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RESULTS OF THE NORTH DAKOTA LAND VALUATION MODEL FOR THE 2012 AGRICULTURAL REAL ESTATE ASSESSMENT

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This report summarizes the 2012 results of the North Dakota Land Valuation Model. The model is used annually to estimate average land values by county, based on the value of production from cropland and non-cropland. The county land values developed from this procedure form the basis for the 2012 valuation of agricultural land for real estate tax assessment. The average value for all agricultural land in a county from this analysis is multiplied by the total acres of agricultural land on the county abstract to determine each county's total agricultural land value for taxation purposes. The State Board of Equalization compares this value with the total value assessed to agricultural property in each county. The State Board of Equalization gave counties the authority to assess a total value of agricultural property no less than 90.0 percent of this value for 2012.

The average value per acre of all agricultural land in North Dakota increased by 29.14 percent from 2011 to 2012 based on the value of production. Cropland value increased by 30.45 percent, and non-cropland value increased by 23.0 percent. The formula capitalization rate was 5.864 percent. This was the first year the formula capitalization rate was used since 2002. The capitalization rate used for all years from 2003 through 2011 was the minimum rate set by the Legislature. The legislation setting a minimum capitalization rate expired after the 2011 tax year.

The increase in the values for cropland, non-cropland and all agricultural land was due to the decrease in the capitalization rate and the increased value of crop production. The value of production for most counties has been considerably higher since 2007 than prior years. This increase in value of production is a combination of increased yields, higher prices and a change in cropping mix. The change in crop revenue impacted land values from an increase of 5.9 percent at the low end to over 17.0 percent at the high end. The capitalization rate change increased land valuations by 26.19 percent in all counties; while the cost of production index decreased land values in all counties by 5.41 percent.

Changes in market value are included for comparison. Market value data are from the annual County Rents and Values survey conducted by North Dakota Agricultural Statistics Service.

Key Words: Land valuation, real estate assessment, agricultural land

RESULTS OF THE NORTH DAKOTA LAND VALUATION MODEL FOR THE 2012 AGRICULTURAL REAL ESTATE ASSESSMENT

Dwight G. Aakre and Ronald Haugen[1]

NORTH DAKOTA LAND VALUATION MODEL

North Dakota state statute mandates that the Department of Agribusiness and Applied Economics at North Dakota State University annually compute an estimate of 1) the average value per acre of agricultural lands on a statewide and countywide basis, and 2) the average value per acre for cropland and non-cropland (N.D.C.C. 57-02-27.2).These estimates are provided to the State Tax Department.

The model determines agricultural land values as the landowner share of gross returns divided by the capitalization rate. *Landowner share of gross returns* is the portion of revenue generated from agricultural land that is assumed to be received by the landowner, and is expected to reflect current rental rates. The Legislature has specified that the landowner share of gross returns is 30 percent of gross returns for all crops except sugar beets and potatoes (20 percent), non-cropland (25 percent), and irrigated land (50 percent of the dry land rate).

Capitalization Rate

The capitalization rate is an interest rate that reflects the general market rate of interest adjusted for the risk associated with a particular investment or asset (in this case, agricultural land in North Dakota). The Legislature specified the gross Federal Land Bank (Agri-Bank, FCB) mortgage interest rate for North Dakota be used as the basis for computing the capitalization rate. The capitalization rate used in the North Dakota Land Valuation model is a twelve-year rolling average with the high and low rates dropped. The 2003 Legislature amended the capitalization rate formula by introducing a minimum level of 9.5 percent with no upper limit. The 2005 Legislature amended the capitalization rate formula again, specifying a rate no lower than 8.9 percent to be used for the 2005 analysis. For subsequent years the capitalization rate was not to be lower than 8.3 percent. The 2009 Legislature amended the capitalization rate formula to set a minimum of 8.0 percent for 2009, 7.7 percent for 2010 and 7.4 percent for 2011. The minimum rate was allowed to sunset after 2011.The capitalization rate calculated according to the formula was used for the 2012 analysis. This rate was 5.864 percent. Lowering the capitalization rate from 7.4 percent to 5.864 percent raised the land values by 26.19 percent without any other changes.

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Cost of Production Index

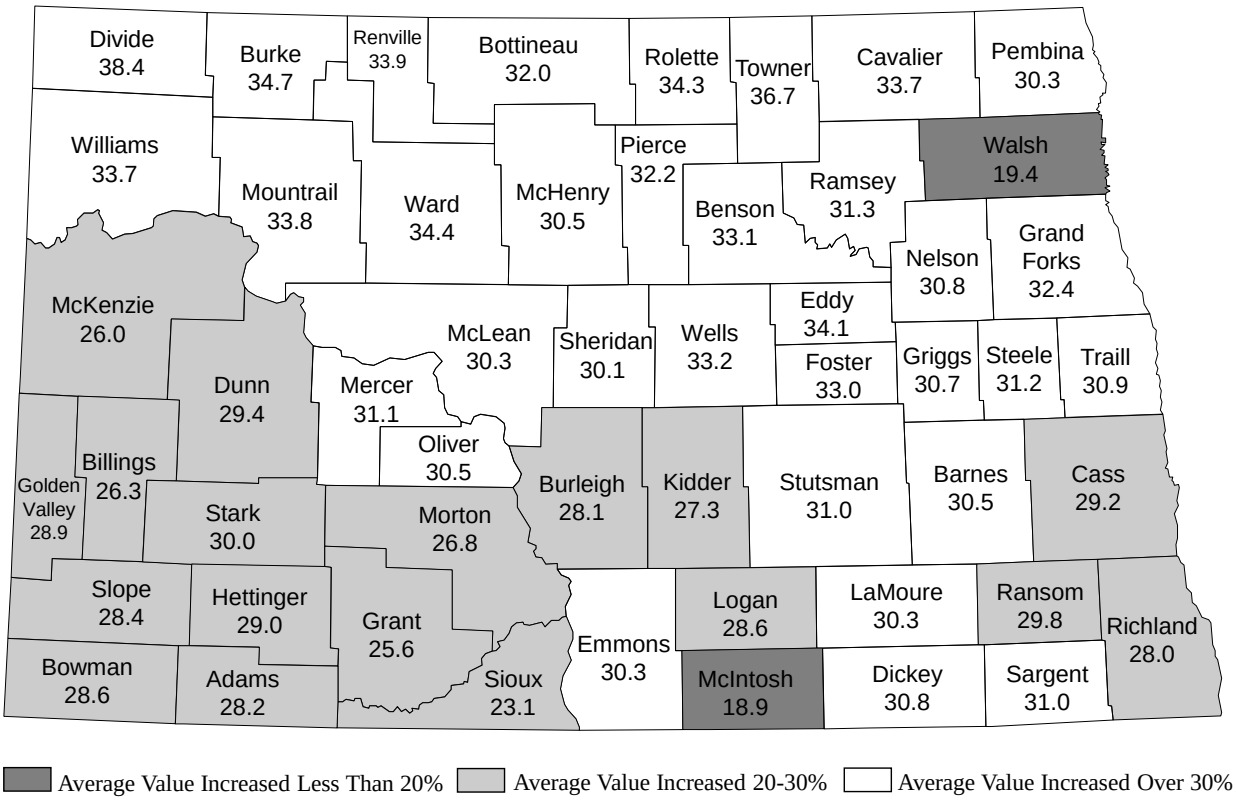
Beginning with the analysis for the 1999 assessment, a cost of production index was incorporated into the land valuation model to account for the increasing proportion of the total cost of production represented by variable costs. The source of data for this index is the *Items Used For Production* from the *Prices Paid Index* published by National Agricultural Statistics Service. The index developed for this analysis was determined by averaging the values of the latest ten years after dropping the high and low values; and dividing this value by the base index. The base index was developed by averaging the index values from the years 1989 through 1995 after dropping the high and low values. The base index value is 102. The index value used in the 2012 analysis was 147.3039, which resulted in a reduction in the landowner share of gross returns of 32.1 percent. The landowner share of gross returns is the amount that is capitalized to determine the land values. Therefore, land values are 32.1 percent lower than they would have been if the cost of production index was not included in the model.

The index used for 2012 increased from 139.338 in 2011, for a one-year change of 7.9659 points, the largest year-to-year increase since the cost of production index was added to the model. This change in the cost of production index from 2011 has the effect of reducing calculated land values by 5.4 percent over 2012.

RESULTS: ALL AGRICULTURAL LAND VALUE

Valuation of all agricultural land in North Dakota, for the 2012 assessment, increased by 29.14 percent or $102.10 per acre over the previous year. The largest percentage increases occurred in Divide County at 38.42 percent and Towner County at 36.67 percent. Values in 33 counties increased greater than 30 percent over 2011. The value increased more than 20 percent but less than 30 percent in 18 counties. The smallest increases were 18.92 percent in McIntosh County followed by 19.43 percent in Walsh County. Results are shown in Figure 1.

Figure 1. Percent Change in Average Value of All Agricultural Land, 2011-2012



The value for all agricultural land is a weighted average of cropland and non-cropland in each county. Calculated values for cropland generally are three to five times the value of non-cropland in each county. Therefore, a shift in acres between these two categories will alter the "all land" value even if all other factors remain unchanged. County Directors of Tax Equalization are surveyed each year to determine total taxable acres of cropland and non-cropland as well as inundated land for each category. Changes in reported acres tend to be minimal most years. Shifting acres from cropland to non-cropland results in a lower value for all agricultural land independent of what happens to gross revenue, the capitalization rate and the cost of production index.

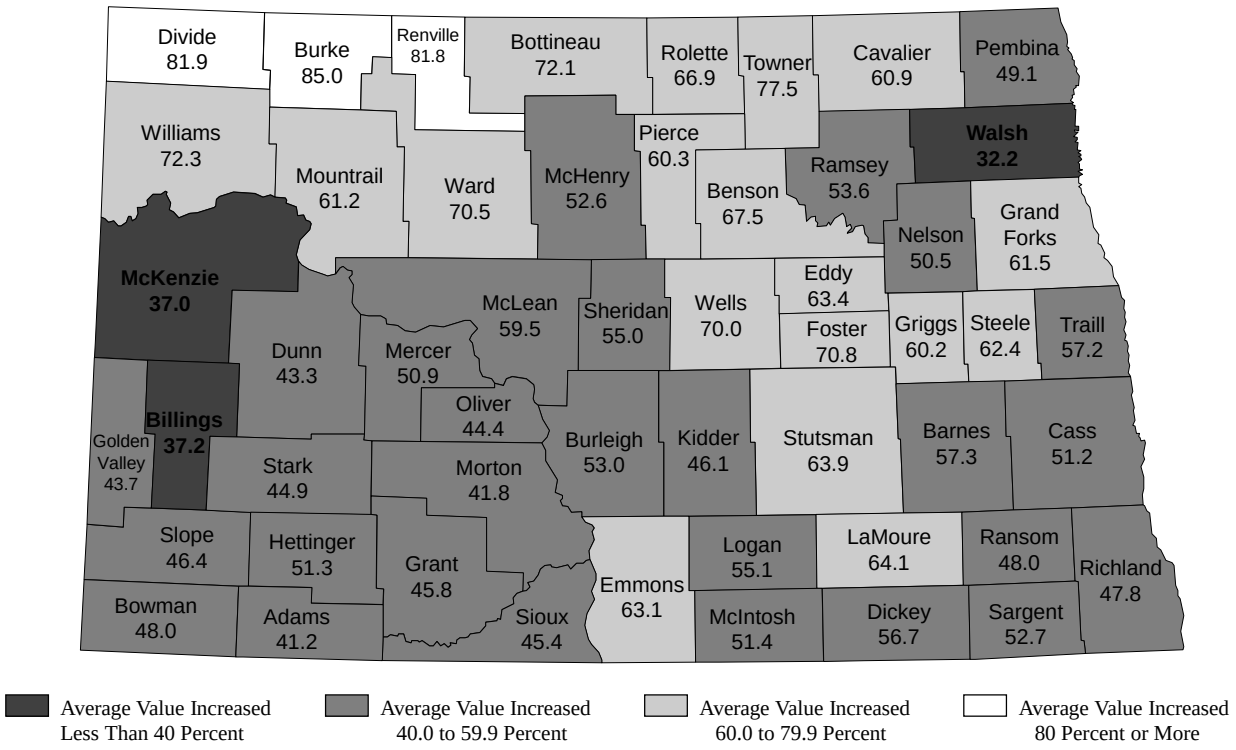
For the 2012 tax year, Cass, McIntosh, Richland, and Walsh counties reported a significant shift in acreage from cropland to non-cropland. Ramsey County reported a large increase in inundated cropland acres. Acreage changes in these five counties results in the all agricultural land value decreasing before any other factors are applied.

Divide County reported a large acreage shift from non-cropland to cropland for 2012. Rolette County reported an increase in total acres, nearly all in the cropland category. These changes increased the all agricultural land values before any other factors are included.

Five-Year Trend: All Agricultural Land Value

Estimated values for 2012 were compared with values estimated for 2007 to see how they have changed over time. The percent change in value by county is shown in Figure 2. The average value for all agricultural land in North Dakota increased 57.23 percent from 2007 to 2012. Values increased by more than 80 percent in Divide, Burke and Renville, all in the northwestern corner of the state. The lowest level of increases occurred in Billings, McKenzie and Walsh counties, where values rose by 30 to 39.99 percent.

Figure 2. Percent Change in Average Value of All Agricultural Land, 2007-2012

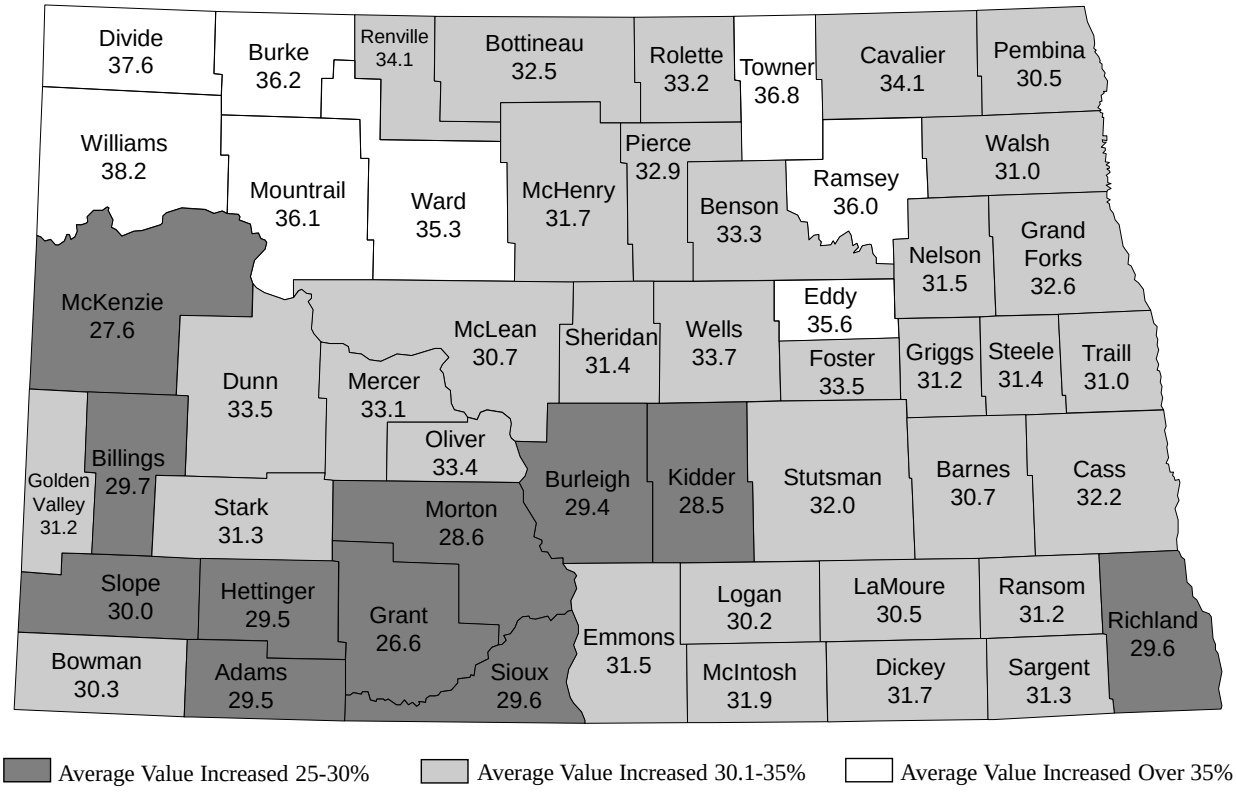


RESULTS: CROPLAND VALUE

The value of cropland increased an average of $141.09 per acre in 2012 across the state. This was an increase of 30.45 percent over 2011. The largest increases in average cropland value were 38.20 percent in Williams County and 37.58 percent in Divide County. The lowest increase in cropland value occurred in Grant County at 26.64 percent. See Figure 3.

Changes in the capitalization rate and cost of production index impact all counties equally. The capitalization rate used for the 2012 analysis was 5.864 percent. The change in the capitalization rate increased values in all counties by 26.19 percent. The increase in the cost of production index resulted in a downward shift in land values in all counties of 5.4 percent from 2011. The net effect is that cropland values in all counties were up by 20.79 percent before any changes in productivity were included. Increased gross revenue primarily due to increased yields and higher crop prices was the cause of the remainder of the increase in cropland values calculated for 2012.

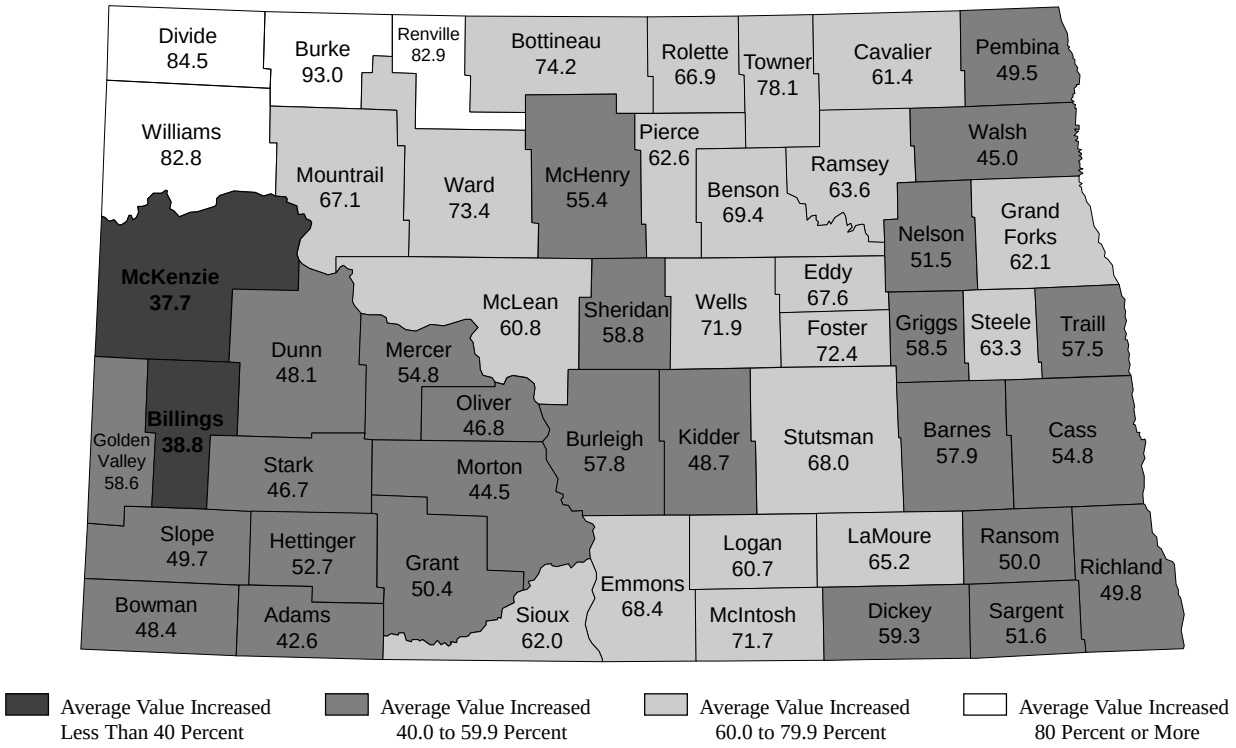
Figure 3. Percent Change in Average Value of Cropland, 2011-2012



Five-year Trend: Cropland Value

Cropland value has increased in all counties from 2007 to 2012. The average value of North Dakota cropland was 60.39 percent higher in 2012 than in 2007. The rate of increase has been highly variable around the state as can be seen in Figure 4. Cropland value increased by less than 40 percent in Billings and McKenzie counties. The greatest increases have been in the northwestern counties. Burke county cropland value increased by 92.97 percent. Cropland value increased by more than 80 percent in Divide, Renville, and Williams counties.

Figure 4. Percent Change in Average Value of Cropland, 2007-2012



RESULTS: NON-CROPLAND VALUE

The value of non-cropland (grazing land) increased by 23.0 percent or $22.80 per acre for the 2012 assessment. The value of non-cropland is derived by calculating the value of the beef produced from grazing. The carrying capacity and the production per cow are held constant in the model. As a result, all change in non-cropland value is due to changes in the price of calves and cull cows and changes in the capitalization rate and the cost of production index. All of these factors apply equally across all counties. Therefore, all counties experienced the same percentage increase in non-cropland values relative to 2011.

The price of calves and cull cows are used to determine the value of an animal unit month (AUM) of grazing. AUM is used as the measure of productivity of grazing land. Based on the price of calves and cull cows, an AUM had a value of $78.48 for the 2010 marketing year, the most recent year added to the data set. This was up from $65.03 the previous year. The value calculated for non-cropland, like cropland, is based on the average of the latest ten years after dropping the high and low years. Therefore, the average gross return is heavily influenced by the comparative values for the latest year added to the data set, relative to the year just removed from the data set. The average value per AUM for 2000, the year rolled out of the data set for this analysis, was $62.02. As a result, the increase in value for non-cropland is a combination of an increase in the value of production, a decrease due to the increase in the cost of production index and the increase due to the lower capitalization rate.

Five-year Trend: Non-Cropland Value

Non-cropland values increased 35.3 percent across the state from 2007 to 2012. All counties experienced the same change.

CAPITALIZED AVERAGE ANNUAL VALUES PER ACRE BY COUNTY

Two tables are provided displaying county values for 2011 and 2012. North Dakota Capitalized Average Annual Values per Acre by County for 2011 are shown in Table 1. North Dakota Capitalized Average Annual Values per Acre by County for 2012 are shown in Table 2.

Table 1. North Dakota Capitalized Average Annual Values Per Acre by County for 2011 Assessments

County	Cropland	Noncropland	All Agricultural Land
Adams	245.36	92.79	187.49
Barnes	577.42	128.91	498.61
Benson	422.14	114.13	353.47
Billings	206.97	86.86	124.22
Bottineau	427.74	110.45	374.41
Bowman	258.52	76.65	169.02
Burke	358.77	101.56	280.85
Burleigh	327.39	101.88	225.66
Cass	715.63	131.07	699.28
Cavalier	538.68	112.01	479.74
Dickey	570.92	128.60	423.59
Divide	338.75	100.98	275.98
Dunn	255.65	92.55	153.56
Eddy	383.24	114.62	302.49
Emmons	411.88	100.89	281.16
Foster	500.60	110.33	430.17
Golden Valley	273.99	76.04	161.88
Grand Forks	661.15	128.66	615.50
Grant	266.52	93.03	177.79
Griggs	499.41	112.43	413.72
Hettinger	361.75	92.33	294.78
Kidder	325.55	102.89	227.28
LaMoure	597.30	132.99	536.21
Logan	364.64	101.52	237.61
McHenry	334.06	109.72	265.59
McIntosh	389.06	100.95	277.44
McKenzie	294.33	92.94	173.77
McLean	412.66	101.22	359.52
Mercer	295.21	92.51	207.43
Morton	294.36	92.73	177.81
Mountrail	348.89	100.84	245.35
Nelson	407.49	111.82	356.11
Oliver	341.39	93.00	196.66
Pembina	792.73	133.95	707.92
Pierce	366.36	109.74	311.50
Ramsey	420.92	114.97	356.50
Ransom	589.95	126.66	451.10
Renville	465.52	110.06	438.14
Richland	773.08	130.14	682.22
Rolette	392.10	111.63	343.90
Sargent	611.56	129.89	541.84
Sheridan	355.28	100.94	256.34
Sioux	262.45	92.81	128.30
Slope	311.84	84.57	195.03
Stark	300.02	93.22	223.16
Steele	648.25	114.24	574.56
Stutsman	469.05	127.04	361.00
Towner	443.98	114.66	429.30
Traill	775.39	129.89	725.81
Walsh	683.61	119.86	623.88
Ward	448.91	100.84	367.39
Wells	492.17	110.74	424.61
Williams	321.05	101.12	237.35
State	463.42	99.12	350.37

Table 2. North Dakota Capitalized Average Annual Values Per Acre by County for 2012 Assessments

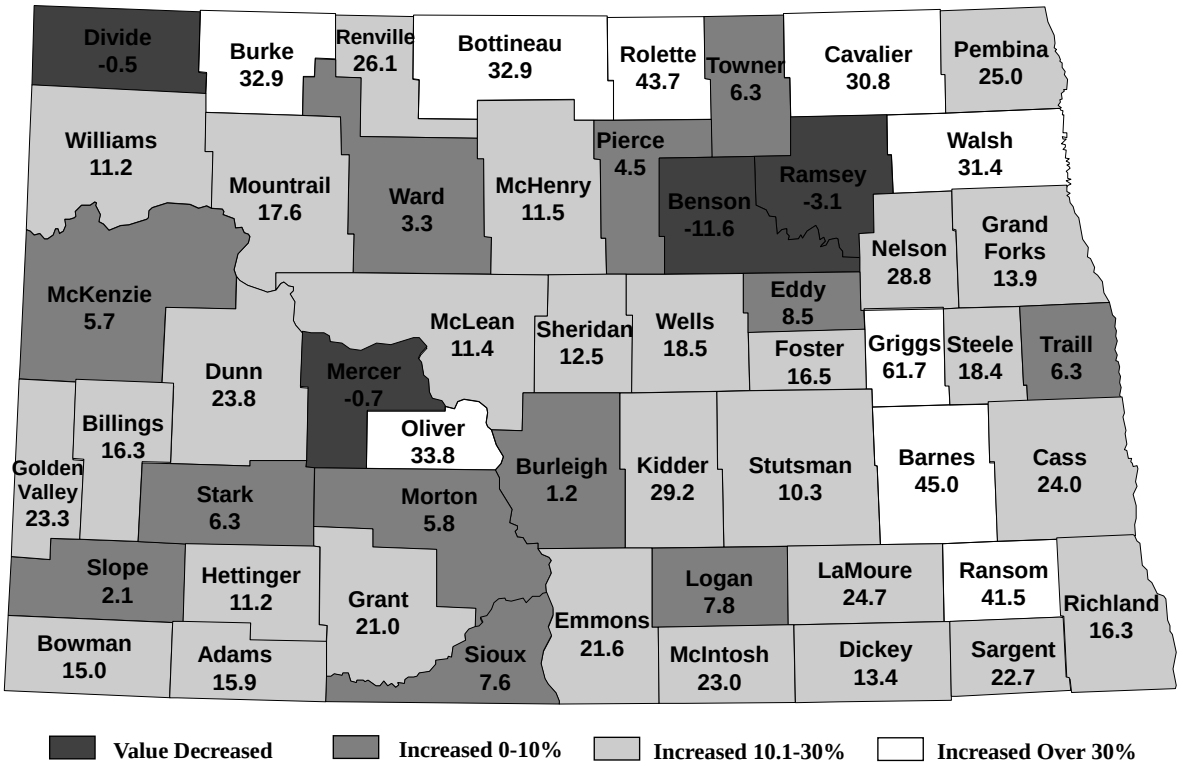
County	Cropland	Noncropland	All Agricultural Land
Adams	317.62	113.82	240.28
Barnes	754.57	158.13	650.72
Benson	562.83	140.00	470.46
Billings	268.48	106.55	156.92
Bottineau	566.61	135.48	494.14
Bowman	336.92	94.02	217.39
Burke	488.57	124.58	378.31
Burleigh	423.57	124.97	288.97
Cass	946.14	160.78	903.46
Cavalier	722.26	137.40	641.46
Dickey	751.68	157.74	553.86
Divide	466.06	123.87	382.02
Dunn	341.18	113.53	198.68
Eddy	519.56	140.59	405.68
Emmons	541.51	123.76	366.20
Foster	668.24	135.33	572.19
Golden Valley	359.49	93.27	208.72
Grand Forks	876.52	157.81	814.91
Grant	337.53	114.11	223.26
Griggs	655.26	137.91	540.71
Hettinger	468.42	113.25	380.18
Kidder	418.23	126.21	289.30
LaMoure	779.72	163.13	698.61
Logan	474.76	124.53	305.66
McHenry	439.89	134.59	346.70
McIntosh	513.06	123.83	329.94
McKenzie	375.47	114.00	218.94
McLean	539.22	124.16	468.40
Mercer	393.00	113.47	271.95
Morton	378.61	113.74	225.51
Mountrail	474.96	123.70	328.33
Nelson	535.65	137.16	465.75
Oliver	455.48	114.08	256.55
Pembina	1034.33	164.30	922.33
Pierce	487.02	134.61	411.66
Ramsey	572.47	141.03	467.92
Ransom	773.95	155.37	585.31
Renville	624.40	135.00	586.69
Richland	1001.55	159.63	872.89
Rolette	522.10	136.93	461.71
Sargent	803.03	159.32	709.86
Sheridan	466.98	123.81	333.58
Sioux	340.19	113.84	157.95
Slope	405.45	103.73	250.37
Stark	393.90	114.34	289.99
Steele	851.87	140.13	753.66
Stutsman	619.10	155.83	472.75
Towner	607.54	140.64	586.73
Traill	1015.60	159.32	949.84
Walsh	895.73	147.03	745.09
Ward	607.21	123.69	493.87
Wells	658.05	135.84	565.62
Williams	443.69	124.04	321.92
State	604.51	121.92	452.47

MARKET VALUE OF FARM LAND IN NORTH DAKOTA

The North Dakota Land Valuation Model was designed to estimate the value of agricultural land dependent solely on the revenue generated from the production of crops and beef cattle. The results of this model were not intended to reflect market value. Market value of farm land is influenced by numerous factors in addition to its productivity value. These include farm enlargement to gain economies of scale, land as an investment, recreational uses, development potential and the effect of government fiscal, monetary and tax policies. As a result, market value and productivity value often differ by a significant amount.

The North Dakota Agricultural Statistics Service conducts an annual survey of farmers and ranchers to obtain rental rates and the value of rented land. The data from the 2012 survey are compared with the 2011 survey for cropland and pasture. Changes in market values by county for cropland varied widely across the state. This survey showed values declined in 2012 in Benson County by 11.6 percent, in Ramsey County by 3.1 percent and less than 1 percent in Divide and Mercer counties. Values increased 10.0 percent or less in 12 counties, from 10.1 to 30.0 percent in 28 counties and over 30.0 percent in 9 counties. The largest increases were in Griggs County at 61.7 percent, Barnes County at 45.0 percent, Rolette County at 43.7 percent, and Ransom County at 41.5 percent. Percentage changes in market value for cropland by county are shown in Figure 5.

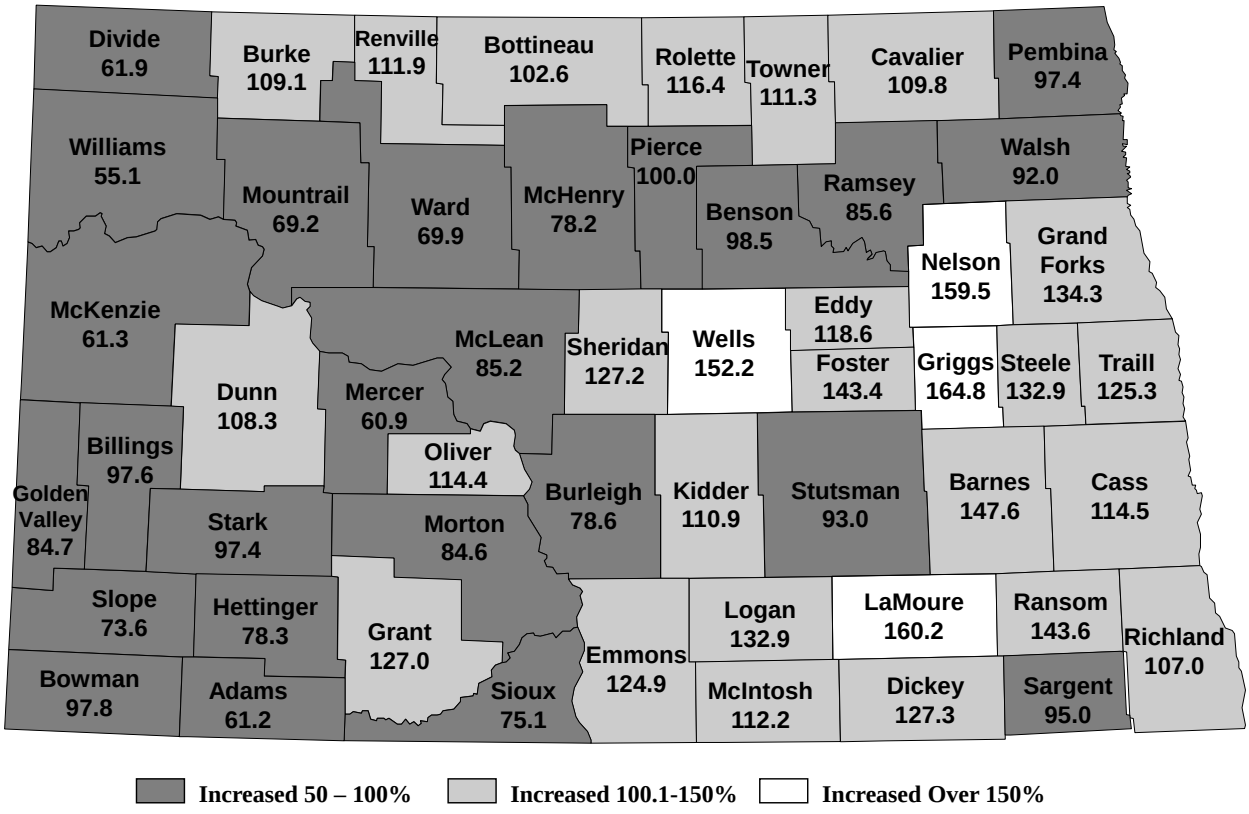
Figure 5. Percent Change in Estimated Market Value of Cropland, 2011-2012



Five-year Trend: Market Value of Cropland

The estimated market value of cropland reported by NASS has increased significantly more than the increase in productivity value over the 2007-2012 period. Griggs County market value increased 164.8 percent, LaMoure County increased by 160.2, Nelson County increased by 159.5 percent and Wells County by 152.2 percent. The remaining counties were nearly equally split with the cropland value increasing from 100.0 to 150.0 percent in 25 counties and less than 100 percent in 24 counties. Williams County had the lowest increase of 55.1 percent. Percentage changes in cropland market values are shown in Figure 6.

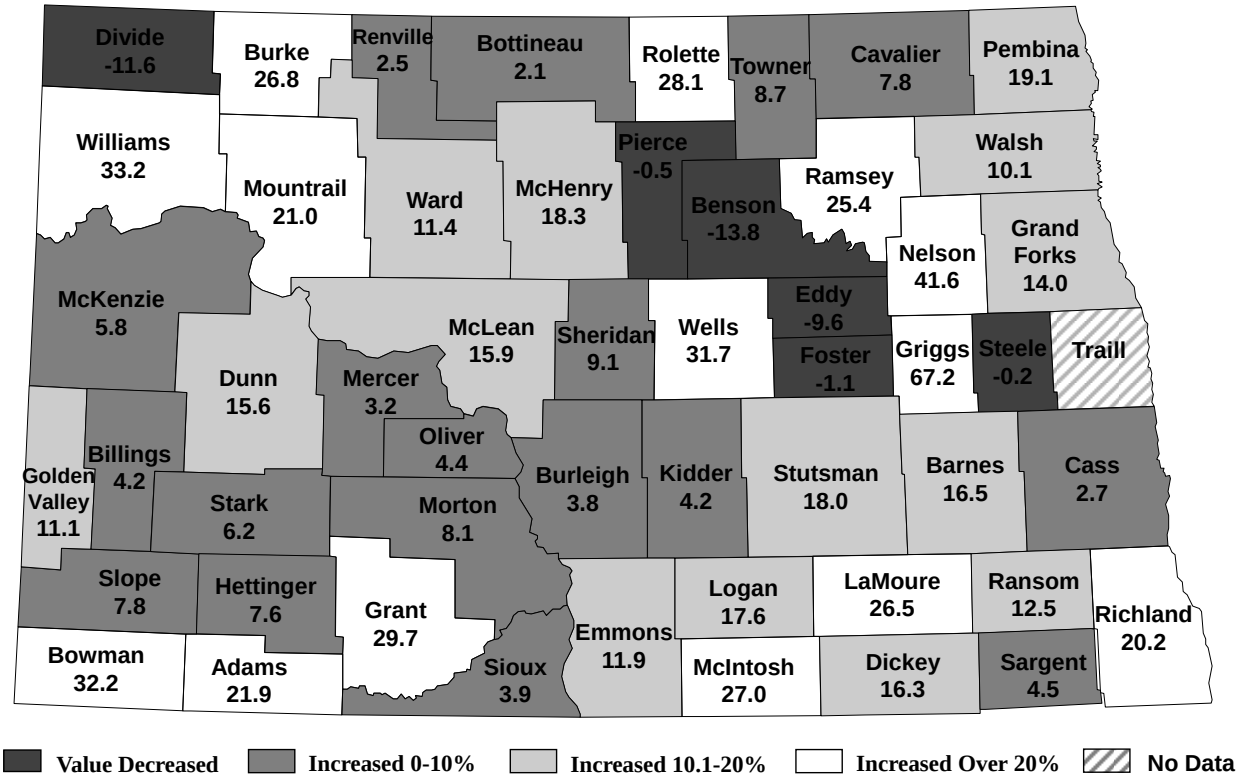
Figure 6. Percentage Change in Estimated Market Value of Cropland, 2007-2012



Market Value of Pasture

The change in market value of pasture was highly variable across the state. Six counties reported a decrease in value from 2011. Pasture values increased less than 10 percent in 18 counties, between 10.1 and 20.0 percent in 14 counties and over 20 percent in 14 counties. The greatest increases were in Griggs County at 67.2 percent and Nelson County at 41.6 percent. Data was incomplete for Traill County. Percentage changes in the market value of pasture are shown in Figure 7.

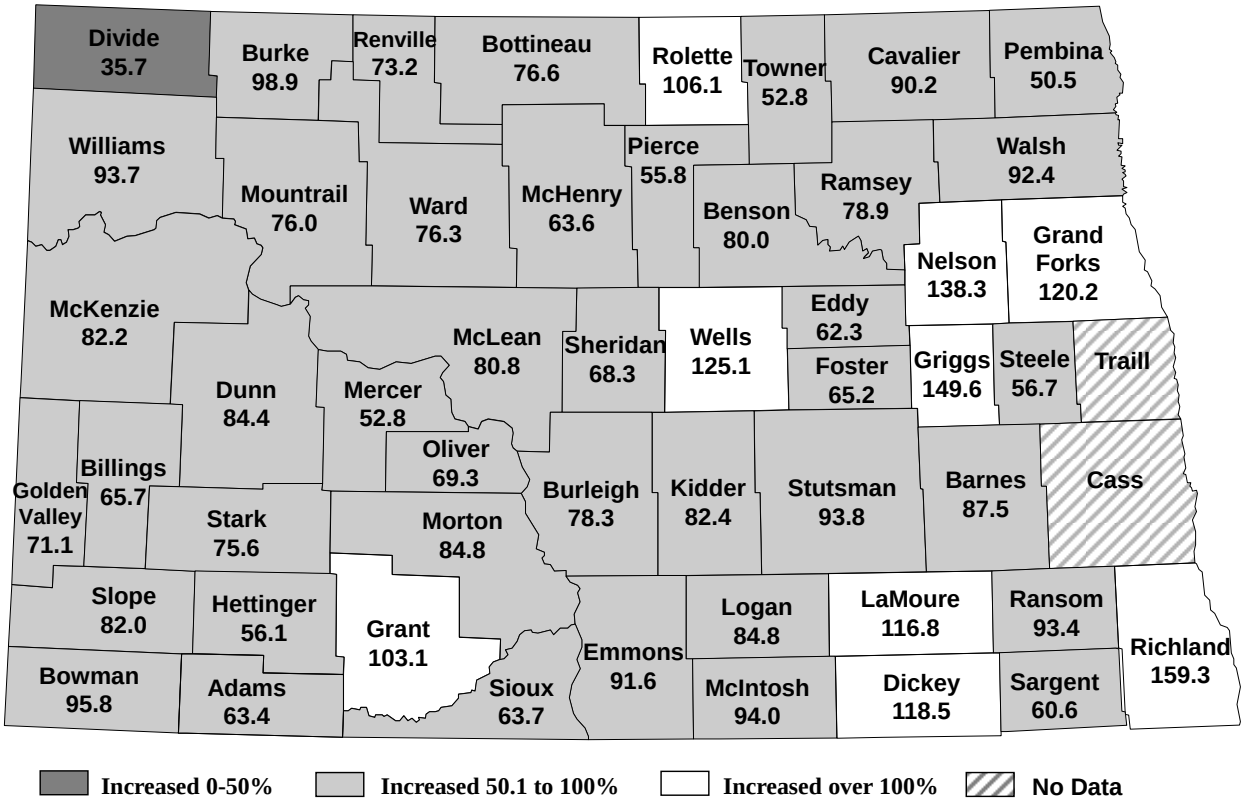
Figure 7. Percent Change in Estimated Market Value of Pasture, 2011-2012



Five-year Trend: Market Value of Pasture

Since 2007, market value estimates of pasture have shown considerable strength across most of the state. See Figure 8. The amount of increase was variable throughout the state. The greatest increase in market values occurred in Richland County at 159.3 percent, followed by Griggs County at 149.6 percent and Nelson County at 138.3 percent. In total, nine counties showed increases greater than 100 percent. Values increased between 50 and 100 percent in 41 counties and less than 50 percent in only Divide county. No value was provided for Cass and Traill counties due to insufficient survey responses.

Figure 8. Percentage Change in Estimated Market Value of Pasture, 2007-2012



CONCLUSIONS

Valuation of all agricultural land in North Dakota, based on productivity, increased by 29.14 percent or $102.10 per acre for the 2012 assessment as compared to the previous year. The average value of all agricultural land increased in all counties. The increases were greater than 30 in 33 counties, between 20 and 30 percent in 18 counties and less than 20 percent in only McIntosh and Walsh counties.

The decrease in the capitalization rate was the primary cause for the large increase in land values for 2012. The capitalization rate used for the 2012 analysis was the legislative formula rate of 5.864 percent. This was the first year since 2002 that a minimum capitalization rate set by the North Dakota Legislature did not replace the formula rate.

Valuation of cropland in North Dakota increased $141.09 per acre. This was a 30.45 percent increase over 2011. Non-cropland values for all counties increased by 23.0 percent from the previous year. The production of grazing units is held constant for non-cropland, only the values per unit change from year to year. The price of cull cows and calves, cost of production index and the capitalization rate are applied uniformly across all counties. Therefore, the percentage change in non-cropland value is the same for all counties.

The increase in values for cropland and all agricultural land was due to the large decline in the capitalization rate used along with an increase in the crop revenue. The crop revenue for most counties has been considerably higher since 2007 than prior years. This increase in crop revenue is a combination of increased yields, higher prices and a change in cropping mix. The change in crop revenue caused an increase in land values of 5.9 percent to as much as 17.4 percent by county. The capitalization rate change had the greatest impact on changing land values. This change resulted in a 26.19 percent increase in all counties. The cost of production index decreased land values in all counties by 5.41 percent.

The increase in non-cropland value was due almost entirely to the decrease in the capitalization rate. The capitalization rate increased the value by 26.19 percent, the livestock revenue increased the value by 1.88 percent and the cost of production index reduced the value by 5.41 percent.

The cost of production index increased 7.97 points over the previous year, to 147.30. The cost of production index reduced the landowner share of gross returns by 32.11 percent before this value was capitalized.

Changes in market value of cropland and pasture, based on the survey of farmers and ranchers by North Dakota Agricultural Statistics Service, is included for comparison. Productivity values generally showed greater increases than market values from 2011 to 2012 for both cropland and noncropland. Market value changes have shown more variability across the state. This is expected due to the additional factors that influence market values. Cropland market values increased considerably more than productivity values in all but the northwestern corner of the state from 2007 to 2012.

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