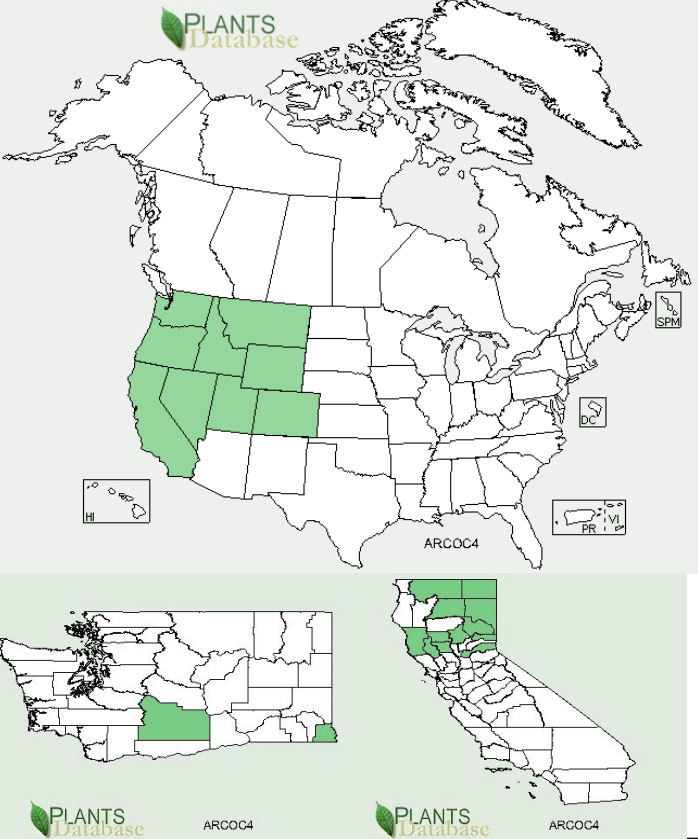


**Plant Propagation Protocol for *Arenaria congesta***  
 ESRM 412 – Native Plant Production

<b>TAXONOMY</b>	
<b>Family Names</b>	
Family Scientific Name:	Caryophyllaceae
Family Common Name:	Pink, Carnation
<b>Scientific Names</b>	
Genus:	<i>Arenaria</i>
Species:	<i>congesta</i>
Species Authority:	Thomas Nuttall
Variety:	<i>congesta</i>
Sub-species:	N/A
Cultivar:	N/A
Authority for Variety/Sub-species:	N/A
Common Synonym(s)	<i>Eremogone congesta</i> var. <i>congesta</i>
Common Name(s):	ballhead sandwort, capitate sandwort
Species Code (as per USDA Plants database):	ARCO5
<b>GENERAL INFORMATION</b>	
Geographical range	<u>North America- CA, CO, ID, MT, NV, OR, UT, WA, and WY (USDA).</u>

	
Ecological distribution	Scrubshrub communities
Climate and elevation range	From warm and arid to cool and moist climates (desert to alpine) (Ritter), ranging from 0 to 10,827 feet in elevation (Calflora).
Local habitat and abundance	Dry open slopes of sagebrush shrub, yellow pine forest, red fir forest, lodgepole forest, pinyon-juniper woodland (Calflora). Considered uncommon in abundance. Found in shallow rocky soils.
Plant strategy type / successional stage	N/A
Plant characteristics	Perennial herbaceous, blooms June-August, grass-like foliage, long inflorescences stalks with five white petals in head-like cluster (Neihaus & Ripper).
<b>PROPAGATION DETAILS</b>	
Ecotype:	Paradise Ridge
Propagation Goal:	Propagation goals are for seeds and container plants.
Propagation Method :	Seed
Product Type:	Container (plug)
Stock Type:	10 cu. in.
Time to Grow :	4 months from seedling until ready to outplant
Target Specifications:	Concentrated root formation
Propagule	Harvest fruit capsules when seed is black and rounded. Capsules start to

Collection:	split open July to August. Store in paper bags or envelopes until ready to clean (Skinner 2006).
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	Cleaning is done based on color and density of seed (to remove any empty seeds). Chaff can be removed by air column separation. Store clean seed in 40 degrees Fahrenheit and 40% humidity (Skinner 2006).
Pre-Planting Propagule Treatments:	Long periods of cold-moist stratification (at least 90 days) increase germination rates with about 25% germination without stratification. Dormancy is flexible, as some seeds will germinate during stratification, as well as without. Overall germination is from 60 to 70%. (Skinner)
Growing Area Preparation / Annual Practices for Perennial Crops:	Sunshine #4 (can be mixed 1:1 with seedling mix) is used in 10 cu. in. Super cell "Cone-tainer" or similar containers for plugs. Peagravel layer can be added on surface to prevent floating of seeds. Seeds can be stratified in containers starting October to early November and moved into a greenhouse after 90 days or moist stratified in refrigerator (35-45 degrees F) for 90 days. (Skinner 2006)
Establishment Phase (from seeding to germination):	Germinants emerge in March when sown and winter stratified outdoors. When moved to the greenhouse around January (after 90 days of stratification), they can emerge within 1 to 7 days. (Skinner 2006)
Length of Establishment Phase:	About one week
Active Growth Phase:	Thoroughly water plants at least ever other day (check daily just after germination when seedlings are sensitive). Nitrogen fertilizer can be applied once per week (if seedling mix, which contains nitrogen, is not used with the Sunshine #4 medium). (Skinner 2006)
Length of Active Growth Phase:	Three months
Hardening Phase:	By late March, the plants can be moved to a cold frame if weather is permitting. During warmer weather, water plants every day in cold frame. (Skinner 2006)
Length of Hardening Phase:	From two to four weeks (Skinner 2006).
Harvesting, Storage and Shipping:	N/A
Length of Storage:	N/A
Guidelines for Outplanting / Performance on Typical Sites:	Transplant in May. Holes at site should be 1 ½" in diameter. 95% survive is reported at sites without existing vegetation, which would decrease survival if present due to competition. Survival in outplanting also depends on weather conditions. (Skinner 2006)
Other Comments:	This species is not known to have problems with insects or disease (Skinner 2006).
<b>INFORMATION SOURCES</b>	

<p>References (full citations):</p>	<p>Skinner, D. 2006. Propagation protocol for production of container <i>Arenaria congesta</i> Nutt. plants (10 cu. in.); Pullman Plant Materials Center, Pullman, Washington. In: Native Plant Network. URL: <a href="http://www.plant-materials.nrcs.usda.gov/pubs/wapmcmnt6528.pdf">http://www.plant-materials.nrcs.usda.gov/pubs/wapmcmnt6528.pdf</a></p> <p>Neihaus, T., and Ripper, C. 1976. <i>Peterson Field Guides: Pacific States Wildflowers</i>. Houghton Mifflin Company: New York</p> <p>United States Department of Agriculture (USDA) Natural Resources Conservation Service. Plant Index. URL: <a href="http://www.plants.usda.gov/java/profile?symbol=ARCO5">http://www.plants.usda.gov/java/profile?symbol=ARCO5</a></p> <p>Lady Bird Johnson Wildflower Center. Native Plant Database. 2007. URL: <a href="http://www.wildflower.org/plants/result.php?id_plant=ARCO5">http://www.wildflower.org/plants/result.php?id_plant=ARCO5</a></p> <p>Watson, L., and Dallwitz, M.J. DELTA – DDescription Language for Taxonomy. 1992. “The families of flowering plants: descriptions, illustrations, identification, and information retrieval” Version: 21st March 2010. URL: <a href="http://delta-intkey.com/angio/www/caryophy.htm">http://delta-intkey.com/angio/www/caryophy.htm</a></p> <p>Keith Karoly, Bio 332 - Vascular Plant Diversity at Reed College Oregon, 2010, <i>Caryophyllaceae</i>. URL: <a href="http://academic.reed.edu/biology/Courses/BIO332/plantfamily/">http://academic.reed.edu/biology/Courses/BIO332/plantfamily/</a></p> <p>Calflora. “Information on wild California plants for conservation, education, and appreciation”. URL: <a href="http://www.calflora.org/cgi-bin/species_query.cgi?where-taxon=Arenaria+congesta+var.+congesta&amp;one=T">http://www.calflora.org/cgi-bin/species_query.cgi?where-taxon=Arenaria+congesta+var.+congesta&amp;one=T</a></p> <p>Fort Hall Replica. “Plants Found on the Fort Hall Indian Reservation and/or Southeastern Idaho, Originally Identified and Cataloged by Thomas Nuttall”. URL: <a href="http://www.forthall.net/plants/nuttal.htm">http://www.forthall.net/plants/nuttal.htm</a></p> <p>Flora of North America, Vol. 5 <a href="http://www.efloras.org/florataxon.aspx?flora_id=1&amp;taxon_id=250060130">http://www.efloras.org/florataxon.aspx?flora_id=1&amp;taxon_id=250060130</a></p> <p>National Parks Service. 2004. “Cabrillo National Monument”. URL: <a href="http://www.nps.gov/archive/cabr/florafau.html">http://www.nps.gov/archive/cabr/florafau.html</a></p> <p>Michael Ritter, “Mixed Aspen-Lodgepole Pine Forest”. URL: <a href="http://www.uwsp.edu/geo/projects/virtdept/ipvft/lodgepole.html">http://www.uwsp.edu/geo/projects/virtdept/ipvft/lodgepole.html</a></p> <p>Schneider, A. 2010. “Southwest Colorado Wildflowers”. URL: <a href="http://www.swcoloradowildflowers.com/">http://www.swcoloradowildflowers.com/</a></p>
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Other Sources Consulted:	N/A
Protocol Author :	Lauren Clark
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