Forest Stand Improvement and Inventory Analysis Amendment Report

Saint Regis Mohawk Tribe

USDA-NRCS EQIP

Farm 2685 Tract 11430, 11431

Total 730 acres

August 2014 - February 2017

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Introduction and Purpose

This report provides an overview of the activities and outcomes of the forest stand improvement project and the benefits that it will provide to the Saint Regis Mohawk Tribes forest lands. It will also act as a supplement to the Saint Regis Mohawk Tribes Forest Inventory analysis report that was completed in 2003 which assessed the forest resource attributes on the reservation.

The Saint Regis Mohawk Tribe received assistance from the United States Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS) under its Forest Stand Improvement (FSI) 666 Farm Bill Program to conduct a forest stand improvement cut with a focus on ash mitigation as a means to head off the potential risks from the invasive beetle, the Emerald Ash Borer (EAB) *Agrilus planipennis*. In New York State the closest known infestation of EAB is in Rome New York, but the larger threat lies to the north in Canada. EAB is currently known to be in Cornwall, Ontario according to Canadian authorities as of June 2013. This infestation is less than 1.5 miles away from the reservation. Because of its close proximity, EAB poses a very high risk to the health of tribal forests.

The purpose of the FSI 666 is to improve the forest by adjusting the number of trees per acre or the understory vegetation. The primary purpose is to enhance health and vigor of the stands, or to modify stand species composition. Such stands offer more abundant wildlife habitat, more diverse plant communities, and more resilient forests with reduced potential for damage by wildfire, pests, and moisture stress. At the same time, forest stand improvement may also be used to initiate stand regeneration and restore native plant communities, including desired understory plants. Other purposes include improving recreation, aesthetic and open space values, water quality protection, water conservation and yield. Forest stand improvement aids in the management of carbon storage and uptake. Another purpose of this practice is to increase the future quantity and quality of forest products. Harvesting forest products is often a secondary benefit of forest stand improvement.[1]

In accordance with the Saint Regis Mohawk Tribe Custodial Forest Management Plan (FMP) that describes the Tribes management practices to ensure the health of the forests on the reservation for the benefit of the community members, the United States Forest Service (USFS) created an addendum the FMP with regard to EAB concerns. The revision presents forest management options with the goal to reduce EAB risk in forest stands. The strategies are:

- *Forest stands with a minor component (<20%) of ash*—If potential economic damage is low, continue normal long-term management of the stands, because management goals can be met even if all of the ash die or are harvested as a result of EAB infestation. However, ash may be considered a less desirable species and consideration may be given to thinning ash to shift stand to best residual (non-ash)

trees. Openings may need to be monitored and/or treated for intended regeneration.

- *Forest stands with a medium component (20%-40%) of ash*— If potential economic damage is moderate, normal long-term management of the stands may be continued, but reduce the proportion of ash during scheduled stand entries. The target for ash in these stands would be <20% of the species composition, while still leaving well stocked stands. This target allows for meeting long-term management objectives in the event that all of the remaining ash are killed or harvested due to EAB infestation. Some stands may need multiple entries to achieve the goal of reducing the ash component to <20%. Ash with low vigor and poor form should be removed first.
- *Forest stands with a major component (>40%) of ash*— If potential economic damage is high, long-term management activities may be continued while considering harvesting high-value ash and low-quality residual non-ash trees to favor desirable species and quality trees. Development of a regeneration plan may be critical if natural regeneration is limited. In general, either one of two timing options may be considered:

I. Reduce the proportion of ash during scheduled stand entries, following the standard order of removal guidelines when selecting trees to retain and remove, except that no more than 20% of the crop trees should be ash. Multiple stand entries will be needed to reduce the ash component to the target level. This timing option may be preferred if known EAB infestations are more than 15 miles away (see below).

II. Convert the stands to other species, regardless of the rotation age. Attempt to keep the stands fully stocked while favoring non-ash species and removing all ash trees and ash regeneration. Other options may need to be considered if the above actions are not practical because of harvesting impacts or because management objectives cannot be met. This timing option may be preferred if known EAB infestations are less than 10 miles away (see below).

While the potential economic impacts of EAB infestation are dependent on the ash inventory of a stand, the proximity to known EAB infestations play an even greater role in the risk of a stand becoming infested. Forest stands more than 15 miles from known EAB infestations may be considered low risk for EAB invasion over the next 5 years, whereas stands within 10 miles of known EAB infestations are at a higher risk of EAB invasion in the next 5 years. That estimate, however, is highly dependent on human-aided movement of EAB-infested material. For instance, forest stands located within a quarantined area may be at a higher risk of infestation because infested ash material may move freely within the quarantined area, increasing the likelihood of rapid spread of EAB in the area. As a result, the following recommendations should be considered regarding proximity to known EAB infestations:

- *Forest stands located more than 15 miles from a known EAB infestation*—These stands are generally low risk for EAB invasion in the next 5 years. Manage the stands with ash according to the general silvicultural guidelines outlined above.
- *Forest stands located less than 10 miles from a known EAB infestation*— These stands

are at a higher risk for EAB invasion in the next 5 years. Salvage and pre-salvage harvest of all or most of the ash is recommended because these trees are at high risk of being killed by EAB. Manage the residual stand according to silvicultural 14 guidelines for the cover type if the residual stand still meets minimum stocking standards (C-line). If the residual stand does not meet minimum stocking standards, regenerate the stand to non-ash species according to silvicultural guidelines for the appropriate cover type.[2]

Background

The Saint Regis Mohawk Tribe is located on the north side of Franklin County, New York, bordering the St. Lawrence River. **Figure 1** shows the location of the reservation. The topography across the forest is gently rolling, ranging from about 170 to 300 feet above mean sea level. Being adjacent to the St. Lawrence River Valley, the topography and soils are influenced by the last glaciations, alluvial soils being moved through the Great Lakes drainage. A second watershed is the St. Regis River, flowing out of the Adirondack Mountains into the valley. The Reservation is forest land (about 10,000 acres), followed by abandoned agricultural land, and then light commercial and residential development. Land use patterns on the reservation are in a state of change and as the reservation population increases there is coincidental commercial and residential development growth and resultant impacts to the forest.

The operable forest land consists of approximately 6,860 acres and 5,481 acres of commercial lands. The forest type is dominated by deciduous hardwoods, including quaking aspen, basswood, sugar maple, red maple, and other river-bottom hardwood species. The Forest Stand Improvement forested area contractually know as Farm 2685, Tract 11430 and 11431 consists of a total of 730 acres of forested land located in the south west corner of the reservation. Tract 11430 is 180 acres located along Conners road and Tract 11431 is 550 acres adjacent to Frogtown road and Helena road. **Figure 2** shows its approximate location.

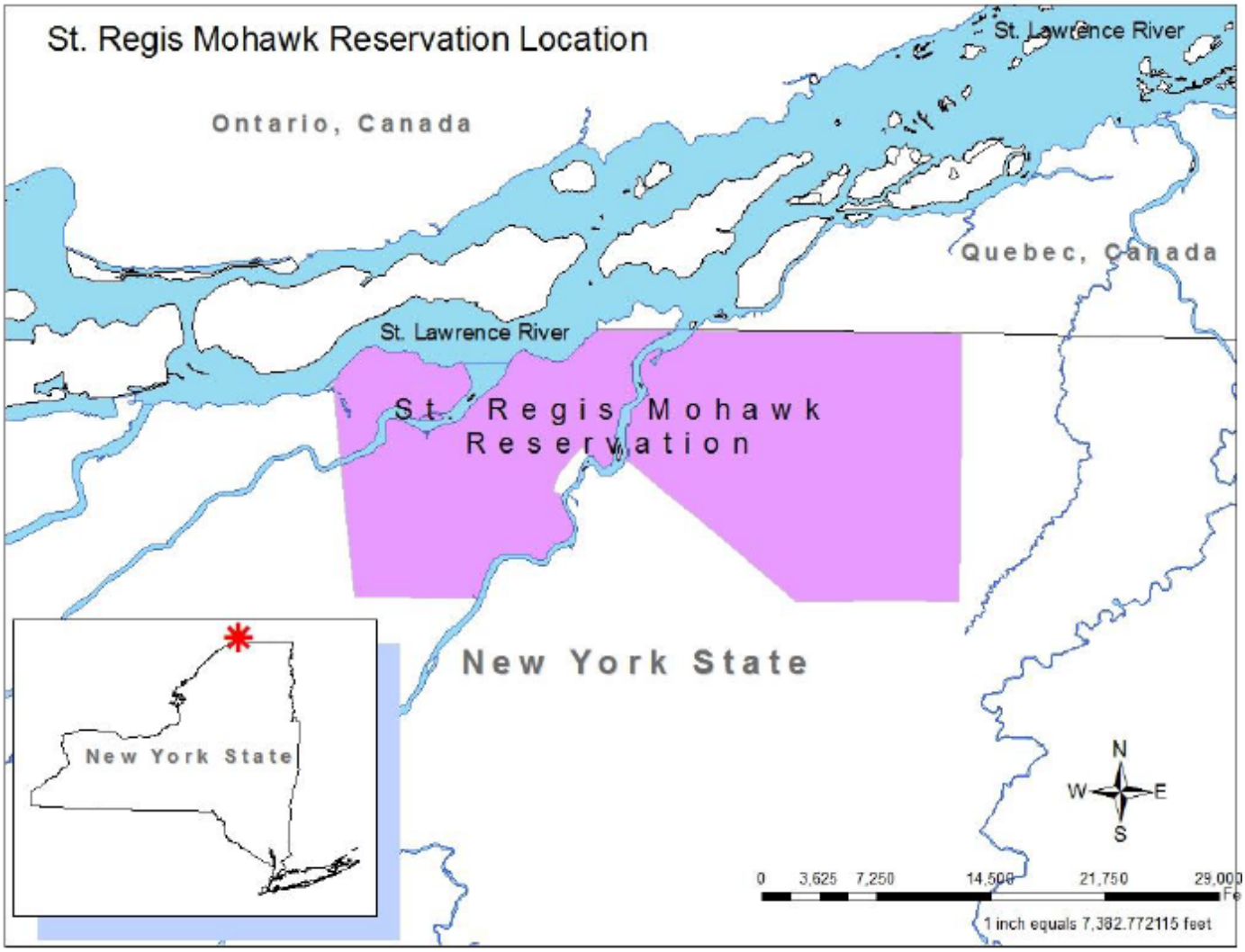


Figure 1 Location of Saint Regis Mohawk Reservation

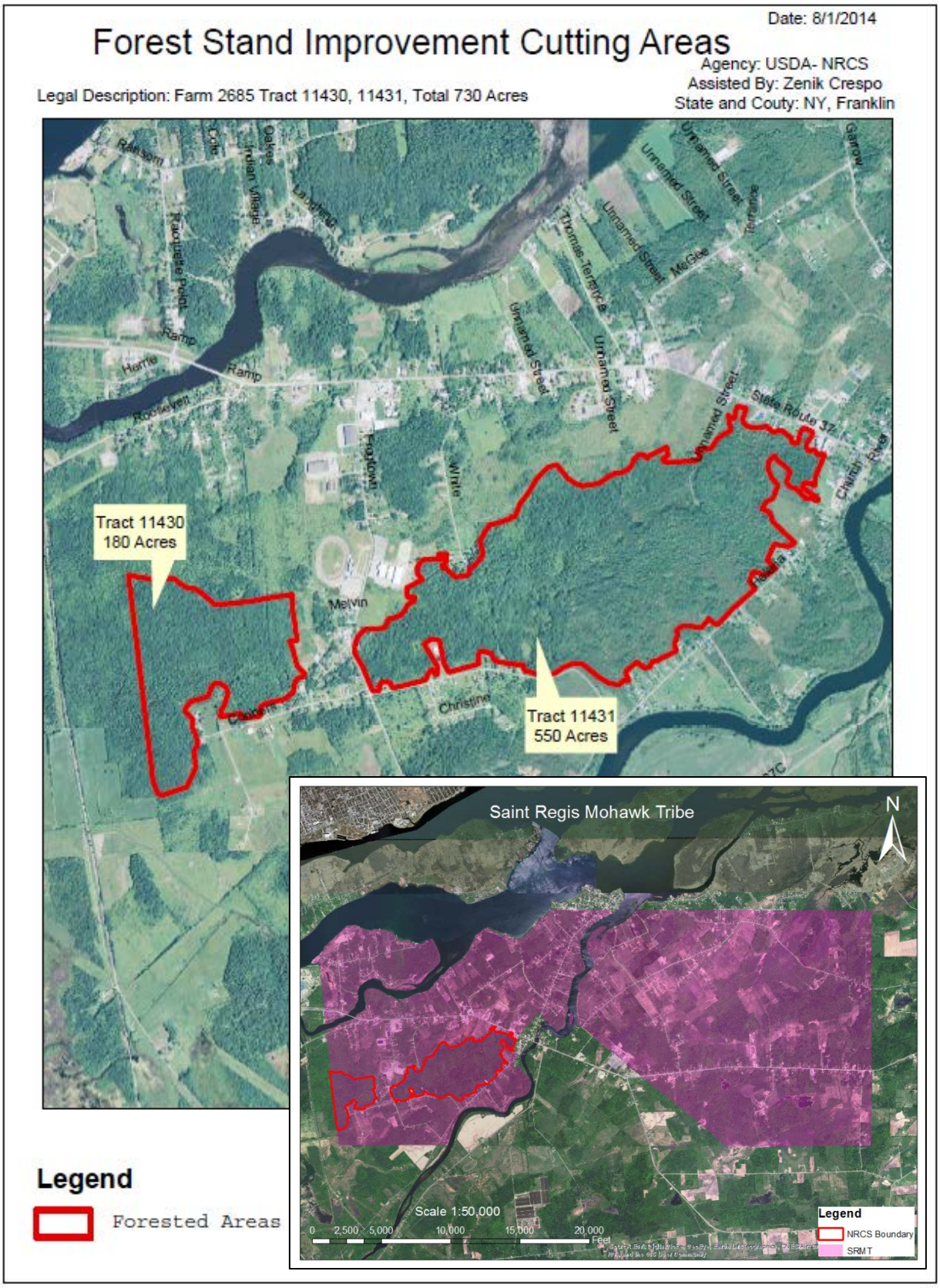


Figure 2 Location of Tract 11430 and 11431

Methods

Prior to the initial start of the project, consultation with the tribal clerk's office was required to identify and delineate tribal members plot number association within tract 11430 and 11431. A public news announcement was released describing the FSI project and requesting assistance from landowners within the targeted areas. Landowners were then contacted directly to gain permission to access the properties and conduct the required work. A total of 33 landowners participated in the project.

During the initial entry to tract 11430 and 11431 a reconnaissance cruise was conducted to delineate different forest types and map out the forest stands. Orthophotos were used get a general idea of the forest cover and then ground truthed to confirm. Stands were then marked out with the use of a hand held global positioning system (GPS) and later mapped out in ArcMap 10.2.2. A total of 23 different forest stands were defined. This can be seen below in **Figure 3 and 4**.

The inventory was conducted with a focus on species composition (%), BA/ac, TPA, and average DBH. A total of 311 BAF10 prism plots were used to sample Tract 11430 and 11431. Plot point centers were established with the use of the fishnet overlay data management tool in ArcToolbox (ArcMap 10.2.2) and uploaded into a hand held Trimble Nomad to be viewed and located in ArcView. The number of sample points needed was determined by the range-mean ratio of basal area technique for a given sampling error percentage of 15% or less. At each BAF10 plot point "in trees" species and DBH to the nearest inch were recorded. The data from the inventory was then analyzed using Microsoft Excel to calculate species composition, average DBH, Basal area, and number of trees per acre for each stand. From the information collected for each stand and soils maps (**see figure 5 and 6**) for Tract 11430 and 11431, FSI cutting prescriptions and marking guides were generated based off of current site conditions and soil types best suited for specific tree species. These prescription and marking guides were also fashioned in accordance with the Saint Regis Mohawk Tribe Custodial Forest Management Plan. Trees in each stand were marked with either orange or blue blaze paint (orange paint = no cut, blue paint = cut) in order for the 4 man cutting crew to determine which trees will be removed and which ones will not. Trees were then felled, cut to log length and left for the property owners to utilize. Tops were cut to 1 meter lengths to reduce the amount of slash and increase the rate of decomposition. Marking guides for tract 11430 and 11431 can be seen in **Figure 7 and 8**.

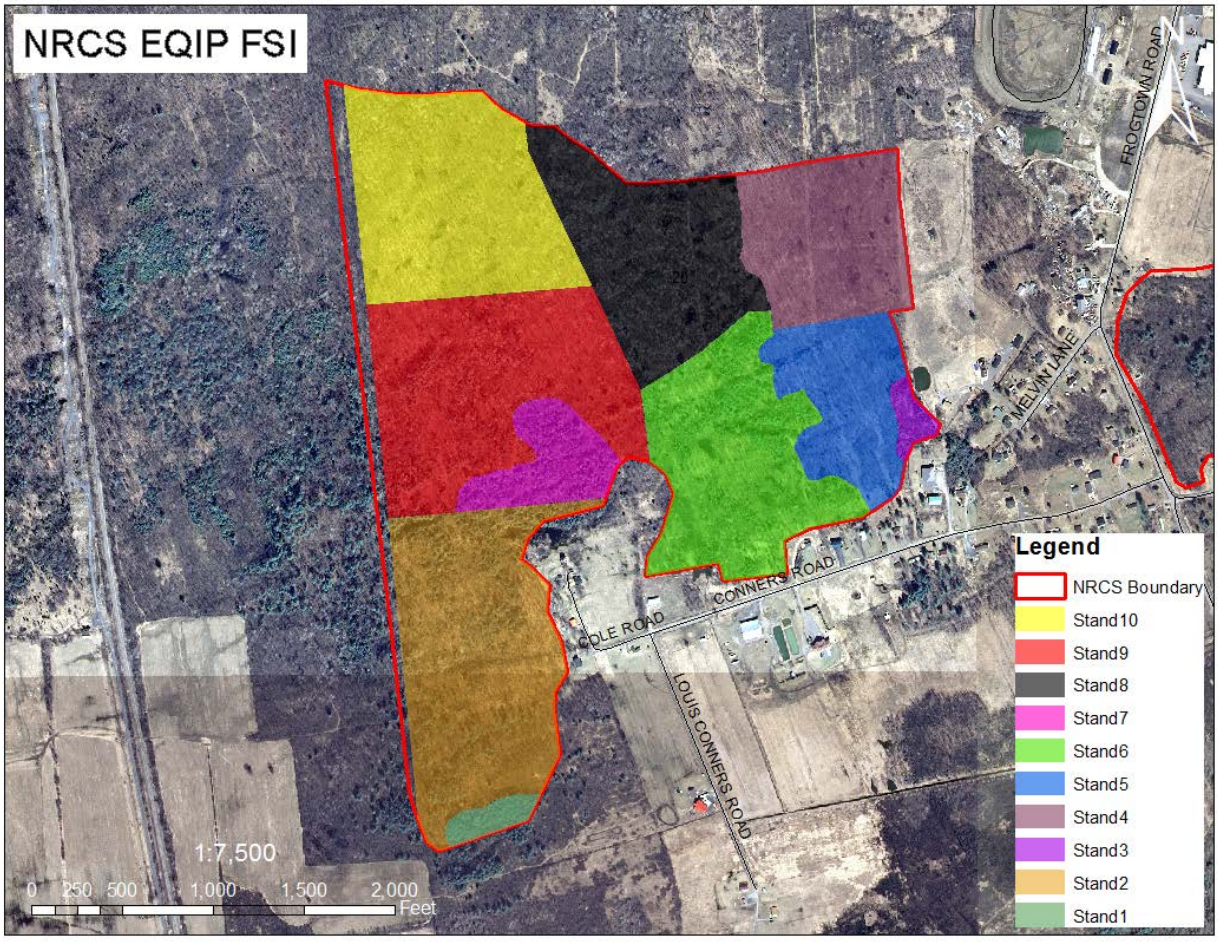


Figure 3 Stand Map for Tract 11430

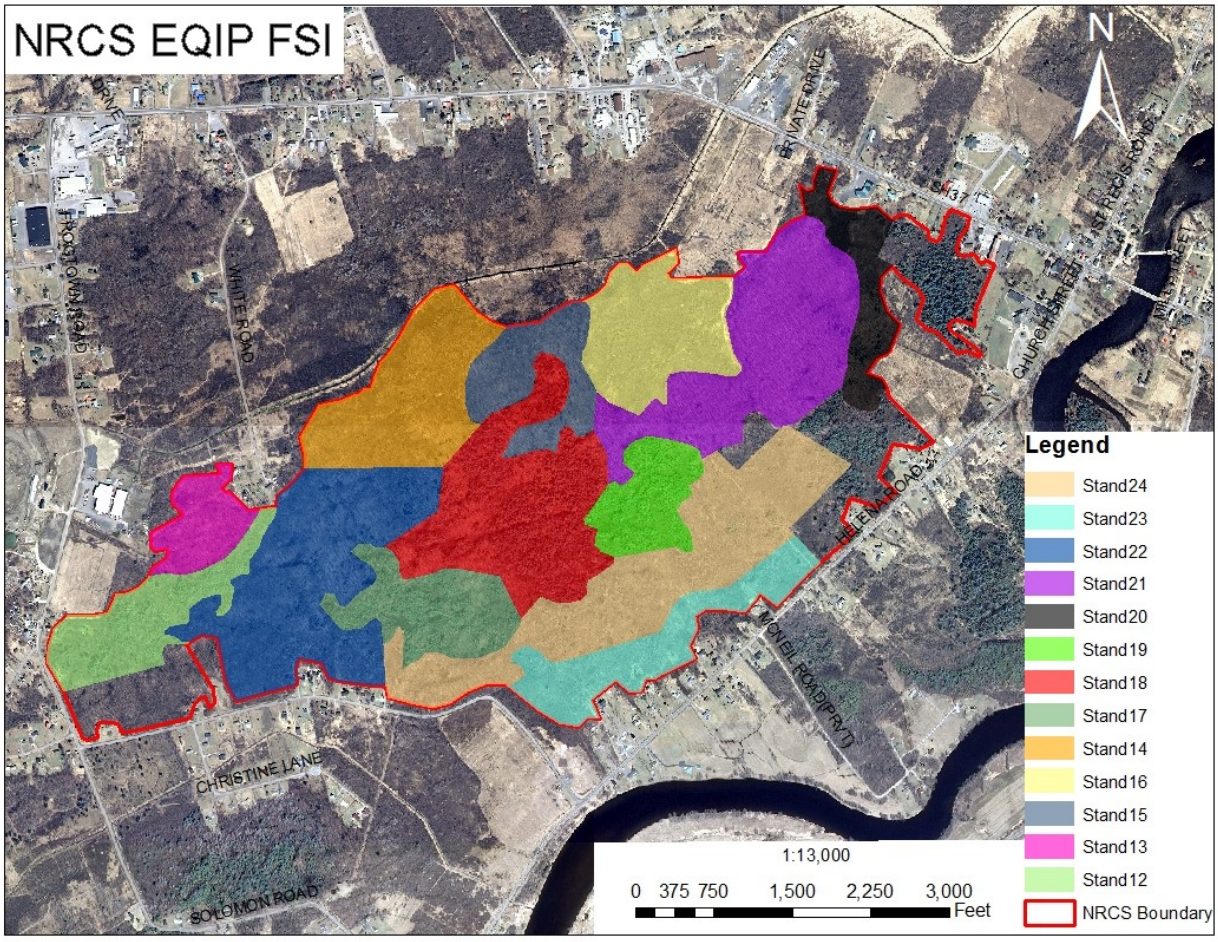
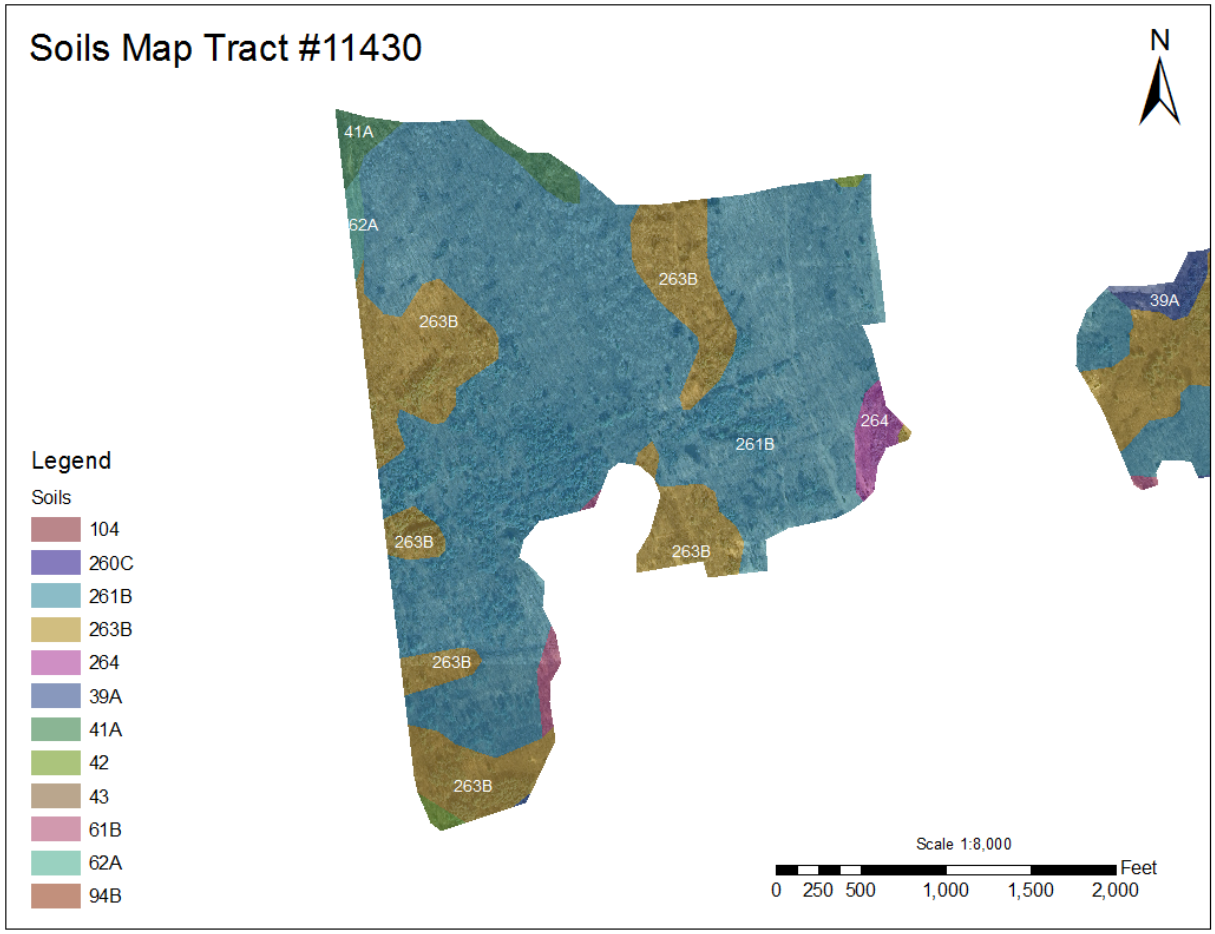
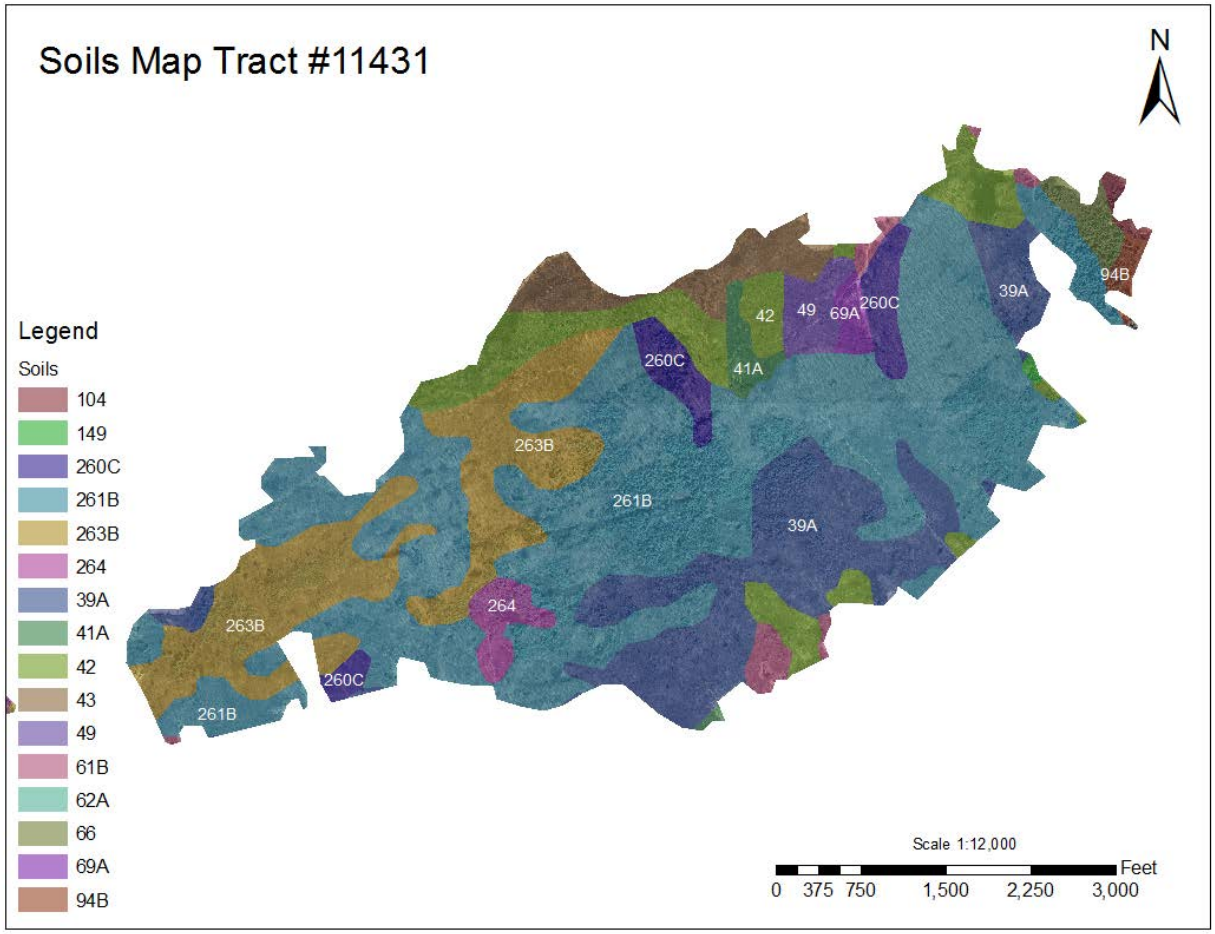


Figure 4 Stand Map for Tract 11431



ID	Soils Description
39A	churchville variant silty clay loam; 0 to 3 percent slopes
41A	muskellunge silty clay loam; 0 to 2 percent slopes
42	adjidaumo silty clay
43	adjidaumo mucky silty clay
49	munuscong mucky fine sandy loam
61B	hogansburg fine sandy loam; 3 to 8 percent slopes
62A	malone loam; 0 to 3 percent slopes
66	matoon silty clay loam; 0 to 2 percent slopes
69A	coveytown loamy sand; 0 to 3 percent slopes
94B	neckrock-summerville complex; strongly sloping; very rocky
104	udorthents; wet substratum
149	pinconning mucky loamy fine sand
260C	grenville loam; strongly sloping; very stony
261B	hogansburg loam; gently sloping; very stony
263B	malone loam; 0 to 8 percent slopes; very stony
264	runeberg loam; very stony

Figure 5 Soils Map for Tract 11430



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263B	malone loam; 0 to 8 percent slopes; very stony
264	runeberg loam; very stony

Figure 6 Soils Map for Tract 11431

Tract 11430	Acres	Avg. DBH	BA/ac removed	TPA removed
Stand 1				
Stand 2	31.5	13	2.4	6.1
Stand 3				
Stand 4	17.2	9	12.3	66.1
Stand 5				
Stand 6	24.3	10.3	1.4	11.3
Stand 7				
Stand 8	22.5	9.6	3.7	24.3
Stand 9	29.9	11.2	3.5	9.9
Stand 10	27.4	10.5	6.8	23.1

Figure 7 Marking Guide for Tract 11430

Tract 11431	Acres	Avg. DBH	BA/ac removed	TPA removed
Stand 12	27.8	7.3	7.9	68.5
Stand 13	14.6	8.1	1.4	6.4
Stand 14	41.7	7.2	1.4	10.0
Stand 15	22.8	10.1	0.2	0.9
Stand 16				
Stand 17	27.5	8.5	24.5	165.6
Stand 18	60.6	9.9	0.5	1.7
Stand 19	19.8	8.8	27.4	206.1
Stand 20	18.7	9.6	0.1	2.2
Stand 21	61.2	10.3	1.0	4.9
Stand 22	66.5	8.5	0.5	2.2
Stand 23	29.6	7.1	0.1	2.0
Stand 24	68.6	8.5	0.1	1.9

Figure 8 Marking Guide for Tract 11431

Results

The information collected conceives a dual purpose in describing the outcome of the FSI project and updating the Saint Regis Mohawk Tribes *Forest Inventory Analysis Report 2003*. Because of this, the information will be broken down into two categories; a description of the FSI project its self and an analysis of the data collected from the inventory.

For the purpose of the NRCS FSI Project the inventory in Tract 11430 and 11431 was conducted on a single or per stand basis. This information was used to determine what method of management would be used in each specific stand and not across the Tracts overall. Because of this the resulting information is in a stand specific arrangement and does not summarize the Tracts overall. The inventory data collected will act as a complimenting feature to the Saint Regis Mohawk Tribes *Forest Inventory Analysis Report 2003* and help to update the existing inventory. Because the FSI Project area only covers a small portion of the reservation lands it will not represent the surrounding forested lands of the reservation respectively. The following results are representative of Tracts 11430 and 11431.

FSI Project Logistics

- The project took a total of 653 hours to complete the forest inventory, calculations and marking on the 651 acres. This is equivalent to 1 hour per acre.

- Approximately 248 office hours and 405 field hours. 132 hours were dedicated to obtaining landowner permissions and signatures.

- The 4 man cutting crew took a total of 4,480 hours over the course of 8 months to complete the work. It should be noted that 2 of the 8 months the crew consisted of only 2 employees. This is equivalent to 6.9 hours per acre.

- Approximately 160 hours in chainsaw maintenance, 112 hours in travel to and from work site and 4,208 hours of cutting.

- The project took a grand total of 5,133 man hours. This is equivalent to 7.9 hours per acre.

- Approximately 15.1 TPA (*4,953 Ash Trees*) with an average DBH of 9.4” totaling 34.1 BA/ac were removed from the 328 acres that qualified for the Ash species reduction (*Forest stands with < 20% Ash Species).* The remaining 402 acres that had >20% ash species were either not treated or FSI cutting was implemented.

Inventory analysis

A total of 674 acres were inventoried in Tracts 11430 and 11431. The overall averages for both Tracts are; average DBH of 9.3, average Basal area per acer of 85.9, 600.2 Trees per acre, and Green Ash being the most common species present. **Figure 9** shows the summary of each stand. **Appendix A** gives a complete description of each stand and treatment.

Stand Summary Table

Tract 11430, 11431	Acres	Avg. DBH	BA/ac	TPA	Dominant Species
Stand 1	1.8	13.4	150	202.9	White Pine (97.7%)
Stand 2	31.5	13	85.8	223.9	Green Ash (24.0%)
Stand 3	1.5	3.8	73.3	1582	White Cedar (86.4%)
Stand 4	17.2	9	69.2	568.6	Green Ash (53.3%)
Stand 5	12.7	11.3	84	405.5	Sugar Maple (33.3%)
Stand 6	24.3	10.3	91.3	560.5	Green Ash (23.5%)
Stand 7	7.3	10.7	85	384.1	Eastern Hemlock (20.9%)
Stand 8	22.5	9.6	85.3	477.3	Quaking Aspen (41.7%)
Stand 9	29.9	11.2	78	245.2	Green Ash (32.5%)
Stand 10	27.4	10.5	98	394.9	Green Ash (31.3%)
Stand 12	27.8	6.6	109.3	951.5	White Cedar (47.0%)
Stand 13	14.6	9.9	95.7	434.6	Green Ash (23.9%)
Stand 14	41.8	8.4	76	558.1	Green Ash (25.4%)
Stand 15	22.8	10.9	96.7	383.3	Sugar Maple (13.8%)
Stand 16	38.5	3.38	8	292.9	Speckled Alder (37.5%)
Stand 17	27.5	8.2	105.3	711.6	Quaking Aspen (26.6%)
Stand 18	60.6	11.6	106.7	377.1	Sugar Maple (27.5%)
Stand 19	19.8	6.4	117.9	887	White Cedar (75.2%)
Stand 20	18.7	7.9	45	909.1	Sugar Maple (20.6%)
Stand 21	61.2	12.4	115.6	587.4	Sugar Maple (56.2%)
Stand 22	66.5	10.8	94	459.2	Sugar Maple (24.8%)
Stand 23	29.6	5.9	39.3	943	Quaking Aspen (29.1%)
Stand 24	68.6	7.8	66.4	1265.4	Quaking Aspen (34.4%)
Total/Avg.	674.1	9.3	85.9	600.2	

Figure 9 Tract 11430 &11431 Stand Summary Table

Considerations

In contrast with the previous inventory *The Forest Inventory Analysis Report 2003*, a comparison of Tract 11431 and stands 3, 4, and 17 of the 2003 inventory show the most applicable correlation based on geographic location (See **Figure 10**). Many of the stands inventoried back in 2003 were fully stocked and had potential to be Pre-commercially thinned. If this thinning was conducted at that time it would have not been financially feasible due to the small returns on investment and lack of funding. Because of this, the stands current state (2014) is overstocked with stagnation in growth in terms of trees DBH. The average DBH has not readily increased and the number of trees per acre has increased significantly, this indicates a need for thinning due high densities of small diameter trees. This association can be seen in **Figure 11**.

Species composition comparison between the *Forest Inventory Analysis Report 2003* and the 2014 FSI Project Report are best referenced by Stand 2 in Track 11430. The average DBH 13'' in stand 2 is considered Upland Hardwoods Sawtimber (10''<) according to *The Forest Inventory Analysis Report 2003.* The total Basal Area/ac of 85.8 and 223.9 Trees/acre most closely represent the average forest in Akwesasne. Also much of the inventory for the FSI project took place in the upland sawtimber according to the forest cover type map in the 2003 inventory. Comparing figure 6 of the 2003 report to species composition in stand 2 can be seen below in **Figure 12**.[3]

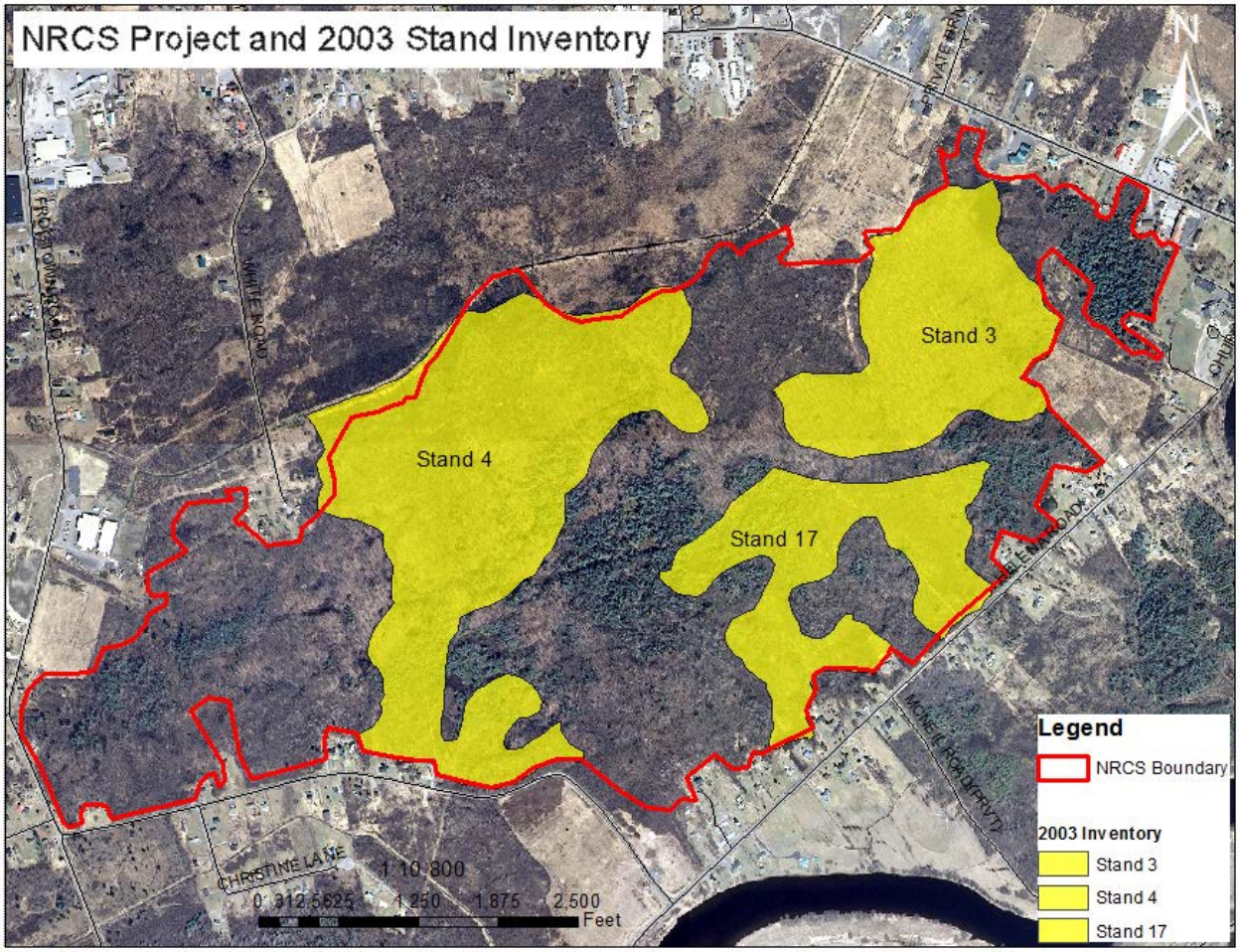


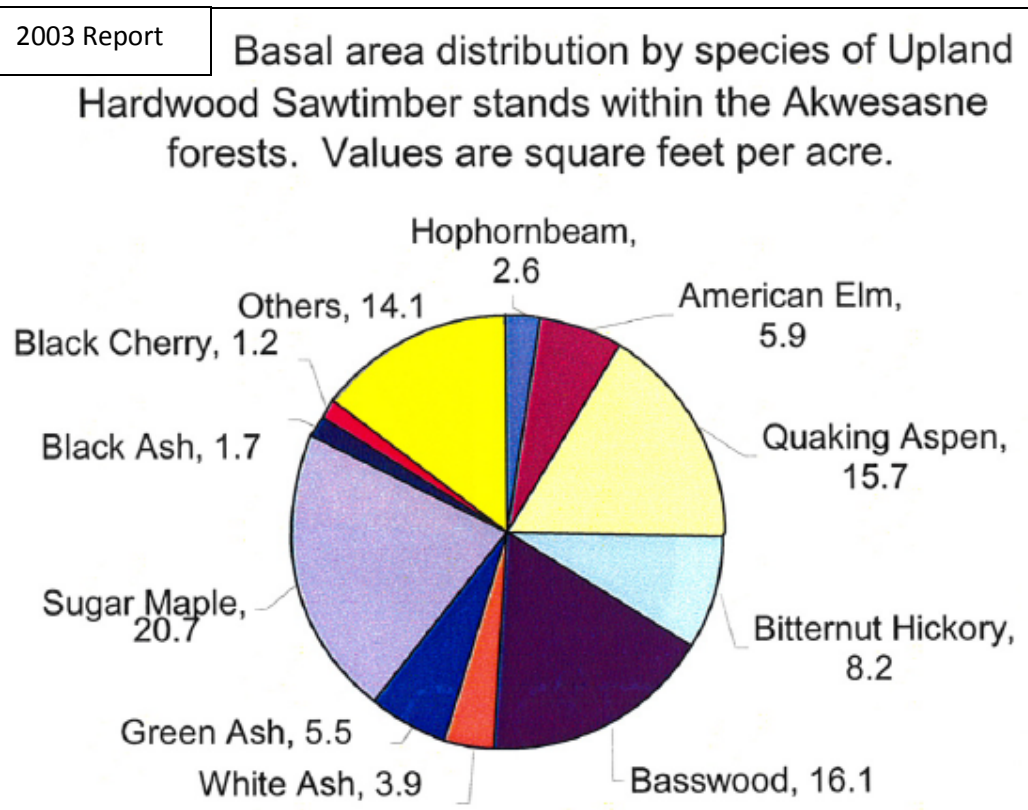
Figure 10 FSI Tract 11431 and the Forest Inventory Analysis Report 2003

Comparison of Tract 11431 and 2003 Inventory

Tract 11431					*2003 Inventory*				
Stand	**Acres**	**Avg. DBH**	**TPA**	**BA/ac**	**Stand**	**Acres**	**Avg. DBH**	**TPA**	**BA/ac**
21	61.2	12.4	587	115	3	62.5	12.6	204	93
14	41.8	8.4	558	76	4	131	10.9	235	95
24	68.6	7.8	1265	66	17	-	-	-	-

Figure 11 Tract 11431 and 2003 Inventory

2003 Report



FSI Project

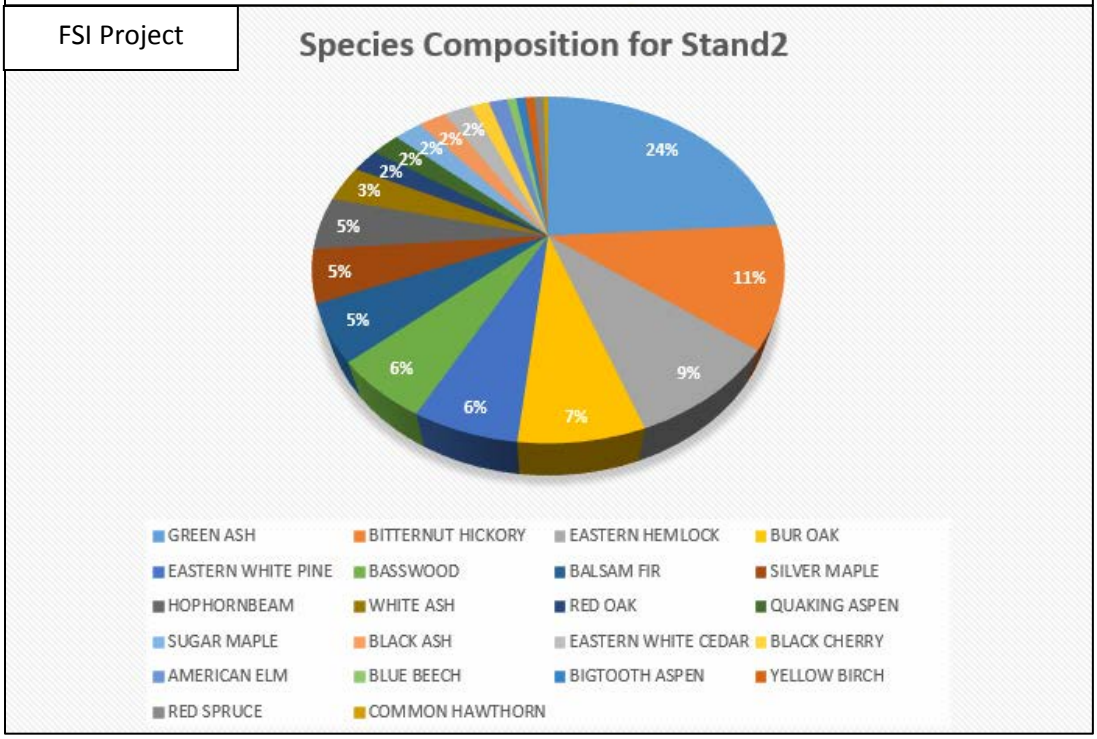


Figure 12 Comparing species comp. of the 2003 report & Stand 2 FSI Project

Conclusions

The main goal of the FSI project was to create a forest that developed a resistance to EAB by both stalling the changes caused by EAB and improving the defensives of the ecosystem against that change. By taking transitional actions towards EAB a system that encourages change can be created. In turn this will support an ecosystem transformation or a response to the change in a targeted fashion. Anticipating the change that will occur will help move the forest system towards that projected change in a controlled manner.

By removing/reducing the percentage of ash species there will essentially be a reduction in the potential for supporting higher populations of EAB. A smaller population lessens the potential damage and delays the time in which that damage will occur. In short, the FSI will provide resilience for the remaining forest, lessen the potential for forest fire by reducing the anticipated down woody debris load, provide space and additional time for a replacement species in the absence of ash, and moderate the dramatic effect on the local biosphere that will occur.

Other benefits provided by the FSI cut are the potential to increase wildlife habitat, promote biodiversity, protect against invasive species, protect against climate change, and an overall increase in timber value. The patch clear cuts of quaking aspen will trigger the regeneration of sapling and pole size aspen shoots which provide cover and a primary food source for Ruffed Grouse. Ruffed grouse thrive in a dynamic landscape with episodic site disturbance so by creating 3 aged class site conditions proves to be the most beneficial form of management. Young aspen 6 to 25 years for nesting and food, mature aspen 25+ years for roosting, and dense saplings 4 to 15 years for brood cover.[4] The Northern white cedar regeneration will provide habitat for Deer in both food and critical over wintering cover and potentially benefit the current low population of deer in the area. The layering of cedar provides a vertical structure through its unique crown form and vegetative reproduction. Cedar contributes to biodiversity, increases local tree species richness and is considered a very important non-timber resource providing medicines and culturally significant materials.[5]

The resulting biodiversity created by the FSI cut will help the forests health overall and improve its ability to respond to future stresses and invasive species. EAB is one of many invasive species threatening the forest, in particular Common Buckthorn *(Rhamnus cathartica)* was also considered a high risk invasive in the FSI project and was managed for along with EAB. The Saint Regis Mohawk Tribe's pesticide technician assisted in the treatment and removal of buckthorn to improve and insure the regeneration of the understory. Buckthorn was treated with a cut stump herbicide application of glyphosate in the last two weeks of August to assure full root permeation. This treatment will be monitored in the subsequent years to insure its success and re-treated if necessary.

The FSI cut will help protect against future stressors of climate change by moving the species composition in the direction of the projected/predicated species composition shift that will occur due to a warming climate. The Northeast Climate Impacts Assessment (NECIA) projects species diversity will be altered towards a monoculture and a shift of southern species will encroach on northern acclimatized species creating competition for the existing forest. There will be more frequent precipitation events in the spring and fall and longer, dryer summers with droughts lasting longer than 20 days. This could potentially stress and kill many of the species not accustomed to drought or extended flooding. The threat from invasive species will be even greater due to the longer growing season and milder winters with less snowpack and higher average temperatures which will reduce the amount of winter kill in insects. Also, nitrogen loss will be accelerated from faster decomposition triggered by warmer soils. By favoring drought and heat tolerant species, maintaining soil quality and nutrient cycling, and promoting age class diversity in specific species the FSI cut will help protect the forest in the years to come.

Many of the stands in Tract 11430 and 11431 were in need of thinning based on the data collected from the inventory and the inventory conducted in 2003. The FSI cut focused on releasing desirable species with good quality and removing ash trees with poor form and low quality that impeded or out competed the preferred species. By removing the competing ash trees it effectively reduces crowding and increases the diameter growth of residual trees. This increases the correlation of tree diameter and tree volume. Additionally, thinning reduces stagnation in growth which reduces excessive tree mortality, reduces invasive species susceptibility and extends the rotation length for trees to reach maturity.

Recommendations

In order to better monitor the changes on the Saint Regis Mohawk Tribes forest lands, the establishment of Continuous Forest Inventory (CFI) plots would be very beneficial to updating and maintaining the forest inventory database. The Consistent data collection should be conducted annually measuring species, size, health of trees, tree growth, mortality, and removal by harvest. This will provide a baseline and help to measure changes over time. A CFI would aid in future management decisions and project how forests are likely to appear 10 to 50 years in the future. This would allow for the evaluation of whether current forest management practices are suitable and sustainable or if the management scheme should be changed.[6]

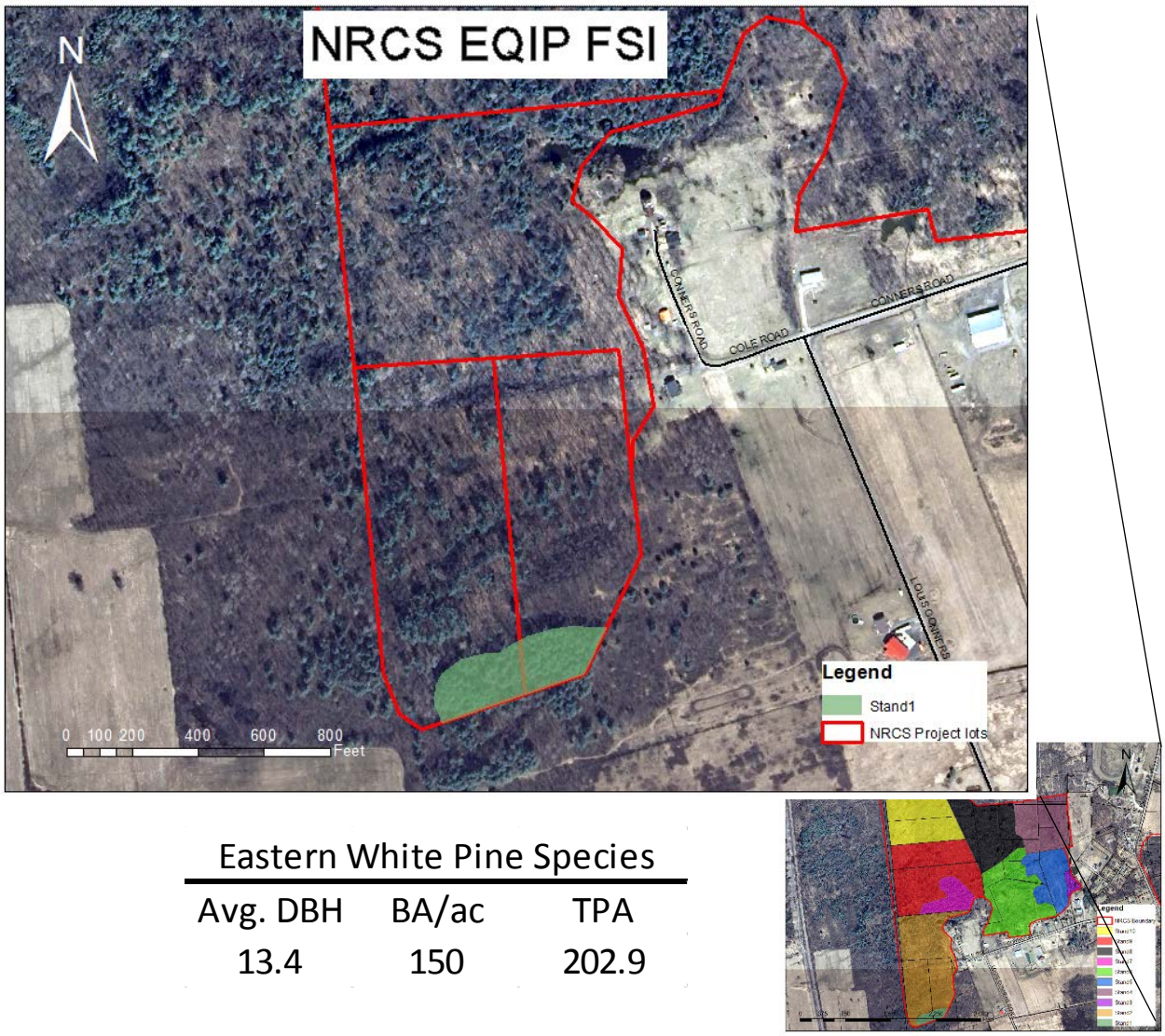
Appendix A

Individual stand details and

FSI treatments

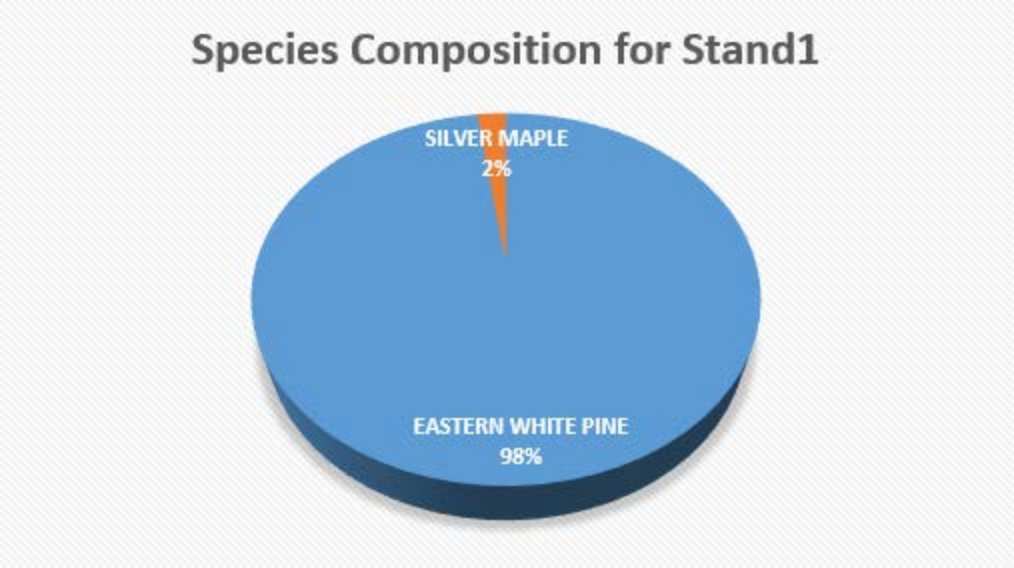
NRCS EQIP Forest Stand Improvement - Tract 11430

Stand 1



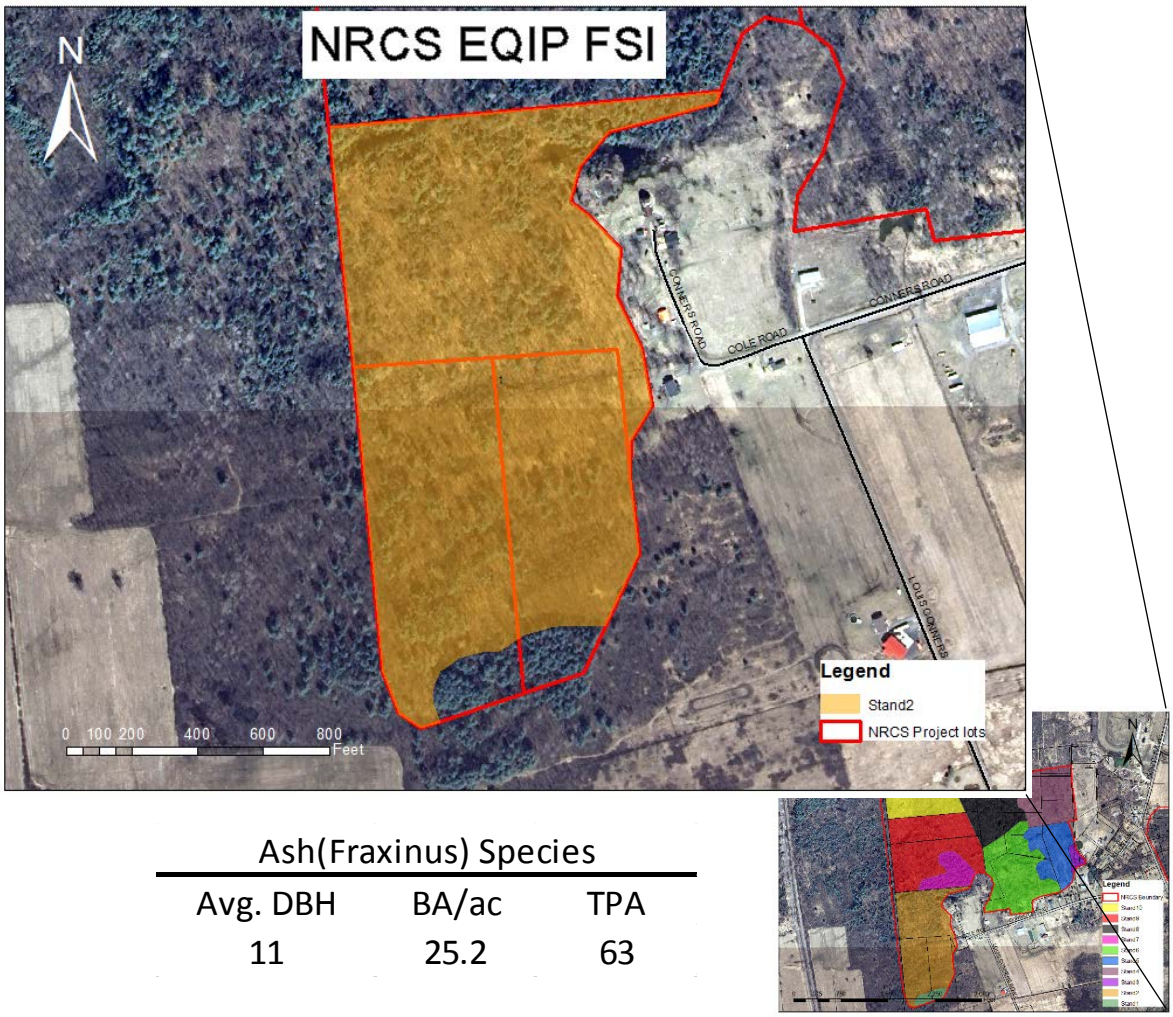
Eastern White Pine Species		
Avg. DBH	BA/ac	TPA
13.4	150	202.9

Stand 1 is 1.8 acres, has an **average DBH of 13.4**, a total **Basal Area/ac of 150** and **202.9 Trees/acre**. 97.7% of the stand is made up of Eastern white pine. This stand has no component of ash species therefore no cutting will take place in this stand.



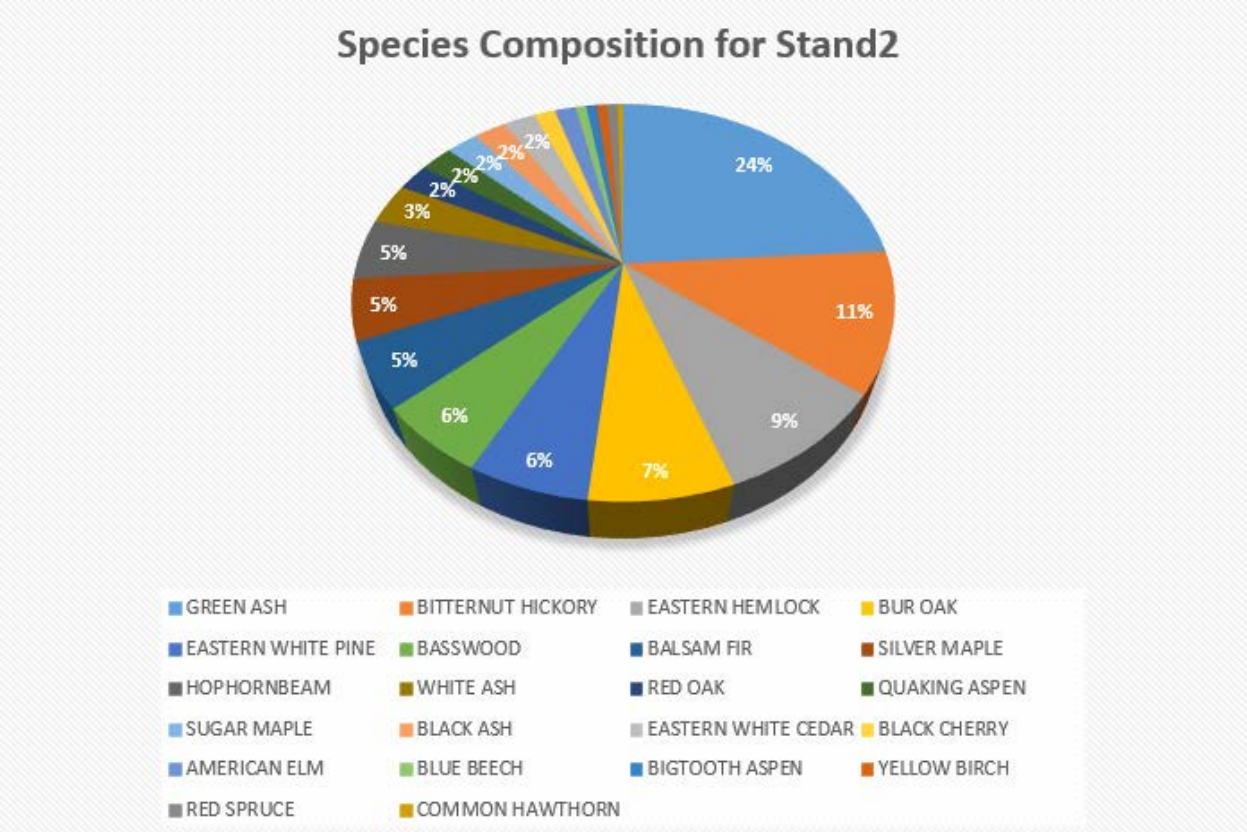
Stand1 Composition	
EASTERN WHITE PINE	97.78%
SILVER MAPLE	2.22%

Stand 2



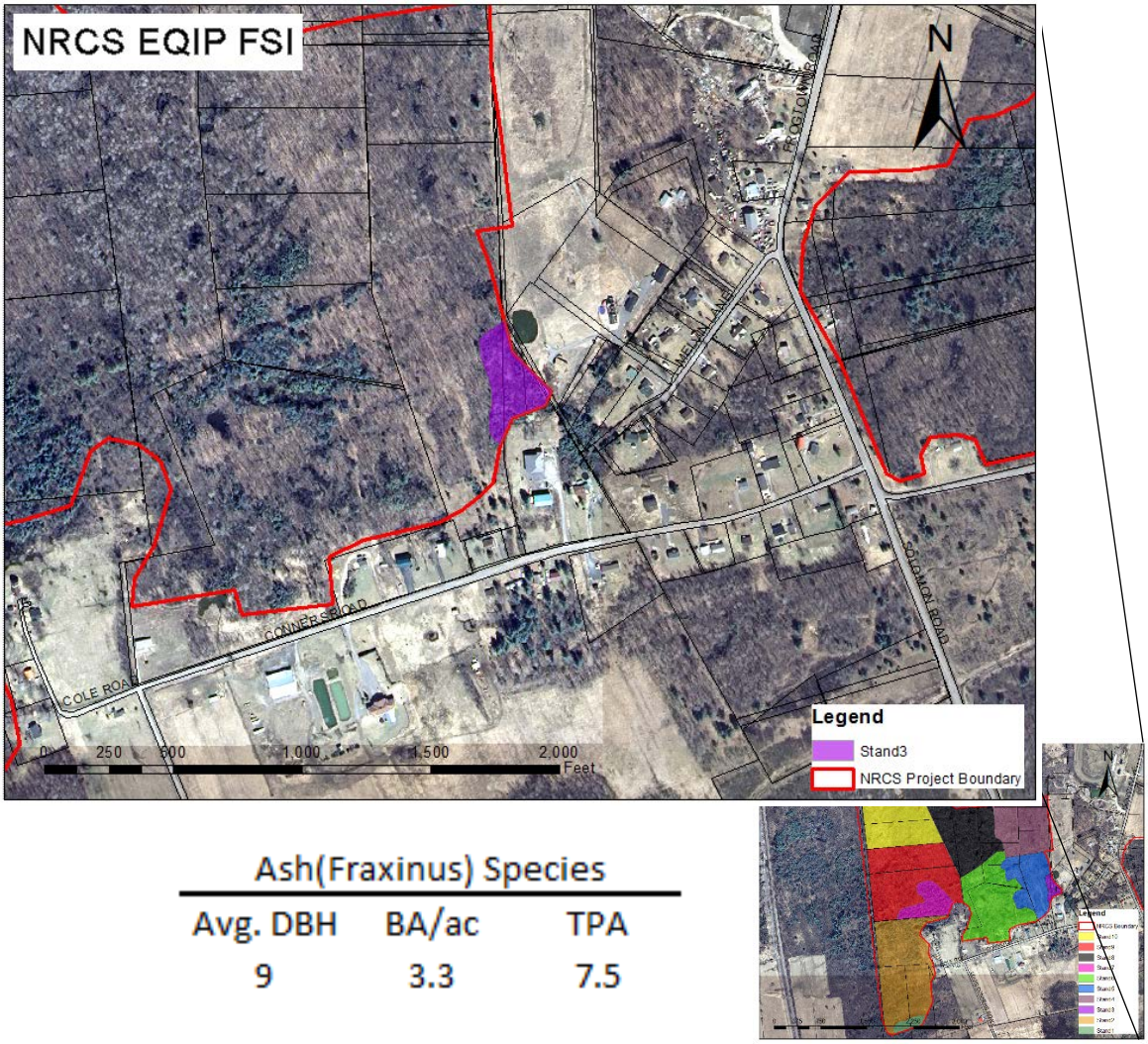
Ash(Fraxinus) Species		
Avg. DBH	BA/ac	TPA
11	25.2	63

Stand 2 is 31.5 acres, has an **average DBH of 13**, a total **Basal Area/ac of 85.8** and **223.9 Trees/acre**. 29.7% of the stand is made up of (*Fraxinus)* Ash species. This stand falls within the (*Forest stands with a medium component (20%-40%) of ash)* therefore the percent of ash will be reduced to 20% across the stand overall; approximately **192 trees** will be cut, focusing on Ash with low vigor and poor form to be removed first. 2.4 BA/ac and 6.1 TPA will be removed from this stand. There are two patches of Black Ash with 10-15 trees that have potential for basket making material located in the south western corner of the property and the north eastern corner of the property which should be noted when ash removal begins.



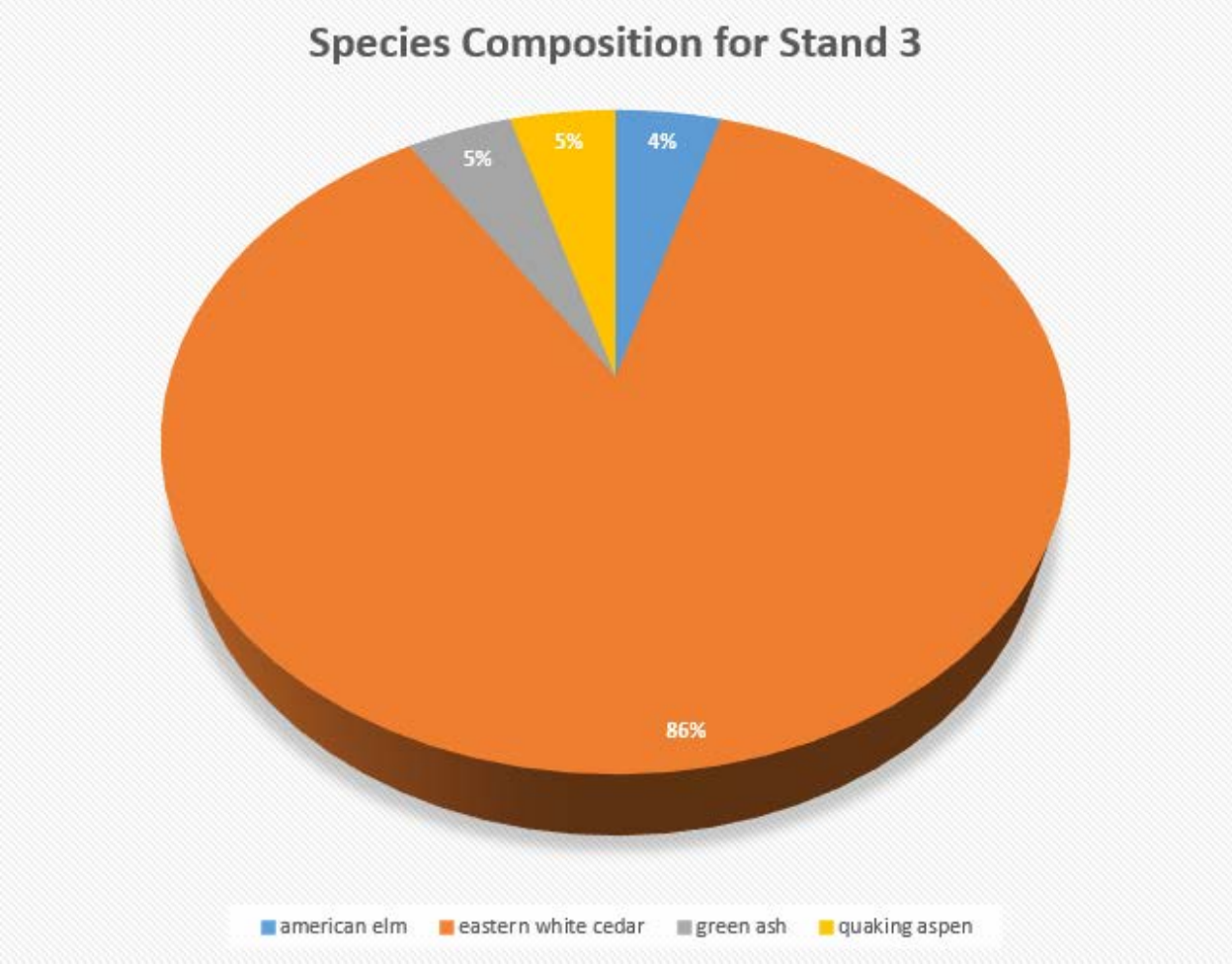
Stand2 Composition	
GREEN ASH	24.0%
BITTERNUT HICKORY	11.4%
EASTERN HEMLOCK	9.1%
BUR OAK	7.2%
EASTERN WHITE PINE	6.1%
BASSWOOD	5.7%
BALSAM FIR	5.3%
SILVER MAPLE	4.9%
HOPHORNBEAM	4.9%
WHITE ASH	3.4%
RED OAK	2.3%
QUAKING ASPEN	2.3%
SUGAR MAPLE	2.3%
BLACK ASH	2.3%
EASTERN WHITE CEDAR	2.3%
BLACK CHERRY	1.5%
AMERICAN ELM	1.5%
BLUE BEECH	0.8%
BIGTOOTH ASPEN	0.8%
YELLOW BIRCH	0.8%
RED SPRUCE	0.8%
COMMON HAWTHORN	0.4%

Stand 3



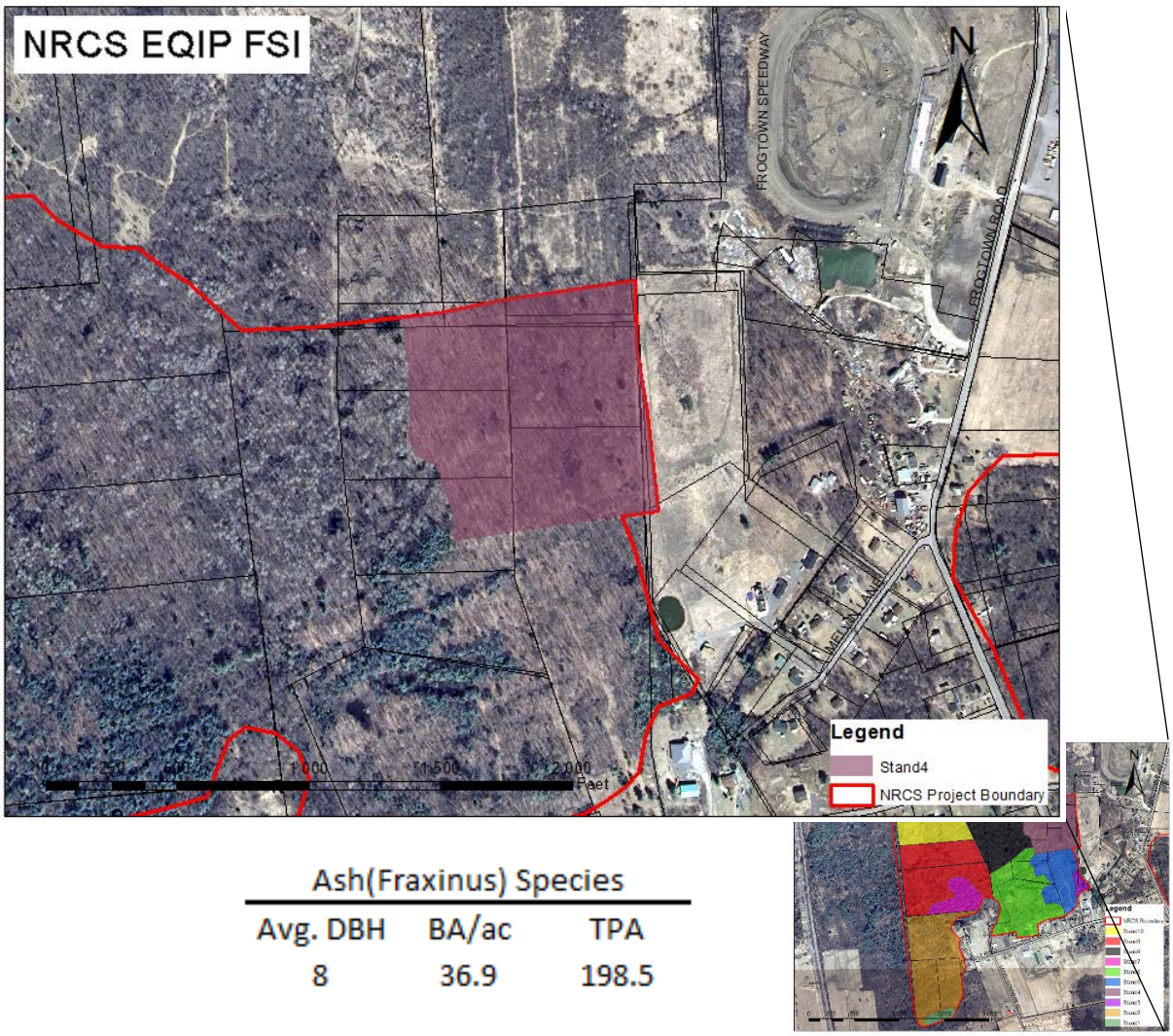
Ash(Fraxinus) Species		
Avg. DBH	BA/ac	TPA
9	3.3	7.5

Stand 3 is 1.5 acres, has an **average DBH of 3.8**, a total **Basal Area/ac of 73.3** and **1,582 Trees/acre**. 86.4% of the stand is made up of Eastern White Cedar. This stand has a very small component of ash species therefore no cutting will take place in this stand.



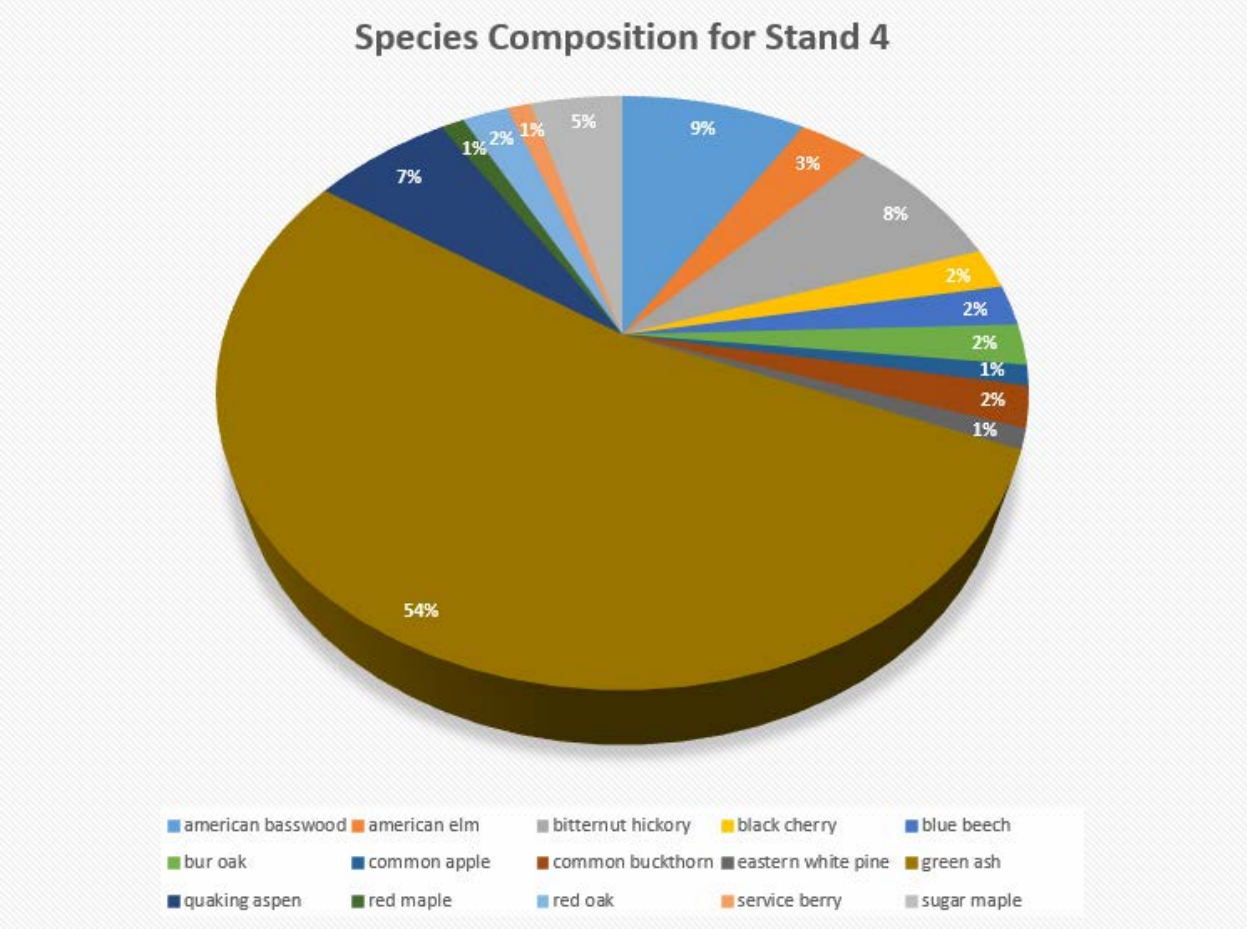
Stand 3 Composition	
american elm	4.5%
eastern white cedar	86.4%
green ash	4.5%
quaking aspen	4.5%

Stand 4



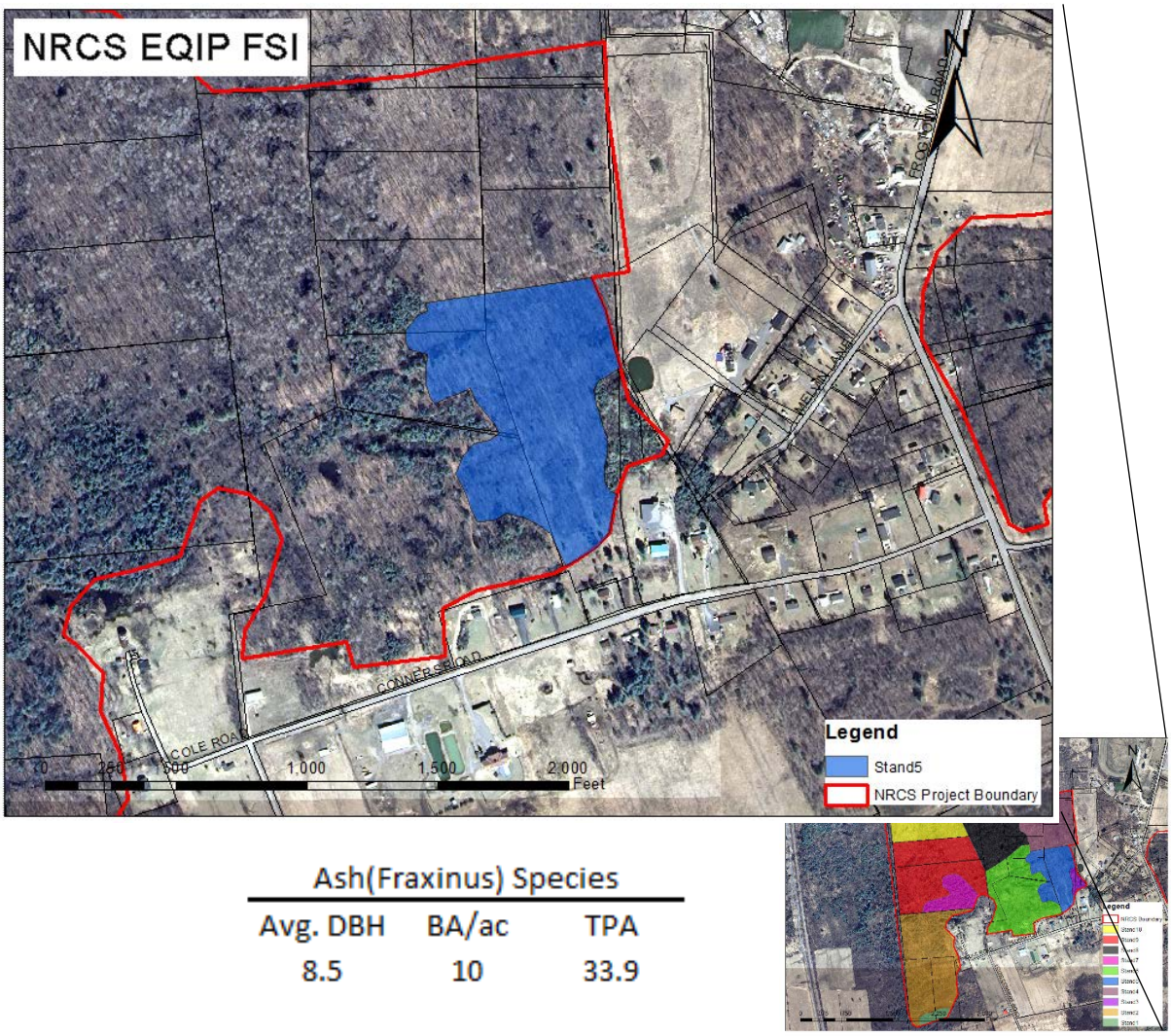
Ash(Fraxinus) Species		
Avg. DBH	BA/ac	TPA
8	36.9	198.5

Stand 4 is 17.2 acres, has an **average DBH of 9**, a total **Basal Area/ac of 69.2** and **568.6 Trees/acre**. 53.3% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a major component (>40%) of ash)* therefore the percent of ash will be reduced to 20% across the stand overall; approximately **2,274 trees** will be cut, focusing on Ash with low vigor and poor form to be removed first. 12.3 BA/ac and 66.1 TPA will be removed from this stand.



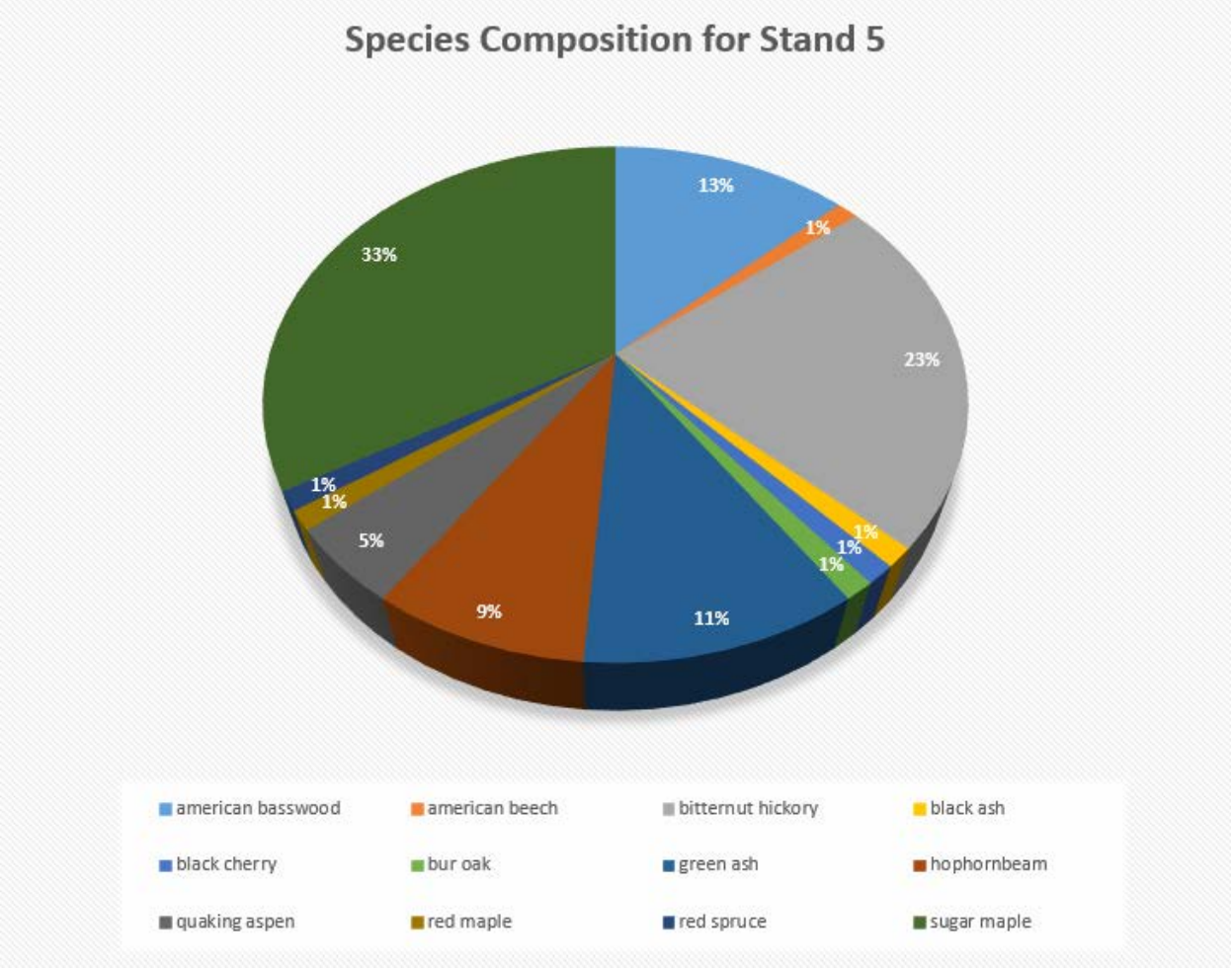
Stand 4 Composition	
american basswood	8.9%
american elm	3.3%
bitternut hickory	7.8%
black cherry	2.2%
blue beech	2.2%
bur oak	2.2%
common apple	1.1%
common buckthorn	2.2%
eastern white pine	1.1%
green ash	53.3%
quaking aspen	6.7%
red maple	1.1%
red oak	2.2%
service berry	1.1%
sugar maple	4.4%

Stand 5



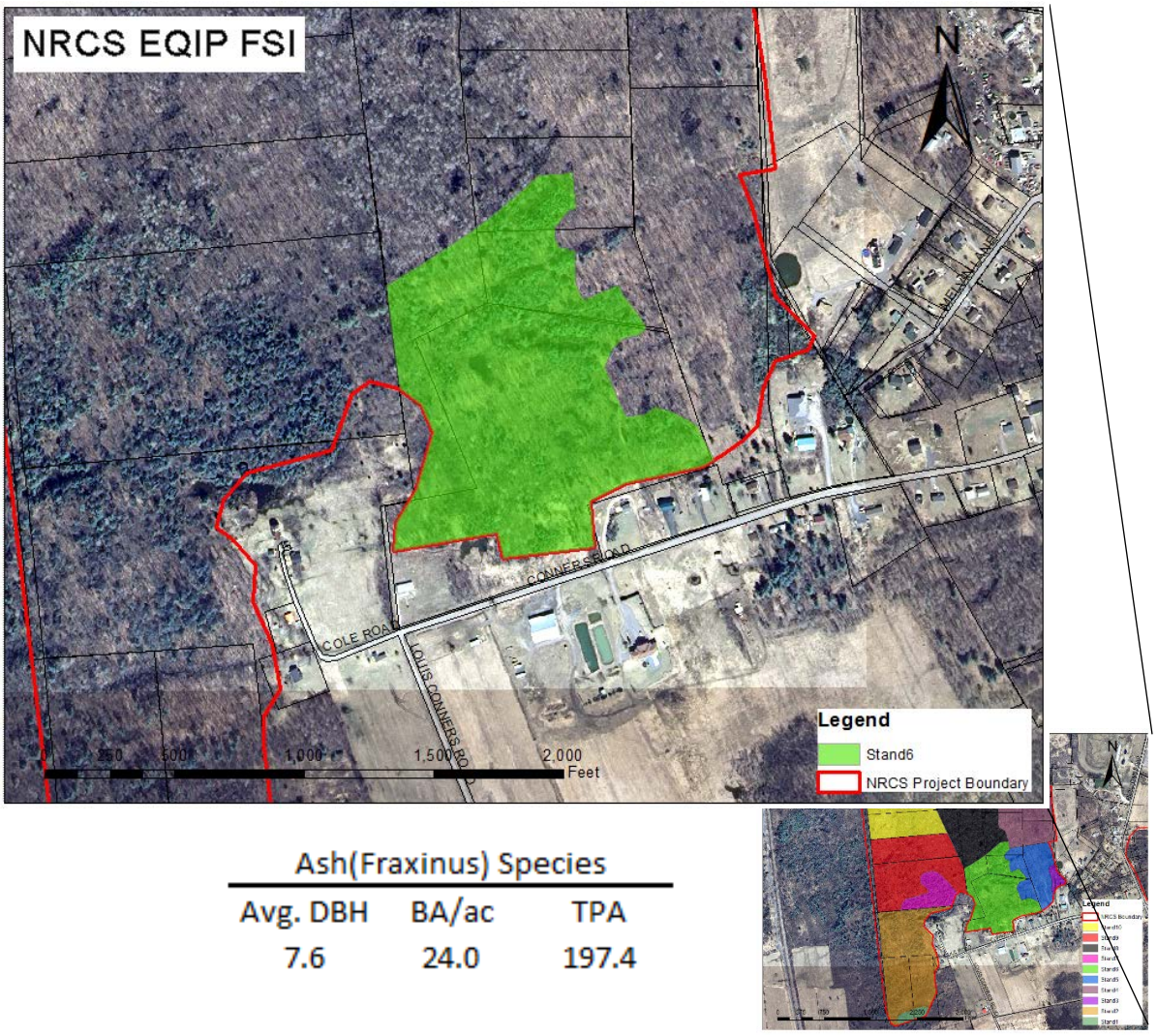
Ash(Fraxinus) Species		
Avg. DBH	BA/ac	TPA
8.5	10	33.9

Stand 5 is 12.7 acres, has an **average DBH of 11.3**, a total **Basal Area/ac of 84** and **405.5 Trees/acre**. 11.9% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a minor component (<20%) of ash)* therefore there will be no cutting in this stand.



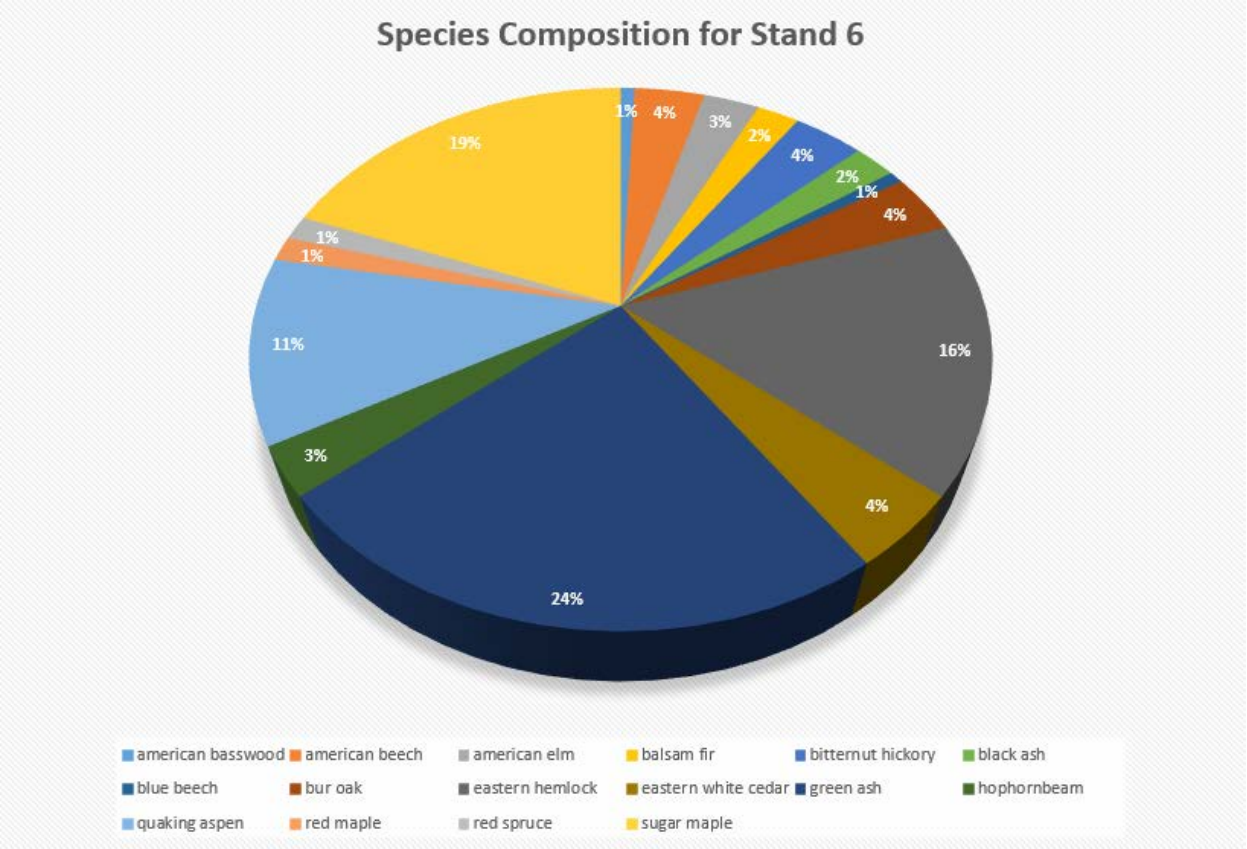
Stand 5 Composition	
american basswood	13.1%
american beech	1.2%
bitternut hickory	22.6%
black ash	1.2%
black cherry	1.2%
bur oak	1.2%
green ash	10.7%
hophornbeam	8.3%
quaking aspen	4.8%
red maple	1.2%
red spruce	1.2%
sugar maple	33.3%

Stand 6



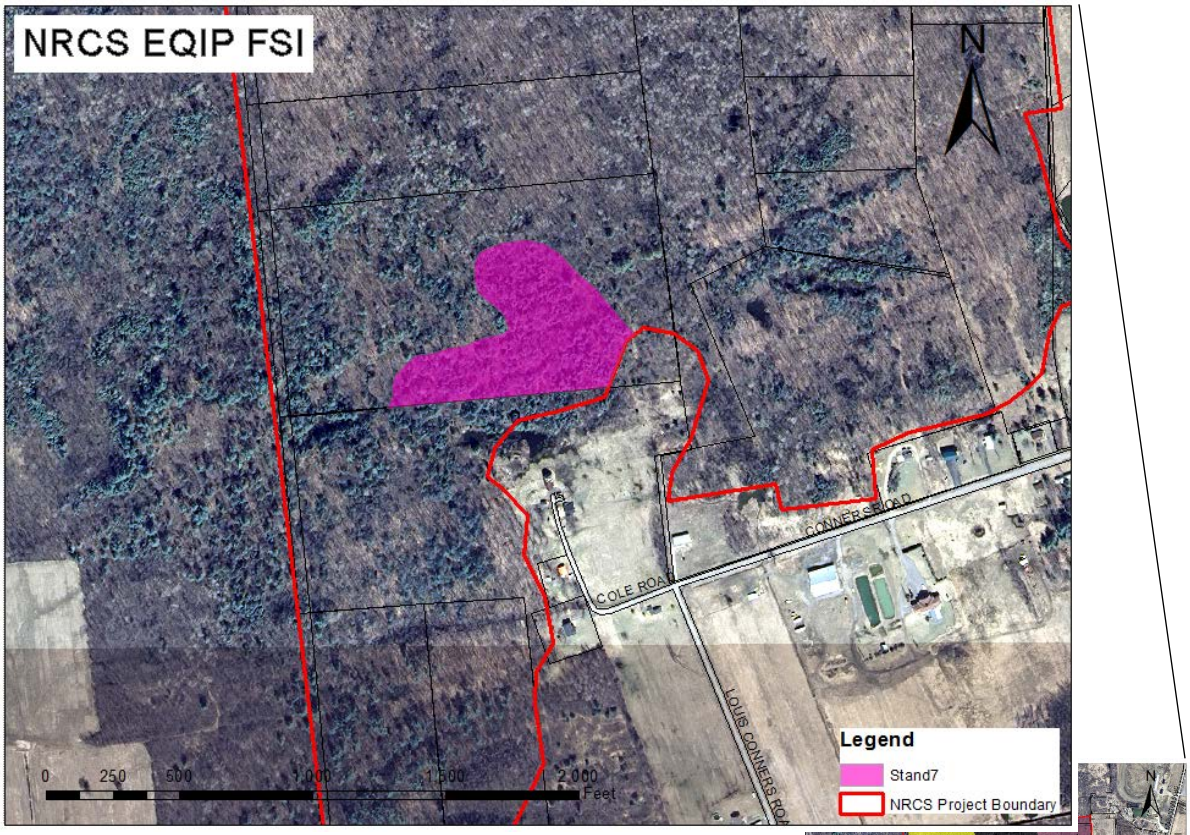
Ash(Fraxinus) Species		
Avg. DBH	BA/ac	TPA
7.6	24.0	197.4

Stand 6 is 24.3 acres, has an **average DBH of 10.3**, a total **Basal Area/ac of 91.3** and **560.5 Trees/acre**. 25.7% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a medium component (20%-40%) of ash)* therefore the percent of ash will be reduced to 20% across the stand overall; approximately **273 trees** will be cut, focusing on Ash with low vigor and poor form to be removed first. 1.4 BA/ac and 11.3 TPA will be removed from this stand.



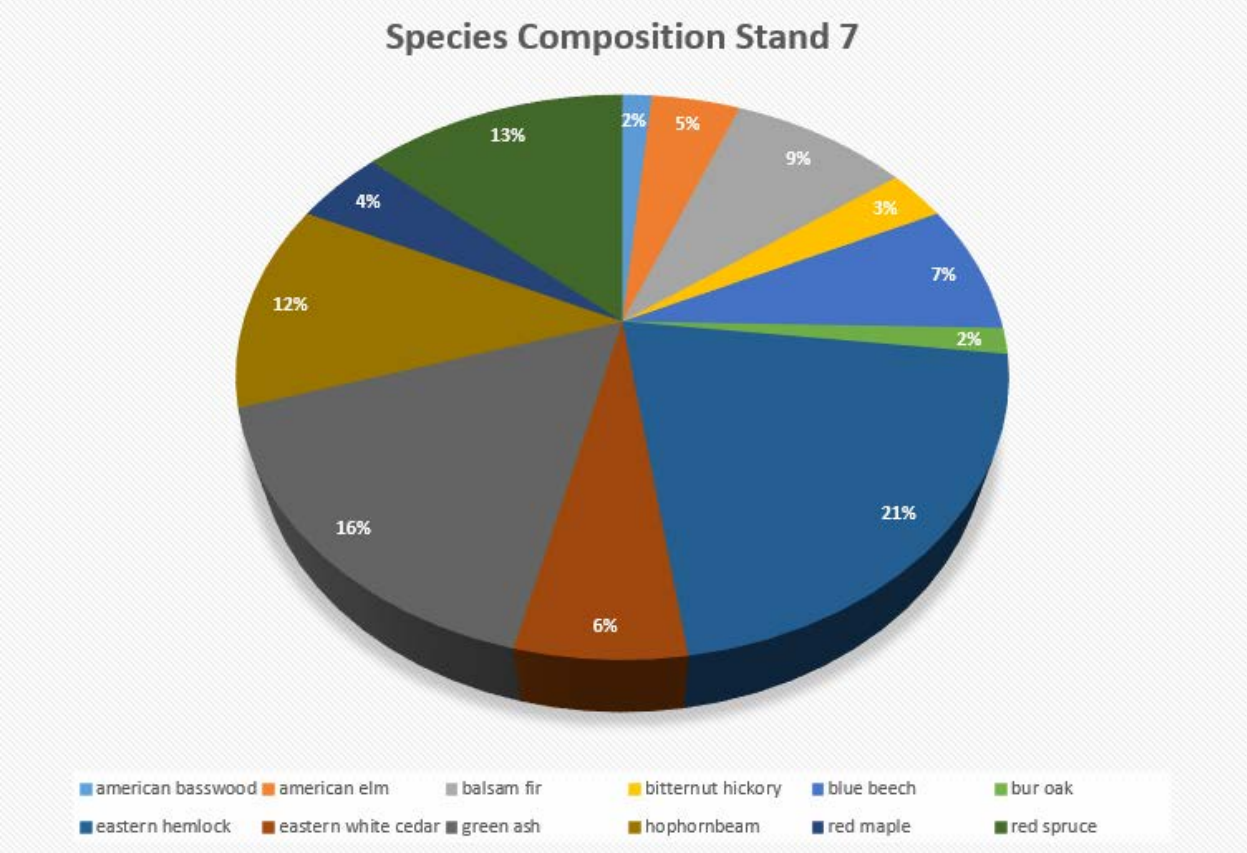
Stand 6 Composition	
american basswood	0.7%
american beech	3.7%
american elm	2.9%
balsam fir	2.2%
bitternut hickory	3.7%
black ash	2.2%
blue beech	0.7%
bur oak	3.7%
eastern hemlock	16.2%
eastern white cedar	4.4%
green ash	23.5%
hophornbeam	2.9%
quaking aspen	11.0%
red maple	1.5%
red spruce	1.5%
sugar maple	19.1%

Stand 7



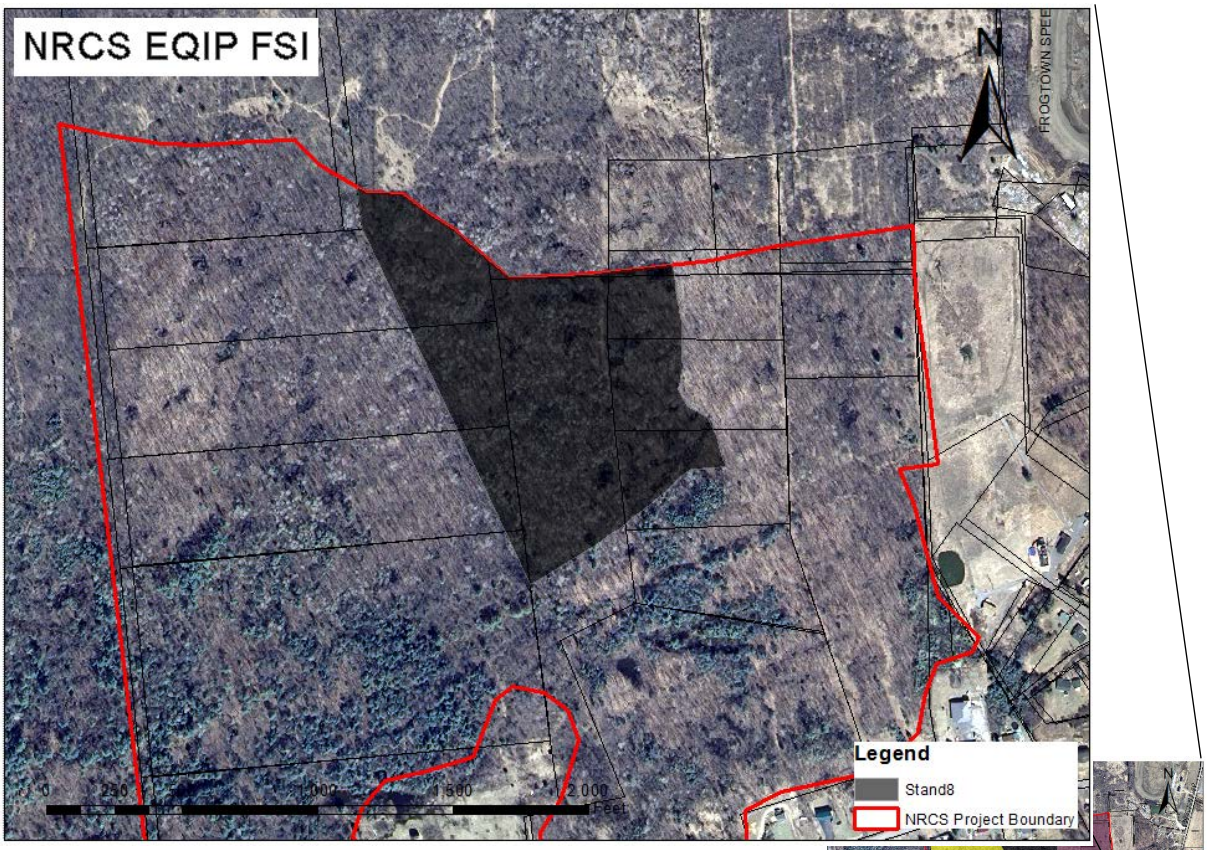
Ash(Fraxinus) Species		
Avg. DBH	BA/ac	TPA
13.0	13.8	22.2

Stand 7 is 7.3 acres, has an **average DBH of 10.7**, a total **Basal Area/ac of 85** and **384.1 Trees/acre**. 16.4% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a minor component (<20%) of ash)* therefore there will be no cutting in this stand.



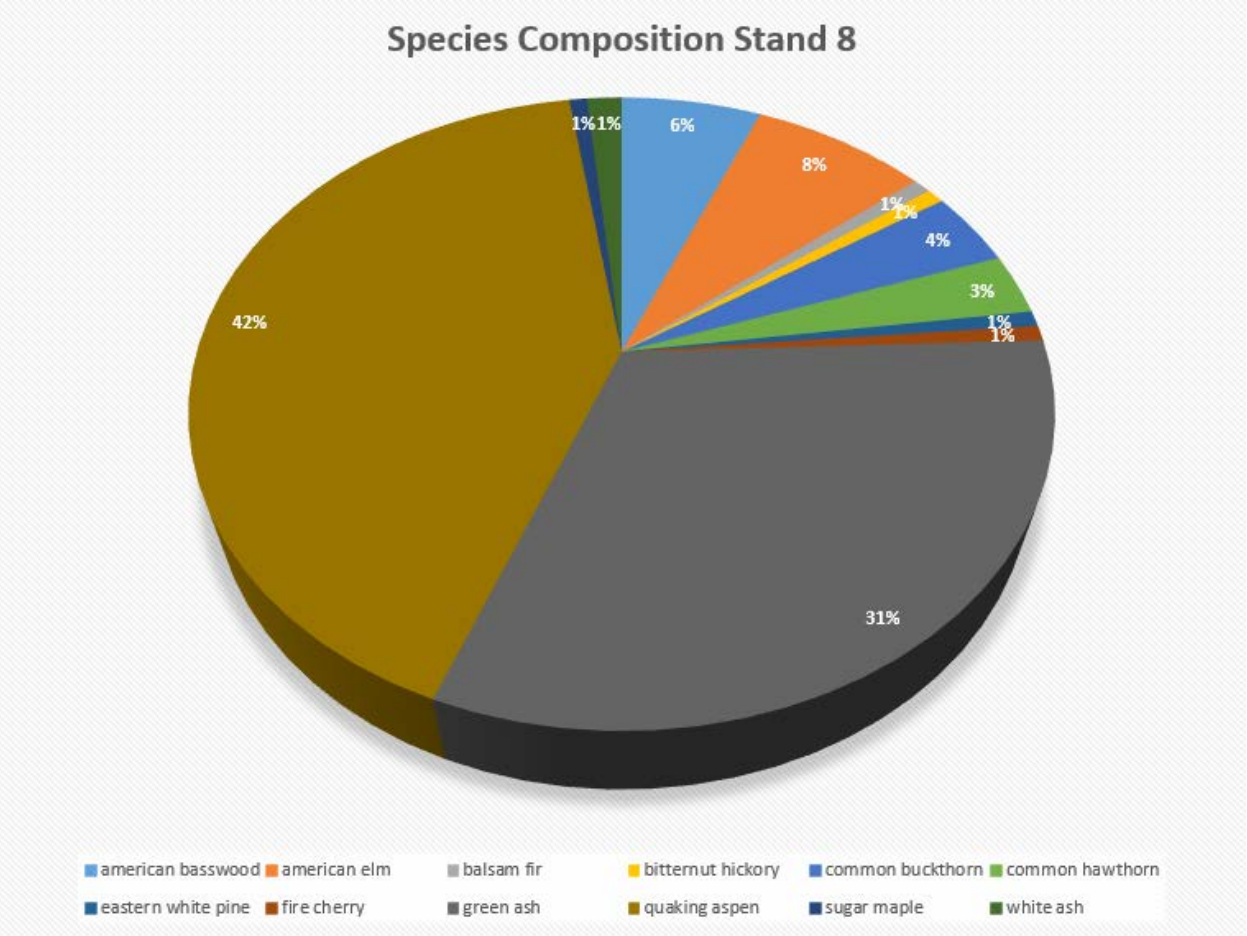
Stand 7 Composition	
american basswood	1.5%
american elm	4.5%
balsam fir	9.0%
bitternut hickory	3.0%
blue beech	7.5%
bur oak	1.5%
eastern hemlock	20.9%
eastern white cedar	6.0%
green ash	16.4%
hophornbeam	11.9%
red maple	4.5%
red spruce	13.4%

Stand 8



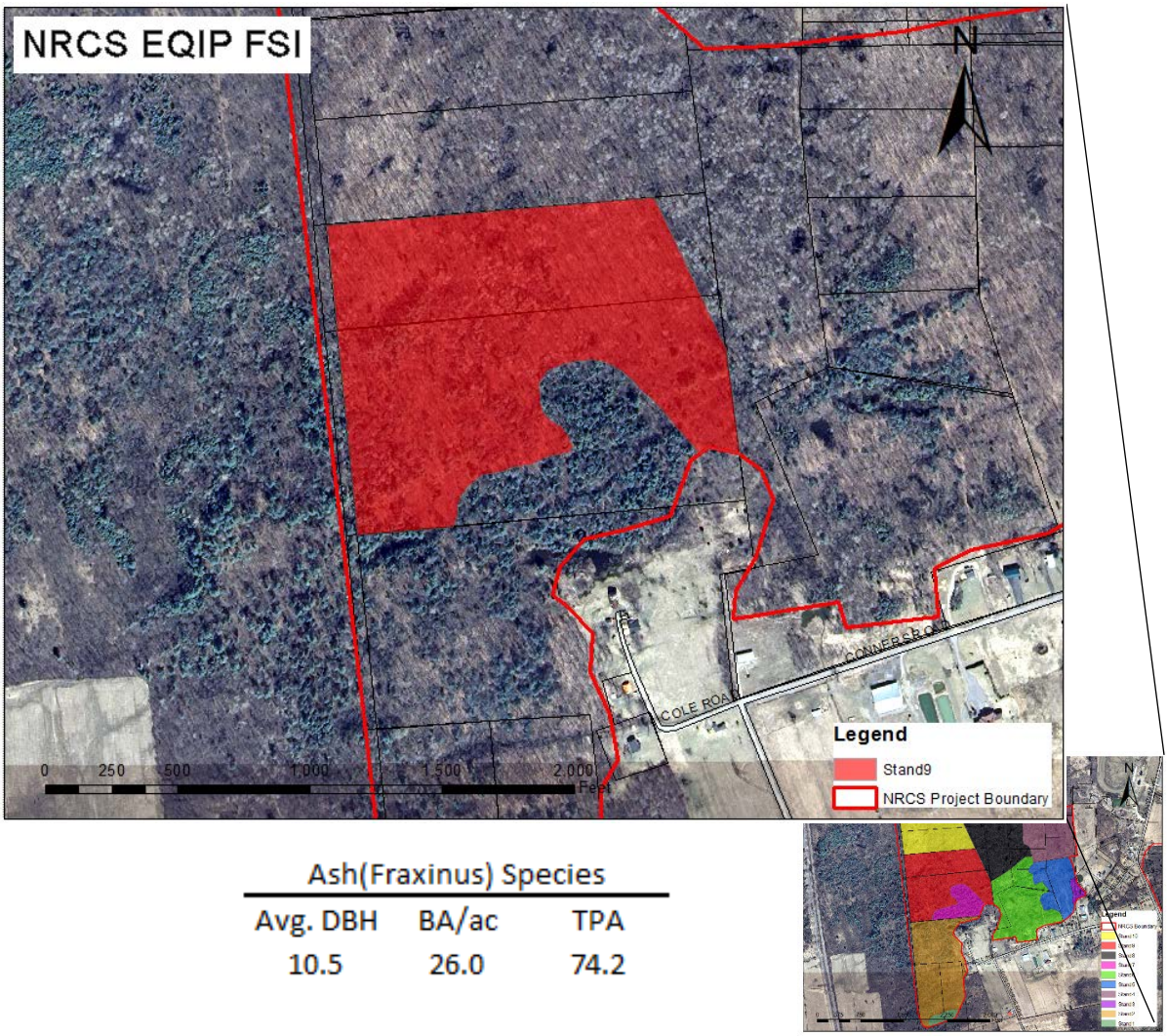
Ash(Fraxinus) Species		
Avg. DBH	BA/ac	TPA
8.9	28.0	185.7

Stand 8 is 22.5 acres, has an **average DBH of 9.6**, a total **Basal Area/ac of 85.3** and **477.3 Trees/acre**. 33.1% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a medium component (20%-40%) of ash)* therefore the percent of ash will be reduced to 20% across the stand overall; approximately **547 trees** will be cut, focusing on Ash with low vigor and poor form to be removed first. 3.7 BA/ac and 24.3 TPA will be removed from this stand.



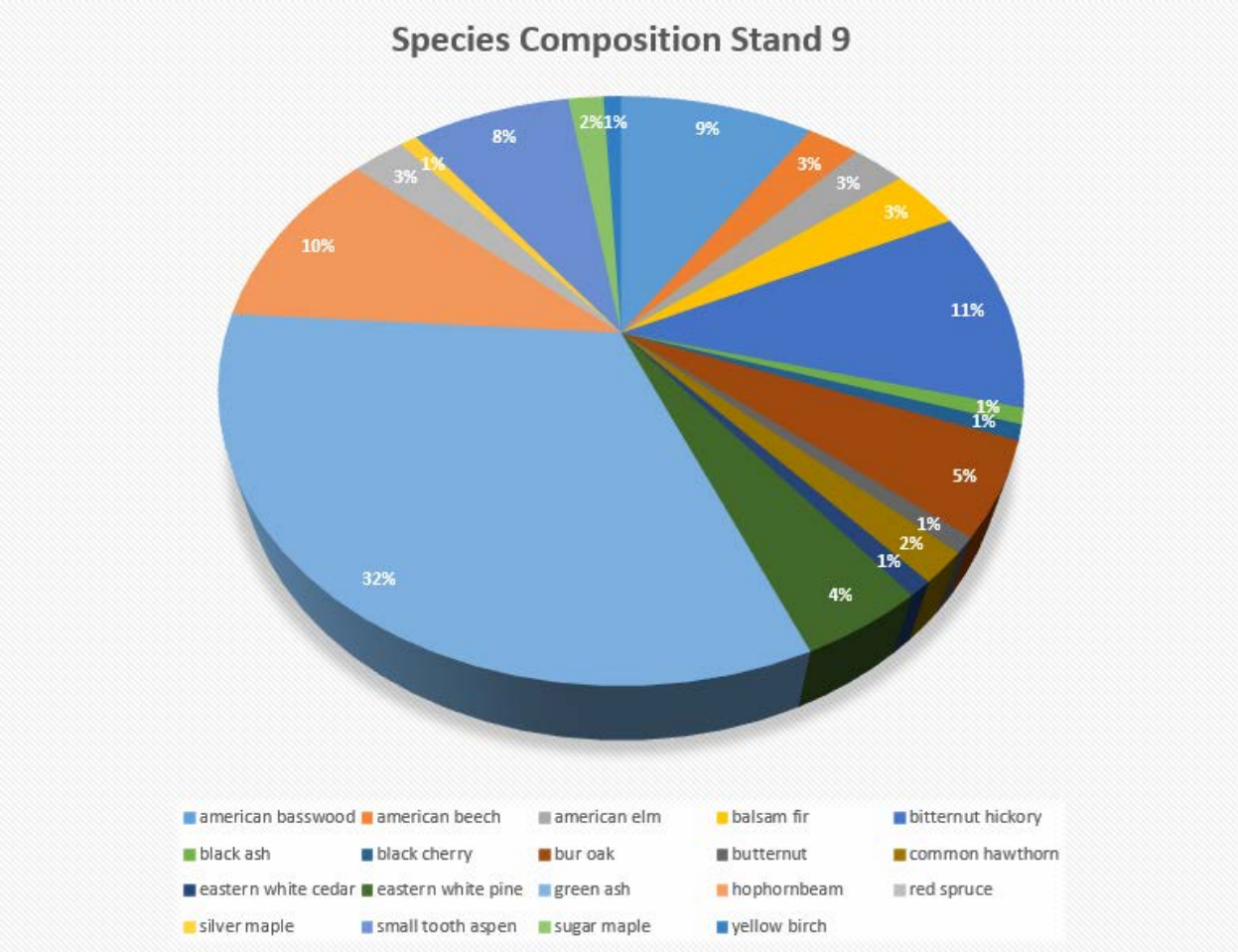
Stand 8 Composition	
american basswood	6.3%
american elm	7.9%
balsam fir	0.8%
bitternut hickory	0.8%
common buckthorn	3.9%
common hawthorn	3.1%
eastern white pine	0.8%
fire cherry	0.8%
green ash	31.5%
quaking aspen	41.7%
sugar maple	0.8%
white ash	1.6%

Stand 9



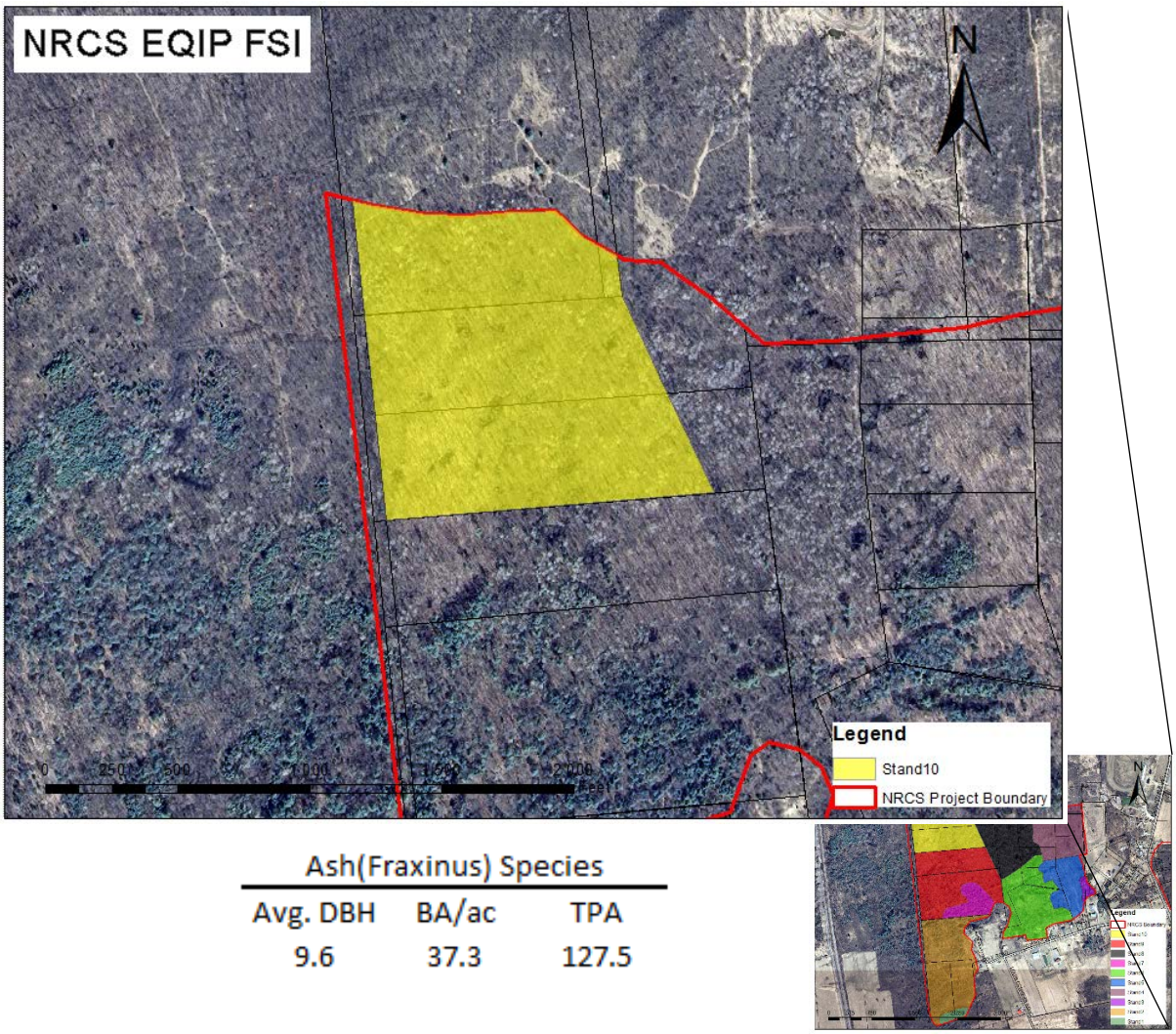
Ash(Fraxinus) Species		
Avg. DBH	BA/ac	TPA
10.5	26.0	74.2

Stand 9 is 29.9 acres, has an **average DBH of 11.2**, a total **Basal Area/ac of 78** and **245.2 Trees/acre**. 33.4% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a medium component (20%-40%) of ash)* therefore the percent of ash will be reduced to 20% across the stand overall; approximately **297 trees** will be cut, focusing on Ash with low vigor and poor form to be removed first. 3.5 BA/ac and 9.9 TPA will be removed from this stand.



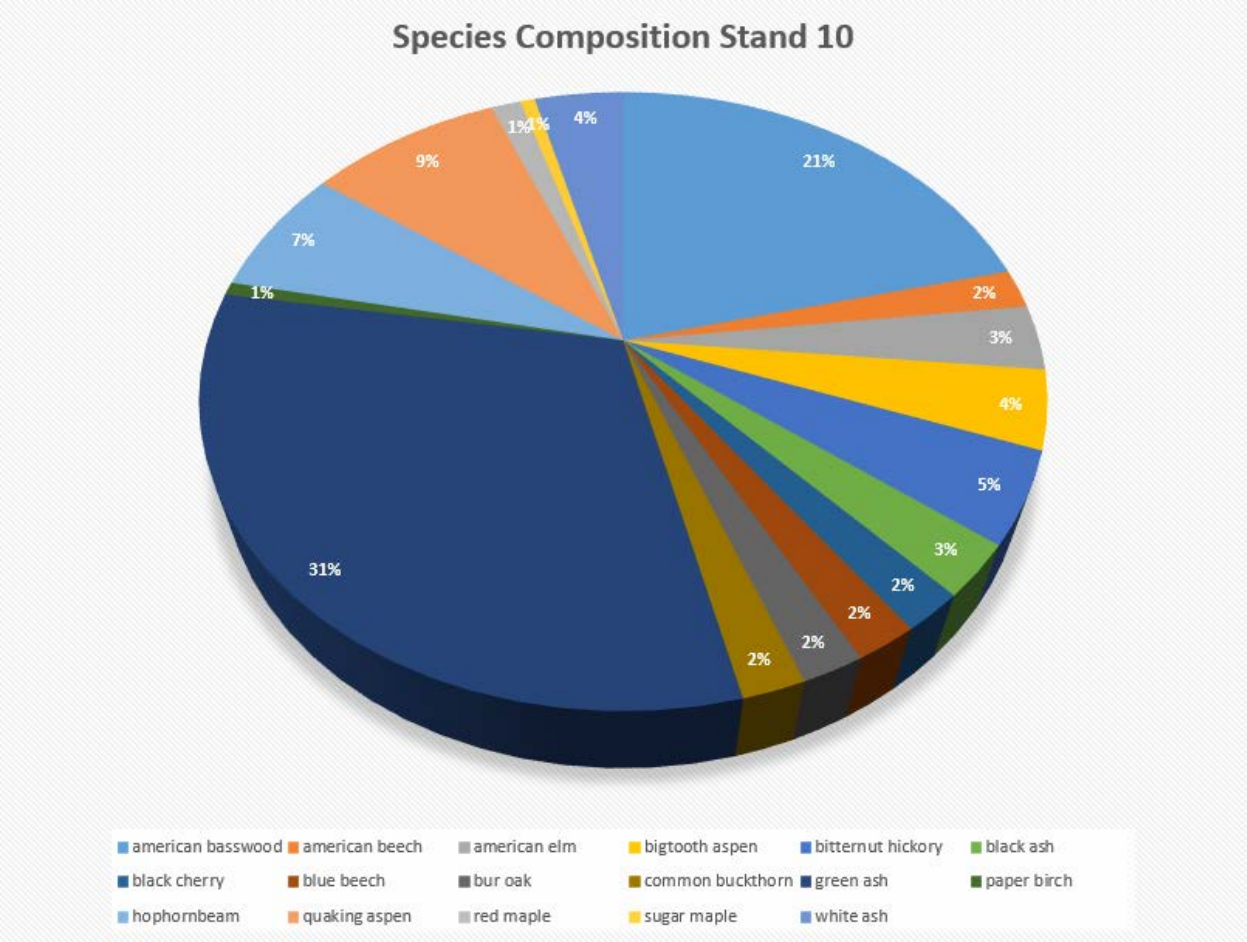
Stand 9 Composition	
american basswood	9.4%
american beech	2.6%
american elm	2.6%
balsam fir	3.4%
bitternut hickory	11.1%
black ash	0.9%
black cherry	0.9%
bur oak	5.1%
butternut	0.9%
common hawthorn	1.7%
eastern white cedar	0.9%
eastern white pine	4.3%
green ash	32.5%
hophornbeam	10.3%
red spruce	2.6%
silver maple	0.9%
small tooth aspen	7.7%
sugar maple	1.7%
yellow birch	0.9%

Stand 10



Ash(Fraxinus) Species		
Avg. DBH	BA/ac	TPA
9.6	37.3	127.5

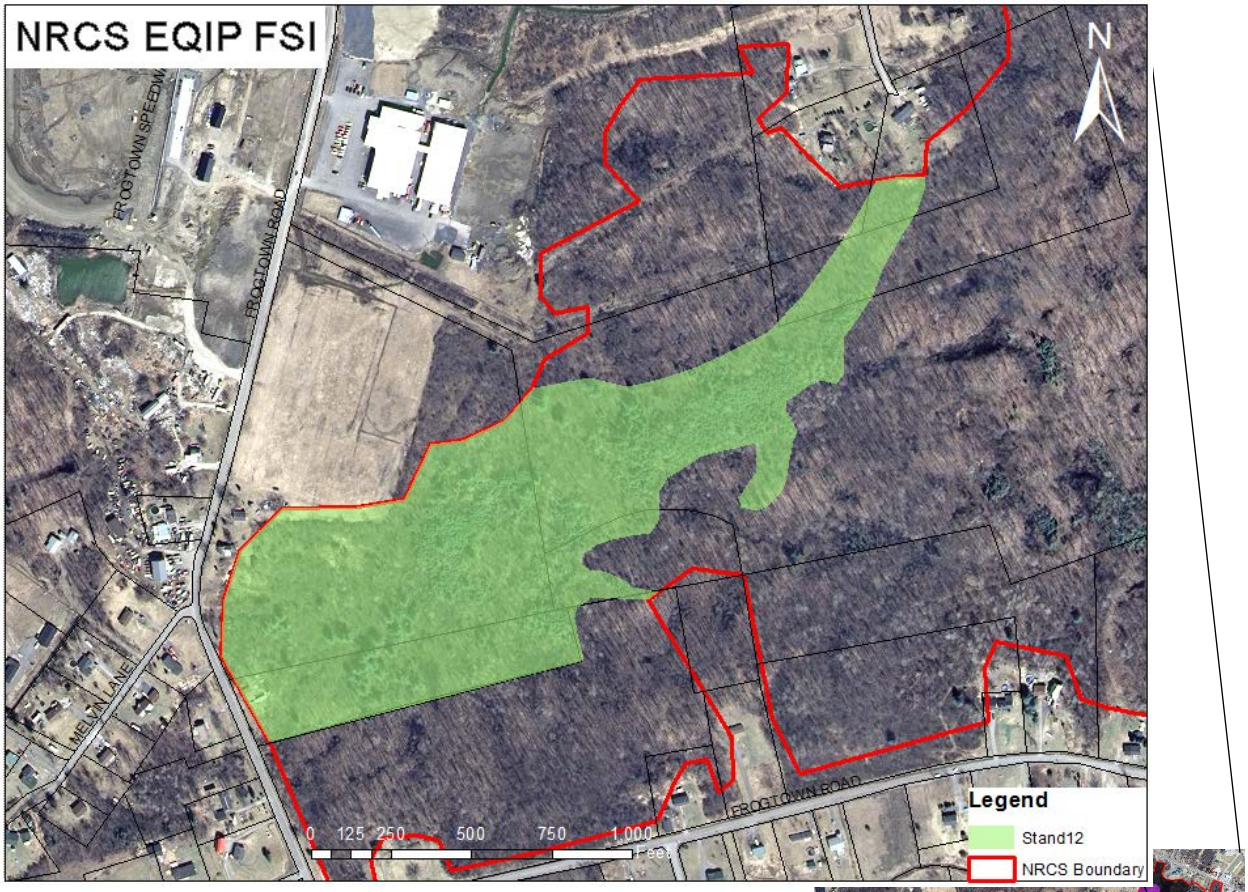
Stand 10 is 27.4 acres, has an **average DBH of 10.5**, a total **Basal Area/ac of 98** and **394.9 Trees/acre**. 38.1% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a medium component (20%-40%) of ash)* therefore the percent of ash will be reduced to 20% across the stand overall; approximately **632 trees** will be cut, focusing on Ash with low vigor and poor form to be removed first. 6.8 BA/ac and 23.1 TPA will be removed from this stand.



Stand 10 Composition	
american basswood	21.1%
american beech	2.0%
american elm	3.4%
bigtooth aspen	4.1%
bitternut hickory	4.8%
black ash	2.7%
black cherry	2.0%
blue beech	2.0%
bur oak	2.0%
common buckthorn	2.0%
green ash	31.3%
paper birch	0.7%
hophornbeam	6.8%
quaking aspen	8.8%
red maple	1.4%
sugar maple	0.7%
white ash	4.1%

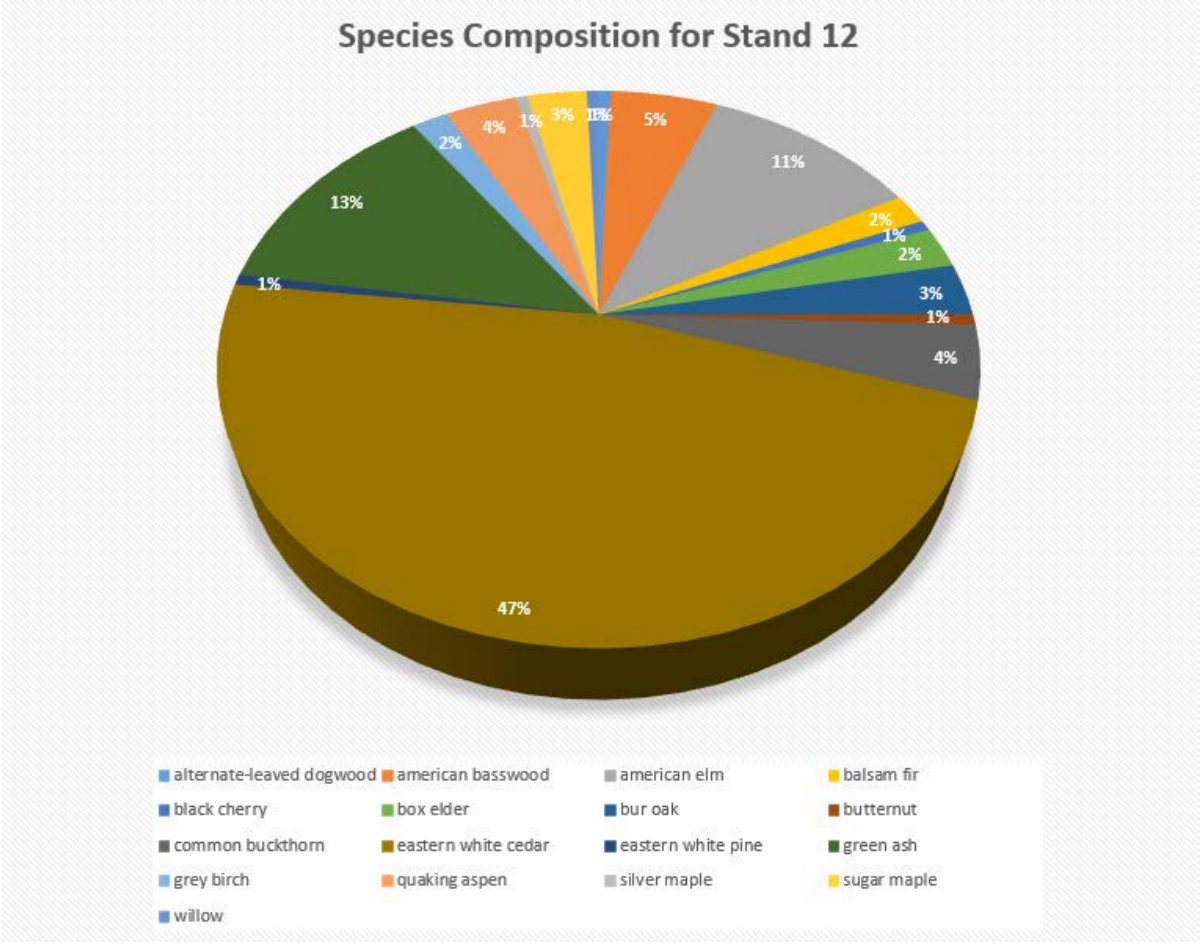
NRCS EQIP Forest Stand Improvement - Tract 11431

Stand 12



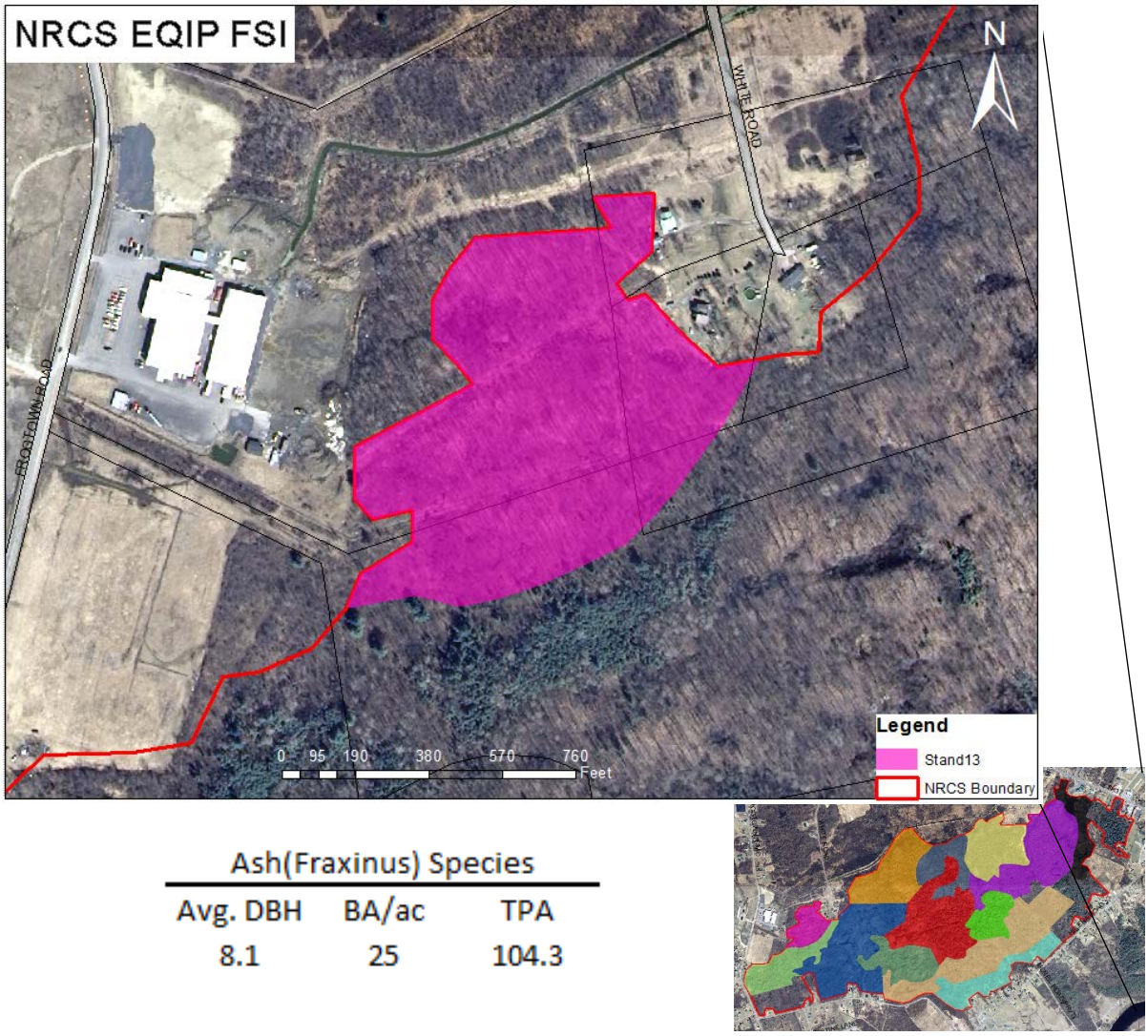
Ash(Fraxinus) Species		
Avg. DBH	BA/ac	TPA
7.3	14	104.3

Stand 12 is 27.8 acres, has an **average DBH of 6.6**, a total **Basal Area/ac of 109.3** and **951.5 Trees/acre**. 12.8% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a minor component (<20%) of ash).* A layering method in cedar stands with patch or strip clear cuts along the edge of cedar stands will be implemented to regenerate cedar, create wildlife habitat and increase deer browsing and bedding areas. The method used will be to cut 15 foot wide strip clear cuts around the boarder of White Cedar stands and every 15ft a cedar will be dropped into the clear cut to promote regeneration. Slash will be left to protect regen from deer browsing. Approximately 2 acres of area will be cleared removing 7.9 BA/ac and 68.5 TPA.



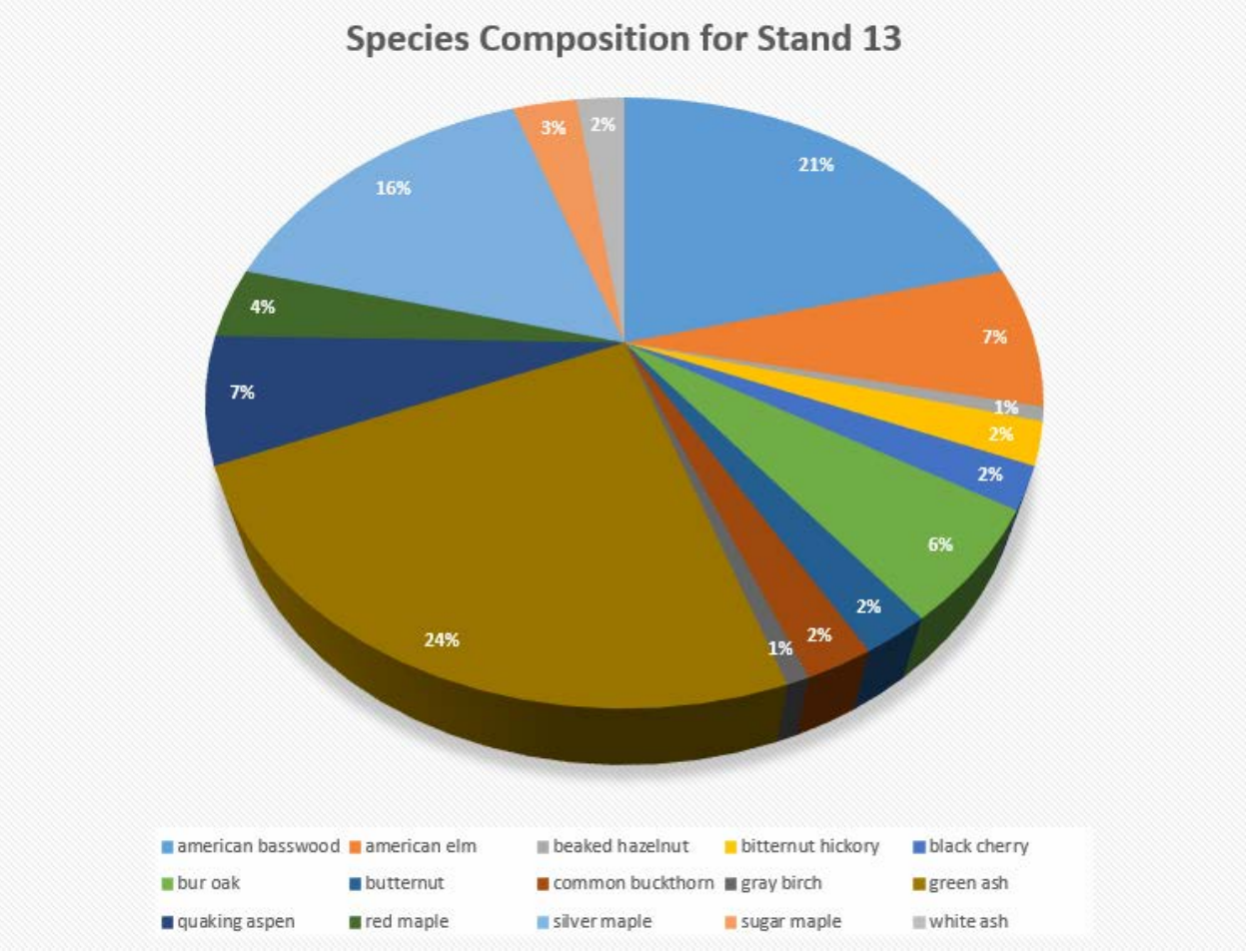
Stand 12 Composition	
alternate-leaved dogwood	0.6%
american basswood	5.5%
american elm	11.0%
balsam fir	1.8%
black cherry	0.6%
box elder	2.4%
bur oak	3.0%
butternut	0.6%
common buckthorn	4.3%
eastern white cedar	47.0%
eastern white pine	0.6%
green ash	12.8%
grey birch	1.8%
quaking aspen	3.7%
silver maple	0.6%
sugar maple	3.0%
willow	0.6%

Stand 13



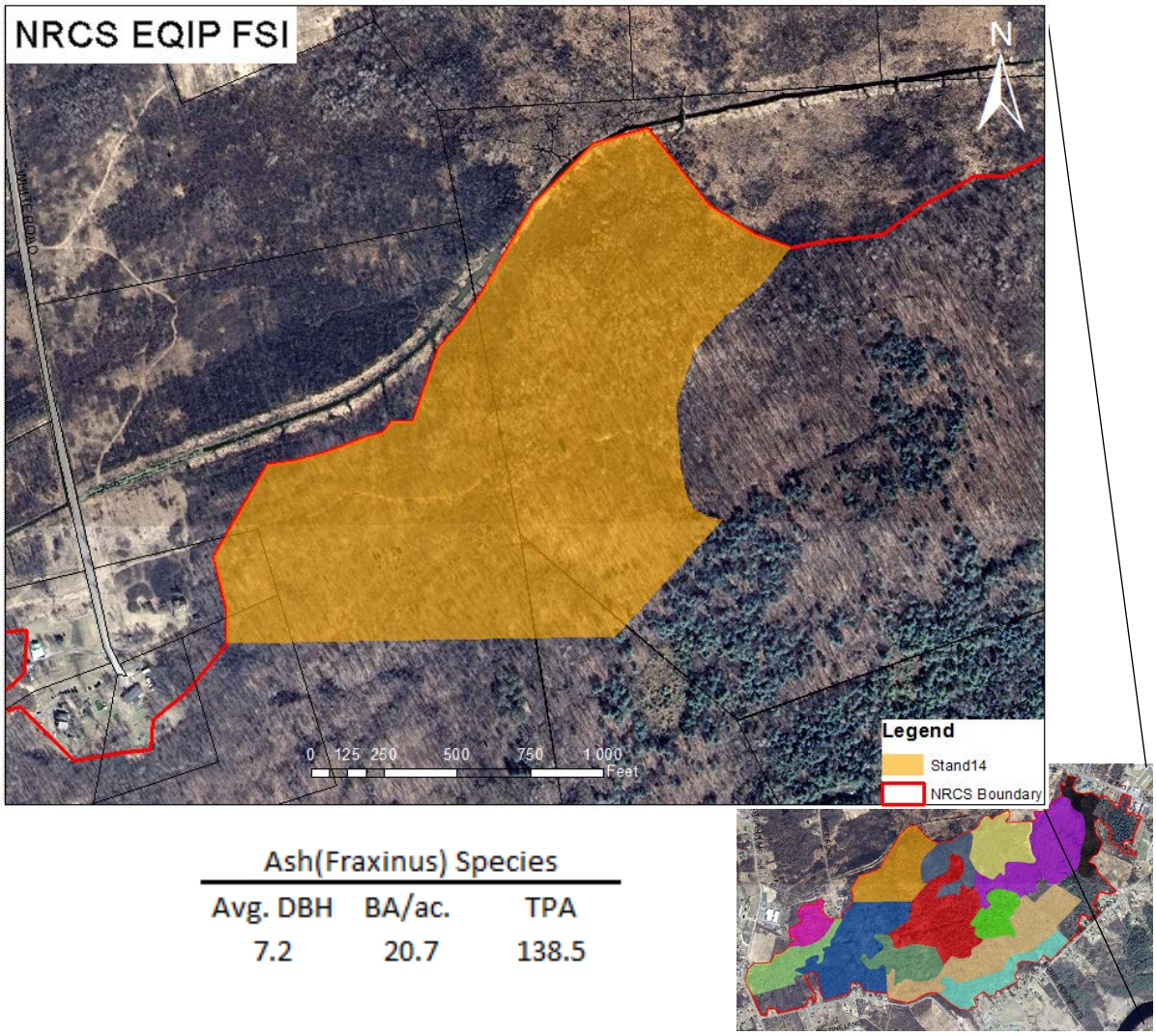
Ash(Fraxinus) Species		
Avg. DBH	BA/ac	TPA
8.1	25	104.3

Stand 13 is 14.6 acres, has an **average DBH of 9.9**, a total **Basal Area/ac of 95.7** and **434.6 Trees/acre**. 26.1% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a medium component (>20%) of ash)* therefore the percent of ash will be reduced to 20% across the stand overall; approximately **93 trees** will be cut, focusing on Ash with low vigor and poor form to be removed first. 1.4 BA/ac and 6.4 TPA will be removed from this stand.



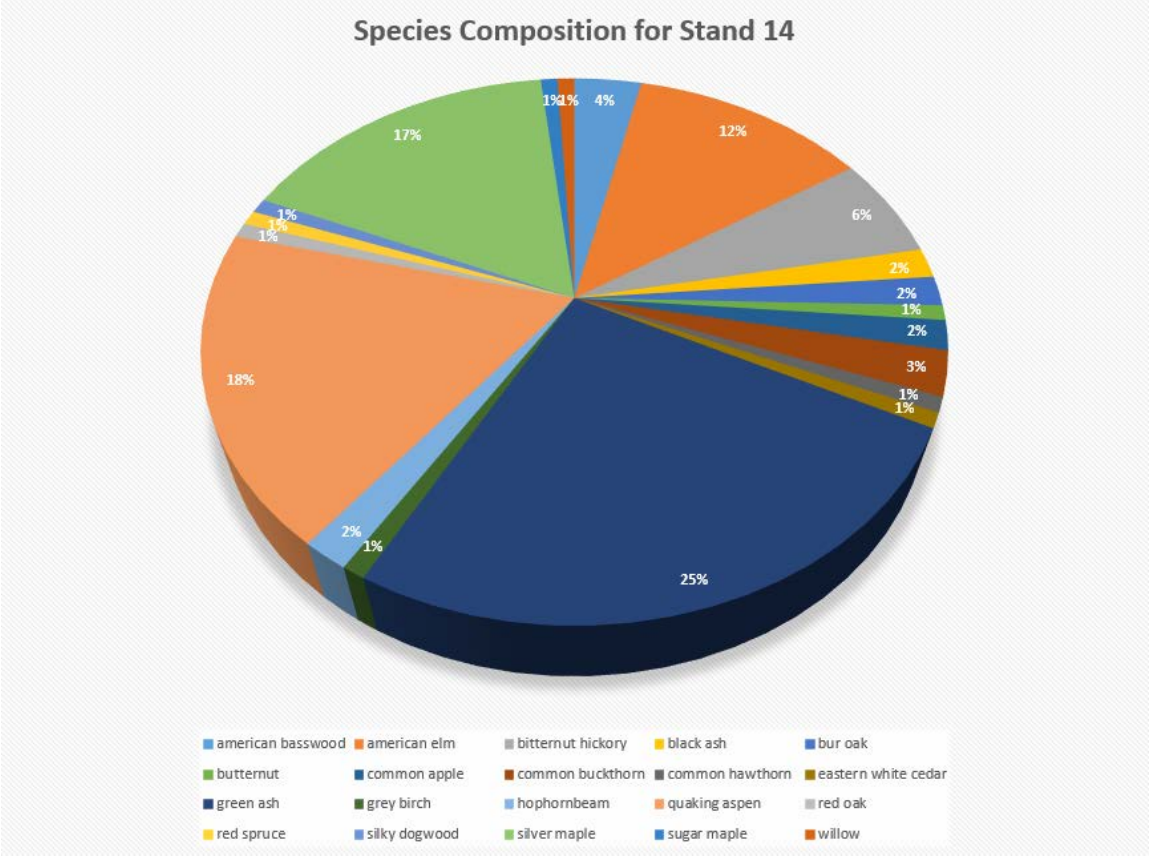
Stand 13 Composition	
american basswood	20.9%
american elm	7.5%
beaked hazelnut	0.7%
bitternut hickory	2.2%
black cherry	2.2%
bur oak	6.0%
butternut	2.2%
common buckthorn	2.2%
gray birch	0.7%
green ash	23.9%
quaking aspen	6.7%
red maple	3.7%
silver maple	15.7%
sugar maple	3.0%
white ash	2.2%

Stand 14



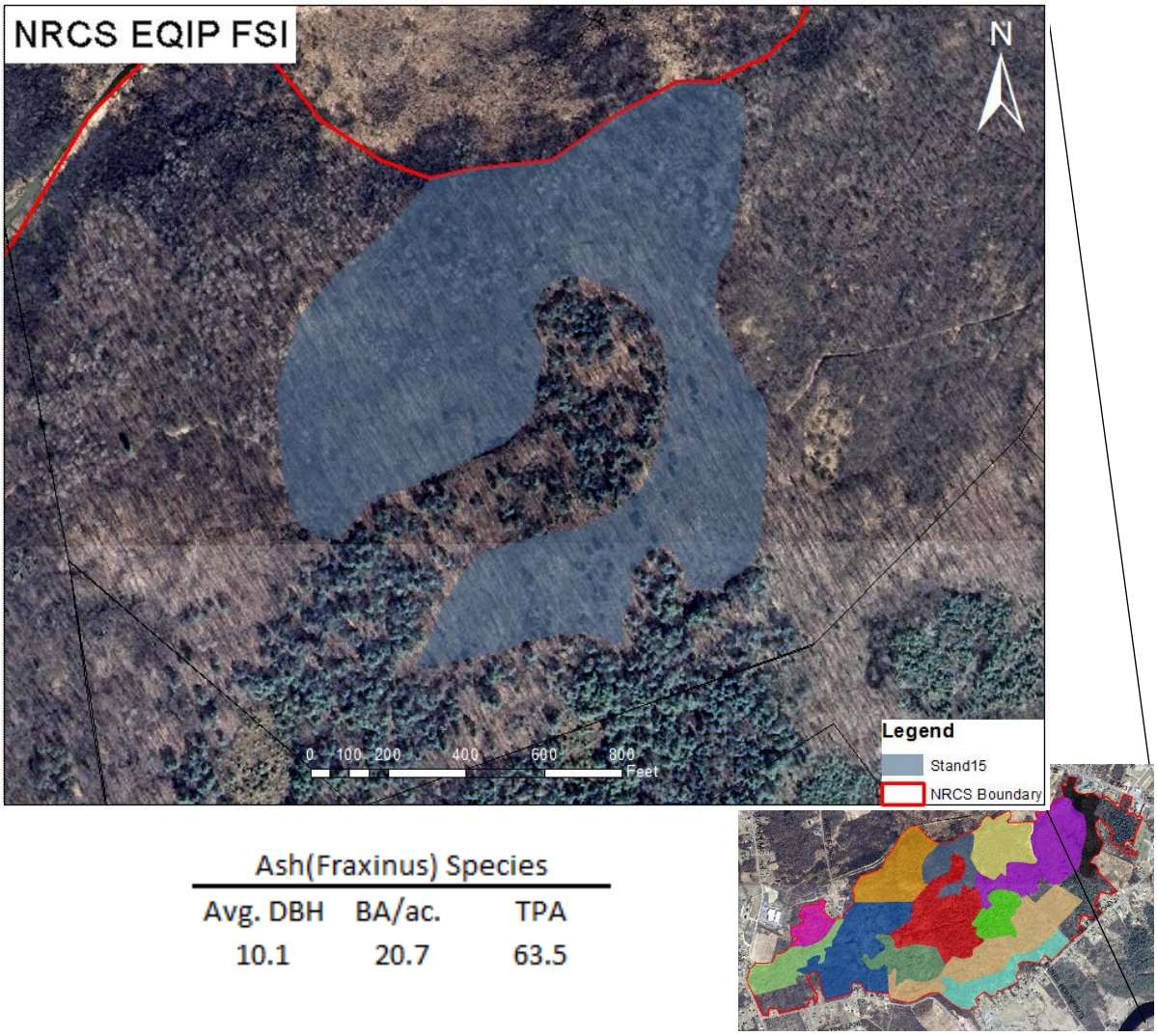
Ash(Fraxinus) Species		
Avg. DBH	BA/ac.	TPA
7.2	20.7	138.5

Stand 14 is 41.8 acres, has an **average DBH of 8.4**, a total **Basal Area/ac of 76** and **558.1 Trees/acre**. 27.2% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a medium component (>20%) of ash)* therefore the percent of ash will be reduced to 20% across the stand overall; approximately **416 trees** will be cut, focusing on Ash with low vigor and poor form to be removed first. 1.4 BA/ac and 10.0 TPA will be removed from this stand.



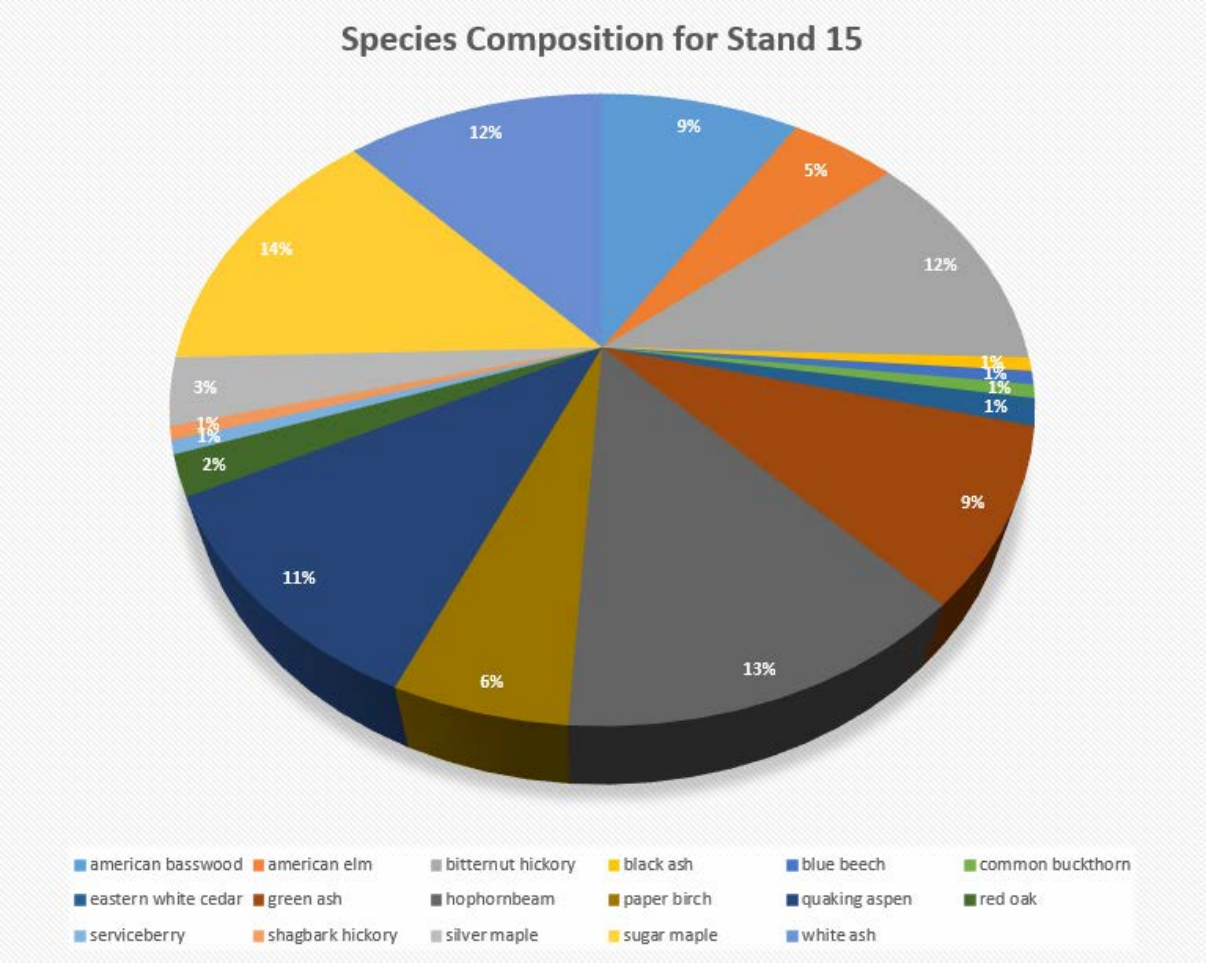
Stand 14 Composition	
american basswood	3.5%
american elm	12.3%
bitternut hickory	6.1%
black ash	1.8%
bur oak	1.8%
butternut	0.9%
common apple	1.8%
common buckthorn	2.6%
common hawthorn	0.9%
eastern white cedar	0.9%
green ash	25.4%
grey birch	0.9%
hophornbeam	1.8%
quaking aspen	18.4%
red oak	0.9%
red spruce	0.9%
silky dogwood	0.9%
silver maple	16.7%
sugar maple	0.9%
willow	0.9%

Stand 15



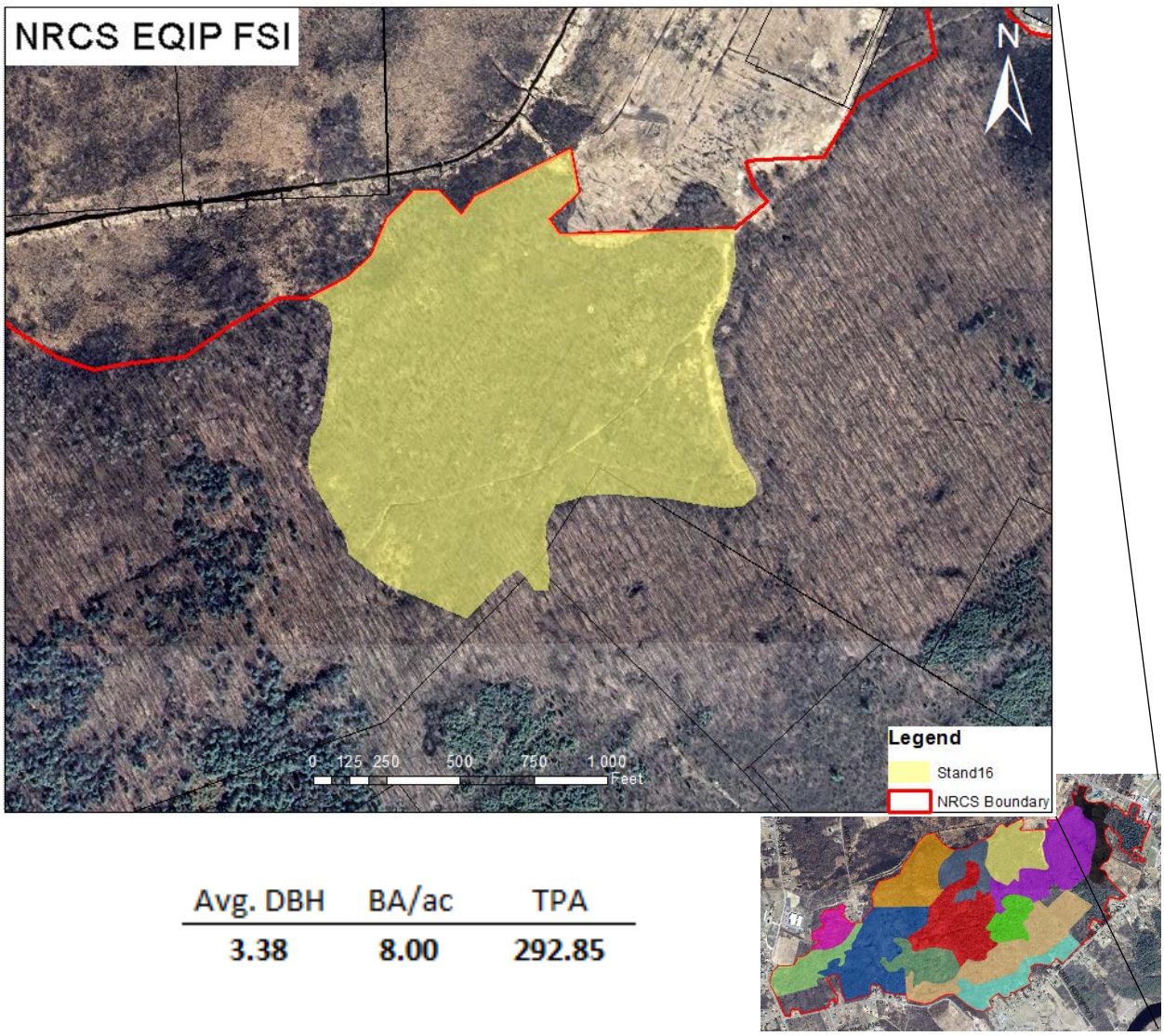
Ash(Fraxinus) Species		
Avg. DBH	BA/ac.	TPA
10.1	20.7	63.5

Stand 15 is 22.8 acres, has an **average DBH of 10.9**, a total **Basal Area/ac of 96.7** and **383.3 Trees/acre**. 21.4% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a medium component (>20%) of ash)* therefore the percent of ash will be reduced to 20% across the stand overall; approximately **20 trees** will be cut, focusing on Ash with low vigor and poor form to be removed first. 0.2 BA/ac and 0.9 TPA will be removed from this stand.



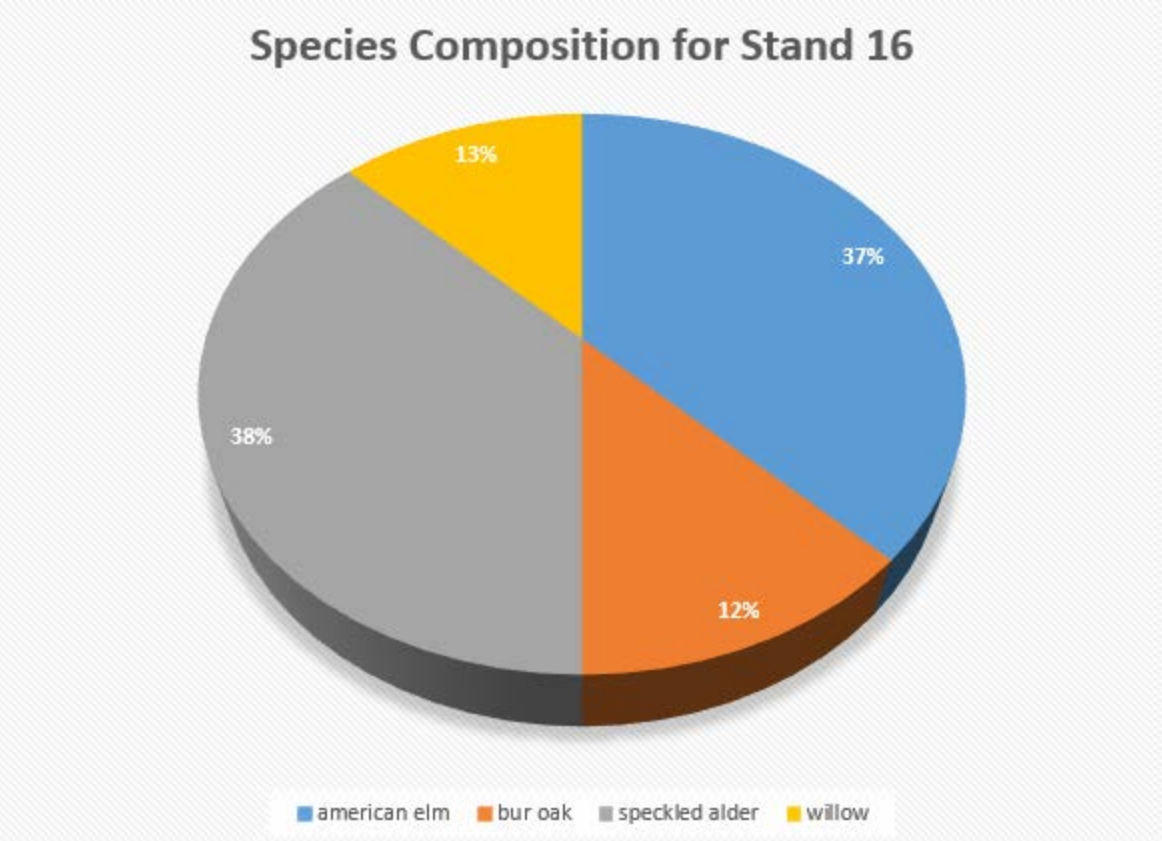
Stand 15 Composition	
american basswood	9.0%
american elm	4.8%
bitternut hickory	11.7%
black ash	0.7%
blue beech	0.7%
common buckthorn	0.7%
eastern white cedar	1.4%
green ash	9.0%
hophornbeam	13.1%
paper birch	5.5%
quaking aspen	11.0%
red oak	2.1%
serviceberry	0.7%
shagbark hickory	0.7%
silver maple	3.4%
sugar maple	13.8%
white ash	11.7%

Stand 16



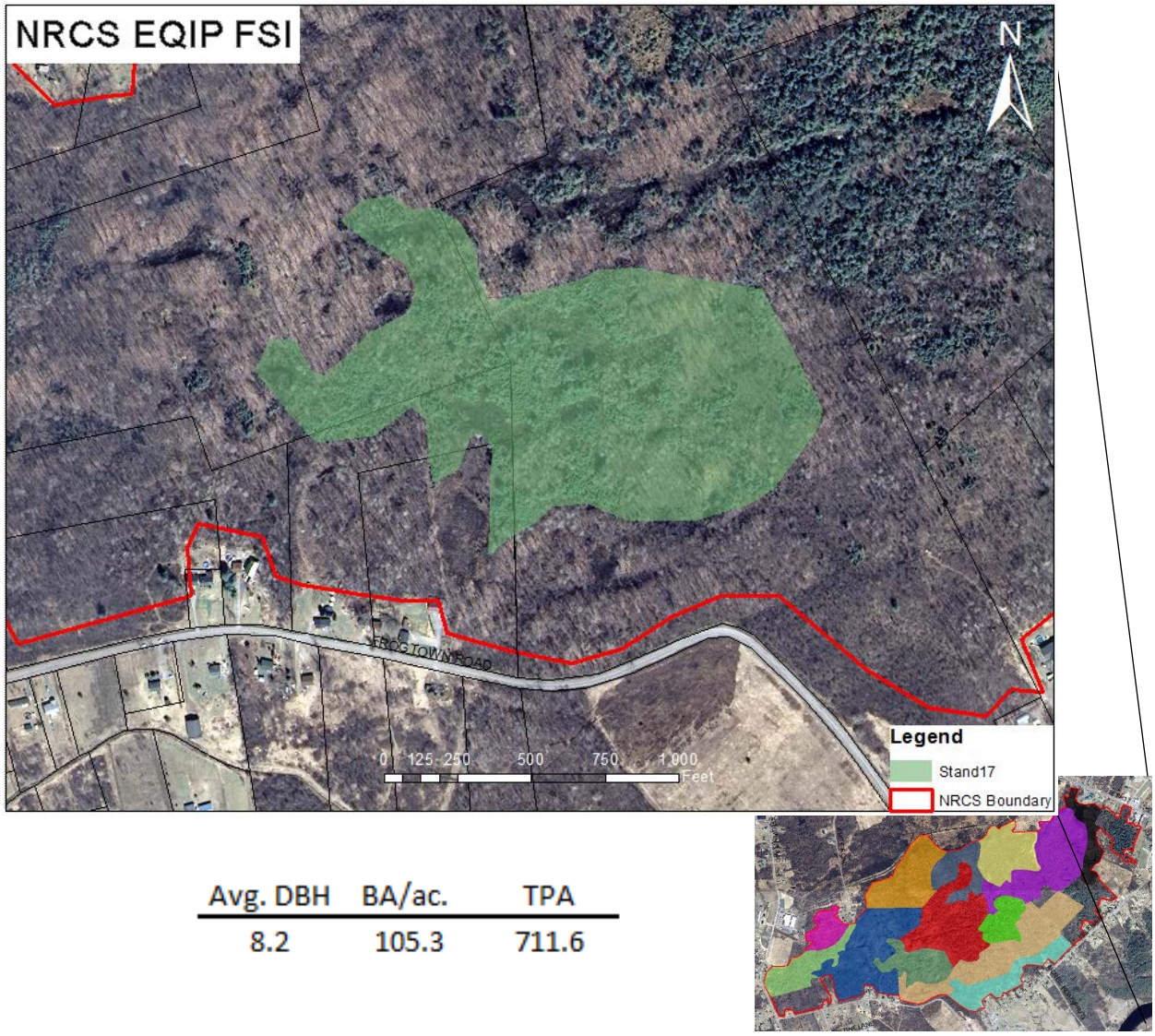
Avg. DBH	BA/ac	TPA
3.38	**8.00**	**292.85**

Stand 16 is 38.5 acres, has an **average DBH of 3.38**, a total **Basal Area/ac of 8** and **292.9 Trees/acre**. 0% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a minor component (<20%) of ash).* A majority of this stand is considered to be wetland and within the riparian buffer; therefore no cutting will take place in this stand.



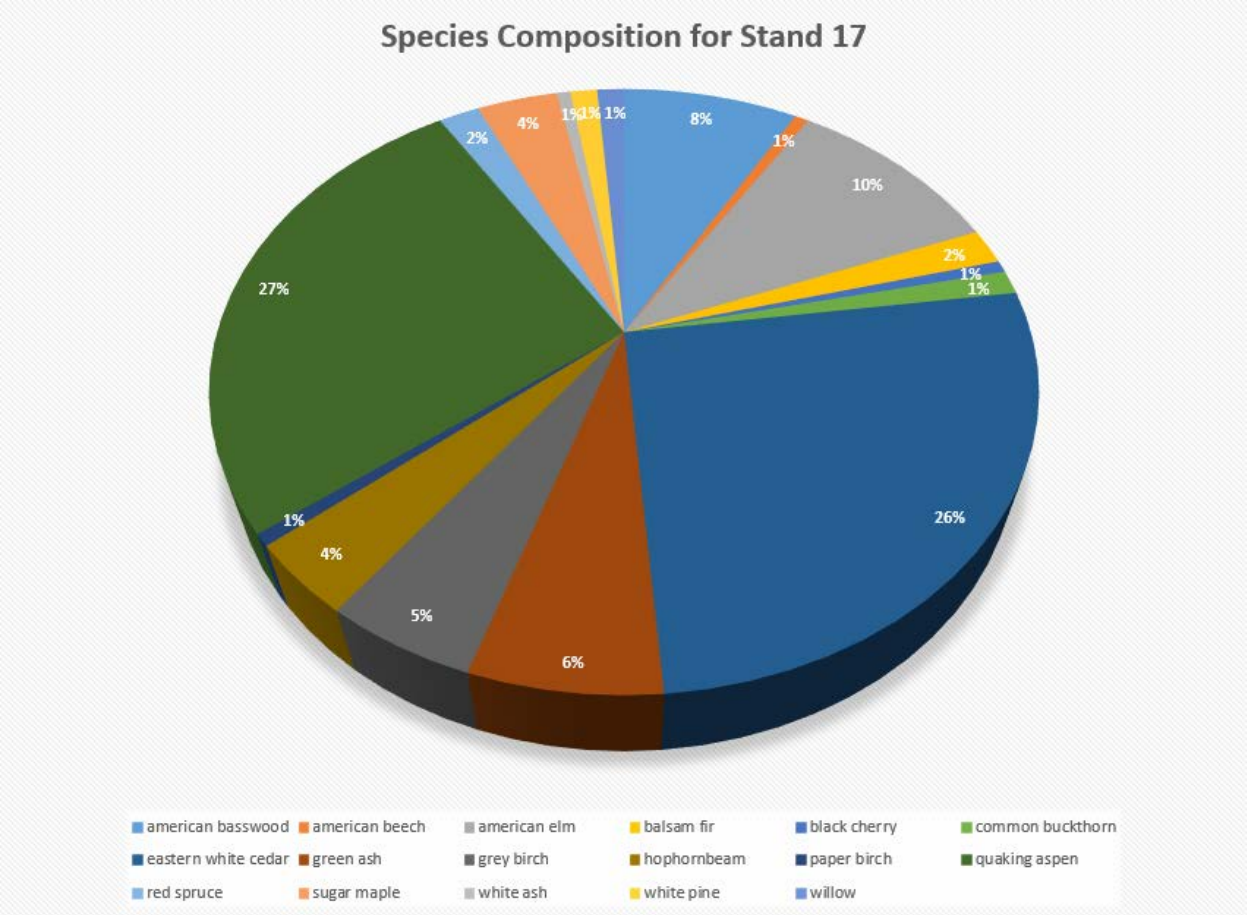
Stand 16 Composition	
american elm	37.5%
bur oak	12.5%
speckled alder	37.5%
willow	12.5%

Stand 17



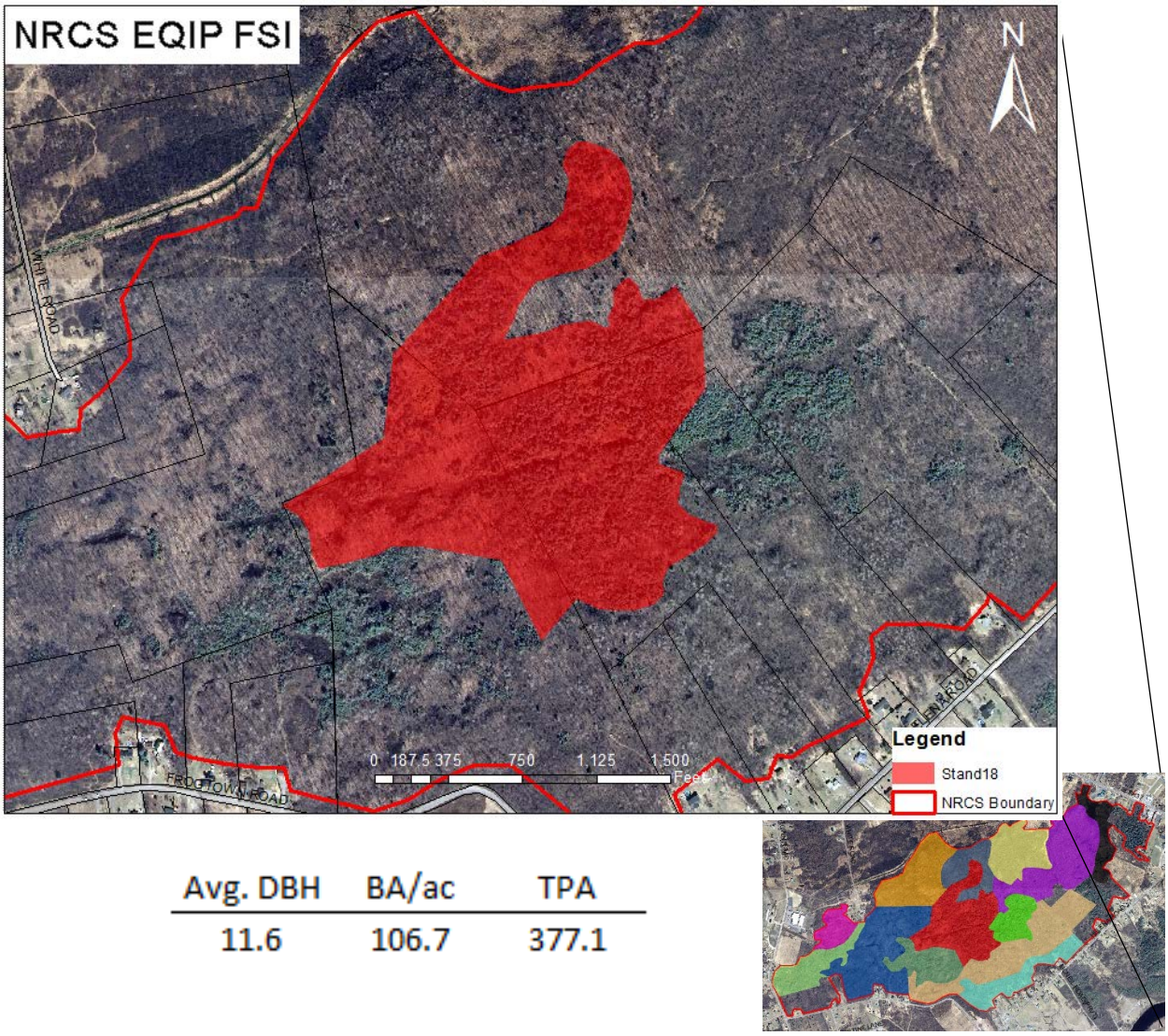
Avg. DBH	BA/ac.	TPA
8.2	105.3	711.6

Stand 17 is 27.5 acres, has an **average DBH of 8.2**, a total **Basal Area/ac of 105.3** and **711.6 Trees/acre**. 6.9% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a minor component (<20%) of ash).* A layering method in cedar stands with patch or strip clear cuts along the edge of cedar stands will be implemented to regenerate cedar, create wildlife habitat and increase deer browsing and bedding areas. Also quaking aspen regeneration will be conducted by means of small patch clear cuts in certain areas to promote wildlife habitat. The method used will be to cut 15 foot wide strip clear cut around the boarder of White Cedar stands and every 15ft a cedar will be dropped into the clear cut to promote regeneration. Slash will be left to protect regen from deer browsing. Approximately 6.4 acres of area will be cleared removing 24.5 BA/ac and 165.6 TPA.



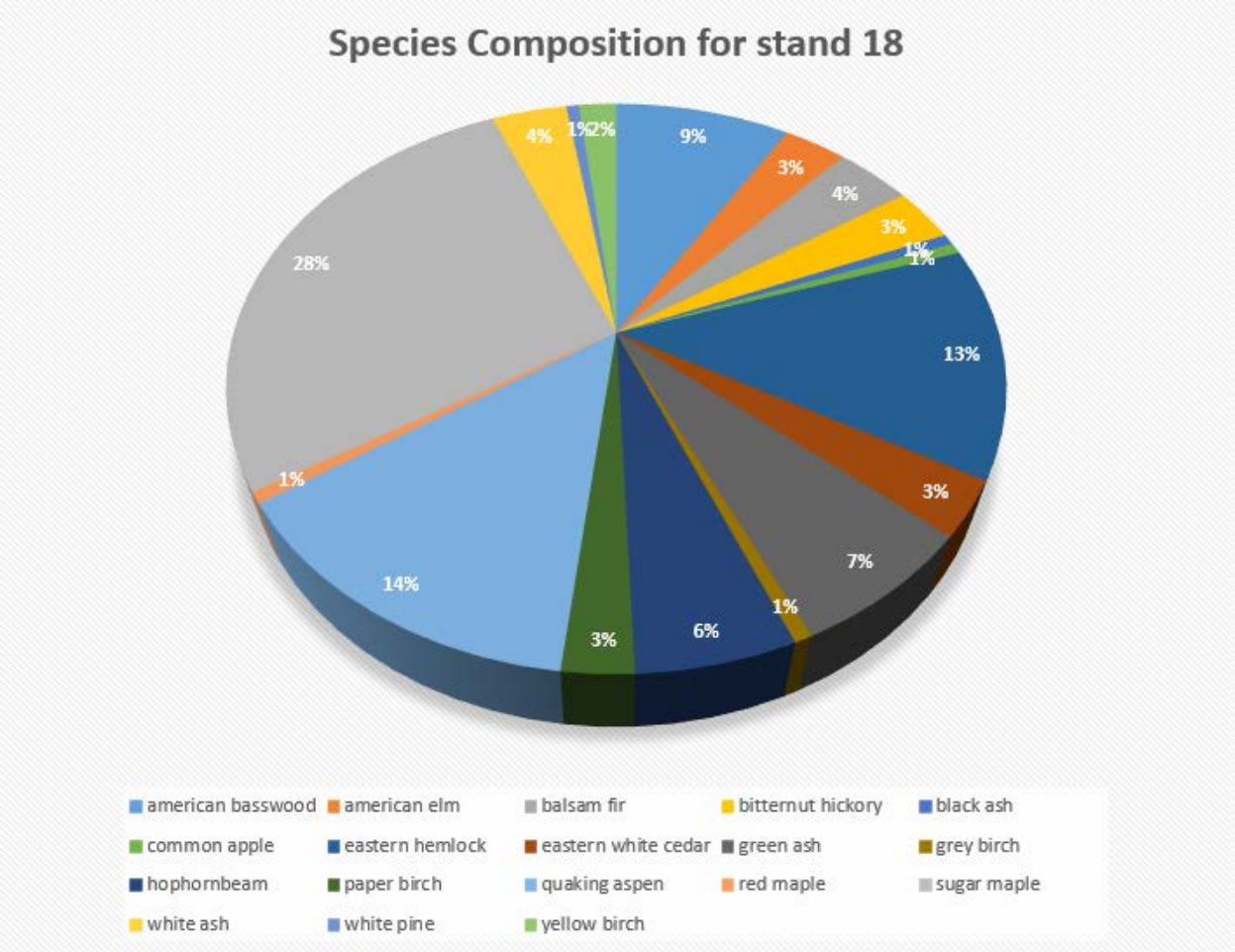
Stand 17 Composition	
american basswood	8.2%
american beech	0.6%
american elm	10.1%
balsam fir	1.9%
black cherry	0.6%
common buckthorn	1.3%
eastern white cedar	25.9%
green ash	6.3%
grey birch	5.1%
hophornbeam	3.8%
paper birch	0.6%
quaking aspen	26.6%
red spruce	1.9%
sugar maple	3.8%
white ash	0.6%
white pine	1.3%
willow	1.3%

Stand 18



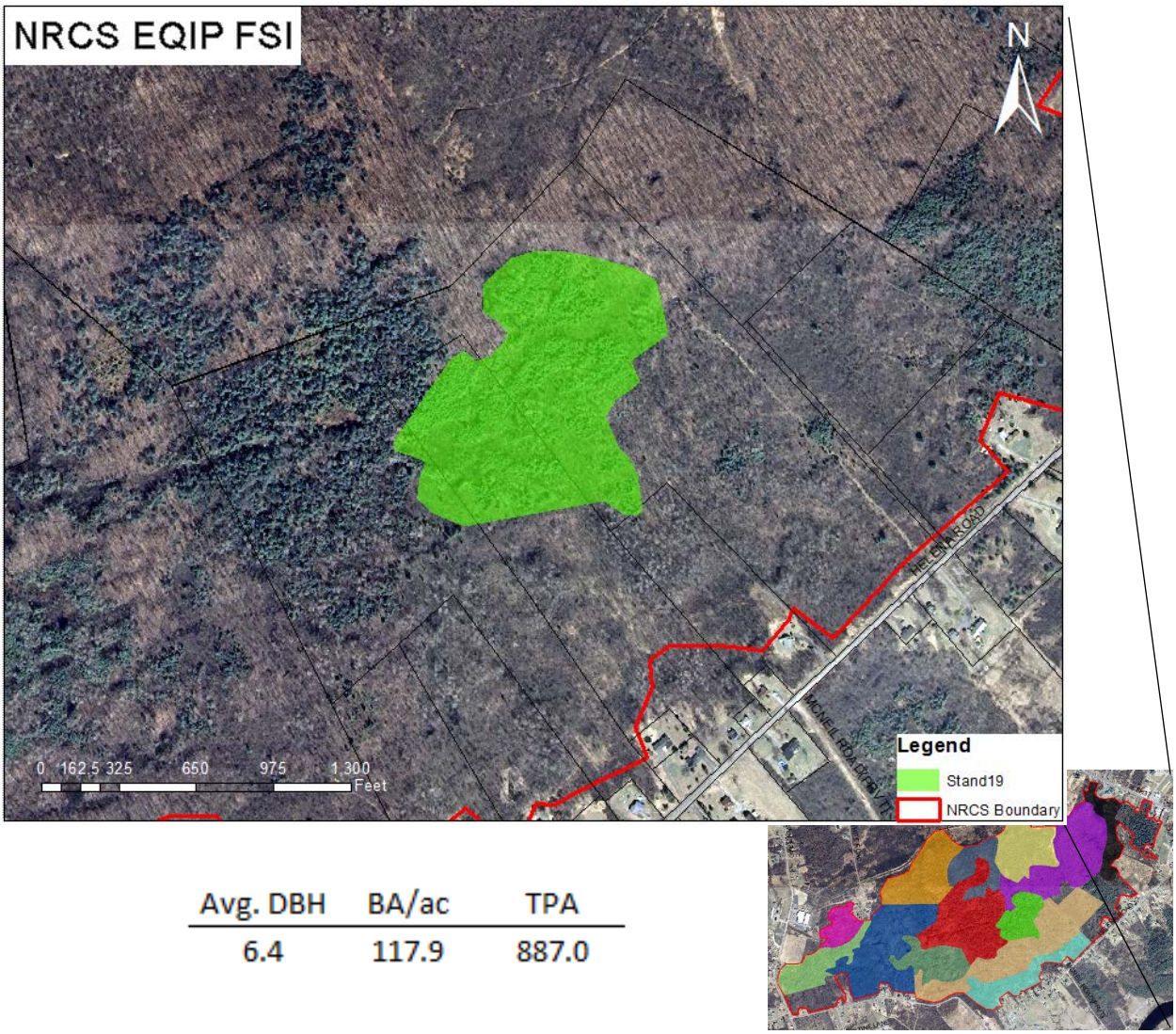
Avg. DBH	BA/ac	TPA
11.6	106.7	377.1

Stand 18 is 60.6 acres, has an **average DBH of 11.6**, a total **Basal Area/ac of 106.7** and **377.1 Trees/acre**. 11.3% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a minor component (<20%) of ash).* The implementation of a release cut with a focus on sugar maple as the desired species will be conducted. Also quaking aspen will be girdled instead of cutting where species interferes with sugar maple or hemlock. Approximately **100 trees** will be removed. 0.5 BA/ac and 1.7 TPA will be removed from this stand.



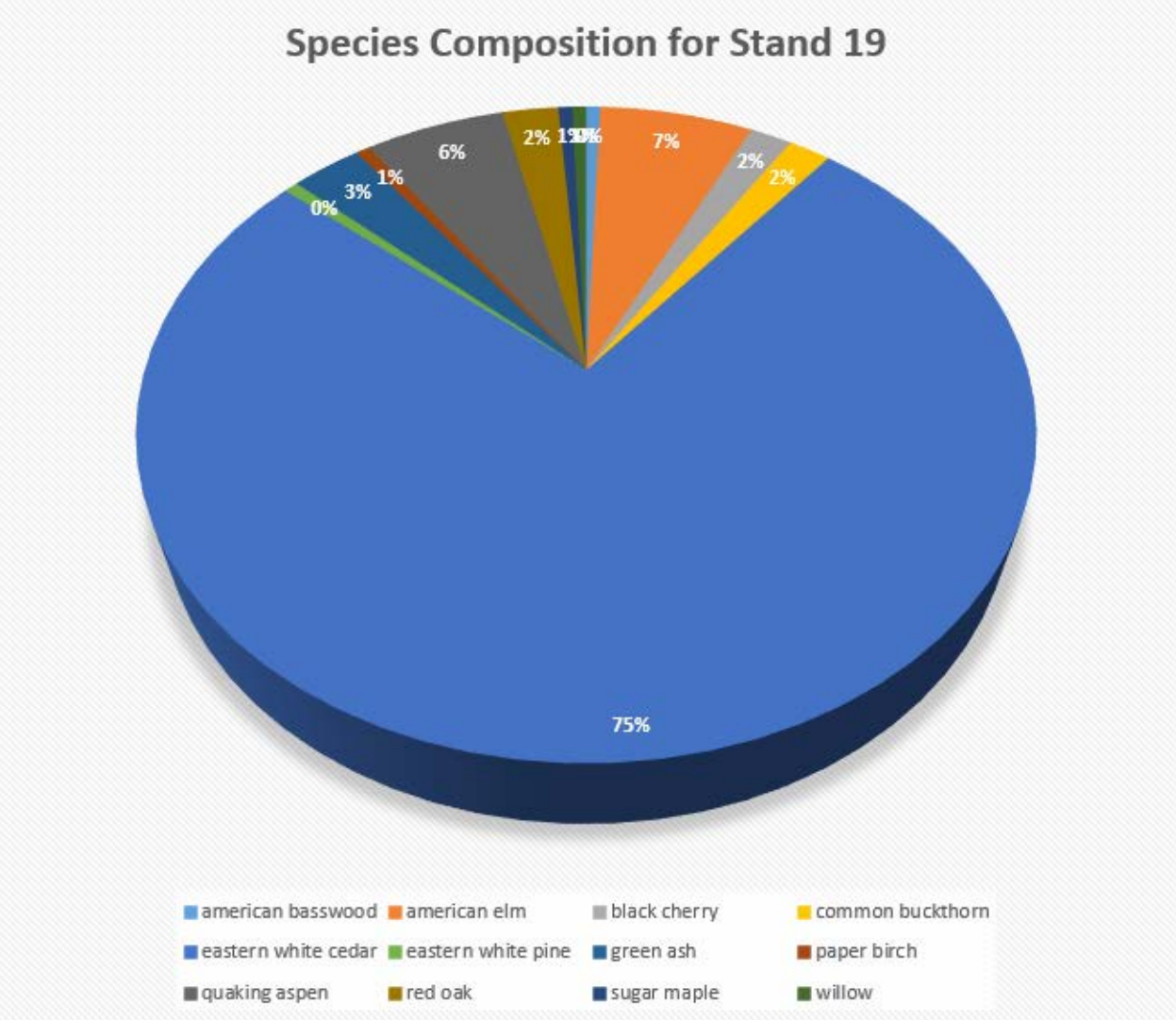
Stand 18 Composition	
american basswood	8.8%
american elm	3.1%
balsam fir	3.8%
bitternut hickory	3.1%
black ash	0.6%
common apple	0.6%
eastern hemlock	13.1%
eastern white cedar	3.1%
green ash	6.9%
grey birch	0.6%
hophornbeam	5.6%
paper birch	2.5%
quaking aspen	13.8%
red maple	0.6%
sugar maple	27.5%
white ash	3.8%
white pine	0.6%
yellow birch	1.9%

Stand 19



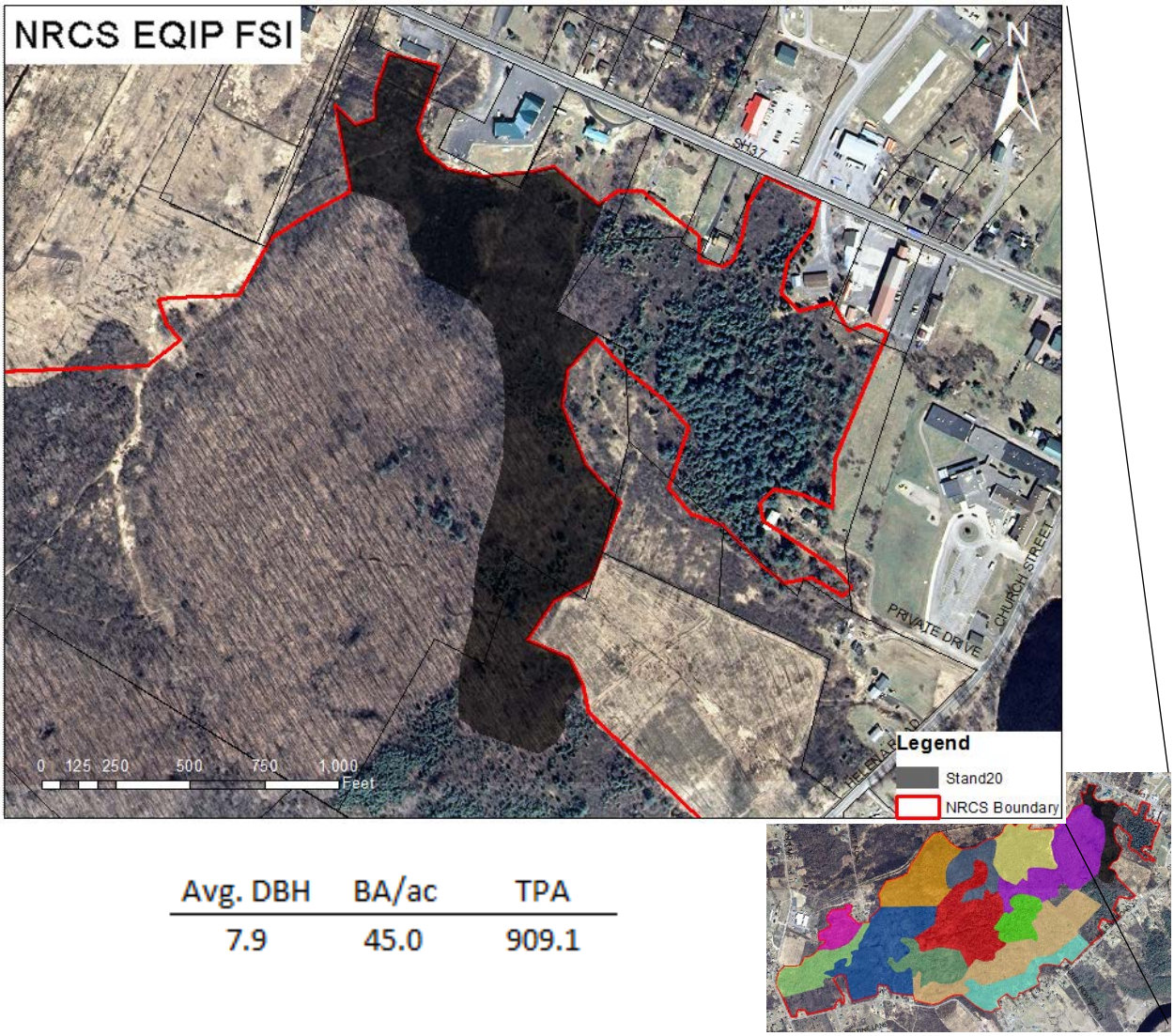
Avg. DBH	BA/ac	TPA
6.4	117.9	887.0

Stand 19 is 19.8 acres, has an **average DBH of 6.4**, a total **Basal Area/ac of 117.9** and **887 Trees/acre**. 3% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a minor component (<20%) of ash).* 75% of the stand is Eastern White Cedar. A layering method in cedar stands with patch or strip clear cuts along the edge of cedar stands will be implemented to regenerate cedar, create wildlife habitat and increase deer browsing and bedding areas. The method used will be to cut 15 foot wide strip clear cut around the boarder of White Cedar stands and every 15ft a cedar will be dropped into the clear cut to promote regeneration. Slash will be left to protect regen from deer browsing. Approximately 4.6 acres of area will be cleared removing 27.4 BA/ac and 206 TPA.



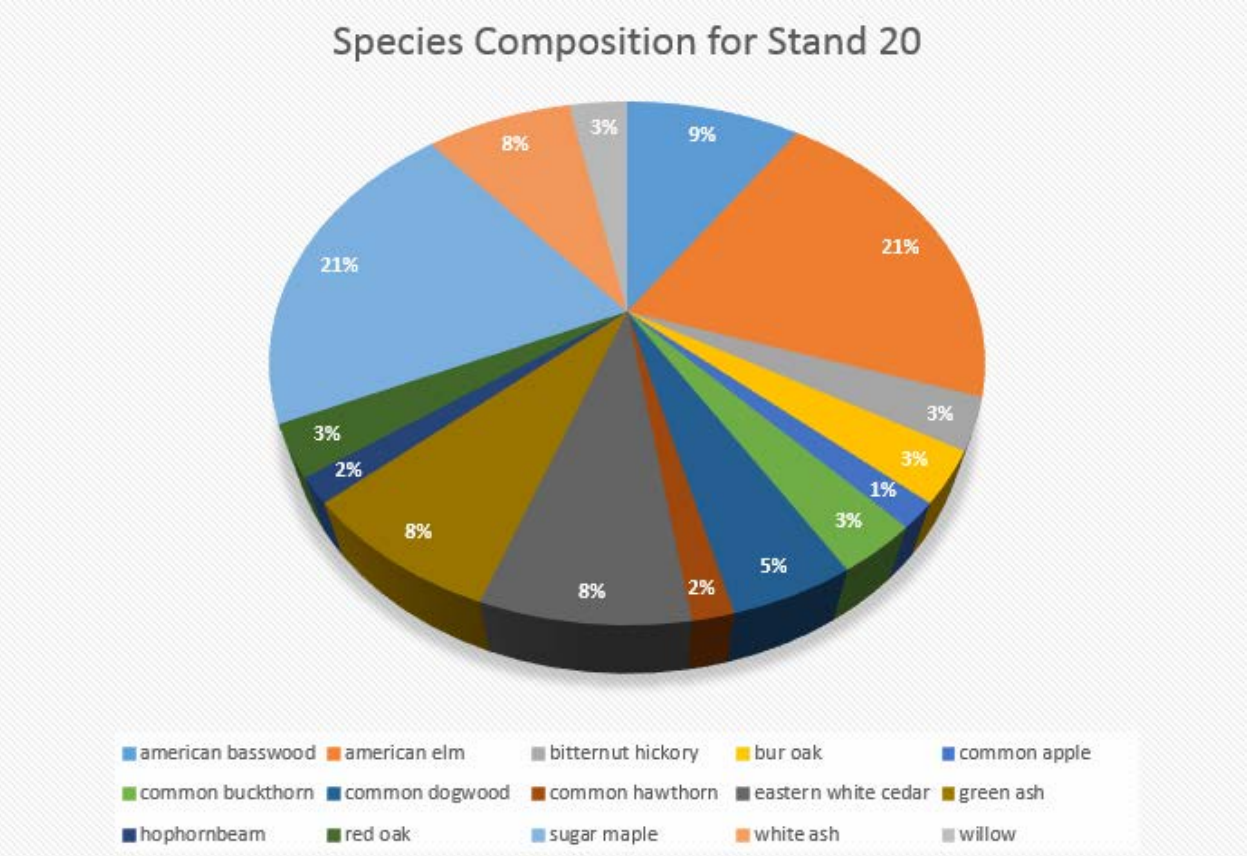
Stand 19 Composition	
american basswood	0.6%
american elm	6.7%
black cherry	1.8%
common buckthorn	1.8%
eastern white cedar	75.2%
eastern white pine	0.6%
green ash	3.0%
paper birch	0.6%
quaking aspen	6.1%
red oak	2.4%
sugar maple	0.6%
willow	0.6%

Stand 20



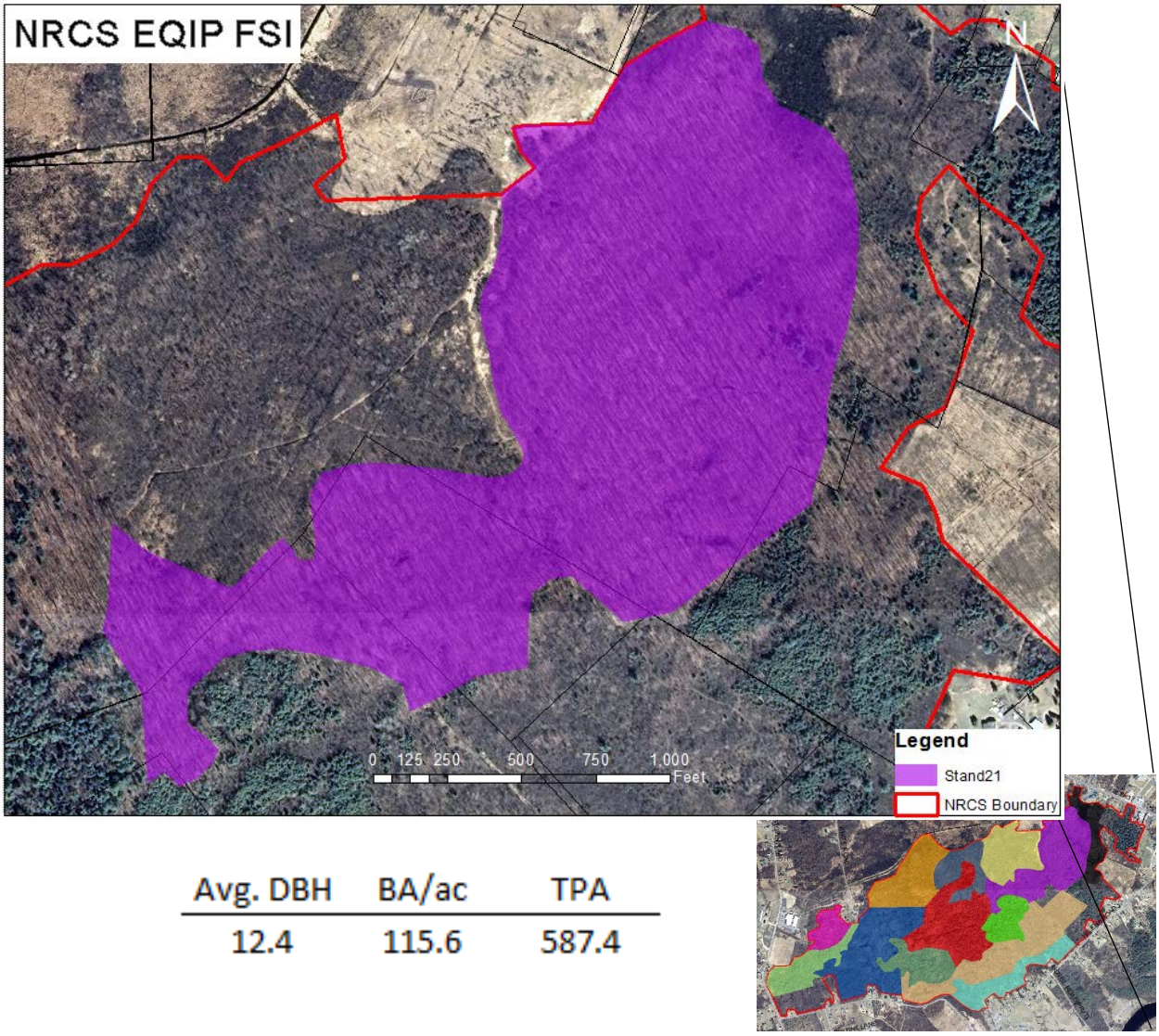
Avg. DBH	BA/ac	TPA
7.9	45.0	909.1

Stand 20 is 18.7 acres, has an **average DBH of 7.9**, a total **Basal Area/ac of 45** and **909.1 Trees/acre**. 15.8 % of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a minor component (<20%) of ash).* A release cut with a focus on sugar maple and basswood as the desired species will be implemented. Approximately **42 trees** will be removed. 0.1 BA/ac and 2.2 TPA were removed from this stand.



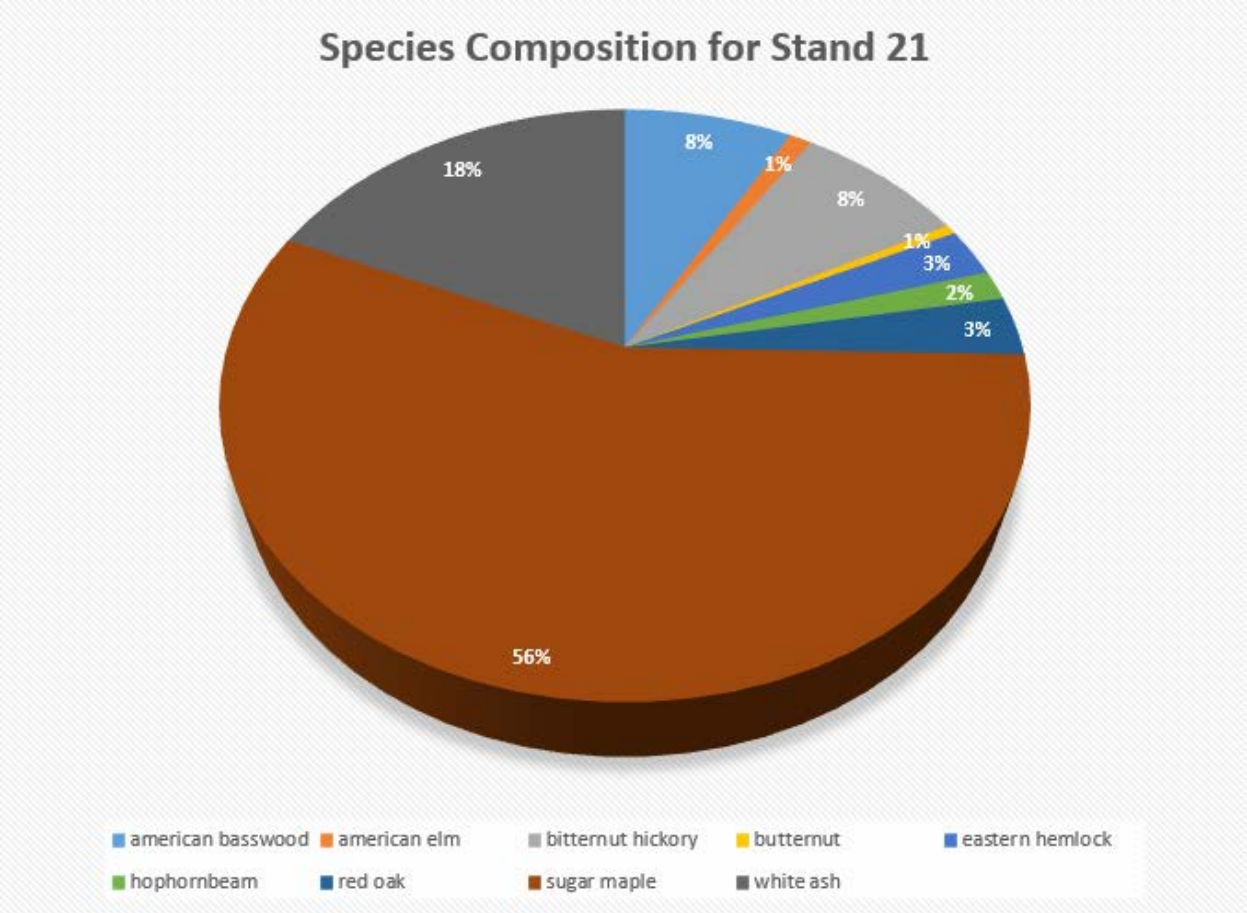
Stand 20 Composition	
american basswood	9.5%
american elm	20.6%
bitternut hickory	3.2%
bur oak	3.2%
common apple	1.6%
common buckthorn	3.2%
common dogwood	4.8%
common hawthorn	1.6%
eastern white cedar	7.9%
green ash	7.9%
hophornbeam	1.6%
red oak	3.2%
sugar maple	20.6%
white ash	7.9%
willow	3.2%

Stand 21



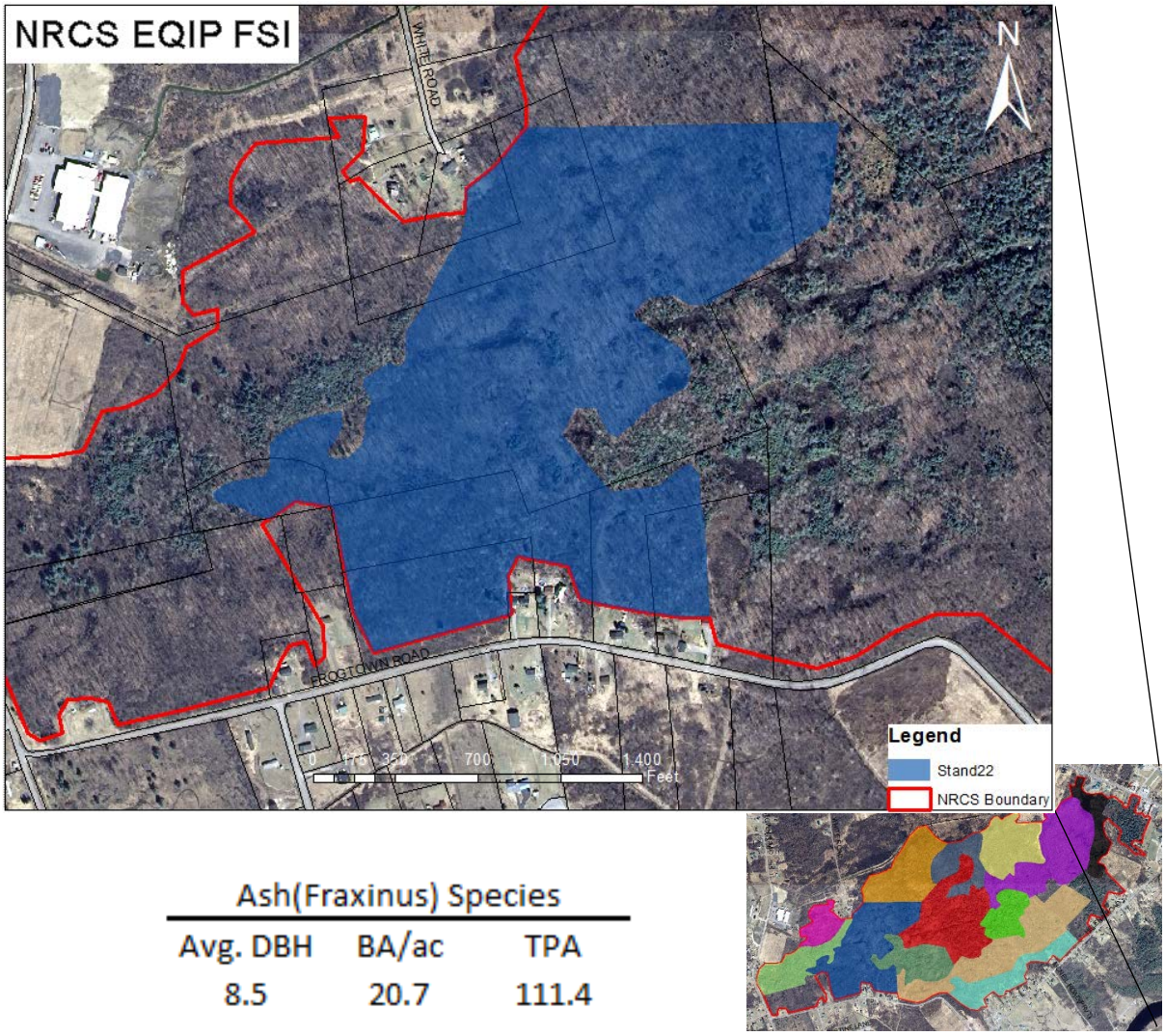
Avg. DBH	BA/ac	TPA
12.4	115.6	587.4

Stand 21 is 61.2 acres, has an **average DBH of 12.4**, a total **Basal Area/ac of 115.6** and **587.4 Trees/acre**. 18.4 % of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a minor component (<20%) of ash).* A release cut will be implemented with a focus on sugar maple as the desirable species. Also the ash composition will be reduce in the selection process. Approximately **300 trees** will be removed. 1.0 BA/ac and 4.9 TPA will be removed from this stand.



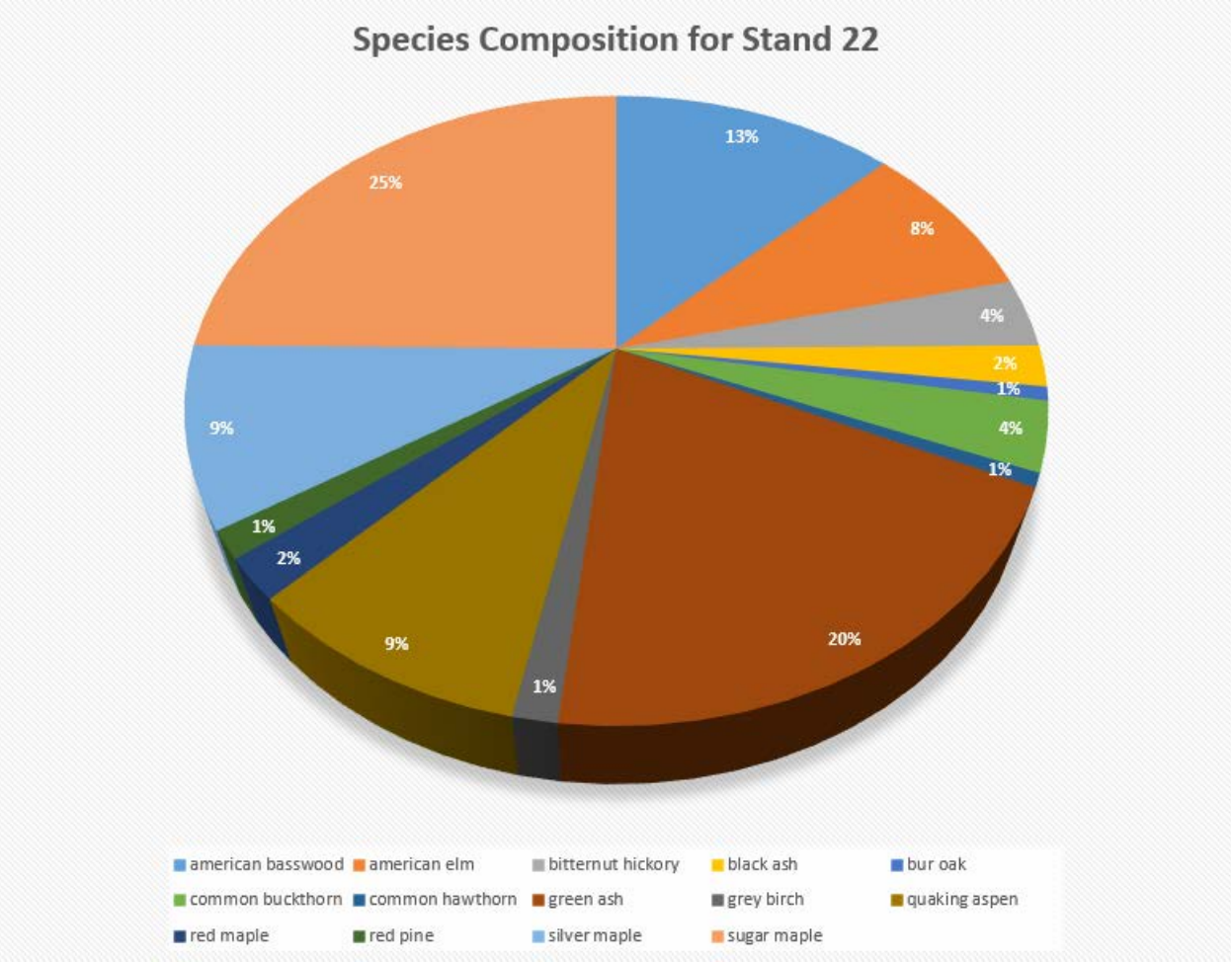
Stand 21 Composition	
american basswood	8.1%
american elm	1.1%
bitternut hickory	8.1%
butternut	0.5%
eastern hemlock	2.7%
hophornbeam	1.6%
red oak	3.2%
sugar maple	56.2%
white ash	18.4%

Stand 22



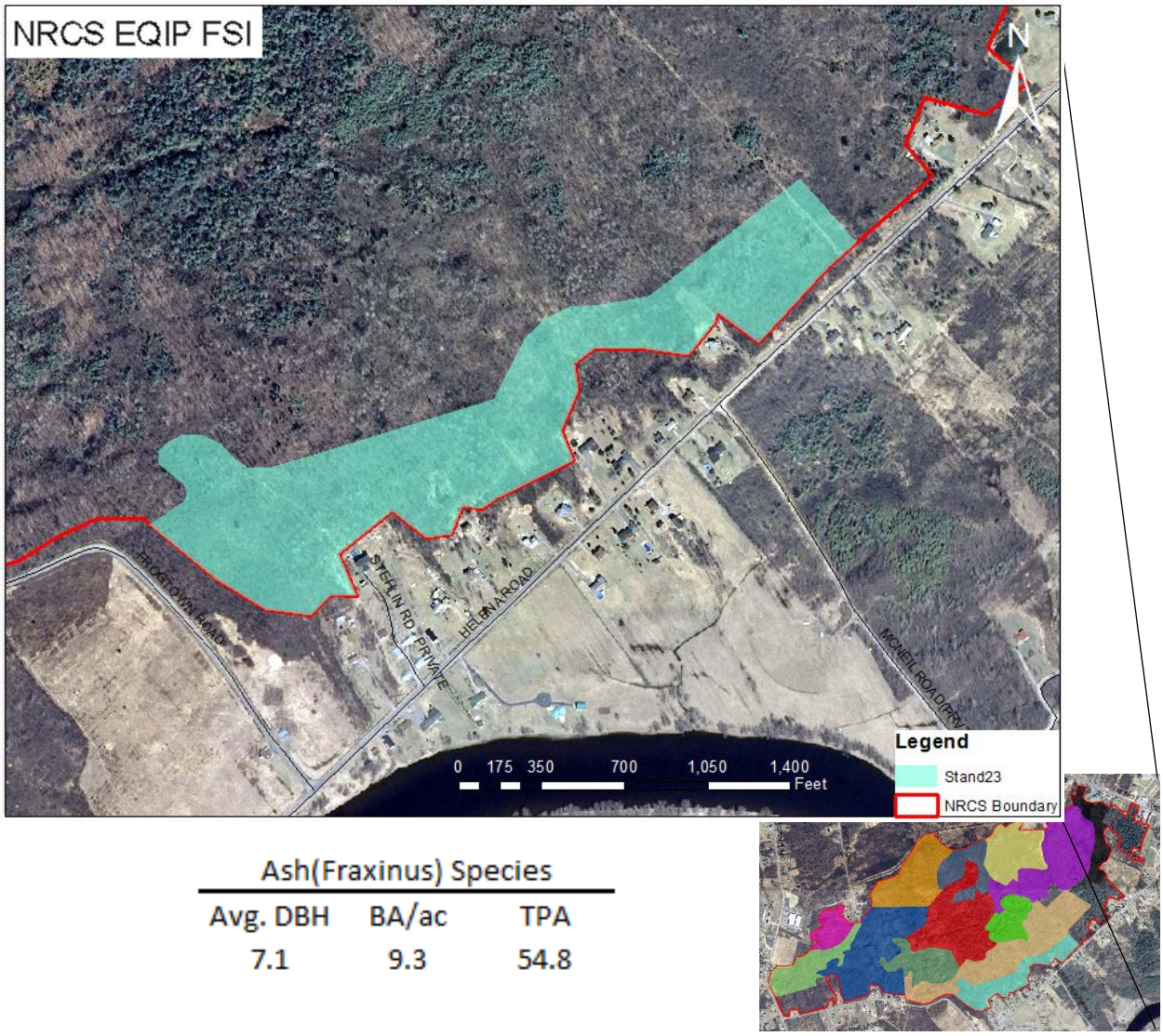
Ash(Fraxinus) Species		
Avg. DBH	BA/ac	TPA
8.5	20.7	111.4

Stand 22 is 66.5 acres, has an **average DBH of 10.8**, a total **Basal Area/ac of 94** and **459.2 Trees/acre**. 22% of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a medium component (>20%) of ash)* therefore the percent of ash will be reduced to 20% across the stand overall; approximately **148 trees** will be cut, focusing on poor quality ash trees to be removed first. 0.5 BA/ac and 2.2 TPA will be removed from this stand.



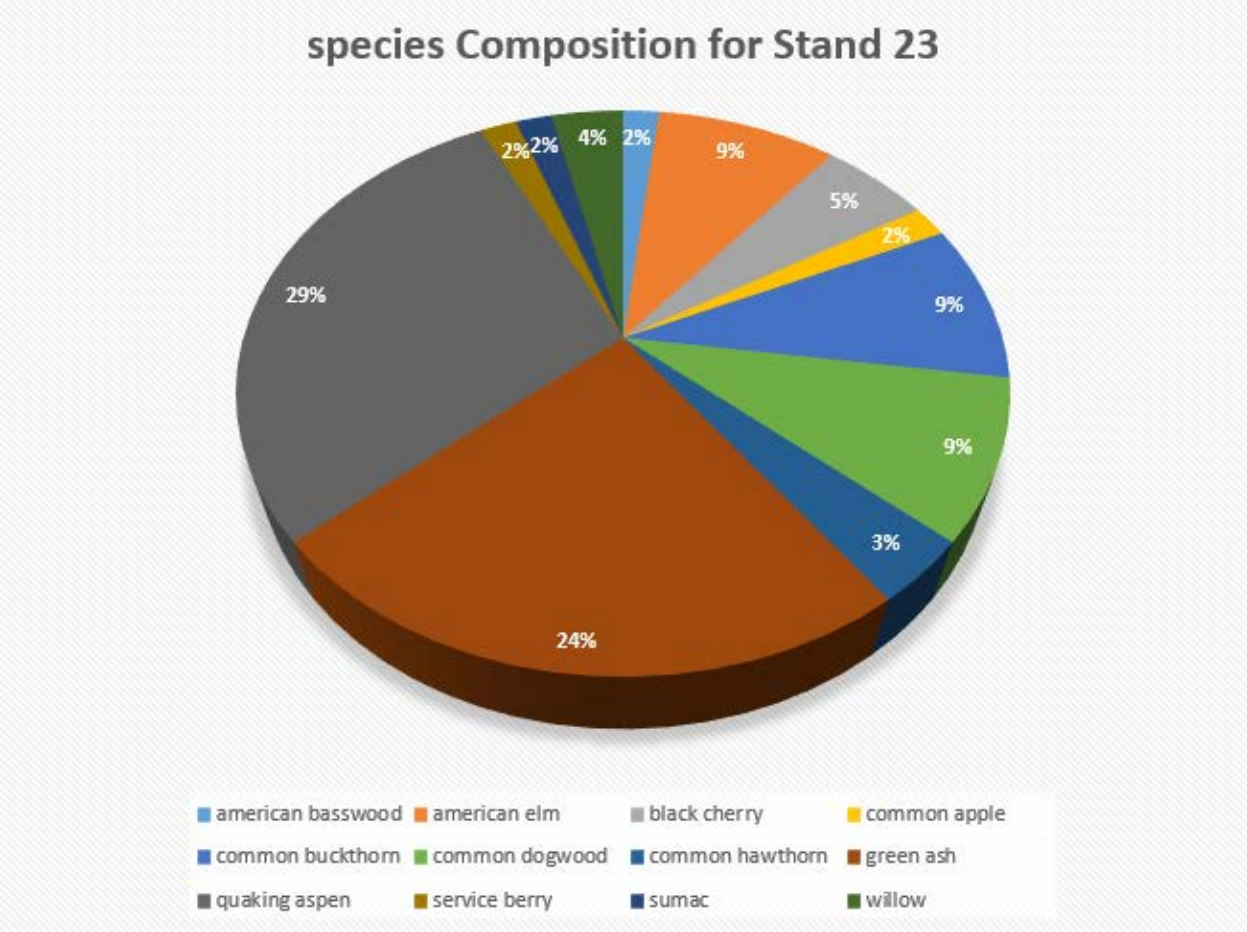
Stand 22 Composition	
american basswood	12.8%
american elm	8.5%
bitternut hickory	3.5%
black ash	2.1%
bur oak	0.7%
common buckthorn	3.5%
common hawthorn	0.7%
green ash	19.9%
grey birch	1.4%
quaking aspen	9.2%
red maple	2.1%
red pine	1.4%
silver maple	9.2%
sugar maple	24.8%

Stand 23



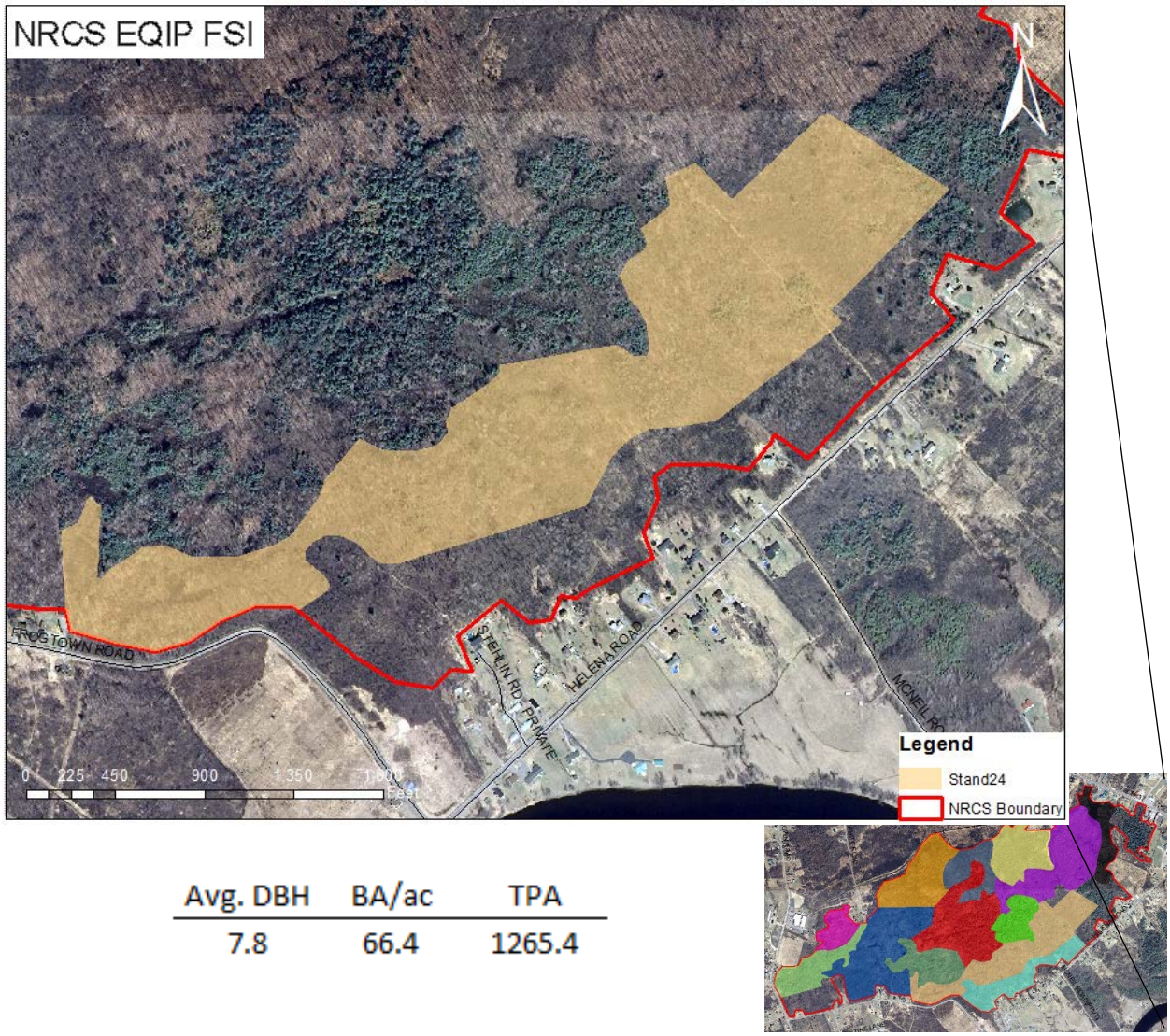
Ash(Fraxinus) Species		
Avg. DBH	BA/ac	TPA
7.1	9.3	54.8

Stand 23 is 29.6 acres, has an **average DBH of 5.9**, a total **Basal Area/ac of 39.3** and **943 Trees/acre**. 23.6 % of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a medium component (>20%) of ash)* therefore the percent of ash will be reduced to 20% across the stand overall; approximately **59 trees** will be cut, focusing on poor quality ash trees to be removed first. 0.1 BA/ac and 2.0 TPA will be removed from this stand.



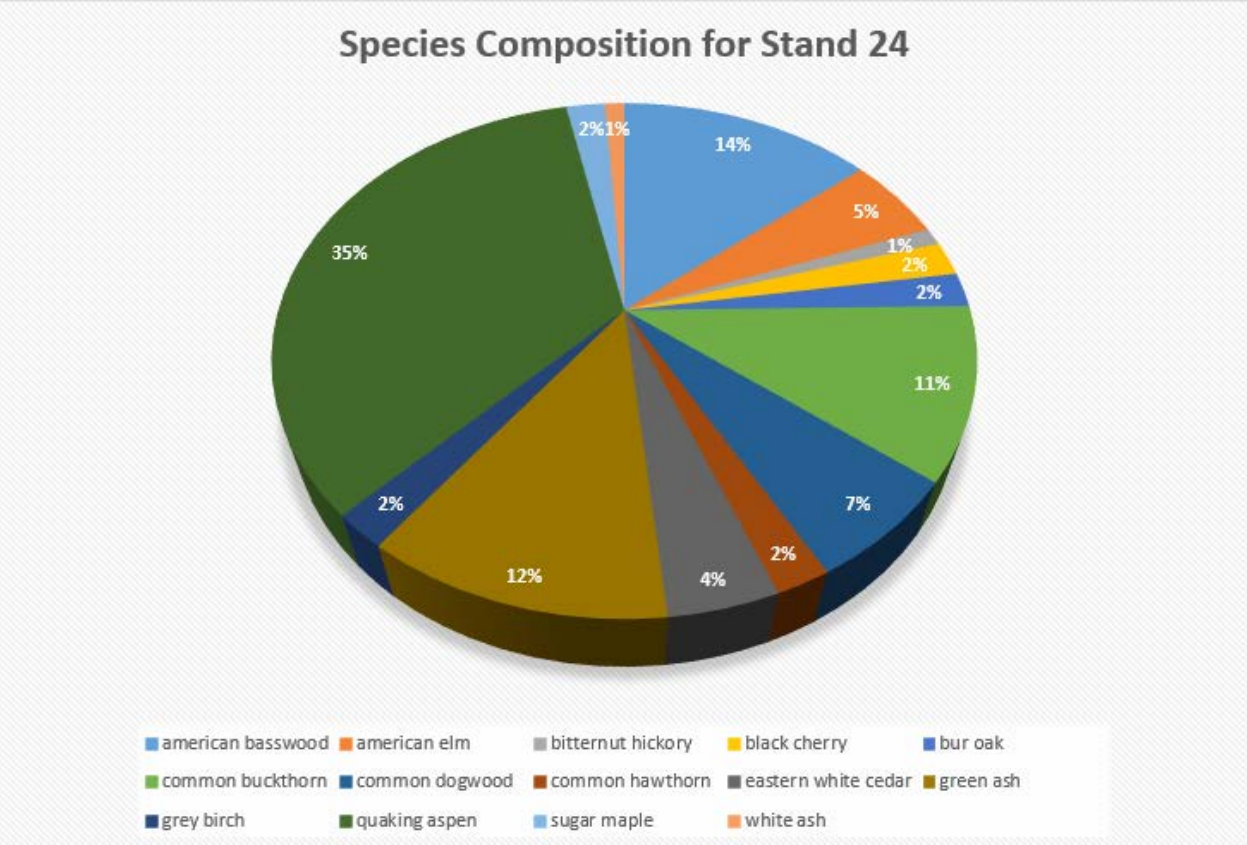
Stand 23 Composition	
american basswood	1.8%
american elm	9.1%
black cherry	5.5%
common apple	1.8%
common buckthorn	9.1%
common dogwood	9.1%
common hawthorn	3.6%
green ash	23.6%
quaking aspen	29.1%
service berry	1.8%
sumac	1.8%
willow	3.6%

Stand 24



Avg. DBH	BA/ac	TPA
7.8	66.4	1265.4

Stand 24 is 68.6 acres, has an **average DBH of 7.8**, a total **Basal Area/ac of 66.4** and **1265.4 Trees/acre**. 12.9 % of the stand is made up of *(fraxinus)* Ash species. This stand falls within (*Forest stands with a minor component (<20%) of ash.* A quaking aspen regeneration by means of patch clear cuts will be implemented in certain areas. Also release cutting for sugar maple and basswood by removing quaking aspen through girdling methods in other areas. Approximately **130 trees** will be removed. 0.1 BA/ac and 1.9 TPA will be removed from this stand.



Stand 24 Composition	
american basswood	14.0%
american elm	5.4%
bitternut hickory	1.1%
black cherry	2.2%
bur oak	2.2%
common buckthorn	10.8%
common dogwood	6.5%
common hawthorn	2.2%
eastern white cedar	4.3%
green ash	11.8%
grey birch	2.2%
quaking aspen	34.4%
sugar maple	2.2%
white ash	1.1%

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