APPENDIX D

HABITAT ANALYSIS – RNV

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CHAPTER 1.0 METHODOLOGY FOR HABITAT CHANGE ANALYSIS

1.1 INTRODUCTION

Range of Natural Variation (RNV) modeling is an approach to maintaining sustainable populations of plant and animal communities by emulating the types and amount of habitat that existed across a regional landscape under natural disturbance regimes.

1.1.1 RNV SUPPORTING CONCEPTS

The underlying concept behind RNV is that, over relatively recent history prior to European settlement, the native communities of plants and animals adapted to particular ranges in the amounts of forest types and ages created by the dominant forest-regenerating disturbances of the presettlement forest. In the forests of northern Minnesota, the predominant large-scale forest disturbances were fire and wind (Frelich 2002). The use of the RNV concept arose out of a need to develop defensible strategies for maintaining biological diversity and sustaining the viability of threatened and endangered species (Landres et al. 1999). Maintaining conditions within the RNV provides a landscape-scale management strategy for sustaining viability of diverse species with recognized habitat relationships, including those requiring an array of habitats (e.g. large mammals, numerous bird species), those that have specific habitat requirements (small mammals amphibians, reptiles), and those whose habitat relationships are poorly understood (Hunter et al. 1989, Swanson et al. 1994). In addition, it provides a means to a comprehensive assessment that avoids the expense and time constraints associated with individual species modeling or population viability analyses.

1.1.2 SUCCESSIONAL PATHWAYS

The RNV analysis relies on successional pathways derived from Frelich 1999 and 2000, with the inclusion of forest management pathways that describe how different silvicultural operations (thinning, clear-cutting, etc.) move stands into different vegetation growth stages (VGS) categories. The successional models behind the RNV analysis are presented in Exhibit D.1. The use of the RNV model also required development of a cross-reference between the nature plant communities (NPCs) used in the model and the forest type classification used in the forest harvest simulations; this is presented in Exhibit D.2.

1.1.3 SAMPLE AREA

Two ecosections were used to model the VGS and plant communities considered in this RNV analysis.[1] It is reasonable to assume that the results presented in the analysis apply in magnitude and direction to the pine, aspen, and analogous NPCs in other parts of the state. This is because the harvest model was not

[1] RNV modeling was conducted for all of the derivative Build and No-Build scenarios noted in DEIS Appendix C. The results of the derivative scenarios are reported when further insights can be gained.

applied on an ecoregional basis and used similar rules to extract timber from different cover types regardless of location[2].

1.1.4 ALTERNATIVES ANALYSIS

Outputs from the forest management models were input into a RNV model adapted to compare the direction and magnitudes of deviation from RNV between the Build and No-Build Alternatives. The model was run once for each these alternatives based on the outputs of the forest management modeling work. Trends toward or away from the RNV under the No-Build Alternative were first assessed, which was then followed by an evaluation of the marginal change due to the Build Alternative[3]. This comparison reflects the percent change from the RNV between the Build and No-Build Alternatives, and is thus the relative effect of the additional harvest required for the Build Alternative. These effects were then related to relevant GEIS impact areas. Assessments were conducted at the scale of individual VGS that constitute NPC, with comparisons at the 10-, 20-, 30- and 40-year intervals used in the forest management model.

1.1.5 SCORING SYSTEM

A system was developed for scoring the positive or negative impact of a forest harvest operation with respect to moving a landscape toward or away from the RNV. The scores stand between -1 and +1, with -1 representing a strong negative impact (loss of habitat) occurring when an action decreases the amount of habitat in a type, which is currently below the minimum of the RNV. Strong positive scores are returned for increasing the amount of habitat, which is below the minimum. The scoring has an extinction bias: increasing or decreasing above the current RNV can only score between -0.5 and 0.5, versus the broader range of -1.0 to 1.0 applied when a system is below RNV, and thus may cause extinction due to habitat loss. Neutral scores (near 0) are returned for changing the amount of habitat currently within its RNV.

1.1.6 SCALE OF RESOLUTION

The finest level of comparisons between the Build and No-Build Alternatives occurs at the level of an individual VGS within an NPC. To conduct this analysis, the percentage of a landscape ecosystem within a VGS was calculated under the No-Build Alternative. This "Reference Level" was calculated as (acres in VGS/acres of NPC). Next, the percentage of a landscape ecosystem within a VGS under the Build Alternative was calculated. The percent increase or decrease in that VGS was then calculated. The percentage change over the reference level gives the percent of the landscape affected under the Build

[2] RNV-type analysis was not a requirement of the Final Scoping Decision. However, it can provide insights into landscape-scale ecological processes, especially forest succession under both natural (e.g., fire, wind) and anthropogenic (e.g., harvest) sources of disturbance. After conferring with its consultant, DNR sanctioned RNV-type modeling for that part of the state where base information relevant to the project was readily available; this was the Drift and Lake Plains and Northern Superior Uplands ecosections. RNV analysis did not occur statewide.

[3] RNV modeling was conducted for all of the derivative Build and No-Build scenarios noted in DEIS Appendix C. The results of the derivative scenarios are reported when further insights can be gained.

Alternative. This percent-affected was then input to the scoring model to provide a score describing the direction and magnitude of the Build Alternative on that particular VGS.

1.1.7 DEALING WITH LARGE VOLUME OF MODEL OUTPUTS – WEIGHTED SCORE

The Build/No-Build analysis at the VGS scale produces a large amount of output. There are typically 4-13 successional stages in an NPC model, 7 NPCs under consideration within each ecosection, and five modeled scenarios over four time intervals. To condense the large set of model outputs to an easily understandable form, a weighted composite index was created for the purpose of conducting DEIS-related comparisons. It provides an aggregate means of summarily comparing decade-by-decade change at the NPC scale[4]. This approach, and the more detailed VGS-scale analysis, provides a means to evaluate the marginal contribution of the Build Alternative over the No-Build Alternative. One key caveat to this level of aggregation is that positive effects in one VGS counteract negative effects in another, which may mask strong impacts to an individual VGS. For this reason, interpretations of the marginal contribution of the Build Alternative involved consideration of both the aggregate and individual data (Exhibit D.3).

1.1.8 EXTRAPOLATED FIA STAND SIZES

Applying the expansion factor to FIA plots creates a large virtual "stand." NPC types were assigned to these stands by the Forest Service. However, these virtual stands are much larger than the typical stand size in USDA Forest Service, state, and county management inventories. On the Northern Superior Uplands they are also much larger than the typical patch size in White's Landscape Ecosystem map (White and Host 2000). Applying a single cover type and single NPC to these large virtual stands is appropriate in a modeling exercise of this scope. Typically, a 3,000-acre stand used in the model represents many smaller dispersed stands in reality, but the total acreages and types are reasonable. However, the combination of the assignment of NPCs and large stand sizes sometimes has noticeable effects that must be interpreted with caution. Factors to consider include: cover type driving selection for harvest; potential inaccuracy in polygon assignment; or number of actions applied within the NPC.

1.1.9 LENGTH OF STUDY PERIOD

The RNV analysis is constrained to a 40-year study frame consistent with the Final Scoping Decision. Forest succession-type processes are dynamic and operate over much longer time periods than examined in the DEIS. Some types of forest change attributable to the Project may not be apparent at end of the 40-years. Persistent but possibly unobserved change would be most likely to be present for late successional growth stages. For example, the impact of cutting a 60-year old stand will not be visible in a 120-200 year growth stage for 60 years.

[4] The weighted composite index is the product of the VGS score times the change in land area (in percentage) resulting from the Build Alternative over the No-Build Alternative, summed acrossed VGSs. It is essentially a "Change (in terms of direction and magnitude) X Percent Area Affected" score. This metric is experimental.

Detailed examinations of these more latent-type effects are beyond the scope of the EIS. It should be recognized, however, that older growth stages, particularly the multi-aged growth stages, are also those generally furthest from RNV conditions.

1.1.10 SUMMARY OF RNV-HABITAT MODEL STRENGTHS AND LIMITATIONS

Any type of forest projection model has strengths and limitations; this is true for the RNV-habitat change model employed in the DEIS.

Strengths

- The principal strength of this model is that it provides insights into landscape-scale changes in habitat suitability, which is especially true when the model directly accepts the outputs from the forest condition projection model.
- The model relies on the best available information on the current ecological condition of Minnesota's natural forest plant communities coupled with an understanding of forest successional patterns. Because the model focuses on change at the natural plant community-scale, it offers the benefit of avoiding the problems associated with modeling large numbers of individual species (e.g., endangered and threatened species lists).

Limitations

- The RNV model is limited in that it must be applied across broad spatial scales, ecosections or larger, and thus is not appropriate for subsection or finer-scale analyses. Related to the scale of application, the RNV model outputs provide an overview on the direction and magnitude of changes in forest composition and structure, which in turn relate the overall integrity of plant and animal populations; it is thus not designed to answer questions on an individual species basis.
- Forest patch dynamics are not taken into account, which is important because patch sizes and distribution may also have played a major part in maintaining plant and animal communities.
- Multiple factors determine habitat quality over time. This includes spatial arrangement of habitat, winter habitat or migrants, or while biological factors such as genetics or invasive species also play a role. The model does not account for all potential variables.

1.2 EXISTING CONDITIONS/FOREST ECOSYSTEMS

The first comparison of current forest conditions to RNV models was conducted in the Drift and Lake Plains (DLP) ecosection (Brown & White 2001). The analysis was based on a common forest inventory of DNR, county and federal lands, augmented with FIA data to account for private lands. This was followed in 2002 by a similar analysis of the Northern Superior Uplands (NSU) ecosection (Brown and White 2002). Because these studies are integral to the present DEIS they are attached to this document as Exhibits D.4 and D.5.

All 14 NPCs included in the RNV share a common pattern with respect to the RNV, the NPCs tend to be strongly overrepresented in the young to intermediate age classes (approximately 10 to ~100 years) and under represented in the older age classes (Exhibit D.6). There is a historical basis for this trend. Present day forests are the landscape response to the large-scale logging events and subsequent fires that occurred between 1880 and approximately 1920, in which many of the great pine forests and other late-successional and old growth forests of the Lake States were harvested. This history and its effects on present-day forests are well documented in Whitney (1987), Williams (1989), and Frelich (2002).

The studies cited above were based on common Minnesota forest inventory procedures, coupled with the 1990 FIA data. Since those reports were written, a more recent (2002) forest inventory was released. To determine the degree of change over this 10+ year period, the relationship between the RNV and two estimates of current condition; one from the 2001 FIA data release and a second from the 2002 Skally-White forest assessment, were evaluated.

There are differences in the older forest classes between the FIA and Skally-White data that preclude a direct comparison – the FIA data have far fewer plots in stands of 100-150 years of age, and virtually none older than 150 years (Exhibit D.6). While direct comparisons are not possible, it is apparent that the patterns found in the previous analysis persist relatively unchanged; RNV comparisons using the Skally-White data continue to show a strong overrepresentation of intermediate age classes, and an under representation of older VGSs (Exhibit D.7).

1.2.1 RESULTS: PROJECTED HABITAT CHANGE UNDER NO-BUILD ALTERNATIVE

A key finding of the existing condition analysis was that NPCs tend to be strongly overrepresented in the young to intermediate age classes and under represented in the older age classes. One consequence of this age structure demonstrated in the RNV modeling is that, over the four decades considered in this analysis, plant communities are generally moving toward their RNV. The following tables provide some examples of this trend from NPCs that are important sources of aspen.

The first example involves the Mesic-birch-aspen spruce-fir system, where the multi-aged conifer stage occupies 47-67 percent within its RNV, but currently occupies only 16 percent of that NPC. The system is currently below the minimum of the RNV (Table D-1). Under the No-Build Alternative, this percentage increases to approximately 31 percent because as this system ages, the proportion of stands containing conifers increases.

Table D-1
Range of Natural Variation – Northern Superior Uplands
Mesic Birch-Aspen-Spruce-Fir, Multi-Age Conifer Percent, 2001 - 2041

Alternative	Percent by Decade				
	2001	2011	2021	2031	2041
No-Build Alternative	15.7	24.5	30.7	32.5	31.9

RNV range 47.25-66.79 percent of NPC. Values are percent of NPC by decade.

The seedling-sapling growth stage of the Dry-mesic pine oak NPC is currently above its RNV, occupying 13 percent of the NPC in the Drift and Lake Plains. Under the No-Build Alternative, this VGS moves toward the RNV range of 3.6-6.7 percent of the NPC (Table D-2).

Table D-2
Range of Natural Variation – Drift and Lake Plains
Dry-Mesic Pine-Oak Forest, Seedling-Sapling Aspen-Pine-Oak, Percent, 2001 - 2041

Alternative	Percent by Decade				
	2001	2011	2021	2031	2041
No-Build Alternative	13.0	12.7	9.2	8.4	9.4

RNV range 3.58-6.86 percent of NPC. Values are percent of NPC by decade.

As a final example, the 11-50 year age class of the Mesic birch-aspen-spruce-fir community is currently overrepresented at 31.5 percent, compared with the RNV of 15.9 to 26 percent. In this case, however, the forest projections show this growth stage moving further above the upper range of the RNV, with an increase of approximately 8 percent in the first 20 years under the No-Build Alternative (Table D-3).

Table D-3
Range of Natural Variation – Northern Superior Uplands
Mesic Birch-Aspen-Spruce-fir, Age Class 11-50, Percent, 2001 - 2041

Alternative	Percent by Decade				
	2001	2011	2021	2031	2041
No-Build Alternative	31.5	34.7	39.4	41.4	39.8

Age Class - natural and anthropogenic VGSs combined.
RNV range 15.9-26 percent of NPC. Values are percent of NPC by decade.

The full set of trends for all VGSs over the four decades under the No-Build Alternative is presented in Exhibit D.3, with a full description of the values in the table. The changes in this value for each NPC over the four decades show how that class is moving toward or away from the RNV for that class.

It is generally true that, over the planning horizon of this study, most of the NPCs are moving toward their RNV. For that reason, the natural aging of the forest over time mediates many of the impacts noted in the GEIS. The RNV analysis is particularly relevant to those impact areas related to the balance of forest types and age structures across the landscape, such as GEIS significant impact areas 3 and 4, which refer to projected changes in tree species mix and age class structure of paper birch, as well as impact areas which are functions of composition and age class structure. These include genetic diversity, forest health risks, and loss of habitat for listed species (Poyry 1994). Wildlife is also an important consideration (Appendix E).

Based on the RNV modeling results presented in Exhibit.D, no change in NPC area as projected by the model over the 40-year planning horizon exceeds the GEIS significance criteria for GEIS impacts 3 or 4.

1.2.2 RESULTS: PROJECTED HABITAT CHANGE UNDER THE BUILD ALTERNATIVE

The marginal effects of implementing the Build Alternative relative to the No-Build Alternative were assessed for the DEIS. The comparison showed that the Build Alternative has both negative and positive effects with respect to moving the forest in total toward or away from the RNV. These effects are detailed at both the aggregated scale of NPCs and the more detailed scale of VGSs.

As with the No-Build Alternative, RNV-modeling of the Build Alternative produced forest change that varied from NPC to NPC as well as from VGS to VGS within a particular NPC. Comparison of the two alternatives yielded both positive and negative differences relative to RNV. Table D-4 builds upon the examples presented in Table D-1 through Table D-3 and shows different RNV values produced by implementing the Project versus the No-Build Alternative.

For the NSU Mesic birch-aspen-spruce-fir NPC, as previously noted the multi-aged conifer stage occupies 47-67 percent within its RNV but currently occupies only 16 percent of that NPC. This example shows that the VGS increases overall under both the Build and No-Build Alternatives, but that increase varies by decade as the system ages and the proportion of stands containing conifers increases. For the DLP Dry-mesic pine-oak forest, the Build Alternative tends to lie above or within the RNV range of 3.6-6.9 percent, so there is little difference between the Build and No-Build Alternatives with respect to this VGS. In the final example, the 11-50 year age class of the Mesic birch-aspen-spruce-fir community is projected to remain overrepresented (relative to RNV) under the Build Alternative, with the Build Alternative being slightly greater than the No-Build Alternative at the end of the study period.

Table D-4
Range of Natural Variation – Sample Comparisons between Build and No-Build Alternatives
Percent NPC/VGS 2001-2041

Natural Plant Community	VGS - (RNV Range)	Alternative	Percent by Decade				
			2001	2011	2021	2031	2041
NSU Mesic birch-aspen-spruce-fir	Multi-age conifer (47.25-66.79 percent of NPC)	No-Build	15.7	24.5	30.7	32.5	31.9
		Build	15.7	24.3	29.9	31.0	30.3
DLP Dry-mesic pine-oak forest	Seedling-sapling mesic-pine-oak (3.58-6.86 percent of NPC)	No-Build	13.0	12.7	9.2	8.4	9.4
		Build	13.0	13.0	9.1	9.9	9.6
NSU Mesic birch-aspen-spruce-fir	Age Class 11-50 Pole-mature birch (15.9-26.0 percent of NPC)	No-Build	31.5	34.7	39.4	41.4	39.8
		Build	31.5	34.9	39.7	42.2	40.0

While the results vary between the Build and No-Build Alternatives, there is a general trend toward more and stronger effects in Decades 3 and 4 of the model. Table D-5 provides an NPC-level summary of effects by treatment and decade. The source values for this index are provided in Exhibit D.3.

Negative scores (- or --) indicate that the Build Alternative moves the VGS away from RNV whereas positive (+) means the Build Alternative moves the NPC closer to RNV. "Away from" and "closer to" are both relative to the RNV condition under the No-Build Alternative. "Strong" effects in Table D-5 are those in which the weighted difference exceeds 5.0 or – 5.0 (Exhibit D.3)[5]. For the purposes of the DEIS, it is used as a criterion for denoting "substantial change" and is a means of identifying those plant communities most affected under the Build Alternative (and consequently which should be studied in terms of their growth stages to determine *how* they are affected). NPCs exhibiting strong negative effects for at least one decade of the study period include: DLP/11; NSU/2; NSU/6.[6]

1.2.3 CHANGE SUMMARY

1.2.3.1 Direction of Change – All Scenarios

Considering all derivative scenarios for the Build and No-Build Alternatives[7], negative effects (i.e., system moving away from RNV) increase as the projection period increases. The most negative effects occurred in the Mesic Birch-Aspen-Spruce-Fir NPC of the Northern Superior Uplands (NSU/6) – in

[5] The -5.0 score represents the 15th percentile cutoff for the distribution of these scores; this percentile is within the range of values (10-25 percent) commonly used in ecological risk assessment to identify areas in the "tails" of the distribution of biotic or environmental stress indices (Host et al. 2005, Hughes 1995, Yoder and Rankin 1995, Davis and Simon 1995). For the purposes of the table, (--) is assigned for those NPCs exceeding the 15th percentile, or < –5.0, cutoff.

[6] DLP/11 = Dry-mesic pine-oak forest/VGS11; NSU/2 = Mesic white and red pine/VSG2; NSU/6 = Mesic birch-aspen-spruce-fir/VGS6.

[7] See Appendix C, Section 4.1.

Decades 3 and 4 under the low private land availability-spruce-fir substitution derivative scenario (b-sf)[8]. Four other NPCs showed consistent negative effects in Decade 4: the Mesic White and Red system of the NSU and the three pine dominated NPC of the Drift and Lake Plains (Dry-mesic Pine Oak Forest, Dry-mesic Pine Forest, and Dry Pine Forest – DLPs 11-13). Note that while these systems are pine types in their late successional stages, aspen is a strong component of the early and mid-successional stages, so these types were targeted as a source of aspen fiber by the forest management model. In all three types, the negative impacts occur in the early successional stages (seedling-sapling and sapling pole) as well as the multi-aged stages (Table DLP/11 in Exhibit D.3). DLP/11 also showed moderate to strong negative impacts in Decade 1 and 3.

Table D-5
Marginal RNV Change between Build and No-Build Alternatives
NPC Level Summary of Effects by Treatment and Decade

NPC		Decade			
		1	2	3	4
DLP/7	Mesic boreal hardwood forest	–	+	+	+
DLP/11	Dry-mesic pine-oak forest	–	+	– –	–
DLP/12	Dry-mesic pine forest	–	–	–	–
NSU/2	Mesic white and red pine	+	– –	– –	–
NSU/3	Dry-mesic white and red pine	+	–	–	+
NSU/6	Mesic birch-aspen-spruce-fir	–	– –	– –	– –
NSU/12	Northern hardwood conifer	–	+	+	+

Key: (+) is a positive effect; (-) is a negative effect; (--) is a strong negative effect.
Note: The following NPCs: DLP/1; DLP/4; DLP/9; DLP/13; NSU/4; NSU5; NSU/7 did not have a sufficient number of harvest treatments to allow an RNV change analysis.[9] *See Figure D-3-2.*

In some cases, the Build Alternative had light to moderate positive effects, i.e. it moved NPCs toward the RNV. There were no cases with strong positive effects observed when the sample size > 30. Several NPC/Treatment/Decade combinations approached this. A closer look at the VGS-scale data for DLP/11 shows that the positive effect was due to early stages (1-15 and 16-35 years) that are currently over the RNV being reduced in area by the Build Alternative (Table DLP/11 in Exhibit D.3).

Several NPCs experienced few harvest actions in any instances; among these are the wetland systems: Tamarack Swamp (DLP/1), White Cedar Swamp (DLP/4), and Rich Swamp (NSU/5), but also the Mesic Northern Hardwood Forest (DLP/9), and, with a few exceptions, the Northern Hardwood-Conifers (NSU/12). Due to the low number of harvest actions projected by the model in these types, results should be interpreted with caution, and most conclusions based on those well represented by harvest activity.

[8] See Table D-3-1 for derivative scenario key.

[9] See Exhibit D.3.

1.2.3.2 Affected Acres

Table D-6 provides a summary of all vegetation growth stages (e.g., VGS) experiencing substantial change. The table also shows the area affected. As might be expected, the vegetation growth stages of the Mesic Birch-aspen-spruce-fir NPC are most affected, with impacts in Decades 2, 3 and 4, under all harvest scenarios. The acreages shown are the increase in acres harvested under the Build Alternative. The negatively affected acres go from 2052 in Decade 1 to 15,575 in Decade 4.

1.2.4 IMPLICATIONS OF MODELING RESULTS

Two key findings stand out in the present analysis. First, the number of vegetation growth stages that are currently under-represented and are moving away from the minimum of the RNV exceeds the number of those positively affected when comparing implementation of the Build Alternative to the No-Build Alternative; see Table D-3-2.[10] More important to note is the number of negative effects shows a steady increase over four decades of forest projections used in this study. These two results of the modeling indicate that project implementation will add to the challenge facing land managers to maintain and/or enhance forest habitat and species diversity, particularly in Decades 3 and 4 of the study period as defined by the assumptions that underlie this analysis. In many cases, the Build Alternative is projected to result in greater change (away from RNV) on forest growth stages that are already below their minimum RNV than the No-Build Alternative. The vegetation growth stages listed in Table D-5 are those of greatest concern as a function of DEIS-related modeling for the Build Alternative.

An observation can also be offered on the degree harvest was modeled to occur on public versus private ownerships. Fewer changes in RNV were present for Build Alternative derivatives where less harvest occurred on private lands.

These observations should be considered with caution and be taken in the context of current conditions. Most plant communities are to some degree removed from the RNV because of both historic and mid-century forest management practices.

[10] Table D-3-2 is a summary of weighted composite indices. The weighted composite index is the product of the VGS score times the change in land area (in percentage) resulting from the Build Alternative over the No-Build Alternative, summed across VGSs. It is essentially a "Change (in terms of direction and magnitude) X Percent Area Affected" score. This metric is experimental.

Table D-6

Area Affected (ac) in Vegetation Growth Stages Undergoing Substantial Change under the Build Alternative

Decade	Actions on this NPC in this Treatment	NPC code	NPC/VGS Stage	RNV, Percent	RNV Score	Level No-Build, Percent	Change due to Build, Percent-Percent	Total Area of NPC, Acres	Change due to Build, Acres	Impact Score
1	122	DLP/7	Mesic boreal hardwood forest (4)	2.6-4.5	-0.48	2.1	-0.15	1,281,445	-1,893	-3.36
4	122	DLP/7	Mesic boreal hardwood forest (6)	5.8-8.7	-0.39	4.5	-0.14	1,281,445	-1,813	-1.23
1	166	DLP/11	Dry-mesic pine-oak forest (5)	16.3-20	-1.00	0.7	-0.01	1,510,766	-159	-1.43
4	81	NSU/2	Mesic white and red pine (5)	11.7-12.5	-0.71	4.6	-0.14	519,776	-725	-2.14
4	81	NSU/2	Mesic white and red pine (9)	9.8-10.4	-0.39	6.4	-0.30	519,776	-1,564	-1.82
2	108	NSU/6	Mesic birch-aspen-spruce-fir (4)	47.2-66.8	-0.49	30.7	-0.84	719,382	-6,054	-1.32
3	108	NSU/6	Mesic birch-aspen-spruce-fir (4)	47.2-66.8	-0.47	32.5	-1.47	719,382	-10,566	-2.13
4	108	NSU/6	Mesic birch-aspen-spruce-fir (4)	47.2-66.8	-0.49	31.9	-1.59	719,382	-11,473	-2.47

*The Impact Score is calculated by [d/R*100*S] where: d = the absolute value of change due to the Project; R = the No-Build Alternative reference level; and S = the RNV score. It provides a relative magnitude of change between the Build and No-Build Alternatives.*

1.2.5 ADDITIONAL INSIGHTS FROM RNV MODELING

The Final Scoping Decision required the DEIS to evaluate the environmental consequences of a No-Build and Build Alternative. As noted in DEIS Appendix C, modeling of forest conditions included several derivative Build and No-Build scenarios; these outputs were used in the RNV model. Although not required by the Final Scoping Decision, this section provides insights from this additional modeling; see Exhibit D.3 and Table D-3-2 for additional information.

Derivative scenarios were also modeled in conjunction with the primary Build and No-Build Alternatives; see DEIS Appendix C, Table C-5, for a full description of the underlying assumptions for these outputs. The assumptions in these derivative scenarios varied from the primary alternatives in terms of degree of: private land availability; substitute species harvest (to replace aspen); and spruce-fir harvest (to replace aspen). Some patterns emerge from that data summary that may have implications for land management planning in the future. When considering each NPC at a given vegetation growth stage, the numbers of strong negative changes by derivative Build scenarios (summed across decades from Table D-7) was[11]:

- 7 for Scenario a-ss (A&P&SS)[12] (Build, aspen from private land, with species substitution)
- 6 for Scenario a (A&P)[12] (Build, aspen from private land, no species substitution)
- 2 for Scenario b-ss (B&P&SS) [12] (Build less aspen from private land, with species substitution)
- 4 for Scenario b (B&P) [12] (Build less aspen from private land, no species substitution)
- 5 for Scenario b-sf (B&P&SF)[12] (Build less aspen from private land, species substitution including spruce-fir)

In general, the derivative scenarios that harvest less aspen from private lands ("b" scenarios) had fewer changes than those that relied more heavily on harvest from non-public ownerships ("a" scenarios).

[11] Scenario key for Table D-7: a-ss: Build, aspen from private land, with species substitution; a: Build, aspen from private land, no species substitution; b-ss: Build less aspen from private land, with species substitution; b: Build less aspen from private land, no species substitution; b-sf: Build less aspen from private land, species substitution including spruce-fir. See Exhibit D.3.1, Table D-3-2 for additional information.

[12] Corresponding forestry modeling scenarios – See Appendix C, Table C-5.

Table D-7

Area Affected (ac) in Vegetation Growth Stages Undergoing Substantial Change under Derivative Build Scenarios

Scenario, Decade[13]	Actions on this NPC in this Treatment	NPC code	NPC / (VGS Stage)	RNV, Percent	RNV Score	Level No-Build, Percent	Change due to Build, Percent-Percent	Total Area of NPC, Acres	Change due to Build, Acres	Impact Score
b-s, 4	144	NSU/6	Mesic birch-aspen-spruce-fir (4)	47.2-66.8	-0.57	32.5	-3.31	719,382	-2,3840	-5.80
a-ss, 3	61	DLP/7	Mesic boreal hardwood forest (4)	2.6-4.5	-0.60	1.9	-0.16	1,281,445	-2,090	-5.25
b, 3	137	NSU/6	Mesic birch-aspen-spruce-fir (1)	4.8-9.1	-0.50	4.2	-0.38	719,382	-2,740	-4.48
a-ss, 4	64	NSU/6	Mesic birch-aspen-spruce-fir (4)	47.2-66.8	-0.54	31.9	-2.43	719,382	-17,509	-4.10
a, 1	122	DLP/7	Mesic boreal hardwood forest (4)	2.6-4.5	-0.48	2.1	-0.15	1,281,445	-1,893	-3.36
a-ss, 3	64	NSU/6	Mesic birch-aspen-spruce-fir (4)	47.2-66.8	-0.51	32.5	-2.14	719,382	-15,384	-3.34
a, 4	108	NSU/6	Mesic birch-aspen-spruce-fir (4)	47.2-66.8	-0.49	31.9	-1.59	719,382	-11,473	-2.47
b-sf, 3	144	NSU/6	Mesic birch-aspen-spruce-fir (4)	47.2-66.8	-0.47	32.6	-1.55	719,382	-11,186	-2.25
a, 4	81	NSU/2	Mesic white and red pine (5)	11.7-12.5	-0.71	4.6	-0.14	519,776	-725	-2.14
a, 3	108	NSU/6	Mesic birch-aspen-spruce-fir (4)	47.2-66.8	-0.47	32.5	-1.47	719,382	-10,566	-2.13
a, 4	81	NSU/2	Mesic white and red pine (9)	9.8-10.4	-0.39	6.4	-0.30	519,776	-1,564	-1.82
b-sf, 3	173	DLP/7	Mesic boreal hardwood forest (4)	2.6-4.5	-0.50	1.9	-0.06	1,281,445	-832	-1.68
a, 1	166	DLP/11	Dry-mesic pine-oak forest (5)	16.3-20	-1.00	0.7	-0.01	1,510,766	-159	-1.43
a-ss, 1	101	DLP/11	Dry-mesic pine-oak forest (5)	16.3-20	-1.00	0.7	-0.01	1,510,766	-150	-1.35
a, 2	108	NSU/6	Mesic birch-aspen-spruce-fir (4)	47.2-66.8	-0.49	30.7	-0.84	719,382	-6,054	-1.32
a, 4	122	DLP/7	Mesic boreal hardwood forest (6)	5.8-8.7	-0.39	4.5	-0.14	1,281,445	-1,813	-1.23

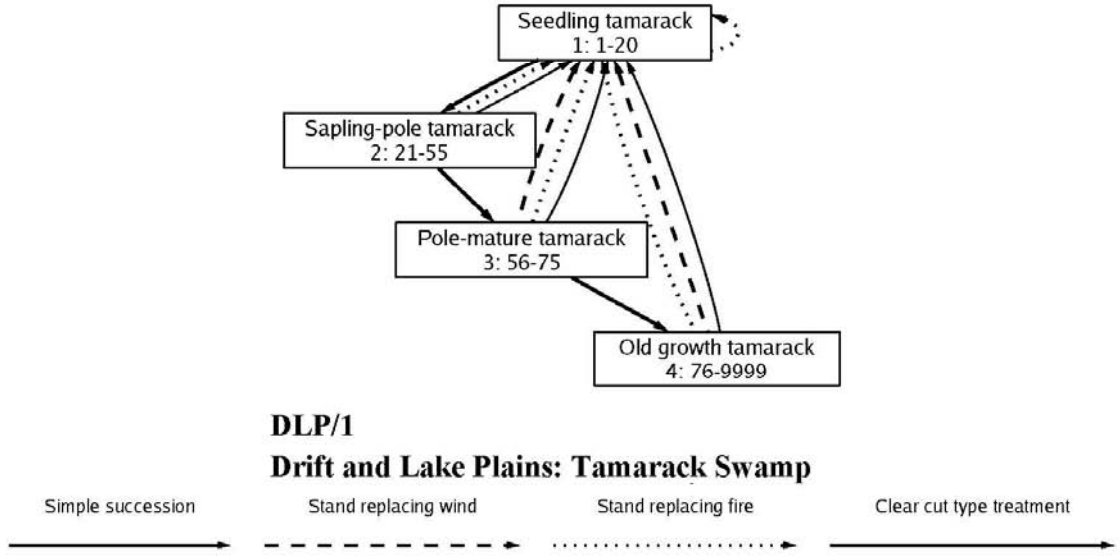
NPCs listed meet 15th percentile weighted-score cutoff.
*Scenario Key: a-ss: Build, aspen from private land, with species substitution; a: Build, aspen from private land, no species substitution; b-ss: Build less aspen from private land, with species substitution; b: Build less aspen from private land, no species substitution; b-sf: Build less aspen from private land, species substitution including spruce-fir. The Impact Score is calculated by [d/R*100*S] where: d = the absolute value of change due to the Project; R = the No-Build Alternative reference level; and S = the RNV score. It provides a relative magnitude of change between the Build and No-Build Alternatives. See Exhibit D.3.1, Table D-3-2 for additional information.*

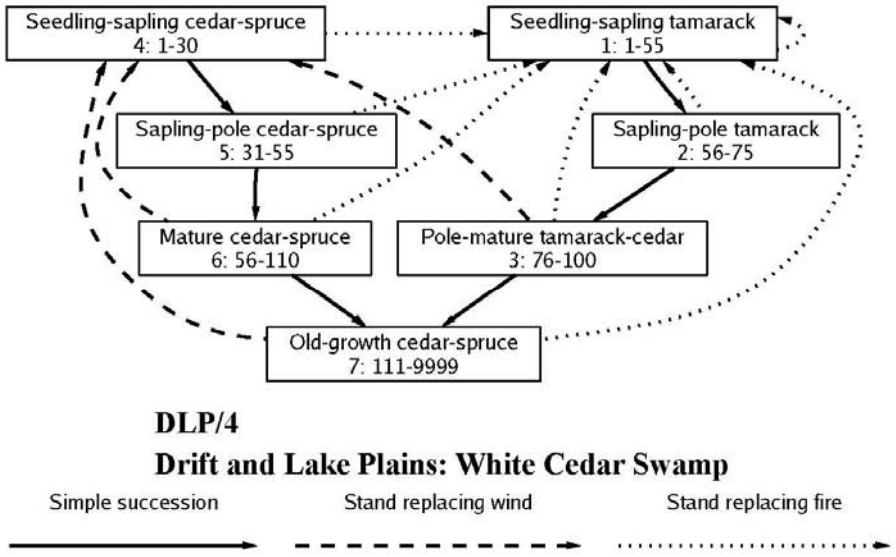
[13] Scenario key correlation to Appendix C (see Table C-5): a = A&P; a-ss = A&P&SS; b = B&P; b-ss = B&P&SS; b-sf = B&P&SF.

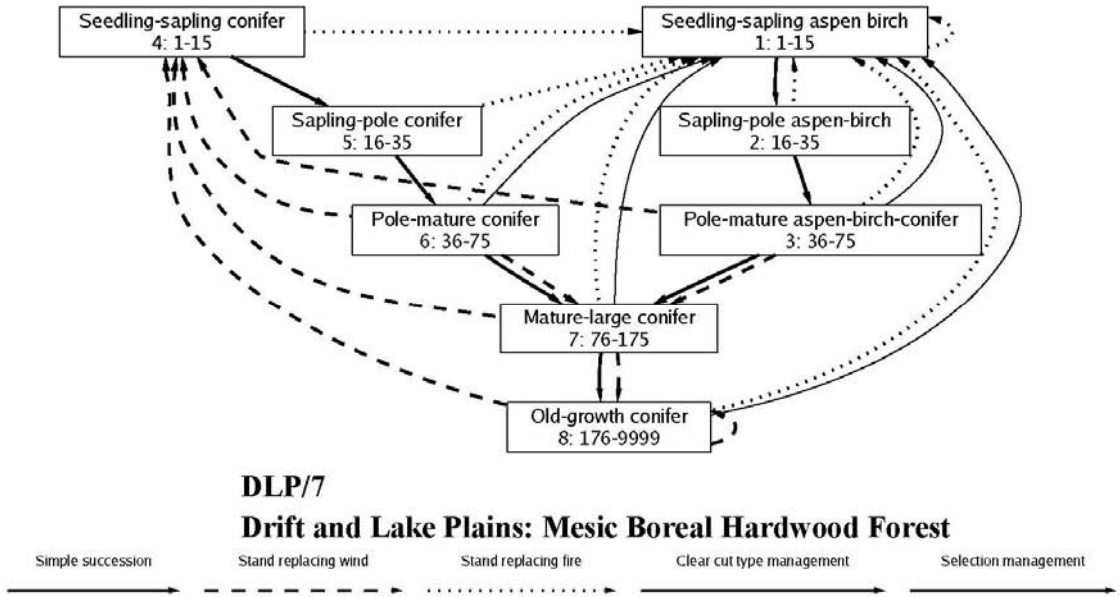
EXHIBIT D.1 FOREST SUCCESSIONAL MODELS

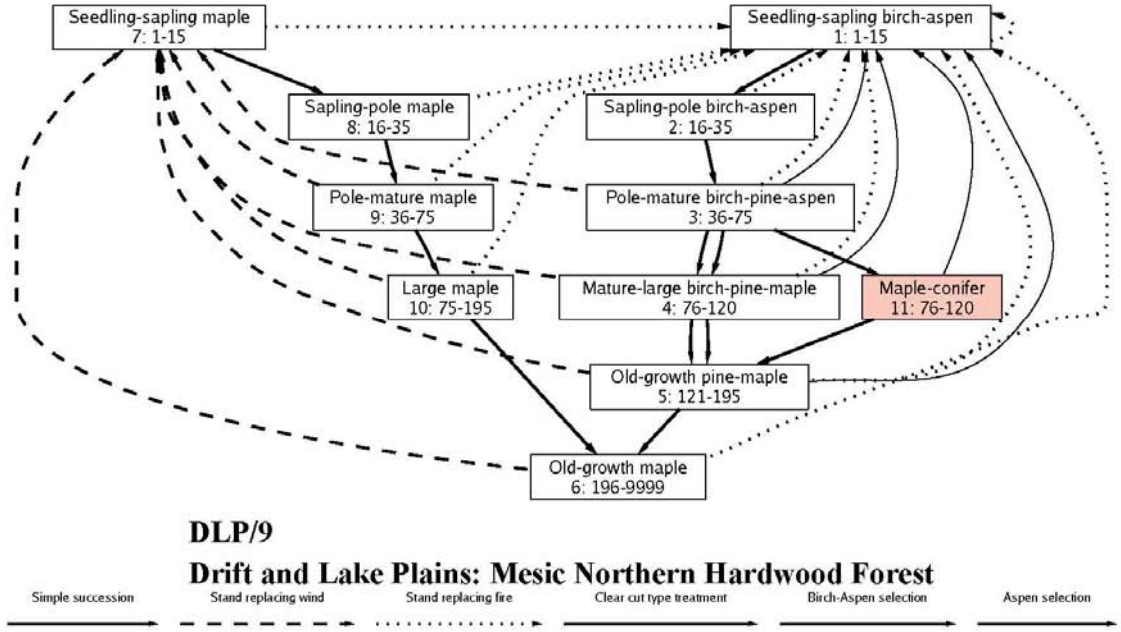
Pathways for the fourteen forest successional models are as follows.

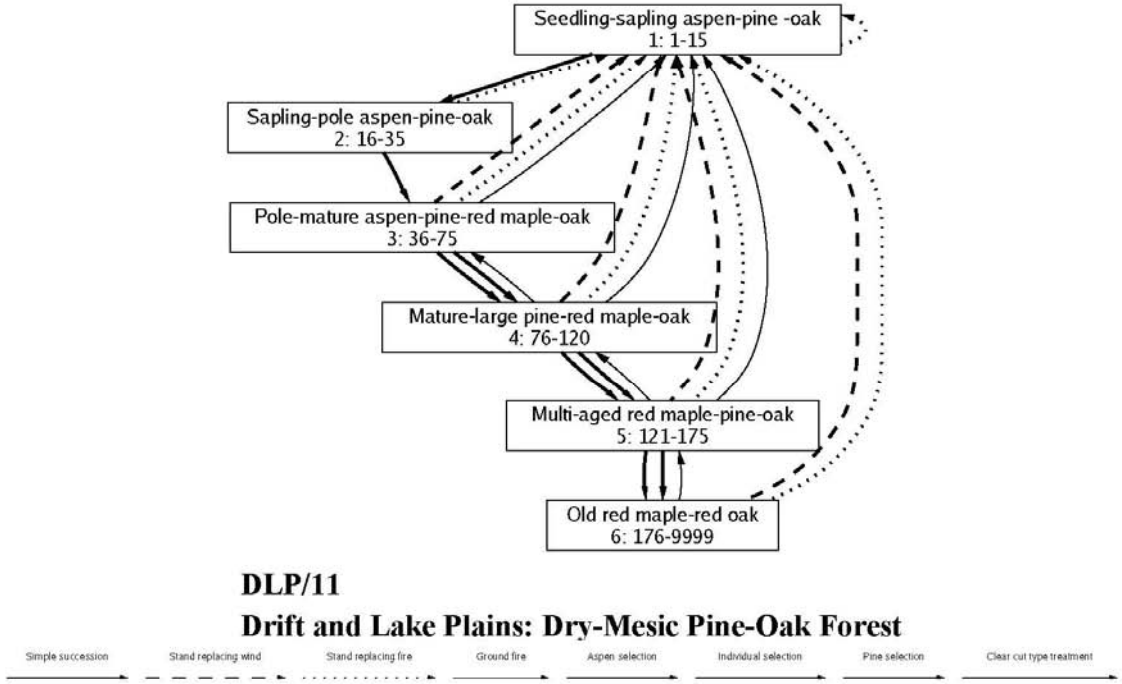
Shaded Vegetation Growth Stages (VGSs) are of anthropogenic origin.

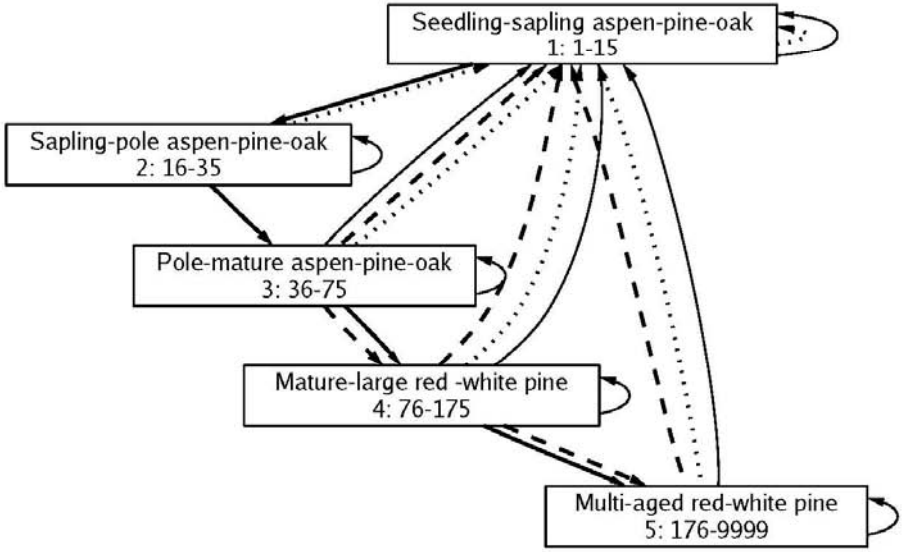

Seedling tamarack
1: 1-20
Sapling-pole tamarack
2: 21-55
Pole-mature tamarack
3: 56-75
Old growth tamarack
4: 76-9999
DLP/1
Drift and Lake Plains: Tamarack Swamp
Simple succession
Stand replacing wind
Stand replacing fire
Clear cut type treatment


Seedling-sapling cedar-spruce
4: 1-30
Seedling-sapling tamarack
1: 1-55
Sapling-pole cedar-spruce
5: 31-55
Sapling-pole tamarack
2: 56-75
Mature cedar-spruce
6: 56-110
Pole-mature tamarack-cedar
3: 76-100
Old-growth cedar-spruce
7: 111-9999
DLP/4
Drift and Lake Plains: White Cedar Swamp
Simple succession
Stand replacing wind
Stand replacing fire


Seedling-sapling conifer
4: 1-15
Seedling-sapling aspen birch
1: 1-15
Sapling-pole conifer
5: 16-35
Sapling-pole aspen-birch
2: 16-35
Pole-mature conifer
6: 36-75
Pole-mature aspen-birch-conifer
3: 36-75
Mature-large conifer
7: 76-175
Old-growth conifer
8: 176-9999
DLP/7
Drift and Lake Plains: Mesic Boreal Hardwood Forest
Simple succession
Stand replacing wind
Stand replacing fire
Clear cut type management
Selection management

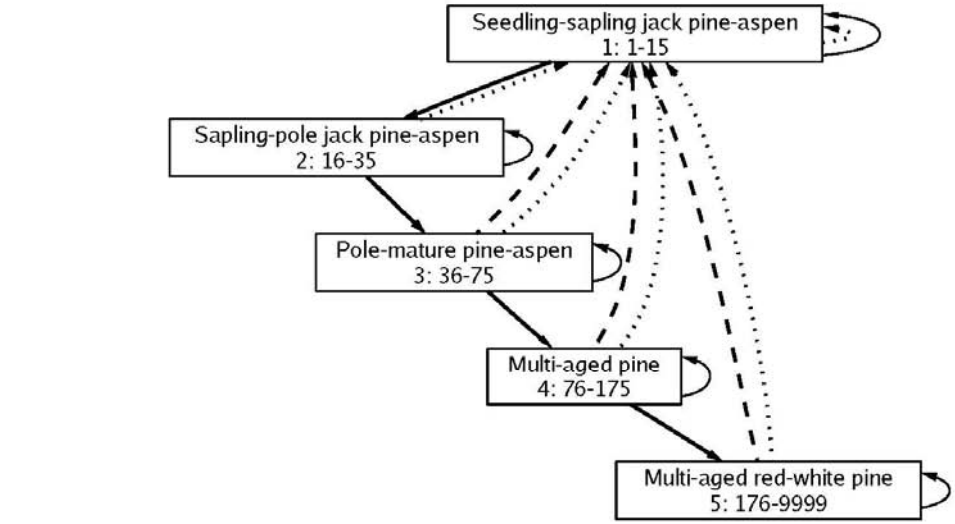

Seedling-sapling maple
7: 1-15
Seedling-sapling birch-aspen
1: 1-15
Sapling-pole maple
8: 16-35
Sapling-pole birch-aspen
2: 16-35
Pole-mature maple
9: 36-75
Pole-mature birch-pine-aspen
3: 36-75
Large maple
10: 75-195
Mature-large birch-pine-maple
4: 76-120
Maple-conifer
11: 76-120
Old-growth pine-maple
5: 121-195
Old-growth maple
6: 196-9999
DLP/9
Drift and Lake Plains: Mesic Northern Hardwood Forest
Simple succession
Stand replacing wind
Stand replacing fire
Clear cut type treatment
Birch-Aspen selection
Aspen selection

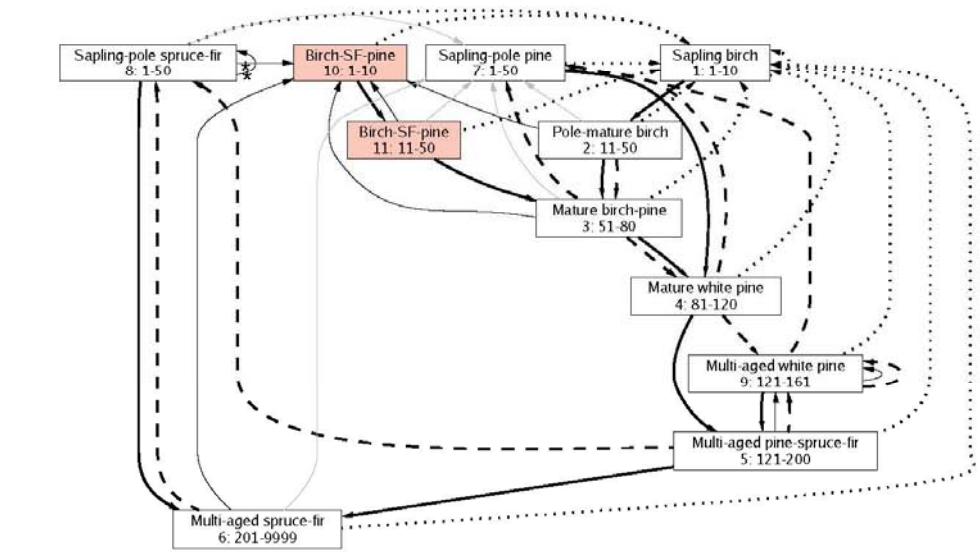

Seedling-sapling aspen-pine -oak
1: 1-15
Sapling-pole aspen-pine-oak
2: 16-35
Pole-mature aspen-pine-red maple-oak
3: 36-75
Mature-large pine-red maple-oak
4: 76-120
Multi-aged red maple-pine-oak
5: 121-175
Old red maple-red oak
6: 176-9999
DLP/11
Drift and Lake Plains: Dry-Mesic Pine-Oak Forest
Simple succession
Stand replacing wind
Stand replacing fire
Ground fire
Aspen selection
Individual selection
Pine selection
Clear cut type treatment



DLP/12

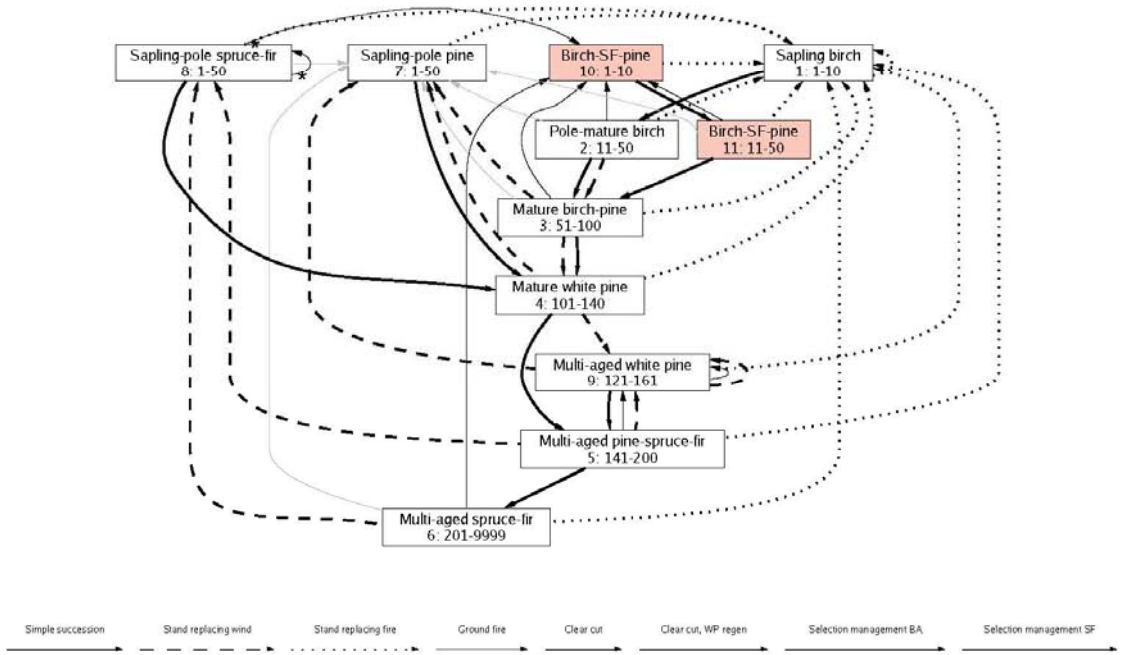
Drift and Lake Plains: Dry-Mesic Pine Forest


Seedling-sapling jack pine-aspen
1: 1-15
Sapling-pole jack pine-aspen
2: 16-35
Pole-mature pine-aspen
3: 36-75
Multi-aged pine
4: 76-175
Multi-aged red-white pine
5: 176-9999
DLP/13
Drift and Lake Plains: Dry Pine Forest
Simple succession
Stand replacing wind
Stand replacing fire
Ground fire



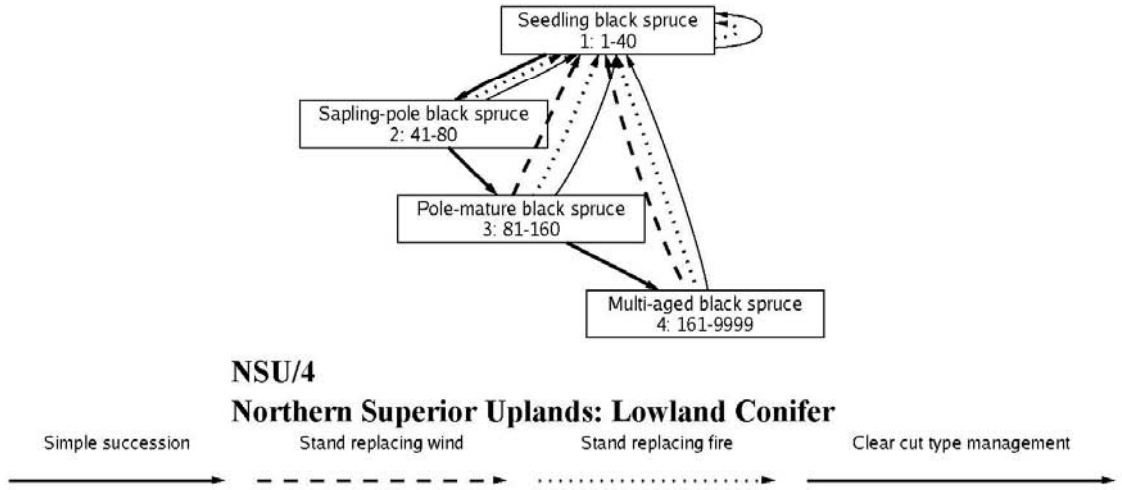
NSU/2

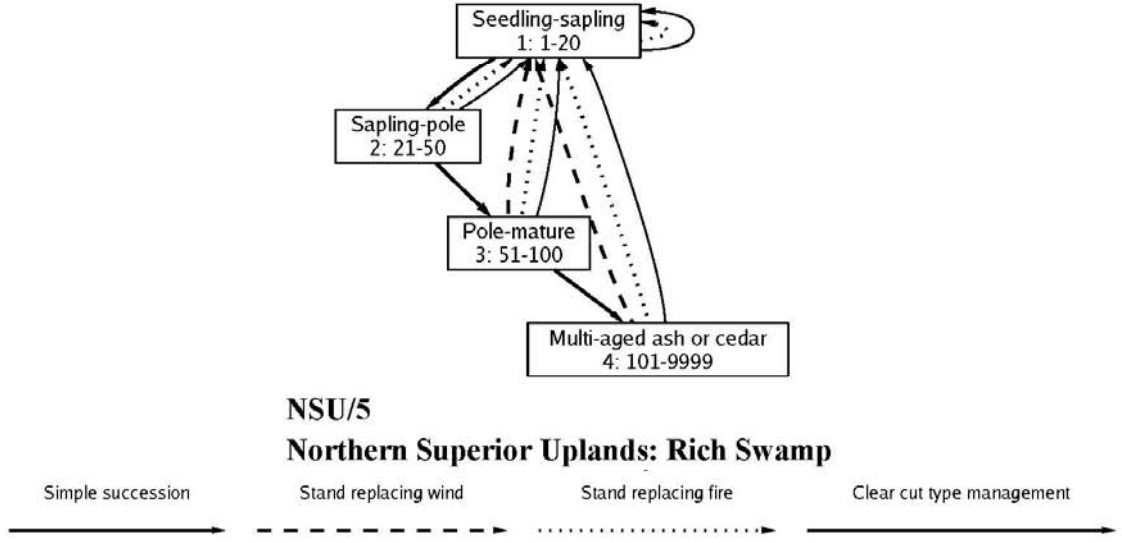
Northern Superior Uplands: Mesic White and Red Pine

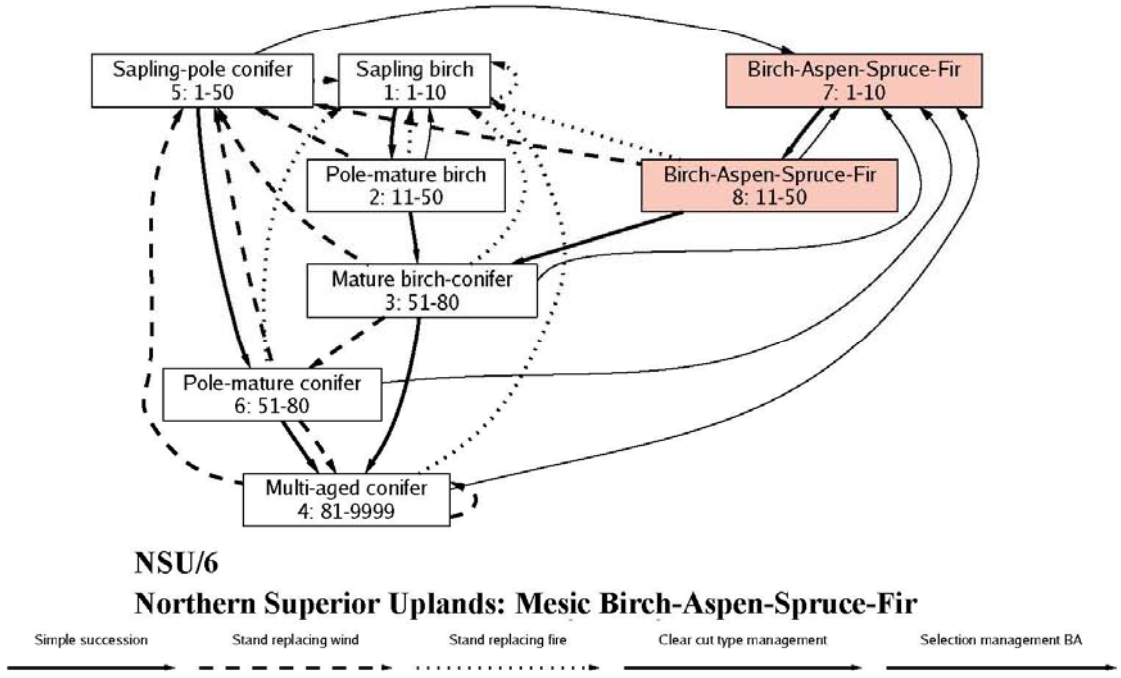


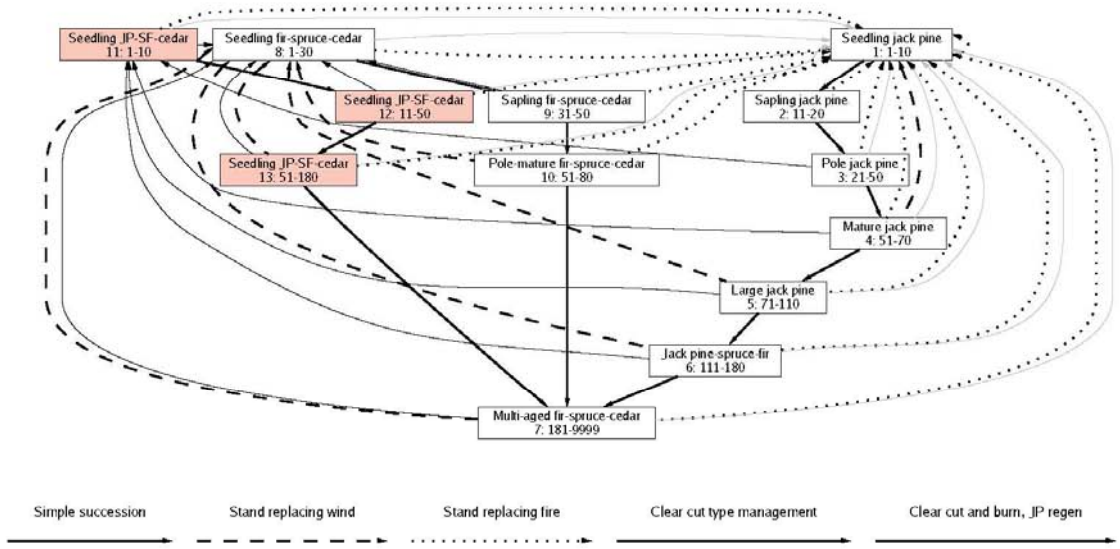
NSU/3

Northern Superior Uplands: Dry-Mesic White and Red Pine


Seedling black spruce
1: 1-40
Sapling-pole black spruce
2: 41-80
Pole-mature black spruce
3: 81-160
Multi-aged black spruce
4: 161-9999
NSU/4
Northern Superior Uplands: Lowland Conifer
Simple succession
Stand replacing wind
Stand replacing fire
Clear cut type management

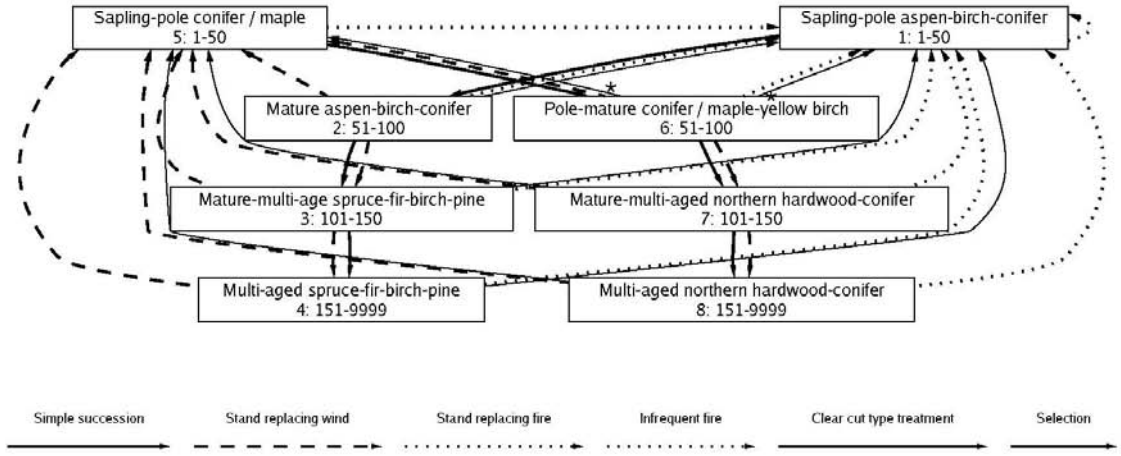

Seedling-sapling
1: 1-20
Sapling-pole
2: 21-50
Pole-mature
3: 51-100
Multi-aged ash or cedar
4: 101-9999
NSU/5
Northern Superior Uplands: Rich Swamp
Simple succession
Stand replacing wind
Stand replacing fire
Clear cut type management


Sapling-pole conifer
5: 1-50
Sapling birch
1: 1-10
Birch-Aspen-Spruce-Fir
7: 1-10
Pole-mature birch
2: 11-50
Birch-Aspen-Spruce-Fir
8: 11-50
Mature birch-conifer
3: 51-80
Pole-mature conifer
6: 51-80
Multi-aged conifer
4: 81-9999
NSU/6
Northern Superior Uplands: Mesic Birch-Aspen-Spruce-Fir
Simple succession
Stand replacing wind
Stand replacing fire
Clear cut type management
Selection management BA



NSU/7

Northern Superior Uplands: Jack Pine-Black Spruce



NSU/12

Northern Superior Uplands: Northern Hardwood Conifer

EXHIBIT D.2 FOREST RNV ANALYSIS CROSSWALKS AND TECHNICAL NOTES

Analysis Overview

Data from simulations of build and no-build forest conditions over the next four decades are supplied by Dr. Howard Hoganson. The Range of Natural Variation (RNV) analysis uses the PolyStat component of the output of Dr. Hoganson's DualPlan model. For details of the DualPlan modeling see the forest condition sections of this report.

The build and no-build scenarios have been simulated for much of northern Minnesota, but not for Forest Service lands. It is assumed that the Forest Service will not significantly modify their management practices if the mill expansion occurs. Therefore the most accurate available projection of future forest conditions on Forest Service lands comes from the DualPlan simulations previously conducted for the preferred alternative management plan recently adopted by the Forest Service. For the RNV analysis these results are combined with the build and no-build simulation results as follows:

NON_FS_DLP_nobuild + CHP = DLP_nobuild
NON_FS_DLP_build + CHP = DLP_build
NON_FS_NSU_nobuild + SUP = NSU_nobuild
NON_FS_NSU_build + SUP = NSU_build

where

CHP

is the simulated condition of the Chippewa National Forest irrespective of mill expansion

SUP

is the simulated condition of the Superior National Forest irrespective of mill expansion

NON_FS_DLP_nobuild

is the new simulated condition for the Drift and Lake Plains in the no build scenario, excluding Chippewa National Forest lands

NON_FS_NSU_nobuild

is the new simulated condition for the Northern Superior Uplands in the no build scenario, excluding Superior National Forest lands

NON_FS_DLP_build

is the new simulated condition for the Drift and Lake Plains in the build scenario, excluding Chippewa National Forest lands

NON_FS_NSU_build

is the new simulated condition for the Northern Superior Uplands in the no build scenario, excluding Superior National Forest lands

Scores for Project impacts on forest RNV status are derived by comparing DLP_nobuild to DLP_build and NSU_nobuild to NSU_build. Note that all of these variables are not single numbers (scalars), but four-dimensional matrices with ecosystem type, age, years from present, and area information.

Scores for the impact of the expansion in the RNV context are calculated by comparing the difference between the no-build and build scenarios with respect to the RNV. The following equation is used, where current represents DLP_nobuild or NSU_nobuild and change represents DLP_build - DLP_nobuild or NSU_build - NSU_nobuild.

$$
\begin{aligned}
&\text{steps} && = 6\\
&\text{outer} && = \text{steps} - 1\\
&\text{inner} && = 1\\
&\text{current} && > \ \text{rnv.midpoint} \begin{cases} \text{change} < 0 \rightarrow \text{sign} = 1,\ \text{adjusted} = \text{current} \\ \text{change} > 0 \rightarrow \text{sign} = -1,\ \text{adjusted} = \text{current} + \text{change} \end{cases}\\
&\text{current} && < \ \text{rnv.midpoint} \begin{cases} \text{change} < 0 \rightarrow \text{sign} = -1,\ \text{adjusted} = \text{current} + \text{change} \\ \text{change} > 0 \rightarrow \text{sign} = 1,\ \text{adjusted} = \text{current} \end{cases}\\
&\text{adjusted} && < \text{rnv.midpoint} - (\text{outer} \times \text{steps}) \rightarrow \text{magnitude} = 1.0\\
&\text{adjusted} && > \text{rnv.midpoint} + (\text{outer} \times \text{steps}) \rightarrow \text{magnitude} = 0.5\\
&\text{adjusted} && < \text{rnv.midpoint} - (\text{inner} \times \text{steps}) \rightarrow \text{magnitude} = 1.0 \times \frac{(\text{rmv.midpoint} - (\text{inner} \times \text{steps})) - \text{adjusted}}{(\text{rmv.midpoint} - (\text{inner} \times \text{steps})) - (\text{rmv.midpoint} - (\text{outer} \times \text{steps}))}\\
&\text{adjusted} && > \text{rnv.midpoint} + (\text{inner} \times \text{steps}) \rightarrow \text{magnitude} = 0.5 \times \frac{\text{adjusted} - (\text{rmv.midpoint} - (\text{inner} \times \text{steps}))}{(\text{rmv.midpoint} + (\text{outer} \times \text{steps})) - (\text{rmv.midpoint} + (\text{inner} \times \text{steps}))}\\
&\begin{pmatrix} \text{rnv.midpoint} - \\ \text{inner} \times \text{steps} \end{pmatrix} && \leq \text{adjusted} \leq \begin{pmatrix} \text{rnv.midpoint} + \\ \text{inner} \times \text{steps} \end{pmatrix} \rightarrow \text{magnitude} = 0.0\\
&\text{score} && = \text{sign} \times \text{magnitude}
\end{aligned}
$$

RNV Impact Scoring

An ecosystem structure specification file is loaded and used to derive maximum ages for each VGS. Stands whose age could occur in more than one VGS are partitioned between VGSs based on results from running the RNV model to equilibrium with human disturbances included. Ecosystem classes are crosswalked as follows:

MN forest classification crosswalks

Generated: 2005-08-11T15:10:08-05:00

Domains

Domain: LF_NSU

Lee Frelich's NSU ecosystems

Lee Frelich's eight Northern Superior Upland ecosystems. Mark White's ecosystem maps for the NSU use this coding system.

Domain: LFMW_NSU

Frelich's NSU ecosystems plus new NH

Lee Frelich's eight Northern Superior Upland ecosystems with a substitute northern hardwood class. NRRI's set of models for the NSU use this coding system.

Domain: SH_DLP

Shadis's DLP ecosystems

Shadis's Drift and Lake Plains ecosystems. Shadis's ecosystem maps for the DLP use this coding system.

Domain: LF_DLP

Lee Frelich's DLP ecosystems

Lee Frelich's Drift and Lake Plains ecosystems. NRRI's set of models for the DLP use this coding system.

Domain: HH_MNFOR

Howard Hoganson's UPM/Blandin EIS simulation classes

Howard Hoganson's UPM/Blandin EIS simulation classes. These cover NSU, DLP, MOP (Minnesota Ontario Peatlands). MOP classes are not included here.

Domain: FS_NSU

U.S.F.S. forest plan NSU model classes.

Used by the U.S.F.S. in the final modeling of their recently adopted plan.

Domain: FS_DLP

U.S.F.S. forest plan DLP model classes.

Used by the U.S.F.S. in the final modeling of their recently adopted plan.

Crosswalk: NSU_NH NSU with New Northern Hardwood

LF_NSU Lee Frelich's NSU ecosystems	LFMW_NSU Frelich's NSU ecosystems plus new NH	HH_MNFOR Howard Hoganson's UPM/Blandin EIS simulation classes	FS_NSU U.S.F.S. forest plan NSU model classes.
1 Sugar maple	12 Northern Hardwood Conifer	16 Sugar Maple	1 Sugar maple
2 Mesic white and red pine	2 Mesic white and red pine	14 Mesic white pine-red pine	2 Mesic white pine-red pine
3 Dry-mesic white and red pine	3 Dry-mesic white and red pine	10 Dry mesic white pine-red pine	3 Dry mesic white pine-red pine
4 Lowland Conifer	4 Lowland Conifer	12 Lowland Conifer	6 Dry Mesic Lowland 7 Mesic Lowland 9 Lowland Conifer
5 Rich Swamp	5 Rich Swamp	15 Rich Swamp	8 Sugar Maple Lowland
6 Mesic birch-aspen-spruce-fir	6 Mesic birch-aspen-spruce-fir	13 Mesic aspen-birch-spruce-fir	4 Mesic aspen-birch-spruce-fir
7 Jack pine-black spruce	7 Jack pine-black spruce	9 Dry mesic jack pine-black spruce	5 Dry mesic jack pine-black spruce
8 Jack pine-aspen-oak	8 Jack pine-aspen-oak	11 Jack pine-aspen-oak	
		17 NSU other	
			10 Other

Crosswalk: DLP_SF DLP Shadis Map to Frelich Models

SH_DLP Shadis's DLP ecosystems	LF_DLP Lee Frelich's DLP ecosystems	HH_MNFOR Howard Hoganson's UPM/Blandin EIS simulation classes	FS_DLP U.S.F.S. forest plan DLP model classes.
6 Tamarack Swamp	1 Tamarack Swamp	7 Tamarack Swamp	7 Ecol Area 7: Tamarack Swamp
9 Sedge Meadow			
	3 Forested Poor Fen		
3 White cedar swamp	4 White cedar swamp	6 White cedar lowlands	6 Ecol Area 6: White cedar lowlands
1 Boreal Hardwood Conifer	7 Mesic boreal hardwood forest	5 Boreal Hardwood Conifer	5 Ecol Area 5: Boreal Hardwood Conifer
8 Mesic northern hardwood	9 Mesic northern hardwood forest	4 Mesic Northern Hardwood	4 Ecol Area 4: Mesic Northern Hardwood
2 Dry-mesic pine / oak	11 Dry-mesic pine-oak forest	2 Dry Mesic Pine Oak	2 Ecol Area 2: Dry Mesic Pine Oak
4 Dry-mesic pine	12 Dry-mesic pine forest	3 Dry Mesic Pine	3 Ecol Area 3: Dry Mesic Pine
5 Dry pine	13 Dry pine forest	1 Dry pine	1 Ecol Area 1: Dry Pine
		8 DLP other	
			8 Ecol Area 8: Unclassified
7 Water			

EXHIBIT D.3 SUMMARY AND VGS LEVEL FOREST RNV RESULTS

Section D.3.1 provides a table which summarizes effects across all Native Plant Communities. Section D.3.2 provides an interpretation guide for the Vegetation Growth Stages level results listed in Section D.3.3. In all these sections codes for alternatives are as follows:

Table D-3-1
Key to Treatment Codes *

Code	Alternative
a	Build, aspen from private land, no species substitution
a-ss	Build, aspen from private land, species substitution
b	Build, less aspen from private land, no species substitution
b-ss	Build, less aspen from private land, species substitution
b-sf	Build, less aspen from private land, species substitution including spruce-fir

** Scenario key correlation to Appendix C (see Table C-5): a = A&P; a-ss = A&P&SS; b = B&P; b-ss = B&P&SS; b-sf = B&P&SF*

D.3.1 NPC-LEVEL SUMMARY OF EFFECTS BY TREATMENT AND DECADE

The following sections provide background information for the *Results: Projected Habitat Change under Build Alternative* section of Appendix D, which evaluates the marginal effects of the Build Alternative over the projections under the No-Build Alternative. The following sections detail these effects at the aggregated scale of NPCs and the more detailed scale of VGSs.

The table on the next page provides an NPC-level summary of effects by treatment and decade. Values in Table D-3-2 are a weighted composite index formed as the product of the VGS Score (percent of the VGS affected by the Build Alternative and percentage of the VGS in the No-Build Alternative, as a percentage). These values are summed across VGSs, as described in Section D.3.1. The source values for this index are provided in Section D.3.2, and the tables and cell values are explained in the Section D.3.3. Cells are shaded orange or blue based on the direction and magnitude of the effect. Orange or negative scores indicate that the Build Alternative moves the VGS away from RNV, blue or positive means the Build Alternative moves the NPC closer to RNV. "Away from" and "closer to" are both relative to the No-Build Alternative. "Strong" effects in this table are those in which the weighted difference exceeds 5.0 or – 5.0; these receive the darkest shades of orange or blue. The -5.0 score represents the 15th percentile cutoff for the distribution of these scores. This percentile is within the range of values (10-25 percent) commonly used in ecological risk assessment to identify areas in the "tails" of the distribution of biotic or environmental stress indices (Host et al. 2005, Hughes 1995, Yoder and Rankin 1995, Davis and Simon 1995). This criterion was developed for "significant impact" and a means of identifying those plant communities most affected under the Build Alternative (and consequently which should be studied in terms of their growth stages to determine *how* they are impacted).

Sample size is an important consideration in interpreting these results. The most robust estimates are based on many "actions", where an "action" is an individual harvest operation in the forest management model. Scores based on 60 or more actions are marked with a two asterisks, those based on 30-60 actions are marked with a single asterisk. Scores based on < 30 actions (meaning there was little harvest activity in these systems) might allow individual harvests to have an unduly large influence on the results – these should be interpreted with caution.

Finally, since individual VGS-level scores were summed to create the aggregate index, it was possible for negative and positive effects to "cancel out", so that scores near 0 ("no effect") could result from strong negative and positive effects. For this reason, interpretations are made both on the aggregate scores in table, and the individual VGS-scale tables that produced these (Section D.3.3).

Table D-3-2
NPC-level Summary of Effects by Treatment and Decade 2001-2041

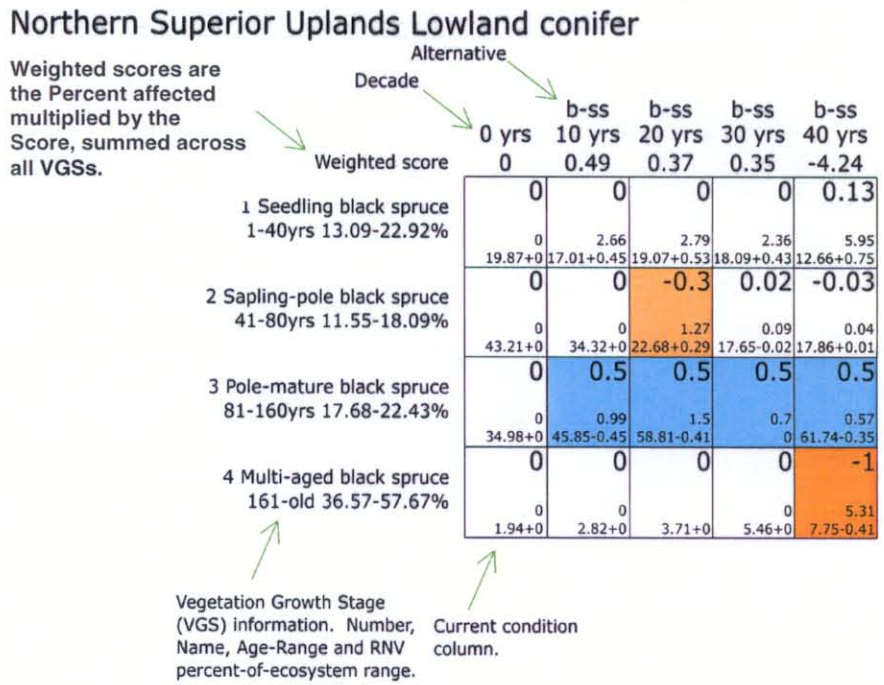
Year	10					20					30					40				
Alternative	a-ss	a	b-ss	b	b-sf	a-ss	a	b-ss	b	b-sf	a-ss	a	b-ss	b	b-sf	a-ss	a	b-ss	b	b-sf
Pos. changes	2	6	6	6	7	5	5	4	5	4	1	3	7	10	4	5	5	4	6	5
Neg. changes	7	7	5	7	5	7	8	7	8	9	11	10	4	4	10	7	9	9	7	9
Pos. changes >= 5	0	1	0	0	1	0	1	1	0	1	0	1	2	1	0	0	1	1	1	1
Neg. changes <= -5	0	1	0	3	1	2	2	2	2	1	3	5	0	0	5	4	2	2	2	5
DLP/1 Tamarack Swamp	2.63	-8.98	0.02	0.14	13	0.96	-1.3	5.19	4.14	6.45	-3.55	6.08	3.61	3.3	-17.21	-1.64	5.69	2.09	4.23	6.14
DLP/4 White cedar swamp	0	-1.06	0	0.05	0	0	0	0	0	-0.2	0	0	0	-0.98	-3.19	0	-0.78	-0.5	-5.83	-5.68
DLP/7 Mesic boreal hardwood forest	-0.15**	-0.94**	0.22*	-0.33**	0.22**	0.2**	1.42**	-0.06*	0.02**	-2.74**	-2.37**	1.25**	-0.8*	0.08**	-3.57**	2.74**	1.7**	-0.07*	0.52**	0.45**
DLP/9 Mesic northern hardwood forest	0	3.85	0	-0.09	0	-3.55	-0.81	0	-1.38	-6.32	-2.08	-2.04	0	0.95	-9.73	1.31	-1.64	0	0	0.64
DLP/11 Dry-mesic pine-oak forest	-2.38**	-2.33**	-0.06	4.63**	-2.99**	-2.91**	0.4**	-4.23	0.11**	-4.05**	-9.24**	-8.41**	-2.43	4.31**	-1.79**	-6.3**	-4.59**	-3.21	-0.35**	-2.99**
DLP/12 Dry-mesic pine forest	-1.43*	-3.36**	-0.02	0.16**	0.64**	-0.36*	-1.31**	0.3	-1.55**	-0.34**	-1.32*	-1.1**	-0.61	-0.19**	-1.4**	-2.18*	-0.76**	-2.04	-2.61**	-4.1**
DLP/13 Dry pine forest	-0.25	0.73	0.6	-8.04*	0.83	1.12	-0.44	-5.45	1.3*	-1.92	-11.07	-17.99	11.71	0.59*	4.58	-13.63	-0.26	-28.07	-1.07*	-35.04
NSU/2 Mesic white and red pine	-0.07*	0.22**	1.2*	-9.82**	2.62**	-9.21*	-7.01**	-10.09**	-1.17**	-1.67**	-0.5*	-6.54**	2.47*	2.78**	-19.34**	-6.87*	-4.78**	-5*	-0.62**	-9.29**
NSU/3 Dry-mesic white and red pine	-1.61	1.04*	-0.05	0.28**	-4.4**	0.06	-2.15*	-1.67	-2.42**	-1.65**	-2.12	-3.97*	10.47	4.91**	-1.77**	0.25	1.74*	-2.17	3.06**	-6.85**
NSU/4 Lowland Conifer	0	-0.79	0.49	1.1*	0.17*	-0.89	-1.26	0.37	0.88*	0.52*	-0.16	-0.03	0.35	0.85*	0.83*	-0.39	-0.93	-4.24	1.36*	-3.92*
NSU/5 Rich Swamp	0	8.2	0	0	-51.97	0	10.01	0	-78.44	0	0	-48.73	0	10.94	-12.26	0	-23.04	5.51	-70.72	-0.49
NSU/6 Mesic birch-aspen-spruce-fir	0.14**	-0.85**	0.18*	-0.41**	1.61**	-7.1**	-5.09**	-2.1*	-2.62**	3.88**	-10.66**	-6.5**	-4.07*	-2.15**	-18.37**	-10.74**	-9.68**	-11.29*	-0.68**	-15.5**
NSU/7 Jack pine-black spruce	0	1.63	-1.2	-7.63*	-0.48*	-0.5	0.6	-1.49	-8.74*	-0.22*	-0.22	-3.56	3.12	3.26*	4.31*	3.42	1.07	2.69	2.44*	0.94*
NSU/12 Northern Hardwood Conifer	-0.06	-0*	-2.34	-2.9	-2.02*	0.9	0.91*	0.37	-1.34	0.2*	4.27	1.67*	4.15	-0.92	3.72*	2.18	0.99*	0.43	42.1	0.8*

No asterisks = 30 or less actions; One asterisks = 30 to 59 actions; and Two asterisks = 60 or more actions.

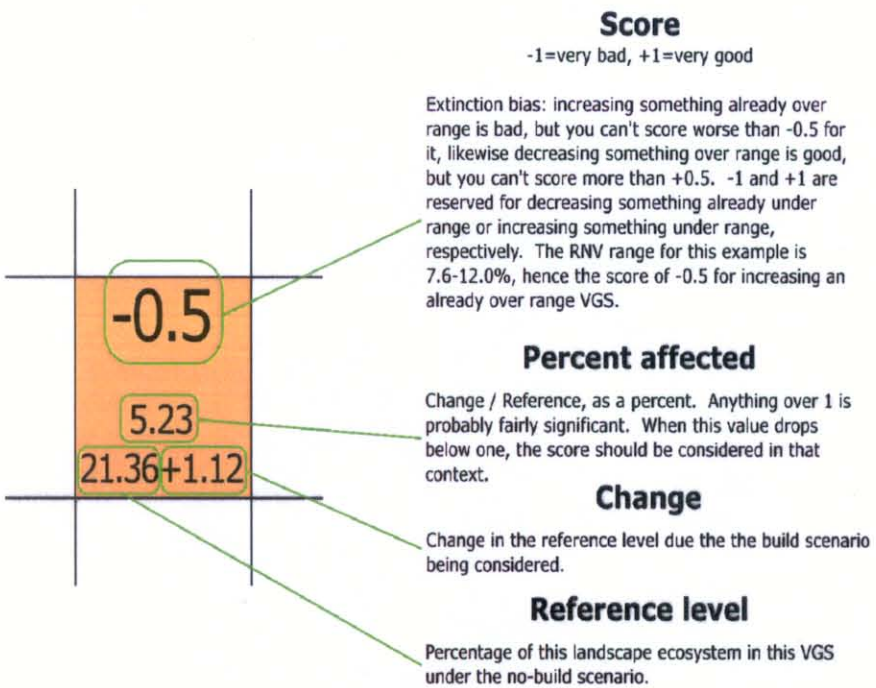
D.3.2 GUIDE TO INTERPRETATION

Tables for VGS level impacts from the forest RNV analysis are provided in the next section. Tables are listed by landscape ecosystem. The following two figures illustrate overall table structure and individual results details.

Overview of table structure showing VGS level results for a single Landscape Ecosystem (Lowland conifer). Each Landscape Ecosystem is represented by two tables, the first showing results for scenarios 'a' and 'a-ss' (private land scenario A without and with species substitution) and the second showing results for scenarios 'b', 'b-ss', and 'b-sf' (private land scenario B without species substitution, with species substitution, and with spruce-fir species substitution).



Detail showing numbers within each cell in the VGS level tables.



D.3.3 VGS LEVEL TABLES

DLP/1 Tamarack Swamp – Treatment Code A

Weighted Score	0 yrs	a-ss 10 yrs	a 10 yrs	a-ss 20 yrs	a 20 yrs	a-ss 30 yrs	a 30 yrs	a-ss 40 yrs	a 40 yrs
	0	2.63	-8.98	0.96	-1.3	-3.55	6.08	-1.64	5.69
1 Seedling tamarack 1-20yrs 12.65-24.11%	0 0 11+0	0.28 4.78 11.35+0.54	-0.53 10.86 11.35-1.23	0.55 1.71 8.39+0.14	-0.61 3.16 8.39-0.26	-0.79 6.03 6.38-0.38	0.65 15.67 6.38+1	-0.76 2.77 6.34-0.18	0.66 13.72 6.34+0.87
2 Sapling-pole tamarack 21-55yrs 18.84-31.25%	0 0 29.49+0	0 0 18.18+0	0 0 18.18+0	0 0 16.38+0	0.24 2.49 16.38+0.41	0.32 3.63 14.96+0.54	-0.5 8.24 14.96-1.23	0.42 1.13 13.73+0.16	-0.46 1.93 13.73-0.26
3 Pole-mature tamarack 56-75yrs 9.3-12.76%	0 0 24.91+0	0.5 2.59 20.99-0.54	-0.5 6.56 20.99+1.38	0 0 18.64+0	0 0 18.64+0	0 0 10.64+0	0 3.84 10.64+0.41	0 0 7.87+0	-0.34 7.42 7.87-0.58
4 Old growth tamarack 76-old 31.89-59.21%	0 0 34.6+0	0 0 49.48+0	0 0.29 49.48-0.14	0.05 0.25 56.58-0.14	0.05 0.25 56.58-0.14	0.24 0.23 68.02-0.16	0.24 0.26 68.02-0.17	-0.31 0.03 72.06+0.02	0.31 0.03 72.06-0.02

DLP/1 Tamarack Swamp – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	0.02	0.14	13	5.19	4.14	6.45	3.61	3.3	-17.21	2.09	4.23	6.14
1 Seedling tamarack 1-20yrs 12.65-24.11%	0 0 11+0	0.51 0.04 9.11+0	0.51 0.22 9.11+0.02	0.32 25.33 9.11+2.31	0.55 7.38 8.02+0.59	0.56 5.77 8.02+0.46	0.52 11.7 8.02+0.94	0.55 5.02 8.15+0.41	0.56 3.83 8.15+0.31	-0.93 25.76 8.15-2.1	0 0 6.42+0	0.7 4.29 6.42+0.28	0.7 4.08 6.42+0.26
2 Sapling-pole tamarack 21-55yrs 18.84-31.25%	0 0 29.49+0	0 0 18.18+0	0 0 18.18+0	0 0 18.18+0	0 0 16.79+0	0 0 16.79+0	-0.29 2.41 16.79-0.4	0.47 1.33 12.8+0.17	0.47 2.04 12.8+0.26	0.34 19.27 12.8+2.47	0.41 4.43 13.36+0.59	0.43 2.24 13.36+0.3	0.39 7.02 13.36+0.94
3 Pole-mature tamarack 56-75yrs 9.3-12.76%	0 0 24.91+0	0 0 23.38+0	0.5 0.07 23.38-0.02	0.5 9.86 23.38-2.31	0.37 3.14 18.85-0.59	0.38 2.45 18.85-0.46	0.37 2.91 18.85-0.55	0 0.1 10.42+0.01	0 0 10.42+0	0 2.14 10.42+0.22	0 0 7.47+0	0 0 7.47+0	0 0 7.47+0
4 Old growth tamarack 76-old 31.89-59.21%	0 0 34.6+0	0 0.01 49.33-0	0 0.01 49.33-0	0 0 49.33+0	0 0 56.35+0	0 0 56.35+0	-0.05 0.03 56.35+0.02	0.25 0.86 68.63-0.59	0.25 0.84 68.63-0.57	0.25 0.86 68.63-0.59	0.31 0.81 72.75-0.59	0.31 0.79 72.75-0.57	0.3 1.65 72.75-1.2

DLP/4 White Cedar Swamp – Treatment Code A

Weighted Score	0 yrs	a-ss 10 yrs	a 10 yrs	a-ss 20 yrs	a 20 yrs	a-ss 30 yrs	a 30 yrs	a-ss 40 yrs	a 40 yrs
	0	0	-1.06	0	0	0	0	0	-0.78
1 Seedling-sapling tamarack 1-55yrs 6.43-12.09%	0 0 14.31+0	0 0 12.53+0	-0.32 9.02 12.53+1.13	0 0 13.82+0	0 0 13.82+0	0 0 13.77+0	-0.24 0.02 13.77+0	0 0 14.05+0	-0.27 0.39 14.05+0.05
2 Sapling-pole tamarack 56-75yrs 2.28-4.19%	0 0 5.21+0	0 0 6.19+0	0.25 21.51 6.19-1.33	0 0 3.03+0	0 0 3.03+0	0 0 2.79+0	0 0.14 2.79-0	0 0 2.62+0	-0.05 0.59 2.62-0.02
3 Pole-mature tamarack-cedar 76-100yrs 2.61-4.41%	0 0 11.44+0	0 0 9.71+0	0 0 9.71+0	0 0 7.72+0	0 0 7.72+0	0 0 5.68+0	0 0 5.68+0	0 0 4.34+0	0.05 0.19 4.34-0.01
4 Seedling-sapling cedar-spruce 1-30yrs 5.84-9.35%	0 0 15.56+0	0 0 13.41+0	-0.5 12.67 13.41+1.7	0 0 11.31+0	0 0 11.31+0	0 0 8.46+0	0 0.06 8.46+0.01	0 0 15.67+0	0.5 10.64 15.67-1.67
5 Sapling-pole cedar-spruce 31-55yrs 4.72-7.34%	0 0 5.67+0	0 0 5.18+0	0 0 5.18+0	0 0 9.02+0	0 0 9.02+0	0 0 11.66+0	0 0 11.66+0	0 0 5.2+0	-0.19 32.06 5.2+1.67
6 Mature cedar-spruce 56-110yrs 8.6-11.43%	0 0 30.07+0	0 0 26.9+0	0.5 5.57 26.9-1.5	0 0 22.99+0	0 0 22.99+0	0 0 17.11+0	0.41 0.03 17.11-0	0 0 11.84+0	0.01 0.24 11.84-0.03
7 Old-growth cedar-spruce 111-old 51.2-69.52%	0 0 17.74+0	0 0 26.08+0	0 0 26.08+0	0 0 32.11+0	0 0 32.11+0	0 0 40.53+0	0 0 40.53+0	0 0 46.28+0	0 0 46.28+0

DLP/4 White Cedar Swamp – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	0	0.05	0	0	0	-0.2	0	-0.98	-3.19	-0.5	-5.83	-5.68
1 Seedling-sapling tamarack 1-55yrs 6.43-12.09%	0 0 14.31+0	0 0 13.67+0	-0.24 0.21 13.67+0.03	0 0 13.67+0	0 0 13.82+0	0 0 13.82+0	-0.24 0.03 13.82+0	0 0 14.08+0	-0.38 4.85 14.08+0.68	0.24 2.18 14.08-0.31	0.26 0.02 13.98-0	-0.37 5.11 13.98+0.71	-0.37 4.89 13.98+0.68
2 Sapling-pole tamarack 56-75yrs 2.28-4.19%	0 0 5.21+0	0 0 4.86+0	0.24 0.69 4.86-0.03	0 0 4.86+0	0 0 3.03+0	0 0 3.03+0	0 0 3.03+0	0 0 2.78+0	0 0 2.78+0	0 0 2.78+0	0 0 2.76+0	0 0.69 2.76-0.02	0 0 2.76+0
3 Pole-mature tamarack-cedar 76-100yrs 2.61-4.41%	0 0 11.44+0	0 0 9.71+0	0 0 9.71+0	0 0 9.71+0	0 0 7.72+0	0 0 7.72+0	0 0 7.72+0	0 0 5.34+0	0.11 13.94 5.34-0.74	-0.41 6.27 5.34+0.33	0 0 4.33+0	0 17.55 4.33-0.76	0 17.2 4.33-0.74
4 Seedling-sapling cedar-spruce 1-30yrs 5.84-9.35%	0 0 15.56+0	0 0 15.11+0	-0.5 0.28 15.11+0.04	0 0 15.11+0	0 0 11.51+0	0 0 11.51+0	0.24 1.77 11.51-0.2	0 0 8.92+0	-0.21 11.52 8.92+1.03	0 5.18 8.92-0.46	-0.46 1.22 13.25+0.16	-0.5 7.78 13.25+1.03	-0.5 7.76 13.25+1.03
5 Sapling-pole cedar-spruce 31-55yrs 4.72-7.34%	0 0 5.67+0	0 0 5.18+0	0 0 5.18+0	0 0 5.18+0	0 0 8.82+0	0 0 8.82+0	-0.27 2.26 8.82+0.2	0 0 11.66+0	0 0 11.66+0	0 0 11.66+0	0.03 2.14 7.4-0.16	-0.06 0.56 7.4+0.04	0 0 7.4+0
6 Mature cedar-spruce 56-110yrs 8.6-11.43%	0 0 30.07+0	0 0 25.4+0	0.5 0.15 25.4-0.04	0 0 25.4+0	0 0 22.99+0	0 0 22.99+0	0 0 22.99+0	0 0 16.67+0	0.3 5.8 16.67-0.97	-0.44 2.61 16.67+0.43	0 0 12+0	0 8.4 12-1.01	0 8.06 12-0.97
7 Old-growth cedar-spruce 111-old 51.2-69.52%	0 0 17.74+0	0 0 26.08+0	0 0 26.08+0	0 0 26.08+0	0 0 32.11+0	0 0 32.11+0	0 0 32.11+0	0 0 40.53+0	0 0 40.53+0	0 0 40.53+0	0 0 46.28+0	0 0 46.28+0	0 0 46.28+0

DLP/7 Mesic Boreal Hardwood Forest – Treatment Code A

Weighted Score	0 yrs	a-ss 10 yrs	a 10 yrs	a-ss 20 yrs	a 20 yrs	a-ss 30 yrs	a 30 yrs	a-ss 40 yrs	a 40 yrs
	0	-0.15	-0.94	0.2	1.42	-2.37	1.25	2.74	1.7
1 Seedling-sapling aspen birch 1-15yrs 2.44-4.76%	0	-0.5	0.5	-0.5	-0.5	0.5	-0.5	-0.5	-0.5
	0	2.19	6.98	6.29	1.63	8.75	2.95	10.8	14.36
	9.53+0	10.27+0.22	10.27-0.72	8.37+0.53	8.37+0.14	9.06-0.79	9.06+0.27	6.45+0.7	6.45+0.93
2 Sapling-pole aspen-birch 16-35yrs 3.15-5.95%	0	0	0	-0.5	0.5	-0.5	0.5	0.5	-0.5
	0	0	0	1.14	3.62	4.03	3.12	1.52	2.31
	13.09+0	15.93+0	15.93+0	19.81+0.22	19.81-0.72	18.65+0.75	18.65-0.58	17.43-0.27	17.43+0.4
3 Pole-mature aspen-birch-conifer 36-75yrs 5.49-9.2%	0	0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	0.5
	0	0.12	2.3	0.77	3.61	3.12	2.3	1.02	3.17
	37.08+0	27.48-0.03	27.48+0.63	21.31+0.16	21.31+0.77	18.96+0.59	18.96+0.44	21.87+0.22	21.87-0.69
4 Seedling-sapling conifer 1-15yrs 2.59-4.52%	0	0.34	-0.48	0.48	0.51	-0.6	0.44	0.63	0.61
	0	2.19	6.98	6.29	1.63	8.75	2.95	10.8	14.36
	1.96+0	2.11+0.05	2.11-0.15	1.72+0.11	1.72+0.03	1.86-0.16	1.86+0.05	1.33+0.14	1.33+0.19
5 Sapling-pole conifer 16-35yrs 3.34-5.65%	0	0	0	0	0	0	-0.05	-0.09	0.03
	0	0	0	1.14	3.62	4.03	3.12	1.52	2.31
	2.69+0	3.27+0	3.27+0	4.07+0.05	4.07-0.15	3.83+0.15	3.83-0.12	3.58-0.05	3.58+0.08
6 Pole-mature conifer 36-75yrs 5.83-8.74%	0	-0.1	0.07	0.35	0.32	0.43	0.44	0.32	-0.39
	0	0.12	2.3	0.77	3.61	3.12	2.3	1.02	3.17
	7.56+0	5.6-0.01	5.6+0.13	4.34+0.03	4.34+0.16	3.86+0.12	3.86+0.09	4.46+0.05	4.46-0.14
7 Mature-large conifer 76-175yrs 20.7-25.88%	0	0.24	-0.25	0.37	0.4	0.49	0.5	0.5	0.5
	0	0.66	0.3	2.77	0.57	1.54	0.34	1.79	1.74
	27.83+0	34.84-0.23	34.84+0.1	39.81-1.1	39.81-0.23	43.01-0.66	43.01-0.15	44.02-0.79	44.02-0.77
8 Old-growth conifer 176-old 35.29-56.46%	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0.27+0	0.48+0	0.48+0	0.56+0	0.56+0	0.76+0	0.76+0	0.86+0	0.86+0

DLP/7 Mesic Boreal Hardwood Forest – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	0.22	-0.33	0.22	-0.06	0.02	-2.74	-0.8	0.08	-3.57	-0.07	0.52	0.45
1 Seedling-sapling aspen birch 1-15yrs 2.44-4.76%	0	-0.5	-0.5	-0.5	-0.5	0.5	-0.5	-0.5	-0.5	0.5	-0.5	-0.5	0.5
	0	2.71	0.08	20.02	5.96	1.26	4.26	6.16	9.81	3.39	7.07	10.89	0.91
	9.53+0	7.97+0.22	7.97+0.01	7.97+1.6	8.87+0.53	8.87-0.11	8.87+0.38	9.3+0.57	9.3+0.91	9.3-0.32	6.73+0.48	6.73+0.73	6.73-0.06
2 Sapling-pole aspen-birch 16-35yrs 3.15-5.95%	0	0	0	0	-0.5	-0.5	-0.5	-0.5	0.5	-0.5	-0.5	-0.5	-0.5
	0	0	0	0	1.23	0.04	9.12	4.42	0.63	11.71	6.06	4.4	0.34
	13.09+0	15.93+0	15.93+0	15.93+0	17.5+0.22	17.5+0.01	17.5+1.6	16.84+0.74	16.84-0.11	16.84+1.97	18.17+1.1	18.17+0.8	18.17+0.06
3 Pole-mature aspen-birch-conifer 36-75yrs 5.49-9.2%	0	-0.5	-0.5	0.5	0	-0.5	0.5	-0.5	-0.5	-0.5	0.5	0.5	-0.5
	0	0.33	1.42	3.31	0	2.4	1.63	0.49	0.42	0.27	0.31	2.22	7.02
	37.08+0	29.21+0.1	29.21+0.41	29.21-0.97	22.25+0	22.25+0.53	22.25-0.36	19.15+0.09	19.15+0.08	19.15+0.05	20.33-0.06	20.33-0.45	20.33+1.43
4 Seedling-sapling conifer 1-15yrs 2.59-4.52%	0	0.54	0.56	0.42	0.43	-0.5	0.45	0.39	0.36	-0.5	0.62	0.6	-0.68
	0	2.71	0.08	20.02	5.96	1.26	4.26	6.16	9.81	3.39	7.07	10.89	0.91
	1.96+0	1.64+0.04	1.64+0	1.64+0.33	1.83+0.11	1.83-0.02	1.83+0.08	1.91+0.12	1.91+0.19	1.91-0.06	1.38+0.1	1.38+0.15	1.38-0.01
5 Sapling-pole conifer 16-35yrs 3.34-5.65%	0	0	0	0	0.04	0.05	0	0.04	-0.11	0	0	0	0
	0	0	0	0	1.23	0.04	9.12	4.42	0.63	11.71	6.06	4.4	0.34
	2.69+0	3.27+0	3.27+0	3.27+0	3.6+0.04	3.6+0	3.6+0.33	3.46+0.15	3.46-0.02	3.46+0.41	3.74+0.23	3.74+0.16	3.74+0.01
6 Pole-mature conifer 36-75yrs 5.83-8.74%	0	0.02	0.01	-0.11	0	0.29	-0.35	0.44	0.44	0.44	-0.4	-0.43	0.34
	0	0.33	1.42	3.31	0	2.4	1.63	0.49	0.42	0.27	0.31	2.22	7.02
	7.56+0	5.95+0.02	5.95+0.08	5.95-0.2	4.54+0	4.54+0.11	4.54-0.07	3.9+0.02	3.9+0.02	3.9+0.01	4.14-0.01	4.14-0.09	4.14+0.29
7 Mature-large conifer 76-175yrs 20.7-25.88%	0	0.26	0.25	0.25	0.41	0.42	0.38	0.5	0.5	0.5	0.5	0.5	0.5
	0	1.06	1.43	2.13	2.2	1.26	4.76	3.81	2.39	4.61	4.09	2.92	3.85
	27.83+0	35.55-0.38	35.55-0.51	35.55-0.76	40.86-0.9	40.86-0.51	40.86-1.94	44.67-1.7	44.67-1.07	44.67-2.06	44.64-1.83	44.64-1.3	44.64-1.72
8 Old-growth conifer 176-old 35.29-56.46%	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.27+0	0.48+0	0.48+0	0.48+0	0.56+0	0.56+0	0.56+0	0.76+0	0.76+0	0.76+0	0.86+0	0.86+0	0.86+0

DLP/9 Mesic Northern Hardwood Forest – Treatment Code A

Weighted Score	0 yrs	a-ss 10 yrs	a 10 yrs	a-ss 20 yrs	a 20 yrs	a-ss 30 yrs	a 30 yrs	a-ss 40 yrs	a 40 yrs
	0	0	3.85	-3.55	-0.81	-2.08	-2.04	1.31	-1.64
1 Seedling-sapling birch-aspen 1-15yrs 0.74-1.48%	0 0 9.49+0	0 0 6.09+0	0.5 6.12 6.09-0.37	-0.5 5.28 5.59+0.3	-0.5 1.85 5.59+0.1	-0.5 1.1 5.41+0.06	-0.5 4.45 5.41+0.24	0.5 4.5 7.89-0.35	-0.5 0.52 7.89+0.04
2 Sapling-pole birch-aspen 16-35yrs 0.98-1.93%	0 0 13.56+0	0 0 17.6+0	0 0 17.6+0	0 0 15.58+0	0.5 2.39 15.58-0.37	-0.5 2.53 11.68+0.3	0.5 2.31 11.68-0.27	-0.5 3.19 11.12+0.35	-0.5 3.09 11.12+0.34
3 Pole-mature birch-pine-aspen 36-75yrs 1.89-3.58%	0 0 13.51+0	0 0 11.8+0	-0.5 3.94 11.8+0.46	0.5 0.06 12.93-0.01	-0.5 3.05 12.93+0.39	0.5 1.55 16.19-0.25	-0.5 0.59 16.19+0.1	0 0 13.93+0	0.5 1.91 13.93-0.27
4 Mature-large birch-pine-maple 76-120yrs 2.03-3.69%	0 0 12.2+0	0 0 12.59+0	0.5 1.17 12.59-0.15	0.5 1.19 12.33-0.15	0.5 1.21 12.33-0.15	0 0 10.77+0	0.5 0.51 10.77-0.06	0 0 9.53+0	0.5 0.05 9.53-0
5 Old-growth pine-maple 121-195yrs 3.15-5.35%	0 0 1.93+0	0 0 2.66+0	0 0 2.66+0	0 0 3.65+0	0 0 3.65+0	0 0 5.39+0	0 0 5.39+0	0 0 8.01+0	0 0 8.01+0
6 Old-growth maple 196-old 69.3-82.77%	0 0 0.73+0	0 0 0.81+0	0 0 0.81+0	0 0 0.97+0	0 0 0.97+0	0 0 1.26+0	0 0 1.26+0	0 0 1.56+0	0 0 1.56+0
7 Seedling-sapling maple 1-15yrs 0.72-1.38%	0 0 4.27+0	0 0 2.74+0	0.5 6.12 2.74-0.17	-0.5 5.28 2.52+0.13	-0.5 1.85 2.52+0.05	-0.5 1.1 2.43+0.03	-0.5 4.45 2.43+0.11	0.5 4.5 3.55-0.16	-0.5 0.52 3.55+0.02
8 Sapling-pole maple 16-35yrs 0.95-1.8%	0 0 6.11+0	0 0 7.93+0	0 0 7.93+0	0 0 7.02+0	0.5 2.39 7.02-0.17	-0.5 2.53 5.26+0.13	0.5 2.31 5.26-0.12	-0.5 3.19 5.01+0.16	-0.5 3.09 5.01+0.16
9 Pole-mature maple 36-75yrs 1.83-3.34%	0 0 14.23+0	0 0 12.43+0	-0.5 3.94 12.43+0.49	0.5 0.06 13.62-0.01	-0.5 3.05 13.62+0.42	0.5 1.55 17.06-0.26	-0.5 0.59 17.06+0.1	0 0 14.67+0	0.5 1.91 14.67-0.28
10 Large maple 75-195yrs 4.93-8.14%	0 0 17.47+0	0 0 18.64+0	0.5 1.01 18.64-0.19	0.5 0.98 19.22-0.19	0.5 0.99 19.22-0.19	0 0 18.81+0	0.5 0.38 18.81-0.07	0 0 19.64+0	0.5 0.03 19.64-0.01
11 Maple-conifer 76-120yrs 0-0%	0 0 6.51+0	0 0 6.71+0	0.5 1.17 6.71-0.08	0.5 1.19 6.58-0.08	0.5 1.21 6.58-0.08	0 0 5.74+0	0.5 0.51 5.74-0.03	0 0 5.08+0	0.5 0.05 5.08-0

DLP/9 Mesic Northern Hardwood Forest – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	0	-0.09	0	0	-1.38	-6.32	0	0.95	-9.73	0	0	0.64
1 Seedling-sapling birch-aspen 1-15yrs 0.74-1.48%	0 0 9.49+0	0 0 5.64+0	-0.5 0.14 5.64+0.01	0 0 5.64+0	0 0 5.5+0	-0.5 1.93 5.5+0.11	-0.5 9.4 5.5+0.52	0 0 5.33+0	0.5 1.91 5.33-0.1	-0.5 11.05 5.33+0.59	0 0 8.18+0	0.5 0.04 8.18-0	0.5 6.9 8.18-0.56
2 Sapling-pole birch-aspen 16-35yrs 0.98-1.93%	0 0 13.56+0	0 0 17.6+0	0 0 17.6+0	0 0 17.6+0	0 0 15.12+0	-0.5 0.05 15.12+0.01	0 0 15.12+0	0 0 11.14+0	-0.5 1.02 11.14+0.11	-0.5 4.64 11.14+0.52	0 0 10.96+0	-0.5 0.04 10.96+0	-0.5 10.09 10.96+1.11
3 Pole-mature birch-pine-aspen 36-75yrs 1.89-3.58%	0 0 13.51+0	0 0 12.29+0	0.5 0.05 12.29-0.01	0 0 12.29+0	0 0 13.47+0	0.5 0.56 13.47-0.08	-0.5 0.04 13.47+0.01	0 0 16.62+0	0.5 0.03 16.62-0	0.5 2.34 16.62-0.39	0 0 13.77+0	0.5 0.01 13.77-0	-0.5 0.02 13.77+0
4 Mature-large birch-pine-maple 76-120yrs 2.03-3.69%	0 0 12.2+0	0 0 12.46+0	0 0 12.46+0	0 0 12.46+0	0 0 12.22+0	0.5 0.03 12.22-0	0.5 2.21 12.22-0.27	0 0 10.77+0	0.5 0.03 10.77-0	0.5 2.65 10.77-0.29	0 0 9.58+0	0 0 9.58+0	0.5 2.93 9.58-0.28
5 Old-growth pine-maple 121-195yrs 3.15-5.35%	0 0 1.93+0	0 0 2.66+0	0 0 2.66+0	0 0 2.66+0	0 0 3.65+0	0 0 3.65+0	0 0 3.65+0	0 0 5.39+0	0 0 5.39+0	0 0 5.39+0	0 0 8.01+0	0 0 8.01+0	0 0 8.01+0
6 Old-growth maple 196-old 69.3-82.77%	0 0 0.73+0	0 0 0.81+0	0 0 0.81+0	0 0 0.81+0	0 0 0.97+0	0 0 0.97+0	0 0 0.97+0	0 0 1.26+0	0 0 1.26+0	0 0 1.26+0	0 0 1.56+0	0 0 1.56+0	0 0 1.56+0
7 Seedling-sapling maple 1-15yrs 0.72-1.38%	0 0 4.27+0	0 0 2.54+0	-0.5 0.14 2.54+0	0 0 2.54+0	0 0 2.48+0	-0.5 1.93 2.48+0.05	-0.5 9.4 2.48+0.23	0 0 2.4+0	0.5 1.91 2.4-0.05	-0.5 11.05 2.4+0.27	0 0 3.68+0	0.5 0.04 3.68-0	0.5 6.9 3.68-0.25
8 Sapling-pole maple 16-35yrs 0.95-1.8%	0 0 6.11+0	0 0 7.93+0	0 0 7.93+0	0 0 7.93+0	0 0 6.81+0	-0.5 0.05 6.81+0	0 0 6.81+0	0 0 5.02+0	-0.5 1.02 5.02+0.05	-0.5 4.64 5.02+0.23	0 0 4.94+0	-0.5 0.04 4.94+0	-0.5 10.09 4.94+0.5
9 Pole-mature maple 36-75yrs 1.83-3.34%	0 0 14.23+0	0 0 12.95+0	0.5 0.05 12.95-0.01	0 0 12.95+0	0 0 14.18+0	0.5 0.56 14.18-0.08	-0.5 0.04 14.18+0.01	0 0 17.51+0	0.5 0.03 17.51-0	0.5 2.34 17.51-0.41	0 0 14.5+0	0.5 0.01 14.5-0	-0.5 0.02 14.5+0
10 Large maple 75-195yrs 4.93-8.14%	0 0 17.47+0	0 0 18.48+0	0 0 18.48+0	0 0 18.48+0	0 0 19.08+0	0.5 0.02 19.08-0	0.5 1.82 19.08-0.35	0 0 18.82+0	0.5 0.02 18.82-0	0.5 1.95 18.82-0.37	0 0 19.71+0	0 0 19.71+0	0.5 1.83 19.71-0.36
11 Maple-conifer 76-120yrs 0-0%	0 0 6.51+0	0 0 6.65+0	0 0 6.65+0	0 0 6.65+0	0 0 6.52+0	0.5 0.03 6.52-0	0.5 2.21 6.52-0.14	0 0 5.74+0	0.5 0.03 5.74-0	0.5 2.65 5.74-0.15	0 0 5.11+0	0 0 5.11+0	0.5 2.93 5.11-0.15

DLP/11 Dry-Mesic Pine-Oak Forest – Treatment Code A

Weighted Score	0 yrs 0	a-ss 10 yrs -2.38	a 10 yrs -2.33	a-ss 20 yrs -2.91	a 20 yrs 0.4	a-ss 30 yrs -9.24	a 30 yrs -8.41	a-ss 40 yrs -6.3	a 40 yrs -4.59
1 Seedling-sapling aspen-pine -oak 1-15yrs 3.58-6.86%	0 0 13.02+0	-0.5 2.22 12.7+0.28	-0.5 2.21 12.7+0.28	-0.5 5.58 9.22+0.51	0.43 1.15 9.22-0.11	-0.5 16.06 8.44+1.36	-0.5 16.87 8.44+1.42	-0.5 1.64 9.41+0.15	-0.5 2.11 9.41+0.2
2 Sapling-pole aspen-pine-oak 16-35yrs 4.59-8.47%	0 0 16.91+0	0 0 21.15+0	0 0 21.15+0	-0.5 1.1 25.72+0.28	-0.5 1.09 25.72+0.28	-0.5 3.63 21.92+0.8	-0.5 0.8 21.92+0.18	-0.5 10.56 17.69+1.87	-0.5 7.44 17.69+1.32
3 Pole-mature aspen-pine-red maple-oak 36-75yrs 32.25-34.29%	0 0 44.78+0	0 0.01 32.2-0	0 1.79 32.2+0.58	0.05 0.57 26.5+0.15	0.02 2.81 26.5+0.74	-0.01 1.78 28.56-0.51	-0.01 1.91 28.56-0.55	0 0.42 28.91-0.12	0 0.85 28.91-0.25
4 Mature-large pine-red maple-oak 76-120yrs 24.22-26.29%	0 0 24.59+0	0.1 0.81 33.09-0.27	0.08 2.56 33.09-0.85	0.16 2.65 35.67-0.95	0.16 2.58 35.67-0.92	0.14 4.6 35.69-1.64	0.15 2.94 35.69-1.05	0.04 5.46 32.54-1.78	0.05 3.88 32.54-1.26
5 Multi-aged red maple-pine-oak 121-175yrs 16.29-20.04%	0 0 0.63+0	-1 1.36 0.73-0.01	-1 1.43 0.73-0.01	-1 0.02 2.75-0	-1 0.02 2.75-0	-0.82 0.01 5.23-0	-0.82 0.01 5.23-0	-0.36 1.14 10.99-0.13	-0.34 0.05 10.99-0.01
6 Old red maple-red oak 176-old 9.87-13.25%	0 0 0.06+0	0 0 0.13+0	0 0 0.13+0	0 0 0.14+0	0 0 0.14+0	0 0 0.16+0	0 0 0.16+0	0 0 0.46+0	0 0 0.46+0

DLP/11 Dry-Mesic Pine-Oak Forest – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	-0.06	4.63	-2.99	-4.23	0.11	-4.05	-2.43	4.31	-1.79	-3.21	-0.35	-2.99
1 Seedling-sapling aspen-pine -oak 1-15yrs 3.58-6.86%	0 0 13.02+0	-0.5 0.24 12.06+0.03	0.5 9.42 12.06-1.14	-0.5 5.99 12.06+0.72	-0.5 9.2 8.88+0.82	-0.5 4.56 8.88+0.41	-0.5 5.86 8.88+0.52	-0.5 1.78 9.79+0.17	0.44 6.2 9.79-0.61	0.5 1.16 9.79-0.11	-0.36 0.24 8.57+0.02	-0.41 2.26 8.57+0.19	-0.45 3.82 8.57+0.33
2 Sapling-pole aspen-pine-oak 16-35yrs 4.59-8.47%	0 0 16.91+0	0 0 21.15+0	0 0 21.15+0	0 0 21.15+0	-0.5 0.11 25.08+0.03	0.5 4.53 25.08-1.14	-0.5 2.88 25.08+0.72	-0.5 4.04 20.95+0.85	0.5 3.49 20.95-0.73	-0.5 5.93 20.95+1.24	-0.5 5.3 18.71+0.99	0.5 1.08 18.71-0.2	-0.5 2.18 18.71+0.41
3 Pole-mature aspen-pine-red maple-oak 36-75yrs 32.25-34.29%	0 0 44.78+0	0 0.63 33.35+0.21	0 2.69 33.35+0.9	0 2.14 33.35-0.71	0.01 0.45 27.48+0.12	0 3.59 27.48+0.99	-0.05 1.4 27.48-0.38	0 0.28 28.03+0.08	0 3.61 28.03+1.01	0 1.18 28.03+0.33	0 0.87 28.51+0.25	-0.04 3.12 28.51-0.89	0 3 28.51+0.86
4 Mature-large pine-red maple-oak 76-120yrs 24.22-26.29%	0 0 24.59+0	0.09 0.73 32.58-0.24	-0.11 0.73 32.58+0.24	0.09 0.03 32.58-0.01	0.16 2.72 35.66-0.97	0.18 0.72 35.66-0.26	0.16 2.41 35.66-0.86	0.16 3.06 35.84-1.1	-0.21 0.9 35.84+0.32	0.15 4.08 35.84-1.46	0.07 3.23 32.72-1.06	-0.14 2.23 32.72+0.73	0.05 4.47 32.72-1.46
5 Multi-aged red maple-pine-oak 121-175yrs 16.29-20.04%	0 0 0.63+0	0 0 0.72+0	0 0 0.72+0	0 0 0.72+0	0 0 2.75+0	0 0 2.75+0	0 0 2.75+0	0 0 5.23+0	0 0 5.23+0	0 0 5.23+0	-0.37 1.83 11.03-0.2	0.33 1.51 11.03+0.17	-0.36 1.17 11.03-0.13
6 Old red maple-red oak 176-old 9.87-13.25%	0 0 0.06+0	0 0 0.13+0	0 0 0.13+0	0 0 0.13+0	0 0 0.14+0	0 0 0.14+0	0 0 0.14+0	0 0 0.16+0	0 0 0.16+0	0 0 0.16+0	0 0 0.46+0	0 0 0.46+0	0 0 0.46+0

DLP/12 Dry-Mesic Pine Forest – Treatment Code A

Weighted Score	0 yrs	a-ss 10 yrs	a 10 yrs	a-ss 20 yrs	a 20 yrs	a-ss 30 yrs	a 30 yrs	a-ss 40 yrs	a 40 yrs
	0	-1.43	-3.36	-0.36	-1.31	-1.32	-1.1	-2.18	-0.76
1 Seedling-sapling aspen-pine-oak 1-15yrs 5.37-10.05%	0 0 10.43+0	-0.36 5.28 11.45+0.6	-0.44 9.19 11.45+1.05	-0.03 3.29 8.71+0.29	0 3.24 8.71-0.28	-0.12 3.98 9.44+0.38	-0.09 2.84 9.44+0.27	0 3.35 8.29-0.28	0 0.92 8.29+0.08
2 Sapling-pole aspen-pine-oak 16-35yrs 6.78-12.02%	0 0 15.46+0	0 0 19.33+0	0 0 19.33+0	-0.5 2.77 21.87+0.6	-0.5 4.81 21.87+1.05	-0.5 4.42 20.14+0.89	-0.5 3.82 20.14+0.77	-0.5 3.61 18.32+0.66	0.5 0.08 18.32-0.01
3 Pole-mature aspen-pine-oak 36-75yrs 11.74-18.38%	0 0 41.35+0	-0.5 0.57 28.75+0.16	-0.5 1.03 28.75+0.3	0.43 0.97 26.44-0.26	0.42 1.95 26.44-0.52	-0.34 0.31 24.16+0.07	-0.34 0.61 24.16+0.15	-0.5 3.62 26.19+0.95	-0.5 3.98 26.19+1.04
4 Mature-large red -white pine 76-175yrs 21.18-25.93%	0 0 32.73+0	0.39 1.9 40.42-0.77	0.37 3.34 40.42-1.35	0.47 1.48 42.87-0.63	0.48 0.59 42.87-0.25	0.5 2.91 46.06-1.34	0.5 2.57 46.06-1.18	0.5 2.87 46.48-1.33	0.5 2.38 46.48-1.11
5 Multi-aged red-white pine 176-old 33.62-54.92%	0 0 0.04+0	0 0 0.06+0	0 0 0.06+0	0 0 0.12+0	0 0 0.12+0	0 0 0.21+0	0 0 0.21+0	0 0 0.72+0	0 0 0.72+0

DLP/12 Dry-Mesic Pine Forest – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	-0.02	0.16	0.64	0.3	-1.55	-0.34	-0.61	-0.19	-1.4	-2.04	-2.61	-4.1
1 Seedling-sapling aspen-pine-oak 1-15yrs 5.37-10.05%	0 0 10.43+0	0.33 0.55 12.41-0.07	0.18 12.31 12.41-1.53	0.3 2.47 12.41-0.31	0 2.42 7.85+0.19	-0.21 20.73 7.85+1.63	-0.13 15.86 7.85+1.25	-0.16 7.94 9.15+0.73	-0.06 2.45 9.15+0.22	-0.14 6.9 9.15+0.63	0 4.35 8.78-0.38	-0.08 5.91 8.78+0.52	0 9.09 8.78-0.8
2 Sapling-pole aspen-pine-oak 16-35yrs 6.78-12.02%	0 0 15.46+0	0 0 19.33+0	0 0 19.33+0	0 0 19.33+0	0.5 0.3 22.83-0.07	0.5 6.69 22.83-1.53	0.5 1.34 22.83-0.31	-0.5 0.6 20.25+0.12	-0.5 0.5 20.25+0.1	-0.5 4.64 20.25+0.94	-0.5 5.33 17.19+0.92	-0.5 10.78 17.19+1.85	-0.5 10.93 17.19+1.88
3 Pole-mature aspen-pine-oak 36-75yrs 11.74-18.38%	0 0 41.35+0	-0.5 0.58 29.49+0.17	-0.5 2.58 29.49+0.76	0.5 1.03 29.49-0.3	0.42 0.07 25.93-0.02	-0.5 3.41 25.93+0.88	0.41 0.3 25.93-0.08	0 0 24.92+0	-0.4 1.22 24.92+0.3	0.34 2.25 24.92-0.56	0.49 0.25 27.43-0.07	0.41 6.16 27.43-1.69	0.48 1.06 27.43-0.29
4 Mature-large red -white pine 76-175yrs 21.18-25.93%	0 0 32.73+0	0.35 0.27 38.71-0.1	-0.41 1.98 38.71+0.77	-0.4 1.57 38.71+0.61	0.5 0.24 43.26-0.1	0.47 2.28 43.26-0.98	0.47 1.99 43.26-0.86	0.5 1.87 45.47-0.85	0.5 1.38 45.47-0.63	0.5 2.22 45.47-1.01	0.5 1.02 45.88-0.47	0.5 1.49 45.88-0.68	0.5 1.72 45.88-0.79
5 Multi-aged red-white pine 176-old 33.62-54.92%	0 0 0.04+0	0 0 0.06+0	0 0 0.06+0	0 0 0.06+0	0 0 0.12+0	0 0 0.12+0	0 0 0.12+0	0 0 0.21+0	0 0 0.21+0	0 0 0.21+0	0 0 0.72+0	0 0 0.72+0	0 0 0.72+0

DLP/13 Dry Pine Forest – Treatment Code A

Weighted Score	0 yrs 0	a-ss 10 yrs -0.25	a 10 yrs 0.73	a-ss 20 yrs 1.12	a 20 yrs -0.44	a-ss 30 yrs -11.07	a 30 yrs -17.99	a-ss 40 yrs -13.63	a 40 yrs -0.26
1 Seedling-sapling jack pine-aspen 1-15yrs 11.61-20.7%	0 0 10.96+0	0 1.68 16-0.27	0 7.71 16+1.23	0 20.14 11.68+2.35	0.03 12.8 11.68+1.5	-0.61 12.89 9.33-1.2	-0.71 19.06 9.33-1.78	-0.87 14.98 5.87-0.88	0.7 0.5 5.87+0.03
2 Sapling-pole jack pine-aspen 16-35yrs 13.27-20.7%	0 0 15.72+0	0 0 18.24+0	0 0 18.24+0	0.3 1 26.96-0.27	-0.42 4.57 26.96+1.23	-0.5 7.53 27.68+2.08	-0.5 9.86 27.68+2.73	-0.15 5.47 21.03+1.15	0.04 1.35 21.03-0.28
3 Pole-mature pine-aspen 36-75yrs 19.61-24.26%	0 0 49.95+0	-0.31 0.79 34.23+0.27	0.27 2.24 34.23-0.77	0 3.97 23.15-0.92	0 4.05 23.15-0.94	0.02 0.1 26.25-0.03	0.02 0.18 26.25-0.05	0.29 0.78 34.3-0.27	-0.38 3.53 34.3+1.21
4 Multi-aged pine 76-175yrs 21.92-26.03%	0 0 23.02+0	0 0 31.06+0	0.08 1.5 31.06-0.47	0.26 3.11 37.51-1.17	0.24 4.77 37.51-1.79	0.22 2.39 35.71-0.85	0.21 2.53 35.71-0.9	0 0 37.46+0	0.27 2.56 37.46-0.96
5 Multi-aged red-white pine 176-old 12.41-29.47%	0 0 0.35+0	0 0 0.48+0	0 0 0.48+0	0 0 0.7+0	0 0 0.7+0	0 0 1.03+0	0 0 1.03+0	0 0 1.34+0	0 0 1.34+0

DLP/13 Dry Pine Forest – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	0.6	-8.04	0.83	-5.45	1.3	-1.92	11.71	0.59	4.58	-28.07	-1.07	-35.04
1 Seedling-sapling jack pine-aspen 1-15yrs 11.61-20.7%	0 0 10.96+0	0 4.98 15.3+0.76	-0.32 17.1 15.3-2.62	0 10.41 15.3+1.59	-0.35 11.12 12.47-1.39	0 16.34 12.47+2.04	0.07 1.83 12.47+0.23	0.37 27.12 7.42+2.01	0.56 0.65 7.42+0.05	0.46 14.56 7.42+1.08	-0.96 27.76 7.06-1.96	-0.6 0.26 7.06-0.02	-1 32.79 7.06-2.32
2 Sapling-pole jack pine-aspen 16-35yrs 13.27-20.7%	0 0 15.72+0	0 0 18.24+0	0 0 18.24+0	0 0 18.24+0	-0.35 2.9 26.26+0.76	0.17 9.97 26.26-2.62	-0.42 6.07 26.26+1.59	0.32 2.25 27.77-0.62	0.33 2.09 27.77-0.58	-0.5 6.56 27.77+1.82	-0.06 3.15 19.91+0.63	-0.19 10.47 19.91+2.09	-0.12 6.58 19.91+1.31
3 Pole-mature pine-aspen 36-75yrs 19.61-24.26%	0 0 49.95+0	0.27 2.24 34.24-0.77	-0.42 5.3 34.24+1.81	0.27 2.19 34.24-0.75	0 0 23.53+0	0 0.55 23.53+0.13	0 4.54 23.53-1.07	0 0 27.41+0	0.06 0.08 27.41-0.02	0.03 3.78 27.41-1.04	-0.34 2.23 34.08+0.76	0.2 7.68 34.08-2.62	-0.4 4.81 34.08+1.64
4 Multi-aged pine 76-175yrs 21.92-26.03%	0 0 23.02+0	-0.12 0.02 31.75+0.01	-0.17 2.53 31.75+0.8	0.09 2.66 31.75-0.84	-0.32 1.69 37.04+0.62	-0.31 1.21 37.04+0.45	0.26 2.03 37.04-0.75	0.22 3.82 36.37-1.39	-0.3 1.52 36.37+0.55	0.2 5.13 36.37-1.87	-0.34 1.52 37.61+0.57	-0.34 1.46 37.61+0.55	0.28 1.69 37.61-0.63
5 Multi-aged red-white pine 176-old 12.41-29.47%	0 0 0.35+0	0 0 0.48+0	0 0 0.48+0	0 0 0.48+0	0 0 0.7+0	0 0 0.7+0	0 0 0.7+0	0 0 1.03+0	0 0 1.03+0	0 0 1.03+0	0 0 1.34+0	0 0 1.34+0	0 0 1.34+0

NSU/2 Mesic White and Red Pine – Treatment Code A

Weighted Score	0 yrs	a-ss 10 yrs	a 10 yrs	a-ss 20 yrs	a 20 yrs	a-ss 30 yrs	a 30 yrs	a-ss 40 yrs	a 40 yrs
	0	-0.07	0.22	-9.21	-7.01	-0.5	-6.54	-6.87	-4.78
1 Sapling birch 1-10yrs 3.23-6.25%	0 0 6.95+0	0 0.18 4.67+0.01	0 0.67 4.67-0.03	-0.44 13.51 6.56+0.89	-0.39 10.85 6.56+0.71	-0.04 1.64 5.58+0.09	-0.22 12.28 5.58+0.68	-0.15 2.89 6.1+0.18	0.06 3.55 6.1-0.22
2 Pole-mature birch 11-50yrs 11.39-19.74%	0 0 14.95+0	0 0 16.04+0	0 0.94 16.04+0.15	0 0.05 17.05+0.01	0 0.03 17.05-0.01	-0.1 4.32 18.7+0.81	-0.09 3.29 18.7+0.61	-0.17 4.46 19.97+0.89	-0.21 6.18 19.97+1.23
3 Mature birch-pine 51-80yrs 7.66-12.03%	0 0 39.42+0	0 0 36.83+0	0.5 0.65 36.83-0.24	0.5 0 21.36-0	-0.5 5.23 21.36+1.12	0.2 1.6 14.3-0.23	0.19 1.85 14.3-0.26	-0.04 4.07 8.66-0.35	-0.05 4.64 8.66-0.4
4 Mature white pine 81-120yrs 9.26-13.08%	0 0 12.04+0	0.22 0.11 16.29-0.02	0.22 0.2 16.29-0.03	0.5 7.71 23.14-1.78	0.5 10.91 23.14-2.52	0.5 6.74 25.77-1.74	0.5 9.54 25.77-2.46	0.5 6.33 24.09-1.53	0.5 6.01 24.09-1.45
5 Multi-aged pine-spruce-fir 121-200yrs 11.73-12.51%	0 0 0.67+0	0 0 0.86+0	0 0 0.86+0	0 0 1.71+0	0 0 1.71+0	0 0 2.74+0	0 0 2.74+0	-0.71 3.02 4.63-0.14	-0.71 3.02 4.63-0.14
6 Multi-aged spruce-fir 201-old 23.96-44.55%	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0
7 Sapling-pole pine 1-50yrs 0.59-1.31%	0 0 9.58+0	-0.5 0.03 9.45+0	-0.5 0.71 9.45+0.07	-0.5 2.53 10.53+0.27	-0.5 1.97 10.53+0.21	-0.5 3.92 11.06+0.43	-0.5 4.63 11.06+0.51	-0.5 4.22 11.86+0.5	-0.5 4.7 11.86+0.56
8 Sapling-pole spruce-fir 1-50yrs 1.21-1.37%	0 0 0.66+0	0.49 0.03 0.65+0	0.48 0.71 0.65+0	0.38 2.53 0.73+0.02	0.39 1.97 0.73+0.01	0.32 3.92 0.76+0.03	0.32 4.63 0.76+0.04	0.25 4.22 0.82+0.03	0.25 4.7 0.82+0.04
9 Multi-aged white pine 121-161yrs 9.75-10.39%	0 0 1.03+0	0 0 1.35+0	0 0 1.35+0	0 0 3.1+0	0 0 3.1+0	0 0 4.82+0	0 0 4.82+0	-0.39 4.71 6.39-0.3	-0.39 4.71 6.39-0.3
10 Birch-SF-pine 1-10yrs 0-0%	0 0 4.71+0	-0.5 0.18 3.17+0.01	0.5 0.67 3.17-0.02	-0.5 13.51 4.45+0.6	-0.5 10.85 4.45+0.48	-0.5 1.64 3.78+0.06	-0.5 12.28 3.78+0.46	-0.5 2.89 4.14+0.12	0.5 3.55 4.14-0.15
11 Birch-SF-pine 11-50yrs 0-0%	0 0 9.98+0	0 0 10.7+0	-0.5 0.94 10.7+0.1	-0.5 0.05 11.38+0.01	0.5 0.03 11.38-0	-0.5 4.32 12.48+0.54	-0.5 3.29 12.48+0.41	-0.5 4.46 13.33+0.59	-0.5 6.18 13.33+0.82

NSU/2 Mesic White and Red Pine – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	1.2	-9.82	2.62	-10.09	-1.17	-1.67	2.47	2.78	-19.34	-5	-0.62	-9.29
1 Sapling birch 1-10yrs 3.23-6.25%	0 0 6.95+0	0 3.3 5.1-0.17	-0.21 17.07 5.1+0.87	0 7.37 5.1-0.38	-0.45 14.47 6.49+0.94	-0.24 4.21 6.49+0.27	-0.18 1.39 6.49+0.09	0 7.66 5.86-0.45	0 10.1 5.86-0.59	-0.5 23.97 5.86+1.4	-0.14 8.98 5.45+0.49	-0.08 5.1 5.45+0.28	-0.22 13.54 5.45+0.74
2 Pole-mature birch 11-50yrs 11.39-19.74%	0 0 14.95+0	0 0 16.55+0	0 0 16.55+0	0 1.56 16.55-0.26	0 0.86 17.79-0.15	-0.07 5.08 17.79+0.9	0 3.18 17.79-0.57	-0.11 3.65 19.11+0.7	-0.16 6.02 19.11+1.15	0.03 1.35 19.11-0.26	-0.15 1.41 20.72+0.29	-0.16 1.8 20.72+0.37	-0.22 4.88 20.72+1.01
3 Mature birch-pine 51-80yrs 7.66-12.03%	0 0 39.42+0	0 0 35.54+0	0.5 4.87 35.54-1.73	-0.5 2.74 35.54+0.97	0.5 4.73 22.24-1.05	0.5 7.42 22.24-1.65	-0.5 1.7 22.24+0.38	0.21 1.17 14.44-0.17	0.18 3.67 14.44-0.53	0.19 2.94 14.44-0.42	0 5.88 9.34-0.55	0 1.16 9.34-0.11	-0.07 8.35 9.34-0.78
4 Mature white pine 81-120yrs 9.26-13.08%	0 0 12.04+0	-0.22 2.16 15.58+0.34	0.17 0.05 15.58-0.01	-0.22 2.21 15.58+0.34	0.49 2.34 20.75-0.49	0.46 4.28 20.75-0.89	-0.5 3.32 20.75+0.69	0.5 1.96 24.17-0.47	0.5 3.43 24.17-0.83	0.5 7.48 24.17-1.81	0.5 4.55 23.5-1.07	0.5 5.94 23.5-1.4	0.5 12.44 23.5-2.92
5 Multi-aged pine-spruce-fir 121-200yrs 11.73-12.51%	0 0 0.67+0	0 0 0.86+0	0 0 0.86+0	0 0 0.86+0	0 0 1.71+0	0 0 1.71+0	0 0 1.71+0	0 0 2.74+0	0 0 2.74+0	0 0 2.74+0	0 0 4.49+0	0.69 0.89 4.49+0.04	0 0 4.49+0
6 Multi-aged spruce-fir 201-old 23.96-44.55%	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0
7 Sapling-pole pine 1-50yrs 0.59-1.31%	0 0 9.58+0	0.5 0.51 9.84-0.05	-0.5 2.62 9.84+0.26	0.5 2.45 9.84-0.24	-0.5 1.85 10.88+0.2	-0.5 4.93 10.88+0.54	0.5 2.37 10.88-0.26	-0.5 1.92 11.35+0.22	-0.5 3.56 11.35+0.4	-0.5 2.51 11.35+0.29	-0.5 2.42 12.05+0.29	-0.5 2.24 12.05+0.27	-0.5 6.04 12.05+0.73
8 Sapling-pole spruce-fir 1-50yrs 1.21-1.37%	0 0 0.66+0	-0.47 0.51 0.68-0	0.44 2.62 0.68+0.02	-0.5 2.45 0.68-0.02	0.36 1.85 0.75+0.01	0.33 4.93 0.75+0.04	-0.42 2.37 0.75-0.02	0.32 1.92 0.78+0.02	0.3 3.56 0.78+0.03	0.31 2.51 0.78+0.02	0.26 2.42 0.83+0.02	0.26 2.24 0.83+0.02	0.22 6.04 0.83+0.05
9 Multi-aged white pine 121-161yrs 9.75-10.39%	0 0 1.03+0	0 0 1.35+0	0 0 1.35+0	0 0 1.35+0	0 0 3.1+0	0 0 3.1+0	0 0 3.1+0	0 0 4.82+0	0 0 4.82+0	0 0 4.82+0	0 0 6.09+0	0.33 1.41 6.09+0.09	0 0 6.09+0
10 Birch-SF-pine 1-10yrs 0-0%	0 0 4.71+0	0.5 3.3 3.46-0.11	-0.5 17.07 3.46+0.59	0.5 7.37 3.46-0.25	-0.5 14.47 4.41+0.64	-0.5 4.21 4.41+0.19	-0.5 1.39 4.41+0.06	0.5 7.66 3.97-0.3	0.5 10.1 3.97-0.4	-0.5 23.97 3.97+0.95	-0.5 8.98 3.7+0.33	-0.5 5.1 3.7+0.19	-0.5 13.54 3.7+0.5
11 Birch-SF-pine 11-50yrs 0-0%	0 0 9.98+0	0 0 11.05+0	0 0 11.05+0	0.5 1.56 11.05-0.17	0.5 0.86 11.87-0.1	-0.5 5.08 11.87+0.6	0.5 3.18 11.87-0.38	-0.5 3.65 12.75+0.47	-0.5 6.02 12.75+0.77	0.5 1.35 12.75-0.17	-0.5 1.41 13.83+0.19	-0.5 1.8 13.83+0.25	-0.5 4.88 13.83+0.68

NSU/3 Dry-Mesic White and Red Pine – Treatment Code A

Weighted Score	0 yrs	a-ss 10 yrs	a 10 yrs	a-ss 20 yrs	a 20 yrs	a-ss 30 yrs	a 30 yrs	a-ss 40 yrs	a 40 yrs
	0	-1.61	1.04	0.06	-2.15	-2.12	-3.97	0.25	1.74
1 Sapling birch 1-10yrs 3.23-6.25%	0 0 6.95+0	-0.19 3.18 6.34+0.2	0.1 2.54 6.34-0.16	0 1.33 4.6-0.06	0 6.36 4.6+0.29	0.1 5.04 3.47+0.18	0.04 10.01 3.47+0.35	0 3.02 5.5-0.17	0 5.99 5.5-0.33
2 Pole-mature birch 11-50yrs 11.39-19.74%	0 0 10.87+0	0 0 14.99+0	0 1.69 14.99+0.25	0 0.24 18.06+0.04	0 0.09 18.06+0.02	-0.04 0.65 18.79+0.12	0.03 0.21 18.79-0.04	0 1.62 16.9+0.27	0 2.45 16.9+0.41
3 Mature birch-pine 51-100yrs 11.94-17.83%	0 0 47.94+0	0.5 1.25 36.12-0.45	0.5 0.81 36.12-0.29	-0.5 0.26 28.53+0.07	0.5 2.4 28.53-0.68	0.23 2.69 22.54-0.61	0.23 2.74 22.54-0.62	0.05 1.25 18.55-0.23	0.05 1.5 18.55-0.28
4 Mature white pine 101-140yrs 9.53-12.56%	0 0 7.38+0	0 0 8.61+0	0 0 8.61+0	0 0.3 10.17-0.03	0 0.12 10.17-0.01	0.13 0.47 14.81-0.07	0.13 0.33 14.81-0.05	0.2 0.3 15.86-0.05	0.2 0.3 15.86-0.05
5 Multi-aged pine-spruce-fir 141-200yrs 9.97-10.36%	0 0 0.16+0	0 0 0.28+0	0 0 0.28+0	0 0 0.87+0	0 0 0.87+0	0 0 1.58+0	0 0 1.58+0	-0.74 0.51 3.52-0.02	0 0 3.52+0
6 Multi-aged spruce-fir 201-old 22.51-43.33%	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0
7 Sapling-pole pine 1-50yrs 0.65-1.44%	0 0 8.24+0	-0.5 0.59 10.38+0.06	-0.5 0.91 10.38+0.09	-0.5 0.05 11.58+0.01	-0.5 0.85 11.58+0.1	-0.5 1.04 11.66+0.12	-0.5 0.71 11.66+0.08	-0.5 0.93 11.2+0.1	-0.5 1.2 11.2+0.13
8 Sapling-pole spruce-fir 1-50yrs 1.14-1.23%	0 0 0.5+0	0.45 0.59 0.63+0	0.45 0.91 0.63+0.01	0.36 0.05 0.7+0	0.35 0.85 0.7+0.01	0.35 1.04 0.71+0.01	0.35 0.71 0.71+0	0.38 0.93 0.68+0.01	0.38 1.2 0.68+0.01
9 Multi-aged white pine 121-161yrs 8.08-8.83%	0 0 0.96+0	0 0 2.17+0	0 0 2.17+0	-0.62 0.55 3.58-0.02	0 0 3.58+0	-0.4 0.61 4.86-0.03	-0.39 0.13 4.86-0.01	-0.16 0.58 6.2-0.04	-0.15 0.11 6.2-0.01
10 Birch-SF-pine 1-10yrs 0-0%	0 0 6.34+0	-0.5 3.18 5.78+0.18	0.5 2.54 5.78-0.15	0.5 1.33 4.19-0.06	-0.5 6.36 4.19+0.27	-0.5 5.04 3.16+0.16	-0.5 10.01 3.16+0.32	0.5 3.02 5.02-0.15	0.5 5.99 5.02-0.3
11 Birch-SF-pine 11-50yrs 0-0%	0 0 10.66+0	0 0 14.71+0	-0.5 1.69 14.71+0.25	-0.5 0.24 17.72+0.04	-0.5 0.09 17.72+0.02	-0.5 0.65 18.43+0.12	0.5 0.21 18.43-0.04	-0.5 1.62 16.57+0.27	-0.5 2.45 16.57+0.41

NSU/3 Dry-Mesic White and Red Pine – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	-0.05	0.28	-4.4	-1.67	-2.42	-1.65	10.47	4.91	-1.77	-2.17	3.06	-6.85
1 Sapling birch 1-10yrs 3.23-6.25%	0 0 6.95+0	-0.07 0.12 5.93+0.01	0.06 0.74 5.93-0.04	-0.22 8.11 5.93+0.48	0 5.04 4.72+0.24	0 5.19 4.72+0.25	0 2.8 4.72+0.13	-0.27 4.55 3.42-0.16	0.09 7.15 3.42+0.24	0.13 3.26 3.42+0.11	-0.01 9.8 4.7+0.46	0 1.71 4.7-0.08	-0 9.17 4.7+0.43
2 Pole-mature birch 11-50yrs 11.39-19.74%	0 0 10.87+0	0 0 15.29+0	0 1.27 15.29+0.19	0 0.58 15.29-0.09	0 0.04 17.87+0.01	0 0.03 17.87+0	-0.03 2.57 17.87+0.46	-0.04 1.14 18.57+0.21	-0.04 0.92 18.57+0.17	-0.06 2.32 18.57+0.43	0 0.46 16.92+0.08	0 2.26 16.92+0.38	-0 3.73 16.92+0.63
3 Mature birch-pine 51-100yrs 11.94-17.83%	0 0 47.94+0	0.5 0.04 36.27-0.02	0.5 1.11 36.27-0.4	0.5 2.33 36.27-0.84	0.5 1.92 28.5-0.55	0.5 0.61 28.5-0.18	0.5 3.72 28.5-1.06	0.26 2.16 22.95-0.5	0.26 2.12 22.95-0.49	0.23 4.07 22.95-0.93	0.05 6.1 19.55-1.19	0.09 1.61 19.55-0.31	0.04 7 19.55-1.37
4 Mature white pine 101-140yrs 9.53-12.56%	0 0 7.38+0	0 0 8.61+0	0 0 8.61+0	0 0 8.61+0	0 0 10.43+0	0 3.67 10.43-0.38	0 3.83 10.43-0.4	0.15 0.14 15.1-0.02	0.11 3.92 15.1-0.59	0.12 2.66 15.1-0.4	0.22 1.99 16.46-0.33	0.2 3.85 16.46-0.63	0.18 5.91 16.46-0.97
5 Multi-aged pine-spruce-fir 141-200yrs 9.97-10.36%	0 0 0.16+0	0 0 0.28+0	0 0 0.28+0	0 0 0.28+0	0 0 0.87+0	0 0 0.87+0	0 0 0.87+0	1 8.16 1.58+0.13	1 7.82 1.58+0.12	0 0 1.58+0	0.71 3.16 3.52+0.11	0.71 3.63 3.52+0.13	-0.74 0.51 3.52-0.02
6 Multi-aged spruce-fir 201-old 22.51-43.33%	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0
7 Sapling-pole pine 1-50yrs 0.65-1.44%	0 0 8.24+0	-0.5 0.02 10.42+0	-0.5 0.92 10.42+0.1	-0.5 0.91 10.42+0.1	-0.5 0.66 11.51+0.08	-0.5 0.67 11.51+0.08	-0.5 2.6 11.51+0.3	-0.5 0.63 11.51+0.07	-0.5 1.48 11.51+0.17	-0.5 2.4 11.51+0.28	-0.5 1.67 10.97+0.18	-0.5 1.75 10.97+0.19	-0.5 4.43 10.97+0.49
8 Sapling-pole spruce-fir 1-50yrs 1.14-1.23%	0 0 0.5+0	0.45 0.02 0.63+0	0.44 0.92 0.63+0.01	0.44 0.91 0.63+0.01	0.36 0.66 0.7+0	0.36 0.67 0.7+0	0.34 2.6 0.7+0.02	0.36 0.63 0.7+0	0.35 1.48 0.7+0.01	0.35 2.4 0.7+0.02	0.4 1.67 0.67+0.01	0.39 1.75 0.67+0.01	0.37 4.43 0.67+0.03
9 Multi-aged white pine 121-161yrs 8.08-8.83%	0 0 0.96+0	0 0 2.17+0	0 0 2.17+0	0 0 2.17+0	0 0 3.58+0	-0.62 0.05 3.58-0	-0.62 0.55 3.58-0.02	0.36 3.89 4.85+0.19	-0.4 0.6 4.85-0.03	-0.4 0.47 4.85-0.02	0.09 2.88 6.33+0.18	0.12 0.16 6.33+0.01	-0.21 3.61 6.33-0.23
10 Birch-SF-pine 1-10yrs 0-0%	0 0 6.34+0	-0.5 0.12 5.41+0.01	0.5 0.74 5.41-0.04	-0.5 8.11 5.41+0.44	-0.5 5.04 4.3+0.22	-0.5 5.19 4.3+0.22	-0.5 2.8 4.3+0.12	0.5 4.55 3.12-0.14	-0.5 7.15 3.12+0.22	-0.5 3.26 3.12+0.1	-0.5 9.8 4.28+0.42	0.5 1.71 4.28-0.07	-0.5 9.17 4.28+0.39
11 Birch-SF-pine 11-50yrs 0-0%	0 0 10.66+0	0 0 14.99+0	-0.5 1.27 14.99+0.19	0.5 0.58 14.99-0.09	-0.5 0.04 17.52+0.01	-0.5 0.03 17.52+0	-0.5 2.57 17.52+0.45	-0.5 1.14 18.21+0.21	-0.5 0.92 18.21+0.17	-0.5 2.32 18.21+0.42	-0.5 0.46 16.6+0.08	-0.5 2.26 16.6+0.38	-0.5 3.73 16.6+0.62

NSU/4 Lowland Conifer – Treatment Code A

Weighted Score	0 yrs	a-ss 10 yrs	a 10 yrs	a-ss 20 yrs	a 20 yrs	a-ss 30 yrs	a 30 yrs	a-ss 40 yrs	a 40 yrs
	0	0	-0.79	-0.89	-1.26	-0.16	-0.03	-0.39	-0.93
1 Seedling black spruce 1-40yrs 13.09-22.92%	0	0	0	0	0	0	0	-0.17	-0.2
	0	0	3.02	4.94	6.27	1.02	0.2	1.43	2.98
	19.87+0	17.63+0	17.63-0.53	19.53-0.96	19.53-1.23	18.75-0.19	18.75-0.04	13.38-0.19	13.38-0.4
2 Sapling-pole black spruce 41-80yrs 11.55-18.09%	0	0	-0.5	0	-0.31	0	0	0	0.04
	0	0	1.58	0	1.26	0	0	0	0.05
	43.21+0	33.7+0	33.7+0.53	22.85+0	22.85+0.29	17.54+0	17.54+0	18.05+0	18.05-0.01
3 Pole-mature black spruce 81-160yrs 17.68-22.43%	0	0	0	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
	0	0	0	1.79	1.74	0.33	0.06	0.31	0.67
	34.98+0	45.85+0	45.85+0	53.92+0.96	53.92+0.94	58.25+0.19	58.25+0.04	61.24+0.19	61.24+0.41
4 Multi-aged black spruce 161-old 36.57-57.67%	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	1.94+0	2.82+0	2.82+0	3.71+0	3.71+0	5.46+0	5.46+0	7.33+0	7.33+0

NSU/4 Lowland Conifer – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	0.49	1.1	0.17	0.37	0.88	0.52	0.35	0.85	0.83	-4.24	1.36	-3.92
1 Seedling black spruce 1-40yrs 13.09-22.92%	0	0	0	0	0	-0	0	0	0	-0.07	0.13	0	0
	0	2.66	5.06	1.53	2.79	5.18	3.63	2.36	7.95	12.55	5.95	19.86	20.69
	19.87+0	17.01+0.45	17.01+0.86	17.01+0.26	19.07+0.53	19.07+0.99	19.07+0.69	18.09+0.43	18.09+1.44	18.09+2.27	12.66+0.75	12.66+2.51	12.66+2.62
2 Sapling-pole black spruce 41-80yrs 11.55-18.09%	0	0	0.5	-0.5	-0.3	-0.28	-0.3	0.02	0	0	-0.03	0	0.01
	0	0	1.3	0.93	1.27	0.29	1.27	0.09	2.49	1.72	0.04	2.74	1.6
	43.21+0	34.32+0	34.32-0.44	34.32+0.32	22.68+0.29	22.68+0.07	22.68+0.29	17.65-0.02	17.65-0.44	17.65-0.3	17.86+0.01	17.86-0.49	17.86-0.29
3 Pole-mature black spruce 81-160yrs 17.68-22.43%	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	0	0.99	0.91	1.26	1.5	1.93	1.79	0.7	1.7	3.34	0.57	3.25	3.09
	34.98+0	45.85-0.45	45.85-0.42	45.85-0.58	54.54-0.82	54.54-1.05	54.54-0.98	58.81-0.41	58.81-1	58.81-1.97	61.74-0.35	61.74-2	61.74-1.91
4 Multi-aged black spruce 161-old 36.57-57.67%	0	0	0	0	0	0	0	0	0	0	-1	-1	-1
	0	0	0	0	0	0	0	0	0	0	5.31	0.27	5.49
	1.94+0	2.82+0	2.82+0	2.82+0	3.71+0	3.71+0	3.71+0	5.46+0	5.46+0	5.46+0	7.75-0.41	7.75-0.02	7.75-0.42

NSU/5 Rich Swamp – Treatment Code A

Weighted Score	0 yrs	a-ss 10 yrs	a 10 yrs	a-ss 20 yrs	a 20 yrs	a-ss 30 yrs	a 30 yrs	a-ss 40 yrs	a 40 yrs
	0	0	8.2	0	10.01	0	-48.73	0	-23.04
1 Seedling-sapling 1-20yrs 2.87-5.51%	0 0 7.06+0	0 0 14.96+0	0.5 25.89 14.96-3.87	0 0 14.29+0	0.5 32.91 14.29-4.7	0 0 3.29+0	-0.5 117.64 3.29+3.87	0 0 6.38+0	-0.5 73.68 6.38+4.7
2 Sapling-pole 21-50yrs 4.18-7.8%	0 0 14.16+0	0 0 18.2+0	0 0 18.2+0	0 0 19.48+0	0 0 19.48+0	0 0 19.2+0	0.5 20.18 19.2-3.87	0 0 17.04+0	0.5 27.6 17.04-4.7
3 Pole-mature 51-100yrs 6.48-11.31%	0 0 63.5+0	0 0 40.83+0	-0.5 9.49 40.83+3.87	0 0 36.49+0	-0.5 12.89 36.49+4.7	0 0 37.33+0	0 0 37.33+0	0 0 30.19+0	0 0 30.19+0
4 Multi-aged ash or cedar 101-old 75.38-86.46%	0 0 15.28+0	0 0 26+0	0 0 26+0	0 0 29.74+0	0 0 29.74+0	0 0 40.19+0	0 0 40.19+0	0 0 46.39+0	0 0 46.39+0

NSU/5 Rich Swamp – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	0	0	-51.97	0	-78.44	0	0	10.94	-12.26	5.51	-70.72	-0.49
1 Seedling-sapling 1-20yrs 2.87-5.51%	0 0 7.06+0	0 0 4.92+0	0 0 4.92+0	-0.5 115.07 4.92+5.66	0 0 8.68+0	-1 71.11 8.68-6.17	0 0 8.68+0	0 0 11.8+0	0.44 37.53 11.8-4.43	0.46 36.62 11.8-4.32	0.5 22.53 13.89-3.13	-0.5 21.9 13.89+3.04	0.5 12.89 13.89-1.79
2 Sapling-pole 21-50yrs 4.18-7.8%	0 0 14.16+0	0 0 18.2+0	0 0 18.2+0	0 0 18.2+0	0 0 19.48+0	0 0 19.48+0	0 0 19.48+0	0 0 9.15+0	0 0 9.15+0	-0.5 61.84 9.15+5.66	0 0 11.43+0	-1 54.02 11.43-6.17	0 0 11.43+0
3 Pole-mature 51-100yrs 6.48-11.31%	0 0 63.5+0	0 0 50.88+0	0 0 50.88+0	0.5 11.12 50.88-5.66	0 0 42.1+0	-0.5 14.66 42.1+6.17	0 0 42.1+0	0 0 38.87+0	-0.5 11.39 38.87+4.43	0.5 3.45 38.87-1.34	-0.5 11.51 27.2+3.13	-0.5 11.51 27.2+3.13	-0.5 11.51 27.2+3.13
4 Multi-aged ash or cedar 101-old 75.38-86.46%	0 0 15.28+0	0 0 26+0	0 0 26+0	0 0 26+0	0 0 29.74+0	0 0 29.74+0	0 0 29.74+0	0 0 40.19+0	0 0 40.19+0	0 0 40.19+0	0 0 47.48+0	0 0 47.48+0	-0.42 2.82 47.48-1.34

NSU/6 Mesic Birch-Aspen-Spruce-Fir – Treatment Code A

Weighted Score	0 yrs	a-ss 10 yrs	a 10 yrs	a-ss 20 yrs	a 20 yrs	a-ss 30 yrs	a 30 yrs	a-ss 40 yrs	a 40 yrs
	0	0.14	-0.85	-7.1	-5.09	-10.66	-6.5	-10.74	-9.68
1 Sapling birch 1-10yrs 4.76-9.09%	0 0 5.62+0	0 1.87 7.14-0.13	0 1.44 7.14-0.1	0 12.6 5.47+0.69	0 6.23 5.47+0.34	0.05 8.06 5.11+0.41	-0.19 2.27 5.11-0.12	0 4.51 5.92+0.27	0 12.06 5.92+0.71
2 Pole-mature birch 11-50yrs 15.87-25.97%	0 0 16.77+0	0 0 18.48+0	0 0.77 18.48+0.14	0 0.61 21.01-0.13	0 0.69 21.01+0.14	0 2.41 22.06+0.53	0 1.96 22.06+0.43	0 4.37 21.23+0.93	0 0.55 21.23+0.12
3 Mature birch-conifer 51-80yrs 10.22-14.65%	0 0 33.27+0	-0.36 1.13 20.05+0.23	-0.35 0.54 20.05+0.11	0 1.66 13.08-0.22	0 0.84 13.08-0.11	0 1.91 10.34+0.2	0 6.72 10.34+0.69	0 0 10.93+0	0 0.41 10.93-0.05
4 Multi-aged conifer 81-old 47.25-66.79%	0 0 15.65+0	0 0 24.53+0	-0.62 0.88 24.53-0.22	-0.49 2.75 30.75-0.84	-0.49 2.74 30.75-0.84	-0.51 6.58 32.48-2.14	-0.47 4.52 32.48-1.47	-0.54 7.63 31.91-2.43	-0.49 5 31.91-1.59
5 Sapling-pole conifer 1-50yrs 1.56-2.09%	0 0 3.66+0	0.5 0.35 4.13-0.01	-0.5 0.35 4.13+0.01	-0.5 1.2 4.41+0.05	-0.5 1.44 4.41+0.06	-0.5 3.11 4.56+0.14	-0.5 1.44 4.56+0.07	-0.5 4.39 4.5+0.2	-0.5 2.21 4.5+0.1
6 Pole-mature conifer 51-80yrs 0.8-0.94%	0 0 5.49+0	-0.5 1.13 3.31+0.04	-0.5 0.54 3.31+0.02	0.5 1.66 2.16-0.04	0.5 0.84 2.16-0.02	-0.5 1.91 1.7+0.03	-0.5 6.72 1.7+0.11	0 0 1.8+0	0.5 0.41 1.8-0.01
7 Birch-Aspen-Spruce-Fir 1-10yrs 0-0%	0 0 4.84+0	0.5 1.87 6.15-0.12	0.5 1.44 6.15-0.09	-0.5 12.6 4.71+0.59	-0.5 6.23 4.71+0.29	-0.5 8.06 4.41+0.36	0.5 2.27 4.41-0.1	-0.5 4.51 5.1+0.23	-0.5 12.06 5.1+0.62
8 Birch-Aspen-Spruce-Fir 11-50yrs 0-0%	0 0 14.7+0	0 0 16.2+0	-0.5 0.77 16.2+0.12	0.5 0.61 18.41-0.11	-0.5 0.69 18.41+0.13	-0.5 2.41 19.34+0.47	-0.5 1.96 19.34+0.38	-0.5 4.37 18.61+0.81	-0.5 0.55 18.61+0.1

NSU/6 Mesic Birch-Aspen-Spruce-Fir – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	0.18	-0.41	1.61	-2.1	-2.62	3.88	-4.07	-2.15	-18.37	-11.29	-0.68	-15.5
1 Sapling birch 1-10yrs 4.76-9.09%	0 0 5.62+0	0 1.3 6.7-0.09	0 5.5 6.7-0.37	0 0.53 6.7+0.04	0 5.11 5.74+0.29	0 6.59 5.74+0.38	-0.03 0.95 5.74-0.05	0.23 11.58 4.23+0.49	-0.5 9 4.23-0.38	0 37.08 4.23+1.57	0 14.03 5.59+0.78	0 7.84 5.59+0.44	0 11.43 5.59+0.64
2 Pole-mature birch 11-50yrs 15.87-25.97%	0 0 16.77+0	0 0.75 18.63-0.14	0 0.4 18.63-0.07	0 0.74 18.63-0.14	0 0.64 20.92-0.13	0 1.69 20.92-0.35	0 0.08 20.92-0.02	0 0.91 22.15+0.2	0 0.67 22.15+0.15	0 1.09 22.15-0.24	0 2.89 20.55+0.59	0 1.57 20.55-0.32	0 7.24 20.55+1.49
3 Mature birch-conifer 51-80yrs 10.22-14.65%	0 0 33.27+0	-0.4 1.61 20.54+0.33	-0.46 3.98 20.54+0.82	0.36 0.51 20.54-0.1	0 0.95 13.57-0.13	0 0.52 13.57+0.07	0 4.19 13.57-0.57	0 3.54 11.56-0.41	0 3.83 11.56+0.44	-0.07 7.74 11.56-0.89	0 5.11 12.17-0.62	0 3.86 12.17-0.47	0 7.11 12.17-0.86
4 Multi-aged conifer 81-old 47.25-66.79%	0 0 15.65+0	0.6 0.31 24.54+0.08	-0.61 0.3 24.54-0.07	0.6 1.36 24.54+0.33	-0.47 0.51 29.83-0.15	-0.47 0.34 29.83-0.1	0.44 2.7 29.83+0.8	-0.44 2.77 32.62-0.9	-0.4 0.21 32.62-0.07	-0.47 4.77 32.62-1.55	-0.5 6.28 32.51-2.04	0.39 1.07 32.51+0.35	-0.57 10.19 32.51-3.31
5 Sapling-pole conifer 1-50yrs 1.56-2.09%	0 0 3.66+0	0.5 0.85 4.11-0.03	0.5 1.31 4.11-0.05	0.5 0.51 4.11-0.02	-0.5 0.18 4.42+0.01	0.5 0.51 4.42-0.02	0.5 0.2 4.42-0.01	-0.5 2.02 4.48+0.09	0.5 0.34 4.48-0.02	-0.5 2.87 4.48+0.13	-0.5 4.47 4.34+0.19	0.5 0.24 4.34-0.01	-0.5 7.83 4.34+0.34
6 Pole-mature conifer 51-80yrs 0.8-0.94%	0 0 5.49+0	-0.5 1.61 3.39+0.05	-0.5 3.98 3.39+0.13	0.5 0.51 3.39-0.02	0.5 0.95 2.24-0.02	-0.5 0.52 2.24+0.01	0.5 4.19 2.24-0.09	0.5 3.54 1.91-0.07	0.5 3.83 1.91+0.07	0.5 7.74 1.91-0.15	0.5 5.11 2.01-0.1	0.5 3.86 2.01-0.08	0.5 7.11 2.01-0.14
7 Birch-Aspen-Spruce-Fir 1-10yrs 0-0%	0 0 4.84+0	0.5 1.3 5.77-0.07	0.5 5.5 5.77-0.32	-0.5 0.53 5.77+0.03	-0.5 5.11 4.94+0.25	-0.5 6.59 4.94+0.33	0.5 0.95 4.94-0.05	-0.5 11.58 3.65+0.42	0.5 9 3.65-0.33	-0.5 37.08 3.65+1.35	-0.5 14.03 4.82+0.68	-0.5 7.84 4.82+0.38	-0.5 11.43 4.82+0.55
8 Birch-Aspen-Spruce-Fir 11-50yrs 0-0%	0 0 14.7+0	0.5 0.75 16.33-0.12	0.5 0.4 16.33-0.06	0.5 0.74 16.33-0.12	0.5 0.64 18.33-0.12	0.5 1.69 18.33-0.31	0.5 0.08 18.33-0.01	-0.5 0.91 19.41+0.18	-0.5 0.67 19.41+0.13	0.5 1.09 19.41-0.21	-0.5 2.89 18.02+0.52	0.5 1.57 18.02-0.28	-0.5 7.24 18.02+1.3

NSU/7 Jack Pine-Black Spruce – Treatment Code A

Weighted Score	0 yrs 0	a-ss 10 yrs 0	a 10 yrs 1.63	a-ss 20 yrs -0.5	a 20 yrs 0.6	a-ss 30 yrs -0.22	a 30 yrs -3.56	a-ss 40 yrs 3.42	a 40 yrs 1.07
1 Seedling jack pine 1-10yrs 9.14-16.77%	0 0 5.91+0	0 0 5.23+0	0.61 5.55 5.23+0.29	-0.6 3.04 5.95-0.18	-0.67 7.65 5.95-0.46	0.55 2.79 5.88+0.16	-0.64 5.22 5.88-0.31	0.79 6.17 3.75+0.23	0.76 13.51 3.75+0.51
2 Sapling jack pine 11-20yrs 8.31-13.97%	0 0 4.85+0	0 0 6.13+0	0 0 6.13+0	0 0 5.43+0	0.48 5.55 5.43+0.3	-0.47 3.04 6.18-0.19	-0.55 7.65 6.18-0.47	0.41 2.79 6.1+0.17	-0.51 5.22 6.1-0.32
3 Pole jack pine 21-50yrs 19.17-26.2%	0 0 21.34+0	0 0 15.21+0	0 0 15.21+0	0 0 14.97+0	0 0 14.97+0	0 0 14.73+0	0.26 1.85 14.73+0.27	-0.23 1.1 15.84-0.17	-0.22 1.01 15.84-0.16
4 Mature jack pine 51-70yrs 10.56-12.3%	0 0 21.84+0	0 0 20.2+0	0 0 20.2+0	0.11 0.07 15.04-0.01	0.11 0.07 15.04-0.01	0.24 3.08 7.43+0.23	0.21 6.93 7.43+0.51	0 0 5.69+0	-0.51 0.13 5.69-0.01
5 Large jack pine 71-110yrs 13.37-14.88%	0 0 29.77+0	0 0 34.58+0	0.5 0.79 34.58-0.27	-0.5 0.58 36.62+0.21	-0.5 0.54 36.62+0.2	0.5 0.55 35.82-0.2	-0.5 0.02 35.82+0.01	0.5 0.03 29.63-0.01	0.5 0.03 29.63-0.01
6 Jack pine-spruce-fir 111-180yrs 9.47-15.01%	0 0 1.55+0	0 0 3.84+0	0.78 0.07 3.84+0	-0.42 0.17 6.76-0.01	-0.42 0.17 6.76-0.01	0 0.08 13.41-0.01	0 0.08 13.41-0.01	0.43 0.85 21.45-0.18	0.44 0.05 21.45-0.01
7 Multi-aged fir-spruce-cedar 181-old 6.83-21.62%	0 0 0.06+0	0 0 0.45+0	0 0 0.45+0	0 0 0.49+0	0 0 0.49+0	0 0 0.54+0	0 0 0.54+0	0 0 0.61+0	0 0 0.61+0
8 Seedling fir-spruce-cedar 1-30yrs 0.56-0.6%	0 0 0.88+0	0 0 0.88+0	-0.3 1.39 0.88+0.01	0.38 0.79 0.97-0.01	0.38 0.46 0.97-0	0.36 0.24 0.96-0	0.34 1.45 0.96-0.01	-0.32 0.46 0.92+0	0.27 3.19 0.92-0.03
9 Sapling fir-spruce-cedar 31-50yrs 0.27-0.33%	0 0 1+0	0 0 0.65+0	0 0 0.65+0	0 0 0.56+0	0 0 0.56+0	0 0 0.59+0	0.5 0.07 0.59-0	0 0 0.61+0	-0.5 2.76 0.61+0.02
10 Pole-mature fir-spruce-cedar 51-80yrs 0.25-0.38%	0 0 3.02+0	0 0 2.65+0	0.5 1.46 2.65-0.04	0.5 0.03 2.08-0	0.5 0.03 2.08-0	-0.5 0.89 1.59+0.01	-0.5 2.01 1.59+0.03	0.5 0.16 0.82-0	0.5 0.21 0.82-0
11 Seedling JP-SF-cedar 1-10yrs 0-0%	0 0 0.83+0	0 0 0.73+0	-0.5 5.55 0.73+0.04	0.5 3.04 0.83-0.03	0.5 7.65 0.83-0.06	-0.5 2.79 0.82+0.02	0.5 5.22 0.82-0.04	-0.5 6.17 0.52+0.03	-0.5 13.51 0.52+0.07
12 Seedling JP-SF-cedar 11-50yrs 0-0%	0 0 3.56+0	0 0 2.78+0	0 0 2.78+0	0 0 2.68+0	-0.5 1.01 2.68+0.03	0.5 0.62 2.71-0.02	0.5 0.1 2.71-0	0.5 0.36 2.87-0.01	0.5 1.82 2.87-0.05
13 Seedling JP-SF-cedar 51-180yrs 0-0%	0 0 5.4+0	0 0 6.67+0	0.5 0.49 6.67-0.03	-0.5 0.29 7.62+0.02	-0.5 0.26 7.62+0.02	0.5 0.17 9.34-0.02	-0.5 0.27 9.34+0.02	0.5 0.55 11.17-0.06	0.5 0.05 11.17-0.01

NSU/7 Jack Pine-Black Spruce – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	-1.2	-7.63	-0.48	-1.49	-8.74	-0.22	3.12	3.26	4.31	2.69	2.44	0.94
1 Seedling jack pine 1-10yrs 9.14-16.77%	0 0 5.91+0	-0.66 4.89 5.62-0.27	-0.8 15.32 5.62-0.86	-0.65 3.73 5.62-0.21	0.61 5.26 5.22+0.27	0.59 9.89 5.22+0.52	0.59 9.72 5.22+0.51	0.58 5.1 5.5+0.28	-0.63 1.63 5.5-0.09	0.6 2.56 5.5+0.14	0.79 0.15 3.92+0.01	-0.81 1.81 3.92-0.07	0.79 0.31 3.92+0.01
2 Sapling jack pine 11-20yrs 8.31-13.97%	0 0 4.85+0	0 0 6.13+0	0 0 6.13+0	0 0 6.13+0	-0.54 4.89 5.83-0.29	-0.71 15.32 5.83-0.89	-0.52 3.73 5.83-0.22	0.48 5.26 5.42+0.29	0.45 9.89 5.42+0.54	0.45 9.72 5.42+0.53	0.44 5.1 5.7+0.29	-0.51 1.63 5.7-0.09	0.46 2.56 5.7+0.15
3 Pole jack pine 21-50yrs 19.17-26.2%	0 0 21.34+0	0 0 15.21+0	0.23 1.84 15.21+0.28	0 0 15.21+0	0 0 14.97+0	0 0 14.97+0	0 0 14.97+0	-0.29 1.75 15.1-0.26	-0.36 5.5 15.1-0.83	-0.28 1.3 15.1-0.2	-0.22 0.03 15.53-0	-0.27 2.22 15.53-0.35	0.2 1.86 15.53+0.29
4 Mature jack pine 51-70yrs 10.56-12.3%	0 0 21.84+0	0 0 20.46+0	-0.5 1.67 20.46+0.34	0.45 1.15 20.46-0.24	0 0 15.06+0	-0.16 2.27 15.06+0.34	0.08 3.55 15.06-0.53	0 0 7.74+0	0.21 2.68 7.74+0.21	0.23 0.49 7.74+0.04	0 0 5.83+0	0.45 4.75 5.83+0.28	0.48 0.1 5.83+0.01
5 Large jack pine 71-110yrs 13.37-14.88%	0 0 29.77+0	-0.5 0.86 33.93+0.29	-0.5 0.74 33.93+0.25	-0.5 1.34 33.93+0.45	0 0 36.97+0	-0.5 0.06 36.97+0.02	-0.5 0.61 36.97+0.23	0.5 0.81 36.29-0.29	-0.5 0.59 36.29+0.21	0.5 1.39 36.29-0.51	0.5 0 29.66-0	-0.5 1.12 29.66+0.33	-0.5 0.1 29.66+0.03
6 Jack pine-spruce-fir 111-180yrs 9.47-15.01%	0 0 1.55+0	-0.78 0.07 3.84-0	-0.78 0.07 3.84-0	0 0 3.84+0	0 0 6.75+0	0 0 6.75+0	0 0 6.75+0	0 0 13.4+0	0 0 13.4+0	0 0 13.4+0	0.44 1.16 21.79-0.25	0.46 0.29 21.79-0.06	0.43 2 21.79-0.44
7 Multi-aged fir-spruce-cedar 181-old 6.83-21.62%	0 0 0.06+0	0 0 0.45+0	0 0 0.45+0	0 0 0.45+0	0 0 0.49+0	0 0 0.49+0	0 0 0.49+0	0 0 0.54+0	0 0 0.54+0	0 0 0.54+0	0 0 0.61+0	0 0 0.61+0	0 0 0.61+0
8 Seedling fir-spruce-cedar 1-30yrs 0.56-0.6%	0 0 0.88+0	0.27 1.29 0.9-0.01	0.24 4.05 0.9-0.04	0.28 0.99 0.9-0.01	0.37 0.25 0.96-0	0.34 2.29 0.96-0.02	-0.4 1.12 0.96+0.01	-0.34 0.51 0.93+0	0.27 4.7 0.93-0.04	-0.37 1.68 0.93+0.02	-0.32 4.21 0.85+0.04	-0.31 3.79 0.85+0.03	-0.34 5.51 0.85+0.05
9 Sapling fir-spruce-cedar 31-50yrs 0.27-0.33%	0 0 1+0	0 0 0.65+0	-0.5 2.62 0.65+0.02	0 0 0.65+0	0 0 0.56+0	0 0 0.56+0	0 0 0.56+0	0 0 0.59+0	0 0 0.59+0	-0.5 0.07 0.59+0	0.5 2.56 0.64-0.02	0.5 8.03 0.64-0.05	0.5 1.9 0.64-0.01
10 Pole-mature fir-spruce-cedar 51-80yrs 0.25-0.38%	0 0 3.02+0	0 0 2.63+0	-0.5 1.53 2.63+0.04	0.5 0.56 2.63-0.01	0 0 2.08+0	-0.5 1.02 2.08+0.02	0.5 2 2.08-0.04	0 0 1.62+0	-0.5 3.35 1.62+0.05	-0.5 0.15 1.62+0	0.5 0.02 0.83-0	-0.5 2.07 0.83+0.02	-0.5 0.55 0.83+0
11 Seedling JP-SF-cedar 1-10yrs 0-0%	0 0 0.83+0	0.5 4.89 0.79-0.04	0.5 15.32 0.79-0.12	0.5 3.73 0.79-0.03	-0.5 5.26 0.73+0.04	-0.5 9.89 0.73+0.07	-0.5 9.72 0.73+0.07	-0.5 5.1 0.77+0.04	0.5 1.63 0.77-0.01	-0.5 2.56 0.77+0.02	-0.5 0.15 0.55+0	0.5 1.81 0.55-0.01	-0.5 0.31 0.55+0
12 Seedling JP-SF-cedar 11-50yrs 0-0%	0 0 3.56+0	0 0 2.78+0	-0.5 1.48 2.78+0.04	0 0 2.78+0	0.5 0.94 2.72-0.03	0.5 2.96 2.72-0.08	0.5 0.72 2.72-0.02	0.5 0.49 2.7-0.01	0.5 2.72 2.7-0.07	-0.5 0.7 2.7+0.02	-0.5 0.92 2.79+0.03	0.5 2.11 2.79-0.06	-0.5 1.99 2.79+0.06
13 Seedling JP-SF-cedar 51-180yrs 0-0%	0 0 5.4+0	-0.5 0.53 6.61+0.04	-0.5 0.74 6.61+0.05	-0.5 0.66 6.61+0.04	0 0 7.66+0	-0.5 0.28 7.66+0.02	0.5 0.02 7.66-0	0.5 0.39 9.41-0.04	-0.5 0.4 9.41+0.04	0.5 0.64 9.41-0.06	0.5 0.75 11.3-0.08	-0.5 0.31 11.3+0.04	0.5 1.26 11.3-0.14

NSU/12 Northern Hardwood Conifer – Treatment Code A

Weighted Score	0 yrs	a-ss 10 yrs	a 10 yrs	a-ss 20 yrs	a 20 yrs	a-ss 30 yrs	a 30 yrs	a-ss 40 yrs	a 40 yrs
	0	-0.06	-0	0.9	0.91	4.27	1.67	2.18	0.99
1 Sapling-pole aspen-birch-conifer 1-50yrs 7.23-13.08%	0 0 33.64+0	-0.5 0.09 31.41+0.03	-0.5 0.02 31.41+0.01	-0.5 4.88 32.33+1.58	-0.5 5.04 32.33+1.63	-0.5 13.82 31.19+4.31	-0.5 5.2 31.19+1.62	-0.5 18.45 29+5.35	-0.5 8 29+2.32
2 Mature aspen-birch-conifer 51-100yrs 6.3-10.06%	0 0 38.92+0	0 0 39.72+0	0.5 0.01 39.72-0.01	0.5 2.4 31.39-0.75	0.5 2.56 31.39-0.8	0.5 6.31 25.07-1.58	0.5 3.18 25.07-0.8	0.5 0.07 21.78-0.02	0.5 0.63 21.78-0.14
3 Mature-multi-age spruce-fir-birch-pine 101-150yrs 5.49-7.74%	0 0 7.85+0	0.14 0.33 9.01-0.03	0 0 9.01+0	0.5 5.25 16.12-0.85	0.5 5.25 16.12-0.85	0.5 12.11 22.96-2.78	0.5 3.69 22.96-0.85	0.5 20.57 26.18-5.39	0.5 8.42 26.18-2.2
4 Multi-aged spruce-fir-birch-pine 151-old 25.84-37.24%	0 0 0.6+0	0 0 0.91+0	0 0 0.91+0	0 0 1.14+0	0 0 1.14+0	0 0 1.72+0	0 0 1.72+0	0 0 4.02+0	0 0 4.02+0
5 Sapling-pole conifer / maple 1-50yrs 2.21-3.95%	0 0 8.28+0	-0.5 0.09 7.73+0.01	-0.5 0.02 7.73+0	-0.5 4.88 7.95+0.39	-0.5 5.04 7.95+0.4	-0.5 13.82 7.67+1.06	-0.5 5.2 7.67+0.4	-0.5 18.45 7.13+1.32	-0.5 8 7.13+0.57
6 Pole-mature conifer / maple-yellow birch 51-100yrs 2.1-3.59%	0 0 8.74+0	0 0 8.92+0	0.5 0.01 8.92-0	0.5 2.4 7.05-0.17	0.5 2.56 7.05-0.18	0.5 6.31 5.63-0.36	0.5 3.18 5.63-0.18	0.41 0.07 4.89-0	0.41 0.63 4.89-0.03
7 Mature-multi-aged northern hardwood-conifer 101-150yrs 2-3.26%	0 0 1.84+0	-0.05 0.33 2.11-0.01	0 0 2.11+0	0.14 5.25 3.78-0.2	0.14 5.25 3.78-0.2	0.47 12.11 5.38-0.65	0.5 3.69 5.38-0.2	0.5 20.57 6.14-1.26	0.5 8.42 6.14-0.52
8 Multi-aged northern hardwood-conifer 151-old 32.48-37.42%	0 0 0.13+0	0 0 0.19+0	0 0 0.19+0	0 0 0.24+0	0 0 0.24+0	0 0 0.36+0	0 0 0.36+0	0 0 0.85+0	0 0 0.85+0

NSU/12 Northern Hardwood Conifer – Treatment Code B

Weighted Score	0 yrs	b-ss 10 yrs	b 10 yrs	b-sf 10 yrs	b-ss 20 yrs	b 20 yrs	b-sf 20 yrs	b-ss 30 yrs	b 30 yrs	b-sf 30 yrs	b-ss 40 yrs	b 40 yrs	b-sf 40 yrs
	0	-2.34	-2.9	-2.02	0.37	-1.34	0.2	4.15	-0.92	3.72	0.43	42.1	0.8
1 Sapling-pole aspen-birch-conifer 1-50yrs 7.23-13.08%	0 0 33.64+0	-0.5 5.74 31.12+1.79	0.5 0.4 31.12-0.13	-0.5 3.49 31.12+1.09	-0.5 8.43 32.41+2.73	0.5 0.88 32.41-0.29	-0.5 4.74 32.41+1.54	-0.5 12.01 31.85+3.83	0.5 1.98 31.85-0.63	-0.5 10.08 31.85+3.21	-0.5 10.58 30.54+3.23	0.5 4.25 30.54-1.3	-0.5 11.73 30.54+3.58
2 Mature aspen-birch-conifer 51-100yrs 6.3-10.06%	0 0 38.92+0	0.5 3.25 39.48-1.28	-0.5 2.49 39.48+0.98	0.5 1.37 39.48-0.54	0.5 8.42 31.92-2.69	0.5 1.46 31.92-0.47	0.5 4.76 31.92-1.52	0.5 8.52 25.01-2.13	0.5 0.46 25.01-0.11	0.5 4.92 25.01-1.23	0.5 3.66 22.16-0.81	0.5 0.18 22.16-0.04	0.5 2.47 22.16-0.55
3 Mature-multi-age spruce-fir-birch-pine 101-150yrs 5.49-7.74%	0 0 7.85+0	0.15 5.57 9.54-0.53	0.11 8.88 9.54-0.85	0.14 5.88 9.54-0.56	0.5 0.59 15.51-0.09	-0.5 4.84 15.51+0.75	0.5 0.28 15.51-0.04	0.5 7.81 22.35-1.75	-0.5 3.36 22.35+0.75	0.5 9.04 22.35-2.02	0.5 9.96 24.21-2.41	-0.5 2.28 24.21+0.55	0.5 12.51 24.21-3.03
4 Multi-aged spruce-fir-birch-pine 151-old 25.84-37.24%	0 0 0.6+0	0 0 0.91+0	0 0 0.91+0	0 0 0.91+0	0 0 1.14+0	0 0 1.14+0	0 0 1.14+0	0 0 1.72+0	0 0 1.72+0	0 0 1.72+0	-1 1.1 4.06-0.04	1 19.98 4.06+0.81	-1 1.1 4.06-0.04
5 Sapling-pole conifer / maple 1-50yrs 2.21-3.95%	0 0 8.28+0	-0.5 5.74 7.65+0.44	0.5 0.4 7.65-0.03	-0.5 3.49 7.65+0.27	-0.5 8.43 7.97+0.67	0.5 0.88 7.97-0.07	-0.5 4.74 7.97+0.38	-0.5 12.01 7.83+0.94	0.5 1.98 7.83-0.16	-0.5 10.08 7.83+0.79	-0.5 10.58 7.51+0.79	0.5 4.25 7.51-0.32	-0.5 11.73 7.51+0.88
6 Pole-mature conifer / maple-yellow birch 51-100yrs 2.1-3.59%	0 0 8.74+0	0.5 3.25 8.87-0.29	-0.5 2.49 8.87+0.22	0.5 1.37 8.87-0.12	0.5 8.42 7.17-0.6	0.5 1.46 7.17-0.1	0.5 4.76 7.17-0.34	0.48 8.52 5.62-0.48	0.5 0.46 5.62-0.03	0.5 4.92 5.62-0.28	0.39 3.66 4.98-0.18	0.43 0.18 4.98-0.01	0.4 2.47 4.98-0.12
7 Mature-multi-aged northern hardwood-conifer 101-150yrs 2-3.26%	0 0 1.84+0	-0.12 5.57 2.24-0.12	-0.2 8.88 2.24-0.2	-0.13 5.88 2.24-0.13	0.15 0.59 3.64-0.02	-0.26 4.84 3.64+0.18	0.16 0.28 3.64-0.01	0.5 7.81 5.24-0.41	-0.5 3.36 5.24+0.18	0.48 9.04 5.24-0.47	0.5 9.96 5.68-0.57	-0.5 2.28 5.68+0.13	0.5 12.51 5.68-0.71
8 Multi-aged northern hardwood-conifer 151-old 32.48-37.42%	0 0 0.13+0	0 0 0.19+0	0 0 0.19+0	0 0 0.19+0	0 0 0.24+0	0 0 0.24+0	0 0 0.24+0	0 0 0.36+0	0 0 0.36+0	0 0 0.36+0	-1 1.1 0.86-0.01	1 19.98 0.86+0.17	-1 1.1 0.86-0.01

EXHIBIT D.4 DRIFT AND LAKE PLAINS FOREST RNV ANALYSIS

Drift and Lake Plains: A comparison of Range of Natural Variation and current conditions.

Prepared by Terry Brown and Mark White, NRRI,
for the Minnesota Forest Resource Council

October 11, 2001

Ecosystem type classification and the common inventory

The current condition is compared to the Range of Natural Variation (RNV) condition by assigning each stand polygon in the DNR's common inventory data set to the spatially corresponding ecosystem type mapped by Shadis (2000, figure 1). The percent of stands in each ten year age class is then plotted against the RNV from Frelich (2000). The common inventory combines DNR, County and Federal lands. To that we have added FIA data to account for private lands. Shadis's map identifies the dominant ecosystem type in relatively large areas. These areas also include other ecosystem types (for example lowlands in predominantly upland regions), so the common inventory does not cover all of the area mapped by Shadis. The area of the inventory area ("Mapped acres") within each ecosystem type is shown in table 1.

Frelich number	Shadis number	Percent mapped	Mapped acres	Name	System acres
7	1	94	1324183	Boreal Hardwood/Conifer	1414237
11	2	79	1581763	Dry Mesic Pine/Oak	2005706
12	4	57	654212	Dry Mesic Pine	1144130
13	5	73	245090	Dry Pine	336862
9	8	94	187573	Mesic Northern Hardwoods	200324

Table 1: *Between 44 and 69 percent of the area classified for each ecosystem type is included in the inventory data used.*

The composition in each ten year age range is broken down in the tables that follow the succession diagram and current vs. RNV plot for each type.

1

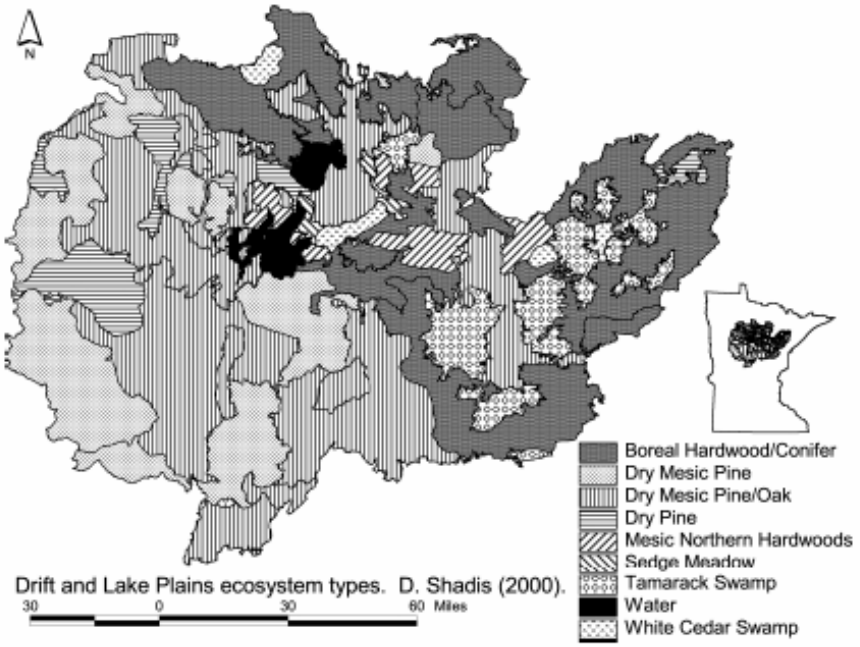


Figure 1: *Ecosystem types delineated by Shadis (2000) for the Drift and Lake Plains section.*

Older growth stages may contain more stands

When dealing with RNV analysis, many people ask how older Vegetation Growth Stages (VGS) can cover a greater proportion of the landscape than younger VGSs. This is a good question if you're used to dealing with tree age distribution plots. With the growth form specific stages defined by Lee Frelich (the box and arrow diagrams starting on page 5) the main answer is that the VGSs represent different lengths of time, and it's reasonable for a VGS that represents stands 20–100 years after disturbance to contain more stands than a VGS that represents stands 1–20 years years after disturbance, even though all the stands in the older VGS came from the younger VGS.

But in the bar-graphs included here, the distribution of stands is broken down into equal (10 year) intervals, and yet there are *still* later stages which contain more stands than earlier stages. This can arise from situations like that shown in figure 2. If movement from VGS 1 to VGS 2 is reasonably rapid (heavy arrow), perhaps due to succession, but movement from VGS 2 to VGS 3 (light arrow) is less rapid, perhaps because ground fire slows succession, and movement from VGS 3 back to VGS 1 is also less rapid, perhaps because of infrequent disturbance, then there is an accumulation of stands in VGS 2. *Remember that a stand can persist much longer than a tree.*

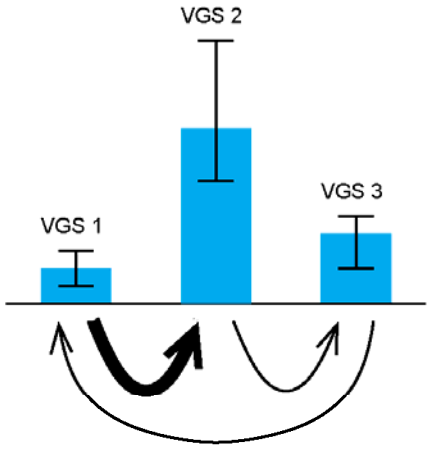


Figure 2: *Older growth stages may contain more stands: here the heavy arrow represents a rapid transfer and the lighter arrows less rapid transfers. The result of such a system would be an accumulation of stands in VGS 2.*

Status of data

It is important to realize that this data is provisional. Improved data sets and more detailed analyses regularly become available. Exact numbers are subject to change. On the other hand, we believe that this data is a good representation of the current situation overall, and in particular the relationship between the current condition and the RNV is unlikely to be significantly revised. Therefore this information can be used when considering management directions with respect to the RNV.

Questions about that data presented here can be addressed to:

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tbrown@nrri.umn.edu	or	mwhite@nrri.umn.edu
218 720 4345		218 720 2710

References

Almendinger, J. and Hanson, D. 1998 Ecological Land Classification Handbook for the Drift and Lake Plains. MNDNR Resource Assessment.

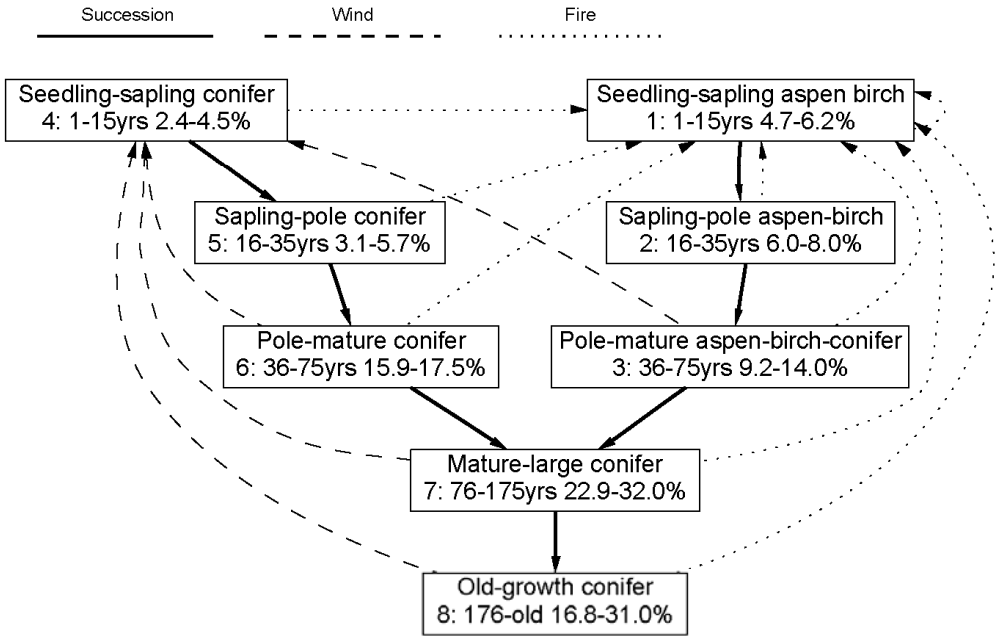
DNR Common Inventory Data Prepared by Chad Skally and others. See http://www.iic.state.mn.us/

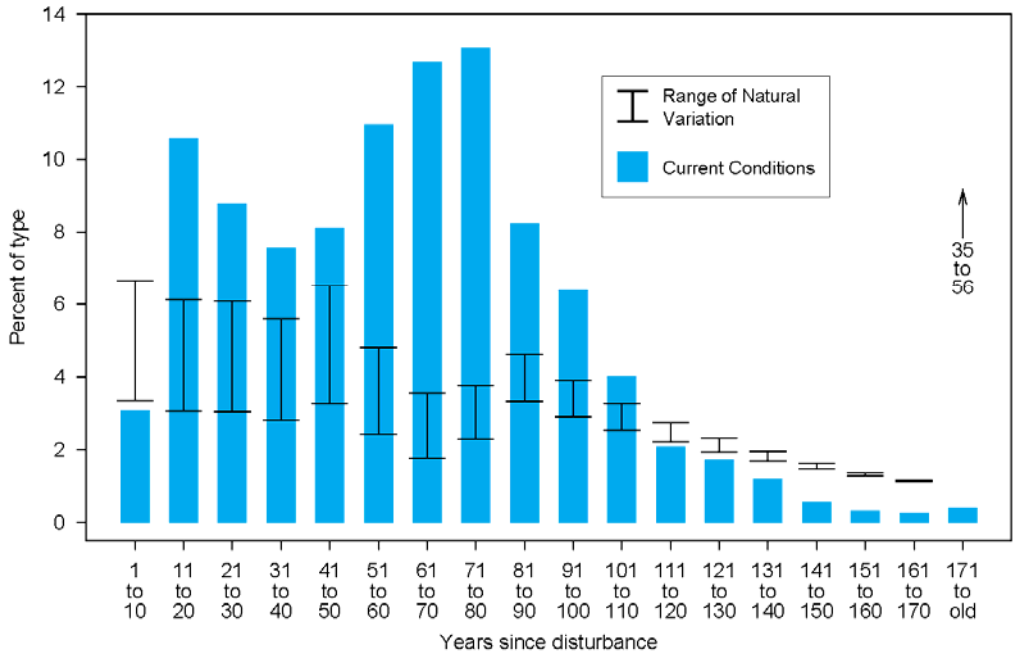
Frelich, L. 2000. Natural Range of Variability estimates for forest vegetation growth stages of Minnesota's Drift and Lake Plains.

Shadis, D. 2000. Minnesota Drift and Lake Plains Natural Vegetation Map.

Drift and Lake Plains: RNV / current conditions comparison October 11, 2001 5

Frelich type 7: Mesic boreal hardwood forest
Shadis type 1: Boreal Hardwood-Conifer
Disturbace interval (years) - Wind: 250-500 Fire: 300-600 Ground Fire: N/A





7: Mesic boreal hardwood forest

Percent cover breakdown

See also area breakdown

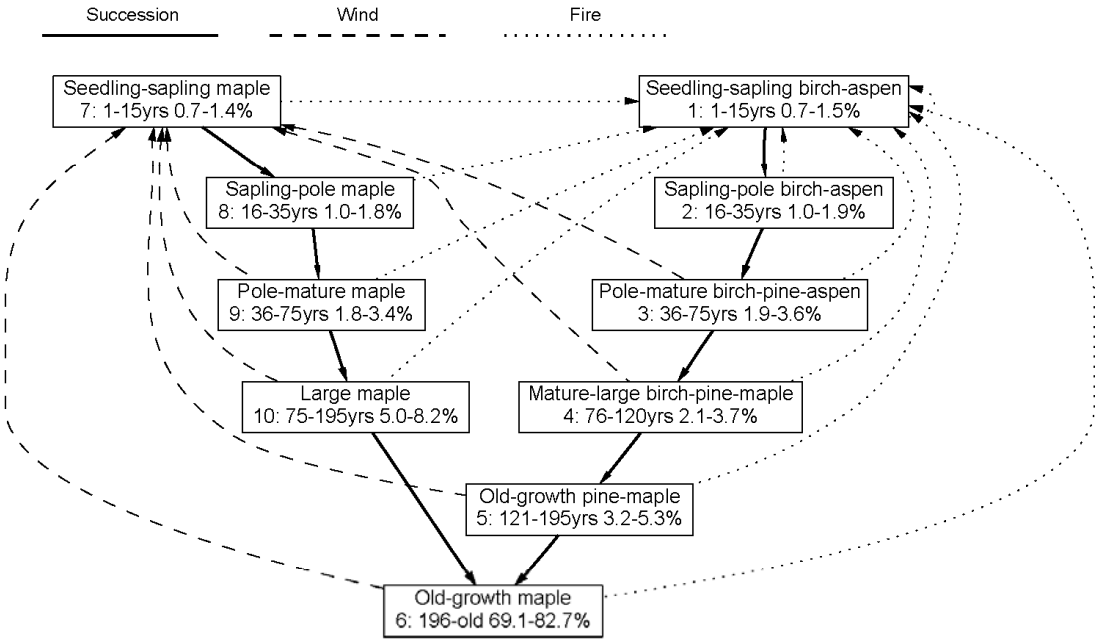
Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	old
Current acres (thousands)	41	140	116	100	107	145	168	173	109	85	53	28	23	16	8	4	3	5
Current % of type	3.1	10.6	8.8	7.6	8.1	11	12.7	13.1	8.2	6.4	4	2.1	1.7	1.2	0.6	0.3	0.3	0.4
RNV minimum % of type	3.3	3.1	3	2.8	3.3	2.4	1.8	2.3	3.3	2.9	2.5	2.2	1.9	1.7	1.5	1.3	1.1	35.8
RNV maximum % of type	6.7	6.1	6.1	5.6	6.5	4.8	3.5	3.7	4.6	3.9	3.3	2.8	2.3	1.9	1.6	1.4	1.2	57
Breakdown of age class by current cover type percent of age class (≥ 10% in **bold**)																		
Balsam poplar		3	1	3	4	3	2	3	2	1	3					1	2	
Aspen	**62**	**55**	**53**	**45**	**52**	**41**	**32**	**33**	**22**	**14**	7	4	1	1	2	2	4	1
Aspen-spruce-fir	**24**	**19**	**17**	**18**	**18**	**16**	**15**	**12**	6	3	4	1	1	1	2	4	**10**	1
Paper birch		1		5		8	7	6	7	7	7	3	1			1	2	1
Paper birch-spruce-fir				1		1	1	1	4	4	2	1					1	
Oak		1	1	1		2	1	2	2	1		1		7	1		1	
Jack pine-hardwood	2	1		1		1	2	2	1									
Balsam fir-hardwood	2	4	3	2	3	5	**10**	8	7	3	2	1	1		1	2		1
Red pine-spruce-fir				2						2	1				1	1		2
Red pine-hardwood	2	3	3	4	3	2	2	1	2	1	3	4	5	3	2	1		9
White pine-spruce-fir																1	3	1
White pine-hardwood												1			**11**			1
White spruce-hardwood	1	3	3	4	1	2	1		1									
Northern hardwood	1	2	2	2	2	**10**	**10**	9	8	**17**	**12**	**10**	**10**	6	3	8	4	8
Northern hardwood-con		2	1				1	2	5	4	3	3	4	3	1	1	2	1
Lowland black spruce	3	2	4	8	8	4	6	8	9	**14**	9	**16**	**17**	**16**	**21**	**16**	**13**	**12**
Upland black spruce																	1	
Tamarack		2	6	2	3	1	2	2	4	3	4	8	8	**10**	4	6	1	5
Black ash		2	3		2	2	5	7	**13**	**12**	**25**	**18**	**24**	**21**	8	**11**	**11**	7
Black ash-conifer		2	3		3	2	1	3	3	6	5	5	5	7	6	4	**12**	8
White cedar							3	1	1	5	9	**15**	**13**	**16**	**25**	**37**	**29**	**38**
Mixed swamp conifers								1	2	3	3	8	**10**	**10**	**11**	6	4	3
Cut over	1																	
Upland grass		1																
Other		1																

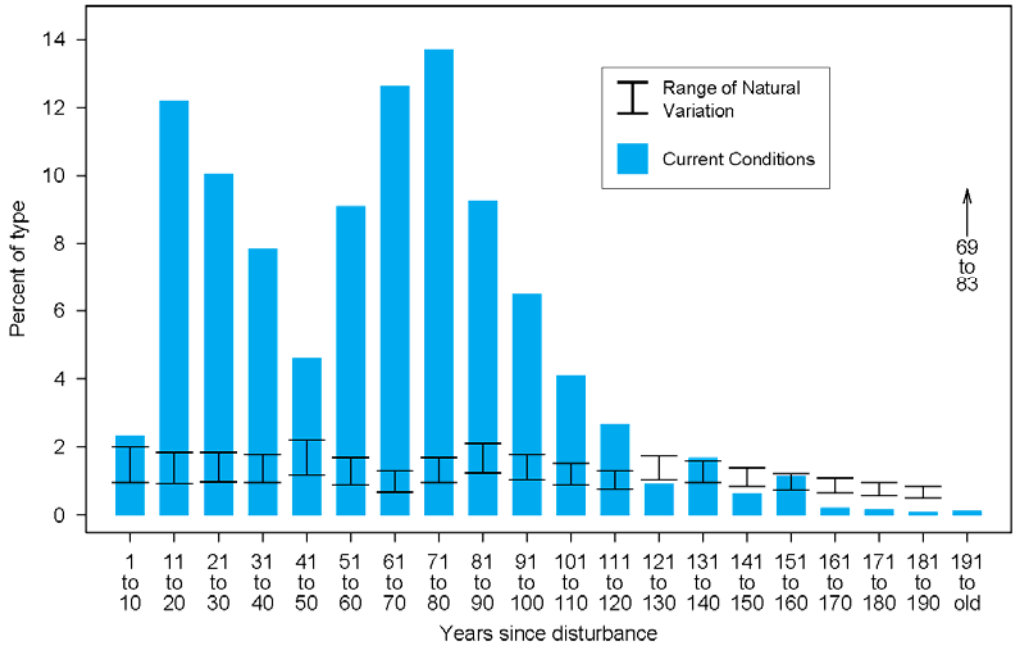
7: Mesic boreal hardwood forest
Area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	old
Current acres (thousands)	41	140	116	100	107	145	168	173	109	85	53	28	23	16	8	4	3	5
Current % of type	3.1	10.6	8.8	7.6	8.1	11	12.7	13.1	8.2	6.4	4	2.1	1.7	1.2	0.6	0.3	0.3	0.4
RNV minimum % of type	3.3	3.1	3	2.8	3.3	2.4	1.8	2.3	3.3	2.9	2.5	2.2	1.9	1.7	1.5	1.3	1.1	35.8
RNV maximum % of type	6.7	6.1	6.1	5.6	6.5	4.8	3.5	3.7	4.6	3.9	3.3	2.8	2.3	1.9	1.6	1.4	1.2	57
Breakdown of age class by current cover type area (thousands of acres) (≥ 10k in **bold**)																		
Balsam poplar	0.1	4.2	1.2	3.2	4.6	3.8	3.1	5.1	2.3	0.4	1.5						0.1	
Aspen	**25.1**	**76.6**	**61.2**	**45.2**	**55.4**	**59**	**53.9**	**56.3**	**24.4**	**12.2**	3.5	1	0.2	0.2	0.1	0.1	0.1	
Aspen-spruce-fir	9.8	**26.3**	**20.1**	**18.3**	**18.8**	**22.6**	**24.3**	**21.2**	6.6	2.8	2.3	0.4	0.1	0.1	0.2	0.2	0.3	0.1
Paper birch	0.1	1.1	0.1	4.5	0.2	**11**	**12.1**	9.5	7.3	5.9	3.5	0.8	0.1				0.1	
Paper birch-spruce-fir	0.1	0.1		1.2	0.1	1.9	1.5	2	4	3.7	1.1	0.3	0.1					
Oak	0.1	0.8	1	1.1		3.4	1.5	4.1	1.9	0.4	0.1	0.2		1.1	0.1			
Jack pine-hardwood	0.8	1	0.5	0.6	0.2	1.7	2.7	3.1	1.6	0.3	0.2	0.1						
Jack pine-spruce-fir		0.1			0.1	0.1	0.3	0.4	0.2	0.1	0.1							
Balsam fir			0.3	0.4	0.1	0.1	0.3	0.6	0.2	0.2								
Balsam fir-hardwood	0.6	4.9	2.9	1.8	3	7.3	**17.1**	**13.3**	7.8	2.1	0.9	0.2	0.2		0.1	0.1		
Red pine-spruce-fir		0.4	0.2	1.7	0.4	0.2	0.2	0.2	0.3	1.7	0.5	0.1	0.1	0.1	0.1			0.1
Red pine-hardwood	0.8	3.5	2.9	4.5	3.3	2.7	3.9	0.9	2.3	0.9	1.7	1.1	1.1	0.5	0.1			0.5
White pine-spruce-fir	0.1									0.1							0.1	
White pine-hardwood	0.2	0.1		0.1				0.1	0.1	0.1	0.1	0.2	0.1		0.8			0.1
White spruce		0.1	0.1	0.1	0.1													
White spruce-hardwood	0.5	3.7	3.7	4.4	1.6	2.2	0.9	0.5	0.6	0.1	0.1	0.1						
Northern hardwood	0.3	2.9	1.9	2.4	2.5	**14.3**	**16.5**	**16**	8.7	**14**	6.3	2.7	2.2	1	0.2	0.3	0.1	0.4
Northern hardwood-con	0.1	2.3	1.1	0.1	0.2	0.5	2	3.1	5.2	3.7	1.5	0.8	0.9	0.4	0.1	0.1	0.1	
Lowland black spruce	1.3	2.5	4.5	8.2	8.8	6.3	**10.3**	**14.3**	9.7	**11.9**	5	4.3	3.9	2.5	1.6	0.7	0.5	0.7
Upland black spruce							0.1	0.2	0.1				0.1					
Tamarack	0.2	2.8	6.4	2	2.9	1	2.7	3.1	4.8	2.6	2	2.3	1.9	1.5	0.3	0.3		0.3
Black ash		2.3	3.7	0.1	1.6	3	8	**11.4**	**14.2**	**10**	**13.3**	5.1	5.5	3.3	0.6	0.5	0.4	0.4
Black ash-conifer		2.1	3.8	0.1	3.2	3.5	2	4.4	3.4	4.8	2.6	1.4	1.1	1.1	0.5	0.2	0.4	0.4
White cedar		0.1		0.1	0.1		4.5	1.6	1.1	4.4	4.7	4.1	3	2.5	1.9	1.5	1	2
Mixed swamp conifers			0.1	0.1	0.2	0.3	0.2	1.3	2	2.2	1.6	2.3	2.2	1.5	0.8	0.2	0.1	0.2
Cut over	0.3	0.2																
Upland grass		0.7	0.4															
Lowland brush								0.1			0.1							
Water				0.1	0.1						0.1	0.1						
Other		1.2																

Drift and Lake Plains: RNV / current conditions comparison October 11, 2001 8

Frelich type 9: Mesic northern hardwood forest
Shadis type 8: Mesic Northern Hardwood
Disturbace interval (years) - Wind: 1000-2000 Fire: 1000-2000 Ground Fire: N/A





9: Mesic northern hardwood forest

Percent cover breakdown

See also area breakdown

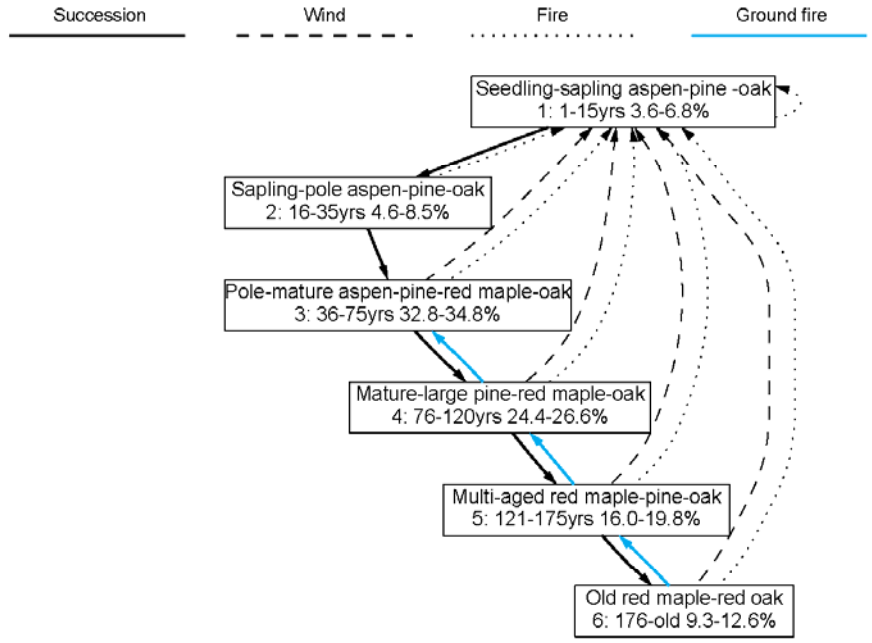
Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	old
Current acres (thousands)	4	23	19	15	9	17	24	26	17	12	8	5	2	3	1	2	0	0	0	0
Current % of type	2.3	12.2	10.1	7.9	4.6	9.1	12.6	13.7	9.3	6.5	4.1	2.7	0.9	1.7	0.6	1.1	0.2	0.2	0.1	0.1
RNV minimum % of type	1	0.9	1	1	1.2	0.9	0.7	1	1.2	1.1	0.9	0.8	1	1	0.8	0.7	0.7	0.6	0.5	69.3
RNV maximum % of type	2	1.8	1.8	1.8	2.2	1.7	1.3	1.7	2.1	1.8	1.5	1.3	1.7	1.6	1.4	1.2	1.1	1	0.8	83.1
Breakdown of age class by current cover type percent of age class (≥ 10% in **bold**)																				
Balsam poplar		3	5			5	1	1				1								
Aspen	**59**	**49**	**45**	**20**	**53**	**32**	**34**	**14**	**25**	**15**	5	2		5					4	
Aspen-spruce-fir	**27**	**14**	**21**	**21**	6	7	3	**11**	**12**	5	**19**								**21**	
Paper birch	2	9		1		6	8	6	9	**10**	6	3	1							
Paper birch-spruce-fir	1			6		6	**14**	2	5	3	1	1								
Oak							**10**	6	3	2	**15**	2								
Balsam fir-hardwood	2		1		1	2	1	8	7	6	2	1								
Red pine-spruce-fir																			6	8
Red pine-hardwood	1	2	2	4	2	1				1	2	1	1	3	5					3
White pine-spruce-fir												1		1		4				
White pine-hardwood						8				2	1	3		2	2	1	2			
White spruce-hardwood	1	6	3	**14**	4			1												
Northern hardwood	1	1	1	**22**	**13**	**24**	**15**	**32**	**20**	**24**	**30**	**36**	**32**	**59**	**29**	2	**34**	6		**32**
Northern hardwood-con					1	1	**10**	**14**	5	7	3	7	**12**	7	**11**	1		2		
Lowland black spruce			8	**10**	1	6	1	1	1	3	4	4	4	6	3	3			**15**	
Tamarack			6		**17**			1	2	5	2	4	6			**66**	1	1	**18**	
Black ash							4	1	1	**10**	4	4	7	2	3	2	**11**	3	**17**	**11**
Black ash-conifer							1	1	1	2	2	4	4	2	4	1	4	2		
White cedar	1		8		2			1	7	5	5	**26**	**31**	**12**	**38**	**19**	**49**	**86**	**20**	**46**
Mixed swamp conifers									1	1	1	1	2	2	6	2				
Cut over	4																			
Upland grass		1	1																	
Lowland brush		5																		
Other		**10**																		

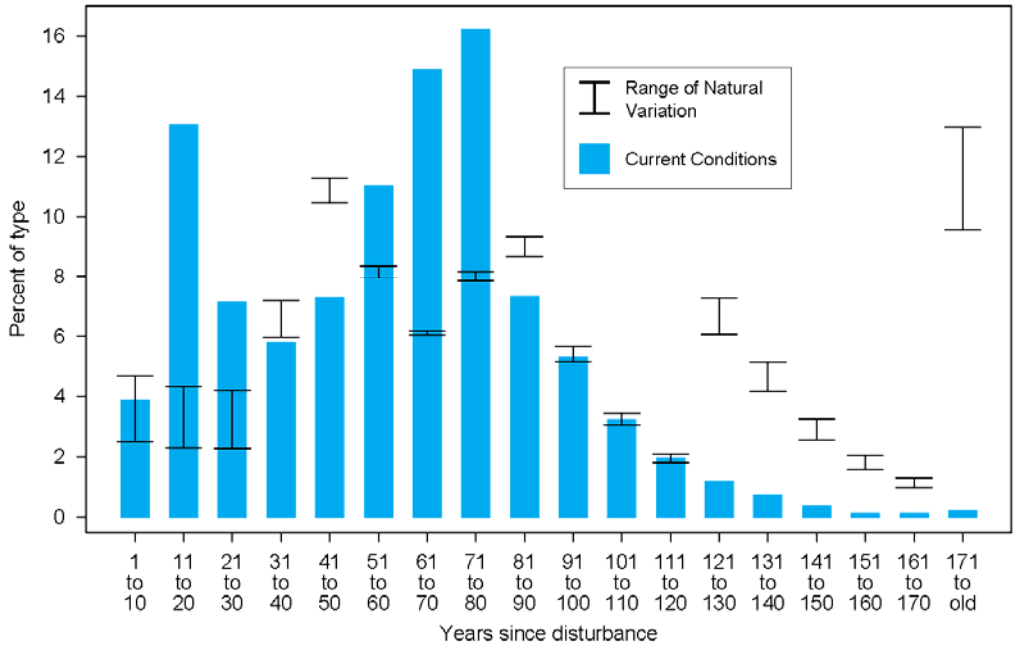
9: Mesic northern hardwood forest
Area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	old
Current acres (thousands)	4	23	19	15	9	17	24	26	17	12	8	5	2	3	1	2	0	0	0	0
Current % of type	2.3	12.2	10.1	7.9	4.6	9.1	12.6	13.7	9.3	6.5	4.1	2.7	0.9	1.7	0.6	1.1	0.2	0.2	0.1	0.1
RNV minimum % of type	1	0.9	1	1	1.2	0.9	0.7	1	1.2	1.1	0.9	0.8	1	1	0.8	0.7	0.7	0.6	0.5	69.3
RNV maximum % of type	2	1.8	1.8	1.8	2.2	1.7	1.3	1.7	2.1	1.8	1.5	1.3	1.7	1.6	1.4	1.2	1.1	1	0.8	83.1
Breakdown of age class by current cover type area (thousands of acres) (≥ 10k in **bold**)																				
Balsam poplar		0.6	1			0.9	0.1	0.2	0.1											
Aspen	2.6	**11.2**	8.4	3	4.6	5.4	8	3.5	4.4	1.9	0.4	0.1		0.1						
Aspen-spruce-fir	1.2	3.2	4	3.1	0.5	1.2	0.6	2.8	2	0.6	1.4									
Paper birch	0.1	2	0.1	0.2		1	1.8	1.6	1.5	1.2	0.4	0.1								
Paper birch-spruce-fir	0.1			0.9		1	3.3	0.5	0.8	0.4	0.1	0.1								
Oak							2.3	1.4	0.6	0.2	1.1	0.1								
Balsam fir			0.1				0.1													
Balsam fir-hardwood	0.1	0.1	0.1	0.1	0.1	0.3	0.2	2	1.2	0.7	0.1									
Red pine-hardwood		0.4	0.3	0.6	0.1	0.2				0.2	0.1	0.1		0.1	0.1					
White pine-spruce-fir																0.1				
White pine-hardwood		0.1				1.4				0.2	0.1	0.1		0.1						
White spruce-hardwood		1.4	0.5	2	0.3		0.1	0.2												
Northern hardwood		0.1	0.1	3.2	1.1	4.1	3.5	8.3	3.4	3	2.3	1.8	0.6	1.9	0.3		0.1			0.1
Northern hardwood-con						0.2	2.3	3.7	0.8	0.9	0.2	0.4	0.2	0.2	0.1					
Lowland black spruce			1.5	1.5	0.1	1.1	0.1	0.3	0.2	0.3	0.3	0.2	0.1	0.2		0.1				
Tamarack		0.1	1.1		1.5		0.1	0.4	0.3	0.6	0.1	0.2	0.1			1.4				
Black ash							0.9	0.3	0.2	1.2	0.3	0.2	0.1							
Black ash-conifer						0.1	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.1					
White cedar			1.5		0.2		0.1	0.2	1.2	0.6	0.4	1.3	0.5	0.4	0.5	0.4	0.2	0.3		0.1
Mixed swamp conifers							0.1	0.1	0.2	0.1	0.1			0.1	0.1					
Cut over	0.2																			
Upland grass		0.1	0.1																	
Lowland brush		1.1																		
Other		2.2																		

Drift and Lake Plains: RNV / current conditions comparison October 11, 2001 11

Frelich type 11: Dry-mesic pine-oak forest
Shadis type 2: Dry-mesic pine-oak
Disturbace interval (years) - Wind: 1000-2000 Fire: 250-500 Ground Fire: 40





11: Dry-mesic pine-oak forest

Percent cover breakdown

See also area breakdown

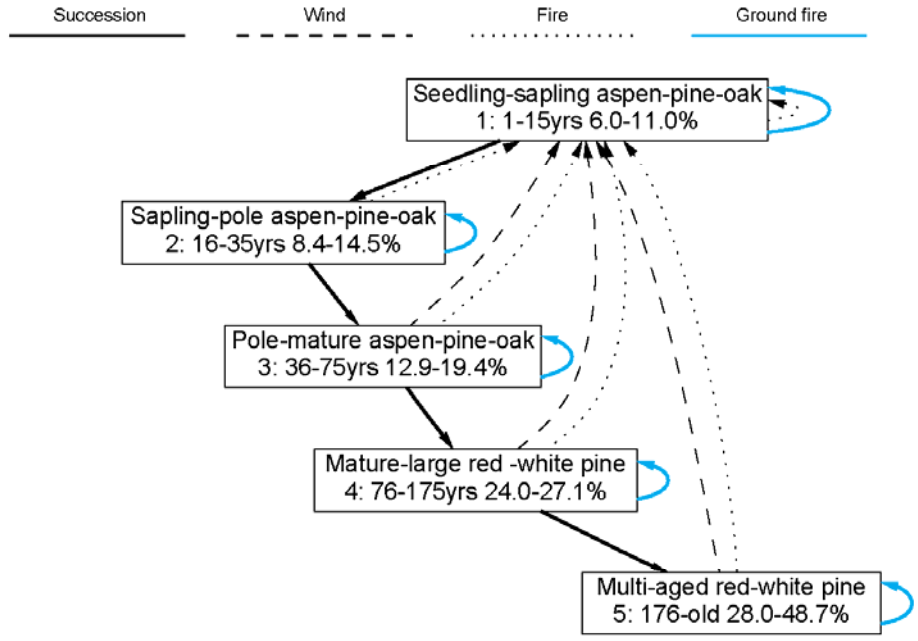
Age (years) from to	1 10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 110	111 120	121 130	131 140	141 150	151 160	161 170	171 old
Current acres (thousands)	62	207	113	92	115	174	235	257	116	84	51	31	19	12	6	2	2	4
Current % of type	3.9	13.1	7.1	5.8	7.3	11	14.9	16.2	7.3	5.3	3.2	2	1.2	0.7	0.4	0.1	0.1	0.2
RNV minimum % of type	2.5	2.3	2.3	5.9	10.4	7.9	6	7.8	8.7	5.1	3.1	1.8	6	4.2	2.6	1.6	1	9.6
RNV maximum % of type	4.7	4.3	4.2	7.2	11.3	8.4	6.2	8.2	9.3	5.7	3.5	2.1	7.3	5.1	3.2	2.1	1.3	13
Breakdown of age class by current cover type percent of age class (≥ 10% in **bold**)																		
Balsam poplar				4	1	1		1		1								
Aspen	**63**	**41**	**45**	**38**	**26**	**38**	**37**	**29**	**22**	5	7	4	2	4	2	6	**14**	7
Aspen-spruce-fir	**19**	**12**	**13**	8	**15**	**13**	**12**	7	6	4	3		1	1		8	1	4
Paper birch	1	3			3	2	7	9	7	4	6	6	1	**10**		2		3
Paper birch-spruce-fir				1	1	2	2	2	2	1	4	1	1			2	2	
Oak		3	2	3	3	9	**11**	**17**	**15**	**20**	8	3	2	1	1	**12**	1	6
Jack pine-hardwood	5	4	**12**	6	**18**	**15**	**14**	8	7	2	1				1	2		
Jack pine-spruce-fir			1	1	2	1	1									1		
Balsam fir-hardwood				1	1	2	2	2	2	1	1	1						
Red pine-spruce-fir		1	1	1	1				2	3	3	6	1	2	2		1	4
Red pine-hardwood	4	**21**	**14**	**20**	7	4	2	4	4	**14**	**13**	**12**	**14**	**25**	**15**	**10**	5	**17**
White pine-spruce-fir															1	2		1
White pine-hardwood	1		1	3			1		2	1	1	1	**12**	2	2	1	1	
White spruce-hardwood	1	2	1	1	3									1	1			
Northern hardwood		4	1	1	2	6	4	7	9	**12**	**10**	**15**	**10**	8	**26**	5	**16**	**28**
Northern hardwood-con		1		1			1		3	1	4	2	1	1	2	1	2	
Lowland black spruce	1	6	1	2	9	1	3	1	3	5	5	7	9	8	3	**11**	5	3
Tamarack		1	2	7	6	2	1	1	4	8	**11**	**11**	**15**	**11**	**11**	3	8	2
Black ash		1	4		3	4	2	**10**	9	**12**	**13**	**18**	8	5	8	**11**	**11**	9
Black ash-conifer			1				1	1	1	3	4	3	4	3	9	5	**13**	3
White cedar								1		2	4	6	**14**	**15**	**13**	**16**	**13**	**14**
Mixed swamp conifers										1	2	4	5	4	6	4	6	1
Cut over	4										1							
Other		1																

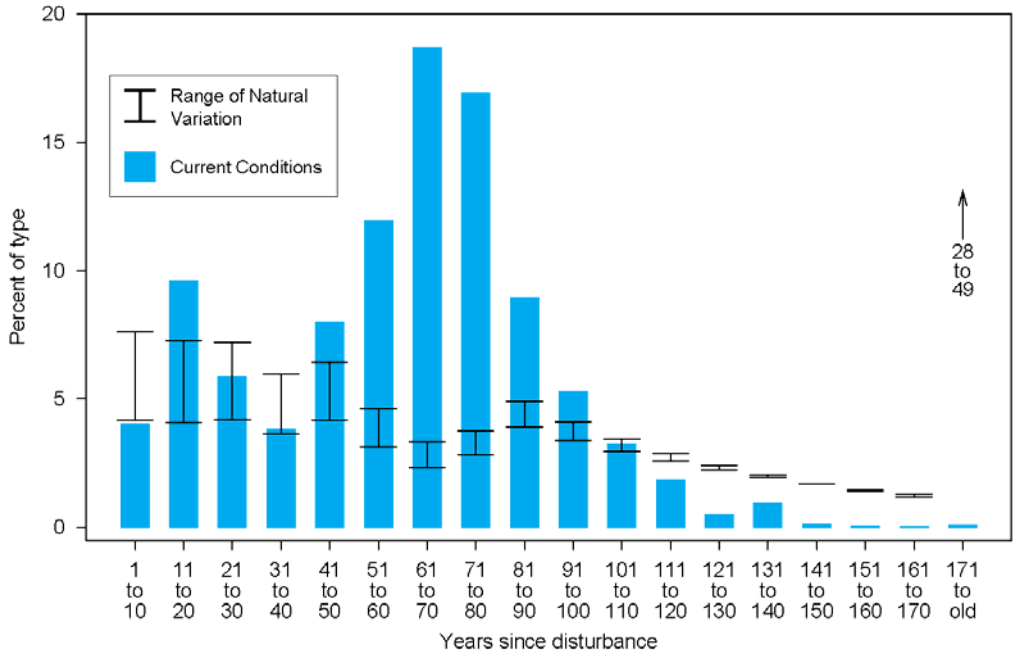
11: Dry-mesic pine-oak forest
Area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	old
Current acres (thousands)	62	207	113	92	115	174	235	257	116	84	51	31	19	12	6	2	2	4
Current % of type	3.9	13.1	7.1	5.8	7.3	11	14.9	16.2	7.3	5.3	3.2	2	1.2	0.7	0.4	0.1	0.1	0.2
RNV minimum % of type	2.5	2.3	2.3	5.9	10.4	7.9	6	7.8	8.7	5.1	3.1	1.8	6	4.2	2.6	1.6	1	9.6
RNV maximum % of type	4.7	4.3	4.2	7.2	11.3	8.4	6.2	8.2	9.3	5.7	3.5	2.1	7.3	5.1	3.2	2.1	1.3	13
Breakdown of age class by current cover type area (thousands of acres) (≥ 10k in **bold**)																		
Balsam poplar	0.1	0.2	0.1	4	1	1.4	0.5	2.7	0.1	1.2								
Aspen	**38.5**	**83.6**	**50.6**	**34.5**	**29.7**	**66.1**	**86.9**	**73.8**	**25.4**	3.9	3.7	1.1	0.4	0.5	0.1	0.1	0.3	0.3
Aspen-spruce-fir	**11.6**	**25.3**	**14.5**	7.3	**17.6**	**22**	**27**	**17.2**	7.3	3.1	1.6	0.1	0.3	0.2		0.2		0.1
Paper birch	0.4	6.8	0.2	0.1	3.6	3.1	**17.1**	**22.5**	8.6	3	2.9	1.7	0.2	1.2				0.1
Paper birch-spruce-fir	0.1	0.1	0.1	1	0.8	2.9	4.4	5.6	1.8	1.1	1.9	0.4	0.1					
Oak	0.1	5.9	2.2	3.1	3.6	**15.1**	**24.8**	**42.9**	**17.3**	**17**	4.2	1	0.3	0.1		0.3		0.2
Jack pine-hardwood	3.2	9.1	**13.6**	5.8	**20.9**	**26.5**	**32.2**	**21.2**	8.1	1.6	0.5	0.1			0.1			
Jack pine-spruce-fir		0.1	0.6	0.7	1.7	2.5	1.7	0.9	0.1									
Balsam fir			0.1	0.2	0.2	0.3	0.7	0.3	0.2	0.2								
Balsam fir-hardwood	0.2	0.5	0.5	0.5	1.4	2.8	3.9	5.4	2.6	0.8	0.7	0.2						
Red pine-spruce-fir	0.1	1.2	1.1	1.3	0.6	0.7	0.7	0.6	1.7	2.6	1.3	1.9	0.2	0.2	0.1			0.2
Red pine-hardwood	2.7	**42.9**	**16.1**	**17.9**	7.9	6.3	5.7	9	4	**11.6**	6.6	3.8	2.7	2.9	0.9	0.2	0.1	0.6
White pine-spruce-fir	0.1						0.1			0.1	0.1	0.1						
White pine-hardwood	0.4	0.2	1.3	2.4	0.1	0.2	1.2	0.1	2.5	1.1	0.2	0.3	2.2	0.2	0.1			
White spruce				0.2	0.1	0.1												
White spruce-hardwood	0.8	3.9	1.2	1.2	3.5	0.4	0.2	0.1		0.1				0.1				
Northern hardwood	0.2	7.9	1.2	1.2	2.2	**11.2**	9.8	**16.8**	**10.9**	**10**	5	4.5	1.9	0.9	1.6	0.1	0.4	1
Northern hardwood-con		1.4		1.2	0.1	0.4	1.1	1.1	3.8	1	2.2	0.7	0.3	0.1	0.1			
Lowland black spruce	0.3	**12.3**	1.3	2.2	**10.1**	2.3	6.2	3	3.9	4.5	2.6	2.2	1.6	0.9	0.2	0.3	0.1	0.1
Upland black spruce		0.2																
Tamarack	0.1	1.5	2.1	6.6	6.6	3	2.5	2.9	5	6.4	5.6	3.4	2.9	1.3	0.7	0.1	0.2	0.1
Black ash	0.1	1.2	4.6	0.1	3.5	6.8	5.2	**25.9**	9.9	9.9	6.9	5.4	1.5	0.5	0.5	0.2	0.3	0.3
Black ash-conifer			1.4	0.1		0.1	2.7	1.3	1.5	2.6	1.8	1	0.8	0.4	0.5	0.1	0.3	0.1
White cedar							0.2	2.8	0.5	1.6	2.2	2	2.6	1.7	0.8	0.4	0.3	0.5
Mixed swamp conifers				0.1		0.2	0.2	0.4	0.4	0.7	1	1.2	0.8	0.5	0.3	0.1	0.1	
Cut over	2.3	0.4									0.2							
Upland grass		0.2	0.1															
Lowland grass			0.1	0.1														
Upland brush	0.1																	
Lowland brush		0.2						0.1										
Water					0.1		0.1		0.1									
Other		1.2																

Drift and Lake Plains: RNV / current conditions comparison October 11, 2001 14

Frelich type 12: Dry-mesic pine forest
Shadis type 4: Dry-mesic pine
Disturbace interval (years) - Wind: 500-1000 Fire: 175-350 Ground Fire: 30





12: Dry-mesic pine forest

Percent cover breakdown

See also area breakdown

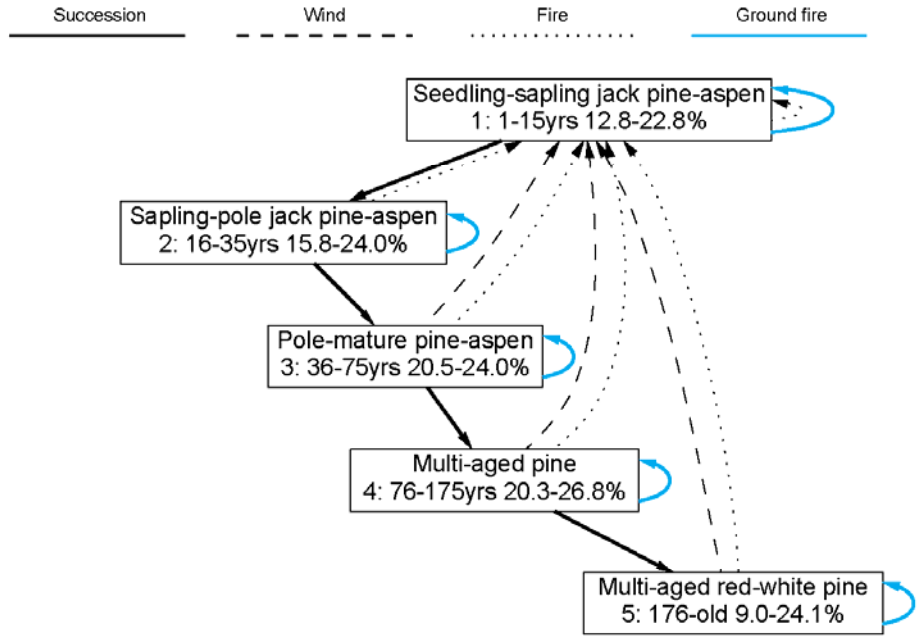
Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	old
Current acres (thousands)	26	63	38	25	52	78	122	111	58	35	21	12	3	6	1	1	0	1
Current % of type	4	9.6	5.8	3.8	8	12	18.7	16.9	8.9	5.3	3.3	1.9	0.5	1	0.1	0.1	0	0.1
RNV minimum % of type	4.1	4	4.2	3.6	4.1	3.1	2.3	2.8	3.9	3.4	2.9	2.6	2.2	1.9	1.7	1.5	1.3	28.6
RNV maximum % of type	7.6	7.2	7.2	5.9	6.4	4.6	3.3	3.7	4.9	4.1	3.4	2.9	2.4	2	1.7	1.4	1.2	49.2
Breakdown of age class by current cover type percent of age class (≥ 10% in **bold**)																		
Balsam poplar		2		**10**	3	2	2	1										
Aspen	**76**	**54**	**62**	**46**	**51**	**42**	**44**	**36**	**23**	**25**	**10**		**42**	3	1	**20**	**16**	8
Aspen-spruce-fir	**16**	**15**	**15**	**11**	**16**	9	**10**	**10**	7	2	2	1	1		6	7	7	
Paper birch					2	**10**	5	7	9	9	7	1		**35**		5	4	7
Paper birch-spruce-fir						1	2	4	1	6	1	1						
Oak		2	5		2	6	**10**	**19**	**23**	**25**	8	**18**	3	**27**	5	**35**	**21**	**21**
Jack pine-hardwood	1				4	7	3	2	2									1
Balsam fir				1														
Balsam fir-hardwood				1	5	1	3	1	1	1	1	1	1	1	1			
Red pine-spruce-fir				1					1	2	1	1	1					**11**
Red pine-hardwood	1	4	2	4	3	2	2	1	3	2	6	6	**19**	1		8		1
White pine-spruce-fir													1					6
White pine-hardwood	1								2	4					1	1		1
White spruce																	3	
White spruce-hardwood		1	1	1	1											1		
Northern hardwood	1	5	1	**16**		4	**15**	**11**	**12**	**14**	**16**	**42**	8	2	3	8	**12**	2
Northern hardwood-con		3	4			3	2	3	3	3	**16**		1	1				**18**
Lowland black spruce				7	1	2				1	1	1	1	1	2	1	2	1
Tamarack			3	1	8	6	1	1	3	2	2	5	6	1	**22**	1	7	3
Black ash		5	3		3	3	3	3	7	2	**28**	**16**	6	**22**	**28**	3	1	1
Black ash-conifer		1	2						2	1	2	1	1		1	3		
White cedar									2	1	1	5	5	5	**13**	7	**19**	**14**
Mixed swamp conifers												1	4	2	**17**	1	8	5
Cut over	3										1							3
Lowland brush		4																
Other		3																

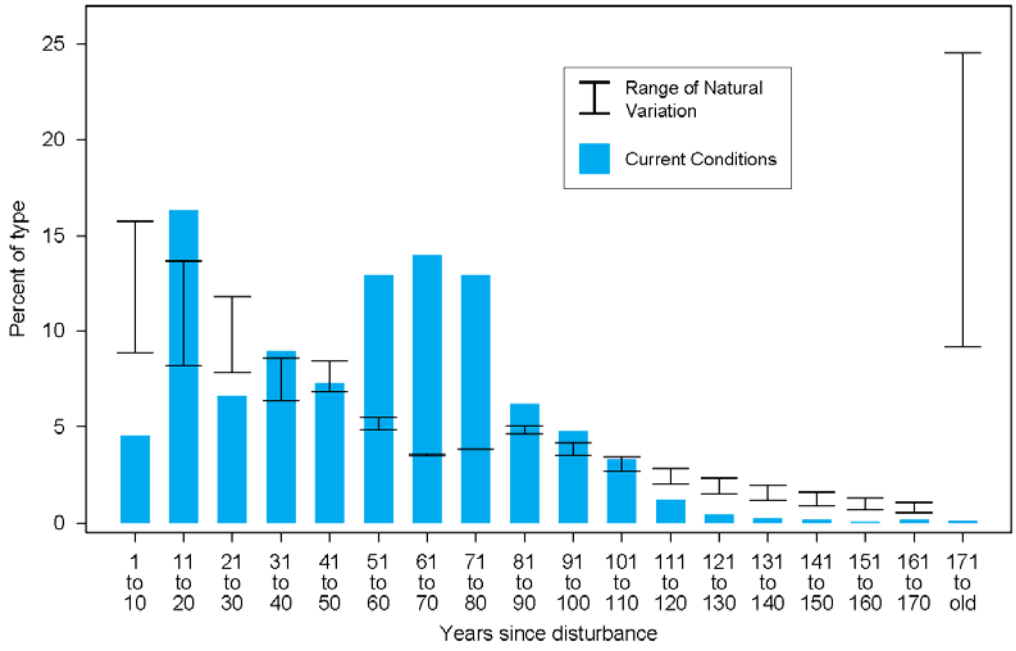
12: Dry-mesic pine forest
Area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	old
Current acres (thousands)	26	63	38	25	52	78	122	111	58	35	21	12	3	6	1	1	0	1
Current % of type	4	9.6	5.8	3.8	8	12	18.7	16.9	8.9	5.3	3.3	1.9	0.5	1	0.1	0.1	0	0.1
RNV minimum % of type	4.1	4	4.2	3.6	4.1	3.1	2.3	2.8	3.9	3.4	2.9	2.6	2.2	1.9	1.7	1.5	1.3	28.6
RNV maximum % of type	7.6	7.2	7.2	5.9	6.4	4.6	3.3	3.7	4.9	4.1	3.4	2.9	2.4	2	1.7	1.4	1.2	49.2
Breakdown of age class by current cover type area (thousands of acres) (≥ 10k in **bold**)																		
Balsam poplar	0.1	1.2		2.4	1.5	1.6	2.4	1.3	0.1									
Aspen	**20.1**	**34**	**23.6**	**11.6**	**26.3**	**32.6**	**53.2**	**39.6**	**13.3**	8.5	2.1		1.4	0.2		0.1		0.1
Aspen-spruce-fir	4.2	9.2	5.6	2.7	8.4	7.1	**11.8**	**10.9**	4.1	0.8	0.4	0.1						
Paper birch	0.1			0.1	1.2	7.5	5.5	7.9	5.2	3.3	1.5	0.1		2.2				
Paper birch-spruce-fir						1.1	2.8	4.3	0.6	2	0.2	0.1						
Oak	0.1	1.1	2		1.2	4.9	**11.6**	**21**	**13.3**	8.8	1.6	2.1	0.1	1.7		0.2	0.1	0.1
Jack pine-hardwood	0.3	0.2	0.2	0.1	2.3	5.7	4.2	2.2	1.2	0.1								
Jack pine-spruce-fir						0.2	0.2	0.1										
Balsam fir			0.1	0.2		0.1	0.1	0.1										
Balsam fir-hardwood		0.1	0.2	0.1	2.6	1.1	3	1.2	0.5	0.5	0.1	0.1						
Red pine-spruce-fir			0.1	0.3			0.1	0.1	0.3	0.6	0.1	0.1						0.1
Red pine-hardwood	0.2	2.6	0.9	1.1	1.6	1.3	2.4	1.2	1.8	0.7	1.3	0.7	0.6	0.1				
White pine-spruce-fir				0.1			0.1											
White pine-hardwood	0.2						0.1	0.1	1.4	1.4								
White spruce							0.1											
White spruce-hardwood	0.1	0.4	0.2	0.3	0.4	0.3		0.1										
Northern hardwood	0.2	3.3	0.4	3.9	0.2	3.4	**17.7**	**12.5**	6.9	4.8	3.4	5.1	0.3	0.1				
Northern hardwood-con		1.7	1.4			2.6	1.8	2.9	1.6	0.9	3.4	0.1		0.1				0.1
Lowland black spruce			0.1	1.7	0.3	1.3	0.3	0.3	0.3	0.3	0.2	0.1		0.1				
Tamarack		0.1	1.1	0.2	4.3	4.9	1	0.5	1.7	0.6	0.4	0.6	0.2	0.1	0.2			
Black ash		3.4	1.2		1.6	2.3	3.4	3.7	4	0.8	5.9	1.9	0.2	1.4	0.2			
Black ash-conifer		0.6	0.8			0.2	0.3	0.4	0.9	0.4	0.3	0.1						
White cedar							0.1	0.1	1.1	0.2	0.2	0.6	0.2	0.3	0.1		0.1	0.1
Mixed swamp conifers										0.1	0.1	0.1	0.1	0.1	0.1			
Cut over	0.7	0.2									0.1							
Upland grass			0.1															
Lowland grass								0.1										
Marsh		0.1																
Lowland brush		2.4																
Water			0.1															
Other		2.1																

Drift and Lake Plains: RNV / current conditions comparison October 11, 2001 17

Frelich type 13: Dry pine forest
Shadis type 5: Dry pine
Disturbace interval (years) - Wind: 1000-2000 Fire: 60-120 Ground Fire: 40





13: Dry pine forest

Percent cover breakdown

See also area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	old
Current acres (thousands)	11	40	16	22	18	32	34	32	15	12	8	3	1	1	0	0	0	0
Current % of type	4.5	16.3	6.6	8.9	7.3	12.9	14	12.9	6.2	4.8	3.3	1.2	0.4	0.2	0.2	0.1	0.1	0.1
RNV minimum % of type	8.8	8.2	7.8	6.3	6.8	4.9	3.5	3.8	4.6	3.5	2.7	2	1.5	1.2	0.9	0.7	0.5	9.2
RNV maximum % of type	15.7	13.7	11.7	8.6	8.4	5.5	3.6	3.8	5	4.2	3.4	2.8	2.3	1.9	1.6	1.3	1.1	24.5
Breakdown of age class by current cover type percent of age class (≥ 10% in **bold**)																		
Balsam poplar			6	6		2			5								1	
Aspen	**38**	**25**	**40**	**22**	**14**	**31**	**17**	**19**	3	**12**	1			3	**15**		3	
Aspen-spruce-fir	**15**	**11**	**13**	6	**14**	**12**	**12**	**19**	2	1		1		7	**15**	**21**	**11**	5
Paper birch						4	4	6	1	3	4							
Paper birch-spruce-fir			7			4	1	1	1		1						**21**	
Oak			8			4	**17**	5	**20**	**11**	1	2		3				4
Jack pine-hardwood	**21**	**15**	3	**24**	**41**	**19**	**33**	**19**	**28**	**15**	5	1			**34**	3	**37**	**12**
Jack pine-spruce-fir			1	1	2	3	3	4								**12**	4	
Balsam fir			1	1	1				1									
Balsam fir-hardwood			1	7	1	1	6	9	3	1	**11**	1	2					
Red pine-spruce-fir	1	1	2	2	1		1	1	2	3	1	2	9	1	2		3	3
Red pine-hardwood	**10**	**44**	**13**	**23**	**16**	7	2	3	7	**27**	**21**	**51**	**14**	**28**	**19**	**27**	8	**14**
White pine-hardwood										1								
White spruce															2			
White spruce-hardwood	1	1	2	2														4
Northern hardwood						1	1	2	3	5		4						
Northern hardwood-con							1	1	1				3					
Lowland black spruce	1		1	1	6	6	1	5	**14**	**11**	**10**	5	**31**	**10**				5
Tamarack			1	7	3	4	2	1	4	4	**39**	**18**	**35**	**43**	3	**24**	**11**	**35**
Black ash								**4**	1	2	1	1	1					
Black ash-conifer								1	1	1	1	4		4		7		
White cedar									1	1	1	5	6		9	6	3	**18**
Mixed swamp conifers										1	1	6		2				
Cut over	**11**	1									2							
Lowland grass		3																
Lowland brush	1																	

13: Dry pine forest
Area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	old
Current acres (thousands)	11	40	16	22	18	32	34	32	15	12	8	3	1	1	0	0	0	0
Current % of type	4.5	16.3	6.6	8.9	7.3	12.9	14	12.9	6.2	4.8	3.3	1.2	0.4	0.2	0.2	0.1	0.1	0.1
RNV minimum % of type	8.8	8.2	7.8	6.3	6.8	4.9	3.5	3.8	4.6	3.5	2.7	2	1.5	1.2	0.9	0.7	0.5	9.2
RNV maximum % of type	15.7	13.7	11.7	8.6	8.4	5.5	3.6	3.8	5	4.2	3.4	2.8	2.3	1.9	1.6	1.3	1.1	24.5
Breakdown of age class by current cover type area (thousands of acres) (≥ 10k in **bold**)																		
Balsam poplar			1	1.2		0.7		0.1	0.8									
Aspen	4.3	9.9	6.5	4.7	2.5	9.8	5.9	6.1	0.4	1.4	0.1				0.1			
Aspen-spruce-fir	1.7	4.2	2.1	1.2	2.5	3.9	4	5.9	0.4	0.1					0.1			
Paper birch						1.3	1.4	2	0.1	0.3	0.3							
Paper birch-spruce-fir			1.1			1.1	0.4	0.3	0.2		0.1						0.1	
Oak			1.2			1.2	5.9	1.7	3	1.3		0.1						
Jack pine-hardwood	2.4	5.9	0.5	5.2	7.4	6.1	**11.2**	6.1	4.2	1.8	0.4				0.1		0.1	
Jack pine-spruce-fir			0.1	0.1	0.3	1	0.9	1.1										
Balsam fir			0.1	0.2	0.1	0.1	0.1	0.1	0.1									
Balsam fir-hardwood			0.1	1.5	0.2	0.3	1.9	2.7	0.4	0.1	0.9							
Red pine-spruce-fir	0.1	0.4	0.3	0.4	0.2	0.1	0.2	0.2	0.3	0.3	0.1	0.1	0.1					
Red pine-hardwood	1.1	**17.5**	2.2	4.9	2.9	2.2	0.6	0.9	1	3.2	1.7	1.5	0.1	0.1	0.1			
White pine-hardwood										0.1								
White spruce-hardwood	0.1	0.2	0.4	0.5		0.1	0.1											
Northern hardwood			0.1		0.1	0.2	0.2	0.5	0.5	0.6		0.1						
Northern hardwood-con							0.2	0.3	0.2									
Lowland black spruce	0.1	0.1	0.2	0.2	1	1.9	0.4	1.5	2.2	1.3	0.8	0.1	0.3	0.1				
Tamarack		0.2	0.2	1.5	0.5	1.3	0.6	0.4	0.7	0.5	3.2	0.5	0.4	0.2				0.1
Black ash						0.1		1.4	0.2	0.2								
Black ash-conifer						0.1	0.1	0.3	0.2	0.2		0.1						
White cedar								0.1	0.1	0.1		0.1	0.1					
Mixed swamp conifers									0.1	0.1		0.2						
Cut over	1.2	0.3									0.1							
Lowland grass		1.1																
Lowland brush	0.1								0.1									

EXHIBIT D.5 NORTHERN SUPERIOR UPLAND FOREST RNV ANALYSIS

Northern Superior Uplands: A comparison of Range of Natural Variation and current conditions.

Prepared by Terry Brown and Mark White, NRRI, for the Minnesota Forest Resource Council

February 26, 2002

Interim status of this data

This data is a re-issue of the data presented in 2001, with the following changes: age classes are presented in 10 year intervals, rather than Vegetation Growth Stages, Frelich's type 1 "Sugar maple" is replaced with type 9 "Northern Hardwood".

This data does not include the new FIA data, nor some updates recently received for some county lands. There are still some classification issues with the Lowland Conifer and Rich Swamp types. This re-release is being made to allow people to use a more compact and somewhat updated source — when the new FIA data is released a new version of this report with the most up to date information available will be prepared. It would be very inefficient to completely regenerate the data set prior to the release of the new FIA data.

Ecosystem type classification and the common inventory

The current condition is compared to the Range of Natural Variation (RNV) condition by assigning each stand polygon in the DNR's common inventory data set to the spatially corresponding ecosystem type mapped by White (2000, figure 1). The percent of stands in each ten year age class is then plotted against the RNV from Frelich (2000). The common inventory combines DNR, County and Federal lands. To that we have added FIA data to account for private lands, and stand age information for the BWCAW. The area of the inventory area ("Mapped acres") within each ecosystem type is shown

in table 1.

In this version of the analysis Frelich's ecosystem type 1, Sugar Maple, has been replaced with type 9, Northern Hardwood, which better reflects the integration of this type with the rest of the landscape. As in previous versions, Frelich's ecosystem type 8, Jack pine Aspen Oak, is not included, as it exists almost exclusively on the Kabetogamma Peninsula, and is difficult to characterize.

Frelich number	Percent mapped	Mapped acres	Name	System acres
2	88	668886	Mesic white pine-red pine	756966
3	91	642828	Dry-mesic white pine-red pine	706731
4	61	683204	Lowland Conifer	1128056
5	45	71990	Rich swamp	161232
6	81	875113	Mesic birch-aspen-spruce-fir	1075332
7	98	1047592	Jack pine-black spruce	1069905
9	84	244575	Northern hardwoods	290670
			Open water	173305
			Unforested wetland	516521
			Developed land	18409

Table 1: *Between 45 and 98 percent of the area classified for each ecosystem type is included in the inventory data used.*

The composition in each ten year age range is broken down in the tables that follow the succession diagram and current vs. RNV plot for each type.

Older growth stages may contain more stands

When dealing with RNV analysis, many people ask how older Vegetation Growth Stages (VGS) can cover a greater proportion of the landscape than younger VGSs. This is a good question if you're used to dealing with tree age distribution plots. With the growth form specific stages defined by Lee Frelich (the box and arrow diagrams starting on page 5) the main answer is that the VGSs represent different lengths of time, and it's reasonable for a VGS that represents stands 20–100 years after disturbance to contain more stands than a VGS that represents stands 1–20 years years after disturbance, even though all the stands in the older VGS came from the younger VGS.

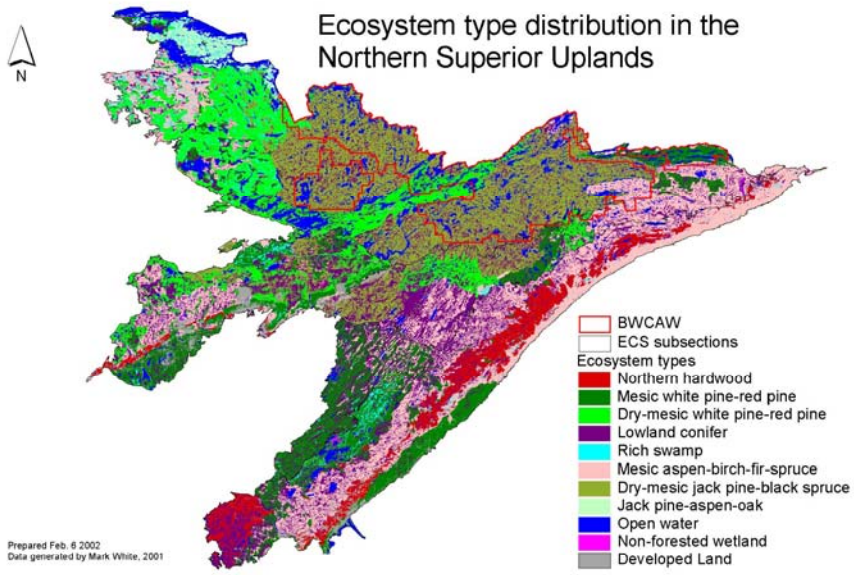


Figure 1: *Ecosystem types delineated by Frelich (2000) for the Northern Superior Uplands section.*

But in the bar-graphs included here, the distribution of stands is broken down into equal (10 year) intervals, and yet there are *still* later stages which contain more stands than earlier stages. This can arise from situations like that shown in figure 2. If movement from VGS 1 to VGS 2 is reasonably rapid (heavy arrow), perhaps due to succession, but movement from VGS 2 to VGS 3 (light arrow) is less rapid, perhaps because ground fire slows succession, and movement from VGS 3 back to VGS 1 is also less rapid, perhaps because of infrequent disturbance, then there is an accumulation of stands in VGS 2. *Remember that a stand can persist much longer than a tree.*

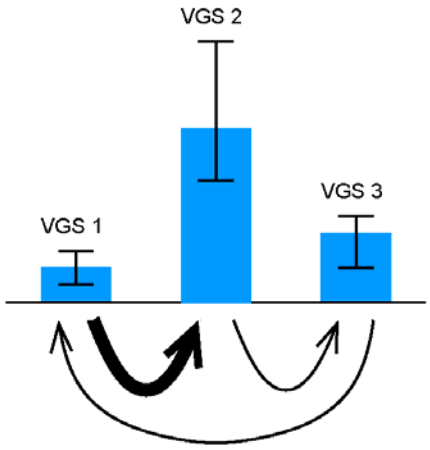


Figure 2: *Older growth stages may contain more stands: here the heavy arrow represents a rapid transfer and the lighter arrows less rapid transfers. The result of such a system would be an accumulation of stands in VGS 2.*

Nature of data

It is important to realize that this data is provisional. Improved data sets and more detailed analyses regularly become available. Exact numbers are subject to change. On the other hand, we believe that this data is a good representation of the current situation overall, and in particular the relationship between the current condition and the RNV is unlikely to be significantly revised. Therefore this information can be used when considering management directions with respect to the RNV.

Questions about that data presented here can be addressed to:

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References

DNR Common Inventory Data Prepared by Chad Skally and others. See http://www.iic.state.mn.us/

Frelich, L. 2000. Natural Range of Variability estimates for forest vegetation growth stages of Minnesota's Northern Superior Uplands.

White, M. 2000. Minnesota Northern Superior Uplands Natural Vegetation Map.

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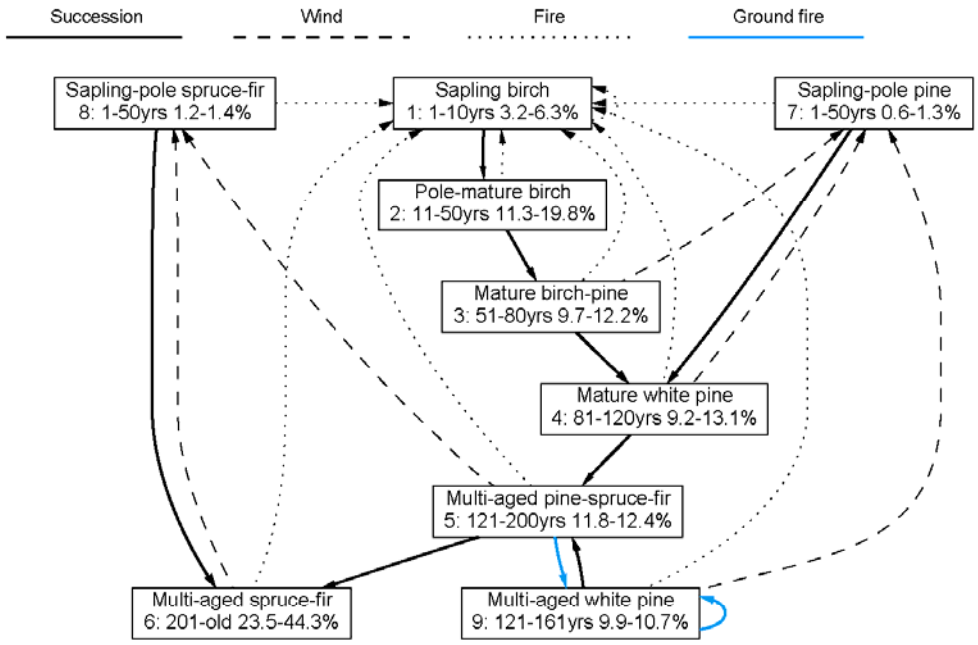
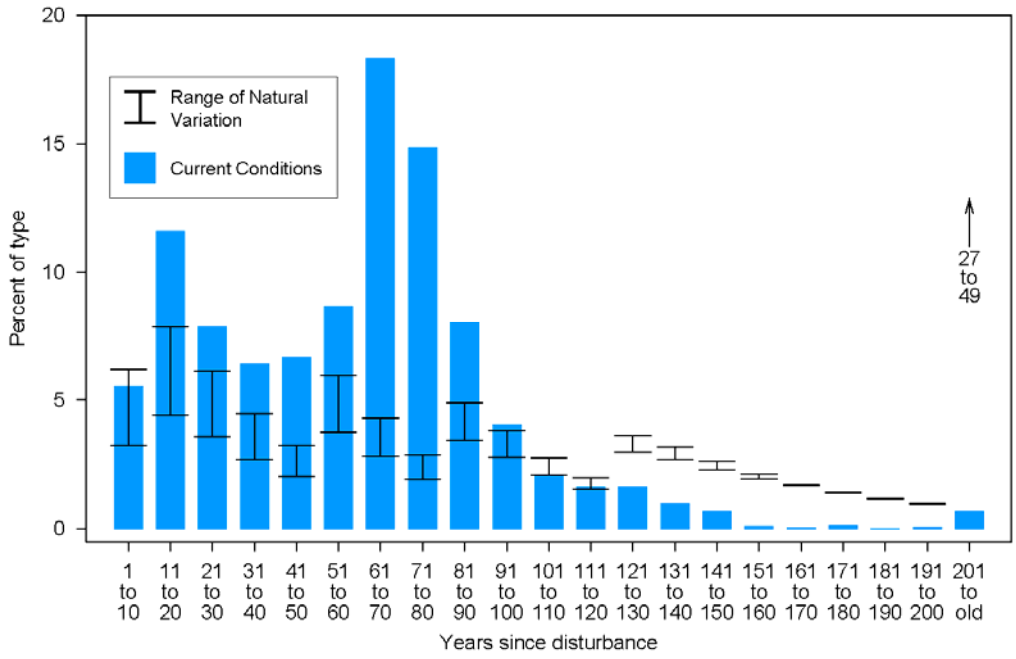
Frelich type 2: Dry red pine-white pine

Disturbace interval (years) - Wind: 1000-2000 Fire: 150-300 Ground Fire: 40





2: Mesic white and red pine

Percent cover breakdown

See also area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191	201
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	old
Current acres (thousands)	37	78	53	43	45	58	122	99	54	27	14	11	11	7	5	1	0	1	0	1	4
Current % of type	5.5	11.6	7.9	6.4	6.7	8.7	18.3	14.8	8	4.1	2.1	1.6	1.6	1	0.7	0.1	0.1	0.1	0	0.1	0.7
RNV minimum % of type	3.2	4.4	3.6	2.7	2	3.8	2.8	1.9	3.4	2.8	2.1	1.6	3	2.7	2.3	1.9	1.7	1.4	1.2	1	27.5
RNV maximum % of type	6.2	7.8	6.1	4.5	3.2	6	4.3	2.8	4.9	3.8	2.7	2	3.6	3.2	2.6	2.1	1.7	1.4	1.2	0.9	49.7
Breakdown of age class by current cover type percent of age class (>= 10% in **bold**)																					
Balsam poplar			1	4		2	1	2		1		**13**	5								
Aspen	**47**	**63**	**56**	**33**	**44**	**30**	**23**	**16**	9	8	6	2	1								
Aspen-spruce-fir	**16**	6	9	24	**23**	**28**	**26**	**22**	**24**	**13**	**14**	5	3								
Aspen-birch-spruce-fir	5						1	1	1		2	**14**	**12**	**13**						1	**23**
Aspen-birch	2											5	3	4							1
Paper birch		2	2	3	**6**	7	**14**	**18**	**12**	8	2	1		1							
Paper birch-spruce-fir					5	5	**12**	**12**	**12**	**13**	8	5	1	3	1		8				
Jack pine	2	3	3	1	1	3	1	1	1	1	2	1	1	3						2	5
Jack pine-hardwood	1		1	1			1	2	1	1	1	1	1								
Spruce-fir	2		1	2	2	3	5	6	4	2	5	1	2	4	1					7	**21**
Spruce-fir-hardwood	2							1			1	**4**	5	6						9	**14**
Balsam fir	1		3	**11**	1	4	2	2	5	1	1			1							1
Balsam fir-hardwood		1	5	3		5	2	2	2												
Red pine	**10**	7	1					1	1	5	1	5	**26**	**26**						6	**26**
Red pine-spruce-fir									1			1							2		
Red pine-hardwood	1	1	2	7	4	1	2	1	1	3	**5**	1	2	1							1
White pine	1								1	1	2	1				**11**	5	**11**		**29**	3
White pine-spruce-fir		1									3	**11**		1		1		8		7	1
White pine-hardwood	1							1	4	9	6	3	8	2	1	6	2				
White spruce	2	4	1			1	1	1							1						
White spruce-hardwood	1	1	2	3	3	3	1			1	1	1					2				
Northern hardwood	4	6	3	**10**	2	3	3	7	4	8	6	2	8	2	**25**					3	
Lowland black spruce	1				6	3	2	2	4	4	6	5	3	3	2	5	5	1	2	**14**	
Upland black spruce	1			1				1	1	1	2	1	1								
Tamarack						2		2		1							2				
Black ash		1	7				2	2	8	**10**	3	3	**13**	2	**50**	**13**	4	**19**	7		
Black ash-conifer											1	1									
White cedar		1					1		1	8	**22**	**12**	5	**26**	**17**	**49**	**67**	**49**	**59**	**15**	3
Mixed swamp conifers									2	1	2	1	1	3	2	**16**	4	**12**	**30**	6	
Cut over	1																				

2: Mesic white and red pine
Area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191	201
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	old
Current acres (thousands)	37	78	53	43	45	58	122	99	54	27	14	11	11	7	5	1	0	1	0	1	4
Current % of type	5.5	11.6	7.9	6.4	6.7	8.7	18.3	14.8	8	4.1	2.1	1.6	1.6	1	0.7	0.1	0.1	0.1	0	0.1	0.7
RNV minimum % of type	3.2	4.4	3.6	2.7	2	3.8	2.8	1.9	3.4	2.8	2.1	1.6	3	2.7	2.3	1.9	1.7	1.4	1.2	1	27.5
RNV maximum % of type	6.2	7.8	6.1	4.5	3.2	6	4.3	2.8	4.9	3.8	2.7	2	3.6	3.2	2.6	2.1	1.7	1.4	1.2	0.9	49.7
Breakdown of age class by current cover type area (thousands of acres) (≥ 10k in **bold**)																					
Balsam poplar		**1**	1.9		1	0.3	2.3	0.3	0.4	0.2		1.4	0.5								
Aspen	**17.5**	**48.6**	**29.5**	**14.3**	**19.4**	**17.3**	**27.9**	**15.5**	4.9	2.3	0.8	0.3	0.1								
Aspen-spruce-fir	6	5	4.9	**10.4**	**10.4**	**16.5**	**32.1**	**21.3**	**12.7**	3.5	2	0.6	0.4								
Aspen-birch-spruce-fir	1.8						0.9	0.7	0.7		0.2	1.5	1.3	0.9							1
Aspen-birch	0.6		0.1				0.2		0.2			0.5	0.4	0.2							0.1
Paper birch	0.1	1.2	1.2	1.4	2.8	4.2	**17**	**17.7**	6.2	2.2	0.3	0.1									
Paper birch-spruce-fir	0.1		0.1		2.2	2.8	**14.2**	**12.1**	6.6	3.6	1	0.5	0.2	0.2	0.1						
Oak								0.1	0.1												
Jack pine	0.8	2.1	1.4	0.2	0.6	1.8	1.3	0.8	0.6	0.2	0.2	0.1	0.1	0.2							0.2
Jack pine-hardwood	0.3	0.1	0.3	0.6	0.1	0.2	0.8	1.5	0.3	0.2	0.1	0.2	0.1								
Spruce-fir	0.7	0.2	0.3	0.6	0.8	1.7	5.8	6	2.3	0.6	0.7	0.1	0.2	0.3	0.1						0.9
Spruce-fir-hardwood	0.8						0.1	0.5	0.1		0.1	0.5	0.5	0.4					0.1		0.6
Balsam fir	0.4	0.2	1.5	4.6	0.3	2.1	2.8	2.3	2.5	0.3	0.2			0.1							0.1
Balsam fir-hardwood		0.8	2.5	1.1		3.1	2.1	2.1	0.9												
Red pine	3.5	5.8	0.7	0.2	0.1	0.1	0.2	0.6	0.4	1.3	0.2	0.6	2.8	1.7							1.2
Red pine-spruce-fir	0.1			0.1	0.2		0.1	0.1		0.1		0.1									
Red pine-hardwood	0.3	0.4	1	3	1.7	0.6	1.9	1.1	0.6	0.9	0.7	0.1	0.2								
White pine	0.4	0.1					0.1	0.1	0.3	0.3	0.2	0.1				0.1		0.1		0.2	0.1
White pine-spruce-fir		1.1							0.1	0.1	0.4	1.2						0.1			0.1
White pine-hardwood	0.2					0.1	0.2	0.5	2.2	2.3	0.8	0.3	0.9	0.1	0.1						
White spruce	0.9	2.9	0.5	0.2	0.1	0.4	0.8	1.1	0.1	0.1											
White spruce-hardwood	0.2	0.5	1	1.3	1.3	1.5	1.4	0.4	0.2	0.3	0.2	0.1									
Northern hardwood	1.3	4.8	1.4	4.3	0.9	2	3.6	7	2.3	2.2	0.8	0.2	0.8	0.1	1.1						
Lowland black spruce	0.2	0.2	0.2	0.1	2.5	1.5	2.3	1.7	2	1	0.8	0.5	0.3	0.2	0.1					0.1	
Upland black spruce	0.4	0.1	0.2	0.2	0.2	0.2	0.5	0.6	0.6	0.2	0.2	0.1	0.1								
Tamarack		0.1			0.1	1.1		2.4	0.2	0.1											
Black ash		1.1	3.8			0.2	2.1	1.9	4.2	2.7	0.5	0.4	1.4	0.1	2.3	0.1		0.2			
Black ash-conifer								0.1	0.2	0.1	0.1										
White cedar		1.1				0.1	1.6	0.2	0.5	2.3	3	1.3	0.5	1.8	0.8	0.3	0.3	0.4	0.1	0.1	0.1
Mixed swamp conifers			0.1			0.1	0.3	0.4	1.3	0.2	0.3	0.1	0.1	0.2	0.1	0.1		0.1	0.1		
Cut over	0.3	0.2																			
Lowland brush	0.1																				
Water				0.1																	

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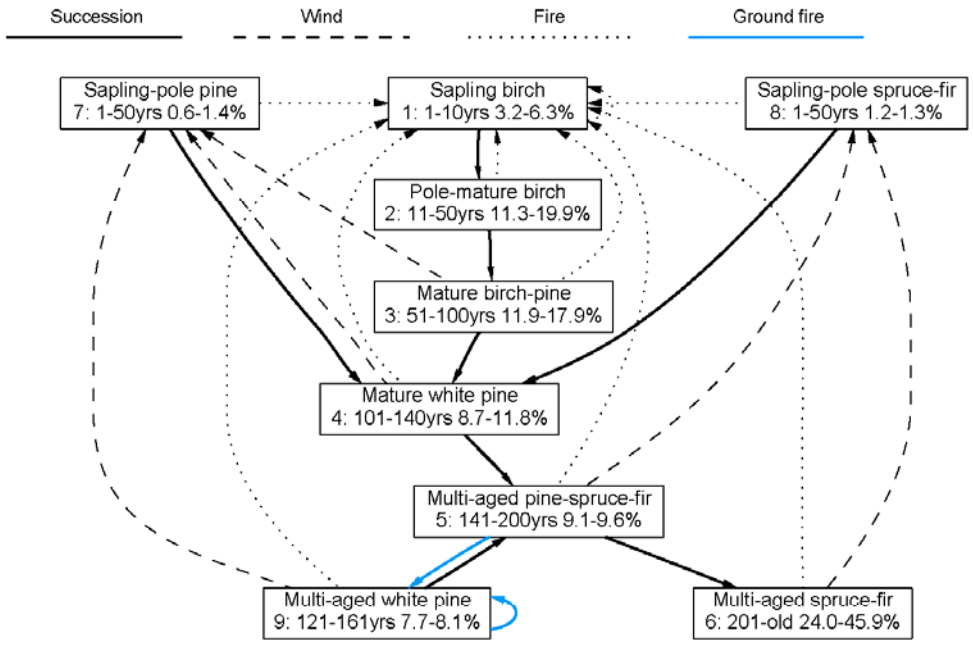
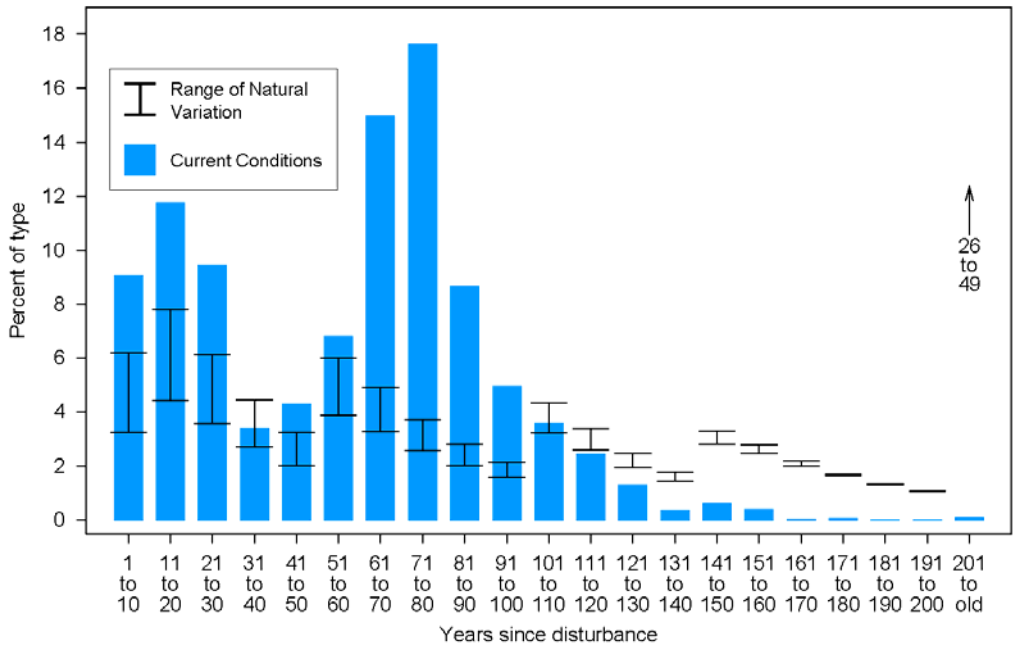
Frelich type 3: Mesic red pine-white pine
Disturbace interval (years) - Wind: 1000-2000 Fire: 150-300 Ground Fire: 40





3: Dry-mesic white and red pine

Percent cover breakdown

See also area breakdown

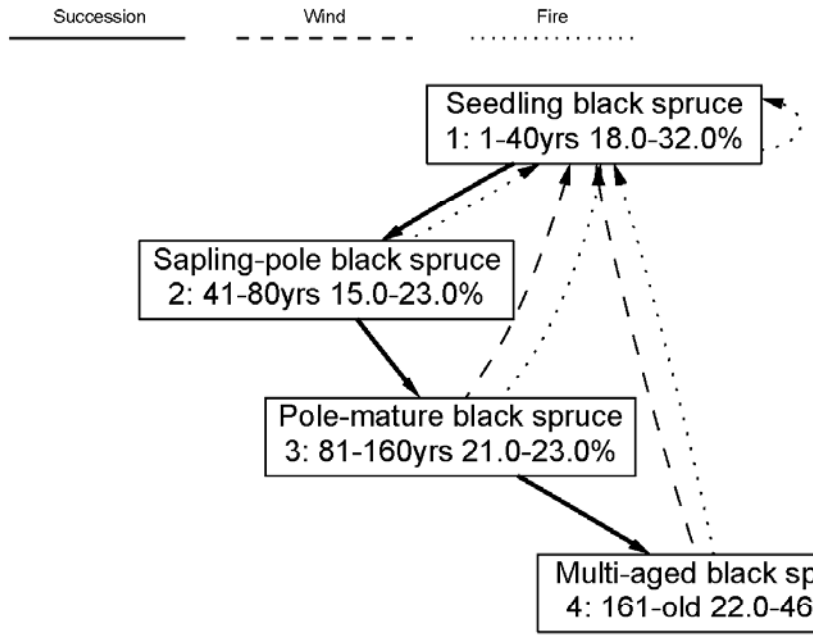
Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191	201
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	old
Current acres (thousands)	58	76	61	22	28	44	96	113	56	32	23	16	8	2	4	3	0	0	0	0	1
Current % of type	9.1	11.8	9.4	3.4	4.3	6.8	15	17.6	8.7	5	3.6	2.5	1.3	0.4	0.6	0.4	0.1	0.1	0	0	0.1
RNV minimum % of type	3.2	4.4	3.6	2.7	2	3.9	3.3	2.6	2	1.6	3.2	2.6	1.9	1.5	2.8	2.5	2	1.6	1.3	1.1	27
RNV maximum % of type	6.2	7.8	6.1	4.5	3.2	6	4.9	3.7	2.8	2.1	4.3	3.4	2.4	1.8	3.3	2.8	2.2	1.7	1.3	1	49.4
Breakdown of age class by current cover type percent of age class (≥ 10% in **bold**)																					
Balsam poplar					4			1				1									
Aspen	**32**	**56**	**46**	**19**	**18**	**23**	**23**	**16**	**13**	7	2	1	1								
Aspen-spruce-fir	**10**	9	**15**	**16**	**42**	**33**	**41**	**26**	**30**	**31**	**24**	5	6			2					
Aspen-birch-spruce-fir	**26**							**13**			3	1	8	**16**				**1**			**34**
Aspen-birch	2							2			1		4								
Paper birch	2		2			7	2	4	2	6	6			1							
Paper birch-spruce-fir				5	6	4	**13**	8	6	**13**	**10**	9	6	**10**	3	1	**15**				
Oak											1										
Jack pine	**11**	7	2	2	2	2	2	6	3	4	**12**	**11**	3	**12**				**47**			**17**
Jack pine-hardwood	1	1	**10**	6	1	1	2	2	2	2	3	1	1	2							1
Spruce-fir			1	2	1	2	2	2	4	3	1	1	3								8
Spruce-fir-hardwood	2							1			1		4	2							5
Balsam fir		3	2	**10**	9	4	2	3	1		1		**18**								
Balsam fir-hardwood					4			2													
Red pine	5	8	2	1			2	1		1	2	1	2	5			2	3	**11**		9
Red pine-spruce-fir		1					1		1	1	1	1	2				5				
Red pine-hardwood	1	2	6	**16**	4	3	3	2	5	7	**12**	**11**	5	6				**10**			1
White pine	3	1								2	1	1	1	1	1	3	7				
White pine-spruce-fir										1	2	2	5	7							
White pine-hardwood	1							1	5	3	8	**14**	**11**		5	1	**24**	6			1
White spruce	1	4	1																		
White spruce-hardwood	1		1	3	4					1											
Northern hardwood		1	8	4			2	1	5			6									
Lowland black spruce		2	3	6	1	**18**	2	3	**13**	6	**4**	4	6	6	2	**42**	8	9	**31**	6	**4**
Upland black spruce	1	1		1	1			1	1	1	1	2	2	2			3	2			5
Tamarack												1									
Black ash		1	2	6	4		2	3	3	2	2	**14**	1	7	4	**42**	4	3	7		7
Black ash-conifer									1			1	1	1	1	2	**12**	4			
White cedar		2							3	7	3	**12**	9	**20**	**82**	8	21	**15**	8	**94**	4
Mixed swamp conifers							1			1	1	1	1	1	2			1	**44**		2

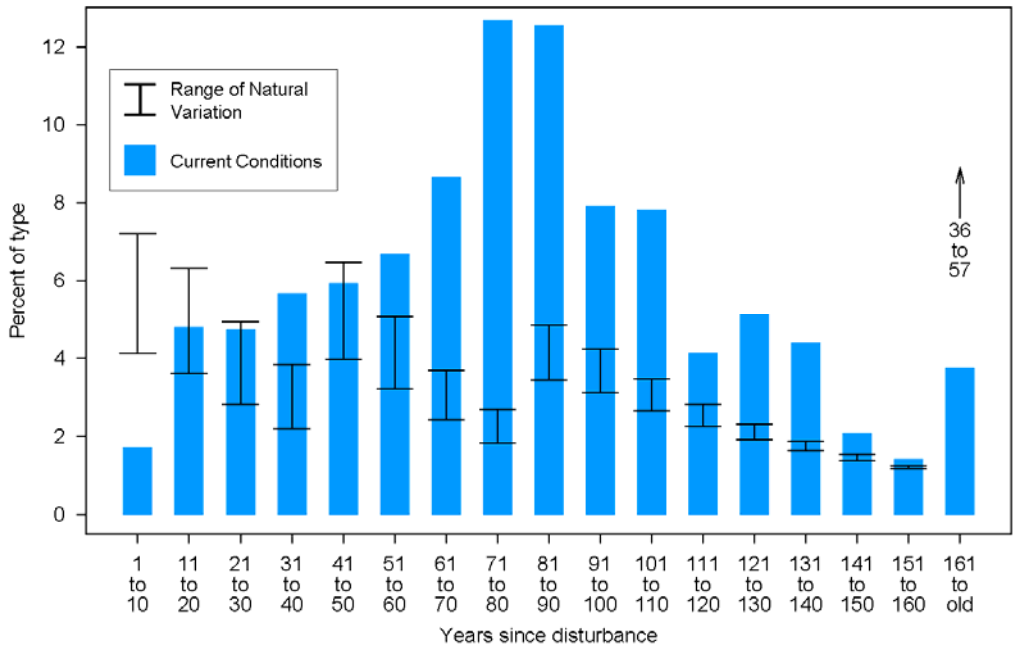
3: Dry-mesic white and red pine
Area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191	201
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	old
Current acres (thousands)	58	76	61	22	28	44	96	113	56	32	23	16	8	2	4	3	0	0	0	0	1
Current % of type	9.1	11.8	9.4	3.4	4.3	6.8	15	17.5	8.7	5	3.6	2.5	1.3	0.4	0.6	0.4	0.1	0.1	0	0	0.1
RNV minimum % of type	3.2	4.4	3.6	2.7	2	3.9	3.3	2.5	2	1.6	3.2	2.6	1.9	1.5	2.8	2.5	2	1.6	1.3	1.1	27
RNV maximum % of type	6.2	7.8	6.1	4.5	3.2	6	4.9	3.7	2.8	2.1	4.3	3.4	2.4	1.8	3.3	2.8	2.2	1.7	1.3	1	49.4
Breakdown of age class by current cover type area (thousands of acres) (≥ 10k in **bold**)																					
Balsam poplar			0.2		1	0.1	0.4	1.1	0.2			0.1									
Aspen	**18.4**	**42.2**	**27.8**	4.1	5	**10.2**	**21.7**	**17.8**	7.1	2.3	0.4	0.2	0.1								
Aspen-spruce-fir	5.6	7	9.2	3.4	**11.7**	**14.3**	**39.8**	**29.5**	**16.6**	9.9	5.4	0.9	0.5								
Aspen-birch-spruce-fir	**15.3**		0.1	0.1				**15.1**	0.2		0.6	0.1	0.7	0.4							0.2
Aspen-birch	1							2.5			0.1		0.3								
Paper birch	1.1	0.3	1.1			3.1	2.2	3.9	1.2	1.8	1.4	0.1									
Paper birch-spruce-fir	0.1	0.1		1.1	1.6	1.7	**12.1**	9.4	3.5	**4**	2.4	1.4	0.5	0.2	0.1		0.1				
Oak								0.1			0.2										
Jack pine	6.2	5.1	0.9	**0.5**	0.5	0.8	2	**6.7**	1.7	1.3	2.6	1.8	0.3	0.3				0.2			0.1
Jack pine-hardwood	0.6	0.6	5.8	1.4	0.1	0.5	1.9	2.7	1.3	0.7	0.8	0.2	0.1	0.1							
Spruce-fir	0.2	0.2	0.6	0.4	0.3	0.7	2.2	2.7	2.1	0.9	0.3	0.1	0.2								0.1
Spruce-fir-hardwood	1.4							1.6			0.2		0.3								
Balsam fir		2.2	1.3	2.2	2.5	1.9	2.1	3.5	0.6	0.1	0.1		1.5								
Balsam fir-hardwood					1			1.7													
Red pine	3	6.3	1.1	0.3		0.1	1.6	0.6	0.2	0.3	0.4	0.1	0.2	0.1							0.1
Red pine-spruce-fir	0.2	1		0.1		0.1	1.3	0.3	0.4	0.2	0.2	0.2	0.2								
Red pine-hardwood	0.6	1.2	3.8	**3.5**	1	1.3	2.6	2.7	2.6	2.3	2.7	1.7	0.5	0.2							
White pine	1.6	0.6				0.1	0.2	0.1	0.2	0.7	0.3	0.2	0.1			0.1					
White pine-spruce-fir		0.1						0.1	0.2	0.2	0.4	0.3	0.4	0.2							
White pine-hardwood	0.6	0.1	0.1				0.1	0.6	2.7	0.9	1.8	2.2	0.9		0.2		0.1				
White spruce	0.8	3.1	0.3			0.1	0.3	0.1	0.1	0.1											
White spruce-hardwood	0.3	0.1	0.4	**0.6**	1.1	0.1	0.4			0.2											
Northern hardwood	0.1	1	4.6	**0.9**		0.1	1.5	1.2	3	0.1		1									
Lowland black spruce	0.2	1.6	1.9	1.3	0.3	7.8	2	3	7.1	2	1	0.6	0.5	0.2	0.1	1.1					
Upland black spruce	0.4	0.4	0.2	**0.3**	0.2	0.2	0.3	1.3	0.6	0.3	0.2	0.3	0.2								
Tamarack	0.1	0.1		0.1			0.1	0.4	0.1	0.1		0.1									
Black ash	0.1	0.9	1.1	1.3	1	0.1	1.4	2.8	1.9	0.7	0.4	2.2	0.1	0.2	0.2	1					
Black ash-conifer								0.3	0.3	0.1			0.1								
White cedar	0.1	1.4				0.1		0.2	1.5	2.3	0.6	1.9	0.7	0.5	3.2	0.2	0.1	0.1		0.1	
Mixed swamp conifers					0.1	0.2	0.2	0.3	0.2	0.3	0.3	0.1	0.1		0.1						
Cut over		0.1																			
Upland grass	0.1	0.1						0.4													
Upland brush			0.1	0.1				0.4													
Water			0.1																		

Northern Superior Uplands: RNV / current conditions Interim report, February 26, 2002 12

Frelich type 4: Lowland conifer
Disturbace interval (years) - Wind: 1000-2000 Fire: 150-300 Ground Fire: N/A





4: Lowland Conifer

Percent cover breakdown

See also area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	old
Current acres (thousands)	12	33	32	39	41	46	59	87	86	54	53	28	35	30	14	10	26
Current % of type	1.7	4.8	4.7	5.7	5.9	6.7	8.6	12.7	12.5	7.9	7.8	4.1	5.1	**4.4**	2.1	1.4	3.8
RNV minimum % of type	4.1	3.6	2.8	2.2	4	3.2	2.4	1.8	3.4	3.1	2.7	2.3	1.9	1.6	1.4	1.2	36.5
RNV maximum % of type	7.2	6.3	4.9	3.8	6.5	5.1	3.7	2.7	4.8	4.2	3.5	2.8	2.3	1.9	1.5	1.3	57.7

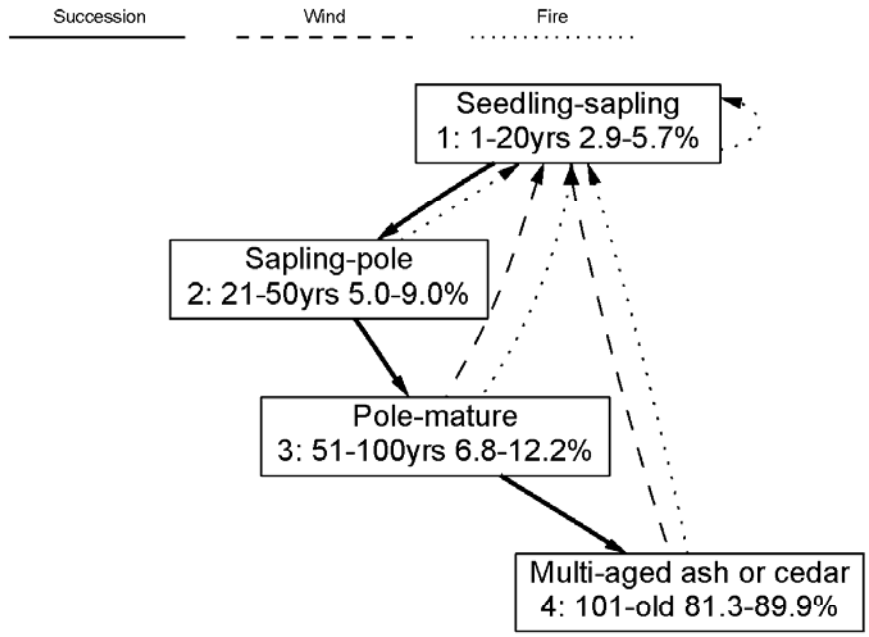
Breakdown of age class by current cover type percent of age class (≥ 10% in **bold**)																		
Balsam poplar			3	7			3		2									
Aspen	**15**	**24**	**14**	**11**	**12**	8	**14**	4	3	4								
Aspen-spruce-fir	6	1	**13**	4	2	4	**10**	2	4	1								
Aspen-birch-spruce-fir	2							1			1		2	2	1		1	
Aspen-birch	1												1	1				
Paper birch			4			1	2	4	2	2								
Paper birch-spruce-fir					3	1	4	1	2	1								
Jack pine	4	1	1	1	1	1	1	2	1	1	2	1	1	3	1		4	
Jack pine-hardwood			1	1														
Spruce-fir	1	1	1	1	1	1	2	2	1	1								
Spruce-fir-hardwood	1													1				
Balsam fir	1	2	**11**	**18**	9	**10**	**14**	4	2	2								
Balsam fir-hardwood			8	3	3			1										
Red pine	2	1																
White spruce	1	3	5		3		1											
White spruce-hardwood			1															
Northern hardwood		3		2														
Lowland black spruce	**28**	**26**	**17**	**34**	**45**	47	**35**	**45**	52	43	**45**	53	43	**28**	**41**	**31**	**20**	
Upland black spruce	**16**	1	2	2	2	1	2	5	4	4	8	1	13	**15**	4	1	**16**	
Tamarack	4	7	5	8	**10**	9	4	8	6	8	6	7	3	6	2	1	3	
Black ash	1	**19**	7	**10**		3	1	6	5	5	6	4	2	3	3	4	2	
Black ash-conifer	1							2	2	1	1	2	1	1	1	1	1	
White cedar	2		1	1	3	5	2	5	5	**19**	**13**	**21**	**25**	**25**	**38**	**51**	**37**	
Mixed swamp conifers	6		1	3	5	6	7	6	**11**	7	**16**	9	8	**14**	9	9	**14**	
Cut over	3																	
Lowland grass	1	3																
Marsh	1																	
Lowland brush	3																	

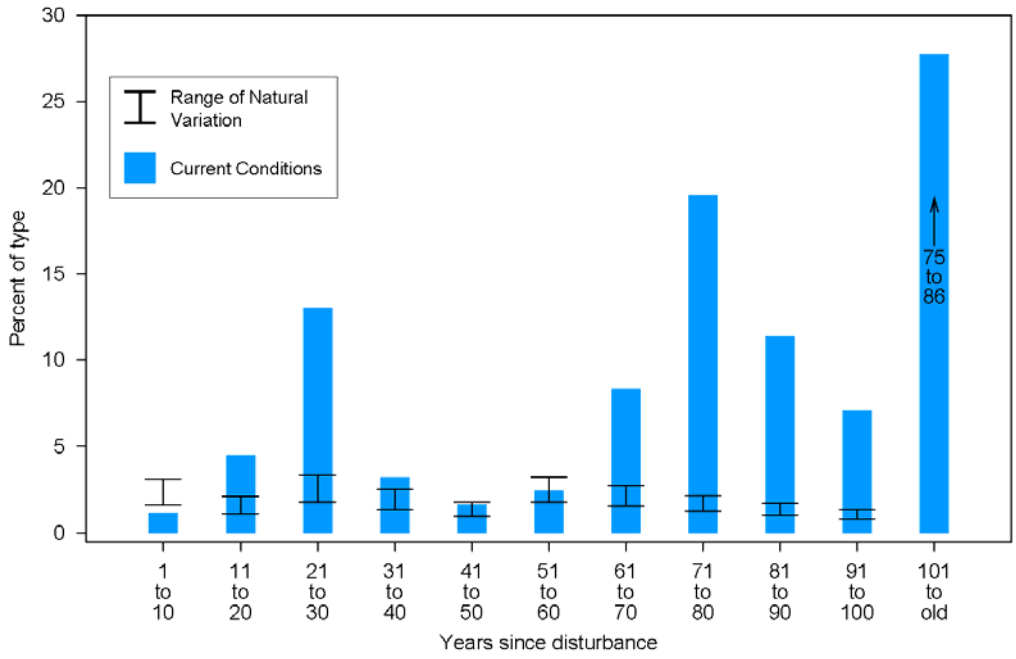
4: Lowland Conifer
Area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	old
Current acres (thousands)	12	33	32	39	41	46	59	87	86	54	53	28	35	30	14	10	26
Current % of type	1.7	4.8	4.7	5.7	5.9	6.7	8.6	12.7	12.5	7.9	7.8	4.1	5.1	4.4	2.1	1.4	3.8
RNV minimum % of type	4.1	3.6	2.8	2.2	4	3.2	2.4	1.8	3.4	3.1	2.7	2.3	1.9	1.6	1.4	1.2	36.5
RNV maximum % of type	7.2	6.3	4.9	3.8	6.5	5.1	3.7	2.7	4.8	4.2	3.5	2.8	2.3	1.9	1.5	1.3	57.7
Breakdown of age class by current cover type area (thousands of acres) (≥ 10k in **bold**)																	
Balsam poplar			1	2.4		1.3	0.2	1.8	0.2	0.1							
Aspen	1.8	7.7	4.6	4.3	4.7	3.6	8.2	3.6	2.8	2.1	0.2	0.1					
Aspen-spruce-fir	0.7	0.3	4.3	1.5	0.6	1.9	6.1	1.4	3	0.3	0.1	0.1					0.1
Aspen-birch-spruce-fir	0.2			0.1	0.2			0.7	0.1	0.1	0.3	0.1	0.6	0.7	0.1		0.3
Aspen-birch	0.1		0.1		0.1						0.1		0.2	0.1			
Paper birch			1.1		0.1	0.2	1	3.2	1.8	1.3	0.1	0.1					
Paper birch-spruce-fir				0.1	1.1	0.3	2.4	0.8	1.5	0.3	0.1	0.1	0.1				
Jack pine	0.5	0.4	0.3	0.2	0.4	0.3	0.4	2.1	0.7	0.4	1	0.1	0.5	0.8	0.2		0.9
Jack pine-hardwood		0.1	0.2	0.3		0.1	0.2	0.2	0.2	0.2							
Spruce-fir	0.1	0.2	0.3	0.3	0.3	0.4	1.3	1.7	1.1	0.6	0.1	0.1	0.1				0.1
Spruce-fir-hardwood	0.1			0.1				0.1			0.1		0.1	0.3			0.1
Balsam fir	0.1	0.5	3.6	7.1	3.6	4.4	8.3	3.1	2.1	1.1	0.2	0.1					0.1
Balsam fir-hardwood			2.6	1.1	1.1			1.1									
Red pine	0.2	0.4	0.1	0.1			0.1		0.2	0.1		0.1				0.1	
Red pine-hardwood		0.1		0.1	0.1		0.1										
White spruce	0.1	1.1	1.7	0.1	1.1	0.2	0.4	0.1	0.1	0.1		0.1					
White spruce-hardwood		0.1	0.2	0.1			0.2			0.1							
Northern hardwood		0.9		0.8		0.1	0.1	0.2	0.1	0.2	0.1						
Lowland black spruce	3.3	8.6	5.6	**13.3**	**18.3**	**21.3**	**20.9**	**38.6**	**44.4**	**23.2**	**24.2**	**14.8**	**15**	8.5	5.8	3	5.2
Upland black spruce	1.8	0.4	0.6	0.7	0.9	0.7	0.9	3.9	3.2	2	4.3	0.4	4.6	4.6	0.5	0.1	4
Tamarack	0.4	2.2	1.7	3.1	4.2	3.9	2.1	6.8	4.9	4.3	3.3	2	1.2	1.7	0.3	0.1	0.7
Black ash	0.1	6.3	2.2	3.8	0.1	1.3	0.7	5.4	3.9	2.5	3	1.2	0.6	0.8	0.4	0.4	0.6
Black ash-conifer	0.2					0.1	0.2	1.3	1.5	0.7	0.5	0.4	0.4	0.3	0.2	0.1	0.2
White cedar	0.2		0.1	0.4	1.4	2.5	1.1	4.7	4.5	**10.3**	7	5.9	8.6	7.5	5.4	5	9.5
Mixed swamp conifers	0.8	0.1	0.4	1.1	2	2.8	4.1	5.5	9.1	3.9	8.6	2.5	2.6	4.3	1.2	0.9	3.6
Cut over	0.4	0.1															
Upland grass			0.1														
Lowland grass	0.1	1.1															
Marsh	0.1																
Lowland brush	0.3							0.1									
Water			0.1														

Northern Superior Uplands: RNV / current conditions Interim report, February 26, 2002 15

Frelich type 5: Rich swamp
Disturbace interval (years) - Wind: 1000-2000 Fire: 500-1000 Ground Fire: N/A





5: Rich Swamp

Percent cover breakdown

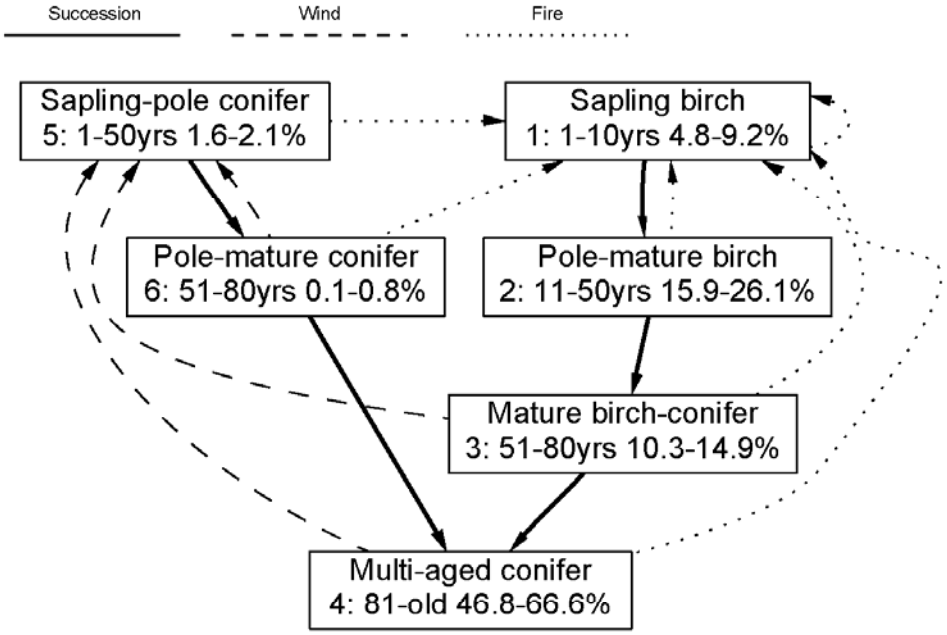
See also area breakdown

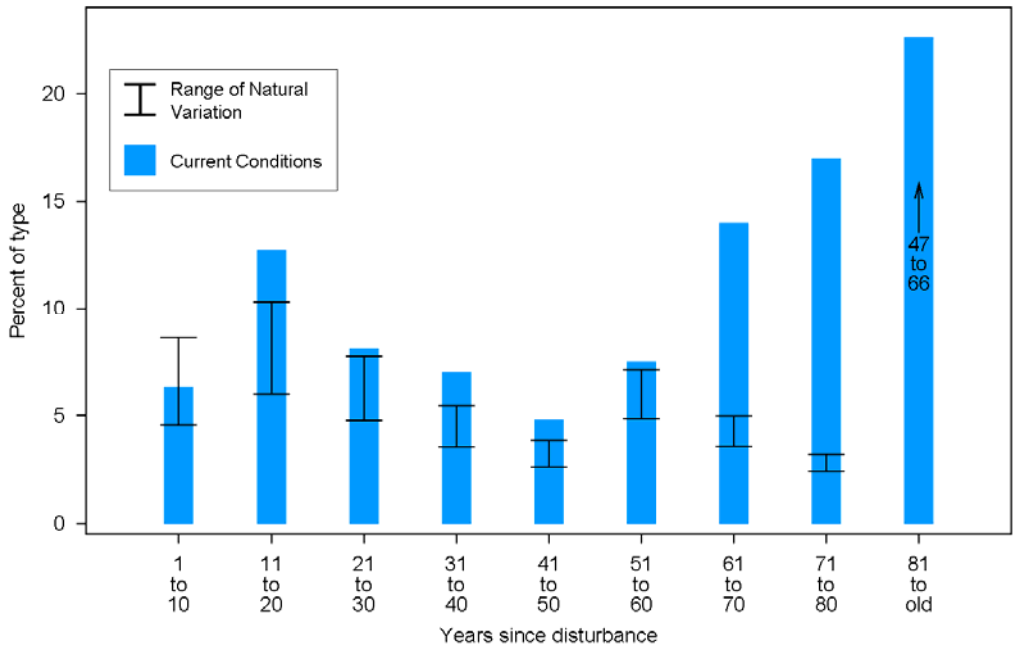
Age (years) from	1	11	21	31	41	51	61	71	81	91	101
to	10	20	30	40	50	60	70	80	90	100	old
Current acres (thousands)	1	3	9	2	1	2	6	14	8	5	20
Current % of type	1.2	4.5	13	3.2	1.6	2.4	8.3	19.5	11.4	7.1	27.7
RNV minimum % of type	1.6	1.1	1.8	1.4	1	1.8	1.6	1.3	1	0.8	75.3
RNV maximum % of type	3.1	2.1	3.4	2.5	1.8	3.2	2.7	2.2	1.7	1.4	86.5
Breakdown of age class by current cover type percent of age class (>= 10% in **bold**)											
Balsam poplar	6	**34**	**26**	**53**		4	2	1	1	1	
Aspen	**20**	**11**	**44**	3	3	8	5	9	2	1	
Aspen-spruce-fir	5	1	**22**		6	**14**	4	1	1		
Aspen-birch-spruce-fir	5										
Aspen-birch	1										
Paper birch		**34**			2	2	1	6		1	
Paper birch-spruce-fir						2	1	1			
Jack pine	5	1						1			
Jack pine-hardwood	1	1						1			
Spruce-fir		1		1	5		1	1	1		
Balsam fir		1	2	6	**12**	3	3	2	2	1	
Balsam fir-hardwood							**23**				
Red pine	2	1	1								
Red pine-spruce-fir	1				1						
Red pine-hardwood					1						
White pine	1										
White pine-hardwood	1						**20**				
White spruce		1			1		1				
White spruce-hardwood											
Northern hardwood										1	1
Lowland black spruce	**31**	8	4	**25**	**43**	**49**	**27**	**30**	**47**	**53**	**34**
Upland black spruce	3			1			1	2			
Tamarack	7	2		9	3	6	1	5	4	2	1
Black ash	1	2		2	4	1	4	5	9	**11**	7
Black ash-conifer	1				9	4	1	2	4	5	5
White cedar	1	1			8	6	3	**28**	**19**	**23**	**47**
Mixed swamp conifers	3				3		2	4	9	1	4
Cut over		1									
Lowland brush	4			1							
Water			1								

5: Rich Swamp
Area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101
to	10	20	30	40	50	60	70	80	90	100	old
Current acres (thousands)	1	3	9	2	1	2	6	14	8	5	20
Current % of type	1.2	4.5	13	3.2	1.6	2.4	8.3	19.5	11.4	7.1	27.7
RNV minimum % of type	1.6	1.1	1.8	1.4	1	1.8	1.6	1.3	1	0.8	75.3
RNV maximum % of type	3.1	2.1	3.4	2.5	1.8	3.2	2.7	2.2	1.7	1.4	86.5
Breakdown of age class by current cover type area (thousands of acres) (≥ 10k in **bold**)											
Balsam poplar		1.1	2.4	1.2		0.1	0.1	0.2	0.1		
Aspen	0.2	0.4	4.1	0.1		0.1	0.3	1.3	0.2		
Aspen-spruce-fir			2		0.1	0.2	0.2	0.1	0.1		0.1
Aspen-birch								0.1			
Paper birch		1.1					0.1	0.9			
Paper birch-spruce-fir							0.1	0.1			
Jack pine								0.1			
Jack pine-hardwood								0.1			
Spruce-fir					0.1			0.1	0.1		
Balsam fir			0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.1	
Balsam fir-hardwood							1.4				
Red pine			0.1								
White spruce							1.2				
White spruce-hardwood							0.1				
Northern hardwood										0.1	0.2
Lowland black spruce	0.3	0.3	0.4	0.6	0.5	0.9	1.6	4.3	3.9	2.7	6.7
Upland black spruce								0.3			
Tamarack	0.1	0.1		0.2		0.1	0.1	0.7	0.3	0.1	0.3
Black ash		0.1			0.1		0.2	0.7	0.7	0.5	1.5
Black ash-conifer					0.1	0.1	0.1	0.3	0.3	0.2	1
White cedar					0.1	0.1	0.2	3.9	1.5	1.2	9.3
Mixed swamp conifers							0.1	0.6	0.7		0.7

Frelich type 6: Mesic birch-aspen-spruce-fir
Disturbace interval (years) - Wind: 1000-2000 Fire: 100-200 Ground Fire: N/A





6: Mesic birch-aspen-spruce-fir

Percent cover breakdown

See also area breakdown

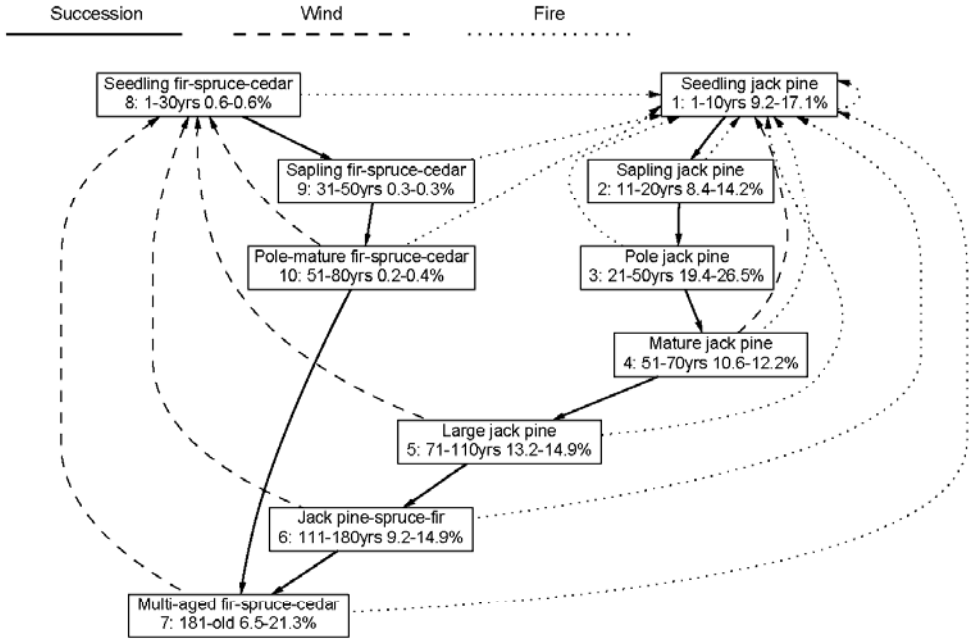
Age (years) from	1	11	21	31	41	51	61	71	81	
to	10	20	30	40	50	60	70	80	old	
Current acres (thousands)	55	111	71	61	42	65	122	149	198	
Current % of type	6.3	12.7	8.1	7	4.8	7.5	14	17	22.6	
RNV minimum % of type	4.6	6	4.8	3.5	2.6	4.9	3.6	2.4	47.1	
RNV maximum % of type	8.6	10.3	7.8	5.5	3.9	7.1	5	3.2	66.8	
Breakdown of age class by current cover type percent of age class (≥ 10% in **bold**)										
Balsam poplar	1	1	5	9	1		3	1	1	
Aspen	**51**	**51**	**45**	**27**	**39**	**34**	**17**	**12**	9	
Aspen-spruce-fir	**15**	2	7	**14**	**27**	**18**	**20**	**20**	**13**	
Aspen-birch-spruce-fir	2		1	1	1		2	4	3	
Aspen-birch				2					1	
Paper birch	3	5	4	2	4	9	**11**	**14**	9	
Paper birch-spruce-fir	1			1	7	5	**10**	**13**	9	
Jack pine	5	3	1	1	1	1	1	4	3	
Jack pine-hardwood	1	1	3		1		1	1	1	
Spruce-fir	2	1	1	2	4	6	7	**10**	6	
Spruce-fir-hardwood	2							3	2	
Balsam fir	3	6	1	3	3	4	9	3	3	
Balsam fir-hardwood				9			4	2		
Red pine	3	7	1				1		**1**	
Red pine-hardwood		2	3	7	4		2			
White pine	1								**1**	
White pine-spruce-fir	1								1	
White pine-hardwood									2	
White spruce	2	**14**	**4**	1	1	1	1			
White spruce-hardwood	1	1	**10**	**13**	4	1	1	1	**1**	
Northern hardwood	3	3	**4**	2	2	**12**	2	4	8	
Lowland black spruce	1	3	1	1	1	7	3	2	3	
Upland black spruce	1	1	1	1	1	1	2	2	2	
Tamarack				2			1			
Black ash			7	4			4	5	7	
White cedar								1	**13**	
Mixed swamp conifers							1		3	
Cut over	1	1								

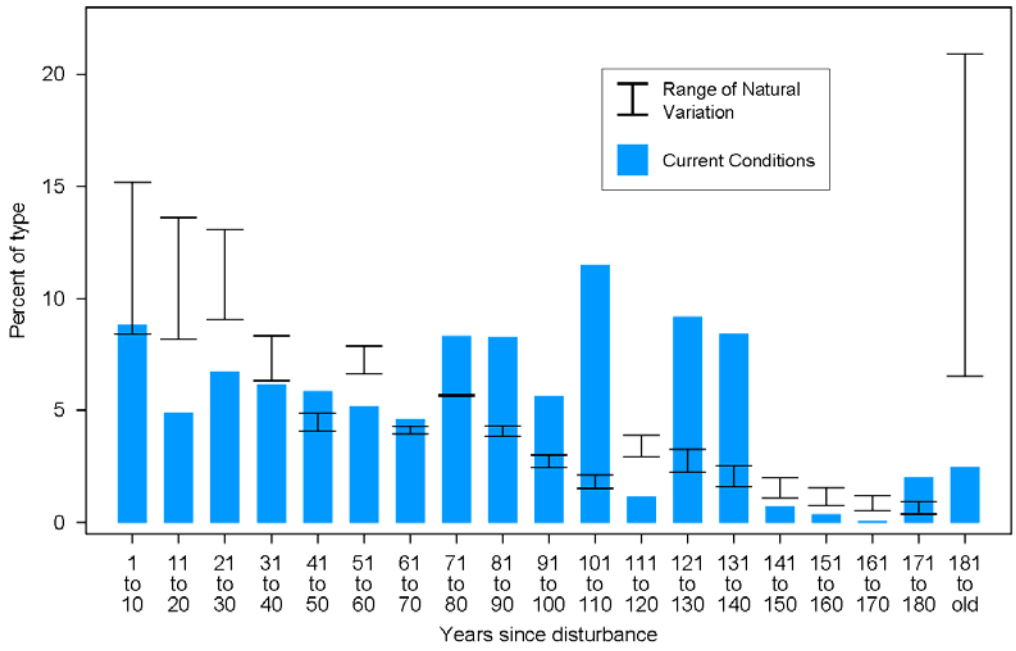
6: Mesic birch-aspen-spruce-fir
Area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81
to	10	20	30	40	50	60	70	80	old
Current acres (thousands)	55	111	71	61	42	65	122	149	198
Current % of type	6.3	12.7	8.1	7	4.8	7.5	14	17	22.6
RNV minimum % of type	4.6	6	4.8	3.5	2.6	4.9	3.6	2.4	47.1
RNV maximum % of type	8.6	10.3	7.8	5.5	3.9	7.1	5	3.2	66.8
	Breakdown of age class by current cover type area (thousands of acres) (≥ 10k in **bold**)								
Balsam poplar	0.6	1.4	3.5	5.4	0.3	0.3	3.4	1	1.4
Aspen	**28.1**	**56.8**	**31.8**	**16.4**	**16.5**	**22.3**	**21.1**	**17.4**	**17.9**
Aspen-spruce-fir	8	2.1	5.2	8.3	**11.2**	**11.6**	**24.6**	**30**	**25.1**
Aspen-birch-spruce-fir	0.8		0.7	0.8	0.2	0.1	1.8	6	5.4
Aspen-birch	0.2		0.1	1.2			0.2	0.6	1.3
Paper birch	1.5	5	3.1	1.2	1.8	5.9	**13.5**	**20**	**17.3**
Paper birch-spruce-fir	0.5	0.1		0.7	2.9	3.4	**12**	**18.7**	**17.7**
Jack pine	2.5	2.9	0.6	0.4	0.5	0.5	0.8	5.3	5
Jack pine-hardwood	0.5	0.7	1.8	0.2	0.2	0.2	0.9	0.7	1
Spruce-fir	1.3	0.7	1	1.1	1.5	4	8.6	**14.7**	**11.8**
Spruce-fir-hardwood	0.8			0.1			0.3	4.1	3.1
Balsam fir	1.8	6.4	0.4	1.5	1.1	2.3	**10.6**	5.1	5.6
Balsam fir-hardwood				5.6			4.5	2.5	
Red pine	1.8	7.6	1	0.2	0.1	0.1	0.6	0.2	2.7
Red pine-spruce-fir					0.1		0.1		0.1
Red pine-hardwood	0.1	2.1	1.9	4.2	1.5	0.3	2.4	0.2	0.5
White pine	0.7	0.1						0.1	0.9
White pine-spruce-fir	0.8						0.1	0.1	2.2
White pine-hardwood	0.2					0.1		0.3	3.3
White spruce	1.1	**15.5**	3.1	0.4	0.2	0.4	1.1	0.5	0.7
White spruce-hardwood	0.5	1.5	7.1	8	1.8	0.5	1.1	0.7	2.4
Northern hardwood	1.9	3.3	3.1	1.1	1	7.6	2.7	6.5	**15.8**
Lowland black spruce	0.3	3.2	0.7	0.5	0.4	4.3	3.3	2.6	6.4
Upland black spruce	0.3	0.6	0.6	0.6	0.4	0.7	2	2.7	4.1
Tamarack		0.1	0.1	1.1			1	0.1	0.2
Black ash			4.7	2.3		0.2	4.3	6.7	**14.3**
Black ash-conifer									0.1
White cedar				0.1		0.2	0.4	0.8	**25.8**
Mixed swamp conifers	0.1		0.1	0.1	0.1	0.3	0.7	0.5	5.4
Cut over	0.4	0.8	0.1						
Upland grass	0.1		0.1					0.3	0.1
Lowland grass	0.1								
Upland brush	0.1		0.2				0.1	0.1	0.2
Lowland brush	0.2	0.1							0.1

Northern Superior Uplands: RNV / current conditions Interim report, February 26, 2002 21

Frelich type 7: Jack pine-black spruce
Disturbace interval (years) - Wind: 1000-2000 Fire: 50-100 Ground Fire: N/A





7: Jack pine-black spruce

Percent cover breakdown

See also area breakdown

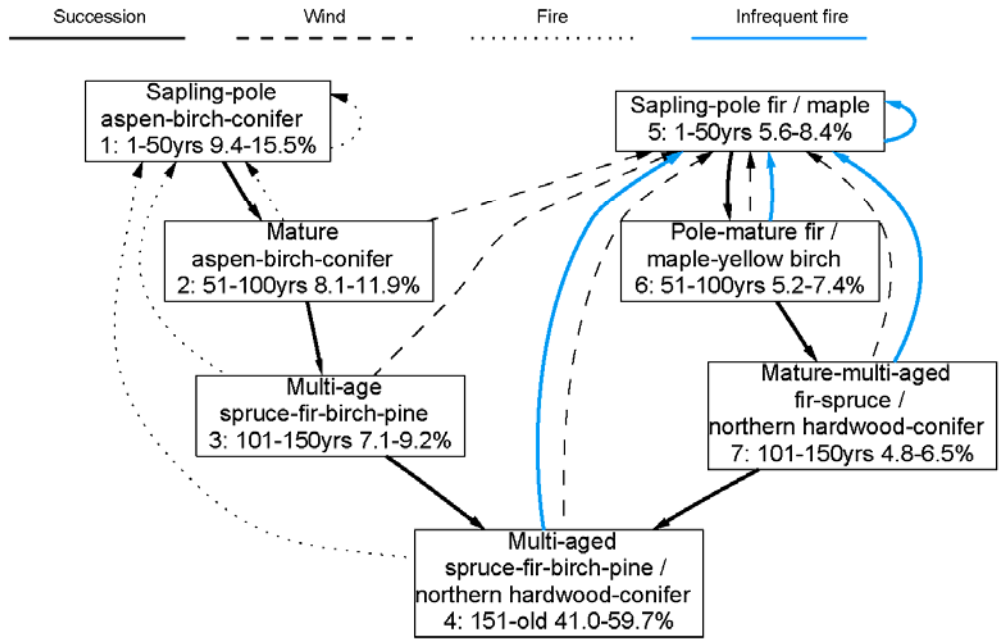
Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	old
Current acres (thousands)	92	51	70	64	61	54	48	87	86	59	121	12	96	88	7	4	1	21	26
Current % of type	8.8	4.9	6.7	6.1	5.8	5.2	4.6	8.3	8.2	5.6	11.5	1.1	9.1	8.4	0.7	0.3	0.1	2	2.5
RNV minimum % of type	8.4	8.1	9	6.3	4.1	6.6	3.9	5.6	3.8	2.4	1.5	2.9	2.2	1.6	1.1	0.8	0.5	0.4	6.5
RNV maximum % of type	15.2	13.6	13.1	8.3	4.9	7.9	4.3	5.7	4.3	3	2.1	3.9	3.2	2.5	2	1.5	1.2	0.9	20.9
Breakdown of age class by current cover type percent of age class (≥ 10% in bold)																			
Aspen	**11**	**45**	**25**	7	6	5	9	7	4	4	4	2							
Aspen-spruce-fir	4	6	**14**	9	**12**	**18**	**34**	**22**	**18**	**12**	4	**12**	1			**1**			1
Aspen-birch-spruce-fir	**34**		5	**21**	**27**	**22**	9	**18**	23	8	**16**	**12**	**38**	**30**	**16**	**27**	**19**	**25**	**35**
Aspen-birch	5		4	**12**	10	5	1	1	1	1	1	1	**25**	3	6	1		1	1
Paper birch	1	3		2			5	2	1	1		2					2		
Paper birch-spruce-fir		2			2	2	8	5	3	2	1	**4**				2			
Jack pine	**28**	**15**	7	**10**	**14**	**15**	4	**15**	**21**	**41**	**55**	**12**	**18**	**45**	**59**	**41**	**31**	**59**	**37**
Jack pine-hardwood	1	9	**20**	8	6	6	5	4	4	6	2	5	1	1			1		
Spruce-fir	2	1	1	2	2	3	5	4	2	4	2	**4**	4	1	2	**13**		1	6
Spruce-fir-hardwood	4		1	3	3	1	1	5	2	3	6	3	5	7	4	5	8	**11**	**11**
Balsam fir		1	4	3	2	1	5	2	3	2		2							
Balsam fir-hardwood			3																
Red pine	3	6	1	1	2	2	1	1	2	1	1	3	1	5	1	1	6	1	3
Red pine-spruce-fir												1					4		
Red pine-hardwood		3	4	**12**	5	7	3	1	1	2	1	9							
White pine	2									1		2			1	2	4		
White pine-spruce-fir									1			1		3					
White pine-hardwood									2	2	1	3			1	1	3		1
White spruce		1																	
White spruce-hardwood			1	2	1		2					1							
Northern hardwood		2	2	2		3		1											
Lowland black spruce		2	2	4	5	6	5	5	4	4	1	**17**	1		3	2	**12**		
Upland black spruce	2	2	2	1	2	3	4	3	3	5	2	2	3	2	4	3		1	3
Tamarack								2											
Black ash		2	2					1			1	1					1		
White cedar										1		1		2	1	**1**	5	1	1
Mixed swamp conifers			1							1	1	1		1	1		4	1	
Upland grass			1					1			1								
Upland brush			1	1				1	**1**	1	1		1						1

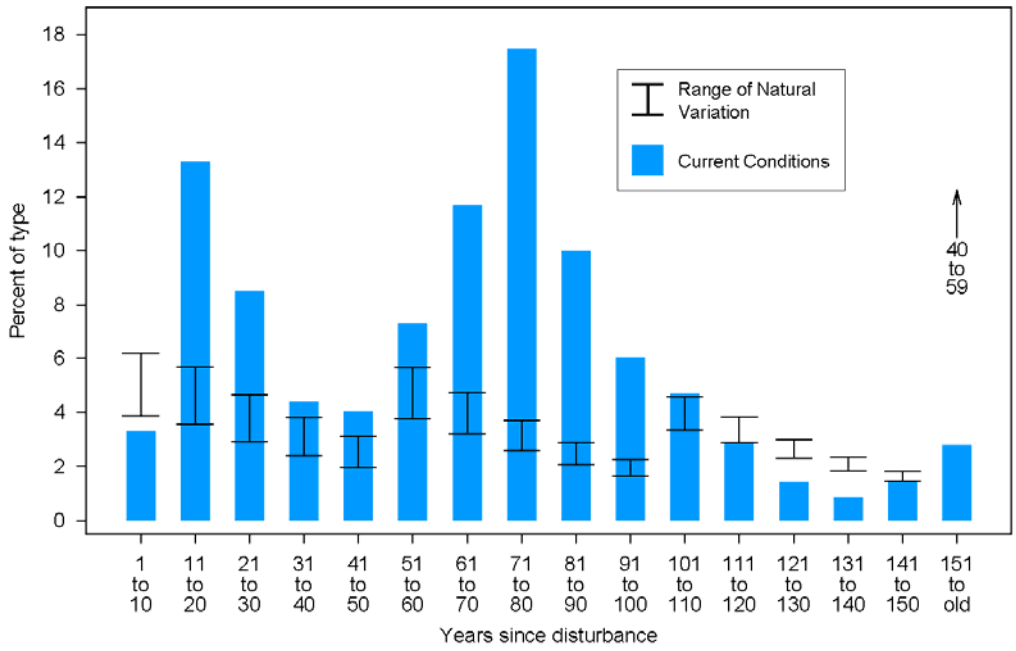
7: Jack pine-black spruce
Area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	old
Current acres (thousands)	92	51	70	64	61	54	48	87	86	59	121	12	96	88	7	4	1	21	26
Current % of type	8.8	4.9	6.7	6.1	5.8	5.2	4.6	8.3	8.2	5.6	11.5	1.1	9.1	8.4	0.7	0.3	0.1	2	2.5
RNV minimum % of type	8.4	8.1	9	6.3	4.1	6.6	3.9	5.6	3.8	2.4	1.5	2.9	2.2	1.6	1.1	0.8	0.5	0.4	6.5
RNV maximum % of type	15.2	13.6	13.1	8.3	4.9	7.9	4.3	5.7	4.3	3	2.1	3.9	3.2	2.5	2	1.5	1.2	0.9	20.9
Breakdown of age class by current cover type area (thousands of acres) (≥ 10k in **bold**)																			
Aspen	**10.4**	**23.1**	**17.4**	4.3	3.6	2.9	4.4	5.8	6.1	2.4	4.2	0.3	0.1						
Aspen-spruce-fir	3.5	2.9	**10.1**	6	7	9.6	**16.3**	**19.5**	**15.3**	7.3	4.3	1.4	0.5	0.1					0.1
Aspen-birch-spruce-fir	**31.6**	0.1	3.5	**13.6**	**16.7**	**11.8**	4.2	**15.6**	**19.4**	4.5	19	1.4	**36.6**	**26.1**	1.2	1	0.1	5.2	9
Aspen-birch	4.1		2.9	7.8	6.3	2.9	0.3	0.9	1.2	0.4	1.4	0.1	**24.3**	2.7	0.4			0.1	0.2
Paper birch	1.1	1.4	0.2	1.1		0.1	2.5	2	0.7	0.3	0.3	0.2							
Paper birch-spruce-fir	0.1	1			1.2	1	3.7	4.1	2.6	1	0.6	0.4	0.2			0.1			
Jack pine	**26**	7.8	4.7	6.6	8.6	8.3	2	**13.4**	**18.2**	**24.3**	**66.4**	1.4	**17.2**	**39.3**	4.4	1.5	0.2	**12.2**	9.5
Jack pine-hardwood	1.3	4.4	**14.1**	5	3.6	3	2.4	3.6	3.8	3.4	2.4	0.6	0.7	0.5				0.1	0.1
Spruce-fir	2.2	0.3	0.8	1	0.9	1.5	2.5	3.2	1.8	2.2	1.9	0.5	4.1	1	0.1	0.5		0.1	1.6
Spruce-fir-hardwood	3.2		0.5	1.6	2	0.5	0.2	4	1.9	1.9	6.7	0.3	4.4	6.4	0.3	0.2	0.1	2.3	2.8
Balsam fir	0.1	0.2	2.6	1.8	1.1	0.6	2.2	1.5	2.8	0.9	0.3	0.2	0.1						
Balsam fir-hardwood			1.9																
Red pine	2.4	3.1	0.9	0.9	1.1	1.2	0.3	0.7	1.7	0.3	1.7	0.4	0.8	4.2				0.2	0.9
Red pine-spruce-fir					0.1	0.1		0.1	0.1		0.1	0.1							
Red pine-hardwood	0.2	1.5	2.6	7.9	3.2	3.6	1.3	0.8	0.5	1.1	1	1	0.3						
White pine	1.5	0.2				0.1		0.1		0.3	0.4	0.2				0.1			
White pine-spruce-fir									0.7	0.1		0.1	0.1	2.5					
White pine-hardwood	0.4	0.1	0.1				0.1		1.5	1.1	0.8	0.4	0.3	0.1	0.1				0.2
White spruce	0.3	0.7	0.3	0.1	0.2	0.2	0.1		0.2	0.1									
White spruce-hardwood		0.1	0.6	1	0.3	0.1	0.8	0.1	0.1	0.1	0.2	0.1							
Northern hardwood	0.1	1.1	1.5	1		1.5	0.1	1	0.2		0.1								
Lowland black spruce	0.2	0.8	1.6	2.7	3.1	3.3	2.2	3.9	3.4	2.4	1.3	2	1	0.4	0.2	0.1	0.1		0.1
Upland black spruce	2.2	0.8	1.2	0.5	1.2	1.6	2	2.3	2.3	3.2	2.6	0.2	3.2	1.4	0.3	0.1		0.2	0.7
Tamarack	0.2					0.1		1.7	0.2	0.1	0.2		0.2	0.3					
Black ash	0.1	0.9	1.2				0.1	0.6	0.3	0.2	1.1	0.1	0.1	0.1					
Black ash-conifer	0.1									0.1									
White cedar	0.1			0.1	0.2	0.2		0.2	0.3	0.4	0.2	0.1	0.2	1.8	0.1			0.2	0.2
Mixed swamp conifers	0.2		0.4	0.3	0.2	0.2	0.1	0.4	0.4	0.4	0.6	0.2	0.4	0.4	0.1			0.1	0.1
Upland grass	0.1	0.1	0.5	0.2	0.2			0.6	0.1	0.1	1		0.3	0.2				0.1	
Upland brush	0.1	0.1	0.7	0.3	0.2			0.8	0.5	0.3	0.9		0.7	0.3					0.1
Other	0.1																		
Flooded/burned	0.1							0.1		0.1	0.4			0.1					

Frelich type 9: Sugar Maple-Northern Hardwood

Disturbace interval (years) - Wind: 1000-2000 Fire: 200-400 Infrequent Fire: 600-1000





9: Northern Hardwood (MW)

Percent cover breakdown

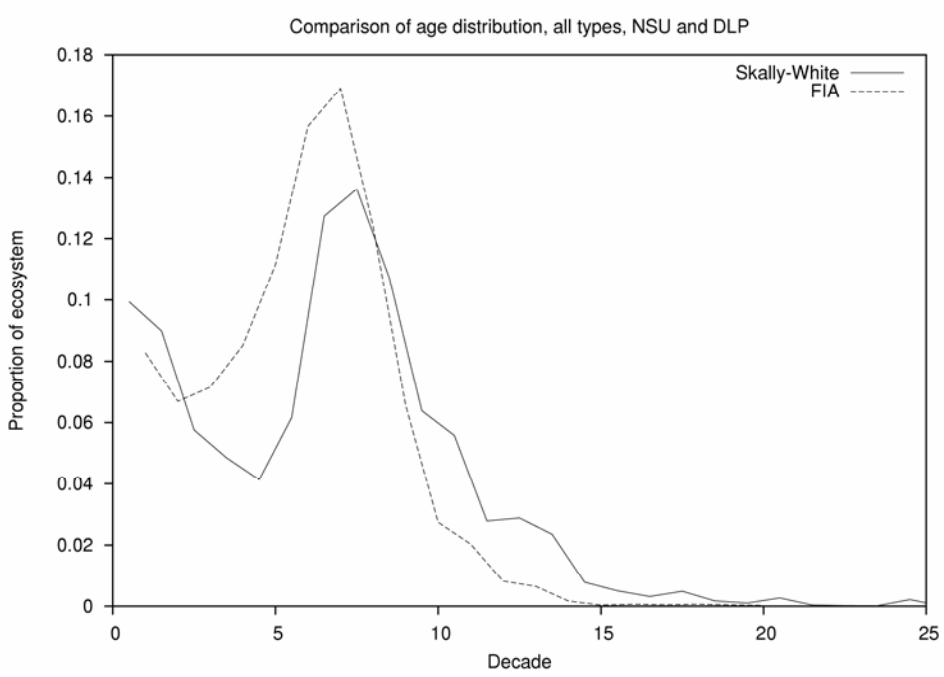
See also area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	old
Current acres (thousands)	8	32	21	11	10	18	29	43	24	15	11	7	4	2	4	7
Current % of type	3.3	13.3	8.5	4.4	4	7.3	11.7	17.5	10	6	4.7	2.9	1.4	0.9	1.4	2.8
RNV minimum % of type	3.9	3.6	2.9	2.4	1.9	3.8	3.2	2.6	2.1	1.6	3.3	2.9	2.3	1.8	1.5	41
RNV maximum % of type	6.2	5.7	4.6	3.8	3.1	5.7	4.7	3.7	2.9	2.3	4.6	3.8	3	2.3	1.8	59.7
Breakdown of age class by current cover type percent of age class (>= 10% in **bold**)																
Balsam poplar		8				7	1	1	1	**10**						
Aspen	**53**	**68**	**47**	**33**	**44**	**17**	**27**	**14**	6	3	3					
Aspen-spruce-fir	7	2	5	**13**	**13**	7	5	7	4	**11**	3					
Paper birch	**12**	5			**13**	**27**	**20**	**22**	**29**	**13**	3	1	3			
Paper birch-spruce-fir					2	2	6	**10**	**10**	3	**9**	4	2			
Jack pine					1											
Spruce-fir	2		1	1	3	1	4	3	2	4	2	2	1	3		
Balsam fir				**11**			2	2	1			2				
Balsam fir-hardwood						7	4		3							
Red pine	1	2	2						4							
Red pine-hardwood		1	2	9	1	**14**	1							1		
White pine-hardwood														1		
White spruce	1	5	1	3	1			3			1	2	1	3		
White spruce-hardwood			6	7	1	1	1									
Northern hardwood	**18**	6	**12**	1	**11**	**15**	**27**	**31**	**34**	**46**	**62**	**59**	**52**	**34**	**53**	**18**
Lowland black spruce									1	1	1			2		
Tamarack				**10**												
Black ash			**23**	9	8	1	1	5	3	5	2	5	8	**27**	3	2
Black ash-conifer														1		
White cedar							1	1	1	2	**13**	**22**	**31**	**23**	**34**	**68**
Mixed swamp conifers								1		1	1	4	3	6	9	**11**
Cut over	4	2														
Upland brush	1															

9: Northern Hardwood (MW)
Area breakdown

Age (years) from	1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151
to	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	old
Current acres (thousands)	8	32	21	11	10	18	29	43	24	15	11	7	4	2	4	7
Current % of type	3.3	13.3	8.5	4.4	4	7.3	11.7	17.5	10	6	4.7	2.9	1.4	0.9	1.4	2.8
RNV minimum % of type	3.9	3.6	2.9	2.4	1.9	3.8	3.2	2.6	2.1	1.6	3.3	2.9	2.3	1.8	1.5	41
RNV maximum % of type	6.2	5.7	4.6	3.8	3.1	5.7	4.7	3.7	2.9	2.3	4.6	3.8	3	2.3	1.8	59.7
Breakdown of age class by current cover type area (thousands of acres) (≥ 10k in **bold**)																
Balsam poplar		2.6	0.1			1.2	0.3	0.3	0.3	1.5						
Aspen	4.3	**21.9**	9.8	3.5	4.4	3	7.7	5.8	1.5	0.4	0.3					
Aspen-spruce-fir	0.6	0.7	0.9	1.4	1.3	1.2	1.4	3	1	1.7	0.3					
Paper birch	0.9	1.5			1.3	4.9	5.7	9.4	7.1	1.8	0.3	0.1	0.1			
Paper birch-spruce-fir					0.2	0.4	1.6	4.4	2.4	0.4	1	0.2	0.1			
Oak							0.1		0.1							
Jack pine					0.1											
Jack pine-hardwood								0.1								
Spruce-fir	0.1	0.1	0.2	0.1	0.3	0.3	1.2	1.4	0.6	0.7	0.2	0.1		0.1		
Balsam fir		0.1	0.1	1.2		0.1	0.6	0.7	0.1	0.1		0.1				
Balsam fir-hardwood						1.2	1.2		0.7							
Red pine	0.1	0.8	0.4						1							
Red pine-hardwood		0.2	0.4	0.9	0.1	2.5	0.2									
White spruce	0.1	1.5	0.2	0.3	0.1	0.1	0.1	1.3								
White spruce-hardwood		0.1	1.3	0.8	0.1	0.1	0.1	0.1	0.1		0.1	0.1		0.1		
Northern hardwood	1.4	1.9	2.5	0.1	1.1	2.6	7.8	**13.1**	8.4	6.8	7.1	4.1	1.8	0.7	1.9	1.2
Lowland black spruce		0.1					0.1	0.2	0.2	0.1	0.1					
Upland black spruce		0.1					0.1									
Tamarack		0.1		1.1												
Black ash			4.8	1	0.8	0.1	0.2	2.2	0.8	0.7	0.3	0.3	0.3	0.6	0.1	0.2
White cedar							0.2	0.2	0.2	0.2	1.5	1.5	1.1	0.5	1.2	4.6
Mixed swamp conifers								0.3	0.1	0.2	0.2	0.3	0.1	0.1	0.3	0.8
Cut over	0.3	0.8														

EXHIBIT D.6 FIA VS MANAGEMENT INVENTORY DATA

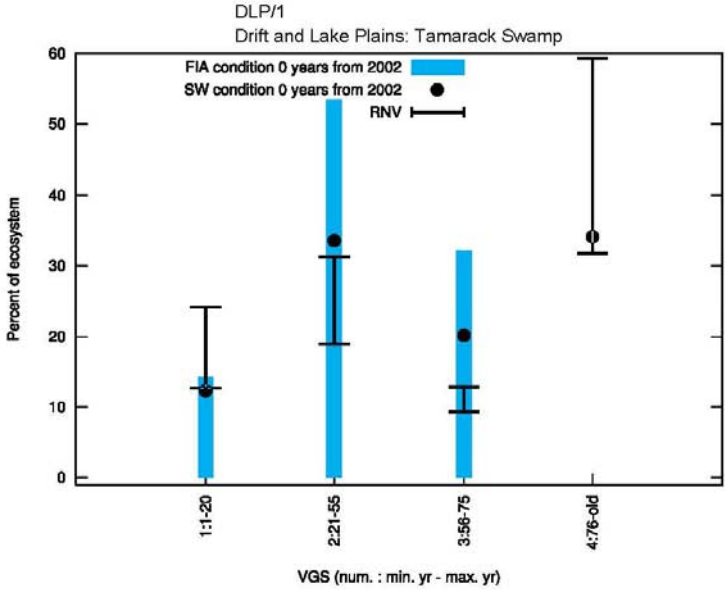


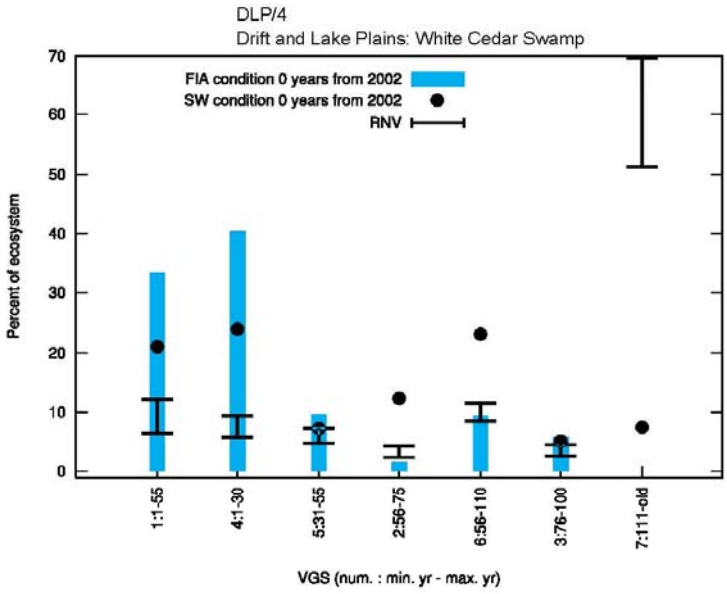
Comparison of FIA plot age distribution and Skally-White combined inventory age distribution. The Skally-White inventory used Federal, State, and County management inventories to characterize the forests of northern Minnesota. The Skally-White inventory has many more stands over on hundred years old.

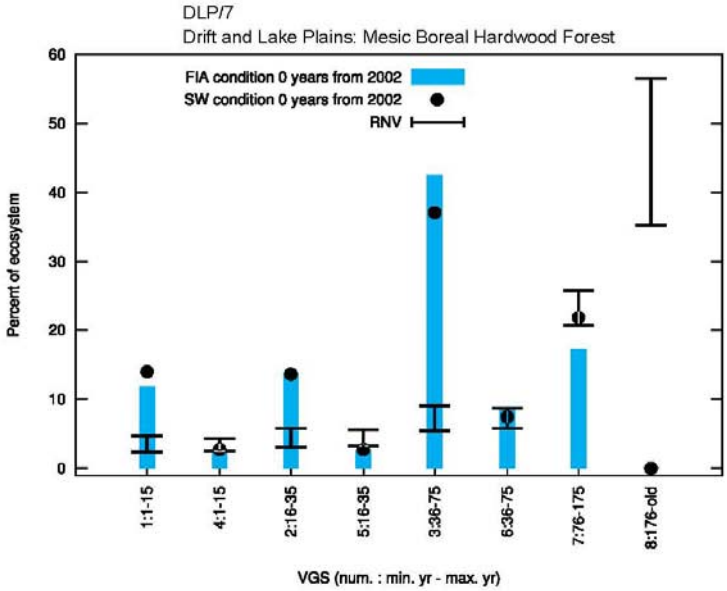
EXHIBIT D.7 CURRENT FOREST CONDITION VS. FOREST RNV

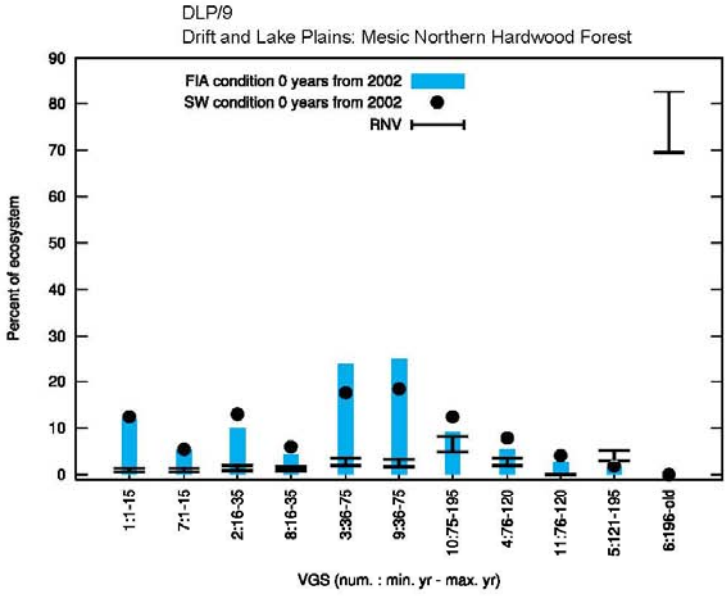
In each of the following plots the shaded (cyan) bar indicates the current proportion of each landscape ecosystem occupied by each VGS as derived from the 2000 era FIA data. Landscape ecosystem assignments were made to the FIA plots by the FIA service using accurate plot positions on a landscape ecosystem base map. The black dot (filled circle) indicates the current proportion of each landscape ecosystem occupied by each VGS as derived from the 2000 era Skally-White combined inventory of forest lands in northern Minnesota. The Skally-White inventory used Federal, State, and County management inventories to characterize the forests of northern Minnesota, with 1990 era FIA plots and expansion factors to account for private land.

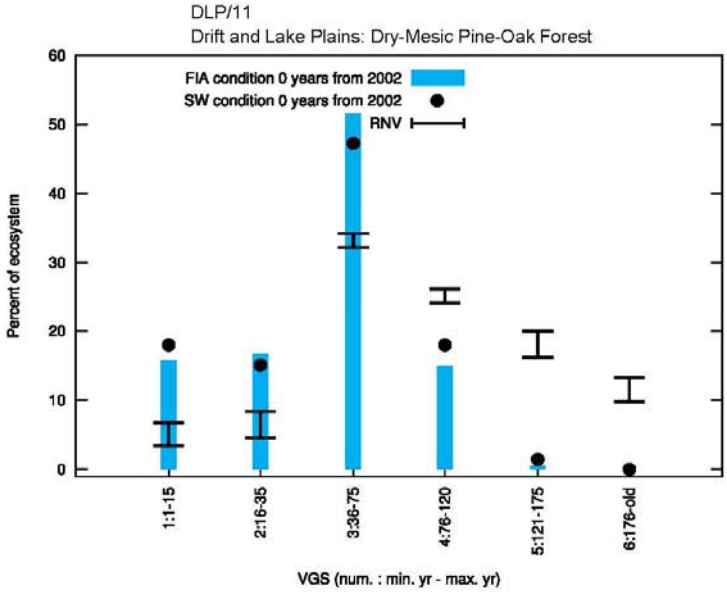
The I-beam (range bar) indicates the range of natural variation modeled for each landscape ecosystem.

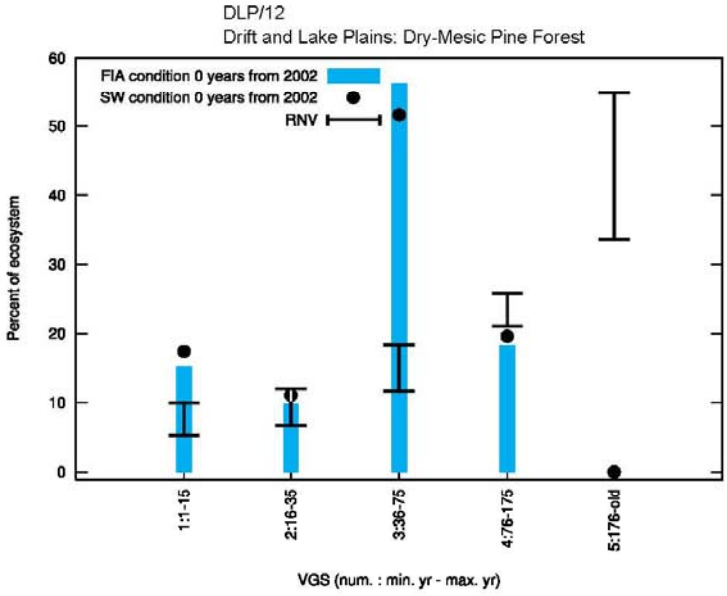

DLP/1
Drift and Lake Plains: Tamarack Swamp
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
60
50
40
30
20
10
0
1:1-20
2:21-55
3:56-75
4:76-old
VGS (num. : min. yr - max. yr)

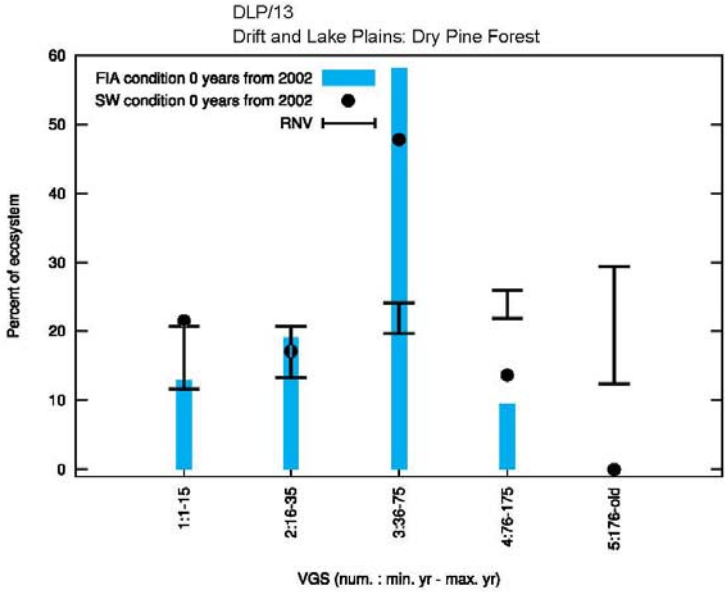

DLP/4
Drift and Lake Plains: White Cedar Swamp
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
70
60
50
40
30
20
10
0
1:1-55
4:1-30
5:31-55
2:56-75
6:56-110
3:76-100
7:111-old
VGS (num. : min. yr - max. yr)

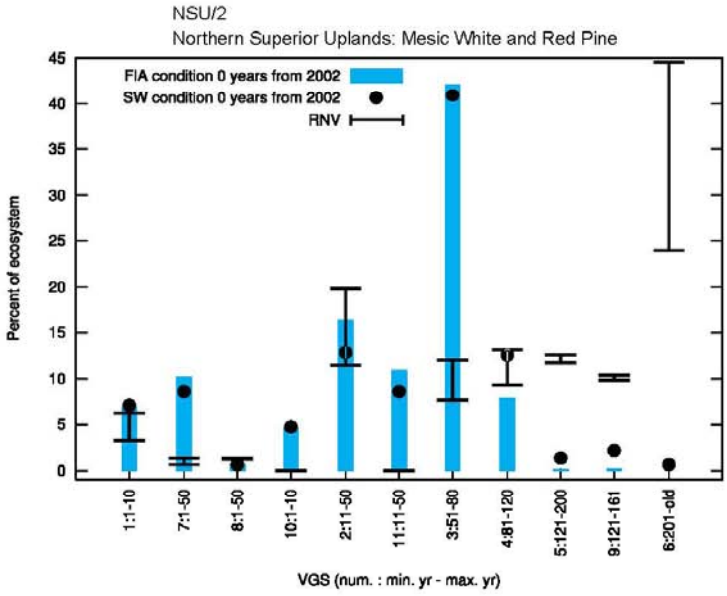

DLP/7
Drift and Lake Plains: Mesic Boreal Hardwood Forest
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
60
50
40
30
20
10
0
1:1-15
4:1-15
2:16-35
5:16-35
9:36-75
6:36-75
7:76-175
8:176-old
VGS (num. : min. yr - max. yr)

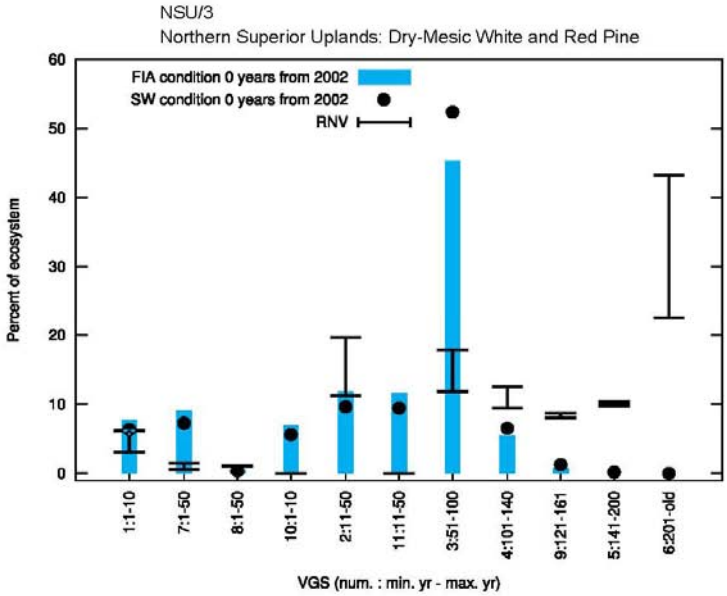

DLP/9
Drift and Lake Plains: Mesic Northern Hardwood Forest
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
90
80
70
60
50
40
30
20
10
0
1:1-15
7:1-15
2:16-35
8:16-35
3:36-75
9:36-75
10:75-195
4:76-120
11:76-120
5:121-195
6:196-old
VGS (num. : min. yr - max. yr)

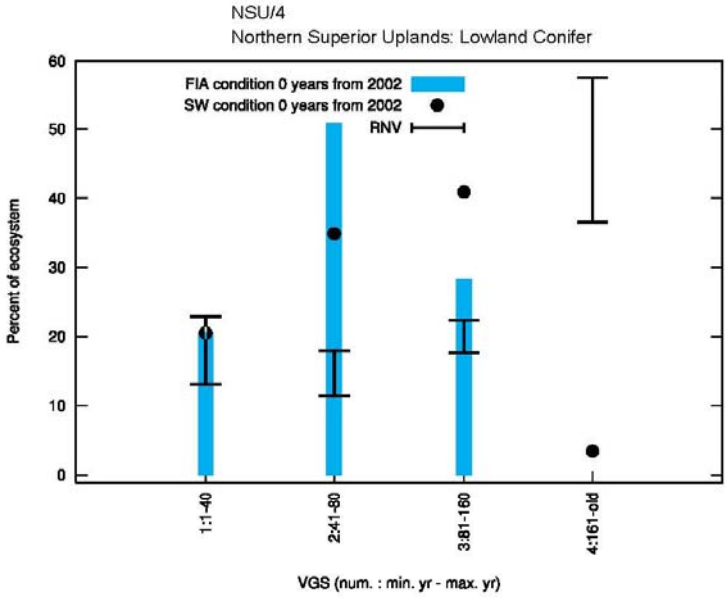

DLP/11
Drift and Lake Plains: Dry-Mesic Pine-Oak Forest
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
60
50
40
30
20
10
0
1:1-15
2:16-35
3:36-75
4:76-120
5:121-175
6:176-old
VGS (num. : min. yr - max. yr)

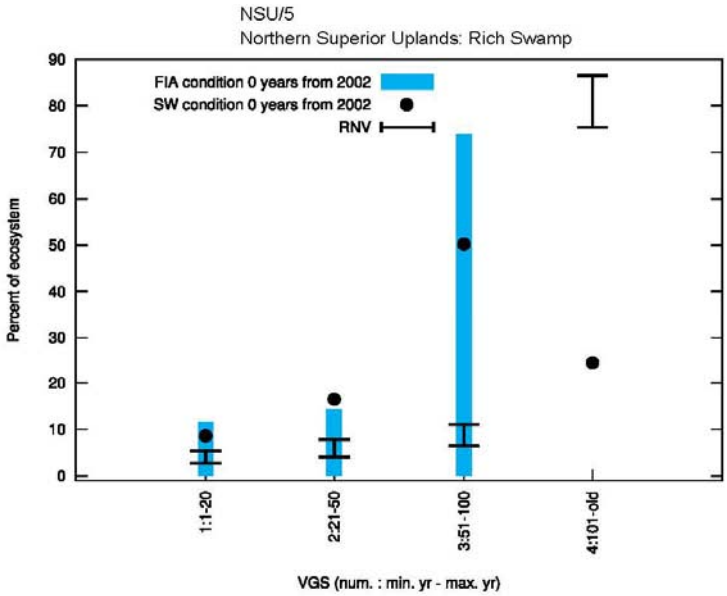

DLP/12
Drift and Lake Plains: Dry-Mesic Pine Forest
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
60
50
40
30
20
10
0
1:1-15
2:16-35
3:36-75
4:76-175
5:176-old
VGS (num. : min. yr - max. yr)

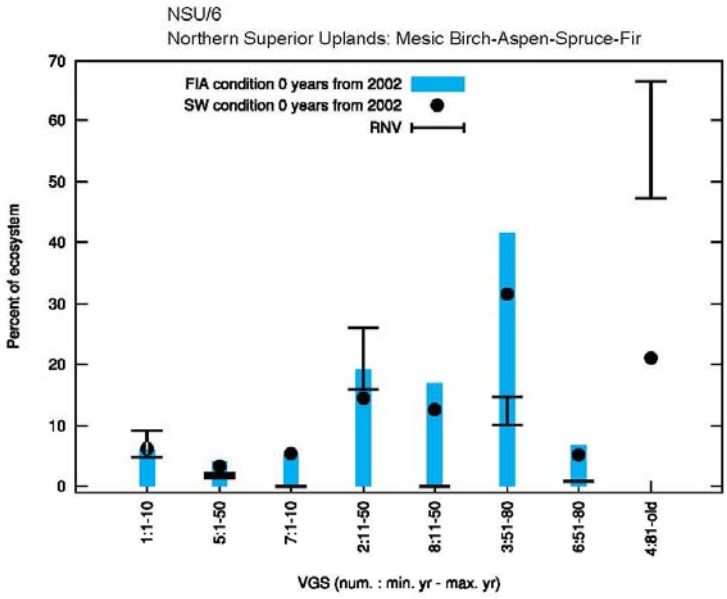

DLP/13
Drift and Lake Plains: Dry Pine Forest
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
60
50
40
30
20
10
0
1:1-15
2:16-35
3:36-75
4:76-175
5:176-old
VGS (num. : min. yr - max. yr)

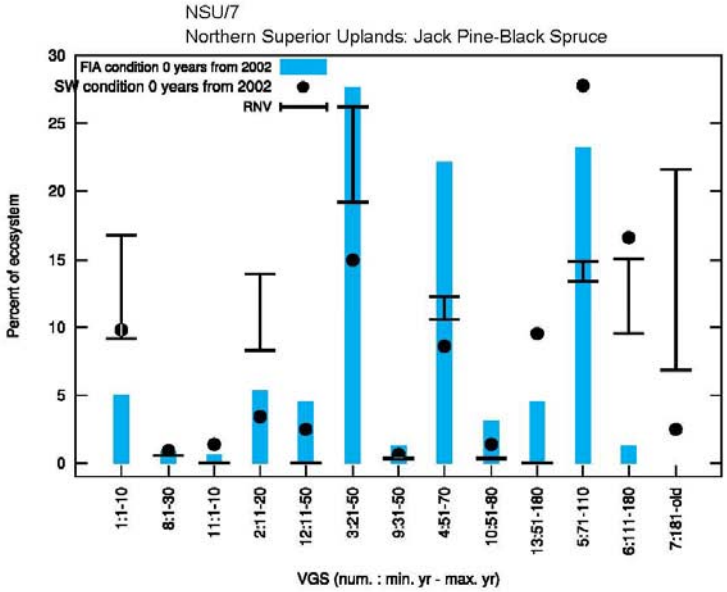

NSU/2
Northern Superior Uplands: Mesic White and Red Pine
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
45
40
35
30
25
20
15
10
5
0
1:1-10
7:1-50
8:1-50
10:1-10
2:11-50
11:11-50
3:51-80
4:81-120
5:121-200
9:121-161
6:201-old
VGS (num. : min. yr - max. yr)


NSU/3
Northern Superior Uplands: Dry-Mesic White and Red Pine
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
0
10
20
30
40
50
60
1:1-10
7:1-50
8:1-50
10:1-10
2:11-50
11:11-50
3:51-100
4:101-140
9:121-161
5:141-200
6:201-old
VGS (num. : min. yr - max. yr)


NSU/4
Northern Superior Uplands: Lowland Conifer
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
0
10
20
30
40
50
60
1:1-40
2:41-80
3:81-160
4:161-old
VGS (num. : min. yr - max. yr)


NSU/5
Northern Superior Uplands: Rich Swamp
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
90
80
70
60
50
40
30
20
10
0
1:1-20
2:21-50
3:51-100
4:101-old
VGS (num. : min. yr - max. yr)


NSU/6
Northern Superior Uplands: Mesic Birch-Aspen-Spruce-Fir
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
70
60
50
40
30
20
10
0
1:1-10
5:1-50
7:1-10
2:11-50
8:11-50
3:51-80
6:51-80
4:81-old
VGS (num. : min. yr - max. yr)


NSU/7
Northern Superior Uplands: Jack Pine-Black Spruce
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
VGS (num. : min. yr - max. yr)
1:1-10
8:1-30
11:1-10
2:11-20
12:11-50
3:21-50
9:31-50
4:51-70
10:51-80
13:51-180
5:71-110
6:111-180
7:181-old

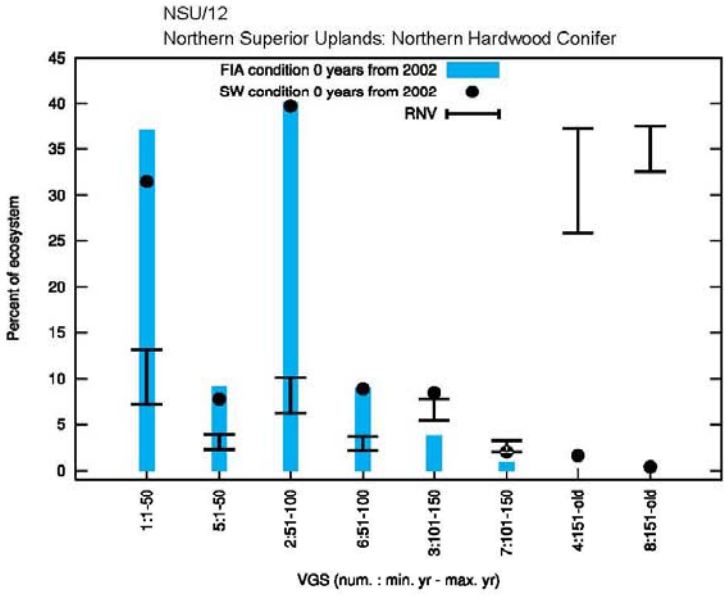

NSU/12
Northern Superior Uplands: Northern Hardwood Conifer
FIA condition 0 years from 2002
SW condition 0 years from 2002
RNV
Percent of ecosystem
VGS (num. : min. yr - max. yr)
1:1-50
5:1-50
2:51-100
6:51-100
3:101-150
7:101-150
4:151-old
8:151-old

EXHIBIT D.8 LATENT IMPACTS

The following two tables illustrate the potential for actions taken in the 40 year planning horizon to have effects that are not manifest until well beyond the 40-year planning horizon.

NSU/3 Dry-mesic white and red pine

Weighted Score	0 yrs 0	10 yrs -4.4	20 yrs -1.65	30 yrs -1.77	40 yrs -6.85	50 yrs	60 yrs	70 yrs	80 yrs	90 yrs	100 yrs	110 yrs	120 yrs	130 yrs	140 yrs
5 Multi-aged pine-spruce-fir 141-200yrs 9.97-10.36%	0 0 0.16+0	0 0 0.28+0	0 0 0.87+0	0 0 1.58+0	-0.74 0.51 3.52- 0.02										
6 Multi-aged spruce-fir 201-old 22.51-43.33%	0 0+0	0 0+0	0 0+0	0 0+0	0 0+0	0 0 0.16+0	0 0 0.27+0	0 0 0.47+0	0 0 1.83+0	0 0 3.37+0	-0.97 0.75 6.29- 0.05	-0.87 0.55 8.49- 0.05	-0.69 3.27 13.09- 0.43	-0.37 2.11 20.26- 0.43	-0.16 4.64 26.31- 1.22
7 Sapling-pole pine 1-50yrs 0.65-1.44%	0 0 8.24+0	-0.5 0.91 10.42+0 .1	-0.5 2.6 11.51+0 .3	-0.5 2.4 11.51+0 .28	-0.5 4.43 10.97+0 .49										

Earlier VGSs omitted, see previous table

In this example the effects are visible in the 40-year planning horizon, but their persistence is only evident when a longer time frame is considered.

NSU/12 Northern Hardwood Conifer

Weighted Score	0 yrs	10 yrs	20 yrs	30 yrs	40 yrs	50 yrs	60 yrs	70 yrs	80 yrs	90 yrs	100 yrs	110 yrs	120 yrs	130 yrs	140 yrs
	0	-2.02	0.2	3.72	0.8										
3 Mature-multi-age spruce-fir-birch-pine 101-150yrs 5.49-7.74%	0 0 7.85+0	0.14 5.88 9.54-0.56	0.5 0.28 15.51-0.04	0.5 9.04 22.35-2.02	0.5 12.51 24.21-3.03										
4 Multi-aged spruce-fir-birch-pine 151-old 25.84-37.24%	0 0 0.6+0	0 0 0.91+0	0 0 1.14+0	0 0 1.72+0	-1 1.1 4.06-0.04	-0.89 0.59 7.59-0.04	-0.84 0.51 8.78-0.04	-0.46 0.27 16.69-0.04	-0.3 8.51 24.19-2.06	-0.18 10.9 28.73-3.13	0 9.41 35.35-3.33	0.01 8.17 40.74-3.33	0.09 7.54 43.94-3.31	0.15 7.87 46.83-3.69	0.25 7.21 51.13-3.69
5 Sapling-pole conifer / maple 1-50yrs 2.21-3.95%	0 0 8.28+0	-0.5 3.49 7.65+0.27	-0.5 4.74 7.97+0.38	-0.5 10.08 7.83+0.79	-0.5 11.73 7.51+0.88										
6 Pole-mature conifer / maple-yellow birch 51-100yrs 2.1-3.59%	0 0 8.74+0	0.5 1.37 8.87-0.12	0.5 4.76 7.17-0.34	0.5 4.92 5.62-0.28	0.4 2.47 4.98-0.12										
7 Mature-multi-aged northern hardwood-conifer 101-150yrs 2-3.26%	0 0 1.84+0	-0.13 5.88 2.24-0.13	0.16 0.28 3.64-0.01	0.48 9.04 5.24-0.47	0.5 12.51 5.68-0.71										
8 Multi-aged northern hardwood-conifer 151-old 32.48-37.42%	0 0 0.13+0	0 0 0.19+0	0 0 0.24+0	0 0 0.36+0	-1 1.1 0.86-0.01	-1 0.59 1.6-0.01	-1 0.51 1.86-0.01	-1 0.27 3.53-0.01	-1 8.51 5.12-0.44	-1 10.9 6.08-0.66	-0.99 9.41 7.48-0.7	-0.94 8.17 8.62-0.7	-0.91 7.54 9.29-0.7	-0.89 7.87 9.91-0.78	-0.85 7.21 10.82-0.78

Earlier VGSs omitted, see previous table