



EXPLORING POST-CRP DECISION-MAKING IN THE SOUTHERN GREAT PLAINS

A Report on Phase II of Landowners and the Conservation Reserve Program: Understanding motivations and needs to cultivate participation, retention, and ongoing stewardship

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EXECUTIVE SUMMARY

The Conservation Reserve Program (CRP), a federal program that incentivizes the re-establishment of vegetative cover on formerly cropped land across the United States, has contributed significantly to soil health, water quality, and the status of wildlife populations (e.g., Pavlacky et al. 2021). However, because CRP contracts are time-limited, the land use decisions made by landowners when their contracts end determine the durability of CRP's benefits for soils, water, and wildlife, as well as the efficiency of federal expenditures (Roberts & Lubowski 2007). While *persistence* of the grasses established through CRP, for example, by using the land for grazing or enrolling it in another conservation program after contract expiration, results in enduring environmental benefits, *reversion*, or a transition back to agricultural production, eliminates the grass cover and environmental benefits generated through CRP (Dayer et al. 2018).

Study Approach

In order to understand the factors that catalyze the persistence of CRP grasslands after contracts end, we conducted a two-phase, multi-year social science study of landowners' experiences before, during, and after CRP in the southern Great Plains of the United States. This report presents methods, results, and recommendations from Phase II, which followed up on and further explored key findings from a mail survey conducted in Phase I (Barnes et al. 2020) through workshops with conservation practitioners and in-depth, qualitative interviews with landowners from the study area. Practitioner workshops provided depth of understanding and additional context for our survey results and directly informed the development of research questions and a guide for our in-depth interviews. The interviews then explored the drivers of landowner decision-making about post-CRP land use, with an emphasis on transitions to grazing and enrollment in other conservation programs – post-CRP land uses that provide enduring conservation benefits and are also likely to make financial sense for producers.

Methods

We conducted semi-structured, qualitative phone interviews with 20 landowners who own or manage fields that were formerly enrolled in CRP in one of 34 contiguous counties across five states (Kansas, Oklahoma, Texas, Colorado, and New Mexico). Interviews were semi-structured and covered the following topics:

- the history and condition of the former CRP field
- whether landowners tried to re-enroll upon contract expiration and why or why not
- how the land has been managed since exiting CRP
- the time and management actions needed to transition from CRP to the chosen post-CRP land use
- the biophysical and socio-economic drivers of post-CRP land use decisions
- why other potential post-CRP land uses had not been chosen

Additionally, interviews explored landowner perceptions of alternative uses for post-CRP land, including organic agriculture, wind and solar energy production, and carbon offsetting.

Interviews were audio-recorded, transcribed, and qualitatively coded to identify emergent themes under each of five research questions.

Results

We conducted interviews with 7 landowners from Colorado, 5 from Kansas, 4 from Oklahoma, and 4 from Texas. Of the landowners we interviewed, 8 were currently farming their former CRP land, 6 were grazing it, 4 were engaged in a combination of farming and grazing on different parcels of expired CRP land, and 2 had left their former CRP fields in grass before ultimately selling them.

(RQ1) Why do landowners decide not to re-enroll their expiring fields in CRP? The majority of the landowners we interviewed had explored CRP re-enrollment as the contracts on their properties were ending and were generally interested in continuing to participate in the program, but had ultimately chosen not to re-enroll their land. Our interviewees most commonly discussed 1) the program's current rental rates and 2) the requirements associated with making their land eligible for CRP under current sign-ups or managing the land in compliance with CRP rules once in the program as key factors in their decision not to re-enroll. Those who were completely uninterested in re-enrollment had often purchased or started renting the land while it was already in CRP, with the explicit intention to use the land for grazing or farming when the contract period ended.

(RQ2) Why are expired CRP fields in the southern Great Plains staying in grass? About half of the landowners we spoke with had left at least some of their former CRP land in the grass established through the program when their contracts expired, and most were using those restored grasslands as grazing land for cattle. Many of these landowners had integrated their former CRP fields into larger grazing operations and were grazing cattle on the land in rotation with a number of other fields. This transition to grazing was driven by 1) the low suitability of the land for growing crops, due to soil quality, slope, or landscape features that made it difficult to farm the ground; 2) concern for local and regional drought and soil erosion; and 3) operational conditions conducive for cattle, including access to drinking water, fencing, and proximity to other pastures. Identity, especially with a ranching culture, and personal connections to the land drove the decision to persist with grass cover for other landowners. Most interviewees had not cut hay off of their former CRP land since it expired, due to regional climatic conditions. A few had simply kept grass cover on their fields after their CRP contracts expired while they evaluated their land use options and waited for new CRP sign-ups to be offered.

(RQ3) Why are expired CRP fields in the southern Great Plains returned to cropland? The landowners we interviewed who had chosen to return their expired CRP land to farming most commonly described the high quality of the ground as a key factor in that decision, often noting that their former CRP fields probably should not have been enrolled in CRP at all, given their soil quality and suitability for farming. Reversion back to grain crop production was also driven by limitations in infrastructure for haying and/or grazing; without fencing and accessible drinking water for livestock, grazing was not an option. Additionally, proximity to other cropped fields emerged as a

key driver of reversion. When CRP fields are located in close proximity to other farmed fields, they are more likely to be broken back out again and integrated into the farming operation occurring on adjacent or nearby land. Nearly all of the landowners we interviewed who had reverted their former CRP fields to cropland indicated that they were implementing soil conserving practices on those fields, primarily no- or low-till agriculture.

(RQ4) Why are expired CRP fields not entering other conservation programs? When asked about other conservation programs as an option for their expired CRP land, most of the landowners we spoke with had not seriously considered enrolling their fields in programs such as the Conservation Stewardship Program or CRP Grasslands, due to their perceptions of 1) the associated restrictions on land use, 2) the relatively small financial compensation derived from those programs, especially compared to CRP, or 3) the fit of those programs for their land or operations. A number of landowners we spoke with had not really explored other conservation programs that may have been options for their expiring CRP land because they felt like their options were essentially to re-enroll in CRP or remove the land from the program and either graze or farm it.

(RQ5) What are landowner attitudes towards alternative land uses that might promote conservation and financial stability for producers? Building primarily from discussions in our Phase II practitioner workshops, we explored landowner perspectives on 1) installations for alternative energy sources; 2) payments for carbon sequestration or carbon offsetting; and 3) organic agriculture as options for former CRP fields. A number of landowners had direct experience with wind turbines, and those experiences, whether positive or negative, were key drivers of their interest in wind energy production as an alternative post-CRP land use. Many interviewees were unfamiliar with the premise of carbon offsetting programs or opportunities to be paid for carbon sequestration, but were generally open to the idea of receiving payments for carbon sequestration, if given the opportunity and more information about how it would impact both their farm revenues and land use options. Finally, none of the landowners we spoke with were particularly interested in or optimistic about prospects for organic farming on their former CRP land, largely due to a lack of markets and processing infrastructure for organic grain crops in their regions. The incompatibility between organic production and no-till or low-till agriculture was also key in limiting landowner interest in organic farming as an option for their former CRP land.

Discussion and Recommendations

Our conversations with landowners highlighted the intersecting biophysical, socio-economic, and institutional factors that shape decision-making about post-CRP land use in the southern Great Plains. In light of these factors, we make seven recommendations for the design and delivery of CRP that may promote the persistence of grasslands and associated environmental benefits after program participation ends.

- 1) **Consider how biophysical attributes of a field or farm associated with persistence might be incorporated into ranking metrics for CRP enrollment.** While the Environmental Benefits Index (EBI) used by FSA to evaluate offers for CRP enrollment includes an “Enduring Benefits” factor, this metric only accounts for the type of vegetation covered by the contract. FSA could consider how to incorporate other field- or farm-level attributes associated with persistence, such as the size, landscape features, and location of the field, into the EBI.
- 2) **Support the establishment of infrastructure needed to transition from CRP to sustainable grazing while fields are still enrolled in CRP.** Both water and fencing were critical resources for grassland persistence for landowners who had incorporated their former CRP land into a rotational grazing system when their contracts expired. To encourage the persistence of grasslands after CRP, FSA, NRCS, and partner organizations, including state agencies and NGOs, could widely promote existing cost-share programs for water and fencing and provide broader cost-share support for the installation of this infrastructure while fields are still in CRP.
- 3) **Continue to promote native grass varieties that provide high-quality forage for sustainable grazing systems.** Transition of former CRP land into a sustainable grazing system is one means to maintain the grasslands established through CRP and the associated improvements in soil quality, plant health, and drought resilience. FSA can continue to prioritize native grasses and those that simultaneously work well for wildlife, soil stabilization, and livestock, in order to promote conditions conducive to grazing and, thus, grassland persistence, after CRP.
- 4) **Engage landowners in long-term land use planning when CRP contracts are initiated and throughout the contract period.** FSA and those who provide technical assistance related to CRP could specifically discuss long-term land use goals with landowners in order to identify those interested in permanent retirement of their land from cropping and to encourage conservation practices and forms of mid-contract management that can support a successful transition to other grass-based land uses after CRP.
- 5) **Expand programs that support the transfer of CRP land to new landowners who are committed to grassland persistence or other land uses that retain the environmental benefits of CRP, and engage with new landowners when CRP land is transferred.** It would be valuable for CRP delivery personnel in local offices to connect with new owners to share information about available programs or technical assistance that could support persistence of grassland, or at least some conservation practices, on portions of the CRP field when it expires. FSA could also consider how to broaden eligibility for CRP Transition Incentive Program to include land that is sold earlier in the contract period or to individuals that do not qualify as new or socially disadvantaged farmers or ranchers.

- 6) **Increase internal and external understanding of the history, purpose, and implementation of CRP, and the importance of persistence as a program objective.** Our interviews revealed ongoing tension between the soil conservation and habitat conservation goals of CRP and misunderstanding about CRP’s history, purpose, and implementation. USDA could work to develop clear and concise messaging for landowners to improve understanding about these aspects of CRP, including the equal importance of wildlife habitat and soil erosion in the prioritization of land for enrollment in CRP’s EBI.

- 7) **Increase the capacity of CRP delivery personnel to communicate with landowners about land use options that support the persistence of grasslands and CRP’s environmental benefits.** USDA staff in county offices could play a larger role in connecting those who do not qualify for or are uninterested in re-enrollment in CRP with other programs in order to promote persistence of CRP’s benefits. Importantly, county-level personnel need to be equipped with tools and training that would help them clearly communicate with landowners about these options.



BACKGROUND

The Conservation Reserve Program in the U.S. Great Plains

The grasslands across the Great Plains of North America have been heavily modified by widespread conversion, primarily to cropland; consequently, less than half of the native prairie is still intact (WWF 2016). Losses in this temperate grassland ecosystem have been accompanied by increased soil erosion, degraded water quality, substantial carbon emissions, reductions in microbial and insect biodiversity, and the loss of grassland-dependent wildlife species (WWF 2020). In particular, populations of obligate grassland birds have experienced dramatic declines over the past 50 years, largely due to habitat loss (Rosenberg et al. 2019). Because about 90% of grasslands in the Great Plains are privately owned (WWF 2020), voluntary financial incentive programs that compensate landowners for practices that maintain or restore grassland vegetation have become key tools for conserving grasslands, the species that depend on them, and the ecosystem services that they provide.

The Conservation Reserve Program (CRP), a component of the federal farm bill, is the largest private lands conservation program in the United States, with over 20 million acres of land enrolled (FSA 2019). Through CRP, landowners receive an annual rental payment for establishing new vegetative cover, including grasses, forbs, shrubs, and trees, on land that was formerly being used for agricultural production (FSA 2019). With programmatic origins in governmental responses to the Dust Bowl of the 1930s, CRP was implemented with the primary objectives to control soil erosion and reduce production of surplus agricultural commodities (Coppess 2017; USDA 2018). Over time, the program's goals have broadened to explicitly and equally prioritize other environmental benefits, including improving air and water quality and providing wildlife habitat (Hellerstein 2017; USDA 2018). Additionally, program policies have recently been updated to enhance CRP's role in climate change mitigation through carbon sequestration (FSA 2021). Consistent with these goals, over the past 35 years, the re-establishment of grassland cover through CRP has contributed significantly to soil health, water quality, and the status of wildlife populations in the Great Plains (e.g., Pavlacky et al. 2021).

Conservation Persistence

Unlike conservation easements, which result in permanent land use change, CRP contracts are time-limited, lasting between 10 and 15 years. Critically, the contracts on over half of the land enrolled in CRP – almost 12.5 million acres – expired or will expire between 2019 and 2022 (FSA 2017). When their CRP contracts end, landowners decide 1) whether or not to try to re-enroll in the program, and 2) what to do with the field if they do not try to re-enroll or they are not granted a new CRP contract. Post-CRP land use broadly falls into two categories: *persistence*, which includes any land use that preserves the grasses or other vegetation established through CRP, such as



hay and/or grazing or enrolling in another land conservation program, or *reversion*, which means a transition of the field back to agricultural use and the removal of the grass cover established through CRP (Dayer et al. 2018). These land use decisions determine the durability of CRP's benefits for soils, water, and wildlife, as well as the efficiency of federal expenditures (Roberts & Lubowski 2007).

A rich literature on landowner decision-making has demonstrated that decisions about conservation on private lands are made in the context of specific and changing cultural, political, economic, and environmental conditions (Turner et al. 2014; Reimer et al. 2014; Swann & Richards 2016; Hendricks & Er 2018). However, much of the research on the drivers of landowner decision-making has occurred in the context of program participation and the initial adoption of conservation practices (e.g., Sorice et al. 2013; Prokopy et al. 2019). We know far less about the factors that encourage the persistence of conservation behavior or particular land uses after financial incentives end (Dayer et al. 2018; Reimer et al. 2014; Swann and Richards 2016). Greater insight into landowners' post-CRP land use decisions is essential for understanding the long-term conservation impact of the grasslands restored through the program and for designing and delivering CRP in a way that promotes enduring benefits for the land, people, and wildlife of the Great Plains.

A Two-Phase Study to Understand CRP Participation, Retention, and Grassland Persistence

In order to understand the factors that might catalyze the persistence of CRP grasslands after contracts end, we conducted a two-phase, multi-year social science study of landowners' experiences before, during, and after CRP in the southern Great Plains. Phase I, which was conducted from 2017-2019, included qualitative data collection through participant observation and interviews with landowners in the region (Steinmetz 2018), focus groups with current CRP contract holders, and a mail survey administered to landowners with current CRP contracts as well as those with contracts that had expired between 2011 and 2017 (Barnes et al. 2019; Barnes et al. 2020). Phase I of the study focused on why landowners participate in CRP; whether landowners are interested in and able to re-enroll in CRP; what happens to fields that are not re-enrolled in the program; and which factors drive the persistence of grass cover after CRP, even in the absence of CRP's financial incentive. Data from Phase I have been summarized in a study report (Barnes et al. 2019), published in the scientific literature (Barnes et al. 2020; Barnes et al. *in preparation*), and shared in multiple conference and outreach presentations.

This report presents methods, results, and recommendations from Phase II, which was conducted from 2019-2021. Phase II was designed to follow up on and further explore key survey findings from Phase I through workshops with conservation practitioners and in-depth, qualitative interviews with landowners from the study area. Practitioner workshops provided an opportunity to translate Phase I findings for those who work on CRP delivery and private lands conservation in the Great Plains, and to solicit feedback on remaining research needs that could be explored through additional qualitative social science (see Appendix A for more information about these workshops). Workshop conversations provided depth of understanding and additional context for our survey results and directly informed

the development of research questions and a guide for our in-depth interviews. Those interviews ultimately explored the transition of expiring CRP land to other land uses in further detail, with the underlying goal to understand how FSA and other partners can support both durable grassland conservation and livelihoods on private lands. We specifically focused on the factors that support or challenge transitions between CRP and sustainable grazing or other conservation programs – post-CRP land uses that provide enduring conservation benefits and are likely to also make financial sense for producers.

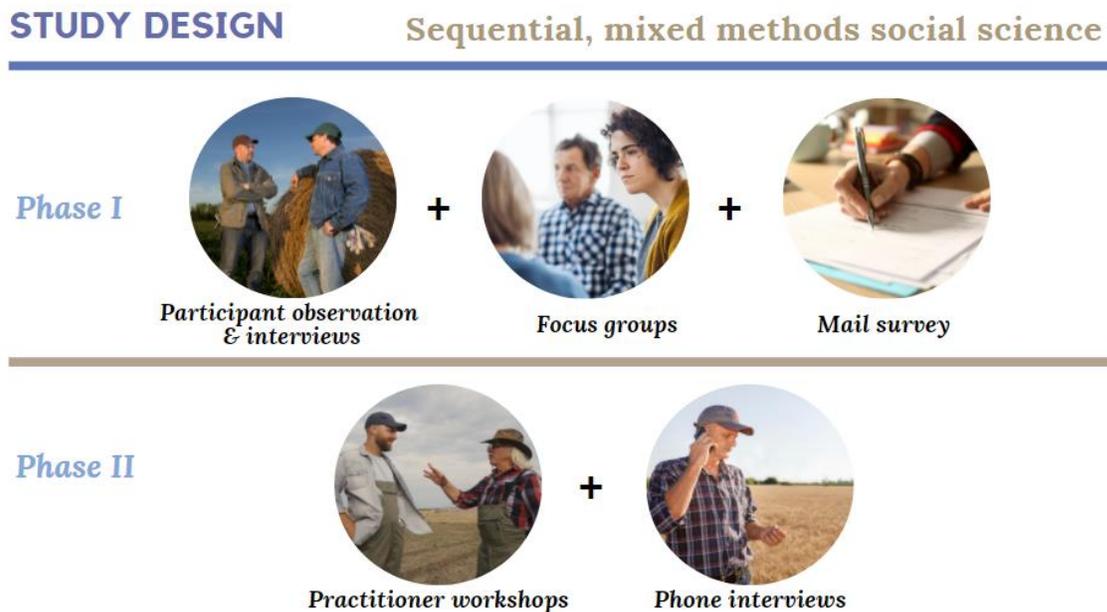


Figure 1. Overall study design for the project *Landowners and the Conservation Reserve Program: Understanding Motivations and Needs to Cultivate Participation, Retention, and Ongoing Stewardship*.

In what follows, we first summarize key insights from Phase I and the practitioner workshops conducted in the first part of Phase II, which together guided the development of research questions for our Phase II interviews. We then present an overview of the methods used in the landowner interviews, followed by results from that phase of qualitative data collection. The report concludes with recommendations for CRP design and delivery, which were co-produced with project partners at FSA, Bird Conservancy of the Rockies, and Playa Lakes Joint Venture and built upon our conversations with other practitioners and landowners in the study region.

Key Phase I Findings and Emergent Research Questions for Landowner Interviews

Re-enrollment. Our Phase I survey and focus groups found that interest in re-enrolling in CRP was high among landowners in the southern Great Plains. About 55% of survey respondents with an expired CRP contract had tried to re-enroll their expired fields in the program, and interest was even higher among landowners who were still in the program. Focus group participants discussed “staying in CRP as long as the program lives,” and over 83% of survey respondents with current CRP contracts

were ‘likely’ or ‘very likely’ to re-enroll (Barnes et al. 2020). However, the survey only evaluated interest in re-enrollment *given the same rental payment*. Many studies have identified the economic drivers of landowner participation in CRP (e.g., Hallerstein & Malcolm 2011), and our focus groups and ethnographic research during Phase I confirmed that decision-making related to CRP in the southern Great Plains is heavily influenced by CRP rental rates and commodity market prices (Barnes et al. 2020). Participants in our practitioner workshops discussed various approaches for improving the financial appeal of CRP, including allowing more haying and grazing on CRP fields to supplement lower payments; adopting alternative payment structures, such as longer contract terms or reduced payments for re-enrolled fields; and making adjustments to the bid ranking system so that highly erodible lands draw higher payments. The 2018 farm bill lowered maximum soil rental rates for CRP contracts, providing an important opportunity to explore the impact of these policy changes and other factors on landowners’ recent re-enrollment decisions. as needed.

→ *Why do landowners decide not to re-enroll their expiring fields in CRP? (RQ1)*

Persistence. Results from our Phase I survey indicated that the reported rate of persistence among landowners with expired CRP contracts was relatively high: around 66% of landowners reported either leaving their former CRP fields in grass or enrolling the majority of the field in another conservation program or easement. Additionally, among landowners with current CRP contracts, almost 55% of respondents indicated that they would be ‘likely’ or ‘very likely’ to keep their fields in grass if they could not re-enroll in CRP (Barnes et al. 2020). These rates of grassland persistence are higher than expected based on other studies of post-CRP land use across a variety of geographies, including both reported or actual post-CRP land use (Caldas et al. 2016; Hendricks & Er 2018; Morefield et al. 2016; Roberts & Lubowski 2007) and post-CRP land use intentions (Atkinson et al. 2011; Beutler et al. 1994; Gustafson & Hill 1993; Janssen et al. 2008; Johnson et al. 1997). However, the survey did not include more specific response options to clarify whether land that was still in grass had been left idle, used for haying and/or grazing, or something else. Twenty-five years ago, Skaggs et al. (1994) suggested that CRP would result in a broad transition of land use to grazing in eastern New Mexico and possibly throughout the region. Practitioners in our workshops were particularly interested in understanding the importance of grazing infrastructure (e.g., water and fencing) in whether land stays in grass or is broken back out, and discussed opportunities to provide cost-share support for this infrastructure, if it was needed.

→ *Why are expired CRP fields in the southern Great Plains staying in grass? How is that grass being used, and what conditions promoted grassland persistence? (RQ2)*

Reversion. While the majority of landowners with expired CRP contracts in our survey sample had kept their fields in grass, about 28% reported converting the majority of their former CRP field to crops (Barnes et al. 2020). The practitioners that attended our workshops were interested in more insight into the shared characteristics of lands that are reverted back to cropland. We know from our survey that the resources that characterize a given field are key drivers of post-CRP land use for many landowners (Barnes et al. 2019). In particular, landowners with expired CRP contracts most often

reported that regional weather, the soil fertility and physical features of a field, and access to water were important considerations in their post-CRP land use decisions. Participants in our practitioner workshops also wanted more information about how reverted fields are managed after exiting CRP, specifically whether or not environmentally beneficial practices are maintained and which crops producers plant on reverted land. Workshop discussions often turned to the changing face of farming, including the adoption of no-till agriculture and shifts in land ownership with an increase in absentee ownership and tenant farming. Our survey provided insight into the use of irrigation on these fields: the vast majority of reverted fields were being used for dryland cropping, while only a single individual reported converting their expired CRP field to irrigated crops (Barnes et al. 2020). The survey did not characterize other post-CRP land management practices employed by landowners, such as the frequency or type of soil disturbance or practices for pest or nutrient control. There is evidence from other studies that fields that are reverted to crops post-CRP are more likely than those that were never enrolled in the program to employ practices that conserve soil and water on working lands, such as terraces and contour farming (Jacobson 2014). It is unclear whether use of these practices after CRP is a product of field quality, landowner familiarity with practices promoted by government programs, or underlying stewardship motivations (Jacobson 2014). Our Phase II interviews provided an opportunity to explore factors at the field, farm, local, and regional level that encourage the reversion of CRP fields to cultivated farm ground, as well as how this reversion intersects with broader shifts in farming practices.

→ *Why are expired CRP fields in the southern Great Plains returned to cropland? How are those fields being used now, and what conditions promoted grassland reversion? (RQ3)*

Other conservation programs. Comparing the survey responses of landowners who held current CRP contracts and those whose CRP contracts had expired revealed substantial inconsistency between the apparent level of landowner interest in other conservation programs and actual enrollment in those programs after CRP. While almost 40% of landowners currently enrolled in CRP reported that they would be ‘likely’ or ‘very likely’ to transition to another conservation program if they could not re-enroll in CRP, only 5% of landowners with former CRP fields reported actually enrolling in these programs at the time of the survey, which was between one and seven years after their contracts expired (Barnes et al. 2020). Other research has similarly shown that former CRP fields across 12 midwestern states were only rarely enrolled in other conservation programs (Morefield et al. 2016). Practitioners in our Phase II workshops emphasized the importance of exploring why participation in other conservation programs lags behind interest in these programs in order to address any potential bottlenecks. Some studies suggest that awareness may be a key limiting factor for participation in other farm bill programs following CRP, as producers tend to be more familiar with CRP than other programs (Arbuckle et al. 2011; Reimer & Prokopy 2014). We have also hypothesized that limited enrollment may be due to the fact that many of the other programs offered by FSA, NRCS, and state agencies are not comparable to CRP in terms of program purpose, size of the financial incentive, and short- and long-term impacts on participants’ operations (Barnes et al. 2020). Through Phase II interviews with landowners, we could begin to understand any cultural, economic,

or institutional barriers that may be precluding the transition to other conservation programs following CRP.

→ *Why are expired CRP fields not entering other conservation programs? (RQ4)*

Alternative land uses for soil, water, and wildlife conservation. Based on focus group conversations in Phase I and the underlying goal to understand grassland persistence, our mail survey included five post-CRP land uses: 1) leaving the majority of the field in grass; 2) enrolling the majority of the field in another conservation program or easement; 3) converting the majority of the field to dryland crops or 4) irrigated crops; and 5) selling the majority of the field. Through our workshops, we heard about a number of other options for expiring CRP land that might be potential mechanisms for maintaining some of the environmental and habitat benefits of CRP vegetation while also offering producers needed financial returns once their annual CRP payments end. These options included payment for ecosystem services programs focused on carbon sequestration; wind and solar energy installations; and organic agriculture. Unlike solar or wind energy installations and carbon sequestration programs, a transition from CRP to organic agriculture would require breaking out the grassland established through the program. However, practitioners in our workshops discussed organic agriculture as a post-CRP land use option that may still represent an improvement for pollinators and other wildlife, given restrictions on the use of inorganic pesticides and herbicides and other associated management practices. Additionally, organic crops generally draw a price premium and may thus also represent an improvement over pre-CRP financial conditions for producers. While these land uses may simultaneously support conservation and sustain livelihoods (albeit in different ways and to varying degrees), more information is needed on landowner attitudes towards and interest in these options. Through our follow-up interviews with landowners, we explored landowner perspectives on carbon offsetting, wind and solar energy production, and organic agriculture as options for expired CRP land, both generally for their regions and specifically for their former CRP land.

→ *What are landowner attitudes towards alternative land uses that might promote conservation and financial stability for producers? (RQ5)*

METHODS: LANDOWNER INTERVIEWS

Sampling and Recruitment

We conducted semi-structured, qualitative interviews with landowners who own or manage fields that were formerly enrolled in CRP in one of 34 contiguous counties across five states (Kansas, Oklahoma, Texas, Colorado, and New Mexico) in the southern Great Plains of the United States (Figure 2). Participants were randomly sampled from a database generated by the Farm Service Agency of individuals who had acreage enrolled in CRP in 2014, but no acreage enrolled by 2020. All recruitment and interaction related to the interviews was conducted remotely due to the COVID-19 pandemic, and all study methods were approved by the Virginia Tech Institutional Review Board (Protocol #18-888).

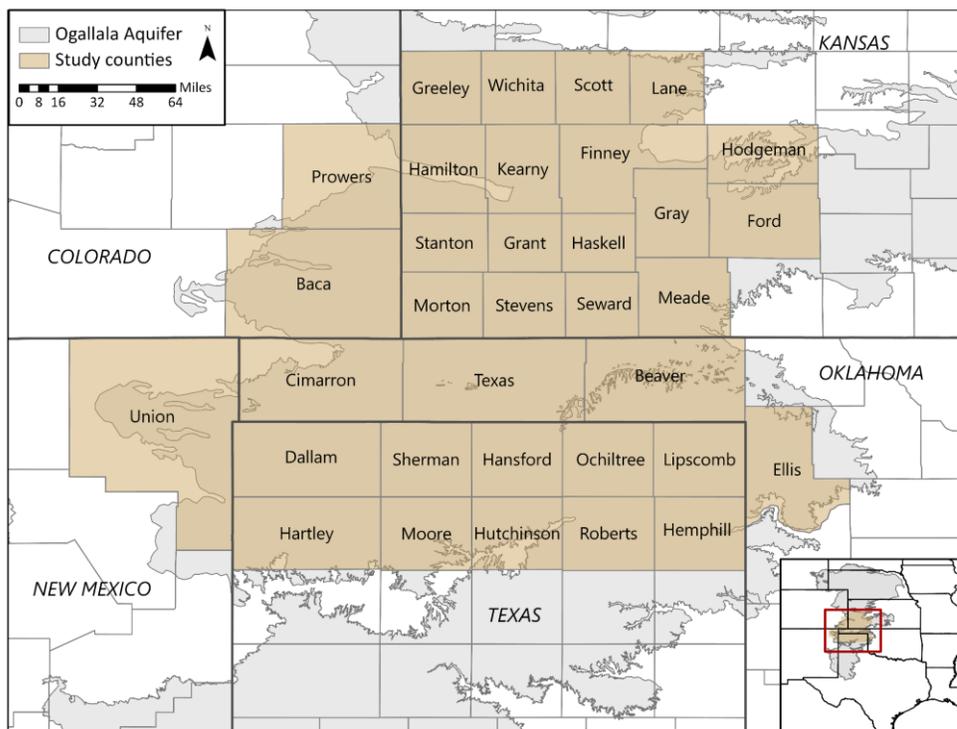


Figure 2. Study counties in the southern Great Plains.

We initially contacted a random sample of 130 potential interview participants (30 each from Colorado, Kansas, Oklahoma, and Texas, and 10 from New Mexico) by email with information about the study, an interview request, and instructions for signing up for an interview using an online scheduling platform (Calendly.com) or by replying to the email. Non-respondents received up to two follow-up emails. Email-based recruitment is known to have limitations for certain target audiences, and we were unable to recruit any interview participants using this approach. We thus switched to phone-based recruitment, using contact information included in the FSA database. We



randomized the order of contacts listed in the FSA database and moved down the list, calling each number and documenting the outcome of the call (e.g., bad number, no answer, interview scheduled, interviewed). We only called contacts for which a phone number and an individual's name (as opposed to a corporation or other organization) were included in the contact information in the database. If the call was unanswered, a voicemail message was left only if the voicemail greeting was personalized and the name given matched the name listed in the FSA database. Potential participants were called up to two times, at least three days apart. We called 271 contact numbers and interviewed 20 individuals.

In initial phone conversations, the interviewer 1) described the purpose of the study; 2) confirmed that participants owned or managed fields that had expired from CRP; 3) explained study and data collection procedures, including how the data would be used and an assurance of confidentiality; and 4) acquired verbal consent to participate in the study and to be audio-recorded. The majority of interviews were conducted immediately following phone recruitment; some were scheduled and conducted at a later time.

Data Collection and Analysis

Interviews were semi-structured and followed an interview guide (see Appendix B for the full Interview Guide). Interview questions covered the following topics:

- the history and condition of the former CRP field
- whether landowners tried to re-enroll upon contract expiration and why or why not
- how the land has been managed since exiting CRP;
- the time and management actions needed to transition from CRP to the chosen post-CRP land use
- the biophysical and socio-economic drivers of post-CRP land use decisions
- why other potential post-CRP land uses had not been chosen

Additionally, interviews explored landowner perceptions of alternative uses for post-CRP land, including organic agriculture, wind and solar energy production, and carbon offsetting.

All interviews were conducted by phone by the lead author between July and September 2021 and lasted between 6 and 56 minutes, with an average of 30 minutes. Interviews were audio-recorded using the Rev Call Recorder iPhone app (version 2.6). Audio recordings were uploaded to Otter.ai (version 2.0), machine-transcribed, and then corrected for accuracy by an undergraduate Research Assistant using the online Otter.ai transcript editing platform. Transcripts were then qualitatively coded by the lead author using Dedoose (version 9.0.17), a Computer-Assisted Qualitative Data Analysis Software (CAQDAS). Transcripts were coded by research question using inductive thematic analysis, through which emergent themes were identified.

RESULTS

Interview Participants

We conducted interviews with 20 landowners, including 7 landowners from Colorado, 5 from Kansas, 4 from Oklahoma, and 4 from Texas. Only one county in New Mexico was included in the study area, and only 10 landowners with expired CRP fields were in the provided FSA database. Because these 10 landowners were all included in the first sample and had been contacted three times by email, we did not contact them further by phone. Thus, no landowners from New Mexico were included in the final study sample. Additionally, because we only called phone numbers that had an individual listed as the point of contact for the CRP contract, the landowners we interviewed generally spoke from the perspective of individuals, families, or partnerships, rather than corporations or other types of organizations that hold CRP contracts. Of the landowners we interviewed, 8 were currently farming their former CRP land, 6 were grazing it, 4 were engaged in a combination of farming and grazing on different parcels of expired CRP land, and 2 had left their former CRP fields in grass before ultimately selling them.



(RQ1) Why do landowners decide not to re-enroll their expiring fields in CRP?

The majority of the landowners we interviewed had explored CRP re-enrollment as the contracts on their properties were ending, and they were generally interested in continuing to participate in the program. However, they had chosen not to re-enroll some of their land after CRP because of 1) current rental rates or 2) program requirements, either for re-enrollment or ongoing compliance while in the program. Those who were completely uninterested in re-enrollment had most often purchased or started renting the land while it was already in CRP, with the intention to use the land for grazing or farming when the contract period ended. A couple of landowners, though, described removing their land from CRP voluntarily and not considering re-enrollment due to the hassle of managing CRP land, particularly in the context of their larger operations. Although we primarily discussed their expired CRP land, a number of interviewees mentioned that they had chosen to re-enroll other CRP fields at other times.

Current rental rates. When asked why they ultimately chose not to re-enroll their properties in CRP, our interviewees most commonly discussed the program's relatively low current rental rates as a key factor in their decisions, stating something along the lines of "[CRP] just doesn't pay" (Landowner 9, KS). A landowner in Oklahoma, who used his expired CRP field for both grazing and hay, had looked into re-enrolling the land in CRP as his contract was expiring, but, given low prices, had decided "it just wasn't quite worth what they were willing to pay... We just needed the grazing, and we felt like it was more valuable for grazing than it was for CRP" (Landowner 13, OK). Another landowner in Oklahoma, who had decided not to re-enroll and instead use his land for grazing, summed up his decision-making as "follow the money"

(Landowner 14, OK). He went on to explain that CRP rental rates had declined to the point that grazing was a better financial decision at the time that his contract was expiring: *“I can make more money [grazing] on it than I can enrolled in CRP... When we first put it in there we could make more with the CRP payments than we could with grazing, but the money was higher”* (Landowner 14, OK). Many producers had been receiving CRP payments that exceeded what they would receive with current rental rates and had decided to use the land in other ways in order to maintain or increase their revenues. A landowner in Colorado explained that while he had offered some of his former CRP land for re-enrollment in the last sign-up, his family members had opted to keep their land out of CRP and graze it instead. He said, *“The price got down to under 20 bucks an acre, and they said, ‘forget it, we’re going to use them’”* (Landowner 5, CO). Another landowner specifically described how reduced rental rates have stacked on top of other economic conditions, including inflation and the increased cost of living, to make CRP enrollment unattractive:

“The old enrollment was \$45 to \$40 an acre. That would buy that many dollars worth of stuff. Now, that much money will buy \$20 worth, and they lowered the rate, so you’re getting about a fourth of what your actual buying power was. So, I’m not a bit interested in their deal.”
(Landowner 17, TX)

One landowner had been grazing some of his expired CRP land for the past year, while watching rental rates and waiting for them to improve. When rental rates were increased in the last sign-up, he decided to re-bid his land for enrollment: *“I didn’t try last year because the price wasn’t good enough, so I waited for this new sign-up... They just jacked the price up 10 bucks an acre”* (Landowner 15, CO).

The influence of rental rates on re-enrollment is connected to consistent complaints from interviewees that higher quality farm ground draws a higher CRP rental rate, both within local areas and across the country. A landowner in Colorado who had reverted some of her former CRP land to grain crops and had been grazing other former CRP fields, said:

“We did consider putting it back in [CRP], but it just didn’t pencil out... From our experience here in this county, they give you more points for better ground. So the fields that needed to be put back in... the lower quality ground is stuff that you got lower scores for, and the payments on it were ridiculously low. So we just kept some of it in grass.” (Landowner 6, CO)

She went on to describe the experience of her neighbors as well, who had been farming land that they would have liked to enroll in CRP and re-establish as grassland.

“I’m thinking of a particular piece of ground that should be put back into grass, but because the price was so low, [our neighbors] just didn’t do it... There’s gullies that run through it, and it’s just hard to farm, you know. The top soil’s not very thick, and it just didn’t farm very well...but they have to make something from it... We always thought that was the whole reason [for CRP], was to put questionable ground out of production. But they didn’t prioritize the lower quality land - the marginal land - and they gave higher prices to the better ground that raised better crops and took that out of production. Well, that just seems backwards to us.” (Landowner 6, CO)

A landowner from Kansas echoed these sentiments and further explained the economic relationship between CRP rental rates and government payments related to crop insurance or disaster assistance programs. He discussed how farmers will “*take a gamble on dryland wheat*” when CRP rental rates are low, resulting in increased risk for crop insurance programs and higher government expenditures than if those fields had just been enrolled in CRP.

“[A] point of contention [I have] with CRP is this: they do not bid based on land quality. The higher quality land gets a higher bid rental rate. It should be the other way; the higher quality land should be producing a crop, and the low-quality land is going to contribute to more risk associated with crop insurance... more government payments from crop insurance or disaster payments. That should be the land that's incentivized to enroll into the CRP programs, not the good soil. The good soil ought to be in cultivation... I live here and watch this, and I just shake my head because it's backwards.” (Landowner 7, KS)

Still, other farmers explained that producers are willing to re-enroll their properties at reduced rental rates under some conditions. One Kansas farmer explained that CRP payments, even if low, may make more financial sense than trying to combat erosion on sloping ground:

“You know, a lot of times, it depends on not only the soil types, but also... erosion and the way the field lays. For example, this is pretty nice, level, flat ground. East of here, I have some ground that's in a really hilly and rolly type situation, and soil types aren't as good as what we're talking about here, so a person may take a lesser rental rate to keep that in CRP... Still not a good rental rate, but probably better than trying to mess with erosion and things like that.” (Landowner 8, KS)

Other interviewees discussed combining their CRP rental payments with income or financial benefits derived from other compatible land uses, particularly hunting. One landowner in Kansas, who had re-enrolled some of his fields and removed others for both grazing and farming, explained that he leaves some ground in CRP even when the rental rates are low in order to capitalize on hunting opportunities: *“If you can get the right bid on your CRP, you know, it pays good, too. But if the ground is a little light, it's better to leave it in CRP. The hunters like it...the bird hunters, pheasant hunters” (Landowner 9, KS)*. He said he had looked into participating in his state’s program for hunting access on private land and considered it to pay well, but in the end just decided to reserve the land for a group of out-of-state hunters with whom he had formed personal relationships with over time: *“they bring me pecans, plus other stuff” (Landowner 9, KS)*.

Program requirements. While re-enrollment decisions were primarily driven by economics for some landowners, others focused more on the requirements associated with making their land eligible for CRP under current sign-ups or managing the land in compliance with CRP rules once in the program as key reasons that they chose not to re-enroll their land. When asked why he had returned his former CRP land to cultivation instead of re-enrolling, one farmer in Colorado explained that program requirements can be costly, affecting net revenues from CRP. He said,

“The payments on CRP. And the other thing is that when we get into what they call midterm management... Depending on what they decide for midterm management, they make us disk it

or mow it. Then they try to reinvent the wheel on grass seed, and everybody's got a whole different idea, and nine times out of ten, they're wrong... A few years ago, they made us plant for pollinators, which was basically flowers. Well, that might work in eastern Oklahoma, in Kansas, on East, and across the Midwest because of the rainfall. In our area, 90% of them never come up... they never did. So sometimes we're asked to do things that really don't make much sense, and if they start making us pay a lot of money to do that, then that affects the bottom line... and we will not be re-signing.” (Landowner 3, CO)

Another interviewee from Kansas similarly explained that he did not try to re-enroll his relatively small CRP field because the payment on that field was not worth the foregone autonomy to use the land as he wanted or the effort required to manage it in compliance with program rules.

“I'll tell you, the reason I didn't re-enroll is this 480-acre farm had 20 acres of CRP, and I wanted to use it for grazing in the wintertime... I wanted to have access to the whole farm. If it's in CRP, I can't graze it. I've got to manage it totally different than the rest of the farm. I've got to somehow keep livestock off of it, can't drive on it, can't stack hay on it. So, I had 20 acres of land that, to me, was a bigger hassle than just doing nothing with it, if that makes sense. I mean, it was paying me \$35 or \$36 an acre a year to do nothing with it, but it's still a bigger hassle. The 700 bucks out of a farm that may be generating into the tens of thousands if it had animals on there... It was too big a hassle to stay off of that 20 acres.” (Landowner 7, KS)

Other landowners had decided against re-enrollment solely because of the inconvenience of managing CRP fields, particularly for parcels that were small in relation to the overall size of an operation or situated adjacent to other fields that were managed very differently. One landowner in Kansas, who chose not to re-enroll his field corners that were expiring from CRP, said, *“It was such a minor part of the farm. It wasn't about income. Sometimes it's about keeping a farm better looking, or doing what is more convenient. The reporting was a nuisance.” (Landowner 20, KS).*

We also spoke to one landowner in Colorado who had removed his field from CRP after 20 years and put it back in cultivation, due to concerns about the risks of prescribed burns on the property for a neighbor's farm. He said, *“I just did not want to re-enroll it because of the hazardous issues with doing the prescribed burning to maintain it” (Landowner 18, CO).* He explained that his CRP field was located next to a tree row, also known as a shelterbelt, that was planted in the 1930s to control wind erosion, and that his neighbor's farm and home were immediately on the other side of those trees. Particularly in wet years, the trees produced abundant seed that would blow into his CRP field. He said,

“We were fighting the trees all the time. The only way we could really manage the CRP was by burning. That's the way they want to do it in Kansas, in that area, is by burning. I did a lot of prescribed burning [professionally], and I'm aware of how easy it is for a prescribed burn to get away and to cause wildfires. And I just couldn't stand the burning of this field right next to that shelter belt and this guy's farmstead... I just decided it was better to farm it. It was okay farm ground. It wasn't good - it's hilly and sandy... but it raises pretty good crops now after being 20 years in CRP.” (Landowner 18, CO)

(RQ2) Why are expired CRP fields in the southern Great Plains staying in grass?

a. How is that grass being used?

Grazing. Half of the landowners we spoke with had left at least some of their former CRP land in the grass established through the program when their contracts expired, and most were using those restored grasslands as grazing land for cattle. We asked those who were using the field for grazing about the details of their grazing operations, in particular, the use of rotational grazing. Many landowners had integrated their former CRP fields into larger grazing operations and were grazing cattle on the land in rotation with a number of other fields. Speaking of one of her former CRP fields that is now used for grazing, a Colorado landowner said: *“We rotate it in and out. We have our herd cut up into about four and just rotate them in and out of different fields. [Our CRP fields] joined the rotation this spring”* (Landowner 6, CO). However, another landowner from Colorado explained that water limitations present a challenge to rotational grazing in his area:

“They're really pushing the rotational grazing, and rotational grazing can be great, but if you're limited on water, and you try and congregate a whole herd of cattle into one water source, it just backfires. We tried it on some fields, and we cannot supply enough water to that tank for too many cattle when you only have one water source. There's just not enough volume of water for that many cattle. So we don't do the holistic grazing deal. We do move cattle around maybe three tracks of grass a year. Having said that, most of us take our cattle off the ranches completely, say like in October, and go to corn stocks in Kansas. We've been doing that for 12 years, or in some cases, more than that. We just found it's cheaper to haul the cows to the feed than bring the feed to the ranch. Plus, it improves our grass quality quite a bit.” (Landowner 5, CO)

A number of other ranchers similarly discussed pulling cattle off of their grazing lands completely when necessary, and either moving them to other locations or taking advantage of emergency grazing on lands that were still in CRP. One Colorado landowner had used her CRP fields for grazing while they were still in the program as a form of mid-contract management, but said that *“this is the first time we've ever gotten to use it in the spring”* due to a combination of restrictions on grazing CRP fields until after the bird breeding season and rainfall. She explained: *“they don't let you use [CRP fields for grazing] until July because of the bird breeding season; by then, it's already hot and dry and not very palatable”* (Landowner 6, CO). Discussing what she had to do make her former CRP land suitable for grazing, she further explained that the palatability of CRP grasses depends heavily on rainfall, in addition to the season:

“This year...we've had quite a bit of rain. But a lot of years, you will have to put protein blocks or protein tubs out there to encourage them to stay [on the CRP grasses] because it will be so dry, and it's not very palatable sometimes... The seed that they encourage you to plant is an early green up. It greens up real early, and then it turns brown during the heat of the summer.” (Landowner 6, CO)



Other ranchers described how the seasonal palatability of some of the grasses planted through CRP necessitated rotational grazing:

“I rotate [the cows] lots... The CRP ground out here is not any good to graze through the winter. So, you just kind of graze it in the summer, depending on the rain... They're just pretty low-quality grasses, usually, especially in winter... If it doesn't rain out here, you have to ship the cattle off... or if they offer the emergency grazing on the CRP, that's a good deal, usually.”
(Landowner 15, CO)

Haying. While grazing was by far the most common post-CRP land use on fields that had remained in grass, some interviewees also discussed haying the land that had formerly been in CRP. One rancher in Oklahoma said of his former CRP land: *“It's grass and ranch land. We graze it, and then also we swap it for hay”* (Landowner 13, OK). He explained that the fields were mostly planted to native grasses that were good for both grazing and haying. A ranching family in Texas had been using one of their former CRP fields exclusively for haying, even though the ground was likely suitable for ranching or farming:

“We have some [land] that hasn't been in CRP for six or seven years, and we've been cutting it for hay; that's a good option as well. Just because there's good grass there, but we've never grazed it or anything, we just keep the cattle off of that one... It's my sister's ground, and so she's kind of decided that she didn't want to put it back into CRP, so that was her option... It's right next to my field that's tillable, but she didn't want to do anything with it right now.”
(Landowner 11, TX)

Another rancher in Kansas, whose operation is divided between ranching and cropping, had cut hay off of his former CRP, but only rarely. He explained that he used haying principally as a management tool, rather than as a source of additional income or food for his cattle:

“Since it's expired I have cut hay off of it twice, but that grass is really not the most palatable for cows. I did it mainly as a management practice, and then to be able to have some extra hay if we needed to bed cows in the wintertime... We had a wet year, so it was really big, and I bailed it to have some bedding in the event that we get snow, and I need to bed some cows down. It's fairly inexpensive hay.” (Landowner 7, KS)

All of the other ranchers we spoke with only described using their former CRP land for grazing, without the added component of haying. Many of them mentioned that haying was not a viable option in their area. One Colorado landowner, whose former CRP land was still in grass, said, *“We don't have haying here. We could pasture it, but we don't have hay.”* (Landowner 4, CO). A farmer in Colorado, in describing why he had converted his CRP fields to grain crops rather than grazing or haying them, further explained that options for haying were constrained by limited regional rainfall:

“In Southeast Colorado average rainfall is 15 to 16 inches... Haying is probably an option once every three to five years at best - just once in that period of time. Grazing, you could graze every year. But we're not like from eastern Oklahoma to Kansas and Missouri and going east, where they get enough rainfall that haying is a substantial part of the mix. It isn't something that you could readily rely on. Some years we can, but that is not often.” (Landowner 3, CO)

Other grassland. A few of the landowners we spoke with had left their fields or portions of them in CRP grasses while waiting to re-enroll the property in CRP or before selling it. Three different landowners explained that because of the timing of their contract expiration and CRP enrollment windows, some or all of their former CRP land had been left in grass while they evaluated their options and waited for new sign-ups to be offered. As one Colorado farmer said:

“Rather than going ahead and plowing them, we decided to see what we'd reapply in January, which we did. But then they... shut down all those programs, and we had to go back and re-sign up. So, by this October, if... it doesn't look like there is going to be any opportunity to get them in then, yeah, we will start a tilling program. First thing we do is kill the grass, and then we'd start a tilling program.” (Landowner 3, CO)

b. What conditions promoted grassland persistence?

In general, the decision to keep the vegetation established through CRP on the landscape was primarily related to 1) the marginal nature of the ground for farming; 2) dry climatic conditions and concern with preventing soil erosion; 3) landscape and operational conditions that made the field conducive to grazing; or 4) rancher identity and personal connections.

Marginal ground. Most commonly, landowners described maintaining grass on their fields “because it was erodible.... It's more stable as grass” (Landowner 13, OK). One landowner in Kansas who has been grazing his expired CRP land, said:

“Out of the 20 acres [we had in CRP], there's probably 8 to 10 that I've contemplated putting back into proper production. But there's like half of it that I can tell from the soil type that it won't be something that needs to be farmed anymore, so I just leave it in grass. I'll have less trouble with it and CRP than I would if I broke it out and farmed it again.” (Landowner 7, KS)

A Texas landowner who returned most of his former CRP ground to cultivation similarly emphasized the importance of soil quality in grassland persistence following CRP. He explained:

“We had good ground and we had bad ground... There is some real poor, sandy soil that needs cover on it, and that Old World bluestem is still on those quarters, so they're in pretty good shape.” (Landowner 12, TX)

Landowner comments about the role of field conditions in their post-CRP land use decisions most often related to soil type and quality, but other factors, particularly the slope of the land and landscape features that made it difficult to farm the ground also shaped whether fields had been left in grass. One landowner in Texas had enrolled the corners of his irrigated circles in CRP as well as some of his farmland that was characterized by a 1% to 3% slope. When his land did not qualify for re-enrollment, he returned some of it to cultivation, but left the sloped land in grass and has been using it for grazing, even though the soil quality was conducive for farming. Although he would like to re-enroll some of those sloped fields in CRP, he explained that they would stay in grass, even if he cannot get them back into the program:

“This one's really good. It's a silt loam, so it's really good for farming. You raise good crops, and it does well. So, it's just the slope that made it difficult. Yeah, that 1% to 3% slope in those areas

was the problem... When we were farming it, we would have wash outs so big that it was not good. [The grass] really has helped a lot with holding that ground in place, and keeping it where it should be... If we can get it back in [to CRP], we'll get it back. If we can't, there are some [fields] that we will just leave [in grass] and let the wildlife grow and let the erosion stop.”
(Landowner 11, TX)

Dry climate and drought. For some landowners, their decision to keep their expired CRP fields in grass was principally driven by their concern for local and regional drought and soil erosion, and they were unwilling to revert their fields to agriculture, even if it made financial sense. A Colorado landowner, who was now grazing expired CRP land that had been farmed and enrolled in CRP by the previous owner, said:

“To me, dryland farming in this area is a poor practice... it doesn't matter how good you farm. The best farmers in the county - eight years ago, all their fields were blowing, you know, and it just made a huge mess. So, I'm never gonna farm... It's just too dry. If it's all grass, it won't blow, even if there is no rain.” (Landowner 15, CO)

Another landowner in Colorado, whose expired CRP fields were currently idle but had recently been offered for re-enrollment and would be sold next year, felt similarly about the importance of maintaining grassland vegetation on the land, given dry conditions on the prairie:

“Whether we got a contract or not, I would have not plowed up the CRP. I would have had someone pasture it or try to get it in the program again and again. We would not have plowed it up. That's probably not a good financial decision, but we were not going to plow up our CRP... We don't need to be making more dust in the air. We don't need to be farming the prairie. That's my personal opinion. We wouldn't plow it up because we need more ground in CRP or some kind of program. We have a drought in the west.” (Landowner 4, CO)

For a couple of landowners, regional drought drove the decision to use the land rather than re-enroll it in CRP. One landowner explained that at the time when her CRP contract was expiring, the region was experiencing deep drought, and those conditions were important in her family's decision not to re-enroll in CRP and to use the land for grazing cattle instead. She said:

“[The drought] did help make the decision [to stay out of CRP and graze the land], because we were needing to use it... When the CRP came out, it was just at the time where we were having to make the decision whether to sell our cows, because we didn't have anything for them to eat. So when we took the CRP out, that was the decision... Our other pasture land was just eaten off; the cows had already eaten it.” (Landowner 6, CO)

Operational conditions conducive for cattle. All former CRP fields that were now being used for grazing were not irrigated, but had water for livestock provided by wells, water lines, and tanks or natural sources of water, including water runoff from terraces. Additionally, all of the landowners we spoke with who had transitioned to grazing on their former CRP fields had some kind of fencing in place to control the movement of cattle. For many, their properties were already fenced while those fields were enrolled in CRP, often to keep livestock off of those fields in compliance with CRP rules,

while others had started using temporary, electric fencing after CRP. In addition to this infrastructure for ranching, the proximity of CRP fields to existing pasture or grain crop food sources was also a key factor in their post-CRP use for grazing. Many landowners discussed simply adding their former CRP fields to existing grazing systems or mixed agriculture and grazing systems to expand the amount of land they had available for cattle.

“The cattle are on there, mainly because it's right next to a pasture anyway, and so we just open that up, so the cattle have more grazing area. We don't put very many out there, usually about 100 head on 140 acres. They're pretty much there year-round; we have a pond out there.”
(Landowner 11, TX)

One landowner in Kansas had integrated his former CRP fields into a mixed agriculture-ranching system, in which he grew irrigated corn for livestock feed and dryland wheat, and had a ranching operation. He used the former CRP land to keep his cattle in close proximity to his wheat fields, which the calves grazed once they were weaned:

“The calves use that prior CRP ground as grazing, bedding, and we feed out there. I mean, I've got a water tank, a buried water line out there and a water tank. So it is a neutral area for those animals to be in that I don't feel like is doing harm to the land, and it's not hurting the other farm ground around there.” (Landowner 7, KS)

Identity and personal connections. A few interviewees explained that their reasons for keeping the land in grass following CRP were primarily related to their identity as a rancher or their personal connections to the land, rather than factors related to field quality. When asked why they chose to use their fields for ranching rather than reverting the fields to grain crop production after CRP, some landowners responded simply: *“I just graze it because I run cows, and I'm not gonna farm”* (Landowner 15, CO), or *“I'm a cattleman, and I run cattle”* (Landowner 17, TX). Both of these landowners had purchased the land when it was already enrolled in CRP, but described the fields as suitable for farming and not highly erodible. Their decision to graze the land rather than convert it to farmland was simply a product of their existing operations, which were solely dedicated to ranching. A couple of interviewees explained that CRP had provided an opportunity for them to transition away from farming marginal ground by funding the establishment of grasses that would support cattle after their participation in the program ended. As one Colorado cattleman said:

“Southeast Colorado can be kind of tough getting rainfall. A lot of it is marginal farmland... I'm more of a cowboy at heart. Getting out of farming and doing more of the cattling appealed to me. \$40/acre, in the beginning, was pretty good money. We chose some grasses having 10 years ahead of us, thinking we don't want to farm this when it comes out. We were looking for more palatable grasses.” (Landowner 5, CO)

Another interviewee described growing up on the land his father had previously enrolled in CRP. Unlike the other landowners we spoke with, this landowner worked off-farm and did not rely on the land as a source of revenue. He inherited the land a few years after the CRP contract expired and ultimately sold it, but in the meantime had decided to leave the field in grass and *“let nature take over and try to help it along”* by establishing food plots for wildlife, especially migratory birds. He explained:

“That's one of the last properties that my father owned... I grew up farming it... I would go out there on the weekends and just keep it clean. It was just a place for me to go, you know, just go be outdoors and that's it... it was my recreation. It was mostly just me picking up trash and keeping weeds mowed and keeping it looking nice... I liked it the way it was. For me, it was more of an emotional attachment to the land. I wasn't there to try to make money. It was a place I could go and meditate and be around wildlife.” (Landowner 2, TX)



(RQ3) Why are expired CRP fields in the southern Great Plains returned to cropland?

a. How are those fields being used now?

No-till agriculture. Nearly all of the landowners we interviewed who had reverted their former CRP fields to cropland indicated that they were implementing soil conserving practices on those fields, primarily no- or low-till agriculture. When asked about any conservation practices that had been implemented on her land, one interviewee from Colorado said that on their former CRP fields, which had been reverted to cropland, *“we have been trying to spray instead of work the ground and just, you know, minimal farming. Just trying to do it without working the field too hard”* (Landowner 6, Colorado). Landowners who were leasing their former CRP land to others for farming generally said they left management decisions to their tenants, but they consistently mentioned that their tenants were *“good farmers. They use minimum till, leave as much crop residue as possible, and plant in the stubble”* (Landowner 18, CO). Another landowner from Oklahoma explained that although he had a bottom line to meet, the practices used by tenant farmers shaped who he chose to farm his land, and he tried to select farmers who would implement practices that minimized soil disturbance:

“Erosion factors into the tenants we choose. Unfortunately, erosion doesn't make our payments, or lack thereof doesn't make our payments. I wish we could solely make decisions based on that, but we try to get farmers that farm in such a manor to minimize erosion.” (Landowner 16, OK)

Many farmers also described having used no-till practices when transitioning their former CRP fields back to cultivated land. They described using chemicals in combination with new equipment that makes it possible to chop up long grain stalks - or in the case of former CRP land, grass - and leave that material on the surface *“for moisture retention and erosion”* (Landowner 8, KS). One Kansas farmer who had removed his land from CRP because of the hassle of program requirements, said, *“In the no-till, we just sprayed [the grass] and started planting [grains]”* (Landowner 20, KS). Others, however, discussed having to till their former CRP land, even though they had adopted no-till agriculture on their other fields. For example, one farmer from Colorado explained:

“There's various forbs in there that chemicals will not kill, so you have to use mechanical tillage to kill them - like cactus, yucca. Those are very hard to use chemicals to get rid of. They are just a natural part of the range” (Landowner 10, CO).

A few landowners specifically discussed the benefits they had seen from adopting no-till practices on their fields. Describing his move to no-till practices, one Kansas farmer said:

“We just try to conserve as much moisture as we can through not opening the ground up or tilling the ground. It makes a world of difference... We have some neighbors that farm conventionally, and you can tell, just any little dry spell, you know, the crops start to change and wither away. If you got no-till, it may hang on for another two or three weeks. If you get rain in the meantime, well, you're just that much better off.” (Landowner 9, KS)



b. What conditions promoted grassland reversion?

High quality farm ground. The landowners we interviewed who had chosen to return their expired CRP land to farming most commonly described the high quality of the ground as a key factor in that decision. In fact, our interviewees consistently described breaking out former CRP fields that they felt should not have been enrolled in CRP at all, given their soil quality and suitability for farming. We interviewed one farmer from Kansas who was renting a former CRP field from a retired farmer. The owner had decided not to re-enroll the land in CRP because of the low rental rates, and the interviewee (and tenant) explained that he had rented the land and broken it out because of the “*quality of the ground*” (Landowner 1, KS). He said:

“It's tabletop flat. For the area, it's really good ground. It's some of the better dryland that I have... It was really good ground and probably never should have been put in [CRP] in the first place... It was just the only piece that wasn't irrigated. At the time, I was early 20s, ambitious, and decided to break out some grass.” (Landowner 1, KS)

Another Kansas farmer had purchased his former CRP land when it was already enrolled in the program and “*had good grass on it*” (Landowner 1, KS). He had broken some of the expired CRP land out for farming, and kept some in grass for ranching. He said of the ones that he broke out:

“Well, it was too good of ground to just be in grass. Even if you could pasture it, it had been farmed before, and we have ground right beside it, which is the very same ground that the CRP was in, and so we knew what we could produce on it. And it would produce more income than what CRP does.” (Landowner 9, KS)

Limitations in infrastructure for haying and grazing. Landowners who discussed reverting their CRP fields back to agriculture generally did not have water sources on their fields, other than “*what Mother Nature will let us have*” (Landowner 9, KS). When asked about the factors that drove the transition of his former CRP field back to grain cropping, especially instead of transitioning to grazing, one landowner from Colorado said: “*Fencing and water were two of the things. It's not fenced, and there was no water to go in there*” (Landowner 10, CO). Another landowner in Colorado summarized the intersection of grazing infrastructure, financial considerations, and weather conditions:

“Of all land that I manage and all the land that I own, any piece that doesn't get back in CRP, or if the rates get too low, I will assure you - you can put it down as a guarantee - they will go under tillage within 30 days... You gotta generate income off of them somehow. Most of them are not readily adaptable to livestock grazing. Not because the grass is not available, but there is no fencing and some don't have available water supply. So, naturally, I'm going back to tillage. And that's where you can generate the highest return.” (Landowner 3, CO)

Proximity to other cropped fields. Many of the landowners we interviewed who had reverted their expired CRP fields back to grain crops described the physical location of the field in relation to other land they were farming. They indicated that when CRP fields are located in close proximity to other farmed fields, they are more likely to be broken back out again and integrated into the farming operation occurring on adjacent or nearby land. When asked why he had chosen to break out his

former CRP land, one landowner from Kansas put it simply: *“I was farming all around it”* (Landowner 1, KS). Another interviewee from Kansas, who had also returned his expired CRP fields to farming, explained the importance of location to that decision in more detail:

“Had this piece of property been adjacent to, or in the middle of a pasture, for example, native grass, then that would have been the way that would have gone. But this is in the middle of farm ground; it's the only CRP within three miles. It's 80 acres right there in the middle of everything. It's not a big enough parcel to graze or pasture. I suppose a person could hay and bail it, but no, it's more feasible to farm that... It wouldn't even be thought about, as far as being left as native grass... When the land is positioned like that, and could be either tilled or farmed no-till, and you have the same as or better expectation on rental or income, then why leave it in grass?” (Landowner 8, KS)

This landowner later explained that the proximity between a grass field restored through CRP and other farm land is also important because of the potential for the flow of vegetation and wildlife from the former CRP field into the cultivated field. He said,

“The other thing is, when you have a field of CRP beside your regular field that you're trying to farm, you do have a problem with grass seed coming over into your fields, and so that's a negative. A lot of times you do have animals that hang out in the CRP that come over and feed off of your crops. Habitat in CRP out here is excellent for rattlesnakes, so that's a negative; people have to watch that. If you're going to have viruses in wheat, for example, a lot of times they can be harbored in a CRP field, in that grass, and then they'll transfer over into your growing wheat. So there are some negatives with CRP. It's not all animal habitat, you know, Bambi and all that stuff. It looks good, but there are some negative things that come out of that.” (Landowner 8, KS)

Consistent with the idea that some expired CRP is returned to cultivation primarily based on its location near other farmed land, a landowner in Texas explained that he had returned field corners that were formerly in CRP to cultivation to make the field easier to manage:

“There was one field where we took part of the circle out and so those corners we didn't leave in [CRP]. We are going to start farming those again, just to square it up instead of having a circle around the corner. (Landowner 11, TX)

On the other hand, one landowner in Oklahoma, who had moved away from the area where his former CRP land was located before the contract expired, explained that the distance to the property was an important reason that he had decided to lease the land for farming, rather than graze it. He said, *“About four and a half hours was the reason. I live four and a half hours away from there. [Grazing it] just wasn't feasible.”* (Landowner 19, OK)

(RQ4) Why are expired CRP fields not entering other conservation programs?

When asked about other conservation programs as an option for their expired CRP land, most of the landowners we spoke with had not seriously considered enrolling their fields in programs such as the Conservation Stewardship Program or CRP Grasslands, due to 1) the associated restrictions on land use, 2) the relatively small financial compensation derived from those programs, especially compared to CRP, or 3) their perceptions about the fit of those programs for their land. However, some of the landowners we spoke with had taken advantage of cost-share opportunities provided by other conservation programs administered by NRCS, FSA, or state agencies, which had helped finance the installation of windbreaks, water wells, and terraces on other pieces of property, most often on working lands that had not been enrolled in CRP.



Restrictions on land use. Interviewees most commonly explained that they had not enrolled their expired CRP field in other conservation programs because, after their experience in CRP, they were uninterested in entering an additional contract with associated rules and regulations. One producer in Kansas, who did not try to re-enroll his expiring CRP land in the program, said: *“I was eliminating a nuisance [by removing my field from CRP]; I didn’t want to enter another nuisance situation”* (Landowner 20, KS). A landowner in Colorado and his family, though they considered each of the various programs offered by FSA and NRCS, have been similarly deterred by the restrictions that accompany government programs for land conservation:

“We look at about every program that comes down from FSA or NRCS. To be honest, there is just so much government rules and regs anymore that it just gets frustrating to try and stay in compliance with them. So, for the most part, our families have said enough is enough” (Landowner 5, CO).

A few landowners specifically described frustration with programmatic rules that seem incompatible with the particularities of their individual lands or broader region. One landowner in Colorado, who had hoped to keep her land in CRP, said:

“We would [consider other programs], you know, but it would depend. The rules that go into some of these programs are just absolutely absurd... The people making the rules don't understand the situation. They need to work on a farm and the ranch for a little while, then they'd have a different attitude about it.” (Landowner 4, CO)

She went on to explain that she and her son have chosen not to participate in other programs because they have observed through the experiences of friends who are participating in a grassland conservation program that the monitoring and record-keeping requirements are large and time-consuming. Additionally, while their land would likely be eligible for programs that support habitat for wildlife, particularly birds, some of the requirements, for example, to plant and maintain shrubs, seem

incongruous with their limited access to water. She said: “*You want to plant a bush so a quail comes and eats some berries, but how do we water that in the meantime?*” (Landowner 4, CO).

Relatively limited financial compensation. While landowners are accustomed to restrictions on how they can use their land while it is enrolled in CRP, our interviews indicate that those restrictions on use are only tolerable if landowners feel like they are being adequately compensated for the accompanying loss of autonomy and the cost of compliance. Ultimately, the financial compensation from other programs does not compare to the annual rental payment received through CRP. As one landowner said, “*We really did not look at any other programs. Either they didn't pay enough or it would have been a nuisance when we were farming close to it*” (Landowner 11, TX). Another Texas landowner, who ultimately sold his expired CRP field but had previously kept it in grass and had been working to establish additional vegetation for wildlife, said of his experience:

“I did a lot of research online; I spent hours on the FSA website. I remember seeing [CRP Grasslands], but I think for [my county], it was like \$4 or \$5 an acre. It was negligible... If you commit to that, how do you get out? I just wasn't sure about it. To me, the rate... wasn't a substantial amount of money... Rates for putting farm ground into CRP were \$35-45 an acre per year. It was substantial enough to give up the next 15 years, but at \$4-5 an acre, I wanted the ability to do whatever I wanted. I didn't want to be subject to any rules. Where is that threshold? I don't know; I think it's different for each individual... I wanted the freedom to do what I wanted out there.” (Landowner 2, TX)

Perceptions of fit for land. Some landowners had not enrolled in other conservation programs due primarily to their perception that other programs are not a good fit for their operational goals or their land. One landowner in Texas said he had explored other programs “*a little bit, but not that much. I couldn't see a need for the things they were offering*” (Landowner 17, TX). A number of landowners we spoke with said they had not really explored other conservation programs that may have been options for their expiring CRP land because they felt like their options were basically to re-enroll, graze the land, or farm it. A landowner in Colorado, who had converted some former CRP to farmland and was grazing other former CRP land, said: “*I guess we just assumed you either kept it out and grazed it, or you kept or took it out and farmed it*” (Landowner 6, CO). Similarly, a farmer from Kansas said, “*Basically, if the ground is good, it's farmed, and if it's rough and thin, then it's in grass, and that's basically what the whole country is out here in western Kansas*” (Landowner 9, KS). Other landowners said that they had assumed that their land was not eligible for other programs, or, in some cases, that they had actually applied to enroll their lands in other programs, but did not qualify (for example, due to a lack of streams or other waterways on their property).

(RQ5) What are landowner attitudes towards alternative land uses that might promote conservation and financial stability for producers?

Building primarily from discussions in our Phase II practitioner workshops, we explored landowner perspectives on three alternative post-CRP land use options that might conserve the grassland cover established through CRP or at least some of the program’s environmental benefits. Those options included 1) installations for alternative energy sources; 2) payments for carbon sequestration or carbon offsetting; and 3) organic agriculture.

Solar and wind energy installations. A number of participants already had wind turbines installed on their property - both former CRP fields and other land - or were actively exploring opportunities to participate in wind energy production. We did not talk to any landowners who are currently participating in solar energy production. Overall, interviewees were divided in terms of their interest in and comfort with solar versus wind energy installations, with some more open to solar and others more open to wind. In both cases, their comments generally focused on the scale of the installations and their permanence in the landscape. One sentiment was that while a single wind turbine can be farmed or grazed around, solar panels preclude other uses of the land, making it not “usable for something other than that” (Landowner 11, TX), as one Texas farmer put it. He went on to say:

“I would definitely consider wind or solar. I think solar may be a little scarier in that there are a lot of panels that get put out, and then say they pull off, then what happens to that land? That’s a little bit different than just one tower on a quarter, compared to the whole quarter covered by solar panels. What do you do with that?” (Landowner 11, TX)

However, given their experience with wind turbines in their areas, multiple landowners mentioned concerns about the degradation of wind towers over time. As one landowner explained:

“I’ll put it like this, the wind farms that got put in around here 20 years ago are now dilapidated and falling apart. And I’m not a fan of wind farms at all because they don’t last long. Whenever they fall apart, they’re an eyesore. I mean, they’re 150-foot poles in the air that caught on fire, and so now they’re charred remnants of what used to be a wind turbine.” (Landowner 1, KS)

Another landowner in Kansas echoed concerns about the longevity of wind turbines and thought that solar energy may thus be a better option:

“The solar, I think, would be more feasible because you don’t have them scattered all over the countryside; they’re more consolidated. It wouldn’t be as much to clean up in 30 or 40 years for you young people. Somebody has to clean that up. They don’t last forever; they’re machines.” (Landowner 8, KS)



Carbon offsetting programs. Many interviewees were unfamiliar with the premise of carbon offsetting programs or opportunities to be paid for carbon sequestration, although one interviewee felt like “carbon sequestration...is a common buzzword we hear a lot about now” (Landowner 1, KS). In general, most of the landowners we spoke with were open to the idea of receiving payments for carbon sequestration, if given the opportunity and more information about how it would impact both their farm revenues and land use options, but had not considered it in any detail. As one Colorado rancher said:

“I haven't really thought about it, you know, but I guess I would probably [consider a carbon offsetting program]. I'll consider most any option, if I think it's gonna be profitable and not give up my freedom, I guess, with the land.” (Landowner 15, CO)

Others had heard of carbon offsetting programs, but had a wait-and-see attitude about participating, given the novelty of the market and uncertainty in its future. One landowner from Kansas, who had converted his expired CRP back to farmland, said: “I just feel like it's a new and, honestly, interesting additional revenue stream. Still a lot of wrinkles to be ironed out before I will consider it” (Landowner 1, KS).

Two landowners had particularly strong perspectives on carbon offsetting. Both expressed frustration at what they perceived as a geographical mismatch between the location of carbon production and carbon sequestration, and the mismatch in responsibility between polluting industries and producers who would be paid to address the problem. One interviewee from Kansas insisted:

“Just because we're out here, you know, conserving the soil and creating carbon credits, we shouldn't be offsetting something else. They need to get their shop in order, and if we get credits here to help clean up other atmospheric problems, that's okay. But I really don't like the fact that they can just [continue polluting] and this farmer out here is helping me offset. That's kind of crazy.” (Landowner 8, KS)

A farmer from Colorado was also skeptical of carbon programs, but primarily because he felt like those programs (and for that matter, other conservation programs, such as CSP) fund practices that will be implemented by producers out of necessity, even without incentive payments.

“They're not going to do a dadgum thing different and they'll take your money... It really brings out people who want to game the system. I manage about 30,000 acres of grasslands, and I can tell you that they're not going anywhere. They're going to be grass, and they'll sequester just as much carbon [in a program] as they are today.” (Landowner 3, CO)

Organic agriculture. None of the landowners we spoke with were particularly interested in or optimistic about prospects for organic farming on their former CRP land. Multiple landowners described a lack of markets and processing infrastructure for organic crops in their regions, which largely produce milo or sorghum and corn for livestock feed. Some crops, like wheat, might be more suitable for organic agriculture, but producers anticipated challenges associated with weed control, particularly vineweed, with organic farming on former CRP land. Producers also mentioned that organic agriculture is particularly difficult in regions characterized by dryland operations that rely on

rainfall. One interviewee in Kansas, who reverted his fields back to grain crop production after CRP, said:

“It's just not something that works for us... It just doesn't work in western Kansas very well, unless you can add water to it... Out here, you can't depend on the rain being there all the time; we go sometimes quite a while in between rains. There's nothing wrong with organic, don't get me wrong, it's just not the way we've been farming. I'm not gonna say that we'll always farm the way we do today... but I don't see changes coming in too fast.” (Landowner 9, KS)

Other landowners described an incompatibility between no-till or low-till agriculture, which relies on chemical applications to control weeds, and organic production, which prohibits them. One producer specifically explained the need for organic herbicides to be developed that could be used in conjunction with no-till agriculture, an innovation that has been critical for controlling erosion in the region:

“Organic is what we evolved from. Our grandpa and great grandpa and dad and I used to be organic farmers 50 years ago, and we couldn't afford to do that. Plus the erosion was killing this place. You know, until they come up with some organic herbicides so that we can no-till, this organic stuff is not going to be good.” (Landowner 8, KS)



DISCUSSION & RECOMMENDATIONS

The interviews we conducted in Phase II of this study built upon previous research (Barnes et al. 2019, Barnes et al. 2020) to explore in detail the factors that promote or undermine the persistence of grass cover on former CRP fields in the southern Great Plains. In particular, we sought to understand the factors that might support the use of former CRP lands for grazing or their enrollment in alternative conservation programs. Our conversations with landowners highlighted the intersecting biophysical, socio-economic, and institutional factors that shape decision-making about post-CRP land use in the region.

Key biophysical factors driving post-CRP land use principally include soil quality and other field conditions, such as slope, landscape features, field size, and proximity to other grazed or cropped fields. The availability of infrastructure for providing water to livestock and fencing for containing them were also important determinants of whether or not land would be kept in grass for grazing after CRP. Those biophysical factors combine with a suite of socio-economic considerations to drive post-CRP land use decisions. Specifically, the persistence of grass after CRP depends on the compatibility of grass-based land use with a producer's overall operation and the profit potential associated with keeping the land in grass, relative to other potential uses, especially producing grain crops. Sometimes in tension with financial logic, decisions about post-CRP land use are also driven by landowner interest in autonomy and concern with regional drought and erosion.

Finally, what happens to the grass established on former CRP land is also a product of institutional factors, such as policy changes, program rules, and the availability of alternative programs for grassland conservation. The timing of our interviews allowed us to explore some of the impacts of policy changes contained in the 2018 farm bill, which reduced maximum soil rental rates and resulted in lower annual payments from CRP for counties across the country, on landowner decision-making. While our Phase I research indicated that the majority of landowners are interested in keeping their land in CRP for multiple contract periods, our Phase II interviews made it clear that a decline in annual payments decreased landowner interest in re-enrolling in the program. We interviewed landowners immediately following the close of the 56th CRP general enrollment period, in which additional contract incentives and higher rates were offered than in the two previous sign-ups. The resulting bump in rental payments had encouraged some landowners to reconsider CRP and even offer some of their expired CRP fields for re-enrollment.



Below, we discuss seven recommendations for applying what we have learned about the factors that drive landowners' post-CRP land use decision-making to promote the persistence of grasslands and associated environmental benefits after program participation ends.

1) Consider how biophysical attributes of a field or farm associated with persistence might be incorporated into ranking metrics for CRP enrollment.

The Environmental Benefits Index (EBI) used to evaluate offers for CRP enrollment and re-enrollment evaluates six types of benefits expected from a contract, including the benefits for wildlife habitat, water quality, on-farm erosion, and air quality, as well as the cost of the contract and the likelihood that benefits generated on the land will endure beyond the contract period. The “Enduring Benefits” factor of the EBI assigns points based only on the type of conservation practices, and consequently, vegetation types, covered by the CRP contract. Trees and rare or specific, targeted habitats earn between 20 and 50 points, while practices that establish or maintain existing native or introduced grasses and forbs earn none. FSA could consider how to incorporate other field- or farm-level attributes associated with persistence, such as the size and location of the field, into the EBI. Because persistence is deeply influenced by soil quality, it is likely partially accounted for in the “Erosion” factor, under which offers earn up to 100 points based on the erodibility of the land. However, our interviews made it clear that persistence is also more likely on fields that are highly sloped or characterized by landscape features that make it difficult to farm the ground. Additionally, the proximity of former CRP land to other pasture or other farm ground consistently emerged as a driver of post-CRP land use decisions. Our interviews suggest that fields that are adjacent or close to pasture are often grazed after CRP, while those that are close to cropland are often cropped. Similarly, Sullins et al. (2021) recently demonstrated that the grass cover established through CRP is less durable in regions dominated by cropland; these geographical drivers appear to shape post-CRP land use at the farm-level as well. There may be opportunities to promote the persistence of grasslands following CRP by incorporating metrics for these landscape-level attributes into the “Enduring Benefits” factor of the EBI.

2) Support the establishment of infrastructure needed to transition from CRP to sustainable grazing while fields are still enrolled in CRP.

Changes to the 2018 farm bill have allowed landowners to conduct more haying and grazing on their CRP land without penalties. These changes enable landowners to supplement lower CRP payments with revenue from haying and grazing and may also promote the establishment of grazing practices and infrastructure that can be maintained after CRP contracts end. Among the landowners we spoke with in Phase II, those who had kept grass on their former CRP land by incorporating the land into a grazing operation all had the infrastructure needed to make that transition relatively quickly and easily. In particular, both water and fencing were critical resources for grassland persistence for landowners who had implemented rotational grazing. Compared to traditional, continuous grazing systems, rotational grazing supports healthier grasslands, including higher soil quality, better plant growth, and more drought resilience, but it generally requires multiple water sources and additional

fencing. Most landowners who had transitioned to rotational grazing after CRP indicated that this infrastructure was already in place on their land when their CRP contract expired, and a few described using existing cost-share programs to install it on their former CRP or other land. To encourage the persistence of grasslands after CRP, FSA, NRCS, and partner organizations, including state agencies and NGOs, could widely promote existing cost-share programs for water and fencing and provide broader cost-share support for the installation of this infrastructure while fields are still in CRP.

3) Continue to promote native grass varieties that provide high-quality forage for sustainable grazing systems.

The landowners we spoke with in both Phase I and Phase II of this study, as well as practitioners in the study states, consistently expressed a desire for palatable and locally-adapted grass varieties in the seed mixes that are available for establishing grass cover on fields enrolled in CRP. Some of the producers we interviewed expressed frustration with the grass varieties that had been promoted or required when they initially enrolled in CRP, and described challenges associated with the limited palatability of those grasses for their livestock, now that the field is out of CRP. Others, however, described CRP as an opportunity to establish grass cover on former cropland that would be suitable for grazing when their contracts ended. These differences in experience related to grass varieties partially reflect evolution in CRP seed mix options, which have become more closely aligned with local ecology in recent years. FSA can continue to prioritize native grasses and those that simultaneously work well for wildlife, soil stabilization, and livestock, in order to promote conditions conducive to sustainable grazing systems, thus, grassland persistence, after CRP.

4) Engage landowners in long-term land use planning when CRP contracts are initiated and throughout the contract period.

Based on findings from Phase I, we previously suggested that post-CRP land use is sometimes already decided when CRP contracts are initially signed (Barnes et al. 2020). Our Phase II interviews provided additional evidence that some landowners know at enrollment what they intend to do with their fields once their CRP contracts expire, and they use the program to pursue long-term operational goals. In particular, we spoke with a number of landowners who had enrolled land in CRP as an opportunity to establish grass that would support an eventual transition from cropping to grazing. FSA and those who provide technical assistance related to CRP could specifically discuss long-term land use goals with landowners in order to identify those interested in permanent retirement of their land from cropping and to encourage conservation practices (for example, those that include native grasses and wildlife habitat) and forms of mid-contract management (for example, grazing) that can support a successful transition to other grass-based land uses after CRP. This recommendation requires increasing capacity among USDA staff and private lands biologists, which are often cost-shared, partner positions, to engage one-on-one with landowners and communicate about the variety of options for keeping land in grass after CRP (see Recommendation 7).

5) Expand programs that support the transfer of CRP land to new landowners who are committed to grassland persistence or land uses that retain the environmental benefits of CRP, and engage with new landowners when CRP land is transferred.

Many of our interviewees had purchased or inherited their former CRP field when the field was already enrolled in the program. Consistent with that observation, among the fields covered by our Phase I mail survey, 23% had been enrolled by someone other than the current owner or manager or their spouse. In our interviews, this was particularly common among those who had reverted the former CRP field to crops; the current landowner purchased the field while it was in CRP with the specific intention to use the restored land for growing grain crops when its contract expired. Often, these fields were located in close proximity to other farmland owned by the producer. It would be valuable for CRP delivery personnel in local offices to connect with these new owners to share information about available programs or technical assistance that could support persistence of grassland, or at least some conservation practices, on portions of the expiring CRP field. The CRP Transition Incentives Program (TIP) provides landowners enrolled in CRP with additional payments if they sell or lease their expiring CRP land to a new or socially disadvantaged farmer or rancher who commits to using the land for sustainable grazing or organic or resource-conserving cropping. FSA staff in local offices can support persistence by expanding promotion of this program. However, the TIP program only applies to land sales made within the last year of the CRP contract. FSA could also consider how to broaden eligibility for CRP TIP to include land that is sold earlier in the contract period or to individuals that do not qualify as new or socially disadvantaged farmers or ranchers.

6) Increase internal and external understanding of the history, purpose, and implementation of CRP, and the importance of persistence as a program objective.

Our interviews revealed ongoing tension between the soil conservation and habitat conservation goals of CRP. Many of the producers we interviewed were frustrated by their observations that lower payments are generally offered for lower quality, highly erodible ground that they feel should be prioritized for retirement from farming. However, other landowners clearly communicated a willingness to accept lower payments for more marginal land that is not suitable for farming and appreciation of the multiple, inter-related environmental benefits of grassland restoration through CRP, including improving grazing opportunities, wildlife habitat, carbon sequestration, and water quality, in addition to limiting soil erosion. The landowners we interviewed also frequently compared the payments and priorities they experienced in their own region to the rates and types of land being enrolled in other regions. Throughout Phase I and II of this study, we consistently heard landowners lament that CRP is administered by people with no experience with their particular regions or farming. While some landowner complaints likely reflect differences of opinion, others seem to reflect misunderstanding about CRP's history, purpose, and implementation, including the program's budget structure and cycles, sign-up timelines, and approach to bid ranking and rates, and the personal and professional experiences of those who administer the program. USDA could work to develop clear and concise messaging for landowners to improve understanding about these aspects of CRP, including the equal importance of wildlife habitat and soil erosion in the prioritization of land for enrollment in CRP's

EBI. Internally, FSA could consider the importance of persistence as a goal of CRP, and develop messaging and metrics that are consistent with persistence. For example, the agency could empirically evaluate the trade-offs that may be unintentionally embedded in the EBI as it equally weights benefits for wildlife, water quality, and on-farm soil erosion in an offer's score. In some regions, fields that provide high-quality wildlife habitat are characterized by high-quality soils, and our interviews and Phase I research both indicate that fields with productive soil are more likely than those with low-quality soils to be returned to cultivation after CRP contracts expire.

7) Increase the capacity of CRP delivery personnel to communicate with landowners about land use options that support the persistence of grasslands and CRP's environmental benefits.

Our Phase II interviews indicated that some landowners, while interested in grassland conservation after CRP, often do not seek guidance from USDA staff about post-CRP land use because they assume that their options are ultimately limited to re-enrolling, grazing, or farming their land. Landowners are also generally open to considering alternative programs or opportunities to generate revenue from conservation, including installations for the production of wind or solar energy and carbon sequestration, but often have not explored these options in any detail. USDA staff in county offices could play a larger role in connecting those who do not qualify for or are uninterested in re-enrollment in CRP with other programs in order to promote persistence of CRP's benefits. Importantly, county-level personnel need to be equipped with tools and training that would help them clearly communicate with landowners about these options. FSA could also develop resources for producers who are making decisions about re-enrollment to communicate recent program changes, the benefits of re-enrollment, and options for expiring CRP land that retain some of the on-farm and regional environmental benefits generated through the program.



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APPENDIX A: PRACTITIONER WORKSHOPS

Workshop Locations and Participation

In the first part of Phase II of this project, we organized and led translational workshops to discuss results from Phase I with conservation practitioners and other personnel responsible for the delivery of CRP and other farm bill programs in each of the five study states (Kansas, Oklahoma, Colorado, Texas, and New Mexico) and national USDA offices. When possible, these workshops were held as a component of other, organized meetings in order to capitalize on and add value to existing practitioner gatherings. We held one-hour break-out sessions at the 2019 Kansas Association of Conservation Districts Convention (Wichita, KS; November 25) and 2020 Oklahoma Association of Conservation Districts (OACD) meeting (Edmond, OK; February 24). Both break-out sessions were attended by approximately 45 individuals who work on private lands conservation in those states; some of the participants were also landowners and brought that perspective to the workshops as well. We also discussed study findings with over 50 representatives from NRCS, FSA, USFS, Colorado state agencies, and other conservation organizations at a Colorado NRCS State Technical Committee meeting (Broomfield, CO; March 3, 2020). Due to the COVID-19 pandemic and associated travel restrictions, in-person work sessions in the two remaining study states (Texas and New Mexico) were not possible. We instead worked with FSA's National Outreach Specialist to organize and host a virtual workshop with FSA leadership from these states (held via GlobalMeet; June 23, 2020). The workshop included 8 participants, and a recording was shared with state and regional FSA staff in Texas and New Mexico for later viewing. Finally, we also worked with FSA's National Outreach Specialist to organize and host a virtual workshop for national-level USDA staff, including participants from FSA, NRCS, USFS, and partner organizations in the southern Great Plains (held via Microsoft Teams; July 30, 2020).

Workshop Structure

Each workshop began with a presentation of Phase I findings on landowner decision-making related to CRP enrollment and re-enrollment and post-CRP land use. The remainder of the sessions consisted of open discussion among attendees about the implications of the study for promoting the persistence of soil, wildlife, and grassland conservation after program payments end. These conversations focused on 1) how participants could individually act on the study findings; 2) what could be done by those involved in CRP design and delivery at other levels; and 3) remaining knowledge gaps about landowners, CRP, and the durability of CRP's benefits for grassland conservation over time. In Kansas, Oklahoma, and Colorado, session participants wrote their thoughts down on notecards or handouts we provided them. Shortly after the meetings, we transcribed the hand-written responses. For virtual meetings, written feedback was collected through the chat features of the virtual platform. Written participant feedback and researcher notes from each meeting were combined and summarized into recommendations for CRP design and delivery and recommendations for future research. An overview of these recommendations was shared with USDA staff in the national-level

workshop. Recommendations for CRP design and delivery that emerged from these workshops provided a starting point for the recommendations included at the end of this report. Recommendations for research, together with key results from Phase I, informed the development of research questions and a conversation guide for the follow-up, qualitative interviews with landowners.

APPENDIX B: INTERVIEW GUIDE

1. First, could you tell me about the field you previously had enrolled in the Conservation Reserve Program?

- a. Can you tell me a little about the role of your former CRP field in your overall operation and livelihood?
- b. Can you tell me more about the history of this field? How was it being used before CRP? Why was it enrolled in CRP?
- c. What were the conditions of the field when it was enrolled? What was the soil quality like? Were there water sources on the field? Was it fenced? Wildlife? Was the land you enrolled highly erodible or otherwise not suitable for farming?

2. Next, I'd like to hear about what happened to the field when it came out of CRP. Did you try to re-enroll the field in the program?

If no: What kept you from trying to re-enroll? What impact, if any, did the likelihood of getting your field back into CRP have? What impact did the current CRP rental rate have on your decision? Did rules related to using CRP fields for forage influence your decision?

If yes: Why did you want to re-enroll?

3. So you [tried to re-enroll but didn't get back in/didn't try to re-enroll], and the CRP contract expired. What have you done with your field since your contract expired?

If sold/leased: Did you participate in the CRP Transition Incentive Program? Do you know how the land is being used now?

If reverted to crops: Can you describe your approach to managing the field for agriculture? Have you implemented any agricultural best management practices (BMPs) since you converted the field back to crops (e.g. buffers; conservation tillage; practices for pest, nutrient, or sediment control)? Were you using these practices before CRP?

If transitioned to haying and/or grazing: How are you managing the land for grazing or haying? Are you using any kind of rotational or sustainable grazing plan?

If enrolled in another conservation program: Can you tell me more about your participation in this program? How do the requirements and benefits compare to CRP?

4. I'm interested in hearing more about your field's transition from CRP to [land use on field].

- a. When did you start [land use on field]? Was it immediately after your CRP contract expired, or was there a longer transition period?
- b. When did you know that you were going to [land use on field] after CRP? Was this decision made before your contract expired? In the final year of CRP? Not until after your contract expired?

- c. Can you tell me a little more about what you had to do to transition your field from CRP grasses to [*land use on field*]?

5. What factors would you say were important in your decision to [*land use on field*] after CRP?

Possible follow-up questions, depending on participant response to Q5:

a. Biophysical factors:

1. How did access to water (including availability, abundance, and/or quality) influence your decisions? Also fencing? Livestock?
2. Can you tell me about any ways that drought or other weather patterns influenced your decision?
3. Did the field's previous enrollment in CRP impact its suitability for [*land use on field*]? If so, in what ways? Did the grass varieties that you planted during CRP influence your post-CRP actions?
4. Did you have access to the equipment you needed? Did you still have agricultural equipment after taking the field out of production and enrolling in CRP?
5. Can you tell me about any ways that wildlife or wildlife habitat played a role in your decision?

b. Socio-economic factors:

1. Did you receive any advice or guidance on what your options were for the field after your CRP contract expired? If so, what was it?
 - i. Did you have any interactions or communications with FSA or NRCS staff about post-CRP planning? What about other conservation or agricultural specialists?
 - ii. Neighbors or other landowners who had previously been in CRP? Friends or family?
2. Can you describe how people in your area generally think about the value of a grass field? What kind of expectations, if any, do you think your neighbors had about how you should use your field after CRP? Your family?
3. How did financial considerations play a role, if at all, in your decision to [*land use on field*] after CRP?

6. I'd like to talk a little more about what your other options were for your expiring CRP field.

- a. Is [*land use on field*] what you thought you would do with your field after CRP, or did you originally have other plans?

- b. What other options did you have for your CRP field after your contract ended?

If NOT in crops: Some fields that come out of CRP are converted back to crops. Why did you decide not to convert your field back to crops?

If NOT haying and/or grazing: Some fields that come out of CRP are transitioned to use for haying and/or grazing. Why did you decide not to transition to haying and/or grazing?

If NOT enrolled in other conservation programs: Were you aware of any other conservation programs that your field might have been eligible for? What about CRP Grasslands? Conservation Reserve Enhancement Program? NRCS programs, such as Environmental Quality Incentive Program and Conservation Stewardship Program?

8. Finally, can you tell me about your future plans for this field?

- a. Are you considering any other uses for this field in the future? Why or why not?
- b. Can you tell me about any help you receive with planning for your operation or the natural resources on your land, now that the field is out of CRP?
- c. We've heard some discussion of carbon markets as a possible option for land in your region. What do you think about putting your field in a carbon market, where you would be paid to maintain vegetation that offsets the carbon produced by energy or industries? What about options to use your field for solar or wind energy installations? Organic agriculture?