Profile of Short Line Railroads in High Grain Production States

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INTRODUCTION

The Central Plains region leads the nation in many areas of agricultural activity. In terms of total production of corn, wheat, sorghum, and soybeans, Iowa leads the nation followed by Illinois, Nebraska, Minnesota, and Kansas. Because many locations in these states are remote from markets and processing centers they are somewhat dependent on railroads for transport of their grain.

After deregulation in 1980 the Class I railroads adopted a cost reduction strategy that involved the sale or lease of their branch lines to short line railroads. Today, in the eight leading states in wheat production, short lines collectively account for about one-third of the total track miles in that region. These short lines provide rail service to many rural shippers whose access to rail service might otherwise have been lost. Abandonment has several potential negative effects on rural areas such as lower grain prices received by farmers, higher transportation costs and reduced profits for rail shippers, loss of market options for rural shippers, foreclosed economic development options in rural communities, and higher road maintenance and reconstruction costs.

This paper analyzes how changes in the grain logistics system have affected short line railroad viability. For example, how have Class I shuttle trains impacted the role of short lines in the grain logistics system? Alternatively, how has the development of multi-short line holding companies affected the competiveness of short lines relative to motor carriers?

Short lines play a critical role in originating and terminating grain transported by rail and promoting economic development along these lines. Particularly important is providing rail service to rural America and its link to the Class I rail network. In the decade following the passage of the Staggers Rail Act in 1980, more than 250 short lines were formed, adding to the approximately 220 short lines that existed as of 1980 (Llorens and Richardson 2014). Today, 562 short lines are operating (AAR 2016).

Definition of Short Lines

Three classes of railroads are designated by the Surface Transportation Board (STB) based on their operating revenue. In 2015, Class I railroads had $457.9 million or more. Class II railroads had $36.63 million or more but less than the Class I threshold. Class III railroads had less than the Class II minimum. These thresholds are adjusted annually for inflation (AAR 2016). All switching and terminal railroads are Class III.

The AAR identifies two groups of non-Class I railroads based on revenue and mileage characteristics. Regional railroads are line-haul railroads below the Class I revenue threshold operating at least 350 miles of road and earning at least $20 million in revenue or earning revenue between $40 million and the Class I revenue threshold regardless of mileage operated. Local railroads are line-haul railroads below the regional criteria as well as switching and terminal railroads (AAR 2016).

Objectives

The overall objective of the paper is to assess the state of the short line industry and its role in the grain logistics system, including who they are, where they are, and what agricultural products they

ship in what amounts in major grain corridors. Specific objectives are to identify the key factors that determine short line success or failure, compile a profile of a successful grain oriented short line railroad, identify infrastructure needs such as the ability to handle 286,000-pound GVW railcars, and trace the history of short line railroads since the Staggers Act.

Methodology

The methodology involves personal interviews and surveys of short line railroad executives and state departments of transportation (DOTs) rail personnel. The sample includes the states listed in Table 1. They were selected on the basis of large crop production and geographic diversity. They include Iowa, Illinois, Nebraska, Minnesota, Kansas, South Dakota, Indiana, North Dakota, Ohio, Missouri, Wisconsin, Texas, Michigan, Montana, Oklahoma, Idaho, and Washington. There is at least one agricultural oriented short line in each of these states. In some cases, a short line will own other short lines, so all together the sample includes 47 agriculture oriented short lines (i.e., Class II and III railroads).

Table 1: 2015 Ranking of Crop Production*
(thousands of bushels)

State	Production	Rank
Iowa	3,060,080	1
Illinois	2,593,816	2
Nebraska	2,067,816	3
Minnesota	1,903,834	4
Kansas	1,332,270	5
South Dakota	1,157,659	6
Indiana	1,114,680	7
North Dakota	950,803	8
Ohio	767,940	9
Missouri	663,885	10
Wisconsin	600,930	11
Texas	524,890	12
Michigan	472,795	13
Montana	238,738	14
Oklahoma	167,865	15
Idaho	160,120	16
Washington	128,805	17

*Includes corn, wheat, sorghum, and soybeans

Source: U.S. Department of Agriculture, National Agricultural Statistics Services. *Annual Statistical Bulletin*.

In the summer of 2016, personal interviews of short line personnel were conducted in the states of Kansas, Oklahoma, Missouri, Arkansas, Nebraska, Iowa, and Illinois. Nearly all the railroads interviewed completed a detailed survey. The rest of the sample short lines were contacted by phone and most of them completed the survey. The survey (available upon request) has five parts, which are General Questions, Traffic by Commodity, Equipment, Markets and Competition, and Short Line Success Profile.

Short line state DOT personnel of the 17 states were contacted by phone and nearly all of them completed a separate survey that included questions on the characteristics of the state short line assistance programs, eligibility requirements, benefits and costs, and the impact of short line assistance programs on short line profitability and rural economic development (available upon request).

THE STRUCTURE OF THE U.S. SHORT LINE RAILROAD INDUSTRY

Short line railroads (Class II and III railroads) have grown from 8,000 miles of track in 1980 to 47,500 miles in 2017 (ASLRRA 2017). In 2015 there were 24 Class II railroads and 579 Class III railroads (ASLRRA 2017, p. 12) that transport aggregates, chemicals, coal, lumber, paper, metal products, motor vehicles, petroleum products, and trailers and containers. Grain and food products rank second in 2015 short line carloads with slightly more than 1 million carloads, 12% of total 2015 carloads (ASLRRA 2017, p. 11).

The most significant change in the short line industry has been the consolidation of the Class III railroads under the control of holding companies. In 2014 there were 27 holding companies that control nearly 270 short lines (Federal Railroad Administration 2014). Holding companies have geographic and commodity diversity resulting in a lower risk of default on loans. Holding companies have relied on multiple sources of funds to finance infrastructure projects. Holding companies say there are still investments to be made particularly the upgrade of track to handle 286,000-pound rail cars as well as repair and replacement of bridges. Thus the consolidation trend is likely to continue.

LITERATURE REVIEW

Most short line railroad research in the last 20 years focuses on the economic benefits of short line railroads and the difficulty they face in maintaining their tracks and bridges.

Resor et al. (2000) conducted a study on the effects of 286,000-pound railcars on the U.S short line and regional railroad system. The objectives of the study were to estimate the amount of short line and regional railroad trackage that met minimum standards for the use of heavy axle load (HAL) rail cars, and to estimate the investment in components required to bring the entire short line and regional railroad system up to the minimum standard.

Resor et al. (2000) developed a survey of track conditions and characteristics for the U.S. short line and regional railroad industry. A questionnaire was sent to all American Short Line and Regional Railroad Association members and 46 railroads responded.

The study found that the U.S. 50,000-mile short line and regional railroad system would need 10,000 miles of new rail and 20 million ties to bring the entire system up to minimum standard. The total cost to upgrade the system to handle HAL cars was estimated at $6.80 billion.

The Casavant and Tolliver study (2001) was designed to provide information on the potential impact of 286,000-pound railcars on light density track and short lines railroads in Washington state. The study assessed the likelihood of heavier cars being used, and it examined the condition of the track in the state. The study included technical analysis using railroad track models, and it was determined that 90 pounds per yard rail may perform marginally at slow speeds if there is good tie and ballast support. The authors concluded that 480 miles of track would need to be upgraded to handle the 286,000-pound rail cars at a cost of between $250,000 and $300,000 per mile with the total cost ranging from $117 to $140 million.

Bitzan and Tolliver (2001) discuss the economics of heavy covered hopper cars. The authors performed simulations of HAL cars to determine what track weight would handle HAL cars. Engineering equations were used to simulate track performance for light rail and for heavier rail. The authors found that any track of less than 90 pounds per yard to be inadequate for HAL rail car traffic.

Bitzan and Tolliver (2003) provided insights into specific areas where abandonment was likely to occur. Abandonment was treated as a result of inability to handle 286,000-pound rail cars and insufficient returns from investment in track upgrades. The study modeled a railroad's decision to upgrade as an investment decision. A firm will invest in a project as long as the internal rate of return to the project exceeds the return available from alternative investments. The investment decision approach to line upgrading was a unique aspect of this study.

The authors concluded that railroads were unlikely to upgrade a short line with traffic of less than 200 cars per mile. However, the study also discussed alternatives to abandonment. Longer term financing may allow short lines to upgrade track with traffic density of 150 cars per mile. They said increased revenue splits with Class I railroads and partial subsidies in the amount of avoided highway damage would also provide greater incentives to upgrade track.

Martens (1999) examined the effects of 286,000-pound rail cars on U.S. short line and regional railroads. He developed a 16-question survey, which was sent to 88 railroads with 39 being returned. The survey requested information on the amount of track miles likely to be closed or upgraded due to the use of HAL cars. It also requested the effects of HAL cars on train speed and how shippers would be affected. In addition, Martens (1999) analyzed the impacts of rail line abandonments attributable to the use of HAL railcars.

The study found that 38% of the U.S. short line rail system was incapable of handling 286,000-pound rail cars even at the slowest operating speeds. It was also determined that the average track upgrading cost for lines, which would otherwise be abandoned due to increased use of HAL cars, would be $118,662 per mile.

Babcock and Sanderson (2006) published a study titled, "Should Short Line Railroads Upgrade Their Systems to Handle Heavy Axle Load Cars?" Motivated by lower costs per ton-mile, U.S. Class I railroads have been replacing 263,000-pound covered hopper cars with 286,000 pound cars. In many cases, short line railroads would have to upgrade their tracks and bridges to handle the heavier cars. The authors used rate of return analysis for a sample of U.S. short lines to determine if short line owners will likely upgrade their infrastructure or abandon the railroad. Analysis revealed that the total cost to upgrade 1,583 miles of mainline track and 1,352 bridges of five short lines in Kansas was estimated to be $308.7 million. None of the short lines in the analysis can earn an adequate rate of return on upgrading track and bridge investment. If the short lines in the study are abandoned, the annual road damage cost will increase by over $58 million.

The Iowa Department of Transportation study (2002) was motivated by the state's recognition of the need to assess the potential magnitude of rail line abandonment due to increasing use of HAL railcars. An important aspect of the study was the physical inspection of 97% of the short line track in Iowa. Track information such as weight and general condition was recorded during the inspection. Data were collected on the number of good ties per 39 feet of rail length and depth and condition of ballast. Tables from Resor (2000) were used to evaluate track components, and necessary upgrading costs were calculated using material and labor costs from railroads.

The minimum short term cost reflected immediate needs utilizing "marginal" rail and upgrading of ties and ballast to an "OK" status. The minimum short term upgrade cost was estimated at $117,000 per mile or a total of $297 million for the state. The study also determined a long-term cost of $154,000 per mile.

Sage et al. (2015) develop an inventory of short line rail infrastructure that can be used to support a data-driven approach to identifying rail system needs. The study provided an inventory of existing infrastructure conditions on short line railroads in Washington state. It developed a detailed preliminary estimate of the total investment needed to bring the system up to modern industry standards. The study contained case studies highlighting the role short line railroads and regional transload centers play within the state's regional economies. The study provided a review of funding strategies employed by other states to support short line railroads.

Sage et al. found that more than 55% of all short line miles within Washington are not able to efficiently handle 286,000-pound rail cars. Overcoming this deficiency would require infrastructure investments of about $610 million. The authors said that this need exceeds the current funding support by the state even if considered over a 20-year horizon with private industry and/or local jurisdictions providing significant matching funds. These authors also found that much of the existing short line system in Washington doesn't meet the state's current or future capacity and velocity needs for efficient operations. Productivity and safety of the system suffers from deferred maintenance. For example, over 55% of the short lines' road miles are less than 112-pound rail, the recommended weight to efficiently operate 286,000-pound rail cars.

Jared Llorens and James A. Richardson (2015) assess the economic role and impact of short line railroads in the state of Louisiana in "Economic Impact of Short Line Railroads." According to the authors, short line railroads are small but significant components of the state's business connections. They describe the scope and presence of the 11 short line railroads currently operating in Louisiana paying attention to their role in facilitating the transportation of goods to and from Class I railroads. Next they provide a detailed description of the broader economic contribution of short line railroads focusing on employment levels and industries served as well as estimates of the economic impact of the short line railroads on the state and selected regions of the state.

The authors found that short lines account for about 1,821 direct and indirect jobs in the state. They found that short lines directly support the state's leading industries (agriculture, oil, and gas), which represent the major drivers of the state's overall economy. These major industries support over 260,000 jobs or close to 15% of all jobs in the state. Also these core industries create the opportunity for other businesses to be successful. Also they discuss short line policies that should be considered by Louisiana. These would include (1) state rehabilitation grants, (2) state loan programs, and (3) state loan/grant hybrid programs.

The U.S. Department of Transportation, Federal Railroad Administration examines short line capital needs and government assistance programs in *Summary of Class II and Class III Railroad Capital Needs and Funding Sources (2014)*. The report says short line railroads have relied on state and federal programs to invest in infrastructure and maintain facilities. Many states have robust programs to assist short line railroads. At the federal level, short lines can access loans through the Railroad Rehabilitation and Improvement Financing (RRIF) program. Also, the Transportation Infrastructure Generating Economic Recovery (TIGER) Program has a competitive grants program. The 456 tax credit is another federal assistance program. The report notes that many states have implemented short line railroad assistance programs that provide low interest loans and grants to improve service, upgrade tracks and bridges, and add capacity. Local benefits of the assistance programs include increased farm and business opportunities, shipper cost saving, and avoided business closures.

Qiao et al. authored *Transportation and Economic Impact of Texas Short Line Railroads* (2010). The authors sent survey invitations to 43 Texas short line railroads, and 20 responses were received. The software IMPLAN was used to measure the economic impact of short line railroads at both the state and county levels. A transportation impact analysis was conducted to estimate the cost by rail and the cost by truck. Shipping cost, safety cost, maintenance cost, highway congestion costs, and emission cost were calculated in the analysis. Results indicated that, on average, the shipping cost of a short line is 7.5% less than truck. The total transportation cost of short lines is 24.3% less than that of truck. The estimation also shows that the operation of 14 surveyed short lines took 417,177 trucks off Texas highways in 2015. The economic impact analysis results indicate that, at the state level, the operation of short line railroads in Texas contribute about 1,416 jobs, $113,769,627 in labor compensation, and $354,443,588 in economic output.

The report also found that Texas short lines have substantial infrastructure needs. The need for more state funding was mentioned by several railroads during the survey and interviews. As Texas short lines play a significant role in the state economy, there is a necessity to establish assistance

programs for short lines to help maintain and improve the existing infrastructure according to the authors. However, most Texas short lines do not have sufficient revenues or access to the large amounts of capital necessary to rehabilitate their infrastructure. Track and bridge conditions often cause short lines to operate at minimal train speed, which reduces operating efficiency and limits their ability to attract new business to the line.

FEDERAL AND STATE SHORT LINE FINANCIAL ASSISTANCE PROGRAMS

Many short lines have deferred maintenance but not enough revenue to fund it. Given the significant public benefits of short lines, the federal government and many states have instituted financial assistance programs to help them develop their infrastructure. Many states have short line assistance programs with the goal of ensuring transportation options and maintaining a balanced transportation program.

Federal Programs

Since 1998, the RRIF program has provided $70 million in loans to Class II and III railroads (Sage et al. 2015). The act and its amendments provided loans to improve or rehabilitate intermodal facilities and railroad equipment of Class II and III railroads.

In 2009, the American Recovery and Reinvestment Act (ARRA) was passed. It is more commonly known as Transportation Investment Generating Economic Recovery (TIGER). TIGER grants are typically used to leverage other funds for larger projects (Sage et al. 2015).

In 2004, a federal short line tax credit, commonly known as a 45G, was passed to enable and encourage private investment in rail line rehabilitation. The 45G is a federal tax credit for up to 50% of track maintenance and qualified infrastructure expenses. The credit is allowable up to the product of $3,500 by the sum of the number of miles of railroad track owned or leased and the number of miles assigned to the taxpayers by a Class II or III railroad (Sage et al. 2015, page 25).

State Programs

State assistance to short lines can be classified into three categories: (1) rehabilitation grants, (2) loan programs, and (3) loan/grant hybrid programs. The first awards funds on a competitive basis for capital improvements that directly benefit economic development interests (Llorens and Richardson 2014). This would include construction of a new line, existing track upgrades, or construction of rail yards.

State loan programs are intended to provide financing alternatives for short line railroads where there may not be viable financing for capital improvements. This would include rail track upgrades, as well as purchasing or rehabilitating rail equipment necessary to maintain essential rail service.

Loan/grant hybrid programs combine elements of both grants and loans. While the state programs differ in form, they all support the goal of maintaining a viable short line network in their state, given the challenge of handling 286,000-pound railcars (Llorens and Richardson 2014). Questions 1 and 2 of the DOT survey (available upon request) deals with the characteristic and eligibility requirement aspects of short line assistance programs of the sample states with the exception of Nebraska, South Dakota, and Texas, which do not have assistance programs for short lines.

COSTS, BENEFITS AND RURAL ECONOMIC DEVELOPMENT IMPACTS OF STATE SHORT LINE ASSISTANCE PROGRAMS

Questions 3 and 4 of the survey deals with the economic effects of the state short line assistance programs. A sample of the responses included Idaho, Iowa, Kansas, Minnesota, and North Dakota.

According to Idaho DOT, the primary benefit of the assistance programs is facilitating the short line railroad's ability to upgrade aging tracks while maintaining profitability with low profit margins. In particular, the track upgrades have enhanced the short line's ability to connect to the Class I railroad in southern Idaho.

The Idaho assistance program allowed the short line to upgrade tracks and make essential connections to Class I railroads in Idaho that had a positive effect on the railroads' profitability. This allowed the short line to serve the agricultural community in the region.

According to Iowa DOT, some short lines have made improvements to encourage business development, increase yard efficiency, and improve resiliency in the event of future flooding that they may not have been able make without the Railroad Revolving Load and Grant (RRLG) program funding. Several short lines have made good use of the funding, creating opportunities for rural economic development while increasing revenue. Other short lines have been able to increase the level of service to customers with yard or line improvements.

Kansas DOT rail officials said the short line railroad assistance plan has had many benefits, including continued rail service (lines that would have been abandoned were not), improved customer service (car turn time improved service schedule). Other benefits include improved operating efficiencies (increased operating speeds, improved use of crew time, and removal of slow orders). It also increased rail carloads, resulting in fewer trucks on the highways and reduced highway maintenance costs. The Kansas State Rail Service Improvement Fund (SRSIF) has improved short line profitability through improved operating efficiencies, which allows the railroads to put additional funds into their capital maintenance programs.

The SRSIF has had a positive economic impact on rural economic development in that short lines that may have been abandoned were not. Service continued, providing rural shippers a more cost effective shipping method for both outbound and inbound carloads.

According to Minnesota DOT rail program officials, the typical benefits of rail rehabilitation projects are decreased travel time, resulting in decreased costs for customers. Additional benefits include decreased railroad maintenance costs. Also, if a rehabilitation project increases the maximum rail car weight that can be shipped on the line, additional operating efficiencies can be realized and passed on to shippers. Another benefit is decreased wear and tear on highways if highway shipments are diverted to rail, or if existing shipments on rail stay on rail because of more competitive rail service.

The Minnesota officials pointed out that many small communities have medium-sized businesses that are rail dependent to both ship and receive goods. The loss of rail service would be detrimental to these businesses because the high cost of other modes may be unsustainable. The Minnesota Rail Service Improvement Plan (MRSIP) program provides short lines with financing tools to improve rail service and, in some cases, prevent rail lines from embargo due to track condition and capital needs. Often, the availability of such financing tools is either absent in the private market or the cost is unrealistic for the viability of the line.

The Wisconsin DOT rail program personnel said that Wisconsin has a program, the Freight Railroad Preservation Program, which is a grant program that provides up to 100% funding for line acquisition and up to 80% funding toward the cost of rehabilitation of publically owned lines to preserve essential rail service.

The FRPP has benefitted Wisconsin by facilitating rehabilitation of rail lines and preserving essential rail service. It has resulted in a broad array of improvements to the rail system, such as rail-related projects like loading and transloading facilities.

According to Wisconsin DOT rail program personnel, Wisconsin programs are designed to provide capital that enhances transport efficiency. Thus, the assistance programs succeeded in preserving freight railroad lines that are economically feasible. The program reduces the cost of capital for facilities, thus improving their profitability and reliability in servicing the shippers. Since 1980, if measured by gross carloads and carloads per mile, the number and size of shippers on assisted lines have grown substantially.

RESULTS OF THE SHORT LINES AND AGRICULTURE SURVEY

The principal data source for this study is the survey administered to 47 short line railroads (Class II and III railroads). A few railroads had incomplete surveys, but additional information to complete the survey was obtained for the railroads that were visited on-site in the summer of 2016. The personal visits occurred in Kansas, Missouri, Arkansas, Oklahoma, Nebraska, Iowa, and Illinois. The survey contains five parts which are:

- Part A – General Questions
- Part B – Traffic
- Part C – Equipment
- Part D – Markets and Competition
- Part E – Short Line Success Profile

Results – Part A

Part A contains general information about the agriculturally oriented railroads. Part A requests the following information:

- When did the railroad begin operating?
- Employment?
- Ownership?
- Route miles?
- How many track miles can handle 286,000-pound rail cars?
- Connecting railroads?
- Received state government financial assistance?
- Received federal government financial assistance?

Table 2 contains the results for initiation of operations. As indicated by the data in Table 2, about 42% of the sample railroads began operating in the 1990s. The 2000s accounted for about 29% and the 1980s for about 27%. Therefore, 98% of the sample railroads began operations after the Staggers Rail Act was passed in October 1980.

Table 2: Decade of Start of Operations of Agriculture-Oriented Short Lines

Decade	Number of Railroads	Percent of Total
2000s	12	29.3
1990s	17	41.5
1980s	11	26.8
1970s and earlier	1	2.4

Employment per railroad varies from two to 1200. The top nine accounted for nearly 70% of the total employment. The top railroad alone had nearly 30% of total sample railroad employment. Railroads with 100 employees or more together accounted for 44.2% of total sample railroad employment of 4,038.

Table 3 contains track mile data and miles of track capable of handling 286,000-pound rail cars. The track miles of the sample short lines vary widely from a low of 29 to a high of 937. A total of 14 railroads said that 100% of their track miles are capable of handling HAL (heavy axle load) railcars, i.e., 286,000-pound cars while only five railroads said that none of their track miles can support the heavier cars. For 39 short line sample railroads, total track miles are 11,094 while track miles capable of handling HAL cars is 7,358, or 66.3% of the total miles.

The higher the number of connections, the greater the revenue since the short line would have access to more Class I railroad equipment and access to more markets. Also the greater the number of connections the greater bargaining leverage over revenue splits with Class I railroads. A total of 10 of the 41 sample railroads have connections to one railroad and are thus "captive" to the connecting railroad. However, the mean number of connections is about three.

Of 42 sample short lines, 28 reported that they received state assistance in the last five years, and 14 reported that they had not received state assistance. A total of 25 short lines reported that they received federal assistance (mainly 45G tax credits) and 17 said they had not received federal assistance in the last five years.

Results of Short Line and Agriculture Survey-Part B

This section provides agricultural-related traffic by commodity, which are:

- Originated-agricultural-related traffic that originates on your railroad and terminates on another railroad.
- Terminated-agricultural-related traffic that originates on another railroad and terminates on your railroad.
- Local-agricultural-related traffic that originates and terminates on your railroad.
- Overhead-agricultural-related traffic handled by your railroad but which originates and terminates on other railroads.

Table 3: Percent of Total Track Miles That Are Capable of Handling 286,000-Pound Rail Cars

Total Track Miles	286,000 Miles	Percent
937	875	93
904	159	18
850	850	100
802	802	100
600	555	93
576	391	68
561	82	15
512	273	53
433	24	6
400	350	88
359	324	90
356	205	58
347	0	0
300	300	100
276	276	100
265	178	67
253	180	71
250	159	64
237	0	0
221	221	100
155	155	100
147	4	3
143	143	100
135	0	0
130	130	100
122	122	100
104	93	89
94	94	100
87	87	100
87	75	86
68	68	100
63	32	51
57	57	100
56	32	57
53	15	28
44	44	100
40	3	8
38	0	0
29	0	0
Grand Totals:		
11,094	**7,358**	**66.3%**

2015 Originated Carloads by Commodity

Table 4 displays the top nine 2015 originated commodities in terms of carloads. Of course the sample short lines ship many more commodities than those in Table 4, but these nine were largest commodity groups shipped by the 47 sample short line railroads. Table 4 also shows the percentage distribution by the nine commodity groups. As indicated by the data in Table 4, corn, soybeans, and wheat collectively accounted for about 80% of the top nine commodity groups.

Table 4: 2015 Originated Carloads by Commodity

Commodity	Carloads	Percent of Total
Corn[1]	116,298	42.6
Soybeans[2]	57,668	21.1
Wheat[3]	46,380	17.0
Ethanol & DDGs	40,061	14.7
Durum Wheat	4,467	1.6
Sorghum	2,657	1.0
Molasses and Sugar	2,520	0.9
Barley	1,921	0.7
Canned and Frozen Vegetables	1,345	0.4
Total	273,317	100

[1] In addition to corn the figure includes corn oil, corn syrup, corn gluten feed, corn starch, corn germ, and wet corn milling.

[2] In addition to soybeans the figure includes soybean meal, soybean oil, soybean cake, soybean flour, and soybean flake.

[3] In addition to wheat the figure also includes wheat flour.

2015 Terminated Carloads by Commodity

Table 5 summarizes the short line terminated traffic for the top six commodities. Table 5 also contains a percent distribution among the top six. Corn accounts for 46.1% of the total top six carloads. Corn, fertilizer, and wheat account for almost 90% of the top six commodity carloads. The total terminated traffic of sample short lines was 54,584 carloads.

Table 5: 2015 Terminated Carloads by Commodity

Commodity	Carloads	Percent of Total
Corn[1]	25,156	46.1
Fertilizer	14,404	26.4
Wheat[2]	9,386	17.2
Fruits and Vegetables[3]	2,452	4.5
Soybeans[4]	2,108	3.7
Animal Feed	1,168	2.1
Total	54,584	100

[1] The figure for corn also includes corn syrup, wet process corn milling, corn oil, and corn meal.

[2] The figure for wheat includes flour and grain mill products.

[3] The figure for fruits and vegetables includes vegetable oil, vegetable oilseed cake, canned fruits, frozen vegetables, vegetable meal, and catsup/tomato sauce. The figure for fruits and vegetables includes vegetable oil, vegetable oilseed cake, canned fruits, frozen vegetables, vegetable meal, and catsup/tomato sauce.

[4] The figure for soybeans also includes soybean oil, soybean cake, and soybean meal.

2015 Local Carloads by Commodity

Table 6 summarizes the local traffic for the major commodities. The total local carloads of the top five commodities are 38,263 with corn accounting for 65% of the total local carloads.

Table 6: 2015 Local Carloads by Commodity

Commodity	Carloads	Percent of Total
Corn[1]	24,494	65.2
Wheat	6,916	18.1
Soybeans[2]	5,671	14.8
Other Grains[3]	727	1.9
Total	38,263	100

[1] In addition to corn the figure includes corn meal.
[2] In addition to soybeans the figure includes soybean meal.
[3] Other grains include sorghum, barley, and oats.

2015 Overhead Carloads by Commodity

Overhead carloads for corn and soybeans are complicated by the presence of a large outlier railroad that identified 92,846 overhead carloads. On the survey, the 92,846 carloads were evenly split between corn and soybeans, resulting in 46,423 carloads for each of the two commodities. This figure is 12 times higher than the mean corn carload and 11 times higher than the mean soybean carload. Therefore, the overhead carloads for corn and soybeans are calculated with and without the outlier carloads included in the analysis.

Table 7 contains 2015 overhead carload data when the outlier railroad's corn and soybean carloads are included in the analysis. An examination of Table 7 data indicates that corn is the top commodity with 38.1% of the top eight overhead commodity.

Table 8 contains 2015 overhead carload data excluding the outlier railroad's corn and soybean carloads. The corn percentage of the top eight overhead commodities declines from 38.1% to 25.9%. The soybean percentage falls from 29.3% to 7.9%. The share of the top eight overhead carloads for wheat increased from 12.2% to 24.8%.

Table 7: 2015 Overhead Carloads by Commodity Including Outlier Railroad

Commodity	Carloads	Percent of Total
Corn[1]	69,820	38.1
Soybeans[2]	53,605	29.3
Wheat[3]	22,318	12.2
Sorghum and Oats	10,060	5.5
Fruits and Vegetables[4]	8,299	4.5
Fertilizer	8,105	4.4
Molasses and Sugar[5]	6,979	3.8
Barley	4,018	2.2
Total	183,204	100

[1] In addition to corn, the figure in the above table includes corn syrup, corn starch, corn meal, and wet corn milling products.

[2] In addition to soybeans, the figure in the above table includes soybean oil and soybean cake.

[3] In addition to wheat, the figure in the above table includes wheat flour, wheat bran, and grain mill products.

[4] The figure in the above table includes frozen vegetables, vegetable oil, and vegetable seed cake.

[5] The figure in the above table includes molasses, blackstrap molasses, sugar mill products, sugar refining byproducts and granulated sugar powder.

Table 8: 2015 Overhead Carloads by Commodity Excluding Outlier Railroad

Commodity	Carloads	Percent of Total
Corn[1]	23,397	25.9
Wheat[3]	22,318	24.8
Sorghum and Oats	10,060	11.1
Fruits and Vegetables[3]	8,299	9.2
Fertilizer	8,105	9.0
Soybeans[4]	7,182	7.9
Molasses and Sugar[5]	6,979	7.7
Barley	4,018	4.4
Total	90,358	100

[1] In addition to corn, the figure in the above table includes corn syrup, corn starch, corn meal, and wet corn milling products.

[2] In addition to wheat, the figure in the above table includes wheat flour, wheat bran, and grain mill products.

[3] The figure in the above table includes frozen vegetables, vegetable oil, and vegetable seed cake.

[4] In addition to soybeans, the figure in the above table includes soybean oil and soybean cake.

[5] The figure in the above table includes molasses, blackstrap molasses, sugar mill products, sugar refining byproducts and granulated sugar powder.

SUMMARY OF SHORT LINE CARLOADS BY TYPE OF TRAFFIC

Table 9 data summarizes sample short line carloads by type of traffic with and without the outlier overhead carloads. The distribution of carloads with the outlier overhead carloads results in about half the total carloads in the originated category, about 10% is terminated carloads, 7% local traffic, and 33.3% overhead carloads. When the outlier overhead carloads are removed from the analysis, the originated traffic share of the total carloads rises from 50% to 60%. The terminated and local shares rise slightly while the overhead share fell to about 20%.

Thus originated traffic is the major traffic type with and without the outlier overhead carloads in the analysis. Local traffic has the fewest carloads of the four types of traffic.

Table 9: Total Carloads with and without Outlier Overhead Carloads by Type of Traffic

Total Carloads with Outlier Overhead Carloads		
Type of Traffic	**Carloads**	**Percent of Total**
Originated Carloads	273,317	49.8
Terminated Carloads	54,484	9.9
Local Carloads	38,263	7.0
Overhead Carloads	183,204	33.3
Total	549,368	100
Total Carloads without Outlier Overhead Carloads		
Originated Carloads	273,317	59.9
Terminated Carloads	54,584	11.9
Local Carloads	38,263	8.4
Overhead Carloads	90,358	19.8
Total	456,522	100

Part C: Results of the Short Line and Agriculture Survey

Part C asks the short lines if they are dependent on Class I railroads for locomotives and railcars. Table 10 reveals that, for locomotives, only 12.5% said they were very dependent, 22.5% said they were somewhat dependent, and 65% said they were not dependent. A few of the short lines qualified their response by stating that they were somewhat dependent on Class I unit trains but not dependent for non-unit trains.

In the dependence on Class I railroads for railcars, 50% of the sample short lines said they were very dependent, 25% responded that they were somewhat dependent, and 25% said they were not dependent. A few short lines said they were very dependent on unit trains but not dependent on non-unit trains.

Also in Part C, the short lines were asked if their railroad was dependent on Class I railroads for equipment (locomotives and railcars), did they have trouble obtaining needed equipment during peak periods such as grain harvest. Only about 3% said all of the time, 60.5% replied some of the time, and about 37% said none of the time.

Thus the majority of sample short lines are not dependent on Class I railroads for locomotives but half the short lines said they are very dependent on Class I railroads for railcars. Short lines do not appear to have difficulty obtaining equipment during peak periods.

Table 10: Short Line Dependence on Connecting Class I Railroads for Locomotives and Railcars

Locomotives		
Dependency	**Number of Short Lines**	**Percent of Total**
Very Dependent	5	12.5
Somewhat Dependent	9	22.5
Not Dependent	26	65
Total	40	100
Railcars		
Dependency	**Number of Short Lines**	**Percent of Total**
Very Dependent	20	50
Somewhat Dependent	10	25
Not Dependent	10	25
Total	40	100

Table 11: Number of Railroads Identifying Agricultural Commodities as Subject to Intermodal Competition – Originated Traffic

Commodities	Number of Railroads
Corn	24
Wheat	21
Soybeans	13
Animal Feed	8
Ethanol	5
Sugar and Molasses	5
DDGs	4
Sorghum and Oats	3

Part D: Results of the Short Line and Agriculture Survey

The first question of Part D asks short lines how dependent they are on Class I railroads to reach the principle markets they serve. A total of 85% of the short lines said they are very dependent and another 12.5% said they are somewhat dependent. This is consistent with local traffic being the smallest traffic category and originated traffic being the largest traffic type.

The next several questions deal with identification of the modes that compete with short lines for agricultural traffic. Short lines were asked to identify modes that compete with respect to originated traffic. Of the short line respondents, 46.7% said motor carriers are competitors while 30.7% said Class I railroads compete with them. A total of 12% said they compete with other short lines and 10.7% said water carriers compete with them.

The next question asks what agricultural commodities are subject to competition for originated traffic. Table 11 contains the commodities and the number of railroads identifying the commodity

as subject to intermodal competition. As indicated by Table 11, corn, wheat, and soybeans were identified as subject to intermodal competition by most short lines.

Question 4 of Part D asks short lines to identify the modes they compete for terminated traffic. A total of 54.4% of short lines said motor carriers are the principal intermodal competitor, and 20.5%, 11.8%, and 7.3% of sample short lines identified Class I railroads, other short lines, and water carriers, respectively, as intermodal competitors.

Question 5 of Part D asks short lines what agricultural commodities are subject to intermodal competition for terminated traffic. Table 12 indicates that corn, fertilizer, wheat, soybeans, and animal feed were the commodities selected by most sample short lines as the commodities subject to intermodal competition.

Table 12: Number of Railroads Identifying Agricultural Commodities as Subject to Intermodal Competition – Terminated Traffic

Commodities	Number of Railroads
Corn[1]	20
Fertilizer	19
Wheat and Flour	11
Animal Feed	9
Soybeans[2]	5

[1] The figure for corn also includes corn syrup and corn oil.

[2] The figure for soybeans also includes soybean oil and meal.

Table 13: Number of Railroads Identifying Agricultural Commodities as Subject to Intermodal Competition – Local Traffic

Commodities	Number of Railroads
Corn[1]	19
Wheat[2]	18
Soybeans[3]	10
Barley	5
Sorghum	5
Oats	4
Fertilizer	4

[1] The figure for corn also includes corn syrup and corn oil.

[2] The figure for wheat also includes wheat flour.

[3] The figure for soybeans also includes soybean oil and meal.

One of the short lines said fertilizer plants have trucks that go to other rail terminals and inland ports to pick up most types of fertilizer. Another short line manager said some shippers have shipped fertilizer via a Class I railroad and then by truck to local buyers. Another short line manager said fertilizer is shipped to a central location by Class I railroads and distributed by truck to local users.

Question 6 of Part D asks short line managers which modes compete with them with respect to local traffic. The mode identified as a competitor by most short lines was motor carriers (74.4% of sample short lines), Class I railroads, other short lines, and water carriers were mentioned by 15.4%, 7.7%, and 2.6% of the sample short lines as competitors for local traffic.

Question 7 of Part D asks short line managers which agriculture commodities are subject to intermodal competition for local traffic. Table 13 indicates that corn, wheat, and soybeans were mentioned by most of the short line mangers as being subject to competition for local traffic.

The next question in Part D asks managers of short lines which modes are intermodal competitors for overhead agricultural traffic. The number of railroad managers indicating modal competitors was much less than the other three types of traffic. Only nine managers mentioned trucks as intermodal competitors and seven indicated Class I railroads are a competitor for overhead agricultural traffic.

The next question asks short line mangers which agricultural commodities are subject to intermodal competition for overhead traffic. Reflecting the lower intensity of competition for overhead traffic, wheat and flour and corn and corn oil had only eight and seven short line managers indicating the agricultural commodities subject to intermodal competition for overhead traffic (Table 14).

Table 14: Number of Railroads Identifying Agricultural Commodities as Subject to Intermodal Competition – Overhead Traffic

Commodities	Number of Railroads
Wheat and Flour	8
Corn and Corn Oil	7
Soybeans and Soybean Oil	3
Fertilizer	2

In summary, managers of sample short lines cited motor carriers as competition for all four types of traffic more often than the other modes of transportation. The commodities most subject to intermodal competition were corn, wheat, and soybeans for originated traffic. For terminated freight, the commodities cited most often by managers of sample short lines as being impacted by intermodal competition were corn, wheat, and fertilizer. In the case of local freight, the most cited commodities by managers of short lines as impacting intermodal competition were corn, wheat, and soybeans. The corresponding information for overhead traffic were wheat and corn.

Part D ended with some open-ended questions about competition facing short line railroads. The first question is: Are shifts in Class I pricing and the move to shuttle trains in grain transport creating an opportunity or a threat to your railroads' competitiveness? The short lines are evenly split on this question of whether changes in grain logistics systems are a threat or an opportunity to the railroads' competitiveness.

Then the short lines were asked if their agricultural traffic will increase or decrease if current trends continue. Of the 41 railroads that answered this question, 44% expected an increase while 42% expected no change and 15% expected a decrease.

The next question was whether Class I railroad policy (i.e., shuttle train loaders) affect competition between trucks and short lines. A total of 77% of the short line managers agree that Class I policy affects competition between trucks and short lines.

The final question is what modes are becoming more of a challenge to short line success and why?

The short lines pointed to lower truck fuel prices and thus low rates. Also, increased size and weights of trucks were frequently mentioned by the short lines. Trucks have greater scheduling and routing flexibility than short lines, resulting in competition based on price.

The short lines mentioned that shuttle trains on Class I railroads have resulted in increased trucking to these locations as opposed to short line shipments. Also, the short lines mentioned their dependency on Class Is for rail cars, switching rates, and price structures.

SHORT LINE SUCCESS PROFILE

The survey contains 12 service characteristics of a profitable short line railroad obtained from previous research. From the choices given, the short line managers were asked to select the three most important determinants of success (profits). They were asked to put a 1 next to the most important, 2 next to the next important, and 3 to the third most important. The characteristics were ranked by the number of short lines selecting the characteristic with a 1, 2, or 3 importance rank.

The top three most important characteristics are adequate traffic levels (ranked number 1), strong shipper support (ranked number 2), and access to mor than one connecting carrier (ranked number 3). Table 15 provides a summary.

A second group of characteristics that received some support was access to more than one connecting carrier (ranked number 4), ship many different commodities (number 5), and adequate track quality (number 6).

The short line managers suggested some additional characteristics, including high quality service, controlled expenses, and adequate traffic density. Others include economic development support, ongoing profitability as primarily a function of traffic density and vulnerability of the traffic base. Another short line manager said generating enough revenue to keep the tracks in good condition is a huge issue.

Table 15: Ranks of the Top 6 Service Characteristics

Rank	Characteristic
1	Adequate traffic levels
2	Strong shipper support
3	Access to more than one connecting carrier
4	Cooperation from connecting carriers on joint rates and revenue splits
5	Ship different commodities
6	Adequate track quality

CONCLUSION

Short line railroads play a critical role in originating and terminating agricultural products transported by rail and promote economic development along these lines. Particularly important is providing rail service to rural America and their link to the Class I rail network. In the decades following the passage of the Staggers Rail Act in 1980, more than 250 short lines were formed, adding to the approximately 220 short lines that existed as of 1980. Today 562 short lines are operating in the U.S.

Many short lines have deferred maintenance but not enough revenue to fund it. Given the significant public benefits of short lines, the federal government and many states have instituted financial assistance programs to help them develop their infrastructure. Many states have short line assistance programs with the goal of insuring transportation options and maintaining a balanced transportation program. These assistance programs have had substantial positive impacts on the short lines, the agricultural shippers, and the rural economy.

Total 2015 carloads for the four types of traffic (excluding the outlier overhead carloads) originated carloads total 273,317 (59.9% of total carloads). Terminated and local carloads were 54,584 (11.9% of total carloads) and 38,263 (8.4% of total carloads), respectively. Overhead carloads were 90,358 (19.8% of total carloads). When the outlier overhead carloads are included, originated traffic is still the top traffic type followed by overhead, terminated, and local carloads.

The majority of sampled short lines are not dependent on Class I railroads for locomotives but half the short lines said they were very dependent on Class I railroads for railcars. Sample short lines do not appear to have difficulty obtaining equipment during peak periods.

Managers of sampled short lines cited motor carriers as competition for all four traffic types more often than other modes of transportation. The commodities most subject to intermodal competition were corn, wheat, and soybeans for originated traffic. For terminated freight, the commodities cited most often by managers of sample short lines as being impacted by intermodal competition were corn, wheat, and fertilizer. In the case of local freight, the most cited commodities by managers of sample short lines as being impacted by intermodal competition were corn, wheat, and soybeans. The corresponding information for overhead traffic were wheat and corn.

Sample short line managers answered four open-ended questions about competition facing short line railroads. The short lines were evenly split on whether changes in the grain logistic system (i.e., Class I shuttle trains) are a threat or an opportunity to their railroads' competitiveness.

The managers of sample short lines were asked whether their agricultural traffic will increase or decrease if current trends continue (i.e., focus on shuttle trains and increased ethanol production). Only six railroads expected their agriculture-related traffic to decrease while 18 railroads expected an increase and 17 expected no change. So of the 41 railroads that answered the question, 43.9% expected an increase while 41.5% expected no change and 14.6% expected a decrease.

The sample short line managers were asked if Class I railroad policy (i.e., shuttle train loaders) affect competition between trucks and short lines. Of the 39 short lines that answered the question, 77% agree the Class I policy affects competition between trucks and short lines.

Short line managers were asked which modes are becoming more of a challenge to short line success. The short lines pointed to lower truck fuel prices and thus low rates. Also, increased size and weights of trucks were frequently mentioned by the short lines. The short lines mentioned that shuttle trains on Class I railroads have resulted in increased trucking to these locations as opposed to short line shipment. Also, some short lines mentioned their dependency on Class I railroads for rail cars, switching rates, and price structures.

This study concludes with a profile of a successful (profitable) short line. The survey contains a dozen service characteristics of profitable short line railroads obtained from previous research. From the choices given, the short line managers were asked to select the three most important determinates of success, which were adequate traffic levels (number 1), strong shipper support (number 2), and access to more than one connecting carrier (number 3).

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Disclaimer

The opinions and conclusions expressed do not necessarily represent the views of USDA or AMS.

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