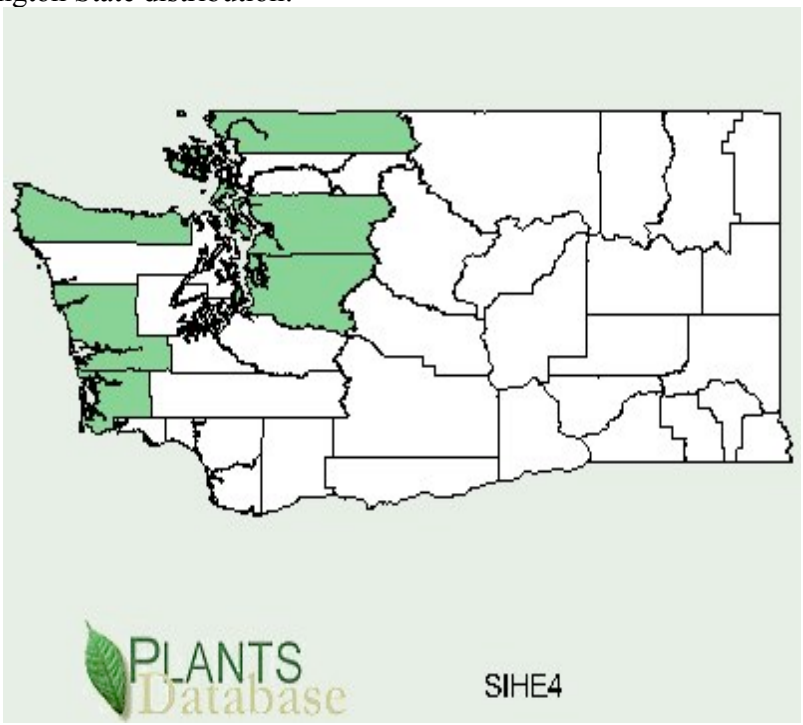
Plant Propagation Protocol for *Sidalcea hendersonii*
ESRM 412 – Native Plant Production

TAXONOMY	
Family Names	
Family Scientific Name:	Malvaceae
Family Common Name:	Mallow
Scientific Names	
Genus:	*Sidalcea*
Species:	*hendersonii*
Species Authority:	S. Watson
Variety:	n/a
Sub-species:	n/a
Cultivar:	n/a
Authority for Variety/Sub-species:	n/a
Common Synonyms:	None found.
Common Names:	Henderson's checkerbloom, Henderson's checker-mallow
Species Code:	SIHE4
GENERAL INFORMATION	
Geographical range:	United States distribution:  Image courtesy of USDA Plants Database

	Washington State distribution:  Image courtesy of USDA Plants Database
Ecological distribution:	Found in wet meadows, tidal marshes and flats (1).
Climate and elevation range	Found at low elevations (1) in full sun or part shade.
Local habitat and abundance; may include commonly associated species	*Sidalcea hendersonii* grows along the coast in tidal marshes and meadows. The *Sidalcea hendersonii* is uncommon in Washington state, extremely rare in Oregon state and rare in the province of British Columbia (2). *Sidalcea hendersonii* is listed as a Species of Concern by the USFWS and a List 1 species in Oregon state with a rank of G3S1. List 1 species status within the state of Oregon means that *Sidalcea hendersonii* is a "taxa threatened with extinction or presumed to be extinct throughout their entire range". G3 indicates that globally, this plant is "rare, uncommon or threatened, but not immediately imperiled" and S1 indicates that in Oregon state, this is a plant that is "critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation" (2). Known associated species include: *Potentilla pacifica, Juncus balticus, Angelica lucida, Achillea millefolium, Galium aparine, Deschampsia caespitosa, Hordeum brachyantherum, Agrostis exarata, Erechtites minima, Festuca rubra var. littoralis, Grindelia integrifolia, Heracleum lanatum, Solidago canadensis,* and *Vicia gigantean* (3).
Plant strategy type / successional stage:	This seral and stress tolerating (can grow in salty environments) species prefers sites in good ecological condition and can be threatened by invasive species, such as *Iris pseudocarus*, which will outcompete the

	Sidalcea hendersonii (4).
Plant characteristics:	This perennial forb grows to a height of 12 to 60 inches with an erect sturdy stem and is tinted purple (1). There are both female and bisexual plants, with the female plants producing dark pink flowers and the bisexual plants producing larger pale flowers. The flowers bloom all summer and are numerous, occurring at the top of the stem in branched racemes. The alternating leaves are palmate with five alternating lobes (1).
PROPAGATION DETAILS	
Ecotype:	Cox Island, Lane County, Oregon, Washington. The island consists of an intact estuarine saltmarsh located within the Siuslaw River a few miles inland from the Pacific Ocean (4).
Propagation Goal:	Plants
Propagation Method:	Seed
Product Type:	Propagules (seeds, cuttings, poles, etc.)
Stock Type:	Information not available.
Time to Grow:	Ten to eleven months. Seed in November or December and outplant in September of the following year (4).
Target Specifications:	Flowering and seeding
Propagule Collection:	Collect seeds in August by stripping 10% of inflorescence of their fruits. Place fruit into a paper bag (4).
Propagule Processing/Propagule Characteristics:	If the fruit displays evidence of weevil infestation, spread the inflorescence material out to dry and sprinkle it with diatomaceous earth. After drying, crush the material with a mortar and pestle lined with rough fabric (known as a "boat"). Separate the seed from the chaff by using a vacuum system that sorts material by weight (4). Another method of obtaining the seeds from the *Sidalcea hendersonii* fruits after drying, is to force the seeds through a 1.981 mm soil sieve. The dried fruit remains, whereas the seeds cross the sieve (4). Seeds that were stored at room temperature for five years had an 8% germination rate. It is hypothesized that storing seeds in that manner for that length of time drastically decreased germination rates (4).
Pre-Planting Propagule Treatments:	Scarify each seed in late autumn with use of a brick and a box both lined with medium grit sandpaper. This will demolish unviable seeds, and will leave visible scratching on viable seeds (4).
Growing Area Preparation / Annual Practices for Perennial Crops:	Sow seeds into water saturated EB Stone seedling starter soil in plug trays. Wrap trays in black plastic so that they retain moisture during cold stratification (4).
Establishment Phase:	After sowing seeds, by pressing them into the soil just below the surface, store at 4°C for six weeks in continuous dark to cold stratify (4). At the end of six weeks (January), unwrap the plastic and transfer the plug trays to a greenhouse. Keep the daytime temperature at 21°C for 14 hours (light provided by a Sun System 3 - 400 HPS bulb) and nighttime temperatures at

	13°C (4). Mist the plug trays three times a week to maintain moisture. Germination will occur within the first two weeks of removal from cold storage resulting in approximately 30% germination rate (4).
Length of Establishment Phase:	Four to six weeks after sowing (sowing near the end of autumn/beginning of winter) (4).
Active Growth Phase:	In early February, transplant all seedlings into gallon containers. Continue to grow in greenhouse until the following September (4).
Length of Active Growth Phase:	Eight months, January through August (4).
Hardening Phase:	Move pots outside at the beginning of September in order to harden off plants prior to outplanting.
Length of Hardening Phase:	Two months, September through October (4).
Harvesting, Storage and Shipping:	Information not available.
Length of Storage:	Zero months.
Guidelines for Outplanting / Performance on Typical Sites:	Plant on one meter centers using standard planting technique in known historical habitats. Initial percent survival rates at three different sites were high (75% through 90%) after the first growing season, and decreased by the second growing season to 27% and 86% percent respectively. However, all surviving plants flowered during the first growing season after outplanting. In the second growing season after ouplanting only 50% of the plants flowered (4).
Other Comments:	Elk have been known to trample and destroy plants if installed in a travel corridor (2). Inbreeding in small populations has been found to correlate with lower seed production, lower germination rates, decreased survival and decreased flowering (5, 6).
INFORMATION SOURCES	
References:	(1) Pojar, J. and Mackinnon, A. (2004) Plants of the Pacific Northwest coast: Washington, Oregon, British Columbia & Alaska. Vancouver; Lone Pine Publishing. pp 318. (2) Rare, Threatened and Endangered Species of Oregon. (2007) Oregon Natural Heritage Information Center. Oregon Natural Heritage Information Center, Oregon State University, Portland, Oregon. 100 pp. (3) Marshall, M., and Ganders, F.R. (2001) Sex-biased seed predation and the maintenance of females in a gynodioecious plant. American Journal of Botany 88:1437-1443. (4) Thorpe, A.S. (2010) Introduction of Sidalcea hendersonii to Dean Creek ACEC, Coos Bay District BLM. Institute for Applied Ecology, Corvallis, Oregon and USDI Bureau of Land Management, Coos Bay District. iv +17 (5) Gisler, S., and Gisler, M. (2005) Habitat assessments for reintroduction of Henderson's checkermallow. Report to the Native

	Plant Society of Oregon. Institute for Applied Ecology, Corvallis, Oregon. (6) Gisler, M.M., and Love, R.M. (2005) Henderson's checkermallow: the natural, botanical and conservation history of a rare estuarine species. Douglasia 29:3-11. (7) Images reference: *Sidalcea hendersonii.* (2010) *Watson*, S. Plants profile. USDA Plants Database. Acessed on 03 April 2011 at http://plants.usda.gov/java/profile?symbol=SIHE4.
Other Sources Consulted:	(1) Rare Care Species. (2009) List of Plants Tracked by the Washington Natural Heritage Program. Washington State Department of Natural Resources. Accessed on 03 April 2011 at http://www1.dnr.wa.gov/nhp/refdesk/lists/plantrnk.html (2) Propagation Protocol Search Native Plant Network (2009) Accessed on 03 April 2011 at http://www.nativeplantnetwork.org/network/search.aspx?SearchType=Continental (3) Thorpe, A.S. (2009) Metapopulation augmentation of Sidalcea hendersonii (Henderson's checkermallow). Report to the Native Plant Society of Oregon. Institute for Applied Ecology, Corvallis, Oregon. ii +6. (4) Thorpe, A.S. and R.T. Massatti. 2008. Introduction of Sidalcea hendersonii to Spruce Reach. Report to USDI Bureau of Land Management, Coos Bay District Institute for Applied Ecology, Corvallis, Oregon. iii + 10.
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