

**Plant Propagation Protocol for *Erythronium revolutum***  
 ESRM 412 – Native Plant Production  
 Spring 2012

<p>Image of mature/flowering <i>E. revolutum</i>.  <a href="http://biology.burke.washington.edu/herbarium/imagecollection.php?Page=plantkey.php">http://biology.burke.washington.edu/herbarium/imagecollection.php?Page=plantkey.php</a></p>	<p>Image of <i>E. revolutum</i> mature, dormant corms.  <a href="http://www.srgc.org.uk/bulblog/log2005/100805/log.html">http://www.srgc.org.uk/bulblog/log2005/100805/log.html</a></p>

<p>United States Distribution Map<sup>1</sup></p>	<p>Washington Distribution Map<sup>1</sup></p>

<b>TAXONOMY</b>	
<b>Family Names</b>	
Family Scientific Name:	Liliaceae
Family Common Name:	Lily family
<b>Scientific Names</b>	
Genus:	<i>Erythronium</i>
Species:	<i>revolutum</i>
Species	Sm.

Authority:	
Variety:	N/A
Sub-species:	N/A
Cultivar:	N/A
Authority for Variety/Sub-species:	N/A
Common Synonym(s) (include full scientific names (e.g., <i>Elymus glaucus</i> Buckley), including variety or subspecies information)	Another species, <i>Erythronium quinaultense</i> , is thought to be a hybrid of <i>E. revolutum</i> and <i>E. montanum</i> . <sup>17</sup>
Common Name(s):	mahogany fawn lily, mahogany fawnlily, pink fawn lily, bog fawn-lily
Species Code (as per USDA Plants database):	ERRE5
<b>GENERAL INFORMATION</b>	
Geographical range (distribution maps for North America and Washington state)	Pacific Coast region from Alaska and Canada to northwestern California. <sup>2,3</sup> See maps above for North American and Washington state distribution.
Ecological distribution (ecosystems it occurs in, etc.):	Common in moist, meadows and open deciduous forests, bog edges, and streamsides. <sup>2,3,6</sup> Characteristic of alluvial floodplain forests on water-receiving sites. <sup>6</sup>
Climate and elevation range	Occurs in maritime to subarctic summer-wet cool mesothermal climates. Primarily low elevation <sup>3</sup> ; occurrence decreases with increased elevation and increased distance from coastal areas. <sup>5</sup>  Precipitation averages 381 cm with 76 cm of that occurring as

	snowfall. <sup>2</sup>
Local habitat and abundance; may include commonly associated species	<p>Prefers moist, mineral soil in open or moderately shaded areas; often with a moss layer. Plant associations include: swampy western hemlock (<i>Tsuga heterophylla</i>) – lodgepole pine (<i>Pinus contorta</i>) forests, Sitka spruce (<i>Picea sitchensis</i>) – western hemlock forests in duff, light Sitka spruce woods on consolidated sand dunes, and shaded river bottoms in mixed conifer-deciduous or pure deciduous thickets.<sup>2</sup></p> <p>Observed Washington populations in Skagit, Clallam, Jefferson, Wahkiakum, Pacific, and Grays Harbor counties; Washington State Sensitive species.<sup>2,18</sup></p> <p>Mapped occurrences throughout Vancouver Island and southwestern British Columbia (Mount Waddington and Cariboo administrative areas). Rare on Valdez Island and mainland at Kingcome Inlet.<sup>6</sup></p>
Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)	<p>Shade-tolerant/intolerant.<sup>5</sup> Full light at ground level is essential for growth and reproduction.<sup>2</sup></p> <p>Slow growing, mostly forming drifts of colonies by spreading seed.<sup>12</sup> Maturity may take up to ten years. Runoff typical of habitat likely aids in seed dispersal; mountain beaver (<i>Aplodontia rufa</i>) and elk (<i>Cervus elaphus</i>) may also disperse seeds.<sup>2</sup></p> <p>Successional stage unknown; fire effects unknown.<sup>7</sup></p>
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc.)	<p>Perennial, herbaceous species from deep, elongated underground corms; mature plants with paired, elliptical basal leaves, petiolate to subsessile (10-20 cm long). Leaves mottled with pale green, brown, or white on dark green background.<sup>2, 6</sup></p> <p>Blooms April to May<sup>2</sup>; single flowers atop an unbranched, smooth stem (15-40 cm tall);<sup>15</sup> rose to deep-pink and nodding; tepals, lanceolate and bent back<sup>2,3,6</sup>; drying to pinkish purple.<sup>2</sup></p> <p>Fruits erect, narrow, club-shaped<sup>3</sup>; capsules obovoid to cylindrical-clavate (3-4 cm long).<sup>2</sup></p> <p>Immature leaf growth emerges in first spring as a single, narrow blade.<sup>4, 11</sup> Second year leaf remains single but slightly more lanceolate.<sup>4</sup></p>
<b>PROPAGATION DETAILS</b>	
Ecotype (this is	N/A

meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Bulbs, Plants, Seeds
Propagation Method (Options: Seed or Vegetative):	Seed or vegetative division of corms.
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Container
Stock Type:	
Time to Grow (from seeding until plants are ready to be outplanted):	3-6 years <sup>8, 10</sup> ; as much as 10 years until flowering maturity. <sup>2</sup> Time until maturity can be accelerated by using shallow flats and extending growing periods. <sup>10</sup>  An experiment with <i>E. grandiflorum</i> seed from subalpine meadows, Logan Pass, 2032m elev. in Glacier National Park,

	found time to grow was 3 years. <sup>13</sup>
Target Specifications (size or characteristics of target plants to be produced):	Flowering and seeding maturity.
Propagule Collection (how, when, etc):	<p>Seeds ripen and may be ready for harvest 6-8 weeks after flowering; leaves have withered at this time so marking the plant while it is in flower is helpful during relocation.<sup>13</sup></p> <p>Optimal collection time may vary (in Metchosin, British Columbia<sup>9</sup> October 13th<sup>9</sup>); another source indicates optimal seed collection in July.<sup>10</sup></p> <p>Collect ripe seed capsules by hand, place into collection bags and shake to release the seeds.<sup>10</sup></p>
Propagule Processing/Pr opagule Characteristics (including seed density (# per pound), seed longevity, etc):	<p>Seeds of <i>E. grandiflorum</i> are easily hand cleaned from open dry capsules.<sup>13</sup></p> <p>Seed viability is moderate to high; seed best sown fresh but can be stored in sealed containers at 5 degree C; should be checked periodically for insect infestations.<sup>10</sup></p>
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	<p>Seeds of <i>Erythronium albidum</i> Nutt. and <i>E. grandiflorum</i> Pursh are known to exhibit morpho-physiological dormancy.<sup>13, 14</sup></p> <p><i>E. revolutum</i> should be cold-moist stratified in refrigerator for 5-6 weeks (wks) or sown immediately into flats or the ground following collection for outdoor winter stratification.<sup>10, 12</sup></p> <p>In one study, <i>E. revolutum</i> seed went through a 70-40-70-40 nursery stratification trial. 33% germinated after 12 weeks of the initial cold period at 40 deg. F and an additional 40% germination in 0-7 weeks during the second 70 deg. F period. Seed that germinated at 40 deg. F formed the cotyledon within a week and grew better than those that germinated at 70 deg. F.<sup>19</sup></p> <p>In seed germination trials with consistent winter/cold stratification, 60% of <i>E. quinaultense</i> germinated between weeks 19-21. If moved in cycles of winter to summer (12 weeks each) with cool springs and falls, 60% germinated again between 18-20</p>

	weeks of total cool temperatures (counting fall and spring before and after a winter period as its coolness trigger). <sup>17</sup>
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	Best sown in containers or bare mineral soil in fall when seeds are ripe; or in early spring in a cold frame. Sow seeds thinly so as no thinning of seedlings is needed. <sup>12</sup>
Establishment Phase (from seeding to germination):	<i>E. grandiflorum</i> seeds germinated uniformly over a 15 day period in early May (16-21 C daytime; 3-11 C nighttime temps.) Seedlings developed one cotyledon before going dormant 4-5 weeks after emergence; tiny corm formed the first year; when dormant, seedlings should only be watered occasionally. <sup>13</sup>
Length of Establishment Phase:	Length of establishment phase for <i>E. grandiflorum</i> was 4 weeks. <sup>13</sup>
Active Growth Phase (from germination until plants are no longer actively growing):	Containers sown with <i>Erythronium oreganum</i> and <i>E. revolutum</i> should be somewhat buried in the soil in a partially shaded location and kept there for 4-5 seasons until flowering. <sup>8</sup> Regular watering is necessary. <sup>11</sup> Provide occasionally with a nutrient-rich, liquid fertilizer. <sup>12</sup>  Potted seedlings of <i>E. quinaultense</i> do not like a normal sunny greenhouse; a specimen placed in the summer sun during it's first year promptly died. <sup>17</sup>  Division of bulbs can occur as leaves senesce in summer. <sup>12</sup>
Length of Active Growth Phase:	10 weeks for <i>E. grandiflorum</i> . <sup>13</sup>
Hardening Phase (from end of active growth phase to end of growing season; primarily related to the development of cold-	Information not found.

hardiness and preparation for winter):	
Length of Hardening Phase:	12 weeks for <i>E. grandiflorum</i> . <sup>13</sup>
Harvesting, Storage and Shipping (of seedlings):	3 years minimum for <i>E. grandiflorum</i> ; stored in outdoor nursery under insulating foam and snow. <sup>13</sup>
Length of Storage (of seedlings, between nursery and outplanting):	Large bulbs can be outplanted to permanent positions 2-3 years following germination. Smaller bulbs should be kept in containers in shady greenhouses for an additional year prior to outplanting in late summer. <sup>12</sup>
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	<p>Bulbs and potted plants are best outplanted while dormant to reduce shock and potential drought-stress. Need to be kept lightly watered if outplanted in late spring-summer while actively growing.<sup>12</sup></p> <p>Outplant to semi-shaded, moist sites with rich, sandy soils.<sup>8, 10</sup></p> <p>Time until flowering maturity is generally 3-6 years<sup>8, 10</sup>; as much as 10 years.<sup>2</sup> This can be accelerated by using shallow flats and extending growing periods.<sup>10</sup></p>
Other Comments (including collection restrictions or guidelines, if available):	<p>Vegetative propagation of <i>E. revolutum</i> may be possible from division of the dormant second year cormels from the mother corms on mature plants.<sup>13, 15, 16</sup></p> <p>Division of dormant <i>E. grandiflorum</i> corms is performed in fall and should be stored in slightly damp peat at 10 C until spring and planted at 7 cm depth;<sup>12, 13</sup> scoring corms (making an incision around the base) may be performed to induce cormel formation.<sup>13</sup></p> <p>Wild collection is not encouraged as it contributes to elimination from wild areas; collection of State Sensitive Species for gardening or personal use is prohibited; restrictions and guidelines apply for wild seed and specimen collection in Washington state and are managed by the Washington Natural Heritage Program.<sup>18</sup></p>

## INFORMATION SOURCES

References (full citations):

<sup>1</sup>United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) PLANTS Database. PLANTS Profile: *Erythronium revolutum* Sm. Accessed here: <http://plants.usda.gov/>. Accessed on: 4/17/12.

<sup>2</sup>Washington Department of Natural Resources (WDNR), Natural Heritage Program (NHP). *Erythronium revolutum* Sm. In Rees. 2003. Accessed here: <http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/eryrev.pdf>. Accessed on: 4/17/2012.

<sup>3</sup>Pojar, J. and A. Mackinnon. Editors. 1994. Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia and Alaska. British Columbia (B.C.) Ministry of Forests and Lone Pine Publishing: B.C., Canada.

<sup>4</sup>Gibble, Wendy. 2012. Program Manager. Washington Rare Care and Conservation, Seattle, WA. Conversation on *Erythronium revolutum* in first and second year vegetative growth, 4/17/12.

<sup>5</sup>Klinka, K., V.J. Krajina, A. Ceska, and A. M. Scagel. 1989. Indicators Plants of Coastal British Columbia. University of British Columbia Press, Vancouver, B.C.

<sup>6</sup>Klinkenberg, Brian. Editor. 2012. *E-Flora BC: Electronic Atlas of the Plants of British Columbia*. University of British Columbia, Vancouver. Accessed at: <http://www.geog.ubc.ca/biodiversity/eflora/>. Accessed on 4/17/12.

<sup>8</sup>Kruckeberg, A. R. 1996. Gardening with Native Plants of the Pacific Northwest, second edition, revised and enlarged. University of Washington Press, Seattle, WA.

<sup>9</sup>Milne, M. Native Seed Harvesting Dates. Native Plant Study Group, Canada. Accessed at: [http://www.npsg.ca/downloads/harvesting\\_dates.pdf](http://www.npsg.ca/downloads/harvesting_dates.pdf). Accessed on: 4/17/12.

<sup>10</sup>Garry Oak Ecosystem Recovery Team (GOERT). 2012. Native Plant Propagation Guidelines: Forbs, *Erythronium revolutum* (Pink fawn Lily). Accessed at: [http://www.goert.ca/propagation\\_guidelines/forbs/erythroniu](http://www.goert.ca/propagation_guidelines/forbs/erythroniu)



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<sup>11</sup>Pettinger, A. and B. Costanzo. 2002. Native Plants in the Coastal Garden, Revised and Updated. Timberland Press, Portland, OR.

<sup>12</sup>Plants for a Future Plant Database. *Erythronium revolutum* Sm. Accessed at:  
<http://www.pfaf.org/user/Plant.aspx?LatinName=Erythronium+revolutum>. Accessed on: 4/18/12.

<sup>13</sup>Luna, Tara, Evans, Jeff, and Wick, Dale. 2008. Propagation protocol for production of container *Erythronium grandiflorum* Pursh plants (172 ml containers); USDI NPS - Glacier National Park, West Glacier, Montana. In: Native Plant Network. URL: <http://www.nativeplantnetwork.org> (accessed 18 April 2012). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

<sup>14</sup>Baskin, Carol C.; Baskin, Jerry M. 2006. Propagation protocol for production of container *Erythronium albidum* Nutt. plants; University of Kentucky, Lexington, Kentucky. In: Native Plant Network. URL: <http://www.nativeplantnetwork.org> (accessed 18 April 2012). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

<sup>15</sup>Lady Bird Johnson Wildflower Center, Native Plant Database. 2012. *Erythronium revolutum* Sm. Accessed at:  
[http://www.wildflower.org/plants/result.php?id\\_plant=ERRE5](http://www.wildflower.org/plants/result.php?id_plant=ERRE5). Accessed on: 4/18/12.

<sup>16</sup>Knerr, E. B. 1897. Propagation of Erythroniums. *Transactions of the Annual Meetings of the Kansas Academy of Science* **15**: 1895-1896.

<sup>17</sup>Clark, Lauren. 2012. Washington Rare Care and Conservation, Seattle, WA. Emailed information on propagation trials of *Erythronium quinaultense*, 4/17/12.

<sup>18</sup>Washington Department of Natural Resources, Natural Heritage Program. Regulatory information for collection of State Sensitive species. Accessed here:  
[http://www.dnr.wa.gov/researchscience/topics/naturalheritage/pages/amp\\_nh.aspx](http://www.dnr.wa.gov/researchscience/topics/naturalheritage/pages/amp_nh.aspx). Accessed on: April 18, 2012.

	<sup>19</sup> Deno, N. C. 1993. Seed Germination Theory and Practice, Second Edition. Pennsylvania State University, PA.
Other Sources Consulted (but that contained no pertinent information) (full citations):	<sup>7</sup> USDA Forest Service Fire Effects Database. Accessed at: <a href="http://www.fs.fed.us/database/feis/plants/forb/index.html">http://www.fs.fed.us/database/feis/plants/forb/index.html</a> Accessed on: 4/17/12.  Rose, R. C. E. C. Chachulski, and D. L. Haase. 1998. Propagation of Pacific Northwest Native Plants. Oregon State University Press, Corvallis, OR.  Leigh, M. Grow Your Own Native Landscape: A Guide to Identifying, Propagating, and Landscaping with Western Washington Native Plants. Native Plant Salvage Project, Washington State University Extension.
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