**Plant Propagation Protocol for *Phegopteris connectilis***
ESRM 412 – Native Plant Production


| TAXONOMY | |
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| Family Names | |
| Family Scientific Name: | Thelypteridaceae |
| Family Common Name: | Marsh Fern |
| Scientific Names | |
| Genus: | Phegopteris Fée |
| Species: | Phegopteris connectilis |
| Species Authority: | (Michaux) Watt |
| Variety: | *Polypodium connectile* Michaux, Fl. Bor.-Amer<br>*Dryopteris phegopteris* (Linnaeus) C. Christensen<br>*Phegopteris polypodioides* Fée<br>*Polypodium phegopteris* Linnaeus<br>*Thelypteris phegopteris* (Linnaeus) Slosson |
| Sub-species: | |
| Cultivar: | |
| Authority for Variety/Sub-species: | Christensen ,Carl Frederick Albert; Fee, Antoine Laurant Apollinaire; Linnaeus, Carl von; Michaux, Andre; Slosson, Margaret. |
| Common Synonym(s) (include full scientific names (e.g., *Elymus glaucus* Buckley), | -*Dryopteris phegopteris* (L.) C. Chr.<br>- *Lastrea phegopteris* (L.) Bory<br>- *Phegopteris polypodioides* Fée<br>- *Thelypteris phegopteris* (L.) Slosson<br>-*Thelypteris phegoptrtis*<br>-*Polypodium phegopteris* |

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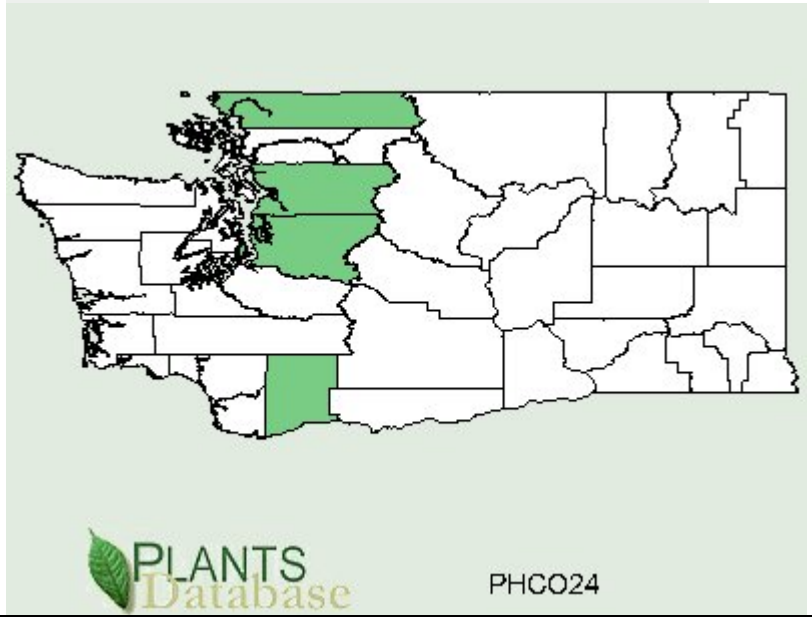
| including variety or subspecies information) | |
| Common Name(s): | long beech fern |
| Species Code (as per USDA Plants database): | PHCO24 |
| **GENERAL INFORMATION** | |
| Geographical range (distribution maps for North America and Washington state) |  <br>  |
| Ecological distribution (ecosystems it | -Moist, strongly to moderately acid soil, or on rocks in shaded crevices |

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| occurs in, etc): | ("Flora of North America")<br>-Moist, rich forests, stream-banks, bogs, wet cliffs, and rocky seepage, slopes at low to subalpine elevations (Pojar & Mackinnon) |
| Climate and elevation range | - Boreal, wet temperate, and cool climates (Rook)<br>- 0 to 9,567 feet (0 to 2,916 meters) (Stang) |
| Local habitat and abundance; may include commonly associated species | -Frequency increasing with precipitation<br>-Moist, calcareous cliff cervices or moist banks in rich, damp forest floors<br>-Often associated with maidenhair fern - *Adiantum pedatum* (Rook)<br>-Prefers moist acid soil but is adaptable and amazingly drought tolerant (Olson.297)<br>-Extremely cold tolerant but does not adapt to heat (Olson.297)<br>-Will grow in areas that are shadier then usual (Hoshizak and Moran, 92)<br>-Often associated with *Gymnocarpium dryopteris* (Bremer 123) |
| Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional) | -Indicator of nitrogen-rich soils and friable forest floors.(Rook)<br>- Colonizing species (Jones.15) |
| Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc) | Stems long-creeping, 1--2(--3) mm diam. Leaves monomorphic, dying back in winter, often 1--2 cm apart, 15--60 cm. Petiole straw-colored, (8--)15--36 cm × 1--3 mm, at base with scales brownish, lanceolate, glabrous or sparingly hairy on margin. Blade narrowly to broadly deltate, usually somewhat longer than broad, (6--)12--25 cm, proximal pinnae longest and slightly narrowed at base, spreading or reflexed. Pinnae deeply pinnatifid, (3--)6--12 × 1--3.3 cm, lowermost 1--2 pairs separate, sessile, more distal pairs strongly adnate and connected by narrow rachis wing; segments entire, or those of proximal pinna pair sometimes crenate, uncommonly shallowly lobed; proximal pair of veins from adjacent segments meeting margin above sinus, veins simple or sometimes forked in lowermost pinnae. Indument abaxially of moderately to densely set hairs 0.3--1 mm along costae, veins, and blade tissue, costae also with scales light tan to shiny brown, ovate-lanceolate, spreading, to ca. 3 mm, scales sometimes sparingly hairy on margin. Sori subterminal on veins. n = 2 n = 90, apogamous. (Flora of North America) |
| **PROPAGATION DETAILS** | |
| Ecotype (this is | N/A |

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| meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from): | |
| Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules): | -Cuttings<br>-Root balls<br>-Spores |
| Propagation Method (Options: Seed or Vegetative): | -Vegetative- by rhizome division. (Rook) |
| Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.)) | -rhizome division |
| Stock Type: | Container (plug) |
| Time to Grow (from seeding until plants are ready to be outplanted): | - 9 months ("Mahalo-Learn Anything") |
| Target Specifications (size or characteristics of target plants to be produced): | -8-20 in (Jones.382) |
| Propagule | Collecting spores on underside of forbs in Spring/Summer |

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| Collection (how, when, etc): | |
| Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc): | N/A |
| Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc): | -Use soil-testing kit to check acidity or alkalinity of the soil<br>-check soil drainage<br>-weed out before planting<br>("BackyardGardener.com") |
| Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc): | -hummus-rich soil and shady location (Jones.382)<br>-Can grow well in shadier areas then usual but provide light in climates where the weather is frequently overcast. (Hoshizak and Moran, 92)<br>-Provide acidic soils with pH 4-7 (Hoshizak and Moran, 94) |
| Establishment Phase (from seeding to germination): | N/A |
| Length of Establishment Phase: | N/A |
| Active Growth Phase (from germination until plants are no longer actively growing): | Perennial (USDA) |
| Length of Active Growth Phase: | N/A |
| Hardening Phase (from end of active growth phase to end of | Fall to Spring |

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| growing season; primarily related to the development of cold-hardiness and preparation for winter): | |
| Length of Hardening Phase: | 6 months |
| Harvesting, Storage and Shipping (of seedlings): | N/A |
| Length of Storage (of seedlings, between nursery and outplanting): | N/A |
| Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering): | -Plant on the north side of the house. (area with most shade)-<br>-Make sure there is a lot of space for the fronds so they don't risk to be damaged by footsteps or racking. Fronds should be protected since spores are under them. (Mahalo-Learn Anything)<br>-Keep area moist while taking into consideration the natural water conditions of the site<br>-Important to prune and trim back ("BackyardGardener.com") |
| Other Comments (including collection restrictions or guidelines, if available): | -Name beech fern is a result of mistranslation. The species was originally given the name *phegopteris* ( from *phegos*, 'oak' and *pteris*, 'fern' ) (Pojar & Mackinnon)<br>-The genus name comes from Greek *phegos,* beech, and *pteris*, fern, since *Phegopteris* commonly grows under beech trees. (Hoshizak and Moran,418)<br>-Has the potential to aid the soil with erosion control (Jones.15) |
| **INFORMATION SOURCES** | |
| References (full citations): | - "*2. Phegopteris connectilis* (Michaux) Watt, Canad. Naturalist & Quart. J. Sci. 3: 29. 1866.." Flora of North America 2. n. pag. Web. 14 May 2011. <http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=200004057>.<br>- "Phegopteris connectilis." *BackyardGardener.com*. BackyardGardener.com, n.d. Web. 18 May 2011. <http://www.backyardgardener.com/plantname/pda_40ce-2.html>.<br>- Bremer, Piet. "*Ecology and Syntaxonomy of Gymnocarpium dryopteris L. in*." American Fern Journal Society 100.2 (2010): 123. Web. 15 May 2011. <http://docs.google.com/viewer?a=v&q=cache:HFRzmwotbtQJ:www.nederlandse |

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| | -varenvereniging.nl/pdf-bestanden/Gymnocarpium_3.pdf+Propagation+Goal-Phegopteris+connectilis&hl=en&gl=us&pid=bl&srcid=ADGEEShAk4N68rdjct036ackG_4o1ld0LvIrN-coxXmd6awsJ366eUuElYaUzcRdjczFwWkZtAUiI-Z2IRndAELiDCRXYnBGZBDei-HFQrAOZmpp-HMe0E6qvqXfWDIfS-vEhq68lPfz&sig=AHIEtbS9PhUP48AeVMgHAhsPJbdQajU6vg>.Rook, Earl J.S.<br><br>- Jones, D L. Encyclopaedia of Ferns: An Introduction to Ferns, Their Structure, Biology, Economic Importance, Cultivation and Propagation. Port Melbourne, Vic: Lothian,15-382. 1998. Print.<br><br>- Hoshizaki, Barbara Joe., and Robbin Craig Moran. *Fern Grower's Manual*. Portland, Or.: Timber,92-94- 2001. Print.<br><br>- "Fern." Mahalo-Learn Anything. Mahalo, n.d. Web. 18 May 2011. <http://www.mahalo.com/fern/>.<br><br>- Olson, Sue. *Encyclopedia of Garden Ferns*. Portland: Timber, 296. 2007. Print.<br><br>- "Phegopteris connectilis- Long Beech Fern." Rook.Org (2002): n. pag. Web. 14 May 2011. http://www.rook.org/earl/bwca/nature/ferns/phegopteriscon.html<br><br>- Pojar, Jim, A MacKinnon, and Paul B. Alaback. Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia & Alaska. Redmond, Wash: Lone Pine Pub.423. 1994. Print.<br><br>- USDA- Natural Resources Conservation Service: Phegopteris connectilis (Michx.) Watt<br>long beechfern- Accessed 05/14/2011 http://plants.usda.gov/java/nameSearch<br><br>- Stang, David. "Phegopteris connectilis (Northern Beech Fern)." ZipcodeZoo.com (2009): n. pag. Web. 15 May 2011. <http://zipcodezoo.com/Plants/P/Phegopteris_connectilis/>. |
| Other Sources Consulted (but that contained no pertinent information) (full citations): | - "How To Grow Ferns." Brooklyn Botanical Garden (2011): n. pag. Web. 15 May 2011. <http://www.bbg.org/gardening/article/how_to_grow_ferns/>.<br><br>- "Long Beechfern (Connectilis) ." *gardengides.com.* gardengides.com, n.d. Web. 18 May 2011. <http://www.gardenguides.com/taxonomy/long-beechfern-phegopteris-connectilis/>.<br><br>- Soare, Liliana.C, Emilia Vişoiu, and M. Andrei. "RESEARCHES CONCERNING THE IN VITRO DIFFERENTIATION OF." *Notulae Botanicae Horti Agrobotanici Cluj-Napoca*. Notulae Botanicae Horti Agrobotanici Cluj-Napoca, 2007. Web. 18 May 2011. <http://notulaebotanicae.ro/nbha/article/view/231/223>.<br><br>- Taylor, Thomas Mayne Cunninghame. Pacific Northwest Ferns and Their Allies. [Toronto]: Published in Association with the University of British Columbia by University of Toronto, 195. 1970. Print. |
| Protocol Author (First and last name): | R. Nelli Newport |

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| Date Protocol Created or Updated (MM/DD/YY): | 5/18/11 |

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

WS. Specimen at Washington State University, Pullman, Washington.