

**ALTERNATIVE METHODS AND COSTS OF
POSITIONING WHEAT PRODUCED IN
NORTH DAKOTA FOR EXPORT**

By

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ALTERNATIVE METHODS AND COSTS OF POSITIONING WHEAT PRODUCED
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Introduction

Hard red spring wheat and durum wheat, respectively, are the two highest valued crops produced in North Dakota in terms of total crop value. Collectively, they account for almost half of the value of all principal crops produced in the state (47 percent in 1981 and 51 percent in 1982). Value of wheat production in the U.S. and in North Dakota is becoming increasingly dependent on exports. From 1978 to 1982 over 40 percent of total wheat usage was attributed to exports while domestic use accounted for about 25 percent. The residual, about one-third of supplies, was in the form of end-of-year or carry-over stocks.

Since 1967 domestic use of wheat has increased 27 percent while production and exports have increased 114 percent and 138 percent, respectively. Annual growth rates from 1967 to 1982 were 1.5 percent for domestic use, 4.9 percent for production and 5.6 percent for exports. Since increases in production have historically been substantially larger than increases in domestic use, it is imperative that export markets be expanded in order to assure relatively low end-of-year stocks and high farm wheat prices.

It is difficult to quantify the direct and indirect benefits of grain exports to individual states, but states with large agricultural bases, such as North Dakota, undoubtedly benefit a great deal. From 1978 to 1982 farmers in North Dakota produced over 40 percent

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of the nation's hard red spring wheat and over 70 percent of the nation's durum wheat. During this same period 53 percent of hard red spring and 54 percent of durum production was exported. Based on the dollar value of these two crops from 1978 to 1982 (\$2.96 billion for HRS and \$1.86 billion for durum), about \$2.62 billion in gross farm income in the state can be attributed to wheat exports.

Problem Statement

Since a large proportion of North Dakota's farm income is generated both directly and indirectly from wheat exports it is important to explore the positioning of wheat produced in the state at export locations. There is a need for grain merchants to have the capabilities to move grain in a timely manner when importing countries express a demand for it. The ability to move the grain efficiently and expeditiously is largely dependent on potential routes and modes to various export regions in the United States.

Equally important is the cost of moving wheat to export points. Associated costs of shipping hard red spring produced in North Dakota affects how competitive it will be in export markets relative to other classes of wheat. Transportation costs may ultimately determine whether hard red spring is competitive in one export market and non-competitive in another. Hence, knowledge of associated costs of shipping wheat to potential export markets will be extremely beneficial to those individuals and groups concerned with the grain industry in North Dakota. This knowledge will be particularly useful in identifying potential new markets or expanding existing export markets.

Objectives


Producers, grain merchants, state and federal governments, and promotional agencies, among others, should be keenly aware of potential routes, modes,

and costs of grain transportation in order to rationally assess the complexities of positioning wheat produced in North Dakota for export. The main purpose of this paper is to explore alternative methods of positioning wheat produced in the state at export locations. Specific objectives are to:

1. Identify potential routes and modes which could be utilized to position wheat produced in North Dakota for export;
2. Develop and identify associated transportation costs of positioning wheat at export locations;
3. Define and identify specific charges associated with handling wheat at export locations; and
4. Describe the export port capabilities in terms of handling facilities and general port characteristics.

Procedure

There are four general areas from which wheat produced in North Dakota may be exported: (1) Great Lakes; (2) Pacific Northwest; (3) Gulf; and (4) Atlantic. Various routes and modes to these exporting areas will be examined. For example, wheat moving to the PNW may be moved by either truck or rail the entire distance or trucked to Lewiston, Idaho, and then transshipped to barge for subsequent shipment to Portland. Similarly, wheat moving to the Gulf may be railed the entire distance or else railed or trucked to an intermediate point and barged the remaining distance. This would typically include a truck or rail movement to Minneapolis/St. Paul with a corresponding barge movement to New Orleans. The existing rail network and navigable inland waterway system will be examined to determine possible rail and barge movements to export points. In addition, tariffs will be examined to ascertain the costs associated with moving grain via these modes. Independent truckers and shippers will be surveyed to identify current truck rates to various exporting regions. Figure 1 contains an illustration of 13 preliminary points from which grain may be either exported directly or positioned



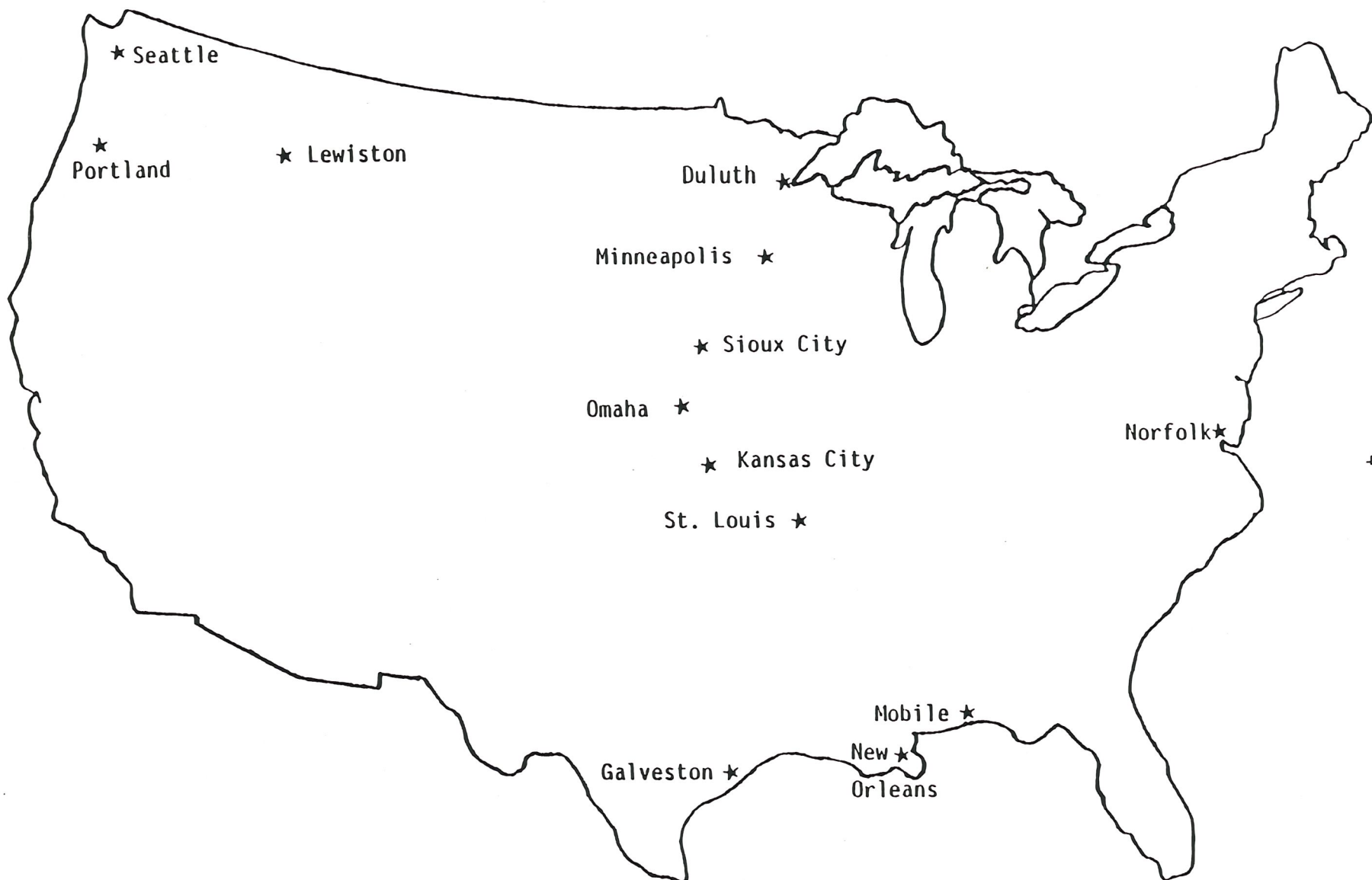


Figure 1. Location of Possible Points for Positioning Wheat Produced in North Dakota for Export.

for transshipment to export points. Data will be gathered on truck, rail and barge movements to these 13 points in order to identify routes and costs of placing wheat at export locations.

In addition, telephone interviews will be conducted with the various port authorities to ascertain exporting capabilities and general port characteristics. Data will be gathered on grain receiving and load out capabilities and port depths to determine the volume of grain that can be handled and the types and sizes of vessels that can be loaded at the various ports.

Production and Exports of HRS and Durum

Farmers in North Dakota traditionally produce a large proportion of the nation's hard red spring wheat and durum wheat. In the five crop marketing years 1978/79 to 1982/83, 43 percent of all U.S. HRS wheat and 73 percent of durum wheat was produced in North Dakota (Tables 1-3). The state traditionally ranks second behind Kansas in total wheat production. The state led the nation in wheat production in crop year 1981/82.

TABLE 1. PRODUCTION OF HARD RED SPRING WHEAT AND DURUM WHEAT, NORTH DAKOTA, 1971-83.

Year	HRS	Durum
	-----thousand bus.-----	
1971	207,711	82,063
1972	149,147	69,493
1973	169,675	69,575
1974	136,330	70,800
1975	156,315	104,940
1976	193,550	90,500
1977	167,000	60,515
1978	180,090	102,060
1979	165,095	84,500
1980	105,450	73,150
1981	197,400	130,790
1982	213,900	112,125
1983	135,000	54,325

Source: North Dakota Crop and Livestock Reporting Service, North Dakota Ag. Stats., 1980 and 1984.

TABLE 2. SUPPLY AND DISAPPEARANCE OF HARD RED SPRING WHEAT, UNITED STATES, 1971-83.

Year	Domestic Use						Exports			
	Production		Total Supply	Total	% of Production	% of Total Supply	Total	% of Production	% of Total Supply	Exports/ Domestic Use
	U.S.	N.D./U.S.								
	(mil. bu.)	(percent)	(mil. bu.)	(mil. bu.)			(mil. bu.)			(percent)
1971/72	366	57	512	133	36	26	104	28	20	78
1972/73	276	54	551	141	51	26	198	72	36	140
1973/74	328	52	540	208	63	39	245	75	46	118
1974/75	293	47	370	136	46	37	130	44	35	96
1975/76	327	48	431	185	57	43	160	49	37	86
1976/77	411	47	528	154	37	29	124	30	23	124
1977/78	398	42	649	158	40	24	156	39	24	101
1978/79	380	47	715	161	42	23	232	61	32	69
1979/80	363	45	684	182	50	27	217	60	32	84
1980/81	312	34	598	153	49	26	188	60	31	81
1981/82	468	42	726	172	37	24	206	44	28	120
1982/83	504	42	853	172	34	20	240	48	28	140

Source: USDA, Outlook and Situation, 1975-83.

TABLE 3. SUPPLY AND DISAPPEARANCE OF DURUM WHEAT, UNITED STATES, 1971-83.

Year	Production		Total Supply	Domestic Use			Exports			Exports/ Domestic Use (percent)
	U.S.	N.D./U.S.		Total	% of Production	% of Total Supply	Total	% of Production	% of Total Supply	
	(mil. bu.)	(percent)	(mil. bu.)	(mil. bu.)			(mil. bu.)			
1971/72	92	89	150	37	40	25	44	48	29	119
1972/73	73	90	142	32	44	23	65	89	46	203
1973/74	79	88	124	46	58	37	45	57	36	98
1974/75	81	87	114	41	51	36	47	58	41	115
1975/76	123	85	149	44	36	30	52	42	35	118
1976/77	135	67	190	57	42	30	41	30	22	72
1977/78	80	76	173	44	55	25	62	78	36	141
1978/79	133	77	201	44	33	22	72	54	36	164
1979/80	106	80	193	49	46	25	83	78	43	169
1980/81	108	68	171	52	48	30	59	55	35	113
1981/82	186	70	248	58	31	23	82	44	33	141
1982/83	151	74	260	50	33	19	70	46	27	140

Source: USDA, Outlook and Situation, 1975-83.

Exports of HRS and durum wheat topped 200 million bushels and 70 million bushels, respectively, four of the five crop years from 1978/79 to 1982/83. The proportion of HRS wheat exported since 1972/73 relative to that produced has ranged from a low of 30 percent in 1976/77 to a high of 75 percent in 1973/74. A low of 30 percent of durum production was exported in 1976/77 while a high of 89 percent was exported in 1972/73. In absolute terms, a high of 245 million bushels of hard red spring was exported in 1973/74 while a high of 83 million bushels of durum was exported in 1979/80.

Economic Significance of Exports

From crop year 1978/79 to 1982/83, 53 percent of the hard red spring wheat and 54 percent of the durum produced in the United States was exported. Based on these percentages and the value of North Dakota's production of durum and hard red spring (Table 4), about \$500 million annually in gross farm income in the state can be attributed to exports of these two crops. This amounts to roughly \$13,500 in gross income per farm per year or about 16 percent of total realized gross income per farm.¹ Export traffic also parlays additional income to grain merchandising firms and transportation companies. Without foreign markets, merchandising firms would handle lower volumes of grain and transportation companies would haul significantly lower quantities. Thus, grain exports not only affect the farming community, but also enhance the economic viability of other sectors of the physical distribution and marketing system.

¹Based on realized gross income of \$82,062 per farm (1981) as reported in North Dakota Crop and Livestock Reporting Service, North Dakota Agricultural Statistics, Ag Statistics No. 52, Fargo, North Dakota, June, 1983.

TABLE 4. VALUE OF HARD RED SPRING WHEAT AND DURUM
WHEAT PRODUCTION, NORTH DAKOTA, 1978-82.

Year	HRS	DURUM
---thousand dollars---		
1978	504,252	299,036
1979	582,785	372,645
1980	413,364	373,065
1981	710,640	457,765
1982	770,040	392,438

Source: North Dakota Crop and Livestock Reporting Service, North Dakota Agricultural Statistics 1983, Ag Statistics No. 52, Fargo, North Dakota, June, 1983.

HRS and Durum Exports by Region

Agricultural commodities produced in the U.S. are typically exported from five regions: (1) St. Lawrence Seaway, (2) Great Lakes, (3) Gulf, (4) Pacific, and (5) Atlantic (Figure 2). Historically, hard red spring and durum have not moved through export points on the Atlantic coast (Table 5). Since 1971 the Pacific coast has accounted for the largest share of hard red spring wheat exports followed by the Gulf and Great Lakes regions. In recent years (1977/78-1982/83) the Great Lakes region has accounted for the largest share of durum exports (over 40 percent). The Pacific coast emerged as a significant durum export region in 1976/77. Prior to that time the Pacific coast region accounted for less than 5 percent of all durum export inspections.

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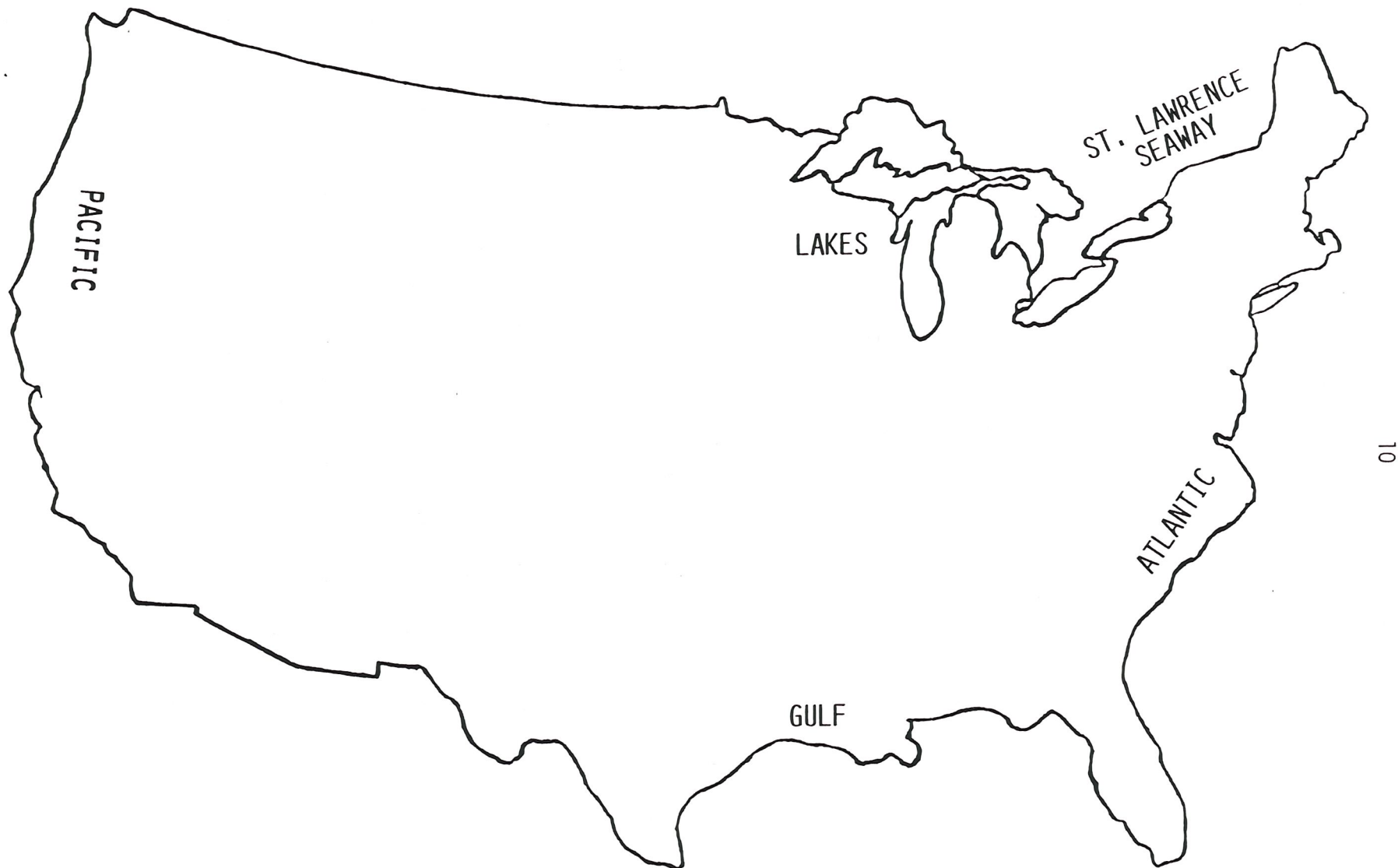


Figure 2. Major Grain Export Locations in the United States.

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TABLE 5. HARD RED SPRING WHEAT AND DURUM WHEAT EXPORT INSPECTIONS BY REGION, UNITED STATES, 1971-83.

Crop Year:	Region	HRS (000 bu)	Percent of Total U.S. Production	Durum (000 bu)	Percent of Total U.S. Production
1971-72:					
	St. Lawrence Seaway	8,576	8	6,942	16
	Great Lakes	19,624	19	15,365	35
	Atlantic	1,200	1	9,055	21
	Gulf	37,393	37	10,531	24
	Pacific	35,534	35	1,911	4
	Total	102,327	100	43,804	100
1972-73:					
	St. Lawrence Seaway	28,112	14	8,653	13
	Great Lakes	27,568	14	29,521	45
	Atlantic	22,907	12	12,250	19
	Gulf	50,081	26	12,520	19
	Pacific	66,156	34	2,017	3
	Total	194,824	100	64,961	100
1973-74:					
	St. Lawrence Seaway	46,663	22	16,571	34
	Great Lakes	24,831	11	10,089	21
	Atlantic	7,642	4	4,387	9
	Gulf	58,194	27	7,476	15
	Pacific	79,651	37	2,355	5
	Total	217,001	100	40,878	100
1974-75:					
	St. Lawrence Seaway	20,039	16	11,521	24
	Great Lakes	16,154	13	18,753	38
	Atlantic	745	1	4,776	10
	Gulf	41,476	33	12,538	26
	Pacific	47,700	38	1,280	3
	Total	126,114	100	48,868	100
1975-76:					
	St. Lawrence Seaway	20,152	13	10,400	20
	Great Lakes	30,731	20	27,718	55
	Atlantic	0	--	2,414	5
	Gulf	51,667	34	8,928	18
	Pacific	51,593	33	1,300	3
	Total	154,143	100	50,760	100
1976-77:					
	St. Lawrence Seaway	8,960	8	4,363	11
	Great Lakes	22,448	19	11,272	28
	Atlantic	0	--	17	1
	Gulf	36,769	31	10,128	26
	Pacific	48,994	42	13,863	35
	Total	117,171	100	39,626	100

(cont.)

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TABLE 5. HARD RED SPRING WHEAT AND DURUM WHEAT EXPORT INSPECTIONS BY REGION, UNITED STATES, 1971-83. (continued)

Crop Year:	Region	HRS (000 bu)	Percent of Total U.S. Production	Durum (000 bu)	Percent of Total U.S. Production
1977-78:					
	St. Lawrence Seaway	14,385	10	5,301	9
	Great Lakes	30,247	20	43,389	74
	Atlantic	555	1	247	1
	Gulf	40,730	28	4,426	8
	Pacific	62,184	42	5,036	9
	Total	148,101	100	58,399	100
1978-79:					
	St. Lawrence Seaway	32,817	15	7,491	11
	Great Lakes	74,893	33	45,254	69
	Atlantic	--	0	--	0
	Gulf	42,638	19	2,824	4
	Pacific	73,761	33	10,309	16
	Total	224,109	100	65,878	100
1979-80:					
	St. Lawrence Seaway	27,258	13	18,868	24
	Great Lakes	46,867	23	36,784	46
	Atlantic	--	0	--	0
	Gulf	47,516	23	16,268	21
	Pacific	83,957	41	7,390	9
	Total	205,598	100	79,310	100
1980-81:					
	St. Lawrence Seaway	33,099	19	8,567	17
	Great Lakes	31,066	18	20,541	40
	Atlantic	--	0	--	0
	Gulf	41,893	24	9,107	18
	Pacific	70,788	40	13,585	26
	Total	176,846	100	51,802	100
1981-82:					
	St. Lawrence Seaway	21,456	11	7,905	11
	Great Lakes	36,972	19	29,911	42
	Atlantic	--	0	--	0
	Gulf	54,872	28	13,326	19
	Pacific	84,341	43	20,083	28
	Total	197,641	100	71,225	100
1982-83:					
	St. Lawrence Seaway	22,312	10	4,776	9
	Great Lakes	34,773	15	26,864	53
	Atlantic	--	0	--	0
	Gulf	67,140	30	9,140	18
	Pacific	102,147	45	10,031	20
	Total	226,372	100	50,815	100

Historic North Dakota Wheat Movements

It is difficult to determine how much wheat produced in North Dakota is exported and how much is used domestically. Once grain is assembled at a given location origin is not easily distinguishable. Detailed data are available on first market destinations of grain moved interstate from North Dakota. These destinations include: (1) Minneapolis/St. Paul, (2) Duluth/Superior, (3) Pacific Northwest, and (4) Miscellaneous. Subsequent movements of wheat from first market destinations listed above may serve as proxies to how much wheat originating in North Dakota is exported and how much is used domestically.

During the three crop marketing years 1979/80 to 1981/82, 49 percent of hard red spring wheat shipments from North Dakota were to Duluth/Superior (DS) (Table 6). Minneapolis/St. Paul (MSP) received 23 percent of the shipments while 18 percent went to Pacific Northwest (PNW). Average shipments during the three year period were 72.2 million bushels to DS, 34.5 million bushels to MSP and 26.5 million bushels to PNW.

Duluth/Superior and MSP are also major first market destinations for durum shipments (Table 7). DS received 61 percent of durum shipments from 1979/80 to 1981/82 while MSP received 26 percent. One percent went to PNW while 13 percent went to miscellaneous markets.

Over 90 million bushels of wheat moved through MSP in 1979 (Table 8). The majority of the wheat was shipped to the Gulf for export (58.5 million bushels) with the remainder moving to various points for domestic use.

Terminal elevators located at DS handled 193.5 million bushels in 1979. Almost 70 percent went directly into the export market. New York received a considerable share (26 percent) of the total for use domestically. Virtually all wheat moving through PNW port elevators went directly into




TABLE 6. NORTH DAKOTA HARD RED SPRING WHEAT SHIPMENTS BY DESTINATION

Year	Minneapolis-St. Paul	Duluth-Superior	Pacific Northwest	Misc. Markets	Total
	(thousand bu.)				
1974-75	35,485 (29%)	54,419 (44%)	17,713 (14%)	15,317 (12%)	122,934 (100%)
1975-76	32,855 (24%)	74,467 (53%)	17,788 (13%)	14,253 (10%)	139,363 (100%)
1976-77	38,230 (31%)	53,419 (43%)	16,675 (13%)	15,651 (13%)	123,975 (100%)
1977-78	28,199 (22%)	65,832 (51%)	21,502 (17%)	12,402 (10%)	127,953 (100%)
1978-79	28,846 (16%)	108,717 (59%)	34,818 (19%)	12,542 (7%)	184,923 (100%)
1979-80	44,031 (26%)	76,887 (45%)	31,377 (19%)	17,278 (10%)	169,573 (100%)
1980-81	27,981 (22%)	62,608 (50%)	23,074 (18%)	12,453 (10%)	126,116 (100%)
1981-82	31,584 (21%)	77,113 (52%)	25,325 (17%)	14,146 (10%)	148,168 (100%)
1979/80-1981/82 Average	34,532 (23%)	72,203 (49%)	26,592 (18%)	14,626 (10%)	147,952 (100%)

TABLE 7. NORTH DAKOTA DURUM SHIPMENTS BY DESTINATION.

Year	Minneapolis-St. Paul	Duluth-Superior	Pacific Northwest	Misc. Markets	Total
(thousand bu.)					
1974-75	19,455 (28%)	40,728 (59%)	847 (1%)	7,751 (11%)	68,781 (100%)
1975-76	14,905 (20%)	51,553 (69%)	434 (1%)	7,925 (11%)	74,817 (100%)
1976-77	17,024 (26%)	35,537 (55%)	1,636 (3%)	10,827 (17%)	65,024 (100%)
1977-78	16,478 (19%)	61,990 (70%)	1,339 (2%)	8,559 (10%)	88,366 (100%)
1978-79	18,797 (21%)	60,973 (69%)	1,545 (2%)	7,345 (8%)	88,660 (100%)
1979-80	26,712 (28%)	57,379 (61%)	1,506 (2%)	8,985 (9%)	94,582 (100%)
1980-81	15,046 (24%)	38,502 (61%)	483 (1%)	9,160 (14%)	63,191 (100%)
1981-82	19,768 (24%)	49,242 (60%)	621 (1%)	12,250 (15%)	81,881 (100%)
1979/80-1981/82 Average	20,509 (26%)	48,374 (61%)	870 (1%)	10,132 (13%)	79,885 (100%)

TABLE 8. MINNESOTA TERMINAL ELEVATOR WHEAT SHIPMENTS TO OUT-OF-STATE DESTINATIONS, 1979.

Origins	Gulf	Export	New York	Pennsylvania	East ² (000 bushels)	Nebraska	Ohio	Unknown ³	Total
Twin Cities ¹ :									
Rail	5,333	--	9,645	3,228	10,955	171	--	3,667	32,999
Truck	--	--	--	--	--	--	--	--	--
Barge	53,192	--	--	--	--	--	--	4,964	58,156
Sub Total	58,525	--	9,645	3,228	10,955	171	--	8,631	91,155
Duluth/Superior:									
Rail	3,249	--	8,358	--	3,091	--	--	1,056	15,754
Truck	--	--	--	--	--	--	--	--	--
Vessel	--	132,846	42,160	--	--	--	2,010	741	177,757
Sub Total	3,249	132,846	50,518	--	3,091	--	2,010	1,797	193,511
Total:									
Rail	8,582	--	18,003	3,228	14,046	171	--	4,723	48,753
Truck	--	--	--	--	--	--	--	--	--
Water	<u>53,192</u>	<u>132,846</u>	<u>42,160</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>2,010</u>	<u>5,705</u>	<u>235,913</u>
TOTAL	61,774	132,846	60,163	3,228	14,046	171	2,010	10,428	284,666

¹Includes terminal elevators in Red Wing and Winona.

²Shipments to locations east of the Mississippi River.

³Shipments to unknown locations outside Minnesota.

Source: Alley, Mike J., Jerry Fruin, Chuck Eldridge, Minnesota Grain Movements 1979, ER 82-1, University of Minnesota, February, 1982.

export markets.² Over 350 million bushels of wheat was exported from Astoria and Portland, Oregon, and from Kalama, Longview and Vancouver, Washington in 1982.

Interior Water Transportation

Barge shipments of wheat take place on five primary river systems: (1) Mississippi, (2) Missouri, (3) Illinois, (4) Ohio and (5) Snake/Columbia. The Mississippi and Snake/Columbia River Systems traditionally account for roughly one-half and one-third of all wheat barge movements, respectively (Table 9). Barges moved over 500 million bushels of wheat in each of the past two seasons (1981-82 and 1982-83).³ Combined movements on the Mississippi and Snake/Columbia River Systems accounted for over 80 percent of all barge shipments since 1976-77.

Barge Capacity

Much of the current barge fleet, like the rail fleet, has been in surplus. However, occasional spot equipment shortages occur. Total capacity on the Mississippi River System⁴ was roughly 600 million bushels in 1983. Capacity on the Snake/Columbia River System was about 7.5 million bushels (Table 10). Roughly 2 billion bushels of grain was shipped annually in barges during the 1981-82 and 1982-83 crop marketing years on the Mississippi River System.⁵ Barge capacity, therefore, must be turned-over 3.5 times per year in order to transport

²Port of Portland, The Columbia-Snake River System Ports Directory, 1981.

³Barge seasons run from April 1 to March 31 of the following year.

⁴Includes Mississippi, Missouri, Illinois and Ohio rivers.

⁵USDA, AMS, Grain and Feed Market News, April 8, 1983.

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TABLE 9. BARGE SHIPMENTS OF WHEAT, INTERIOR RIVER POINTS, 1976-77 TO 1982-83.

Year ^a	Mississippi	Missouri	Illinois	Ohio	Snake/Columbia	Total
-----thousand bushels-----						
1976-77	150,990 (45%)	26,362 (8%)	18,738 (6%)	20,342 (6%)	116,377 (35%)	332,809 (100%)
1977-78	164,327 (46%)	28,596 (8%)	18,215 (5%)	23,469 (7%)	123,331 (34%)	358,138 (100%)
1978-79	112,278 (38%)	31,451 (11%)	2,458 (1%)	11,271 (4%)	141,532 (47%)	299,000 (100%)
1979-80	136,089 (40%)	35,772 (11%)	8,574 (3%)	10,713 (3%)	150,354 (44%)	341,502 (100%)
1980-81	200,951 (44%)	31,192 (7%)	16,135 (4%)	33,606 (7%)	178,231 (39%)	460,115 (100%)
1981-82	250,234 (46%)	25,078 (5%)	23,915 (4%)	67,938 (125)	179,150 (33%)	546,315 (100%)
1982-83	261,926 (50%)	24,460 (5%)	15,274 (3%)	56,983 (11%)	162,259 (31%)	520,902 (100%)

^aFrom April 1, to March 31.

Source: USDA, AMS, Grain and Feed Market News, Washington, D.C., 1976-83.

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that quantity of grain. A conservative average of loaded barge trips is about seven per year.⁶ Hence, considerable overcapacity exists on the Mississippi River System.

TABLE 10. COVERED HOPPER BARGE FLEET CAPACITY, BY RIVER SYSTEM, 1983.

River System	Units	Capacity (000 bushels)
Mississippi	12,000	599,000
Snake/Columbia	74	7,326

Source: Personal communications with officials from Consolidated Grain and Barge Company (Mississippi River System) and Knappton Corporation (Snake/Columbia River System), July, 1983.

The 74 barges operating on the Snake/Columbia River System typically make about three trips per month.⁷ Based on average payloads of these barges (about 100,000 bushels) and average transit times (about 10 days) these 74 barges could haul about 270 million bushels of grain annually. Excess barge capacity is apparent on the Snake/Columbia River System because wheat shipments, which normally comprise about 90 percent of the annual barge movements, have never exceeded 180 million bushels.

Rail Transportation

Rail transportation is extremely important to North Dakota with respect to grain marketing. Railroads hauled over two-thirds of the state's interstate grain shipments to various market destinations from 1981 to 1984.⁸ The state is served by two primary railroads, Soo Line and Burlington Northern (BN). BN typically handles about two-thirds of total rail grain shipments from the state in any given year.

⁶Gladwell, David M., "The Barge Freight Call Session of the Merchants Exchange of St. Louis: An Innovation in Transportation Pricing," Transportation Journal, Fall 1980.

⁷Knappton Corporation, op. cit.

⁸Ming, Dennis R. and Randy Dick, North Dakota Grain and Oilseed Transportation Statistics, 1983-84, UGPTI Rpt. No. 56, Upper Great Plains Transportation Institute, North Dakota State University, Fargo, North Dakota.

The rail system in North Dakota was constructed so that it proportionately serves areas where most of the grain production occurs. Grain production is generally highest in the eastern part of the state and this is depicted by the preponderance of rail lines situated there (Figure 3). Both carriers (BN and Soo) operate on a network of main and branch lines with the majority of trackage consisting of branch lines (about 67 percent). Since both BN and Soo Line are Class I railroads they are able to logistically penetrate most major wheat markets, both domestic and export, of importance to North Dakota.

Truck Transportation

Independent truckers provide essential service to many grain producing areas in North Dakota. Certain sections of the state rely totally on motor carriers to haul grain to market. Trucks exist in other areas as economic competitors of railroads and provide some degree of inter-modal competition.

Truckers hauled slightly more than one-third (36 percent) of North Dakota's grain and oilseed shipments to first market destinations from 1979/80 to 1981/82.⁹ Their market share has been declining in recent years (from 41 percent in 1978/79 to 31 percent in 1981/82), but motor carriers remain as significant haulers of grain from the state. Generally, motor carriers are competitive with railroads in short-haul markets and in longer haul markets when backhaul opportunities exist. Trucks become less competitive with rail transportation when these two elements are lacking.

Modal Costs of Transporting Wheat from North Dakota

The purpose of this section is to describe potential routes, methods and costs of moving wheat produced in North Dakota to export location. The

⁹Ming, op. cit., p. 9.

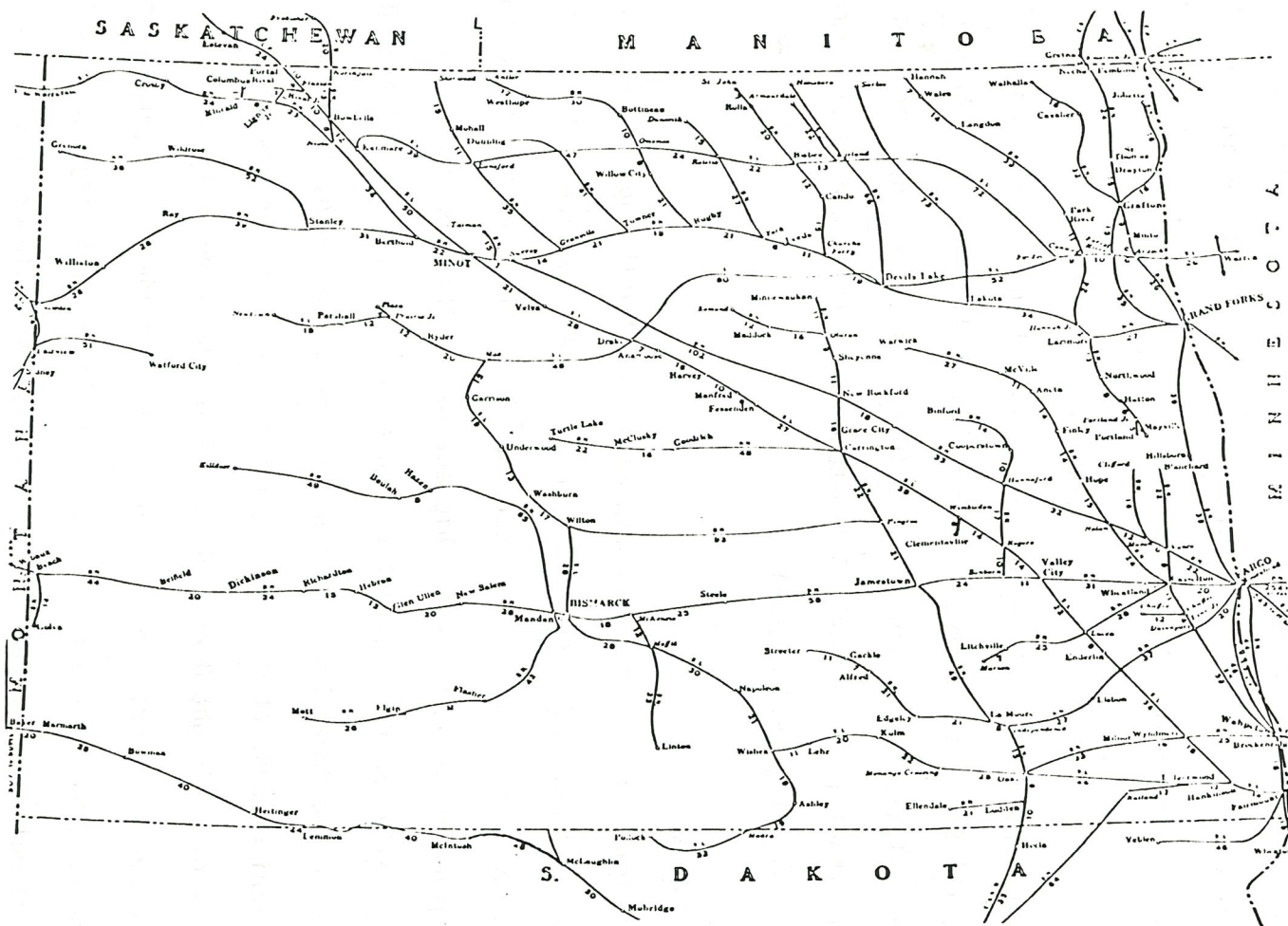


Figure 3. Railroad System in North Dakota.

Source: Rand McNally and Company, Handy Railroad Atlas of the United States, 1982.

descriptive analysis includes both existing and potential transportation networks that link the state with various export outlets. In addition, costs of positioning wheat at the various export regions is detailed. Eight origins depicting alternative geographic locations in the state are included in the analysis (Figure 4).


Export Regions

Four primary export regions are examined in this section: (1) Great Lakes, (2) Pacific Northwest, (3) Gulf, and (4) Atlantic. Ports included in the analysis are Duluth/Superior (Great Lakes region), Portland and Seattle (Pacific Northwest), Galveston, New Orleans and Mobile (Gulf region), and Norfolk (Atlantic region).

Great Lakes

Shipment of wheat from North Dakota to Duluth/Superior (DS) is typically accomplished by direct rail or truck service. The close proximity of the port to the state precludes the need to ship grain to a given location for transshipment to Duluth/Superior. Thus, DS is typically the first market destination for grain shipped from North Dakota to the Great Lakes region for export. As such, costs of positioning wheat at DS will consist of either rail rates or truck rates from the eight North Dakota origins depicted in Figure 4.

Generally, three freight rates exist for wheat shipments from North Dakota origins to Duluth/Superior: (1) truck, (2) single car rail, and (3) multiple car rail. Additionally, multiple car rates are segmented into alternative levels of service such as 3-car, 26-car, 52-car, etc. Truck rates generally follow single-car rail rates and occasionally are competitive with multiple car rail rates.



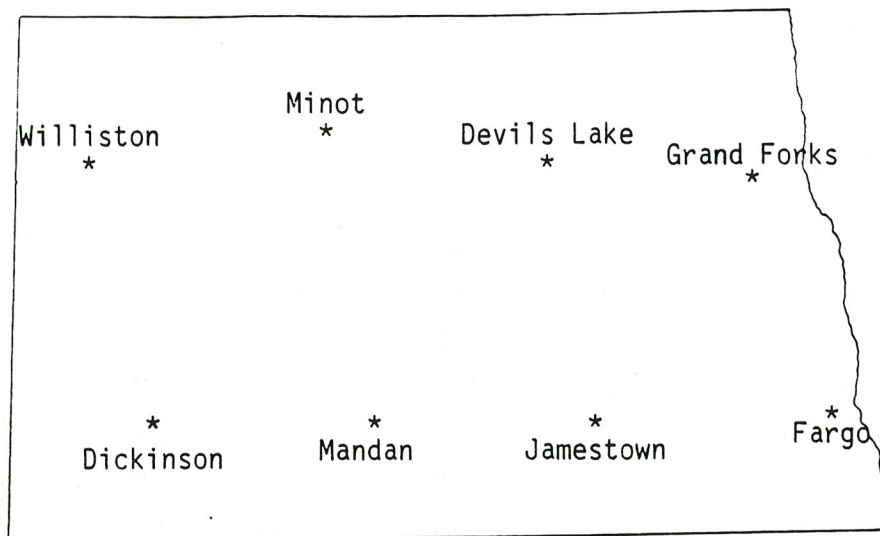


Figure 4. Geographic Location of Eight North Dakota Grain Shipping Origins.

Rail and truck rates for wheat were collected from eight North Dakota origins to Duluth/Superior. Rail rates in effect in July, 1983 included single-car, 3-car, 26-car single origin (26 S.O.) and 52-car (Table 11). Savings associated with 52-car shipments relative to single-car shipments varied from a low of 14 percent from Williston to a high of 29 percent from Grand Forks. This difference is due to the level of the rates and not the absolute difference in the spreads.

Generally, truck rates from the eight origins were competitive with 26-car rates (Table 11). However, trucks were competitive with the 52-car rail rate in two instances (from Williston and Minot). The truck rate from Williston was \$1.25/cwt. while the 52-car rail rate was \$1.33/cwt. Minot had a \$1.00/cwt. truck rate and a \$1.02/cwt. 52-car rate.

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TABLE 11. TRUCK AND RAIL RATES FOR WHEAT FROM SELECTED NORTH DAKOTA ORIGINS TO DULUTH/SUPERIOR DESTINATIONS, JULY 1983.

Station	RATE				
	Truck	Single-Car	3-Car	26-Car	52-Car
	-----¢/cwt.-----				
Williston	125	155	151	139	133
Dickinson	110	122	118	107	102
Minot	100	122	118	107	102
Mandan	100	102	99	88	83
Devils Lake	80	90	86	77	72
Jamestown	80	83	79	69	64
Grand Forks	60	73	66	58	52
Fargo	60	68	65	55	50

Pacific Northwest

Wheat shipped from North Dakota to the Pacific Northwest (PNW) is typically moved directly by truck or rail service to export points or trucked to Lewiston, Idaho for transshipment to barges on the Snake/Columbia River System. Railroads accounted for the greatest share of movements from 1979/80 to 1981/82, capturing 60 percent of the shipments (Table 12). Trucks, generally not considered to be competitive with rail in long-haul markets, carried 40 percent of the wheat to PNW destinations.

Rail Rates. Rail rates for wheat from North Dakota origins to PNW destinations are primarily for four levels of service: (1) single-car, (2) 26-car multiple origin, (3) 26-car single origin, and (4) 52-car (Table 13). With the exception of the western fringe of the state, wheat rail rates from North Dakota to PNW are, by definition,

"blanket rates". That is, one group-rate generally applies throughout the state (or over a portion of the state) for a given level of service. Figure 5 depicts the approximate area of North Dakota for which blanket wheat rates applied in July 1983. The area east of the line indicates the approximate portion of the state for which blanket rates apply. Point-to-point rates apply in the area west of the line. Point-to-point rates are defined as rates that specify a specific origin and a given destination.

TABLE 12. SHIPMENTS OF HARD RED SPRING AND DURUM WHEAT FROM NORTH DAKOTA TO PACIFIC NORTHWEST DESTINATIONS, BY MODE, 1979-80 TO 1981-82.

Year	HRS		DURUM		TOTAL	
	Rail	Truck	Rail	Truck	Rail	Truck
	-----thousand bushels-----					
1979-80	19,337 (62%)	12,040 (38%)	1,254 (83%)	252 (17%)	20,591 (63%)	12,292 (37%)
1980-81	12,444 (54%)	10,630 (46%)	353 (73%)	120 (27%)	12,797 (54%)	10,760 (46%)
1981-82	15,709 (62%)	9,616 (38%)	443 (71%)	177 (29%)	16,152 (62%)	9,793 (38%)
Average	15,830 (60%)	10,762 (40%)	683 (79%)	186 (21%)	16,513 (60%)	10,948 (40%)

Point-to-point rail rates for wheat shipments to PNW exist for Williston and Dickinson (Table 13). Both cities are located west of the line depicted in Figure 5. The remaining six origins all have the same rate for a given level of service; \$2.30/cwt. for single-car, \$2.18/cwt, for 26-car multiple origin, \$1.97/cwt. for 26-car single origin and \$1.82/cwt. for 52-car service. These six origins are located east of the line shown in Figure 5.

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TABLE 13. RAIL RATES FOR WHEAT FROM SELECTED NORTH DAKOTA ORIGINS TO PACIFIC NORTHWEST DESTINATIONS, JULY 1983.

Station	RATE			
	Single-Car	26-Car M.O. ^a	26-Car S.O. ^b	52-Car
	----- ¢/cwt. -----			
Williston	216	204	185	169
Dickinson	220	205	187	172
Minot	230	218	197	182
Mandan	230	218	197	182
Devils Lake	230	218	197	182
Jamestown	230	218	197	182
Grand Forks	230	218	197	182
Fargo	230	218	197	182

^aMultiple Origin Rate (2-4 Origins)

^bSingle Origin Rate

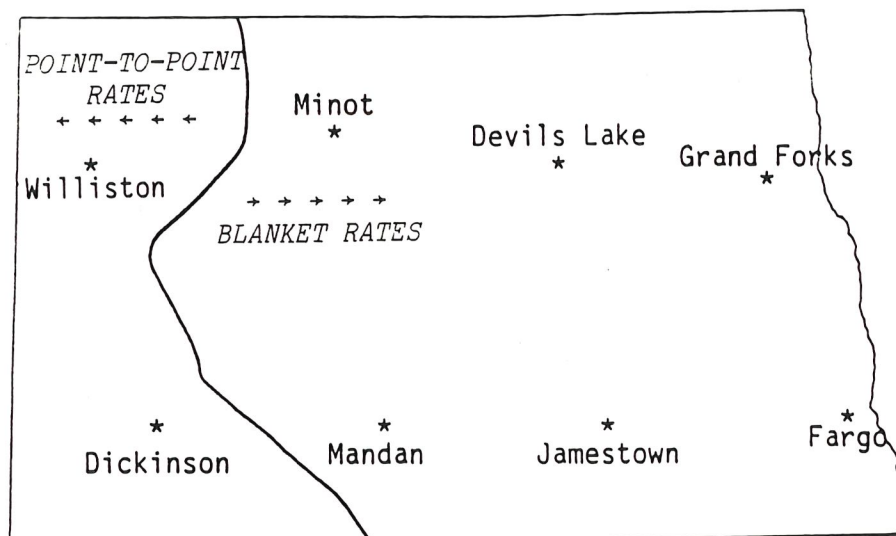


Figure 5. Approximate Areas of North Dakota for which Point-to-point and Blanket Wheat Rates to Pacific Northwest Exist.

Truck Rates. Truck rates for wheat, in effect in July 1983, to Lewiston and Portland generally were competitive with 26-car single origin rail rates. Rates for trucking grain from various North Dakota cities to selected destinations are presented in Table 14. Rates from Williston and Dickinson were 5 cents and 3 cents per cwt. higher than respective 26-car single origin rail rates. Truck rates from Minot and Mandan were 2 cents per cwt. lower than the 26-car single origin rate. Motor carriers are generally unable to compete with 52-car rail rates. However, in certain instances truckers have been able to haul wheat from North Dakota to PNW at rates competitive with 52-car rail rates.¹⁰

TABLE 14. TRUCK RATES TO VARIOUS DESTINATIONS FROM SELECTED NORTH DAKOTA ORIGINS, 1983.

Origin	Destination			
	Duluth/ Superior	Lewiston	Portland	Minneapolis
Williston	125	145	190	115
Dickinson	110	145	190	90
Minot	100	150	195	90
Mandan	100	150	195	80
Devils Lake	80	--	--	80
Jamestown	80	--	--	70
Grand Forks	60	--	--	60
Fargo	60	--	--	60

Source: Personal communication with personnel at Harvest States Cooperatives, Regional Office, Minot, North Dakota.

Barge Rates. The Columbia/Snake inland waterway system (Figure 6) provides a vital link in the transportation of wheat between North Dakota

¹⁰For example, one subterminal elevator manager reported trucks hauling wheat at rates that were equal to the 52-car rail rate in the fall of 1982. It was reported that independent truckers were "backhauling" grain to PNW and "fronthauling" lumber into the state. Minimizing empty runs is generally thought to be a prerequisite in order for grain trucks to be competitive with railroads in long-haul markets and/or with multiple car grain rates.

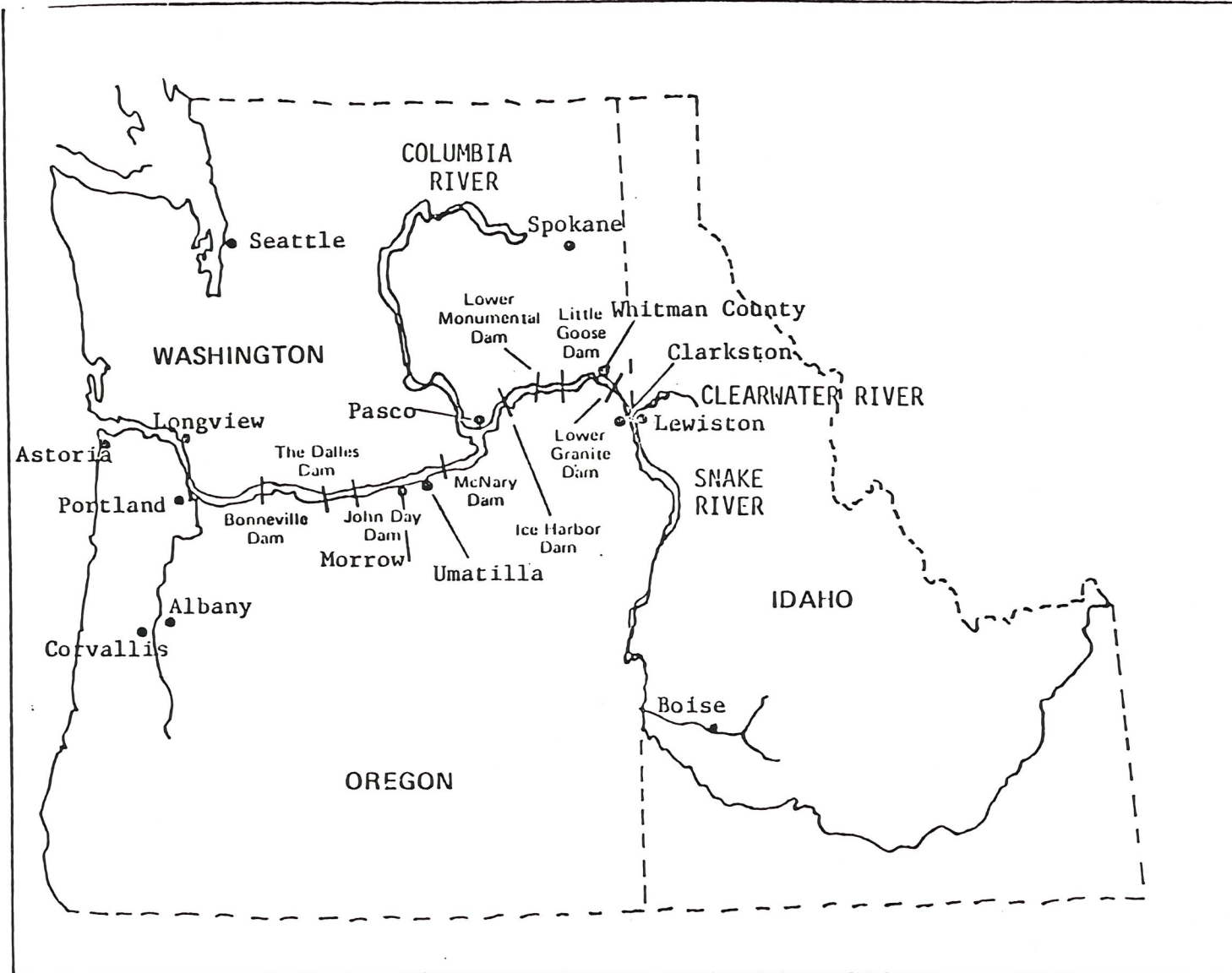


Figure 6. Columbia/Snake River Inland Waterway System.

Source: Martin, Michael V., William A. McNamee, Kenneth L. Casavant, James R. Jones, The Transportation System Serving Agriculture in the Pacific Northwest, Report No. 12, Northwest Agricultural Development Project, December, 1979.

and the Pacific Northwest. Trucks commonly haul wheat from North Dakota to the Lewiston, Idaho area for subsequent movement by barge to the coast. Rates to Columbia River ports by barge are contained in Table 15. In June 1983, the rate for shipping wheat by barge from the Lewiston/Clarkston area to Columbia river ports was 25.9 cents per hundredweight.

TABLE 15. GRAIN RATES BY BARGE FROM SNAKE RIVER POINTS TO COLUMBIA RIVER PORTS, JUNE, 1983.

Origin	Rate	
	cwt.	ton
	(cents)	
Lewiston, ID	25.9	517
Clarkston, WA	25.9	517
Central Ferry, WA	24.8	495

Source: Personal communication with official at Tidewater Barge Lines, Inc., June, 1983.

Recently there has been little or no variance through time with respect to barge rates for grain shipments on the Columbia/Snake River System. Barge rates for wheat, barley and corn documented by Northwest Economic Associates in September 1981, were identical to rates contained in Table 15.¹¹ This price rigidity has existed for almost two years. However, recently the Union Pacific Railroad lowered rail rates in certain areas of the Pacific Northwest by as much as 22 percent. Subsequent to this, barge movements of grain on the Columbia/Snake River System reportedly declined by 18 percent.¹² Thus, pricing policies of the Union Pacific railroad, and other railroads, may influence future responsive pricing behavior on the part of barge lines operating in the Pacific Northwest.

¹¹ Northwest Economic Associates, Compendium of Rate Data: Phase I Draft Report of Economic Study of Transportation Pricing, RFD DACW57-82-R-0119, Vancouver, Washington, March 1, 1983.

¹² Traffic World, September 12, 1983, p. 37.

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Atlantic

Although no hard red spring or durum wheat is currently being exported through ports on the Atlantic coast it is important to be aware of potential routes and costs of such movements. Only rail transportation will be considered in analyzing the cost of moving wheat from North Dakota to Norfolk, Virginia. The cost of moving wheat by rail from North Dakota to Norfolk will consist of the various rail rates to Minneapolis/St. Paul from the eight North Dakota origins (Table 16) plus the proportional rate from MSP to Norfolk (\$2.04 per cwt.).

TABLE 16. RAIL RATES FOR WHEAT FROM SELECTED NORTH DAKOTA ORIGINS TO MINNEAPOLIS/ST. PAUL DESTINATIONS, JULY 1983.

Station	Rate			
	Single-Car	3-Car	26-Car	52-Car
	-----¢/cwt.-----			
Williston	155	151	139	133
Minot	122	118	107	102
Dickinson	112	108	97	92
Mandan	95	92	81	76
Devils Lake	90	86	77	72
Jamestown	83	79	69	64
Grand Forks	73	69	61	55
Fargo	68	64	55	50

Gulf

Various alternatives exist for moving wheat from North Dakota to Gulf ports (i.e., Mobile, New Orleans and Galveston). Wheat may be shipped by rail the entire distance or trucked or railed to an interior river point for subsequent barge shipment. Other alternatives that exist generally do not represent feasible options. Costs (rates) of movements from North Dakota to the Gulf included truck, rail and barge rates. The five interior points considered in the analysis were Minneapolis/St. Paul, Sioux City, Omaha, Kansas City and St. Louis.

Cost of movements to New Orleans consisted of:

1. Rail to New Orleans;
2. Rail to interior points with subsequent barge movement to New Orleans; and
3. Truck to interior points with subsequent barge movement to New Orleans.

Barge Rates. Barge movements of wheat on the Mississippi and Missouri rivers typically vary throughout a given marketing year. Figure 7 contains movements of wheat by barge from Minneapolis, St. Louis and the Missouri River for crop year 1982-83. Figures for the Missouri River include Nebraska, Iowa and the Kansas City area. Most of the wheat that moves by barge down the river system originates in Minneapolis.

Barge rates for wheat also vary throughout the marketing year on the Mississippi and Missouri rivers (Figure 8). Rates are typically highest in the fall and then decrease as the marketing year progresses. Because of variances in traffic and rates, a weighted average rate was calculated for the five interior river points (Table 17). Weighted average rates varied from a low of 21.3 cents per cwt. from St. Louis to a high of 65.7 cents per cwt. from Sioux City.

TABLE 17. WEIGHTED AVERAGE BARGE RATES FOR
WHEAT ON THE MISSISSIPPI AND MISSOURI
RIVERS, 1983.

Origin	Rate
	(¢/cwt.)
Sioux City	65.7
Omaha	56.5
Kansas City	44.5
Minneapolis	42.6
St. Louis	21.3

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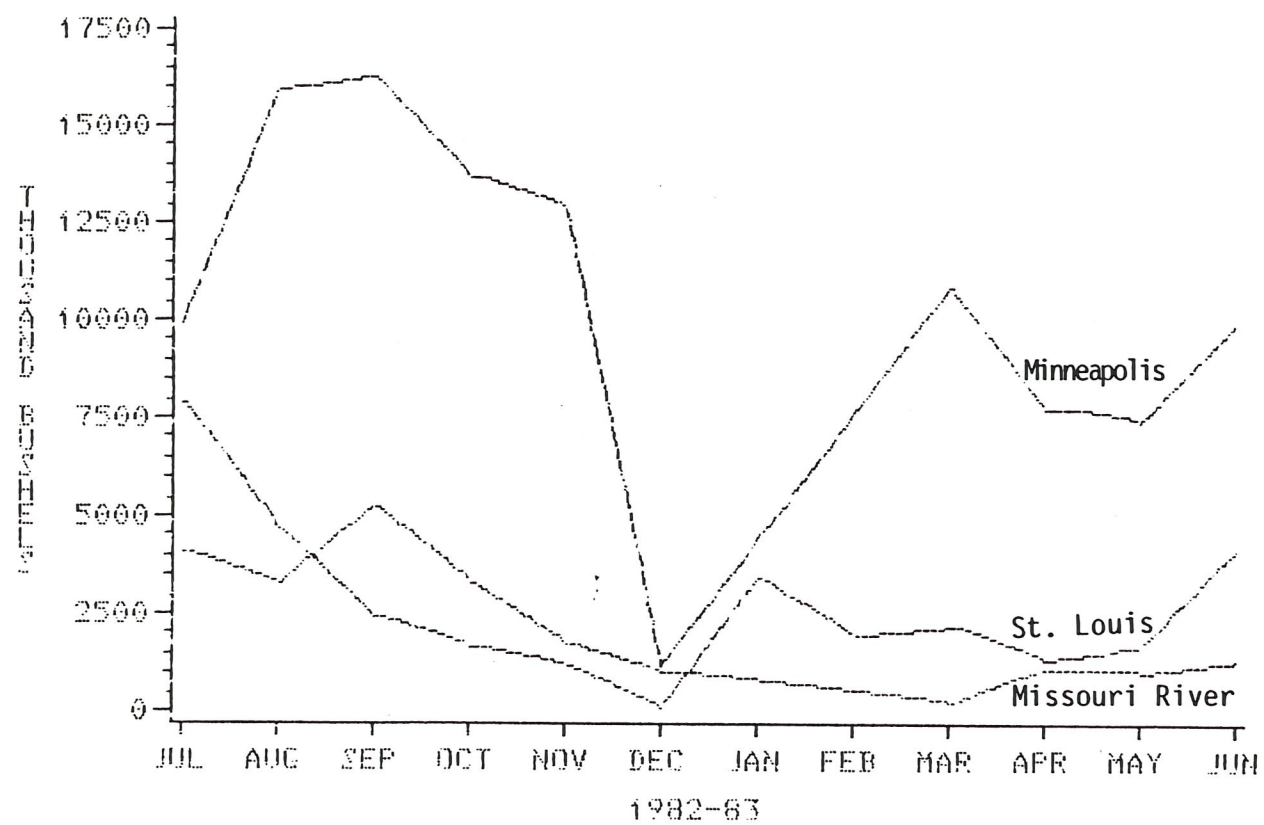


Figure 7. Barge Movements of Wheat by Station, 1982-83.

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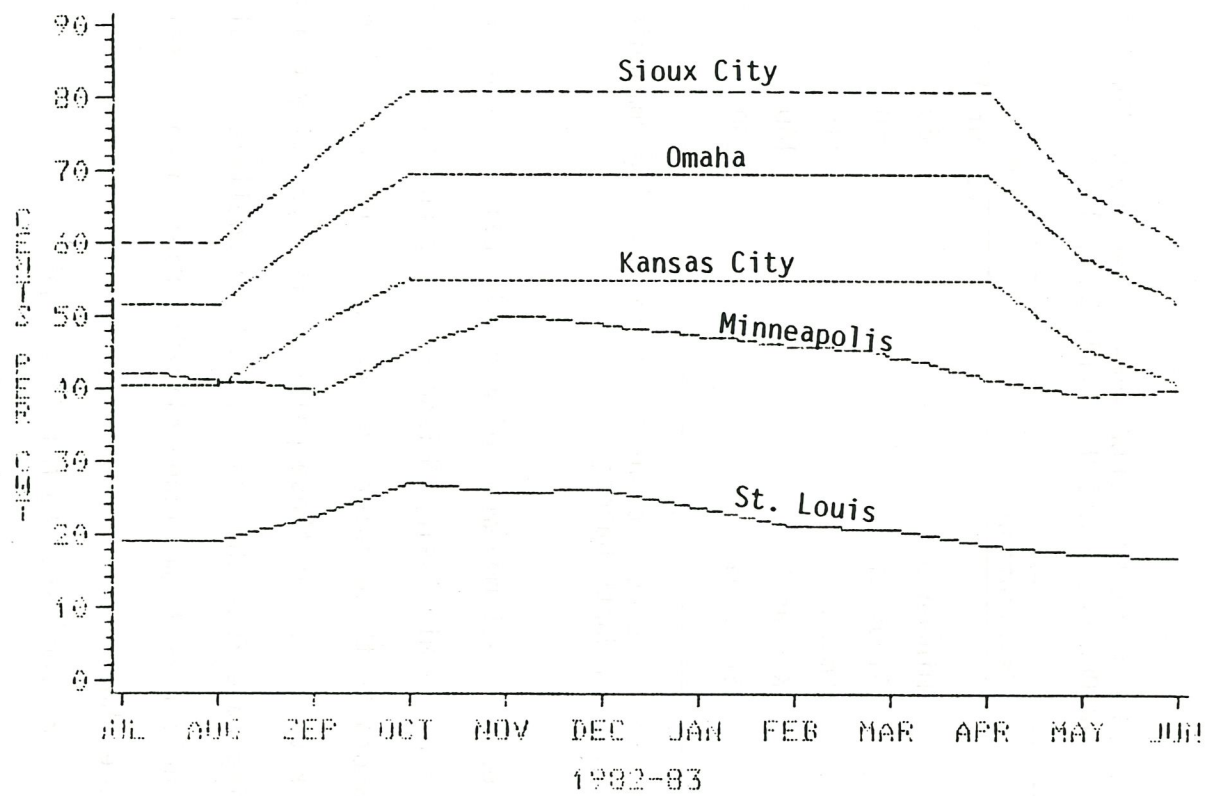


Figure 8. Monthly Barge Rates for Wheat by Station, 1982-83.

Truck Rates. Truck rates for wheat were gathered for various locations on the Mississippi and Missouri Rivers (Table 18). Rates from Fargo varied from 60 cents per cwt. to Minneapolis to 200 cents per cwt. to St. Louis. Truck rates to these locations were used to compare costs of truck/barge movements to the Gulf with rail/barge movements.

TABLE 18. TRUCK RATES FOR WHEAT FROM FARGO, NORTH DAKOTA TO VARIOUS DESTINATIONS, SEPTEMBER, 1983.

Destination	Rate (¢/cwt.)
Minneapolis	60
Sioux City	90
Omaha	115
Kansas City	160
St. Louis	200

Source: Rate quotations by grain trucking companies operating in North Dakota.

Rail Rates. Direct movement of wheat by rail from North Dakota to the Gulf and certain Mississippi/Missouri river points is atypical. Rates from North Dakota to these points are generally not published. A rate from North Dakota to one of these points would typically consist of the grain gathering rate from the state into Minneapolis/St. Paul and the flat (or proportional) rate from Minneapolis/St. Paul to the destination. For example, assume that:

1. The rate from Fargo to MSP is X; and
2. The rate from MSP to the Gulf is Y.

Therefore, the rate from Fargo to the Gulf would be:

$$X + Y = Z$$

where: X = grain gathering rate

Y = applicable rate from MSP to the Gulf

Z = combination rate from Fargo to the Gulf

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Table 19 contains various rail rates for wheat movements from Minneapolis/St. Paul to Sioux City, Omaha, Kansas City, St. Louis, Galveston, New Orleans and Mobile. These rates will be combined with rail rates from the eight North Dakota origins (i.e., Dickinson, Williston, etc.) to Minneapolis/St. Paul, in the manner described above, in order to construct rail rates from North Dakota to these destinations. The rates from MSP will also be used to construct costs (rates) of truck/rail and rail/barge combination movements.

TABLE 19. RAIL RATES FOR WHEAT FROM MINNEAPOLIS/ST. PAUL ORIGINS TO VARIOUS DESTINATIONS, AUGUST, 1983.

Destination	Rail Rate					
	Single-Car	5-Car	26-Car	27-Car	52-Car	54-Car
	(cents/cwt.)					
Sioux City	95	--	79	--	73	--
Omaha	101	--	--	--	--	--
Kansas City	153	--	--	--	--	--
St. Louis	159	--	--	--	--	--
Galveston	--	156	--	145	--	135
New Orleans	--	156	--	145	--	135
Mobile	--	156	--	145	--	135

Source: Burlington Northern Railroad Company

Grain Handling/Transshipment Costs

Interior Points

Moving grain to a given export location typically involves more than one transportation mode. As such, shippers originating traffic may incur a "transshipment" or handling charge in addition to the rate or rates that apply on a particular movement. For example, assume that an elevator

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manager in North Dakota is shipping wheat by truck or rail to Sioux City (an interior point) for transshipment by barge to New Orleans. The manager of the facility in Sioux City will normally assess a charge for handling the wheat at his plant. It is not uncommon for this charge to be higher for trucks than for rail because of efficiencies gained in unloading rail hopper cars versus trucks. Common truck-to-barge and rail-to-barge transfer rates are contained in Table 20. Average transfer rates varied from 8.3 cents per cwt. for truck-to-barge transshipment at Sioux City and Kansas City to 12.5 cents per cwt. at St. Louis. Rail-to-barge transfer rates were slightly lower at most river locations and ranged from 6.7 cents per cwt. to 12.5 cents per cwt.

TABLE 20. AVERAGE TRANSFER RATES TO BARGE FROM TRUCK AND RAIL, WHEAT, 1983.

Interior Point	Transfer Rate	
	Truck to Barge	Rail to Barge
	-----cents per cwt.-----	
Sioux City	8.3	6.7
Omaha	9.8	8.6
Kansas City	8.3	6.7
Minneapolis/St. Paul	10.0	8.3
St. Louis	12.5	12.5
Lewiston	8.3	--

Source: Personal communication with managers of various grain transfer facilities on Mississippi, Missouri and Snake/Columbia Rivers, 1983.

Data contained in Table 20 suggest a high degree of variability exists with respect to transfer rates. This demonstrates the necessity to grain shippers of exploring various alternatives in positioning grain for export. Shippers must closely monitor these relationships over time in order to move wheat to export points economically. Changes in transfer rates through time may result in the displacement of a given transportation mode (or modes) as the most economical alternative(s) in

moving grain to a particular location. Generally, transfer rates increase during periods when grain movements are peaking and decrease as grain movements enter trough periods. Put-through agreements can be negotiated between shippers and managers of these facilities (if the parties so desire) and is a good tool for assuring a stable rate through time.

Export Points

Handling charges for wheat at export locations may vary depending on the inbound transportation mode used. For example, the physical characteristics of a specific export facility may be designed so that barge traffic can be handled more efficiently than truck or rail traffic. As such, handling charges assessed by the export facility may be less for barge than for other modes. A survey of selected export facilities was conducted in order to determine differences in these charges among export regions (i.e., PNW, Gulf, Atlantic and Duluth/Superior) (Table 21).

TABLE 21. HANDLING CHARGES^a AT EXPORT LOCATIONS FOR INBOUND WHEAT SHIPMENTS, BY MODE, 1983.

Location of Export Facility	Inbound Mode		
	Truck	Rail	Barge
	-----cents per cwt.-----		
Pacific Northwest	17.2	15.2	15.3
Gulf	16.0	12.8	15.8
Atlantic	NA	16.7	NA
Duluth/Superior	13.1	11.7	NA

^aFigures represent averages of those facilities surveyed.

Grain Handling Facilities

This section contains a descriptive analysis of grain handling facilities located at Minneapolis/St. Paul, Lewiston and export locations. The analysis includes a synopsis of physical characteristics pertinent to receiving and loading out grain.

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Minneapolis/St. Paul

Grain elevator capacity within the Minneapolis/St. Paul switching district is over 120 million bushels (Appendix Table 1). While several of the facilities listed are processors (i.e., malsters, brewers, millers, etc.), most of the space is owned by firms that generally buy grain from country elevators and consolidate shipments for further marketing. Much of the grain handled at these facilities is shipped out to domestic processing plants or to Gulf ports for export.

The preponderance of wheat (and all grains) shipped from MSP area elevators is moved by barges. Barges accounted for 68 percent of total outbound wheat shipments, railroads 32 percent and trucks less than 1 percent in 1982.¹³

Lewiston

The Lewis and Clark terminal located at Lewiston, Idaho, provides an important link between wheat shippers in North Dakota and the west coast export market. Much of North Dakota's wheat that is shipped west by truck is unloaded at Lewiston for subsequent reshipment by barge to Portland, Oregon. The Lewis and Clark terminal is strictly a handling facility. That is, grain is not bought and sold at the terminal, but is brought in by truck and transferred to barges for movement to the coast. The facility has 5.25 million bushels of storage capacity which is owned by several large grain companies and cooperatives. A shipper must be affiliated with one of these interests to utilize the terminal.

Export Locations

Duluth/Superior

Duluth/Superior (DS) has several grain elevator facilities (Table 22). Storage capacity of these facilities is over 60 million bushels. This capacity is particularly important when peak movements

¹³Minneapolis Grain Exchange, op. cit., pp. 31-33.

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TABLE 22. PHYSICAL CHARACTERISTICS OF GRAIN ELEVATOR FACILITIES LOCATED AT DULUTH/SUPERIOR.

Elevator	Storage Capacity (Bushels)	Fresh Water Available	Draft	Draft of Dock Apron	Length of Birth	Width of Birth	Number of High Spouts	Height of High Spouts	Approx. Rate Per Hr. Wheat (mt.)	Approx. Loading Rate Per Hr. Sunflower Seeds (mt.)
Cargill B2		No	27'	16'	1000'	200'	5	85'	1100	500
Cargill B1	9,200,000 ^a	Yes	27'	25'	900'	100'	2 loading pecos clearance 46' above waterline		1900	1000
Cargill Meal Facility	800,000	Use Facilities at Cargill B1 or B2								
Capitol 6	4,200,000	Yes	27'	14'	930'	250'	3	70'	1000	---
Continental	5,543,000	Yes	30'	30'	790'	---	6	70'	1400	800
Elevator M	2,256,000	Yes	28'	11'	800'	85'	3	72'	800	400
Farmers 1	8,000,000	No	23'-24'	12'	700'	200'	3	80'	1000	550
Farmers 2	11,000,000	No	27.5'	11'	1250'	175'	4	75'	1300	---
Farmers Gallery	Adjacent to Farmers 1	No	30'	25'	740'	200'	5	80'	950	275
General Mills	3,400,000	Yes	27'	15'	900'	250'	1	90'	1000	400
Globe	4,000,000	Yes	27'	12'	600'	80'	3	70'	750	400
BN "S" (ADM)	12,500,000	No	28'	12'	1850'	150'	3	75'	1400	800
Great Lakes Storage	3,500,000	Yes	22'	40'	600'	90'	1	80'	460	215

Source: Guthrie-Hubner, Inc., Port of Duluth/Superior U.S.A., Duluth, Minnesota, April, 1983.^aCombined total of B1 and B2.

occur and when the Great Lakes is closed to navigation during the winter months. Grain shipped into DS during the winter months is usually stored until the shipping season opens in the spring.¹⁴

Extremely large ocean-going vessels, such as ships with 100,000 deadweight tons (dwt.) capacity, cannot be loaded at DS because of insufficient water depths. Bulk carriers operating at DS are most commonly in the 15,000 to 25,000 dwt. capacity range. Maximum draft at DS grain elevators varies between 22 and 30 feet with most facilities being able to accommodate vessels with drafts of 27 to 30 feet.


Approximate load-out rates at DS grain elevators vary between 460 and 1,900 mt. per hour. Given a 25,000 dwt. carrier, total loading time would normally vary between 13 and 54 hours. However, loading times not only depend on load-out rates, but also on weather, size of ship, type of ship, type of grain and the number of elevators required to fill the holds. Piloting ships to more than one facility significantly increases loading times. Filling bulk carriers with heavy coarse grains, such as wheat, normally reduces loading time since the ship's maximum draft will be reached sooner than if loading with a lighter grain.

Pacific Northwest

The Port of Portland is the largest export point on the Pacific Coast.¹⁵ Eight grain elevator facilities with over 28 million bushels of storage

¹⁴Great Lakes navigation is typically closed from mid-December until late March.

¹⁵Martin, Michael V., William A. McNamee, Kenneth L. Casavant, James R. Jones, The Transportation System Serving Agriculture in the Pacific Northwest, Report No. 12, Northwest Agricultural Development Project, December, 1979.



capacity operate in the Portland area (Table 23). Most facilities have capabilities to receive grain by truck, rail and barge. Receiving capacities range from 400 to 2,500 mt. per hour. Loading capacities range from 600 to 2,800 mt. per hour. Shipments of grain from PNW are commonly in vessels in the 25,000 to 35,000 dwt. range. However, ships with 65,000 dwt. capacity and larger can be handled at the port area.

Three grain export elevators operate in the Puget Sound area. One is at Seattle and two are at Tacoma. These facilities provide the deepest draft of any export grain facilities in the United States (Table 24). Cargill, located at Seattle, maintains a draft of 73 feet. The two facilities at Tacoma have drafts of 50 feet and 65 to 70 feet. Total storage capacity at the three facilities is nearly 12 million bushels. Loading capacities range from 1,120 to 3,360 mt. per hour.

Atlantic

Two grain export facilities are located in the Norfolk area (Table 25). The facilities have combined storage capacity of about 10 million bushels and can handle vessels up to 65,000 dwt. Ship loading rates are 1,680 mt. per hour at the Cargill facility and 2,400 mt. per hour at the Continental elevator. Draft is 40 feet at both locations.

Gulf

New Orleans. The Port of New Orleans has 11 grain export facilities (Table 26). Draft varies from 40 feet to 45 feet except at the Peavey Co. facility which has a draft of 60 feet. Most facilities have a single ship berth while two can handle two ships and one can handle three ships. Storage capacity ranges from 2 million to 7.7 million bushels. Loading capacity varies from 1,790 mt. per hour to 3,580 mt. per hour.




TABLE 23. PHYSICAL CHARACTERISTICS OF COLUMBIA WILLAMETTE RIVER EXPORT ELEVATORS.

TPH Tons Per Hour Total Less Mixing Bins	Astoria Elevator	Continental Grain Co. Longview Elevator	North Pacific Grain Growers Elevator	United Grain Corp. Elevator	Cargill, Inc. Terminal 4 Elevator	Bunge Portland Grain Terminal	Louis Dreyfus Elevator	Columbia Grain Terminal 5 Elevator	Peavey Grain Co. Elevator
Location	Astoria, OR	Longview, WA	Kalama, WA	Vancouver, WA	Portland, OR	Portland, OR	Portland, OR	Portland, OR	Kalama, WA
Operator	Astoria Grain Terminal, Inc.	Continental Grain Co.	North Pacific Grain Growers	United Grain Corp.	Cargill, Inc.	Bunge Corp.	Louis Dreyfus	Columbia Grain	Peavey Co.
Draft (ft.)	38	40	40	40	40	40	42	40	40
Gallery Elevator (ft. above 0 water level)	NA	NA	78	100	70	111	57	100	118
Storage Facilities									
Total Capacity (bu.)	1,100,000	5,000,000	6,400,000	5,000,000	8,000,000	1,500,000	1,500,000	4,000,000	2,000,000
Vertical Capacity (bu.)	1,100,000	1,500,000	2,350,000	4,250,000	2,000,000	1,500,000	1,500,000	3,500,000	2,000,000
Operating Capacity (bu.)	1,100,000	5,000,000	6,000,000	4,230,000	7,000,000	1,500,000	1,500,000	4,000,000	2,000,000
Receiving Facilities									
Barge	--	Marine Leg	Marine Leg	Marine Leg	Marine Leg	Marine Leg	Marine Leg	Marine Leg	Marine Leg
Capacity (mt./hr.)	--	350	750	1,200	1,000	500	600	750	1,200
Rail	Bulk shovels	Car Tipper	Car Tipper	Car Tipper	Hopper Only	Car Tipper	Car Tipper	Car Tipper	Hopper Only
Capacity (mt./hr.)	400	350	1,500	1,200	900	750	350	1,750	3,000
Truck	--	Hydraulic Truck Dump	Hydraulic Truck Dump	--	Hydraulic Truck Dump	Truck Dump	--	Hydraulic Truck Dump	--
Capacity (mt./hr.)	--	200	200	--	500	750	--	500	--
Receiving Capacity (mt./hr.)	400	900	2,450	2,400	2,400	2,000	950	3,000	3,000
Loading Facilities									
Belts	2	2	2	1	1	1	2	2	1
Spouts	2	6	7	1	2	5	6	3	4
Loading Capacity (mt./hr.)	600	800	1,500	2,400	2,500	1,800	1,200	2,000	3,000

TABLE 24. PHYSICAL CHARACTERISTICS OF GRAIN EXPORT FACILITIES IN THE PUGET SOUND AREA.

Physical Characteristic	Name and Location		
	Continental Grain Co. (Tacoma)	Cargill Inc. (Seattle)	United Grain Corp. (Tacoma)
Draft (ft.)	65-70	73	50
Length of Berth (ft.)	900	890	750
Storage Capacity (bu.)	3,000,000	4,200,000	4,700,000
Spouts (no.)	3	5	7
Loading Capacity (mt./hr)	2,350	3,360	1,120

Source: Personal Communication with official at Port of Seattle, Summer, 1983.

TABLE 25. PHYSICAL CHARACTERISTICS OF GRAIN EXPORT FACILITIES LOCATED AT NORFOLK, VIRGINIA.

Characteristics	Facility	
	Cargill	Continental
Draft (ft.)	39.5	40
Storage Capacity (bu.)	6,800,000	3,300,000
Loading Capacity (mt.hr.)	1,680	2,400

Source: Virginia Port Authority

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TABLE 26. PHYSICAL CHARACTERISTICS OF GRAIN EXPORT FACILITIES IN THE NEW ORLEANS AREA.

Facility	Physical Characteristic			
	Draft	Berth	Storage Capacity	Loading Capacity
	(ft.)	(# of ships)	(bu.)	(mt./hr.)
Bunge	45	1	5,500,000	3,000
Cargill, Inc.				
RDB ^a	40	1	7,707,000	2,100
LDB ^b	40	2	6,000,000	3,000
Continental Grain Co.	40	2	4,000,000	3,360
Continental Reserve Elevator Corp.	40	1	4,000,000	2,100
Farmers' Export Co.	45	1	5,800,000	1,790
Mississippi River Grain Elevator, Inc.	40	1	6,000,000	2,400
Peavey Co.	60	1	2,000,000	1,790
Public Grain Elevator of New Orleans, Inc.	40	3	7,220,000	2,400
St. Charles Grain	45	1	6,250,000	2,100
Zen-Noh Grain Elevator	45	1	4,000,000	3,580

^aRight Descending Bank.^bLeft Descending Bank

Source: Port of New Orleans, 1983-84 Annual Directory.

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The Port of New Orleans also has seven floating grain elevators or midstream transfer facilities. These facilities have no storage available, but transfer grain directly from barges to ocean-going vessels.

Mobile. A public grain elevator is available for grain exports from the Port of Mobile. The facility has 6.45 million bushels of storage capacity and 1,085 mt. per hour loading capacity. Current plans are to increase load-out capacity to 3,200 long tons per hour.

Galveston. The two export grain elevators located at the Port of Galveston are Bunge and FAR-MAR-CO (Table 27). The Bunge facility can unload four trucks per hour, ten rail cars per hour and two barges per day. The facility has 6 million bushels of storage capacity, 1,650 mt. per hour of loading capacity and has a maximum draft of 40 feet. The FAR-MAR-CO elevator has the capabilities to unload 12 trucks per hour and 18 rail cars per hour. Storage capacity is 3.25 million bushels and ships can be loaded at a rate of 2,450 mt. per hour. Maximum draft is 40 feet.

Total Positioning Costs

Transportation costs typically comprise a significant portion of the total marketing bill for many commodities. In the case of raw grains, such as wheat, it is not uncommon for transportation costs from country points to domestic and export markets to comprise up to one-fourth of the value of the commodity. For example, in the fall of 1983 a price of

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TABLE 27. PHYSICAL CHARACTERISTICS OF EXPORT GRAIN ELEVATORS
AT PORT OF GALVESTON.

Physical Characteristic	Facility	
	Bunge	FAR-MAR-CO
Receiving Capabilities		
Truck (#/hr.)	4	12
Rail (#/hr.)	10	18
Barge (#/day)	2	--
Capacity (million bu.)	6,000,000	3,253,000
Loading Capacity (mt./hr.)	1,650	2,450
Draft (ft.)	40	40

\$4.75 per bushel existed at Portland for No. 2 DNS 14 percent protein wheat. At the same time, truck rates for wheat shipped from several western North Dakota origins to Portland were \$1.90 per cwt. (\$1.14 per bushel). Given these price levels, cost of transporting wheat to Portland represented 24 percent of the value of the commodity.

The relatively high cost of transporting raw grain, as depicted in the foregoing example, typifies the importance to country grain merchants of being aware of marketing costs associated with alternative marketing channels. The remainder of this section details modal costs (rates) for various movements of wheat from North Dakota to four primary export locations (Duluth/Superior, Atlantic, Gulf and PNW). In addition, grain facility handling charges are brought into the discussion.

Gulf

Appendix Tables 2A through 2H contain typical costs (rates) to shippers of moving wheat from eight North Dakota origins to export locations at the Gulf. Generally, least cost movements involve rail or

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truck transportation to Minneapolis/St. Paul with subsequent transshipment by barge to the Gulf. Cost differentials are due to differences, with respect to rail/barge movement, in rates for alternative levels of rail service (i.e. 52-car, 26-car, 3-car, etc.).

Appendix Tables 2A through 2H are each subdivided into seven sections (A, B, C, D, E, F and G). These sections contain rates for alternative types of movements to the Gulf from North Dakota. For example, Appendix Table 2A which applies to movements from Fargo, has seven different movement configurations for positioning wheat at the Gulf. Section A contains combination rail rates. The total cost column consists of a specific rail rate from Fargo to MSP plus the applicable rail rate from MSP to the Gulf. For instance, a total cost of 185 cents per cwt. is derived by adding the 54-car rail rate from MSP to the Gulf, to the 52-car rate from Fargo to MSP (135¢/cwt. plus 50¢/cwt.).

Sections B through F contain total costs for rail/barge and truck/barge movements. Each section contains a specific inbound rate to the transshipment point, a transfer rate, and a barge rate. These three items are then summed to give the total cost of the entire movement. For example, section C contains rail and truck rates into MSP where the grain is then transferred to barge for the remainder of the movement to the Gulf. Thus, total cost of a 26-car/barge movement would be 105.9 cents per cwt. (55 cents for rail transportation, plus 8.3 cents for transferring the grain from rail cars to barges, plus 42.6 cents for barge transportation).

Pacific Northwest

Costs of movements from North Dakota to the Pacific Northwest (PNW) are for three basic types of movements (Appendix Tables 3A through 3D): (1) rail, (2) truck, and (3) truck/barge. Costs of truck/barge movements consist of truck rates from four of the eight North Dakota origins to Lewiston, Idaho, plus applicable barge rates to Portland, Oregon.

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Transfer rates for truck/barge movements are 8.3 cents per hundredweight. Costs of combination truck/barge movements varied from 179.2 cents per cwt. from Williston and Dickinson to 184.2 cents per cwt. from Minot and Mandan.

Truck rates from Fargo, Grand Forks, Jamestown and Devils Lake were not listed since they were significantly higher than single-car rail rates. Truck rates from the other four origins (Minot, Mandan, Dickinson and Williston), generally were at levels comparable to the 26-car single origin rail rates. Costs of these movements were higher than 52-car rail movements, but lower than 26-car single origin rail movements.

Duluth/Superior


Costs of moving wheat from the eight locations in North Dakota to Duluth/Superior varied from a low of 50 cents per cwt. from Fargo (52-car rail service) to a high of \$1.55 per cwt. (single-car rail service) from Williston (Appendix Table 4A).

Atlantic

Movements of wheat from the eight North Dakota origins to the Atlantic consisted of combination rail movements. Single-car, 3-car, 26-car and 52-car rates apply on the initial move to MSP, while proportional single-car rates apply on the subsequent movement from MSP to the Atlantic. The rates varied from 254 cents per cwt. for a 52-car movement from Fargo to 359 cents per cwt. for a single-car movement from Williston (Appendix Table 5).

Rail Contract Rates

The preceeding discussion focused primarily on published (tariff) rail rates. The Staggers Rail Act of 1980 gave railroads the authority to enter into contract negotiations with shippers and receivers. Specific terms of such contracts are typically confidential. Therefore, rail contract rates could not be addressed in this study.



Summary and Conclusions

Country elevators in North Dakota transport a considerable amount of grain directly to export locations or to intermediate points where the grain is transshipped to another mode for movement to export facilities. Direct movements are typically to Duluth/Superior and the Pacific Northwest area. Common intermediate points include Minneapolis/St. Paul and Lewiston, Idaho, where the grain is typically shipped by barge to export facilities located at the Gulf and Pacific Northwest, respectively.

North Dakota country elevator managers ship their grain by truck or rail. Rail shipments are in either single-car or multiple car consignments. Multiple car shippers receive rate concessions for shipping greater volumes. Typical multiple car rates include 3-car, 26-car and 52-car consignments with the 52-car rate being the lowest.

A number of alternatives exist for positioning wheat produced in North Dakota for export. Transportation rates, to a great extent, influence how and where certain elevator managers will ship wheat during a given marketing period. Rail and truck rates for wheat shipped from North Dakota are fairly stable, but mild fluctuations can affect elevator managers' marketing patterns. Shifts in marketing patterns are typically the result of changes in supply and demand factors, but the level of freight rates often affects the movement of wheat from the country. Therefore, it is important for country shippers to be constantly aware of alternative market outlets in order to be flexible and competitive when marketing factors change.


The movement of wheat from North Dakota to export locations is typically accomplished by direct rail or truck service. Over half of the wheat transported from the state is sold in the Duluth/Superior market. This grain is moved by railroads and trucks since there is no inland waterway system linking Duluth/Superior to North Dakota. Wheat produced in the state does not move by barge until it is first transported

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to intermediate or transfer points -- usually Minneapolis/St. Paul or Lewiston. Wheat may be transported to Minneapolis/St. Paul by trucks or railroads and then transferred to barges for subsequent shipment to the Gulf. Wheat that is transshipped to barges at Lewiston is trucked from North Dakota.

Freight rates are not the only cost factor to consider when moving wheat to export locations. Handling costs or transfer rates at transshipment points can also affect the total cost of grain movements. Transfer rates for barge transshipment on interior river points vary among location and by inbound mode. Truck to barge transfer rates are typically higher than rail to barge transfer rates.

Put-through or handling charges at export locations vary depending on inbound mode and region. Charges are typically highest for inbound truck shipments and lowest for rail. Handling charges were generally the lowest at Duluth/Superior and highest at the Pacific Northwest. These charges exhibit seasonal variability and regional differences may fluctuate throughout a given period.



APPENDIX TABLE 1

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APPENDIX TABLE 1

Elevator Capacity Within Minneapolis-St. Paul Switching District

COMPANY AND ELEVATOR	Location	Capacity in Bu.	Railroads	Type of License	Construction	Capabilities						Mechanical Sampling			
						Load			Unload			Load		Unload	Not Available
						T	H	B	T	H	B				
ADM Grain Co. Anderson Mill	Mpls	850 000	Milw	None	Concrete		X		X	X			X		
D	St. Paul	2 208 000	CNW	Federal	Concrete & Steel	X	X	X	X	X		X	X		
Quinn	Mpls	14 272 000	CNW	Federal	Concrete & Steel	X	X		X	X			X		
Quinn's Mill	Mpls	488 000	Milw	None	Concrete & Steel				X	X				X	
Soo	Mpls	3 610 000	Soo	Federal	Concrete & Steel	X	X		X	X				X	
Twin City A	Mpls	2 277 000	CNW	Federal	Concrete & Steel		X			X				X	
Bunge Corp.															
Midway	Mpls	2 643 000	CNW	Federal	Concrete	X	X		X	X		X	X		
Port Bunge	Savage	9 276 000	CNW	Federal	Concrete & Steel	X	X	X	X	X		X			
Burdick Grain Co. Div. Conagra, Inc.															
Becko	St. Louis Park	2 353 000	CNW	Federal	Concrete		X		X	X				X	
Chumet	Mpls	1 322 000	CNW	Federal	Concrete		X		X	X				X	
Marquette	Mpls	4 000 000	CNW	Minnesota	Concrete		X		X	X		X	X		
Shoreham	Mpls	3 193 000	Soo	Federal	Concrete & Wood	X	X	X	X	X				X	
Cargill, Inc.															
Mpls. Fax Plant	Mpls	1 650 000	Soo	Federal	Concrete		X		X	X				X	
Port Cargill A	Savage	1 322 000	CNW, MNS	Federal	Concrete & Steel	X	X	X	X	X		X			
Port Cargill C	Savage	15 309 000	CNW, MNS	Federal	Concrete & Steel	X	X	X	X	X		X			
ConAgra, Inc.															
St. Louis Park	Mpls	300 000	Soo	None	Steel	X	X	X	X	X		X			
ConAgra-Fruen, Inc.															
ConAgra-Fruen Mill	Mpls	350 000	MNS	None	Concrete		X		X	X				X	
Continental Grain Co.															
Red Wing	Red Wing	2 033 000	Milw	Federal	Concrete & Steel	X		X	X	X		X	X		
Port Continental	Savage	5 402 000	CNW	Federal	Concrete	X	X	X	X	X		X	X		
Fleischmann Malting Co., Inc.															
North Star	Mpls	1 800 000	BN	None	Concrete, Steel & Tile	X	X	X	X	X				X	
Froedter Malting Corp., Div. GTA															
Union	Mpls	1 649 000	BN	None	Concrete & Steel		X		X	X				X	
General Mills, Inc.															
Unity Oats	Mpls	225 000	BN	None	Concrete		X		X	X				X	
WCCO	Mpls	5 625 000	Soo-CNW	Federal	Concrete	X	X	X	X	X				X	
Grain Terminal Association															
#1	St. Paul	5 852 000	Milw	Federal	Concrete & Steel	X	X	X	X	X		X	X		
#2	St. Paul	1 058 000	CNW	Federal	Concrete & Steel	X	X	X	X	X		X	X		
M	Mpls	1 383 000	Milw	Federal	Concrete									X	
Savage	Savage	565 000	CNW	Federal	Concrete & Steel	X	X	X	X	X		X	X		
Honeycomb Products Co., Div. GTA															
Fridley	Fridley	2 500 000	BN	Minnesota	Concrete	X	X	X	X	X		X			
International Multifoods Corp.															
Capital A	St. Paul	16 000	CNW-Soo	None	Concrete					X				X	
Capital B	St. Paul	503 000	BN	Federal	Concrete		X	X	X	X				X	
Kurth Malting Corp.															
Kurth	Mpls	2 750 000	BN	None	Concrete & Steel		X		X	X				X	
Olympia Brewing Co.															
Olympia	St. Paul	1 500 000	CNW	None	Concrete	X	X		X	X				X	
Packer River Terminal															
Packer River Terminal	St. Paul	0	CNW	None	Steel	X	X	X	X	X		X			
Peavey Co.															
Edw. Inc. Steel	Mpls	4 250 000	BN	Federal	Steel	X	X	X		X				X	
Hastings Flour Mill	Hastings	1 418 000	Milw	None	Concrete	X	X		X	X				X	
Pioneer	Mpls	1 880 000	BN	Federal	Steel		X	X	X	X				X	
River Terminal	Shakopee	1 000 000	CNW	Federal	Concrete & Steel	X	X	X	X	X		X			
The Pillsbury Co.															
A Mill	Mpls	3 683 000	BN	Federal	Concrete	X	X	X	X	X		X	X		
Kellogg ABS	Mpls	3 039 600	CNW	Federal	Concrete & Steel	X	X		X	X		X	X		
Red Rock	St. Paul	240 000	Milw	Federal	Concrete	X	X	X	X	X		X		X	
Tile	Mpls	400 000	BN	None	Tile										
M.J. Pritchard, Inc.															
Pritchard	Mpls	125 000	Soo	None	Steel & Wood	X	X		X	X				X	
Rahr Malting Co.															
Copro	Mpls	1 500 000	Milw	None	Concrete		X		X	X		X			
Ralston Purina Co.															
Chickwood	Mpls	2 400 000	Milw	Federal	Concrete & Steel	X	X		X	X		X		X	
Purina Mill	Mpls	180 000	Milw	None	Concrete	X	X		X	X					
Schrier Malting Co.															
T	Mpls	4 047 000	Milw	Federal	Concrete & Steel		X		X	X		X	X		
Victoria Co. of Minneapolis															
Gould	Mpls	563 000	Soo BN	Federal	Concrete & Steel	X	X	X	X	X				X	
Walsh Grain Co.															
Consolidating A	Mpls	1 058 000	CNW	Federal	Concrete, Steel & Brick	X	X		X	X				X	
Winona River Terminal															
Winona River Terminal	Winona	100 000	CNW	Federal	Concrete	X	X	X	X	X		X			

Source: Minneapolis Grain Exchange, Statistical Annual, December 31, 1982.

APPENDIX TABLES 2A - 2H
Costs of Wheat Movements to the Gulf

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Appendix Tables 2A - 2H contain costs (rates) for various types of wheat movements from eight North Dakota cities to the Gulf. Following is an explanation of the various types of movements:

Rail (52/54):	52-car rail movement from North Dakota to MSP with a corresponding 54-car rail movement from MSP to the Gulf.
Rail (26/27):	26-car rail movement from North Dakota to MSP with a corresponding 27-car rail movement from MSP to the Gulf.
Rail (3/5):	3-car rail movement from North Dakota to MSP with a corresponding 5-car rail movement from MSP to the Gulf.
Rail (1/5):	Single-car rail movement from North Dakota to MSP with a corresponding 5-car rail movement from MSP to the Gulf.
Rail (52)/Barge:	52-car rail movement from North Dakota to MSP with a corresponding barge movement from MSP to the Gulf.
Rail (26)/Barge:	26-car rail movement from North Dakota to MSP with a corresponding barge movement from MSP to the Gulf.
Rail (3)/Barge:	3-car rail movement from North Dakota to MSP with a corresponding barge movement from MSP to the Gulf.
Rail (52/1)/Barge:	Combination 52-car rail movement from North Dakota origin to MSP and single-car rail movement from MSP to transshipment point with a corresponding barge movement to the Gulf.
Rail (26/1)/Barge:	Combination 26-car rail movement from North Dakota origin to MSP and single-car rail movement from MSP to transshipment point with a corresponding barge movement to the Gulf.
Rail (3/1)/Barge:	Combination 3-car rail movement from North Dakota origin to MSP and single-car rail movement from MSP to transshipment point with a corresponding barge movement to the Gulf.

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Rail (1/1)/Barge: Combination single-car rail movement from North Dakota origin to MSP and single-car rail movement from MSP to transshipment point with a corresponding barge movement to the Gulf.

Truck/Barge: Truck movement to MSP with a corresponding barge movement from MSP to the Gulf.

Truck/Rail (54): Truck movement to MSP with a corresponding 54-car rail movement from MSP to the Gulf.

Truck/Rail (27): Truck movement to MSP with a corresponding 27-car rail movement from MSP to the Gulf.

Truck/Rail (5): Truck movement to MSP with a corresponding 5-car rail movement from MSP to the Gulf.



APPENDIX TABLE 2A. COSTS (RATES) OF MOVING WHEAT FROM FARGO, NORTH DAKOTA TO THE GULF, 1983.

Type of Movement	Rate (¢/cwt.)	Transshipment Point (Location)	Transfer Rate	Barge Rate (¢/cwt.)	Total Cost
<u>A</u>					
Rail (52/54)	185	-	-	-	185.0
Rail (26/27)	200	-	-	-	200.0
Rail (3/5)	220	-	-	-	220.0
Rail (1/5)	224	-	-	-	224.0

<u>B</u>					
Rail (52)/Barge	73	Sioux City ^a	6.7	65.7	145.4
Rail (26)/Barge	79	Sioux City ^a	6.7	65.7	151.4
Rail (3)/Barge	95	Sioux City ^a	6.7	65.7	167.4
Truck/Barge	90	Sioux City ^a	8.3	65.7	164.0

<u>C</u>					
Rail (52)/Barge	50	MSP	8.3	42.6	100.9
Rail (26)/Barge	55	MSP	8.3	42.6	105.9
Rail (3)/Barge	64	MSP	8.3	42.6	114.9
Rail (1)/Barge	68	MSP	8.3	42.6	118.9
Truck/Barge	60	MSP	10.0	42.6	112.6

<u>D</u>					
Rail (52/1)/Barge	151	Omaha	8.6	56.5	216.1
Rail (26/1)/Barge	156	Omaha	8.6	56.5	221.1
Rail (3/1)/Barge	165	Omaha	8.6	56.5	230.1
Rail (1/1)/Barge	169	Omaha	8.6	56.5	234.1
Truck/Barge	115	Omaha	9.8	56.5	181.3

<u>E</u>					
Rail (52/1)/Barge	203	Kansas City	6.7	44.5	254.2
Rail (26/1)/Barge	208	Kansas City	6.7	44.5	259.2
Rail (3/1)/Barge	217	Kansas City	6.7	44.5	268.2
Rail (1/1)/Barge	221	Kansas City	6.7	44.5	272.2
Truck/Barge	160	Kansas City	8.3	44.5	212.8

^aRail rates for movements to Sioux City were obtained from Burlington Northern Railroad Tariff BN 4022-C, effective June 20, 1983.

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APPENDIX TABLE 2A. COSTS (RATES) OF MOVING WHEAT FROM FARGO, NORTH DAKOTA
TO THE GULF, 1983. (continued)

Type of Movement	Rate (¢/cwt.)	Transshipment Point (location)	Transfer Rate -----	Barge Rate (¢/cwt.)	Total Cost -----
<u>F</u>					
Rail (52/1)/Barge	209	St. Louis	12.5	21.3	242.8
Rail (26/1)/Barge	214	St. Louis	12.5	21.3	247.8
Rail (3/1)/Barge	223	St. Louis	12.5	21.3	256.8
Rail (1/1)/Barge	227	St. Louis	12.5	21.3	260.8
Truck/Barge	200	St. Louis	12.5	21.3	233.8

<u>G</u>					
Truck/Rail (54)	195	MSP	10.0	-	205.0
Truck/Rail (27)	205	MSP	10.0	-	215.0
Truck/Rail (5)	216	MSP	10.0	-	226.0

APPENDIX TABLE 2B. COSTS (RATES) OF MOVING WHEAT FROM JAMESTOWN, NORTH DAKOTA TO THE GULF, 1983.

Type of Movement	Rate (¢/cwt.)	Transshipment Point (location)	Transfer Rate -----	Barge Rate (¢/cwt.)	Total Cost -----
<u>A</u>					
Rail (52/54)	199	-	-	-	199.0
Rail (26/27)	214	-	-	-	214.0
Rail (3/5)	235	-	-	-	235.0
Rail (1/5)	239	-	-	-	239.0

<u>B</u>					
Rail (52)/Barge	84	Sioux City	6.7	65.7	156.4
Rail (26)/Barge	89	Sioux City	6.7	65.7	161.4
Rail (3)/Barge	106	Sioux City	6.7	65.7	178.4
Truck/Barge	100	Sioux City	8.3	65.7	174.0

<u>C</u>					
Rail (52)/Barge	64	MSP	8.3	42.6	114.9
Rail (26)/Barge	69	MSP	8.3	42.6	119.9
Rail (3)/Barge	79	MSP	8.3	42.6	129.9
Rail (1)/Barge	83	MSP	8.3	42.6	133.9
Truck/Barge	70	MSP	10.0	42.6	122.6

<u>D</u>					
Rail (52/1)/Barge	165	Omaha	8.6	56.5	230.1
Rail (26/1)/Barge	170	Omaha	8.6	56.5	235.1
Rail (3/1)/Barge	180	Omaha	8.6	56.5	245.1
Rail (1/1)/Barge	184	Omaha	8.6	56.5	249.1
Truck/Barge	125	Omaha	9.8	56.5	191.3

<u>E</u>					
Rail (52/1)/Barge	217	Kansas City	6.7	44.5	268.2
Rail (26/1)/Barge	222	Kansas City	6.7	44.5	273.2
Rail (3/1)/Barge	232	Kansas City	6.7	44.5	283.2
Rail (1/1)/Barge	236	Kansas City	6.7	44.5	287.2
Truck/Barge	170	Kansas City	8.3	44.5	222.8

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APPENDIX TABLE 2B. COSTS (RATES) OF MOVING WHEAT FROM JAMESTOWN, NORTH DAKOTA TO THE GULF, 1983. (continued)

Type of Movement	Rate (¢/cwt.)	Transshipment Point (Location)	Transfer Rate	Barge Rate	Total Cost
			-----	(¢/cwt.)	-----
<u>F</u>					
Rail (52/1)/Barge	223	St. Louis	12.5	21.3	256.8
Rail (26/1)/Barge	228	St. Louis	12.5	21.3	261.8
Rail (3/1)/Barge	238	St. Louis	12.5	21.3	271.8
Rail (1/1)/Barge	242	St. Louis	12.5	21.3	275.8
Truck/Barge	210	St. Louis	12.5	21.3	243.8

<u>G</u>					
Truck/Rail (54)	205	MSP	10.0	-	215.0
Truck/Rail (27)	215	MSP	10.0	-	225.0
Truck/Rail (3)	226	MSP	10.0	-	236.0

APPENDIX TABLE 2C. COSTS (RATES) OF MOVING WHEAT FROM MANDAN, NORTH DAKOTA TO THE GULF, 1983.

Type of Movement	Rate (¢/cwt.)	Transshipment Point (Location)	Transfer Rate	Barge Rate (¢/cwt.)	Total Cost
<u>A</u>					
Rail (52/54)	211	-	-	-	211.0
Rail (26/27)	226	-	-	-	226.0
Rail (3/5)	248	-	-	-	248.0
Rail (1/5)	251	-	-	-	251.0

<u>B</u>					
Rail (52)/Barge	115	Sioux City	6.7	65.7	187.4
Rail (26)/Barge	120	Sioux City	6.7	65.7	192.4
Rail (3)/Barge	137	Sioux City	6.7	65.7	209.4
Truck/Barge	110	Sioux City	8.3	65.7	184.0

<u>C</u>					
Rail (52)/Barge	76	MSP	8.3	42.6	126.9
Rail (26)/Barge	81	MSP	8.3	42.6	131.9
Rail (3)/Barge	92	MSP	8.3	42.6	142.9
Rail (1)/Barge	95	MSP	8.3	42.6	145.9
Truck/Barge	80	MSP	10.0	42.6	132.6

<u>D</u>					
Rail (52/1)/Barge	177	Omaha	8.6	56.5	242.1
Rail (26/1)/Barge	182	Omaha	8.6	56.5	247.1
Rail (3/1)/Barge	193	Omaha	8.6	56.5	258.1
Rail (1/1)/Barge	196	Omaha	8.6	56.5	261.1
Truck/Barge	135	Omaha	9.8	56.5	201.3

<u>E</u>					
Rail (52/1)/Barge	229	Kansas City	6.7	44.5	280.2
Rail (26/1)/Barge	234	Kansas City	6.7	44.5	285.2
Rail (3/1)/Barge	245	Kansas City	6.7	44.5	296.2
Rail (1/1)/Barge	247	Kansas City	6.7	44.5	298.2
Truck/Barge	180	Kansas City	8.3	44.5	232.8

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APPENDIX TABLE 2C. COSTS (RATES) OF MOVING WHEAT FROM MANDAN, NORTH DAKOTA
TO THE GULF, 1983. (continued)

Type of Movement	Rate (¢/cwt.)	Transshipment Point (location)	Transfer Rate ----- (¢/cwt.) -----	Barge Rate	Total Cost
<u>F</u>					
Rail (52/1)/Barge	235	St. Louis	12.5	21.3	268.8
Rail (26/1)/Barge	240	St. Louis	12.5	21.3	273.8
Rail (3/1)/Barge	251	St. Louis	12.5	21.3	284.8
Rail (1/1)/Barge	254	St. Louis	12.5	21.3	287.8
Truck/Barge	220	St. Louis	12.5	21.3	253.8

<u>G</u>					
Truck/Rail (54)	215	MSP	10.0	-	225.0
Truck/Rail (27)	225	MSP	10.0	-	235.0
Truck/Rail (5)	236	MSP	10.0	-	246.0

APPENDIX TABLE 2D. COSTS (RATES) OF MOVING WHEAT FROM DICKINSON, NORTH DAKOTA TO THE GULF, 1983.

Type of Movement	Rate (¢/cwt.)	Transshipment Point (Location)	Transfer Rate -----	Barge Rate (¢/cwt.)	Total Cost -----
<u>A</u>					
Rail (52/54)	227	-	-	-	227.0
Rail (26/27)	237	-	-	-	237.0
Rail (3/5)	264	-	-	-	264.0
Rail (1/5)	268	-	-	-	268.0

<u>B</u>					
Rail (52)/Barge	147	Sioux City	6.7	65.7	219.4
Rail (26)/Barge	152	Sioux City	6.7	65.7	224.4
Rail (3)/Barge	170	Sioux City	6.7	65.7	242.4
Truck/Barge	120	Sioux City	8.3	65.7	194.0

<u>C</u>					
Rail (52)/Barge	92	MSP	8.3	42.6	142.9
Rail (26)/Barge	97	MSP	8.3	42.6	147.9
Rail (3)/Barge	108	MSP	8.3	42.6	158.9
Rail (1)/Barge	112	MSP	8.3	42.6	162.9
Truck/Barge	90	MSP	10.0	42.6	142.6

<u>D</u>					
Rail (52/1)/Barge	193	Omaha	8.6	56.5	258.1
Rail (26/1)/Barge	198	Omaha	8.6	56.5	263.1
Rail (3/1)/Barge	209	Omaha	8.6	56.5	274.1
Rail (1/1)/Barge	213	Omaha	8.6	56.5	278.1
Truck/Barge	145	Omaha	9.8	56.5	211.3

<u>E</u>					
Rail (52/1)/Barge	245	Kansas City	6.7	44.5	296.2
Rail (26/1)/Barge	250	Kansas City	6.7	44.5	301.2
Rail (3/1)/Barge	261	Kansas City	6.7	44.5	312.2
Rail (1/1)/Barge	265	Kansas City	6.7	44.5	316.2
Truck/Barge	190	Kansas City	8.3	44.5	242.8

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APPENDIX TABLE 2D. COSTS (RATES) OF MOVING WHEAT FROM DICKINSON, NORTH DAKOTA TO THE GULF, 1983. (continued)

Type of Movement	Rate (¢/cwt.)	Transshipment Point (location)	Transfer Rate -----	Barge Rate (¢/cwt.)	Total Cost -----
<u>F</u>					
Rail (52/1)/Barge	251	St. Louis	12.5	21.3	284.8
Rail (26/1)/Barge	256	St. Louis	12.5	21.3	289.8
Rail (3/1)/Barge	267	St. Louis	12.5	21.3	300.8
Rail (1/1)/Barge	271	St. Louis	12.5	21.3	304.8
Truck/Barge	230	St. Louis	12.5	21.3	263.8

<u>G</u>					
Truck/Rail (54)	225	MSP	10.0	-	235.0
Truck/Rail (27)	235	MSP	10.0	-	245.0
Truck/Rail (5)	246	MSP	10.0	-	256.0

APPENDIX TABLE 2E. CCSTS (RATES) OF MOVING WHEAT FROM WILLISTON, NORTH DAKOTA TO THE GULF, 1983.

Type of Movement	Rate (¢/cwt.)	Transshipment Point (location)	Transfer Rate -----	Barge Rate (¢/cwt.)	Total Cost -----
<u>A</u>					
Rail (52/54)	268	-	-	-	268.0
Rail (26/27)	284	-	-	-	284.0
Rail (3/5)	307	-	-	-	307.0
Rail (1/5)	311	-	-	-	311.0

<u>B</u>					
Rail (52)/Barge	131	Sioux City	6.7	65.7	203.4
Rail (26)/Barge	136	Sioux City	6.7	65.7	208.4
Rail (3)/Barge	154	Sioux City	6.7	65.7	226.4
Truck/Barge	145	Sioux City	8.3	65.7	219.0

<u>C</u>					
Rail (52)/Barge	133	MSP	8.3	42.6	183.9
Rail (26)/Barge	139	MSP	8.3	42.6	189.9
Rail (3)/Barge	151	MSP	8.3	42.6	201.9
Rail (1)/Barge	155	MSP	8.3	42.6	205.9
Truck/Barge	115	MSP	10.0	42.6	167.6

<u>D</u>					
Rail (52/1)/Barge	234	Omaha	8.6	56.5	299.1
Rail (26/1)/Barge	240	Omaha	8.6	56.5	305.1
Rail (3/1)/Barge	252	Omaha	8.6	56.5	317.1
Rail (1/1)/Barge	256	Omaha	8.6	56.5	321.1
Truck/Barge	170	Omaha	9.8	56.5	236.3

<u>E</u>					
Rail (52/1)/Barge	286	Kansas City	6.7	44.5	337.2
Rail (26/1)/Barge	292	Kansas City	6.7	44.5	343.2
Rail (3/1)/Barge	304	Kansas City	6.7	44.5	355.1
Rail (1/1)/Barge	308	Kansas City	6.7	44.5	359.2
Truck/Barge	215	Kansas City	8.3	44.5	267.8

APPENDIX TABLE 2E. COSTS (RATES) OF MOVING WHEAT FROM WILLISTON, NORTH DAKOTA TO THE GULF, 1983. (continued)

Type of Movement	Rate (¢/cwt.)	Transshipment Point (Location)	Transfer Rate ----- (¢/cwt.) -----	Barge Rate (¢/cwt.)	Total Cost
<u>F</u>					
Rail (52/1)/Barge	292	St. Louis	12.5	21.3	325.8
Rail (26/1)/Barge	298	St. Louis	12.5	21.3	331.8
Rail (3/1)/Barge	310	St. Louis	12.5	21.3	343.8
Rail (1/1)/Barge	314	St. Louis	12.5	21.3	347.8
Truck/Barge	255	St. Louis	12.5	21.3	288.8

<u>G</u>					
Truck/Rail (54)	250	MSP	10.0	-	260.0
Truck/Rail (27)	260	MSP	10.0	-	270.0
Truck/Rail (5)	271	MSP	10.0	-	281.0

TABLE 2F. COSTS (RATES) OF MOVING WHEAT FROM MINOT, NORTH DAKOTA TO THE GULF, 1983.

Type of Movement	Rate (¢/cwt.)	Transshipment Point (Location)	Transfer Rate ----- (¢/cwt.) -----	Barge Rate ----- (¢/cwt.) -----	Total Cost
<u>A</u>					
Rail (52/54)	237	-	-	-	237.0
Rail (26/27)	252	-	-	-	252.0
Rail (3/5)	274	-	-	-	274.0
Rail (1/5)	278	-	-	-	278.0

<u>B</u>					
Rail (52)/Barge	126	Sioux City	6.7	65.7	198.4
Rail (26)/Barge	131	Sioux City	6.7	65.7	203.4
Rail (3)/Barge	148	Sioux City	6.7	65.7	220.4
Truck/Barge	120	Sioux City	8.3	65.7	194.0

<u>C</u>					
Rail (52)/Barge	102	MSP	8.3	42.6	152.9
Rail (26)/Barge	107	MSP	8.3	42.6	157.9
Rail (3)/Barge	118	MSP	8.3	42.6	168.9
Rail (1)/Barge	122	MSP	8.3	42.6	172.9
Truck/Barge	90	MSP	10.0	42.6	142.6

<u>D</u>					
Rail (52/1)/Barge	203	Omaha	8.6	56.5	268.1
Rail (26/1)/Barge	208	Omaha	8.6	56.5	273.0
Rail (3/1)/Barge	219	Omaha	8.6	56.5	225.1
Rail (1/1)/Barge	223	Omaha	8.6	56.5	288.1
Truck/Barge	145	Omaha	9.8	56.5	211.3

<u>E</u>					
Rail (52/1)/Barge	255	Kansas City	6.7	44.5	306.2
Rail (26/1)/Barge	260	Kansas City	6.7	44.5	311.2
Rail (3/1)/Barge	271	Kansas City	6.7	44.5	322.2
Rail (1/1)/Barge	275	Kansas City	6.7	44.5	326.2
Truck/Barge	190	Kansas City	8.3	44.5	242.8

TABLE 2F. COSTS (RATES) OF MOVING WHEAT FROM MINOT, NORTH DAKOTA TO THE GULF, 1983. (continued)

Type of Movement	Rate (¢/cwt.)	Transshipment Point (Location)	Transfer Rate -----	Barge Rate (¢/cwt.)	Total Cost -----
<u>F</u>					
Rail (52/1)/Barge	261	St. Louis	12.5	21.3	294.8
Rail (26/1)/Barge	266	St. Louis	12.5	21.3	299.8
Rail (3/1)/Barge	277	St. Louis	12.5	21.3	310.8
Rail (1/1)/Barge	281	St. Louis	12.5	21.3	314.8
Truck/Barge	230	St. Louis	12.5	21.3	263.8

<u>G</u>					
Truck/Rail (54)	192	MSP	10.0	-	202.0
Truck/Rail (27)	197	MSP	10.0	-	207.0
Truck/Rail (5)	208	MSP	10.0	-	218.0

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TABLE 2G. COSTS (RATES) OF MOVING WHEAT FROM DEVILS LAKE, NORTH DAKOTA TO THE GULF, 1983.

Type of Movement	Rate (¢/cwt.)	Transshipment Point (Location)	Transfer Rate	Barge Rate ----- (¢/cwt.) -----	Total Cost
<u>A</u>					
Rail (52/54)	207	-	-	-	207.0
Rail (26/27)	222	-	-	-	222.0
Rail (3/5)	242	-	-	-	242.0
Rail (1/5)	246	-	-	-	246.0

<u>B</u>					
Rail (52)/Barge	110	Sioux City	6.7	65.7	182.4
Rail (26)/Barge	115	Sioux City	6.7	65.7	187.4
Rail (3)/Barge	132	Sioux City	6.7	65.7	204.4
Truck/Barge	110	Sioux City	8.3	65.7	184.0

<u>C</u>					
Rail (52)/Barge	72	MSP	8.3	42.6	127.9
Rail (26)/Barge	77	MSP	8.3	42.6	127.9
Rail (3)/Barge	86	MSP	8.3	42.6	136.9
Rail (1)/Barge	90	MSP	8.3	42.6	140.9
Truck/Barge	80	MSP	10.0	42.6	137.6

<u>D</u>					
Rail (52/1)/Barge	173	Omaha	8.6	56.5	238.1
Rail (26/1)/Barge	178	Omaha	8.6	56.5	243.1
Rail (3/1)/Barge	187	Omaha	8.6	56.5	252.1
Rail (1/1)/Barge	191	Omaha	8.6	56.5	256.1
Truck/Barge	135	Omaha	9.8	56.5	201.3

<u>E</u>					
Rail (52/1)/Barge	225	Kansas City	6.7	44.5	276.2
Rail (26/1)/Barge	230	Kansas City	6.7	44.5	281.2
Rail (3/1)/Barge	239	Kansas City	6.7	44.5	290.2
Rail (1/1)/Barge	243	Kansas City	6.7	44.5	294.2
Truck/Barge	180	Kansas City	8.3	44.5	232.8

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TABLE 2G. COSTS (RATES) OF MOVING WHEAT FROM DEVILS LAKE, NORTH DAKOTA TO THE GULF, 1983. (continued)

Type of Movement	Rate (¢/cwt.)	Transshipment Point (location)	Transfer Rate	Barge Rate ----- (¢/cwt.) -----	Total Cost
<u>F</u>					
Rail (52/1)/Barge	231	St. Louis	12.5	21.3	264.8
Rail (26/1)/Barge	236	St. Louis	12.5	21.3	269.8
Rail (3/1)/Barge	245	St. Louis	12.5	21.3	278.8
Rail (1/1)/Barge	249	St. Louis	12.5	21.3	282.8
Truck/Barge	220	St. Louis	12.5	21.3	253.8

<u>G</u>					
Truck/Rail (54)	215	MSP	10.0	-	225.0
Truck/Rail (27)	225	MSP	10.0	-	235.0
Truck/Rail (5)	236	MSP	10.0	-	246.0

TABLE 2H. COSTS (RATES) OF MOVING WHEAT FROM GRAND FORKS, NORTH DAKOTA TO THE GULF, 1983.

Type of Movement	Rate (¢/cwt.)	Transshipment Point (Location)	Transfer Rate	Barge Rate (¢/cwt.)	Total Cost
<u>A</u>					
Rail (52/54)	190	-	-	-	190.0
Rail (26/27)	206	-	-	-	206.0
Rail (3/5)	225	-	-	-	225.0
Rail (1/5)	229	-	-	-	229.0

<u>B</u>					
Rail (52)/Barge	94	Sioux City	6.7	65.7	166.4
Rail (26)/Barge	99	Sioux City	6.7	65.7	171.4
Rail (3)/Barge	116	Sioux City	6.7	65.7	188.4
Truck/Barge	90	Sioux City	8.3	65.7	164.0

<u>C</u>					
Rail (52)/Barge	55	MSP	8.3	42.6	105.9
Rail (26)/Barge	61	MSP	8.3	42.6	111.9
Rail (3)/Barge	69	MSP	8.3	42.6	119.9
Rail (1)/Barge	73	MSP	8.3	42.6	123.9
Truck/Barge	60	MSP	10.0	42.6	112.6

<u>D</u>					
Rail (52/1)/Barge	156	Omaha	8.6	56.5	221.1
Rail (26/1)/Barge	162	Omaha	8.6	56.5	227.1
Rail (3/1)/Barge	170	Omaha	8.6	56.5	235.1
Rail (1/1)/Barge	174	Omaha	8.6	56.5	239.1
Truck/Barge	115	Omaha	9.8	56.5	181.3

<u>E</u>					
Rail (52/1)/Barge	208	Kansas City	6.7	44.5	259.2
Rail (26/1)/Barge	214	Kansas City	6.7	44.5	265.2
Rail (3/1)/Barge	222	Kansas City	6.7	44.5	273.2
Rail (1/1)/Barge	226	Kansas City	6.7	44.5	277.2
Truck/Barge	160	Kansas City	8.3	44.5	212.8

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TABLE 2H. COSTS (RATES) OF MOVING WHEAT FROM GRAND FORKS, NORTH DAKOTA TO THE GULF, 1983. (continued)

Type of Movement	Rate (¢/cwt.)	Transshipment Point (location)	Transfer Rate	Barge Rate ----- (¢/cwt.) -----	Total Cost
<u>F</u>					
Rail (52/1)/Barge	214	St. Louis	12.5	21.3	247.8
Rail (26/1)/Barge	220	St. Louis	12.5	21.3	253.8
Rail (3/1)/Barge	228	St. Louis	12.5	21.3	261.8
Rail (1/1)/Barge	232	St. Louis	12.5	21.3	265.8
Truck/Barge	200	St. Louis	12.5	21.3	233.8

<u>G</u>					
Truck/Rail (54)	195	MSP	10.0	-	205.0
Truck/Rail (27)	205	MSP	10.0	-	215.0
Truck/Rail (5)	216	MSP	10.0	-	226.0

APPENDIX TABLES 3A - 3D

Costs of Wheat Movements to Pacific Northwest

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APPENDIX TABLE 3A. COSTS (RATES) OF MOVING WHEAT FROM FARGO, GRAND FORKS, JAMESTOWN AND DEVILS LAKE TO THE PACIFIC NORTHWEST, 1983.

Type of Movement	Rate (¢/cwt.)	Transshipment Point (Location)	Barge Rate ----- (¢/cwt.) -----	Total Cost
Rail (52)	182	-	-	182.0
Rail (26-S0)	197	-	-	197.0
Rail (26-M0)	218	-	-	218.0
Rail (1)	230	-	-	230.0

APPENDIX TABLE 3B. COSTS (RATES) OF MOVING WHEAT FROM MINOT AND MANDAN TO THE PACIFIC NORTHWEST, 1983.

Type of Movement	Rate (¢/cwt.)	Transshipment Point (Location)	Transfer Rate ----- (¢/cwt.) -----	Barge Rate ----- (¢/cwt.) -----	Total Cost
Rail (52)	182	-	-	-	182.0
Rail (26-S0)	197	-	-	-	197.0
Rail (26-M0)	218	-	-	-	218.0
Rail (1)	230	-	-	-	230.0
Truck	196	-	-	-	195.0
Truck/Barge	150	Lewiston	8.3	25.9	184.2

APPENDIX TABLE 3C. COSTS (RATES) OF MOVING WHEAT FROM DICKINSON TO THE PACIFIC NORTHWEST, 1983.

Type of Movement	Rate (¢/cwt.)	Transshipment Point (Location)	Transfer Rate ----- (¢/cwt.) -----	Barge Rate ----- (¢/cwt.) -----	Total Cost
Rail (52)	172	-	-	-	172.0
Rail (26-S0)	187	-	-	-	187.0
Rail (26-M0)	205	-	-	-	205.0
Rail (1)	220	-	-	-	220.0
Truck	190	-	-	-	190.0
Truck/Barge	145	Lewiston	8.3	25.9	179.2

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APPENDIX TABLE 3D. COSTS (RATES) OF MOVING WHEAT FROM WILLISTON, NORTH DAKOTA TO THE PACIFIC NORTHWEST, 1983.

Type of Movement	Rate (¢/cwt.)	Transshipment Point (Location)	Transfer Rate ----- (¢/cwt.) -----	Barge Rate	Total Cost
Rail (52)	169	-	-	-	169.0
Rail (26-S0)	185	-	-	-	185.0
Rail (26-M0)	204	-	-	-	204.0
Rail (1)	216	-	-	-	216.0
Truck	190	-	-	-	190.0
Truck/Barge	145	Lewiston	8.3	25.9	179.2

APPENDIX TABLE 4

Costs of Wheat Movements to Duluth/Superior

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APPENDIX TABLE 4. COSTS (RATES) OF MOVING WHEAT FROM EIGHT
NORTH DAKOTA ORIGINS TO DULUTH/SUPERIOR, 1983.

Station	RATE				
	Truck	Single-Car	3-Car	26-Car	52-Car
	-----¢/cwt.-----				
Williston	125	155	151	139	133
Dickinson	110	122	118	107	102
Minot	100	122	118	107	102
Mandan	100	102	99	88	83
Devils Lake	80	90	86	77	72
Jamestown	80	83	79	69	64
Grand Forks	60	73	66	58	52
Fargo	60	68	65	55	50

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APPENDIX TABLE 5

Costs of Wheat Movements to the Atlantic

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APPENDIX TABLE 5. COSTS (RATES) OF MOVING WHEAT BY RAIL FROM EIGHT NORTH DAKOTA ORIGINS TO THE ATLANTIC, 1983.

Origin	Rail Rate ^a			
	T-car	3-car	26-car	52-car
	----- (¢/cwt.) -----			
Fargo	272	268	259	254
Grand Forks	277	273	265	259
Jamestown	287	283	273	268
Devils Lake	294	290	281	276
Mandan	299	296	285	280
Dickinson	316	312	301	296
Minot	326	322	311	306
Williston	359	355	343	337

^aRates represent either single-car, 3-car, 26-car or 52-car rates to MSP plus proportional single-car rate from MSP to Norfolk, Virginia.

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