Preliminary Comparison of Similarities and Differences in Tree Height and Volume as a Function of Diameter for Aggregated and Individual Species in Different Watershed Basins within the Catskills

DBH-Height and DBH-Volume Curves

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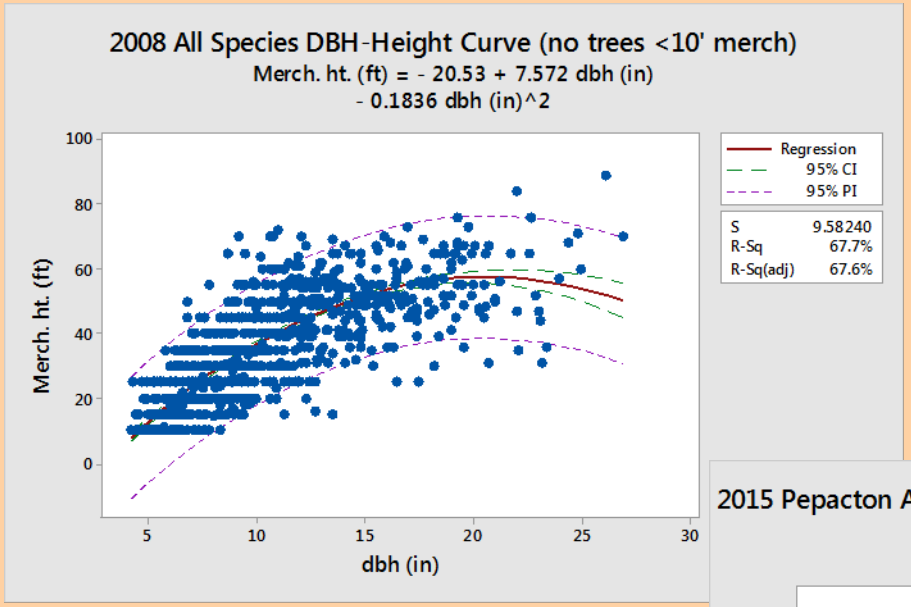
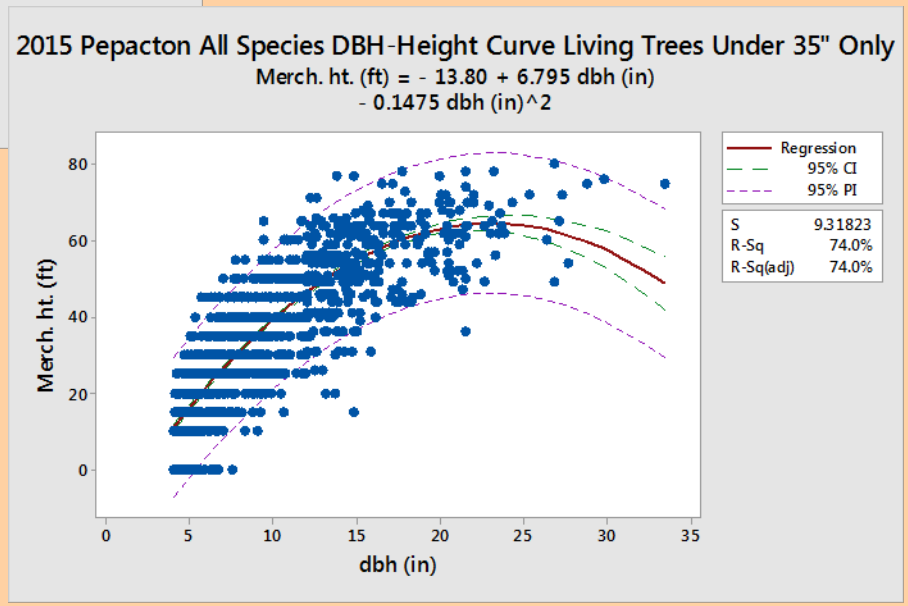
NYCDEP Continuous Forest Inventory

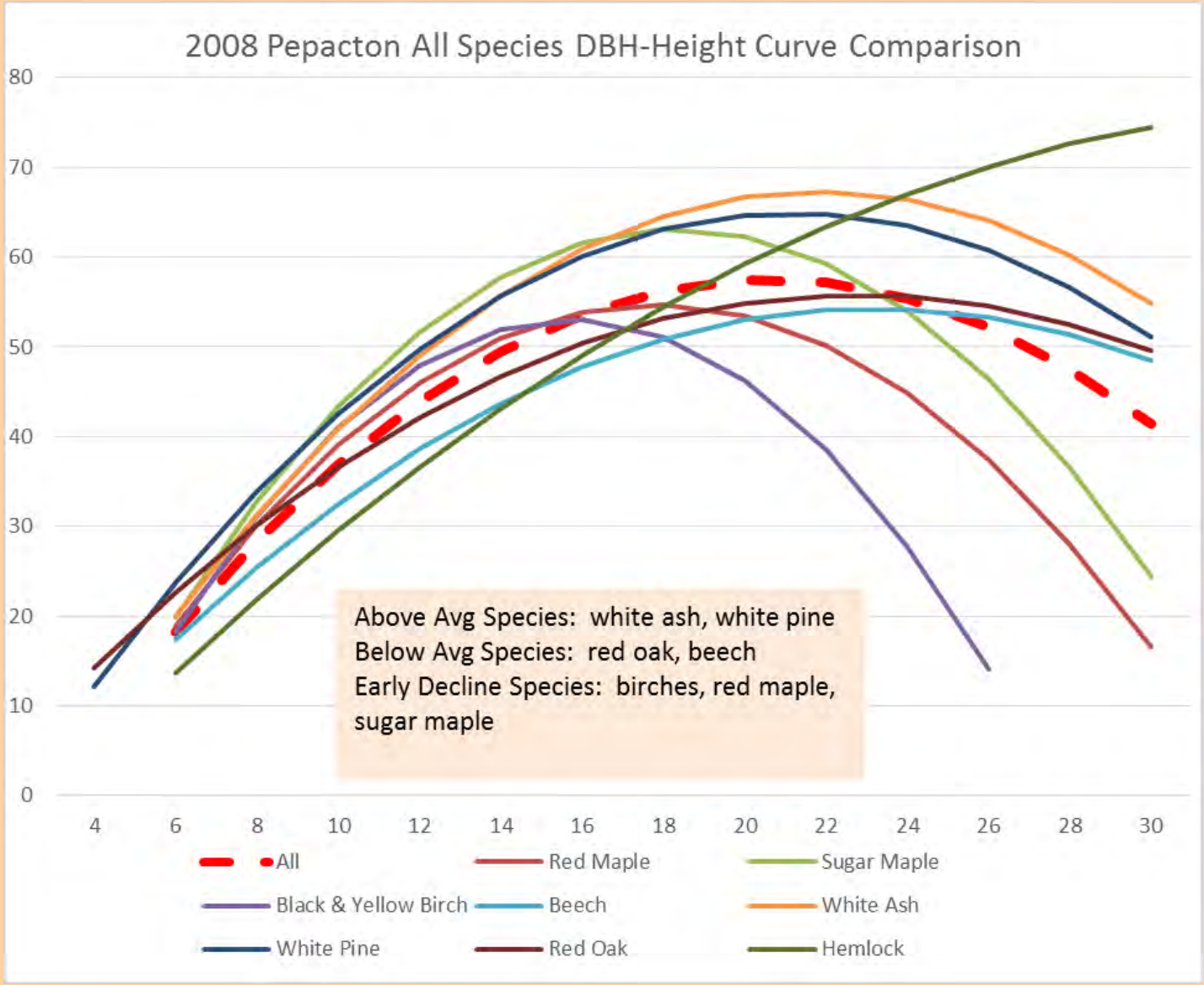
- Beginning in 2001, the Forest Science Program of NYCDEP began establishment of continuous forest inventory plots across NYC-owned lands on the watershed. These are long-term plots measured every 7-10 years.
- These plots were established to track, over time, forest composition, growth, mortality, and recruitment of seedlings and saplings into the overstory stand.
- Baseline measurements were completed at Schoharie reservoir during the 2006 and 2007 field seasons and at Pepacton in 2008. The most recent measurements were taken at both reservoirs in 2015. New plots were also established at Ashokan reservoir in 2015.
- On each plot, habitat factors are observed (slope, aspect, adjacency to wetland, etc.) along with stand data including species, diameter breast height (DBH), merchantable height (sawtimber and pulpwood), timber quality, crown canopy position and percent crown, number of saplings by species and size class, etc.
- This presentation shows, only for those basins measured during 2015, the relationship between diameter and both merchantable height and timber volume in the 3 basins, both aggregated and by species, and how they differ and are similar.

Pepacton DBH-Height Model All Species

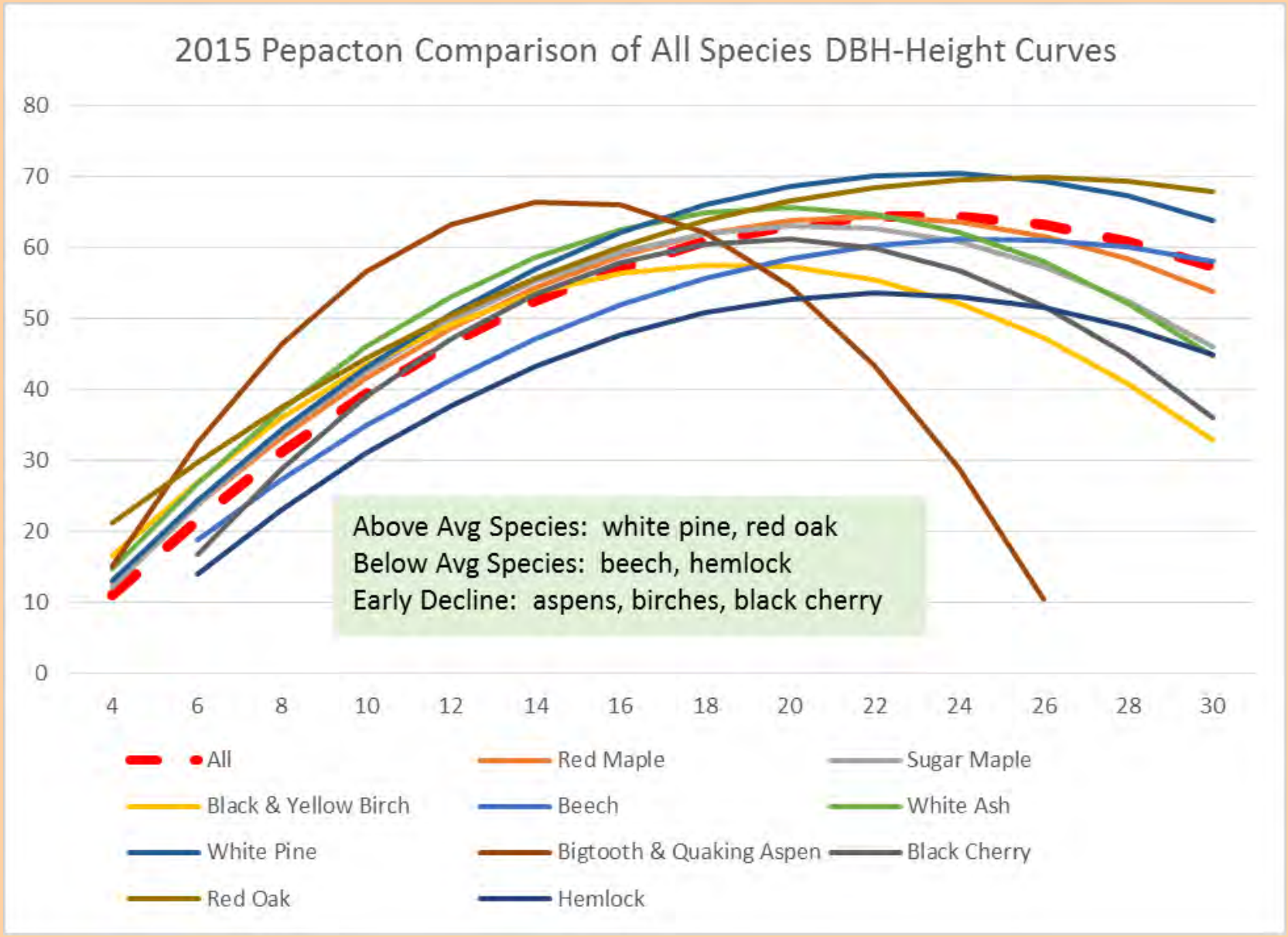




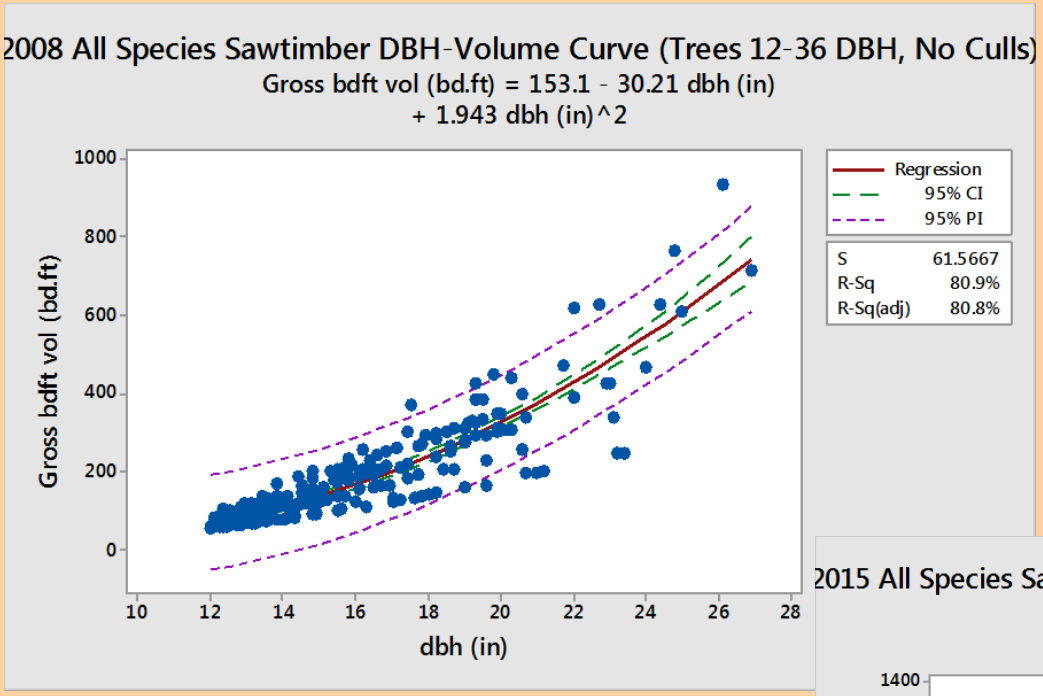
2008 Pepacton DBH-Height Species Comparison

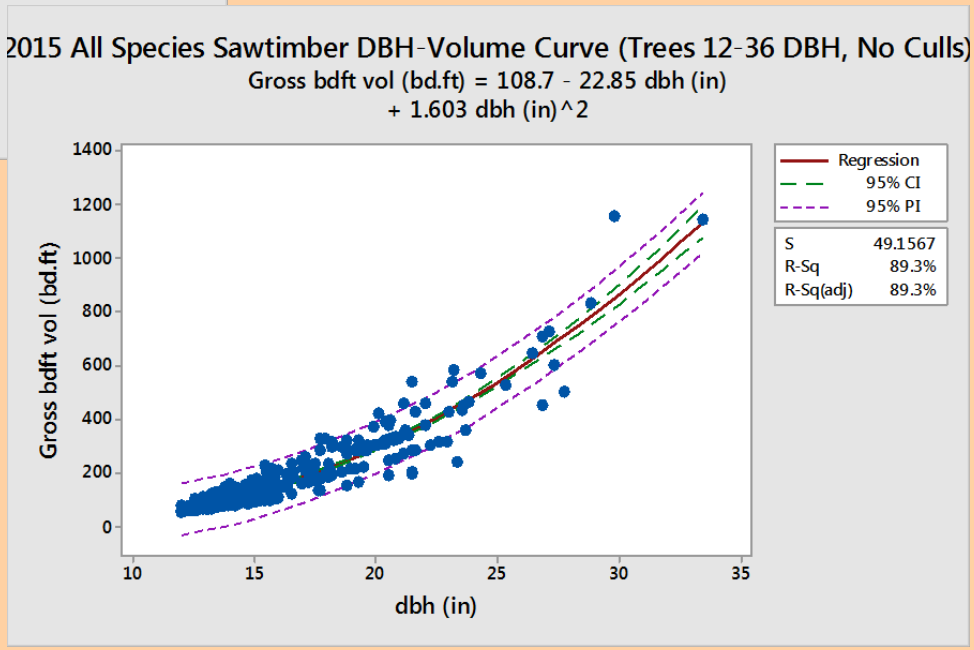


2015 Pepacton DBH-Height Species Comparison

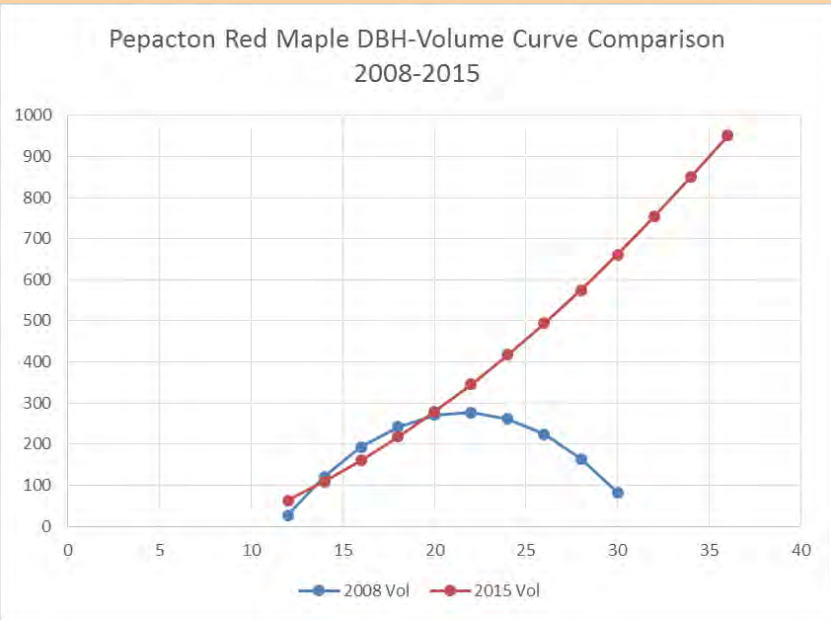


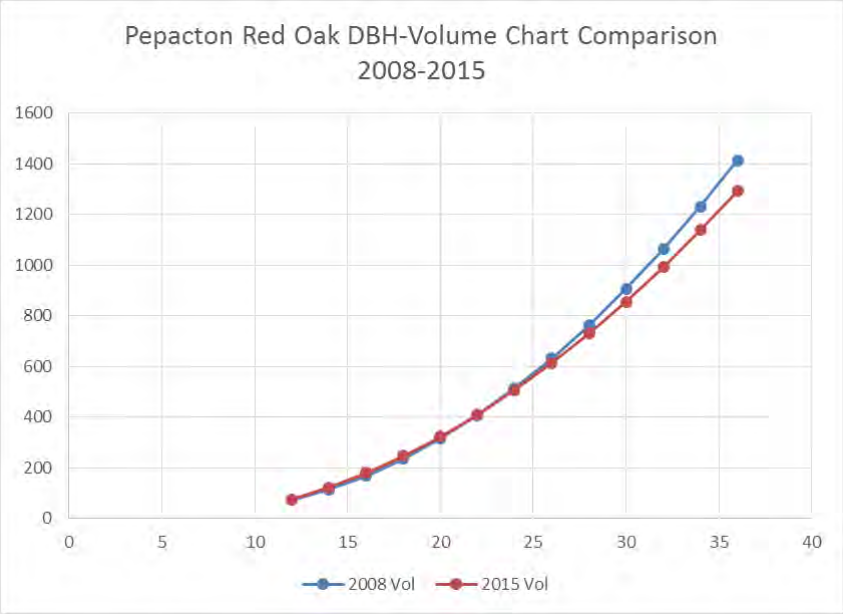
Pepacton DBH-Volume Models

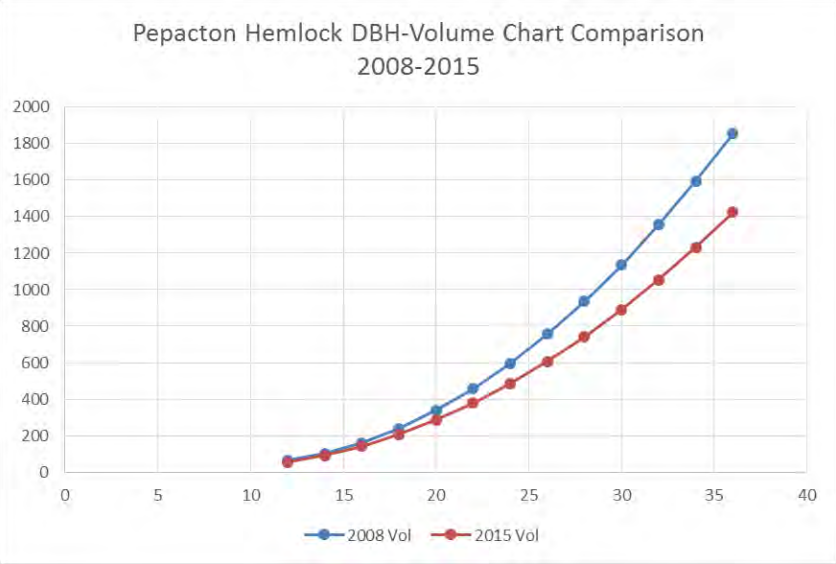




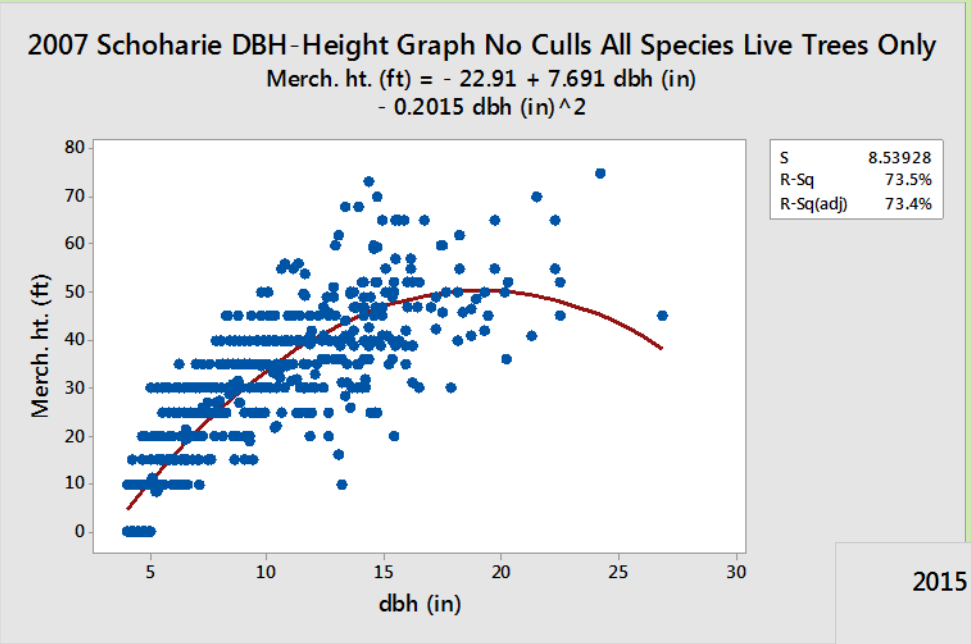
Pepacton DBH-Volume Model Change by Species

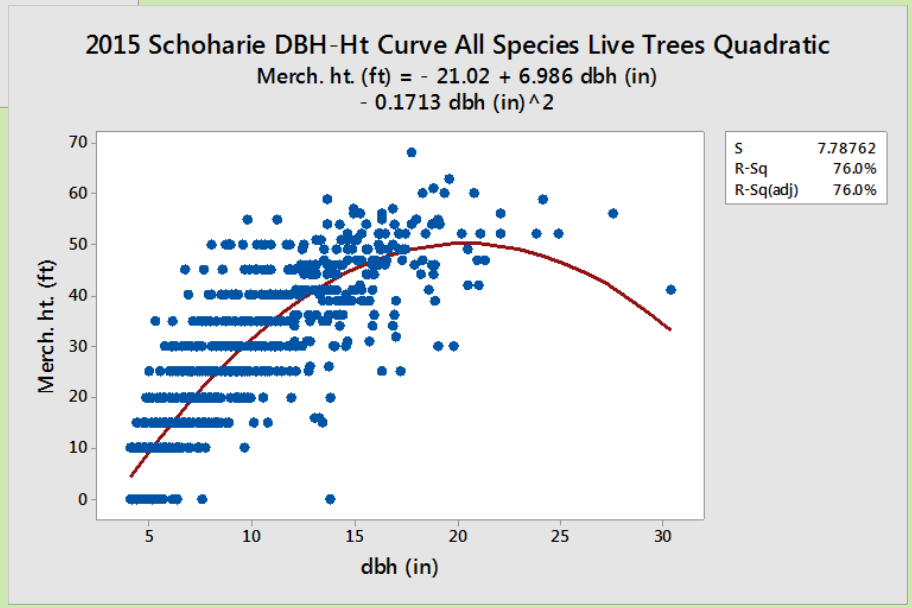




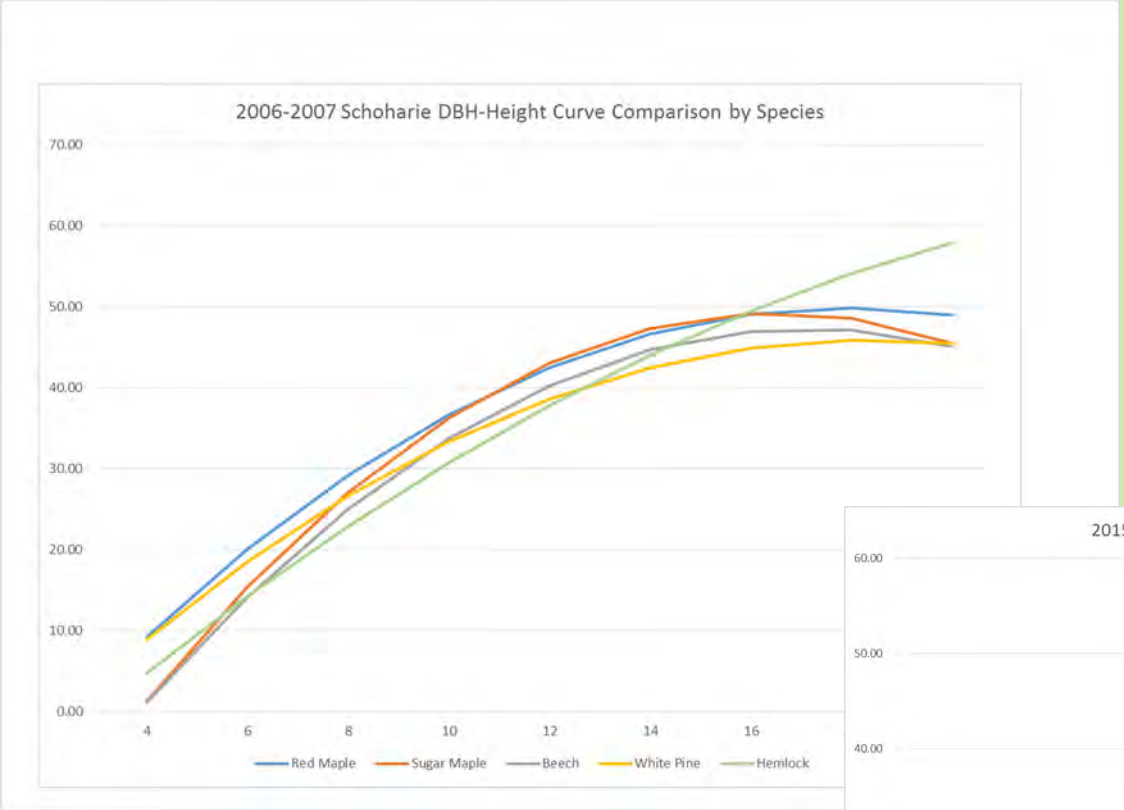


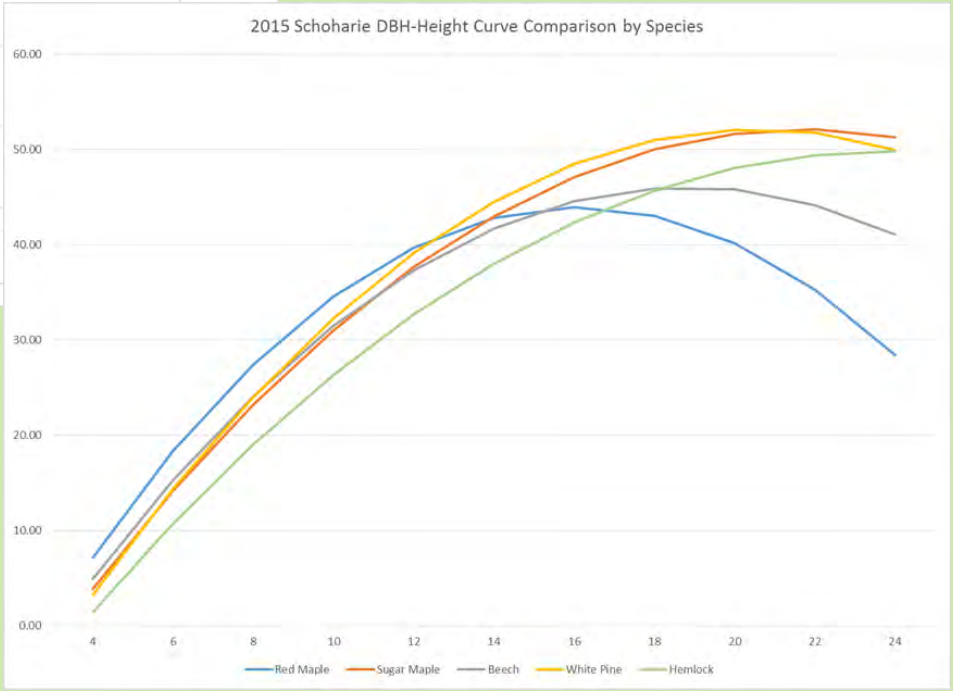
Schoharie DBH-Height Models



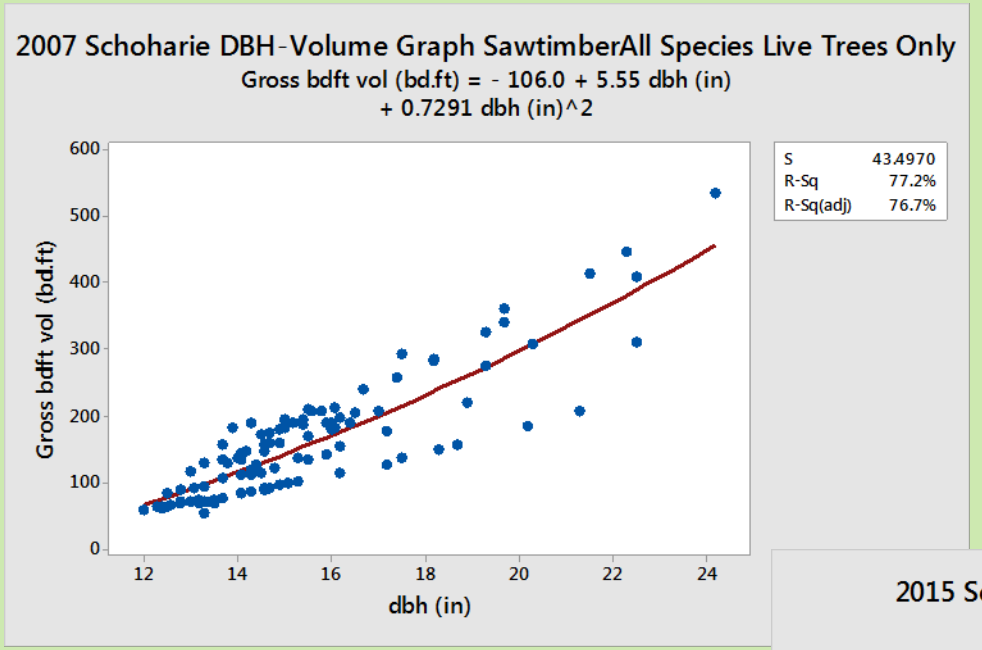


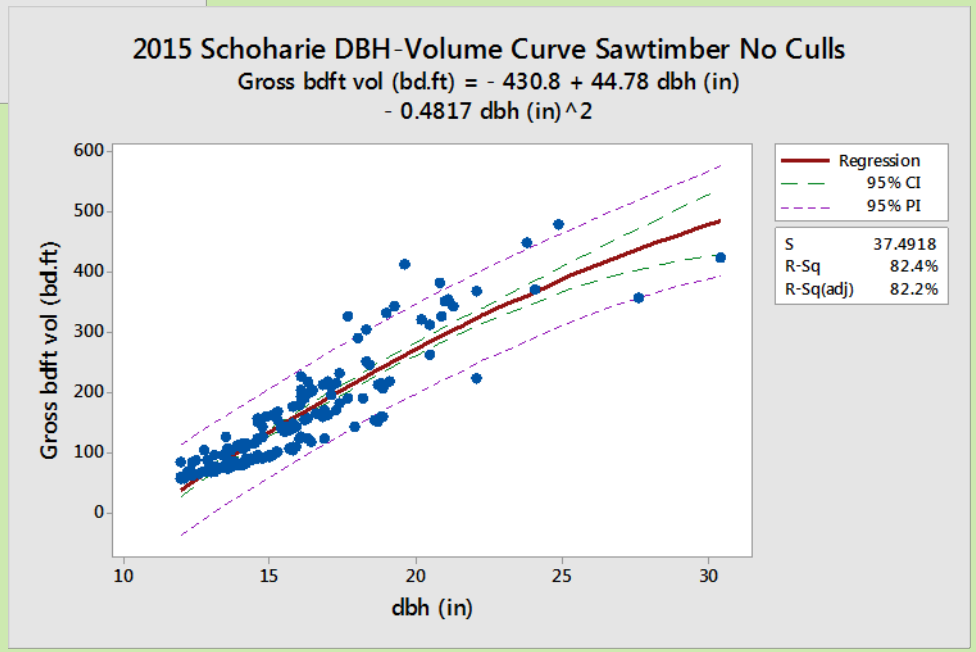
Schoharie DBH-Ht Curves by Species



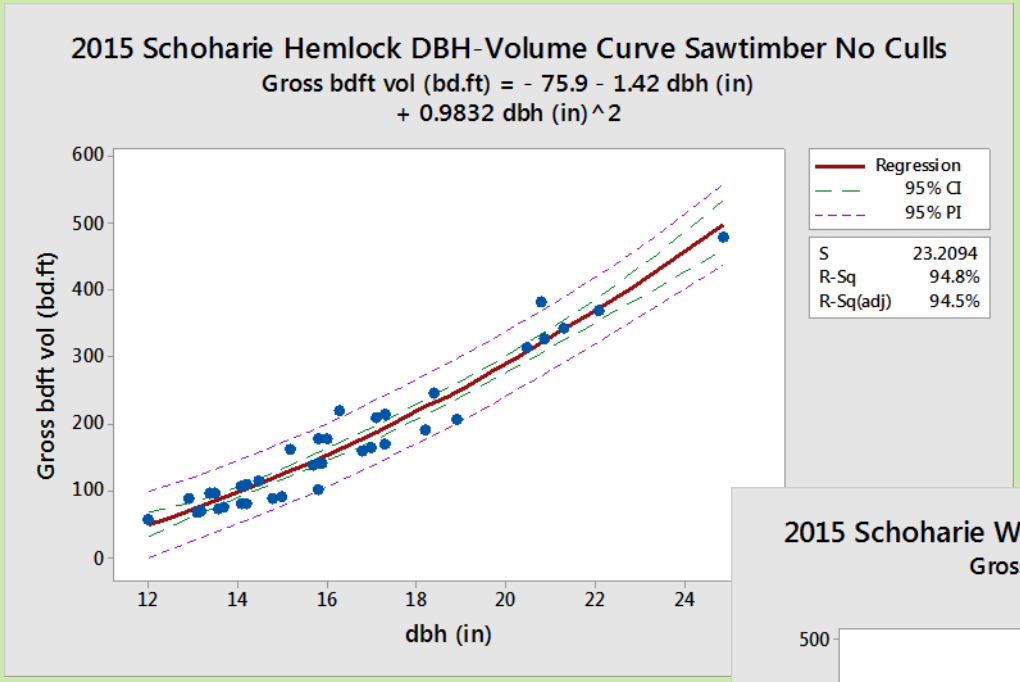


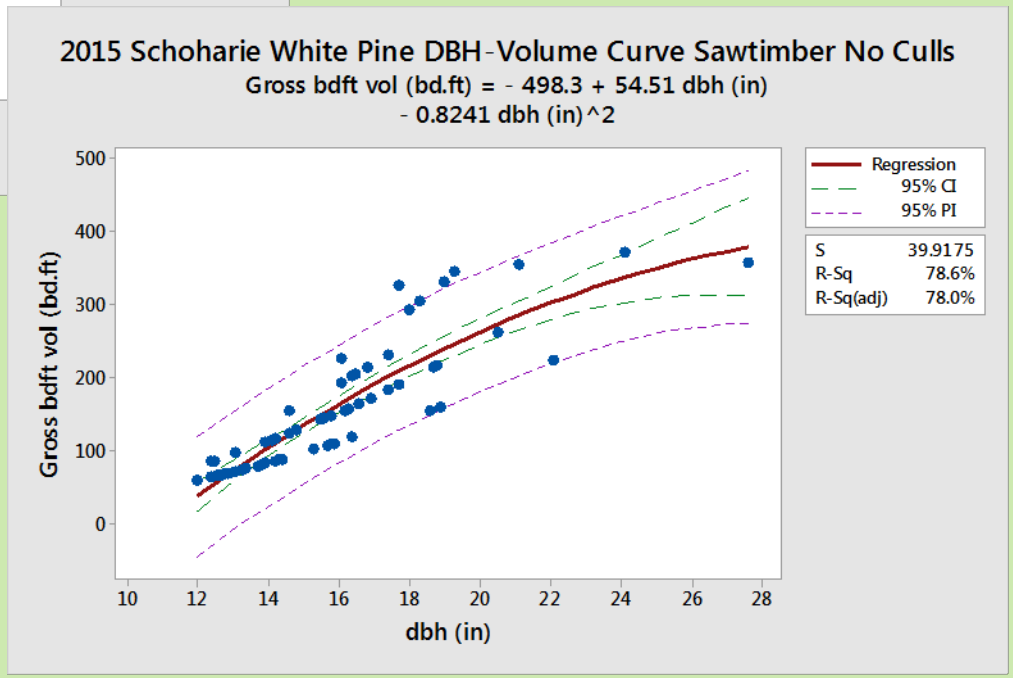
Schoharie DBH-Volume Models



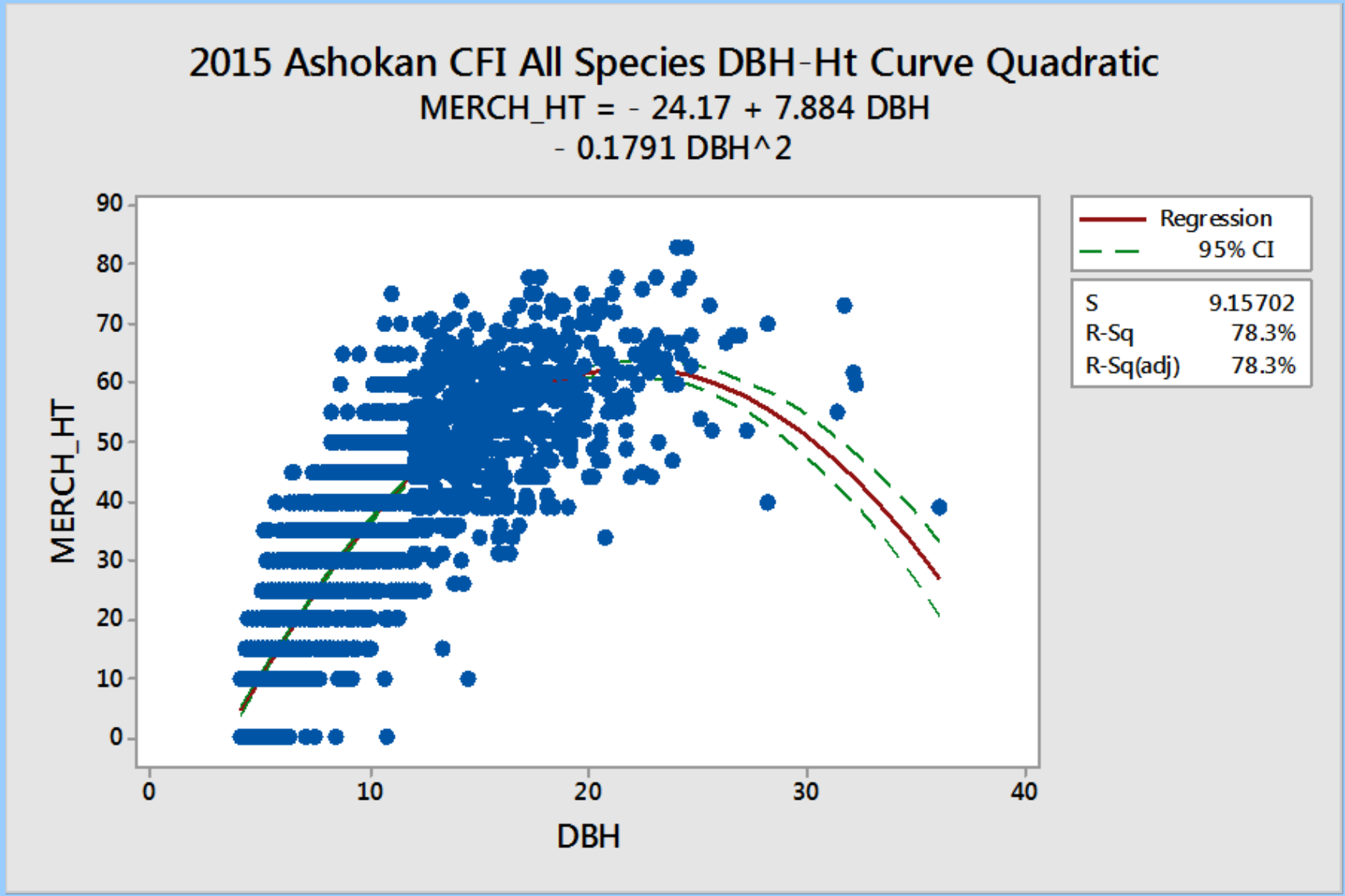


2015 Schoharie DBH-Vol Hemlock & White Pine

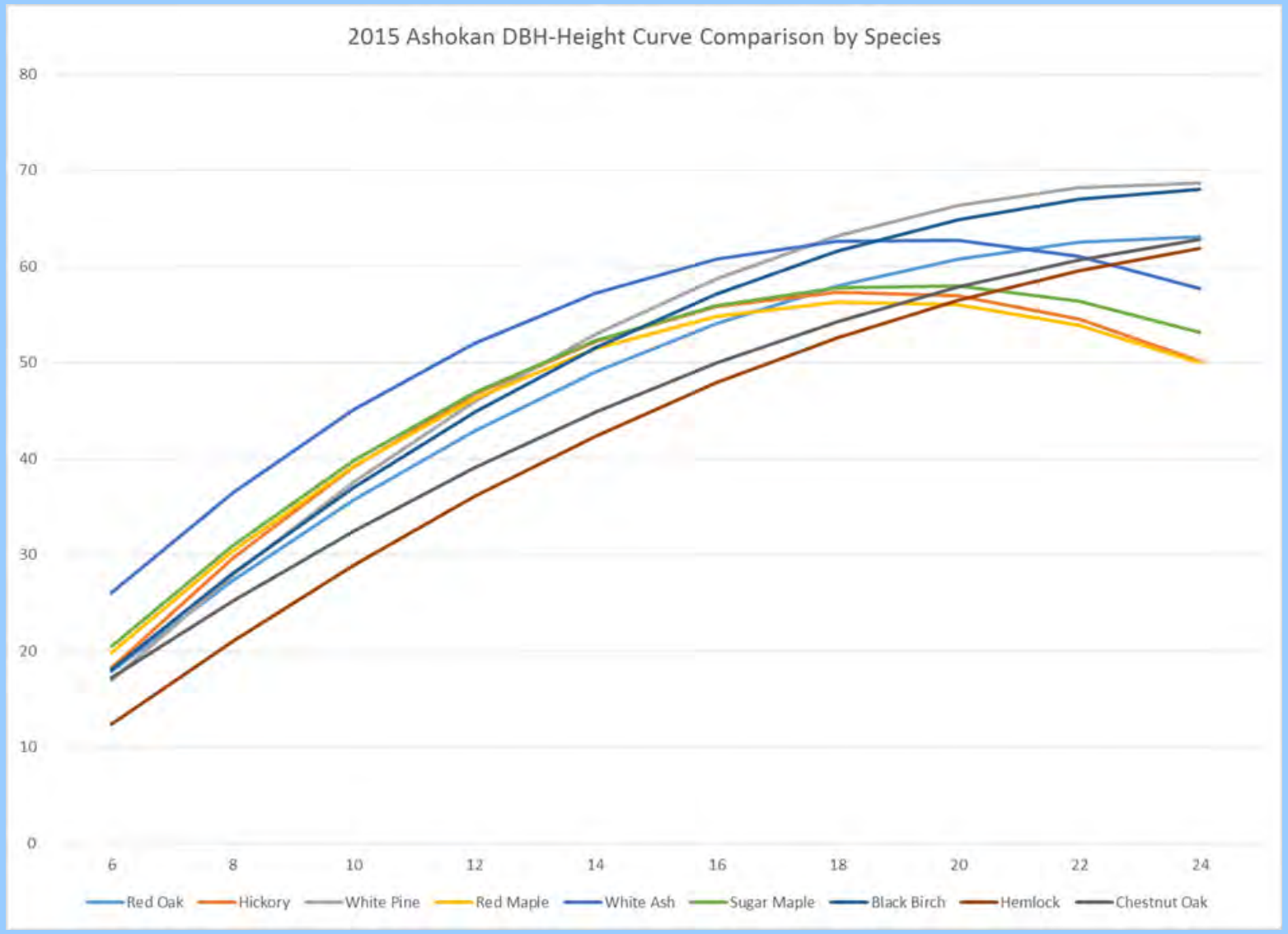




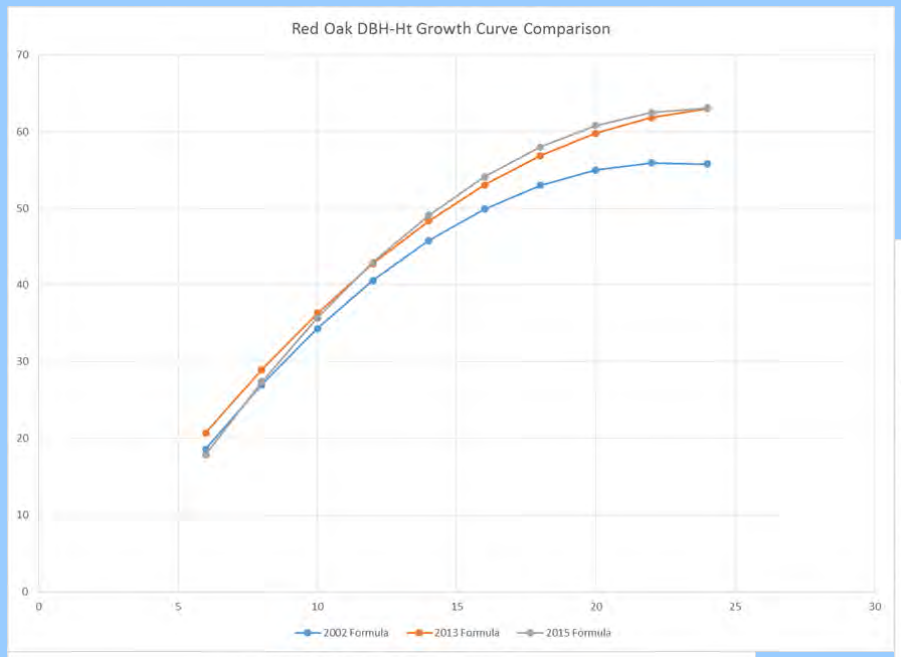
2015 Ashokan DBH-Height Model

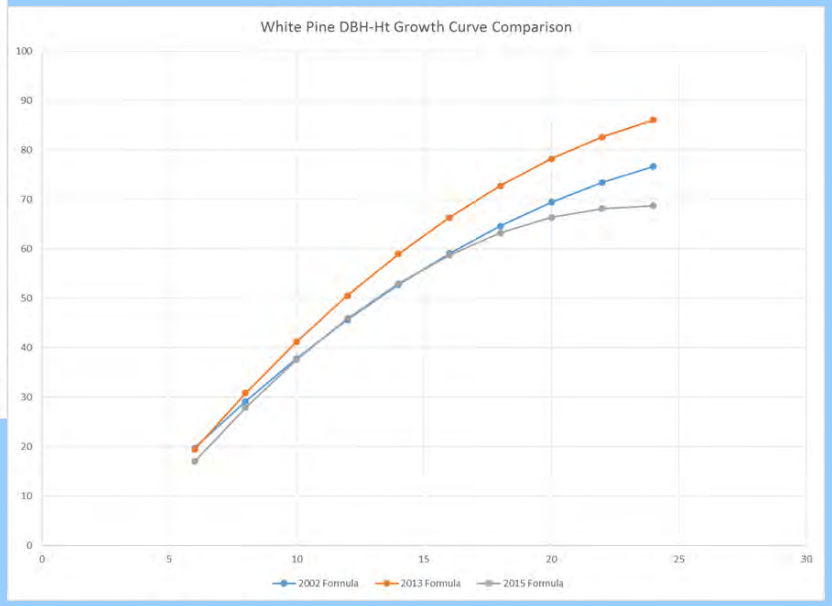


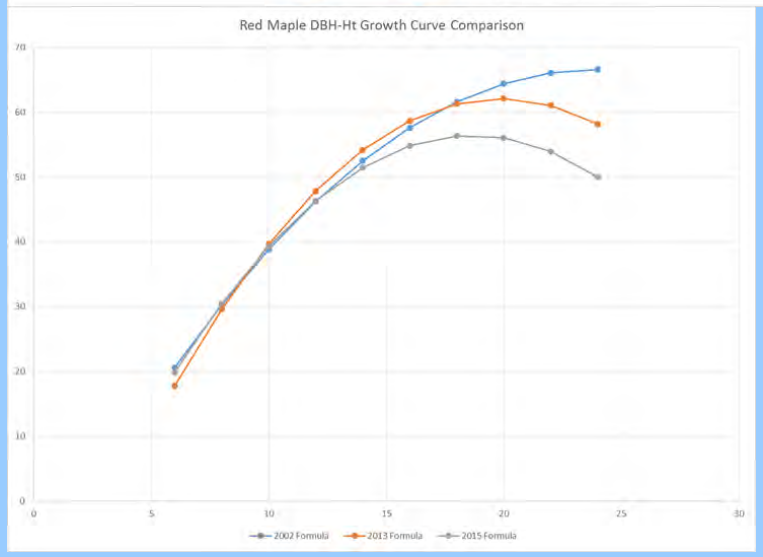
2015 Ashokan DBH-Ht by Species



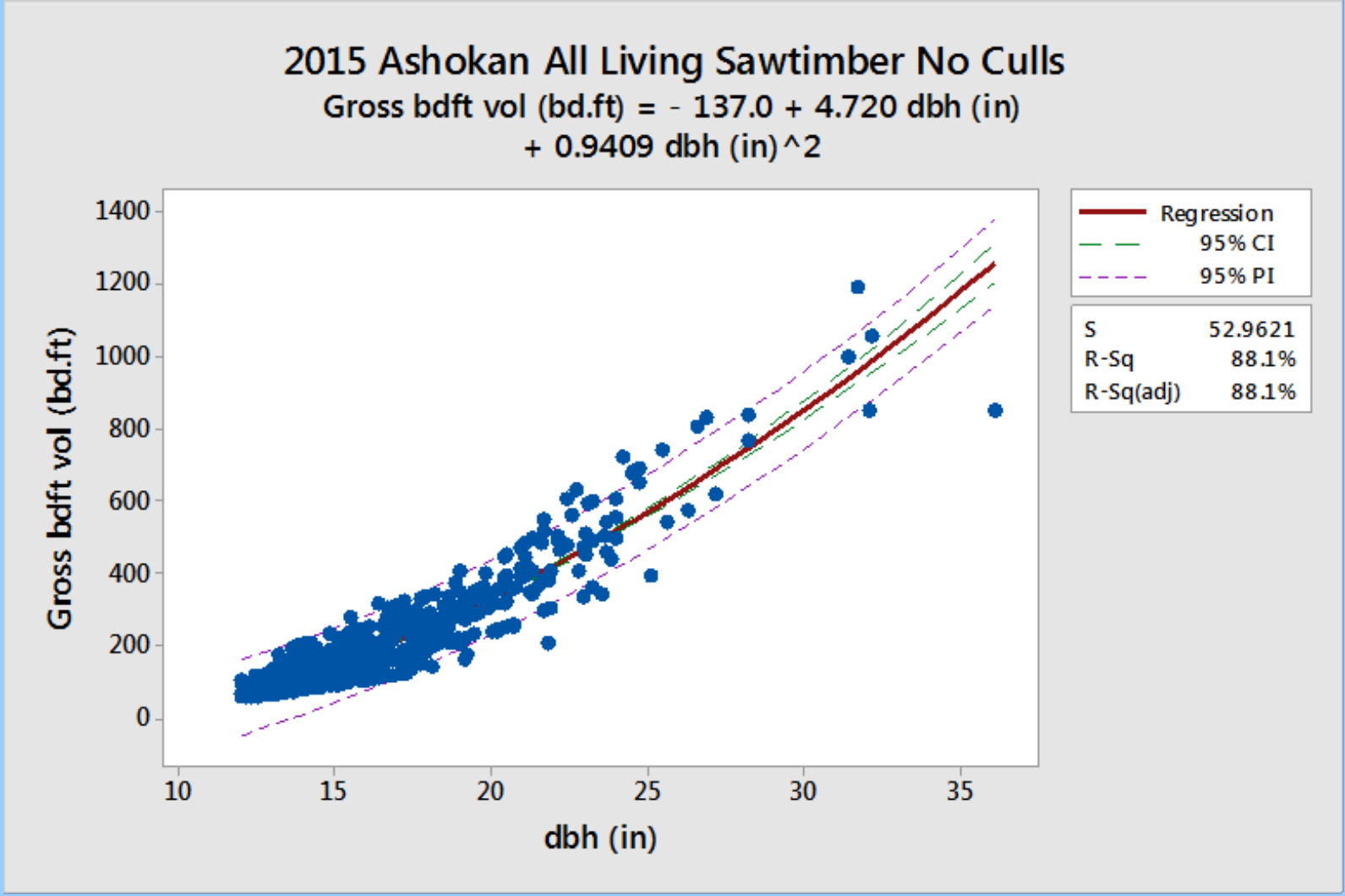
Ashokan Comparison of Old & New Plots



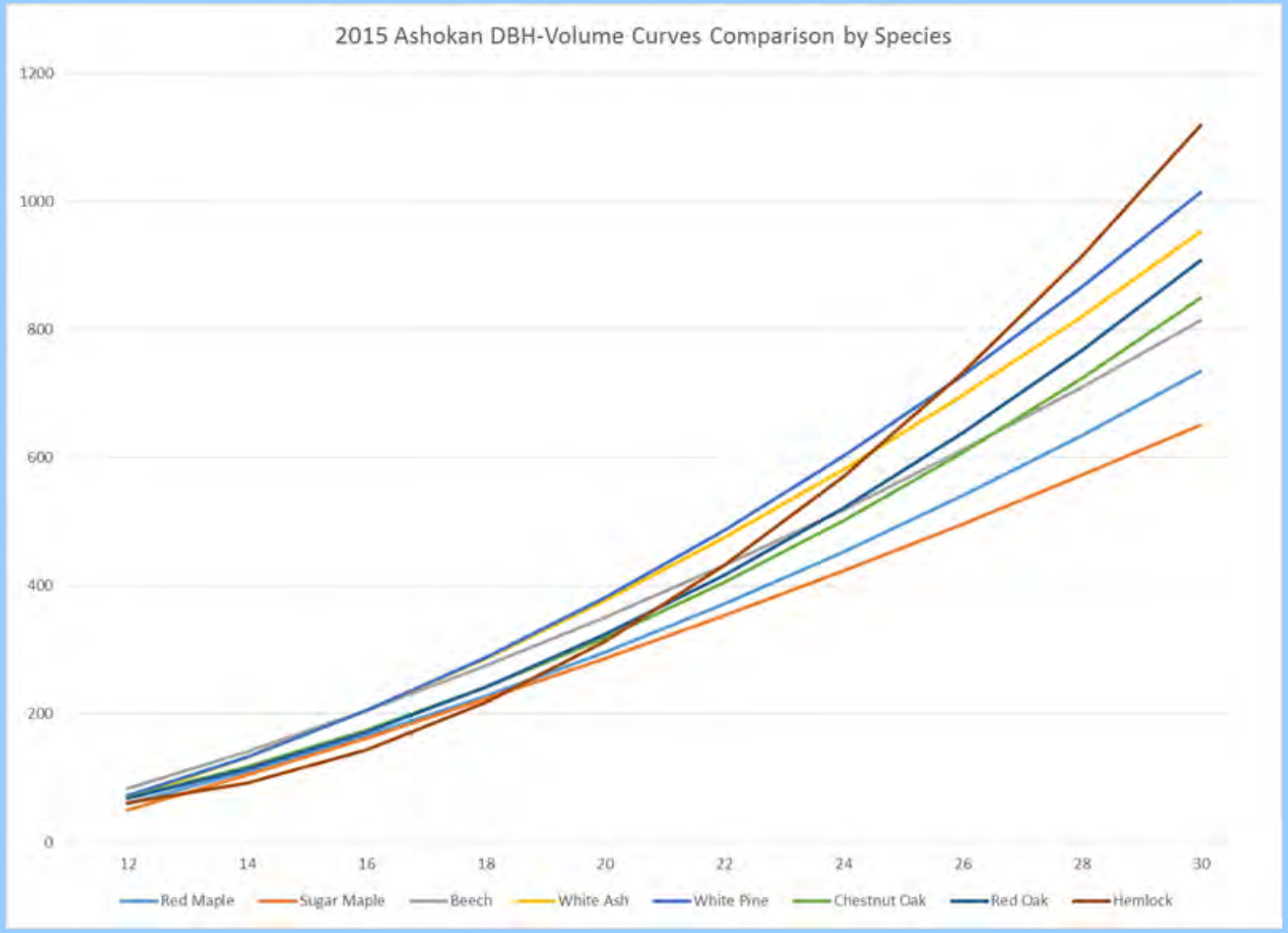




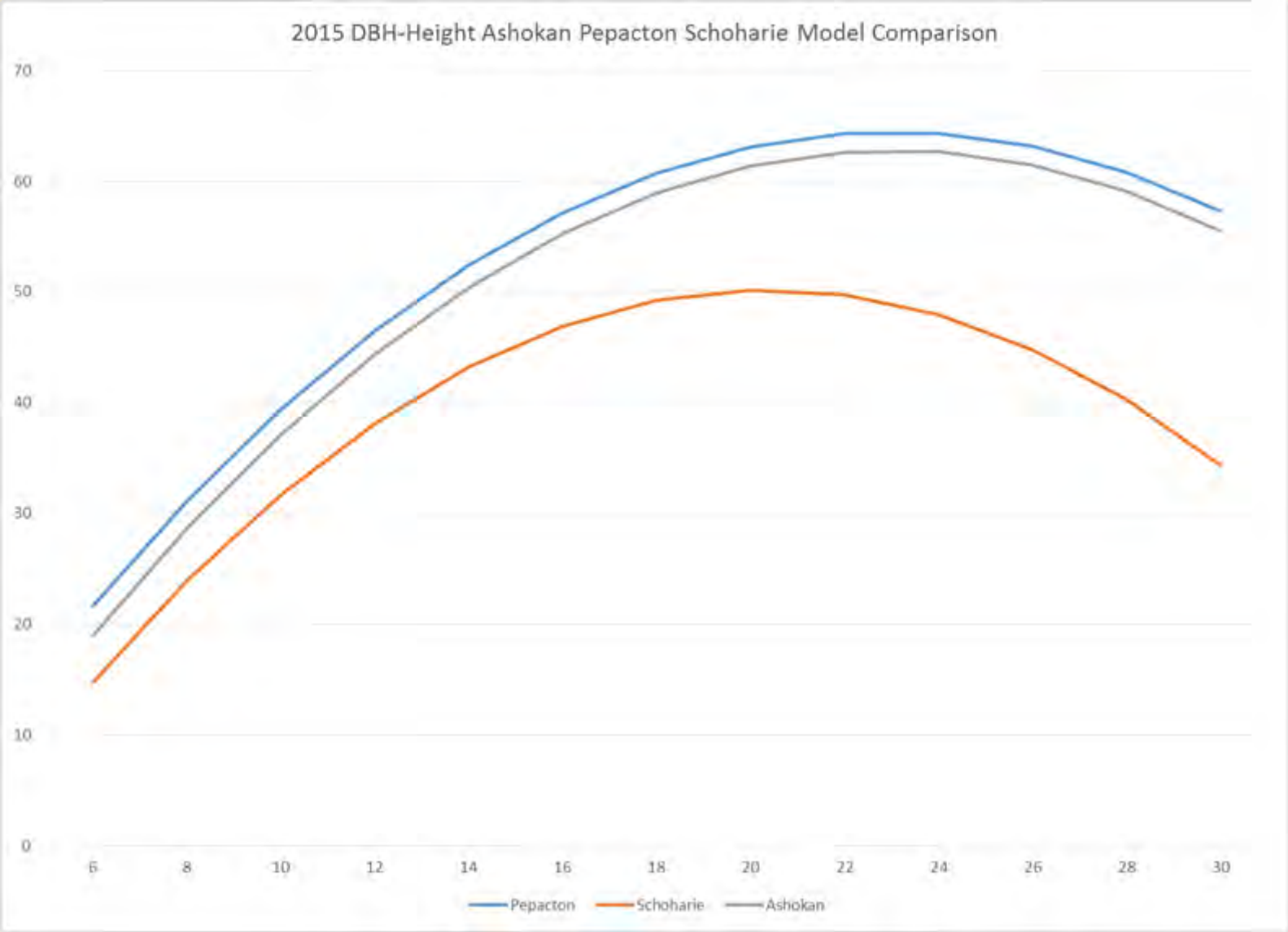
Ashokan DBH-Volume Model



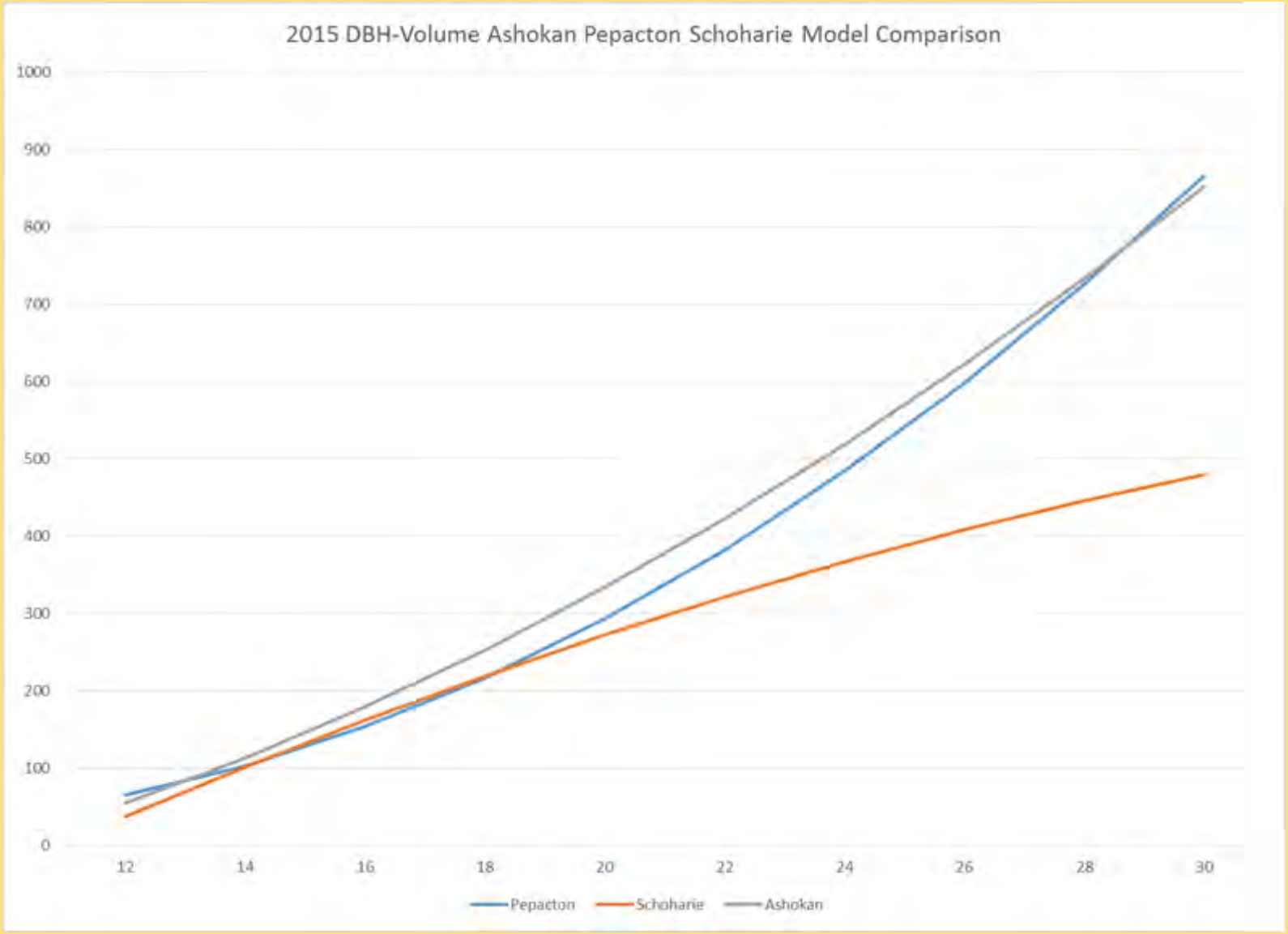
Ashokan DBH-Volume by Species



2015 DBH-Ht Basin Comparison



2015 DBH-Volume Basin Comparison



General Findings to Date

- In Catskills even-aged stands that are either approaching maturity or are mature/over-mature, there is a tendency for the curves to tighten up as less-vigorous trees drop out of the stand—even with smaller trees growing in to merchantable size classes.
- If there is a desire to capture wood products rather than to leave trees to decay, these graphs provide diameter-based decision points for capturing trees that are likely to drop out of the stand—especially for shorter-lived species like red maple.
- It is unclear that many of the longer-lived species have yet reached physiological maturity on NYC watershed lands, particularly hemlock, white pine, and red oak. Despite the fact that hemlock losses through attrition and, possibly, because of hemlock woolly adelgid, have been significant on some plots, trees that survive to large diameters tend to remain in stands and continue to grow.
- The Schoharie watershed basin, at least with information gathered thus far, seems to have much smaller tree heights and volumes, especially once past a diameter of 18-20". In forestry terms this indicates lower site index, which often follows particular soil types or other physiographic conditions.

Future Research & Analyses

- Additional data was collected in the Neversink and Rondout basins but was not presented here. A second measurement of Cannonsville basin plots is being completed in 2016 and additional plots have been established in the Rondout and Neversink basins this year. All data will be combined into a larger database for a meta-analysis of correlations by species and with all species together to gain a clearer view of similarities and differences among and between basins. We are hoping to present this broader view at the next CERM conference.
- The larger dataset should allow a review/analysis of the potential effects of varying geology/soils, elevation, exposure, slope, etc. on the occurrence of forest communities; the relative age of maturity of various species specific to our watershed, its basins and sub-basins; and which stands may be more vulnerable to climatic changes or attack by species-specific insect or disease.
- It may be that additional research plots exist that could be useful to add to our analysis. It is known that the U.S. Forest Service FIA plots exist and there may be other datasets that could be combined with ours for an even broader scale to include private and state lands.

Future Research & Analyses

- Work is beginning on analyzing forest dynamics in the Catskills to gain a better understanding of not only forest growth but also recruitment and attrition. These models are a first step in that understanding but at present the dearth of long-term data at a scale that is useful for driving management decisions in the Catskills means we cannot answer some of the simplest questions, such as:
    - What is an adequate number of advance seedlings per acre to assume we will have a new stand after harvest?
    - At what age should a typical northern hardwood stand be thinned?
    - At what point should a regeneration harvest be done?
    - Where beech bark disease is present, how many stems per acre do there need to be before root sprouts will be a problem after thinning?
    - And so much more!
- We hope to be able to answer some of these questions in the near future.

Questions?