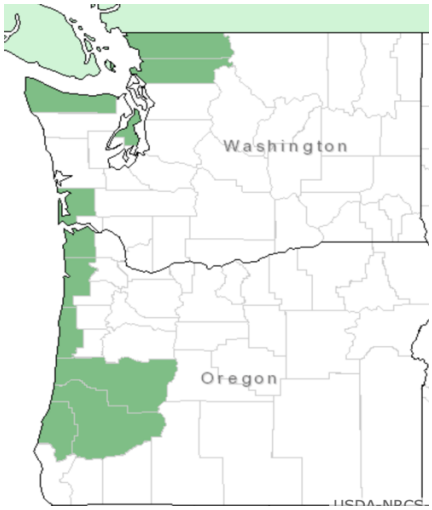
Plant Propagation Protocol for *Zostera marina*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/ZOMA.pdf

(2)



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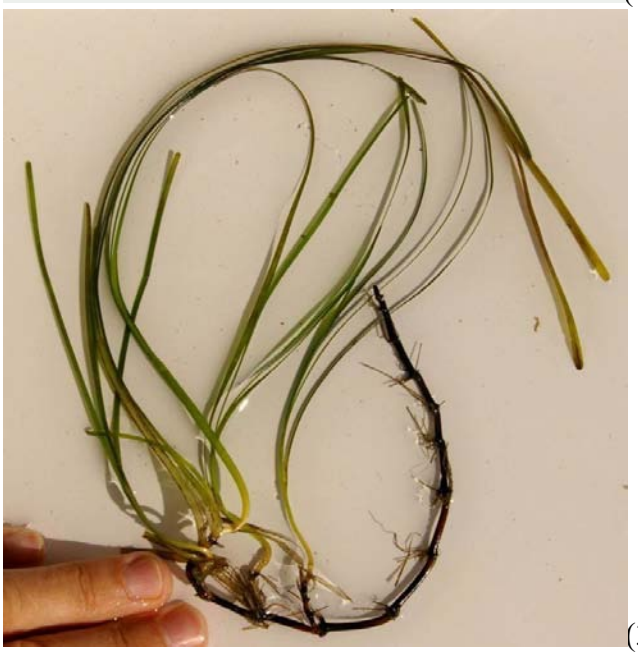
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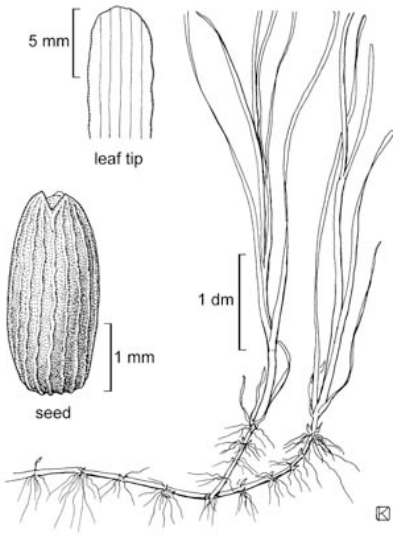

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TAXONOMY	
Plant Family	
Scientific Name	Zosteraceae (2)
Common Name	Eel-grass (2)
Species Scientific Name	
Scientific Name	*Zostera marina* L. (2)
Varieties	
Sub-species	

Cultivar	
Common Synonym(s)	*Zostera pacifica* S. Watson (11) *Zostera marina* var. latifolia Morong (11) *Zostera marina* var. marina L. (11) *Zostera marina* var. stenophylla Asch. & Graebn (11)
Common Name(s)	Seawrack (3) Common eel-grass (1) Tapegrass (3)
Species Code (as per USDA Plants database)	ZOMA (2)
GENERAL INFORMATION	
Geographical range	North American Coasts (3) West: SE Alaska to Baja, California (3) East: Labrador to North Carolina (3)
Ecological distribution	Minimum salinity of 10 PSU (3) Inter to subtidal up to 6m (1) Submerged or partially floating (1) Forms large colonies in estuaries and sheltered coves (1)
Climate and elevation range	Coastal North America, only at sea level (2)
Local habitat and abundance	Whatcom, Skagit, Clallam, and Pacific counties (2) Declining over the last 4 decades due to water quality (3)
Plant strategy type / successional stage	Marine perennial (1)
Plant characteristics	True seagrass. Requires salinity of at least 10 PSU (3). Reproduces both sexually (monoecious) or through rhizomes (3). Helps stabilize and reduce erosion of shorelines while providing habitat to marine animals (3)
PROPAGATION DETAILS	
Ecotype	Chesapeake Bay beds (York River, VA & Tangier Sound, MD) (4)
Propagation Goal	Plants for restoration (4)
Propagation Method	From seed (4)
Product Type	Vegetative shoots for outplanting (4)
Stock Type	Seed (4)
Time to Grow	6-7 months, late spring / early summer to fall (4)
Target Specifications	Shoots: 12.25cm or more (5) Rhizome: 2.25cm or more (5)
Propagule Collection Instructions	Late spring, by hand or mechanical harvester (8), flowering shoots in different stages of maturity (4).
Propagule Processing / Propagule Characteristics	1000 seeds per tray estimated 10% germination rate (4)
Pre-Planting Propagule Treatments	Placed in aerated tanks of flowing estuarine water until seeds are shed (4). Separate seed from leaves and stems (4). Store in aerated water tanks at 21 C and 18 PSU (4).

Growing Area Preparation / Annual Practices for Perennial Crops	34 x 24 x 8cm plastic tray (4) Estuarine sediment from restoration site (10) 2.5mL of 14:14:14 Osmocote slow-release fertilizer (4)
Establishment Phase Details	Sterilizing soak in 1% Na hypochlorite 5 minutes (6) 3 sterile estuarine water rinses (6) Bubble with N2 until O2 saturation below 1% (4) Scarification with wet sandpaper (7) Vernalized 1-4 weeks at 3-4 C (10) Trays placed in estuarine water tank with a salinity of 15 PSU and temperature of 13-14 C. (9)
Length of Establishment Phase	3-29 days (4)
Active Growth Phase	Temperature raised 2 C a week until reaching 22 C (4) Water level increased to keep shoots submerged (4) Clean tanks and plants weekly (4)
Length of Active Growth Phase	60-70 days until ready for planting (4)
Hardening Phase	
Length of Hardening Phase	
Harvesting, Storage and Shipping	Harvest in the fall. Remove plants from the sediment and separate into individual shoots. Store in floating baskets (10)
Length of Storage	Overnight (10)
Guidelines for Outplanting / Performance on Typical Sites	Planting unit of 2 shoots attached to substrate with bamboo skewers (5) 76.5% seedling survival (4)
Other Comments	Costly due to the need for aerated flowing water tanks, heating pumps, and lights. Labor intensive (4)
INFORMATION SOURCES	
References	1) Pojar, J., MacKinnon, A., & Alaback, P.B. (2016). *Plants of the Pacific Northwest coast: Washington, Oregon, British Columbia & Alaska.* Auburn, WA, USA: Lone Pine. 2) *Plants Profile for Zostera Marina (Seawrack)*, plants.usda.gov/core/profile?symbol=ZOMA. 3) Murphy, R., L. Orzetti and W. Johnson. 2011. Plant fact sheet for eelgrass (*Zostera marina)*. USDA, Natural Resources Conservation Service, Norman A. Berg National Plant Materials Center. Beltsville, MD 20705 4) Tanner, Christopher E., and Thomas Parham. "Growing Zostera Marina (Eelgrass) from Seeds in Land-Based Culture Systems for Use in Restoration Projects." Restoration Ecology, vol. 18, no. 4, 2010, pp. 527–537.

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Other Sources Consulted	12) *Zostera Marina*, ucjeps.berkeley.edu/eflora/eflora_display.php?tid=48950.
Protocol Author	Jeffrey LaFrance
Date Protocol Created or Updated	05/28/19