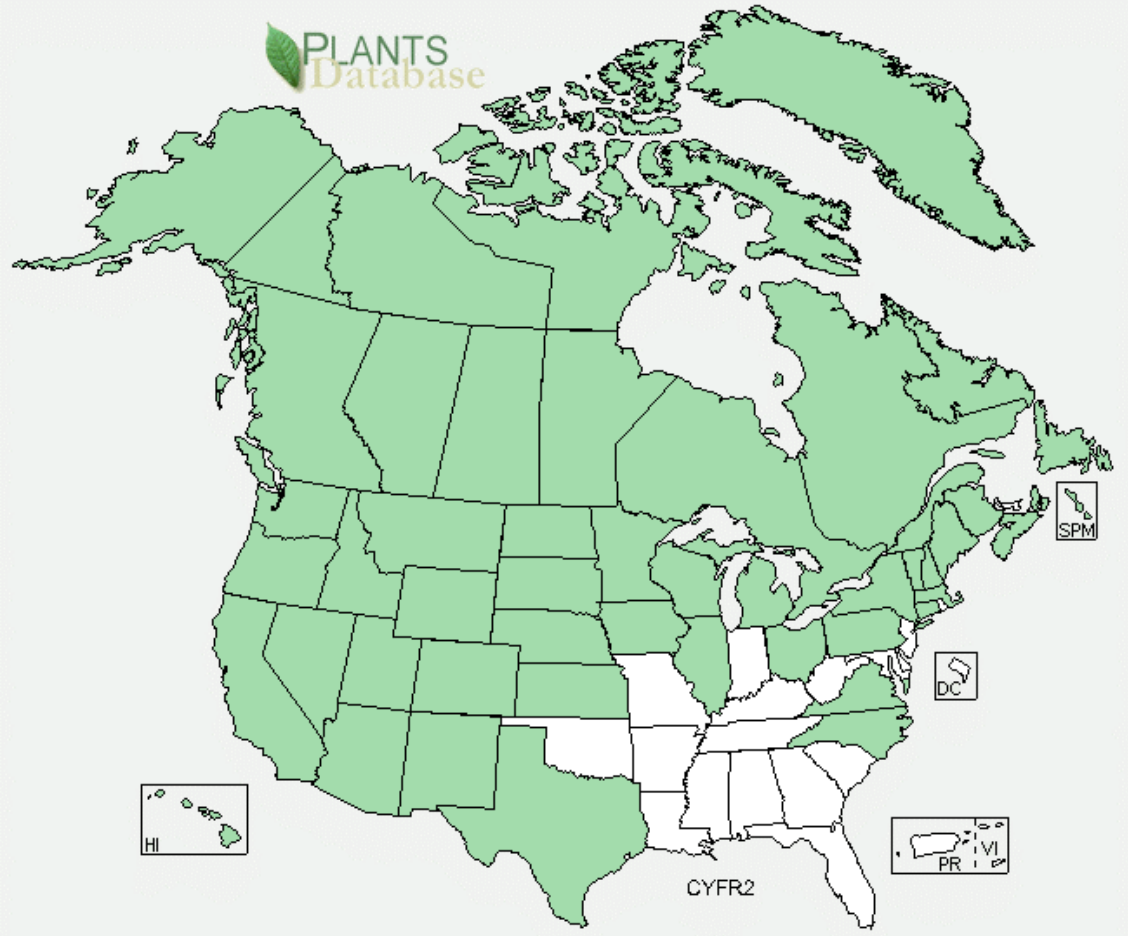
Plant Propagation Protocol for *Cystopteris fragilis*

ESRM 412 – Native Plant Production

TAXONOMY	
Family Names	
Family Scientific Name:	*Cystopteris fragilis*
Family Common Name:	
Scientific Names	
Genus:	*Cystopteris*
Species:	*fragilis*
Species Authority:	
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)	
Common Name(s):	*Fragile fern, Bladder fern, Brittle bladder fern*
Species Code (as per USDA Plants database):	CYFR2

GENERAL INFORMATION	
Geographical range (distribution maps for North America and Washington state)	*Cystopteris fragilis* is a greatly distributed species that can be found growing along the western coast of North America into Canada Alaska and even as far South as Virginia.



Ecological distribution (ecosystems it occurs in, etc):	*Cystopteris fragilis* grows well under conditions ranging from full sun to shade. The plant grows best in moist to dry fertile soil.
Climate and elevation range	It can be found on rocky cliffs or forests and crevices and ledges at all elevations, even above the timberline. Also *C. fragilis* can be found on damp rocks and on thin soil over rock. It is a fern that can grow in full sun.
Local habitat and abundance; may include commonly associated species	Extremely common in the Western states. Commonly associated species are white pine, bearberry, ground juniper, Red Oak, wild rose, beargrass , and hairgrass.
Plant strategy type / successional stage (stress-tolerator,	Facultative Seral Species

competitor, weedy/colonizer, seral, late successional)	
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	Four to ten inch fronds, black fibrous roots. Fronds are numerous herbaceous and delicate, produced in tufts. Leafy portion broadly lance-shaped, bipinnate. Ovate pinnules.
PROPAGATION DETAILS	
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Plants
Propagation Method (Options: Seed or Vegetative):	There are two was to propagate fragile ferns. The first is by using fragile fern spores. This will give you substantially more plants but is an extremely long process. The way to propagate fragile ferns is by dividing. Fragile ferns have a rhizome that when cut can potentially double or triple the fern mass.
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Spore atop brick inside petri dish.
Time to Grow (from seeding until plants are ready to be outplanted):	6 months if grow from spores. Propagation through dividing produces full grown plants faster
Target Specifications (size or characteristics of target plants to be produced):	30% of their mature size
Propagule Collection (how, when, etc):	Collect the spores when mature, usually from winter to early spring. If spores have ruffled papery texture, spores have already been released. Collecting Method #1 A commonly practiced method of collection is to tie a clear plastic bag over a healthy frond and tap/shake until spores fall into bag. You may need to gently rub a thumb over some of the sori (spore casing) to get them to loosen and release spores into bag. Collecting Method #2 Another method of collecting spores is to cut off the frond at the stem. Use a sheet of paper fold in half lengthwise (hotdog) and store for at least one week in between and book or magazine. The frond will dry out and release the spores.
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	To store spores use a glassine envelope or packets of waxed paper. If storage container is too porous spores will get stuck. The older the spores though the lower the germination rate will be. Packets should be stored in the refrigerator (1-4 degrees C) or freezer in

	moisture-tight and air tight containers
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	Boil a growing medium of peat moss mixed with perlite or vermiculite to sterilize. Another way to sterilize growing medium is to place mix into a plastic bag and using a deep microwave safe dish, microwave for 2-3 minutes.
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	Spores: Take a few sterilized bricks place them into a nursery tray and pour in water to a depth of 2". After this spread a layer of 1⁄4" growing medium of the top surface of the bricks. Gently tap spores over the layer of growing medium. Place a large clear plastic bag or a sheet of glass over the tray. Place the tray in a dark location for about two days then move the tray to a location that gets plenty of light. It is important to keep the growing medium damp, do not allow mold to form or the ferns will be lost. After ferns start to grow divide into bigger pots as needed. Dividing: Cut rhizome and separate the clump of ferns. Plant the separated clumps in the same type of soil that the original plant came from. Place just under the top of the soil. Should take just a few weeks for them to be healthy adults. New plants can be divided again after 1-2 years.
Length of Establishment Phase:	2-3 weeks for germination, 12 months to plant outside
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	Should be approximately 8 inches by 8 inches. Better to plant in the rainy season. Watering may be needed during the first summer.
INFORMATION SOURCES	
References (full citations):	-Holloway, Dr. Patricia S., "Tips on Collecting, Processing, and Storing Fern Spores" Georgeson Botanical Notes, No. 17. University of Alaska Fairbanks, April 1994. http://www.uaf.edu/salrm/gbg/pubs/Notes/17.pdf -Washington trails association. Ferns and Horsetails. http://www.wta.org/~wta/cgibin.dev/wtaweb.pl?3+hg+flora+ferns. May 2010. -Elzinga, C.L., D.W. Salzer, and J.W. Willoughby. 1998. Measuring and Monitoring Plant Populations. The Nature Conservancy and Bureau of Land Management, Denver. BLM Technical Reference 1730-1. 477pp. -Goff, G.F., G.A. Dawson, and J.J. Rochow. 1982. Site examination for Threatened and Endangered plant species.

	Environmental Management 6(4): 307-316 -Nelson, J.R. 1984. Rare Plant Field Survey Guidelines. In: J.P. Smith and R. York. Inventory of rare and endangered vascular plants of California. 3rd Ed. California Native Plant Society, Berkeley. -Lellinger, D.B. 1985. A field manual of ferns and fern allies of the United States and Canada.. Smithsonian Institute Press, Washington D.C. -Mickel, J.T. 1979. How to know the ferns and fern allies. The Pictured Key Nature Series. William C. Brown Company, Dubuque. -Nelson, J.R. 1987. Rare Plant Surveys: Techniques for Impact Assessment. In: Conservation and management of rare and endangered plants. Ed. T.S. Elias. California Native Plant Society, Sacramento. - Moran, Robbin C. *A Natural History of Ferns*. Portland, OR: Timber Press. - Heath, Francis. *Where to Find Ferns*. 1. London: Committee of General Literature, 1885. Print.

Keenan Lee-Peters
(6/5/2010)

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