

## 25 Years of the Grain Handling and Transportation System (1995-2020): A Time of Great Change

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Twenty-five years ago, saw the beginning of some of the most significant changes in the Canadian grain industry since its beginnings over 120 years ago. The industry was a bedrock of the country’s initial economic growth and a foundation for the settlement of Western Canada. In 1995, the Government of Canada had just completed the closure of the Western Grain Transportation Agency, transforming it to an advisory group and was starting a gradual deregulation of some of the control mechanisms to a more commercial nature. At the same time, the industry itself was introducing operational changes aimed at increasing throughput and gaining efficiencies. Today, the Grain Handling and Transportation System (GHTS) for Western Canadian grain is much improved and has changed the industry. This paper will discuss the changes in the GHTS over the past 25 years, starting with what precipitated the change and growth in the industry, followed by a discussion on the infrastructure and operational changes that has accommodated that and concluding with the legislative, regulatory and policy actions that supported it.

### What has caused the Increase in Production and Supply?

There are several interrelated drivers for the change that has occurred. The most significant of those is global population growth combined with a growing global demand for higher protein foods as incomes in developing nations increase.

In the past 25 years the global population has increased by 34%, from 5.7 billion to 7.7 billion in 2019 <sup>1</sup>. Most prevalent of this increase is seen in Africa and the Middle East where the population has increased by 85% and 62% respectively. Asia Pacific population has increased by 31%, representing more than 1 billion people. In China alone the GDP per capita has increased from \$2,564 in 1995 to \$15,309 in 2017 (USD <sup>2</sup>), an increase of 497%. While some global regions have not enjoyed this type of economic improvement, in certain regions it has made a significant change in household incomes and hence, a shift in the demands for the type of food they choose to eat. This has led to an increase in higher quality proteins in daily diets to the benefit of the Canadian grains industry and the products that are grown, as well as our country’s general agriculture industry.

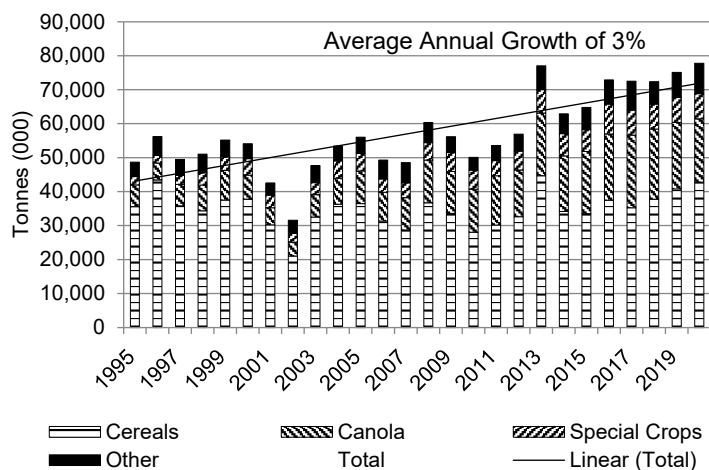


Figure 1- Grain produced in Western Canada - 1995 -2020

Annual grain production in Western Canada has increased over the past 25 years from an average of 48,000 MT to 72,000 M, and average increase of 3% annually (see figure 1<sup>3</sup>). This growth has been the result of

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improved agronomic processes that include zero tillage seeding, increased use of chemical inputs such as fertilizers, herbicides, and pesticides as well as advancements in seed developments.

Canada, unlike the United States, exports most of the grain that is grown. Domestic demand for grains has consistently been 18 – 20 MMT and the remainder of what is grown is sold into the global market. As such, the amount that is exported has increased at a rate higher than production volume growth. For example, while production over the last 5 years has increased 14.5%, movements to export position have increased 20%<sup>4</sup>.

### Change in Directional Flow of Grain

The markets for Canadian grain have changed appreciably over that time with a shift from European and former Soviet Union in the 1980’s and early 1990’s to Asia Pacific and Central and Southern American buyers (figure 2). In the past 5 years the volume of Asia Pacific demand has increased from less than 50% to almost 60%, predominantly in Japan, China and India.

Because of the shift in market, the directional flow of grain traffic has swung from Eastern routing (through Thunder Bay and the St. Lawrence Seaway) to the West Coast ports of Vancouver and Prince Rupert. (figure 3). The rapid shift in directional flow of grain from east to west and the subsequent growth in volumes through the ports of Vancouver and Prince Rupert necessitated that both the grain companies and railways adapt, starting with a reshaping of the country elevator network.

### The Country Network

The delivery of grain from farm to country elevator has evolved considerably. Moving from horse and wagon in the early 1900’s to trucks that could carry as much as 5 tonnes in the 1960’s. By the 1990’s most grain was being delivered into the system using tractor trailer combinations with the capability of delivering up to 45 tonnes each. By 1995 the elevator network itself was transforming from the wooden crib elevator typically seen across the

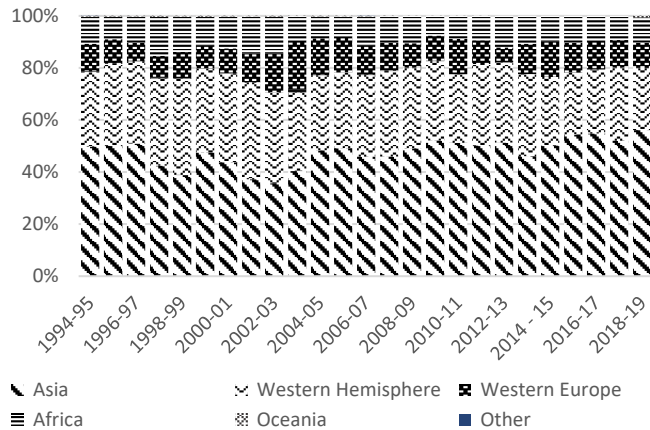


Figure 2- Proportional volume of Canadian grain exports to global regions

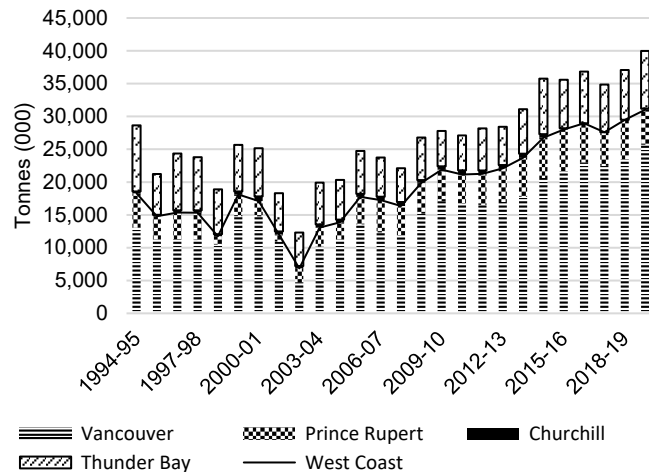
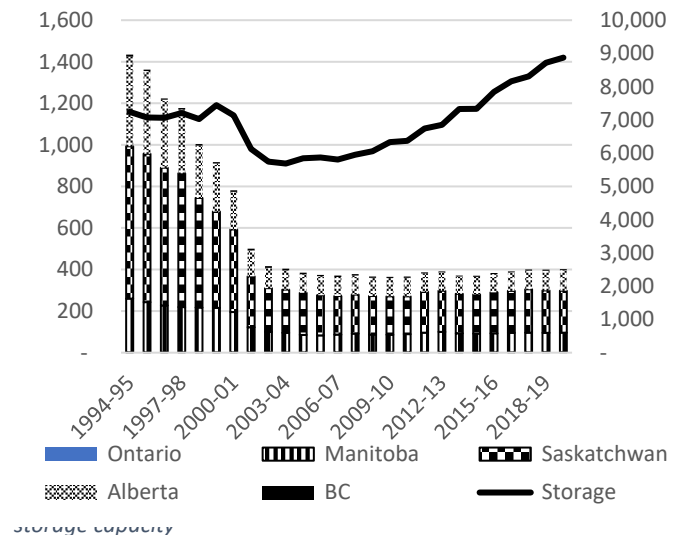


Figure 3- Canadian grain exports from Western Canadian ports



Canadian prairies that had a storage capacity of 4,000 to 8,000 tonnes and a capability of loading up to 18 cars to high throughput elevators (HTP) with more than 20,000 tonnes storage and capability for loading more than 100 cars. High throughput elevator allowed efficiencies, such as the speed at which they could accept grain deliveries and load railcars. Introduced in the early 1990's, incentives were offered by the railways for loading larger blocks of cars. Starting with 25 car blocks they quickly moved to 100 (CN) and 112 (CP) car blocks (unit trains) of grain.

These incentives and the HTP network brought about a contraction of the network. In 1995 there were 1,434 facilities across the Canadian prairies with a total storage capacity of 7.2 million tonnes of storage capacity. At that time fewer than 20 high throughput facilities were in place. By 2000 there were 36 HTP facilities and the system was contracting with a total of 1,004 facilities, shrinking to a low of 370 by 2005 and 129 HTP elevators. In 2020 the network had increased again to 402 facilities with 8.9 million tonnes storage capacity, 162 of which were HTP (figure 6<sup>5</sup>).



Figure 5- A typical wooden crib elevator at Hudson Bay, SK

In the past five years another transformation has begun with the advent of loop track facilities that can load 134 to 150 cars, all while keeping the locomotives attached, loading a full train in less than 10 hours. At the end of 2020 there were 25 loop track facilities in operation across the prairies, with several in the planning or construction phase.

The impact of these closures and the contraction of the elevator network on many communities has been significant. In 2000 there were elevators in 685 different communities. This had been reduced to 278 communities in 2020.

### **Railway adaptation**

Starting in the 1980's the Canadian railways moved to reduce the size of their respective networks in Western Canada through a series of abandonments and sales to newly created shortlines.

In 1995 the total rail network was more than 21,000 miles with only a few short line railways in existence. This had been reduced to 19,500 miles by 2000 and abandonments since then have decreased the total miles to 17,300 miles, 2,700 of which are operated by 21 short lines carriers across the prairies. The

reduction of the rail network was made possible largely from the closure of many of the smaller conventional wooden crib elevators across the prairies that were located on branch and grain dependent lines. The consolidation of the elevator network to larger, more efficient elevators in the country, located on or closer to mainlines has had a significant impact on the capability of the railways to move greater volumes of grain more effectively. This has been accomplished through a combination of investments in grain facility and rail line infrastructure and as noted above, the use of incentive rates that encourage grain companies to build larger car blocks and ultimately whole unit train configurations.



Figure 6 - A high throughput elevator at Irricana, AB

The Grain Monitoring Program (GMP <sup>6</sup>) has tracked railway block sizes since 1999 and found that the use of large block configurations has shifted from less than 25% in 1999 to more than 80% in 2020 <sup>7</sup>. (figure 7). The increased loading of larger car block and unit train operations by the railway allows for significant reductions in the number of times a car must be switched in rail yards. The reduced handling of cars has had a positive impact on the velocity of car cycles which have decreased from over 22 days in 1999 to less than 16 days in 2020 <sup>8</sup>.

Another area where improvement has been made most recently are hopper cars that are being built and purchased by railways and grain companies that are replacing the Federal Government fleet which are ending the end of their 50-year lifespan <sup>9</sup>. These newer cars allow for increased loading of more than 12% and are shorter thereby allowing for more cars to be on a train.

### Port and Terminal Changes

The port and port terminal operational practices in 1995 revolved largely around the movement of cereal grains that were under the marketing purview of the Canadian Wheat Board (CWB) who controlled more than 72% of the grain that was moved (1995). Terminals were largely used as a staging ground for sales that would be contracted based on the availability of stocks that were located at port. Hence, the grain handling and transportation system, for the most part, was structured to “push” grain to port where it would be assembled based on the demands of the sales that were being made. In essence, grain companies were warehousing and distribution entities and agents of the CWB for a large portion of their handlings.

The control of vessel priorities and loading was delegated to a central authority, the Canadian Ports Clearance Association (CPCA) <sup>10</sup>. The CPCA would maintain the vessel line up, set the priority and order by which vessels would be loaded, and perform the accounting for volumes that would determine the payments to the port terminal operators on the grain that was handled on behalf of the CWB.

The early 2000’s began to see a change in how the sale and movement of grain was approached. The shifting directional flow of grain and the consequent increased volumes to west coast terminals caused congestion. To correct the issue, terminals, grain companies and the CWB began to organize the movement of grain based on a “pull” system as opposed to the “push” strategy that had been in place for decades before. This required that sales would be planned further ahead of time, then sourced and gathered specifically for the individual sale from producers in the country then directed to specific vessels at port. This required a change in the level of coordination between the country elevator operations, the railways, and the port terminals. This was a change that was not easy at first and took several years to accomplish and continues to be a challenge for all the stakeholders in the grain supply chain.

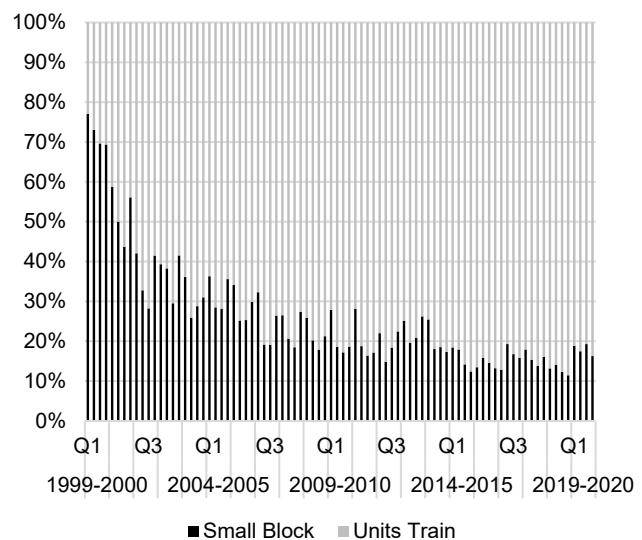


Figure 7- Railway block sizes - small block (less than 100 cars) and large block (more than 100 cars)

To accomplish this massive change port terminals and operation needed to make changes.

In the mid 1990's, vessels loading grain were typically of a size that would load 28,000 tonnes and terminals loaded at an average rate of approximately 500-700 tonnes per hour. Over the past 25 years, the size and capacity of the ocean vessels loading grain has almost doubled. In 2020 the average vessel load is over 48,000 tonnes (figure 8) and are loaded at rates of between 1,500 and 2,300 tonnes per hour. Essentially, terminals can now load a vessel now in the same time it took or faster than one half its size 25 years ago.

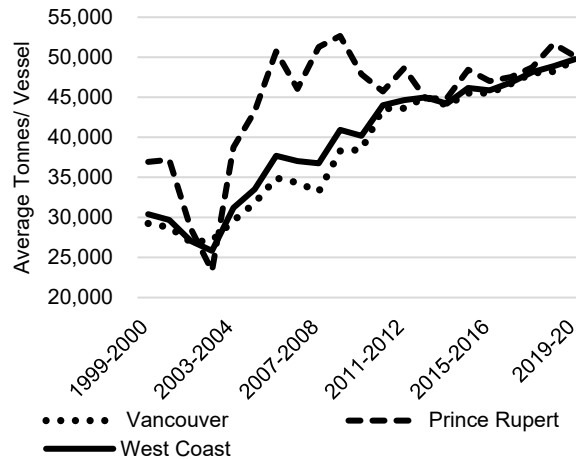


Figure 8- Average load per vessel: 1999-2020

The increased volumes have been aided by significant capital investments at the port terminals: upgrading the ship loaders at three of the terminals; upgrading the railcar unloading facilities at all terminals, replacing the shipping galleries at three of the terminals; expanding the storage capacity at one terminal and making improvements in the overall elevation systems at all the terminals.

In addition, Vancouver has seen the addition of three terminals, one of which went into operation in 2020. The G3 terminal is the first loop track grain terminal in Canada and can handle three trains within the terminal and can unload over 200 cars daily with a maximum vessel loading capability of over 6,000 tonnes/hour. The other two terminals (Fibreco and Fraser Grain Terminal) are planned to come into operation in late 2021.

### The Containerization of Grain

The rapid growth of the global container industry provided an opportunity for some parts of the Canadian grain industry to gain access to markets not previously available to them. Prior to the 1990's grain exported from Canada had traditionally moved to export location in bulk ocean vessels whose capacity would range up to 30,000 tonnes. As global trade was enabled using containers, it brought an increasing number of containers to Canada, which would then be emptied and returned to the place of origin for a return load. That empty capacity could be sold at a reduced rate to exporters looking to gain access to markets that would had been out of their reach as the potential buyers were looking for lot sizes much smaller than what would be economically or logistically conducive to bulk vessel movement.

Many of the offshore markets that were being sold into included small volume buyers who would purchase their product from larger dealers and pay that dealer a premium. Containers then gave them the opportunity to deal directly with a grain processor in Canada who could sell the product in a much smaller lot size, thereby allowing the buyer to reduce his cost by avoiding the dealers premium.

The result has been an increase in the volume of grain exported from Canada in containers. The first available statistic on that volume showed that in 2000 Canada exported 2.5% of its total volume of grain in containers. In 2019 this has increased to 11.5% to the total volume <sup>11</sup>. This has especially benefited the Canadian special crops industry and enabled their growth over the past 25 years.

## **Changes in the Legislative and Regulatory Environment that has supported these changes**

### **Rail Freight Rates**

By 1995 the Crow rate, initially put in place between the Federal Gov't and CP Rail in 1897 and formally enacted into legislation in 1927, was abandoned in 1983 and replaced with a structured rate scale controlled by the Western Grain Transportation Agency (WGTA). The WGTA was responsible for oversight of the transportation of grain in Western Canada and coordinated and managed the allocation of cars, coordinated the activities between the railways, grain companies and the CWB and reported regularly on all aspects of the movement of grain in the west. The WGTA was in place until 1996 when it was replaced by the Western Grain Transportation office whose role was much reduced with the coordination of activities shifting to an industry-based oversight committee and car allocation moved under railway control.

The passage of the Canada Transportation Act in 1996 saw that railway freight rates continued to be regulated. The newly created Canadian Transportation Agency (Agency) was mandated with setting the rates that would ultimately be paid by the farmer, although this would now reflect the full – rather than just partial – cost of railway transportation. Based on distance, this became known as the Maximum Rate Scale. Since these rates were set by the Agency, pricing again remained outside of the carriers' own purview.

The winter of 1997 brought extreme cold temperatures, heavy snowfall for an extended period. This severely impacted railway performance and led to a service level complaint being submitted to the CTA by the CWB on behalf of farmers. The railways ultimately were found responsible of favouring other market segments over grain and were made to pay significant penalties to the CWB. This also led to a Royal commission of inquiry in 1998 which was led by Justice Willard Estey followed by a review and examination of the Estey Inquiry results by Arthur Kroeger who was to make recommendations on policy and legislative changes to address the issues that had arisen through the inquiry.

Based on the recommendations made by Kroeger, along with changes in the competitive and operational environment, railways called for greater regulatory freedom. The tentative steps in this process came in 2000 because of the regulatory reforms put forward under amendments to the Canada Transportation Act. Chief among these was the replacement of the Maximum Rate Scale. Henceforth, the railways would assume full responsibility for the setting of the freight rates applicable on Western Canadian grain, but any escalation would be subject to a regulatory limit that essentially contained – or “capped” – the rates CN and CP could charge from the overall movement. Although the transition to the new Maximum Revenue Entitlement (MRE) allowed the railways to set their own freight rates, they initially extended the mileage-based Maximum Rate Scale system that had prevailed since 1996<sup>12</sup>. In the MRE's first few years of operation, these rates were adjusted for little more than inflation.

It should be emphasized what the MRE is and what it is not. The MRE is not a “cap” on the revenue that a railway can earn but rather, it is a dynamic revenue regulating mechanism that limits the absolute amount that railway can increase its rates each year. Adjustments are made for any increase or decrease in a carrier's average length of haul. Railway costs related to the movement of grain are reviewed annually by the Agency and adjusted for inflation. Those unit costs are factored against total revenues through the Volume-Related Composite Price Index (VRCPI) which also declines in the event of cost reductions<sup>13</sup>. The result is a statutory limit on the amount a prescribed railway can increase the rates applied to the movement of regulated grain from western Canada to an export position in Western Canada. It applies to the rates and revenues earned by CN and CP affecting all export shipments from western Canada handled through the west coast ports, and Thunder Bay. It does not place a limit on the volume of grain handled by the railway but rather, it provides for a proportional gain in compensation when traffic volumes increase, and a proportional reduction when it declines.

There have been only a few changes to the MRE over its 20 years, but in 2018 the Canadian Government, through the Transportation Modernization Act, made two that had significance. The first was to split the application of the VRCPI individually for each railway. The original practice was to calculate each railway's applicable cost changes and then blend them into one that would be applied equally to both railways. The result would then be any cost improvement or specific grain related investment by one railway would be shared with the other. Splitting the VRCPI has then given greater incentive to each railway to increase their investments such that it will impact only them in the application of the annual VRCPI. The second adjusted how investments would be handled in the calculation of the VRCPI. These changes have incited the railways to invest heavily in the purchase of new larger, more efficient hopper cars, a benefit already being felt in the industry.

After 20 years the MRE, while the subject of some criticism, has generally been a preferable approach to rate regulation as it allows the railways to price their rates differentially, allowing for adjustments that recognize seasonal changes, corridor and commodity variations, car type and size, and loading and unloading configurations. Both railways and the grain industry have benefited by its use in that the industry has been able to sustain consistent growth and the railways are now making increasing margins on the business. Rail revenues over the term of the MRE have increased by 136% on a volume increase of 76%.

While at the inception of the MRE in 2000 it was expected that railways would always fall below the MRE, the past 10 years has shown the opposite as the railways have consistently been only slightly above the MRE<sup>14</sup>. As a testament to their analytical capability the difference over that period has been less than \$10 M, or 1% of the total revenues.

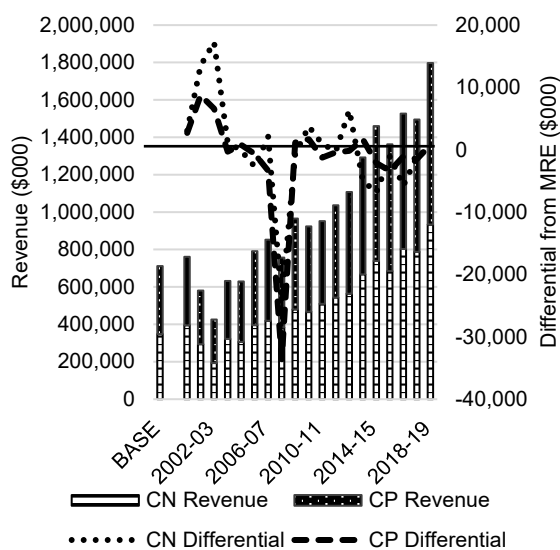


Figure 9 - Railway Western Grain Revenues during the MRE vs. differential to MRE

### The elimination of the CWB's marketing mandate in 2012

In 1995 the CWB controlled and managed the marketing and sales of 73% of the total crop production in Western Canada. Over the next 17 years the crops produced started to shift as other grain commodities gained in value and popularity, most significantly canola and pulse crops. By 2012 a portion of the seeded acreage in Western Canada had shifted to other types of grain and the CWB controlled the marketing of only 57% of the total crop production<sup>15</sup>.

A long running debate between factions in the grain industry ended in 2012 when the Federal Government eliminated the CWB single desk mandate for the marketing of wheat, durum and barley. That change enabled grain companies to take over the purchase of all grain in the country, the marketing of that grain and all related logistics of the movement to destination. As noted above, the CWB control over this portion of the Canadian grain markets placed grain companies in a position of agent and service provider. The consequence of that constrained their ability to control the management of their assets in both the country and port terminal operations. It also put limits on who and where producers could sell their products to. With those constraints lifted, the industry moved forward with operational changes.

Grain Companies moved forward with completing the shift to a “pull” logistics approach, and established marketing desks to handle the wheat, durum, and barley crops. Management of the logistics of grain movement became more efficient with the grain companies now having complete control over the management of their assets in the country and at port. Producers, who were limited in how they sold their grain were now working at gaining a better understanding of how the marketing system worked and how to best manage themselves in the new environment. Ultimately, new investment in the system began to flow at an unprecedented level with new elevators, increased storage, and improvements to the efficiency of the port terminals<sup>16</sup>. It also brought new players to the industry both foreign and domestic<sup>17</sup>. The CWB was sold to a consortium<sup>18</sup> who have moved into the grain marketing and handling industry as a competitor.

The move to eliminate the CWB single desk was not an entirely smooth change and was not favoured by some parts of the industry and continues to the subject of debate to this day by a smaller faction of the producer community. There have been some growing pains along the way, most of which have been resolved. In most of the stakeholder’s opinion, it has been a positive move for the industry, one that has provided the system with the capacity to meet the overall growth in volumes that have evolved over the past 25 years.

### **Summary**

The past 25 years have seen dramatic changes, from the way grain is marketed and sold to how it is moved and where it is sold to. It has brought about a higher level of efficiency to the movement of grain unprecedented in our country’s history, allowing for successive volume records to be set over the past 5 years.

Yet there will always be a need for continued improvement. Canada is unique in its position in the global grain industry in that it is furthest from the global markets it sells to, has the longest haul from point of production to export position (ports) and deals with the harshest geographic and climatic conditions of any of its competitors. Failures in the delivery of product over the years have hurt Canada’s reputation as a reliable supplier. In short, if Canada is not the best in the world at moving grain to its destination, we cannot adequately compete.

The Western Canadian Grain Handling and Transportation System has always been about an intertwined relationship between the producers, the grains companies, and the railways, fraught with competing interests and objectives. The resulting confrontations have at times made the relationships between the parties less than optimal. This has been the history of the GHTS for over 120 years. With over 95%<sup>19</sup> of all grain moving to either its destination or to port position by rail, railways are most often the subject of this consternation. With repeated periods of railway service issues due to a multitude of factors, they are the object of the industry pressing the Government for more and greater shipper protection legislation and regulation. While some actions and initiatives have been put in place over the past 25 years to improve shipper remedies to railway service issues, many shippers remain unsatisfied with the options available to them and continue to press Government for action.

It is inevitable that the consternation between stakeholders in the GHTS will continue far into the future as it has for the whole of the industries more than 120-year history. This should not be viewed in a negative light however, as it is likely it is the impetus for what has driven the great changes that have been realized, particularly over the past 25 years.



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## Endnotes:

<sup>1</sup> Source - Our World in Data/ United Nations data source

<sup>2</sup> Source – World Bank

<sup>3</sup> Grain Monitoring Program (GMP) data warehouse (measure 3A-1) : sourced from Statistics Canada.

<sup>4</sup> Increases in production vs export – GMP Data Warehouse (measures 1A-1 & 2B-1)

<sup>5</sup> Elevator facilities from GMP data extracted from CGC licensed facilities (measure 3A-1)

<sup>6</sup> Grain Monitoring Program (GMP) – The GMP is a program established in 2001 by the Federal Government of Canada. It is an independent monitor of the grain handling and transportation system of grain in Western Canada. The Monitor is responsible for gathering detailed data on the movement of grain from the farm through to its destination in Canada or the US, analysing that data and the performance of the stakeholders within it and reporting those findings to Government and the industry. Quorum Corporation has been managing the program since its inception and the author of this paper is the managing principle of the program. As such much of the data in this report referring to the GMP is used, has been verified as correct and does not betray any commercial confidences of the grain industry stakeholder community.

<sup>7</sup> GMP data warehouse: Western Canadian Railway Infrastructure (measure 3B-1)

<sup>8</sup> GMP data warehouse (measure 5B-1): A car cycle is the time measured from when an empty car is placed at a country elevator for loading through to the destination and returned back to the country empty.

<sup>9</sup> The Federal and Provincial Governments (Alberta and Saskatchewan) in an initiative to improve the grain handling system in the 1970's and 1980's purchased more than 18,000 hopper cars that were dedicated to the movement of Western Canadian grain.

<sup>10</sup> The Canadian Ports Clearance Association was a non-profit entity that handled the vessel loading in both the Ports of Vancouver and Thunder Bay. It was staffed by permanent employees of the association and overseen by a broad based Board of Directors with membership from a broad base of grain industry stakeholders (grain companies, port authorities, ship owners etc.). It was in place from early 1900's until it was disassembled in 2012 concurrent with the end of the CWB marketing mandate.

<sup>11</sup> Container traffic: GMP Data Warehouse and Quorum Corporation Analysis on container movement (2009 revised in 2020) (<http://www.grainmonitor.ca/Downloads/SupplementalReports/ContainerUseWesternCanada.pdf>)

<sup>12</sup> The Maximum Revenue Entitlement targeted carrier revenues to a level 18% below those that had been estimated without any reform coming into effect on 1 August 2000. The MRE has specific annual limits for both CN and CP, which are adjusted each year by the Canadian Transportation Agency to reflect changes arising from inflation, the actual grain tonnage moved, and the average distance over which it was moved.

<sup>13</sup> The calculation of the VRCPI is performed by the CTA and reviews a series of cost components and their variance from the previous year. Railways submit their costs at the year end for review and the CTA calculates the individual component costs with the index calculated using the total of the cost variances. For example, fuel costs will vary year to year based on the average price through any given year. That variance is factored into the total VRCPI.

<sup>14</sup> MRE data from CTA and GMP Data Warehouse (measure 4C-3)

<sup>15</sup> Grain production: from GMP data warehouse (measure 1A-1 and Quorum report on Traffic, Marketing, and Logistics Changes - 1980-2010 (<http://www.grainmonitor.ca/Downloads/SupplementalReports/TraffMktLogChanges1980-2010.pdf>)

<sup>16</sup> Investments and expansion – GMP and Quorum Analysis (as reported in Annual Reports from 2013 – 2020)

<sup>17</sup> A number of companies have entered the Canadian market since 2012: Grains Connect (a joint venture between Grain Corp of Australia and Zen-noh grain of Japan), Scoular (US), Ceres Global Ag (a Canadian-US consortium) have all invested and built or bought facilities in Western Canada

<sup>18</sup> G3 was created as a consortium of Bunge Grain and Saudi Agricultural and Livestock Investment Company (SALIC) who purchased the assets of the former Canadian Wheat Board with the intent of expanding as a full service grain company in Canada.

<sup>19</sup> Railway portion of total movement from GMP measures 2B-19 (Rail Movements) and 2D-1 (Truck movements to US)