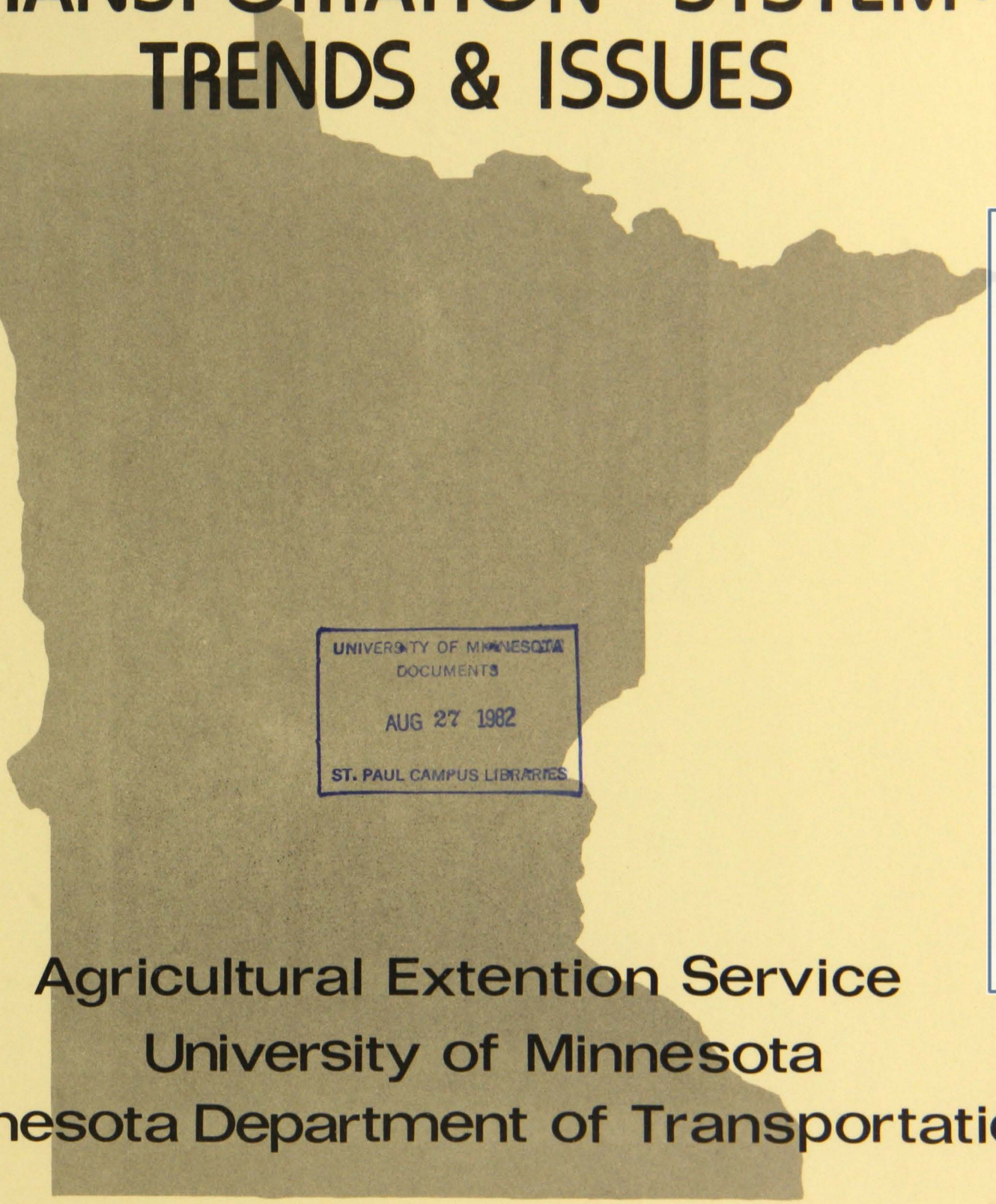
MINNESOTA'S AGRICULTURAL TRANSPORTATION SYSTEM: TRENDS & ISSUES



Agricultural Extention Service
University of Minnesota
Minnesota Department of Transportation

Extention
Bulletin 474-1982

MINNESOTA'S AGRICULTURAL TRANSPORTATION SYSTEM:

TRENDS AND ISSUES

Extension Bulletin 474-1982

by

Jerry Fruin
Associate Professor, Marketing and Transportation
Department of Agricultural and Applied Economics
University of Minnesota

May 1982

Financial support and technical assistance was provided by:

Minnesota Department of Agriculture

Minnesota Department of Transportation

United States Department of Agriculture SEA-Extension

TABLE OF CONTENTS

INTRODUCTION

Agricultural technology and trade patterns have reached the point where an adequate agricultural transportation system is absolutely essential for farm prosperity in Minnesota and the Upper Midwest. Our cash grain farms increasingly require reliable access to international markets. About one-half of Minnesota's corn crop and one-third of its soybean crop are typically exported. An even higher proportion of Minnesota and North Dakota wheat and sunflowers are exported.

If this grain cannot be moved into export channels--either because of a lack of transportation facilities or because high transportation costs make it non-competitive in international markets--returns per acre of farmland will decrease, marginal land will come out of production, and the value of the remaining land will decrease. Rural firms which provide goods and services to farmers and farm families will feel the impacts almost immediately.

Upper Midwest farm products are especially vulnerable to transportation shortfalls. Because of the distance from the oceans and the deepwater ports, Upper Midwest farms are the last to prosper and the first to be hurt during swings in export demand. Consequently, it is necessary to be ready to ship to where the markets are located. The Upper Midwest must have alternative outlets. Upper Midwest grain merchants must be able to ship to ports on the Gulf of Mexico, or out through the St. Lawrence Seaway, or by rail to the West Coast or even to the East Coast. That type of flexibility is essential to a healthy agriculture.

There are some important trends in agricultural transportation--some continuing and some developing--that must be recognized if future transportation requirements are to be met.

"What are these future agricultural transportation requirements?" That question cannot be answered definitely without knowing what the world supply and demand for food is going to be in the year 2000 and who will have the purchasing power to buy it. It requires answers to questions like:

> What will the world population growth be in the next 20 years?
>
> In what countries will this population growth occur?
>
> Will the industrialized nations continue to subsidize exports of food produced by their farmers?
>
> Who will be the "good guys" and the "bad guys" in the world's shifting political alliances?

Future agricultural transportation requirements will also be affected by state and federal government policies on such things as port and waterway user charges, railroad mergers, economic regulation of transportation, energy controls and road, bridge and highway financing.

Citizens of Minnesota and other states can have influence on some developments and policies through their political and economic activities. However, frequently Minnesota citizens, firms and government officials will have to respond to external events and trends. This report discusses a number of these trends and external factors and how they impact Minnesota agricultural transportation.

UNITED STATES FOOD EXPORT POLICY

One of the key questions is, "what will the U.S. policy on food exports be in future administrations?" Recent administrations have basically supported all-out agricultural production and have encouraged agricultural exports. A primary driving force behind this policy was to use foreign agricultural sales to obtain foreign exchange to help pay for the United States oil imports. However, as we reduce imports of oil, the U.S. foreign exchange problems will become more manageable. Then the political pressures for an all-out agricultural export policy will decline. A future administration may encourage extensive conservation measures at the expense of farm production and exports. This is a real possibility. There are people, some with excellent credentials, who will argue that we are farming too intensively with too little regard for conservation and, consequently, exporting our future soil fertility and production capacity. If their arguments prevail, then some future administration may adopt farm policies that will deliberately reduce our farm exports. Many agriculturalists do not agree with their arguments, but this is an important issue that deserves the most serious consideration.

Another key question influencing export demand is the future strength of the dollar as a world currency. One of the driving forces behind the increase in farm exports during the 1970's was the devaluation of the dollar in 1971 and the continuing weakness of the dollar throughout the decade. A strengthened dollar is not good for farm exports for two reasons. First, it takes more dollars to buy an equivalent amount of U.S. agricultural products. Second, OPEC oil is priced in dollars. When the dollar strengthens, OPEC oil prices to other countries increase in real terms. This reduces the purchasing power of those countries for both food imports and oil imports. If a country can produce some food but no oil, it tends to first use its foreign exchange for oil for heating, transportation and power--and only after meeting those needs, will it buy U.S. grain. In fact, high oil prices may cause some potential food importers to become self-sufficient or nearly self-sufficient in food production.

AGRICULTURAL EXPORT TRENDS

Historically, Minnesota adjusted for its locational disadvantage in two distinct ways depending on whether the product was feed grain (i.e., corn) or food grain (i.e., wheat). A very high percentage of the corn produced was consumed on the farm or locally and converted to less bulky meat, dairy and poultry products. The potential problems of high transportation costs and logistics capacity for bulk corn was thereby avoided until the grain export boom of the 1970's. Upper Midwest wheat and wheat flour, on the other hand, has always been shipped long distances eastward to the population centers of the U.S. industrial northeast, and even farther to the historic Old World markets of Europe where the Region's durum and hard, red spring wheats were preferred for bread and baking.

This movement developed very early in the history of the country. Its initial development was due to the favorable transportation costs at the time. Over the years, a favorable rate structure was developed, and this encouraged the continuation and growth of the long distance movement of wheat and flour.

Specifically, U.S. wheat has been moving eastward to U.S. and European markets since 1825 when the Erie Canal was opened. Use of the Erie Canal lowered the cost of transportation from Buffalo, New York, to Albany almost immediately from $100 per ton to $10 per ton and eventually to $3 per ton. This opened a way for the Old Northwest (the current Midwest) to get its produce to market. Although that area is considered part of the Corn Belt today, the primary cash grain there in the 1820's and 30's was wheat. In the years following the opening of the Erie Canal, New England's agriculture declined rapidly. Grain prices in Great Britain fell 40 to 60 percent as U.S. Midwestern agriculture expanded. Wheat production moved westward. Traffic grew from inland ports on the Great Lakes to Buffalo and the Erie Canal, and then up and down the sea coast or to England and Europe.

After the Civil War, agriculture continued to expand westward. Great Lakes traffic grew and the trunk line railroads became important competitors with the Lakes for grain traffic from the Midwest. By the 1870's, railroad rate wars from the Midwest to the East were common. These ended with the establishment of the ICC in 1887 which institutionalized the railroad east-west rate structure. That rate structure included export rates, port-equalization rates, transit privileges, and proportional rates all designed to allow railroads to compete with Great Lakes water transportation.

Eventually, the pattern of the Corn Belt, the dairy region of the Lakes states, and the Wheat Belt evolved. The high quality milling wheat of Minnesota and the Upper Midwest was served by water transportation from Duluth-Superior to Buffalo, and in recent years, by the St. Lawrence Seaway connection to Europe and by a stable established rail-rate structure. This rail-rate structure was designed to compete with wheat shipments over the lakes, and was equalized at a number of rail-basing points so that changes in the level of rail rates, through general increases, would not change the Upper Midwest's advantage over wheat coming through Omaha and Kansas City. Specifically, although frequently challenged, the rail rate for wheat from Duluth and

Minneapolis to East Coast ports was generally 3¢ less per hundredweight than from Omaha and Kansas City. This favorable railroad rate structure for Upper Midwest wheat lasted almost to the present day.

Since the late 1960's, however, two long-term trends in U.S. agricultural exports have developed which impact the Upper Midwest agricultural commodity flows, and consequently, its agricultural transportation requirements. First, is the increasing proportion of exports of feed grains such as corn and soybeans as opposed to food grains, i.e., wheat and flour. Wheat and wheat products accounted for almost 50 percent of the U.S. export tonnage of grain and oilseeds and their products in 1960, one-third in 1970, and only one-fourth in 1980 (Table 1). In addition, an increasing amount of U.S. export wheat is used as feed or is tied to feed grain sales. This is basically because of the increase in consumer demand for meat, and hence, livestock feed around the world.

The second long-term trend is the shift in our export customers away from our historical markets of Europe. Table 2 shows the change in customer mix by area between 1971 and 1980. Although the total tonnage of farm exports increased by 172 percent during the decade, the export tonnage to the Common Market countries of Europe, which used to be our primary market for wheat, has increased only 56 percent. Agricultural sales to the centrally planned economies of Russia and eastern Europe in 1979 were greater than the total agricultural sales to western Europe in the early 1970's. The Russian grain embargo reduced this in 1980. Future sales to this area obviously will depend on world politics and events over the next several years.

Mexico is now taking twice the quantities of our agricultural products as all of Latin America did 10 years ago. This trade should continue and grow because of U.S. demand for Mexican oil and Mexico's increase in food demand as a result of its very rapid population growth.

Japan is a growth market and is now importing at about the same level as western Europe was 10 years ago. However, its rate of growth is less than that of several other areas. China is, of course, a huge market with whom we did not trade in 1971. The Pacific Rim nations of Japan and China are two of the three nations that are now the world's largest importers of food. The third large importer is Russia.

The exports to Asia have shifted over the decade away from western and southern Asia, i.e., India and Pakistan, to southeast Asian countries bordering the Pacific. Growth in those markets has been much greater than the 82 percent indicated in the table.

What does this mean? Well, the U.S. is exporting to many more locations, but Minnesota and the Upper Midwest are not well located for exporting to many of these locations. Countries that are in a good location for exports from the Upper Midwest, such as Russia and the centrally planned economies, are primarily interested in feed grains to produce meat for their consumers--and not in wheat for bread production--and they are politically uncertain customers. In short, the Upper Midwest grain industry is at the end of the whip driven by world food demand and political events over which it has little or no control.

TABLE 1

EXPORTS OF UNITED STATES AGRICULTURAL EXPORTS
(million metric tons)

Year	All Ag Commodities	Total Grain Oilseed and Products	Wheat and Products	Percent[1/] of Grain Oilseed and Products	Corn	Percent[1/] of Grain Oilseed and Products	Soybeans and Products	Percent[1/] of Grain Oilseed and Products
1960	N.A.	33.6	16.4	48.8	5.6	16.7	4.6	13.7
1965	57.1	52.2	19.8	37.9	15.1	28.9	8.2	15.7
1970	63.5	57.9	19.4	33.5	14.4	27.5	15.6	29.9
1975	101.7	92.5	32.1	34.7	33.4	36.1	16.3	17.6
1980	163.0	146.4	37.2	25.4	63.0	43.0	28.8	19.7

1/ Percentages will not total 100 because of other grains, e.g., rice, barley, oats, etc.

Source: Compiled from U.S. Foreign Agricultural Trade Statistics Report. ERS/USDA various years.

TABLE 2

U.S. AGRICULTURAL EXPORTS BY DESTINATION AREA

(million metric tons)

	1971	1980	% Increase
Western Europe	26.4	41.2	56
Eastern Europe	2.0	11.4	470
U.S.S.R.	--	6.2[1/]	--
Mexico	[2/]	10.1	355
Other Latin America	5.3	14.0	
Japan	9.3	24.9	167
Mainland China	--	9.0	--
Asia - Less Japan & Mainland China	11.4	20.7	82
Africa	2.3	8.8	283
Others	3.3	16.7	406
TOTAL	60	163.0	172

[1/] 19.5 in 1979.

[2/] Included in Latin America

Source: Compiled from U.S. Foreign Agricultural Trade Statistics Report. ERS/USDA, calendar years 1971 and 1980.

WATER TRANSPORTATION TRENDS AND ISSUES

THE GREAT LAKES/SEAWAY ROUTE

The Great Lakes and the Seaway, and before that the Erie Canal, has been the route to move the hard, red spring wheat and durum from the Upper Midwest to Europe. In 1979, grain shipments through Duluth-Superior totaled over 8.5 million metric tons of which about 7 million metric tons were exported. This was about 6.8 percent of U.S. grain exports even though there was a strike at Duluth-Superior for 91 days. The 8.5 million metric tons included 193 million bushels of wheat, or nearly 15 percent of U.S. wheat exports, 52 million bushels of corn, 25 million bushels of barley, and 27 million hundredweight of sunflowers. Over 93 percent of the movements were by lake or ocean vessel. The rest were by rail to East Coast ports or to food processing industries. Rail shipments are primarily during the winter months when the Seaway is closed. Soybean movements through Duluth-Superior have not been important in recent years.

As noted previously, the movement of wheat to European Economic Community (EEC) countries is declining in importance relative to movements to developing countries served by other ports. The extreme length of the Seaway and its capacity limitations tend to place the Seaway at a disadvantage for developing grain movements. The Seaway is an important residual route for corn exports when Gulf and East Coast ports are at capacity. In 1979, 67 percent of the corn exports from Duluth went to Russia and eastern Europe. It is a preferred route for shipments to Russia by Russian ships because of Russia's foreign exchange strategy of using their own fleet as much as possible and the lack of deep-draft "super ports" on the Baltic Sea.

One bright spot for Seaway exports is sunflower seed. There is a big demand in our traditional European markets for sunflower seed. Also, they are light in weight, and thus, do not present a draft problem on the Seaway.

The Great Lakes and the Seaway face a troubled future for both political and physical reasons. On the political side, tolls on the Seaway, which were stable for nearly 20 years, essentially doubled between 1977 and 1980 and increased another 18 percent last spring. A 10 percent increase is scheduled for 1983. The toll increases on the Seaway, of course, impact traffic and flows for all commodities including grain. There are now serious proposals for port user charges to cover dredging and maintenance. The concept of port user charges is, of course, consistent with the Reagan administration's policies of local control of expenditures. However, the concept is being pushed most vigorously by deep-draft ocean ports who want to trade off user charges for a speed-up in channel and port improvements and for a looser set of environmental regulations. A major argument is that such development would help increase coal exports--which like grain exports provide needed foreign exchange to pay our OPEC oil bill. It would also give economic advantages to a few well-situated ocean ports like New York, Baltimore, and New Orleans at the expense of the Lake ports and the Upper Midwest which are already burdened with Seaway tolls.

Two types of constraints exist on the Great Lakes-Seaway system that limit its long-term potential. These are: 1) physical capacity limits due to channel depth, lock dimensions, and locking operations, and 2) seasonal limits due to the winter closing of the system. These constraints will seriously hamper any increase in grain exports through the Seaway that would be likely to occur between 1980 and 2000.

The Welland Canal between Lake Erie and Lake Ontario is the short-term capacity constraint on the Great Lakes-St. Lawrence Seaway System. Without expansion, the limit would be reached by about 1986, but it could be reached sooner if grain exports through the Great Lakes surge. However, Canada is implementing a number of minor structural and non-structural improvements to expand the Welland's capacity to attempt to provide adequate capacity past 1990 and possibly to the year 2000.

Extension of the nine-month Seaway season for two or three weeks is feasible and will provide needed capacity increases for moving export grain in the short run. However, an increase in the Great Lakes' shipping season to 11 or 12 months without a corresponding increase in the Seaway season would be beneficial mainly to ore and coal haulers and the iron and steel industry and of little utility to Midwest grain shippers. If year-round access is to assist the grain trade, it is needed to international markets through the St. Lawrence Seaway and not be limited to Buffalo, New York. It does appear that the Seaway season will be gradually extended to 10 months over the next several years, but there will be continued and severe opposition from environmentalists, eastern ports, East Coast longshoremen unions, and the overland transportation companies that compete for the Great Lakes traffic.

By the year 2000, the physical capacity constraints of the Great Lakes and the Seaway will present numerous problems. The channel depth of 27 feet is the most limiting constraint. Deepening the channel just three feet to 30 feet would have serious environmental impacts on water levels, shorelines, and ecological systems throughout the Great Lakes Basin. Deepening the channel to increase capacity does not seem feasible even in the years after 2000; thus, lake navigation by typical ocean vessels will become less economical or common. The Great Lakes-Seaway system will eventually evolve into a 27-foot draft inland waterway with transfer ports for true deep-draft vessels near the Gulf of St. Lawrence.

THE MISSISSIPPI RIVER ROUTE

As mentioned previously, the Upper Midwest is geographically disadvantaged for corn producers. Prior to the agricultural export boom of the 1970's, much of the corn was fed locally to dairy animals in the form of silage, or it was sold for feed in nearby markets.

The export boom changed that. Now, about one-half of Minnesota's much larger corn crop is exported as many of the livestock and dairy farms have

been converted to cash grain farms. The proportion of Minnesota's corn crop that is exported is substantially higher than that of the United States as a whole.

However, farm prices for corn in Minnesota are still among the lowest in the nation. Why? Simply stated, throughout most of the 1970's, it was the last area in the nation that the exporters would buy from because of its distance from the Gulf ports. Sixty percent of the corn exported from the U.S. is shipped by barge to the Gulf. However, the Upper Midwest has the longest barge haul, as well as the highest barge operating costs of any major grain traffic segment on the river system. However, with the exception of the drought years of the mid-70's, truck-barge shipments of corn from the area expanded rapidly. This was not primarily due to rail car shortages, branchline abandonments, or other railroad problems. It was due primarily to truck-barge rates to the Gulf declining throughout the period when compared with single-car rail rates so that truck-barge transportation to the Gulf was the lowest cost route.

Mississippi River transportation has a number of problems including the Lock and Dam 26 bottleneck at Alton, Illinois, proposals to increase user charges, and restrictions on the Corps of Engineers' dredging.

Lock and Dam 26 has been operated at or near its capacity since 1976. There is no question that this lock is a bottleneck that restricts the capacity of the cheapest method for transporting grain from the Upper Midwest to the Gulf of Mexico and has silently caused expensive changes in grain flow patterns. This bottleneck will continue until about 1990.

A paradox exists in that barge shipments from the upper reaches of the Mississippi River (i.e., from the Twin Cities and Winona) have increased consistently since Lock and Dam 26 reached its capacity of about 63 million tons per year six years ago. For example, almost 7 million metric tons of grain and soybeans were shipped by barge from Upper Mississippi River terminals in 1979, up from a little over 3.6 million metric tons in 1970 and 4.5 million metric tons in 1976. That is because barge shipments from the Upper Mississippi have larger transportation cost savings than from locations closer to Lock and Dam 26. Consequently, these shipments have forced grain from Iowa and Illinois off the river. That grain then goes by an alternative mode or to an alternative port at a higher cost and causes expansion of the alternative mode or port. That is, grain is diverted to the Gulf or to the East Coast by rail, or by truck to lake ports because of the lack of capacity at Lock and Dam 26.

The new Lock and Dam 26 is under construction and is scheduled for completion about 1988. At this time, the capacity will still be constrained to about 73 million tons for 18 months until parts of the old lock and dam can be removed. The capacity of the new, single 1200-foot lock, as currently authorized, is estimated to be about 89 million tons per year from 1990, or about a 40 percent increase over the present capacity.

One of the unsettled arguments regarding Lock and Dam 26 has been whether or not a second lock chamber is needed at Alton, and if so, how large should that lock chamber be, i.e., 600 or 1200 feet long? Proponents of building a second lock at the present time maintain that the new lock will be operated at capacity immediately because of the growth in demand for river transportation over the next decade. This probably will not be the case as the railroads and alternative outlets to the Gulf for Midwest barge grain (Pacific Northwest, East Coast, and lake ports) will have established capacities and handled the grain during the 1980's. The railroads and ports will attempt to keep this business through contracts, concessions and competitive measures. In time, this grain may shift back to the river, but not immediately. When the new lock opens, its capacity will be adequate for several years.

There have also been arguments that when the capacity of Lock and Dam 26 is enlarged, other locks will become bottlenecks. This is not true as Lock and Dam 26 is located at Alton, Illinois, just below the conjunction of the Illinois River and the Upper Mississippi River. During the 1970's, each of these rivers (the Illinois and the Upper Mississippi) contributed about an equal amount of traffic to Lock and Dam 26, so that Lock and Dam 26 handled about twice as much traffic as any of the locks immediately above it. The locks on the Upper Mississippi are the same size as the current Lock and Dam 26 so they will not automatically be at capacity when the new 26 is opened. Lock and Dam 27, below 26, is a new lock and dam with two 1200-foot chambers; thus, it will not be a capacity problem.

This doesn't mean that there will not be problems with lock and dam conditions and/or capacities. Almost all of the 27 locks on the Upper Mississippi were built in the 1930's with a design life of 40 years. Hence, major repairs and/or reconstruction will be necessary at many of these locks prior to 2000. Political battles and delays are likely. In addition, some locks, such as Lock and Dam 2 near Hastings, are used very heavily by recreational boaters causing this lock to be near capacity. However, low-cost alternatives exist for locking small boats and should not present major problems.

WATER USER CHARGES

Waterway user charges will have more effect on barge volumes in the 1990's than the capacity of new Lock and Dam 26. The amount of effect will depend on the outcome of current proposals for increased user fees. A fuel tax user charge was instituted on the inland river system as a result of the political compromise authorizing Lock and Dam 26 construction. This is now at 6¢ per gallon and is scheduled to increase to 10¢ per gallon in 1985.

The current 6¢ tax is estimated to increase the cost of barge transportation from St. Paul to Baton Rouge by 2¢ per bushel and the future 10¢ tax by 3¢ per bushel. The current and 1985 user tax level and structure will have very little impact on grain flows.

However, last year the administration proposed that a fuel tax of 36¢ per gallon be implemented, the Congressional leaders proposed, in all serious-

ness, that all commercial navigation expenditures be recovered. Some of the proposals would change the structure of the user charges so that collections from the different river segments would correspond to the federal navigation expenditures on each segment.

The proposals to increase the tax to 36¢ per gallon would increase barge transportation costs from St. Paul to the Gulf by about 10¢ per bushel. This would be significant and would impact grain flows and exports. A full expenditure recovery charge of 70¢ per gallon would raise barge transport cost to the Gulf an estimated 20¢ per bushel based on current volumes. However, at that level of user charge, sufficient volumes of commodities would leave the river so that user charges per unit would have to be made even higher to meet expenditures. The other proposals calling for changing the structure of the user charge to more closely match revenues and expenditures on river segments would have an even greater impact on the Upper Mississippi River route and possibly raise costs so that only traffic that was truly captive to the river would remain.

RAILROAD TRENDS AND ISSUES

MULTI-CAR LOADING FACILITIES AND DIRECT RAIL SHIPMENTS

Upper Midwest grain flows responded to the changing commodity and customer mix in the 1970's primarily by an increase in barge shipments of grain to the Gulf. However, the Lock and Dam 26 bottleneck and the success of unit grain trains in Illinois and Iowa eventually led to the introduction of multiple-car and train load rates into the Upper Midwest. Table 3 shows the growth of multiple-car loading facilities in rural Minnesota. Note the growth in both size and number. Until recently, all of the multiple-car facilities were located in the corn and soybean area in southwestern Minnesota. Recently, unit-train facilities have been constructed in South Dakota and in the wheat areas of North Dakota and Minnesota.

In 1979, about 1.8 million metric tons, or nearly 70 million bushels of corn and soybeans were shipped by rail from these loading facilities to Gulf ports for export. Direct rail shipments to Gulf ports were negligible prior to the mid-70's. This direct rail movement to the Gulf will continue to increase as a consequence of waterway user fees, Lock and Dam 26 congestion, improved rail operations in the Midwest, and low unit-train grain rates.

The rail system map going to the Gulf from the Upper Midwest is still undergoing changes. Parts of the defunct Rock Island will eventually be absorbed into the remaining railroads and the reorganized Milwaukee II will continue to be available as a bridge line. The merger of the Burlington Northern and the Frisco will allow single-line service from Minnesota and the Upper Midwest to the Gulf ports of Mobile and Pensacola and increase the importance of these Gulf ports for corn and soybeans.

TABLE 3

MULTI-CAR RAIL LOADING FACILITIES IN MINNESOTA[1/]

	1974	1977	1981
25-Car	14	29	39
50-Car	5	11	9
75-Car	--	--	9
100-Car	--	--	3
TOTAL	19	40	60

1/ Does not include terminal elevators in the Twin Cities and Duluth.

Source: Yearbook: The Farmers Elevator Association of Minnesota -- various years.

Potential exists for two major international movements by direct rail which might impact the rail network of the Upper Midwest. One, unit train shipments to locations in Mexico, is already occurring and will undoubtedly increase. The other is a movement of Canadian grain by unit train through Minnesota directly to Gulf ports. The wheat area of the Canadian prairie is a geographical and geological extension of the U.S. Wheat Belt. Total logistics costs which include both land and ocean transportation to South America, Africa, and some other markets would be less if Canadian grain was shipped out of U.S. Gulf ports rather than Thunder Bay, Ontario, on Lake Superior, or Vancouver, British Columbia, on the Pacific coast. This has not been so in the past because the artificially low grain rates in Canada subsidized Canadian grain movements. It appears that Canadian rail grain rates will be increased in the near future. When this occurs, the economic incentive to use the U.S. Gulf ports will increase. There are some problems and constraints, in such things as different quality grading systems, but these are relatively minor compared with the potential cost savings. One rail company, the Burlington Northern, runs from Winnipeg, Manitoba, to the Gulf. In addition, it is likely that railroads affiliated with either the Canadian National (the Grand Trunk Western) or the Canadian Pacific (the Soo Line) will purchase the reorganized Milwaukee II. In that event, one of the major Canadian rail systems will control U.S. lines as far south as the Kansas City gateway.

THE PACIFIC NORTHWEST RAIL ROUTE

Some wheat from western North Dakota has always gone west. In the last decade, the quantities have been increasing and some westward movements now originate as far east as the Red River Valley. However, the real growth in shipments to the Pacific Northwest in recent years has been in corn for export. There was no corn exported from the Pacific Northwest ports in 1977. Sixty-eight million bushels were exported in 1978, 171 million bushels in 1979, and 270 million bushels (6.8 million metric tons) in 1980. This corn came by unit train from South Dakota, Minnesota, Nebraska, and Iowa. The latest development is that unit train shipments of soybeans direct to the Pacific Northwest for export were initiated during the summer and fall of 1981.

What is responsible for this rapid growth of corn exports through the Pacific Northwest? Contributing factors include continued growth in demand in the Pacific Rim markets, the bottleneck at Lock and Dam 26, a capacity problem and increased tolls at the Panama Canal, and increased ocean fuel costs.

However, the most important factor has been the development of low unit-train rates. Table 4 analyzes the net price per bushel of corn obtainable from four major markets from locations in southwestern Minnesota in the fall of 1981. This was calculated by taking the bid price for corn in each of the four potential markets and subtracting the appropriate transportation cost to the market. The highest net price could be obtained by shipping 75-car trains to the Pacific Northwest export market. This was 20¢ per bushel more than

TABLE 4

CORN PRICE AT VARIOUS MARKETS - NET OF TRANSPORTATION FROM SOUTHWESTERN MINNESOTA [1]

(Dollars Per Bushel)

MARKET	MARKET CASH CORN PRICE [2]	CORN PRICE LESS TRANSPORTATION [3] [4]				
		Truck	Single Rail	26-Car Rail	54-Car Rail	75-Car Rail
DULUTH/SUPERIOR	3.07	2.64	2.51	2.70	2.73	2.76
TWIN CITIES	2.93	2.71	2.59	2.75	2.76	2.78
GULF	3.42	NA	2.22	2.64	2.69	2.74
PACIFIC NORTHWEST	3.83	NA	2.54	2.88	2.95	2.98

[1] Walnut Grove, Minnesota.

[2] Number 2 Yellow Export Offers, Oct. 3, 1981, USDA, Grain & Feed Market News.

[3] Chicago Northwestern Transportation Company Freight Tariff CNW 4028-C Series, X003 Level.

[4] Minnesota Public Services Commission Distance and Commodity Rate Table 1.

could be obtained by shipping 75-car train to the Twin Cities, In general, direct rail shipments to the Pacific Northwest provided considerably higher net prices than any of the alternatives throughout the summer and fall of 1981. This is a very recent development. Throughout the 70's, the highest net corn prices would have been obtained by truck shipment to the Twin Cities (if barges were available so barge rates to the Gulf were favorable). Note in Table 4 that trucking to the Twin Cities would provide a more favorable net corn price than any location using single-car rail shipments. This demonstrates the truck rate advantage that caused the switch from rail to trucks throughout the 1970's. Table 4 also indicates that the truck market in the Twin Cities would have provided a higher net corn price than 26- or 52-car trains directly to the Gulf ports during the 1981 harvest season.

Using Table 4, it can be computed that an increase in trainload rates of 21¢ per bushel (37¢ per hundredweight) and the same market prices would "price the Pacific Northwest out of the market." These rates to the Pacific Northwest are now very competitive due to the rail car surplus. They are compensatory, that is, they cover variable costs, but probably do not cover fully allocated costs. It is quite possible that rate increases could occur in the future and that other markets will provide higher net prices as they did as recently as 1980.

RAILROAD DEREGULATION

The Staggers Rail Act of 1980 provided for major changes toward less economic regulation of the railroads in the United States. In general, the current deregulation thrust is bipartisan and was promoted by the Carter administration even more vigorously than the present administration. There will be changes, adjustments, and probably some return to regulation, but many of the changes toward less regulation and more competition will be permanent. The most important principle of the deregulation movement to date is the common carrier concept of equal rates and equal services to all is no longer a guiding philosophy. Many of the old rules about price discrimination were legislated away by the Staggers Rail Act of 1980.

One of the probable results of rail deregulation is that rails will become more competitive with trucks for grain movements. Railroads are best suited for long distance movements of large quantities of heavy, bulk commodities such as grain. However, if the quantities are large enough, railroads can be a lower cost mode than trucks for relatively short distances. Rails have been severely hampered in the past by rate and service regulation that did not allow rail management to adjust rates and/or service to specific market opportunities or competitive situations.

Deregulation of railroad rates and services has allowed railroads to become more flexible and hence, more competitive with trucks. Railroads have been raising rates on unprofitable and/or low volume services with the intention of covering the full cost of this traffic. They also have lowered rates with the intention of recovering grain business lost to trucks.

In addition to the further loosening of restrictions on abandonments, the Staggers Rail Act allows railroads to surcharge low volume branchlines to recover the full cost of service. This means that rail shipments from branchlines can be changed substantially more than from nearby mainline locations. A manufacturing plant may be able to pay such a surcharge. However, for a grain firm, such a difference in transportation costs is the same as abandonment.

This increased freedom to adjust rates and services should encourage railroads to make investments in plant and equipment such as yard improvements in port areas that will produce efficiencies and cost savings that will eventually help grain movements.

The act also authorizes railroads to enter into contracts with shippers, which was not allowed previously. The ability to write contracts will allow the railroad and shipper to negotiate rates, service, and volumes. The railroad can obtain efficiencies through better equipment utilization and needed capital improvements if the volume to support the improvements is guaranteed. Long-term contracts for large volume, short distance movements will allow railroads to recapture business lost to trucks. The formal legalization of rail contracts will encourage the expansion of unit train movements.

However, once established, volume contracts may tie shippers to a port or ports that might not be price competitive as grain markets shift seasonally or in response to shifts in export demand. Other risks or problems for shippers with volume contracts with railroads include shortages in the countryside so that the volume terms of the contract cannot be fulfilled, or the official rail rates may be lowered to less than the contract rates during periods of car surplus. In geographic areas where two railroads compete and enter contracts, the possibility exists that the total volume of rail shipments contracted for may be more than 100 percent of a normal crop. In that case, the shippers would be unable to fulfill the volume part of the contract and possibly be penalized by the contracting railroads.

Rail mergers to increase efficiency are also encouraged by the Staggers Rail Act. Past and future railroad mergers will affect Minnesota grain flows as merged railroads attempt to route more grain traffic over improved or lower cost routes to ports with single-line service from an area. An example would be the development of single-line service for corn and soybeans on the Burlington Northern to the Gulf ports of Mobile and Pensacola as a result of the Burlington Northern-Frisco merger.

Rail abandonments will continue. The Staggers Act, in general, makes it easier to abandon rail lines, and not only branchlines but any unprofitable rail lines--be they one mile or 500 miles long. The philosophy is "use it or lose it."

The result of the Staggers Act rate deregulation, rail contracts, mergers and abandonments, will be a concentration of large volume grain movements through a limited number of mainline locations that can load multiples of 25 or 26 cars or more. Trucks will haul grain farther from farms to country

train-loading facilities. This has far-reaching implications for such things as the structure and organization of country elevators and the future of the small towns and businesses whose economic outlook was previously favorable because they were on a railroad mainline. In addition, the rural road network will be impacted because heavier vehicles will travel farther to get to the train-loading locations with resulting costs to local governments.

ROAD AND HIGHWAY TRENDS AND ISSUES

We need a strong infrastructure of roads and highways to get agricultural products to locations where they can be processed or where rail or water can move them to export ports. This includes the rural road and country road systems, as well as our federal and state primary systems. However, there is a significant road and highway financing problem. We generally have not been building or rebuilding roads and highways as fast as we have been wearing them out.

Agriculture as an industry has three interrelated concerns about roads and highways. The first is the financial crisis at all levels of highways from the interstate system to the township roads. The second is the inadequacies of our rural road and bridge system. The third is the relationship between heavier vehicles, longer hauls, and increased highway wear. As a result of technology and shifting markets, vehicle sizes and lengths of hauls have been increasing for several decades.

ROAD AND HIGHWAY FINANCING TRENDS

Highway construction and maintenance have probably been as hurt by the hidden cost of inflation as any other part of our economy. Until recently, the costs of road construction and maintenance had been increasing much faster than inflation. On the other hand, our system for funding roads is almost independent of inflation.

The primary sources of funds for roads have traditionally been gasoline taxes, vehicle and operator licenses, and property tax revenues. Revenues from the gasoline tax and license fees do not increase with inflation, but require legislative action. In fact, the impact of inflation on purchasing power has frequently been used as a reason not to increase these fees. The end result has been that revenues from the gasoline tax, which historically accounted for 50 percent of our national highway and road spending, were decreasing absolutely as a result of our national goals of improving gas mileage and reducing driving. Total highway fuel used in the U.S. dropped about 3.5 percent in 1979, 5.2 percent in 1980, and 2.7 percent through August 1981. This downward trend in gasoline consumption is permanent, as the 1985 model U.S. cars are projected to obtain 45 percent better gas mileage than the average car on the road in 1981.

Gasoline tax revenues are spent primarily on the interstate and primary road system. In 1972, total Minnesota and federal tax on gasoline was 11¢

per gallon, or about one-third the retail price. At that time, roughly 33¢ of every dollar spent on gasoline went to the construction and maintenance of roads and highways. Now, the total Minnesota and federal tax is 17¢ per gallon, but only about 12¢ of every dollar spent on gasoline goes to the road and highway system.

Local revenues, such as the property tax, have been the primary source of funding for local roads. The property tax is theoretically a very good source of funds for local roads because the local property owner receives most of the benefits of local roads through improved access and increased property values. However, state limits on property tax levels has probably kept the level of spending on rural roads below that which rural people would be willing to pay even in the face of widespread discontent with taxes generally.

RURAL ROAD ISSUES

Our rural road system was built during the 1920's and 1930's when the average farm was less than 200 acres and farm trucks had gross weights of 6 or 7 tons. In fact, 70 percent of U.S. rural bridges were constructed by 1935. About 50 percent of all the U.S. rural roads were improved before 1950.

Rural transportation needs have changed considerably since the 1930's. Crop yields have increased, U.S. farm size has doubled, and markets have shifted off the farm into national and international channels. Rural traffic characteristics have also changed. Tandem-axle trucks with gross weights of 23 tons have become common on rural roads. A farm tractor and two wagons loaded with soybeans can weigh up to 28 tons. These vehicles are traveling over bridges built when 8 tons were considered a heavy load.

Obviously, we must maintain an adequate rural road system to cope with these changes. However, in many parts of the Upper Midwest, we have too many rural roads to maintain efficiently. We no longer need roads that were plotted at one-mile intervals to serve 160-acre farms with horses.

If we were to lay out a road system today, we could put roads two miles apart and still have better access to towns and markets than we had 60 years ago. If the excess roads were eliminated, the number of intersections, and grade crossings would be reduced and the remaining land could be farmed. The selection of roads to be abandoned will be a tough political process, but bridge replacement needs will probably play a key role in these decisions.

Vehicle weight limits on roads and highways are frequently a problem for agricultural shippers. However, they are necessary to protect our investment in roads as the stress exerted on highway pavement increases as the fourth power of the axle load. When axle weight increases from 9 tons to 10 tons, stress from that axle increases by roughly 50 percent. An

80,000-pound truck weighs 20 times as much as an automobile, but its combined axles cause 9,600 times as much stress on the pavement and roadbed. This presents a major problem for Minnesota and other Corn Belt states because we have many grain elevators and other rural businesses on 9-ton or seasonally restricted roads. These businesses, especially the elevators, have a severe competitive advantage compared with any nearby competitor on a year-round 10-ton route.

It is no secret that in the past, grain trucks frequently were overloaded. Farmers, truckers, and enforcement officials often failed to realize the magnitude of the damage and expense that overloading causes. Because of the potential damages, the weight limit laws require vigorous enforcement and education.

Another rural road problem relates to the size, especially the width, of farm machinery. Should the farm machinery industry and farmers expect the public to provide adequate width for the movement of set-up machinery between farms? Is a bridge that is adequate and safe for automobile and truck traffic inadequate because it is too narrow for farm machinery? If so, then in a time of reduced road funds, where will the money come from for its modification or replacement? This issue will become more important in the future.

UNIT TRAIN EFFECTS ON THE RURAL ROAD NETWORK

Development of unit-train loading facilities and their use has had a mixed effect on the road and highway system. Like the old rail-rate structure, the primary highways of the area are generally east-west oriented. Usage and wear on these primary roads increased substantially throughout the 70's as an increasing number of heavy grain trucks hauled grain longer and longer distances to the lake and river terminals.

Increased direct-rail shipments of grain from country elevators has reduced the use of the primary highways. But now heavy vehicles used in grain assembly are going much longer distances over rural and secondary roads and are increasing the wear on these roads. These secondary roads are frequently not as well constructed as the primary roads which were previously used.

The net effect of whether total road wear will increase or decrease has not yet been determined. However, there will be a transfer of the financial responsibility from the states to local units of government because financing the collector roads is generally a function of local government. This shift will become of increasing concern to the local officials who are responsible for highways.

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Norman A. Brown, Director of Agricultural Extension Service, University of Minnesota, St. Paul, Minnesota 55108.