Alberta Forest Genetics Resource Management and Conservation Standard of Alberta Stakeholder Feedback

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Background

This document summarises the stakeholder consultation process and outcomes, and describes how the presentation of the response to stakeholder concerns is organised. Steering and Technical Committees completed the review of Forest Genetics Resource Management and Conservation Standard of Alberta (FGRMS) in May, 2015. The completed draft document was made available to stakeholders October 5, 2015. An invitation to participate in face-to-face meetings and provide written feedback within 60 days was extended to all stakeholders at that time. Two meetings were hosted by the Policy Branch with support from Forest Management Branch in Edmonton and Calgary to provide information on the purpose of the standards and major changes. The meeting in Edmonton had 29 attendees and was focused on the Forestry Industry. The Calgary meeting had 15 attendees and focused on the Reclamation Industry. There were 24 written submissions. The written feedback captured the essence of meeting discussions.

The complete information package is designed to provide a comprehensive response to stakeholder concerns.

There were four main changes welcomed by key stakeholders:

1. Expanded use of Stream 2 material: The current standards allow deployment of Stream 2 material up to 50% of the target strata. The new standards allow deployment to 100% of the target strata that is conditional to implementation of *in situ* gene conservation as per FGRMS to prevent replacement of the entire wild populations with Stream 2 material.
2. Deployment of Stream 2 material outside CPP region: Deployment may occur within 50 km outside a *CPP region* boundary without applying for a variance, provided the transfer of material does not exceed 100 m up in elevation and 50m down in elevation from the *CPP* region elevation limits.
3. The new clonal deployment standards: The new clonal standards allow only Alberta native species existing naturally as clones to be deployed vegetatively on public land at three levels and with genetic diversity at the same minimum level as that for seed deployment.
4. Streamlined standard operating procedures: Changes to Appendix 18 and 33.

Organization of AAF response to stakeholder feedback

The responses affirmed the need to divide stakeholders into two groups: Forestry and Reclamation industry sectors. In keeping with that approach, two appendices were developed to independently address concerns from the two groups (Appendix A and B for Forestry and Reclamation industry sectors respectively). The appendices provide a summary of what we heard and a corresponding response. A single response is provided to groups of identical concerns. All the feedback provided is a valuable contribution to the FGRMS regulatory framework that is designed to be open and adaptable to current and future practices in forest management, reclamation, gene conservation and collection and distribution of genetic materials on public land.

APPENDIX A. FORESTRY FGRMS STAKEHOLDER ENGAGEMENT - FEEDBACK

Forest Genetics Resource Management and Conservation Standard of Alberta

Section	What we heard	AAF Response
17.1.1	Doubling the amount of seed that is withheld in the absence of viability tests data without justification is a concern.	Fifty percent seed viability is assumed for untested seed.
17.1.1 & 17.1.2	There are concerns that the *Ex situ* gene conservation standard was not resolved, particularly as it relates to Stream 2.	Standard 17.1.2 has been repealed.
18.4.3.2	Restrictions on deployment of vegetative material are too conservative. This is a good start but should be reviewed in the future. There should be an emphasis on this being a work in progress.	FGRMS 2009 did not include any clonal deployment standards. In FGRMS 2016 deployment of 5,000 ha to 10,000 and15, 000 ha is enabled in the standards. FGRMS is reviewed every five years. During this review, this, and all other standards, will be assessed.

20.2	1. Consider using an equation to determining conservation areas. 2. Clarify when conservation zones are required. However, there is no evidence that the conservation zones are required. 3. When is implementation of the conservation standard required? 4. The administrative burden is too high for establishing and applying for protective notation. Many companies use natural regeneration for a significant portion of the pine programs. Not linking conservation areas to target strata results in more conservation areas than are actually needed. 5. The process results in too many conservation areas being established resulting in too much work. 6. The method for determining conservation areas does not take regeneration method into consideration or deployment. Gap analysis was supposed to guide implementation of conservation standard. Pine orchards do not have the capacity to meet 100% deployment because deployment levels are tied to Cumulative *Ne*. CPPs and FMPs have no plans for 100% deployment or artificial regeneration. 7. Would like to see further discussion on the conservation standard. 8. Conservation standard as is will not work because it is based on total seedzone rather than target strata. No (zero) target strata would still require creation of conservation areas. 9. Some areas will require too many conservation areas. 10. The conservation standard is not workable. 11.	FGRMS Technical Committee Recommendations to the FGRMS Steering Committee from December 16 & 17, 2014 Meeting: **FGRMS existing gene conservation standards for CPPs be immediately implemented for all existing CPPs** (mindful of the need for time to plan and select appropriate sites) even though the GAP analysis has yet to be completed. Implementing the FGRMS CPP gene conservation standards is needed at this time as the current revision of FGRMS has established new cumulative orchard Ne standards enabling Stream 2 seed deployment to all of the target strata (previously a 50% cap was established pending appropriate resolution of the cumulative Ne issue). Therefore, to conserve forest genetic material and evolutionary processes, the FGRMS conservation standards need to be implemented. This recommendation does <u>not</u> require any additional work by the review committees; rather simply end the current practice of holding the conservation standards in abeyance. FGRMS Technical Committee developed a new version of Standard 20.2 which was recommended to the FGRMS Steering Committee. Further consideration of the new version failed to reach an agreement due to lack of time. The old version was reinstated as a result. Feedback from stakeholders was based on the old version. Since the new version addresses various concerns raised with regards to the old version, the new version is now included in the FGRMS. CPP-based gene conservation standards have been revised to: o Specify that conservation is a collective obligation of all proponents involved in the program; o Link the number of conservation stands to the area of the target stratum; o Reduce the size of the buffer zone around the conservation stand from 500 to 200 metres. 2, 3, 4, 6 and 11: o GAP analysis is no longer a condition for implementing Standard 20.2.

	- Too many conservation areas required - Buffer zone is too large - Does not consider target strata Gap analysis was to be completed before implementation	o A letter with guidelines for implementation and timelines will be mailed out. o The standards are designed to address possible scenarios and not so much ability to meet capacity. o The seed use directive mandates use of improved seed. o Gene conservation areas may be chosen from natural regeneration areas (Standard 20.5).
Appendix 20	*Ne* calculations are complex. Can they be simplified?	Seed buyers and forest practitioners are not asked to do any calculation involving genetic parameters of the seedlots including Ne. This work is done at a seed production stage by geneticists who are technically responsible for the breeding programs and the seed these programs sell to other users.
Appendix 20	*Ne* calculations for the production population and deployed population are the same but these could be different in magnitude. What is needed is that this appendix be clearly applicable to both production and	Title changed to Appendix 20. Calculation of Cumulative Effective Population Size (Ne).

	deployment populations.	
Appendix 40	1. The published Appendix 40 further reduced the lodgepole pine age-age correlations as a result of including additional data from a mal-adapted site. No citations supporting the change were provided. 2. Additional data obtained from test sites containing maladapted seed sources was used to determine age-age correlations. Use of this data reduced gain projection values from those in the approved version. 3. A 40% reduction in age-age correlation values over the approved document could adversely affect investments in tree improvement. 4. Genetic gain determined from age-age correlations is significantly reduced for pine as a result of reworking the correlation values. 5. Age-age correlation values for pine are significantly less than the approved values and this negatively impacts program objectives. 6. The GoA publication does not identify seed sources and sites or comment on adaptation of seed sources to planting sites. Poorly adapted seed sources may have been used. This could affect age-age correlations, especially at young ages and at rotation. Only data from well-adapted seed sources should be used because the data will be applied to well-adapted source/site combinations. Recalculation of correlations is a concern. 7. There are objections to the use of provenance trials. Unlike progeny trials, provenance trials are more likely to include mal-adapted material, which significantly reduces age-age correlation values of some species. This was a change from	The Alberta Forest Genetic Resource Management and Conservation Standards (FGRMS) currently in force mandates the use of the age-age correlation derived from the Lambeth (1980) equation to adjust genetic gain at a measurement age to genetic gain at the rotation age. The Lambeth (1980) equation was developed using correlation coefficients published in journal articles and reports. These correlations came from both progeny and provenance trials. These correlations came from trials of loblolly pine, slash pine ponderosa pine, red pine, white pine, shortleaf pine and Douglas-fir in the USA. The use of such species and the environments in which they were tested (in subtropical environment in USA) were among the reasons for the forest companies objecting the use of age-age correlation in Alberta, which precipitated the review by Jim Flewelling in 2008. The Lambeth (1980) equation has a technical problem that far outweighs the species and location of the test site argument making it inappropriate for practical use. The equation neither serves the industry nor the government in mitigating the risk associated with prediction of genetic gain using young trees. The way the equation was developed using the age-ratio makes it appear as if the correlations that were used to develop the equation were observed over the entire rotation age. Therefore, when we use this equation, we are not predicting correlations for advanced ages as we think. We are just obtaining the correlation from within the age range of the observed correlations, which may be a small fraction of the rotation age. To put it bluntly, the use of Lambeth equation by FGRMS is pretending to mitigating something while we are not. The Lambeth (1980) also was fitted without regard to the age of the trees from which the input correlation came from. Consequently, it penalizes breeding programs with older trials and heavily rewards those with young trials. The new correlations that will appear in FGRMS 2016 have corrected all flaws associated with the Lambeth (1980) equation. Stakeholder feedback on FGRMS review questioned some components of the new age-age correlations, which include the use of a pine test site

	the approved version. 8. Data may have included material mal-adapted to a breeding program. 9. The published version of Appendix 40 will result in decreased genetic gain values.	at the Alberta Tree Improvement and Seed Centre in Smoky Lake and inclusion of provenance trial data in the fitting of the age-age correlation prediction equation. Clarifying these questions would entail a long text explaining the mechanics of the new method, its biological rationale and what we mean when invoke the word adaptation. It is very important to realize that the new method is more realistic than Lambeth (1980) equation and yield better correlations than Lambeth (1980). This has not been communicated to the forest companies who have expressed concerns with the new method.

APPENDIX B. RECLATION FGRMS STAKEHOLDER ENGAGEMENT - FEEDBACK

Forest Genetics Resource Management and Conservation Standard of Alberta

Section	What we heard summary	AAF Response
General	1. Updating FGRMS is good practice. However, there are concerns about the plan to regulate shrub seed collection and deployment using the same seed zones as for trees. This may reduce the amount of revegetation done with shrubs. Some shrub seeds are not readily available. Seed collections can also be cost-prohibitive, especially when reclamation projects cover multiple seed zones. There are a limited number of trained seed collectors. Propagation methods for shrubs are still being developed and are not as well established as those for trees. Use of eco-regions is recommended until justifiable seed zone boundaries are developed. This will encourage development of effective and cost-feasible understory revegetation plans. 2. Barriers to implementing shrub standards exist. These are increased difficulty or cost. These will limit revegetation with shrubs. Consider using subregions or Green Area to limit shrub seed transfer. Defaulting to planting trees instead of shrubs for revegetation will lead to loss of a functioning under-story. Reclaimed areas are different from forestry cutblocks and approaches to preserving genetic diversity should be different. 3. FGRMS have guided the management of shrub seed and propagules	**Regulating shrub transfer through Alberta seed zones** The revised Alberta Forest Genetic Resource Management and Conservation Standards (FGRMS) require users of shrub seed and vegetative materials to follow Alberta seed zones. When local seed is not available, variance application for use of alternative materials can be submitted to Alberta for review and approval. These standards are intended to ensure that shrubs are collected and planted in places where they are genetically well-adapted and will be able to sustain themselves over many generations of continued evolution in response to an ever-changing environment. This practice has successfully guided forestry and agriculture for hundreds of years. It is being extended to shrubs used in reclamation as part of the best practices specifically to manage genetic resources in that sector. The decision to regulate shrub seed and vegetative materials through the existing seed zones is supported by our knowledge of landscape genetic variation in plants that has accumulated for about 250 years. It shows that genetic variation among

	(authorization, collection, processing, transportation and planting). *In situ* deployment of shrubs is small compared to trees and is usually in areas surrounded by intact boreal forest. The concern is that scientific evidence may support the development of species specific seed zones that are smaller than the current seed zones. This would make use of shrubs and plants for reclamation economically and logistically impossible and would result in over simplified reclamation vegetation prescriptions. 4. Applying tree seed/propagule collection and propagation to shrubs is a barrier to reclamation innovation. Use of subregions for moving materials is recommended. 5. Point collections are preferred over seed zone collections, especially when seed zones cross over large reclamation projects. This is because point collections optimize resources (seed and manpower). Species distribution can be sparse (e.g. Fern or bog). Access is usually the biggest challenge because of difficult terrain, wetlands, remoteness and increasing number of dispositions that are fragmenting and limiting available areas. Subregions are split into few seed zones using political/artificial boundaries not representative of natural variation. Use of political instead of natural limits present additional challenges. Oil sands operators usually have leases in 2 different seed zones in the same natural subregion. Use of subregions and increased flexibility in elevation range for shrubs is recommended. Global warming asserts that species can be deployed up to 200 km North and 50km South with a set elevation range. This approach ignores seed zones but would still be highly adapted to specific range of adaptability of specific species or plant groups. 6. There are no citations. FGRMS were originally developed for upland commercial forest management under a sustained yield timber	populations for traits responding to natural selection is strongly related to variation in the physical environment, especially climate and day length. Life history characteristics of plants are also good indicators of potential landscape genetic variation in the species. Life history characteristics of the main shrubs used for reclamation in Alberta were reviewed by Chai et al. (2013). When we know the reproductive biological characteristics of the species and the climatic variability of the species' natural range, we can anticipate the pattern of landscape genetic variation in the species. At a practical operational level, this is what we need to establish seed transfer guidelines until species-specific and/or regional-specific research suggest otherwise. Seed zones that control use of forest tree seed in provinces, states and countries were originally established this way and continued to evolve with new knowledge. Shrub standards will evolve in the same way. Standards governing seed transfer work only when we are able to track seed identity from collection, storage, seedling production and finally to planting in the field. Therefore, the FGRMS requirements to follow a formal seed collection, registration, storage and withdrawal process and the paperwork involved is an inevitable consequence of controlling seed origin and deployment.

	management paradigm. This context is not directly applicable to shrubs. Legislation appears to be superseding science. 7. The need for proponents to provide information upon request when the regulator does not understand process tools is unreasonable. Increased effort to engage a wider audience in bridging science and legislation is required. Professionals are ill equipped to defend the process and rationale to the public. 8. - Required processes are preventing innovation. - Industry is expected to fund research. - Variance application should not be a standard operating tool used to bridge science and legislation as this increases operating costs. - The added cost is not justifiable**.**	
General	- There are concerns about the approach under consideration for provenance trials - This approach takes several years, is inefficient and not very informative. - Genomic studies reduce time and inefficiencies, provide more information and once developed can be used forever for many applications and research questions. - The technology can be used to find out if there are any significant differences in individual shrub species growing in different seed zones. - There is interest in the reclamation community to explore this possibility. - The high cost of alternative technologies is acknowledged, but benefits outweigh the expense.	This is a good suggestion but the proposed approach is not currently feasible. It would cost millions of dollars and field testing would still be needed. Genome Canada has spent well over $120 M to develop genomic selection for a few traits in a few commercial tree species and still the technology hasn't yet moved past the proof of concept stage. The main reason are costs and the fact that the association between markers and genes of interest are typically population-specific (i.e. a gene may have a similar function across populations or even across species but the genetic markers that allow identification of that gene generally change from population to population). In addition, we don't know

	- A focus on physiological adaptations and quantitative measures (biomass, etc) does not provide complete information on how the plant is responding. - Understanding gene orthologs (by relating data to model plant systems, for example) is the only way to understand the species response to different seed zones. - The best approach is to use both a genetics approach and a physiological one. - This is the general standard for acceptance of scientific publications.	which genes are critical for adaptation even in commercial tree species as identifying them out of some 20K potential genes is a pretty daunting task. Field testing is a necessary part of developing the genome-based selection. It is needed to find associations between phenotypic expression (e.g. frost hardiness or drought tolerance) and genetic sequences. Setting up these field experiments now may in fact speed up the development of the genomic approach in the future.
General	- There is lack of momentum and direction for research on genetically modified organisms (GMOs). - The draft version mirrors same approach to the last version in that GMOs are not allowed on public land because there is not enough research on impacts to local ecosystems. - This is understandable; however, there is no initiative or guidance as to how to move this issue forward to overcome the information gaps. - Negative public perceptions of GMOs and lack of education on GMOs are acknowledged. - GMOs present an opportunity to enhance reclamation in order to make it faster and more efficient, particularly in overcoming challenges that are not present in traditional reclamation or reforestation. - There are unique challenges in reclamation for both in situ and oil sands mining and for this reason traditional reforestation approach may not be sufficient. - Reclamation deals with unprecedented substrates and there is no guarantee on the performance of revegetated areas, to say nothing of climate change, drought tolerance or heavy metal accumulation (in the case of tailings reclamation). - Challenges include very high soil salinity, exposure to lean oil sands (hydrocarbon light ends), inconsistent soil moisture profiles, poor microbial diversity and inadequate fungal diversity in soils (affecting nutrient uptake and stress	Testing and use of GMOs in Canada is a federal mandate. Refer to the Canadian Food Inspection Agency website for more information on plants with novel traits (PNTs).The legal authority is under the *Plant Protection Act*, Plant Protection Regulations, the *Seeds Act* and *Seed Regulations*. GMOs must be federally approved prior to any provincial consideration. It is not the role of the provincial government to lead research on GMO's for the reclamation industry. However, the provincial government does not specifically prevent such research that can be conducted by universities or by industry R&D departments. As explained above, any testing of GMO's must have first federal approval. FGRMS outline testing, analysis and documentation protocols.

	adaptation). - GoA position on GMOs creates a precedent. - A requirement to appeal to the federal government for permission to perform GMO research is setting the industry up for failure. - There is no support provided by GoA to help make a federal appeal successful. - Steps to move this forward are needed. - Lack of guidance or direction will stifle innovation and lead to undesirable reclamation performance - There need to be dialogue on this issue and how we can move it forward. - A small pilot study is the expectation. - We need to build a body of knowledge.	
General	o Qualifications of people who have developed and reviewed these standards should be published in the FGRMS manual. o The government has always been concerned with timber and there is no timber in shrubs; why getting involved in shrubs o Not all stakeholders with interest and expertise in reclamation and shrubs were consulted in the development of shrub standards o No knowledge on shrubs	o Publishing academic credentials and work experience of people who have worked in the development and revision of the standards in the FGRMS manual is not a necessary measure to prove the validity of the standards. GoA ensures that the Technical and Steering Committees that develop and review these standards are assembled from government, academic, researchers and industry personnel with relevant training in genetics, ecology, other areas of plant biology and work experience in the industry. In addition to theory, we institute standards only if they are practically implementable. o The FGRMS is meant to manage plant genetic resources on forested crown land in the green zone. While management of genetic resources in timber management system is a major FGRMS business, the standards designed to continually evolve as the needs arise.

		Management of genetic resources in reclamation shrubs is a new addition to the scope of the standards. o GOA worked to reach out to all stakeholders in Alberta. Those who may have been missed and those who will come into business after publishing the 2016 standards will be engaged when FGRMS come up for review in the next five years. o See technical notes in trees and shrubs
General	- Do the standards apply to the Cold Lake Air Weapons Range? - Is this deemed to be federal lands?	Yes, the standards apply to the Cold Lake Air Weapons Range. The Alberta part of the Cold Lake Air Weapons Range is included in the Green Area. **Authorizations/approvals for access under the Public Lands Act must also be coordinated with the Department of National Defense (**http://www.rangesafety.ca/clawr.html**).**

Appendix 4	Applicability of FGRMS to shrubs limits the ability to collect plants that are rare, sparse and growing in localized communities. This could inadvertently encourage use of plants that are more abundant and collected in compliance with FGRMS. This could negatively impact biodiversity and deliverables. Additional research is required to set more practical guidelines for reclamation. Reclamation is progressively done in small blocks annually to various ecosites, close to the natural setting with natural ingress and seed are collected on a continuous basis. This leads to high genetic variability on reclaimed landscapes. This complicates supply management of small seedlots for small scope operations over time. Research on natural distribution patterns of non-commercial species is required. It is recommended that applicability of FGRMS to shrubs be delayed, allow regulated professionals to be more accountable or increase flexibility for sparse and rare plants to support localized initiatives.	As per FGRMS Appendix 4, seed collected from a smaller range of trees and shrubs is allowed and managed through restricted registration. Seed collected from trees fewer than identified in Appendix 4 for restricted registration may be stored as "pending registration" for combination with other existing and/or subsequent collections.
Appendix 7	Can Table A7.1 be sorted in alphabetic and numeric order by seed zone label and not seed zone name?	Table A7.1 will be sorted in alphabetic/numerical order by seed zone label. The Excel spreadsheet will be made available on the FGRMS website for proponents to sort according to preference.
10 **Appendix 2** **Appendix 4**	Cooperatives have registered shrub seedlots since 2009 and individual companies have had plans to register seedlots since 2011. Availability of non-destructive testing methods has alleviated concerns about depletion of small seedlots. This concern resulted in a large inventory of valuable unregistered seedlots. Companies would like to continue using this seed and recommend a transition period. Companies track and report deployment of both registered and unregistered seedlots through AER.	Seedlots of shrub species collected prior to the inclusion of shrub species into FGRMS will be accepted by Alberta for registration and storage for up to one year starting from date of implementation of the revised 2016 FGRMS. All seedlots submitted to the Provincial Seed Officer for registration and storage must be accompanied by a Registration Request Form (FGRMS App 2). Seedlots will be assessed by collection requirements and registered accordingly as determined by FGRMS Appendix 4. The minimum collection information required for registration of these seedlots only are seed zone and species. In order to be stored with GoA at ATISC, seedlots must be tested by an Alberta approved seed testing facility for

		moisture determination and results must be documented and be within the allowable moisture content (MC) or equilibrium relative humidity (eRH) ranges of 4-8% MC or 15-40% eRH at 20-30˚C.
11 **Appendix 10A**	1. Seed availability, predation and diseases present challenges in timing of seed collection. The process for requesting authorization presents additional challenges when collecting 25 species in various seed zones at various timing. Timing is key to avoiding loss of opportunities to collect material. Collected material is provided upon registration as well as prior to collection. Non-destructive seed collection could be included in the Mine Reclamation Plan. 2. The needs for shrub species are diverse for Cooperative Groups. Contract service providers get a list with target species and quantities. Direction is given to collect more than the specified quantities if it is a good crop year for a given species. Collections are from a variety of seed zones and exact locations cannot be provided at the time of requesting authorization. An annual authorization procedure is recommended in areas where a surface disposition has not been granted. Locations could be identified at the township level. Direction has been that no Letter of Authorization is required for disposition holders and that the Letter of Authorization is required only when collections are off company dispositions. This exception is not captured in Section 11. 3. The new requirement for non-forest tenure holders to obtain a Letter of Authorization from an Alberta Regional Office to collect tree or plant material is a concern. The understanding is that tree seed that is collected using destructive methods is exempt from this requirement through the Temporary Field Authorization (TFA) process. The requirement to submit the form in Appendix 10A duplicates the authorization process. Submission of an email notification using a form similar to Appendix 10A was acceptable practice. This should be sufficient considering that non-destructive methods are used to collect shrub seed. Requirements for a Letter of Authorization further delays seed collection programs and has a direct impact on ability to meet reclamation targets in the Mine Financial Security Program which triggers submission of financial security under the Outstanding Reclamation Deposit	All collections of plant material from public land require authorization from Alberta except for collections outside Alberta's jurisdiction. See 11.1.1 and 11.1.5. Appendix 10A has been developed to expedite the approval process and AAF endeavors to provide timely responses. When dealing with more than one species submit the target species, material type and amounts, and harvest methods on a separate attachment to App 10A. As a best practice seek authorization several weeks prior to collection start dates.

	(a financial commitment made to the Alberta Energy Regulator). Three year Revegetation Plans outline species to be planted. These plans are part of the Mine Reclamation Plan for Base Mine (required by operating approval 94-02-00 section 6.1.44) and Fort Hills (required by operating approval 151469-00-00 section 5.2.16). Annual reclamation plans are also a requirement by AER in the form of Soil Salvage and Placement Plans or Soil Salvage, Placement and Revegetation Plans. This process is similar to the Reforestation Program Plan submitted by forest tenure holders (referenced in MCHRS 11.1.2). Given that approval to collect tree seed is obtained through TFAs, that notification to conduct non-destructive collections is already provided, and that intent to collect seed is outlined in required reclamation plans, a respectfully request to reconsider the requirement for a Letter of Authorization is being submitted. Development of a process for communicating revegetation plans to Alberta Agriculture & Forestry is recommended.	
13	At times seed is collected and hand seeded directly on site, e.g. burning trials to release jack pine from cones. GoA requires seed processing to be done at a seed processing facility and delivered for storage to ATISC. Some requirements of Sections 13 and 19 are conflicting. Exemptions statements would address the conflict.	For seed in which cones are not removed from site of origin for processing there is no conflict between standards 13.1 and 13.3 and section 19.0. Section 19.0, deployment of unregistered material, applies to the example.
14	Seed testing requirements for small seedlots of rare, sparse or poor yielding non-commercial species would deplete seedlots by as much as 50%. Some flexibility is needed for small seedlots.	Other than a moisture measurement, no seed testing is required for Stream 1 seed registration as per Standard 10.7.1. FGRMS accepts water activity (eRH) measurements which is a non-destructive moisture determination method (15.7).
15	Can firms store all propagules? GoA could develop standard operating procedure for an effective storage system. This would encourage invention of more efficient storage systems.	In accordance with std. 15.2 materials that need to be maintained in growing conditions for propagule production must be stored at an approved facility. Proponents wishing to have approved storage facilities can contact Alberta for the approval process.
18.2.4 **Appendix 8**	Elevation of manmade structures can be over 60 m above the original elevation which is relatively flat in most seed zones in the North East. This limits deployment ability. A 150 m elevation limit would increase flexibility.	Standard 18.2.4 allows for seed movement across seed zones without applying for variance if the movement is within 1 km of the seed zone boundary and the difference in

		elevation does not exceed 100 m. Any movement exceeding the set limits is dealt with through variance request (Appendix 8). On the form explain in the "Reasons for request" box that the elevational limit is exceeded because of a man-made structure.
19	What records need to be maintained? Where does Section 19 fit into Fig. 5?	Standard19.1 and 2 refers to records of deployed material (Fig.5 deployment in seed zone).
19	Do FGRMS apply to direct placement of soil when seeds and propagules are part of the soil matrix?	Section 19 in FGRMS does not apply to the direct placement of soil. It is recommended that FGRMS be considered in moving soil to avoid maladaptation with respect to progagules in the soil. FGRMS does not apply to soil.
21	It is unclear why oil sands surface mineable areas are relevant to deployment planning and reporting.	Standard 21.2.2.2 lists types of deployment areas to provide clarity on the exact location.