North Shore Restoration Project:
Adaptive Management Implementation Guide
Version 1.0 August 2014

Overview

This document is a guide to using adaptive management in the North Shore Restoration Project. Adaptive management will be used to make decisions during three different phases. **Phase 1** occurs on a stand before any treatments take place. Adaptive management is used to determine if the proposed primary treatment is appropriate given current stand conditions. Data is collected during an initial stand assessment. **Phase 2** occurs after reforestation activities on a stand have been performed. Adaptive management is used to determine if reforestation efforts were successful or if further actions are needed to increase success. Data is collected during routine first and third year stocking surveys. **Phase 3** begins during the third year of project implementation. Adaptive management is used to review successes and failures associated with stands treated during Phases 1 and 2, and to inform future management actions.

Audience

- Silviculture and timber field crews
- North Shore Interdisciplinary Team

1. Phase One: Initial Stand Assessment

In Phase 1, sites with **clearcut**, **mechanical site preparation or underplanting** as proposed primary treatments will receive initial stand assessments before any treatment takes place. The initial stand assessment is a rough and cursory estimate of the stand condition and will be used to verify if the proposed primary treatment is appropriate for the site given current stand conditions.

When Data is Collected: Prior to any treatment. Data is collected to document baseline conditions of site variables and to determine if proposed primary treatment is appropriate given current site conditions.

Who Performs Work: Timber crews, silviculture crews

Data Storage Location: FS Veg Database

1.1 Proposed Primary Treatment: Clearcut

Timber crews will perform initial stand assessments on stands with clearcut as the proposed primary treatment**.** This initial stand assessment is a modification to the informal scouting that timber crews already perform. Before any treatment takes place, timber crews will collect data on the following variables.

- Tree density: Estimate of the overstory basal area, reported as a percent by species
- Operability: Note what type of equipment may be used and where.
- Bluejoint grass cover: Estimate of the percent of bluejoint grass when seasonally feasible.

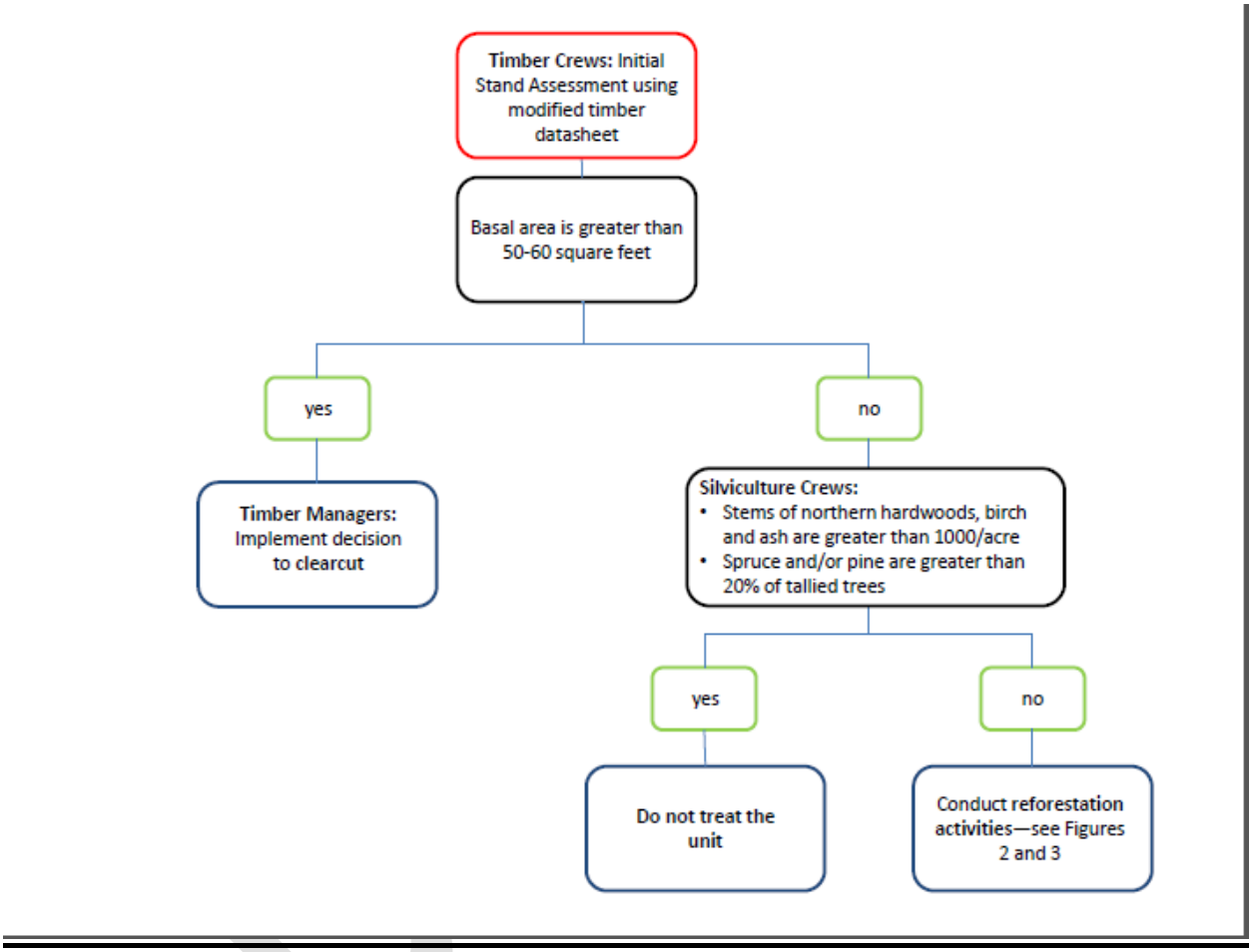
Of these variables, basal area of overstory species will be used to determine if a clearcut can be performed. Bluejoint grass cover is measured to establish a baseline for comparison in future management activities. If the basal area data are consistent with previous stand exam information, timber crews will proceed with the proposed clearcut treatment. If, based on the newly collected basal area information, the stand is deemed inappropriate for harvest, **silviculture** crews will revisit the stand and perform an assessment to determine if reforestation activities are an appropriate adaptive action (See Section 1.2).

Summary of Timber Crew Actions in Phase 1.1:

1. Review current stand exam data and complete initial stand assessment.
2. Enter initial stand assessment data on O Drive.
3. Based on stand exam information and initial stand assessment variables, timber managers determine if proposed clearcut is feasible.
4. If stand is not suitable for harvest, silviculture crews and North Shore Interdisciplinary Team members use process outlined in Section 1.2 to determine an adapted primary treatment.

Figure 1 outlines the process for determining whether to proceed with the proposed clearcut or perform an adaptive action. Table 1 provides detailed information on thresholds associated with data variables.

Figure 1: Phase 1.1 adaptive management process for stands with <u>clearcut</u> as the proposed primary treatment. Data is collected before any treatment takes place. Adapted prescriptions may vary depending on stand objectives. In many cases, harvest would be followed by site preparation.



1.2 Proposed Primary Treatment: Mechanical Site Preparation, Underplanting *or* Stands Deemed Inappropriate for Clearcut

Silviculture crews will perform initial stand assessments on stands with mechanical site preparation or underplanting as the proposed primary treatment *and stands deemed inappropriate for clearcut as outlined in Section 1.1*. This initial stand assessment is a modification to the layout reconnaissance walkthroughs that silviculture crews already perform. Before any treatment takes place, silviculture crews will collect data on the following variables:

- Tree density: Estimate of the overstory basal area, reported as a percent by species
- Regeneration stocking level: Reported as trees /acre by species
- Regeneration diversity: Reported as percent by species
- Bluejoint grass cover: Estimate of the percent of bluejoint grass when seasonally feasible.
- Deer browse: Estimate of the percent of browsed woody stems when seasonally feasible
- Brush cover: Reported as stems/acre of mountain maple, hazel and alder. Estimate of percent cover of raspberry

In addition to collecting information on the above variables, silviculture crews will reference previous stand exam data when available. If previous stand exam data is available, silviculture crews will use it as a baseline reference while performing the initial stand assessment. If the stand exam information appears to coincide with current stand conditions, the initial stand assessment will be conducted as a walkthrough with data on the above variables averaged for the entire stand and entered as one North Shore Common Stand Exam (CSE) plot. In this case, one plot would be downloaded onto the FS Veg Database for the initial stand assessment. If previous stand exam data is not available or current stand conditions do not appear consistent with previous data, silviculture crews may conduct several North Shore CSE plots to calibrate their eyes, followed by a walkthrough which averages the rest of the stand information into one North Shore CSE plot. In this case, multiple plots would be downloaded onto the FS Veg Database for the initial stand assessment.

Summary of Silviculture Crew Actions in Phase 1.2:

1. Load previous stand exam information onto field data recorder to use as baseline comparison.
2. Complete initial stand assessment.
3. Download completed plot information to FS Veg Database.
4. Based on stand exam information and initial stand assessment variables, North Shore Interdisciplinary Team members determine if proposed primary activity is feasible or if adaptive action should be taken. ***For any planting done in this phase, refine or reassign species according to NPCC or soil information if available.***

Collecting information on the above variables is important to inform an adaptive action (if needed) and to provide a baseline for comparisons when stocking surveys occur the 1st and 3rd years after planting. Figure 2 outlines the process for determining whether to proceed with the proposed mechanical site preparation or perform an adaptive action. Figure 3 illustrates the adaptive management process when

underplanting is proposed. Table 1 provides detailed information on thresholds associated with data variables.

Figure 2: Phase 1.2 adaptive management process for stands with <u>mechanical site preparation</u> as the proposed primary treatment. Data is collected before any treatment takes place. Adapted prescriptions may vary depending on stand objectives.

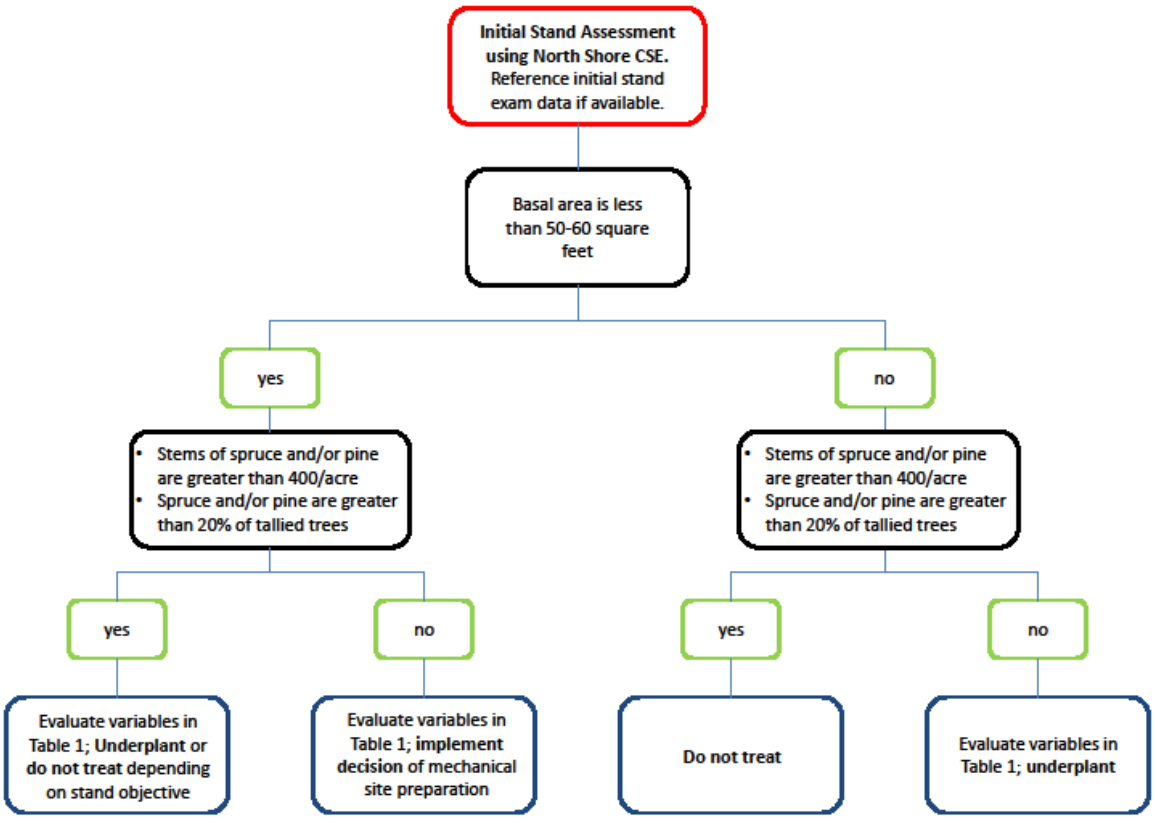


Figure 3: Phase 1.2 adaptive management process for stands with <u>underplanting</u> as the proposed primary treatment. Data is collected before any treatment takes place. Adapted prescriptions may vary depending on stand objectives.

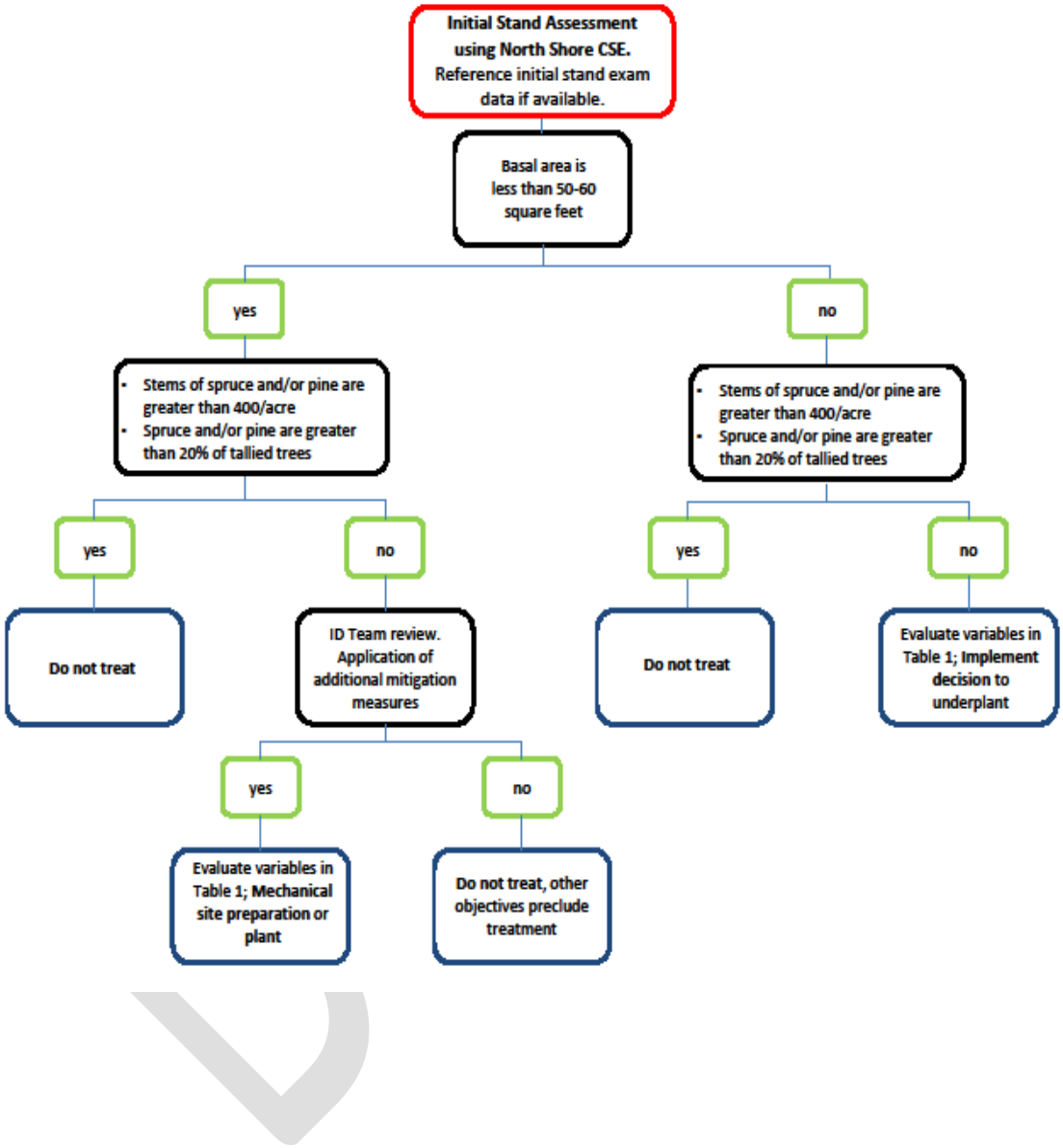


Table 1: Variables considered during initial stand assessments.

Variable	Measurement unit	Methods	Threshold for adaptive action
Bluejoint grass cover	Percent cover	Estimate based on Braun-Blanquet cover-abundance scale: 5% < 5% cover 25% 5-25% cover 50% 25-50% cover 75% 50-75% cover 90% 75-100% cover	At 25% or higher, consider: • Avoiding grassy areas when treating stand • Not treating the stand • Installing grass mats
Browse	Percent browsed woody stems	Estimate based on Braun-Blanquet cover-abundance scale: 5% < 5% woody stems browsed 25% 5-25% woody stems browsed 50% 25-50% woody stems browsed 75% 50-75% woody stems browsed 90% 75-100% woody stems browsed	• At 25-50%, consider applying budcaps • At 50+%, consider installing individual exclosures
Brush cover	• Stems per acre by species • Percent cover	• Count stems of mountain maple, hazel and alder in fixed plot by species and scale up to per acre basis • Estimate percent cover of raspberry based on Braun-Blanquet cover-abundance scale: 5% < 5% cover 25% 5-25% cover 50% 25-50% cover 75% 50-75% cover 90% 75-100% cover	• ??? stems/acre of identified species • 50+% cover of raspberry

2. Phase Two: Monitoring Reforestation Efforts

In Phase 2, **silviculture crews** will monitor reforestation efforts during stocking surveys and North Shore Interdisciplinary Team members will decide if further adaptive action is needed. Stocking surveys are typically done after the 1st and 3rd growing season following reforestation treatment and follow regional procedures. If further monitoring is deemed necessary, an additional survey may be taken the 5th year after planting.

When Data is Collected: During 1st and 3rd year stocking surveys after primary treatment is complete. Determines if adaptive action is necessary to increase reforestation success

Who Performs Work: Silviculture crews

Data Storage Location: FS Veg Database

2.1 Monitoring Reforestation Efforts During Stocking Surveys

Silviculture crews will monitor reforestation success during routine stocking surveys by collecting data on the following variables:

- Regeneration stocking level: Reported as trees /acre by species
- Regeneration diversity: Reported as percent by species
- Bluejoint grass cover: Estimate of the percent of bluejoint grass when seasonally feasible.
- Deer browse: Estimate of the percent of browsed woody stems when seasonally feasible
- Brush cover: Reported as stems/acre of mountain maple, hazel and alder. Estimate of percent cover of raspberry

Monitoring reforestation efforts will allow North Shore Interdisciplinary Team members to gauge the success of primary treatment activities and determine if additional actions are needed. During Phase 2, monitoring data will be compared with data from the initial stand assessments to gauge if stand conditions were exacerbated by primary treatments.

Summary of Silviculture Crew Actions in Phase 2.1:

1. Collect reforestation monitoring data during stocking survey.
2. Download data to FS Veg Database.
3. Based on initial stand assessment report and reforestation monitoring data from the stocking survey, North Shore Interdisciplinary Team members determine if adaptive action is necessary to increase reforestation success.

If thresholds for variables outlined above are exceeded, an adaptive action will be considered. Figure 4 outlines the process for determining when to perform an adaptive action to increase reforestation success. Specific thresholds and adaptive actions are referenced in Table 2.

Figure 4: Phase 2 adaptive management process used to evaluate the success of reforestation efforts. Data is collected during 1st and 3rd year stocking surveys.

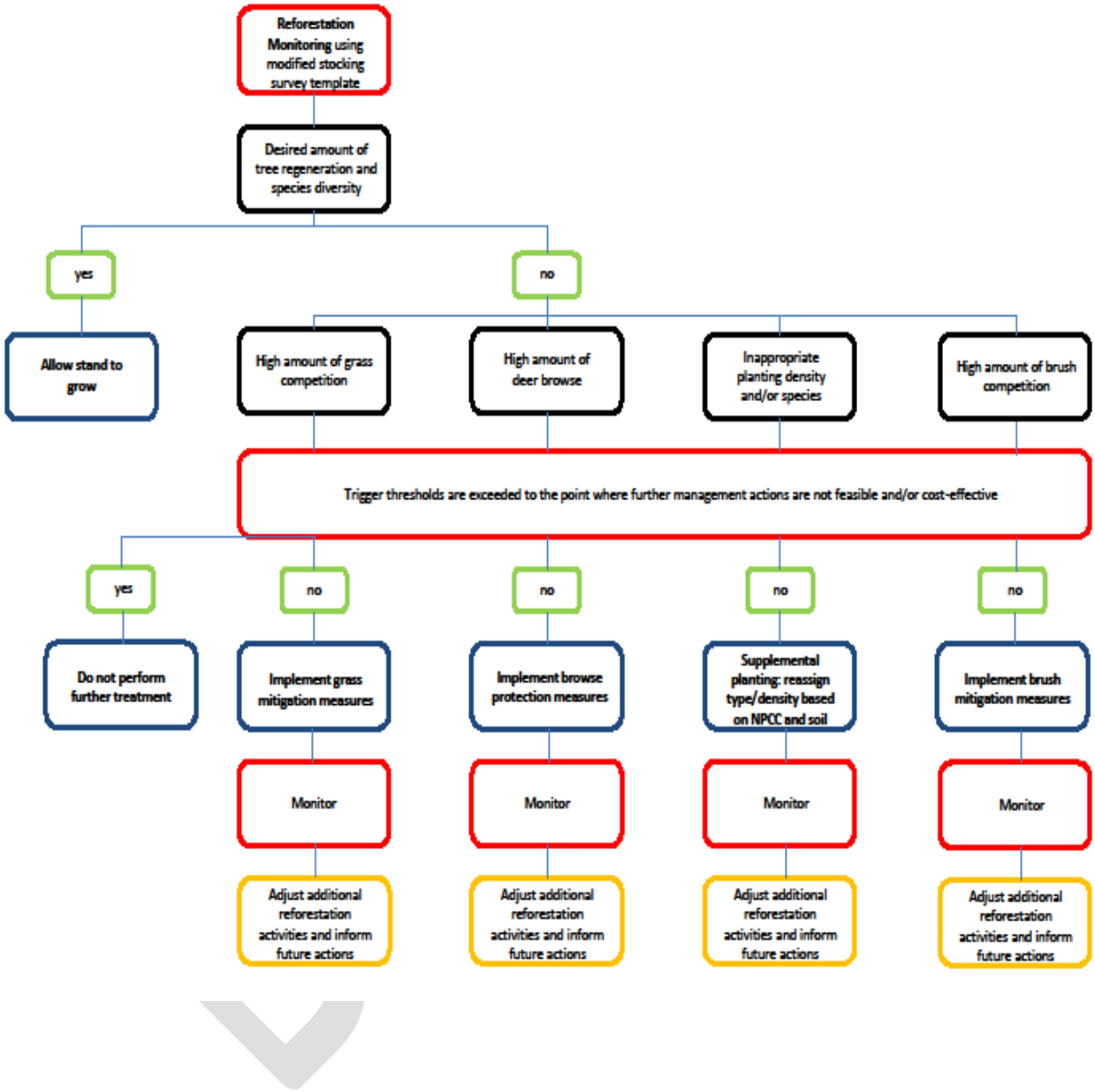


Table 2: Thresholds and adaptive actions referenced in Figure 4. To be used when monitoring reforestation efforts during 1st and 3rd year stocking surveys.

Reforestation parameters	Trigger variable	Methods	Threshold	Adaptive action	When to stop treatment
Regeneration stocking level	Trees per acre by species	Count all seedlings and saplings (< 5" DBH) in fixed radius 1/200 ac (8.3' radius) plot centered on prism plot and scale up to a per acre basis	•Stems per acre of spruce and/or pine are less than 400/acre •Stems per acre of northern hardwoods, birch and ash are less than 1,000/acre	Supplemental planting: reassign density based on prior monitoring information.	Too costly to re-treat
Regeneration diversity	Percent tree species	Count seedlings and saplings in fixed plot by species and scale up to per acre basis	Stems per acre of spruce and/or pine are less than 400/acre	Supplemental planting: reassign species based on NPCC and soil if information is available.	Too costly to re-treat
Bluejoint grass	Percent Cover	Estimate based on Braun-Blanquet cover-abundance scale: 5% < 5% cover 25% 5-25% cover 50% 25-50% cover 75% 50-75% cover 90% 75-100% cover	Grass cover at 25% or higher	•Replant with bigger stock •Increase frequency of mats with planting •Bring in equipment to deal with sod •Replant and clear a larger area in preparation •Modify grass mat technique (different material, more staples, etc.)	•None of the proposed mitigation measures would suppress •Grass cover is high and widespread
Browse	Percent of browsed woody stems	Estimate based on Braun-Blanquet cover-abundance scale: 5% < 5% browsed 25% 5-25% browsed 50% 25-50% browsed 75% 50-75% browsed 90% 75-100% browsed	Browsed woody stems at 25% or higher	•Budcaps •Tubes •Spray deer repellent •Single tree exclosures	•Browsing pressure is high and widespread •The only way to protect trees is to erect larger exclosures •Further treatment is too costly
Brush cover	• Stems per acre by species • Percent cover	• Count stems of mountain maple, hazel and alder • Estimate percent cover of raspberry based on Braun-Blanquet cover-abundance scale: 5% < 5% cover 25% 5-25% cover 50% 25-50% cover 75% 50-75% cover 90% 75-100% cover	• ??? stems/acre of identified species • 50+% cover of raspberry	•Release	•Too costly to re-treat •Too much soil disturbance

4. Phase Three: Informing Future Decisions

In the third year of North Shore Restoration Project implementation, North Shore Interdisciplinary Team members will begin to hold annual meetings to assess the circumstances associated with successes and failures in Project implementation.

Four different pieces of information will be reviewed at each meeting. For each stand treated using the adaptive management process in the Project Area (clearcut, mechanical site preparation and/or underplanting treatments), team members will review:

1. **FS Veg Database reports**: A stand-level summary of the variables listed in Table 2 (regeneration stocking level, regeneration diversity, bluejoint grass cover, browsing pressure and brush cover)
2. **Narrative summary sheets**: Yearly information about external factors potentially affecting reforestation success (drought, insect outbreaks, etc.)
3. **FACTS database reports**: Stand-level summaries of treatments (trees/acre planted, protection measures applied, etc.)
4. **New science/techniques**: New information available regarding planting or mitigation techniques

For each treated stand under consideration, a folder will be created on the O Drive containing the above information. North Shore Interdisciplinary Team members will use the information to identify potential factors influencing reforestation successes and failures in the Project. They will use these evaluations to inform and adapt future proposed primary treatments that have not yet occurred in the Project Area.