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RESULTS OF THE NORTH DAKOTA LAND VALUATION MODEL FOR THE 2014 AGRICULTURAL REAL ESTATE ASSESSMENT

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ABSTRACT

This report summarizes the 2014 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 2014 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 average value per acre of all agricultural land in North Dakota increased by 12.41 percent from 2013 to 2014 based on the value of production. Cropland value increased 12.67 percent, and non-cropland value increased by 4.38 percent. The formula capitalization rate was 5.19 percent. 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 and all agricultural land was primarily due to 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 capitalization rate change increased land valuations by 5.74 percent in all counties; while the cost of production index decreased land values in all counties by 6.289 percent. The value of production increased cropland valuation between 4.45 percent up to 15.7 percent across individual counties.

Non-cropland values increased by 4.38 percent, all due to an increase in the price received for calves and cull cows.

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 2014 AGRICULTURAL REAL ESTATE ASSESSMENT

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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 2014 analysis. This rate was 5.19 percent. Lowering the capitalization rate from 5.488 percent to 5.19 percent raised the land values by 5.74 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 2014 analysis was 165.69, which resulted in a reduction in the landowner share of gross returns of 39.6 percent. The landowner share of gross returns is the amount that is capitalized to determine the land values. Therefore, land values are 39.6 percent lower than they would have been if the cost of production index was not included in the model.

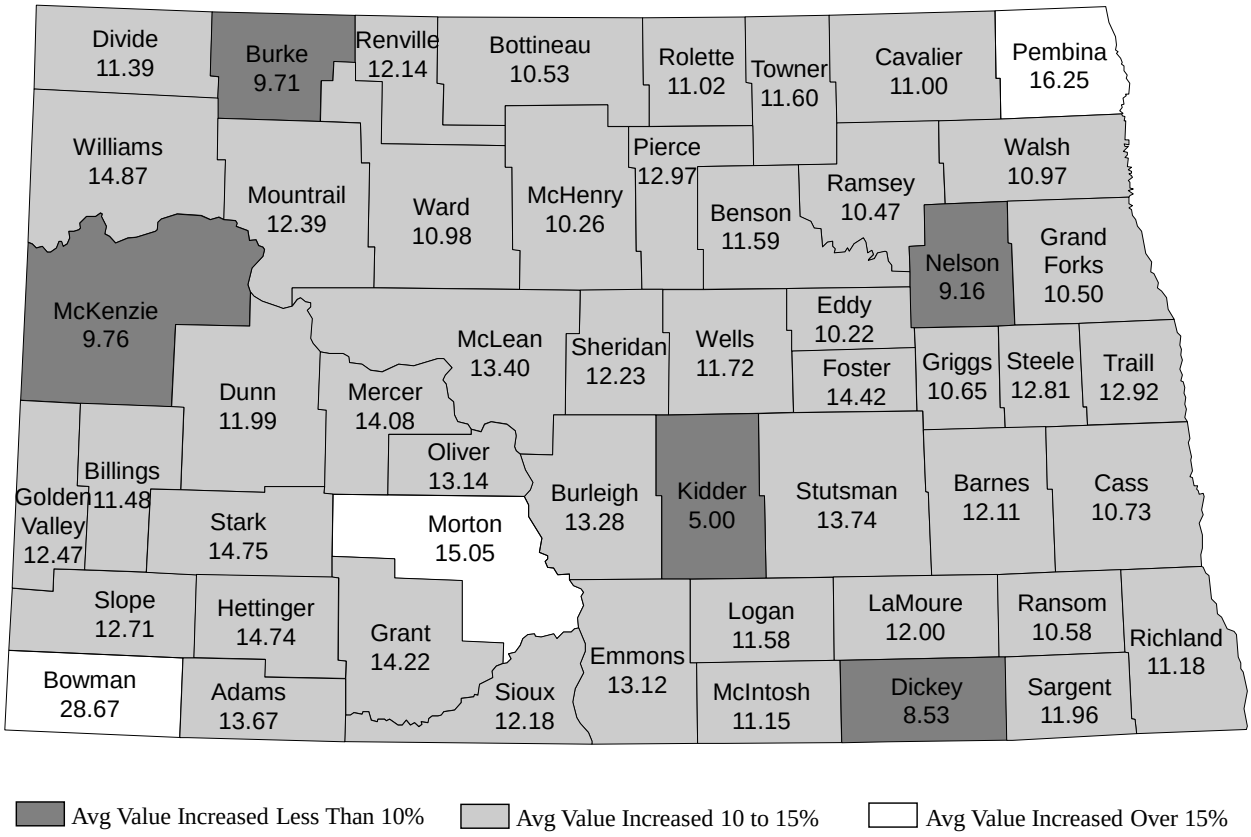
The index used for 2014 increased from 155.2696 in 2013, for a one-year change of 10.42 points. This change in the cost of production index from 2013 has the effect of reducing calculated land values by 6.289 percent from 2013.

The cost of production index and the capitalization rate apply equally to all land in all counties. The net impact of the change in value from the previous year for these two factors was to lower land values by 0.549 percent. Therefore any change in county values more or less than a negative 0.549 percent from 2013 values is due to an increase or decrease in productivity.

RESULTS: ALL AGRICULTURAL LAND VALUE

Valuation of all agricultural land in North Dakota, for the 2014 assessment, increased by 12.41 percent or $61.45 per acre over the previous year. The largest percentage increases occurred in Bowman County at 28.67 percent and Pembina County at 16.25 percent. Values increased less than 10 percent in Burke, Dickey, Kidder, McKenzie and Nelson counties. The increase in value over 2013 of all agricultural land in all other counties was between 10.1 and 15 percent. Results are shown in Figure 1.

Figure 1. Percent Change in Average Productivity Value of All Agricultural Land, 2013-2014



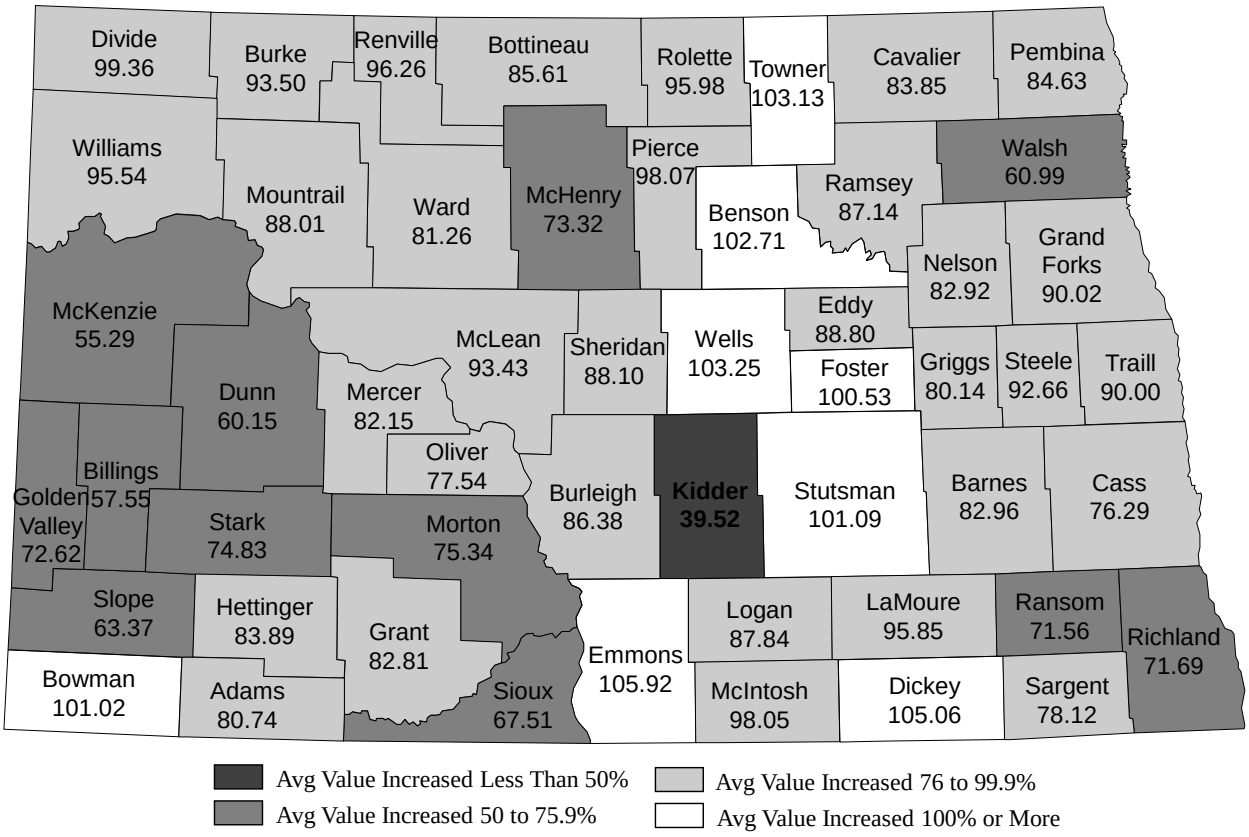
The value for all agricultural land is a weighted average of cropland and non-cropland in each county. Calculated values for cropland generally are three to five times the value of non-cropland in each county. Therefore, a shift in acres between these two categories will alter the "all land" value even 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 2014 tax year, Bowman, Pembina and Walsh counties reported a significant shift in acreage from non-cropland to cropland. The acreage shift in Bowman County involved over 80,000 acres. Pembina County shifted about 40,000 acres and Walsh County shifted about 15,000 acres. In addition to moving acres from non-cropland to cropland, Walsh and Pembina counties also reported an increase in total acres. Acreage changes in these three counties results in the all agricultural land value increasing before any other factors are applied.

Five-Year Trend: All Agricultural Land Value

Estimated values for 2014 were compared with values estimated for 2009 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 85.19 percent from 2009 to 2014. Values increased by more than 100 percent in eight counties. The smallest increase over this 5-year period was in Kidder County at 39.52 percent.

Figure 2. Percent Change in Average Productivity Value of All Agricultural Land, 2009-2014

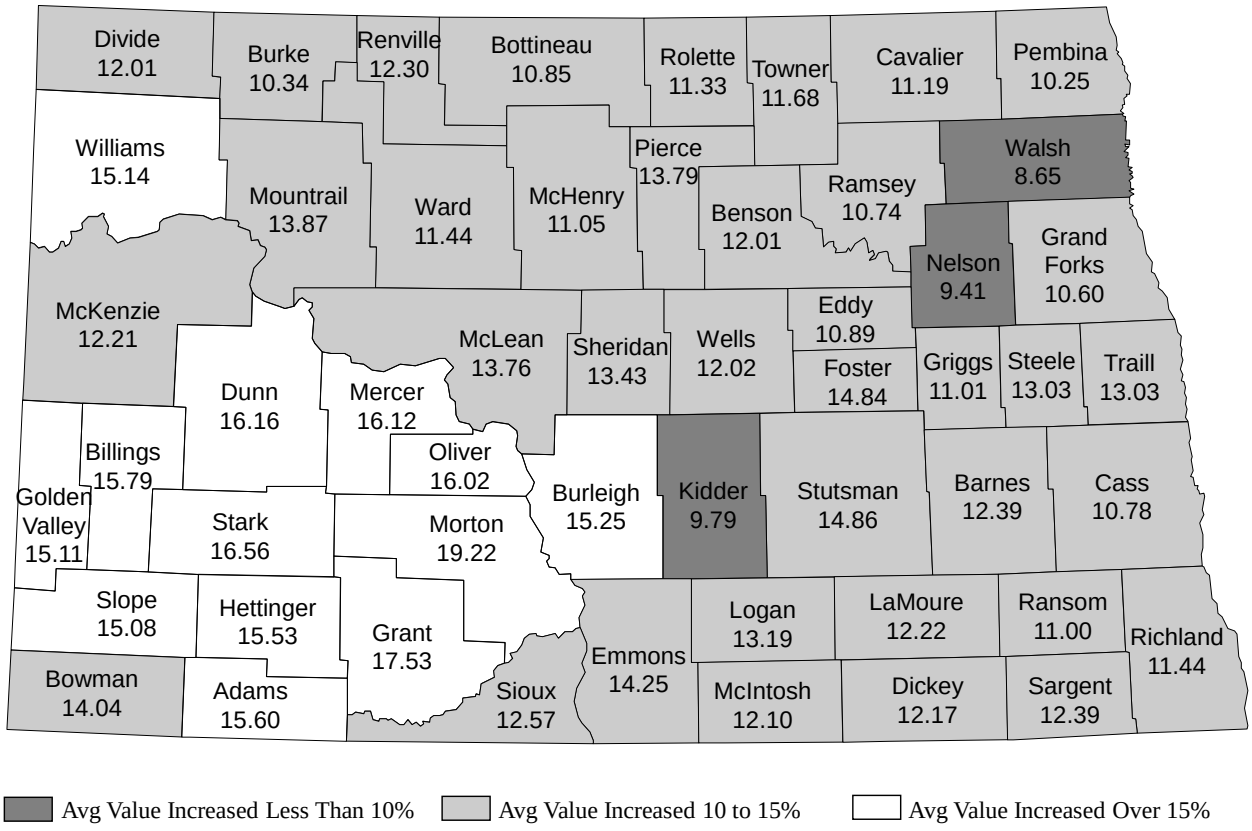


RESULTS: CROPLAND PRODUCTIVITY VALUE

The value of cropland increased an average of $83.98 per acre in 2014 across the state. This was an increase of 12.67 percent over 2013. Average values increased between 10 and 20 percent in all but three counties. Values increased less than 10 percent only in Kidder, Nelson and Walsh counties. See Figure 3.

Changes in the capitalization rate and cost of production index impact all counties equally. The capitalization rate used for the 2014 analysis was 5.19 percent. The change in the capitalization rate increased values in all counties by 5.74 percent. The increase in the cost of production index resulted in a downward shift in land values in all counties of 6.289 percent from 2013. The net effect of these two components is that cropland values in all counties declined by 0.549 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 2014.

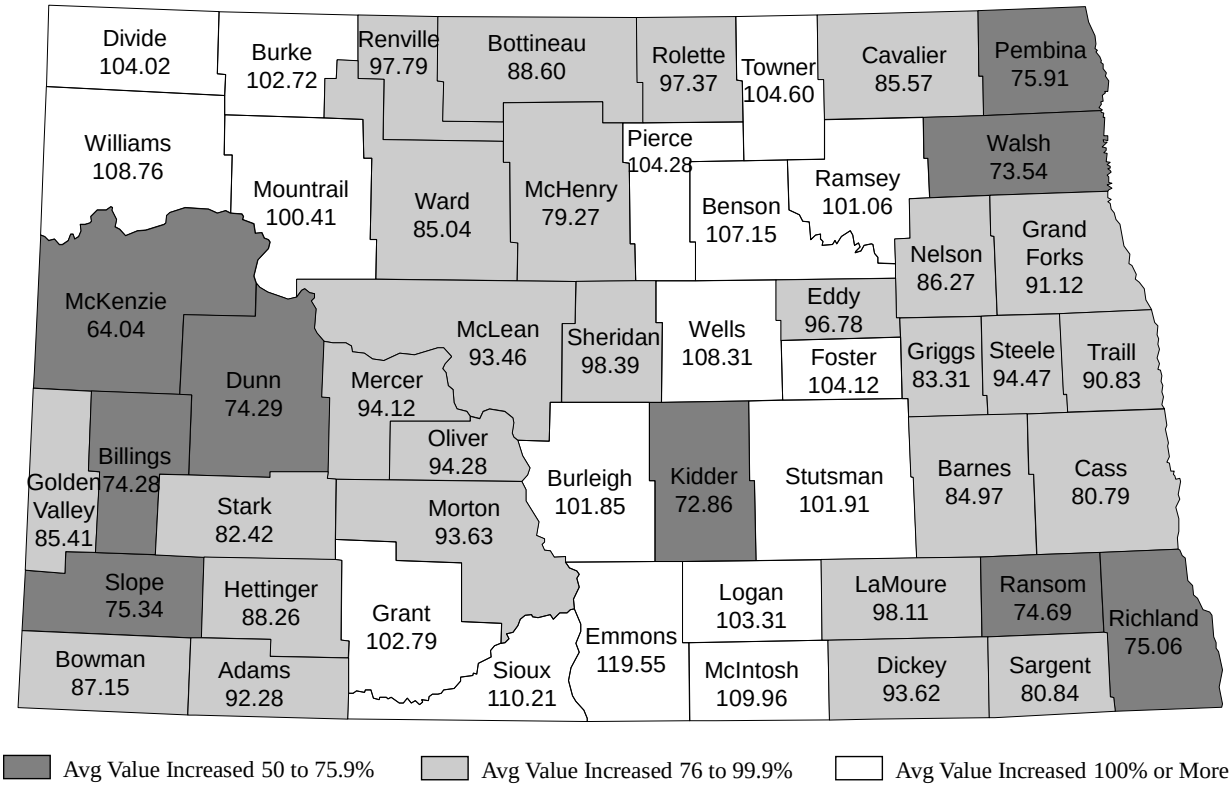
Figure 3. Percent Change in Average Productivity Value of Cropland, 2013-2014



Five-year Trend: Cropland Productivity Value

Cropland value based on the value of production has increased in all counties from 2009 to 2014. The average value of North Dakota cropland was 90.56 percent higher in 2014 than in 2009. The rate of increase has been highly variable around the state as can be seen in Figure 4. The smallest increase in cropland value over this 5-year period was in McKenzie County at 64.04 percent. The largest increase was in Emmons County at 119.55 percent. Value of cropland increased by more than 100 percent in sixteen additional counties.

Figure 4. Percent Change in Average Productivity Value of Cropland, 2009-2014



RESULTS: NON-CROPLAND PRODUCTIVITY VALUE

The value of non-cropland (grazing land) based on the value of production increased by 4.38 percent or $5.64 per acre for the 2014 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 2013.

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 $103.01 for the 2012 marketing year, the most recent year added to the data set. This was up from $97.87 the previous year. The AUM value used to determine productivity, 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 2002, the year rolled out of the data set for this analysis, was $56.34. 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 $36.65 per acre from 2009 to 2014. This is a 37.5 percent average increase for the state over this five-year period. All counties experienced the same change.

CAPITALIZED AVERAGE ANNUAL VALUES PER ACRE BY COUNTY

Two tables are provided displaying county values for 2013 and 2014. North Dakota Capitalized Average Annual Values per Acre by County for 2013 are shown in Table 1. North Dakota Capitalized Average Annual Values per Acre by County for 2014 are shown in Table 2.

Table 1. North Dakota Capitalized Average Annual Values Per Acre by County for 2013 Assessments

County	Cropland	Non-cropland	All Agricultural Land
Adams	353.03	120.29	264.71
Barnes	822.96	167.11	708.28
Benson	649.95	147.95	540.18
Billings	297.87	112.60	170.23
Bottineau	573.78	143.18	501.40
Bowman	372.90	99.37	238.29
Burke	498.54	131.66	387.22
Burleigh	474.97	132.07	318.95
Cass	1023.77	169.91	976.50
Cavalier	797.98	145.20	707.80
Dickey	858.03	166.70	706.03
Divide	471.68	130.91	388.09
Dunn	366.92	119.98	212.35
Eddy	576.16	148.58	447.55
Emmons	627.72	130.79	419.58
Foster	734.85	143.02	628.18
Golden Valley	386.31	98.57	224.69
Grand Forks	978.20	166.78	908.64
Grant	376.06	120.60	245.40
Griggs	713.54	145.74	587.82
Hettinger	508.53	119.68	411.94
Kidder	457.19	133.38	274.88
LaMoure	893.16	172.40	798.38
Logan	546.06	131.61	345.85
McHenry	461.53	142.23	364.07
McIntosh	586.95	130.87	410.13
McKenzie	404.03	120.48	234.41
McLean	594.52	131.22	523.57
Mercer	433.42	119.92	297.66
Morton	420.38	120.21	246.78
Mountrail	510.17	130.73	351.78
Nelson	599.81	144.95	520.12
Oliver	512.50	120.56	284.12
Pembina	1143.18	173.64	1018.37
Pierce	553.02	142.26	465.22
Ramsey	656.31	149.04	534.53
Ransom	839.82	164.19	637.62
Renville	622.65	142.67	585.67
Richland	1103.47	168.70	959.08
Rolette	569.08	144.71	502.55
Sargent	873.99	168.38	768.49
Sheridan	524.53	130.85	371.60
Sioux	388.71	120.31	172.61
Slope	428.95	109.62	260.34
Stark	428.80	120.84	314.25
Steele	942.55	148.09	832.92
Stutsman	699.33	164.68	551.01
Towner	670.47	148.63	645.57
Traill	1130.88	168.37	1056.96
Walsh	987.04	155.38	819.71
Ward	615.53	130.72	501.88
Wells	733.23	143.56	626.43
Williams	458.35	131.09	329.08
State	662.65	128.85	495.26

Table 2. North Dakota Capitalized Average Annual Values Per Acres by County for 2014 Assessments

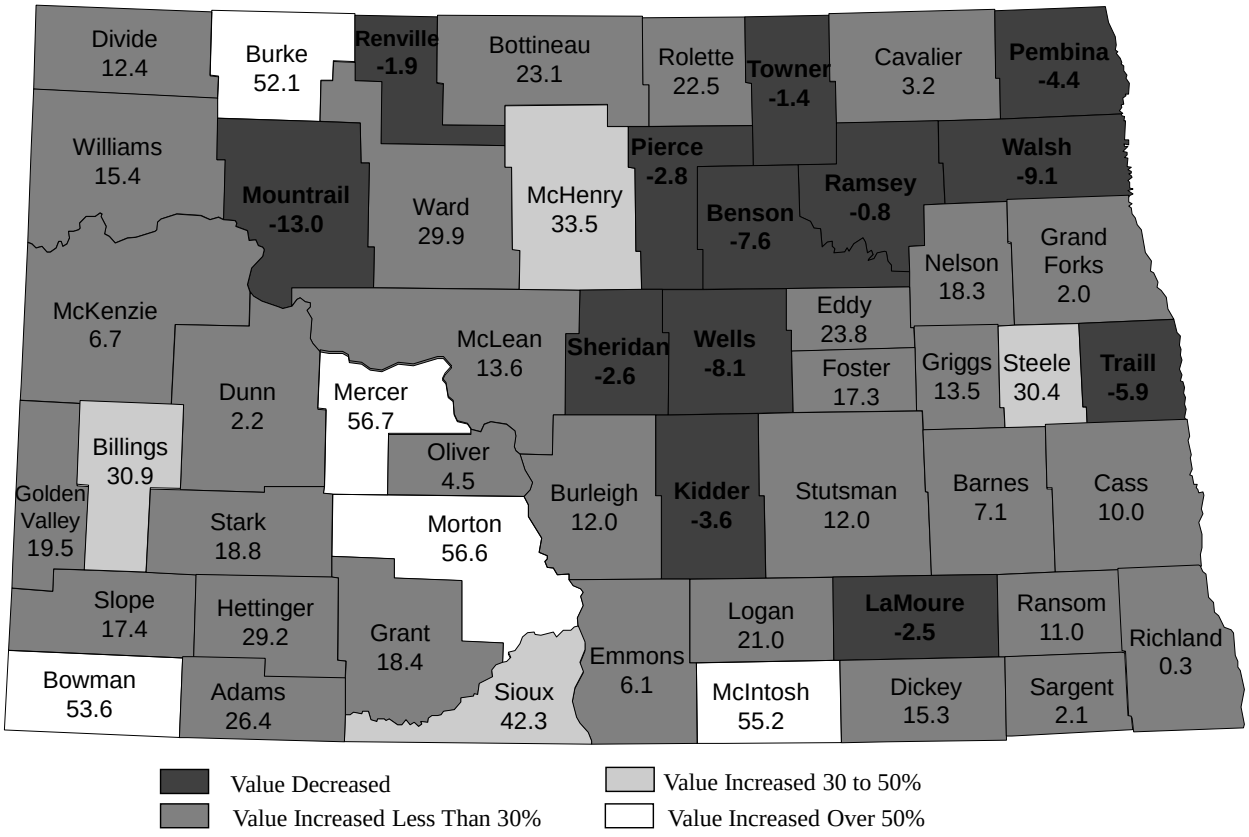
County	Cropland	Non-cropland	All Agricultural Land
Adams	408.09	125.63	300.90
Barnes	924.89	174.48	794.02
Benson	728.00	154.53	602.81
Billings	344.89	117.53	189.78
Bottineau	636.03	149.52	554.22
Bowman	425.24	103.66	306.61
Burke	550.10	137.38	424.81
Burleigh	547.40	137.96	361.32
Cass	1,134.10	177.46	1,081.28
Cavalier	887.28	151.64	785.65
Dickey	962.43	173.99	766.25
Divide	528.32	136.61	432.28
Dunn	426.20	125.24	237.81
Eddy	638.92	155.11	493.27
Emmons	717.15	136.61	474.63
Foster	843.93	149.33	718.74
Golden Valley	444.70	102.89	252.71
Grand Forks	1,081.89	174.18	1,004.07
Grant	442.00	125.82	280.29
Griggs	792.10	152.22	650.42
Hettinger	587.48	125.05	472.68
Kidder	501.93	139.31	288.63
LaMoure	1,002.31	179.96	894.19
Logan	618.11	137.38	385.89
McHenry	512.52	148.55	401.42
McIntosh	658.00	136.61	455.86
McKenzie	453.37	125.82	257.28
McLean	676.30	136.99	593.71
Mercer	503.28	125.24	339.57
Morton	501.16	125.43	283.91
Mountrail	580.92	136.42	395.38
Nelson	656.26	151.25	567.78
Oliver	594.61	125.82	321.45
Pembina	1,260.31	181.31	1,183.84
Pierce	629.29	148.55	525.55
Ramsey	726.78	155.68	590.50
Ransom	932.18	171.48	705.05
Renville	699.23	148.94	656.76
Richland	1,229.67	176.11	1,066.35
Rolette	633.53	151.06	557.95
Sargent	982.27	175.72	860.40
Sheridan	594.99	136.61	417.06
Sioux	437.57	125.63	193.63
Slope	493.64	114.45	293.42
Stark	499.81	126.20	360.60
Steele	1,065.32	154.53	939.64
Stutsman	803.28	171.87	626.74
Towner	748.75	155.11	720.47
Traill	1,278.23	175.72	1,193.56
Walsh	1,072.45	162.24	909.62
Ward	685.93	136.42	557.00
Wells	821.39	149.90	699.85
Williams	527.75	136.80	378.00
State	746.63	134.49	556.71

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 2014 survey are compared with the 2013 survey for cropland and pasture. Changes in market values by county for cropland varied widely across the state. This survey showed values declined in thirteen counties, primarily in the northeast quarter of the state. At the opposite end of the price change spectrum were five counties with cropland values increased by more than 50 percent from 2013. These included Bowman, Burke, Mercer, Morton, and McIntosh counties. Percentage changes in market value for cropland by county are shown in Figure 5.

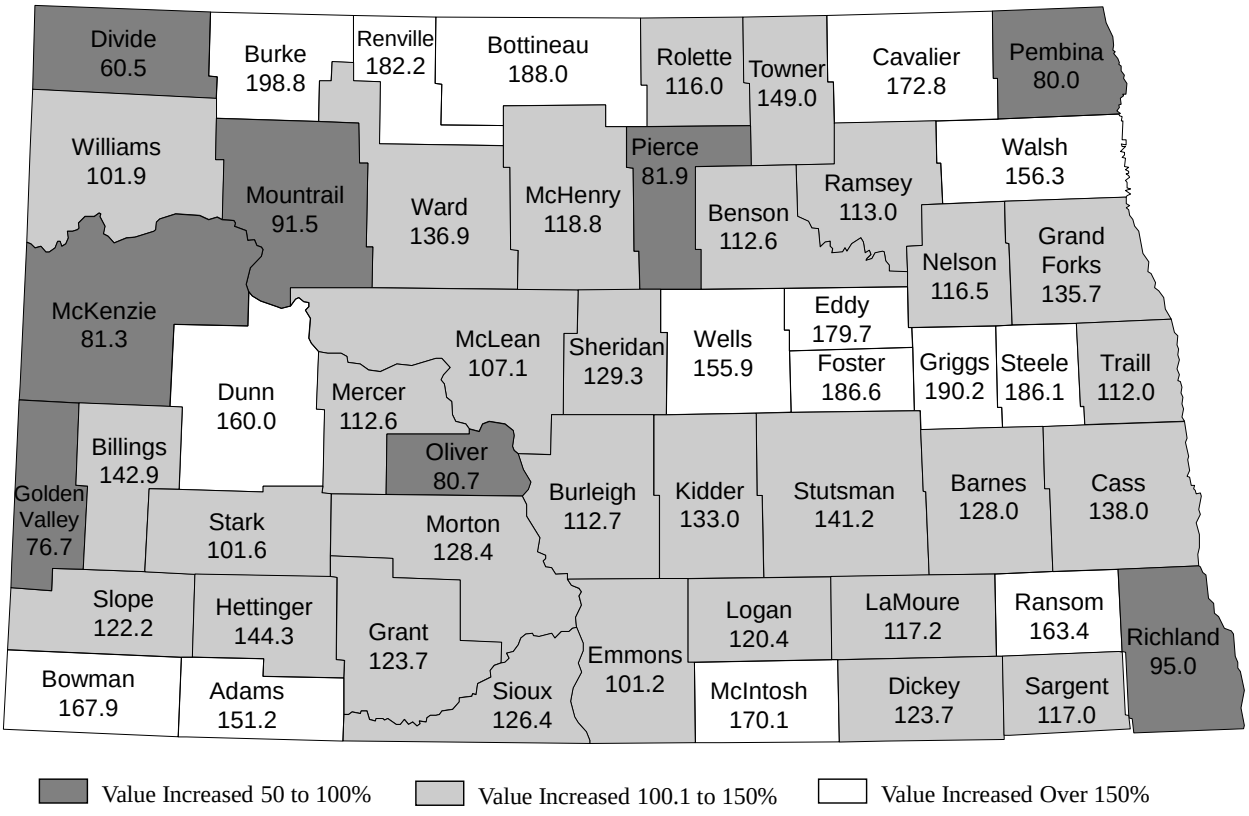
Figure 5. Percent Change in Estimated Market Value of Cropland, 2013-2014



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 from 2009 to 2014. Cropland values increased by more than 150 percent in fifteen counties, distributed throughout the state. Estimated market prices increased less than 100 percent in eight counties. Divide County had the smallest increase of 60.5 percent. Percentage changes in cropland market values are shown in Figure 6.

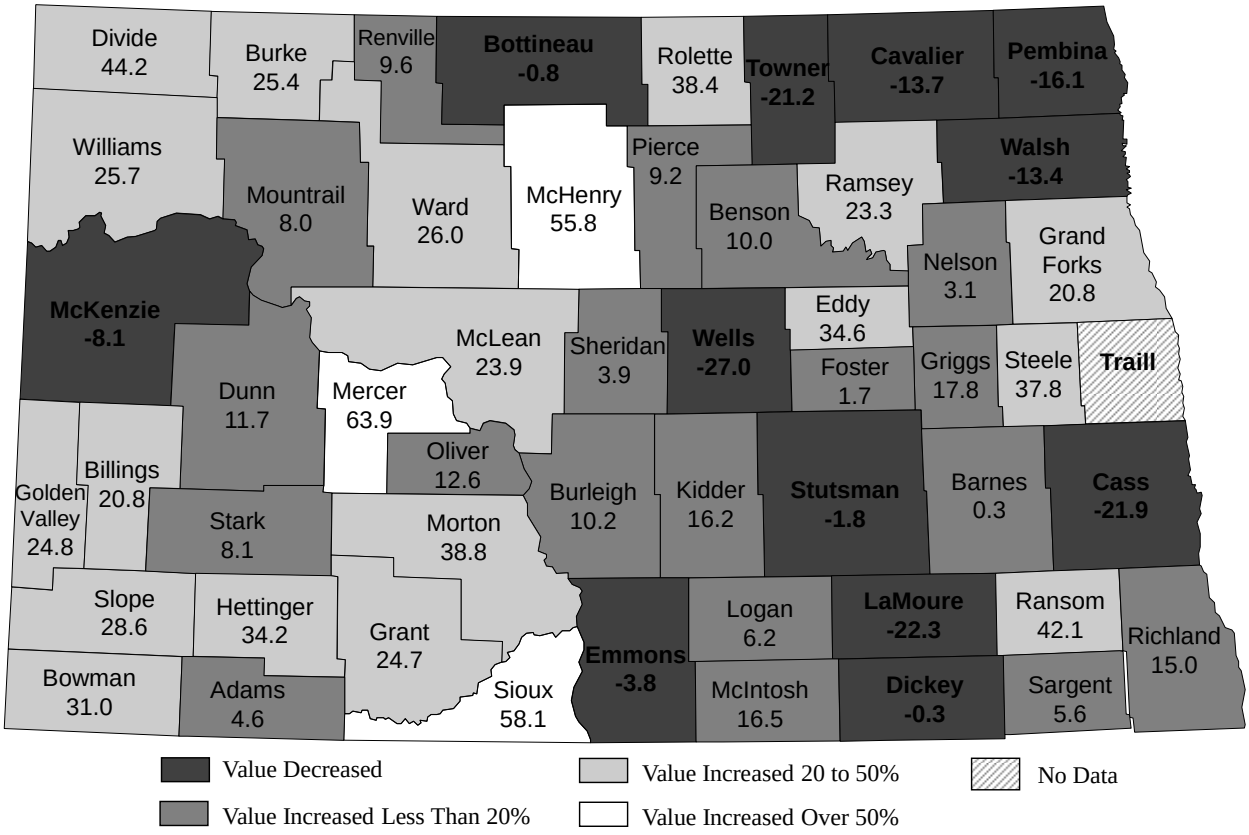
Figure 6. Percentage Change in Estimated Market Value of Cropland, 2009-2014



Market Value of Pasture

The change in market value of pasture was highly variable across the state. Twelve counties reported a decrease in value from 2013. Pasture values increased less than 20 percent in 19 counties. Values increased between 20.0 and 50.0 percent in 18 counties, primarily in the west. McHenry, Mercer, and Sioux counties showed increases greater than 50 percent. Data were incomplete for Traill County. Percentage changes in the market value of pasture are shown in Figure 7.

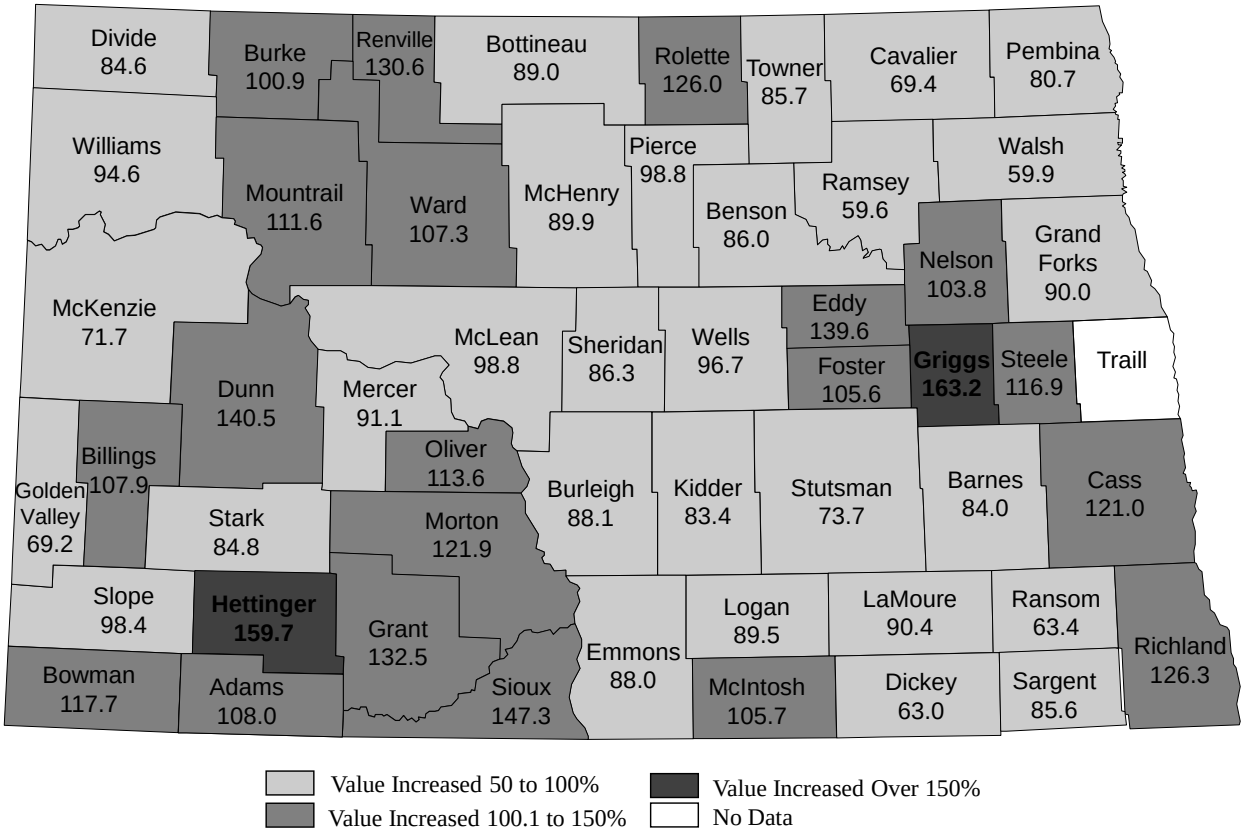
Figure 7. Percent Change in Estimated Market Value of Pasture, 2013-2014



Five-year Trend: Market Value of Pasture

Since 2009, market value estimates of pasture have increased significantly across the state. Increases have been extremely variable across county lines. See Figure 8. The greatest increases in market values occurred in Griggs County at 163.2 percent and Hettinger County at 159.7 percent. In total, 22 counties showed increases greater than 100 percent. Values increased between 50 and 100 percent in 30 counties. No value was provided for Traill County due to insufficient survey responses.

Figure 8. Percentage Change in Estimated Market Value of Pasture, 2009-2014



CONCLUSIONS

Valuation of all agricultural land in North Dakota, based on productivity, increased by 12.41 percent or $61.45 per acre for the 2014 assessment as compared to the previous year. The average value of all agricultural land increased in all counties. The largest increase was in Bowman County at 28.67 percent. However part of this increase was due to a large shift in acres of non-cropland to cropland. Values increased between 10 and 20 percent in 47 counties and less than 10 percent in the remaining 5 counties.

Valuation of cropland in North Dakota increased $83.98 per acre. This was a 12.67 percent increase over 2013. Non-cropland values for all counties increased by 4.38 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 primarily due to an increase in the crop revenue. The analysis for 2014 added data from 2012 and dropped data from 2002. The crop revenue for most counties has been considerably higher since 2007 than prior years. Ten years of data are included in the analysis, however, the high and low years are dropped to calculate an Olympic average. The 2012 year was dropped as the high year in all but 7 western counties. 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 4.45 percent to as much as 15.7 percent by county. The decline in the capitalization rate resulted in an increase of 5.74 percent in land values. This change was more than offset by the increase in the cost of production index. The cost of production index decreased land values in all counties by 6.289 percent.

The increase in non-cropland value was due almost entirely to the increase in the 2012 price for calves and cull cows. As with cropland, the capitalization rate decrease and the increase in the cost of production index offset each other.

The capitalization rate used for the 2014 analysis was the legislative formula rate of 5.19 percent.

The cost of production index increased 10.42 points over the previous year, to 165.69. The cost of production index reduced the landowner share of gross returns by 39.6 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. Market values increased considerably more than productivity values from 2013 to 2014. Market value changes also have shown more variability across the state. This is expected due to the additional factors that influence market values.

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