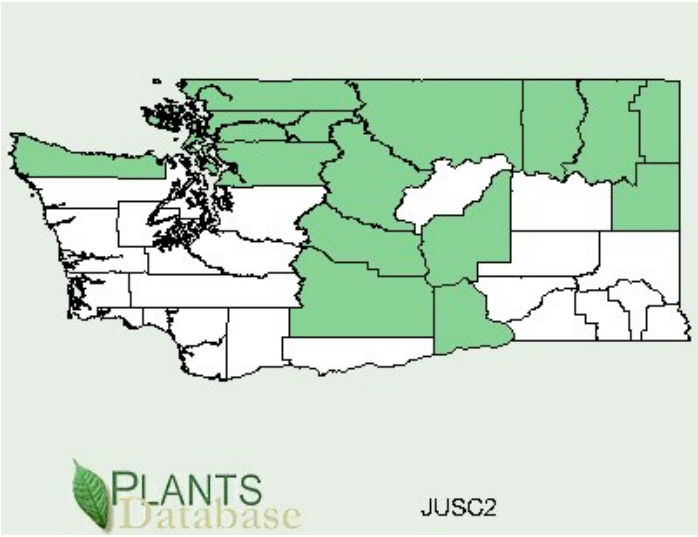
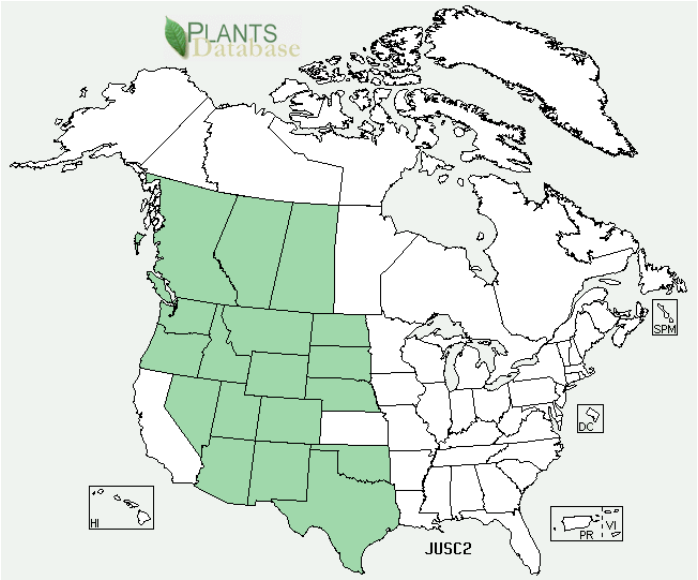
Plant Propagation Protocol for *Juniperus scopulorum*
ESRM 412 – Native Plant Production
Spring 2010

Photos USDA-NRCS PLANTS Database / Herman, D.E., et al. 1996. North Dakota tree handbook. USDA NRCS ND State Soil Conservation Committee; NDSU Extension and Western Area Power Administration, Bismarck. USDA NRCS Bridger Plant Materials Center, Bridger, MT.

TAXONOMY	
Family Names	
Family Scientific Name:	Cupressaceae
Family Common Name:	Cypress Family
Scientific Names	
Genus:	*Juniperus*
Species:	*scopulorum*
Species Authority:	Charles Sprague Sargent (1841–1927)
Variety:	N/A
Sub-species:	N/A
Cultivar:	N/A
Authority for Variety/Sub-species:	N/A
Common Synonym(s):	N/A
Common Name(s):	Rocky Mountain Juniper, Colorado Redcedar [1, 9]
Species Code:	JUSC2
GENERAL INFORMATION	
Geographical range:	

	
Ecological distribution:	Open woods, dry, clay, sandy or rocky coastal areas, including islands, to inland valleys and low montane. [4, 5, 7, 10]
Climate and elevation range:	Withstands cold winters (average 15 degrees F) and summer drought. Not well adapted to humid, high night temperatures. [1, 10]
Local habitat and abundance; may include commonly associated species	Found in association with sagebrush (*Artemisia* spp.) and grasses, Douglas-fir (*Pseudotsuga menziesii*), Gambel oak (*Quercus gambelii*), Ponderosa pine (*Pinus ponderosa*), and along riparian corridors with cottonwood (*Populus* spp.) and willow (*Salix* spp.). Can form pure stands in northern low elevations. [10]
Plant strategy type / successional stage:	Most common in long-term seral to near-climax, tending to dominate in higher elevations (up to 9,000 ft.) [10]
Plant characteristics:	Slow-growing, small, shrubby evergreen tree with multiple leaders. Overall shape is rounded to columnar. Two foliage types, juvenile and mature. Juvenile foliage is needlelike, occurring in threes. Mature foliage is scale-like, opposite leaves in pairs. Fruits are pea-sized bluish-purple “berries”/ ovulate cones at the ends of branches, each containing up to 12 seeds. Long-lived species up to 300 years. [5, 10]
PROPAGATION DETAILS	
Ecotype:	Glacier National Park Lodgepole Pine forest
Propagation Goal:	Plants.
Propagation Method:	Vegetative
Product Type:	Container plugs
Stock Type:	800 ml containers.
Time to Grow:	15 months/1.3 years.
Target Specifications:	15 cm height, 5 mm caliper, firm root plug in 800 ml container.
Propagule Collection:	12 cm length, 5 mm caliper semi-hardwood cuttings from new growth on donor plants just emerging from dormancy (early June). Can also be collected in mid-November for outplanting the next fall, however it is known that the juvenile phase of most plants has a higher rooting potential.

	[1, 2, 3, 6] Cutting may contain a “heel” or a small piece of wood from the parent plant. [9]
Propagule Processing/Propagule Characteristics:	Keep moist and refrigerated until processing. Best to process the same day. [6]
Pre-Planting Propagule Treatments:	Place into 2 minute fungicide bath to kill surface pathogens, then remove half the leaves, treat with 8,000 ppm IBA rooting hormone, and stick 2 nodes under rooting medium (50% perlite; 50% sand). [6]
Growing Area Preparation / Annual Practices for Perennial Crops:	Use outdoor mist bed with intermittent mist infrequent enough to prevent leaf and stem rot, e.g. 6 seconds every 6 minutes. Use bottom heat 12 cm beneath rooting medium at 21 degrees C. Plants will move from shaded mist house in 12 weeks to outdoor shade house for 2 weeks, and finally to outdoor nursery in full sun until ready for outplanting. [6]
Establishment Phase:	Time to transplant.
Length of Establishment Phase:	12 weeks.
Active Growth Phase:	After rooting, pot into 800 ml plugs with 70% 6:1:1 sphagnum peat, perlite and vermiculite and 30% coarse sand with balanced NPK controlled release fertilizer (2.5 grams per container). Keep in shade house for 2 weeks then move to full exposure for remainder. [6]
Length of Active Growth Phase:	12 weeks.
Hardening Phase:	Fertilize with 200 ppm 5-10-10 NPK solution in August and September. Irrigate once before winterization. Insulate with foam cover and snow. [6]
Length of Hardening Phase:	4 weeks.
Harvesting, Storage and Shipping:	Harvest the next September.
Length of Storage:	5 months.
Guidelines for Outplanting / Performance on Typical Sites:	Survival rate in Northern Idaho was 97%.
Other Comments:	N/A.
PROPAGATION DETAILS	
Ecotype:	N/A
Propagation Goal:	Plants.
Propagation Method:	Seed.
Product Type:	Container plugs.
Stock Type:	45/340 Copperblocks or 10-40 cubic inch conetainers. [2, 8]
Time to Grow:	2 years.
Target Specifications:	30-40 cam height, 5.7 mm caliper, firm root plug in either container. [2, 8]
Propagule Collection:	Collect healthy, mature dark blue or black fruit with a white waxy coating by hand picking, hand stripping or pole pruning in late fall/early winter. Store fruit in 34-37 degree F cooler at 80% humidity with adequate ventilation to prevent molding until cleaning can take place. [2, 8]
Propagule Processing/Propagule Characteristics:	Clean seeds from sticky fruit pulp by alternately rinsing in water and a weak lye solution or citrus hand cleaner. Separate sound seeds by floatation. Seed density is 39,362 to 92,380 seeds/kg. [2, 8]
Pre-Planting Propagule Treatments:	After soaking seeds in running water for 24 hours, sow into 66 ml pine cells and place into an unheated greenhouse for 60 days to undergo warm, moist stratification. Then transfer seeds to cold, moist stratification for 60-90 days in a 1-2 degree C cooler. [2, 8]
Growing Area Preparation / Annual	Extend photoperiod with incandescent lamps at 500 lux.

Practices for Perennial Crops:	Fertigate with overhead boom. Rooting medium is 1 part sphagnum peat to 1 part vermiculite with a pH of 4.2. To prevent dampening off, use bottom heat, underbench air circulation, and use grit to increase air movement around the root collar. Temperature should be 75-80 degrees F in the daytime and 60-70 degrees F in the nighttime. [2, 8]
Establishment Phase:	Newly germinated seedlings require irrigation with acidified water only for the first two weeks. If it is early winter, all night lighting with 300 watt bulbs is used. From the third week to the ninth week, seedlings are fertilized twice a week with conifer starter. [2, 8]
Length of Establishment Phase:	9 weeks in year 1.
Active Growth Phase:	Nutrients are supplied twice a week with conifer grower. Irrigation is supplied when containers are 80-85% the weight of field capacity and slowly decreased to 70%. Gradually the interval is increased until the medium remains barely moist in between irrigation. [2, 8]
Length of Active Growth Phase:	20 weeks in year 1; 15 weeks in year 2.
Hardening Phase:	Fertigation is applied when necessary using confier finisher. Nightime lighting is stopped. Temperature control is avoided as long as ambient temperature is between 28-80 degrees F. [2, 8]
Length of Hardening Phase:	18 weeks year 1; 18 weeks year 2.
Harvesting, Storage and Shipping:	Seedlings are ready for packing in January. They should be well-watered but the leaves should be dry to prevent mold. They are stored at 34 degrees F in plastic bags inside waxed boxes. Relative humidity is kept at 100%. [2, 8]
Length of Storage:	4-5 months.
Guidelines for Outplanting / Performance on Typical Sites:	Seedlings should be planted with enough space so their roots are not bent. Weeds must be controlled for the first two years of establishment and seedlings must be protected from damage by browsing animals. [9]
Other Comments:	Containers should be sterilized in hot water in between crops. Cleaned seeds remain viable for several years in semi-moist storage at 20-40 degrees F. [5]
INFORMATION SOURCES	
References:	1. Dirr, Michael A. 1998. Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics, Culture, Propagation and Uses. Stipes Publishing, Champaign, Illinois. 2. Dumroese, R. Kasten 2008. Propagation protocol for production of container Juniperus scopulorum Sarg. plants (45/340 Copperblocks); USDA Forest Service, Southern Research Station, Moscow, Idaho. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 4 May 2010). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery. 3. Hartmann, Hudson T., Dale E. Kester, Fred T. Davies, Jr., Robert L. Geneve. 2007. *Plant Propagation Principles and Practices, Seventh Edition*. Prentice-Hall of India, New Delhi. 4. Hitchcock, C. Leo and Arthur Cronquist. 1976. Flora of

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Other Sources Consulted:	
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