

The Timber Logistics Improvement Project

Executive Summary

U.S. Endowment for Forestry and Communities

During 2018 the U.S. Endowment for Forestry and Communities partnered with Trimble Forestry, Northwest Timber Logistics, and a large Alabama harvesting and timber brokerage company in a comprehensive analysis of logging truck utilization and the opportunities and challenges for fleet central dispatching. Findings:

- Although truck wait times at mills are a problem, significant potential efficiency gains exist at log loading sites.
- Companies diligent about truck maintenance and operating fleets under warranty suffer little down time.
- Even with multiple, diversified mill customers, unscheduled mill delivery curtailments drastically lower fleet and truck productivity.
- In-truck and mobile real-time data, load ordering, and reporting software can be readily mastered by drivers and fleet management staff.
- A significant percentage of truck drivers remain reluctant to have GPS monitoring of their load journeys and to load from unfamiliar harvesting crews.
- Fleet central dispatching requires a commitment to training drivers and fleet management staff.
- Where individual trucks fully participated with fleet central dispatching; gains of over 12% in calculated hours at greater than 50% hours per week were achieved over a 13-week period of active dispatching.
- Real-time central dispatching can reduce a fleet's delivered log haul costs by 12%–13%.

- The greatest challenge for expanding logging truck fleet managed logistics remains demonstrating the importance of increasing truck productivity across the highly interdependent timber supply chains of the U.S.

The Timber Logistics Improvement Project

Summary Report

U.S. Endowment for Forestry and Communities

Few log truck operations in the United States are profitable today. Many regions have 12% to 20% more trucking capacity than needed to meet industry's total annual requirements. Both logging and trucking companies, particularly in the U.S. Southeast, have faced declining returns on investment for more than 20 years. Lacking tolerance to innovation risk, they have become vulnerable to volatility in supply quotas.

For log trucking businesses, 70% to 80% of total annual costs are outside their control. Improving productivity is thus the primary hope for returning fleets to profitability. Although individual trucks can achieve some productivity gains, the real gains will come from fleet management of multiple loading locations and customer destinations. This is something that long-haul fleet companies, FedEx, and UPS have known—and acted on—for decades. Yet that reality has yet to be accepted by the timber-hauling industry.

The challenge here is logistics management: matching truck capacity to harvesting crews and mill demand so that the timber harvest–log truck–primary mill links in the forest products chain remain strong enough to support family-wage jobs in rural communities.

In 2016 the U.S. Endowment for Forestry and Communities (Endowment) and Region 8 of the U.S. Forest Service commissioned a scoping study to identify the challenges facing log transportation businesses in the Southeast and opportunities for improving productivity. The study found, among other problems, limited understanding in the industry of the opportunity costs of inefficient haulage. Accordingly, in fall 2017 the Endowment asked Growing Excellence Inc., a forestry consultant based in Boise, to conduct a case study with a well-run wood supplier, first determining baseline hauling performance and modeling an improved scenario, and then deploying a logistics decision support system to test and quantify actual improvements.

Phase 1: Baseline

The purpose of the first phase of the case study was to understand the constraints on timber supply operations and timber haulage logistics, as a basis for identifying solutions. The project engaged a midsize timber-harvesting operation, here called “ALHA,” headquartered in Alabama. This company’s harvest scale and diversified customer base allow it to cope well with swings in regional timber demand. The fleet comprises 32 trucks and the company employs roughly 50 people. As is common in the industry, the trucks are generally allocated to particular harvesting crews.

Logging truck logistics management depends on managing the status of trucks, operating conditions, production, customer needs, and fulfillment such that the trucks haul more loads with fewer empty miles and the wait times at harvesting sites and mills are shorter. Loads hauled must match daily harvesting production, which must match fluctuating timber demand. Achieving higher productivity—using fewer trucks to do the same haulage task—requires (1) more responsive capacity matching (scheduling and sending the trucks when and where they are needed) and (2) better routing that is quicker and cheaper, with fewer empty miles.

In an ideal world, consistent mill demand would allow flexibility and optimization in harvesting and haulage operations, which in turn would allow efficiency in timber supply operations (plus guarantee steady employment and reliable paychecks for workers). But demand fluctuates, weather affects harvest operations, and trucks require maintenance. ALHA’s diverse customer base provides some cushioning, yet diligent planning is required to maintain consistency in overall production, and the company must minimize downtime for truck repairs and maintenance.

A GPS-based software system (MTData) was installed in drivers’ cabs to collect data on individual truck and fleet performance for seven weeks in March and April 2018. The data were captured by Trimble Forestry’s WSX system.

Phase 1 Results: Optimization opportunities

The Trimble WSX system and drivers' event logs were used to analyze both major and minor individual truck and fleet time usage over the baseline period. The analysis of fleet time utilization is summarized in the following figures.

Summary of Key Haulage Statistics- 7 weeks Comm. Mar 5, 2018									
	Loads Delivered			Home Emptys	All Journeys	Miles Traveled			
	Same day	On- Cart Overnight	Total			To Mill		Empty	% Loaded
						Total	Average		
Week 1	424	48	472	128	600	29,576	63	34,655	46%
Week 2	417	25	442	138	580	27,665	63	33,663	45%
Week 3	453	35	485	147	632	27,326	56	34,502	44%
Week 4	428	26	454	135	589	22,045	49	29,888	42%
Week 5	401	34	435	119	554	22,404	52	28,058	44%
Week 6	424	27	451	129	580	22,847	51	29,451	44%
Week 7	419	37	456	127	583	22,861	50	29,345	44%
Total	2966	229	3195	923	4118	174,724	55	219,562	44.3%
	93%	7%	100%						
			78%	22%	100%				

Figure 1. Summary of Phase 1 haulage data

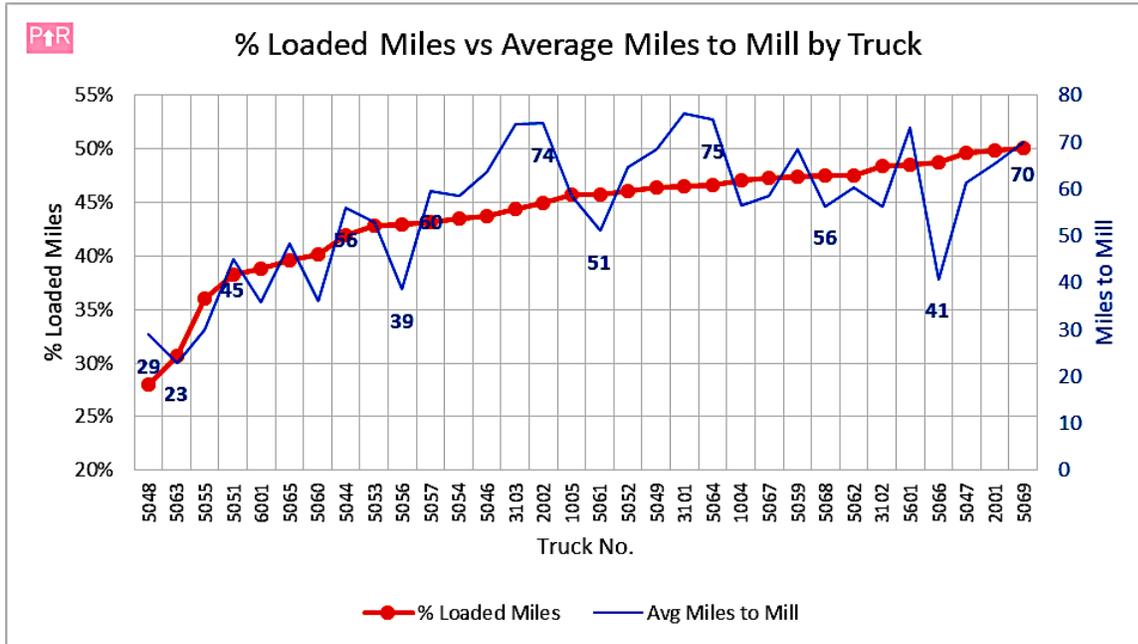


Figure 2. Truck utilization as percentage of miles traveled and total hauls

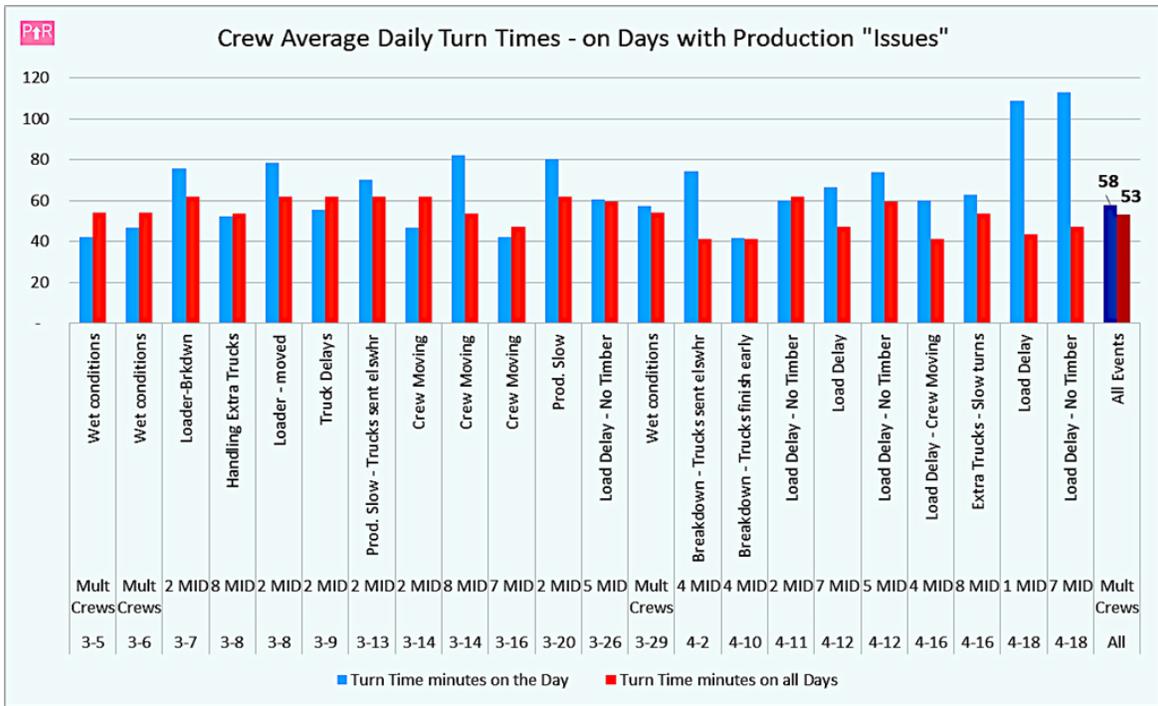


Figure 3. Crew turn times and factors contributing to delays

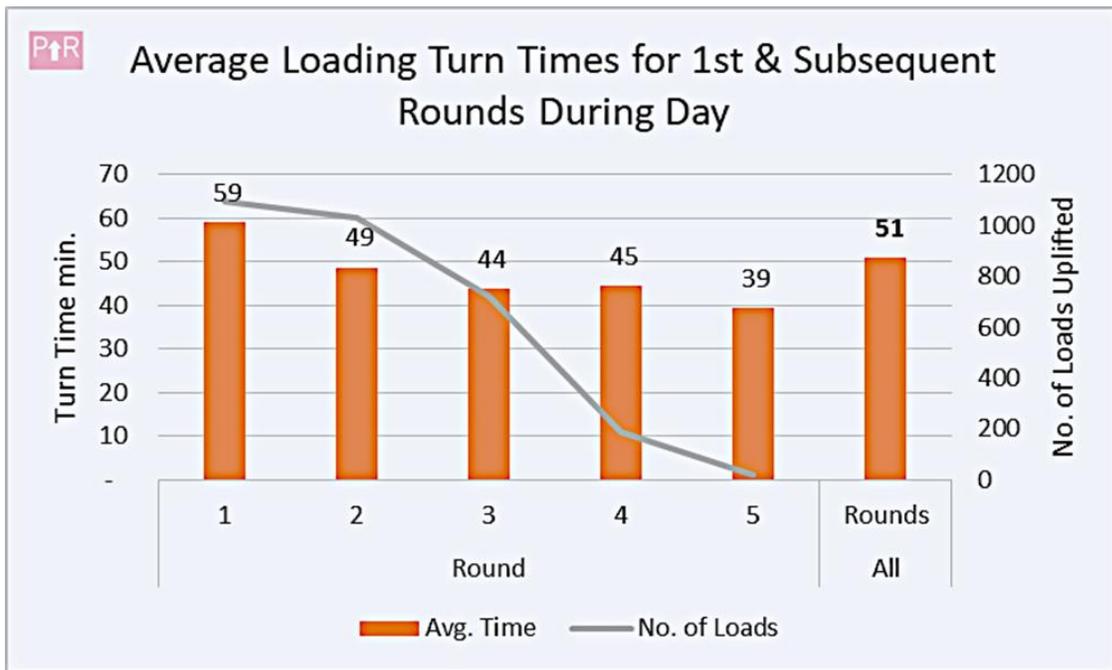


Figure 4. Average loading turn times for first and subsequent rounds of day

Initial findings suggested that intensive management of the existing fleet to haul additional loads would reduce empty miles, thus improving the cost-per-ton hauling rate. Tightening turnaround times at both timber landings and mill sites would reduce waits and excess haulage capacity.

An alternative daily schedule was then mathematically modeled and compared with the ALHA fleet's actual baseline haulage on four representative days. The main difference between the two scenarios: in the model, any truck can load for any crew, whereas in the baseline scenario, trucks are assigned to particular crews.

The model scenario achieved up to 52% loaded miles, versus 44% for the baseline scenario, with 1,700 fewer empty miles run per day. The model also indicated that haulage could theoretically be done with two fewer trucks than in the baseline scenario—a 9.4% reduction in capacity—with a similar range of work hours. The results indicated that with better routing, a smaller, more productive fleet could complete daily haulage tasks with fewer empty miles, more quickly, and at lower cost.

Phase 2: Central dispatch logistics

The second phase of the case study began in April 2018 and ran for 19 weeks, concluding at the end of August. Its purpose was to evaluate the extent of improvement in ALHA's operations with reliance on central dispatch logistics software and a dedicated fleet dispatcher. The decision support system would impose a business management structure on a process historically driven by harvesting contractors and the logging culture. Could it accommodate fluctuations in harvesting operations and mill hours and achieve efficiencies?

The company's log truck drivers were now being directed by dispatchers trained in the WSX logistics system. One third of truck drivers were quick and effective in utilizing the in-truck technology, one third periodically participated, and one third essentially refused.

Phase 2 Results: Productivity Improvements

The primary metric for evaluation of the test was percentage of loaded miles, with loads carried per week indicating the efficiency of the log trucks.

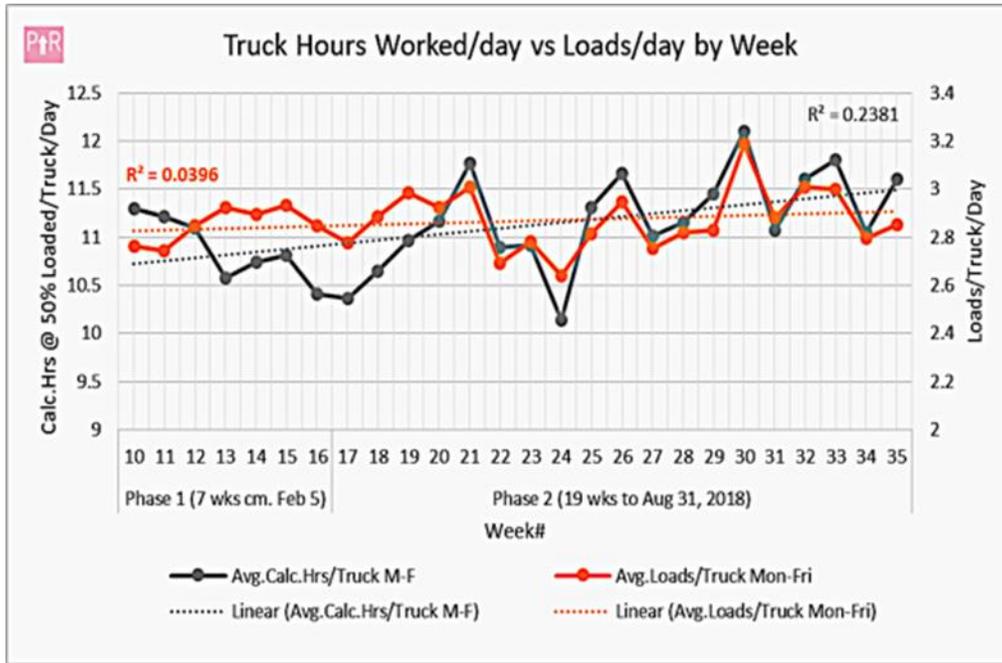


Figure 5: Truck Utilization

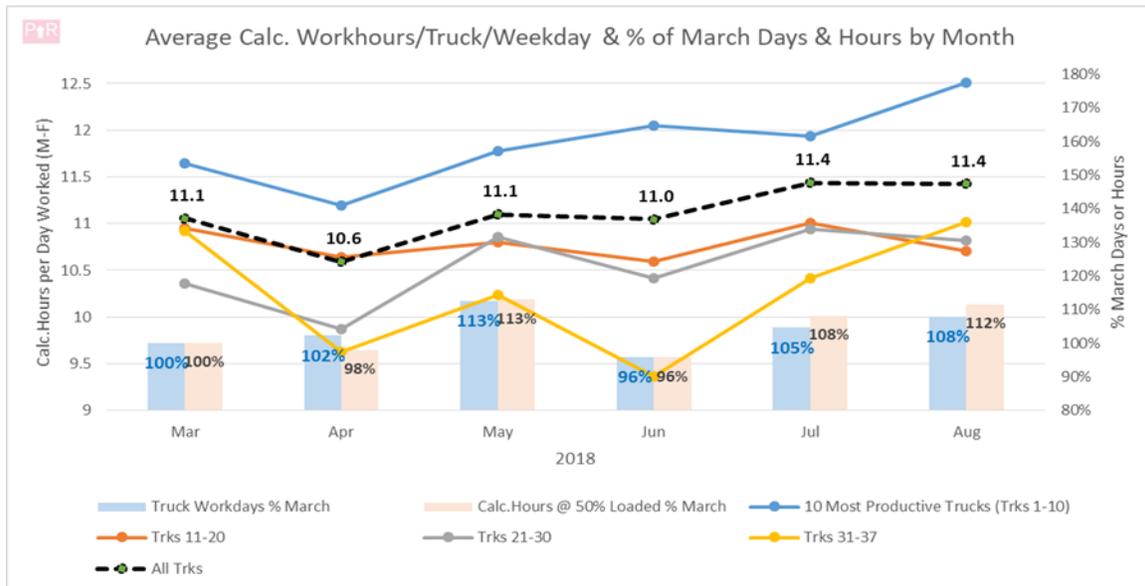


Figure 6: Calculated workhours by truck by month

Challenges and lessons

The project exposed challenges to the new approach—only one of which, the actual installation of the in-cab GPS trackers, was technological. The remaining challenges involved human nature and human systems. The obverse of each impediment, of course, is a lesson for companies considering a centralized logistics management system.

Log truck logistics management requires a significant up-front investment in personnel so that all participants are well trained and committed to the objectives. A company implementing a logistics management system must be willing to dedicate full-time staff to planning and dispatching. Each participant must understand his or her value and effect on the entire supply chain and recognize that sub-optimizing one component of that supply chain will compromise the gains.

A related issue is employee buy-in. Real-time log load and log stock inventory information is vital to any form of logistics management. Yet many logging crews and truckers remain anxious about having truck movements and log stock information tracked. Drivers may prove unwilling to use the technology and seek other, “less invasive” driving opportunities. Developing approaches to motivate employees will be important when implementing a managed logistics operation.

Roadblocks encountered in the case study can be categorized as follows.

Truck drivers

- Some drivers were reluctant to use the in-cab technology.
- Some balked at being directed to logging crews other than their customary crew.
- Some did not fully understand the project objectives and their roles in its success.
- Some feared for their jobs if the fleet became more efficient.
- Some were anxious about having their time and speed tracked.

Logging crew management

- Some logging crew managers worried that without dedicated trucks, they were at risk of not meeting daily harvest production targets.

- Some crews found it difficult to use the WSX system for the daily log inventory report.
- Some crews have been together for many years and want to remain with their familiar co-workers.

Timber supply chain management

- Some staff members were skeptical about centralized fleet-scale logistics management.
- Logging crews' and truck drivers' daily objectives and employment incentives need to be aligned, not in conflict.

Industry culture

- With the end of vertically integrated forest sector companies, mill managers may not see the economic interdependence of independent enterprises in the wood products supply chain and have little to no incentive to help log haulers.
- Some workers and managers are resistant to change: "Leave me alone and let me do my job." Change is seen as a loss of control.
- Industry people harbor two misperceptions: that the biggest loss in trucking time is waiting at the mill to get unloaded, and that regular, unplanned log suppliers' quotas are a normal part of the business and don't affect delivered log costs. Neither supposition is supported by the evidence.
- Industry managers are not rewarded for forming alliances or partnerships to reduce costs or increase profits.
- Few loggers and log truck drivers realize how their cost component affects the total cost of finished wood product supply chain.

Recommendations

- Industry groups should take the lead in fostering regional workshops that address the financial interdependence of the wood products total value chain.

- State and regional logging associations and TEAM Safe Trucking should offer technology workshops to introduce truck drivers and logging crew supervisors to reporting systems that will improve their performance metrics.
- State or regional logging associations in partnership with the Endowment or others should explore how timber suppliers might share information about load opportunities and truck locations.
- Logging associations should engage the American Trucking Research Institute to expand its annual cost survey to include log trucking as a category.
- The investment community should explore Uber and Lyft business models to evaluate operating a logging industry pilot program.
- Tech companies should explore options for lightweight dispatching software systems and in-cab devices that are easier to install and will be more readily accepted.

Technology alone—“tracking trucks”—is not the solution to the challenges faced by timber supply and hauling companies. Ultimately, fleet productivity improvements in the forest products supply chain requires supply chain alliances, willingness to change traditional practices, and openness to new technology, starting with information support.