

**Human Dimensions of Habitat Conservation on Western Agricultural Lands:  
Engaging Producers in the Conservation Conversation**

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# **Human Dimensions of Habitat Conservation on Western Agricultural Lands: Incorporating agricultural landowners in the conservation conversation**

Mary E. Sketch

## **Abstract (Academic)**

Achieving long-term conservation gains through conservation incentive programs on agricultural lands requires a deep understanding of landowner needs and interests. However, social science research related to private lands conservation programs authorized by the United State farm bill lags behind biological research, limiting our knowledge about how to best design these programs to ensure they are effective. Given this need to better understand the human dimensions of habitat conservation on agricultural lands, we used two research projects to investigate landowner considerations related to land management decisions as well as how to effectively engage landowners in the conservation process. First, using two landowner-led workshops, we looked at what factors ranchers in the Intermountain West consider in deciding to continue or discontinue flood irrigation, an irrigation practice that sustains historically flooded wet meadows across the region. We also evaluated these landowner-led workshops as a form of participatory research. Our second project included three focus groups of landowners currently enrolled in the Conservation Reserve Program, the largest private lands conservation program in the United States, and a survey of landowners with fields currently enrolled or no longer enrolled with expiration dates from 2011 to 2017. Our results highlight the role of agricultural landowners in habitat conservation and the complex social-ecological considerations that they face in making management decisions. Many landowners are interested in conservation programs that meet the context of their specific operation. Our findings suggest the need to better incorporate landowner needs into conservation program design and implementation that promote both operation and habitat sustainability.

## **Abstract (Public)**

Agricultural lands across the American West play a critical role in conserving both agricultural operations and wildlife habitat. Conservation programs that provide incentives to landowners for various conservation efforts are available to aid in the protection of these lands and communities. Gaining a deeper understanding of the considerations of agricultural landowners for their land management decisions can help inform conservation programs and policy to more effectively meet the needs of landowners. We used two research projects to investigate landowner considerations related to land management decisions as well as how to effectively engage landowners in the conservation process. First, we looked at what factors ranchers in the Intermountain West consider in deciding to continue or discontinue flood irrigation, an irrigation practice that sustains historically flooded wet meadows across the region. We also evaluated these landowner-led workshops as a form of participatory research. Our second project included three focus groups of landowners currently enrolled in the Conservation Reserve Program, the largest private lands conservation program in the United States, and a survey of landowners with fields currently enrolled or no longer enrolled with expiration dates from 2011 to 2017. Our results highlight the role of agricultural landowners in habitat conservation and the complex environmental and social considerations that they face in making management decisions. Many landowners are interested in conservation programs that meet the needs of their specific operation. Our findings suggest the need to better incorporate landowner needs into conservation program design and implementation that promote both agricultural and environmental conservation.

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## **Attributions**

Four co-authors contributed significantly to this thesis, which is a collection of three manuscripts. This section specifies the contributions of each co-author to this work.

Ashley Dayer is my academic advisor and primary project supervisor. In addition to writing the grants to fund both studies and serving as the principal investigator, she contributed to the research design, data collection, analysis strategy, and provided extensive edits to the writing. Alex Metcalf contributed to the study design, implementation, and editing of Chapters 1 and 2. Michael Sorice, Ashley Gramza, and Rich Iovanna contributed to the study design and editing of Chapter 3. Additionally, Ashley Gramza and I co-led the focus groups and survey design and administration. Given these contributions, this thesis is written in the first-person plural voice. Some information is redundant between chapters because each chapter was written as a stand-alone manuscript.

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## **Introduction**

Agriculture is the dominant land use in the United States with approximately 50 percent of all land in the US used for either pasture, range, or crops (Heard, 2000; World Bank, 2016). Given their large proportion of the United States, these agricultural lands are an essential consideration for landscape-scale conservation. Additionally, farms and ranches are increasingly being recognized for their critical role in providing ecosystem services, resulting in a greater emphasis by conservation professionals on fostering landscapes where conservation and agricultural sustainably coexist (Aillery, 2006).

Additionally, especially across the Western part of the United States, agricultural lands are facing many challenges and increasing pressures due to social and environmental changes. Since the 1970's, much of the rural American West has faced demographic changes from exurban migration leading to subdivision of land and increasing rural development (Travis, 2007). Agricultural lands are increasingly vulnerable to development as many producers are being priced out of the changing rural land market (Sheridan, 2007). In addition to social changes, other forces such as climate change and water scarcity are at play across the West with agriculture being particularly susceptible to these forces (Yung et al, 2015). The combination of these environmental forces with the social changes discussed above has contributed to habitat degradation and fragmentation (Chambers & Pellant, 2008). With these changes to the landscape and the importance of these lands to conservation, there is a need to foster win-win solutions for both agricultural communities and the habitat and resources they protect.

To help cultivate this cooperation between agricultural viability and habitat conservation, many programs have been developed to aid in the conservation of these lands and communities.

Federal actions, including low-cost loans, crop insurance, and agricultural extension programs, have long been a critical component in family farm support across the United States (Opie, 1998). The USDA Farm Service Agency (FSA) and the Natural Resources Conservation Service (NRCS) manage the impressive portfolio of \$6 billion (Claassen, 2018) in voluntary conservation programs on agricultural lands that seek to address various natural resource issues from water quality to soil erosion to wildlife habitat (USDA Natural Resources Conservation Service, 2016c). These programs run by FSA and NRCS are funded through the conservation title of the farm bill, a comprehensive food and agriculture bill renewed by Congress about every five years. As we look toward future farm bills, human dimensions research will be valuable for developing more informed, effective conservation programs that appropriately motivate and engage landowners. Despite the scope and potential impact of these programs, social science research related to farm bill authorized private lands conservation programs lags behind biological research, limiting our knowledge about how to best design these programs to ensure their effectiveness

Given the need to better understand the human dimensions of habitat conservation on agricultural lands to inform conservation programs, this thesis investigates landowner considerations related to land management decisions as well as how to effectively engage landowners in the conservation process. Our research is focused within the American West, a region of the 17 states of the Great Plains, Mountain Region, and Pacific Region (US Congress Office of Technology Assessment, 1983). Although geographically large and diverse, the region is dominated by vast, open landscapes that lie between urban areas. These vast quantities of often unfragmented land naturally lead to a regional economy based on natural resources. Human dimensions research helps move forward a deeper understanding of landowners' personal

experiences and provides guidance to translate this understanding of landowner needs into effective conservation mechanisms. Through our research I hope to provide social science findings, which can be integrated with ecological findings, and inform future conservation efforts across the West that better incorporate landowners.

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## **Chapter 1. Insights From Western Rancher Perspectives on Social-Ecological Services Provided by Flood Irrigation**

### **Abstract**

Flood irrigation on rangelands of the Intermountain West is important for diverse social and ecological reasons, providing forage for many agricultural operations as well as maintaining many critical wetlands across the region. As the sustainability of these landscapes is primarily dependent on rancher management decisions, we sought to gain a deeper understanding of factors influencing ranchers who flood irrigate and how these factors interrelate. We adapted the Community Capitals Framework to explore what considerations act as facilitators and constraints to maintaining flood irrigation on the landscape and to evaluate the role of each type of capital in facilitating and constraining the co-production of working wet meadows for ranchers and the environment. Our qualitative analysis of facilitated workshop transcripts and observation notes from two study areas within the Intermountain West showed that ranchers perceived constraining and facilitating factors of flood irrigation related to all seven types of community capital: natural, financial, built, cultural, human, social, and political. The irrigation methods used by ranchers were heavily influenced by environmental components of the landscape (e.g., slope, water availability, and soil type), rather than reflecting a choice among alternative methods. Other prominent facilitators included a commitment toward maintaining the natural history of the landscape and the ranching lifestyle. Primary constraints included the impact of public misperception and the ability to pass their operation on to the next generation. Ranchers weighed multiple considerations simultaneously in a holistic, community-scale approach to management decisions and described how diverse facilitators and constraints interacted to determine the overarching viability of flood irrigation and ranching. These results indicate rancher decisions

are driven by complex social-ecological considerations and demonstrate the importance of each capital type to rangeland conservation.

## **Introduction**

Flood irrigation<sup>1</sup> on private rangelands maintains many wetland systems that were historically dependent on natural flooding. Flood irrigation, when water is spread across a field via ditch or pipe system, has been a traditional practice for hay and irrigated pasture production since the early 1900s (Peck & Lovvorn, 2001a). This form of irrigation recharges wetlands as surface water flows from ditch systems and as groundwater percolates from fields and ditches (Lovvorn & Hart, 2001; Peck & Lovvorn, 2001c), thus sustaining valuable wildlife habitat on working lands such as foraging habitat for migrating and breeding waterbirds (Petrie, Vest, & Smith, 2013) and late summer brood-rearing sage-grouse (Atamian, Sedinger, Heaton, & Blomberg, 2010; Donnelly, Naugle, Hagen, & Maestas, 2016).

Despite these benefits, flood irrigation is often criticized for being less efficient than alternative forms of irrigation, primarily center pivot or sprinkler irrigation (Venn, Johnson, & Pochop, 2004), where water is sprayed across a field through either a stationary or rotating sprinkler system (USDA Natural Resources Conservation Service, 2016a). These concerns, combined with increased demands on the water system from development, have increased pressure to eliminate flood irrigation systems in some portions of the West in recent years (Blevins, Hansen, Paige, & Mackinnon, 2016; J Patrick Donnelly et al, 2015). However, the ecological and water system recharge benefits of flood irrigation call into question the notion that sprinkler irrigation is always the more efficient method (Peck & Lovvorn, 2001).

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<sup>1</sup> In the context of the article, our use of the term flood irrigation is inclusive of surface irrigation which is where ditches are plugged to allow water to flow freely across the landscape.

In addition to ecological benefits, flood irrigation can be economically beneficial for ranchers. For instance, a study in the Upper Green River Basin of Wyoming found the net value of hay produced by one acre with flood irrigation is \$45, whereas switching to center pivot would net approximately \$13 per acre (Blevins et al., 2016). The transition from flood to sprinkler irrigation threatens the sustainability of wet meadows that are an important source of forage for cattle and biologically rich habitat for wildlife. Long-term conservation success of this habitat now requires effectively working with ranchers to conserve the privately-owned and managed wet meadow habitats.

Specifically in the Intermountain West, where nearly 70% of emergent wet meadow resources occur on private lands, conservation of wet meadow-associated wildlife on private lands and agriculture are inextricably linked (Donnelly & Vest, 2012). While past research has explored the hydrology and ecology of flood irrigation (Peck and Lovvorn, 2001a), social science has lagged behind. Importantly, little is known about rancher thoughts and experiences regarding flood irrigation and the factors influencing whether they will continue the practice. A deeper understanding of the human dimensions of this issue may aid professionals as they design and adapt tractable conservation solutions. To help inform conservation programs and policy for working wet meadow conservation, we sought to evaluate what factors ranchers consider when deciding to or not to continue with flood irrigation and how these factors interrelate.

### *Working Wet Meadows as a Social-Ecological Service*

From preventing habitat fragmentation to safeguarding native species, rangelands have long been recognized for their conservation potential (Brunson & Huntsinger, 2008; Huntsinger & Hopkinson, 1996). Effective management of these resources is challenging, however,

especially given the complex social dynamics of western rangelands (Brunson & Huntsinger, 2008; Knapp & Fernandez-Gimenez, 2009; Kreuter et al., 2006; Rissman & Sayre, 2012; Sayre, 2004; Sorice, Kreuter, Wilcox, & Fox, 2014; Willcox, Giuliano, & Monroe, 2012). The social-ecological services framework (Huntsinger & Oviedo, 2014) provides an approach to holistically explore this human-landscape intersection in the context of flood irrigation on private lands. Social-ecological services include all benefits garnered by humans and the ecosystem that are co-generated by people and the environment (Huntsinger & Oviedo, 2014). The traditional definition of ecosystem services is purely unidirectional, accounting only for the benefits that flow from the natural environment to humans. However, in many cases, ecosystem services are produced by both humans and the environment (Palomo, Felipe-Lucia, Bennett, Martín-López, & Pascual, 2016) and require a more system-wide analysis of all inputs (Torralba, Fagerholm, Hartel, Moreno, & Plieninger, 2018). Thus, Huntsinger and Oviedo's (2014) social-ecological services model accounts for human alteration of the landscape, where human activity on the land (e.g. certain agricultural practices) fosters the production of ecosystem services. In this sense, the social-ecological services framework is a bi-directional feedback approach to looking at ecosystem services. This framework for understanding rancher behavior has been described in various contexts such as on California rangelands where both native plant and animal species benefit from sustainable cattle grazing (Huntsinger & Oviedo, 2014) and more recently within silvopastoral systems across the world (Plieninger & Huntsinger, 2018). However, the framework has not been applied to understand flood irrigation on western US rangelands.

## *Community Capital Impacts on Social-Ecological Services*

The Community Capitals Framework developed by Emery et al (2006) offers an approach to more deeply understand the diverse considerations of ranchers that shape the production of social-ecological services. This framework is commonly applied in the context of sustainable community development, particularly as relates to resource-dependent communities (e.g. Bodin and Crona, 2008; Flora et al., 2012; Katz, 2000). It consists of seven types of capital that include: natural, cultural, human, social, political, financial, and built (Emery et al, 2006 ).

**Table 1.** Overview of types of community capital (Emery et al 2006, page 5-6).

<b>Type</b>	<b>Definition</b>
Natural	Those assets that abide in a location, including resources, amenities, and natural beauty
Financial	The financial resources available to invest in community capacity building, to underwrite business development, to support civic and social entrepreneurship, and to accumulate wealth for future community development
Built	The infrastructure that supports the community such as telecommunications, industrial parks, main streets, water and sewer systems, roads, etc.
Cultural	The way people know the world and how to act within it and includes the dynamics of who we know and feel comfortable with, what heritages are valued, collaboration across races, ethnicities, and generations, etc.
Human	The skills and abilities of people, as well as the ability to access outside resources and bodies of knowledge
Social	The connections between people and organizations or the social glue that make things happen
Political	Access to power and power brokers, such as access to a local office of a member of Congress, access to local, county, state, or tribal government officials, or leverage with a regional company

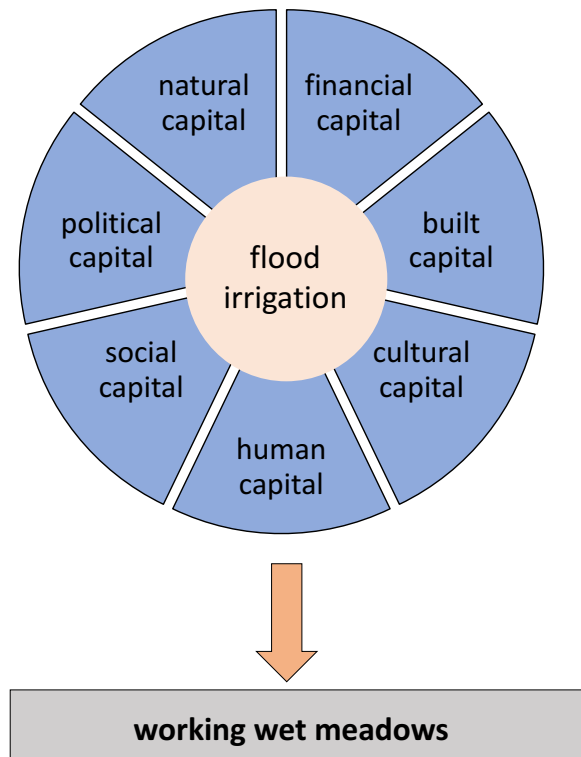
Although capital types are defined independently, the model emphasizes the importance of evaluating the intersections among all seven capital types to more holistically understand the “multi-dimensional nature of community life” (Beaulieu, 2014, p.1). When used for community

evaluation, components of one type of capital are often found to be interrelated with other types of capital (Emery & Flora, 2006).

Most typical applications of this framework emphasize community-scale assets, with analyses focusing on what fosters the development of each type of capital individually and resilient communities overall. While some research has touched on factors that constrain community capital (e.g. Wellman et al, 2001), few studies have considered the “push” and “pull” involved in the composition of all seven types of community capital. In order to develop recommendations for conservation programs and policy, evaluating both facilitators (enablers) and constraints (barriers) as relates to the community capital types may be more useful, as both are needed to develop recommendations for program development and improvement (Shepherd et al, 2013). A facilitating factor can be defined as something that is perceived to promote or support the use of flood irrigation, whereas a constraining factor is something that has the possibility of inhibiting the use of flood irrigation. The concept of facilitating and constraining factors has been applied to past conservation (e.g. drivers of water stewardship behavior of private well owners [Kreutzwiser et al, 2011]). Our adaptation allowed us to categorize these diverse community-level inputs in evaluating the human component of social-ecological service co-production (Palomo et al., 2016).

We developed a model of social-ecological services (Figure 1), integrated with the Community Capitals Framework, that reflects the natural, financial, built, cultural, human, social, and political capital considerations that influence the viability of flood irrigation by ranchers, and, thus, impact the maintenance of working wet meadows. The model reflects the factors that impact the creation and sustainability of working wet meadows by both people and the environment. By exploring these seven types of capital and their intersections in relation to

flood irrigation, through the perspectives of ranchers, we aim to more deeply understand how working wet meadows are co-produced by humans and the environment.



**Figure 1.** An integrated social-ecological services and Community Capital model for understanding how facilitators and constraints lead to the co-production of working wet meadows for ranchers and the environment.

## Methods

### *Study Areas*

The Intermountain West spans parts of eleven states (California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, Nevada, Utah, New Mexico, and Arizona) and 486 million acres from the front range of the Rocky Mountains to the Eastern slope of the Cascade and Sierra Nevada Mountains. The ecologically and geopolitically complex region is also home to many rangelands (Intermountain West Joint Venture, 2013). We conducted our research in two study areas within the region. The two study areas were selected in coordination with the

Intermountain West Joint Venture (IWJV), a joint public-private partnership working on bird habitat conservation across the Intermountain West region. We chose sites that were significant to migratory birds, where flood irrigation was occurring, and where there were local partners with connections to ranchers willing to partner on the project. Additionally, we sought to increase the potential diversity of rancher perspectives by focusing on agricultural regions that spanned state boundaries and multiple counties. The first study area was in Southern Oregon and extended into northeastern California. Ranching is a prominent land use in the region, with 28 percent of the acreage privately owned (Vest, 2018). The region also has a long history of collaboration between ranchers and conservation professionals that has resulted in the conservation of over 42,000 acres of flood irrigated rangeland over the past decade (Intermountain West Joint Venture, 2016). The area, located within the Pacific Flyway, continues to provide vital habitat for the majority of migratory waterfowl and other waterbirds in the Flyway (Fleskes & Gregory, 2010), largely through flood irrigated rangelands (Petrie et al, 2013). In 2016, the region received \$2.6 million through the Natural Resources Conservation Service (NRCS) Regional Conservation Partnership Program for working wet meadow conservation on privately owned, flood irrigated lands (Intermountain West Joint Venture, 2016).

The second study area was in Southwestern Wyoming in the Little Snake River Valley with a geographical focus extending to the Yampa River, which extends from the Little Snake River, in Northwestern Colorado. The primary land use in the region is agriculture, mainly native or cultivated hay crops (Wyoming Game & Fish Department, 2014), and private ownership makes up 39 percent of the region (Vest, 2018). The region is also home to a large wet meadow complex which provides habitat for multiple priority bird species (Wyoming Game & Fish Department, 2014). Although many of these wet meadows remain viable due to intact livestock

ranching operations, they are threatened by commercial and industrial development in the region as well as land subdivision from housing development, particularly given its proximity to Steamboat Springs, Colorado (Wyoming Game & Fish Department, 2014).

### *Landowner-Led Workshop Methodology*

To examine considerations related to flood irrigation among ranchers, we held a landowner-led workshop in each of the study areas. Landowner-led workshops are a unique type of participatory process, originated by Partners for Conservation (PFC) (Partners for Conservation, 2013) for research. Still, they follow principles for effective community engagement discussed in the scholarly literature (Ingles, Musch, Qwist-Hoffmann, Valli, & Joseph, 1999; Kellert, Mehta, Ebbin, & Lichtenfeld, 2000; Plummer & Fitzgibbon, 2004). A workshop-based interaction offered a unique data collection opportunity by facilitating a more informal and interactive experience than other qualitative methods such as interviews or focus groups (Chapter 2). Additionally, the workshops facilitate learning among participants, fostering an atmosphere that supports active engagement by participants (Kueper, Sagor, & Becker, 2013). This approach aligned well with our goals to gain a more holistic understanding of ranchers' experiences with flood irrigation and what they consider in making irrigation decisions.

In landowner-led workshops, the emphasis is on landowners talking while conservation professionals attend and listen to landowners and gain a better understanding of their needs and interests as well as to answer potential questions that arise. Additionally, a facilitator from the area follows a semi-structured script to guide participant discussion throughout the workshop. The workshops were planned in coordination with regional and local conservation professionals. Researchers worked with IWJV, U.S. Fish and Wildlife Service (e.g., Partners for Fish and

Wildlife, Refuges), NRCS, the respective state fish and wildlife agencies, and staff from several non-governmental organizations to plan the meetings and invite appropriate participants, both landowners and conservation professionals. Local partners also identified landowners to talk on two panels during each workshop. Finally, with the research team (the authors), we decided on a list of conservation professionals who they felt had appropriate connection to and interest in the subject of working wet meadow conservation and who would be helpful in answering potential questions during the workshop. In the case of the Wyoming workshop, several additional conservation professionals reached out to the local partners to ask if they could participate and then did attend, accounting for the higher number of professionals in this workshop.

Workshops included presentations and panels by ranchers, facilitated discussions of key questions designed for ranchers to answer, discussions between ranchers and conservation professionals, and informal conversations. The workshop consisted of three sections: 1) experiences with flood irrigation, 2) decisions related to flood irrigation, and 3) experiences with programs and policies related to flood irrigation. A professional facilitator from the local area facilitated each workshop, in coordination with the researchers. Question prompts associated with each section of the workshop were crafted by the researchers, with feedback from the local partners and the facilitator to make sure they were locally and contextually-grounded and would resonate with the participants. During the workshops, one researcher was focused on taking notes and participant observations while the other researcher worked closely with the facilitator to ensure questioning was focused on the research objectives, to ask follow-up questions, and to re-frame the conversation when necessary to align with our research questions. All data for the purpose of this article was sourced from the transcript of the workshop, focusing on what considerations ranchers take into account in their irrigation decision. The case study approach

through landowner-led workshops allowed for deeper access to the issue at hand. Such qualitative methods emphasize contextual components of an issue and place-based nuance which has been argued to be particularly important for rangeland management research (Sayre, 2004).

### *Data Analysis*

We audio-recorded and transcribed the workshops and coded using Nvivo software. As the focus was on understanding what the ranchers thought about flood irrigation, the analysis was only on their comments (i.e. we did not include analysis of the more limited comments of conservation professionals). We based initial coding on the wider categories of social, financial, and natural considerations related to flood irrigation as defined by Palomo et al (2016). During a second iteration, we re-coded more specifically within the seven types of community capital as defined by Emery and Flora (2006): natural, financial, built, cultural, human, social, and political capital. Although the Community Capitals Framework generally focuses on catalysts of community development, given the adaption of the model to focus on a specific social-ecological service (working wet meadow production), we examined how capital both facilitates and constrains flood irrigation. Thus, the capital types were broadly sub-coded as facilitators or constraints. Facilitators included any considerations related to a type of capital that were perceived to positively support and promote flood irrigation, whereas constraints were any considerations that were perceived to have a negative or inhibiting effect on flood irrigation. For consistency, all coding was completed by the lead author using a codebook. The codebook was reviewed and discussed by co-authors and adapted to address questions and further understanding. Results were presented to and reviewed by the co-authors, IWJV staff, and regional and local planning partners to ensure the results resonated with them. Questions raised

by those who reviewed the findings were addressed by querying the coded transcripts and discussion by the lead author and co-authors.

## **Results**

Twelve ranchers and seven conservation professionals participated in the Oregon workshop. Participants represented three counties in the bi-state region with ten ranchers from Oregon and two ranchers from California. The Wyoming workshop was attended by twenty conservation professionals and nineteen ranchers (seven from Wyoming, eleven from Colorado, and one who ranched in both states). Across both workshops, participants articulated various facilitating and constraining factors that influenced the viability of flood irrigation practices on western ranches. These considerations related to all seven categories of community capital (i.e. natural, financial, built, cultural, human, social, and political) (Table 2).

**Table 2.** Summary of facilitators and constraints of flood irrigation

<b>Capital Type</b>	<b>Facilitators</b>	<b>Constraints</b>
<b>Natural</b>	Natural history of landscape Wildlife habitat Land health	Erosion Damage from wildlife Drought
<b>Financial</b>	Better hay production  Fit within economic portfolio Minimized capital outlay  Dependable form of production Conservation incentives	Labor intensive
<b>Built</b>	Pre-existing infrastructure	Maintenance and upkeep
<b>Cultural</b>	Lifestyle centrality	
<b>Human</b>		Skilled labor Future generations
<b>Social</b>	Positive relationships  Recreation/tourism	Development Outsiders Public misperception
<b>Political</b>	Conservation delivery programs Collaboration	Regulation and policy

*Natural Capital: Watershed-Scale Management*

Many ranchers discussed their landscape-scale approach to thinking about their operation, revealing that they manage their land as a part of the greater ecological system, and in line with the natural ecosystem processes therein. For many ranchers, this comprehensive view of the natural environment impacted their rangeland management decisions. The natural capital of the landscape ultimately determined where ranchers can and do flood irrigate. Rather than a decision between flood or sprinkler irrigation, they described irrigation options as constrained by

the natural features of the land including slope, elevation, soils, and water availability. A rancher explained, “A lot of these meadows and areas that are flood irrigated are historically areas that have a lot of water and so they evolved with that soil type.” Further, on landscapes with natural water flows, ranchers saw flood irrigation as “mimicking Mother Nature,” with one rancher explaining, “I consider myself the modern-day beaver. Old beavers dammed ‘em up and now we just kinda control the flooding.” As relates to their perceptions of natural capital, multiple ranchers communicated that they viewed their occupation as directly in line with an environmentalist ethos. A rancher from the Wyoming workshop explained, “I consider my profession one of the first environmentalists around. We’re the ones that created environmentalists.” Flood irrigation facilitates the ecological mindset with which ranchers view their operation.

In line with the landscape-scale mindset revealed by many of the ranchers, there was substantial recognition of the benefit of flood irrigation as cooperating with the nature of the land where it facilitates the natural flow of water on historic wet meadows across the landscape. Several ranchers viewed irrigation as more than the simple application of water to the landscape, acknowledging its role in groundwater recharge, return flows and other watershed processes. A rancher in Oregon described,

So, you know instead of it being a bathtub effect where we put the plug in the bottom of the bathtub and fill it up as full as we can get it and leave it just as long as we could possibly leave it and pulling the plug. We’re pricking fields and turning water right back to the river so that it goes on to whoever gets it below.

This recognition of the full water cycle was in line with the systems-scale lens through which many ranchers viewed their operations.

Ranchers discussed wildlife habitat benefits from flood irrigation. However, the type of wildlife discussed differed between the two locations. Multiple ranchers in Oregon acknowledged the link between flood irrigation and bird abundance and enjoyed the increased bird presence, respecting the coexistence between their operation and wildlife as part of the overall flood irrigated system. A rancher described his experience with birds on his fields: “The amount of birds that are through there in the springtime is amazing.” The increase of wildlife, particularly in migratory waterfowl, related to flood irrigation on working wet meadows was noticeable to many ranchers. Looking more widely at the benefits to wildlife and the larger ecosystem, a rancher in Oregon explained, “Obviously the flood irrigation has a big impact on how the systems are managed more naturally. A naturally managed system draws in natural creatures like the wildlife.” During the Wyoming workshop, ranchers’ discussion focused more on big game species, particularly elk (*Cervus canadensis*). Although birds (e.g. snow geese, *Chen caerulescens*, and ducks) were mentioned occasionally in the workshop as a benefit of flood irrigation, ranchers were much more cognizant of elk and deer habitat on their land. A rancher explained the connection between flood irrigation and elk habitat: “Environmentally, ‘cause we flood irrigate, we have a different species of grass ... which of course draws elk and wildlife to us...And if we sprinkled, that would be gone in a heartbeat.”

In line with these landscape-scale benefits from flood irrigation, several ranchers in the Wyoming workshop discussed the benefits of flood irrigation to the land as a whole. A rancher explained, “What it does is [it] benefits the ecology of the land by keeping that part from Steamboat down a greenbelt... the water is what’s keeping that area green.” One rancher even mentioned the specific benefit of flood irrigation in increasing the nitrogen and protein in the grass which in turn benefited the productivity of his operation.

Although the emphasis was on facilitators of flood irrigation related to natural capital, several constraints emerged. A few ranchers, particularly in the Wyoming workshop, discussed erosion from flood irrigation practices as a drawback. One rancher described, “We were having real soil erosion issues from the flooding that we just aren’t seeing from the pivot ‘cause you just aren’t putting that volume of water on it.” Depending on the slope of the land, the high volume of water spread over the ground from flood irrigation can lead to erosion. Additionally, ranchers, particularly in the Oregon workshop, discussed wildlife damage as a challenge related to flood irrigation. Although they appreciated wildlife on their land, several ranchers expressed frustration with losses to their operation from birds feeding on hay crops and disease (i.e. salmonella) transferred from birds to cattle. One rancher explained the forage loss from wildlife: “You know my grass will be this high and I’ll have 3,000 snow geese come into a field and it’s gone. I’m guessing I’m losing at least 25-30% of my hay production every year.” Finally, several ranchers voiced that climatic fluctuations, particularly related to drought and variable annual snowfall, were potential constraints to flood irrigation as well. When asked about drawbacks to flood irrigating one rancher in Oregon responded, “Might as well put drought on there [a list of issues]... Gotta have water to put in the ditch.”

#### *Financial Capital: Meeting the Bottom Line*

Although management decisions were not purely financially-grounded, it was important to most of the ranchers that they meet their bottom line and maintain a financially stable operation in the long-term with irrigation practices that maintain productivity. A rancher from the Oregon workshop explained, “It comes down to the money ‘cause we don’t do it for laughs

and giggles. It's a business enterprise and the revenue has to exceed the expense, end of the story in that regard."

Given this bottom-line mindset, ranchers recognized several financial assets and challenges of flood irrigation. One rancher explained his motivation to flood irrigate as improving the productivity of his land: "I mean it's the most productive use of that part of the land so yeah that's a big driver of it." More specifically, several ranchers mentioned how flood irrigation improves the land and forage for their operation with a rancher from Wyoming explaining, "We grow better hay crop 'cause we have better use of the water while we have it." The discussion of financial capital considerations extended to how flood irrigation fits within their entire operation portfolio. According to ranchers in the Wyoming workshop in particular, flood irrigation made sense as related to the "economics of cows." That is, the finances of flood irrigation aligned with cattle and commodity prices and other pieces of the production portfolio. One rancher from the Wyoming workshop explained how commodity prices can impact their decisions:

'Til commodity prices start coming up in the beef cow- if we start to where we're having the prices we were getting in 2014 and 2013 on our animals, there'd be a lot more investment in the pivots in my mind. In my mind, my ranch needs to pay for itself... To put in a \$100,000 pivot, it's gotta pencil out somehow.

Additionally, ranchers appreciated the long and proven history of flood irrigation working for agriculture in the region. A rancher from the Wyoming workshop explained the tried and true nature of flood irrigation:

Why do we ranch the way we do? From a strictly production point it's pretty much tried and true. It's been tested. You're batting a lot of singles and you're making a solid offense.

We might not make our home runs and grand slams, but we're still here. The way we've done it has allowed us to keep the place... You know it's the value average as a whole that really matters if you want to be there for the length of it.

Several ranchers valued maintaining this steady viability over the long-term. That is, financial considerations extended to the security of an operation as whole.

Some ranchers discussed the role of conservation incentive programs in alleviating the financial constraints of maintenance and upkeep of flood irrigation. A rancher from the Wyoming workshop explained that conservation program delivery through the NRCS has allowed them to maintain a viable operation, explaining, "Realistically you just plain flat can't get it done with the revenue generated on land." However, involvement with conservation programs and agencies was not for everyone. One rancher in the Wyoming workshop explained, "It was virtually impossible to get anything approved 'cause half my family was very unkind [to NRCS]- signing on the dotted line... it was easier to just not deal with the headache." In the Oregon workshop, several ranchers mentioned concern about the potential repercussions of their involvement including their personal data being shared. They believed information about participants would be accessible due to the Freedom of Information Act (FOIA). A rancher in Oregon described, "With a lot of these NRCS programs and government programs- Freedom of Information Act gives anybody any piece of information we've had to give those people and there's a lot of us that just don't go that way."

Finally, flood irrigation can be resource-intensive, both as relates to dollars and hours. Flood irrigation requires more labor than many other more automated types of irrigation. A rancher in Wyoming explained, "We spend a lot of time irrigating. We're out there eight o'clock in the morning, shoveling, moving water. And we're back out there at six-thirty, seven o'clock at

night doing the same thing... It takes work.” Ranchers recognized the drawbacks of these labor demands, especially when access to skilled labor in many of the communities was already limited. Several ranchers hired “ditch riders” to help clean and maintain their ditches. However, depending on the size and demands of the operation, other ranchers kept all of the labor within their family. A rancher in Wyoming explained, “It’s most efficient for me to spend the time, the labor, which is myself, so I’m not drawing a significant salary.”

### *Built Capital: Keeping Up with the Ditches*

Ranchers perceived built capital as both a facilitator and constraint. They explained flood irrigation often requires less financial outlay than other forms of irrigation because much of the infrastructure is already in place. This pre-existing infrastructure of flood irrigation acted as a facilitator. Given water access and established infrastructure, many ranchers saw flood irrigation as the most cost-effective form of irrigation as they are simply paying for their time and any outside labor.

Built capital constraints focused on concerns related to upkeep of flood irrigation infrastructure. Although there was not the initial capital outlay that newer forms of irrigation may require, many of the structures for flood irrigation are dilapidated and require an increasing amount of maintenance. Responding to the question on the primary challenges of flood irrigation, a rancher from the Oregon workshop explained, “You know just being able to replace structures and you know get the old system back up into place, same time put in some new twists to it if you will. It’s just a pretty tough deal.” As described above in the financial capital section, maintenance of flood irrigation ditch systems was perceived by many to be labor-intensive and demanding. Although conservation programs helped offset some of the financial demands related

to flood irrigation, there was some frustration among ranchers in Oregon with limitations on how conservation funding could be applied related to these infrastructure constraints. For instance, in the Oregon workshop, we heard from several ranchers that they could not use NRCS funding for maintenance or upkeep of infrastructure and it could only be applied to the purchase of new infrastructure.

### *Cultural Capital: It's a Way of Life*

Cultural capital primarily functioned as a facilitator of flood irrigation. Ranchers identified strongly with the ranching lifestyle which has positive implications for flood irrigation. A rancher from the Wyoming workshop explained,

Well I think a lot of people just keep ranching the way they do now because that's all they know and that's what they enjoy. Most of the time you ain't in a family ranch to get rich, it's a way of life. And what better way of life is there? You know you're out on the land. You make your own decisions... for the most part.

For many, these established ranching practices were seen as foundational to their operation and livelihood and multiple ranchers expressed commitment to maintaining this ranching lifestyle. One rancher alluded to the connection between flood irrigation and lifestyle centrality explaining, "The reason we go to flood irrigation is because we have one of the oldest irrigation ditches on the Yampa River...we're following a tradition there that our fathers and grandfathers fostered, that they realized the importance of water and spreading that water." For many, flood irrigation has been used on their ranch for generations, and they felt a certain pride in continuing this traditional approach that connects them to their heritage. Some ranchers worked to promote this approach within the next generation as well to ensure the continuation of the tradition. For

instance, a rancher in the Wyoming workshop explained, “It teaches your generation that you’re raising moral values and stuff like that- stewardship of the ground.”

### *Human Capital: Ensuring Longevity*

Ranchers expressed concern over the future prosperity of agriculture in general, and flood irrigation specifically. The lack of available, skilled labor was a particular constraint noticed by ranchers. A rancher from Oregon described this necessary skill set, “To take a shovel out there and look at the situation and then make the decision there- well I’ll tell ya that’s tough to train somebody to do that.” Additionally, there has been a downturn in skilled labor in many rural ranching communities. A rancher in Oregon explained,

I think there’s a whole set of people that are coming up into the workforce that all they’ve ever done is played video games to where they’d be real good with that automation, but they don’t know a damn thing about a shovel or even running a piece of equipment. That’s scary. It seems to me that’s more and more what you run into: nobody knows how to work.

On top of concern with the skillset needed to maintain flood irrigation, there was concern regarding the continuation of many of the operations by the next generation. Many of the children of the ranchers realized the difficulties of ranching and were hesitant to continue the tough lifestyle demanded by running such an operation. A rancher in Oregon explained,

If the kids can see value in that, they’ll continue with flood irrigation. But if it isn’t there, there’s too much to fight about or something like that, they’ll discontinue it because there’s work to it... and there’s required knowledge in order to make these systems work out there.

Although some ranchers expressed concern with their ability to pass their operation on to the next generation, they respect their children's decisions, fully understanding the difficulty of the ranching lifestyle. With this, several ranchers, particularly in the Wyoming workshop, emphasized the need to work to minimize the burden on the next generation in taking over the ranch. A rancher in Wyoming described,

You just have to have someone who is interested in taking it further. There has to be interest from your children, okay. And to set it up financially so it's not a burden when it does change through estate planning and things like that.

In the face of much of the generational transfer that is impacting ranching and agriculture in the West, ranchers felt it was important to ensure operations are set-up correctly for long-term sustainability.

#### *Social Capital: The Community-Shed*

Ranchers were cognizant of and integrated with their larger social community, including both other ranchers and all neighbors connected to the water system. They acknowledged the community impacts on their operations. With a mindset beyond his individual operation, a rancher from the Oregon workshop described,

Our neighbor's irrigation is largely dependent on the way we irrigate too and so it is kinda a community thing... if we weren't flood irrigated we would have to do you know quite a project to keep from getting wet cause it is a flood SYSTEM.

Ranchers recognized that their irrigation decisions were not independent of their neighbors as water flow is not limited to their fields. This requisite connection with the community was a

facilitator when ranchers have longstanding, trusting relationships with their neighbors. A rancher voiced,

Our two ditches that we're on really communicate really well. Everybody texts, texts when we're turning on more water or somebody's turning down their ditch and the rest so that really works pretty good...and I think it starts off making sure you have a good ditch company or good meetings.

These positive relationships promoted coordination, communication, and making decisions together, facilitating flood irrigation.

Ranchers also identified constraints related to new landowners coming into the area who do not necessarily understand the nature and nuances of the water system. Ranchers discussed noticeable impacts from rural sprawl and related development that is putting pressure on water supplies, fragmenting landscapes, and thus affecting agricultural operations. A rancher from Oregon explained a negative experience he had related to the water use of those upstream of him:

What bothers me or concerns me is when somebody comes in and all of a sudden takes that ditch that went along the side of the hill and puts that water right out in the middle of the field. That not only affects him, but it could affect me and we've had several of those you know 'where'd our water go?'

The upstream-downstream connection between water users was strongly recognized among Wyoming and Colorado ranchers. Ranchers face the vulnerability that comes with the open nature of the watershed and the impact of upstream user decisions on the water availability and use of those downstream.

Despite the perceived constraining limitations to flood irrigation from outsiders, in the Oregon workshop, tourism was largely perceived as a community asset. Although not necessarily

beneficial to their individual operations, ranchers noted the positive cascading effects of tourism for their small, rural areas as it brought jobs and income to the community. Several ranchers also expressed favorable attitudes toward the birdwatchers coming in, such as for the annual bird festival in the area, taking pride in the natural beauty and capital of their community. A rancher explained, “I mean just for small communities that influx of tourism you can definitely see a benefit because it doesn't take much to see the influx in such small communities.”

A primary constraint to flood irrigation was public misperception of ranching. Ranchers discussed the negative attitudes of others (e.g., general public, environmental advocates, policy makers) toward flood irrigation specifically and agriculture as a whole. Many felt that the public did not see the full picture of agriculture and were making evaluations based on misinformation. A rancher from the Wyoming workshop elucidated, “There is a lot of population, I’m sure, in my County that thinks we’re all incompetent, we’re ruining the land out there, we are using those shovels to do bad things.” Ranchers felt much of the general public thinks flood irrigation is an inefficient, unsustainable use of water. One rancher referred to this mindset as the “myth of efficiency,” explicating that the public fails to look at the system-wide level and account for the role of flood irrigation on the landscape in recharging the aquifer and maintaining a functioning watershed.

### *Political Capital: Telling the Story*

Rancher considerations surrounding political capital had strong connections to the facilitators and constraints of social capital outlined above. In the Wyoming workshop, we had several ranchers present who were particularly plugged into the political arena which seemed to fuel much of this conversation. Ranchers saw positive local relationships with conservation

professionals as a facilitator of political capital related to flood irrigation. One rancher explained, “When Fish and Wildlife comes to this valley, it’s ‘let’s go do some stuff.’ And so, what we’ve been able to figure out here is partnerships work a lot better than confrontation.” Ranchers realized the need for partnering and appreciated the role of such relationships in their communities.

Related to the intersection of public misperception and regulation constraints, ranchers were frustrated they did not have a stronger voice in the decision-making arena, calling for necessary education of the public. As discussed above related to natural capital, ranchers described themselves as being stewards of the land and having a deep understanding of landscape-scale needs. One rancher from the Wyoming workshop called for other ranchers to join the conversation:

We better do a little better job of partnering with our conservation partners and start telling a better story of what this means not just in the Yampa and not just in the Little Snake but what’s it mean to those tens of thousands of people that go to the National Wildlife Refuge south of Albuquerque to go look at cranes...because that’s the ecology that you guys buy and we don’t tell that story.

However, the focus of policy and regulation discussion differed between the two workshops. In Wyoming, the focus on water law and policy was very strong. Many ranchers were frustrated with the regulations and policy surrounding water rights. This social complexity of water in the region translated into frustration with state- or federal-level water policy. One rancher described,

As far as the pressure to be more efficient... our administration has mentioned to me a couple times that they were concerned about the puddling of some of the fields in the irrigation district. But a lot of those fields you can't irrigate without a puddle and you're actually more efficient if you get a puddle 'cause you can get in there and get over the wide spots and be done.

In Oregon, although there was discussion of water regulations, the conversation focused heavily on policies ranchers felt limited their freedom and breached their property rights such as the Endangered Species Act and Freedom of Information Act. One rancher explained, "If we lost our permits because of the sage grouse, whatever bird you wanna come up with, what's the beneficial use of that ground then?"

Several ranchers also expressed frustration with funding available only for efficiencies projects which often refers to incentives for newer technologies such as sprinkler irrigation. Some ranchers felt that pressure for increased water savings is pushing funding to be directed toward these types of projects, negatively impacting flood irrigation. For instance, one rancher in Wyoming pronounced,

When you go to the head of the Ag Committee and say thanks for all the money for efficiency, which is real money, right, it's real money coming out. We're gonna go ahead and say 'wait a minute efficiency isn't the ultimate deal,'... But right now, the dollars are on the efficiency side not on the irrigation side.

Despite the frustration, ranchers discussed the role of collaboration among conservation partners and ranchers in countering the constraints of regulation and policy. Also, the ranchers alluded to the long history of collaboration among stakeholders in the regions, working together to manage

complex resource related issues. One rancher in the Oregon workshop discussed the role of collaboration:

We've made inroads in the past fifteen years that are absolutely unbelievable. But it takes honest people sitting around, getting over their biases, their agendas and listening to one another and doing the right thing.

However, there were differing levels and types of collaboration with different organizations and particularly in different places and communities.

In looking specifically at the policy ramifications of collaboration, one California rancher explained the unique collaboration in his region:

I belong to our irrigation district and there's about twenty users and we're a united front. Everything we do, we do together and we go right after the Department of Water Resources... So, we have better success by doing it that way.

Although collaboration was happening on the Oregon-side of this region, this specific type of collaboration related to agricultural advocacy was unique to this California rancher's community. Other ranchers in the workshop were unaware of this specific model, expressing interest in bringing it to their community.

### *Community Capital Interplay: Balancing Interests in Rangeland Management*

Both workshops revealed approaches to rangeland management overall, and irrigation practices specifically, that extended beyond the individual operation. This community-scale, system-wide perspective of ranchers extended into all seven types of capital. In evaluating the intersectionality of the seven types of capital, ranchers often faced trade-offs in managing their operations and evaluated potentially conflicting considerations and interests as related to flood

irrigation. That is, ranchers faced the push and pull of various facilitators and constraints across the spectrum of community capital when making management decisions. One way in which several ranchers managed the push and pull of facilitators and constraints was in balancing natural and financial capital related to wildlife damage. Although they had to maintain an economically viable operation, many were willing to limit profits if doing so contributed to the provision of natural capital. This was true of other ranchers who sought to balance financial interests with cultural outcomes. Many expressed a deep love of ranching and an enduring commitment to keeping agriculture alive, aspirations for which they were willing to make financial concessions to achieve.

## **Discussion**

Flood irrigation is critical for social and ecological reasons. It provides forage for cattle and wet meadow habitat for birds (Lovvorn & Hart, 2001; Peck & Lovvorn, 2001). Recent interest in the transition from flood irrigation to alternative forms of irrigation, primarily center pivot and sprinkler irrigation (Blevins et al., 2016; Donnelly et al., 2015), calls for a need to better understand what is driving these decisions. We applied the Community Capital Framework to more deeply understand rancher decision-making in the context of flood irrigation and working wet meadows, evaluating what facilitators and constraints influence their decisions. In summary, we found that ranchers consider complex, multifaceted factors across the social-ecological system when approaching irrigation decisions. Facilitators and constraints related to all seven types of capital (i.e., natural, financial, built, cultural, human, social, and political).

Conservation professionals often reduce ranching to a predominantly economic endeavor, assuming that profit maximization is the primary motivator of rancher decisions (Kreuter et al, 2006; Willcox & Giuliano, 2011). However, we found that the drivers of ranching decisions were multifaceted, complex, and interrelated, involving components of all seven types of community capital (i.e., natural, financial, built, cultural, human, social, and political). Although the Community Capital Framework has been applied to agricultural communities related more broadly to community development (e.g. Flora et al, 2012; Salamon et al, 1998), its application to the production of a specific social-ecological service provides insight by looking beyond the benefits to the ecosystem to a more holistic analysis of community-level impacts. Most ranchers in our workshops were not purely profit maximizers when it came to making decisions about their land. For instance, several ranchers mentioned that they consider themselves ‘environmentalists’ or ‘wildlife biologists,’ managing the landscape in consideration of the larger environmental system, particularly as relates to their irrigation practices. This intimate connection with the environment has been seen in other ranching communities (Knapp and Fernandez-Gimenez, 2009; Sheridan, 2007; Willcox et al., 2012) and has been found to influence land management decisions (Cross, Keske, Lacy, Hoag, & Bastian, 2011; Willcox & Giuliano, 2011). Similarly, we found the ecological context within which ranchers operate often had a strong impact on their irrigation decisions. That is, the irrigation methods used by ranchers were often determined by environmental components of the landscape such as slope, water availability, and soil type.

Further supporting the multifaceted nature of rancher decisions, one of the most prominent areas of discussion amongst ranchers reflected cultural capital. Ranchers repeatedly came back to the importance of maintaining a ranching culture in rural communities. Lifestyle

centrality, or “the strength with which a landowner identified him or herself as a rancher” can impact landowner motivations for decisions on their land (Sorice et al, 2012, p.145). Past research supports this finding that ranchers are not purely financially motivated and are willing to trade monetary gain for maintaining a traditional lifestyle (e.g. Brain et al, 2014; Didier and Brunson, 2004; Willcox and Giuliano, 2011; Yung et al, 2015). This commitment to ranching has been found to be particularly strongly associated with traditional agricultural practices (Yung et al, 2015). Flood irrigation--a practice important in the west for over a century (Peck & Lovvorn, 2001)--fits this characterization. Flood irrigation is unique among conservation practices often studied on private lands in that ranchers are not taking on something new, instead the conservation activity (for the sake of wet meadow wildlife habitat) is continuing with the old despite technological innovation (i.e., sprinkler irrigation). Therefore, it is not surprising that we found lifestyle centrality to be a facilitator of conservation, rather than a constraint as in other research where the conservation behavior requires innovation adoption (e.g, Didier and Brunson, 2004). However, in an effort to maintain the ranching culture in their communities, ranchers expressed concern about the ability to pass their operation on to the next generation. As ranchers age they are facing the challenge of keeping their operation alive (Brunson & Huntsinger, 2008; Travis, 2007). Support in succession planning, through workshops or technical assistance, may be needed to ensure sustainability of ranching in many of these rural communities.

Although profit maximization alone does not explain the decision-making context for flood irrigation for most ranchers, financial issues were highly salient. That is, ranchers needed to be able to meet the bottom line to remain viable. For many ranchers, flood irrigation was important as a financially viable approach to forage production. Yet, the labor demands of flood irrigation became a financial burden for some ranchers and had to be weighed. Similarly, a

human capital constraint, enough skilled labor has to be available for landowners to flood irrigate, a practice that traditionally requires a higher labor demand (Food and Agriculture Organization of the United Nations, n.d.).

In summary, related to financial, human, and built capital, ranchers must consider these various challenges in managing their operations and ensuring long-term sustainability. Additionally, related to built capital, financial and time demands of maintaining old and dilapidated infrastructure (e.g. ditches) were primary constraints to flood irrigation. This finding certainly has implications in the design and application of conservation programs in the future, particularly given the interrelated nature of wildlife habitat, floodplain function, and forage production from flood-irrigated wet meadows.

Social and political constraints also influenced ranching operations as a whole and flood irrigation specifically. For instance, ranchers, particularly in our Wyoming workshop, were faced with development pressures that are impacting their communities and operations. Past research has also found that ranchers feel the impacts of development pressure on their operations (Brain et al., 2014; Rissman & Sayre, 2012). Related to the potential impacts of these social pressures on ranching communities, recent research found that upwards of 45 percent of U.S. ranches are being sold every decade (Gosnell & Travis, 2005). While research is limited on the impacts of development on ranches of flood irrigators specifically, potential changes to the landscape can be socially significant, such as altering community networks (Yung & Belsky, 2007), and ecologically impactful, such as pressure on water resources (Hansen et al., 2002) and fragmentation of habitat (Brunson & Huntsinger, 2008).

Our finding of the social-ecological complexity of rancher considerations suggests the importance of integrating the full spectrum of community capital facilitators and constraints into

conservation design and delivery, particularly those traditionally less incorporated (i.e. human, social, and cultural capital) to ensure successful, sustainable engagement of ranchers and maintenance of working wet meadows. For instance, as called for in other studies, our findings from the two locations support the idea of moving away from simply financial incentives to promote sustainable private land conservation (Langpap, 2006; Ramsdell, Sorice, & Dwyer, 2016). Yet, based on our case study, we do not recommend fully abandoning financial incentives. Instead, it is crucial that they continue to be one of the conservation tools available and that they be designed to ensure ranchers can meet the bottom line while considering the diverse commitments and constraints they face. Thus, according to our findings, conservation incentive program success might be improved by appealing to the specific constraints of ranchers while emphasizing financial viability. For example, we recommend reconsidering some of the statutes and policies of the NRCS' Environmental Quality Incentives Program, given the NRCS incentive program for flood irrigation in Oregon, as we heard in Oregon that maintaining existing infrastructure is the built capital constraint that ranchers face.

Although the Community Capital Framework has been applied to agricultural communities related more broadly to community development (e.g. Flora et al, 2012; Salamon et al, 1998), it had not been applied to the production of a specific social-ecological service. Our application of the framework was also unique in evaluating the push and pull of facilitators and constraints related to all types of capital. That is, we evaluated the various factors that enable flood irrigation (facilitators) and those that are barriers to it (constraints). Given that many environmental processes transcend property boundaries, ranchers are often driven to consider a diversity of factors, both social and environmental. Use of this approach within ranching communities can help identify and inform conservation research and ensure delivery is grounded

in local social and ecological context that incorporates rancher needs and interest. Our application of the framework to flood irrigation and working wet meadows provides a more holistic view of the full social-ecological system and sheds light on larger issues within the community such as related to development pressures and the next generation of ranchers. Beyond flood irrigation, the framework could be applied to other conservation issues within rangelands such as soil regeneration, woody plant encroachment, and water conservation to evaluate the diversity of factors at play in rangeland management. In community planning, Flora et al (2006) emphasize incorporating place-specific elements in each step of the process. Based on our application, organizing these place-based nuances through the lens of community capital would likely be beneficial applied to rangeland management.

While our research revealed a great deal of similarity between two locations, the case study nature of the research also presents potential limitations. Care should be taken in extending these insights beyond the two specific areas in which we worked: Southern Oregon/Northeastern California and the Southwestern Wyoming/Northwestern Colorado regions. Case studies, like other qualitative approaches, allow for deeply exploring the context and nuances of the research topic. They are not meant for broad-scale generalization across a region. We also acknowledge that our insights are shaped by those who were recruited by conservation professionals and chose to attend the workshop. Given that our approach involved local conservation professionals determining which ranchers to invite, there was potential that the invitation process was limited to ranchers that they already knew or ranchers already involved in environmental programs. We tried to limit the bias from this approach by having conservation professionals use a spreadsheet of diverse demographic factors and operation characteristics (e.g. experience with flood irrigation, age, gender, size of operation, involvement in conservation

programs, location) when developing a list of landowners to invite to help promote a diversity of perspectives.

### **Implications**

Applying the Community Capitals Framework to understand the social-ecological service of working wet meadows revealed diverse and complex facilitators and constraints that span across all seven capital types. Ensuring these multifaceted considerations are accounted for can be achieved through communications efforts, partnership development, and conservation programs and policy. Related to communications, our findings reiterate the importance of acknowledging and communicating to various audiences the awareness that many ranchers have of their local environments and their potential role in landscape-scale conservation in their communities. Many ranchers felt they were not being appreciated for their role in providing food to people, downstream water, and wildlife benefits, particularly related to flood irrigation. Those in surrounding communities (as indicated in the Oregon workshop, a closed watershed, urban areas downstream (as indicated in the Wyoming workshop, an open watershed), or those moving into rural areas (e.g., resort town new residents) are an important audience for these communication efforts.

Further, to fully address the social-ecological complexity of rancher decisions into programs and policies, conservation efforts need to be grounded in the context of the individual place, moving away from a one-size-fits-all approach of many large-scale conservation programs. Thus, it is critical that those on the ground delivering conservation programs, such as partner biologists, are versed in local, place-specific constraints and considerations. The value of partner biologists is extended when they are supported in gaining the skills and allocated the time

required to build relationships with ranchers. Further, relationships among ranchers and conservation professionals are an important part of the multifaceted context within which ranchers operate and make decisions. An awareness of the multifaceted, contextual factors influencing ranchers' decision-making among diverse audiences, from conservation professionals to policy makers to the general public, can lead to stronger communication, partnerships, and ultimately conservation outcomes. Support for landowners and partners working with landowners (e.g. training, coaching, mentoring) to in key aspects of trust building, partnership development and sustaining collaborative efforts will increase the likelihood of their success. Still, given the contextual nature of many of our findings, it is important to evaluate the effectiveness of efforts to implement these results and continue to learn how specific communities respond to programs and policies. This cycle of implementation, evaluation, and re-assessment will benefit rangeland management.

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## **Chapter 2. Evaluation of Landowner-Led Workshops: An Innovative Method for Participatory Natural Resource Research**

### **Abstract**

Participatory approaches to natural resource research have become increasingly popular in recent years, ensuring local knowledge is incorporated into conservation decisions while also empowering local community members in local resource management. Evaluation of these processes is important to understand if and how different methods achieve stated goals. In this study, we investigated how a novel participatory research method, landowner-led workshops, performed according to several criteria. We applied mixed-methods empirical evaluation of the workshops including participant observation, coding of the workshop transcript, and a post-workshop debrief survey. We found that landowner-led workshops provided a unique space for informal, open conversation with both conservation professionals and landowners benefiting from such candid social learning. However, workshops did not perform consistently on fostering the diversity of participation. Based on our two applications, we conclude landowner-led workshops show promise for enhancing participatory research within the realm of natural resource management, empowering community members, and bridging the gap between conservation professionals and landowners.

## Introduction

Participatory research methods emphasize a partnership-driven approach, empowering and stressing the involvement of local community members (Ablah et al., 2016) and emphasizing approaches that are mutually beneficial to all partners (Williams, Shelley, & Sussman, 2009). Recently, these methods have grown increasingly popular as researchers have become more aware of the benefits of involving diverse stakeholders in the research process (Bergold & Thomas, 2012). Participatory research offers particular promise for private lands conservation research, involving landowners and other local partners in the conservation process. Engaging landowners in the conservation process can lead to more community buy-in and conservation involvement (Sorice & Donlan, 2015). Additionally, professionals can learn local knowledge and values that must be considered to effectively manage resources (Carr & Halvorsen, 2001; Fortmann, 2008; Kellert et al, 2000). One method for engaging diverse stakeholders in conservation through participatory research is landowner-led workshops. However, evaluation is needed to determine the level of stakeholder engagement landowner-led workshops provide (Kaufman, Ozawa, & Shmueli, 2014). Thus, we did this study to evaluate the potential of landowner-led workshops in engaging landowners and conservation professionals in conservation through participatory research.

### *Landowner-Led Workshops as Community-Based Participatory Research*

Landowner-led workshops were originally developed by Partners for Conservation (PFC), a collaborative, grassroots conservation organization based across the United States, and used to enhance stakeholder engagement (Partners for Conservation, n.d.). While these

workshops have led to reports with key findings, they have not been used formally as a participatory research method. Landowner-led workshops offer a unique opportunity for inverting traditional power dynamics, such as between private landowners and conservation professionals. While the primary purpose of landowner-led workshops as we applied them as a research technique is to gain access to local stakeholder knowledge and perceptions on a certain topic, there is also the opportunity for engaging and empowering diverse stakeholder groups (Taylor et al, 2004). Such local empowerment was one of the original goals of landowner-led workshops as implemented by PFC as an applied approach. An atmosphere emphasizing knowledge exchange can foster trust building, network development, and collective action (Kueper et al, 2013; Muro & Jeffrey, 2008). Although conservation professionals attend these workshops, the emphasis is on hearing from landowners. According to the model used by PFC, the key tenets of landowner-led workshops include: 1) more landowners are in the room than conservation professionals, 2) landowners present on panels and share their experiences, 3) landowners lead and professionals listen, 4) workshops facilitate benefits to landowners.

Landowner-led workshops offer potential as a form of community-based participatory research (CBPR), a form of participatory research that has primarily been used in the health field. CBPR uses partnerships with those grounded in the community of interest to develop knowledge across all components of the research process (Israel et al, 2005; Schulz et al, 2003). Similar to landowner-led workshops, benefits of CBPR include enhanced research quality by bringing together partners with unique knowledge sets, improved community well-being, increased trust among partners, and increased relevance of the research to the community of interest (Israel et al, 2005). The methodology and objectives of landowner-led workshops run parallel to those of CBPR, applying these principles specifically to landowner engagement and

conservation. Landowner-led workshops emphasize this knowledge-sharing through the goal of increasing conservation professional understanding of landowner considerations, interests, and needs. Additionally, local leaders and representatives play a key role in the planning and implementation of landowner-led workshops. Given the complexity of many local systems, engaging local conservation professionals in the planning process can help ensure that the methods are locally relevant and applicable while also enhancing quality and validity of the research (Israel et al, 2005; Martin & Sherington, 1996).

Through our research, we sought to evaluate landowner-led workshops using CBPR criteria to determine how landowner-led workshops engage landowners in community-scale conservation research and what this approach offers as a novel form of both data collection and stakeholder engagement. We based our evaluation on a framework for evaluating CBPR put forth by Blackstock et al (2007) and adapted it to fit the unique nature and objectives of landowner-led workshops.

## **Methods**

### *Study Areas*

We conducted our study of landowner-led workshops as part of a larger project examining landowner perspectives on flood irrigation and working wet meadow conservation on private rangelands in the Intermountain West. The Intermountain West spans parts of eleven states (California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, Nevada, Utah, New Mexico, and Arizona) and covers 486 million acres from the front range of the Rocky Mountains to the Eastern slope of the Cascade and Sierra Nevada Mountains (Intermountain West Joint Venture, 2013). We conducted the workshops in two areas that were selected in

coordination with the Intermountain West Joint Venture (IWJV), a public-private partnership focused on bird and habitat conservation across the Intermountain West region. We chose sites that were significant to birds, where flood irrigation was occurring, and where there were local partners with connections to landowners who wanted to partner on the project. Additionally, we sought to increase the potential diversity of landowner perspectives by including areas that crossed state and/or county boundaries.

The first study area was in the Southern Oregon portion of the Southern Oregon-Northeastern California (SONEC) region of the Intermountain West. Ranching is a prominent land use in the area and the region also has a long history of collaboration between landowners and conservation professionals that has resulted in the conservation of over 42,000 acres of flood irrigated rangeland over the past decade (Intermountain West Joint Venture, 2016).

The second study area was in southwest Wyoming in the Little Snake River Valley with a geographical focus extending to the Yampa River, which runs from the Little Snake River, in northwestern Colorado. The primary land use in the region is agriculture (Wyoming Game & Fish Department, 2014). The region is also home to a large wet meadow complex that provides habitat for multiple priority bird species (Wyoming Game & Fish Department, 2014). Although many of these wet meadows remain viable due to intact livestock ranching operations, they are threatened by commercial and industrial development in the region as well as land subdivision from housing development (Wyoming Game & Fish Department, 2014).

#### *Landowner-Led Workshop Methodology*

As part of the larger study on flood irrigation, each of the landowner-led workshops brought together landowners and conservation professionals for a day of facilitated discussions

and panels. The target population was private landowners who ranched in the Intermountain West with some experience with flood irrigation. The applied conservation purpose of the workshop was to explore what considerations act as facilitators and constraints to maintaining flood irrigation on the landscape and how these factors interrelate.

Researchers worked with the IWJV, Fish and Wildlife Service (FWS), the Natural Resource Conservation Service (NRCS), the appropriate state fish and wildlife agency, NGO staff, and one or two local landowners to plan the workshops. The researchers conducted monthly planning calls with all involved partners to coordinate all components of the workshop and co-produce all research materials including the semi-structured script and the workshop agenda. The local planning team led the invitation process for both landowners and conservation professionals, guided by the researchers. A spreadsheet with different demographic factors and operation characteristics (e.g. experience with flood irrigation, age, gender, size of operation, involvement in conservation programs, location) was provided to conservation professionals to aid in deciding which landowners to invite to help promote a diversity of perspectives. Local partners were provided with an information sheet and invitation script to use when talking to landowners. Conservation professionals with an appropriate connection to the subject of working wet meadow conservation were identified by local partners and then were invited by researchers via email. Prior to the workshop, researchers (Oregon Workshop and Colorado landowners in Wyoming workshop) or local partners (Wyoming landowners in Wyoming workshop) sent a fact sheet on the research project, a consent form to review, and an agenda to all participants. Landowners who served as panel participants also received a brief list of questions to consider for the panel via email from the researchers.

Workshops included presentations and panels by landowners, facilitated discussions of key questions designed for landowners to answer, discussions between landowners and conservation professionals, and informal conversations. The workshop consisted of three sections: 1. experiences with flood irrigation, 2. decisions related to flood irrigation, and 3. experiences with programs and policies related to flood irrigation. A professional facilitator from the local area facilitated each workshop, in coordination with the researchers. Question prompts associated with each section of the workshop were crafted by the researchers, with feedback from the local partners and the facilitator to make sure they were locally and contextually-grounded and would resonate with the participants. During the workshops, one researcher was focused on taking observations while the other researcher worked closely with the facilitator to ensure questioning was focused on the research objectives, to ask follow-up questions, and to re-frame the conversation when necessary.

### *Data Collection and Analysis*

Evaluative criteria for the workshops, based off of the CBPR evaluation of Blackstock et al (2007), included: satisfaction, clarity of/focus on objectives, spread of representation, spread of voices heard, conflict management, relationship development, benefit to participants, and social learning. (See Table 1 for definitions of each criterion). For our evaluation, we used a mixed-methods approach to data collection including a post-workshop survey of participants and participant observation, and analysis of the workshop transcript. When possible, objectives were assessed with all methods to allow for triangulation of findings.

**Table 1.** Evaluative criteria for landowner-led workshops based on previously applied framework for evaluation of community based participatory research (Blackstock et al 2007)

<b>Criteria</b>	<b>Definition</b>	<b>Source(s) of data</b>	<b>Survey question(s)<sup>1</sup></b>
Focus on objectives (clarity of objectives)	The ability to maintain a focus on the goals and objectives of the process and if participants understood the goals and objectives of the process	Survey, observation	L: Were the objectives of the workshop clear to you before the workshop? (Yes/No)
Spread of representation	The diversity of participants in attendance	Survey	P: Based on your past experience, do you feel that all voices and opinions of landowners' experiences with this issue were present at the meeting? (Yes/No) P: If no, what type of landowners were missing? (Open-ended)
Spread of voices heard	The equity of different perspectives and voices heard	Survey	L: To what extent did you feel you were able to openly voice all of your thoughts and opinions during the workshop? (5-point Likert scale, Always to Never). Please explain your response. (Open-ended). If you could've expressed your thoughts more openly, what would you have told us in addition? (Open-ended)
Conflict management	The extent to which tension and disagreement was successfully resolved/managed by the facilitator and participants	Survey, observation	L/P: In your opinion, what (if any) were the major points of conflict or tension in the workshop? Please explain your response. (Open-ended) L/P: How do you feel these conflicts or tension were handled by the facilitator? By the group at large? Please explain your response. (Open-ended)
Relationship development	The extent to which new connections and	Survey, observation	L/P: Do you feel you formed a meaningful connection with anyone new at the workshop?

<b>Criteria</b>	<b>Definition</b>	<b>Source(s) of data</b>	<b>Survey question(s)<sup>1</sup></b>
	correspondences were fostered by the workshop		(Yes/No). Please explain. (Open-ended)
Benefit to participants	The extent to which participants felt they gained from the workshop	Survey, observation	L: To what extent do you feel you got everything you wanted out of the workshop? (5-point Likert scale, Strongly agree to Strongly disagree) L: Was the workshop worth your time? (Yes/No) P: What do you feel you gained from the workshop? (Open-ended) L/P: Overall, how satisfied were you with the workshop? (5-point Likert scale, Very satisfied to Very dissatisfied)
Social learning	The spread of knowledge between stakeholders (including better understanding of landowner needs)	Survey, observation	L/P: What (if anything) did you learn about the topic from other landowners? From other conservation professionals? (Open-ended) P: To what extent do you agree with the statement, “The workshop provided me with a better understanding of landowner needs and interests”? (5-point Likert scale, Strongly agree to Strongly disagree)

<sup>1</sup>L refers to the survey of landowners and P refers to the survey of conservation professionals

Surveys were distributed to participants at the end of the workshop with a different version for landowners and conservation professionals. Participants were given approximately ten minutes to complete the survey and were asked to return the survey to a manila envelope before leaving to ensure anonymity. Close-ended survey responses were entered and frequencies calculated in Excel. Open-ended survey responses were transcribed and analyzed qualitatively within each criterion.

Participant observation data were recorded using a pre-developed spreadsheet (Appendix B) during the workshop including a definition and indicators of each. One researcher focused on taking observations during the workshops. The same researcher conducted the observations at both workshops for consistency. The other researcher at the workshop (who was different in the two workshops) took some notes, as able, when not supporting the facilitator. These observations were also collected for analysis. Participant observation notes were transcribed from the observation spreadsheet (Appendix B) into Microsoft Word and qualitatively analyzed using a codebook for the seven criteria. Qualitative data from the audio recordings of the workshop (landowner, conservation professional, and facilitator remarks) was transcribed and also analyzed by deductive coding with each criterion as a category using Nvivo software.

## **Results**

Twelve landowners and seven conservation professionals participated in the Oregon workshop. Participants represented three counties in the bi-state region with ten landowners from Oregon; and two landowners from California. In Wyoming, 19 landowners and 20 conservation professionals with 7 landowners from Wyoming, 11 landowners from Colorado, and 1 who ranched in both states, participated in the Oregon workshop.

At the end of the workshops, we received 12 landowner surveys and 6 professional surveys from the Oregon workshop and 15 landowner surveys and 16 professional surveys from the Wyoming workshop. Thus, the response rate was 80% for landowners and 79% for professionals from the Wyoming workshop, and 100% for landowners and 86% for professionals from the Oregon workshop.

### *Clarity of/Focus on Objectives*

We found mixed results related to clarity of/focus on objectives. At the Oregon workshop, all but one (11 of 12) landowner felt the objectives of the workshop were clear beforehand. At the Wyoming workshop, according to the survey, 8 landowners felt the objectives of the workshop were clear before the workshop and 6 landowners felt they were not. Everyone who responded that the objectives were not clear from both workshops were either very satisfied or satisfied with the workshop.

We observed that participants tended to stay focused on the workshop objectives with conversation staying on the topic of flood irrigation and working wet meadows. Overall, the conversation always related to the larger context related to rangeland decisions. The facilitator occasionally had to refocus the discussion on the question at hand and for the most part was able to let the landowners lead the course of the conversation. Additionally, particularly in the Oregon workshop, the conservation professionals sometimes took the discussion in a different direction. For instance, one conservation professional in Oregon moved the conversation to the topic of agricultural zoning, asking landowners their opinion.

### *Spread of Representation*

We measured perceived spread of representation only through the survey of conservation professionals; as outside researchers we did not have a sense of the breadth of perspectives in the full population outside of who attended, making observations ineffective for this criterion. We received differing results from the two workshops. All but one (11 of 12) professional in Wyoming responded “yes” that all voices and opinions of landowners’ experiences with the

issue were present at the workshop. However, we heard the opposite in Oregon with 1 responding “yes” and 5 responding “no.” When asked what voices and opinions were missing, one professional felt that “small operators” and “hobby farmers” were not present at the meeting. Another professional felt the “less progressive” producers were missing whereas another felt that “those that have already converted away from flood” were not present.

### *Spread of Voices Heard*

In looking at spread of voices, we were primarily interested in evaluating if certain participants spoke more than others in the room. All landowners in both workshops felt they were able to openly voice their thoughts and opinions ‘always’ (n= 10 in Oregon and n= 11 in Wyoming) or ‘most of the time’ (n= 2 in Oregon and n= 4 in Wyoming). However, despite this overall perception of open conversation, several landowners, particularly in the Wyoming workshop, suggested in their comments on the survey that they were hesitant at times to speak up for various reasons. For instance, one landowner from the Wyoming workshop wrote, “I don’t want to offer things that may be counterproductive to the goal of the workshop,” and another wrote that they were “a little intimidated at times due to the expertise of some participants.”

In both workshops, the facilitators emphasized hearing from landowners who had not spoken as much. For instance, after one of the panels in the Wyoming workshop the facilitator emphasized hearing diverse viewpoints: “We really would like to hear other perspectives of the things that you heard in the panel that resonated with you or the things you feel like in your situations are a little bit different.” The facilitator later encouraged landowners who had not been as vocal to speak up stating, “Who has some thoughts? Especially anybody who has not had much to say.” Although in both workshops a majority of landowners spoke throughout the day,

some landowners notably spoke more than others. In the Wyoming workshop the landowners who participated on the panels tended to talk more than others even during the parts of the day that were open to discussion among all participants. Also in Wyoming, the two female landowners did not speak at all except in introducing themselves. In Oregon there was only one female landowner who spoke throughout the workshop. However, both the facilitator and other participants fostered an atmosphere that led to hearing diverse perspectives. In the Oregon workshop, the facilitator prompted two landowners to speak saying, “I think the two of you, where you operate, is unique.” These prompts were more common in the Oregon workshop which may be due to the facilitator in that workshop personally knowing almost all of the participating landowners. However, in the Wyoming workshop, some of the more vocal landowners occasionally called on the quieter landowners to speak at points in the same way that the Oregon facilitator did.

### *Conflict Management*

Based on open-ended survey responses, many participants in both workshops felt there was little to no conflict in the workshop. The written responses of 10 participants in the Oregon workshop and 12 participants in the Wyoming workshop specifically mentioned lack of conflict. Still, 17 participants in Wyoming and 4 participants in Oregon listed a specific type of conflict such as related to the impact of development on water availability and operation viability. In both workshops, several participants felt there was conflict related to some of the policy, regulation, and outsider misperception discussion. For instance, in Oregon, one landowner wrote, “Any sort of regulatory issue was a hot button topic. Some participants were very vocal while others were not. I think the quiet ones were silent to avoid conflict.”

The written responses from 7 participants in Oregon and 22 participants in WY (landowners and conservation professionals) specifically mentioned that any conflict that did arise was handled well by the facilitator and group at large. For instance, one landowner wrote that the facilitator “let the discussions naturally run their course” where “folks were able to gripe for a bit, and then productive conversation resulted.” No respondents mentioned anything related to it not being handled well. However, 8 participants in Wyoming and 7 participants in Oregon left this open-ended question blank.

Similarly, we observed little to no conflict emerging throughout the workshop. Participants were respectful of and attentive to the opinions of others. When any tension did emerge, such as related to water policy and regulation or management of federal grazing allotments, the facilitator allowed landowners to voice their frustration and concerns fully before moving on.

### *Relationship Development*

The majority of participants felt they formed a meaningful connection with someone new at the workshop. Landowners particularly felt they developed relationships; all but one (10 of 11) landowner in Wyoming and all but two landowners in Oregon responded “yes” (n=9) to the associated question about relationship building. Slightly fewer professionals felt they formed a meaningful connection in both Wyoming (“yes” n=11; “no” n=3) and Oregon (“yes” n=4; “no” n=2).

In both workshops, participant observation revealed many pre-existing relationships amongst landowners and conservation professionals as they greeted each other or talked about past experiences with each other. For example, many of the landowners in Oregon appeared to

already know the NRCS representative through past interactions and involvement. However, particularly during lunch and networking breaks, we observed several landowners and conservation practitioners discussing topics brought up throughout the workshop with others, even those who they did not seem to know well or at all coming in to the workshop.

### *Benefit to Participants*

When asked if they got everything they wanted out of the workshop, the majority of participants felt they benefitted from the workshop with no landowners disagreeing or strongly disagreeing with the statement. Most landowners “strongly agreed” (n=1 in Oregon and n=4 in Wyoming) or “agreed” (n=11 in Oregon and n=8 in Wyoming) with the statement, and several responded “neither” (n=1 in Oregon and n=3 in Wyoming). Additionally, in both workshops, landowners reported that they felt the workshop was worth their time. Several landowners voiced appreciation of being heard. One landowner wrote, “You were here to listen and not tell us.” Only one landowner responded that the workshop was not worth their time, commenting “too much meeting, more boots.”

We also observed that landowners and conservation professionals stating they benefitted from and were satisfied with the workshop. For instance, at the Oregon workshop, one landowner explained, “This is extremely important what is being done here today and thank you guys for setting up the opportunity to do that.” Another landowner at the Wyoming workshop described, “I haven’t seen a gathering like this for a long time and it’s a powerful thing.”

### *Social Learning*

The majority of participants felt they learned from other participants. In both workshops, according to the survey, all but one professional either “agreed” (n=12) or “strongly agreed” (n=9) that they gained “a better understanding of what landowners are concerned about” and a “deeper understanding of the threats to flood irrigation,” with only one professional responding “neither.” Examples included learning about “issues being dealt with by landowners” and “a better understanding of landowner needs and interests.” One professional specifically responded that they learned “the perceived threats to flood irrigation are different than conservationists believe.”

In line with survey findings, in both workshops, we observed that the interactive format of the workshop promoted social learning. Participants appreciated the opportunity to be heard and have deep conversation. For instance, one landowner said during the Oregon workshop, “I think it’s important to do what you guys are doing in this situation, which is coming and discussing these things because the more education you have, the easier it is to fight those battles.” Another landowner in the Oregon workshop expressed similar appreciation: “To me that’s the positive thing to come about here is from having a group come in and not know the benefits of flood irrigation to having people now understanding the benefits of flood irrigation.”

We observed interest from both conservation professionals and landowners in learning from each other throughout the day. Particularly in the Oregon workshop, professionals asked questions of the landowners such as what they thought of potential conservation programs and policies (e.g. water banking and conservation easements). Some landowners also seemed interested in learning from conservation professionals as they called on their scientific expertise,

such as related to availability of data on the amount of hay forage consumed by birds or conservation principles such as the best type of grass for waterbird habitat. One landowner described the benefit of hearing from conservation professionals stating, “You know we all want to be science-based.”

## **Discussion**

While participatory research methods have been touted for their mutual benefits to all involved parties (Williams et al, 2009), there is a need to empirically evaluate the success of these processes in meeting this goal (Blackstock, Kelly, & Horsey, 2007; Kaufman et al, 2014). Thus, we evaluated the effectiveness of landowner-led workshops in engaging participants and reflected on their impact/role as a participatory research approach in the realm of private lands conservation. We found that landowner-led workshops have advantages for both landowners and conservation professionals, promoting power-sharing and local empowerment in the information-gathering process. Landowners appreciated being listened to and having the chance to communicate with others in an open setting. Our findings suggest the need for and importance of participatory research to inform policy and programs for private landowners.

We found that the primary advantages of the workshop method related to “social learning” and “benefit to participants.” Landowners and conservation professionals learned from each other and became aware of new perspectives and concerns and they appreciated this benefit. As highlighted by Mueller et al (2010), such participatory methods that emphasize community input in conservation can promote more locally-relevant dialogue. Further, gaining insight into

locally relevant information is critical for designing programs and policy for private landowners applicable to their needs and interests (Sorice & Donlan, 2015).

Our results also suggest several limitations of the landowner-led workshop, particularly in looking at the impact of power-sharing in the planning and implementation process of the workshops between researchers and local partners. The role of the researcher within participatory research processes can vary depending on the context of the community and the specific needs of the process at hand (Dickson & Green, 2001).

While this power-sharing between researcher and community partners has its benefits, it can also have drawbacks. For instance, some conservation professionals, particularly in the Oregon workshop, felt certain voices and opinions were missing from the conversation. Having local conservation professionals determine who to invite to the workshops may have limited spread of representation as, even though they tried to invite a diversity of landowners, they may simply know more landowners who were more likely to already be involved with conservation. This, in turn, may have had an impact on the lack of conflict we found in both workshops as landowners with potentially dissenting opinions may not have been present. Yet, it should be noted that this issue of who attends is also problematic for focus groups as those who are most passionate about an issue are most likely to make the effort to participate (Hennink, 2007). Since the goal of this qualitative method is not to be generalizable to the full population of landowners, this limitation should be noted but does not diminish the value of the workshops.

Further, putting control in the hands of local partners led to different approaches for recruitment between the two workshops, which may in turn have impacted results. In Oregon, partners invited specific landowners directly and Wyoming partners sent the invitation to a broad listserv of Wyoming landowners. Colorado landowners (part of the Wyoming workshop) were

invited directly by a local partner in Colorado. This might explain why there was a greater spread of representation in Wyoming. Or, it may be due to the sheer number of landowners who attended, even though we had suggested to the local partners to keep the number to a size we felt would be more manageable (approximately 15 landowners). Also notable, different results related to “clarity of objectives” between the two workshops may have been impacted by the differences in recruitment process. Objectives may have been clearer in the Oregon workshop as the information was directly communicated to invited landowners whereas it was broadly distributed in Wyoming. Maintaining consistency of recruitment and participant preparations that you get with traditional research processes may be lost with this power-sharing. However, we had local partners lead the invitation process for several reasons. First and foremost, as we were asking to have landowners spend all day at a workshop we wanted to have those who landowners trusted ask them to come and emphasize it was worthwhile to participate. Also, as we didn’t know landowners in the region, we wanted to utilize the collective knowledge of those who knew landowners to help us recruit a mix of landowners with flood irrigation experience and a diversity of experiences. Either way it is important to note that balancing the role of the researcher in participatory processes can be a challenge and is often highly fluid and dependent on the situation (Dickson & Green, 2001).

Relatedly, participatory research methods such as the landowner-led workshop can overlook important, yet nuanced, social complexities and power dynamics. (Chambers, 1994; Goebel, 1998). Potential social complexities may have been at play in our workshop and may have impacted “spread of representation” and “spread of voices heard” as the more “powerful” landowners in the community may have dominated the conversation. The power differentials may have been further impacted by the panels as we may have heard more from those on the

panels than the other participants. Panels are typically a part of landowner-led workshops as practiced by Partners for Conservation as they are trying to showcase certain types of landowners. We hoped to use them to help kickstart conversation throughout the day with each panel followed by an open discussion. However, it is possible that the panels had the opposite effect, minimizing the “spread of voices heard.”

In summary, the landowner-led workshop offers many advantages as a form of participatory research in the realm of community-based natural resource conservation. Specifically for private lands conservation, our findings suggest there are benefits from having conservation professionals present while emphasizing that landowners are the ones talking. Social learning and relationship development in particular are mutually beneficial for all involved, providing benefits to community members through power-sharing and likely increasing the depth and nuance of information gathered by researchers. Fostering these benefits to participants can enhance participant buy-in and foster a more successful process (Williams et al., 2009). However, it may be more effective in future application of landowner-led workshops to take a more traditional approach in the recruitment process rather than placing this responsibility in the hands of local partners. Additionally, given our observation that the landowners on the panels tended to speak more, particularly in the Wyoming workshop, it may be useful to eliminate the panels as they may foster unequal spread of voices. Overall, landowner-led workshops offer promise for future use to gain insight into landowner perceptions for private lands conservation, bringing together landowners and conservation professionals via participatory research. To further understand the potential of landowner-led workshops, there is a need for continued evaluation of the process. Our research only applied landowner-led workshops to one specific natural resource management issue and did not include a

counterfactual as a comparison (Centre for Research on Impact, 2018). Thus, future research could involve diverse communities as well as a comparison of the method to other qualitative research approaches. Our research provides the foundation for future evaluations and applications of landowner-led workshops within the realm of natural resource participatory research.

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### **Chapter 3. Assessing the Implications of a Reduced Conservation Reserve Program Enrollment Cap on Management Behavior After Program Contracts End**

#### **Abstract**

The Conservation Reserve Program (CRP), part of the conservation title of the United States farm bill, is the largest private lands conservation program by acreage in the United States and plays an important role in conserving land and wildlife habitat. However, there is a lack of understanding regarding actions agricultural landowners take with their land when CRP contracts expire. This leads to questions related to the implications for conservation when people are not able to re-enroll. Thus, we explored current CRP participants' re-enrollment intentions and the reported land management behavior of past participants to help fill this knowledge gap. We conducted focus groups across the Southern Great Plains and a mail survey of landowners with fields currently enrolled in CRP and those whose had CRP field contracts that expired between 2011 to 2017. Although we found very high interest among current landowners in staying enrolled in CRP, over one half of past landowners who tried to re-enroll were not able to. While the majority of these landowners have stated that they kept or intend to keep their land in grass, there is still a substantial percentage (21%) that have converted back to crops. In designing future farm bills, our findings indicate that the CRP enrollment cap plays an important role in landscape-scale conservation in this region. Our research identifies specific landowner motivations that conservation delivery practitioners can focus on to help promote persistence of conservation behavior after the program contracts end.

## Introduction

The Conservation Reserve Program (CRP) is the largest private lands conservation program by land area in the United States with approximately 22.6 million acres currently enrolled and over \$1.8 billion in payments to landowners annually (USDA Farm Service Agency 2018). The incentive program targets environmentally sensitive cropland and offers voluntary contracts from 10 to 15 years in length to remove these marginal lands from production (Farm Service Agency, 2018). The Conservation Reserve Program began in 1985 as a component of the farm bill, a comprehensive food and agriculture bill renewed by Congress about every five years. However, the program's total enrollment cap dropped over the last two farm bills from 32 million in 2008 to 24 million in 2014, driven largely by commodity prices (Coppess, 2017). However, with recent declining commodity prices, the demand for CRP is rising again (Politsch, 2016). As a result of limited room under the cap, producers who try to re-enroll are limited due by the reduced cap (Newton 2017; USDA Farm Service Agency, n.d.) In 2016, the Conservation Reserve Program accepted just 22 percent of acres that farmers offered for enrollment (R. Johnson 2017). Thus, the cap plays a key role in determining how many landowners can enroll in the program and if landowners are able to re-enroll in CRP.

The declining CRP acreage cap and its impact on landowners' ability to re-enroll leads to questions about what management actions participants perform on their property after contracts expire if they are not able to re-enroll. As it relates to conservation behavior, persistence is "a continuation of a course of action or behavior" (Dayer et al 2018). In our study area, persistence is characterized by producers keeping their fields in grass after CRP contracts ends, while reversion is characterized by re-planting fields to crops after CRP contracts end. Converting land

back to crop production can reverse the conservation benefits of these areas by eliminating important grassland habitat used by a variety of wildlife species (e.g. Spencer et al, 2017). According to a North Dakota study from the early years of CRP, the majority of landowners intended to revert or convert their fields back to crops if they could not get back into CRP (Gustafson & Hill, 1993). Conversely, one Kansas study found more landowners were likely to persist or keep their land in grass for livestock forage production than to revert or convert to crops (Johnson, 1993). However, this research is approximately 25 years old and has primarily looked at behavioral intention of current participants. Research on reported behavioral persistence of past incentive program participants is lacking (Dayer et al, 2018). Insight into both behavioral intention and behavior following a conservation program can be important for predicting future persistence of conservation behavior. It is also important to understand the drivers of persistence and reversion to design programs and policies that promote continued conservation behavior. One potential driver of persistence is landowners motivations for doing a certain behavior (Dayer et al., 2018; Lutter, Dayer, & Larkin, in press). For instance, related to CRP, motivations to keep the land in grass could include preventing soil erosion or increasing wildlife habitat. Past research has found motivations to impact landowner post-program intention, particularly in the case of CRP (e.g. Lutter, Dayer, & Larkin, in press.; Johnson, Misra, & Ervin, 1997; Skaggs, Kirksey, & Harper, 1994). Thus, through our research, we sought to evaluate the extent to which landowners want to re-enroll in CRP and what happens to land following CRP if landowners cannot re-enroll.

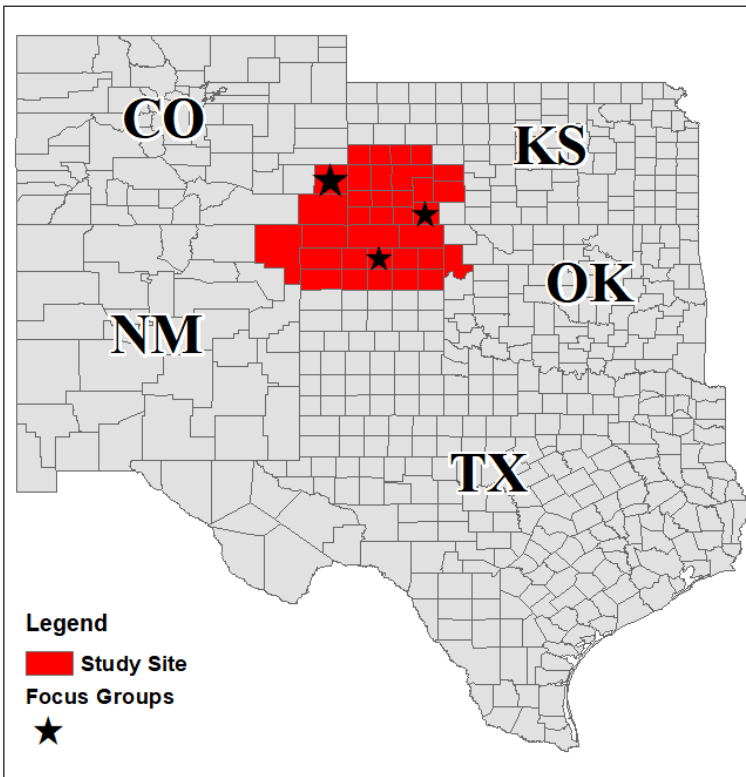
We aim to address three main research questions:

1. To what extent did past CRP participants try to re-enroll but were not able to and to what extent do current landowners want to re-enroll?
2. What are landowners who were not able to re-enroll doing with their land after CRP and what are current landowners who want to re-enroll likely to do with their land after CRP?
3. What motivates the post-CRP land management decisions of these landowners?

## **Methods**

### *Study Area*

Our study region of the Southern Great Plains includes parts of six states (CO, KS, NE, NM, OK, and TX), including the three states in the US with the most CRP acreage (TX, KS, and CO) (USDA Farm Service Agency, 2016). We focused on 34 counties with 40% or more of their area over the Ogallala Aquifer as part of a broader study to look at opinions and decisions related to CRP in part of the Southern Great Plains (Figure 1). This region includes approximately 2.1 million acres enrolled in CRP in 2017 (USDA Natural Resources Conservation Service, 2017). The region is home to critical grassland bird habitat, much of which is conserved through CRP (McLachlan et al, 2007; McLachlan et al, 2009). However, much of the bird habitat in this region is at risk, as a result of cropland conversion, habitat fragmentation, and other development impacts (Wang et al, 2017). Additionally, given the arid nature of the region, CRP is important in for recharge of the High Plains Aquifer (Gurdak & Roe, 2009) and prevention of wind erosion (Sullivan et al, 2004).



**Figure 2.** Research study area within the Southern Great Plains region (counties that surveys were sent to are in red and locations of focus groups are starred).

### *Study Design*

We used a mixed qualitative and quantitative approach to address our research questions. In August 2017, we conducted three focus groups across the study region in Lamar, Colorado; Meade, Kansas; and Spearman, Texas. Due to recruitment and logistic limitations, focus groups only included landowners currently enrolled in the program. The focus groups provided insights related to project objectives such as concerns related to the future of CRP and drivers of post-CRP land management decisions. Focus groups were transcribed and analyzed using inductive thematic analysis where patterns and themes development arises naturally from the content of the transcript data (Guest, MacQueen, & Namey, 2011).

We followed up the focus groups with a survey of two strata of landowners: 1) those currently enrolled in CRP and 2) those who have left CRP within the last five years (with contracts expiring 2012-2017). Our unit of selection and analysis was the field level. Thus, for the survey, we asked landowners to reference the specific field we identified for them. Due to the focus on grassland conservation in our study area, we only chose fields that were or had been enrolled in the CRP practices focused on grassland conservation (CP1: Introduced Grass and Legume Establishment; CP2: Native Grass, Forb, and Legume Establishment; CP4: Wildlife Habitat Corridors, Permanent Wildlife Habitat; CP10: Grass Already Established; CP23: Wetland Restoration (Floodplain), Non-Floodplain Wetland Restoration; CP25: Rare and Declining Habitat; CP33: Upland Bird Habitat Buffer; CP38: State Acres for Wildlife Enhancement; and CP42: Pollinator Habitat Establishment).

We randomly selected fields currently and previously enrolled in CRP stratified by state based on the number of CRP fields that fell within each state in our study area. For selected fields, the individual affiliated with that contract who received the largest payment from the program was sent a survey. We sent surveys to 1149 current and 2000 past CRP participants using a modified Dillman approach to survey administration consisting of two survey mailings and a reminder postcard from April to June 2018 (Dillman et al, 2014). Although respondents did not have to be the owner of the field, we asked that the survey be completed by a primary decision maker related to the field. The survey of current landowners (Appendix C) and past landowners (Appendix D) included questions on experiences with CRP, enrollment motivations, post-CRP management intentions/actions, motivations driving post-CRP behavior, and demographic information. Drafts of the survey were also reviewed by local conservation organizations and pre-tested with current and past CRP participants.

### *Data Analysis*

We used the Statistical Package for the Social Sciences (SPSS Version 25) for all analyses. For our analyses of persistence behavior and motivation of participants with past fields, we selected the 165 responses that indicated that they tried to re-enroll a field that expired in 2011-2017 but were unable to do so. For our analysis of persistence intention and motivation of participants with current fields, we selected for the 298 responses who were ‘likely’ or ‘very likely’ to re-enroll their field in CRP. These subgroups allowed for a more accurate evaluation of the potential impact of what is currently happening or would happen if current participants could not re-enroll in CRP.

Within these subgroups, we looked at those who stated that they kept their former CRP fields in grass and those who reverted to crops. For the past participants, persistence behavior included those who reported keeping the majority of their field in grass or enrolling the majority of their field in another (non-CRP) conservation program (e.g. CSP or EQIP). Reversion behavior included those who reported converting the majority of their field to dryland or irrigated crops. We measured post-CRP persistence intentions among current participants on a 5-point likelihood scale (score 1-5 with 1 being ‘very unlikely’ and 5 ‘very likely’). We then calculated the average score of their likelihood to keep their field in grass and their likelihood to re-enroll in another conservation program. We also calculated the average of their likelihood to convert their field to irrigated or dryland crops. If a landowner’s average likelihood to keep the field in grass or enroll in another conservation program was greater than 4 (with 4 being ‘likely’ to persist) and greater than their average likelihood to convert to dryland or irrigated crops, we scored them as likely to keep the field in grass (persist). If this was not the case, we scored them

as likely to convert the field to crops (revert). We also looked at the pattern of persistence versus reversion by year contract ended. We looked at distribution using a likelihood ratio given the small n values within

For our analysis of motivations for persistence, we compared those who persisted with those who reverted (landowners of fields previously enrolled in CRP) and those who were likely to persist with those who were likely to revert (landowners of fields currently enrolled in CRP). We conducted a chi-square test comparing the motivations of those who persisted or were likely to persist with those who reverted or were likely to revert. We grouped those who responded ‘very important’ or ‘important’ in influencing their post-CRP decision and compared them to those who responded ‘neither important or unimportant’, ‘unimportant’, or ‘very unimportant.’

We also compared nonrespondent and respondents based on several responses. We separated current and past landowners for the analysis, comparing respondent landowners of current fields with nonrespondent landowners of current fields and respondent landowners of past fields with nonrespondent landowners of past fields.

## **Results**

We received 700 completed surveys: 363 from current CRP participants and 337 from CRP participants with a field that had expired from 2011-2017. Our overall adjusted response rate excluding non-deliverable and ineligible surveys was 24.2% (past participant response rate of 19.1%; current participant response rate of 32.3%). This entire population was only used for the initial analysis of likelihood to re-enroll and ability to re-enroll. For the analysis of post-CRP behavior/intentions and motivations of these behavior, we focused on the 298 of the 363 current

participants likely or very likely to re-enroll in CRP and 165 of the 303 past participants who tried to re-enroll but were not able to.

*Nonrespondent and Respondent Comparison*

We compared our 363 respondents with current field with 1250 nonrespondents; and we compared 337 respondents with fields that expired from 2011-2017 with 1879 nonrespondents. For both comparisons, we found no significant difference between respondents and non-respondents based on acreage of their field (Table 1) or whether their field was previously re-enrolled or not (Table 2). In looking at expiration year, there was significant difference in the distribution of respondents and non-respondent landowners by expiration year. Notably, a greater percentage of respondents than non-respondents had fields that expired in 2016 and 2017, as well as less respondents than non-respondents had fields that expired in 2012 (Table 3). However, the magnitude of differences in percentages were relatively small. There was no significant difference in distribution between respondent and non-respondent landowners of current fields by expiration year (Table 4).

**Table 1.** Independent sample T-test comparing respondents and non-respondent landowners of past and current fields based on acreage of field.

<b>Past</b>	<b>Mean</b>	<b>t-statistic</b>	<b>df</b>	<b>p-value</b>
Respondent	155.2	0.975	1877	.330
Non-Respondent	145.4			
<b>Current</b>		1.389	1248	.165
Respondent	123.6			
Non-Respondent	112.8			

**Table 2.** Percent respondent versus non-respondent landowners of past and current field landowners based on whether they had re-enrolled the field before or not.

<b>Past</b>	<b>Re-enrolled</b>	<b>Not re-enrolled</b>	$\chi^2$	<i>p</i> -value
Respondent	54.6	45.4	.004	.950
Non-Respondent	54.4	45.6		
<b>Current</b>	<b>Re-enroll</b>	<b>Did not re-enroll</b>	.094	.759
Respondent	68.9	31.1		
Non-Respondent	68.0	32.0		

**Table 3.** Percent previously expired (2011-2017) respondent versus non-respondent landowners by expiration year.

	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	$\chi^2$	<i>p</i> -value
Respondent	9.2	28.2	18.1	12.2	8.3	12.8	11.3	21.854	.001
Non-Respondent	9.5	36.4	18.6	13.5	7.6	7.3	7.2		

**Table 4.** Percent respondent versus non-respondent landowners of current field landowners distributed by expiration year.

	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	$\chi^2$	<i>p</i> -value
Respondent	4.1	1.7	30.6	20.1	18.5	6.6	1.9	4.7	18.304	.193
Non-Respondent	3.3	1.8	22.8	18.8	24.0	7.7	1.6	3.7		
	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>			
Respondent	4.1	2.2	0.8	0.3	0.8	2.8	0.8			
Non-Respondent	5.0	3.7	1.7	0.8	1.4	2.3	1.6			

### *Respondent Characterization*

For those whose parcel was currently enrolled in CRP (n=363), 20.8% identified as a ‘full time agricultural producer,’ 12.7% as ‘part-time agricultural producer,’ 5.9% as ‘retired but now working a non-agriculture job,’ 43.9% as ‘fully retired,’ and 16.6% as ‘other.’ Of the past landowners (n=337), 36.7% identified as ‘full time agricultural producers,’ 16.1% as ‘part-time agricultural producer,’ 4.8% as ‘retired but now working a non-agriculture job,’ 28.6% as ‘fully retired,’ and 13.8% as ‘other.’ Of all landowners with a current CRP field, 96.1% owned the

field (either owner or owner-operator) and 90.4% of landowners with a past field owned the field. However, all respondents were decision-makers for the field. We will refer to all individuals as “landowners” in the rest of the paper.

### *Intention and Ability to Re-enroll in CRP*

There was heavy interest from all participants whose field was currently enrolled in re-enrolling: 83.5% of current landowners who responded to this question (298 of 357 respondents) were ‘likely’ or ‘very likely’ to re-enroll their field assuming they were able to re-enroll. In line with survey results, in all three focus groups, the majority of landowners would re-enroll in CRP if they could. One landowner in our Texas focus group explained, “The land here never should’ve been broke out from grass to begin with so I plan on it staying in CRP as long as the program lives.”

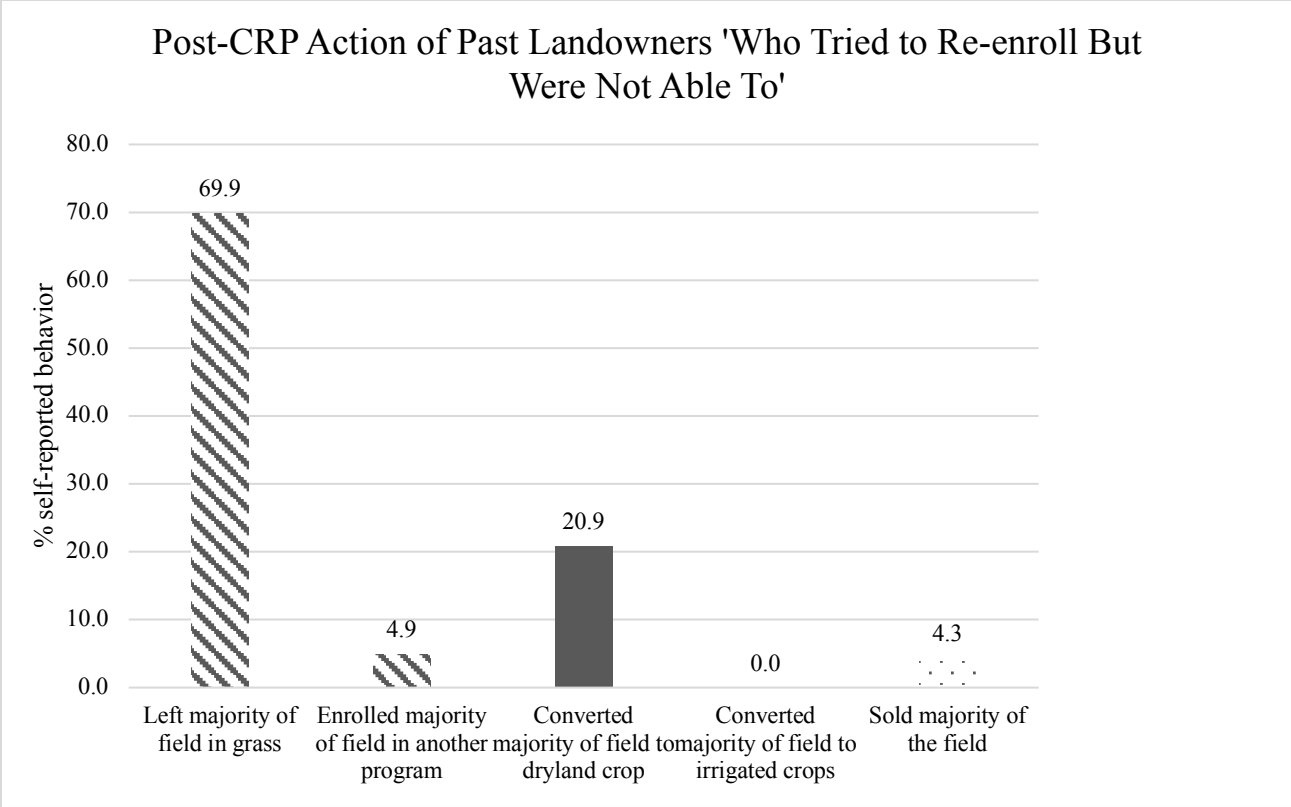
Many landowners with a past field stated they were unable to re-enroll in CRP; 54.5 % of past landowners stated they were unable to re-enroll the specific field when they tried (165 of 303 respondents). Inconsistent with this finding, participants with a field currently enrolled were not overly concerned about their ability to re-enroll in the program with just 12.3% of all participants with a current field (44 of 357 respondents) saying it was ‘unlikely’ or ‘very unlikely’ they could re-enroll. Based on what we heard in focus groups, the small concern that does exist may stem from hearing of others in their community who were not able to re-enroll. Landowners talked of neighbors who could not get back into CRP which fueled their concerns about their own ability to re-enroll. One landowner in Colorado explained, “The administration we have is cutting programs and I’d say the chances of getting back in are nil.”

*The Future of CRP Land*

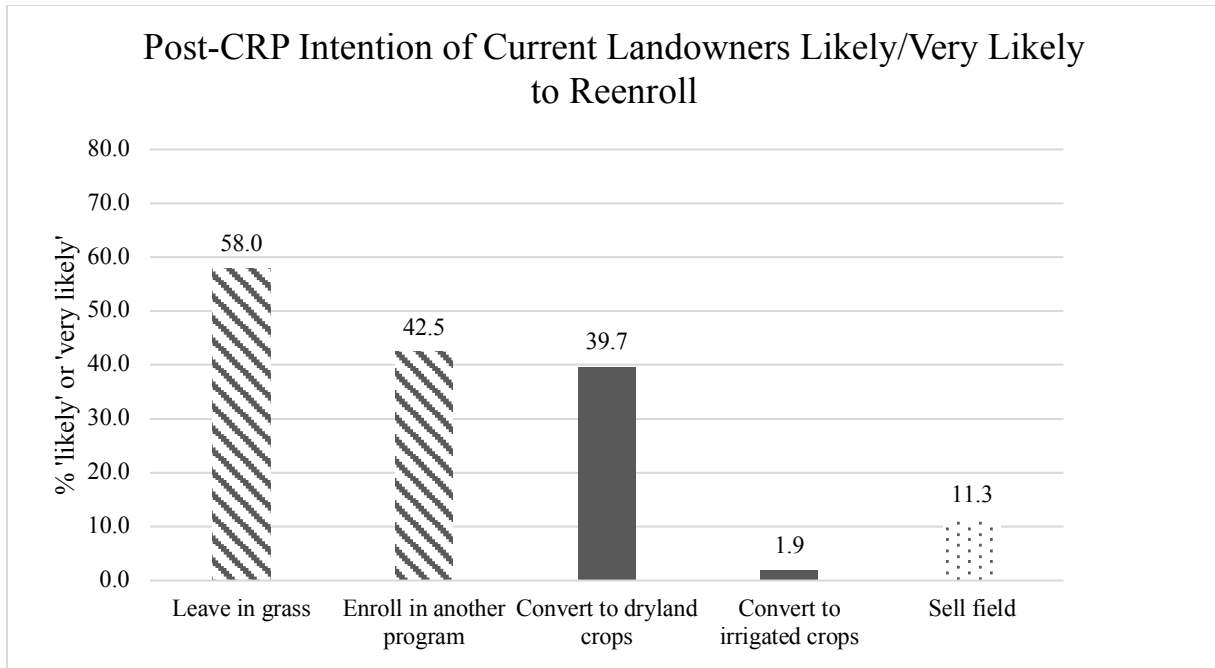
In the survey, we asked landowners who had their field previously enrolled what they were doing on the majority of the field no longer enrolled in CRP. Of the 54.5% of past participants (n=165) who tried to re-enroll their field but were not able to, 70.5% left the majority of the field in grass, 20.9% converted the majority of the field to dryland crops, 4.9% enrolled the majority of the field in another conservation program, 4.3% sold the majority of their field, and no one converted the majority of the field to irrigated crops (Figure 2). Thus, within this group of landowners whose field was no longer in CRP, 74.0% persisted with the conservation behavior (n=122), 20.9% reverted (n=34), and 4.3% sold the majority of the field (n=7). We also found a significant difference in the pattern of persistence versus reversion by year contract ended (Table 5). A larger percent of participants whose fields expired more recently reported persistence behavior than those whose fields expired longer ago (Table 5).

**Table 5.** Percent of past landowners (who tried to re-enroll but were not able to) persisting and reverting by year of contract expiration (2011-2017) and likelihood ratio comparing distribution between years. We looked at distribution using a likelihood ratio given the small n values within persistence/reversion responses for certain years.

Year	Persist	Revert	Likelihood Ratio	p-value
2011	58.3	41.7	130.049	.042
2012	62.1	37.9		
2013	66.7	33.3		
2014	80.0	20.0		
2015	80.0	20.0		
2016	73.5	26.5		
2017	93.8	6.3		



**Figure 2.** Self-reported post-CRP actions of landowners who were previously enrolled in CRP ‘who tried to re-enroll but were not able to’ (n=163). As landowners could only choose one option, they were asked what management action they took on the majority of their field. Bars with stripes persisted with the conservation behavior (left in grass or enrolled in another conservation program), solid bars reverted (converted field to dryland or irrigated crops), and bars with dots sold their field and we do not know if they persisted or reverted.



**Figure 3.** Post-CRP intentions of current CRP participants ‘likely’ or ‘very likely’ to re-enroll (n=298). Bars with stripes persisted with the conservation behavior (left in grass or enrolled in another conservation program), solid bars reverted (converted field to dryland or irrigated crops), and bars with dots sold their field and we do not know if they persisted or reverted.

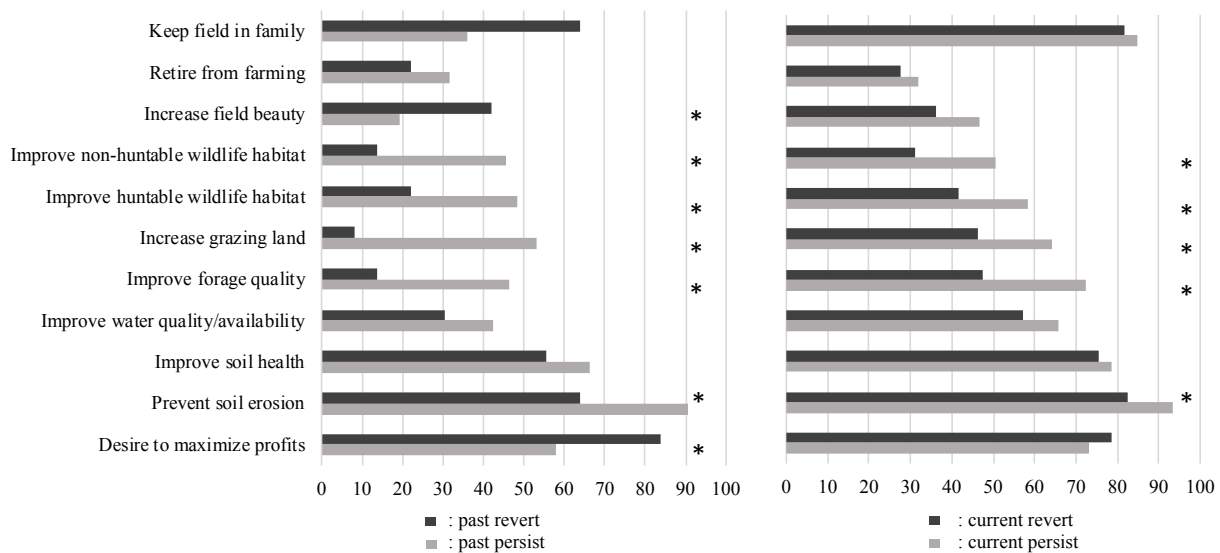
We also asked landowners whose field was currently enrolled how likely they were to take various actions on their fields after contract expiration. According to participants with a current field who were ‘likely’ or ‘very likely’ to re-enroll in CRP if they could (n=298), the majority of CRP lands would either go into dryland crops (39.7% ‘likely’ or ‘very likely’) or stay in grass (58.0% ‘likely’ or ‘very likely’) if they could not re-enroll (Figure 3). There also was substantial interest in enrolling in another conservation program with 42.5% ‘likely’ or ‘very likely’ to enroll in another program. Based on our aforementioned calculation for persistence (comparing average scores for persistence likelihood and reversion likelihood), only 38.9% of the current CRP participants were likely to persist with the conservation behavior. Thus, 61.1% of participants were likely to revert.

When we asked focus group participants what they would do if they could not re-enroll in CRP, many told us they would not convert their land back to crops; instead, they would graze and/or hay the fields. However, some would revert their land to crops depending on the nature of the land and resource availability (e.g. water, fencing, cattle). A landowner in Lamar, Colorado explained, “On very little of it (my CRP) I would have water to graze. I don’t own cattle. I don’t intend on cattle and if I had to take it out (of CRP) it would have to go right back into crops because there is no water (for cattle)”.

#### *Motivations of Post-CRP Land Management Decision*

We asked both landowners whose field is currently enrolled and landowners whose field was previously enrolled how important various motivations were in their post-CRP management decision if they were unable to re-enroll their field. For landowners whose field was previously enrolled (who tried to re-enroll but were not able to), the most important motivations for those who reverted (n=41) were ‘desire to maximize profits,’ ‘prevent soil erosion,’ and ‘keep field in the family.’ The most important motivations for these landowners who persisted (n=122) were ‘prevent soil erosion,’ ‘keep the field in the family,’ and ‘improve soil health’ (Figure 4). For landowners whose field is currently enrolled (who were likely to re-enroll), the most important motivations for those who intended to revert (n=168) were ‘keep field in family,’ ‘prevent soil erosion,’ and ‘desire to maximize profits’ (Figure 4). For landowners whose field is currently enrolled who were likely to persist (n=107), the most important motivations were ‘prevent soil erosion,’ ‘keep field in family,’ and ‘improve soil health’ (Figure 4). Thus, preventing soil erosion was a primary motivation for all groups, regardless of persistence or reversion behavior/likelihood. For both both landowners whose field is currently enrolled and landowners

whose field was previously enrolled, motivations related to grazing land and forage quality were significantly higher (Table 3) for those who persisted/intended to persist with the behavior than those who reverted/intended to revert (Table 3). Other motivations that were significantly higher for those who persisted/intended to persist with the behavior were improving huntable and non-huntable wildlife habitat and preventing soil erosion (Table 3). For landowners whose field was previously enrolled, desire to maximize profits was significantly higher for those who reverted than those who persisted and desire to increase field beauty was higher for those who persisted than those who reverted (Table 3). There was no significant difference between landowners whose field is currently enrolled that are likely to persist versus those likely to revert for desire to maximize profits.



**Figure 4.** Motivations (percent ‘important’ or ‘very important’) of past and current landowners persisting with conservation behavior versus motivations of those reverting. (For current landowners who were likely to persist, n=107 and for those likely to revert n=168. For past landowners who persisted n=122 and for those who reverted n=41).

**Table 6.** Chi square test values, degrees of freedom, and p-values of motivations comparing those who persisted with those who reverted (past landowners) and those who were likely to persist with those who were likely to revert (current landowners).

	Chi-square value		<i>p</i> -value	
	Past	Current	Past	Current
Keep field in family	1.113	0.383	.291	0.536
Retire from farming	1.202	0.559	.273	0.455
Increase field beauty	6.050	2.784	.014	0.095
Improve non-huntable wildlife habitat	11.600	9.566	.001	0.002
Improve huntable wildlife habitat	7.561	6.685	.006	0.010
Increase grazing land	22.443	7.938	<.001	0.005
Improve forage quality	12.263	15.805	<.001	<0.001
Improve water quality/availability	1.593	1.811	.207	0.178
Improve soil health	1.382	0.342	.240	0.558
Prevent soil erosion	14.255	6.643	<.001	0.010
Desire to maximize profits	8.150	1.078	.004	0.299

The focus groups revealed similar considerations. Without the rental payment from CRP, some participants believed they would need to compensate for this financial loss through other forms of production, whether crops or livestock. One landowner explained, “The fact of the matter is that money talks. We would prefer to leave it in grass, but if you are asking us to take, let’s say \$50,000 a year hit or something, we will probably shred it and plow it up.” In line with this, some producers in the focus groups suggested that if land is farmable it will return to crops after CRP ends. One landowner explained, “And I’ll have to break some of mine out. Now that sand part I won’t, but the stuff that’s farmable.” Additionally, many would hay or graze the field as it allows them some income off the land while preventing erosion.

## Discussion

Over the last ten years, the Conservation Reserve Program has faced cuts to the number of acres that can be enrolled, leading to the potential loss of many grasslands that were previously conserved through CRP. While we found that landowners in the Southern Great Plains are very interested in re-enrolling in CRP, many landowners in our sample who tried to re-enroll when their contracts ended in the last five years were not able to do so. This is likely due, at least in part, to the reduced acreage for CRP in the 2014 farm bill.

The intentions of landowners if they were unable to re-enroll lead to concerns about long-term protection of grasslands and ensuring the longevity of investments in CRP if there is not an adequate option to support the conservation interests of landowners. Our results suggest that while the majority of the land has stayed in grass since 2011, looking at the future behavior intentions of landowners, there is still potential for land to be converted back to crops. Specifically, given the trend of more past fields reverting to crops the earlier the expiration year of their field, it is possible that there is a time lag between expiration and reversion. Thus landowners whose fields recently expired may still convert their field back to crops in later years. Between 2018 and 2021, a little over 3 million acres of the CRP grass practices included in our survey will expire within our region (USDA Farm Service Agency, 2016b). If this same trend of 54% of landowners not able to get back into CRP continues (percent of past landowners who ‘tried but were not able to re-enroll’) and 61.1% of this not conserved (percent of current landowners likely to revert), this could result in nearly 1 million acres reverting to cropland just in our study region within the studied CRP practices. Past research has found similar trends

related to crop reversion, with reversion being the most likely action after CRP contract expiration across a variety of geographies (Atkinson et al, 2017; Caldas et al, 2016; Gustafson & Hill, 1993; Janssen & Beutler, 1994; Janssen et al, 2008; Johnson, 1993). This reversion to crops means the loss of gains from past conservation efforts. Thus, to ensure conservation dollars are being well spent it is important to promote persistence behavior.

It is critical to note the demand for other conservation programs (e.g. CSP or EQIP) if landowners cannot enroll in CRP. However, we found that significantly more current landowners intended to enroll in another program than past landowners who actually reported enrolling in another program. This may be related to there being limited options for enrollment in another program for landowners to go into if they cannot stay in CRP or landowners are not aware of options that are available. One such option may be to transition the expired land to a haying or grazing regime through the Environmental Quality Incentives Program or the Conservation Stewardship Program, both of which provide financial and technical assistance for conservation practices on working lands (USDA Natural Resources Conservation Service, 2018). Another option would be to put the land under a conservation easement through the Agricultural Conservation Easement Program or Fish and Wildlife Service easement programs. However, all of these programs have limits of how many acres can be enrolled or how many dollars are available for these programs and thus they may not be able to accommodate landowner interest in the future as their CRP contracts expire. These findings demonstrate the need for long-term conservation support for landowners to ensure these acres are kept in grass..

Our research revealed that maximizing profit was most commonly noted as important among the motivations for those participants whose fields were reverted or were likely to revert. When examining the potential of CRP participants to revert to crops, past research has also found

that economic considerations such as market prices, expected costs of crop production, rental payments, and the potential to enroll in other financial incentive programs are a primary driver. (Atkinson et al, 2017; Gustafson & Hill, 1993; Janssen & Beutler, 1994). Thus, increasing the profitability of keeping the land in grass whether through haying and grazing or other incentive programs may help increase persistence behavior following CRP. That haying and grazing related motivations (improving forage quality and increasing grazing land) were significantly higher for those landowners who persisted or were likely to persist suggests the importance of including grazing in post-CRP grass conservation programs. Haying and grazing can increase the profitability of the land while keeping it in grass and thus potentially increase likelihood of persistence of grass.

Our findings demonstrate the potential for reversion if landowners cannot get back into CRP, leading to concern about the effect that a further reduction in the acreage cap in the Farm Bill can have on grassland conservation. CRP has been critical for habitat connectivity and recovery success for species such as the lesser prairie chicken (*Tympanuchus pallidicinctus*) in this region (Spencer et al, 2017). Further, by keeping marginal lands in grass cover, CRP provides diverse environmental benefits including soil productivity, erosion prevention, carbon sequestration, and water quality (USDA Farm Service Agency, 2011). Thus, reversion to crops would likely lead to further loss of wildlife habitat and of other conservation benefits from CRP. Further, our research highlights the importance of other conservation programs that can provide financial opportunities for producers to keep land in grass if they are unable to re-enroll in CRP. Grazing and forage production may motivate some CRP participants to keep their land in grass, rather than revert to crops. Thus, if they have no other option, maintaining grass through grazing is most likely if it is supported given land for grazing and other infrastructure (e.g. fencing) can

be costly. Particularly in the heartland of the US, including our study region of the Southern Great Plains, where grassland loss on private lands is a threat to air quality, water quantity and quality, and wildlife habitat, fostering landscape-scale conservation through CRP and fostering persistence behavior after the program is critical.

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## Conclusion

### *Summary of Findings*

The management of privately-owned agricultural lands of the American West is driven by landowner decisions and, thus, has a direct impact on wildlife habitat conservation on these lands. Gaining a deeper understanding of the considerations of agricultural landowners' management decisions can help inform conservation design and delivery to more effectively meet the needs of landowners. Our research highlights this role of agricultural landowners in habitat conservation and the complex considerations they face in making management decisions. Comprising three research articles, this thesis examined the considerations and motivations of landowners related to conservation and management activities on their land as well as how to effectively engage them in community-scale conservation. The articles were based on data from two research projects: (1) a study of ranchers involved in flood irrigation in the Intermountain West consisting of two landowner-led workshops and (2) a study of landowners currently or previously enrolled in the Conservation Reserve Program (CRP) using data from three focus groups and a region-wide survey.

In Chapter 1, we used two landowner-led workshops to examine the factors that ranchers in the Intermountain West consider when deciding to flood irrigate or not. We applied the Community Capital Framework (Emery & Flora, 2006) to understand the production of working wet meadows as a social-ecological service. Flood irrigation maintains many historically flooded lands in the West, conserving critical wetland habitat. While rancher decisions are often thought to be heavily driven by economic considerations (Kreuter et al, 2006; Willcox & Giuliano, 2011), our results suggest that their decisions were actually a result of the interplay of seven types of capital (i.e., natural, financial, built, human, cultural, social, and political). Ranchers

balanced interests when managing their operations that are largely driven by the social-ecological complexity of the place where they operate.

In Chapter 2, we evaluated the landowner-led workshop as a form of consultation and participatory research. Landowner-led workshops seek to engage landowners in the research process through power-sharing. In addition to allowing researchers to gather qualitative data, the process gives landowners the opportunity to be heard by local conservation professionals. We found that both landowners and conservation professionals benefit from the interactive nature of the participatory process, particularly through relationship development and social learning. These results suggest that there is value in engaging landowners in a consultation process for community-scale conservation and other communities could benefit from using the approach.

Chapter 3 looked at the extent to which landowners plan to or are able to re-enroll in the Conservation Reserve Program and what landowners are doing or are likely to do if they cannot re-enroll in the program. Despite a lower enrollment cap in the last two farm bill re-authorizations (2008 and 2014), declining commodity prices have led to increased demand for the program among landowners. We conducted three focus groups with landowners currently enrolled in CRP and a survey of landowners currently enrolled in CRP and those landowners who have had a contract expire from 2011 to 2017. While our results suggest that landowners in the Southern Great Plains are very interested in re-enrolling in CRP, many landowners who tried to re-enroll when their contracts ended between 2011 and 2017 were not able to do so. This is likely due, at least in part, to the reduced cap in acreage since 2008. Our results suggest that while the majority of the land has stayed in grass over the past five years, looking at current landowners' behavioral intentions, there is still substantial potential for land to be converted back to crops. These findings on actual behavior and behavioral intentions of landowners post-CRP

have implications for potentially large impacts on grassland conservation in the region – a region that has already faced large scale loss of grasslands to crops over the last century (Lauenroth & Burke, 2008).

### *Contributions to Research: Theory and Methods*

This thesis contributes to human dimensions of private land conservation research, specifically within the context of agricultural landowners. In the first chapter, we offer a unique application of the Community Capitals Framework (Emery & Flora, 2006) to the production of a social-ecological services, specifically of working wet meadows. The framework has typically been applied to the larger context of community development, particularly within resource dependent communities (e.g. Bodin and Crona, 2008; Flora et al, 2012; Katz, 2000). However, our results illustrate the utility in applying the framework to rangeland management as a way to holistically explore the social and ecological considerations and intersections that impact resource management. Further, our results highlight the importance of including an evaluation of all seven types of capital (instead of just one type of capital [e.g. Pretty and Smith, 2004]), as well as both facilitators and constraints in the application of the Community Capital Framework. While some research has touched on factors that constrain community capital (e.g. Wellman et al, 2001), few studies have considered simultaneously the “push” and “pull” involved in the composition of all seven types of community capital.

Methodologically, our evaluation of a new consultation approach--the landowner-led workshop—suggests its potential value for studies to inform community-based natural resource management. We highlight the benefits of this method as a form of participatory research. Social learning, in particular, is mutually beneficial for all involved, providing benefits to community

members through power-sharing and likely increasing the depth and nuance of information gathered by researchers.

Finally, by providing results on both behavioral intentions and actual behaviors of landowners currently and previously enrolled in CRP, our third chapter fills a gap in the conservation incentive program literature. While there has been research on behavioral intentions following CRP (e.g. Gustafson & Hill, 1993; Janssen & Beutler, 1994), research on actual behavior is rarely accomplished (Dayer et al, 2018). Our findings dig into motivations for these landowners' continued persistence behavior, showing how financial motivations are more closely tied to reversion and natural resources motivations are linked to persistence. These results lay out initial findings that can act as a springboard for future research on the full breadth of drivers of persistence behavior (Dayer et al, 2018).

#### *Contributions to Conservation: Policy and Practice*

Overall, our research suggests the importance of engaging agricultural landowners in conservation for designing effective programs and policy that are more in line with landowner needs and interests. Involving landowners on the front-end of private lands program design will likely increase the incorporation of more nuanced landowner needs and norms to produce more innovative solutions (Sorice & Donlan, 2015). Our results suggest the value of social science inquiry co-produced with those who will use the results to design or adapt programs, bridging the gap between researchers and the communities and thus allowing researchers to be more successful in engaging with communities in conservation research. The results in our second chapter further emphasize the importance of incorporating landowners into the conservation process in a time where there is increasing attention to the need for bottom-up solutions to

private lands challenges. Landowner-led workshops offer one such method of connecting landowners and conservation professionals. Our findings suggest there are benefits from having conservation professionals present while emphasizing that landowners are the ones talking. Past research has found existing knowledge gaps between landowners and conservation professionals. For instance, researchers and extension staff have overestimated the role of profit maximization in adoption of conservation behaviors and failed to realize the role of social factors (Kreuter et al., 2006). Similarly, according to Willcox and Giuliano (2011), conservation professionals are sometimes not aware of the degree to which landowners incorporate wildlife management as part of their routine operations. Additionally, trust between landowners and professionals (particularly government representatives) can be important for conservation success (Lubell et al., 2013; Metcalf, Mohr, Yung, Metcalf, & Craig, 2015). Landowner-led workshops offer a mechanism to foster trust and break down barriers between landowners and conservation professionals.

Further, in considering conservation policy and practice, our research suggests that while ensuring the financial viability of an operation is important, economic considerations and motivations are not the full picture. Our results from Chapter 1 highlight the importance of maintaining the ranching lifestyle in rancher decision-making. Our results from Chapter 3 further emphasize this finding as among all landowners surveyed it was important for the field to stay in the family. These findings have implications for effective design and implementation of conservation policy and practice with private landowners. To increase landowner buy-in, it is important that conservation policy and practice foster the overall sustainability of operations. Relatedly, our results suggest that financial incentives by themselves may not be the best approach to encouraging conservation. For instance, several ranchers expressed interest in

assurances that protect them from regulatory threat (such as related to the Endangered Species Act) as a component of conservation programs. In line with our results, Langpap (2006) suggests combining assurances with financial incentives to increase interest in conservation programs.

Our findings also have potential implications for the conservation title of the farm bill and the rule making of farm bill programs. While EQIP funding is available in Oregon related to flood irrigation, there is no program in Wyoming/Colorado and many other parts of the Intermountain West. Given our findings on the many diverse benefits of flood irrigation, there may be room for program expansion into other areas. Within the program, landowners would like to see some changes such as providing assurances for protection from regulation and providing financial help for maintaining current flood irrigation infrastructure.

Related to CRP and the farm bill, landowners are very interested in re-enrolling in CRP, and if they cannot re-enroll, they want to enroll in another conservation program. Thus, increasing the acreage cap in CRP is important to meeting the demand of landowners and, thereby, promoting long-term landscape conservation. Further, given the strong profit motivations of many who reverted or were likely to revert, increasing the profitability of keeping the land in grass whether through haying and grazing or other incentive programs may help increase persistence behavior following CRP. Additionally, many producers felt conservation programs should be adapted to the local social-ecological context of their communities which federal conservation programs often do not leave space for. Past research also suggests implementing and managing conservation programs at a smaller geographic scale (Steinmetz, 2018). Beyond conservation program design, it is critical that those on the ground delivering conservation programs, such as partner biologists are versed in local, place-specific constraints and considerations of landowners.

### *Limitations*

There are a few caveats and limitations to this thesis research worth noting. First, the research for our first and second chapters was based on two case study locations within a larger region. While findings may provide insights into these specific locations, our results are not necessarily generalizable to the full region. However, the use of case studies, like other qualitative approaches, allow for exploring deeply the context and nuances of the research topic. Further, our findings for these two chapters are shaped by those who attended the workshop. Given that our approach involved local conservation professionals playing a key role in determining which ranchers to invite to ensure participation in the all-day workshop, there was potential that the invitation process was limited to ranchers that they already knew. We tried to limit the bias from this approach by having conservation professionals use a spreadsheet with different demographic factors and operations characteristics when developing a list of landowners to help promote diversity; yet, we did not have population-level information or a database of flood irrigators with which to compare our invitees.

Similarly, our third chapter was based on a survey of current and past landowners in CRP from only one region of the country, as well as focus groups in a few counties in that region. Thus, the results are not necessarily generalizable beyond this region. However, our study region contains much of the heart of the CRP with sections of the three states with the highest enrolled acreage in CRP (i.e. Texas, Kansas, and Colorado). Further, this region is of particular interest within the scope of the program due to high cropland conversion rates and resulting habitat fragmentation (Wang et al, 2017).

Finally, in Chapter 2, a limitation of our evaluation of landowner-led workshops relates to the lack of comparison for this process. That is, while we evaluated the landowner-led workshop as a participatory research methodology we were not able to compare it to another approach either within participatory research specifically or qualitative methods more generally. Thus, we were missing a counterfactual which is a best practice of impact evaluation (Centre for Research on Impact, 2018).

### *Future Research*

Agricultural landowner decisions are complex, and their impact on private land conservation merits further research as laid out by this thesis. An important area of potential future research relates to the application of landowner-led workshops for participatory research in the field of natural resources. Our findings suggest that this approach is effective for engaging and connecting landowners and conservation professionals and fostering social learning between them. Still, there is a need for further evaluation of the process. Our research only applied landowner-led workshops to one specific natural resource management issue. Thus, future research could focus on other issues in other communities, as well as comparison of the landowner-led workshop to other qualitative research approaches.

Related to the persistence of conservation behavior, our findings suggest the need for future research related to persistence behavior when enrollment ends in a conservation program. There is opportunity for further empirical application of the pathways to persistence laid out by Dayer et al (2018) and tested in Lutter, Dayer, & Larkin, (2018). Research examining all five pathways for persistence following CRP is important to follow up on our research on the motivations pathway alone. Research to further enhance the understanding of the extent to which

these pathways drive persistence is critical to inform conservation programs and policies (Dayer et al, 2018).

Finally, our research on ranchers' irrigation decisions (Chapter 1) raised questions related to other issues in rangeland management, particularly surrounding the future viability of these operations. Future research could explore more deeply what factors are driving concerns about future viability of ranching operations (e.g. continuation of the next generation, lack of skilled labor, development pressures) and how the conservation community can work with ranchers to address them. Additionally, research could apply the Community Capital Framework to other rangeland management topics such as holistic grazing and woody plant management. Expanding the use of the framework within rangeland management specifically and natural resource conservation more generally can help elucidate the diverse considerations that landowners face when making often complex decisions.

In closing, our research provides important results on the human dimensions of conservation on agricultural lands. Our results provide insight into landowner considerations in their management decisions and the impact this may have on landscape-scale conservation. This deeper understanding of the social components of agricultural management has important implications for successful design and delivery of conservation programs and policy to agricultural landowners across the country.

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## Appendix A. Landowner-Led Workshop Semi-Structured Script

### Welcome, Introduction & Expectations

- Welcome and thank you for coming to today's workshop.
- Help yourself to pastries, coffee, and tea. Restroom location. Catered lunch around noon, a mid-afternoon break, and end the workshop at [insert time]. Invited to stick around for additional networking and refreshments until [insert time].
- Laurel introduce herself, the IWJV, and extremely brief overview of project partnership.
- Workshop is hosted by Partners for Conservation, Natural Resources Conservation Service, the US Fish & Wildlife Service, and the IWJV.
- Virginia Tech and University of Montana are conducting a study about working wet meadows and flood irrigation in the Intermountain West. We're here to learn more about producers' experiences with flood irrigation in the region. We're collaborating with the Intermountain West Joint Venture to better understand the relationship between working wet meadows, agricultural production, and bird habitat and to help conservation practitioners learn more about how they can better help sustain beneficial practices.
- Although you will be asked to provide your opinions throughout the workshop, they will not be attached to your names in any way so I encourage you to be honest and candid with your responses. As we mentioned in the consent form, we are audio recording the meeting to ensure we capture your comments correctly. In addition to being confidential, your participation in this meeting is voluntary. You can stop participating in the meeting at any time or choose not to answer any questions.
- The workshop agenda is composed of several landowner-led panels and discussions. For the discussions, we have a set of questions we'd like your thoughts on and we will guide you through them with time for discussion. Although we've got conservation practitioners in the room, the focus is on hearing from you, the producers.
- Let's begin with introductions. Go around the circle and VERY BRIEFLY:
  - *Your name*
  - *Where you live*
  - *Brief description of your ranching operation*
- Next, have conservation practitioners introduce themselves:
  - *Name*
  - *Job title*
  - *Agency/organization & office location*
- Are there any questions about the day?

Opening: For this discussion, we will focus on your experiences with flood irrigation.

### Moderated Panel Discussion: Experiences of Flood Irrigation

- *Each panel member has 10 minutes to share their story (i.e., responses to Question Script 1) to kickstart the conversation.*

### Question Script 1 -- Facilitated Discussion: Experiences of Flood Irrigation

- Why do you flood irrigate (either currently or in the past)?
- Do you consider flood irrigation part of your lifestyle as a producer? If so, how?

- What do you see as the benefits of flood irrigation?  
Prompts
  - To you and your family?
  - To your operation?
  - To your land?
  - To your community?
  - To wildlife, water, and the environment?
- How does flood irrigation impact the look of your land, if it does at all? How important is this to you?
- What are the financial considerations related to flood irrigation?  
Prompts
  - What makes it profitable?
  - What makes it costly?
- What else about the outcomes or process of flood irrigation stands out to you as important?
- How common is flood irrigation in your area/with your neighbors?

**Question Script 2 – Facilitated Discussion: Landowner Decisions Related to Flood Irrigation**

Opening: For this discussion, we will focus on how and why you have made the decisions you have related to flood irrigation and what alternatives to flood irrigation you have considered.

- What are the challenges of flood irrigating?  
Prompts
  - Logistics?
  - Labor?
  - Social pressures? (e.g. from other ranchers, your overall community, your family)
  - Economics?
  - Water supply limitations
- Do you have any alternatives to flood irrigation? If so, how do you feel about them?  
Prompts
  - What are the benefits of these alternatives?
  - What are the challenges of these alternatives?
- How do you decide whether to continue flood irrigating?  
Prompts (if needed): Do you consider....
  - Production costs
  - Infrastructure costs
  - Water costs
  - Water recharge/availability
  - Other producers' decisions regarding flood irrigation?

- Have your thoughts about flood irrigation changed over time? If so, how and why?

Opening: For this discussion, we are interested in hearing about your experiences with programs and policies and their impact on your agricultural conservation practices.

**Moderated Panel Discussion: Experiences with Programs and Policies Related to Flood Irrigation**

- *Each panel member has 10 minutes to share their story (i.e., responses to Question Script 3) to kickstart the conversation.*

**Question Script 3 – Facilitated Discussion: Experiences with Programs and Policies Related to Flood Irrigation**

- Are you currently involved in any conservation programs for flood irrigation? If so, which?
- What has been your experience with these programs?
- If you aren't involved in flood irrigation programs, are you involved in other conservation programs?
  - If so, how do you feel about these programs? What components of them are the most important to you?
  - If not, why not?
- What could agencies or conservation organizations do to help keep you in flood irrigation?
- Beyond conservation programs specifically, what has your experience with federal and agencies that run conservation programs (FSA, NRCS, USFWS) been? Other conservation organization (e.g. state agency, non-profits).

**Wrap-up**

- Thank you for sharing your thoughts and opinions today. Your participation is critical to the success of this research project. Next steps: We will take the recordings and notes from today, and compare and contrast them with another similar workshop we conducted with producers who flood irrigate in the Southern Oregon – Northeastern California Region last fall.
- The researchers will analyze the results and prepare a report, and will advise the IWJV how to best integrate the findings into our science program, communications efforts, and field delivery (i.e., working with landowners on the implementation of conservation programs). The IWJV will use the research project findings to work with its conservation partners (some of whom are in the room today) to help guide how they administer programs for agricultural producers. Research findings will also provide IWJV and its partners with data to share with elected officials as they develop and fund a 2018 Farm Bill that ensures improved conservation programs that work for producers.
- We now invite you to complete a survey on your workshop experience today. Your responses will help inform us on the effectiveness of the workshop and inform a report to

partners, journal article, and master's thesis. Once you completed the survey please put it in the manila envelope on the table before leaving.

- Thank you for your participation in the workshop and the survey.
- Invite participants to stay, network and enjoy refreshments until [insert time].

## Appendix B. Landowner-Led Workshop Participant Observation Spreadsheet

<b>Criterion</b>	<b>Definition</b>	<b>Indicators</b>	<b>Observations (and time)</b>	<b>Thoughts</b>
Focus on Objectives	The ability to maintain a focus on the goals and objectives of the process	Participants stay focused on flood irrigation and working wet meadow conservation (e.g. type of other conversations had)		
Spread of voices heard	The equity in different voices heard throughout process	Who speaks? Who is called on by the facilitator? Whose ideas seem to be acknowledged by practitioners? By other landowners? Who seems hesitant to speak? Who speaks the most? Whose opinions are/aren't respected? (check in several times throughout day)		
Diversity of representation	The spread of representation in the room	Does there seem to be diversity in the room (age, gender, producer frames, etc.)?		
Absence of conflict	The extent to which tension and disagreement was absent between participants	What disagreements are arising (what sections of discussion). Who is disagreeing with whom (landowner and landowner, landowner and practitioner).		



Appendix C. Survey of Landowners Currently Enrolled in CRP

**Participation in the  
Conservation Reserve Program**  
Understanding Producer Opinions



Spring 2018



Conducted for:



2 2 5 6

Thank you so much for taking this survey! As a person associated with land **currently** enrolled in the Conservation Reserve Program (CRP), your thoughts and opinions related to the program are important.

For most of this survey, we are interested in your thoughts and opinions associated with your CRP field of **191.6 acres under contract 10089 in Washington County in the shaded region on the map below**. We ask that a decision maker related to the contract take this survey. If you are not a decision maker for this contract, please pass this survey along to one.

The questionnaire should take you about 20 minutes to complete. Please complete this questionnaire at your earliest convenience, seal it, and drop it in any mailbox; return postage has been provided.

**Thank you again for your participation!**



**Figure 1.** Counties included in the study shaded in gray

**First, we would like to know about your land ownership, farming/ranching, and CRP enrollment history.**

1. Are you a decision maker for the CRP field associated with the contract number listed on the inside cover of this survey?

- Yes  No\*

*\*IF NO, PLEASE PASS THIS SURVEY ON TO A DECISION MAKER FOR THIS FIELD.*

2. What is your relationship to the CRP field associated with the contract number listed on the inside cover of this survey?

*(Please fill in only one circle.)*

- Owner  
 Operator  
 Owner-operator (both Owner & Operator)  
 Other

Please check the box that best represents your answer to the questions in the table below *(Please fill in only one circle for each row.)*

	Yes	No	Unsure
3. Have you ever decided <b>not</b> to re-enroll any CRP land?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Have you ever <b><i>tried to re-enroll CRP land but were not able</i></b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Now, we would like to know more about the CRP field associated with the contract number listed on the inside cover.**

5. Approximately how many years has your family owned this field? *(Insert number of years to closest whole number.)*

\_\_\_\_\_ years

- This field is not in my (or my spouse's) extended family

6. Approximately how many years have you (or your spouse) owned this field? *(Insert number of years to closest whole number.)*

\_\_\_\_\_ years

- My spouse or I do not own this field

2 2 5 6



7. How likely are you to pass this field on to a family member?  
 (Please fill in only one circle.)

Very Unlikely	Unlikely	Neither Likely nor Unlikely	Likely	Very Likely	Not Applicable
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. How was this CRP field enrolled or re-enrolled? Please refer to the most recent enrollment/re-enrollment of this field. \*(Please fill in only one circle.)

- Enrolled (or re-enrolled) most recently by *yourself* (or your spouse)
- Enrolled (or re-enrolled) most recently by those I *bought* the field from\*
- Enrolled (or re-enrolled) most recently by those I *inherited* the field from\*
- Enrolled (or re-enrolled) most recently by *someone other than those mentioned above* \*

\*if you (or your spouse) did not enroll/re-enroll this field yourself please SKIP TO QUESTION 10.

9. How important were the following considerations in your decision to enroll/re-enroll this field in CRP? Please refer to the most recent enrollment/re-enrollment of this field. (Please fill in only one circle for each row.)

<i>Your desire to...</i>	Very Unimportant	Unimportant	Neither Important nor Unimportant	Important	Very Important
maximize profit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
prevent soil erosion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
improve wildlife habitat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
improve water quality and/or availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
improve soil health	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**Now we would like to know more about your experiences with CRP.**  
**For questions 10-12 please continue to refer to your experiences related to the specific CRP field identified on the inside cover.**

**10. Please rate your experiences with the following aspects of CRP.**  
*(Please fill in only one circle for each row.)*

	Very Negative	Negative	Neutral	Positive	Very Positive	Not Applicable
General CRP sign-up ranking process	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CRP enrollment process (office and site visits)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CRP rules and regulations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grass establishment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mid-contract management (disking, burning, interseeding, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Re-enrollment process	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**11. With whom have you interacted with the most regarding this CRP field?**

Please consider all components of CRP including enrollment, re-enrollment, and management. *(Please fill in only one circle.)*

- USDA Natural Resource Conservation Service (NRCS) staff
- Wildlife biologist working at USDA NRCS or state wildlife agency office
- USDA Farm Service Agency (FSA) staff
- Extension staff from a university
- Other, please list: \_\_\_\_\_
- I don't know the affiliation of the person I interact with most



12. To what extent do you agree or disagree with the following statements about your CRP-related experiences with the person you interact with most (that you identified in question 11 above)? (Please fill in only one circle for each row.)

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I trust the expertise of this person to help me achieve my CRP land management goals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that I have similar values to this person.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe that this person properly informs me about the rules and regulations of CRP.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. Are there playas (i.e., buffalo wallows, lagoons, mudholes) on this CRP field? (Please fill in only one circle.)

- Yes
- No
- Unsure

**Now we would like to know more about your thoughts on the quality of your CRP field**

**14. We want to know your thoughts and opinions about the quality or relative amount of the following characteristics of this *current* CRP field over the last year. There are no right or wrong answers so even if you don't know much about these characteristics, please rate each. (Please fill in only one circle for each row.)**

	Very Low	Somewhat Low	Neither Low nor High	Somewhat High	Very High
Amount of soil erosion occurrences (gullies, rills etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amount of blowing/drifted soil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amount of surface water (playas, buffalo wallows, streams, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Large mammal habitat quality (deer, elk, antelope, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Upland bird habitat quality (pheasants, quail, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Waterfowl habitat quality (ducks, geese, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Songbird habitat quality (meadowlarks, sparrows, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pollinator habitat quality (butterflies, bees, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amount of pest insects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amount of weeds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grass quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cattle forage quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beauty of field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**15. Thinking of your assessments in the question above, how likely do you think it is that the quality of the above characteristics are due to this field being enrolled in CRP and its associated management? (Please fill in only one circle.)**

Very Unlikely	Unlikely	Neither Likely nor Unlikely	Likely	Very Likely
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**In this section, we would like to know more about your plans for this field after the CRP contract has expired (contract # listed on inside cover).**

**16. How likely do you think it is that you will be able to re-enroll this field in CRP if you want to? (Please fill in only one circle.)**

Very Unlikely	Unlikely	Neither Likely nor Unlikely	Likely	Very Likely
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**17. Assuming you can re-enroll your land if you want, how likely are you to re-enroll this field in CRP if you receive the same rental payment? (Please fill in only one circle.)**

Very Unlikely	Unlikely	Neither Likely nor Unlikely	Likely	Very Likely
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**18. If you do not or can not re-enroll this field in CRP, how likely are the following post-CRP actions to be employed on this field after your contract ends? (Please fill in only one circle for each row.)**

	Very Unlikely	Unlikely	Neither Likely nor Unlikely	Likely	Very Likely
Convert the majority of this field to dryland crops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Convert the majority of this field to irrigated crops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leave the majority of this field in grass	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enroll the majority of this field in another conservation program (e.g. CSP, EQIP)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell the majority of this field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



19. If you do not or can not re-enroll this field in CRP, how important are each of the following financial and resource considerations to your future post-CRP decisions? (Please fill in only one circle for each row.)

	Very Unimportant	Unimportant	Neither Important nor Unimportant	Important	Very Important
Cost/availability of resources needed to keep land in grass (cattle, equipment to fence and hay, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost/availability of equipment needed to convert to crops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of conservation technical assistance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regional weather (e.g., rainfall, temperature)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to water for irrigation/cattle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Soil fertility of field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical features of field (slope, terraces, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Desire to maximize profits and/or increase financial stability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



20. If you do not or can not re-enroll this field in CRP, how important are each of the following considerations to your future post-CRP decisions? (Please fill in only one circle for each row.)

<i>Your desire to...</i>	Very Unimportant	Unimportant	Neither Important nor Unimportant	Important	Very Important
improve forage quality for haying/grazing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
prevent soil erosion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
improve water quality and/or availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
improve huntable wildlife habitat (for deer, pheasants, ducks, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
improve non-huntable wildlife habitat (for songbirds, small mammals, pollinators, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
keep this field in my family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
increase the beauty of this field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
increase land available for grazing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
improve soil health of this field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
retire from farming	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
minimize wildfire risk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
minimize risk from pest insects or wildlife eating/damaging crops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
follow what my neighbors and/or family think I should	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



21. To what extent do you agree or disagree with the following statements regarding your future post-CRP decisions for this field? (Please fill in only one circle for each row.)

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Keeping this CRP field in grass is easier than converting back to crops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want to keep this field "as is" when the CRP contract ends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. How common is it for other people in your area to keep their CRP land in grass when their CRP contracts ends and the land is not re-enrolled? (Please fill in only one circle.)

Very Uncommon	Moderately Uncommon	Slightly Uncommon	Neither Common nor Uncommon	Slightly Common	Moderately Common	Very Common
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**In this section, we would like to know your thoughts about some potential changes to CRP.**

Please indicate how interested or disinterested you would be in the following ways CRP could change in the future. While each is possible, none are currently being planned. (Please fill in only one circle per question.)

23. The decision maker has the option to increase the chances of enrollment/re-enrollment by agreeing to follow the CRP contract up with a permanent easement (i.e. legally binding agreement) limiting post-contract production to only haying and/or grazing (i.e. no other crops).

Very Disinterested	Moderately Disinterested	Slightly Disinterested	Neither Disinterested nor interested	Slightly Interested	Moderately Interested	Very Interested
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



24. The decision maker has the option to receive an annual program payment that varies to reflect changing crop market conditions (similar to variable rate mortgage).

Very Disinterested	Moderately Disinterested	Slightly Disinterested	Neither Disinterested nor Interested	Slightly Interested	Moderately Interested	Very Interested
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

25. The decision maker has the option to increase the chances of enrollment/re-enrollment by agreeing to collect and submit field-level environmental information annually (such as photos, soil samples, or wildlife counts) following directions provided by the agency.

Very Disinterested	Moderately Disinterested	Slightly Disinterested	Neither Disinterested nor Interested	Slightly Interested	Moderately Interested	Very Interested
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26. The decision maker has the option to receive a reduced annual payment instead of having to pay grass cover establishment and maintenance costs.

Very Disinterested	Moderately Disinterested	Slightly Disinterested	Neither Disinterested nor Interested	Slightly Interested	Moderately Interested	Very Interested
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27. Which type of CRP program sign-up would you prefer? (Please fill in only one circle.)

- Non-competitive sign-up at a rate determined by the FSA at the national level
- Competitive sign-up at rate determined by landowner



**Now, we would like to know more about your views on land management.**

**28. To what extent do you agree or disagree with the following statements? (Please fill in only one circle for each row.)**

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Good farming/ranching requires using all available acreage as efficiently as possible to maximize yields.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To protect the rural landscape, producers must move away from conventional agriculture.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Land modifications to a farm/ranch that increase production have little impact on the environment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Programs to protect soil and water resources should emphasize approaches that primarily benefit agricultural production.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a result of modern agricultural practices, producers must exert more effort now to protect the environment than was necessary in the past.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The primary role of producers is the production of food, fiber, and related agricultural products; the protection of the environment is separate from this purpose.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good farming/ranching results from placing equal importance on the management of both the agricultural and natural areas of my farm/ranch.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A successful producer is someone who continuously evaluates the environmental impact of their farm/ranch and adopts new approaches to protect the environment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**Finally, please answer the following questions to help us better understand producers in the region.**

29. In what year were you born? \_\_\_\_\_

30. Are you? (Please fill in only one circle.)

Male  Female

31. What is your occupation? (Please fill in only one circle.)

Full-time agricultural producer

Part-time agricultural producer

Retired agricultural producer, but now working a non-agricultural full or part time job

Fully retired

Other

32. Approximately how many years have you been farming and/or ranching? (Insert number of years to closest whole number.)

\_\_\_\_\_ years

33. Approximately how many acres of land do you own and operate/rent in the region (see map on inside cover)? (Insert number of acres to closest whole number in each blank.)

\_\_\_\_\_ acres own          \_\_\_\_\_ acres operate/rent

34. Approximately what percent of your gross household income (include you and your spouse) comes directly from *crop production* and what percent comes from *livestock production*? Do not include payments from CRP in this percentage. (Insert percent to closest whole number in each blank.)

\_\_\_\_\_ percent of income from *crop production*

\_\_\_\_\_ percent of income from *livestock production*

**Past Participation in the  
Conservation Reserve Program  
Understanding Producer Opinions**



Spring 2018

 **VirginiaTech.**  
College of Natural Resources  
and Environment

Conducted for:



0 0 0 0 1

Thank you so much for your help in taking this survey! As a person associated with land **formerly** enrolled in the Conservation Reserve Program (CRP), your thoughts and opinions related to the program are important.

For most of this survey, we are interested in your thoughts and opinions associated with your former CRP field of **164.4 acres under contract 948 in Washington County, NM** **in the shaded region on the map below**. We ask that a decision maker related to the contract take this survey. If you are not a decision maker for this contract, please pass this survey along to one.

The questionnaire should take you about 15 minutes to complete. Please complete this questionnaire at your earliest convenience, seal it, and drop it in any mailbox; return postage has been provided.

**Thank you again for your participation!**



**Figure 1.** Counties included in the study shaded in gray



**First, we would like to know about the field that was formerly enrolled in CRP under the contract number listed on the inside cover**

**1. Are/were you a decision maker for the CRP field formerly associated with the contract number listed on the inside cover of this survey?**

- Yes
- No\*

*\*IF NO, PLEASE PASS THIS SURVEY ON TO A DECISION MAKER FOR THIS FIELD.*

**2. What was your relationship to the CRP field formerly associated with the contract number listed on the inside cover of this survey? (Please fill in only one circle.)**

- Owner
- Operator
- Owner-operator (both Owner & Operator)
- Other

**3. Approximately how many years has your family owned this field? (Insert number of years to closest whole number.)**

\_\_\_\_\_ years

This field is not in my (or my spouse's) extended family

**4. Approximately how many years have you (or your spouse) owned this field? (Insert number of years to closest whole number.)**

\_\_\_\_\_ years

My spouse or I do not own this field

**5. How likely are you to pass this field on to a family member? (Please fill in only one circle.)**

Very Unlikely	Unlikely	Neither Likely nor Unlikely	Likely	Very Likely	Not Applicable
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



6. How was this field enrolled or re-enrolled in CRP? Please refer to the most recent enrollment/re-enrollment of this field. We realize it is not currently enrolled in CRP. (Please fill in only one circle.)

- Enrolled (or re-enrolled) most recently by yourself (or your spouse)
- Enrolled (or re-enrolled) most recently by those I bought the field from
- Enrolled (or re-enrolled) most recently by those I inherited the field from
- Enrolled (or re-enrolled) most recently by someone other than those mentioned above

**Now we would like to know more about your past experiences with CRP.**

For questions 7-9 please continue to refer to your experiences related to the specific former CRP field identified on the inside cover.

7. Please rate your overall past experience with CRP related to this field. (Please fill in only one circle.)

Very Negative	Negative	Neutral	Positive	Very Positive
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Who did you interact with the most regarding this former CRP field?

Please consider all components of CRP including enrollment, re-enrollment, and management. (Please fill in only one circle.)

- USDA Natural Resource Conservation Service (NRCS) staff
- Wildlife biologist working at USDA NRCS or state wildlife agency office
- USDA Farm Service Agency (FSA) staff
- Extension staff from a university
- Other, please list: \_\_\_\_\_
- I don't know the affiliation of the person I interacted with most



9. To what extent do you agree or disagree with the following statements about your past CRP-related experiences with the person you interacted with most (*that you identified in question 8 above*)? (*Please fill in only one circle for each row.*)

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I trusted the expertise of this person to help me achieve my CRP land management goals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt that I had similar values to this person.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe that this person properly informed me about the rules and regulations of CRP.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Are there playas (i.e., buffalo wallows, lagoons, mudholes) on this field that was formerly enrolled in CRP? (*Please fill in only one circle.*)

- Yes
- No
- Unsure



**Now we would like to know more about your thoughts on the quality of your former CRP field associated with the contract number listed on the inside cover.**

**11. We want to know *your* thoughts and opinions about the quality or relative amount of the following characteristics of this *former CRP field over the last year*. There are no right or wrong answers so even if you don't know much about these characteristics, please rate each.\*  
(Please fill in only one circle for each row.)**

*\*If you have sold this field within the last year, please answer this question based on its quality at the time of sale.*

*\*\*If you have sold this field longer than one year ago, please skip to question 13.*

	Very Low	Somewhat Low	Neither Low nor High	Somewhat High	Very High
Amount of soil erosion occurrences (gullies, rills etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amount of blowing/drifted soil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amount of surface water (playas, buffalo wallows, streams, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Large mammal habitat quality (deer, elk, antelope, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Upland bird habitat quality (pheasants, quail, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Waterfowl habitat quality (ducks, geese, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Songbird habitat quality (meadowlarks, sparrows, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pollinator habitat quality (butterflies, bees, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amount of pest insects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amount of weeds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grass quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cattle forage quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beauty of field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



12. Thinking of your assessments in question 11, how likely do you think it is that the quality of the above characteristics are due to this field being formerly enrolled in CRP and its associated management?  
*(Please fill in only one circle.)*

Very Unlikely	Unlikely	Neither Likely nor Unlikely	Likely	Very Likely
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**In this section, we would like to know more about your motivations to take this field out of CRP (contract # listed on inside cover).**

13. Did you try to re-enroll this field in CRP but were not able to?  
*(Please fill in only one circle.)*

Yes\*  No  Unsure

\*IF YES, PLEASE SKIP TO QUESTION 15.

14. How important were the following considerations in your decision to take this field out of CRP? *(Please fill in only one circle per row.)*

	Very Unimportant	Unimportant	Neither Important nor Unimportant	Important	Very Important
Fire risk associated with this field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Limited ability to hay and graze on this field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Crop and property damage caused by wildlife, pest insects, and/or disease from this field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rules and regulations of CRP were difficult to follow or understand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rules and regulations for CRP management did not make sense in this region	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keeping this field in CRP was less profitable than other uses of this field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**In this section, we would like to know more about your land management decisions on this field following the expiration of your CRP contract. (Contract number listed on inside cover.)**

**15. Which of the following post-CRP actions have been employed on this field (contract # listed on inside cover) that is no longer enrolled in CRP? (Please fill in only one circle.)**

- Converted the majority of this field to dryland crops
- Converted the majority of this field to irrigated crops
- Left the majority of this field in grass
- Enrolled the majority of this field in another conservation program or easement (e.g. CSP, EQIP)
- Sold the majority of this field

**16. If you kept this field in grass after your CRP contract ended, to what extent do you agree with the following statements (as identified in question 15)? (Please fill in only one circle for each row.)**

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Not Applicable
Keeping my field in grass was easier than converting it back to crops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wanted to keep this field "as is" when the CRP contract ended	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**17. How common is it for other people in your area to keep their CRP land in grass when their CRP contracts ends and the land is not re-enrolled? (Please fill in only one circle.)**

Very Uncommon	Moderately Uncommon	Slightly Uncommon	Neither Common nor Uncommon	Slightly Common	Moderately Common	Very Common
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



18. How important were each of the following **financial and resource considerations** in your post-CRP actions on this field? (Please fill in only one circle for each row.)

	Very Unimportant	Unimportant	Neither Important nor Unimportant	Important	Very Important
Cost/availability of resources needed to keep land in grass (cattle, equipment to fence and hay, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost/availability of equipment needed to convert to crops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of conservation technical assistance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regional weather (e.g., rainfall, temperature)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to water for irrigation/cattle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Soil fertility of field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical features of field (slope, terraces, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Desire to maximize profits and/or increase financial stability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. How important were each of the following considerations in your post-CRP actions on this field? (Please fill in only one circle for each row.)

<i>Your desire to...</i>	Very Unimportant	Unimportant	Neither Important nor Unimportant	Important	Very Important
improve forage quality for haying/grazing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
prevent soil erosion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
improve water quality and/or availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
improve huntable wildlife habitat (for deer, pheasants, ducks, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
improve non-huntable wildlife habitat (for songbirds, small mammals, pollinators, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
keep this field in my family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
increase the beauty of this field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
increase land available for grazing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
improve soil health of this field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
retire from farming	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
minimize wildfire risk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
minimize risk from pest insects or wildlife eating/damaging crops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
follow what my neighbors and/or family think I should	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**Now, we would like to know more about your views on land management**

**20. To what extent do you agree or disagree with the following statements? (Please fill in only one circle for each row.)**

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Good farming/ranching requires using all available acreage as efficiently as possible to maximize yields.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To protect the rural landscape, producers must move away from conventional agriculture.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Land modifications to a farm/ranch that increase production have little impact on the environment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Programs to protect soil and water resources should emphasize approaches that primarily benefit agricultural production.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a result of modern agricultural practices, producers must exert more effort now to protect the environment than was necessary in the past.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The primary role of producers is the production of food, fiber, and related agricultural products; the protection of the environment is separate from this purpose.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good farming/ranching results from placing equal importance on the management of both the agricultural and natural areas of my farm/ranch.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A successful producer is someone who continuously evaluates the environmental impact of their farm/ranch and adopts new approaches to protect the environment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Finally, please answer the following questions to help us better understand producers in the region.

21. In what year were you born? \_\_\_\_\_

22. Are you? (Please fill in only one circle.)

Male  Female

23. What is your occupation? (Please fill in only one circle.)

- Full-time agricultural producer
- Part-time agricultural producer
- Retired agricultural producer, but now working a non-agricultural full or part time job
- Fully retired
- Other

24. Approximately how many years have you been farming and/or ranching? (Insert number of years to closest whole number.)

\_\_\_\_\_ years

25. Do you own/operate other fields currently enrolled in CRP?

(Please fill in only one circle.)

Yes  No  Unsure

26. Approximately how many acres of land do you own and operate/rent in the region (see map on inside cover)? (Insert number of acres to closest whole number in each blank.)

\_\_\_\_\_ acres own \_\_\_\_\_ acres operate/rent

27. Approximately what percent of your gross household income (include you and your spouse) comes directly from *crop production* and what percent comes from *livestock production*? Do not include payments from CRP in this percentage. (Insert percent to closest whole number in each blank.)

\_\_\_\_\_ percent of income from *crop production*

\_\_\_\_\_ percent of income from *livestock production*