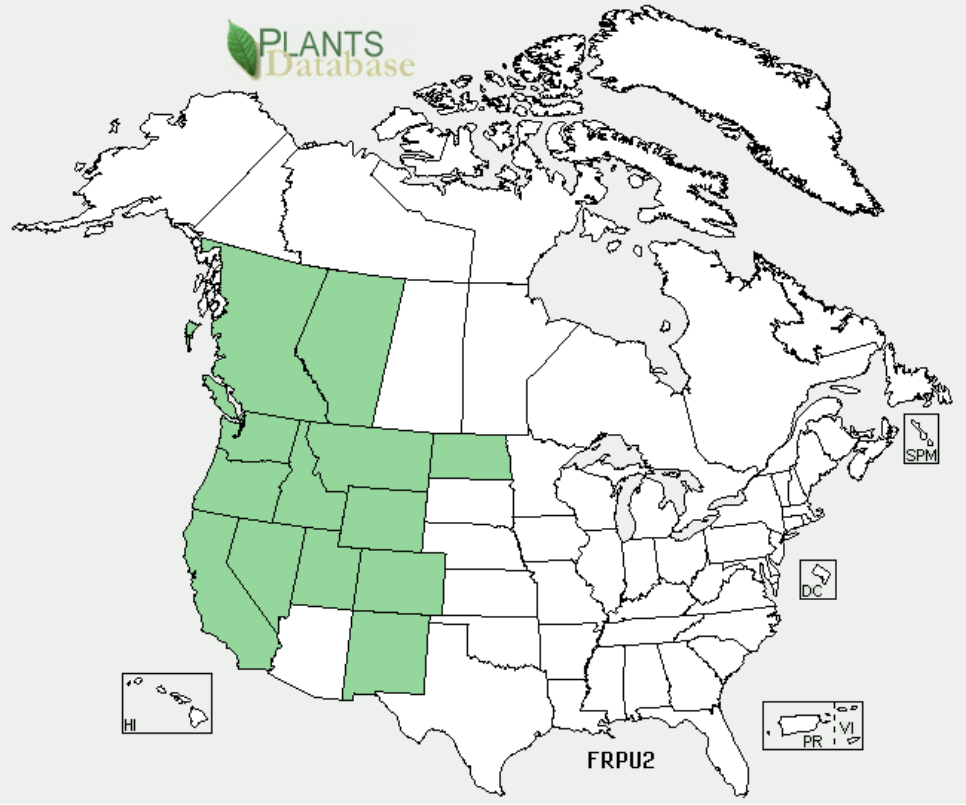
Plant Propagation Protocol for *Fritillaria pudica*
ESRM 412 – Native Plant Production

Margaret Williams @ USDA-NRCS PLANTS Database

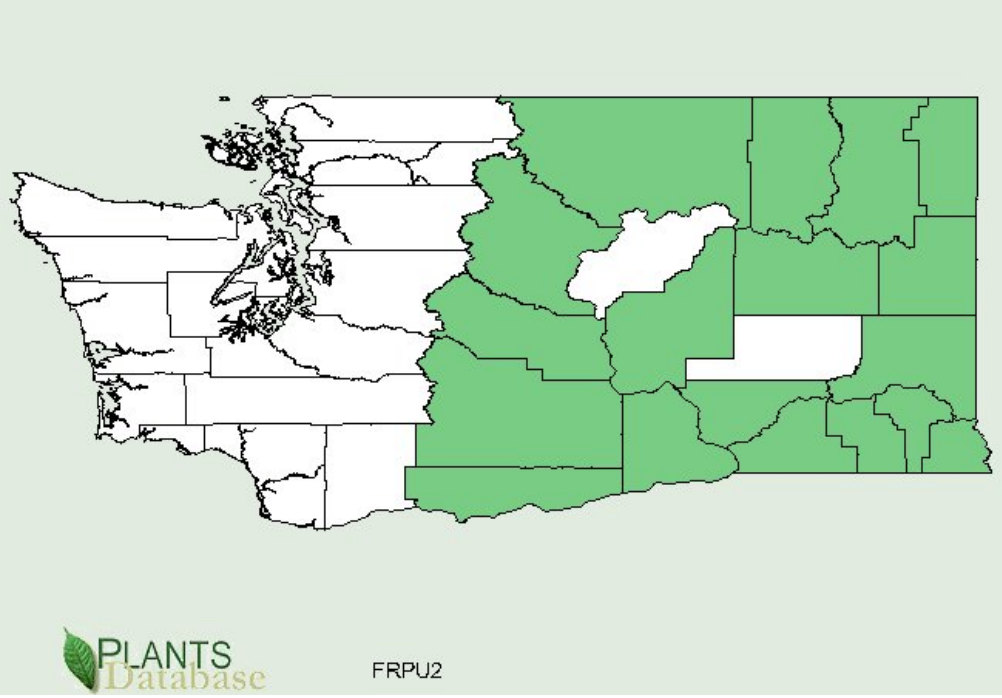
Steve Hurst @ USDA-NRCS PLANTS Database

TAXONOMY	
Family Names	
Family Scientific Name:	Liliaceae
Family Common Name:	Lily family
Scientific Names	
Genus:	*Fritillaria*
Species:	*pudica*
Species Authority:	(Pursh) Spreng.
Variety:	
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	
Common Synonym(s)	*Lilium pudicum* Pursh; *Ochrocodon pudicus* (Pursh) Rydb.
Common Name(s):	yellow fritillary, yellow bells
Species Code (as per USDA Plants database):	FRPU2

GENERAL INFORMATION	
Geographical range:	North America from British Columbia south to northern California; east to Alberta, Montana, Wyoming, Nevada and Utah. In Washington, east of the Cascades (Hitchcock & Cronquist 1976).



Map courtesy of USDA-NRCS Plants Database http://plants.usda.gov/java/nameSearch



Map courtesy of USDA-NRCS Plants Database
http://plants.usda.gov/java/county?state_name=Washington&statefips=53&symbol=FRPU2

Ecological distribution:	Shrub-steppe to ponderosa-pine or mixed coniferous forest (Hitchcock & Cronquist 1976)
Climate and elevation range:	Low to high elevations (Turner & Gustafson 2006). Minimum temperature: 47 °F. Dry areas (8-16 inches precipitation) with sufficient spring moisture (Taylor & Valum 2006, USDA-NRCS 2012).
Local habitat and abundance; may include commonly associated species:	Common. Occurs in the understory layers of sagebrush (*Artemisia* spp.), wheatgrasses, Idaho fescue (*Festuca idahoensis)* and other perennial bunchgrasses along with other herbs and perennials like sagebrush buttercup (*Ranunculus glaberrimus)* (Franklin & Dyrness 1988, Kruckeberg 1996, Turner & Gustafson 2006, Taylor & Valum 2006, Link *et al*. 2006).
Plant strategy type / successional stage:	*F. pudica* is associated with early to mid seral conditions in sagebrush-steppe (Bunting *et al*. 1999). It occurs on sites which are moist in spring, but dry during the summer. It flowers very early in spring, taking advantage of the narrow opportunity to produce abundant fruit and seed, then goes dormant during the hot, dry summer (Taylor & Valum 2006, Skinner 2006, USDA-NRCS 2012). This species also spreads

	vegetatively at a moderate rate (USDA-NRCS 2012).
Plant characteristics:	Short-lived, herbaceous perennial, 3-12" tall. Deep-seated bulb with numerous smaller, grainlike bulblets. One stalk with 2-8 fleshy, narrow leaves and 1 to 2 terminal flowers. Nodding, bellshaped yellow flowers, aging to orange. Flowers in early spring. Fruit is a many-seeded capsule (Hitchcock & Cronquist 1976, Kruckeberg 1996, Taylor & Valum 2006, Turner & Gustafson 2006).
PROPAGATION DETAILS	
Ecotype:	--
Propagation Goal:	Bulbs
Propagation Method:	Seeds
Product Type:	Propagules (bulbs)
Stock Type:	--
Time to Grow:	5-6 years (Skinner 2006)
Target Specifications:	Bulbs (about 15 mm in diameter) (Skinner 2006).
Propagule Collection:	Collect seeds when capsules begin to split in late June or July. Store in paper bags or envelopes at room temperature (Skinner 2006).
Propagule Processing/Propagule Characteristics:	The reddish brown, flattened and winged seeds can be shaken from capsules and need no further cleaning (Skinner 2006). Store seeds at 40 °F and 40% humidity (Skinner 2006). Seed density: 165,996 seeds/pound (USDA-NRCS 2012) Seed longevity: unknown
Pre-Planting Propagule Treatments:	Seeds need to be exposed to cold, moist conditions for an extended period to meet dormancy requirements (Deno 1993, Kruckeberg 1996, Skinner 2006, Link *et al*. 2011). This can be achieved by sowing seeds outdoors in the fall, or by cold-moist stratification. Nauman (cited by Skinner 2006) obtained highest germination rates after 90 days of cold, moist stratification in the dark, or 120 days of cold, moist stratification in light.
Growing Area Preparation / Annual Practices for Perennial Crops:	Sow in flats in fall in 2:1 mix of Sunshine #4 (http://www.sunshineadvanced.com/sunshine%C2%AE-advanced-growing-mix-4-how-its-made) and sand. Cover seeds likely—a thin layer of pea gravel will prevent seeds from floating. Water deeply (Skinner 2006).
Establishment Phase:	Leave seed flats outside until germination starts in early spring. Water only during extended dry periods. Some seeds may only germinate the second winter (Kruckeberg 1996, Skinner 2006).

Length of Establishment Phase:	4-6 months (Kruckeberg 1996, Skinner 2006).
Active Growth:	Move seed flats to a protected area, such as a lath house, in May. Water only as needed and fertilize alternate weeks. Once dormant, water only enough to prevent growing medium from drying out completely. Protect flats from extreme cold during the winter. Plants will re-emerge the following March (Skinner 2006). After 2 years, remove bulbs from flats after they have died back. Separate out bulblets and replant in a clean, moist soil mixture (Kruckeberg 1996, Stevens 2006).
Length of Active Growth Phase:	4-5 years
Hardening Phase:	Since plants are grown outside, no hardening is needed.
Length of Hardening Phase:	Not applicable.
Harvesting, Storage and Shipping:	After 4 years in flats, bulbs can be harvested in fall. Offsets can be replanted in flats—these will take several more years to flower (Skinner 2006, Stevens 2006).
Length of Storage:	Bulbs should be replanted by late fall (Skinner 2006).
Guidelines for Outplanting / Performance on Typical Sites:	This species requires a dry location with spring moisture (Kruckeberg 1996). Larger bulbs may flower the spring following outplanting (Skinner 2006). Note that *Fritillaria* species do not flower reliably, and are described as shy-flowering (Stevens 2006).
Other Comments:	To protect wildland populations, collection of bulbs in the wild is not recommended. Purchase bulbs only from a reputable dealer, propagate from seeds, or subdivide garden-grown bulbs or bulb scales (Kruckeberg 1996).

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Protocol Author (First and last name):	Ina Penberthy
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