INFORMATION BULLETIN

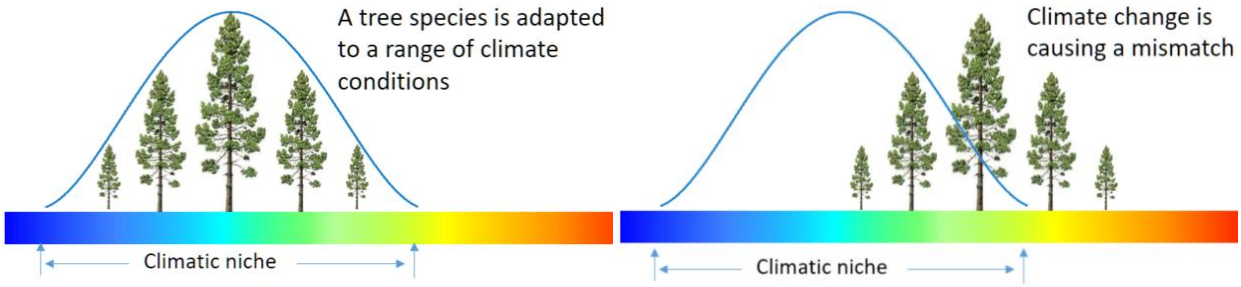
Transitioning British Columbia to Climate-Based Seed Transfer (CBST) – April 2018

This bulletin describes the science, policy, and Seed Planning and Registry (SPAR) system changes implemented to support the option to use Climate Based Seed Transfer to meet silviculture (seed use) obligations in a changing climate. For more information, refer to the Province of British Columbia website for Climate Based Seed Transfer: https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/tree-seed/seed-planning-use/climate-based-seed-transfer

Climate Based Seed Transfer

In British Columbia, science-based seed transfer, enabled through forest genetic science and seed use policies and practices, is the foundation of the effective reforestation and genetic adaption of stock planted as part of BC's sustainable forest management system. Climate Based Seed Transfer (CBST) promotes healthy, resilient and productive forests and ecosystems through the matching of seed sources (seedlots) to climatically suitable planting sites (Figure 1). CBST is one of the ministry's first climate change adaptation policies intended to increase the ability of BC's forests and ecosystems to adapt, and respond to the impacts of climate change.

Figure 1 Illustration of climate change impact on forest tree adaptation. Source: Dr. Tongli Wang, UBC



Science Foundation[1]

The Province's current seed transfer system uses a geographically-based methodology that limits seed transfers on the basis of longitude, latitude, elevation, and Biogeoclimatic (BGC) zone. The new climate based seed transfer system, with the aid of assisted migration, matches the climate[2] and latitude of a seed source, as

[1] CBST scientific methodology and approach was developed by the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNROD) with assistance from Dr. Tongli Wang at the University of British Columbia (UBC).

[2] Climate variables matched are: mean annual temperature, mean cold month temperature, summer–winter temperature differential, mean annual precipitation, mean summer precipitation, degree days above 5° C, extreme maximum temperature, and precipitation as snow.

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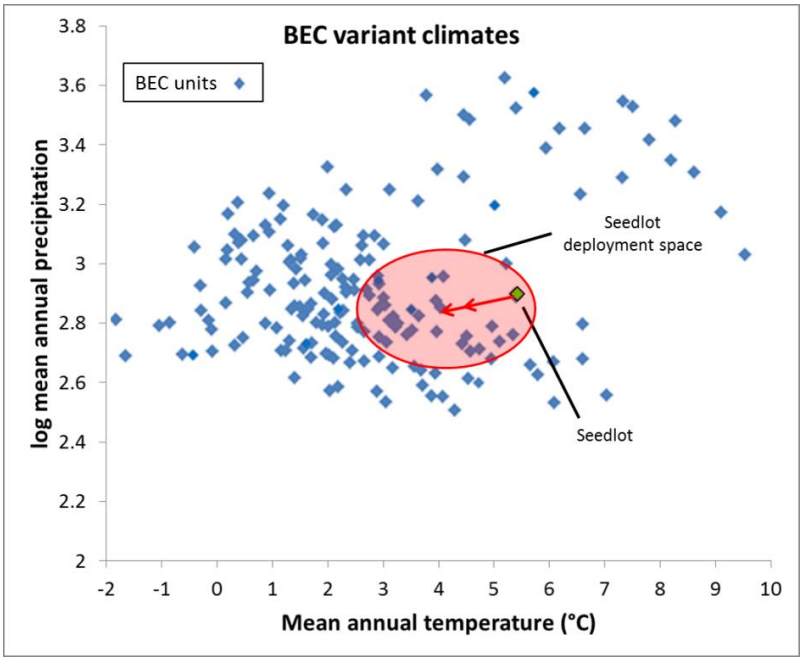
represented by a Biogeoclimatic Ecosystem Classification (BEC) subzone/variant, with the current and near-future climate of a planting site (Figure 2)[3].

Figure 2 Migration of a two variate climate space (represented by BEC variants). Source: Dr Greg O'Neill, FLNRORD



CBST is primarily designed to catch up with past climate change (1940s – 2016) or "adaptation lag" future climate change projected forward only 15 years on the coast and 20 years in the interior (a representative quarter harvest age rotation). This conservative approach is aimed at balancing the need for adaptation (in a changing climate) without compromising plantation establishment. Updates to CBST pertaining to foundational and baseline data sets (transfer functions, BEC, Climate BC) will be planned and scheduled appropriately as new information becomes available.

Amendments to the Standards

The *Chief Forester's Standards for Seed Use* (Standards) have been amended to enable the option to use Climate Based Seed Transfer (CBST) when planning for, selecting and using seed for Crown land reforestation. The amended Standards come into effect after the four month notice period, on August 6, 2018. Forest licence and silviculture agreement holders may waive the notice period and begin using the amended Standards from this point forward.

A consolidated version of the *Chief Foresters Standards for Seed Use*, updated to April 6, 2018, is available at: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/tree-seed/legislation-standards/chief_forester_standards.pdf

[3] See, O'Neill G, Wang, T, Ukrainetz N, et al. Technical Report 099 - *A proposed Climate-based Seed Transfer System for British Columbia*

Policy Implementation - A Phased Approach

Initially, seed users will have two options to choose from, including the existing (geographically based) transfer standards or the new CBST standards. . Both options will be available during a "transition period" which will end with the removal of the option to use the geographically based transfer standards. A two year transition period is currently planned.

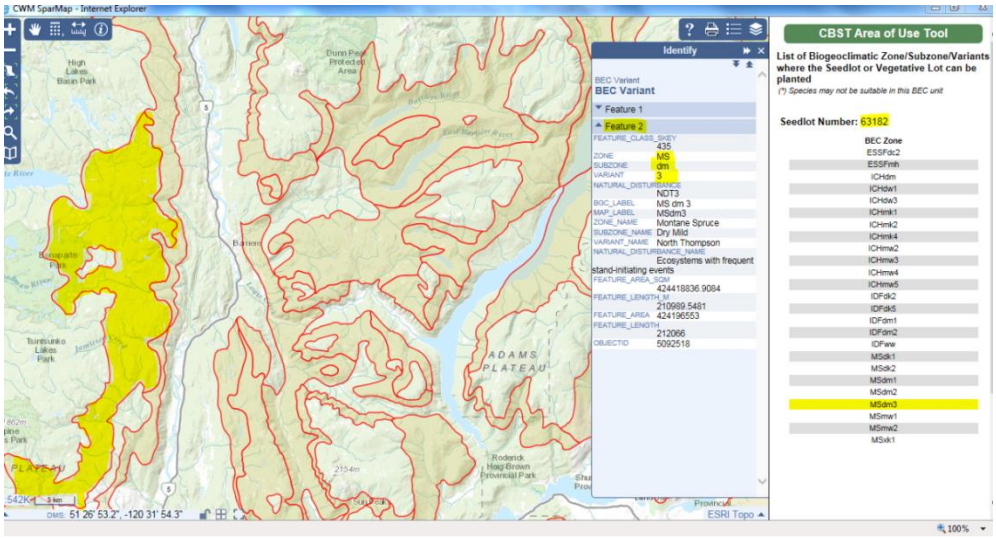
Tree species and seed selection:

Under Forest and Range Practices Act (FRPA), species selection is supported by the Reference Guide for Forest Development Stocking Standards[4], as determined and approved in a Forest Stewardship Plan (FSP). Given this approach, unless it is decided that species should be migrated out of their current range, assisted migration under CBST will continue to limit seed transfer to those areas considered suitable (for the near future climate) within a species' range and distribution.

Seed Planning and Registry system:

The Seed Planning and Registry (SPAR) system has been enhanced to incorporate CBST amendments to the Standards. These changes enable seed users to search for, view, and select, climatically suitable seed sources (seedlots) to meet silviculture obligations and reforestation needs in a changing climate. Seed users may view CBST Areas of Use as either a list of suitable BEC variants (derived from the Seed BEC unit) or as a map (Figure 3).

Figure 3 Example of a map using the CBST Area of Use Tool. (Source: Seed Planning and Registry System)



Extension and Training

To learn more about CBST, information sessions (online and in person) will be provided by the Forest Improvement and Research Management Branch (FIRMB). These information sessions will cover recent amendments to the Standards including the option to use CBST for seed transfer, new cone collection

[4] https://www.for.gov.bc.ca/hfp/silviculture/stocking_stds.htm

standards; and, related changes to the Seed Planning and Registry (SPAR) system. Cone collection workshops (sponsored by FIRMB), including information on CBST seed planning and collection, are also planned over the coming months (summer 2018). For more information and session dates see: www.gov.bc.ca/climatebasedseedtransfer.

Next Steps

CBST policy development and stakeholder engagement is ongoing and additional changes are expected to be implemented in stages. Currently, a GIS-based CBST impact assessment and gap analysis is underway to help identify potential seed shortages and gaps in addition to new opportunities (e.g. new seed sources moving into areas where not previously deployable). Future changes currently planned will address:

- Removal of the option to use the "Geographically based transfer standards." This is targeted to be in two years (2020); however, timing will be subject to the results of CBST impact and gap analyses (currently underway); orchard/breeding program realignment, and, additional consultation with stakeholders;
- Replacement of current seed planning zones / breeding zones with new CBST seed planning /breeding zones. This is expected in 2 to 5 years' time; and,
- Implementation, administration and streamlining of the Standards (including SPAR and RESULTS enhancements).

Please note that the full extent of climate change adaptation through CBST will be realized at a later date when the climate change informed species selection (CCISS) project advances to implementation.[5] Collaboration efforts between the CBST and CCISS projects will continue to ensure integration and consistency between decision tools and policy realms.

For More Information

Questions regarding this bulletin can be directed to the Forest Improvement and Research Management Branch, Ministry of Forests, Lands, Natural Resource Operations and Rural Development:

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Climate Based Seed Transfer: www.gov.bc.ca/climatebasedseedtransfer

Chief Forester's Standards for Seed Use: https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/tree-seed/legislation-standards/chief-forester-s-standards-for-seed-use

[5] Until the climate informed tree species selection project advances, the current Reference Guide for FDP Stocking Standards (including the 2014 Update: Climate-change Related Stocking Standards) applies to integrated silviculture strategies and forest stewardship planning (https://www.for.gov.bc.ca/hfp/silviculture/stocking_stds.htm).