

2019 Validation Data Collection Protocols for the Petawawa Research Forest

Background

Single Photon LiDAR (SPL) was acquired July 1, 2018 over the Petawawa Research Forest (PRF) and neighboring Canadian Nuclear Laboratories property. A research project was initiated to understand the opportunities and challenges of working with SPL data in the production of raster-based enhanced forest inventories. This project is structured to provide an independent validation data set by forest-type to test the accuracy of the raster predictions.

Methods

Stratification

Nine forest-types were identified for validation (Table 1). Three stands of each type were selected for a total of 27 stands. A 50m x 50m sampling grid was superimposed over the stands and sampling stations were identified. An approximate maximum stand size of 15 ha was selected to maintain the maximum number of stations close to 50. In many cases far fewer stations were identified within the selected stands (due to their size and shape). However, for some forest-types (tolerant hardwood, red oak, mixedwood) original photo-interpreted polygons were modified to help meet the desired maximum of approximately 50 stations. For some of these forest-types ~60 stations were identified. Stations along the 50m x 50m grid was adjusted as necessary to maintain a minimum distance of 20m from clearly marked trails and roads. Each sampled stand was also buffered-inside 20m to ensure that sampling would be contained to the target stand condition.

Station Location

A GNSS capable GPS will be used to navigate to the identified stand-station waypoint (Figure 1). Due to the GPS/GNSS constellation always moving and satellite locks changing (made even more difficult in a forested environment) an attempt to be within 5 m of the target station location is acceptable. A piece of flagging tape will be attached over the final centre point selected as the station centre point. Stand number and station number will be written on the flagging tape. The flagging tape will serve as monumentation for audit or post-analysis clarification purposes

Table 1. Forest-Type by Stand and number of stations to be sampled

2019 PRF-SPL Stand Validation		
Forest Type	Stand No.	No. Stations
Pr Plantation	186	16
Pr Plantation	455 mod	12
Pr Plantation	192	12
Mixedwood	536 mod	50
Mixedwood	548 mod	52
Mixedwood	590 mod	60
TolerantHwd	518	44
TolerantHwd	619	63
TolerantHwd	572	61
Oak	92 mod	55
Oak	547	55
Oak	45	60
BlackSpruce	978 mod	47
BlackSpruce	74 mod	22
BlackSpruce	478	21
Poplar	161	26
Poplar	77 mod	50
Poplar	198	13
PwManaged	28	50
PwManaged	465	28
PwManaged	442	39
JackPine	191	20
JackPine	200	37
JackPine	194	26
PwNatural	588	46
PwNatural	73	31
PwNatural	85	25
TOTAL STATIONS		1021

Assessments

At each station a BAF 2 prism will be used to measure each tree determined “in” that is ≥ 9.1 cm. Each “in” tree will be recorded for **species, DBH, and Quality**. In addition, for each station, the largest tree by Dbh sampled by the BAF 2 prism will be measured for height and recorded. Borderline trees will be checked with a limiting distance table. The vertex or tape measure can be used to check distance.

Notes of recent stand disturbance are to be recorded by station; looking for some type of disturbance that is estimated to have occurred after July 1, 2018 (date of LiDAR acquisition).

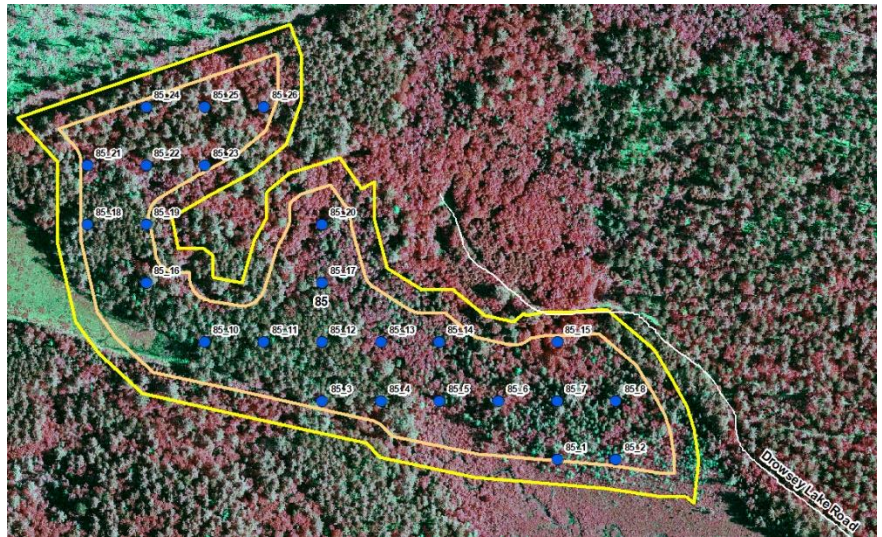


Figure 1. Identified station locations and number within a selected validation stand.

PRF Stand Inventory Tally

Date: 22-Mar-2019 | Block ID: | Inventory Crew: | Stand ID: | Forest Type: [v]

Plot: | Species: [v] | DBH: | Height: | Quality: AGS UGS CULL | Wildlife: C1 C2 Nest M1 M2 None

Notes: | Total Trees: | Trees in Plot: |

PREV | NEXT | CLEAR TREE DATA | SAVE TREE | END PLOT

Regeneration: | Topography: | Site Quality: Class 0 Class 1 Class 2 Class 3 Class 4

Figure 2. Cruising Software Package

image of each stand.

Data collection will be completed using a Petawawa Research Forest Cruising Software package (an Excel Form Based Macro – Figure 2). This software will be run on a Panasonic Toughbook tablet computer. Paper tally forms will be provided as a backup to any hardware or software problems that may occur.

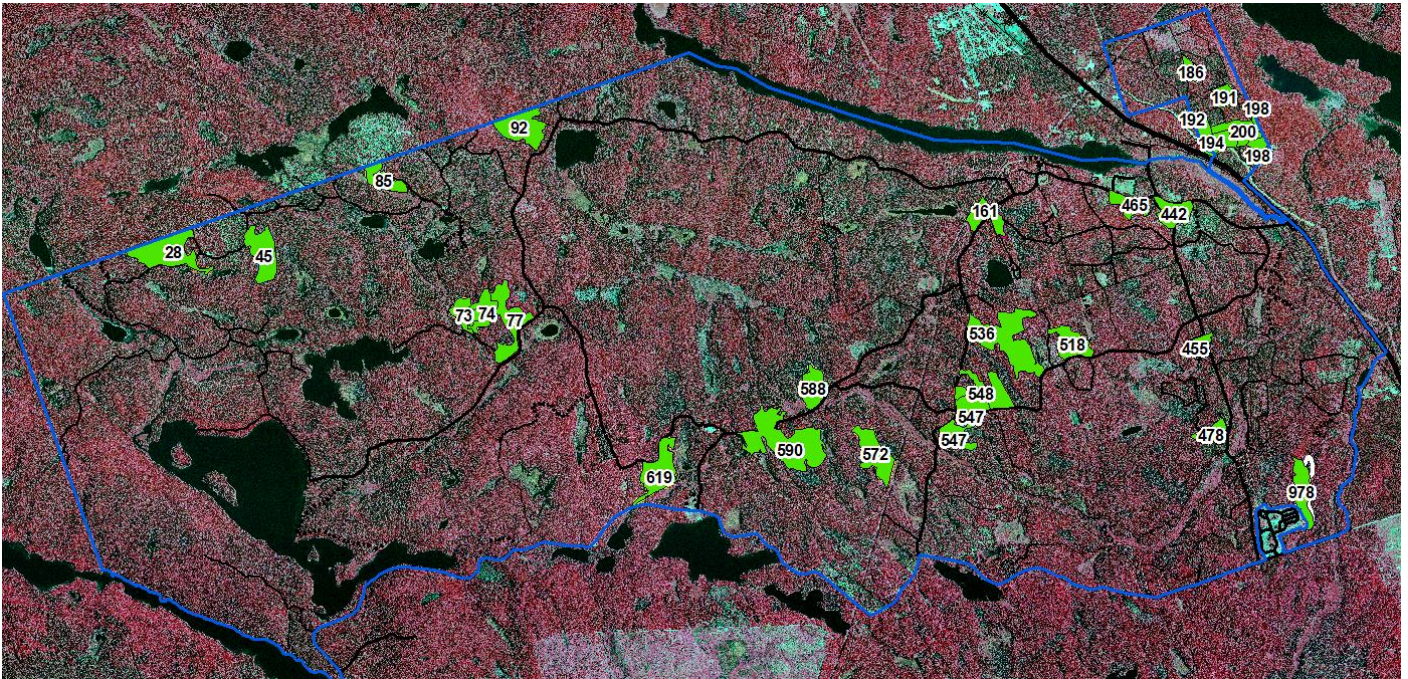
Safety

Station locations that place the crew in any danger are **NOT** to be established. If possible, relocate a new station centre point as close as possible to the original position and provide an estimated distance and location (33m @150° from 124_4) to the new plot center.

Validation Stand Locations

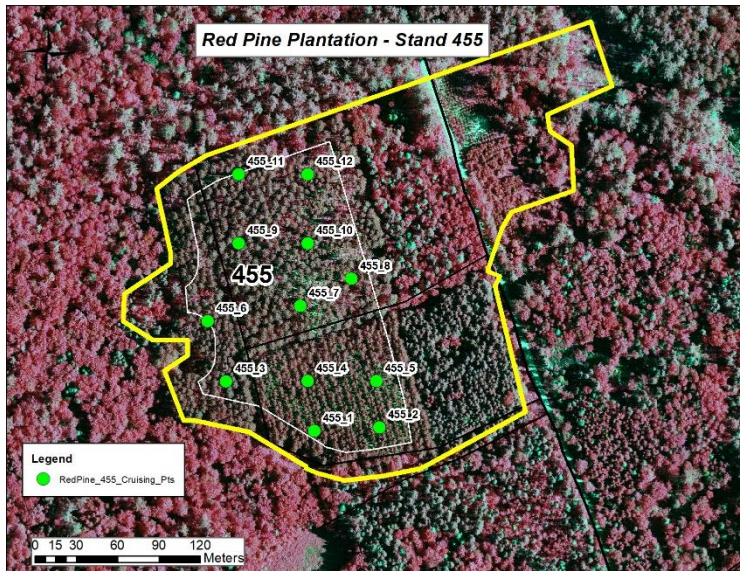
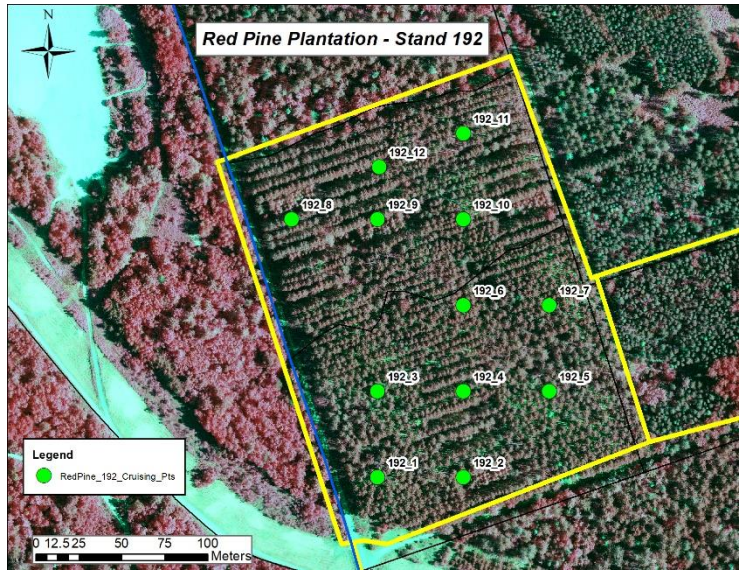
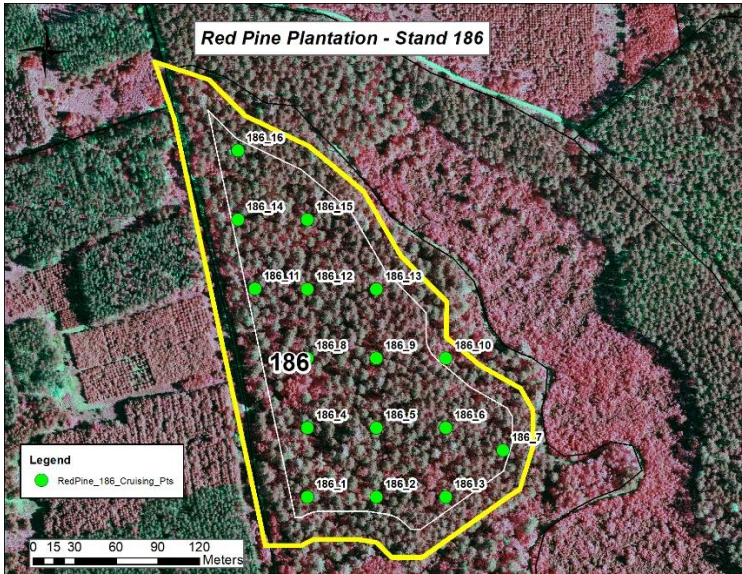
All stands involved in this validation effort are within the Petawawa Research Forest boundaries. Selection of the validation stands considered items such as road access and stands being considered for future operational harvesting allocations to meet forest plan objectives. **Appendix A** provides maps of stand locations within PRF and a large-scale

Appendix A

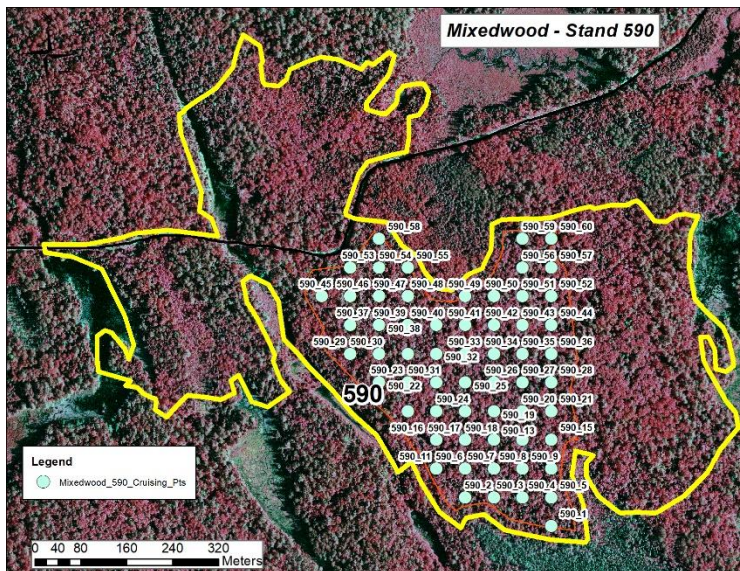
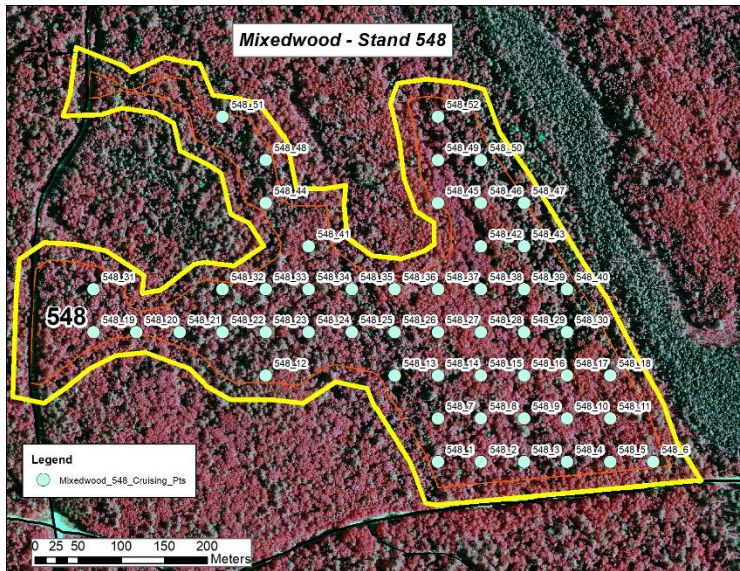
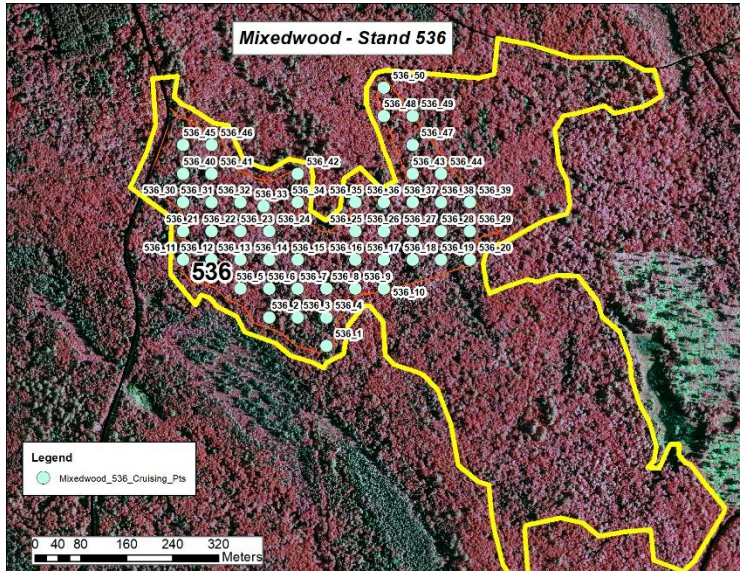


Overview of stands selected for validation on the Petawawa Research Forest

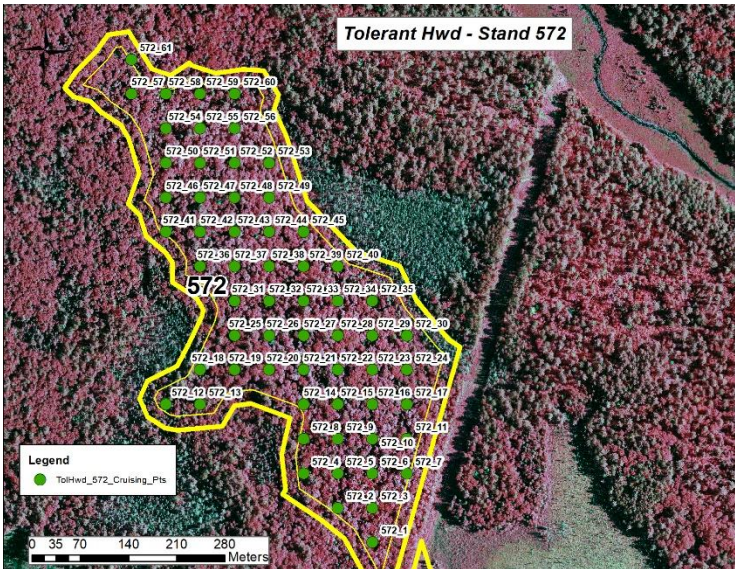
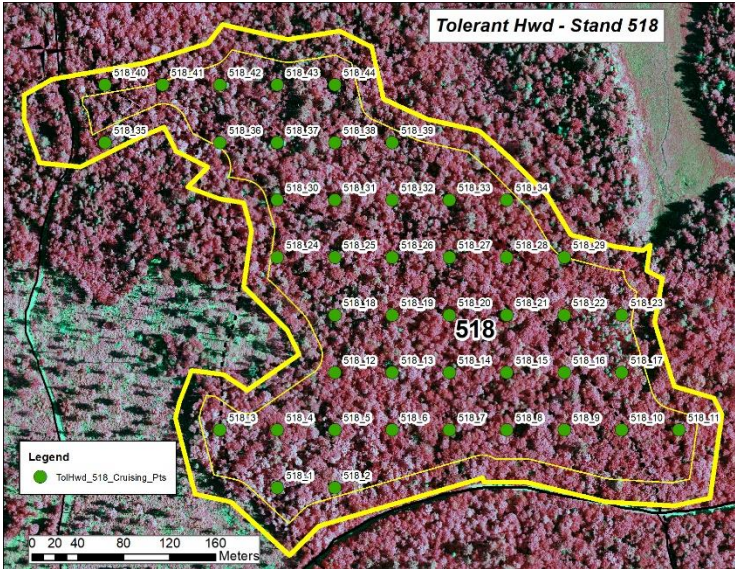
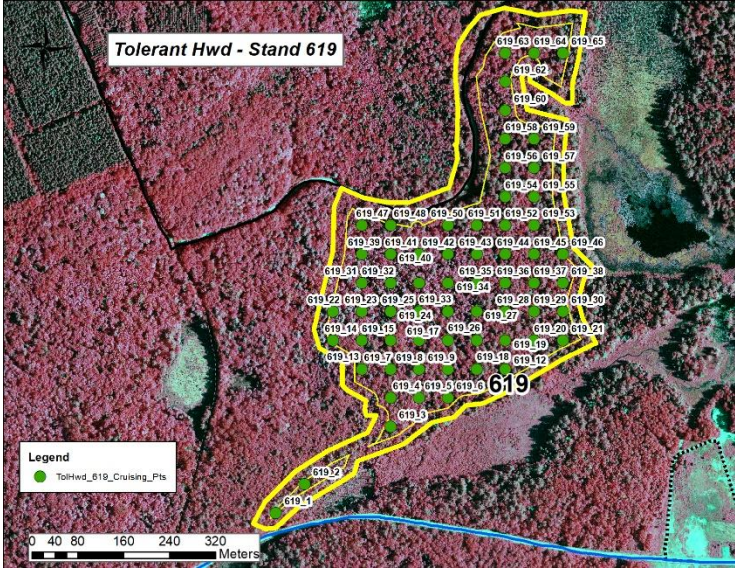
Red Pine Plantations



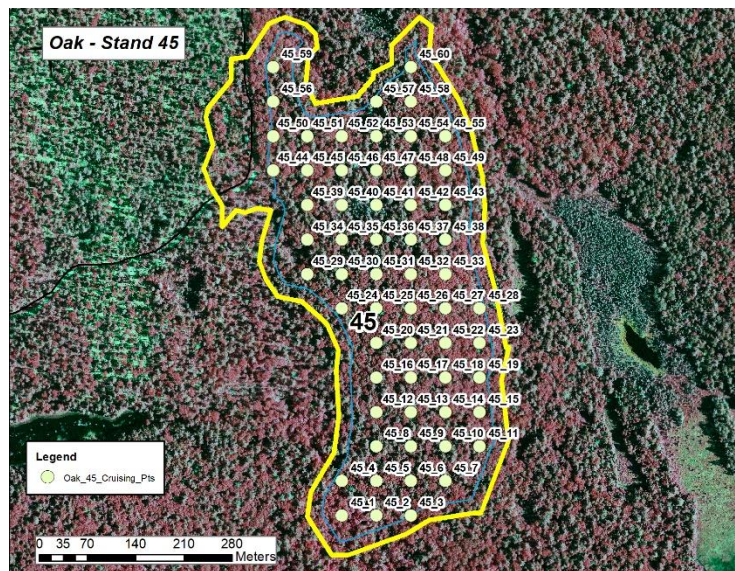
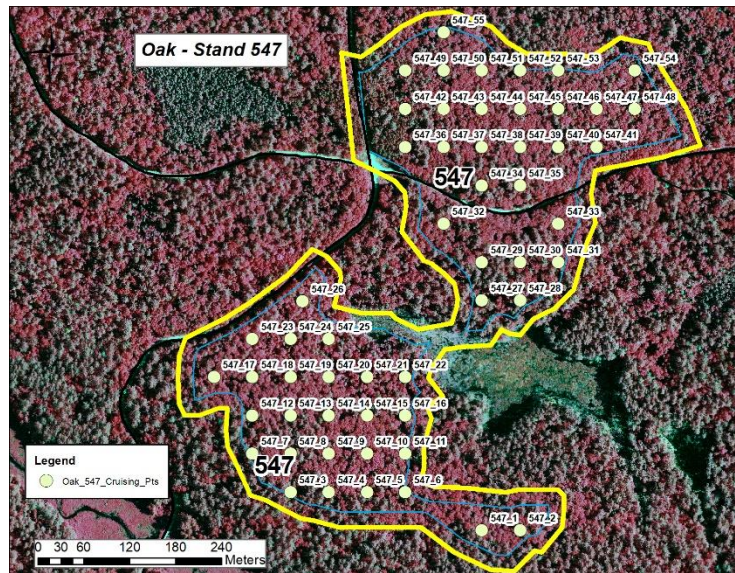
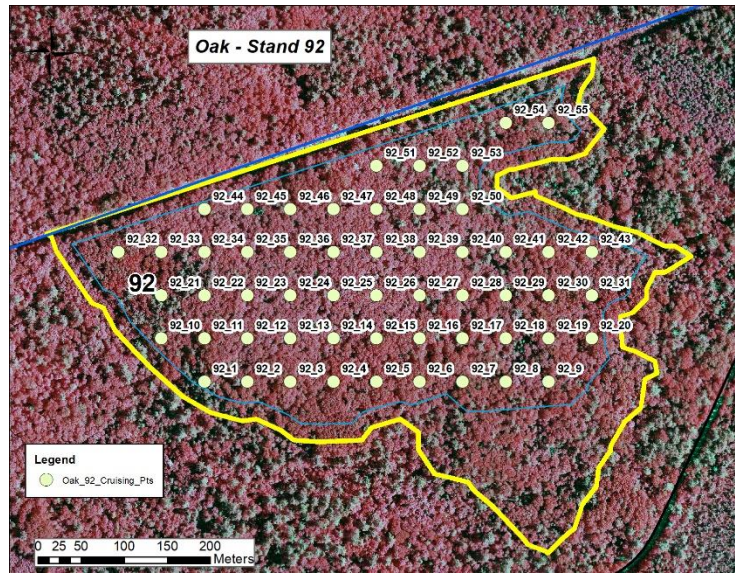
Mixedwoods



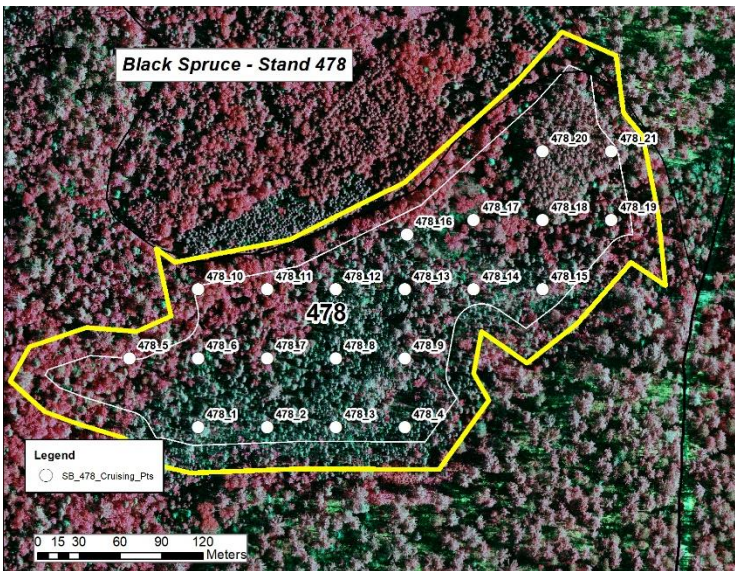
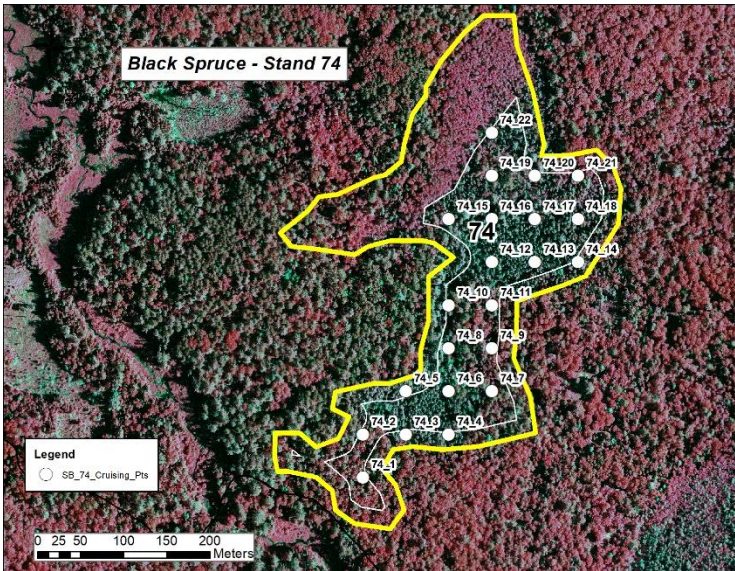
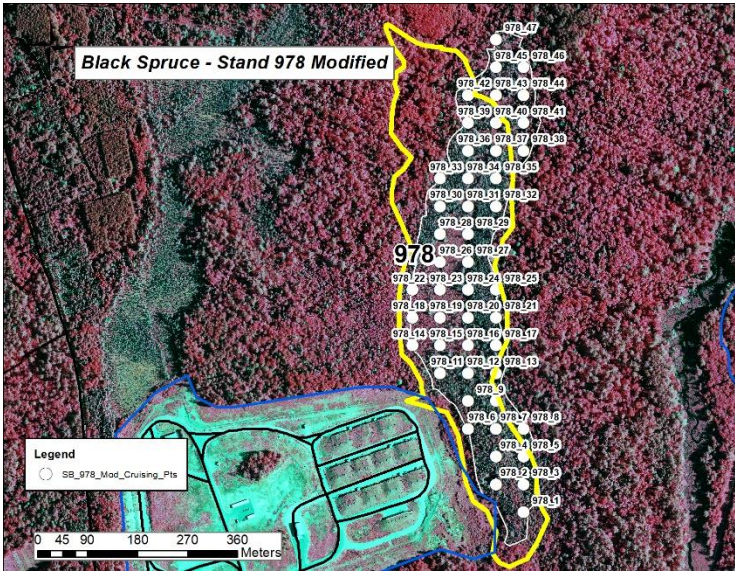
Tolerant Hardwoods



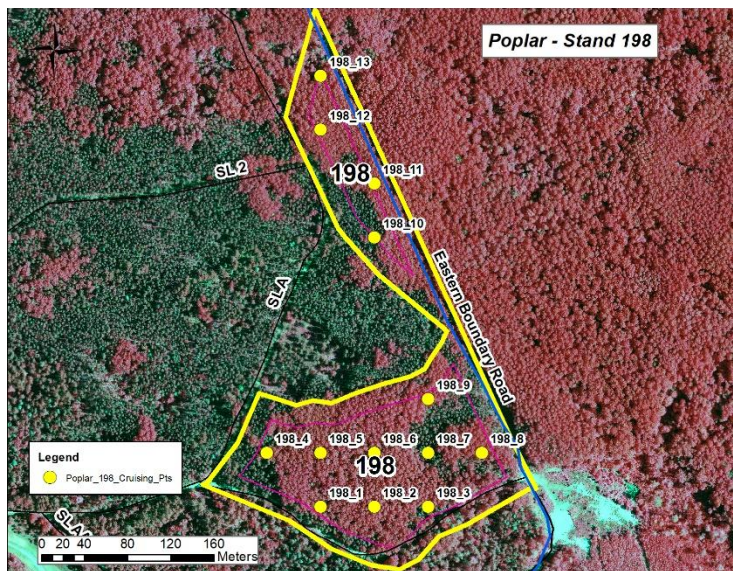
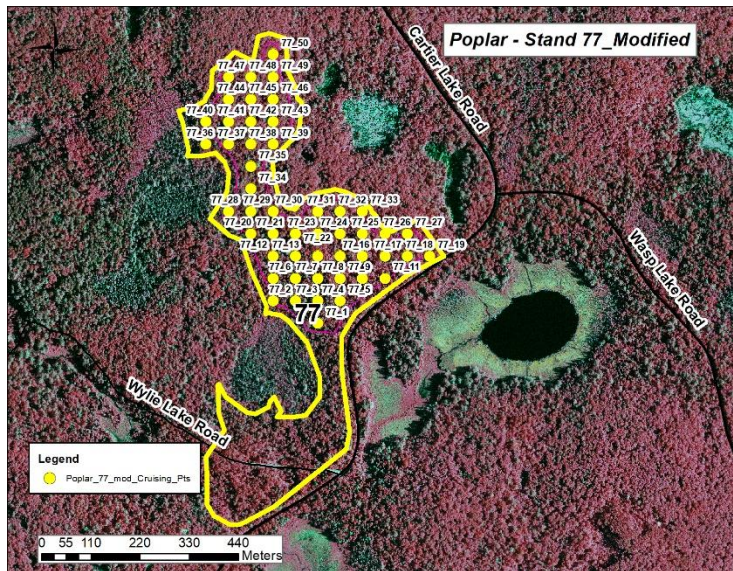
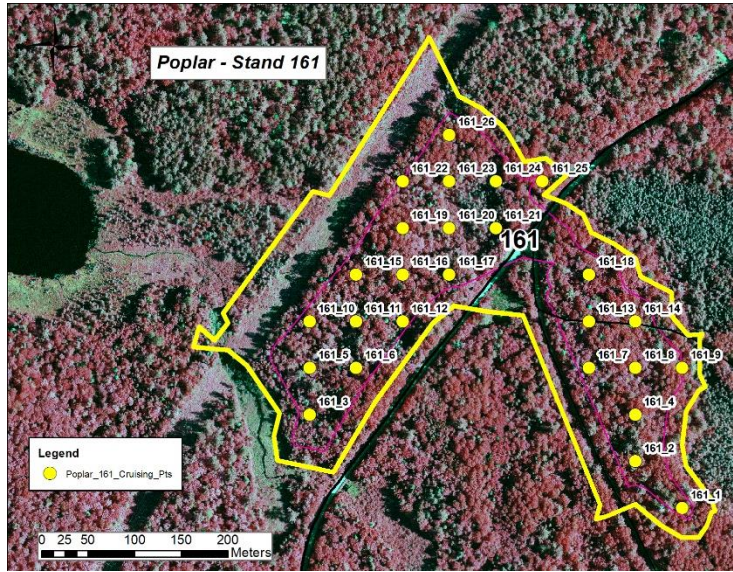
Oak



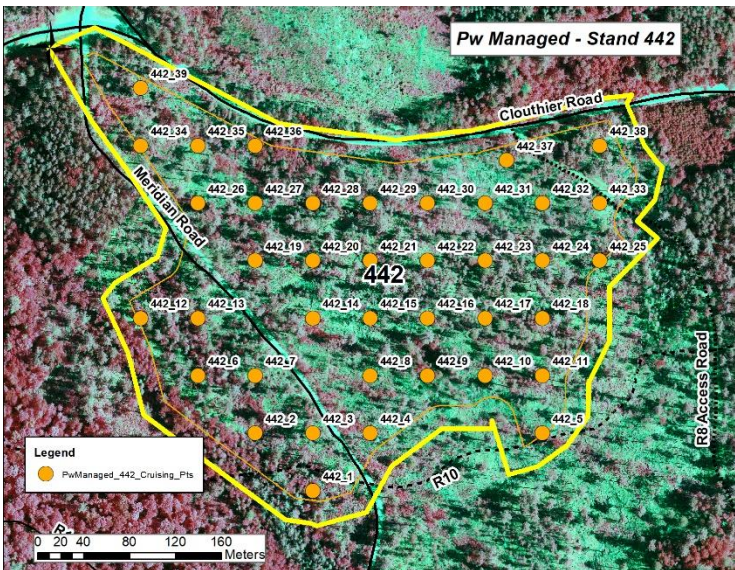
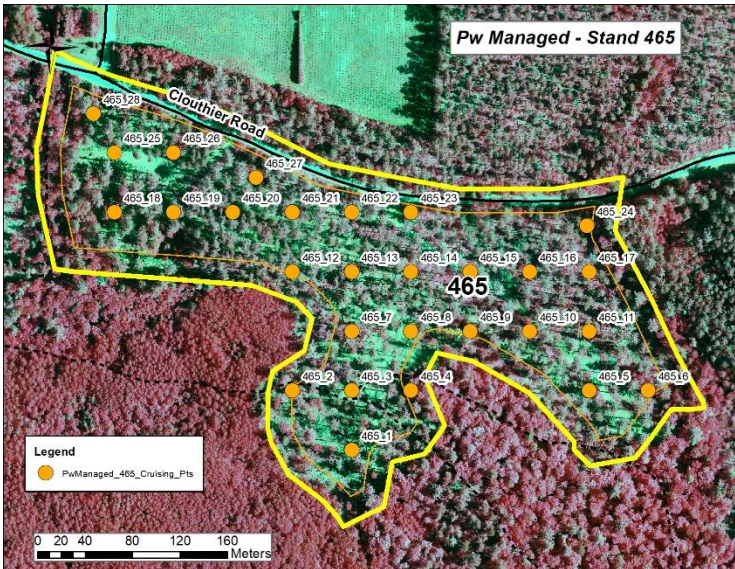
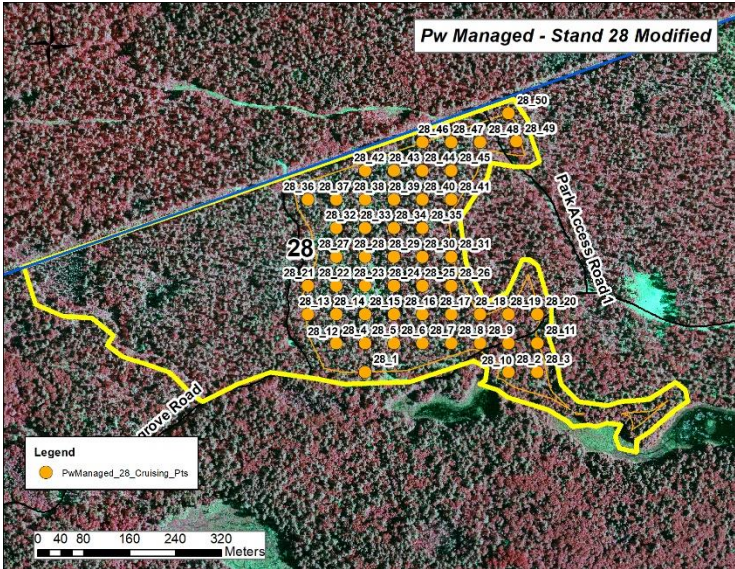
Black Spruce



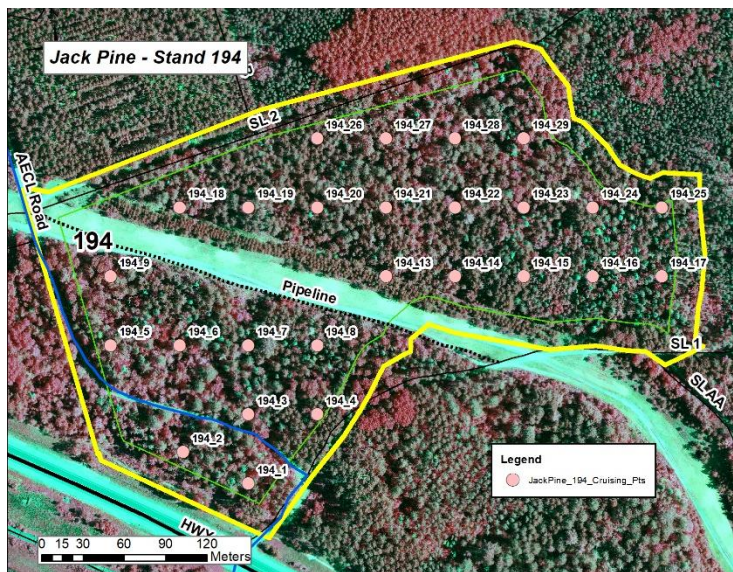
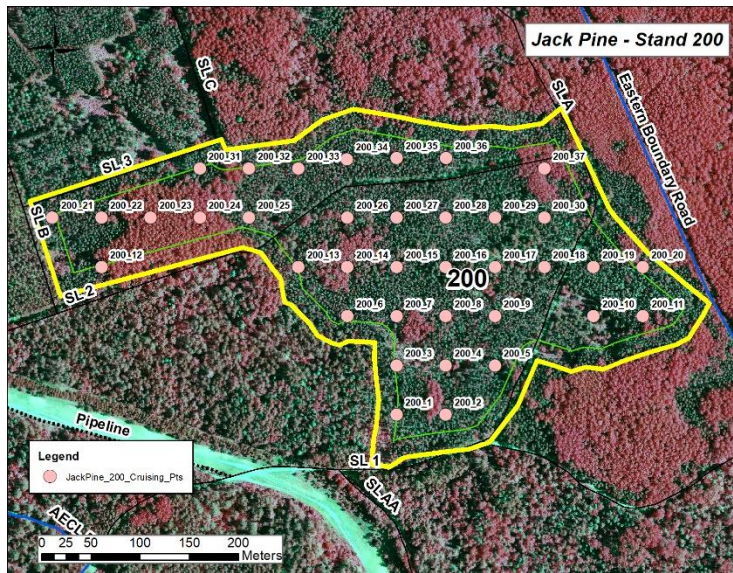
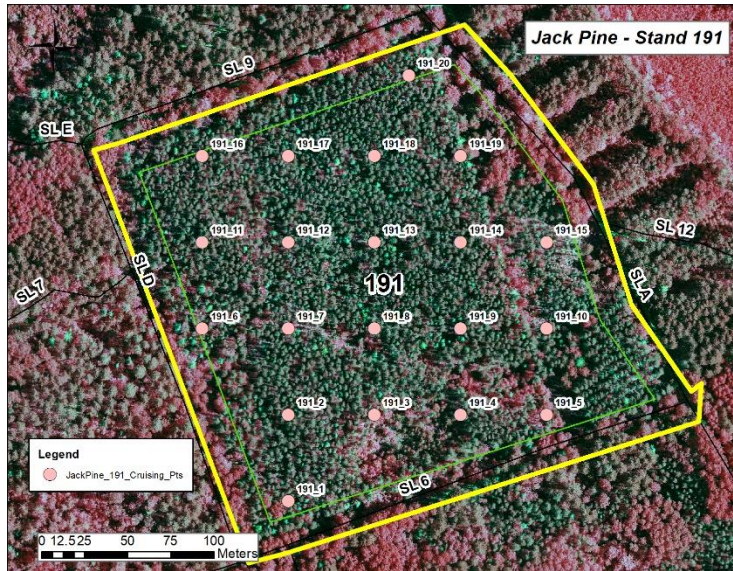
Poplar



White Pine Managed



Jack Pine



White Pine Natural

