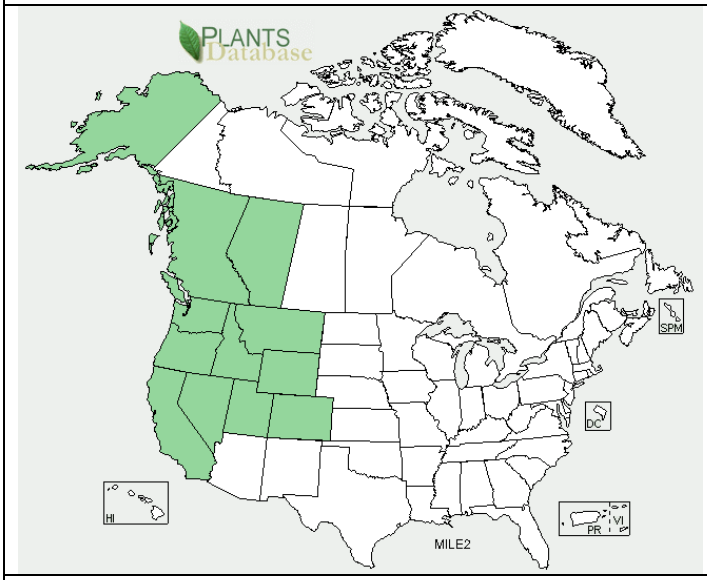
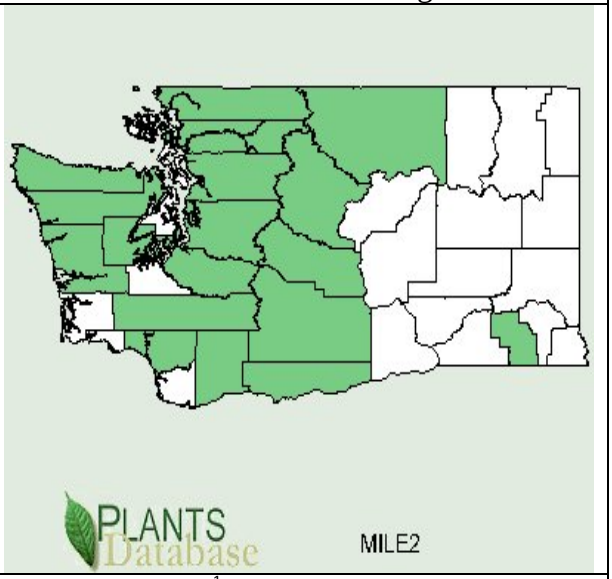
Plant Propagation Protocol for *Mimulus lewisii*

ESRM 412 – Native Plant Production

North American Distribution	Distribution in Washington
	

Source of map images: USDA PLANTS Database[1]

TAXONOMY	
Family Names	
Family Scientific Name:	Phrymaceae or Scrophulariaceae[2]
Family Common Name:	Figwort
Scientific Names	
Genus:	*Mimulus*
Species:	*lewisii*
Species Authority:	Pursh
Variety:	
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	
Common Synonym(s) (include full scientific names (e.g., *Elymus glaucus* Buckley), including variety or subspecies information)	*Mimulus lewisii* Pursh[1], *Mimulus tilingii*[3]
Common Name(s):	Purple monkeyflower, Great purple monkeyflower, Lewis's monkeyflower, Lewis monkeyflower[2, 4]
Species Code:	MILE2[1]
GENERAL INFORMATION	
Geographical range:	The range of *M. lewisii* includes Alaska, British Columbia and Alberta, Canada, and the western United States.[1] See distribution maps above.
Ecological distribution:	Suitable habitats include wet clearings, wetlands, marshes, riparian areas, seeps, springs, high-elevation

	lakeshores, along wet glacial talus or gravel tracks in forested areas and on gravel bars in riparian areas that are flooded annually.[3, 5, 6]
Climate and elevation range	Occurs from middle to high elevations.[5, 7] Found at elevations ranging from 1,600 to 3,000 meters (5,250 to 9 840 feet).[6]
Local habitat and abundance; may include commonly associated species	See ecological distribution information. In the wild, *M. lewisii* is found growing on moderately well-drained sites including sandy substrates, silt with cobbles, and pumice or basalt.[3]
Plant strategy type / successional stage:	Primary or early secondary successional stage.[3]
Plant characteristics:	Perennial, rhizomatous forb with stems one to three feet long, light green, broadly lance-shaped leaves, and few to several pink/red/maroon colored flowers situated at the ends of the stems.[4, 5, 7] The flowers are shaped like a trumpet and marked with darker pink/red linear and spotted nectar guides in the throat. The lip of the flower has yellow coloration.[5] *M. lewisii* forms dense clumps in moist areas.[7]
PROPAGATION DETAILS	
Ecotype:	All information in this section is from the Glacier National Park propagation protocol for *M. lewisii*[7] unless otherwise noted. The protocol information is assumed to be specific to growing conditions and seed collected in West Glacier, Montana.
Propagation Goal:	Plants
Propagation Method:	Seed
Product Type:	Container (plug)
Stock Type:	800 ml containers
Time to Grow:	9 months
Target Specifications:	6-cm high container seedlings with roots that form a firm plug in the container
Propagule Collection:	Seed capsules can be collected in the fall when they begin to turn brown and open. In a study conducted in Yosemite National Park, seeds of *M. lewisii* were collected in August from a site 3,000 meters in elevation.[6] Capsules may need to be soaked in water in order to open fully. The seeds of *M. lewisii* are very small (“dust-like”) and are a light tan color when mature. Place collected seed capsules in a paper bag and store in a well-ventilated area for drying.
Propagule Processing/Propagule Characteristics:	Clean seeds with a screened hamermill; processed seed density is 20,636,363/lb. (45,400,000/kg). The longevity of *M. lewisii* seed is unknown.
Pre-Planting Propagule Treatments:	Physiological dormancy must be broken by five

	months of cold/moist stratification.
Growing Area Preparation / Annual Practices for Perennial Crops:	Seeds can be directly surface-sown in an outdoor nursery in late fall. Seeds should be "lightly dusted" over the soil and then pushed below the soil surface.[8] Sow seeds in an area with full sun exposure. The recommended growing media is 6:1:1 milled sphagnum peat, perlite, and vermiculite. Osmocote (at 2 grams/800-ml conetainer) and Micromax (at 1 gram/800-ml conetainer) fertilizer treatments are also recommended. Water seeds thoroughly prior to winter stratification.
Establishment Phase:	Seeding is conducted in late fall and germination occurs in spring.
Length of Establishment Phase:	4 weeks
Active Growth Phase:	A 13-13-13 liquid NPK fertilizer was applied at 100 ppm to seedlings and plants were frequently watered. Within 4 weeks of germination, plants were described as being "root tight" and within 8 weeks of germination some plants had flowered. Once the second or third pair of leaves has formed on a seedling, it can be separated from neighboring seedlings and replanted in a small pot.[8]
Length of Active Growth Phase:	8 weeks
Hardening Phase:	In the fall, a 10-20-20 NPK solution was applied to *M. lewisii* plants at a concentration of 100 ppm and plants were well-watered. From September through October, watering frequency was tapered off and then plants were watered one last time before being covered for the winter.
Length of Hardening Phase:	4 weeks
Harvesting, Storage and Shipping:	The total time required until seeds could be harvested was nine months. Seeds were harvested in July and August and then overwintered outdoors (insulated by foam and snow).
Length of Storage:	The propagation protocol reviewed listed the length of storage as 5 months; however, it was not clear if this referred to storage of seed or storage of seedlings.
Guidelines for Outplanting / Performance on Typical Sites:	Seedlings were outplanted in July and August.
Other Comments:	The propagation protocol reported that *M. lewisii* can also be propagated vegetatively through stem cuttings or divisions of nursery stock. For stem cuttings, apply 1,000 ppm IBA rooting hormone and place under mist with bottom heat of 21˚C. Some *Mimulus* species can also be propagated vegetatively from rooted stolons[8]; however,

	information was not available to determine whether *M. lewisii* can be successfully propagated in this way. The seeds of all *Mimulus* species are reported to germinate easily.[8, 9]
INFORMATION SOURCES	
References:	See below
Other Sources Consulted (but that contained no pertinent information):	See below
Protocol Author:	Jenny Buening
Date Protocol Created or Updated:	05/07/11

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

References Cited:

1. USDA, NRCS. 2011. The PLANTS Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed on April 19 2011.
2. USDA Germplasm Resources Information Network (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?448210). University of Texas, Austin. Accessed on May 1, 2011.
3. Meinke, R. 1995. Assessment of the Genus *Mimulus* (Scrophulariaceae) within the Interior Columbia River Basin of Oregon and Washington. Department of Botany and Plant Pathology, Oregon State University, Corvallis.
4. Lady Bird Johnson Wildflower Center Native Plant Database (http://www.wildflower.org/plants/result.php?id_plant=MILE2). The University of Texas at Austin. Accessed on May 1, 2011.
5. Pojar, J. and MacKinnon, A., eds. 1994. Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia and Alaska. B.C. Ministry of Forests and Lone Pine Publishing: Canada.
6. Ramsey, J., Bradshaw, H. D., Jr., Schemske, D. 2003. Components of reproductive isolation between the monkeyflowers *Mimulus lewisii* and *M. cardinalis* (Phrymaceae). Evolution: 57 (7): 1520 – 1534.
7. Glacier: http://www.nativeplantnetwork.org/network/ViewProtocols.aspx?ProtocolID=216
8. Schmidt, M. 1980. Growing California Native Plants. University of California Press: Berkeley and Los Angeles, CA.
9. Kruckeberg, A. 1982. Gardening with Native Plants of the Pacific Northwest. University of Washington Press: Seattle and London.

Other Sources Consulted (but that contained no pertinent information):

McVicar, J. 2003. Seeds: the Ultimate Guide to Growing Successfully from Seed. The Lyons Press.

Rose, R. Chachulski, C. and Haase, D. 1998. Propagation of Pacific Northwest Native Plants. Oregon State University Press: Oregon.

Young, J. and Young, C. 1986. Collecting, Processing and Germinating Seeds of Wildland Plants. Timber Press: Portland, OR.