

Data compiled by (student name and date)  
Lara Johnson