DRAFT Minutes
Region II-III Reforestation Science & Technical Committee (S&TC)
Meeting #7 – May 6, 2015

DNR Large Conference Room - Fairbanks

S&TC Attendance

Roger Burnside,	Teresa Hollingsworth	Will Putman
Jim Durst, co-chair	Glenn Juday	John Winters
Marty Freeman, co-chair	Nick Lisuzzo	Trish Wurtz
Nancy Fresco	Mitch Michaud	John Yarie
Doug Hanson	Tom Paragi	

Unable to attend: Amanda Robertson, Brian Young

Note: Handouts referenced in the minutes are available from either co-chair.
To-Do Items: Marked with ▶ at the end of the minutes.

Agenda and minutes. The Committee approved the agenda and the minutes from the April 20, 2015 meeting.

Applicability. Freeman reviewed the applicability rules for the Forest Resources and Practices Act (FRPA) in Regions II and III (See Figure 1 attached).

Stocking data review. Freeman reviewed summaries of inventory data from State and Native lands in Regions II and III provided by Hanson and Putman (see PowerPoint on DOF website at: http://forestry.alaska.gov/forestpractices.htm#reforestation). The inventory data shows that the average stocking in nearly all existing stands across stand types and areas exceed the post-harvest residual stocking standard in 11 AAC.375(b)(4). The one exception was for hardwood sawtimber stands on Native land, which averaged 97% of the residual stocking standard. Based on these summaries, the FRPA reforestation standard cannot generally be met solely with residuals after harvest of pole and saw logs. In some instances, the residual saplings may meet the reforestation standard depending on their distribution and level of damage.

Putman noted that the data from the Tanana Chiefs Conference (TCC) inventories on Native lands included some saplings <1" dbh. TCC plots were allocated by stand type and size classes based on photo interpretation. Dwarf black spruce types were not included. The TCC data in Region III are largely outside the Tanana Valley, and some are from fringe forest areas such as the Kobuk and Noatak areas. Hanson said that State inventory plots were randomly selected based on timber types. They were not limited to commercial forest land but were all on land where forestry is a designated use in the Tanana Valley and Kantishna areas in Region III, and the Copper River, Kenai, and Mat-Su areas in Region II. Stands are typically of fire origin, but samples did not include recent burns. DOF is working on an inventory for Galena and has found volumes/acre higher than those in the Copper River valley. The Copper River and Kenai data

include post-spruce bark beetle stands. Putman: Galena also had spruce beetle infestation in 1989-90. Burnside: Agreed; at Galena, flooding led to an *Ips* beetle outbreak followed by spruce bark beetles.

Michaud commented that the number of sawlog-size trees (trees ≥9" dbh) in sawtimber stand types averages about 80 trees/acre, indicating that this approximates full stocking in existing stands.

Michaud, Hanson, and Putman said that stocking goals depend on the desired product or landowner's management goal. Putman noted that timber harvests currently emphasize cutting in the better end of the stocking range, where there are 100-120 sawlog size trees/acre.

Juday said that he had measured 12 stands across Region III and found generally good agreement with the State and TCC date. His surveys used a lower size limit of 2 cm at dbh. He found 700-1000 total stems/ha (approx. 280-400 trees/acre), of which 150-300 trees/ha (60-120 trees/ac) were large trees >30 cm at dbh. He noted that it is important to be clear on the minimum diameter and methodology used for measurements when comparing data.

Putman: A given site will change stand type over time through succession, but the mix of types has remained similar over time. Juday: If the amount of fire increases, it will lower the average stand age, and decrease the acreage of white spruce stands, but it wouldn't change the average stocking within stands of a given age and type.

Yarie commented that there are no data on what a fully-stocked stand would be. Site quality affects tree growth more than the number of trees/acre, which is more random. In silviculture, the term "normal forest" means a managed, fully-stocked stand, not a typical stand that includes a lot of randomness.

Wurtz: Remember that FRPA's goal is to prevent long term degradation since the state cannot tell landowners what their goals are [e.g., moose vs. fiber]. The assumption is that acreages in each timber type will shift over time; types don't change over time, acreages do (even with climate changes).

Stocking standards discussion, continued from April 20 meeting – Artificial and natural regeneration

Yarie: (Regarding time frames for natural regeneration) Regeneration problems could develop in as little as 5 years after harvest. If wait 5 years to evaluate regeneration success and have crossed a climate change threshold in the meantime, do we have the tools to get a forest back on the site? The S&TC may need to provide more information about what to plant to overcome reforestation failures.

Juday: Research has shown that the old cut and instantly regenerate model was inaccurate. However, one can't just procrastinate on regeneration and walk away. Allaby's study showed that planted areas are doing well. Need to add a finding on Allaby's research.

Paragi: If you have conditions favorable for white spruce, you will still get moose browse back after harvest even with planting.

Hanson showed slides of a 5-acre winter-logged clearcut in a birch stand in the Fairbanks area (NC-793-F: likely cut in 1995, scarified by ADF&G in 2002, and likely planted in 2005). Where the site was deeply blade-scarified through the thick grass mat, there was good natural birch regeneration in the bladed areas. In disk-trenched areas, only planted trees survived. The planted trees were 12' tall at 10 years at another [blade-scarified?] birch sale to the west across Skinny's road to the Tanana River (NC-746-F). The planters chose good sites, e.g., those with *Equisetum*. Where grass is present, natural regeneration doesn't occur even when seed sources are present. This is a small patch and moose browsing is now keeping the birch regeneration down. Gradual north-facing slopes under birch canopies seem to be real grass producers.

Paragi: The criteria we set now can be useful for the future if we continue monitoring what is happening in harvested units; think of them as testable hypotheses. We may need to review the standards more often if climate change accelerates.

Michaud: Seedlings may be 3-4' tall and above the competition, but if they are smaller than 1" dbh, they will not count as saplings under the residual stocking standards (11 AAC 95.375(B)(4)). Juday: However, those will count as seedlings to meet the 450 seedling/acre standard (11 AAAC 95.375(d)(2)). Freeman: For example, if residual trees meet 50% of the standard for residual stocking, the landowner would only need to provide 50% of the seedling standard to meet the reforestation targets. Qualifying seedlings may be either natural or planted stems. Hanson and Putman noted that the State and TCC inventories include trees above breast height that are 0-5" dbh as saplings, while the residual standard counts stems that are 1-5" dbh. [Note: The difference in sapling definition could affect the determination of whether the average stocking of Mat-Su WS-BI Saw Closed type and Kenai Birch type on State land meet the residual stocking standards.]

Hanson: Regeneration surveys code seedlings as "desirable, acceptable, or not acceptable" to determine whether they count toward meeting the stocking standards.

The S&TC discussed advantages, disadvantages, and recommendations regarding use of natural and artificial (planting, seeding, and site prep) regeneration, as summarized in the following table.

Natural Regeneration (White/Lutz spruce & hardwoods)	Artificial Regeneration (White/Lutz spruce)
+ Sustains genotypes – including good genotypes (i.e., genotypes that are well-adapted to the range of local conditions)	**+** Provides an opportunity to improve tree quality
+ Maintain genetic diversity across the landscape to respond to variability from year to year and trends in climate change	**+** Can introduce specific new genetic diversity (e.g., seed sources from other provenances or non-native species)
+ Lower cost	**-** Higher cost
- Variable quality	**+** More consistent higher wood quality
- May need to do site disturbance to get adequate natural regeneration; tends to produce random, clumpy distribution of trees	**+** Control distribution and stocking to optimize site use
- Where aspen regeneration from root suckers is desired, natural regeneration without site preparation is beneficial.	**+** Can be used to sustain a species that might otherwise be reduced
+ Natural regeneration can provide variability within and between stands that is beneficial for wildlife habitat.	**+** Can provide future source for specific products, e.g., spruce sawtimber
	+ Planting is advantageous in specific circumstances: • Where needed to remediate regeneration failures • Where *Calamagrostis* is present in the pre-harvest stand (>2%). This is an indicator of serious grass competition following harvest; site preparation and/or planting will be needed. For white spruce, planting is the only known successful method of getting adequate regeneration where grass competition occurs. • In the absence of either sufficient residuals or seed sources (due to harvest, infestation, etc.). • Where seedbed conditions aren't conducive to natural regeneration based on lack of exposed mineral soil and deep organic layers. • When residual stems are subject to ongoing insect or disease attack.
	- The rotation age of planted trees is long

	enough that they may be subject to significant climate effects prior to harvest, and there is a risk of losing the investment in planting.
	--Site preparation can reduce suitable habitat for wildlife species that rely on late-seral features for security cover, maternal denning or nesting structures, or hunting perches if it reduces the amount and distribution of standing dead and down wood remaining after harvest.
	It is important to maintain the capacity and expertise to do planting and site preparation so that it is available when needed to remediate regeneration failures and to conduct reforestation research.

The S&TC also developed a number of findings and draft recommendations. See the following consensus points in the consensus summary for these results:

- Findings **F5-F17**
- Recommendations **C4-C6**

Distribution of regeneration

Freeman: The current regulations require that seedlings be "vigorous, undamaged, and well-distributed" to meet the stocking standards (11 AAC 95.375(d)(2)). "Well-distributed" is defined as "no more than 10% of the harvest area or contiguous areas may be below the stocking levels" (11 AAC 95.375(d)(4)).

Yarie: That means that the plot distribution of regeneration surveys must be able to detect any gaps that account for more than 10% of the area.

Paragi: Natural stocking isn't uniform, edge habitat is valuable to many species of wildlife, and wildlife relate to varying stand densities. Juday: Uneven distribution (patchiness) produces varying forest structures. For example, tree crown size and extent vary with the openness of the stand and orientation of physical features and the sun. A need for uniform, consistent regeneration isn't based on science. It may be appropriate when the goal is maximum wood production. Having 10% in open patches is reasonable. Yarie: A "patch" is a bigger area, e.g., 5-10 acres.

Michaud: Is there a variation for stands with uneven distribution of stocking? Uneven distribution may be appropriate based on the site conditions. Freeman: There is a variation for stands that have low stocking prior to harvest, but it doesn't address the stocking distribution.

Yarie: It is important to think about patchiness also in the context of landscape rather than stand. Rules that require green-up of a regenerated area prior to harvest of an adjacent stand are an example of standards that can affect the patchiness at the landscapes levels. Paragi: Most timber sales in Regions II and III are small. The proposed Tok River sale (NC-837-T) was about 900 acres, and the revised FLUP (Nov. 2003) had a guideline precluding additional harvesting in that drainage until the regeneration in the Tok River cut reached 4" dbh or 30' tall because the proposed sale contained most of the large white spruce in the area. Durst: Control of adjacent harvests goes beyond the current FRPA goals for addressing reforestation, at least on non-state lands. Paragi: ADF&G is working on guidelines for wildlife management related to forest management.

Michaud: Land ownership doesn't occur across landscapes. We can't allow "first-come, first-served" to limit the opportunities of individual landowners. Economics also affect harvest unit location. Paragi: Timber salvage in response to natural disturbances also drives a lot of the timber harvesting.

Juday recommended that the S&TC encourage the Board to design an alternative process that allows flexibility in approaches to reforestation, rather than a uniform expectation of outcomes, as things change over time. This could include active consultation with the resource agencies and use of variations under FRPA. Paragi: That approach should include monitoring.

Yarie: Reforestation occurs on a large piece of land not on a single spot. Could a landowner depend on an adjacent stand in a different land ownership for a seed source? What if the adjacent owner later harvests the seed source? Freeman: Each landowner is responsible for meeting the reforestation standards on his/her own land. If regeneration fails, the owner must fix the problem.

Hanson: If the goal is a sustained yield of merchantable timber, does an allowance for 10% non-stocked areas get you there? Juday: The 90% stocking requirement is a rigorous standard compared to what happens on the ground in natural stands within 7 years of disturbance.

Winters: The DOF Reforestation Handbook methodology determines stocking based on stockable plots; non-stockable plots are excluded. Yarie: Non-stockable areas should be determined in the harvest unit design ahead of time and identified in the DPO. Hanson: Sometimes non-stockable areas are clearly definable; other times they are in smaller patches. Paragi: That is particularly true for partial harvest areas. Michaud: Could there be a limit to non-stocked patches?

Juday: Morimoto's study included 700 plots in 36 stands that were measured 10-40 years post-harvest. Of these plots, 82% met the reforestation standard based on natural regeneration alone, and 88% met the standard based on a combination of natural regeneration and planted seedlings. No areas were grossly deficient. Over time, the nonstocked area changes (see Figure 2 attached). Regeneration surveys are done a short time after harvest. We need to be realistic

about what we should see at year 5 to have full stocking at maturity. Hollingsworth: Both recruitment and self-thinning occur over time, and both respond to site conditions.

Juday and Paragi: Perhaps a two-tiered approach is needed for unstocked gaps. A maximum of 10% unstocked area is a high bar at 5 years; 20% at 7 years would be more reasonable. Michaud: 10% is a reasonable standard for planted areas; 20% is more appropriate with natural regeneration. Planting would cost more but would increase productivity.

Juday: How often do landowners plant to be able to meet the stocking standards vs. planting to meet other forest management objectives? Freeman: DOF often plants to increase the percentage of white spruce in mixed stands and to speed up the establishment of spruce in the stands. Winters: DOF also plants to fill in areas with insufficient seedfall.

Michaud: Some landowners have suggested replacing trees cut with planting, then assuming that there will be additional natural regeneration. Juday: You can't just plant one tree for each tree that is harvested because of mortality over time. Michaud: You could plant at a higher ratio than 1:1 to accommodate mortality.

Stocking standards: trees/acre

Juday: The 450 seedlings/acre standard [approx. 10' x 10' spacing] is low compared to stocking at stand maturity, and does not adequately accommodate mortality, but is not low given the early timeframe for regeneration surveys and the extended time over which natural recruitment occurs. Morimoto compared data from initial regeneration surveys on State timber harvests to data from surveys 8 to 30 years later. The number of stems increases two-fold to eight-fold following the initial surveys. The 450/acre standard doesn't seem unreasonable for the early survey time frame. Hanson: The current standard is probably reasonable.

Putman: Recruitment may normally occur over an extended but not continuous time frame. It is only continuous at some sites.

Paragi: 450 stems/acre is less than the total number of stems at maturity, but greater than the number of large stems/acre at maturity.

Yarie: Generally agrees with Juday. 450 stems/acre seems low based on thinning studies where stands thinned down to that level still respond with increased tree growth. However, it is a minimum standard and the number of trees/acre will increase after the initial survey period if the stand transitions from even-aged to multi-aged. In multi-aged, get multiple waves of recruitment. Later regeneration will be shaded and slower-going and may or may not be good reproduction.

Paragi: Increasing the initial stocking standard sets areas up for very high stocking later. Higher stand densities have increased risks of damage from fire, insects, and disease, especially in light of increased climate stress.

Juday: Miho found 2 to 15 times increase in stem density between 7-years and 10 to 40-years post-harvest in the stands she examined.

Putman: If one-third of the seedlings survive, the resulting stocking would approximate the sawlog stocking levels in natural stands.

Michaud: Pre-commercial thinning costs about $325/acre. If you plant trees at 450/acre you would have close to natural full stocking for intensively managed stands and would likely want to drop the stocking level 20 years later to improve the stand quality. Freeman: Should there be different standards for planted vs. natural regeneration? Winters: The standard could be lower for planted sites. There are advantages to encouraging some planting. Juday: 5 years is a reasonable time frame for evaluating planting success.

Juday & Yarie: 450 stems/acre is reasonable because of extended recruitment. Part of the trick is the time to assessment. Michaud: 450 stems/acre is too high in many instances depending on management goals. To mimic a natural stand, one would use 600 stems/acre then PCT. Wurtz: How about planting 1:1 with trees cut with expectation that will not have total mortality and still allow extended regeneration to fill in gaps.

Yarie: Under even-aged management, the intent is to keep the age class range tight and the tree size consistent. Under uneven-aged management, trees are of variable age and size, and partial harvests may be used. The residual stocking standard ties to uneven-aged management.

Putman: Unregulated fuelwood harvesting around villages is uneven-aged harvesting. All age classes are present over the decades, including gaps and retention of mature trees too large to hand log. Michaud: That harvesting sometimes results in stands with a class of large and old trees left on site and small-group selection of other, somewhat smaller trees. Harvesting is mostly in winter with snowmachines to haul wood, and there is little damage to residual stands.

Putman: A 120-year-old stand with a 20-year age spread is an even-aged stand. There's often a 50-year age spread in 150-year-old stands.

Juday: Uneven-age management is not going to work if one starts with a clear cut and plants to 450 stems/acre. One option would be to require planting a tree for each harvested tree and then counting on additional natural recruitment to increase the number of trees/acre. That would channel growth into fewer, larger stems. Michaud: Planting should be at a 2-to-1 ratio relative to the number of trees harvested as insurance against losses over time. Planted areas should be checked at 5 years. Putman: This approach should only be applied where the indicators don't identify hazards for natural regeneration [see **F14**]. This encourages a hybrid natural/artificial regeneration system. Michaud: It also encourages early planting which

improves survival. Paragi: Planting immediately following fire also captures the initial nutrient flush.

Hanson: Under this system, the cost/tree planted may increase, but the cost/acre may decrease. Winters: It's important to avoid a need for reentry due to insufficient survival. 200 trees/acre is roughly 15' x 15' spacing. You don't want to injure regeneration with re-entries. Michaud: You could set a standard of 250 trees/acre if planting occurs within 2 years of harvest. Winters: Operators probably don't want to go back in and replant so might consider planting at higher densities (500 trees/acre?) to assure single entry. Michaud: What's being discussed isn't really different that fill-in planting being practiced today. How about 250 trees/acre if done in first 2 years after harvest, then increase to 450 stems/acre?

Freeman: It sounds like there might be two options for a standard:

- **Suggested stocking standard Option A:** 250 planted seedlings/acre; planting must occur within two years of harvest. A regeneration survey and seedling survival of 200 trees/acre is required at five years post-harvest.
- **Suggested stocking standard Option B:** Existing standards [450 seedlings/acre]

Miscellaneous

Yarie: Fertilization studies have shown no changes in the stand type (timeframe?).

Winters: Browsing stimulates suckering in aspen and produces thickets of whip-size trees.

Winters: On the Kenai Peninsula, birch reach a certain size and then fall apart.

NEXT MEETING DATES AND AGENDA. Freeman will circulate a Doodle poll to set dates for a mid-summer check-in and fall meetings.

TO DO LIST

- **Freeman and Durst:**
  - Minutes #7 and summary of draft consensus points (draft attached)
  - Send Minutes for Meeting #6 to mail list (done 5/12/15)
  - Agenda for next meeting
  - Post PowerPoint on natural stocking data and FRPA applicability (done 5/13/15)
- **Hanson and Durst:**
  - Reevaluate whether the 10% limit on understocked plots is too high based on additional data from regeneration surveys. Get Andrew's and Miho's data from Glenn?

Other attendees

Theo DeLaca, Future Forests
Jeremy Douse, TCC

Attachments

Draft consensus points

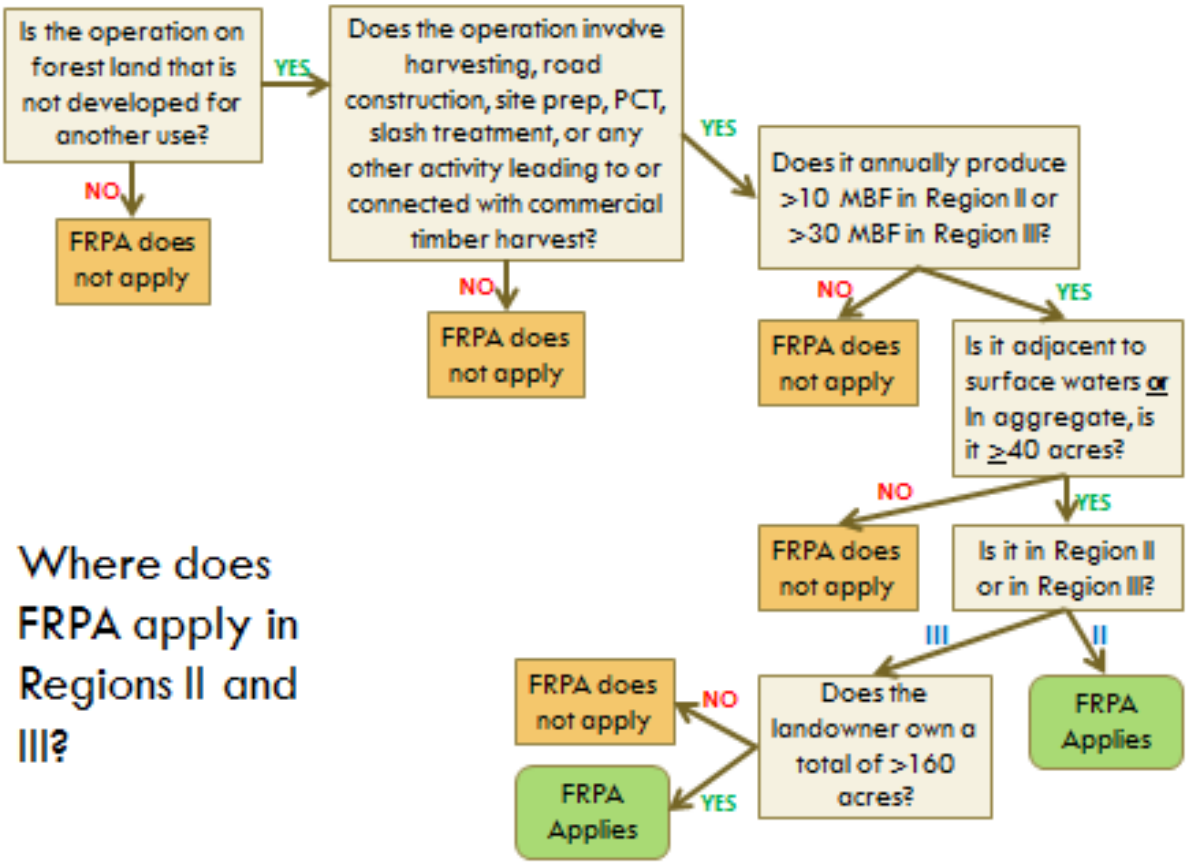

Figure 1. Applicability of FRPA in Regions II and III

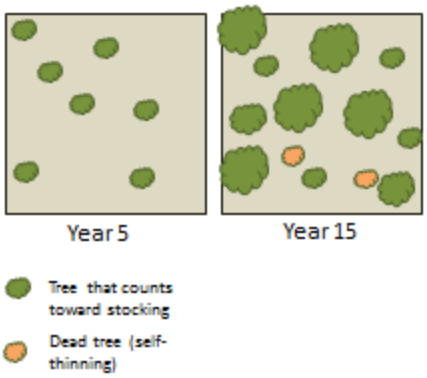

Figure 2. Changes in stocked area over time