Opportunities to enhance carbon storage potential in the CRP

New research from the CRP Climate Change Mitigation Assessment Initiative

Key Findings

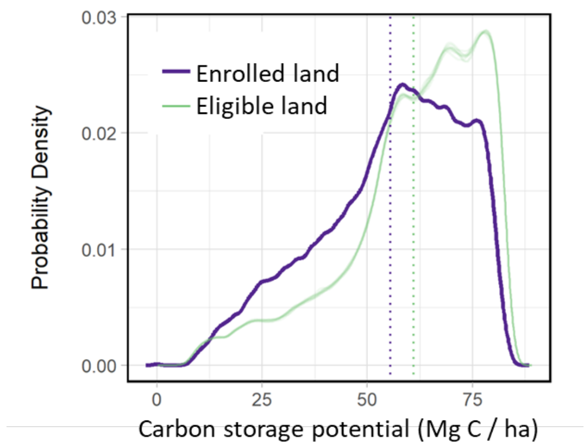
- Current CRP enrolled parcels perform 95% better on wind erosion, 45% better on water erosion, and 17% better on leaching performance indices than average CRP-eligible lands.

- CRP parcels could sequester 9 percent more carbon if enrollment geography was distributed equally across eligible land; even more if climate mitigation potential was further prioritized.

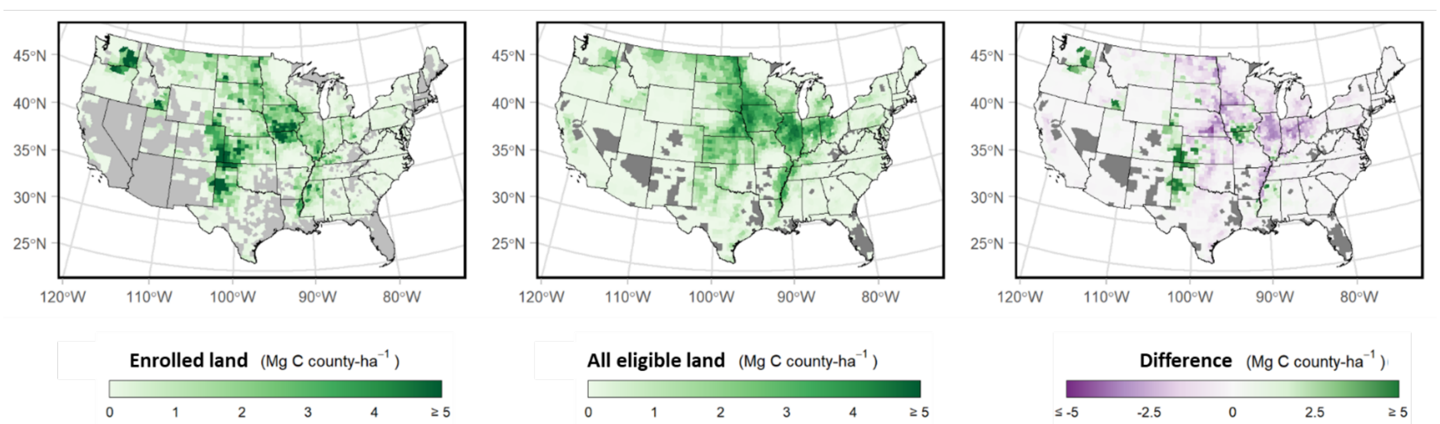
- Aligning CRP enrollment locations with carbon storage potential would enhance erosion control co-benefits but likely reduce leaching benefits and increase program costs.

Summary of research

The Conservation Reserve Program has immense potential to help mitigate climate change, yet the program's current offer ranking system (EBI) does not consider land's intrinsic carbon storage potential. Comparing existing enrolled lands with all eligible lands shows that the CRP's current geography embodies a soil carbon (C) storage capacity that is 9% less than what would be attainable if enrollments were selected at random. This stems from a heavier weighting towards other conservation objectives, resulting in greater enrollment of coarse-textured (e.g. sandy) soils that are prone to erosion and leaching but that exhibit lower C storage capacity.



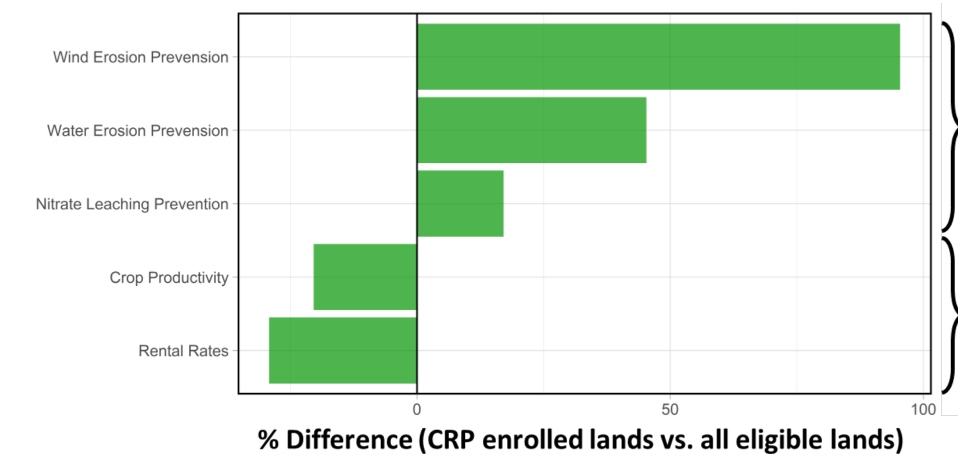
Geographies of current and potential CRP carbon storage capacity



Carbon storage potential of the USDA Conservation Reserve Program. Comparison of currently enrolled lands (*left panel*) to all eligible lands (*middle*) reveals disproportionate enrollment (*right panel, in green*) in the southern Great Plains, southern Iowa, and Washington state—areas targeted for their erosion risk—as well as opportunities to increase CRP carbon storage capacity in other locations (*purple*).

CRP is highly effective at targeting its prioritized conservation outcomes

Enrolled CRP land is outperforming random enrollment in achieving its non-climate objectives—preventing wind and water erosion, improving groundwater quality, minimizing impact on agricultural productivity, and managing program costs. Explicitly considering soils' carbon storage capacity in CRP enrollment could similarly enhance the program's climate mitigation ability but would likely be associated with tradeoffs in program costs and lost agricultural productivity.



CRP selection excels at delivering soil retention and water quality outcomes

...and currently avoids the most productive and expensive lands

CRP delivers cost-effective conservation

The CRP is delivering conservation benefits at considerable cost savings. On average, rental rates of lands selected for enrollment in the CRP are 30% less than average eligible lands. By targeting land for conservation outcomes, the CRP saves an estimated $730 Million per year on rent expenditures.

CRP Annual Rent Estimate

Enrolled lands	**$1.77B***
Average eligible land	**$2.50B**

*USDA-reported actual 2020 rent: $1.724B

Estimation methods

Comparison of CRP enrolled lands and eligible lands based upon analysis of 2020 CRP parcels relative to a random selection of all eligible lands, determined by cultivation history for the preceding 6 years.

Carbon storage estimates reflect soils' maximum carbon storage potential, based upon mineral associated organic carbon to a depth of 30cm. Values reported are expressed in units "metric tons of carbon per hectare". Because C stocks of agricultural soils generally exist well below their maximum potential, soils' max storage potential provides an effective index of their climate mitigation utility.

More information

Research and summary provided by Seth A. Spawn-Lee and Tyler J. Lark, University of Wisconsin-Madison, and based upon work supported by the CRP Climate Change Mitigation Assessment Initiative under agreement number FBC21CPT0011802. For more info see Spawn-Lee (2023) (link).

State	Mean Carbon Storage Potential (MgC/ha)	CRP eligible area (acres)	2022 enrolled area (acres)	2022 mean rent ($)
Alabama	30.42	1,725,278	139,188	45.48
Alaska	NA	NA	10,790	41.19
Arizona	38.28	615,494	10,252	15.00
Arkansas	70.32	6,243,133	200,293	82.07
California	52.48	3,279,014	56,390	33.49
Colorado	53.02	5,842,114	2,034,799	28.06
Connecticut	36.50	60,895	0	NA
Delaware	18.36	435,367	3,220	153.05
District of Columbia	36.70	1	0	NA
Florida	7.17	737,819	11,389	51.66
Georgia	11.97	3,260,623	183,111	66.81
Hawaii	NA	NA	4,875	20.78
Idaho	60.86	3,930,570	425,744	50.82
Illinois	76.44	21,466,042	822,961	207.89
Indiana	62.04	11,491,164	199,735	199.16
Iowa	69.36	23,164,078	1,693,950	233.94
Kansas	68.52	21,683,911	1,720,651	43.16
Kentucky	73.72	3,435,336	189,102	168.09
Louisiana	75.52	2,719,668	256,004	97.95
Maine	49.85	264,393	3,907	53.01
Maryland	32.34	1,181,106	45,115	231.45
Massachusetts	33.48	61,211	9	101.00
Michigan	38.50	6,453,851	116,782	121.96
Minnesota	57.34	18,868,279	996,592	146.27
Mississippi	70.85	3,837,985	515,846	82.42
Missouri	70.34	9,859,720	766,425	129.36
Montana	56.56	10,762,761	785,989	28.11
Nebraska	61.32	17,430,592	1,521,757	51.47
Nevada	52.50	196,586	2,718	9.86
New Hampshire	31.57	41,145	0	NA
New Jersey	29.86	319,387	1,839	89.71
New Mexico	37.99	1,061,920	616,761	23.09
New York	56.78	2,361,700	16,330	88.23
North Carolina	21.70	4,514,790	27,902	75.01
North Dakota	54.84	21,444,134	1,244,240	54.01
Ohio	66.41	9,139,354	227,454	210.79
Oklahoma	55.95	7,449,563	614,129	25.82
Oregon	60.84	1,878,307	531,021	55.56
Pennsylvania	53.70	2,440,543	92,795	145.85
Puerto Rico	NA	NA	495	51.21
Rhode Island	41.05	8,025	28	74.00
South Carolina	13.19	1,388,875	37,587	42.32
South Dakota	64.76	15,343,172	1,764,563	66.48
Tennessee	65.69	2,904,587	103,187	102.33
Texas	52.15	19,573,832	2,307,632	35.06
Utah	53.81	589,546	136,491	25.01
Vermont	47.46	205,499	2,121	118.21
Virginia	28.42	2,000,069	31,023	65.74
Washington	61.95	4,582,402	1,033,857	61.22
West Virginia	52.36	255,359	7,412	58.76
Wisconsin	57.05	7,639,274	195,867	166.92
Wyoming	40.60	1,151,694	286,946	18.13