# ECONOMIC IMPACT OF RAILROAD ABANDONMENT: CARRINGTON-TO-TURTLE LAKE RAIL LINE

**By**

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**Abstract**

The Carrington-to-Turtle Lake rail line serves five agricultural shippers in a four county area in central North Dakota. Service on the line has been affected by recent embargoes, floods, and poor, deteriorating track conditions. The line is a strong candidate for abandonment as efforts to rehabilitate the line have lacked financial support. Prior to this study, a benefit/cost study, which compares benefits and costs of a rail line reconstruction, was performed for the rail line in an attempt to secure financial assistance for rehabilitation.

Railroad abandonment impacts rural communities and local economies in a variety of ways. Businesses that use rail for transportation usually experience a change in their shipping options. Instead of sending and/or receiving materials and supplies by rail, those items must be moved by truck. The severity of the change is often a function of the amount of material shipped and distance hauled.

Rail abandonment affects property values. In the absence of tax rate changes, reduced property values translate directly into lower property tax revenues for local governments. Rural areas, especially in North Dakota, often do not have adequate road and highway infrastructure to absorb movements of grain and agricultural inputs exclusively by truck. The transference of rail movements to truck traffic accelerates the deterioration of local roads and highways.

Abandonment of the Carrington-to-Turtle Lake rail line was estimated to increase transportation costs for shippers on the line by $329,000 annually. A majority of the increase in transportation costs would be incurred by farmers in the form of reduced commodity prices. The North Dakota Input-Output Model

estimated that the $329,000 in direct impacts would generate an additional $682,000 in secondary impacts. Total economic losses for the regional economy were estimated to be $1 million annually. Additional impacts included an annual loss of $17,900 in state-collected tax revenue. Annual net costs (i.e., damages less additional user revenues) to repair and maintain state roads impacted from increased truck traffic were estimated at $297,000 for resurfacing and $868,000 for reconstruction.

**Keywords**: rail abandonment, economic impact, rural communities

## Highlights

The Carrington-to-Turtle Lake rail line runs for 85 miles in central North Dakota and is operated by the Red River Valley and Western Railroad. Service on the line has been affected by recent embargoes, floods, and poor, deteriorating track condition. Nearly all service on the line was discontinued in 1996. A benefit/cost study of rehabilitating the rail line was performed in 1995. Benefit/cost studies compare the benefits of rail line improvements with the costs of improvements. The goal of this study was to assess the economic impact of a loss in rail service on the local economy.

Economic impacts associated with rail line abandonment usually represent an economic leakage from a local economy. Direct impacts on rural economies often include (1) increased transportation costs for shippers, (2) loss of property tax revenues from reductions in property values, (3) local job transfer and/or unemployment, (4) increased local road deterioration, and (5) reduced economic development opportunities.

Pre-abandonment transportation costs for shippers were based on rail rates and commodity-volumes shipped. Post-abandonment transportation costs, determined from shippers' post abandonment shipping plans, included transshippment costs, rail costs from point of transshipment to final destination, and truck rates for direct deliveries. The total change in shipper cost (based on 1,000 rail cars) due to an abandonment was estimated at $329,000 annually.

Rail abandonment diverts rail traffic onto local highways and roads, resulting in increased wear and damage to local road systems. The annual net cost (damages less

increased user fees) of resurfacing and reconstructing state roads and highways affected by increased truck traffic was estimated to be $297,000 and $868,000, respectively. Most highways damaged in the region will likely be resurfaced as opposed to reconstructed.

The effect of rail abandonment on property values was estimated by capitalizing over time increased shippers' transportation costs into property values. Reduced property values result in annual property tax losses of $155,000 to the four-county area.

The annual direct economic impacts from a rail line abandonment from Carrington-to-Turtle Lake were $329,000 (increased transportation costs). Other annual impacts included $155,000 in reduced property tax revenues and local road infrastructure damages ranging from $297,000 for road resurfacing to $868,000 for reconstruction.

Secondary impacts, which occur when direct impacts are spent and respent within an economy, were estimated using the North Dakota Input/Output Model. Annual direct impacts (losses to the local economy) of $329,000 generated $682,000 in secondary impacts (also lost to the local economy). The total economic impact of the rail line abandonment was estimated to be a loss of $1,011,000 annually to the area economy. The level of gross business volume would be enough economic activity to support 11 full-time jobs in the economy. The loss of state collected tax revenues included $10,600 in sales and use taxes, $5,800 in personal income taxes, and $1,500 in corporate income taxes.

## INTRODUCTION

Much of the economy of North Dakota is dependent upon agriculture, especially many rural areas in the state (Leistritz et al. 1993; Coon and Leistritz 1994). Crop production, specifically wheat, barley, sunflower, oats, and other grains, is the dominant agricultural activity. Since North Dakota has little in-state grain processing (relative to in-state production), most of agricultural commodities produced are shipped out of state. The dependence on efficient transportation systems is particularly important to rural economies whose economic base is highly reliant on agriculture.

Traditionally, agricultural commodities are moved by rail and truck from North Dakota to destinations throughout the United States. Since 1985, rail transportation has accounted for 75 percent of all grain and oilseed shipments from North Dakota elevators to in-state and out-of-state destinations (Andreson and Vachal 1995). Besides delivering agricultural commodities to various destinations, rail service in rural agriculturally dependent communities also plays a role in bringing in agricultural inputs (e.g., fertilizer, machinery). Other non-agricultural commodities and inputs are also moved by rail to North Dakota communities, especially those with manufacturing industries. In an era of pursuing rural economic development, rail access can be a critical factor in a community's ability to attract new manufacturing and/or agricultural processing facilities.

Thus, rural based economies and other agriculturally dependent businesses and communities become particularly concerned about maintaining existing rail services. Changes in availability and access to rural transportation can be particularly troubling to small rural communities. Not only are rural transportation links important to

agriculturally based businesses, but loss of rail service can affect economic development opportunities. This effect can be additionally troublesome since most small rural communities have suffered some economic decline (e.g., loss in population, retail sales, etc.) during the 1980s and early 1990s (Leistritz and Wanzek 1993; Coon et al. 1995), making it harder to retain rural remote rail service. Inter-modal and intra-modal competition has forced some rail lines to re-examine the economic viability of low volume branch lines. Such is the case with the Carrington-to-Turtle Lake rail line. The purpose of this study is to assess the economic impacts of an abandonment of the Carrington-to-Turtle Lake rail line.

## OBJECTIVES

The overall objective of this study is to assess the economic impacts of an abandonment of the Carrington-to-Turtle Lake rail line. Specific objectives include:

1) estimate annual change in transportation costs to shippers,
2) estimate change in local road/highway use and its associated costs,
3) estimate change in tax revenues,
4) estimate the direct and secondary economic impacts on the local economy, and
5) discuss the economic development implications of a change in rail line services.

## PROCEDURES

This study followed the methods developed by Honeyman (1995). Honeyman (1995) estimated (1) the change in shipper costs associated with moving grain by truck compared to the costs using rail services, (2) the effects of changes in truck traffic on local road systems, (3) the secondary economic effects on related sectors in the economy, (4) the local tax revenue consequences of rail line abandonment, and (5) discussed the economic development opportunities that are associated with rail abandonment.

The cost/benefit of rail line rehabilitation should not be confused with the economic impacts of rail line rehabilitation. A benefit/cost study usually compares the benefits and costs of rail line rehabilitation. Generally, benefits include transportation savings for shippers, railroad profit resulting from rehabilitation, and avoidable highway reconstruction and resurfacing costs. Costs include rehabilitation expenses plus the net liquidation value of rail assets currently in place. These studies generally compare the ratios of benefits to costs in an attempt to determine the eligibility of the project for financial assistance. This study will duplicate some of the estimates generated in the benefit/cost study for the Carrington-to-Turtle Lake rail line (Tolliver and Andres 1995); however, this study does not address rehabilitation expenses that would be incurred with reconstructing the rail line. This study assesses the economic impacts to the local economy of a rail line abandonment.

The status of the Carrington-to-Turtle Lake rail line in 1996 was synonymous with abandonment. The condition of the track, ties, and ballast had deteriorated to the extent that attempts to ship grain over the rail line resulted in derailments (Red

River Valley and Western 1996). Thus, in assessing abandonment impacts, present transportation costs (using trucks and transshipments) will be compared with rail costs that existed when the rail line was operational, and losses in property values and local road infrastructure will be estimated.

## Impacts of Railroad Abandonment

Economic activity (or the loss thereof) from a project, program, or policy can be categorized into direct and secondary impacts. Direct impacts are those changes in output, employment, or income that represent the initial or direct effects of the project, program, or policy. Direct impacts on rural economies include increased transportation costs to shippers (some of which may be absorbed by patrons through lower commodity prices) and depending upon the scope of the rail abandonment, can include job transfer and/or unemployment resulting from impacted businesses and communities.

Secondary impacts (sometimes further categorized into indirect and induced effects) result from subsequent rounds of spending and respending within the economy. In the case of rail line abandonment, increased transportation costs can result in economic leakage (i.e., less money available in the local economy). Likewise, lower property tax revenues can translate into less funds spent (less services provided) by local governments or can increase the tax burden on residents to compensate for the loss in tax revenue. The economic leakage that occurs in local economies has additional effects on related sectors in the economy, thereby reducing the amount of economic activity in other sectors of the economy.

Other economic impacts of railroad abandonment can include changes in local employment and damages to local road systems. Economic development opportunities also can be impacted; however, industry and site-specific information is generally required to accurately measure the potential economic impacts associated with such actions.

## Input-Output Analysis

Secondary impacts accrue to other sectors in the local economy as money circulates within the economy. The process of spending and respending within an economy is sometimes termed the multiplier process, and the resultant secondary effects are sometimes referred to as multiplier effects (Leistritz and Murdock 1981). This process of spending and respending can be explained by using an example. A single dollar from an area wheat producer (**Households** sector) may be spent for a loaf of bread at the local store (**Retail Trade** sector); the store uses part of that dollar to pay for the next shipment of bread (**Transportation** and **Agricultural Processing** sectors) and part to pay the store employee (**Households** sector) who shelved or sold the bread; the bread supplier uses part of that dollar to pay for the grain used to make the bread (**Agriculture-Crops** sector) ... and so on (Hamm et al. 1993).

Input-output (I-O) analysis is a mathematical tool that traces linkages among sectors of an economy and calculates the total business activity resulting from a direct impact in a basic sector (Coon et al. 1985). The North Dakota Input-Output Model includes 17 economic sectors of the North Dakota economy. Households are included as a sector in the model and represent economy-wide estimates of personal

income. The model was developed from primary (survey) data from firms and households in North Dakota. Empirical testing has shown the North Dakota Input-Output Model is sufficiently accurate in estimating gross business volume, personal income, retail activity, and economic activity in other major sectors in North Dakota (Coon and Leistritz 1994).

## CARRINGTON-TO-TURTLE LAKE RAIL LINE BACKGROUND

The Carrington-to-Turtle Lake line runs for 84.9 miles in central North Dakota and is operated by the Red River Valley and Western Railroad (Figure 1). Service on the line has been affected by recent embargoes, floods, and poor, deteriorating track condition. Nearly all service on the line was discontinued in the winter of 1995-1996. As a result of the near abandoned state of the rail line, most shippers on the line have had to move their grain by truck. The line generated an average of 561 carloads from 1992 through 1994, although rail volumes before that period were higher.

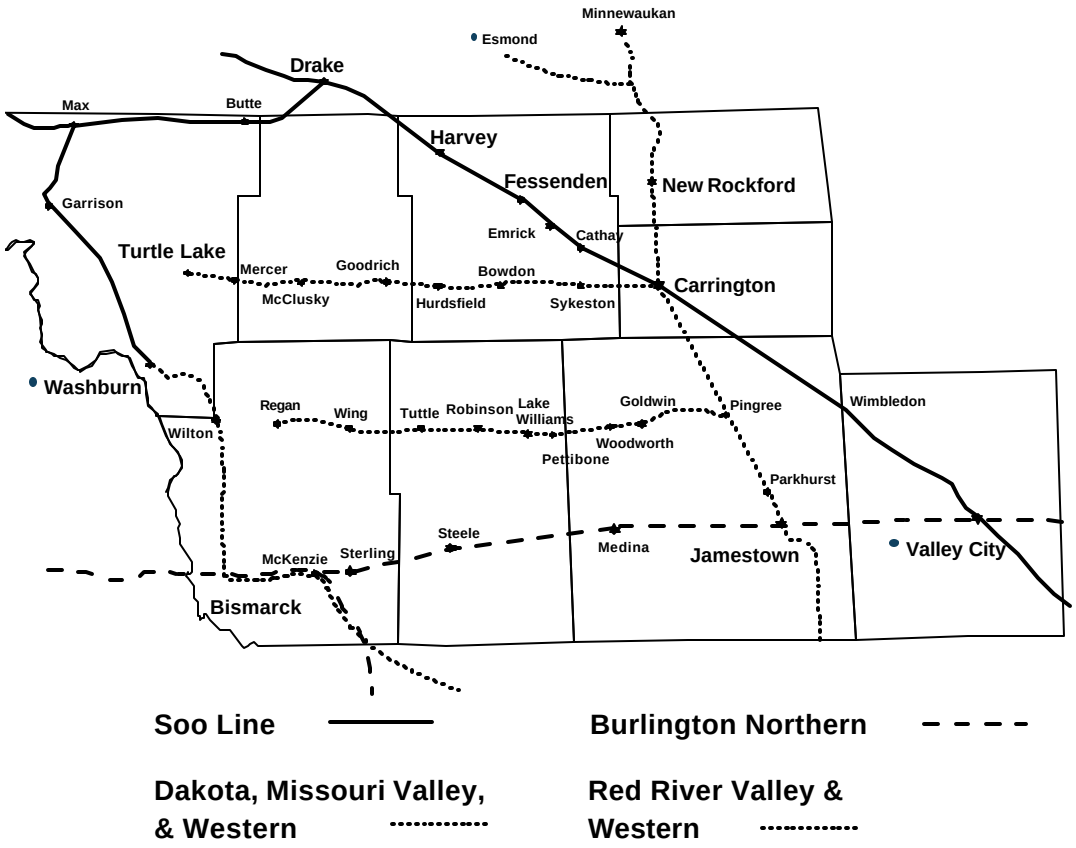


Figure 1. Carrington-to-Turtle Lake Rail Line and Surrounding Region, North Dakota, 1996

Source: North Dakota Public Service Commission (1994).

Since rail abandonment will impact the communities served by the line, a brief demographic and economic profile was included for the affected area. For this analysis, four counties (McLean, Sheridan, Wells, and Foster) in the central portion of North Dakota were assumed to be affected by the abandonment. The communities along the line that would be directly affected include Turtle Lake, Mercer, McClusky, Denhoff, Goodrich, Hurdsfield, Bowdon, Heaton, Sykeston, and Carrington.

## Demographics

Population in the affected counties has decreased 22 percent from 1980 to 1995 and decreased 7 percent from 1990 to 1995 (Table 1). All four counties had population decreases from 1980 to 1990 and from 1990 to 1995; however, Foster County has fared better than the other counties. Population for the study region in 1995 was estimated at about 20,900 people. The combined population of cities on the rail line in 1994 comprised about 20 percent (3,971 people) of the affected area's population. The largest cities affected by the abandonment include Carrington, Turtle Lake, and McClusky (Table 1). The other towns affected all had populations below 200 people in 1994.

Table 1. Population of Counties and Cities Affected by the Carrington-to-Turtle Lake Rail Line, 1980 to 1995

| City/County | Population | | | Percentage Change | |
|---|---|---|---|---|---|
| | 1980 | 1990 | 1995[a] | 1980-1995[a] | 1990-1995[a] |
| Bowdon | 220 | 196 | 175 | -20.5 | -10.7 |
| Carrington | 2,641 | 2,267 | 2,258 | -14.5 | -0.4 |
| Goodrich | 288 | 192 | 176 | -38.9 | -8.3 |
| Hurdsfield | 113 | 92 | 77 | -31.9 | -16.3 |
| McClusky | 658 | 492 | 463 | -29.6 | -5.9 |
| Mercer | 134 | 104 | 94 | -29.9 | -9.6 |
| Sykeston | 193 | 167 | 145 | -24.9 | -13.2 |
| Turtle Lake | 802 | 681 | 583 | -27.3 | -14.4 |
| Foster | | 4,611 | 3,983 | 3,892 | -15.6 |
| -2.3 | | | | | |
| McLean | 12,383 | 10,457 | 9,847 | -20.5 | -5.8 |
| Sheridan | 2,819 | 2,148 | 1,895 | -32.8 | -11.8 |
| Wells | 6,979 | 5,864 | 5,254 | -24.7 | -10.4 |
| Four-County Region | 26,792 | 22,452 | 20,888 | -22.0 | -7.0 |

[a] Population figures for North Dakota cities represent 1994 estimates.
Source: North Dakota State Data Center (1996).

Current per capita incomes in the study region compare favorably with the state average (Figure 2). Per capita incomes in 1994 for Foster, McLean, and Wells Counties were above the state average. However, in the late 1980s, all counties were lower than the state average. Sheridan County has consistently lagged behind both the state average and the other counties in the study area. All counties have exhibited real growth in per capita incomes from 1987 to 1994. From 1987 to 1994, real growth in per capita income was highest in Wells County (35 percent) and lowest in Foster County (14 percent). Per capita income in the state increased 16 percent over the same period.

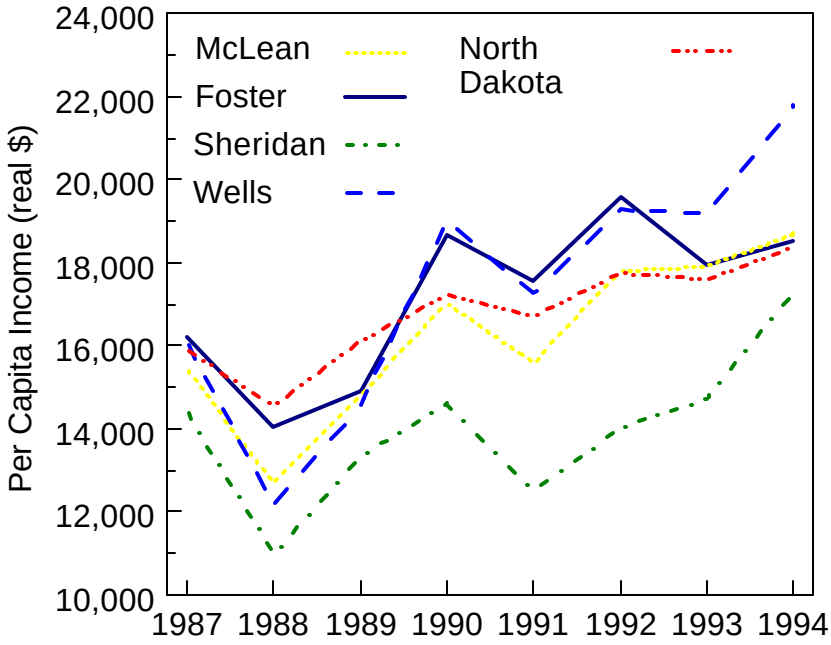


Figure 2. Per Capita Incomes in the Carrington-to-Turtle Lake Study Area, 1987 Through 1994

Source: North Dakota State Data Center (1994).

Another indicator of economic health in an area is the level of taxable sales and purchases. Collectively, adjusted retail sales (effects of inflation removed) for the cities affected by the rail line have decreased 20 percent from 1980 levels (Table 2). However, adjusted sales since 1990 in the study cities have increased nearly 34 percent. The largest increases have occurred in Sykeston (140 percent), Carrington (41 percent), and McClusky (32 percent). Not all cities have shown growth; Hursdfield and Turtle Lake both have experienced a 14 percent decline in retail sales since 1990.

Table 2. Retail Sales of Cities Affected by the Carrington-to-Turtle Lake Rail Line, 1980 to 1994.

| City | Retail Sales | | | Percentage Change | |
|---|---|---|---|---|---|
| | 1980 | 1990 | 1994 | 1980-1994 | 1990-1994 |
| | ---------- 1994 dollars ---------- | | | | |
| Bowdon | 535,976 | 206,005 | 254,033 | -52.6 | 23.3 |
| Carrington | 37,399,061 | 23,308,935 | 32,800,307 | -12.3 | 40.7 |
| Goodrich | 982,415 | 542,511 | 419,900 | -57.3 | -22.6 |
| Hurdsfield | na | 322,188 | 275,578 | na | -14.5 |
| McClusky | 4,264,883 | 1,392,262 | 1,838,755 | -56.9 | 32.1 |
| Mercer | na | 186,641 | 177,391 | na | -5.0 |
| Sykeston | na | 178,959 | 430,137 | na | 140.4 |
| Turtle Lake | 5,025,547 | 2,456,267 | 2,101,623 | -58.2 | -14.4 |
| Total | 48,207,882 | 28,593,768 | 38,297,724 | -20.6 | 33.9 |

Source: North Dakota Tax Department (1995).

## Economic Base

Economic base is a term used to describe the industries, sectors, or common economic activities that bring "new" money into an area. Economic base data represent sales of goods and services produced within an area to entities outside the area. The area in question can be any reasonable geographical unit--county, multi-county region, state, multi-state area, etc. Also, goods and services considered "sales to final demand" vary by area definition.

Economic base activities represent only a portion of all economic activity in an area. Other industries (sometimes called derivative or residentiary) are those whose existence derives from the presence of basic (primary sector) industries (Hertsgaard et al. 1984). The spending and respending of economic base or primary sector dollars creates spillover (multiplier) effects, which then in turn support other sectors of the

economy. Economic base is an important economic measure since the size and composition of an area's economic base says much about the strengths and weaknesses of its economy. Without a strong economic base, or activities producing goods and services for export from an area, overall economic activity--personal income, retail trade activity, etc.--becomes largely reliant on spillover effects from economic base activities in other areas.

The economic base in the study area is primarily composed of agriculture and federal activities. Energy is an important industry in McLean County; however, the branch line in this study does not extend beyond the eastern edge of the county and is not directly involved with the energy industry. The economic base in the eastern edge of McLean County is similar in composition to the other counties.

Agriculture, composed of livestock activities and crop production, represents over 50 percent of the economic base in the affected counties (Figure 3). In Foster, Sheridan, and Wells Counties, agriculture accounts for over 70 percent of the economic base. Federal activities in the four county area accounts for about 20 percent of the economic base. Although energy activities only exist in McLean County, they represent nearly one quarter of all economic base activity in the four county area.

The economic base in the four county area, measured in real dollars (the effects of inflation removed), has fluctuated from $455 million in 1980 to $610 million in 1985. The economic base has increased about 3.3 percent (real growth) from 1990 to 1994 (Figure 3). Changes in economic sectors within the four counties have not been uniform. Federal activities, in the study area, have increased 7 percent

since 1990. Energy increased 1 percent, while agriculture has decreased 0.7 percent during the same period. Manufacturing activity in the area has doubled since 1990, yet remains a minor industry in the study area. Likewise, tourism has shown strong growth, yet only constitutes about 2 percent of the economic base. Thus, by excluding the unaffected areas in McLean County that have energy activities, agriculture clearly becomes the major industry in the study area.

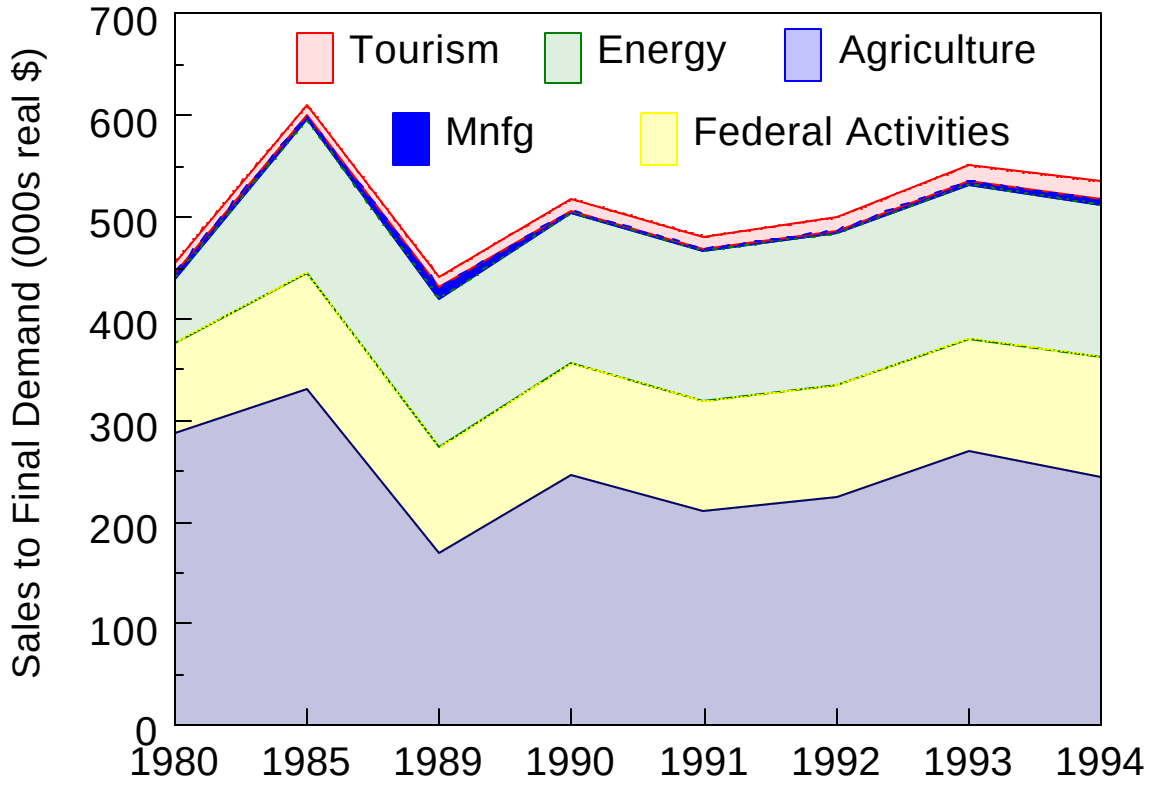


Figure 3. Economic Base of Carrington-to-Turtle Lake Study Area, 1980 Through 1994.

## RESULTS

While the railroad industry has realized efficiency and productivity gains through branch line abandonment, rural communities may have been negatively impacted due to the loss of rail service. Generally, these impacts have included (1) increased transportation costs to shippers, (2) increased highway and local road use and associated costs, (3) reductions in economy-wide personal income and gross business volume, (4) unemployment and job transfer in the local work force, (5) reductions in local tax revenue, and (6) reduced economic development opportunities. These impacts can be divided into *direct* and *secondary* impacts.

### Direct Impacts

Direct impacts are those changes in output, employment, or income that represent the initial or direct effects of the project, program, or policy. Railroad abandonment will directly affect the grain elevators in Turtle Lake, McClusky, Goodrich, Hurdsfield, and Bowdon. These shippers were surveyed to determine their most likely options in the event of abandonment. In the absence of rail service, elevators on the line would be forced to ship grain by truck to the nearest railhead (facility capable of loading grain from trucks onto rail cars) for transshipping[2] or ship directly to final market by truck. Conversely, in the event of rehabilitation of the line, shippers have pledged an annual traffic volume of 1,000 cars. Presumably the

[2]Transshipping was defined as the process of moving grain by truck to a facility capable of unloading grain from truck and loading grain onto rail. Grain transshipped moves by rail from the transshipment point to final destination.

additional traffic would come from diverting current truck shipments to rail or from competing elevators in the area.

Two shipping volumes were used as the basis for analysis: (1) pre-abandonment volume of 561 rail cars and (2) rehabilitation of the line resulting in an additional 439 rail cars. The total impact of abandonment includes the change in transportation cost to shippers, avoidance of increased highway damage, loss of gross business volume in the local communities along the line, avoidance of property tax losses, and continued economic development opportunities.

Shippers (country grain elevators) served on rail lines that become abandoned experience *direct* impacts of abandonment. In the absence of rail service, they are forced to ship products by truck to final market or to the nearest railhead for continued movement to final destination. Due to extra loading and unloading costs, transshipping usually raises shipping costs. Also, truck rates generally are not competitive with rail, thereby raising costs in the absence of rail access. Also, the reduction of competitive factors in rural areas, including a lack of intra-modal (e.g., truck vs truck) and inter-modal (e.g., truck vs rail) competition, can raise transportation rates.

Rail abandonment diverts rail traffic onto local highways and roads. In rural areas, these usually consist of light-duty, low-volume roads not designed for heavy traffic (Tolliver 1994). As a result, state and local governments are burdened with greater road maintenance and construction costs. Ultimately, tax payers will be forced to cover the costs of maintenance and rehabilitation of local roads. Alternatively, in the absence of necessary road maintenance

and construction, increased vehicle operating costs and opportunity costs associated with deteriorated and overused rural roads are borne by local residents.

Change in Transportation Cost to Shippers

If the Carrington-to-Turtle Lake rail line is abandoned, shippers on the line will be forced to move grain by truck to the nearest railhead for transshipment or truck directly to the final market. The increased transportation cost will affect the competitiveness of grain elevators on the line. Due to the competitive nature of the grain elevator industry (operations are limited by narrow margins), it is unlikely an elevator on the line could absorb much of the increased cost of transportation. In light of the increased cost of transportation, shippers are likely to reduce commodity prices to farmers. The effects of railroad abandonment on the long-term competitiveness and sustainability of shippers on the line was not examined in this study, yet those issues are important factors for communities affected by rail line abandonment.

Lower commodity prices mean lost revenues for farmers, and consequently, farmers may deliver grain to other elevators in the region, possibly those that can offer more favorable prices. Those elevators are likely to be located on other area rail lines (Figure 1). Therefore, the competitiveness of shippers on the abandoned line would presumably be a function of the truck shipping cost (farmer's costs) to competing elevators and the price differential between elevators. Presumably, if the cost of moving grain to an alternative elevator is greater than the price differential received, there would be no economic advantage to move grain to other elevators.

The first step to determine the post-abandonment shipper cost is the conversion of rail cars into truckloads. Approximately 3.5 semi-loads[3] of grain are equivalent to a 100-ton railroad hopper car (Upper Great Plains Transportation Institute 1993).

Post-abandonment shipment options were determined from a survey of shippers along the line. Shippers acknowledged that most of the grain will be transshipped to nearby elevators on the Soo Line Railroad to the north or to facilities in Carrington to the east (Figure 1). Traffic patterns, determined from the survey, were used for determining transshipment distances and for identifying which highways in the abandonment area will experience increased truck traffic. Based on mileage to the transshipment point and final destination, truck costs were estimated using a study by Faucett and Associates (1986) and updated using fruit and vegetable truck cost summaries (U.S. Department of Agriculture 1995).

Railroad shipment costs prior to abandonment were estimated (Table 3) based on multiple car rates obtained from Burlington Northern tariff reports (Burlington Northern Railroad 1995). Multiple car rates reflect the transportation costs that would be incurred after a rail line rehabilitation. Knowing the destination, commodity, and volume shipped, the associated railroad shipment cost was computed (see Appendix for further explanation).

Railroad transportation costs for all commodities and major destinations for the base case of 561 carloads and the incremental traffic of 439 carloads were estimated using multiple car rates. Some low volume commodity-destination combinations used single car rates (e.g., durum shipped to Portland). The shipment cost with rail access for the pre-abandonment level of railroad traffic, 561 carloads, was estimated to be $1,193,025 (Table 3). The largest portion of the annual transportation cost was for shipments of grain to Minneapolis and Portland.

[3] Five axle tractor-trailer loaded to 80,000 pounds gross vehicle weight.

Table 3. Pre-Abandonment Shipping Costs, Base Case, Carrington-to-Turtle Lake Rail Line, 1995

| | Destinations | | | | |
|---|---|---|---|---|---|
| Commodity | Portland | Duluth | Minneapolis | ND | Total |
| | ---------- $ ---------- | | | | |
| Wheat-HRS | 22,637 | 46,855 | 561,597 | 425 | 631,514 |
| Durum | 88 | 5,135 | 55,102 | 2,816 | 63,141 |
| Barley | 132,988 | 0 | 332,259 | 20,594 | 485,841 |
| Sunflowers | 0 | 0 | 8,429 | 4,100 | 12,529 |
| Total | 155,712 | 51,990 | 957,387 | 27,936 | 1,193,025 |

Note: Transportation costs were based on 561 carloads.

Similarly, post-abandonment shipping costs were estimated for the 561 rail cars (Table 4). Transportation costs in the post-abandonment case consist of direct truck hauls to final market and transshipping costs to the nearest railhead. Transshipping cost includes trucking costs to the nearest railhead, transloading costs, and railroad transportation costs to final market. The estimated total post-abandonment (without rail service) shipping cost is $1,387,600. The difference between the current railroad shipping cost and the post-abandonment shipping cost under the base scenario ($194,575) represents the benefit to shippers of continued rail service. Alternatively, if the branch line becomes abandoned, the difference represents annual increases in transportation costs.

Table 4. Post-Abandonment Shipping Costs, Base Case, Carrington-to-Turtle Lake Rail Line, 1995

| | Destinations | | | | |
|---|---|---|---|---|---|
| Commodity | Portland | Duluth | Minneapolis | ND | Total |
| | ---------- $ ---------- | | | | |
| Wheat-HRS | 26,812 | 66,170 | 712,626 | 274 | 805,882 |
| Durum | 93 | 7,615 | 72,157 | 1,850 | 81,714 |
| Barley | 140,349 | 0 | 317,661 | 20,985 | 478,995 |
| Sunflowers | 0 | 0 | 12,015 | 8,993 | 21,008 |
| Total | 167,255 | 73,785 | 1,114,458 | 32,101 | 1,387,600 |

Note: Transportation costs were based on 561 carloads.

An additional 439 carloads were assigned to shippers on the line using a weighted average of current railroad traffic. Presumably, the additional traffic would be generated from current truck shipments, or, because of a more competitive market position, some traffic may come from grain marketed at competing elevators located on different rail lines. Shipping costs with rail access for the incremental traffic were computed using the same methods to compute the base traffic transportation costs. The estimated total annual railroad shipping cost for the incremental traffic was $945,519 (Table 5).

Table 5. Pre-Abandonment Shipping Costs, Incremental Traffic, Carrington-to-Turtle Lake Rail Line, 1995

| | Destinations | | | | |
|---|---|---|---|---|---|
| Commodity | Portland | Duluth | Minneapolis | ND | Total |
| | ---------- $ ---------- | | | | |
| Wheat-HRS | 10,026 | 20,819 | 466,320 | 464 | 497,629 |
| Durum | 38 | 2,293 | 30,663 | 1,219 | 34,213 |
| Barley | 60,349 | 0 | 339,088 | 9,358 | 408,794 |
| Sunflowers | 0 | 0 | 3,815 | 1,067 | 4,882 |
| Total | 70,413 | 23,112 | 839,886 | 12,108 | 945,519 |

Note: Incremental traffic was based on an additional 439 carloads.

The estimated annual post-abandonment transportation cost for the incremental traffic was estimated at $1,079,682 (Table 6). The cost represents the combination of direct shipments to final market and transshipment costs. The method used to compile the incremental traffic costs was the same as that used for the base scenario.

Table 6. Post-Abandonment Shipping Costs, Incremental Traffic, Carrington-to-Turtle Lake Rail Line, 1995

| | Destinations | | | | |
|---|---|---|---|---|---|
| Commodity | Portland | Duluth | Minneapolis | ND | Total |
| | ---------- $ ---------- | | | | |
| Wheat-HRS | 11,717 | 28,992 | 556,999 | 294 | 598,002 |
| Durum | 40 | 3,394 | 40,377 | 799 | 44,610 |
| Barley | 63,439 | 0 | 354,758 | 9,507 | 427,703 |
| Sunflowers | 0 | 0 | 6,720 | 2,647 | 9,367 |
| Total | 75,196 | 32,386 | 958,853 | 13,247 | 1,079,682 |

Note: Incremental traffic was based on an additional 439 carloads.

The total change in shipper costs (base traffic plus incremental traffic) due to an abandonment was estimated at $328,738 annually (Table 7). The change in shipper costs includes the estimated $194,575 change in transportation costs for base traffic and $134,163 change in transportation costs for the incremental traffic.

Highway Impacts

The highway investment costs were computed only for the base case (561 rail cars) for several reasons. First, where the incremental traffic would be generated from was unclear; traffic from the anticipated 439 additional rail cars could not be assigned to particular highways. Second, the incremental traffic was assumed to be already moving by truck to the elevators in the region regardless of how it is moved to final market. Thus, these highway impacts would occur regardless of abandonment. Finally, if the additional traffic was diverted from truck to rail, producer surplus, in the form of excess trucking capacity within the region, would result. The excess capacity could be viewed as a negative impact of the incremental traffic, thereby negating the positive impact of a reduction in highway impacts. Therefore, the highway impacts resulting from the incremental traffic were not included.

Table 7. Changes in Annual Shipper Transportation Costs, Base and Incremental Traffic, Carrington-to-Turtle Lake Rail Line Abandonment, 1995

| Transportation Scenario | Base Case (561 Carloads) | Incremental Traffic (439 Carloads) | Totals |
|---|---|---|---|
| | ---------- $ ---------- | | |
| Pre-Abandonment Shipping Costs[a] | 1,193,025 | 945,519 | 2,138,544 |
| Post-Abandonment Shipping Costs[b] | 1,387,600 | 1,079,682 | 2,467,282 |
| Change in Transportation Cost | 194,575 | 134,163 | 328,738 |

[a] Shipping rates reflected a rehabilitated rail line.
[b] Includes truck costs to direct markets and to transshipment points, transloading expenses, and rail costs from transshipment points to final destination.

Highway routes were developed to each site based on information from the shippers' survey, and where information was incomplete, minimal distance and time algorithms were used (Caliper Corporation 1992). Based on post-abandonment routes, annual incremental truck vehicle miles of travel (VMT) were estimated for each impacted highway in North Dakota. The attributes of each impacted highway section were obtained from the North Dakota Department of Transportation's (NDDOT) Pavement Management System Database (NDDOT 1993). Based on the traffic level, incremental annual equivalent single axle loads (ESAL) were estimated for each impacted highway section. The ESAL calculations reflect typical combination grain truck weights, axle configurations, and axle weight distributions. Average reconstruction and resurfacing costs per lane mile were developed by NDDOT pavement engineers. A modified pavement deterioration model was used to estimate the resurfacing and reconstruction costs per mile (Tolliver 1994). This modified procedure considers that some pavement deterioration occurs due to environmental decay and normal use (Federal

Highway Administration 1987; American Association of State Highway and Transportation Officials 1986).

One of two potential highway improvements may be implemented after abandonment: pavement reconstruction or resurfacing. If the NDDOT must fully reconstruct the impacted highways, then the avoidable highway costs will be much greater than if the additional traffic can be accommodated through accelerated resurfacing. Whether NDDOT reconstructs or resurfaces the impacted sections depends upon the available highway budget, priorities associated with other highway projects, and the extent to which older pavements have already deteriorated.

Without being certain of the NDDOT's plans for highway resurfacing and reconstruction, the present value of resurfacing, based on the increased truck traffic, was used for the highway investment cost. Conversely, using the value of reconstruction, which is a substantially higher than the cost of resurfacing, would overstate the total highway impacts. Additionally, increased truck volume is probably not enough to force any roads in the area over the resurfacing threshold into a full reconstruction.

Incremental highway user costs generated from additional truck traffic were subtracted from the total highway investment costs. These highway user costs include the annual and cumulative diesel fuel taxes and vehicle registration fees. The vehicle registration fees are based on an average 1994 state assessment of $1,036 for a standard five-axle combination truck and 100,000 annual miles of operation (NDDOT 1994). Annual motor vehicle fuel taxes reflect both state and federal taxes, and assume a fuel efficiency rating of six miles per gallon.

Based on the described methodology, annual highway resurfacing costs, reconstruction costs, and incremental truck user revenues were estimated at $297,264, $868,471, and $61,087,

respectively (Table 8). A nonquantified effect of local road degradation is the quality of travel in local areas. Unquantified impacts not estimated in this study include (1) more truck traffic (increased traffic congestion), (2) rough and uneven roads, and (3) additional vehicle wear and maintenance caused by poor road conditions.

Table 8. Annual Highway Investment Costs and Incremental Truck User Revenues, Carrington-to-Turtle Lake Rail Line Abandonment, 1995

| Base Year | Present Value Resurfacing | Present Value Reconstruction | Present Value User Fees |
|---|---|---|---|
| 1995 | $297,264 | $868,471 | $61,087 |

The road and highway impact figures did not include damages incurred on county and township roads or bridge impacts. County and township road use was not included in the shippers' survey, nor are currently accepted methods and models available for assessing damages on county and township roads (Tolliver 1994).

Grain flows to and from shippers on the Carrington-to-Turtle Lake rail line may change depending upon a variety of factors. The competitiveness of shippers on the line (i.e., the prices they are able to give farmers for grain) may influence deliveries of grain. County and township roads will be impacted as farmers adjust grain movements to coincide with competitive markets. Changes in grain volumes handled also present another factor affecting road damages (i.e., as the number of trucks hauling grain from elevators to delivery points change, road impacts also change). Other impacts on county and township roads are likely to occur as truck routes fluctuate to bypass construction and avoid traffic congestion on main routes or as market forces dictate (i.e., change in destinations and transshipment points).

Honeyman (1995) listed some examples of county road impacts resulting from railroad abandonment. One example was found with the abandonment of the Mandan-to-Mott rail

line. A 32-mile county road, between Carson and New Salem, was used by trucks moving grain from the Carson Elevator to a railhead facility in New Salem. The county road was substantially impacted as a result of the additional truck traffic. Another example was found between Regent and Gladstone, North Dakota. A county road was impacted because a sub-terminal facility was built near Gladstone, whereby trucks hauled grain from Regent to the sub-terminal via the county road (Tolliver and Zink 1985). The county road between Regent and Gladstone was eventually rehabilitated at a cost of $275,000 per mile (Horner 1995).

Effects on Local Employment

This study assumed that enough extra capacity exists within the trucking industry to absorb the additional grain flow caused by the Carrington-to-Turtle Lake rail line abandonment without noticeably increasing employment or capital expenditures (Wilson and Dooley 1991). The marginal gains in employment obtained in the trucking industry would be equally offset by marginal losses in the railroad industry (Red River Valley and Western Railroad 1996). Thus, the branch line abandonment was assumed to result in no change in the level of direct employment in the local or regional economy.

Reductions in Local Tax Revenues

The attractiveness and profitability of businesses on the Carrington-to-Turtle Lake rail line may be reduced due to abandonment, which may subsequently translate into reduced property values, particularly for businesses located next to the abandoned line. Reduced property values, in the absence of changes in mill rates or tax base, result in decreased tax

revenues for local governments. In addition, railroad property would likely generate less tax revenue after abandonment. A substantial portion of local government revenues are generated from property taxes (Bangsund and Leitch 1990).

Assuming the increased transportation cost (IC) occurs over an infinite period of time, its value is represented by (IC / I), where (I) is a discount rate. A discount rate of 3.5 percent was used in this analysis. The value is based on the average prime rate of interest from 1961 to 1993 deflated by the rate of inflation[4] over the same period. A discount rate is used to express future values in terms of current dollars. The higher the discount rate used, the smaller the impact of permanently higher transportation costs.

In North Dakota, the assessed value of land is 50 percent of the appraised value, and the taxable value is 10 percent of the assessed value. Therefore, the increased cost of transportation was discounted similarly, assuming the increased transportation cost is capitalized into the value of the land.

Accordingly, the lost local property tax revenues were estimated by multiplying the reduction in property value by the average county mill rate.[5] The local property tax rate, discounted change in transportation cost, and corresponding loss in local tax revenue were estimated for McLean, Sheridan, Wells, and Foster Counties. Total property tax losses to the four-county area were estimated at $155,000 annually (Table 9). Approximately $9,600 in property tax revenues would not be collected from post-abandonment railroad property. Post-abandonment railroad property is

[4]Gross Domestic Product Implicit Price Deflator (U.S. Bureau of Economic Analysis, *various years*).

[5]A "mill" represents one tenth of one cent or $0.001.

taxed as agricultural land (North Dakota Tax Department 1996). Average cropland values, average mill rates, and estimates of the acreage of railroad right-of-way were used to estimate the property taxes after abandonment. Post-abandonment property tax revenues were then compared to pre-abandonment property tax revenues for the rail line for an estimate of the change in tax revenues.

Table 9. Reduction of Local Property Tax Revenues, Carrington-to-Turtle Lake Rail Line Abandonment, 1995

| Weighted Average Mill Rate per $1000 of Taxable Property Value (MR) | Change in Transp. Cost (TC) | Change in Total Property Values (TC/0.035) | Taxable Value of Change in Transp. Cost (TC*0.5*0.1) | Change in Taxable Property Values (TC*0.5*0.1) /0.035 | Revenue Lost MR(TC*0.5*0.1)/0.035 |
|---|---|---|---|---|---|
| 330.17 | $328,738 | $9,392,514 | $16,437 | $469,626 | $155,056 |

Reduced Economic Development Opportunities

Diminished economic development opportunities may result from a loss of rail service. The attractiveness of a local community for some businesses and industries can be reduced by a loss of rail service. This is especially true in the case of energy and processing industries, which require shipments of large or heavy equipment and bulky material (e.g., coal, grain). Such was the case involving the abandonment of a 90-mile rail line from Mandan to Mott, North Dakota. Discussion during the abandonment process focussed on the development of coal reserves in the New Leipzig area. Coal development in this area would have involved 70 miles of Burlington Northern branch line. Burlington Northern Railroad had hoped to sell that portion of the line to the Knife River Mining Company, which would lease the

line back to them for rail service. However, the lack of sale of coal leases eventually dissolved the agreement. In the absence of rail service, future development of the coal reserves in that part of North Dakota is unlikely. Based on the current availability of coal in the region, trucking or transshipping coal is not feasible.

This scenario, when applied to the Carrington-to-Turtle Lake rail line, shows similarities. The western end of the line (Turtle Lake area) is near a large coal producing region. Without rail service it is unlikely that any coal development would take place. In a broad view, this loss in potential traffic can be viewed as an impact of abandonment. Details regarding future coal development in the region or information on other development opportunities, that would be lost as a result of rail line abandonment, would be required before those impacts could be estimated.

Summary of Direct Impacts

Direct economic impacts of an abandonment of the Carrington-to-Turtle Lake rail line represent a loss of business activity or revenue in the region. In the absence of rail service, shippers are forced to move products by truck to final market or to the nearest railhead for continued movement to final destination. The process of loading and unloading trucks at railheads and using trucks for long distance deliveries substantially raises transportation costs. These increased transportation costs represent an economic leakage from the area economy. Thus, increased transportation costs represent a direct impact from the rail line abandonment.

Property values, particularly railroad property and other business property in the region, are decreased and in the absence of changing tax levies, reduce local tax

revenues. The movement of grain by truck increases wear and shortens the useful life of local roads and highways, since most are designed for low volume use. In addition to the forementioned quantifiable impacts, the loss of rail service also can have future implications on the ability of a community(s) to attract new economic development.

The change in shipper costs was estimated from information obtained from a survey of shippers on the Carrington-to-Turtle Lake rail line (Tolliver 1995). The approximate volumes of grain moved by mode to various destinations were obtained. The current shipper profile (i.e., current shipper patterns are likely to represent future patterns since the rail line is inactive) was compared to historic grain movement on the branch line. Transportation costs were estimated for pre-abandonment traffic levels and incremental traffic volumes (in the event of rail line rehabilitation). The difference in transportation costs was $194,600 annually for pre-abandonment shipper volumes (561 rail cars). In the event of rail rehabilitation, shippers have promised additional grain movements equal to a total of 1,000 rail cars (439 additional rail cars). The change in transportation costs for the additional grain movement was $134,100 annually. Thus, the anticipated change in transportation costs for shippers on the rail line was estimated to be $328,700 annually.

The loss of property tax revenues was estimated by capitalizing the increased cost of transportation into the value of land near the abandoned rail line. Annual losses in local government revenues were estimated to be about $155,000. The losses in property tax revenues were sensitive to the discount rate used. The rate used in

this study approximated the real (effects of inflation removed) rate of interest over the last 20 years.

One of the primary impacts of diverting grain shipments from rail to truck is an increase in local road deterioration. The deterioration in the value of the local road infrastructure can be measured in the cost of resurfacing or reconstruction. Resurfacing is less costly than reconstruction; however, both represent annual costs to the region or state in terms of necessary and cumulative losses in road and highway condition. Eventually road conditions will deteriorate to the point that repairs are needed; increased truck traffic accelerates this condition. The net cost (damages less increased user fees) of resurfacing local roads and highways affected by increased truck traffic was estimated to be $297,000 annually. The estimated cost of reconstruction was estimated to be $868,000 annually.

Highway and local road infrastructure impacts represent the incremental damage to local roads and highways occurring over time--not actually repair expenses spent each year. Road costs in this study represent a discounted value of the cost of road improvements divided by the life of the improvements. Resurfacing or reconstruction may only take place over a short period (e.g., one or two construction seasons). Also, usually no new state money (drain on existing funds or additional tax liabilities) is used to repair and maintain the impacted roads. Instead, state road funds and road/highway projects receive a continual readjustment of resurfacing and reconstruction priorities.

Annual direct impacts from a rail line abandonment from Carrington-to-Turtle Lake were $329,000 in increased transportation costs. Additional impacts included

$155,000 in reduced property tax revenues, and losses in the value of local road infrastructure ranging from $297,000 for road resurfacing to $868,000 for reconstruction. In summary, transportation costs represent a loss to the local economy; property tax losses do not change the amount of business activity in the area economy, and road impacts represent a loss in road values, but do not represent a change in local economic activity.

## Secondary Impacts

*Secondary* impacts occur when direct impacts are spent and respent within an economy. In the absence of increased transportation costs, the money spent on the additional transportation cost would be considered revenue for farmers and cooperatives (in this study, the increase in transportation costs could be viewed as foregone revenues or an economic leakage from the local economy).

However, the loss in government revenues does not represent less money available in the area economy. This premise is based on the assumption that reductions in property values caused by a rail line abandonment will not affect the amount of money coming into and out of the four-county economy. A business or individual, affected by reduced property values, would pay out less in property taxes. Thus, in an absence of a change in the tax base (i.e., the definition and inclusion of property taxed) or a change in the tax rate (i.e., the mill rate levied on the tax base), reduced property taxes would represent a shift from government spending to private spending. County governments would likely find a means of recollecting the lost

revenues (e.g., expanding the tax base, increasing mill levies, increasing user fees, and/or through intergovernmental assistance).

Property taxes paid by railroads to local governments are likely to represent a loss to the area. Those revenues represent money coming into the counties that would no longer be available. The loss would be evident by less county government services, increased user fees, and/or an increased tax burden distributed throughout the tax base. Other businesses and/or individuals may, through increased taxes, carry the burden of lost railroad property tax revenues. About $9,600 in annual losses in tax revenue would be attributable to the abandonment of the Carrington-to-Turtle Lake rail line.

In the case of the Carrington-to-Turtle Lake rail line, the portion of the increased transportation cost absorbed by shippers was assumed to represent a loss of economic activity for the local economy (economic leakage). Sufficient capacity exists within the trucking industry to handle the additional traffic volume; therefore, expenses paid by shippers for additional truck transportation were assumed to be made to existing firms and operations. This study also assumed that most of the trucking firms involved were headquartered outside the affected communities.

In the event that the additional trucking activity was captured locally or the additional shipping requirements resulted in an expansion of existing firms and/or the creation of new firms in the immediate area, arguments could be made that the additional transportation costs would represent a transfer of economic activity from one economic sector to another. Instead of higher commodity prices and revenues

for farmers, some of the revenue that would have been received by farmers would subsequently be channeled into the transportation industry.

The overall effect, combination of direct and secondary impacts, is often measured in terms of personal income, gross business volume, and secondary employment. The North Dakota Input-Output Model was used to estimate the secondary effects of rail line abandonment in the four-county area affected by the Carrington-to-Turtle Lake rail line. Direct impacts (i.e., transportation costs and farmer revenues) were allocated to various sectors of the North Dakota Input-Output Model.

Much of the financial burden of increased transportation costs can be shifted from the shipper onto its customers. Shippers pass the costs onto patrons in the form of lower prices. This study assumed that 75 percent of the increase in transportation costs was borne by farmers in the form of lower grain prices. The portion of the increase in transportation costs borne by farmers was allocated to the **Households** sector, while the remaining transportation costs absorbed by shippers were allocated to the **Transportation** sector (Table 10).

Total direct impacts of $329,000 generated $682,000 in secondary impacts. The $682,000 in secondary impacts represent the amount of economic activity that would have been created if the direct impacts were to have remained in the local economy. The economic sectors with the greatest secondary impacts included **Retail Trade** ($229,000), **Households** ($201,000), and **Finance, Insurance, and Real Estate** ($51,000) (Table 10). A loss in economy-wide personal income was estimated to be $448,000 annually. The annual decrease in retail sales in the regional economy was

estimated to be $229,000. The economy-wide loss in gross business volume resulting from the rail line abandonment was estimated to be $1 million annually.

The loss of economic activity in a region can affect secondary employment. Secondary employment estimates represent the number of full-time jobs generated based on the volume of business activity created by an industry. Secondary employment is proxy for the jobs that exist outside of an industry, but employment that is dependent on the existence of that industry. Productivity ratios[6] were used with estimates of business activity to obtain estimates of secondary employment. Economy wide secondary employment losses from the rail line abandonment were estimated at 11 full-time equivalent jobs (Table 10).

The impact of the Carrington-to-Turtle Lake rail line abandonment on state-collected tax revenues was estimated. Sales and use taxes were based on the level of economic activity in the **Retail Trade** sector. Individual income tax collections were based on economic activity in the **Households** sector. Corporate income tax collections were based on total gross business volume less the amount of economic activity in the **Agriculture-Crops**, **Agriculture-Livestock**, **Households**, and **Government** sectors. Total foregone tax collections as a result of the branch line abandonment were estimated at $17,900 annually, which included $10,600 in sales and use taxes, $5,800 in individual income taxes, and $1,500 in corporate income taxes.

[6]A measure of the amount of economic activity needed in an economic sector to support one full-time job.

Table 10. Direct, Secondary, and Total Economic Impacts of the Carrington-to-Turtle Lake Rail Line Abandonment, North Dakota, 1996

| Economic Sector | Annual Economic Impacts | | |
|---|---|---|---|
| | Direct | Secondary | Total |
| | ---------- $ ---------- | | |
| Agriculture-Livestock | | 20,000 | 20,000 |
| Agriculture-Crops | | 8,000 | 8,000 |
| Nonmetal Mining | | 2,000 | 2,000 |
| Construction | | | 26,000 |
| 26,000 | | | |
| Transportation | 82,000 | 3,000 | 85,000 |
| Communication and Public Utilities | | 33,000 | 33,000 |
| Ag Processing and Misc Manufacturing | | 13,000 | 13,000 |
| Retail Trade | | | 229,000 |
| 229,000 | | | |
| Finance, Insurance, and Real Estate | | 51,000 | 51,000 |
| Business and Personal Service | | 19,000 | 19,000 |
| Professional and Social Service | | 29,000 | 29,000 |
| Households | 247,000 | 201,000 | 448,000 |
| Government | | 48,000 | 48,000 |
| Totals | 329,000 | 682,000 | 1,011,000 |
| Secondary Employment (full-time equivalent jobs) | | | 11 |

## Total Impacts

The abandonment of the Carrington-to-Turtle Lake rail line was estimated to increase transportation costs for shippers on the line by $329,000 annually. Total direct impacts were estimated to be $329,000 annually. In addition to greater transportation costs, local property tax revenues were estimated to be reduced by $155,000 annually.

A majority of the increase in transportation costs would be incurred by farmers in the form of reduced commodity prices. The portion of the costs borne by farmers was allocated to the **Households** sector, while the remaining transportation costs were allocated to the **Transportation** sector of the North Dakota Input-Output Model. The model estimated that the $329,000 in direct impacts would generate an additional $682,000 in secondary impacts. Total economic losses for the regional economy were estimated to be $1,011,000 annually. Additional impacts included an annual loss of $17,900 in state-collected tax revenue Annual net costs (i.e., damages less additional user revenues) to repair and maintain local roads impacted from increased truck traffic were amortized to be about $297,000 for resurfacing and $868,000 for reconstruction. Secondary employment losses were estimated at 11 full-time equivalent jobs.

Community impacts from railroad abandonment are likely to be ongoing. Highway damage will certainly occur as long as grain is forced to be moved by truck. Therefore, highway impacts are often measured for up to 20 years, which is equivalent to a typical pavement design performance period. Changes in gross business volume may be felt until the structure of the economy has sufficient time to adjust to the change in transportation cost (i.e., economic leakage).

Principally, the change in transportation cost will be felt in the local economy so long as the rail transportation in the area maintains a competitive advantage over truck transportation. Based on previous conditions in the transportation industry, those advantages appear unlikely to change. Discounting future impacts can produce

a measure of the present value of annual impacts. The annual impact of $1,011,000, discounted over 10 years at 3.5 percent, results in a present value of $8.7 million.

## SUMMARY AND CONCLUSIONS

The Carrington-to-Turtle Lake rail line runs for 84.9 miles in central North Dakota and is operated by the Red River Valley and Western Railroad. Service on the line has been affected by recent embargoes, floods, and poor, deteriorating track condition. Without rehabilitation, the line will most likely be abandoned.

Railroad abandonments impact communities and local economies in a variety of ways. First, shippers on the rail line usually experience a change in their transportation options. Instead of sending and receiving commodities and supplies by rail, shippers now must move those items by truck. The severity of the change is often a function of the amount of material shipped and distance hauled. The process of moving grain and bulk agricultural inputs by truck increases handling requirements, and depending upon quantity and distance moved, can increase per unit hauling rates. The combination of greater handling costs and greater per unit hauling rates results in additional transportation expenses. The nature of the grain handling industry in North Dakota does not allow shippers much freedom (margins are slim) in absorbing additional transportation costs when competing with other shippers on rail lines. As a result of the competitive situation in the rural grain handling industry, much of the increased costs of transportation are passed on to farmers in the form of lower commodity prices.

Another effect of rail abandonment can include reduced property values. In the absence of tax rate changes, reduced property values translate directly into lower tax revenues for local governments. Lower tax revenues mean less services or an

additional burden on the existing tax base. Thus, the effects of rail abandonment on property values were estimated along with decreases in property tax revenues.

Rural areas in North Dakota often do not have the road and highway infrastructure to handle movement of grain and agricultural inputs exclusively by truck. Additional truck traffic accelerates the deterioration of local roads and highways. The costs of the increased road damage caused by truck traffic is another impact of rail abandonment. The costs of the additional repairs and maintenance of damages to local roads and highways were estimated. Resurfacing and reconstruction were considered the two most likely actions needed to counteract the effects of increased truck traffic. Resurfacing improvements are more likely to occur than reconstruction. A nonquantified effect of local road degradation is the quality of travel in local areas. Nonquantified impacts include (1) more truck traffic (increased traffic congestion), (2) travel on rough and uneven roads, and (3) additional vehicle wear and maintenance caused by poor road conditions. Additional impacts that remained unquantified in this study include estimates of lost economic development opportunities, effects of abandonment on the sustainability and competitiveness of shippers on the line, the economic impacts of the loss of railroad profits from line operation, and the traffic and use implications for county and township roads.

Total direct impacts were estimated to be $329,000 annually. Seventy-five percent of the direct impact was transferred to farmers in the form of lower prices. The secondary impacts were estimated to be $682,000 annually. The loss of gross business volume from the rail abandonment was estimated at $1 million annually. The level of gross business volume was enough economic activity to support 11 full-

time jobs in the economy. The loss of state collected tax revenues included $10,600 in sales and use taxes, $5,800 in personal income taxes, and $1,500 in corporate income taxes. Avoidable highway investment costs for impacted roads and highways were estimated. Annual costs for resurfacing were estimated at $297,000 and expenses for reconstruction at $868,000.

The Carrington-to-Turtle Lake rail line, if abandoned, could reduce economic activity in the affected area by $1 million annually. The present value of the rail line abandonment impacts (3.5 percent over 10 years) is $8.7 million.

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# Appendix

Appendix Table 1. Road Surface Impacts by Highway, Carrington-to-Turtle Lake Area

| North Dakota State Highways | Total Highway Miles Affected | Estimated Number of Trucks | Estimated Resurfacing Cost | Estimated Reconstruction Cost |
|---|---|---|---|---|
| | | | ---------- $ ---------- | |
| 1 | 92.26 | 31.58 | 583 | 1,647 |
| 2 | 78.74 | 626.73 | 88 | 278 |
| 3 | 161.63 | 262.77 | 3,028 | 8,547 |
| 14 | 256.54 | 1,731.52 | 24,406 | 42,079 |
| 15 | 281.87 | 78.96 | 694 | 1,197 |
| 29 | 175.26 | 94.75 | 43 | 199 |
| 31 | 47.78 | 0.77 | 4 | 7 |
| 32 | 162.94 | 94.75 | 550 | 948 |
| 36 | 555.96 | 1,343.00 | 21,035 | 36,267 |
| 41 | 130.54 | 1,006.73 | 23,101 | 39,830 |
| 45 | 69.04 | 31.58 | 397 | 685 |
| 52 | 1,965.86 | 20,589.20 | 171,350 | 475,691 |
| 83 | 356.66 | 2,002.05 | 9,386 | 26,493 |
| 94 | 3,758.73 | 15,815.32 | 2,341 | 10,890 |
| 200 | 1,583.44 | 15,979.95 | 100,784 | 283,220 |
| 281 | 117.16 | 152.82 | 560 | 1,581 |
| Total | 9,794.4 | -- | 358,351 | 929,558 |

**Explanation of Transportation Costs**

The change in transportation cost to shippers on the Carrington-to-Turtle Lake rail line is a function of two primary factors, the truck cost and the rail rate. Truck *costs* rather than truck *rates* were used in calculating the associated truck portion of the change in transportation cost. Truck costs account for the fully allocated cost of the shipment plus any return on investment. Due to the extreme competitive nature of the trucking industry and variability in truck rates, truck costs more accurately reflect the actual transportation cost. The truck cost per mile was $1.13 per mile (Faucett and Associates 1986).

The transloading cost used was $0.084 per bushel (Washington State University 1995). A total of 2,733,028 bushels were transloaded (1,710,048 for base traffic and 1,022,980 for incremental traffic). Roughly 85 percent of the base and 70 percent of the incremental traffic was transshipped to other rail facilities. Total transloading costs were estimated to be $229,574 annually.

Rail rates rather than rail costs were used for calculating the railroad portion of the change in transportation cost. Published tariffs and the stability of rail rates over the last ten years accurately reflect railroad shipping costs and therefore represent a reasonable value of the total railroad shipping cost. The average rate per rail car was $2,139, which reflects a weighted average of movements to Minneapolis, Portland, and in-state destinations.