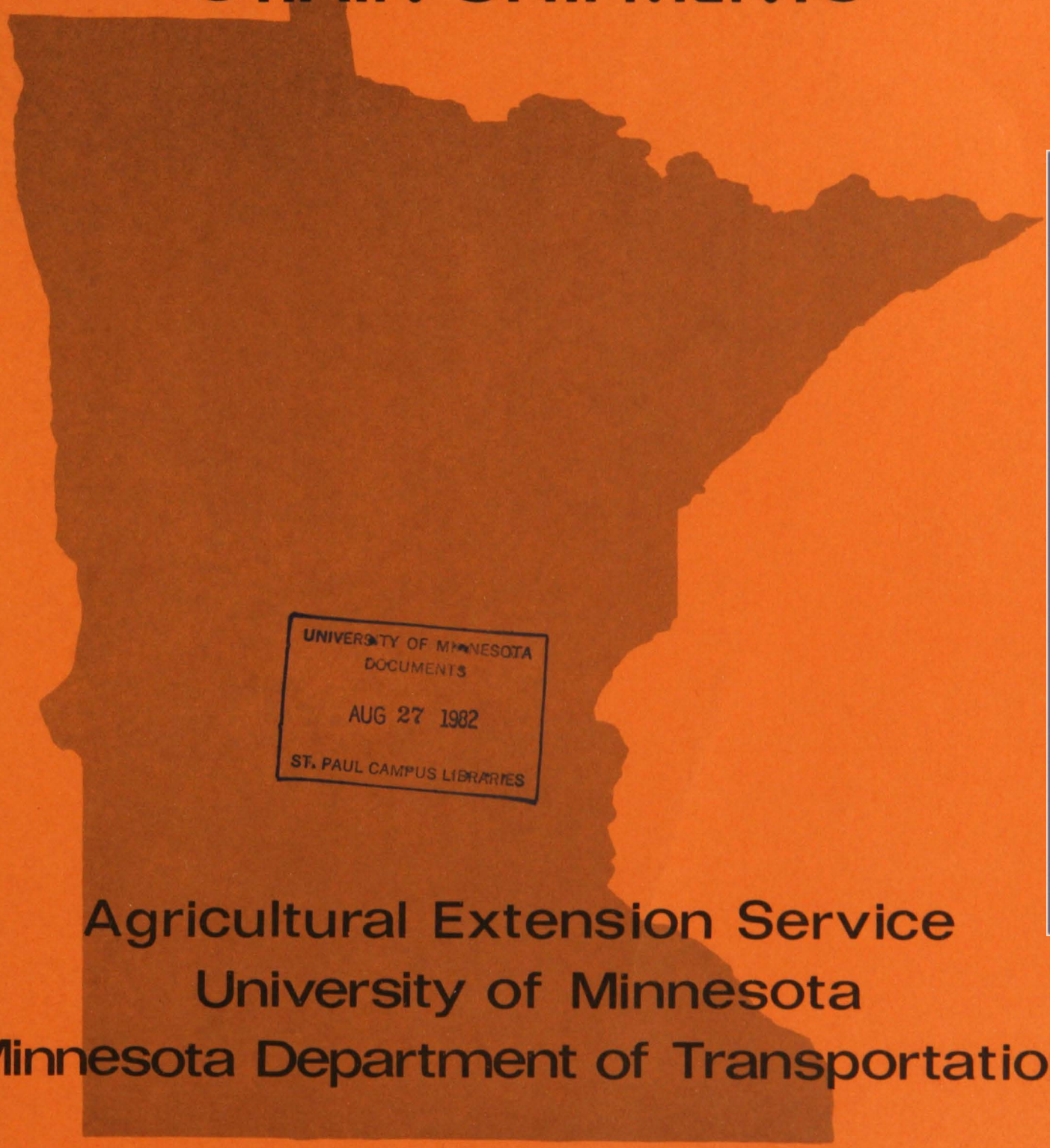


UNIT TRAINS AND MINNESOTA GRAIN SHIPMENTS



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UNIT TRAINS AND MINNESOTA
GRAIN SHIPMENTS

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by

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GRAIN AND THE RAILROADS

The decade of the 70's saw farm policy changes that resulted in an era of unprecedented growth and expansion in the grain industry. Grain exports became an important element in U.S. foreign policy, beginning with the signing of the two-year trade agreement with Russia in the fall of 1972. The Russian agreement was indicative of a major policy shift from agricultural production restrictions to aggressive export sales promotion. With certain perturbations, as in 1975 when domestic reserves became dangerously low and in 1979 during the Russian embargo, U.S. grain exports have moved steadily upward throughout the 70's. This has caused a virtual revolution in grain transportation.

The railroad industry has evolved from their chaotic handling of the harvests of 1973-74 when 15,000 to 20,000 open coal cars were drafted to handle the upsurge in grain demand, to a much more efficient operation in the 1980 season when the rail carriers transported 5 billion bushels of grain with no major or prolonged car shortages.

A principal contributor to the increase in rail carrier efficiency during the 70's was the transformation of the "grain fleet" to "jumbo" covered hopper cars. The jumbo cars were capable of carrying 3,400 bushels of corn compared to 2,000 bushels in the outmoded 40-foot boxcar. This transformation occurred at an average annual rate of 12,300 covered hopper cars until, by 1980, 90 percent of all rail-hauled grain moved in hopper cars.

The changing grain fleet quickly outgrew many branch and main lines with old light-weight rail not up to the 100 pounds per yard standard considered minimal for rail operations today. Shippers found it necessary to upgrade siding and grain transfer facilities during an extensive period of alteration and remodeling.

The decade of the 70's saw the advent of another grain transportation development, the "unit train" grain shipment. Substantial cost and rate reductions were realized from unit train shipments of covered hopper cars, especially when compared to single boxcar shipments. This was due to a 60 percent increase in grain capacity per car and reduced loading, unloading, in-transit, and switching time. The Staggers Rail Act of 1980 afforded rail carriers greater opportunities to transmit these savings to the shipper through rate reductions and to experiment with and adjust charges and services. The result was an unmistakable message that the railroads are in the business of moving large volumes over long distances. This message has been clearest to communities, grain elevators, and farmers served by low-density branch and main lines throughout the Upper Midwest who have discovered that rail carriers intend to move quickly to exercise their Staggers Act freedoms to divest themselves of rail lines that remain or become unprofitable.

The combined efficiencies of covered hopper car and unit-train shipment of grain opened the door for Upper Midwest participation in the rapidly developing export outlets on the West Coast. U.S. West Coast grain volume increased approximately fivefold during the 1971-1980 period, with Japan receiving a relatively constant percentage. Though wheat exports from West Coast terminals tripled during the 1971-1980 period, the biggest contributor

to West Coast grain volume increases has been corn. Corn shipments from these ports remained negligible until 1977, but increased to 39 percent of all West Coast grain volume in the next four years. The rapid development of the corn export market through West Coast outlets, as shown in Table 1, is part of a worldwide trend from food grains, such as wheat, to feed grains and oilseeds, such as corn and soybeans. This has had a significant impact on Minnesota agriculture.

Table 1. Pacific Exports of All Commodities from Puget Sound, Columbia River and California (000 Metric Tons)

	<u>1971</u>	<u>1980</u>
Japan	1,999 (40%)	10,073 (42%)
Korea	930 (19%)	3,605 (15%)
China	0	1,865 (8%)
Other Asia & Oceania	1,302 (26%)	5,659 (24%)
Europe	437 (9%)	344 (1%)
Latin America	319 (6%)	1,600 (7%)
Africa	<u>0</u>	<u>811</u> (3%)
TOTAL	4,987	23,957
Wheat	85%	52%
Corn	9%	39%
Barley	12%	2%
Soybeans	2%	0%
Sorghum	1%	7%

SOURCE: United States Department of Agriculture, "Grain and Feed Market News."

THE MINNESOTA CONNECTION

Minnesota is locationally disadvantaged with respect to the major U.S. grain export markets. The four principal Minnesota grain arteries are: 1) lake shipments from Duluth/Superior, 2) barge shipments from Mississippi River terminals to the Gulf, 3) direct rail shipments from country elevators to Gulf export terminals, and 4) direct rail shipments to the West Coast, specifically to Pacific Northwest export terminals. These outlets provide the flexibility necessary for participation in the constantly changing international grain markets.

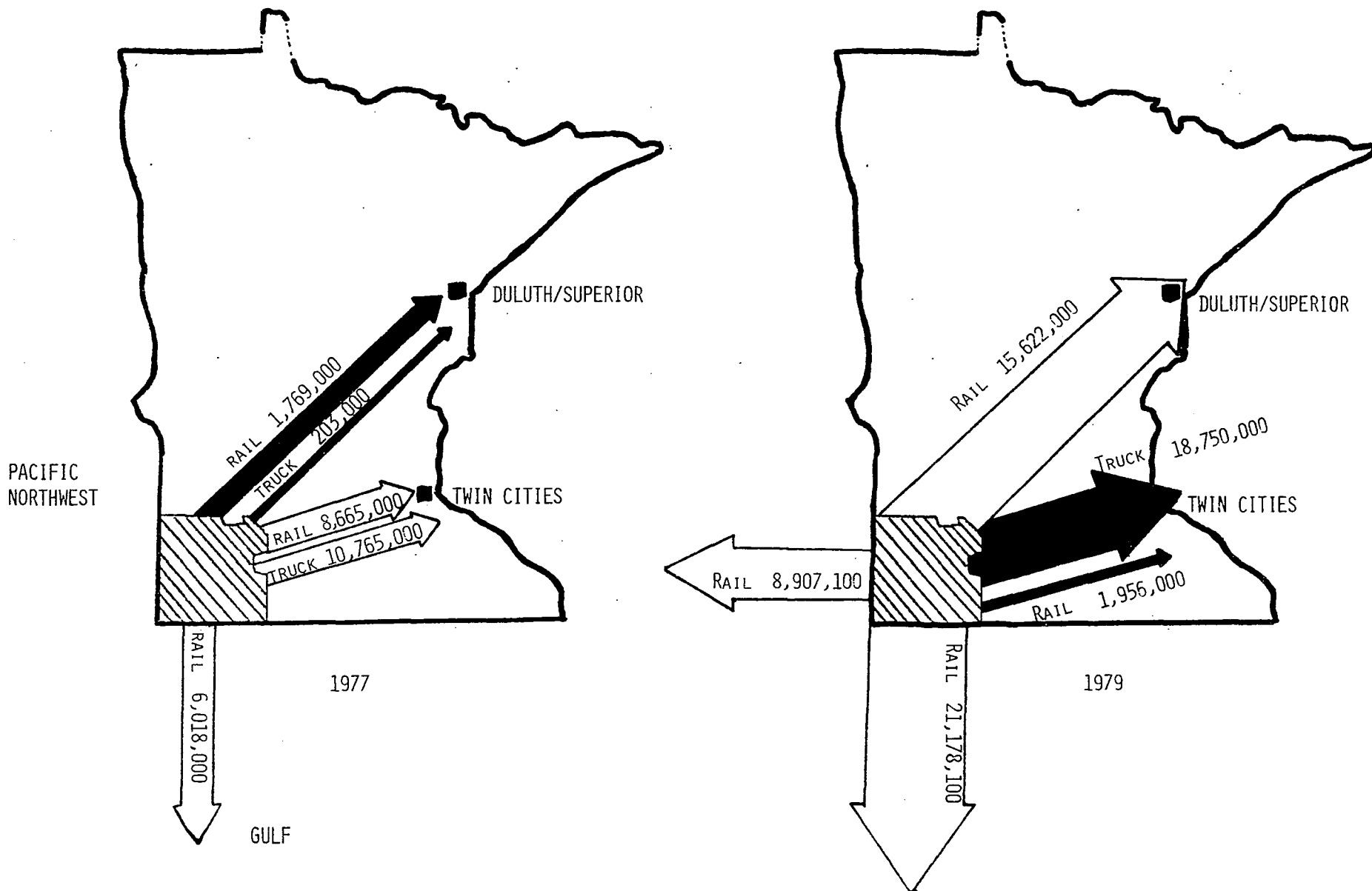
International supply and demand, exchange rates, international and domestic politics, and the grain transportation system interact to cause export offers that attract Minnesota grain. At some point along the flow of agricultural commodities, a country elevator or subterminal manager must obtain the necessary information to make a decision as to where, when, in what quantity, and by which mode he will sell and ship the agricultural commodities which he has assembled. The decision is highly sensitive to prices, elevator location, transportation carriers providing service, and the rail shipping capacity of the elevator. It is the profit-maximizing decision that the elevator makes to sell grain in a particular export market that determines the draw of that export outlet. Throughout much of the 70's, truck-barge movements to Gulf ports through Minnesota river terminals, and truck or rail to Duluth terminals followed by lake shipment have been the profit-maximizing decisions for elevator managers in Minnesota and portions of North and South Dakota. Recently, direct-rail shipments from country and subterminal elevators have become important, particularly as increasing quantities of Minnesota corn move to Pacific Northwest export terminals.

The major causal factor for the increased Minnesota participation in West Coast corn exports was the publication by the railroads serving Minnesota's cash corn producing regions of low unit-train grain rates to Pacific Northwest destinations. The most recent survey data indicates that the Pacific Northwest draws corn in Minnesota from an area south of U.S. Highway 10 and up to three or four counties from Minnesota's western border. Figure 1 shows Minnesota Crop Reporting District 7's corn shipments. These estimates were obtained from the University of Minnesota's commodity flow surveys for 1977 and 1979.

The 1977 corn crop followed two poor harvests and was an inventory rebuilding year with below average out-of-state corn sales. The 1979 crop generated corn shipments from southwestern Minnesota of 66,413,200 bushels, which was 142 percent above the 1977 level. Market disturbances in 1979 included the Duluth Grain Millers strike and rail disruptions due to the Rock Island and Milwaukee Road bankruptcies. Figure 1 illustrates the following:

1. Despite strike problems, Duluth/Superior became an important outlet for the relatively large southwestern Minnesota corn crop in 1979.
2. Long-haul trucking from southwestern Minnesota to Duluth/Superior dropped to zero in 1979.
3. Rail to the Twin Cities, and the Twin Cities share of the southwestern Minnesota corn market dropped substantially in 1979. Trucking, however, increased 74 percent.
4. Direct Gulf rail shipments expanded more than threefold, partly due to a much larger cash grain crop, obtaining 31.9 percent of the southwestern Minnesota cash corn market.
5. The Pacific Northwest market opened for southwestern Minnesota in 1978 at single-car rates, accounting for 13.4 percent of the cash corn market by 1979.

FIGURE 1. 1977, 1979 CORN MOVEMENTS FOR SOUTHWESTERN MINNESOTA CROP REPORTING DISTRICT 7.
(IN BUSHEL)



THE EXPORT MARKET CHOICE

What are the factors that influence the country elevator or subterminal manager's shipment choice? At the simplest level, it is the combination of export price offer and market access that yields the best net price (export offer minus the transportation cost of moving grain to the export point) that should provide the highest revenue available to that shipper. This is the underlying basis of our complex marketing system. However, in order for a shipper to qualify for the most advantageous rail rates and, therefore, the best net price, it is sometimes necessary to commit to a prescribed number of shipments ranging from 1 to 25 trips in a given period of time. Also, failures in the transportation system from rail car shortages to labor strikes introduce unpredictable limitations on access to markets. Finally, hedged positions, differential grain handling charges, embargoes, inventory costs, and revenue turn-around times can cloud the relatively clear market signal of the best net price to the extent that they are not reflected in the net price computation. Despite the disturbances noted above, commodity price, net of transportation cost, predicts the elevator manager's decision quite closely, especially over the longer term.

The following discussion examines corn prices, transportation rates, and a computed net corn price in harvest and non-harvest time periods from 1979 through 1981 for a selected subterminal in southwestern Minnesota.

EXPORT TERMINAL CORN PRICES AND THE SOUTHWESTERN MINNESOTA SPOT PRICE

Figure 2 illustrates corn prices at five locations from 1979 to 1981. The non-harvest time period of 1980 has been split between June and July, which was when multiple-car rail rates to the Pacific Northwest were first published. The spread between the southwestern Minnesota spot price (the price paid by the subterminal) for corn and the export offer at a particular destination for prompt delivery is the local basis due to location. In simpler terms, it is the price spread at a point in time between southwestern Minnesota and one of the other four destinations presented in Figure 2 when transportation cost is not considered. The local basis due to location for shippers in southwestern Minnesota desiring to sell corn to Gulf terminals was strong during the harvest of 1979 (\$0.80/bu.), but dropped to a relatively constant \$0.62 per bushel for the remaining time periods. The local basis due to location for Pacific Northwest oriented shippers has fluctuated around \$1.00 per bushel--strongest during the harvest of 1980 (\$1.10/bu.) and weakest during the harvest of 1981 (\$0.88/bu.). One factor contributing to the 1981 weakness was the relative strength of the U.S. dollar. The price difference between Pacific Northwest and Gulf ports was small during the 1979 harvest (\$0.19/bu.). It expanded to \$0.48 per bushel during the 1980 harvest, and as illustrated in Figure 2, was \$0.26 per bushel during the harvest of 1981.

The Duluth/Superior, Twin Cities, and southwestern Minnesota spot prices for corn tend to move together over time as depicted in Figure 2. The locational basis was slightly stronger during the summer of 1980 for both Duluth/Superior and Twin Cities destinations. The difference between Duluth/Superior and Twin Cities corn prices was small in the 1979 harvest (\$0.09/bu.) and

LEGEND

- D/S - Duluth/Superior
- TC - Twin Cities
- G - Gulf Ports
- PNW - Pacific Northwest
- SWS - S.W. Minnesota Spot

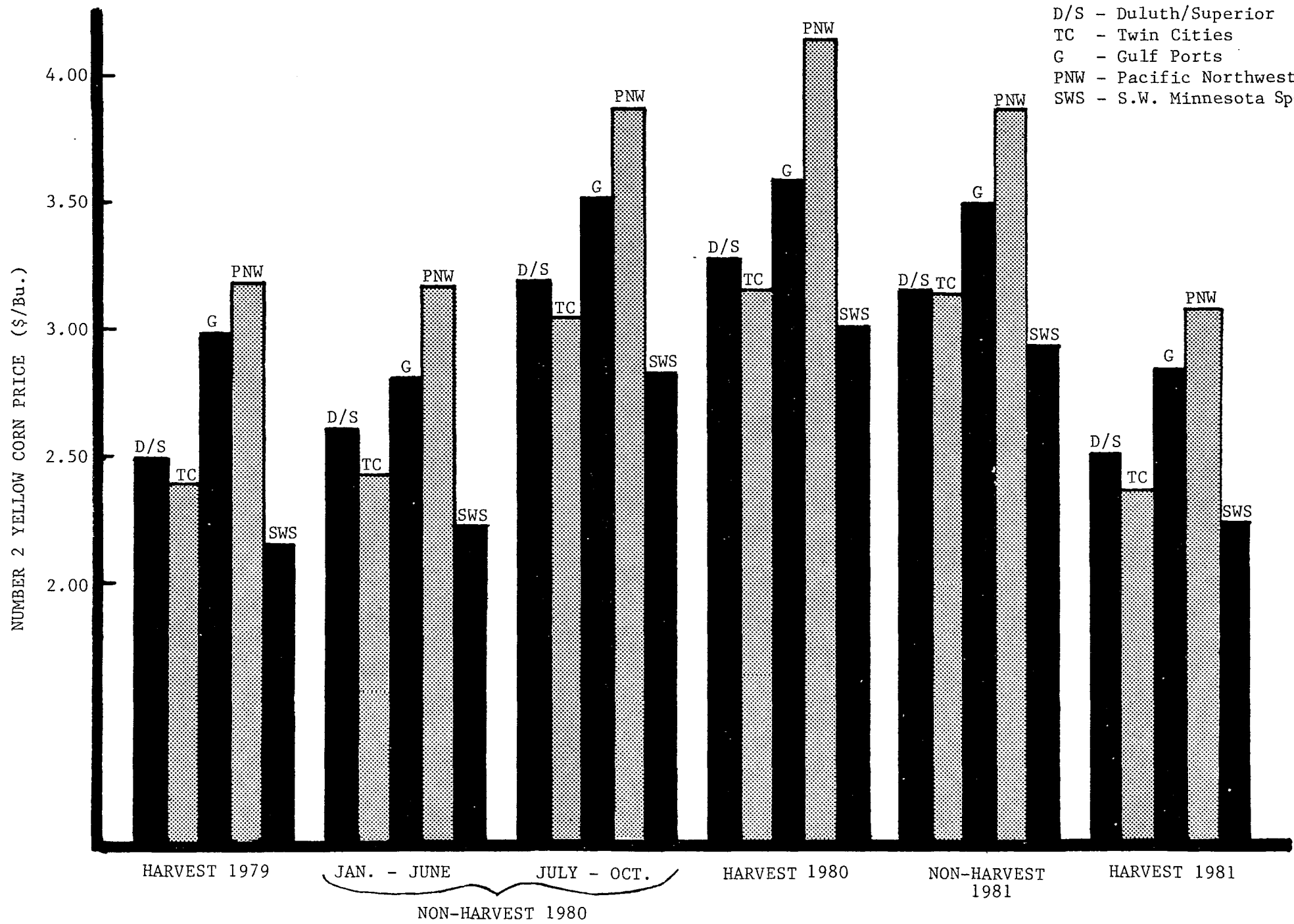


FIGURE 2. NUMBER 2 YELLOW CORN EXPORT OFFERS AND SOUTHWEST MINNESOTA SPOT, OCTOBER, 1979 to DECEMBER, 1981.

again during the non-harvest time period of 1981 (\$0.02/bu.). Duluth/Superior prices are sensitive to foreign sales, particularly to Russia, while Twin Cities corn prices are tied to Gulf export offers by barge rates. This relationship is discussed in more detail later in the net corn price section of this publication.

RAIL AND MOTOR CARRIER RATES

Table 2 presents motor carrier and rail rates from October 1979 through December 1981. During this time period, the Interstate Commerce Commission (ICC) approved general rail rate increases totaling 40 percent. However, rail carriers published multiple-car rates that gave high volume shippers lower costs to Twin Cities and Pacific Northwest destinations in late 1981 than in 1979. High volume rates published to Gulf terminals and Duluth were increased only slightly. This type of rate competition with other railroads is characteristic of the post-Staggers Act railroad industry.

Briefly, the Staggers Act of 1980 reduced the common carrier obligation of the railroads. This obligation historically required the provision of service on a non-discriminatory basis at a reasonable cost. Enforcement of this obligation over the years had served to hinder the railroad's ability to earn a reasonable rate of return. The Staggers Rail Act of 1980 provided:

1. Greater rate flexibility.
2. Service contracts between shipper and carrier. These contracts may specify shipment volume, number of shipments, and a variety of performance factors and incentives for both parties.
3. Faster and easier abandonment of unprofitable branch and main lines.
4. Surcharges to shippers on low-density lines.

Another rate factor is the size of shipment. Though rail and motor carrier rates have been computed from a single origin point with a fixed shipping capacity, rates for facilities with different shipping capacities will be compared.

Due to what some have termed the 1981 "rate war" between rail carriers providing service from Minnesota's cash corn producing region, high volume rail rates in late 1981 were as much as 9 cents per bushel lower than any rate available in early 1981. This reduction occurred while Interstate Commerce Commission approved Rail Cost Recovery Increases "could" have increased rates by 14 percent (13¢/bu.). Small shippers, however, were increasingly disadvantaged as many of the ICC approved rate increases were implemented in full for single-car movements (Table 2). Figure 3 illustrates the growing difference between large and small shippers in cents per bushel. This rate disparity is frequently sufficient enough to force small southwestern Minnesota shippers to truck to the Twin Cities (Savage) where the corn will be barged to the Gulf. Fortunately for the small shippers, truck rates remained relatively stable throughout the 1979 to 1981 time frame, increasing 19.3

Table 2. Motor Carrier and Rail Rates From a Selected Southwest Minnesota Origin to Principal Destinations (¢/bu.)⁴

Time Period	Dates	DULUTH					TWIN CITIES ¹				
		Truck	Single Rail	26-Car	54-Car	75-Car	Truck	Single Rail	26-Car	54-Car	75-Car
Harvest 1979	10/1/79 to 12/31/79	41.4	42.6	31.4	30.0	27.2	20.7	25.8	20.2	19.3	NA
Non-Harvest 1980	Period 1	41.4	43.5	32.1	30.7	27.8	20.7	26.4	20.7	19.7	NA
Non-Harvest 1980	Period 2	43.1	49.3	34.7	33.0	29.7	22.4	30.0	22.7	21.8	NA
Harvest 1980	10/1/80 to 12/31/80	45.6 ²	51.8	36.4	34.7	31.4	23.0 ²	31.4	24.1	23.0	21.8
Non-Harvest 1981	1/1/81 to 9/30/81	43.1	55.4	35.3	33.0	30.2	22.4	33.6	21.8	20.7	18.5
Harvest 1981	10/1/81 to 12/31/81	51.5	56.6	37.0	34.2	31.4	25.2	34.2	18.5	16.8	15.1
Time Period	Dates	GULF ³					PNW ³				
		Single Rail	Best Comb. ← 26-Car	26-Car	54-Car	75-Car	Single Rail	Best Comb. ← 26-Car	26-Car	54-Car	75-Car
Harvest 1979	10/1/79 to 12/31/79	91.0	NA	66.9	61.9	58.5	176.4	97.4	NA	NA	NA
Non-Harvest 1980	Period 1	93.0	NA	68.4	63.3	59.8	180.3	113.1	NA	NA	NA
Non-Harvest 1980	Period 2	105.6	NA	77.6	71.7	67.8	204.4	113.1	98.6	94.4	89.9
Harvest 1980	10/1/80 to 12/31/80	110.9	NA	81.5	75.3	71.1	210.6	118.7	103.6	99.1	94.4
Non-Harvest 1981	1/1/81 to 9/30/81	118.7	NA	81.2	75.6	71.7	230.2	126.6	99.1	93.5	89.0
Harvest 1981	10/1/81 to 12/31/81	120.4	NA	77.8	73.4	67.8	233.0	128.8	95.2	87.9	85.1

¹ Savage was used as the Twin Cities truck destination.

² Minimum Minnesota Public Service rate plus 10%.

³ Multiple-car rates are for the maximum "number of movements."

⁴ Rates are published on a ¢/cwt. basis. For accuracy at the ¢/bu. level, no rounding has been done to the cent or half cent.

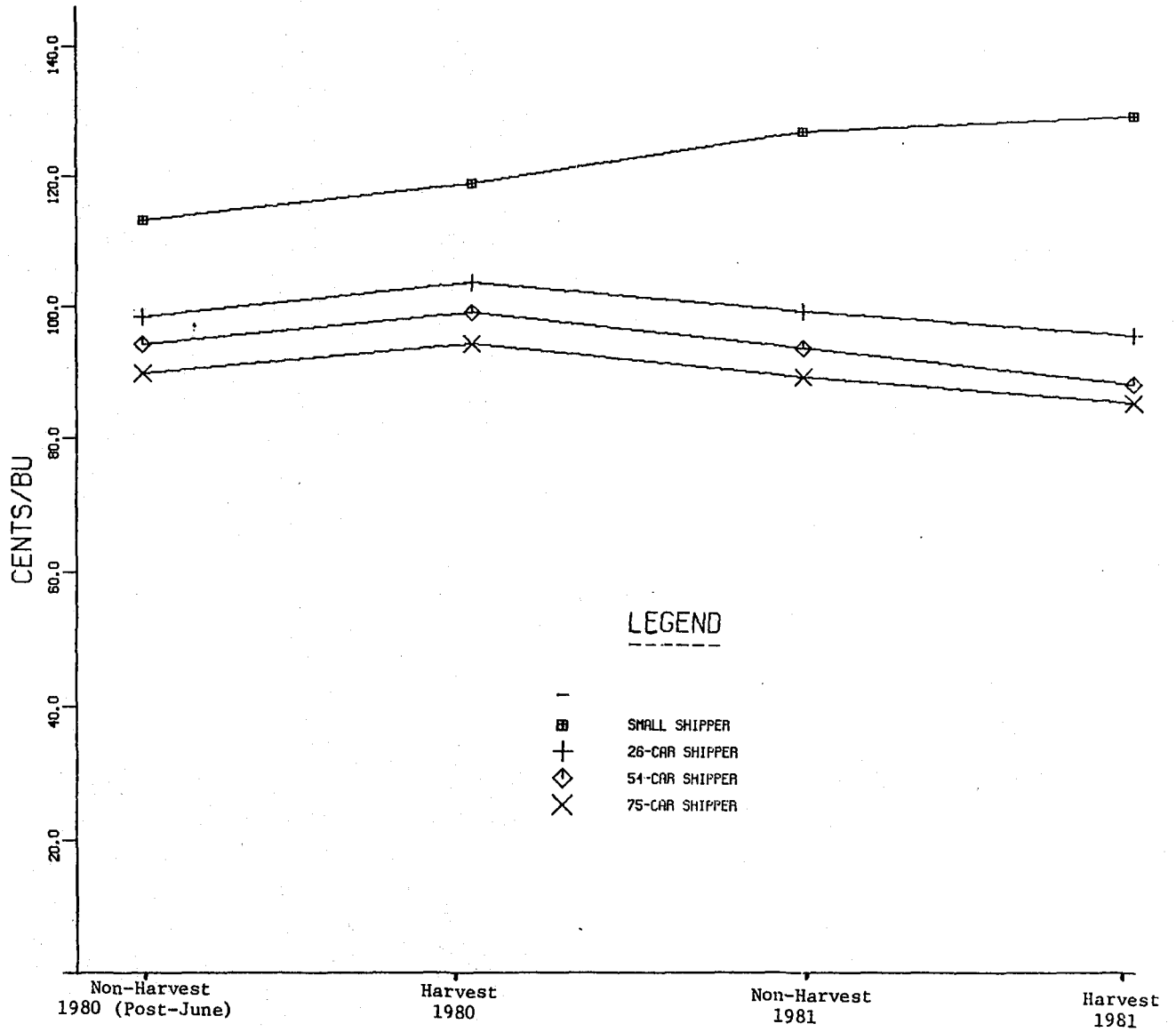


FIGURE 3. SOUTHWESTERN MINNESOTA TO PACIFIC NORTHWEST RAIL RATE TREND, 1980-81 (¢/bu.)

percent to Duluth and 12.5 percent to the Twin Cities in December 1981. Truck rates were less than single-car rail rates to Duluth/Superior and the Twin Cities throughout the 1979-1981 time period.

The most significant rate development for southwestern Minnesota shippers occurred in July of 1980. Then 26, 54, and 75 car rail rates were published to Pacific Northwest destinations. The rate for the largest volumes was 23.2 cents per bushel lower than any West Coast rate previously available. The combined impact of a strong Pacific locational basis (Figure 1) and the new unit-train rail rates to the West had a predictable effect on the decisions of many subterminal managers in southwestern Minnesota.

THE SOUTHWESTERN MINNESOTA NET CORN PRICE DECISION

Net corn price is a major decision variable in corn market selection. Figure 4 illustrates the market strength of the four principal Minnesota export outlets for corn from 1979 through 1981. The net corn price levels in Figure 4 represent an average of the weekly net corn prices for each export destination during the time periods indicated. Shipment volumes large enough to get the lowest transport rates were assumed.

Net corn prices during the harvest of 1979 were strong for Gulf shipments, exceeding the next best alternative (Duluth/Superior) by \$0.31 per bushel for high volume shippers. During the January to June time period of 1980, Duluth/Superior provided the strongest net corn price, exceeding the Gulf by \$0.16 per bushel. Pacific Northwest net corn prices in early 1980 were the lowest computed for the 1979-1981 time period. By July, Pacific Northwest corn prices strengthened and the multiple-car rates to the west were instituted, combining to increase the Pacific Northwest net corn price by \$1.36 per bushel. This increase began an uninterrupted net corn price advantage for the Pacific Northwest market for elevators that could meet the high volume shipment requirements. This net price advantage reached \$0.41 per bushel over the next best alternative during the harvest of 1980.

Recently, excess grain transportation capacity has existed in the truck, rail, and barge modes. The impact of excess barge capacity has lowered barge rates from the Twin Cities to the Gulf and has caused a strengthening of the Twin Cities net corn price. As barge rates go lower, the direct rail net corn prices to Gulf outlets fall below those available by truck or rail to Twin Cities river terminals. The result is a net corn price advantage switch to the Twin Cities. This is illustrated in Figure 4 in 1981. The Twin Cities net corn price surpasses that available from direct rail shipments to the Gulf by as much as \$0.12 per bushel. The Twin Cities net corn price was also considerably closer to the Pacific Northwest net corn price in 1981.

Figure 5 examines the differences in net corn prices for large and small volume shippers from 1979 to 1981. The magnitude of the rail rate advantage for those who can make large volume shipments is tempered somewhat by the fact that small and large shippers can often choose different markets for their corn. There is frequently a "truck to the Twin Cities" floor on the net corn price differences between large and small shippers. However,

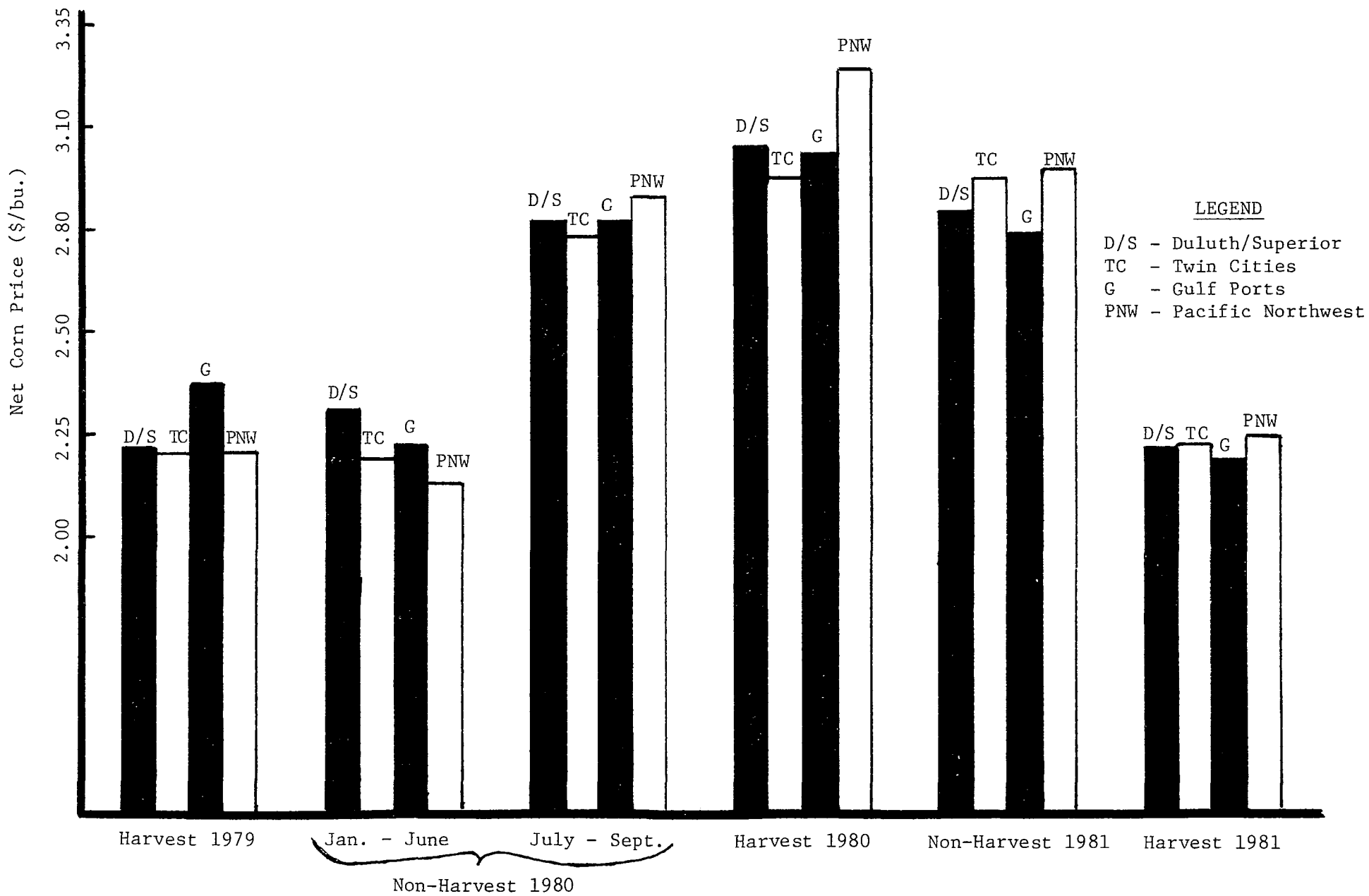


FIGURE 4. AVERAGE MAXIMUM NET CORN PRICE, 1979-1981 (\$/bu.)

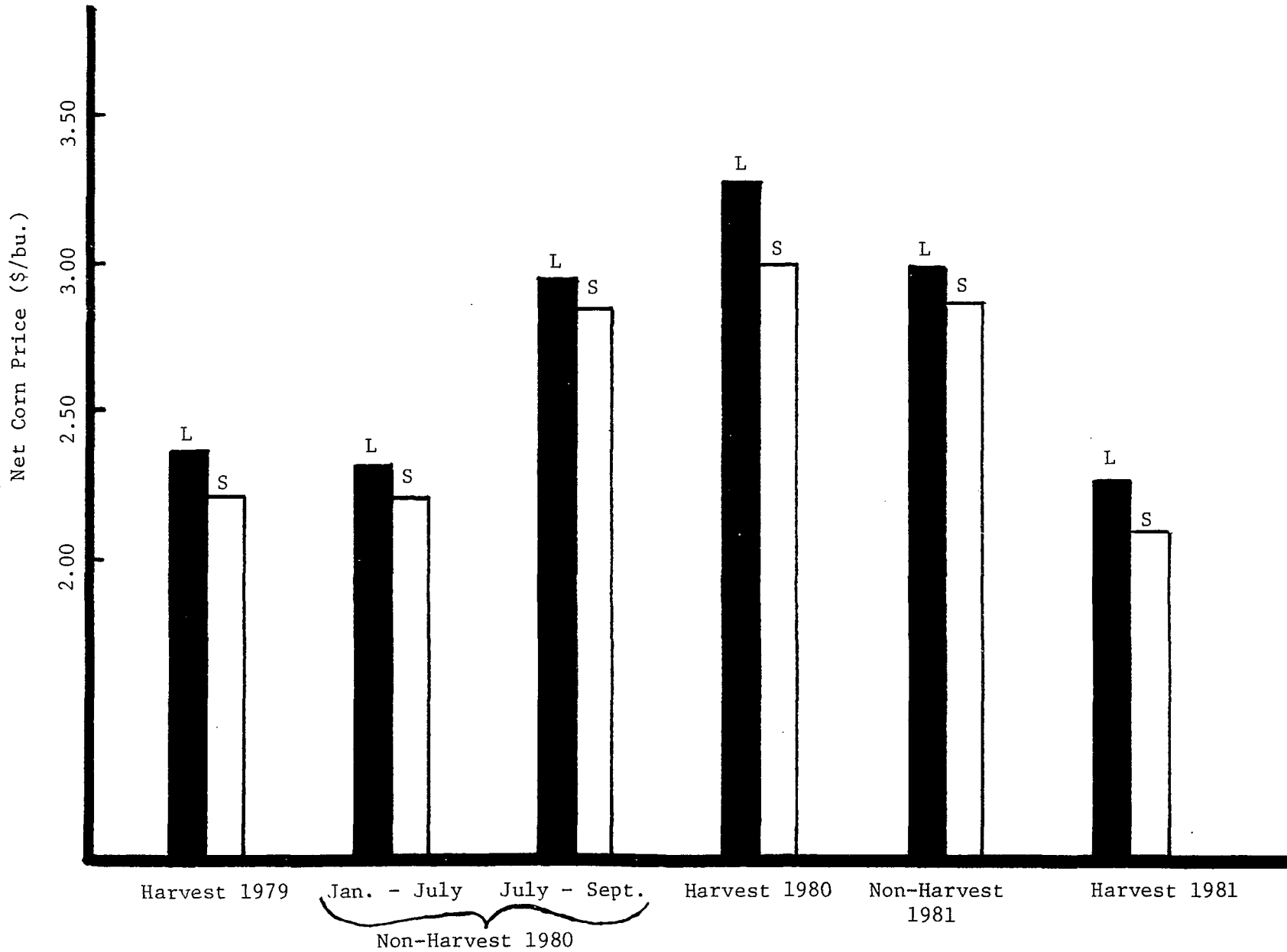


FIGURE 5. AVERAGE MAXIMUM NET CORN PRICE FOR LARGE AND SMALL VOLUME SHIPPERS, 1979-1981.

the net corn price advantage of the large over the small shipper has expanded \$0.07 per bushel since 1979. Particularly distressing for the small shipper is that the net price difference of the large over the small shipper is very strong during the harvest season when 40 percent of the corn is marketed. The three harvests illustrated in Figure 5 have had large versus small shipper net corn price differences of \$0.17, \$0.23, and \$0.24, respectively. This is a sufficient difference to cause great concern to the small elevator operator. The small elevator operator in southwestern Minnesota has responded by:

1. Attempting to construct subterminal or temporary facilities on main lines or federating with other shippers who have such facilities.
2. Buying into existing subterminals on main lines.
3. Trucking to the Twin Cities or to nearby subterminals.
4. Phasing out cash corn operations and focusing on feed, fertilizer, agricultural chemicals, and farm service.
5. Going out of business.

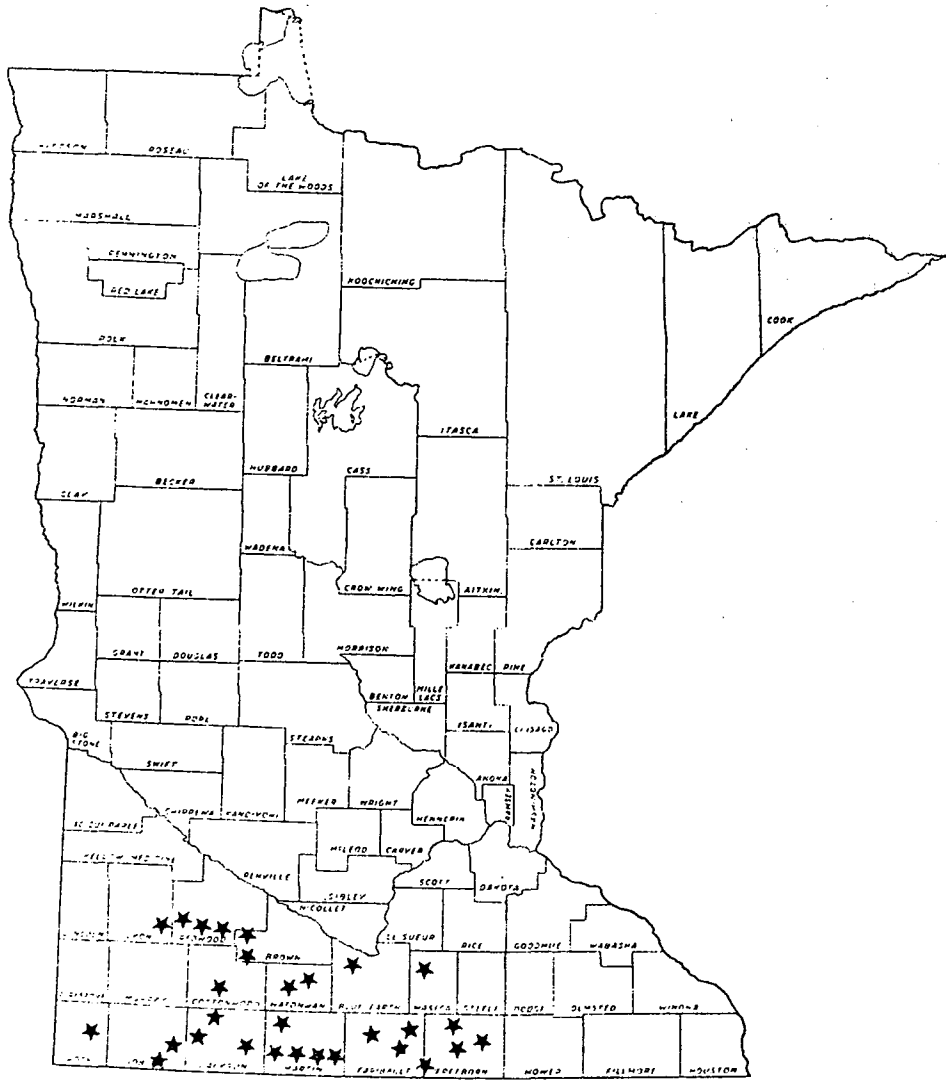
Figure 6 illustrates subterminal development in Minnesota in 1974 and 1981. Interviews with elevator managers confirm that many of the new facilities in southwestern Minnesota have been "justified" solely on expectations of grain shipments to Pacific Northwest destinations. Subterminal construction activity during the summer of 1981 has focused attention of the issue of elevator capacity. Of the 85 elevators in Minnesota's Crop Reporting District 7, the 20 largest, in terms of annual volume, handled 90 percent of the transportable corn surplus in 1979. The new subterminals will be in direct competition with existing firms that had sufficient capacity to serve the area. Indications are that a poor harvest, increased on-farm feeding, or the construction of processing facilities could impact marginal or locationally disadvantaged facilities severely.

The trend in modern grain marketing to regional subterminal assembly for high volume shipment has a double-edged impact on the agricultural community. The corn producer is the recipient of a better Minnesota spot price for his product due to improved, high volume access to a rapidly developing market in the Pacific Northwest. The small elevator and small community, on the other hand, experience a progressively deteriorating situation as cash grain volume is drawn to the regional subterminals. This draw has another impact--that on the road system.

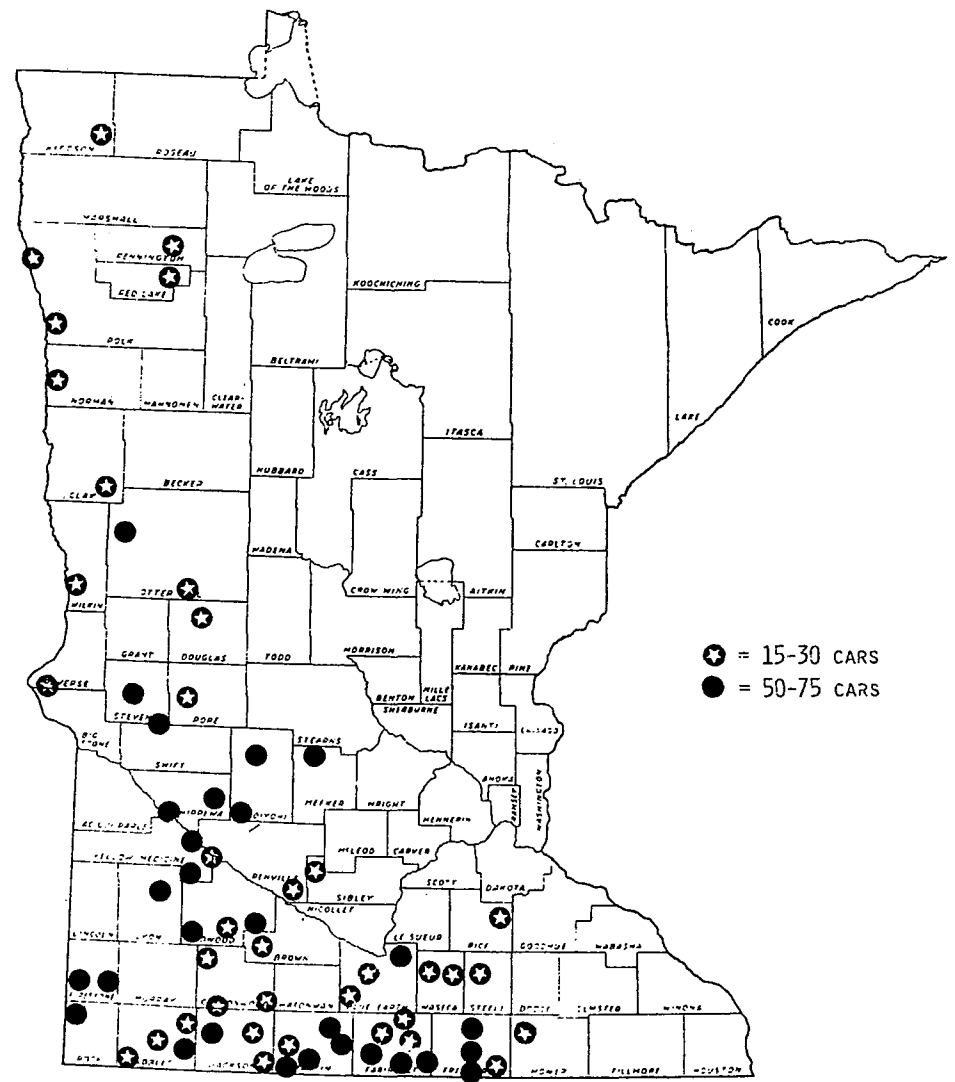
Development of unit-train loading facilities and their use has had a mixed effect on the road and highway system. Like the old rail rate structure, the primary highways of the area are generally east-west oriented. Usage and wear on these primary roads increased substantially throughout the 70's as an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

Increased direct rail shipments of grain from country elevators has reduced the use of the primary highways. But now heavy vehicles used in

MULTIPLE-CAR RAIL ELEVATORS - 1974



MULTIPLE-CAR RAIL ELEVATORS - 1981



★ = 15-30 CARS
● = 50-75 CARS

FIGURE 6. MINNESOTA ELEVATORS CAPABLE OF MULTIPLE-CAR RAIL SHIPMENTS, 1974 and 1981.

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 is only now being recognized, but will become of increasing concern to the local officials who are responsible for highways.

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