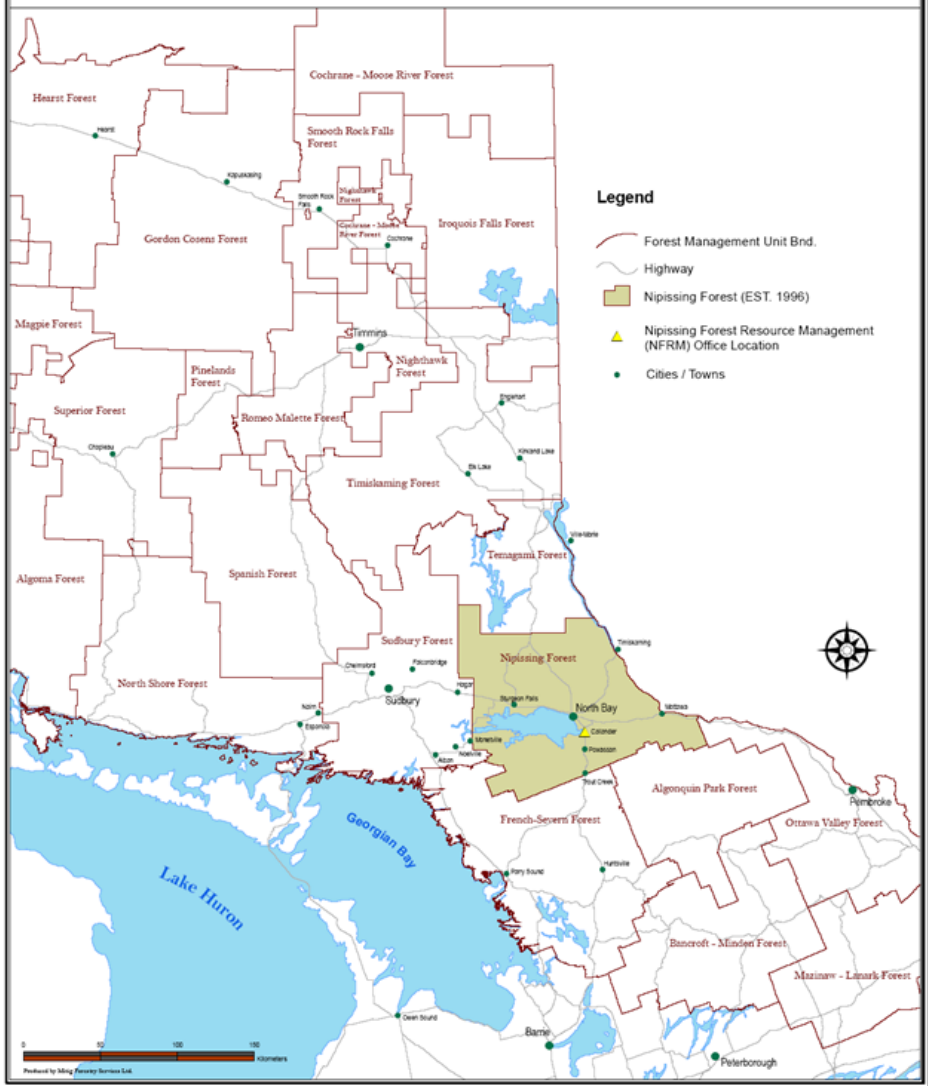
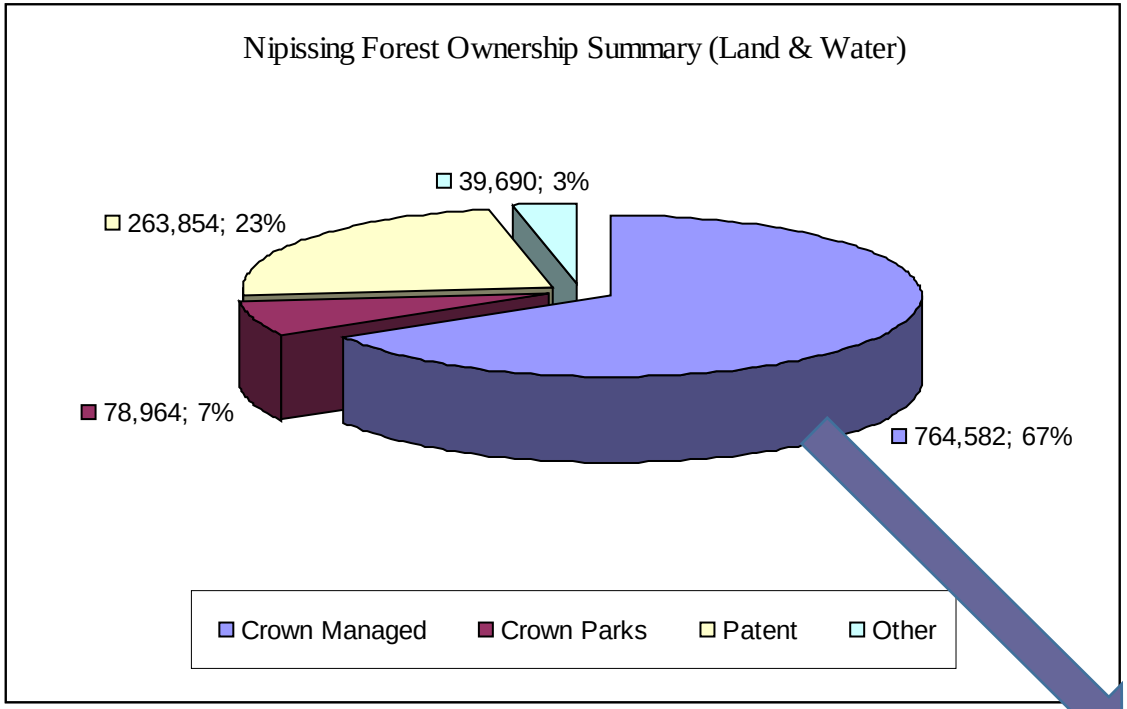
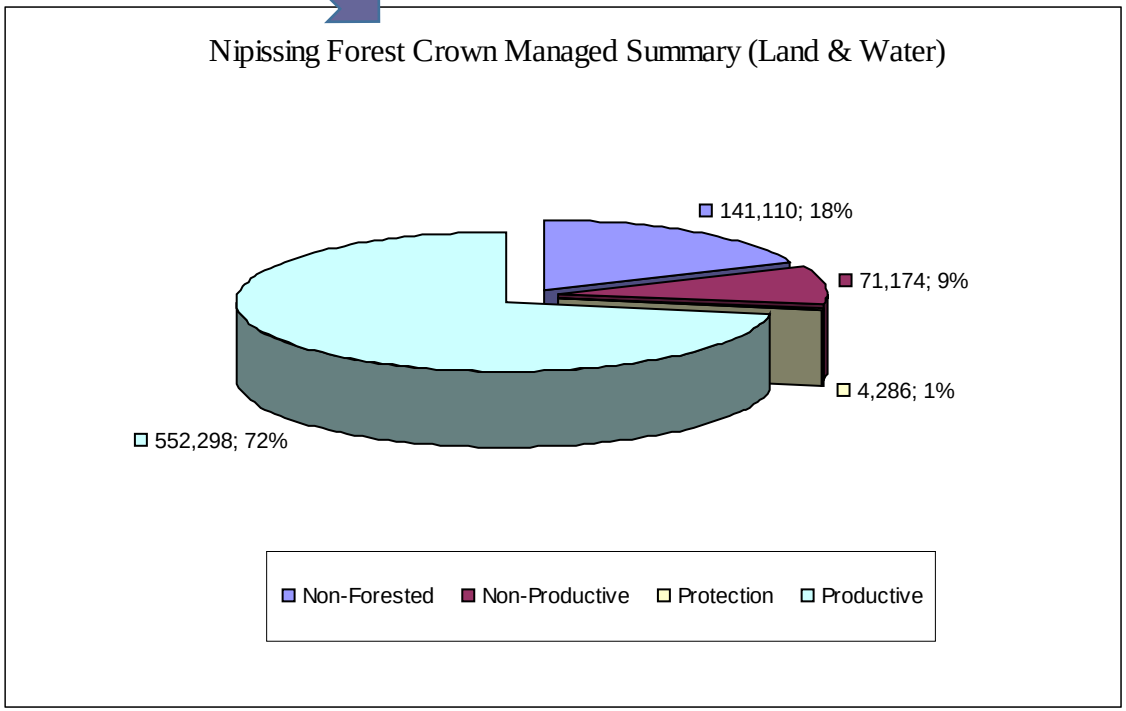
White Pine Management on the Nipissing Forest: Challenges and Opportunities

Forestry Futures Trust Workshop, March 21, 2017, Thunder Bay

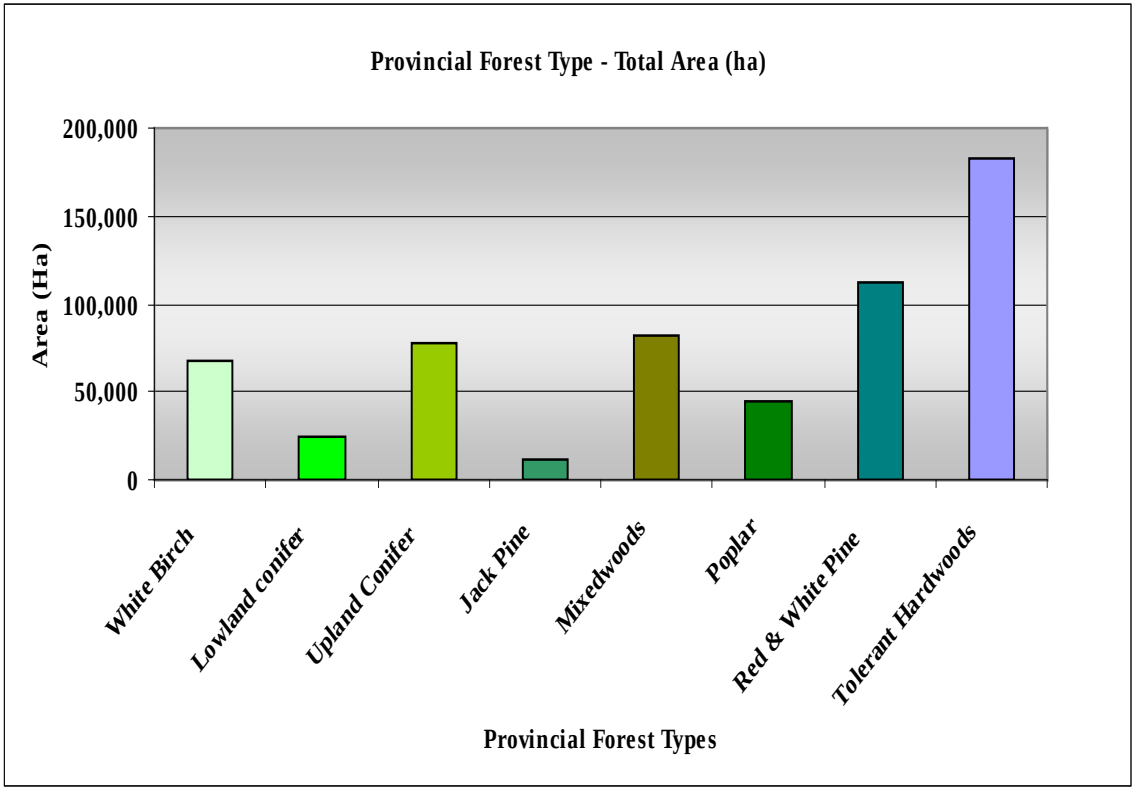
Nipissing Forest Key Map
Northeast Region - North Bay District




Nipissing Forest Ownership Summary (Land & Water)
39,690; 3%
263,854; 23%
78,964; 7%
764,582; 67%
Crown Managed
Crown Parks
Patent
Other


Nipissing Forest Crown Managed Summary (Land & Water)
141,110; 18%
71,174; 9%
4,286; 1%
552,298; 72%
Non-Forested
Non-Productive
Protection
Productive

White Pine on The Nipissing Forest



Plan FU	Provincial Forest Type	Area (ha)
BW	White Birch	67,068
BY	Tolerant Hardwoods	16,265
HDSEL	Tolerant Hardwoods	61,856
HDUS	Tolerant Hardwoods	68,402
HE	Tolerant Hardwoods	9,777
LWMX	Tolerant Hardwoods	26,557
MW	Mixedwoods	82,567
MCL	Lowland conifer	24,956
PJ	Jack Pine	11,639
PJSB	Upland Conifer	18,376
PO	Poplar	45,216
PR	Red & White Pine	11,433
PWST	Red & White Pine	29,837
PWUS	Red & White Pine	71,209
SF	Upland Conifer	58,607

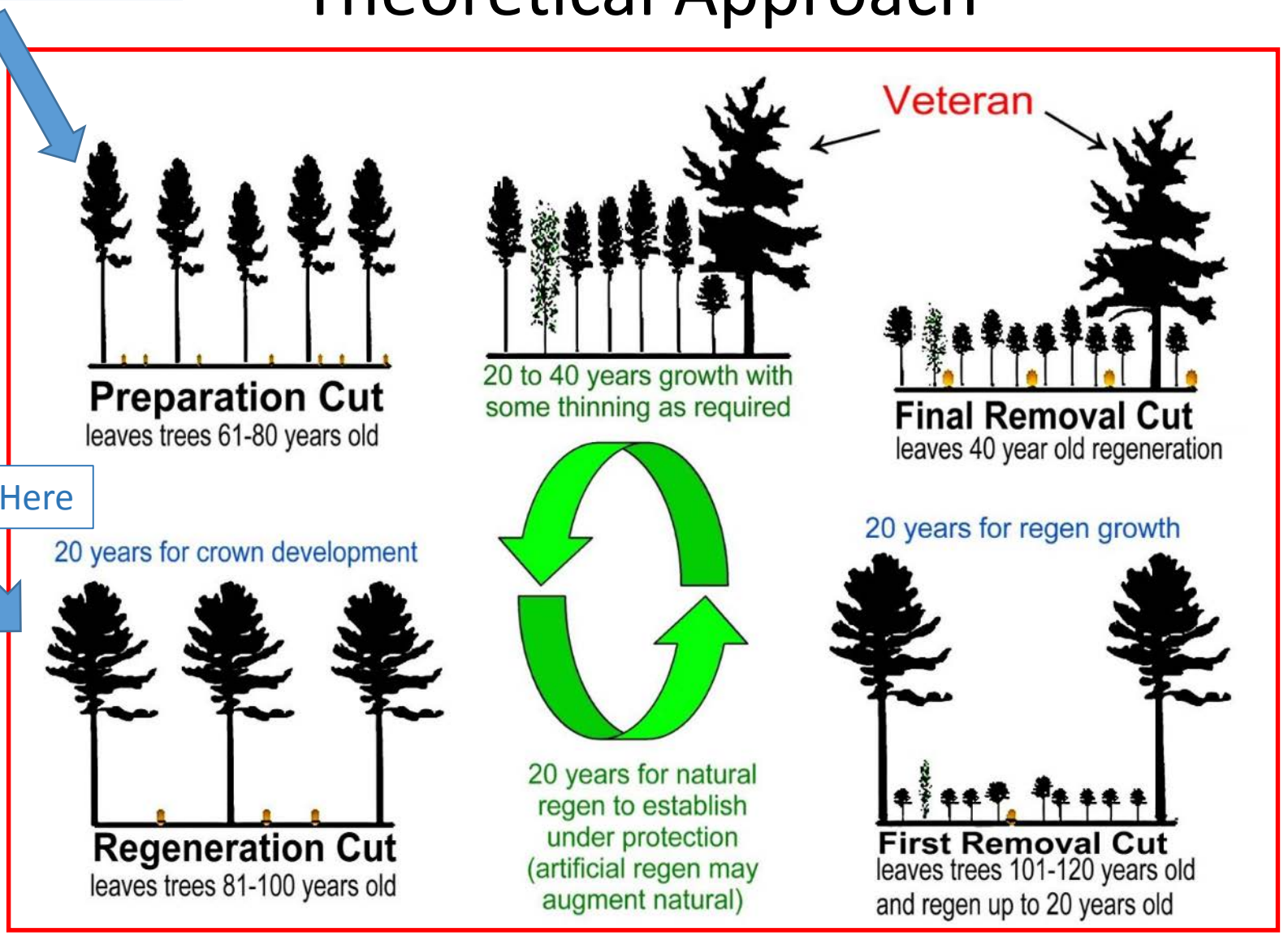
White Pine Uniform Shelterwood Silvicultural System

- Started in Algonquin Park in the mid-1970's, radiated out from there
- Tree marking in PWUS in North Bay District began around 1990. Before that, white pine stands were managed through diameter limit cutting or clear cutting.
- Requirement for Certified Tree Markers started in 1995 (Forest Operations and Silviculture Manual, 1995)
- Rational, context, and ecological principles were provided in:
  - A Silvicultural Guide for the Tolerant Hardwood Forest in Ontario (1998)
  - A Silvicultural Guide to the Great Lakes–St. Lawrence Conifer Forest in Ontario (1998)
- Ontario Tree Marking Guide available in 2004
- New Direction provided in new Silvicultural Guide in 2015
- So, tree marking and silvicultural approaches have evolved since shelterwood first implemented – we've learned a lot.

Theoretical Approach

Not very common

Often Start Here



Mistakes in the Early Years - Overstory

- Direction: 50% crown closure
- Large crowns = low basal area
- In early 1990's – no market for Po
- Changed marking on the fly within PWUS stand:
  - 50% cc - Regen cut
  - 40% cc – first removal
  - 10% cc - final removal
  - PWST or even clearcut
- Results:
  - Inconsistent crown closure
  - Irregular light conditions
  - Patchy regeneration
  - Lost opportunity for 2 more cuts

New Direction – in new Silvicultural Guide (2015)

- 2-cut (regen cut + final removal), applied when:
  - Low stocking / volume
  - Patchy
  - Only enough BA for regeneration (seed-cut) with residual BA of 12 m^2/ha, followed by 1 removal

- 3-cut (regen cut + first removal + final removal cut), applied when:
  - High stocking / volume – residual regen cut BA of 18 m^2/ha
  - Uniform
  - Allows for a first removal with residual BA of 12 m^2/ha, followed by second removal cut

- Prescription developed and implemented at the stand level, not changed every hectare

Mistakes in the Early Years - Midstory

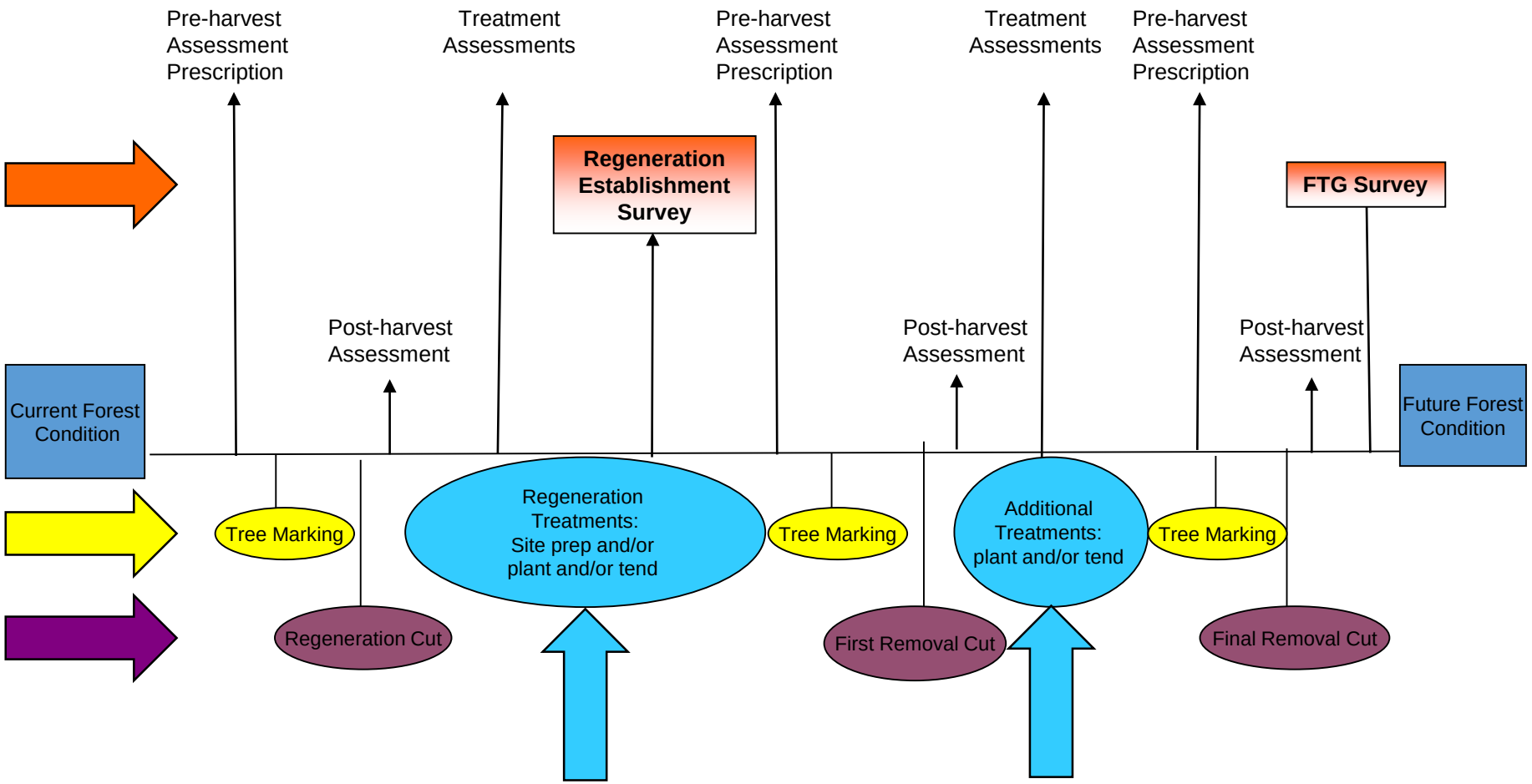
- Focus on spacing overstory pine
- No market for smaller diameter red maple, balsam fir, black spruce, suppressed white and red pine - therefore not cut
- Results:
  - Variable light conditions
  - Patchy regeneration
  - Silvicultural challenge to remove mid-story
- New direction:
  - Thin from below at time of harvest

Mistakes in the Early Years - Regeneration

- No effort to regenerate
  - Myth – shelterwood is a natural regeneration system – white pine will establish on its own
- Focus on establishment but no tending
  - Mechanical site preparation, some chemical site preparation
  - Tending treatments limited to brush saw or ground spray, no technology for aerial spray
  - Myth – white pine is mid-tolerant and will grow through
- No removal cuts
  - Focus on regeneration cut
  - Myth - no need for removal cut for 20 years
- Results:
  - Little or no white pine regeneration

MONITOR, MONITOR, MONITOR!

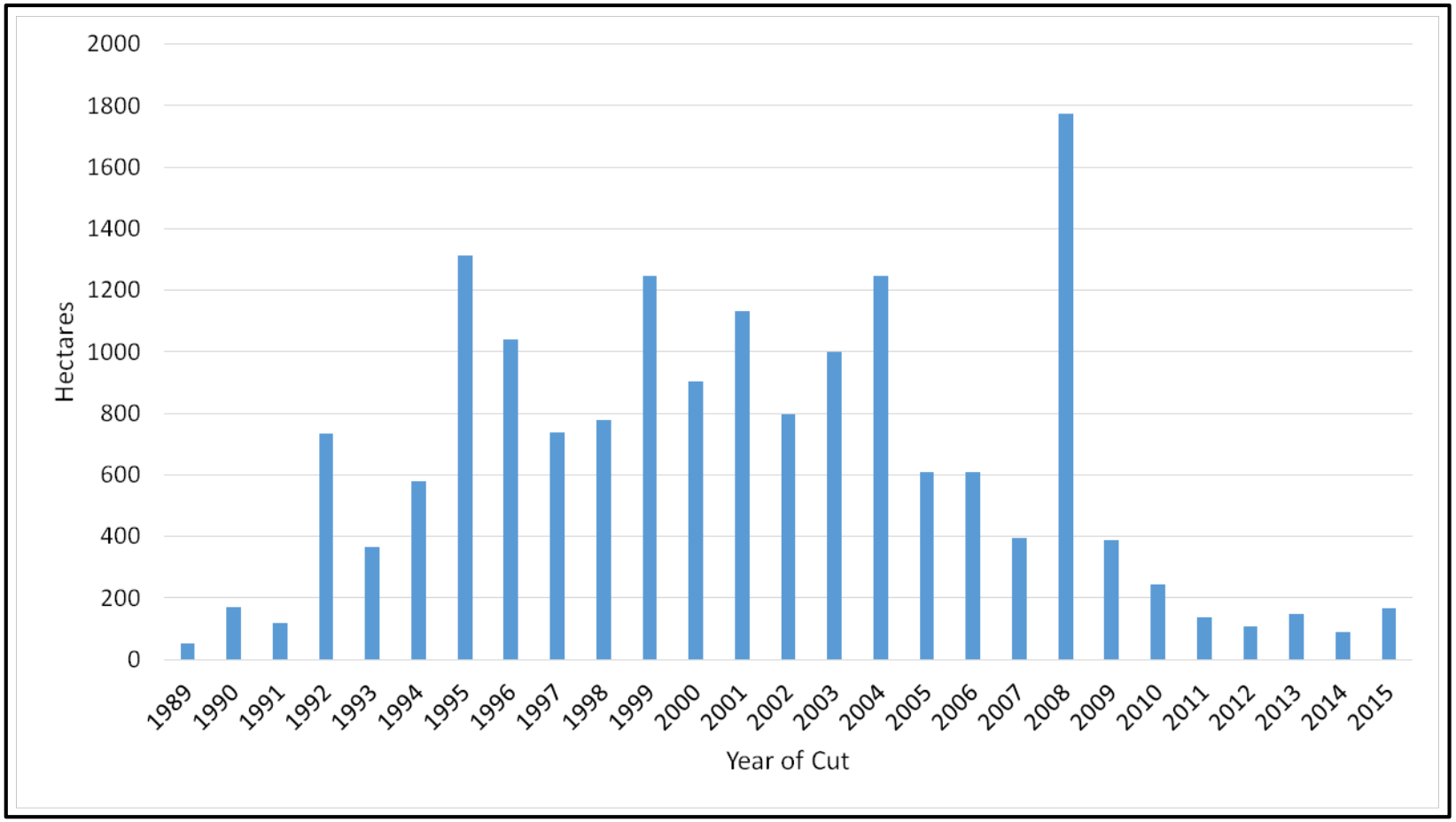
White Pine Uniform Shelterwood Silviculture, Monitoring, and Assessments



Monitoring Regeneration and Need for Treatment

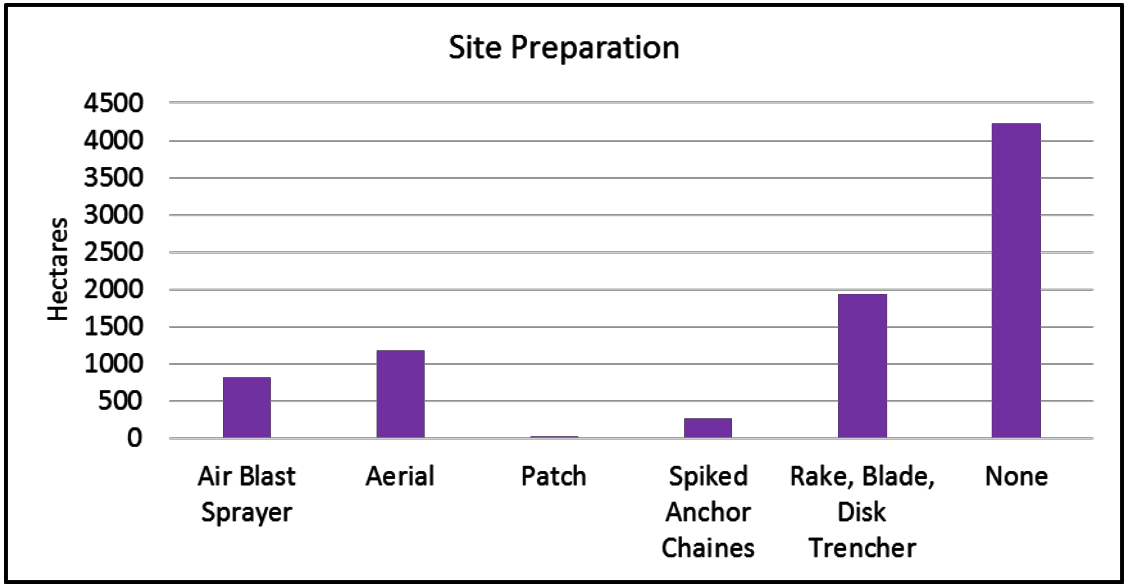
REGENERATION TYPE	MEASUREMENT TYPE	COMMENTS	
Planting	Establishment Quality	time of treeplant-contract specs	Assess planting depth, spacing, microsite, leaning trees, etc.
	Temporary Sample Plots	1,2, & 5 years after tree plant	Provides: tending rationale, stock performance, identifies any pests, etc.
	Post Tending Surveys	done in the season following any herbicide use	Monitors efficacy, inspect Buffer Zones, next actions
	Free To Grow	5 to 12 years after planting	SOI Method Used Identifies need for final tending
Natural Regeneration	PW / BY Shelterwood Progress	2 to 7 years after Regen Cut	Treatment Decisions, evaluation of scarification
	Post Tending Surveys	done in the season following any herbicide use	Monitors efficacy, inspect Buffer Zones, next actions
	PW Shelterwood Status	done 8 to 12 years after Regen Cut	SOI Method Used Provides: progress on regen, status of overstory, tending rationale
	Free To Grow	Done after Shelterwood Final Removal Cut	SOI Method Used

Pw Shelterwood Regeneration Cuts on the Nipissing Forest (16,875 ha)

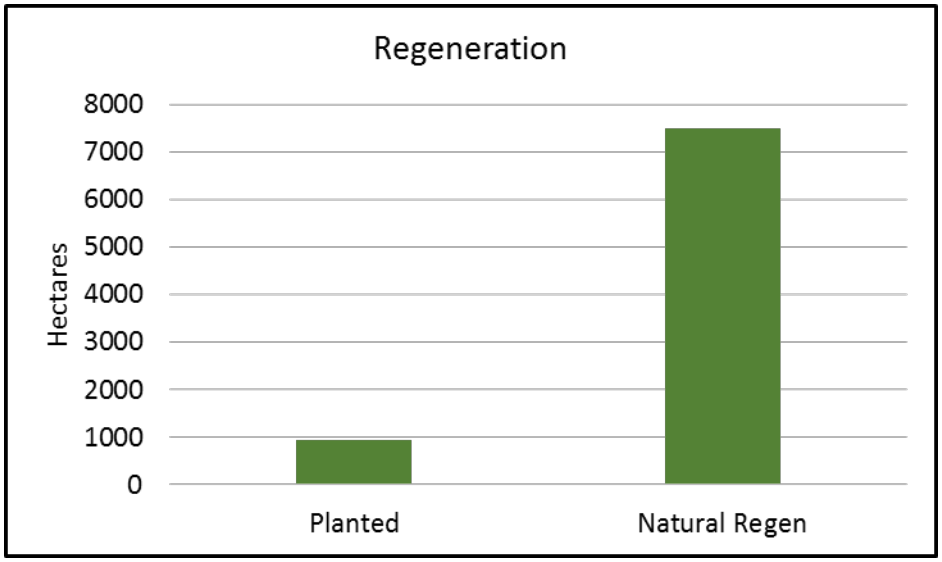


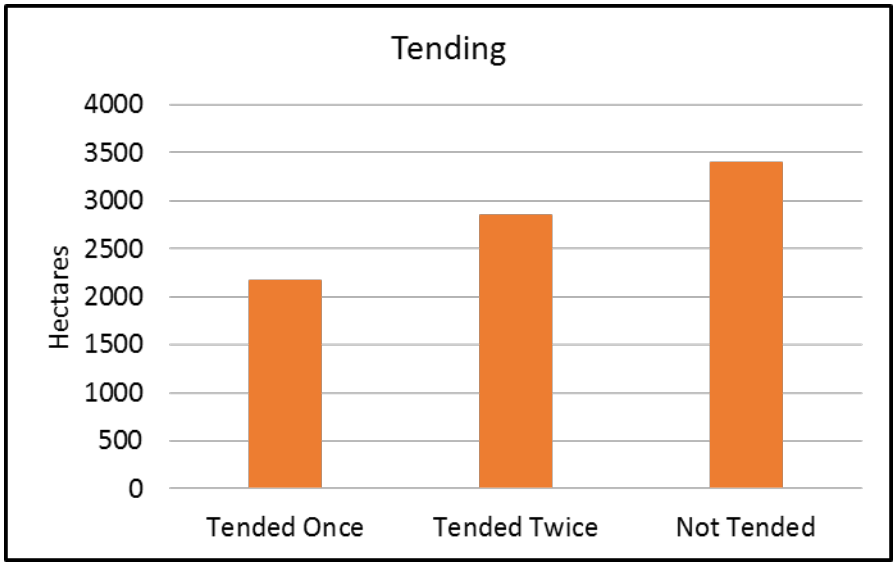
We've Surveyed 9657 ha to date (most cuts dating before 2005).

Treatments in Surveyed Area (9657 ha)

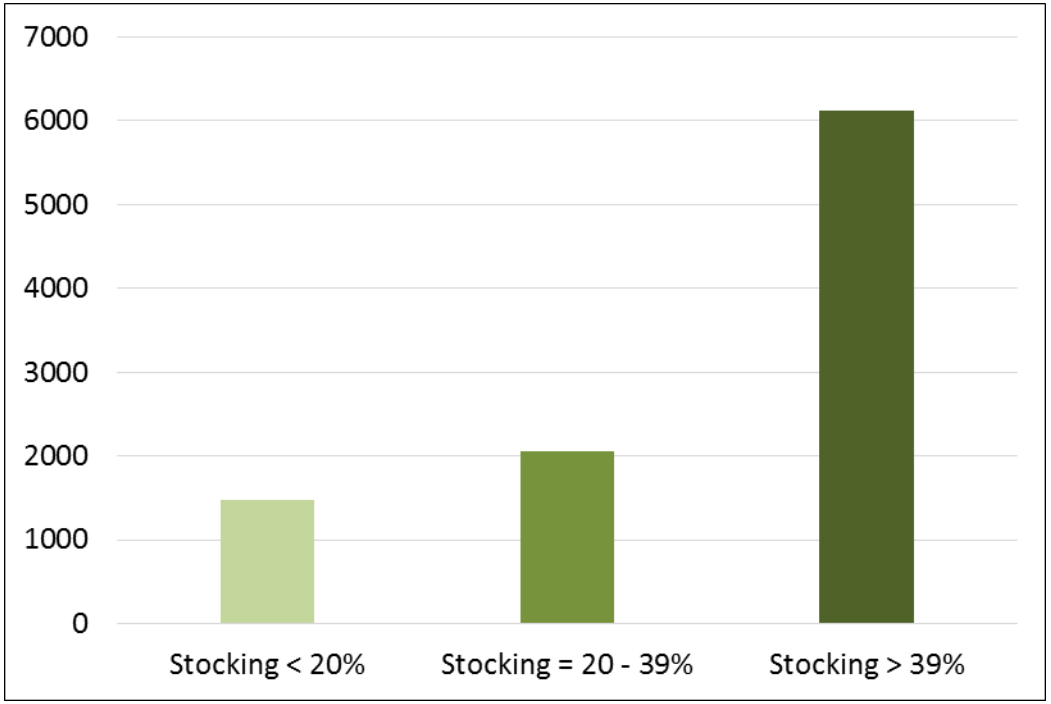


- 50% Site Prepared
- 11% Planted
- 26% Tended Once
- 34% Tended Twice
- 60% Tended
  - ½ Chemical
  - ½ Brush saw



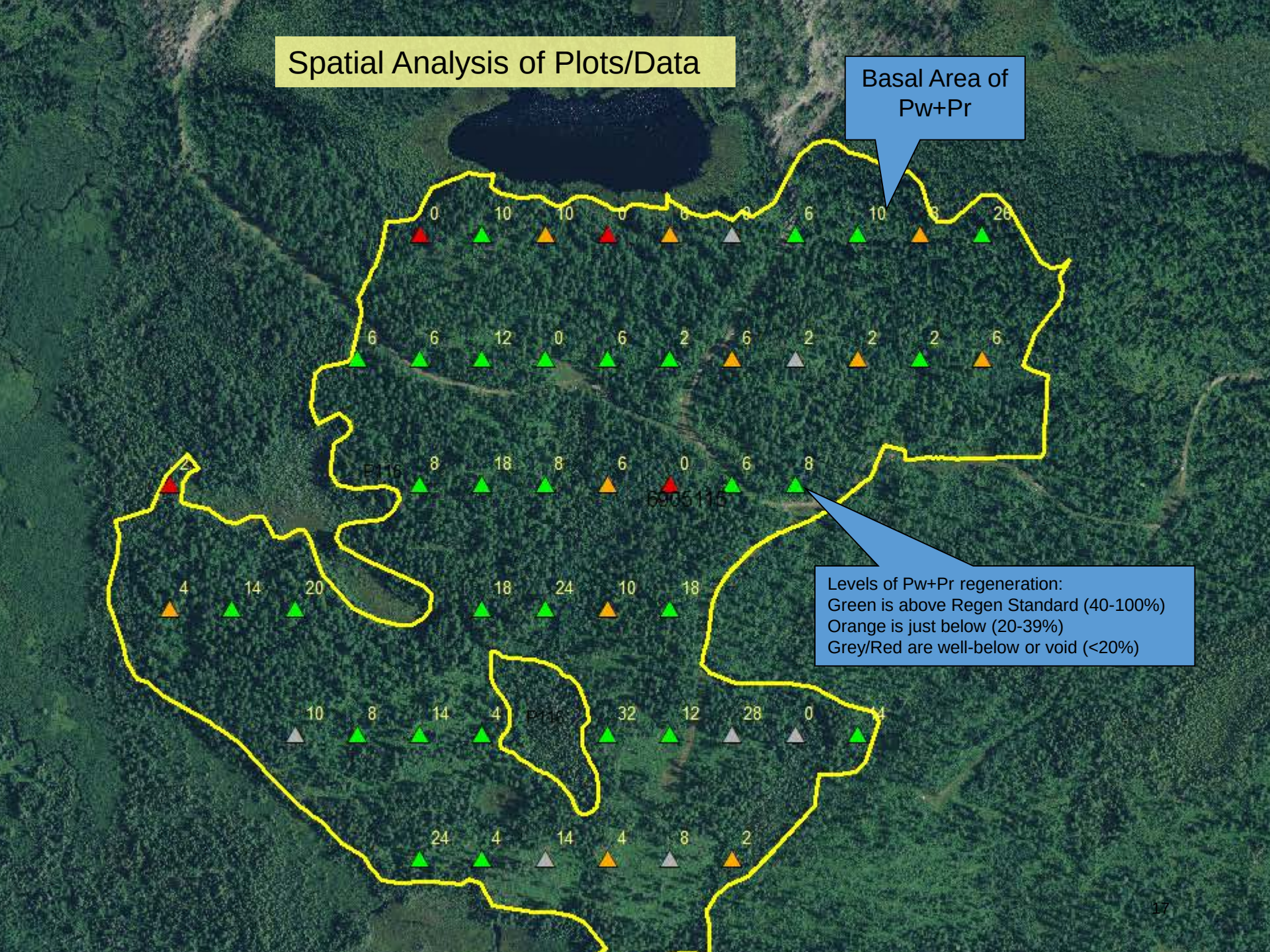


Interim Regeneration Survey Results: Stocking to Pw, Pr, Sw



6118 ha (63%) of the 9657 ha surveyed meet interim regeneration standard and are on track to achieve the Future Forest Unit. (Survey results from 2010-2016)

Spatial Analysis of Plots/Data



Remedial Treatments in Older Stands (Cut before 2005)

- When possible
- Scenario 1. One more cut or no more cuts, regeneration present (>39% stocking) but suppressed by balsam fir and mid-story
  - Post-harvest treatments targeting midstory
  - FFT project – 923-1-R42 White Pine Stand Improvement
- Scenario 2. One more cut or no more cuts, no regeneration (<20% stocking), non-crop vegetation less than 6 m tall, light mid-story – Start Over
  - Aerial site preparation to kill hardwood mid-story understory
  - Mechanical site prep to knock everything down and create seedbed
  - Ground chemical site prep to control competition
  - Supplemental plant (750 trees/ha) to ensure adequate regeneration
  - FFT project – 925-1-R42 Remediation of degraded white pine shelterwoods

Pw Shelterwood Management – current approach in ideal conditions

White Pine Restoration: Current Approach in Clear Cuts

- Conversion from clearcut forest units is a challenge
  - Weevil, blister rust, competition
- Deciduous nurse crop may be technically feasible (as with research study) but impractical
- Moving away from planting white pine in clear cuts except as a mix with Pr, Sw, and Pj

White Pine Restoration: Red Pine Plantations

- Need for *high-level conifer* shade
- Thinned red pine stands may provide best opportunity
  - Nurse crop – weevil and blister rust mitigation
  - Best, sandy sites