The 2013-2014 Crop Year: Performance of the Grain Handling and Transportation System in a Challenging Time

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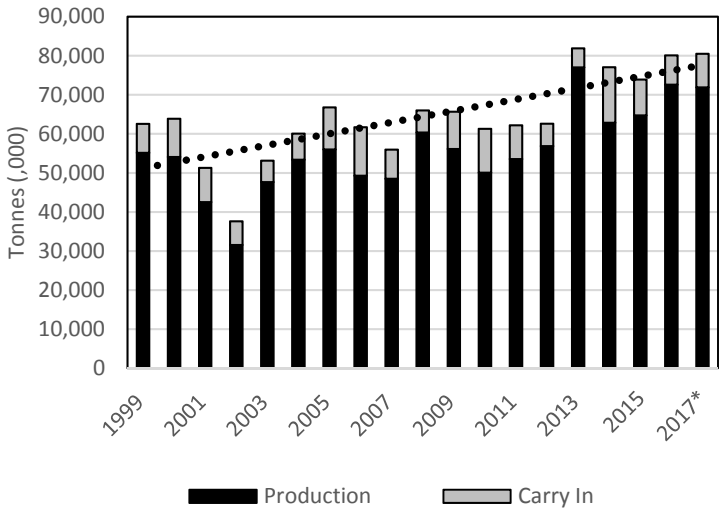
The 2013-2014 shipping season has become a euphemism for poor supply chain performance in the Canadian transportation industry. Despite moving a record amount of grain, the railway service provided that year was undependable and led to the damaging of Canada's international reputation as a reliable supplier of grain as well as the exercising of extraordinary governmental action to remedy the situation. It is often referenced as a situation that no one wants to see repeated.

In the spring of 2013 the grain industry was forecasting a normal crop but by late August it was becoming clearer that the harvest would be much larger. The late autumn also saw increased demand for other Canadian products in world markets with the rail transportation system subjected to unprecedented capacity pressures. When one of the harshest winters came to the prairies in late November 2013, it set the stage for a perfect storm that would confound the railways as well as the grain industry and government.

It was a period when all railway shippers faced seemingly insurmountable challenges in gaining access to rail capacity. In the case of the grain industry, this resulted in the country elevator network filling to over capacity, with many producers unable to deliver grain through much of the autumn and winter months. In the face of the increased demand for rail capacity and extreme operating conditions, both the industry and the federal government pressed the railways into providing additional capacity, which often stretched their existing resources.

The months that followed also brought legislative changes with broader implications for the future provision of rail service. While there is ample evidence to suggest that cold weather had some influence on the grain movement, there were other, more complex commercial issues at play, and which may have caused industry stakeholders to make decisions that only compounded the congestion problems faced in the country, at port, and, ultimately, by the entire supply chain.

This paper seeks to present the events of 2013 and 2014 in a broader context, using both the statistics and understanding gathered through the Grain Monitoring Program, and to draw out some relevant observations concerning the challenges presented during this period.



Grain Production and Supply

The 2013 harvest was the largest realized by prairie farmers in the history of grain production in Western Canada. Following a successful spring planting season, a near perfect summer took what was expected to be a "normal" crop to a whole new level. By October it had become apparent that records were going to be shattered.

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The initial estimate put production at about 65 million metric tonnes (MMT) in early September [1], a level that would be considered extraordinary by the standards of the time. By November, however, the estimate had ballooned to over 76 MMT [2] and eventually came in at 77.02 MMT. With carry-in stocks from the previous 2012-2013 crop year amounting to 4.9 MMT[3] the total supply of grain for the 2013-2014 crop year reached an unprecedented 81.9 MMT.[4]As Canada will typically use approximately 20 – 25 MMT for domestic purposes (this includes human consumption and feed purposes), this left somewhere between 57 – 62 MMT of the total grain supply available for export.

The Movement of Grain through the Year

With the realization of the extraordinary size of the crop about to be harvested, renewed discussions between the grain companies and the railways centred on determining how much the railways could actually handle in the face of the outdated guidance they had already been given. It was self-evident to most within the grain industry that the railways would unlikely be able to move all of the grain then beginning to come off the field. By September both CN and CP had come forward with individual estimates of 5,000 cars per week, for a combined total of 10,000 cars per week.[5] This served as the foundation for the subsequent sales plans established by the grain companies. Given that the ports of Vancouver, Prince Rupert and Thunder Bay were allocated 82% of the cars earmarked for movements within Western Canada over the previous three years,[6] this suggested a combined potential supply of some 8,200 cars every week. The remaining 1,800 cars would ostensibly be used to accommodate movements into Eastern Canada and the United States. The grain companies then used these approximations to develop their sales plans, taking into consideration the historical share of rail capacity that each had obtained.

For comparative purposes, the number of cars unloaded at port terminals can be used as a proxy for the actual number supplied by the railways and then gauged against the planned allocation of the railways.[7] Using these measures reveals that grain movements in the 2013-14 crop year started out at the typically slower pace often witnessed in the early harvest months of August and September. As can be seen in Figure 2, while volumes stood higher than the three-year average through to grain week 19 (the beginning of December), they did not consistently rise to the expected 8,200-car range until the late spring (grain week 39). Reflected within this are the effects of various events on the flow of traffic itself: a mainline derailment on CN's Edson Subdivision in grain week twelve;[8] the onset of extreme weather from grain week 18 to 23;[9] and the heightened volumes arising from the federal government's intervention that carried on from April through to the end of the crop year.

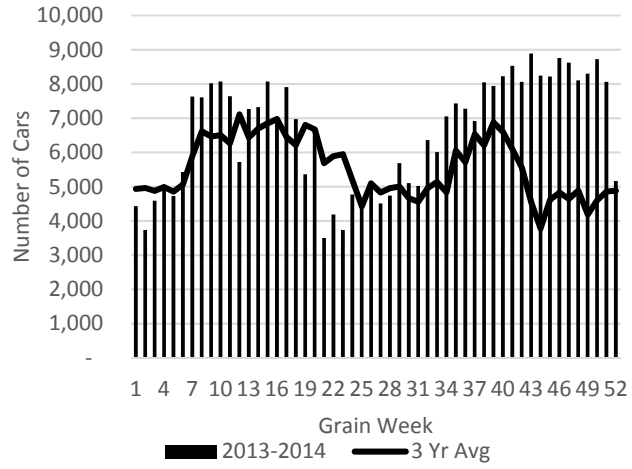

Figure 2 - Weekly Unloads (Cars) at Western Canadian Ports in the 2013-14 Crop Year (Source – GMP Unload statistics)

While these volume statistics show that both railways ultimately began to move grain at a pace that exceeded the three-year average[10] and would eventually lead to the setting of new handling records, 17 of the first 29 grain weeks saw lower-than-normal shipments. Not only were these shipments below the guidance that had been given in September, they were lower than what both railways had published in their weekly allocation plans. It was this service aspect, more than any other, that stirred shipper ire and producer frustration as the effectiveness and efficiency of the GHTS began to wane in the period leading up to February 2014.

Impact of Cold Weather

As widely observed in other assessments of the problems encountered in the 2013–14 crop year, cold weather did indeed play a part in slowing the grain movement from December through to February. The challenges faced by railways when the minimum temperature falls below -25 C have a significant impact on railway capacity. Much of this stems from the inability of a train's braking system to maintain sufficient air pressure when the outside temperature falls below this threshold.[11] This compels the railways to reduce the length of their trains. In addition to increasing the numbers of trains required to move the same amount of traffic, delays are incurred because it takes a crew more time to charge a train's the air brake system for safe operation in cold weather.

However, as depicted in by the five- year average for Winnipeg shown in Figure 4, the minimum temperature rarely falls below -25 C in any given week. Still, the 2013-14 crop year did see a sustained period when the weekly minimum fell below this level for nine of the twelve weeks between grain weeks 19 and 30. As a consequence of this meteorological extreme, railway capacity was reduced by 12% or more during a twelve-week period [12].

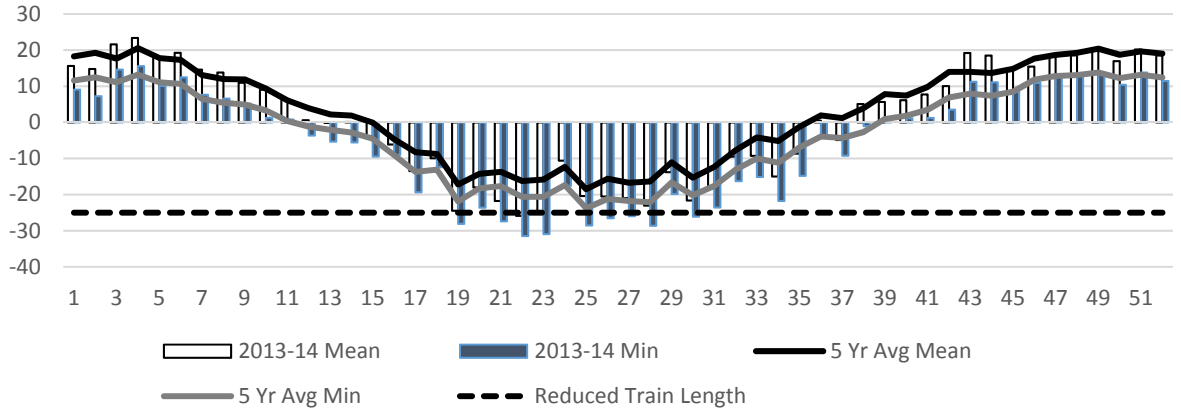

Figure 3- Weekly average minimum and mean temperatures at Winnipeg; Temperature at which train operations must be altered (Environment Canada; Railway Association of Canada)

The impact can be seen in the lower traffic volumes handled during the seven-week period between grain week 19 and 26, where the number of cars unloaded at Western Canadian ports fell sharply against the three-year average.

Impact of Car Allocation Plans

Western Canadian grain exports are almost entirely dependent on rail transportation. It is, therefore, essential that a grain company selling into the export market optimize its use of the available railcar supply in order to maximize sales and market share through the positioning of grain at the point of export.[13]

The process of establishing grain sales contracts with buyers and securing ocean vessels often begins as much as twelve weeks ahead (sometimes as far out as nine months) of the product's anticipated export. The attendant sourcing of product in the country usually begins six to eight weeks before the aligned vessel is scheduled to berth. This means that arrangements made in the month of September are typically for vessels that will load in November; October for December; and so forth. Grain marketers, therefore, must build their sales plans around the cars they understand the railways will provide, trusting that these cars will in fact be supplied in the quantity and time period stated. Consequently, the real ramifications arising from a shortfall in the planned allocation of railcars is revealed only twelve weeks after the sales contract and the terminal's logistics plans have been set in place.

The railways' weekly car-allocation plans issued in 2013 and 2014[14] provided the grain companies with the market signals that they needed to guide them in developing their sales plans. As these sales plans began to take shape in September 2013, numerous discussions between the grain companies and railways ensued. Grain marketers understood that the carrying needs of that year's crop could not be accommodated by the rail system in the short-term but were looking for an indication of the capacity that would be made available as they moved forward with their future sales plans. As noted above, both CN and CP indicated that they would be able to supply a combined 10,000 cars every week, which laid the foundation for the grain companies in the setting of their sales programs. Not only did this give the grain companies an understanding of the allocation they could expect based on their historic market shares of railway capacity, it also shaped the contracts that they entered into with producers to secure grain deliveries.

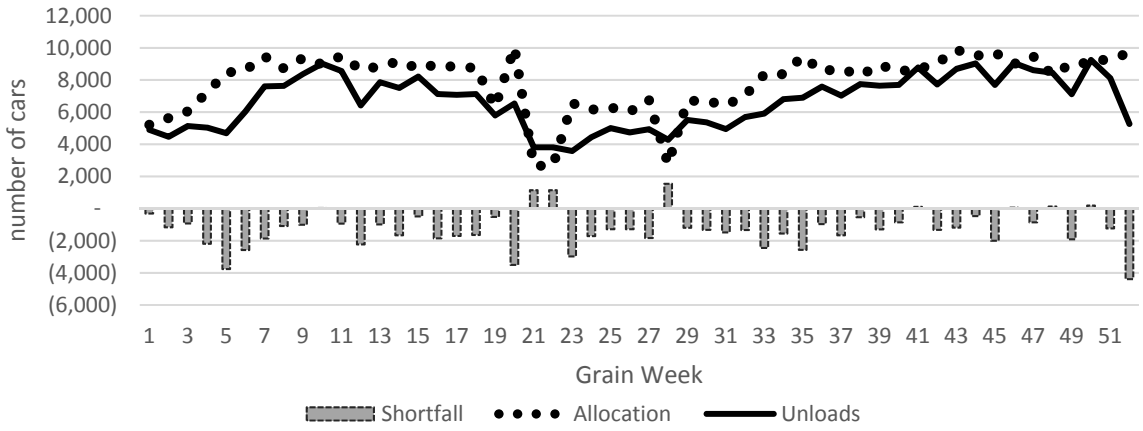

Figure 4 - Weekly aggregated railway car allocation plan to Western Canadian ports (Thunder Bay, Vancouver and Prince Rupert), Port Terminal Unloads and weekly shortfall for 2013-14 crop year. (CN and CP weekly car allocation plan; GMP Weekly Terminal unloads)

While movements in the 2013-14 crops year started slowly because of a reduced "carry-in" supply, it quickly accelerated in the face of mounting country-elevator deliveries and the resultant demand for carrying capacity. As noted in Figure 4, by mid September the railways had responded with plans to allocate over 9,000 cars each week to accommodate the movement of grain to Western Canadian ports. However, the number of cars supplied did not match what had been in the allocation plan. This is evidenced by the lower number of cars unloaded at port terminals during this same period. In fact, there were very few weeks in the crop year where the number of cars supplied corresponded with what had been pledged in the allocation plan. By week 6, the cumulative shortfall was beginning to grow rapidly.

As the crop year progressed into autumn and early winter, the number of vessels waiting to load grain increased, as did the length of time these vessels waited.

By the end of November, it had become apparent to most grain marketers that the railways were unable to keep up with their own allocation plans. At that point,

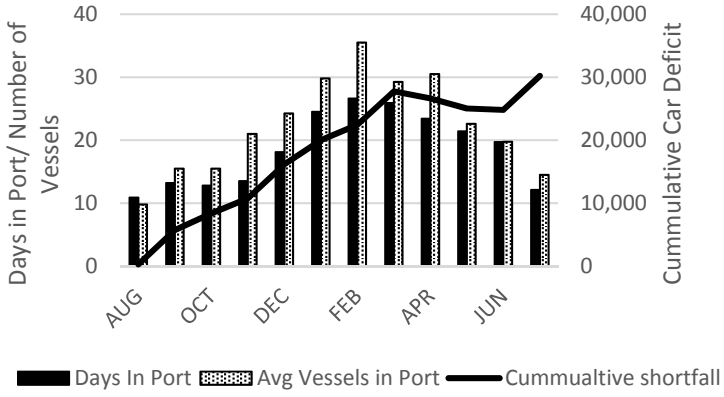

Figure 5 - Cumulative shortfall of cars (railway supply against plan); Average vessel days in ports; Average weekly number of vessel in lineup at port; comparative planning period (GMP data warehouse; CN and CP weekly car allocation plan against monthly railway traffic data

the grain companies began to adjust their sales programs. However, owing to the lead time involved, these changes would not improve the workings of the supply chain until late February, or possibly later.

Figure 5 portrays the correlation between the number of vessels in port, their waiting times, and the shortfall in railcar loadings as the crop year advanced. Although grain marketers had been acting on the market signals sent by the railways through their weekly allocation plans, the cumulative shortfall in supplied cars only worsened.

Realizing that the severe congestion of product in the country along with the mounting number of vessels waiting at port was seriously hindering their sales programs, grain marketers moved to reschedule grain deliveries. While this eased some of the pressure on the GHTS, eventually helping to reduce vessel lineups and waiting times it was not having an effect that was sufficient to alleviate the backup in the country and the subsequent political pressure weighing on the Government. In March of 2014, legislative action taken by the Federal Government setting mandatory minimum volumes the railways were to move on a weekly basis, in addition to extending the interswitching zones from 30 kilometres to 160 kilometres.

Impact on Country and Port Terminal Stocks

As the crop year progressed, country elevators began to buy more grain from producers to meet the needs of the sales program. As such, producer deliveries in the country began to increase. Without a corresponding increase in rail capacity to accommodate the movement of this grain to port, country-elevator stocks increased rapidly. By grain week 9 they exceeded 85% of the network's working capacity (in some regions, such as southern Saskatchewan, it reached 100%). At the same time, the stocks held at port position were falling in response to the constricted inbound railway movement of grain, reaching historic lows by week 19. This disparity in stock levels was one of the primary indicators of a supply-chain problem.

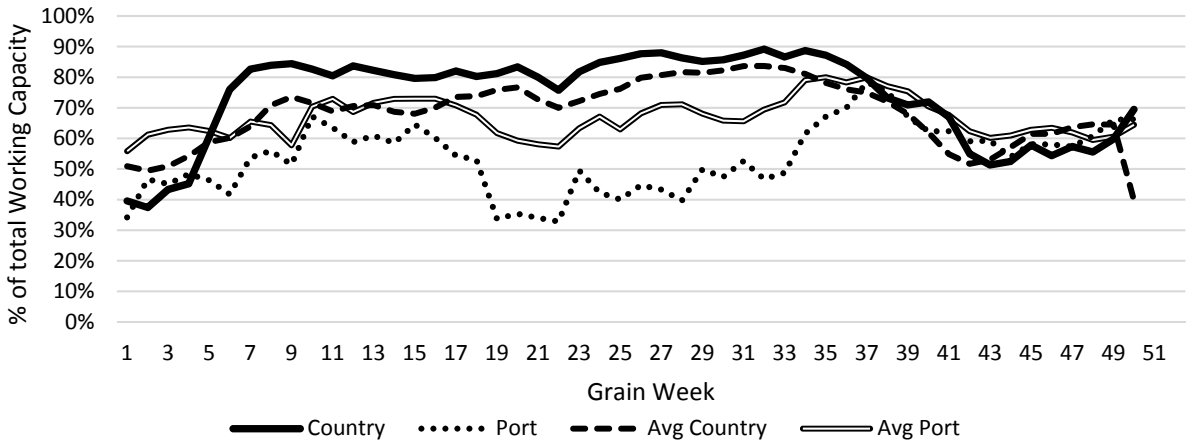

Figure 6- Stocks in store in the primary country elevator network, port terminals by grain week - 2013-14 crop year, 3 prior year average[15]

Figure 6 depicts the relative change in weekly stocks through the 2013-14 crop year along with comparisons to the three-year norm. With country stocks rising to some of the highest levels ever seen, and a mounting shortfall in supplied rail capacity, grain companies found themselves increasingly incapable of accepting grain from producers attempting to make deliveries. With few alternatives available, grain companies were left with little choice but to refuse producer grain deliveries or to set prices so as to dissuade them from doing so. This action was taken despite their port terminals being desperate to receive grain to load onto a growing number of awaiting vessels, all of which were triggering costly demurrage charges.

Impact on Grain Prices

Grain producers will market their grain in various ways, the most common being through advance contracts or delivery on the spot market. In the case of advance contracts, the producer enters into an agreement with a grain company to sell a specific grain at a fixed price based on the futures price at the time of anticipated delivery (i.e., a contract signed in April for November delivery would be set at the price forecast for November). Grain companies, having entered into advance contracts with producers in the spring of 2013, found themselves at a significant financial disadvantage as market prices continued to fall. This came in response not only to the extraordinarily larger domestic crop alongside heightened international grain supplies, but also because of the challenges faced by the supply chain.

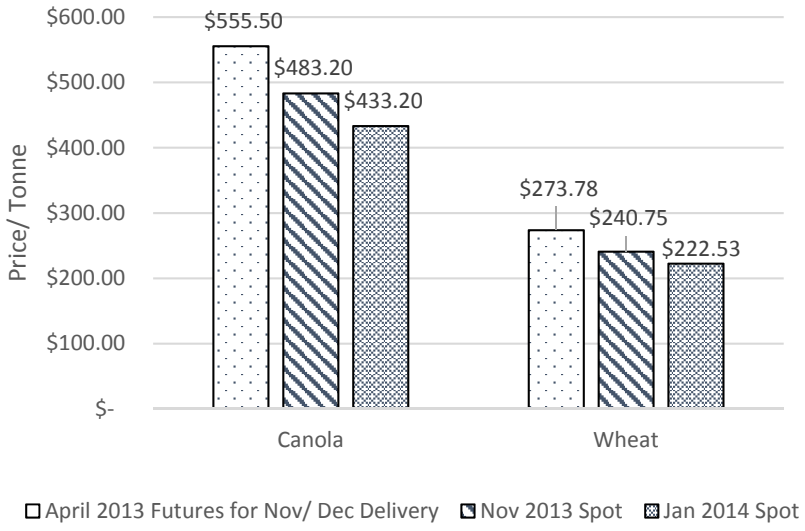

Figure 7- Futures and spot prices for Canola and Spring Wheat (Source: Western Producer Weekly Markets)

As shown in Figure 7, the spot prices for wheat and canola in November 2013 fell from those set forth in contracts entered into for November deliveries back in April, by about $33 per tonne and $72 per tonne respectively. As the crop year progressed these spot prices declined still further.

The basis is the mechanism commonly used by grain buyers on the Canadian prairies to signal their need for product on the spot market. Typically, the basis embodies the difference between the cash price immediately payable at the elevator driveway and the nearest delivery futures price. It is, however, also impacted by other factors, such as storage and transportation costs. The basis normally varies between $15 to $25 per tonne[16] depending on prevailing market conditions.

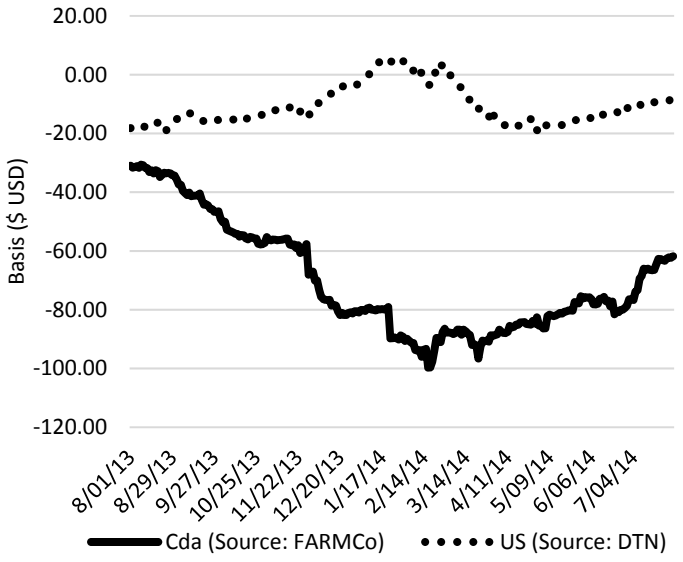

Figure 8 - Canadian delivered Spring Wheat Basis vs US delivered in the 2013-14 crop year (source – FARMCo, Winnipeg)

The 2013-14 crop year proved to be an exception as grain companies could no longer accept deliveries owing to congestion and, therefore, "widened" the basis steadily through the autumn and winter months. By February 2014 the basis had ballooned to a punitive $100 per tonne. This progressive enlargement unmistakeably tracked the mounting shortfall in supplied railcars and the

ensuing challenges with country-elevator capacity. In short, the message being sent to producers was clear: grain companies did not - or could not – want to buy their grain. (See Figure 8)

But this was not the case across the border in the United States, with the exception of the states immediately south (North Dakota, South Dakota and Montana which suffered many of the same problems experienced on the Canadian prairies). Grain elevators in the US Midwest actually narrowed their basis levels significantly given the availability of rail capacity in much of this area. This was also due, at least in part, to an inability to source milling wheat from their regular Canadian suppliers during this period. Consequently, US grain producers were able to secure advantageous prices with basis levels moving into positive territory ($2.00 - $4.00 US per tonne) while Canadian producers were facing reductions of as much as $100 per tonne from the spot price.

Not surprisingly, this was a cause of significant frustration for many producers who were looking to deliver grain on the spot market. Similarly, producers who had entered into advance contracts were having their scheduled deliveries pushed back later into the crop year. Reports of producers with December delivery contracts being pushed back as late as May were not uncommon. This left many with the undesirable choice of accepting the delay or opting out of the contract to deliver on the deeply discounted spot market. The consequence in both scenarios was delayed or reduced cash flow, with a significantly negative financial impact on many producers.

Summary

Record production was undoubtedly a mitigating factor in the problems that beset the movement of grain in the 2013-14 crop year. It must be noted, however, that most industry stakeholders fully understood that it would likely overwhelm the GHTS's handling capacity; that the whole crop could likely not be moved in one year and that there would be a significant carry-over into the 2014-15 crop year. Extreme cold weather also had an impact on the total movement. However, its sway was not as significant as has been purported in some quarters. This is evidenced in a shorting of the railways' planned car allocation that began weeks before the cold winter weather set in. This shortfall started to reveal itself as early as grain week 6, whereas the extreme cold weather only began to manifest itself three months later, in grain week 19.

Rather, the record suggests that the failure of the grain supply chain arose out of a repeated shorting of the railways' planned car allocation, which then snowballed to upset the intricately balanced logistics plans of the grain companies. Seldom did the railways meet any of their allocation commitments through the first 30 grain weeks of the crop year. This ultimately led to a massive shortfall, with a backlog of more than 30,000 car orders by March 2014. But contingent on these very same car allocations were the various sales contracts that the grain companies were continuing to enter into – based on the guidance given to them by the railways – from the outset of the crop year. This set in motion a host of secondary contracts: for ocean vessels needed to carry the grain overseas; and with producers to deliver the grain needed to meet these sales contracts.

While stocks in the country hit record high levels, stocks at port were reduced to record low levels. The impact of the low stock levels at port position led to a rapid increase in the numbers of vessels waiting at port, with a record 38 reported at Vancouver in early February 2014. With country elevators full, the grain companies were then unable to accept further grain deliveries from producers. This had a negative impact on the producers' cash flows. The widening spread in the basis caused many producers and producer groups to complain vociferously, which soon caught the attention of the federal government. This soon made the problem a political issue, which the Government of Canada came to believe required a legislative remedy. (This paper does not address the details of that legislation, nor the ramifications that followed.)[17]

The large crop, combined with the overly optimistic promises of the railways in being able to move it, were the primary elements that shaped the logistical problems that followed. Extreme cold weather merely exacerbated the situation. Had the railways presented a forecast and a weekly plan that reflected their actual capabilities, the grain companies would have tailored their sales programs accordingly, possibly avoiding the congestion – and the attendant costs – that these expectations occasioned. While this may have still given rise to stakeholder frustrations with the railways, it likely would have been far preferable to what actually ensued.

Endnotes:

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[1] Statistics Canada, September 2013 Production outlook
[2] Statistics Canada November 2013 production estimate
[3] Canadian Grain Commission 2012-13 week 52 stock estimate
[4] Quorum GMP calculation of supply (2013 production + 2012-13 year end carry forward stocks)
[5] WGEA member entered into discussions with railways in late August/ early September. WGEA advised the GMP this was the estimate they would plan to.
[6] CN and CP allocation records, 2010 through 2012.
[7] Unloads are used as a proxy for actual railcars supplied as at the time, railcar supply was not specifically measured. A portion of allocation (approximately 4-8% under normal conditions) is traffic that is destined to either transloaders or the livestock industry in the lower Vancouver mainland and is not reflected in the unload statistics. For this purpose, the car allocation plans were compared with both the unloads and the actual railway reported traffic to destination were compared. As railway traffic is reported to the GMP on a monthly basis, a analysis comparing the 2013-14 crop year by month yielded the same shortfall as seen in the weekly assessment.
[8] CN Rail Customer Service notification system, October 19, 2013
[9] GMP Weather records are extracted from Environment Canada records online
[10] GMP Annual Report for 2013-14 Table 2A-1
[11] Railway Association of Canada - Technologies Applied to Canada's Railways for Safety, Service, and Capacity, Paul Miller, Rail-Government Interface, February 25, 2015
[12] The reduction in train length when temperatures fall below -25C equates to an average reduction in railway capacity. i.e. a train that would normally be 10,000 feet must be reduced to 8,800 feet at -25C. (Railway Association of Canada, ibid)
[13] Grain Supply Chain Study - Supply Chain Description and Analysis of System Problems, Quorum Corporation, May 2013
[14] Both CN and CP produced weekly car allocation plans and published them on their company websites until the autumn of 2014. These reports stated the total numbers of cars ordered and the number of cars they had allocated and planned to supply by destination corridor (port, eastern Canada and the US). In late September 2014 CP stopped publishing their weekly report. At about the same time CN, while continuing to publish a weekly allocation report, changed both their allocation rules and methodology.
[15] From Canadian Grain Commission weekly statistics report in the 2010-11, 2011-12, 2012-13 and 2013-14 crop years.
[16] Drawn from reports on www.PDQinfo.ca
[17] In March of 2014 Bill C-30 was passed establishing mandatory minimum volumes of grain that were to be moved by the railways as well as an extension of interswitching limits from its normal distance of 30 kilometres to 160. As emergency legislation its life was limited to two years where an extension would be required. In August of 2016 a one-year extension was granted and in July of 2017, the legislation was allowed to lapse in anticipation of a new bill (C-49) that would deal with many of the issues that were raised