Environmental Benefits of Conservation Reserve Program Filter Strips

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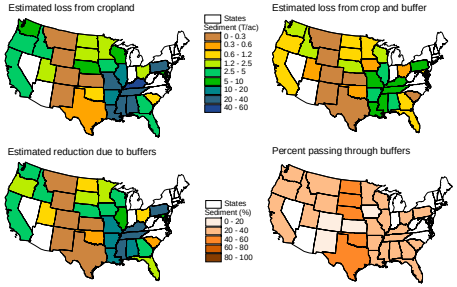
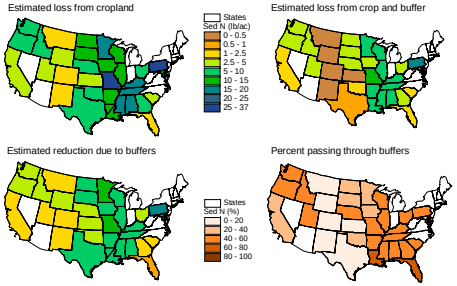
Average annual estimated loads over 10-year contract

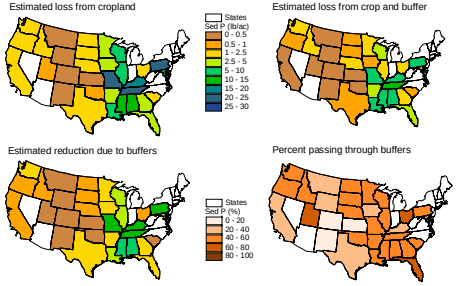
Sediment



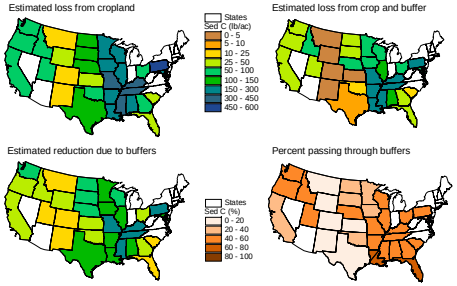
Nitrogen With Sediment



Phosphorus with Sediment



Carbon with Sediment



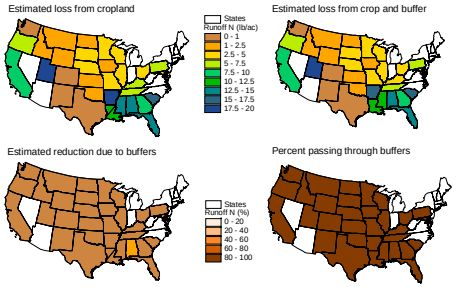
OBJECTIVE

Estimate the likely environmental benefits of conservation buffers, as compared to the likely crop rotations they replaced.

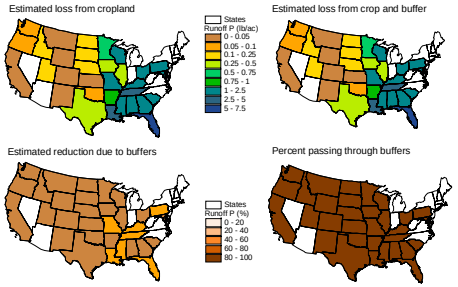
STUDY DESIGN

- Model crop fields with and without filter strips using USDA's Agricultural Policy Environmental eXtender (APEX) model.
- Develop set of representative fields (363) nation-wide based on soils and contract data obtained from USDA (~53% of enrollments).
- For each representative field, develop 2 scenarios - one with an edge-of-field buffer (i.e., filter strip) , and one without.
- Major cropping systems for each modeled soil in each state were taken from NRI data.
- Filter strips modeled as a mixture of alfalfa, brome, switchgrass, big bluestem, and indian grass based on discussions with USGS & NRCS.
- For each scenario on each field, conduct 30 10-year runs, each using a different generated weather pattern.
- Estimate changes in environmental indicators between scenarios, including movement of water, nutrients, and sediment, and carbon sequestration.

Nitrogen With Water



Phosphorus with Water

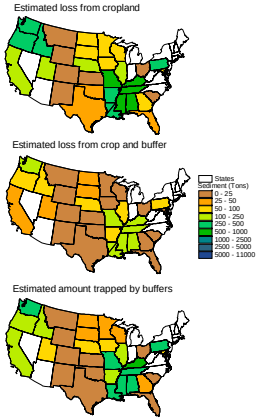


IMPLICATIONS

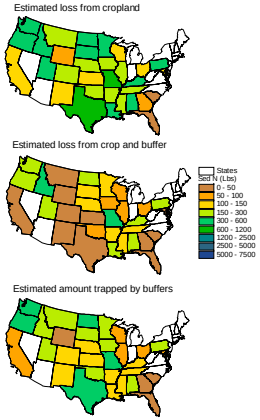
- Model outputs were averaged across weather seeds, and were summarized to the state level based on a weighted-average of soils within each state modeled.
- As expected, the APEX model estimated reductions in pollutant loads as a result of implementing buffers.
- Benefits afforded by buffers vary spatially across the United States, due to differences in soil type, slope, and crop rotation.
- Benefits afforded by buffers varied by environmental indicator - buffers effectively trapped sediment-borne pollutants but were less effective with water-borne pollutants.
- Model provides a structure under which to test new managements and hypotheses related to buffers. For example, different planting mixtures could be modeled, and the effects of hay harvest could be estimated.

Total estimated loads over 10-year contract

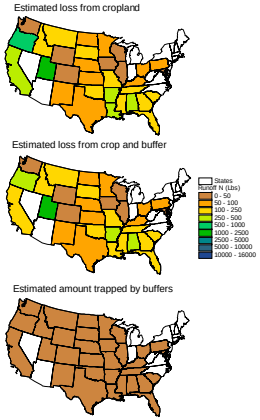
Sediment



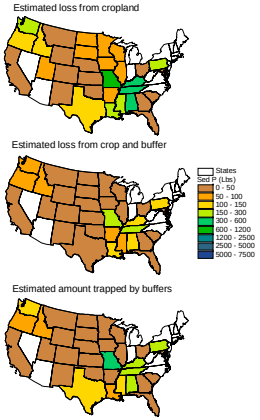
Nitrogen with Sediment



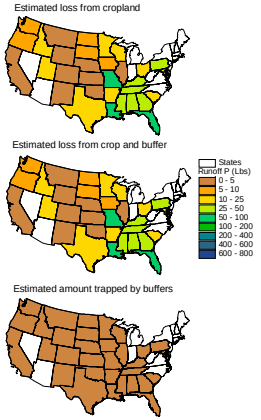
Nitrogen with Water



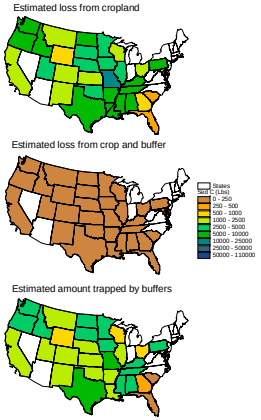
Phosphorus with Sediment



Phosphorus with Water



Carbon with Sediment



Environmental Benefits of Conservation Reserve Program Grasslands

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OBJECTIVE

Estimate the likely environmental benefits of conservation grasslands as compared to the crop rotations that would likely replace them if that acreage came out of the program.

STUDY DESIGN 1

- Model Conservation Reserve Program grasslands using USDA's Environmental Policy Integrated Climate (EPIC) model.
- Develop a set of representative fields (363) nation-wide based on soils data and contract data obtained from USDA (~53% of enrollments).
- For each representative field, develop 2 scenarios - idled grassland and active crop rotation.
- For each representative field, acreage and slope was determined by soil series and contract data.
- Major cropping systems for each modeled soil in each state were determined from NRI data. Management practices were based on NASS data.
- For each cropping system, separate versions were run for conventional and conservation tillage practices.
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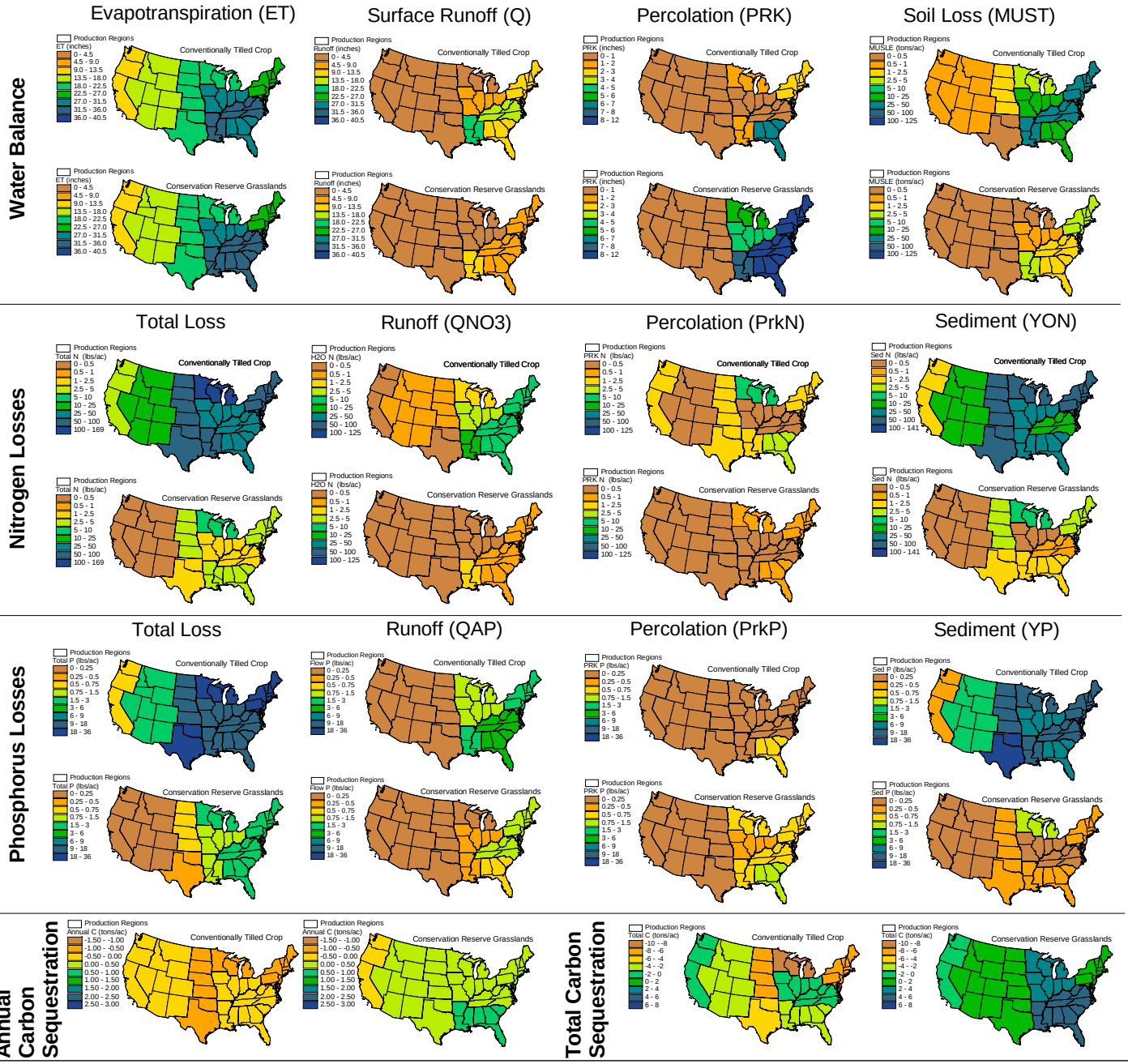

STUDY DESIGN 2

- Each grassland was modeled as a mixture of alfalfa, smooth brome, switchgrass, big bluestem and indian grass, based on discussions with USGS and NRCS.
- Each scenario on each field was modeled as 10-year runs using 30 different generated weather patterns to capture variability.
- Estimated changes in environmental indicators between scenarios, including movement of water, nutrients, and sediment, and carbon sequestration. Outputs summarized to state, then to Production Region (shown), 2-digit HUC, and MLRA (not shown).

IMPLICATIONS

- As expected, EPIC estimated reductions in pollutant loads from CRP compared to crops.
- Benefits of CRP vary spatially, with greater benefits in the east due to higher precipitation.
- Benefits of CRP vary by indicator as well, but less drastically than for buffers.
- This model provides a structure for testing hypotheses related to the impacts of CRP. For example, this model was used to assess the effect of managed haying.