Minutes
Region II-III Reforestation Science & Technical Committee (S&TC)
Meeting #4 – November 25, 2014

Bridgit/Teleconference sites: Fairbanks, Anchorage, Soldotna, Vermont, Palmer

S&TC Attendance

Jim Durst, co-chair	Nick Lisuzzo	Amanda Robertson
Marty Freeman, co-chair	Mitch Michaud	John Winters
Nancy Fresco	Tom Paragi	Trish Wurtz
Doug Hanson	Will Putman	Brian Young

Unable to attend: Roger Burnside, Glenn Juday, Teresa Hollingsworth, John Yarie

Note: Handouts referenced in the minutes are available from either co-chair.

Agenda and minutes. The Committee approved the agenda and the draft minutes from the September 30, 2014 meeting without objection.

Public comments. Freeman noted that the chairs received no public input since the September 30 meeting except address updates.

PRESENTATIONS

The S&TC heard seven presentations. A summary of key points from each presentation follows. PDFs of the presentations can be viewed on the DOF website for the S&TC at: http://forestry.alaska.gov/forestpractices.htm#reforestation

◆ **Trish Wurtz, USFS Forest Health Protection**
Are invasive plants affecting post-harvest forest regeneration in the Tanana Valley State Forest?

Case study of effects of invasive plants on forest vegetation: Scotch broom (*Cytisus scoparius*) introduced in the 1860s as an ornamental in northern California. Forty years later, it had become naturalized in British Columbia. It is now spread throughout all the counties in western Oregon and is moving to the east. It competes heavily with conifer seedlings, costing an estimated $40M annually in Oregon alone for control and lost timber production. This is presented as a cautionary tale about how invasive species can spread and gradually become an expensive hindrance of forest regeneration.

As an aside, there are 29 known populations of Scotch broom in Alaska, primarily in Southeast but also the western Kenai. It is spreading from ornamental plantings, too, but Scotch broom isn't a problem in interior or southcentral Alaska. Imports of broom into Alaska are not currently controlled.

Invasiveness ranking: A scoring system for non-native plants in Alaska has been developed, with potential scores from 1 (low) to 100 (extreme). This provides a mechanism for assessing relative risk and for focusing control or management resources. One hundred thirteen species have been ranked, with invasiveness scores of 25 to 90 [Scotch broom has a rank of 69 in Alaska].

Tanana Valley State Forest survey: Seven harvest units with poor regeneration were examined for invasive plant species west and southeast of Fairbanks. Seven non-native species were found, none of which are likely to cause problems with forest regeneration (rankings of 32 [very weakly invasive] to 63 [moderately invasive]). Along the highway and forest road system, two species were noted that caused more concern: white sweetclover (81; extremely invasive) and bird vetch (73; highly invasive).

- Bird vetch in particular is showing a propensity to spread along forest roads, into cleared areas, and onto/over spruce seedlings
- As an indication that bird vetch is spreading aggressively in interior Alaska, we repeated a survey of vetch on roadsides that was first conducted in 2002. Nolen surveyed 107 miles of state highways around Fairbanks in 2002 and found bird vetch at 39% of roadside sites sampled. Our survey in 2014 found that 79% of same sites had bird vetch. So, there is no question that bird vetch is spreading in the Fairbanks area.
- UAF Cooperative Extension has flyer on control of bird vetch.
- Appears that propagules are spreading along roads and into harvest units.

Recommendations and discussion:

- Need to be aware of highly invasive plant such as white sweetclover and bird vetch, although no evidence that they are affecting forest regeneration currently.
- Would need more work to identify method(s) of propagule transport with certainty. Studies have documented transport by wind, mud, and dirt on vehicles and equipment, shoes, ATVs and snowmachines, and snow plowing. Paragi noted that ADOT used to list white sweet clover as an approved species for revegetation. Now it has spread all down the Nenana River corridor and several highway corridors in interior and southcentral Alaska.
- Appears that bird vetch requires disturbed areas to become established but can then spread into undisturbed forests; burning does not control it once established. Young commented that bird vetch was present in the Cache Creek woodcutting area. He and others suggested that controlling bird vetch along the road systems before it spread further should be part of road maintenance.
- The AKEPIC database is a good source of statewide information on invasives. It is important to document where invasive species do not currently occur as well as where they do.

◆ **Nick Lisuzzo, USFS Forest Health Protection**
Forest insects: considerations for successful tree regeneration in south-central and interior Alaska

Role of insects: In the boreal forest, insects are important providers of food sources to wildlife from invertebrates to bears, perform a variety of ecosystem functions including pollination and decomposition, and are the second largest disturbance agent after wildland fire. In addition to mortality, insects can cause large-scale losses of productivity (defoliators) and merchantability (topkill, sawtimber).

Insects and reforestation: Insects can directly affect seed production and seedling productivity and survival. There have been few studies in Alaska, with much of our knowledge coming from Canada, Minnesota, and Scandinavia. FRPA Regulations provide an exemption from regeneration requirements when the harvested stand is significantly composed of insect-killed or fatally damaged trees. This is most likely to be bark beetle affected stands.

Bark beetles and woodborers: Landscape level effects. Live in the phloem of live trees, girdling them when occurring in high densities. Larger trees have thicker phloem so larger beetles (50 species, e.g., spruce and larch bark beetles) while smaller trees and slash have thinner phloem and smaller beetles (many species, e.g., *Ips* engraver beetles). Phloem on seedlings is too thin for most tree-killing beetles in Alaska. Regeneration is generally fairly good after infestation. River corridors often have elevated beetle populations, perhaps due to damaged trees along the banks due to ice scouring.

Cone feeding insects: Generally local effects. Spruce cone maggot, seed worm, and coneworm can be locally severe but generally ephemeral and not regionally significant. Can cause local problems if result is no residual seed source (outbreak summer before harvest).

Defoliators: Examples are aspen and birch leaf miners, spruce budworm, and spruce and larch sawflies. Long-term outbreaks can increase mortality and decrease productivity. Spruce budworm has been a major problem for reforestation in Canada and Minnesota. It could be a problem in Alaska during outbreaks.

Firewood: DOF looked at sources of firewood being sold in Interior as well as brought in at the Alcan border. Bought/swapped samples and incubated for insects present. Most of the imported firewood still had bark capable of supporting bark beetles.

- Retail locations: 51 collections, 20 of which reared wood boring insects; samples originated in WA, OR, MT, and BC-Canada; all but MT reared insects.
- Alcan border: 12 collections, 7 of which reared wood boring insects; samples originated in WA, OR, MT, CA, IA, OK, Canada, Haines AK, and Unknown; all but OR, CA, and IA reared insects.
- Firewood is a known carrier of insects. It could be banned by the receiving state. Many retailers in Alaska sell imported firewood.

Discussion:

- Robertson – found fire ants in wooden stakes bought at Walmart. Many wood products bring in unwanted species.
- Michaud -- are tree seedlings are vectors for invasives? Wurtz -- live plants are the main source of pathogens. Nursery ornamentals were sources of 35 species of weeds from seeds in containerized plants. Some nurseries were completely clean while others were full of seeds.
- Michaud – Phytosanitary certificates are not routinely enforced. Canadian nursery stock is good quality but raising seedlings elsewhere may increase introductions, especially when landowners are buying thousands of trees. Winters – it would be good to find out what the sanitary procedures are for Lower 48 nurseries. Could we list vendors that meet the sanitation criteria? Sterilizing growth media and tubes should be standard procedure.
- Robertson – Customs and immigration protocols are a good thing. Could we require compliance with the international protocols for all?
- Jim Smith and Lisuzzo – State & Private Forestry programs provide information to private owners on the best time to harvest to reduce insect problems. E.g., don't harvest spruce between mid-March and mid-July.

Recommendations:

- Treat slash properly (facilitate drying).
- Maintain healthy residuals (keep slash and log decks away from residuals, avoid cutting spruce during bark beetle flight season).
- Expect reduced growth and survivorship in areas of a long term defoliator outbreak (such as aspen leaf miner).
- Expect to have years with poor natural seed sources and/or survivorship from ephemeral outbreaks. As climate changes, effects of some insect species may increase as they have in other states.
- Expect invasive/non-native insects to arrive in Alaska over time: firewood, seedlings, nursery stock, etc. Already have pests present in Alaska for non-native plantings (e.g., pine pests in Interior). It is hard to predict which invasive species will cause the biggest problems.

◆ **Lori Winton, USFS Forest Health Protection**
Diseases affecting regeneration in Alaska's boreal forest

Pathogens: Diseases are a malfunction resulting from continuous irritation by a pathogenic agent or environmental factor that leads to development of symptoms. Most forest pathogens are fungi, but others include parasitic higher plants, protozoa, viruses, viroids, bacteria, nematodes, and phytoplasmas. Some insects can spread disease. Forest diseases cause larger losses than fire and insects together, but effects tend to be stand-scale rather than landscape-scale.

Disease classes: Forest diseases can be classified by the tree parts they commonly affect: roots and butts, stems and branches, foliage, and shoots. There are also noninfectious diseases.

Root and butt diseases: Kill infected trees of all ages now and remain viable on site for up to 50 years. Can infect trees in area that are healthy as well as seedlings planted in an infected area. Transmission through stump surface inoculation, direct root infection, and contact between infected and uninfected roots. Trees with root rot may exhibit distressed cone crops, declining crown, mushrooms or conks at root collar or on roots, basal resin, and nearby uprooted trees. *Tomentosus* root rot good example:

- Widespread in southcentral and interior Alaska in spruce and larch; #1 root rot of spruce.
- Increases cull volume up to 1/3 of tree, reduces growth at least 12%. It opens stands and can cause a group of trees to die and fall over. Openings provide structural diversity but leave refugia for the disease.
- It is hard to recognize root rot in a stand from above ground. Mushrooms or conks near the ground are diagnostic but not always present. Accurate diagnosis depends on root exams. Pre-harvest surveys for *Tomentosus* are very expensive. Symptoms include white rot in roots of singular or multiple trees. Infected trees don't show symptoms until about 80% of roots are infected. Winton would like to participate in stump surveys at harvest time to gather more information on diseases in Alaska.
- More likely to occur in dry to moist sites with evidence of historic infection and old or stressed trees.

British Columbia has developed hazard of infection matrix, harvest considerations, and silvicultural considerations to reduce spread of disease in unit. Something similar would be good for Alaska. Seedling death occurs when roots contact infected roots in soil.

Lori Trummer did a good, but small, study on the effects of *Tomentosus* on seedlings on the Kenai. Kathy Lewis did a study of root rot and bark beetles on the Kenai and did not find a correlation between bark beetles and the severity of *Tomentosus*. *Tomentosus* may contribute to endemic spruce bark beetle levels. *Armillaria* root disease attacks all tree species in Alaska, is opportunistic on stressed trees.

Shoot diseases: Tend to be most damaging to your plants and tissue; young trees may be killed, stunted, or suppressed. Example is *Venturia* shepherd's crook, which spreads by aerial spores and possibly insects to aspen and balsam poplar hosts. Spring growth blackens and withers.

Foliage diseases: Various leaf rusts occur throughout Alaska. Spruce needle rust causes premature needle and leaf loss in spruce and Labrador tea, growth reduction. Hardwood leaf rusts also attack tree firs, spruce, hemlock, and pine. Spores can spread between confers and hardwoods or cycle on hardwoods alone.

Recommendations:

- Before developing a harvest plan, visually assess for the presence of root disease.
- If there is a high incidence of root disease, avoid partial cutting or thinning as this may result in increased inoculum in cut stumps.

- Disease distribution is important: aggregated infection centers may be stratified for treatment, whereas adjacent areas might not require treatment.
- Stump-top surveys to determine the incidence of advance decay in the harvested trees can help determine if white spruce can safely be replanted on the site.
- Alternatively, the simplest assessment method is to tally the number of affected butts at the log decks during harvesting.
- Silvicultural options:
    - Treatment strategies are usually based on inoculum reduction (e.g., stump removal, push-falling) or (most commonly) clear-cutting and then planting less susceptible species.
    - If there is a high incidence of advanced root disease, encourage the growth of less susceptible birch and aspen either by planting or natural regeneration.
    - If planting susceptible species, trees should be planted at least 3 m from old, infected stumps.
    - Stocking in young stands may be reduced by up to 10% by age 20

◆ **John Alden, USFS (retired), Alaska Reforestation Council**
Use of nonnative trees on mainland Alaska

Why use nonnative trees in Alaska? There are a number of reasons people have planted nonnative trees in Alaska, including an impoverished diversity of native trees, climate change concerns (drying or warming), for anthropogenic and wildlife amenities, and to find the best adapted species. Exclusive of shrubs, at least 28 conifers in 5 genera and 14 broadleaf species in 9 genera have been introduced to Alaska since 1950. Of those, 9 nonnative conifers survived >10 years, 6 colonized, and 1 naturalized (lodgepole pine *Pinus contorta*); while 10 broadleaf species survived ≥2 years and 2 of those naturalized (bird cherry *Prunus padus* and European mountain ash *Sorbus acuparia)*.

Siberian larch: As of 2002, there had been 108 successful plantings of non-native conifers. At that time, 25 (23%) were Siberian larch that were >10 years old. Plantings occurred in both interior and southcentral Alaska, with more in the Interior.

- Tallest and largest Siberian larch in Alaska in 2002 was a 50 years old tree in Wasilla measuring 75 ft tall and 16.5 in DBH, while a 48 year old Siberian larch at Division of Forestry in Fairbanks was 62 ft tall and 19 in DBH. Other Siberian larch, at the Musk Ox Farm, in Fairbanks averaged 68 ft tall and 11 in dbh at 36 years old.
- From 1996-2001 Russian forest research institutions collected Siberian larch seeds from 17 locations and 4 species across Russian for international distribution and species variation research. The 4 species were *Larix sibirica, L. sukaczewii*, *L. cajanderii*, and *L. gmelinii*. Test plantations have been established in Alaska and Canada.
- Photo examples provided of Siberian larch in Fairbanks, Delta, and the Willow Experimental Forest in Wasilla. In the Delta area, planted Siberian larch survived while planted native larch did not.

- In the Delta area, both moose and bison heavily browsed Siberian larch; in the Willow Experimental Forest, moose caused damage. If birch is mixed in with larch, moose seem to focus on the birch. There is prolific seeding and some reproduction under the trees in Delta.
- Siberian larch heart wood is very dense and decay resistant but it is difficult to kiln dry and is not widely used for sawtimber because it twists and has poor nail-holding capacity. The high wood density may make Siberian larch a good choice for wood energy products.
- Compared to the native larch, Siberian larch is more resistant to bark beetles and sawfly defoliation. The Siberian larches are prolific seeders but shade intolerant, and fairly well fire-adapted with thick bark and serotinous or semi-serotinous cones. Western Siberian larch prefers more productive, well-drained sites, and appears more genetically diverse than Alaska larch.

<u>Lodgepole pine</u>: As of 2002, there had been 50 successful plantings of lodgepole pine ≥10 years old in interior and southcentral Alaska.

- In a 1974 provenance (seed source) trial in the UAF Boreal Arboretum T-field with British Columbia seed collections, 12 of 30 provenances survived winter kill; 10 of those were north of 60° latitude. Survival was tied to a mean annual isotherm of 0° C (a map line of equal temperatures). With exception of 2 seed sources >1000 m in altitude, all sources south of the 0° C mean annual isotherm failed to survive > 10 years. Thus seed source temperature ranges or perhaps growing season lengths determine adaptability of northern lodgepole pine in Interior Alaska.
- Lodgepole pine outgrows shade-tolerant white spruce for 30-40 years, but on productive sites spruce overtakes pine after it seeds in the understory if the area is not cleared. There is a niche for an intolerant conifer in Alaska.
- In Tyonek area, (black?) bears clawed, stripped, and bit lodgepole pine bark when coming out of hibernation, leading to tree damage. In Glennallen area, damage from hares was so high that trial was abandoned. Some trees recovered. Surviving trees could be studied for animal resistance.
- Lodgepole pines in interior Alaska were susceptible to wind and snow loads. Some had weak or deformed roots. Scandinavians found that lodgepole pine has unstable roots on glaciated/shallow soil; seedlings may be susceptible to container problems.
- At the Gondor Farm in the Mat-Su, 27 year-old trees are very large. Regeneration is very prolific, even without fire. Lodgepole has serotinous cones, but some seed is released without fire.

<u>Scotch pine</u>: As of 2002, there had been 14 successful plantings (>10 years old) of Scotch pine in interior and southcentral Alaska; more were widely planted south than north of the Alaska Range.

- In 2001, 39 year old Scotch Pine had 10 year old natural regeneration in the Big Lake area.
- Scotch pine is susceptible to moose damage.

Other nonnative conifer plantings: A few plantings each were established of balsam, Siberian, and subalpine firs; jack and shore pines; Dahurian larch; Norway, Siberian, and blue spruces; balsam fir, and Douglas-fir. Douglas-fir planted in 1964 at the Gondor Farm has cones but no regeneration. Growth is quite variable. Balsam fir at the Gondor Farm has survived for 28 years and there is 1-5 year-old regeneration. Balsam fir is shade tolerant and has chances for landscaping uses in southcentral.

Lost formal species and provenance field trials: From Alaska Reforestation Council records, a total of 15 formal field trial sites (with replicated and randomized plots) have been lost due to poor documentation, lack of maintenance, or land use changes, including plantings of Siberian larch, lodgepole pine, and 7 other species. Even known study areas have had little or no maintenance or documentation.

◆ **Doug Hanson, DNR Division of Forestry (DOF)**
Reforestation and site preparation results – Region III state lands

Fairbanks Area. There is a lot of variability even within the Fairbanks Area.

- Site preparation methods:
    - Dozer blades are used most commonly for scarification. It achieves good results in summer conditions and even with snow cover in the spring. Some grass occurs with site preparation but it is not preventing regeneration.
  - Results with disc trenchers have been variable. In some cases they just stimulated grass, but worked well on other sites. Scarification has to be deep enough to be successful.
  - Tests with paddle trencher prior to 1991 didn't appear to get a deep enough disturbance. It may provide sites for seed spotting.
  - DOF tested broadcast burning on a site with a good birch seed source. It did not create vigorous regeneration. Burning should be effective, but it is hard to get the timing right to get deep enough burns. It is only effective if burning occurs during a hot, dry season when fire managers and equipment are typically tied up with wildfire management. A May test on inadequately thawed soil stimulated grass.
- DOF scarification contracts usually specify that 50% of the area be scarified; equipment is a D-6 or smaller dozer. Scarification needs to only disturb the organic mat not total removal down to silt layer.
- Site preparation prescriptions are included in the Forest Land Use Plan (FLUP) for state timber sales based on moss thickness, residual trees, location, and season.
  - Winter sales with winter-only roads make planting difficult. If the access is difficult DOF leans more toward scarification.
  - Scarification is required where grass is present prior to harvest, even where good seed sources are present.
  - Scarification is prescribed on a case-by-case basis in spruce and mixed spruce-hardwood units.
  - Reforestation in birch stands is harder than in white spruce stands, and birch harvesting has recently increased. A review of 17 birch units showed that only 62% met the 450 trees/ac standard after four years, compared with 80% of the spruce sites and 90% of

the mixed spruce-hardwood sites. Post-harvest birch stump sprouting usually occurs only in stands younger than 60 years, and harvested stands are usually 80-100 years old. Without planting, when spruce stands are harvested, birch grows back; when birch stands are harvested, grass grows back. Birch stands should be scarified unless the understory contains a significant spruce component.

  - Regeneration is generally good in personal use firewood harvest areas due to ground disturbance and advance regeneration on the site – no one wants to harvest small trees for fuel.

- Planting prescriptions:
  - DOF generally specifies 300 trees/ac (12' by 12' spacing). DOF has reduced the number of trees/ac required (down from 680/acre in earlier years) to enable the division to plant more acres for the same cost and because survival is adequate at the lower levels.
  - Specs use 313B one-year-old styroblock plugs of white spruce – the cheapest seedling from the Canadian nurseries – with good results. Seedlings cost 17¢ each + 25¢ shipping + 60¢ or more to plant for a total cost per planted seedling of about $1.00. DOF has ordered from PRT Nursery and Coast-to-Coast N
  - DOF has used the same planter for 25 years. He knows how to avoid sites where the seedlings won't survive.
  - DOF only plants white spruce, and plants spruce on both spruce and birch sites. Planting is used on upland spruce sites to increase the proportion of white spruce in the regeneration.
  - Planting results are best on freshly logged sites. Seedlings beat out grass if planted ASAP after harvest.
- Natural regeneration
  - DOF generally relies on natural regeneration on floodplain stands if a seed source is present and the moss is thin ($\leq$4"). Regeneration is poor on floodplain sites with heavy moss even after scarification and planting, especially if the ground is hummocky (e.g., due to permafrost). Wetness is conducive to grass growth.
  - Natural regeneration is usually adequate on white spruce/balsam poplar floodplain sites, aspen sites (from seed and root suckers), mixed spruce-hardwood sites and upland white spruce sites typically have adequate regeneration of hardwoods.

<u>Delta Area</u>

- Regional conditions affect regeneration success: high winds provide good seed dispersal, snow cover and moss layers are usually thinner than in Fairbanks, and soils are sandier.
- Harvesting is done with ground equipment which usually provides sufficient ground disturbance for summer harvests.
- Where additional site preparation is needed on winter harvests, it is done by a dozer with an angle blade or by an excavator.
- Planting is just spot planting at lower densities (e.g., 100 trees/ac).
- The Gerstle River area is problematic for grass competition.

<u>Tok Area</u>

- Local alluvial outwash soils are droughty which is good for natural regeneration, but older stands compete for the limited water resource resulting in thickets of small trees. Natural regeneration often results in over-stocking but can also be patchy. Most regeneration is white spruce with aspen on some sites.
- Scarification improves stocking levels. It is usually done with a dozer blade. The area is also testing a roller-chopper to stimulate aspen regeneration and conducting disc-trencher trials. Scarification is most cost-effective when the equipment can keep moving forward, as with a roller-chopper or disc-trencher. A roller-chopper can also stimulate aspen root suckering. Scarification costs about $125/ac.
- Some winter harvest areas are hard to access due to river crossings which limits summer treatment options.

Considerations for FRPA standards
- The standard of 450 trees/ac after seven years is possibly high -- maybe half this amount could be adequate. More than adequate regeneration will fill in with enough trees over the rotation length especially during the first 20 years.
- Should continue with the 7-year time period.
- Standards could vary depending on species harvested, (birch vs. spruce).
- Standards could vary depending on site index so as not to invest heavily into poor sites

Database. DOF maintains a geodatabase on reforestation, including information on planting and regeneration surveys.

◆ **Will Putman, Tanana Chiefs Conference (TCC)**
Reforestation – Interior Alaska experiences on Native and military land

Background: TCC works with Native village corporations, Native Allotments, the Fairbanks North Star Borough and other clients.
- Most Native land harvesting has occurred in the Tanana Valley and it has been primarily white spruce harvesting followed by planting.
- Operations used primarily with containerized seedlings for early-season planting.
- Awareness of the scarcity of good white spruce seed crops increased interest in artificial regeneration. Planting was expensive, results uncertain, and planting stock from the state nursery was poor quality.
- Scarification was considered essential.

Direct seeding: Putman researched direct seeding for white spruce. Growth and survival were better on scarified spots and with seedling shelters. Scarified seedspots were more economical than shelters. Survival was about 52% on scarified, unsheltered seedspots. Seed collection is an issue, and planting is a more efficient use of limited seed resources.

Field results:

- A 640-acre harvest on Toghotthele land (Soldier Slough) in the early 1990s was planted in August by local planters at 680 trees/ac (8' by 8' spacing) using 1-0 stock shipped from Washington and British Columbia. The harvest area was not scarified. Frost-checking was a concern if the seedlings didn't establish quickly, but that didn't happen. The seedling stock was excellent and there was a good natural seed crop the prior to harvest of 360 acres. Both planted and natural stock did well on that portion of the area. On the remaining area, only the planted seedlings grew. Regeneration surveys 4-5 years after planting showed some hare damage; 15 years after planting there was good regeneration success everywhere. The late-season planting and lack of scarification reflected logistical challenges, but turned out to be a valuable experiment.
- A 40-acre timber sale on a Native Allotment near Gerstle River occurred in 1997. It was in a decadent white spruce stand infected throughout with *Tomentosus* root rot and thick with grass. Under normal circumstances, this unit would have undergone white spruce planting, but because of the rot, TCC chose to use direct seeding on scarified seedspots in 1998, using specially equipped swing saws to churn out small (1 ft^2) seedspots in heavy grass sod. Although skeptical of success, TCC found that after 15 years there is substantial white spruce regeneration.
- Cut-over areas on Toghotthele land on Nenana Ridge near Fairbanks, dating from the late 1960s and 1970's were perceived as a silvicultural "problem" in the 1980s. The stands had been extensively cut for spruce sawtimber leaving some residual trees and heavy grass. These sites are now thick with poletimber 30-40 years later. The forest comes back –it's a matter of timing. Paragi commented that Steve Joslin (DOF Delta Area, retired) said that grass doesn't last forever and provides soil amendment. Durst said that grass cover transitions to rose and then spruce in some areas, but it takes more than seven years.
- Recent development of a biomass energy project at Fort Yukon has resulted in some harvesting of a balsam polar stand, with very promising initial results for regeneration from stump and root sprouting.
- On military land, Dan Rees reported that harvesting has been mostly summer harvesting of hardwood, with very little spruce harvesting. They rely solely on natural regeneration, with very little scarification. Land management objectives are different – the major consideration is trying to open up training areas for military exercises. Rees observed major impacts on regeneration by moose. 10 years after harvest, regeneration can still be browsed down low. Implementation of cow harvests resulted in rapid regeneration response.

Summary observations

- Planting can work well with white spruce.
  - Survival rates are good enough that past planting levels could be considered excessive. Given the survival rates, the required trees/ac could be reduced from 450 to 200-300.
  - Late-season planting has shown great success, and scarification can be considered optional, depending on the site.
- Direct seeding for white spruce regeneration is still an option, provided a seed source is available. Scarification would be required.

- Scarification or some sort of ground disturbance will often be required when relying on natural seeding.
- The use of scarification can be better served by ensuring the presence of some organic material on seedspot micro-sites. For example, regeneration is often best on the edges of scarified patches.
- Natural regeneration of hardwoods not perceived as a problem in the past, but newer management regimes involving hardwood management indicate that it may not be so straightforward.
- Coppice regeneration of hardwoods in some circumstances shows promise, particularly floodplain balsam poplar. Especially promising with some biomass energy projects.
- In some examples, it appears that adequate stocking does occur naturally given an adequate time frame, even in challenging or "problem" circumstances. A longer time frame standard for regeneration could be OK, but would be harder to administer and enforce.
- The uniform distribution requirement under the current standards may not reflect natural conditions, and may only be appropriate on sites managed for maximum productivity. Patchiness is OK for wildlife and other uses.

Notes:
- The B.C. nursery did a good job at controlling the photoperiod to increase caliper growth of the seedling stock.
- The Tanana Valley comprises multiple seed zones – John Alden has a seed zone map. TCC tries to match upland v. floodplain sources and general areas.

◆ **John Winters, DNR Division of Forestry**
Region II reforestation

Valdez-Copper River Area:
- There are few difficulties achieving FRPA stocking levels within 7 years.
- Natural regeneration reliably occurs after logging and associated site disturbance.

Mat-Su Area:
- Past harvests targeted spruce in mixed stands that were dominantly birch. Residual birch resulted in reforestation compliance.
- Scarification after harvesting resulted in adequate natural regeneration.
- More grass incursion has been observed in recent personal use firewood sites due to slower harvest rates, and more time for grass to establish.
- DOF and the Mat-Su Borough are monitoring reforestation to see if compliance issues are developing.

Kenai Area
- Grass competition is a significant and widespread reforestation obstruction.
- As timber died during the beetle infestation, more sunlight enabled more grass establishment.

- Grass and fireweed occupy and dominate sites more readily in recent harvest sites.
- Scarification is necessary to enable natural regeneration or improved planting sites.
- Natural regeneration occurs –even to FRPA stocking levels—along skid trails, and within 100 feet of retention fringes. Large, under-stocked areas are common.

<u>Reforestation options</u>

- Harvest -- no scarification -- natural regeneration: lowest cost option. Harvesting provides enough site disturbance in some areas. Use it where it works.
- Harvest – scarify – natural regeneration: decreases competing vegetation, but seedlings have to grow fast enough to not get overtopped. Scarification increases costs.
- Harvest -- scarify – plant: Competing vegetation is held at bay and larger planted seedlings have a head start on recruitment. Scarification and planting are added costs that often exceed commercial value of the timber
- Partial cutting: Used for some salvage and sanitation cuts, e.g. some firewood operators only want dead trees. Partial harvest not usually limited by terrain in Region II, but they require finesse by the operators, and/or smaller equipment, and they require more land manager scrutiny and preparatory work (marking trees, inspections). Residual trees may be poor quality and competing vegetation can hinder recruitment.

<u>Site preparation</u>

- Site preparation is needed to expose mineral soil and decrease *Calamagrostis* competition. Fireweed can also blanket young seedlings.
- Lieffers et al (1993) described options for *Calamagrostis* control. Some options have limited applicability, e.g., herbicide use on public land, and prescribed burning. It is difficult to get a hot enough burn to impede grass except during seasons when the risk of wildfire is high and fire control is difficult.
- Site preparation effectiveness is time-sensitive. On the Kenai, mechanically scarified sites become nearly 100% encroached with grass within 5 years. Grass loves exposed mineral soil and grows faster than seedlings—especially natural regeneration.
- Grass is as a problem above and below ground; rhizome mats bind up available mineral soil leaving less nutritious subsoil for planting and seeding. However, you want to maintain some organic matter in the soil when scarifying.
- Treatments on wet soils still have grass; scarification on better-drained sites can be effective.
- Costs: 2014 scarification work by an experienced operator at Anchor Point cost $200/hour or $300/acre using a large excavator with thumb. Scarification Coverage was 30% of the area. Mike Fastabend said that the Kenai Peninsula Borough used masticators to scarify 20% of a large site for $80/acre, and the operators can do mounding for the same price.
- Single, contiguous units are more efficient to treat. However, they also tend to have stocking deficiencies near the unit centers.
- Equipment options
    - Excavators: Reaching capabilities are effective; can pile slash for burning or use mounding techniques. They are more expensive per hour than a dozer. Michaud noted

that some machines have rotary attachments that aren't good in grass but work well in alder. An operation on Kodiak is going to test a rolling Fecon. The machines give good spacing of patches but lose the opportunity for planters to find superior microsites.
  - Dozers: Effective at broadcast scarification, can either blade or tow trenchers; can create large piles and windrows, but efficiency may be lost due to time moving debris out of the way. Many operators on the Kenai are reluctant to use them over excavators
  - Tracked vehicles with masticating heads (Fecon): have efficient coverage, maneuverable, may make them more available over time; don't scalp grass sod as thoroughly as excavators

Discussion:
- Wade Wahrenbrock commented that forest owners on the Kenai Peninsula have two years to get regeneration going before grass takes over. If you miss that window, you have to be patient as regeneration will take 15-25 years. He also noted that FRPA allow reforestation with any species. Due to heavy moose browsing, seedlings can stay 3' tall for a long time unless there is a very high seedling density. The Kenai Peninsula Borough has tried various techniques. Herbicides are effective in decreasing grass.
- Michaud said that landowners in the Kodiak part of Region I used herbicides and it gave them three years to regenerate. Native corporations are using ground-based herbicide applications.
- Wurtz commented that grass dominance may not be an issue if you can wait 15-20 years instead of seven. Michaud reported that Ed Berg [USFWS Kenai National Wildlife Refuge] researched a site on the northeastern Kenai that had previously been hit by spruce bark beetles and found that it became fully stocked after 40-50 years. Chris Olson said that DOF surveys found grass cover persisting on an old planting site after 25 years.
- Mike Fastabend noted that grass competition on the Kenai Peninsula varies north and south of Clam Gulch.
- Paragi commented that Bill Collins (ADF&G) tested intensive cattle and horse grazing on *Calamagrostis* sites. The trials were not successful at increasing regeneration of birch or white spruce on wet sites but created favorable conditions for regeneration on drier sites.
- Robertson reported that Dawn Magness [USFWS-Kenai Wildlife Refuge] found that grass is changing fire regimes – there are more early-season fires. These fires aren't historically typical of the Kenai but are typical of grasslands. Early season fires can take out seedlings without setting back the grass. Michaud agreed that grass is horrendous for seedlings and perpetuate grass even with artificial regeneration. Paragi noted that the Yukon Flats NWR used fire to get rid of tree and willow encroachment on wetlands.

Existing standards
- Wahrenbrock said that lowering the standard for trees/acre could be good.
- Winters commented that lengthening the time frame for reforestation could work, but there would be serious problems administering standards over a long period.
- Winters asked whether we now know enough to have a more site-specific approach to the standards.

◆ **Mitch Michaud, Natural Resources Conservation Service**
Site preparation treatment types and applications – Regions I-K and II.
Michaud also presented highlights from a presentation on Site Preparation Treatment Types and Applications in Region II and Region I-Kodiak.

Herbivory:
- Herbivory impacts (e.g., from moose, deer, and hare) can increase reforestation costs by $200-4300/acre.
- Tyonek Native Corporation has low moose and high bear populations and has no problem with hardwood regeneration. In Seldovia, increased bear hunting contributed to an increase in moose populations which led to loss of half of the leaders on planted lodgepole pine seedlings. In Kenai, moderately low moose populations have increased birch regeneration.

BIBLIOGRAPHY UPDATE. An update of the draft bibliography (with approximately 325 references) has been posted on the Division of Forestry website along with the cross-reference index: http://forestry.alaska.gov/forestpractices.htm#reforestation

The next step will be to draft a 1-2 page introduction to each of the sections in the bibliography providing an overview and synthesizing the key information. Freeman and Durst will contact S&TC members about summaries for the various sections.

NEXT MEETING AGENDA. Freeman will send out a Doodle poll to select the date – which is targeted for late January. The next meeting will include
- Presentations
  - Amanda Robertson -- latitudinal provenance trials and assisted migration.
  - Mitch Michaud – remainder of site preparation presentation
- Review of bibliography section summaries
- Start review of existing reforestation standards

TO DO LIST.
Freeman and Durst:
- Minutes
- letter to mail list
- date and agenda for next meeting
- Intro to bibliography
- contact S&TC members about bibliography section summaries
  - Yarie and Juday – Silvics
  - Michaud, Hanson, Winters, and Putman – Reforestation methods and stocking standards and Site preparation, competition control, and soils

- Hollingsworth – Fire and regeneration
- Paragi and Hagelin – Wildlife
- Lisuzzo and Burnside – Insects and disease
- Wurtz and Lisuzzo – Non-native and invasive species
- Fresco and Robertson – Climate change and assisted migration
- Young – Reforestation modeling

Other attendees

John Alden, USFS retd.
Libby Bella, USFWS-KNWR
Jeremy Douse, Tanana Chiefs
Mike Fastabend, Kenai Pen. Bor.
Jeff Graham, DOF
Jessica Guritz, NRCS
Julie Hagelin, ADF&G
Rick Jandreau, DOF
Dawn Magness, USFWS-KNWR
Jason Moan, DOF
John Morton, USFWS-KNWR
Todd Nichols, ADF&G
Chris Olson, DOF
Bob Sattler, Tanana Chiefs
Jim Smith, DOF
Wade Wahrenbrock, Kenai Pen. Bor.
Lori Winton, USFS-S&PF