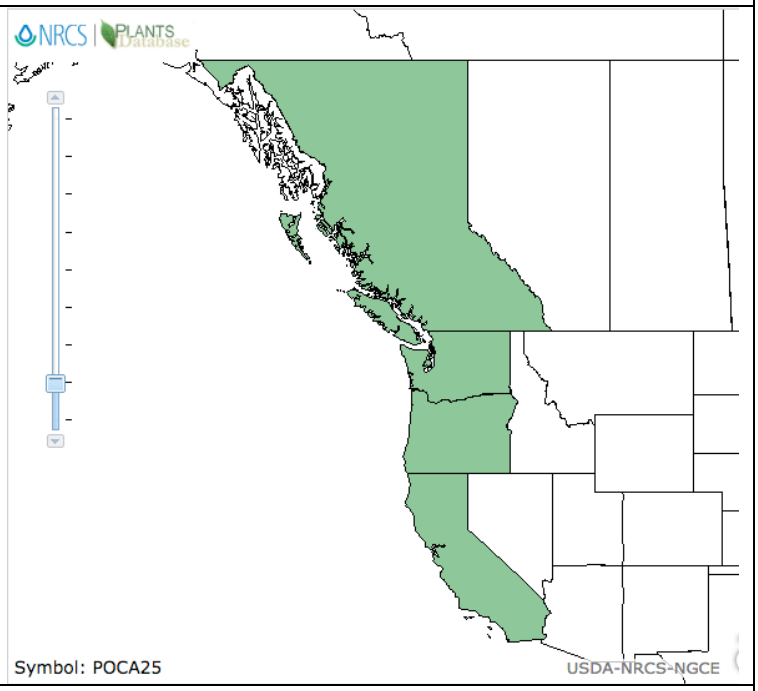
Plant Propagation Protocol for *Polystichum californicum*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/*[POCA25.pdf]*

TAXONOMY	
Plant Family	
Scientific Name	Dryopteridaceae (2)
Common Name	Wood Ferns
Species Scientific Name	
Scientific Name	*Polystichum californicum* (D.C. Eaton) Diels (2)
Varieties	N/A
Sub-species	N/A
Cultivar	N/A
Common Synonym(s)	N/A
Common Name(s)	California swordfern, California sword fern (1)
Species Code (as per USDA Plants database)	POCA25 (2)
GENERAL INFORMATION	
Geographical range	
Ecological distribution	Moist closed-canopy forests, redwood forests, mixed evergreen forests, rock slopes, wetlands (1)
Climate and elevation range	This fern grows relatively low on the western coast of the United States and British Columbia. Its elevation ranges from 100 – 4700 feet (1, 4).
Local habitat and abundance	The fern inhabits the coastal mountain ranges over its distribution, often found in the understory of conifer forests or on rocky cliff outcroppings. It is commonly

	associated with Douglas-fir, coastal redwood, giant sequoia, and western hemlock (5).
Plant strategy type / successional stage	The California swordfern is a shade tolerant understory species that can spread easily through the dispersal of spores. It is often an indicator of moist areas, and productive forests (1,5,7).
Plant characteristics	The California swordfern is a perennial non-woody fern. It produces a number of long erect leaves. The shape of each leaf is that of a lance, and each leaf has many slender segments branching off the central leaf axis. The underside of each leaf segment is dotted with brown-colored spores. The swordfern is also very resistant to pests and diseases, as well as deer browsing (5,8,10).
PROPAGATION DETAILS (taken from *Polystichum* species in similar environments)	
Ecotype	Muir Woods (3)
Propagation Goal	Plants (3)
Propagation Method	Seed (3)
Product Type	Container (plug) (3)
Stock Type	4 inch pots (3)
Time to Grow	18 – 24 months (3)
Target Specifications	Root system = firm plug in container (3)
Propagule Collection Instructions	The seeds for propagation are gathered from June 1st to August 30th. Seeds will be brown when they are mature, and may be collected when the indusium is folded back (3,9).
Propagule Processing/Propagule Characteristics	When cleaning the spores, all chaff must be removed carefully. The cleaned spores can then be stored under dry conditions in a refrigerator (3,9).
Pre-Planting Propagule Treatments	To prepare for propagation, sterilize both the flats and flat coverings, as well as the growth media (3).
Growing Area Preparation / Annual Practices for Perennial Crops	The ferns will be grown in a greenhouse. Spores may be sown directly onto petri dishes containing distilled water. These dishes can then be placed in sterile ziplock bags (3).
Establishment Phase Details	After germination of the spores, the prothalii may be placed on rectanglular flats containing a 3:1 Peat / Perlite mix. The flats should then be covered in glass to trap the moisture, and watering should only be done with distilled water (3).
Length of Establishment Phase	The order of weeks (8).
Active Growth Phase	After fertilization has happened, and the sporophytes each at least 1 true leaf, they may be individually potted. These containers may be 2-4 inches and contain a standard potting mixture (fir bark, perlite, sand, peat

	moss). All ferns should be grown in the shade (3,8).
Length of Active Growth Phase	N/A
Hardening Phase	N/A
Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	N/A
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	Outplanting should be done very carefully as the ferns will be fragile (8). The ferns will do well when outplanted into their natural environments, listed above.
Other Comments	N/A
INFORMATION SOURCES	
References	1. Calflora: Information on California plants for education, research and conservation, with data contributed by public and private institutions and individuals, including the Consortium of California Herbaria. [web application]. 2017. Berkeley, California: The Calflora Database [a non-profit organization]. Available: http://www.calflora.org/ (Accessed: Apr 24, 2017). 2. "Polystichum Californicum (California Swordfern)." *Plants Database*. USDA, n.d. Web. 24 Apr. 2017. 3. Young, Betty. 2001. Propagation protocol for production of Container (plug) Polystichum munitum (Kaulfuss) K. Presl plants 4 inch pots; San Francisco, California. In: Native Plant Network. URL: http://NativePlantNetwork.org (accessed 2017/04/25). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. (Accessed: Apr 24, 2017). 4. Calscape.com. ", Polystichum Californicum." *Calscape*. California Native Plant Society, n.d. Web. 24 Apr. 2017. 5. Polystichum californicum (D. C. Eaton) Diels in Engler & Prantl, Nat. Pflanzenfam. 1(4): 191. 1899. 6. Berger, Carrie A. (2006). Development of Tree and Understory Vegetation in Young Douglas-Fir Plantations in Western Oregon. *Western Journal of Applied Forestry, 21*(2), 94-101. 7. Alaback, Paul B., and F. R. Herman. "Long-term response of understory vegetation to stand density in Picea-Tsuga forests." *Canadian journal of forest research* 18.12 (1988): 1522-

	1530. 8. Hansen, Wallace C. "Polystichum Munitum." *The Wild Garden: Hansen's Northwest Native Plant Database*. N.p., n.d. Web. 25 Apr. 2017. 9. Arbury, Jim, Richard Bird, Clive Innes, and Mike Salmon. "The Complete Book of Plant Propagation." *Google Books*. N.p., n.d. Web. 25 Apr. 2017. 10. "Polystichum Munitum." *Lady Bird Johnson Wildflower Center*. University of Texas at Austin, n.d. Web. 25 Apr. 2017.
Other Sources Consulted	1. Limm, E., & Dawson, Todd. (2009). *On the Acquisition of and the Physiological Response to Fog by Redwood Forest Plants,* ProQuest Dissertations and Theses. 2. Russell, W., & Michels, K. (2011). Stand Development on a 127-yr Chronosequence of Naturally Regenerating Sequoia sempervirens (Taxodiaceae) Forests. *Madroño, 57*(4), 229-241. 3. Agnew, Lindsey P. "Environmental and Evolutionary Influences of Light on Fern Leaf Morphology in California." 4. Barker, Allen V., and D. J. Pilbeam. *Handbook of Plant Nutrition*. Boca Raton, FL: CRC/Taylor & Francis, 2007. Print.
Protocol Author	Sam Scharffenberger
Date Protocol Created or Updated	April 24th, 2017