MINUTES

Genetic Conservation Technical Advisory Committee

Meeting Nov 28, 2016, Meeting held at UBC and online from 10 am – 3:30 pm.

Attending:
GCTAC members: Pia Smets (Chair), ***Tongli Wang, Charlie Cartwright, Dave Kolotelo, Sally Aitken, Alvin Yanchuk****; online:* ***Michael Murray, Alan Vyse***
Others attending: Jack Woods, Brian Barber, Shane Ford, ***Don Pigott, Ian MacLachlan, Christine Chourmouzis***
Regrets: ***Tory Stevens, Andreas Hamann***

Motion: Accept minutes from last meeting – Moved Sally, Second Dave
Passed.

Pia-Strategic plan update
Review of timing. Review of changes.
Major changes in the Strategic plan 2015-2020 are:

3.1 Clear definitions for "genetic conservation", "representative populations", and "adequately conserve" – with existing guidelines for the three methods.
6.3 Current efforts for Ex Situ Conservation: updated numbers; added explanations.
7.1 Needed work: Catalog: commitment to incorporate VRI data (this comes on top of version updates for each of the three layers, which are not explicitly mentioned here).
7.5 Needed work: Research: change of priorities, with impacts from climate change on conservation needs now listed first
7.5 and 7.7: explicit mention of the work on Whitebark Pine we are currently supporting and reference to the WBP Genetic Conservation Strategy (CGTAC 2009) document.
8. Program delivery: the activity "Catalog updates" has been moved from the Ministry to the Centre. Explicit mention of: setting planting diversity standards (TIB); maintenance of online resources including BigTree registry (CFCG); and collaboration with other agencies.
10.1 Human Resources: recognition that ½ salary for CFCG Associate Director now comes from a different source.
10.2 Funding: updated budget recognizing: the cost of seed bank management; and existing WBP projects (M.Murray); increased total budget of 250,000.
Appendix 1: updated table of species considered in-scope (now 42); footnotes explain changes.
Appendix 2 (new) "A": Status Update on In Situ Conservation) in table format; "B": Ex-situ collections overlaid on the same table to show gaps.
Appendix 3 (new): the performance indicator reflects our best knowledge of the conservation status, but as the baseline varies with developing methods, it should not be used to evaluate the work carried out by GCTAC.
Appendix 4 (new): priority listing of minor species from 2002, repeated here with progress to date and as a point of reference.

Important point: Method is changing and stabilizing over time. Need to present changes over time carefully. Propose leaving the 2016 numbers out of table of overall performance indicator.

Motion: Approve strategic plan with proposed changes. Pia- moved. Dave – second. Approved by all voting members present.
Action: Present strategic plan to FGC at Dec. meeting (Pia).

Dave- Seed Bank update

1. Status update: our conservation collections now cover 35 species. Some species have specific barriers to collection: seeds do not keep well; expense for remote collections; species identification for hybrids.
2. Perhaps seed collection for PINUBAN-BWBS should be of low priority, given its high collection cost (remoteness) and protection in other parts of its range.
3. Several older seed collections do not have 20 parents.
4. New Seed Moisture Content testing devices will help with drying conservation collections and reducing backlog.
5. 15 Whitebark pine (WBP) seedlots are now officially registered.
6. A commercial WBP stratification regime is being developed by testing 6 treatments (results in July 2017). The results will provide useful information for operational seedling production. To avoid losing seeds, especially for small seedlots, x-rays may continue to be used for predicting seed viability.

Don Pigott – Ex situ conservation collections

1. Black cottonwood: harvested seed at five sites. Controlled drying of the catkins and seed results in good maintenance of seed viability.
2. Vine and Douglas maple: 2 collections each; Water birch: 2 collections; Whitebark pine: 2 collections. Slides illustrate the difficulty of accessing certain (esp. WBP) sites, explaining the collection cost. In the meantime, D. scouted for Juniper trees for future collections.
3. This year, the "monumenting" of WBP parent trees was finally funded and carried out: trees were marked and re-tagged with metal tags for long-term identification. Worthwhile, given the effort we spend on testing offspring from those trees.
4. D. suggests adding thinleaf alder back to our list of species in-scope, due to the tree sizes he found.
5. For WBP seed collections, caging of the maturing cones on the trees is needed to safeguard them from animals. Transporting the necessary heavy equipment to remote locations, which need to be visited a second time for the actual harvest (sometimes in inclement weather), increases the cost for this species. Collaborations with local nature enthusiasts and climbers help to ensure success of this endeavour.

Michael Murray – Blister rust screening for Whitebark pine

1. WBP was recognized as an endangered species at the federal level in 2012. Resistance to white pine blister rust is the foundation of whitebark pine recovery.
2. Rust resistance screening is a lengthy process: two-year old seedlings of WBP are inoculated in a controlled chamber. The seedlings are outplanted in raised beds and evaluated for an additional three years. GCTAC funds this work (approx. 20K this year) from seed extraction to seedling assessment. Also funded is an annual application of Verbenone to Parent trees in the

field to protect them from Mountain pine beetle. This is worthwhile especially because it takes >50 years for WBP to become cone-bearing: we do not want to lose these valuable seed trees.

3. To date, several families have been found with good resistance. This is thanks to selecting healthy parent trees from stands with high infection rates, letting nature do some of the selection.
4. The seed collections are donated by several other agencies. Partners are planting seedlings in the field already.
5. Rust screening funding is needed until 2020, when conclusions / identification regarding families will be finalized.

Charlie Cartwright – WBP field screening

1. Maintenance of clone banks: Garry Oak at Cowichan (CFCG collections); Yew at Cowichan (J. Russell collections); Arbutus 2 test sites in BC, (collaboration with USFS)
2. The Whitebark pine field trial (collaboration with USFS for both sources and sites) is in Year 4 of 9. Survivals on the field trials have been in the range of 86% to 97%. Fill planting was undertaken at the 2 sites with the worst survivals (Whitetail Lake and Perkins Peak) to take them over 90% of trees alive. It appears lower survival at Whitetail was due to the droughty summer in 2015 and at Perkins Peak it was a result of rodent damage and cold climate (based on lower survival of the most southerly seed sources there relative to on warmer sites). Stock for next year's planting is looking good at Skimikin Nursery at this point.
3. More labour intensive seed stratification process includes nicking, which allows removal of empty seeds, yielding more filled cavities. Excess seedlings are repurposed or sold for other plantings. They could also be used as root stock for a clone bank of grafted parent trees.
4. Waiting for the federal WBP plan. We are ready to respond (collaboration with / led by Whitebark Pine Ecosystem Foundation) at the provincial level. The Federal policy remains based on the critical habitat principle, while the province –correctly- attributes the real threats to diseases.

Suggestion not to stretch GCTAC mandate too far re. WBP.

Ian MacLachlan – effects of selective breeding on adaptation and diversity

1. The AdapTree project had >250 seedlots for pine and spruce: comparison of natural and selected materials. The Totem field experiment (2800 plants x 2 spp x 3 years) is also suitable to investigate potential trade-offs between growth and cold tolerance.
2. Growth traits have strong climatic associations. Delayed bud set and increased growth rate drive height gains in breeding programs.
3. We observed no effect of breeding on phenotypic adaptation overall. In the few breeding zones where there was a small effect, no negative consequences were found. The process of testing progeny in several field test sites, and using that information to choose orchard parents, is effective at removing any negative correlations.
4. Genomic data reveal that there is a small number of Sitka genes in the interior spruce complex, most notably in the Bulkley Valley. In most breeding zones, breeding does not affect the hybrid index. Breeding results in a push toward more Engelmann spruce genes in TO low. Breeding results in a push toward more white spruce genes in NE low. This may result in a pre-adaptation of selected seedlots to future climates.

Request to compare seed orchard lots from different years.
Interest in pleiotropy in GWAS.

Sally Aitken – update on CFCG work

1. No new minor species projects due to reduced budget; UBC overhead charge on existing budget; and return go the catalogue update work to CFCG.
2. Relevant CFCG projects by other funders: Garry oak genome re-analysis; somatic mutation rates in conifers; accumulation of genetic diversity during colonization.
3. Lessons from AdapTree project: Comparative genomics approach can sidestep the population structure problem. Planning to use genomic data to assess the scale of local adaptation and the most efficient conservation units: are the BEC zones capturing the important variation?
4. New genome-funded project will address four species and two major diseases.

Tongli Wang – Catalogue Update

5. Botanical plot data: this data source has been much improved (by the ministry). In the previous version, manual cleaning of plots with 'wrong coordinates' resulted in a retention of only 34K out of 46K plots. BEC Plots now match the zone, but further manual cleaning may still be needed.
6. Presently we've combined botanical plot and VRI data (all 6 layers).
7. New BEC version 10 (instead of v.4 used in 2009)
8. New Parks layer from Tory Stevens. Protected areas have increased from 11% (Hamann et al. 2004) to 15% (2016).
9. New Table 1 – many new pink and red cells that result primarily from changes to the estimated species ranges at the fringes. Need to evaluate whether "fringe" should be defined as 1% or at some higher level.
10. Should the VRI data be downplayed/not used for range map?

Alpine and subalpine zones are not likely under-protected and so should be low priority (or ignored)
Question about National/Federal Parks – are they included in new analysis?
CFCG to continue to gradually improve the catalog work: verify data quality and methods; then concentrate efforts on known problem zones; and solicit more feedback from experts.

Meeting closed at 3:30 pm.
Minutes by Pia Smets.