Evaluation of MLRA 55A Map Unit 144B

Objective

Evaluate map unit composition of eroded fine-loamy glacial till found on 3-6 percent slopes in cropland. From determined composition percentages, a map unit name will be developed and an MLRA Symbol assigned. New map unit will be correlated across MLRA 55A.

Justification and Significance

The eroded fine-loamy till landscape on 3 to 6 percent slopes is a common feature throughout MLRA 55A ***(see figure 1)***. Two map units have been used to identify this terrain in the past. These map units are Barnes-Buse 3-6% slopes and Svea-Buse 3-6% slopes. Experience in the field suggests that these two map units may not correctly represent the terrain and further study is needed. This correlation is significant as the above map units exist in thirteen of sixteen counties in MLRA 55A. These map units encompass a total of 580,000 acres (85% on cropland) across MLRA 55A and include the Benchmark soils such as the Barnes Series and Svea Series. These soils are among the most productive in the state and are extremely important to conservation planning (e.g. RUSLE II, wind erosion). Future work will potentially include additional investigations on other map units related to the eroded study, the progression of erosion to the landscape, the impact of erosion on the North Dakota Soil Productivity Index, and the impact on MLRA 55B.

Potential Reportable Acres

25,000 acres

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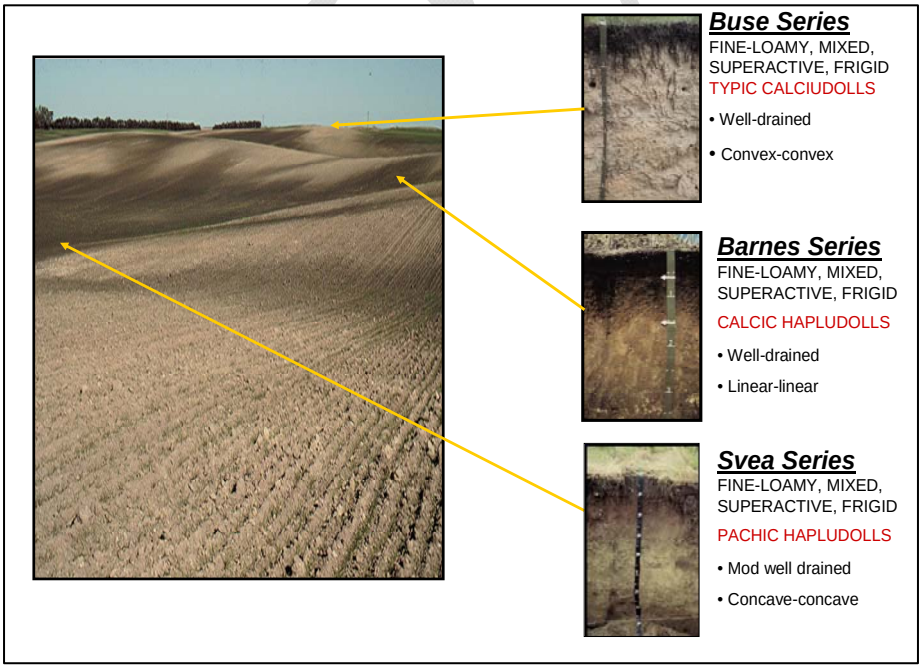
Figure 1: Landscape of Barnes-Buse loams, 3-6% slopes



Background

Traditional cultivation practices used in the last 50 years have had a negative impact to the landscapes found in MLRA 55A, especially to fine-loamy tills found on 3 to 6 percent slopes. Continuous tillage of soils has allowed for machine, water and wind erosion to progressively move down slope. In addition to affecting the tops of rises, the deposition of calcareous material has affected soils down slope. Erosion has noticeably affected the landscape to the point where past soil correlations representing the landscape may no longer be correct. An investigation on this landscape and the associated map units is needed in order to truly represent what is happening on the ground.

Benefits

Completion of this project will end in better identifying a soil-landscape relationship found extensively throughout MLRA 55A. Soils found on this landscape include North Dakota Benchmark Soils such as the Barnes Series and Svea Series. Spatial and tabular data available to users will be updated. Updated soil interpretations for these cropped landscapes can lead to better conservation practices being implemented in MLRA 55A.

General Procedure

Locate the eroded fine-loamy till landscapes found on 3 to 6 percent slopes in cropland across MLRA 55A and identify map units used. Choose representative map units to investigate. Complete detailed transects of the eroded landscape, focusing on eroded areas and depositional areas. Select random transects to input into TRANSWIN. Determine composition percentages and develop map unit name and assign MLRA Symbol. Identify map unit trends across MLRA 55A. Correlate the map unit across MLRA 55A.

Needs

Equipment used for this project will include:

- ATV
- Bucket auger
- ArcMap GIS 9.2
- LE 1600 Tablet PC
- Transect forms
- TRANSWIN

Duration

Procedure	*Time Table*
Office Preparation & Investigation	10 days
Field Investigation	25 days
Summary of Field Work	5 days
Correlation Process	10 days
SSURGO Download of MLRA 55A	2 days
Total	**52 days**

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Personnel

Lance Duey (Soil Scientist): Conducting Field Investigation and Summary
Earnie Jensen (MLRA Coordinator): Quality Control
Joe Brennan (Soil Scientist/GIS): Assisting in GIS Applications/Use/Training
Mike Ulmer (Senior Regional Soil Scientist): Quality Assurance
County Field Offices: District Conservationists will be contacted prior to working in a county

Contact Person

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I. Office Preparation and Investigation

A. *Reviewing Existing Correlation Documentation*

1. Historical transect data will be evaluated using TRANSWIN (North Dakota NRCS Soil Transect Program)
2. Review correlation decisions of the eroded fine-loamy till, 3-6% slopes in MLRA 55A.
3. Choose map units which will be investigated during the project.

B. *Review of Spatial Data*

1. Evaluate the existing MLRA Legend, and non-updated County Legends. Choose map units to be queried using GIS ***(see chart 1)***

Chart 1: MLRA 55A Eroded B-slope Fine-loamy till Map Units

MLRA 55A Eroded B-Slope Fine-loamy till Map Units

County Symbol	MLRA Symbol	Existing Correlated Map Unit Name	County	Total Acres	Total Acres Cropland
118	F144B	Barnes-Buse loams, 3-6% slopes	Towner	134,715	118,093
11B	F144B	Barnes-Buse loams, 3-6% slopes	Nelson	49,396	37,547
12B 11B	F144B F154B	Barnes-Buse loams, 3-6% slopes Svea-Buse loams 3-6% slopes	Cavalier	120,058	107,278
130B	F144B	Barnes-Buse loams, 3-6% slopes	Grand Forks	2,006	1,746
140B	F144B	Barnes-Buse loams, 3-6% slopes	Benson	51,012	43,998
19B	F144B	Barnes-Buse loams, 3-6% slopes	Ramsey	74,840	64,427
53B	F144B	Barnes-Buse loams, 3-6% slopes	Pierce	2,471	2,308
BkB2	F144B	Barnes-Buse loams, 3-6% slopes	Walsh	41,174	28,256
118		Barnes-Buse loams, 3-6% slopes	Rolette	75,787	63,373
24B		Barnes-Buse loams, 3-6% slopes	McHenry	22,744	19,477
BbB		Barnes-Buse loams, undulating	Ward	3,210	2,985
BdB		Barnes-Buse loams, 3-6% slopes	Renville	3,023	2,695
Total Acres				**580,436**	**492,183**

2. Using ArcMap GIS 9.2, query the eroded fine-loamy till map units, 3-6% slopes and develop a physiographic map of MLRA 55A ***(see figure 2)***
3. Review spatial distribution for trends such as map unit clustering and voids.
   i. Map units are heavily populated in the Eastern half of MLRA 55A because Eastern counties have had MLRA Legend updates
   ii. Map units are thinly populated in the Western half of MLRA 55A because Western counties have not been updated to a MLRA Legend

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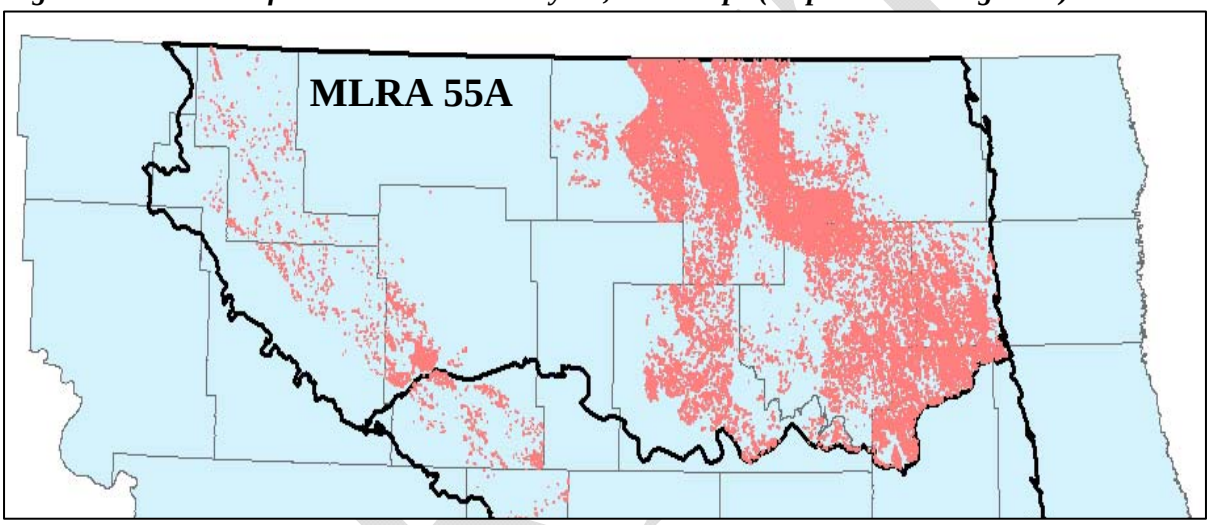
iii. Bottineau County and Pierce County are void of eroded, fine-loamy till 3 to 6 percent slope map units because Bottineau County did not recognize an eroded fine-loamy till map unit on 3 to 6 percent slopes. The eroded fine-loamy till map unit was correlated on 3 to 9 percent slopes. Additional investigation needs to be conducted on Pierce County

4. Identify map units that exist only on cropland.
5. Choose map units in cropland across MLRA 55A that correctly represent the landscape and investigate each using techniques outlined in *Section II Field Investigation*

Figure 2: Locations of All Eroded Fine-loamy till, 3-6% slope (cropland and rangeland)



C. *Office Evaluation of Ortho-Imagery Photo Tones* ***(see figure 3)***

1. Analyze photo tones of selected map units and choose areas for transecting.
2. Conclude that three photo tones influence the landscape
   a. Black = Possible zones of wetness or potholes
   b. Grey tones = Possible zones of deposition and other
   c. White tones = Possible zones of erosion

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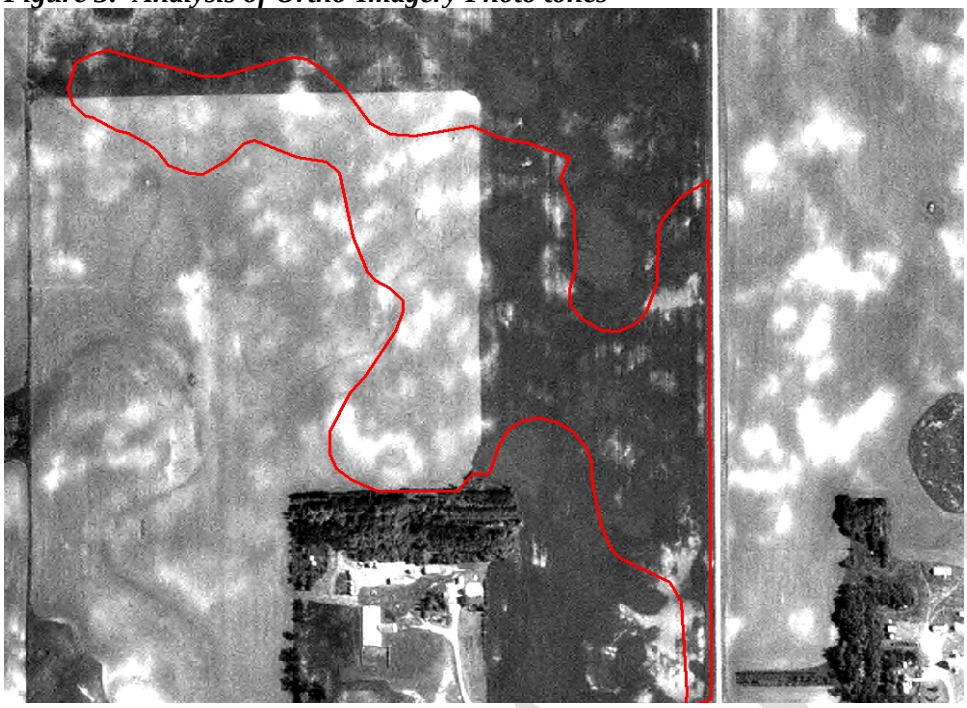
Figure 3: Analysis of Ortho-Imagery Photo tones



3. Determining Photo Tone Coverage
    a. What percentage of the map units are white tones?
    b. What percentage of the map units are black tones?

Who: Duey, Jensen, Brennan
When: Spring 2007
Quality Control: Jensen
Quality Assurance: MO-7 Staff

II. Field Investigation

A. *Transecting* ***(see figure 4)***

1. Choose 10 representative map units and investigate black, grey, and white photo tones
2. Determine areas to transect
3. Identify soil series and record stops on TRANSWIN Field Form (MO-7 SSFG, Part D-2 Appendix B – Version 3.0 4/01)
    a. Example of data collected
        i. Soil Series
        ii. Slope percent
        iii. Mollic epipedon thickness
        iv. Surface carbonate thickness
        v. Depth to calcic horizon

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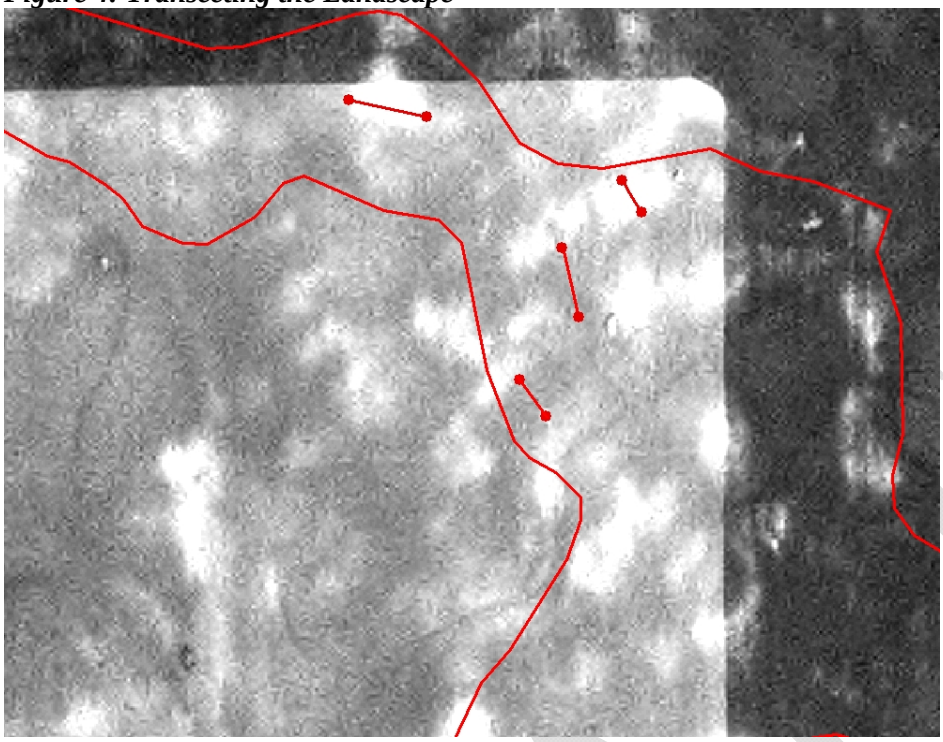
Figure 4: Transecting the Landscape



Who: Duey
When: Summer/Fall 2007, Spring 2008
Quality Control: Jensen
Quality Assurance: MO-7 Staff

III. Summary of Field Work

A. Application of Transects to Photo Tone

1. Select 20 additional sites across the MLRA and apply knowledge gained from landscape transects.
2. Using photo tone of the Ortho-imagery to correctly identify the soil series

Who: Duey
When: Summer/Fall 2007, Spring 2008
Quality Control: Jensen
Quality Assurance: MO-7 Staff

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IV. Correlation Process

A. *Component Determination using TRANSWIN*
   1. Major Component(s)
   2. Minor Component(s)
   3. Determine Similar Soils
   4. Determine Dissimilar Soils

B. *Assigning Map Unit Name and Symbol*
   1. Revise or populate Reference Components
      a. Changes to WEG (e.g. 5 changes to 4L)
   2. Select a new map unit name if needed
   3. Select a new MLRA Symbol if needed
   4. Add the new MLRA Symbol to the MLRA Legend
   5. Spatially assign MLRA Symbol to counties where the eroded, fine-loamy till on 3 to 6 percent slopes landscape occur

C. *Documentation will be entered in NASIS at Level II*
   1. Populate Data Map unit(s) at Level II
   2. Validate Data Map unit(s)

D. *Implement Map Unit Name and Symbol to MLRA 55B*

Who: Duey, Jensen
When: Fall/Winter 2008
Quality Control: Jensen
Quality Assurance: MO-7 Staff

V. SSURGO Download

A. Download map unit changes to SSURGO

Who: MO-7 Staff
When: Winter 2008

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MLRA Soil Survey Leader Signature

MO-7 Leader Signature

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