

2013 Project Abstract

For the Period Ending June 30, 2016

PROJECT TITLE: Enhancing Timber Sale Program Environmental and Economic Sustainability

PROJECT MANAGER: Charles Blinn

AFFILIATION: Department of Forest Resources

College of Food, Agricultural and Natural Resource Sciences

University of Minnesota

MAILING ADDRESS: 1530 Cleveland Avenue North

CITY/STATE/ZIP: St. Paul, MN 55108

PHONE: 612-624-3788

E-MAIL: cblinn@umn.edu

WEBSITE: None

FUNDING SOURCE: Environment and Natural Resources Trust Fund

LEGAL CITATION: M.L. 2013, Chp. 52, Sec. 2, Subd. 03i

APPROPRIATION AMOUNT: \$336,000

Overall Project Outcomes and Results

The method used by a timber sale program to collect payment for timber sold was perceived by land managers and others to have a substantial impact on post-harvest ecological conditions and net timber sale revenue. The two payment methods used are consumer scale (scale) and lump sum. Under the scale method, the buyer only pays for timber that has been harvested and scaled by a qualified scaler. With this method, the seller tracks harvested volume using scale tickets which require administrative time to process. The lump sum method requires the buyer to pay a fixed amount for the timber, regardless of the timber volume actually harvested.

Our study goals were to evaluate how the two timber payment methods: a) impact post-harvest ecological conditions; b) impact the cost-effectiveness within Minnesota's public timber sale programs; and c) are perceived by natural resource managers and loggers. To accomplish these study goals, we collected data from post-harvest sites, reviewed agency records, conducted a field economic experiment using a timber sale auction, conducted time studies, administered a mail survey, and conducted interviews and focus groups.

We found that the perceptions of ecological and economic impacts of timber payment method often exceed actual impact. Timber payment method did not impact post-harvest ecological conditions, gross stumpage revenue or stumpage price bids. Numerous factors (e.g., pre-harvest operator conditions, operator) had a greater impact on post-harvest ecological conditions than payment method. A strong biomass market could increase utilization and thus post-harvest ecological conditions under a lump sum method. The impact of using the consumer scale method on net timber sale revenue is less than one percent of the timber sale's value. Logging business owners participating in the study ranked timber payment method lower in importance than other factors when bidding on a sale. As each payment method has its strengths and weaknesses (see table below), agencies need the flexibility to select the approach which best meet their needs.

Summary of factors favoring use of scale and lump sum payment methods.

Factors favoring scale method	Factors favoring lump sum method
<ol style="list-style-type: none"> 1) Less administrative time and accuracy needed to estimate sale volume 2) Appraisal staff have low probability of accurately estimating sale volume and value 3) Timber sales with a high percentage of low value timber and/or where operating costs are expected to be high 4) More woody material may be retained on-site for wildlife purposes 5) Salvage timber sales 	<ol style="list-style-type: none"> 1) Less time needed to administer active timber sale and to process paperwork and other related documents 2) Facilitates simultaneously administering several timber sales 3) Fewer personnel required for timber sale 4) High utilization can facilitate manual reforestation efforts 5) Timber sale has uniform characteristics (e.g., pine plantation)



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2013 Work Plan Final Report

Date of Status Update Report: August 15, 2016

Date of Next Status Update Report: Final Report

Date of Work Plan Approval: June 11, 2013

Project Completion Date: June 30, 2016

PROJECT TITLE: Enhancing Timber Sale Program Environmental and Economic Sustainability

Project Manager: Charles Blinn

Affiliation: Department of Forest Resources
College of Food, Agricultural and Natural Resource Sciences
University of Minnesota

Mailing Address: 1530 Cleveland Avenue North

City/State/Zip Code: St. Paul, MN 55108

Telephone Number: (612) 624-3788

Email Address: cblinn@umn.edu

Web Address: None

Location: Aitkin, Becker, Beltrami, Carlton, Cass, Clearwater, Cook, Crow Wing, Hubbard, Itasca, Koochiching, Lake, Lake of the Woods, Pine, and St. Louis counties

Total ENRTF Project Budget:

ENRTF Appropriation: \$336,000

Amount Spent: \$336,000

Balance: \$ 0

Legal Citation: M.L. 2013, Chp. 52, Sec. 2, Subd. 03i

Appropriation Language:

\$336,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota to evaluate the impacts of timber payment methods on postharvest forest ecological conditions and net revenue generated from public timber sale programs. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Enhancing Timber Sale Program Environmental and Economic Sustainability

I. PROJECT TITLE: Enhancing Timber Sale Program Environmental and Economic Sustainability

II. PROJECT STATEMENT:

Minnesota's 9.5 million acres of public forest land play an important role in sustaining our state's environment and economy. The policies and programs used by public timber sale programs can impact post-harvest ecological conditions such as the types and amount of living and dead trees retained. These conditions can, in turn, have pronounced effects on the composition, structure, and productivity of the future forest (e.g., merchantable timber volume and products, wildlife habitat, species diversity). Timber harvesting on these lands also helps support the state's forest products industry, which is an extremely important source of direct and indirect economic activity, employment, and tax revenue. The revenue generated from public timber sales also benefits state and local governments as well as K-12 education.

The method used by a public timber sale program to collect payment for the timber sold can have a substantial impact on post-harvest ecological conditions and net timber sale revenue. Public land management agencies collect payment for timber sold at auction in one of two ways, pay-as-cut (consumer scale) or sold-on-appraised-volume. Under the consumer scale approach, the buyer (typically a logging firm) pays for the scaled timber based on the amount harvested and scaled at a mill or on a landing by a qualified scaler. For the sold-on-appraised-volume approach, the buyer pays a fixed amount for the timber sale based upon the appraised volumes of standing timber, regardless of the volume actually harvested. Payment method can affect the level of utilization from a given forest site, producing important differences in post-harvest ecological conditions. It can also impact gross timber sale receipts and agency timber sale administrative costs. In Minnesota, the Cass County Land Department and the USDA-Forest Service are the only public forestry agencies that almost exclusively use the sold-on-appraised-volume approach; the St. Louis County Land Department and MN DNR offer timber sales using each method.

The goals of our study are to evaluate: (1) how the two timber payment methods impact post-harvest forest ecological conditions; (2) the cost-effectiveness of Minnesota's public timber sale programs; and 3) how natural resource managers and loggers perceive each of these payment methods (strengths, weaknesses, opportunities, barriers). We will achieve our goals by reviewing the literature, collecting field data (both economic and ecological), and conducting focus groups with resource managers and loggers. The study will provide Minnesota's public forest management agencies and policymakers with information that can help them identify economic and ecological tradeoffs associated with each payment method.

III. PROJECT STATUS UPDATES:

Project Status as of (January 2014):

Protocols were established and implemented on nine St. Louis County Land Department (SLCLD) sites for assessing the impacts of timber sale payment method on post-harvest ecological conditions. A visit to three of those field sites was conducted with project personnel from the SLCLD and the University of Minnesota on July 26, 2013 to discuss potential constraints and barriers associated with the two payment approaches. During a project team meeting on September 25, results from the nine sites were presented to all study cooperators. An initial literature review indicates very little literature directly related to the cost-effectiveness of the two payment systems has been published in the last 10 years. Protocol for collecting data on the administrative time required to process scale tickets were developed and tested at the SLCLD Pike Lake office. Contacts were made with the MN DNR to access scaling and related tract data for approximately 190 "SOAV only" timber sales. University of Minnesota personnel provided input on the paired bid study instructions that will be used by the SLCLD during its February 20, 2014 timber auction. An extensive literature review was conducted on logger decision making, opportunities and constraints in timber sales and harvesting to guide interview and focus group study design. Interview and focus group protocol, consent forms, contact scripts and guides for forest

Enhancing Timber Sale Program Environmental and Economic Sustainability

management professionals and loggers were developed. We are on schedule to meet all proposed completion dates for each Activity.

Project Status as of (July 2014):

Sampling of post-harvest ecological conditions is almost done on lands managed by the St. Louis and the Cass County Land Departments. A list of sites to visit on Minnesota DNR lands was being finalized to identify locations for additional sampling within those two counties. The St. Louis County Land Department administered an auction which included paired bid tracts and has provided data on the administrative time required for processing sale tickets. Minnesota DNR tracts harvested under the SOAV payment method were analyzed to assess variability in appraised and scaled volumes. Natural resource managers and loggers operating in Cass and St. Louis County were recruited for participation in key informant interviews. Seventeen key informant interviews have been conducted. We are on schedule to meet all proposed completion dates for each Activity.

Project Status as of (January 2015):

Post-harvest ecological conditions were sampled at a total of 40 recent timber harvests on the St. Louis and Cass County Land Department and Minnesota Department of Natural Resources landbases. We collected and analyzed data from 531 timber sales conducted by the St. Louis County Land Department (SLCLD) to assess the effect that timber sale characteristics (e.g., payment method) have on gross revenue. We analyzed data from the February, 2014 paired bid auction and are concluding our analysis of SLCLD administrative time to derive a total cost of ticket processing. We are beginning to collect additional merchantable timber volume data from the Minnesota DNR to help us assess the effect that timber sale characteristics have on the actual volume removed from a timber tract. A national assessment of state and county timber sale program administrators was conducted to understand their use of these two timber payment methods, perceptions of the ecological, financial, administrative advantages and disadvantages of each, including how each one affects forest certification and chain-of-custody efforts. The data from the questionnaires has been entered into a database and work has begun to analyze that data. We conducted 17 additional interviews with loggers operating in Cass and St. Louis counties and have transcribed 10 interviews with loggers. We have also transcribed, coded and conducted preliminary analysis of all of the natural resource manager interviews. We developed plans to conduct four focus groups with loggers during the Minnesota Logger Education Program's annual conferences in Tower and Bemidji in April 2015. Preliminary findings associated with all three activities were presented at a project meeting with cooperators at the St. Louis County Land Department on September 10, 2014. We are on schedule to meet all proposed completion dates for each Activity.

Project Status as of (July 2015):

Analyses comparing post-harvest ecological conditions between timber sale payment methods were completed. Overall, there was no significant difference in average site-level ecological conditions between payment methods, particularly for downed woody debris volume, aspen regeneration density, density of leave trees, and average diameter of leave trees. The primary difference between payment methods was related to basal area of leave trees on site with sales harvested under SOAV payment methods containing a significantly higher residual basal area. This difference likely reflects the types of forest stands sold under this payment method, as SOAV payment methods are often used on stands containing a higher proportion of high value species. The species most commonly retained on SOAV sites are also reflective of this trend with white pine being the most common species retained on these sales, whereas low-value, red maple was the most common species retained on consumer scale sales. Given these differences in leave trees are related more to forest conditions and value prior to harvest, the general impacts of payment method alone on forest ecological condition are quite negligible. For timber sales administered by the St. Louis County Land Department, there were no statistically significant differences in gross timber sale revenue attributed to the timber payment method using three different techniques to measure gross timber sale revenue. The average consumer scale timber sale was approximately \$323.06 more expensive to administer in 2014 than the average SOAV timber sale. That total,

Enhancing Timber Sale Program Environmental and Economic Sustainability

\$323.06 per timber sale, is approximately 2.8% of the gross timber sale revenue generated by an average timber sale sold by the St. Louis County Land Department from 2006 - 2012. Preliminary survey results from a national assessment questionnaire of state and county timber sale program administrators suggest that agencies with relatively little timber sale activity have a tendency to use only one stumpage payment method, whereas agencies with robust timber sale programs were more likely to use both methods. Program administrators perceive greater differences in the administrative and financial aspects of the two stumpage payment methods and few differences with respect to their ecological effects. We have transcribed, coded, and conducted thematic analysis of the 20 interviews with loggers operating in Cass and St. Louis counties. In April, we attended the Minnesota Logger Education Program annual conference in Tower, Minnesota and conducted 2 focus groups with 16 loggers. We conducted basic descriptive statistics on quantitative sociodemographic and behavioral data and analyzed qualitative interview data for the determinants of logger decision-making. We believe we have reached saturation in data collection with logger participants and have adequately represented the diversity of loggers operating in Cass and St. Louis counties. As a result of our research across the three activities, we have determined that additional focus groups should be conducted with foresters and natural resource managers with responsibilities in timber harvesting and sales. Thus, we have begun to plan for 1 to 2 focus groups with natural resource managers to be held later in 2015. We are on schedule to meet all proposed completion dates for each Activity.

Project Status as of (January 2016):

The national review of timber sale payment methods used by state and county forestry agencies was completed. The review examined the use of the two timber payment methods; perceptions of the ecological, financial, administrative advantages and disadvantages of each; and how each one affects forest certification and chain-of-custody efforts through the use of a mailed survey. The review found that there was a higher use of the consumer scale method over the SOAV method as 34% of the responding agencies used *only* the consumer scale method while 19% used *only* the SOAV method. Of the remaining responding agencies, both methods were used but with different approaches (32% used both methods on separate timber sales while 15% used both methods on single timber sales but for different species-products). State agencies had a greater tendency to use the SOAV method (30% used *only* the SOAV method), while county agencies had a greater tendency to use the consumer scale method (56% used *only* the consumer scale method). Agency size (as defined by number of timber sales sold in fiscal year 2013) was related to how stumpage payment methods were used. Small sized (defined as 1 – 7 timber sales sold in fiscal year 2013) agencies had a tendency to use only a single stumpage payment method (45% used only the SOAV method and 40% used only the consumer scale method), while larger sized (defined as 54 – 982 timber sales sold in fiscal year 2013) agencies had a greater tendency to use both methods on separate timber sales (40%) or blended methods (both methods used on a single sale) (40%). When weighted by number of timber sale acres sold in fiscal year 2013, the largest agencies (in terms of acres sold) had a greater tendency to use both the consumer scale and SOAV methods (64% of the acres sold were sold by agencies that use both payment methods).

Each payment method was perceived to have distinct financial and administrative advantages and disadvantages. For the consumer scale method, advantages include perceptions of high stumpage bid prices and timber sale revenue, timber sales are more attractive to bidders when the sale has a high percentage of low valued material and/or when harvest operating costs are high, and requires less administrative time to cruise and determine a volume estimate. For the SOAV method, respondents perceived advantages include requiring few administrative personnel to process timber sales (making timber sales less costly to administer) and the ability to manage a large number of active timber sales managed per forester. Consequently, universally recommending one payment method over the other is difficult, as there are important differences between timber sale programs (e.g., acres managed, staff size) and timber sale characteristics (e.g., volume and value of individual species and products offered for sale) that impact which timber sale payment method would be most advantageous to an agency.

Enhancing Timber Sale Program Environmental and Economic Sustainability

Only one agency reported an actual change in the use of stumpage payment methods as a function of using chain-of-custody certification, citing a change that requires the use of scale tickets on SOAV timber sales. Another state agency reported developing a process to account for chain-of-custody on SOAV timber sales but only when requested by the purchaser.

Two focus groups were conducted with 11 natural resource managers during August 2015 in Cloquet. Participants were surveyed prior to the focus group in an online survey format. In the focus groups, online survey findings were presented and discussed with the groups. Topics discussed included payment method decisions and factors affecting decision making. Data analysis revealed several factors that drive manager decisions about timber payment methods in setting up timber sales including a stand's overall species composition, timber quality, silvicultural prescription, fairness to bidders, and markets. Natural resource manager participants also reflected on what they believed drives bidders' decisions to bid on sales. Season of operation, access, species composition and sale personnel were identified as primary factors.

We are on schedule to meet all proposed completion dates for each Activity.

Overall Project Outcomes and Results

The method used by a timber sale program to collect payment for timber sold was perceived by land managers and others to have a substantial impact on post-harvest ecological conditions and net timber sale revenue. The two payment methods used are consumer scale (scale) and lump sum. Under the scale method, the buyer only pays for timber that has been harvested and scaled by a qualified scaler. With this method, the seller tracks harvested volume using scale tickets which require administrative time to process. The lump sum method requires the buyer to pay a fixed amount for the timber, regardless of the timber volume actually harvested.

Our study goals were to evaluate how the two timber payment methods: a) impact post-harvest ecological conditions; b) impact the cost-effectiveness within Minnesota's public timber sale programs; and c) are perceived by natural resource managers and loggers. To accomplish these study goals, we collected data from post-harvest sites, reviewed agency records, conducted a field economic experiment using a timber sale auction, conducted time studies, administered a mail survey, and conducted interviews and focus groups.

We found that the perceptions of ecological and economic impacts of timber payment method often exceed actual impact. Timber payment method did not impact post-harvest ecological conditions, gross stumpage revenue or stumpage price bids. Numerous factors (e.g., pre-harvest operator conditions, operator) had a greater impact on post-harvest ecological conditions than payment method. A strong biomass market could increase utilization and thus post-harvest ecological conditions under a lump sum method. The impact of using the consumer scale method on net timber sale revenue is less than one percent of the timber sale's value. Logging business owners participating in the study ranked timber payment method lower in importance than other factors when bidding on a sale. As each payment method has its strengths and weaknesses (see table below), agencies need the flexibility to select the approach which best meet their needs.

Enhancing Timber Sale Program Environmental and Economic Sustainability

Summary of factors favoring use of scale and lump sum payment methods.

Factors favoring scale method	Factors favoring lump sum method
1) Less administrative time and accuracy needed to estimate sale volume	1) Less time needed to administer active timber sale and to process paperwork and other related documents
2) Appraisal staff have low probability of accurately estimating sale volume and value	2) Facilitates simultaneously administering several timber sales
3) Timber sales with a high percentage of low value timber and/or where operating costs are expected to be high	3) Fewer personnel required for timber sale
4) More woody material may be retained on-site for wildlife purposes	4) High utilization can facilitate manual reforestation efforts
5) Salvage timber sales	5) Timber sale has uniform characteristics (e.g., pine plantation)

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Assess ecological impacts of the two payment approaches

Description:

We will establish study plots on at least 50 recently closed timber sales on state and county lands in Cass and St. Louis counties to assess the impact of timber payment method on post-harvest silvicultural and ecological conditions. We will measure the distribution and abundance of living and dead trees and the amount of coarse wood retained on the forest floor, allowing us to address questions related to how each payment method affects important habitats. The abundance and species of forest seedlings will also be measured to examine how each payment method affects future forest composition. Results concerning the impacts of timber sale payment method on forest habitat and composition will be summarized in project reports.

Summary Budget Information for Activity 1:

ENRTF Budget: \$ 110,000
Amount Spent: \$ 110,000
Balance: \$ 0

Activity Completion Date: July 2015

Outcome	Completion Date	Budget
1. Post-harvest field sites identified through work with counties and MNDNR	March 2014	\$33,000
2. Post-harvest sampling data collection completed	September 2014	\$42,100
3. Analysis of post-harvest data completed	March 2015	\$17,400
4. Final report of activity results submitted	July 2015	\$17,500

Activity Status as of (January 2014):

Protocols were established for assessing the impacts of timber sale payment method on post-harvest ecological conditions. Through collaboration with the St. Louis County Land Department, we located and established nine sites for assessing the impacts of timber sale payment method on post-harvest ecological conditions. These sites are part of a larger set of research sites (60 sites total) that we will be using for addressing Activity 1. A preliminary assessment of post-harvest structural (coarse woody debris and retention trees) and regeneration conditions was conducted at these nine sites and indicated other factors beyond timber sale payment method were affecting post-harvest ecological conditions. A field visit to three sites was conducted with project personnel from the St. Louis County Land Department and the University of Minnesota on July 26 to discuss sampling protocol, site criteria, and results from those sites. During a project team meeting on September 25, results from the nine sites were presented to all study cooperators. We are currently working with the St. Louis

Enhancing Timber Sale Program Environmental and Economic Sustainability

County and Cass Land Departments and Minnesota DNR to identify more sites for field sampling next spring. We are on schedule to meet all proposed completion dates under Activity 1.

Activity Status as of (July 2014):

Post-harvest ecological conditions have been sampled at a total of 25 recent timber harvests on the St. Louis and Cass County Land Department landbases, with an additional five sites planned for sampling by the end of August 2014 on Cass County lands. We are currently working with the Minnesota DNR to finalize 30 sites for field sampling later this summer and fall and will sample 15 sites each on the DNR landbase in Cass and St. Louis County, respectively. A field visit was conducted with project personnel from the St. Louis County Land Department and the University of Minnesota on June 23, 2014 to discuss results from sampled sites and to answer questions regarding timber sale details. In addition, we will be meeting with Minnesota DNR staff in the Two Harbors Office to review potential field sites on July 29, 2014. We are on schedule to meet all proposed completion dates under Activity 1.

Activity Status as of (January 2015):

Post-harvest ecological conditions were sampled at a total of 40 recent timber harvests on the St. Louis and Cass County Land Department and Minnesota Department of Natural Resources landbases. These timber harvests are divided equally between the two timber sale payment methods and represent a smaller sample size than originally proposed (50 sites). This smaller sample is due to the sampling effort required to adequately describe the variability in post-harvest ecological conditions, namely leave-tree characteristics and coarse woody debris abundance. Evaluations of statistical power of this sampling intensity indicate this reduced sample is adequate for characterizing timber sale payment effects on post-harvest ecological conditions. Preliminary findings associated with Activity 1 were presented at a meeting with project cooperators at the St. Louis County Land Department on September 10, 2014. We are on schedule to meet all proposed completion dates under Activity 1.

Activity Status as of (July 2015):

Analyses comparing post-harvest ecological conditions between timber sale payment methods were completed. General mixed models were constructed to examine the impacts of payment method on post-harvest live-tree and deadwood conditions. These models also accounted for other factors that may influence post-harvest ecological conditions, including land management agency, year of harvest, and geographic location (i.e., county). Overall, there was no significant difference in average site-level ecological conditions between payment methods, particularly for downed woody debris volume (SOAV= $46.0 \pm 4.0 \text{ m}^3\text{ha}^{-1}$; Scaled= $56.6 \pm 6.8 \text{ m}^3\text{ha}^{-1}$, $P=0.2000$), aspen regeneration density (SOAV= $3.5 \pm 0.4 \text{ stems}^{-1} \text{ m}^2$; Scaled= $2.9 \pm 0.3 \text{ stems}^{-1} \text{ ha}$, $P=0.2685$), density of leave trees (SOAV= $65.8 \pm 20.3 \text{ trees}^{-1} \text{ ha}$; Scaled= $43.9 \pm 13.9 \text{ trees}^{-1} \text{ ha}$, $P=0.3720$), and average diameter of leave trees (SOAV= $12.2 \pm 3.2 \text{ cm}$; Scaled= $7.6 \pm 2.0 \text{ cm}$, $P=0.2260$). The primary difference between payment methods was related to basal area of leave trees on site with sales harvested under SOAV payment methods containing a significantly higher residual basal area (SOAV= $3.7 \pm 1.2 \text{ m}^2\text{ha}^{-1}$; Scaled= $1.4 \pm 0.4 \text{ m}^2\text{ha}^{-1}$, $P=0.0646$). This difference likely reflects the types of forest stands sold under this payment method, as SOAV payment methods are often used on stands containing a higher proportion of high value species. The species most commonly retained on SOAV sites are also reflective of this trend with white pine being the most common species retained on these sales (18% of all stems), whereas low-value, red maple was the most common species retained on consumer scale sales (36% of all stems). Given these differences in leave trees are related more to forest conditions and value prior to harvest, the general impacts of payment method alone on forest ecological condition are quite negligible. We are on schedule to meet all proposed completion dates under Activity 1.

Activity Status as of (August 2016): Post-harvest ecological conditions were sampled at a total of 40 recent timber harvests on the St. Louis and Cass County Land Department and Minnesota Department of Natural Resources landbases. Comparisons of post-harvest ecological conditions between timber sale payment methods indicated there was generally no significant differences in average site-level ecological conditions between

Enhancing Timber Sale Program Environmental and Economic Sustainability

payment methods, particularly for downed woody debris volume, aspen regeneration density, density of leave trees, and average diameter of leave trees. The only difference detected between payment methods involved the level of post-harvest basal area retained on site with sales harvested under SOAV payment methods containing a significantly higher residual basal area. Discussion of this finding with cooperators involved with the project confirmed that this difference likely reflects the types of forest stands sold under this payment method, as SOAV payment methods are often used on stands containing a higher proportion of high value species. Overall, the differences detected in post-harvest ecological conditions were largely related to forest conditions and value prior to harvest with payment method having a negligible impact. Given the high number of factors that influence the distribution and abundance of forest structure and regeneration following timber harvesting, future work that offers and implements paired sales under each payment method on separate portions of the same site would be useful for determining if in fact these sale structures have any influence on post-harvest forest conditions.

Activity Status as of (January 2016): We have completed all outcomes under Activity 1.

Final Report Summary:

Post-harvest ecological conditions were sampled at a total of 40 recent timber harvests on the St. Louis County Land Department, the Cass County Land Department and the Minnesota Department of Natural Resources landbases. While we initially proposed sampling 50 sites, the smaller sample was due to the sampling effort required to adequately describe the variability in post-harvest ecological conditions, namely leave-tree characteristics and coarse woody debris abundance. Evaluations of statistical power of this sampling intensity indicate this reduced sample is adequate for characterizing timber sale payment effects on post-harvest ecological conditions.

Comparisons of post-harvest ecological conditions between timber sale payment methods indicated there was generally no significant differences in average site-level ecological conditions between payment methods, particularly for downed woody debris volume, aspen regeneration density, density of leave trees, and average diameter of leave trees. The only difference detected between payment methods involved the level of post-harvest basal area retained on site with sales harvested under SOAV payment methods containing a significantly higher residual basal area. Discussion of this finding with cooperators involved with the project confirmed that this difference likely reflects the types of forest stands sold under this payment method, as SOAV payment methods are often used on stands containing a higher proportion of high value species. Overall, the differences detected in post-harvest ecological conditions were largely related to forest conditions and value prior to harvest with payment method having a negligible impact. Given the high number of factors that influence the distribution and abundance of forest structure and regeneration following timber harvesting, future work that offers and implements paired sales under each payment method on separate portions of the same site would be useful for determining if in fact these sale structures have any influence on post-harvest forest conditions.

In-kind staff support was provided by the St. Louis County Land Department, the Cass County Land Department and the Minnesota Department of Natural Resources to identify sites for field sampling, to provide timber sale data for each site and to participate in project cooperator meetings. The University of Minnesota provided in-kind support for project staff who were not funded under this project as well as indirect support for items such as office space, computers, accounting services, clerical time to prepare reports, and grants administration.

ACTIVITY 2: Assess the cost-effectiveness of the two payment approaches

Description:

Literature will be reviewed to identify any relatively new published articles which relate to the cost-effectiveness of the two payment methods. A national assessment of state and county timber sale program administrators will be conducted to understand their use of these two timber payment methods, perceptions of the ecological,

Enhancing Timber Sale Program Environmental and Economic Sustainability

financial, administrative advantages and disadvantages of each, including how each one affects forest certification and chain-of-custody efforts. Selected St. Louis County Land Department timber sales will be set up and offered for sale under both payment options using a paired bidding methodology to determine how payment method affects gross timber sale revenue. We estimate that 50-75 tracts of timber sold using the paired bidding methodology will generate 200-300 usable paired bids from which we will assess the impact timber payment method has on willingness to pay for stumpage. Time card information from St. Louis County Land Department field and office personnel responsible for setting up and administering timber sales will be collected and assessed to identify the administrative costs associated with each payment method. Records of merchantable timber volume harvested will be examined to estimate differences in gross revenue generated from sold-on-appraised-volume and consumer scale timber payment methods.

Summary Budget Information for Activity 2:

ENRTF Budget: \$ 126,000
Amount Spent: \$ 126,000
Balance: \$ 0

Activity Completion Date: *January 2016*

Outcome	Completion Date	Budget
1. <i>Updating of literature review completed</i>	December 2013	\$18,000
2. <i>Survey of state and county land department timber sale administrators completed</i>	September 2014	\$24,000
3. <i>Timber sales set-up and auctioned using paired bidding methodology and paired bid data analyzed; estimates made of gross timber sale revenue associated with each payment method</i>	June 2015	\$42,000
4. <i>Timber sale administration time data collected and analyzed</i>	September 2015	\$24,000
5. <i>Final report of activity and project results submitted</i>	January 2016	\$18,000

Activity Status as of (January 2014):

An initial literature review examining the cost-effectiveness of the two payment methods has been conducted to update our understanding of that literature. The review indicates very little literature directly related to the cost-effectiveness of the two payment systems has been published in the last 10 years, thus highlighting the seminal nature of the study. Therefore, the review focuses on literature which considers the relative economic and administrative advantages and disadvantages of the two payment methods. A visit to three field sites was conducted with project personnel from the St. Louis County Land Department (SLCLD) and the University of Minnesota (UMN) on July 26, 2013 to discuss potential constraints and barriers associated with the two payment approaches. On September 25, 2013 the project team met in Duluth, MN to update project collaborators on each segment of the study and to discuss future deliverables. That meeting included representatives from the Minnesota DNR (MN DNR), SLCLD, Cass County Land Department, Minnesota Logger Education Program, and UMN. UMN and SLCLD personnel developed a protocol for collecting data on the administrative time required to process scale tickets. This protocol was tested at the SLCLD Pike Lake office during fall 2013. Contacts were made with the MN DNR to access scaling and related tract data for approximately 190 "SOAV only" timber sales. Once acquired, a portion of that data will be contrasted with an equal number of consumer scale sales to estimate the differences in gross revenue between the two payment methods. Additionally, UMN personnel provided input on the paired bid study instructions that will be used by the SLCLD during its February 20, 2014 timber auction. At this auction, 16 tracts of timber will be sold using the paired bidding methodology to obtain data that will enable UMN to estimate the impact of timber payment method on willingness to pay for stumpage. Depending on the number of paired bids generated in the February auction, SLCLD may offer additional paired bid tracts in its August 2014 timber auction. The project is on schedule to meet all proposed completion dates specified for Activity 2.

Enhancing Timber Sale Program Environmental and Economic Sustainability

Activity Status as of (July 2014):

The St. Louis County Land Department (SLCLD) successfully administered the paired bid auction for the timber payment method experiment on February 20, 2014. As the auction generated a sufficient number of paired bids for the analyses, additional paired bid tracts will not be needed. The SLCLD staff collected data on administrative time required for processing sale tickets. That data will be used to derive an average processing time per ticket to better understand the total cost of ticket processing. This information will be used to assess the cost differences between the two timber payment methods. SLCLD also provided us several hundred timber sale data records. This data will be used to further evaluate differences in gross revenue per acre generated by the two different timber payment methods.

To understand how payment method may influence the merchantable volume removed from a timber sale, 42 tracts sold by the Minnesota DNR under the SOAV payment method were evaluated. Work has begun on the national survey to state and county timber programs to address the uses and perceptions of payment methods. The project is on schedule to meet all proposed completion dates specified for Activity 2.

Activity Status as of (January 2015):

We have successfully collected and analyzed timber sale data from the St. Louis County Land Department (SLCLD). There were a total of 531 timber sales from 2004-2013, which are being used to analyze the timber sale characteristics (e.g., payment method) that influence gross revenue. In addition, we have analyzed the data from the February, 2014 paired bid auction. Both of those methods are being employed to evaluate the affect timber payment method has on gross revenue generated.

We are concluding our analysis of SLCLD administrative time to derive a total cost of ticket processing. The SLCLD staff provided detailed information on each stage of timber sale administration which has allowed us to separate out the various functions of administratively processing a timber sale. The information collected from SLCLD staff is being used to derive a total cost for each payment method type so that we can investigate the cost differences between payment systems (i.e., SOAV vs. Consumer Scale).

We are beginning to collect additional merchantable timber volume data from the Minnesota DNR. The data will be used to assess the effect that timber sale characteristics have on the volume removed from a timber tract.

A national assessment of state and county timber sale program administrators was conducted to understand their use of these two timber payment methods, perceptions of the ecological, financial, administrative advantages and disadvantages of each, including how each one affects forest certification and chain-of-custody efforts. The survey population included 58 state agencies across the United States and 46 county agencies from the Lake States (Michigan, Minnesota and Wisconsin). Approximately 87 percent of the agencies have responded to the survey. The data from the questionnaires has been entered into a database and work has begun to analyze that data.

Preliminary findings associated with Activity 2 were presented at a meeting with project cooperators at the St. Louis County Land Department on September 10, 2014. We are on schedule to meet all proposed completion dates under Activity 2.

Activity Status as of (July 2015):

The graduate student whose research focused on assessing the cost-effectiveness of the two timber sale payment approaches defended his thesis on June 8, 2015. This student's research examined the financial tradeoffs associated with timber sale payment methods as applied in the St. Louis County Land Department. The findings reported in the thesis were that for timber sales administered by the St. Louis County Land Department, there were no statistically significant differences in gross timber sale revenue attributed to the timber payment method using three different techniques to measure gross timber sale revenue. Additionally,

Enhancing Timber Sale Program Environmental and Economic Sustainability

the research found the average consumer scale timber sale was approximately \$323.06 more expensive to administer in 2014 than the average SOAV timber sale. That total, \$323.06 per timber sale, is approximately 2.8% of the gross timber sale revenue generated by an average timber sale sold by the St. Louis County Land Department from 2006 - 2012. Sensitivity analyses were conducted to evaluate the two timber payment methods under alternative cost scenarios.

Ninety individuals returned the national assessment questionnaire of state and county timber sale program administrators that was conducted to understand their use of these two timber payment methods, perceptions of the ecological, financial, administrative advantages and disadvantages of each, including how each one affects forest certification and chain-of-custody efforts. Preliminary survey results suggest that agencies with relatively little timber sale activity have a tendency to use only one stumpage payment method, whereas agencies with robust timber sale programs were more likely to use both methods. Program administrators perceive greater differences in the administrative and financial aspects of the two stumpage payment methods and few differences with respect to their ecological effects. Further analysis of the data will continue.

Preliminary findings were presented in two UMN graduate student seminars to students, faculty, representatives of the MN Forest Resources Council, and others on March 25, 2015 and April 3, 2015 at the University of Minnesota's St. Paul Campus.

We are on schedule to meet all proposed completion dates under Activity 2.

Activity Status as of (January 2016):

The national review of timber sale payment methods used by state and county forestry agencies was completed. The graduate student who conducted this research defended his research on November 25, 2015. The student's research examined the use of the two timber payment methods; perceptions of the ecological, financial, administrative advantages and disadvantages of each; and how each one affects forest certification and chain-of-custody efforts through the use of a mailed survey. The study found that there was a higher use of the consumer scale method over the SOAV method as 34% of the responding agencies used *only* the consumer scale method while 19% used *only* the SOAV method. Of the remaining responding agencies, both methods were used but with different approaches (32% used both methods on separate timber sales while 15% used both methods on single timber sales but for different species-products). State agencies had a greater tendency to use the SOAV method (30% used *only* the SOAV method), while county agencies had a greater tendency to use the consumer scale method (56% used *only* the consumer scale method). Agency size (as defined by number of timber sales sold in fiscal year 2013) was related to how stumpage payment methods were used. Small sized (defined as 1 – 7 timber sales sold in fiscal year 2013) agencies had a tendency to use only a single stumpage payment method (45% used only the SOAV method and 40% used only the consumer scale method), while larger sized (defined as 54 – 982 timber sales sold in fiscal year 2013) agencies had a greater tendency to use both methods on separate timber sales (40%) or blended methods (both methods used on a single sale) (40%). When weighted by number of timber sale acres sold in fiscal year 2013, the largest agencies (in terms of acres sold) had a greater tendency to use both the consumer scale and SOAV methods (64% of the acres sold were sold by agencies that use both payment methods).

Each payment method was perceived to have distinct financial and administrative advantages and disadvantages. For the consumer scale method, advantages include perceptions of high stumpage bid prices and timber sale revenue, timber sales are more attractive to bidders when the sale has a high percentage of low valued material and/or when harvest operating costs are high, and requires less administrative time to cruise and determine a volume estimate. For the SOAV method, respondents perceived advantages include requiring few administrative personnel to process timber sales (making timber sales less costly to administer) and the ability to manage a large number of active timber sales managed per forester. Consequently, universally recommending one payment method over the other is difficult, as there are important differences between

Enhancing Timber Sale Program Environmental and Economic Sustainability

timber sale programs (e.g., acres managed, staff size) and timber sale characteristics (e.g., volume and value of individual species and products offered for sale) that impact which timber sale payment method would be most advantageous to an agency.

Only one agency reported an actual change in the use of stumpage payment methods as a function of using chain-of-custody certification, citing a change that requires the use of scale tickets on SOAV timber sales. Another state agency reported developing a process to account for chain-of-custody on SOAV timber sales but only when requested by the purchaser.

We are on schedule to meet all proposed completion dates under Activity 2.

Final Report Summary (*August 2016*):

Analyses of St. Louis County Land Department timber sale records for the period 2006 - 2012, a paired bid experiment in 2014 where prospective buyers submitted two bids (one for the consumer scale payment method and the other for the SOAV method) for tracts offered for sale at an auction, and time studies were used to derive a total cost of processing each scale ticket. For timber sales administered by the St. Louis County Land Department, there were no statistically significant differences in stumpage price bids or gross timber sale revenue attributed to the timber payment method. Additionally, the research found the average consumer scale timber sale was approximately \$323.06 more expensive to administer in 2014 than the average SOAV timber sale. That amount is less than 1% of the average value of a timber sale sold by the St. Louis County Land Department from 2006 - 2012. Sensitivity analyses indicated that administrative costs for consumer scale sales will be higher for agencies that require more intensive cruise standards and/or less efficient consumer scale ticket processing procedures.

We initially estimated that 50-75 tracts of timber would be sold using the paired bidding methodology to generate 200-300 usable paired bids to assess the impact timber payment method has on willingness to pay for stumpage. The 15 tracts of timber auctioned by the St. Louis County Land Department in 2014 generated 84 usable paired bids. As an analysis of those paired bids indicated no statistically significant difference in stumpage price bids based on the timber payment method, it was determined that no additional paired bid tracts were needed.

The mail survey of timber sale program managers within state forestry agencies in the US and county land departments with active timber sale programs in the Lake States found that the consumer scale method was used more frequently than any other method during FY 2103. Nearly as many agencies reported using a blended approach where they used the consumer scale method on some timber sales and the sold-on-appraised volume method on other timber sales. Small sized agencies (defined as 1 – 7 timber sales sold in fiscal year 2013) had a tendency to use only a single stumpage payment method (45% used only the SOAV method and 40% used only the consumer scale method), while larger sized agencies (defined as 54 – 982 timber sales sold in fiscal year 2013) had a greater tendency to use both methods on separate timber sales (40%) or blended methods (both methods used on a single sale) (40%).

For the consumer scale method, advantages identified through the mail survey include perceptions of high stumpage bid prices and timber sale revenue, timber sales are more attractive to bidders when the sale has a high percentage of low valued material and/or when harvest operating costs are high, and requires less administrative time to cruise and determine a volume estimate. Respondents perceived that advantages of the SOAV method included requiring few administrative personnel to process timber sales (making timber sales less costly to administer), buyers are incentivized to utilize more material across the harvest site that might not have been marketed under the consumer scale method, and the ability to manage a large number of active timber sales managed per forester.

Enhancing Timber Sale Program Environmental and Economic Sustainability

The St. Louis County Land Department provided In-kind staff support in many ways: by providing timber sale records for the period 2006 - 2012, conducting the paired bid experiment in 2014 which required additional staff time to prepare advertisements and bid packages for the various tracts, during time study data collection which we used to derive a total cost of processing each scale ticket, by answering numerous questions to help researchers better understand their data and to verify study assumptions, and when participating in project cooperator meetings. The University of Minnesota provided in-kind support for project staff who were not funded under this project as well as indirect support for items such as office space, computers, accounting services, clerical time to prepare reports, and grants administration.

ACTIVITY 3: Assess implementation barriers for the two payment approaches

Description:

Literature will be reviewed to examine opportunities and constraints associated with timber sale programs. Cass and St. Louis County Land Department staff will be interviewed to document the processes used to transition from consumer scaling to sold-on-appraised-volume timber sale payment process and the issues they encounter in doing so. Up to 30 in-depth interviews and 5 focus groups with MN loggers and natural resource managers will be conducted to assess ecological and economic opportunities and concerns associated with each timber payment method. Recommendations will be provided for addressing constraints and barriers identified.

Summary Budget Information for Activity 3:

ENRTF Budget: \$ 100,000
Amount Spent: \$ 100,000
Balance: \$ 0

Activity Completion Date: June 2015

Outcome	Completion Date	Budget
1. Interview and focus groups methods developed based on literature reviewed	March 2014	\$16,000
2. Conduct and analyze interviews with Cass and St. Louis County Land Department staff, natural resource professionals, logging business owners, and industry procurement foresters in the study counties	June 2014	\$45,000
3. Focus groups conducted	April 2015	\$27,000
4. Final report of activity results submitted	January 2016	\$12,000

Activity Status as of (January 2014):

An extensive literature review was conducted on logger decision making, opportunities and constraints in timber sales and harvesting to guide interview and focus group study design. We collaborated with a Biomass Consultant within DNR Forestry to discuss project methodology and previous focus group research findings related to decision making barriers and constraints. A field visit to three field sites was conducted with project personnel from the St. Louis County Land Department and the University of Minnesota on July 26 to discuss potential constraints and barriers associated with the two payment approaches. In a project team meeting on September 25 we discussed data collection protocol with all study cooperators. We collaborated with the Minnesota Logger Education Program, St. Louis County Land Department and the Cass County Land Department to develop a database of more than 150 forest management professionals and loggers operating within the two study counties. We developed interview and focus group protocols including consent forms, contact scripts and guides for forest management professionals and loggers. We have scheduled pilot interviews to test the interview protocol. We are on schedule to meet all proposed completion dates under Activity 3.

Activity Status as of (July 2014):

We developed interview instruments (i.e., contact script, interview guide, consent form, and background information sheet) for natural resource manager interview and the research team and partners reviewed and

Enhancing Timber Sale Program Environmental and Economic Sustainability

provided feedback on the instruments in January 2014. Three pilot interviews were conducted with natural resource managers in January and February to pre-test the interview guide for clarity and completeness. Natural resource managers and loggers were recruited for participation in the project interviews. Following the pilot interviews and minor revisions, twelve in-person interviews were conducted with natural resource managers at the county, state, and federal levels in February and March. Interview instruments (i.e., contact script, interview guide, consent form, & background information sheet) for interviews with loggers were developed and reviewed by the research team and partners in March and April. Project personnel attended and presented an overview of the project to loggers attending the Minnesota Logger Education Program (MLEP) conference in April in Tower. A summary was also presented in Bemidji by project partners. All loggers in attendance were given a flyer inviting participation for the upcoming interviews and focus groups. We collaborated with MLEP staff in creating a pool of prospective loggers representing varying operation types and sizes. Through June, five in-person interviews were conducted with loggers. Three interviews were conducted with loggers operating in Cass County and two interviews with loggers operating in St. Louis County. The remaining interviews with loggers will be scheduled in August and September.

Activity Status as of (January 2015):

We conducted 17 additional interviews with loggers operating in Cass and St. Louis counties. We also transcribed, coded and conducted preliminary analysis of all of the natural resource manager interviews. Ten of 20 interviews with loggers have been transcribed. Preliminary findings associated with Activity 3 were presented at a project meeting with cooperators at the St. Louis County Land Department on September 10, 2014. Preliminary findings also were presented in a UMN graduate student seminar to students, faculty, representatives of the MN Forest Resources Council, and others on November 19, 2014 in St. Paul. We planned for four focus groups to be conducted in conjunction with the Minnesota Logger Education Program annual conferences in Tower and Bemidji in April 2015. We developed a draft focus group script. We met multiple times with project personnel to share and exchange feedback on project preliminary findings. A literature review of relevant publications has been ongoing. An abstract was prepared to submit to the annual *International Symposium on Society and Resource Management* conference held in June 2015. We are on schedule to meet all proposed completion dates under Activity 3.

Activity Status as of (July 2015):

We have transcribed, coded, and conducted thematic analysis of the 20 interviews with loggers operating in Cass and St. Louis counties. In April, we attended the Minnesota Logger Education Program annual conference in Tower, Minnesota and conducted 2 focus groups with 16 loggers. We conducted basic descriptive statistics on quantitative sociodemographic and behavioral data and analyzed qualitative interview data for the determinants of logger decision-making. Sarah Fellows, the graduate research assistant on the project, presented a seminar in the Department of Forest Resources at UMN in April 2015, on the study and completed her Master of Science thesis report titled "Northern Minnesota logger conservation action: Social, moral, and business norms and profitability." We presented a seminar titled "Pride and profitability: The influence of norms on logger decisions and conservation action" at the International Symposium for Society and Resource Management in Charleston, South Carolina on June 15, 2015 using non-LCCMR funds. We believe we have reached saturation in data collection with logger participants and have adequately represented the diversity of loggers operating in Cass and St. Louis counties. As a result of our research across the three activities, we have determined that additional focus groups should be conducted with foresters and natural resource managers with responsibilities in timber harvesting and sales. Thus, we have begun to plan for 1 to 2 focus groups with natural resource managers to be held later in 2015. In these focus groups we will be presenting summaries of project findings and asking participants to reflect on their implications for timber harvesting and sales.

Activity Status as of (January 2016):

We conducted two focus groups with 11 natural resource managers on August 27, 2015 in Cloquet. Participants were surveyed prior to the focus group in an online survey format. In the focus groups, online survey findings

Enhancing Timber Sale Program Environmental and Economic Sustainability

were presented and discussed with the groups. Topics discussed included payment method decisions and factors affecting decision making. Activity 2 data were presented by Mike Kilgore and Charlie Blinn for further reflection by participants. Focus groups were audio-recorded and transcribed. Data analysis revealed several factors that drive manager decisions about timber payment methods in setting up timber sales including a stand's overall species composition, timber quality, silvicultural prescription, fairness to bidders, and markets. Natural resource manager participants also reflected on what they believed drives bidders' decisions to bid on sales. Season of operation, access, species composition and sale personnel were identified as primary factors.

We are on schedule to meet all proposed completion dates under Activity 3.

Final Report Summary (*August 2016*):

In-depth interviews were conducted with 20 logging business owners (loggers) and 12 natural resource managers operating in Cass and St. Louis counties, Minnesota to attain a rich and detailed understanding of perceptions of sold on appraised volume (SOAV) and consumer scale timber payment methods. In addition, focus groups were conducted with a sample of loggers and natural resource managers operating in Cass and St. Louis counties. Focus groups provided an opportunity for project personnel to share preliminary findings with participants and to explore in an interactive group setting perceptions of the two payment methods.

KEY FINDINGS

Perceived Advantages of the SOAV Method for Loggers

- SOAV is flexible: Loggers are more in control of what they harvest and where/how to sell it.
- SOAV is efficient: Loggers have less paperwork to keep track of, and less time spent waiting for foresters to scale on the landing.
- SOAV has financial benefits: Loggers know what they have to pay up front, and they can benefit if there is an overrun.

Perceived Advantages of the SOAV Method for Natural Resource Managers

- SOAV has financial benefits: Agency has savings in both time and money due to reduced administrative costs compared to consumer scale sales.
- SOAV is efficient: Natural resource managers note that loggers are encouraged to remove more biomass from SOAV sale sites, making agency regeneration efforts cheaper and easier.
- SOAV is transparent: Natural resource managers feel that in SOAV sales the roles and timing of the process are clear.

Enhancing Timber Sale Program Environmental and Economic Sustainability

Table 2. Perceived advantages of the SOAV method as reported by logging business owners and natural resource managers.

SOAV Method Advantages*	Logger Participants	Natural Resource Manager Participants
Financial Gains for Loggers		
Additional income in the case of an overrun	X	X
Spreads out infrastructure costs	X	
Financial Gains for Agencies		
Reduces chances of theft	X	X
Savings on administrative costs		X
Efficiencies for Loggers		
Loggers do not have to deal with tickets	X	X
No scaling at landing	X	X
More flexibility of when/where the wood is sold	X	X
Less paperwork	X	
Less agency oversight	X	
Can utilize more from each lot	X	
Provides opportunity for mixed species	X	
Efficiencies for Agencies		
Agencies do not have to deal with tickets		X
No setting up a scale		X
Encourages logger to utilize more		X
Roles and timing are clear		X
Who benefits		
Operations with chippers	X	X
Operations/agencies doing small sales		X
Bigger operations		X
Smaller operations		X
Operations with a forester		X
Counties that do not have a big mill		X

*An "X" in the cell denotes that at least one reference to this issue was made by a study participant.

Perceived Disadvantages of the SOAV Method for Loggers

- SOAV is high risk: Loggers and natural resource managers both acknowledge that logging operations bear the burden of risk in SOAV sales. An underrun is a financial cost for the logger. Natural resource managers identified market volatility as a potential risk to loggers taking SOAV sales. If there is not a market for all of the wood types on the lot, then the logger may experience a financial loss on the sale.
- SOAV requires trust: For loggers, SOAV sales require greater trust in the forester, and they may not bid on an SOAV sale if the forester is new or unfamiliar.
- SOAV favors certain operations: Loggers identified the large size of federal SOAV sales and ownership of a chipper as two factors limiting access to the potential benefits of SOAV.

Perceived Disadvantages of the SOAV Method for Natural Resource Managers

- SOAV has financial costs: Some managers described SOAV sales as being costlier to the agency, either because of the costs associated with an overrun or the time spent check cruising to set up a sale.

Enhancing Timber Sale Program Environmental and Economic Sustainability

- SOAV is uncertain: Some managers noted they do not always receive accurate information on how much was ultimately removed from the lot.

Table 3. Perceived disadvantages of the SOAV method as reported by logging business owners and natural resource managers.

SOAV Method Disadvantages*	Logger Participants	Natural Resource Manager Participants
Financial Costs to Loggers		
Loss due to an underrun	X	X
Need for an additional check cruise	X	
High financial risk	X	
Bid on too heavily	X	
Potential loss due to theft by contractor	X	
Bad if you do not have a market for everything in the lot		X
Financial Costs to Agencies		
Overrun is hard on the agency		X
Expensive for regeneration efforts loggers do not clear all the wood		X
Staff time on appraisal		X
Uncertainty and Risk		
Have to trust the forester/appraiser	X	X
Financial risk is carried by the logger	X	X
Loggers need to be knowledgeable about timber and markets	X	X
Do not get scale information back to confirm accuracy of estimate		X
Risk of blow down requiring reappraisal by agency		X
Who Does NOT Benefit		
Operations that do not have chippers	X	
Large size of federal sales limit access by smaller operations	X	
Smaller operations do not have resources for bid deposit		X

*An "X" in the cell denotes that at least one reference to this issue was made by a study participant.

Perceived Advantages of the Consumer Scale Method for Loggers

- Consumer scaling has financial benefits: Loggers described only paying for what they harvest as the primary financial benefit but also noted costs savings associated with not needing to do their own cruise check.
- Consumer scaling is a fairer process: Loggers described consumer scale sales as ensuring honesty from all parties due to money being exchanged based solely on timber weight by species.

Perceived Advantages of the Consumer Scale Method for Natural Resource Managers

- Consumer scaling ensures good reporting: Managers expressed getting reliable information back from scales as a benefit from consumer scale sales.
- Consumer scaling is good for forest management: Managers described consumer scale sales as providing them with more control over what species and how much is harvested at a site.

Enhancing Timber Sale Program Environmental and Economic Sustainability

Table 4. Perceived advantages of the consumer scale method reported by logging business owners and natural resource managers.

Consumer Scale Method Advantages*	Logger Participants	Natural Resource Manager Participants
Financial Benefits for Loggers		
Logger only pays for timber they harvest	X	
No need to check cruise	X	
Not bid on heavily	X	
Only buy what there is a market for		X
Wood moves faster		X
Fairness		
More fair across the supply chain	X	X
No risk that the volume estimate was wrong	X	
Ensures honesty by all parties	X	
Efficiency		
Operationally more flexible for loggers	X	X
Rare or no ticket issues	X	
Auditing appraisals is easier because of scale information		X
Accuracy and Reporting		
Get good information from scales	X	X
Money exchanged reflects what is actually there		X
Agency knows exactly what is coming off the site		X
Timber cruisers receive feedback on accuracy		X
Who Benefits		
Small operations	X	X
All parts of the supply chain like it		X
Operations without a forester on staff		X

*An "X" in the cell denotes that at least one reference to this issue was made by a study participant.

Perceived Disadvantages of the Consumer Scale Method for Loggers

- Consumer scale tickets are frustrating: Many loggers interviewed expressed dislike or frustration about the time and effort involved in using tickets to track the wood.
- Onsite scaling is a limitation: Some loggers found the requirement to weigh timber on site restricting to both their efficiency and their ability to sell their wood when and how they choose.

Perceived Disadvantages of the Consumer Scale Method for Natural Resource Managers

- Consumer scaling is costly: Managers lamented the cost of time spent tracking tickets and sending foresters to scale wood rather than having foresters cruise more lots for sale.
- Consumer scaling leads to conflicts: Some managers described conflicts between managers and loggers or foresters and loggers around ticketing issues, scaling accuracy and schedules, and refunds.

Enhancing Timber Sale Program Environmental and Economic Sustainability

Table 5. Perceived disadvantages of the consumer scale method reported by logging business owners and natural resource managers

Consumer Scale Method Disadvantages*	Logger Participants	Natural Resource Manager Participants
Financial Costs for Agencies		
High administrative costs	X	X
State loses money	X	X
Does not incentivizes use of all wood on lot		X
High startup costs when moving to a new area		X
Potential loss due to theft		X
Efficiency		
Less flexibility for when/where loggers can sell wood	X	X
Forester needs to be present on site	X	X
Tickets are annoying for loggers	X	
Cannot sort wood at the end	X	
Cannot stockpile	X	
Loggers still need to check cruise	X	
Limits the market	X	
Administrative time for agencies to track tickets		X
Too many rules and procedures		X
Not all mills have scales		X
Security and Conflicts		
Conflict between logger and forester/agency	X	X
More opportunity for mistakes along the way		X
Discrepancies between what is on permit and what the sales are		X
Agency is accountable for the wood		X

*An "X" in the cell denotes that at least one reference to this issue was made by a study participant.

Enhancing Timber Sale Program Environmental and Economic Sustainability

Table 6. Factors identified by natural resource managers prompting agencies to consider changing timber payment methods.

Factors Prompting Change*	To SOAV	To Consumer Scale
Financial benefits		
Cost savings	X	
Limit opportunities for theft	X	
Efficiency		
Perceived as more efficient for loggers	X	
Clarity of roles leading to reduced conflict	X	
Easier to administer	X	
Changes in the industry		
Increased use of chippers	X	
Mills changing what they will take	X	
Increased preference for mixed loads	X	
Difference in preference based on geography	X	X
Regulations		
Government mandate		X
Change in state law	X	

*An “X” in the cell denotes that at least one reference to this issue was made by a study participant.

Rankings of Factors Affecting Sales and Bids

- Logger and natural resource manager focus group participants ranked season of operation, access, and species as the most important factors when setting up a sale or bidding on a sale.
- Natural resource managers ranked season of operation as the most important factor overall.
- Loggers ranked species as the most important factor overall.

Table 7. Natural resource manager focus group participants’ rankings of factors influencing sale type (Ranking 1 = most important and 10 = least important).

Ranking	Factors Influencing Bids
1	Season of operation
2 (tie)	Access
2 (tie)	Species (type and quality)
4	Total sale volume
5	Cords per acre
6	Appraiser/forester/sale administrator
7	Block size
8	Auction type (sealed vs. oral)
9	Payment method (SOAV vs. consumer sale)
10	Markets

Enhancing Timber Sale Program Environmental and Economic Sustainability

Table 8. Logger focus group participants' rankings of factors influencing bids (Ranking 1 = most important and 10 = least important).

Ranking	Factors Influencing Bids
1	Species
2	Access
3	Season of operation
4	Appraiser/forester/sale administrator
5	Total volume
6	Cords per acre
7	Block size
8	Auction type (sealed vs. oral)
9	Payment method (SOAV vs. consumer sale)
10	Markets

SUMMARY AND RECOMMENDATIONS

SOAV has advantages because of its flexibility, efficiency and financial benefits. At the same time, SOAV is perceived as high risk because of underruns and market volatility. SOAV requires trust between loggers and foresters and it may favor larger operations and chipper operations.

Consumer scaling has added financial security in paying for what you harvest and not having to perform a cruise check or as intensive of a cruise check. It is also perceived as a fairer and easier to track process in that funds are exchanged based on timber harvested. Consumer scaling was also perceived as better for forest management in enabling managers more control over species and amount harvested. Consumer scaling requires more "hands-on" management of tracking tickets and scaling onsite which take additional resources and can lead to more conflict around ticketing issues.

The study points to opportunities to enhance or strengthen existing sales processes and procedures. A need exists for ongoing and open dialogue between natural resource managers and loggers to share expertise, experiences, and expectations for timber sales and harvesting. Formal and informal communication and relationship building will forge trusting relationships and a shared sense of responsibility for sustainable forest management. Natural resource managers and loggers can explore together areas in which timber sales processes and procedures could be more flexible to accommodate logger operations or stricter to better maintain healthy forests. Concerns about equity and disproportionate hardships on different logger operations can be shared, legitimized, and addressed. Minnesota's Forest Management Guidelines (Minnesota Forest Resource Council 2014) set standards for site-level timber harvesting. Continued examination and updating of the guidelines in collaboration with county, state and federal land managers, logging operators, and forest ecologists may reveal opportunities for better balancing ecological and economic outcomes of harvests. For example, logger study participants expressed an interest in ways to enhance profitability by increasing the number of summer sales, adapting visual quality mandates, and providing loggers with financial and technical assistance similar to existing agricultural cost-share programs.

There is a lack of clear consensus among the natural resource manager participants about which timber payment method provides the market with more wood, is financially better for loggers, and is of lower cost to the agencies. Providing accessible information to agencies and policy makers about the administrative and implementation costs of each method will create a shared baseline understanding across the timber industry.

Enhancing Timber Sale Program Environmental and Economic Sustainability

Above all, logger participants expressed a strong desire for more clarity in timber sales programs and harvesting guidelines and reduced uncertainty in an already uncertain environment.

In-kind support was provided by the St. Louis County Land Department, the Cass County Land Department, and the Minnesota Department of Natural Resources to allow their foresters time on the job and travel support to participate in interviews and focus groups. The Minnesota Logger Education Program provided in-kind support by identifying logging business owners to participate in interviews and focus groups and for reserving meeting space during one of their conferences for focus groups to occur. All of those organizations provided in-kind support when participating in project cooperator meetings. The University of Minnesota provided in-kind support for project staff who were not funded under this project as well as indirect support for items such as office space, computers, accounting services, clerical time to prepare reports, and grants administration.

V. DISSEMINATION:

Description:

Project cooperators will receive a summary of Activity Status reports and regular updates semiannually. In addition, results will be communicated with cooperators on an ongoing basis as appropriate. After the project ends, presentations will be made to appropriate groups in Minnesota (e.g., Minnesota Forest Resources Council, Minnesota Logger Education Program, MN DNR, county land departments, USDA-Forest Service) and manuscripts will be submitted to peer-review outlets for publication.

Status as of (January 2014):

Project personnel from the St. Louis County Land Department and the University of Minnesota visited three field sites on July 26 to discuss potential constraints and barriers associated with the two payment approaches. During a project team meeting on September 25, results from the nine sites that were field visited under Activity 1 were presented to and discussed with all study cooperators. In that meeting, data collection protocols were discussed with study cooperators.

Status as of (July 2014):

A meeting was conducted with the DNR Forest Operations and Management Section in St. Paul on January 8, 2014 to share Activity 1 findings. Two papers reporting Activity 2 results were presented during the Council on Forest Engineering's annual meeting in Moline, IL on June 25, 2014. The papers, which also appear in the conference proceedings, were entitled "Forestry Applications of Paired Bid Methodology" and "Analysis of Volume Removed from Sold on Appraised Volume Timber Sales in Minnesota". A project overview focusing on Activity 3 was presented to loggers attending the MLEP annual conference in Bemidji and Tower.

Status as of (January 2015):

Preliminary findings associated with all three activities were presented at a project meeting with cooperators at the St. Louis County Land Department on September 10, 2014. Preliminary findings for Activity 3 were presented in a seminar to UMN graduate students and faculty, representatives of the MN Forest Resources Council, and others on November 19, 2014 in St. Paul.

Status as of (July 2015):

Preliminary findings for Activity 2 and Activity 3 were presented in three UMN seminars to students, faculty, representatives of the MN Forest Resources Council, and others in March and April, 2015 in St. Paul. A seminar presented some Activity 3 results at the International Symposium for Society and Resource Management in Charleston, South Carolina in June, 2015

Enhancing Timber Sale Program Environmental and Economic Sustainability

Status as of (January 2016):

Two papers reporting Activity 2 results were presented during the Council on Forest Engineering's annual meeting in Lexington, KY on July 22, 2015. The papers, which also appear in the conference proceedings, were entitled "Does Timber Payment Method Affect Stumpage Price?" and "An Assessment of Stumpage Payment Methods Used by Non-Federal Public Timber Sale Programs". A poster reporting Activity 2 results entitled "An Assessment of Stumpage Payment Methods Used by State and County Timber Sale Programs" was presented during the Society of American Foresters Annual Meeting in Baton Rouge, LA on November 4-5, 2015.

Final Report Summary (August 2016):

Project cooperator meetings were conducted annually to discuss upcoming areas of focus, data and methods, and to present results to date. Semi-annual project summary reports submitted to LCCMR were shared with all project cooperators. During the March 24, 2016 project cooperator meeting in Willow River, final results from all project components were presented during a highly interactive session and four one-page fact sheets were distributed. Participants at that March 2016 meeting were so interested in the study results that they suggested and helped arrange additional presentations to the Minnesota Association of County Land Commissioners (June 9, 2016) and the Minnesota Forest Resources Partnership (June 23, 2016). Additional project outreach included a meeting with the DNR Forest Operations and Management Section in 2014, four papers and presentations at the Council on Forest Engineering annual meetings in 2014 and 2015, a seminar presented during the 2015 International Symposium for Society and Resource Management, three seminars to University of Minnesota graduate students and faculty, and a poster presented during the 2015 Society of American Foresters Annual Meeting. Three graduate students completed M.S. theses on their work in this project. Two University of Minnesota, Department of Forest Resources Staff Papers were produced. Everyone who participated in the Activity 2 mail survey was sent an electronic summary letter with instructions for how to receive the full report. At least two manuscripts are being prepared for peer-review journals and will be submitted after project completion.

Enhancing Timber Sale Program Environmental and Economic Sustainability

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget:

Budget Category	\$ Amount	Explanation
Personnel:	\$321,584	<p>Faculty salary: One month of summer salary and fringe (0.36) for two years (University of Minnesota Co-PI faculty on 9-month appointments - D'Amato, Davenport, and Kilgore; 0.1 FTE each) (Total: \$74,980)</p> <p>Graduate students: Salary and fringe (0.8636) for University of two Minnesota graduate students at 2 years and one graduate student at 2.5 years, each at 50% time (20 hours/week). Graduate fringe is budgeted at 0.8636 of salary load and includes tuition for the academic year, health care for the fiscal year, and social security and Medicare for summer pay periods. (Total: \$239,890)</p> <p>Undergraduate student: Salary and fringe (0.0743) for a University of Minnesota work-study undergraduate student for 1 year (Total: \$6,714)</p>
Travel Expenses in MN:	\$ 14,416	Travel within Minnesota to pay mileage (75%) and per diem costs (25%) for researchers, graduate students and undergraduate students to collect project data and meet with study collaborators.
TOTAL ENRTF BUDGET:	\$336,000	

Explanation of Use of Classified Staff:

N/A

Explanation of Capital Expenditures Greater Than \$3,500:

N/A

Number of Full-time Equivalent (FTE) funded with this ENRTF appropriation:

3.75 FTE

Number of Full-time Equivalent (FTE) estimated to be funded through contracts with this ENRTF appropriation:

N/A

Enhancing Timber Sale Program Environmental and Economic Sustainability

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
Non-state			
St. Louis County Land Department	\$6,500	\$6,500	Staff time to identify recently-closed timber sales to be evaluated during the field assessment (Activity 1); to set up and administer pair bid timber sales, to redesign and collect pertinent time card information, and to participate in assessment of timber sale administrators (Activity 2); and to participate in focus groups (Activity 3).
Cass County Land Department	\$1,750	\$1,750	Staff time to identify recently-closed timber sales to be evaluated during the field assessment (Activity 1), to participate in assessment of timber sale administrators (Activity 2) and to participate in focus groups (Activity 3)
Minnesota Logger Education Program	\$500	\$500	Staff time to identify loggers for focus groups and provide incentives for them to attend (Activity 3)
State			
Minnesota DNR	\$1,000	\$1,000	Staff time to identify recently-closed timber sales to be evaluated during the field assessment (Activity 1) and to participate in focus groups (Activity 3)
University of Minnesota	\$50,000	\$50,000	Project faculty in support of working with project PIs and other project employees to provide input on study protocol and interpretation of study results.
TOTAL OTHER FUNDS:	\$59,750	\$59,750	

VII. PROJECT STRATEGY:

A. Project Partners:

The University of Minnesota will receive all of the funding and contribute time and effort to the project. Faculty members involved are: Activity 1--Tony D'Amato (Associate Professor); Activity 2--Charlie Blinn (Professor and project leader), Alan Ek (Professor) and Mike Kilgore (Professor); and Activity 3--Mae Davenport (Associate Professor). The University will partner at no cost to the project with the St. Louis County (SLC) Land Department, Cass County Land Department, the Minnesota Logger Education Program (MLEP) and the MNDNR-Forestry. SLC will assist researchers with setting up and offering tracts for sale under both timber payment options, providing access to staff time card effort information, information about their recently completed timber sales and staff to participate in the focus groups. Cass County Land Department will provide information about their recently completed timber sales as well as staff to participate in the focus groups. MLEP will assist with identifying loggers for focus groups. MNDNR-Forestry will provide information about their recently completed timber sales as well as staff to participate in the focus groups.

Enhancing Timber Sale Program Environmental and Economic Sustainability

B. Project Impact and Long-term Strategy:

The method used by a public timber sale program to collect payment for the timber sold can have a substantial impact on post-harvest ecological conditions and net timber sale revenue. University of Minnesota faculty previously assessed how state timber sale policies and procedures, and forest management guidelines impact the price paid for timber. It is anticipated that the project will be completed within a 2.5-year period beginning July 2013. Project study results will be presented to cooperators, others and submitted to peer review outlets after project completion.

C. Spending History:

Funding Source	M.L. 2007 or FY08	M.L. 2008 or FY09	M.L. 2009 or FY10	M.L. 2010 or FY11	M.L. 2011 or FY12-13
Minnesota Forest Resources Council		\$197,400			

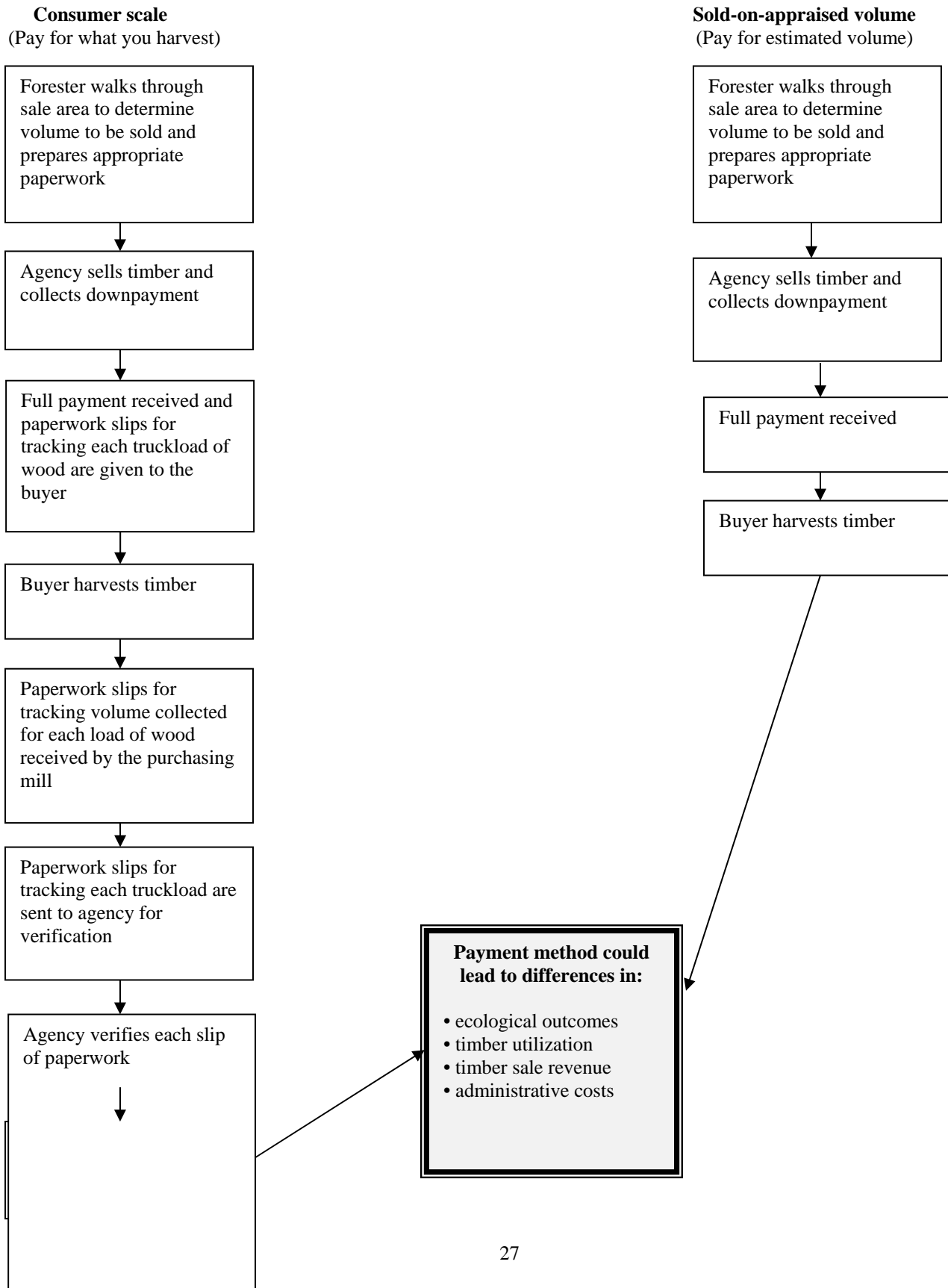
VIII. ACQUISITION/RESTORATION LIST:

N/A

IX. MAP(S):

Enhancing Timber Sale Program Environmental and Economic Sustainability

Comparison of activities and differences between the consumer scale (pay for what you harvest) and sold-on-appraised volume (pay for the estimated volume) payment methods.



Enhancing Timber Sale Program Environmental and Economic Sustainability

X. RESEARCH ADDENDUM:

N/A

XI. REPORTING REQUIREMENTS:

Periodic work plan status update reports will be submitted not later than January 2014, July 2014, January 2015, July 2015, and January 2016. A final report and associated products will be submitted between June 30 and August 15, 2016.

Final Attachment A: Budget Detail for M.L. 2013 Environment and Natural Resources Trust Fund Projects											
Project Title: : <i>Enhancing Timber Sale Program Environmental and Economic Sustainability</i>											
Legal Citation: M.L. 2013, Chp. 52, Sec. 2, Subd. 03i											
Project Manager: <i>Charles Blinn</i>											
M.L. 2013 ENRTF Appropriation: \$ 336,000											
Project Length and Completion Date: Three years, June 2016											
Date of Update: <i>Final Report</i>											
ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Balance	Activity 2 Budget	Amount Spent	Balance	Activity 3 Budget	Amount Spent	Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	<i>Assess ecological impacts of the two</i>			<i>Assess the cost-effectiveness of the two</i>			<i>Assess implementation barriers for the two</i>				
Personnel (Wages and Benefits)											
A) One month of summer salary and fringe (0.36) for two years (University of Minnesota Co-PI faculty on 9-month appointments - D'Amato (Activity 1), Kilgore (Activity 2), and Davenport (Activity 3); 0.1 FTE each) (Total: \$74,980). B) Salary and fringe (0.8636) for two University of Minnesota graduate students at 2 years and one graduate student at 2.5 years, each at 50% time (20 hours/week). Graduate fringe is budgeted at 0.8636 of salary load and includes tuition for the academic year, health care for the fiscal year, and social security and Medicare for summer pay periods (Total: \$239,890). C) Salary and fringe (0.0743) for a University of Minnesota work-study undergraduate student for 1 year (Total: \$6,714).	\$100,000	\$100,000	\$0	\$124,000	\$124,000	\$0	\$97,584	\$97,584	\$0	\$321,584	\$0
Travel Expenses in Minnesota											
Mileage (75%) and per diem costs (25%) for researchers, graduate students and undergraduate students to collect project data and meet with study collaborators.	\$10,000	\$10,000	\$0	\$2,000	\$2,000	\$0	\$2,416	\$2,416	\$0	\$14,416	\$0
COLUMN TOTAL	\$110,000	\$110,000	\$0	\$126,000	\$126,000	\$0	\$100,000	\$100,000	\$0	\$336,000	\$0