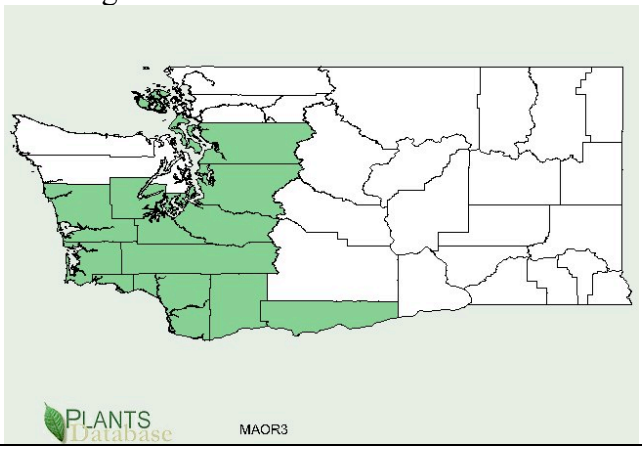
Plant Propagation Protocol for *Marah oreganus*
ESRM 412 – Native Plant Production

TAXONOMY	
Family Names	
Family Scientific Name:	*Cucurbitaceae*
Family Common Name:	Cucumber Family (also known as the Gourd Family)
Scientific Names	
Genus:	*Marah*
Species:	*oreganus*
Species Authority:	(Torr. Ex S. Watson) Howell
Variety:	N/A
Sub-species:	N/A
Cultivar:	N/A
Authority for Variety/Sub-species:	N/A
Common Synonym(s) (include full scientific names (e.g., *Elymus glaucus* Buckley), including variety or subspecies information)	*Echinocystis oregana* (Slichter); Marah oregana (Calflora); Sicyos oregana T. & G.; Megarrhiza oregana Torr. ex S. Wats.; Micrampelis oregana Greene (Donovan)
Common Name(s):	Manroot, Coastal Manroot, Bigroot, Old Man-in-the-ground, Oregon Bigroot, Wild Cucumber (Slichter)
Species Code (as per USDA Plants database):	MAOR3
GENERAL INFORMATION	
Geographical range (distribution maps for North America and Washington state)	

	North America  Washington State 
Ecological distribution (ecosystems it occurs in, etc):	Commonly observed at low elevations in moist soils on open hillsides, fields, meadows, or thickets. (Pojar) Generally occurs west of the Cascades from Southern British Columbia to central California. (Donovan)
Climate and elevation range	Found occurring at elevations ranging from 0 to 5905 feet. (Calflora) Occurs in Mediterranean to temperate climates. (Schlising)
Local habitat and abundance; may include commonly associated species	Commonly associated with Garry Oaks on rocky, south-facing slopes or in roadside thickets around British Columbia, although it is becoming less abundant and has been put on the endangered species list in Canada. It is commonly seen within 30 meters of the shore on northwest American islands as well as Vancouver Island and the southern Gulf Islands. (Donovan)
Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer,	In California, this species begins growth after fall rains and cool temperatures, giving it an early start on the growing season. Survival may possibly depend on its early start while moisture is still available to accelerate growth. Shoots generally emerge from the ground in early March. Stems produce tendrils in order to “climb” above other plants

seral, late successional)	by grabbing onto them, but negative effects of this on associated plants are not documented. Flowering generally lasts approximately 8 to 10 weeks, beginning soon after vine emergence. After flowering, vines die back due to the hot dry weather and the plants carbohydrates are stored within its tubers underground, which remain dormant until the next rainy season. This monoecious species begins the flowering stage in a predominantly staminate phase and complete the flowering stage in more of a pistillate stage. It is also known to tolerate a wide range of soil conditions, such as pH and composition, as long as it receives a good amount of moisture for part of the season. (Donovan)
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	A perennial vine forb/herb with tendrils to stabilize itself and compete with surrounding plants. (Sagebud) Tubers allow it to store its carbohydrates throughout the dormant seasons and get an earlier start on growth than many species. (Donovan) This species flowers and dies back in late spring/early summer when the climate gets too hot and dry for it to grow. (Plant)
PROPAGATION DETAILS	
Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	Ecotype for test *Marah oreganus* is unknown, although it is commonly associated with Garry Oak stands in British Columbia and lowland coastal or woodland-edge environments west of the Cascade Mountain Range.
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Tubers (can grow up to several meters in length and weigh more than 100 kg on old plants) or seeds (planted at depths approximately 5-10 cm below soil surface). (Donovan)
Propagation Method (Options: Seed or Vegetative):	Seed or vegetative (tubers)
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Container (plug) would be ideal for planting tubers or seeds in preparation for outplanting.
Stock Type:	No information found on *Marah oreganus* stock type.
Time to Grow (from seeding until plants	Underground growth generally begins from the rains of January and February, with sprouts emerging from the ground in March. The plant

are ready to be outplanted):	continues to grow until the rains seize and temperatures rise (early summer). At this point it the aboveground vegetation senesces and storage for next years growth occurs in the tubers. (Donovan) Due to this growth cycle, *Marah oreganus* should be outplanted late in the winter.
Target Specifications (size or characteristics of target plants to be produced):	Size varies due to environmental conditions and plant associations. As a climbing vine, *Marah oreganus* can grow very high. If it is not growing in association with climbable plants it can spread laterally. Can grow over 20 feet long. (Atkinson)
Propagule Collection (how, when, etc):	Seeds (which are poisonous) can be collected from the plants fruit after maturity in early summer. Tubers should theoretically be collected during dormancy periods (mid to late summer).
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	Each fruit contains several large seeds. (Kozloff) No information found for Marah oreganus seed longevity.
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	Most seeds require at least 3 weeks of cool temperatures (40^{o}F) for germination to occur, suggesting cold stratification is effective in releasing the seeds from dormancy. (Donovan)
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	No information found for Marah oreganus growing area preparation. It is known to grow in a variety of soil types with good moisture retention. The pH varies widely as well. (Donovan) Preferable containers would be wide so that healthy tubers have space for establishment.
Establishment Phase (from seeding to germination):	Seeding occurs in early to mid summer; germination occurs late winter to early spring, depending on location. (Donovan)
Length of Establishment Phase:	Approximately 8 months depending on location.
Active Growth Phase (from germination until plants are no longer actively growing):	Late winter/early spring to early summer (or whenever heat and lack of rain prohibits further growth). (Donovan)
Length of Active Growth Phase:	Approximately 5 months depending on location.

Hardening Phase (from end of active growth phase to end of growing season; primarily related to the development of cold-hardiness and preparation for winter):	Hardening phase generally occurs mid summer through late winter (approximately late June to late January) depending on location.
Length of Hardening Phase:	Approximately 7 months depending on location.
Harvesting, Storage and Shipping (of seedlings):	No information found for *Marah oreganus* in regards to harvesting, storage, and shipping (of seedlings).
Length of Storage (of seedlings, between nursery and outplanting):	No information found for *Marah oreganus* length of storage.
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	Plant in a site with good sun exposure as well as in soil with good water retention capacity. (Donovan)
Other Comments (including collection restrictions or guidelines, if available):	Embryonic sprouts become enlarged and grow downward into the soil, carried by the elongating bases of the cotyledons. Cotyledons fuse together to form a hollow tube, which carries the epicotyl, hypocotyl and radicle out of the seed and downward further into the soil. This type of germination is rare to most dicots, but common among the genus *Marah*. (Donovan) *Marah oreganus* was a multiuse plant for the coastal indigenous people. It was used to make a decoction for venereal disease, as well as kidney issues and scrofula sores. It was also used to sooth hand aches by soaking hands in a mixture of water and mashed up vegetative stems. (Pojar) Marah oreganus is also a source of ribosome inactivating proteins, making it potentially useful in the pharmaceutical industry due to its "antiviral, antitumor, antidiabetic, abortifacient, and immunomodulatory properties" (Donovan).
INFORMATION SOURCES	
References (full	Atkinson, Scott, and Fred Sharpe. *Wild Plants of the San Juan Islands*.

citations):	Seattle, WA: Mountaineers/San Juan Preservation Trust, 1993. 14. Print. Calflora: Information on California plants for education, research and conservation, based on data contributed by dozens of public and private institutions and individuals, including the Consortium of Calif. Herbaria. [web application]. 2012. Berkeley, California: The Calflora Database [a non-profit organization]. Available: http://www.calflora.org/ (Accessed: May 17, 2012). Donovan, Marta, and Matt Fairbarns. "COSEWIC Assessment and Status Report on the Coast Manroot Marah Oreganus in Canada." *Coastal Manroot (Marah Oreganus)*. COSEWIC Secretariat C/o Canadian Wildlife Service. Web. 17 May 2012. <publications.gc.ca/collections/...2011/.../CW69-14-595-2010-eng.pdf>. Kozloff, Eugene N. *Plants and Animals of the Pacific Northwest: An Illustrated Guide to the Natural History of Western Oregon, Washington, and British Columbia*. Seattle: University of Washington, 1976. Print. "Plant Files: Oregon Manroot." *Dave's Garden*. Web. 17 May 2012. <http://davesgarden.com/guides/pf/go/57540/>. "Sagebud." *Coastal Manroot (Marah Oreganus)* -. Web. 17 May 2012. <http://www.sagebud.com/coastal-manroot-marah-oreganus/>. Slichter, Paul. "The Cucumber Family in the Columbia River Gorge of Oregon and Washington." *Marah Oreganus*. Web. 17 May 2012. <http://science.halleyhosting.com/nature/gorge/5petal/cuke/marah.htm>. Schlising, Robert A. "Seedling Morphology in Marah (Cucurbitaceae) Related to the Californian Mediterranean Climate." *JSTOR*. American Journal of Botany. Web. 17 May 2012. <http://www.jstor.org/discover/10.2307/2440650?uid=3739960>. Pojar, Jim, A. MacKinnon, and Paul B. Alaback. *Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia & Alaska*. Redmond, WA: Lone Pine Pub., 1994. Print. *USDA Natural Resources Conservation Service*. United States Department of Agriculture. Web. 16 May 2012. <http://plants.usda.gov/java/profile?symbol=BOLU>.
Other Sources Consulted (but that contained no	

pertinent information) (full citations):	
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