Factors Influencing Transportation Decisions by Pacific Northwest Grain Shippers —a Survey

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FACTORS INFLUENCING TRANSPORTATION DECISIONS BY PACIFIC NORTHWEST GRAIN SHIPPERS--A SURVEY

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Summary and Conclusions

Rail transportation was used to some extent by 88% of the respondents to a 1978 survey of Pacific Northwest grain shippers. Seventy two percent of the shippers used a combination of truck-barge to ship wheat in 1977. The truck-barge share was 49% of the volume of wheat shipped, rail accounted for 28%, and truck alone for the remaining 23%. Owing to possible ambiguity in the survey questionnaire, some portions of the wheat reportedly shipped by truck alone may have been transferred to barges for final movement to Columbia River ports. Many shippers chose to ship by more than one mode, indicating that shippers recognize the existence of a choice among modes of transport. Also, the use of multiple shipment modes by a shipper may have been in response to capacity constraints of individual modes of transport.

Shippers ranked timely availability of rail cars, barges and trucks as their most important problem. Rail car shortages appeared to have equal impact on all sizes of shippers. Several individual respondents in Washington and Montana said they had extreme difficulty getting rail cars on a time. Montana shippers had to wait about a week longer than shippers in the other three states between the time of ordering and delivery of rail cars.

Information was also obtained on the storage capacity of the responding shipper. Commercial elevators in Washington and Idaho had more capacity than required for the 1977 crop year. However, production was below normal in 1977 because of a region-wide drought. The limited storage capacity of Montana elevators implies that these firms engage primarily in put-through activities and that on-farm storage is more common in Montana.

Information from the survey of shippers was used in a later study to estimate the sensitivity of choice of mode of shipment to alternative transport rates, transit time, and equipment availability. Results of this demand on market-share analysis will be published in a Washington State University Agricultural Research Center bulletin.

The following suggestions are offered as possible means of easing shipper problems. Rail car availability was by far the most often mentioned problem. The problem would be reduced by increasing the number of grain cars and

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more efficient use of available cars. Tax incentives to railroads designed to encourage investment in additional grain cars would be one approach to increasing car availability. Encouraging shipper cooperation in scheduling shipments by offering unit train rates or rate discounts would lead to a more efficient use of the available rolling stock.

There appears to be significant demand by shippers for increased storage at the river, particularly on the Oregon side of the waterway. While this seems to imply that some additional storage would be a viable investment, remember that the survey was made before the dramatic increase in the price of diesel fuel in 1979.

Introduction

Wheat shippers from the four Pacific Northwest states were surveyed in November 1978 to discover why and how much wheat was shipped by various transportation modes. The major objective of the survey was to gather data with which to estimate the demand for truck-barge transportation of wheat. Demand parameters were estimated in order to provide a consistent framework that could be used to evaluate some of the following issues concerning the future growth of wheat traffic along the Snake-Columbia River waterway:

1. Whether or not to spend additional public funds to upgrade or expand the capacity of the waterway, including lock and dam improvements, dredging, and public port development. That is, to improve the estimate of cost-savings benefits calculated as the impact on method of hauling, of potential rate decreases resulting from such improvements, and the subsequent effect on total transporation charges paid by shippers.

2. The impact of user charges assessed on waterway users and also the effect of higher diesel fuel prices on wheat shippers' choice of transportation mode. These impacts include the amount of increase in shipper's transportation costs for barge, truck, and rail shipments, and the extent of traffic diversion to rail, if any.

3. Whether or not there is a market for additional transportation services along the waterway, particularly grain storage.

In order to develop estimates of relevant demand parameters, information was obtained about the rate and quality of service differences among rail, truck, and barge shipments as perceived by wheat shippers in Washington, Oregon, Montana, and Idaho. This was done by surveying wheat shippers in the four-state area.

This circular presents the results of this survey. The implications of the resultant demand estimates will be discussed in a forthcoming publication.

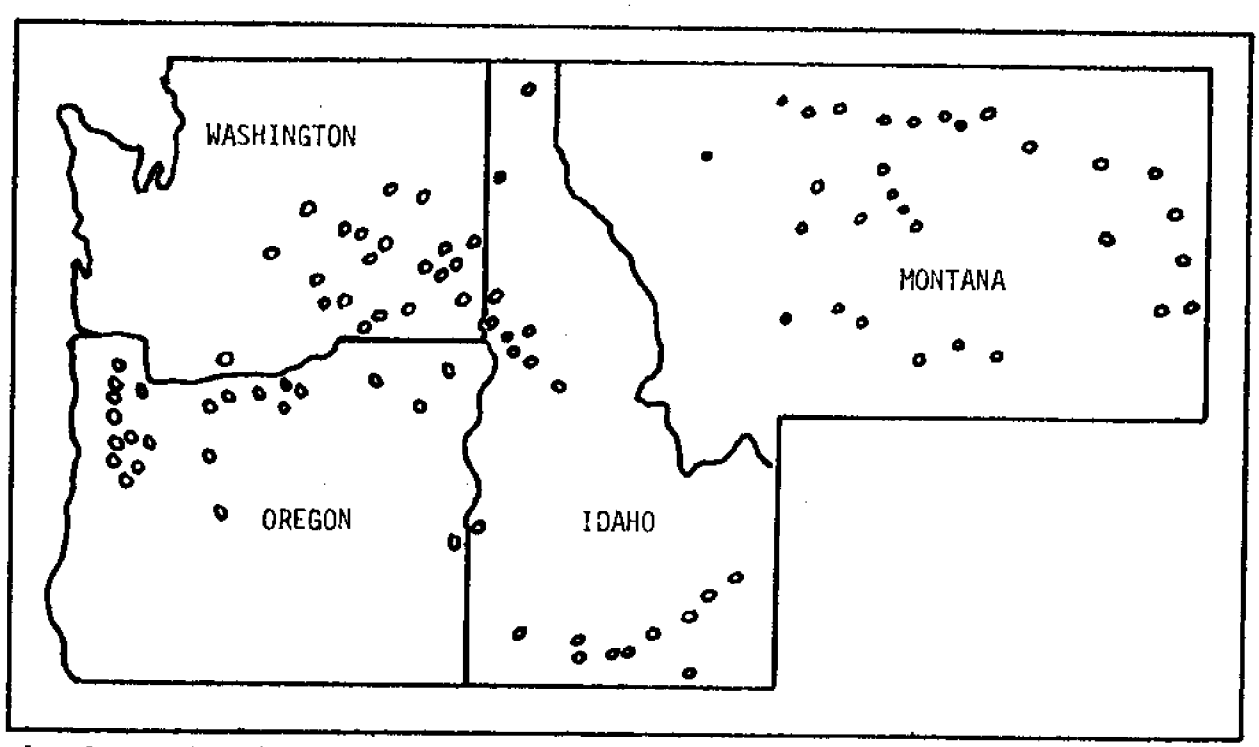
Questionnaire Construction and Survey Implementation

Various elevator managers in Whitman and Spokane Counties were interviewed to delineate the marketing channels for wheat and to identify those variables important in determining modal choice. Interviews were conducted with

managers of river subterminals and major grain buyers in the Portland, Oregon area to determine their influence on grain sellers' choice of transportation.

With this background, a questionnaire was developed to get information tion about rates, transit times, rail car availability, and storage costs. For this study, members of the Pacific Northwest Grain Dealers Association were considered the population of shippers in the Pacific Northwest. This definition excludes a significant number of shippers, but the Pacific Northwest was defined as the states of Washington, Oregon, Idaho, and Montana. The region was further divided into 60 homogenous production regions.[2] The locations of respondents are shown in figure 1.

A stratified random sampling approach was used in which each subregion represented a stratum. Several firms from each subregion were randomly selected and mailed questionnaires. After one follow-up letter was mailed to firms not responding to the initial survey, subregions from which no firm responded were resampled by randomly choosing from all firms in that subregion. This process was continued to insure at least one response from



1. Geographic distribution of Pacific Northwest wheat shippers surveyed in November, 1978.

2/ The production subregions were taken from Ken Casavant and Robert Thayer "Economics and Emerging Issues of Wheat Transportation in the Pacific Northwest." Circular 612, College of Agriculture Research Center, Washington State University, September 1978.

each production subregion. For statistical analysis, care was taken to insure that all members of the Pacific Northwest Grain Dealers Association in each subregion had an equal likelihood of being chosen.

Profile of Sampled Shippers

The sampled shippers varied widely in the amount of storage they had available and the amount of wheat shipped. The largest shipped 9.8 million bushels and the smallest shipped 16,600 bu; the average was 1.5 million bu shipped per respondent. Overall, the shippers included in the survey shipped 110.8 million bu of wheat between July, 1977 and July, 1978. The wheat production in the four-state area in 1976 was 440 million bu. Given the 60% response rate, the geographic representation in the sample, and the total amount of wheat shipped relative to total 1976 wheat production, survey responses were assumed to reflect the shipping environment of country wheat shippers in the Pacific Northwest.

It is important to note two sources of potential bias. First, the sample was stratified geographically rather than by size of shipper; therefore some subregions may not have a distribution of firms representative of the population. A related problem is that all the geographic subregions are weighted equally, even though some subregions ship far more wheat than others.

Second, not all shippers belong to the Pacific Northwest Grain Dealers Association. The assumption that they do excludes many wheat shippers from the analysis and limits the general application of the results.

The largest storage owned by a respondent was 9.3 million bu; the smallest was 45,000 bu. The storage and shipping behavior of respondents differed considerably by state. The distribution of shippers by the amount they shipped and stored for the four sizes of shipment and storage categories is shown in table 1.

In Oregon, the amount shipped and the available storage correspond quite closely. This indicates that elevator put-through was roughly equivalent to available elevator storage capacity for the size categories listed. Half of the shippers surveyed in Idaho had storage capacity greater than 1.0 million bu, while 80% of the shippers shipped less than 1.0 million bu. This indicates potential existence of excess capacity, although regional production for 1977 was depressed because of the drought. It should be stressed that elevators in northern Idaho tended to be different from those in southern Idaho, both in size and marketing patterns. Northern Idaho was dominated by large cooperative elevators and the south by smaller, privately owned elevators. Idaho elevators, at least in the north, may also do much more storage business than simple put-through activities.

Montana was at the other extreme of the spectrum. Eighty percent of the Montana elevators surveyed had storage capacity of less than 500,000 bu. Of the shippers, 61.1% made total shipments of less than 500,000 bu. Obviously, with more on-farm storage in Montana than in the other states surveyed, elevators were more interested in put-through activity than in storage.

Table 1. Percentage Distribution of Elevators by Quantity Shipped and Available Storage Capacity

State	Volume of Grain Shipped and Storage Capacity (000 bu.)			
	Under 500	500 to 1,000	1,000 to 5,000	Over 5,000
Oregon:				
% Distribution of Elevators by Quantity Shipped	53.3	20.0	26.7	0.0
% Distribution of Elevators by Storage Capacity	40.0	40.0	20.0	0.0
Idaho:				
% Distribution of Elevators by Quantity Shipped	33.3	46.7	20.0	0.0
% Distribution of Elevators by Storage Capacity	37.5	12.5	50.0	0.0
Montana:				
% Distribution of Elevators by Quantity Shipped	61.1	16.7	16.7	5.5
% Distribution of Elevators by Storage Capacity	80.0	10.0	10.0	0.0
Washington:				
% Distribution of Elevators by Quantity Shipped	18.2	27.3	31.8	22.7
% Distribution of Elevators by Storage Capacity	18.2	9.1	54.5	18.2
Total Region:				
% Distribution of Elevators by Quantity Shipped	41.6	26.7	23.8	7.9
% Distribution of Elevators by Storage Capacity	45.0	17.0	32.9	5.1

In Washington, over half the elevators surveyed had between 1.0 million-bu and 5.0 million-bu storage capacity. There appeared to be some excess capacity, but this may be a false impression caused by the low production in 1977. The considerable capacity of Washington elevators indicates that they engaged in the storage as well as put-through business, and presumably store grain other than wheat.

Although it is hard to generalize from such aggregate data, the survey indicates that on-farm storage may be more prevalent in Oregon and Montana than in Idaho and Washington. Storage charges varied somewhat throughout the region. The region-wide average storage charge at surveyed elevators for producer owned wheat was 2.0¢ per bu per month. Washington and North Idaho elevators, which had considerable storage capacity and seemed to do more storage, had an average charge of 1.5¢ per bu per month. Storage charges in Montana, where elevators engaged heavily in put-through activities, averaged close to 3.0¢ per bu per month. Monthly storage charges in Oregon averaged slightly more than 2.0¢ per bu.

Shipment Destination and Modal Choice

The quantity and mode of shipment of wheat to each of the major coastal markets of the Puget Sound area and Columbia River ports is summarized in table 2 and table 3. Table 2 shows the distribution by shipment size while table 3 has the distribution of the overall volumes of wheat shipped. The patterns of shipment vary considerably by state. Oregon, because of its location relative to the mouth of the Columbia River, shipped no wheat by truck and little by rail to Puget Sound ports. Truck-barge accounted for 49% of the wheat shipped (table 3) by Oregon shippers from July, 1977, to July, 1978. Truck (23%) and rail (28%) shipments to Columbia River ports accounted for the remaining traffic. Oregon respondents reported that the 49% truck-barge share of wheat traffic was the result of 26% of the shippers choosing to ship some portion of their wheat by this mode (table 2). In Oregon, 48% of the respondents shipped some of their wheat by rail (table 2). Roughly 60% of the respondents shipped less than 1.0 million bu, but more than 100,000 bu. These results show that rail was the most often used mode, but truck-barge was the dominant choice for the large volume shippers in Oregon. Wheat production in Oregon is concentrated in the central and eastern part of the state, reasonably close to the river, so truck-barge is a logical choice for volume shipments.

In Idaho, truck-barge was the dominant mode for wheat shipments to the Pacific Northwest tidewater ports in terms of volume. Truck-barge hauled 58.4% of the wheat, while rail accounted for 34.1%, and truck for 7.5% (table 3). In terms of choice of mode by shippers, 35.0% of the shippers shipped some wheat by truck-barge, 47.5% sent some by rail, and 17.5% shipped some by truck (table 2). As in the case of Oregon, many Idaho shippers chose to ship some wheat by rail, but the greatest volume went by truck-barge. Part of the explanation for this is that major production areas in northern Idaho are fairly close to the river.

Montana shippers used rail shipment much more than the other states surveyed, shipping 56.3% of their wheat by rail (table 3). They also shipped a much higher percentage to the Puget Sound (30.8%). Mainline service and greater

Table 2. Percentage of Shipments Made by Volume of Shipment by State

State of Origin:	Destination and Mode	Up to 100,000 bu.	100,000 to 1,000,000	Greater than 1,000,000 bu.	% Distribution of all Shipments
Oregon:	Puget Sound (PS) Truck	0.0	0.0	0.0	0.0
	PS Rail	3.7	0.0	0.0	3.7
	Columbia River (CR) Truck	11.1	11.1	3.7	25.9
	CR Truck-Barge	3.7	11.1	11.1	25.9
	CR Rail	7.4	37.0	0.0	44.4
	Total	25.9	59.2	14.8	100.0
Idaho:	PS Truck	5.0	0.0	0.0	5.0
	PS Rail	12.5	2.5	0.0	15.0
	CR Truck	7.5	5.0	0.0	12.5
	CR Truck-Barge	2.5	30.0	2.5	35.0
	CR Rail	12.5	20.0	0.0	32.5
	Total	40.0	57.5	2.5	100.0
Montana:	PS Truck	15.8	3.9	0.0	19.7
	PS Rail	17.1	3.9	0.0	21.0
	CR Truck	13.1	2.6	0.0	15.7
	CR Truck-Barge	13.2	5.2	0.0	18.4
	CR Rail	9.2	13.2	0.0	22.4
	Total	68.4	28.8	0.0	100.0
Washington:	PS Truck	0.0	2.1	0.0	2.1
	PS Rail	16.7	8.3	4.2	29.2
	CR Truck	0.0	0.0	0.0	0.0
	CR Truck-Barge	4.2	12.5	14.6	31.3
	CR Rail	4.2	25.0	8.4	37.6
	Total	25.1	47.9	27.2	100.0
Total Region:	PS Truck	7.3	2.1	0.0	9.4
	PS Rail	14.2	4.2	1.0	19.4
	CR Truck	8.4	3.7	1.0	13.1
	CR Truck-Barge	6.9	13.2	5.7	25.8
	CR Rail	9.4	21.2	1.6	32.2
	Total	46.2	44.4	9.3	100.0

Table 3. Percentage Distribution of Total Volume of Wheat Shipped by Method of Shipment by State

Mode	Oregon	Idaho	Montana	Washington	Total Region
Puget Sound (PS) Truck	0.0	0.4	14.7	0.8	2.0
PS Rail	0.3	4.8	16.1	12.4	7.0
Columbia River (CR) Truck	22.9	7.1	10.0	0.0	7.0
CR Truck-Barge	49.0	58.4	19.0	51.3	52.0
CR Rail	27.8	29.3	40.2	35.4	32.0
Total	100.0	100.0	100.0	100.0	100.0

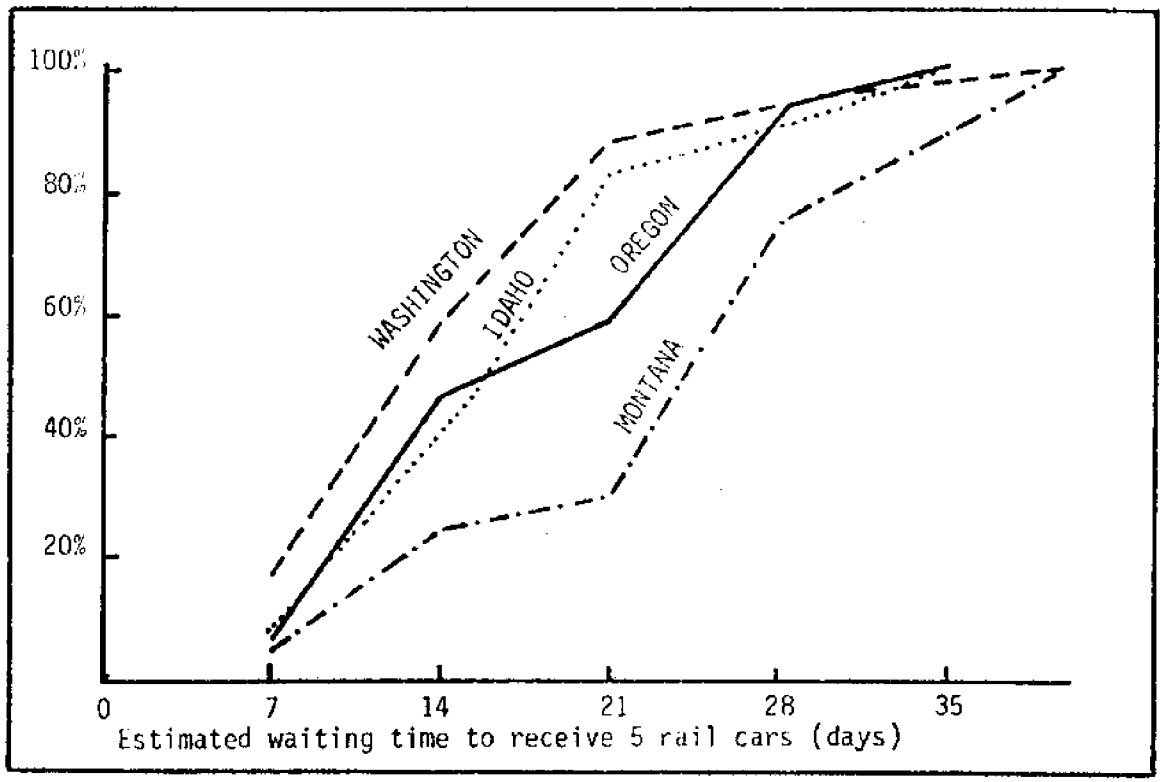
distance from the waterway probably explain this port choice. Many Montana shippers used all three modes to move wheat to both destinations. A large number of shippers shipped fewer than 100,000 bu. The significant use of more than one mode of transportation showed Montana shippers were willing to use long distance truck and truck-barge as alternatives to rail.

Washington shippers tended to ship in greater quantity than the other states. Of the shippers surveyed, 30% shipped more than 1.0 million bu during the year (table 2). This reflected the more highly concentrated system of country elevators in the state. Truck-barge shipments accounted for 51.3% of the volume shipped (table 3), although rail was the most often used mode. Rail was used to move at least some wheat by 66.8% of the surveyed shippers (table 2). Shippers rely on truck-barge for the majority of shipment volume because major Washington wheat growing areas are near the waterway.

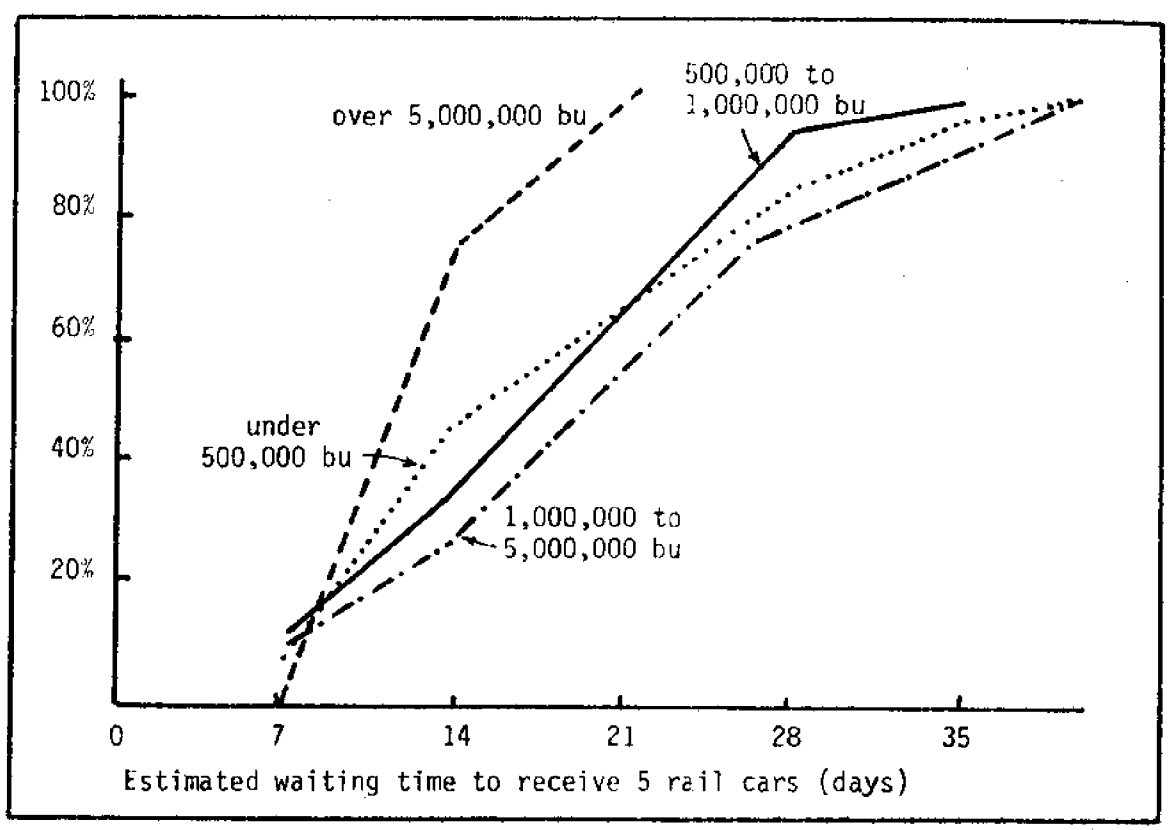
Looking at the Pacific Northwest as a whole, a majority of shippers used more than one mode of transportation. This implies that competition for wheat traffic existed and that capacity constraints on moving wheat during peak demand periods may exist.

Rail Car Availability

Owing to acute nationwide rail car shortages during most of 1978, a significant portion of the survey questionnaire was devoted to determining the experience of Pacific Northwest shippers with rail car shortages. Elevator manager estimates of the average number of days shippers were required to wait in order to receive 5 rail cars are illustrated in figures 2 and 3.



2. Percentage of shippers expecting to receive an order for 5 rail cars within a specified number of days, by state.



3. Percentage of shippers expecting to receive an order for 5 cars within a specified number of days,

The 5 rail-car level of equipment availability was selected as characteristic of a typical car order and to standarize question response. Figures 2 and 3 let one see whether there was a "discrimination" or major differences in the level of rail service among states or different size shippers.

The availability of rail cars, as measured by time from order to receipt, differed widely within states and often within subregions. Washington shippers were affected least and Montana shippers were affected most by rail car shortages. In Washington, 88.2% of the shippers estimated they would receive 5 rail cars in less than 21 days, while in Montana, only 35% would expect to receive 5 cars in less than 21 days. In Idaho, 83.3% of the shippers and 60% of Oregon shippers would expect to get 5 cars in less than 21 days. Part of the explanation for this difference lies in the location of Montana shippers. They tend to be more highly dispersed and are farther from final destination than shippers in other states. Although the data are quite aggregate and subject to sampling error, there is evidence that Montana shippers were more vulnerable to rail car shortages than shippers from other states.

Shipment size, on the other hand, did not appear to affect the availability of rail cars, except in the case of those who shipped more than 5 million bushels annually. Car availability appears to be neither worse nor better for smaller or bigger shippers. Overall, if discrimination existed in providing rail cars, it appeared to be based on location rather than size of shipper.

Location also influenced transportation reliability. The survey showed that 57% of the Montana respondents had been penalized for late delivery to tidewater ports, while only 14% of Washington respondents, 21% of Idaho respondents, and no Oregon respondents suffered such penalties. Transportation of Montana wheat apparently is more risky for shippers. This situation could increase the incentive for Montana shippers to diversify modal choice and move more wheat by truck and truck-barge. The extensive use of more than one mode by Montana shippers bears this out.

Transportation Problems Wheat Shippers Face

Shippers were asked what they thought were the two most important transportation problems of wheat shippers. Not surprisingly, the most often mentioned problem was rail car availability (67.5%), followed by barge availability (22.1%), truck availability (20.8%), weight discrepancies (14.3%), storage at the river (11.7%), and rail rates (11.7%). Although the same problems occur in all states, several problems seem to be more location specific (table 4). In Montana for instance, respondents had more problems getting enough trucks. Montana shippers also mentioned weight discrepancies more often. These discrepancies may be related to the longer hauls to market, which increase the possibility of loss and damage. Oregon shippers in particular lacked adequate river storage.

Table 4. Frequency of Respondents' Mentioning Specific Transportation Problems, by State

Problem	OR	ID	MT	WA	Region
	(percent)				
Rail car availability	57.1	68.8	66.7	73.9	67.5
Barge availability	28.6	37.5	4.8	26.1	22.1
Truck availability	7.1	12.5	38.1	21.7	20.8
Weight discrepancy	7.1	12.5	33.3	0.0	14.3
Storage at the river	35.7	6.3	0.0	13.0	11.7
Rail rates	14.3	12.5	19.0	4.3	11.7
Rail service	7.1	12.5	4.8	9.5	7.8
Rail equipment quality	0.0	0.0	4.8	13.0	5.2
Truck service	0.0	12.5	4.8	4.3	5.2