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What is Happening to Farmland in Minnesota?

by

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Policy makers and researchers are concerned about loss of farmland. Their big problem is trying to determine how much farmland, if any, is being irreversibly lost and where this land is. New data are becoming available from the Census of Agriculture and the National Agricultural Lands Study which they hope will answer these questions.

The loss of farmland has been a growing concern across the country and in Minnesota in particular. Many incentives have been created to keep land in agriculture, including differential appraisal and differential property tax rates. Some counties have created special zoning districts with restrictions against nonfarm related activity. The question which people hope to answer with the new data is: "have these controls and incentives done the job?" If not, more work will probably need to be done.

The new data are sometimes confusing and other times clearly wrong. This paper will attempt to resolve the confusion and identify those inaccuracies.

Is Minnesota Really Losing Farmland?

Reporting from the National Agricultural Lands Conference in February, the Minneapolis Tribune said the state is losing farmland to urban development at the rate of about 100,000 acres per year [8]. This number is but one of a dozen different indicators of possible changes in farmland, and it is the most pessimistic. Other indicators show substantially less loss. Some even show a gain in farmland. Two factors account for this confusion: definition of farmland and methods of collecting data to support the conclusion.

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Farmland can be variously defined. Popular alternatives include land available for agriculture, land-in-farms, cropland, and harvested cropland (see Table 1). The alternatives are listed in increasing order of specificity. Land available for agriculture includes all land which might be used for agriculture as broadly defined. Land-in-farms is usually all acreage under farm ownership; the Census of Agriculture put a minimum dollar sales limit in determining what is or is not a farm. Cropland excludes woodlots, ponds, roads, the farmstead, and some other lands, but includes both harvested cropland and pasture. Harvested cropland is that single use. None of these definitions includes a direct measure of crop yields.

TABLE 1: ALTERNATIVE DEFINITIONS OF "FARMLAND"

<u>Term</u>	<u>Definition</u>
Land available for agriculture	Non-federal lands currently used to produce agricultural commodities or lands that have the potential for such production. These lands include cropland, pastureland, farmsteads, other land in farms, rangeland, and forest lands. Minnesota area in 1977: 41.5 million acres [6].
Land-in-farms	Sum acreage of agricultural operations including rented land. Minimum acreage and gross sales used in definition. Includes land used for crops, pasture, and grazing as well as other woodland, wasteland, and farmstead land. Minnesota area in 1978: 29.1 million acres [3].
Cropland	Subset of land-in-farms. Includes harvested cropland, pastures, grazing, and cropland in more passive current uses such as idle, fallow, or unharvested cover grasses. Excludes woodland, farmstead, ponds, roads, wasteland, etc. Minnesota area in 1978: 22.8 million acres [3].
Harvested cropland	Subset of cropland. Excludes all other lands mentioned above. Minnesota area in 1978: 19.2 million acres [3].

Methods of data collection also vary. The Census of Agriculture uses a mail-out, mail-back questionnaire sent to a sample of farmers drawn from administrative lists, e.g. Department of Agriculture and Internal Revenue Service records. Because of incompleteness in these lists, the 1978 Census supplemented the mail survey with a personal canvas to bring state counts to completeness, but this canvas was not done in earlier years. Some inaccuracies may come from sampling errors or from such non-sampling errors as incorrect or incomplete reporting. The Minnesota Crop and Livestock Reporting Service uses a more rigorous technique. It uses an area sample of 350 sites around the state, usually one square mile in size. Then farmers within these sites are interviewed. The National Agricultural Lands Study (NALS) used a different technique that simply measured land use within sample sites in non-federal areas without regard to management intentions or practices.

The Tribune article was based on Census of Agriculture land-in-farms figures for 1969 and 1978. Had the Census figures been used directly, Minnesota would have shown a gain of 37,000 acres per year rather than a loss of 100,000 acres. Instead the Tribune used Census figures adjusted by the National Agricultural Lands Study to account for underenumeration in 1969 [1]. Here, the 1969 acreage was increased by 4.8 percent for states in the "West North Central Region." This adjustment created the apparent large loss by 1978. An adjustment of some size was probably required, but the magnitude is in question. The 1978 canvas added only 1.3 percent to state land-in-farms. If the 1969 Census were underenumerated by the same amount as 1978, Minnesota data would show virtually no change in land-in-farms.

How do other estimates of farmland change compare? A number of estimates are presented in Table 2. Estimates are given from many sources for

TABLE 2: ESTIMATES OF FARMLAND CHANGE IN MINNESOTA
(in thousands of acres)

<u>Source</u>	<u>Years</u>	<u>Current Land Area</u>	<u>Change in Land Area</u>	<u>Change per Year</u>	<u>Annual % Change</u>
LAND-IN-FARMS					
Census of Agriculture ^a	1969-78	29,118	+333	+37	+0.13%
Adjusted Census of Agriculture ^{a,b}	1969-78	29,118	-1049	-117	-0.39%
Minn. Crop & Livestock Reporting Service ^a	1969-78	30,600	-500	-56	-0.18%
National Agricultural Lands Study ^c	1967-77	28,890	-490	-45	-0.15%
CROPLAND					
Census of Agriculture ^a	1969-78	22,808	+547	+61	+0.27%
Adjusted Census of Agriculture ^{a,b}	1969-78	22,808	-522	-58	-0.25%
National Agricultural Lands Study ^d	1967-77	25,805	-490	-45	-0.17%

a Minimum acreage and sales figures for both years based on 1969 definition of land-in-farms. For farms under 10 acres, a \$250 sales minimum was required; for larger areas, a \$50 minimum was required.

b Base year adjusted upward 4.8% to account for underenumeration following Benbrook and Hidlebaugh. Note that though these authors applied this adjustment only to land-in-farms, it is applied here to both indicators of "farmland."

c NALS presented data on non-federal farms available for agriculture. A rough, though low, estimate of land-in-farms was computed by subtracting forested lands. The change in land area figure includes all "available" lands converted to urban and built up transportation and water uses during the 11 year period. Therefore, the percent loss of land-in-farms and cropland is exaggerated.

d NALS total cropland and pastureland. See note c above.

both land-in-farms and cropland. No data are presented for either of the extreme definitions of farmland. Land available for agriculture is probably too broad a definition. Growth in harvested cropland comes most often at the expense of fence rows, pastureland, and forests and does not represent an irreversible land use change. While the Census and the Crop and Livestock Reporting Service use comparable definitions of land-in-farms, adjustments were made to the NALS data to make them roughly comparable. These adjustments, documented below the table, present the worst case for loss of farmland, yet losses remain far below those presented in the Tribune article.

At first blush it remains unclear whether Minnesota is losing farmland, or how much it is losing. Census of Agriculture estimates range from heavy losses to significant gains depending on the magnitude of an adjustment applied to 1969 acreage. The other sources seem to indicate that farmland is indeed being lost, but at a fairly low rate. Given the instability in the Census figures this conclusion seems appropriate. Taking all these factors into consideration, an educated guess might be that Minnesota is losing about 50,000 acres of farmland per year, about 78 square miles. While this area is roughly equal to a strip of land one-half mile wide from Shakopee to Worthington, it represents only seventeen one-hundredths of a percent of Minnesota's land-in-farms.

Where Are The State's Farmland Losses?

On the whole, Minnesota may be losing relatively little farmland, but the location of these losses is important. If the better lands in southern and western Minnesota bear the brunt of these losses, then they represent a more significant problem. If counties with more growing urban economies, highway

or powerline construction, or less strict land use controls are losing more land, this tells us something about the cause of the loss and possible solutions.

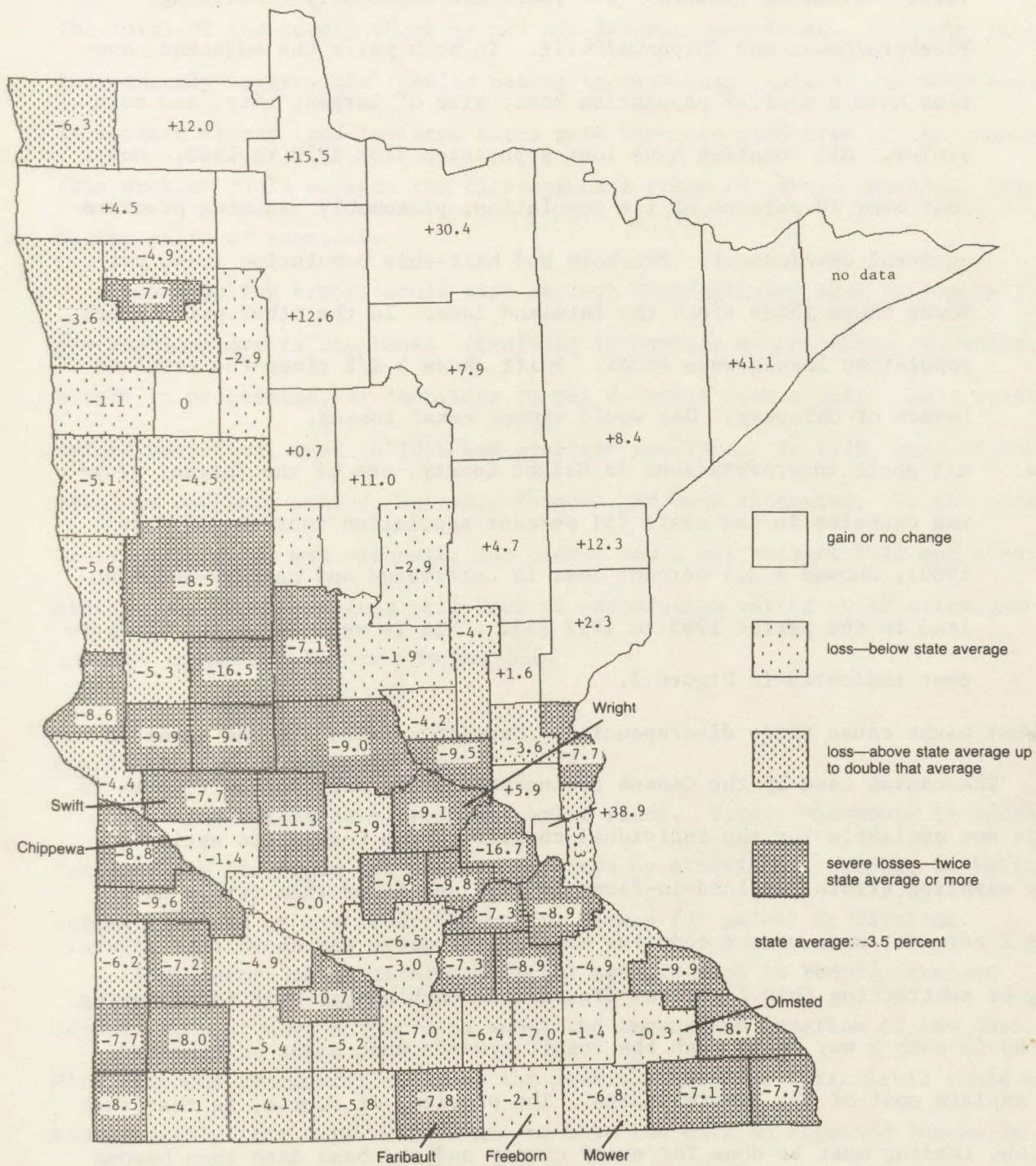
Unfortunately, only the Census of Agriculture publishes data for the county level. If we can assume that Census of Agriculture errors in estimation (either overestimated or underestimated) occur uniformly in all counties across the state, then we can use the Census data to estimate the relative amount of change among the counties.

Figure 1 is a map showing change using the same estimates of change as the Tribune article. Though the statewide adjusted Census figure was shown to overestimate losses, this map is presented to show relative degrees of change among the counties. If the pattern of relative change is accurate, our worst fears are confirmed. Acreage losses above the state average appear to occur in the best farmland counties although to some extent they are counter-balanced by large gains in the less productive counties of the north and east.

However closer inspection of the map shows inconsistencies that lead one to doubt the pattern. For example:

- Faribault County containing some of the richest farmland in the world, appears to have lost 36,000 acres in spite of preliminary estimates that it also lost 5.7 percent of its people in the last decade.
- Olmsted County, with a large population and a 9.1 percent population growth rate, shows the lowest farmland loss in southern Minnesota. To be sure the county has been tightening its land use regulations, but other CURA studies have found over 1500 residential structures built outside municipal boundaries from 1971 through 1979. With a lot size of even two acres, the county Health Department minimum, land losses would be three times that reported by the Census.

Figure 1: Adjusted Census of Agriculture Estimates of Percent Change in Land-in-Farms, 1969-1978



- Several pairs of adjacent counties with similar characteristics show vastly different results. Two pairs are especially unsettling: Freeborn/Mower and Chippewa/Swift. In both pairs the adjacent counties have a similar population base, size of largest city, and corn yields. All counties have lost population from 1970 to 1980. Mower lost over 10 percent of its population, presumably reducing pressure on rural development. Freeborn had half this population loss, yet Mower shows three times the farmland loss. In the other pair though, population losses were equal. Swift shows 5 1/2 times the farmland losses of Chippewa. One would expect equal losses.
- Air photo interpretations in Wright County, one of the fastest growing counties in the state (51 percent population increase 1970 to 1980), showed a 3.5 percent loss in cultivated and pasture-and-open land in the period 1968 to 1977 [5]. This is well below the 9.1 percent indicated in Figure 2.

What might cause these discrepancies? Sampling errors are one possible cause. The canvas used by the Census to increase state mail survey figures in 1978 is not available for the individual counties. The Census did estimate county sampling errors for land-in-farms in 1974 and found them rarely more than ± 2 percent; none of the counties singled out above was above that figure. Adding or subtracting this 2 percent figure from each number used in preparing this map in such a way as to push the result towards what might be expected, could explain most of the discrepancies. The problem, of course, is that such judicious loading must be done for every county and the base data then become meaningless.

Related to the sampling error is the Census' method of tabulating the data collected from farmers. All of the land worked by each farmer is added into the total of the county where he has his largest operations. As farms become increasingly larger, the results become increasingly useless. In some counties in western states land-in-farms total more than the land area of the county. This problem could explain the discrepancies presented above involving neighboring pairs of counties.

Non-sampling errors could also explain discrepancies seen in Figure 1. Non-sampling errors are those involving incomplete or incorrect reporting, errors in processing, or inability to get a report from a unit. Mail questionnaires were first used in 1969 and problems resulted. By 1978, most of these problems had been solved, but many farmers had been alienated. To the extent their cooperation was withheld, the Census could not collect full and accurate statistics. To the extent this lack of cooperation varied by location, geographic comparison becomes impossible.

Conclusions and Recommendations

Two conclusions come from this brief study. First, Minnesota is losing farmland but far below the amount presented by alarmists. Second, no reliable estimate exists of the county-by-county losses (or gains) in farmland.

If Minnesota is to develop policies and programs to reduce farmland losses, it must have better data about the amount and location of the loss. With time and procedural changes, the federal Census of Agriculture could eventually supply this data. If we are to have the data on farmland losses in the near term, they must come from state efforts such as expanded Crop and Livestock reports or expanded and upgraded programs in the State Planning Agency. County level data has recently been gathered, though not published, by the

Crop and Livestock Reporting Service. To the extent these data are independent of the Census data they may eventually provide a basis for measuring county by county change in farmland. No existing program will provide information on the type of land being converted (current use, productivity, etc.) or on its precise location. The State Planning Agency is now completing a report on land use change which should make recommendations for state activity. Given the nature of existing sources, this activity is clearly necessary for monitoring changes in state farmland.

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