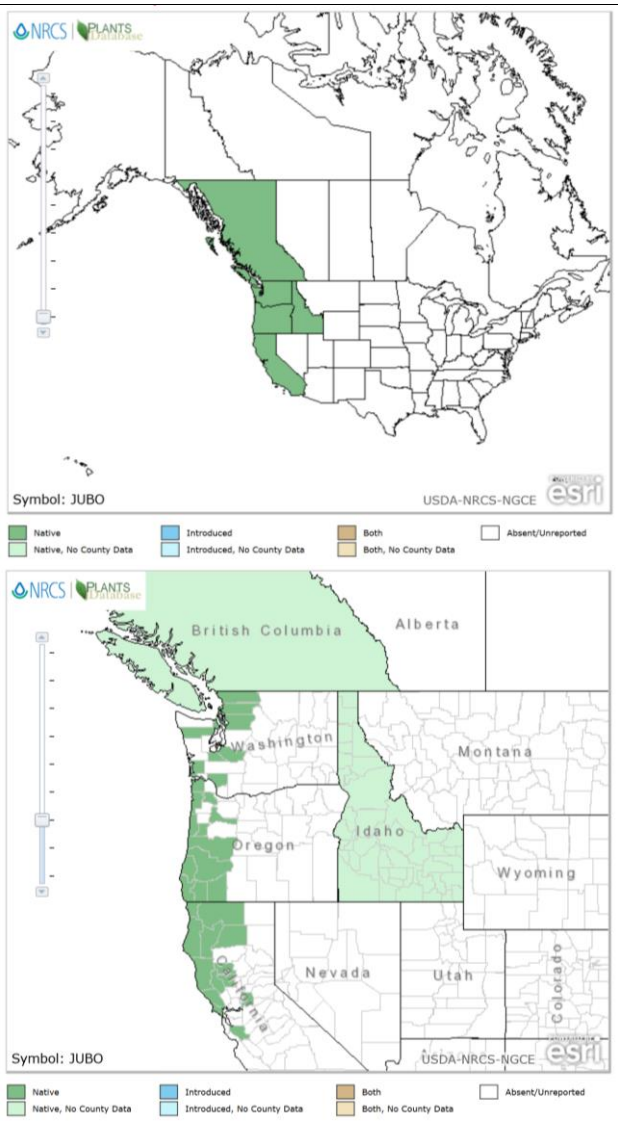
Plant Propagation Protocol for *Juncus bolanderi*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/JUBO.pdf

Source: Steve Matson (CalFlora)

TAXONOMY	
Plant Family	
Scientific Name	Juncaceae
Common Name	Rush
Species Scientific Name	
Scientific Name	*Juncus bolanderi* Engelmann
Varieties	*Juncus bolanderi* var. *riparius* Jepson
Sub-species	none
Cultivar	none
Common Synonym(s)	none
Common Name(s)	Bolander's rush
Species Code (as per USDA Plants database)	JUBO
GENERAL INFORMATION	

Geographical range	 North coast ranges. Found mostly in coastal counties, west of the Cascades, from Whatcom County in WA to Santa Clara County in CA (USDA; Robson, Richter & Filbert; maps from USDA).
Ecological distribution	Found in wetlands, riparian zones (Calflora; Robson, Richter & Filbert) and other wet habitats like marshes, beaches, meadows (CalScape), and in swamp or sandy ground (Zika). Also occurs along edges of small lakes, ponds and pools (Guard).
Climate and elevation range	Elevations up to 1600 m (Zika), or more typically low elevations, 100-2955 ft, from SW British Columbia to California (Pojar & MacKinnon; CalFlora)
Local habitat and abundance	Swampy or sandy ground with fast soil drainage, prefers full sun and annual precipitation of approximately 27.6”-101.0”. (CalScape)

	May occur alongside *Juncus ensifolius* (Dagger-leaf rush) (Guard), grasses, aquatic plants and pebbles at water's edge (Brenzel).
Plant strategy type / successional stage	Perennial (USDA)
Plant characteristics	Perennial, graminoid, monocot (Calflora) with rhizomatous root system, forms bunches of smooth stems up to about 2.6 ft/80 cm in height (CalScape). Round, thin leaves and flowers in rounded heads grouped near tip of stalks (Guard; Pojar & MacKinnon). Inflorescence of 1-3 flower clusters, each with at least 20 flowers. Each flower has brown, pointed segments about 3mm long; 3 stamens (CalScape; Beidleman & Kozloff). Spherical flower heads are tawny to brown in color (Robson, Richter & Filbert; CalScape). Flower petals and sepals looks the same and are called tepals; length of tepal helpful in distinguishing species. Each capsule contains many seeds per flower (Cooke).
PROPAGATION DETAILS **Seed Propagation**	
Ecotype	n/a
Propagation Goal	Plants (Bartow)
Propagation Method	Seed (Bartow)
Product Type	Container (plug) (Bartow)
Stock Type	Seed
Time to Grow	n/a
Target Specifications	Seedlings
Propagule Collection Instructions	For *Juncus spp*.: pick seed heads just before they ripen and place in paper bag to dry. When dry, the seed capsules will burst open and may be collected from bottom of bag (King County). Fruiting occurs July-September (Zika)
Propagule Processing/Propagule Characteristics	Seeds are tiny (Leigh), measuring about 0.5 mm, obovoid in shape; fruits are oblong and short-beaked (Zika).
Pre-Planting Propagule Treatments	"Seeds were sown into cone-tainers filled with Sunshine #1 (a soil-less peat-based media) amended with micronutrients (Micromax) and a slow-release fertilizer (Osmocote 14-14-14)" (Bartow) For *Juncaceae*: seeds should be dried before planting (Speichert).

	For emergent wetland species: "seeds can be stored in moist sand at about 40 degrees" (King County).
Growing Area Preparation / Annual Practices for Perennial Crops	"Seeds were placed in plastic germination boxes on moistened germination paper and stored in a growth chamber set at 8 degrees C days and 4 degrees C nights with 8 hours of light for 45 days and 90 days each. One "control" box of seeds was left in a greenhouse set at fall temperatures (16 degrees C days/10 degrees C nights)" (Bartow) For *Juncaceae*: "Sow on soil surface, barely cover, and keep moist" (Leigh). Sow on constantly wet soil (Speichert).
Establishment Phase Details	Provide moderate summer watering, continuously moist to wet soil (Zika).
Length of Establishment Phase	n/a
Active Growth Phase	For *Juncaceae*: Seedlings are heavy feeders, use liquid fertilizer as soon as shoots are visible, water soluble 20-10-20 (Speichert).
Length of Active Growth Phase	2 months (Speichert)
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	Plant in moist location, such as wetland habitat. Grows especially well in zones 4-7, 15-17, 22-24 (Zika).
Other Comments	
PROPAGATION DETAILS **Rhizome division**	
Ecotype	n/a
Propagation Goal	Rhizome cuttings
Propagation Method	Vegetative
Product Type	Propagule - Rhizome cutting (Leigh; King County)
Stock Type	n/a
Time to Grow	For rhizomatous perennials: 2-3 weeks (Croton & Byam).
Target Specifications	New roots begin to develop at bottom of cutting.
Propagule Collection Instructions	For best results, perform division in spring or summer (Speichert). In general, rhizome division should occur at the end of the growing period or just before it begins. If performed early enough in summer, the rhizome division can develop roots and become established before winter (Hartmann & Kester).

	For small, clumping grasses: lift clump out of soil with fork, shake off loose soil and/or wash roots, divide by hand or with hand forks into sections; ensure at least one bud per divided section. If clump is tightly packed, can cut through roots with sharp knife or spade to loosen rootstock (Toogood).
Propagule Processing/Propagule Characteristics	For small, clumping grasses: wash roots, trim off any damaged roots from each division (Toogood).
Pre-Planting Propagule Treatments	Keep divisions moist or evenly wet but not submerged in water (Speichert)
Growing Area Preparation / Annual Practices for Perennial Crops	For *Juncus spp*.: after division, immediately plant each section horizontally with roots down into pots, flats or directly on site (King County). For small, clumping grasses: plant into free-draining soil mix (Toogood).
Establishment Phase Details	For rhizomatous perennials: if weather is hot/dry or divisions are small, pot divisions and keep in closed coldframe (Croton & Byam).
Length of Establishment Phase	For rhizomatous perennials: 2-3 weeks (Croton & Byam).
Active Growth Phase	n/a
Length of Active Growth Phase	2 months (Speichert)
Hardening Phase	For rhizomatous perennials: allow divisions to harden off before outplanting (Croton & Byam).
Length of Hardening Phase	n/a
Harvesting, Storage and Shipping	n/a
Length of Storage	n/a
Guidelines for Outplanting / Performance on Typical Sites	For herbaceous perennials: plant divisions at same depth as original plant, spacing about 12” apart and water in thoroughly (Croton & Byam). For small, clumping grasses: plant each division into free-draining soil mix, with rhizome just below soil surface and shoots exposed (Toogood).
Other Comments	For *Juncaceae*: “Division can be used to multiply salvaged plants or plants already in your yard” (Leigh).
INFORMATION SOURCES	
References	See list below
Other Sources Consulted	See list below
Protocol Author	Summer Swallow
Date Protocol Created	04/30/19

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

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