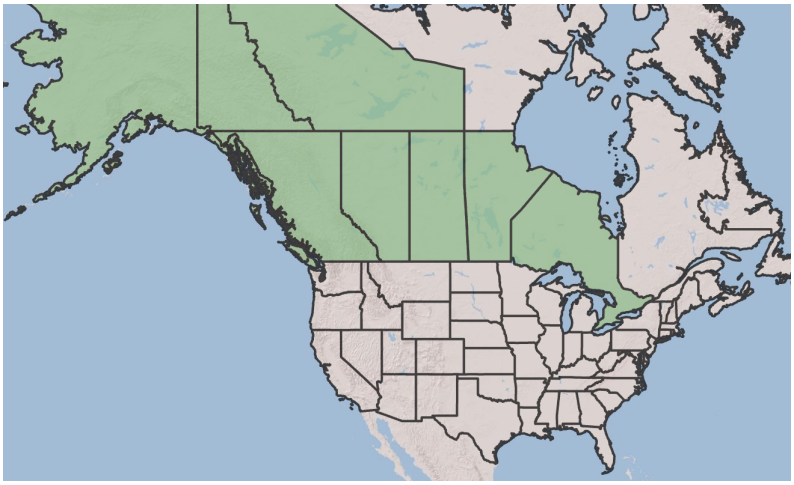
Plant Propagation Protocol for *Betula neoalaskana*
ESRM 412 – Native Plant Production
URL: https://courses.washington.edu/esrm412/protocols/*2022*/*BENE4.pdf*

TAXONOMY	
Plant Family	
Scientific Name	Betulaceae
Common Name	Birch family
Species Scientific Name	
Scientific Name	*Betula neoalaskana* Sarg.*
Varieties	*Betula neoalaskana* var. kenaica (W.H. Evans) B. Boivin
Sub-species and Cultivar	None
Common Synonym(s)	Betula alaskana Sarg. Betula papyrifera Marshall ssp. humilis (Regel) Hultén Betula papyrifera Marshall var. humilis (Regel) Fernald & Raup Betula papyrifera Marshall var. neoalaskana (Sarg.) Raup Betula resinifera Britton[1]
Common Name(s)	Resin Birch[1], Alaska Paper Birch[4], Yukon White Birch[3],
Species Code (as per USDA Plants database)	BENE4
NOTE	Betula neoalaskana was formerly B. papyrifera var. humilis. Resulting sources will mention "neoalaskana" as a variety instead of its own species, along with titles of papers mainly naming Betula papyrifera. [2]
GENERAL INFORMATION	
Geographical range	 1
Ecological distribution	Occurs on bogs and poorly drained soils. [4]
Climate and elevation range	Ranging in elevations between 100-1200m[6] and up to 2400m in the Cascades, forested areas of Western Canada, and the Canadian Rockies.[5] Its range is bounded on the north by the 13° C July isotherm and in the south, it seldom grows naturally where average July temperatures exceed 21° C. [8t]

Local habitat and abundance	Found in pure stands or mixed with other species, especially Picea mariana. On better-drained sites in northeastern British Columbia it is commonly found in association with Picea glauca.[4] Can grow in rocky or peaty slopes, bog margins, sandhills, and open woods.[7]
Plant strategy type / successional stage	Stands can establish within 30 years following fire. While generally succeeded by other species, it can maintain in forest openings. As the conifer's age and openings occur, it re-enters the stands, becoming a younger component of the mature conifer forests.[8]
Plant characteristics	A small tree, often with many stems, up to 15 meters tall. Crown narrow, oval.[4] Bark is white or pale brown, not peeling freely; young shoots are usually thickly covered with viscid warts. Leaves triangular-ovate cuneate or truncate at the base, coarsely and often doubly toothed.[3] Rarely lives more than 140 years.[8]
PROPAGATION DETAILS	
Propagation Goal	Plant
Propagation Method	Seed
Product Type	Planting stock can be either conventional bare-root stock or container-grown seedlings. [8]
Time to Grow	2 years
Target Specifications	First year seedlings are about 5-12 cm tall.[9] After the second year seedling height should reach at least 20cm.[8]
Propagule Collection Instructions	Assess ripeness of catkins before collection. The seeds ripen from early August until mid-September.[8] Collect only female catkins. Because catkins can shatter easily, they should be put directly into paper bags, either by stripping seeds from catkins or clipping entire catkins. Do not fill bags more than half full.[10]
Post Harvest Handling	Seeds should be processed as soon as possible, but can be temporarily stored in a well-ventilated area. When storing temporarily, seeds can be kept in bags or spread on trays to begin drying. Seeds should be sealed in containers overnight to prevent reabsorption of moisture. [10]
Propagule Processing/Propagule Characteristics	Spread catkins out to dry in a well-ventilated area with low relative humidity. Betula species will release their seeds between -14°C and 16°C. Dry for several weeks until the catkins begin to fall apart. The seeds can then be extracted by rubbing the catkins or shaking them inside a bag. Dry seeds in a well-ventilated area between 5°C and 20°C with low relative humidity (15%). B. neoalaskana seeds likely have orthodox seed behavior and should be dried down to

	approximately 15% equilibrium relative humidity (eRH), or 3% of their initial fresh weight moisture content. before storing. Store seeds in the freezer at -18 °C ± 3 °C for long-term conservation. [10]
Pre-Planting Propagule Treatments	Seeds shown to germinate after 30 days of cold stratification, however, it has been noted that Betula species can vary significantly in germination requirements based on their location of growth. Light can assist in breaking dormancy in Betula species and has been shown to reduce required cold stratification times. If seeds have been dried prior to germination, soaking seeds in a solution of 0.5% sodium hypochlorite (NaOCl) for 10 minutes, then rinsing with water for 1 minute prior to germination will reduce the chance of rehydration damage. If this treatment is not available, suspend dry seeds over water in a sealed container for 24 hours. [10]
Growing Area Preparation	Although germination and early survival are often best on mineral soils, seedling growth is best on humus seedbeds.[8] Post seedling establishment, plants can be moved into soils that better match their outplanting environment.
Establishment Phase Details	Germination is epigeal.[8] Most seeds will have germinated by 3 weeks; however, it is advisable to run germination tests for as long as possible to ensure all seeds are being germinated. Continue testing until no more seeds germinate or all seeds have germinated. 42 days is the recommended time for germination testing unless slow germination is expected. [10]
Active Growth Phase	Peak growth occurs over 3 months during the June to August growing season. [8]
Hardening Phase	Post growth season after August begins the hardening phase. Following drops in temperature, the plant will begin to harden for the upcoming winter. In greenhouse settings following this drop in temperature (while not going to the extremes of the outside) will aid in seedling survival. [8]
Harvesting, Storage and Shipping	During the first growth season, greenhouses allows for the quickest establishment and growth. In the following year, partial or full outdoor growth (in pots/containers) is suitable.
Guidelines for Outplanting / Performance on Typical Sites	After 2 years of growth (either fully indoor or outdoor for the second growth cycle), outplanting plants into field sites can be done at the beginning of the growth season after the threat of freezing has passed. April through early May depending on location. [8]
PROPAGATION DETAILS	
Propagation Goal	Plants
Propagation Method	Vegetative
Product Type	Container Propagules
Time to Grow	1 year

Target Specifications	Using 10-15 cm cuttings (with at least 5cm underground and 1-3 nodes) after 1 years growth the plants should grow around 10cm.[11] However if establishment and good health is apparent, outplanting can still be done.
Propagule Collection and Treatment Instructions	Cuttings should be taken in mid to late May, selecting material from side shoots from the previous season's growth. Softwood heel or nodal tip cuttings can be taken 10-15 cm in length where the base is beginning to ripen; these should have the lower leaves removed and a wound made at the stem base to enhance rooting.[11]
Rooting Phase	Success can be achieved using mist or fogging systems, or polythene covers, with rooting occurring after about six weeks. Artificially extending day length from July to October will aid establishment considerably by prolonging the growing season and preventing early leaf drop.[11]
Hardening Phase	Post growth season after August begins the hardening phase. Following drops in temperature, the plant will begin to harden for the upcoming winter.[8]
Guidelines for Outplanting / Performance on Typical Sites	Outplanting plants into field sites can be done at the beginning of the growth season after the threat of freezing has passed. April through early May depending on location. [8]
INFORMATION SOURCES	
References (full citations)	1. Betula neoalaskana Sarg. (n.d.). Retrieved May 23, 2022, from https://plants.usda.gov/home/plantProfile?symbol=BENE4 2. Common trees of Alaska - US forest service. (2009, August). Retrieved May 23, 2022, from https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5320147.pdf 3. Betula neoalaskana Sarg. (n.d.). Retrieved May 23, 2022, from https://treesandshrubsonline.org/articles/betula/betula-neoalaskana/ 4. Alaska paper birch1. (n.d.). Retrieved May 23, 2022, from https://www.for.gov.bc.ca/hfd/library/documents/treebook/alaskabirch.htm 5. Betula occidentalis. (n.d.). Retrieved May 23, 2022, from https://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=277817 6. Betula resinifera in global plants on JSTOR. (n.d.). Retrieved May 23, 2022, from https://plants.jstor.org/compilation/Betula.resinifera

	7. Betula neoalaskana. (n.d.). Retrieved May 23, 2022, from http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=233500257 8. Safford, L. O. (n.d.). Betula papyrifera Marsh. Retrieved May 23, 2022, from https://www.srs.fs.usda.gov/pubs/misc/ag_654/volume_2/betula/papyrifera.htm#:~:text=Growth%20and%20Yield%2D%20Young%20paper,(70%20ft)%20in%20height. 9. SPECIES: Betula papyrifera. (n.d.). Retrieved May 23, 2022, from https://www.fs.fed.us/database/feis/plants/tree/betpap/all.html 10. Betula neoalaskana. (n.d.). Retrieved May 23, 2022, from https://www.yukonu.ca/sites/default/files/inline-files/Betula_noalaskana_F.pdf 11. Clennett, C., & Sanderson, H. (2002). 436. BETULA PAPYRIFERA: Betulaceae. Curtis's Botanical Magazine, 19(1), 40–48. http://www.jstor.org/stable/45065517
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