United States Government Accountability Office

Report to Congressional Requesters

December 2022

FREIGHT RAIL

Information on Precision-Scheduled Railroading

Accessible Version

GAO-23-105420

GAO Highlights

Highlights of GAO-23-105420, a report to congressional requesters

December 2022

FREIGHT RAIL

Information on Precision-Scheduled Railroading

Why GAO Did This Study

The nation's freight railroad network is vital to the functioning of the economy. Several of the largest freight railroads have reported implementing PSR. The first freight railroad began implementing PSR in 1998, followed by others from 2012 through 2019. FRA oversees railroad safety and STB is primarily responsible for the economic regulation of freight rail, with jurisdiction over matters including railroad rates, practices, and services.

GAO was asked to examine the effect of PSR on freight rail safety and service. This report describes (1) stakeholder views on operational changes associated with PSR, and what is known about the extent of those changes, (2) the effects of these operational changes on freight rail safety, and what FRA has done to monitor these effects, and (3) the effects of these operational changes on freight rail service, and what STB has done to monitor these effects.

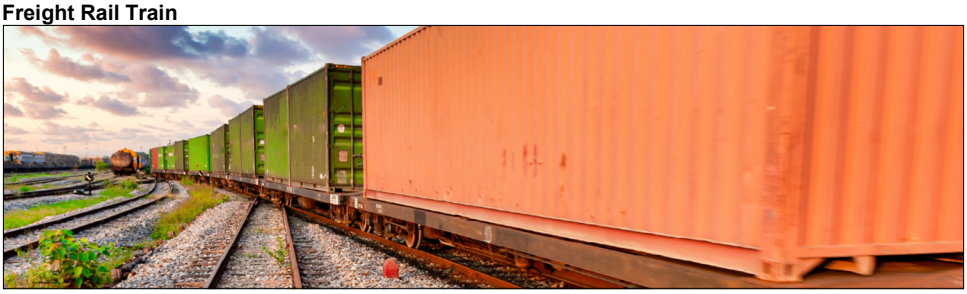
GAO reviewed data on railroad operations for 2011 through 2021 from the Association of American Railroads and STB. In addition, GAO reviewed FRA and STB documents and data on freight rail safety and service for 2011 through 2022. GAO found these data to be reliable for the purpose of providing contextual information about freight rail operations, safety, and service. GAO interviewed a non-generalizable sample of 28 freight rail industry stakeholders—including representatives of railroads, employee unions, and shippers—selected to achieve a range of perspectives.

View GAO-23-105420. For more information, contact Elizabeth Repko at (202) 512-2834 or RepkoE@gao.gov.

What GAO Found

Six of the seven largest U.S. freight railroads have reported implementing precision-scheduled railroading (PSR), a strategy intended to increase efficiency and reduce costs. PSR is not defined by a prescribed set of operational changes. However, stakeholders GAO interviewed—including representatives of railroads, employee unions, and shippers—associated the following operational changes with PSR: (1) reductions in staff, (2) longer trains, and (3) reductions in assets such as locomotives. For example, the overall number of staff among the seven largest freight railroads (known as Class I) decreased by about 28 percent from 2011 through 2021. Further, all seven railroads said they have increased the length of trains in recent years.

Freight Rail Train



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Federal Railroad Administration (FRA) officials stated that data from 2011 through 2021 are inconclusive about the extent to which operational changes associated with PSR may have affected rail safety, but have taken steps to address potential risks. Class I railroad representatives generally stated that these operational changes improved or had no effect on railroad safety. In contrast, rail safety inspectors and employee unions identified safety concerns related to reductions in staff and longer trains. In response, FRA has several efforts underway to monitor the effects of such changes. These efforts include analyzing safety data, conducting compliance inspections, and reviewing existing regulations. FRA also has planned efforts to address potential risks, such as employee fatigue and the effects of longer trains. FRA's efforts may offer important insights into additional actions that FRA and railroads could take to address potential safety concerns identified by stakeholders.

Surface Transportation Board (STB) data vary, with periods of improvement and decline. STB officials said that the extent to which PSR-associated changes have affected freight rail service is unclear, but STB has efforts to address service issues. Class I railroad representatives stated that service changes associated with PSR were intended to increase the efficiency and reliability of the railroads. However, freight rail customers GAO interviewed identified concerns such as reduced frequency and reliability of service, and increased fees. For example, rail customers stated that unreliable service can have significant effects, causing production shut downs and higher costs. STB is considering further data collection and has held hearings on service challenges. According to STB officials, these efforts could result in STB decisions establishing new requirements for railroads that may help further address service concerns.

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Abbreviations

AAR	Association of American Railroads
DOT	U.S. Department of Transportation
FRA	Federal Railroad Administration
PSR	precision-scheduled railroading

STB	Surface Transportation Board
USDA	U.S. Department of Agriculture

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December 13, 2022

The Honorable Peter A. DeFazio
Chair
Committee on Transportation and Infrastructure
House of Representatives

The Honorable Donald M. Payne, Jr.
Chair
Subcommittee on Railroads, Pipelines, and Hazardous Materials
Committee on Transportation and Infrastructure
House of Representatives

The Honorable Tammy Baldwin
United States Senate

The nation's freight railroad network is vital to the functioning of the economy. According to the Bureau of Transportation Statistics, railroads transported more than 1.4-trillion revenue "ton-miles" of freight in 2020 over about 160,000 miles of track, accounting for nearly 30 percent of U.S.-freight traffic.[1] The largest freight railroads are referred to as Class I railroads.[2] As of December 2021, there were seven Class I freight railroads. Freight railroads, including the seven Class I railroads, rely on their operating revenues to acquire and maintain trains, tracks, and other equipment and facilities as well as hire employees to operate and maintain the freight rail network. To reduce costs, several Class I railroads have reported they are implementing a strategy called precision-scheduled railroading (PSR).

While there is no one definition of PSR, it is generally understood as an overarching strategy to increase a railroad's efficiency and reduce costs. As described by one Class I railroad in its 2017 annual report, "scheduled

[1]Freight traffic is measured in ton-miles. A "ton-mile" refers to one ton of freight shipped one mile, and therefore accounts for both the volume of freight shipped, and the distance the freight is transported. Revenue-ton-miles indicate the number of tons of revenue freight transported; that is, freight the railroad has been paid to transport.

[2]The Surface Transportation Board (STB) classifies freight rail carriers based on annual operating revenues for regulatory purposes. Current thresholds establish Class I freight railroads as carriers that earn $900 million or more annually, Class II railroads earn between $40.4 million to $900 million annually, and Class III railroads earn $40.4 million or less annually. 49 C.F.R. pt. 1201.

railroading is about relentlessly identifying and eliminating every unnecessary step, every unproductive asset, every extra mile, and every extra car handling that does not contribute to the quality and consistency of our transportation product." Overall, six of the seven Class I railroads say they have implemented PSR.

Within the U.S. Department of Transportation (DOT), the Federal Railroad Administration (FRA) oversees railroad safety. The Surface Transportation Board (STB)—an independent, federal adjudicatory agency—has responsibility for the economic regulation of freight rail (in addition to other modes of transportation) and certain passenger rail matters, including rail service issues. While railroads have stated that PSR can increase the efficiency and reliability of freight rail, some stakeholders have raised questions about the effects of PSR on freight rail safety and service. You asked us to examine the impact of PSR on freight rail safety and service. This report describes three objectives:

1. stakeholders' views on operational changes associated with PSR, and what is known about the extent of those changes among Class I freight railroads from 2011 through 2021;
2. effects, if any, of operational changes stakeholders associate with PSR on freight rail safety and what FRA has done to monitor these effects; and
3. effects, if any, of operational changes stakeholders associate with PSR on freight rail service and what STB has done to monitor these effects.

To inform all objectives, we interviewed representatives from all seven Class I freight railroads and officials from FRA, STB, and the U.S. Department of Agriculture (USDA), which represents the interests of agricultural shippers in improving transportation services, including freight rail.[3] We also interviewed representatives of a non-generalizable sample of 28 railroad stakeholder groups including railroad customers (such as shippers and receivers), passenger railroads, short line and regional railroads, railroad workers, and railroad inspectors. We selected stakeholders to achieve a range of perspectives based on input from relevant federal agencies, participation in related STB proceedings, and other factors. We analyzed the responses of the Class I freight railroad representatives and stakeholders to identify common themes, including the operational changes they associated with PSR and potential effects

[3]We focused our review on Class I freight railroads because they own the large majority of the freight rail network.

on railroad safety and service. Additional information about this analysis and the stakeholders we interviewed is included in appendix I.

To describe operational changes associated with PSR, we reviewed Class I railroad documents, such as annual reports and press releases as well as freight railroad operations data from 2011 through 2021. This period captures years before and after the majority of Class I railroads reported implementing PSR. Specifically, we reviewed STB data on the number of employees by railroad and employment category for 2011 through 2021.[4] Based on our review of the data for obvious errors as well as interviews with knowledgeable officials, we found these data sufficiently reliable for the purpose of providing contextual information on changes in the number of Class I railroads' employees. Class I railroads are required to file an Annual Report of Finances and Operations with STB, known as the R-1, that contains information about their finances and operating statistics.[5] Additionally, the Association of American Railroads (AAR) collects and aggregates the R-1 data from railroads and makes this information available in various publications.[6] We reviewed these data for obvious errors and found these data sufficiently reliable for the purpose of providing contextual information on changes in the freight rail industry. In this report, all monetary figures are in nominal dollars and have not been adjusted for inflation, unless otherwise noted.

To describe the effects of PSR-associated operational changes on rail safety, we reviewed applicable statutes and regulations. We also reviewed FRA data on Class I railroads for 2011 through 2021 from two FRA datasets: (1) workplace injuries and illnesses and (2) accidents and incidents. We also reviewed FRA safety inspection results for 2011 through 2021 and other FRA documents such as safety audits. Based on our review of the data and interviews with knowledgeable officials, we found these data to be sufficiently reliable for the purposes of providing contextual information on rail safety. We did not review FRA's entire oversight program, but focused instead on its efforts to understand operating changes that stakeholders associated with PSR, and any potential risk they may pose. Additionally, in recent years, railroads and

[4]Class I railroads are required to submit information to STB on the number of employees, service hours, and compensation by employee category on both a quarterly and annual basis; STB makes this information publicly available. *See* 49 C.F.R. § 1245.2.

[5]49 C.F.R. § 1241.11.

[6]AAR is the trade association for the largest railroads in the United States and publishes a variety of railroad industry and economic reports, such as the annual publications *Freight Commodity Statistics* and *Railroad Facts*, and trend reports such as *Railroad Ten-Year Trends*.

railroad employee unions have been negotiating the terms of new collective bargaining agreements. These negotiations were outside the scope of our audit work, and we did not review the potential effects of the negotiations or related agreements on railroad operations. We also did not review their potential relationship to PSR, if any.

To describe the effects of PSR-associated operational changes on rail service, we reviewed applicable statutes and regulations. We reviewed AAR data on system average train speed for 2011 through 2020. We also reviewed STB data on system average train speed for 2017 through 2022, service delays for 2017 through 2022,[7] and demurrage and accessorial charges for 2018 through 2021.[8] Based on our review of the data and interviews with knowledgeable officials, we found these data sufficiently reliable for the purpose of providing contextual information on changes to trip speed (train velocity) and the time railcars sit idle (dwell time). We also reviewed documents filed in STB proceedings on "first/last mile service" and urgent service issues.[9] We did not review STB's entire oversight program, but focused instead on its efforts to understand the operating changes that stakeholders associated with PSR and address current service challenges that STB and stakeholders identified.

Finally, we reviewed Amtrak data on delays of Amtrak trains from 2011 through 2021 and interviewed Amtrak representatives to identify potential effects of Class I operational changes on passenger rail service (see app. IV). Based on our review of the data and interviews with knowledgeable officials, we found these data to be sufficiently reliable for the purpose of providing contextual information.

We conducted this performance audit from September 2021 to December 2022 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to

[7]These data are available beginning in March 2017. Specifically, we reviewed the weekly average of trains held due to a lack of (1) staff to operate the train or (2) locomotives.

[8]Demurrage is a fee incurred by a rail customer when it detains a freight railroad's railcars beyond a specified period of time for loading or unloading. *See* 49 C.F.R. § 1333.1. Accessorial charges are not specifically defined by statute or regulation but are generally understood to include charges other than line-haul charges and demurrage. Demurrage Billing Requirements, 86 Fed. Reg. 17,735, 17,736 n.10 (Apr. 6, 2021). Accessorial charges would include fees paid for additional freight service such as diverting a railcar. STB started collecting these data in 2018.

[9]First/last mile service refers to the movement of railcars between a local railyard and a shipper or receiver facility. First-Mile / Last-Mile Service, STB Docket No. EP 767; Urgent Issues in Freight Rail Service, STB Docket No. EP 770; Urgent Issues In Freight Rail Service—Railroad Reporting, STB Docket No. EP 770 (Sub-No. 1).

obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Freight Rail in the United States

Class I railroads. More than 600 freight railroads operate in the United States. They are divided into three classes, according to operating revenue thresholds set by STB regulation. The seven Class I freight railroads generally move freight over long-haul routes and may face competition from other shipping modes, such as trucks and barges. Class II and III railroads tend to operate over smaller geographic areas than Class I railroads and employ fewer people. As of 2021, the seven Class I railroads are (1) BNSF Railway, (2) Canadian National, (3) Canadian Pacific, (4) CSX Transportation, (5) Kansas City Southern, (6) Norfolk Southern, and (7) Union Pacific.

Locomotives and railcars. A typical train consists of one or more locomotives—the power and control units of the train—followed by connected railcars. The lead locomotive pulls the train and provides control for other functions, including braking. Additional locomotives may be placed behind the lead locomotive or distributed throughout the train (called “distributed power”) to provide additional power and control, which can allow for longer or heavier trains. Freight trains carry a variety of freight using different types of railcars that vary in capacity, length, height, and weight. For example, box-cars may carry a wide variety of goods including paper, lumber, and packaged goods; whereas tank cars carry liquid commodities such as diesel fuel, chemicals, or molasses.

Freight railroad employees. Railroad employees are responsible for all aspects of a freight rail network—from building and operating trains to installing, inspecting, and maintaining railroad assets, such as tracks, yards, locomotives, cars, and signal equipment. For example, freight trains in the United States generally operate with two crew members—the conductor and the engineer. The conductor is responsible for the train, freight, and crew. The engineer operates the locomotive, including application of the throttle (which controls the flow of fuel) and brakes, as well as any distributed power locomotives located throughout the train. Other railroad employees are responsible for maintaining equipment, such as locomotives and railcars. For example, a railcar maintenance

employee—referred to as a "carman"—is responsible for ensuring the safe operation of railcars by conducting pre-departure checks of cars in railyards to identify and repair defects. Other examples include staff who inspect and maintain other railroad assets such as locomotives, grade crossing signals, and train tracks.

Freight rail customers. The primary users of freight rail services are shippers and receivers of either bulk commodities or consumer goods. Commodities shipped via freight rail include agricultural products like grain, energy products such as coal, construction materials, chemicals, and minerals. Consumer goods shipped by rail include packaged food, clothing, and electronics.

Competition for freight traffic. Depending on the location of shippers and freight being shipped, Class I railroads may face competition from one another and from other freight-shipping modes, such as trucks and barges. However, some shippers are served by a single railroad without an economically viable transportation alternative because a trucking or barge route either does not exist or would be too costly—these shippers are referred to as "captive."[10]

Precision-Scheduled Railroading (PSR)

There is no single description or definition of PSR.[11] PSR is defined differently in various Class I railroad materials, such as annual reports and other documents, but is generally defined by goals associated with increased efficiency and improved reliability. For example, as described by one railroad, PSR will look different from railroad to railroad, but is defined by its intended benefits of consistent, reliable, and predictable service. In another example, a 2016 railroad news release identified the five foundations of PSR as (1) improving customer service, (2) controlling costs, (3) optimizing asset utilization, (4) operating safely, and (5) valuing and developing employees. Some railroads also describe the goal of PSR as transporting the same amount of freight using fewer railcars and locomotives and a more simplified, direct line of transport across a railroad's network.

[10]For additional information, see GAO, *FREIGHT RAIL PRICING: Contracts Provide Shippers and Railroads Flexibility, but High Rates Concern Some Shippers*, GAO-17-166 (Washington, D.C.: Dec. 7, 2016).

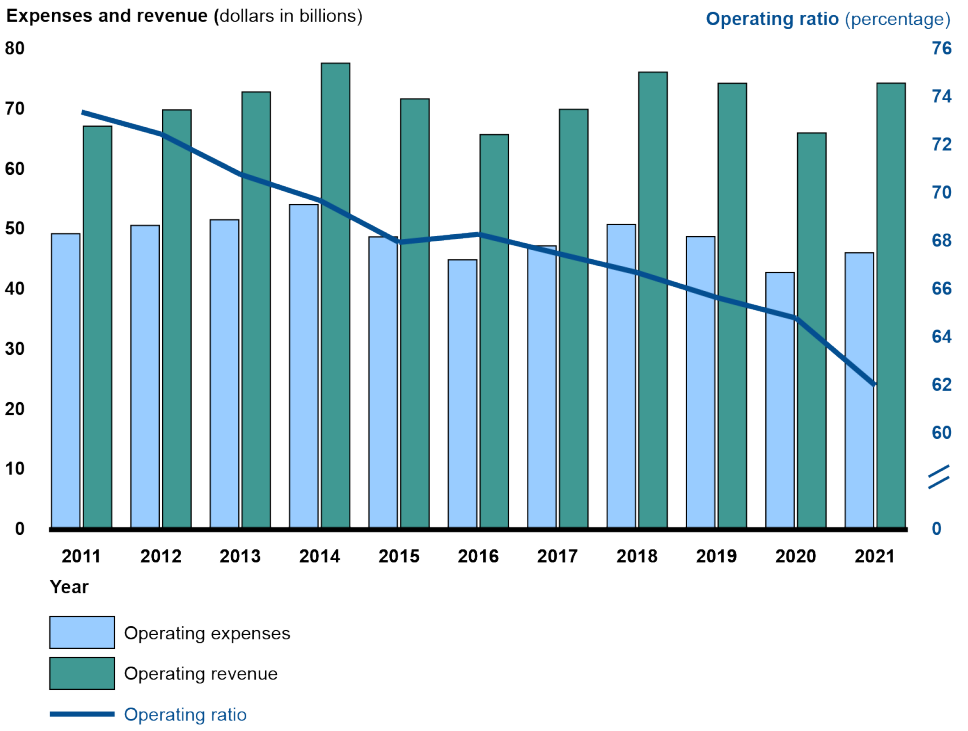
[11]The development of PSR is credited to E. Hunter Harrison, a railroad executive who led several Class I railroads at various times in his career.

While each railroad may have a different approach to PSR, some Class I railroads have set forth financial goals to increase efficiency in terms of operating costs relative to revenue. According to the Association of American Railroads (AAR), operating ratio—operating expenses divided by operating revenue—is one way to compare performance across companies within an industry. Lower operating ratios—which are expressed as a percentage—indicate higher profits. Some of the railroads have recently set goals of achieving an operating ratio of 60 percent.[12] Overall, the operating ratio for Class I railroads, including one that does not report implementing PSR, decreased over the period from 2011 through 2021, as shown in figure 1, indicating an increase in profits over that time. According to AAR and STB data, the average operating ratio for Class I railroads decreased from 73 percent in 2011 to 62 percent in 2021; reflecting an increase in net revenue of about 58 percent—from almost $18 billion to more than $28 billion—over that same period.[13]

[12]Operating ratios are calculated as operating expenses divided by operating revenue, which provides a percentage. While operating ratios may assist in comparing across a single industry, operating ratios for one industry may not be comparable to another because different industries have different capital needs (that is, the cost of the assets required to operate).

[13]According to AAR data, the overall operating ratio among Class I railroads has fallen in recent decades, from just under 88 percent in 1990, to 85 percent in 2000, and 73 percent in 2010.

Figure 1: Operating Expenses, Revenue, and Ratios for Class I Freight Railroads (in Nominal Dollars), 2011–2021



Source: GAO analysis of Association of American Railroads and Surface Transportation Board data. | GAO-23-105420

Accessible Data for Figure 1: Operating Expenses, Revenue, and Ratios for Class I Freight Railroads (in Nominal Dollars), 2011–2021

Year	Operating Expenses (in thousands)	Operating Revenue (in thousands)
2011	49.2764	67.1541
2012	50.6413	69.8871
2013	51.5825	72.8733
2014	54.1291	77.6589
2015	48.7311	71.7092
2016	44.9085	65.7621
2017	47.241	69.9975
2018	50.8066	76.1774
2019	48.7849	74.3
2020	42.8017	66.0492
2021	46.0847	74.3315

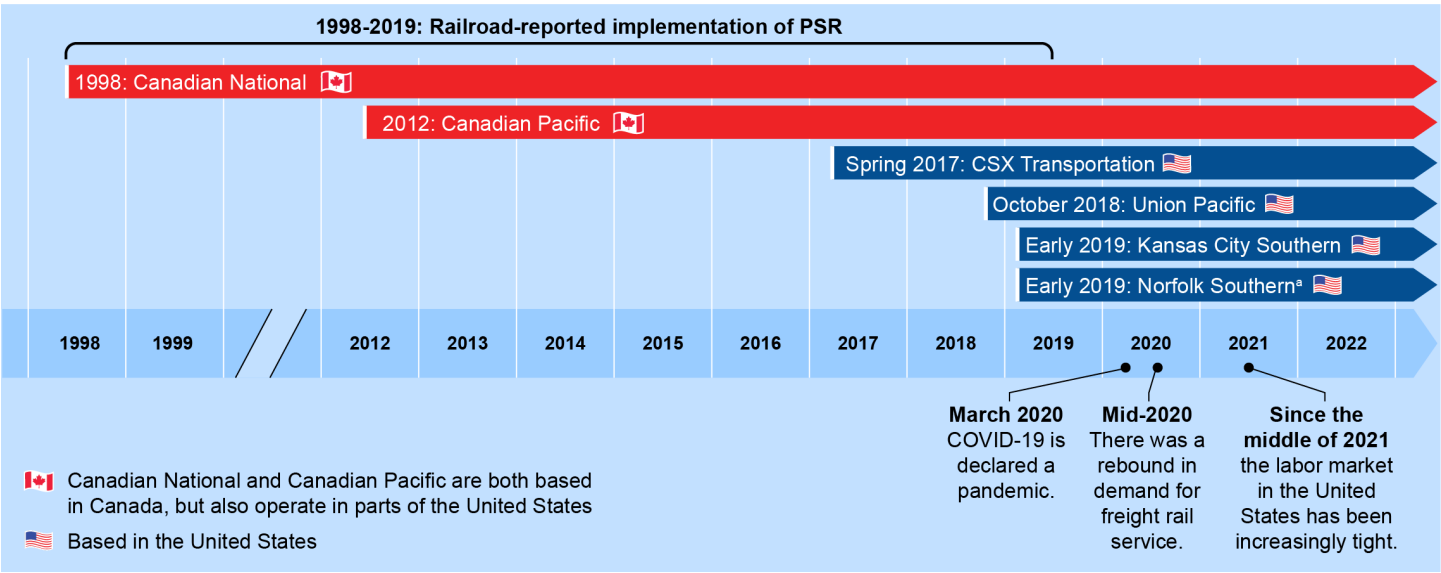
Year	Operating Ratio
2011	73.3781
2012	72.4616
2013	70.7839
2014	69.7011
2015	67.9566
2016	68.2894
2017	67.4896
2018	66.695
2019	65.6594
2020	64.8028
2021	61.9989

Note: Operating ratio is a metric that expresses operating costs as a percentage of operating revenue. This metric can be used to make comparisons across companies within an industry. The ratio is calculated by dividing operating expenses by operating revenue. Lower operating ratios indicate higher profits.

Recent Events Affecting Freight Rail Operations

A series of events in both freight rail operations as well as the broader U.S. economy affected the freight rail network in recent decades, as outlined in figure 2. The initial Class I railroad began implementing PSR in 1998, followed by others from 2012 through 2019. The onset of the COVID-19 pandemic in March of 2020 resulted in a drop in demand for rail service with some railroads furloughing employees. Subsequently, changes in consumer activity resulted in a surge in demand for freight rail in mid-2020. Beginning in mid-2021, railroads, like many businesses, faced an unusually tight labor market and difficulties finding sufficient staff to fill available jobs.

Figure 2: Precision-Scheduled Railroading (PSR) Implementation, 1998–2021, and Recent Events Affecting the Freight Rail Network

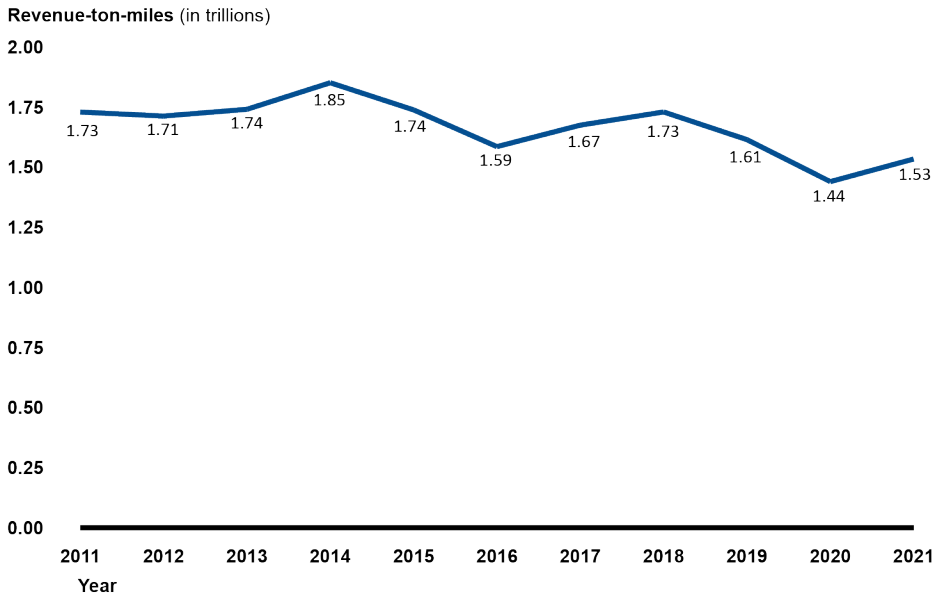


Source: GAO analysis of World Health Organization and Class I freight railroad materials, data from the Bureau of Transportation Statistics on freight volumes, and analysis by the Council of Economic Advisors. | GAO-23-105420

[a]According to Norfolk Southern, the railroad began adopting principles of PSR in early 2018 but formally adopted an operating plan incorporating those principles in the first half of 2019.

Data published by the Bureau of Transportation Statistics, AAR, and STB also indicate changes in demand for freight rail from 2011 through 2021. For instance, while the overall amount of U.S.-freight transported increased about 7 percent from 2011 through 2020, the share of U.S.-freight transported by rail decreased from 35 percent to 27 percent over that period, according to the Bureau of Transportation Statistics (the remaining freight travels by air, water, truck, or pipeline). Additionally, from 2011 through 2021, revenue-ton-miles—a measure that accounts for both the weight of freight and distance transported—among Class I freight railroads declined by about 11 percent, as shown in figure 3, with an uptick between 2020 and 2021. Some of the reduction shown—particularly from 2019 to 2020—may be attributed to a temporary reduction in demand for freight rail as a result of the COVID-19 pandemic.

Figure 3: Class I Freight Railroads Revenue-Ton-Miles, 2011–2021



Source: GAO analysis of Association of American Railroads and Surface Transportation Board data. | GAO-23-105420

Accessible Data for Figure 3: Class I Freight Railroads Revenue-Ton-Miles, 2011–2021

Year	Revenue Ton Miles (in trillions)
2011	1.72926
2012	1.71257
2013	1.74069
2014	1.85123
2015	1.73828
2016	1.58544
2017	1.67478
2018	1.72964
2019	1.6145
2020	1.43981
2021	1.53387

Note: Freight traffic is measured in ton-miles. A “ton-mile” refers to one ton of freight shipped one mile, and therefore accounts for both the volume of freight shipped, and the distance the freight is transported. Revenue-ton-miles indicate the number of tons of revenue freight transported; that is, freight the railroad has been paid to transport.

Role of the Federal Railroad Administration

Within DOT, FRA regulates the safety of U.S. freight and passenger railroads. While there are no federal statutes or regulations governing PSR specifically, many federal statutes and FRA regulations governing the safety of railroad operations may play a role in a railroad's PSR implementation.[14] FRA is responsible for monitoring and enforcing railroads' compliance with federal safety statutes and regulations, as well as railroads' operating rules and practices. FRA does this through a variety of activities, including inspecting and auditing railroads and their records, investigating railroad accidents and incidents, and collecting and analyzing railroad safety data.[15] FRA field inspectors, reporting to six technical Divisions within FRA's Office of Safety, as well as state inspectors employed by 30 states and the District of Columbia primarily perform inspections, audits, and accident investigations.[16] FRA inspectors—located throughout the United States—specialize in one of six technical disciplines including track and structures; signal, train control, and crossings; motive power and equipment; and operating practices. Inspectors also investigate and respond to complaints alleging

[14]For example, federal railroad safety statutes include hours of service laws establishing maximum on-duty and minimum off-duty periods for certain freight railroad employees. *See* 49 U.S.C. Subtitle V, Part A, Chapter 211. FRA's regulations governing railroad safety are located in 49 C.F.R. Subtitle B, Chapter II.

[15]Federal statute requires that within 30 days after the end of each month, railroads must submit a report to FRA on certain accidents and incidents that arise from the railroad's operations during the month. 49 U.S.C. § 20901. FRA's regulations implementing this statute generally define and divide reportable accidents/incidents into three groups: (1) any impact between railroad on-track equipment and highway users (highway-rail grade crossing accidents/incidents); (2) collisions and derailments involving operation of on-track equipment that results in certain property damage exceeding a monetary reporting threshold, which is $11,300 for calendar year 2022; and (3) death, injury, or occupational illness. In addition to submitting monthly reports, FRA requires railroads to report some accidents/incidents, such as deaths, immediately to the National Response Center by telephone.

[16]According to FRA, as of August 2022, there are about 330 FRA inspectors and 75 vacant inspector positions, and an estimated 230 state inspectors. The primary means for a state to help ensure railroads' compliance is by entering into an agreement with FRA authorizing it to participate in specific investigative and inspection activities. *See* 49 U.S.C. § 20105; 49 C.F.R. §§ 212.103, 212.105. To hold such an agreement, state inspectors must meet FRA's minimum qualification requirements. 49 C.F.R. § 212.201. FRA offers trainings to help state inspectors meet these requirements.

railroads' violations of federal railroad safety statutes and regulations.[17] FRA has the authority to take enforcement action for rail safety violations by assessing civil monetary penalties against responsible railroads or individuals or by issuing compliance orders against railroads or disqualification orders against individuals.[18]

Role of the Surface Transportation Board

STB is an independent federal agency that is responsible for the economic regulation of rail transportation, predominantly freight rail.[19] The Board has jurisdiction over matters including railroad rates, practices, and services, such as demurrage charges.[20] STB collects and makes publicly available a variety of data on railroad finances, employment, and performance. STB is also authorized to enforce freight railroads' common carrier obligations, which refers to the statutory duty of freight railroads to provide transportation or service on reasonable request, provided that STB regulates the transportation or service.[21]

In addition to its authority related to freight rail, STB has jurisdiction over certain passenger rail service issues. For example, under certain circumstances, STB has the authority to conduct investigations into Amtrak's on-time performance issues, make recommendations for improvement, and enforce Amtrak's statutory right of preference (which requires freight railroads to give Amtrak preference over freight transportation in using or accessing their rail lines, junctions, and

[17]Railroads also must also comply with applicable state railroad safety statutes, regulations, and orders in the states where they operate. However, these statutes, regulations, and orders are investigated and enforced exclusively by the state and remain in effect until FRA prescribes a regulation or issues an order covering the subject matter of the state requirement. 49 U.S.C. § 20106.

[18]*See* 49 U.S.C. §§ 20111, 21301, 21304; 49 C.F.R. pt. 209.

[19]STB's authorities related to rail transportation are primarily codified at 49 U.S.C. Subtitle IV, Part A. Its regulations are located in 49 C.F.R. Subtitle B, Chapter X.

[20]STB also has jurisdiction over issues such as railroad mergers, rail line construction, and rail line abandonment (that is, the withdrawal of transportation service from a rail line).

[21]49 U.S.C. § 11101(a). Railroads may not refuse to provide services merely because it would be inconvenient or unprofitable to do so. Common Carrier Obligation of Railroads, 73 Fed. Reg. 10,509, 10,510 (Feb. 27, 2008) (citing G.S. Roofing Prods. Co. v. STB, 143 F.3d 387, 391 (8th Cir. 1998)). However, the common carrier obligation is not absolute, as service requests must be reasonable. *Id*.

crossings, except in an emergency) by awarding damages or other appropriate relief.[22]

Stakeholders Associated Specific Operational Changes with PSR and Railroads Have Implemented Them to Varying Degrees

Stakeholders Described Workforce Reductions, Longer Trains, and Reduced Assets, such as Locomotives and Railcars, as PSR-Related Operational Changes

While PSR is not defined by a prescribed set of operational changes, stakeholders we interviewed—including railroad representatives, employee unions, and shippers—identified a number of operational changes that they associate with PSR.[23] These changes include (1) reductions in railroad workforce; (2) use of fewer, longer trains; and (3) a decreased number of assets such as railcars, locomotives, and facilities. Representatives of the seven Class I railroads stated that they have made changes to their workforce and assets as well as other changes to increase efficiency and asset utilization. However, some railroad representatives noted that these changes may not be part of a PSR strategy but align with efforts to increase efficiency.

[22]*See* 49 U.S.C. § 24308(f). Before STB is permitted to exercise this authority, an intercity passenger train must fail to meet minimum standards established by FRA for customer on-time performance and service quality for two consecutive calendar quarters. See appendix II for more information.

[23]Due to the varying experiences of the groups we spoke with, not all stakeholders had opinions on all questions or issues during our interviews. Accordingly, we do not enumerate stakeholder responses in the report. Instead, we analyzed the responses and reported on common themes that arose during the stakeholder interviews. In some cases, we refer to “some” stakeholders if representatives of between three and five of the relevant groups (for instance, Class I railroads, employee groups, or freight rail customers) expressed a similar view, or “most” stakeholders if representatives of more than half of the relevant groups expressed a similar view.

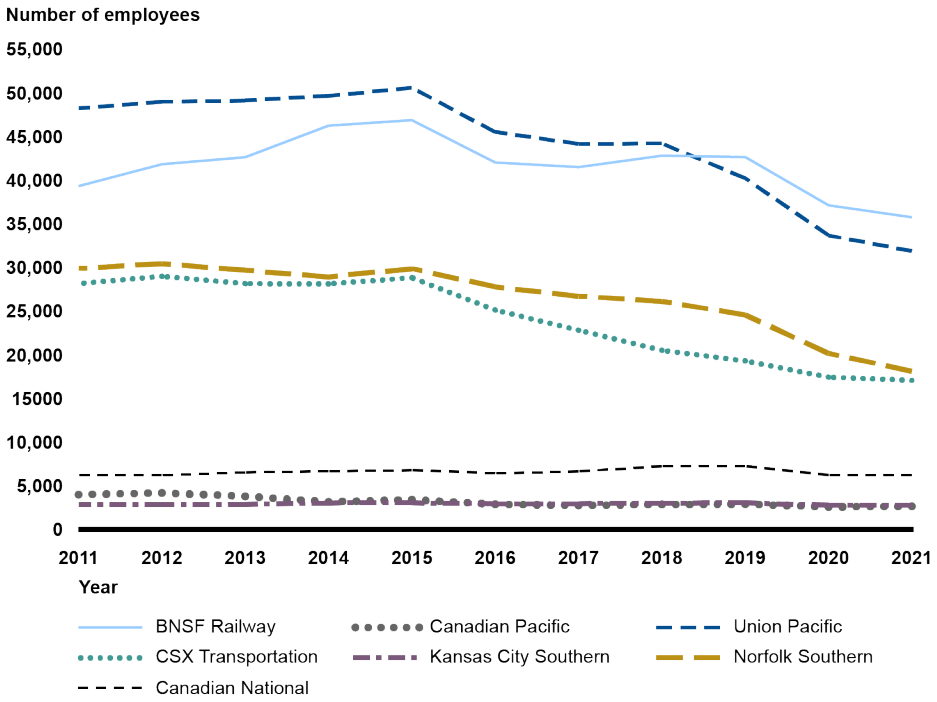
Railroads Have Reduced Workforce Numbers for All Employee Categories

Most Class I freight railroads reduced the number of employees from 2011 through 2021, according to STB employment data. Specifically, averaged over all Class I railroads, the number of employees decreased by about 28 percent, from nearly 159,000 employees in 2011 to slightly under 115,000 in 2021.[24] The changes in workforce varied by railroad. While five of the seven Class I railroads reduced their workforce between 9 percent (BNSF Railway) and 39 percent (CSX Transportation and Norfolk Southern) from 2011 through 2021, the remaining two railroads had consistent or slightly increased workforce levels (Canadian National and Kansas City Southern), as shown in figure 4.

For some railroads, changes in workforce occurred both prior to and after the railroad reports implementing PSR. For example, CSX began reducing its workforce in 2015, and then continued after implementing PSR in 2017. BNSF, which does not report implementing PSR, also had reductions in workforce at various points since 2011. According to railroad representatives, the number of personnel may be adjusted at times to account for changes in the operating environment including changes in demand for rail service, which may occur depending on seasonality or economic conditions. For example, according to some railroads, COVID-19 led to furloughs in 2020 because of reduced demand.

[24]STB collects data from the seven Class I railroads on the number of employees, service hours, compensation, and mileage run, by employee group (executive, officials and staff assistants, professional and administrative, maintenance of way and structures, maintenance of equipment and stores, transportation other than train and engine, and transportation train and engine). The data are collected quarterly and annually. 49 C.F.R. § 1245.2. They are not independently verified by STB.

Figure 4: Total Employment by Class I Railroad, 2011–2021



Source: GAO analysis of Surface Transportation Board data. | GAO-23-105420

Accessible Data for Figure 4: Total Employment by Class I Railroad, 2011–2021

Year	BNSF Railway	Canadian National	CSX Transportation	Kansas City Southern	Norfolk Southern	Canadian Pacific	Union Pacific
2011	39318	6200	28156	2831	29885	3992	48241
2012	41821	6207	28987	2833	30459	4189	48968
2013	42625	6548	28154	2890	29666	3799	49116
2014	46240	6675	28123	3038	28923	3158	49652
2015	46868	6788	28829	3050	29873	3413	50563
2016	42020	6439	25126	2954	27768	2885	45503
2017	41493	6641	22814	2958	26717	2768	44146
2018	42802	7249	20515	3033	26126	2868	44192
2019	42647	7275	19296	3046	24571	2905	40220
2020	37120	6250	17440	2771	20161	2585	33670
2021	35748	6212	17083	2817	18129	2655	31873

Notes: Employment numbers are calculated as an annual average of the number of employees mid-month.

These data include the U.S.-based workforce of Class I freight railroads, but railroads may have additional employees based in other countries (such as Mexico and Canada).

Changes in workforce also varied depending on the type of employee, though there were overall reductions in number of every class of employee, as shown in table 1. Across Class I railroads, the largest percentage decrease from 2011 through 2021—nearly 40 percent—was among “Maintenance of Equipment and Stores” employees, which includes mechanical staff, such as foremen, carmen, and machinists, who are responsible for the maintenance of equipment including railcars and locomotives. The next largest percentage decrease—nearly 30 percent—was among Transportation (Other than Train & Engine) employees, which include train dispatchers, crew dispatchers, and railyard supervisors (called yardmasters).

Table 1: Percentage Change in Class I Railroad Employees by Classification, 2011 to 2021

Employment classification description	Examples of employees	Percentage change from 2011–2021
Maintenance of equipment and stores: those with responsibility for maintenance of equipment (such as locomotives and railcars) and materials/supplies	Foreman, blacksmith, carman, electrician, fuel inspector, machinist, grain/coal/ore elevator operator, sheet metal worker	-39.8%
Transportation (other than train and engine): those with responsibility for transportation tasks other than operating trains	Train dispatcher, stationmaster, bridge operator, yardmaster, crew dispatcher	-29.6%
Professional and administrative	General counsel, chemist, nurse, computer analyst, clerk, claim agent	-27.4%
Transportation (train and engine): those with responsibility for operating trains	Switchtender, freight conductor, brakeman, engineer	-26.7%
Maintenance of way and structures: those with responsibility for maintaining track and rights-of-way as well as railroad facilities	Bricklayer, ironworker, bridge and building inspector, signalman/signal maintainer	-21.5%
Executives, officials, and staff assistants	President, vice president, director, manager	-21.3%

Source: GAO analysis of Association of American Railroads information, Surface Transportation Board employment data, and 49 C.F.R. Part 1245. | GAO-23-105420

Note: Regulations governing the classification of railroad employees, including job descriptions, and reporting on compensation are located in 49 C.F.R. Part 1245.

Railroads Generally Operated Longer Trains

In 2022, all seven Class I railroads told us they ran longer trains with the goal of increasing efficiency.[25] For example, according to one railroad, average train length has increased from 5,250 feet in 2011 to about 7,000 feet in 2021. According to another Class I railroad, the percentage of trains over 10,000 feet long has increased from less than 3 percent in 2017 to more than 25 percent in 2021. According to a third railroad, while the average train length has increased from about 6,300 feet in 2019 to nearly 7,000 feet in 2021, the percentage of trains over 10,000 feet has increased from 0.2 percent to about 5 percent during that timeframe. In 2019 we also reported that freight train length had increased from 2008 through 2017.[26]

[25]Overall data on train length are not publicly available. However, some Class I railroads provided us with information on changes in freight train length over time.

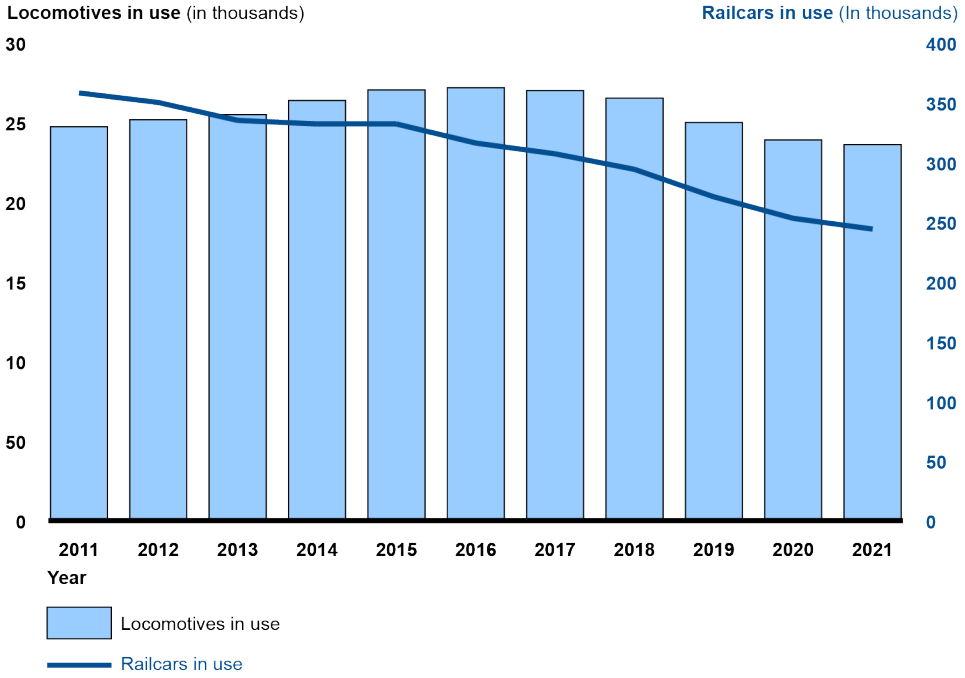
[26]GAO, *RAIL SAFETY: Freight Trains Are Getting Longer, and Additional Information Is Needed to Assess Their Impact,* GAO-19-443 (Washington, D.C.: May 30, 2019).

Some Railroads Reduced Assets, Such as Railcars and Railyards

Locomotives and railcars. AAR and STB data from 2011 through 2021 show an overall decrease in the number of locomotives and railcars in service for Class I railroads, as shown in figure 5. Across all Class I railroads, the number of locomotives in service decreased about 5 percent from 2011 to 2021, from 24,730 to about 23,600. Additionally, the number of railcars in service (those owned or leased by Class I railroads) decreased by about 32 percent from about 358,000 in 2011 to about 243,500 in 2021. According to some railroad representatives, this decrease is related to an increase in the number of cars owned and maintained by shippers, rather than by railroads. Additionally, this decline may be related to the decrease in revenue-ton-miles of freight transported by freight railroads since 2011 (see fig. 3). According to FRA officials, many railroads, including Class I railroads, reduced or optimized their locomotive fleets leading up to the 2018 deadline for the implementation of a positive train control system required by statute.[27]

[27]Positive train control is a communications-based system designed to prevent train-to-train collisions, over-speed derailments, incursions into established work zone limits, and the movement of a train through a switch left in the wrong position by automatically slowing or stopping a train that is not being operated safely. 42 railroads, including the seven Class I railroads, were required to implement positive train control by December 31, 2018, but almost all received FRA-approved extensions up to December 31, 2020 as permitted by statute. *See* 49 U.S.C. § 20157. For additional information, see GAO, *Positive Train Control: Railroads Generally Made Progress, but Several Must Meet Compressed Schedules to Meet Implementation Date,* GAO-20-516R (Washington, D.C.: Apr. 30, 2020).

Figure 5: Railroad Owned and Leased Locomotives and Freight Railcars among Class I Railroads, 2011–2021



Source: GAO analysis of Association of American Railroads and Surface Transportation Board data. | GAO-23-105420

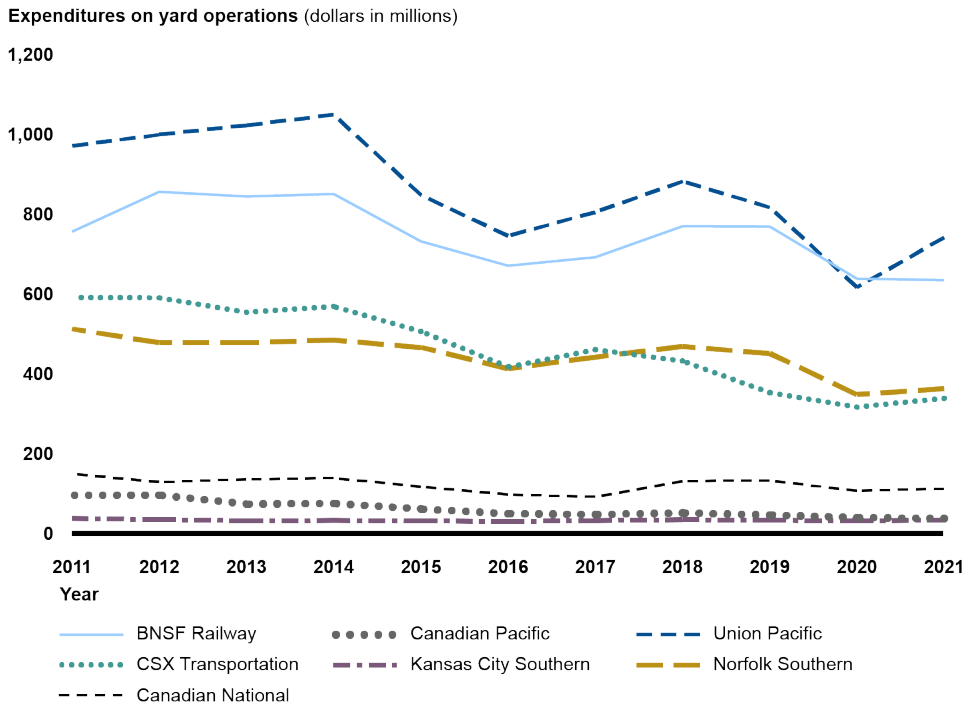
Accessible Data for Figure 5: Railroad Owned and Leased Locomotives and Freight Railcars among Class I Railroads, 2011–2021

Year	Locomotives in use
2011	24730
2012	25172
2013	25491
2014	26381
2015	27035
2016	27176
2017	27003
2018	26529
2019	25000
2020	23900
2021	23606

Year	Railcars In Use
2011	358
2012	350
2013	335
2014	332
2015	332
2016	316
2017	307
2018	294
2019	271
2020	253
2021	244

Railyards and facilities. While industry-wide data on the number of railroad facilities are not available, representatives of most of the Class I railroads said they have closed yards and other rail facilities over this period to reduce the number of times a railcar is handled between origin and destination. From 2011 through 2021, Class I railroad expenditures on yard operations (including employee salaries, supplies, and facility costs) decreased overall by about 27 percent but varied from year to year and among railroads, as shown in figure 6.

Figure 6: Expenditures on Yard Operations among Class I Freight Railroads (in Nominal Dollars), 2011-2021



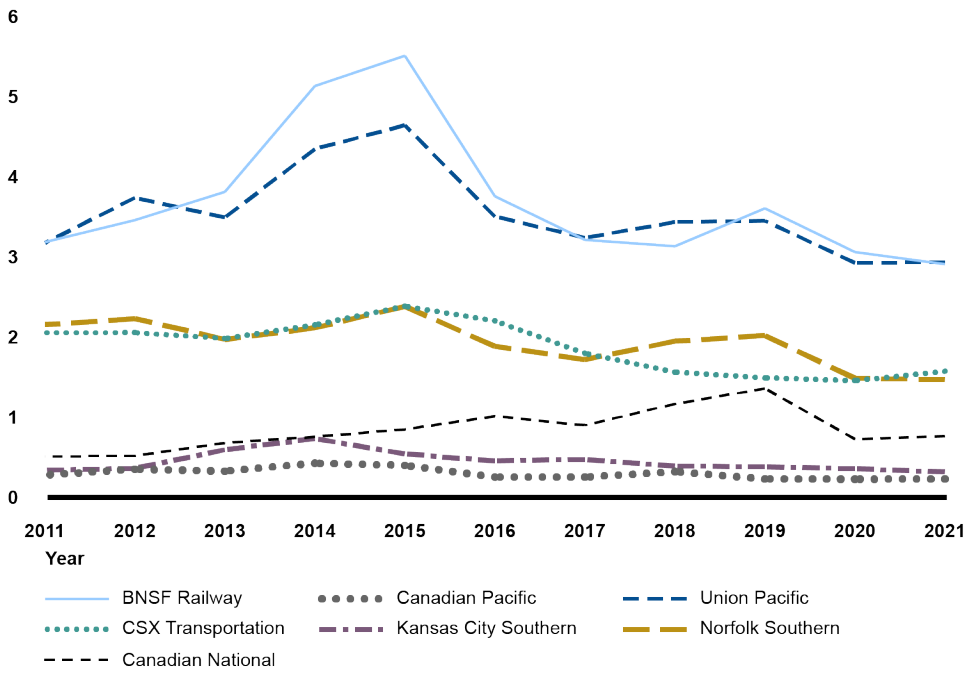
Source: GAO analysis of Association of American Railroads and Surface Transportation Board data. | GAO-23-105420

Accessible Data for Figure 6: Expenditures on Yard Operations among Class I Freight Railroads (in Nominal Dollars), 2011-2021

Year	BNSF Railway	Canadian National	Canadian Pacific	CSX Transportation	Kansas City Southern	Norfolk Southern	Union Pacific
2011	756.163	149.537	95.927	591.372	37.577	512.712	970.848
2012	856.065	128.884	96.213	590.347	34.923	477.937	999.114
2013	844.314	135.797	73.982	554.155	31.888	478.147	1022.74
2014	850.532	138.939	75.186	568.729	32.704	484.497	1049.34
2015	731.921	117.402	61.522	506.161	31.962	466.254	847.79
2016	670.786	97.51	49.556	417.364	30.231	412.292	745.421
2017	692.129	92.067	47.573	460.505	32.465	442.188	805.266
2018	769.757	131.411	51.719	432.164	34.679	468.176	882.502
2019	768.962	132.713	46.327	352.751	33.073	450.938	816.847
2020	638.303	106.941	39.934	316.851	31.616	347.902	616.725
2021	634.778	112.554	37.363	338.752	34.113	362.625	741.485

Capital expenditures. While railroad representatives told us they have reduced some categories of assets, data on capital expenditures—that is, expenditures on improvements to the railroad network such as acquiring equipment or land—among Class I railroads varied from 2011 through 2021, as shown in figure 7. Overall, expenditures peaked at $16.7 billion in 2015 and had an overall low of $10.2 billion in 2021. FRA officials noted that increases in capital expenditures prior to 2018 may be related to railroad efforts to equip their locomotive fleets and other equipment to meet the 2018 deadline for implementation of positive train control.[28]

Figure 7: Capital Expenditures by Class I Freight Railroads (in Nominal Dollars), 2011–2021



Source: GAO analysis of Association of American Railroads and Surface Transportation Board data. | GAO-23-105420

Accessible Data for Figure 7: Capital Expenditures by Class I Freight Railroads (in Nominal Dollars), 2011–2021

Year	BNSF Railway	Canadian National	Canadian Pacific	CSX Transportation	Kansas City Southern	Norfolk Southern	Union Pacific
2011	3.18607	0.510113	0.279168	2.05489	0.340382	2.15577	3.17648
2012	3.46081	0.521268	0.351888	2.05663	0.362661	2.23418	3.73857

[28]For additional information, see GAO-20-516R.

Year	BNSF Railway	Canadian National	Canadian Pacific	CSX Transportation	Kansas City Southern	Norfolk Southern	Union Pacific
2013	3.81336	0.680835	0.328023	1.98425	0.595707	1.9709	3.49538
2014	5.13439	0.755589	0.427738	2.15418	0.734961	2.11598	4.34834
2015	5.51247	0.850316	0.400751	2.38638	0.542636	2.38425	4.64431
2016	3.7582	1.01383	0.253735	2.20351	0.456275	1.88661	3.50516
2017	3.21468	0.900113	0.253663	1.79951	0.475024	1.72231	3.24054
2018	3.13462	1.16733	0.322654	1.56419	0.390221	1.94985	3.43706
2019	3.6078	1.35981	0.230889	1.4938	0.383801	2.02142	3.45336
2020	3.0625	0.728143	0.227691	1.457	0.35759	1.48738	2.92688
2021	2.91112	0.765068	0.230113	1.5751	0.318423	1.46934	2.9356

Note: Capital expenditures include expenditures related to acquiring or making improvements to equipment (such as railcars and locomotives) and structures (including track, bridges, and railyards), as well as other costs.

FRA Data Are Inconclusive on Safety Effects of Operational Changes Associated with PSR, but FRA Is Monitoring Potential Risks Identified by Stakeholders

Available Data Are Inconclusive on Safety Effects of Operational Changes Associated with PSR, According to FRA

According to FRA officials, available data are inconclusive about the extent to which operational changes among Class I railroads that stakeholders associate with PSR may have affected rail safety. Specifically, FRA safety data on rail equipment accidents, which includes derailments, and workplace injuries fluctuated within and among railroads from 2011 to 2021. According to FRA officials, while FRA has observed some short-term increases in accident and incident rates at some locations, FRA safety data do not show a clear causal relationship between the timing of reported implementation of PSR and changes in railroads' train accident and incident rates. However, FRA officials noted that they continue to analyze safety data and investigate locations where short-term increases were observed. As they continue their analysis, they said they could not rule out finding some type of a relationship between

the timing of operational changes associated with PSR and changes in rail safety metrics in the future. FRA officials added that a variety of factors may affect changes in safety data, including ongoing effects of the COVID-19 pandemic, and available safety data do not have the granularity to discern between operational changes related to PSR and other factors that may affect rail safety. For more information on FRA safety data, see appendix II.

Data on the results of compliance inspections have also varied from 2011 through 2021.[29] Inspectors employed by FRA as well as some states conduct periodic inspections of railroads, including inspections of equipment, track, and operations. As described by FRA officials, these inspections may result in the documentation of defects—any condition not in compliance with statutes, regulations, or related orders—and may then lead to violations, which can result in the assessment of civil monetary penalties or other FRA enforcement actions.[30] According to FRA officials, however, these safety inspection data are not always a good indicator of changes in defects over time because different factors influence inspection frequency for different railroads, the locations and types of assets prioritized for inspection, and the timing of inspections.[31] In addition, FRA officials and inspectors stated that in recent years, there has been an increase in the number of complaints from railroad employees on issues such as working too many hours or safety incidents,

[29]According to FRA's *Fiscal Year 2021 Enforcement Report*, these data include data on hazardous materials defects over which FRA has been delegated jurisdiction, i.e., noncompliance with statutes, regulations, and orders related to the transportation or shipment of hazardous materials by rail. FRA has also been delegated the authority to issue orders assessing civil penalties for violations of these particular hazardous materials statutes, regulations, and related orders. *See* 49 C.F.R. § 1.89 (generally delegating the authorities located in 49 U.S.C. §§ 5121-5124 relating to the transportation or shipment of hazardous materials by rail to FRA); 49 C.F.R. Part 209 (describing FRA's procedures for assessing civil monetary penalties for violations involving hazardous materials transportation within its jurisdiction). While these data overall show a recent decrease in violations, preliminary data on violations related to hours of service requirements for railroad personnel show an increase in defects of 60 percent from 2011 through 2021. This issue is discussed later in this report.

[30]According to 49 C.F.R. Part 209, Appendix A, depending on the number, severity, and circumstances of an instance of non-compliance, the inspector may prepare a violation report recommending the assessment of a penalty. Recommended violations are referred for legal review before a railroad, contractor, or person is notified.

[31]FRA collects data on the results of safety inspections completed by FRA and state inspectors.

which may require investigations that may reduce the frequency of compliance inspections in other locations.[32]

Selected Rail Employees and Safety Inspectors Identified Potential Safety Risks of Operational Changes

While safety data are inconclusive about safety effects from PSR, representatives of railroads, railroad employee unions, and safety inspectors we interviewed provided views on the safety effects of PSR-associated operational changes, including reductions in staff and running fewer, longer trains. Representatives of the seven Class I railroads generally stated that operational changes associated with PSR had no overall effect on or improved railroad safety and cited FRA's safety data. Some railroad representatives also discussed ways in which they had ensured safety as operational changes were implemented. For example, representatives of one railroad stated that they had invested in new technology to ensure that the railroad could operate safely with fewer employees.

On the other hand, some railroad representatives stated that there had been some initial safety effects following PSR changes, but that these initial effects may have been the result of unfamiliarity with new operating practices. For example, representatives of one railroad noted that they had an increase in derailments during the initial implementation of PSR. The representatives stated that once employees got used to PSR and the operational changes, more recent safety data have shown an improvement over the time period prior to PSR implementation.

In comparison, rail employees and inspectors identified safety concerns with recent operational changes such as fewer staff available to operate and maintain rail facilities and equipment and operating longer trains. Examples of these concerns included challenges related to pre-departure checks of train equipment, deferred maintenance, employee fatigue, and operating longer trains.

Changes in Pre-departure Checks

[32]For example, according to data on complaints regarding operating practices, FRA received nearly 200 total complaints in 2020, 500 complaints in 2021, and nearly 400 complaints as of July 2022. According to FRA's General Manual, FRA and state inspectors are to investigate complaints of alleged noncompliance with laws and orders and document their findings in a report.

Rail employees and FRA inspectors stated that railroads have compensated for a reduction in mechanical staff by having other staff, such as train conductors, complete pre-departure checks of trains on a regular basis. Each railroad must designate an employee to check each railcar in a train for compliance with FRA's minimum safety standards before the train departs.[33] These pre-departure checks generally consist of inspecting certain components of the freight cars for physical defects, such as testing brakes or identifying cracked wheels. While FRA regulations require railroads to designate qualified persons to conduct the inspections, they do not require railroads to designate a certain type of railroad employee, such as a mechanic. Rather, FRA regulations provide that each designated inspector must have demonstrated to the railroad a knowledge and ability to inspect railroad freight cars for compliance with the federal minimum safety standards for freight cars and make other required determinations. However, FRA officials, FRA inspectors, and some railroad employees said that transportation employees, including conductors, may not have the same level of training or expertise as mechanical staff, and may identify fewer safety issues. In addition, representatives from rail employee unions and inspectors noted that railroads require employees to conduct pre-departure checks in a certain amount of time and with fewer staff, including on longer trains, a situation that could lead to missing some defects.

Maintenance of Infrastructure and Equipment

Rail employees and inspectors said that the combination of fewer maintenance employees and a focus on moving trains out of yards as quickly as possible has resulted in railroads deferring maintenance on tracks and equipment. Some FRA and state inspectors said that as a result of this deferred maintenance, in some locations, they have seen an increase in certain types of defects in equipment and track, such as broken wheels, which could lead to accidents and injuries. Further, a variety of stakeholders—including rail workers, inspectors, and a rail customer—stated that using longer trains causes increased wear and tear on car couplings and track due to factors such as the increased train weight, which could cause derailments or other accidents if maintenance is deferred.

Employee Fatigue

[33]FRA's minimum safety standards for freight cars are located in 49 C.F.R. Part 215 and prohibit a railroad from placing or continuing in a service a freight car with certain defective components. Part 215 also specifies what constitutes a defect for each component.

Representatives from many of the railroad employee unions we spoke to said workforce reductions have resulted in remaining staff working additional hours, which may lead to employee fatigue. Specifically, some rail employees and inspectors said that, in some cases, railroad employees working additional hours could violate federal statutes establishing maximum on-duty and minimum off-duty periods for certain freight railroad employees for safety purposes (hours-of-service laws).[34] While recent data are preliminary, FRA assessed 60 percent more hours of service violations in 2021 than it did in 2011. While this increase could indicate an increase in hours of service violations, it could also reflect an increase in the number of these complaints, according to FRA officials. Further, rail employees, railroad representatives, and federal and state inspectors said that railroads have struggled to retain staff given current working conditions and increased workloads.

Training Changes

According to rail employees, some railroads responded to the reduced workforce by decreasing training time to get new staff to the field faster. However, FRA officials as well as some rail employees and inspectors said shortened training programs for new hires may lead to safety issues in the future if employees do not have sufficient training. For example, one employee union representative said that one railroad reduced its classroom training time for new engineers and conductors from 18 weeks to 6 weeks.[35]

Operational and Community Effects of Longer Trains

Stakeholders also identified safety concerns related to operating longer trains, such as communication between the front and rear of the train, and the effect of long trains on surrounding communities. For example, some rail employees explained that the air braking communication system

[34]See GAO, *Freight Railroad Safety: Hours of Service Changes Have Increased Rest Time, but More Can Be Done to Address Fatigue Risks,* GAO-11-853, (Washington, D.C.: Sept. 29, 2011). We recommended that FRA evaluate and develop recommendations about the relative impact of consecutive days worked and work performed during night hours on the potential for fatigue and risk of accidents. DOT did not take action to address this recommendation. However, to meet a mandate in the Rail Safety Improvement Act of 2008, FRA has issued a final rule requiring certain railroads to establish employee fatigue risk management programs. Pub. L. No. 110-432, div. A, § 103, 122 Stat. 4848, 4853 (2008) (codified as amended at 49 U.S.C. § 20156); Fatigue Risk Management Programs for Certain Passenger and Freight Railroads, 87 Fed. Reg.35,660 (June 13, 2022).

[35]Training, qualification, and certification requirements for engineers and conductors are located in 49 C.F.R. Parts 240 and 242, respectively.

between the lead locomotive and additional locomotives distributed throughout the train may not work as effectively on longer trains. This is because each railcar receives a signal to brake sequentially, and therefore the signal may not reach from the front to the rear of the train as quickly in a longer train, which rail employees said could contribute to a derailment.[36] Stakeholders also noted that longer trains can increase the likelihood of blocked highway-railroad crossings in communities. However, representatives of several railroads stated that fewer, longer trains could have the effect of reducing opportunities for accidents by reducing the frequency of trains passing through communities. We have previously reported on the potential safety effects of longer trains, including considerations for operating these trains and their impact on communities, including blocked crossings.[37]

FRA Has Ongoing and Planned Efforts to Monitor and Address Potential Rail Safety Risks

FRA officials stated that while data do not currently show a decrease in safety due to PSR-associated operational changes, these changes may increase risk, and FRA is engaged in several efforts to monitor and address these potential risks. Specifically, officials identified potential risks related to employee fatigue, training, and equipment inspection. For instance, FRA officials stated that maintenance and defect issues may take time to degrade to the point that they could potentially cause an accident. FRA efforts include ongoing activities such as conducting

[36]Freight trains in the United States use air-braking systems to control speed and stop. A conventional air-braking system is controlled by an air pressure signal from the leading locomotive, which sends a signal through the train to engage brakes. Because each railcar receives this signal sequentially, it takes multiple seconds for railcars at the end of the train to receive the air pressure signal and begin braking, depending on the train's length. The application of air brakes generates in-train forces, as railcars at the front of the train that have applied brakes will be pushed by railcars further back that have not yet received the air signal. As we will discuss later in this report, FRA is currently conducting a study of braking in longer trains. For additional information, see GAO, *Rail Safety: Freight Trains Are Getting Longer, and Additional Information Is Needed to Assess Their Impact*, GAO-19-443, (Washington, D.C.: May 30, 2019). Additionally, a rail employee said crew radios may not reach the full length of a long train, particularly in mountainous terrain. As a result, crew members may need to walk the length of the train to communicate.

[37]GAO, *Rail Safety: Freight Trains Are Getting Longer, and Additional Information Is Needed to Assess Their Impact*, GAO-19-443, (Washington, D.C.: May 30, 2019). GAO made two recommendations in our 2019 report, which FRA has implemented. We recommended that FRA (1) develop a strategy to share FRA research results with internal and external stakeholders and to implement that strategy and (2) work with railroads to engage local and state governments to identify community specific impacts and potential solutions to reduce those impacts.

inspections and audits, analyzing safety data, conducting outreach to railroads, and reviewing existing regulations. FRA also has several new or planned efforts that may help monitor and address potential risks.

Data analysis and railroad outreach. FRA has not identified a statistically significant relationship between the timing of a railroad's PSR implementation and the number of accidents and incidents. However, FRA officials stated that they have identified short-term increases in accident and incident rates at some locations, and continue to monitor data to identify potential safety effects of operational changes. Officials stated that FRA continually analyzes and uses safety data to focus monitoring and enforcement activities and allocate its limited resources. FRA uses the results of these analyses to guide FRA's inspection program, as described below, as well as outreach with railroads and other stakeholders. For instance, as part of FRA's regular oversight, safety management teams composed of FRA officials act as a liaison between the agency and railroads' safety leadership. According to FRA officials, safety management teams monitor accident and incident reports to identify potential trends, and discuss these items during weekly informal calls with each Class I railroad.

Compliance inspections. Also as part of its oversight function, FRA adjusts its compliance inspection program to focus on areas of concern. According to FRA officials, inspectors conduct several types of inspections, including accident and complaint investigations as well as regular inspections that may be conducted randomly or as directed by headquarters or divisional leadership.

Beyond periodic compliance inspections, FRA has begun conducting system safety audits, including audits of all seven Class I railroads. In 2021, FRA conducted an audit of a Class I railroad based on data indicating the railroad had a growing percentage of reportable derailments and other safety issues. The scope of this audit included a comprehensive review of the company's rail operations. FRA found compliance issues with protections for rail employees working on tracks or trains, improper tracking of hazardous materials, and track defects that could lead to a derailment, among other things. FRA recommended actions for the railroad to improve compliance in those areas but concluded that, in many aspects, the railroad's programs are largely effective and compliant with relevant safety regulations. In summer 2022, FRA completed a similar audit of another railroad and plans to complete audits of all seven Class I railroads over the next few years, according to officials.

Regulatory review. FRA officials stated that they are reviewing and considering areas of FRA regulations where they can provide additional guidance or clarity on existing regulations to help address potential safety risks. For example, officials stated that they are exploring whether they could provide additional guidance to railroads on the circumstances under which non-mechanical staff should conduct pre-departure checks. Additionally, the officials stated that FRA may identify areas in which changes to regulations are needed. For example, officials stated that the result of FRA's ongoing audit of railroad locomotive engineers' and conductors' training, qualification, and certification programs (discussed below) may indicate the need for regulatory changes. In July 2022, FRA also issued a Notice of Proposed Rulemaking that, if finalized, would establish minimum requirements for the size of train crews depending on the type of operation.[38]

Planned efforts to address potential risks, including employee fatigue, training, and effects of longer trains. In addition, FRA has several planned and in-process efforts that may assist in monitoring the potential safety effects of PSR-associated operational changes, as outlined in table 2. For example, FRA has issued a final rule requiring Class I and certain Class II and Class III freight railroads to develop a Risk Reduction Program and another final rule requiring certain railroads to establish an employee fatigue risk-management program as part of these railroads' safety risk reduction programs.[39] These programs will be implemented over the next several years. FRA also has several efforts planned to address requirements in the Infrastructure Investment and Jobs Act, which was enacted in 2021. Such efforts include conducting audits of Class I employee training and certification programs and studying the safety risks of longer freight trains. These efforts have generally not yet been completed or fully implemented. As such, it is too soon to assess how FRA's efforts will address the risks FRA has identified. However, these efforts may offer important insights into additional actions that FRA and railroads could take to address potential safety concerns identified by stakeholders, and whether there are specific areas in need of additional oversight by FRA.

[38]Train Crew Size Safety Requirements, 87 Fed. Reg. 45,564 (July 28, 2022).

[39]Risk Reduction Program, 85 Fed. Reg. 9262 (Feb. 18, 2020); Fatigue Risk Management Programs for Certain Passenger and Freight Railroads, 87 FR 35,660 (June 13, 2022).

Table 2: FRA Efforts Related to Safety Concerns Stakeholders Associated with PSR, as of August 2022

Area of concern	Scope	Status
Overall risk	**Risk Reduction Program:** To satisfy requirements in the Rail Safety Improvement Act of 2008, FRA issued a final rule in February 2020 requiring that Class I and certain other freight railroads develop and implement a Risk Reduction Program to improve the safety of their operations.[a] While railroads will have flexibility in implementing their programs, the main required components include risk-based hazard analysis and management.	Class I railroads were required to submit their risk reduction program plans describing how they will implement their program by August 16, 2021, at which point FRA was to review the plans. According to FRA, all seven Class I railroads submitted risk reduction plans on schedule, and FRA has prepared a set of review questions to evaluate them.
Employee fatigue	**Fatigue risk management:** FRA issued a final rule in June 2022 requiring railroads to develop fatigue risk management plans as a part of their broader Risk Reduction Programs.[b] As outlined in the final rule, this program will require railroads to consider including elements in their plans addressing factors that may influence employee fatigue, such as scheduling practices and an employee's consecutive hours off-duty.	The effective date of the final rule was July 13, 2022. Employee fatigue program plans are required to be filed with FRA for review by July 2023, and implementation is required within 3 years of FRA's approval of the plan.
Employee fatigue	**Employee fatigue pilot program:** The Infrastructure Investment and Jobs Act required FRA to commence the pilot program required under 49 U.S.C. § 21109(e)(1) to analyze different ways to reduce railroad employee fatigue within 90 days of the act's enactment.[c]	According to FRA officials, they are working with the Railroad Safety Advisory Committee to involve railroads in this effort and to solicit volunteers.[d]
Railroad employee training	**Engineer and conductor training audits:** The Infrastructure Investment and Jobs Act required FRA to audit training, qualification, and certification programs for engineers and conductors.[e]	According to FRA, it has completed a review plan and begun audits of several Class I railroads. FRA officials stated that the findings of these audits (and any potential changes to FRA regulations) will be published annually on FRA's public website, as required.
Operational and community effects of longer trains	**Study on brake systems in longer trains:** Since 2019, FRA has been evaluating air brake systems in longer trains.	Phase 3 of the study was completed in July 2022, which included stationary train tests for a very long train, including distributed power configurations. Phase 4, a moving train test, will be completed during 2023.
Operational and community effects of longer trains	**Study on stakeholders' concerns associated with longer trains:** FRA is performing stakeholder focus groups aimed at identifying the safety issues associated with very long trains (a term used to broadly characterize the subject of increasingly long freight trains).	FRA has conducted focus groups with representatives of employee unions, railroads, and FRA's Office of Railroad Safety. FRA is analyzing data with focus group participants and anticipates publishing a report in fall 2022.
Operational and community effects of longer trains	**Further study on trains longer than 7,500 feet:** The Infrastructure Investment and Jobs Act required FRA to conduct a study on the operation of freight trains longer than 7,500 feet.[f] To complete this study, FRA has engaged the National Academy of Sciences, Engineering, and Medicine to examine safety impacts of the operation of trains longer than 7,500 feet relative to shorter trains, including, but not limited to: loss of radio communications between crew members, derailments and other train accidents, and impacts on braking.	FRA has developed a statement of work with the National Academies of Science for this new study. The statement of work identifies a deadline for FRA to submit a report to Congress by November 15, 2023.

Area of concern	Scope	Status
Operational and community effects of longer trains	**Blocked crossing reporting portal:** The Infrastructure Investment and Jobs Act requires FRA to create a portal to collect information on blocked highway-rail crossings.[g] FRA has an existing blocked crossing incident reporting portal, through which members of the public can report when a train is blocking a highway-rail crossing.	To meet this requirement, FRA issued a request for information in the Federal Register in June 2022 seeking information on improvements that can be made to its existing blocked crossing incident reporting portal.[g] The deadline for public comments was August 15, 2022. According to officials, FRA is evaluating comments and may make updates to the portal as a result.

Source: GAO analysis of Federal Railroad Administration Information. | GAO-23-105420

[a]Pub. L. No. 110-432, div. A, § 103, 122 Stat. 4848, 4853 (2008) (codified as amended at 49 U.S.C. § 20156); Risk Reduction Program, 85 Fed. Reg. 9262 (Feb. 18, 2020). The Rail Safety Improvement Act of 2008 also required passenger railroads to establish Safety System Programs, which must include features similar to Risk Reduction Programs but are tailored to passenger rail. FRA issued implementing regulations for System Safety Programs in 2016 and 2020. System Safety Program, 81 Fed. Reg. 53,850 (Aug. 12, 2016), 85 Fed. Reg. 12.826 (Mar. 4, 2020).

[b]Fatigue Risk Management Programs for Certain Passenger and Freight Railroads, 87 Fed. Reg. 35,660 (June 13, 2022).

[c]Pub. L. No. 117-58, § 22408, 135 Stat. 429, 739 (2021).

[d]The Railroad Safety Advisory Committee was establish in 1996 by FRA and is made up of representatives from railroads, labor, shippers, industry associations and government agencies. The committee provides recommendations to FRA on issuing and updating regulations and identifies non-regulatory approaches to improve safety.

[e]Infrastructure Investment and Jobs Act § 22410.

[f]Infrastructure Investment and Jobs Act § 22422.

[g]Infrastructure Investment and Jobs Act § 22404; Request for Information Regarding FRA's Public Blocked Crossing Portal, 87 Fed. Reg. 36,036 (June 14, 2022).

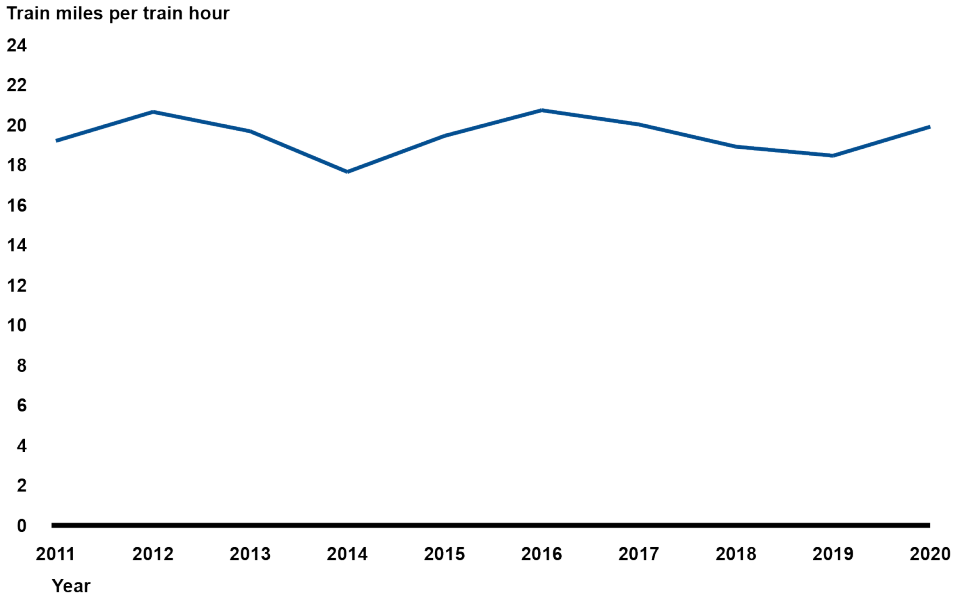
Service Effects from Operational Changes Associated with PSR Are Unclear, and STB Has Several Monitoring Efforts in Place

STB Data Show Variation in Freight Rail Service Data

Data on freight rail service show variation over the past 10 years, with periods of improvement and decline, but according to STB officials, it is unclear if that variation is linked to any PSR-associated operational changes made by railroads. Available data on freight rail service—including rail speed, dwell time, and average delays—can help STB and stakeholders monitor service conditions and identify regional or national service disruptions. However, STB officials said that data currently collected may not be sufficient to determine whether or not the operational changes associated with PSR have affected rail service.

Rail speed and dwell time. AAR data show that annual average rail-system speed (the speed with which trains on the U.S.-freight rail network reach their destination) varied from 2011 through 2020, as shown in figure 8.

Figure 8: Class I Freight Rail System Speed, 2011–2020



Source: GAO presentation of Association of American Railroads data. | GAO-23-105420

Accessible Data for Figure 8: Class I Freight Rail System Speed, 2011–2020

Year	Train miles per train hour
2011	19.2
2012	20.65
2013	19.68
2014	17.65
2015	19.45
2016	20.73
2017	20.02
2018	18.91
2019	18.46
2020	19.91

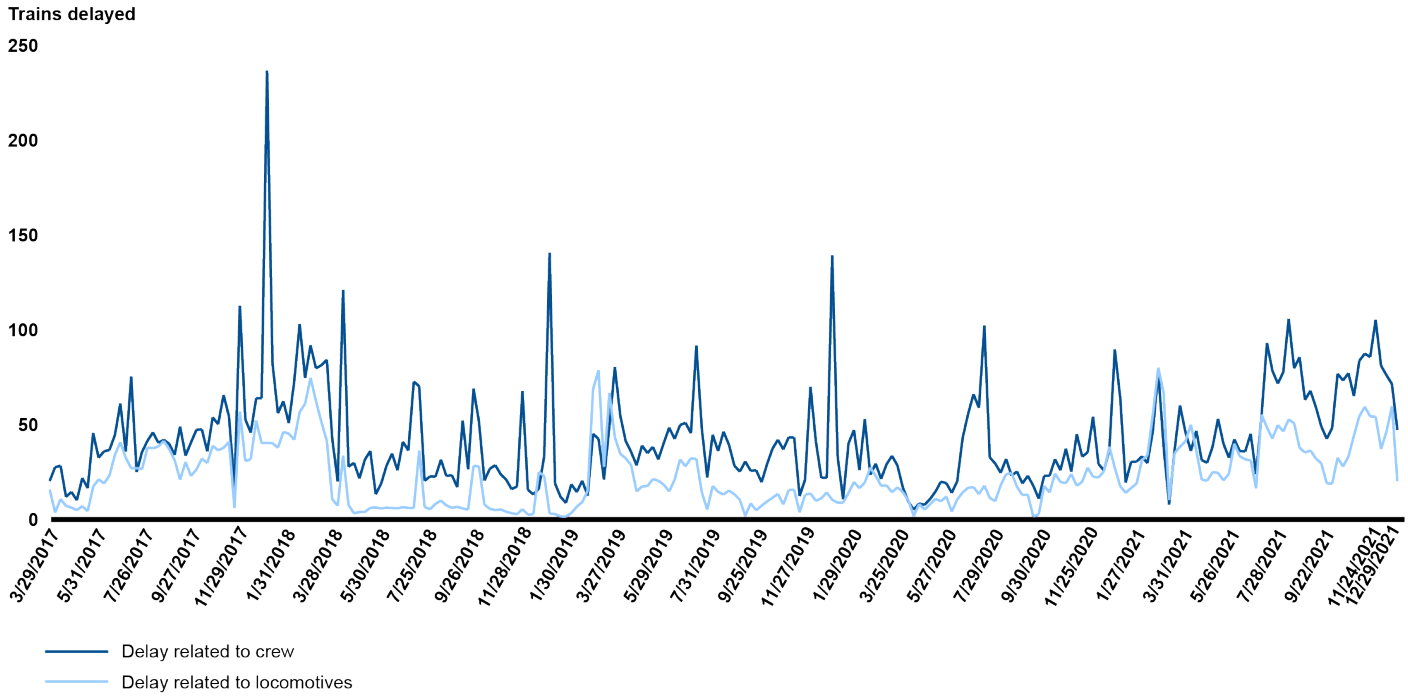
Notes: 2020 data are the latest available from the Association of American Railroads.

System speed refers to the average distance per hour for train operations between origin and destination, including time for stops (such as for equipment failures, weather, or to allow other trains to pass). System speed does not refer to the speed of the train as it moves over the tracks.

In 2017, STB began collecting more granular data from railroads on weekly system average train speed and dwell time (the amount of time a car is idle, expressed in hours) as well as the potential causes for delayed trains (such as crew and locomotive shortages).[40] However, because data are available since March of 2017, it is unknown how these data compare to service prior to 2017. Between March 2017 and August 2022, STB data on average train speed and dwell time vary, with both increases and decreases from week to week. For data on weekly average speed and dwell time by railroad, see appendix III.

Train delays. Similarly, data on trains held for lack of locomotives and crew (a measure indicating train delays) varied from 2017 through 2021, with some periods showing increased delays, as shown in figure 9.

Figure 9: Surface Transportation Board Data on Class I Freight Train Delays Due to Locomotives and Crew, March 2017 to December 2021



Source: GAO Analysis of Surface Transportation Board data. | GAO-23-105420

[40]United States Rail Service Issues—Performance Data Reporting, STB Docket No. EP 724 (Sub-No. 4).

Accessible Data for Figure 9: Surface Transportation Board Data on Class I Freight Train Delays Due to Locomotives and Crew, March 2017 to December 2021

Type	Locomotives	Crew
MAR-29-2017	15.83	20.33
APR-05-2017	3.7	27.64
APR-12-2017	10.81	28.39
APR-19-2017	7.2	12
APR-26-2017	6.3	14.57
MAY-03-2017	5	10.19
MAY-10-2017	7.04	21.91
MAY-17-2017	4.4	16.56
MAY-24-2017	17.31	45.66
MAY-31-2017	21.21	32.6
JUN-07-2017	19.03	35.94
JUN-14-2017	23.21	36.71
JUN-21-2017	34.1	44.57
JUN-28-2017	40.77	61.2
JUL-05-2017	32.54	35.87
JUL-12-2017	27	75.5
JUL-19-2017	27.14	25.06
JUL-26-2017	26.57	35.74
AUG-02-2017	37.97	41.56
AUG-09-2017	37.64	45.96
AUG-16-2017	38.51	40.47
AUG-23-2017	41.39	42.04
AUG-30-2017	37.14	39.94
SEP-06-2017	31.29	34.07
SEP-13-2017	20.97	49.03
SEP-20-2017	30.39	33.71
SEP-27-2017	22.99	40.61
OCT-04-2017	26.39	47.31
OCT-11-2017	32.13	47.54
OCT-18-2017	29.79	35.97
OCT-25-2017	38.91	53.89
NOV-01-2017	36.49	50.29
NOV-08-2017	37.84	65.67
NOV-15-2017	40.96	54.36
NOV-22-2017	6.11	16.24

Type	Locomotives	Crew
NOV-29-2017	56.89	112.77
DEC-06-2017	30.84	52.86
DEC-13-2017	31.87	45.81
DEC-20-2017	52.19	64
DEC-27-2017	40.27	63.91
JAN-03-2018	40.43	236.66
JAN-10-2018	40.26	82.39
JAN-17-2018	37.89	56.06
JAN-24-2018	46.26	62.41
JAN-31-2018	45.33	50.84
FEB-07-2018	42.09	72.83
FEB-14-2018	56.7	103.11
FEB-21-2018	61.06	74.7
FEB-28-2018	74.77	91.9
MAR-07-2018	62.5	79.77
MAR-14-2018	51.43	81.36
MAR-21-2018	41.46	84.29
MAR-28-2018	10.67	42.51
APR-04-2018	7.27	20.13
APR-11-2018	33.74	121.2
APR-18-2018	7.59	27.86
APR-25-2018	3.29	29.94
MAY-02-2018	3.99	21.69
MAY-09-2018	4.03	31.57
MAY-16-2018	6.2	36.16
MAY-23-2018	6.37	13.33
MAY-30-2018	5.83	19
JUN-06-2018	6.29	28.5
JUN-13-2018	6.1	34.79
JUN-20-2018	5.89	25.99
JUN-27-2018	6.57	41.01
JUL-04-2018	6.19	36.41
JUL-11-2018	6.04	72.77
JUL-18-2018	36.39	70.29
JUL-25-2018	6.59	20.41
AUG-01-2018	5.47	22.81
AUG-08-2018	8.31	22.64

Type	Locomotives	Crew
AUG-15-2018	10.01	31.57
AUG-22-2018	7.47	22.96
AUG-29-2018	6.21	23.46
SEP-05-2018	6.7	17.07
SEP-12-2018	5.87	52.19
SEP-19-2018	5.24	26.53
SEP-26-2018	28.34	69.09
OCT-03-2018	28.03	51.47
OCT-10-2018	7.9	20.59
OCT-17-2018	5.64	26.81
OCT-24-2018	5	28.67
OCT-31-2018	5.34	23.86
NOV-07-2018	4.13	21.09
NOV-14-2018	3.34	16.07
NOV-21-2018	2.79	17.44
NOV-28-2018	5.49	67.77
DEC-05-2018	2.6	15.69
DEC-12-2018	2.83	13.23
DEC-19-2018	25.04	16.2
DEC-26-2018	22.99	33.44
JAN-02-2019	3.09	140.69
JAN-09-2019	2.93	19
JAN-16-2019	1.69	12
JAN-23-2019	1.54	8.76
JAN-30-2019	3.49	18.63
FEB-06-2019	6.8	14.5
FEB-13-2019	9.21	20.47
FEB-20-2019	15.17	12.57
FEB-27-2019	68.83	45.21
MAR-06-2019	78.73	42.5
MAR-13-2019	27.89	21.14
MAR-20-2019	66.77	49.41
MAR-27-2019	43.34	80.49
APR-03-2019	34.64	54.83
APR-10-2019	32.27	41.33
APR-17-2019	28.69	35.63
APR-24-2019	14.8	28.61

Type	Locomotives	Crew
MAY-01-2019	17.47	39.04
MAY-09-2019	17.63	35.06
MAY-15-2019	21.34	38.34
MAY-22-2019	20.47	31.71
MAY-29-2019	18.43	40.33
JUN-05-2019	14.81	48.49
JUN-12-2019	21.07	42.49
JUN-19-2019	31.74	49.81
JUN-26-2019	28.04	51.03
JUL-03-2019	32.33	45.54
JUL-10-2019	31.97	91.79
JUL-17-2019	14.43	48.13
JUL-24-2019	5.24	22.2
JUL-31-2019	17.74	44.77
AUG-07-2019	14.6	36.13
AUG-14-2019	13.19	46.36
AUG-21-2019	15.33	39.43
AUG-28-2019	13.33	28.39
SEP-04-2019	10.44	25.27
SEP-11-2019	1.94	30.64
SEP-18-2019	8.57	25.69
SEP-25-2019	4.89	26.01
OCT-02-2019	7.29	19.7
OCT-09-2019	9.53	29.13
OCT-16-2019	11.46	37.29
OCT-23-2019	13.56	42.09
OCT-30-2019	8	37
NOV-06-2019	15.59	43.39
NOV-13-2019	15.71	43.19
NOV-20-2019	3.79	12.4
NOV-27-2019	13.06	20.99
DEC-04-2019	13.77	69.96
DEC-11-2019	9.9	41.04
DEC-18-2019	11.24	21.99
DEC-25-2019	14.3	22.04
JAN-01-2020	10.41	139.29
JAN-08-2020	8.93	33.24

Type	Locomotives	Crew
JAN-15-2020	8.87	10.66
JAN-22-2020	14.07	40.13
JAN-29-2020	19.83	47.2
FEB-05-2020	16.57	26.07
FEB-12-2020	19.53	52.97
FEB-19-2020	27.44	23.61
FEB-26-2020	23.1	29.49
MAR-04-2020	17.76	21.44
MAR-11-2020	18.06	29.14
MAR-18-2020	14.37	33.6
MAR-25-2020	17.01	28.5
APR-01-2020	14.43	16.86
APR-08-2020	10.17	9.54
APR-15-2020	1.94	5.24
APR-22-2020	8.1	8.43
APR-29-2020	5.3	7.81
MAY-26-2020	8	10.8
MAY-13-2020	10.94	14.74
MAY-20-2020	9.61	19.97
MAY-27-2020	12.13	19.23
JUN-03-2020	4.16	14.07
JUN-10-2020	10.57	20.2
JUN-17-2020	14.3	43
JUN-24-2020	16.77	55.63
JUL-01-2020	17.06	66.11
JUL-08-2020	13.43	58.93
JUL-15-2020	17.86	102.24
JUL-22-2020	11.41	32.71
JUL-29-2020	9.73	29.56
AUG-05-2020	18.09	24.63
AUG-12-2020	23.93	31.99
AUG-19-2020	24.54	23.14
AUG-26-2020	17.29	25.34
SEP-02-2020	12.9	19.04
SEP-09-2020	13.1	23.07
SEP-16-2020	1.64	17.84
SEP-23-2020	2.79	11.01

Type	Locomotives	Crew
SEP-30-2020	17.73	23.07
OCT-07-2020	14.3	23.13
OCT-14-2020	24.23	31.81
OCT-21-2020	19.79	26
OCT-28-2020	19.2	37.43
NOV-04-2020	24.04	25.23
NOV-11-2020	17.84	45.06
NOV-18-2020	19.89	33.19
NOV-25-2020	27.39	35.41
DEC-02-2020	22.6	54.21
DEC-09-2020	22.17	29.34
DEC-16-2020	25.39	25.87
DEC-23-2020	38.47	36.91
DEC-30-2020	27.3	89.66
JAN-06-2021	17.64	64.19
JAN-13-2021	14.09	19.53
JAN-20-2021	16.63	30.44
JAN-27-2021	18.94	30.57
FEB-03-2021	31.34	33.33
FEB-10-2021	33.93	29.69
FEB-17-2021	55.39	46.53
FEB-24-2021	80.13	77.93
MAR-03-2021	66.53	37.83
MAR-10-2021	10.37	7.9
MAR-17-2021	34.94	36.57
MAR-24-2021	38.44	60.16
MAR-31-2021	41.24	46.11
APR-07-2021	50.04	36.17
APR-14-2021	36.24	46.8
APR-21-2021	21.03	31.31
APR-28-2021	20.5	29.97
MAY-05-2021	25.03	38.47
MAY-12-2021	24.6	53.11
MAY-19-2021	20.64	39.97
MAY-26-2021	24.1	32.57
JUN-02-2021	39.99	42.29
JUN-09-2021	33.3	36.14

Type	Locomotives	Crew
JUN-16-2021	31.79	35.91
JUN-23-2021	31.19	45.21
JUN-30-2021	16.49	23.97
JUL-07-2021	55.3	54.61
JUL-14-2021	48.59	93.16
JUL-21-2021	42.64	78.49
JUL-28-2021	49.84	71.74
AUG-04-2021	46.44	77.69
AUG-11-2021	52.79	105.84
AUG-18-2021	50.84	79.76
AUG-25-2021	37.84	85.66
SEP-01-2021	35.33	63.1
SEP-08-2021	36.4	67.91
SEP-15-2021	32.2	59.33
SEP-22-2021	29.6	49.13
SEP-29-2021	19.14	42.56
OCT-06-2021	18.9	48.24
OCT-13-2021	32.61	76.87
OCT-20-2021	27.94	73.34
OCT-27-2021	33.23	77.17
NOV-03-2021	44.3	65.1
NOV-10-2021	54.44	83.71
NOV-17-2021	59.44	87.49
NOV-24-2021	54.44	85.71
DEC-01-2021	54.2	105.31
DEC-08-2021	37.2	81.1
DEC-15-2021	46.44	76.1
DEC-22-2021	59.74	71.46
DEC-29-2021	20.2	47.27

Note: Data are available beginning March 2017. The data points are the weekly average of trains held due to a lack of either locomotives or crew to drive the train.

Stakeholders We Interviewed Identified Effects of PSR-Associated Operational Changes Including Concerns about Service, Reliability, and Fees

While it is unclear if variations in service data are linked to PSR, both railroads and stakeholders we interviewed identified service changes to freight rail service as a result of operational changes associated with PSR implementation. Class I railroad representatives stated that service changes associated with PSR were intended to increase the efficiency and reliability of the railroads. Freight rail customers we spoke to identified service concerns including changes in frequency of service, reduced reliability of service, and increased fees. We also spoke to representatives of passenger railroads about potential effects of PSR-associated operational changes on passenger rail; this information is included in appendix IV.

Frequency of Freight Service

Both railroad representatives and rail customers stated that for some customers, use of fewer, longer trains reduced the frequency of freight service.[41] For example, a shipper that used to receive service from a railroad 5 days a week may now receive service 2 days a week, with potentially more railcars at one time. Four of the seven Class I railroads told us that they chose to reduce the frequency of service to some smaller customers when the railroad could deliver all of the customer's cars in fewer days of service. Railroad representatives also said that they increased the frequency of service for some customers—based on market demand—to improve service to all customers and improve overall network efficiency.

However, some rail customers stated that, even if the number of cars delivered or picked up on a weekly basis remained the same, changes to the frequency and number of cars transferred at one time can be problematic. For example, one rail customer said that their physical plant, built to accommodate the previous railcar delivery schedule, has limited space available to process railcars. As a result, the facility cannot process more cars at one time. Further, customers that use unit trains—trains transporting a single commodity, rather than different types of freight—stated that railroads have been combining trains for efficiency, which has caused challenges. For example, representatives of coal power plant operators said that railroads have been combining trains for multiple

[41]Data on the frequency with which railroads service individual customers are unavailable.

shippers, which has led to railcars being delivered in larger groups than before or delivered to the wrong location. They noted this situation is challenging for power plants because large swings in the coal supply make it difficult to manage their coal storage area.

Reliability of Freight Service

Representatives from one railroad and other stakeholders we interviewed stated that a lack of sufficient crew and locomotives impeded railroads' ability to recover from disruptions and maintain reliable service. Some Class I railroads have reduced both staff and locomotives since 2011. Railroad representatives stated that they reduced staff according to workforce needs prior to and early in the COVID-19 pandemic. Since then, however, they noted that they have faced challenges rehiring furloughed employees and hiring new employees to respond to the current surge in demand.

Most stakeholders we interviewed stated that—by reducing the number of staff and locomotives to increase asset use—railroads may have reduced the resilience of the rail network to respond to unexpected events such as extreme weather and the COVID-19 pandemic. STB officials stated that railroads' efforts to optimize the efficiency of their operations may have inhibited their ability to recover from the pandemic and fulfill subsequent customer demand. For example, at an April 2022 hearing, the STB Chairman noted that the Board had received complaints about inconsistent and unreliable rail service from a broad range of stakeholders, and that these complaints were corroborated by weekly rail service data.[42] According to investment analysis presented at the hearing, a railroad may run smoothly with a lean crew capacity, but an unforeseen event—such as a weather event or an unexpected loss of crew—will result in a slowdown of the rail network.[43]

Stakeholders stated that unexpected delays in rail service can negatively affect their businesses. For example, coal shippers told us that in 2021, coal inventories at power plants were low because of rail delays, and officials from one coal power plant said the plant had switched to natural gas, in part because it did not receive its expected coal shipments.

[42]*See* Statement of Martin J. Oberman, Urgent Issues in Freight Rail Service, STB Docket No. EP 770: (April 26, 2022).

[43]*See* Statement of Rick Paterson, Loop Capital Markets, Urgent Issues in Freight Rail Service, STB Docket No. EP 770 (April 26, 2022).

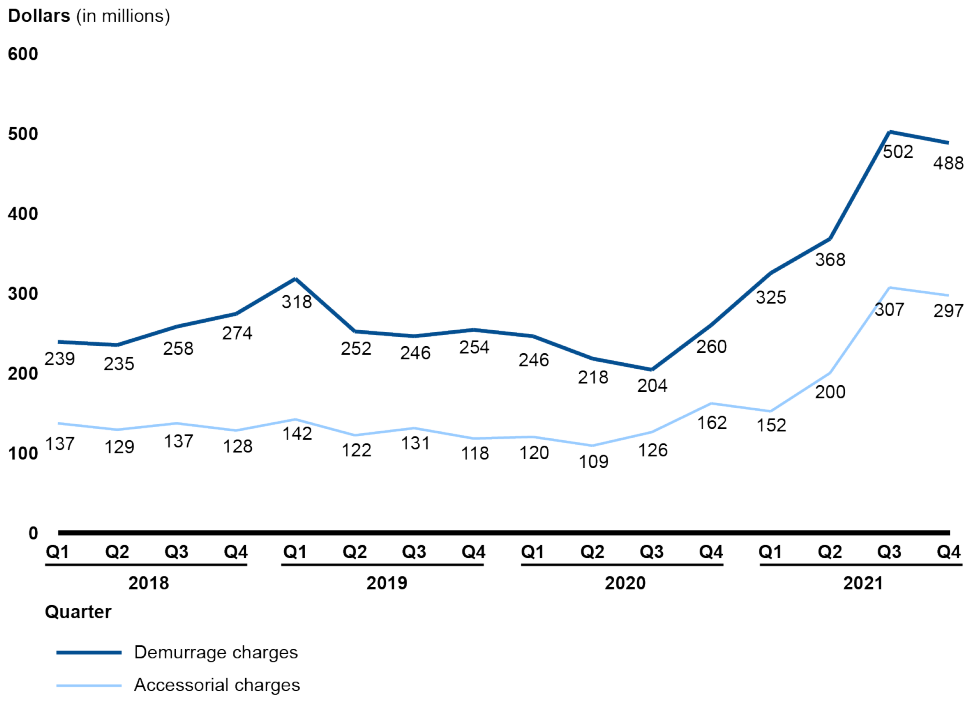
Further, some rail customers said that as a result of freight rail delays they have had to shift some freight to trucks, which are more expensive.

Railroad Fees

Freight rail customers we interviewed said they are paying higher fees to railroads as a result of changes in service. Specifically, some rail customers have said that they are paying more in demurrage and accessorial charges.[44] In 2018, STB started collecting data on demurrage and accessorial charges. These data show an increase in both charges in the second half of 2021, as shown in figure 10. Railroad representatives and rail customers noted several reasons for changes in demurrage charges. Some Class I railroads stated they have increased the amount and types of charges to encourage customers to process cars more quickly to increase railcar use. For example, representatives from one railroad stated that they had reduced the time allowed for customers to unload and return cars without incurring a charge, a change that was intended to incentivize customers to return the cars faster and reduce dwell time.

[44]As previously mentioned, demurrage is a fee incurred by a rail customer when it detains a freight railroad's railcars beyond a specified period of time for loading or unloading. *See* 49 C.F.R. § 1333.1. Accessorial charges are not specifically defined by statute or regulation but are generally understood to include charges other than line-haul charges and demurrage. Demurrage Billing Requirements, 86 *Fed. Reg*. 17,735, 17,736 n.10 (Apr. 6, 2021).

Figure 10: Class I Freight Railroad Demurrage and Accessorial Charges (in 2021 Dollars) by Quarter for 2018-2021



Source: GAO analysis of Surface Transportation Board data. | GAO-23-105420

Accessible Data for Figure 10: Class I Freight Railroad Demurrage and Accessorial Charges (in 2021 Dollars) by Quarter for 2018-2021

Quarter	Demurrage charges (dollars in millions)	Accessorial charges (dollars in millions)
Q1 2018	239	137
Q2 2018	235	129
Q3 2018	258	137
Q4 2018	274	128
Q1 2019	318	142
Q2 2019	252	122
Q3 2019	246	131
Q4 2019	254	118
Q1 2020	246	120
Q2 2020	218	109
Q3 2020	204	126
Q4 2020	260	162
Q1 2021	325	152

Quarter	Demurrage charges (dollars in millions)	Accessorial charges (dollars in millions)
Q2 2021	368	200
Q3 2021	502	307
Q4 2021	488	297

Note: Demurrage fees to railroads are for delayed pick-up or return of railcars, and accessorial charges, which generally are charges other than demurrage fees, include fees paid for additional freight service such as diverting a railcar. See 49 C.F.R. § 1333.1; Demurrage Billing Requirements, 86 Fed. Reg. 17,735, 17,736 n.10 (Apr. 6, 2021). Fees have been adjusted for inflation and are in 2021 dollars.

However, some rail customers said that the changes in service discussed above—such as reduced frequency of service—may lead to more charges for rail customers. For instance, if a railroad delivers more cars at one time than a customer is prepared to handle, the increased time to unload those cars may result in a delay in returning the cars to the railroad and thus in additional charges. Some rail customers also said that they were charged demurrage fees for delays caused by the railroad and had to go through a process of disputing those charges. STB issued a final rule in April 2021 that required Class I carriers to include certain minimum information on or with demurrage invoices to help shippers review and verify the charges.[45] This rule went into effect on October 6, 2021.

STB Has Ongoing Efforts to Address Data Collection and Rail Customer Service Concerns

STB generally exercises its authority to address major concerns and disputes of freight rail customer and passenger rail service issues by adjudicating or addressing these issues on a case-by-case basis. For example, STB adjudicates disputes over whether railroads' demurrage fees or related rules themselves are lawful based the specific facts and

[45]Demurrage Billing Requirements, 86 *Fed. Reg.* 17,735 (Apr. 6, 2021).

circumstances of each individual case.[46] However, STB has broader authorities that include collecting financial, service, and performance reports from railroads subject to its jurisdiction; establishing informal mechanisms to resolve individual disputes; issuing regulations; and other activities.[47] For example, in October 2017, STB held a public-listening session to help monitor one Class I railroad's implementation of PSR and associated service concerns. STB continued to correspond with the railroad on these issues through March 2018, at which point STB noted that the railroad's service metrics had shown marked improvement since the 2017 disruptions.

While STB does not have ongoing efforts specific to PSR, it has several efforts aimed at collecting data and addressing service challenges for freight rail customers and passenger rail operators. Specifically, STB has established mechanisms to help rail customers and railroads resolve specific service problems and disputes. For example, according to STB officials, STB monitors rail service by holding monthly calls with Class I railroads. Additionally, officials stated that STB works with customers through its Rail Customer and Public Assistance program, which is intended to resolve issues related to service such as reduced service frequency or missed service on an informal case-by-case basis. STB officials told us that they monitor rail service performance data reported by Class I railroads on a weekly basis and use the data to better understand the rail network's performance, including railroad disruptions, and to help with specific complaints by rail customers.

In addition to these activities, STB has initiated proceedings to collect information on industry-wide challenges, such as complaints from

[46]STB has jurisdiction over demurrage under 49 U.S.C. § 10702, which requires railroads under its authority to establish reasonable rates and service transportation-related rules and practices, including those pertaining to demurrage. Demurrage charges also must be computed and implemented in a way that fulfills national needs related to freight car use and distribution and maintenance of an adequate freight car supply. 49 U.S.C. § 10746. STB adjudicates disputes over the lawfulness of demurrage charges on a case-by-case basis, in part because it recognizes that there may be different ways to implement and administer reasonable demurrages fees and rules. Policy Statement on Demurrage and Accessorial Rules and Charges, 85 Fed. Reg. 26,866, 26,866 (May 6, 2020).

[47]For example, STB is statutorily authorized to require railroads to enter into reciprocal switching agreements where it determines them to be practicable and in the public interest or where such agreements are necessary to provide competitive rail service. STB's regulations implementing this statute specify what determinations it must make before it will do so, which include determining that the railroad desiring to use reciprocal switching has used or would use it for a significant amount of traffic.

shippers related to the reduction in service frequency and reliability. Recent efforts include STB proceedings on rail service metrics, competition, and service degradation, as outlined in table 3.

Table 3: Surface Transportation Board (STB) Efforts to Address Freight Rail Service Concerns

Service concern	STB effort	Status
Rail service degradation: In 2022, STB and stakeholders identified significant service problems involving Class I freight railroads.	In April 2022, STB initiated proceedings to monitor recent rail service problems and associated recovery efforts by four Class I freight railroads.[a] In May 2022, STB issued a decision (1) requiring these railroads to provide data and service recovery plans as well as biweekly progress reports to STB detailing their proposed rehiring plans and other changes to address service concerns and (2) requiring all Class I railroads to submit additional weekly performance data for a period of six months.[b] STB officials stated that the service data reported in the submitted recovery plans revealed more extensive service delays and reliability problems than captured by the Board's existing data collection efforts.	In June 2022, STB issued a decision requiring the four railroads to correct deficiencies in their service recovery plans and to provide additional information on their efforts to improve service.[b] In October 2022, STB extended its requirement for biweekly progress reports from four railroads and additional weekly performance data for all Class I railroads until May 5, 2023.
First- and last-mile service data: Some rail customers we interviewed said that the existing STB rail service metrics—train speed, dwell time, and trains held, among others—do not show a complete picture of the service challenges they have been experiencing, particularly at the time of pick-up from shippers and delivery to receivers, commonly known as first- and last-mile service.	In August 2021, STB requested comments from freight rail customers and other stakeholders on issues related to first- and last-mile service, including whether additional metrics should be required.[c] The results may enable STB and stakeholders to better understand and document customers' ongoing rail service concerns, according to STB officials.	According to STB, as of October 2022, STB is studying what new metrics might be most helpful, but STB stated that further action in this area has been delayed due to the interrelationship between this effort and STB's efforts to monitor rail service degradation (see above).
Freight rail service and competition: Some rail customers have stated that railroads are not meeting their common carrier obligation or that the lack of competition among railroads had led to decreased service.	In 2022, STB continued a proceeding related to a 2016 notice of proposed rulemaking that would revise its regulations that enable rail customers to receive service from other railroads (called reciprocal switching).[d]	According to officials, STB plans to issue a decision on reciprocal switching in February 2023.

Source: GAO analysis of Surface Transportation Board information. | GAO-23-105420

Notes: The Surface Transportation Board (STB) classifies freight rail carriers based on annual operating revenues for regulatory purposes. Current thresholds establish Class I freight railroads as carriers that earn $900 million or more annually. 49 C.F.R. pt. 1201.

[a]*See* Urgent Issues in Freight Rail Service. STB Docket No. EP 770.

[b]*See* Urgent Issues In Freight Rail Service—Railroad Reporting, STB Docket No. EP 770 (Sub-No. 1).

[c]*See* First-Mile/Last-Mile Service, STB Docket No. EP 767.

[d]*See* Reciprocal Switching, STB Docket No. EP 711 (Sub No. 1); Petition for Rulemaking To Adopt Revised Competitive Switching Rules; Reciprocal Switching, 81 FR 51,149 (proposed Aug. 3, 2016).

STB's ongoing proceedings may result in STB decisions establishing requirements for railroads, as well as regulatory changes. For instance,

according to the STB Chairman, Board members are developing new regulations for reciprocal switching. According to the Chairman, while the proceedings on reciprocal switching are not specifically about PSR, new regulations in that area have the potential to increase competition among the railroads. Increased competition could, in turn, improve service for customers.

Agency Comments

We provided a draft of this report to the Department of Transportation (DOT); Surface Transportation Board (STB); U.S. Department of Agriculture (USDA); and Amtrak for review and comment. USDA told us that they had no comments on the draft report. DOT, STB, and Amtrak provided technical comments, which we incorporated as appropriate.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 10 days from the report date. At that time, we will send copies of this report to the appropriate congressional committees, the Secretaries of Transportation and Agriculture, the Chairman of the STB, the Chief Financial Officer of Amtrak, and other interested parties. In addition, the report is available at no charge on the GAO website at https://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-2834 or RepkoE@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix V.

Elizabeth Repko
Director, Physical Infrastructure

Appendix I: Stakeholders Contacted during the Course of This Review

To better understand precision-scheduled railroading (PSR) and the potential effects of operational changes associated with PSR, we interviewed officials from the following federal agencies: Federal Railroad Administration (FRA); Surface Transportation Board (STB); and the U.S. Department of Agriculture (USDA). Within FRA, we interviewed the Administrator, Associate Administrator for Railroad Safety, and a variety of staff within the Office of Railroad Safety. Additionally, we interviewed FRA rail safety inspectors representing all eight of FRA's districts and four technical disciplines based on their relevance to the safety concerns identified during the course of our review: Motive Power & Equipment, Operating Practices, Signal & Train Control, and Track & Structures. Within STB, we interviewed the Chairman of the Board as well as officials who provide assistance to rail customers and oversee railroad compliance. We also interviewed officials from USDA's Agricultural Marketing Service, which—among other things—provides support to U.S. agricultural businesses by conducting research and representing the interests of agricultural shippers related to transportation issues.

Additionally, we interviewed representatives of stakeholders selected to achieve a broad range of perspectives including railroads, railroad employees, customers, and other stakeholders. For instance, we interviewed Amtrak officials to understand potential effects of freight railroads' operational changes on passenger rail service. Selected stakeholders are listed in table 4, along with the methodology for selection within each group.

Table 4: Interview Groups with Selection Methodologies

Stakeholder category	Interviewees
State rail safety inspectors: Based on input from Federal Railroad Administration officials and the Association of State Rail Safety Managers, we selected state safety inspectors that represented a geographic dispersion of states and a variety of technical disciplines.	Association of State Rail Safety Managers (ASRSM)

Stakeholder category	Interviewees
State rail safety inspectors: Based on input from Federal Railroad Administration officials and the Association of State Rail Safety Managers, we selected state safety inspectors that represented a geographic dispersion of states and a variety of technical disciplines.	Alabama Public Service Commission
State rail safety inspectors: Based on input from Federal Railroad Administration officials and the Association of State Rail Safety Managers, we selected state safety inspectors that represented a geographic dispersion of states and a variety of technical disciplines.	California Public Utilities Commission
State rail safety inspectors: Based on input from Federal Railroad Administration officials and the Association of State Rail Safety Managers, we selected state safety inspectors that represented a geographic dispersion of states and a variety of technical disciplines.	Illinois Commerce Commission
State rail safety inspectors: Based on input from Federal Railroad Administration officials and the Association of State Rail Safety Managers, we selected state safety inspectors that represented a geographic dispersion of states and a variety of technical disciplines.	North Carolina Department of Transportation
State rail safety inspectors: Based on input from Federal Railroad Administration officials and the Association of State Rail Safety Managers, we selected state safety inspectors that represented a geographic dispersion of states and a variety of technical disciplines.	Pennsylvania Public Utility Commission
Class I railroads: We interviewed all seven Class I railroads.[a]	BNSF Railway
Class I railroads: We interviewed all seven Class I railroads.[a]	Canadian National
Class I railroads: We interviewed all seven Class I railroads.[a]	Canadian Pacific
Class I railroads: We interviewed all seven Class I railroads.[a]	CSX Transportation

Stakeholder category	Interviewees
Class I railroads: We interviewed all seven Class I railroads.[a]	Kansas City Southern
Class I railroads: We interviewed all seven Class I railroads.[a]	Norfolk Southern
Class I railroads: We interviewed all seven Class I railroads.[a]	Union Pacific
Rail employee unions: We interviewed rail employee unions representing a broad range of disciplines.	American Train Dispatchers Association
Rail employee unions: We interviewed rail employee unions representing a broad range of disciplines.	Brotherhood of Locomotive Engineers and Trainmen
Rail employee unions: We interviewed rail employee unions representing a broad range of disciplines.	Brotherhood of Maintenance of Way Employees Division
Rail employee unions: We interviewed rail employee unions representing a broad range of disciplines.	Brotherhood of Railroad Signalmen
Rail employee unions: We interviewed rail employee unions representing a broad range of disciplines.	International Brotherhood of Electrical Workers
Rail employee unions: We interviewed rail employee unions representing a broad range of disciplines.	International Association of Sheet Metal, Air, Rail & Transportation Workers
Rail employee unions: We interviewed rail employee unions representing a broad range of disciplines.	Transportation Communications International Union
Rail employee unions: We interviewed rail employee unions representing a broad range of disciplines.	Transport Workers Union of America
Rail customers: We interviewed representatives of rail customers from a variety of industries such as minerals, chemicals, agricultural products, and consumer products based on prior GAO work and contributions to Surface Transportation Board proceedings that may be related to precision-scheduled railroading.	American Chemistry Council*: represents companies engaged in chemistry and companies that ship chemicals.*

Stakeholder category	Interviewees
Rail customers: We interviewed representatives of rail customers from a variety of industries such as minerals, chemicals, agricultural products, and consumer products based on prior GAO work and contributions to Surface Transportation Board proceedings that may be related to precision-scheduled railroading.	Freight Rail Customer Alliance: *an alliance of freight rail shippers, including large trade organizations.*
Rail customers: We interviewed representatives of rail customers from a variety of industries such as minerals, chemicals, agricultural products, and consumer products based on prior GAO work and contributions to Surface Transportation Board proceedings that may be related to precision-scheduled railroading.	International Liquid Terminals Association: *represents terminal operators handling liquids, such as chemicals, fuel, animal and vegetable oils, and fertilizers.*
Rail customers: We interviewed representatives of rail customers from a variety of industries such as minerals, chemicals, agricultural products, and consumer products based on prior GAO work and contributions to Surface Transportation Board proceedings that may be related to precision-scheduled railroading.	Industrial Minerals Association-North America: *represents companies that mine or process industrial minerals, such as clay, industrial sand, and calcium carbonate.*
Rail customers: We interviewed representatives of rail customers from a variety of industries such as minerals, chemicals, agricultural products, and consumer products based on prior GAO work and contributions to Surface Transportation Board proceedings that may be related to precision-scheduled railroading.	National Grain and Feed Association: *represents agricultural companies that produce, buy, sell, and store grain and feed as well as related businesses.*
Rail customers: We interviewed representatives of rail customers from a variety of industries such as minerals, chemicals, agricultural products, and consumer products based on prior GAO work and contributions to Surface Transportation Board proceedings that may be related to precision-scheduled railroading.	National Industrial Transportation League: *represents the interests of shippers.*

Stakeholder category	Interviewees
Rail customers: We interviewed representatives of rail customers from a variety of industries such as minerals, chemicals, agricultural products, and consumer products based on prior GAO work and contributions to Surface Transportation Board proceedings that may be related to precision-scheduled railroading.	Private Railcar Food and Beverage Association: *represents producers of food and beverages that own or lease their own railcar fleets.*
Rail customers: We interviewed representatives of rail customers from a variety of industries such as minerals, chemicals, agricultural products, and consumer products based on prior GAO work and contributions to Surface Transportation Board proceedings that may be related to precision-scheduled railroading.	Western Coal Traffic League: *represents consumers of coal produced from mines located west of the Mississippi River.*
Other rail stakeholders: We selected additional stakeholders based on their experience interacting with Class I railroads.	Amtrak
Other rail stakeholders: We selected additional stakeholders based on their experience interacting with Class I railroads.	American Public Transportation Association: *represents organizations that promote and advocate for the public transportation industry, including commuter and passenger rail.*
Other rail stakeholders: We selected additional stakeholders based on their experience interacting with Class I railroads.	American Short Line and Regional Railroad Association: *represents owners and operators of short line and regional railroads throughout North America.*
Other rail stakeholders: We selected additional stakeholders based on their experience interacting with Class I railroads.	Association of American Railroads: *a policy, research, and standard setting organization representing the major freight railroads in the United States, Canada, and Mexico, as well as Amtrak.*
Other rail stakeholders: We selected additional stakeholders based on their experience interacting with Class I railroads.	Loop Capital Markets: *an investment bank, brokerage, and advisory firm providing analysis for and about the freight rail industry.*
Other rail stakeholders: We selected additional stakeholders based on their experience interacting with Class I railroads.	Transport Canada: *the governmental agency responsible for developing transportation regulations, policies, and programs in Canada.*

Source: GAO. | GAO-23-105420

[a]The Surface Transportation Board (STB) classifies freight rail carriers based on annual operating revenues for regulatory purposes. Current thresholds establish Class I freight railroads as carriers that earn $900 million or more annually. 49 C.F.R. pt. 1201.

Due to the varying experiences of the groups we spoke with, not all stakeholders had opinions on all questions or issues during our interviews. Accordingly, we do not enumerate stakeholder responses in the report. Instead, we analyzed the responses and reported on common themes that arose during the stakeholder interviews. In some cases, we refer to "some" stakeholders if representatives of between three and five of the relevant groups (for instance, Class I railroads, employee groups, or freight rail customers) expressed a similar view or "most" stakeholders if representatives of more than half of the relevant groups expressed a similar view.[1] Because we selected a non-generalizable sample of stakeholders, their responses should not be used to make inferences about a population. However, we believe that the variety of stakeholders represented provides a good basis for describing the range of experiences and opinions stakeholders have had with Class I railroads' implementation of PSR.

[1]The Surface Transportation Board (STB) classifies freight rail carriers based on annual operating revenues for regulatory purposes. Current thresholds establish Class I freight railroads as carriers that earn $900 million or more annually, Class II railroads earn between $40.4 million to $900 million annually, and Class III railroads earn $40.4 million or less annually. 49 C.F.R. pt. 1201.

Appendix II: Class I Freight Rail Safety Data

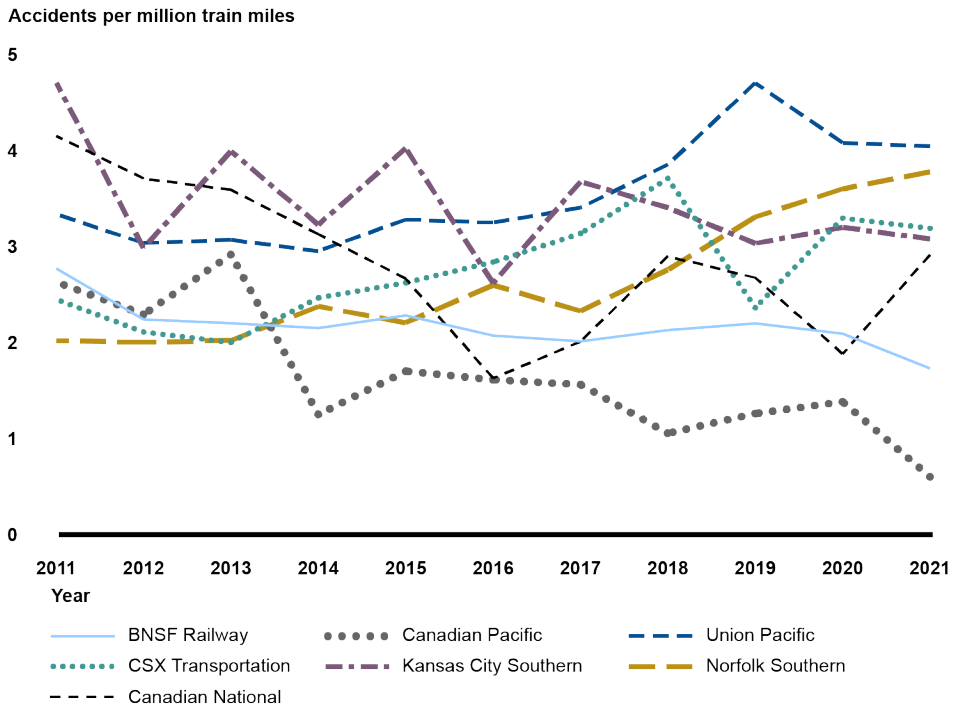
FRA maintains Class I rail safety data on (1) rail equipment accidents and (2) workplace injuries and illnesses; both of which have varied over time from 2011 through 2021.[1] For example:

Rail equipment accidents data. As shown in figure 11, data show that overall numbers of accidents per million train-miles have varied since 2011, with periodic increases and decreases for each railroad between 2011 and 2021. Data on rail equipment accidents include those involving the operation on track of rail equipment that cause certain property damage over a monetary threshold.[2]

[1]Accident data are required to be submitted to FRA by railroads on a monthly basis. These data are not exclusive of each other, and may overlap, for example, when a reportable accident also causes an injury.

[2]The reporting threshold for calendar year 2022 is $11,300.

Figure 11: Rail Equipment Accidents per Million Train-Miles by Class I Freight Railroad, 2011–2021



Source: GAO analysis of Federal Railroad Administration Data on train accidents. | GAO-23-105420

Accessible Data for Figure 11: Rail Equipment Accidents per Million Train-Miles by Class I Freight Railroad, 2011–2021

Year	BNSF Railway	Canadian National	Canadian Pacific	CSX Transportation	Kansas City Southern	Norfolk Southern	Union Pacific
2011	2.773	4.153	2.631	2.451	4.704	2.022	3.338
2012	2.242	3.71	2.295	2.111	2.988	2.004	3.037
2013	2.203	3.591	2.918	2.003	3.992	2.023	3.07
2014	2.152	3.13	1.253	2.467	3.229	2.377	2.955
2015	2.284	2.666	1.703	2.624	4.023	2.208	3.282
2016	2.074	1.629	1.614	2.839	2.619	2.6	3.25
2017	2.014	2.012	1.564	3.137	3.678	2.329	3.406
2018	2.131	2.9	1.057	3.71	3.405	2.76	3.855
2019	2.201	2.676	1.262	2.365	3.034	3.309	4.705
2020	2.094	1.884	1.385	3.297	3.202	3.602	4.081
2021	1.732	2.917	0.604	3.191	3.079	3.781	4.045

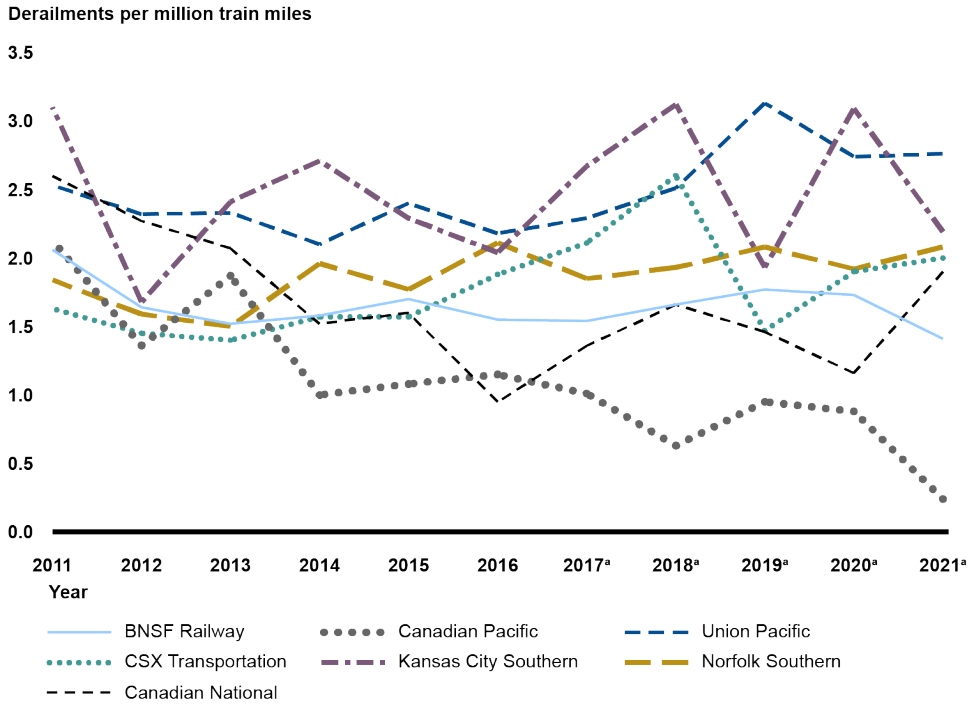
Notes: Reportable rail equipment accidents include those involving operation of on-track equipment that cause certain property damage over a monetary threshold.

The number of accidents is reported per million train miles traveled to adjust for differences in size among railroads. The data do not include grade crossing accidents.

[a]Data for 2017 through 2021 are preliminary; railroads have 5 years to submit changes to accident/incident data.

Additionally, FRA data show that the number of derailments per million train miles has also varied since 2011. All seven railroads have had increases and decreases in derailments—a subset of accidents—from 2011 through 2021, though the extent has varied by railroad, as shown in figure 12.

Figure 12: Derailments per Million Train Miles by Class I Freight Railroad, 2011–2021



Source: GAO analysis of Federal Railroad Administration data. | GAO-23-105420

Accessible Data for Figure 12: Derailments per Million Train Miles by Class I Freight Railroad, 2011–2021

Year	BNSF Railway	Canadian National	Canadian Pacific	CSX Transportation	Kansas City Southern	Norfolk Southern	Union Pacific
2011	2.06	2.6	2.13	1.63	3.1	1.84	2.53
2012	1.64	2.27	1.36	1.45	1.68	1.59	2.32
2013	1.52	2.07	1.87	1.4	2.41	1.5	2.33

Year	BNSF Railway	Canadian National	Canadian Pacific	CSX Transportation	Kansas City Southern	Norfolk Southern	Union Pacific
2014	1.58	1.52	1	1.57	2.71	1.96	2.1
2015	1.7	1.6	1.08	1.57	2.29	1.77	2.4
2016	1.55	0.95	1.15	1.88	2.04	2.11	2.18
2017	1.54	1.36	1.01	2.11	2.67	1.85	2.29
2018	1.66	1.66	0.63	2.6	3.12	1.93	2.51
2019	1.77	1.46	0.95	1.47	1.93	2.08	3.13
2020	1.73	1.16	0.88	1.9	3.09	1.92	2.74
2021	1.41	1.9	0.24	2	2.19	2.08	2.76

Notes: A derailment occurs when on-track equipment such as a train leaves the tracks for a reason other than a collision, explosion, or highway-rail grade crossing impact.

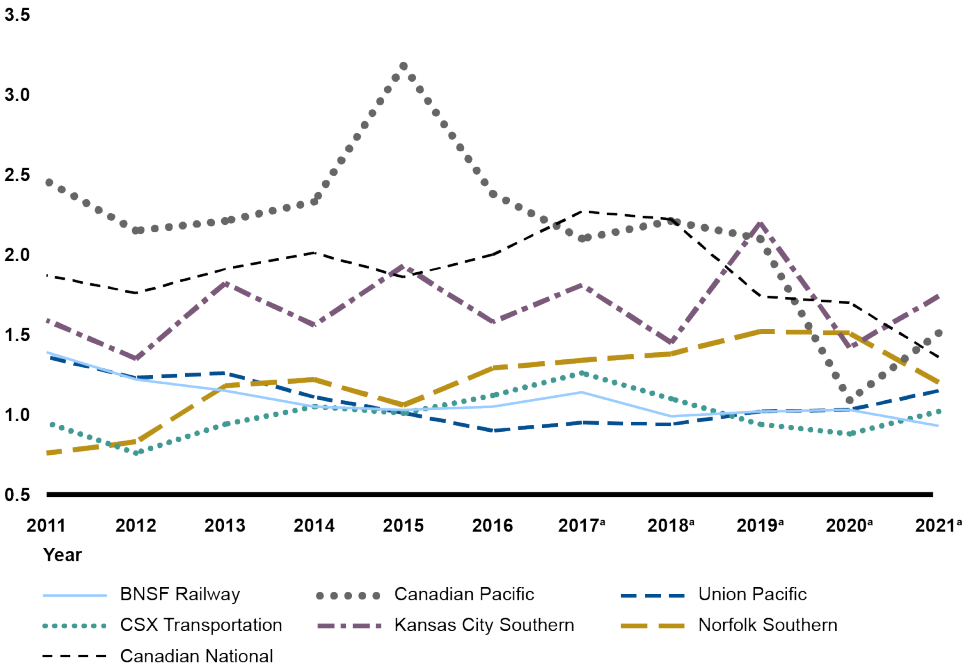
The number of derailments are divided by each railroad's total train miles travelled to adjust for differences in size among railroads.

[a]Data for 2017 through 2021 are preliminary; railroads have 5 years to submit changes to accident/incident data (including derailments).

Workplace injuries and illnesses data. Finally, as shown in figure 13, workplace injuries and illnesses per 200,000 hours worked have varied since 2011, according to FRA data, with periodic increases and decreases for each railroad between 2011 and 2021.[3] Data on workplace injuries and illnesses include fatalities; injuries (such as broken bones); and illnesses (such as heat exhaustion) related to railroad operations. According to FRA officials, the variation in workplace illnesses and injuries or accidents/derailments could be due to a number of factors, including changes in personnel and equipment at railroads or, from 2020 to 2021, disruptions in the rail network due to COVID-19.

[3]Data on injuries and illnesses are reported as a rate per 200,000 hours worked to enable comparison across railroads of different sizes. For example, based on a 40 hour work week, an employee would work about 2,080 hours per year. With about 115,000 employees in 2021, that could result in about 239-million hours worked among Class I railroads. The total number of reported injuries and illnesses among all Class I railroads in 2021 was 2,383.

Figure 13: Illnesses and Injuries per 200,000 Hours Worked by Class I Freight Railroad, 2011–2021



Source: GAO analysis of Federal Railroad Administration illness and injury data. | GAO-23-105420.

Accessible Data for Figure 13: Illnesses and Injuries per 200,000 Hours Worked by Class I Freight Railroad, 2011–2021

Year	BNSF Railway	Canadian National	Canadian Pacific	CSX Transportation	Kansas City Southern	Norfolk Southern	Union Pacific
"2011	1.39	1.87	2.46	0.95	1.59	0.76	1.36
"2012	1.22	1.76	2.15	0.76	1.35	0.83	1.23
"2013	1.15	1.91	2.21	0.94	1.82	1.18	1.26
"2014	1.05	2.01	2.33	1.05	1.56	1.22	1.11
"2015	1.03	1.86	3.18	1.01	1.93	1.06	1.01
"2016	1.05	2	2.38	1.12	1.58	1.29	0.9
"2017	1.14	2.27	2.1	1.26	1.81	1.34	0.95
"2018	0.99	2.22	2.21	1.1	1.45	1.38	0.94
"2019	1.02	1.74	2.1	0.94	2.2	1.52	1.02
"2020	1.03	1.7	1.09	0.88	1.42	1.51	1.03
"2021	0.93	1.36	1.51	1.02	1.74	1.2	1.15

Notes: An example of an injury is a broken bone, and an example of an illness is heat exhaustion.

The number of workplace injuries and illnesses are divided by the number of hours worked by railroad staff to adjust for differences in railroad size.

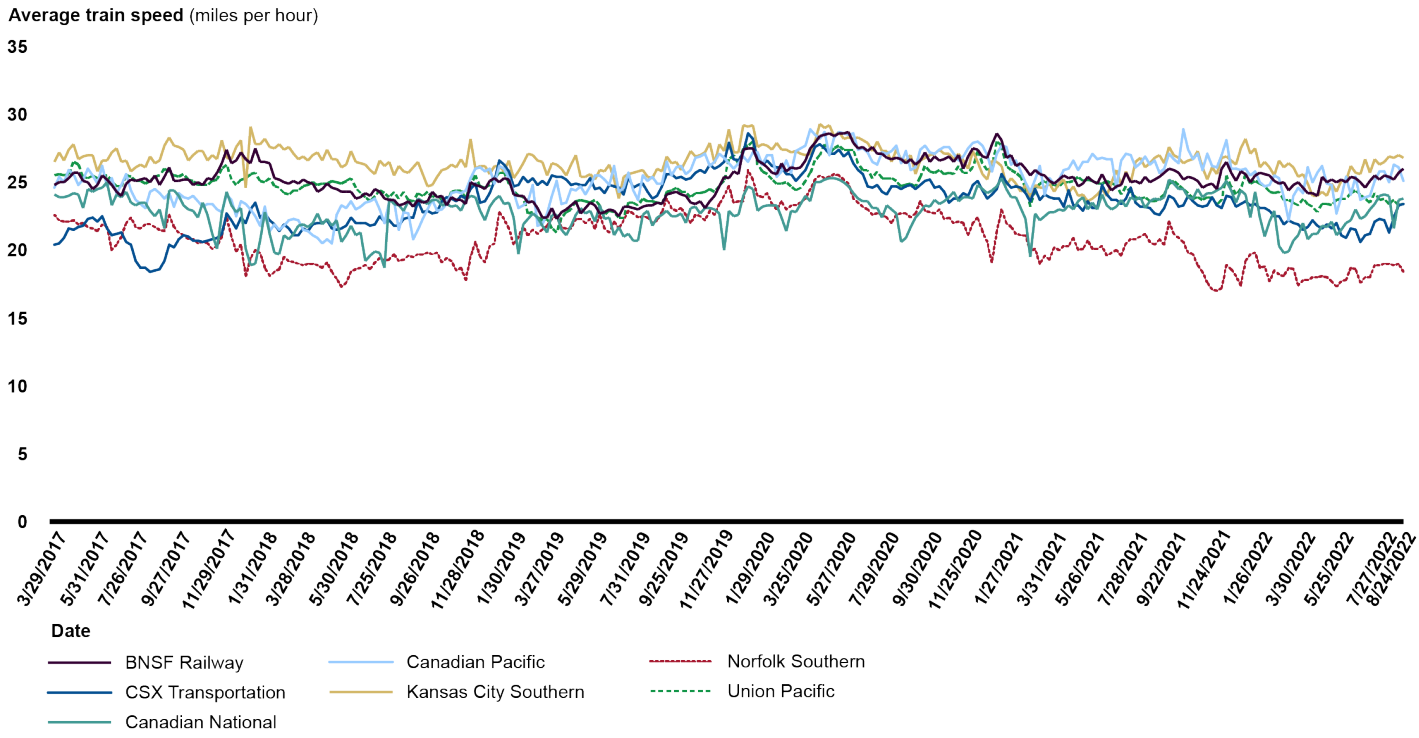
[a]Data for 2017 through 2021 are preliminary; railroads have 5 years to submit changes to illness and injury data.

Appendix III: Class I Freight Railroad Weekly System Average Train Speed and Dwell Time

System average train speed refers to system-average train speed for the overall system, calculated as the number of total train-miles traveled divided by train hours operated, expressed in train-miles per train hour. Figure 14 shows Surface Transportation Board (STB) data on weekly system average train speed for Class I freight railroads since STB began collecting the data in 2017.[1]

[1]The Surface Transportation Board (STB) classifies freight rail carriers based on annual operating revenues for regulatory purposes. Current thresholds establish Class I freight railroads as carriers that earn $900 million or more annually, Class II railroads earn between $40.4 million to $900 million annually, and Class III railroads earn $40.4 million or less annually. 49 C.F.R. pt. 1201.

Figure 14: Weekly System Average Train Speed for Class I Freight Railroads, March 2017 to August 2022



Source: GAO Analysis of Surface Transportation Board data. | GAO-23-105420

Accessible Data for Figure 14: Weekly System Average Train Speed for Class I Freight Railroads, March 2017 to August 2022

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
3/29/2017	24.8	24.1	24.6	20.4	26.5	22.6	25.5
4/5/2017	25	23.9	25.4	20.5	27.2	22.2	25.6
4/12/2017	25	23.9	25	20.9	26.6	22.1	25.5
4/19/2017	25.3	24	25.9	21.6	27.4	22.1	25.6
4/26/2017	25.7	24.2	25.6	21.5	27.8	22.2	26.5
5/3/2017	25.7	24.1	24.8	21.7	26.7	21.9	26.3
5/10/2017	25.1	23.1	25.2	21.8	26.9	22	25.4
5/17/2017	25	24.5	26	22.3	27	21.7	25.3
5/24/2017	24.5	24.3	25.5	22.4	27	21.6	25.5
5/31/2017	24.8	24.5	24.9	22.1	25.8	21.4	25.3
6/7/2017	25.5	24.6	26.2	22.5	26.6	21.9	25.4
6/14/2017	25.2	25	24.7	21.6	26.6	21.7	25.5
6/21/2017	24.8	23.3	25.3	21.1	27.2	20	25.1

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
6/28/2017	24.3	24.1	24.2	21.2	27.5	20.4	24.7
7/5/2017	24	23.9	24.8	21.3	26.5	21	24.7
7/12/2017	24.9	24.3	25.6	20.6	26.6	22	25.5
7/19/2017	25.2	23.5	24.4	20.4	25.8	22.4	25.4
7/26/2017	25.1	23.3	23.7	19.2	26.1	21.7	25.1
8/2/2017	25.2	23.5	23.4	18.7	26.3	21.6	25.1
8/9/2017	25.3	23.5	23.1	18.7	26.1	21.9	24.9
8/16/2017	25	22.9	24.3	18.4	26.9	21.9	25.1
8/23/2017	25.5	22.5	24.5	18.5	26.4	21.7	25.4
8/30/2017	24.8	23	24.2	18.6	26.6	21.5	25.5
9/6/2017	25.4	21.6	23.8	19.2	27.7	21.4	26
9/13/2017	26.1	24.4	24.2	20.4	28.3	22.6	25.8
9/20/2017	25.1	24.4	23.2	20.2	27.7	21.7	25.5
9/27/2017	25.1	24	24.2	20.8	27.6	21.3	25.4
10/4/2017	25.2	23.3	23.9	21.1	27.4	21.1	25.6
10/11/2017	25.2	23	23.8	21	26.6	20.8	25.2
10/18/2017	24.8	22.9	24	20.7	27	20.8	25.1
10/25/2017	25	22.4	23.6	20.7	27.3	20.5	24.8
11/1/2017	24.8	23.5	23.2	20.6	27.3	20.6	24.8
11/8/2017	25.3	22.6	23.4	20.7	26.6	20.5	24.8
11/15/2017	25.2	21.2	23.4	20.8	27	20.1	25.1
11/22/2017	25.7	20.1	23	20.9	26.7	20.3	25.2
11/29/2017	26.4	22.7	22.8	21.2	28.1	21	26
12/6/2017	27.4	24.3	24.1	22.7	26.8	22.4	26.3
12/13/2017	26.4	23.3	23.7	22.2	26.7	21	25.2
12/20/2017	26.6	22.8	22.5	21.6	27.6	19.9	24.8
12/27/2017	27.2	23.1	23.6	22.4	28.1	20.4	25.2
1/3/2018	26.7	20.1	23.4	22	24.6	18.1	25.3
1/10/2018	26.4	18.9	23	23	29.1	19.4	25.6
1/17/2018	27.5	19	22.5	23.5	27.8	20	25.7
1/24/2018	26.5	20.7	21.8	22.4	27.8	19.8	25.1
1/31/2018	26.5	22.8	23.2	22.7	28.2	18.7	25
2/7/2018	26.4	21.2	21.4	22.2	27.6	18.1	25.3
2/14/2018	25.3	19.8	21.9	21.9	27.5	18.4	24.7
2/21/2018	25.2	19.7	21.5	21.4	27.8	18.6	24.6
2/28/2018	25	21.1	21.8	21.9	27.4	19.5	24.2

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
3/7/2018	24.9	20.8	22.2	21.6	27.6	19.2	24.1
3/14/2018	25.1	21.2	22.3	21.1	27.1	19.1	24.4
3/21/2018	24.9	21.8	22.2	21.1	26.7	19	24.4
3/28/2018	25.2	21.9	21.5	21.6	26.9	18.9	24.7
4/4/2018	25	21.7	21.4	21.4	26.6	19	24.8
4/11/2018	24.9	22	21.1	21.9	27	19	25
4/18/2018	24.3	22.7	20.9	22	27.2	18.9	24.8
4/25/2018	24.5	21.9	20.5	22	26.6	18.7	24.9
5/2/2018	24.9	22.3	20.8	22.2	27.4	19.1	24.9
5/9/2018	24.6	21.8	20.5	21.6	26.7	18.4	25.1
5/16/2018	24.5	22.2	22.6	21.5	26.7	17.9	25
5/23/2018	24.3	20.6	23.3	21.6	26.1	17.3	24.9
5/30/2018	24.3	21.1	23.1	21.8	26.3	17.6	25.1
6/6/2018	24.3	21.8	23.6	22.4	27.3	18.4	25.3
6/13/2018	23.8	21.1	23	22	26.5	18.6	24.6
6/20/2018	23.9	21.3	23.2	22	26.4	18.7	24.2
6/27/2018	24.2	19.2	23.5	22	26.3	18.9	23.9
7/4/2018	24	19.6	23.6	21.8	25.9	18.6	23.6
7/11/2018	24.5	19.9	23.8	21.9	25.6	19.1	24
7/18/2018	24.3	19.8	23	22.5	26.6	19.4	24.4
7/25/2018	23.8	18.7	22	22.1	26.2	19.2	24.2
8/1/2018	23.7	23.8	23.6	22.2	26.5	19.3	23.9
8/8/2018	23.7	23.4	23.6	21.8	25.5	19.7	24.3
8/15/2018	23.3	23.3	21.5	21.8	26.2	19.2	23.8
8/22/2018	23.4	22.9	22.8	22.3	25.8	19.3	24.3
8/29/2018	23.6	23.6	22.7	22.4	25.7	19.6	23.7
9/5/2018	23.2	23.2	20.8	22.4	26.1	19.5	23.6
9/12/2018	23.7	23.8	21.5	23.6	26.5	19.7	24.2
9/19/2018	23.5	23.6	22.3	22.8	25.6	19.7	24
9/26/2018	23.6	23.4	23	22.9	24.7	19.8	24.3
10/3/2018	24.3	23.7	23.7	22.7	24.8	19.7	23.9
10/10/2018	23.9	23.7	22.9	22.8	25.4	19.8	24.1
10/17/2018	24	23.3	23	23.6	25.9	19.1	23.7
10/24/2018	23.3	23.4	23.4	23.9	26	19.4	23.4
10/31/2018	23.9	23.2	24.2	23.8	26.3	19.2	24.3
11/7/2018	23.7	23.3	24.3	23.6	26.1	18.5	24.4

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
11/14/2018	23.7	22.9	24.2	24	26.7	18.7	24.4
11/21/2018	23.4	23.7	24.4	23.8	26.1	17.8	23.8
11/28/2018	25	24	25.3	24.5	28.2	19.5	24.8
12/5/2018	24.8	23.9	26	24.9	26	20.6	25.5
12/12/2018	24.7	22.9	26.1	23.5	26.2	19.5	24.7
12/19/2018	24.5	22.2	25.8	23.6	26.2	19.1	24.6
12/26/2018	25.1	23.2	26	24.2	25.6	20.3	24.8
1/2/2019	25.3	23.7	24.9	25.1	26.2	20.5	25.3
1/9/2019	25	24	26.2	26.6	26.2	22.8	25.7
1/16/2019	25.3	23.4	26	26.3	25.8	22.3	25.7
1/23/2019	25.2	23.5	25.3	25.8	26.6	21.6	24.9
1/30/2019	24.1	22.4	24.3	24.7	25.3	20.4	24.4
2/6/2019	24	19.7	23.1	24.8	25.8	21	24
2/13/2019	24	21.9	23.3	25.4	26.4	21.7	23.9
2/20/2019	23.5	22.3	23.6	25	27.1	21.1	22.7
2/27/2019	23.6	22.7	24.8	25.3	27	21.5	22.8
3/6/2019	23.1	22.4	21.8	24.8	26.6	21.2	22.4
3/13/2019	22.4	21.8	21.9	25.1	26.5	21.5	22.2
3/20/2019	22.4	21.3	22.7	24.8	25.5	21.8	22.3
3/27/2019	23.1	22.6	24	25.5	26.4	22.3	21.6
4/3/2019	22.3	22.6	25.1	25.4	26.3	22.5	21.3
4/10/2019	22.8	21.5	23.4	25.4	26	21.7	22.4
4/17/2019	23	21.1	23.5	25.2	25.5	21.6	22.8
4/24/2019	23.3	21.8	24.5	24.8	26.3	21.6	23
5/1/2019	23.6	22.6	24.4	24.9	27	22.3	23.6
5/8/2019	22.7	23.1	24.7	24.8	25.4	22.3	23.7
5/15/2019	23.1	22.7	24.1	24.8	25.4	22	23.6
5/22/2019	23.5	22.9	24.7	25.3	25.6	22.3	23.5
5/29/2019	23.3	22.1	25.5	24.5	25.2	21.6	23.7
6/5/2019	22.7	23.3	25.5	24.6	25.9	22.6	23.3
6/12/2019	22.8	22.3	25.2	24.2	25.8	21.6	22.6
6/19/2019	23	22.4	24.8	24.8	26.3	21.3	22.9
6/26/2019	22.9	21.1	26.2	24.7	25.2	22.1	22.8
7/3/2019	22.5	21.7	24.3	24.6	23.8	21.6	22.4
7/10/2019	23.2	21	24.6	24.1	25.4	22.2	22.4
7/17/2019	23.2	21.2	25.7	25.4	25.6	22.9	23.5

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
7/24/2019	23.1	20.7	24.4	24.6	25.7	22.7	23.5
7/31/2019	23	20.7	23.7	24.8	25.8	22.4	23.3
8/7/2019	23.2	22.6	25.5	24.9	25.9	22.5	23.8
8/14/2019	23.3	22.9	25.1	24.3	25.4	22.4	23.6
8/21/2019	23.3	21.8	25.4	23.8	25.3	22	23.6
8/28/2019	23.5	22.4	24.9	24	26	22.2	23.5
9/4/2019	23.4	22.6	24.9	24.7	25.8	22.8	23.4
9/11/2019	24.1	22.9	26.5	25.6	26.9	23.8	24.3
9/18/2019	24.2	22.5	25.5	25.6	26.4	23.1	24.4
9/25/2019	24.3	22.5	26.1	25.3	26.5	22.9	24.6
10/2/2019	24.1	22.7	26.2	25.4	25.9	23.1	24.3
10/9/2019	24	22	25.6	25.2	26.6	22.6	24.3
10/16/2019	23.5	23.1	25.9	25.3	27.3	22	23.9
10/23/2019	23.4	23.2	26.8	25.7	26.9	22.6	24.2
10/30/2019	23.6	22.7	26.9	25.9	27	22.5	24.2
11/6/2019	23.1	23.1	27.1	25.7	27.2	22.2	24.3
11/13/2019	23.6	23.1	26.2	26.3	27.9	22.9	24.5
11/20/2019	24	23	26.5	26	26.4	22.6	24.3
11/27/2019	24.7	22.7	27.1	26.2	27.8	23.4	24.7
12/4/2019	25.4	20	26.8	26.5	27.3	24	25.1
12/11/2019	25.3	22.9	26.4	27.9	28.9	24.7	26.7
12/18/2019	25.8	22.5	26	26.7	27.2	23.5	27
12/25/2019	25.6	22.6	26.4	26.6	27.2	23.6	26.4
1/1/2020	27.4	24	26.9	27.2	29.2	23.6	27.5
1/8/2020	27.5	24.7	26.5	28.6	29.1	25.9	27.7
1/15/2020	27.5	24.5	27.2	28.2	29.2	25.2	28
1/22/2020	26.6	22.9	27.2	26.7	27.6	24	26.3
1/29/2020	26.4	23.2	26.3	26.3	27.8	23.9	25.8
2/5/2020	26.1	23.3	27	26.6	27.7	24.2	25.6
2/12/2020	25.7	23.3	27	26.2	27.4	23.4	25.2
2/19/2020	25.6	23.3	25.4	26.1	27.9	23	24.9
2/26/2020	26.4	22.4	25.8	26.1	27.4	23.6	24.9
3/4/2020	25.8	21.4	26.6	25.6	27.4	23	25
3/11/2020	26.1	22.9	25.7	25.6	27.2	23.3	24.7
3/18/2020	26	22.8	27.3	25.1	27.3	23.3	24.4
3/25/2020	26.1	23.4	27.5	25.5	27.1	23.5	24.6

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
4/1/2020	26.6	24	27.7	25.9	27	23.8	25.1
4/8/2020	27.5	23.6	28.9	26.7	27.1	24.5	25.7
4/15/2020	27.9	25	28.5	27.6	28	25.2	26.6
4/22/2020	28.4	25	28.2	27.8	29.3	25.5	27
4/29/2020	28.5	25.2	28.7	27.5	29	25.3	27.8
5/6/2020	28.6	25.3	27	27.1	29.2	25.4	27.1
5/13/2020	28.4	25.3	28.3	27.1	28.4	25.6	27.5
5/20/2020	28.6	25.2	28.7	27.4	28.7	25.5	27.7
5/27/2020	28.6	25	28.6	26.9	28.2	25.2	27.4
6/3/2020	28.7	24.7	28.5	27.2	28.3	24.9	27.4
6/10/2020	27.9	24.2	28.6	26.4	28.2	23.8	27.4
6/17/2020	27.5	23.8	27.4	25.9	28.3	23.5	26.4
6/24/2020	27.6	23.6	27.5	25.6	28.1	23.2	25.9
7/1/2020	27.3	23.6	27.2	24.7	27.9	23	25.9
7/8/2020	27.6	23.1	26.5	24.6	27.3	22.6	25.3
7/15/2020	27.1	23.1	26.3	24.8	28	22.7	25.8
7/22/2020	27.1	22.4	27.2	24.3	27.3	22.6	25.3
7/29/2020	26.8	23.3	27.1	24.1	27.3	22.4	25.3
8/5/2020	26.7	23	27.3	24.7	26.5	22	25.3
8/12/2020	26.8	22.7	27.7	24.7	27.4	22.6	25.1
8/19/2020	26.7	20.6	26.4	24.5	26.7	22.7	24.7
8/26/2020	26.4	20.9	27.3	24.7	26.6	22.7	24.8
9/2/2020	26.7	21.7	25.9	24.8	27	22.4	24.9
9/9/2020	26.3	22.4	26.1	24.5	25.6	22.7	24.7
9/16/2020	26.6	22.8	27.4	24.8	26.6	23.6	25.4
9/23/2020	27.2	23.3	27.7	25.1	26.8	22.9	26.2
9/30/2020	26.5	23.2	27.2	25.2	27	22.8	25.8
10/7/2020	26.9	23.7	27.1	24.6	27.1	22.7	25.7
10/14/2020	26.6	23.4	27.4	24.7	27.4	23	25.9
10/21/2020	26.7	23.6	27.6	24.3	27.1	22.3	25.6
10/28/2020	26.9	23.9	27.6	23.5	27.1	22.4	25.7
11/4/2020	26.5	24.3	27.1	23.8	26.7	22	25.6
11/11/2020	27	23.6	26.6	23.8	27.1	22.1	26.2
11/18/2020	26	23.9	26.9	24.2	26.6	22	25.7
11/25/2020	26.9	23.9	27.5	24	26	21.1	25.7
12/2/2020	27.5	23.8	27.9	24.8	27.3	22	26.1

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
12/9/2020	27.4	24.8	28	25.1	26.5	22.4	27.3
12/16/2020	26.9	24.5	27.7	24.4	25.6	21.4	26.4
12/23/2020	26.8	24.2	27	23.8	25.2	20.6	25.9
12/30/2020	27.8	24.4	25.8	24.1	26.6	19.1	26.1
1/6/2021	28.6	24.7	27.1	24.5	26.5	21.4	28
1/13/2021	28.1	25.3	27.7	25.6	26.2	23	27.7
1/20/2021	26.8	24.5	27.6	25	24.8	22	26.2
1/27/2021	27	23.9	26.3	24.6	25.3	21.7	25.9
2/3/2021	26.2	23.9	26.6	24.7	24.9	21.2	25.7
2/10/2021	26.4	23.1	25.8	24.6	24.3	21.1	25.4
2/17/2021	26	22.3	25	24.2	24.8	21.1	24.6
2/24/2021	25.5	19.5	24.3	23.6	23.9	19.9	23.2
3/3/2021	25.9	22.7	25.2	24.5	24.8	20.1	24.4
3/10/2021	25.6	22.2	26.2	23.7	24.6	19	24.9
3/17/2021	25.5	22.5	24.1	24.1	24.6	19.6	25.1
3/24/2021	25.1	22.8	25.3	23.9	24.9	19.3	24.8
3/31/2021	24.9	22.8	24.9	23.8	24.3	20.2	24.8
4/7/2021	25.2	23	25.2	23.8	24.9	20	24.7
4/14/2021	25.5	22.9	25.9	23.2	25.2	20.3	25
4/21/2021	25.3	23.3	26	24.4	24.2	20.3	25
4/28/2021	25.4	23	26.6	23.3	24.7	20.9	25.1
5/5/2021	24.7	23.6	25.9	23.3	24	20	25.4
5/12/2021	24.9	23.9	26.5	22.9	24.1	20.1	25.1
5/19/2021	25.4	23	26.5	23.6	23.6	20.7	25.2
5/26/2021	25.1	23.5	27.1	23.1	23.8	20.1	25.1
6/2/2021	24.9	23	26.7	23.1	24.1	20.1	24.9
6/9/2021	25.6	24.1	26.8	24.8	24.5	20.3	24.9
6/16/2021	24.9	23.3	26.7	24.1	24	19.6	25.1
6/23/2021	24.4	23	26.7	23.7	25	19.8	24.9
6/30/2021	24.7	23.2	24.6	23.7	25.9	20	24.8
7/7/2021	24.8	23.7	26.6	23.4	24.8	19.6	24.1
7/14/2021	25.7	23.2	27.1	23.8	25.8	20.5	24.7
7/21/2021	25	23.9	27	24.6	25	20.8	24.2
7/28/2021	25.1	23.7	26.1	23.5	26.5	20.8	23.9
8/4/2021	24.9	23.9	26.4	23.2	26.8	21	23.8
8/11/2021	25.4	23.1	26.9	23.2	26.1	21.2	23.9

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
8/18/2021	25	23.6	26.3	23.1	26.4	20.6	23.6
8/25/2021	25.2	23.8	26.6	22.7	26.8	20.4	23.6
9/1/2021	25.4	23.7	25.7	22.6	27	20.8	23.8
9/8/2021	25.7	23.9	26	23.1	26.4	20.4	24.1
9/15/2021	26	25.2	27.1	24	27.6	22.1	24.9
9/22/2021	25.9	24.9	26.7	23.8	27	21.2	25.1
9/29/2021	25.7	24.5	26.4	23.2	26.8	20.9	24.8
10/6/2021	25.2	24.5	28.9	23.3	26.4	20.6	24.5
10/13/2021	25.4	23.9	27.4	24	26.6	19.8	24.2
10/20/2021	25.3	23.8	26.7	23.6	26.7	19.7	23.8
10/27/2021	25.1	24.5	27.1	23.3	27.3	18.9	23.9
11/3/2021	24.6	23.9	25.9	23.2	26.1	18.4	23.7
11/10/2021	24.8	24.2	27.1	23.3	25.2	17.6	23.9
11/17/2021	24.9	24.2	26.2	23.9	26.1	17.1	23.9
11/24/2021	24.5	24.4	26.1	23.3	25.6	17	23.3
12/1/2021	26	24.6	27	23.1	26.8	17.2	23.7
12/8/2021	26.5	25.1	28.1	24	26.9	18.9	25.5
12/15/2021	25.7	24.4	26	23.9	26.6	18.6	24.7
12/22/2021	25.1	23.5	26	23.2	26.3	18.1	24.1
12/29/2021	25.8	24.4	25.9	23.4	27.5	17.4	24.5
1/5/2022	25.6	24.1	26	23.6	28.2	19.2	25.6
1/12/2022	25	22.4	25.5	23.3	27.1	19.7	24.9
1/19/2022	25.5	24.3	25.8	23.4	27.5	19.8	25.1
1/26/2022	25.7	22.4	25	23.1	26.1	18.7	24.9
2/2/2022	25.6	21	24.7	23.1	26.5	18.8	24.7
2/9/2022	25.5	22.1	24.8	22.9	26.1	17.7	24.3
2/16/2022	25.1	22.9	25.5	22.5	25.5	18.5	24.2
2/23/2022	24.9	20.3	25.3	22.5	26.6	18.2	24.3
3/2/2022	25	19.8	23.9	21.9	26.1	18.1	23.7
3/9/2022	24.4	19.9	22.2	22.2	26.4	18.7	23.7
3/16/2022	24.8	20.7	24	22	26.1	18.6	23.5
3/23/2022	25	21.1	24.6	21.9	25.4	17.4	23.3
3/30/2022	24.6	22	24.2	21.5	25.6	17.8	23.8
4/6/2022	24.2	20.8	26.1	21.7	24.9	17.8	23.4
4/13/2022	24.2	21.2	25	22.2	24	18	23.2
4/20/2022	24	21.2	25.7	21.8	24	18	22.8

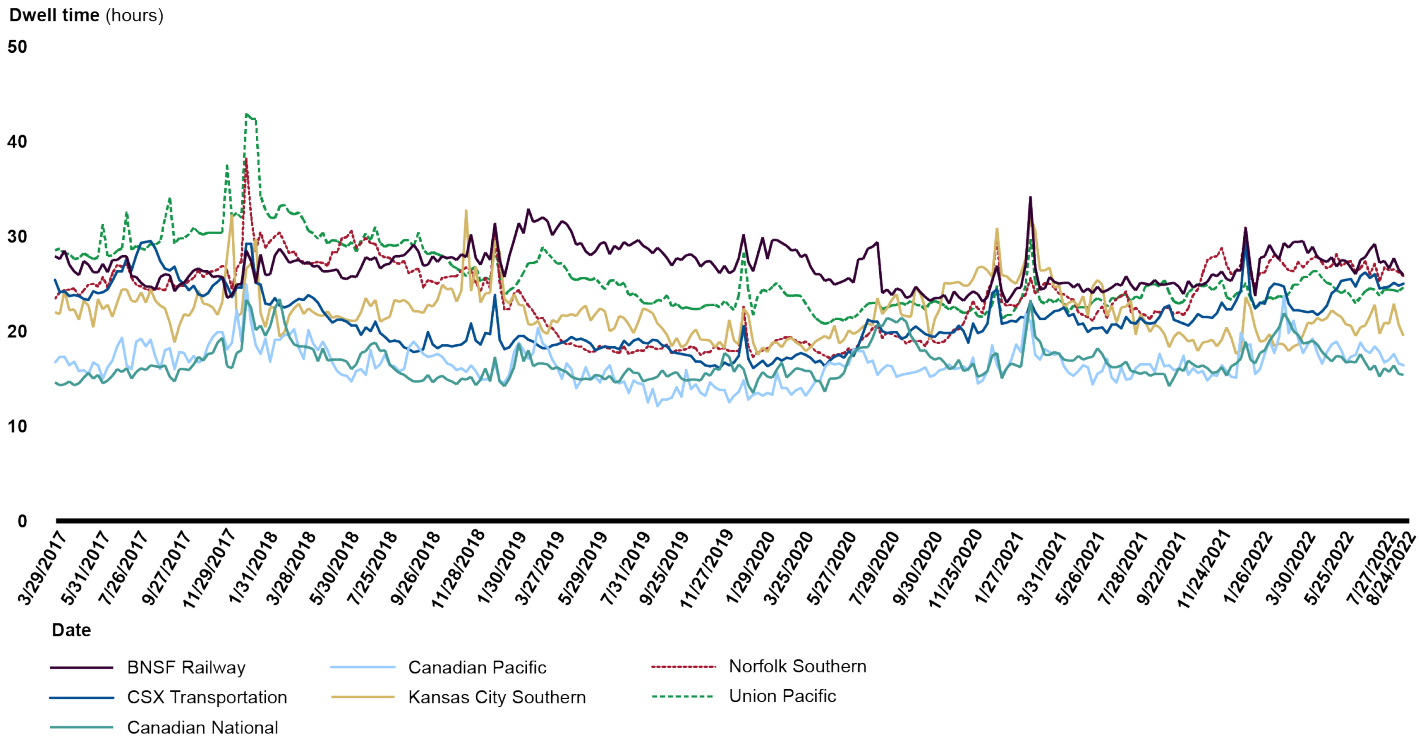
Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
4/27/2022	25.4	21.8	26.2	21.6	24.3	18.1	23.4
5/4/2022	25	21.7	24.9	21.9	24	18	23.4
5/11/2022	25.2	22.1	24.8	21.6	24.9	17.7	23.3
5/18/2022	25	21.1	22.7	22	24.3	17.3	23.7
5/25/2022	25.2	21.5	23.9	21.1	25.1	17.7	23.8
6/1/2022	25	22	25.4	20.9	25.1	17.8	23.8
6/8/2022	25.4	22.2	24.1	21.6	26.2	18.7	24.2
6/15/2022	25.3	23	25.4	21.5	25.7	18.6	24.4
6/22/2022	25	22.3	23.7	20.6	25.6	17.6	24.1
6/29/2022	24.6	22.5	23.9	21.1	26.7	18	23.8
7/6/2022	25.1	23	24	21.2	25.7	18	23.5
7/13/2022	25.5	23.4	25.1	22.1	26.7	18.9	24.2
7/20/2022	25.2	24	25.8	22.3	26.3	18.9	23.7
7/27/2022	25.5	24.1	25.8	22.2	26.5	19	23.8
8/3/2022	25.4	24	25	21.3	26.9	19	23.4
8/10/2022	25.2	21.6	26.3	22.4	26.8	18.9	23.7
8/17/2022	25.7	23.7	26.1	23.3	27	19	23.3
8/24/2022	26	23.8	25.1	23.4	26.8	18.4	23.4

Note: System train speed refers to the average distance per hour for trains to operate between a train's origin and destination, including time for stops (such as stops for equipment failures, weather, or to allow other trains to pass). Network train speed does not refer to the speed of the train as it moves over the tracks.

Class I railroads are also required to submit weekly data on average terminal dwell time system-wide to STB.[2] Terminal dwell time refers to the average time a car resides at a specified terminal location expressed in hours. Figure 15 presents data on terminal dwell time by railroad since STB began collecting data in 2017.

[2]49 C.F.R. § 1250.2.

Figure 15: Weekly System Average Terminal Dwell Time by Railroad, March 2017 to August 2022



Source: GAO Analysis of Surface Transportation Board data. | GAO-23-105420

Accessible Data for Figure 15: Weekly System Average Terminal Dwell Time by Railroad, March 2017 to August 2022

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
3/29/2017	27.9	14.6	16.7	25.4	22	23.4	28.5
4/5/2017	27.6	14.3	17.3	24.1	21.8	24.1	28.7
4/12/2017	28.5	14.4	17.3	24.2	24.3	24.3	28.1
4/19/2017	27	14.7	16.4	23.7	22.2	24.4	28.2
4/26/2017	26.3	14.3	16.8	23.8	22.3	24.5	27.6
5/3/2017	25.9	14.5	15.8	23.7	21.2	23.7	27.7
5/10/2017	27.4	15.1	15.9	23.4	23.2	24.3	28.2
5/17/2017	27	15.6	15.5	23.3	22.7	24.9	27.9
5/24/2017	26.2	15	16.7	24.2	20.4	25	27.6
5/31/2017	26.2	15.4	16.4	24	23.4	24.7	27.8
6/7/2017	27.1	14.5	15	24.1	22.3	25.7	31.3
6/14/2017	26.2	14.8	16.2	24.4	22.8	24.6	27.9
6/21/2017	27.5	15.3	16.9	25.3	21.5	26.1	28

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
6/28/2017	27.5	16	18.4	26.3	23	27	28.5
7/5/2017	27.9	15.7	19.3	26.3	24.4	26.8	28.7
7/12/2017	27.9	16.1	16.4	27.7	24.4	27.1	32.6
7/19/2017	25.8	15	16	26.4	23.2	25.6	28.5
7/26/2017	25.7	15.7	18.9	28	23.1	24.9	29
8/2/2017	25.1	16.1	19.2	29.3	24.1	24.7	28.7
8/9/2017	24.7	15.9	18.4	29.4	23	24.4	28.6
8/16/2017	24.7	16.4	19.1	29.5	24.4	24.3	29.2
8/23/2017	24.4	16.3	17.3	28.7	23.2	24.4	29.1
8/30/2017	25.7	16.2	16	27.4	22.7	24.5	29.5
9/6/2017	26	16.4	18	26.6	22.4	24.3	31.8
9/13/2017	25.9	15.2	18.2	26.4	20.9	25.5	34.1
9/20/2017	24.2	14.7	16	26.8	18.8	24.7	29.2
9/27/2017	24.9	16	17.8	25.4	20.6	24.7	29.8
10/4/2017	25.1	16	17.7	25	21.8	24.8	29.8
10/11/2017	25.8	15.9	16.7	24.3	21.6	25.3	30.2
10/18/2017	26.4	16.5	17.4	24.8	22.4	25.6	30.9
10/25/2017	26.6	17.3	16.7	23.9	24.3	26.4	30.4
11/1/2017	26.3	16.9	17	23.7	22.9	25.7	30.2
11/8/2017	26.3	17.6	18.5	24	22.8	26.2	30.4
11/15/2017	25.7	17.7	19.4	24.8	22.5	26.3	30.4
11/22/2017	25.8	18.8	19.9	25.2	21.7	26.5	30.4
11/29/2017	25.7	19.3	19.9	25.7	23.1	26.9	30.4
12/6/2017	23.5	16.3	18.1	24.8	27.9	26.4	37.6
12/13/2017	23.8	16.1	18.8	23.6	32.3	24.5	32
12/20/2017	24.9	17.7	22.2	24.6	21.5	26.6	32.5
12/27/2017	25	18	18.9	24.6	21.9	27.4	31.9
1/3/2018	28.5	23.3	24.9	29.2	26.6	38.2	43
1/10/2018	27.4	22.5	20.9	29.2	27.1	32.2	42.4
1/17/2018	25.1	20.1	18.5	25.1	29.7	28.4	42.4
1/24/2018	28.1	20.6	17.6	24.9	21.9	30.4	34.2
1/31/2018	25.9	19.5	19.2	22.9	20.4	28.8	32.8
2/7/2018	26	20.5	16.8	22.8	22.5	29.5	32
2/14/2018	28	22.4	19.1	23.5	22.5	30	31.9
2/21/2018	28.7	23.4	19.1	22.7	19.4	30.4	33.2
2/28/2018	28	20.9	19.6	22.5	19.9	29.3	33.3

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
3/7/2018	27.2	19.4	19.6	22.7	21.7	28.2	32.5
3/14/2018	27.4	18.6	20.2	23.1	22.4	28.4	32.3
3/21/2018	27.5	18.4	18.2	23.4	22.9	27.5	32.5
3/28/2018	27.1	18.4	17.1	23.3	21.8	27.3	31.7
4/4/2018	27.3	18.3	20.1	23.8	22.4	27.1	30.6
4/11/2018	26.8	18.1	18.7	23.5	22	27.2	30.3
4/18/2018	26.9	16.8	18	23	21.7	27.3	29.7
4/25/2018	26.3	18.2	18.9	22.1	21.6	27.2	30.4
5/2/2018	26.3	16.9	18	21.5	22.1	26.9	29.2
5/9/2018	26.4	17	16.7	20.9	21.4	28.3	29.6
5/16/2018	26.5	17	15.8	21.2	21.6	28.3	29.5
5/23/2018	25.6	17	15.4	21.2	21.4	29.8	29.2
5/30/2018	25.5	16.8	15.3	21	21.2	29.9	28.9
6/6/2018	25.8	16	14.7	20.6	21.1	30.6	29.4
6/13/2018	25.7	16.5	15.8	20.6	21.1	28.8	28.4
6/20/2018	26.7	17.7	16	19.6	22	29.3	29.5
6/27/2018	27.8	17.9	15.4	20.4	23.5	29.8	30.3
7/4/2018	27.5	18.6	18	20	22.6	29.3	29.6
7/11/2018	27.8	18.8	16.1	21	23.3	29.2	31
7/18/2018	26.6	17.9	16.5	19.8	21	28	29.3
7/25/2018	27	18	17.5	19.4	21.3	27.8	28.9
8/1/2018	27.1	16.5	16.4	18.9	21.5	27.7	29.1
8/8/2018	27.9	16	16.3	19	23.3	27.3	29
8/15/2018	27.9	15.6	15.8	18.9	23.1	27.1	29.1
8/22/2018	28	15.4	16	18.3	23.3	27.4	29.6
8/29/2018	28.5	15	18.3	18.1	22.9	26.1	29.6
9/5/2018	29.1	14.7	18.9	17.8	22.1	26.4	28.9
9/12/2018	28.4	14.7	18.3	17.9	22.1	26.6	30.4
9/19/2018	26.9	14.8	17.6	18.1	21.9	24.6	28.6
9/26/2018	27	15.4	17.3	19.9	22.8	25.4	28.1
10/3/2018	27.9	14.6	17.4	18.6	22.6	25.2	28.3
10/10/2018	27.3	15.1	17.6	18.2	23.3	25	28.1
10/17/2018	27.9	15.3	17.3	18.5	24.9	25.6	27.9
10/24/2018	27.7	14.9	16.6	18.5	24.4	25.7	27.6
10/31/2018	27.8	14.7	16.4	18.4	24.5	25.8	26.9
11/7/2018	27.5	14.4	15.9	18.5	23.1	25.8	26.6

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
11/14/2018	28.1	15	16.1	18.6	24.3	26.4	26.3
11/21/2018	27.8	14.9	15.7	19	32.8	26.7	25.8
11/28/2018	30.2	15.2	16.4	20.8	24.2	26.4	26.5
12/5/2018	27.7	14.3	15.8	19	26.8	25.1	26.8
12/12/2018	27	14.9	14.9	18.6	23	24.2	25.2
12/19/2018	28.3	16.1	14.9	19.8	24	25.6	25.7
12/26/2018	27.5	14.7	15	19.7	24	24.5	25.4
1/2/2019	31.4	17.3	16.7	23.8	29.6	31.3	28.7
1/9/2019	27.5	14.7	14.7	19.1	28.3	25.1	25.8
1/16/2019	25.7	14.2	14.6	18.1	23.4	22.3	23.7
1/23/2019	27.9	15	15.4	18.3	22.9	22.3	24.3
1/30/2019	29.6	16.2	17.8	19	23.9	24	24.6
2/6/2019	31.4	18.7	18.8	19.5	22.8	24.3	25.3
2/13/2019	30.3	16.8	18	19.5	22.7	23.5	26.2
2/20/2019	32.9	18	17.1	19.1	20.7	22.7	27.2
2/27/2019	31.5	16.3	17.7	18.9	20.7	22.1	27.2
3/6/2019	31.7	16.6	20.3	18.5	21.1	21.3	27.4
3/13/2019	32	16.6	18.7	18.2	20	21.4	28.9
3/20/2019	31.6	16.5	18.3	18.2	19.7	20.5	28.2
3/27/2019	30.1	16	17	18.5	21.2	20.3	27.7
4/3/2019	30.9	16.2	16.2	18.6	20.9	19.7	27.1
4/10/2019	31.6	15.9	15	18.8	21.7	18.9	27.2
4/17/2019	31.3	15.7	16.6	19	21.6	18.6	26.5
4/24/2019	30.5	15.2	16	19.4	21.8	18.7	25.6
5/1/2019	29.1	15	14	19.1	21.6	18.4	25.4
5/8/2019	29.3	14.9	14.8	19.2	22.3	18.4	25.6
5/15/2019	28.4	15	16.2	19	22.7	18	25.6
5/22/2019	28	14.9	14.9	18.7	21.1	17.8	25.4
5/29/2019	28.4	15.4	15.2	18	21.8	17.9	25.6
6/5/2019	29.2	15.3	14.6	18.2	22.4	18.5	25
6/12/2019	29.4	14.9	15.8	18.4	22.1	18.3	24.4
6/19/2019	28.1	15.3	16.4	18.3	20	18.2	25.3
6/26/2019	29	14.6	14.9	18.3	20.3	17.8	25.4
7/3/2019	28.6	14.7	14.5	18.1	21.6	17.7	24.8
7/10/2019	29.4	15.5	14.7	19	21.4	18.4	25.1
7/17/2019	29	16.1	13.5	18.5	20.7	17.6	23.8

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
7/24/2019	29.3	15.6	14.8	19	19.8	17.8	24
7/31/2019	29.6	15.6	14.5	19.2	21	18	23.6
8/7/2019	29	14.7	14.4	18.8	22.4	17.9	23
8/14/2019	28.7	14.9	12.5	18.7	22.2	18.4	22.9
8/21/2019	28.2	15	13.9	19.1	21.9	18.3	22.9
8/28/2019	28.8	15.2	12.1	19	20.8	18.1	23.3
9/4/2019	28.3	15.9	12.8	18.5	20.3	18.2	23.2
9/11/2019	27.7	15.2	12.8	18.4	19.6	18.6	23.8
9/18/2019	26.9	15.5	13	17.8	18.4	17.7	22.6
9/25/2019	27.7	15.7	14.1	17.7	19.3	18	22.9
10/2/2019	27.5	15	13.1	17.6	18.3	18	22.4
10/9/2019	28	14.8	15.9	17.5	18.6	18.1	22.5
10/16/2019	28.1	14.9	13.9	17.4	19.6	18.4	22.4
10/23/2019	27.7	14.9	14.4	16.8	20.2	18.2	22.3
10/30/2019	26.8	14.8	13.5	16.8	19.1	17.5	22.4
11/6/2019	27.3	15.6	13.2	16.4	19.1	17.8	22.7
11/13/2019	27.4	15.3	14.6	16.3	19	17.8	22.8
11/20/2019	26.8	16.1	14.1	16.4	18.3	18.4	22.8
11/27/2019	26.1	15.9	13.8	16.1	18.9	18.1	22.5
12/4/2019	26.9	17.7	13.8	16.7	18.2	18.2	23.2
12/11/2019	26.1	17.3	12.5	16.4	21.2	17.9	22.7
12/18/2019	26.4	15.7	13.2	16.7	19	17.9	22.2
12/25/2019	27.7	16.5	13.6	17.4	18.6	17.9	23.8
1/1/2020	30.2	16	14.8	20.5	22.4	22.6	28.3
1/8/2020	27.3	14.3	12.8	17.1	21.7	18.4	24.4
1/15/2020	26.3	13.5	13.3	16.1	18.8	17.3	21.7
1/22/2020	28.1	14.9	13.5	16.5	17.5	17.8	23.7
1/29/2020	29.9	15.7	13.2	16.9	18.3	18	24.4
2/5/2020	27.6	15.2	13.5	16.3	17.8	18.2	24.2
2/12/2020	29.6	15.1	13.3	16.6	18.8	18.7	24.7
2/19/2020	29.6	16	15.6	17.2	18.8	19.1	25.1
2/26/2020	29.3	16.7	14	16.9	18.3	19.2	24.4
3/4/2020	29	15.1	14	17.2	19.1	19.4	23.8
3/11/2020	28.5	15.6	13.3	17.1	19.3	19.3	23.7
3/18/2020	28.6	16.1	13.8	17.5	18.8	19	23.8
3/25/2020	27.8	16	14	17.7	18.5	18.7	23.7

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
4/1/2020	28.1	15.8	13.2	17.5	17.9	18.9	22.9
4/8/2020	26.8	15.8	13.9	17.2	18.3	18.5	22.1
4/15/2020	26	14.8	14.7	16.7	18.9	17.9	21.4
4/22/2020	26	14.7	14.8	16.9	19.2	17.7	21
4/29/2020	25.3	13.6	16.2	16.3	19.5	17.4	20.8
5/6/2020	25.5	15	16.7	16.9	19.2	17.2	20.9
5/13/2020	24.9	15	16.5	17.3	20.6	17.5	21.3
5/20/2020	25.1	15.1	16.6	17.5	18.7	17.6	21.3
5/27/2020	25.3	15.6	16.3	17.2	19.1	17.7	21.1
6/3/2020	25.6	17.1	16.5	17.9	20.1	18.2	21.5
6/10/2020	25.1	17.7	18.1	17.4	19.7	17.9	21.4
6/17/2020	27.6	18.2	17.9	18.5	20	18.6	21.8
6/24/2020	27.6	18.3	17.9	19.8	20.5	19.3	22.4
7/1/2020	28.7	18.3	16.7	21.2	20.8	19.6	22.9
7/8/2020	28.9	19.3	16.9	21	20.6	20.3	23
7/15/2020	29.4	20.7	15.4	21	23.5	20.6	23
7/22/2020	24	20.5	16	20	21.8	19.3	22.3
7/29/2020	24.4	21.4	16.4	19.8	22.4	19.8	22.5
8/5/2020	23.8	21.2	16.3	19.9	23.3	19.7	22.7
8/12/2020	24.5	20.9	15.2	19.9	23.9	19.4	22.8
8/19/2020	24.3	21.4	15.4	19.2	21.7	19.3	23
8/26/2020	23.5	21	15.5	19.4	21.6	18.7	22.8
9/2/2020	23.7	19.5	15.6	20.1	21.5	19	23.2
9/9/2020	24.7	18.8	15.7	20.5	24.7	18.9	22.8
9/16/2020	24.1	17.9	15.9	20.1	23.9	19	22.7
9/23/2020	23.6	18	16.2	19.7	22.5	18.4	22.3
9/30/2020	23.2	17.3	15.2	19.5	19.1	19.4	23
10/7/2020	23.5	17	15.4	19.4	21.3	18.8	23.2
10/14/2020	23.5	17.2	15.9	19.9	22.3	18.8	23
10/21/2020	23.8	16.7	16	19.8	25.1	18.9	22.7
10/28/2020	22.9	16	16.5	19.8	25	19.5	22.3
11/4/2020	24.2	16.2	16	19.9	25.1	20.2	22.6
11/11/2020	23.6	17	16.1	20.6	25.2	20.2	22.2
11/18/2020	23.2	15.8	16.3	20	24.8	20.8	21.9
11/25/2020	23.8	16	15.9	18.8	24.8	22.1	22
12/2/2020	24.2	16.6	17.2	20.8	25.5	23.1	22.4

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
12/9/2020	23.9	15.2	14.5	19.8	26.7	22.4	21.6
12/16/2020	23.1	15.4	14.8	20	26.8	21.9	21.5
12/23/2020	23.6	15.8	15.8	20.8	26.4	24.2	22.1
12/30/2020	25.3	17.4	18.5	24	25.7	25.3	22.8
1/6/2021	26.9	17.7	16.4	24.4	30.9	30	24.8
1/13/2021	24.2	15	15.5	20.8	25.9	23.1	21.3
1/20/2021	23	16.1	16	20.9	25.8	22.7	21.7
1/27/2021	23.7	16.6	17	21.1	25.3	22.8	21.7
2/3/2021	24.5	16.4	18.6	21	25	22.6	22.5
2/10/2021	24.6	16.2	17.8	21.5	26.1	23.4	23.3
2/17/2021	27	19.7	21.8	21.4	27.6	23.9	24.8
2/24/2021	34.2	23.3	21	23.1	32.1	25.6	29.7
3/3/2021	26.7	19.4	17.5	22	30.6	24	25.3
3/10/2021	24.4	18.9	17	21.3	26.4	24.5	23.2
3/17/2021	24.5	17.5	18.1	21.3	26.4	25.1	22.9
3/24/2021	25.7	17.5	17.8	21.7	26.7	25	23.4
3/31/2021	25.2	17.8	17.5	22.1	24.6	24.6	23
4/7/2021	25	17.6	17.7	22.2	24.8	23.9	23.4
4/14/2021	25.1	17	16.3	22.5	22.5	23.9	22.9
4/21/2021	25.1	16.9	15.6	21.6	23	23.5	22
4/28/2021	24.6	16.9	15.3	21.8	23.2	23.3	22.7
5/5/2021	25	17.4	15.8	20.7	22.6	22	22.5
5/12/2021	24.1	17	16.4	20.8	23.7	21.7	22.5
5/19/2021	24.5	17.2	16.2	19.9	21.6	21.5	22.5
5/26/2021	24	17.3	14.4	20.3	24.7	21.1	23.1
6/2/2021	24.7	18.2	15.5	20.3	25.4	22	23.5
6/9/2021	24.1	17.6	15.8	20.4	24.9	22.6	23.2
6/16/2021	24.3	16.6	17.1	19.8	21.6	21.4	22.6
6/23/2021	24.6	16.2	15.1	20.7	22.7	22.8	23.5
6/30/2021	25	16.2	14.6	20.7	20.9	23.4	23.4
7/7/2021	24.8	16.4	16.2	20.3	22.5	23.7	23.8
7/14/2021	25.8	16.8	14.9	21.5	22.6	24.2	23.9
7/21/2021	24.9	15.8	15	20.9	23.2	22	23.2
7/28/2021	24.3	15.7	16.1	20.8	19.6	22.5	23.7
8/4/2021	25.1	15.5	16.5	21.4	21.8	21.9	23.4
8/11/2021	25	15.7	16.5	20.9	21	21.7	24.7

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
8/18/2021	24.9	15.3	16.5	20.8	19.9	21.3	24.9
8/25/2021	25.4	15.5	15.7	20.9	20.7	22.1	25
9/1/2021	24.9	15.5	17.6	21.5	20.4	22	24.7
9/8/2021	24.9	15.5	16.3	22.5	19.7	22.4	25.4
9/15/2021	25	14.2	16.4	22.7	18.3	22.5	24.1
9/22/2021	25.1	15.1	15.9	21.2	19.4	21.8	23.1
9/29/2021	24.7	16.1	16	21	19.9	22	22.9
10/6/2021	23.9	15.8	17.4	20.8	19.5	21.7	23.1
10/13/2021	25.3	16.9	15.4	20.6	18.9	22.4	24.1
10/20/2021	24.6	16.5	16.1	21.1	19.1	23.8	24.5
10/27/2021	24.9	16.2	15.6	21.8	17.9	24.4	25
11/3/2021	24.9	16.4	15.8	21.5	18.8	26.1	24.7
11/10/2021	25.2	16.1	14.8	21.5	18.9	27.5	24.9
11/17/2021	26	15.6	15.4	21.4	19.1	27.8	24.3
11/24/2021	25.8	15.7	15.3	21.9	18.4	27.9	24.7
12/1/2021	26.3	16.2	16.4	23	19.1	28.8	25.4
12/8/2021	25.5	15.3	15.8	22.3	20.4	27	23.6
12/15/2021	25.3	16.3	15.2	22.3	19.3	26	23.3
12/22/2021	26.4	16.6	15.1	23.2	17.6	26.4	24
12/29/2021	26.4	17.1	19.8	24.3	18	27	24.1
1/5/2022	30.9	18.9	18.5	29.5	23.6	30.9	25.1
1/12/2022	26.8	17	18.6	23.8	22.5	25.9	23.5
1/19/2022	23.7	16.6	15.5	22.4	20.3	24.8	22.4
1/26/2022	27.7	17.7	16	23	18.9	26.1	22.8
2/2/2022	27.9	18	17.6	22.9	19	26.2	23.2
2/9/2022	29.1	19	19	24.5	19.7	27.4	23.6
2/16/2022	28.2	19.7	17.7	25	18.4	28	23.4
2/23/2022	27.6	20.4	19.4	24.9	18.7	27.6	23.7
3/2/2022	29.3	21.9	23.7	24.7	18.6	27	23.6
3/9/2022	28.8	21.1	19.8	22.9	17.9	26.4	23.9
3/16/2022	29.4	20	21.1	22.2	18.4	26.3	24.9
3/23/2022	29.4	19.6	19.2	22.2	18.6	27.3	24.9
3/30/2022	29.5	18.7	17.7	22.1	19.6	26.7	25.7
4/6/2022	28.2	18.8	18.6	22	20.9	27.3	25.7
4/13/2022	28.9	19	19.2	22.1	20.8	27.7	26.3
4/20/2022	27.8	18.6	17.7	21.7	21.4	27.9	26.3

Year	BNSF	Canadian National	Canadian Pacific	CSX	Kansas City Southern	Norfolk Southern	Union Pacific
4/27/2022	27.5	17.8	16.6	22.1	21.1	27.2	25.6
5/4/2022	27.3	17.3	17.8	22.7	21.4	26.6	25.1
5/11/2022	27.8	16.8	18.6	24	22.2	26.9	24.9
5/18/2022	26.8	17.4	18.9	24.4	21.8	28.1	24.3
5/25/2022	27.5	17.3	18	25.3	21.5	26.9	24
6/1/2022	27.4	16.7	16.7	25.4	20.7	27.2	24.3
6/8/2022	26.7	16.8	17.3	25.5	20.6	27.4	23.7
6/15/2022	26	16.7	17.5	24.7	19.5	26.3	22.9
6/22/2022	27.5	17.6	18.8	25.8	20.4	26.6	23.6
6/29/2022	27.8	16.7	18	26.2	20.6	27.4	24.2
7/6/2022	28.6	15.9	17.7	25.6	21.6	26	24.5
7/13/2022	29.2	16.4	18.4	26	22.8	27.1	24.4
7/20/2022	27.2	15.2	17.8	24.5	19.7	25.3	23.7
7/27/2022	27.4	16.1	16.7	24.6	20.9	26.7	24.4
8/3/2022	26.6	15.7	17	24.7	20.8	26.4	24.4
8/10/2022	27.7	16.4	17.6	25.1	22.9	26.5	24.3
8/17/2022	26.5	15.5	16.6	24.8	20.7	26.2	24.2
8/24/2022	25.9	15.4	16.4	25	19.5	25.8	24.6

Note: Dwell time refers to the average number of hours railcars are stationary in terminals between their origin and destination.

Appendix IV: Potential Effects of Precision-Scheduled Railroading-Associated Operational Changes of Class I Freight Railroads on Passenger Rail Service

We spoke with representatives of Amtrak, a federally subsidized passenger rail corporation, and the American Public Transportation Association about potential effects of Class I freight railroads' operational changes associated with precision-scheduled railroading (PSR) on passenger rail performance. As stated in Amtrak's fiscal year 2021 consolidated financial statement, most of the rights-of-way over which Amtrak operates are owned by freight and other railroads, known as host railroads.

Amtrak officials stated that they have experienced increased delays because of longer freight trains, even though Amtrak has a statutory right of preference.[1] This requires freight railroads to give Amtrak preference over freight transportation in using or accessing their rail lines, junctions, and crossings, except in an emergency.[2] Amtrak data on passenger train delays from 2011 to 2021 vary, with host freight railroads causing over half of delays each year. While these data do not contain the detail required to determine whether a delay was caused by longer trains, Amtrak officials stated that they have seen an increase in delays related to Class I railroads operating longer trains. Specifically, Amtrak officials stated that longer trains cannot fit in track sidings to allow the Amtrak train to pass.[3] According to the officials, when a freight train is dispatched ahead of a faster Amtrak train, the Amtrak train must follow the freight

[1]See 49 U.S.C. § 24308(c).

[2]However, a freight railroad may apply for relief from this requirement to STB. If STB, after an opportunity for a hearing, determines that Amtrak's right of preference will materially lessen the quality of freight transportation provided to shippers, then it must establish the rights of the carrier and Amtrak on reasonable terms.

[3]Trains operate on different types of train tracks. Main line tracks are the primary rail arteries trains use to travel. Some sections of main line track have "sidings" that lead to a parallel set of rails to allow trains to pass one another.

train at reduced speed until the freight train reaches a siding long enough to accommodate it. Amtrak officials said this violates Amtrak's right of preference in accessing freight tracks. Further, Amtrak officials stated that—while they experienced problems with delays before the implementation of PSR-associated changes—there has been an increase in particularly long delays that they associate with PSR implementation.

In contrast to Amtrak's concerns, Class I railroad representatives noted that PSR-associated practices have the potential to improve reliability for passenger rail, as scheduled freight operations could reduce conflicts between passenger and freight trains. Amtrak officials said they have not experienced this reduction in conflicts between passenger and freight trains. Officials from the American Public Transportation Association stated that precise scheduling for freight railroads can reduce disruptions for passenger railroads but noted that changes such as longer trains and increased asset utilization had reduced the resilience of the network. Specifically, because facilities such as ports and yards have not been optimized for long trains, backlogs occur that require a long time for recovery.

In addition to its authority related to freight rail, the Surface Transportation Board (STB) has jurisdiction over certain passenger rail service issues. For example, STB has the authority to conduct investigations into Amtrak's on-time performance issues, make recommendations for improvement, and enforce Amtrak's right of preference by awarding damages or other appropriate relief.[4] However, before STB is permitted to do so, an intercity passenger train must fail to meet minimum standards established by FRA for customer on-time performance and service quality for two consecutive calendar quarters.[5] Once this occurs, STB may initiate an investigation on its own and must initiate an investigation upon complaint by certain entities, including Amtrak. The investigation is to determine whether and to what extent the train's delays or failure to achieve the minimum standards are due to causes that could reasonably be addressed by the host railroad, Amtrak, or other intercity passenger rail operators. STB must identify reasonable measures to address these causes and issue recommendations to improve the train's service, quality, and on-time performance. In addition, if STB determines that the train's delays or failures are attributable to the host railroad's failure to give

[4]*See* 49 U.S.C. § 24308(f).

[5]FRA's metrics and minimum standards for measuring customer on-time performance and service quality of intercity passenger train operations are located in 49 C.F.R. Part 273.

preference to Amtrak over freight transportation, then STB may award damages to Amtrak or provide other relief.[6]

Additionally, the Infrastructure Investment and Jobs Act required STB to establish a program through which it will primarily carry out its passenger rail responsibilities and hire additional full-time employees to help it do so.[7] In October 2022, STB established its Office of Passenger Rail, which will be responsible for investigating and analyzing issues regarding Amtrak customer on-time performance.

[6]In addition to STB's authority, the U.S. Attorney General may enforce Amtrak's right of preference by bringing a civil action against the host railroad in federal district court to obtain equitable relief. *See* 49 U.S.C. § 24103(a). According to Amtrak, the U.S. Attorney General has brought a civil action only once in 1979. *See* U.S. v. Southern Pacific Transp. Co., Civil Action No. 79-3394 (D.D.C. 1979).

[7]Pub. L. No. 117-58, § 22309, 135 Stat. 429, 734 (2021).

Appendix V: GAO Contact and Staff Acknowledgments

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In addition to the contact named above, Jean Cook (Assistant Director), Katie Hamer (Analyst-in-Charge), Sarah Jones (Senior Analyst), Richard Jorgenson, Terence Lam, Alicia Loucks, Joshua Ormond, Mary-Catherine P. Overcash, Minette Richardson, and Kelly Rubin made key contributions to this report.

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