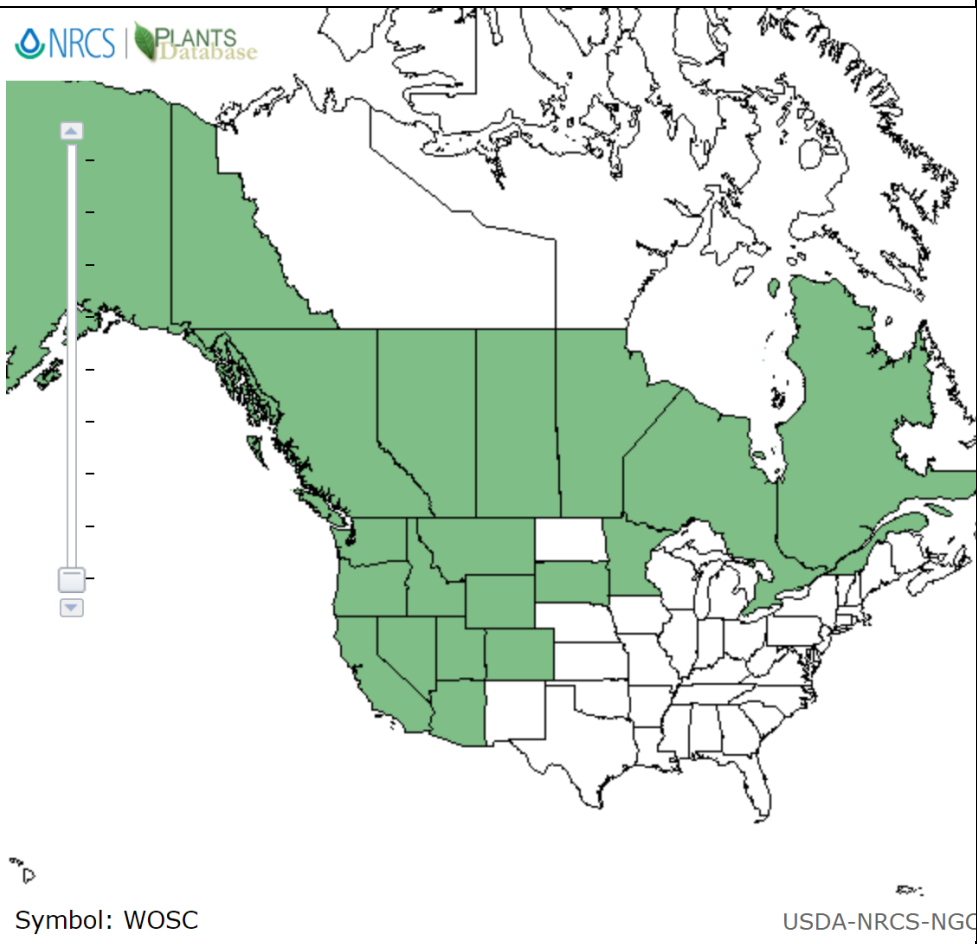
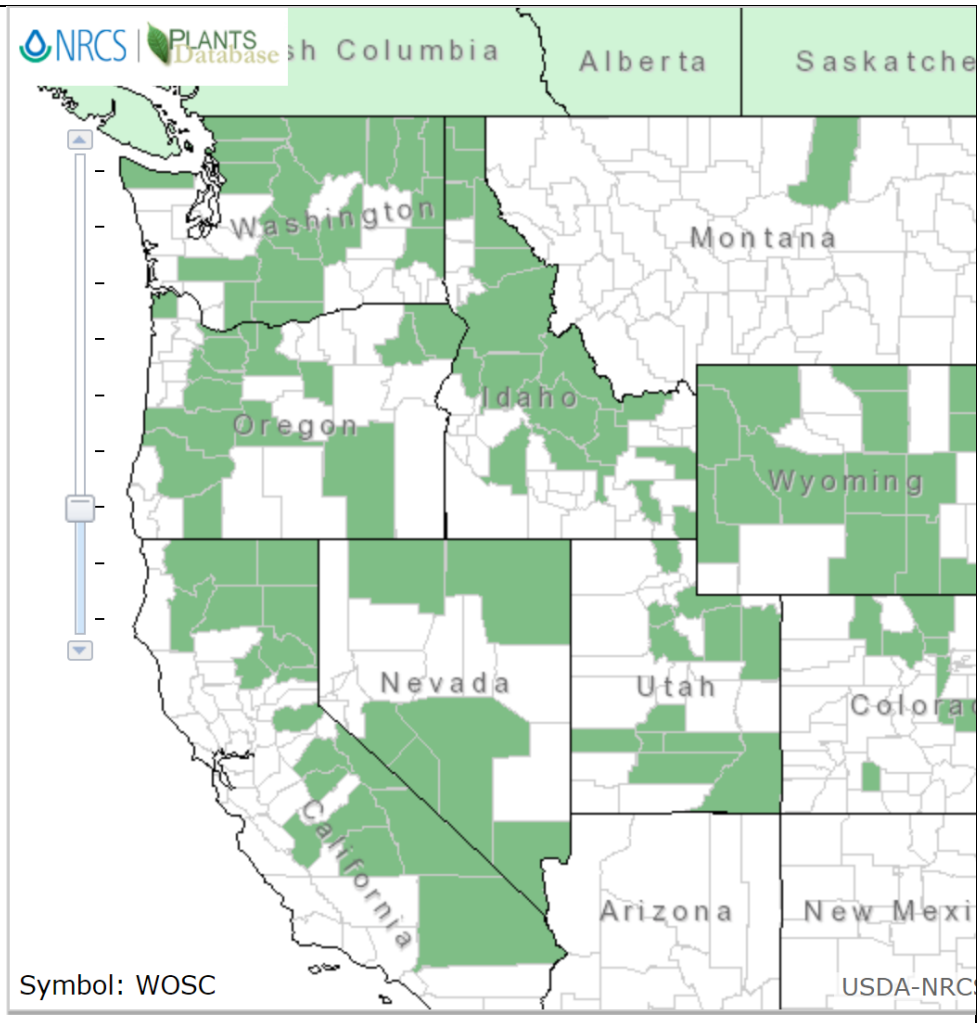
Plant Propagation Protocol for *[**Woodsia scopulina*** D.C. Eaton***]***
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/*[WOSC.pdf]*
(example: http://courses.washington.edu/esrm412/protocols/LAJA.pdf)

1- Gary A. Monroe, hosted by the USDA-NRCS PLANTS Database

TAXONOMY	
Plant Family	
Scientific Name	Dryopteridaceae
Common Name	Wood Fern Family
Species Scientific Name	
Scientific Name	*Woodsia scopulina* D.C. Eaton
Varieties	*N/A*
Sub-species	*Woodsia scopulina ssp. laurentiana* Laurent's Cliff Fern *Woodsia scopulina ssp. scopulina* Rocky Mountain Woodsia (USDA, 2019)

Cultivar	None Found
Common Synonym(s)	*Woodsia scopulina ssp. scopulina D.C Eat*
Common Name(s)	Mountain cliff fern, Rocky Mountain Woodsia, Mountain Woodsia,
Species Code (as per USDA Plants database)	WOSC
GENERAL INFORMATION	
Geographical range	


NRCS | PLANTS Database
Alberta
Saskatche
Washington
Montana
Oregon
Idaho
Wyoming
Nevada
Utah
California
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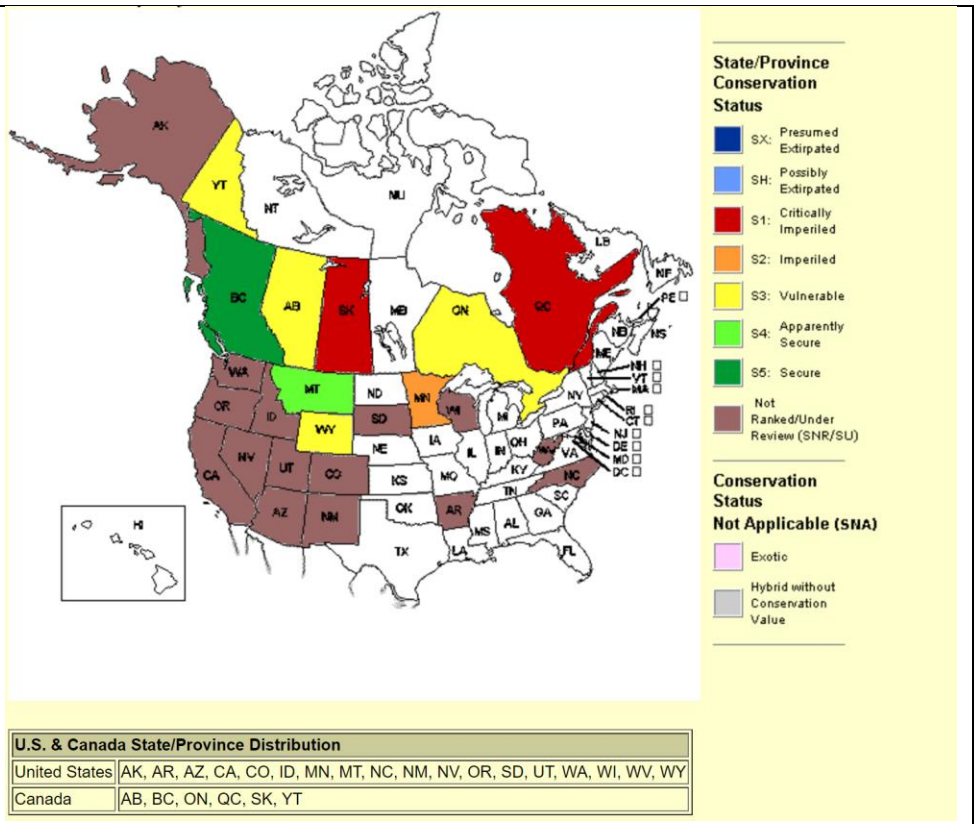
Symbol: WOSC
USDA-NRCS

Ecological distribution	 U.S. & Canada State/Province Distribution United States: AK, AR, AZ, CA, CO, ID, MN, MT, NC, NM, NV, OR, SD, UT, WA, WI, WV, WY Canada: AB, BC, ON, QC, SK, YT *2- "Comprehensive Report Species - Woodsia Scopulina." Explorer.natureserve.org. N. p., 2019. Web. 28 May 2019.*
Climate and elevation range	6595 to 10400 ft (2010 – 3170m) 17-57 inches of rain per year Wet Season: 4-9 months Temp: 47-56 F (Cal, 2019)
Local habitat and abundance	Crevices, rock bases. Ledges, talus slopes in the mountains, occupying less arid parts of the lowlands. Low water tolerant (Cal, 2019)
Plant strategy type / successional stage	Perennial - thrive in indirect light and high humidity. Soil doesn't need to be very wet, but humidity is a crucial requirement.
Plant characteristics	Perennial, Herb, Fern, Pinnate / Bipinnate, Lanceolate Around 12 inches in height

	Wide, unforked, hairs on abaxial leaves, segmented, non-glandular, non-segmented, glandular, pinnae Common on the east slope from middle to high altitudes; occurring on the west slope at high altitudes; growing on cliffs or hillsides. (Amer, 2016)  (Wildflower, 2018)
PROPAGATION DETAILS	
Ecotype	
Propagation Goal	Plants
Propagation Method	Vegetative / Some Spore propagation **Seed (spores)**
Product Type	Container (Plug)
Stock Type	
Time to Grow	1 Year
Target Specifications	Container sporophyte; height 25cm, 7 mature fronds, root system fully developed, with rhizomatous root mass (Native Plant Network, 2008, *Dryopteris* (carthusiana) – adopted)
Propagule Collection Instructions	Beginning of July through August

Propagule Processing/Propagule Characteristics	Wait until spores darken and start to fall off the fronds. Either spore collection, by collecting fronds; or vegetative propagation through collecting fronds and planting them again with a chemical treatment.
Pre-Planting Propagule Treatments	Spores should be collected from fronds and immediately dispersed into the media with adequate moisture and watering. Watering surface should remain damp and untouched, unless mold appears in which it should be removed.
Growing Area Preparation / Annual Practices for Perennial Crops	Choose finely grained media at the top, with coarse grained media at the base for moisture departure. Leave at least an inch at the bottom for gravel or other filler media for drainage. Useful Media: peat moss, sand, garden soil, lime, manure, charcoal
Establishment Phase Details	Engaging ferns in the growth phase involves planting spores as gametophytes, which, if properly irrigated and managed, produce male gametes and an egg structure. When fertilized, the gametophyte generates a sporophyte (the fern plant). (Extension, 2019) Spores germinate 10 – 20 days after sowing. It is critical to maintain sterile conditions during germination and establishment.
Length of Establishment Phase	2 to 3 months (Luna, 2008)
Active Growth Phase	Appearance of sporophytes occur 5 months after spore germination. Individual plants are transplanted from flats to pots when they are 4cm tall.
Length of Active Growth Phase	8 months (Luna, 2008)
Hardening Phase	Plants are fertilized and kept under moist climate - sun exposure limited.
Length of Hardening Phase	4 weeks (Luna, 2008)

Harvesting, Storage and Shipping	Total Time to Harvest: 1 year Harvest Date: September Storage Conditions: Overwinter in Outdoor share house under insulated foam or other forms of insulation. (Luna, 2008)
Length of Storage	5 months (Luna, 2008)
Guidelines for Outplanting / Performance on Typical Sites	Ferns can be planted whenever the climate is warm enough to induce growth. Vegetative growth can be staked in the fall, laying dormant until the spring to grow new leaflets.
Other Comments	Threatened in Minnesota (USDA, 2019)
INFORMATION SOURCES	
References	"Lady Bird Johnson Wildflower Center - The University Of Texas At Austin." *Wildflower.org*. N. p., 2019. Web. 28 May 2019 C. N. p., 2019. Web. 28 May 2019. "Native Plant Network — Reforestation, Nurseries And Genetics Resources." *Npn.rngr.net*. N. p., 2019. Web. 29 May 2019. Luna, Tara; Evans, Jeff; Wick, Dale; Hosokawa, Joy. 2008. Propagation protocol for production of Container (plug) *Gymnocarpium dryopteris* (L.) Newm. plants 800 ml containers; USDI NPS - Glacier National Park West Glacier, Montana. In: Native Plant Network. URL: http://NativePlantNetwork.org (accessed 2019/05/29). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. * John C. Game, Alan R. Smith and Thomas Lemieux 2012, *Woodsia scopulina*, in Jepson Flora Project (eds.) *Jepson eFlora*, http://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=48616, accessed on May 29, 2019. Amer, Fern J. “Figure 2f from: Irimia R, Gottschling M (2016) Taxonomic Revision of Rochefortia Sw. (Ehretiaceae, Boraginales). Biodiversity Data Journal 4: e7720. Https://Doi.org/10.3897/BDJ.4.e7720.” *American Fern Society*, doi:10.3897/bdj.4.e7720.figure2f.

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Other Sources Consulted	
Protocol Author	Aidan Jensen
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