THE INFLUENCE OF CULTURAL WORLDVIEW AND NETWORKS OF RELATIONSHIPS ON IMPLEMENTATION OF CONSERVATION PRACTICES IN WHITMAN COUNTY, WASHINGTON

A Dissertation

Presented in Partial Fulfillment of the Requirements for the

Degree of Doctorate of Philosophy

with a

Major in Natural Resources

in the

College of Graduate Studies

University of Idaho

by

Jennifer A. Boie

December 2013

Major Professor: Nick Sanyal, Ph.D.

Authorization to Submit Dissertation

This dissertation of Jennifer A. Boie, submitted for the degree of Ph.D. in Natural Resources and titled “The Influence of Cultural Worldview and Networks of Relationships on Implementation of Conservation Practices in Whitman County, Washington," has been reviewed in final form. Permission, as indicated by the signatures and dates given below, is now granted to submit final copies to the College of Graduate Studies for approval.

Major Professor:

_____ Date: _____

Nick Sanyal, Ph.D.

Committee Members:

_____ Date: _____

Edwin E. Krumpe, Ph.D.

_____ Date: _____

Tamara J. Laninga, Ph.D.

_____ Date: _____

Manoj K. Shrestha, Ph.D.

Department Administrator:

_____ Date: _____

Troy Hall, Ph.D.

Discipline’s College Dean:

_____ Date: _____

Kurt Pregitzer, Ph.D.

Final Approval and Acceptance by the College of Graduate Studies:

_____ Date: _____

Jie Chen, Ph.D.

Abstract

This dissertation integrates cultural cognition with Social Network Theory to describe cultural worldviews of agricultural producers and information sources within Whitman County, Washington; influence of cultural worldview on producer selection of information sources; and influence of cultural worldview on producer likelihood to implement conservation practices. A mixed methods approach consisting of three phases was employed: I) survey of producers, II) survey of information sources, and III) interviews with producers. Our findings indicate that the majority of producers within Whitman County fall within the "hierarchical individualists" worldview type and they have a high likelihood of selecting information sources who hold the same cultural worldview as themselves. This is exhibited in network graphs as a high level of homophily between "hierarchical individualist" producers and information sources. Producer interviews provide context for influence of cultural worldview on information source selection. Our findings reinforce that cultural cognition operates when an individual is evaluating an expert for credibility, resulting in the individual selecting information sources whom they perceive to share their values. This has practical implications for Whitman County information sources as they are significantly more likely than producers to fall within the worldview type classified as "egalitarian communitarians." This is even further compounded within the information sources classified as "conservation information sources" and "university affiliated information sources." Our findings suggest that while cultural cognition may be an indicator for attitudes toward conservation, there was no difference in actual behavior of producers of different worldview types as measured by the number or types of conservation practices implemented. The themes and sub-themes that emerged from producer interviews to explain both implementation and non-implementation of conservation practices were both rich in content and broad in scope. Producers' reasons for implementing conservation practices fell under the main themes of "voluntary" and "regulatory compliance." Additional recommendations related to successful delivery of outreach programs and important characteristics of information sources are presented. The theoretical approach advanced through this research provides a theoretical contribution regarding how cultural cognition may influence the network characteristic of homophily and the formation and structure of agricultural producers' social networks within Whitman County, Washington.

Acknowledgements

Great appreciation and gratitude go to the following individuals and organizations for their contributions to this research: Nick Sanyal, my advisor and major professor, for guidance and support throughout my program and research; Ed Krumpe, Tammi Laninga, and Manoj Shrestha, my committee members, for their insight and feedback throughout my research; Britta Carr and Taryn Longberry for assistance with survey data entry and interview transcription; Palouse-Rock Lake Conservation District, Palouse Conservation District, Whitman Conservation District, and Pine Creek Conservation District for support and design feedback.

I would like to recognize and express gratitude to the agricultural producers of the Palouse who strive to sustain their livelihood while conserving natural resources for future generations, as well as the conservation professionals who work to aid agricultural producers while promoting the conservation of natural resources on the working lands of the Palouse.

Dedication

I would like to dedicate this dissertation to my family. They have encouraged me every step of the way and have continually inspired me by their unwavering belief that I can make a difference.

I would like to recognize my father who has continually been a role model with his quest for knowledge and my mother who has always instilled in me a sense of dedication and determination.

My love and admiration go to Michael Lopez, my husband and partner in the adventure of life, who is an inspiration both personally and professionally with his commitment to conservation and creating a better world through service.

For my beautiful daughter Paloma, I am truly blessed to have you. Thank you for helping me celebrate the beauty and wonder in each day.

Table of Contents

List of Figures

List of Tables

Chapter 1: Introduction

Agricultural conservation practices, also called best management practices (BMPs), can help to increase agricultural productivity, while reducing soil erosion, reducing nonpoint source pollution, protecting water quality, improving air quality, providing wildlife habitat, and providing numerous additional natural resources conservation benefits. Despite the extensive research in this area, there have been inconsistent findings regarding factors that lead to a producer's willingness to implement conservation practices. Even with these research efforts and the establishment of federal, state, and private programs to promote financial and technical incentives aimed at conservation of soil and water resources, the widespread implementation of conservation practices by agricultural producers has yet to be realized (Nowak & Korsching, 1998; Prokopy et al., 2008).

The implementation or non-implementation of conservation practices, and the reasons underlying these behaviors are critical to the conservation of soil and water resources. The need for an understanding of the social dimensions of soil and water conservation goes as far back as 1937 when Lowry Nelson stated, "The conservation of soil is not alone an economic and technological problem. In the last analysis it is a social concern" (p. 12). To further address these needs, this dissertation research combines several theoretical perspectives including Social Network Theory and cultural cognition (a measure of cultural worldview, consisting of individual values and societal values, along two continuous attitudinal scales of "hierarchy-egalitarianism" and "individualism-communitarianism").

This dissertation research employed a mixed methods approach consisting of three phases: Phase I) survey of agricultural producers, Phase II) survey of agricultural information sources identified by producers, and Phase III) in-depth interviews with agricultural producers. All principal farm operators in Whitman County were invited to participate in Phase I of the study. All individual agricultural information sources identified by producers were invited to participate in Phase II of the study. During Phase III, a combination of critical case sampling and maximum variation sampling was employed to select producers to participate in semi-structured interviews.

Producers consisted of individuals involved with dry land grain production (conventional tillage, conservation tillage, or direct seed system), livestock production, and Conservation Reserve

Program (CRP) enrollment. Each producer's operation was unique and had variable involvement in the different types of production. Producers' operations were as varied as dry land grain production exclusively, livestock production exclusively, CRP enrollment exclusively, or some combination of the three. Throughout this dissertation, producers who are involved with dry land grain production are referred to as "farmers" whereas producers who are involved with livestock production are referred to as "livestock producers."

This dissertation is written as an article-based document with three articles for publication. In addition to the three articles, extended sections on theory and methods have been included in order to provide further context for the reader. The three articles together address the overarching research question, "how do cultural worldview and networks of relationships influence selection of information sources and implementation of conservation practices?" This question is addressed through use of cultural cognition combined with Social Network Theory to look at producer selection of agricultural information sources and implementation of conservation practices in Whitman County, Washington.

Chapter four contains the article, "Effects of Cultural Worldview on the Selection of Agricultural Information Sources and Implementation of Conservation Practices by Agricultural Producers in Whitman County, Washington." In this article, based on theoretical propositions of cultural cognition, we hypothesized the following: (H1) a majority of conservation professionals will be of the "egalitarian communitarianism" (type 4) worldview type, (H2) producers will choose individual agricultural information sources who hold the same cultural worldview as themselves, (H3) producers who fall within the "hierarchical individualism" (type 1) worldview type would implement the fewest number of conservation practices, and (H4) producers who fall within the "egalitarian communitarianism" (type 4) worldview type would implement the greatest number of conservation practices.

Chapter five contains the article, "Producers' Perspectives for Further Understanding Factors that Influence Implementation of Conservation Practices in Whitman County, Washington." In this article, a qualitative analysis of in-depth interviews with producers is presented to explore major factors influencing the implementation of conservation practices within Whitman County, Washington.

Chapter six contains the article, "Using Cultural Cognition to Better Understand Relationship Formation and the Role of Homophily within Social Networks of Agricultural Producers and Information Sources in Whitman County, Washington." The research approach presented here is in response to recent recommendations regarding a call to re-focus Social Network Theory on social relationships as a central theoretical concept. This research employs a theoretical framework which uses cultural cognition to further examine the role of homophily within Social Network Theory. In this approach, cultural cognition was employed as a lens to view the influence of social forces on social relationships and the ability of social forces to shape an actor's choice of individual information sources. Our approach focuses on the influence of cultural worldview on the selection of information sources and as a factor influencing homophily within network structure. The theoretical approach advanced through this research provides a theoretical contribution to understanding the factors facilitating the formation of ties between actors in a social network by providing a new look at how cultural worldview may influence the formation and structure of agricultural producers' social networks within Whitman County, Washington.

This study has been designed with a focus on providing practical application for both producers and conservation professionals in Whitman County. Elements of the research presented in this dissertation that lend insight for practical application include: a description of the influence of cultural worldview on relationships and transfer of information; providing conservation professionals with information on current networks of relationships and how they may be fostered or modified; a look at how relationships can be strengthened to provide producers better access to information; and providing a better understanding of factors influencing implementation of conservation practices in Whitman County, Washington.

References

Nelson, L. (1937). Soil conservation and human welfare. Utah Farmer, 57(3), 11–21.

Nowak, P., & Korsching, P. F. (1998). The human dimension of soil and water conservation: A historical and methodological perspective. In F. J. Pierce & W. W. Frye (Eds.), Advances in soil and water conservation (pp. 159–184). Chelsea, MI: Sleeping Bear Press.

Prokopy, L. S., Floress, K., Klotthor-Weinkauf, D., & Baumgart-Getz, A. (2008). Determinants of agricultural best management practice adoption: Evidence from the literature. Journal of Soil and Water Conservation, 63(5), 300–311.

Chapter 2: Theoretical Framework

Several theoretical perspectives have been traditionally used to explain the factors related to implementation of conservation practices including Social Network Theory (Lubell & Fulton, 2007). Despite extensive research using Social Network Theory, a comprehensive theoretical perspective explaining implementation of conservation practices has yet to be determined. A promising theory that has recently emerged in the attempt to explain environmental behavior and action is Cultural Cognition (Kahan, Braman, Monahan, Callahan, & Peters, 2010; Kahan, Slovic, Braman, & Gastil, 2006). The proposed research will examine both Social Network Theory and Cultural Cognition as factors that may influence the implementation of conservation practices. The influence of cultural worldview (consisting of individual values and societal values) on the structure and formation of local networks will also be examined.

2.1 Social Network Theory

2.1.1 Social Networks

A social network consists of actors (people, groups, or organizations) and the relationships or ties between them (Wasserman & Faust, 1994). The relationships between actors emerge as patterns of networks which determine the structure of the social system (Krebs & Holley, 2004). Wasserman and Faust (1994) define social networks as "the relational structure of a group or larger social system consisting of the pattern of relationships among the collection of actors."

A social network assumes the importance of relationships between actors, as defined by the ties between actors (McIllwain, 1999). Wasserman and Faust (1994) identify the following characteristics of social networks:

- Actors and their actions are viewed as interdependent rather than independent, autonomous units.
- Relational ties (linkages) between actors are channels for transfer or "flow" of resources (either material or nonmaterial).
- Network models focusing on individuals view the network structural environment as providing opportunities for or constraints on individual action.

- Network models conceptualize structure (social, economic, political, etc.) as lasting patterns of relations among actors.

Within a social network, actors are linked by relational ties. The range and types of ties are numerous, but may include evaluation of one person by another, transfers of material resources, association or affiliation, behavioral interaction, movement between places or statuses, physical connection, formal relations, biological relationship, or other types of relationships (Wasserman & Faust, 1994).

2.1.2 Principles of Social Network Theory

Social Network Theory focuses on the objective pattern of social relationships linking actors in order to study social structure (Blau, 1982). Social network theory attempts to describe social structure and structural constraints on an actor rather than explain why people act (Wellman, 1983). Consequently, Social Network Theory can be used to draw attention to the regular network patterns underlying social systems and how network structures can constrain social behavior and social change (Wellman, 1983).

The study of social structures through network patterns gives insight to the ability of any given actor to have access to resources (Ritzer, 2011). The network pattern can thus be used to evaluate an actor's access to resources including information, wealth, or power (Ritzer, 2011).

Network theory has a broad focus, ranging from people as actors to organizations as actors (Brass, Galaskiewicz, Greve, & Tsai, 2004; Diani, 2003; Kadushin, 2004). Network theory is non-atomistic since atomistic approaches focus on the individual actors acting independent from other actors, while the network approach focuses on the relationships between actors (Ritzer, 2011).

Network theory is non-normative since a normative approach focuses on the ability of norms to group people together (Ritzer, 2011). Network theorists attempt to objectively describe the relationships linking actors. Wellman (1983) states that social network theorists "want to study regularities in how people and collectivities behave rather than regularities in beliefs about how they ought to behave. Hence network analysts try to avoid normative explanations of social behavior. They dismiss as non-structural any explanation that treats social processes as the sum of individual actors' personal attributes and internalized norms" (p. 162).

Network theory regards norms as effects rather than as causes of behavior. Wellman (1983) describes four ways that network theory deals with matters of normative motivation:

1. Network theory excludes questions of human motivation and concentrates on describing and explaining social systems only in system terms.
2. Network theory regards social structures as providing constraints and opportunities for social behavior. This principle does not deny the existence of normatively guided behavior but concentrates on analyzing the structurally determined limits of the behavior.
3. Network theory suggests that structural constraints and opportunities explain social behavior more fully than does normative motivation.
4. Network theory explains the uneven distribution of norms as a structural phenomenon. Rather people acquire norms, as they do other pieces of information: through their ties structured in social networks.

Fundamental to network theory is the strength of relationships between actors. Granovetter (1973; 1982) states that the strength of an interpersonal tie can be defined by a combination of the amount of time, the emotional intensity, the intimacy, and the reciprocal services which characterize the tie. Strong ties are social relationships that are frequent, long-lasting and influential, whereas weak ties are infrequent and remote (Kilduff & Tsai, 2003).

Historically, sociologists have directed their study toward actors with strong ties or groups of actors. A key development in network theory is the understanding of the importance of weak ties between actors. This development in network theory has resulted in sociologists moving away from the exclusive study of groups of actors, and has redirected research toward the study of relationships between actors, including distant relationships (Ritzer, 2011). These weak ties have been found to be important for acting as a bridge between actors resulting in a less fragmented social system (Ritzer, 2011).

Although network theory is relatively young, a coherent set of six principles have been defined as being foundational to the development of a general theory (Wellman, 1983, 1988):

1. Ties are usually asymmetrically reciprocal, differing in content and intensity.
2. Ties link network members indirectly as well as directly. Hence they must be defined within the context of larger network structures.
3. The structuring of social ties creates nonrandom networks, hence network clusters (of ties), boundaries, and cross-linkages.

4. Cross-linkages connect clusters (of ties or actors) as well as individuals.
5. Asymmetric ties and complex networks differentially distribute scarce resources.
6. Networks structure collaborative and competitive activities to secure scarce resources.

2.1.3 Application of Social Network Theory to Natural Resource Management

Social Network Theory is gaining recognition for its ability to explain critical issues in the field of natural resource management (Chiffoleau, 2005; Conley & Udry, 2001; Hahn, Schultz, Folke, & Olsson, 2008; Lubell & Fulton, 2007; Napier & Tucker, 2001; Schneider, Steiger, Ledermann, Fry, & Rist, 2010). Fundamental to natural resource management are the relationships or ties between actors (people, groups, or organizations). The use of Social Network Theory can help natural resource managers answer important questions including:

- Are the right relationships in place for sustainable natural resource management? Are any key actors missing?
- Who is playing a leadership role in the community? Who is not, but should be?
- Who are the experts in the area?
- Who are the community mentors and technical scientific advisors that others seek out for advice?
- Who are the innovators? Are ideas shared and acted upon?
- Are collaborative alliances forming between local entities?
- Which entities will provide a better solution for the social-economic problems at hand? (adapted from Krebs & Holley, 2004)

Social networks provide a means to build trust, facilitate information flows and bring together the expertise needed for sustainable natural resource management. Bodin and Crona (2009) recognized social networks as being valuable to collaborative natural resources management by allowing for enhanced communication and the transfer of knowledge and information, mobilization of critical resources, enforcement of rules, and conflict resolution. Lauber et al. (2008) identified several additional functions of social networks including providing funds, providing other tangible resources, and exerting influence.

Social Network Theory has also been used for network creation by way of maximizing participation from marginalized subgroups and maximizing efficiency of communication and engagement efforts

(Bodin & Crona, 2009). Prell et al. (2009) demonstrated the utility of Social Network Theory within stakeholder analysis to help identify stakeholder categories, ensure key groups are not marginalized, and specify representatives that are well connected.

A strength of using Social Network Theory to understanding the critical issues of natural resource management is the flexibility to apply Social Network Theory at both the network level and the actor level. At the network level, Social Network Theory allows a manager to understand the pattern of the entire network and evaluate what relationships are crucial to the success of natural resource management. Evaluation at the network level allows a manager to determine what pattern is most likely to promote or hinder collaboration between interested parties. Using Social Network Theory as a framework, a manager may be able to determine what network pattern is likely to provide the maximum benefit to the resource and can then appropriately allocate resources to support the development of the desired network pattern. At the level of the actor, Social Network Theory provides a lens for managers to look at the behavior of individual actors and evaluate the likely result of specific behaviors within the network.

2.1.4 Important Social Network Patterns for Natural Resource Management

The core-periphery network (see Figure 2.1) has been identified as being the "end-goal for vibrant, sustainable community networks" (Krebs & Holley, 2004). This type of network emerges as the result of "network weaving" over time (Krebs & Holley, 2004). The main value of the core-periphery network is the stability it is able to maintain due to inclusion of both bonding (strong) and bridging (weak) ties. The core consists of actors tied by strong bonds, while the periphery consists of groups of actors that are connected to the core through weak ties (Krebs & Holley, 2004). Bonding ties promote trust, reciprocity, and cohesion within networks. These characteristics of bonding ties have been identified as important for both consensus building and conflict resolution within natural resource management (Bodin & Crona, 2009). Bridging ties are important for information transfer and acquiring external resources that are essential to natural resource management (Bodin & Crona, 2009).

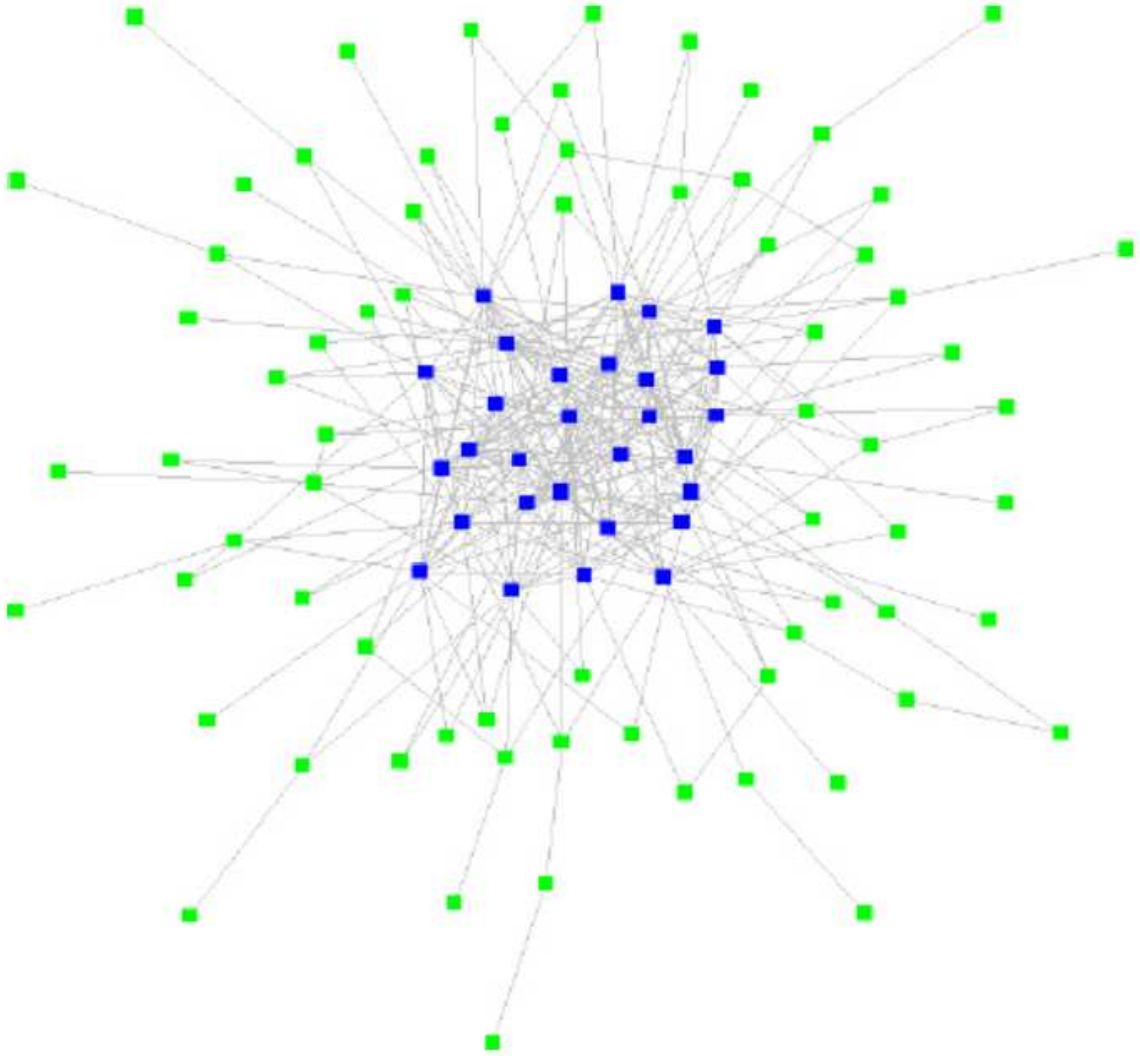

Figure 2.1. Core-periphery network (Krebs & Holley, 2002). The blue nodes (actors) with bonding ties in the center of the graph represent core group whereas green nodes (actors) with bridging ties with the core represent periphery.

Newman and Dale (2005) emphasize the need for the existence of both bonding and bridging links within the community in order to build community resilience. Bonding networks are tightly connected while bridging networks are weaker relations or ties external to the group (Bodin & Crona, 2009). Bodin et al. (2006) explain how a balance of bridging and bonding links enhance community participation in natural resource management, “bridging links extend outside the community and provide access to a diverse set of resources, whereas bonding links within the

community are necessary to absorb these benefits." With regard to sustainable natural resource management, weak ties may enhance community engagement in natural resource management due to their ability to create bridges to segments of a network that would otherwise be disconnected (Prell et al., 2009).

Ties to the periphery are essential for bringing in new actors, increasing diversity within the network, reaching new information and bridging to unique or limited resources (Krebs & Holley, 2004). Another role of the periphery is to monitor the environment, while the core contains actors central to decision making (Krebs & Holley, 2004).

Core-periphery networks are important to natural resource management due to the ability to maximize resources by using the periphery to connect to the core of other networks while keeping the core strong (Krebs & Holley, 2004). Ernstson, Sörlin, and Elmqvist (2008) reinforce the importance of the core-periphery structure for sustainable natural resource management in their study of green areas in Stockholm. In this case study, the core was important for establishing political connections while the periphery gathers information necessary for the core to take action.

The characteristic of density within the network is also important for determining the effectiveness of the network. High density may help to facilitate trust and provide buffering capacity if actors are lost (Lauber et al., 2008). Sandström and Rova (2010) show support for the importance of higher levels of density in their single case study of a fish management area. Conversely, low density may facilitate different roles for actors that may be essential during times of change (Lauber et al., 2008). This emphasizes the finding by Bodin and Crona (2009) that no structural characteristic of a network produces an entirely positive effect for resource management.

Homogeneity among actors can result in a reduction of conflict which can prove useful for the transfer of complex information (Prell et al., 2009). Sandström and Rova (2010) show that heterogeneity is important for the existence and spread of ecological knowledge among the actors involved in their single case study of a fish management area. The disadvantage of homogeneity is that often the representation of diverse views and opinions are lost, which is essential for successful natural resource management (Prell et al., 2009).

Centralization within the network may make access to the entire network easier for an outsider, but it is a risk to long-term natural resource problem solving efforts since only a few actors hold a

majority of the ties linking the network together (Prell et al., 2009). Crona and Bodin (2006) found that high centralization was beneficial for coordinating collective action in the early stages of a natural resource management process, but decentralization provided diverse access necessary for long-term sustainable natural resource management. Prell et al. (2009) also explore the position of individuals within the network and the impact of centrality on the exchange of information and resources within the network.

Bodin and Crona (2009) state that "favoring one characteristic likely occurs at the expense of another" so the best arrangement is a mix of different network characteristics to maximize desired effects. Crona and Bodin (2006) emphasize the fact that "one optimal network structure is unlikely, as optimization of the structure seems related to the phase of the management process." Crona and Bodin (2009) further investigated the structural characteristics of social networks and implications for natural resource management. Their review indicated that sustainable natural resource management is most likely to be attained when network characteristics are balanced in such a way as to maximize the benefit of each measure while attempting to minimize the negative impacts of the same measure.

2.2 Cultural Cognition

Cultural cognition is a measure of cultural worldview along two continuous attitudinal scales of "hierarchy-egalitarianism" and "individualism-communitarianism" (Kahan, 2012). Cultural cognition has been used to look at individual differences in environmental risk perception based on the cultural "way of life" and associated worldview of an individual (Kahan, Jenkins-Smith, & Braman, 2011; Kahan et al., 2006; Kahan, Peters, et al., 2011). Cultural cognition designates four ways of life (see Figure 2.2): "hierarchical individualism," "hierarchical communitarianism," "egalitarian individualism," and "egalitarian communitarianism" (Kahan, 2012). The explanatory, predictive, and potentially prescriptive utility of cultural cognition makes it valuable as a lens to view the influence of social forces on social relationships and the ability of those social forces to shape an actor's perceptions and actions regarding implementation of conservation practices.

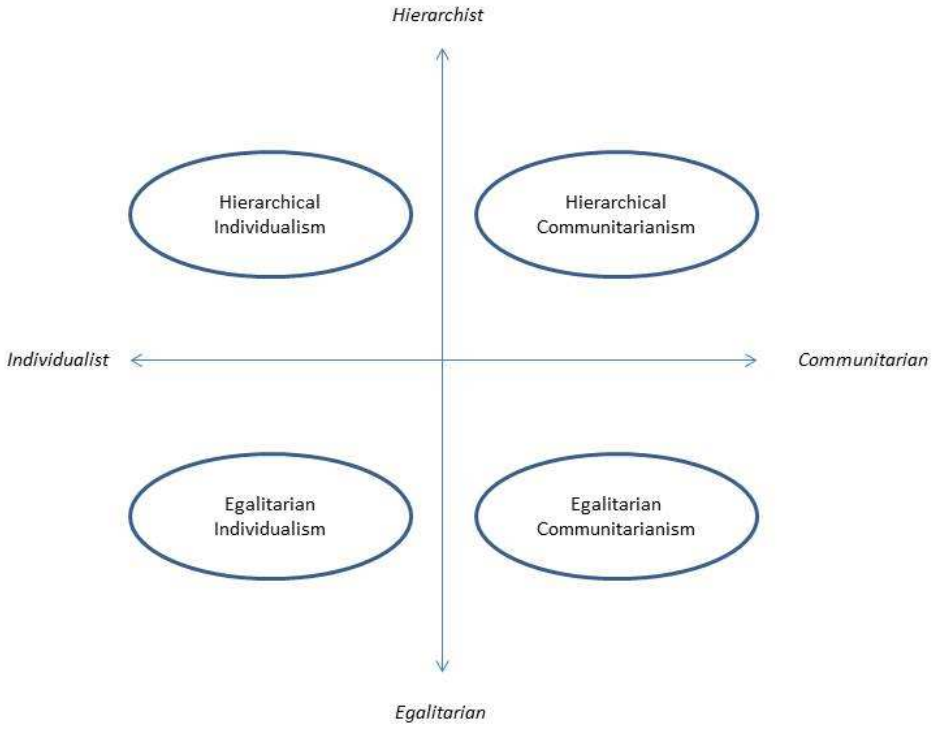

Figure 2.2. Cultural cognition "ways of life" (Kahan, 2012).

2.2.1 Cultural Cognition Concepts

Cultural cognition refers to the influence of group values on risk perceptions and related beliefs (Kahan, 2010). The concepts of values, beliefs, and risk are related in Cultural Cognition to explain how people's beliefs regarding environmental risk, scientific evidence, behavior, and policy are shaped by their core values and the values they share with others (Kahan, Braman, Slovic, Gastil, & Cohen, 2007; Kahan, Jenkins-Smith, & Braman, 2011). Kahan et al. (2007) have found that differences in values explain conflict over environmental-risk perceptions more completely than differences in other individualistic characteristics (i.e. socio-economic status, political ideology, education level, personality type, etc.) (Kahan, Braman, Cohen, Gastil, & Slovic, 2010).

Cultural Cognition asserts that individuals believe that behavior that is in alignment with their (and their peers) values is socially beneficial, while behavior that is against their values is socially detrimental. Socially, it is in the best interest of an individual to believe environmental and scientific arguments that are in line with the values they share with peers since doing otherwise would pose a risk to those social relationships (Kahan, 2010).

Cultural cognition also influences the way that individuals interpret new information which in turn influences environmental risk perception (Kahan, 2010). New information tends to be interpreted in a way that reinforces their own cultural predisposition, current values, and the current values of their peers (see Figure 2.3).

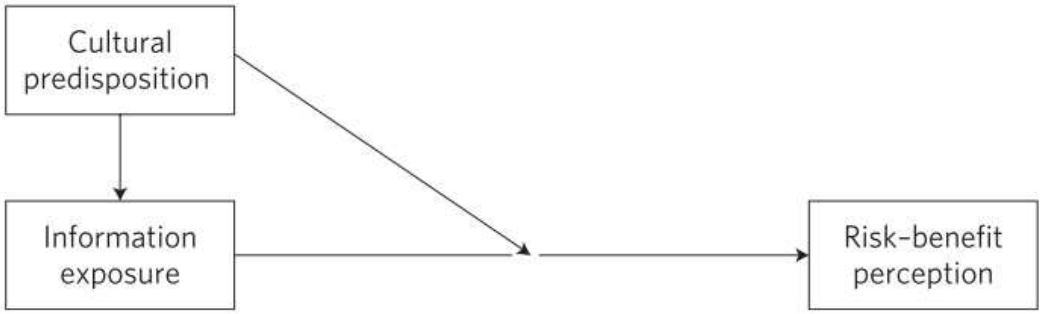

Figure 2.3. Relationships between cultural worldviews, information exposure and risk–benefit perceptions (Kahan, Braman, Slovic, Gastil, & Cohen, 2009).

2.2.2 Conceptual Roots

Cultural Cognition is derived from the cultural theory of risk and the psychometric paradigm. The cultural theory of risk comes from the work of Douglas and Wildavsky on risk and culture (Douglas & Wildavsky, 1982). The culture theory of risk looks at the way culture, political, and psychological factors influence the way risks are constructed, perceived, and ranked by individuals (Hulme, 2009). The culture theory of risk elaborates on how cultural factors influence risk perceptions and why risk perceptions vary from individual to individual. The culture theory of risk framework explains risk perception as a function of cultural worldviews, consisting of individual values and societal values. The psychometric paradigm identifies the psychological mechanisms that explain how individuals form risk perceptions shaped by cultural values (Kahan, Jenkins-Smith, & Braman, 2011).

2.2.3 Cultural Cognition and Environmental Risks

Many theoretical perspectives have attempted to explain the lack of implementation of conservation practices due to newness of information, lack of information, or complexity of information. These theories "do not explain why people who subscribe to competing moral outlooks react differently to scientific data" (Kahan, 2010). Research by Kahan et al. (2007; 2009;

2011) suggests that this form of 'protective cognition' is responsible for conflict over the credibility of scientific data on environmental risks. Kahan (2010) contributes this conflict to group values (see Figure 2.2):

> *People with individualistic values, who prize personal initiative, and those with hierarchical values, who respect authority, tend to dismiss evidence of environmental risks, because the widespread acceptance of such evidence would lead to restrictions on commerce and industry, activities they admire. By contrast, people who subscribe to more egalitarian and communitarian values are suspicious of commerce and industry, which they see as sources of unjust disparity. They are thus more inclined to believe that such activities pose unacceptable risks and should be restricted (p. 296).*

Research by Kahan et al. (2010) has found that Cultural Cognition also operates when an individual is evaluating an expert for credibility. Perception of expert credibility is influenced by an individual's readiness to trust experts who they perceive as sharing their cultural values and distrust experts who they perceive as not sharing their cultural values (Kahan, Jenkins-Smith, & Braman, 2011). This mechanism results in the individual selecting experts whom they perceive to share their values and the values of their peers.

2.2.4 The Role of Cultural Worldview in Natural Resource Management

A review of the application of Social Network Theory to natural resource management has demonstrated the importance of knowing the structure of a network to facilitating the implementation of conservation practices. Related research also points to the importance of relationships to the flow of information and implementation of conservation practices, but these studies have not focused specifically on the content of relationships. There is a difference between the channels of information that create knowledge of conservation issues and those that are effective in forming and changing beliefs toward an idea, and thus influence conservation action (Rogers, 1983).

Recent research using Cultural Cognition has shown that individuals are inclined to believe an argument if it reinforces their relationship to others whom they share important cultural ties with, even in the face of sound scientific "evidence" (Kahan, 2010). Cultural cognition also influences the way that individuals interpret new information. New information tends to be interpreted in a biased way that reinforces the current values they hold and the current values of their peers (Kahan, 2010). Kahan has called this phenomenon a "culture war" over empirical data (Kahan,

Braman, Slovic, Gastil, & Cohen, 2007). These findings are of particular importance to the transfer of information regarding conservation practices since when an individual encounters new technical or scientific information that is beyond the scope of their knowledge (as is often the case with information regarding environmental risks), they rely on the interpretation of experts whom they deem to be credible.

Research by Kahan et al. (2010) has found that Cultural Cognition operates in the selection of credible experts, resulting in the individual selecting experts whom they perceive to share their values and the values of their peers and denying credibility and trustworthiness to experts whose values they perceive to be different than their own. If Cultural Cognition is operating in decisions regarding implementation of conservation practices, then these findings have real implications for conservation professionals if they desire to increase implementation of conservation practices.

2.3 A Theoretical Framework for Factors Influencing the Implementation of Conservation Practices

Key theoretical concepts from Social Network Theory have been combined with concepts from cultural cognition to develop a new theoretical framework for looking at factors influencing the implementation of conservation practices. Cultural Cognition serves as a lens to interpret relationships within a framework which is based on a traditional Social Network Theory approach. The following discussion will provide context for the concepts and relationships central to the proposed theoretical framework.

Social Network Theory provides us the theoretical framework to explain how the network of a social system provides opportunities for or constraints on individual action (Wasserman & Faust, 1994). Consequently, Social Network Theory can be used to draw attention to the network regularities underlying social relations and how network structures can constrain social behavior and social change including the implementation of conservation practices (Wellman, 1983).

Social Network Theory provides the framework to examine the structure of social systems, and their function as "vehicles of diffusion and/or distribution" (Azarian, 2010, p. 325) but is lacking in ability to account for social relationships that are important to the communication channels in a social system (Azarian, 2010). In a review of the contemporary network theory and analysis, Azarian (2010) claims that "the contemporary network approach has so far declined to produce a

theoretically elaborate account of social relationships- the very core entities that underpin both its ontological outlook and methodological stance" (p. 323). One area that Azarian (2010) identifies as being theoretically underdeveloped within the social network approach is the impact of larger socio-cultural contexts in which specific ties and networks emerge. Within Social Network Theory, social relationships need to be considered a central theoretical concept, with the focus being on the content of the ties between actors, not just the structure formed by the ties (Azarian, 2010).

In order to reframe Social Network Theory around the central theoretical concept of social relationships, it is necessary to consider the larger socio-cultural contexts in which relationships form, taking into account the influence of divisions including class, gender, race, religious conviction, political standpoint, ethnic background, personality traits, etc. (Coughenour, 2003; Lemke et al., 2010; Mintrom & Vergari, 1998; Valente, 1996). These larger socio-cultural contexts also play a role in determining the type of social relationships that are formed. One general ground of relationship formation is affinity. The need to belong to a group not only motivates the establishment of a relationship, but the ability of the relationship to influence action of the related actors. Azarian (2010) notes that social relationships are "mainly fuelled by the parties mutual perception of affinity and the accompanying sense of fellowship, solidarity and group identification- a feature that inseparably is coupled with its opposite, that is, the sense of demarcation, distinction and distance from others" (p. 330). Contemporary network research regarding homophily recognizes this notion of similarity as grounds for the formation of social relationships (Azarian, 2010).

A focus on the content and context of social relationships, allows the social network approach to investigate the effects of the social forces at work including the ability of those social forces to shape an actor's perceptions and actions. By refocusing on the relationship as the central concept in Social Network Theory, Azarian (2010) suggests that the social network approach is able to lend insight regarding the mechanisms of social action. Azarian (2010) explains:

> *A re-conceptualization of social relationship that emphasizes the substantive properties of connectivity offers in other words the possibility of producing a more realistic and fuller account of social action as the outcome of the interactive processes unfolding in the focal actor's embedding setting, that is, the immediate, partially self-made, fairly durable and yet dynamic relational context that is both constraining and enabling him, both confining and expanding his objective*

> *possibilities as well as his subjective perceptions of the possible, plausible and/or permissible courses of action (p.333).*

Following this critique of Social Network Theory, the proposed theoretical framework (see Figure 2.4) attempts to refocus on the content of relationships within the network and how those relationships influence actions to implement conservation practices. Cultural Cognition provides a lens to further investigate the larger socio-cultural contexts in which relationships form and the consequent influence on social action. Adding the concepts of group and core values to the theoretical framework allows the focus to be placed on the content of relationships, in addition to a structural look at relationships. Looking at relationships within the context of values and beliefs allows for further focus on the content of relationships, something that is identified as the important concept of homophily within the traditional Social Network Theory framework.

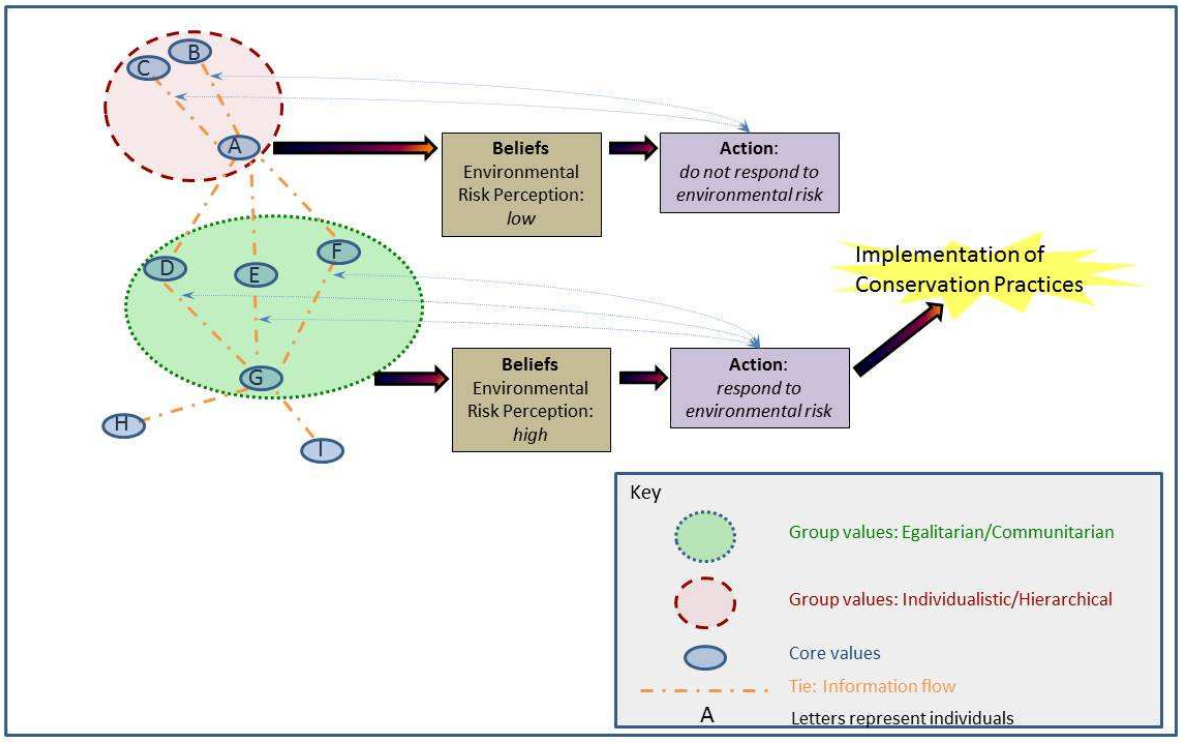

Figure 2.4. Concept map for factors influencing the implementation of conservation practices

References

Azarian, R. (2010). Social ties: Elements of a substantive conceptualization. Acta Sociologica, 53(4), 323–338.

Blau, P. M. (1982). Structural sociology and network analysis. In P. V. Marsden & N. Lin (Eds.), Social structure and network analysis1 (pp. 273–279). Beverly Hills: Sage Publications.

Bodin, Ö., & Crona, B. I. (2009). The role of social networks in natural resource governance: What relational patterns make a difference? Global Environmental Change, 19(3), 366–374.

Bodin, Ö., Crona, B. I., & Ernstson, H. (2006). Social networks in natural resource management: What is there to learn from a structural perspective? Ecology and Society, 11(2), r2.

Brass, D. J., Galaskiewicz, J., Greve, H. R., & Tsai, W. (2004). Taking stock of networks and organizations: A multilevel perspective. The Academy of Management Journal, 47(6), 795–817.

Chiffoleau, Y. (2005). Learning about innovation through networks: The development of environment-friendly viticulture. Technovation, 25(10), 1193–1204.

Conley, T., & Udry, C. (2001). Social learning through networks: The adoption of new agricultural technologies in Ghana. American Journal of Agricultural Economics, 83(3), 668–673.

Crona, B. I., & Bodin, Ö. (2006). What you know is who you know? Communication patterns among resource users as a prerequisite for co-management. Ecology and Society, 11(2).

Diani, M. (2003). Networks and social movements: A research programme. In M. Diani & D. AcAdam (Eds.), Social movements and net-works: Relational approached to collective action (pp. 299–319). Oxford: Oxford University Press.

Douglas, M., & Wildavsky, A. (1982). Risk and culture: An essay on the selection of technical and environmental dangers. Los Angeles: University of California Press.

Ernstson, H., Sörlin, S., & Elmqvist, T. (2008). Social movements and ecosystem services — the role of social network structure in protecting and managing urban green areas in Stockholm. Ecology and Society, 13(2).

Granovetter, M. S. (1973). The strength of weak ties. The American Journal of Sociology, 78(6), 1360–1380.

Granovetter, M. S. (1982). The strength of weak ties: A network theory revisited. In P. V. Marsden & N. Lin (Eds.), Social structure and network analysis (pp. 105–130). Beverly Hills: Sage Publications.

Hahn, T., Schultz, L., Folke, C., & Olsson, P. (2008). Social networks as sources of resilience in social-ecological systems. In J. Norberg & G. S. Cumming (Eds.), Complexity theory for a sustainable future (pp. 119–144). New York: Columbia University Press.

Hulme, M. (2009). Why we disagree about climate change: Understanding controversy, inaction and opportunity. New York: Cambridge University Press.

Kadushin, C. (2004). Some basic network concepts and propositions. In Introduction to social network theory.

Kahan, D. M. (2010). Fixing the communications failure. Nature, 463(7279), 296–7.

Kahan, D. M. (2012). Cultural cognition as a conception of the cultural theory of risk. In Handbook of Risk Theory (pp. 725–759). Springer Netherlands.

Kahan, D. M., Braman, D., Cohen, G. L., Gastil, J., & Slovic, P. (2010). Who fears the HPV vaccine, who doesn't, and why? An experimental study of the mechanisms of cultural cognition. Law and Human Behavior, 34(6), 501–516.

Kahan, D. M., Braman, D., Gastil, J., Slovic, P., & Mertz, C. K. (2007). Culture and identity-protective cognition: Explaining the white-male effect in risk perception. Journal of Empirical Legal Studies, 4(3), 465–505.

Kahan, D. M., Braman, D., Monahan, J., Callahan, L., & Peters, E. (2010). Cultural cognition and public policy: The case of outpatient commitment laws. Law and Human Behavior, 34(2), 118–140.

Kahan, D. M., Braman, D., Slovic, P., Gastil, J., & Cohen, G. (2007). The second national risk and culture study: Making sense of—and making progress in—the American culture war of fact.

Kahan, D. M., Braman, D., Slovic, P., Gastil, J., & Cohen, G. (2009). Cultural cognition of the risks and benefits of nanotechnology. Nature Nanotechnology, 4(February), 87–90.

Kahan, D. M., Jenkins-Smith, H., & Braman, D. (2011). Cultural cognition of scientific consensus. Journal of Risk Research, 14(2), 147–174.

Kahan, D. M., Peters, E., Braman, D., Slovic, P., Wittlin, M., Ouellette, L. L., & Mandel, G. (2011). The Tragedy of the risk-perception commons: Culture conflict, rationality conflict, and climate change. Cognition.

Kahan, D. M., Slovic, P., Braman, D., & Gastil, J. (2006). Fear and Democracy: A cultural evaluation of Sunstein on risk. Harvard Law Review, 119, 1071–1109.

Kilduff, M., & Tsai, W. (2003). Social networks and organizations. Thousand Oaks, CA: Sage Publications.

Krebs, V., & Holley, J. (2004). Building sustainable communities through social network development. The Nonprofit Quarterly, Spring, 46–53.

Lauber, T. B., Decker, D. J., & Knuth, B. A. (2008). Social networks and community-based natural resource management. Environmental Management, 42, 677–687.

Lubell, M., & Fulton, A. (2007). Local policy networks and agricultural watershed management. Journal of Public Administration Research and Theory, 18(4), 673–696.

McIllwain, J. S. (1999). Organized crime: A social network approach. Crime, Law & Social Change, 32, 301–323.

Napier, T. L., & Tucker, M. (2001). Use of soil and water protection practices among farmers in three Midwest watersheds. Environmental Management, 27(2), 269 –279.

Newman, L., & Dale, A. (2005). Network structure, diversity, and proactive resilience building: A response to Tompkins and Adger. Ecology and society, 10(1).

Prell, C., Hubacek, K., & Reed, M. (2009). Stakeholder analysis and social network analysis in natural resource management. Society & Natural Resources, 22, 501–518.

Ritzer, G. (2011). Sociological theory (8th ed.). New York: McGraw-Hill.

Rogers, E. M. (1983). Diffusion of innovations (3rd ed.). New York: The Free Press.

Sandström, A., & Rova, C. (2010). The network structure of adaptive governance: a single case study of a fish management area. International Journal, 4(1), 528–551.

Schneider, F., Steiger, D., Ledermann, T., Fry, P., & Rist, S. (2010). No-tillage farming: Co-creation of innovation through network building. Land Degradation & Development.

Wasserman, S., & Faust, K. (1994). Social network analysis: Methods and applications. New York: Columbia University Press.

Wellman, B. (1983). Network analysis: Some basic principles. Sociological Theory, 1(1), 155–200.

Wellman, B. (1988). Structural analysis: From method and metaphor to theory and substance. In B. Wellman & S. D. Berkowitz (Eds.), Social structures: A network approach (pp. 19–61). New York: Cambridge University Press.

Chapter 3: Methods

3.1. Study Site

Surveys and interviews were conducted during 2012 in Whitman County, located in southeast Washington, in the heart of the Palouse region of the Pacific Northwest (see Figure 3.1). Land use within the County consists primarily of dry land farming with some rangeland/pasture. Agriculture has been the foundation of the region's economy in the past and continues to be a large contributor. The County has some of the most productive farmland in the nation, shipping wheat, barley, lentils, and peas worldwide (Palouse Conservation District, 2007). Whitman County consistently produces more wheat than any other county in the nation (yields of 100 bushels/ac are common in many parts of the county).

Approximately 91% (1,271,141 acres) of the 1,393,920 acres in Whitman County are classified as agricultural (USDA National Agriciultural Statistics Service, 2007). A majority of waterways within the county have become a part of the agricultural landscape which has resulted in many waterways becoming highly channelized with limited riparian areas. Many of the riparian areas that are currently in place are narrow and have limited vegetation.

Farming began on the Palouse in the 1870 with the predominant crop being wheat. The region produces almost 13% of the nation's wheat crop which is a significant source of wheat for both domestic consumption and export (90% of the specialty soft wheat grown in the area is exported) (Kok, Papendick, & Saxton, 2009). Despite this incredible productivity, the loss of the rich topsoil was noted as being substantial by the mid-1900s. Since then, the environmental and economic repercussions of erosion to the Palouse region have been closely studied.

Soil erosion and consequent water quality issues have been ongoing with many of the streams in the County currently on the State's 303(d) list of impaired waters (Department of Ecology, 2013). Currently there are Total Maximum Daily Loads (TMDLs), a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards, in place for several of the major waterways in Whitman County including the main stem Palouse River, South Fork Palouse River, and the North Fork Palouse River (Department of Ecology, 2013). The Palouse region consists of steep topography and erodible loess soils, which has intensified the soil erosion

issues in Whitman County. Additionally, the high winter precipitation and frequent snow melt on frozen ground has also intensified soil erosion. Overall, Whitman County has a relatively low use of conservation tillage practices compared to other regions in the U.S. (Pickart et al., 2012).

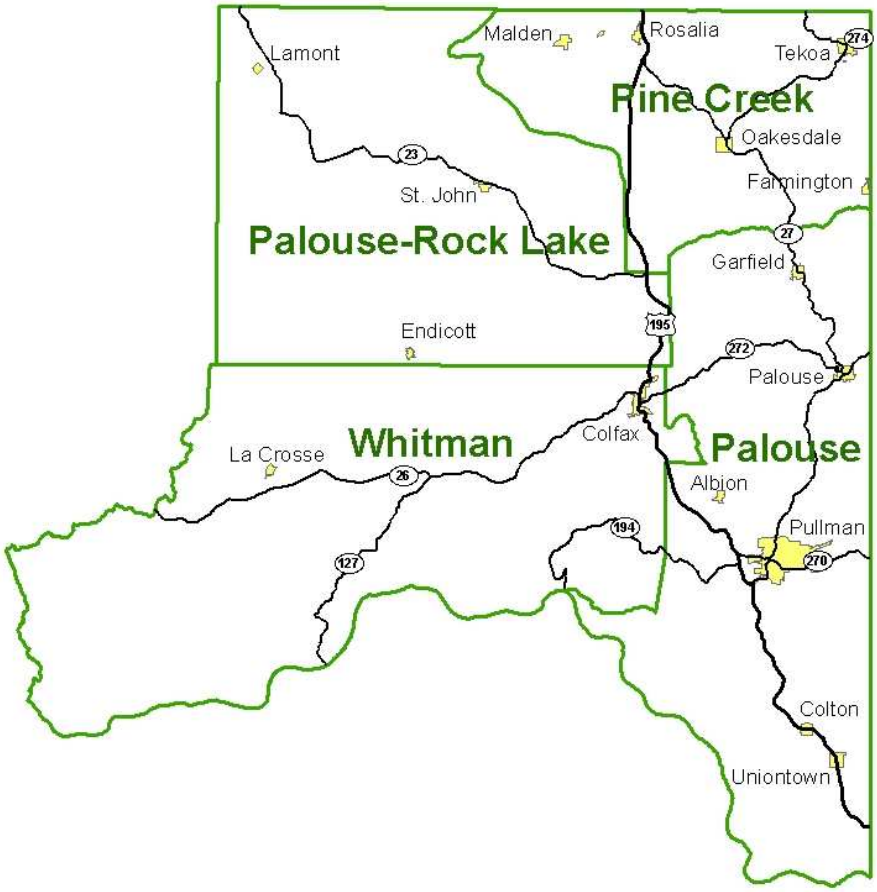

Figure 3.1. Map of Whitman County, showing population centers and conservation district boundaries.

3.2. Procedures

3.2.1. Survey Methods and Analyses

Producer surveys were conducted with principal farm operators within Whitman County during the winter of 2012. The choice for conducting a survey during the winter months of January-March was to increase participation by providing producers the opportunity to participate in research during their off-season. A limitation of a survey research strategy for this population is the documented

low survey response rates from farmers (Pennings, Irwin, & Good, 2002). Consequently, questionnaires were distributed by mail with a modified Dillman (2000)*Tailored Design Method* (introduction letter, survey package, reminder, second survey package, and second reminder), using suggestions from research by Pennings et al (2002) regarding how to improve farmers' response rates to mail surveys: 1) the length of the questionnaire was limited to 30 questions, 2) the number of pages was limited to 12, 3) the questionnaire was designed to easily be completed within 15 minutes, 4) questions were designed so that they did not require consulting farm records, and 5) questions were formulated such that producers could easily check the answers.

The sampling frame for a single stage, sample of principal farm operators within Whitman County was generated by the Washington state office of the United States Department of Agriculture (USDA) National Agricultural Statistics Service. The 2007 USDA Census of Agriculture identified 875 principal farm operators within Whitman County. This group was made up of principal farm operators who consider farming to be their primary occupation and principal farm operators who consider their primary occupation to be something other than farming.

Producers consisted of individuals involved with dry land grain production (conventional tillage, conservation tillage, or direct seed system), livestock production, and Conservation Reserve Program (CRP) enrollment. Each producer's operation was unique and had variable involvement in the different types of production. Producers' operations were as varied as dry land grain production exclusively, livestock production exclusively, CRP enrollment exclusively, or some combination of the three. Throughout this dissertation, producers who are involved with dry land grain production are referred to as "farmers" whereas producers who are involved with livestock production are referred to as "livestock producers."

To protect confidentiality, questionnaires were mailed directly from the state office of USDA National Agricultural Statistics Service. To ensure anonymity, all principal farm operators issued survey packages were assigned numbers. As an incentive for participation, survey participants were entered into a lottery for a chance to win one of two $25 cash gift cards. During January-March 2012, a total of 258 surveys were returned for a response rate of 30%.

The questionnaire included items to assess: (1) producer attitudes towards conservation practices aimed at soil and water conservation; (2) the number and type of conservation practices implemented; (3) open-ended questions regarding why conservation practices were or were not

implemented; (4) number and type of conservation programs enrolled in; (5) open-ended questions regarding why producers did or did not enroll in conservation programs; (6) producer contacts consulted with in the past year for information related to production practices, conservation practices, funding/cost share, and regulatory information; (7) producer cultural worldview-measured by using the short form version of the cultural cognition Worldview Scale (permission obtained for use Kahan, 2011); (8) producer characteristics; (9) farm characteristics; and (10) willingness to participate in an interview. The full producer questionnaire is included in Appendix B.

Data entry consisted of entering all variables into SPSS (556 variables total for each producer and 24 variables total for each information sources). Once entered, data was checked at random for quality control.

Following analysis of returned questionnaires from primary farm operators, on-line questionnaires were e-mailed during September-October 2012 to 130 individuals identified as being sources of agricultural information. During September-October 2012, a total of 78 surveys were returned for a response rate of 60%. The full information source questionnaire is included in Appendix C.

Cultural cognition items were used to characterize respondents' cultural worldviews along two cross-cutting dimensions: (1) hierarchy-egalitarianism, indicates attitudes toward social orderings that connect authority to stratified social roles based on highly conspicuous and largely fixed characteristics such as gender, race, and class (Kahan, Jenkins-Smith, et al., 2011), and (2) individualism-communitarianism, indicates attitudes toward social orderings that expect individuals to secure their own well-being without assistance or interference from society versus those that assign society the obligation to secure collective welfare and the power to override competing individual interests (Kahan, Jenkins-Smith, et al., 2011).

To determine cultural worldview, respondents indicated the level of their "disagreement" or "agreement" with each item on a six-point Likert response measure. Responses were aggregated to form continuous "hierarchy-egalitarianism" and "individualism-communitarianism" worldview scores. Each short-form scale consisted of only six "agree- disagree" items that are "balanced" with three items supportive of each end of the two continuous scales [individualism-communitarianism (Cronbach's $\alpha = 0.76$) and hierarchy-egalitarianism (Cronbach's $\alpha = 0.84$) (Kahan, 2011)] (see Table 3.1 and Table 3.2). The short-form scales used in this study have been shown in previous studies to

be as reliable as their full-form counterparts (Cronbach's α presented above are from previous studies of cultural cognition) (Kahan, 2011, 2012).

Table 3.1. Cultural cognition short form scale for individualism-communitarianism (Cronbach's α = 0.76) (Kahan, 2011)].

People in our society often disagree about how far to let individuals go in making decisions for themselves. How strongly do you agree or disagree with each of these statements? *(Please circle one response for each statement)*

Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

A. Government should put limits on the choices individuals can make so they don't get in the way of what's good for society.
B. Sometimes government needs to make laws that keep people from hurting themselves.
C. The government should stop telling people how to live their lives.
D. The government interferes far too much in our everyday lives.
E. The government should do more to advance society's goals, even if that means limiting the freedom and choices of individuals.
F. It's not the government's business to try to protect people from themselves.

Table 3.2. Cultural cognition short form scale for hierarchy-egalitarianism (Cronbach's α = 0.84) (Kahan, 2011)].

People in our society often disagree about issues of equality and discrimination. How strongly do you agree or disagree with each of these statements? *(Please circle one response for each statement)*

Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

A. It seems like blacks, women, homosexuals and other groups don't want equal rights, they want special rights just for them.
B. Our society would be better off if the distribution of wealth was more equal.
C. We need to dramatically reduce inequalities between the rich and the poor, whites and people of color, and men and women.
D. Discrimination against minorities is still a very serious problem in our society.
E. Society as a whole has become too soft and feminine.
F. We have gone too far in pushing equal rights in this country.

For each scale, we computed scores by averaging responses to the six items. The location of respondents in a cultural cognition map was determined based on the respondents' scores on the continuous "hierarchy-egalitarian" and "individualism-communitarianism" scales. To further facilitate analysis, individual respondents were assigned to cultural worldview groups. Respondents were classified as either "hierarchical individualists" (type 1), "hierarchical

communitarians" (type 2), "egalitarian individualists" (type 3), or "egalitarian communitarians" (type 4) depending on where their scores fall in relation to the median scores of both scales.

Bivariate analysis was used to describe relationships between pairs of variables including: (1) cultural worldview and implementation of conservation practices, and (2) cultural affinity of farmers and individual information sources. Analysis of variance (ANOVA) was used to describe relationships between variables when one variable consisted of nominal data. Chi-square was used to describe relations between variables when both variables consisted of nominal data.

Social network analysis was used to provide a map of the network of relationships between producers and information sources. Cultural worldview attributes were applied to each actor in the network and analysis was conducted using UCINET.

3.2.2 Interview Methods and Analysis

Following the survey research and analysis, interviews were conducted with selected principal farm operators. The final item on the questionnaire distributed to principal farm operators inquired as to producer willingness to be interviewed. Eighty of the 258 respondents indicated willingness to participate in an interview (willingness to interview rate of 30.9%). Twenty-five producers were selected to participate in interviews through a combination of critical case sampling (selecting what are believed to be particularly important cases) and maximum variation sampling (selecting a wide range of cases) in an effort to select a diversity of producers engaged in different types of agriculture and different levels of implementation of conservation practices.

The interview guide was designed to ensure that similar lines of inquiry were pursued with each producer interviewed, thus enhancing the likelihood of creating comparable qualitative data sets. The Interview guide was designed around research findings gained from analysis of survey research in-order to ensure that interviews would provide further context to aid in the interpretation of the survey results. Twenty-five semi-structured interviews were conducted in-person by the same researcher. The researcher wore casual apparel appropriate for touring an agricultural operation. Interviews were structured to explore three primary areas of interest: (1) producer agricultural and conservation practices, (2) producer information sources, and (3) role of cultural worldview. The full interview guide is included in Appendix D.

To facilitate conversation around role of cultural worldview, interview participants were lead through a “participatory mapping” process, whereby interview participants plotted the locations of themselves and their information sources on a cultural cognition "map" (see Figure 3.2). Interview participants were provided with the following descriptions for the four worldview types: 1) communitarians value solidarity, reject the unconstrained pursuit of self-interest, see fundamental interdependency in society, and reject competitive individualism; 2) individualists value social orderings based on individual self-reliance and self-sufficiency, and believe that the “best” societies are those organized around personal ambition and competitive achievement; 3) hierarchists value status differentiation, and believe that societal resources should be distributed on the basis of distinctions in status such as class, race, and gender; and 4) egalitarians value equality and reject status distinctions as a basis for social order.

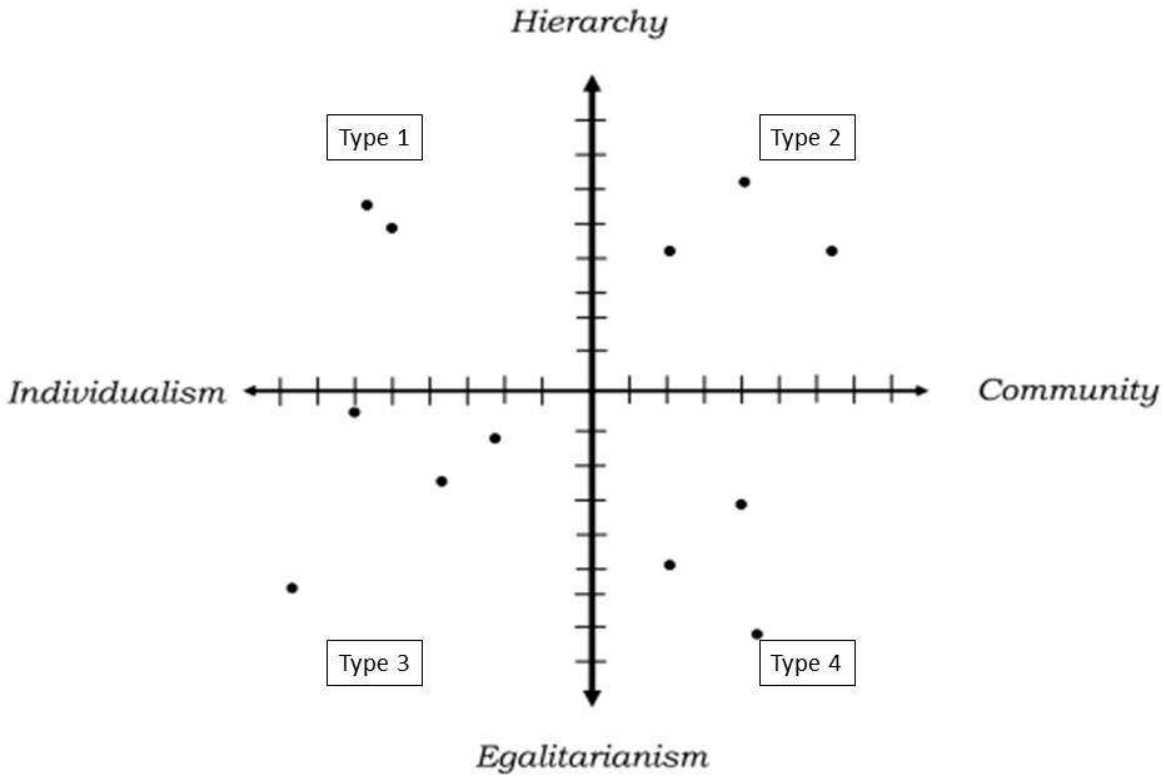

Figure 3.2. To facilitate conversation around worldview types, interview participants were lead through a “participatory mapping” process, whereby interview participants plotted the locations of themselves and their information sources on a cultural cognition "map.” Figure does not display actual data from this study but should be regarded for illustration purposes only.

Interviews ranged from 30 minutes to 2 hours with the average interview lasting approximately 1 hour and 15 minutes. Interviews were audio recorded and transcribed (total audio time for all interviews was 1870 minutes for a total transcript length of 334 single-spaced pages). Data analysis proceeded in three main stages including data reduction, data display, and interpretation (Miles & Huberman, 1994). In the data reduction stage, the data was selected, simplified, abstracted, and transformed in a focused way that allowed for valid conclusions to be drawn (Miles & Huberman, 1994). Effort was made to ensure that data remained in context throughout the process (Onwuegbuzie & Teddlie, 2003). Researchers collaborated to store, index, sort, and code interview data in a database in order to assign categories and codes (Leech & Onwuegbuzie, 2011). To enhance interpretation, codes and themes were organized and consolidated through the data display stage. The final stage of analysis included drawing conclusions through interpretation of the meaning embedded in the data display. Finally, conclusions drawn from the qualitative analysis were triangulated with survey data. Quality assurance measures included member checking, peer debriefing, and triangulation.

References

Department of Ecology. (2013). Water Quality Improvement Projects: Palouse Watershed Area. WATER QUALITY IMPROVEMENT PROJECTS (TMDLs). Retrieved from http://www.ecy.wa.gov/programs/wq/tmdl/palouse/index.html

Dillman, D. A. (2000). Mail and internet surveys: The tailored design method. New York: J. Willey.

Kahan, D. M. (2011). Cultural Cognition Worldview Scales (CCWS)- long and short forms. Retrieved February 10, 2011, from http://sjdm.org/dmidi/Cultural Cognition Worldview Scales.html

Kahan, D. M. (2012). Cultural cognition as a conception of the cultural theory of risk. In Handbook of Risk Theory (pp. 725–759). Springer Netherlands.

Kahan, D. M., Jenkins-Smith, H., & Braman, D. (2011). Cultural cognition of scientific consensus. Journal of Risk Research, 14(2), 147–174.

Kok, H., Papendick, R. I., & Saxton, K. E. (2009). STEEP: Impact of long-term conservation farming research and education in Pacific Northwest wheatlands. Journal of Soil and Water Conservation, 64(4), 253–264.

Leech, N. L., & Onwuegbuzie, A. J. (2011). Beyond constant comparison qualitative data analysis: Using NVivo. School Psychology Quarterly, 26(1), 70–84.

Miles, B. M., & Huberman, A. M. (1994). Qualitative data analysis (2nd ed.). Thousand Oaks, CA: Sage Publications.

Onwuegbuzie, J. A., & Teddlie, C. (2003). A framework for analyzing data in mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), Handbook of mixed methods in social and behavioral research. Thousand Oaks, CA: Sage Publications.

Pennings, J. M. E., Irwin, S. H., & Good, D. L. (2002). Surveying farmers: A case study. Review of Agricultural Economics, 24(1), 266–277.

Pickart, G., Kane, S., Young, D., Diebel, P., Wulfhorst, J., & Foltz, B. (2012). Three Decades of Change in Soil Conservation in the Washington-Idaho Palouse.

USDA National Agricultural Statistics Service. (2007). County profile: Whitman County – Washington.

Chapter 4: Effects of Cultural Worldview on the Selection of Agricultural Information Sources and Implementation of Conservation Practices by Agricultural Producers in Whitman County, Washington

Abstract

This study describes the cultural worldviews of producers and agricultural information sources within Whitman County, Washington; the influence of cultural worldview on producer selection of agricultural information sources; and the influence of cultural worldview on producer likelihood of implementation of conservation practices. A mixed methods approach consisting of three phases was employed: Phase I) survey of agricultural producers, Phase II) survey of agricultural information sources identified by producers, and Phase III) in-depth interviews with agricultural producers. Our findings indicate that the majority of producers within Whitman County fall within the "hierarchical individualists" worldview type and they are more likely to choose individual agricultural information sources who hold the same cultural worldview as themselves. Our research findings are consistent with previous studies of cultural cognition which have demonstrated that cultural cognition operates when an individual is evaluating an expert for credibility, resulting in the individual selecting information sources whom they perceive to share their values. The operation of cultural cognition within producers selecting information sources has real implications for local Whitman County information sources as they are significantly more likely than producers to fall within the worldview type classified as "egalitarian communitarians." This increased diversity of worldview types within the information sources is even further compounded within the information sources classified as "conservation information sources" and "university affiliated information sources" since they are significantly less likely to fall in the "hierarchical individualism" worldview type and significantly more likely to fall within the "egalitarian communitarianism" worldview type. Interview findings provide further context for the role of cultural worldview on selection of information sources. Additionally, the cultural worldview of agricultural producers and their resultant likelihood of implementation of conservation practices was examined. Our findings suggest that while cultural cognition may be an indicator for environmental risk perception and consequently attitudes toward

conservation, there was no difference in actual behavior of producers of different worldview types as measured by the number or types of conservation practices implemented.

Keywords: agriculture—best management practices—cultural worldview—conservation practices—soil conservation—water quality protection—cultural cognition

4.1. Introduction

The factors that facilitate or inhibit the implementation of conservation practices by private landowners have been researched for over half a century (Lamba, 2006; Lemke et al., 2010; Napier & Thraen, 1984; Napier, Tucker, & McCarter, 2000; Napier, 1991; Nowak & Korsching, 1998; Overton, 1997; Wells, 2004). Despite these research efforts and the establishment of federal, state, and private programs to conserve soil and water resources, the widespread implementation of conservation practices by agricultural producers has yet to be realized (Nowak & Korsching, 1998; Prokopy, Floress, Klotthor-Weinkauf, & Baumgart-Getz, 2008).

The implementation or non-implementation of conservation practices, and the reasons underlying these behaviors, are critical to the protection of soil and water resources. A comprehensive understanding of the beliefs, motives, and actions of both resource managers and farmers has been identified as essential to further the implementation of conservation practices (Lemke et al., 2010; Nowak & Korsching, 1998; Prokopy et al., 2008).

The need for an understanding of the social dimensions of soil and water conservation goes as far back as 1937 when Lowry Nelson stated, “The conservation of soil is not alone an economic and technological problem. In the last analysis it is a social concern” (p. 12). Since then, several theoretical perspectives have been employed to explain the barriers and incentives to implementation of conservation practices worldwide (Prokopy et al., 2008).

Early theoretical perspectives indicated that socio-economic factors including age, gender, income, and education were important to hindering or facilitating soil and water conservation practices (Gale et al., 1993; Prokopy et al., 2008). Subsequent theories identified farm characteristics, including size of farm, gross farm income, and type of farm, as having a substantial influence on implementation of conservation practices (Gale et al., 1993; Prokopy et al., 2008).

The reigning theoretical perspective from the 1950’s through the 1980’s included a framework that attempted to combine farmer socio-economic characteristics, farmer values and attitudes, farm

characteristics, social structure, and information diffusion (Napier, Camboni, & Thraen, 1986; Napier, Thraen, & Camboni, 1988; Nowak & Korsching, 1998; Prokopy et al., 2008). These perspectives were replaced by research using theoretical frameworks that focus on personal values, conservation attitudes, and farmer perceptions in relation to concern for conservation issues (Karp, 1996; McCann, Sullivan, Erickson, & De Young, 1997; Nowak & Korsching, 1998; T. E. Ryan, 1999).

Over the past half-century, progress has been made in demonstrating the importance of understanding the influence of social factors on implementation of conservation practices (Baumgart-Getz, Prokopy, & Floress, 2012; Cary, Webb, & Barr, 2001; Knowler & Bradshaw, 2007; Kok et al., 2009; Napier, 1991; Nowak & Korsching, 1998; Rogers, 1983; C. M. Ryan, 2009; Vanclay, 1997). Despite this progress, the knowledge base regarding factors facilitating and inhibiting implementation of conservation practices is limited. An alternative approach to understanding the influence of social factors to implementation of conservation practices involves looking at environmental risk perception and resultant behavior to address environmental risks (Braman, Kahan, Peters, Wittlin, & Slovic, 2012; Dietz, Dan, & Shwom, 2007; Hersha, Wilson, & Baird, 2012; Kahan, 2012; Tompkins & Adger, 2004). One theoretical approach to shed light on environmental risk perception is cultural cognition (Kahan, 2010, 2012).

Cultural cognition is a measure of cultural worldview along two continuous attitudinal scales and has been used to look at individual differences in environmental risk perception based on the cultural "way of life" and associated worldview of an individual (Kahan, Jenkins-Smith, et al., 2011; Kahan et al., 2006; Kahan, Peters, et al., 2011). In recent studies cultural cognition has been used to examine the impact of group values on perceptions of risk and related facts including public disagreement over climate change, public reactions to emerging technologies, and conflicting public impressions of scientific consensus (Braman et al., 2012; Kahan, Jenkins-Smith, et al., 2011; Kahan, 2010, 2012).

Cultural cognition designates four ways of life (see Figure 4.1): "hierarchical individualism" (designated as type 1 in this study), "hierarchical communitarianism" (designated as type 2 in this study), "egalitarian individualism" (designated as type 3 in this study), and "egalitarian communitarianism" (designated as type 4 in this study) (Kahan, 2012). The explanatory, predictive, and potentially prescriptive utility of cultural cognition makes it valuable as a lens to view the influence of social forces on social relationships and the ability of those social forces to shape an individual's risk perceptions and consequent actions regarding implementation of conservation practices.

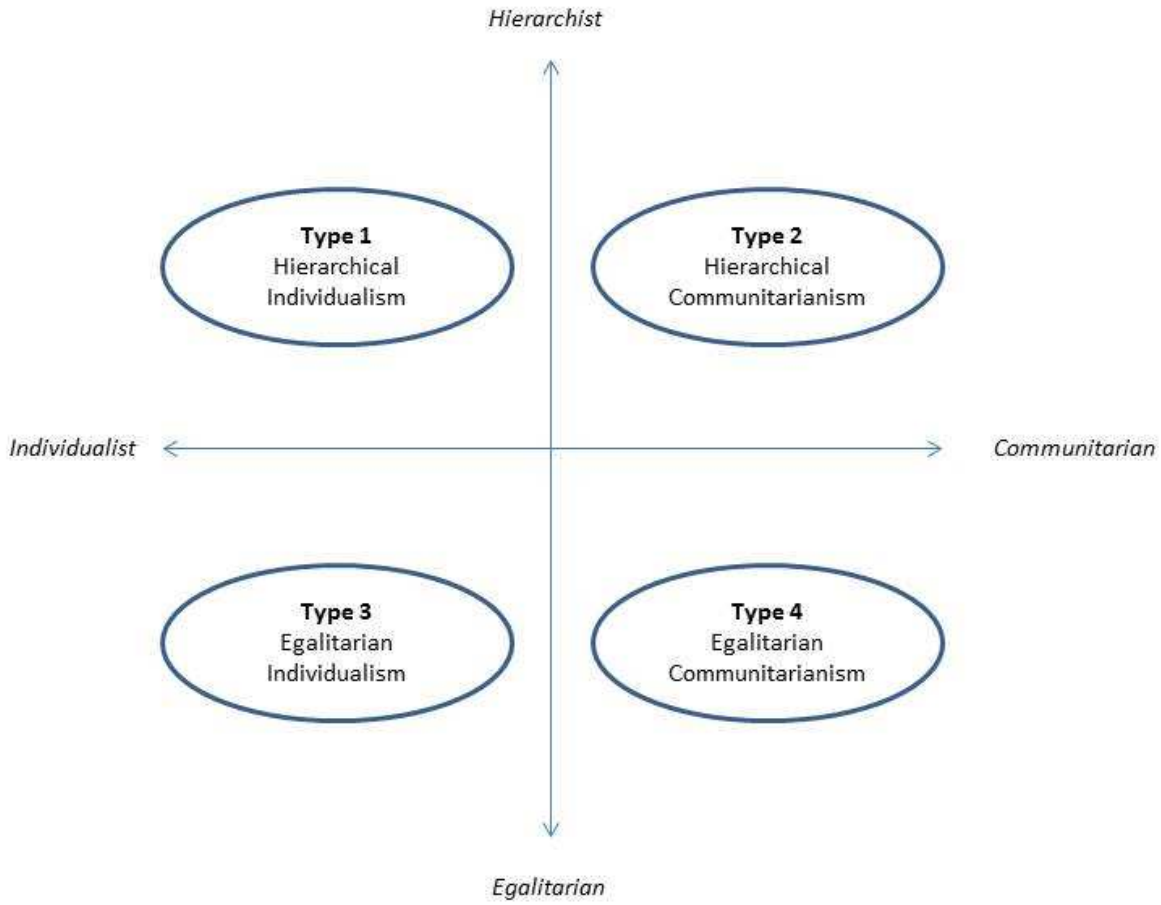

Figure 4.1 Cultural cognition "ways of life" (Kahan, 2012). Framework for classifying individuals' cultural values (Kahan, Braman, Slovic, Gastil, & Cohen, 2007).

4.1.1 Cultural Cognition Concepts

Cultural cognition refers to the influence of group values on risk perceptions and related beliefs (Kahan, 2010). The concepts of values, beliefs, and risk are related in cultural cognition to explain how people's beliefs regarding environmental risk, scientific evidence, behavior, and policy are shaped by their core values and the values they share with others (Kahan, Braman, Slovic, et al., 2007; Kahan, Jenkins-Smith, et al., 2011). Kahan et al. (2007) have found that differences in values explain conflict over environmental-risk perceptions more completely than differences in other individualistic characteristics (i.e., socio-economic status, political ideology, education level, personality type, etc.) (Kahan, Braman, Cohen, Gastil, & Slovic, 2010).

Cultural cognition asserts that individuals believe that behavior that is in alignment with their (and their peers) values is socially beneficial, while behavior that is against their values is socially detrimental. Socially, it is in the best interest of an individual to believe environmental and scientific arguments that are in line with the values they share with peers since doing otherwise would pose a risk to those social relationships (Kahan, 2010).

Cultural cognition also influences the way that individuals interpret new information which in turn influences environmental risk perception (Kahan, 2010). New information tends to be interpreted in a way that reinforces their own cultural predisposition, current values, and the current values of their peers (see Figure 4.2).

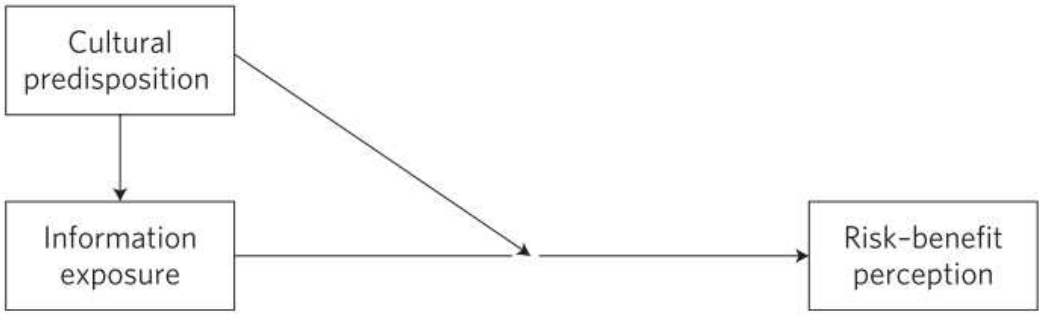

Figure 4.2. Relationships between cultural worldviews, information exposure and risk–benefit perceptions (Kahan, Braman, Slovic, Gastil, & Cohen, 2009).

4.1.2 Conceptual Roots

Cultural Cognition is derived from the cultural theory of risk and the psychometric paradigm. The cultural theory of risk comes from the work of Douglas and Wildavsky on risk and culture (Douglas & Wildavsky, 1982). The culture theory of risk looks at the way culture, political, and psychological factors influence the way risks are constructed, perceived, and ranked by individuals (Hulme, 2009). The culture theory of risk elaborates on how cultural factors influence risk perceptions and why risk perceptions vary from individual to individual. The culture theory of risk framework explains risk perception as a function of cultural worldviews, consisting of individual values and societal values (Kahan, Jenkins-Smith, & Braman, 2011).

4.1.3 Cultural Cognition and Environmental Risks

Many theoretical perspectives have attempted to explain the lack of implementation of conservation practices due to newness of information, lack of information, or complexity of information. These theories "do not explain why people who subscribe to competing moral outlooks react differently to scientific data" (Kahan, 2010). Research by Kahan et al. (2007; 2009; 2011) and Braman et al. (2012) suggests that this form of 'protective cognition' is responsible for conflict over the credibility of scientific data on environmental risks. Kahan (2010) attributes this conflict to group values:

> *People with individualistic values, who prize personal initiative, and those with hierarchical values, who respect authority, tend to dismiss evidence of environmental risks, because the widespread acceptance of such evidence would lead to restrictions on commerce and industry, activities they admire. By contrast, people who subscribe to more egalitarian and communitarian values are suspicious of commerce and industry, which they see as sources of unjust disparity. They are thus more inclined to believe that such activities pose unacceptable risks and should be restricted (p. 296).*

In this study, the application of the cultural cognition framework allows us to look at the influence of cultural worldview (consisting of individual values and societal values) on producer choice for sources of agricultural information. Additionally, this study looks at the cultural worldview of different agricultural producers and their resultant likelihood of implementation of conservation practices.

The theoretical foundations of cultural cognition posit the likelihood of individuals falling within the "egalitarian communitarianism" (type 4) world view to be more concerned with environmental risks, and as an extension, more inclined toward conservation behavior, but to our knowledge, there have not been any studies that have attempted to look at behavior of individuals from different worldview types. Additionally, the use of cultural cognition within an agricultural setting is unprecedented. Based on these theoretical concepts, we hypothesized the following: (H1) a majority of conservation professionals will be of the "egalitarian communitarianism" (type 4) worldview type, (H2) producers will choose individual agricultural information sources who hold the same cultural worldview as themselves, (H3) producers who fall within the "hierarchical individualism" (type 1) worldview type would implement the fewest number of conservation practices, and (H4) producers who fall within the "egalitarian communitarianism" (type 4) worldview type would implement the greatest number of conservation practices. Specific hypotheses were not

developed for “hierarchical communitarianism” (type 2) or “egalitarian individualism” (type 3) producers.

Our approach employed a county-wide survey to all principal farm operators followed by in-depth semi-structured interviews with agricultural producers to expand upon primary survey findings. Specific objectives of the present study were to describe (1) the cultural worldviews of producers and agricultural information sources within Whitman County, Washington, (2) the influence of cultural worldview on producer selection of agricultural information sources, and (3) the influence of cultural worldview on producer likelihood of implementation of conservation practices.

4.2. Procedures

4.2.1 Study Site

Surveys and interviews were conducted during 2012 in Whitman County, located in southeast Washington, in the heart of the Palouse region of the Pacific Northwest (see Figure 4.3). Land use within the County consists primarily of dry land farming with some rangeland/pasture. Agriculture has been the foundation of the region’s economy in the past and continues to be a large contributor. The County has some of the most productive farmland in the nation, shipping wheat, barley, lentils, and peas worldwide (Palouse Conservation District, 2007). Whitman County consistently produces more wheat than any other county in the nation (yields of 100 bushels/ac are common in many parts of the county).

Approximately 91% (1,271,141 acres) of the 1,393,920 acres in Whitman County are classified as agricultural (USDA National Agriciultural Statistics Service, 2007). A majority of waterways within the county have become a part of the agricultural landscape which has resulted in many waterways becoming highly channelized with limited riparian areas. Many of the riparian areas that are currently in place are narrow and have limited vegetation.

Farming began on the Palouse in the 1870 with the predominant crop being wheat. The region produces almost 13% of the nation’s wheat crop which is a significant source of wheat for both domestic consumption and export (90% of the specialty soft wheat grown in the area is exported) (Kok et al., 2009). Despite this incredible productivity, the loss of the rich topsoil was noted as being substantial by the mid-1900s. Since then, the environmental and economic repercussions of erosion to the Palouse region have been closely studied.

Soil erosion and consequent water quality issues have been ongoing with many of the streams in the County currently on the State's 303(d) list of impaired waters (Department of Ecology, 2013). Currently there are Total Maximum Daily Loads (TMDLs), a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards, in place for several of the major waterways in Whitman County including the main stem Palouse River, South Fork Palouse River, and the North Fork Palouse River (Department of Ecology, 2013). The Palouse region consists of steep topography and erodible loess soils, which has intensified the soil erosion issues in Whitman County. Additionally, the high winter precipitation and frequent snow melt on frozen ground has also intensified soil erosion. Overall, Whitman County has a relatively low use of conservation tillage practices compared to other regions in the U.S. (Pickart et al., 2012).

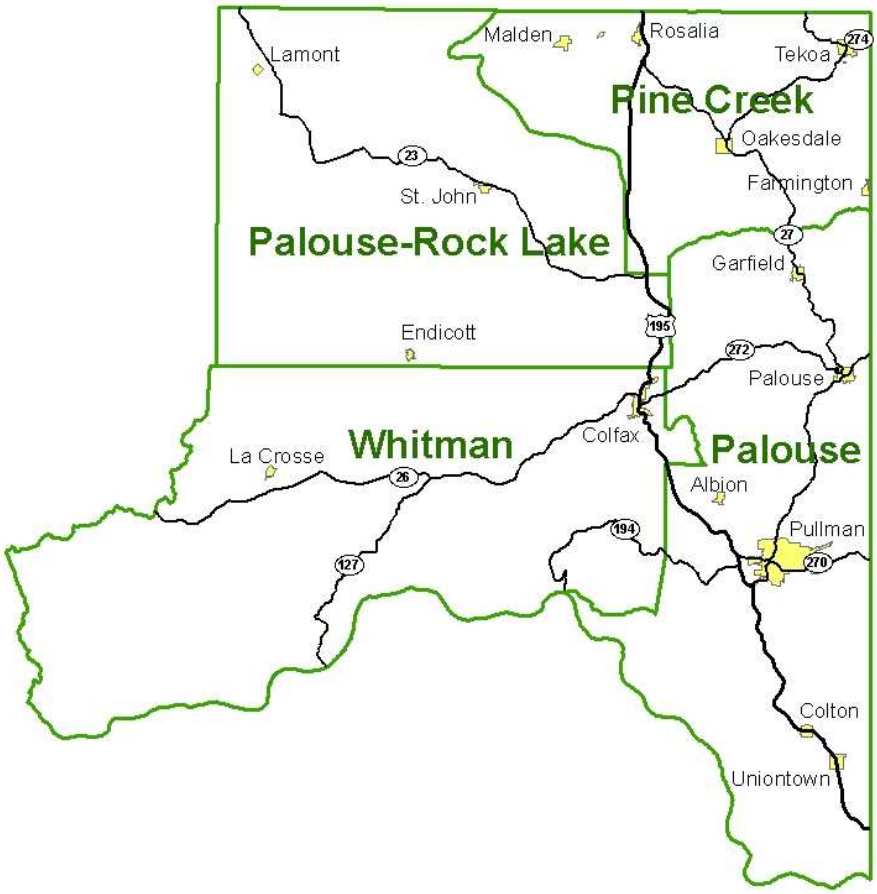

Figure 4.3. Map of Whitman County, showing population centers and conservation district boundaries.

4.2.2 Survey Methods and Analyses

Producer surveys were conducted with principal farm operators within Whitman County during the winter of 2012. The choice for conducting a survey during the winter months of January-March was to increase participation by providing producers the opportunity to participate in research during their off-season. A limitation of a survey research strategy for this population is the documented low survey response rates from farmers (Pennings et al., 2002). Consequently, questionnaires were distributed by mail with a modified Dillman (2000)*Tailored Design Method* (introduction letter, survey package, reminder, second survey package, and second reminder), using suggestions from research by Pennings et al (2002) regarding how to improve farmers' response rates to mail surveys: 1) the length of the questionnaire was limited to 30 questions, 2) the number of pages was limited to 12, 3) the questionnaire was designed to easily be completed within 15 minutes, 4) questions were designed so that they did not require consulting farm records, and 5) questions were formulated such that producers could easily check the answers.

The sampling frame for a single stage, sample of principal farm operators within Whitman County was generated by the Washington state office of the United States Department of Agriculture (USDA) National Agricultural Statistics Service. The 2007 USDA Census of Agriculture identified 875 principal farm operators within Whitman County. This group was made up of principal farm operators who consider farming to be their primary occupation and principal farm operators who consider their primary occupation to be something other than farming.

Producers consisted of individuals involved with dry land grain production (conventional tillage, conservation tillage, or direct seed system), livestock production, and Conservation Reserve Program (CRP) enrollment. Each producer's operation was unique and had variable involvement in the different types of production. Producers' operations were as varied as dry land grain production exclusively, livestock production exclusively, CRP enrollment exclusively, or some combination of the three. Throughout this dissertation, producers who are involved with dry land grain production are referred to as "farmers" whereas producers who are involved with livestock production are referred to as "livestock producers."

To protect confidentiality, questionnaires were mailed directly from the state office of USDA National Agricultural Statistics Service. To ensure anonymity, all principal farm operators issued survey packages were assigned numbers. As an incentive for participation, survey participants were

entered into a lottery for a chance to win one of two $25 cash gift cards. During January-March 2012, a total of 258 surveys were returned for a response rate of 30%.

The questionnaire included items to assess: (1) producer attitudes towards conservation practices aimed at soil and water conservation; (2) the number and type of conservation practices implemented (see Table 4.1); (3) open-ended questions regarding why conservation practices were or were not implemented; (4) number and type of conservation programs enrolled in; (5) open-ended questions regarding why producers did or did not enroll in conservation programs; (6) producer contacts consulted with in the past year for information related to production practices, conservation practices, funding/cost share, and regulatory information; (7) producer cultural worldview- measured by using the short form version of the Cultural Cognition Worldview Scale (permission obtained for use Kahan, 2011); (8) producer characteristics; (9) farm characteristics; and (10) willingness to participate in an interview (Boie, 2013).

Table 4.1 Implementation of conservation practices was assessed by asking producers to mark all practices used in 2011 on their Whitman County Farm.

The following question asks about the implementation of conservation practices on your Whitman County farm:
(Please mark ☒ all practices that you currently use on your farm)

A.	Grazing lands/pasture management
B.	Riparian exclusion fencing
C.	Off-site water development
D.	Nutrient management
E.	Riparian buffer
F.	Pest management
G.	Cover crop (seasonal)
H.	Conservation cover (permanent vegetation)
I.	Critical area planting
J.	Windbreaks
K.	Residue management, strip till
L.	Residue management, mulch till (stubble busting, mowing, shredding)
M.	Conservation crop rotation
N.	Terraces
O.	Contour farming
P.	Divided slope farming
Q.	Direct seed, no-till
R.	Direct seed, two-pass
S.	Direct seed fallow/chemical fallow
T.	Upland wildlife habitat management
U.	Sediment basins/gully plugs
V.	Grass filter strips
W.	Grassed waterways
X.	Contour buffer strips
Y.	Other (Please specify): _____

Following analysis of returned questionnaires from primary farm operators, on-line questionnaires were e-mailed during September-October 2012 to 130 individuals identified as being sources of agricultural information. During September-October 2012, a total of 78 surveys were returned for a response rate of 60%.

Cultural cognition items were used to characterize respondents' cultural worldviews along two cross-cutting dimensions: (1) hierarchy-egalitarianism, indicates attitudes toward social orderings that connect authority to stratified social roles based on highly conspicuous and largely fixed characteristics such as gender, race, and class (Kahan, Jenkins-Smith, et al., 2011), and (2) individualism-communitarianism, indicates attitudes toward social orderings that expect individuals

to secure their own well-being without assistance or interference from society versus those that assign society the obligation to secure collective welfare and the power to override competing individual interests (Kahan, Jenkins-Smith, et al., 2011).

To determine cultural worldview, respondents indicated the level of their "disagreement" or "agreement" with each item on a six-point Likert response measure. Responses were aggregated to form continuous "hierarchy-egalitarianism" and "individualism-communitarianism" worldview scores. Each short-form scale consisted of only six "agree- disagree" items that are "balanced" with three items supportive of each end of the two continuous scales [individualism-communitarianism (Cronbach's α = 0.76) and hierarchy-egalitarianism (Cronbach's α = 0.84) (Kahan, 2011)] (see Table 4.2 and Table 4.3).

Table 4.2. Cultural cognition short form scale for individualism-communitarianism (Cronbach's α = 0.76) (Kahan, 2011)].

People in our society often disagree about how far to let individuals go in making decisions for themselves. How strongly do you agree or disagree with each of these statements? *(Please circle one response for each statement)*

Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

A. Government should put limits on the choices individuals can make so they don't get in the way of what's good for society.
B. Sometimes government needs to make laws that keep people from hurting themselves.
C. The government should stop telling people how to live their lives.
D. The government interferes far too much in our everyday lives.
E. The government should do more to advance society's goals, even if that means limiting the freedom and choices of individuals.
F. It's not the government's business to try to protect people from themselves.

Table 4.3. Cultural cognition short form scale for hierarchy-egalitarianism (Cronbach's α = 0.84) (Kahan, 2011)]

People in our society often disagree about issues of equality and discrimination. How strongly do you agree or disagree with each of these statements? *(Please circle one response for each statement)*

Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

A. It seems like blacks, women, homosexuals and other groups don't want equal rights, they want special rights just for them.
B. Our society would be better off if the distribution of wealth was more equal.
C. We need to dramatically reduce inequalities between the rich and the poor, whites and people of color, and men and women.
D. Discrimination against minorities is still a very serious problem in our society.
E. Society as a whole has become too soft and feminine.
F. We have gone too far in pushing equal rights in this country.

For each scale, we computed scores by averaging responses to the six items. The location of respondents in a cultural cognition map was determined based on the respondents' scores on the continuous "hierarchy-egalitarian" and "individualism-communitarianism" scales. To further facilitate analysis, individual respondents were assigned to cultural worldview groups. Respondents were classified as either "hierarchical individualists" (type 1), "hierarchical communitarians" (type 2), "egalitarian individualists" (type 3), or "egalitarian communitarians" (type 4) depending on where their scores fall in relation to the median scores of both scales.

Bivariate analysis was used to describe relationships between pairs of variables including: (1) cultural worldview and implementation of conservation practices, and (2) cultural affinity of farmers and individual information sources. Analysis of variance (ANOVA) was used to describe relationships between variables when one variable consisted of nominal data. Chi-square was used to describe relations between variables when both variables consisted of nominal data.

4.2.3 Interview Methods

Following the survey research and analysis, interviews were conducted with selected principal farm operators. The final item on the questionnaire distributed to principal farm operators inquired as to producer willingness to be interviewed. Eighty of the 258 respondents indicated willingness to participate in an interview (willingness to interview rate of 30.9%). Twenty-five producers were selected to participate in interviews through a combination of critical case sampling (selecting what are believed to be particularly important cases) and maximum variation sampling (selecting a wide range of cases) in an effort to select a diversity of producers engaged in different types of agriculture and different levels of implementation of conservation practices.

The interview guide was designed to ensure that similar lines of inquiry were pursued with each producer interviewed, thus enhancing the likelihood of creating comparable qualitative data sets. The Interview guide was designed around research findings gained from analysis of survey research in-order to ensure that interviews would provide further context to aid in the interpretation of the survey results. Twenty-five semi-structured interviews were conducted in-person by the same researcher. The researcher wore casual apparel appropriate for touring an agricultural operation. Interviews were structured to explore three primary areas of interest: (1) producer agricultural and conservation practices, (2) producer information sources, and (3) role of cultural worldview.

To facilitate conversation around role of cultural worldview, interview participants were lead through a “participatory mapping” process, whereby interview participants plotted the locations of themselves and their information sources on a cultural cognition "map" (see Figure 4.4). Interview participants were provided with the following descriptions for the four worldview types: 1) communitarians value solidarity, reject the unconstrained pursuit of self-interest, see fundamental interdependency in society, and reject competitive individualism; 2) individualists value social orderings based on individual self-reliance and self-sufficiency, and believe that the “best” societies are those organized around personal ambition and competitive achievement; 3) hierarchists value status differentiation, and believe that societal resources should be distributed on the basis of distinctions in status such as class, race, and gender; and 4) egalitarians value equality and reject status distinctions as a basis for social order.

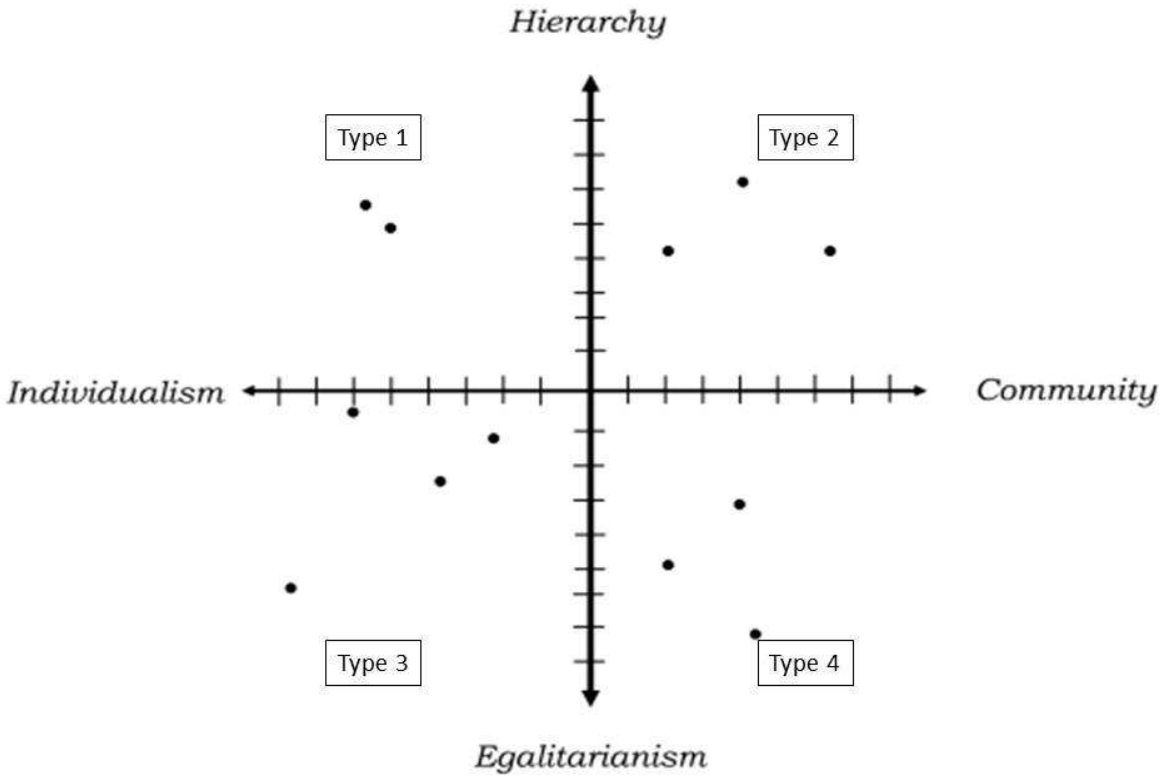

Figure 4.4. To facilitate conversation around worldview types, interview participants were lead through a “participatory mapping” process, whereby interview participants plotted the locations of themselves and their information sources on a cultural cognition "map.” Figure does not display actual data from this study but should be regarded for illustration purposes only.

Interviews were audio recorded and transcribed. Data analysis proceeded in three main stages including data reduction, data display, and interpretation. Researchers collaborated to store, index, sort, and code interview data in order to assign it to categories. To enhance interpretation, codes and themes were organized and consolidated through the data display stage. The final stage of analysis included drawing conclusions through interpretation of the meaning embedded in the data display. Finally, conclusions drawn from the qualitative analysis were triangulated with survey data. Quality assurance measures included member checking, peer debriefing, and triangulation.

4.3. Results and Discussion

4.3.1 Cultural Worldviews of Producers within Whitman County

Distribution by worldview type was determined for all producers (see Figure 4.7). Producers in Whitman County fell primarily within the "hierarchical individualists" (type 1) worldview type, making up 63.5% of all producers. Twenty-five percent of producers were classified as "egalitarian individualists" (type 3) and only 10% were classified as "egalitarian communitarians" (type 4). The worldview type classified as "hierarchical communitarians" (type 2) proved to be unsupported with only 3 out of 219 (1.4%) producers being classified as such. Consequently, the "hierarchical communitarians" (type 2) worldview type has been removed from further analysis within this study. Our Cronbach's α was calculated for each of the two continuous scales [individualism-communitarianism (Cronbach's $\alpha = 0.863$) and hierarchy-egalitarianism (Cronbach's $\alpha = 0.856$)]. Our Cronbach's α for this study proved to be higher than those calculated by Kahan (2011).

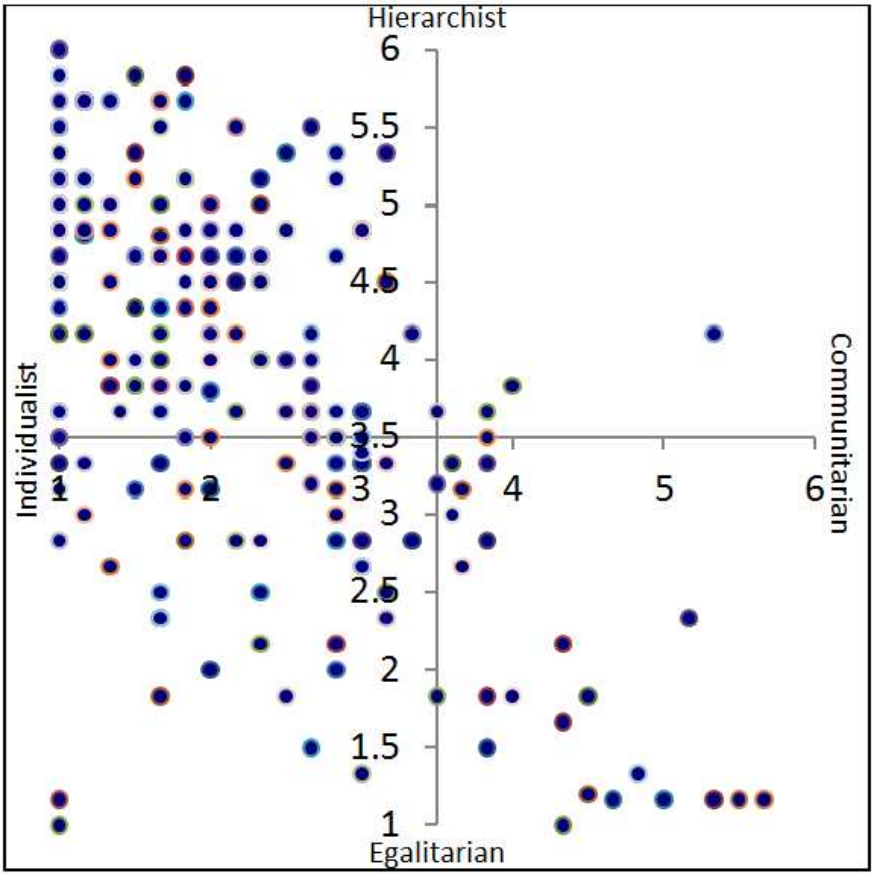

Figure 4.5. Cultural Worldview of producers in Whitman County. Larger dot size indicates multiple dots are overlapping. Type 1 "hierarchical individualists" (139, 63.5%); Type 2 "hierarchical communitarians" (3; 1.4%) Type 3 "egalitarian individualists" (55, 25.1%); or Type 4 "egalitarian communitarians" (22; 10.0%)

4.3.1.1 "Hierarchical Individualism" (Type 1) and "Egalitarian Individualism" (Type 3) Worldview Types

Producer characteristics for producers who fell within the "hierarchical individualism" (type 1) or "egalitarian individualism" (type 3) worldview types were determined to be very similar in many regards with the only differences between the two types being total size of farm (2,195 ac. vs. 1,292 ac., respectively) and number of acres leased (1,241 ac. vs. 684 ac.). Also of interest, was the finding that producers of the "hierarchical individualism" (type 1) worldview type stated that their decision to implement conservation practices was less influenced by past family farming practices than producers from the "egalitarian Individualism" (type 3) worldview type.

4.3.1.2 "Egalitarian Communitarianism" (Type 4) Worldview Type

Producers who were determined to fall within the "egalitarian communitarianism" (type 4) worldview type had on average a significantly lower percentage of their total income come from farming than did producers who were determined to fall within “hierarchical individualism” (type 1) or “egalitarian individualism” (type 3) worldview types (31.6% vs. 71% and 60.1%, respectively). The total size of farm on average was significantly smaller at 586 acres (vs. 2,195 ac. and 1,292 ac., respectively) as was the percentage of farm income from conventional tillage at 12.8% (vs. 38.5% and 35.4%, respectively).

The percentage of "egalitarian communitarianism" (type 4) worldview type producers who had someone in their family farming their land prior to them was significantly lower (45.5% vs. 80.6% and 69.1%, respectively) as was the average number of years the land had been in the producer’s family (55.7 yrs. vs. 77.4 and 79.1 yrs., respectively). Although there was no significant difference in average age of producers from different worldview types, producers of the "egalitarian communitarianism" (type 4) worldview type had been farming for a significantly shorter amount of time (23 yrs. vs. 33 yrs. and 33 yrs., respectively).

Other producer characteristics of interest include that producers of the "egalitarian communitarianism" (type 4) worldview type were significantly more likely to be affiliated with a (non-sportsman) conservation association (29.4% vs. 4.0% and 5.8%, respectively) and were significantly less likely to be affiliated with an agricultural association (46.7% vs. 70.5% and 61.8%, respectively). Additionally, producers of "egalitarian communitarianism" (type 4) worldview type had contact with significantly fewer sources within the past year to gain information about production practices, conservation practices, funding/cost share, and regulatory information (2.7 vs. 4.1 and 3.5, respectively).

4.3.1.3 Producer Characteristics for Worldview Types

A more detailed comparison of characteristics for producers who were determined to fall within each worldview type follows (for a full comparison of significant differences by worldview types see Table **4.4** for producers’ farm operation characteristics and Table 4.5 for producer characteristics). The three worldview types did not differ on the following characteristics: 1) age of producer, 2) acres owned, 3) percentage of farm income from direct seed/no till, 4) percentage of farm income from livestock, 5) percentage of farm income from CRP, and 6) percentage of farm income from other sources.

Table 4.4. Significant differences in producers' farm operation characteristics from each of the three worldview types represented in Whitman County, WA.

	Type 1 "Hierarchical individualists"	Type 3 "Egalitarian individualists"	Type 4 "Egalitarian communitarians"
Total size of farm (average acres)	2,195[a]	1,292[b]	586[b]
Acres leased (average acres)	1,241[a]	684[b]	174[b]
Number of years this farm has been in producer's family (average years)	77.4[a]	79.1[a]	55.7[b]
Percentage of farm income from conventional tillage (average %)	38.5[a]	35.4[a]	12.8[b]

* Means with different superscripts (within each row) differ significantly at $p < 0.05$.

Table 4.5. Significant differences in producer characteristics from each of the three worldview types represented in Whitman County, WA.

	Type 1 "Hierarchical individualists"	Type 3 "Egalitarian individualists"	Type 4 "Egalitarian communitarians"
Number of years producer has been farming (average years)	33[a]	33[a]	23[b]
Number of years producer has been farming this land (average years)	28.5[a]	28.0[a]	19.1[b]
Percentage of total income from farming (average %)	71.0[a]	60.1[a]	31.6[b]
Highest level of education (average) (1-less than 12th grade; 2- high school graduate or GED; 3-some college, no degree; 4- two year college degree; 5- four year college degree; 6- graduate or professional degree)	4.3[a]	4.3[a]	5.1[b]
Percentage of producers who are currently affiliated with or a member of an agricultural association (%)	70.5[a]	61.8[a]	46.7[b]
Percentage of producers who are currently affiliated with or a member of a (non-sportsman) conservation association (%)	4.0[a]	5.8	29.4[b]
Number of sources used within the past year to gain information about production practices, conservation practices, funding/cost share, and regulatory information	4.1[a]	3.5	2.7[b]
Percentage of producers who had someone in their family farming this land prior to them (%)	80.6[a]	69.1	45.5[b]
Decision to implement conservation practices is influenced by past family farming practices (average) (1-strongly disagree, 2- disagree, 3-neither agree or disagree, 4-agree, 5- strongly agree)	3.4[a]	3.8[b]	3.3

* Means with different superscripts (within each row) differ significantly at $p < 0.05$.

Survey data was triangulated with interview findings to further expand upon and explain producer worldview types. An example of one such quote from a producer that confirms survey findings is, "*smaller producers are going to be over in this area [egalitarian communitarian (type 4)] more than the larger producers who would be over here [hierarchical individualists (type 1)].*" *Comments* by another producer further explained,

> *I would think most of Whitman County falls in this zone in here [hierarchical individualists (type 1)]. You know, it's more hierarchical, make as much money as you can, farm the ground however you can, and that's what I see of the big farmers here. They are farming ground as fast as they can, they are using it as a tool to get themselves somewhere…you have to get across it fast and furious and don't worry about some of the consequences.*

Additional interviews and the participatory mapping exercise with producers provided for a deeper understanding of why a majority of producers belong to the "hierarchical individualists" (type 1) worldview type,

> *That [egalitarian communitarian (type 4) category] is not what agriculture is. I don't know a farmer that would fit in that [egalitarian communitarian (type 4)] category. Otherwise, we would have chosen a different industry. We're independent thinkers, we like to excel, majority of us don't like to brag about it, there's a lot of self-satisfaction involved in it. And to do that, you're going to fit into this [hierarchical individualists (type 1)] quadrant up here… because farmers are very independent. They're very strong willed, independent, very self-disciplined.*

Another producer further described the worldview of the producer as,

> *Out here on the farm, if an implement falls on me, I'm all alone, nobody is here to help me. You get more into the selfish [hierarchical individualist (type 1)] area because there is no one to depend on but yourself. It is extremely hard to take a community understanding into an area [of work] where you are all by yourself and when it comes to going broke or making it, there is nobody out there to help you, you're going to go broke on your own. If you make it, they are all going to take credit for it, but you still have made it on your own. There is nobody out there to help you… these are all very strong individuals.*

4.3.2 Cultural Worldviews of Information Sources within Whitman County

Distribution by worldview type was determined for all information sources (see Figure 4.8). Information source worldview types within Whitman County were determined to be widely distributed between the different worldview types with 47.9% classified within the "hierarchical individualists" (type 1) 28.2% classified as "egalitarian communitarians" (type 4) and 22.5%

classified as “egalitarian individualists” (type 3). The worldview type classified as “hierarchical communitarians” (type 2) proved to be unsupported with only 1 out of 71 (1.4%) information sources being classified as such. Consequently, the “hierarchical communitarians” (type 2) worldview type has been removed from further analysis within this study.

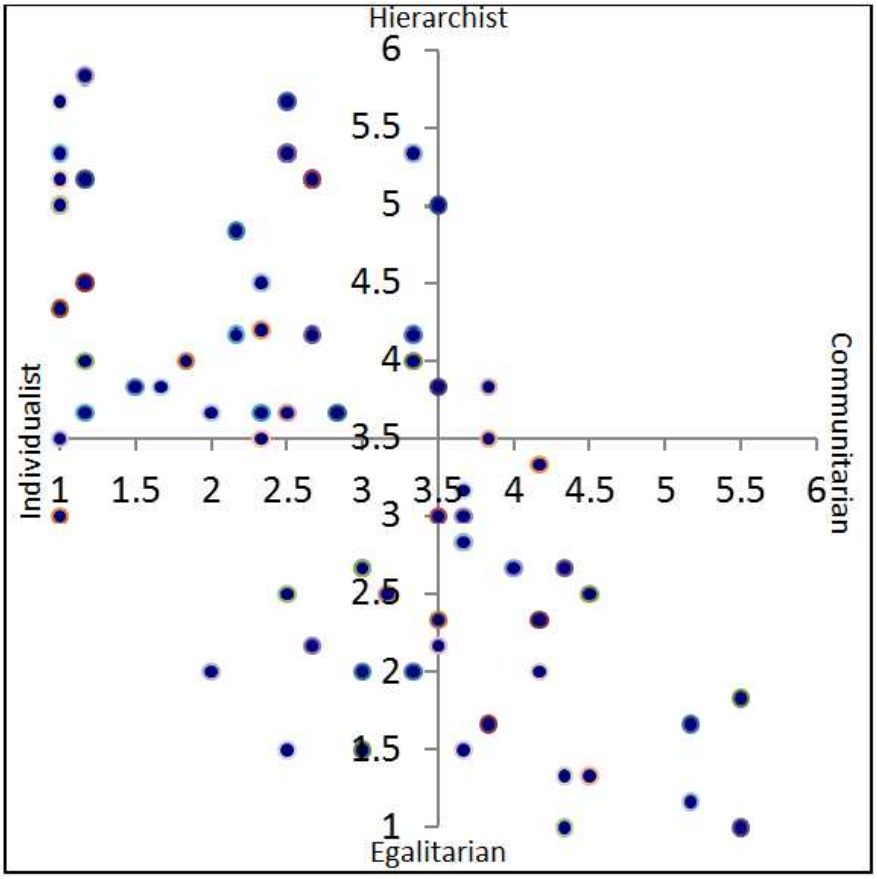

Figure 4.6. Cultural Worldview of information sources in Whitman County. Larger dot size indicates multiple dots are overlapping. Type 1 “hierarchical individualists” (34, 47.9%); Type 2 “hierarchical communitarians” (1; 1.4%) Type 3 “egalitarian individualists” (16, 22.5%); or Type 4 “egalitarian communitarians” (20; 28.2%)

When information sources were further classified by type of source (conservation, agricultural production, and university affiliated), our hypothesis (H1) that a majority of conservation professionals will be of the “egalitarian communitarianism” (type 4) worldview type was not supported (see Table 4.6). Conservation information sources were classified to be 47.4% “hierarchical individualists” (type 1), 42.1% “egalitarian communitarianism” (type 4), and 10.5% “egalitarian individualists” (type 3).

Table 4.6. Worldview types by information source type.

	Type 1 "Hierarchical individualists"	Type 4 "Egalitarian communitarians"	Type 3 "Egalitarian individualists"
Conservation information source (n= 19)	47.4%	42.1%	10.5%
Agricultural production information source (n= 29)	75.9%	6.9%	17.2%
University affiliated information source (n = 22)	13.6%	45.5%	40.9%

Survey findings were confirmed during interviews and the participatory mapping exercise with producers to further expand upon and explain information source worldview types. One producer described the differences between the information sources types in this way: conservation and university affiliated information sources would be, *"in this [egalitarian communitarian (type 4)] quadrant because it would be what would be best for the community,"* whereas agricultural production information sources would be "hierarchical individualists" (type 1) since, *"it seems they're concerned about my individual performance."*

Many producers identified the majority of information sources for conservation and university affiliated information as being in the center of the worldview map or within the "egalitarian communitarian" (type 4) worldview, *"[Conservation] organizations or your universities are somewhere back in here [egalitarian communitarian (type 4)]. Conservation districts, government agencies are charged with equality for all."* Another producer stated, *"they [conservation information sources] would have to be [egalitarian communitarian (type 4)], that is their job."*

4.3.3 Worldview Type of P*roducer vs. Information Source*

Producers were significantly more likely than information sources to fall within the worldview type classified as "hierarchical individualists" (type 1) (63.5% to 47.9%) ($\chi 2$= 5.508, p= 0.019, df = 1, n = 286) (see Figure 4.7 and Figure 4.8). Information sources were significantly more likely than producers to fall within the worldview type classified as "egalitarian communitarians" (type 4) (28.2% to 10%) ($\chi 2$= 14.265, p= 0.00, df = 1, n = 286) (see Figure 4.7 and Figure 4.8).

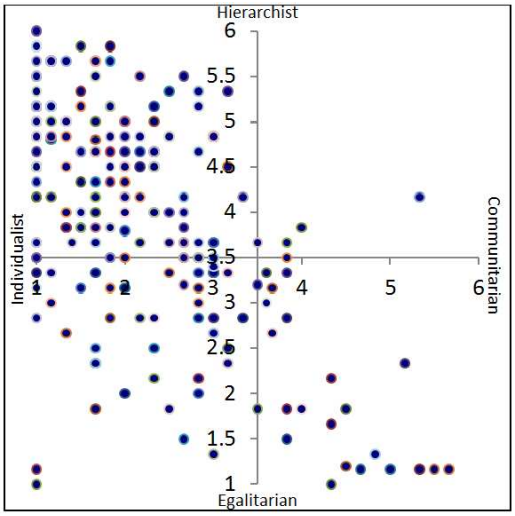

Figure 4.7. Cultural Worldview of producers in Whitman County. Larger dot size indicates multiple dots are overlapping.
Type 1 "hierarchical individualists" (139, 63.5%);
Type 2 "hierarchical communitarians" (3; 1.4%)
Type 3 "egalitarian individualists" (55, 25.1%); or
Type 4 "egalitarian communitarians" (22; 10.0%)

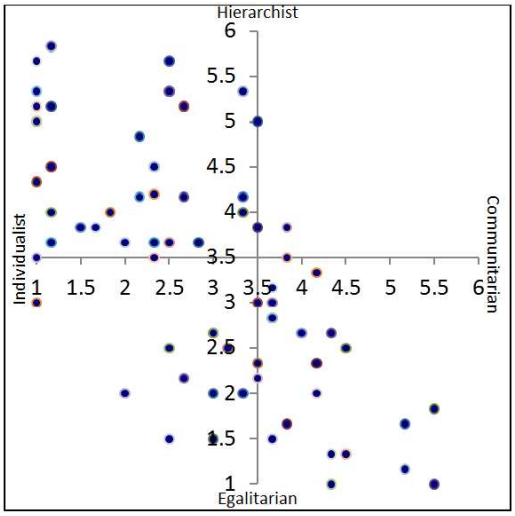

Figure 4.8. Cultural Worldview of information sources in Whitman County. Larger dot size indicates multiple dots are overlapping.
Type 1 "hierarchical individualists" (34, 47.9%);
Type 2 "hierarchical communitarians" (1; 1.4%)
Type 3 "egalitarian individualists" (16, 22.5%); or
Type 4 "egalitarian communitarians" (20; 28.2%)

4.3.4 Influence of Cultural Worldview on Producer Selection of Information Sources

A chi-square test of independence was performed to examine the relation between producer choice of individual agricultural information sources and worldview. The relation between these variables was significant for worldview types classified as "hierarchical individualists" (type 1) and "egalitarian communitarians" (type 4) ($\chi 2 = 10.19$, $p = 0.001$, $df = 1$, $n = 165$). The odds of a "hierarchical individualist" (type 1) information source being selected by a producer that is "hierarchical individualist" (type 1) is 7.3 times higher than that of an "egalitarian communitarian" (type 4) information source being selected by a producer that is "hierarchical individualist" (type 1). For producers who are "hierarchical individualists" (type 1), this supports our hypothesis (H2) that producers will choose individual agricultural information sources that hold the same cultural worldview as themselves.

Survey data were triangulated with findings from interviews and the participatory mapping exercises to further expand upon and explain how worldview influenced producer selection of information sources. A majority of the producers indicated that they would be more inclined to seek information from information sources that were from the same worldview type as themselves. One producer explained,

> *With everything that I do, not just with farming decisions, the people that I value their opinions, the people that I get information from, that I talk to, that I hang around with, are not people that are totally opposite from me. So maybe some parts of their personality are different than mine, but our values are mostly the same…as far as seeking information, it's going to be more of the [same worldview] type that I talk to.*

Another producer simply stated, "*I'm awfully sure that like attracts like."*

Many producers attributed their preference for selecting information sources of the same worldview type as themselves to the likelihood of greater trust, credibility and respect given to others who share the same worldview. One producer stated, *"I think they [producers] probably seek out somebody with similar values just to confirm peace of mind."* Additionally, *"The people that you think alike with would probably do a great job at sharing ideas and information."* Another producer stated,

> *You test them a little bit and you can kinda take a look at the philosophy where they are coming from... You test them and you take a look at how their expertise is working for ya. That's where we base our trust and opinion on one person versus another.*

Worldview was also identified as being an important factor for determining if a source was approachable,

> *I think there would be a more natural immediate trust in the personal trust component [with someone of the same value system] but when I deal with people I like to deal on a very factual basis so I will draw again back to the training and expertise of the scenario. [I] would probably really like them as an individual if they had the same thought concepts as I do but that would not necessarily influence my decision, it might make them more approachable but that would be the extent of the similarity issues, the approachability. If somebody where strictly neutral and approachable then I wouldn't have a problem there. It's the approachability issue, professionalism and approachability.*

Another producer stated that they seek someone with similar values because *"well, that's where I am more successful."*

Additional components identified by producers as indicators of information source worldview included appearance and first impressions,

> *It [worldview] sure does [play a role in how information is received]. Somebody comes down in a suit and a tie, the appearance, like when you walked up here, I saw your appearance and I hadn't talked to you, and it was pleasant to me. If somebody came up here and was dressed to the nines and wanted to tell me how to farm, well I wouldn't respect that person because he's read it in a book and has never been out doing it. He'd have to show it to me that he's giving me information that he knows works…Well you meet somebody down here on the street, and your first impression is quite often the lasting one.*

A minority of the producers interviewed suggested that they would seek information from all sources, independent of worldview in order to gain the best information for making an informed decision. An example of one such quote from a producer was, *"when it comes to new practices, I think they [producers] probably seek out the most knowledgeable and they don't really care about the values. They're just seeking out the knowledge."*

A few producers emphasized that there are some producers who just will not seek out new information regardless of the worldview of available information sources,

> *There are others that are so old way that they won't listen to anyone no matter if they are "hierarchy," "community" or "equality," they are clear out here with the "individual" and they won't listen to anybody, they will only listen to themselves.*

4.3.5 Additional Themes Related to Producer Selection of Information Sources

Many producers also said that they seek out individuals who have done very well in a certain area of agriculture production and they are likely to give credibility to those sources that have proven to be the best in their field. One producer said he,

> *Spent a whole day with a farmer up north, and I seek him out because he grows great crops. It might be a little different in thinking, but we spent all afternoon looking around, everything. I took his word because I saw evidence.*

Some producers indicated that they did not specifically seek out information sources, but that they were assigned to information sources due to program participation. One producer said,

> *We go into the office, we don't really choose who we can work with. There are only three or four guys we can choose from. I think they're assigned, I don't think I can walk in and say I want this guy or that guy.*

Another producer relayed,

> *You just respect their education, their knowledge and experience without getting into the personal value aspect of it because you just don't know them that well. You know them more on business relationship rather than a personal relationship.*

Woman producers interviewed shared unique insights regarding how the social aspects of farming are different for men and women and how those differences may influence how women and men producers select information sources (woman producers made up 10.8% of the survey respondents). One woman producer shared,

> *You go to seek information from people that have the knowledge and the background to provide the information you need, and not necessarily that they share the same personal values. You are looking for that resource to give you the best information in order to apply good farming practices to the land that you are trying to maintain in a successful manner…. they [men] go out and have coffee every morning and talk about the weather and the farming. I don't do that, I am not going to do that and sit in the fertilizer station with ten men having coffee. I don't do that, they have a different relationship, the good old boy club and that exists in Whitman County and obviously I don't have that.*

4.3.6 Influence of Cultural Worldview on Producer Implementation of Conservation Practices

Our hypotheses that producers who fall within the "hierarchical individualism" (type 1) worldview type would implement the fewest number of conservation practices (H3) and producers who fall within the "egalitarian communitarianism" (type 4) worldview type would implement the greatest number of conservation practices (H4) were not supported. There was no significant difference in the number or type of conservation practices implemented by producers of different cultural worldview types.

Although no difference in the actual implementation of conservation practices was observed, there was a slight but significant difference in the attitudes of producers from different cultural worldviews towards the importance of the implementation of conservation practices for soil conservation and protection of water quality.

4.3.6.1 Attitudes towards Soil Conservation

A one-way ANOVA was used to test for differences in the attitudes of producers among three cultural worldview types towards the importance of the implementation of conservation practices for soil conservation on the Palouse. Attitudes towards the importance of soil conservation differed significantly across the three types, F (2, 207) = 4.615, p = 0.011, n = 210. Post-hoc comparisons using the Fisher LSD test of the three types indicate that the producers who fall within the "egalitarian communitarianism" (type 4) (M= 4.64, 95% CI [4.38, 4.89]) cultural group ranked the importance of implementation of conservation practices for soil conservation on the Palouse significantly higher than producers who fall within the “hierarchical individualism” (type 1) (M= 4.19, 95% CI [4.04, 4.33]) or “egalitarian individualism” (type 3) (M= 4.47, 95% CI [4.26, 4.69]) cultural worldview groups. The Likert scale for the analysis was as follows: 1- not important, 2- somewhat important, 3- moderately important, 4- quite important, and 5-extremely important.

4.3.6.2 Attitudes towards Water Quality Protection

A one-way ANOVA was used to test for differences in the attitudes of producers among three cultural worldview types towards the importance of the implementation of conservation practices for protecting water quality on the Palouse. Attitudes towards the importance of conservation practices for protecting water quality differed significantly across the three types, F (2, 207) = 7.996, p = 0.000, n = 210. Post-hoc comparisons using the Fisher LSD test of the three types indicate that the producers who fall within the "egalitarian communitarianism" (type 4) (M= 4.50, 95% CI [4.24, 4.76]) cultural group ranked the importance of implementation of conservation practices for protecting water quality on the Palouse significantly higher than producers who were determined to fall within the “hierarchical individualism” (type 1) (M= 3.91, 95% CI [3.76, 4.07]) or “egalitarian individualism” (type 3) (M= 4.34, 95% CI [4.14, 4.54]) cultural worldview groups. The Likert scale for the analysis was as follows: 1- not important, 2- somewhat important, 3- moderately important, 4- quite important, and 5-extremely important.

4.3.7 Potential Study Limitations

People are often more likely to respond to a survey when the topic is relevant to them (Dillman & Carley-Baxter, 2000). In the case of producer implementation of conservation practices, an assumption can be made that producers who are most willing to implement conservation practices may also be those who are most likely to complete a questionnaire and interview on the topic of

factors that facilitate or discourage the implementation of conservation practices. Consequently, it is likely that the network of relationships described by this research will be incomplete and it is possible that it may over represent the presence of producers who implement conservation practices. Additionally, producers who fall within certain cultural worldview types may be more or less willing complete a questionnaire and interview, and may thus be overrepresented or underrepresented within this study.

4.4. Summary and Conclusions

The application of the cultural cognition framework within this study allowed us to look at the influence of cultural worldview (consisting of individual values and societal values) on producer choice for sources of agricultural information and producer likelihood of implementation of conservation practices. Specific objectives met by this study include describing the cultural worldviews of producers and agricultural information sources within Whitman County, Washington; the influence of cultural worldview on producer selection of agricultural information sources; and the influence of cultural worldview on producer likelihood of implementation of conservation practices.

The cultural cognition framework sheds new light regarding information transfer within agricultural communities. Our findings indicate that the majority of producers within Whitman County fall within the “hierarchical individualists” (type 1) worldview type and they are more likely to choose individual agricultural information sources who hold the same cultural worldview as themselves (H2). Our research findings are consistent with research by Kahan et al. (2010) which maintains that cultural cognition operates in the selection of credible experts, resulting in the individual selecting experts whom they perceive to share their values and the values of their peers and denying credibility and trustworthiness to experts whose values they perceive to be different than their own.

The operation of cultural cognition within producers selecting information sources about production practices, conservation practices, funding/cost share, and regulatory information, has real implications for local Whitman County information sources as they are significantly more likely than producers to fall within the worldview type classified as “egalitarian communitarians” (type 4). This increased diversity of worldview types within the information sources is even further compounded within the information sources classified as “conservation information sources” and

"university affiliated information sources" since they are significantly less likely to fall in the "hierarchical individualism" (type 1) worldview type and significantly more likely to fall within the "egalitarian communitarianism" (type 4) worldview type (H1).

This discrepancy in worldview types between producers and conservation information sources could have substantial implications for the flow of conservation information to producers in Whitman County. Many producers discussed the difficulty of communicating across values sectors,

> *It's [different values] not a stopper, but it slows it [delivery of conservation messages] down…If you can figure out that barrier, get to understand that these [producers] are all very strong individuals…then you can start getting through to them.*

Another producer stated,

> *No, they ["hierarchical individualism" (type 1) producers] are not seeking out the [conservation] information because they are sitting over there ["hierarchical individualism" (type 1) quadrat]. They are not even looking, they don't find there is somebody credible that they can trust. Trust is the piece that is the whole key and if you don't have trust in the individual you are seeking out the information from, if there is no trust there to start with, you are not going to them.*

These findings are further supported by recent research by Kahan et al. (2010) which has found that cultural cognition operates when an individual is evaluating an expert for credibility. Perception of expert credibility is influenced by an individual's readiness to trust experts who they perceive as sharing their cultural values and distrust experts who they perceive as not sharing their cultural values (Kahan, Jenkins-Smith, & Braman, 2011). This mechanism results in the individual selecting experts whom they perceive to share their values and the values of their peers.

Cultural cognition research has also demonstrated that individuals are inclined to believe an argument if it reinforces their relationship to others whom they share important cultural ties with, even in the face of sound scientific "evidence" (Kahan, 2010). Cultural cognition influences the way that individuals interpret new information. New information tends to be interpreted in a biased way that reinforces the current values they hold and the current values of their peers (Kahan, 2010). Kahan et al. have called this phenomenon a "culture war" over empirical data (Kahan, Braman, Slovic, Gastil, & Cohen, 2007). These findings are of particular importance to the transfer of information regarding conservation practices since when an individual encounters new technical or scientific information that is beyond the scope of their knowledge (as is often the case with

information regarding environmental risks), they rely on the interpretation of experts whom they deem to be credible. A potential opportunity to enhance source credibility and information flow related to conservation within Whitman County lies with conservation and university affiliated information sources forming closer working relationships with agricultural production information sources. Since agricultural production information sources fall primarily within the "hierarchical individualism" (type 1) worldview type, they are consequently more likely to be selected by producers who are of the "hierarchical individualism" (type 1) worldview type.

Several producers discussed the importance of having information sources that are *"closer to the middle"* and not on the extremes of the cultural worldview types, *"Anybody that's too far on either direction here, it's trust and respect at that point."* Additionally, a need was identified to have information presented in a way that is culturally neutral yet respectful of all worldviews,

> *Somebody who would be right in the middle, balanced but yet would respect my opinion. That's really key, who would respect my opinion …That's exactly right, I would go to somebody in the middle, a very neutral position, the most neutral position possible but supported by education, education credentials behind it.*

The recommendation to move toward middle ground was relayed by a producer during an interview,

> *The [conservation] information that people are coming from, working from and the [conservation] rules and regulations are coming from this area ["egalitarian communitarianism" (type 4)], trying to talk to this area ["hierarchical individualism" (type 1)] and that's the problem. The values systems are way different and there's where the rub is. In order to make things work we need to be in here [middle]…where things are going to get done is in this very middle…They [information sources] are over here ["egalitarian communitarianism" (type 4)], but this [middle] is the only place that things are going to get done and this group ["egalitarian communitarianism" (type 4)] has to understand that they have to move here [middle] in order to get the trust of this group ["hierarchical individualism" (type 1)] and in order to do it and that's the problem…That's the real rub and that's where we got to figure out how to get to there [middle] if we're gonna get anything done [for conservation].*

Additionally, this study looks at the cultural worldview of different agricultural producers and their resultant likelihood of implementation of conservation practices. The theoretical foundations of cultural cognition posit the likelihood of individuals falling within the "egalitarian communitarianism" (type 4) world view to be less inclined to dismiss evidence of environmental risks and thus more motivated toward conservation behavior. Our findings suggest that while

cultural cognition may be an indicator for environmental risk perception and consequently attitudes toward conservation, there was no difference in actual behavior of producers of different worldview types as measured by the number or types of conservation practices implemented (H3 and H4).

Although, producers of the "egalitarian communitarian" (type 4) worldview type were not observed to have greater implementation of conservation practices, targeted messages regarding environmental risks associated with soil and water on the Palouse should be better received by this group of producers. The significantly fewer number of connections that "egalitarian communitarians" (type 4) producers had for agricultural information could be due to a combination of factors including the factor that "egalitarian communitarians" (type 4) producers tend to derive a higher percentage of their total income from off-farm sources and they are less likely to be affiliated with or a member of an agricultural association. Consequently, information sources may be able to influence implementation of conservation practices within Whitman County with a more concerted effort to provide better outreach programs directed towards "egalitarian communitarian" (type 4) producers.

Additionally, if the goal is to increase implementation of conservation practices with producers of all cultural worldview types, information sources should focus not only on the extent of information distribution, but also on both the cultural meaning and the scientific content of the information they are disseminating. Such an effort will not only facilitate information sources in their goal to provide quality information regarding production practices, conservation practices, funding/cost share, and regulatory information, but will benefit producers by providing them better access to information resulting in the conservation of their valuable soil and water resources.

Acknowledgements

Great appreciation and gratitude go to the following individuals and organizations for their contributions: Palouse-Rock Lake Conservation District, Palouse Conservation District, Whitman Conservation District, and Pine Creek Conservation District for support and design feedback; Britta Carr for survey data entry and interview transcription; and Taryn Longberry for interview transcription.

References

Baumgart-Getz, A., Prokopy, L. S., & Floress, K. (2012). Why farmers adopt best management practice in the United States: a meta-analysis of the adoption literature. Journal of environmental management, 96(1), 17–25.

Boie, J. A. (2013). The influence of cultural worldview and networks of relationships on implementation of conservation practices in Whitman County, Washington. University of Idaho.

Braman, D., Kahan, D. M., Peters, E., Wittlin, M., & Slovic, P. (2012). The Polarizing Impact of Science Literacy and Numeracy on Perceived Climate Change Risks.

Cary, J., Webb, T., & Barr, N. (2001). The adoption of sustainable practices□: Some new insights. Land & Water Australia, Canberra.

Department of Ecology. (2013). Water Quality Improvement Projects: Palouse Watershed Area. WATER QUALITY IMPROVEMENT PROJECTS (TMDLs). Retrieved from http://www.ecy.wa.gov/programs/wq/tmdl/palouse/index.html

Dietz, T., Dan, A., & Shwom, R. (2007). Support for climate change policy: Social psychological and social structural influences. Rural Sociology, 72(2), 185–214.

Dillman, D. A. (2000). Mail and internet surveys: The tailored design method. New York: J. Willey.

Dillman, D. A., & Carley-Baxter, L. R. (2000). Structural determinants of survey response rate over a 12 year period, 1988-1999. In Proceedings of the section on survey research methods (pp. 394–399). Washington, D.C.: American Statistical Association.

Douglas, M., & Wildavsky, A. (1982). Risk and culture: An essay on the selection of technical and environmental dangers. Los Angeles: University of California Press.

Gale, J. A., Line, D. E., Osmond, D. L., Coffey, S. W., Spooner, J., Arnold, J. A., … Wimberley, R. C. (1993). Perspectives on the rural clean water program: Survey results. Environmental Protection (Vol. 1993). U.S. Environmental Protection Agency.

Hersha, D. K., Wilson, R. S., & Baird, A. M. (2012). A conceptual model of the citizen stream stewardship decision process in an urbanizing Midwestern United States watershed. Journal of Environmental Planning and Management, 55(2), 253–270.

Hulme, M. (2009). Why we disagree about climate change: Understanding controversy, inaction and opportunity. New York: Cambridge University Press.

Kahan, D. M. (2010). Fixing the communications failure. Nature, 463(7279), 296–7.

Kahan, D. M. (2011). Cultural Cognition Worldview Scales (CCWS)- long and short forms. Retrieved February 10, 2011, from http://sjdm.org/dmidi/Cultural Cognition Worldview Scales.html

Kahan, D. M. (2012). Cultural cognition as a conception of the cultural theory of risk. In Handbook of Risk Theory (pp. 725–759). Springer Netherlands.

Kahan, D. M., Braman, D., Cohen, G. L., Gastil, J., & Slovic, P. (2010). Who fears the HPV vaccine, who doesn't, and why? An experimental study of the mechanisms of cultural cognition. Law and Human Behavior, 34(6), 501–516.

Kahan, D. M., Braman, D., Gastil, J., Slovic, P., & Mertz, C. K. (2007). Culture and identity-protective cognition: Explaining the white-male effect in risk perception. Journal of Empirical Legal Studies, 4(3), 465–505.

Kahan, D. M., Braman, D., Slovic, P., Gastil, J., & Cohen, G. (2007). The second national risk and culture study: Making sense of—and making progress in—the American culture war of fact.

Kahan, D. M., Braman, D., Slovic, P., Gastil, J., & Cohen, G. (2009). Cultural cognition of the risks and benefits of nanotechnology. Nature Nanotechnology, 4(February), 87–90.

Kahan, D. M., Jenkins-Smith, H., & Braman, D. (2011). Cultural cognition of scientific consensus. Journal of Risk Research, 14(2), 147–174.

Kahan, D. M., Peters, E., Braman, D., Slovic, P., Wittlin, M., Ouellette, L. L., & Mandel, G. (2011). The Tragedy of the risk-perception commons: Culture conflict, rationality conflict, and climate change. Cognition.

Kahan, D. M., Slovic, P., Braman, D., & Gastil, J. (2006). Fear and Democracy: A cultural evaluation of Sunstein on risk. Harvard Law Review, 119, 1071–1109.

Karp, D. G. (1996). Values and their effect on pro-environmental behavior. Environment and Behavior, 28(1), 111–133.

Knowler, D., & Bradshaw, B. (2007). Farmers' adoption of conservation agriculture: A review and synthesis of recent research. Food Policy, 32(1), 25–48.

Kok, H., Papendick, R. I., & Saxton, K. E. (2009). STEEP: Impact of long-term conservation farming research and education in Pacific Northwest wheatlands. Journal of Soil and Water Conservation, 64(4), 253–264.

Lamba, P. (2006). Factors affecting the adoption of environmental best management practices in rural Ontario. University of Guelph.

Lemke, A. M., Lindenbaum, T. T., Perry, W. L., Herbert, M. E., Tear, T. H., & Herkert, J. R. (2010). Effects of outreach on the awareness and adoption of conservation practices by farmers in two agricultural watersheds of the Mackinaw River, Illinois. Journal of Soil and Water Conservation, 65(5), 304–315.

McCann, E., Sullivan, S., Erickson, D., & De Young, R. (1997). Environmental awareness, economic orientation, and farming practices: A comparison of organic and conventional farmers. Environmental Management, 21(5), 747–58.

Napier, T. L. (1991). Factors affecting acceptance and continued use of soil conservation practices in developing societies: A diffusion perspective. Agriculture, Ecosystems & Environment, 36(3-4), 127–140.

Napier, T. L., Camboni, S. M., & Thraen, C. S. (1986). Environmental concern and the adoption of farm technologies. Journal of Soil and Water Conservation and Water, 41(2), 109–113.

Napier, T. L., & Thraen, C. S. (1984). Factors affecting adoption of conventional and conservation tillage practices in Ohio. Journal of Soil and Water Conservation, 39(3), 205–209.

Napier, T. L., Thraen, C. S., & Camboni, S. M. (1988). Willingness of land operators to participate in government-sponsored soil erosion control programs. Journal of Rural Studies, 4(4), 339–347.

Napier, T. L., Tucker, M., & McCarter, S. (2000). Adoption of conservation production systems in three Midwest watersheds. Journal of Soil and Water Conservation, 55(2), 123–134.

Nelson, L. (1937). Soil conservation and human welfare. Utah Farmer, 57(3), 11–21.

Nowak, P., & Korsching, P. F. (1998). The human dimension of soil and water conservation: A historical and methodological perspective. In F. J. Pierce & W. W. Frye (Eds.), Advances in soil and water conservation (pp. 159–184). Chelsea, MI: Sleeping Bear Press.

Overton, T. A. (1997). Factors that influence farmers' environmental practices. North Carolina State University at Raleigh.

Pennings, J. M. E., Irwin, S. H., & Good, D. L. (2002). Surveying farmers: A case study. Review of Agricultural Economics, 24(1), 266–277.

Pickart, G., Kane, S., Young, D., Diebel, P., Wulfhorst, J., & Foltz, B. (2012). Three Decades of Change in Soil Conservation in the Washington-Idaho Palouse.

Prokopy, L. S., Floress, K., Klotthor-Weinkauf, D., & Baumgart-Getz, A. (2008). Determinants of agricultural best management practice adoption: Evidence from the literature. Journal of Soil and Water Conservation, 63(5), 300–311.

Rogers, E. M. (1983). Diffusion of innovations (3rd ed.). New York: The Free Press.

Ryan, C. M. (2009). Managing nonpoint source pollution in western Washington: landowner learning methods and motivations. Environmental management, 43(6), 1122–30.

Ryan, T. E. (1999). The clean up rural beaches program: Environmentalism in action? The University of Guelph.

Tompkins, E. L., & Adger, W. N. (2004). Does adaptive management of natural resources enhance resilience to climate change? Ecology and Society, 9(2), 10.

USDA National Agricultural Statistics Service. (2007). County profile: Whitman County – Washington.

Vanclay, F. (1997). The social basis of environmental management in agriculture: A background for understanding landcare.

Wells, K. C. (2004). Factors affecting the adoption of best management practices in the Canagagigue Creek Sub-Watershed. University of Guelph.

Chapter 5: Producers' Perspectives for Further Understanding Factors that Influence Implementation of Conservation Practices in Whitman County, Washington

Abstract

The major factors influencing the implementation of conservation practices within Whitman County, Washington, are investigated in this qualitative study. This research aims to provide meaningful findings for local practical application rather than for universal understanding. This study was designed to capture perspectives directly from producers with consideration of both the social dimensions and the cultural landscape of the Palouse Region of Whitman County, Washington. Producers were selected to participate in semi-structured interviews through a combination of critical case sampling and maximum variation sampling in an effort to select a diversity of producers engaged in different types of agriculture and different levels of implementation of conservation practices. The themes and sub-themes that emerged from producer interviews to explain both implementation and non-implementation of conservation practices were both rich in content and broad in scope. Producers' reasons for implementing conservation practices fell under the main themes of "voluntary" and "regulatory compliance." Producers' reasons for not implementing conservation practices included several diverse main themes. Main themes and sub-themes are initially described and then supported by illustration with producer quotes. Themes related to voluntary implementation of conservation practices were far more diverse than those related to implementation of conservation practices to meet regulatory compliance. While the producers in this study unanimously stressed that a voluntary process would be more effective than a regulatory process for them, they also recognized the importance of the regulatory component for compelling those producers who would not engage under the voluntary system. The producers' suggestions for an effective regulatory system echoed what has been found in previous research and emphasized that the regulatory approach must be strong and credible. As suggested by producers in this study, credibility will only be achieved by a regulatory approach that clearly states conservation compliance requirements based on adequate data and monitoring. Additionally, producers emphasized that the regulatory process must be executed through a process that is consistent and timely, and that regulatory agencies must be

willing to impose penalties that are formidable in the event of non-compliance. Additional recommendations related to successful delivery of outreach programs and important characteristics of information sources are presented.

Keywords: best management practice (BMP)—conservation practice—conservation implementation—information dissemination

5.1. Introduction

Agricultural conservation practices, also called best management practices (BMPs), can help to increase agricultural productivity, while reducing soil erosion, reducing nonpoint source pollution, protecting water quality, improving air quality, providing wildlife habitat, and providing numerous additional natural resources conservation benefits. Consequently, the factors that facilitate or inhibit the implementation of conservation practices by private landowners have been researched for over half a century (Lamba, 2006; Lemke et al., 2010; Napier & Thraen, 1984; Napier et al., 2000; Napier, 1991; Nowak & Korsching, 1998; Overton, 1997; Wells, 2004). Despite the extensive research in this area, there have been inconsistent findings regarding factors that lead to a producer's willingness to implement conservation practices. Even with these research efforts and the establishment of federal, state, and private programs to promote financial and technical incentives aimed at conservation of soil and water resources, the widespread implementation of conservation practices by agricultural producers has yet to be realized (Nowak & Korsching, 1998; Prokopy et al., 2008).

The implementation or non-implementation of conservation practices, and the reasons underlying these behaviors are critical to the conservation of soil and water resources. A comprehensive understanding of the beliefs, motives, and actions of both resource managers and producers has been identified as essential to further the implementation of conservation practices (Lemke et al., 2010; Nowak & Korsching, 1998; Prokopy et al., 2008).

The need for an understanding of the social dimensions of soil and water conservation goes as far back as 1937 when Lowry Nelson stated, "The conservation of soil is not alone an economic and technological problem. In the last analysis it is a social concern" (p. 12). Since then, several theoretical perspectives have been employed to explain the barriers and incentives to implementation of conservation practices worldwide (Prokopy et al., 2008).

Past research related to the implementation of conservation practices has primarily focused on specific characteristics of producers, farms, or conservation practices over a wide geographic area. Much of this past research has overlooked the social dimensions and the cultural landscape of the specific geographic areas where the motivations regarding implementation of conservation practices is in question. To address these limitations, a qualitative analysis of in-depth interviews with producers was conducted to determine major factors influencing the implementation of conservation practices within Whitman County, Washington.

5.2. Procedures

5.2.1 Research Location

Surveys and interviews were conducted during 2012 in Whitman County, located in southeast Washington, in the heart of the Palouse region of the Pacific Northwest (see Figure 5.1). Whitman County is characterized by a moderate climate with deeply deposited loess soils divided by rivers flowing through the Palouse River Watershed. Land use within the County consists primarily of dry land farming with some rangeland/pasture. Approximately 91% (1,271,141 acres) of the 1,393,920 acres in Whitman County are classified as agricultural (USDA National Agriciultural Statistics Service, 2007). Agriculture has been the foundation of the region's economy in the past and continues to be a large contributor. Pullman (population 29,913 in 2011), home to Washington State University, and Colfax (population 2,839 in 2011) are the main population centers of Whitman County (population 45,077 in 2011).

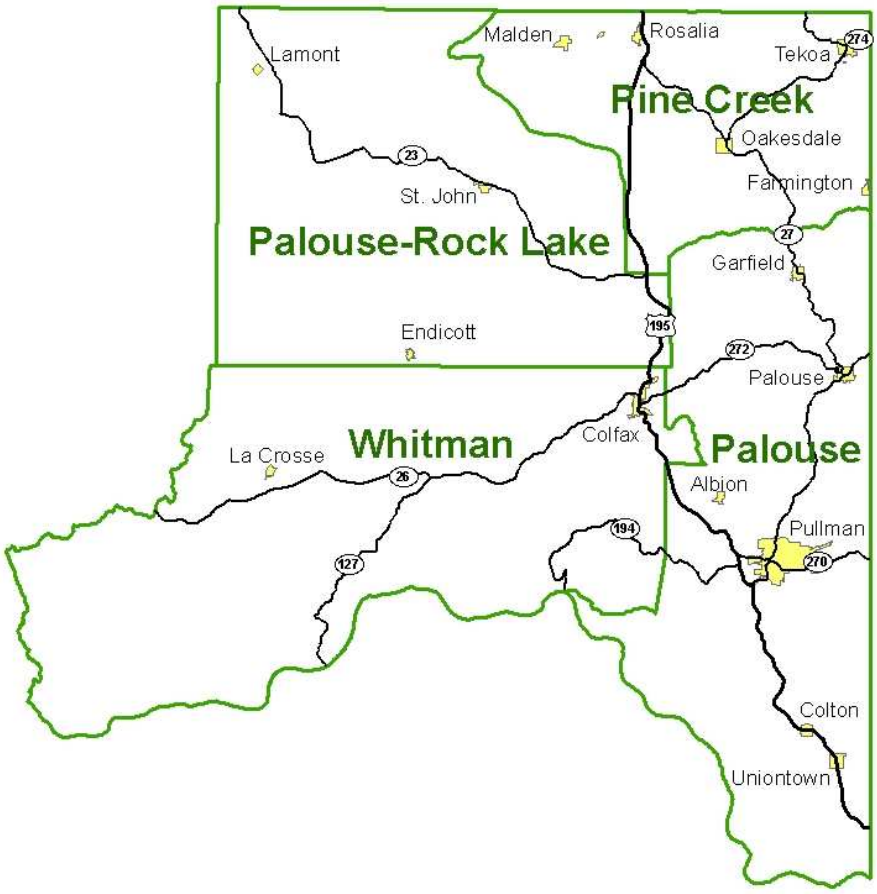

Figure 5.1. Map of Whitman County, showing population centers and conservation district boundaries.

5.2.2 Interview Methods

Producer surveys were conducted with principal farm operators within Whitman County during the winter of 2012 (Boie, 2013). The choice for conducting a survey during the winter months of January-March was due to limited seasonal availability of producers to participate in research. A limitation of a survey research strategy for this population is the documented low survey response rates from farmers (Pennings et al., 2002). Consequently, questionnaires were distributed by mail with a modified Dillman (2000)*Tailored Design Method* (introduction letter, survey package, reminder, second survey package, and second reminder), using suggestions from research by Pennings et al (2002) regarding how to improve producers' response rates to mail surveys.

The sampling frame for a single stage, sample of principal farm operators within Whitman County was generated by the Washington state office of the United States Department of Agriculture (USDA) National Agricultural Statistics Service. The 2007 United States Department of Agriculture (USDA) Census of Agriculture identified 875 principal farm operators within Whitman County. This

group was made up of principal farm operators who consider farming to be their primary occupation and principal farm operators who consider their primary occupation to be something other than farming.

Producers consisted of individuals involved with dry land grain production (conventional tillage, conservation tillage, or direct seed system), livestock production, and Conservation Reserve Program (CRP) enrollment. Each producer's operation was unique and had variable involvement in the different types of production. Producers' operations were as varied as dry land grain production exclusively, livestock production exclusively, CRP enrollment exclusively, or some combination of the three. Throughout this dissertation, producers who are involved with dry land grain production are referred to as "farmers" whereas producers who are involved with livestock production are referred to as "livestock producers."

To protect confidentiality, questionnaires were mailed directly from the state office of USDA National Agricultural Statistics Service. To ensure anonymity, all principal farm operators issued survey packages were assigned numbers. As an incentive for participation, survey participants were entered into a lottery for a chance to win one of two $25 cash gift cards. During January-March 2012, a total of 258 surveys were returned for a response rate of 30%.

The final item on the questionnaire inquired as to producer willingness to be interviewed. Eighty of the 258 respondents indicated willingness to participate in an interview (willingness to interview rate of 30.9%). Twenty-five Whitman County producers were selected to participate in semi-structured interviews through a combination of critical case sampling (selecting what are believed to be particularly important cases) and maximum variation sampling (selecting a wide range of cases) in an effort to select a diversity of producers engaged in different types of agriculture and different levels of implementation of conservation practices.

The interview guide was designed to ensure that similar lines of inquiry were pursued with each producer interviewed, thus enhancing the likelihood of creating comparable qualitative data sets. Twenty-five semi-structured interviews were conducted in-person by the same researcher during the spring and summer of 2012. Interviews were structured to explore two primary areas of interest: (1) Why conservation practices are implemented, (2) Why conservation practices are not implemented. Interviews ranged from 30 minutes to 2 hours with the average interview lasting approximately 1 hour and 15 minutes.

Interviews were audio recorded and transcribed. Data analysis proceeded in three main stages including data reduction, data display, and interpretation (Miles & Huberman, 1994). In the data reduction stage, the data were selected, simplified, abstracted, and transformed in a focused way that allowed for valid conclusions to be drawn (Miles & Huberman, 1994). Effort was made to ensure that data remained in context throughout the process (Onwuegbuzie & Teddlie, 2003). Researchers collaborated to store, index, sort, and code interview data in a database in order to assign categories and codes (Leech & Onwuegbuzie, 2011). To enhance interpretation, codes and themes were organized and consolidated through the data display stage. The final stage of analysis included drawing conclusions through interpretation of the meaning embedded in the data display. Finally, conclusions drawn from the qualitative analysis were triangulated with survey data. Quality assurance measures included member checking, peer debriefing, and triangulation.

5.3. Findings

There is an abundance of literature reporting on producers' attitudes and behavior derived both from theoretical foundations and natural resource professionals' perspectives based on anecdotal experiences. The purpose in designing this study was to provide producers an opportunity to directly share their attitudes towards conservation practices and explanations for why they do or do not implement conservation practices. Table 5.1 on implementation of conservation practices and Table 5.2 on non-implementation of conservation practices summarize the main themes with exemplar quotes that emerged from initial coding. In this section, research findings are organized by main themes, followed by sub-themes. Both main themes and sub-themes are initially described and then supported by illustration with producer quotes.

Table 5.1. Main themes related to conservation practice implementation with exemplar quotes

Why Conservation Practices Are Implemented	
Voluntary	I think that any conservation practice in this area is true conservation from the producer themselves, because we don't have to. We can farm the same way we did 20 years ago. And it would be fine. So any changes in this area are from the grower themselves. And I don't know any grower off the top of my head that hasn't implemented quite a bit of conservation in their farms totally voluntarily.
Regulatory	Some of those folks that are out there on the fringe, they're anti-agency program. He's just not switching. So I'm not sure how you get to a guy like that to get him to see the light. It's going to come with the water quality laws, I think… I don't know that you're going to change their personal thinking, but you can change their practices through law.

Table 5.2. Main themes related to conservation practice non-implementation with exemplar quotes

Why Conservation Practices Are NOT Implemented	
Economic	If you ask anybody, they'll say they don't want soil erosion, but I think some people are more motivated by what's the cheapest, most economical way to get something done. And sometimes, doing it the old way is the easiest, cheapest, quickest way to make a short-term profit. Economics drives everything…But dollars talk, and so I would say in general, farmers will sacrifice conservation practices if they can make more money somewhere else. I would say that's the typical. It's the rarity when somebody will sacrifice dollars for conservation…Economics is the driving factor. We are individuals, we have to stay in business. So whatever decision we make has an economic consequence. So if the economics are favorable, but you also have to sell this to your banker, to sell this operating line. So economics has to be a driving factor.
Civic responsibility	We're the cheapest, most abundant, safest food source of anyone the world; we're the envy of everyone in the world. So I think we're doing something right, right now, let's not mess it up with more regulations.
Responsible to the next generation	You don't know what the trickle down consequences could be. Maybe when we're not taking government funds for these conservation practices, in reality we think we are protecting the farm for future generations. You know I personally don't want to sign a contract that's going to hamstring anybody else.
Mandated	The conservation practices, that's kind of a two-edged sword. Most of us are independent enough that we don't want any more government interference in our lives. Something that's mandated is always resisted.
Credibility/Trust	A guy shows up from the government and says, "I'm really trying to help you." Well, what do you really know about it? If you don't have that trust, I don't care if it's an agency or a program, farmers in particular are probably less inclined to participate if the trust level isn't there.
Program requirements	Those types of issues need to be put into the grant, not the current philosophies and goals that we see are in these funding outcomes and incentives. They are all wrong. They are not built for a mutual interest of the producers. They are built for the interest of somebody's personal believes or content, whatever drives their decision. I don't think they are scientifically based as well as they should or could be...I think it's just pushed on, thrown into it this is what you'll do. I don't see those that regulate or are responsible for being the gate keepers for the financial resources available for conservation. I don't see them looking into it at that level, I see them being the gate keeper on the other end for the community and the regulatory aspect. I do not see them in looking at the mutual win-win benefit.
Local factors	What may work up here doesn't work down there and vice versa.
Inadequate understanding	The farmer has his lines up on his farm. Nothing beyond that farm matters. As soon as that water leaves my farm, it's not mine. I don't know whose it is. Leave me the hell alone.
Unwilling to change	I think that the ones that are left, some of them are doing practices over others because their grandfathers farmed it, and they're gonna farm it. And that's kind of the farmer's mentality sometimes. They've been on this ground for 70 years, and I'm gonna farm it the way I want to.

5.3.1 Why Conservation Practices are Implemented

Producers' reasons for implementing conservation practices fell under the main themes of "voluntary" and "regulatory compliance." Within these main themes were many sub-themes which provide further insight into producer willingness to implement conservation practices.

5.3.1.1 Voluntary

Producers shared many reasons for voluntary implementation of conservation practices. The sub-themes identified were numerous and diverse.

Stewardship

Producers indicated that they felt a sense of responsibility or conservation ethic to implement conservation practices because it was the right thing to do for stewardship or for the next generation. Producers talked about agricultural producers getting a "bad rap" when it comes to natural resource conservation, partially due to historical "abuses of the land." One producer stated that producers are "trying to be stewards because the land will blow away if they aren't cognizant of the next generation and the quality of the land. They can use it to death...and just about did." Agreement amongst producers was that most producers are willing to try new practices and are trying to be the best stewards of the land possible because they recognize the necessity of maintaining the quality of their ground for future productivity. As one producer summarized,

> *I think just good stewardship is number one, even if there wasn't anything to do with economics. Nobody likes to see erosion. We need to farm this ground.*

Accordingly, producers were motivated by wise use of natural resources and sustainability. These producers mentioned the importance of not damaging the resource for future harvest and the need for thinking long-term,

> *Or putting something in with the expectation of taking it back off, but you want to do it on a repeatable basis, so you don't want to damage the resource doing that... A lot of long-term planning.*

Other producers wanted to give something back and improve the ground beyond the condition it was in when they started working it,

> *Man can make all the money he wants and put it in the bank and when he's dead, he's still dead. So* unless *he does something valuable with his time, he's probably*

> *wasted his life. And whether you believe in God or not, doesn't matter, if you've wasted your life, you have wasted your life. I wanna leave more than I took I guess.*

In line with these subthemes, producers made mentioned of values related to smaller family farms "*where people take pride in what they are doing.*" Producers felt that smaller family farming operations were more personal, with greater ties to "roots" and "identity" resulting in producers being driven by "t*he heritage and the love of the land as opposed to the love of the money,"*

> *When it's your own family farm that you've inherited and grown up with, you value that heritage and that history that you've had…it's more than land and conservation, it's that history and tradition and roots.*

Generational Change

Producers noted the idea of conservation practices becoming more common now and in the future with a new generation and new ideas, and often discussed conservation issues as being "things that we wouldn't have talked about 20 years ago." Additionally, there was agreement that "the new crop [of *producers*] has got different ideas. They do a different job of farming." One producer explained how the decision making authority, and consequently opportunity to try new practices, is slowly transferred from generation to generation,

> *There's a little bit of the generational thing. One farmer in particular, the old farmer is 90, that makes his son heading for 70, the grandson is 30. If the older generation still calls the shots then that's the deal, it kinda depends on whose money is involved... I do [think this generation would be more willing to try new things if they were calling the shots]... I think you see change in the generations.*

Another important factor that has increased implementation of conservation practices by the current generation is the availability of technology and a proven record over time that conservation practices actually work well,

> *So those days are over. That kind of ended with the generation or so before. And they were limited as to equipment. Now technology has advanced to the point where we can use much better conservation practices with the equipment we have to take the next step.*

Public Demands for Conservation

The sub-themes of public demand for conservation, science, research, and education were often intertwined with generational change,

> *Because I don't use the same practices my great grandfather used nor any of my other relatives but it's really the science that teaches me that there are alternatives to the way I've/my grandparents or my lineage…farmed. So, you go to a class or you take a seminar or you read an article and once and awhile and you say "Oh, uh, I could do that" and actually a lot of the times I'll be better off for it. And those things are probably brought on by the public's desire to see cleaner water, cleaner air, yada, yada, and so, I think that a lot of the science is done for the benefit of the farmer as well as the public.*

Producers often discussed frustration with public demands for conservation and the resultant laws passed by the public at large that complicate agricultural operations. While producers acknowledged the inconvenience of environmental laws, they also recognized that implementation of conservation practices allowed them to take a step in the direction of what society at large demands,

> *And they have laws that they passed, the population passes a law, and it might not be in agreement with what I want, but as a member of society, I'm required to live by those laws. So society requires certain things of their environment, and by participating in those conservation practices, I help meet those requirements*

Economic Influences

Producers made mention of economic influence on the implementation of conservation practices. Producers indicated the importance of the right timing in regards to wheat prices and input costs such as fuel and chemicals,

> *What has forced it is fuel costs and equipment costs. Beating your head against a rock and not making any money every year. Those costs will push farmers far faster than any regulation because you run out of money. Because people are out of money so everyone has to change their practices to make it work.*

Other producers were involved in conservation programs due to the guaranteed payments from programs or that their bankers were pleased by the regular income generated from conservation program payments. As one producer stated*, "I made more money farming it than I did CRP-ing it, but I made the bank happier."*

Education and Outreach

Producers discussed the importance of adequate education and outreach to producers to inform them about natural resource conservation problems and issues. One producer stated that many "old farm families" have had several generations graduate with agricultural related degrees from

Washington State University resulting in a “very educated farming base,” which has influenced local farming practices,

> *The land grant university and its proximity to those producers and affiliations to those producers I think is probably the biggest influence with what I see with our local folks.*

Producers commented on the qualities that make a local information sources successful at disseminating information about conservation practices. Producers repeatedly commented on the importance of local information sources with personal experience who can say “I've been doing this, it works. I'm doing it for less money, you can do it too.” Additionally, producers were interested in information sources who are willing to not only share successes but share pitfalls that producers can learn from. The most important factor for credibility of sources was the ability to use “farmer talk” to demonstrate positive, local examples,

> *And it may be that conservation messages need to be presented in the right way at the right time…You need somebody that talks farmer talk, and you come down to dollars and cents, you come down to what's logical. It comes down to what they can understand and what they can get their hands around.*

<u>Conservation Practices versus Conservation Programs</u>

There was a lot of discussion about conservation programs in addition to conservation practices. Producers spoke about why they choose to implement conservation practices without financial assistance and incentives that area available through conservation programs. The choice to pay out of pocket to implement conservation practices was often connected to the less expensive costs of installing simpler practices without permits or the need to follow agency specifications,

> *Yea, they [ranchers] are doing it on their own. Ranchers are conservationists but they are not using the government programs.*

Additionally, there was concern expressed from producers about disclosing information about their operations or losing full control over their operations as a result of entering program agreements to gain financial assistance for instillation of conservation practices. Many livestock producers, in particular, “feel like maybe it's better management if the government isn't in it.”

> *I see a very quiet majority of my ranching colleagues that do implement conservation. They try like we do to fly very much under the radar of those that are interested in or watching or quantifying in some way conservation efforts. That*

> *anymore the perception is that if you have cows you are a targeted minority and so they keep their cattle operation and business as quiet and low profile as possible.*

Often these privately funded conservation practices are implemented by producers with dual benefits in mind, protection or enhancement of agricultural operations and attainment of conservation benefits,

> *I see neighbors that do the same things, rotate grazing, attempt to fence off river areas, attempt to inhibit erosion for the very same reason that we do, because it is detrimental, it's loss of grass production. Who likes to see their land base eroded and give way to a bigger water channel? That's not a maximum potential for grass production. There's some common goals with conservation practices that are out there, they're just very quietly held close to the vest.*

Producers discussed the high cost of conservation practice implementation. There was recognition of the tradeoffs between using public funds from taxpayer money to make enhancements to private operations versus using private producer funds to implement conservation practices that have a public benefit. Additionally, producers discussed concern about adding to the public debt,

> *I think there's a growing movement in the country right now that a lot of producers want to do conservation practices, but they want to do it on their own, because they see the amount of money they have to put into it. That's just increasing the debt, and they have an issue with leaving that debt legacy to future generations. They don't feel that's any better than leaving them dirty air, dirty water. On the same hand, some of the stuff that needs to be done is so big it needs taxpayer money.*

Conversely, Producers discussed their use of conservation program incentives to reinforce their existing good practices. One producer stated that he was taking conservation program payments, but he was "going to do it [conservation practices] regardless." Another producer discussed the benefits of conservation program payments for current conservation practices,

> *Basically, they are all encouraging what I am already doing. I didn't do this to get that money, but if they're standing there handing out money for what I'm already doing, I'm not that well fixed that I won't take it.*

Local Influence

To encourage greater participation in conservation programs, producers mentioned the importance of conservation practices being driven by local producers and organizations where local producers can participate in processes and guide programs to determine which conservation practices are appropriate for the area and where each individual is able to make individual conservation

decisions for their own operation. There was concern by producers that some entities are "pushing one program over another" and that conservation practices and programs were being dictated by state or federal priorities and not by local factors or priorities. One producer stated,

> *If they feel they have some of the power to direct that [conservation practices or programs], they are going to be much more open to participating because they feel they have some of the power.*

Producers stated that "there is no one size fits all description" when it comes to defining a conservation practice or program. Producers mentioned the importance of conservation practices and programs having "leeway" or "flexibility" built in so that a "farmer can work it a little bit to make sense for himself."

Additionally, the role of individual values in implementation decisions was discussed,

> *Well it is going to be different for each and every individual, it's from their view of the world, their values, and their operation and what they are trying to get out of it...each individual, based on their values system, has to determine what will and will not work for them.*

Benefits to Society

Producers discussed benefits to society at large as influencing their decision to implement conservation practices,

> *You're using common sense and practical, practical measures to improve the quality of your soil, your water, your land, but it's also, there's benefit to anyone else involved. And that goes from (farmers) farther downstream to the condition of the Columbia River when it runs into the Pacific.*

In regards to increased conservation efforts, producers often stated, "It's been a good thing for everybody." Public benefits acknowledged included: increased water quality, improved salmon habitat, enhanced soil health, reduced erosion from water and wind, reduced chemical use, increased health benefits, improved weed control, reduced county spending to clean out ditches, benefits to wildlife, improved air quality, and diversified native plant species. Personal testimony from one producer included,

> *I have never seen a moose until like 5 years ago. I have never seen an eagle till like 5 years ago. I've seen river otters in front of my house, I have never seen one before in my life…there's a lot more wildlife that I don't dislike, I think it's kind of fun. So does that mean we're getting better? Maybe we are.*

Producers commented on the demand from the public for improved environmental conditions and the response from the agricultural community to improve conditions through implementation of conservation practices. Producers often agreed that if "Society wants clean water, and if they're willing to help pay for it and he's willing to accept it, then that's fine." Consequently, producers were often frustrated with having to personally cover the costs of improved environmental conditions that benefit the public,

> *So if you're farming and you're throwing it all down the creek, then it's your responsibility to take care of it. Where does the public come in? Well, the public benefits from it, so can we get some funding from the public to help do this? That's pretty cynical, it's also what I hear.*

Overall, producers were proud of the conservation changes that have taken place over the past decades and recognized the benefits to their operations and to the public at large. Producers often were discouraged by the lack of public acknowledgement for the contributions that agricultural producers have made for improved natural resource conservation,

> *We're probably silently one of the largest improvers of water quality in the last thirty years. I mean, certainly it isn't the general public that's improved the water quality. Their desire to see cleaner and healthier water and better food has perhaps led to that but agriculture has certainly implemented a lot of stuff!*

<u>Personal Benefits</u>

Producers discussed a wide range of personal benefits and benefits to their operation as motivations for implementation of conservation practices. As one producer described,

> *I think everybody is very conscientious about conservation right now, because generally associated with conservation is a self-serving interest in that it's cheaper, less operations over the field. And any time you do less operations over the field, I consider that conservation. The ground may look the same, but you're burning less fuel, so in that respect, you're conserving on a conservation side in fuel management. So yes, I think that we all think about conservation when we're doing things. Whether we intend to or not, just from the economic incentive.*

a. Longevity and Legacy

Longevity of productivity and protecting the ground for future use was important to producers. Producers talked about how agricultural land managers have always implemented conservation measures and that "If we didn't have some conservation to us, these ranches wouldn't [currently] be functional, productive."

A sense of responsibility to current family health and family legacy of farming on the Palouse was important to producers. Producers stated that they were the party most concerned with conservation and indicated "we're living here, we want to hand this down." The pride and responsibility of being a multi-generation farm family was echoed often,

> *You know, I was lucky enough to be born into a farm so I gotta pass it on. I hear that more and more. We gotta keep it just as good as we can for the next generation. I feel like that is pretty much across the board, everybody is singing that song.*

b. Operational Efficiencies and Economic Advantages

Conservation practices that resulted in operational efficiencies were noted as being economically advantageous and increasing producer quality of life due to efficiencies, fewer passes and overall less work. Additionally, conservation measures often reduced fuel usage, equipment wear and tear, man hours, and chemical use. One producer summarized the efficiencies as,

> *My fall work is less than it used to be, my spring work is less than it used to be, I can go faster, I can get more done with less people and less time.*

Economics was a driving factor behind most producers' decisions to implement conservation practices or participate in conservation programs. Producers discussed that they believe that "in general the farming community wants to get better," and that producers are always looking for ways to make money so they "have their eyes wide open" looking for practices that increase efficiency. One producer summarized the balance between conservation and economics as,

> *The biggest thing that people are looking for is trying to make money. Fuel and equipment expenses have probably pushed the farmer more towards that direction than the government or conservation has. We want to conserve but we also want to make a living out of this.*

Producers often talked about the high cost of doing business as an agricultural producer and the challenges of staying in business. Producers discussed the importance of conservation practices not only having a benefit for natural resources, but also simultaneously enhancing operations and increasing production through land productivity, animal gains, yields, and overall economics. Producers talked about the importance of "win-win" solutions for enhanced operations and conservation. Producers mentioned that often things that they do for profitability have a conservation benefit but that "if there is no gain for the end user, then they're not going to be very embracing of the concept." Overall, producers often thought that highlighting efficiencies,

enhanced productivity and economics would be most effective in bringing about conservation change,

> *So, I'd say there is a lot of ways, but again, economics drives farmers. When it's profitable to do something, particularly if it's easier and nicer, then people jump on the bandwagon. But if you're going to dictate that you have to be conservation, and it's going to cost everybody money, and you're going to have less yield and so forth, then people aren't going to jump in, they're going to fight it, because it means survival.*

c. Productivity versus Net Income

Producers who had transitioned to direct seed systems highlighted the current divergence in producer philosophy around the goals of maximum yield versus net income. Producers felt that the implementation of conservation practices through direct seed was merited regardless of potential initial yield losses because they were increasing overall profits and net income due to efficiencies and reduction in input costs. One producer attributed his ability to overcome debt and remain farming due to the increases in net income he experienced with conservation tillage as told in the following story,

> *I was so broke, I decided it wouldn't hurt me to do no-till. Either I was going to go out of business that year conventional farming, or [I could try] no-till. My expenses on the no-till were so much less than my expenses on conventional, that I started coming out of the hole in the first year.*

d. Improvements to Marginal Land

The Conservation Reserve Program (CRP) was a frequent topic of conversation. While some producers called it "farmer welfare" because CRP is a government program that provides producers with a "check every year and it comes in like clockwork," other producers recognized the value in a program where producers "are paid to keep that out of production and conserve it." Overall, the CRP program was noted as being important for reducing soil erosion, increasing water quality, improving wildlife habitat, creating hunting opportunities, and providing economic stability for producers on marginal land. One producer discussed the economic predictability and conservation benefits that were influential in his decision to enroll land with marginal productivity in the CRP program,

> *I did the CRP; the main reason was the payment that you know exactly what you are going to get every year for ten years. That was probably the biggest incentive. The market, it fluctuates, that's a crapshoot at best. It goes up, it goes down, it can*

> *be $3, it can be $15...I think as a whole conservation practices have improved immensely in the last 10-20 years and as we were talking about a little bit ago I think the incentives that the government provides with the filter strips and the buffer strips has been huge for people to be more conscientious about preserving the land particularly where the ground is rocky or clay or a wetland.*

e. Financial Incentives for Conservation Programs and Practices

Producers mentioned how production practices are influenced by funding opportunities including cost-share, grants, cheap loans, insurance, government programs, and subsidies to support producers and stabilize the industry. Producers mentioned that one way that the general public can share the financial burden of implementing expensive conservation measures would be to "implement more government supported programs to aid in the production of moving that direction." Producers identified that with many of the financial incentives for conservation, "it all depends on the farm bill. We are kinda at the mercy of that."

f. Reducing Risk

A constant theme throughout all of the interviews was the risk associated with farming and the enhanced risks of trying new practices, including conservation practices. One producer shared,

> *I cannot ignore it. I haven't been farming for myself for all that many years, and in my 25 years of farming, I've almost been out of business twice. And so you don't forget when the banker tells you to find another line of work.*

Conservation funding programs were noted to reduce the risk of trying new farming practices and in aiding the initial implementation of conservation practices, but it was noted that there is a lack of funding to sustain implementation of conservation practices,

> *Funding-wise, we've had EQUIP through NRCS...if you take EQUIP to get started into direct seed, it's quite a bit of help. But if you need help again later on, you're already into direct seed on that ground so you better find something else. And that's...I agree with that. I've heard people disagree with it, and when you're broke you disagree with it, but it's the right way.*

g. Telling a Good Story

Producers noted that they were inspired to implement conservation practices in order to set an example within the community and tell a good story about agriculture. Producers talked about how poor farming practices by a few producers give "farming such a black eye." Producers discussed how the negative examples in the industry set the stage for how the public views all of

agriculture. Producers mentioned that "farmers do a poor job at advertising what a good job we do" and the importance of increasing the positive image of farming. Because many members of the public could say, "wow, I've never met a farmer," it is important for producers to make an effort to "farm pretty" as one producer described,

> *I think farmers have to try to advertise themselves better and it's basically how we appear doing 60 from the highway…If you've got something highly erodible along the highway, grass it, put it in a program, buffer the ditches, and farm pretty. I think farm pretty.*

Producers also noted the need for better advertising within the agricultural community to promote the conservation work that is already being done by producers. Because "agriculture is doing a very poor job at promoting themselves and what they are doing" and because many producers are "just wanting to go quietly about their business, they have taken the brunt of the attack," producers do not feel like they are getting enough credit for their current conservation efforts. The cost of advertising was discussed as a barrier to establishing a positive message as one producer explained,

> *I guess you have to toot your own horn and it's tough to get the economics, funding funneled to pay and show…but it's hard to get out there and really tell people about this. I think the general hunting population is probably more aware of it than the general person... General response from the public generally isn't a good thing with Ag, which is too bad. They need to look beyond that and see all the good points that we're doing..., but if there was some support level as far as funds for advertising to get the word out, and it would be a benefit to the government to say, 'Tax dollars in this area, your tax dollars support not only the cheapest, most abundant, safest food source in the world, but we also have conservation practices in line that are making x-number of acres habitable for wildlife that wouldn't be able to live here,' and things like that. But that's hard for our industry on a small budget to get the word out. So that's the only area I can see is kind of a stretch, I think to bring the general public into it with funding of some sort.*

<u>Local Factors</u>

Producers often commented on production practices and subsequent conservation practices being dependent on local natural resource issues and local conditions including climate, soil type, amount of rainfall, and topography. In this respect, producers commented that implementation of conservation practices is not only pending on the "economics of conservation," but whether the practices are "even practical" in a particular area. Producers continually emphasized that "it goes back to individual areas and implementation of what works there" and often felt that producers were "doing the best they can in their circumstances."

5.3.1.2 Regulatory

Producers shared their thoughts regarding the regulatory influence on implementation of conservation practices and the role of regulatory agencies in furthering implementation of conservation practices. Producers indicated that they thought that there would be more regulation on agricultural producers in the future.

Preemptive Compliance

Producers mentioned their choice to implement conservation practices voluntarily was influenced by the incentives available for voluntary implementation resulting in a pro-active approach being more financially advantageous than mandated implementation,

> *When they were just starting to talk about water quality and salmon mitigation and such, everybody else was putting up barriers and slamming doors, and I looked at it as an opportunity…Some of them look at it the way I do, that it's going to enhance their operation and it's much better that they realize that government intervention is getting more and more so. They realize that being proactive versus reactive is better. I think the more progressive ones also have figured out as I, that intervention from the government is not going to go away but the fiscal help to do it may. If you can get help now, it's better than later when they still require the same thing but don't have any money to help you.*

Forcing Change

Producers felt that additional implementation of conservation practices would only come with regulatory force and that if some producers "weren't forced to, they wouldn't do anything." Consequently, producers suggested that regulation with feedback from the ground up would be most successful,

> *It's gonna take regulation to force change. Hopefully the regulation comes from the ground level…try to get the regulations where there more acceptable to the producer. There's such a disconnect from the Ag world to the general public as a whole, that too often regulation happens without knowing how it's going to affect the producer.*

Alternatively, some producers mentioned that they felt that money and time would be better spent on improving education and outreach efforts rather than on regulatory approaches to conservation,

> *There's an entire industry built upon just filing lawsuits on behalf of what they claim is trying to improve the environment. I think those monies and efforts would be better spent promoting conservation, rather than fighting in a law room.*

Effective Regulatory Process

Producers discussed the reality that the regulatory process has not been effective because it has not had a consistent process. Producers stated the importance of clear regulations with requirements put in "black and white." Additionally, producers stated that regulatory action needs to be timely and consistently enforced,

> *No, I haven't seen it [DOE regulation for farmers] yet. I've been to the meetings listening to them talk about it, but I don't know when that's going to come. The livestock thing, we heard about that for 10-20 years before it happened, so everybody just got to the point where they didn't believe it, and they shouldn't have believed it. You don't come out with a threatening warning for 10-20 years and then finally implement the thing and say, well what took you so long to figure this out?*

Producers discussed the shortfalls of past enforcement efforts. Producers said that in order to be effective, the regulatory process has to include penalties that are formidable and consistently issued. Producers often referenced that "there needs to be teeth in it" when discussing the regulatory process. While describing the ineffectiveness of regulatory efforts in the past, one producer told the following story,

> *The government comes out with a regulation, there was a farmer who didn't follow the regulations, but he was threatened and never fined. Unless you have some teeth and start throwing $100,000 fines out there, it is never going to happen. A $5,000 fine for someone like him, that is no big deal, he will just do it every year. It all comes down to money...It's like dealing with a child. They will push until you draw a line in the sand. Gotta draw a line in the sand and stand behind it. If you are going to regulate, you have to have teeth in it. If there's no teeth in it, nobody is going to follow it. I am not one for government control. We are good enough farmers, but I do see that we need to steer some of these old-way farmers into better conservation practices. I'm all for that.*

5.3.2 Why Conservation Practices are Not Implemented

Producers' reasons for not implementing conservation practices included several diverse main themes. Within these main themes were additional sub-themes which provide further insight into producer decisions not to implement conservation practices.

5.3.2.1 Economic

The majority of reasons that producers discussed for not implementing conservation programs were economic in nature. One producer discussed the economic constraints of the agricultural business as,

> *Economics has to be a major factor in any decision you make. It could be the best thing in the world for the environment or it could be the best thing in the world for producing a widget, but if it's not in your economic portfolio, you can't do it.*

Producers often made mention of the fact that it is easier not to implement conservation practices, or that participating in conservation programs requires too much paperwork, is too encumbering, takes too much money or too much time.

Economic Risks of Agricultural Producers

Producers commented on the inherent financial risks of being an agricultural producer. The costs and profits within agricultural production are volatile, since there is no way for producers to "control your input costs" and producers "have no control of your end-use product" pricing. Additionally, "Mother Nature will determine" both the required inputs and end harvest. Producers described agricultural production as being "a very bad business to get into" because without any control "it's an iffy situation." One producer summed up the reality of agricultural production,

> *I was just talking to the grain company to decide what to do, but the only smart thing is to sit and wait, and see what happens in harvest. There is no guarantee whatsoever, and there's no guarantee that we won't lose money. We can and do. And the only guarantee that I know for a fact is that it's going to cost me a fortune every year to do it. So I have to do the best I can every year at income, otherwise I'm out of business.*

In the already risky agricultural sector, producers emphasized the risks of trying new agricultural practices. Producers talked about a "risk factor in this to venture out and spend the kind of capital to go into conservation production." Producers discussed the nature of current farming where producers "operate on a cash basis, so we have to secure an operating line year after year." Confounded by the fact that "the equipment and everything to do so is too expensive," producers said they didn't feel that they could "economically do that." One producer identified the actual implications of these risks,

> *If I could take advantage of it without increasing the risk, I think that's what a lot of them fear, well if I do this and it doesn't work, then I'm not in compliance, then I lose everything…Well let's take a risk and try it, I'm sitting on a legacy here, I don't want to risk it. I could sell it, make a pile of money and do something else, but that's not what it's about. Pass it to the next generation and hope they can put back more than they take out of it and leave it to someone that does it too.*

Additionally, producers noted that the current funding programs and incentives are not enough to counter the expense of the "specialized equipment" necessary to implement some conservation practices. Producers identified getting specialized equipment as the "key factor" and as "one of the biggest hurdles to get over." Consequently, producers discussed the importance of timeliness and easing into conservation practices to reduce the associated risks,

> *We're slowly migrating into a continuous no-till. I don't want to jump into it right off the bat; a lot of people can lose money if you jump into something too quickly.*

Importance of Producing Cheap, Safe Food

Producers discussed the contrary demands from the public for producers to engage in conservation efforts and produce cheap, safe food. Producers often stated "what I don't think the public realizes is if they want a safe food supply" then there are huge expenses involved with meeting the regulatory requirements. One producer reflected on the conundrum of implementing conservation practices and of producing cheap, safe food as,

> *I'm not saying that's wrong, but if you want cheap, safe food, it's not going to happen, I mean, you can't have it both ways.*

There was also comment from producers that they are providing for a "Public that doesn't want to know what farming is in the United States." Producers felt that the public has too many demands including "they want cheap food, and they want it to taste good, and they want all this stuff, they don't want to know what it takes to produce it." Additionally, producers end up paying for the cost of implementing conservation on their operations since in a commodity market they cannot pass those costs onto the consumer,

> *Everything that costs them money costs us more. And in that respect it costs us more to stay in business…Then yeah again the public needs to know that the cost of producing food is more expensive because of the safety…There's a cost to things, and the farmer can't absorb all of the cost, otherwise we won't be in business and we will be importing our food from a country that doesn't have the restrictions and regulations…So there's a cost to the safety, and you can't disconnect them.*

Shifting Conservation Priorities

Producers also commented on the risks associated with changes in conservation priorities, extraneous public demands for conservation, and consumer awareness. Producers were leery about making very expensive changes in their operations to meet one particular conservation priority. For example, when the public decided they wanted improved air quality, "they force those farmers to change from that bluegrass pattern back to conventional farming" and consequently, "they're trading particulates in the air for either sending it down the river or completely taking it out of production." This seemed to producers to be a tradeoff between clean air, clean water, and abundant food supply. Producers discussed the changing conservation priorities as too volatile and unpredictable to base expensive operation changes on and stated that "It's just not that easy to go out and do everything they think should be done." One producer summarized the economic impacts of shifting public demands,

> *So, when they change their mind and they want certain things, there's always an economic impact to that, and that is where the public probably doesn't realize, because everything else in our economy operates this way. If the cost of business goes up, you pass it on to the consumer. The farmer doesn't have that. When our cost of business goes up, we just eat it. And if they dictate that they don't want to smell smoke, and the public wants that, and the public sees that as a priority, they better know that that's costing us a lot of money to change. And that doesn't, we don't pass it on to you guys [the consumer].*

Restrictions on Leased Land

Producers often made a distinction between owned and leased land. Ninety-five percent of the principal farm operators in Whitman County who replied to a recent questionnaire indicated that they leased some land (Boie, 2013). Producers who leased land stated "they haven't got control of everything either, because they aren't the landlord." Producers who leased land often stated "I have other people I am responsible for" and discussed the obligations of having "landlords that I have to produce for" in the form of having "to raise bushels for them" as being contrary to conservation practice implementation on leased land.

Local differences in types of leases (share lease vs. cash lease) were said to have dramatic influence on implementation of direct seed practices in different parts of Whitman County. Producers talked about actual restrictions imposed by landlords in leases specifically excluding conservation practices that landlords indicated as being unacceptable,

> *I know of farmers who have got their lease contract, it says "you will not direct seed, you will plow it every so many years"… You tell a landlord that you want to save the soil for the next generation, and one landlord out of four will say, hey that's a great idea. The rest of them are going to say, I need my income. And almost every farmer I know of has a landlord.*

Producers who operated on leased land talked about the lack of incentives for producers who operate on leased land. One producer discussed the lack of conservation measures as a weighing between short term gains in income versus long term returns from natural resource conservation,

> *Then again it depends on if you are leasing the land and it depends on if you're a landowner that gives a rip about having something to pass on or if you are just in it to get the dollars. If you are just maximizing your dollars you probably aren't going to participate in any of these things because the return may be 5, 10, 15, 20, 100 years down the road. If I am just needing the money next year, if I take $5,000 out to do this, I may take 20 years to get it back, let's let the next guy worry about it.*

Past Failures and Uncertainty

The visibility of past failed local projects or practices has discouraged some producers from considering certain conservation practices. Producers talked about producers that "were given very bad information" when they changed their operations and consequently "just about lost their farm" or "came very close to losing everything." Additionally, the uncertainty of effectiveness of expensive conservation practices has been a disincentive to some producers who see those practices as a waste of money or impractical to maintain,

> *We see stuff the government and the DOE have done here and it doesn't work. They've spent money, and they are out to make something show that it's paying for itself…the only thing he's got going for him, he's fenced miles of creeks. He doesn't have anything showing that he did any good.*

Growing Size of Operations

There was a notion by producers that with the trend towards larger agricultural operations in Whitman County, operations were becoming "more profit driven." This was described as a focus only on economic gains and that for most producers, "the final go for all of them is money." Producers stated that economic gain for large producers was "the name of the game" and that meeting minimum conservation requirements was the norm. Additionally, there was a belief that big producers and agricultural operations have too much land base to manage. Confounding the management of larger agricultural operations was the acknowledgement that these large operations often operate with a large land base of leased land from "absentee landowners and

they could care less." One producer described the conservation implications of larger agricultural operations,

> *I would think most of Whitman County falls in this zone in here…make as most money as you can, farm the ground however you can, and that's what I see of the big farmers here. They are farming ground as fast as they can, they are using a tool to get themselves somewhere… you have to get across it fast and furious and don't worry about some of the consequence…But I'm just trying to think of if there's any justification to sometimes the larger farmers are those that are not looking to make those kind of [conservation] changes…they are so large maybe they don't have the time, maybe they don't have the desire to seek out some of the new technology and some of the possibilities that are out there.*

There was some discussion about the larger operations having "deep enough pocket books" and larger producers "think they're important enough people" that they would fight conservation regulations "tooth and nail" because they "believe that what they're doing is the way to do it." Some producers were sympathetic and indicated that they could "understand some of that, because they [bigger producers] have higher inputs, they've got bigger machinery, they've got higher taxes."

Competing Land Use

The issue of competing land use including use of ground for dry land grain production versus livestock versus CRP was a factor for conservation practice implementation. Confounding factors included the recent increase in wheat prices, inadequate amount of land available to implement livestock conservation practices, and local perceptions regarding taking farmland out of production for enrollment into CRP. One producer summarized,

> *In this area of course, competing with conservation reserve programs, pasture ground is not easily accessible or easy to fall into.... So it's very difficult and with of course the price of wheat, everything that could be plowed up was. Pasture ground is really a rarity, a rare commodity.*

Specific to the CRP program, producers often viewed it as a temporary situation because a "break for that ground has got to be good for it." Producers talked about the conflict between using ground for agricultural production versus conservation benefit and stated "I want to farm the ground, or I wouldn't have it" or "to watch it be grass is sickening." Additionally, there was often indecisiveness in regards to land being used for conservation benefit and producers would often

make mention of scaling back from full implementation of conservation efforts in anticipation of "if we ever decide to take it out."

Producers who participated in the CRP program said it was often difficult because "people resent you" for enrolling farmland into CRP because "it's taking away the opportunity for someone to make money off of this farm besides just me." One producer shared,

> *I personally wish there was a more positive outlook on the CRP, the negativism comes from taking money away from the fertilizer companies and the seed companies and the farmers who would be farming the land. That it hurts the economy of the community. You would be shocked; I am when people have said some of that stuff to me personally. I've been kinda horrified, quite frankly it's none of your business, and I did this for very personal reasons. I probably never would have done it had I not been put into the position I was put into. So I think a positive attitude toward CRP would be helpful.*

5.3.2.2 Civic Responsibility to "Feed the World"

Producers discussed their civic responsibility to produce enough food to "feed the world." The importance of producing cheap, safe food was often juxtaposed to potential yield reductions that could result from implementation of conservation practices or taking farmland out of production. Conservation practices were sometimes determined to be "impractical 100%, because we still have to feed a large part of the world." Agriculture in the United States was often contrasted to agriculture elsewhere whereas "no one in the world feeds themselves for less than we do per capita." One producer discussed the responsibility of producers and the implications of conservation on abundant production of cheap, safe food,

> *We're the cheapest, most abundant, safest food source of anyone the world, we're the envy of everyone in the world. So I think we're doing something right, right now, let's not mess it up with more regulations.*

5.3.2.3 Responsible to the Next Generation

Producers were concerned with the legacy of their farms and their responsibility to "pass it on" to the next generation. Producers were apprehensive about conservation programs that restrict farm operations or may result in the loss of "farmable" acres. At the foundation of these concerns producers often talked about "a general no trust in government." One producer reflected on this general lack of trust and decided, "I should research it more to find out whether it's coffee shop talk or hear-say, and really get both sides of the story." A producer discussed the use of

government funds through enrollment in conservation programs to fund conservation practice implementation,

> *Rather than take the risk of running into a road block somewhere down the road and I don't really want to hamstring the next generation because of a decision I made. "You would like to take this fence out but Uncle signed a contract 20 years ago, we can't."…You don't know what the trickle down consequences could be. Maybe when we're not taking government funds for these conservation practices, in reality we think we are protecting the farm for future generations. You know I personally don't want to sign a contract that's going to hamstring anybody else.*

5.3.2.4 Mandated

Although it was recognized that mandated conservation regulations might be the only way to increase implementation of conservation practices with some producers, there was a general consensus that mandated conservation would be resisted and cause greater barriers between producers and regulatory agencies. Producers described regulators mandating conservation "with a rigid set of rules" as "a death sentence" that would result in producers "throwing up walls and making them [regulators] more the enemy all the time." Producers were of the feeling "if you've got a place and you don't want to do it, you shouldn't have to." Producers also felt that mandated conservation would result in a situation where "people are more reluctant to participant,"

> *The conservation practices, that's kind of a two-edged sword. Most of us are independent enough that we don't want any more government interference in our lives. Something that's mandated is always resisted.*

Producers had concerns about mandated conservation having negative implications for long term land management. A frequent concern was that "anytime government gets in it, it is not good for the ground, it's not good for the land because more gets controlled and less gets managed right." Consequently, producers preferred voluntary implementation of conservation practices over a regulatory approach,

> *I think all of us would balk, with anyone on high telling us what to do. Showing us and showing us how it can be done better, without it being shoved down our throat, might be a little better approach. Offering us a carrot, instead of a stick. Giving us a tax deduction or an incentive, rather than a penalty.*

There was mention that implementation of conservation practices had been forced on some producers as a condition to staying in ranching/farming. There was an impression that non-compliance with conservation regulations would drive some producers out of their business.

Conversely, there was concern that an increase in mandated conservation practices could drive producers out of business because the costs of implementation would be too high resulting in "a massive subdivision of agricultural land" and a concern that agricultural producers would "lose the land bases to urbanization." One producer shared the implications of the current influx of government regulation into all aspects of agricultural production,

> *Anytime you're forced into something, even if it's a good change, human nature has a tendency to resist any force. Also, it's a concern at some point, how much do you want regulation? Are you farming for the government or is it free enterprise? We have to battle government regulations at every turn we make. From the diesel we buy to the equipment we're running, to the chemicals we buy, to where we haul our grain, to what's on the grain when we haul it in there, so it's not going to be any one thing as far as government regulations, but it is going to get to the point where it's the straw that broke the camel's back.*

5.3.2.5 Credibility/Trust

General Lack of Trust in Government

At the root of the conflict with mandated approaches to conservation was the general lack of trust of regulatory agencies. This was often contributed to the belief that regulatory agencies had "started out way in the wrong mode of operations" and consequently "they have a huge hole that they've dug" resulting in a situation where "nobody has any confidence in them." This lack of confidence was identified as a systemic problem that had trickled down from previous generations and went beyond mistrust of regulatory agencies and extended to a lack of trust with government in general,

> *In my mind, it's like they [grandpa] didn't trust them either. What we get is a trickle down and then we confuse what we see in government, we probably unjustly judge just because they are government people. You just worry about what their motive might be even though 9 times out of 10, 99 times out of 100, it's pretty innocent.*

This mistrust is often a consequence of regulatory agencies being cast with a bad reputation based on some producers having a negative past experience.

> *It only takes one or two of those bad experiences and the info is like fire, it spreads pretty quick and we've seen it time and time again. That's where the Department of Ecology, in this case, has gotten their bad reputation…It doesn't take very many cases like that and word gets around and nobody wants to get caught without a chair when the music stops. It's an absolute disincentive...*

Some producers have extended their mistrust of regulatory entities, and government in general, into a suspicion towards non-regulatory voluntary conservation agencies, including local conservation districts. This has resulted in some producers even avoiding assistance from non-regulatory entities offering voluntary, incentive-based opportunities for conservation. As one producer summarized,

> *You know, you go in there and you ask yourself, "Whose side are they on?" It's the thing, that's the big question. You don't know, nobody knows if they are against you or for you...Everybody's always a little leery, you know?*

This suspicion has led some producers to disengage from the local entities that are in place to offer technical and financial assistance for voluntary implementation of conservation practices. This has resulted in a disconnection of some producers form the local outreach efforts for delivery of conservation related information. As one producer explained,

> *You know, they hold meetings and well that's one way for them to get your foot in the door. We just avoided them and didn't go to the meetings at all, didn't do anything… The more they talk to you, the greater chance they got to get you to do something you probably don't want to do anyway.*

<u>Local Experience and Investment</u>

Factors identified by producers as amplifying the level of distrust between producers and agency personnel included not wanting "someone who's never been in your shoes telling you what to do." There was often a perception that agency personnel do not have any real farm experience but that their training was purely academic. Producers emphasized that "it takes a whole lot more to life than book learning" and that they "wouldn't respect that person because he's read it in a book and has never been out doing it." One producer illustrated how local experience influences trust and credibility with the following story,

> *A guy shows up from the government and says, "I'm really trying to help you." Well, what do you really know about it? If you don't have that trust, I don't care if it's an agency or a program; farmers in particular are probably less inclined to participate if the trust level isn't there.*

Additionally, regulatory agency representatives are often regarded as outsiders or "foreigners" and consequently perceived as lacking knowledge about local issues. Producers recommended that conservation messages would be better received if delivered by "farm people, people who understand it, instead of people from the city who don't understand it." Furthermore, producers

commented on the lack of vested interest that agency personnel have in local operation success. Agency personnel were referred to as “people that have no money invested.” One producer explained,

> *They have nothing at risk, they’re not vested. They are gonna have a job whether I go broke or not and let’s put our shoes on different feet.*

Unclear Regulations and “Raising the Bar”

Producers were leery of implementing conservation measures to meet regulatory compliance when they perceived regulations to be unclear. Regulators were often seen as having “no sense, rhyme, or reason” and not willing to “put anything in black or white.” Producers were concerned about regulators continually "raising the bar" and discounting BMPs that are not to their current specifications. Even with current improvements in water and air quality, producers often anticipate that regulators are “going to want to ratchet the regulations up.” As one producer explained, “they kind of step off making changes, because if it's going to ratchet up tighter, let's wait till they ratchet up tighter then go.” Producers saw this as an explanation for “why you don't see some of the transformation happening as fast.” Ambiguity with regard to water quality, in particular, was described by one producer as a “loose goose,”

> *Water quality is a loose goose, we all know the state in the 1930’s said, “all waters belonged to us.” So the water belongs to the State and you can hardly sneeze in the river without getting into a problem and being fined. So whatever you do, it is a loose, loose, situation for water quality. There is absolutely nothing you will ever be able to do that is going to be a win in the government’s eyes concerning water quality.*

5.3.2.6 Program Requirements

Producers often commented on the lack of flexibility in conservation practices that are funded or considered to be effective. Additionally, there was a perception that regulatory agencies often push only a select few conservation practices and that “they’ve got one plan and that’s all.” Additionally, agency personnel were often seen as “being the gate keepers for the financial resources available for conservation” and that programs were “not built for a mutual interest of the producers.” Recommendations included redesigning funding, incentives, and conservation programs so that they look “at the mutual win-win benefit” for both conservation and enhancement of producers’ operations. Additionally, producers were skeptical of some conservation program goals. One producer explained that with some programs it “seems like the

goal is to get everybody into conservation, and maybe the goal should be, did we achieve successful results?"

Rigid Requirements

Producers often see conservation funding as having "strings attached" or opening up their operations to restrictions placed by regulatory agencies. One producer described the current funding philosophy as "here is some money, you do what we want you to do, this is what works for us." Producers pointed to the current funding requirements as an explanation for why some producers were not participating in conservation programs,

> *Most of them aren't interested in taking the money because they don't want to be told how to manage their ground by someone that's not on the ground.*

Producers highlighted that some government programs actually have rigid restrictions and requirements that provide direct disincentives to implementing conservation practices. One example was in regards to the strict seeding deadlines for crop insurance that do not work well with direct seeding dates. One producer explained, "I'm doing an awful lot of using what my landlord did in the 50's and 60's for seeding dates, and those are out beyond the insurance seeding dates." Producers felt that program requirements should be less rigid and that "flexibility is really needed to survive."

No Local Input

Producers indicated that they often felt powerless in directing local conservation programs and practices. The perception by producers was that practices that are funded and generally accepted by regulatory agencies are pushed on producers. A common problem with conservation funded by "federal and state dollars" was that funders "throw a wide loop out there" resulting in "the parameters are set too specific" and they do not work locally. One recommendation was that "there should be ability by the [local] program managers to adjust in or out as they need to."

5.3.2.7 Local Factors

Producers often commented that recommended conservation practices are not adjusted for local conditions or local natural resource concerns. Direct seed was often a topic of discussion and producers had concerns about their ability to implement direct seed due to localized issues with

moisture availability, soil type, disease, high weed pressure, changes in soil pH, and poor equipment for local topography,

> *If we could no-till around here, well that wouldn't be a bad thing. Our ground is different than it is up around Moscow and Tekoa and up in there. Just different texture, and it just doesn't lend itself to no-till.*

Lack of Community Support

Producers also mentioned that local agricultural producers continue to disseminate confounding messages about the success and economic feasibility of implementing conservation practices. One producer shared that "it's beat into us that no-till is going to be too expensive, the yields are going to drop, and we're going to be broke within two years," but when he talks to local producers who have transitioned to direct seed systems he hears "yes, it has worked out economically, but it wasn't something we were expecting." This producer recognized the unexpected profitability of conservation implementation as a confounding factor with often times the outcome being that producers "won't tell other people it's economical." Consequently, there was a call for increased community support and a shift in the local conversation around economic feasibility of conservation practices. Producers said it was important to change the misconceptions that "direct seed is great for the environment, but it's not good for the pocketbook."

Social Factors

Producers mentioned that social factors including local heritage and farming ancestry influences acceptability of farm practices. Additional social factors identified include discrepancy between a producer's timeframe and the timeframe of those working in the agricultural services or information sector. One producer illustrated the difference in timeframes,

> *You know, on a farm, your experiments better be 10-20 years long or they don't tell you anything…Okay, but this is really a farmers mind. We work on something a long time before you know if you made any money. It takes a long time to figure out your cropping…I understand that because it takes so damn long to implement things…The person who lives in town gets paid every two weeks and your mindset/timing is on that timing and a farmer's income, yes comes from FSA and selling your crop, but it really comes once a year. So your timeframe is once every two weeks or once a year. That is how a farmer is thinking, very slow thinking, I know it's conservative.*

Opposing Conservation Benefits

Trade-offs in conservation benefits often make it difficult for producers to make a definitive choice regarding which practices have the greatest benefit for local natural resource concerns. This was discussed as "conservation practices that I probably wouldn't mind doing, if I had a solution for the problem that it causes." Producers discussed the reduction in agricultural burning leading to improved air quality, but increased soil erosion. Other producers discussed the tradeoff of keeping livestock out of riparian areas for improved water quality, but the drawback as increased weed pressure.

Confounding this uncertainty are recommendations from local agricultural experts that are not always consistent with regards to effectiveness of conservation practices or prescription of best management practices. Producers discussed the "variety of places they can go to for information" and the reality that within Whitman County, "not all of them are always in agreement." Producers often exemplified these discrepancies in regards to two specific practices: 1) livestock grazing in riparian areas and 2) conversion to direct seed systems.

Industry Specific Insights on Conservation

Producers commented on the practicality of implementing conservation practices and the likelihood of participation in conservation programs dependent on the type of agricultural operation and current regulatory pressure. General consensus from farmers was that they have not "been under the same pressure as the cattlemen have, because the current emphasis has been on fecal coliform or E. Coli." Producers forecasted that "the next wave [of regulatory focus] is going to be dirt, temperature."

a. Farmer Specific Insights on Conservation

When discussing dryland farming, the primary distinction centered around the difference in philosophies regarding net income per acre versus yield. One producer shared his experience with following the shift in philosophies throughout the past few decades,

> *I'll go back to my landlord and my dad. At that age, it was your net income per acre, and it didn't make a difference what your yield was. But during the 80s and 90s, those words [net income] disappeared. Now you gotta have the maximum yield per acre. The extension service will still tell you, you aren't looking for the maximum yield per acre, but it's maximum net income per acre.*

Producers discussed that the current philosophy is centered on high yield but there was often mention along the lines of "the few people who don't pay attention to the yield are making the best income." Several producers discussed where the current research is headed and the possible negative implications for direct seed systems,

> *I haven't liked the research I've seen in the last 10 years…I feel that the majority of the information from the fertilizer companies is going toward high yield, and that's not where they should be. They shouldn't be downplaying direct seed in a time where we've got regulatory starting to push through, farmers worrying about how many generations can use this land when it's going down the creeks. I feel that our fertilizer companies really ought to be getting on board by saying direct seed is something that's important.*

b. Livestock Producer Specific Insights on Conservation

The recent regulatory pressure on livestock producers was discussed often and livestock producers made a point of distinction regarding their feelings towards participation in conservation programs,

> *With the livestock, we don't get into it like the farmers…That's an easy one, most of them, the farmers, live on the government programs. They government farm, they don't farm. The cattlemen don't want the government in their business. It's been that way, and if you get into the true cattlemen, most of them will stay away from government programs. You can go do it [conservation practices] yourself, you can do them cheaper, more economical and easier, and it does the same thing…He [the livestock producer] doesn't want nothing to do with the government. He doesn't want the government programs, but all these young kids got to farm the government to survive because they've got new tractors, new combines, fancy equipment… Farmers will implement more than the livestock because they are like I said, on the welfare program...Yep, it will always be that way. You are never going to get the cattlemen to change.*

One explanation for why conservation practices are not implemented was identified exclusively by livestock producers. Livestock producers often discussed their concern with natural resource problems being largely contributed to their operations. Livestock producers expressed their belief that wildlife and domestic urban animals are major contributors to water quality degradation and livestock producers feel that it is unfair to place the majority of the burden for water quality improvements on them. One producer elaborated on the current situation,

> *If 99% of the fecal coliform comes from wildlife and 1% from the cows, they said "oh, well that's natural and therefore we don't have to do anything about it." See that to the producers seems quite unfair because they still want to hold you accountable for that 1%, but they won't take the responsibility to do the analysis to*

> *find out what the true problem is. They want to hold people responsible for just a portion of the info and then an assumption. That's where things start going south.*

This perception is confounded by the fact that livestock producers do not think that the natural resource problems have not been proven with adequate data. The general belief among livestock producers is that "there are so few cases of where they have done the analysis to find out where the true problem was." Livestock producers commented on the unfair treatment of holding producers responsible for natural resources conditions that they did not contribute to,

> *It makes everybody scratch their head, why don't they want to do this and figure out where the actual problem is because it could be cats, skunk, deer, geese, it could be those cows. If it's the cows, I want to know, but I don't want to be held responsible and have to pay for wildlife.*

Livestock producers feel that often the public and regulatory agencies "quickly jump to the conclusion it's the agricultural producers." Producers commented on the perceived tendency of regulatory agencies to ignore data and the common practice of "manipulating the info so they can get the outcome they seek." Additionally, the livestock producers referenced data that they find to be contrary to other data being used by regulatory entities,

> *I don't think they [government] know how to do it either because if you take a look at water quality, and we are very interested in doing genetic analysis of our E. Coli issues in our river because we are convinced with the other data we've seen remotely, that the majority is not operation or agricultural operation derived. It is 100% or nearly 100% wildlife or human driven from the data that we've seen, and again we are pretty scientific. As we get to a point where these tools are a little more available to us at a more reasonable rate, we can take a look at that and reanalyze or take a look at our philosophy behind that. But for right now, what we see is water quality is a much bigger issue and that the agriculture aspects do not have near the impact that the public perception and government perception seems to indicate it does.*

Also of concern was how regulatory agencies intersect with public perception of agriculture to influence policy and legislation. Producers described "a population base that is out of touch with what happens on the family farm or farm at all." Consequently, livestock producers expect that the general public "is going to continue to demand" increased regulation for conservation. One producer expanded on how public perception influences policy,

> *I think the public perception is wrong; I think it automatically assumes that if you are an agricultural enterprise that you are detrimental to the environment, and I do not think that is an accurate assumption at all. I think that has infiltrated a lot into our governmental support structure and of course laws and regulations and*

> *procedures… [The public] will finance, come in, put a community spin and sell it, then go straight to the top, as far as our legislative officials, to implement their bought and sold policy, and that's not uncommon practice in our government these days.*

5.3.2.8 Inadequate Understanding

A lack of understanding regarding local natural resources conservation issues and the conservation practices adequate to address those issues was noted as being a barrier to further implementation of conservation practices. Producers noted that it is often those producers who are "uneducated" regarding local conservation issues that "are the ones often targeted publically for Ecology type of issues and lack of conservation practices." A common concern among producers was a "fear that I am doing something wrong and I need to comply and I don't know what that would be or the best way."

Producers felt that their contribution to local natural resource concerns were small and insignificant. Additionally, producers felt that they lacked the power or resources to change the conditions,

> *But I could spend a huge amount of money and time and effort and cost myself yield to try and make my part not having erosion, which is always just a little bit…I can't control what my neighbors do, so I don't have the power to stop all of it anyway.*

Others suggested that it is difficult for producers to think beyond the borders of their operation and consequently difficult to implement conservation measures that improve conditions outside of the producers' operation. This notion extended to the difficulty for producers to approach other producers to make conservation recommendations. One producer explained that,

> *The farmer has his lines up on his farm. Nothing beyond that farm matters. As soon as that water leaves my farm, it's not mine. I don't know whose it is. Leave me the hell alone. So, I don't know. I haven't even thought about that fact, but it's true. Once you are past your fence line, that's it. You don't interfere on somebody else's property.*

Ineffective communication from local information sources was identified by producers as playing a role in the lack of implementation of conservation practices. Producers discussed shifting roles of local information sources whereby "the fertilizer companies in the 70s and 80s were a help on conservation information, but they are no longer any help on conservation information."

Confounding this shift in roles, producers mentioned that funding has "been cut so far, that the information that I'm getting from the extension service is almost nil." Producers mentioned neighbors, NRCS, and local conservation districts as being the main sources for conservation related information, but even those sources were not as widely accessible as in the past,

> *NRCS is no longer really allowed to go out in the field...But the redirection of NRCS to have them stay in the office because they were hoping the conservation districts would be the person out on the dirt, but there's no money for the conservation districts, so it's awfully hard to make such a radical change.*

Producers expressed frustration that education resources for adult continuing education were no longer available and reminisced about the past when "extension agents took a strong role in educating farmers." Producers felt as if producer education "has come to a dead stop."

Additionally, producers noted that community resources and informal information sources are also disappearing in many remote areas. One producer explained,

> *The education end is so important. I want to learn all my life, but the grange I used to go to is gone, the lodge I joined is gone. Our community sources are disappearing.*

Producers noted that the community dynamics have changed in many remote areas where there once were thriving agricultural communities. This has limited the role of informal information sources as one producer explained,

> *But the problem down here in this country is there's no one left to be personal…there's only 2 farmers down there. The others are absentees…Used to be, we'd go down to the store and there'd probably be 4 or 5 farmers in there and you'd talk about plowing or how wet it is, or the wheat isn't looking good. Now you can't do that and the information has to come from a different way...We're losing out on our contacts because there just isn't any, anymore. That's the plight of living out in a remote area.*

5.3.2.9 Unwilling to Change

Producers acknowledged that there are some producers that will always be unwilling to change their practices because "this is always the way it's been done, therefore that's the way." The possibility of some producers continuing to do things the way they have always been done could impact the further implementation of conservation practices,

> *I think that the ones that are left, some of them are doing practices over others because their grandfathers farmed it, and they're gonna farm it. And that's kind of*

> *the farmer's mentality sometimes. They've been on this ground for 70 years, and I'm gonna farm it the way I want to.*

This mentality was often referred to by producers as “old generation thinking,” "plow boys,” or “Neanderthal mentality,”

> *Down the road has that Neanderthal mentality, he learned it from his dad. He stays like his dad, that is not going to change…I don’t know how you change that, it wouldn’t be with information. Maybe raising better wheat, but he raises pretty good wheat. There is a lot of erosion, but he is raising a good crop every year.*

Producers discussed the “need to change that perception that you can’t do no-till here, or conservation practices here.” Producers were uncertain as to “how you convince them otherwise as long as they are making money.” Producers thought that “regulatory rather than voluntary” was the only way to change those individuals, but they were certain that conservation regulations would be “fought tooth and nail.” One producer described this mentality as “more of an ego” than an economic decision and predicted that some producers would continue in their current practices until “forced to make a change" because “they don't feel that they're contributing to the problem.”

5.4. Summary and Conclusions

The major factors influencing the implementation of conservation practices within Whitman County, Washington were investigated by providing agricultural producers an opportunity to directly share their attitudes towards conservation practices and explanations for why they do or do not implement conservation practices. Through their interviews, producers candidly shared their feelings and perspectives. The themes and sub-themes that emerged from producer interviews to explain both implementation and non-implementation of conservation practices were both rich in content and broad in scope (see Figure 5.2 and Figure 5.3). Recommendations for future research include creation of scales for a quantitative measurement of each domain.

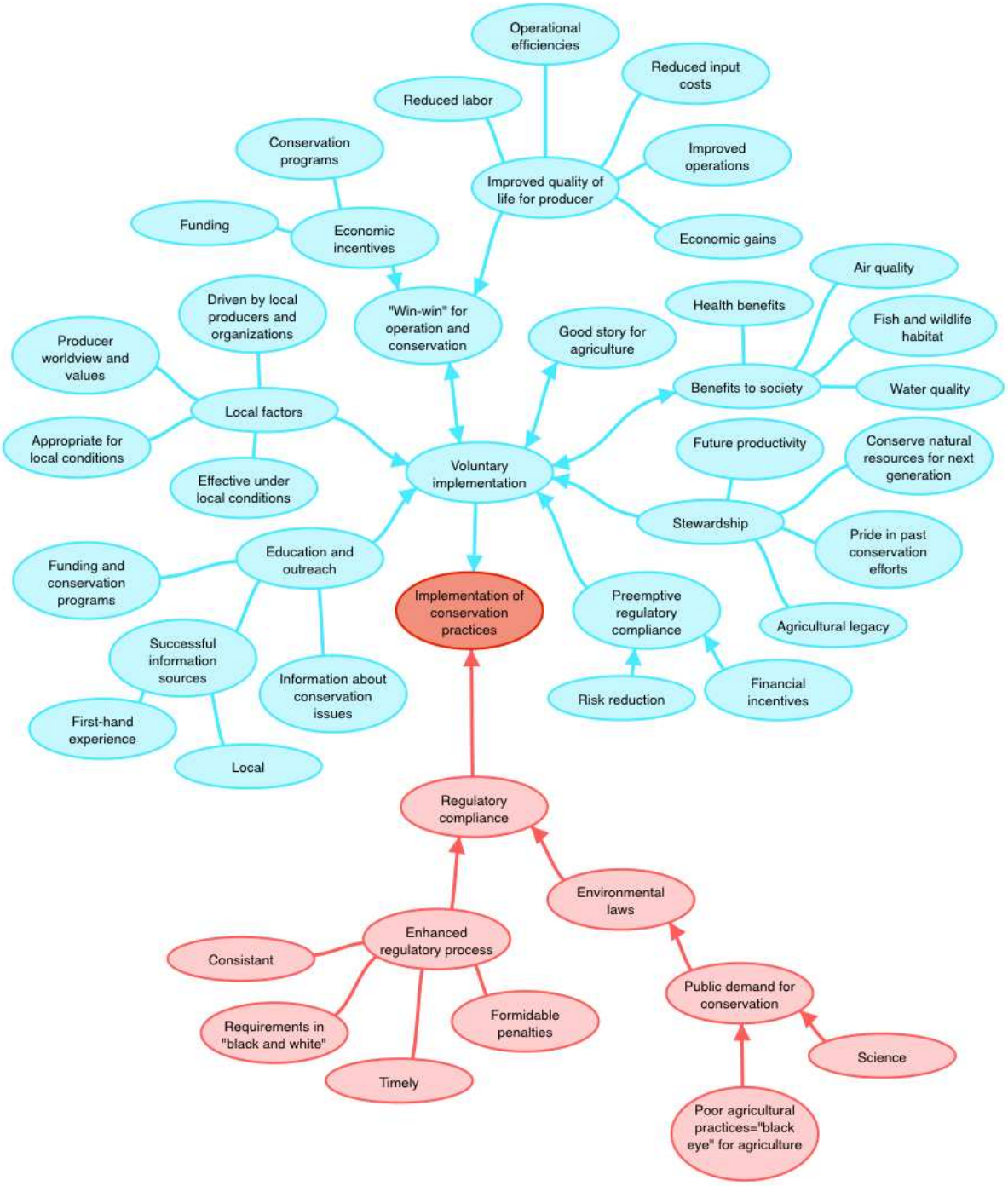

Figure 5.2. Summary map of themes and sub-themes identified to influence the implementation of conservation practices in Whitman County, WA.

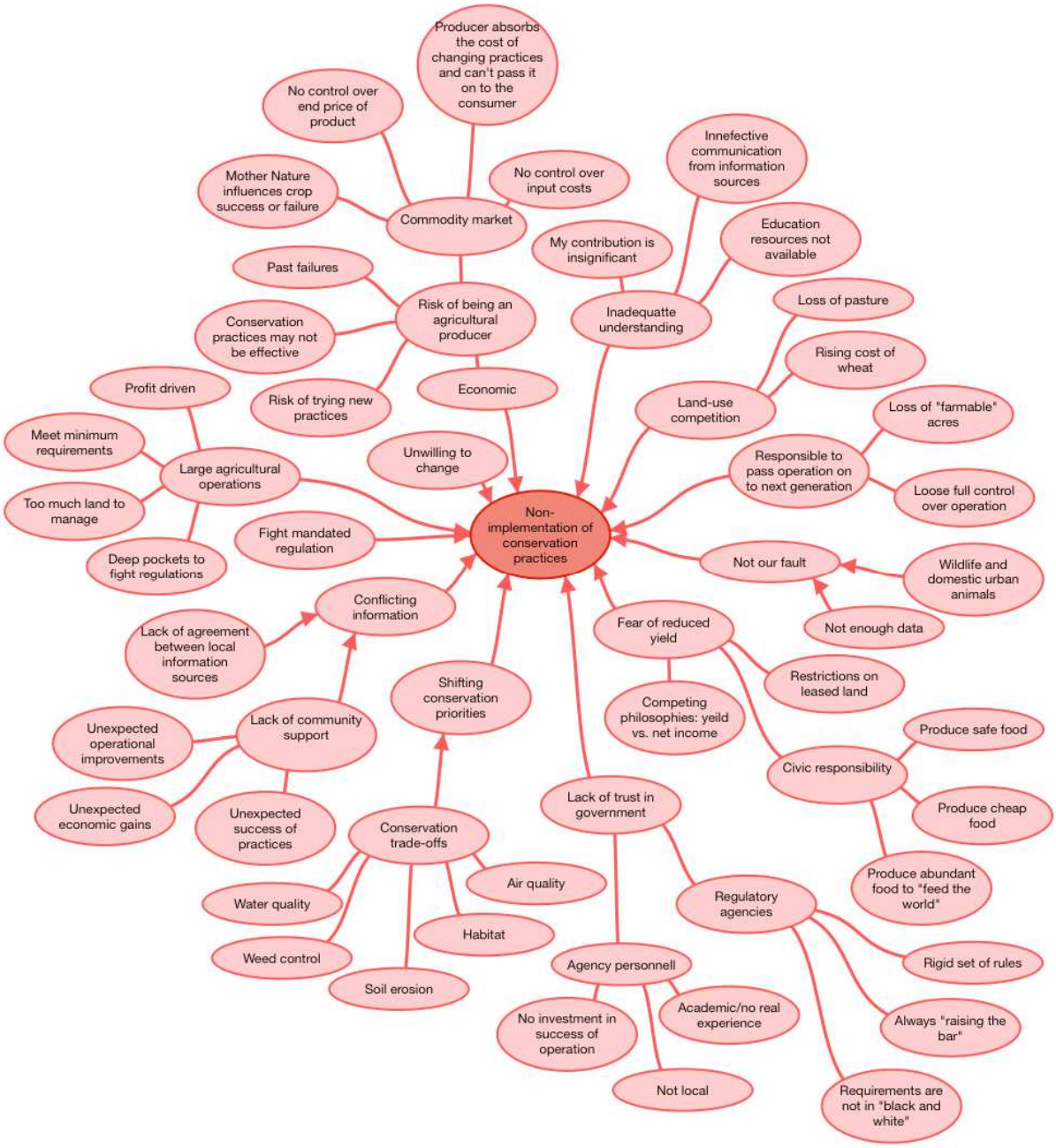

Figure 5.3. Summary map of themes and sub-themes identified to influence the non-implementation of conservation practices in Whitman County, WA.

5.4.1 Alignment with Previous Research

The aim of our study was to gain a greater understanding of the factors related to implementation or non-implementation of conservation practices rather than to quantify their relative influence. That being said, our findings are in line with a recent meta-analysis of studies that assessed factors that influence the adoption of agricultural BMPs within the United States (Baumgart-Getz et al., 2012). The meta analysis by Baumgart-Getz et al. (2012) determined that access to quality information, financial capacity, and being connected to local networks of formal or informal information sources were the variables having the largest impact on adoption of conservation practices.

Very few studies have looked specifically at producer reasons for non-adoption of BMPs. A recent study examining the reasons for non-adoption of BMPs, by cattle producers specifically, identified the following reasons: unfamiliarity with BMPs, perceived non-applicability to the farm, high cost, still considering adoption, and preference not to adopt (Gillespie, Kim, & Paudel, 2007). Non-adopters of BMPs due to unfamiliarity with BMPs were found to be those with less contact with formal natural resources and agricultural institutions such as Natural Resources Conservation Service (NRCS) and/or extension services (Gillespie et al., 2007).

In line with our livestock specific findings, Gillespie et al. (2007) found that few cattle producers had adopted BMPs with incentive or cost-share payments. Gillespie et al. (20007) also reported that a substantial number of producers choose not to implement conservation practices simply because they preferred not to, especially with regard to BMPs requiring commitment to substantial management and resources. Gillespie et al. (2007) proposed that these types of producers are unlikely to be convinced to implement conservation practices unless they are required to do so, this was also suggested by the producers interviewed in our study (see Figure 5.3).

Themes related to voluntary implementation of conservation practices were far more diverse than those related to implementation of conservation practices to meet regulatory compliance (see Figure 5.2). Many of the sub-themes identified for voluntary implementation of conservation practices have been discussed in recent research (Ag Forestry, 2012; Alberini & Segerson, 2002; Arimura, Hibiki, & Katayama, 2008; Bosch, Cook,

& Fuglie, 1995; Frondel, Lehmann, & Wätzold, 2012; Genskow & Wood, 2011; Krarup, 2001; Lyon & Maxwell, 1999; Short & Duane, 2011; Wu & Babcock, 1999). Important factors identified to influence implementation of conservation practices include personal satisfaction derived from a sense of stewardship, public demand for conservation efforts, an effective outreach effort to highlight "win-win" conservation practices, and presence of adequate incentives including financial subsidies and cost-share programs (Alberini & Segerson, 2002; Frondel et al., 2012; Krarup, 2001; Lyon & Maxwell, 1999; Short & Duane, 2011).

A voluntary approach to conservation implementation allows the flexibility for producers to choose the specific practices to use in meeting conservation targets, and provides an incentive for producers to choose practices that achieve conservation targets most economically (Alberini & Segerson, 2002; Lyon & Maxwell, 1999). Additionally, producers are free to choose conservation practices that best fit their specific operations (Alberini & Segerson, 2002). Several key conditions necessary for having a successful voluntary conservation approach have been identified by both producers in this research as well as previous research. Key components include: 1) that there be adequate incentives for participation, and 2) there be in existence a strong regulatory threat (Alberini & Segerson, 2002; Krarup, 2001; Lyon & Maxwell, 1999; Wu & Babcock, 1999). While the producers in this study unanimously stressed that a voluntary process would be more effective than a regulatory process for them, they also recognized the importance of the regulatory component for compelling those producers who would not engage under the voluntary system. This finding strengthens past evidence that suggests that both voluntary processes and regulatory processes are necessary and must be employed simultaneously in order to achieve greater implementation of conservation practices (Ag Forestry, 2012; Arimura et al., 2008; Lyon & Maxwell, 1999; MacKendrick & Davidson, 2007; Short & Duane, 2011; Wu & Babcock, 1999).

The producers' suggestions for an effective regulatory system echoed what has been found in other research and emphasized that the regulatory approach must be strong and credible (Ag Forestry, 2012; Alberini & Segerson, 2002; Short & Duane, 2011). As suggested by producers in this study, credibility will only be achieved by a regulatory approach that clearly states conservation compliance requirements based on adequate data and

monitoring. Additionally, producers emphasized that the regulatory process must be executed through a process that is consistent and timely, and that regulatory agencies must be willing to impose penalties that are formidable in the event of non-compliance.

Another recent review and synthesis of the literature related to variables that explain adoption of conservation practices found that there are few, if any, universal variables that regularly explain the adoption of conservation practices (Knowler & Bradshaw, 2007). Knowler and Bradshaw (2007) concluded that efforts to increase implementation of conservation practices should be tailored to reflect the particular conditions of individual locations. Recent recommendations for future research emphasized the importance of conducting research that aims to provide meaningful findings for local management rather than for universal understanding (Knowler & Bradshaw, 2007). With that spirit in mind, our research was designed to capture perspectives straight from the producers themselves with consideration of both the social dimensions and the cultural landscape of the Palouse Region of Whitman County, Washington.

5.4.2 Community Context and Implications for Future Conservation on the Palouse

Many of the discussions with producers touched on the history of farming on the Palouse and how agricultural operations have changed over time. Agricultural practices, and consequently farm operation sizes, have changed drastically since farming began on the Palouse in the 1870s. Historically, Whitman County consisted of smaller acreage diversified family farms consisting of grain and livestock production. Through the 1930's pasture was still abundant on the Palouse due to the widespread use of horses in farming and the inability to use steep slopes for grain production. Up to 1940, average farm size was approximately 400 acres; after 1940, average farm size increased to approximately 800 ac in 1959; by 2002, average farm size had increased to approximately 1200 acres, and farm size is predicted to be reported as having increased yet again for the 2012 Census of Agriculture (Land Use History of North America, 1992; USDA NASS, 2007).

Producers often mentioned their perception that producers with large operations had too much land to manage or that they were more profit driven and consequently would only implement the minimum conservation requirements. This is of concern with the upward

trend in farm size forecasted to continue and the likelihood that mid- size farm operations could commonly reach 4500 acres or more within the next decade.

5.4.2.1 Contemporary Concerns for Agricultural Operations

Recent changes within the county have included the transfer of farm acres to CRP and small acreage lots. In 2011, Whitman County landowners had 193,000 acres enrolled in CRP contracts (Spokesman-Review, 2011). This transfer was often spurred by retirement of farm producers or the volatile price of wheat pushing farmers to look at options that would allow for a steady and reliable income from the land.

In recent years, there has been intensified competition of land use. The rising price of wheat and consequent increase in demand for land to be used for dryland grain production has increased competition for land available for pasture and enrollment in conservation programs. Average all wheat price for Washington state in 2012 was $8.30/bushel, a $2.06/bushel increase over the average Washington state all wheat price in 2010 (USDA National Agriciultural Statistics Service, 2013). With changes in land use, there was concern amongst producers about shifting land use and conservation priorities, and the perceived trade-offs required by implementing one conservation practice over another. Producers often talked about trade-offs between air-quality, erosion, weed control, and water quality.

5.4.2.2 Forecasted Regulatory Landscape

In 1972 congress passed the Clean Water Act which provides for the establishment of water quality standards and the control of water pollution throughout the United States. In the state of Washington, the state Department of Ecology (DOE or Ecology) has the authority and responsibility to implement the Clean Water Act. Nonpoint source water pollution has been identified as the number one cause of water quality impairments in state of Washington (Ag Forestry, 2012). Section 319 of the Clean Water Act requires Ecology to identify nonpoint sources of water pollution as well as the necessary corrective measures. Water quality concerns within Whitman County have been ongoing, with many of the streams in the County currently on the State's 303(d) list as "waters of concern" for water quality impairment. Currently there are TMDLs in place for several of the major waterways in Whitman County including the main stem Palouse River, South Fork Palouse River, and the North Fork Palouse River (Department of Ecology, 2013). Producers forecasted an

increase in the presence of conservation related regulation and enforcement and expressed concern for how that would transpire and the consequences to agricultural operations.

5.4.2.3 Contemporary Concerns for Livestock Producers

The loss of pasture land, due in part to competition for land use in dryland grain production and CRP, has often resulted in the limited amount of land available for livestock production being within floodplain and riparian areas. The close proximity of livestock to waterways has been identified by regulatory agencies as being a concern for water quality. More recently, the livestock producers within Whitman County have been under increased scrutiny from regulatory agencies to address pollutants from livestock operations.

Livestock producers do not believe that the majority of water quality issues can be attributed to agricultural operations. Additionally livestock producers often expressed their belief that wildlife and domestic urban animals are major contributors to water quality degradation and consequently felt that it is unfair to place the majority of the burden for water quality improvements on them. This perception is confounded by the fact that livestock producers often do not think that the natural resource problems have been proven with adequate data. The lack agreement between regulators and livestock producers in regards to the need for increased implementation of conservation practices continues to be an issue of great concern.

5.4.2.4 Contemporary Concerns for Farmers

Today, Whitman County, Washington, consistently produces more wheat than any other county in the nation (Wheat Life, 2013). Yields over 100 bushels per acre are common in many parts of the county. The County has some of the most productive farmland in the nation, shipping wheat, barley, lentils, and peas worldwide (Palouse Conservation District, 2007). The Palouse region produces almost 13% of the nation's wheat crop which is a significant source of wheat for both domestic consumption and export (90% of the specialty soft wheat grown in the area is exported) (Kok et al., 2009).

The high erosion rates on the Palouse have been an ongoing water quality concern for regulatory agencies. A majority of waterways within the county have become a part of the

agricultural landscape which has resulted in many waterways becoming highly channelized with limited riparian areas. Many of the riparian areas that are currently in place are narrow and have limited vegetation. The Palouse region has experienced some of the highest erosion rates in the United States since farming began in the 1870s. Annual estimated losses have amounted to 10 to 30 tons per acre per year with conventional farming practices (USDA, 1978). The steep topography and erodible loess soils, has intensified the soil erosion issues in Whitman County. Additionally, the high winter precipitation and frequent snow melt on frozen ground has also intensified soil erosion. Approximately a third of the eroded soil is washed into the region's surface water (Kok et al., 2009).

While adoption of direct seeding in Whitman County has increased six-fold from 1980 to 2010 from 5% to 37%, Whitman County still has a relatively low use of conservation tillage practices compared to other regions in the U.S (Hall, Young, & Walker, 1999; Pickart et al., 2012; Young, Wulfhorst, & Diebel, 2012). Producers recognized that current regulatory efforts have primarily been focused on water quality issues as related to livestock, but there is general consensus among producers that farmers will be the next focus for conservation regulation.

5.4.3 The Future for Conservation Implementation in Whitman County

The Palouse has long been noted for incredible productivity and strong agricultural roots. Despite this incredible productivity, the reduction in water quality and loss of rich topsoil has been substantial and the resultant natural resource degradation has been documented. The environmental and economic repercussions of natural resources degradation within the Palouse region has merited close study in an effort to increase implementation of conservation practices.

A recent study from the Solutions to Environmental and Economic Problems (STEEP) Project (Pickart et al., 2012) shows evidence that Whitman County farmers reported a marked decline in stewardship values and reported to be less concerned about consequences of soil erosion in 2010 than in 1980. Researchers on the STEEP Project suggested that this change in conservation values and attitudes could be due to producers' perception of their

conservation progress in the past 30 years and beliefs that they have already adopted the more affordable conservation practices.

Our study, in line with previous research efforts, reinforces the need to employ voluntary processes and regulatory processes simultaneously in order to achieve greater implementation of conservation practices. The relative success of both the voluntary and regulatory approaches depends on the combined effect associated with the existence and effective operation of the other (Short & Duane, 2011). This approach will have the greatest opportunity of success only if incentives are adequate under the voluntary program and the regulatory process is consistent, timely, and willing to impose penalties that are formidable.

This approach recognizes that while initial conservation goals may be more readily achieved through regulation, a regulatory approach alone will not necessarily lead to proper implementation of conservation practices, nor is it likely to lead to the durable changes in conservation behavior than could be achieved through a voluntary approach (Ag Forestry, 2012; Bosch et al., 1995). Additionally, an effective conservation program will be accompanied by appropriate education and outreach efforts to insure that producers are adequately informed about the impacts of conservation practices both on their operations and in achieving conservation goals (Bosch et al., 1995).

Our findings complement the STEEP findings and suggest that if there is the desire to increase implementation of conservation practices beyond current levels, there is a need to show adequate data that additional conservation measures are needed and can be implemented in a way that is a “win-win” for both conservation and enhancement of producers’ operations. Additionally, there is a need for further dissemination of information related to the economic profitability of implementing conservation practices and participating in conservation programs. Conservation information should highlight that additional efforts to increase local conservation of precious natural resources will help to sustain the rich history, culture and productivity of the Palouse region.

Successful delivery of educational programs is dependent on the particular style of interaction used by agricultural and conservation professionals as well as perceived characteristics of information sources (Boie, 2013; Genskow & Wood, 2011; Kahan, 2010;

Short & Duane, 2011). As suggested in our research and other related research, professionals will have a greater likelihood of success if they are known to be local, have real on the ground experience and show a vested interest in the success of the operation (Genskow & Wood, 2011). Additionally, in order to facilitate effective outreach efforts, producers must be engaged in peer to peer outreach and strong partnerships between individual information sources must be fostered within the region (Boie, 2013; Genskow & Wood, 2011; MacKendrick & Davidson, 2007; Short & Duane, 2011).

Acknowledgements

As a final note, we hope that this study will find practical application for both producers and conservation professionals in Whitman County. We would like to recognize and express gratitude to the agricultural producers of the Palouse who strive to sustain their operations while conserving natural resources for future generations and the conservation professionals who work to aid agricultural producers while promoting the conservation of natural resources on the working lands of the Palouse.

Great appreciation and gratitude go to the following individuals and organizations for their contributions: Britta Carr and Taryn Longberry for transcription; Palouse-Rock Lake Conservation District, Palouse Conservation District, Whitman Conservation District, and Pine Creek Conservation District for support and design feedback.

References

Ag Forestry. (2012). Agriculture and Water Quality Protection: the Perspective of Local Stakeholders.

Alberini, A., & Segerson, K. (2002). Assessing voluntary programs to improve environmental quality. Environmental and Resource Economics, 22(1-2), 157–184.

Arimura, T. H., Hibiki, A., & Katayama, H. (2008). Is a voluntary approach an effective environmental policy instrument? A case for environmental management systems. Journal of Environmental Economics and Management, 55(3), 281–295.

Baumgart-Getz, A., Prokopy, L. S., & Floress, K. (2012). Why farmers adopt best management practice in the United States: a meta-analysis of the adoption literature. Journal of environmental management, 96(1), 17–25.

Boie, J. A. (2013). The influence of cultural worldview and networks of relationships on implementation of conservation practices in Whitman County, Washington. University of Idaho.

Bosch, D. J., Cook, Z. L., & Fuglie, K. O. (1995). Voluntary versus mandatory agricultural policies to protect water quality: Adoption of nitrogen testing in Nebraska. Review of Agricultural Economics, 17(1), 13–24.

Department of Ecology. (2013). Water Quality Improvement Projects: Palouse Watershed Area. WATER QUALITY IMPROVEMENT PROJECTS (TMDLs). Retrieved from http://www.ecy.wa.gov/programs/wq/tmdl/palouse/index.html

Dillman, D. A. (2000). Mail and internet surveys: The tailored design method. New York: J. Willey.

Frondel, M., Lehmann, P., & Wätzold, F. (2012). The impact of information on landowners' participation in voluntary conservation programs – Theoretical considerations and empirical evidence from an agri-environment program in Saxony, Germany. Land Use Policy, 29(2), 388–394.

Genskow, K. D., & Wood, D. M. (2011). Improving voluntary environmental management programs: Facilitating learning and adaptation. Environmental Management.

Gillespie, J., Kim, S.-A., & Paudel, K. (2007). Why don't producers adopt best management practices? An analysis of the beef cattle industry. Agricultural Economics, 36(1), 89–102.

Hall, M., Young, D. L., & Walker, D. J. (1999). Agriculture in the Palouse: A portrait of diversity.

Kahan, D. M. (2010). Fixing the communications failure. Nature, 463(7279), 296–7.

Knowler, D., & Bradshaw, B. (2007). Farmers' adoption of conservation agriculture: A review and synthesis of recent research. Food Policy, 32(1), 25–48.

Kok, H., Papendick, R. I., & Saxton, K. E. (2009). STEEP: Impact of long-term conservation farming research and education in Pacific Northwest wheatlands. Journal of Soil and Water Conservation, 64(4), 253–264.

Krarup, S. (2001). Can voluntary approaches ever be efficient? Journal of Cleaner Production, 9(2), 135–144.

Lamba, P. (2006). Factors affecting the adoption of environmental best management practices in rural Ontario. University of Guelph.

Land Use History of North America. (1992). Additional Figures. In Biodiversity and land-use history of the Palouse Bioregion: Pre-European to present.

Leech, N. L., & Onwuegbuzie, A. J. (2011). Beyond constant comparison qualitative data analysis: Using NVivo. School Psychology Quarterly, 26(1), 70–84.

Lemke, A. M., Lindenbaum, T. T., Perry, W. L., Herbert, M. E., Tear, T. H., & Herkert, J. R. (2010). Effects of outreach on the awareness and adoption of conservation practices by farmers in two agricultural watersheds of the Mackinaw River, Illinois. Journal of Soil and Water Conservation, 65(5), 304–315.

Lyon, T. P., & Maxwell, J. W. (1999). “Voluntary” approaches to environmental regulation: A survey. Bloomington IN.

MacKendrick, N. A., & Davidson, D. J. (2007). State capital relations in voluntary environmental improvement. Current Sociology, 55(5), 674–695.

Miles, B. M., & Huberman, A. M. (1994). Qualitative data analysis (2nd ed.). Thousand Oaks, CA: Sage Publications.

Napier, T. L. (1991). Factors affecting acceptance and continued use of soil conservation practices in developing societies: A diffusion perspective. Agriculture, Ecosystems & Environment, 36(3-4), 127–140.

Napier, T. L., & Thraen, C. S. (1984). Factors affecting adoption of conventional and conservation tillage practices in Ohio. Journal of Soil and Water Conservation, 39(3), 205–209.

Napier, T. L., Tucker, M., & McCarter, S. (2000). Adoption of conservation production systems in three Midwest watersheds. Journal of Soil and Water Conservation, 55(2), 123–134.

Nelson, L. (1937). Soil conservation and human welfare. Utah Farmer, 57(3), 11–21.

Nowak, P., & Korsching, P. F. (1998). The human dimension of soil and water conservation: A historical and methodological perspective. In F. J. Pierce & W. W. Frye (Eds.), Advances in soil and water conservation (pp. 159–184). Chelsea, MI: Sleeping Bear Press.

Onwuegbuzie, J. A., & Teddlie, C. (2003). A framework for analyzing data in mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), Handbook of mixed methods in social and behavioral research. Thousand Oaks, CA: Sage Publications.

Overton, T. A. (1997). Factors that influence farmers’ environmental practices. North Carolina State University at Raleigh.

Pennings, J. M. E., Irwin, S. H., & Good, D. L. (2002). Surveying farmers: A case study. Review of Agricultural Economics, 24(1), 266–277.

Pickart, G., Kane, S., Young, D., Diebel, P., Wulfhorst, J., & Foltz, B. (2012). Three Decades of Change in Soil Conservation in the Washington-Idaho Palouse.

Prokopy, L. S., Floress, K., Klotthor-Weinkauf, D., & Baumgart-Getz, A. (2008). Determinants of agricultural best management practice adoption: Evidence from the literature. Journal of Soil and Water Conservation, 63(5), 300–311.

Short, A. G., & Duane, T. P. (2011). Regulatory spillover: How regulatory programs influence voluntary efforts to adopt best management practices to manage non-point source pollution. Environs: Environmental Law and Policy Journal, 35(1), 37.

Spokesman-Review, T. (2011, October 2). Research aims to fine-tune vast CRP lands to boost pheasants. The Spokesman-Review. Spokane, WA.

USDA. (1978). Palouse co-operative river basin study. Washington, DC: US Department of Agriculture.

USDA NASS. (2007). Table 1. County Summary Highlights: 2007 2007 CENSUS OF AGRICULTURE - COUNTY DATA USDA, National Agricultural Statistics Service IDAHO 251 Table 1. County Summary Highlights: 2007 - Con. 252 IDAHO 2007 CENSUS OF AGRICULTURE - COUNTY DATA (pp. 251–258).

USDA National Agricultural Statistics Service. (2007). County profile: Whitman County – Washington.

USDA National Agricultural Statistics Service. (2013). Crop values 2012 summary.

Wells, K. C. (2004). Factors affecting the adoption of best management practices in the Canagagigue Creek Sub-Watershed. University of Guelph.

Wheat Life. (2013). Wheat's importance to the world, U.S. and Washington. Wheat Life. Retrieved November 17, 2013, from http://www.wheatlife.org/ourfarms.html

Wu, J., & Babcock, B. a. (1999). The relative efficiency of voluntary vs mandatory environmental regulations. Journal of Environmental Economics and Management, 38(2), 158–175.

Young, D. L., Wulfhorst, J. D., & Diebel, P. (2012). 2011 STEEP Progress Report.

Chapter 6: Using Cultural Cognition to Better Understand Relationship Formation and the Role of Homophily within Social Networks of Agricultural Producers and Information Sources in Whitman County, Washington

Abstract

In response to recent critiques of Social Network Theory, this research employs a theoretical framework which uses cultural cognition to further examine the content of relationships within a social network and the role of homophily within Social Network Theory. The research approach employed integrates Social Network Theory with cultural cognition to look at how networks of relationships between agricultural producers and information sources are influenced by cultural worldview. A mixed methods approach which combined survey with interview methods was employed. In line with cultural cognition propositions, "hierarchical individualists" producers were determined to have a high likelihood of selecting individual agricultural information sources that hold the same cultural worldview as themselves. This is exhibited in network graphs as a high level of homophily between "hierarchical individualist" agricultural producers and information sources. Interview findings explore producer perceptions of how cultural worldview orientation influences relationship formation between producers and information sources. Our findings are in line with previous studies of cultural cognition supporting that individuals tend to search out information and experts agreeable to their cultural predispositions. The theoretical approach advanced through this research provides a theoretical contribution to understanding the factors facilitating the formation of ties between actors in a social network by providing a new look at how cultural cognition may influence the network characteristic of homophily and the formation and structure of agricultural producers' social networks within Whitman County, Washington.

Keywords: cultural cognition—social networks—homophily—information source selection

6.1. Introduction

A current trend in theoretical perspectives aimed at understanding the social dimensions of soil and water conservation and agricultural producer selection of information sources includes the use of Social Network Theory (Chiffoleau, 2005; Conley & Udry, 2001; Coughenour, 2003; Genskow & Wood, 2011; Hahn et al., 2008; Henrich, 2001; Lubell & Fulton, 2007; Napier & Tucker, 2001; Schneider et al., 2010). Social Network Theory provides a theoretical framework to explain how the network of a social system in which an individual is embedded provides opportunities for or constraints on information flow (Wasserman & Faust, 1994). Consequently, Social Network Theory can be used to draw attention to the network regularities underlying social relations and how network structures can facilitate or constrain producer access to conservation information (Wellman, 1983). Additionally, the availability of individual agricultural information sources has been looked at, but there has been little attention paid to how these individuals are chosen and specifically how delivery of conservation information may be influenced by cultural worldview of both agricultural producers and information sources.

The research approach presented here is in response to recent recommendations regarding a call to re-focus Social Network Theory on social relationships as a central theoretical concept (Azarian, 2010). This research employs a theoretical framework which uses cultural cognition to further examine the role of homophily within Social Network Theory. In this approach, cultural cognition (a measure of cultural worldview along two continuous attitudinal scales of "hierarchy-egalitarianism" and "individualism-communitarianism") was employed as a lens to view the influence of social forces on social relationships and the ability of social forces to shape an actor's choice of individual information sources. Our approach focuses on the influence of cultural worldview (consisting of individual values and societal values) on the selection of information sources and as a factor influencing homophily within network structure. The theoretical approach advanced through this research provides a theoretical contribution to understanding the factors facilitating the formation of ties between actors in a social network by providing a new look at how cultural worldview may influence the formation and structure of agricultural producers' social networks within Whitman County, Washington.

The research approach employed integrates Social Network Theory with cultural cognition to look at how networks of relationships between local producers and information sources are influenced by

cultural values. This research was accomplished through a mixed methods approach which combined survey with interview methods. Survey data will be used to determine network structure between producers and information sources while the interview findings will explore producer perceptions of how cultural worldview orientation influences relationships between producers and conservation professionals.

A description of current networks of relationships on the Palouse will provide local producers and conservation professionals with an opportunity to explore how changes to the network structure may better facilitate conservation information flow on the Palouse. An application of the research findings will provide an understanding of what relationships and partnerships currently exist and where relationships could be developed to enhance flow of information regarding agricultural conservation practices within Whitman County. Finally, a look at the content of relationships by describing the cultural worldview of actors connected in the network lends to further investigation of factors that affect relationship formation and thus influence network structure.

6.1.1 Social Network Theory and Information Access

A social network consists of actors (people, groups, or organizations) and the relationships or ties between them (Wasserman & Faust, 1994). The relationships between actors emerge as patterns of networks which determine the structure of the social system (Krebs & Holley, 2004). Wasserman and Faust (1994) define social networks as "the relational structure of a group or larger social system consisting of the pattern of relationships among the collection of actors."

A social network assumes the importance of relationships between actors, as defined by the ties between actors (McIllwain, 1999). The study of social structures through network patterns gives insight to the ability of any given actor to have access to resources (Ritzer, 2011). The network pattern can thus be used to evaluate an actor's access to resources including information (Ritzer, 2011). Social Network Theory can be used to draw attention to the regular network regularities underlying social systems and how network structures can facilitate or constrain the flow of information in a social system (Wellman, 1983).

6.1.1.1 Homophily and Information Access

Homophily refers to the degree to which actors are similar to each other (Rogers & Bhowmik, 1970). Similarity of attributes between actors may be derived by status related sociodemographic

dimensions that stratify society or values based attributes, including beliefs and attitudes (Lazersfeld & Merton, 1954; Rogers & Bhowmik, 1970). The Homophily Principle within Social Network Theory explains the higher rate of connection between similar actors in a social network (McPherson, Smith-Lovin, & Cook, 2009) . The structure of social networks as determined by homophily has been shown to influence, and in some cases limit, the information received by actors within the network.

In regards to the Homophily Principle, communication patterns have been proposed to frequently be homophilous because more effective communication often occurs when source and receiver are homophilous (Rogers & Bhowmik, 1970). When actors share common beliefs and values, communication is often more effective, while more effort is often needed to communicate with individuals who are dissimilar (Rogers & Bhowmik, 1970). Additionally, within natural resources management, homophily among actors can result in a reduction of conflict which can prove useful for the transfer of complex information (Prell et al., 2009).

6.1.1.2 Recent Critique of Social Network Theory

Recent critique of the current status of Social Network Theory claims that Social Network Theory provides the framework to examine the structure of social systems, and their function as "vehicles of diffusion and/or distribution" (Azarian, 2010, p. 325) but is lacking in ability to account for social relationships that are important to the communication channels in a social system (Azarian, 2010). In a review of the contemporary network theory and analysis, Azarian (2010) claims that "the contemporary network approach has so far declined to produce a theoretically elaborate account of social relationships- the very core entities that underpin both its ontological outlook and methodological stance" (p. 323). One area that Azarian (2010) identifies as being theoretically underdeveloped within the social network approach is the impact of larger socio-cultural contexts in which specific ties and networks emerge. Within Social Network Theory, social relationships need to be considered a central theoretical concept, with the focus being on the content of the ties between actors, not just the structure formed by the ties (Azarian, 2010).

Additional research needs identified within Social Network Theory include a closer look at the cultural values of the actors within a social network (Conley & Udry, 2001; Coughenour, 2003; Henrich, 2001) and the impact of larger socio-cultural contexts in which specific relationships form and networks emerge (Azarian, 2010; Coughenour, 2003; Lemke et al., 2010; Mintrom & Vergari, 1998; Valente, 1996). Our research aims to advance the conversation in each of these identified

areas by examining the importance of cultural worldview to understanding the conservation related communication network between producers and information sources.

6.1.2 Cultural Cognition and Information Source Selection

While Social Network Analysis reveals the network of relationships present, cultural cognition provides a lens to further look at network structure in an attempt to uncover how cultural values influence network structure and the formation of relationships within the network. Cultural cognition is a measure of cultural worldview along two continuous attitudinal scales (Kahan, Jenkins-Smith, et al., 2011; Kahan et al., 2006; Kahan, Peters, et al., 2011). Cultural cognition designates four ways of life (see Figure 6.1): "hierarchical individualism" (designated as type 1 in this study), "hierarchical communitarianism" (designated as type 2 in this study), "egalitarian individualism" (designated as type 3 in this study), and "egalitarian communitarianism" (designated as type 4 in this study) (Kahan, 2012). The explanatory, predictive, and potentially prescriptive utility of cultural cognition makes it valuable as a lens to view the influence of social forces on social relationships and the ability of those social forces to shape an actor's perceptions and actions regarding selection of information sources.

Research by Kahan et al. (2010) has found that cultural cognition operates when an individual is evaluating an expert for credibility. Perception of expert credibility is influenced by an individual's readiness to trust experts who they perceive as sharing their cultural values and distrust experts who they perceive as not sharing their cultural values (Kahan, Jenkins-Smith, & Braman, 2011). This mechanism has been demonstrated (in several contexts) to result in the individual selecting experts whom they perceive to share their values and the values of their peers (Kahan, 2012).

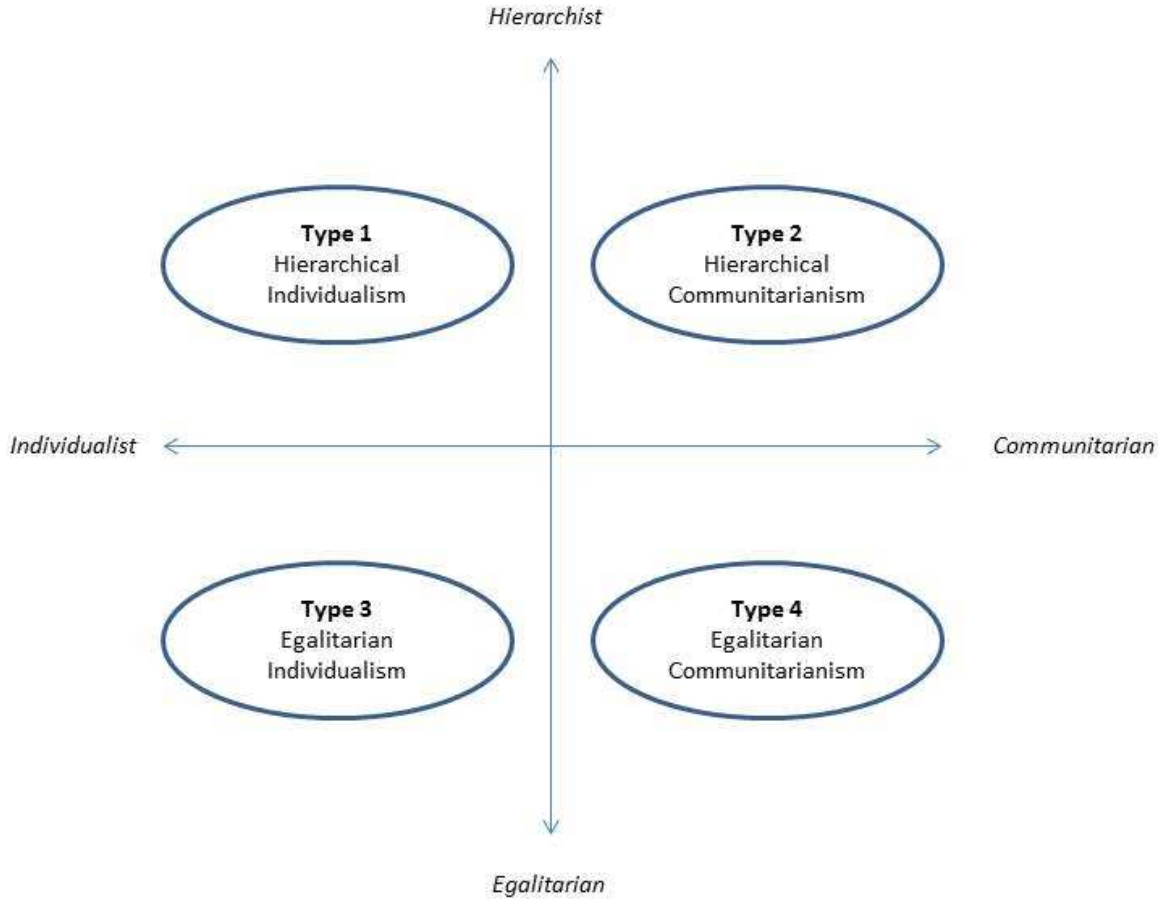

Figure 6.1. Cultural cognition "ways of life" (Kahan, 2012). Framework for classifying individuals' cultural values (Kahan, Braman, Slovic, Gastil, & Cohen, 2007).

6.2. Procedures

6.2.1 Research Location

Surveys and interviews were conducted with principal farm operators during 2012 in Whitman County, located in southeast Washington, in the heart of the Palouse region of the Pacific Northwest (see Figure 6.2). Whitman County is characterized by a moderate climate with deeply deposited loess soils divided by rivers flowing through the Palouse River Watershed. Land use within the County consists primarily of dry land farming with some rangeland/pasture. Approximately 91% (1,271,141 acres) of the 1,393,920 acres in Whitman County are classified as agricultural (USDA National Agriciultural Statistics Service, 2007). Agriculture has been the foundation of the region's economy in the past and continues to be a large contributor. Pullman (population 29,913 in 2011), home to Washington State University, and Colfax (population 2,839 in 2011) are the main population centers of Whitman County (population 45,077 in 2011).

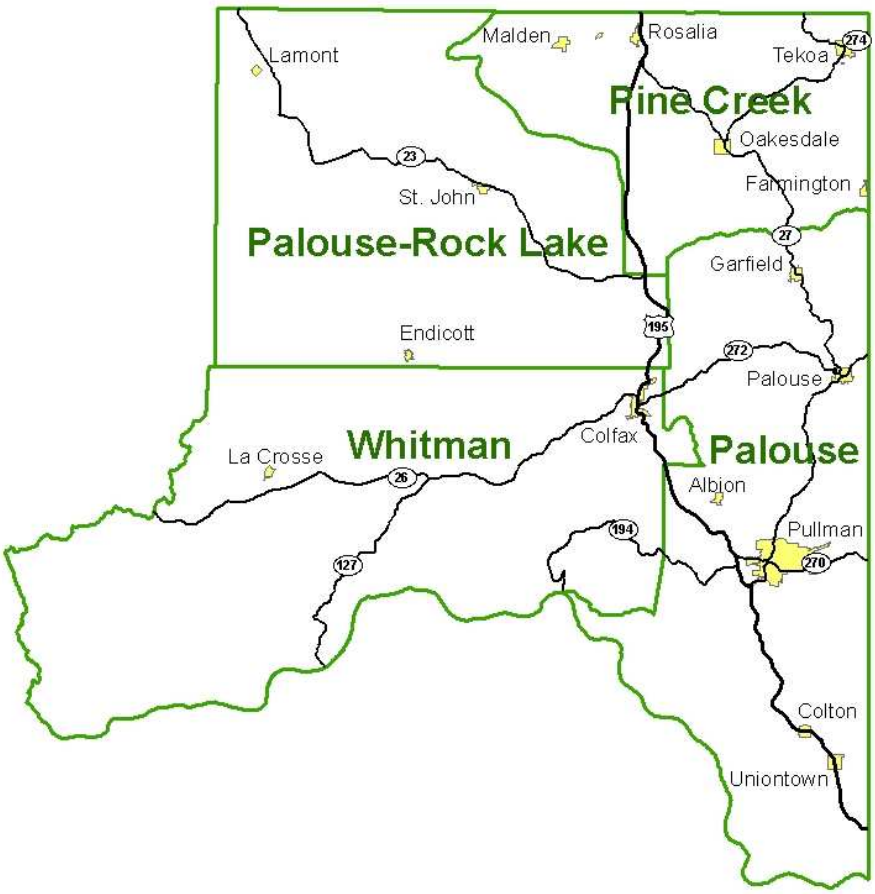

Figure 6.2. Map of Whitman County, showing population centers and conservation district boundaries.

Farming began on the Palouse in the 1870 with the predominant crop being wheat. The region produces almost 13% of the nation's wheat crop which is a significant source of wheat for both domestic consumption and export (90% of the specialty soft wheat grown in the area is exported) (Kok et al., 2009). Despite this incredible productivity, the loss of the rich topsoil was noted as being substantial by the mid-1900s. Since then, the environmental and economic repercussions of erosion to the Palouse region have been closely studied.

6.2.2 Survey Methods and Analyses

Producer surveys were conducted with principal farm operators within Whitman County during January-March, 2012. The choice for conducting a survey during the winter months of January-

March was to increase participation by providing producers the opportunity to participate in research during their off-season. A limitation of a survey research strategy for this population is the documented low survey response rates from farmers (Pennings et al., 2002). Consequently, questionnaires were distributed by mail with a modified Dillman (2000)*Tailored Design Method* (introduction letter, survey package, reminder, second survey package, and second reminder), using suggestions from research by Pennings et al (2002) regarding how to improve farmers' response rates to mail surveys: 1) the length of the questionnaire was limited to 30 questions, 2) the number of pages was limited to 12, 3) the questionnaire was designed to easily be completed within 15 minutes, 4) questions were designed so that they did not require consulting farm records, and 5) questions were formulated such that producers could easily check the answers.

The sampling frame for a single stage, sample of principal farm operators within Whitman County was generated by the Washington state office of the United States Department of Agriculture (USDA) National Agricultural Statistics Service. The 2007 USDA Census of Agriculture identified 875 principal farm operators within Whitman County. This group was made up of principal farm operators who consider farming to be their primary occupation and principal farm operators who consider their primary occupation to be something other than farming.

Producers consisted of individuals involved with dry land grain production (conventional tillage, conservation tillage, or direct seed system), livestock production, and Conservation Reserve Program (CRP) enrollment. Each producer's operation was unique and had variable involvement in the different types of production. Producers' operations were as varied as dry land grain production exclusively, livestock production exclusively, CRP enrollment exclusively, or some combination of the three. Throughout this dissertation, producers who are involved with dry land grain production are referred to as "farmers" whereas producers who are involved with livestock production are referred to as "livestock producers."

To protect confidentiality, questionnaires were mailed directly from the state office of USDA National Agricultural Statistics Service. To ensure anonymity, all principal farm operators issued survey packages were assigned numbers. As an incentive for participation, survey participants were entered into a lottery for a chance to win one of two $25 cash gift cards. During January-March 2012, a total of 258 surveys were returned for a response rate of 30%.

The questionnaire included items to assess: (1) producer contacts consulted with in the past year for information related to production practices, conservation practices, funding/cost share, and regulatory information; (2) network characteristics including frequency of contact and direction of contact; (3) producer cultural worldview measured by using the short form version of the Cultural Cognition Worldview Scale (permission obtained for use Kahan, 2011); (4) producer characteristics; (5) farm characteristics; and (6) willingness to participate in an interview.

Following analysis of returned questionnaires from primary farm operators, on-line questionnaires were e-mailed during September-October 2012 to 130 individuals identified as being sources of agricultural information. During September-October 2012, a total of 78 surveys were returned for a response rate of 60%.

Cultural cognition items were used to characterize respondents' cultural worldviews along two cross-cutting dimensions: (1) hierarchy-egalitarianism, indicates attitudes toward social orderings that connect authority to stratified social roles based on highly conspicuous and largely fixed characteristics such as gender, race, and class (Kahan, Jenkins-Smith, et al., 2011), and (2) individualism-communitarianism, indicates attitudes toward social orderings that expect individuals to secure their own well-being without assistance or interference from society versus those that assign society the obligation to secure collective welfare and the power to override competing individual interests (Kahan, Jenkins-Smith, et al., 2011).

To determine cultural worldview, respondents indicated the level of their "disagreement" or "agreement" with each item on a six-point Likert response measure. Responses were aggregated to form continuous "hierarchy-egalitarianism" and "individualism-communitarianism" worldview scores. Each short-form scale consisted of only six "agree- disagree" items that are "balanced" with three items supportive of each end of the two continuous scales [individualism-communitarianism (Cronbach's $\alpha = 0.76$) and hierarchy-egalitarianism (Cronbach's $\alpha = 0.84$) (Kahan, 2011)] (see Table 6.1 and Table 6.2). The short-form scales used in this study have been shown in previous studies to be as reliable as their full-form counterparts (Cronbach's α presented above are from previous studies of cultural cognition) (Kahan, 2011, 2012).

Table 6.1. Cultural cognition short form scale for individualism-communitarianism (Cronbach's α = 0.76) (Kahan, 2011)].

People in our society often disagree about how far to let individuals go in making decisions for themselves. How strongly do you agree or disagree with each of these statements? *(Please circle one response for each statement)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
A.	Government should put limits on the choices individuals can make so they don't get in the way of what's good for society.					
B.	Sometimes government needs to make laws that keep people from hurting themselves.					
C.	The government should stop telling people how to live their lives.					
D.	The government interferes far too much in our everyday lives.					
E.	The government should do more to advance society's goals, even if that means limiting the freedom and choices of individuals.					
F.	It's not the government's business to try to protect people from themselves.					

Table 6.2. Cultural cognition short form scale for hierarchy-egalitarianism (Cronbach's α = 0.84) (Kahan, 2011)].

People in our society often disagree about issues of equality and discrimination. How strongly do you agree or disagree with each of these statements? *(Please circle one response for each statement)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
A.	It seems like blacks, women, homosexuals and other groups don't want equal rights, they want special rights just for them.					
B.	Our society would be better off if the distribution of wealth was more equal.					
C.	We need to dramatically reduce inequalities between the rich and the poor, whites and people of color, and men and women.					
D.	Discrimination against minorities is still a very serious problem in our society.					
E.	Society as a whole has become too soft and feminine.					
F.	We have gone too far in pushing equal rights in this country.					

For each scale, we computed scores by averaging responses to the six items. The location of respondents in a cultural cognition map was determined based on the respondents' scores on the continuous "hierarchy-egalitarian" and "individualism-communitarianism" scales (see Figure 6.4and Figure 6.5). To further facilitate analysis, individual respondents were assigned to cultural worldview groups (see Figure 6.1). Respondents were classified as either "hierarchical individualists" (type 1), "hierarchical communitarians" (type 2), "egalitarian individualists" (type 3), or "egalitarian communitarians" (type 4) depending on where their scores fall in relation to the

median scores of both scales. Chi-square was used to evaluate cultural affinity of producers and individual information sources.

Social network analysis was used to provide a graph of the network of relationships between producers and information sources. Cultural worldview attributes were applied to each actor in the network and analysis was conducted using UCINET.

6.2.3 Interview Methods and Analysis

Following the survey research and analysis, in-depth interviews were conducted with agricultural producers to determine producer selection of information sources for information related to agricultural practices within Whitman County, Washington (Boie, 2013). The final item on the questionnaire distributed to principal farm operators inquired as to producer willingness to be interviewed. Eighty of the 258 respondents indicated willingness to participate in an interview (willingness to interview rate of 30.9%). Twenty-five producers were selected to participate in interviews through a combination of critical case sampling (selecting what are believed to be particularly important cases) and maximum variation sampling (selecting a wide range of cases) in an effort to select a diversity of producers engaged in different types of agriculture and different levels of implementation of conservation practices.

The interview guide was designed to ensure that similar lines of inquiry were pursued with each producer interviewed, thus enhancing the likelihood of creating comparable qualitative data sets. The Interview guide was designed around research findings gained from analysis of survey research in-order to ensure that interviews would provide further context to aid in the interpretation of the survey results. Twenty-five semi-structured interviews were conducted in-person by the same researcher. Interviews were structured to explore two primary areas of interest: (1) producer information sources and (2) role of cultural worldview in selection of information sources.

To facilitate conversation around role of cultural worldview, interview participants were lead through a “participatory mapping” process, whereby interview participants plotted the locations of themselves and their information sources on a cultural cognition "map" (see Figure 6.3). Interview participants were provided with the following descriptions for the four worldview types: 1) communitarians value solidarity, reject the unconstrained pursuit of self-interest, see fundamental interdependency in society, and reject competitive individualism; 2) individualists value social

orderings based on individual self-reliance and self-sufficiency, and believe that the "best" societies are those organized around personal ambition and competitive achievement; 3) hierarchists value status differentiation, and believe that societal resources should be distributed on the basis of distinctions in status such as class, race, and gender; and 4) egalitarians value equality and reject status distinctions as a basis for social order.

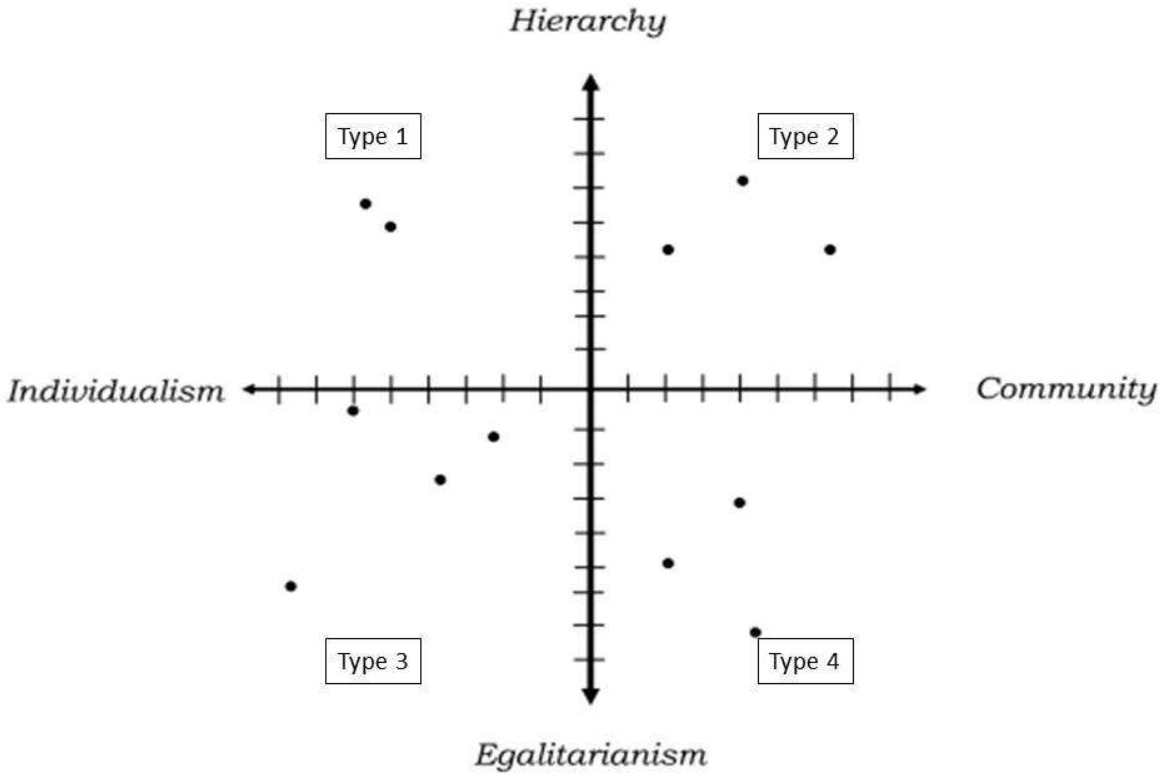

Figure 6.3. To facilitate conversation around worldview types, interview participants were lead through a "participatory mapping" process, whereby interview participants plotted the locations of themselves and their information sources on a cultural cognition "map." Figure does not display actual data from this study but should be regarded for illustration purposes only.

Interviews were audio recorded and transcribed. Data analysis proceeded in three main stages including data reduction, data display, and interpretation (Miles & Huberman, 1994). In the data reduction stage, the data was selected, simplified, abstracted, and transformed in a focused way that allowed for valid conclusions to be drawn (Miles & Huberman, 1994). Effort was made to ensure that data remained in context throughout the process (Onwuegbuzie & Teddlie, 2003).

Researchers collaborated to store, index, sort, and code interview data in a database in order to assign categories and codes (Leech & Onwuegbuzie, 2011). To enhance interpretation, codes and themes were organized and consolidated through the data display stage. The final stage of analysis included drawing conclusions through interpretation of the meaning embedded in the data display. Finally, conclusions drawn from the qualitative analysis were triangulated with survey data. Quality assurance measures included member checking, peer debriefing, and triangulation.

6.3. Results and Discussion

6.3.1 Cultural Worldviews of Producers within Whitman County

Distribution by worldview type was determined for all producers (see Figure 6.4). Producers in Whitman County fell primarily within the "hierarchical individualists" (type 1) worldview type, making up 63.5% of all producers. Twenty-five percent of producers were classified as "egalitarian individualists" (type 3) and only 10% were classified as "egalitarian communitarians" (type 4). The worldview type classified as "hierarchical communitarians" (type 2) proved to be unsupported with only 3 out of 219 (1.4%) producers being classified as such. Consequently, the "hierarchical communitarians" (type 2) worldview type has been removed from further analysis within this study. Our Cronbach's α was calculated for each of the two continuous scales [individualism-communitarianism (Cronbach's $\alpha = 0.863$) and hierarchy-egalitarianism (Cronbach's $\alpha = 0.856$)]. Our Cronbach's α's for this study proved to be higher than those calculated by Kahan (2011).

6.3.2 Cultural Worldviews of Information Sources within Whitman County

Information source worldview types within Whitman County were determined to be widely distributed between the different worldview types with 47.9% classified within the "hierarchical individualists" (type 1) 28.2% classified as "egalitarian communitarians" (type 4) and 22.5% classified as "egalitarian individualists" (type 3). The worldview type classified as "hierarchical communitarians" (type 2) proved to be unsupported with only 1 out of 71 (1.4%) information sources being classified as such. Consequently, the "hierarchical communitarians" (type 2) worldview type has been removed from further analysis within this study.

6.3.3 Worldview Type of P*roducer vs. Information Source*

Producers were significantly more likely than information sources to fall within the worldview type classified as "hierarchical individualists" (type 1) (63.5% to 47.9%) ($\chi 2 = 5.508$, $p = 0.019$, $df = 1$, $n = 286$). Information sources were significantly more likely than producers to fall within the worldview type classified as "egalitarian communitarians" (type 4) (28.2% to 10%) ($\chi 2 = 14.265$, $p = 0.00$, $df = 1$, $n = 286$).

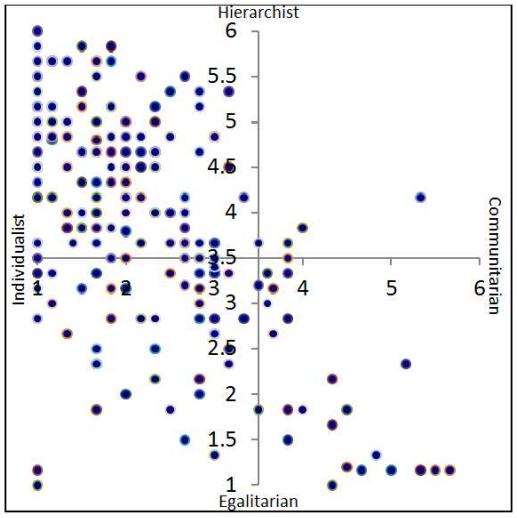

Figure 6.4. Cultural Worldview of producers in Whitman County. Larger dot size indicates multiple dots are overlapping.
Type 1 "hierarchical individualists" (139, 63.5%);
Type 2 "hierarchical communitarians" (3; 1.4%)
Type 3 "egalitarian individualists" (55, 25.1%); or
Type 4 "egalitarian communitarians" (22; 10.0%)

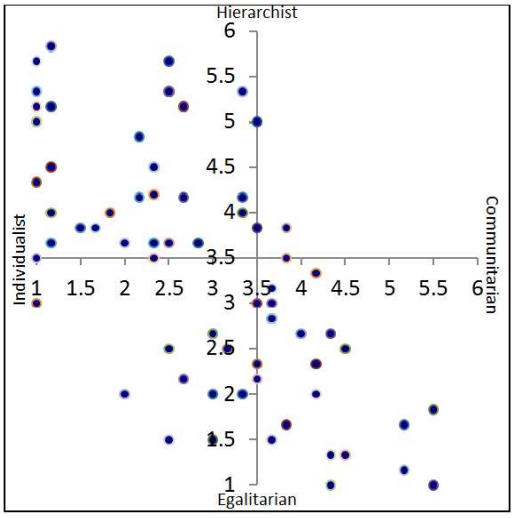

Figure 6.5. Cultural Worldview of information sources in Whitman County. Larger dot size indicates multiple dots are overlapping.
Type 1 "hierarchical individualists" (34, 47.9%);
Type 2 "hierarchical communitarians" (1; 1.4%)
Type 3 "egalitarian individualists" (16, 22.5%); or
Type 4 "egalitarian communitarians" (20; 28.2%)

6.3.4 Homophilious Cultural Worldview and Selection of Information Sources

The influence of cultural worldview on the selection of information sources and as a factor influencing homophily within network structure was looked at through the use of chi-square and social network analysis. Interview findings explore producer perceptions of how cultural worldview orientation influences relationships between producers and information sources. Producer interviews also provide additional context for understanding the influence of cultural worldview and values as factors facilitating the formation of ties between actors in a social network of

agricultural producers' within Whitman County, Washington. Additionally, producer interviews provide further context and support for visual impressions represented by the network graphs.

6.3.4.1. Association between Producer Selection and Information Source

A chi-square test of independence was performed to examine the relation between producer choice of individual agricultural information sources and worldview. The relation between these variables was significant for worldview types classified as "hierarchical individualists" (type 1) and "egalitarian communitarians" (type 4) ($\chi 2 = 10.19$, $p = 0.001$, $df = 1$, $n = 165$). The odds of a "hierarchical individualist" (type 1) information source being selected by a producer that is "hierarchical individualist" (type 1) is 7.3 times higher than that of an "egalitarian communitarian" (type 4) information source being selected by a producer that is "hierarchical individualist" (type 1). In line with cultural cognition propositions, "hierarchical individualists" (type 1) producers were determined to have a high likelihood of selecting individual agricultural information sources that hold the same cultural worldview as themselves.

6.3.4.2 Communication Network between Producers and Information Sources

Social network analysis was used to provide descriptive network graphs representing relationships between producers and information sources. Cultural worldview attributes were applied to each actor in the network. The following section provides insight regarding implications of network characteristics for information dissemination related to agricultural production and conservation.

A network graph of producers and information sources of all worldview types (see Figure 6.6) shows elements of a core-periphery network. This type of network has been determined in previous research to emerge as the result of "network weaving" over time (Krebs & Holley, 2004). The main value of the core-periphery network is the stability it is able to maintain due to inclusion of both bonding (strong) and bridging (weak) ties. The core consists of actors tied by strong bonds, while the periphery consists of groups of actors that are connected to the core through weak ties (Krebs & Holley, 2004). Bonding ties promote trust, reciprocity, and cohesion within networks. These characteristics of bonding ties have been identified as important for both consensus building and conflict resolution within natural resource management (Bodin & Crona, 2009). Bridging ties are important for information transfer and acquiring external information that is essential to natural resource management (Bodin & Crona, 2009).

With regard to natural resource management, weak ties may enhance community engagement in natural resource management due to their ability to create bridges to segments of a network that would otherwise be disconnected (Prell et al., 2009). Ties to the periphery are essential for bringing in new actors, increasing diversity within the network and reaching new information (Krebs & Holley, 2004).

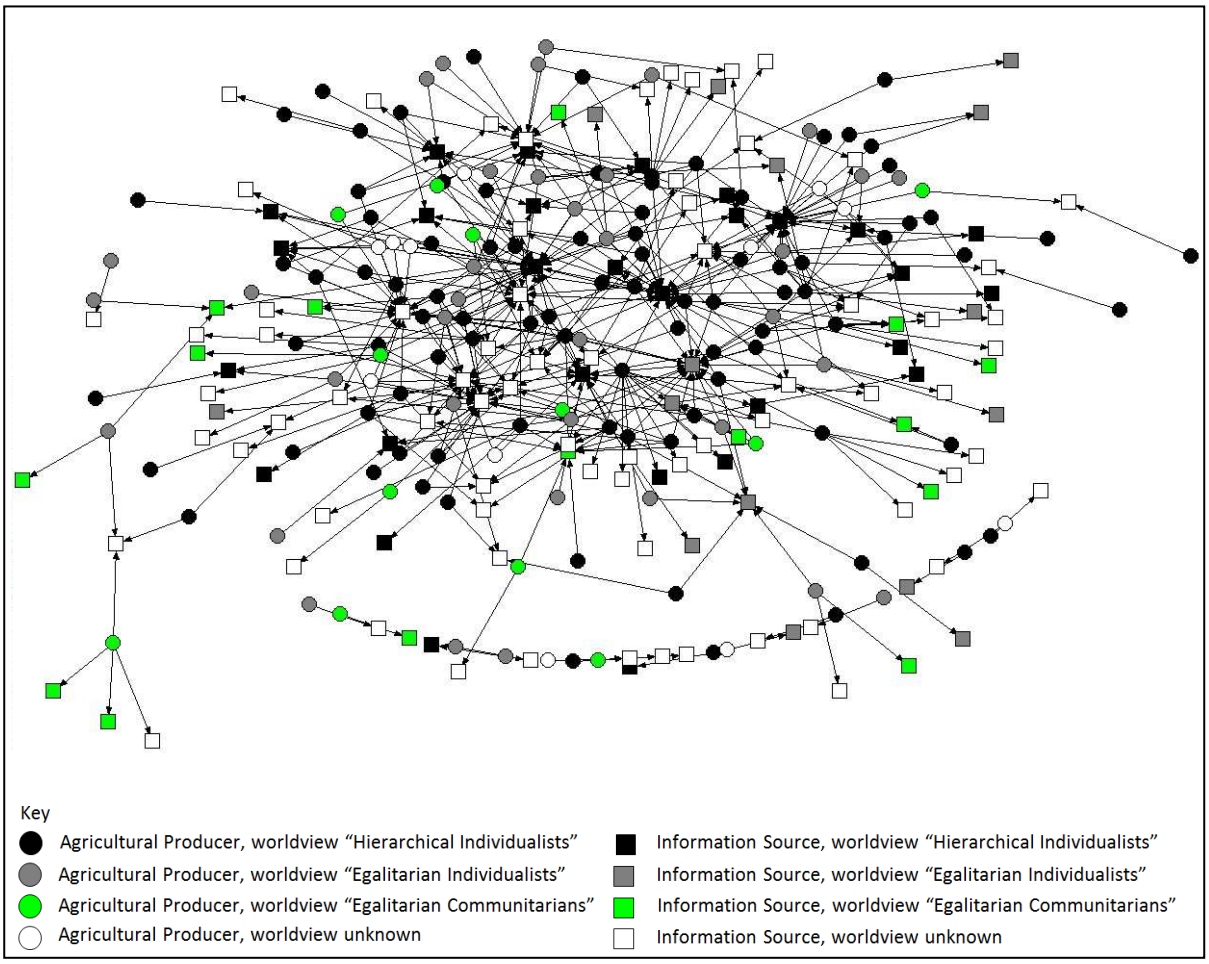

Figure 6.6. Network of all agricultural producers with information sources, includes all cultural worldview types. Unknown producer and information source worldviews are due to lack of information provided by respondents on items necessary to calculate cultural worldview.

In line with cultural cognition propositions, "hierarchical individualists" (type 1) producers were determined to have a high likelihood of selecting individual agricultural information sources that hold the same cultural worldview as themselves. This is exhibited in the network graph as a high level of homophily between "hierarchical individualist" (type 1) agricultural producers and information sources (see Figure 6.7). In previous studies of natural resource management,

homogeneity among actors has been shown to result in a reduction of conflict which can prove useful for the transfer of complex information (Prell et al., 2009). Additionally, Sandström and Rova (2010) show that heterogeneity is important for the existence and effective spread of information among the actors. A disadvantage of homogeneity is that often the representation of diverse views and opinions are lost, which is essential for successful long term natural resource management (Prell et al., 2009).

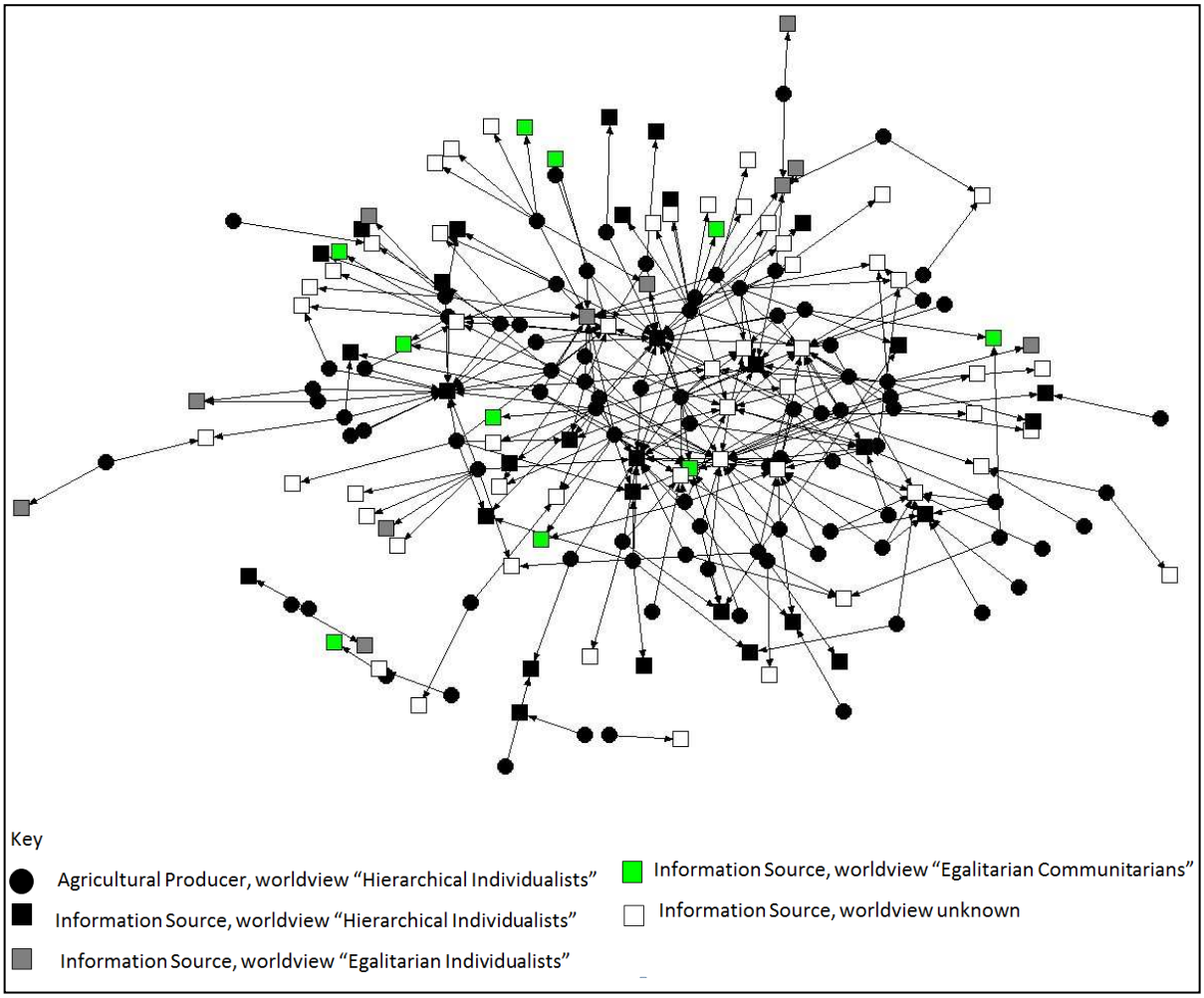

Figure 6.7. Network of "hierarchical individualist" (type 1) agricultural producers exhibits high level of homophily with information sources. Unknown producer and information source worldviews are due to lack of information provided by respondents on items necessary to calculate cultural worldview.

A network graph of "egalitarian individualist" (type 3) agricultural producers with information sources (see Figure 6.8) indicates less centralization within the network. Centralization within the network may make access to the entire network easier for an outsider, but it is a risk to long-term

natural resource problem solving efforts since only a few actors hold a majority of the ties linking the network together (Prell et al., 2009). Crona and Bodin (2006) found that high centralization was beneficial for coordinating collective action in the early stages of a natural resource management process, but decentralization provided diverse access necessary for long-term sustainable natural resource management.

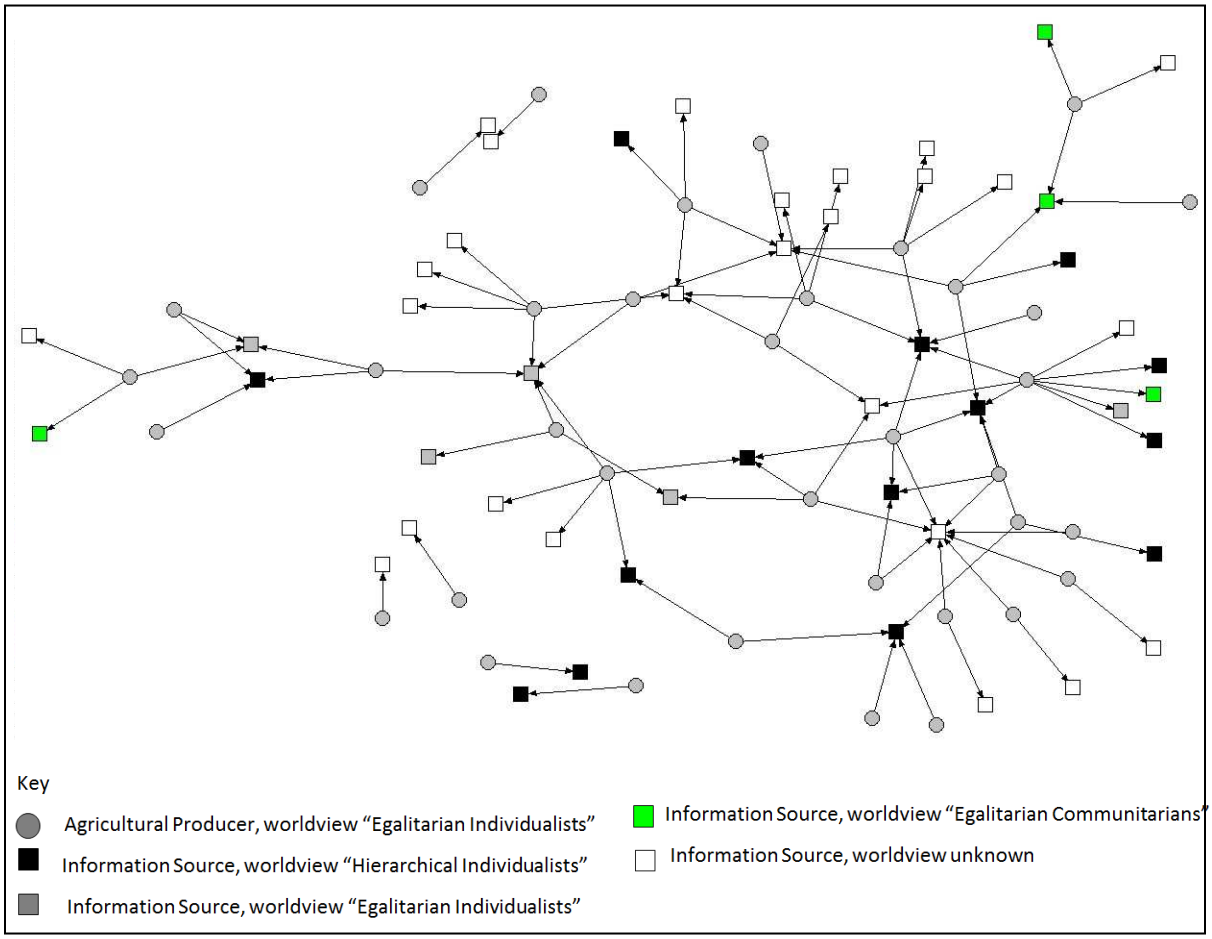

Figure 6.8. Network of "egalitarian individualist" (type 3) agricultural producers with information sources. Unknown producer and information source worldviews are due to lack of information provided by respondents on items necessary to calculate cultural worldview.

A network graph for producers of the "egalitarian communitarianism" (type 4) worldview type with information sources is found in Figure 6.9. In contrast to "hierarchical individualist" (type 1) and "egalitarian individualist" (type 3) producer networks, "egalitarian communitarianism" (type 4) worldview type producers were significantly more likely to be connected with a (non-sportsman) conservation association (29.4% vs. 4.0% and 5.8%, respectively) and were significantly less likely

to be connected to an agricultural association (46.7% vs. 70.5% and 61.8%, respectively). Additionally, producers of "egalitarian communitarianism" (type 4) worldview type had contact with significantly fewer sources within the past year to gain information about production practices, conservation practices, funding/cost share, and regulatory information (2.7 vs. 4.1 and 3.5, respectively). These findings are illustrated by the low density with in the producer network. In previous network studies, the characteristic of density within the network has been demonstrated as being important for determining the overall effectiveness of the network. High density may help to facilitate trust and provide buffering capacity if actors are lost (Lauber et al., 2008). The lower density within the social network of "egalitarian communitarianism" (type 4) producers could result in reduced availability of information and diminished information transfer.

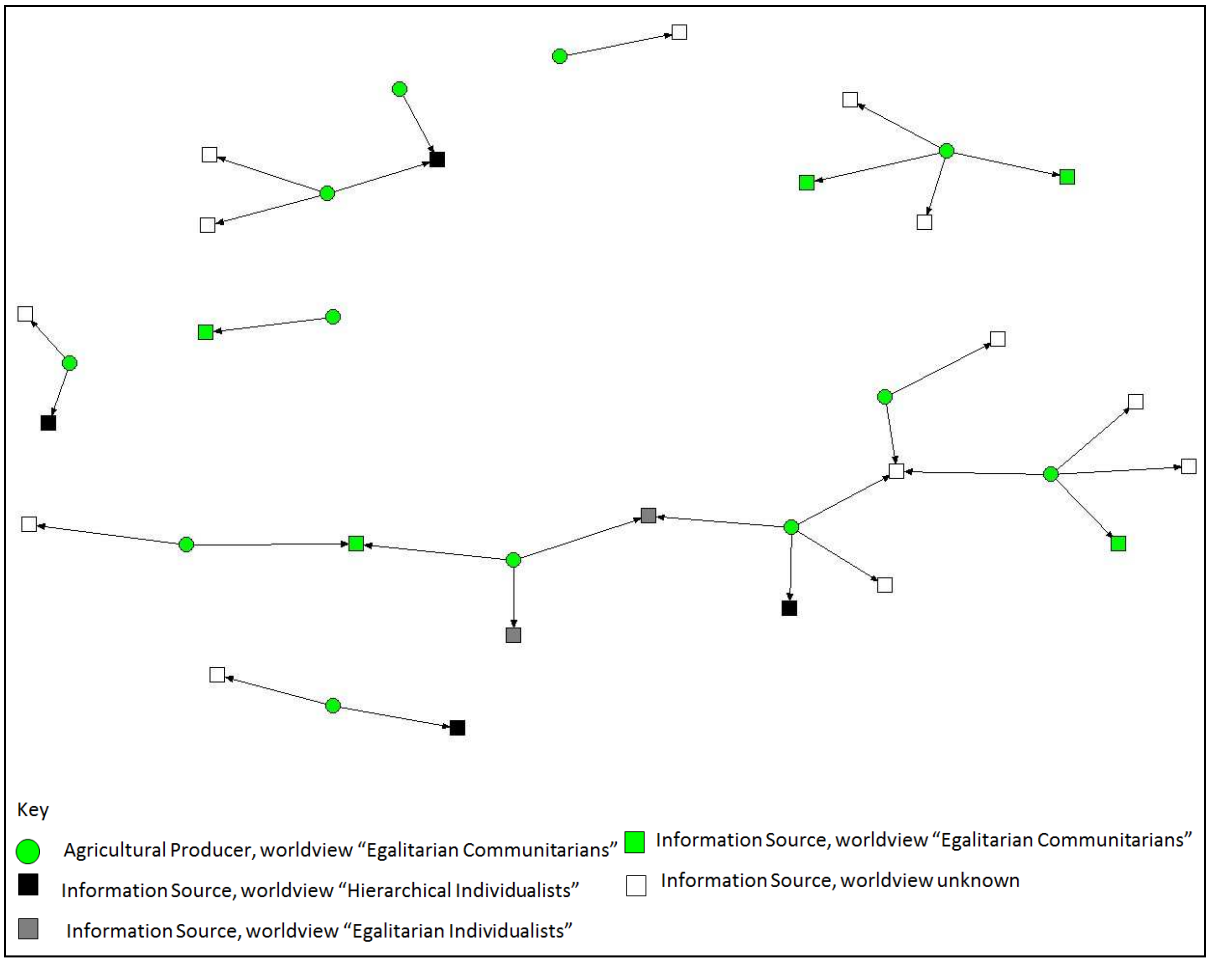

Figure 6.9. Network of "egalitarian communitarian" (type 4) agricultural producers with information sources. Unknown producer and information source worldviews are due to lack of information provided by respondents on items necessary to calculate cultural worldview.

As demonstrated in previous network studies and illustrated by the divergent network graphs of producers of different worldview types, network characteristics have profound implications for information transfer and conservation of natural resources. Previous studies of social networks have shown that that "favoring one characteristic likely occurs at the expense of another" so the best arrangement is a mix of different network characteristics to maximize desired effects (Bodin & Crona, 2009). Crona and Bodin (2006) emphasize the fact that "one optimal network structure is unlikely, as optimization of the structure seems related to the phase of the management process." Crona and Bodin (2009) further investigated the structural characteristics of social networks and implications for natural resource management. Their review indicated that sustainable natural resource management is most likely to be attained when network characteristics are balanced in such a way as to maximize the benefit of each measure while attempting to minimize the negative impacts of the same measure.

6.3.4.3. Themes Related to Producer Selection of Information Sources and Network Structure

There is an abundance of literature reporting on producer selection of information sources derived both from theoretical foundations and from natural resource professionals' perspectives based on anecdotal experiences. The purpose in designing the subsequent qualitative portion of this study was to provide producers an opportunity to discuss their selection of information sources and what factors were important to them in deciding what sources to seek out (see Table 6.3 and Table 6.4). Producer selection of information sources influences network structure and has practical implications for information transfer related to agricultural production and conservation.

Table 6.3. Main worldview related themes for producer selection of information sources with exemplar quotes that emerged from initial coding.

Why Information Sources Are Chosen	
Person shares similar values/ worldview	With everything that I do, not just with farming decisions, the people that I value their opinions, the people that I get information, that I talk to, that I hang around with, are not people that are totally opposite from me. So maybe some parts of their personality are different than mine, but our values are mostly the same.
Trust	Trust is the piece that is the whole key and if you don't have trust in the individual you are seeking out the info from, if there is no trust there to start with, you are not going to them.

Table 6.4. Main themes for producer identified factors that influence relationships with exemplar quotes that emerged from initial coding.

Factors That Influence Relationships	
Confidence/trust	Basically, you build a relationship with people that you trust.
Values/worldview	I think there would be a more natural immediate trust in the personal trust component [with someone of the same value system] but when I deal with people I like to deal on a very factual basis so I will draw again back to the training and expertise of the scenario, very much would probably really like them as an individual if they had the same thought concepts as I do but that would not necessarily influence my decision, it might make them more approachable but that would be the extent of the similarity issues, the approachability. If somebody where strictly neutral and approachable then I wouldn't have a problem there. It's the approachability issue, professionalism and approachability.
Credibility	Well right away, everybody's listening. He's got credibility, he's talking farmer talk.

When producers were asked about why they choose information sources and the factors that influenced the development of those relationships, 59% of producers discussed the importance of values and worldview. Additionally, 80% of all producers who discussed the importance of trust to both choice of information source and relationship development also discussed the role of values and worldview. In cases where producers mentioned credibility as being a main factor that influences relationship development, 100% of those producers also discussed the role of similar values and worldview as being an important factor in relationship development. These findings provide additional support for the role of similar world view in building trust, which leads to the selection of information sources of similar world view type.

Survey data were triangulated with findings from interviews and the participatory mapping exercises to further expand upon and explain how worldview influenced producer selection of information sources. Producers indicated that they would be more inclined to seek information from information sources that were from the same worldview type as themselves. One producer explained,

> *With everything that I do, not just with farming decisions, the people that I value their opinions, the people that I get information from, that I talk to, that I hang around with, are not people that are totally opposite from me. So maybe some parts of their personality are different than mine, but our values are mostly the same…as far as seeking information, it's going to be more of the [same worldview] type that I talk to.*

Another producer simply stated, "*I'm awfully sure that like attracts like."*

Producers contributed their preference for selecting information sources of the same worldview type as themselves to the likelihood of greater trust, credibility and respect given to others who share the same worldview. One producer stated, *"I think they [producers] probably seek out somebody with similar values just to confirm peace of mind."* Additionally, *"The people that you think alike with would probably do a great job at sharing ideas and information."* Another producer stated,

> *You test them a little bit and you can kinda take a look at the philosophy where they are coming from... You test them and you take a look at how their expertise is working for ya. That's where we base our trust and opinion on one person versus another.*

When further discussing how producers of different worldview types seek out information and the consequent flow of information within the network, one producer stated,

> *No, they ["hierarchical individualism" (type 1) producers] are not seeking out the [conservation] information because they are sitting over there ["hierarchical individualism" (type 1) quadrat]. They are not even looking, they don't find there is somebody credible that they can trust. Trust is the piece that is the whole key and if you don't have trust in the individual you are seeking out the information from, if there is no trust there to start with, you are not going to them.*

In conjunction with trust, worldview was also identified as being an important factor for determining if a source was approachable,

> *I think there would be a more natural immediate trust in the personal trust component [with someone of the same value system] but when I deal with people I like to deal on a very factual basis so I will draw again back to the training and expertise of the scenario. [I] would probably really like them as an individual if they had the same thought concepts as I do but that would not necessarily influence my decision, it might make them more approachable but that would be the extent of the similarity issues, the approachability. If somebody where strictly neutral and approachable then I wouldn't have a problem there. It's the approachability issue, professionalism and approachability.*

Another producer stated that they seek someone with similar values because *"well, that's where I am more successful."*

A minority of the producers interviewed suggested that they would seek information from all sources, independent of worldview in order to gain the best information for making an informed decision. An example of one such quote from a producer was,

> *When it comes to new practices, I think they [producers] probably seek out the most knowledgeable and they don't really care about the values. They're just seeking out the knowledge.*

Some producers indicated that they did not specifically seek out information sources, but that they were assigned to information sources due to program participation. One producer said,

> *We go into the office, we don't really choose who we can work with. There's only three or four guys we can choose from. I think they're assigned, I don't think I can walk in and say I want this guy or that guy.*

Another producer relayed,

> *You just respect their education, their knowledge and experience without getting into the personal value aspect of it because you just don't know them that well. You know them more on business relationship rather than a personal relationship.*

6.3.5 Potential Study Limitations

People are often more likely to respond to a survey when the topic is relevant to them (Dillman & Carley-Baxter, 2000). In the case of producer selection of information related to conservation practices, an assumption can be made that producers who are most interested in natural resources conservation may also be those who are most likely to complete a questionnaire and interview on the topics related to natural resources conservation. Consequently, it is likely that the network of relationships described by this research will be incomplete and it is possible that it may over represent the presence of producers who are most interested in natural resources conservation. Additionally, producers who fall within certain cultural worldview types may be more or less willing complete a questionnaire and interview, and may thus be overrepresented or underrepresented within this study.

Within this study, social network analysis was limited to descriptive use of network graphs. Discussion was limited to influence of cultural worldview on role of homophily within Social Network Theory. Additional research and analysis is necessary to quantify network characteristics. To further extend theoretical contributions from cultural cognition to Social Network Theory, it is necessary to quantify the influence of cultural cognition on specific network characteristics.

6.4. Summary and Conclusions

6.4.1 Contributions from Cultural Cognition to Advance Understanding of Homophily within Social Network Theory

In response to recent critiques of Social Network Theory, this research focuses on the content of relationships within a social network and how those relationships influence flow of information related to production practices, conservation practices, funding/cost share, and regulatory information. Cultural cognition was employed alongside Social Network Theory to provide a deeper look at network structure formation in an attempt to uncover how cultural worldview influences network structure and consequently the flow of agricultural information. Additionally, cultural cognition was used as a lens to further investigate the larger socio-cultural contexts in which relationships form and the consequent influence on information flow. This approach allowed the focus to be placed on the content of relationships, in addition to a structural look at relationships, as is commonly done with a more traditional approach to social network analysis. Looking at relationships within the context of values and worldviews allows for further focus on the content of relationships, and advances our understanding of the role of homophily within the traditional Social Network Theory framework.

Our research demonstrates how cultural cognition can be used to further investigate factors contributing to homophily within a Social Network. To further reframe Social Network Theory around the central theoretical concept of social relationships, it is necessary to consider the larger socio-cultural contexts in which relationships form, taking into account the influence of divisions including class, gender, race, religious conviction, political standpoint, ethnic background, personality traits, etc. (Coughenour, 2003; Lemke et al., 2010; Mintrom & Vergari, 1998; Valente, 1996). These larger socio-cultural contexts also play a role in determining the type of social relationships that are formed.

Our research further validates the role that cultural cognition plays in homophily as a general component of relationship formation. This research adds to the contemporary network research regarding homophily as grounds for the formation of social relationships (Azarian, 2010). The need to belong to a group not only motivates the establishment of a relationship, but the ability of the relationship to influence related actors. Azarian (2010) notes that social relationships are “mainly fuelled by the parties mutual perception of affinity and the accompanying sense of fellowship,

solidarity and group identification- a feature that inseparably is coupled with its opposite, that is, the sense of demarcation, distinction and distance from others" (p. 330). This addition to the knowledge regarding the content and context of social relationships, allows the social network approach to investigate the effects of the social forces at work including the ability of those social forces to shape an actor's perceptions and ties formed.

6.4.2 Application of Social Network Theory to Natural Resource Management

Social Network Theory is gaining recognition for its ability to explain critical issues in the field of natural resource management (Chiffoleau, 2005; Conley & Udry, 2001; Hahn et al., 2008; Lubell & Fulton, 2007; Napier & Tucker, 2001; Schneider et al., 2010). Fundamental to natural resource management are the relationships or ties between actors (people, groups, or organizations). The use of Social Network Theory can help natural resource managers answer important questions including (questions adapted from Krebs & Holley, 2004): 1) Are the right relationships in place for sustainable natural resource management? 2) Are any key actors missing? 3) Who is playing a leadership role in the community? Who is not, but should be? 4) Who are the experts in the area and which experts are being sought out by land managers? 5) Why are some community mentors and technical scientific advisors sought out for advice? 6) Who are the innovators? 7) Are ideas shared and acted upon? 8) Are collaborative alliances forming between local entities? 9) Which entities will likely have better success at disseminating information?

Social networks provide a means to build trust, facilitate information flow and bring together the expertise needed for sustainable natural resource management. Bodin and Crona (2009) recognized social networks as being valuable to collaborative natural resources management by allowing for enhanced communication and the transfer of knowledge and information, mobilization of critical resources, enforcement of rules, and conflict resolution. Lauber et al. (2008) identified several additional functions of social networks including providing funds, providing other tangible resources, and exerting influence.

Social Network Theory has also been used for network creation by way of maximizing participation from marginalized subgroups and maximizing efficiency of communication and engagement efforts (Bodin & Crona, 2009). Prell et al. (2009) demonstrated the utility of Social Network Theory within stakeholder analysis to help identify stakeholder categories, ensure key groups are not marginalized, and specify representatives that are well connected.

6.4.3 The Role of Cultural Worldview in Natural Resource Management

A review of the application of Social Network Theory to natural resource management has demonstrated the importance of knowing the structure of a network and how relationships facilitate the flow of information. Recent research using cultural cognition has emphasized the importance of relationship content and has shown that individuals are inclined to believe an argument if it reinforces their relationship to others whom they share important cultural ties with, even in the face of sound scientific "evidence" (Kahan, 2010). Cultural cognition also influences the way that individuals interpret new information. New information tends to be interpreted in a biased way that reinforces the current values they hold and the current values of their peers (Kahan, 2010). Kahan et al. have called this phenomenon a "culture war" over empirical data (Kahan, Braman, Slovic, Gastil, & Cohen, 2007). These findings are of particular importance to the transfer of information regarding conservation practices since when an individual encounters new technical or scientific information that is beyond the scope of their knowledge (as is often the case with information regarding environmental risks), they rely on the interpretation of experts whom they deem to be credible.

Our findings are in line with cultural cognition research by Kahan et al. (2011) supporting that individuals tend to search out information and experts agreeable to their cultural predispositions. Additionally, research by Kahan et al. (2010) has found that cultural cognition operates in the selection of credible experts, resulting in the individual selecting experts whom they perceive to share their values and the values of their peers and denying credibility and trustworthiness to experts whose values they perceive to be different than their own. This may have real consequences for the formation of relationships between agricultural producers and conservation professionals within Whitman County and the resulting structure of the network of relations dictating the flow of information.

6.4.4 Recommendations for Practical Application of Social Network Theory and Cultural Cognition

Conservation professionals on the Palouse interested in increasing dissemination of information related to conservation practices, will find utility in the application of cultural cognition as a lens to a traditional Social Network Theory approach. Cultural cognition coupled with Social Network Theory demonstrates the need to not only examine the structure of the network of relationships that dictate the transfer of conservation related information, but to increase the degree of

attention given to communication style. Research by Kahan et al. (2011) suggests that cultural cognition motivates individuals of all cultural value orientations to select experts and believe information that reinforces their cultural predispositions. Consequently, conservation related information must be both scientifically sound and culturally relevant. The real world implication of this recommendation is that conservation professionals must focus on both the cultural meaning and the scientific content of the information they are disseminating.

Several promising communication strategies identified by cultural cognition research have practical application to the implementation of conservation practices. These communication strategies include identity affirmation, narrative framing, and pluralistic advocacy. First, since individuals tend to dismiss information that threatens their cultural values, an identity affirmation communication strategy presents information in such a way that the information affirms their cultural values so that individuals are more likely to consider the information open-mindedly. Second, since narratives have been found to be powerful in shaping beliefs and actions, a narrative framing communication strategy allows messages to be constructed in ways that assure that the content of information received by individuals of diverse cultural groups is given equal consideration (Jones & McBeth, 2010; Kahan, Jenkins-Smith, & Braman, 2011).

Lastly, as a result of an individual's tendency to reject information inconsistent with their current cultural values if they perceive it is being advocated by experts which they perceive to have opposing cultural values, a pluralistic advocacy communication strategy suggests that individuals will be more open-minded to information and consequently more willing to accept it, if the information is presented by experts of diverse cultural values. Additionally, an individual who encounters advocates who hold similar values but are willing to take unexpected positions on issues that would traditionally be contrary to their own persuasion, may come to see that position as being acceptable for someone with their values to hold. Consequently, they may be less likely to form the subconscious impression that taking such a position will alienate them from their peers. In such a situation, an individual may be more likely to consider the merits of an argument that runs contrary to their cultural predispositions (Kahan et al., 2007). Practically speaking, there is a need to have a greater diversity of actors, holding diverse cultural values, distributing the message of conservation. Information regarding conservation practices needs to be delivered to producers by individuals whom they perceive to share similar cultural values.

6.4.5 Additional Research Needs

Supplemental research focusing on actual implementation of conservation practices as related to effectiveness of information dissemination is needed. This would provide conservation professionals with information regarding how networks of relationships and perceived cultural values may be modified in order to foster the relationships needed to increase the level and success of implementation of conservation practices.

Future research should focus on providing an understanding of how the structure of relationships and the cultural values of actors within the network facilitate or inhibit the implementation of conservation practices. A comprehensive understanding of factors influencing the implementation of conservation practices will require research that both looks at the structure of the network and the content of relationships within the network. Additionally, future research should investigate the relative explanatory weight of cultural cognition alongside other potential factors related to producer selection of information sources.

Acknowledgements

Great appreciation and gratitude go to the following individuals and organizations for their contributions: Palouse-Rock Lake Conservation District, Palouse Conservation District, Whitman Conservation District, and Pine Creek Conservation District for support and design feedback; Britta Carr for survey data entry and interview transcription; and Taryn Longberry for interview transcription.

References

Azarian, R. (2010). Social ties: Elements of a substantive conceptualization. Acta Sociologica, 53(4), 323–338.

Bodin, Ö., & Crona, B. I. (2009). The role of social networks in natural resource governance: What relational patterns make a difference? Global Environmental Change, 19(3), 366–374.

Boie, J. A. (2013). The influence of cultural worldview and networks of relationships on implementation of conservation practices in Whitman County, Washington. University of Idaho.

Chiffoleau, Y. (2005). Learning about innovation through networks: The development of environment-friendly viticulture. Technovation, 25(10), 1193–1204.

Conley, T., & Udry, C. (2001). Social learning through networks: The adoption of new agricultural technologies in Ghana. American Journal of Agricultural Economics, 83(3), 668–673.

Coughenour, C. M. (2003). Innovating conservation agriculture: The case of no-till cropping. Rural Sociology, 68(2), 278–304.

Crona, B. I., & Bodin, Ö. (2006). What you know is who you know? Communication patterns among resource users as a prerequisite for co-management. Ecology and Society, 11(2).

Dillman, D. A. (2000). Mail and internet surveys: The tailored design method. New York: J. Willey.

Dillman, D. A., & Carley-Baxter, L. R. (2000). Structural determinants of survey response rate over a 12 year period, 1988-1999. In Proceedings of the section on survey research methods (pp. 394–399). Washington, D.C.: American Statistical Association.

Genskow, K. D., & Wood, D. M. (2011). Improving voluntary environmental management programs: Facilitating learning and adaptation. Environmental Management.

Hahn, T., Schultz, L., Folke, C., & Olsson, P. (2008). Social networks as sources of resilience in social-ecological systems. In J. Norberg & G. S. Cumming (Eds.), Complexity theory for a sustainable future (pp. 119–144). New York: Columbia University Press.

Henrich, J. (2001). Cultural transmission and the diffusion of innovations: Adoption dynamics indicate that biased cultural transmission is the predominate force in behavioral change. American Anthropologist, 103(4), 992–1013.

Jones, M. D., & McBeth, M. K. (2010). A narrative policy framework: Clear enough to be wrong? Policy Studies Journal, 38(2), 329–353.

Kahan, D. M. (2010). Fixing the communications failure. Nature, 463(7279), 296–7.

Kahan, D. M. (2011). Cultural Cognition Worldview Scales (CCWS)- long and short forms. Retrieved February 10, 2011, from http://sjdm.org/dmidi/Cultural Cognition Worldview Scales.html

Kahan, D. M. (2012). Cultural cognition as a conception of the cultural theory of risk. In Handbook of Risk Theory (pp. 725–759). Springer Netherlands.

Kahan, D. M., Braman, D., Cohen, G. L., Gastil, J., & Slovic, P. (2010). Who fears the HPV vaccine, who doesn't, and why? An experimental study of the mechanisms of cultural cognition. Law and Human Behavior, 34(6), 501–516.

Kahan, D. M., Braman, D., Slovic, P., Gastil, J., & Cohen, G. (2007). The second national risk and culture study: Making sense of—and making progress in—the American culture war of fact.

Kahan, D. M., Jenkins-Smith, H., & Braman, D. (2011). Cultural cognition of scientific consensus. Journal of Risk Research, 14(2), 147–174.

Kahan, D. M., Peters, E., Braman, D., Slovic, P., Wittlin, M., Ouellette, L. L., & Mandel, G. (2011). The Tragedy of the risk-perception commons: Culture conflict, rationality conflict, and climate change. Cognition.

Kahan, D. M., Slovic, P., Braman, D., & Gastil, J. (2006). Fear and Democracy: A cultural evaluation of Sunstein on risk. Harvard Law Review, 119, 1071–1109.

Kok, H., Papendick, R. I., & Saxton, K. E. (2009). STEEP: Impact of long-term conservation farming research and education in Pacific Northwest wheatlands. Journal of Soil and Water Conservation, 64(4), 253–264.

Krebs, V., & Holley, J. (2004). Building sustainable communities through social network development. The Nonprofit Quarterly, Spring, 46–53.

Lauber, T. B., Decker, D. J., & Knuth, B. A. (2008). Social networks and community-based natural resource management. Environmental Management, 42, 677–687.

Lazersfeld, P. F., & Merton, R. K. (1954). Friendship as a social process: A substantive and methodological analysis. In M. Berger (Ed.), Freedom and control in modern society (pp. 18–66). New York: Van Nostrand.

Leech, N. L., & Onwuegbuzie, A. J. (2011). Beyond constant comparison qualitative data analysis: Using NVivo. School Psychology Quarterly, 26(1), 70–84.

Lubell, M., & Fulton, A. (2007). Local policy networks and agricultural watershed management. Journal of Public Administration Research and Theory, 18(4), 673–696.

McIllwain, J. S. (1999). Organized crime: A social network approach. Crime, Law & Social Change, 32, 301–323.

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2009). Birds of a feather: Homophily in social networks. Annual Review of Sociology, 27(2001), 415–444.

Miles, B. M., & Huberman, A. M. (1994). Qualitative data analysis (2nd ed.). Thousand Oaks, CA: Sage Publications.

Napier, T. L., & Tucker, M. (2001). Use of soil and water protection practices among farmers in three Midwest watersheds. Environmental Management, 27(2), 269 –279.

Onwuegbuzie, J. A., & Teddlie, C. (2003). A framework for analyzing data in mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), Handbook of mixed methods in social and behavioral research. Thousand Oaks, CA: Sage Publications.

Pennings, J. M. E., Irwin, S. H., & Good, D. L. (2002). Surveying farmers: A case study. Review of Agricultural Economics, 24(1), 266–277.

Prell, C., Hubacek, K., & Reed, M. (2009). Stakeholder analysis and social network analysis in natural resource management. Society & Natural Resources, 22, 501–518.

Ritzer, G. (2011). Sociological theory (8th ed.). New York: McGraw-Hill.

Rogers, E. M., & Bhowmik, D. K. (1970). Homophily-Heterophily: Relational concepts for communication research. The Public Opinion Quarterly, 34(4), 523–538.

Sandström, A., & Rova, C. (2010). The network structure of adaptive governance: a single case study of a fish management area. International Journal, 4(1), 528–551.

Schneider, F., Steiger, D., Ledermann, T., Fry, P., & Rist, S. (2010). No-tillage farming: Co-creation of innovation through network building. Land Degradation & Development.

USDA National Agricultural Statistics Service. (2007). County profile: Whitman County – Washington.

Wasserman, S., & Faust, K. (1994). Social network analysis: Methods and applications. New York: Columbia University Press.

Wellman, B. (1983). Network analysis: Some basic principles. Sociological Theory, 1(1), 155–200.

Chapter 7: Summary and Conclusions

The research presented in this dissertation employed a novel theoretical framework which combined cultural cognition with Social Network Theory to address the overarching research question, "how do cultural worldview and networks of relationships influence selection of information sources and implementation of conservation practices?" Specific objectives met by this study include describing the cultural worldviews of producers and agricultural information sources within Whitman County, Washington; the influence of cultural worldview on producer selection of agricultural information sources; and the influence of cultural worldview on producer likelihood of implementation of conservation practices.

The research approach was developed in response to recent recommendations regarding a call to re-focus Social Network Theory on social relationships as a central theoretical concept. This research employed a theoretical framework which used cultural cognition to further examine the role of homophily within Social Network Theory. In this approach, cultural cognition was employed as a lens to view the influence of social forces on social relationships and the ability of social forces to shape an actor's choice of individual information sources. Our approach focused on the influence of cultural worldview on the selection of information sources and as a factor influencing homophily within network structure. The theoretical approach advanced through this research provides a theoretical contribution to understanding the factors facilitating the formation of ties between actors in a social network by providing a new look at how cultural worldview may influence the formation and structure of agricultural producers' social networks within Whitman County, Washington.

The use of the combined framework sheds new light regarding information transfer within agricultural communities. Our findings indicate that the majority of producers within Whitman County fall within the "hierarchical individualists" (type 1) worldview type and they are more likely to choose individual agricultural information sources who hold the same cultural worldview as themselves (H2). Our research findings are consistent with research by Kahan et al. (2010) which has found that cultural cognition operates when an individual is evaluating an expert for credibility. Perception of expert credibility is influenced by an individual's readiness to trust experts who they perceive as sharing their cultural values and distrust experts who they perceive as not sharing their

cultural values (Kahan, Jenkins-Smith, & Braman, 2011). This mechanism results in the individual selecting experts whom they perceive to share their values and the values of their peers.

The operation of cultural cognition within producers selecting information sources about production practices, conservation practices, funding/cost share, and regulatory information, has real implications for local Whitman County information sources as they are significantly more likely than producers to fall within the worldview type classified as “egalitarian communitarians” (type 4). This increased diversity of worldview types within the information sources is even further compounded within the information sources classified as “conservation information sources” and “university affiliated information sources” since they are significantly less likely to fall in the “hierarchical individualism” (type 1) worldview type and significantly more likely to fall within the “egalitarian communitarianism” (type 4) worldview type (H1).

Additionally, this study looked at the cultural worldview of different agricultural producers and their resultant likelihood of implementation of conservation practices. The theoretical foundations of cultural cognition posit the likelihood of individuals falling within the “egalitarian communitarianism” (type 4) world view to be less inclined to dismiss evidence of environmental risks and thus more motivated toward conservation behavior. Our findings suggest that while cultural cognition may be an indicator for environmental risk perception and consequently attitudes toward conservation, there was no difference in actual behavior of producers of different worldview types as measured by the number or types of conservation practices implemented (H3 and H4).

The major factors influencing the implementation of conservation practices within Whitman County, Washington, were investigated by providing agricultural producers an opportunity to directly share their attitudes towards conservation practices and explanations for why they do or do not implement conservation practices. Through their interviews, producers candidly shared their feelings and perspectives. The themes and sub-themes that emerged from producer interviews to explain both implementation and non-implementation of conservation practices were both rich in content and broad in scope (see Figure 7.1and Figure 7.2).

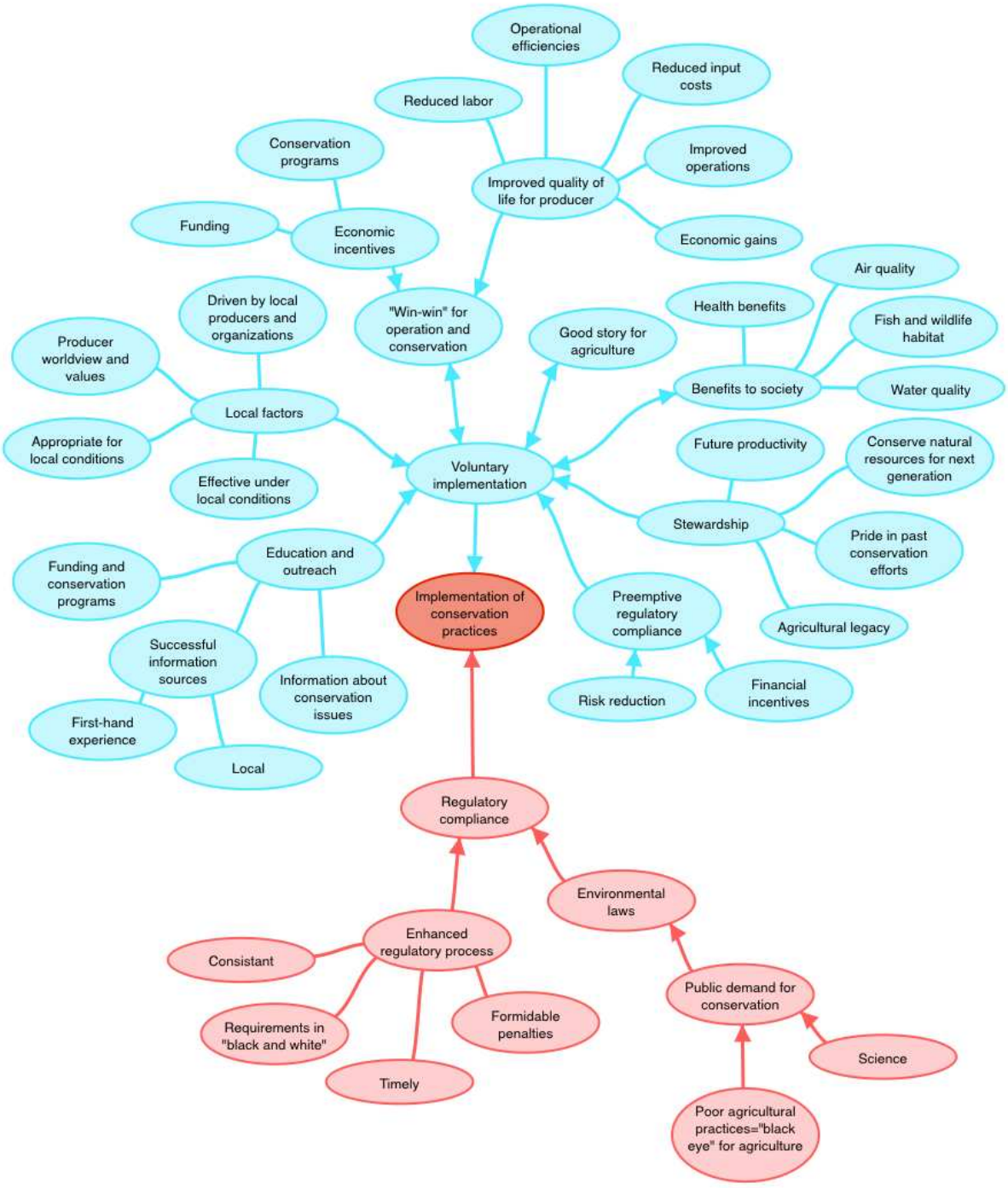

Figure 7.1. Summary map of themes and sub-themes identified to influence the implementation of conservation practices in Whitman County, WA.

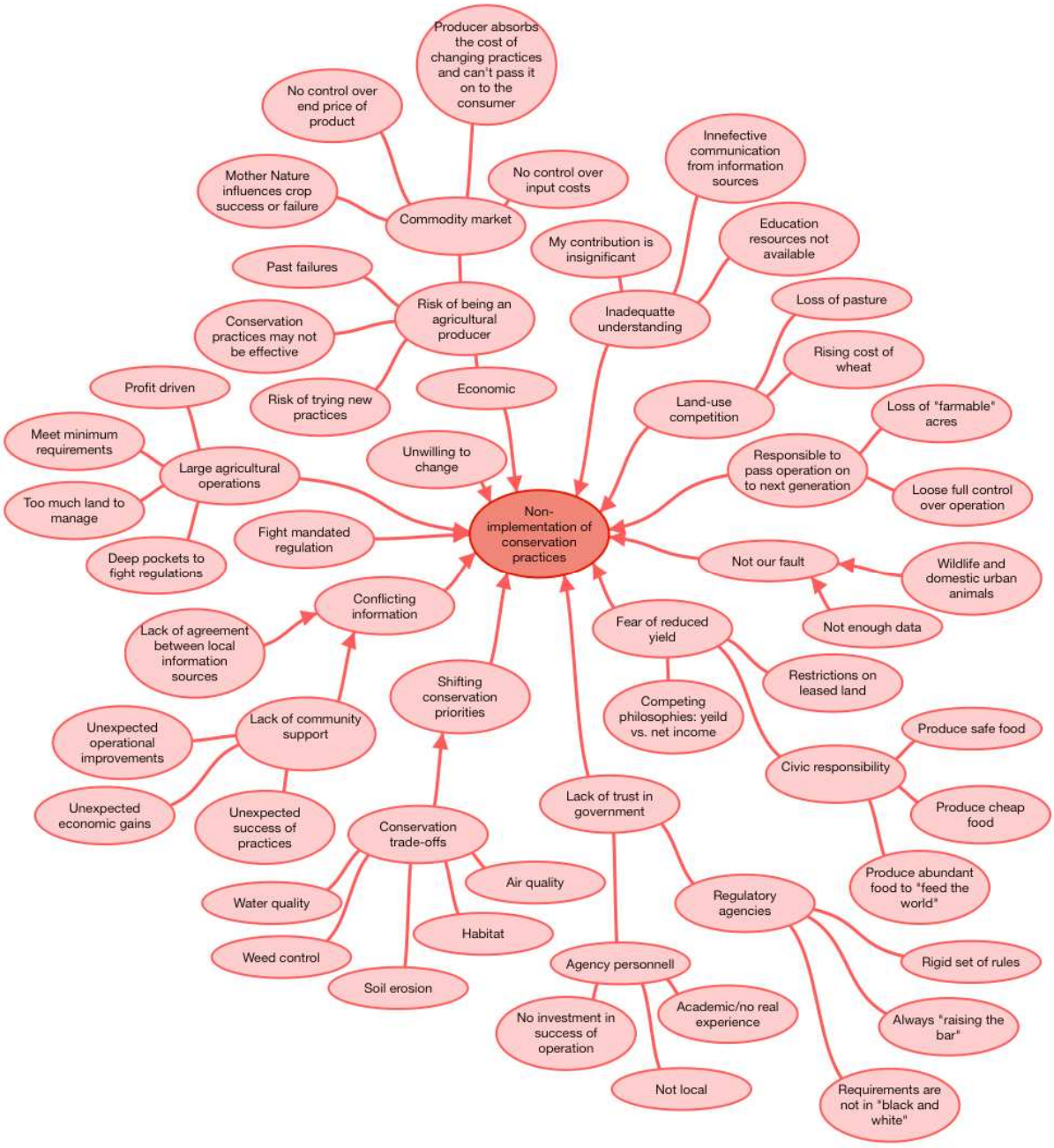

Figure 7.2. Summary map of themes and sub-themes identified to influence the non-implementation of conservation practices in Whitman County, WA.

Themes related to voluntary implementation of conservation practices were found to be more complex than those related to regulatory compliance. Producers identified several key conditions necessary for a successful voluntary approach to conservation practice implementation including adequate incentives for participation and the existence of a strong regulatory component for producers who do not engage under the voluntary system. As suggested by producers in this study, credibility will only be achieved by a regulatory approach that clearly states conservation compliance requirements based on adequate data and monitoring. Additionally, producers emphasized that the regulatory process must be executed through a process that is consistent and timely, and that regulatory agencies must be willing to impose penalties that are formidable in the event of non-compliance.

This study was designed with a focus on providing practical application for both producers and conservation professionals in Whitman County. Elements of the research presented in this dissertation that lend insight for practical application include: a description of the influence of cultural worldview on relationships and transfer of information; a description of current networks of relationships; recommendations regarding how relationships can be strengthened to provide producers better access to information; and a better understanding of factors influencing implementation of conservation practices in Whitman County, Washington.

References

Kahan, D. M., Braman, D., Cohen, G. L., Gastil, J., & Slovic, P. (2010). Who fears the HPV vaccine, who doesn't, and why? An experimental study of the mechanisms of cultural cognition. Law and Human Behavior, 34(6), 501–516.

Kahan, D. M., Jenkins-Smith, H., & Braman, D. (2011). Cultural cognition of scientific consensus. Journal of Risk Research, 14(2), 147–174.

Appendix A

Protocol Approval Letter from the University of Idaho Institutional Review Board

University of Idaho

January 12, 2012

Office of Research Assurances
Institutional Review Board
PO Box 443010
Moscow ID 83844-3010

Phone: 208-885-6162
Fax: 208-885-5752
irb@uidaho.edu

To: Sanyal, Nick
Cc: Boie, Jennifer

From: Traci Craig, PhD
Chair, University of Idaho Institutional Review Board
University Research Office
Moscow, ID 83844-3010

IRB No.: IRB00000843

FWA: FWA00005639

Title: 'The Influence of Cultural Worldview and Networks of Relationships on Implementation of Conservation Practices in Whitman County, WA '

Project: 11-112
Approved: 01/10/12
Expires: 01/09/13

On behalf of the Institutional Review Board at the University of Idaho, I am pleased to inform you that the protocol for the above-named research project is approved as offering no significant risk to human subjects.

This approval is valid for one year from the date of this memo. Should there be significant changes in the protocol for this project, it will be necessary for you to resubmit the protocol for review by the Committee.

Traci Craig

Traci Craig

Appendix B

Cover letter and questionnaire sent to all principal farm operators in Whitman County, Washington

University of Idaho
College of Natural Resources

P.O. Box 441139
Moscow, Idaho 83844-1139

January 2012

Dear Whitman County Farm Operator:

I am writing to ask for your help with an important study on the implementation of agricultural conservation practices in Whitman County. My purpose is to learn about:

- Your unique Whitman County farm operation
- Your particular motivations related to implementation or non-implementation of conservation practices on your Whitman County Farm
- Your sources of information regarding production practices, conservation practices, funding/cost share, and regulatory information

The information you provide will assist agricultural professionals in offering services that are most responsive to your needs. This survey is part of an effort that will result in providing farm operators better access to information resulting in the protection of resources that are valuable to your farm operation and the future of farming on the Palouse.

All principle farm operators in Whitman County have been contacted and asked to participate in this important study. Your response is important in helping us get accurate and meaningful results. Because your farm operation is unique, your response is essential in order to ensure that your farm operation is represented.

Please complete the enclosed questionnaire entirely. Your response to every question is important *(partially completed questionnaires will not provide adequate information and will not be usable in this study)*. In order to reduce the costs associated with mailing and printing, please return your completed questionnaire by **February 6, 2012**, in the postage-paid return envelope. If you have not responded within 2-weeks, I will send you an additional paper questionnaire along with an additional postage-paid return envelope for your convenience.

The questionnaire should take about 20 minutes to complete. Your participation is voluntary, and your answers will be kept strictly **confidential**. Your name will never be attached to the survey itself, nor will it ever be associated with your responses.

As a small token of appreciation, participants who return completed questionnaires, will be eligible to be entered into a lottery to receive a cash gift card *(please include your contact information on the detachable contact card on the last page of the questionnaire and return it along with your completed questionnaire in the postage-paid return envelope)*.

I will be happy to answer any questions you have about the study. You can contact me at the University of Idaho by email at jenniferb@uidaho.edu.

Sincerely,

Jennifer Boie
Graduate Student
University of Idaho
College of Natural Resources

Understanding Implementation of Agricultural Conservation Practices in Whitman County

Conducted by:
College of Natural Resources
University of Idaho

Please return this completed questionnaire in the prepaid return envelope by **February 6, 2012**

Thank you for your participation. Your response is important.
The information you provide will be used for research purposes, but your responses will we both **confidential** and **anonymous**.

1. How important do you think the implementation of conservation practices is for soil conservation on the Palouse?
(Please circle one response)

Extremely Important	Quite Important	Moderately Important	Somewhat Important	Not Important

2. How important do you think the implementation of conservation practices is for protecting water quality on the Palouse?
(Please circle one response)

Extremely Important	Quite Important	Moderately Important	Somewhat Important	Not Important

3. How supportive is your local community in supporting your use of conservation practices?
(Please circle one response)

Very Supportive	Supportive	Neither Supportive Nor Unsupportive	Unsupportive	Very Unsupportive

4. The following question asks about the implementation of conservation practices on your Whitman County farm:
*(Please **mark** ☒ all practices that you currently use on your farm)*

		Practice used in 2011
A.	Grazing lands/pasture management	☐
B.	Riparian exclusion fencing	☐
C.	Off-site water development	☐
D.	Nutrient management	☐
E.	Riparian buffer	☐
F.	Pest management	☐
G.	Cover crop (seasonal)	☐
H.	Conservation cover (permanent vegetation)	☐
I.	Critical area planting	☐
J.	Windbreaks	☐
K.	Residue management, strip till	☐
L.	Residue management, mulch till (stubble busting, mowing, shredding)	☐
M.	Conservation crop rotation	☐
N.	Terraces	☐
O.	Contour farming	☐
P.	Divided slope farming	☐
Q.	Direct seed, no-till	☐
R.	Direct seed, two-pass	☐
S.	Direct seed fallow/chemical fallow	☐
T.	Upland wildlife habitat management	☐
U.	Sediment basins/gully plugs	☐
V.	Grass filter strips	☐
W.	Grassed waterways	☐
X.	Contour buffer strips	☐
Y.	Other (Please specify): _____	☐
Z.	Other (Please specify): _____	☐
AA.	Other (Please specify): _____	☐
BB.	Other (Please specify): _____	☐

5. If you do implement conservation practices, please tell us why:

6. If you do not implement conservation practices, please tell us why:

7. The following question asks about what programs you are currently enrolled in:
*(Please **mark** ☒ all programs that you are currently enrolled in)*

			Currently enrolled
A.	EQIP (Environmental Quality Incentives Program)		☐
B.	CSP (Conservation Stewardship Program)		☐
C.	WHIP (Wildlife Habitat Incentive Program)		☐
D.	CRP (Conservation Reserve Program)		☐
E.	Conservation easement		☐
F.	CL (Conservation Loan)		☐
G.	SURE (Supplemental Revenue Assistance Program)		☐
H.	DCP (Direct and Counter-cyclical Program)		☐
I.	ACRE (Average Crop Revenue Election)		☐
J.	MPCI (Multiple Peril Crop Insurance)		☐
K.	Revenue protection (previously called CRC)	What level of coverage? ___ % (50-85 %)	☐
L.	Yield protection	What level of protection? ___ % (50-85 %)	☐
M.	Crop/Hail/Fire		☐
N.	Other (Please specify): _____		☐
O.	Other (Please specify): _____		☐
P.	Other (Please specify): _____		☐

8. If you do participate in programs, please tell us why:

9. If you do not participate in programs, please tell us why:

10. Approximately, how much rainfall does your farm receive annually? *(Please **mark** ☒ all that apply)*
☐ Less than 10 inches/yr ☐ 10"-14"/yr ☐ 15"-17"/yr ☐ more than 18"/yr

11. Do you have an open watercourse such as a stream or ditch on or adjacent to your farm? ☐ Yes ☐ No

12. What is the total size of your Whitman County farm? _____acres
Acres owned:_____acres

Acres leased: _____acres

If you lease land, what percentage of the landowners live in or near Whitman County? _____%

13. Do you use GPS /precision farming? *(Please **mark** ☒ one response)* ☐ Yes ☐ No

14. Do you use variable rate technology? *(Please **mark** ☒ one response)* ☐ Yes ☐ No

15. If you use technology on your farm operation, please describe below:

16. What is the gross income for your farm? *(Please **mark** ☒ one response)*

☐ Less than $10,000
☐ $10,000-$24,999
☐ $25,000-$49,999
☐ $50,000-$99,999
☐ $100,000-$249,999
☐ $250,000-$499,999
☐ $500,000-$999,999
☐ $1,000,000or more

17. Which of the following best describes your farm operation? *(Please **mark** ☒ one response)*

☐ Sole Proprietorship
☐ Cooperation
☐ Partnership
☐ Family Limited Partnership
☐ Family Corporation
☐ Limited Liability Partnership
☐ Limited Liability Company
☐ Other_____

18. What is the net income for your share of the farm? *(Please **mark** ☒ one response)*

☐ Less than $5,000
☐ $5,000 - $9,999
☐ $10,000 - $14, 999
☐ $15,000 - $19, 999
☐ $20,000 - $24, 999
☐ $25,000 - $29, 999
☐ $30,000 - $34, 999
☐ $35,000 - $39, 999
☐ $40,000 - $49,999
☐ $50,000 - $74,999
☐ $75,000 - $99,999
☐ $100,000 - $249,999
☐ $250,000 or more

19. What are approximate sources of your farm income?
(Please estimate the average of your farm income over the past 3 years)

_____% of farm income from livestock

_____% of farm income from conventional tillage

_____% of farm income from direct seed/no till

_____% Other (Please specify): _____

20. Did someone in your family farm this land prior to you? *(Please **mark** ☒ one response)* ☐ Yes ☐ No
(If YES, please answer questions 21, 22 and 23. If NO, please skip to question 24)

21. How many years has this land been in your family? _____years

22. How many years have you personally been farming this land? _____years

23. Your decision to implement conservation practices is influenced by past family farming practices?
(Please circle one response)

Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree

24. Implementation of conservation practices on my Whitman County farm does/would have the following economic impact:
(Please circle one response):

Greatly increase profits	Somewhat increase profits	Have no economic impact	Somewhat decrease profits	Greatly decrease profits

25. Please mark the approximate location(s) of your farm operation on the map below and check the box(s) to indicate what conservation district(s) your farm operation is in: (Please ***mark*** ☒ *all that apply*)
☐ Palouse Conservation District ☐ Palouse-Rock Lake Conservation District
☐ Pine Creek Conservation District ☐ Whitman Conservation District

26. The following are questions about your sources of information:
We are interested in the pattern of information transfer within agricultural communities. These questions will help us to understand how you gain information about production practices, conservation practices, funding/cost share, and regulatory information,

Who did you rely on over the past 12 months (at local or regional levels) to gain information regarding production practices, conservation practices, funding/cost share, and regulatory information? Individuals identified may include institutional sources (federal, state, county, local, etc.) or non-institutional sources of information (friends, neighbors, local merchants, etc.)

If you have had contact with individuals other than those listed, please select OTHER and provide the name in the spaces provided below the table. *(Please **mark** ☒ all information sources that apply to you)*

Source of Information	Name of primary individual worked with (please provide first and last name)	Frequency of contact	Direction of contact
☐ NRCS	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ Palouse Conservation District	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ Palouse-Rock Lake Conservation District	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ Pine Creek Conservation District	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ Whitman Conservation District	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ WSU Extension	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ WSU Faculty, Programs or Departments	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ U of I Extension	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ U of I Faculty, Programs, or Departments	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ Whitman Cattlemen's Association	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ Pacific NW Direct Seed Association	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally

This individual provides information regarding:	Information provided is:	Years you have known this contact	Why do you work with this individual?	Will you seek out this individual in the future?
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:______________	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:______________	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not

Source of Information	Name of primary individual worked with (please provide first and last name)	Frequency of contact	Direction of contact
☐ WA Assn. of Wheat Growers	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ FSA	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ Capital Press	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ Whitman Co. Farm Bureau	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ Department of Ecology	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ McGregor's	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ NuChem	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ Crop Production Service	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ Family member	**Address:** **(Information used for identification, individual will not be contacted)**	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ Other farmer	**Address:** **(information used for identification, individual will not be contacted)**	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally
☐ Other source (please specify): _____	_____ _____	☐ Weekly ☐ Monthly ☐ Quarterly ☐ Once every 6 months ☐ Once a year	☐ I initiated contact ☐ The other person initiated contact ☐ Initiated by both of us equally

This individual provides information regarding:	Information provided is:	Years you have known this contact	Why do you work with this individual?	Will you seek out this individual in the future?
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not
☐ Production practices ☐ Conservation practices ☐ Funding/cost share available ☐ Regulatory information ☐ Other:_______________	☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Inadequate	____years	☐ Information is reliable ☐ This person shares similar values to me ☐ Individual is accessible ☐ Other:_______________	☐ Extremely likely ☐ Fairly Likely ☐ Somewhat Likely ☐ Not Likely ☐ Definitely Not

27. People in our society often disagree about how far to let individuals go in making decisions for themselves. How strongly do you agree or disagree with each of these statements? *(Please circle one response for each statement)*

A.	Government should put limits on the choices individuals can make so they don't get in the way of what's good for society.	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
B.	Sometimes government needs to make laws that keep people from hurting themselves.	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
C.	The government should stop telling people how to live their lives.	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
D.	The government interferes far too much in our everyday lives.	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
E.	The government should do more to advance society's goals, even if that means limiting the freedom and choices of individuals.	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
F.	It's not the government's business to try to protect people from themselves.	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

28. People in our society often disagree about issues of equality and discrimination. How strongly you agree or disagree with each of these statements? *(Please circle one response for each statement)*

A.	It seems like blacks, women, homosexuals and other groups don't want equal rights, they want special rights just for them.	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
B.	Our society would be better off if the distribution of wealth was more equal.	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
C.	We need to dramatically reduce inequalities between the rich and the poor, whites and people of color, and men and women.	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
D.	Discrimination against minorities is still a very serious problem in our society.	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
E.	Society as a whole has become too soft and feminine.	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
F.	We have gone too far in pushing equal rights in this country.	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

29. Some final questions about you:

A. In what year were you born? Year born: _____

B. What is your gender? *(Please **mark** ☒ one response)*

☐ Male ☐ Female

C. How long have you been farming? _____ Number of years

D. What best describes your highest level of education? *(Please **mark** ☒ one response)*

- ☐ Less than 12th grade
- ☐ High school graduate or GED
- ☐ Some college, no degree
- ☐ 2-year college degree (Associate's, Technical, etc.)
  Agriculture related degree? ☐ Yes ☐ No
- ☐ 4-year college degree (Bachelor's, etc.)
  Agriculture related degree? ☐ Yes ☐ No
- ☐ Graduate or Professional degree (Master's, Ph.D., etc.)
  Agriculture related degree? ☐ Yes ☐ No

E. What associations are you currently affiliated with or a member of? *(Please **mark** ☒ all that apply)*

- ☐ Whitman County Cattlemen's Association
- ☐ Pacific Northwest Direct Seed Association
- ☐ Washington Association of Wheat Growers
- ☐ Washington Grain Alliance
- ☐ Washington Dry Pea and Lentil Commission
- ☐ Western Pea and Lentil Growers Association
- ☐ Palouse Prairie Foundation
- ☐ Ducks Unlimited
- ☐ Pheasants Forever
- ☐ Trout Unlimited
- ☐ The Nature Conservancy
- ☐ Audubon Society
- ☐ Local Grange (please specify)_____
- ☐ Local co-op (please specify)_____
- ☐ Other_____
- ☐ Other_____

F. What percentage of your total income comes from farming? _____% of income is from farming

We would appreciate your answering the last questions. If, however you feel this is a private matter, we respect your decision not to answer.

G. Which of the following best describes your total family income from all sources in 2011, before taxes?
*(Please **mark** ☒ one response)*

- ☐ I'd rather not answer
- ☐ Less than $5,000
- ☐ $5,000 - $9,999
- ☐ $10,000 - $14, 999
- ☐ $15,000 - $19, 999
- ☐ $20,000 - $24, 999
- ☐ $25,000 - $29, 999
- ☐ $30,000 - $34, 999
- ☐ $35,000 - $39, 999
- ☐ $40,000 - $49,999
- ☐ $50,000 - $74,999
- ☐ $75,000 - $99,99
- ☐ $100,000 - $249,999
- ☐ $250,000 or more

H. Would you be willing to be contacted at a future date regarding this study? ☐ Yes ☐ No
(If you answered **YES**, please fill out your contact information on the back page)

I. Would you be willing to participate in an interview to provide further explanation of factors influencing the implementation of conservation practices in Whitman County? ☐ Yes ☐ No
(If you answered **YES**, please fill out your contact information on the back page)

J. If you have *fully completed* your questionnaire, you are eligible to be entered into a lottery to receive a cash gift card. Would you like to have your name entered into a lottery to receive a cash gift card? ☐ Yes ☐ No
(If you answered **YES**, please fill out your contact information on the back page)

Please use the space below to write any additional concerns or comments regarding implementation of conservation practices in Whitman County.

Thank you for your participation in this study!

Please return this completed questionnaire in the prepaid return envelope by **February 6, 2012**

Please detach this section and return it in the prepaid return envelope along with your completed questionnaire.
Your survey responses will remain both **confidential** and **anonymous.**

If you answered **YES** to question H, I, or J above, please provide us with your contact information for your preferred method of contact. *The information provided will not be associated with your responses on this survey, but will only be used to contact you in the future.*

Name:_____ Address_____

Phone:_____ Email:_____

Appendix C

Cover letter and on-line questionnaire e-mailed to information sources

Whitman County Ag Information Sources Survey

INTRODUCTION

A recent survey of all 875 Whitman County principal farm operators was conducted to inquire about their sources of information regarding production practices, conservation practices, funding/cost share, and regulatory information. You were identified by Whitman County farm operators as a source of such information. As an identified source of information for Whitman County farmers, we are asking for your participation in our study. Your response to every question is important *(partially completed questionnaires will not provide adequate information and will not be usable in this study)*.

Our research project, "Understanding Implementation of Agricultural Conservation Practices in Whitman County" aims to add to society's understanding of the social and community factors that influence the implementation of conservation practices. This project, I believe, addresses an important need for agricultural professionals and will, we hope, lead to more efficient and timely distribution of information from agencies and organizations in Whitman County.

One goal of our study is to learn how personal worldview plays into selection of information sources. Several of the questions included on the questionnaire may not seem to be related to agricultural practices. Some of the questions involve subject matter that may be regarded as controversial or inappropriate. They are important, however, for gaining a better understanding of how social perspectives and values influence the sources of information that individuals seek and trust when making individual decisions.

We selected the particular questions in this questionnaire (a measurement scale of cultural worldview) after an exhaustive search and after talking with leading researchers in the field. The questions were originally developed to understand the credibility of information sources used by the public. Others who have used this scale (at institutions including University of Washington, Oregon State University, University of Oregon, Yale, and Stanford) have studied public perceptions of or reactions to gun control, climate change, health care, disaster planning, water conservation, the acceptance of nanotechnology, and environmental risk perception. The scale has been shown to be a much stronger predictor of conservation behaviors than traditional measures of political ideology, age, gender, education level, personality type, race or the many other individual characteristics that have traditionally been used for similar research.

As a part of this study, all principal farm operators in Whitman County were contacted and asked to answer these same questions as an indication of overall worldview. We received responses from 258 farm operators (30% of the principal farm operators in Whitman County). As an overall goal, we would like to determine if farmers seek out information from individuals who share the same worldview as themselves. Ultimately, we will be looking to see if relationships are present between individuals of similar worldviews.

Whitman County Ag Information Sources Survey

YOUR PARTICIPATION

Your responses to all questions will be kept both anonymous and confidential. The data are not designed to stereotype people and the data collected will not be analyzed and reported as individual responses, nor will any of the data be identified with an individual. All scores will be added together to provide an indicator of overall worldview. The University of Idaho Institutional Review Board has approved this study. Completing the questionnaire is completely **voluntary**. The questionnaire should take less than 5 minutes to complete. Your answers will be kept strictly **confidential**. Your name will never be attached to the survey itself, nor will it ever be associated with your responses.

The information you provide will assist agricultural professionals in offering services and information that is most responsive to the needs of Whitman County farm operators. This research is part of an effort that will result in providing farm operators better access to information resulting in the protection of resources that are valuable to Whitman County farm operations and the future of farming on the Palouse.
I will be happy to answer any questions you have about the study. You can contact me at the University of Idaho by email at jenniferb@uidaho.edu.

Sincerely,

Jennifer Boie

Graduate Student
University of Idaho
College of Natural Resources

Whitman County Ag Information Sources Survey

How important do you think the implementation of conservation practices is for soil conservation on the Palouse?

(Please select one response)

- Extremely Important
- Quite Important
- Moderately Important
- Somewhat Important
- Not Important

How important do you think the implementation of conservation practices is for protecting water quality on the Palouse?

(Please select one response)

- Extremely Important
- Quite Important
- Moderately Important
- Somewhat Important
- Not Important

Whitman County Ag Information Sources Survey

People in our society often disagree about how far to let individuals go in making decisions for themselves. How strongly do you agree or disagree with each of these statements?

(Please select one response for each statement)

Government should put limits on the choices individuals can make so they don't get in the way of what's good for society.

- Strongly Disagree
- Moderately Disagree
- Slightly Disagree
- Slightly Agree
- Moderately Agree
- Strongly Agree

Sometimes government needs to make laws that keep people from hurting themselves.

- Strongly Disagree
- Moderately Disagree
- Slightly Disagree
- Slightly Agree
- Moderately Agree
- Strongly Agree

The government should stop telling people how to live their lives.

- Strongly Disagree
- Moderately Disagree
- Slightly Disagree
- Slightly Agree
- Moderately Agree
- Strongly Agree

Whitman County Ag Information Sources Survey

The government interferes far too much in our everyday lives.

- Strongly Disagree
- Moderately Disagree
- Slightly Disagree
- Slightly Agree
- Moderately Agree
- Strongly Agree

The government should do more to advance society's goals, even if that means limiting the freedom and choices of individuals.

- Strongly Disagree
- Moderately Disagree
- Slightly Disagree
- Slightly Agree
- Moderately Agree
- Strongly Agree

It's not the government's business to try to protect people from themselves.

- Strongly Disagree
- Moderately Disagree
- Slightly Disagree
- Slightly Agree
- Moderately Agree
- Strongly Agree

Whitman County Ag Information Sources Survey

People in our society often disagree about issues of equality and discrimination. How strongly you agree or disagree with each of these statements?

(Please select one response for each statement)

It seems like blacks, women, homosexuals and other groups don't want equal rights, they want special rights just for them.

- Strongly Disagree
- Moderately Disagree
- Slightly Disagree
- Slightly Agree
- Moderately Agree
- Strongly Agree

Our society would be better off if the distribution of wealth was more equal.

- Strongly Disagree
- Moderately Disagree
- Slightly Disagree
- Slightly Agree
- Moderately Agree
- Strongly Agree

We need to dramatically reduce inequalities between the rich and the poor, whites and people of color, and men and women.

- Strongly Disagree
- Moderately Disagree
- Slightly Disagree
- Slightly Agree
- Moderately Agree
- Strongly Agree

Whitman County Ag Information Sources Survey

Discrimination against minorities is still a very serious problem in our society.

- Strongly Disagree
- Moderately Disagree
- Slightly Disagree
- Slightly Agree
- Moderately Agree
- Strongly Agree

Society as a whole has become too soft and feminine.

- Strongly Disagree
- Moderately Disagree
- Slightly Disagree
- Slightly Agree
- Moderately Agree
- Strongly Agree

We have gone too far in pushing equal rights in this country.

- Strongly Disagree
- Moderately Disagree
- Slightly Disagree
- Slightly Agree
- Moderately Agree
- Strongly Agree

Whitman County Ag Information Sources Survey

Some final questions about you:

In what year were you born? (enter 4-digit birth year; for example, 1956)

What is your gender?

- Female
- Male

How long have you been working with farm operators in Whitman County?
Number of years:

What best describes your highest level of education?

(Please select one response)

- Less than 12th grade
- High school graduate or GED
- Some college, no degree
- 2-year college degree (Associate's, Technical, etc.)
- 4-year college degree (Bachelor's, etc.)
- Graduate or Professional degree (Master's, Ph.D., etc.)

If your answer to the previous question was 2-year college degree, 4-year college degree, or Graduate or Professional degree, was your degree agriculture related?

- Yes
- No

Whitman County Ag Information Sources Survey

Would you be willing to be contacted at a future date regarding this study?
(If you answer YES, please fill out your contact information below)

- Yes
- No

Would you be willing to participate in an interview to provide further explanation of factors influencing the implementation of conservation practices in Whitman County?
(If you answer YES, please fill out your contact information below)

- Yes
- No

If you answered YES to either question above, please provide us with your contact information for your preferred method of contact. The information provided will not be associated with your responses on this survey, but will only be used to contact you in the future.

Name:

Address:

Phone:

Email:

Whitman County Ag Information Sources Survey

Please use the space below to write any additional concerns or comments regarding implementation of conservation practices in Whitman County.

Thank you for your participation in this study!

Your survey responses will remain both confidential and anonymous.

Appendix D

Interview guide for interviews conducted with producers in Whitman County, Washington

Interview Guide

Understanding Implementation of Agricultural Conservation Practices in Whitman County

Contact: Jennifer Boie, Graduate Student in College of Natural Resources
at University of Idaho, jenniferb@uidaho.edu

Introduction: project description, recording system, confidentiality, and copy of interview guide

About farming practices/conservation practices:

1. Tell me a little bit about your farm and farm practices.
2. How would you define what conservation practices are?
3. Do you implement conservation practices?
4. Which conservation practices are aimed at soil conservation and which are aimed at protection of water quality? What other conservation benefits are achieved?
5. Why do you implement or not implement conservation practices?
6. Do you feel compelled to implement conservation practices because of conservation messages that appeal to public benefits?
7. How does government regulation vs. government involvement (funding and support) influence your decisions regarding implementation of conservation practices?
8. Are you more inclined to implement conservation practices if they are mandatory vs. voluntary?
9. Why do you think other farmers implement or not implement conservation practices?
10. Do you think there is a need for greater local implementation of conservation practices?
11. What other factors do you think facilitate or discourage implementation of conservation practices?
12. Do you participate in any conservation programs? Why or why not?
13. Do you think that soil conservation is more important than protection of water quality? Why or why not?
14. In the survey that I distributed, most farm operators stated that reducing soil erosion was their main reason for implementing conservation practices? Do you think there is an overall belief that soil conservation is more important than water quality? Why or why not?
15. Is there more of a public or private responsibility for soil conservation?
16. Is there more of a public or private responsibility for water quality?

17. Review county map and identify location of farm and information sources. Where in Whitman County do you think most conservation practices are located taking place? Why?

About networks and information sources:

18. Where do you get your information regarding production practices, conservation practices, funding/cost share, and regulatory information?
19. What do you think the role is of informal vs. formal sources of information?
20. Could you explain what your relationship is like with these individuals?
21. Why do you choose these particular information sources?
22. What do you think the main factors are that influence whether or not two individuals will form a relationship?
23. Do you most often go to an individual looking for specific advice or do you often take unsolicited advice from informal contacts that you find credible?
24. Why do you think that other farmers choose to work with particular agricultural/conservation agents?
25. Do you think that these relationships are an important factor influencing whether conservation practices are implemented?
26. Do you think that local agricultural and conservation professionals play an important role in Whitman County?
27. Who do you think the most important single source of information for agriculture related information in Whitman County?

About values:

28. Review values map.
29. Self-description/classification of personal values.
30. What type of person would you seek out most often for information?
31. Would you seek out someone who has values opposite of you?
32. What are the values of the information sources you seek out (mark on values map).
33. Do you think that values influence who you seek out for information?
34. Do you give credibility to sources who you perceive to share the same values as you?

35. How do you think values influence the relationships between other farmers and the agricultural/conservation professionals they seek out?

Future of Conservation Practices in Whitman County:

36. What would you recommend to increase implementation of conservation practices in Whitman County?
37. What would be the one thing that would be most helpful to increase implementation of conservation practices in Whitman County?
38. Who do you recommend that I interview next?
    A.

    B.

    C.

    D.

    E.

End interview: Review of interview and review confidentiality.

Thank you for your participation!