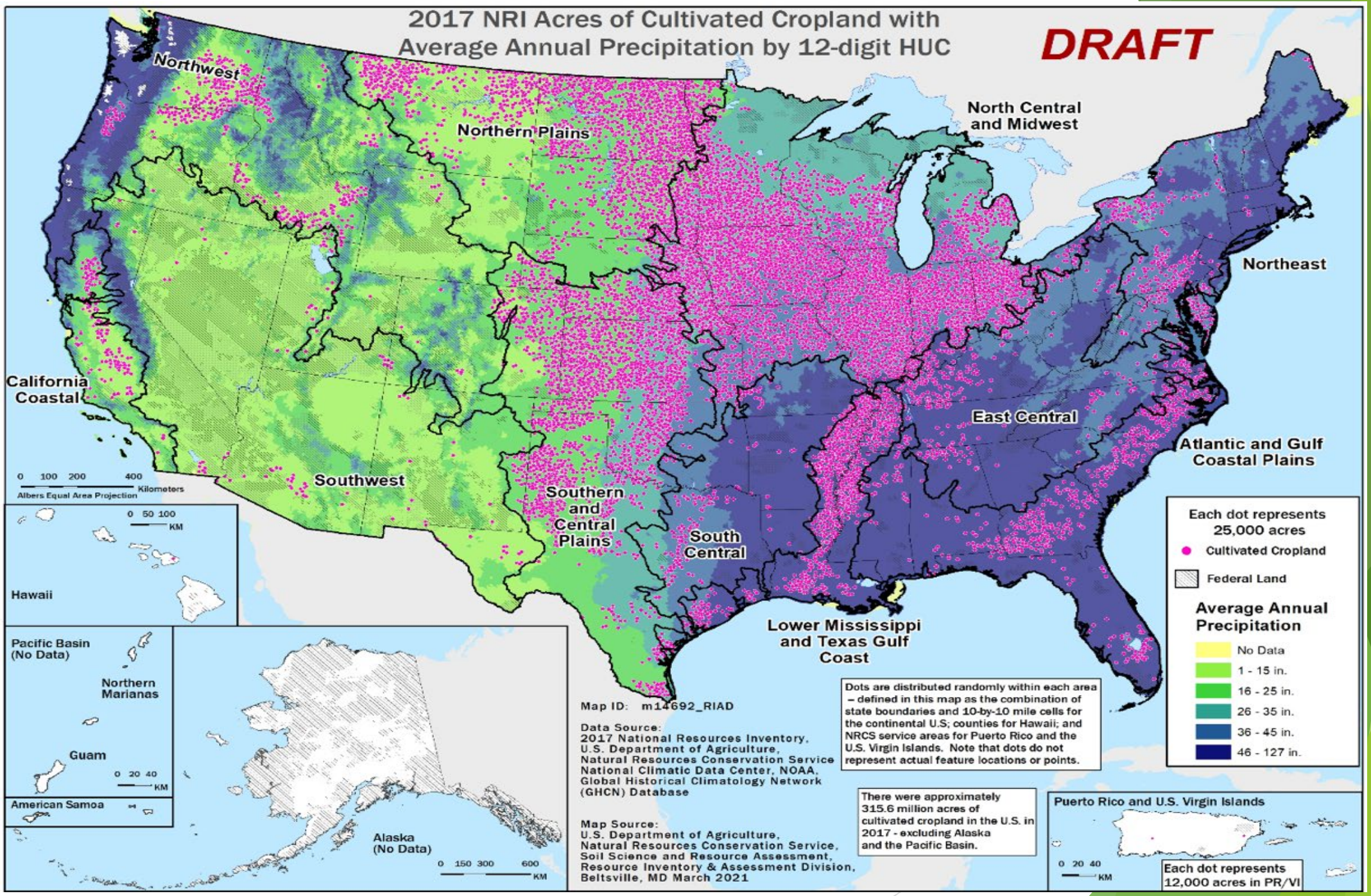
CEAP II Cropland Assessment 2013-2016

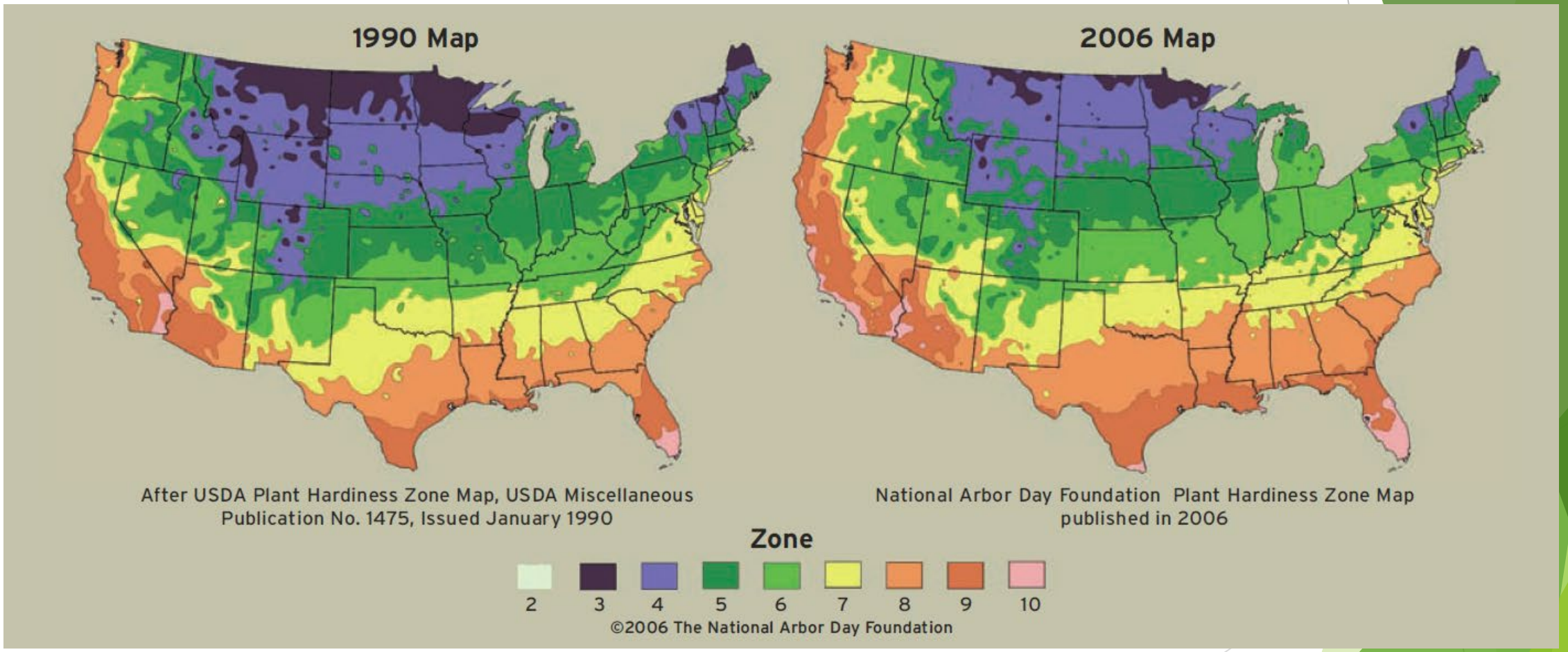
1. The Second National Farmer Survey
2. CEAP I 2003-2006 comparison
3. Drivers of Change
4. Practice Adoption trends
5. Estimated Impacts


2017 NRI Acres of Cultivated Cropland with
Average Annual Precipitation by 12-digit HUC
DRAFT
Northwest
Northern Plains
North Central and Midwest
Northeast
California Coastal
Southwest
Southern and Central Plains
South Central
East Central
Atlantic and Gulf Coastal Plains
Lower Mississippi and Texas Gulf Coast
0 100 200 400 Kilometers
Albers Equal Area Projection
Hawaii
0 50 100 KM
Pacific Basin (No Data)
Northern Marianas
Guam
0 20 40 KM
American Samoa
Alaska (No Data)
0 150 300 600 KM
Each dot represents 25,000 acres
Cultivated Cropland
Federal Land
Average Annual Precipitation
No Data
1 - 15 in.
16 - 25 in.
26 - 35 in.
36 - 45 in.
46 - 127 in.
Dots are distributed randomly within each area – defined in this map as the combination of state boundaries and 10-by-10 mile cells for the continental U.S; counties for Hawaii; and NRCS service areas for Puerto Rico and the U.S. Virgin Islands. Note that dots do not represent actual feature locations or points.
Map ID: m14692_RIAD
Data Source:
2017 National Resources Inventory, U.S. Department of Agriculture, Natural Resources Conservation Service
National Climatic Data Center, NOAA, Global Historical Climatology Network (GHCN) Database
Map Source:
U.S. Department of Agriculture, Natural Resources Conservation Service, Soil Science and Resource Assessment, Resource Inventory & Assessment Division, Beltsville, MD March 2021
There were approximately 315.6 million acres of cultivated cropland in the U.S. in 2017 - excluding Alaska and the Pacific Basin.
Puerto Rico and U.S. Virgin Islands
0 20 40 KM
Each dot represents 12,000 acres in PR/VI

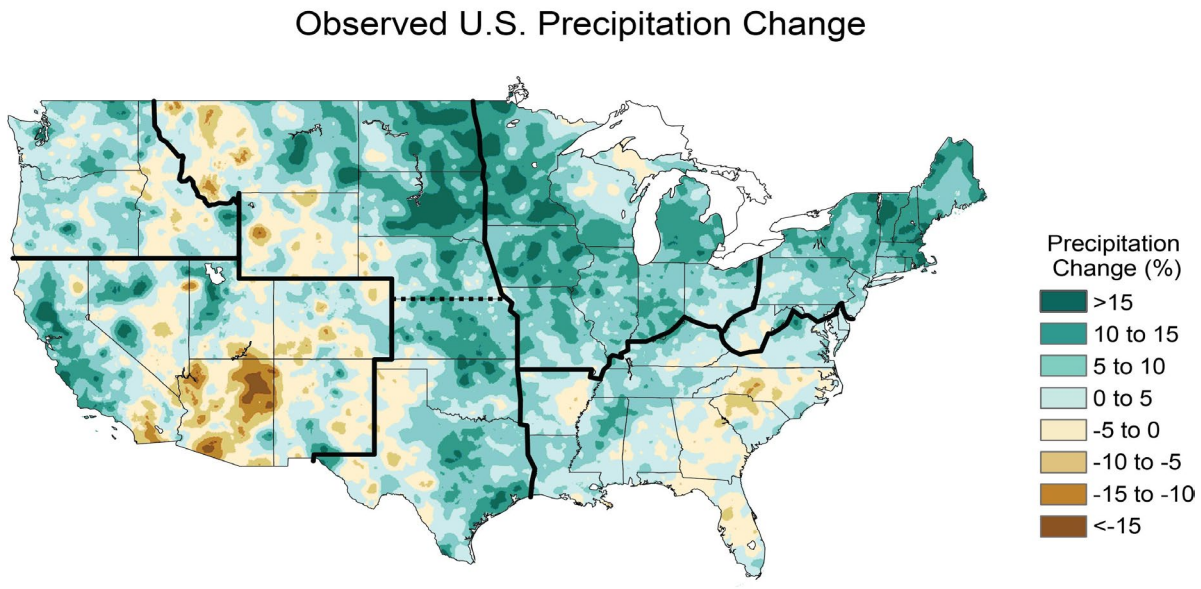
Climate Change: Policy Impacts

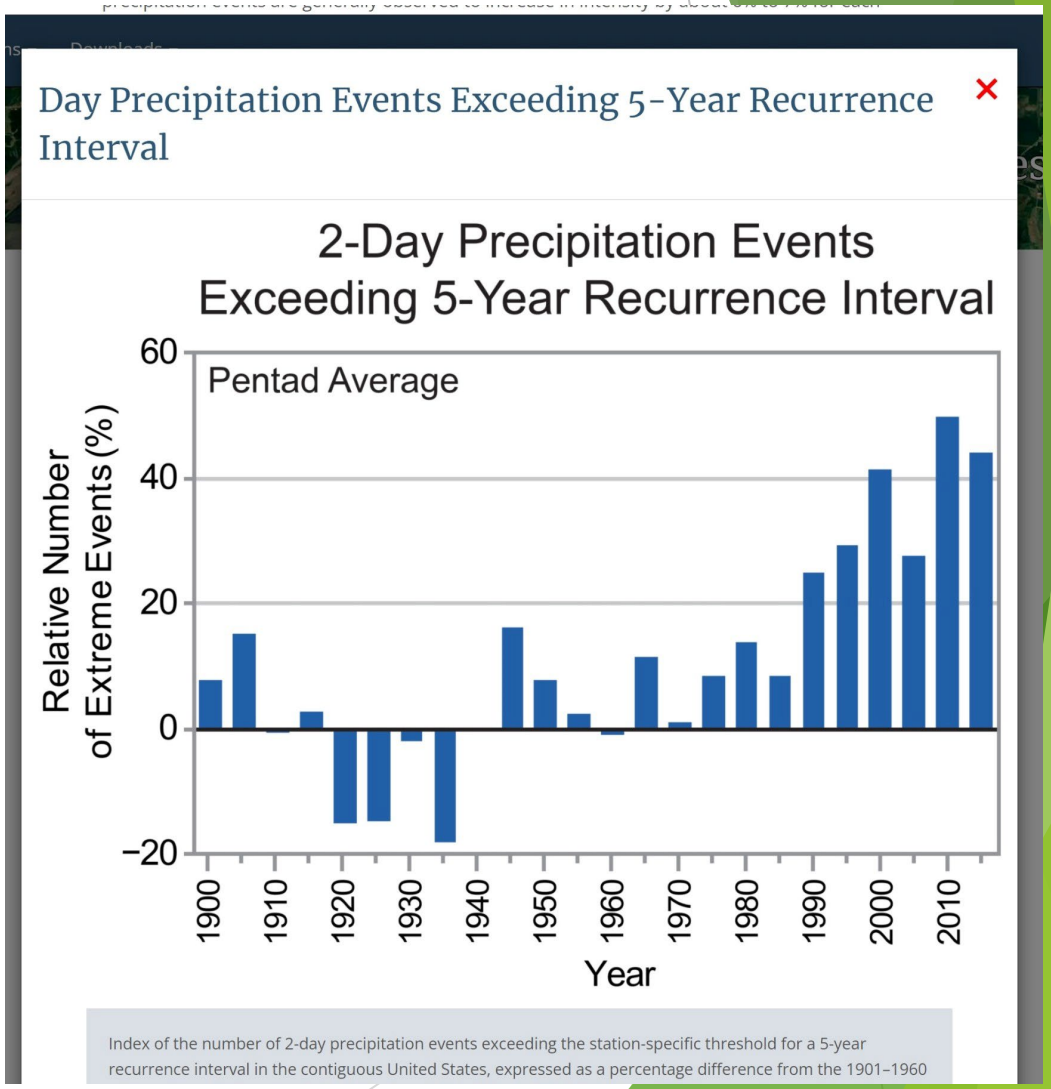
- Renewable Energy:
  - Biofuels
    - Increased demand for corn and soybean => Prices and profitability
    - Increased biotech for productivity
- GHG
  - Carbon sequestration; carbon “farming” for potential trading markets.
  - Soil health campaign
- Trade Agreements: Degree of climate influence ?

Climate Change: Physical Changes

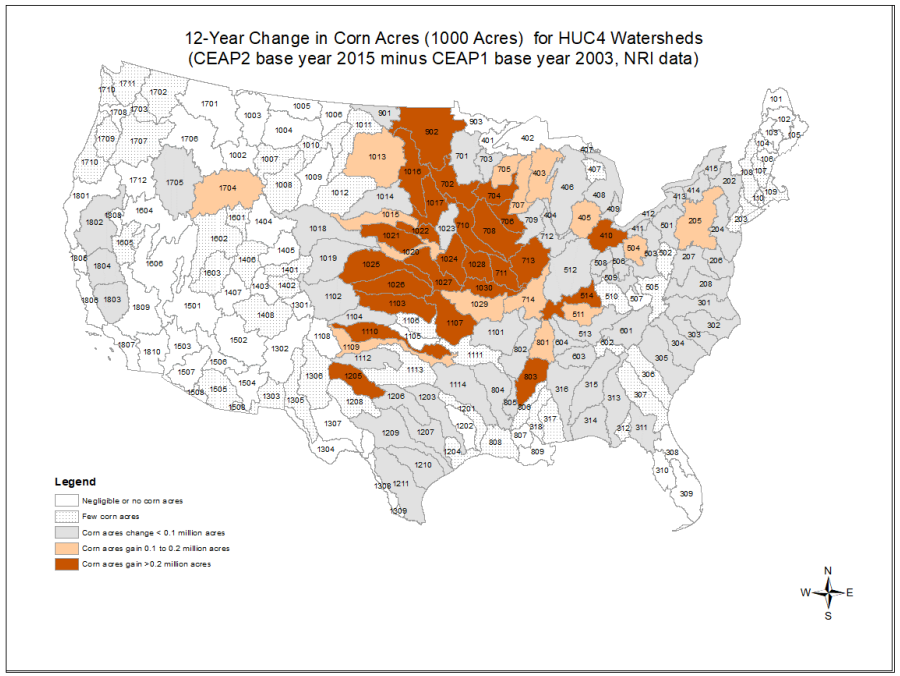


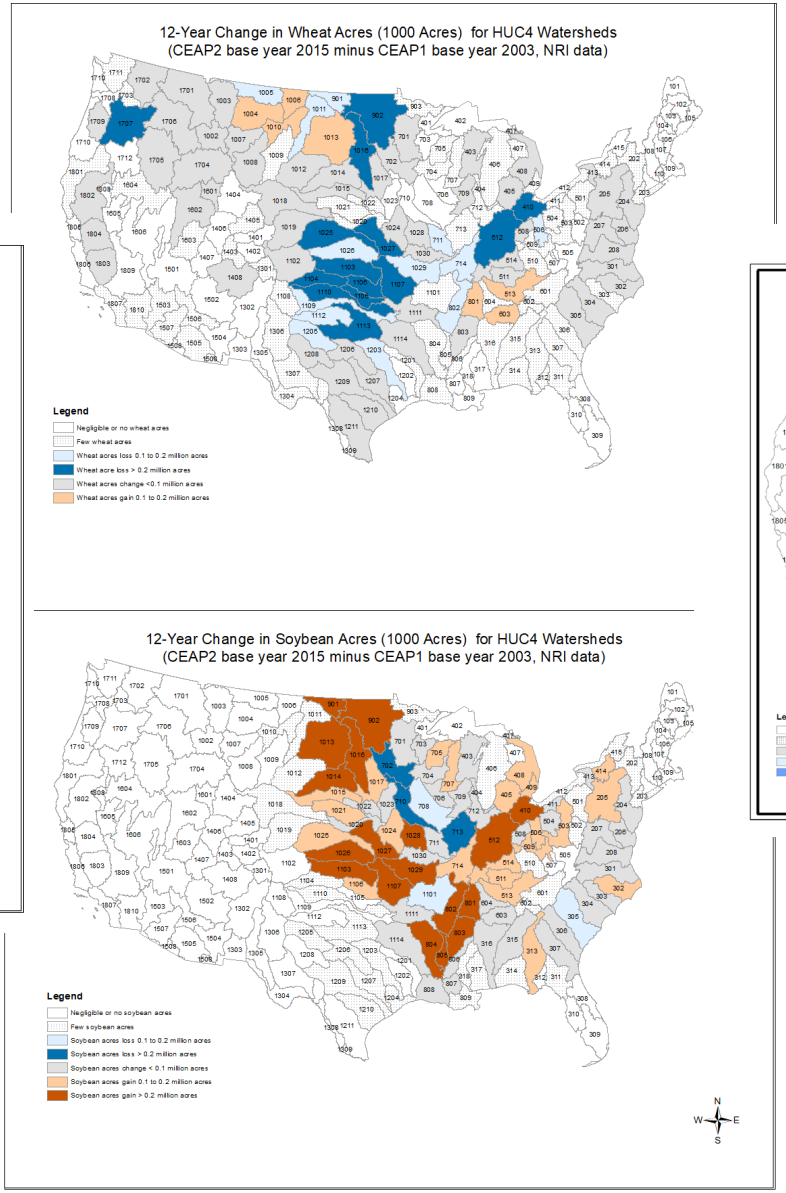
Climate Change: Physical Changes

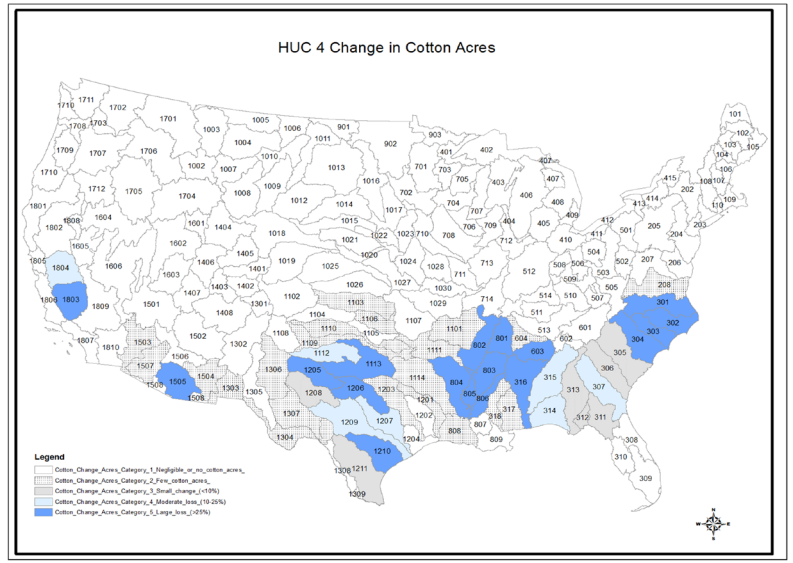




Cropping Pattern Shifts





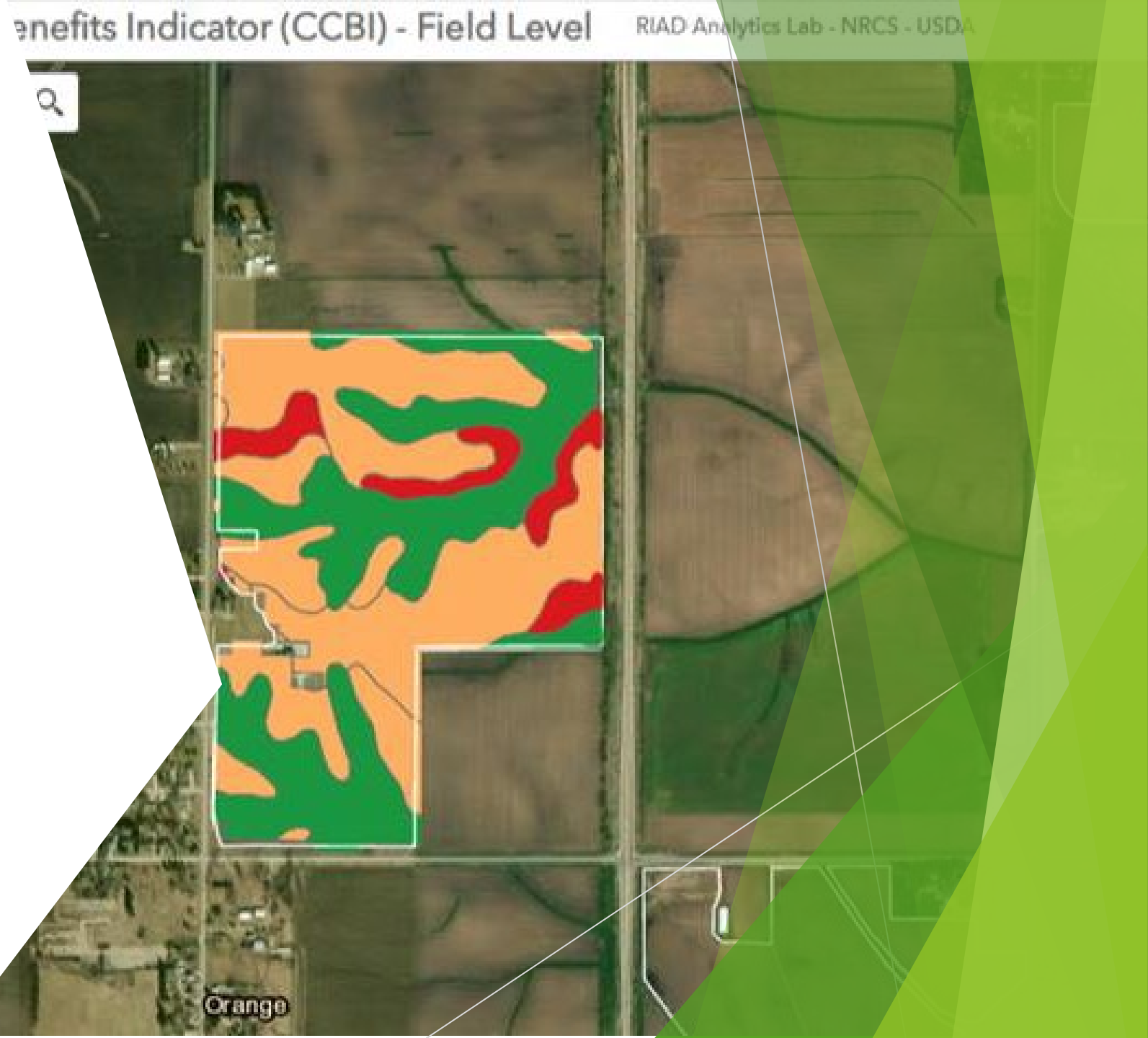


Changes in Technology, Old and New

Practice	CEAP 1 Million Acres	CEAP 2 Million Acres
Variable Rate Technology	12.7	52.2
Enhanced Efficiency Fertilizers	11.4	74.1
Soil Test (<= 5 years)	56%	60%
Cover Crops	3.8	20.3

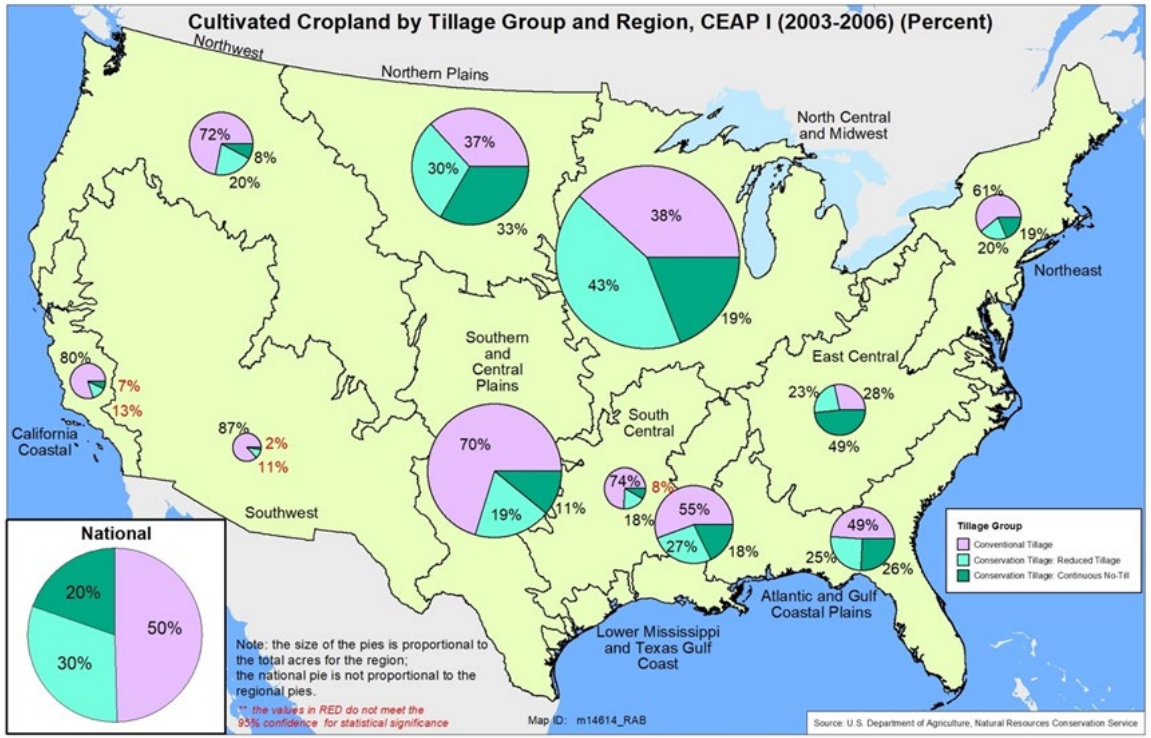
Conservation Planning and Technology

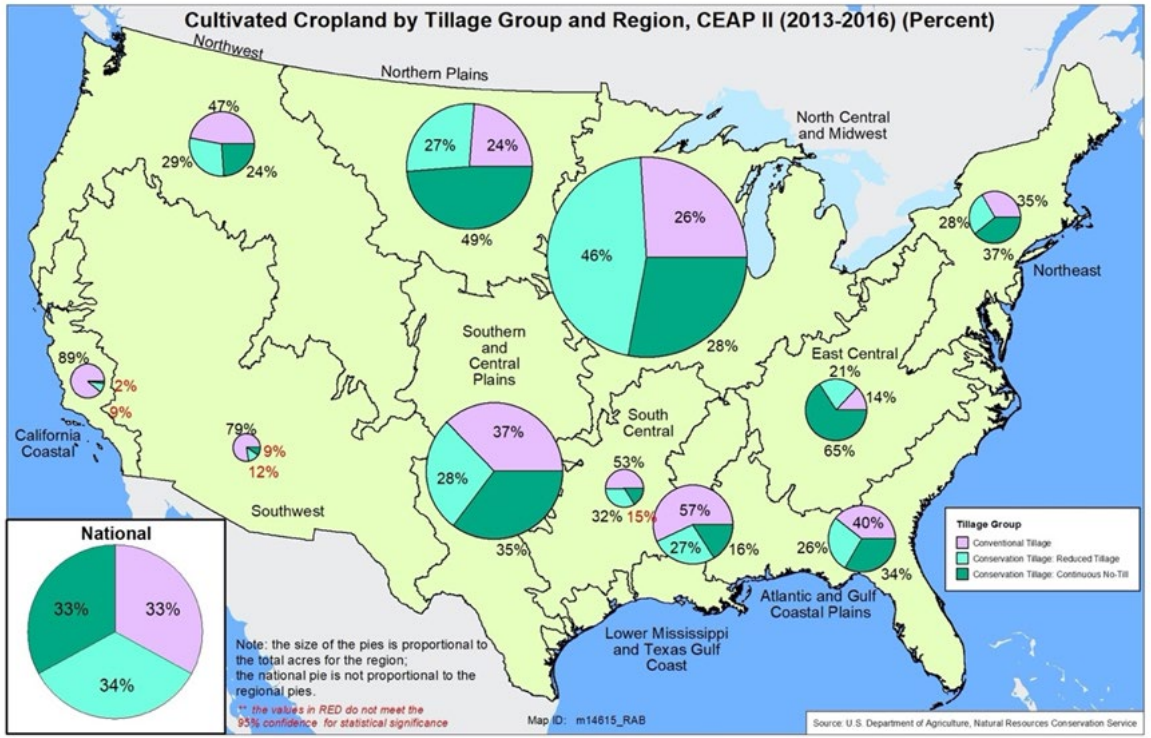
- Farm Fields are a mosaic of soils with variable properties.
- Successful treatment requires:
  - Balanced approach to all resource concerns
  - Field level planning
  - Advanced Technologies like Precision Ag with Variable Rate Application Technology



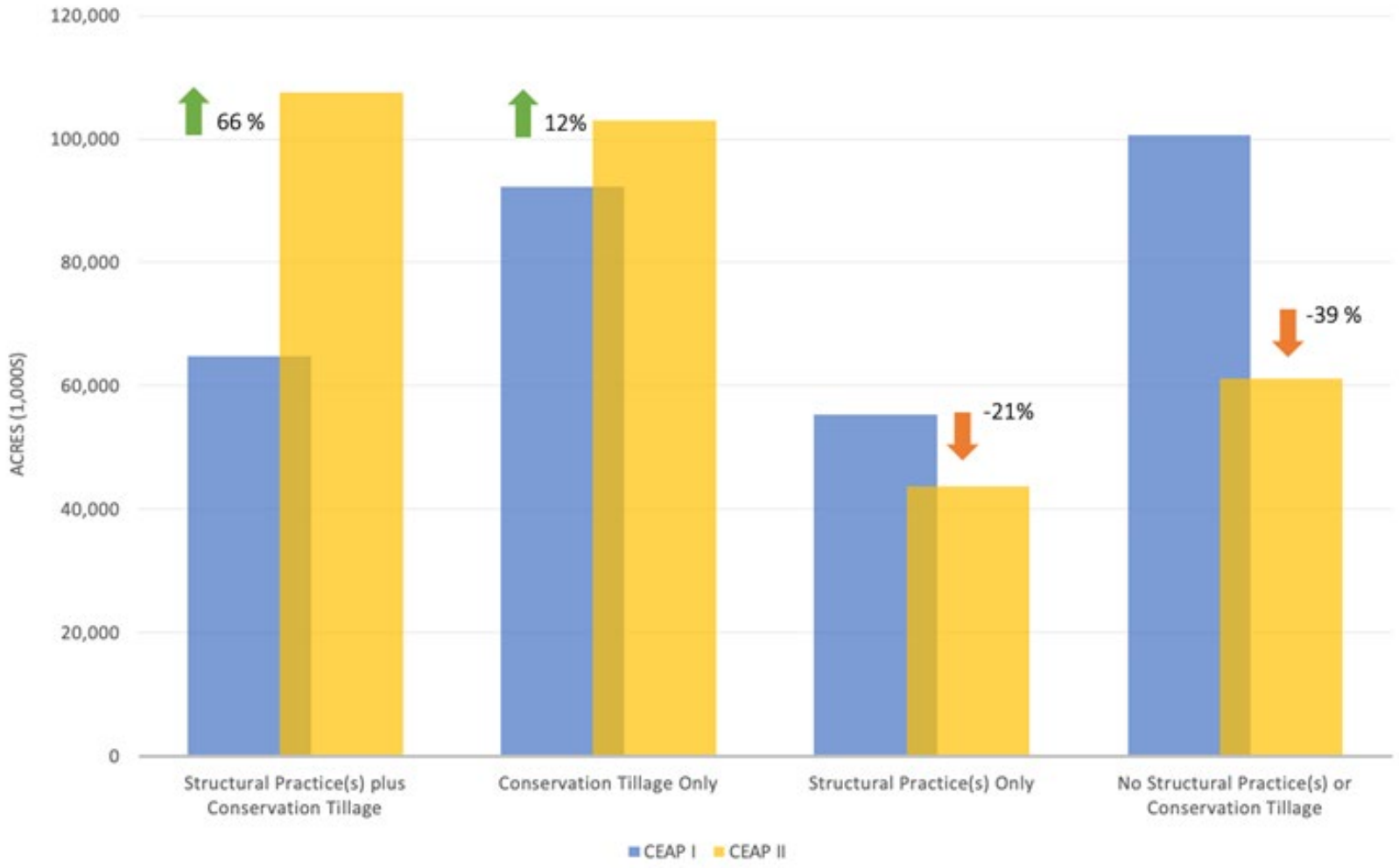
How Did Practice Adoption Change Between the CEAP Surveys?

Conservation Tillage IS Conventional





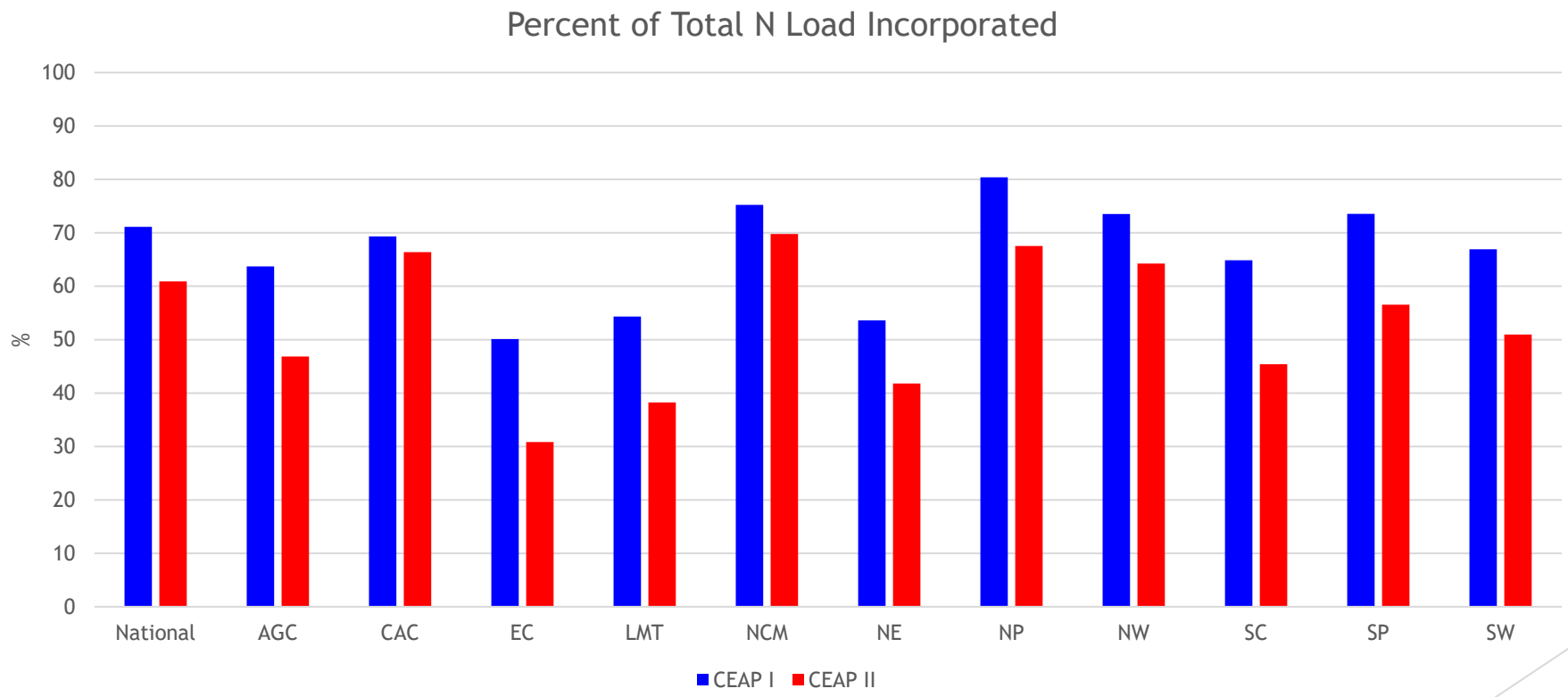
Tillage and Structural Practices:



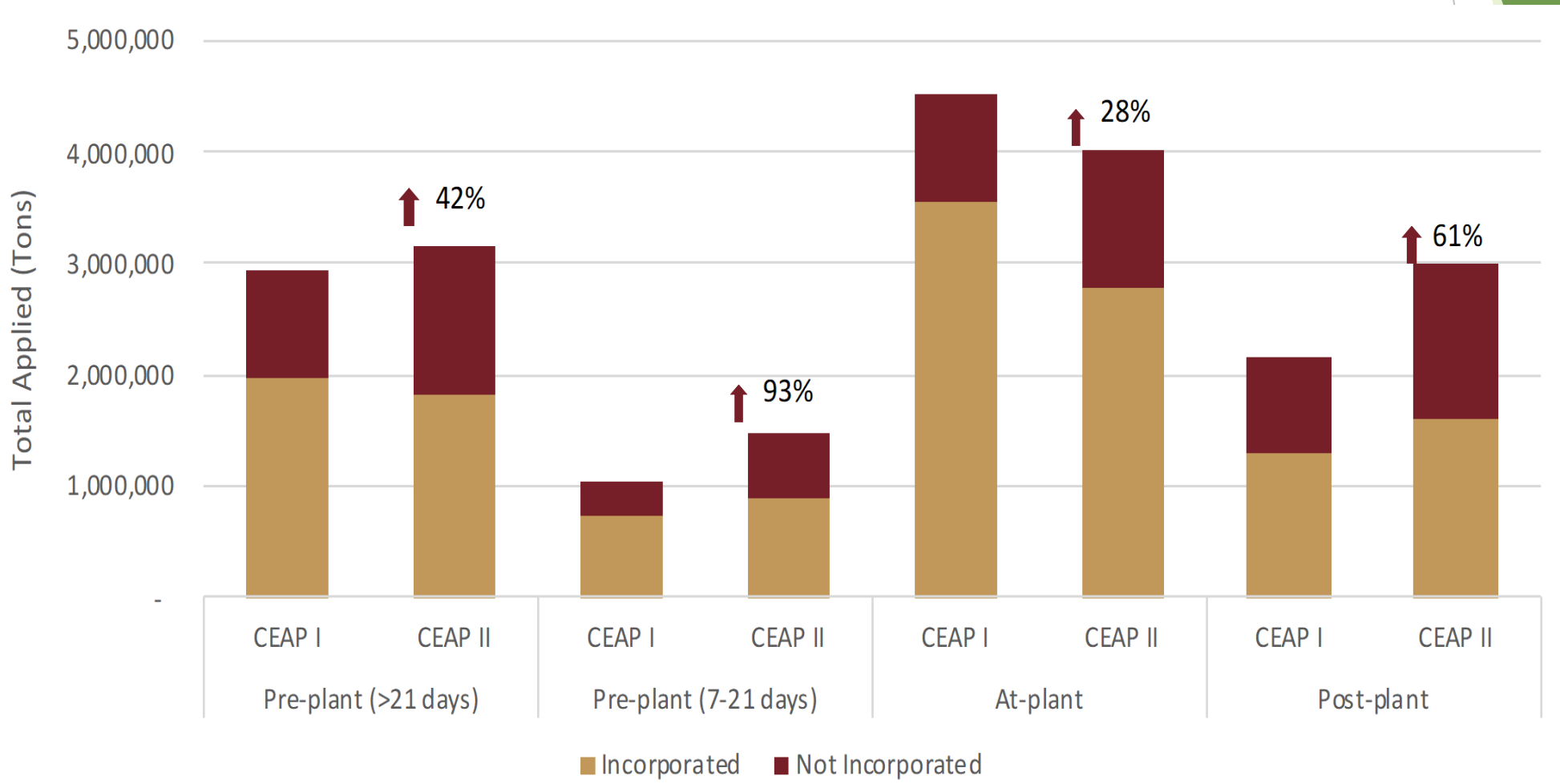
Overview of Changes from CEAP 1 to CEAP 2

Resource Concern		% per acre change	Total change (tons)
Sediment	✓	-21%	-73,695,526
Water erosion	✓	-12%	-69,966,089
Wind erosion	✓	-15%	-93,752,394
Soil Carbon	✓	39%	8,862,346 (32 mil CO_2 eq)
Fuel Use (diesel equivalents)	✓	-10%	-110 million gallons
CO2 eq. Emissions	✓		-1,221,000
Irrigation Water*	✓	-19%	-6,977,438 ac-ft
Total Nitrogen Applied	✓	7% (5.2 lbs)	915,870
Total Nitrogen Lost (non gas)	✓	6% (2.4 lbs)	419,493
Total Phosphorus Applied	✓	16% (2.7 lbs)	436,491
Total Phosphorus Lost	✓	-2%	-4,428

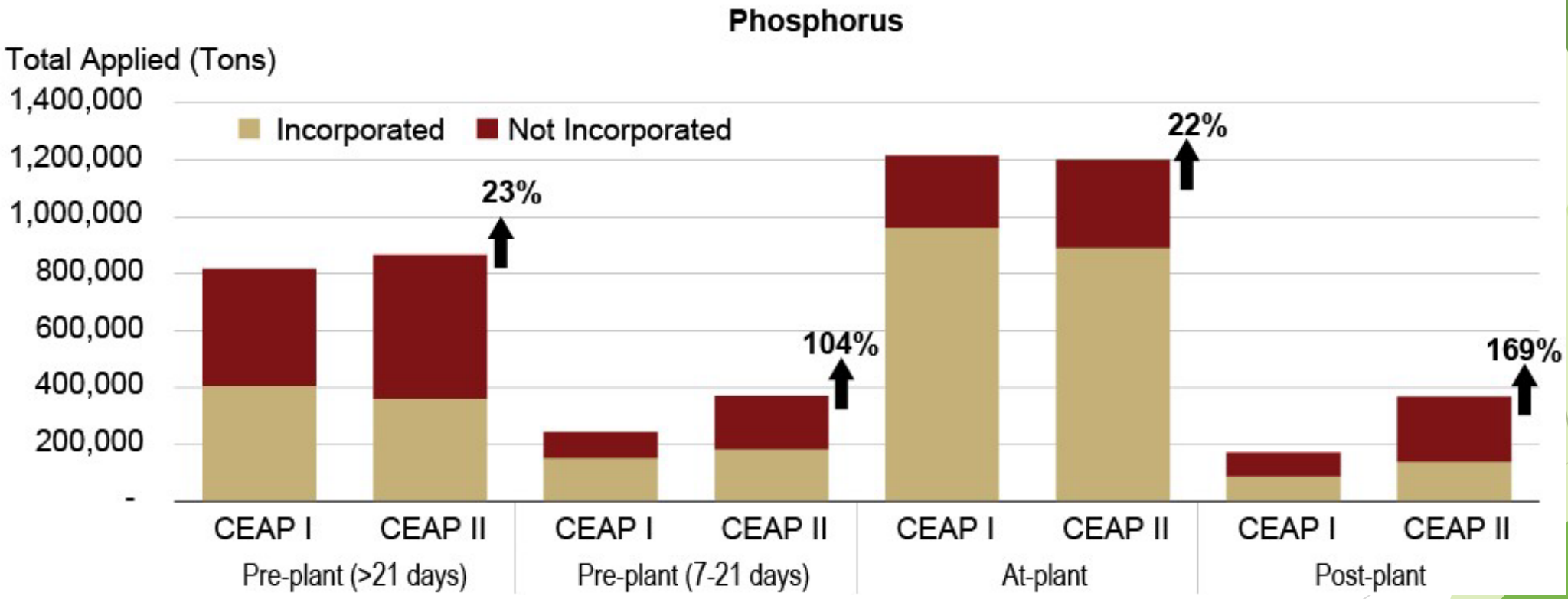
Reduced Nitrogen Incorporation



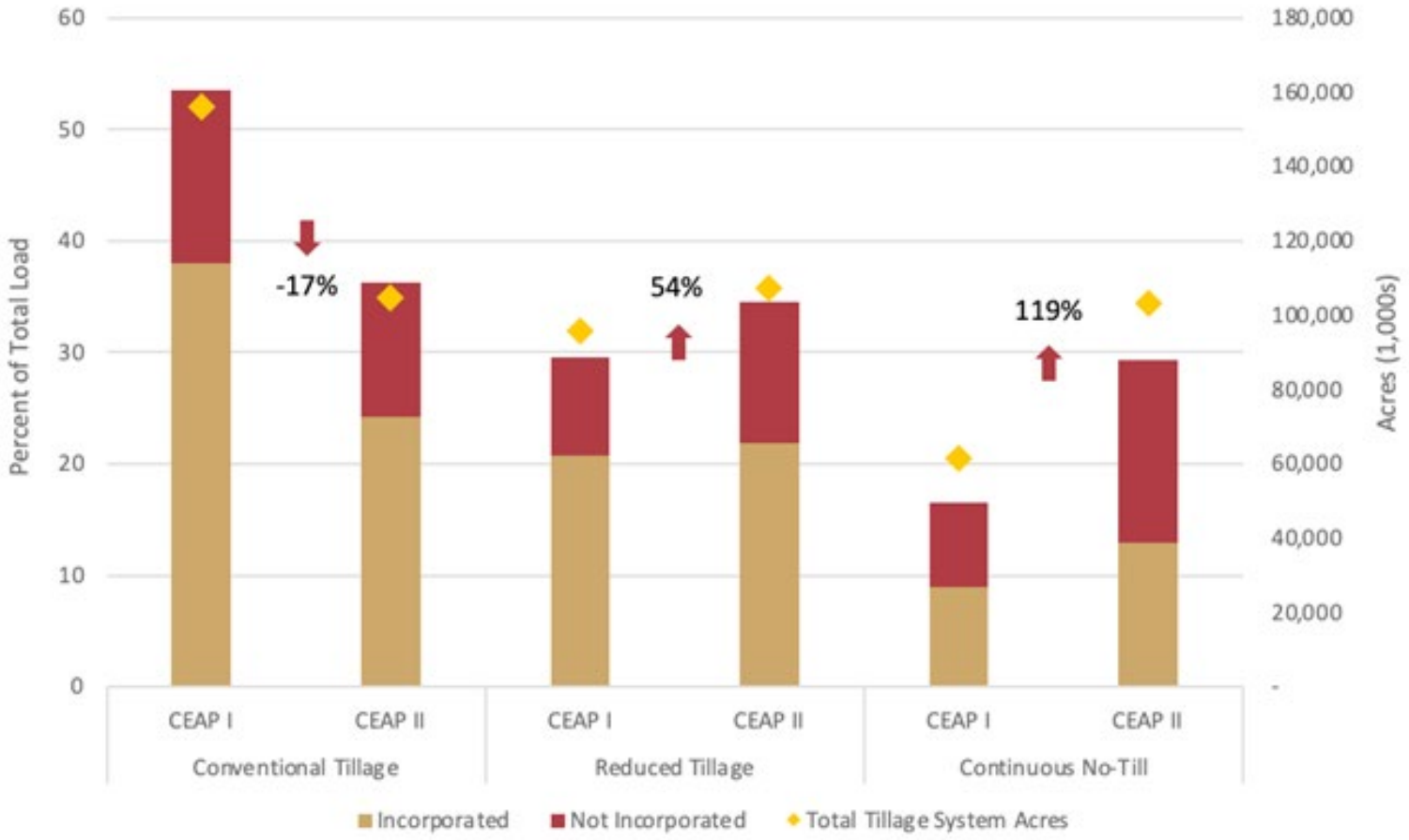
Nitrogen: Method, Timing and Load



Phosphorus: Method, Timing, and Load

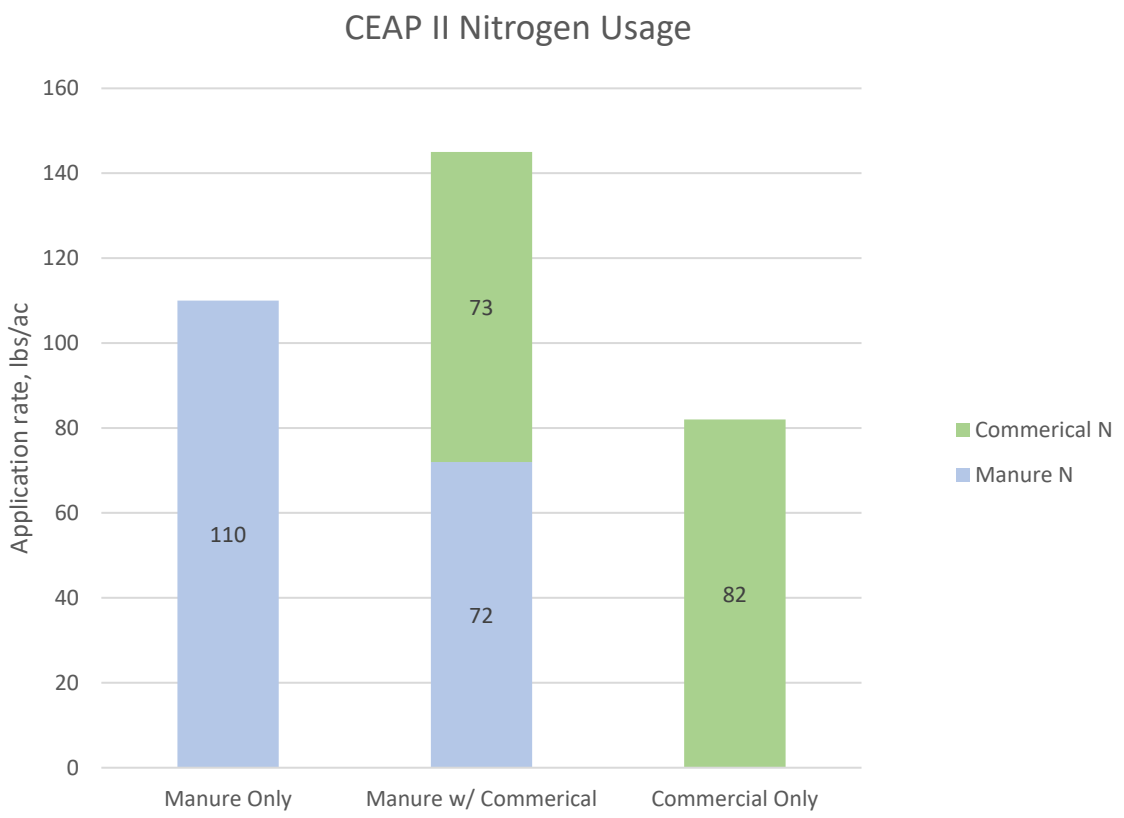


Managing for Carbon and Nitrogen

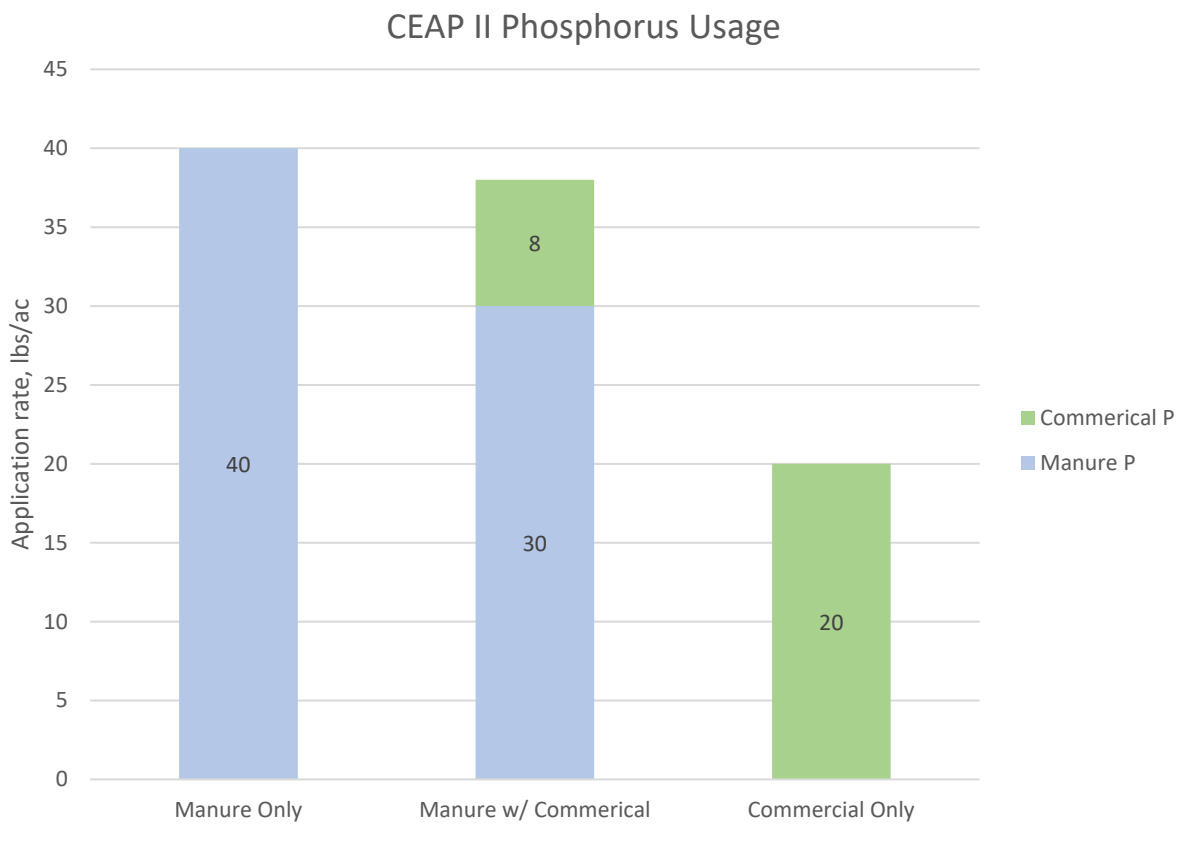


Manure Nutrients

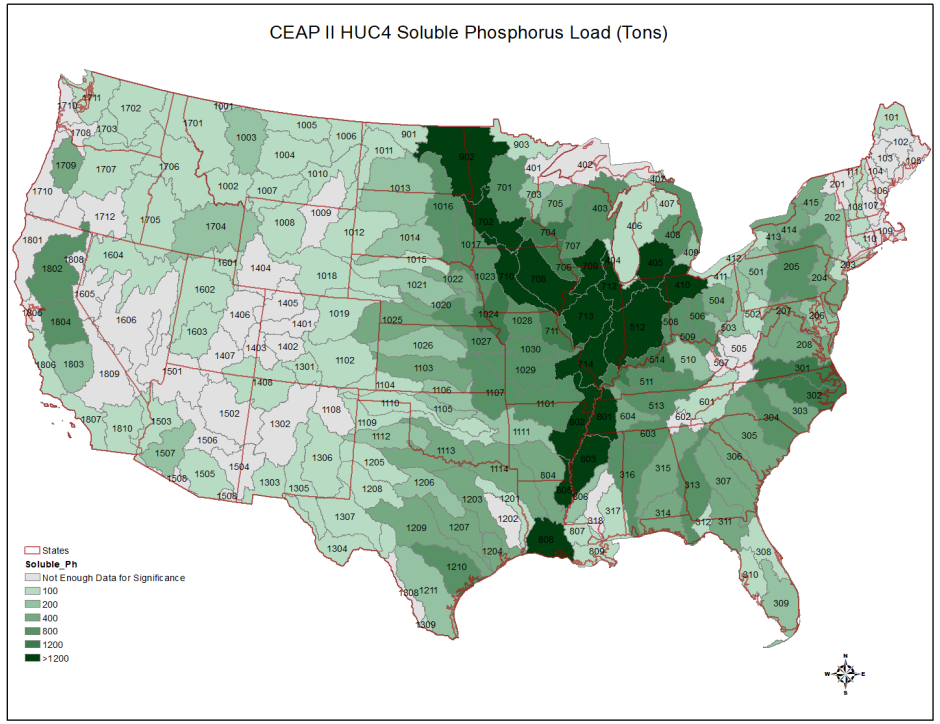
Nitrogen Applied

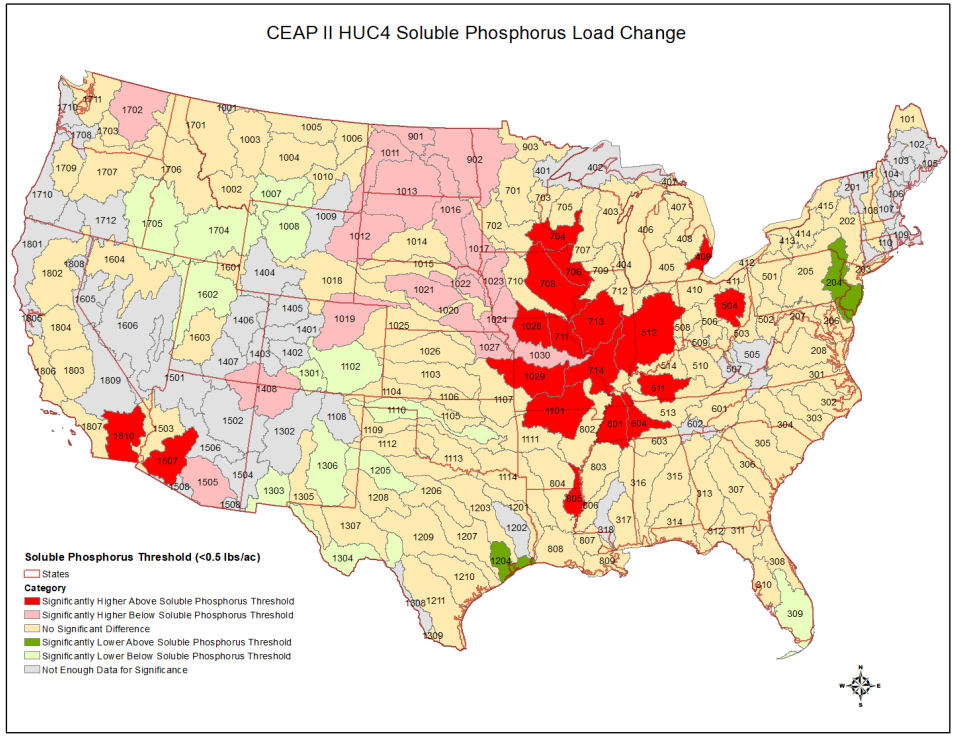


Phosphorus Applied

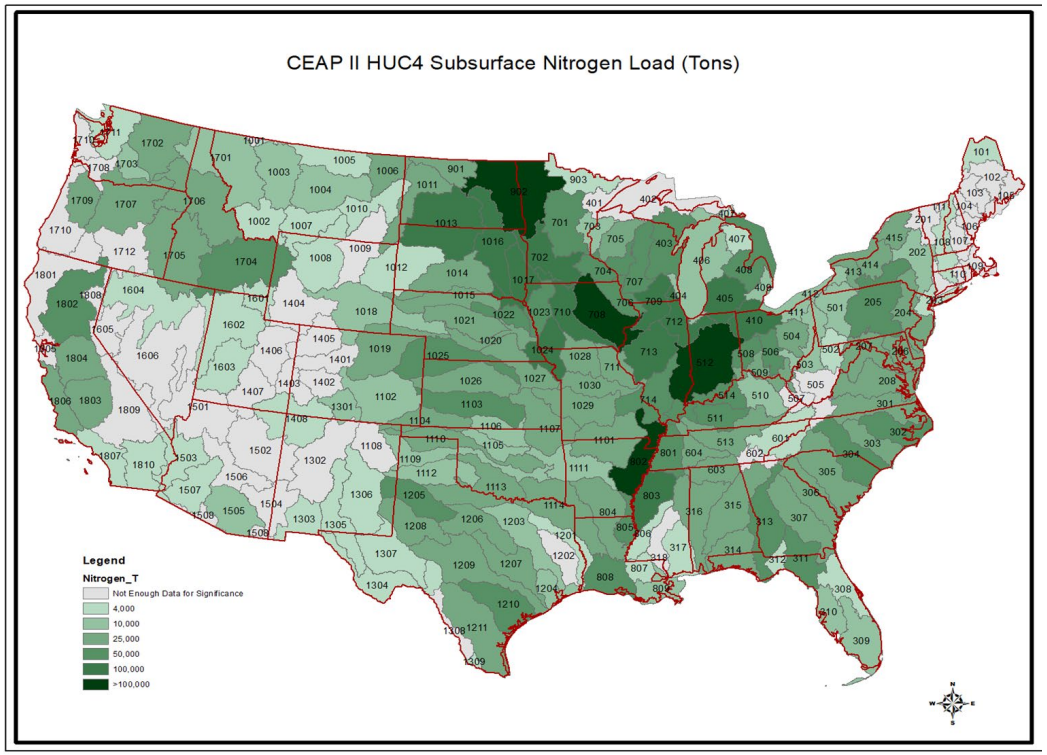


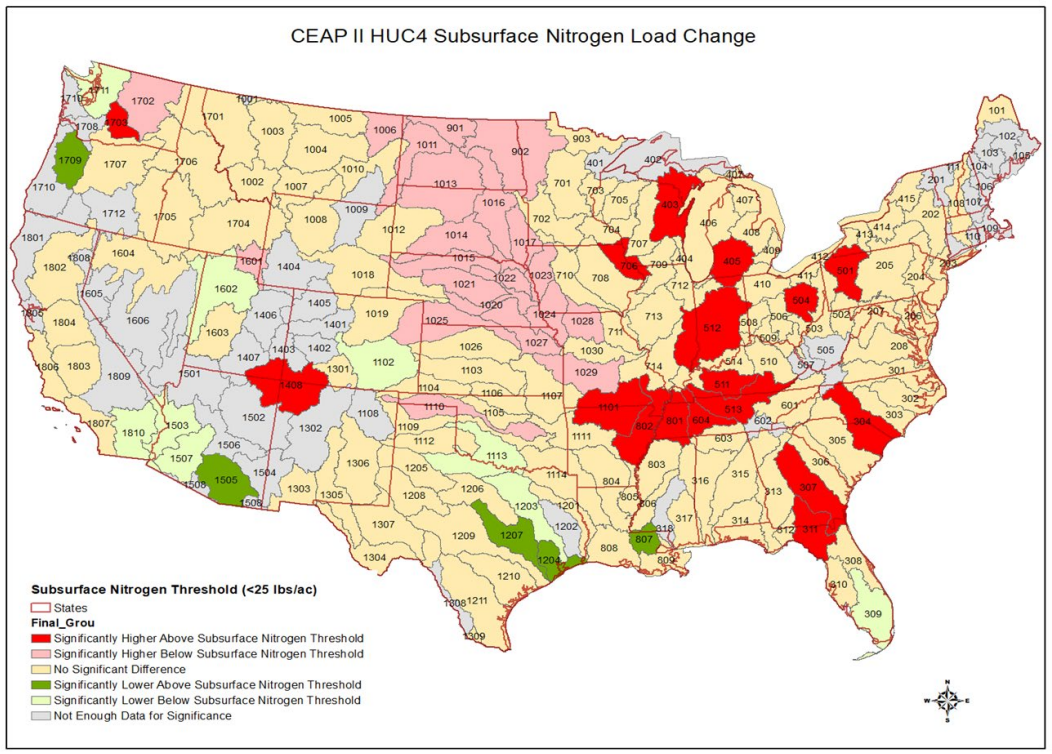
Soluble Phosphorus Changes





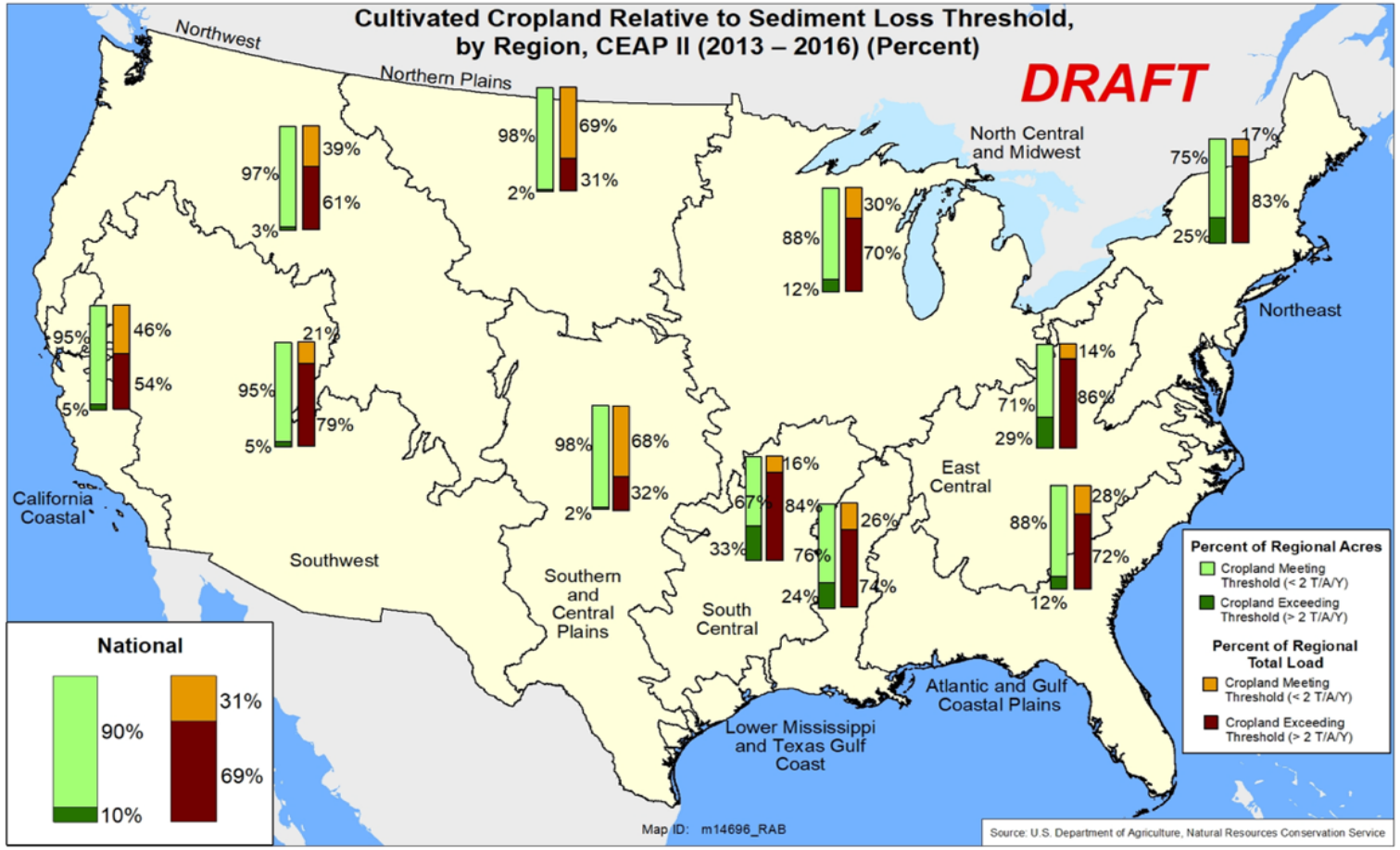
Subsurface Nitrogen Loads and Trends



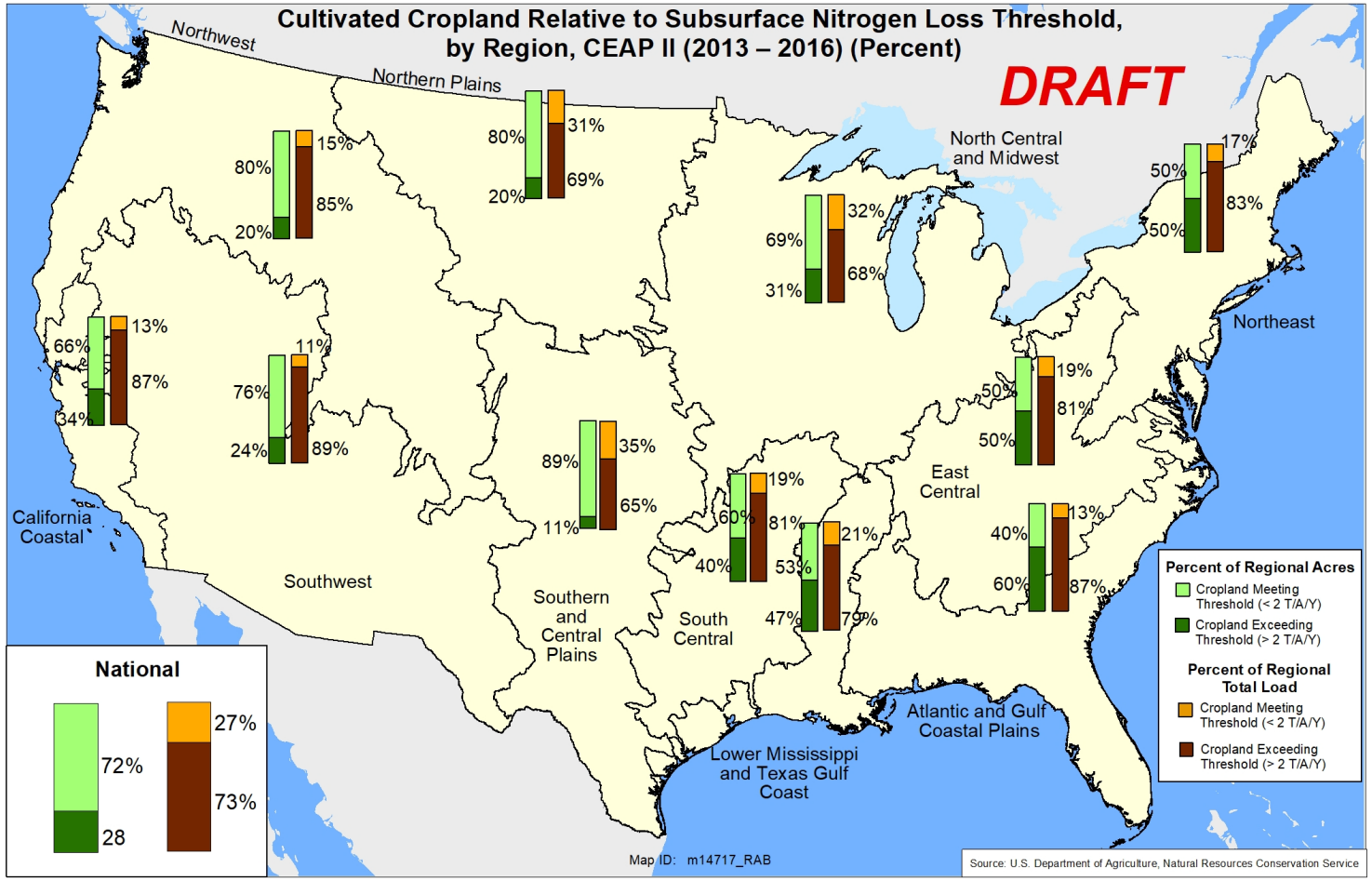


How Big is the Challenge?

Minority of Acres Producing Majority Of Losses: Sediment



Minority of Acres Producing Majority Of Losses: Nitrogen Leaching



Meeting Resource Concerns: Economic and Environmental Benefit

Resource Concerns Met		Corn Yield (bu)	Nitrogen Applied to Corn (lbs)	Sediment Loss (tons)	Total N Loss (lbs)	Total P Loss (lbs)	Soil Carbon Change (lbs)
1	10%	148	174	9.5	131	11.4	-864
2		155	179	8.0	84	11.0	-291
3		160	167	6.4	59	8.2	-52
4		159	171	3.1	56	5.7	-62
5	47%	156	177	1.0	60	3.6	24
6		159	179	0.6	44	1.8	228
7		161	165	0.4	33	1.2	326
8	43%	158	135	0.3	13	0.7	372

- Sediment
- Surface N loss
- Subsurface N loss
- Total P Loss
- Soluble P loss
- Soil Carbon (maintain or gain)
- Meet T water
- Meet T wind

Conservation Investment by Practice, CEAP1 and CEAP2

CEAP Practice Code	Practice Name	CEAP 1 Survey ($)	CEAP 2 Survey ($)	Change in Cost ($)
328	Conservation Crop Rotation	2,671,069,504	2,787,265,354	116,195,850
329	NT /striptill	1,417,784,438	2,381,528,548	963,744,110
330	Contouring	98,295,361	117,516,132	19,220,770
332	Cont Buffer Strip	17,417,496	66,482,283	49,064,787
340	Cover Crop	214,108,733	1,281,908,953	1,067,800,219
342	Critical Area Planting	117,229,696	164,620,990	47,391,294
345	Residue and Tillage Management, Reduced Till	2,515,948,051	2,829,599,994	313,651,943
362	Diversion	24,042,549	16,761,601	(7,280,948)
380	Windbreak/Shelterbelt Establishment	46,510,956	123,994,356	77,483,400
386	Field Border	168,797,726	495,028,220	326,230,494
391	Rip For Buffer	99,548,412	382,216,747	282,668,336
393	Filter Strip	132,256,413	177,573,017	45,316,604
410	Grad Stabil	116,337,891	201,266,265	84,928,374
412	Grass Waterway	1,970,466,842	2,500,609,815	530,142,973
422	Hedgerow Planting	24,747,786	47,051,111	22,303,325
585	Contour Strip	16,598,941	21,246,742	4,647,802
587	Structure for Water Control	76,876,520	58,885,411	(17,991,109)
590	Nutrient Man	4,689,559,363	3,948,964,556	(740,594,808)
600	Terrace	719,614,475	754,333,815	34,719,340
603	Herbaceous wind Barriers	46,855,393	31,235,781	(15,619,612)
Total		**15,184,066,547**	**18,388,089,692**	**3,204,023,145**