RC 082

Ahtna Moose Habitat Enhancement Briefing Update

Results and Lessons Learned 2/15/2015

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Roller Chopper with scarification discs in 18+" of snow Dec 2013

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Summary of Results

WHIP Contract Overview

Through it's Wildlife Habitat Incentive Program, NRCS developed a cost share agreement with Ahtna, Inc. to conduct management on a total of 1507 acres to create early successional habitat at three locations on Ahtna, Inc. ownership (Figure A1). The areas were selected to expand early successional habitat created by forest harvesting in the 1990's, based on ease of access and stand conditions. The target stand condition was moderate density 4-5" dbh black spruce with old, decadent willow clumps scattered throughout. The intent was to develop a one-pass process for regenerating willows in black spruce stands and be able to apply this process to developing firebreaks for future fire. The process can create potential moose harvest sites and can be used to create firebreaks allowing for greater opportunities for fire in the landscape. The most productive sites for habitat creation would result from chopping 15-30 year old burns and riparian zones with older willow stands. However, the objective was to develop an efficient one-pass process to convert black spruce stands to habitat productivity, while creating fuel breaks to allow fire safely in the landscape. Future work will include the production of biomass for heating fuel as well.

Tazlina Site

Estimate of completion was 115 acres of the 144 acres of the Tazlina Tract in December 2013 (Figure A2). Timber size and tree density outside target stand parameters for roller chopping prevented completion of the entire tract as contracted (Figure B1). Approximately 2/3 of the treated area was roller chopped where the stand was within target parameters for use of the roller chopper (Figure B2). An additional 1/3 of the treated area was sheared, where the trees were larger and denser, and the snow became deeper as the project moved forward. Aerial photos of Tazlina roller chopped area are in Appendix A, Figures A6-9.

The project started on December 9, 2013 with delivery of the contractors equipment, a d-9 and d-6 bulldozers to the site. The d-9 was used to pull the 40,000-pound roller chopper filled with Glycol. There were 18 inches of snow on the ground and temperatures just above 0 degrees F. Initially, the roller chopper worked well, with good ground penetration (Figures B3-B4). Maximum snow depth for the roller chopper to work effectively was estimated at 18", however in light, dry snow conditions, the roller chopper was effective up to about 24" snow depth. At this point the roller chopper began to clog with snow, reducing its ability to penetrate the ground (Figure B6). We also determined that clogging was related to snow conditions as well as depth. Due to continued increase in snow depth and discovery of larger trees in sections of the tract, the contractor began to shear into windrows (Figures B7-B8). Snow continued to fall; essentially daily, and the contractor completed the 115 acres on December 19, 2013. Weather and snow conditions are definitely a limiting factor on production and quality of the treatment. A rule of thumb is still about 18" as a limit for the amount of snow. Keeping the roller chopper cleared of compacted snow is critical to maintaining

quality chopping of materials. In correct conditions the roller chopper keeps itself clean by the materials it is chopping.

Klutina Site

In fall of 2014, a change of contractors was made and a local shareholder company was hired to pull the roller chopper with a d-7. The contractor had mobilized his equipment to the site by the end of September 2014. Ahtna requested from NRCS a change in the area boundaries for the contracted acreage. The contracts were specific to acreage within a specific unit. Stand conditions are so variable that the ability for contractor selection of areas was requested. NRCS was able to adjust their oversight approach and allow much greater flexibility for actual acres treated. Thus the specified contractual units became general guidance to a larger area. Total payments for acreage could not exceed the contracted amount but the contractor could adjust the original contract boundary lines in order to create a better mosaic, and allowed the contractor to skip areas that were outside the prescription parameters.

With the new contractor, equipment and the ability to select areas while working on the ground, the project progressed smoothly with higher productivity. GPS was used to register the work and to calculate acres treated. NRCS and landowner worked together to create a much more effective approach to achieving quality results on the ground. Areas treated can be seen in Figure A5 mapped with a GPS and in Figure A10 an aerial photo of Klutina sites.

Gulkana Site

The Gulkana site is 468 acres and will be completed in spring of 2015 if weather conditions allow. (Figure A4)

Background

Ahtna, Inc. is the landowner working directly with NRCS on enhancing habitat for moose and pioneering methods for conversion of black spruce to moose habitat, while creating fuel breaks for future wild land fire. The Copper River Ahtna Intertribal Resource Conservation District (CRITR), a multi-tribal conservation district made up of all of the Ahtna Tribes, is the organization over seeing the work and developing a strategic plan for enhancing customary and traditional use resources on Ahtna lands in cooperation with Ahtna, Inc. The Ahtna Community, including its villages, tribes and CRITR, support this effort and see customary and traditional use of local resources management as a prime issue that supports food security, health, and maintenance of cultural utilization of it lands.

In addition, rising from this initial project of creating moose habitat was recognition that landscape scale planning across ownership boundaries is needed. CRITR applied and received a national competition Conservation Innovation Grant through NRCS to develop an ecologically based landscape habitat plan for moose and Caribou in the region. Other objectives include developing a regional moose and

caribou habitat model to determine where moose habitat should be developed and where caribou habitat should be maintained. The process was initiated in early 2015 with a regional meeting of all the landowner and resource agencies. The area of focus is the Ahtna Traditional Use Lands. The project will create an ecologically based GIS data base across multiple ownerships (Figure A-1) for use by CRITR and Ahtna in the region. In addition, a landscape-working group across agencies was formed to support the effort.

Goals and Objectives

Ahtna, Inc. and CRITR's goal is to develop a program to enhance customary and traditional use by enhancing and maintaining populations of primary use species on their historic use lands. Moose is one of those primary species. Lack of fire or expedient fire suppression has reduced the amount of new moose habitat within the region. Thus, Ahtna and CRITR desired to create moose habitat through mechanical means on targeted portions of Ahtna lands, and to learn how to convert black spruce stands to willow and hardwood stands in a cost effective manner. Future goals include learning how to create firebreaks with moose habitats that allow for future safe burns on the landscape and producing affordable biomass for heating.

Project Objectives:

1. Increase quality of moose habitat on 1507 acres of land on three sites adjacent to previously harvested timber stands; through conversion of old black spruce stands to early succession stands favoring willow.
2. Test the efficacy of the roller chopper for eliminating black spruce, and stimulating existing willows within the stands. Assess the snow and winter conditions under which the roller chopper will perform. Assess how the use of the roller chopper will allow utilization of downed materials for firewood or biomass.
3. Test how shearing can be utilized effectively in stands that are larger than 4-5 inches in diameter and how the material sheared can be windrowed, dried for a couple of years and then chipped for biomass boilers.
4. Determine how to enhance roller chopper methods to create more scarification on one pass for overall moose browse enhancement and costs.
5. Expand and create fuel breaks around communities to allow greater opportunities for safe fire in the landscape.

Target stands structure and composition

Target stand parameters for roller chopper use were set at 1-5 inch dbh black spruce stands with moderate to thin stem density and live willows within the stand, to stimulate willow re-growth (Figure B1). There was some expectation that stands would be somewhat heterogeneous in structure with a few pockets of larger trees. Some of these pockets were to be left for security cover (Figures A6-A9), based on initial stand delineation, and some were to be left based on contractor selection. The contractor was instructed to leave some buffer strips for security cover so

moose would utilize the newly regenerated areas more readily. Stands with 5-12" dbh black spruce were to be sheared into windrows with no dirt, and stems aligned in the same direction for future utilization as biomass. However, the amount of heterogeneity and the amount of stands with greater dbh exceeded the expectations. The cost of shearing is higher than roller chopping, based on about double the amount of fuel use and ½ the amount of production. Thus, only a portion of the total stand was sheared and approximately 1/3 of the total area treated.

Description of Activities

After a thorough bidding process and determining a contractor, a D-9 and a D-6 dozer were moved to the site on December 9, 2013. The d-6 was used for support and for ringing the boundary of the area. The roller chopper was delivered on site on December 11th. Snow depth was at the predicted limit of the roller chopper's capability of penetrating the ground, which is 18". However, the snow was very light and work was initiated. The roller chopper was very effective the first several days of use, until snow continued to accumulate. At about 24" of snow, the roller chopper was plugging up with snow and its use was suspended. The shear blade was then used in all stand sizes. Some larger thicker stands of spruce were encountered, and in the end, approximately 115 acres of the 144 acres projected under the contract with NRCS were treated.

Roller Chopper

Roller chopping with a 40,000 pound machine requires the use of a d-7 dozer or larger. In the correct stands with 18" or less of snow, the roller chopper will produce 2-3 acres per hour and use less fuel than shearing. Roller chopping chops trees up to 6" in diameter into 20" "sticks of stove wood" that can be picked up the following spring when the snow melts (Figure B5).

Scarification

One of the issues with roller chopping is that it chops black spruce and currently growing willows, which stimulates new growth on the willows. However, the roller chopper cuts through the moss/duff layer, but does not scarify to a high level (Figures B3-B4) to enhance new willow generation. Working with the contractor, we tried to devise a way to create more scarification in one pass with the roller chopper (Figure B2). Pipes were welded onto the back of the chopper and cables with metal weights were dragged behind. Initially this was moderately successful at 18" of snow, but did not work at all at 24". The concept is good, but will require work be done only up to 12" of snow to be more effective. The contractor tried welding metal "scratchers" onto the weights and with modification could work more effectively than they did. This did not work very effectively.

Timing for use of roller chopper

A key issue for use of the roller chopper is timing relative to weather conditions. The best use of the roller chopper is in the fall after heavy freezing and before much snow, or in spring after the snow is less than 12" and the ground is still frozen. A

solid frozen ground base is required to get heavy equipment into the stands to be treated, but as discussed above, the roller chopper looses scarification effectiveness after 12" of snow and looses its ability to chop tree trunks effectively after 18" of snow.

This issue of timing makes it difficult for a contractor to have equipment on site and ready for the narrow windows of a month or two in the fall and spring. This is also complicated by the road weight restrictions in spring for moving equipment from site to site. The second year we used a local contractor that could leave equipment in place and work when conditions were best. This greatly improved project execution and management.

Shearing

Shearing with a d-9 dozer costs about $400-500 per acre in 5-12" dbh trees. Production is about 1-1.5 acres per hour. Shearing creates windrows that are full of snow and moss that is rolled with the trees. The goal is to have all the stems laying in the same direction with little or no dirt in the windrow. Thus, shearing can skim off willows to allow re-sprouting and can scarify the moss and duff to allow for new regeneration of willows and hard woods. This is to allow future utilization of the material for firewood or chipped for biomass. We determined that shearing was not effective at the Tazlina site at creating clean windrow for future biomass use. This needs to be explored more to determine if this is a viable process. Figure B8 shows the D-9 shearing a moderate sized stand too large for the roller chopper.

Advantages and disadvantages of shearing

The primary advantages of shearing are the ability to shear once freeze up occurs, and continuation even at greater snow depth, with a large machine like a D-9 dozer. The additional advantage is that, if done correctly, the shear will take off the duff layer and expose mineral soil for regeneration of willow and other hardwoods. Also, a competent operator can shear into windrows with the stems facing the same direction with little or no soil in the windrow, allowing for future use of the material for chipping into biomass.

The disadvantage is the cost. When compared with roller chopping, the cost is too high. However, if compared to the cost of harvesting the same stand using a feller/buncher then the cost is much lower and may be effectively utilized if the material can be utilized for biomass.

Lessons Learned

Tree Size and Density

Many black spruce stands in the Ahtna region are quite heterogeneous in tree size and density of stems, as we learned on the Tazlina site. This was not expected to be as dramatic as was discovered. We reviewed the contract sites at the Gulkana and Klutina the same heterogeneity was found. The process of looking at a portion of the stand and using satellite imagery and soil maps does not work in identifying the

amount of heterogeneity within the boundaries of a unit. In the future, we will need more ground confirmation for target tree size and density. However, the oversight methods used by NRCS at the Klutina site allow much greater flexibility for selecting of treatment sites while working. Ahtna plans to reevaluate each of the sites currently selected in Gulkana and determine how to move the boundary lines to create greater opportunities for target tree size and density.

Treatment Timing

Snow depth has a major impact on roller chopping, and less so with shearing. In the future, stands to be roller chopped will have contractors in place and ready to initiate treatment when weather conditions are correct. Having a local contractor with equipment that can stay on site ready for the correct conditions also helps with quality control of the work.

Roller Chopper Blades

Keeping the roller chopper blades sharp (Appendix B-10) also increases the efficiency in breaking up the black spruce into 20 inch pieces. This accomplishes two things: it creates 20" firewood for future use and it allows the spruce to dry quickly, which will discourage bark insect production. Insects cannot utilize dry cambium under the bark as efficiently as if it remained wet for a season.

Scarification

Stands of willows in riparian stands and in old burns do not require as much scarification as conversion of black spruce stands to allow additional willow and other hardwood regeneration. Thus, old burns and riparian areas are ideal stands for roller chopping. However, there is a significant amount of black spruce that could be converted, especially in the Glennallen region, and for development of firebreaks. An effort will be made to develop a one-pass method for chopping and scarification utilizing the roller chopper. This will be the most economical approach to conversion of black spruce stands. In discussion with the contractor, shearing in smaller black spruce stands of 1-4" dbh may be able to be done for less than $400 per acre.

Ahtna has discovered another approach to a one-pass process for chopping black spruce and scarifying the duff layer that it wants to try. The Dixie Pipe Harrow pulled behind the roller chopper may prove to be the correct tool. The Harrow will need to be modified so that the pipes turn and only 3-4 pipes with greater distance between would be pulled. The goal is 30-60% scarification for generation of new willow on a site. (See Figure B11)

Monitoring and Browse Surveys

These treated areas will be monitored in two ways. The first three years photo points have been established to generally document the height and density of growth each year. This may be followed with following the photo points every 2-3 years from then on. In cooperation with the Fish and Game Department, browse survey training will be held to teach Ahtna, Inc. Natural Resource Technicians to

conduct browse surveys to determine more specifically the amount of production and the amount of use in these areas. See initial year productivity in Appendix C, Figures C1-C4.

Appendix A. Maps and Aerial Photos

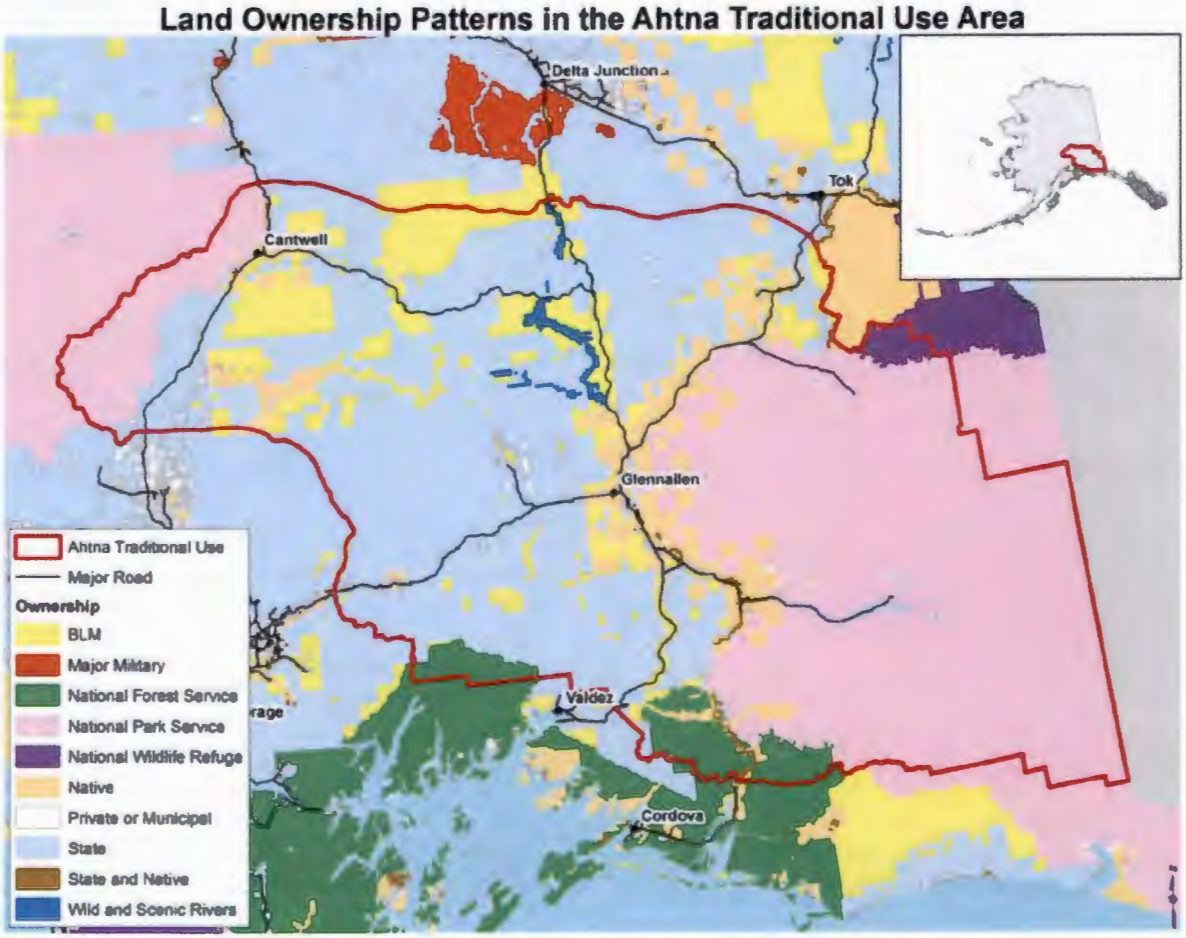

Figure A1. Ahtna Traditional Use Lands and Fee Ownership.

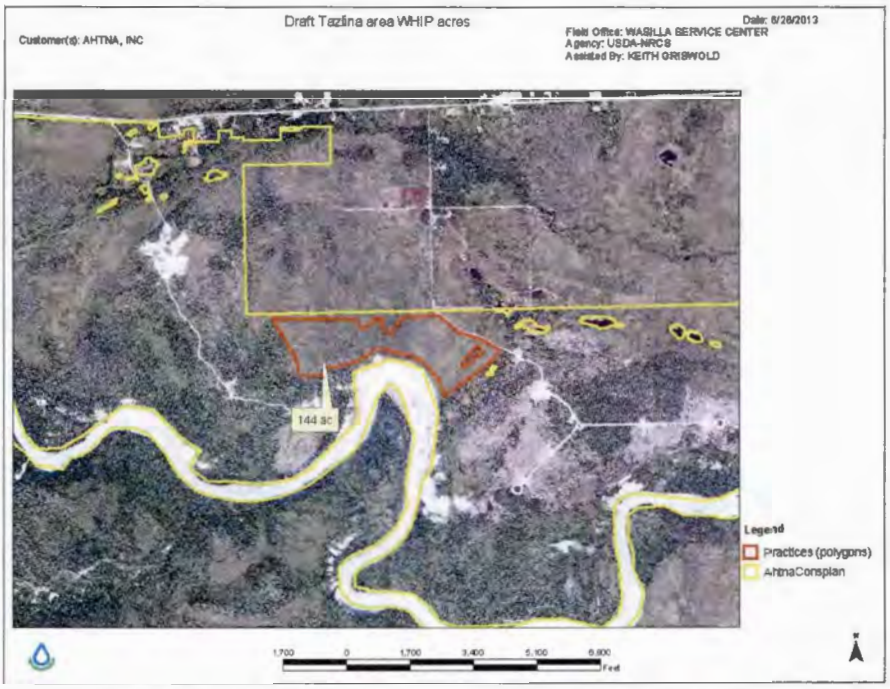

Figure A2. Tazlina moose browse enhancement site near Glennallen, AK.

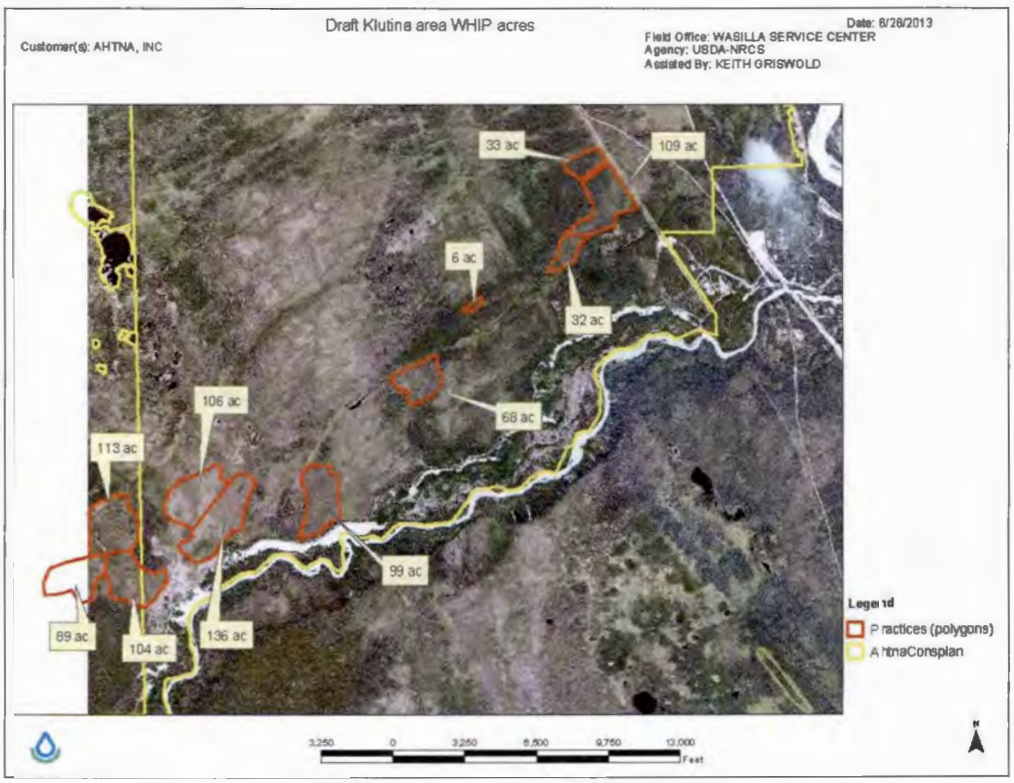

Figure A3. Klutina moose browse enhancement sites

Figure A4. Gulkana moose browse enhancement sites

Figure A5. Klutina GPS output on areas roller chopped fall 2014 in gold, area boundary in yellow and contract treatment units in red. Note how the contractor was able to select in and around the contracted areas.

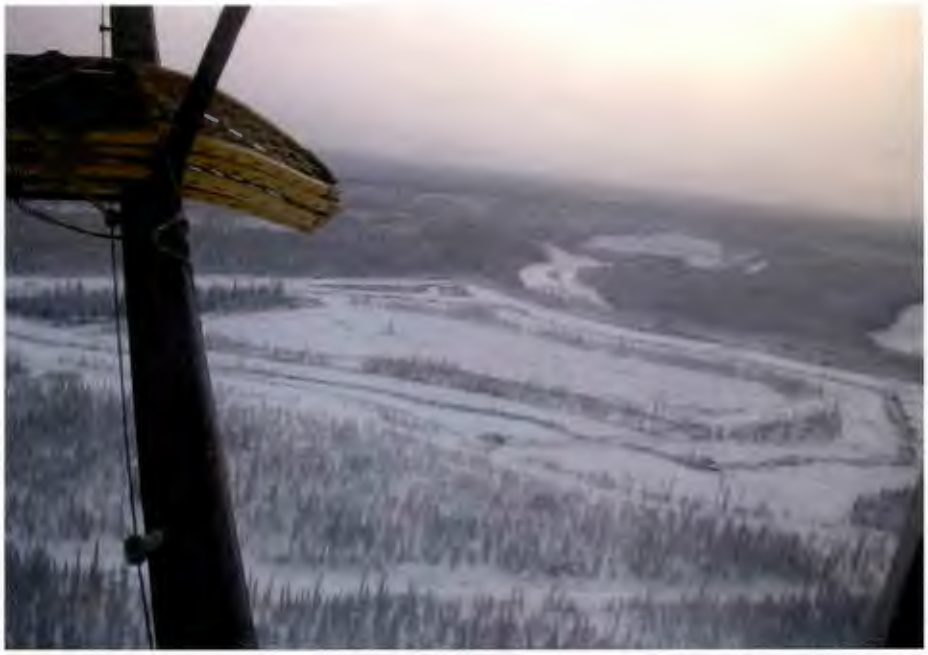

Figure A6. Tazlina site. Showing roller chopper area with reserve island and visual security buffers.

Figure A7. Tazlina site. Showing west end of stand with larger trees and thicker stand. This area was sheared.

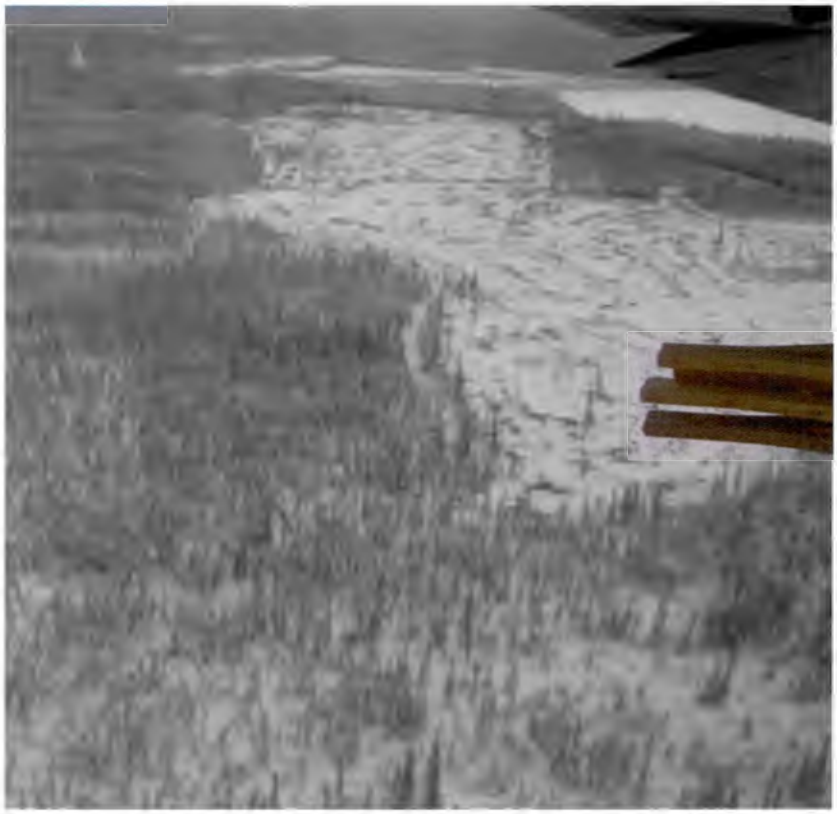

Figure A8. Tazlina Site. Sheared area with windrows

Figure A9. Tazlina site. Shows much larger trees in sheared area that were left.

Figure A10. Klutina Site. Looking west to east are the treated areas achieved with a contractor select process for determining actual treated sites. Treated fall 2014.

Appendix B. Ground photos of treated areas

Figure B1. Black Spruce stand pre-treatment. This stand is on the larger end to be treated with roller chopper but worked quite well.

Figure B2. Modification to roller chopper in attempt to get greater scarification of moss and duff layers while roller chopping.

Figure B3. Results of one pass with roller chopper while snow is still around 18"

Figure B4. Ground penetration by roller chopper in the area of the above photo.

Figure B5. Firewood generated by roller chopper into 20" lengths.

Figure B6. Cleaning snow compaction on roller chopper after snow reaches 24". Snow compaction reduces effectiveness of the roller chopper for ground penetration and cutting tree trunks.

Figure B7. Portion of the stand that was too large to Shear Blade

Figure B8. D-9 shearing into windrows where the stand is too large and thick to use roller chopper

Figure B9. Shear blade treated area with smaller trees after roller chopper not effective due to snow depth.

Figure B-10. Grinding of the chopper fins is critical to getting good ground penetration and chopping of tree trunks.

Figure B11. Dixie Pipe Harrow in western US: Design would be modified significantly for pulling behind a Roller Chopper, but concept is the same. The goal is for the pipes to spin and while cutting through the moss. Fewer pipes would be used to prevent clogging with chopped materials.

Appendix 3. 1st growing season photos of Tazlina Area

Figure C2. First year after roller chopper and shearing on Tazlina site

Figure C3. Willow regeneration first season after roller chopping Black Spruce

Figure C4. Willow regeneration first season after roller chopping Black Spruce.