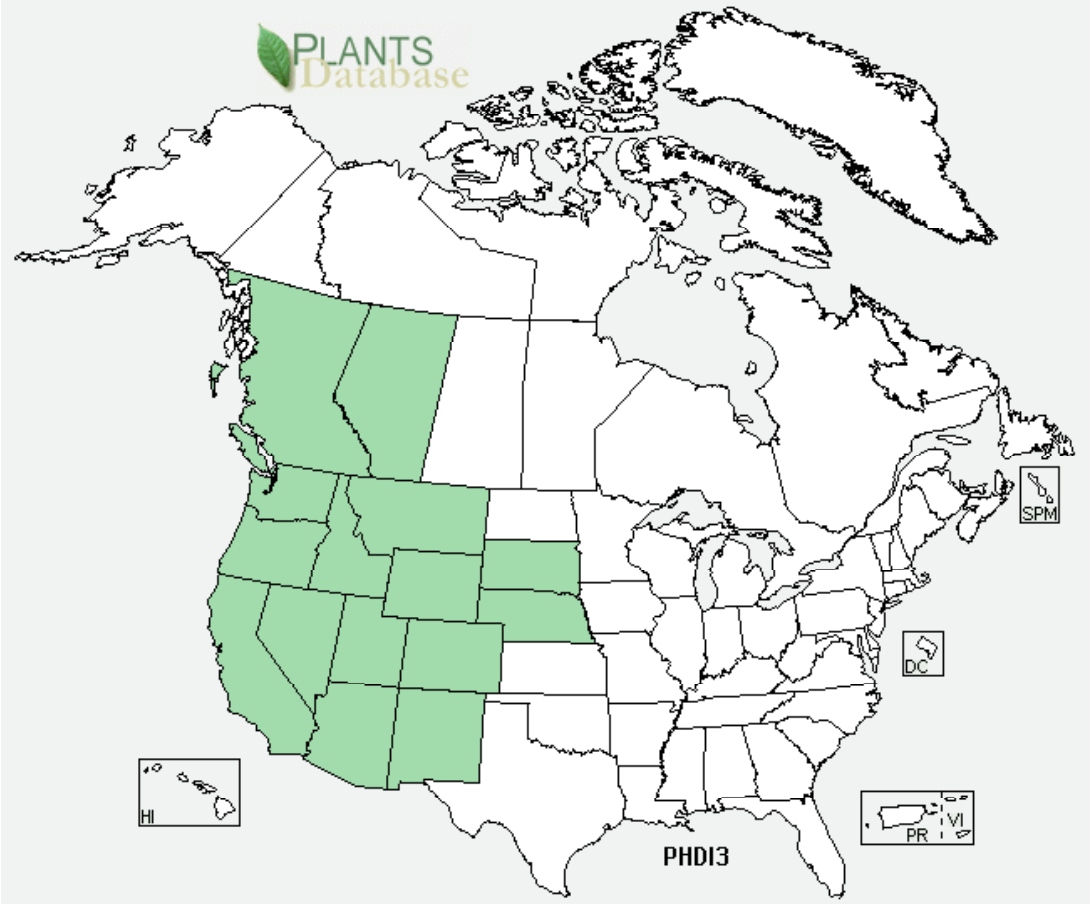
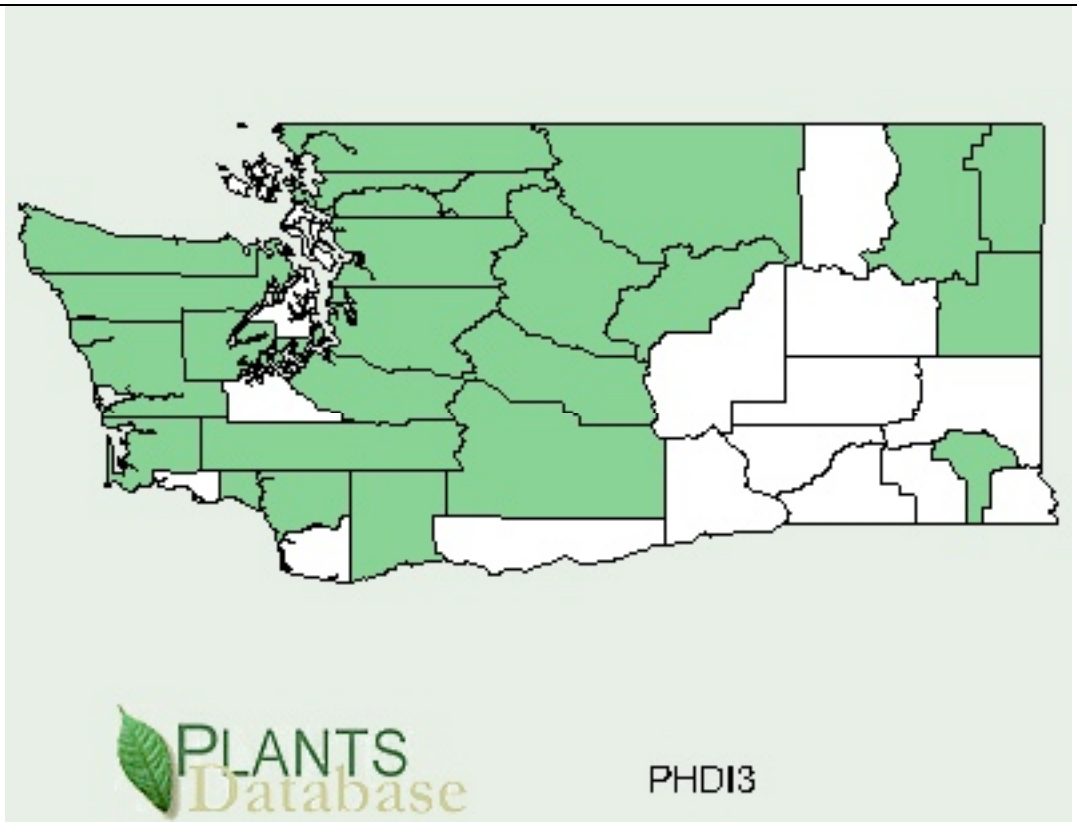
Plant Propagation Protocol for *Phlox diffussa*
ESRM 412 – Native Plant Production
Spring 2008

(Calphotos)

TAXONOMY (USDA Plants)	
Family Names	
Family Scientific Name:	*Polemoniaceae*
Family Common Name:	Phlox family
Scientific Names	
Genus:	*Phlox*
Species:	*diffusa*
Species Authority:	Benth
Variety:	
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	
Common Synonym(s):	*Phlox diffusa* Benth ssp. *diffusa*, *Phlox diffusa* Benth ssp. *longistylis* Wherry, *Phlox diffusa* Benth ssp. *scleranthifolia* (Rydb.) Wherry, *Phlox diffusa* Benth ssp. *subcarinata* Wherry, *Phlox diffusa* Benth var. *longistylis* (Wherry) M. Peck
Common Name(s):	Spreading Phlox
Species Code:	PHD13
GENERAL INFORMATION	

Geographical range:	Common from Southwestern British Columbia south to California (Washington Native Plant Society). 

	 (USDA PLANTS)
Ecological distribution:	Mesic to dry rocky slopes, rock outcrops and open forests from the lowland to alpine zones (Atlas Page).
Climate and elevation range	Between 3300 and 13300 feet (Calflora).
Local habitat and abundance; may include commonly associated species	Douglas-Fir Forest, Yellow Pine Forest, Red Fir Forest, Lodgepole Forest, Subalpine Forest, Alpine Fell-fields (Calflora).
Plant strategy type / successional stage:	Prefers exposed rocky sites to open forests from middle to high elevations (Washington Native Plant Society). Late succession.
Plant characteristics:	Subshrub Forb/herb (USDA Plants).
PROPAGATION DETAILS (Trindle et al. 2003)	
Ecotype:	Crater Lake National Park, 7,000 ft elev on pumice flats and open gravelly slopes around Rim Village.
Propagation Goal:	Plants
Propagation Method:	Seeds
Product Type:	Container (plug)
Stock Type:	4
Time to Grow:	1 Year

Target Specifications:	Healthy, branched crown foliage with healthy central taproot.
Propagule Collection:	Seeds are slow and tedious to collect from these low-growing plants; not present at all in some collection years and sparse in most; tend to wither if collected at less than full ripeness, single seed per flower.
Propagule Processing/Propagule Characteristics:	No processing needed other than perhaps blowing away chaff/light, empty seeds. 1 gram of seed produced 36 healthy container plants for us in this trial
Pre-Planting Propagule Treatments:	Germination significantly enhanced in our trials with 17 weeks cold moist pre-chill.
Growing Area Preparation / Annual Practices for Perennial Crops:	Seeds sown into standard "1040" flats with a fine, soil-less potting mix (Fisons' Sunshine #3 seedling starter); topped with a thin layer of fine vermiculite; watered-in and placed in polyethylene bags in a walk-in cooler at 34-36 F for 17 weeks.
Establishment Phase:	Flats with stratified seeds placed in warm greenhouse (approx 60 nights/70-85 F days) and lightly watered as needed until germination was complete, in about 45 days: approximately 50% of seeds germinated with this treatment. Good air circulation and drainage is crucial; these seedlings are highly susceptible to damping-off and other fungal attacks. Seedlings remained in these flats for another 4 to 6 weeks until large enough to transplant.
Length of Establishment Phase:	12 weeks.
Active Growth Phase:	When large enough to handle for transplant, seedlings are placed in a light, fast-draining potting medium (Fisons' Sunshine Aggregate 4 Plus) in 4" deep pots and moved outdoors to a lightly shaded area (we placed ours at the outside northern edge of the shadehouse). Plants should be protected from overwatering and given plenty of room for air circulation. One light fertilization of Peters' started (9-45-15) given once after transplanting; excess fertilizer should be avoided on these slow-growing plants.
Length of Active Growth Phase:	May to July.
Hardening Phase:	Plants can be allowed to become rather dry in August: pots should become quite light between waterings and then drained very quickly after watering.
Length of Hardening Phase:	August-September.
Harvesting, Storage and Shipping:	Plants were shipped up to Crater Lake in late August via refrigerated van to a holding facility at the park: they can also be placed into a walk-in cooler with soil very lightly moistened for dormant storage over winter. Most important is for the plants not to be moved outside in early spring in Corvallis where they can become waterlogged and overwhelmed by foliar/fungal diseases.
Length of Storage:	Seeds-not known; plants can be held over winter but may need transplanting to deeper containers in the following spring.
Guidelines for	A small observational plot of seeds direct-sown in September at Crater Lake near the

Outplanting / Performance on Typical Sites:	revegetation test plots resulted in successful germination the following spring; however none of these seedlings survived. Transplants were successfully established in the Rim Village landscape planting from the plants grown and shipped as described above.
Other Comments:	Although called "spreading", our experience with this phlox was that it produced only a single, very deep taproot. We did not find evidence of spontaneous root spreading in even the very large plants at the park; nor were we successful in producing significant numbers of transplants from stem cuttings.
INFORMATION SOURCES	
References:	Calflora. 27 Apr. 2008 <http://www.calflora.org/cgi-bin/species_query.cgi?where-taxon=Phlox+diffusa>. "CaPhotos." 27 Apr. 2008 <http://calphotos.berkeley.edu/cgi/img_query?where-genre=Plant&where-taxon=Phlox+diffusa>. "E-Flora BC: Electronic Atlas of the Plants of British Columbia." Atlas Page. 27 Apr. 2008 <http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Phlox%20diffusa>. "Phlox Difussa." Washington Native Plant Society. 27 Apr. 2008 <http://www.wnps.org/plants/phlox_diffusa.html>. "PLANTS Profile for Phlox Diffusa." USDA Plants. 27 Apr. 2008 <http://plants.usda.gov/java/profile?symbol=PHDI3>. Trindle, Joan DC; Flessner, Theresa R. 2003. Propagation protocol for production of container Phlox diffusa Benth. plants (4); USDA NRCS - Corvallis Plant Materials Center, Corvallis, Oregon. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 30 April 2008). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.
Other Sources Consulted:	Keenan, Mary. "Flowers, Borders & Containers." Irish Garden Dec. 2007: 6-7. Symons-Jeune, B.h.b. Phlox. London: Collins Clear-Type P, 1953.

	"TAKE ROOT CUTTINGS--ERYNGIUM." Garden Answers Oct. 2006: 10-11. Wherry, Edgar T. The Genus Phlox. Philadelphia, PA: Associates of the Morris Arboretum, 1955.
Protocol Author (First and last name):	Kimberly Jones
Date Protocol Created or Updated (MM/DD/YY):	06/06/08

Note: This template was modified by J.D. Bakker from that available at:
http://www.nativeplantnetwork.org/network/SampleBlankForm.asp

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Plant Data Sheet

Species (common name, Latin name)

Spreading Phlox, Phlox diffusa

Range

It is widespread through the Cascades from southern British Columbia to the Sierra Nevada of California. Eastward, it ranges across northern Washington, Idaho, and Montana to the west slopes of the Rocky Mts.

Climate, elevation

Spreading Phlox is a wildflower of middle to high elevations in the mountains. It is typically found in open forests or open rocky slopes.

Local occurrence (where, how common)

Spreading Phlox is found from the mountains of Vancouver Island, south through the Olympic Mts, and at Saddle Mt in the coast range of Oregon. It may occasionally be found as far south as the mountains of central Idaho and northeastern Oregon.

Habitat preferences

Exposed rocky sites to open forests from middle to high elevations (WNPS)

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

Creeping perennial

Associated species

?

May be collected as: (seed, layered, divisions, etc.)

Cuttings, seed, divisions

Collection restrictions or guidelines

None

Seed germination (needs dormancy breaking?)

Seeds should be chilled in the refrigerator a week before planting. They may be started indoors at a 65-degree temperature, 8 to 10 weeks before it's safe to plant outside.

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

?

Recommended seed storage conditions

?

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

Seed when ripe or in early spring cuttings in late summer (The rock garden database). They should be sown in two parts of loam and one part of leaf mold or peat moss, with a liberal amount of sand added. Lightly cover them. Set a pane of glass over them. Gradually harden them off before setting outdoors. When they are to grow in a sunny greenhouse, seeds may be sown in pots of sandy soil from August to February to provide blooms in the late winter and early spring. The perennial, summer flowering Phloxes can be increased readily by cuttings, which may be taken at any time during the spring and summer.

Soil or medium requirements (inoculum necessary?)

Prefer sand

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

Fresh shoots of the current year's growth are used; those that are flowerless are the best choice, though even the tops of shoots that have flowered may be used if necessary. Insert these into a bed of sand in a frame and keep it closed and shaded for a few weeks.

Can also be propagated by root cuttings taken in early autumn. The easiest way to increase perennial Phloxes is by separating large clumps into several rooted pieces in October or early spring and replanting immediately. Only the outer pieces should be used to replant because these are the younger portions. However, the best method is to raise new plants from cuttings. The perennial, spring flowering Phloxes may be

increased by seeds sown in the spring, by soft cuttings of non-flowering shoots taken in early summer and inserted in a bed of sand in a cold frame, or by root division in the spring or early summer (The rock garden database)

Recommended planting density

Care requirements after installed (water weekly, water once etc.)

sunny, dry, rock crevices, protection against winter wet
alpine house, poor, drained soil, sun. (Botany .com)

Normal rate of growth or spread; lifespan

not exceeding 10 cm in height

Sources cited

http://www.wnps.org/plants/phlox_diffusa.html (Washington Native Plant Society)

http://web.kadel.cz/flora/c/kvCard.asp?Id=4009 (The rock garden database)

http://www.botany.com/phlox.html (Botany .com)

Data compiled by (student name and date)

Roger Whalley 04-29-03