Staff Papers Series

Staff Paper P79-6

February 1979

HISTORICAL FLOWS OF CORN, WHEAT AND SOYBEANS FROM MINNESOTA, NORTH DAKOTA AND SOUTH DAKOTA

by

Hing Poon and Jerry E. Fruin

Department of Agricultural and Applied Economics

University of Minnesota
Institute of Agriculture, Forestry and Home Economics
St. Paul, Minnesota 55108

Historical Flows of Corn, Wheat and Soybeans from Minnesota, North Dakota and South Dakota

by

Hing Poon and Jerry E. Fruin

Staff papers are published without formal review within the Department of Agricultural and Applied Economics.

Prepared for the U.S. Army Corps of Engineers Contract "Study of Movements of Bulk Commodities in the Upper Mississippi River Valley," Contract No. DACW 37-77-C-0138.

This research was partially funded by the United States Department of Agriculture Cooperative State Research Service, Research Agreement No. 701-15-37.

TABLE OF CONTENTS

	Page
LIST OF TABLES	iii
INTRODUCTION	1
CORN	2
WHEAT	7
SOYBEANS	17
SUMMARY	24
BIBLIOGRAPHY	32

LIST OF TABLES

TABLE		PAGE
1.	Production of Corn	3
2.	Amount of Corn Sold and as a Percentage of Production	4
3.	Volume of Corn Traffic Through Minneapolis-St. Paul	6
4.	Volume or Corn Traffic Through Duluth-Superior	8
5.	Production of Wheat	9
6.	Percentage of Wheat Produced in North Dakota, South Dakota and Minnesota Shipped to Minneapolis and Duluth	10
7.	Volume of Wheat Shipped from North Dakota	11
8.	Volume of Wheat Shipped From South Dakota and Minnesota	13
9.	Volume of Wheat Traffic Through Duluth-Superior	15
10.	Summary of Wheat Handled by Minneapolis-St. Paul Area Elevator as Reported to the Minneapolis Grain Exchange	16
11.	Production of Soybeans	19
12.	Volume of Soybeans Transported to Duluth-Superior, Minneapolis-St. Paul, Red Wing, Mankato and Hastings as a Percentage of the Tri-State Production	20
13.	Soybean Traffic Through Duluth-Superior	22
14.	Distribution of U.S. Exports of Soybeans by Originating Port Area	23
15.	Soybean Traffic Through Minneapolis-St. Paul	25
16.	Difference Between Inbound and Outbound Soybean Traffic: Minneapolis-St. Paul	26
17.	Grain Traffic Through Duluth-Superior	27
18.	Grain Traffic Through Minneapolis-St. Paul	28
19.	Volume of Grain Traffic Through Duluth-Superior by Truck, Rail and Vessel	29
20.	Volume of Grain Traffic Through Minneapolis-St. Paul by Truck, Rail and Barge	31

I. INTRODUCTION

In recent years, the increase in production of grains and oilseeds and the increasing percentage of these commodities that have been exported has placed severe strains on the existing transportation system. Various potentially serious problems associated with commodity transportation have already surfaced. The shortage of railcars in recent years along with the other problems of the railroad industry in general have partially contributed to increasing trucking activities. This increase in trucking activities has led to faster depreciation and higher maintenance costs for the highway system. The increase in barge traffic on the nation's waterways has raised problems and controversies. Some of the locks and dams constructed prior to World War II are now being used at levels over their rated capacities. Long queues of waiting vessels are not uncommon scenes at these locks and dams. Modern towboats and barges necessitate a certain minimum depth of the waterways which quite often can only be maintained by dredging. These dredging activities, however, may be detrimental to the local ecology.

This host of articulated problems have aroused much attention and controversies. These symptoms of the strain on the existing transportation system indicate that improvements of both the capacity and the efficiency is called for and points out the need for more effective planning for the future to meet transportation needs and eliminate bottlenecks.

In this paper, the historical transportation pattern of corn, wheat and soybeans, the three major crops produced in the Upper Midwest, is reported and should provide a basis for determining future transportation requirements for this region.

II. CORN

Production of Corn

The production of corn in Minnesota has averaged about 12.4 million tons per year for the seven years from 1971 to 1977. It had a high of 16.8 million tons in 1977 right after a low of only 9.25 million tons in the drought year of 1976. In the same seven-year period, South Dakota produced an average of about 3 million tons of corn annually. Like Minnesota, it hit a high in 1977, producing 3.55 million tons, right after a low of just over 1 million tons in 1976. North Dakota has not been a major corn producing state and hence it is not included here.

Corn Requiring Transportation

Of the corn produced in Minnesota in the seven years from 1971 to 1977, 46 percent was used as feed on the farm where the corn was produced and the rest was sold off the farm (Table 1 and 2). The corresponding figure for South Dakota was about 50 percent. In both states the annual figures do not differ from the average by more than 7 or 8 percent (Table 2). The corn that was sold amounted to an average of 6.8 million tons of corn annually in Minnesota and about 1.5 million tons in South Dakota. That is, a total of about 8.3 million tons of corn annually required some mode of transportation. Part of this corn was hauled by trucks or wagons to other farms which had a deficit in corn for feeding and the rest was hauled by trucks or wagon either to country elevators, subterminals or directly to the Twin Cities. It should be noted, however, that South Dakota has become a net importer of corn in the last few years due to increased feeding activities and is projected to remain so in the future.[1/]

[1/] Based on preliminary projections made by South Dakota State University.

TABLE 1

	PRODUCTION OF CORN: (million tons)				
	MN	SD	Sub-total	Iowa	Total Production
1977	16.80	3.55	20.35	30.55	50.9
1976	9.25	1.04	10.29	32.87	43.16
1975	11.41	2.33	13.74	30.57	44.31
1974	10.08	2.15	12.23	26.54	38.77
1973	14.37	3.98	18.35	33.72	52.07
1972	12.76	4.28	17.04	33.94	50.98
1971	13.30	3.45	16.75	33.04	49.79
Average	12.57	2.97	15.54	31.60	47.14

SOURCE: Agricultural Statistics. 1971-77, USDA.

TABLE 2

Amount of Corn Sold and as a Percentage of Production
(million tons)

	MN		SD		Sub-total		Iowa		Total	
		(%)		(%)		(%)		(%)		(%)
1977	9.58	(57.0)	1.70	(47.9)	11.28	(55.4)	17.11	(56.0)	28.39	(55.8)
1976	4.81	(52.0)	0.46	(44.2)	5.27	(51.2)	17.75	(54.0)	23.02	(53.3)
1975	6.16	(54.0)	1.26	(54.1)	7.42	(54.0)	16.81	(55.0)	24.23	(54.7)
1974	5.44	(54.0)	1.16	(54.0)	6.60	(54.0)	15.93	(60.0)	22.53	(66.8)
1973	8.62	(60.0)	2.15	(54.0)	10.77	(58.7)	18.83	(55.8)	29.60	(56.8)
1972	6.76	(53.0)	1.97	(46.0)	8.73	(51.2)	17.31	(51.0)	26.04	(51.1)
1971	6.12	(46.0)	1.59	(46.1)	7.71	(46.0)	16.52	(50.0)	24.23	(48.7)
Average	6.78	(54.0)	1.47	(49.5)	8.25	(58.1)	17.18	(54.4)	25.43	(54.4)

Source: Agricultural Statistics, 1971-77, USDA.

In recent years, a number of subterminals capable of handling multiple car shipments by rail were built in Southern Minnesota. Corn assembled in these subterminals can be shipped directly to the West Coast or to Gulf Ports.

Corn assembled in country elevators was generally shipped by rail or truck to the Twin Cities. From there it would be put in multiple car shipments for domestic use or to Gulf Ports for export, or it would be reloaded onto barges and sent down the Mississippi River to Gulf Ports.

Minneapolis-St. Paul

Minneapolis-St. Paul is a major corn market and transshipping point in the Upper Midwest. In the past seven years, from 1971 to 1977, Twin Cities terminals received an average of about 2.8 million tons of corn annually, of which about 75 percent was carried by trucks and the rest by rail. This quantity of corn amounted to about a third of the corn sold off the farms where it was produced, or about one-fifth of the total two-state production. The truck/rail ratio has remained fairly stable (Table 3).

From 1971 to 1977, an average of about 2.6 million tons[1/] of corn was shipped from Minneapolis-St. Paul terminals annually. Close to 90 percent of this corn went down the Mississippi by barge. The rest went out by rail. It is apparent that the major reason corn went through Minneapolis-St. Paul area is that the Twin Cities provided an access to cheap barge transportation on the Mississippi River. Recently the increasing ratio of rail rates to barge rates has made river movement even more attractive.

[1/] Less corn is reported outbound than inbound because of the quantities processed or consumed in the Twin Cities area.

TABLE 3

Volume of Corn Traffic Through Minneapolis-St. Paul
(thousand tons)

Inbound Traffic

	Truck	(%)	Rail	(%)	Total
1977	1,595.6	(74.7)	569.9	(26.3)	2,165.5
1976	1,733.0	(69.3)	767.1	(30.7)	2,500.1
1975	1,700.7	(70.2)	721.3	(29.8)	2,422.0
1974	2,424.8	(72.7)	909.7	(27.3)	3,334.5
1973	3,755.8	(84.0)	713.1	(16.0)	4,468.9
1972	1,963.5	(71.7)	776.2	(28.3)	2,739.7
1971	1,331.2	(73.2)	488.7	(26.8)	1,819.9
Average	2,072.1	(74.6)	706.6	(25.4)	2,778.7

Outbound Traffic

	Barge	(%)	Rail	(%)	Total
1977	1,643.7	(92.4)	135.2	(7.6)	1,778.9
1976	2,132.0	(91.9)	186.9	(8.1)	2,318.9
1975	1,780.2	(85.8)	295.8	(14.2)	2,076.0
1974	3,143.7	(90.0)	350.0	(10.0)	3,493.7
1973	3,486.1	(88.5)	453.1	(11.5)	3,939.2
1972	2,028.4	(88.6)	260.6	(11.4)	2,289.0
1971	1,786.8	(84.1)	337.8	(15.9)	2,124.6
Average	2,285.8	(88.8)	287.1	(11.2)	2,572.9

Source: Minneapolis Grain Exchange Annual Reports, 1971-77 and Waterborne Commerce of the United States, U.S. Army Corps of Engineers, 1971-77.

Duluth

Duluth has not been a primary port for corn in the past. It may be heavily used when the export demand for grain is high and transportation facilities are under stress, as in 1973 and 1974. In these two years, Duluth handled 1 million and 1.4 million tons of corn respectively. However, in the slack year of 1977, Duluth only handled less than 200,000 tons of corn (Table 4).

Over 90 percent of the corn received in Duluth was carried by rail. This is due to the distance between Duluth and the corn growing area in Minnesota which is situated in the south and southwestern part of the state. Rail is a less costly mode of transportation than truck for long distance movements.

Almost all of the corn shipped out from Duluth was carried by lake or ocean vessels.

III. WHEAT

North Dakota

North Dakota is the largest wheat growing state in this three-state region. During the last six years, from 1972 to 1977, annual production of wheat has fluctuated between 6.32 million tons in 1974 and 8.64 million tons in 1976, with the average being 7.26 million tons per year (Table 5). In that same period, the percentage of wheat produced in North Dakota that was shipped to Duluth varied between 31 percent in 1976 and 67 percent in 1973, with the average being 49 percent (Table 6). Trucks carried an average of 20 percent of these shipments while rail carried the rest (Table 7). The volume of wheat shipped to Minneapolis-St. Paul area terminals varied between 17 percent of North Dakota production in 1975 and 35 percent in 1972,

TABLE 4

Volume of Corn Traffic Through Duluth-Superior
(thousand tons)

Inbound Traffic

	Truck	(%)	Rail	(%)	Total
1977	18.6	(10.8)	154.2	(89.2)	172.8
1976	31.5	(9.0)	317.4	(91.0)	348.9
1975	24.7	(6.5)	354.8	(93.5)	379.5
1974	75.1	(7.2)	970.4	(92.8)	1,045.5
1973	243.3	(17.4)	1,154.1	(82.6)	1,397.4
1972	6.7	(1.3)	525.8	(98.7)	532.5
1971	9.9	(1.1)	915.5	(98.9)	925.4
Average	58.5	(8.5)	627.5	(91.5)	686.0

Outbound Traffic

	Vessel	(%)	Rail	(%)	Total
1977	154.5	(98.7)	2.0	(1.3)	156.5
1976	382.0	(99.5)	2.1	(0.5)	384.1
1975	303.6	(98.6)	4.3	(1.4)	307.9
1974	1,021.9	(98.7)	13.8	(1.3)	1,035.7
1973	1,388.8	(99.5)	6.9	(0.5)	1,395.7
1972	579.0	(97.7)	13.4	(2.3)	592.4
1971	1,003.9	(98.5)	15.8	(1.5)	1,019.7
Average	690.5	(98.8)	8.3	(1.2)	698.9

Source: Minneapolis Grain Exchange Annual Reports, 1971-77.

TABLE 5

Production of Wheat
(million tons)

	North Dakota	South Dakota	Minnesota	Total
1977	6.90	2.16	3.96	13.02
1976	8.64	1.19	3.91	13.74
1975	7.93	1.88	2.65	12.46
1974	6.32	1.71	2.43	10.46
1973	7.25	1.80	2.34	11.40
1972	6.51	1.63	1.48	9.62
1971	8.75	1.96	1.79	12.50
1970	4.59	1.18	0.69	6.58
1969	6.17	1.29	0.73	8.19
1968	6.38	1.97	1.02	9.37
1967	5.41	2.22	1.00	8.63

SOURCE: Agricultural Statistics, 1967-77, USDA.

TABLE 6

Percentage of Wheat Produced in North Dakota, South Dakota and Minnesota Shipped to Minneapolis and Duluth

	North Dakota [a]		South Dakota and Minnesota [b]	
	Duluth	Minneapolis	Duluth	Minneapolis
1977	50.2%	23.4%	16.8%	34.5%
1976	31.2%	22.7%	24.4%	36.0%
1975	49.7%	17.3%	33.5%	51.4%
1974	40.7%	26.7%	21.1%	39.9%
1973	66.6%	31.1%	36.5%	19.8%
1972	49.4%	35.3%	37.5%	27.8%
Average	(49.17)	(24.70)	(27.08)	(35.42)

[a] Computed from figures in Table 5 and Table 7.

[b] Computed from figures in Table 5 and Table 8.

TABLE 7

Volume of Wheat Shipped from North Dakota

to

	Duluth		Minneapolis	
	Truck	Rail	Truck	Rail
	(%)	(%)	(%)	(%)
1977	.743 (21.4)	2.721 (78.6)	.541 (33.5)	1.074 (66.5)
1976	.635 (23.5)	2.062 (76.5)	.429 (28.0)	1.104 (72.0)
1975	.784 (19.9)	3.161 (80.1)	.317 (23.1)	1.054 (76.9)
1974	.456 (16.9)	2.117 (83.1)	.362 (15.5)	1.327 (84.5)
1973	.949 (19.7)	3.876 (80.3)	.600 (26.6)	1.652 (73.4)
1972	.700 (17.9)	3.217 (82.1)	.400 (17.4)	1.898 (82.6)
AVERAGE	.711 (19.9)	2.860 (80.1)	.442 (24.6)	1.352 (75.4)

SOURCE: Upper Great Plains Transportation Insittute, Fargo, North Dakota.

with the average being 25 percent (Table 6). Trucks carried an average of 25 percent of these shipments while rail took the rest (Table 7).

South Dakota and Minnesota

The annual production of wheat in South Dakota in the last six years varied between a low of 1.2 million tons in the drought year of 1976 to a high of 2.16 million tons in 1977, with the average being 1.73 million tons per year (Table 5). As for Minnesota, the annual production of wheat increased every year from 1.48 million tons in 1972 to 3.96 million tons in 1977 with the average being 2.8 million tons per year (Table 5).

From 1972 to 1977 Minnesota and South Dakota together shipped more than 9.6 million tons of wheat to Minneapolis-St. Paul area terminals, that is, an average of about 1.6 million tons per year (Table 8).[2/] This amounted to about 35 percent of the total two-state production in that period (Table 6 and 8). Trucks carried about 60 percent of this wheat while rail was responsible for the rest.

In that same six-year period, more than 7.3 million tons of wheat originating from Minnesota and South Dakota were shipped to Duluth, that is,

[2/] These figures probably understate total wheat shipments somewhat. They were arrived at by subtracting the volume of wheat traffic originating from North Dakota to Duluth-Superior and Minneapolis-St. Paul from the total volume of wheat received by elevators in Duluth-Superior and Minneapolis-St. Paul respectively. The figures indicating the volume of wheat traffic originating from North Dakota are quite accurate because North Dakota elevators are required by law to report to the State Public Service Commission the volume and the destination of wheat shipped as well as the mode of transportation used. However, although the volume of wheat received by elevators as reported to the Minneapolis Grain Exchange gives an accurate estimate of the total volume of wheat that was shipped to Duluth-Superior and the Twin Cities area, some of the wheat may go through the Twin Cities by rail without ever being handled by an elevator in the Twin Cities and, therefore, not appear in grain exchange statistics.

TABLE 8

Volume of Wheat Shipped from South Dakota and Minnesota*

to

	Duluth		Minneapolis	
	Truck (%)	Rail (%)	Truck (%)	Rail (%)
1977	.576 (56.0)	.452 (44.0)	1.345 (63.7)	.766 (36.3)
1976	.728 (58.9)	.518 (41.6)	.934 (50.9)	.900 (49.1)
1975	.733 (48.3)	.784 (51.6)	1.200 (51.6)	1.127 (48.4)
1974	.479 (54.8)	.395 (45.2)	.863 (52.2)	.790 (47.8)
1973	1.066 (70.5)	.445 (29.5)	.818(100.0)	0 (0)
1972	.347 (29.7)	.820 (70.3)	.686 (79.3)	.179 (20.7)
AVERAGE	.655 (53.5)	.569 (46.5)	.974 (60.8)	.627 (39.2)

* Refer to footnote 2, page 12.

an average of 1.2 million tons annually, which amounted to about 27 percent of the two-state average annual production. Trucks captured more than 50 percent of this traffic while rail got the rest.

Duluth-Superior

Duluth-Superior is the major wheat port in the North Central region of the U.S. In the past eight years, it shipped out an annual average of 4.5 million tons, or about two-thirds of the total wheat shipment from or through the State of Minnesota. In the year 1973, it was shown that the port facilities could handle up to 6.5 million tons of wheat (Table 9). However, the capacity of the locks on the St. Lawrence Seaway and the difficulties of getting enough small ocean vessels to go up to Duluth may prevent Duluth-Superior from handling substantially higher volumes even if port facilities are expanded.[3/]

Minneapolis-St. Paul Area

The Twin Cities area facilities handled about only one-third of the total wheat shipment from or through the State of Minnesota in the past eight years. However, the present trend as seen in Table 9 and 10 indicates that its importance will rise both in absolute and relative terms.

[3/] Grain Transportation in Minnesota, p. 67.

TABLE 9

Volume of Wheat Traffic Through Duluth-Superior
(million tons)

INBOUND TRAFFIC

	Rail		Truck		
		(%)		(%)	Total
1977	3.173	(69.5)	1.391	(30.5)	4.564
1976	2.580	(65.4)	1.363	(34.6)	3.943
1975	3.945	(72.2)	1.517	(27.8)	5.462
1974	2.512	(73.6)	0.935	(26.4)	3.447
1973	4.321	(68.2)	2.015	(31.8)	6.336
1972	4.037	(79.4)	1.047	(20.6)	5.084
1971	1.529	(45.0)	1.869	(55.0)	3.398
1970	1.975	(52.7)	1.776	(47.3)	3.751
AVERAGE	3.009	(66.9)	1.489	(33.1)	4.498

OUTBOUND TRAFFIC

	Rail		Water		
		(%)		(%)	Total
1977	.557	(12.2)	4.012	(87.8)	4.569
1976	.784	(20.9)	2.963	(79.1)	3.747
1975	.602	(11.0)	4.862	(89.0)	5.464
1974	.946	(26.0)	2.696	(74.0)	3.642
1973	1.257	(19.2)	5.285	(80.8)	6.542
1972	1.315	(26.3)	3.691	(73.7)	5.006
1971	.650	(19.3)	2.726	(80.7)	3.376
1970	.806	(21.4)	2.956	(88.6)	3.762
AVERAGE	.865	(19.2)	3.649	(80.8)	4.514

SOURCE: Minneapolis Grain Exchange Annual Reports, 1970-77, and Waterborne Commerce of the U.S., Army Corps of Engineers, 1970-77.

TABLE 10

Summary of Wheat Handled by Minneapolis-St. Paul Area Elevator as Reported to the Minneapolis Grain Exchange (million tons)

INBOUND TRAFFIC

	Truck		Rail		
		(%)		(%)	Total
1977	1.886	(50.6)	1.840	(49.4)	3.726
1976	1.363	(40.5)	2.004	(59.5)	3.367
1975	1.517	(41.0)	2.181	(59.0)	3.698
1974	1.225	(36.7)	2.117	(63.3)	3.342
1973	1.418	(46.6)	1.624	(53.4)	3.042
1972	1.086	(34.3)	2.077	(65.7)	3.163
1971	1.066	(52.2)	0.978	(47.8)	2.044
1970	0.940	(43.7)	1.210	(56.3)	2.150
AVERAGE	1.313	(42.8)	1.754	(57.2)	3.067

OUTBOUND TRAFFIC

	Barge		Rail		
		(%)		(%)	Total
1977	1.977	(75.1)	.654	(24.9)	2.631
1976	2.035	(77.0)	.608	(23.0)	2.643
1975	2.019	(73.4)	.730	(26.6)	2.749
1974	1.776	(71.7)	.700	(28.3)	2.476
1973	1.024	(45.8)	1.214	(54.2)	2.238
1972	1.242	(60.5)	.812	(39.5)	2.054
1971	0.982	(71.1)	.400	(28.9)	1.382
1970	0.967	(57.7)	.710	(42.3)	1.677
AVERAGE	1.503	(67.4)	.729	(32.6)	2.232

SOURCE: Minneapolis Grain Exchange Annual Report, 1970-77, and Waterborne Commerce of the U.S., Army Corps of Engineers, 1970-77.

The Twin Cities received an annual average of just over three million tons of wheat and shipped out an annual average of about 2.2 million tons in the past eight years. Much of the balance was milled into wheat flour in the Twin Cities, which is the fourth largest milling city in the nation. At present, the total capacity of wheat flour mills, excluding durum, in the State of Minnesota is 79,100 cwts. per day, which translates to 1.44 million tons per year.[4/] The total capacity of durum flour mills in Minnesota is 31,300 cwts. per day, or .57 million tons per year.[5/] Forty-one percent of the state wheat flour capacity, which is 32,300 cwts. per day or .814 million tons per year,[6/] and eighty-four percent of the durum flour capacity, which is 26,300 cwts. per day, or .66 million tons per year,[7/] is concentrated around the Twin Cities area.

Barges captured about two-thirds of the outbound wheat traffic from the Twin Cities Area while rail captured almost all the rest[8/] (Table 10).

IV. SOYBEANS

Production of Soybeans

Minnesota is the largest soybean producing state in the three-state region. From 1970 to 1977, it produced a total of over 22 million tons of soybeans, an average of about 2.8 million tons per annum. North and South Dakota are relatively small soybean producing states. The combined production from 1970 to 1977 totaled about 2.5 million

---

[4,5,6,7/] On a 365-day basis.

[8/] Since the rail traffic figures are understated, rail might have played a more important role than is shown here, due to railcars going through the Twin Cities which were not handled by elevators.

tons, or an average of only about 0.3 million tons annually (Table 11). Southcentral Minnesota is the heaviest soybean growing area in this three-state region.

Transportation of Soybeans

About 98 percent of the soybeans produced were sold off the farms where they were grown. A large portion of these went through various ports in Minnesota for export to foreign countries.

From 1970 to 1977, an average of over 1.1 million tons of soybeans, which amounted to about 36 percent of production, went to Duluth-Superior and ports in the Minneapolis-St. Paul area (Table 12). A fraction of the production also found its way to other ports. In 1972, 103 thousand tons of soybeans went through Red Wing and 64 thousand tons went through Winona. These amounted to 3.4 percent and 2.1 percent of the 1972 production respectively. In 1975, the volume of soybeans which went through Red Wing decreased to only 24 thousand tons while that which went through Winona increased to 97 thousand tons. These correspond to less than 1 percent and 3 percent of the 1975 production respectively.

Soybeans produced in southcentral Minnesota have also been shipped directly down to the Gulf ports by rail from subterminals and large country elevators which can handle multiple-car shipments.

Another substantial portion of the soybeans produced in the study region went to the five soybean processors in Minnesota and the nearby processors in Iowa. The total processing capacity of the Minnesota processors, which are Dawson Mills in Dawson, ADM in Red Wing, ADM in Mankato, Honeymead Products

TABLE 11

Production of Soybeans
(millions of tons)

	Minnesota	North Dakota & South Dakota	Minnesota, North and South Dakota	Iowa	Total
Est. 1977	4.00	.39	4.39	7.37	11,76
Rev. 1976	1.99	.19	2.19	6.00	8,19
1975	2.96	.34	3.30	7.11	10.41
1974	2.52	.31	2.83	5.97	8.80
1973	3.82	.44	4.26	7.90	12.16
1972	2.71	.34	3.05	6.48	9.53
1971	1.92	.23	2.15	5.36	7.51
1970	2.36	.21	2.57	5.54	8.11
Average	2.79	0.31	3.09	6.47	9.56

Source: Agricultural Statistics, Annual Report

TABLE 12

Volume of Soybeans Transported to Duluth-Superior, Minneapolis-St. Paul, Red Wing, Mankato and Hastings as a Percentage of the Tri-State Production

	Duluth-Superior	Minneapolis-St. Paul	Red Wing, Mankato & Hastings	Total
1977	0	22.4	19.9	42.3
1976	0	40.1	44.6	84.7
1975	0	25.3	22.9	48.2
1974	2.5	43.2	32.5	78.2
1973	1.3	21.4	16.0	38.7
1972	2.0	33.7	19.3	55.0
1971	16.4	43.9	29.7	90.0
1970	14.2	46.7	20.7	81.6

Source: Constructed from data provided in Minneapolis Grain Exchange Annual Report, 1970-77.

Company in Mankato and Cargill, Inc., in Savage, amounts to over 2 million tons per year. In 1977, an estimated volume of at least 1.6 million tons of soybeans were processed in these plants. Over 95 percent of the soybean deliveries to these processors were estimated to be by truck.

Duluth-Superior

There have not been any soybean exports through Duluth-Superior since 1975, although in 1970 more than 0.36 million tons went through (Table 13). This decline in soybean traffic through Duluth-Superior is in accordance with the decline of soybean traffic through lake ports in general, as can be seen in Table 14. There are three reasons for this change, namely, the inability of the St. Lawrence Seaway to handle large ocean-going vessels, the availability of more competitive multiple-car and unit train rail rates to the Gulf, and the very competitive barge rates down the Mississippi River.

In the years when soybeans went through Duluth-Superior, rail played a major role in delivering the soybeans to this port (Table 13). This is due to the distance between the soybean producing area in Minnesota and Duluth-Superior. If soybeans are exported through Duluth-Superior again in the future because of an increase in export demand, improvements in the Seaway, or other changes in the transportation system and marketing patterns, it would be reasonable to expect the railroads to handle the movement to Duluth rather than trucks.

TABLE 13

Soybean Traffic Through Duluth-Superior

Inbound Traffic (thousand tons)

	Truck	(%)	Rail	(%)	Total
1977	--		--		--
1976	--		--		--
1975	--		--		--
1974	42.8	60.1	28.4	39.9	71.2
1973	26.6	46.5	30.6	53.5	57.2
1972	37.5	62.6	22.4	37.4	59.9
1971	65.3	18.6	286.6	81.4	351.9
1970	76.1	20.8	289.5	79.2	365.6
Average*	31.0	27.4	82.2	72.6	113.2

Outbound Traffic (thousand tons)

	Truck	(%)	Rail	(%)	Total
1977	--		--		--
1976	--		--		--
1975	--		--		--
1974	65.0	92.7	5.1	7.3	70.1
1973	75.1	99.1	0.7	0.9	75.8
1972	46.9	88.8	5.9	11.2	52.8
1971	371.6	99.5	1.9	0.5	373.5
1970	368.2	99.2	3.1	0.8	371.3
Average	115.8	98.2	2.1	1.7	117.9

*Average over eight years.

Source: Minneapolis Grain Exchange Annual Report, 1970-77 and Waterborne Commerce of the United States, U.S. Army Corps of Engineers

TABLE 14

Distribution of U.S. Exports of Soybeans by
Originating Port Area
(in percent)

Port Area	1965	1970	1975	1976
Lakes	26.3	22.1	12.5	10.6
Atlantic	9.3	5.8	11.0	11.4
Gulf	64.4	72.1	76.4	77.9
Pacific	0	0	0.1	0.1

Source: An Analysis of Current and Future Marketing Patterns and Transportation Alternatives in Southern Minnesota, CONSAD Research Corporation, August 1977.

Minneapolis-St. Paul

Most of the soybean exports from this study region went through the Minneapolis-St. Paul area ports. Table 15 shows the volume of soybeans that went into and out of the Twin Cities area ports.

From 1970 to 1977, an average of one million tons of soybeans was received annually by elevators in this area. Trucks moved more than three quarters of the traffic to these elevators while rail was responsible for the rest. Moreover, trucks are slowly gaining an even larger share of this traffic.

In the eight-year period, the average shipment of soybeans from the Twin Cities area amounted to about three quarters of a million tons annually. This means that an average of about a quarter of a million tons of soybeans were processed into various products in the Twin Cities area annually (Table 16). Barges handled over 90 percent of the shipments out of the area while rail handled most of the rest.

V. SUMMARY

Duluth-Superior and Minneapolis-St. Paul are the two major grain ports in the Upper Midwest. From 1970 to 1977, Duluth-Superior handled an average of more than 5.3 million tons of corn, wheat and soybeans per year (Table 17). Trucks accounted for 29 percent of these grain deliveries to Duluth-Superior and rail accounted for the rest. Eighty-three percent of these grains was shipped out by vessel and the rest by rail (Table 19). In the same eight-year period, Minneapolis-St. Paul received an average of about 6.8 million tons of corn, wheat and soybeans per year (Table 18), while shipping out an average of about 5.5 million tons per year. The balance,

TABLE 15

Soybean Traffic Through Minneapolis-St. Paul

Inbound Traffic (thousand tons)

	Truck	(%)	Rail	(%)	Total
1977	797.0	81.0	187.5	19.0	984.5
1976	699.5	79.7	178.7	20.3	878.2
1975	682.7	81.9	150.4	18.1	833.1
1974	961.3	78.7	260.9	21.3	1,222.2
1973	824.4	90.4	87.5	9.6	911.9
1972	816.6	79.5	210.4	20.5	1,027.0
1971	742.3	78.6	202.4	21.4	944.7
1970	748.6	62.4	451.9	37.6	1,200.5
Average	784.1	78.4	216.2	21.6	1,000.3

Outbound Traffic (thousand tons)

	Barge	(%)	Rail	(%)	Truck	(%)	Total
1977	579.3	77.4	66.6	8.9	102.8	13.7	748.7
1976	665.4	97.6	13.0	1.9	3.6	0.5	682.0
1975	397.5	89.8	29.6	6.7	15.7	3.5	442.8
1974	886.1	95.5	37.4	4.0	4.2	0.5	927.7
1973	578.5	87.0	64.0	9.6	22.7	3.4	665.2
1972	610.5	98.3	10.6	1.7	--		621.1
1971	677.1	90.9	67.5	9.1	--		744.6
1970	1,024.0	89.1	125.7	10.9	--		1,149.7
Average	677.3	90.6	51.8	6.9	18.6	2.5	747.7

Source: Minneapolis Grain Exchange Annual Report, 1970-77, and Waterborne Commerce of the United States, U.S. Army Corps of Engineers

TABLE 16

Difference Between Inbound and Outbound Soybean Traffic:
Minneapolis-St. Paul
(thousand tons)

	Inbound	Outbound	Difference
1977	984.5	748.7	235.8
1976	878.2	682.0	196.2
1975	833.1	442.8	390.3
1974	1,222.2	927.7	294.5
1973	911.9	665.2	246.7
1972	1,027.0	621.1	405.9
1971	944.7	744.6	200.1
1970	1,200.5	1,149.7	50.8

TABLE 17

Grain Traffic Through Duluth-Superior (thousand tons)

Inbound Traffic

	Corn	Wheat	Soybeans	Total
1977	173	4,564	---	4,737
1976	349	3,943	---	4,292
1975	380	5,462	---	5,842
1974	1,046	3,447	71	4,493
1973	1,397	6,336	57	7,790
1972	532	5,084	60	5,676
1971	925	3,398	352	4,675
1971	958	3,751	366	5,075
Average	720	4,498	113	5,331

Outbound Traffic

	Corn	Wheat	Soybeans	Total
1977	157	4,569	---	4,726
1976	384	3,747	---	4,131
1975	308	5,464	---	5,772
1974	1,036	3,642	70	4,748
1973	1,396	6,542	76	8,014
1972	592	5,006	53	5,651
1971	1,020	3,376	374	4,770
1970	827	3,762	371	4,960
Average	715	4,514	118	5,347

TABLE 18

Grain Traffic Through Minneapolis-St. Paul (thousand tons)

Inbound Traffic

	Corn	Wheat	Soybeans	Total
1977	2,166	3,726	985	6,877
1976	2,500	3,367	878	6,745
1975	2,422	3,698	833	6,953
1974	3,334	3,342	1,222	7,899
1973	4,469	3,042	912	8,423
1972	2,740	3,163	1,027	6,930
1971	1,820	2,044	945	4,809
1970	2,492	2,150	1,201	5,843
Average	2,743	3,067	1,000	6,810

Outbound Traffic

	Corn	Wheat	Soybeans	Total
1977	1,779	2,631	749	5,159
1976	2,319	2,643	682	5,644
1975	2,076	2,749	443	5,268
1974	3,494	2,476	928	6,898
1973	3,939	2,238	665	6,842
1972	2,289	2,054	621	4,964
1971	2,125	1,382	745	4,251
1970	2,299	1,677	1,150	5,126
Average	2,539	2,232	748	5,519

TABLE 19

Volume of Grain Traffic Through Duluth-Superior
by Truck, Rail and Vessel (million tons)

Inbound Traffic

	Truck		Rail		Total
		(%)		(%)	Total
1977	1.4	30	3.3	70	4.7
1976	1.4	33	2.9	67	4.3
1975	1.5	26	4.3	74	5.8
1974	1.0	21	3.5	79	4.5
1973	2.3	29	5.5	71	7.8
1972	1.1	19	4.6	81	5.7
1971	1.9	41	2.8	59	4.7
1970	1.9	37	3.2	63	5.1
Average	1.56	29	3.76	71	5.32

Outbound Traffic

	Vessel		Rail		Total
		(%)		(%)	
1977	4.2	88	0.5	12	4.7
1976	3.3	81	0.8	19	4.1
1975	5.2	90	0.6	10	5.8
1974	3.7	80	1.0	20	4.7
1973	6.7	84	1.3	16	8.0
1972	4.3	87	1.3	23	5.6
1971	3.7	85	1.1	15	4.8
1970	4.2	84	0.8	16	5.0
Average	4.41	83	0.93	17	5.34

which is mainly wheat, was processed in the Twin Cities area which has the fourth largest milling capacity of the U.S. cities. Trucks accounted for over 60 percent of the corn, wheat and soybean deliveries to the Twin Cities and rail accounted for the rest. The dominance of trucks can be explained in part by the relative rates for truck and rail grain transportation. Truck rates in 1978 were generally less than rail rates for hauls of up to 100 miles and competitive with rail rates for hauls of 100 to 200 miles. Barges captured 80 percent of the shipments from the Twin Cities while rail handled the rest (Table 20). Costs of barge movement to the Gulf under long term contracts were less than $7.00 per ton while the multiple car rail rate to the Gulf was over $22 per ton.

Duluth has remained a major wheat port in the Upper Midwest due to (1) its proximity to the wheat producing areas in North Dakota, (2) the existing rail lines linking it to these areas, and (3) its abundance of port facilities. However, wheat traffic through Duluth has not been growing while Minneapolis-St. Paul area (including Savage) has been gaining importance as a wheat port. One explanatory factor is that the growth in wheat production in the three-state area has been largely in west and southwest Minnesota. Another reason is that total transportation costs to foreign countries via the Mississippi River and Gulf ports by barge and ocean vessel can be favorable to those by vessel from Duluth via the St. Lawrence Seaway.

Corn and soybeans, grown largely in southern Minnesota, have been going down the Mississippi to the Gulf ports primarily via Minneapolis-St. Paul. The importance of Duluth for corn and soybean traffic has declined both in absolute and relative terms. This is again due to cost considerations as well as the difficulties of getting small ocean vessels to go up to Duluth.

TABLE 20

Volume of Grain Traffic Through Minneapolis-St. Paul
by Truck, Rail and Barge (million tons)

Inbound Traffic

	Truck		Rail		Total
		(%)		(%)	
1977	4.3	62	2.6	38	6.9
1976	3.8	56	2.9	44	6.7
1975	3.9	56	3.1	44	7.0
1974	4.6	58	3.3	42	7.9
1973	6.0	71	2.4	29	8.4
1972	3.9	56	3.0	44	6.9
1971	3.1	65	1.7	35	4.8
1970	3.5	60	2.4	40	5.8
Average	4.14	61	2.68	39	6.82

Outbound Traffic

	Barge		Rail		Total
		(%)		(%)	
1977	4.2	81	1.0	19	5.2
1976	4.8	86	0.8	14	5.6
1975	4.2	79	1.1	21	5.3
1974	5.8	84	1.1	16	6.9
1973	5.1	75	1.7	25	6.8
1972	3.9	78	1.1	22	5.0
1971	3.5	81	0.8	19	4.3
1970	4.0	78	1.1	22	5.1
Average	4.44	80	1.09	20	5.53

Bibliography

Milling and Grain Directory, Milling and Baking News, Vol. 56, No. 44, December 9, 1977.

Minneapolis Grain Exchange Annual Reports, 1970-77.

Waterborne Commerce of the United States, U.S. Army Corps of Engineers, 1970-77.

Grain Transportation in Minnesota, Minnesota State Planning Agency, Transportation Planning Section, January 1975.

TRANSPLAN 76: Initial Iowa Transportation Plan, Department of Transportation, Iowa, Planning and Research Division, March 1976.

Minnesota Agricultural Statistics, Crop and Livestock Reporting Service, U.S. Department of Agriculture and Minnesota Department of Agriculture, 1970-77.

Hill, R. A., Fruin, J., Wilson, D., Historical and Projected Volumes of the Twin Cities Waterborne Commerce 1963-1985, Title V Report 21, Department of Agricultural and Applied Economics, University of Minnesota, February 1978.

North Dakota Grain Transportation Statistics, Upper Great Plain Transportation Institute Report No. 26, 29-31.

Koo, W. W., and Cramer, G. L., Shipment Patterns of Montana Wheat and Barley Under Alternative Rail and Truck-Barge Rate Structures, Montana Agricultural Experiment Station, Bulletin 696, Montana State University, March 1977.

Payne, W. F., Primary Destinations of South Dakota Wheat, Soybeans and Flaxseed, 1970, Agricultural Experiment Station, Bulletin 601, South Dakota State University, September 1972.

_____, Primary Destinations of South Dakota Corn, Oats, Barley and Sorghum, 1970, Agricultural Experiment Station, Bulletin 605, South Dakota State University, December 1972.

Commodity Movement by Railroad in the State of South Dakota, South Dakota Department of Transportation, Division of Railroads.