Regeneration Assessment Program (RAP)

District Training
Northeast Region, September 8, 2021

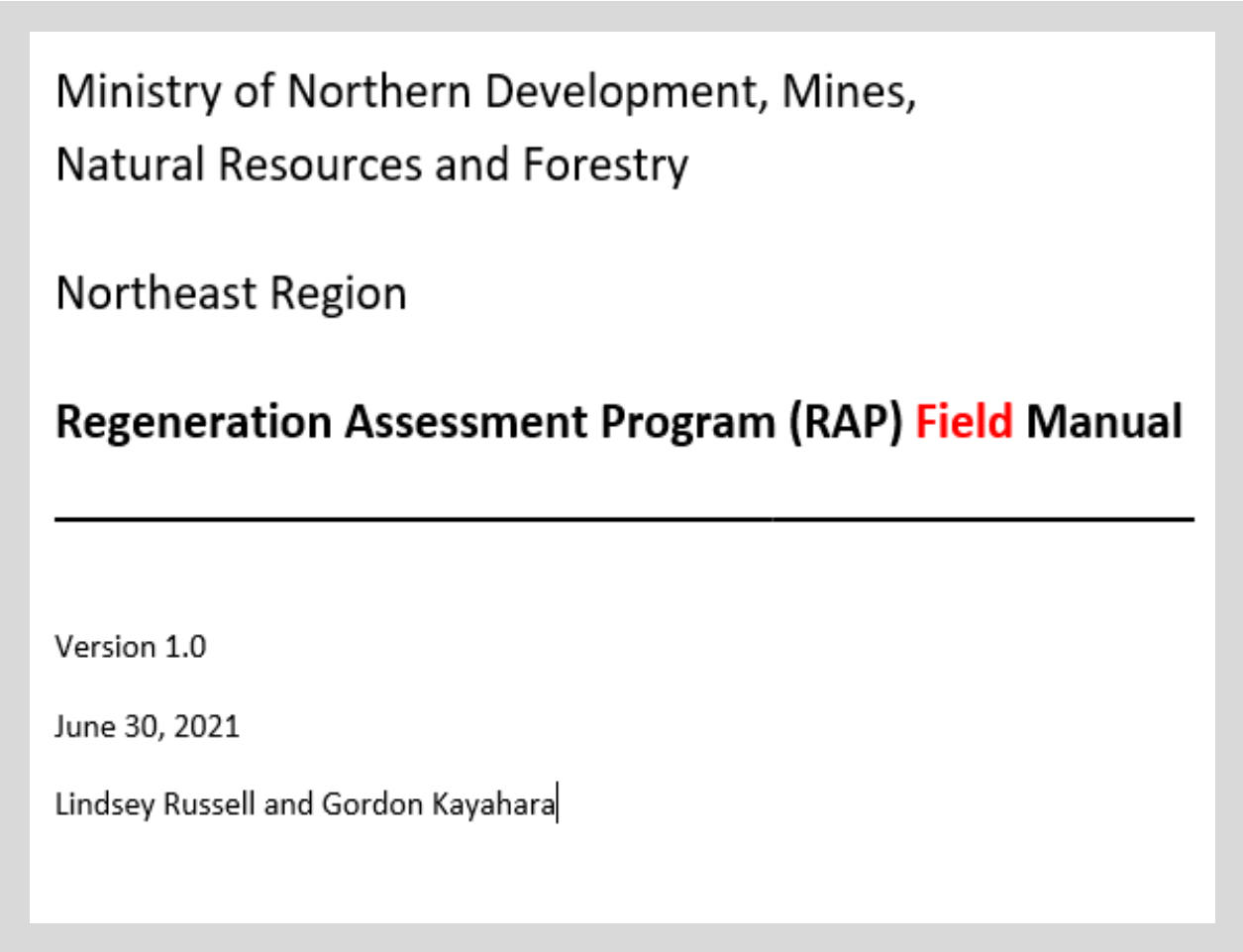
Lindsey Russell and **Gordon Kayahara**
Regional Forest Science Specialists
Daniel Kim
Regional Resource Analyst
Northeast Region, NDMNRF


Photo: Kirkland Lake District

Outline

- Opening remarks
- Regeneration Assessment Program (RAP) objectives
- Establishment assessment process
  - Office work planning
  - Field assessment procedure
  - Data collection process (TerraFlex forms, SharePoint, etc.)
  - Office summary/data comparison
- Validation Timeline
- Questions

RAP Work in Progress


Ministry of Northern Development, Mines,
Natural Resources and Forestry

Northeast Region

Regeneration Assessment Program (RAP) Field Manual

Version 1.0

June 30, 2021

Lindsey Russell and Gordon Kayahara

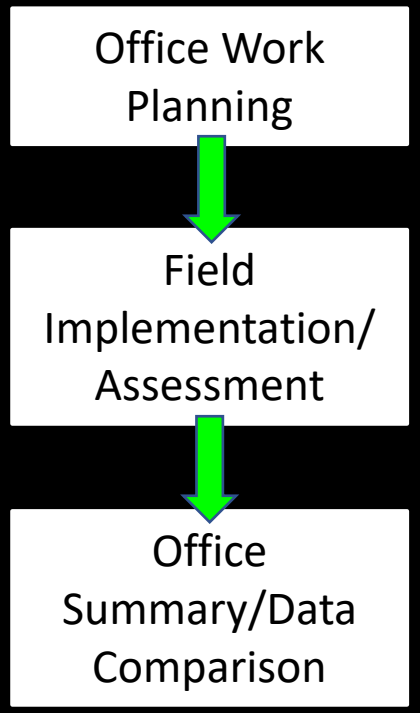
- Regeneration Assessment Program (RAP) **Field** Manual.
- RAP Field Manual still in draft form, updates in progress.
- RAP 2021 field season focus:
  - Do what you can; 10% sample of forest managers' submission not likely this late in the season.
  - Become familiar with the new field methods.
- In collaboration with Ontario Forest and Research Institute (OFRI), formalized the statistical testing application to validate the forest manager establishment census.
  - Draft SRB technical note outlining the statistical procedure currently under review.

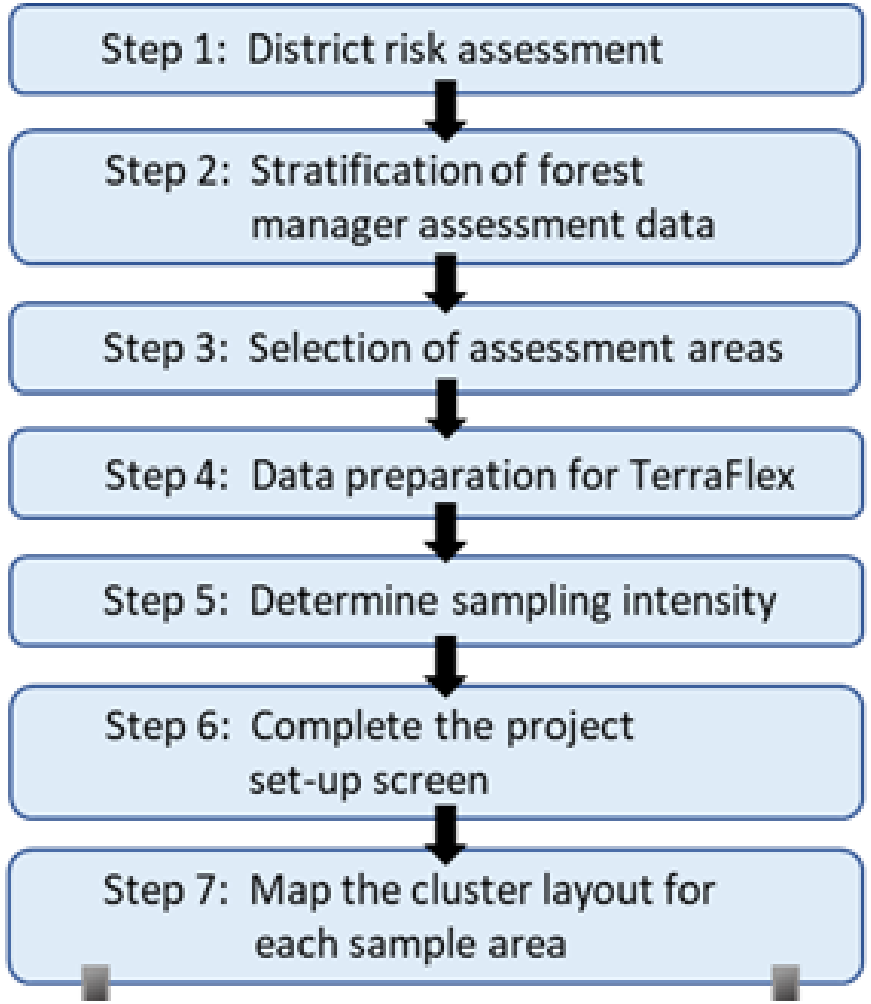
RAP Objectives

1. **Validate** - Quality control of the forest manager establishment assessment results to provide confidence in the accuracy and precision of the data reported.
2. **Transparency** - Report and provide open access to results from the regeneration assessment program
3. **Due diligence and professional reliance** - To enable meaningful discussion which will help ensure the inputs into FMPs are accurate including silvicultural objectives and approaches, as well as modeling inputs (i.e., silviculture success rates, silvicultural treatments, regeneration standards, yield curves, etc.) [Lennon, 2016].
4. **Enhance the knowledge of district forest practitioners** - The RAP provides the opportunity for district forester practitioners to gain experience and knowledge with silviculture practices implemented on their management unit. Experience gained in the field, 'boots on the ground', cannot be replaced by in office learning.

Office Work Planning

Establishment Assessment Procedure
Overview





Office Work Planning

Step 1: District Risk Assessment

Focus on **High Risk** areas.

- Forest units or silvicultural treatments where the results of the NDMNRF establishment assessments are often **different** than the forest manager assessment.
- Different refers to large differences, > 10% difference in species composition (leading species), site occupancy or effective density.
- Comparing species composition should focus on **target or leading species** that define the forest unit.

  → **Pj70** Sb10 Po10 Bw10

Office Work Planning

Step 1: District Risk Assessment

Focus on **High Risk** areas.

Examples	MNRF Result	Forest Manager Result
Species call	**Sb40 Sw40** Bf10 Mr10	**Sb80** Mr20
	Sb85 Po10 Bf5 Bw5	**Sb70** Bf10 Mr10 Po10 Bw5
	Sb70 **Bf30**	Sb80 Sw10 Po10

- Same forest unit
- Same intensity

- Bf component puts the stand into a different forest unit, SF1 vs SP1

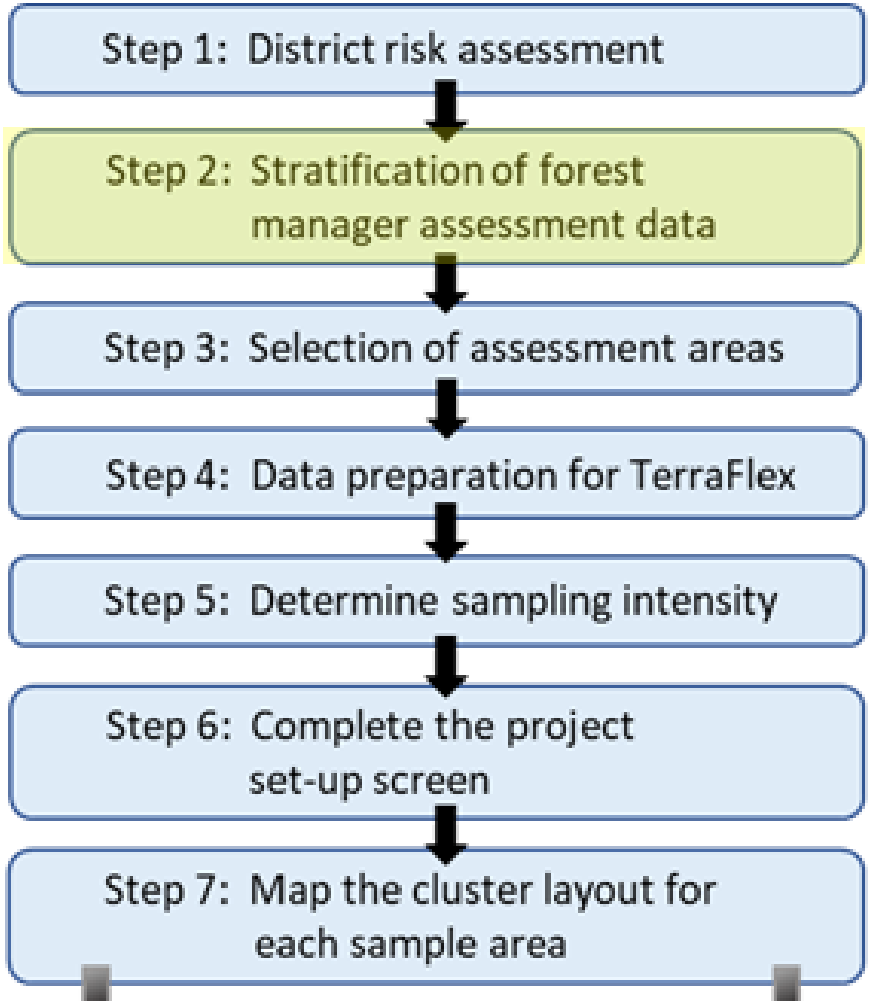
Office Work Planning

Step 1: District Risk Assessment

Focus on **High Risk** areas.

Examples	MNRF Result	Forest Manager Result	
Species call	**Pj60** Sb20 Mr10 Bf 5 Pr5	**Pj75** Sb10 Pr10 Bf5	← - Different forest unit (PJ2 vs. PJ1) and different intensity
	Mr25 Po25 Bw20 Mh10 Bf10 Bw10	Po30 **Pj20** Mr20 **Sw10 Pr10** Mr10	← - Mixed hardwood vs. mixed conifer
Site occupancy	75%	90%	← - Both intensive yield
	60%	80%	← - Intensive vs. basic yield

Office Work Planning



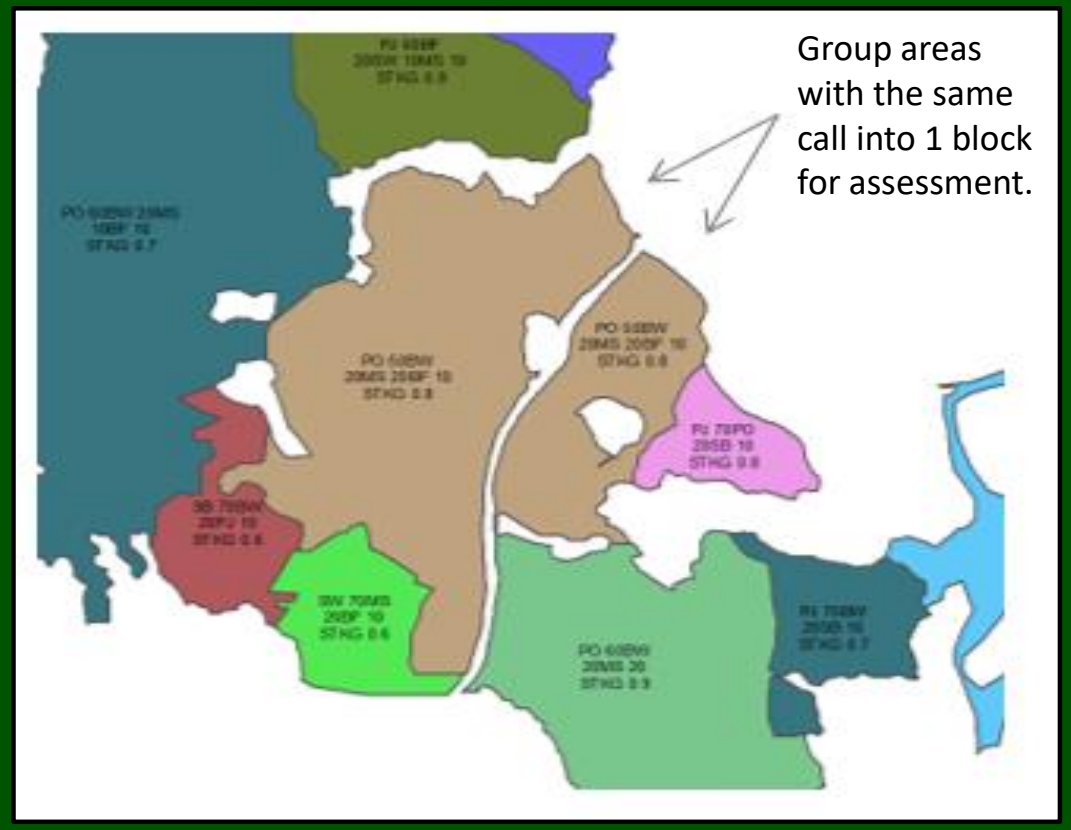
Office Work Planning

Step 2: Stratification of forest manager assessment data

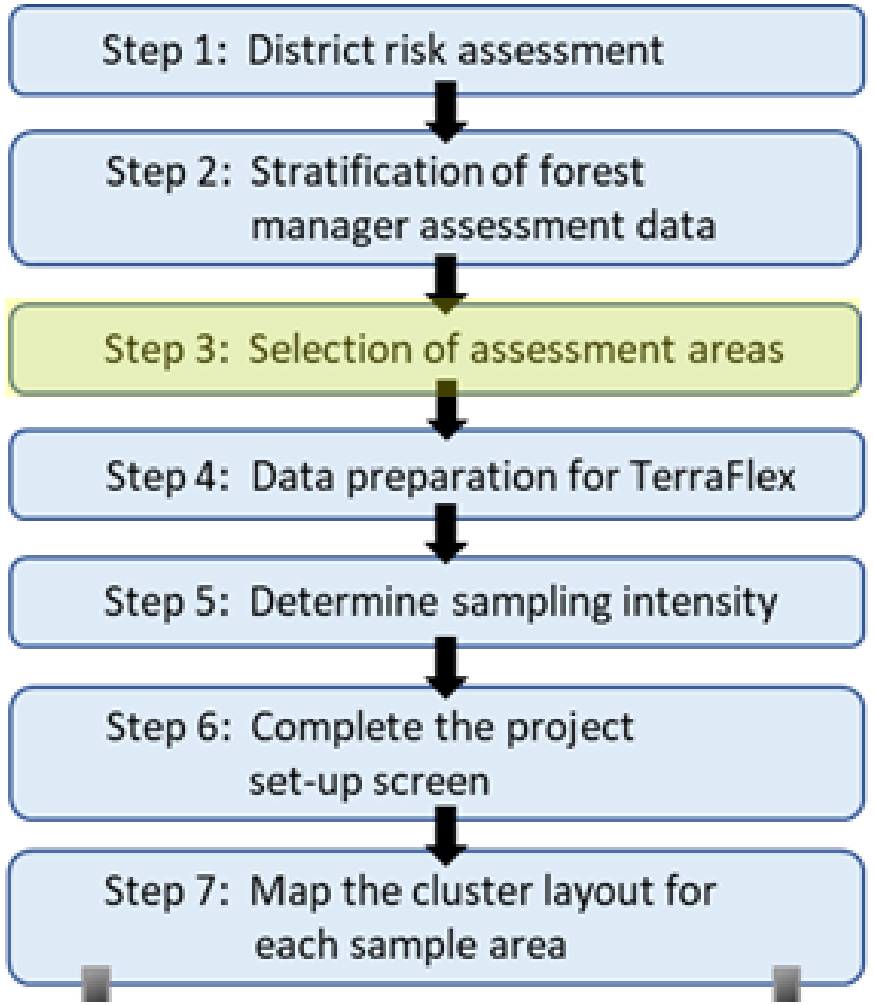
- Ensure NDMNRF is assessing the same area as the forest manager and not a subset of a larger block.
- Group stands/blocks with identical stand attributes (i.e., species composition and site occupancy/stocking) into one block for assessment.
- Reminder, GIS document *RAP Preliminary Block Stratification GIS help* available to help with this process. Accessible on the RAP SharePoint website.

Office Work Planning

Step 2: Stratification of forest manager assessment data



Office Work Planning



Office Work Planning

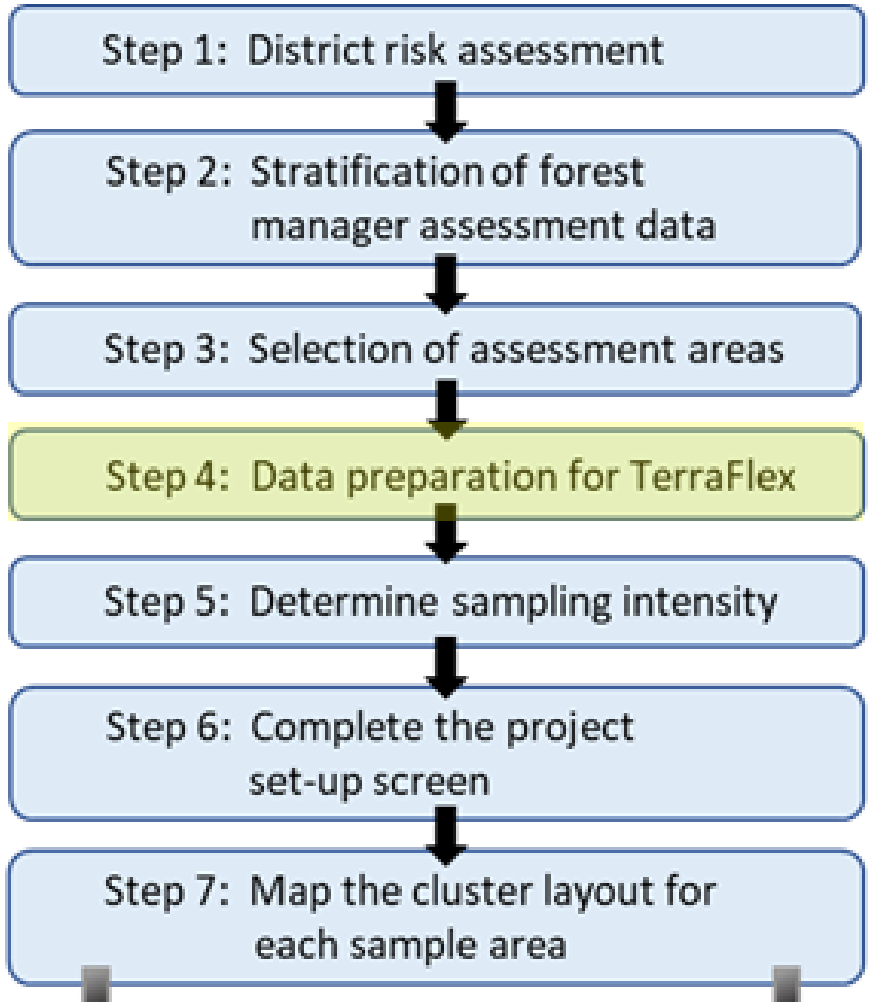
Step 3: Selection of Assessment Areas

- Priority areas eligible for assessment must be selected using a random weighted selection process
- Currently an excel tool is available to help with this step

Random 'weighted' selection of records, based on FTG records in "Data" Tab.

FMU:	Spanish	AR Year:	2016	
Number of FTG Records:				
198				
Target Area (10%):		Check Results Area:		
418		0		
Randonly selected record number (Data:Column A)	Area (ha) of selected record	Cumulative Area (ha)	'INCLUDE' if Cumulative Area is lessa than Target Area	Count
3572	10.3	10.3	INCLUDE	1
1432	26.2	36.5	INCLUDE	2
1619	24.6	61.1	INCLUDE	3
1788	22.6	83.7	INCLUDE	4
3117	13.6	97.3	INCLUDE	5

Office Work Planning

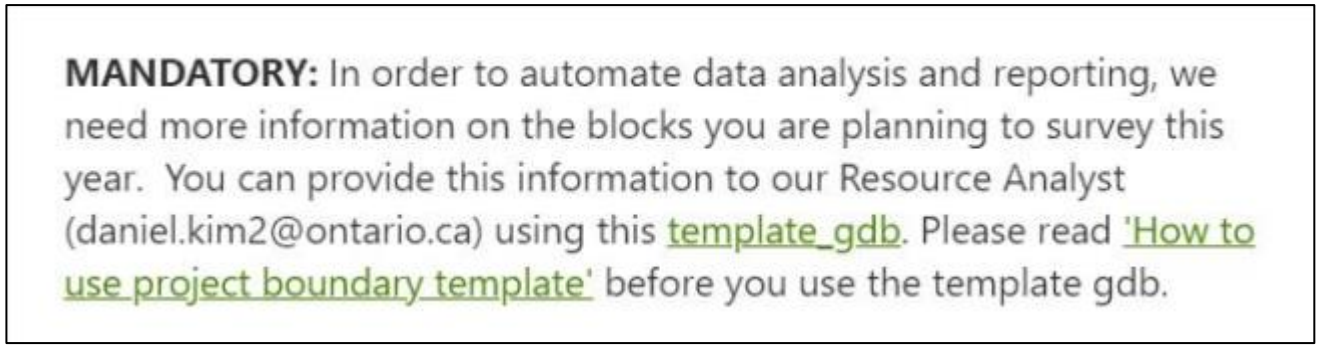


Office Work Planning

Step 4: Data Preparation for TerraFlex

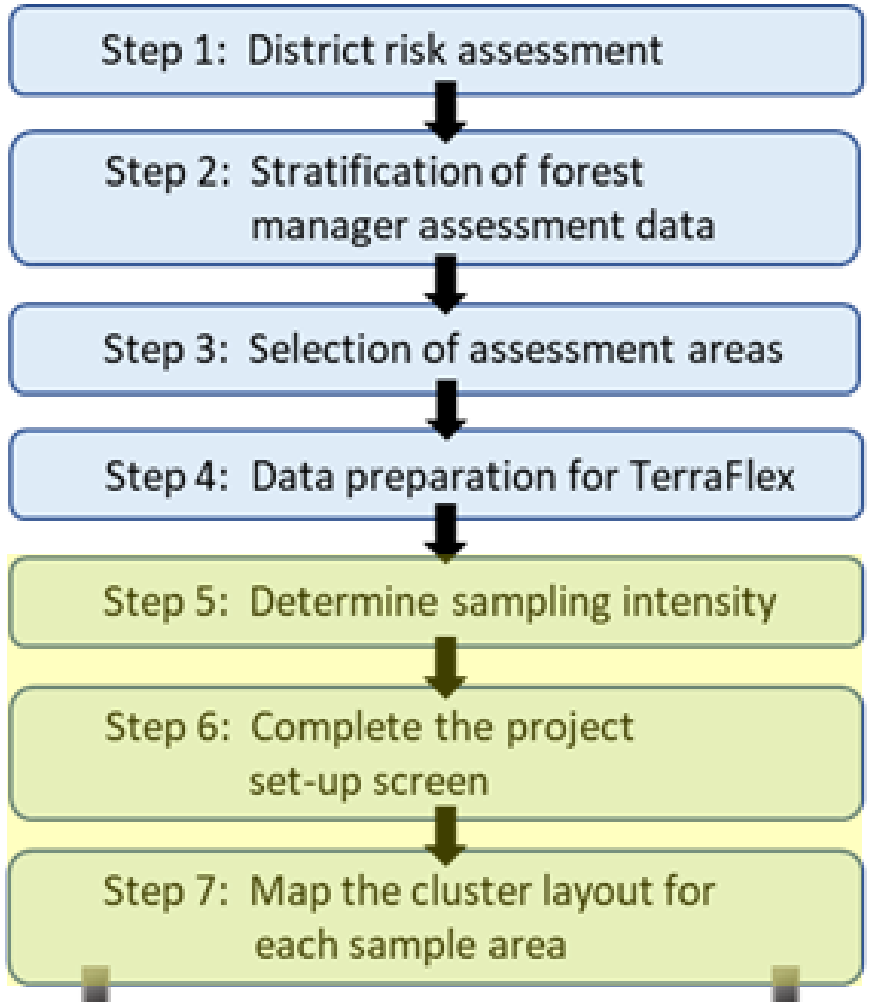
- To automate data analysis and reporting districts must provide the appropriate spatial information to the regional resource analyst (daniel.kim2@ontario.ca) for all areas selected for assessment.
  - Create a geodatabase in ArcGIS that includes all project areas using the '*template.gdb*' provided on the SharePoint website.
  - Refer to the '*How to use project boundary template*' on SharePoint .
  - Once the 'template.gdb' is complete, send to the regional resource analyst daniel.kim2@ontario.ca through email.

RAP SharePoint Website



Ontario

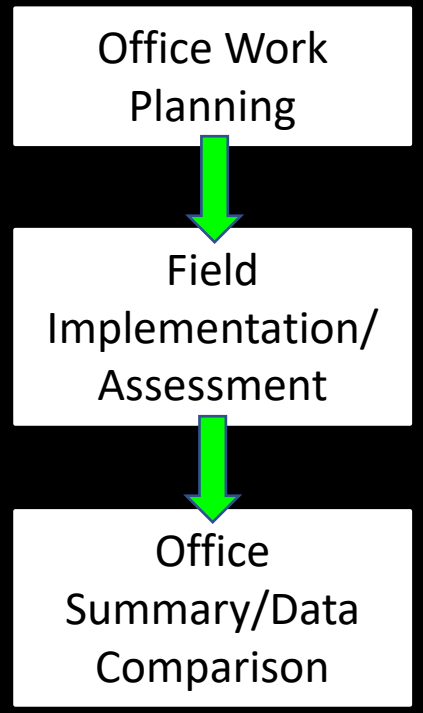
Office Work Planning

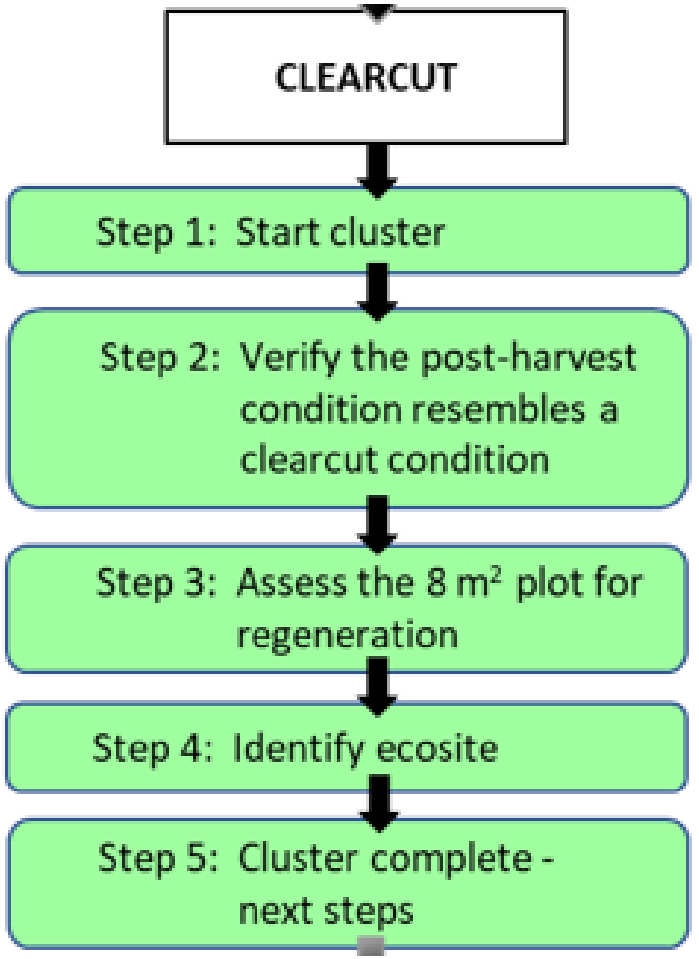


Refer to the Regeneration Assessment Program Field Manual for steps 5 – 7.

Field Assessment

Establishment Assessment Procedure
Overview





Field Assessment

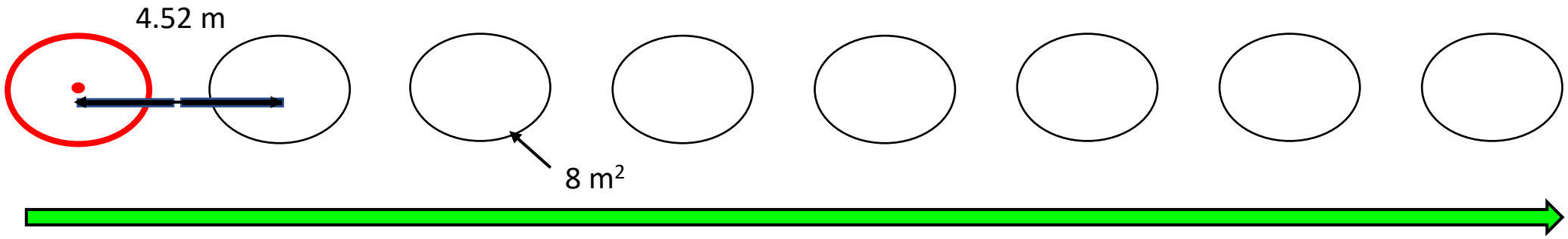
Step 1: Start Cluster

- Locate first cluster using GPS/AvenzaMaps.
- Note the direction of travel to the remaining plots.
- Take a picture  along the direction of travel for the cluster, prior to starting the assessment.

Field Assessment

Step 1: Start Cluster…

- Use the plot measurement stick to measure the distance between plots.

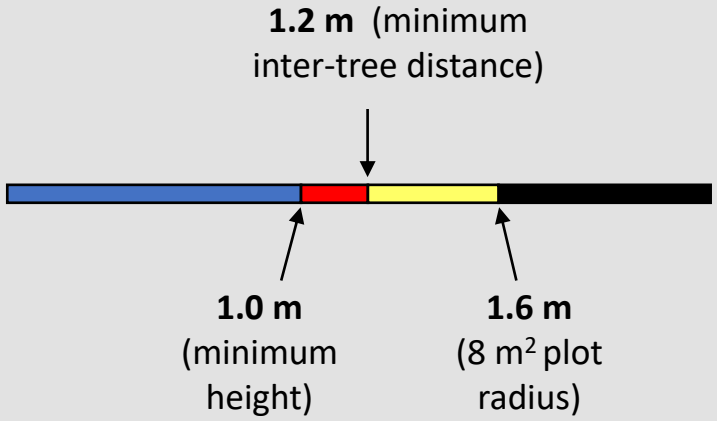


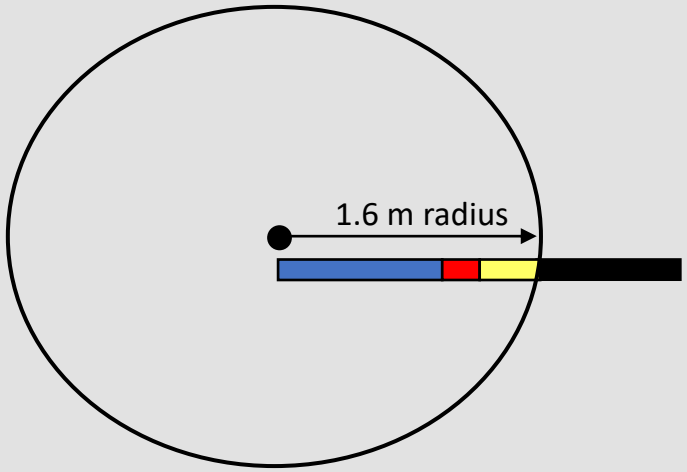
Field Assessment

Step 3: Assess 8 m^2 plot for regeneration

- Determine the perimeter of the plot by extending the plot measurement stick from plot centre out 1.6 m.

Plot measurement stick, 2.26 m in length with key markings.





Field Assessment

Step 2: Verify the post-harvest condition resembles a clearcut condition

- A clearcut is an even-aged future stand with regeneration established in >70% full sunlight (OMNR 2015).
- Consider the mature residual canopy above the regenerating trees. How much light is available in the understory?
- Check with district compliance staff or Supplementary Aerial Photos (SAPs) prior to field assessment.

More information on considering light levels later in the training.

Post-harvest imagery

Field Assessment

Step 3: Assess 8 m^2 plot for regeneration

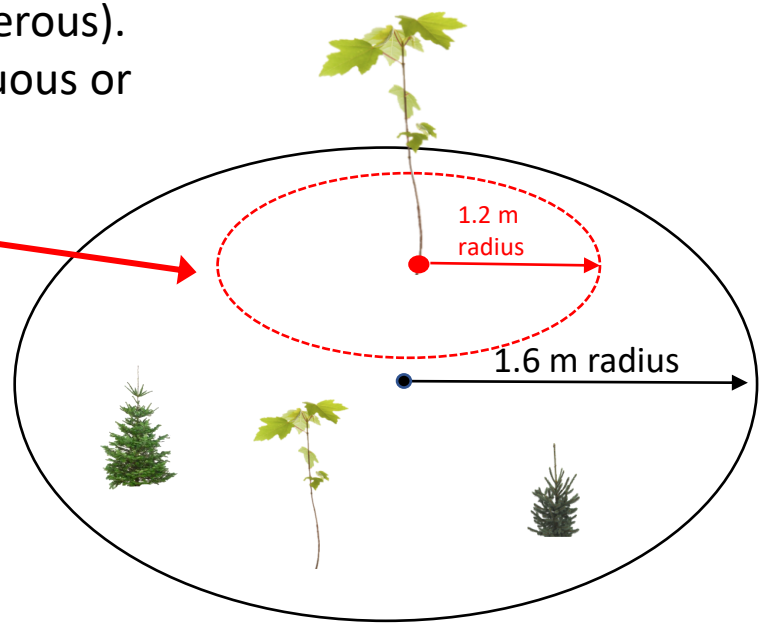
Key points to remember before considering free growing assessment:

- Trees must be ≥ minimum height to be considered free growing (general rule = 1 m).
- Trees must be healthy to be counted as regeneration.
- Do not consider mature residual trees as regeneration (trees left behind after the harvest that have little potential of forming part of the dominant canopy in the future stand).
- Advance regeneration must show moderate to high vigour to be tallied as regeneration.

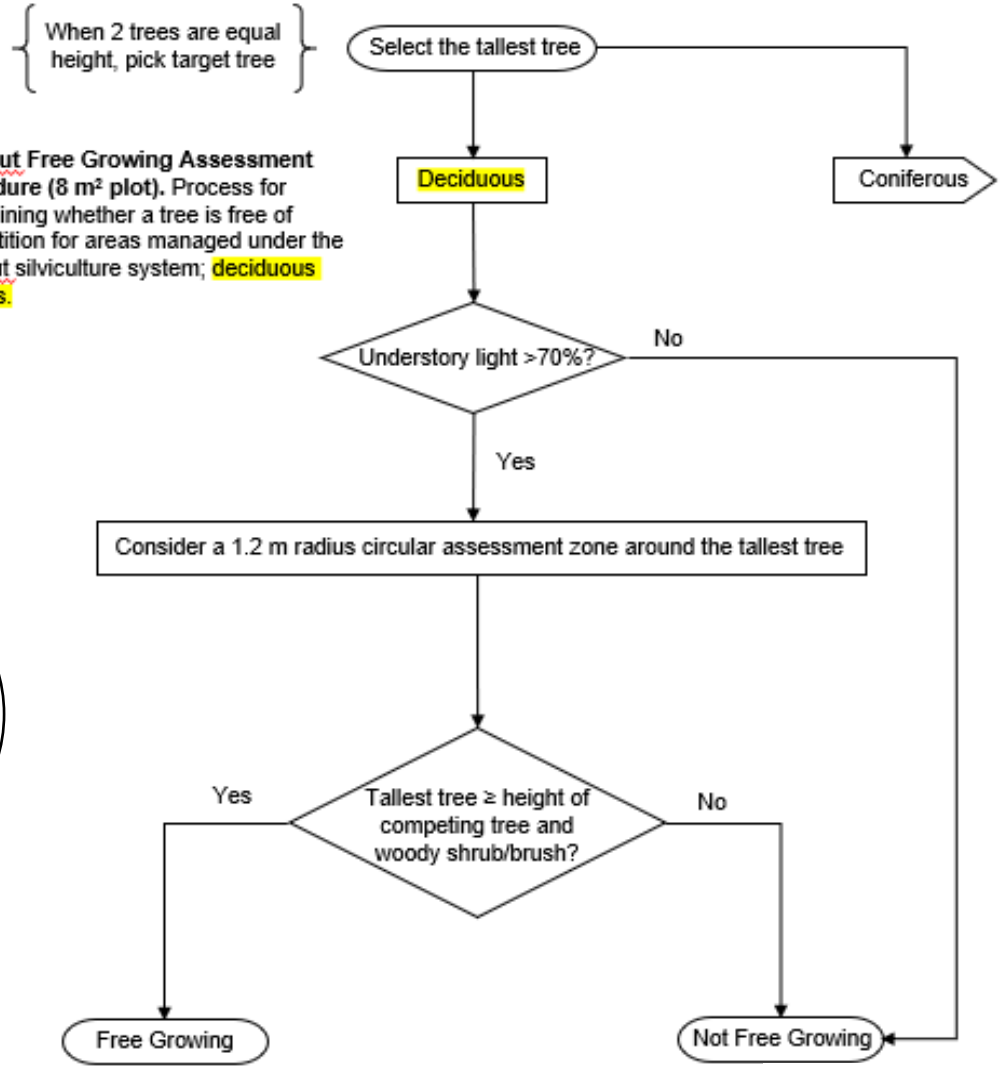
Field Assessment

Step 3: Assess 8 m² plot for regeneration

- **START with the tallest tree**. If two trees are identical height, pick the target tree.
- Tree species being assessed will determine the type of competition assessment (deciduous vs. coniferous). Choose the 'Field Key' for deciduous or conifer trees.
- Assess whether the tree is free growing (FG), based on the concept of an **assessment zone.**



Clearcut Free Growing Assessment Procedure (8 m² plot). Process for determining whether a tree is free of competition for areas managed under the clearcut silviculture system; deciduous species.

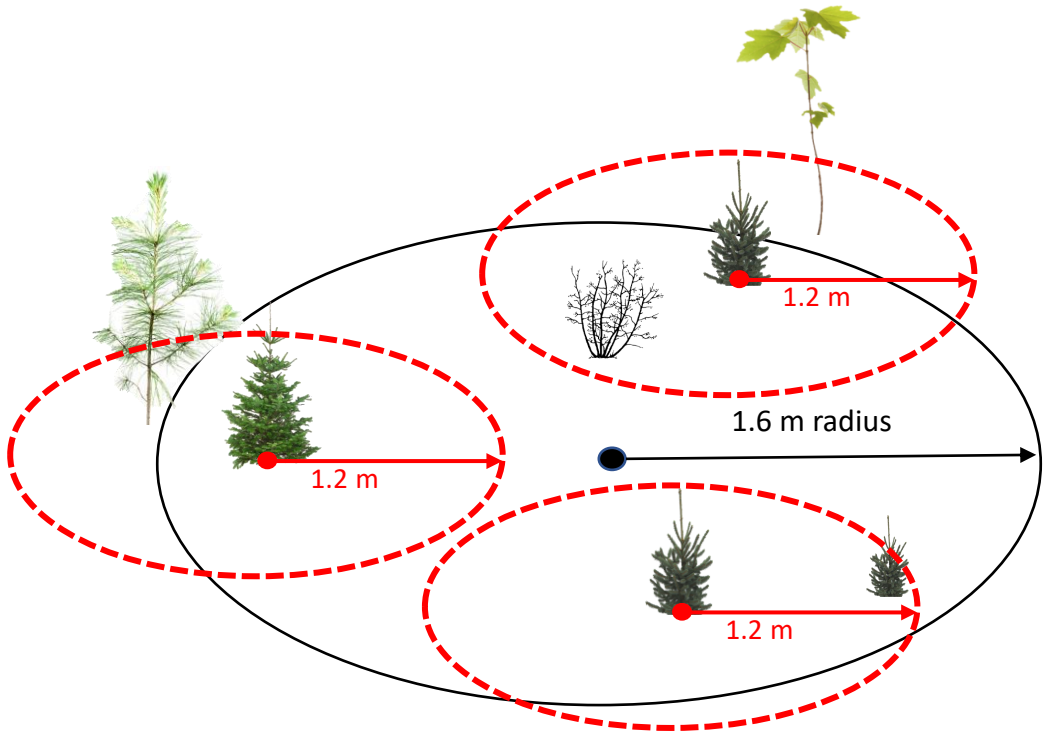


Field Assessment

Step 3: Assess 8 m^2 plot for regeneration

Examining the Assessment Zone:

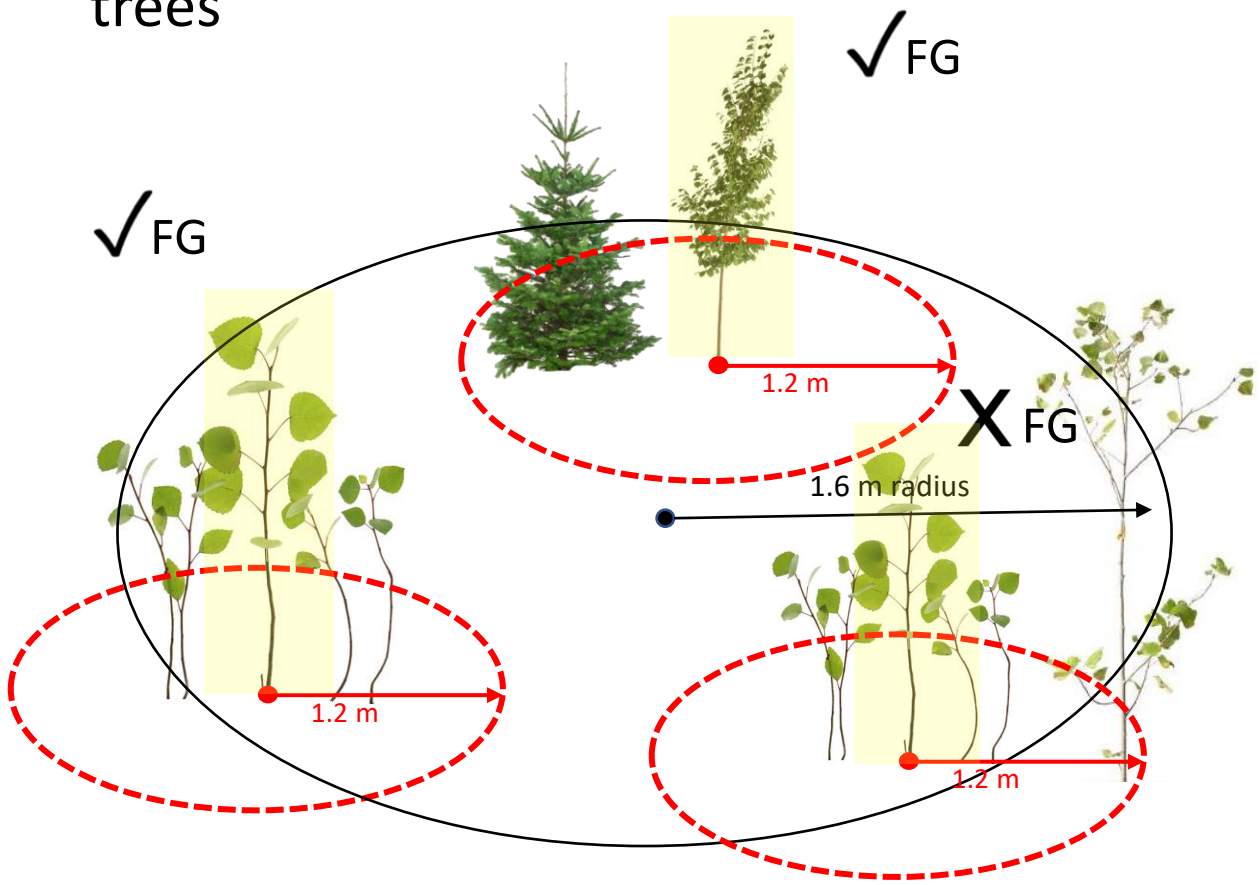
- **The assessment zone is a 1.2 m radius cylinder or zone around any tree being assessed to determine if it is free growing (free of competition).**
- The tree being assessed is the central pivot point of the zone.
- The assessment zone may extend outside the 8 m^2 plot.
- Both trees and woody shrubs and brush will be considered when assessing competition within the assessment zone.



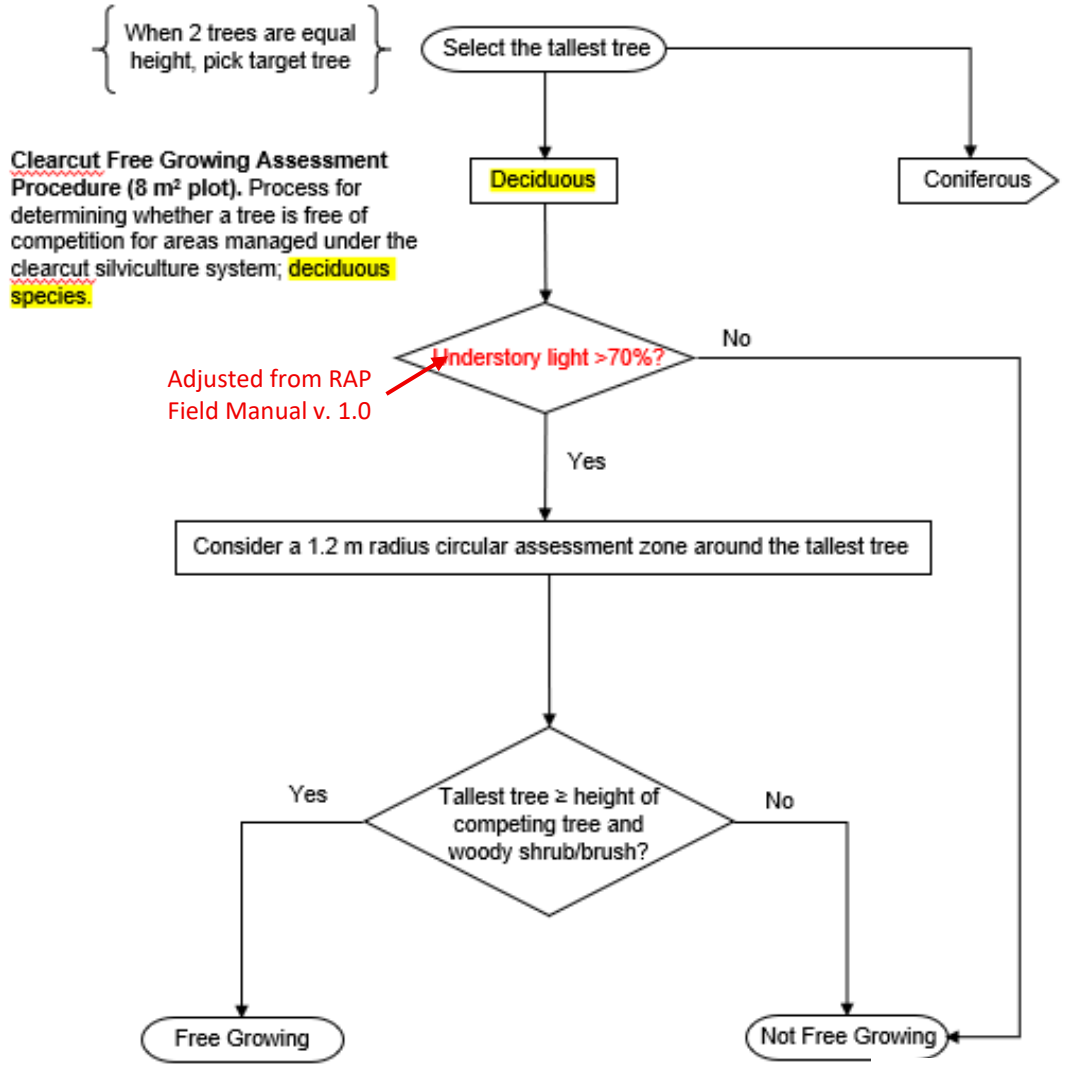
Field Assessment

Step 3: Assess 8 m² plot for regeneration

E.g. Free Growing (FG) Assessment for deciduous trees



Repeat process for additional trees in the 8 m² plot, with a minimum inter-tree distance of 1.2 m from free growing tree(s).

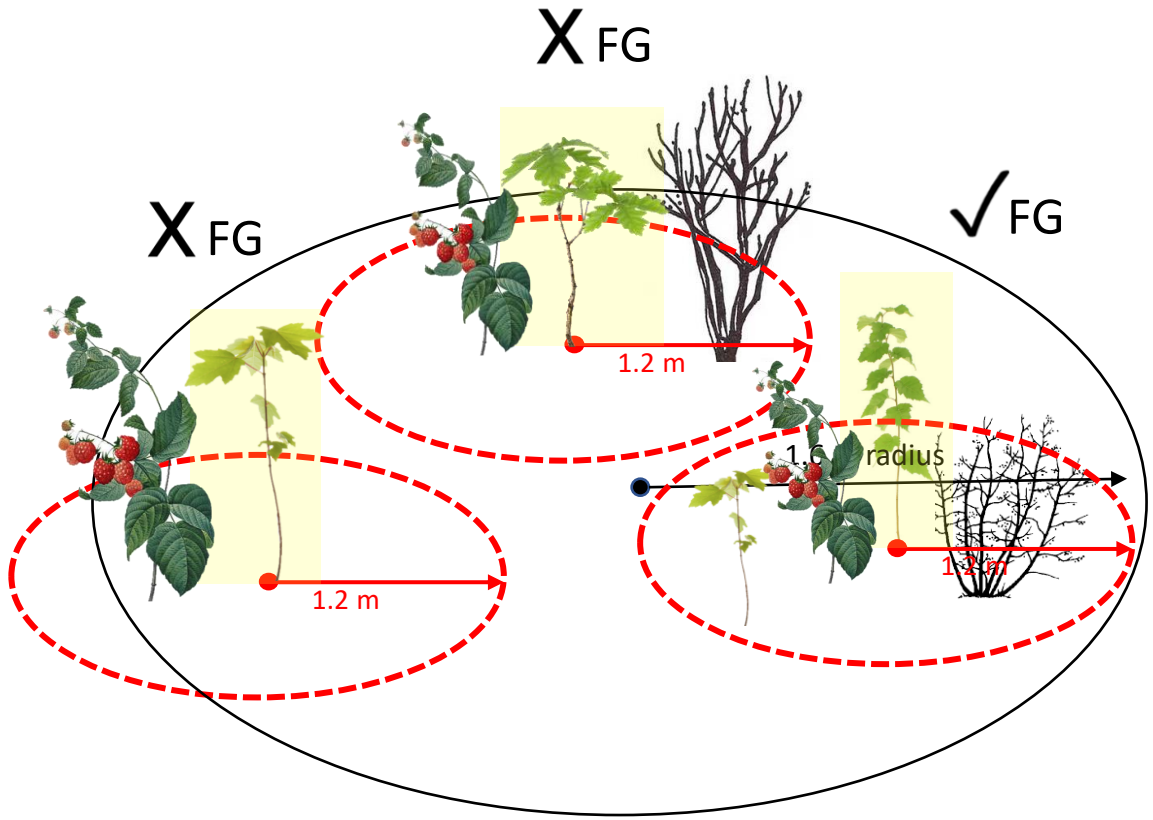


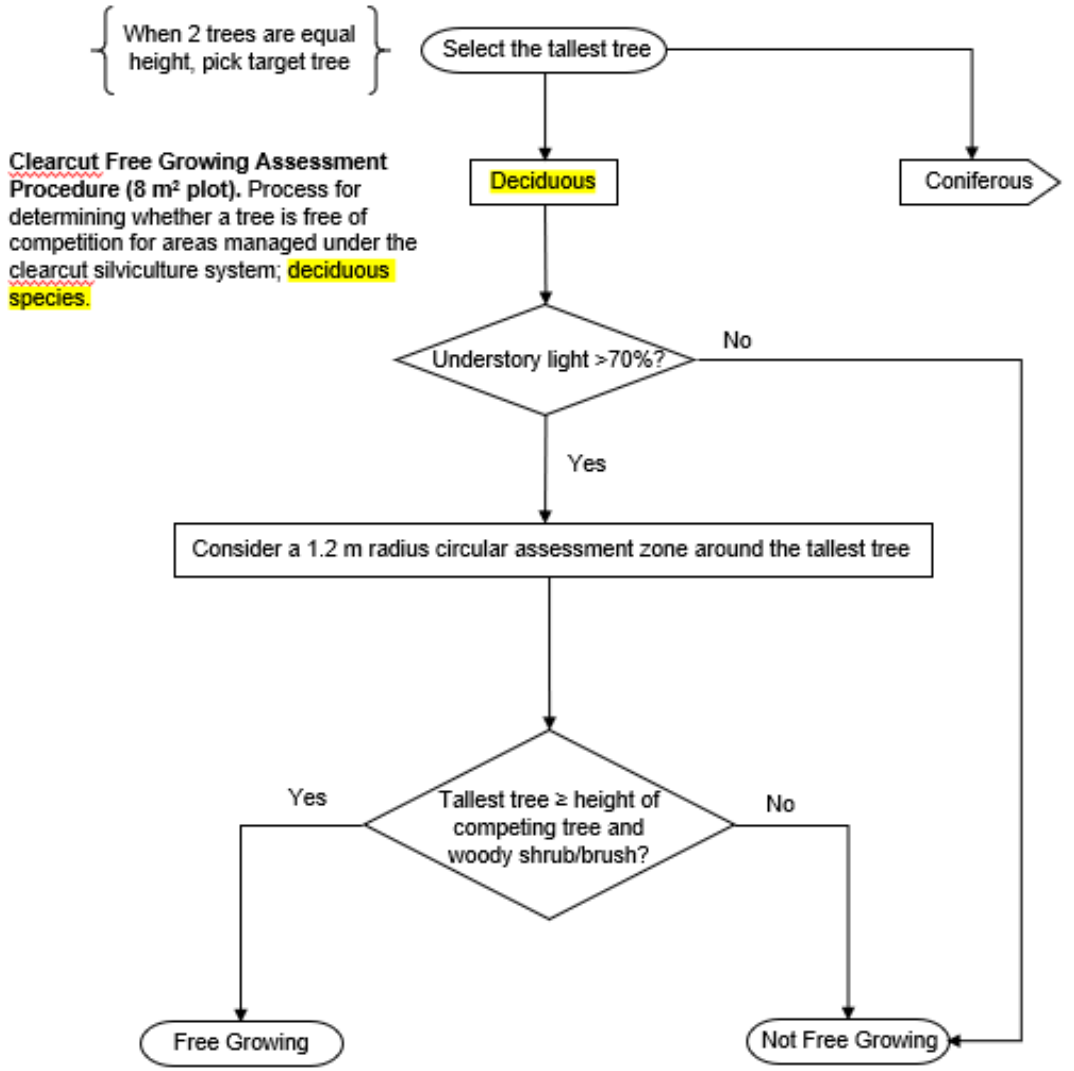
Ontario

Field Assessment

Step 3: Assess 8 m² plot for regeneration

E.g. Free Growing (FG) Assessment for deciduous trees



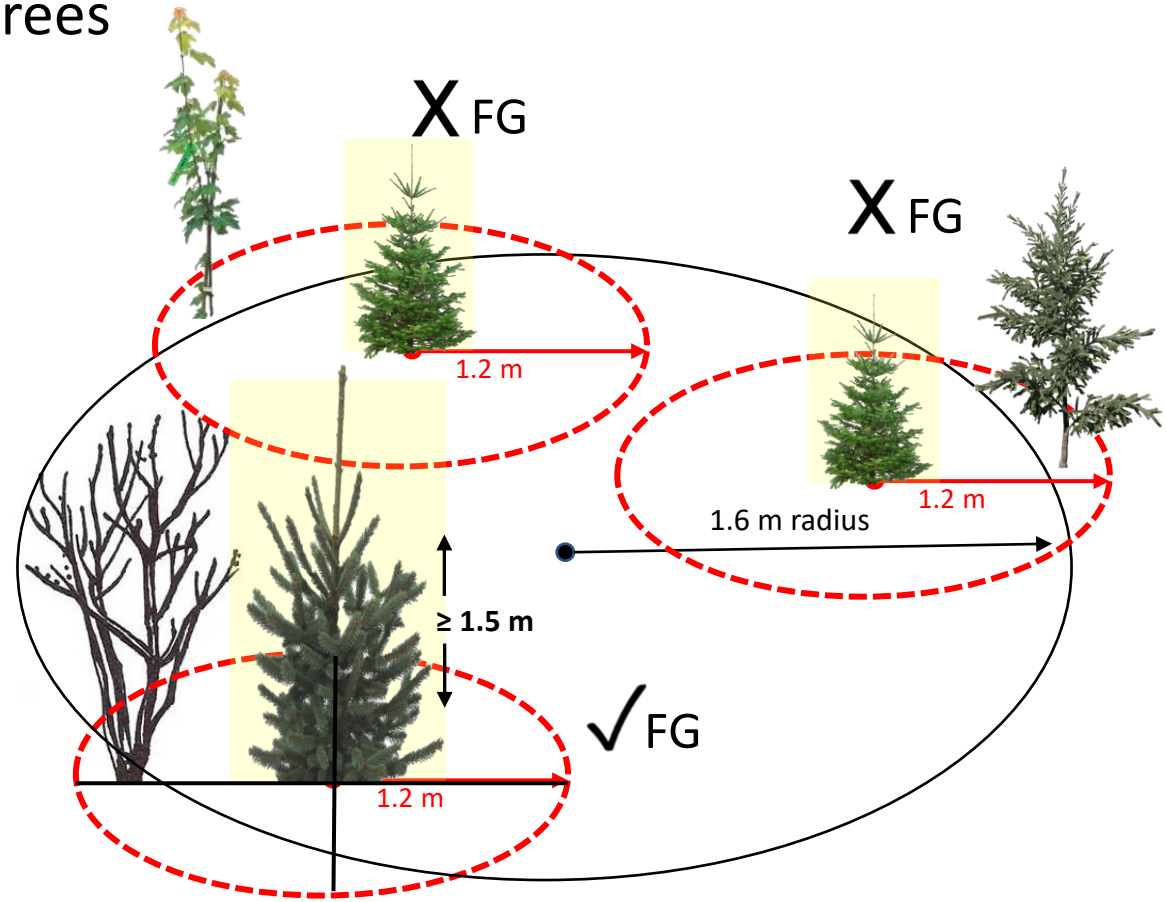


Repeat process for additional trees in the 8 m² plot, with a minimum inter-tree distance of 1.2 m from free growing tree(s).

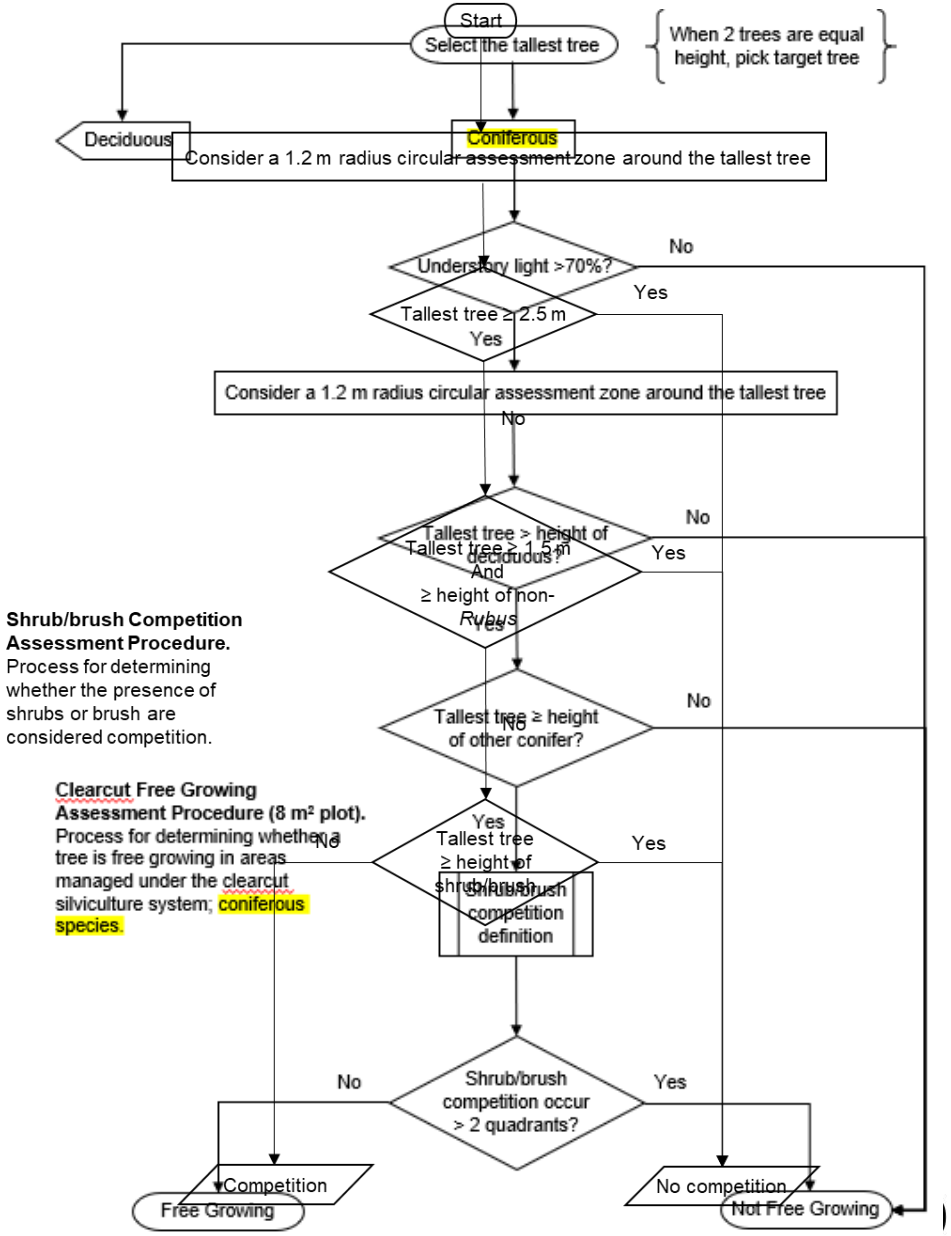
Field Assessment

Step 3: Assess 8 m² plot for regeneration

E.g. Free Growing (FG) Assessment for coniferous trees



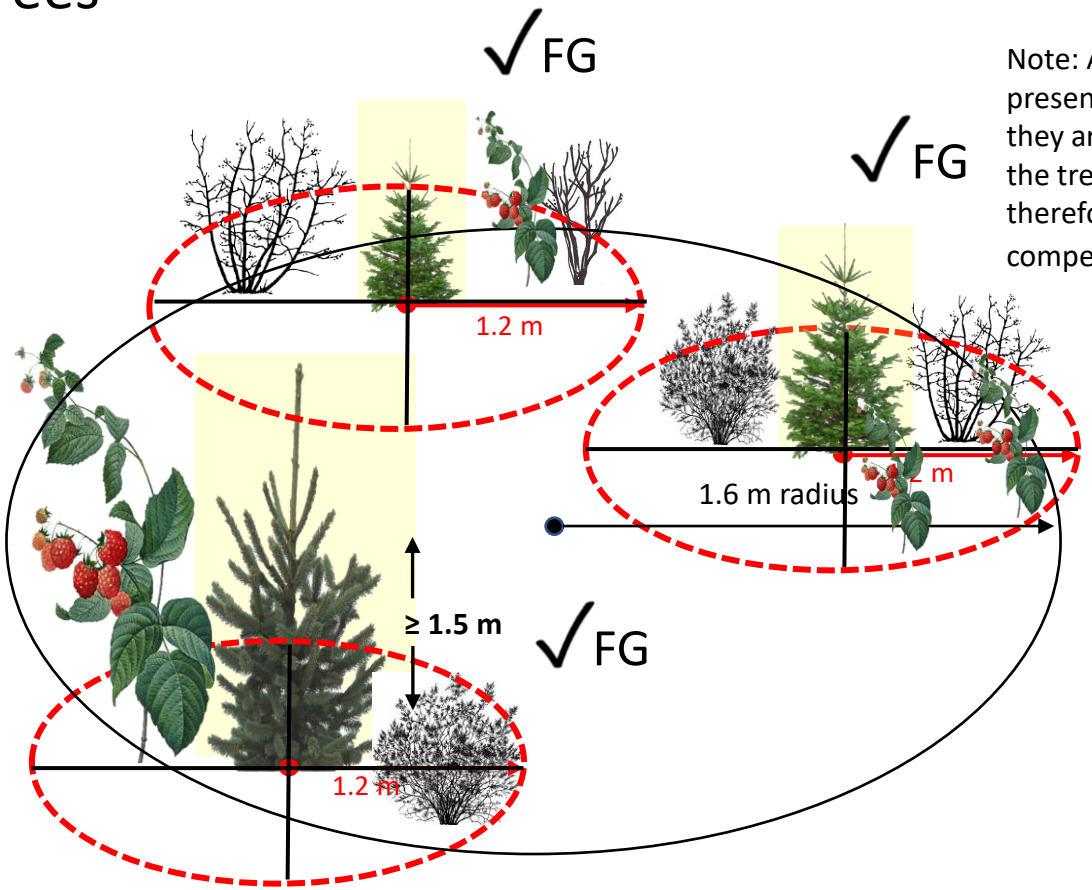
Repeat process for additional trees in the 8 m² plot, with a minimum inter-tree distance of 1.2 m from free growing tree(s).



Field Assessment

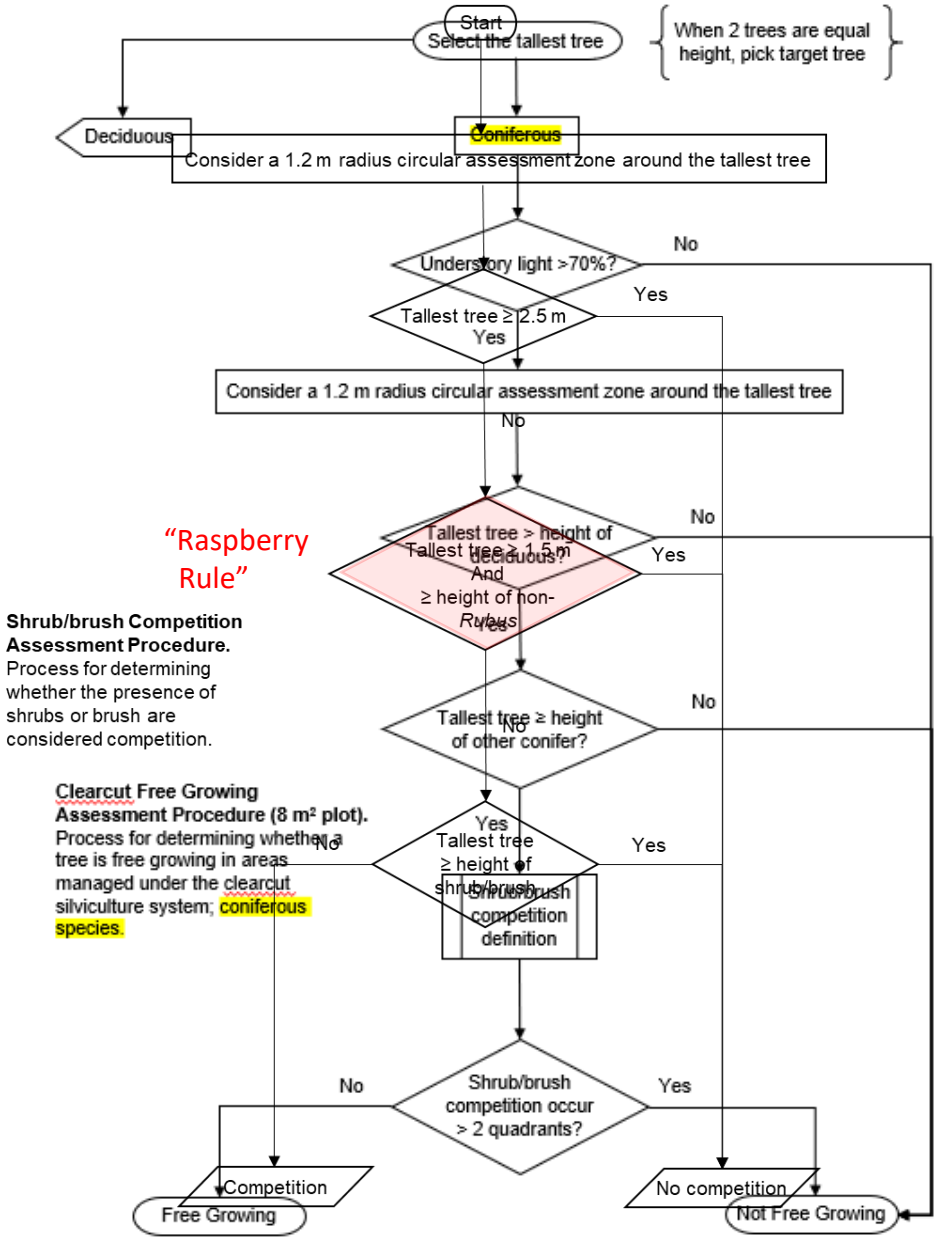
Step 3: Assess 8 m² plot for regeneration

E.g. Free Growing (FG) Assessment for coniferous trees



Note: Although shrubs are present in > 2 quadrants, they are < the height of the tree being assessed, therefore, not considered competition.

Repeat process for additional trees in the 8 m² plot, with a minimum inter-tree distance of 1.2 m from free growing tree(s).

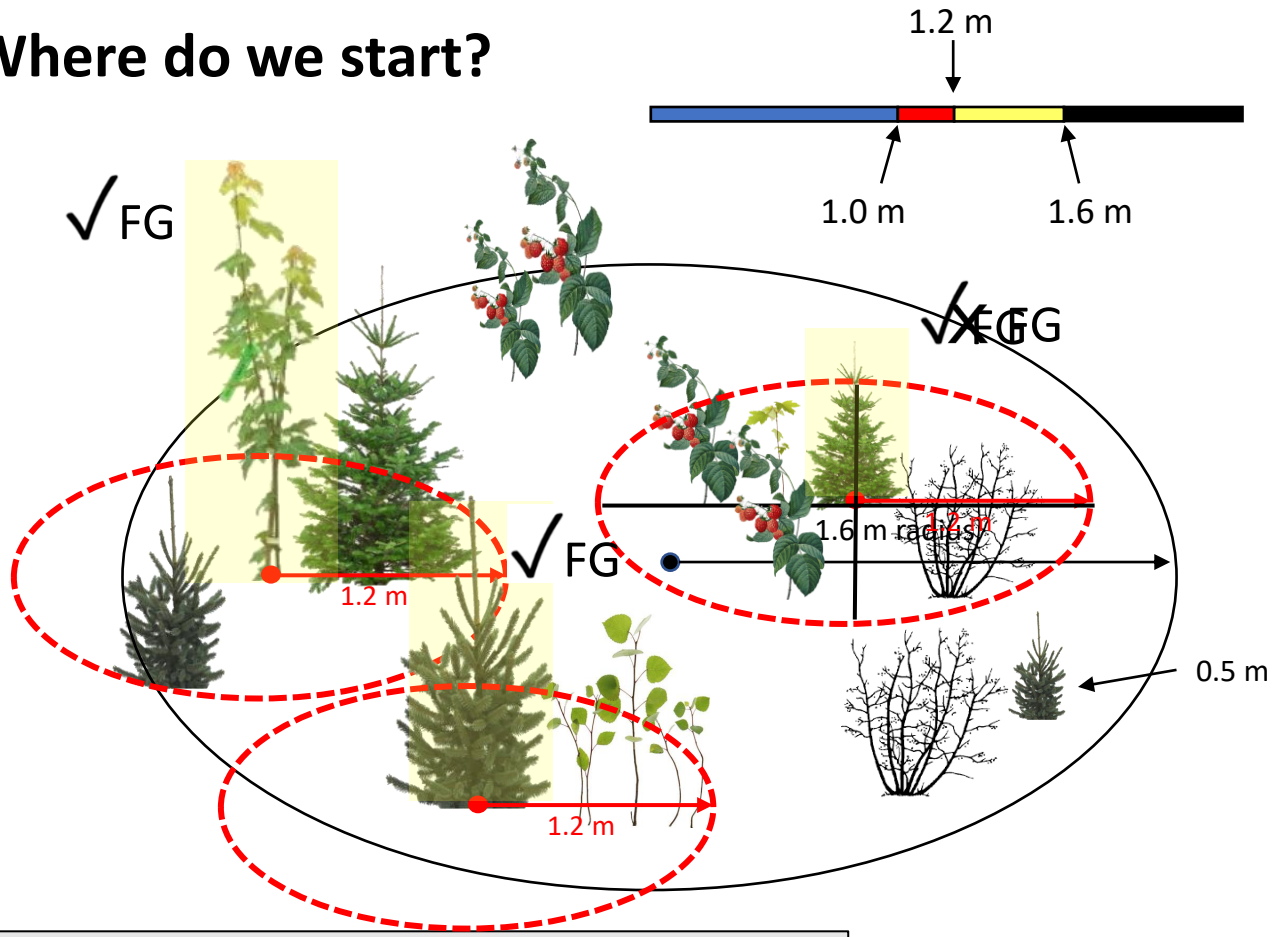


Field Assessment

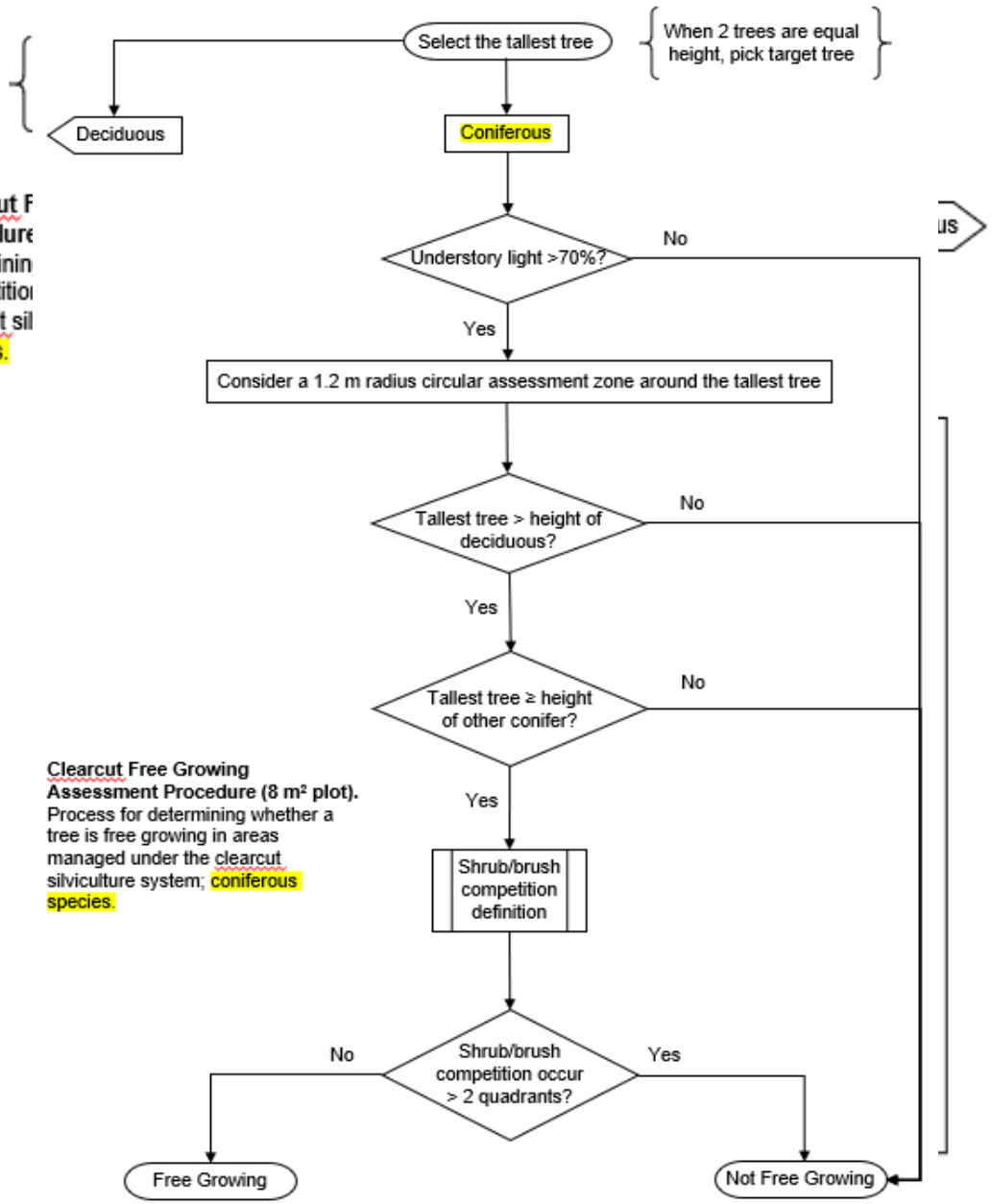
Step 3: Assess 8 m² plot for regeneration

Free Growing (FG) Assessment

Where do we start?



Repeat process for additional trees in the 8 m² plot, with a minimum inter-tree distance of 1.2 m from free growing tree(s).



Field Assessment

Step 2: Verify the post-harvest condition resembles a clearcut condition

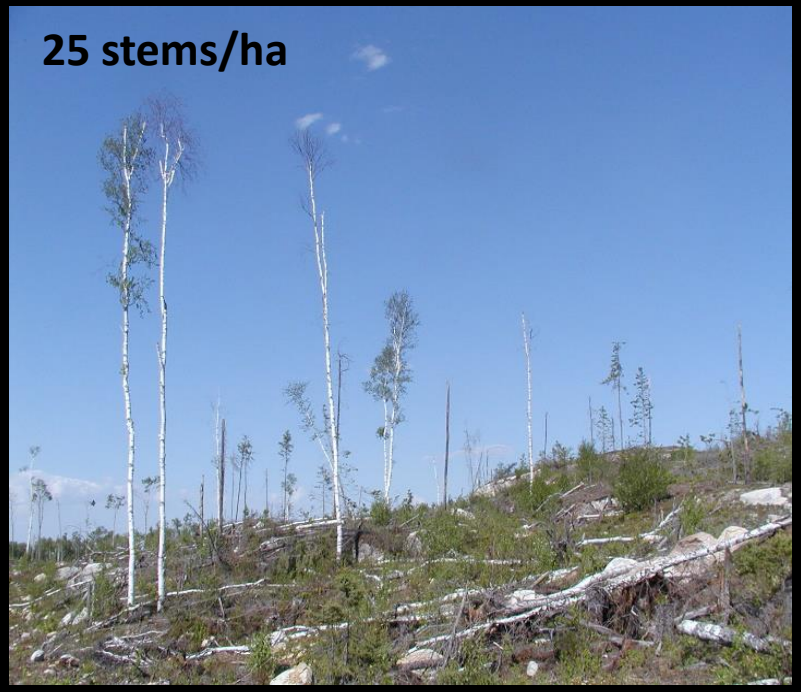
Purpose: Assess whether the post-harvest stand provides > 70% full sunlight for regeneration to be established in an even-aged stand.

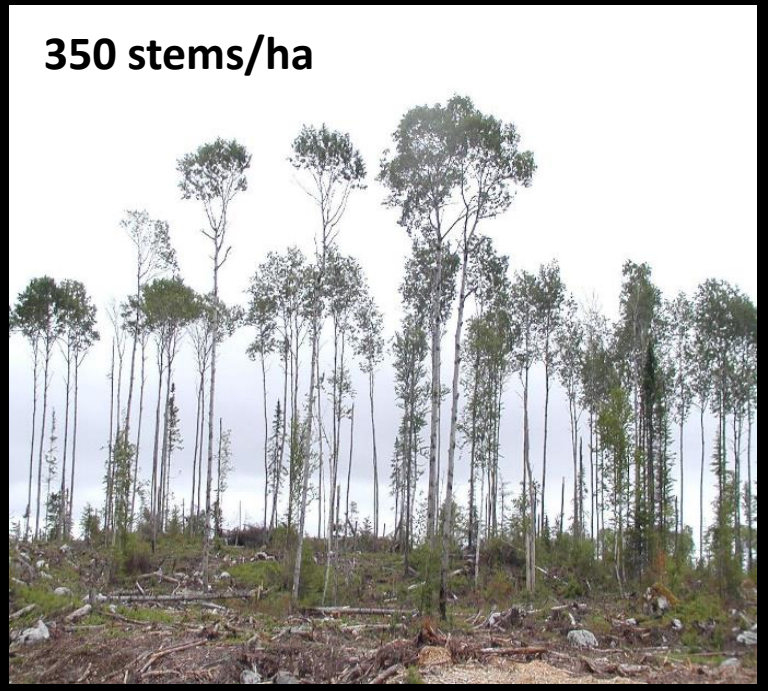
- At the cluster level, assess whether the plots are exposed to > 70% full sunlight.
- Evaluating light levels as a result of residual trees remaining after harvest is intended to be a relatively quick estimate when conducting establishment assessments.
- Stands where excessive retention of mature residuals remain post-harvest typically due to poor market conditions are the most likely to fall below the threshold light levels in a clearcut harvest.

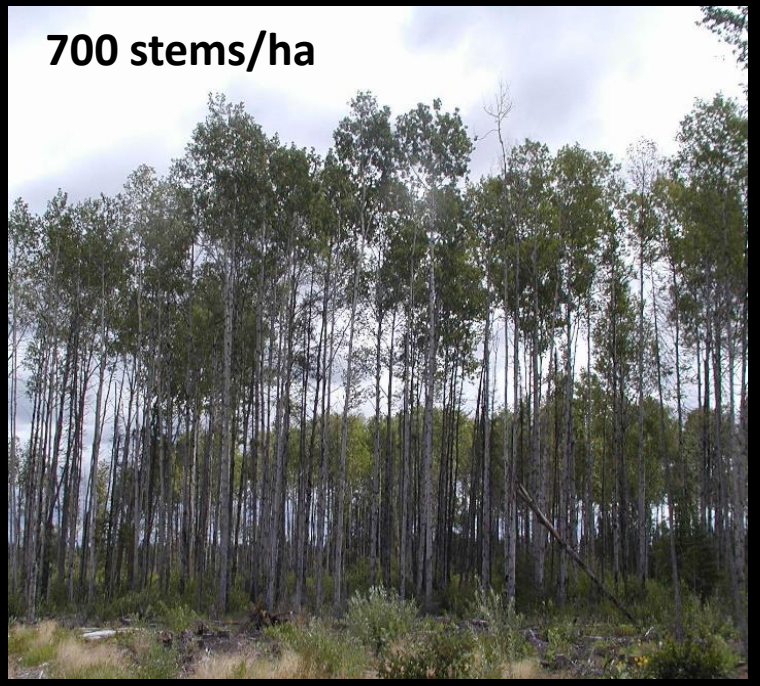
Field Assessment

Post-harvest conditions in a clearcut…how much shade is too much?

- Research carried out by Parker and Sharma (2018) looked at the relationship between residual stand structure and the transmission of light through residual tree crowns on boreal mixedwood sites. As a result of this study, an operational tool was developed that estimates understory light levels in relation to basal area in residual stands dominated by poplar and birch.







Field Assessment

Step 2: Verify the post-harvest condition resembles a clearcut condition

Where it is suspected that understory light levels are <70% as a result of residual poplar and white birch trees overtopping the plot, follow the steps below to determine residual basal area (BA):

- ✓ Conduct a prism sweep to count the number of residual stems by species (see RAP Field Manual - Appendix for information on 'Conducting a Prism Sweep').
- ✓ Multiply the number of stems for each species by 2 to determine the BA. For example, 3 white birch tallied in your prism sweep is equivalent to a BA of 6.
- ✓ Refer to the RAP Field Manual – Appendix, 'Evaluating Crown Closure and Understory Light Levels' to determine if the residual BA is acceptable for clearcut conditions in aspen and birch dominated residual stands.

Maximum BA (m^2/ha) by species to achieve the appropriate understory light levels in clearcut harvest areas.

Tree Species	Maximum BA (m^2/ha)
White birch	5
Poplar	10

Field Assessment

Step 2: Verify the post-harvest condition resembles a clearcut condition

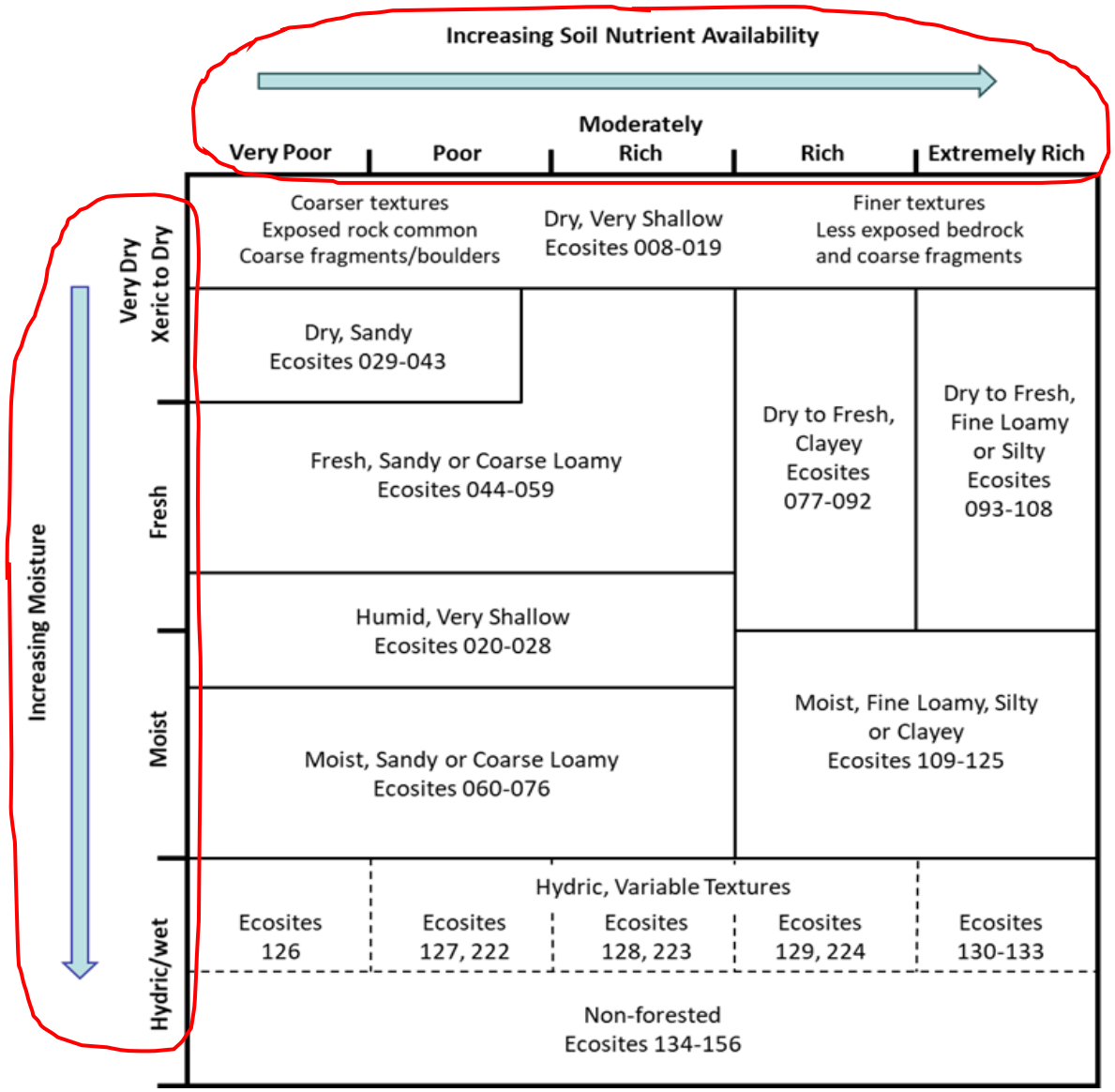
- If a plot is located in a residual patch trees, no need to estimate light levels. In this situation, there will be no regeneration to assess. Document the reason for unoccupied as '**<70% understory light**.'
- A field method for estimating understory light levels in clearcut areas dominated by residual conifer species is TBD.
- The focus of an establishment assessment is on regeneration; however, considering the mature canopy and light levels is important as it affects the overall growth and success of regeneration. Where there is uncertainty whether the clearcut stand provides adequate light levels to be considered a clearcut, continue assessing regeneration and contact a district technician responsible for compliance inspections for further discussion and investigation.

Field Assessment

Step 4: Identify Ecosite

- Record the combination of soil moisture and nutrient regimes
- E.g., Dry-Fresh/Poor-Moderate for PJ1, Wet/Poor-Moderate for SB1

Edatopic Grid

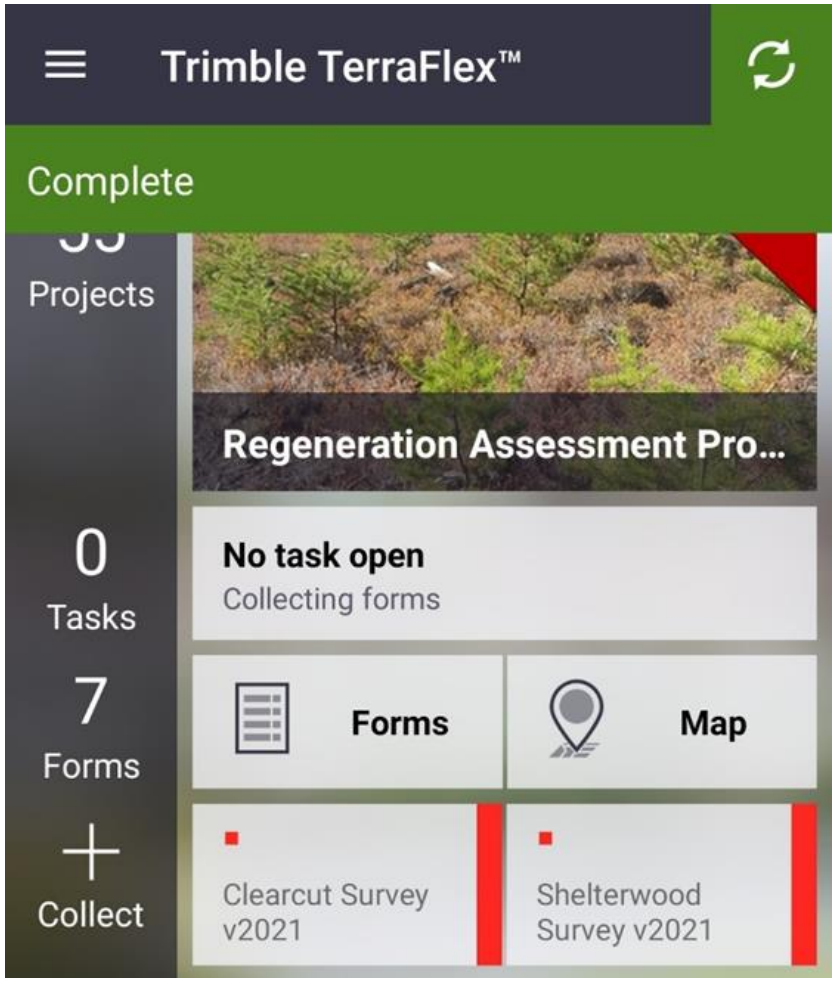


Ecological Land Classification field guide (ELCWG 2009).

Ontario

Data Collection Process

- Demonstration of ‘how to use’ TerraFlex forms
- Overview of RAP SharePoint website



Office Summary/Data Comparison

Establishment Assessment Procedure
Overview

- Office Work Planning
- Field Implementation/ Assessment
- Office Summary/Data Comparison

Revised version

- Step 1: Summarize the Ministry and forest manager assessment data
- Step 2: Analyse results

Previous, v. 1.0 of RAP Field Manual

- Step 1: Ensure forest manager assessment results are entered in TerraFlex

Office Summary/Data Comparison

Step 1: Summarize the Ministry and forest manager assessment data

- Ensure the data and results from the forest managers' establishment assessments (i.e., block name, species composition, site occupancy and effective density, if available), are entered into the appropriate project/block ID in TerraFlex.
- An annual summary of establishment assessment data is required by each district. The summary should include:
  1. The results of all Ministry assessments alongside the forest manager data. ***A template for summarizing district and forest manager data will be available on the RAP SharePoint website.***
  2. A compilation of all establishment assessment results submitted by the forest manager.
- Once complete, summarized data should be sent to the regional RAP lead. This information will be used in the statistical analysis and for regional reporting.

Silviculture Effectiveness Monitoring 2019 Core Task 1: 10% audit of FTG Assessm

							SFL FTG Results				MNRF Survey Results			
Stand / Block ID [4]	Depleted PlanFU	Harvest Year	SGR Code	FMP Year RE: SGR [5]	Target FU	Target Intensity [6]	SFL Species Comp [8]	SFL Stocking / Density [9]	SFL FTG Plan FU	Area MNRF Assessed (ha)	MNRF Species Comp (Actual)	MNRF Species Comp (Rounded to 10) PO = PB & PT Combined SX = SB & SW Combined	MNRF Stocking/ Density [11]	MNRF Plan FU
critical	critical (DSTB)	optional	critical	critical	critical	critical	optional	optional	critical	critical	critical		critical	critical
Amundsen_01	MW2	2006	MW2EXTPO1	2010 FMP	PO1	EXT	PO 40BF 20BW 20PB 10SB 10	0.3	PO1	34	PT 35BW 32BF 8SW 7PB 4SB 4PB 3	PO 40BW 30LA 10BF 10SX 10	0.43	PO1
Amundsen_02	PO1	2006	PO1BAS3SP1	2010 FMP	SP1	BAS2	SB 90BF 10	0.8	SP1	20	SB 76BF 13PB 3PT 3BW 3SW 2	SX 80PO 10BF 10	0.77	SP1
Amundsen_03	MW1	2009	MW2BAS2SF1	2010 FMP	SF1	BAS2	SB 70BF 10BW 10PO 10	0.5	SF1	14	SB 34SW 27BW 27BF 9PB 2CE 1	SX 60BW 30BF 10	0.69	SF1
Amundsen_04	PO1	2007	PO1BAS2SP1	2010 FMP	SP1	BAS2	SB 80BF 10PJ 10	0.7	SP1	29	SB 63SW 20BF 8PT 6BW 1PB 1CE 1	SX 80PO 10BF 10	0.72	SP1
Amundsen_05	SP1	2007	SP1BAS2SP1	2010 FMP	SP1	BAS2	SB 70BF 30	0.7	SP1	7	BF 36SB 20SW 15BW 13PT 11PB 9LA 6	SX 70BF 30PO 20BW 10	0.83	SF1
Amundsen_06	PO1	2006	PO1EXTPO1	2010 FMP	PO1	EXT	PO 80BF 10SB 10	0.6	PO1	17	PT 68BW 11PB 6SB 6SW 5BF 4	PO 80SX 10BW 10	0.59	PO1
Amundsen_07	BW1	2006	BW1EXTPO1	2010 FMP	PO1	EXT	PO 60BW 20BF 10SB 10	0.5	PO1	18	BW 49PT 20BF 10PB 10SB 8SW 3	BW 60PO 30SX 10BF 10	0.37	BW1
Burritt_01	SP1	2006	SP1BAS2SP1	2010 FMP	SP1	BAS2	SB 70BF 10PO 10PB 10	0.8	SP1	36	SB 64LA 17PT 15PB 4SW 4BF 2	SX 80LA 20PB 10	0.87	SF1
Burritt_02	SP1	2006	SP1BAS2SP1	2010 FMP	SP1	BAS2	PJ 90SB 10	0.9	PJ1	13	SB 83LA 8PJ 5PT 1BF 1PB 1SW 1	SX 80LA 10PJ 10	0.94	SP1

Office Summary/Data Comparison

Step 2: Analyse results

- District leads for the RAP should notify the regional lead upon completion of the season's establishment assessments.
- Regional specialists are responsible for comparing and analyzing the establishment assessment data. Statistical analysis of the district and forest manager datasets will identify inconsistencies between assessment results. The compilation of all the forest managers' assessment data (i.e., the complete submission of establishment assessments) will be required by region to complete the analysis, in the event of discrepancies between results.
- The results of this analysis will be shared and discussed with the district forester and/or lead forest practitioner for RAP for each management unit. The district lead is responsible for providing feedback to the forest manager to discuss the Ministry assessment results. Regional specialists can support these discussions at the request of the district.

Establishment Assessment Validation Timeline

Current Framework

Note: Example displayed with dates for improved clarity.	Calendar Year								
	2019				2020	2021			
Establishment Assessment (EA) Related Action	**Jan. 1 - Mar. 31**	**Apr. 1 - June 30**	**July 1 - Sept. 30**	**Oct. 1 - Nov. 15**	**Jan. 1 - Nov. 15**	**Jan. 1 - Mar. 31**	**Apr. 1 - June 30**	**July 1 - Sept. 30**	**Oct. 1 - Nov. 15**
AWS - EA polygons identified									
EA polygons verified									
Establishment census									
Previous year (2018) establishment results submitted in Annual Report and data accepted									
Compile 2019 EA data for submission in 2020 Annual Report									
EA validation work planning for 2019 forest manager results									
Validate field sample of 2019 forest manager results									
Analyse and compare results for consistency; agree or disagree									
The Ministry provides feedback to forest manager; potential joint field inspection(s)									

* Currently there is no formal process written in policy to prohibit the submission of forest manager EA results in the Annual Report, despite potential discrepancies between the Ministry and the forest manager results. This process has to be worked out informally.

= Forest manager responsibility = Ministry responsibility

Questions

Ministry's Priority Bin Selection Process