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16. Abstract

This study evaluated transportation changes affecting the grain industry relative to impact on the road system. Present and proposed railline abandonment, grain subterminal construction, andgeneral modal traffic patterns were determined. Causal variables were incorporated into a general framework for continual monitoring of the industry. While it does not appear the state highway system is receiving large overall negative impact, "pockets of potential problems" are being caused by grain transportation changes. Most identifiable impacts are being felt on county and local roads. The final grain industry structure has not yet evolved. Monitoring of the grain industry during this evolution should include on-farm storage, age of elevators, mergers and consolidations and potential railline abandonments.

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Impact on Washington Highways of Grain Transportation Changes

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The contents of this report reflect the view of the authors who are responsible for the facts and the accuracy of the data presented therein. The contents do not necessarily reflect the official views or policies of the Washington State Department of Transportation or the Federal Highway Administration. This report does not constitute a standard specification or regulation.

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SUMMARY

The state of Washington has had available a complete and complex transportation system, one of many modes and means of reaching markets. This complete system has generated competition among modes with resulting low rates for product movement. But numerous changes are occurring that can affect that competition, those rates and resultant traffic flows. The Staggers Rail Act of 1980 and the Motor Carrier Act of 1980 have increased carrier flexibility, allowing easier railline abandonment, innovative rate making, service changes, and increased competition between rail and truck. As the grain industry reacts to these changes a decline in the quality of rural roads and bridges may be associated. These roads, laid out in the '20s and '30s, paved and hard surfaced in the '40s and '50s, have been consumed in varying degrees in the '60s and '70s, and now must be rebuilt in the '80s and '90s. However, the location and degree of impact of these transportation changes on rural roads is not certain.

The overall purpose of this project was to evaluate transportation changes affecting the grain industry, relative to impact on the road system. Specific objectives of the study, and the outline of the research procedure, were:

(1) inventory present and proposed railline abandonment;

(2) inventory present and proposed subterminal construction;

(3) determine general modal traffic patterns resulting from these and other transportation changes;

(4) analyze and determine the causal variables affecting change; and,

(5) develop a general framework for continual monitoring of the industry.

Research activities were based on first identifying railline abandonments, past and future. Then a survey of the entire grain elevator industry was undertaken, accompanied by a survey of agricultural producers in two major counties in central Washington. These efforts provided information on traffic pattern changes, modal choice by elevator and farmer, location of impacted roads, and implications for the future.

It does not appear the state highway system is receiving the overall negative impact suggested earlier by people in the state. The marginal effect of grain traffic changes on state highways is overall quite small, although railline abandonments, traffic to waterway terminals, and multiple-car subterminals are creating "pockets of potential problems," even on the state highway system. Problems of a more general nature are occurring mostly on county and local roads; such impacts call for further development of information on location and magnitude of impact.

Many of the impacts on county and local roads are occurring because of an increase in volume of grain handled by subterminals, much of which has been transshipped from other elevators. It appears a decrease in traffic volume on some roads to river terminals is occurring even while an increase in movement on some local roads is seen.

It is evident that the final grain industry structure, and resultant grain traffic flow pattern, has not yet evolved. It was found that truck size used by producers has not increased, nor has

there been a significant change in the seasonality of movement on the road system. Also, on-farm storage had not increased to the extent expected, at least in the two counties in the pilot study area. Finally, the grain elevator industry appears to be reacting to the transportation changes of multiple-car rates and railline abandonment in a very orderly and systematic fashion, avoiding overbuilding and construction of entirely new facilities, favoring instead retrofitting of existing elevators.

A general framework for monitoring the grain industry as it continues to evolve will be useful in determining future impacts on roads. Multiple-car loading facilities are one obvious factor. Other decisions, made at the farm and firm level, and within the railroad industry itself, include: (a) on-farm storage, (b) the age of elevators, (c) mergers and consolidations, and (d) potential railline abandonments.

CHAPTER 1

INTRODUCTION

The Staggers Rail Act of 1980, designed to improve the financial viability of the nation's railroad system, granted the railroads greatly increased flexibility in rate making, service decisions and rail line abandonment. Under this freedom, Washington State railroads have introduced multiple-car rates and have abandoned many unprofitable branch lines. Grain elevator companies have started to respond to these changes by upgrading facilities on rail lines where service seems secure to take advantage of multiple car rates and/or to compensate for loss of rail service at outlying elevators.

The grain industry and its market structure have only begun to respond to these changes. Rail decisions on abandonment, rate level and configuration, and service levels may have a continuing impact on the industry. These actions are causing changes in the traffic flow of grain during the grain assembly process prior to final shipment. For example, there is a significant increase in the amount of transshipping by trucks between elevators. There is a strong possibility these traffic changes will have a serious impact on the highway system. A better understanding of these new traffic flows and accompanying problems can enhance the highway planning process. This study was designed to give an indication of the degree and location of those impacts and to provide a

general framework to monitor future changes in grain traffic characteristics.

Objectives

The overall purpose of the study was to evaluate transportation changes affecting the grain industry, especially rail-line abandonment and rate changes, relative to the magnitude and location of impacts on the highway system. Specific objectives were to:

(1) inventory recent and proposed rail-line abandonment locations in Washington;

(2) inventory recent and proposed subterminal construction or operation in Washington;

(3) examine modal traffic pattern changes related to 1 and 2 above;

(4) identify how the impact takes place and from what changes in what variables, e.g. competition, seasonality, traffic density, etc.;

(5) develop a grain industry investigative framework appropriate for further monitoring of transportation changes.

Methodology

The data base necessary to evaluate the changes in the movement of grain and variables causing these changes was multifaceted. Data was collected utilizing two mail surveys, informal discussions with elevator and other agribusiness personnel, personal interviews with two county highway engineers, personal interviews with Washington Department of Transportation officials, a literature review, and use of published agricultural and transportation statistics.

Because decisions made at the firm level will affect the way grain is transported, all of the 84 firms operating the 501 elevators in Washington State and licensed by the state of Washington were sampled. The primary survey technique employed was a mailed questionnaire, although follow-up phone calls and personal visits were made when necessary. The purpose of this survey was to determine the structure, conduct, and performance of the industry and changes that are currently taking place. Seventy-nine percent (68) of the firms, which operate eighty percent (405) of the elevators, representing eighty-three percent (181,258,000 bu.) of total storage capacity in this state, responded.

To determine the changes in grain transportation and marketing occurring in the farm-to-market roads, grain farmers were surveyed via a mailed questionnaire. The pilot study area included Grant and Lincoln counties, two centrally located counties with high grain production. The sampling frame, which included 1467 grain farmers in Grant and Lincoln counties, was developed from lists of grain farmers provided by the Agricultural Stabilization and Conservation Service of USDA. Slightly more than fifty percent (738) of all farmers sampled returned the questionnaire. Of those responding, 649 of the total sampled were active grain producers.

Organization of Report

The following section, Chapter 2, gives a brief summary of the agricultural sector in Washington State. The purpose of this section is to emphasize the importance of agriculture and explain why the deregulation of the railroads can have significant impacts

on the marketing of agricultural commodities. This will set the stage for a later discussion of the variables that should be monitored by highway officials.

Chapter 3 provides a synopsis of the transportation sector in Washington. Emphasis is placed on the role of the railroads in the grain marketing process. Other modes of transportation, i.e. truck and truck-barge, are also given attention. The purpose of fully outlining the transportation network is to show the interrelationship between the various transportation modes, discussing how the various modes serve as both complements and substitutes to one another.

Chapter 4 details the elevator industry in Washington. Since decisions made at this level will greatly influence the way grain is marketed, it is important to have a clear understanding of the history, the trends, and the nature of elevator ownership in Washington State.

The actual and potential road impacts that deregulation of the railroad does and could cause are reviewed in Chapter 5. The state and county road classification system is outlined, setting the stage for which roads will be most heavily impacted by changes in grain marketing. Following this, the results of the two mail surveys are given. Finally, perceptions of county engineers in both Grant and Lincoln counties as to present and future problems are summarized.

Chapter 6 gives a general framework that highway planners and engineers can use to monitor changes in road conditions due to shifts in the movement of grain. In particular the following

framework variables are discussed: (1) on-farm storage, (2) multiple car rates, (3) the age and function of elevators, (4) mergers and consolidation, and (5) potential abandonment.

CHAPTER 2

THE AGRICULTURAL SECTOR

Agriculture is one of Washington State's largest industries. Actual producer returns are highly dependent, however, on using the cheapest form of transportation available. Because of this, producers are constantly weighing transportation alternatives, searching for the most efficient and most cost effective method of shipping grain to its final market.

Washington State's agricultural industry produces a wide variety of crops. Total value of production in 1983 was $3.3 billion. While horticultural crops are certainly important to the state's economy, grain crops generate the largest revenues. In fact, wheat was number one in value of production in Washington State in 1983 with production valued at $647,130,000 and was third in U.S. production with 7.1 percent of all production (Washington State 1983 wheat production totaled 172,570,000 bushels and barley production totaled 54,400,000 bushels). Barley was valued at $144,160,000 and ranked seventh in the state in value of production. The production of horticultural crops is also significant. Nationally, Washington State leads in the production of hops, with 75 percent of all U.S. production, sweet cherries, with 50 percent, spearmint oil, with 57 percent, and apples with 36 percent of all U.S. production.

While the production of horticultural crops, i.e. apples and sweet cherries, is significant and their contribution to the

Washington economy cannot be overlooked, the method of marketing such crops is much different than grain. Since horticultural crops are highly perishable, they are usually transported in refrigerated trucks. Grain crops, i.e. wheat and barley, on the other hand, have been transported by rail for a number of years. For this reason, the deregulation of the railroads greatly altered the method by which grain is transported. Any impacts that are caused to roads due to deregulation are going to be caused by changes in the marketing of grain crops rather than horticultural commodities.

Grain production in this state is concentrated in fourteen eastern counties (Figure 2.1). The majority of production is centered in Whitman, Lincoln, Walla Walla, Grant and Adams counties although significant grain production exists throughout the region (Table 2.1). Wheat and barley production areas are the same, as barley is usually grown in rotation with wheat. Wheat represents over 70 percent of all grain production by volume in the state.

Pacific Northwest wheat production is almost entirely committed to white wheat and the region produces over 90 percent of the white wheat produced in the U.S. Washington produces over 52 percent of the wheat in the region.

Over the period from 1981-1985 about 80 percent of U.S. white wheat utilization has been export markets, almost all of which has been exported through PNW Columbia River ports. Production of white wheat averaged roughly 260 million bushels a year from 1976

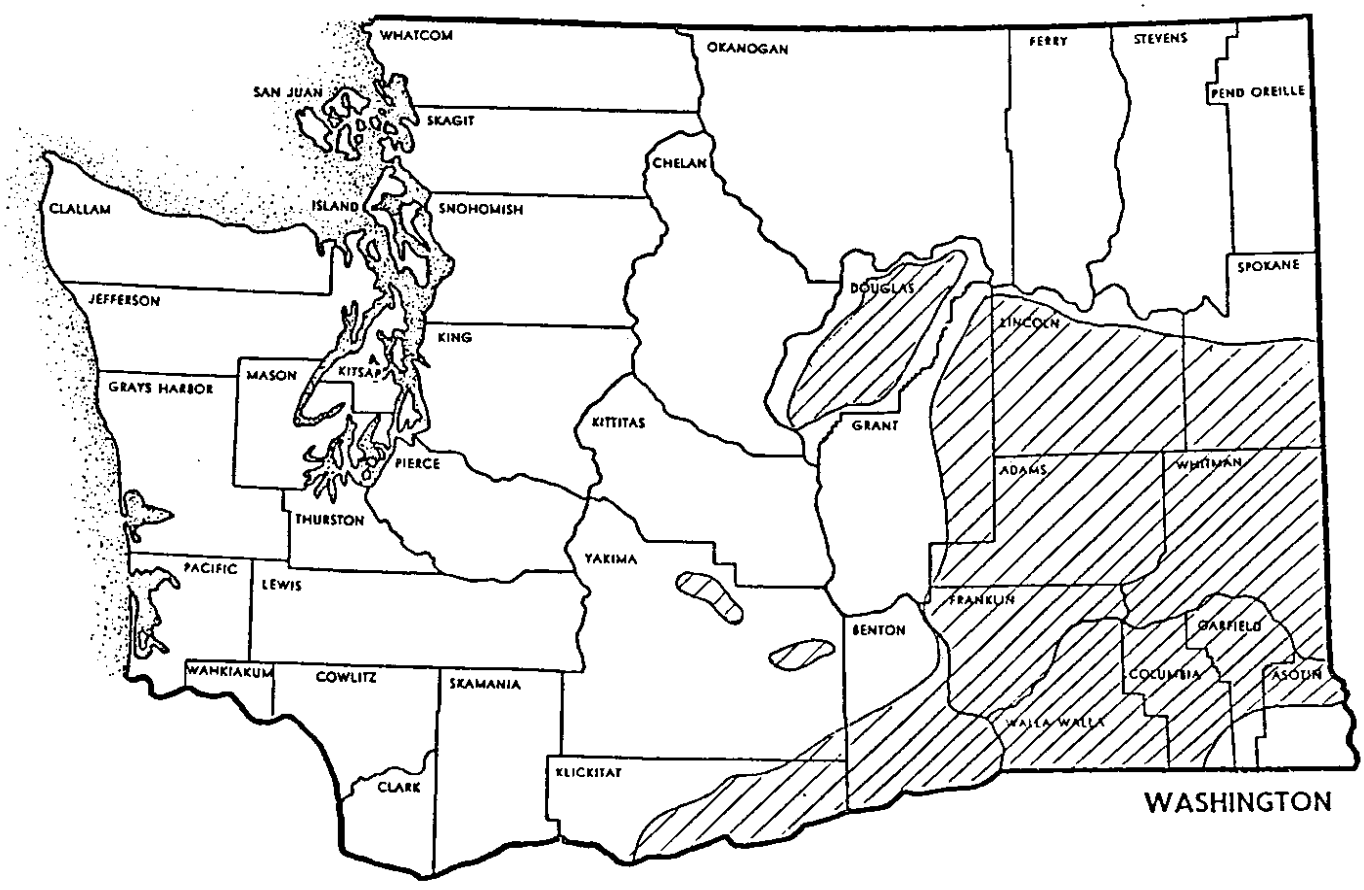


FIGURE 2.1. Washington Wheat Production Regions (SOURCE: Washington Crop and Livestock Reporting Service. Washington Agricultural Statistics, 1983-84. Seattle, 1984.)

Table 2.1. Washington Grain Production, by County, 1983

COUNTY	WHEAT (000 bu)	BARLEY (000 bu)	CORN (000 bu)	TOTAL (000 bu)
Adams	22,788	3,676	1,595	28,059
Asotin	1,570	1,485	0	3,055
Benton	6,435	670	5,510	12,615
Columbia	6,990	1,063	0	8,053
Douglas	11,489	1,668	30	13,187
Franklin	9,137	1,667	2,310	13,114
Garfield	4,466	2,707	0	7,173
Grant	15,225	2,410	3,915	21,550
Klickitat	2,298	914	125	3,337
Lincoln	21,896	11,873	0	33,769
Spokane	9,803	5,611	0	15,414
Walla Walla	16,078	2,469	1,833	20,380
Whitman	33,877	14,993	0	48,870
Yakima	6,102	774	1,950	8,826

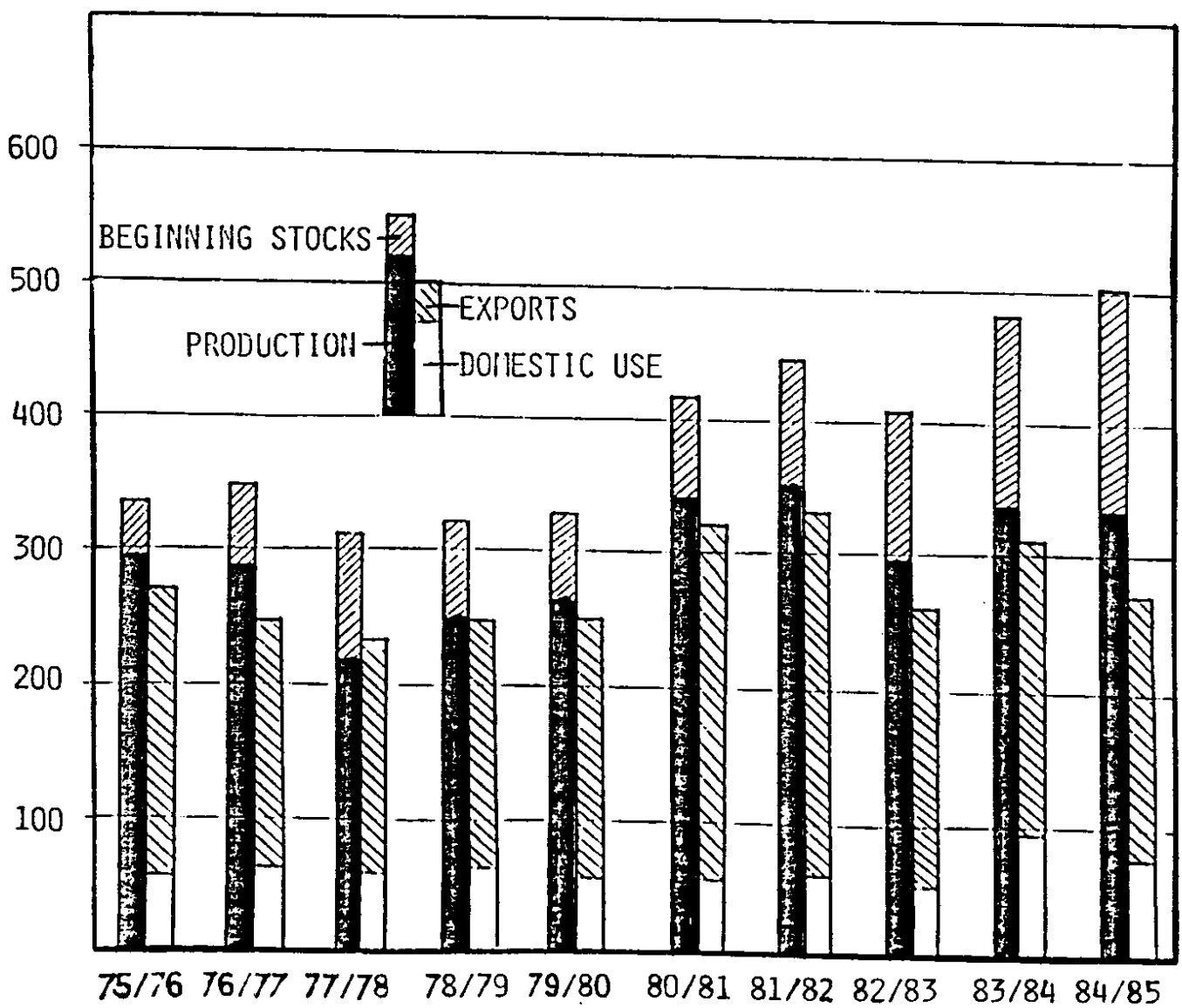
SOURCE: Washington Crop and Livestock Reporting Service. Washington Agricultural Statistics, 1983-84. Seattle, 1984.

to 1980. Utilization averaged roughly 249 million bushels per year with the difference of about 11 to 12 million bushels per year being added to reserves (surplus). From 1981-1985 white wheat production was over 330 million bushels per year, while utilization was between 295 and 300 million bushels per year. This difference of 30 to 35 million bushels per year goes into reserves (Figure 2.2). This growing surplus is in long-term storage in on-farm storage, Washington State elevators, or ground piles.

Average farm size in Washington State was 437 acres in 1984. Farm size in wheat and barley producing areas is considerably larger. In the pilot study areas, Grant and Lincoln counties, 23 percent of the farms were 1 to 320 acres, 18 percent were 321 to 640 acres, and 67 percent were over 641 acres in size. Lincoln country which is almost entirely grain production, shows over 77 percent of the farms reporting were over 641 acres in size and 31.5 percent were over 1,920 acres in size.

The relatively large size of these farms suggests that decisions made by one farm-operator may have a significant impact on the roads in the area. As size increases, farmers can be expected to get larger and newer transportation equipment, thus increasing the possibility of bypassing local elevators in their search for higher farm prices. The result could be heavier loads and longer hauls.

Figure 2.2 White Wheat U.S.: Beginning Stocks, Production, Domestic Use, and Exports.



SOURCE: USDA, Wheat Situation, various issues.

The overwhelming majority of grain producers in the state belong to grain warehousing and marketing cooperatives.[1] In this structure, the producers themselves own the organization and profits or losses at years end are returned to the owners of the cooperative. Management of cooperatives is hired by a board of directors each of whom are elected, normally on the basis of one member one vote, from the membership at large. These cooperatives, because they are multi-plant and service-oriented, may make decisions which differ from single-house firms.

The interdependency between the transportation and the grain industry in Washington is self evident. The wheat and barley producing areas are in the eastern region of the state and the export elevators are located 250 to 450 miles to the west. In 1983, for example, over 130,000,000 million bushels of wheat moved from eastern Washington farms to the export elevators located in Portland, Kalama, Vancouver, and Longview. Prior to this long distance movement the grain was harvested, assembled, and stored. All these activities affect highway usage.

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[1]From the 1984 County Grain Elevator Survey it was determined that 55 percent of the responding elevators were farmer-owned cooperatives, while 25 percent were family-owned, and 20 percent were corporations.

CHAPTER 3

THE TRANSPORTATION SECTOR

The grain merchandising system which evolves in any region is heavily dependent upon the transportation network serving that region. Any analysis of highway usage must, therefore, examine the modes that compete in moving grain. The Pacific Northwest is an atypical region of the country in that a complete transportation system exists, comprised of rail, truck and barge. The resulting competition for intramodal and intermodal shares has created a downward pressure on transportation rates.

The competitive position of the rail industry was enhanced with the advent of the Staggers Rail Act of 1980. The greater pricing flexibility brought about through this legislation has given the railroads more freedom in structuring rates. The liberalized abandonment procedures have given management more discretion in determining the future life of a given rail line.

The ramifications of the deregulation of the rail industry do not lie solely within the industry itself. As a complete transportation network exists in Washington, other transportation modes are bound to feel the pressure from a more competitive rail industry. Shippers then are going to react to changes in rates and adjust to abandonments. All of this leads to a dynamic interaction of the various segments of the transportation sector as the decision-making process at both the farm and firm level undergo change and the system once again moves toward equilibrium.

The following section briefly describes the relevant sectors of the grain transportation system in Washington State, i.e., rail and truck-barge. Specific attention is given to the road system in a later section. Emphasis is placed on the impact each sector has experienced since the advent of the Staggers Rail Act of 1980 and the ramifications of these impacts on the highway system.

Rail

History

The first railroad to the region was completed in 1875. By the end of the 1880-89 decade over 1500 miles of rail line had been constructed in Washington. Collusion, discriminatory pricing, and cutthroat competition were characteristic of railroad practices throughout the country during this era. Public indignation with the railroads' abusive business practices led to the passage of the Act to Regulate Commerce. "The 1887 act required that rates be just and reasonable, prohibited discrimination against persons or shippers and undue preferences among areas and forbade the practice of charging more for a short haul than a longer haul" (Keeler, pp. 22-23). This legislation served to regulate the rail industry for nearly a century.

The regulatory policy concerning the adoption and utilization of rate innovation was extremely conservative, reflecting the Interstate Commerce Commission's (ICC) concern with preventing various forms of discrimination (Harris). As a result, new rail rates based upon either new technology or cost consideration were

slow to receive ICC approval. Also, abandonment of unprofitable branch lines was a lengthy and expensive process, often being denied because of the railroad's common carrier obligation (Keeler). Thus changes occurred slowly and planning by both private and public entities was fairly straightforward.

Beginning in the 1940s railroads attempted to reduce rates to compete with better truck service and lower barge rates. However, the ICC denied most proposed rail rate cuts, relying upon two principal arguments. First, there was a fear that a rail rate cut could trigger a railroad rate war, which would threaten the profitability of the entire rail industry. Second, it was also argued that a rail rate cut "could divert traffic from trucks and barges, thereby undermining the profitability of those carriers" (Keeler).

In response, the railroads initiated an intensive lobbying campaign in the mid 1950s with the goal of securing increased rate-making flexibility. Later, the railroads also asserted that they faced unfair competition from motor carriers and barges, in that the federal government subsidized both by maintaining their respective rights-of-way (American Association of Railroads).

With the passage of the Staggers Rail Act of 1980, railroads finally received increased pricing flexibility and liberalized abandonment procedures. The dramatic change in rail policy is centered on the premise that the railroad industry no longer is a monopoly requiring extensive ICC regulation, but faces intramodal and intermodal competition. As such, the Act assumes that reliance upon the marketplace and less regulation will lead to a more

efficient rail system. The Act seeks to achieve its goals by reducing

> the carrier's obligations to cross-subsidize money-losing services, allowing them instead to restructure rates and services to realize a profit or discontinue the service if that is impossible (Keeler, p. 99).

Rate Structures

The most dramatic outgrowth of the Staggers Rail Act in Washington has been the sweeping revision of rail rates. Multiple-car rates have gained wide acceptance from the railroads and the country elevator grain industry because both have been able to decrease their costs. Railroads' yarding costs of a multiple-car shipment are less because there are economies of switching.

> It takes less time to switch 5 cars as long as they are coupled. There is better car utilization; cars move more quickly, there is a better record of car movement and location of cars. There are some substantial economics in bookkeeping (Casavant, p. 66, quoting Ingram).

To generate traffic which will achieve these cost savings, railroads have instituted lower rates for multiple-car shipments. While it is more difficult to assemble and sell multiple-car shipments, these rates are being heavily used by the grain industry because they offer substantial shipping cost savings to country elevators.

Both Burlington Northern and Union Pacific have introduced different tiers of rail rates in Washington. As of June 1, 1985, single, 3, 5, 6, 10, 25 and 26 car rates were available at various

Washington origins (Washington Dept. of Transportation)[2]. As seen in Table 3.1, the cost savings for using a 25 car shipment over a single car are substantial, averaging approximately 40 percent. However, multiple-car rates are not uniformly available to all grain firms as a result of their location or size. Many elevators do not have access to these rates because they are located on branch lines or lack rail service altogether. Other elevators cannot access these lower rail rates because they do not have high speed rail loadout capabilities.[3] This can potentially cause a shift in traffic patterns as producers and elevator managers attempt to minimize cost or maximize revenues.

The restructuring of rail rates has forced elevator managers to reevaluate the decision-making process itself. As a result of these Staggers-permitted changes, managers can no longer view rail rates and service as a constant. Rather, country grain firms must now consider rail rates and services as an additional variable in the firm's decision-making process. Managers are now evaluating the utilization of their elevators and making changes based in part upon the new transportation environment. This leads to a shifting of the overall transportation system, as many shippers

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[2]Union Pacific offers 25-car rates while Burlington Northern offers 26-car rates.

[3]As a condition to receiving these rates, the elevator must be able to load the multiple-car shipment in a limited time period. For example, elevators typically have a 24-hour period to load 86,000 bushels of wheat necessary to load a 26-car train (26 100-ton hopper cars at 33.3 bushels of wheat per ton).

Table 3.1. Corn and Wheat Rail Rates and Savings from Select Washington Towns to North Coast Ports (in cents per cwt.)

	25 car[a] rate	3 car[b] rate	% Increase Over 25 car rate	single[c]	% Increase Over 25 car rate
Albion	34	45	32	54	59
Cheney	43	52	21	63	47
Diamond	29	40	38	50	72
Endicott	28	39	39	49	75
Hooper	26	36	38	47	81
Kennewick	26	36	38	47	81
Pullman	34	45	32	54	59
Tekoa	39	49	26	59	51
Touchet	26	37	42	46	77
Walla Walla	30	41	37	51	70
Yakima	32	43	34	52	63

SOURCE: Union Pacific Rate Schedule, effective July 1, 1984.

Note: 25-car rates are offered by Union Pacific while Burlington Northern offers 26-car rates.

a Rates apply only in shipments of 25 cars, subject to an aggregate minimum weight on corn and wheat of 2,375 tons per shipment in not more than 25 cars.

b Rates apply on shipments of not more than 3 cars, subject to an aggregate minimum weight of not less than 285 net tons corn and wheat.

c Rates apply on single cars, subject to a minimum weight of not less than 190,000 lbs. per car for corn and wheat, further subject to the marked capacity of the car used, except when loaded to full visible capacity, in which case actual weight will apply, but in no case less than the amount stated above.

are hauling grain longer distances by truck or elevator managers are transshipping grain in order to take advantage of the multiple-car rates offered at upgraded elevators.

ABANDONMENT

Rail line abandonment is a second area in which rail deregulation has affected grain elevator firm's decision making. The 4-R Act, legislation enacted in 1976, "established the principle that a railroad cannot be forced to provide service on which it loses money (and costs in this case are specified to include a return on investment" (Keeler, p. 34). Provisions of Staggers reaffirmed the liberalization of rail abandonments in two ways. First, a time limit of 255 days from the date of application, including appeals, was established. Second, under Staggers it was further specified that the railroad's return on investment should include the opportunity cost. An opportunity cost implies that it is not enough for the railroad to be simply making a profit but the profit should be equal to those available from other investment opportunities.

History of Abandonment in Washington

Whereas abandonment has been common in the Midwest since the 1950s, it has recently come to Washington. Since 1980, 63 rail line segments constituting 1040.8 miles of track have been abandoned in the state of Washington (see Table 3.2). This number includes 12 rail abandonments, constituting 180.28 miles, during calendar year 1985. Attalia-Walla Walla, Hampton-Strandell, and Spokane-Carders have been identified as candidates for abandonment within the next three years. In 1980 segments totaling 482.96 miles were abandoned compared to three lines totaling 81.2 miles

Table 3.2. Washington Railroad Abandonments (page 1 of 3)

RR	Description	Mileage	Filed	Decision Date
Milw	Port Angeles-Ranger	9.35		est. 1953
Milw	Port Angeles	0.06	est. 1964	
Milw	National-Ashford	1.80	est. 1966	
Milw	Newport-Tweedie	9.60	est. 1969	
Milw	Maple Falls-Glacier	8.50	est. 1969	
BN	Limestone Jct.-Maple Falls	5.50	7/13/70	10/21/70
BN	Walla Walla-Tracy	4.22	7/20/70	11/2/70
BN	Snake River Jct.-Monumental	14.48	est. 1969	
BN	Wickersham-Larsen	17.00	12/29/70	5/6/71
BN	Univ. Bridge-Lake Forest Park	11.01	5/5/71	7/6/71
BN	Black River Jct.-Renton	2.78	9/20/71	11/30/71
BN	Viola-Estes	4.30		est. 1972
BN	Havermale Island(Spokane)	1.39	12/6/71	3/14/72
BN	Arlington-Clear Lake	20.22	11/12/71	3/23/72
BN	Hartford-Edgecomb	10.25	11/12/71	3/23/72
BN	W. Fairfield-Fairfield	2.60	10/1/71	3/27/72
BN	Seabury-Oakesdale	5.05	10/1/71	3/27/72
BN	Crabtree-Garfield	3.79	10/1/71	3/27/72
BN	Garfield-Grinnel	5.54	10/1/71	3/27/72
Milw	NP Xing & Monroe St.	62.44	1/7/72	4/3/72
OWN	Fish Lake-Spokane(operations)	12.48	1/31/72	4/3/72
BN	Maple Valley-Lake Wilderness	3.13	12/27/71	4/7/72
UP	Starbuck-Relief	5.38	3/22/72	6/29/72
BN	Issaquah-Tanner	19.26	1/22/73	5/24/74
Milw	Dryad Jct.-Raymond	28.83	3/26/73	6/10/74
Milw	Snoqualmie Falls-Monroe	31.13	11/23/73	11/7/74
OWN	McKay-Alto	4.52	3/24/75	4/9/76
OWN	Dayton-Turner	11.02	7/25/75	4/13/76
YVTC	Selah	0.46	8/2/76	3/24/77
BN	Clyde-Pleasant View(operations)	7.93	11/6/75	4/12/77
BN	Crabtree-Oakesdale	6.97	6/16/76	4/29/77
OWN	Fish Lake-Spokane	12.48	4/4/77	5/18/77
OWN	Montesano-S. Montesano	1.60	10/6/76	11/14/77
Milw	Montesano-S. Montesano	1.60	10/6/76	11/14/77
Milw	Bagley Jct.-Enumclaw	16.00	11/25/77	1/12/78
Milw	Park Jct.-National	3.80	12/3/77	1/26/78
BN	Fairfield-Spokane	33.25	3/8/78	4/26/78
BN	Adrian-Odair	19.54	3/8/78	4/28/78
OE	Forest Grove	0.59	3/8/78	4/28/78
BN	Aloha-Moclips	4.34	10/2/78	11/29/78
OWN	Hooper Jct.-Connell	37.25	6/13/78	8/8/79
OWN	LaCrosse-Riperia	23.23	8/6/79	9/27/79
Milw	Beverly Jct.-Hartford	20.80	11/28/78	11/18/79

Table 3.2. Washington Railroad Abandonments (page 2 of 3)

RR	Description	Mileage	Filed	Decision Date
		Abandonments Since 1980		
Milw	Plummer, ID-Spokane	24.70	8/79	1/29/80(a,b)
Milw	Dishman-Coeur d'Alene	12.40	"	"
Milw	Tiflis-Marcellus	39.00	"	"
Milw	Sumas-Limestone Jct.	8.13	"	"
Milw	Strandell-Bellingham	15.00	"	"
Milw	Easton-Royal City Jct.	87.50	"	"
Milw	Warden-Idaho St. Line	124.30	"	"
Milw	Warden-Seiler	6.60	"	"
Milw	Tacoma-Blakeslee Jct.	62.80	"	1/29/80(a,b,e)
Milw	Frederickson-Morton	54.30	"	"
Milw	Maytown-Helsing Jct.	11.20	"	1/20/80(a,b)
BN	Clear Lake-Sedro Wooley	2.74	7/20/79	8/13/80
BN	Fairbanks-Seabury	2.07	7/11/80	8/29/80
OWN	Starbuck	0.39	8/15/80	10/9/80
BN	Balder-Manning	20.60	1/79	12/17/80
BN	Eureka-Clyde	11.23	11/12/80	12/18/80
BN	Fairchild-Geiger Field (track removal)	3.40	est. 1981	
BN	Lake Kapowsin	3.33	4/15/81	
OWN	Starbuck-Pomeroy	30.18	5/29/81	7/13/81(d)
BN	Clyde-Pleasant View (track)	7.98	6/8/81	7/22/81
BN	Veazy-Cascade Jct.	9.99	2/5/82	3/16/82
BN	Orting-Lake Kapowsin	5.30	3/26/82	6/15/82
UP	Tacoma	1.67	8/31/82	10/19/82
UP	Connell Branch	0.28	8/31/82	10/19/82
BN	Hoquiam-Alhoa	20.86	11/5/82	12/15/82
UP	Tekoa	0.76	9/10/82	1/12/83
BN	Davenport-Eleanor	17.51	11/18/82	1/18/83
BN	Spring Valley-Fairbanks	5.68	12/12/82	2/3/83
BN	Spring Valley-Mt. Hope	14.33	1/13/83	2/23/83
BN	Basin City-Sage Hill	10.13	1/24/83	3/14/83
BN	Adrian-Wheeler	19.80	2/4/83	3/18/83
BN	Palouse-Grinnell	4.85	4/14/83	6/23/83
BN	Walair-Dayton	31.18	7/1/83	8/30/83(c)
BN	San Poil-Republic	3.53	11/15/83	12/27/83
BN	Bellingham	2.73	12/1/83	1/19/84
BN	Newport-Dean	30.00	12/22/83	1/6/84
BN	Moxee City	0.57	12/30/83	1/9/84
BN	Greenacres-State Line(Post Falls)	3.85	12/16/83	1/20/84
UP	Spokane	0.62	1/25/84	3/22/84
BN	Brace-Tieton	11.70	2/24/84	8/10/84
BN	Pullman Jct.-Genesee, ID	27.66	3/28/84	6/11/84
BN	Granger-Parker	16.61	6/22/84	8/9/84
BN	Aberdeen Jct.-Markham	10.26	7/27/84	1/11/85
BN	Rosalia-Balder	5.00	9/7/84	10/25/84
BN	Palouse-Viola, ID	7.02	8/17/84	10/4/84
UP	Centralia M.P. 1.02-2.50	1.48	8/29/84	9/17/84
BN	Leavenworth-Old Leavenworth	1.74	10/18/84	12/6/84
BN	Orting-Cascade Jct.	11.08	10/22/84	12/7/84

Table 3.2. Washington Railroad Abandonments (page 3 of 3)

RR	Description	Mileage	Filed	Decision Date
BN	Palmer Jct.-Veazy	7.00	10/2/84	10/23/84
BN	Cascade Jct.-Carbonado	8.80	10/5/84	10/23/84
CP	Rye-Chelatchie	29.50	11/15/84	Rejected
UP	Olympia Branch	0.14	10/15/84	12/5/84
BN	College Place-Baker Langdon	4.62	11/29/84	1/11/85
BN	Walla Walla-Milton Freewater	14.78	12/6/84	4/19/85
BN	Woodinville-Kenmore	4.88	12/27/84	7/19/85
BN	Oroville-Keromeos	20.04		1/8/85
CP	Rye-Chelatchie	29.50	2/22/85	8/5/85
UP	Tekoa Branch (Spokane)	2.24	3/17/85	
UP	Seattle 1st & 2nd Main Lines	3.88	3/21/85	5/9/85
BN	Rosalia-Spring Valley	5.57	4/12/85	
YVT	Yakima	19.92	4/26/85	6/5/85
BN	Carders-Greenacres	4.43	8/8/85	10/23/85
BN	Cle Elum-Ronald	4.92	8/22/85	10/7/85
BN	Orting	1.40	4/3/85	5/9/85

(a) Date of recommendation to Reorganization Court.
(b) Actual abandonment authorized by Reorganization in Order 297A on 2/29/80.
(c) 1.8 miles sold to UP for continuing operations included in total.
(d) Service resumed by Nez Perce RR. Feb. 1984.
(e) Purchased by Weyerhaeuser Co. Not operated as a common carrier.

No. of Line Segments Abandoned 1953 through October 1985.

	Western Washington	Eastern Washington
0.06 - 3.9 mi.	15	15
4.0 - 15.9 mi.	16	29
16 - 30 mi.	9	11
>30 mi.	3	9
TOTAL	43	64
	522.12 miles	977.02 miles

Abandonments by Year Since 1980.

Year	Mileage Abandoned	No. Segments
1980	482.96	16
1981	44.89	4
1982	38.1	5
1983	107.77	9
1984	186.8	17
1985	180.28	12

in 1979. The 1980 total, however also includes those lines which were abandoned due to the bankruptcy of the Milwaukee Road Railroad in the same year (Table 3.2).

Over the last 10 years the extent of the rail line network in Washington State has shrunken considerably. Visual comparison of the 1975 Railroad Map (Figure 3.1) and the 1985 map (Figure 3.2) graphically illustrates this point. Whether due to the bankruptcy of any given railroad or the abandonment of individual, unprofitable branch lines, the rail system that shippers can depend on is noticeably shrinking. This has forced some shippers to turn to other modes of transportation, i.e. truck, to haul grain to more distant rail lines or river ports.

Abandonment Procedures[4]

It is useful to examine in some detail the abandonment process in that it provides the time frame and warning signs to highway planners of future transportation changes. The process for filing for abandonment of any given rail line was established by the Interstate Commerce Commission. The ICC, not the Washington State Utilities and Transportation Commission (WUTC) or the state of Washington, has the authority to approve abandonment applications.

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[4]This discussion of abandonment procedures relies heavily on the "Abandonment Process" as outlined in the Washington State Rail Abandonment Handbook, Washington State Department of Transportation, August 1981.

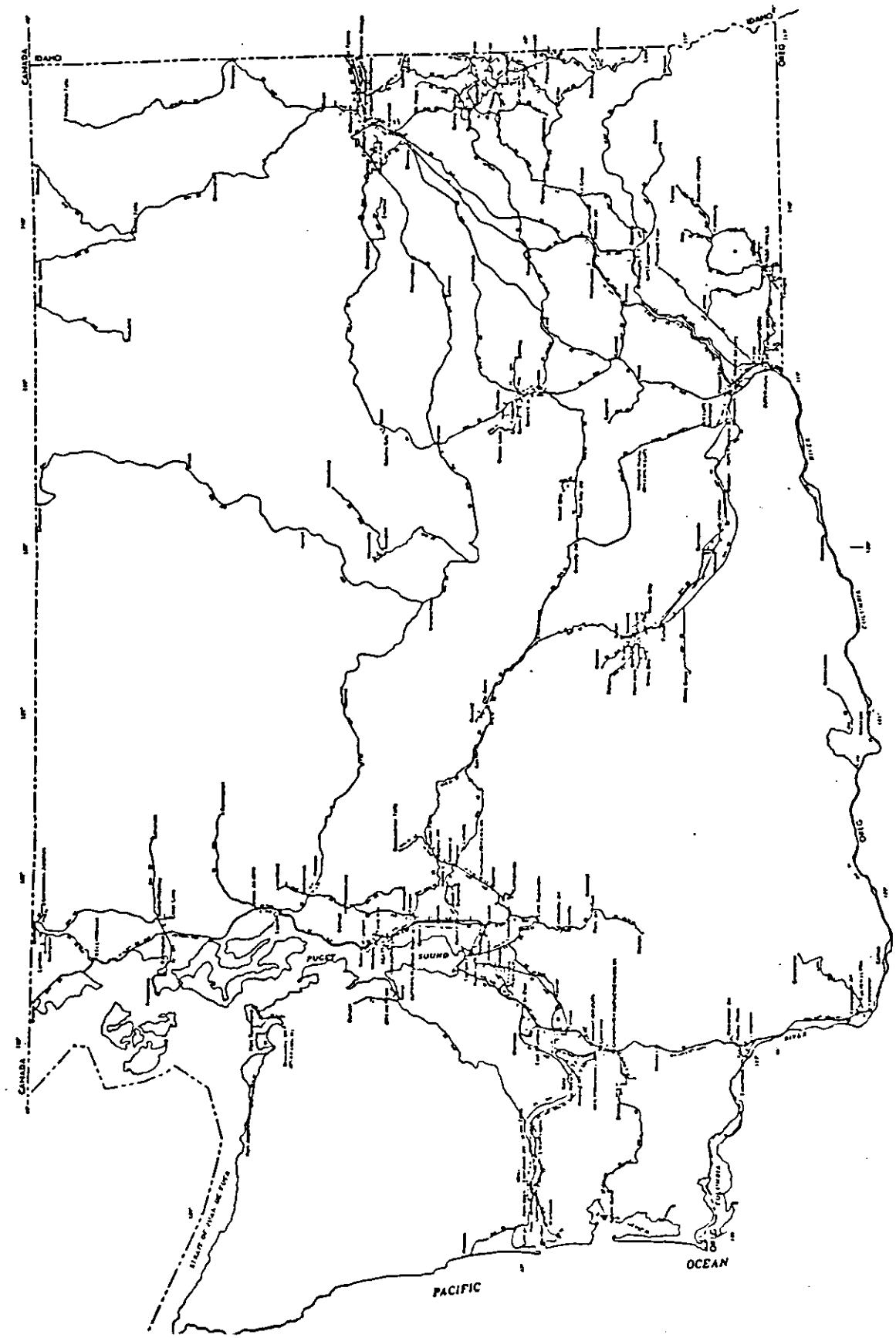

Figure 3.1. RAILROAD MAP OF WASHINGTON (1975)

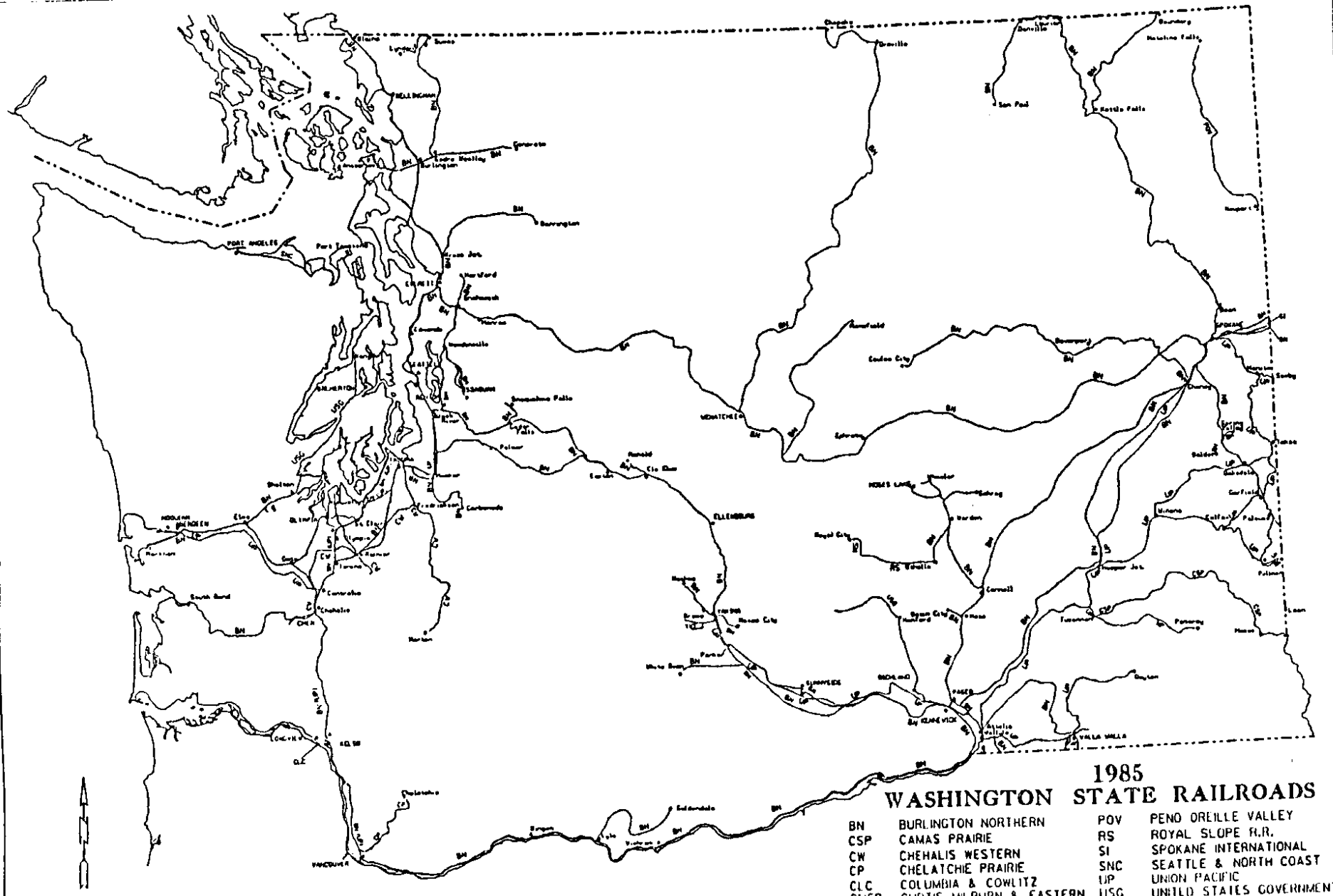
1985
WASHINGTON STATE RAILROADS
BN BURLINGTON NORTHERN
CSP CAMAS PRAIRIE
CW CHEHALIS WESTERN
CP CHELATCHIE PRAIRIE
CLC COLUMBIA & COWLITZ
CMER CURTIS MILBURN & EASTERN
MILW MILWAUKEE ROAD
NP NEZPERCE
POV PEND OREILLE VALLEY
RS ROYAL SLOPE R.R.
SI SPOKANE INTERNATIONAL
SNC SEATTLE & NORTH COAST
UP UNION PACIFIC
USG UNITED STATES GOVERNMENT
WWV WALLA WALLA VALLEY
YVT YAKIMA VALLEY TRANS.
• AMTRAK & FREIGHT SERVICE
• FREIGHT SERVICE ONLY

Figure 3.2.

Every railroad in the United States is required to annually file a System Diagram Map. This map must be filed with the ICC and the Washington JTC and DOT. All the lines the railroad anticipates it may abandon within the next three years will be identified as "Category 1." Lines for which an abandonment application has already been filed are "Category 3." In theory, "Category 2" also exists. This category would be used to indicate the lines the railroad has under study which may be the subject of an abandonment application at some indefinite time in the future. To date, no railroads in Washington State have filed Systems maps containing lines identified under "Category 2." (See Figure 3.3 for illustration of a Systems Diagram Map).

In order to initiate abandonment procedures, a railroad must file a "Notice of Intent to Abandon." This notice is put out 30 days before the railroad can file its abandonment application. After a line has been identified as Category 1 for at least four months, the railroad may file an application seeking abandonment. This notice must be given to 1) the governor, 2) the ICC, and 3) to all shippers which have used the line during the last 12 months. In addition, a copy must be published in the county newspaper and a copy posted in each of the railroad's stations on the line.

If no one protests the abandonment within 30 days after the application is filed, the ICC must approve the abandonment and issue an abandonment certificate within 45 days of the filing date. This would allow the physical abandonment to occur within 75

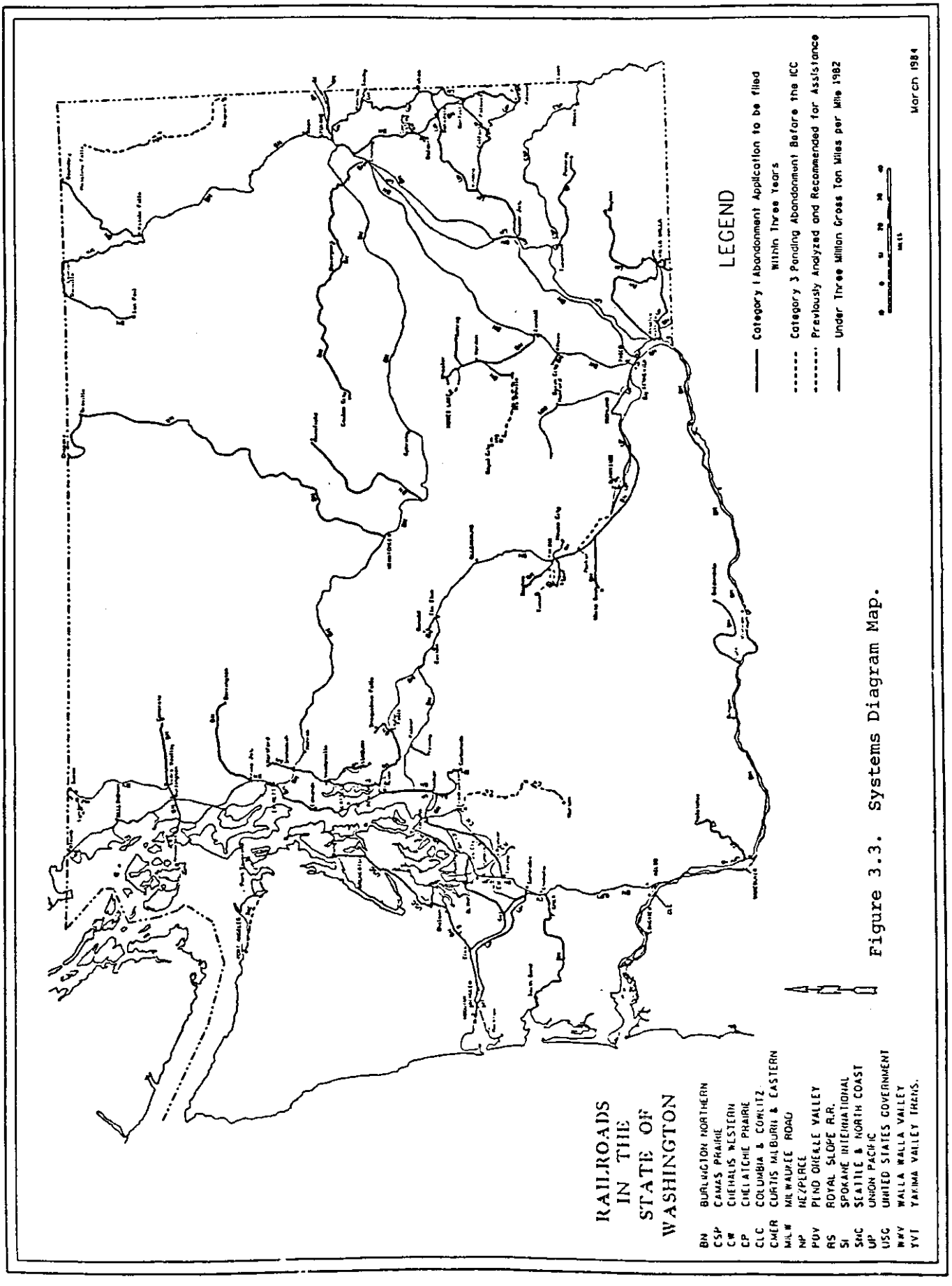

Figure 3.3. Systems Diagram Map.

days after the application is filed. These time limitations are substantially shorter than they were before the passage of the Staggers Rail Act of 1980. Previously, six months or more could elapse between the time notice of intent to abandon was received and the time the ICC issued an abandonment certificate in an uncontested abandonment. Now a shipper could find service completely discontinued in less than three and one-half months after a notice of intent to abandon is filed.

If someone protests the railroad's application for an abandonment, the ICC must decide within 45 days after the application is filed whether to investigate the abandonment. The investigation, however, is discretionary. If the ICC decides not to conduct an investigation, it must rule on the application within 90 days after it is filed, and if approved, allow the abandonment to become effective within 120 days from the filing date. Even if the ICC investigates the application, the abandonment will become effective in less than 300 days from the date of the Notice of Intent to Abandon, assuming the ICC approves the application and there are no appeals. The operational truth is, however, that most rail lines marked in Category 3 on the Systems Diagram Map, and therefore, pending abandonment before the ICC, are likely to be abandoned in the near future. This is because it has been extremely difficult to prove during an abandonment proceeding that a given rail line is as profitable as an alternative investment opportunity.

Some of the branch lines in the state which are not in need of extensive repair might be able to meet the required return

standards if all the traffic on the line was shipped via rail. Usually, however, by the time application for abandonment has been filed, shippers have changed to other modes and hence revenue is extremely low to the railroads or service on the line has deteriorated to the point where shippers have stopped relying on it and have turned to trucks for their transportation needs. However, in the future some segments which now have sufficient revenues for profitable operation may be candidates for abandonment if they do not meet the railroads return to investment or opportunity cost goals. The recent decisions of the ICC have shown that few, if any, abandonment applications in the entire United States have been denied in the last two years. This situation holds in Washington as well. Hence, a "Notice of Intent to Abandon" can be interpreted by the shipper or highway planner as a harbinger of transportation change. Even in cases such as the Mansfield line where abandonment was delayed while the shipping community evaluated alternatives, the final result was loss of the line and attendant highway impacts.

Truck-Barge

History

Steamboats arrived on the Columbia River by 1860, transporting produce and other goods from Lewiston to Astoria. The Corps of Engineers began surveying the rivers and dredging a channel from Portland to the ocean in 1867. Wheat from the Wallula area was the source of extensive downriver freight traffic. In 1867, a

cargo of wheat was delivered to San Francisco. Canals were completed at Cascade Lock in 1896 and at Celilo Lock in 1915.

River traffic slowed in the latter 1880s as railroads were established in the PNW. Construction of Bonneville Lock and Dam in 1938 caused a new surge of river traffic. Tonnage through Bonneville Lock was 161,000 tons in 1938 and by 1946, tonnage increased to over a million tons. River traffic made remarkable increases with the addition of each of the other seven locks and dams (Table 2.1). Three of these dams are on the Columbia River, McNary Dam (1952), The Dalles Dam (1957), and John Day Dam (1963); the remaining four locks and dams are on the Snake River, Ice Harbor Dam (1962), Lower Monumental (1969), Little Goose (1970), and Lower Granite (1975).

With the completion of the Lower Granite Lock and Dam, year-round slack water navigation was possible from tidewater to Lewiston, Idaho, a distance of 465 miles. Total river traffic increased steadily as the inland waterway system was further developed. Inland shippers began to truck wheat to the river, where it was loaded on barges for shipment to Portland. The Columbia River ports became the primary destination for Washington wheat. Although competitors, an important institutional distinction existed between rail and truck-barge carriage. Unlike railroads, trucks and barge movements of raw agricultural products were exempt from Interstate Commerce Commission regulation (Keeler). As a result, there was more pricing (rate) flexibility for truck-barge movement of grain as opposed to rail shipment.

Initially, "motor truck transportation developed as a 'feeder,' bringing produce from the production areas to the rail station" (Casavant, p. 34.). Commercial motor carriers continued this complementary role to railroads until the early 1950's when truck transportation became an effective long-haul competitor to rail carriage of grain.

> Since the highway transportation of these unprocessed agricultural products was not regulated by the ICC, the exempt for-hire truck began to haul grain and other exempted products at negotiated rates, often much lower than the prevailing rail rates (Casavant, p. 35)

Currently, in Washington State, trucks are primarily used to haul grain to Columbia River ports, where it is then carried by barge to ocean port facilities at Portland. A 1978 survey determined that Columbia River ports were the primary destination for Washington wheat, receiving 87 percent of the total volume (Table 3.3). Of this total, 51 percent moved by truck-barge while 36 percent moved by rail. Truck, as a direct movement, is presently not a competitor to railroad or barge, moving less than one percent of the grain. While the percent moving by rail has increased since 1980, no increase in direct shipments has been noticed.

User Fees

Any factor that decreases the competitive position of truck-barge relative to rail will shift the traffic pattern of grain in eastern Washington. User fees on waterways may be such a factor.

Until 1978, the nation's inland waterway systems were financed from general revenues rather than direct user charges.

This enhanced the competitive position of barge carriers as they were not internalizing all the costs of operation. The "free ride" ended, however, with the enactment of the Inland Waterways Revenue Act of 1978. The act imposed an excise tax, which in October 1985 reached its maximum level of ten cents per gallon on any liquid fuel used in a vessel in commercial waterway transportation. It has been estimated that the tax will recover between 10 and 20 percent of the operating and routine maintenance costs (Martin and Casavant).

It is possible that an additional increase in waterway users charges will cause a further shift of river traffic to the rails. As a result, there would be less traffic to bear the segment's operating and maintenance costs, in turn requiring yet further increases in user fees. "As this cycle continues, the future of river transportation as a viable alternative to rail may cause a significant change in the competitive nature of the existing transportation system serving PNW shippers" (Casavant, Mehringer, and Meyer, p. 4). Such a situation will decrease traffic on roads leading to the river and possibly increase traffic on roads leading to multiple-car loading facilities.

Summary

A grain transportation network comprised of rail, truck, and barge exists in Washington State. Throughout the years, each mode has been vying for a greater share of Washington's grain traffic. In many instances, however, these transportation modes serve as

Table 3.3. Percentage of Total Volume of Wheat Shipped by Mode, 1978.

Destination	Mode	Percent
Puget Sound	Truck	0.8
Puget Sound	Rail	12.4
Columbia River	Truck	0.0
Columbia River	Truck-Barge	51.3
Columbia River	Rail	35.4

SOURCE: Logsdon, Charles L. and LeRoy Rogers. Factors Influencing Transportation Decisions by Pacific Northwest Grain Shippers--A Survey. Circ. 0630 Coll. Agr. Res. Center, Wash. St. U., Pullman, 1981.

complements rather than competitors--as in the case of trucks acting as 'feeders' to railroads or as links to barges. The competitive position of each mode, however, has been dictated to a large extent by legislation. The railroads, acting under strict regulation prior to 1980, did not have the freedom to negotiate rates, thus undermining their competitive position. Barge traffic, on the other hand, had its competitive position enhanced by "free-riding" on the inland waterway system prior to the 1978 legislation which imposed users fees.

The legislative decisions directed toward an individual transportation industry not only affect the earmarked industry but its competitors. The 1978 Inland Waterway Act, directed at commercial waterway traffic, enhanced the competitive position of the then highly-regulated rail industry. The 1980 deregulation of the railroads granted that industry greater flexibility in structuring rates and more discretion over abandoning given lines. The

industries served by this transportation system are also directly affected by this deregulation. As multiple-car facilities are built, branch lines abandoned, and/or barge becomes less competitive, grain shipping is bound to become more centralized. This implies that more grain will have to be hauled by truck from the outlying production and storage areas.

The extent to which truck traffic will increase due to rail deregulation is largely based on the decisions made at the country elevator level, i.e. which facilities will be used for storage and which will be upgraded to multiple-car loading facilities. These points will be discussed in subsequent sections. It is clear, however, with the advent of the Staggers Rail Act, trucks are once again becoming important 'feeders' to rail.

CHAPTER 4

The Elevator Industry

General Description

The critical nucleus or focal point of the changes occurring in grain transportation is the management of the elevator industry. This section analyzes the number of firms, number of elevators, and storage capacity for the past eight years, searching for structural changes that affect transportation.[5] Data for this section is secondary yearly data for the years 1977-1984, maintained by the Washington State Department of Agriculture, Commodity Inspection Division.[6]

As a preliminary note, it is important to delineate the nature of the multi-plant grain firm because managers can use the different houses for different functions, thus affecting traffic flow. The multi-plant grain firm is comprised of several houses of various sizes at several locations. State law defines a house or warehouse to be any elevator, mill, subterminal grain warehouse, or other structure (including outside wheat piles) which is used for the storage, handling, conditioning, or shipment of grain received from the public. The operator of a multi-plant grain firm is required by law to separately license each house in the firm.

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[5]Analysis only includes those elevators operating with state licenses. Since 1976, the State has identified but not collected or published data on firms operating with federal licenses.

[6]There is one major limitation to this data. Beginning in
(Footnote Continued)

In 1984, 26 percent of the firms operated a single house while 36 percent were found at a single location (Tables 4.1 and 4.2). If all houses of a firm are at one location, little affect on roadway or traffic is expected from transshipment.

Table 4.1. Number of Licensed Elevators per Firm in Washington, 1984.

Number of Elevators (houses) in the Firm	Number of Firms	Percent	Cumulative Percent
1	21	26.25	26.25
2- 4	22	27.50	53.75
5- 8	15	18.75	72.50
8-10	8	10.00	82.50
11-20	10	12.00	95.00
21-30	4	5.00	100.00
TOTAL	80	100.00	100.00

ADAPTED FROM: Public Grain Warehouses. Washington Department of Agriculture, Olympia, 1983.

(Footnote Continued)
1981, firms also were required to license outside storage piles. This led to a significant increase in the total number of licensed houses and total storage capacity.

Table 4.2. Number of Locations per Firm in Washington, 1984.

Number of Locations in the Firm	Number of Firms	Percent	Cumulative Percent
1	29	36.25	36.25
2- 4	30	37.50	73.75
5- 7	13	16.25	90.00
8-11	4	5.00	95.00
12-21	4	5.00	100.00
TOTAL	80	100.00	100.00

ADAPTED FROM: Public Grain Warehouses. Washington Department of Agriculture, Olympia, 1983.

The typical country grain firm in Washington operated 6.1 houses at 3.6 locations. The average number of houses per firm increased erratically over the 8 years under study, as from 5.29 in 1977 to 6.14 in 1984 (Table 4.3).

The total number of licensed elevators reached a low of 381 in 1977 (Table 4.4). Since 1977, the number of licensed elevators has steadily increased, reversing a 15 year trend. This increase is somewhat misleading, however, because it reflects the 1981 definitional change of elevators requiring that outside storage piles also be licensed as elevators. In 1984, 29 outside wheat piles were separately licensed as country elevators (Public Grain Warehouse). On the average, these outside storage piles are almost twice as large as conventionally built storage facilities. Of the 1984 total licensed storage capacity, over 51 million

Table 4.3. Elevators per Firm, Average Capacity per Elevator, and Average Capacity per Firm, 1977-1984.

Year[a]	Elevators per Firm	Ave. Capacity per Elevator (000 bu)	Ave. Capacity per Firm (000 bu)
1984	6.14	395.56	2427.78
1983	6.20	368.09	2282.19
1982	6.68	359.86	2402.02
1981[b]	5.82	289.32	1683.69
1980	5.30	297.78	1579.01
1979	5.23	311.67	1631.19
1978	5.20	304.37	1581.91
1977	5.29	286.05	1513.67

ADAPTED FROM: Public Grain Warehouses. Washington Department of Agriculture, Olympia, 1983.

[a]The license is effective for a crop year, July 1 to June 30.

[b]Beginning in 1981, elevator was redefined to include outside wheat piles.

bushels or 26 percent was outside storage. The increasing importance of outside piles does have implications for roadway use. With the exception of those piles built on outside augers, every pile has to be loaded onto trucks to be moved inside. Those trucks can move grain to elevators other than the nearby elevator, thus causing more traffic on the road.

The average licensed storage capacity per firm has increased over time from 1,513,670 bushels in 1977 to 2,427,780 in 1984. This growth can be attributed to the increase in total licensed capacity and the increase in the number of elevators per firm. Thus, while Washington country elevator firms have grown in size,

Table 4.4. Number of Grain Firms, Elevators, and Total Licensed Storage Capacity, 1977-1984.

Year[a]	Number of Firm	Number of Elevators (000 bu)	Total Licensed Capacity
1984	80	491	194,202
1983	75	465	171,164
1982	68	454	163,378
1981[b]	72	419	121,226
1980	76	403	120,005
1979	77	403	125,602
1978	76	395	120,225
1977	72	381	108,984

ADAPTED FROM: Public Grain Warehouses. Washington Department of Agriculture, Olympia, 1983.

[a]The license is effective for a crop year, July 1 to June 30.

[b]Beginning in 1981, elevator was redefined to include outside wheat piles.

the reasons underlying their growth differ from other regions of the United States. Unlike other areas, the growth in firm size arises from the operation of multi-plant firms and the unique climatic conditions which allow for the outside storage of wheat.

Turnover Ratios

Historically, country elevators in the Pacific Northwest have placed more emphasis on long-term storage than elevators found elsewhere in the United States (Ratcliffe). The continuance of this practice is in question because new facilities designed to load 25 car or larger shipments generally do not include bins for

long-term storage (Schnake and Stevens). New multiple-car loading facilities seek to earn revenues through greater utilization of the facility rather than long-term storage.

A common measure of elevator utilization is turnover, which is the volume of grain handled per year divided by the elevator's storage capacity (Casavant and Griffin). A high turnover ratio (greater than 2.0) indicates that the elevator is used primarily for merchandising grain. On the other hand, a turnover ratio less than or equal to one suggests the primary function of the facility is storage.

The average turnover ratio for Washington country elevators in 1984 was 1.3 (Table 4.5). Over 43 percent of the licensed elevators have turnover ratios less than or equal to one, while only 15 percent have a turnover ratio greater than 1.5 (Table 4.5). This indicates that many elevators continue to function primarily as storage facilities. This occurs because older elevators and outside wheat piles are not designed as high turnover facilities. Older elevators cannot act as put-through facilities because they do not have high-speed receiving and shipping equipment. Outside storage piles cannot be used as put-through facilities because it would involve excessive handling of grain. Also, long-term storage has taken on more importance for the grain industry since the farmer-owned reserve (FOR) was created in the Food and Agriculture Act of 1977 and because of the growing surplus due to wheat utilization being well below production.

Ownership

There are three forms of elevator ownership, farmer-owned cooperatives, family-owned elevators, and corporate elevators. In 1984, 55 percent of the responding elevators were cooperatives, with 20 percent corporate and 25 percent family-owned (Table 4.6). Thus, the activities of cooperatives directly relate to the activity of the industry. The cooperatives have a greater number of larger elevators at more locations than the other two categories of elevators. Further, cooperatives are often more service oriented, thus they could maintain older houses, and engage in transshipping from those houses as a means of giving local service to patrons.

Table 4.5. Washington Elevator Turnover Ratios, 1984.

Turnover Ratio	Number of Elevators	Percent	Cumulative Percent
.50 or less	11	6.5	6.5
.51- .75	14	8.3	14.8
.76-1.00	74	43.8	58.6
1.01-1.25	27	16.0	74.6
1.26-1.50	18	10.7	85.2
Over 1.50	25	14.8	100.00
TOTAL	169	100.00	100.00

SOURCE: Country Grain Elevator Survey.

Table 4.6. Form of Elevator Ownership and Firm Size Characteristics, 1984.

Type of Ownership	Percent	Avg. Size (000 bu.)	Avg. Number of Elevators per Firm	Avg. Number of Locations per Firm
Cooperative	55	6837.3	11.86	6.57
Family	25	535.6	2.80	2.00
Private	20	2722.6	6.12	4.25

SOURCE: Country Grain Elevator Survey.

CHAPTER 5

INDUSTRY REACTIONS TO RAIL DEREGULATION

In 1981 a study was conducted by the Washington State Department of Transportation to assess the impacts of truck and railroad deregulation on transportation operations in the state of Washington.[7] In essence, the study proved to be an account of shippers perceptions of the potential impacts of deregulation, as the Staggers Rail Act was passed shortly before the investigative research for the project was undertaken. Furthermore, "throughout the study period it was apparent that a weak economy was diminishing freight shipments and masking the full impacts of deregulation" (pg. v).

In many ways 1985 is not unlike 1981. The economic climate for agricultural commodities is not conducive to marketing grain. Depressed farm prices are forcing producers to hold on to their grain in anticipation of an economic upswing. This economic stagnation in agriculture has delayed the potential impacts of rail deregulation, resulting in changes that have been slow and steady. In short the radical changes that some opponents of deregulation foresaw are not occurring. The concern about

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[7]Washington Dept. of Transportation. Impacts of Trucks and Railroad Deregulation on Transportation Operations and Economic Activity in the State of Washington. Olympia, June 1982. Although the document was published in June 1982, the investigative research for the project was carried out in 1981.

potential overbuilding of multiple-car loading facilities does not seem to have arisen.

This is not to say that substantial changes are not taking place in the transportation of grain. For one, Washington State is experiencing a steady increase in the number of multiple-car loading facilities available to shippers. On the other hand, seasonality shifts are not apparent.

Multiple-Car Loading Facilities

As early as 1955, the railroads were proposing multiple-car rates for grain (Harris). By the early 1970's, there were several levels of volume rates available to Midwest shippers, including multiple-car shipments, several levels of unit trains and Rent-a-Train (Harris). However, prior to rail deregulation in 1980, the usage of such rates was limited and unsuccessful in the state of Washington.

The function of multiple-car loading facilities (MCLF) differs from that of a traditional country elevator. MCLFs concentrate on the rapid handling of grain rather than storage, since a 24-hour load-time period is usually requisite for receiving the multiple-car rates offered by railroads. To access these lower rates, some country elevators have made investments in their facilities. Figure 5.1 shows the locations of the MCLFs in Washington. As seen from Table 5.1, both the number of firms operating multiple-car loading facilities and the absolute number of MCLFs in operation increased steadily between December 1981 and November 1984. This growth indicates that the country

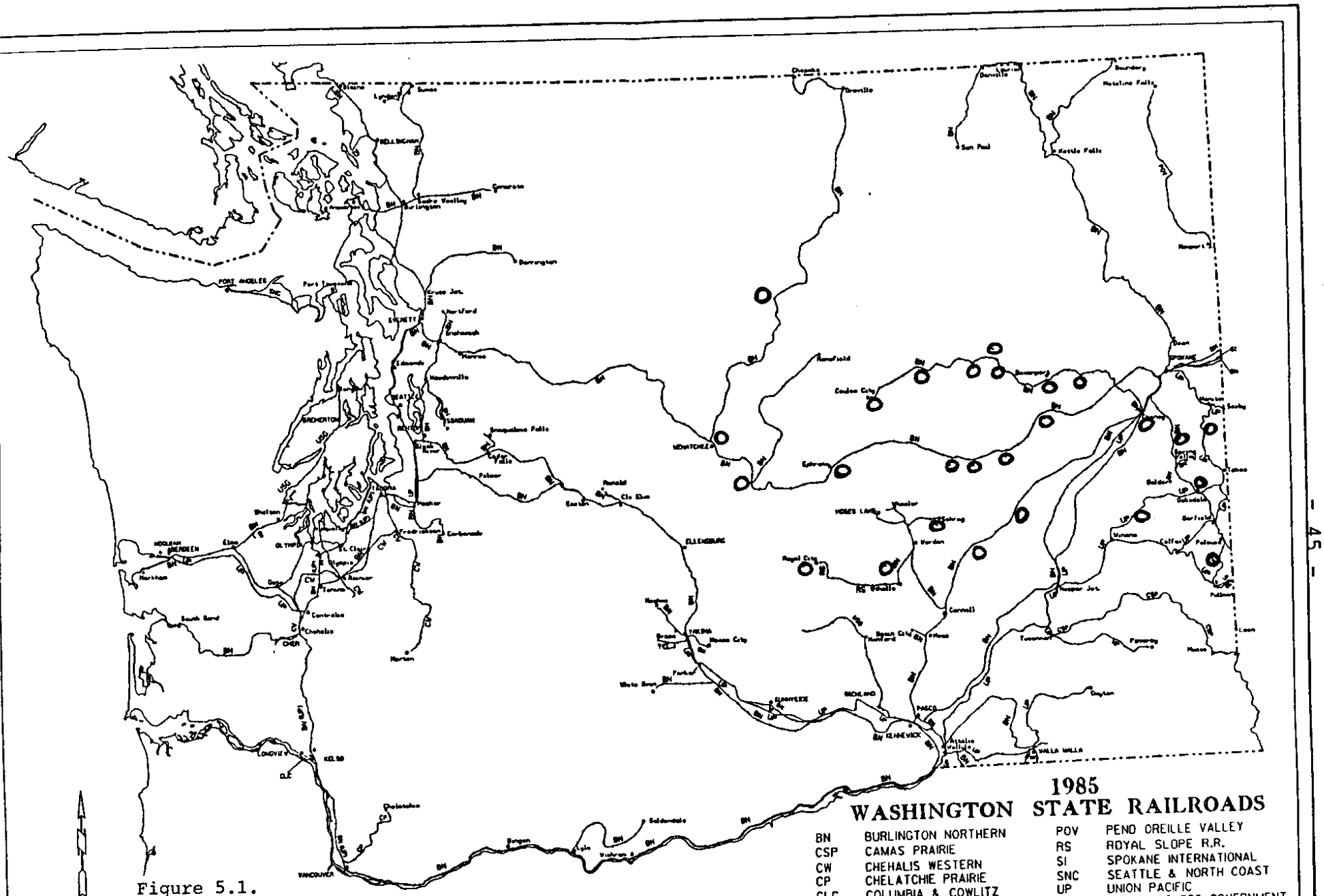

Figure 5.1.
(Legend) Multiple-Car Loading Facilities.
(Location may contain several MCLFs.)

Table 5.1. Number of Multiple-Car Loading Facilities in Washington.

	December 1981	August 1983	November 1984
Total Number of MCLFs in Operation	14	23	34
Number of Firms Operating MCLFs	9	12	16

ADAPTED FROM: Washington State Department of Agriculture, Changing Transportation and Storage Characteristics of the Grain Industry, Olympia 1983; and Casavant, K.L. and F.J. Dooley, Transportation Needs of Washington Agriculture, Phase II: Present and Future Needs, Department of Agricultural Economics, Washington State University, 1984; Grain Elevator Survey.

grain elevator system is in a state of transition as it responds to changes in its transportation alternatives.

Between August 1983 and November 1984, the rail's share of traffic from MCLFs increased from 83.5 percent to 98.5 percent (Tables 5.2 and 5.3). During the same time period, however, rail grain movements from the smaller country elevators declined from 41 percent to 30 percent. (Tables 5.2 and 5.3). The decline of rail shipments from country elevators has been caused by a sharp increase in the transshipment of grain from country elevators to MCLFs.

Trucks are used to funnel grain into a central point, the multiple-car loading facility. From there, the firms ship the grain to the terminal market at a lower multiple-car rate. In 1984, approximately 20 percent of the grain was transshipped an average of 22.5 miles from country elevators to MCLFs (Country Elevator Survey). This represents a significant increase from

Table 5.2. Modal Shares for Washington Grain Movements, in Percent, 1983.

	Type of Shipper	
Mode/Rate	MCLF	Country Elevator
Single Car Rail	2.0	8.7
3/5/10 Car Rail	15.7	32.7
25/26 Car Rail	65.8	0.0
ALL RAIL	83.5	41.4
Truck-Barge	16.5	58.6
TOTAL	100.0	100.0

SOURCE: Casavant, Kenneth L. and Frank J. Dooley. Transportation Needs of Washington Agriculture, Phase II: Present and Future Needs. Department of Agricultural Economics, Washington State University, 1984.

August 1983, when it was found that only a minimal amount of grain was being transshipped (Casavant and Dooley). Obviously, the transshipment of grain is becoming an increasingly more vital link in the grain transportation system in Washington State.

The average distance of transshipping, i.e. 22.5 miles, is relatively short. What this suggests is that most of the hauling is taking place from country elevators to MCLFs within the same county, or to near-by counties. Logic dictates that county roads are more likely to feel the impact of this increased movement of grain by truck than are major state highways.

In sum, the longer hauls on specific roads to river elevators are experiencing less traffic. A corresponding increase in shorter hauls on local roads to multiple-car loading facilities is evident.

Table 5.3 Modal Shares for Washington Wheat Movements, in Percent, 1984.

Mode/Rate	Wheat	
	MCLF	Country Elevator
Single Car Rail	.4	1.9
3/5/10 Car Rail	8.7	25.3
25/26 Car Rail	89.5	
Other Rail[a]		3.3
ALL RAIL	98.5	30.5
Transshipment	0.0	22.6
Direct Truck	.7	7.8
Truck-Barge	.7	39.1
TOTAL	99.9	100.0

SOURCE: Country Grain Elevator Survey.

[a]Other rail for wheat is movements in 40 foot boxcars.

CHAPTER 6

THE ROAD SYSTEM

The Highway System

State vs. County Roads

In order to evaluate the types of roads that are most likely to be affected by shifts in the movement of grain, it is important to understand the system that is currently being used to delineate a state highway from a county road. By understanding these classifications, it can be determined which types of roads are going to feel the most pressure from shifts in grain traffic patterns. As the financial responsibility for upkeeping the state and county system lies within different jurisdictional boundaries, it is essential that these two different road systems be clearly defined. In 1977, a legislative study was conducted by the Washington State Department of Transportation "to develop uniform methods and procedures for designating and maintaining a logical and efficient state highway system" (p.1).[8] In particular, the study sought to develop criteria for determining whether or not a given road should be added to or deleted from the state highway system. While the findings from this research never became part of formal legislation, they are currently being used as a

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[8]Washington State Department of Transportation. State Highway Stem Criteria and Evaluation (Additions and Deletions). Prepared for the Legislative Transportation Committee, 1977 Legislative. Reprinted January 1984.

springboard for developing a comprehensive list of criteria for the classification of the state highway system.

The criteria established to determine what rural roads should be on the state highway system were largely outlined in the 1977 study. In 1984, the Road Jurisdiction Committee (RJC) modified and amended the list.[9] While still not part of formal legislation, the guidelines used to determine if a rural route should be considered a state highway are as follows:

I. A route will be designated as a state highway if it meets either of the following criteria:
   A. Is designated as part of the National System of Interstate and Defense Highways.
   B. Is designated as part of the system of U.S. Numbered Routes.

II. A route may be designated as a state highway if it is part of an integrated system of roads which connect places exhibiting one or more of the following characteristics:
   A. A population center of 1,000 or greater.
   B. Any area or aggregation of areas having a population equivalency of 1,000 or more such as, but not limited to, recreation areas, military installations, etc.
   C. A county seat (all county seats are now served by a state highway).
   D. A major commercial industrial terminal in a rural area (with population equivalency or 1,000 or greater).

III. Routes which provide a major cross connection between existing state highways may be designated as state highways.

In an effort to determine what state roads should be re-designated as county and vice-versa, the RJC also discussed several other points which are relevant to this study:

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[9]The RJC is comprised of 12 members: 4 from Washington DOT, 4 from County Associations, and 4 from City Associations.

1. Intra-State Truck Routes. Discussion on what constituted "continuous, non-seasonal heavy hauling" and "farm-to-market" led to an agreement that counties would decide which roads they recommended be on the State System and why. Likewise, WSDOT would identify those segments they feel should be added to the County system.

2. Traffic Counts. Members agreed that this should not be a criterion. The use of other factors which develop traffic is more appropriate.

3. Inter-County Routes. Members agreed that any road passing through or into more than one County should not be a state route per se. Other criteria should be used to determine the need for a state route. County and state members will list those for which they feel there should be a change in jurisdiction.

4. Access Roads to an Interstate Route From Other State Routes. Members agreed that there may be situations where considerable traffic might be required to travel over a county road to get from a state road to a nearby interstate interchange. County members will identify any roads that might fit this situation on county maps.

5. Railroad Abandonment. Members agreed that counties should identify on their maps roads they feel should be a state route based on railroad abandonment. The DOT does not feel this should be a sole criterion to use.

The process of systematically evaluating what constitutes a state route has been long and complicated. While there have been a number of additions to and deletions from the state highway system in the past, "in some cases this was done without benefit of any specific evaluation as to whether or not they [the roads] were of statewide benefit or interest" (WSDOT, 1977, p. 1). The development of strict criteria is a step toward standardizing the evaluation process.

Changes in road jurisdiction (i.e. state to county) are not merely a reclassification of routes on paper. Significant fiscal

impacts on the agency receiving jurisdiction can result (p. 2). The issue of the distribution of gas tax monies to the reclassified roads has not yet been addressed, but is the next topic that will be undertaken by the WSDOT.

Financial Aspects

Classification System

The State Highway System is essentially broken down into four categories: 1) interstates, 2) principal arterials 3) minor arterials, and 4) major collectors. Of these the first three are exclusively on the state system, while the latter--major collectors-- may be under the jurisdiction of the particular county.[10] County roads are likewise broken down into three classification categories: 1) major collectors, 2) minor collectors, and 3) rural local roads.

A list of rural county miles by functional classification was obtained for the study area counties, i.e. Grant and Lincoln counties, from the Washington Department of Transportation (Table 6.1). Given that both of these counties are largely rural the list essentially covers all roads therein.

From Table 6.1 it is clear that county roads constitute over 80 percent of the total miles in both Grant and Lincoln counties.

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[10]Approximately 1,000 major collectors are currently on the State System while 6,000 are on the County Road System.

Table 6.1. Rural County Miles by Functional Classification

County	Functional Classification	State Miles	County Miles	City Miles	TOTAL MILES
Grant	Interstate	48.39			48.39
	Principal Arterial				
	Minor Arterial	210.09			210.09
	Major Collector	3.66	354.00	7.25	364.91
	Minor Collector		547.93	4.44	552.37
	Rural Local		1,438.99	115.92	1,554.91
COUNTY TOTAL		315.91	2,340.92	127.61	2,784.44
Lincoln	Interstate	16.18			16.18
	Principal Arterial	59.07			59.07
	Minor Arterial	176.03			176.03
	Major Collector	41.58	323.44	4.15	369.17
	Minor Collector		272.30	3.27	275.57
	Rural Local		1,472.05	68.19	1,540.24
COUNTY TOTAL		292.86	2,067.79	75.61	2,436.26

It is logical to conclude that any change in traffic patterns, i.e. those brought about from the ramifications of rail deregulation or abandonment, are more likely to impact county roads than state roads (this implication is supported by the following Survey Results). As the county is responsible for the upkeep of these roads, the financial burden for these changes will rest within the county.

CHAPTER 7

ROAD IMPACTS

Elevator managers and agricultural producers were surveyed to evaluate what changes or problems existed in the industry. The surveys were designed to shed light on questions of road conditions, seasonality of shipments, and other aspects of the grain industry. For the elevator industry, the survey provided information concerning the size and nature of the industry, and a number of factors affecting the transportation sector. Many of these findings are reported elsewhere in this report. This section deals strictly with road-related findings.

Access roads to elevators were considered as one of the classifications of roads most likely to be impacted by transportation shifts in the industry. Elevator operators were asked specifically if they were experiencing any problems with state or county roads serving as access roads to their elevators. Slightly over one-half of those responding (51 percent) responded "no." Of the 39 percent who responded "yes," county roads were by far the most commonly mentioned area of problems. The state routes mentioned were: Route 17 in Douglas County; Routes 95 and 195 from the Palouse region to the Snake River ports; and Route 27 in Spokane County. A number of the operators simply mentioned "county," "all," "around all elevators," "winter road closures," or "weight limit or small bridges" in response to which roads were problem roads. Specific county roads mentioned were: the Palouse

to Pullman highway and the Almota grade in Whitman County; Mansfield Center City road in Douglas County; Harvey Shaw Road and Eureka North in Walla Walla County; and Valley Chapel and Martin Roads in Spokane County. Seven (17 percent) of the firms felt traffic would increase on the access roads leading to their elevators. Specific roads mentioned that would experience increased traffic were U.S. 2, SR 17 plus "county" roads in Douglas County, SR 95 (probably 195) and the Pullman or Colfax to Almota road in Whitman County, SR 12, SR 124, Harvey Shaw Road and Eureka North in Walla Walla County, and "all" (meaning all roads in the county) and Martin Road in Spokane County.

It was expected that seasonality of shipments from the elevators to final market should reflect export shipments from the Pacific Northwest as over 80 percent of all grain marketed in the Pacific Northwest is exported. It was not expected that any modal shifts of shipments to the export elevators from country elevators would affect seasonality of shipments. Elevator operators were asked to identify what percentage of grain shipped towards final market in a "typical year" fell into each of six, two-month marketing periods starting with July-August.

The results indicated a slightly higher percentage being shipped in the first three marketing periods than actual export marketing data suggest. But as can be seen from Table 7.1 there has been significant variability of the seasonality of export marketings during the past five years which would make it difficult to identify a "typical year." It is possible the higher than usual shipments from July to October in 1984, the time period

Table 7.1. White Wheat Inspections for Export (in percent).

	survey results	84/85	83/84	82/83	81/82	80/81	5 yr. avg.
Jul-Aug	18.6	20.8	11.3	13.8	16.9	12.1	14.8
Sep-Oct	28.1	21.4	20.8	18.8	20.1	17.8	19.7
Nov-Dec	20.1	17.4	22.6	20.1	14.8	15.6	17.9
Jan-Feb	17.2	17.7	15.3	20.6	15.5	18.1	17.4
Mar-Apr	10.6	13.1	15.9	16.1	16.5	22.3	17.1
May-Jun	10.9	9.5	14.2	10.6	16.3	14.2	13.2

SOURCE: USDA Grain Market News.

immediately preceding the survey, influenced the survey results. An average of all export marketings over the last five years shows a fairly even flow of grain to market throughout the year with a slight bulge in the fall and a drop off just prior to harvest.

Transshipments by elevator firms between elevators as identified earlier have increased significantly during the past year. While information concerning the seasonality of the transshipments of the elevator firms was not developed, it is reasonable to expect that they reflect the seasonality of shipments to final market. Because of the volume change documented earlier in rail and truck-barge, most of these movements are local. Given the seasonality described above these local transshipments are probably increasing heavy traffic on local roads during the winter and spring months. It is not possible to identify definitively what size of trucks are being used for these transshipments from the survey as only 19 percent of the firms truck shipments of grain were transported in firm owned or leased trucks. The remaining 81 percent were shipped in for-hire trucks. However, of the trucks

owned or leased by elevator firms, 37 percent are semi's, 14 percent are tandem axle, and 49 percent are single axle.

The study done by Washington State Department of Agriculture in 1983 identified 104,730,000 bushels of on-farm storage in the 15 major grain producing counties. This figure was significantly higher than that indicated by county assessment records or the USDA Agricultural Stabilization and Conservation Service records, leading to the conclusion the grain producers were increasing their on-farm storage faster than was expected. The study found that the increase in on-farm storage was a factor contributing to road deterioration as farmers would store the grain on-farm at harvest and then transport it to elevators throughout the year, ". . .often during periods of inclement weather and often in forty-ton semi's."

It was expected that the findings of the Department of Agriculture Study would give a good indication of the current situation in the pilot study area of Grant County and Lincoln County. It was expected that on-farm storage would lengthen the marketing season thereby increasing heavy truck traffic on roads throughout the year. The increased number of multiple-car loading facilities and the river ports would provide an enticement to farmers to truck their grain directly to these facilities rather than to local elevators. This enticement is potentially higher prices at MCLF's and river ports as these elevators operators pass on transportation savings in order to attract grain. This would add heavy truck traffic to the roads over a longer period of time but in addition would mean that farmers would be trucking over longer

distances with expected increased impacts to the road system. For these reasons, grain producers in the pilot area were surveyed to ascertain whether producers are making significant changes in their truck fleets, on-farm storage, seasonality of shipments from the farm to the elevators and/or subterminals, and to identify the road segments which are problems to farmers.

Contrary to expectations, producers have not increased truck size significantly. Eighty one percent of producer-owned or leased trucks were single axle, 15 percent were tandem axle, and 4 percent were semi's. Nearly all producers responding to the survey indicated they were not intending to upgrade their trucks with larger size trucks.

The average distance from the farm to the closest elevator was 6.5 miles and the farthest grain is shipped from the farm to an elevator (including shipments to the river) averaged 17.9 miles. Eleven percent of producers ship to a river port at an average distance of 84 miles. Over 53 percent of the producers ship to only one elevator and 31 percent ship to two elevators. If there has been a lengthening of distances farmers are trucking their grain, the above figures suggest any increases have been modest. If the modal shift from truck-barge to rail continues, we would be expect to see distances shipped shortening rather than lengthening. Producers continue to use elevators predominately in their local area so that the overwhelming percentage of tonnage is moving over local roads.

There was little indication that producers have continued to increase their on-farm storage and survey results indicate that

heavy seasonality of grain shipments from the farm to elevators or final markets holds. Farmers identified that they ship 74 percent of their grain from the farm during the July through October period (Table 7.2).

Table 7.2. Shipments from Farm to Elevator (in percent).

July-August	52
September-October	22
November-December	12
January-February	7
March-April	5
May-June	2

SOURCE: Producer Survey

The impact of on-farm storage on seasonality of shipments has probably been lessened by the depressed grain market experienced over the past three years. It is likely that much of the on-farm storage is used for long term storage of grain placed under loan in one of the government programs. The capacity of on-farm storage in place, as indicated by the Department of Agriculture study, is of sufficient size that if the market were to pick up or government programs were to change in a manner that freed up grain, the seasonality pattern of off-farm shipments identified in this study might change significantly.

Producers were also questioned about the general condition of the county roads in their area, whether road conditions had changed in the past 5 years, and specific road segments that needed improvement to meet their transportation needs. Over 77 percent indicated their county roads were in good or excellent

shape. However, 37 percent of those identifying their roads as being in good to excellent condition still named one or more specific road segments that needed improvement. Slightly over 50 percent stated the conditions of their roads had not changed in the past 5 years. About two-thirds of those identifying that their roads had changed felt their roads had deteriorated and one-third felt the condition of their roads had improved over the past 5 years. Nearly 45 percent of all respondents to the survey named road segments, a total of 568, segments which they felt needed improvement. Segments mentioned six more more times are listed in Table 7.3.

Table 7.3. Road Segments Needing Improvement in Grant(G) and Lincoln Counties(L).

Road Name	County	No. of Times Mentioned
Dodson	(G)	23
Adams	(G)	16
Harrington-Tokio	(L)	12
11 (NW, SE, SW)	(G)	12
Beverly Burke	(G)	10
Waukon	(L)	9
0 (NE, NW, SE, SW)	(G)	9
9 (NW, SW, E-W)	(G)	9
Wheeler	(G)	7
Stratford	(G)	7
Sherman	(L)	6
P (NW)	(G)	6

SOURCE: Producer Survey

In summary, the majority of elevator operators are not having problems with access roads to their elevators. Elevator transshipments are up significantly and with the modal shift identified

from truck-barge to rail, this indicates that most of this increased traffic is on local roads. This traffic is most likely spread throughout the year and will lead to increased impacts on local roads.

Producers on the whole feel good about the local road system although there are specific road segments that need improvement. Contrary to expectations, producers are not increasing on-farm storage at this time and the seasonality of shipments from the farm to elevator or market is still predominately in the months immediately following harvest. Farmers truck their grain modest distances and continue to predominately use those elevators closest to their farms. This situation is probably influenced by the depressed markets for grain and the fact that many farmers have placed their grain in government loan programs that keep grain in storage for periods of nine months to three years before it either enters the market or ownership is transferred to the government. Improvements in the market or changes in government programs could produce conditions that would lead to increased seasonality of grain movements from farm to market with the concomitant increased impact to the local road system.

INTERVIEW FINDINGS

County road officials in the surveyed counties, Grant and Lincoln, were informally interviewed in October 1985, to further test survey results and to determine officials' perceptions of the conditions of the roads in their respective counties. These counties, while we do not know how well their road maintenance

problems compare with other counties, are major grain producing counties. In particular, it was hoped to determine (a) what they felt the overall condition of the county road system is, (b) how much road structure is in need of major reconstruction, and (c) what factors could be contributing to the deterioration of roads.

Grant County

Grant County has a road system comprised of approximately 2500 miles. Of that total, 50 percent are paved and the other half are gravel. Grant County currently has 400 miles of county roads that could be considered structurally deficient. At a cost of $150,000-$200,000/mile, with present revenues it is impossible to reconstruct all roads in need of major improvement. While the county receives approximately $5.7 million ($2.7 million from local property taxes, $3.0 million from gas tax) for roads annually, $1800/county mile (or approximately $5.1 million) is spent each year on maintenance. This leaves approximately a half million dollars per annum for reconstruction. If forced to use only its own resources, then, Grant County would only be able to improve approximately two miles of road per year. With federal assistance money and the newly-formed Rural Arterial Program (RAP), it has been able to improve approximately ten miles annually. Clearly, the level of funding is still inadequate given the number of county-road miles that are currently in need of reconstruction.

Two major factors can be attributed to the large number of roads currently in need of reconstruction in this county:

(1) age, and (2) the presence of irrigated agriculture. Many of the roads in Grant County were built in the 1950s when irrigated agriculture first came to the area. In many cases, these roads were constructed without a sufficient structural base, and are now showing the effects of heavy use. A major problem with roads in irrigated areas is that water damages any existing structural base. The roads were not designed to withstand the pressure that the accumulation of run-off can put on a road surface. Almost every road project in the recent past has had surface drainage problems. Since 80 percent of the total county road miles are in irrigated areas, the problems related to water drainage affect almost the entire county system. Road reconstruction, in many cases, requires raising the level of the road above the existing water table. Reconstruction of this type is extremely costly.

The problems of obsolete roads and irrigated agriculture are compounded by the access to funds. When irrigated agriculture was introduced into Grant County, part of the agreement for receiving federal monies for irrigation development was that the infrastructural support would be provided by the county. While the county was able to borrow money from the state (on bonds), the loan was still the responsibility of the county. In fact, Grant County is still having some of its gas revenue share withheld to pay for loans taken out 30 years ago.

Lincoln County

Lincoln County has a county road system comprised of approximately 2100 miles. Of that total, 450 miles or about 21 percent

are paved. In general, the overall condition of the roads is good. Most construction projects are based on trying to bring heavy-traffic roads up to standards and to save the existing asphalt roads. Here, too, however, available funding permits the major reconstruction of only about 10 miles per year.

Major problems with the existing roads can be attributed to use and weather. There seems to be a concern about hauling oversize loads across the roads during the spring--the worst time of the year in regard to rapid road deterioration. In order to prevent some of the damage, roads are red-flagged and violation is monitored by the sheriff. If someone needs to haul a large load over a red-flagged road, he must get a permit to do so. The county then outlines the route that will be used. The truck must follow the given route and be off the road by 10:00 a.m., when the ground starts to thaw.

Overall, however, there have been no drastic changes in hauling since the deregulation of the railroads and no real changes in traffic flows are anticipated by officials in the county. While funds are limited, the county feels it is able to at least keep on top of maintenance problems as it owns heavy road equipment and therefore does not have to contract equipment for routine maintenance projects.

CHAPTER 8

FRAMEWORK FOR MONITORING

The deregulation of the rail industry is currently serving as a catalyst in the centralization of grain movements. While the impact of the Staggers Rail Act to date has not been as far-reaching as some earlier envisioned, this does not imply that changes in the movement of grain have not taken place. Nor does it imply that the transportation system has once again reached a point of equilibrium. Changes have occurred and will continue to occur, particularly if the economic climate for the marketing of agricultural commodities improves.

The road system has already been impacted by decisions made by shippers in reaction to changes that are taking place within the rail industry. For example, since 1983 Washington State has experienced a 20 percent increase in the amount of grain transshipped from county elevators to multiple-car loading facilities. The average distance of these transshipments is 22.5 miles. Short-hauls of this type have undoubtedly impacted county roads and in a pattern not previously anticipated.

Still, the continued building of multiple-car loading facilities is only one factor that must be monitored by highway specialists in determining future impacts to roads due to the deregulation of the railroad. Other decisions, made at the farm and firm level, and within the railroad industry itself, must be monitored closely. Of particular importance are: (a) on-farm storage,

(b) multiple-car loading facilities, (c) the age of elevators, (d) mergers and consolidations, and (d) potential abandonments. Each of these framework variables, with no priority assigned, will be explained briefly below, emphasizing the changes that have taken place since the Staggers Rail Act and changes that call for continual monitoring.

Framework Variables

On-Farm Storage

An increase in on-farm storage could alter the seasonality of grain movement. Surveys show that to date there has been little increase in the amount of on-farm storage. However, this situation could change.

If the amount of on-farm storage increases substantially and seasonal shifts do occur in the truck movement of grain, the impacts to county roads could be substantial. This is particularly true if a marked increase in spring shipping occurs. At that time of the year, unpaved roads are in their most fragile condition, freezing and thawing on a daily basis. This implies that county road officials will have to carefully monitor the building of on-farm storage and the resultant shifts in the seasonality of grain movement.

Multiple-Car Rates

There has been a steady increase in the number of multiple-car loading facilities (MCLF) in the State of Washington over the last four years. The lower rates offered at these facilities are

forcing elevator operators to reconsider their current shipment process. Many are already transshipping grain from outlying country elevators in order to take advantage of the discounted rates offered by MCLFs.

The growth in the number of multiple-car loading facilities has already been significant. County roads are already being affected by the increase in transshipping. If the economic climate changes, it is likely that Washington State will see even more MCLFs being built. Consequently, the transshipment of grain may increase considerably.

Highway officials must carefully monitor both the increase in the numbers of MCLFs, their locations, and their functions as a multiple-plant firm. With this information, predictions can be made as to what county roads will experience the greatest pressure from an increase in transshipping. Steps can then be taken to prevent the early obsolescence of those roads identified.

Age and Function of Elevators

On the average, county elevators in Washington State are 40 years old. If high-speed load out of grain becomes an increasing important variable to be considered (i.e. there is a favorable upsurging in the economic climate), elevator operators will have to choose between upgrading their presently aged facilities or transshipping to facilities that offer high-speed load out. In a multiple-plant firm, operators may choose to upgrade some of their facilities and maintain the others as storage. Either decision,

however, will lead to changes in the way grain is currently being transported. The resulting impacts to roads can be significant.

Mergers and Consolidations

In recent years, the number of mergers and consolidations of shipping firms has been minimal. Conditions in the industry have not been conducive to the building of large, highly efficient subterminals. While efficiencies of through-put may be gained through consolidation, the low turnover ratios (i.e. the large amount of storage) currently prevalent give little incentive to move toward larger firm size.

Again, if the economic climate changes, even to a pre-1980 level, and governmental storage dollars subsequently disappear, many of the individual firms may become financially stressed. At that point, Washington State could see a rapid increase in the number of mergers and consolidations occurring, resulting in more multi-plant firms. These mergers will serve to further centralize the shipment of grain, implying that a greater amount of grain will be transshipped from outlying facilities.

Potential Abandonments

Since 1980, 63 rail lines constituting slightly more than 1040 miles of track have been abandoned in the state of Washington. Due to this, many country elevators are currently without access to rail service. This has forced elevator operators to look for other transportation alternatives to shipping grain. Many have

already reacted by turning to trucks to haul grain to more distant elevators where rail service appears secure.

The abandonment of branch lines has not ended. As rail service becomes more centralized, elevator operators are left with little choice but to turn to trucks. As more and more lines are abandoned, the distance that will be covered by truck will undoubtedly increase.

The lines that are currently being considered for abandonment before the Interstate Commerce Commission are part of public documentation (see earlier discussion under Abandonment Procedures). Since very few petitions to abandon have been denied, highway officials should begin to plan for abandonment before service is cut off. By carefully monitoring potential abandonments, highway officials can more readily predict what roads will be affected if, indeed, abandonment is granted and more grain is subsequently hauled by truck. This monitoring will help to circumvent any problems that might arise due to an increase in transshipping. Continued discussion with railroad personnel and monitoring of light-density track segments will allow identification of potentially abandoned lines, even prior to the railroads' issuance of public statements.

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