

Durability of expired Conservation Reserve Program fields across the western United States

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Please note that this report is deliberately abbreviated because the results are currently in preparation for journal submission: Vandever, M.W., S.K. Carter, T.J. Assal, and R. Iovanna. In prep. Evaluating the durability of conservation covers in expired Conservation Reserve Program fields across the western United States. Environmental Management.

Abstract

For more than thirty years the Conservation Reserve Program (CRP) has implemented practices that are intended to reduce soil erosion, improve water quality and groundwater recharge, and more recently, provide habitat for wildlife and pollinators. But recent declines in acres allocated for conservation coupled with agricultural expansion may greatly affect environmental benefits attributed to the CRP. To help address this concern, we evaluated to what extent expired CRP fields in different states and conservation practices retained their CRP covers after three years out of the program. We identified a stratified random sample of previously enrolled CRP fields in six conservation practices (CPs) across 14 western states. We then conducted edge-of-field surveys of 1092 fields in 2017 and 2018. We found that an average of 44% of expired CRP fields across practices and states still retained >50% cover of CRP vegetation (grasses, forbs, shrubs, trees). When fields had converted back into agricultural production, the most commonly observed crops were soybeans, corn, and wheat. The vast majority (99%) of expired CRP fields are not irrigated. Just over half (55%) of expired CRP fields either were not tilled or are in strip/no-till tillage, while 22% are now in conventional tillage. Grass management was evident on 33% of those expired CRP fields persisting in grass cover. Overall there is clear evidence that the CRP program is providing significant benefits beyond the contract period, with many fields persisting in CRP covers for more than three years after contracts have expired.

Introduction

The Conservation Reserve Program has been in place for several decades, and provides technical and monetary support to farmers to implement practices that are intended to reduce soil erosion, improve water quality and groundwater recharge, and provide habitat for pollinators and wildlife, among other benefits. These associated benefits are assumed to diminish after conservation covers are converted for agricultural purposes, or are not fully accounted for after expiring from the CRP.

The wildlife and pollinator habitat, water quality, and soil erosion benefits literally depend on what is on the ground and do not cease upon CRP contract expiration if conservation covers remain unchanged. Cumulative persistence of benefits post contract are poorly understood and rarely quantified when estimating CRP returns on investment. There is a need to evaluate to what extent CRP practices are providing the intended benefits to people and wildlife both during and after the contract periods.

On-site assessments of expired, as well as currently enrolled, CRP lands enable the program to quantify benefits that continue to accrue for as long as the conservation covers persist to at least some degree. Understanding where and which ex-CRP fields continue to function as were originally intended could help USDA target conservation practices that provide the greatest opportunity for ecosystem services long after contracts expire. More realistic and defensible estimates of the benefits generated by CRP (present and future) strengthen the case for the program and provide a basis for making policy changes that fully realize its potential. Identifying which conservation practices persist post contract could help USDA target conservation efforts where they may achieve the greatest benefits.

This need is imperative, as CRP enrolled acreage has dropped 25% over the last decade, with a proportion of expired CRP land returning to agricultural production. Reductions in acreage have been perpetually proposed in Farm Bills without fully understanding where CRP land is being converted, and maybe more importantly, where CRP land persists after contracts expire. It is reasonable to assume environmental benefits persist on expired CRP land if the cover remains, including if that cover is managed for forage. Failure to estimate those persistent, post-CRP benefits could result in USDA underestimating the significance and value of their Program.

This project included three components focused on 1) which conservation practices had been successfully implemented on the ground across the western United States and are providing the expected benefits for people and wildlife (e.g., reduced soil erosion, grassland bird and pollinator habitat), 2) the extent to which different CRP practices and benefits persist after CRP contracts have expired, and 3) field validation of an edge-of-field survey method used to explore 1 and 2. This report focuses on component #2.

Methods

We acquired spatial data on enrolled and expired CRP fields from the U.S. Department of Agriculture (USDA; Rich Iovanna, unpublished data, April 2016). We worked with USDA to identify geographic areas and conservation practices of primary interest to the agency. We then identified the population from which samples (i.e., expired CRP fields) would be drawn by identifying all fields in the dataset that met the following five criteria:

1. A target conservation practice had been implemented (CP1, 10, 2, 4D, 25, 23) and documented in the spatial dataset,
2. The field was located in one of 14 western states: WA and OR (eastern), ID, MT, ND, SD, MN, IA, MO, CO (eastern), NE, KS, OK (western) and TX (panhandle),
3. The field was within 25 m of an existing road centerline (this distance accounts for the width of the road and adjacent right of way),
4. The field was at least 5 acres in size, and
5. The field had been out of CRP for ≥ 3 years (contract end date ≤ 2013 in data file).

Sampling sites were selected from this population using a stratified random design (stratified by state) to ensure that results would be statistically valid and able to be interpreted in individual states and across the western United States. To focus the evaluation for each conservation practice on states in which that practice has commonly been implemented and ensure statistical validity, we only sampled those conservation practices in each state for which there were at least 50 fields previously enrolled in the practice and meeting the above criteria.

Edge-of-field surveys were used to evaluate the sampled fields across the 14 states and 6 conservation practices of interest. Edge-of-field surveys documented the status of expired CRP fields, including the percent of the field currently in grass/forbs/shrubs, corn, soybeans, wheat, other small grains (e.g., sorghum/milo, barley, rye, millet), other crops (e.g., sunflower, oats, cotton, canola), hay (e.g., alfalfa, clover), other vegetation, or unknown vegetation; the percent of the field irrigated; tillage (e.g., conventional, strip till/no-till); and amount of grass management. Surveys were conducted between June and October of 2017 and in July 2018. In this report, we summarize these results by state across the western United States.

If grass/forb cover on the field exceeded 20% and represented originally planted CRP seed mixes, edge-of-field surveys were used to evaluate the same metrics quantified for currently enrolled fields: cover of grasses, forbs, pollinator friendly forbs (both native and introduced), shrubs, and trees overall and by individual species; cover of bare soil; forb species richness; disturbance (amount, type, and timing); presence of windbreaks/shelterbelts; presence of erosional characteristics (rills, gullies, pedestaling); field heterogeneity; habitat metrics for grassland birds (usable bare soil and cover of vegetation of different height classes), and survey confidence.

Results

We visited and assessed 1092 expired CRP fields (Table 1). Detailed edge-of-field vegetation assessments were conducted on 299 of those fields that still contained vegetation typical of the CRP (Table 2).

Table 1: Total number of expired CRP fields sampled to evaluate the status of fields formerly enrolled in ten conservation practices (CP1: Permanent introduced grasses/legumes, CP2: Permanent native grasses, CP4D: Permanent wildlife habitat, CP10: Established grasses, CP23: Wetland restoration, CP25: Restoration of rare and declining habitat). A diagonal line in the cell indicates there were too few eligible fields in the practice in that state to meet our criteria for sampling. An ‘X’ in the cell indicates there were adequate fields in the practice in that state meeting our criteria for sampling, but the practice was not selected for sampling in that state for other reasons (e.g., limited field staff).

	CP 1	CP 2	CP 4D	CP 10	CP 23	CP 25	<i>Total</i>
Colorado		20	20	22			62
Idaho	26	25	21	37			109
Iowa	21	20	20	20			82
Kansas	23	21		20			64
Minnesota	22	21	21	21			85
Missouri	18	20		20		20	78
Montana	22	19	0	19			60
Nebraska	23	19	17	19			78
North Dakota	22	19	20	22	19		102
Oklahoma		19		18			37
Oregon	28	32		37			97
South Dakota	21	20	21	20	19		101
Texas	17	19		17			53
Washington		31	23	31			85
	243	305	163	323	38	20	1092

Table 2: Expired CRP fields remaining in CRP cover and sampled for vegetation cover.

	CP 1	CP 2	CP 4D	CP 10	CP 23	CP 25	<i>Total</i>
Colorado		4	4	9			17
Idaho	10	3	7	16			36
Iowa	9	1	6	6			22
Kansas		2		3			5
Minnesota	1	3	1	1			6
Missouri	5	9		11		6	31
Montana							0
Nebraska		5	5	4			14
N. Dakota	4	4	1	3	2		14
Oklahoma		11		15			26
Oregon	9	11		15			35
S. Dakota	7	5	9	5	4		30
Texas	12	10		8			30
Washington		4	16	13			33
	57	72	49	109	6	6	299

Vegetation cover on expired CRP fields: An average of 44% of fields across all states and practices remained primarily or entirely in CRP cover more than three years after the contract had expired (Fig. 1). Retention of CRP covers varied by state and region, with retention being highest in the Pacific, Mountain, and Southern Plains regions. Retention of CRP cover reached 81% in Texas and 89% in Oklahoma, while conversion back to crops was highest in North Dakota (79% of fields) and Minnesota (82% of fields). When fields were converted, the most commonly occurring crops were soybeans, corn, and wheat. Conservation practice had little effect on determining current use of fields (Fig. 2).

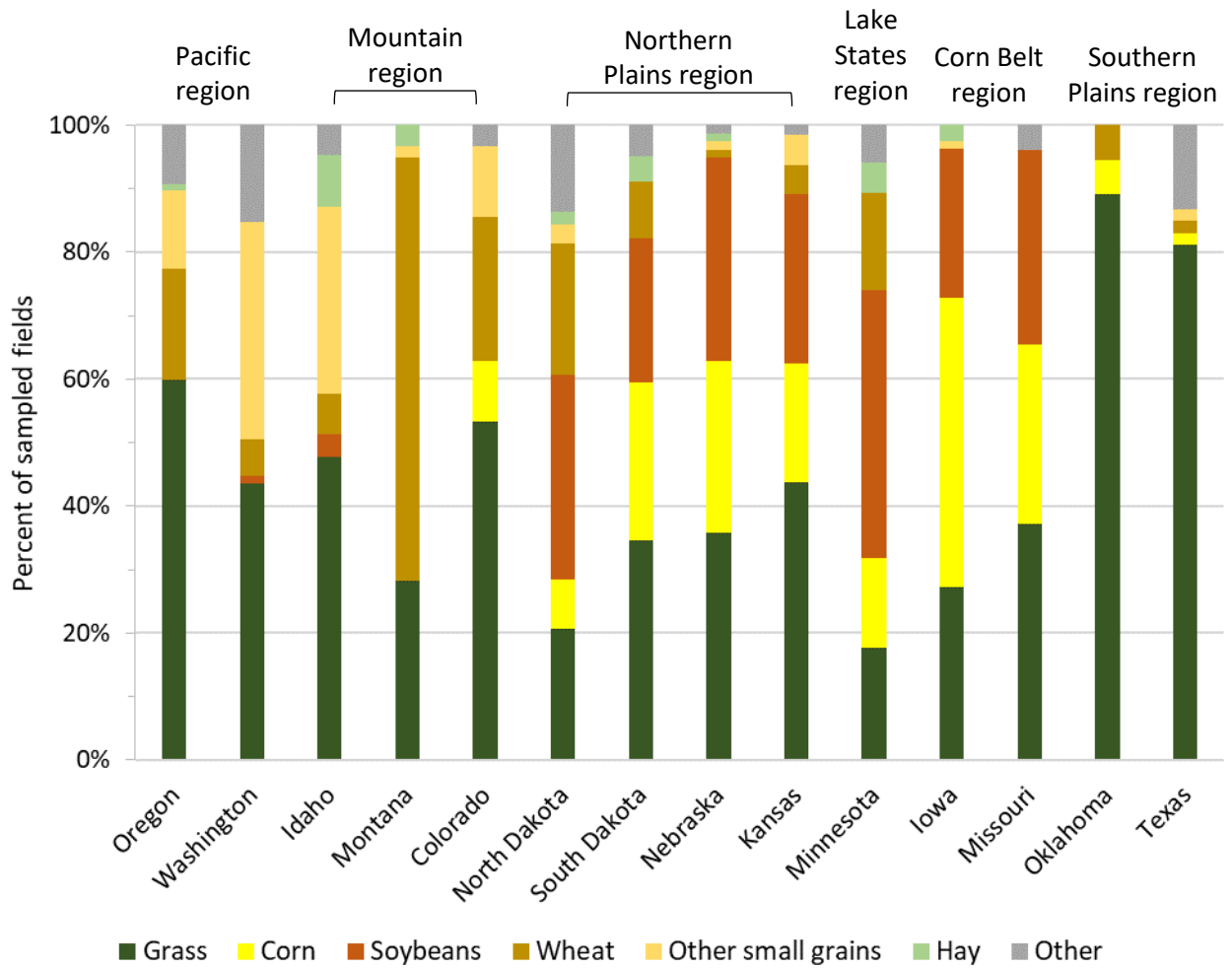


Figure 1. Vegetation cover on expired CRP fields. Dark green represents the percent of sampled fields remaining in CRP covers (grass, forb, shrub, tree). Other colors represent the type of crop cover that the field has been converted to.

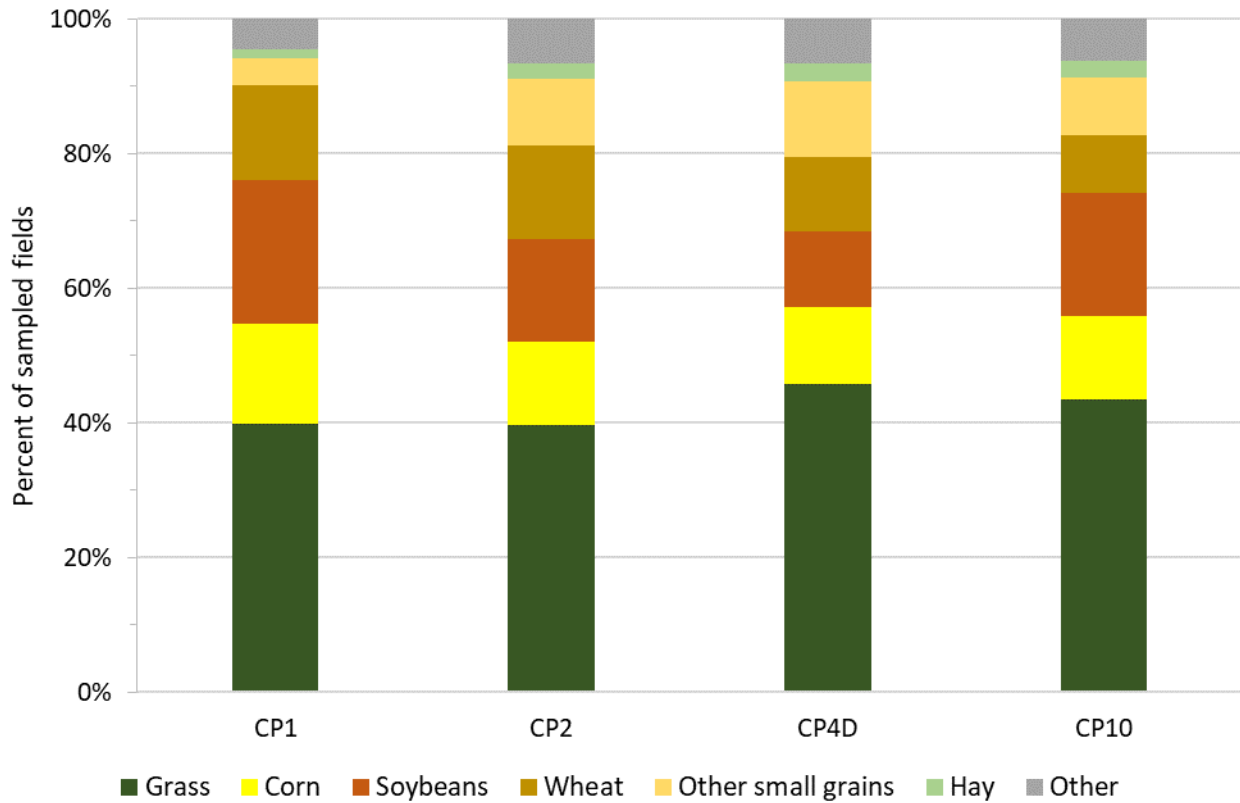


Figure 2. Vegetation cover on expired CRP fields by select conservation practice (CP). Dark green represents the percent of sampled fields remaining in CRP covers (grass, forb, shrub, tree). Other colors represent the type of crop cover that the field has been converted to.

Irrigation on expired CRP fields: Only an average of 1% of expired CRP fields across all sampled states and practices are irrigated (Fig. 3). Irrigation rates were highest in Texas and Idaho, but still very low (only 4% of sampled fields). When the type of irrigation was known, it was most often center pivot.

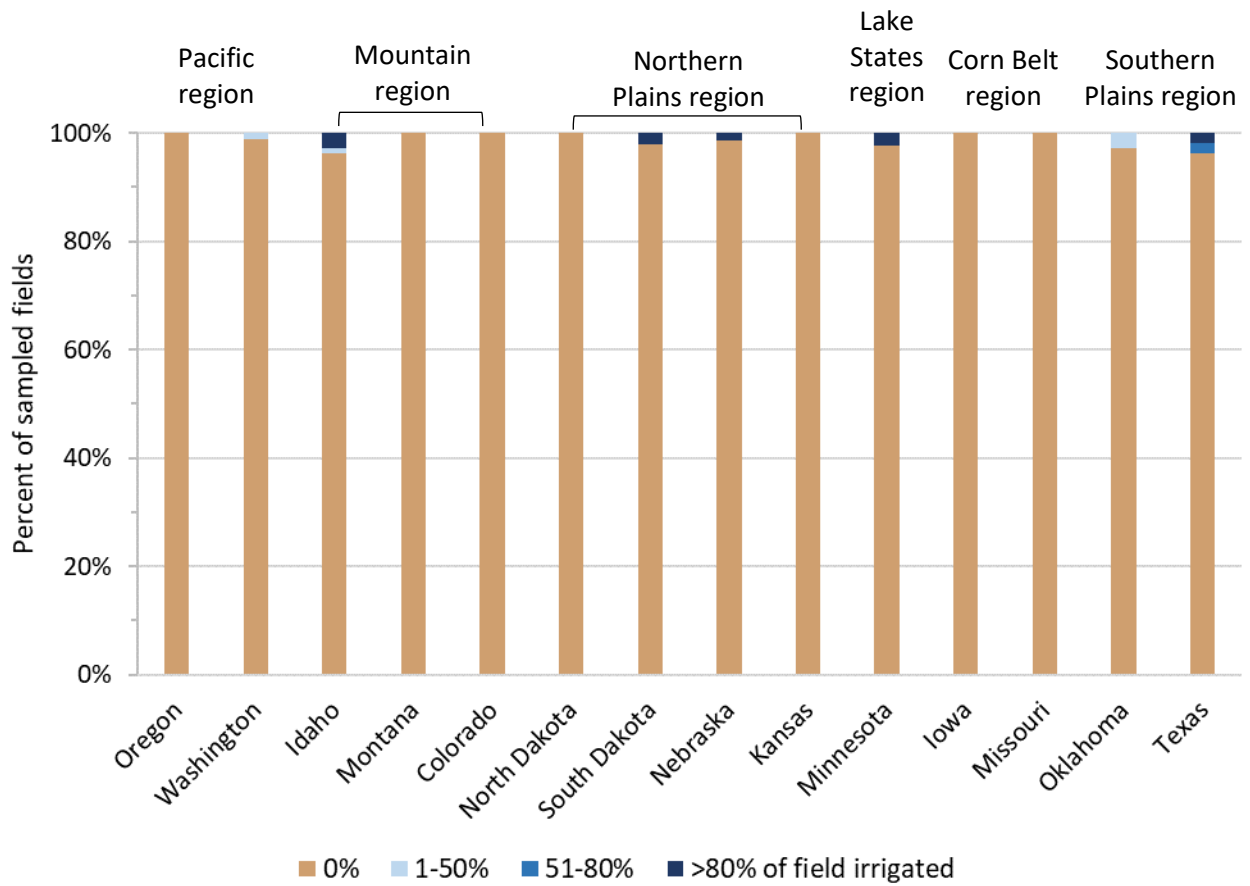


Figure 3. Irrigation on expired CRP fields. Color categories represent the percentage of the field that is currently irrigated. Light brown represents the percent of sampled fields that are not currently irrigated.

Tillage on expired CRP fields: An average of 55% of expired CRP fields across all sampled states and practices either have not been tilled or are in strip/no-till crops; 22% of expired CRP fields are currently in conventional tillage (Fig. 4).

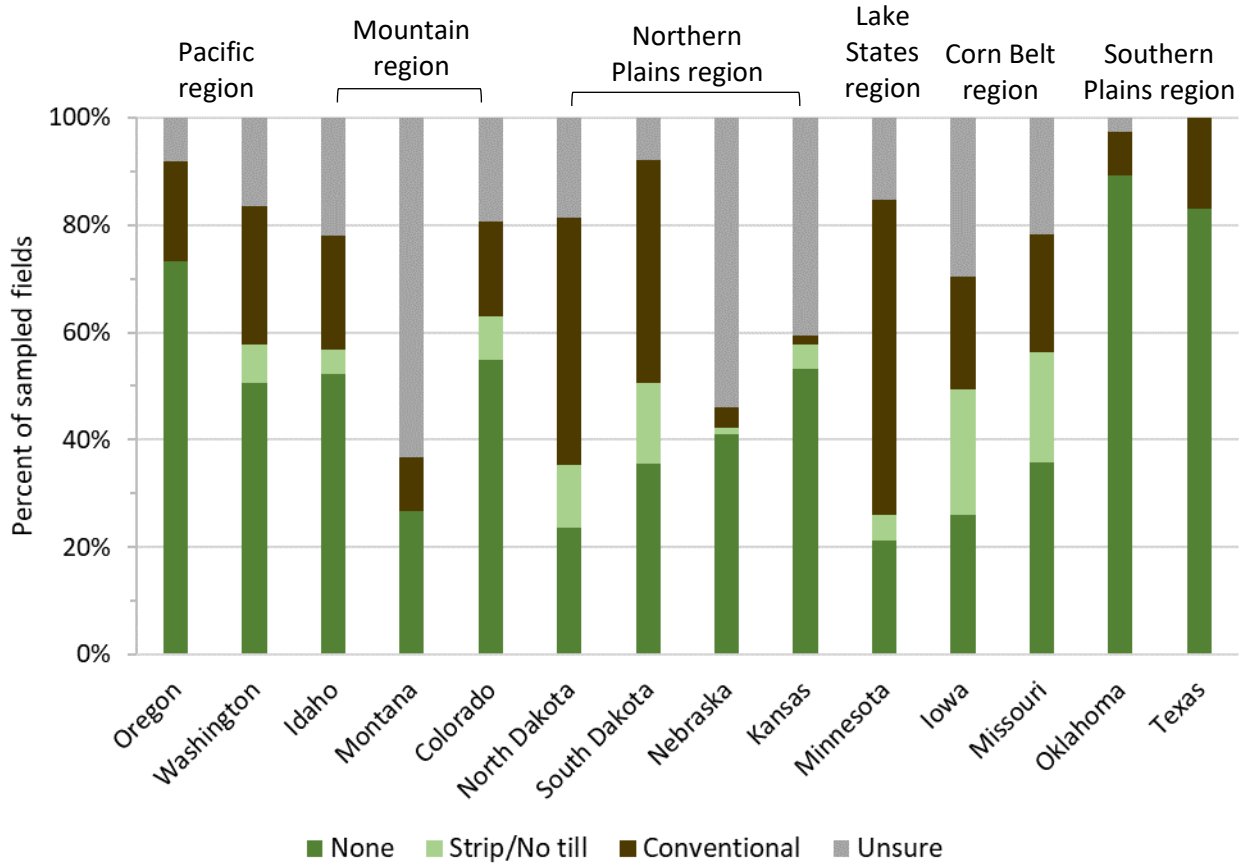


Figure 4. Current tillage of expired CRP fields. Color categories represent different types of tillage of the field currently.

Grass management on expired CRP fields: One third (33%) of the expired CRP fields across all sampled states and practices that persisted in grass cover showed evidence of grass management (Fig. 5). Grass management was more commonly observed in the Pacific, Mountain, and Northern Plains regions.

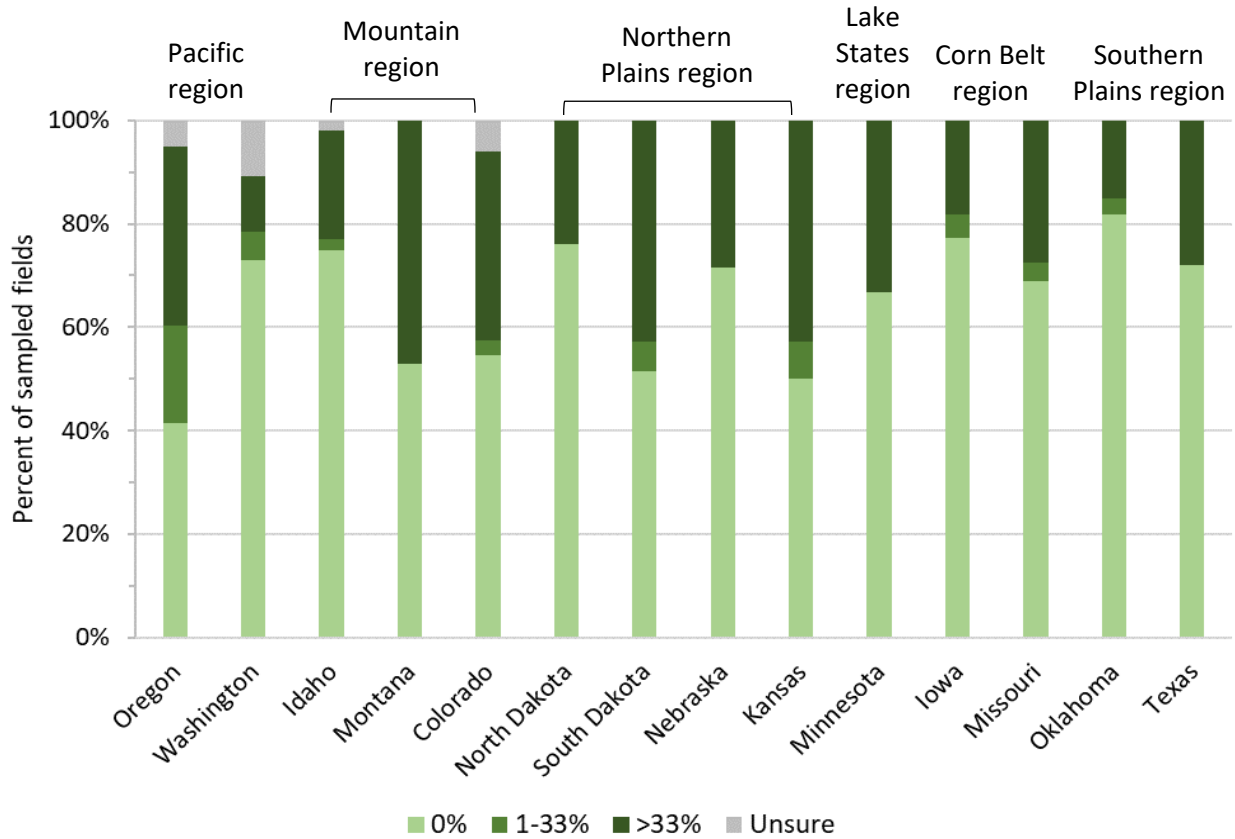


Figure 5. Current grass management on those expired CRP fields still containing some grass cover. Color categories represent different proportions of the field (0%, 1-33%, >33%) showing evidence of grass management.

Next steps

We are providing this final report to USDA to inform the agency of project results. Peer-reviewed publications based on these and other data collected during the study are currently in preparation.

These data are extremely valuable because of the statistically valid manner in which they were collected, the broad extent of the sampling across the western United States, and the multiple conservation practices evaluated.

Acknowledgments

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