

**Table 1. Desired Future Condition and Restoration Guidance  
for the Split Rock Till Plain LTA**

**Scope of the Endeavor** There are ~74,000 acres of the Split Rock Till Plain LTA (SRTP LTA) in the NS Collaborative area. We recommend restoring native trees and sub-flora to 30,000 acres or 40% of this LTA. For the combined North Shore and Split Rock Till Plains we recommend restoring 105,500 acres. A goal of 30,000 acres for the SRTP is 28% of this total. The Collaborative has planned 1,000 acres as an annual goal for restoration activity throughout both LTA's. Assuming 28% occurs on the SRTP, the annual target would be 280 acres. With these goals it will take 107 years to achieve the restoration goal.

Ecosystem Element	Desired Future Condition	Objectives
<b>Native Plant Communities (NPC's)</b>	<ul style="list-style-type: none"> <li>• There is an ecologically distributed proportion of high-quality, representative native plant communities, and native plant community associations.</li> <li>• High quality, representative native plant communities and rare native plant communities are sustained or enhanced.</li> <li>• Lands are managed or restored according to the forest system (e.g. MH, FD) defined in the Native Plant Community (NPC) classification System.</li> <li>• Native plant communities occur at patch sizes sufficient for self maintenance and integrity.</li> </ul>	<p>See Table 2 and 3 for desired conditions of individual native plant communities.</p> <ul style="list-style-type: none"> <li>• NPCs are associated with appropriate ecological settings (use Field Guide to NPCs of MN, Laurentian Mixed Forest Province and NPC mapping within Minn. Biological Survey Sites ranked Outstanding or High as reference).</li> <li>• Species composition and structure of native plant community types is as described in Field Guide to NPCs of MN, Laurentian Mixed Forest Province.</li> <li>• Native plant communities with an S-Rank of S1 ("Critically Imperiled") or S2 ("Imperiled") rare to the LTA are protected or restored.</li> <li>• Native plant communities with an S-Rank of S3 to S5 that are rare or unique in the LTA are sustained or enhanced.</li> </ul>
<b>Forest Continuum</b>	<ul style="list-style-type: none"> <li>• Forest is continuous and connectivity is maintained between Lake Superior and inland reaches of LTA and adjacent LTA's.</li> <li>• Large patches of contiguous forest dominate the landscape.</li> <li>• Plant communities are minimally fragmented by ownership boundaries, development and unnatural disturbances.</li> <li>• Older forest stands are larger and more spatially contiguous.</li> </ul>	<ul style="list-style-type: none"> <li>• Increase the 81+ multi-aged conifer growth stage (MFRC NE Landscape Committee 2003).</li> <li>• Group project sites that have similar goals in respect to growth stages.</li> <li>• Plan and accomplish work on large acreages where possible.</li> </ul>
<b>Age Distribution of Forest Community</b>	<ul style="list-style-type: none"> <li>• Succession combined with the restored tree diversity has resulted in multiaged stands and most stands are in advanced growth stages.</li> <li>• MHN and WFn53 forests are older on average than FDN forests.</li> <li>• Woody debris and snags have a greater presence, in both harvested and aging stands.</li> </ul>	<ul style="list-style-type: none"> <li>• Most restored stands in the LTA will be managed or allowed to succeed to older NPC growth stages with old forest characteristics. Restored stands include the native long lived species (e.g. white pine, white cedar, and sugar maple) which are maintained, restored, and protected to reestablish old-growth potential and the diversity of the Range of Natural Variability (RNV).</li> </ul>
<b>Tree Species Diversity</b>	<ul style="list-style-type: none"> <li>• All native tree species have been restored to the North Shore and their presence, proportion, and distribution is roughly similar to their occurrence before white settlement. However, some species are being favored by climate changes, others are not; some species are easier to foster than others; some native species are expanding their range; and some new species are becoming part of the mix. So, the mix and balance of species is continually changing.</li> <li>• The species that have been restored over the widest area are: white pine, white cedar, white spruce, tamarack, and yellow birch. Species restored to or maintained in scattered locations are American elm, basswood, red and bur oak, black and green ash (assuming ash can be brought through the EAB invasion), jack and red pine.</li> <li>• White pine has been increased by planting, natural regeneration, and protection and is a minor or better component on all appropriate sites on all projects in upland plant communities. (This assumes the acreage goal as displayed in next column or something similar)</li> <li>• White cedar has been increased by planting, natural regeneration, and protection and is a minor or better component of all appropriate sites on all projects in upland and lowland plant communities. (This assumes the acreage goal as displayed in the "Scope of the Endeavor" above, or something similar)</li> <li>• White spruce has been increased by planting and natural regeneration and is found on most project sites, in areas outside of project sites, and often is the most common species in any stand.</li> <li>• Tamarack has been increased by planting, natural regeneration, and protection on many appropriate sites on many projects in upland and some lowland plant communities.</li> <li>• Yellow birch has been increased by planting, natural regeneration, and protection on many appropriate sites on many projects in upland plant communities.</li> <li>• American elm has been returned by planting and protection to scattered, typically terrace forest sites on some project areas.</li> <li>• Basswood, red and bur oak, black and green ash, and jack pine have been maintained where they occurred in 2013, and have been planted on appropriate sites to increase and retain native diversity.</li> <li>• Red pine has been planted or maintained as a component in some project areas.</li> <li>• Paper birch has been maintained through natural regeneration and protection as a component of many stands in most project areas. It has also been maintained as the dominant species in stands to provide birch forest aesthetics at strategic sites.</li> <li>• Red maple occurs in different NPC throughout the LTA. Sugar Maple is found at higher elevations; and maples in general now occupy more sites through natural regeneration.</li> </ul>	<ul style="list-style-type: none"> <li>• Project areas will consider LTA DFCs and achieve or exceed DFCs where the site conditions are conducive.</li> <li>• <i>Note: "Priority" below relates to area of restoration for that particular species - the relative acreage on which that species should be restored as compared to the other emphasized species. In all cases, the restoration objective for the species below is an increased frequency as individual trees, small groups of trees, or small patches depending on the species and location in the LTA.</i></li> <li>• White pine is the 1st priority to manage for increase. At this time (2017) its numbers and distribution have decreased markedly from presettlement and it has a good chance to adapt to climate change. Decimating effects from herbivory and blister rust can be modified by management. White pine will have an increased presence on most project sites.</li> <li>• White spruce is the 2nd highest priority to manage for restoration, because its presence has declined considerably. It will regenerate naturally over time, given a seed source. And it is not likely to be browsed by deer and hare. However, it is predicted to face some stress under climate change.</li> <li>• White cedar is the 3rd highest priority to manage for increase. It has also been much reduced from its original distribution and it can be maintained as the climate warms in lowlands and on uplands with groundwater seeps. Decimating effects from herbivory can be modified by protection. White cedar will have an increased presence on most upland sites; its presence will be restored and/or maintained on lowland sites.</li> <li>• Tamarack and yellow birch are the 4th level priority to manage for restoration, as their presence has declined significantly. Tamarack will be the harder to reestablish, primarily because of its susceptibility to Eastern Larch Beetle and Larch Sawfly. Both will be planted and natural regeneration encouraged through scarification; seedlings and saplings will be protected.</li> <li>• Balsam fir is ubiquitous and will remain so. It is a short-lived tree and will fluctuate on the landscape. It does not need restorative management.</li> <li>• Paper birch and quaking aspen increased significantly beyond historic levels because of fires during the early 1900's. They will remain present, but they will be managed to reduce their dominance on the landscape.</li> <li>• American elm (and possibly red and bur oak) has declined since white settlement (elm because of introduced disease). These will be restored mainly by planting and protecting in appropriate, scattered ecological settings.</li> <li>• Basswood and green ash should be maintained where it occurs.</li> <li>• Red pine has declined slightly from RNV. It should be reintroduced to scattered locations at minimum levels on appropriate sites and most should occur in sites dominated by white pine. Any previously established red pine stands currently considered monotypic should be diversified with appropriate species best fit for the site and expected climate changes.</li> <li>• Jack pine can be maintained as part of the diversity of native trees. However, it should occur only in scattered, ecologically appropriate locations.</li> <li>• Black ash is common in wet sites, often indicating strong subsurface drainage. It can benefit from browse protection. More important is the impending threat of the nonnative, invasive Emerald Ash Borer. Management should include strategies to save and restore black ash when the borer arrives.</li> <li>• Sugar and red maple are not in need of restoration. Sugar maple has increased since white settlement. Both maples will likely benefit from climate changes.</li> <li>• Balsam poplar is common on wet sites and does not need encouragement or protection.</li> <li>• Black spruce was and is similar to white spruce in distribution. It is also typical on wet sites where historically tamarack and white cedar were co-inhabitants. Black spruce should be considered an important conifer in the native mix. It can maintain itself with no restorative management, however, stresses from climate change will likely reduce black spruce presence in several decades.</li> <li>• Bur oak and ironwood may be among those species that expand in the SRTP LTA after several decades of climate change. This natural presence and potential increase could be aided by browse protection.</li> </ul>
<b>Nonnative Species</b>	Native species are dominant and invasive species are limited in extent; new populations are being controlled.	<ul style="list-style-type: none"> <li>• Maintain natives. Projects will be conducted to reduce the potential for spreading and introducing invasive species.</li> <li>• Project areas are monitored to identify new populations of nonnative species during project activities and for three years after project completion. Invasive populations will be prioritize for elimination/control.</li> <li>• State and county officials will coordinate to eliminate or control nonnative invasive species populations; prioritize based on risk assessment.</li> <li>• State and federal authorities can provide direction, recommendations, and assistance to prevent introduction of nonnative invasive species.</li> <li>• The Collaborative contributes by disseminating information and educating the public.</li> </ul>

**Table 2. Guidance for Northern Mesic Hardwood Forest System: Northern Mesic Hardwood Forest class MHn45 in the Split Rock Till Plain LTA**

Ecosystem Element	DFC	Objectives
<b>Vegetation Structure and Composition</b>	<ul style="list-style-type: none"> <li>Plant communities are uneven-aged, sustained primarily through small gaps resulting from natural disturbance processes i.e. wind throw of individual and small groups of mature trees and composed of native species.</li> <li>All MHn45 NPC types occur; associated with appropriate ecological settings (use Field Guide to NPCs of MN, Laurentian Mixed Forest Province and NPC mapping within MBS Sites ranked Outstanding or High as reference).</li> <li>Species composition and structure of native plant community types is as described in Field Guide to NPCs of MN, Laurentian Mixed Forest Province.</li> </ul>	<ul style="list-style-type: none"> <li>Commercial harvest should be considered as a silvicultural treatment aimed at restoration goals. Harvest should focus on existing even-aged or two-aged (bi-modal) NPCs to accelerate transition to (multi-modal) multi-aged structure and restore tree species diversity.</li> <li>Even-aged and two-aged (bi-modal) NPCs (types MHn45a and MHn45c) under 100 years are identified and evaluated for restoration potential. Check for evidence of past high grading; favorable conditions for planting such as in broken canopy, small to large windthrow gaps, and rock outcrops to increase tree species diversity. Treatment should accelerate transition to (multi-modal) multi-aged structure.</li> <li>Trees selected for felling commercially or individually should mimic small gap phase disturbance. (Silvicultural treatments use selective harvest to mimic small gap phase disturbance.)</li> </ul> <p>*Other silvicultural practices not addressed here will be covered in future technical guidance documents.</p>
<b>Growth Stages</b>	<ul style="list-style-type: none"> <li>Multi-aged, older growth stages with their associated compositional and structural diversity dominate the landscape</li> <li>Woody debris and snags are very common in harvested and forested stands of all ages.</li> </ul>	<ul style="list-style-type: none"> <li>41-60% of forests in MHn45 classes are older than 150 years (Fig. 4; graph on page G57 USDA Forest Service 2004; Minnesota Department of Natural Resources 2003b).</li> </ul>
<b>Tree Species Diversity</b>	<p>At the large patch scale, tree species composition reflects:</p> <ul style="list-style-type: none"> <li>A sugar maple dominated, forest matrix with white pine, white spruce, white cedar, paper birch, and yellow birch in the canopy (and red oak and basswood may be present), subcanopy and understory; and</li> </ul> <p>At the small to medium patch scale, tree species composition reflects:</p> <ul style="list-style-type: none"> <li>Small and medium sized patch inclusions of NPCs associated with wet-mesic (yellow birch, white cedar dominant or codominant), wet (black ash, green ash, and red maple), shallow to bedrock (red maple, white cedar, red oak, white spruce, paper birch) substrates; and cliffs (white cedar, white pine, paper birch, heart-leaved birch).</li> <li>A few American elm may be found in the wet-mesic or wet sites.</li> <li>Basswood, ironwood, and red oak have been maintained where present in 2012 and also occupy scattered, appropriate, new sites.</li> </ul>	<ul style="list-style-type: none"> <li>Encourage the restoration of a mix of species by planting, using canopy gaps, existing or created, if needed; and/or by scarifying for natural regeneration; and by protecting high priority species - white pine, white spruce, white cedar, and yellow birch. Maples need not be protected and other species such as black ash and paper birch may be added and/or protected where desired. In all cases, restoration objectives for the species below should result in an increased frequency as individual trees, small groups of trees, and/or small to medium-sized patches depending on the species and location.</li> <li>White pine should occur as individuals, small clumps, or small stands throughout MHn45. It may range between absent to uncommon in any one MHn45.</li> <li>White spruce should occur as individuals and clumps throughout MHn45. It may range between uncommon to common, but not abundant in any one MHn45.</li> <li>White cedar should occur as individuals, clumps, and groves throughout MHn45. It may range between absent to abundant in any one MHn45 patch.</li> <li>Yellow birch should occur as individuals, clumps, or small to medium sized patches throughout MHn45. It may be codominant with white cedar and/or sugar maple. It may range between absent to common in any one MHn45 patch.</li> <li>Paper birch is an infrequent component, usually of early (0-100 years) seral stands. It typically occurs as canopy/subcanopy individuals or canopy dominant in small patches.</li> <li>Poplar species (quaking aspen, big-toothed aspen, or balsam poplar) are also usually of early (0-100 years) seral stands, are occasional components of MHn patches, and regeneration is discouraged.</li> <li>Balsam fir is an infrequent component of all growth stages.</li> <li>Red maple is occasionally a component and typically associated with ridge tops where soils are shallow to bedrock or in wet-mesic conditions.</li> <li>Ironwood is very infrequent and must be maintained where it exists. Efforts to expand its occurrence in very scattered but appropriate locations is encouraged but not planned.</li> </ul>
<b>Native/ Nonnative Species</b>	<ul style="list-style-type: none"> <li>A majority of the MHn45 native plant community within the lands accessible to the NSFC have received restoration activities including replacing off-site species with appropriate native plants.</li> <li>Eliminating non-native plants remains a base activity. It continues to be as important as and may require more wide-spread effort than direct restoration activities. Changes in climate are affecting the plant mix considered appropriate for each NPC types; so, the species targeted for elimination changes over time. Climate change may require a consideration to allow Minnesota native species to occupy sites at a different proportion than exists today. Some very rare or nonexistant species here today could be appropriate in the future.</li> </ul>	<ul style="list-style-type: none"> <li>Identify and eliminate existing nonnative species populations in MHn45 NPCs; prioritize areas where silvicultural treatment is planned.</li> <li>Prevent to the extent possible non-native species from establishing in managed sites (e.g. Require “come clean, go clean” BMPs for all operations.)</li> <li>Rare and uncommon native plants discovered in field inventories and operations should be considered high priority for protective measures.</li> </ul>
<b>Rare communities</b>	<ul style="list-style-type: none"> <li>S1 (“Critically Imperiled”) or S2 (“Imperiled”) [See (<a href="http://files.dnr.state.mn.us/natural_resources/npc/s_ranks_npc_types_&amp;_subtypes.pdf">http://files.dnr.state.mn.us/natural_resources/npc/s_ranks_npc_types_&amp;_subtypes.pdf</a>)] MHn45 NPC types have been identified and protected and/or restored where possible.</li> <li>S3-S5 MHn45 NPC types rare or unique to the LTA have been identified and protected and/or restored where possible.</li> </ul>	<ul style="list-style-type: none"> <li>Identify, map, and evaluate locations of native plant communities with an S-Rank of S1 (“Critically Imperiled”) or S2 (“Imperiled”) for restoration needs. [See (<a href="http://files.dnr.state.mn.us/natural_resources/npc/s_ranks_npc_types_&amp;_subtypes.pdf">http://files.dnr.state.mn.us/natural_resources/npc/s_ranks_npc_types_&amp;_subtypes.pdf</a>)]</li> <li>Protect or restore native plant communities with an S-Rank of S1 (“Critically Imperiled”) or S2.</li> <li>Identify, sustain, or restore native plant communities with an S-Rank of S3 to S5 that are rare or unique in the LTA.</li> </ul>
<b>Forest/Landscape connectivity</b>	<ul style="list-style-type: none"> <li>Sustained and restored high-quality MHn45 communities are ecologically distributed throughout the Split Rock Till Plain LTA.</li> <li>Native plant communities occur on appropriate sites and at appropriate patch sizes defined by slope, aspect, soil origin and type, depth of soil if any to bedrock, subsurface drainage, and distance from Lake Superior.</li> <li>The total acreage and the distribution of high quality MHn45 have increased since the formative years of the Collaborative; and patches of MHn45 command many of the higher elevations along the entire North Shore.</li> <li>MHn45 communities are minimally fragmented by roads, development, ownership boundaries, and unnatural disturbances.</li> </ul>	<ul style="list-style-type: none"> <li>The projected increase (esp. due to expected climate changes) in acreage and distribution of this plant community will depend on natural processes and will not be controlled through silvicultural practices. However, forest management should be used to maintain plant diversity in this NPC if necessary.</li> <li>Project work will consider the native plant community and manage sites for appropriate vegetation, diversity, and growth stages.</li> <li>Projects are implemented at maximum sizes appropriate to the NPC. Project work at the NPC/stand (or groups of these) scale will contribute to appropriate vegetation, patch size, growth stage, and species composition at the landscape scale.</li> <li>MHn45 communities will be minimally fragmented by roads, development, ownership boundaries, and unnatural disturbances.</li> </ul>

**Table 3. Guidance for Fire Dependent Forest System: Northern Mesic Mixed Forest class FDn43 in the Split Rock Till Plain LTA**

Ecosystem Element	DFC	Objectives
Vegetation Structure and Composition	<ul style="list-style-type: none"> <li>The disturbance regime along the North Shore has been and will continue to be altered to some degree, and, in particular, by climate change. However, the system should operate in ways to maintain restored, multi-aged, conifer dominated forests that are relatively similar to presettlement forests. Moderated by the more humid, cooler weather conditions adjacent to Lake Superior there could be infrequent ground fires and perhaps 500 to 1,000 year interval between stand altering fire; and this could be altered, even lengthened, by human intervention. Heavy rainfall, and ice and wind storms could challenge current concepts of forest structure.</li> <li>The canopy is irregular and broken; a patchwork of different mixes and dominance of conifer and mixed conifer and hardwood species. The irregular canopy is both a result of the diversity of site conditions and the diversity of tree species.</li> <li>All FDn43 NPC types occur; associated with appropriate ecological settings (use NPC mapping within Minnesota Biological Survey Sites ranked Outstanding or High as reference), and are composed of native species.</li> <li>Species composition and structure of native plant community types is as described in Field Guide to NPCs of MN, Laurentian Mixed Forest Province.</li> </ul>	<ul style="list-style-type: none"> <li>Restoration will reestablish and maintain a mix of soft and hardwood species, however management emphasis will differ between the two. Management will focus on increasing the occurrence frequency, the area predominantly occupied by the advanced growth stage softwoods, i.e. white pine, white and black spruce, white cedar, and tamarack. Coincidentally, management will assure hardwoods - yellow birch, American elm, and black and green ash are reestablished and maintained. THE KEY: The restoration within any native plant community will reestablish and maintain these species AND the native diversity of the community. For example, although not emphasized, aspen, balsam poplar, paper birch, heart-leaved birch, red maple, balsam fir, and bur oak are likely as part of the mix.</li> <li>Tree replacement results from natural (sprouting and seeding) and artificial (planting and seeding) regeneration. However, because parental seed stock is for many species not distributed throughout the project area, sowing seeds and planting will be the primary means to reestablish trees.</li> <li>Most desirable, planted and natural seedlings will require protection (white and black spruce are exceptions). Protected trees must cover enough area that they mature to create a mixed forest characteristic of the NPC expected on the site with conditions that perpetuate patch, structural, and microhabitat characteristics that foster the same mixed forest community in the future.</li> </ul>
Growth Stages	<ul style="list-style-type: none"> <li>Multi-aged NPCs at older growth stages with their associated compositional and structural diversity dominate the landscape.</li> <li>FDn43 NPCs older than 80 years are dominated by conifers.</li> <li>Tree species diversity reflects older growth stages and that diversity has been maintained or increased where appropriate.</li> <li>Woody debris and snags are very common in harvested and forested stands of all ages.</li> </ul>	<ul style="list-style-type: none"> <li>60% of forests in FDn43 classes are older than 80 years (graph on page G53 USDA Forest Service 2004; Minnesota Department of Natural Resources 2003b).</li> </ul>
Tree Species Diversity	<p>At the large patch scale, tree species composition reflects:</p> <ul style="list-style-type: none"> <li>A conifer dominated, forest matrix with white pine, white and black spruce, white cedar, balsam fir, and tamarack. It is diverse, and typically includes paper birch, aspen, red maple, yellow birch, American elm, black and green ash, and balsam poplar. White pine, white cedar, white and black spruce, and balsam fir are the most common conifers and paper birch the most common hardwood.</li> </ul> <p>The small to medium size patches or inclusions within the FDn43 forest matrix add tree diversity and are associated with site conditions. These include:</p> <ul style="list-style-type: none"> <li>Mesic to wet-mesic (white cedar dominant or codominant), wet-mesic (bur oak, American elm, yellow birch, black ash, and green ash [Terrace Forest NPC]); wet (black ash, yellow birch, and red maple), and shallow to bedrock (red maple, white cedar, white spruce, paper birch, and bur oak) substrates; and cliffs (white cedar, white pine, paper birch, heart-leaved birch). Black and green ash will probably need special restoration management following the invasion of the emerald ash borer.</li> </ul>	<ul style="list-style-type: none"> <li>In all cases, restoration objectives for the species below should result in an increased frequency as individual trees, small groups of trees, and/or small to medium-sized patches depending on the species and location. Note: there is a difference between restoration emphasis and management emphasis. Particularly with white spruce, we seek a restoration emphasis - an increased occurrence, but it is likely to do so on its own, so will require less management emphasis by planting and will not need protective strategies.</li> <li>In forest matrix: <ul style="list-style-type: none"> <li>Restore and maintain a mix of species by underplanting and/or scarifying for natural regeneration, and protecting the species threatened by deer and hare.</li> <li>White pine, white spruce, white cedar, and tamarack are the priority conifer species for restoration. Yellow birch, American elm, and perhaps black ash are the priority hardwood species for restoration.</li> <li>White pine is the highest priority to manage for increase. Its frequency will increase on most project sites. It must be protected from herbivores, pruned to discourage blister rust, and released from heavy competition. White pine should occur as individuals, small clumps, small patches, and stands throughout FDn43. It may range between absent to abundant in any stand.</li> <li>White spruce is the 2nd highest priority to restore. It will regenerate naturally over time, given a seed source. And it is not likely to be browsed by deer and hare. White spruce may be ubiquitous enough that it will require much less effort to emphasize its presence in many areas when compared with the other high priority species. It may be the easiest of the high priority species to restore and maintain in the near term. <b>Therefore it will not require the second highest priority in terms of management emphasis.</b> Climate change may reduce its vigor in the project area, requiring more narrowly focused restoration efforts to specific microhabitats, but it should survive well enough to persist in the native mix. Its “second highest priority” status relates to desired frequency in the NPC at all scales. White spruce should occur as individuals and small groups, and smaller stands throughout FDn43. It may range between uncommon to abundant in any NPC.</li> <li>White cedar is the third highest, restoration priority. Cedar will have an increased presence on a majority of upland sites; its presence will be restored and/or maintained on lowland sites. Cedar must be protected from herbivores and released from heavy competition. White cedar should occur as individuals, clumps, groves, and smaller stands throughout FDn43. It may range between absent to abundant in any stand.</li> <li>Tamarack is the 4th level priority to manage for restoration. It should occur as clumps or small patches on suitable sites throughout FDn43. Because of its susceptibility to Eastern Larch Beetle and Larch Sawfly, tamarack may require special management considerations.</li> <li>Black spruce should be considered as an appropriate species of FDn43 NPC. It may be on upland or lowland sites and a coinhabitant of sites occupied by white spruce. Except for consideration for restorative planting in some areas, it needs no special management.</li> <li>Balsam fir is ubiquitous. It is a short-lived tree and its frequency in FDn43 communities and across the landscape is variable. At present, it does not need restorative management. Its propensity to burn and carry fire may present a management concern near homes and buildings. (Refer to Firewise recommendations for this and other species near dwellings.) Balsam fir may decline in frequency as the climate changes.</li> <li>Red pine should be considered a minor component of this LTA, occurring in scattered locations. When planted it should be with white pine in some stands on appropriate sites (typically those with a gravel substrate) and at a rate of up to 1 to 2 percent of the stand area or of the planting stock.</li> <li>Jack pine may be retained as a minor component in scattered areas of this plant community occurring in occasional gravel or shallow to bedrock sites.</li> <li>Yellow birch, American elm, and black and green ash (post EAB invasion) are the most important hardwoods to restore and maintain. These species are not less important than the conifers above, but will require differing silvicultural practices. Typically these will be in scattered areas across FDn43. American elm should occur as individuals and several may occur in favorable sites. Yellow birch may be restored and maintained on a variety of sites. It should occur as individuals or may dominate on favorable sites. It may range between absent to common in any stand. Black ash should occur as individuals or stands. Bur oak may rarely be included if and where appropriate.</li> <li>Paper birch and quaking aspen will be managed to reduce their dominance on the landscape. They should occur as individuals, clumps, and may dominate small to medium sized patches in some NPCs throughout FDn43. Paper birch (including heart-leaved birch) may be mixed in the diversity throughout, and featured in stands for aesthetic purposes.</li> <li>Red maple is likely to increase through natural regeneration in some settings. It may be used to increase species diversity in FDn43 communities where other options are limited or unsuccessful.</li> </ul> </li> </ul>
Native/ Nonnative Species	<ul style="list-style-type: none"> <li>A majority of the FDn43 native plant community within the lands accessible to the NSFC have received restoration activities.</li> <li>Eliminating non-native plants remains a base activity. It continues to be as important and may require more wide-spread effort than direct restoration activities. Changes in climate are affecting the plant mix considered appropriate for each NPC types; so, the species targeted for elimination changes over time. Climate change may require consideration of allowing Minnesota native species to occupy sites at a different proportion than exists today. Some very rare or nonexistent species here today could be appropriate in the future.</li> </ul>	<ul style="list-style-type: none"> <li>Identify and eliminate existing nonnative species populations in FDn43 NPCs; prioritize areas where silvicultural treatment is planned.</li> <li>Prevent to the extent possible non-native species from establishing in managed sites (e.g. Require “come clean, go clean” BMPs for all operations.)</li> <li>Rare and uncommon native plants discovered in field inventories and operations should be considered high priority for protective measures.</li> </ul>
Rare communities	<ul style="list-style-type: none"> <li>S1 (“Critically Imperiled”) or S2 (“Imperiled”) FDn43 NPC types [See (<a href="http://files.dnr.state.mn.us/natural_resources/npc/s_ranks_npc_types_&amp;_subtypes.pdf">http://files.dnr.state.mn.us/natural_resources/npc/s_ranks_npc_types_&amp;_subtypes.pdf</a>)] have been identified and protected and/or restored where possible.</li> <li>S3-S5 FDn43 NPC types rare or unique to the LTA have been identified and protected and/or restored where possible.</li> </ul>	<ul style="list-style-type: none"> <li>Conserve and restore existing FDn43a, FDn43c communities where possible.</li> <li>Identify, map, and evaluate locations of native plant communities with an S-Rank of S1 (“Critically Imperiled”) or S2 (“Imperiled”) for restoration needs. [See (<a href="http://files.dnr.state.mn.us/natural_resources/npc/s_ranks_npc_types_&amp;_subtypes.pdf">http://files.dnr.state.mn.us/natural_resources/npc/s_ranks_npc_types_&amp;_subtypes.pdf</a>)].</li> <li>Protect or restore native plant communities with an S-Rank of S1 (“Critically Imperiled”) or S2.</li> <li>Identify, sustain, or restore native plant communities with an S-Rank of S3 to S5 that are rare or unique in the LTA.</li> <li>Restoration targets species composition and structure of native plant community types is as described in Field Guide to NPCs of MN, Laurentian Mixed Forest Province.</li> </ul>
Forest/Landscape connectivity	<ul style="list-style-type: none"> <li>Sustained and restored high-quality FDn43 communities are ecologically distributed throughout the Split Rock Till Plain LTA. Patch mosaic is controlled most by site conditions (especially slope, aspect, soil origin and type, depth of soil if any to bedrock, subsurface drainage, and distance from Lake Superior), and to human intervention and harsh weather.</li> <li>FDn43 communities are minimally fragmented by roads, ownership boundaries, development, and unnatural disturbances.</li> </ul>	<ul style="list-style-type: none"> <li>Project work will consider the native plant community and manage sites for appropriate vegetation, diversity, and growth stages.</li> <li>Projects are implemented at the maximum size appropriate to the NPC. Project work at the NPC/stand (or groups of these) scale will contribute to appropriate vegetation, patch size, growth stage, and species composition at the landscape scale.</li> <li>FDn43 communities are minimally fragmented by roads, development, land ownership, and unnatural disturbances.</li> </ul>