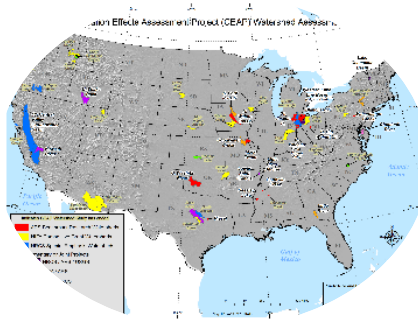

What is NAM?

- Conservation Effects Assessment Project – [CEAP](#)

CONSERVATION EFFECTS ASSESSMENT PROJECT - CEAP

Short overview of model development



2016

CEAP – SECOND PHASE

Evolved from the original goal of assigning metrics. Dynamic tool informing current and future conservation decision making. More data, better tools.

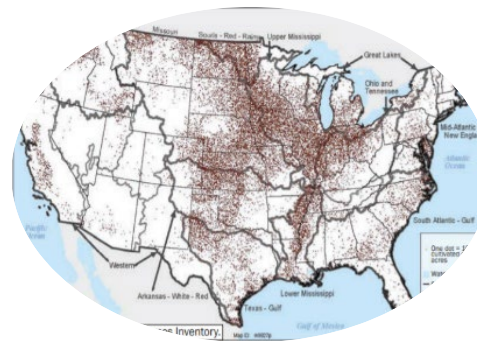


2003

CEAP – CROPLAND NATIONAL ASSESSMENT

Agricultural Policy Environmental eXtender (APEX) model, and

Soil and Water Assessment Tool (SWAT)



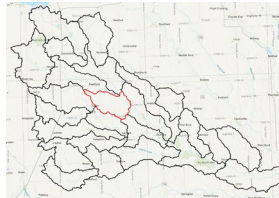
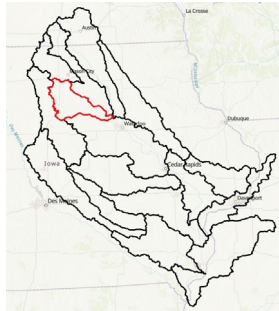
2021 – 2025

NATIONAL AGROECOSYSTEM MODEL (NAM V 1.0 TO NAM V 2.0)

SWAT+ – completely revised version of the model

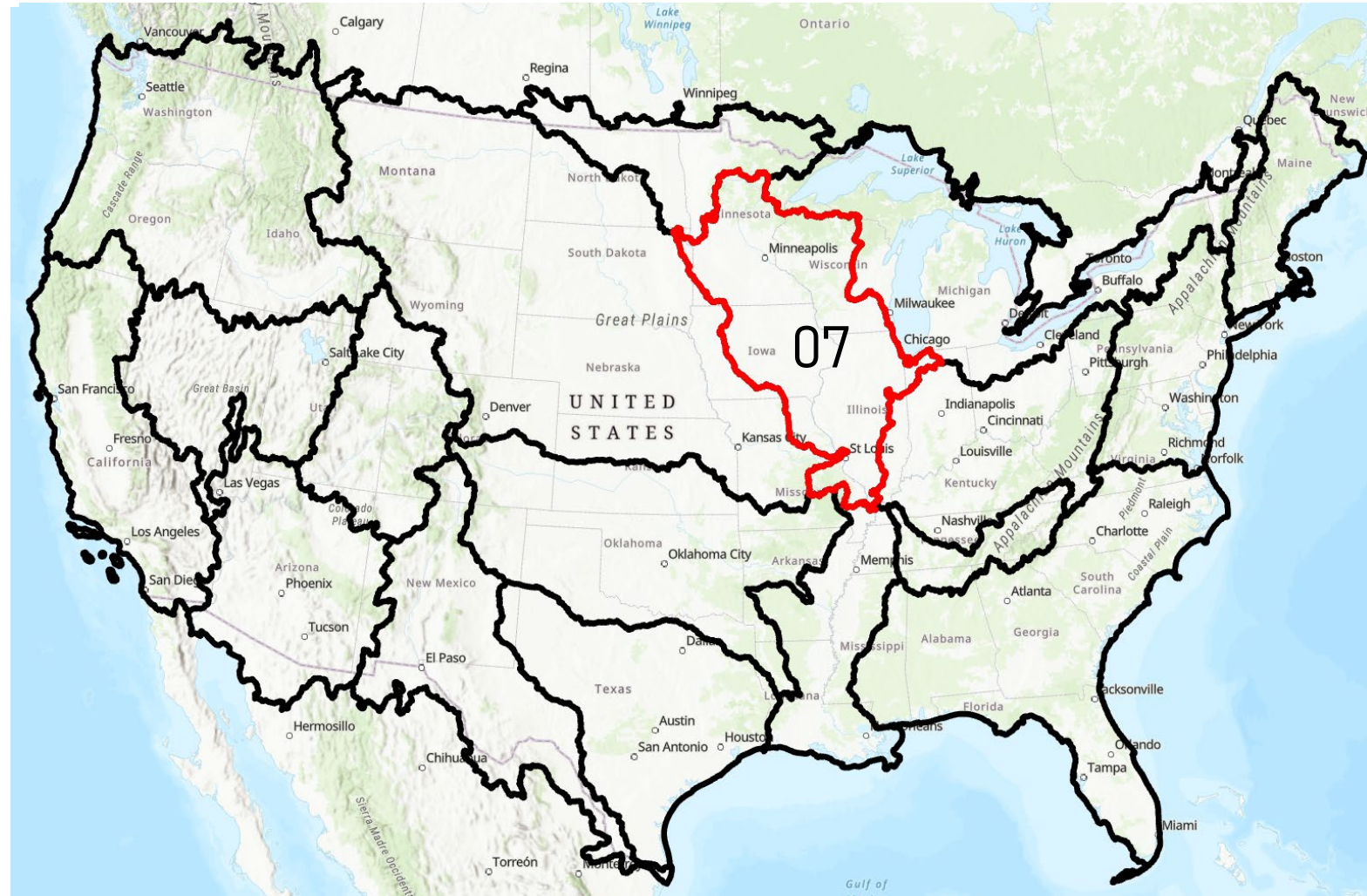
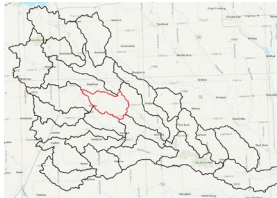
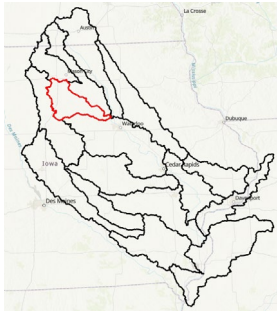
Scope and Scale

HUC2 – 18 Units



Scope and Scale

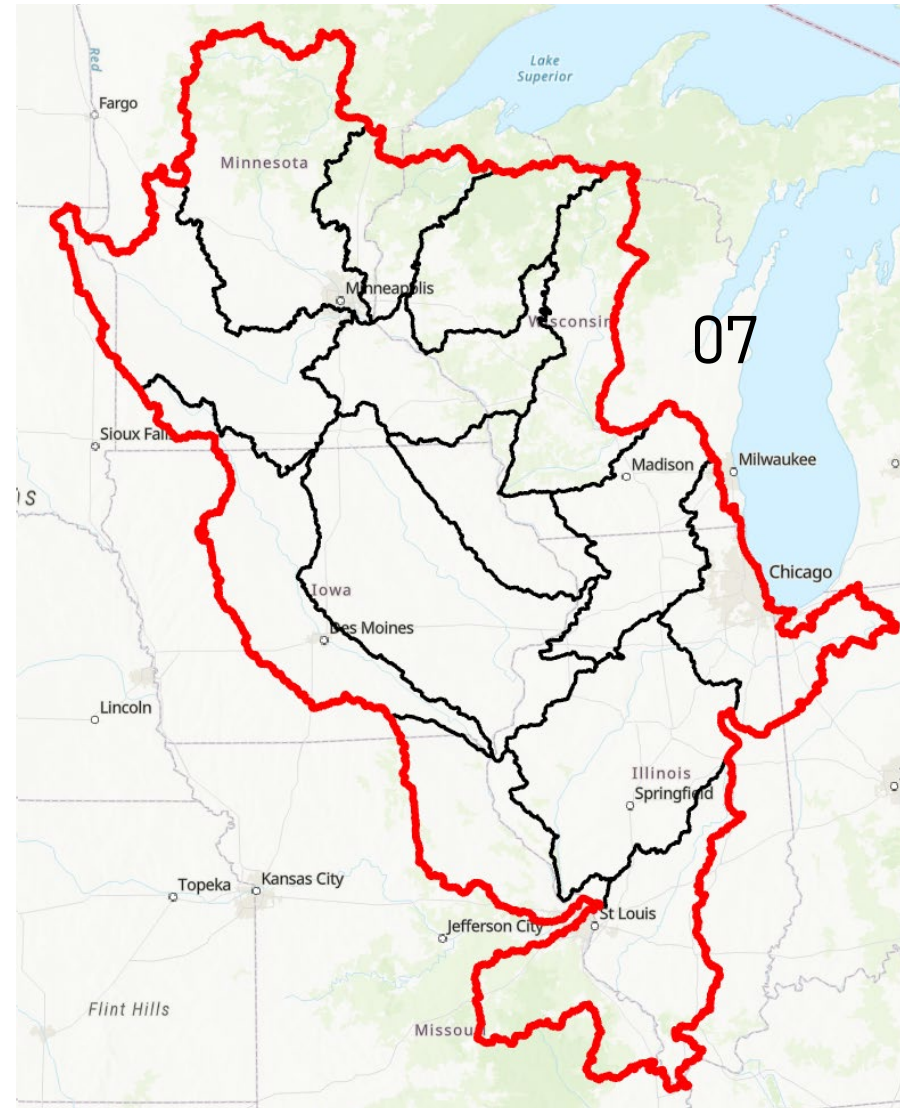
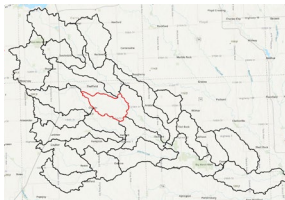
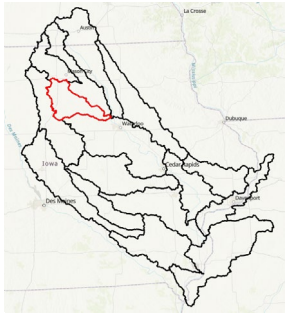
HUC2 – 18 Units



Scope and Scale



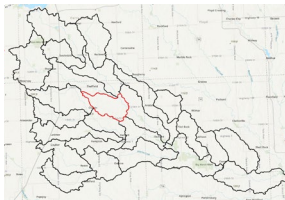
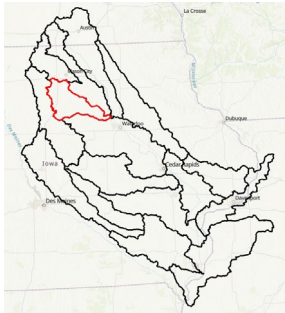
HUC4 – 202 Units in US



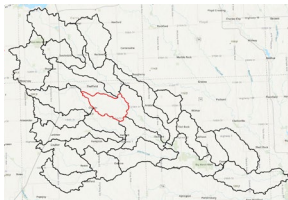
Scope and Scale



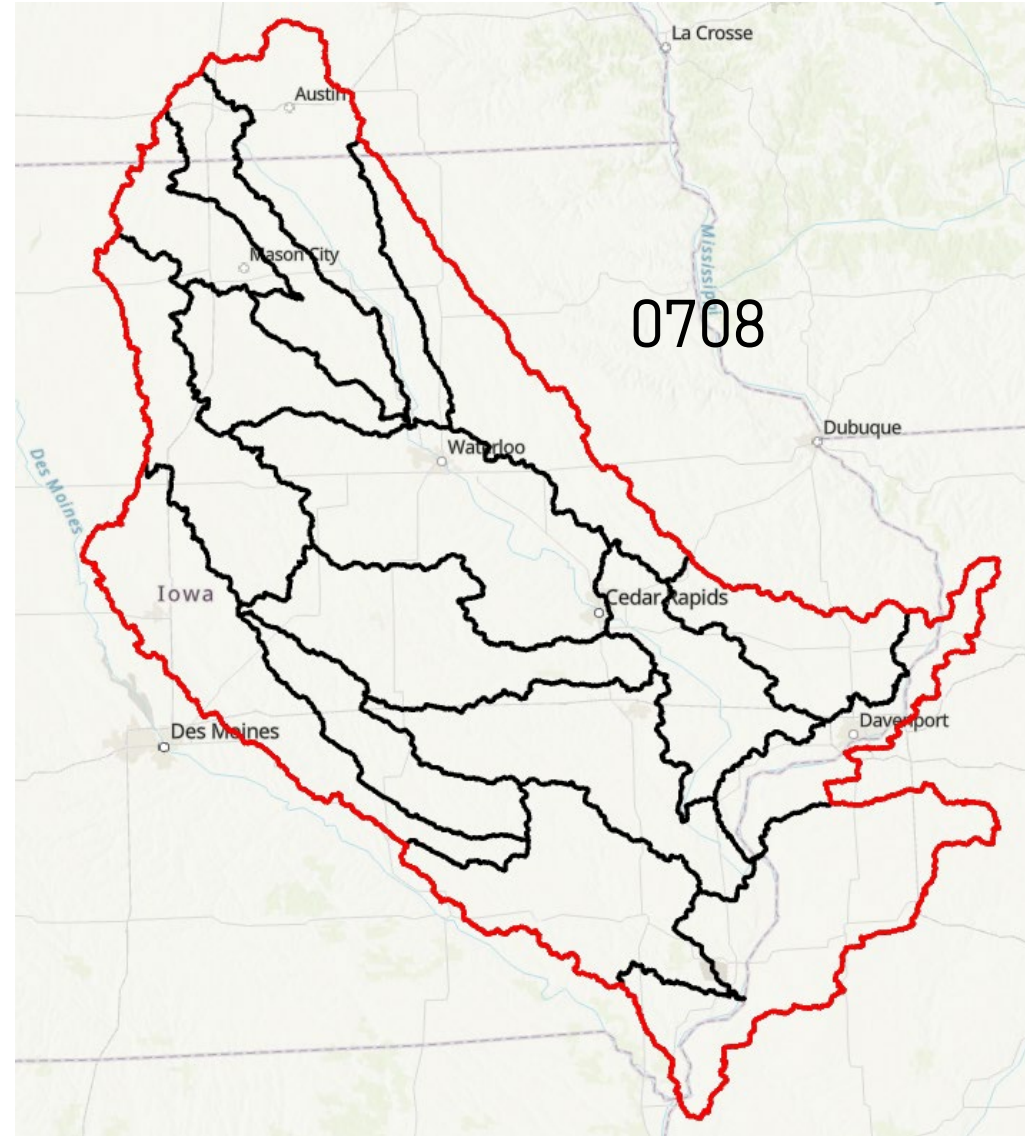
HUC4 – 202 Units in US



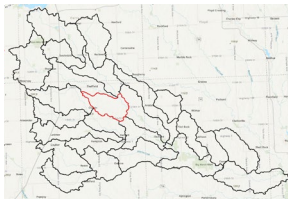
Scope and Scale



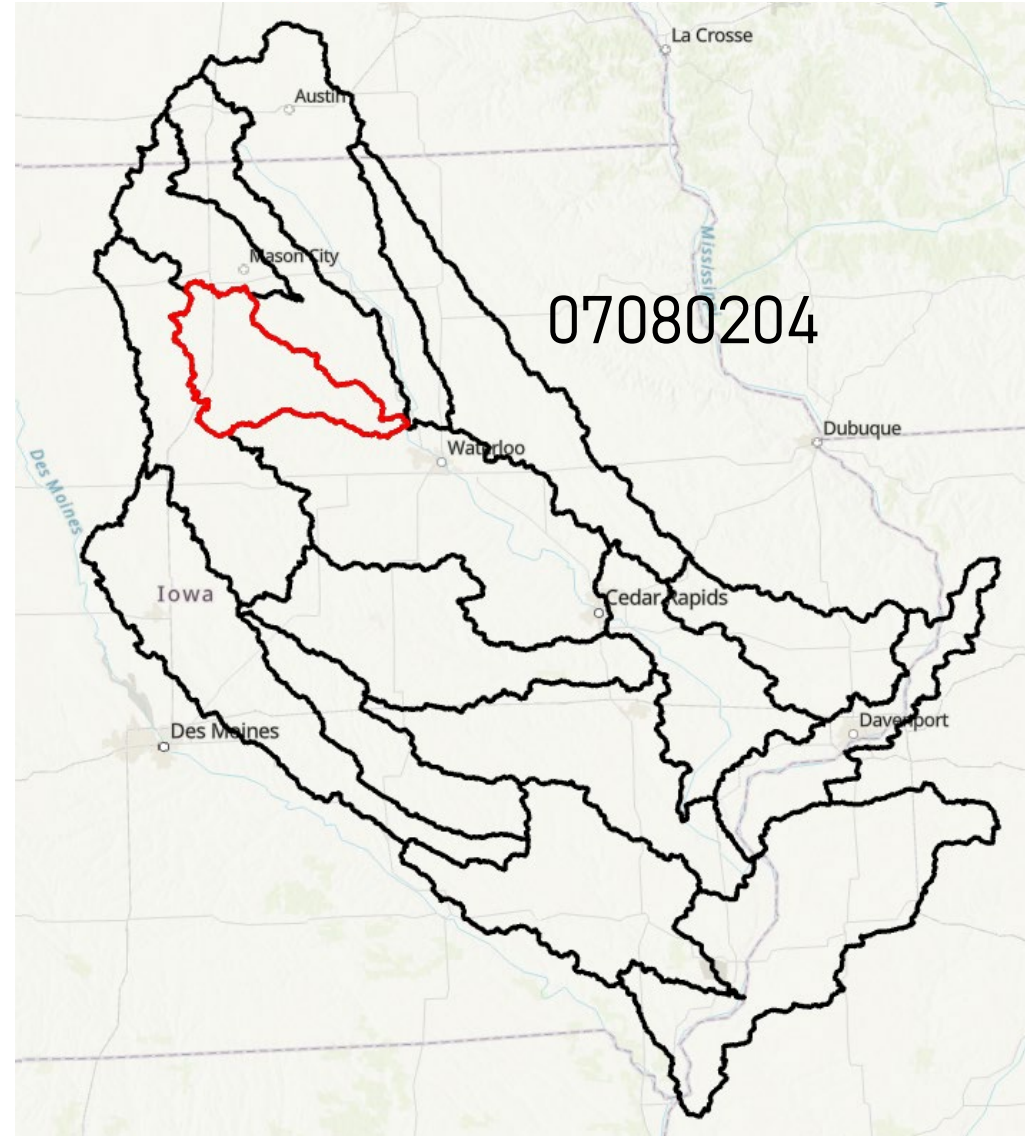
HUC8 – 2,121 Units in US



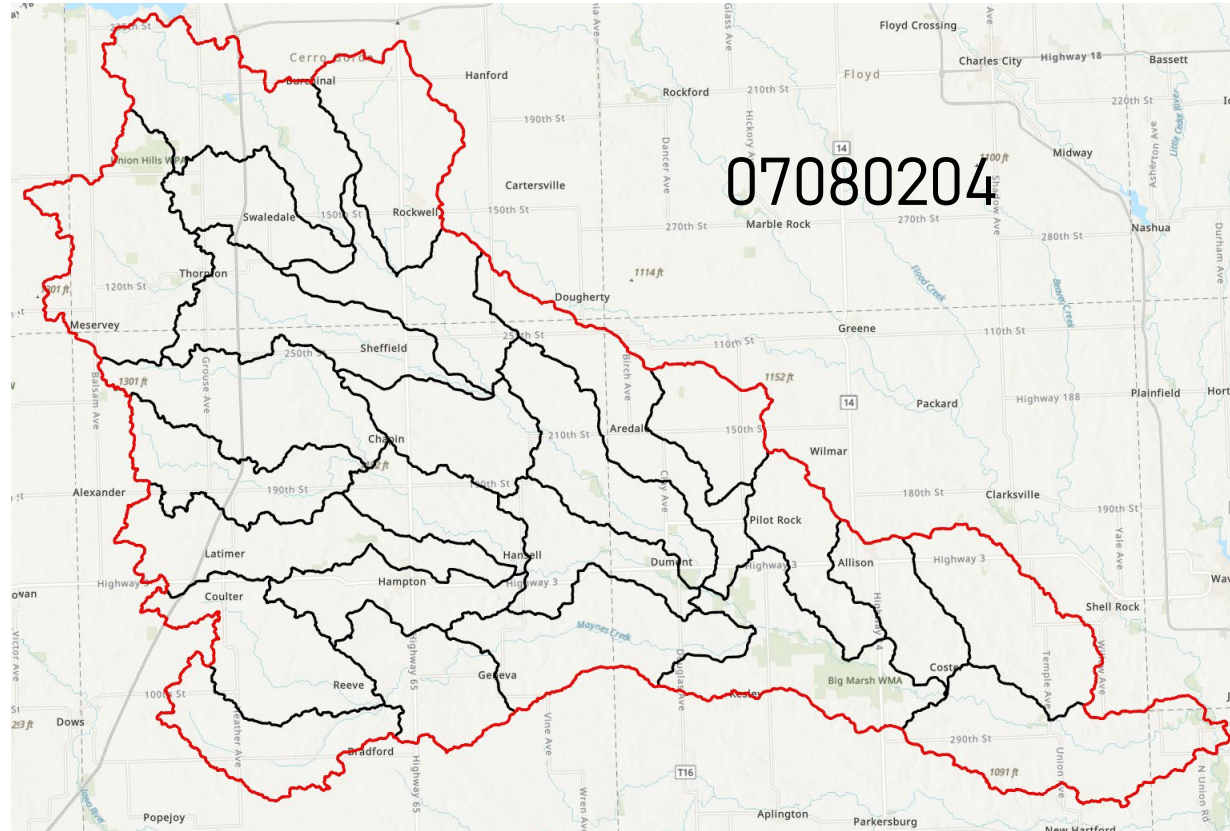
Scope and Scale



HUC8 – 2,121 Units in US

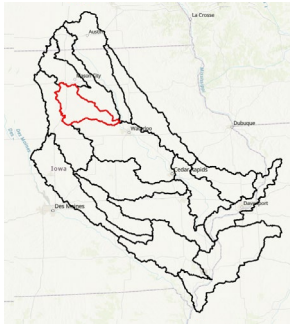


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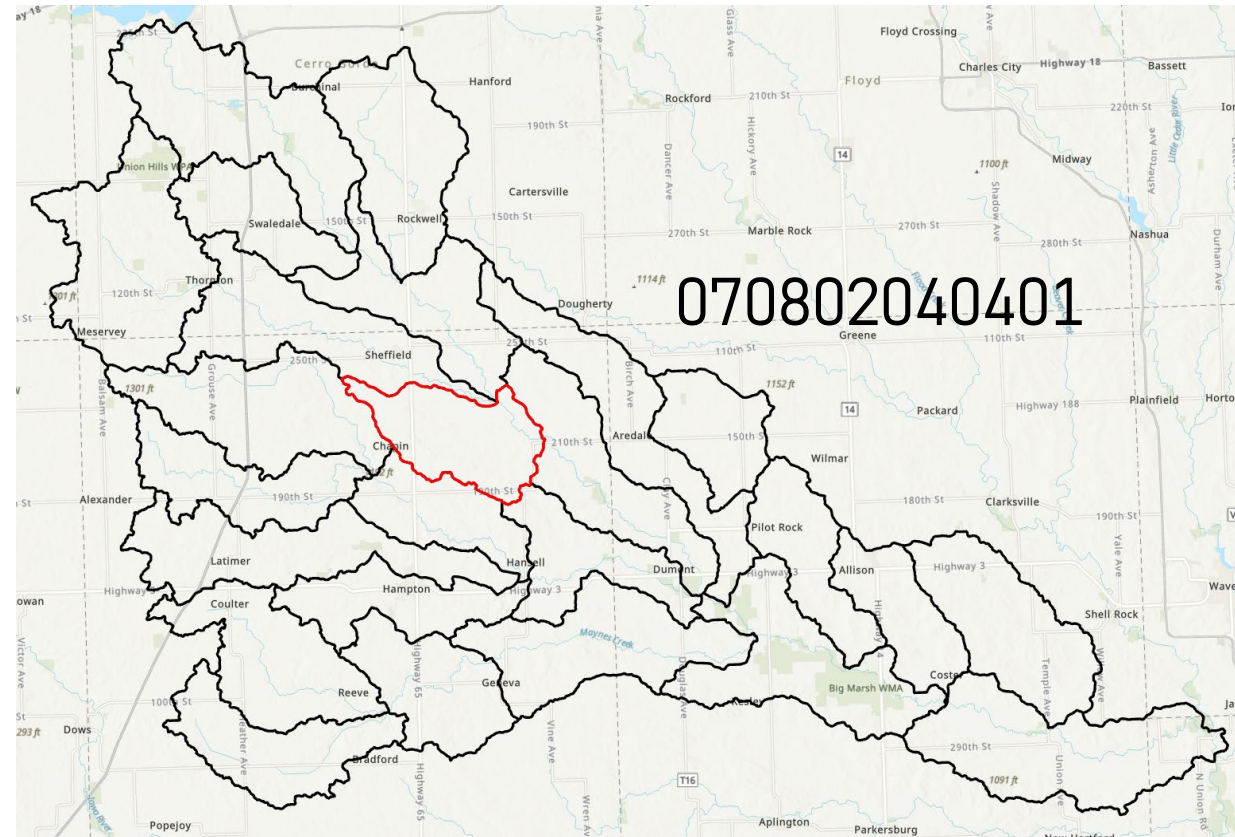


07080204

Scope and Scale



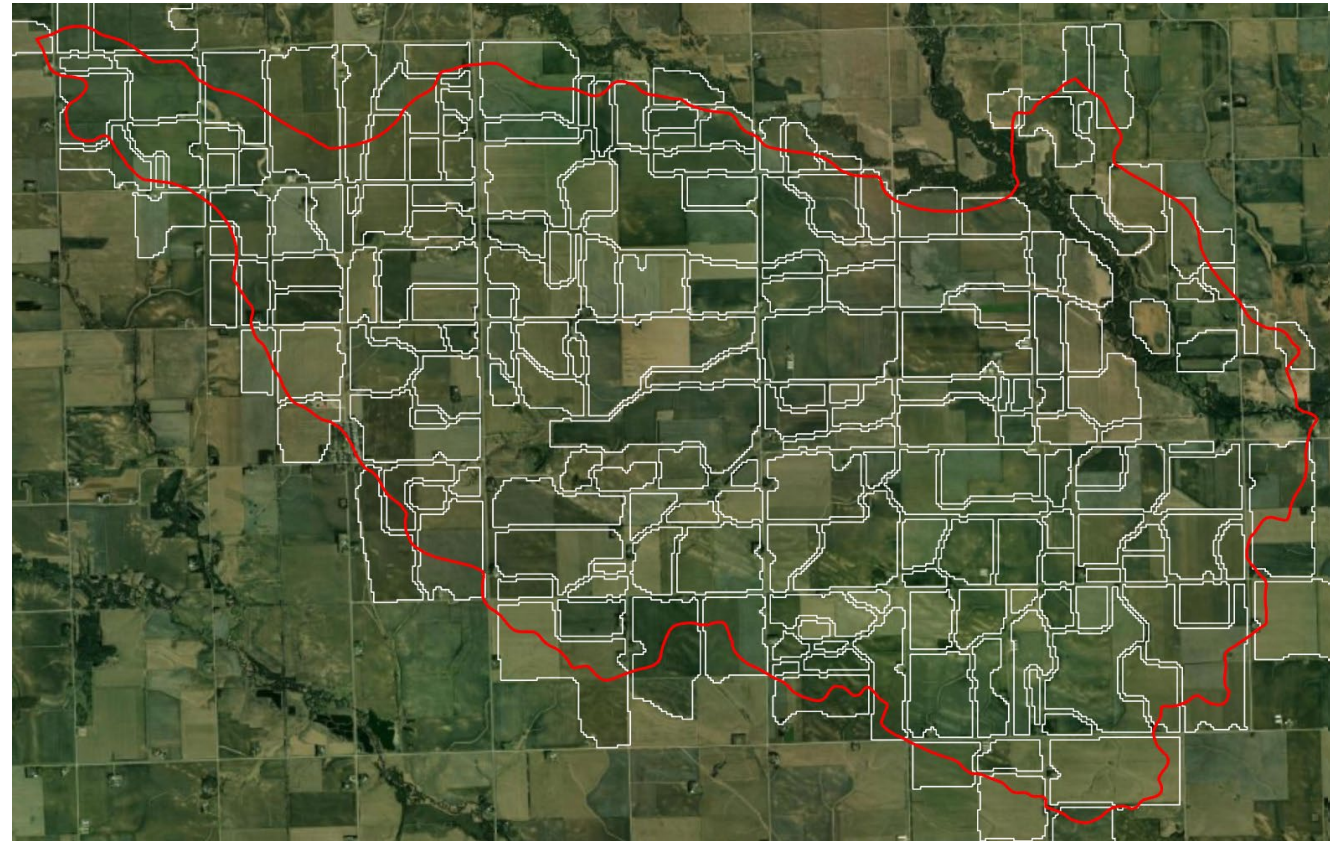
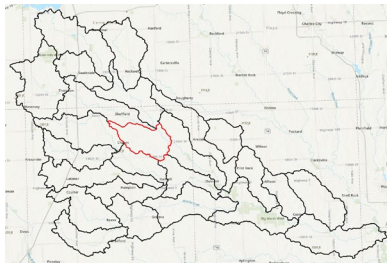
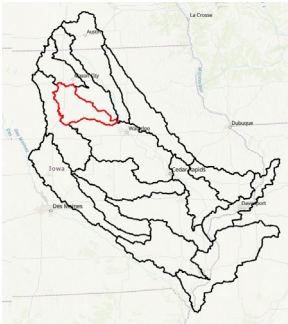
HUC12 – 65,000 Units in US



Scope and Scale

HUC12 – 65,000 Units in US

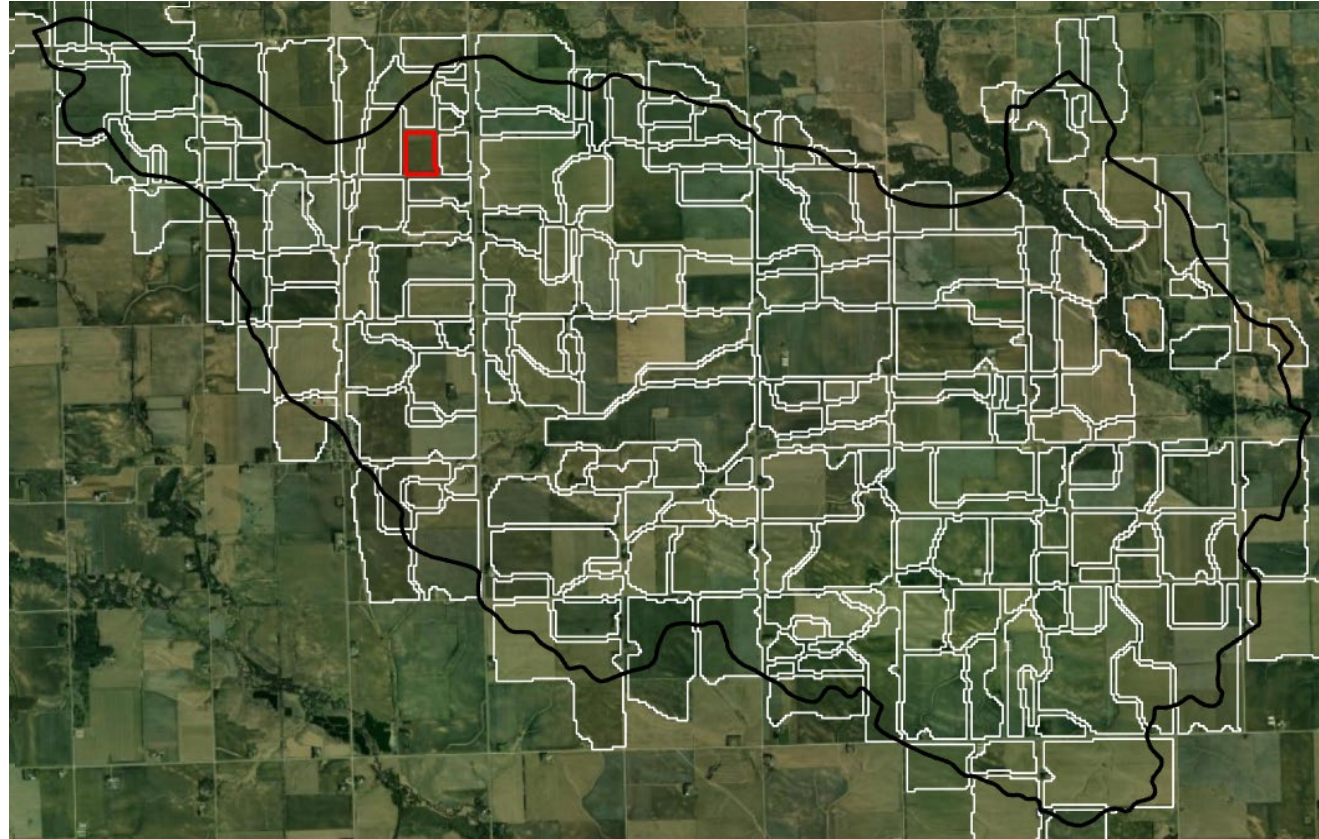
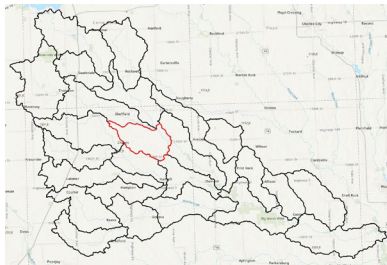
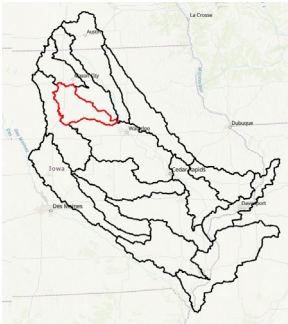
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Scope and Scale

HUC12 – 65,000 Units in US

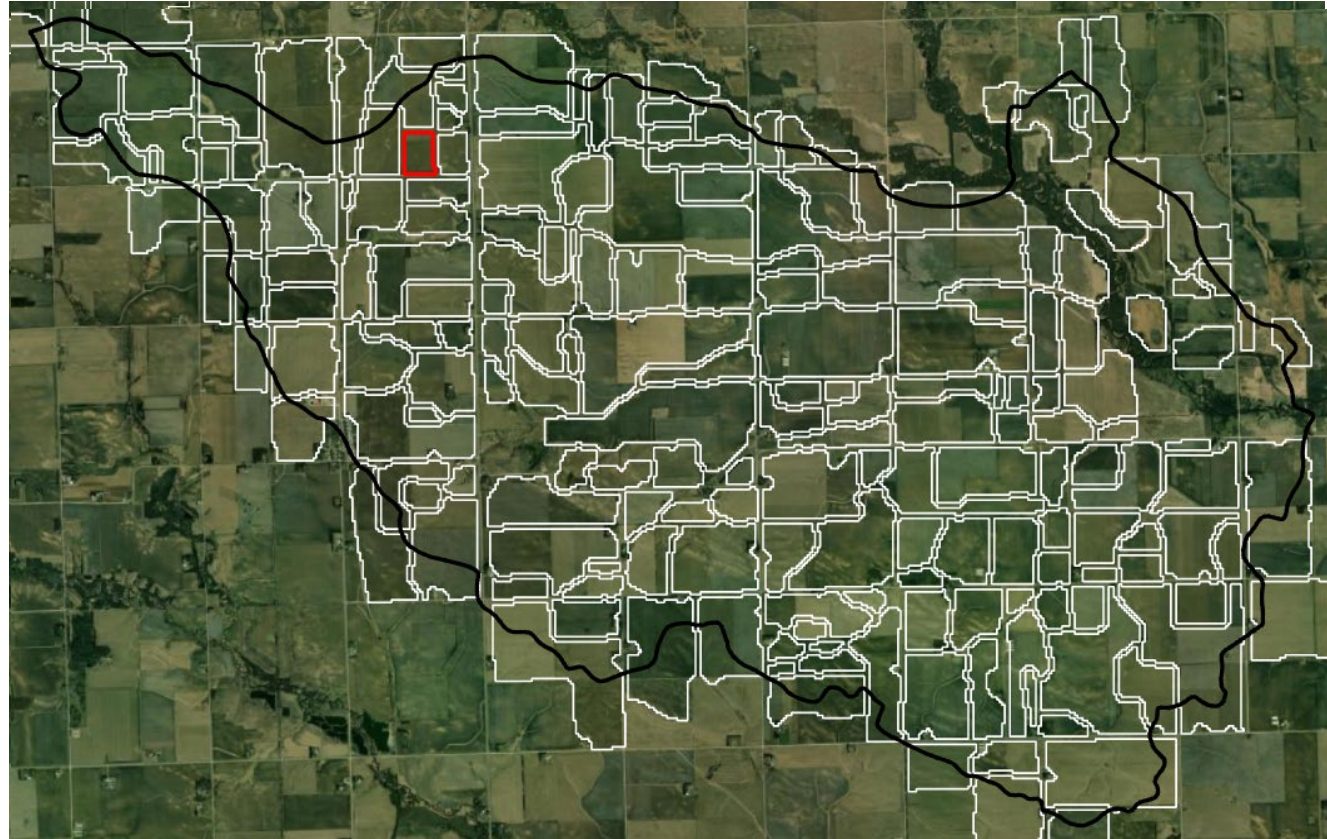
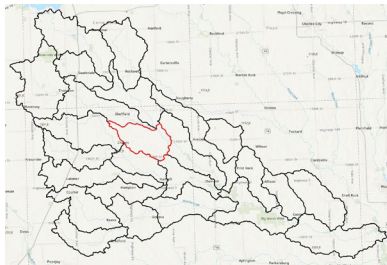
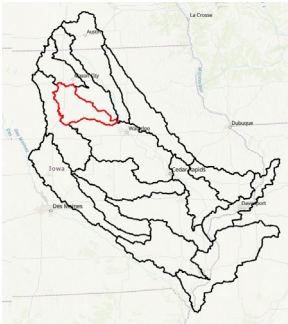
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Scope and Scale

Fields – 4.1 Million Units in US

FUID = 1277645001

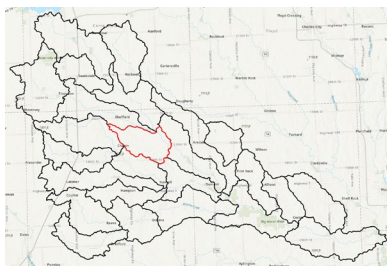
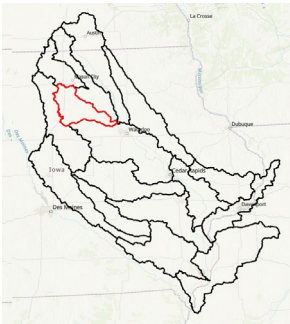


Scope and Scale



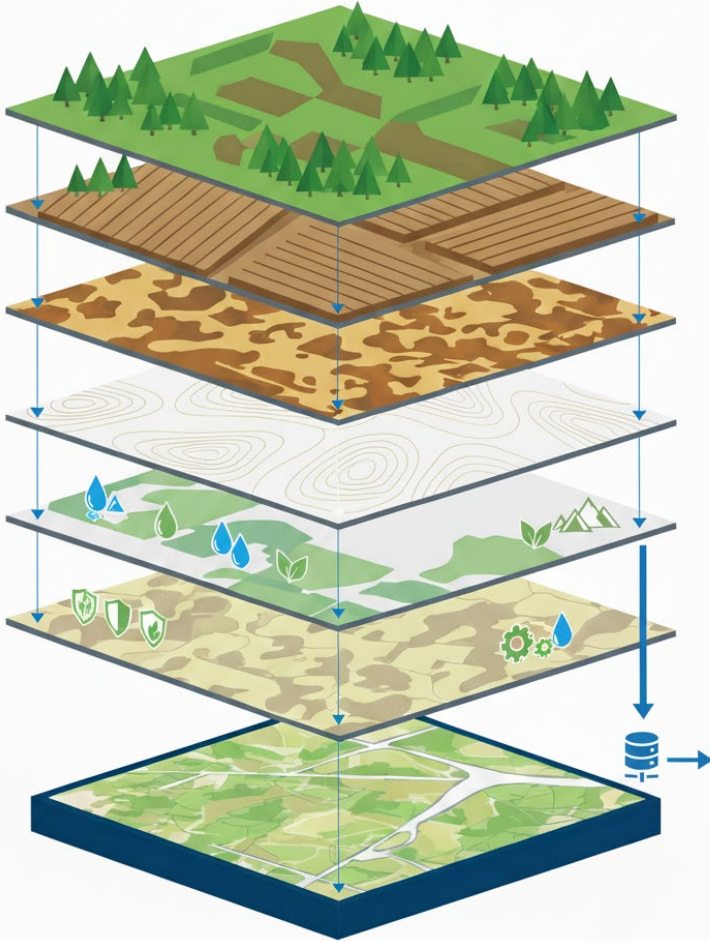
Fields – 4.1 Million Units in US

FUID = 1277645001



HRU_ID = 1484863
FUID = 1277645001
1% Slope
Soil = Dinsdale
Corn-Soybean rotation
Tiled
Conservation Tillage

Model Input Data



- Landcover - NLCD
- Crop rotation - CDL
- Soils - SSURGO/STATSGO/Supplements
- Topography - NED
- Irrigation & Fertilization
 - Ag Census
- Conservation Practices
- Management templates
 - NRCS RUSLE2 - 20,000 templates
- Automated processing for ingestion into NAM where possible



NAM – National Agroecosystems Model

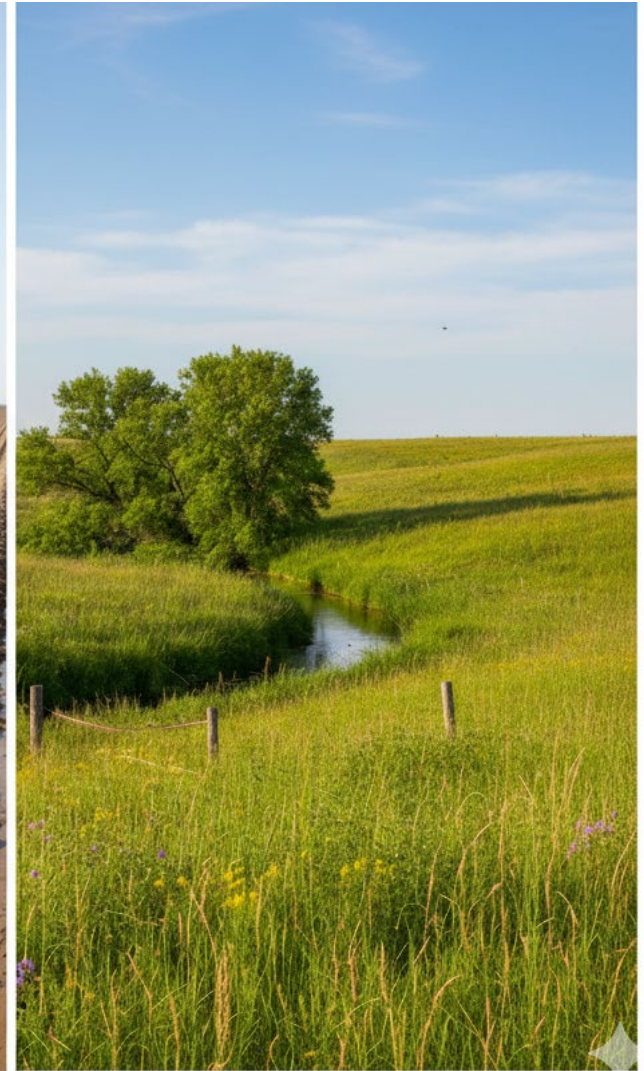
- 2,120 interconnected SWAT+ models
- Total: 7,132,058 HRUs
 - 4,160,595 Field-HRUs
- 2,524,673 channels
- Countless calibration runs
- Over a thousand coffee cups

What is CRP?

Conservation Reserve Program (CRP):

“voluntary program that encourages agricultural producers and landowners to convert highly erodible and other environmentally sensitive acreage to vegetative cover, such as native grasses, trees, and riparian buffers.”

Practically: land conversion from agricultural land to grassland



Procedure for the NAM CRP

Starting from the
pre-calibrated
NAM:

1. Locate all relevant agricultural fields/HRUs (close grown and row crops).
 2. Replace the landuse for those HRUs with fesc (fescue grass).
 3. Leave all other conditions intact (i.e. grassed water ways, tiles, filter strips, etc.)
 4. Run the NAM with changes to landuse (NAM CRP).
 5. Compare to the “default” NAM by basin and HRU/field-basis.
-

CRP scenarios analyzed

0. Baseline (unrealistic) scenario:

- All CONUS cropland is replaced by grasslands.

1. Targeted reduction scenario :

- Top 5% of agricultural fields (HRUs) with the highest erosion rates are converted to grassland.

2. Distributed targeted scenario:

- Top 10% of eroding agricultural area in each 8-digit Hydrologic Unit Code (HUC8) is converted to grassland.

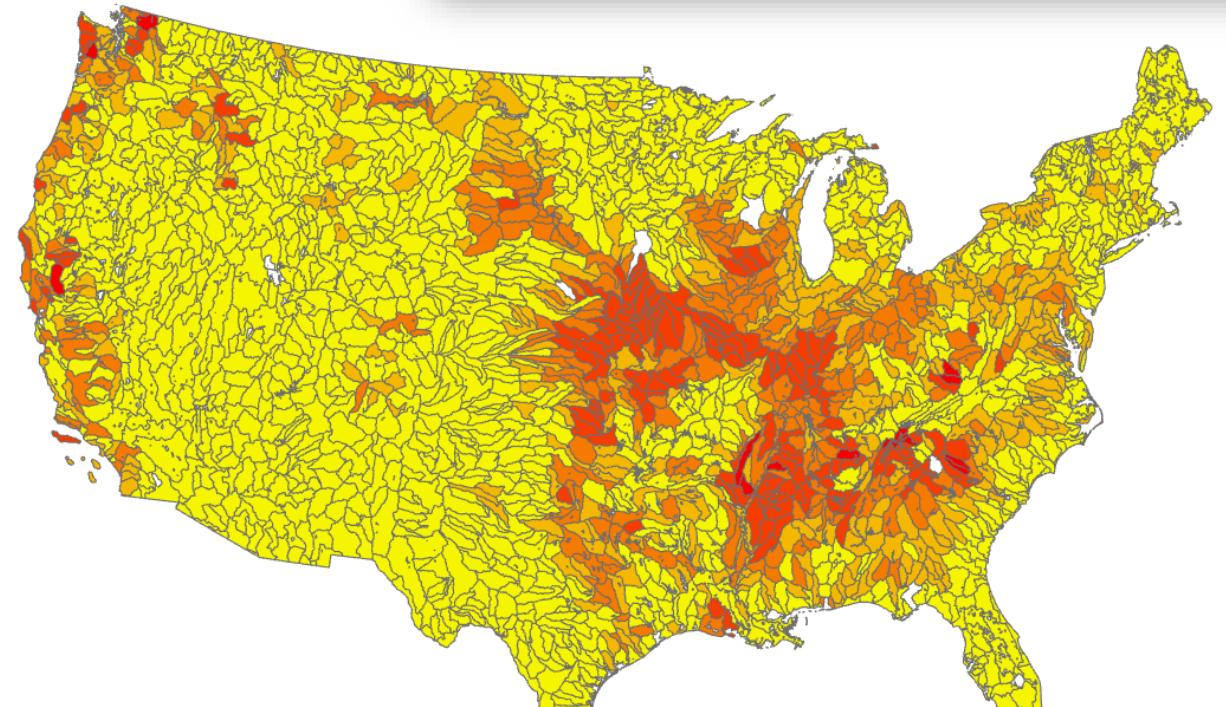
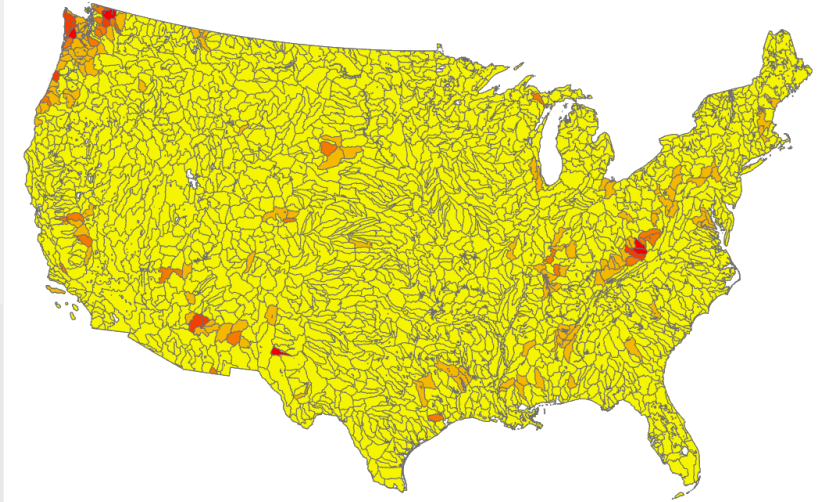
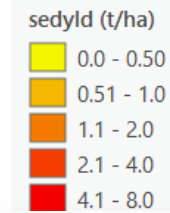
3. Realistic scenario:

- The 5% of the least productive fields (HRUs that produce on average the bottom 5% of the corn and soybean average annual yields per ha) were converted to grassland.

0. Baseline: Sedimen Yield (t/ha) Default vs CRP

CONUS-scale reduction for cropland area:

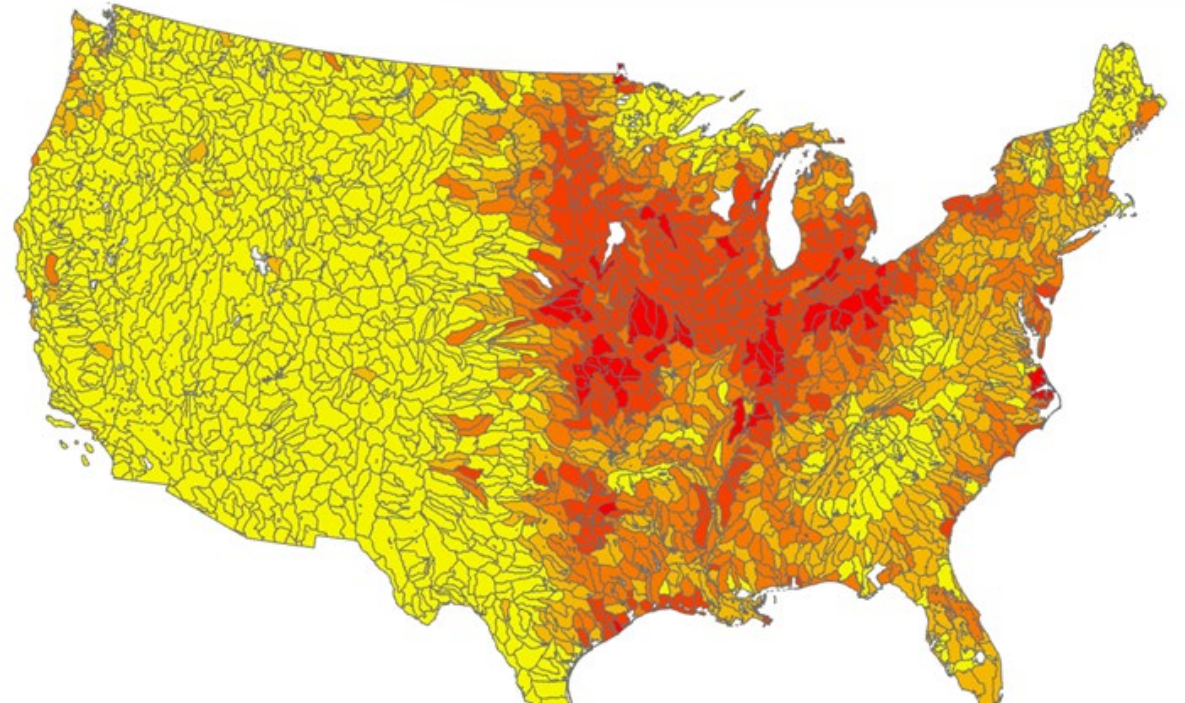
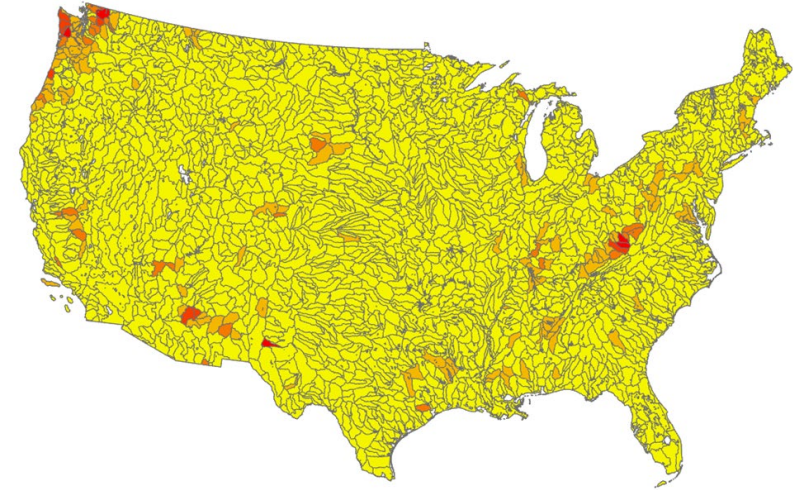
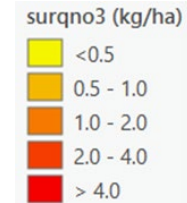
- Sediment yield (tones) -71%



0. Baseline: Surface N03 (kg/ha) Default vs CRP

CONUS-scale reduction for cropland area:

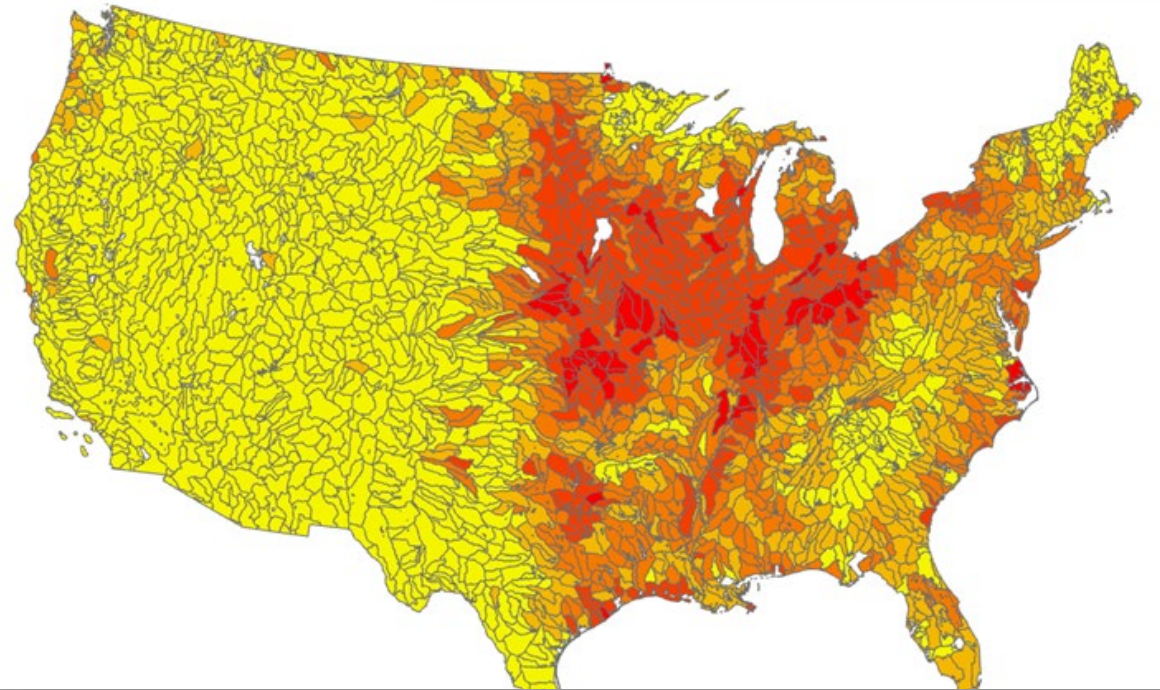
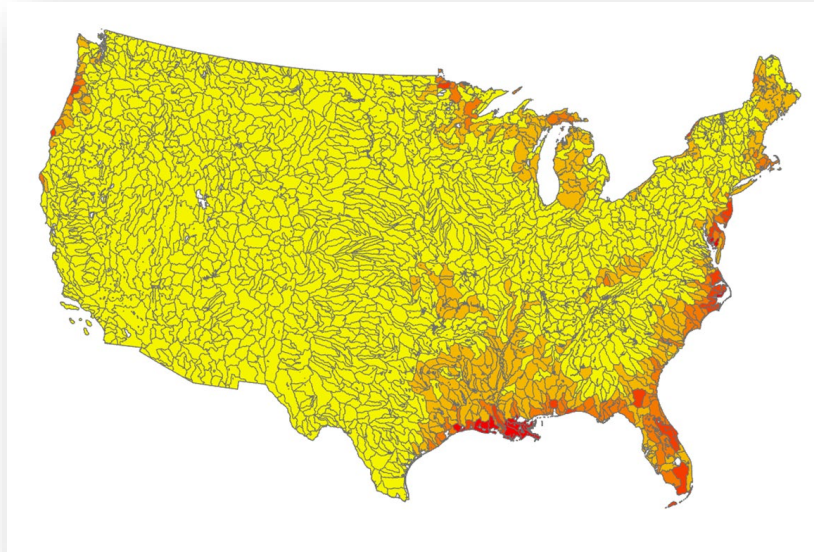
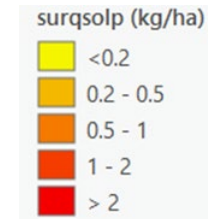
- Sediment yield (tones) -71%
- Surface no_3 (kg) -61%
- Lateral no_3 (kg) -72%



0. Baseline: Surface soluble P (kg/ha) Default vs CRP

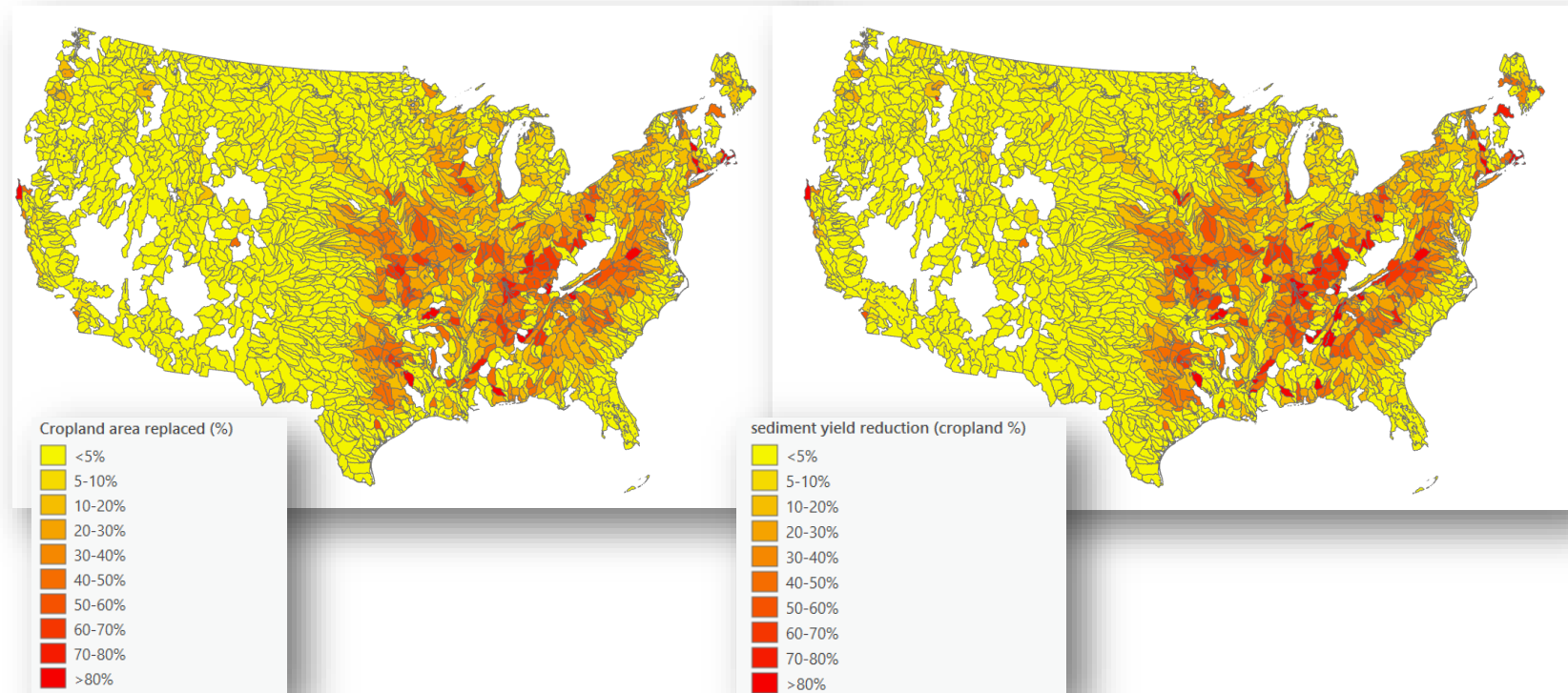
CONUS-scale reduction for cropland area:

- Sediment yield (tones) -71%
- Surface no_3 (kg) -61%
- Lateral no_3 (kg) -72%
- Surface soluble P (kg) -93%



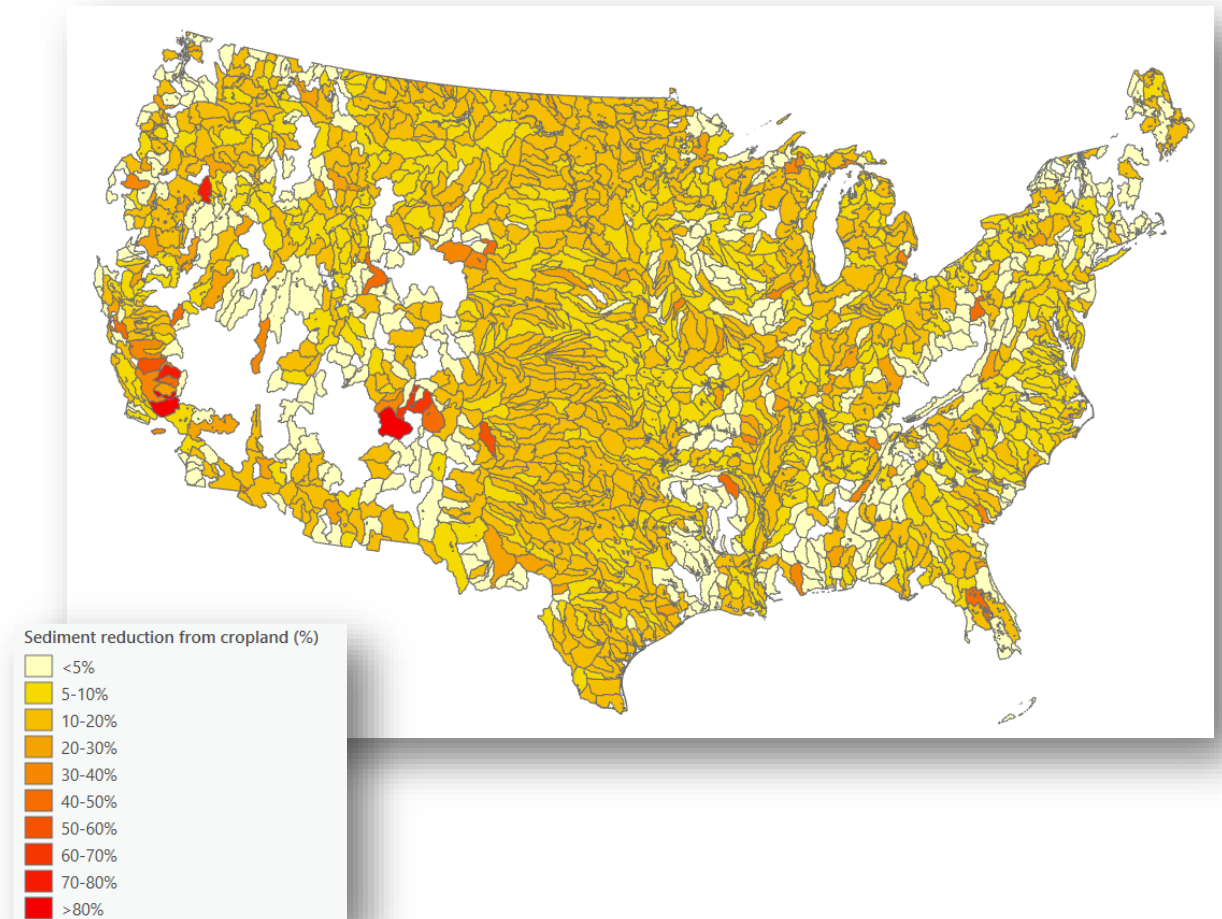
1. Targeted reduction scenario: tradeoffs

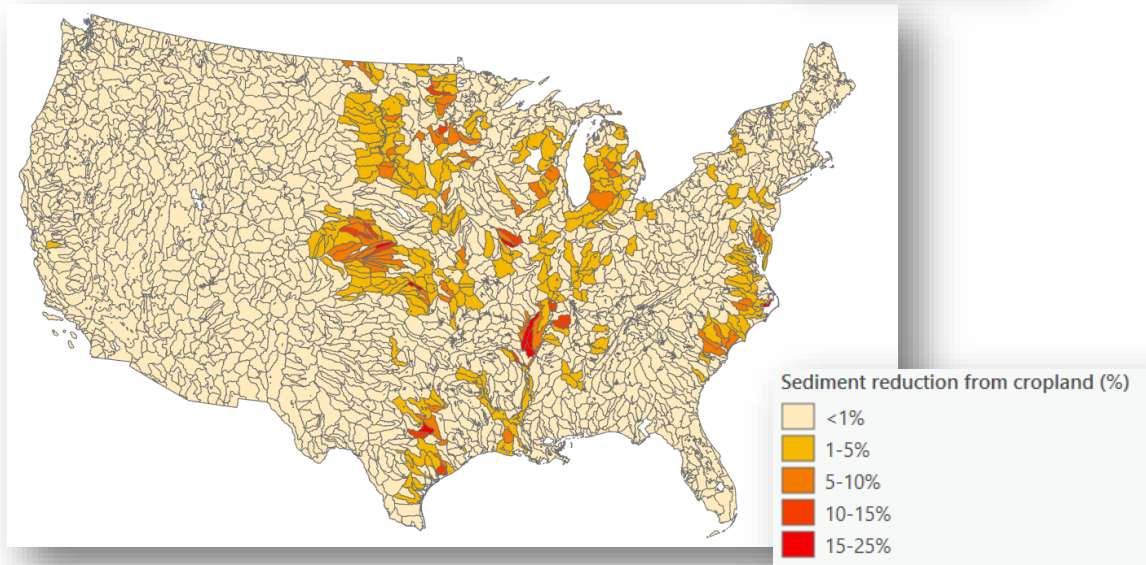
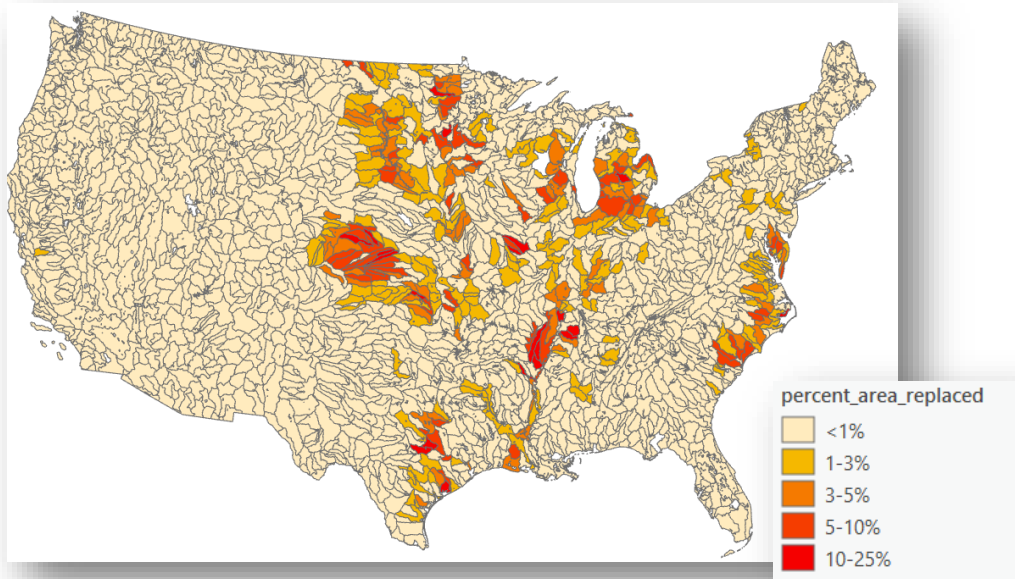
- 5% of all agricultural fields (HRUs) with the highest erosion rates are converted to grassland
- Significant loss of ag area in some HUC8



2. Distributed targeted scenario

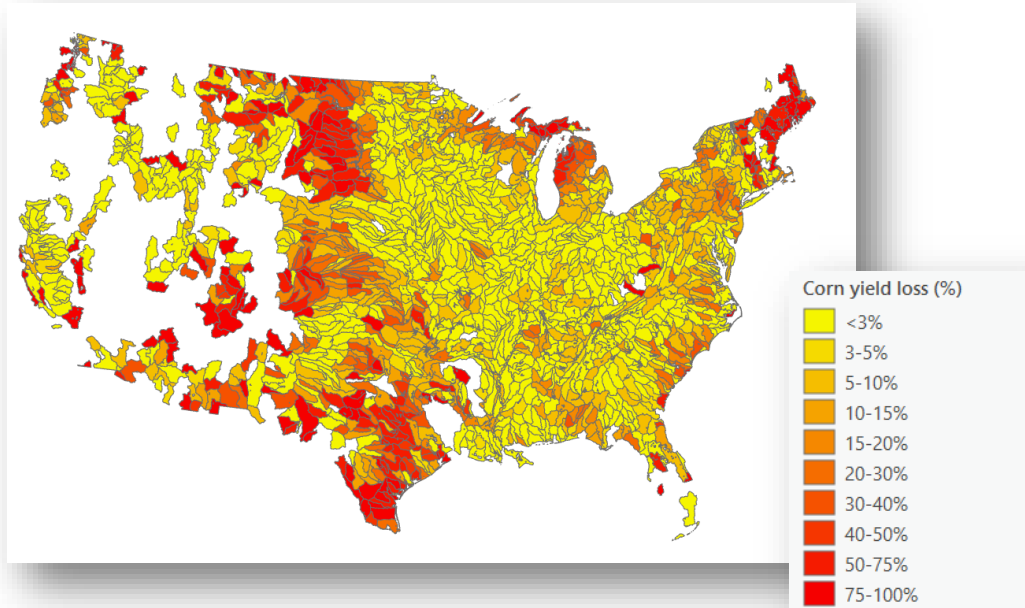
- Top 10% of eroding agricultural area in each 8-digit Hydrologic Unit Code (HUC8) is converted to grassland.
- Distributed result, with an average 10-20% sediment yield reduction





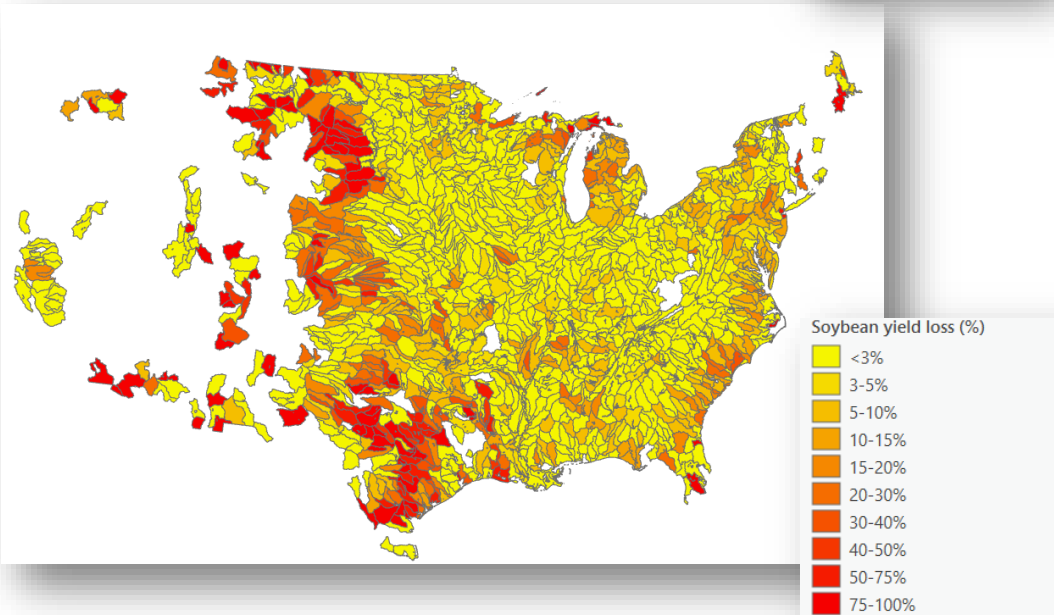
3. Realistic scenario

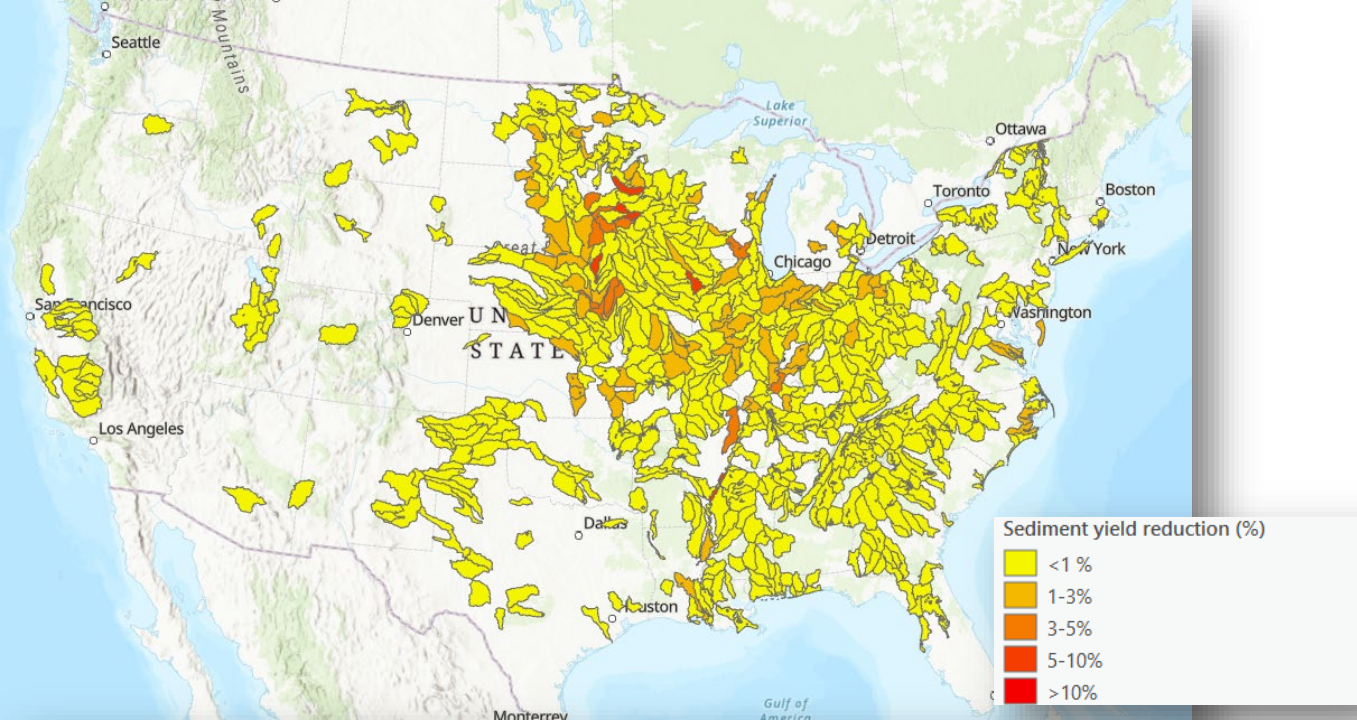
- The 5% of the least productive fields were converted to grassland:
 - HRUs/fields that are the bottom 5% of the corn and soybean average annual yield per ha
- Only some HUC8 are affected



3. Realistic scenario: tradeoffs

- The percentage of corn and soybean yield loss if the “realistic” scenario is implemented
- Some HUC8s completely remove corn and soybean production

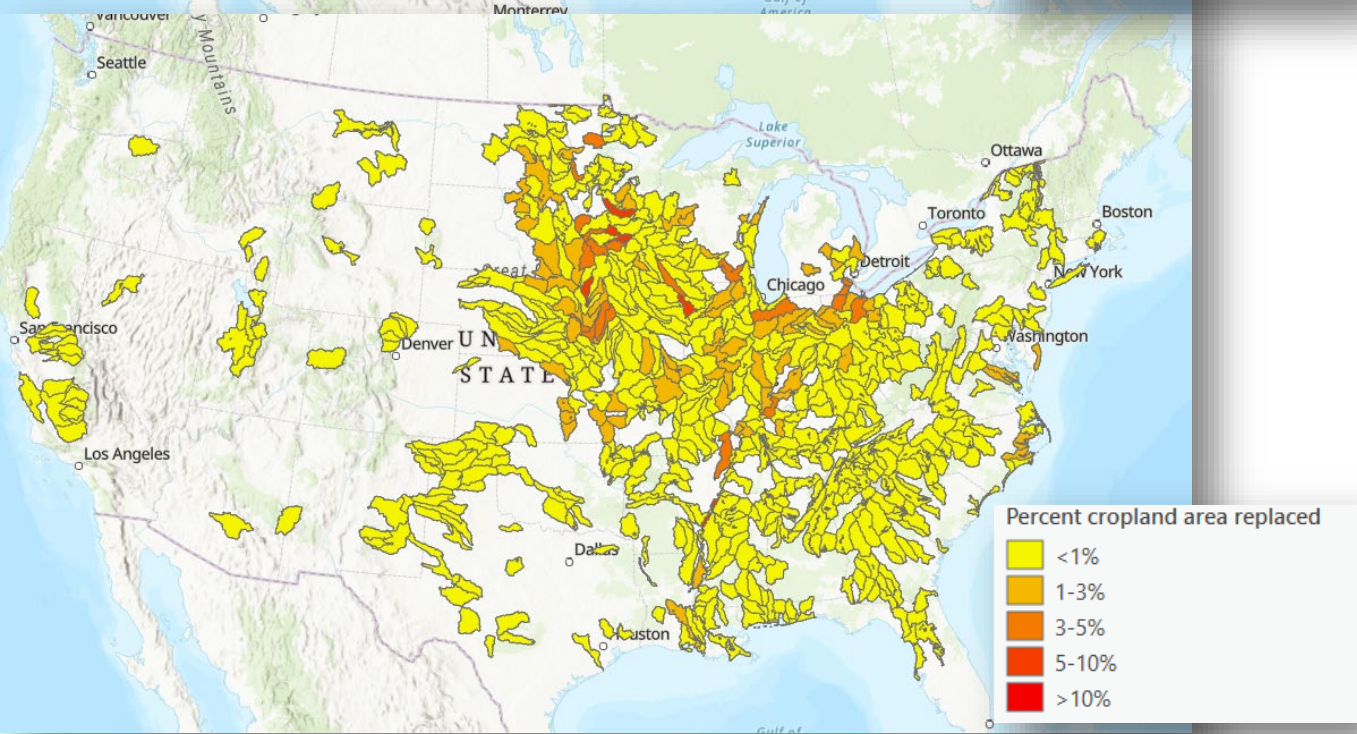




Filtering the results by criteria

AREAS WHERE:

- CORN YIELD REDUCTION < 5%, AND
- SOYBEAN YIELD REDUCTION < 5%



Reduction totals

- Simulated effectiveness does not correspond with realistic settings
- There are always trade-offs

Scenario	Sediment yield reduction (%)	Surface NO3 reduction (%)	Lateral NO3 reduction (%)	Surface Soluble P reduction (%)	Total area used (km ²)
Targeted reduction	40.8	12.0	13.5	10.1	9,095
Targeted distributed reduction	34.1	15.0	17.0	11.2	30,087
Realistic scenario	3.7	1.3	0.5	1.7	63,459

Thank you!



QUESTIONS

