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Date \_\_\_\_\_

Social Capital and Farmers' Adaptive Responses to Water Restrictions

By

Kathleen Shipley

A thesis

submitted in partial fulfillment

of the requirements for the degree of

Master of Arts in the Department of Sociology

Idaho State University

Spring 2018

## Committee Approval

To the Graduate Faculty:

The members of the committee appointed to examine the thesis of Kathleen Shipley find it satisfactory and recommend that it be accepted.

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Katrina Running, PhD  
Major Advisor

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Morey Burnham, PhD  
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Kevin Marsh, PhD  
Graduate Faculty Representative

## Human Subjects Committee Approval

October 4, 2016

Katrina Running

[IRB Approval Request includes Kathleen Shipley as Master's student researcher]

Sociology, Social Wrk, Crim Just

MS 8114

RE: Regarding study number IRB-FY2017-50 : Adapting to New Water Restrictions in Idaho: A Study of Water Managers and Farmers

Dr. Running:

I have reviewed your request for expedited approval of the new study listed above. This is to confirm that I have approved your application.

Notify the HSC of any adverse events. Serious, unexpected adverse events must be reported in writing within 10 business days.

You may conduct your study as described in your application effective immediately. The study is subject to renewal on or before Oct 4, 2017, unless closed before that date.

Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. Contact Tom Bailey (208-282-2179, email humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP  
Human Subjects Chair

Human Subjects Committee Approval  
Permission for Continuance

September 19, 2017

Katrina Running

[IRB Approval Request includes Kathleen Shipley as Master's student researcher]

Sociology, Soc Wrk , Crim Just

MS 8114

RE: Study number IRB-FY2017-50: Adapting to New Water Restrictions in Idaho: A Study of Water Managers and Farmers

Dear Dr. Running:

You are granted permission to continue your study as described effective immediately. The study is next subject to continuing review on or before Sep 19, 2018, unless closed before that date.

As with the initial approval, changes to the study must be promptly reported and approved. Contact Tom Bailey (208-282-2179, humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP  
Human Subjects Chair

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## Abstract

### Social Capital and Farmers' Adaptive Responses to Water Restrictions

Water is a significant resource in the natural environment and farmers rely on a steady supply of water during their growing season to be productive and maintain their livelihood. Due to several decades of decreasing water supplies, farmers in southern Idaho face new water restrictions. I use data from in-depth interviews with thirty farmers to investigate how social capital shapes perceived adaptive capacity as farmers face challenges collectively. This case study highlights creative entrepreneurs, who press forward and work together to solve agriculture-related problems through joint business ventures and representative leadership roles. As a result, farmers with more social capital have improved perceived adaptive capacity, which has the potential to lead to adaptation success. Benefits of social capital include opportunities for mobilization of information, emotional and social support, influence on decision making, and positive experiences mitigating agricultural risks cooperatively.

Key Words: Social capital, perceived adaptive capacity

## **Introduction**

Water is a significant resource in the natural environment. Humans rely on water for cultural, social and economic vitality. For example, water resources contribute to Idaho's outdoor lifestyle, power the cities, and drive agricultural productivity (Rudin 2016). Water connects people together and depending on how communities manage this valuable resource, water can be a source of conflict or a source of cooperation (Ostrom 1990). Why is water in Idaho so important? Because people rely on water, it contributes culturally, socially, and economically to their communities, and it has the potential to bring people together.

This study investigates farmers facing new water restrictions and the development and stability of networks of relationships that lead to collective adaptation strategies. In this study, I will investigate the potential of social capital to empower Idaho farmers who rely on steady water access during their growing season to be productive farmers and maintain their livelihood.

My research question is - How does social capital shape perceived adaptive capacity for farmers facing new water restrictions? Social capital in this study is defined as “features of social life – networks, norms, and trust – that enable participants to act together more effectively to pursue shared objectives” (Putnam 1995). I will explore perceived adaptive capacity because of the timing of this study. This study takes place the spring and summer of 2016, which is the spring of the first year of new water restrictions. For the most part, the farmers have not yet put into practice adaptation plans for their farming operations. They are assessing the situation and considering their options. As noted by Grothmann and Patt (2005), individuals with low perceived adaptive capacity may be more vulnerable to climate changes because a low estimation decreases the likelihood that they will engage in an adaptive behavior. Another way to look at this is that individuals with high perceived adaptive capacity may present a high

estimation, increasing the likelihood that they will engage in an adaptive behavior. In this study, I will explore the potential for social capital as a positive force for farmers' facing new challenges. Thus, my hypothesis is that farmers with more social capital will perceive increased adaptive capacity to new water restrictions.

This case study explores an application of the concepts of social capital in response to encouragement from previous research to discover and expand on cases of governance of common resources and social capital as an adaptive mechanism in agricultural communities (Fleck 2016; Putnam 2003; Trawick 2001; Whitely, Ingram, and Perry 2008). Moreover, my findings provide insight into social responses to water restrictions which may potentially help policymakers design water-related policies and programs that are helpful for successful future adaptation strategies.

#### *Idaho Setting and Context*

Agricultural producers in much of the world obtain their water for crops from rain throughout the year. There is variation from one landscape to another. In arid regions, such as throughout southern Idaho, rain and snow do not regularly arrive on time and in just the right amount for production of crops (Desert Research Institute n.d.; Hyndman and Alt 1989). Historically, farmers in Idaho have mitigated precipitation risks by building canal systems to divert water from the rivers and streams for surface water irrigation, and as electricity became available, wells were drilled from underground sources (Fiege 1999). A blend of surface water and groundwater has been effective in building a prosperous agricultural economy in Idaho. Currently, agriculture in the Snake Plain Aquifer region covers 10,800 square miles of Idaho and produces approximately 21 percent of state's goods and services, resulting in an estimated value

of ten billion dollars annually (Idaho Department of Water Resources n.d.; University of Idaho n.d.).

Over the last few decades, there has been a steady decrease in water supplies in southern Idaho from increased diversion of water and changing irrigation practices (Idaho Department of Water Resources n.d.). Additionally, Idaho's climate is changing with snowpack melting earlier in the year and flow of melted water or ice into streams during summer declining (Environmental Protection Agency 2016). Because of the steady decrease in water supplies, a potential for litigation arose in 2015 between members of two groups of farmers who rely on irrigation for crop production, members of the Surface Water Coalition (SWC) and members of the Idaho Groundwater Appropriators, Inc. (IGWA). Of note, water law in Idaho incorporates the appropriation doctrine, also called "first in time is first in right." Essentially, the state issues water rights to applicants and, if they grant a right, a priority date for that right is established. Based on Idaho water law, senior water right holders have priority rights to water when there are decreased flows (Idaho Department of Water Resources n.d.).

Potential litigation leading to a water call could negatively affect the livelihood of farmers and subsequently influence Idaho's communities. To minimize catastrophic social and economic impacts throughout Idaho, a settlement agreement was established between SWC and IGWA in 2015 (O'Connell 2015). This 2015 settlement agreement provides safe harbor from curtailment for junior water rights holders and sets terms for an adaptive groundwater management plan to stabilize and enhance the Eastern Snake Plain Aquifer (ESPA). In return, members of IGWA bound by this agreement face a collective reduction of 240,000 acre-feet a year, or an average of 12.9% per water user. The shared objective within IGWA is that the most vulnerable members with water rights after 1989 receive protection from the collective group so

that individual farmers are not completely cut off from the diversion of water to irrigate their farms (Idaho Department of Water Resources 2015a).

This setting, where farmers in southern Idaho are facing new water restrictions, provides an excellent opportunity to explore social capital in action. Potential for struggles over limited water supplies in western states are likely to become more common and more contested in the future. This case study provides insight into the potential for cooperative adaptation in the context of changing natural resources. Additionally, this study furthers academic research with an exploration of social capital in connection to perceived adaptive capacity and potential for adaptation success.

In the next section, I will briefly review what other academic researchers have to say about social capital and perceived adaptive capacity. I will share my expectations for this study based on what other researchers have found. I will then describe my methods for data collection and an analysis of the findings. Next, I will compare the findings of this study to previous research and suggest further research possibilities.

## **Literature Review**

In this study, I define social capital as a network of people who know and trust one another. They can count on one another for assistance in times of need, and they are comfortable pooling and sharing resources. These connections enable participants to act together and pursue shared objectives in an effective way (Putnam 1995). An adaptive capacity can be both objective and subjective. In this study, I focus on social capital as a feature of an objective adaptive capacity, where an objective adaptive capacity includes existing resources like time, money, staying power, knowledge, entitlements, and social or institutional support (Grothmann and Patt 2005). As a reminder, I chose to explore perceived adaptive capacity because of the timing of

this study. This study takes place the spring and summer of 2016, which is the spring of the first year of new water restrictions. Farmers have not yet put into place adaptation plans. They are at the stage where they are assessing the situation. As argued by Grothmann and Patt (2005), cognitive factors described as perceptions shape adaptive capacity. An estimation of an adaptive capacity influences the likelihood that individuals will engage in an adaptive behavior. The perceived adaptive capacity is a subjective appraisal, drawn from an actor's point of view. In this study, the perceived adaptive capacity for adaptation success in facing new water restrictions is a farmers' ability to cope with a threat and avert harm (Burnham and Ma 2016; Smit et al. 2000). I expect that farmers with a positive perception will express confidence, hope, and optimism when referring to their individual and collective ability to adapt to new water restrictions on their farm. The links from objective adaptive capacity to subjective adaptive capacity to adaptation success are illustrated in the Model of Private Proactive Adaptation to Climate Change (Grothmann and Patt 2005). See Illustration 1: Model of Private Proactive Adaptation to Climate Change. I also provide the Simplified Model of Private Proactive Adaptation to Climate Change with attention drawn to social capital as the featured element of objective adaptive capacity that leads to perceived adaptive capacity and adaptation. See Illustration 2: Simplified Model of Private Proactive Adaptation to Climate Change.

### *Social Capital Theory*

Pierre Bourdieu introduces the concept of social capital, and his interest is in the formation and reproduction of class differences. He argues that people are more likely to form reciprocal relationships for distribution of economic, social, and cultural capital within their own class. Individuals naturally circulate their resources with people of a similar social position. Individuals of an elite class mobilize their resources within the elite class and individuals of

lower classes mobilize their resources within their own class (Appelrouth and Edles 2010; Bourdieu 1986; Siisiäinen 2000). Based on Bourdieu's viewpoint of social capital, I predict that farmers of a similar class will share their resources freely, but there may be barriers to flow of resources due to differences in social positioning.

Several additional authors note concern about barriers to the mobilization of resources within communities. Goldman et al. (2013) conclude that the adaptive capacity to climate change is uneven within and across communities and, as a result, new coping mechanisms are not available to everyone. Brooks, et al. (2005) agrees with this assessment and adds that inequality based on geographic and social differences leads to vulnerability to harm when hazardous events occur.

Robert Putnam (2000) looks at social connections that unite people who may not otherwise be included. He notes that social capital channeled through engagement in religious, civic, and political activities not only binds similar people together but also bridges differences. He provides convincing evidence that the more we connect with others, the more we trust them, and the benefits of a trust development through these social engagements empower people to overcome challenges together. He notes, based on both quantitative and qualitative research, that social capital in American communities has decreased but that on a local level communities can and do successfully choose connective strategies in the pursuit of goals for solving local problems, including potentially harmful situations. This applies to my study because farmers have the potential to successfully choose connective strategies in the pursuit of shared goals as they face a variety of farming challenges, including new water restrictions.

Elinor Ostrom (1990) conveys optimism for solving local problems, this time in the management of water as a common pool resource. She finds that water users in many settings



dealing with water issues are motivated to find better solutions to their problems because of their interdependence on this valuable resource. She adds that formal and informal gatherings are helpful in the give and take required for successful negotiations. For example, visiting in coffee shops and going on rafting trips together provide opportunities for people to appreciate different points of view (Dietz, Ostrom, and Stern 2003; Ostrom 1990; Ostrom et al. 1999). As this study addresses water as a vital common pool resource for crop production, I anticipate finding farmers that are motivated by their interdependence to adapt cooperatively, and this motivation may lead to optimism that they can achieve positive outcomes enriched by their social connections.

Eakin, et al. (2016) poses that interdependence between community members can be effective despite independence and self-reliance. Welsh et al. (2013) applies the studies of adaptive capacity to farmers, noting that as farmers recognize their interdependence with social and ecological systems, their adaptive capacity increases. W. Neil Adger (2003) asserts that social capital builds resilience or flexibility in a person's ability to adapt to environmental changes. Some activities that build these characteristics including trust, reputation, and reciprocal action include visiting friends, reciprocal feasting and gift giving, church attendance, organizational membership, political and stakeholder participation in planning, knowledge exchange, and cooperation in partnership development (Mendis, Mills, and Yantz 2003). In this study, I anticipate that farmers will find that social capital builds their perceived adaptive capacity through stakeholder and public participation despite their sense of independence and self-reliance because they recognize their inter-dependence as a group.

Further research supports positive aspects of social capital in the form of new networks of communication and sharing of knowledge (Anderson et al. 2016; Inkpen and Tsang 2005; Keen and Mahanty 2006; Pannell et al. 2006; Pérez Perdomo et al. 2016). In contrast, other researchers

find negative aspects of social capital. Rather than increase acceptance of new information, several researchers argue that social connections exacerbate risk by impeding transmission of information about the potential impacts of climate change within populations that are vulnerable to environmental changes (Godoy et al. 2007; Running, Burke, and Shipley 2017; Smith, Anderson, and Moore 2012; Wolf et al. 2010).

Social capital accrues over time, as a historical development (Putnam 1993). Studies by several authors support this observation, finding that collective learning in decision-making processes in agricultural environments contributes to reinforcing relationships (Ruiu, Seddaiu, and Roggero 2017), provides inspiration and innovation (Fazey et al. 2015; Pérez Perdomo et al. 2016) and positively influences outcomes of decision-making (Endter-Wada, Selfa, and Welsh 2009). Robert Putnam (2000) emphasizes energetic civic engagement when he states, “What really matters from the point of view of social capital and civic engagement is not merely nominal membership, but active and involved membership.” Individual participation in both formal and informal civic events empower communities, give them a voice in political issues, and provide potential resources for recovery (Jicha et al. 2011). I expect to find that farmers who take on multiple leadership roles representing fellow farmers will express hope and confidence in as they face new water restrictions. They will have a positive estimation of their perceived adaptive capacity to adapt to changes drawing on the resources they gain through social connections and solving problems collectively.

There is substantial empirical literature studying the formation and benefits of cooperatives for the purpose of mitigating risks for individuals and collective groups. In consideration of formation of cooperatives, Gyau et al. (2016) identify occupation and area of residence as significant influences toward participation in cooperatives. I anticipate that farming

as a livelihood within a small community will be a healthy site for the formation of cooperative business arrangements. Frank et al. (2010) provide evidence that members of cooperatives are less vulnerable to climate changes. Pretty (2003) finds social capital in formalized groups builds confidence for investment in collective activities. People know that others will invest also. This lowers transaction costs of working together and facilitates cooperation in long-term resource management. I anticipate finding that positive experiences mitigating risks through cooperative arrangements transfer to confidence in mitigating other risks, in this case, water insecurity.

In the context of marketing agricultural products, Meuwissen et al. (2001) conclude that price and production risks encourage farmers to find private market solutions where they share risks with others, Glaeser (2002) observes that social capital yields tangible private returns on market outcomes, and Wuepper et al. (2016) discovers that historical roots based on cocoa cooperatives lead to profitable experiences that bring farmers together and fosters optimism for the further development of social capital.

Morrow et al. (2017) advance a fresh view of the benefits of cooperatives. He finds expected economic benefits to be less significant factors in his study of cooperation among farmers. Instead, emotional support and social support motivates willingness to cooperate. Sporleder (2007) confirms this finding as he observes a preference for alliance-based networks over transaction-based networks in agricultural supply chains because of the value of trust influencing network ties. Finally, Fischer and Qaim (2014) discover that smaller farmer groups in Kenya who have benefited in the past from group services in terms of better access to information and innovation have an increased tendency to participate intensively in group activities. I anticipate finding farmers who are members of cooperative business ventures benefit

from emotional and social support, obligations of reciprocity, cost-sharing, and mitigating market risks for the sustenance of their farm operations.

In summary, I find support from previous research on social capital and adaptation literature that social capital has the potential to empower individuals to solve problems collectively. I anticipate that farmers with more social capital will perceive an increased adaptive capacity to new water restrictions, drawing on experiences sharing resources and mitigating agriculture-related risks through informal community interactions and formal pooling of their resources in cooperative business ventures and representative leadership roles.

## **Methods**

There are eight groundwater districts in the Eastern Snake Plain Aquifer region impacted by the aforementioned 2015 settlement agreement (Idaho Department of Water Resources 2015b). This case study focuses on farmers specifically in the American Falls-Aberdeen Groundwater District, which covers 974,237 acres (Idaho Department of Water Resources n.d.). The sample for this study represents thirty farmers who farm a total of 93,815 acres. See Illustrations 3: Map of American Falls-Aberdeen Groundwater District.

I recruited participants for this study by convenience as well as snowball sampling methods. I informed the public of the upcoming recruitment by placing flyers in local businesses in American Falls and Aberdeen. See Illustration 4: Recruitment Flyer. I initially approached farmers living in the research site that previously participated in a research project the summer of 2015, when farmers were queried about their perceptions of environmental change and climate concern (Running et al. 2017). Next, I accessed additional contacts through personal referrals and an online search of agricultural producers in the area.

As an Idaho State University research team (consisting of three Ph.D. assistant professors/researchers, two undergraduates, and myself), we collaboratively prepared an interview guide for this study. For the purposes of this study, I contributed open-ended questions designed to explore social connections and feelings about the farmers' current challenges in farming, including the new water restrictions. The questionnaire offers additional questions not related to my research project because it was designed to meet several research goals within the team. See Appendix 1 for Interview Guide. As a team, we conducted thirty semi-structured interviews from January to July 2017 at local restaurants and in farm shops, offices, and homes. Each interview lasted from 30 minutes to 2 hours.

I began an analysis of the data by preparing a memo immediately after each interview. As the primary researcher, I made notes during the transcription process. I then assessed the data in Word and recorded my observations in the review panel. During the third time through the data, I utilized MAXQDA qualitative analysis software to sort the data into codes and themes, identifying factors relevant to the research through a method of free-form qualitative coding, allowing themes to emerge from the data (Glaser 1998; Glaser and Strauss 1967).

Three key themes emerged in assessing social capital: shared values, joint business ventures, and representative leadership roles. I took note of shared values drawn from descriptive statistics, analyzing similarities in race, gender, occupation, religious affiliation, and political ideology. I measured joint business ventures with an ordinal level of measurement from low to high, where low indicated no joint business ventures outside of the family farm, medium indicated one joint business venture outside the family farm, and high indicated two or more joint business ventures outside of the family farm. I also measured leadership roles with an ordinal level of measurement from low to high, where low indicated no leadership roles, medium

indicated one leadership role, and high indicated two or more leadership roles. I measured perceived adaptive capacity subjectively with an ordinal level of measurement from low to high. Low indicated a negative coping appraisal, drawn from expressions of frustration, anger, and uncertainty; medium indicated a mixed coping appraisal with a blend of negative and positive expressions; and high indicated positive coping appraisal statements, drawn from expressions of confidence and hope. I utilized R Studio software for calculation of the Kendall Rank Correlation, which is used to measure the ordinal association between two measured quantities. The closer the correlation coefficient is to 1 or -1, the greater the strength of the relationship. I also assess the direction of the relationship as positive or negative. Of note, Kendall Rank Correlation does not provide information about significance (Healey 2012; Kabacoff 2015).

As a member of the community where the study takes place, I reap the benefit of convenient access to farmers for recruitment. Additionally, my personal knowledge of the community provided insight into interpreting the data and understanding the value of the research findings. In order to address bias concerns, I discussed observations and findings with members of the research team, including identifying shared values, joint business ventures and leadership roles as emergent themes. Under the direction of the Idaho State University Institutional Review Board, I maintained appropriate protection of participant data with key-locked offices and password-protected computer data files. Additionally, I utilized pseudonyms in the place of actual names in the findings section of this paper to ensure the privacy of participants.

## **Data Analysis and Findings**

### *Descriptive Statistics*

The American Falls-Aberdeen Ground Water District represents 93,815 acres of land farmed. On average, each participant farms about 3,127 acres, with a range of 300 to 22,000 acres. On average, the represented farmers rely on farming for 90% of their household income. They raise cattle and/or produce a variety of crops including sugar beets, potatoes, alfalfa, corn, wheat, barley, and oilseed. One hundred percent of the farmers in this study are male and white, as ascertained from subjective observation. The mean of our respondents is 57 years old and range from 27 to 87. Ninety-seven percent of participants identify their political ideology as Conservative, three percent Libertarian, and none as Liberal. Fifty percent of participants identify their religious affiliation as LDS (Mormon), twenty-six percent Christian, ten percent Lutheran, seven percent Catholic, and seven percent as none or nondisclosed. The overall educational backgrounds of our participants are as follows: seven percent hold only a high school education; sixty-three percent have attended some college or technical training or earned an Associate's degree; twenty-seven percent have a Bachelor's degree; three percent hold a Master's degree. See Descriptive Statistics in Table 1.

The farmers in the study site have many common characteristics. For the most part, the participants are of similar gender (male), race (white), political ideology (conservative), and religious affiliations (Christian or LDS). They also all identify as farmers. Therefore, culturally speaking, the participants constitute a relatively homogeneous group. They have a similar way of making a living, raising livestock and/or producing field crops. Their livelihood connects them to the natural environment so they are interdependent on common water sources and weather cycles.

As a reminder, all uses of names in the findings section are pseudonyms. I utilize pseudonyms in place of actual names to ensure the privacy of participants.

The farmers in this study grew up in a rural community, most of them specifically in the American Falls and Aberdeen region. In this community, there is a united heritage of fathers, grandfathers, and great-grandfathers who have transformed this arid region into irrigated cropland. Elden links this heritage to his confidence that he and his fellow farmers can overcome current challenges associated with access to water.

“Our heritage [in] this area was developed on the pioneer spirit. People came out and did things. They came out and said we’re gonna put a canal in the middle of a desert, and they took water out there and they created something that was going on...So that same thing comes into mind when you talk about a community of water...I believe that there are people that can do that because our pioneers did it. Our ancestors, they came out here and did something that to me is totally miraculous.”

This farmer represents many fellow farmers in the district in his optimism that they can work together to meet shared objectives related to water. He takes pride in the fathers, grandfathers, and great-grandfathers that passed down a legacy of cooperation. He is optimistic that their shared heritage can lead to positive outcomes in managing what he calls their community of water.

The participants in this group are proud of their occupation. They value the distinctiveness and prestige attributed to farming for a living. At the end of each interview, I ask participants if they want to share anything else. The farmers questioned spontaneously speak up for their fellow farmers and use terms of “we” and “our” when referring to their shared



occupation. The farmers also describe collective pride in farming responsibly. As an example, Glen submits his opinion:

“Farmers, they’re probably the best land stewards there are. We want to take care of our own. We want to take care of our ground. We want the best for it.”

This farmer’s statement reflects a repeated use of the word “we” and also reflects his positive appraisal of his identifying group. Because of strong connections, friendly networks in this group lead to support for one another in many ways. Frederick expresses his support for the needs of the group:

“You want to see them succeed and they want to see you succeed. It’s kinda a two-way street.”

This farmers’ support for the group is an example of reciprocity, where there is an expected exchange of support within the group for mutual benefit. This is a very important point because social capital has the potential to strengthen perceived adaptive capacity through confidence in a shared willingness to help others and receive help when needed.

Many members of this community declare a tradition of looking out for one another. Calvin expresses the dilemma that the farmers face.

“We’re kinda helping those guys out too. But I guess that’s what the whole association is doing right now. We’re trying to help each other out...But you have to play along and participate and use less water. Effectively that’s what we’re doing...Getting us together, we kept guys from getting shut off and which would’ve affected me also...So it’s good. I mean I complain about it a lot, but if we didn’t have the group, there would be curtailments.”

As a reminder, the new water restrictions are a result of a collective settlement agreement, and the terms of the agreement allow the most vulnerable members (with junior water rights before 1989) to receive protection from the group. All of the farmers in this group are required to meet the obligations of the 2015 settlement agreement based on their membership in Idaho Groundwater Appropriators, Inc. (IGWA). In the end, this farmer adds a positive appraisal that getting together with everyone trying to help each other out effectively prevents curtailments.

### *Perceived Adaptive Capacity*

As part of analyzing the data, I assess the farmers' perceived adaptive capacity. Here are a few examples of what I measure as positive coping appraisals. Participants who express their perceived adaptive capacity positively do so by describing their ability with "I can" statements. For example, Hugh says:

"I can adapt and if we are over-appropriating the water then I have to, and so does everyone else...It's very important to me because as long as it remains an agricultural operation, I have a livelihood."

Additional positive coping appraisals worded in a variety of ways are provided by Elden, Aaron, and Mark as follows:

"We'll do it. I mean that [is] what farming is. You have to adapt to what happens."

"I'll get it. I'll get 'er taken care of. It's just gonna cost extra to do it."

"I think I can adapt."

Although there are farmers that provide positive coping appraisals, not every participant is so optimistic. There are farmers that submit negative appraisals. They describe the water restrictions as out of their control and difficult. For example, Charles expresses his frustration.

“We’ve struggled with the adaptation to it up until this point, and I think we’re going to continue to struggle with it because it’s an added expense...I mean, obviously, we want to continue to keep in business.”

Some farmers are very angry and communicate that they are not on board with collective reductions. As an example, John says:

“I think it sucks. Well, I’ll tell you why. This whole thing upsets me...It’s not a good thing. I feel like it’s been crammed down our throat.”

I rank the perceived adaptive capacity of farmers in this district and find 26% of participants as negative, 17% as mixed, and 57% as positive. In an effort to understand the variation within the study group in coping appraisals, I explore descriptions of informal and formal social connections that shape farmers’ perceived adaptive capacity.

#### *Informal Social Connections*

Many farmers’ informal involvement including attending community events and getting together with friends provide benefits to their estimations of perceived adaptive capacity. Most likely as a result of their shared heritage and similar occupations in this district, the farmers we interviewed spend time together and know each other very well. The farm families attend the same schools and traditional community events. Spending time together in formal and informal settings reinforces their common interests and mutual support for one another within the study group. William talks about his experience being involved in local informal meetings when he says:

“[We] kind of gather for coffee and talk and stuff like that and, you know, you kinda get your day started that way. So, you’re kind of in touch with the community by that, by doing that.”

This farmer's experience gathering for coffee on a regular basis gives him a good start for the day and keeps him apprised of his community. This is not an isolated case. The farmers in this district describe a variety of informal settings where they have informal conversations with friends or family members and they describe the conversations as helpful.

Micah represents many of the farmers when he declares his connection to others in the community afford him an opportunity to be of assistance to neighbors.

"I feel pretty connected...I've got my brother, I've got three or four neighbors that I can call, and they feel that way about me. They can call me...I try to drive around and look what [is] going on to see if the neighbor's in trouble. Then I just go. I just take my stuff and go."

This farmer is ready and willing to help others and he expects reciprocity. Not only is he willing to be there for others, he is also confident that he can call on them to help him if he needs something.

#### *Formal Social Connections*

In addition to informal interactions, sugar beet, potato, and grain producers get together at formal meetings where they learn about the latest news and information for crop production.

Keith declares:

"I know most of 'em. You run into about the same guys every meeting you ever go to."

This farmer describes seeing the same people at the agriculture-related meetings. This is an example of building relationships over time with contact on a frequent basis.

John compares farmer networks to networks in other industries:

“So, there’s a network of communicators and of communication, just talking farmer to farmer, the same as being in the banking business. As bankers talk to bankers, they learn different things from each other too.”

Just like in the other kinds of businesses, farmers benefit from getting together and sharing information.

In contrast to farmers who have abundant connections at formal and informal settings, several farmers represent low social capital when they share that they stay at home or on their farm and do not socialize. As an example, in response to questions about involvement in the local community, Kurt stated firmly:

“No. I don’t have time for that.”

This farmer describes little or no formal or informal involvement. He represents several farmers in the district that do not get out for a variety of reasons including busyness on the farm and/or lack of interest in social involvement.

### *Joint Business Ventures*

In this next section, I will share how farmers are mitigating a variety of agricultural risks. When I ask about the main challenges and/or risks their farm operation faces, the farmers share the concern of commodity prices. That is the most pressing reason farmers attribute to economic losses this last year. The farmers in American Falls and Aberdeen grow the same crops, including sugar beets, potatoes, corn, barley, wheat, and alfalfa. In the global economy, they describe looking at the same commodity markets and sharing similar storage costs. There is shared prosperity when the crops yield well and the commodity markets are in their favor. They also have the similar losses in times of poor yields and unfavorable commodity prices. The

strength of their solidarity is evident when they face challenges that put their farms at risk. Sid shares:

“Relationships are very important. Whether [it is] potatoes and the people at the plant, or the wheat and the elevators, or the grass seed, or the oilseed, that’s a big part of [getting] in and out of things for sure.”

This farmer shares his confidence that relationships have been instrumental for him in managing the products of his farming operation, including potatoes, wheat, grass seed, and oilseed.

Many producers in this district adapt in a cooperative fashion by pooling their resources in joint business ventures for marketing and storage of potatoes, sugar beets, and grains. They have done this in the past to mitigate unfavorable economic conditions. Their solidarity adds to their sense of power to make changes and solve problems as a group. Richard shares his understanding of the formation of a jointly-owned sugar beet company.

“For years everybody was dependent on U&I Sugar Company, and then the news came that it was shutting down... That was kind of concerning, kind of worrying. But then Amalgamated decided to come in and buy out... It would become a farmer-owned cooperative... It was just kind of the unknown, but it actually, looking back now, has turned out pretty well... The farmers have control over it so that it’s not like before when U&I just had it.”

As he looks back, this farmer is describing his investment in the joint business venture as a beneficial experience.

The only way to market sugar beets in this district is to own shares in Amalgamated Sugar Company. Therefore, farmers who grow sugar beets are members of the local sugar beet cooperative. Jim described his experience buying stock in Amalgamated Sugar:

“We had to scrape \$400 an acre to buy into it. I tapped out every resource I could. I wanted to buy as many beets as I could. So, when the company came in the 1990’s I bought 500 acres.”

This farmer makes it clear that it is a substantial financial investment to be a joint owner in the sugar beet cooperative.

Tim says that joining the sugar beet cooperative put him in a position of inter-dependence.

“I own the beet company with, I don’t remember the exact number of other shareholders, but I am very dependent on them to hold up their part of the company.”

This farmer is clear that pooling his resources is a shared experience where farmers rely on one another.

The beet growers in this study describe positive results from mobilizing their resources and investing in Amalgamated Sugar. They describe purchasing shares in the sugar beet cooperative as probably the best investment they ever made in farming. Robert put it this way:

“It’s really positive. I’m glad we did it. I would never want to do it any other way.”

Sid also expressed his gratitude that he bought into the cooperative.

“Sugar beets are kind of a bright spot because we have the same amount of acres every year with beets and we have the same contract. Of course, the farmers own the shares in the Amalgamated Sugar Company and it [has] been pretty stable for us. So, we’re thankful for the sugar beet contract.”

Overall, the sugar beet growers in this study rated the collective endeavors pooling resources as a positive experience.

Additionally, several farmers describe investing in multiple joint business ventures. For example, agricultural producers in this district cooperatively own fresh-pack potato warehouses and granaries. They also jointly own other agriculture-related businesses. Karl describes mitigating market risks as a motivation for cooperatively owning a fresh-pack potato warehouse with several farmers.

“It was a way to market our potatoes and be treated, you know...if the people that market your spuds aren’t completely above board that’s what we were trying to get away from. We wanted the market to treat us as fair as it could...that’s when we decided to put our little shed together and just market our own.”

This farmer entered into a joint business venture motivated by a need to mitigate market risks.

In this rural setting, the formation of joint ventures comes through social connections. For example, Brent describes the formation of his jointly owned potato warehouse.

“We’re friends, all kind of related in a way too, couple cousins, and then my brother. My brother’s brother-in-law is one of ‘em. So, then there’s me and then there’s, you know. So, we’re all kind of, we just knew each other. I guess my brother and a couple of the other guys probably led it. We all kind-of were going the same direction.”

This farmer’s experience owning a potato warehouse with friends and family is motivated by what he describes as going the same direction.



Benefits of joint business ventures include opportunities for long-term friendships where members transfer information. I asked Calvin if he shares information with fellow farmers, and he replies:

“We do, especially with the marketing of potatoes. It’s always a topic.”

The regular meetings where partners discuss their shared business venture provide opportunities to be with each other and talk often. James describes monthly business meetings as an opportunity to share feelings:

“We meet every month and everybody just kind of talks and shares thoughts...It helps.”

This farmer is sharing that he considers it useful to share what is on his mind. Grover supplements his perception of the benefits of sharing feelings.

“Misery loves company...Yes. I do feel like that. I feel like isn’t that a human characteristic is when you’re hurt you need someone to share your pain?”

Support for one another in the farming community includes sharing good feelings as well as the bad ones.

The open discussions that the farmers share provide rich insight into the benefits farmers receive as a result of their social capital. As a complement to this study, I created an ordinal ranking of farmers’ involvement in joint business ventures and an ordinal ranking of farmers’ perceived adaptive capacity. As a result, I find a correlation between being involved in joint business ventures and perceived adaptive capacity. The Kendall Rank Correlation formula reveals that there is a moderate positive correlation between joint business ventures and perceived adaptive capacity (0.445). As the variable for joint business ventures increases perceived adaptive capacity increases. See Table 2.

### *Representing one another in leadership roles*

In addition to participating in joint business ventures to mitigate market risks, farmers in this district rely on their network of support for political representation. They serve on state and regional boards to represent the political interests of agricultural producers. They also serve on boards for local school districts, libraries, and banks. Abe shares his thoughts about representing fellow farmers.

“Reason I served as a ... was to make sure that the [policies] were good for farmers and myself... I have to rely on hopefully my neighbors who are looking out for everybody’s interests ‘cause their interests are gonna be about the same as mine... They don’t serve on [this] board. I do.”

This farmer believes that taking on a leadership role benefits his farm operation and also benefits the collective group. He expresses confidence in a reciprocal relationship where other farmers will represent him in other leadership roles in the community.

Being involved in leadership roles in this district also mobilizes access to valuable information. Kyle states that being on a local board provides him opportunities to be apprised of current water issues.

“I feel like I’m pretty clued in because I’m on the... board, and have been for twenty years. We review everything... We are pretty close to what’s going on with the groundwater, the surface water, the Surface Water Coalition, and everything.”

This farmer describes a sense that he has access to information and has increased knowledge as a result of serving in a leadership role.

Additionally, Chester cheerfully reveals that involvement in leadership affords him an opportunity to provide input in decision-making at meetings.

“I do think it helps. I think it is good to be involved. You have got to stand up and be counted. Or another way to say it, decisions are made by those that show up...Sometimes we don’t realize that if we would work together we can do something that will make everyone much better off.”

This farmer opens up about the benefits of serving in leadership roles and promotes other farmers to either be a leader or participate as well.

As a result of the positive responses I received from agricultural producers who take on leadership roles, I supplement this study with a calculation of the Kendall Rank Correlation. I find that there is a weak positive correlation between leadership roles and perceived adaptive capacity (0.138). As taking on leadership roles increases, perceived adaptive capacity increases. See Table 2. Upon further investigation, I tally a combination of joint business ventures and leadership roles into one index to see if a blend of these two measures of social capital correlates with perceived adaptive capacity. Based on the Kendall Rank Correlation, I find a moderate positive correlation between an index of the combination of joint business ventures plus leadership roles and perceived adaptive capacity (0.348). As a combination of joint business ventures and leadership roles increases, perceived adaptive capacity increases. See Table 2.

As a summary, I find evidence for a foundation of shared values, based on similar descriptive statistics as well as a common reliance on water and concern for water insecurity. Informal and formal social connections are described as beneficial currently and in the recent past as farmers work together to solve problems and share their farming lifestyle. Additionally, I find a positive correlation between formal social connections in the form of joint business ventures and perceived adaptive capacity. I also find a positive correlation between leadership roles and perceived adaptive capacity. The findings in this study support my hypothesis that

farmers with more social capital will perceive increased adaptive capacity to new water restrictions.

### *Non-Social Factors Correlating with Perceived Adaptive Capacity*

I explore three non-social factors that may explain variations in perceived adaptive capacity. These alternative factors that may explain perceived adaptive capacity include the percent water restriction required, the size of the farming operation, and the unique situation of each farmer in terms of percentage groundwater and surface water rights.

I calculate the percentage water restriction requirement as an ordinal measure from low to high. According to the Kendall Rank Correlation, I find a negative correlation between water restrictions and perceived adaptive capacity (-0.700). As the percentage water restriction increases, perceived adaptive capacity decreases. This may be explained by increased challenges attributed to decreased access to water.

A second non-social factor that I measure looks at the number of acres farmed as an ordinal measure from low to high. The Kendall Rank Correlation calculation results in a moderately positive correlation between the size of the farm and perceived adaptive capacity (0.348). As farm size increases, perceived adaptive capacity increases.

A third non-social factor is the influence of the portfolio of groundwater and surface water rights, as an ordinal measure from low to high. The Kendall Rank Correlation calculation of groundwater results in a weak positive correlation between an increased percentage of groundwater and perceived adaptive capacity (0.299). As the percentage of groundwater rights increases, perceived adaptive capacity increases. This interesting finding is open for further investigation.

## **Conclusion**

I expected to find evidence of positive influences of social capital in this case study of farmers in the American Falls-Aberdeen Groundwater district. I anticipated that similarities would positively influence perceived adaptive capacity, based on Bourdieu's conceptualization of the conditions under which social capital is especially effective (Appelrouth and Edles 2010; Bourdieu 1986; Siisiäinen 2000). I also anticipated interdependence on one another and sharing the concern for water security bridging differences (Dietz et al. 2003; Ostrom 1990; Ostrom et al. 1999; Putnam 1993). I expected to find influences from formal and informal gatherings on farmers' coping appraisals for adaptation based on past and present experience mitigating risks (Endter-Wada et al. 2009).

As a summary, I find the farmers in the study site to have many common characteristics. They constitute a relatively homogeneous group. They also have a similar livelihood and dependence on water as a common good. I also find a similar heritage of cooperation in bringing water across the valley. There is evidence of solidarity and reciprocity in the social interactions described by farmers. Many farmers' informal and formal involvement leads to benefits including opportunities to share information and give mutual support.

The farmers are vulnerable in a similar way in times of poor yields and unfavorable commodity prices. Shared experiences pooling resources in joint business ventures for marketing and storage of their crops are shown to enrich farmers' perceptions of solidarity and their sense of power to make changes and solve problems collectively. I argue that these factors influence perceived adaptive capacity in a positive way in this study. The growers in this study involved in joint business ventures and taking on leadership roles describe positive results from pooling resources, sharing information, and providing emotional and social support.

In addition to participating in shared decision-making to mitigate market risks, farmers in this district rely on their network of support for political representation. Taking on leadership roles benefits farmers individually and collectively in this study site. Being involved in leadership roles in this district affords opportunities to be apprised of current water issues and empowers farmers to provide input in decision-making at meetings.

As a complement to the in-depth descriptions of the benefits of social capital for farmers, I find a positive Kendall Rank correlation between farmers involved in joint business ventures and for leadership roles and perceived adaptive capacity. I argue that the benefits including extra opportunities for mobilization of information, emotional and social support, influence on decision making, and positive experiences mitigating agricultural risks cooperatively positively influence farmers' coping appraisal. The findings of this study support my hypothesis that farmers with more social capital will perceive increased adaptive capacity to new water restrictions.

Social capital is a powerful, necessary resource. This case study has provided an opportunity to highlight an exceptional case in which farmers, as creative entrepreneurs, press forward and work together to solve agriculture-related problems. Farmers in this study build and strengthen social capital through multiple social connections and positive exchanges. As a result, farmers with more social capital have improved perceived adaptive capacity, which has the potential to lead to adaptation success.

The farmers in this study have recently been faced with the shared threat that comes in the form of threatened litigation and potential for a water call. As a result of their membership in IGWA, they are bound to a collective 2015 settlement agreement which requires a reduction in the water access for use on their farms. As I consider adaptive responses of farmers in this

district to water restrictions, I note that farmers describe experiences where they count on one another for assistance in times of need and they are comfortable pooling and sharing resources. These connections show evidence of potential for farmers in this study site to act together and pursue shared objectives in an effective way.

The purposes of collective action are not one time events. What we can learn from this is that social capital displayed in multiple actions of support strengthens humans' abilities to adapt to changes in the natural environment. Policymakers who design water-related policies and programs may see benefit from promoting a shared vision of collective actions.

#### *Suggestions for Further Study*

I recommend further research on alternative explanations for variation in perceived adaptive capacity. It may be beneficial to follow up with the same participants over a longer period of time. A longitudinal study may provide further insight into the anticipated potential for adaptation success as a result of positive perceived adaptive capacity. I also recommend questioning farmers in other groundwater districts that are impacted by the 2015 settlement agreement. This may provide an opportunity for comparison between different water districts that may compose of farmers with decreased or different social capital experiences in their communities.

#### *Limitations of this Study*

I utilized the convenience method for recruitment of participants, and so the findings cannot be explained as representative of a larger population. Additionally, the sample size of thirty participants is a good starting point, but increasing sample size may allow for increased insight and variation in participant responses.

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## Appendix 1: Interview Guide

### Interview Guide: Adapting to New Water Restrictions in Idaho: A Study of Water Managers and Farmers

Thank you for taking the time to talk with us today. We are doing a study for a better understanding of how farmers have been impacted by and are adapting to the aquifer recharge program in the Snake River Plain and the associated water call settlement. The interview should take about 60 minutes. Everything you tell us during the interview will be kept strictly confidential, and your name will not be revealed to anyone beyond the research team. You may discontinue the interview at any time. For the purpose of data coding and analysis, we would like to record this conversation. Do you feel comfortable with this? If not, please let me know now. Again, thank you for your willingness to participate in this interview. Unless you have any questions, let's go ahead and get started.

#### Section 1: Farm operation

To begin, we would like to ask you some basic questions about your farm operation.

How much land do you own? \_\_\_\_\_ acres

How much of that land do you farm? \_\_\_\_\_ acres

How much land do you lease? \_\_\_\_\_ acres

What are the major crops that you grow and how much acreage for each?

What is the yield for each crop, and how are they irrigated?

Crop	Acreage	Yield	Irrigation type

What percentage of your household income comes from the following sources?

Source	Percentage
Agricultural production (not including livestock)	
Livestock production	
Off-farm work	
Conservation easements or programs	

(Only if they report a percentage of their income coming from off-farm work) When did your household's off-farm work begin, and why did you choose it?

What types of water rights do you have?

Type	Amount (% of total)	Year	Water Cut Requirement
Surface			
Ground			

#### Section 2: Risk and land management decision-making

Next, we want to ask you some questions about the risks and challenges you face and how you make farming decisions.

Right now, what are the main challenges and/or risks your farm-operation faces?

*Prompt: What are the biggest challenges or risks you face that affect your ability to be a successful farmer?*

What are you doing to deal with these challenges or risks?

*Prompt: What are the main reasons you chose this particular action?*

*Prompt: Is there anything you wish you could do to deal with the risks but have not been able to? What and why?*

*Prompt: What prevents you from adequately dealing with the risks you face?*

*Prompt: What enables you to deal with the risks you face?*

In the future, what do you think the main challenges and/or risks your farm operation faces?

When considering making changes to your farm, what are the major criteria you consider?

*Prompt: What are the economic criteria you consider?*

*Prompt: What are the labor criteria you consider?*

*Prompt: What are the lifestyle criteria you consider? (Hunting, recreation)*

*Prompt: What environmental criteria you consider?*

*Prompt: What contract criteria do you consider?*

Where do you sell your crops?

Do you have contracts for your crops?

*Prompt: Which crops and with who?*

*Prompt: What are the terms of the contract?*

### Section 3: Impacts and adaptation

Next, we want to ask you some questions about how you were impacted by the settlement agreement and what you did to deal with the water curtailments.

How much (what percentage) of your former water usage do you have to cut?

How did the water curtailment impact your farm in 2016?

*Prompt: How did not being able to irrigate prior to April 1 affect your operation?*

*Prompt: How did not being able to irrigate later than October 31 affect your operation?*

How did the water curtailment impact decisions you made on your farm in 2016?

What changes did you make to deal with the water curtailment?

*Prompt: Why did you make [x] change?*

*Prompt: Did you make any changes to your irrigation system?*

*Prompt: What did you do to deal with decreased yields?*

*Prompt: What did you do to make up for decreased income?*

If no, why didn't you make any changes?

If no changes, then skip to Section 3.1.

If they did make changes:

Overall, how effective was [each] change for dealing with the impacts of the water curtailments and why?

What other changes could you have made?

*Prompt: Why didn't you choose them?*

Have you installed a water meter?

*Prompt: Who paid for the installation?*

What are your concerns about having to put in a water meter?

*Prompt: Is cost a factor?*

Looking back, what would you have done differently. Why?

Did the water curtailment impact the income your farm generated in 2016, and if so how?



*Prompt: How did the water curtailments impact your household income and your yields?*  
How much risk do the water curtailments pose to your farm operation in the future?  
How do you think the water curtailment will impact your farm operation in the future?  
*Prompt: How will the water curtailments affect your household income?*  
What changes will you make in the future to deal with the water curtailments?  
Overall, how would you describe your ability to adapt to the water curtailments?  
*Prompt: What makes it easy for you to adapt?*  
*Prompt: What makes it difficult for you to adapt?*  
How have the water curtailments interacted with the other risks and challenges to your farming operation that you mentioned earlier?

#### Section 4: Social Connectedness

Did you grow up on a farm?  
Did you grow up in this community?  
What local community events do you attend?  
Overall, how connected do you feel with your local community?  
In what ways would you say you are connected generally in the community?  
In what ways would you say you are connected specifically to the agricultural community, such as other farmers and farm organizations?  
What information sources do you rely on when making decisions about your farm operation?  
ag vendors?  
educational institutions, such as local universities?  
government agencies, such as the USDA, Natural Resource Conservation Service?  
family members?  
other farmers in your area?  
What are your primary sources of information for making decisions on how to adapt to the recent water restrictions?  
ag vendors?  
educational institutions, such as local universities?  
government agencies, such as the USDA, Natural Resource Conservation Service?  
family members?  
other farmers in your area?  
In what ways has their advice or information influenced your decisions about how to adapt?  
Do you share labor, equipment, or other resources with your family?  
*Prompt: If so, in what ways do you share?*  
Do you share labor, equipment, or other resources with farmers outside of your family?  
*Prompt: If so, in what ways do you share?*  
Has this changed as a result of the water cuts?  
How did your social connections influence your ability to adapt to water restrictions?  
Are you currently involved in the Amalgamated Sugar Company, Pleasant Valley Potato, Idaho Select, Driscoll Potato, or any other ag-related business relationships?  
If no, skip to Section 5  
If yes: What has been your experience? Is this helpful in mitigating risks associated with marketing and selling your crops?  
How did your involvement in the [cooperative or business relationship] influence your ability to adapt to water restrictions?

*Prompt: How will it affect your ability to adapt in the future?*

## Section 5: Governance and fairness

Now we want to ask you some questions about the aquifer recharge settlement agreement. You mentioned you had to cut [x] percent of your groundwater. How was that number reached by the groundwater district?

How were you involved in the water curtailment decision-making process?

*Prompt: If not involved, why weren't you involved?*

If not involved, skip next question:

(If they are involved in a cooperative or business relationship): How did your experience being part of the [cooperative or business relationship] impact the extent to which you have participated in the water curtailment negotiations?

Did you attend any groundwater district meetings? If so, did you feel like you had a voice?

Was the decision-making process that led to the aquifer recharge settlement agreement fair or unfair?

*Prompt: Why was it fair?*

*Prompt: Why was it unfair?*

*Prompt: What would have made the agreement fair?*

In your opinion, was the process sufficiently transparent, or do you think it should have been more transparent?

Are the terms of the aquifer recharge settlement agreement fair or unfair?

*Prompt: Why are they fair?*

*Prompt: Why are they unfair?*

What do you think the motivation is for implementing these water curtailments right now?

Hypothetically, what should happen if the amount of available water in the state of Idaho declines?

*Prompt: How should this resource be allocated during times of scarcity?*

Who should be in charge of leading the process of making new rules for governing water resources?

## Section 6: Socio-demographics

Okay, before we finish here, I would just like to ask you a couple of brief demographic questions. Including yourself, how many people live in your household?

In the simplest terms, how would you describe your political views?

*Prompt: If the answer is vague, try to probe a little bit on this.*

What is your educational background?

What religious tradition, if any, are you affiliated with?

And what is your age?

When you retire, what would you like to see done with your farmland?

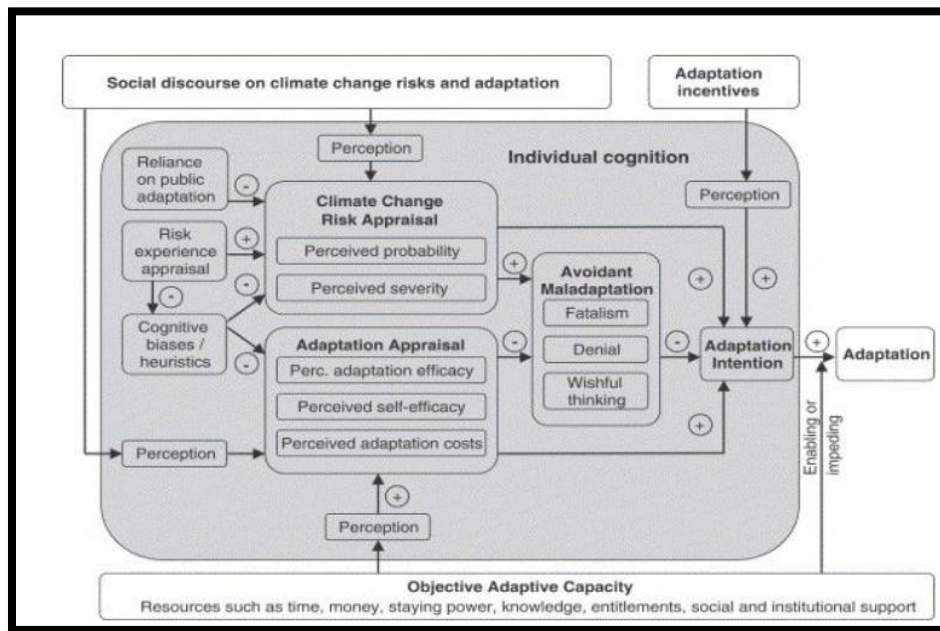
How important is it to you that it remains an agricultural operation?

Finally, is there anything else you would like to share with us about farming in southeastern Idaho, especially in the aftermath of this water curtailment agreement, we have missed?

Thank you very much. We really appreciate the time you have taken to participate in this research. It helps us understand what issues you are facing and how steps could be taken to help you do your work, which is work we know benefits this community and others.

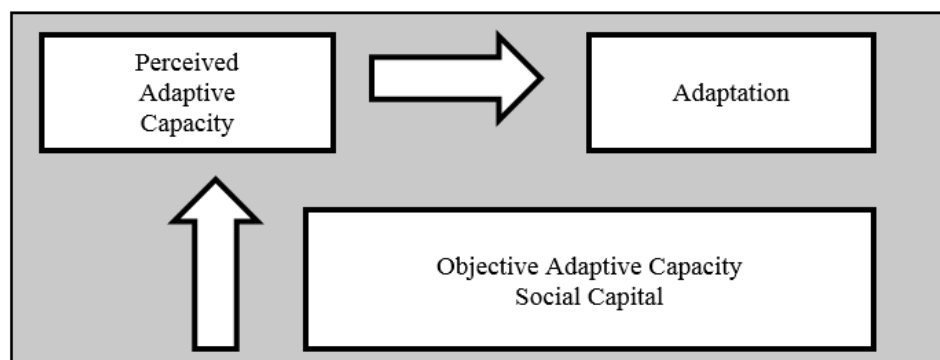
Turn off recording device now.

### Illustration 1: Model of Private Proactive Adaptation to Climate Change



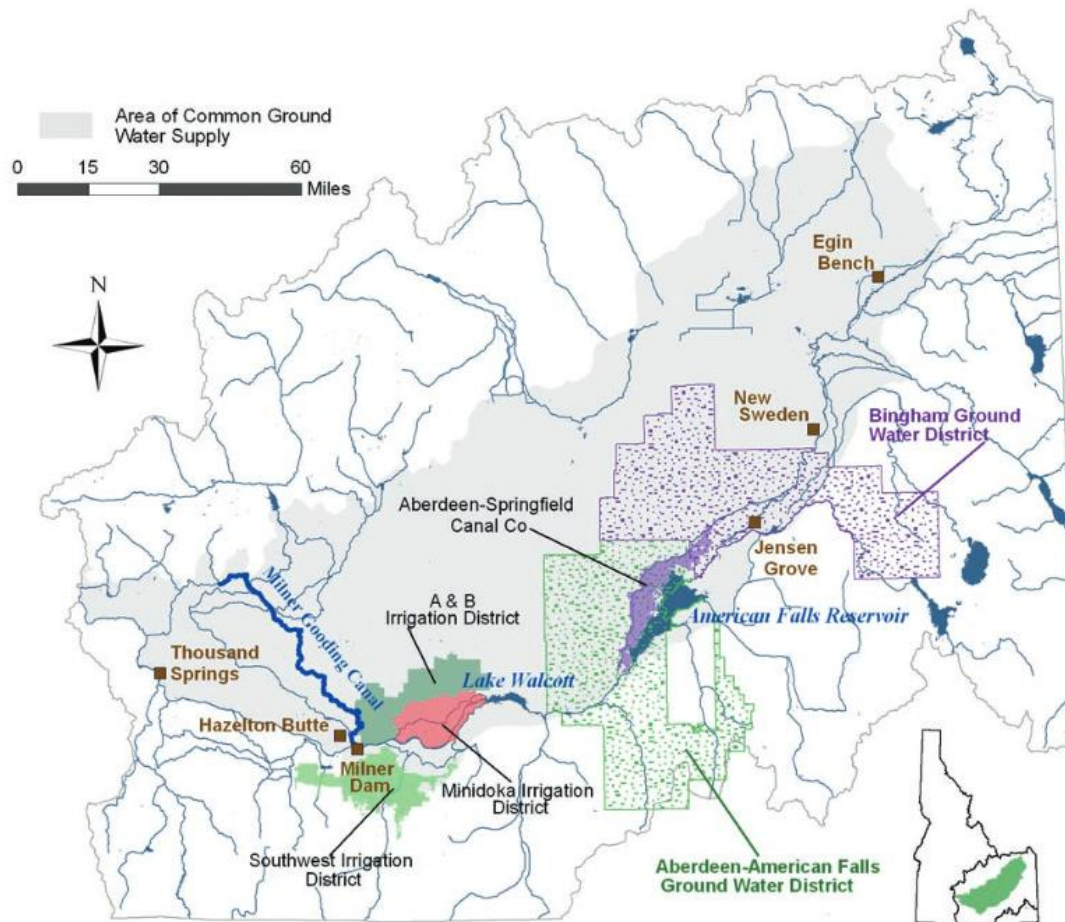
Model of Private Proactive Adaptation to Climate Change  
(Grothmann and Patt 2005)

### Illustration 2: Simplified Model of Private Proactive Adaptation to Climate Change



Simplified from Model of Private Proactive Adaptation to Climate Change  
(Grothmann and Patt 2005)

**Illustration 3: Map of American Falls-Aberdeen Groundwater District**



Map of American Falls-Aberdeen Groundwater District  
(Idaho Department of Water Resources n.d.)

Illustration 4: Recruitment Flyer

discover OPPORTUNITY

## Adapting to New Water Restrictions in Idaho: A Study of Water Managers and Farmers

**Are you an Idaho farmer impacted by the recent Private Managed Aquifer Recharge Agreement?**

As part of a state-wide research effort, the Department of Sociology, Social Work, and Criminology at Idaho State University is seeking farmers, who actively manage a farm, that have been impacted by the recent water curtailment agreement to participate in a voluntary interview.


### Research Participation

The goal of the interview is to evaluate how farmers are making adaptive decisions in response to new water restrictions and what they think of the negotiation process. The interview should last approximately one hour and will be conducted at a time and place convenient for the respondent. Please contact us if you are interested!

### Contact

Kathleen Shipley  
Email: [shipkat2@isu.edu](mailto:shipkat2@isu.edu)  
Phone: (208) 241-3875

### MILES



Managing Idaho's Landscapes  
for Ecosystem Services

Pocatello | Idaho Falls

Idaho State  
UNIVERSITY

Meridian | Twin Falls

Recruitment Flyer

**Table 1: Descriptive Statistics**

Descriptive Statistics (n=30)				
Description	Percentage	Mean	Median	Range
Farmed Land (acres)		3,127	2,000	300 – 22,000
Age (in years)		57	59.5	27 to 87
Household size		3	2	1-8
Household income from farm		90%	100%	15 to 100%
Gender				
Female	0			
Male	<u>100</u>			
Total	100			
Race				
White	100			
Other	<u>0</u>			
Total	100			
Political ideology				
Conservative	97			
Libertarian	3			
Liberal	<u>0</u>			
Total	100			
Religious Affiliation				
LDS/Mormon	50			
Christian	26			
Lutheran	10			
Catholic	7			
None or Nondisclosed	<u>7</u>			
Total	100			
Education				
High School	7			
Some college, technical, or Associate's degree	63			
Bachelor's degree	27			
Master's degree	<u>3</u>			
Total	100			

Descriptive Statistics

**Table 2: Kendall Rank Correlation**

Kendall Rank Correlation (n=30)			
<u>Perceived Adaptive Capacity</u>	<u>Coefficient</u>	<u>Strength</u>	<u>Direction</u>
Leadership Roles	0.138	Weak	Positive
Business Ventures	0.445	Moderate	Positive
Combined Leadership and Business	0.348	Moderate	Positive
Percent Water Restriction	-0.700	Strong	Negative
Percent Groundwater	0.299	Weak	Positive
Acres Farmed	0.348	Moderate	Positive
<u>Leadership</u>	<u>Coefficient</u>	<u>Strength</u>	<u>Direction</u>
Business	0.284	Weak	Positive

Kendall Rank Correlation