

Agricultural Crop Residue Removal for the BTS and Beyond

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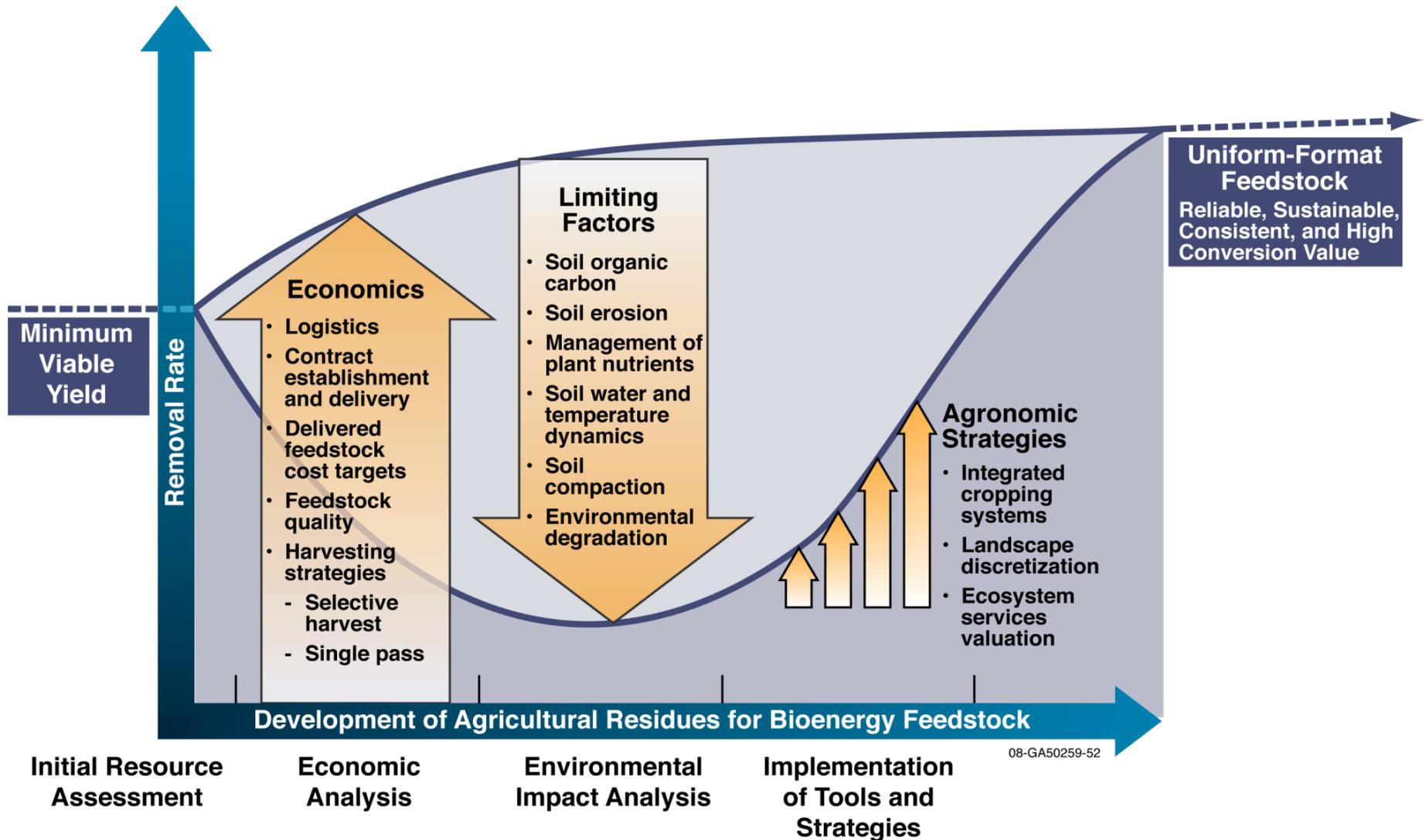
Agricultural Crop Residue Removal

Residue Required for Erosion Control is a function of:

1. Type of Erosion (wind or rainfall (water))
2. Field management practices (tillage)
3. Soil type
4. Climate (rainfall, temperature, retained moisture)
5. Physical field characteristics (% slope, soil erodibility)
6. **Crop and cropping rotation**
7. Tolerable Soil Loss, T
8. **Grain yield (bu/ac)**



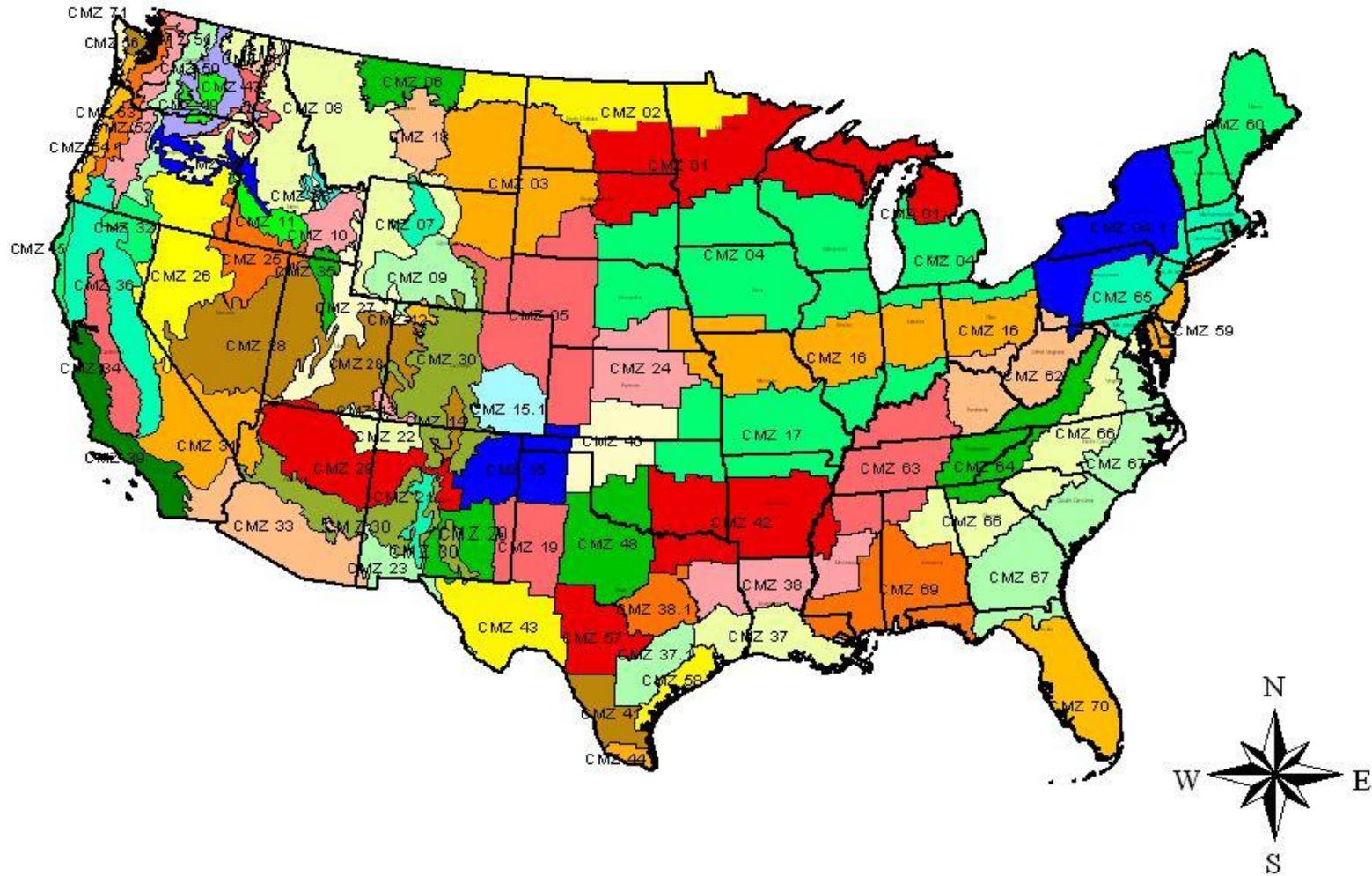
Agricultural Residues – Big Picture

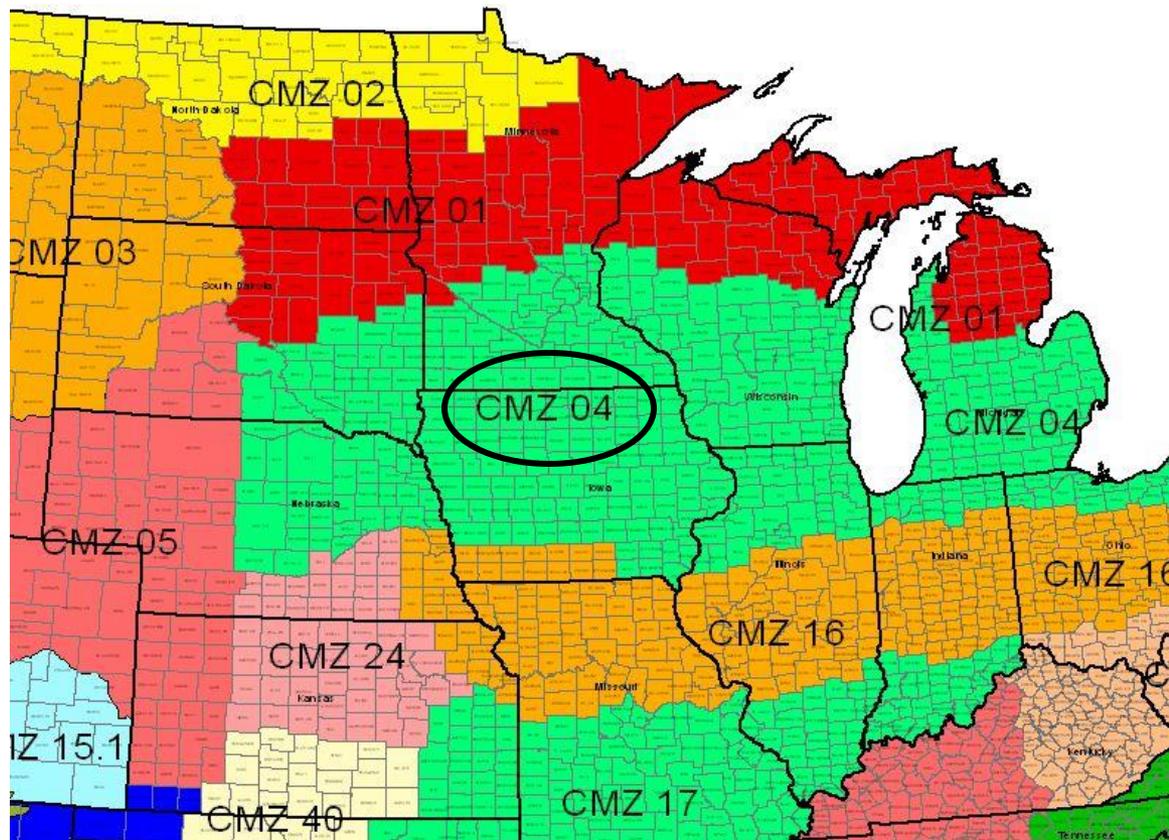


Some History

- 1996 – first attempt at collaboration w/ NRCS
 - continuous corn and continuous wheat only
- 2004 – better concerning rotations
 - 7 1-2 year rotations; still not indicative of reality
- 2009 – decided to get real about this once and for all and get NRCS to help out in a big way
 - rotations pretty much indicative of reality with respect to large periods of time

Crop Management Zones





- 4 Continuous corn grain;NT no stover harvest
 corn grain;NT, corn grain;NT, Soybean, wr, NTz4
 Corn, grain; NT, SB NT, WW NT CMZ4
 corn grain;NT,anhyd, Soybean, nr, NT Single disk z4

Key Assumptions

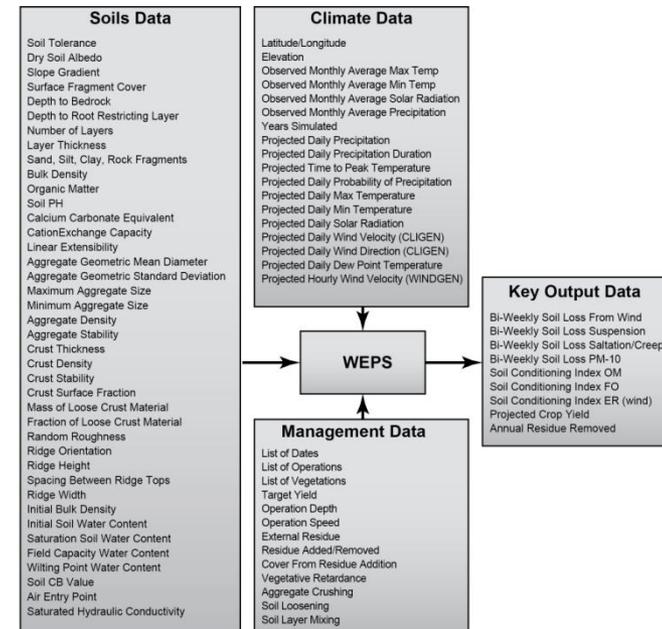
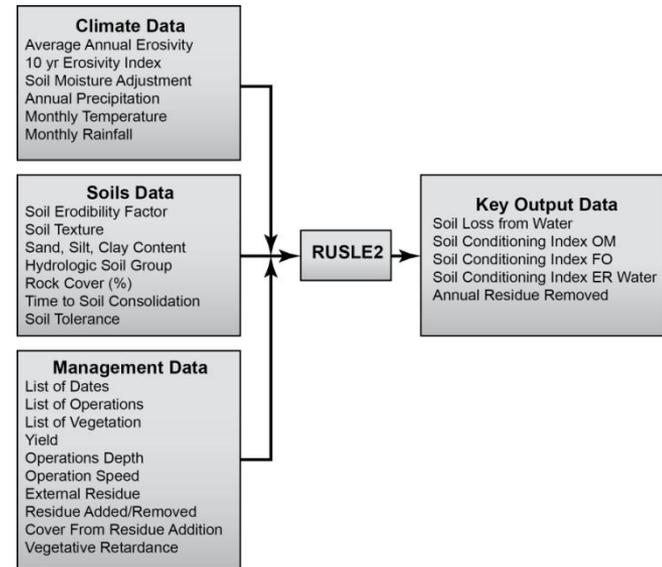
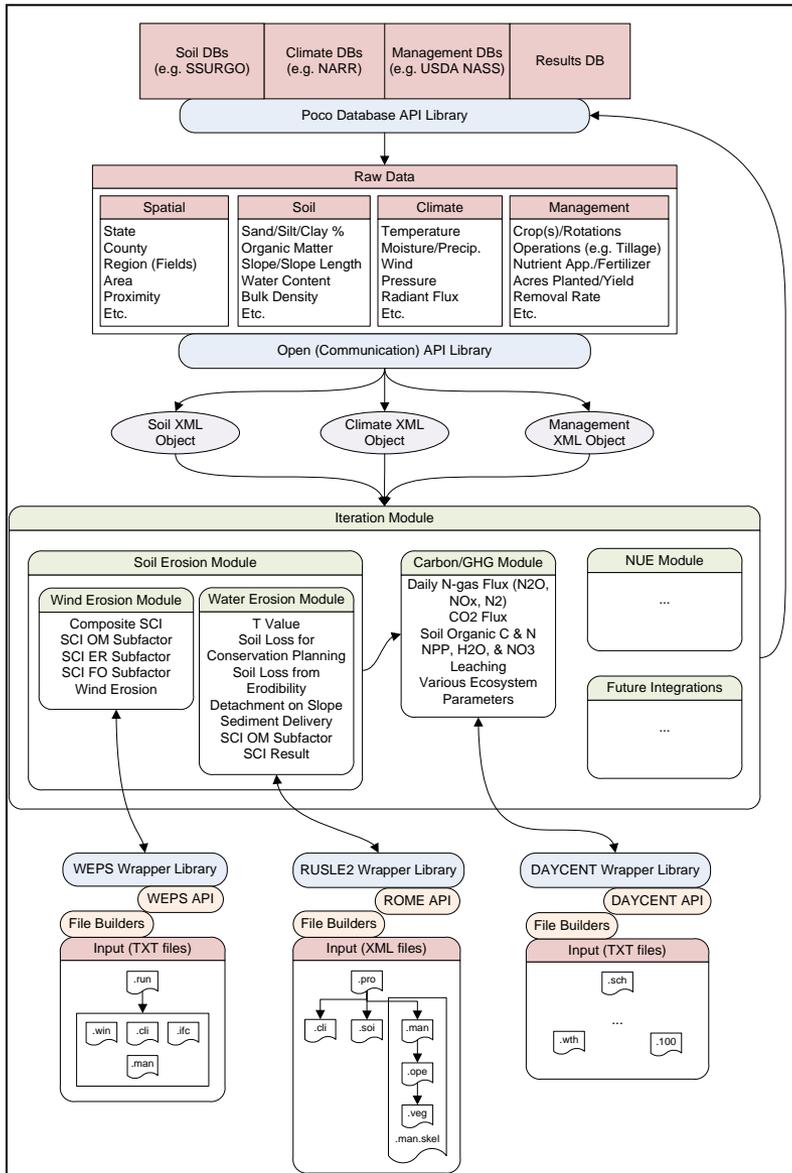
- **Static harvest index (0.5 for corn stover)**
- NRCS developed crop rotations
- SSURGO soils with capability class 1-4 considered
- **SSURGO soils with greater than 1,000 acres in each county considered**
- Rotations assumed to be evenly distributed across soils
- **Erosion limited to less than T-value in SSURGO for each soil**
- Soil Conditioning Index greater than 0

NRCS Rotations Forced into NASS acres

Ag Crop Residue Soil Type Analysis

Management	Wind Erosion	Water Erosion	Total Erosion	T	Wind + Water SCI	Crop	Yield	Annual Residue (lbs)	Crop	Yield	Annual Residue (lbs)	Crop	Yield	Annual Residue (lbs)
CSW (baseline)	0.00	2.43	2.43	5	0.306	Corn	70	0	Soybeans	25	0	Wheat	45	0
CSW high residue harvest	4.00	7.51	11.51	5	-0.264	Corn	70	3,539	Soybeans	25	0	Wheat	45	2,839
CSW moderate residue harvest	0.01	4.04	4.05	5	0.106	Corn	70	1,472	Soybeans	25	0	Wheat	45	1,527
CSW moderately high residue harvest	0.00	4.53	4.53	5	0.053	Corn	70	1,716	Soybeans	25	0	Wheat	45	1,710
GSSuW (baseline)	0.00	3.10	3.10	5	0.266	Grain S	70	0	Sunflower	1200	0	Wheat	45	0
GSSuW high residue harvest	0.06	9.29	9.35	5	-0.386	Grain S	70	3,276	Sunflower	1200	0	Wheat	45	2,820
GSSuW moderate residue harvest	0.00	4.84	4.84	5	0.066	Grain S	70	1,037	Sunflower	1200	0	Wheat	45	1,517
GSSuW moderately high residue harvest	0.01	5.35	5.36	5	0.009	Grain S	70	1,328	Sunflower	1200	0	Wheat	45	1,699

Residue Tool Structure



Adair County, Iowa Example Kennebec Silt Loam 0% to 2% Slope

10-yr Average Yield

Management + Removal Rate	Calculated Erosion	SCI OM Subfactor	Annual Average Residue (lbs)	Corn Grain Yield
Continuous corn grain; NT, Harvest grain and cobs	0.1660717	0.320423	1891	149.9
Continuous corn grain; NT, High residue Harvest	1.1931644	-0.60299	7070	149.9
Continuous corn grain; NT, Moderate Residue Harvest	0.2281336	0.13634	2905	149.9
Continuous corn grain; NT, Moderately High residue Harvest	0.5972384	-0.12565	4542	149.9
Continuous corn grain; NT no stover harvest	0.0889718	0.784717	0	149.9

Adair County, Iowa Example Kennebec Silt Loam 0% to 2% Slope

10 year baseline projection

Management + removal rate erosion SCI RemRes Yield (bu/ac)

Continuous corn grain; NT, Harvest grain and cobs	0.1194257	0.498468	2180	174.3
Continuous corn grain; NT, High residue Harvest	1.0937827	-0.566	8151	174.3
Continuous corn grain; NT, Moderate Residue Harvest	0.1699904	0.286264	3349	174.3
Continuous corn grain; NT, Moderately High residue Harvest	0.5033516	-0.01575	5236	174.3
Continuous corn grain; NT no stover harvest	0.0675342	1.029399	0	174.3

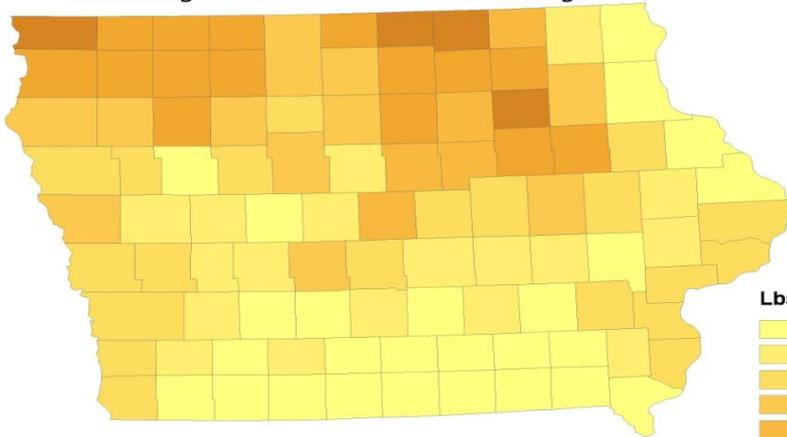
Adair County, Iowa Example Kennebec Silt Loam 0% to 2% Slope

10-year baseline projection plus 10%

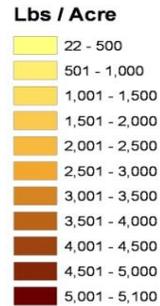
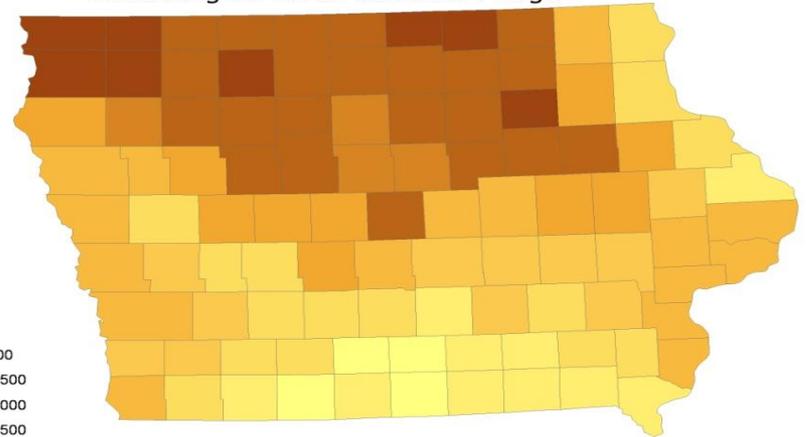
Management + removal rate	erosion	SCI	RemRes	Yield (bu/ac)
Continuous corn grain; NT, Harvest grain and cobs	0.0975953	0.625653	2386	191.73
Continuous corn grain; NT, High residue Harvest	1.0297659	-0.53958	8922	191.73
Continuous corn grain; NT, Moderate Residue Harvest	0.1386611	0.393361	3666	191.73
Continuous corn grain; NT, Moderately High residue Harvest	0.4473739	0.062759	5732	191.73
Continuous corn grain; NT no stover harvest	0.0560973	1.204186	0	191.73

Regional Assessment Results

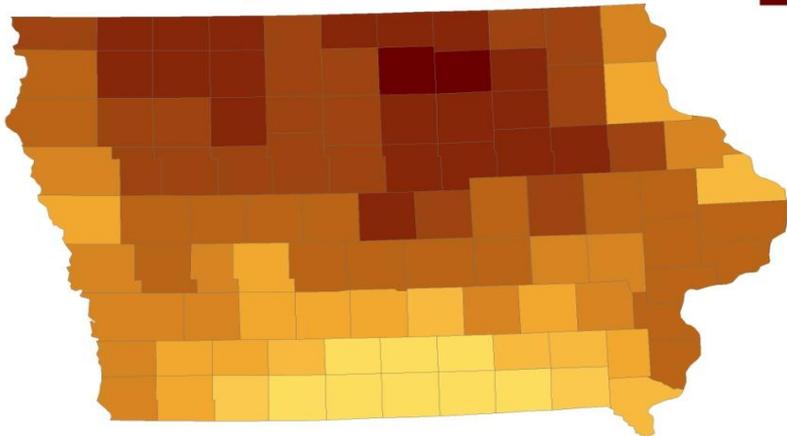
Assuming All Acres Conventional Tillage



Assuming All Acres Reduced Tillage



Assuming All Acres No Tillage



Actual Tillage Projections

