



Are There Economic Benefits from Forest Stewardship Council (FSC) Certification? An Analysis of Pennsylvania State Forest Timber Sales

WORKING PAPER

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Executive Summary

Despite steady increases in both the supply and demand for Forest Stewardship Council (FSC)-certified products over the past decade, many observers assert that FSC-certified forestry operations should not expect to receive higher prices for their products. We analyzed six years of data from timber sales on Pennsylvania state forest land – certified by the FSC since 1998 – to determine whether FSC chain-of-custody certified buyers are paying more for timber from these sales than non-certified buyers.

We found that:

- Between 2001 and 2006 FSC-certified buyers of Pennsylvania state forest timber sales paid approximately \$7.7 million more for this timber than what would have been earned had all buyers been non-certified. Higher bid prices offered by FSC-certified buyers translated into roughly a 10 percent increase in revenue for the Pennsylvania state forest over what would have been earned in the absence of certification.
- The proportion of timber sold to FSC-certified buyers and the dollar value of those sales has increased dramatically since the state forests were first certified in 1998. By 2006, FSC-certified buyers accounted for nearly two-thirds of the dollar value of all state forest timber sales, up from less than 15 percent in 1998. The percentage of timber volume going to FSC-certified buyers increased from less than 10 percent in

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1998 to over 40 percent in 2006, while the total acreage producing wood sold to FSC-certified buyers increased from 7 percent to nearly 30 percent over that time period.

- Most of the additional revenue earned by the Pennsylvania state forests through sales to FSC-certified buyers is driven by the sale of black cherry. On average, FSC-certified buyers paid \$198 more per thousand board feet (mbf) for black cherry from state forest timber sales than did non-certified buyers. The price differential for sugar maple was \$138 per mbf, \$49 per mbf for red oak, \$35 per mbf for red maple, and \$17 per mbf for white ash. There was no price differential for white oak.

These results indicate that, in addition to any environmental or social benefits that FSC certification has brought to the management of Pennsylvania's state forests, certification has led to economic benefits in the form of higher prices being paid for state forest timber sales. While our research does not reveal the motivations of the FSC-certified buyers, one can only presume that they are willing to pay more because they are receiving financial benefits from their sales of FSC-certified products further up the supply chain. In the future we would like to test this hypothesis through a more detailed examination of the motives driving FSC-certified companies to pay more for timber. Future research will also examine timber sales from other state and public forests to determine whether the pattern observed in Pennsylvania holds elsewhere.

Introduction

Despite growing demand for Forest Stewardship Council (FSC)-certified products, recent research appears to support the conventional wisdom that forest certification has failed to create the higher prices and new markets that it implicitly promised (Taylor, 2004). In a survey of FSC-certified forestry operations in the U.S., most forest owners were positive about their decision to certify and reported that certification has helped them to improve and gain recognition for their forest practices, but respondents were generally disappointed with the absence of price premiums (Oeverdeest and Rickenbach, 2005). Other discussions of price premiums understandably rely on anecdotes and opinions, since 'hard' data on this topic is so rare. We take a different approach in this paper and examine six years of timber sale data provided by the FSC-certified Pennsylvania Bureau of Forestry (BoF), to determine empirically whether higher prices are being paid for state forest timber as a result of its certified status.

Pennsylvania's state forest system comprises over 2.1 million acres and accounts for 12 percent of the forested area in the state. The state forest system was established in 1898 to generate a steady supply of wood products, protect critical watersheds, and provide opportunities for outdoor recreation. In 1995, the BoF released a strategic plan, "Penn's Woods: Sustaining Our Forests," addressing the long-term sustainability of the state forestlands. This was followed by third-party certification of the state forest system by the Forest Stewardship Council in 1997-1998, at the time making the Pennsylvania State Forest the largest forest in North America to receive this designation (PA-DCNR, 2003). The actual certification of Pennsylvania's state forests took place in two parts, with 1.2 million acres undergoing a "pilot certification" in 1997 and the remainder of the 2.1 million acres being certified in 1998. Funding for the initial certification was provided by the Heinz Endowments of Pittsburgh through a grant to the Gifford Pinchot Institute for Conservation. The Pinchot Institute facilitated the certification of Pennsylvania's state forests as a case study for other public forestland certifications in the U.S. The state forest system was re-certified by the FSC in 2003.

The Pennsylvania BoF was motivated to pursue FSC certification for a number of reasons (Pinchot Institute, 1998). First, the BoF felt strongly that their forest management practices measured up with the standards set by the FSC, and that third-party certification would strengthen this claim in terms of public outreach. Second, the BoF welcomed the opportunity that FSC certification provided to strengthen key aspects of their management system, such as the implementation of a timber harvest allocation model (DCNR, 2003). Third, the certification process allowed the BoF to highlight major areas of concern in terms of forest management, such as the impact of a large deer population on regeneration. Lastly, the BoF hoped to serve as a model for other public and private forests in the state and elsewhere.

Today, the BoF's forest management plan is aimed at balancing the age class distribution of the state forest (DCNR, 2003). Timber harvests are planned around the number of acres in each district to be harvested and regenerated, with the volume of timber removed a secondary consideration. The Pennsylvania BoF offers more than 180 timber sales

annually for eligible buyers to bid on. These sales are conducted through a competitive, sealed bid process with bidders having information on the species composition and volume of the parcel, as well as the minimum bid required by the BoF, which is based on an assessment of the value of the sale by BoF foresters. The BoF is required to accept the highest bid.

Companies bidding on these sales range from small logging operations bidding on sales of pulpwood and firewood for under \$10,000, to large, integrated forest product companies and sawmills bidding on sales of high-value hardwoods for over \$5 million. Some of these buyers are FSC chain-of-custody (CoC) certified, meaning that they have systems in place to ensure, among other things, that FSC-certified products are kept separate from non-certified products. Only CoC-certified buyers can label the timber they buy from the BoF as 'FSC certified'.

Timber sales in one district alone, District 15 in north-central Pennsylvania, regularly account for over half of the dollar value of statewide sales due in large part to the high volume of black cherry (*Prunus serotina*). Overall, black cherry has made up between 20 and 40 percent of the total volume of state forest timber sales in recent years, while accounting for between 70 and 80 percent of the dollar value of those sales. Red maple (*Acer rubrum*) and red oak (*Quercus rubra*) are next in importance in terms of volume.

With the goal of contributing to the debate on the economic impacts of forest certification, we asked the following research questions:

1. What proportion of BoF timber sales (in terms of both volume and dollar value) are purchased by FSC CoC-certified buyers, and how has that changed since the state forests were first certified?
2. Is the BoF receiving higher prices for its timber from FSC CoC-certified buyers than from non-certified buyers?
3. How are the price differences between timber sales to FSC CoC-certified and non-certified buyers influenced by the species composition of timber sales, sale volume, and sale year?

Methods

Analyses were based on data provided by the Pennsylvania Bureau of Forestry.² For each state forest timber sale in the period 2001-2006 (821 sales in all) we had data on the volume sold and the final sale price; the certification status of the buyers (i.e. FSC chain-of-custody certified or not) was determined by analyzing publicly available listings of certified companies and consultation with the two main certifying groups in the U.S. – SmartWood and Scientific Certification Systems. We included in our analysis six species

² Data on overall state forest sales trends are available from 1998 to 2006; however we limit our analysis of price differences to the 2001-2006 period because of limitations with the price data prior to 2001.

that accounted for an average of 77 percent of the total volume of state forest timber sales: black cherry, red maple, red oak, sugar maple (*Acer saccharum*), white oak (*Quercus alba*), and white ash (*Fraxinus americana*).

To determine which factors influenced the price paid to the Bureau of Forestry, we constructed a linear model with price per thousand board-feet (mbf) as dependent variable. Year of sale, tree species, sale volume, and the certification status of the buyer were included as independent variables.

The year of sale did not show a significant relationship with price and was dropped from the model. Volume had a significant relationship with price: the average price paid increased with volume. However, this relationship was non-linear and exceedingly complex to model because the relationship was highly heteroscedastic and dominated by an uneven distribution of sample sizes. Without further information allowing us to elucidate this complex relationship, we chose to weight the model by volume rather than include volume as a variable in the model. This led to an improved model fit and ensured that the relatively low number of high volume sales – which are of extraordinary importance to the overall value of sales – were fit well. Without this weighting, the model parameterization was dominated by the numerous low-volume sales, which didn't fit the high-volume sales well and led to an underestimation of total value.

Species and certification status had strong relationships to price and were retained in the model along with an interaction between the two, which was also significant. The resulting model allowed us to determine the difference in prices paid by FSC CoC-certified and non-certified buyers while controlling for the fact that, for example, certified buyers tended to prefer high-value species. All statistics were calculated in the R statistical computing environment (R Development Core Team, 2005).

Results and Discussion

Trends in Certified Sales 1998-2006 – By all measures, the proportion of timber sold to FSC CoC-certified buyers by the Pennsylvania Bureau of Forestry has increased dramatically between 1998 and 2006 (Figure 1). By 2006, FSC CoC-certified buyers accounted for nearly two-thirds of the dollar value of all state forest timber sales, up from less than 15 percent in 1998. The percentage of timber volume going to FSC CoC-certified buyers increased from less than 10 percent in 1998 to over 40 percent in 2006, while the total acreage producing wood sold to FSC CoC-certified buyers increased from 7 percent to nearly 30 percent over that time period.

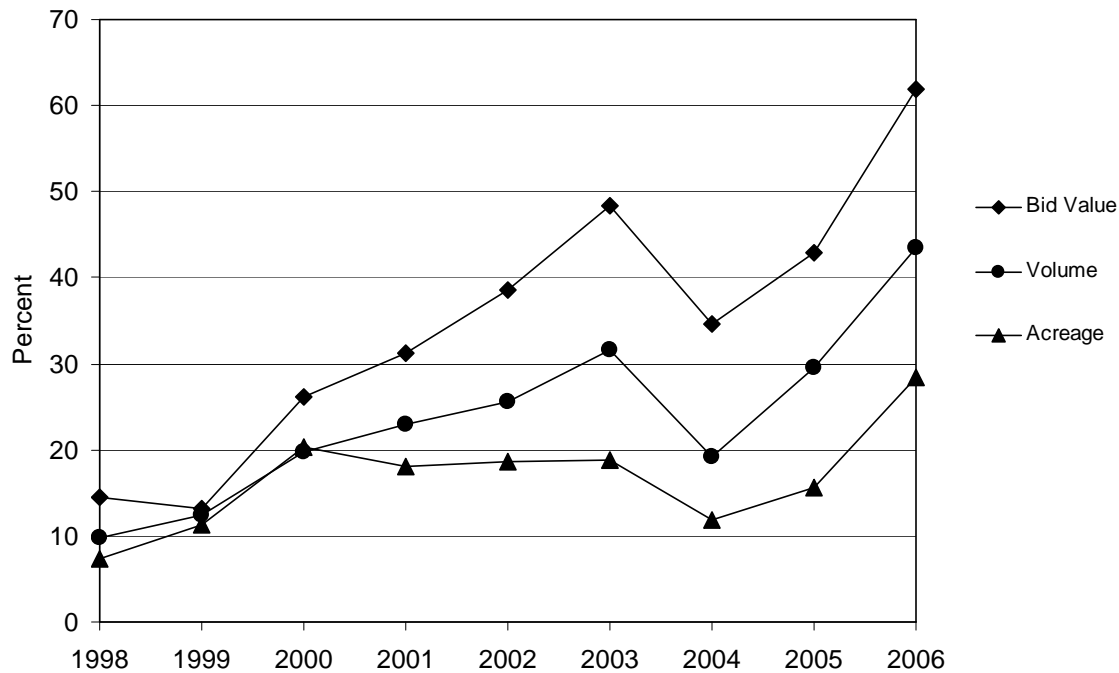


Figure 1. Percentage of bid value, timber volume and acreage sold to FSC CoC-certified companies by the Pennsylvania Bureau of Forestry, 1998-2006

These trends are explained by both an increase in the number of FSC CoC-certified buyers (up from two in 1998 to eight in 2006), and an increase in the annual volume purchased by these buyers. While a number of regular buyers of state forest timber sales quickly underwent FSC chain-of-custody certification in the years following certification of the state forests, only to drop that certification after a year or two, most of the remaining certified buyers in existence today have maintained an FSC chain-of-custody certificate for over a decade and are generally committed to the system. At least three of these companies also hold FSC forest management certificates for their own forestland or for forests they manage for clients.

Strong interest among these companies in FSC certification is not surprising given that the demand for FSC-certified forest products is higher now than ever before. The green building movement, which focuses on quality construction, energy efficiency, indoor air quality, and the conservation of natural resources, promotes the use of FSC-certified construction materials through its building rating systems, such as the Leadership in Energy and Environmental Design (LEED) program. Estimates of the annual growth of the green building movement range from 30 percent (www.greenbiz.com) to 75 percent (Cassidy, 2003). The demand for FSC-certified pulp and paper is also growing, and FSC CoC-certified buyers of Pennsylvania state forest timber are also finding strong markets for wood and wood products in export markets, especially in Europe.

Price Differences – We looked for differences between prices paid to the Pennsylvania BoF by FSC-certified and non-certified buyers, hypothesizing that FSC CoC-certified

buyers would offer higher prices because they can maintain the certified status of this timber throughout subsequent stages in the commodity chain. Our analysis was designed to determine differences in price on a per species basis paid by certified and non-certified buyers. Overall, our weighted linear model provided a very good fit to the data ($R^2 = 0.85$, $F_{11,2756} = 1378$, $p = 0.000$). Based on this model, we estimate that between 2001 and 2006 FSC CoC-certified buyers of Pennsylvania state forest timber sales paid approximately \$7.7 million more for the timber they successfully bid on than what would have been earned had these sales been made to non-certified buyers. The price differential between FSC CoC-certified buyers and non-certified buyers averaged about 10 percent over this time period, and translated into annual increases in revenue for the BoF of between \$840,000 (in 2004) and \$2.1 million (in 2006)(see Figure 2). The difference in price among years was not statistically significant.

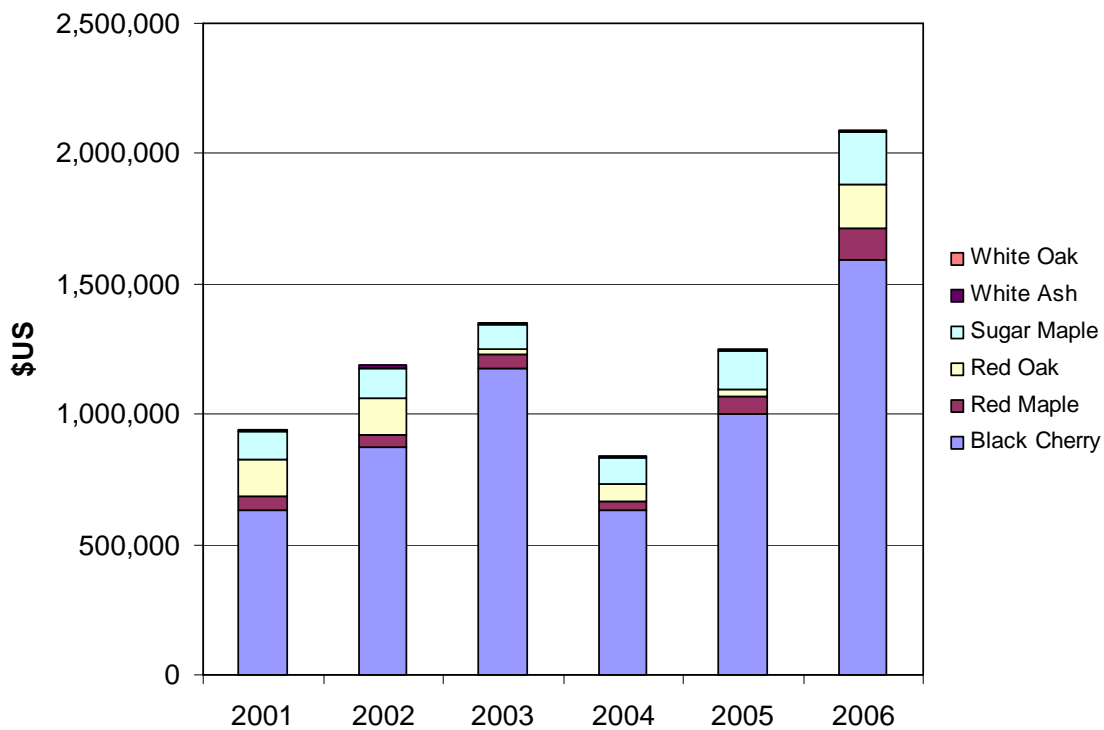


Figure 2. Price differential received by the Pennsylvania Bureau of Forestry for sales to FSC CoC-certified buyers 2001-2006, broken down by tree species.

By way of comparison, the Pennsylvania BoF typically spends between \$10,000-15,000 a year for their annual audit and FSC certificate fee. In 2003 the BoF paid approximately \$70,000 for the five-year recertification of the state forests, and is expecting to pay approximately \$50,000 this year for their ten-year recertification. While these are significant costs, they represent only a fraction of the higher revenue that the BoF appears to be earning as a result of their certified status. In addition to higher prices, FSC certification also provides benefits to the BoF in terms of regular provision of feedback on management and improved relations with the public and other stakeholders.

Impact of Species on Timber Prices – Figure 2 also reveals that most of the additional revenue earned by the BoF through sales to FSC CoC-certified buyers is driven in large part by the sale of black cherry. This is due primarily to the high value of black cherry relative to other species. On average, FSC CoC-certified buyers paid \$198 more per thousand board feet (mbf) for black cherry from state forest timber sales than did non-certified buyers. The price differential for sugar maple was \$138 per mbf, \$49 per mbf for red oak, \$35 per mbf for red maple, and \$17 per mbf for white ash. There was no price differential for white oak. Figure 3 shows a comparison of prices paid for each species by FSC CoC-certified and non-certified buyers.

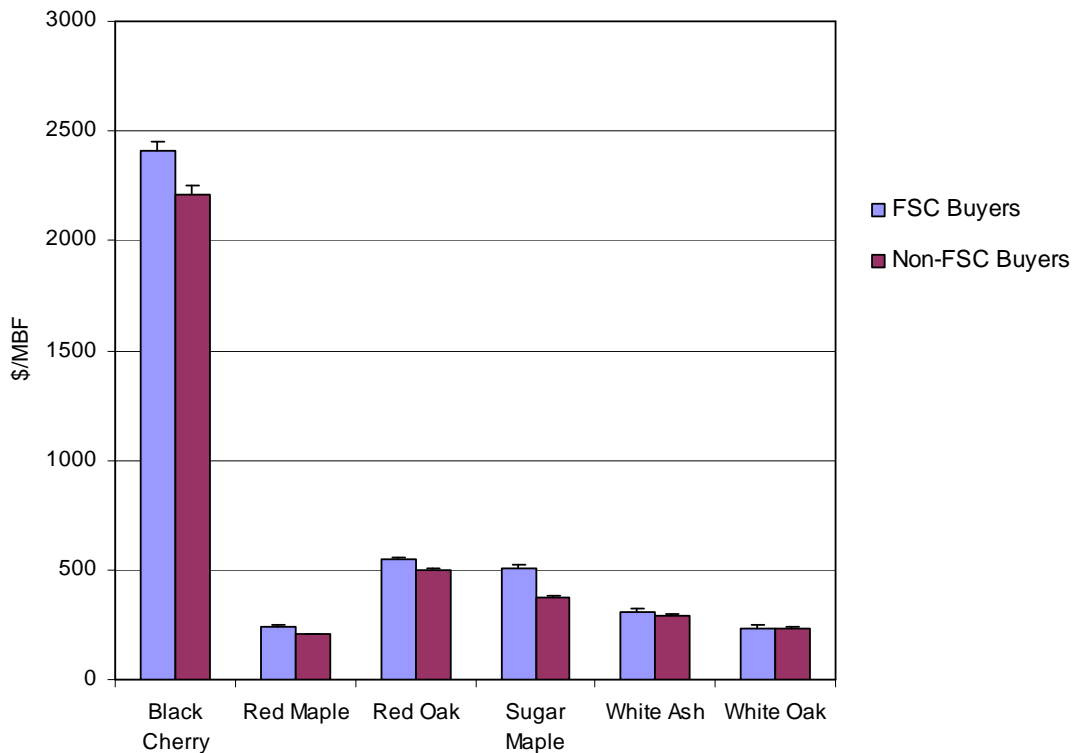


Figure 3. Average price paid by FSC CoC-certified and non-certified buyers per MBF for six species between 2001 and 2006. Error bars show standard error of the mean.

Though less important than the high dollar value of black cherry, the high volume of black cherry sold by the BoF relative to other species also influences the observed price difference. Figure 4 reveals that sales of black cherry as a percentage of total volume sold averaged 28 percent between 2001 and 2006. The most recent forest inventory available for Pennsylvania forests shows that black cherry is the second most abundant species in the state by volume (McWilliams et al, 2004), suggesting that the large amounts of black cherry sold by the BoF is a reflection of existing volumes of standing timber. Discussions with senior foresters at the BoF suggest at least three other reasons for the dominance of black cherry in state forest timber sales of recent years: the historical legacy of land use and forest management in the north-central region of the state where black cherry is now a dominant species; the fact that stands of black cherry are far more productive in terms of timber output per acre than stands of other species; and the BoF's current forest

management plan, where cutting patterns attempt to create a better age-class distribution of forest stands and ensure regeneration. The combination of these factors, at this point in time, results in relatively large volumes of black cherry being made available.

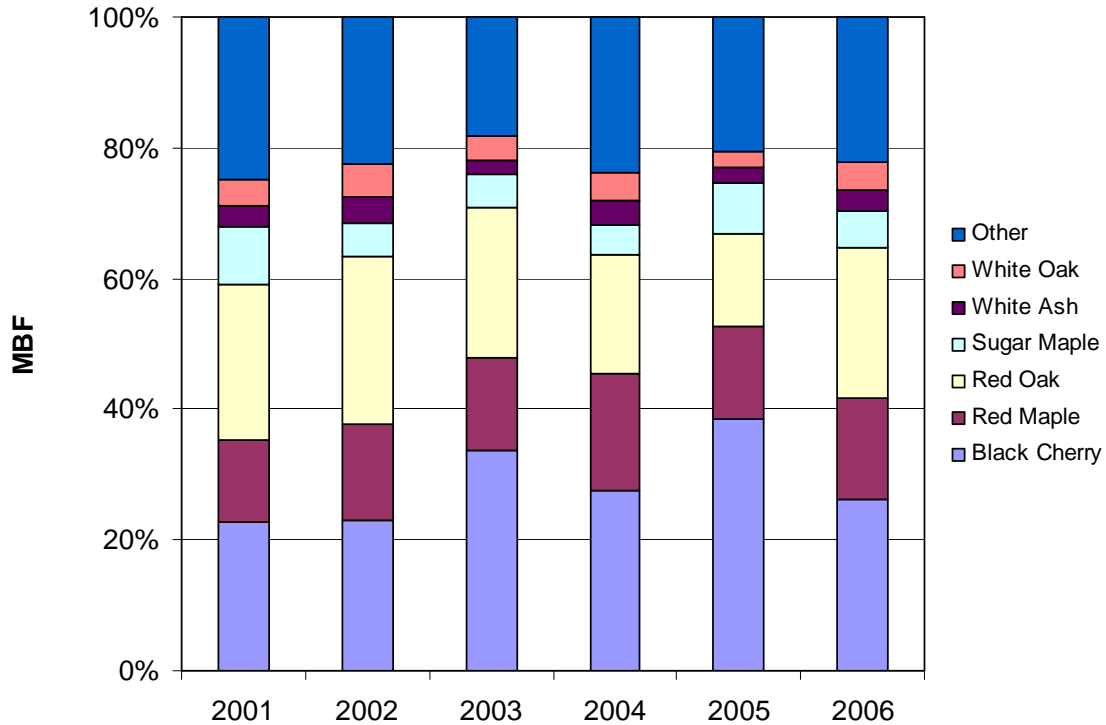


Figure 4. Volume sold of each species as a percentage of total volume sold, 2001-2006

Other variables could potentially influence of wood sales. Although year of sale was not significant in our model, the volume of the sale had a stabilizing effect on prices; i.e. high volume sales had a narrow price range while the prices of low volume sales varied widely. If more covariates had been known that influence prices in conjunction with volume, the high variability at low volumes might have been explained and volume could have been successfully incorporated into the volume as a covariate. However, in absence of such information the weighting by volume – emphasizing the high volume sales with relatively stable prices – led to a significant model improvement. Other variables, such as haul distance and tree size, have the potential to account for some of the variability in prices, but were not accounted for in our model because they were not available.

Conclusion

In addition to any environmental or social benefits that FSC certification has brought to the management of Pennsylvania’s state forests, it also appears to have provided economic benefits in the form of higher prices being paid for state forest timber sales. These findings represent an apparent contradiction to the conventional ‘producer pays’ wisdom, which holds that the brunt of the costs of certification are inevitably paid by the forest owner, with little monetary compensation.

Our research shows that a large part of the price differential is due to the relatively high volumes of high-value black cherry on the state forest lands. Future analyses of timber sale data from other state forests will reveal the extent to which our findings apply to other public lands that may have lower volumes of high-value species.

What our research does not reveal is the motivations of the FSC CoC-certified buyers, who are placing higher bids for timber from the Pennsylvania BoF than their non-certified counterparts. One can only presume that their willingness to pay more indicates that they are receiving financial benefits from their sales of certified product further up the supply chain, but at this point this is only speculation. Empirical research to answer this question would be especially timely for those forest owners and processors feeling the growing demand for FSC-certified products and considering whether or not to pursue certification. We intend to build on this research in the near future, both by undertaking a more detailed examination of the motives driving FSC CoC-certified companies to pay more for timber, and also by examining timber sales from other state and public forests to determine whether the pattern observed in Pennsylvania holds elsewhere.

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