Scientific Name: *Betula neoalaskana* **Common Names:** Alaska paper birch, Alaska white birch, Alaska birch

Life Form: Tree

Site Preferences: Bogs, poorly drained soils, commonly found in stands with black spruce in wet soils and white spruce in better drained soils (British Columbia Ministry of Forestry, 2003).

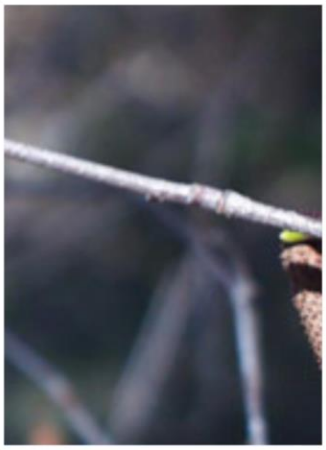
Tolerances: Acidic soil, very nutrient-poor soil, frost, fluctuating water table, wet sites (Forests Lands and Natural Resource Development, n.d.)

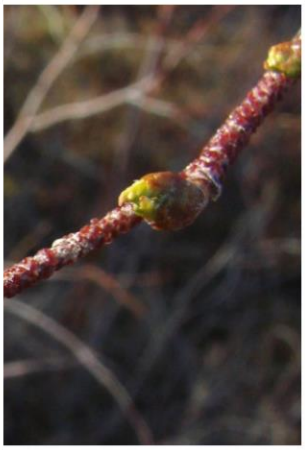
Distribution: Yukon, Northwest Territories, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario (USDA NRCS, 2018)

Left: *Lupinus arcticus*. Alfred Cook, some rights reserved, CC BY, cropped from original, http://www.alaskawildflowers.us/Kingdom/Plantae/Magnoliophyta/Magnoliopsida/Fabaceae/Lupinus_arcticus/Arcticus_01.html

Plant Identification:

Betula neoalaskana is a species of birch which typically grows to 15 m tall. It can have one or many trunks covered in dark brown bark when the tree is young, maturing to a whitish pink with age. The bark is papery and peels off in thin layers. Leaves are flat and smooth at the base, with rounded, doubly saw-toothed sides tapering to a sharp point. Leaves are shiny and dark green with small resin glands on underside. This species can be easily confused with *Betula papyrifera*, however, it is smaller in size and can most simply be differentiated by the presence of resin glands on the twigs (British Columbia Ministry of Forestry, 2003). Seeds develop in dry, cone-like fruits called catkins that split open at maturity (J. M. Baskin, 2009). The fruit are 2-4 cm long, and contain small nutlets with broad wings on either side (British Columbia Ministry of Forestry, 2003).





Above left: *B. papyrifera* twig. Note absence of resin glands. Paul Wray, Iowa State University, Bugwood.org. some rights reserved CC BY-NC
Above right: *B. neoalaskana* twig. Note presence of resin glads. Alfred Cook, some rights reserved, CC BY, cropped from original, http://www.alaskawildflowers.us/Kingdom/Plantae/Magnoliophyta/Magnoliopsida/Betulaceae/Betula_neoalaskana/Neoalaskana_05.html

Harvesting Considerations:

Male and female catkins occur on the same tree. The female catkins can be differentiated in that they are shorter and thinner than male catkins (Banerjee, Creasey, & Gertzen, 2001). When very ripe, catkins can shatter, so they are best collected when the nutlets within the catkin are brown (mature) but the catkin is still green enough to hold together (Banerjee et al., 2001; J. M. Baskin, 2009). This species should be ready to harvest between August 1 and September 15 (Smreciu, Gould, & Wood, 2013). This may vary in the Yukon and should be determined by forecasting earlier in the season (Banerjee et al., 2001). *Betula* species commonly hybridize, so when choosing a population to collect from it is important to ensure the stand is isolated from other varieties. Although these species generally produce abundant seed regularly, there can be variability in the proportion of viable of seed (J. M. Baskin, 2009). Collect a representative sample of 10-20 seeds, cut open with a sharp blade or crush, and examine the inside with a 10x or 20x hand lens to determine proportion of hollow, damaged, or infested seeds. These seeds are small and winged, so it is recommended to place seeds on a piece of tape when cutting open for ease of handling. If possible, increase harvest to accommodate for proportion of hollow seeds. Ensure your harvest plans will not remove more than 20% of the available seeds (Way & Gold, 2014).

Above left: *B. neoalaskana* male catkin. Alfred Cook, some rights reserved, CC BY, cropped from original, http://www.alaskawildflowers.us/Kingdom/Plantae/Magnoliophyta/Magnoliopsida/Betulaceae/Betula_neoalaskana/Neoalaskana_29.html

Above right: *B. neoalaskana* female catkin. Alfred Cook, some rights reserved, CC BY, cropped from original, http://www.alaskawildflowers.us/Kingdom/Plantae/Magnoliophyta/Magnoliopsida/Betulaceae/Betula_neoalaskana/Neoalaskana_23.html

Below: *B. neoalaskana* seeds. Alfred Cook, some rights reserved, CC BY, cropped from original, http://www.alaskawildflowers.us/Kingdom/Plantae/Magnoliophyta/Magnoliopsida/Betulaceae/Betula_neoalaskana/Neoalaskana_37.html

Seed Collection:

Assess ripeness of catkins before collection. 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. Use ladders to access higher catkins (Banerjee et al., 2001).

Post-Harvest Handling:

Remove large debris from bag. Staple tops of paper bags to prevent seed loss. Ensure seeds do not overheat in direct sunlight or in a parked car. Label all bags inside and out, and inspect collections from different collectors before combining (Way & Gold, 2014). 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 (Banerjee et al., 2001). Seeds should be sealed in containers overnight to prevent reabsorption of moisture (Way & Gold, 2014).

Seed Processing:

Spread catkins out to dry in a well-ventilated area with low relative humidity. Research has shown that *Betula* species will release their seeds between -14°C and 16°C. Dry for several weeks until the catkins begin to fall apart (J. M. Baskin, 2009). 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% RH recommended). *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 (Smreciu et al., 2013). eRH is a measure of the relative humidity of seeds at equilibrium with air in a sealed chamber and can be measured with a hygrometer (Linington & Manger, 2014). Screen seeds with 3.2 mm round hole screen to remove scales and separate from debris (J. M. Baskin, 2009).Seeds should be placed in labelled, air-tight containers for storage.

Seed Storage:

Store seeds in freezer at -18 °C ± 3 °C for long-term conservation (FAO, 2014). (FAO, 2014). Seeds of *betula* species are orthodox, but will quickly lose viability if not dried and stored at low temperatures (C. C. Baskin & Baskin, 2014). For active collections being stored for 10 years or less, seeds can be stored between 0°C and 10°C. (Rao et al., 2006). Seeds from *Betula alleghaniensis Britt.* were stored for 8 years at 3°C with only 2% viability loss (J. M. Baskin, 2009). Longevity of orthodox seeds increases with low moisture content and low temperatures (Rao et al., 2006).

Germination Pre-treatment:

Fresh seeds collected for reclamation in the Athabasca Oil Sands region of Alberta were 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 (Smreciu et al., 2013). Light can assist in breaking dormancy in *Betula* species and has been shown to reduce required cold stratification times (J. M. Baskin, 2009). 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 (Davies, Sacco, & Newton, 2015).

Seed Germination:

For germination testing, label germination containers with collection number, species, germination conditions, start date, and number of seeds. Place germination paper into petri dishes. Wet paper just enough so that paper is moist but there is no standing water. Place a representative sample of seeds into Petri dish and space in an even grid. Multiple dishes may be required depending on sample size. Place lids on Petri dishes and place in germination chamber (or area with stable temperature) at 25°C (C. C. Baskin & Baskin, 2014). Place lids on Petri dishes and place in germination chamber (or area with stable temperature) (Davies et al., 2015). Seeds should not be in direct sunlight but exposed to daylight. Monitor seeds daily and record proportion of seeds having germinated. Moisten filter paper as necessary. 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 (Yelenosky, 1961). Continue test until no more seeds germinate or all seeds have germinated. 42 days is the

recommended time for germination testing unless slow germination is expected (Davies et al., 2015). Seeds that have not been germinated should be assessed. If seeds look healthy inside, it is possible that gemination conditions or length of germination is not suitable for a portion of the seeds. A tetrazolium test can be used to determine viability of remaining seeds to determine if germination is due to inappropriate conditions or seeds that are unviable (Hay & Probert, 2013).

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