

UNDERSTANDING THE ROLE OF SOCIAL VALUES IN RANCHLAND
MANAGEMENT DECISION-MAKING: COLLABORATIVE
RESEARCH WITH MONTANA RANCHERS

by

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A thesis submitted in partial fulfillment
of the requirements for the degree

of

Master of Science

in

Land Resources and Environmental Sciences

MONTANA STATE UNIVERSITY
Bozeman, Montana

April 2017

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ACKNOWLEDGEMENTS

I wish to extend my gratitude to Dr. Cliff Montagne for his dedication to my research and continued guidance. I want thank, Dr. Tracy Sterling, for the opportunity to pursue such a research project and contributing your time, direction, and thoughts. And, thank you Dr. Brody, for your instruction in developing the right tools for this work.

A big thank you to Dr. Lillian Lin, Andrea Mack, and Kenneth Flagg at Montana State University Statistical Consulting and Research Services.

I am immensely thankful for the opportunity to collaborate with ranchers across the state, as research participants, and for their contributions to my research. Their willingness to openly discuss their social values and what is important to them, made this research possible.

I am deeply appreciative and blessed by the continued support of Cliff and Joan Montagne, who have provided me with the social piece I needed to maintain motivation through the process of completing this work. And, thank you Julee Bellomo, for being my kindred spirit and sharing your light.

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ABSTRACT

Montana's ranching communities are considered socio-ecological systems (SES), a term which recognizes the role of the social component within a land-based whole. This component includes the decision-making process of ranchers, which is critical for building adaptability, resilience, and transformability (ART) for long-term sustainability. A tool for understanding decision-making process is Kolb's Learning styles which explains how decisions are made in three general stages of Feel-Think-Action. The Holistic Management (HM) decision-making framework, follows Kolb's process by providing a working framework for the Kolb's stages. The HM framework is commonly used by ranchers to manage SES dynamics, in ways that include positive SES benefits. Many measures exist for understanding how decision-making influences economic and ecological components of SESs, however, there are few measures or indicators for understanding the role of social values. Therefore, the objective of this study was to determine the extent to which social values identified by a case study group of HM ranchers are used by a general sample of ranchers. This project used a two-part, participatory collaborative action research – exploratory mixed-methods design to learn about the role of social values within ranchland management decision-making. Local knowledge partnered with science-based approaches connects common ground and social capital, leading to increased sustainability of SESs. Five HM ranching practitioners collaborated as case study participants. Discussions with each participant was social value focused, lasted 60-minutes, and was recorded. Collaboratively, 10 social values were identified which were held in common. Using the 10 identified social values from the discussions, a 20-question survey was created which included the 10 identified social values, with an underlying element of ART. The survey was administered to 50 ranchers in Eastern Montana via phone and took each participant approximately 10-12 minutes to complete. It was found that all ranchers use the Kolb's Feel-Think components in relationship to the ten identified social values, and HM case study ranchers were more likely and survey respondents were less likely to take Action on these social values. This research documents the role of social values and ART in ranchland management decision-making in ways that cannot be fully expressed when using conventional metrics.

CHAPTER ONE

INTRODUCTION

“We can't impose our will on a system. We can listen to what the system tells us, and discover how its properties and our values can work together to bring forth something much better than could ever be produced by our will alone.”

~ Donella H. Meadows, *Thinking in Systems: A Primer*

Montana ranching cultures are undergoing rapid changes with fluctuations in social, ecological, and economic conditions with which they interact. As such, they are part of regional, land-based ‘whole systems’ which extend into the fabrics of local and regional economies. Rancher decision making is key to their adaptability, resilience, and transformability which provides stability to these regional systems. This research examines the critical role of social values in rancher decision making.

Systems thinking involves sets of parts that are interconnected in relationships which create a whole (Capra 1996, Meadows 2008). As systems operate, they produce emerging properties which are complex, with the interactions between the parts of the whole producing a sum greater than the individual parts (Capra 1996, McGreavy, et al, 2015, Savory 1999). These parts are connected as interlocking wholes with components that cannot be managed in isolation (Capra 1996, Meadows 2008). Recognition of the complexity of the interactions within the system can lead to a heightened understanding of system function and improved land management decision-making.

Other aspects of systems thinking are the relationships between the human and ecological components of a system. Known as socio-ecological systems (SES), these

systems are linked by synergistic, coevolutionary, and complex relationships (Adger 2000, Kulig 2013, Provenza 2013). A cattle ranch, with its social and ecological components, is an example of a SES, with cattle ranching being a process within the system. The ranch operates with a resource base consisting of social, ecological, and economic components which come together in a SES. The interrelationships between the social and ecological components influence decision-making. SESs function with a dynamic interconnectedness that is enhanced when adaptability, resilience, and transformability are present within the system.

The Holistic Management (HM) decision-making process provides a framework for land management practitioners to develop systems thinking approaches which focus on the sustainability of the ecological, economic, and social components of a whole system under management (Savory 1999). The HM management framework is most commonly used for the management of grazing systems (Savory 1999), but the process is applicable to most management wholes.

Holistic Management ranching practitioners were chosen as a reference group for this research because the HM framework is a system based, decision-making process which considers the ecological, economical, and social components of their resource base (Savory 1999). HM places strong emphasis on including quality of life within the decision-making process (Savory 1999). Holistic Management ranchers are making decisions with an awareness of the needs of social values, well-being, and quality of life and therefore are closer to the idea of social values in their everyday decision-making and management (Stinner, Stinner, & Martsof, 1997). A few examples of social values

within a ranching SES include: landscape health, connection to the land, intergenerational planning and management, and community participation.

There are many ways to measure the economic and ecological success of ranching SESs, however, there are few ways to evaluate the role of social values for land managers, such as ranchers, in relationship to the ecological and economic components of land-based systems. Conventional valuations and cost-benefit analysis methods do not sufficiently account for the quality of life and social values of people dependent upon a land resource base (Kenter 2015). Understanding and considering these values can contribute to a more realistic and comprehensive understanding of environmental management choices (Wegner and Pascual 2011). There is little documentation of the non-measurable values which are commonly expressed in social terms like quality of life.

If land-based social values are a key part of the decision-making process, there is a need to establish ways to measure and evaluate the role and importance of these values (Brown 2013, Kenter et al. 2015, Smith et al. 2013, Wegner and Pascual 2011). A growing community of researchers, shown in Table 1, is requesting the academic research community to assist in developing ways for assessing and measuring social values appropriate to the research process.

Table 1.1. A calling from researchers to included social values in criteria for sustainability of socio-ecological systems..

Current Researchers Calling for the Recognition and Integration of Social Values in the Research Community	Reference
“If the social values of ecosystem services are to inform future land use decisions, there must be a mechanism to evaluate...If the participatory mapping of the social values of ecosystem services for landscape evaluation is to breach the walls of academia and gain traction within land management and decision-making processes, its value in decision support must be demonstrated.”	Brown 2013
“The material world, ultimately, is a network of inseparable patterns of relationships; the planet as a whole is a living, self-regulating system. We believe it will be critical for present and future generations of young researchers and graduate students to understand the new systemic conception of life and implications for a broad range of professions...”	Capra and Luisi 2014
“Considerable further research is necessary in terms of building up a credible evidence base for demonstrating the importance of shared and social values in these different sectors and spheres, and in terms of developing pluralistic methodologies for assessing the many and diverse shared and social values of nature.”	Kenter et al. 2015
“Since people are the beneficiaries of sustainable solutions, it is essential that metrics reflect the dependence of humans on ecosystems - services provided that contribute to economic well-being, the ability to meet basic need and life satisfaction – in order to progress sustainably.”	Smith et al. 2013
“We end this review with the hope that resilience scholars might more actively share their epistemological and methodological foundation with each other, thus increasing the transformative potential of our common endeavor.”	Stokols et al. 2013
“Rather than channeling all our efforts and resources into technical debates about how to convert biophysical processes and human values into a monetary measure for cost-benefit analysis, we call for the development of increasingly realistic and comprehensive institutions for the evaluation of environmental choices.”	Wegner and Pascual 2011

Objective

Use a collaborative research approach to determine the extent to which the social values identified by a case study group of Holistic Management ranchers are used by a general sample of ranchers in ranchland management decision-making.

CHAPTER TWO

LITERATURE REVIEW

Socio-Ecological Systems

Increasingly, there is recognition of the interdependence between humans, their environment (Adger 2000, Smith et al 2013) and their function together as a socio-ecological system (SES) (Ross and Berkes 2013, Wegner and Pascual 2011). A growing body of research literature indicates that SESs that integrate local and place-based knowledge are more likely to respond to dynamics of system change (Folke et al. 2005) in ways that are positive for the whole system. If the social values of ecosystem services contribute to land management decision making, there must be a mechanism to evaluate these values and the adaptability, resilience, and transformability (ART) within SESs (Brown 2013), to improve our understanding of the networks and patterns of relationships (Capra and Luisi 2014) and how these systems will response to disturbances, challenges, and change.

The lack of metrics to assess quality of life creates a challenge when measuring social values within a SES. Conventional valuation approaches may not fully capture the social values in a SES and new ways or additional methods are needed to more fully capture the values within these systems (Brown 2013, Kenter et al 2015, Wegner and Pascual 2011). As researchers are exploring, learning, and understanding more about SESs, there is a trend of common attributes that offer potential for use as a way for understanding social values. These attributes are adaptability, resilience, and

transformability (Stokols, et al 2004, Walker et al 2004). These qualities of adaptability, resilience, and transformability bring balance and stability to the changing dynamics present within SESs.

Adaptability, Resilience, and Transformability

The level of stability within SESs can be indicated and maintained by three complementary attributes: adaptability, resilience, and transformability (Berkes, 2009, Stokols 2013, Walker et al 2004). The reference to adaptability, resilience, and transformability (ART) can be found in other research (Berkes, 2009, Stokols 2013, Walker et al 2004). The acronym, ART, has not been referenced in the literature but is used for the purposes of this research. Learning about the ways in which the ART in decision-making influences the social values of SESs can provide an understanding of how the system may respond to system changes (Folke et al. 2005, Gunderson and Holling 2001). Assessing the decision-making ART of a SES, such as a ranch, can improve the effectiveness of internal and external knowledge inputs and help people reach their goals by knowing if they have the ART to respond to system changes in positive and sustainable ways (Gosnell, Haggerty, and Travis 2006).

The adaptability of social, ecological, and economic aspects are all important, but the social component seems to be a prerequisite for success because it takes a strong social component to support the improvement of ecological function as well as economic function. Successful adaptability occurs when management responds to system changes

in ways that maintain or improve a desirable level of system function (Gunderson and Holling 2001).

The link between ecological and social resilience is furthered by the dependency of a SES, like a ranch, upon ecological condition for economic well-being (Adger 2000, Walker et al 2004). Resilience increases the capacity to cope with stress (Adger 2000), which may bring to light weak links within the system, and improve the capability of a system to positively respond to a disturbance in ways that reorganize while undergoing change, and maintaining the same basic function, structure, identity, and feedbacks (Gunderson and Holling 2001, Walker et al, 2004).

Transformability is the capacity of the system to positively respond to changes, in ways that creates a different system state or stability through the integration of new approaches to thinking and doing, resulting in changes within system function (Walker et al. 2004). For example, the number of sheep ranchers in Montana was higher in the 1940s compared to today (National Agricultural Statistics Service 2017). When the market became dominated by foreign-produced wool, most Montana ranchers could not compete. To continue, many ranchers switched from raising and selling sheep and sheep products to raising cattle. The function of the ranches was maintained, but with a new set of components. Ranchers who could not transform have sold their ranches and moved on. Transformability allows for the decision-maker to create a new stability in changing landscapes, by integrating new ways of thinking and doing into the system (Walker 2004).

The positive or negative response to system changes and shift in scale is largely dependent on the strength of the ART in decision-making and management in SESs. Management of SESs is more successful and sustainable when strong and vigorous ART (Stokols, et al 2013, Walker 2004) is an active part of management decision-making process.

Kolb Learning Styles

The cognitive dimensions of land management are frequently overlooked in the assessment of SES (Ross and Berkes 2014). Environmental behavior studies place importance on making the connection between how people are thinking about their natural environment, how they are managing with goals in mind, and the value-sets implied by one's goals (Ross and Berkes 2014). The Kolb model (Figure 2.1) is useful for understanding the human decision-making process, particularly in rural management systems (Wilson and Morren 1990) where management decision-making is modifying the landscape for cropping, irrigation, and other management needs. This model is commonly used to recognize how people feel and think about an action before implementing the action because it is what people naturally do in new situations (Chambers 1994, Kolb 2012). The theory explains, Figure 2.1, that the learning process begins with a new experience. A learner encounters something new, and then reflects back to the experience to improve understanding. The learner continues to develop what has been learned, often into new ideas. The ideas are then transformed into an intention, with application of the

new ideas and existing knowledge (Baker, Robinson, and Kolb 2012, Wilson and Morren 1990). Simplified, the learner goes through a process of Feeling-Thinking-Action.

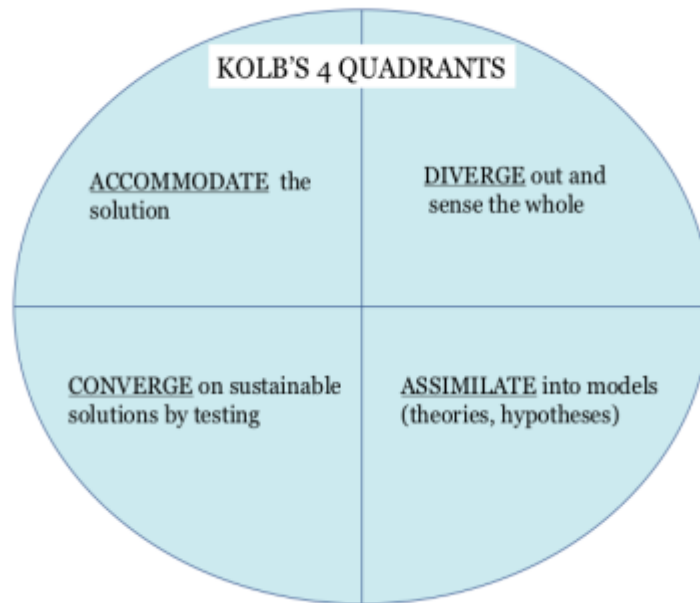


Figure 2.1. This simplified model of the Kolb's Learning process is represented by a four-stage learning cycle (Wilson and Morren 1984).

The process begins in the upper right quadrant and moves clockwise. The first stage of the learning processes begins with diverging out by experiencing, feeling, and watching the whole. New ideas and feelings are then assimilated and developed into new ways of thinking. As these ideas converge, decision-making can be tested to find solutions for questions and problems. The accommodating stage integrates feeling and thinking into doing as ideas are carried out through action.

Agriculture education professionals have found that individuals involved with agriculture-based systems tend to be experience-based learners, going through the Kolb's

process of feeling-thinking-doing (Baker, Robinson, and Kolb 2012, Trede and Miller 2009, Wilson and Murren 1990). Knowledge of this learning process is useful as it provides a framework to assess how people are taking action and how that action decision is connected to thinking and knowledge (Baker, Robinson, and Kolb 2012, Trede and Miller 2009).

Ranchland Systems in Montana

This research focuses on the SESs of Montana ranchers, to further learn, understand, and develop ways for knowing about the the role of social values in land management decision-making. Agriculture is Montana's top industry and cattle are the state's largest commodity. Ranchers are important contributors to Montana's triple bottom line – as defined by Savory, including social, economic, and ecological components (Savory 1999). There are roughly 11,845 cattle ranches across the state, with approximately 39,450,000 acres of private rangeland managed for pasture. An additional 30,000,000 acres of public lands are utilized by cattle through summer grazing leases. Ranching and the cattle industry produce Montana's largest commodity, contributing \$1.8 billion in sales in 2012. The average Montana rancher is 59 years of age (Montana 2016 Agricultural Statistics).

Rangeland systems in Montana reflect the synergistic relationships between individual ranchers and the communities to which they are connected (Kulig et al 2013).

By knowing about the decision-making ART of a ranching system, ranch families and communities can better plan for future changes or at least understand how prepared they are to face change.

The panarchy theory describes how complex systems, including SESs, respond to changes and stabilize into organized patterns across a scale of space and time (Allen et al. 2013, Gunderson and Holling 2002). For example, a ranching family and their landscape may reach an equilibrium state with little change in operation and social, ecological and economic dynamics over a period of time. These socio-ecological systems are in dynamic states of equilibrium and respond to changes in adaptive cycles (Gunderson and Holling 2002). A major change within or outside of the ranching family's 'stable system' may cause the equilibrium to shift in order to adjust to the new circumstances.

Connecting and recognizing the role of social values, such as landscape health, intergenerational planning, and community participation, further empowers and informs decision-makers today and in the future (Carlise 2016) and can provide ranchers, and others dependent upon a land resource base, with an additional tool to assist in stabilizing and strengthening the decision-making resource base.

Holistic Management Ranchers

The Holistic Management (HM) model and decision-making process encourages decision makers to think in a whole system perspective (Savory 1999). The process provides a method for whole system decision-making in a multitude of situations, especially SESs. HM places strong emphasis on including quality of life and social values

within the decision-making process (Savory 1999). A simplified model of the HM decision-making framework, Figure 2.2, was developed by Dr. Clifford Montagne and Holistic Management consultant, Roland Kroos, as an adaptation of the formal HM decision-making framework and process (Personal Communication). The model guides practitioners through the steps for developing stewardship approaches which focus on the sustainability of the whole system under management. The framework is a useful tool for managing the complexity of social-ecological systems in a way that creates flexible and respectful relationships within the whole system.

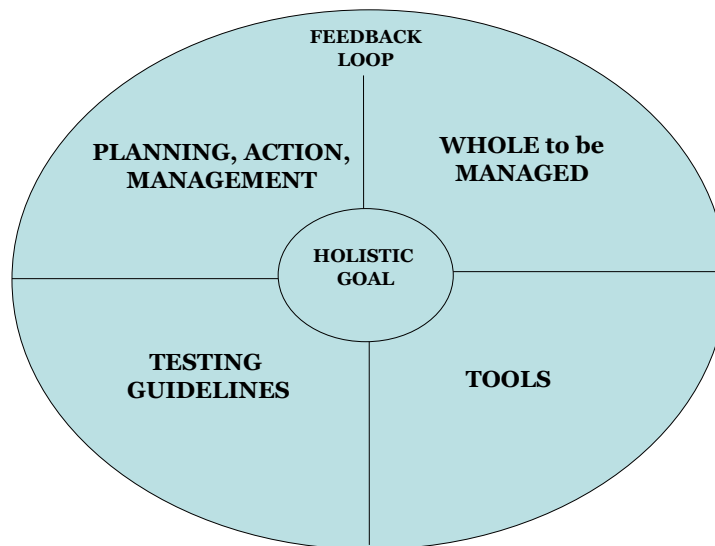


Figure 2.2. The Holistic Management Circle.

The center of the circle contains the Holistic Goal which is the focus of the four outer quadrants. The process begins in the upper right quadrant with identification of the Whole to be Managed. This is the social, ecological, and economic resource base of the system, along with the assessment of condition and function. The social part of the

resource base includes, stakeholders and decision-makers who then consider all possible Tools for improving the resource base to achieve the desired goal. The Testing Guidelines are used to test the Tools to determine what Tools will be most effective and sustainable for achieving the Holistic Goal. After the Tools have been tested, planning and action can take place with the confidence that consideration has been given to many of the possible outcomes to expect from the actions. Throughout the process, feedback is actively monitored so that decision-makers may make necessary adjustments to maintain progress towards the Holistic Goal. The process is a continuing cycle as decision-makers find ways to improve the Whole and refine the Goal. The outcome is a management approach which is actively monitoring system changes and responding in ways that are not only sustainable, but also adaptable, resilient, and transformable.

Holistic Management ranchers are making decisions with an awareness of the needs of social values and quality of life for the whole system and therefore are closer to the idea of social values in their everyday decision-making and management (Stinner, Stinner, & Martsolf, 1997). They are actively part of a process which is recognizing, building, respecting, and utilizing the whole system under management, with long-term sustainability in mind. For a rancher to use HM effectively, they must take a 'whole systems' approach which recognizes and utilizes ecological, social, and economic components (wealth). This approach requires a deep awareness of practice of social skills (open communication, frank communication, inclusivity, etc.) needed to build learning organizations which are adaptable, transformable and resilient (Senge, 1990). These

aforementioned attributes (ART) form the core of the social values which these ranchers depend on as they adapt to change through holistic decision making.

Participatory Action Research Design

As SESs are the beneficiaries of sustainable solutions, it is essential that metrics reflect the dependence of humans on ecosystems – services provided that contribute to economic well-being, the ability to meet base needs, and life satisfaction – to progress sustainably (Smith et al. 2013). Participatory approaches for SES assessment are increasingly supported as a way to include the multidimensionality of social values within decision-making (Kenter et al 2015, Wegner and Pascual 2011) and are seen as a primary way to understand how the decision-making process is functioning within the system (Berkes 2009).

Participatory research provides research participants the opportunity to learn and understand more about their socio-ecological system and improves the effectiveness of scientific research when trust is developed between researchers and participants, leading to a richer understanding of the system (Chambers 1994). Local knowledge, partnered with science-based approaches, connects knowledge resource bases and social capital, leading to increased sustainability of the ranching resource base through an enhanced decision-making process (Curtain, 2015, DeLyser, et al. 2010). With collaborative research, a relationship with trust and common ground is established with the co-researcher resulting in more open, complete, and reliable data. Collaborative approaches encourage the development of co-researcher relationships resulting in a better

understanding of social capital (Curtain, 2015) and a more engaged and active link for data collection (DeLyser, et al. 2010).

The openness created through a participative-collaborative mode of inquiry adheres well within a social-ecological framework (Stokols, Lejano, & Hipp, 2013), and is a requisite for the environment needed to document the multidimensional values within decision-making (Kenter, et al, 2015). A participatory collaborative research approach enables local people, connected to a land resource base to share knowledge of their ecological and social condition and is commonly used in agricultural-based research (Chambers 1994, Berkes 1999). Montana ranchers, as collaborative researchers, contribute their rural socio-ecological perspectives along with connection to and dependency (Adger 2000, Ross and Berkes 2014) on a fluctuating resource base.

CHAPTER THREE

METHODS

Participatory Collaborative Action Research –
Exploratory Mixed-Methods Design

A transdisciplinary research approach was used as a tool to understand the role of social values and ART in ranch management decision-making. This approach also provided the potential for a deeper understanding of the social component within the decision-making of land managers. The participatory collaborative action research-exploratory mixed methods design, also known as a QUAL-quan model (Gay, Mills, & Airasian, 2009, Patton, 2002), was used in two phases: (1) qualitative participant discussions and (2) Likert-scale phone survey.

In this model, qualitative data collection precedes quantitative data collection and qualitative data is weighted more heavily (Gay, Mills, & Airasian, 2009). The mixed methods approach allows for rich qualitative insights about individual decision-making and analysis of how the decision-making process influences social wealth (McGreavy, 2015). The exploratory mixed-methods research design also provides an opportunity to more fully capture social values in ways that could not be captured using a single research method (Patton, 2002).

Researchers have found that a mixed-methods research approach bridges traditional divisions found in other research designs (DeLyser, et al. 2010). In addition, this type of action research design provides a way for the researcher to be positioned as a

collaborative researcher with Holistic Management practitioners providing the opportunity to more effectively learn and understand how social values are part of the land management decision-making process and contribute to the ART present within the ranching SES. Additionally, this collaborative research approach, in which the researcher participates actively with participants provides a closer understanding of the SES experienced by the participants.

I. Qualitative Participant Case Studies

The qualitative phase of the research, was completed with the collaboration of five research participants selected from a community of Holistic Management ranching practitioners in southwest Montana (Figure 3.1). The participants were selected from a community of Montana Holistic Management practitioners, recommended by certified Holistic Management educators Dr. Cliff Montagne and Roland Kroos. The participants are all current decision-makers on large scale (>2000 acres), multi-family ranches located in mountain-valley landscapes with semi-arid climates. The five ranches have all been in operation for at least 30 years, with the oldest ranch operating since 1907. The participants all face the challenges of drought, changing markets, and shifts in community structure.

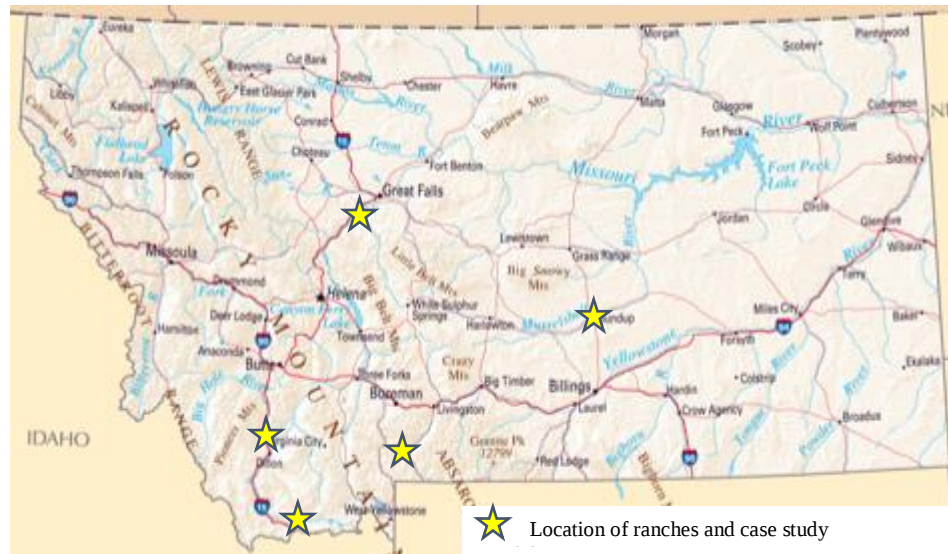


Figure 3.1. Map of case study participant's ranch locations. (Map credit: <http://www.vidiani.com>)

Individual, open discussions were held with each research participant. The discussion focused on understanding the role of social values within ranch management decision-making. The discussions were unstructured, though the participants did answer specific questions about social value descriptors, indicators, and measures. The discussions were conducted in November 2015 through March 2016 and lasted approximately 1.5 hours each. Field notes were taken during each discussion along with audio recordings which were fully transcribed (Appendix C).

Working with case study participants, a matrix (seen in Results, Figure. 4.1) was developed which works within established parameters for ART and the Kolb learning styles as potential indicators for understanding and assessing social values. The matrix shows the relationships between decision-making and ART which were used to develop the Likert scale survey.

II. Written Likert Scale Survey

A phone survey was conducted with rancher participants living in Eastern Montana. Fifty participants were selected from the Montana Stockgrowers Association 2016/2017 Montana Seedstock and Commercial Cattle Directory. Using the directory, participants were chosen alphabetically and by survey region. If there was no answer, the next listing was called. Of fifty-one calls answered, fifty respondents participated in the survey. The two-page survey took approximately 10-15 minutes to complete by phone (Figure 3.2) and respondents remained anonymous. The phone survey was administered from October to November 2016. The data were analyzed using assistance from the Montana State University Statistical Consulting and Research Services.

The survey consisted of 20 statements which were paired and structured to learn about rancher social values and the ART of those values. The statements were developed from research with the five case study participants. The first set of 10 statements used the 4-point Likert scale and focused on Kolb's stages of 'Feeling-Thinking' within ranch management decision-making and asked ranchers about values that management practices consider. The second set of 10 statements, paired with the first set of statements, used a 5-point Likert scale, and are the Kolb's 'Action' parallel to the first set of statements in asking ranchers about specific actions related to social values. Survey statements included ranch management decision-making, community, and diversity.

Social Wealth Assessment Survey

Participant Name _____ Age _____ Gender _____

Ranch Location _____ Number of Years Operating Ranch _____

Description of Overall Operation:

The following statements are factors which may be considered in ranch management decision-making. Read each statement, consider how it applies to your ranch management, and select whether you strongly agree, agree, are uncertain, disagree, or strongly disagree.

Management Practices Consider:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) Openness to new ways of ranch management					
2) Regular meetings with family, employees, etc.					
3) Ways to manage the ranch beyond one generation					
4) Knowledge and input from outside resources					
5) Enterprise diversity					
6) Biodiversity					
7) Overall landscape health					
8) Community participation					
9) Ways to maintain motivation					
10) Ways to monitor for change					

Figure 3.2. Written Likert Scale Social Values Survey

The following statements are management approaches you may be practicing on your ranch. Select Always Practice, Sometime Practice, Never Practice, or Uncertain as it applies to management that you have done and/or are currently doing. Share an example if applicable.

Applied Management Practices:	Always Practice	Sometimes Practice	Never Practice	Uncertain	Example
11) In the past five years, you have integrated new ranch management practices.					
12) Meetings with ranch stakeholders are regularly scheduled.					
13) Ranch planning includes a long-term intergenerational plan for the ranch.					
14) In the past year, you have accessed resources such as extension services, NRCS, workshops, etc. to improve management.					
15) In the past five years, ranch management has included ways to diversify the enterprise.					
16) In the past five years, you have managed to support and/or increase biodiversity.					
17) In the past five years, you have managed to maintain or improve landscape health.					
18) In the past year, you have participated in a community activity which has increased your sense of belonging to the community.					
19) In the past five years, management has included ways to improve environment, society, or economy within the ranch and/or local community.					
20) In the past year, you have formally monitored for change.					

Figure 3.2 (continued). Written Likert Scale Social Value Survey.

CHAPTER FOUR

RESULTS AND DISCUSSION

I. Case Study Data Analysis

The conversations from each of the five case study participants were transcribed (see Appendix C). The transcriptions were reviewed and analyzed for conversation pieces relating to social values and management decision-making. The information was then developed into a matrix for each case study (Figures 4.1-4.6). Each matrix works within the parameters of adaptability, resilience, and transformability (ART) and the Kolb's learning styles of Feel-Think-Action to reflect the key pieces of management decision-making for each participant. A summary matrix (Appendix C) was developed which captured the social values from all case study discussions. The social values were evaluated and categorized by the properties of adaptability, resilience, and transformability.

A 20 question survey was developed based on the social values expressed by case study participants. Questions were paired with Feel-Think-Action, with an underlying component of adaptability, resilience, and transformability.

Participant #1 – Hannibal Anderson, Tom Miner Basin, Montana, Anderson-Pope Ranch, established in 1955. The ranch is primarily a cow-calf, grass-fed beef operation. The enterprise diversifies its income through summer guest stays. Anderson has been ranching his entire life and is currently part of four generations of family living and working on the ranch. The ranch is located in an area with a high predator population. Anderson has adopted management practices (Figure 4.1) which are focused on working with the system dynamics rather than against.

	Feel	Think	Action
Adaptable	Open to receiving and interacting with a broad set of information rather than being narrow.	Be realistic about the risks of raising livestock in a high predator density area.	Range riding, knowledge and input from others
Resilient	Open to all possibilities within the relationships and decision-making.	“You can’t expect it all to go your way.”	Take the loss
Transformable	Let go of the ego and need for control. Sees being part of the system as a wonderful piece of the human experience.	Willing to sacrifice considerably on the economic side for benefit of the whole.	Management maintains the integrity of the system.

?

Figure 4.1. Case Study Participant #1 – Hannibal Anderson.

Openness and flexibility in relationships has led to rancher's willingness to develop more complexity in management, resulting in more resources and solutions being available for the decision-making process. One example of adaptability, is seen in Anderson's perspective towards the relationship and interaction with predators in his area.

“We want this place to be as healthy for the predator part of the landscape as much as for the things that everybody loves. Those are real primary values for us. What we believe is that, well for me, a really high social value is the fact that there are wolves here. That is a high value socially. I'm prepared to sacrifice considerably in the economic side in order to have that social value” (Anderson 2015). Management decision-making is open to a broad range of tools and resources for management. Anderson has implemented management tools such as range riding, moving cattle, and taking the loss to avoid lethal approaches to management. The outcome is the social value of a landscape that is “full and meaningful” (Anderson 2015). This implies that being a part of and connected to the socio-ecological system has a high social value return for Anderson.

Participant #2 – Chase Hibbard, Cascade, Montana, Sieben Livestock Company, established in 1906. Historically the ranch was a sheep operation and is currently a cow-calf and yearling, grass-fed beef operation and historically with one-week of commercial outfitting during the fall hunting season. Hibbard has been ranching his entire life and began formally managing the ranch in 1976. Ranch management decision-making is being made with an awareness of the role of the social piece, including that of ranch stakeholders and community connection (Figure 4.2) .

Participant #2 Sieban Livestock Company		Feel	Think	Action
	Adaptable	Recognizes the importance of new ideas and having an open mind.	Open to new ways of cattle management.	Community connection allowed for adaptable management after the loss of elk habitat in wildfire.
	Resilient	Feel strongly about the well-being of those connected to the ranch – family & employees.	On the people level, want to honor lifestyle, personal development, education, enrichment Recognizes value in personal growth for family and employees.	Use scorecard to evaluate the three circles of sustainability. Building bridges of trust with family and community. Part of Devil's Kitchen Group.
	Transformable	Willingness to give something up	Planning ways to manage ranch beyond one generation.	Passing management responsibilities down to next generation.

Figure 4.2. Case Study Participant #2 – Chase Hibbard

In his management decision-making, Hibbard feels that it is important to have a willingness to give something up. One step is to think about how to manage the ranch beyond one generation with current action being taken to pass management responsibilities down to the next generation. Additionally, the ranch has also developed a scorecard for monitoring the social, ecological, and financial sustainability of its action planning.

Participant #3 – Eric Kalsta, Glen, Montana, Kalsta Ranch, established in 1907. Historically, the ranch was a commercial cattle operation which expanded to sheep rearing. They shifted to a predominately cow-calf operation until 2005 and diversified again over the years to fill market niches, including return to raising sheep. Kalsta is the fourth generation on the ranch. Ranch decision-making (Figure 4.3) includes a multi-generation management plan, enterprise diversity, and partnerships with community.

Participant #3 Kalsta Ranch		Feel	Think	Action
	Adaptable	“You have to adapt or you die.”	The multi-generation philosophy is open to change, meeting economic challenges with the idea that the “impossible just takes a little longer”.	“Ranch has always had a diversity of ways to generate income.” Diversity in economic base – cattle, sheep, truck garden, orchard, etc.
	Resilient	Enjoy being able to connect with a larger part of the community.	Sees value in maintaining ties with community.	Connect with broad network including NGOs, Wildlife Conservation Society, Big Hole Watershed Foundation, Future West, CFWP, and local community
	Transformable	Ultimate goal is for my kids and my grandkids to have some part of the ranch.	One of the things I have always had is a one hundred year management plan.	“Written in pencil not in stone. There’s a lot of variability in that.” Sees being part of the landscape as another component of wealth.

Figure 4.3 Case Study Participant #3 – Erik Kalsta

Community partnerships are important contributors to social values and resiliency for Kalsta. These partnerships are maintained and strengthened through active involvement with a broad network of organizations including wildlife and conservation NGOs, Wildlife Conservation Society, and the Big Hole Watershed Foundation. The

community connection also extends to ties with the ecological community. “When you talk about wealth, well, a few years ago, my daughter and I were riding the four-wheeler down through the field. We went through some trees and popped into a pasture along the river and there’s a wolverine standing in the pasture about 40 yards away. That’s the third wolverine I’ve seen in my whole life. That’s something that people don’t calculate but I think that is one of the most important aspects for me of what I do. It’s the unexpected parts of the day that are not necessarily tied to ranching.”

Participant #4 - Bill Milton, Round-Up, Montana. Milton Ranch LLC., established in 1978. The Milton ranch is a cow-calf and yearling operation and cattle are grass finished on the ranch. Milton has been ranching his entire life. His management decision-making (Figure 4.4) includes prioritizing ranch stakeholder communication, connecting with community, and managing with an awareness for the larger landscape beyond the ranch.

Participant #4 Milton Ranch		Feel	Think	Action
	Adaptable	When people are choosing to meet regularly, they can check in to keep the connection.	The most important practice for families, relationships as a team, with the land, is listening to each other. Relationships, regularly communicate to be sustained and grow. The meeting is the most important thing we do.	Weekly planning meeting.
	Resilient	The more people can talk, the more people can work with those insights.	Future sustainability for rural areas needs people to work together. Communities need collaboration. Benchmarking social well-being in communities.	Communities need collaboration to get to the core principles of how people overcome difficulties.
	Transformable	Triple bottom line for large landscapes. Groups connecting food and the land.	Shared monitoring, for large landscape health, valuable connecting point for stakeholders.	Landscape monitoring for landscape health by a large variety of groups. Sharing information in a constructive way.

Figure 4.4. Case Study Participant #4 – Milton Ranch

Open communication is a key piece to successful decision-making and management for the Milton Ranch. Milton is actively sharing ideas about social and ecological health with ranch stakeholder through regular meetings which involve a

follow-up component. The idea of social and ecological health extends beyond on the ranch with active connection to the larger community and landscape. As he states, “Social values are a huge deal. I love to read examples of how communities are working together. This interdependent social web in a rural community influences how successful people can be...No family is an island in a community. The more people that are successful and share it, the more the capacity of the community is increased.” Milton emphasizes the importance of active community connection and collaboration to improve the success of the whole SES of a ranching community.

Participant #5 - Bryan Ulhring, J-L Ranch in Lima, Montana (summer months) and Twin Bridges, Montana (winter months). The ranch is a cow-calf and yearling operation and cattle are grass finished on the ranch. Ulhring has been ranching for 14 years and managing the J-L Ranch for 10 years. Ranch management decision-making (Figure 4.5) is dedicated to improving the social condition of ranch stakeholders and maintaining effective communication with the broader community.

Participant #5 J-L Ranch		Feel	Think	Action
	Adaptable	Having ways to gauge what we're doing, provide feedback, and improve communication, will help us be adaptable.	Dedicated to lifestyle, ecological component.	Developed a 'dashboard' to measure ecological, economic, and social, Including total family hours per month and neighbor relations
	Resilient	Will help retain employees enabling overall social improvement	Sustainable and reasonable labor requirements	Relationship bank account and improved labor communication for efficiency increases Continuing education,
	Transformable	Reduce stresses on entire system resulting in overall improvements	Communication, emotional, and family needs effect employees which may see traditional	Developed a 'dashboard' to measure ecological, economic, and social, Including total family hours per month and neighbor relations

Figure 4.5. Case Study Participant #5 – Bryan Ulhring

As a ranch manager, Ulhring feels it is important to maintain the social well-being of ranch stakeholders. The ranch has developed a monitoring tool called a 'dashboard' to provide a gauge to actively measure and monitor social and ecological health and well-being. The 'dashboard' tool helps to ensure the ranch is going in the desired direction. As Ulhring explains, "Are we driving down the road and about to run out of gas? It'll [dashboard] hopefully get people to actively think about this each month and give me some feedback. And, communicating about these things. Bringing them up in meetings.

That will give us a test of how we're actually doing. Which will help us be adaptable. It's hard to adapt if you don't know what's going on." Ulhring is actively monitoring the social component of the SES to ensure the ranch continues to move in a direction that is in line with their social values.

Case Study Discussion

Based on themes from the interviews, the five case study participants are thinking about the role of social values, and acting to actively manage the social piece in a way that instills the components of ART within their SESs. The management and decision-making of the five case study participants all have similar attributes for valuing the social component in ranchland management. These attributes include, but are not limited to, community connection, long term planning, active monitoring of actions, communication with ranch stakeholders, and maintaining knowledge flow within the SES. These attributes all possess levels of ART with the Kolb's learning stages of Think-Feel-Action. Ten social values qualities for management were summarized, from the case study conversation, in Table 4.1, and then used to develop the questions and statements for the survey (Figure 3.2).

1. Openness to new ways of ranching	6. Biological diversity
2. Regular meetings	7. Overall landscape health
3. Intergenerational planning	8. Community participation
9. Outside knowledge resources	6. Whole system management
10. Enterprise diversity	7. Monitoring

Table 4.1 Social values summary.

The social values expressed by one or all of the case study participants are reflective of those found in other research. Kenter et al. (2015), found that strong social values such as community connection and collaborative ecological management were important for land managers in order to improve the planning processes and outcomes. Survey research completed by McGreavy et al. (2015), also recognized that active stakeholder engagement, such as meetings, improved the capacity of the decision-making, planning, and implementation of plans. The social value of monitoring the feedback loop was found by Walker et al. (2004), to be critical for adaptive and flexible management.

II. Survey Data Results & Discussion

The phone survey achieved close to 100% response rate, of 51 calls answered, 50 respondents participated in the survey. The high respondent rate may potentially be attributed the introduction when the call was answered. The first part of the introduction stated the call was associated with the College of Agriculture at Montana State University, then explained the purpose was to learn more about the social component of land management decision-making. Many respondents conveyed a willingness to participate in local university research that focused on the people part of their socio-ecological systems.

Demographics

Fifty Eastern Montana ranchers participated in the survey, 11 respondents were female, 39 were male. The average age was about 55 years and the median age was 60 years. Ages ranged from 19 to 88 (Appendix F).

The following ten figures were created, with the paired survey statements, to visualize the distribution of ‘Action’ responses for each level of the ‘Feeling-Thinking’ variables from the Kolb’s learning styles. The figures (Figures 4.6-4.15) visualize the distribution of Action responses for each level of the Feel-Think variable. The paired statements have ordinal responses. The horizontal axis is the Feel-Think social value. The height of the vertical columns represents the number of responses for each response choice for the Feel-Think social value statement. The extent of each color represents the number of responses to each color category of Always, Sometimes, or Never, for the Action parallel of social value. Across all statement pairs, most respondents were able to

designate the degree to which they took the management Action with what they were Thinking-Feeling.

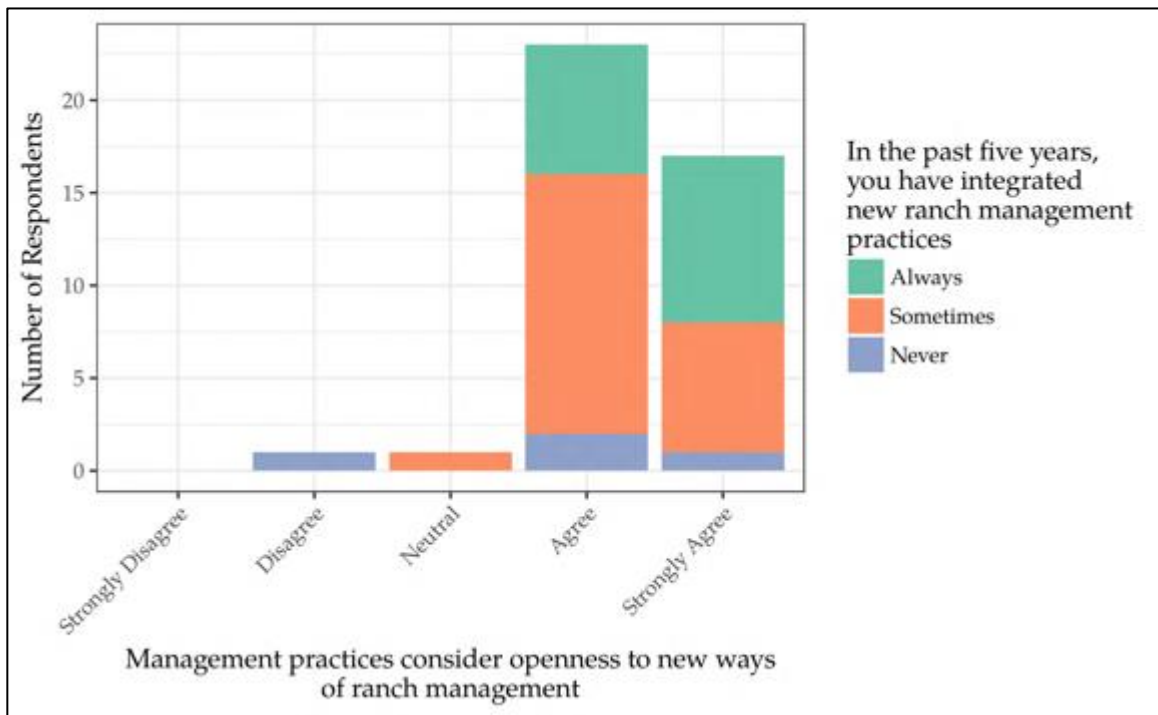


Figure 4.6. Survey questions 1 (Feel-Think) and 11 (Action) pairing and comparison.

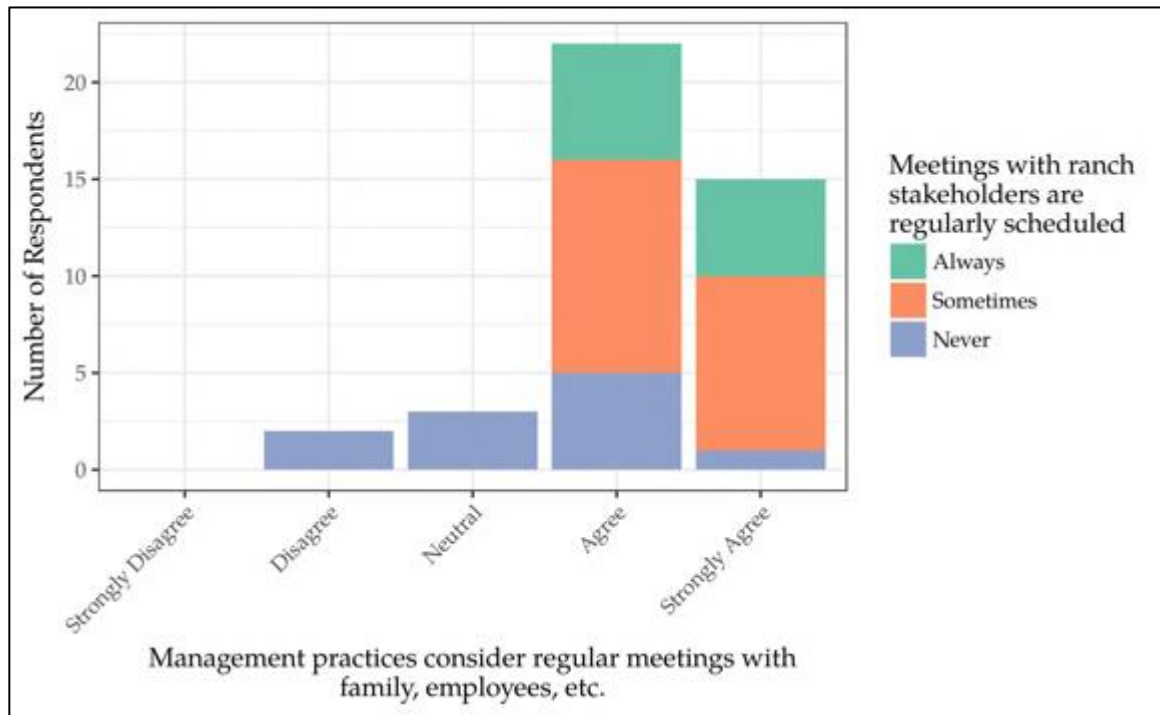


Figure 4.7. Survey questions 2 (Feel-Think) and 12 (Action) pairing and comparison.

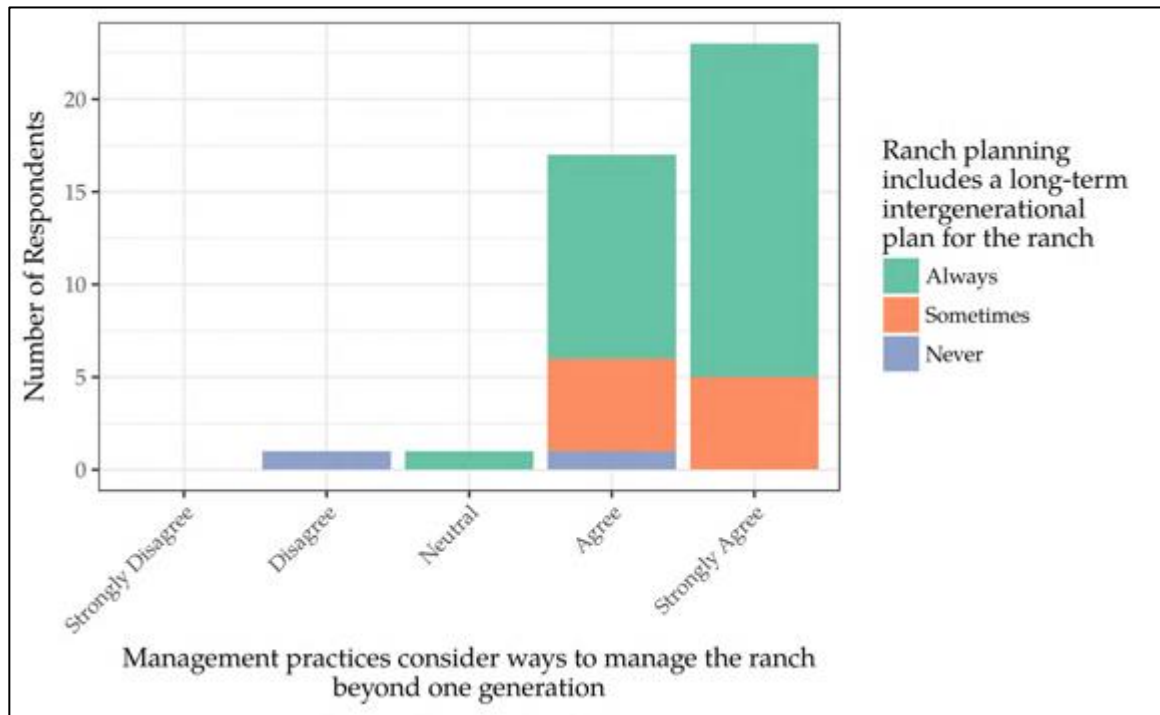


Figure 4.8. Survey questions 3 (Feel-Think) and 13 (Action) pairing and comparison.

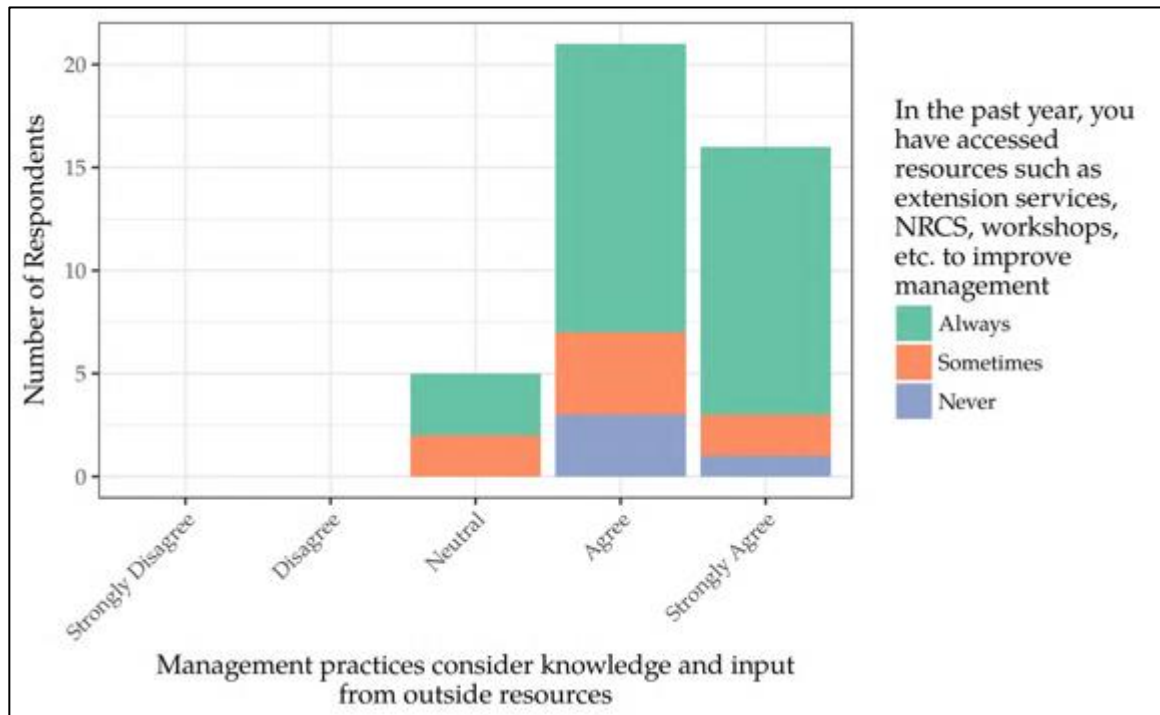


Figure 4.9. Survey questions 4 (Feel-Think) and 14 (Action) pairing and comparison.

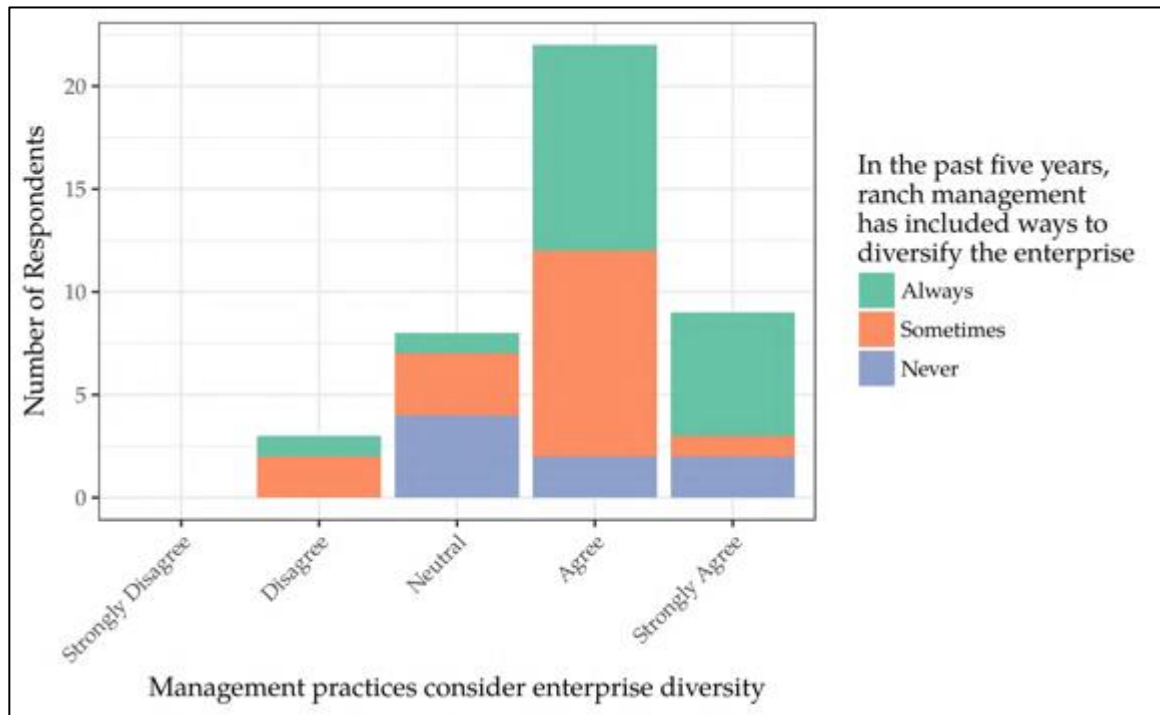


Figure 4.10. Survey questions 5 (Feel-Think) and 15 (Action) pairing and comparison.

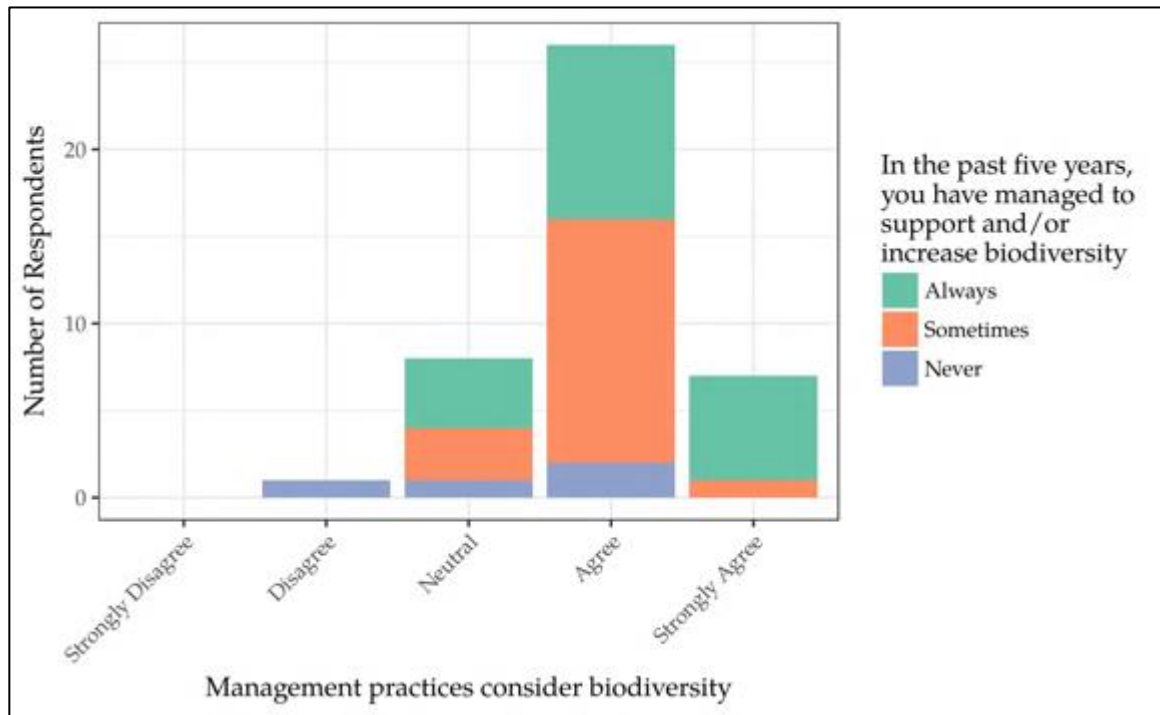


Figure 4.11. Survey questions 6 (Feel-Think) and 16 (Action) pairing and comparison.

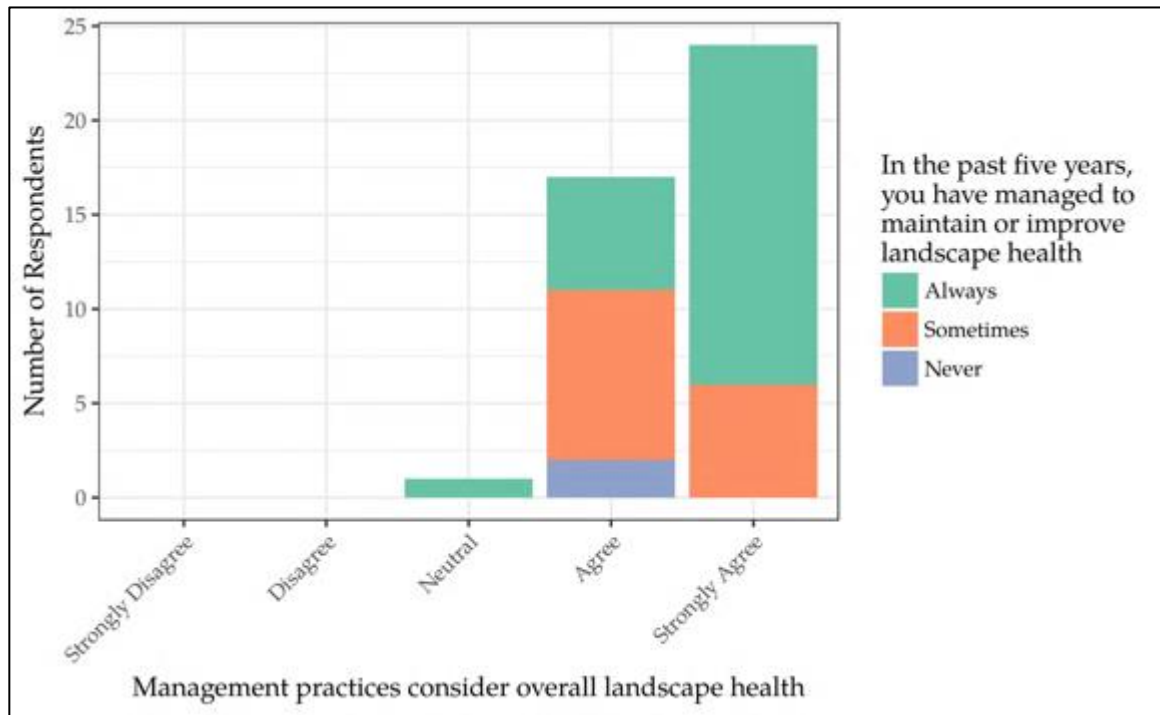


Figure 4.12. Survey questions 7 (Feel-Think) and 17 (Action) pairing and comparison.

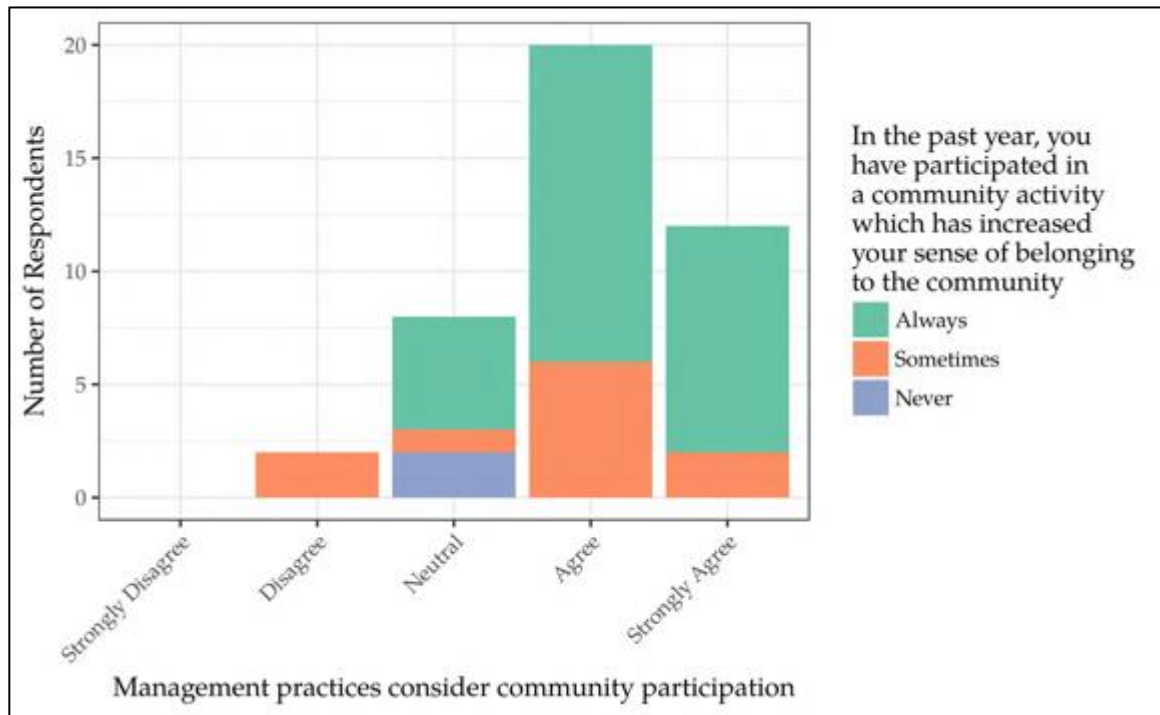


Figure 4.13. Survey questions 8 (Feel-Think) and 18 (Action) pairing and comparison.

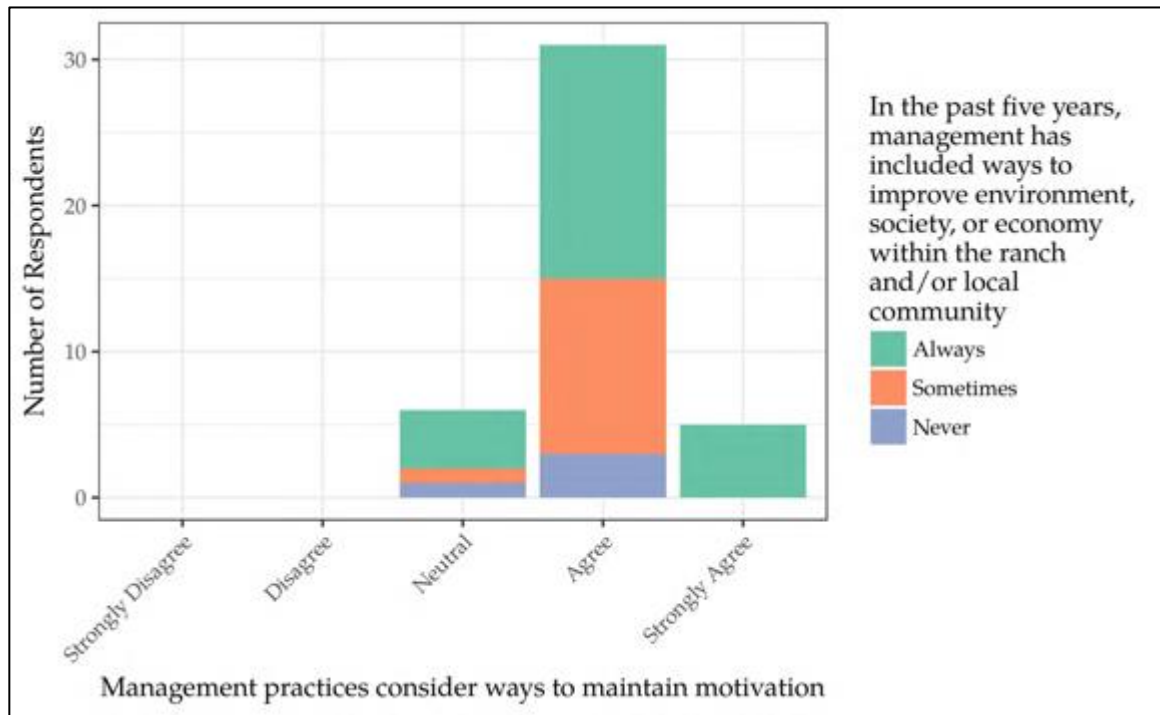


Figure 4.14. Survey questions 9 (Feel-Think) and 19(Action) pairing and comparison.

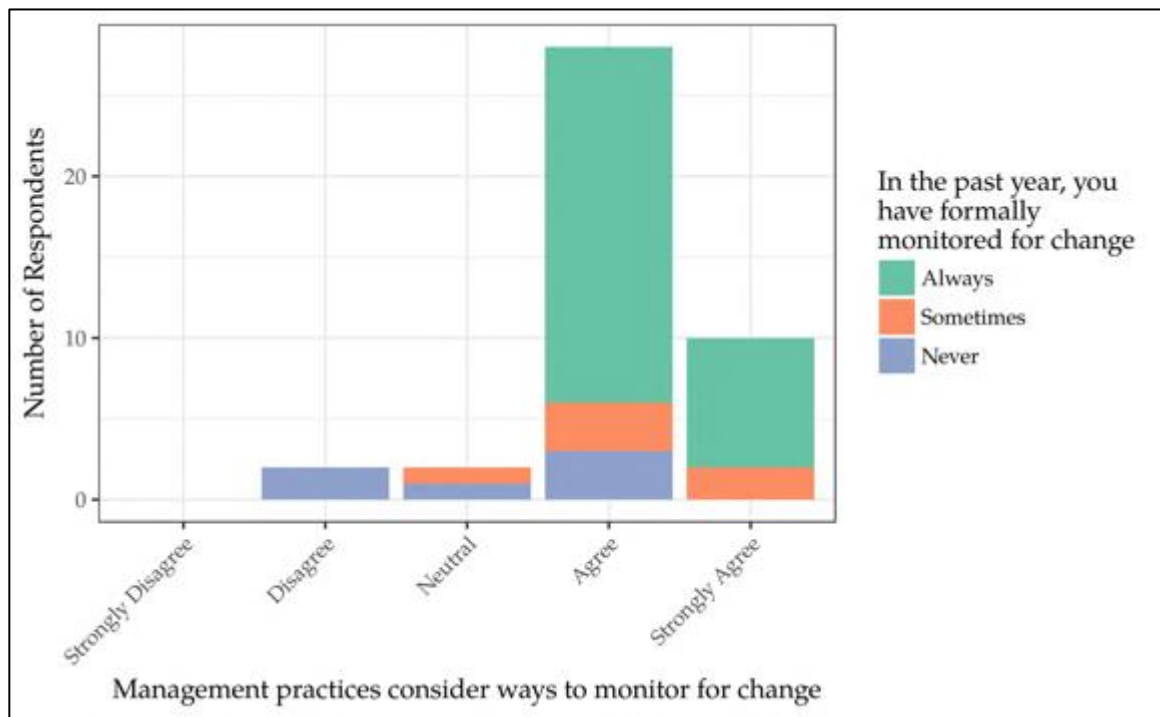


Figure 4.15. Survey questions 10 (Feel-Think) and 20 (Action) pairing and comparison.

Survey Statement Pairs Correlations

To further understand the dimensions of adaptability, resilience and transformability, responses to statement pairs were grouped by three question categories: Adaptable (3 questions), Resilience (4 questions), and Transformable (3 questions). Average responses to both the “Action” and “Feel-Think” statements were computed across statements within each category for each respondent. The statements for adaptability, resilience, and transformability were in random order on the survey.

Spearman’s correlation measures the strength and direction of association between two ranked variables and was computed between the Feel-Think and Action responses for each question pair. Correlations were calculated on the ranks shown in the following figures (Figures 4.16-4.18).

In Figures 4.16-4.18, the points are randomly nudged above and below the actual numerical response, so the responses of the same value do not overlap, this is a common practice for displaying multiple data of the same value. This is for display purposes only, the actual numbers analyzed were only 1, 2, 3, 4, and 5.

The boxplot horizontal bars are the median (with half the points above and below), the 25th percentile (with 25% of the points below) and the 75th percentile (with 25% of the points above). The height of the boxplot represents the interquartile range (IQR). That is the range of the middle 50% of the data. The vertical lines on the plot extend to the farthest points that are less than 1.5 IQRs away from the box. A thick horizontal bar, instead of a box, is where there were few responses and/or most of the responses were the same. For example, on the Adaptable figure (Figure 4.17), there were only 5 who said “Never” to Q1, 3 respondents said “Agree” to Q1, and since that’s more than half, the 25th percentile, median, and 75th percentile are all three.

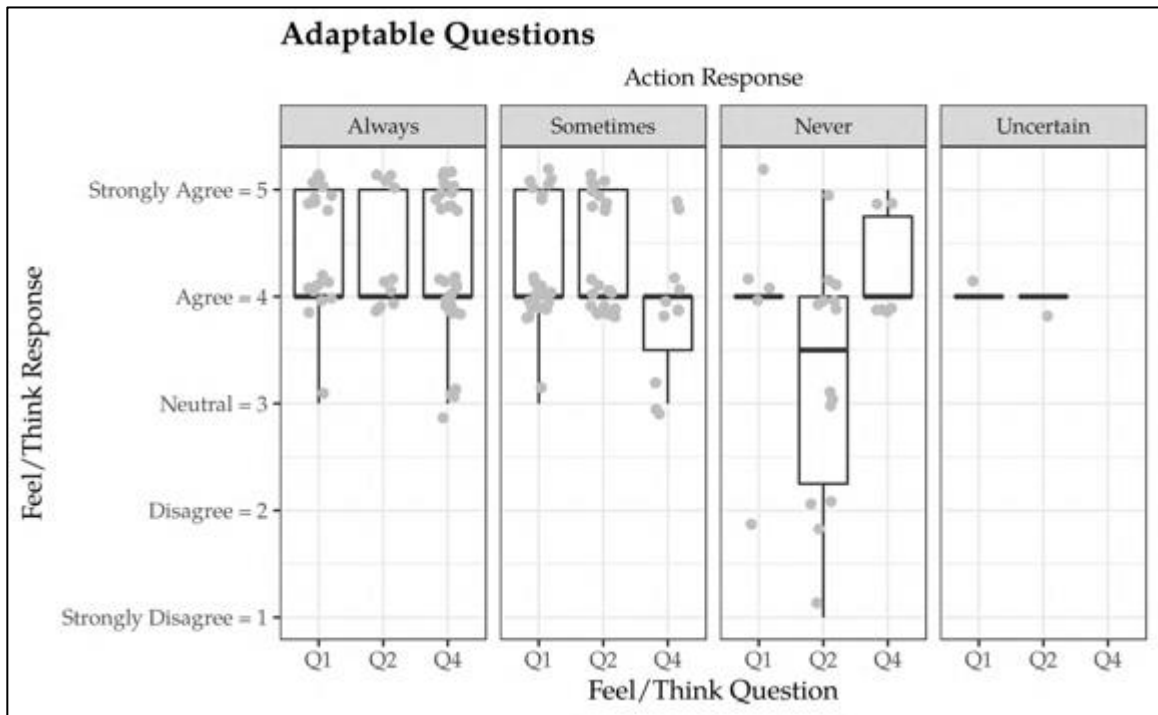


Figure 4.16. Correlation between Feel-Think responses and Action responses to questions with an adaptability focus. Spearman correlation = 0.46

Key: Q1 – Management practices consider openness to new ways of ranch management.

Q2 – Management practices consider regular meetings with family, employees, etc.

Q4 – Management practices consider knowledge and input from outside resources.

Among those responding “Never” to the Adaptable questions, the median “Feel-Think” response was 4. Most of the survey respondents agree that they Feel-Think about the adaptability based survey statements. Most of the respondents are “Sometimes” or “Always” taking the corresponding action with the survey statement idea.

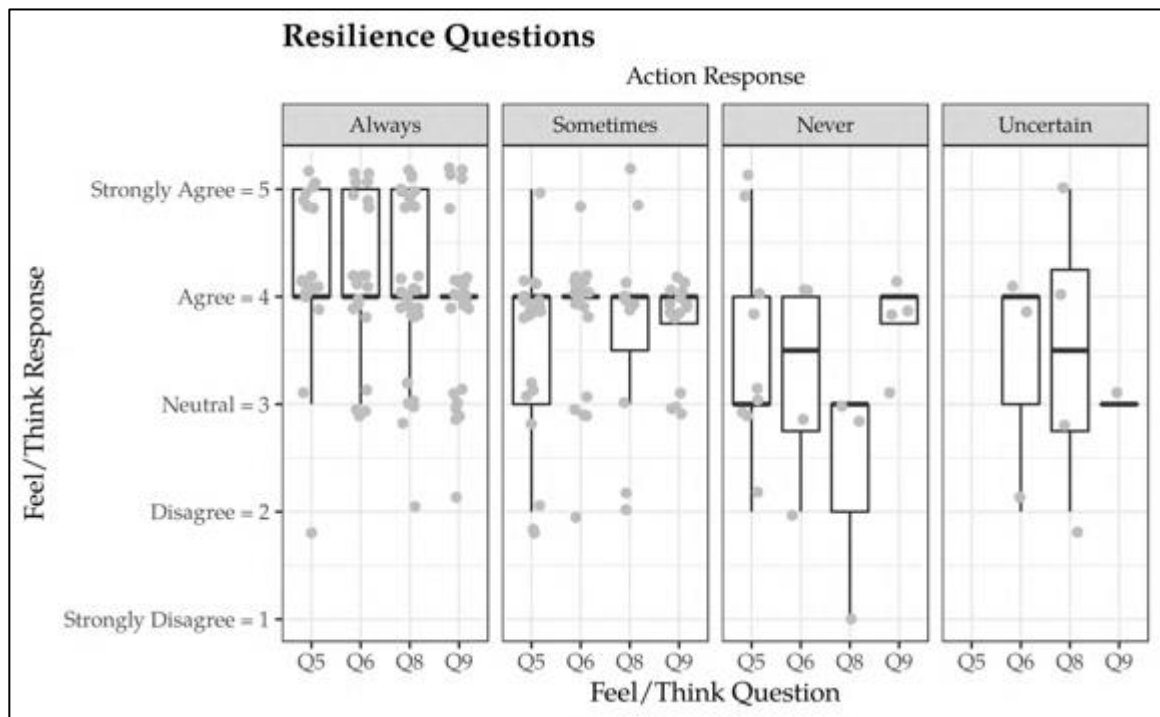


Figure 4.17. Correlation between Feel-Think responses and Action responses to questions with a resilience focus. Spearman correlation = 0.52

Key: Q5 – Management practices consider enterprise diversity.
Q6 – Management practices consider biodiversity.
Q8 – Management practices consider community participation.
Q9 – Management practices consider ways to maintain motivation.

Among those responding “Always” and “Sometimes” to the Resilience questions, the median “Feel-Think” response was 4. Most of the survey respondents agree and strongly agree that they “Feel-Think” about the Resilience based survey statements and most of the respondents are “Always” or “Sometimes” taking the corresponding action with the survey statement idea. For example, statement Q8 focuses on community, most survey respondents “Agree” and “Strongly Agree” that they are always considering community participation and have participated in a community activity in the past year.

One respondent's reaction to this social value was, "If your goal is to be a rancher you have to make an investment in the community. What else would you do?"

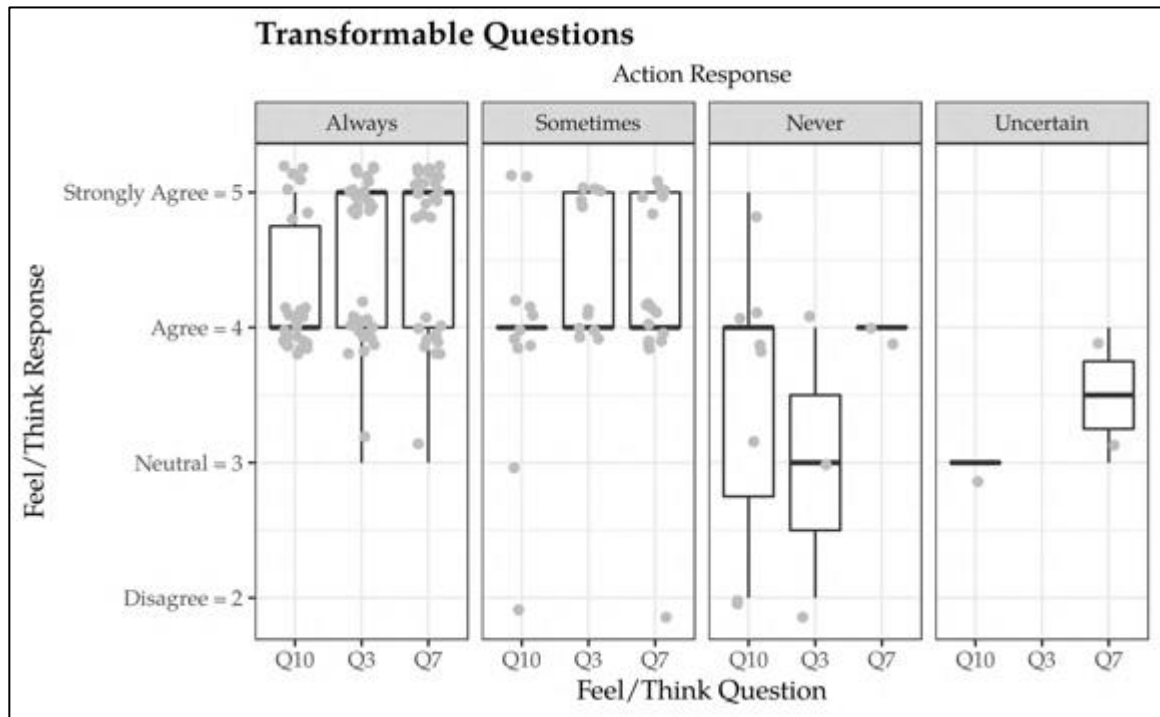


Figure 4.18. Correlation between Feel-Think responses and Action responses to questions with a transformability focus. Spearman correlation = 0.58

Key: Q10 – Management practices consider ways to monitor for change.
Q3 – Management practices consider ways to manage the ranch beyond one generation.
Q7 – Management practices consider overall landscape health.

Among those responding “Always” and “Sometimes” to the Transformability questions, the median “Feel-Think” response was 4. Most of the survey respondents “Strongly Agree” and “Agree” that they “Feel-Think” about the “Transformability” based survey statements and most the respondents are “Always” taking the corresponding action with the survey statement idea. About intergenerational management from Q3, one respondent stated, “Multi-generation planning is their goal, it may not be reached because

of generational difference, but they are planning for their part.” These feeling were reflected by most respondents, as most feel and think that intergenerational planning is an important social value.

Discussion

Most the survey respondents agree to some level that the social value statements in the survey are important to their socio-ecological system (SES). Many respondents “Feel-Think” about the social values in the survey and believe they are important for maintaining their SES. However, fewer respondents are taking management action to sustain or improve the social values from the survey.

The survey generated useful data for learning more about the role of social values for a broader set of Montana ranchers. There were some weaknesses present with the survey statements. Many of the statements and questions were not clearly defined and interpretation was left to the survey participant. An example is the question about integrating new management approaches. This question was interpreted differently by survey participants. Some respondents understood changing management approaches to improve the landscape, others interpreted it as bringing in new supplements for their livestock.

III. Summary

Jointly these two sets of data come together to draw a picture of the role of social values in land management decision-making for Holistic Management (HM) ranchers and a broader community of ranchers connected with the Montana Stockgrowers Association.

It was found that for all ranchers, social values are an important part of decision-making. Of the ranchers surveyed, most have a desire to improve their social condition including: intergenerational management, connecting with community, and learning about different ways of managing. The primary difference between the deep case study group and the larger group of ranchers is the Action piece. Both groups of ranchers had a similar distribution of Feeling-Thinking about management decision-making that includes the social values and ART of those values within their SES. HM case study participants and survey respondents demonstrated a strong awareness of the role of the social piece and the ART components. However, Action management was more consistently implemented by the HM participants and less frequently by the survey respondents as illustrated in Figures 4.6, 4.7, 4.11, and 4.15. The HM decision-making framework is an actualization of the Kolb's Action step in decision-making and management, resulting in a stronger SES with a higher level of ART for those decision-makers.

CHAPTER FOUR

CONCLUSION

Social values and ecological connection are embedded in the landscapes and livelihoods of Montana ranchers. While the human component is recognized as part of the system, the social values of people connected with working landscapes are a frequently forgotten piece within the disciplines of science and research related to land management.

Socio-ecological systems (SEs) are more successful when social values are a part of the management focus and the properties of adaptability, resilience, and transformability (ART), are present within the system. These properties are potentially one of the most critical elements for resource management (Adger 2000). Goals for sustainability become possible when more attuned to the complexities within systems, including the human component (McGreavy et al 2015). Increasing understanding of the role of social values can bring to the surface a richness of views that could improve the decision-making base of the SES (Kenter et al 2015).

This research brings together the ideas of SES, ART, and the components of decision-making (Kolb's learning styles) to understand more about the role of social values for five Montana Holistic Management practitioners along with a broader set of fifty ranchers in Eastern Montana. For all ranchers, the ten social values are an important part of decision-making. Most ranchers have a desire to improve their social condition including: intergenerational management, connecting with community, and learning

about different ways of managing. Assessing the adaptability, resilience, and transformability (ART) of the social piece in SESs has strong potential to lead towards developing standardized social value monitoring beyond the extent of this research.

As Montana ranchers face the dynamics of panarchy change, perhaps scientists and researchers can assist by recognizing the role of social values. In doing so, ranchers and others can be provided with additional decision-making resources. Understanding the role of social values offers an additional resource to those within SESs who wish to strengthen and improve decision-making, to build the social capital needed to sustainably address challenges in large and complex systems.

REFERENCES CITED

- Adger, W.N. 2000. Social and ecological resilience: are they related? *Progress in Human Geography*. 24:347
- Anderson, H. R. Cacy, S.J. Heuck, P. Mangan, V. Novak, D. Streufert. 1998. Social Wealth of the Greater Yellowstone Ecosystem. Bioregional Citizenship Honors Seminar. Montana State University.
- Baker, M., J. Robinson. 2012. Aligning Kolb's experiential learning theory with a comprehensive agricultural education model. *Journal of Agricultural Education*. 53 (4):1-16
- Berkes, Fikret. 1999. Sacred Ecology: Traditional ecological knowledge and resource management. Routledge, Taylor and Francis. New York.
- Bermann, M. T. Jahn, T. Knobloch, W. Krohn, C. Pohl, E. Schramm. 2012. Methods for transdisciplinary research: A primer for practice. Campus Verlag, Frankfurt, Germany.
- Brown, G. 2013. The relationship between social values for ecosystem services and global land cover: An empirical analysis. *Ecosystem Services*. 5, e58-e68.
- Chambers, R. The origins and practice of participatory rural appraisal. *World Development* 22(7): 953-969
- Charnley, S. T.E. Sheridan, G.P. Nabhan. Stitching the west back together: Conservation of working landscapes. 2014. University of Chicago Press, Chicago.
- Creswell, J.W. 2003. Research design: qualitative, quantitative and mixed methods approaches. Sage, Thousand Oaks, California, USA.
- Curtain, C. G. 2015. The science of open spaces: Theory and practice for conserving large complex systems. Island Press, Washington D.C.
- De Villiers, A.C., K. Esler, and A.T. Knight. 2014. Social processes promoting the adaptive capacity of rangeland managers to achieve resilience in Karoo, South Africa. *Journal of Environmental Management*. 146 (2014) 276-283
- Folke, C., T. Hahn, P. Olsson, J. Norberg. 2005. Adaptive Governance of Social-Ecological Systems. *Annu. Rev. Environ. Resource*. 30:441-73

- Gay, L.R., G. E. Mills, P. Airasian. 2009. Educational Research: Competencies for analysis and applications. Merrill Pearson, Upper Saddle River, New Jersey.
- Golafshani, N. 2003. Understanding reliability and validity in qualitative research. *The Qualitative Report*. 8 (4): 597-607
- Gunderson, L.H. and C.S. Holling. 2001. Panarchy: understanding transformation in human and natural systems. Island Press, Washington, D.C., USA.
- Hampel, B. 2015. Against the grain: Fourteen farmers-adapt to climate change. Rosenberg Publishing, Australia.
- Kenter, J., L. O'Brian, N. Hockley, N. Ravenscroft, I. Fazey, K.N. Irvine, M.S. Reed, M. Christie, E. Brady, R. Bryce, A. Church, N. Cooper, A. Davies, A. Evely, M. Everard, R. Fish, J.A. Fisher, N. Jobstvogt, C. Molloy, J. Orchard-Webb. S. Ranger, M. Randy, V. Watson, S. Williams. 2015. What are share and social values of ecosystems? *Ecological Economics* 111, 86-99
- Kulig, J., D. Edge, I. Townshend, N. Lightfoot, W. Reimer. 2013. Community Resiliency: Emerging Theoretical Insights. *Journal of Community Psychology*. 41(6):758-775
- McGreavy, B., L. Lindenfeld, K. H. Bieluch, L. Silka, J. Leahy, and B. Zoellick. 2015. Communication and sustainability science teams as complex systems. *Ecology and Society* 20(1): 2.
- Montagne, C. 2002 Bioregional wealth profiles for sustainable development in Hokkaido, Japan; Darhad Valley, Mongolia; and Greater Yellowstone Ecosystem, USA. Globalization and Local Diversity: Towards an Era of Symbiosis. Kumamoto Gakuen University. Kumamoto, Japan. May 31, 2002. pp 241-260
- Montana 2016 Agricultural Statistics: 2014-2015 County Estimates. ISS: 1095-7278. Volume LIII. October 2016.
- Montana state map
http://www.vidiani.com/maps/maps_of_north_america/maps_of_usa/montana_state/large_map_of_montana_state_with_relief_highways_and_major_cities.jpg
 (Accessed April 2, 2017)
- National Agricultural Statistics Service. USDA. <https://quickstats.nass.usda.gov/#6E0CDB88-1772-3999-A567-766049F7BE71>, Accessed March 20, 2017

- Provenza, F., H. Pringle, D. Revell, N. Bray, C. Hines, R. Teague, T. Steffens, M. Barnes. 2013. Complex creative systems: Principles, processes, and practices of transformation. *Rangelands*. 35 (5): 6-13
- Ross, H. F. Berkes. 2014. Research approaches for understanding, enhancing, and monitoring community resilience. *Society & Natural Resources*. 27(8):787-804
- Savory, A. 1999 *Holistic Management: A new framework for decision making*. Island Press, Washington, D.C.
- Senge, P. 1990. *The Fifth Discipline: The Art and Practice of the Learning Organization*. Doubleday, New York.
- Sierra Business Council. 2006. Planning for prosperity: Building successful communities in the Sierra Nevada. Sierra Nevada Business Council.
- Smith, L., J.L. Case, H. M. Smith, L.C. Harwell, J.K. Summers. 2013. Relating ecosystem services to domains of human well-being: Foundation for a U.S. index. *Ecological Indicators*. 28 (2013): 79-90
- Stinner, D. H., B.R. Stinner, E. Martsolf. 1997. Biodiversity as an organizing principle in agroecosystem management: Case studies of holist resource management practitioners. *Agriculture Ecosystems and Environment*. 62 (1997): 199-213
- Stokols, D., R.P. Lejano, J. Hipp. 2013. Enhancing the resilience of human-environment systems: a social ecological perspective. *Ecology and Society* 18 (1): 7
- Walker, B., C.S. Holling, S.R. Carpenter, A. Kinzig. 2004. Resilience, adaptability, and transformability in social-ecological systems. *Ecology and Society*. 9 (2): 5
- Wegner, G. U. Pascual. 2011. Cost-benefit analysis in the context of ecosystem services for human well-being: A multidisciplinary critique. *Global Environmental Change* 21: 492-504
- Wilson, K., G.E.B. Morren. 1990. *Systems Approaches for Improvement in Agriculture and Resource Management*. Macmillian Publishing Company. New York.

APPENDICES

APPENDIX A

CASE STUDY COLLABORATIVE RESEARCH INTRODUCTION

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Hello!

I am a Montana State University graduate student earning my Master's degree in Land Resources and Environmental Sciences. The focus of my graduate research is to learn more about how various forms of wealth influence the decision making of ranchers practicing holistic management. Using the holistic management process, I would like to collaborate with ranchers to develop a wealth profile which provides the ranchers with a tool for visualizing how to improve their resource base.

About me

I was raised on a wheat and alfalfa farm in southeast Idaho, where my family has been farming for five generations. I reflect back on the skills, knowledge, and love of the land within my family and the community and believe that there is a need to place more value on the quality of life of people living in agrarian systems.

I was first introduced to holistic management while earning my undergraduate degree at MSU. The concepts taught in the course resonated well with me. It was while taking this course I decided to pursue a career involved with sustainable community and land management. I have continue to be a part of the course as a co-teacher with Dr. Cliff Montagne and Roland Kroos.

In the summer, I manage several goat herds which travel around the west grazing noxious weeds. During the past summer, I moved 2000 goats around Gallatin and Paradise Valleys, on both private and public lands. The goats are a viable economic and ecological approach to reducing undesirable species and improving plant communities. The goats also spark public interest which leads to increased awareness of the need for invasive species management.

In addition to graduate research, teaching, and goat work, I have the joy of raising my son Jack. He is three and a half, with an energetic and outgoing personality. We enjoy hiking, biking, skiing, and herding goats together. I am grateful to be able to bring a connection to the land into his life.

Research Background

The holistic management decision making process encourages practitioners to develop stewardship approaches which focus on the sustainability of the ecological, economical, and social components of the whole system under management. (7) Many metrics exist to measure the economic and ecological success of holistic management in grassland ecosystems. However, there are few metrics to evaluate the role of social values in relationship to ecological and economic systems. Conventional valuations and cost-benefit analysis methods do not sufficiently account for the quality of life and social values of people dependent upon a land resource base (5). If land-based social values are a key part of the decision making process, there is a need to establish ways to measure and evaluate the role and importance of these values. (2)

A wealth profile can be a useful tool for assessing various forms of wealth (8). The wealth profile identifies indicators for ecological, economical, and social wealth as a foundation for future decision making. The non-profit organization, BioRegions International has adapted the process to reflect the parallels between human and ecosystem processes. (6) Bioregions has found success in applying this model when working with grassland managers in the Greater Yellowstone Ecosystem and similar regions worldwide. This framework, provides a way to measure social values in terms that cannot be fully expressed when using conventional metrics.

Collaborative approaches enable local people to share knowledge of their ecological and social condition and is commonly used in agricultural based research (3, 1). Local knowledge partnered with science based approaches connects common ground and social capital, leading to increased sustainability of the grassland resource base (4).

For my research, I wish to collaborate with Montana holistic management ranching practitioners to develop metrics for a social wealth profile which reflects the values and quality of life needs of rural communities and individuals dependent upon a grassland resource base.

Ranchers Role

Collaborate with Lora to develop a wealth profile model.

Total time: 8-10 hours over 1-1 ½ months

- 1) Initial meeting and discussion
- 2) Questionnaire
- 3) Review results from first discussion and questionnaire
- 4) Final discussion

References

1. Berkes, Fikret. 1999. Sacred Ecology: Traditional ecological knowledge and resource management. Routledge, Taylor and Francis. New York.
2. Brown, G. 2013. The relationship between social values for ecosystem services and global land cover: An empirical analysis. *Ecosystem Services*. 5, e58-e68.
3. Chambers, Robert. 1885. The Origins of Practice and Participatory Rural Appraisal. *World Development*, Vol. 22, No. 7, 953-969
4. Curtain, Charles G. 2015. The science of open spaces: Theory and practice for conserving large complex systems. Island Press. Washington.
5. Kenter, J. et al. 2015. What are share and social values of ecosystems? *Ecol. Econ.* 111, 86-99
6. Montagne, C. 2002 Bioregional wealth profiles for sustainable development in Hokkaido, Japan; Darhad Valley, Mongolia; and Greater Yellowstone Ecosystem, USA. *Globalization and Local Diversity: Towards an Era of Symbiosis*. Kumamoto Gakuen University. Kumamoto, Japan. May 31, 2002. pp 241-260
7. Savory, Allan. 1999. Holistic Management: A new framework for decision making. Island Press. Washington D.C.
8. Sierra Business Council. 2006. Planning for prosperity: Building successful communities in the Sierra Nevada. Sierra Nevada Business Council.

APPENDIX B

CASE STUDY COLLABORATIVE RESEARCH CONSENT FORM

**SUBJECT CONSENT FORM FOR PARTICIPATION IN HUMAN RESEARCH
AT MONTANA STATE UNIVERSITY.**

*Valuing Social Wealth in Natural Resource Based Decision-Making: Collaborative
Research with Holistic Management Practitioners Managing Grasslands in
Southwest Montana*

You are being asked to participate in a research study as a collaborative researcher to develop the indicators, descriptors, and measures for a social wealth profile. This research may help us learn and understand how the role of social wealth, in natural resource management decision-making, reflects the values and quality of life needs of rural communities and individuals dependent upon a grassland resource base.

If you agree to participate you will be asked to participate in an informal discussion, questionnaire, and final discussion. Participation is voluntary, you can choose to not answer any questions you do not want to answer and you may withdraw at any time.

Total time: 2-3 hours over 1-1 ½ months

- 1) Initial meeting and discussion
- 2) Review results from discussion and closing discussion

All data collected will be stored on a computer with a restricted password. There are no foreseen risks involved in this study.

If you have questions about the research you may contact Lora Soderquist (406) 209-5317, [lsoderquist@hotmail.com]. If you have additional questions about the rights of human subjects you can contact the Chair of the Institutional Review Board, Mark Quinn, (406) 994-4707 [mquinn@montana.edu].

AUTHORIZATION: I have read the above and understand the discomforts, inconvenience and risk of this study. I, _____, agree to participate in this research. I understand that I may later refuse to participate and that I may withdraw from the study at any time. I have received a copy of this consent form for my own records.

Signed: _____

Investigator: _____

Date: _____

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If you agree to participate you will be asked to participate in an informal discussion, questionnaire, and final discussion. Participation is voluntary, you can choose to not answer any questions you do not want to answer and you may withdraw at any time.

Total time: 4-6 hours over 1-1 ½ months

- 1) Initial meeting and discussion – 1-2 months
- 2) Summarize your recommendations into a questionnaire – 1 hours
- 3) Administer questionnaire – 30 minutes
- 4) Review results from first discussion and questionnaire – 30 minutes
- 5) Final discussion – 1-2 hours

All data collected will be stored on a computer with a restricted password. There are no foreseen risks involved in this study.

If you have questions about the research you may contact Lora Soderquist (406) 209-5317, [lsoderquist@hotmail.com]. If you have additional questions about the rights of human subjects you can contact the Chair of the Institutional Review Board, Mark Quinn, (406) 994-4707 [mquinn@montana.edu].

AUTHORIZATION: I have read the above and understand the discomforts, inconvenience and risk of this study. I, Chase Hibbard, agree to participate in this research. I understand that I may later refuse to participate and that I may withdraw from the study at any time. I have received a copy of this consent form for my own records.

Signed: Chase T. Hibbard

Investigator: Lora Soderquist

Date: 2/4/16

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This research may help us learn and understand how the role of social wealth, in natural resource management decision-making, reflects the values and quality of life needs of rural communities and individuals dependent upon a grassland resource base.

If you agree to participate you will be asked to participate in an informal discussion, questionnaire, and final discussion. Participation is voluntary, you can choose to not answer any questions you do not want to answer and you may withdraw at any time.

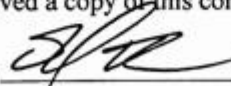
Total time: 4-6 hours over 1-1 ½ months

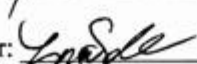
- 1) Initial meeting and discussion – 1-2 months
- 2) Summarize your recommendations into a questionnaire – 1 hours
- 3) Administer questionnaire – 30 minutes
- 4) Review results from first discussion and questionnaire – 30 minutes
- 5) Final discussion – 1-2 hours

All data collected will be stored on a computer with a restricted password. There are no foreseen risks involved in this study.

If you have questions about the research you may contact Lora Soderquist (406) 209-5317, [lsoderquist@hotmail.com]. If you have additional questions about the rights of human subjects you can contact the Chair of the Institutional Review Board, Mark Quinn, (406) 994-4707 [mquinn@montana.edu].

AUTHORIZATION: I have read the above and understand the discomforts, inconvenience and risk of this study. I, Erik Kalish, agree to participate in this research. I understand that I may later refuse to participate and that I may withdraw from the study at any time. I have received a copy of this consent form for my own records.

Signed: 

Investigator: 

Date: 2.2.16

SUBJECT CONSENT FORM FOR PARTICIPATION IN HUMAN RESEARCH AT MONTANA STATE UNIVERSITY.

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This research may help us learn and understand how the role of social wealth, in natural resource management decision-making, reflects the values and quality of life needs of rural communities and individuals dependent upon a grassland resource base.

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Total time: 2-3 hours over 1-1 ½ months

- 1) Initial meeting and discussion
- 2) Review results from discussion and closing discussion

All data collected will be stored on a computer with a restricted password. There are no foreseen risks involved in this study.

If you have questions about the research you may contact Lora Soderquist (406) 209-5317, [lsoderquist@hotmail.com]. If you have additional questions about the rights of human subjects you can contact the Chair of the Institutional Review Board, Mark Quinn, (406) 994-4707 [mquinn@montana.edu].

AUTHORIZATION: I have read the above and understand the discomforts, inconvenience and risk of this study. I, Bill Minton, agree to participate in this research. I understand that I may later refuse to participate and that I may withdraw from the study at any time. I have received a copy of this consent form for my own records.

Signed: Bill Minton

Investigator: _____

Date: 3/10/17

SUBJECT CONSENT FORM FOR PARTICIPATION IN HUMAN RESEARCH AT MONTANA STATE UNIVERSITY.

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If you agree to participate you will be asked to participate in an informal discussion, questionnaire, and final discussion. Participation is voluntary, you can choose to not answer any questions you do not want to answer and you may withdraw at any time.

Total time: 4-6 hours over 1-1 ½ months

- 1) Initial meeting and discussion – 1-2 months
- 2) Summarize your recommendations into a questionnaire – 1 hours
- 3) Administer questionnaire – 30 minutes
- 4) Review results from first discussion and questionnaire – 30 minutes
- 5) Final discussion – 1-2 hours

All data collected will be stored on a computer with a restricted password. There are no foreseen risks involved in this study.

If you have questions about the research you may contact Lora Soderquist (406) 209-5317, [lsoderquist@hotmail.com]. If you have additional questions about the rights of human subjects you can contact the Chair of the Institutional Review Board, Mark Quinn, (406) 994-4707 [mquinn@montana.edu].

AUTHORIZATION: I have read the above and understand the discomforts, inconvenience and risk of this study. I, Hannah Anderson, agree to participate in this research. I understand that I may later refuse to participate and that I may withdraw from the study at any time. I have received a copy of this consent form for my own records.

Signed: Hannah Anderson

Investigator: Lora Soderquist

Date: _____

APPENDIX C

INSTITUTIONAL REVIEW BOARD APPROVAL FORM



INSTITUTIONAL REVIEW BOARD
For the Protection of Human Subjects
FWA 00000165

960 Technology Blvd. Room 127
 c/o Immunology & Infectious Diseases
 Montana State University
 Bozeman, MT 59718
 Telephone: 406-994-6783
 FAX: 406-994-4303
 E-mail: cherylj@montana.edu

Chair: Mark Quinn
 406-994-5721
 mquinn@montana.edu
Administrator:
 Cheryl Johnson
 406-994-6783
 cherylj@montana.edu

MEMORANDUM

TO: Lora Soderquist and Michael Brody
FROM: Mark Quinn, Chair *Mark Quinn*
DATE: November 19, 2015
RE: "Valuing Social Wealth in Natural Resource Base Decision-Making: Collaborative Research with Holistic Management Practitioners Managing Grasslands in Southwest Montana" [LS111915-EX]

The above research, described in your submission of November 6, 2015, is exempt from the requirement of review by the Institutional Review Board in accordance with the Code of Federal regulations, Part 46, section 101. The specific paragraph which applies to your research is:

- ☐ (b) (1) Research conducted in established or commonly accepted educational settings, involving normal educational practices such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
- ☒ (b) (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.
- ☐ (b) (3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if: (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.
- ☐ (b) (4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects.
- ☐ (b) (5) Research and demonstration projects, which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.
- ☐ (b) (6) Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed, or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the FDA, or approved by the EPA, or the Food Safety and Inspection Service of the USDA.

Although review by the Institutional Review Board is not required for the above research, the Committee will be glad to review it. If you wish a review and committee approval, please submit 3 copies of the usual application form and it will be processed by expedited review.

APPENDIX D

CASE STUDY CONVERSATION AUDIO TRANSCRIPTIONS

Hannibal Anderson – Discussion #1

November 8, 2015

Tom Miner Basin, Anderson Residence (1879 Victorian stone home)

Sunny day, two and a half feet of snow on the ground from the storm the week before.

Lora: The main outcomes for today's conversation, in holistic management we are recognizing there are measures for economic and environmental wealth but aren't many ways to measure social wealth. Would like to work with you and other ranchers to think about the role of social wealth for you working with a natural resource base. Also, thinking about the parameters, we could develop to measure that wealth. Would like to develop a model that has measurable ways to see if the quality of life needs are being met. To see if social success is being met. For my research I would like to think about the social values and the parameters that could be put together to develop a model for measuring social wealth.

Hannibal: I'll try not to let my thoughts be too wild and crazy!

L: No, I think we need out-of-the-box thinking. Conventional ways of thinking don't always allow for the social component within decision making.

H: Good, sounds great.

L: Do you have a formal holistic goal for the ranch?

H: We haven't done it in the pure, structured sort of way, but we've created various kinds of mission statements and goal statements that are grounded in the same kind of process. There are two mission statements. One for this place and one for the Tom Miner Basin Homeowners Associated. The two statements are similar. Malou and Hilary put it together.

L: How does the community feel about the mission statement? Is everyone on board?

H: Everyone is on board at least a little bit.

L: They like the idea?

H: Yes, some neighbors philosophically, but aren't sure what it means to be a part. Our neighbor might be a little interested, and not closed off. They are disconnected with what we are trying to do and it will take some time.

H: Some absentee owners are caught in an interesting place. They have money tied up in the real estate and unlike...I can just say, we're incredibly lucky, this place has been in the family long enough it has no debt against us. We go move along...and this will go toward some of the aspects of social values. When you're able to step away from a primary economic driver, then you can start to entertain, at least your mind can open up to some of these other possibilities. So, generally speaking, some properties have been bought for the amenity value, not strictly for economic return. At least not in the short term. But then what they experience is the cost of operation, as soon as it is moved up into some sort of serious ranch operation, the cost of operation is more than what they...they struggle with holding their investment together and struggle on just breaking even on overhead costs. That is a difficult one to come up with, unless there are the social and environmental values that start to come in that make up for the lack of economic opportunity.

L: Yes. If you can put more weight into the environmental and social component...

H: Exactly.

L: (8:55) If we look at the different forms of economic, environmental, and social wealth. What do those look like for you at the Anderson Ranch? We don't need to go into economic details. I'm thinking more of the social focus, but the other components tie in so they can't be completely isolated.

H: Just quickly, the economic piece, we have already in our mission statement, so called value statement, we recognize that economic value is important in some place. Without that, how can we even have somebody on the place? So, it's not like...the challenge we run into, even with the highest priority being good care of the landscape and good care of the family. The family is a very high social value. Take care of the landscape...take care of the ranch. The ranch landscape piece is all about sound stewardship and top to bottom, wildlife, grass, soil, and the cattle are a tool to allow that to occur. We believe it is a valuable tool that way. The economic value has to be pressed. That's the needle that moves! We all know that in many ways in moves pretty aggressively. At the loss to some of those other values perhaps. But we have to move it at least enough, or at least explore how to move it, so that someone can afford to live here and take care of the place. That's not even in itself and easy model. So, with the cattle, we are leasing grass, J-L, pleased with that. We're taking a pretty low cut in terms of possible gross income with steers, just leasing grass. And yet, what we're also doing is eliminating and reducing overheads. That's the beauty of it. So, we don't have cattle year round. That has an environmental value as well as a social value. Where it is probably a little bit of a negative from an economic standpoint. And, then we juggle, since we have more freedom with our time in the wintertime, there are opportunities there to deal with the economic values without the economic values having to come directly off the place. That's how a lot of people have to deal with it. Someone works in town. Julie and I have both worked in other careers for all of our lives just to be able to afford to be here!

I've thought for a long time, how do you, in a really clear, concrete, kind of tangible way, that people can hear and understand and test and all that. How do you transfer the economic value, or how do you bring more complexity into the value system from the primary economic value. I know that is the driving force behind all of this. How do you keep the environmental values and the social values from being ignored and come out in a comprised fashion? In a really ironic way it makes people focus more on the economic values because people think they can buy their way out of the dysfunction of the environmental and the social.

Pat Flowers is interviewing 30-40 ranchers in Wyoming on so called sustainable, best practices. Some of that if for the new big land owners so they can look at a template of good stewardship. Like the Wilkes folks near Lewistown and these people that are buying the big ranches. And not abusing them, but right out of the gate they can see that these are the practices that people have thought about for land stewardship.

H: (17:00) I think the weight is still in the conventional side. Think of the most convention, fertilizer, pesticides. That's really hard to move people away from. You're right in the middle of it.

L: Yes

H: A lot of people are starting to calve later.

L: Yes, it seems like even the conventional ranchers are seeing the value in doing that.

H: Yes. More and more people are going to, really trying hard to graze cattle through winter. Reduce hay. There are shifts going on. But that bulk are still selling calves right into the commodity market. There's no other big market for them unfortunately.

Bill: Then they go to the feed lot?

H: Yes. They go right into the corn world. That's the worst! That's a deep, deep system that is one of the most destructive systems that we have in our whole agricultural world.

L: Well, just the inputs to get the corn to the feed lots. It makes no sense.

H: Totally. Then, throw the ethanol subsidy in on top of that. You think, oh my god! So, within that, there are some really good operators. People that are really thinking. The younger generations... There is a lot of attention that the younger generation should have. They are prepared to do some things differently. We joked about Cooper Hibbard, Walt Donald, Andrew, you could throw about six or eight of these young guys that we know together, they could move it.

L: They're innovative thinkers.

H: They can start it going in a different direction.

L: It's really neat to see the momentum that a group like that can create

H: That's right. They talk to each other and communicate with each other.

L: So, it's that exchange of knowledge, that exchange of knowledge that is big for that sort of shift to occur. And, for it to be people that are leaders in the community is important too.

H: In a way, generalization, then this could go lots of places... I think the main, at least one of the main social values in social wealth, one of the main ones is just in the quality of relationships that people have. Those can occur in lots of ways. If people can identify shared values and the old neighboring kinds of relationships. And, maybe on the economic side, they start to see opportunities for more efficiencies through the kinds of networks that they are a part of.

L: Yeah, the collaborative relationship.

H: Well, Whit Hibbard, two and a half years ago, came to the J-L and put on a two stockman ship two-day clinic at the J-L, mainly talk. He was just beginning to go out into the public forum kind of world, sharing. He is now regularly in the field. He came to the B-Bar last summer in June. A month ago, Andrew went down to a horse stockman ship thing somewhere in eastern Montana. Whit was doing a stockman ship thing in Melville with a bunch of people. The whole Melville community. So that thing is starting to roll out. And, he has a strong economic argument which he knows he can get people's attention with. That is maybe the most important tool to get people's attention. But, the other parts of that, of his world and sharing with people. It's all really based on relationship. That's what really get people. If they buy into it, that's what gets people and makes them want to hold onto it more and more. I'm speaking from my own view, I think the economic thing matters, but it's actually the other stuff that excites people.

L: It seems like conventional agriculture doesn't allow for that human and environmental connection. As much as traditional once did. There is less community.

H: Presence within a community, you bet, it is the other path.

L: There is value within community place-based knowledge.

H: (25:00) If people can get beyond the distrust of so called experts, specialists, that whole community. Plus the scientific community in itself. It's not fair to generalize at all, but when research at a university is being driven by a seed and fertilizer company. You have to say, what are the motivations? What does that mean for the local NRCS office?

I've never been particularly distrustful in any of that stuff. I sort of believe in everybody's got a value to come to the table with and everybody operates on best intention, etc. etc. But, I don't that's necessarily the case anymore. And, so the corporate, the end all be all of selling of the product seems to have become really the number one goal. And, buy is the hidden agenda on everything.

The local knowledge and local community relationships are starting to stabilize and maybe open more integrity into that whole set of relationships. For example, with the local NRCS agents, I'm really pleased with the work we've been doing with them, where they're coming from, the knowledge they have, and all that.

B: I think this applies to society in general. Relationships starting to suffer for a variety of reasons. The one thing ranching has, you have the land in common. You have a common, real property, real land, in common. People living in cities, suburbia, don't have quite the connection to the natural world. Maybe that connection to the natural world is some kind of binding thing that can draw you back together.

H: I hope so. I think you're hitting huge, huge point. The non-profit I'm a part of, One Montana, is about creating mutually positive relationships between rural and urban.

Getting the connection back between the rural and urban aspects of the Montana landscape, the cultures, etc. The bridge or the divide, get it reconnected. So, the urban folks don't see the land owning or rural populations as being this other world that they don't understand. There's a lot of antagonism that's built into it. The rural folks don't look into the urban side and say that these people don't have a clue and all they care about is recreation, etc.

L: It sounds like the non-profit does a lot of the same stuff we've been talking about. How do we rekindling relationships....As you've been moving forward with trying to be sustainable here at the Anderson Ranch, what are some of the indicators or descriptors that you would use to see that success?

H: (30:20) Certainly from the economic, those are pretty straight ahead. It's just a matter of whether the level of income is satisfactory or not. The question there is it's not about making a killing. Everybody says that. People the days want to make a killing, they're not satisfied with making a living. Just making a honest living would be the bottom line.

Environmentally, more and more, while we don't know our specific measure as well as we think we'd like to. We haven't developed them. Unquestionable the grass, diversity of vegetation, health, diminishing non-desirables, especially invasives, learning how to leave enough on the ground for next year. That kind of thing. What I think is becoming more and more understood is sound grazing and land management practices. We definitely want to bring a great knowledge of the soil into that mix. Just, we don't yet how to do that in the measuring component, without finding ourselves in the position that we really don't know what to do with the information. Mainly, I think the sound grazing practices in this part of the world, at this elevation, where we're not farming, sound

grazing practices are really the most positive that we can leverage and put onto the quality of the soil. Here the elevation is right about 6300 feet. Diversity of wildlife. We're not measuring a lot in a formal way, but certainly paying attention. I think we'll learn how to record and just document more, sort of random info that we have a stream of.

L: Like the badger population you mentioned. Making note of those observations.

H: We're noting trends. The wolves, you know full well how we feel about the wolves. We want a diversity in the landscape. We want this place to be as healthy for the predator part of the landscape as much as for the things that everybody loves. Those are really primary values for us. What we believe is that, well for me, a really high social value is the fact that there are wolves here. That is a high value socially. I'm prepared to sacrifice considerably in the economic side in order to have that social value. For grizzly too. That's part of the wonder of living here. That's a social, human experience and excitement that's not possible in lots of places. At least for those species. In that way, the whole cattle thing, if you're not prepared to take some hits from the wildlife than you should be doing your business somewhere else. If you've made a conscious choice to be in the livestock business here that you have to be realistic and not expect that it will all go your way. I feel very strongly about that. Even though I know it's not easy

B: (35:25) How about the longtime residents, such as yourself, that have been here for 20-30 years ago before there were any wolves?

H: There were no wolves and were not nearly as many grizzly.

B: You were overrun with elk.

H: Yes.

B: What a changing environment. That is a huge change.

H: Yes, and actually when you think of the economics, the economics of it all start to feed in...with some management. This whole thing, I think, is a really interesting process of really open consciousness. Being open to what possibilities there are. At the bottom line, economically, if you have 200 elk eating feed, there's no questions that's going to compromise your economic opportunity with cattle. On the other side of that, if you have x number of calves or losses from predators there's an economic loss. If you start to look at those pretty closely you're a whole lot better off losing some calves to wolves than you are having 200 elk grazing.

B: You're more environmentally in a natural balance.

H: Yes, very much, and then you're leaning in healthy sustainable ways you're starting to move into a basic postulate of this. Or what's the right term...is that a really sound, healthy, complex environment, is the best economic model for you to be working in. It's just trying to understand how to work effectively. And, it's all about managing risk. Managing risk becomes easier compared to a monoculture where look at the amount of inputs you have to have to deal with costs and investments and everything else. Then it's deciding you're going to take less out of it and finding a balance in that.

B: There's a saying that the right way to do a job is the easiest way. In ranching it may not appear that way when you're losing an animal here or there. It's kind of easier, better way.

H: Definitely. It's all theoretical in a way, where a person's values come from. You're familiar with the 80 20 rule? Okay, well you could look at as 90 10, 95 5. How far do you want to drive yourself to having it exactly the way you want it economically? The inputs for that last 20%, 10%, 5%, suddenly become really big compared to the actual returns. How much social wealth or capital are you going to expend being angry and not sleeping at night? Really it is basically an antagonistic relationship. Then you got to stressors and all that. What I'm describing is just my own choice. I'd rather get along with everything and take value in that set of relationships. Experience value in that, rather than not get along, or moderate it as much as possible. And expend a lot of my own quality of life wealth.

(40:06) I think we are approaching equilibrium with the wolves. From a biological standpoint I think we are. Even biologically, there are going to be swings and sudden events that occur. Generally speaking, compared to let's say the first six or eight years that the wolves were introduced there was a lot of extreme behavior. I think we are moving to an equilibrium where the prey population is certainly reduced and predator populations are reducing along with them. And, everything is settling down more or less. With the grizzlies, I think that is a real wild card! That population is I think actually, at least here in Tom Miner, that population is still on an accelerated increase. The curve is still climbing. Because, all of the sows seem to have triplets and twins! (big smile on his face!) And, they're raising them successfully to two years old. Yet, somewhere that whole thing...there's going to be a collision somewhere in that. The tolerance level...I think male predation...the mortality of cubs is probably going to be the major balancer. The male bears are going to start killing those cubs off. The delisting...it will be interesting to see what happens. From our experience, I won't say for everyone in the basin, I know the neighbor believes he's had predation from the grizzlies. I am always suspect. I know it doesn't happen but it doesn't very much. If there is an accelerated, or what appears to be a high risk of predation from grizzlies, then it demands a lot of attention let's just say. Is it really that amount of loss, or is it cattle eating poison (I think he's referring to larkspur.) and dying and then all that. But, despite that, we've been living in a really comfortable relationship with the grizzlies. As many of them as there are, it's really amazing with how comfortable it is. Part of it is that we value that relationship. We're not entering it with an automatic, fearful, conflict, oriented relationship. Imagine what it would be like if one lived for the fear of a cow being killed all the time by grizzlies. I wouldn't be able to sleep at night!

L: Yes, socially your wealth would decline significantly.

H: Yes, so that relationship, there's another relationship where the social wealth is built upon a respectful relationship to say the least. Maybe even stronger than that in terms of an appreciative relationship or appreciative energy in it. Appreciation within that whole deal is a big, big concept. The more one can move with appreciation bar, the more they are able to experience social paybacks or social value through all kinds of different relationships. Human and non-human, complex...That gets into another realm but I think that is really big in terms of social value. That opens up

(44:46)

Social, environmental, economic values...the richness of possibility of experiencing those values has a lot to do with how open or closed one is purely on a personal level. The example... I like that the wolves are here and the landscape is more full and meaningful to me because the wolves are part of the landscape. If there's a problem with the wolves and I get wacked on some other part of my value system, the fact that I have an automatic positive outlook on the wolves lends itself a lot of opportunity for what solutions might be out there. How do I respond to that event which has negative aspects to it? There's plenty of room for creative and imaginative kinds of things because you have complex set of stuff you're trying to maintain. Things like range riding, taking the loss, or moving cattle somewhere else, willingness to respond in a way that is not a lethal response. All that world can exist pretty easily if one is automatically sympathetic to the idea that there are wolves on the landscape. If one is automatically hostile or closed to that piece, I don't think those other opportunities or possible solutions are nearly as readily available. If you're not in that world, all of the other possibilities are not available.

To me then, what happens that those other social and environmental values become distilled into a narrow defined economic value. It becomes a death spiral with the whole way that the human and non-human interface occurs. Whereas just being able to have creative solutions, and the networks, let's say neighbors working with each other, might be F&W, Abby Nelson ...all that is social wealth as well. Those relationships that people work together with. There's a tremendous amount of social value in that.

48:33

L: When you are open, have respect, and the automatic desire to find other solutions, your tool box has a lot of resources. Lethal has only one tool.

H: And, if you do have to go to a lethal level, if you have done it through a social network you can feel pretty good about having done what you've needed to do and can feel confident about the integrity of the whole value system and you've done your best. We got rid of a bear at the B-Bar two years ago. Fish and Wildlife did it. We made the call on trapping him. We did a lot of talking with each other conferencing, lots of good insights. It wasn't a knee jerk decision. After talking about it we decided that a bear that kills cattle wasn't doing anyone any favors. The other bears would become victimized by that bears behavior. He would become detrimental to the entire population, not just himself. So, even with the primary value being placed on the bears, not doing something was irresponsible.

L: By having those resources you were able to move forward with confidence in your decision.

H: With lots of input, we could feel good about the decision and move forward. In a way then, social capital, social wealth, or social values, they very quickly start to impact the other values. They all become part of the same complex system. The core of the whole thing is being open enough to want to and success receive and interact with a broad set of information rather than being narrow.

Relationships are connected, a part of a collective sense of how things are in the world. That trumps everything else. Part of what I'm referring to is being present within the systems. Presencing. Completely open. That opens up all the possibilities in relationships.

Let go of the control and the ego cworld, which allows energy to shift and things to happen. That approach allows possibilities to become available.

Hannibal #2

L: What are the questions that need to be developed to measure social wealth?

H: The basic value is some sort of relational value. How does one measure or get to that? If you had a five point scale...How would you rate, or how important is it for you to have relationships with family, community, etc. How important is that compared to economic value?

How do you identify when the social value is taking a higher value than the economic value? When would you chose the social value knowing that the others may come second?

With well-being, happiness people need to allow viability in that type of construct.

7:05

What is the role of history? Can be valuable...also may create negative trends and cycles...Can come with embedded beliefs (may not be truths).

Robert Coles

16:28

H: To me this is ultimately about landscape consciousness. When one sees themselves as a part of a landscape, it could be a human landscape or an environmental landscape, but when they seem themselves as part of a dynamic landscape, as their primary experience. As opposed to the primary experience being focused on trying to control that landscape. If the consciousness that is coming in is valued, the relationship is different than if they are hung up in their own place trying to move something to their advantage. That is a huge shift, if one is in that place than the question of social value isn't nearly so hard to figure out.

Chase Hibbard Interview

February 4, 2016

Location: Co-op, Bozeman

Recording begins with a conversation about Bill Milton and his view of the topic of social wealth

Chase: We were talking about this very same talking recently in from the production perspective. Looking at the stool...How do you evaluate where you are? How do you set benchmarks?

For me it is very timely. My nephew is currently performing the job as foreman/ranch manager. He's on a track to take over everything. He'll take my job in the foreseeable future. Cooper has been schooled in holistic management and Savory grazing, Savory approach to the world. He comes with that wealth of knowledge and adds to our experiences to date, going on 115 years.

2:30 It's an interesting transition. For instance, we're using fish oil as a fertilizer by the tanker load. We discussed recently, do we know if we're getting a return on our investment? Any information we have is conjectural. We'll call someone and they says it's great, everything looks wonderful. It seems good. How do we evaluate this? How do we set a baseline? How do we determine what is really needed for the soil? What are the

parameters for soils? Is what we're buying meeting the needs of the soil and the growing plants. Are we fulfilling the needs of the soil and growing plant? We're starting to put some processes in place with some sophisticated soil sampling. So we've decided that we have three years, with one behind him [Cooper]. We got to show visible progress that there's a return on our investment and tangible progress being made. That is very timely for us.

We're also, he's bringing the Savory grazing, I hate to throw that term around but, he's bringing a different style of grazing and we need to do the same there. Set some parameters to be sure we are getting adequate rest, to be sure that we're progressing in the right direction.

4:11 We're grappling with exactly the questions you're asking right now, in the ecological front, the economics, I think we have the best Tools. Good finances, I have a financial background. We have objective measure and criteria and comparative data that goes back decades (?) That's a little easier...

It is a little more difficult to compare one alternative to another. At least we know those Tools exist. We can use them when we need to.

5:10 That brings us around to the social. I personally view that on two levels. One is interaction with and responsibility to the community. The community can be defined as the neighbors, your watershed, trade area, and it can extend to the industry as a whole, nationally, and your peers that are trying to do the same thing. That is one level. The other level is the human component, right there in our ranch community and family. On the ranch family, we have a balance score card that evaluate the three circles of sustainability. On the people level there are things like honoring a lifestyle, personal development through attending ranch related workshops, educational opportunities, personal enrichment, as well.

One of our employees has wanted to fly. We're trying to figure out how he can get his pilot's license. He has gone to school to prep for exam. He has had one flight with an instructor. Trying to find time to do the rest.

We also pay competitive wages and benefits. That a little difficult to find out what those levels are but we try to be competitive./ WE have a profit share and 401K plan so long term employees end up with a good nest egg over 20 years or so. Gives them an opportunity to build equity. We've had some employees leave with six figures. We feel good about that.

Lora: It's neat to be able to create more sustainability for that economic piece. It's sometimes hard for people who want to be part if this time of livelihood.

C: We also feel strongly about health care. We have a ranch sponsored plan. As you know it is getting more expensive. We still maintain a plan that covers them and their family. We cover the premium. We help with 100% out of pocket expenses. We try to take good care of our employees. We give them good housing. That's how we approach the people side of it.

Then in the community, probably the best example of that I could give you is the going back over 20 years, and Bill Milton was involve with this as well. We decided one of our emerging issue was the growing elk population in the area. Sharing the border for several miles with the FWP owned Beartooth Wildlife Management area. We had a bit of unique

situation with what the Beartooth would do regarding elk management. What F&G policies was regarding elk management on game ranges. That one in particular affected us big time. Our tools were pretty limited to public hunting to control numbers, and control elk distribution, and completion with livestock, and messing up grazing systems being a problem.

11:25 We launched a community initiative to find commonality and define our goals. We initially invited all the public agencies, private land owners, sportsmen, environmental groups. Rolled up our sleeves and decided we were going to take a 360 degree view of the situation and come up with a solution. That started over 20 years ago and we're still meeting 3 times a year. We're very active in setting season types. WE have three seasons that allow us to quickly address the growing elk population.

L: So, you're working with an active action plan developed on those consensus goals?

C: Yes. We have a very active role in setting season type, setting harvest goal. We work in partnership with FWP instead of just reacting to policy.

L: This is on public and private land?

C: Yes.

L: Are you seeing a shift in herd size and composition?

C: Well, unfortunately, we've got the tools. We have a season type and that allows us to shoot cow season long. Bulls are by permit. By putting bulls on a permit. were able to achieve the one common thread that ran through all the different interests when sat around the table initially 20 years ago, and still it's true to this day. Everybody there wanted to see bull elk die of old age. At the time that we put this all together, it was a standard season type where cows were by drawing and bull was open. It used to be a rag horn was a trophy. Now we're seeing bachelor groups of 200 bulls. That has been successful. With the cows we're still challenged with that. One of the things, the shoulder season idea came out of group. It is called Devil's Kitchen. So, we're in the pilot program of the shoulder season. We're putting tools in place. We have the work in the community through the Devils Kitchen Group...

We're talking about all this stuff but I haven't answered your questions about how do you measure this part?

(16:30) I guess my view comes back to what I've been saying, I try to set goals that are measureable in terms of employee satisfaction, motivation, and quality of life. We review that all the time through the balance scorecard.

L: Did you come up with the scorecard yourself? Or it a tool developed by someone else.

C: It's commonly used in business. The KRI the only Master's program for Ranch Management. They teach a course on this, on how to do it. It's through a three day course. You come away with the tools to use the balance scorecard. Tries to integrate the economic, social, and environmental. That's how we're measuring.

And involvement in the Devils Kitchen is one of our evaluating points.

L: The big part that I'm seeing with this research is the role of relationships. Open and adaptable relationships seem to be important for quality of life.

For Hannibal the big piece for him is the relationship with the land.

Kalsta it seems to be with the people. Relationships are important for rural people...NOT
ACCURATE REVIEW

C: Yes it is. I had a real a-ha moment in the first 3rd of my career. We had a major first in the fire in the Beartooth Management Area. It was November, very dry year, three drainages over, three camp fires started at the same time. They converged and exploded. Burned 30,000 acres in eight hours. We were downwind from that. The way the community rallied to come up there and protect personal property and brace for that fire that was advancing. That was the most amazing thing I'd ever seen. We had every volunteer fire department in 150 mile radius, National Guard, Salish-Kootenai, DH cats, water tenders....Absolutely phenomenal.

The Region 4 manager was new to the job, first 6 months of job. We had all these elk in the area, BWR is wintering ground for the elk. He wondered how he was going to feed his elk. We called a meeting of land owners effected in the area. We said, well, we'll take care of them. Because of the trust establishing in the DK working group that enabled what could have been a major issue for all involved. It wasn't a huge burden on private land owners.

L: The Gibb's Triangle explanation....

C: There are several groups have tried to establish similar working groups, Madison River example. Many have failed and I think it because they have not taken the time to establish the trust.

L: Yes, one that trust is established. You can move more quickly into developing action plans. Many times people get antsy and want to get moving with the action piece. The trust part is so important.

L: From your perspective, what do you think the questions are that need to be asked by someone like me who wants to better understand the quality of life on-the-ground? How do you start working on the trust piece?

27:30 C: Going back to the DK group. The group is facilitated and we had a lot of diverse groups sitting around the table. We spent an awful lot of touchy-feely time, that people don't like to do, but we struggled through it. We did things like landscape descriptions. Everyone developed their own definition of quality of life. Through three or four long meetings, the one thing that seemed to be a common thread, everyone there wildlife cons, range, etc. wanted to see elk die of old age. That has been the cement and the glue that has kept us together. I believe the reason other groups have failed is because they have not taken that time to develop that trust and understanding of where others might be coming from. The thing about the elk was an unintended consequence and it became the glue. Developing a commonality. The elk became more important than the differences in view.

L: Once you get the buy in then people seem to embrace it more.

30:15 C: People have to feel comfortable letting down their defenses and actually listening instead of just proffering a point of view. And, if you go to public hearings, they are all about proffering a point of view. And, the person with the most people on his or her side wins at the end of the day. That victory is often short lived and shallow. Because a year and a half later the group will change, the opposition will speak louder the next time.

L: It creates a dualistic situation and really limits you.

C: Yes. True lasting consensus building which I personally think is the most effective way to progress with natural resource issues. You've got to develop that commonality, that level of trust, and you've got to have a solution that everybody gives a little. Nobody gets it all. That everybody gives a lot to gain a little. That buy in to that extent and that fashion makes it an enduring solution. I think the questions to ask are, important...I think the questions need to be geared toward creating that commonality to creating trust, and when you do that you can make progress.

32:15 L: Maybe one question you could ask people to try and develop where people are with quality of life, or social well-being is almost how adaptable are you. How willing are you to sit down with people and set dualistic feelings aside.

C: Are you willing to give up any of your...Are you willing to give up anything?

If you have the trust, you are comfortable giving up a little bit. It's interesting watching people come to DK for the first time. Often people come with a whole laundry list of things, they splay it out, nobody says anything. Back to business. The person comes back a second time and nobody says anything. The fourth or fifth time it's like, what was that you were talking about? The people that stick with it get something in return. They have to let go of the 'do it my way'.

L: Do you think your connection with the landscape, and history with the ranch, creates more open decision-making? Does long term connection matter?

C: we don't feel threatened. We allow hunting and fishing access. We feel strongly that we are a member of the community and have obligations as members of the community. We don't feel threatened by it. Economically at risk because of it. Everybody complains about the bad stuff that happens. We have ten good things for every bad thing that happens. It's a state of mind. If you want to find the bad you will and dwell on it. If you want to find the good you'll see that. We get frustrated. We've found trash in the reservoir and shut it down. We always open it back up after a couple months. It's a synergistic relationship. I'm the fourth generation. I didn't have to earn it, it was given to me. It is gratitude to my ancestors and my family and the community we've existed with. We have a responsibility to give some of that back. If it's all economic and missing the social part, it's not sustainable. I know that. The whole community to came up to fight the fire.

L: Yes. Neat example of the power of community connection.

What are the weak links for integrating the social piece into more conventional or main stream decision-making? It seems like there's a set of progressive thinkers and decision-makers that recognize the value of this. There are also a lot of people that are more economically driven or environmentally driven rather than recognizing the people piece.

C: Treachery of age!

39:05 It's interesting because Cooper is coming up with all of these new ideas, and we've been around the circle a couple times. I still feel a little threatened. I want to slow down a little bit. I'm trying to find the line between that conservatism over the long pull and keep from going whole hog into a new direction. Going too far too fast. Integrated conservatism with new ideas. It's probably the trust. Things are changing at such a rapid pace now, it's hard stay up with it.

42:05 Here's a concrete example. We graze the game range. And, in order to graze the game range they need to monitor. There's a long standing policy that you need to strictly adhere to three pasture best rotation. We did for 24 years. We got a little bold because people in our operation. Cooper came and took it another several steps. The long and short of it... We compromised our grazing techniques in favor of the Savory techniques, which arguably depending on how you look at it, might be better. We ran smack into FWP... we said we've strayed a bit here but we think it's better and we're resting as much if not more. It's just not your traditional pattern. They said, wait a minute, this is a contractual agreement. We hear you but we have people to answer to. What you've been doing is defensible. What you've started doing is not defensible. We'd like to do this but we really can't. And so, this is a really concrete example of that new progressive hitting the old, what was once progressive. Ideas have progressed beyond where it way.

I know my forty years of experience and being successful has some merit. It's a little threatening. I'm trying to blend new and fresh without going too far too fast.

Chase & Emily: Chase explains our conversation to Emily.

Emily & Lora: Goat conversation

Chase: The NRCS used to be a great resource in every regard. Irrigation help... anymore it hasn't been funded. They haven't been keeping up. They could have people in that do what we're talking about. There's an article in the chronicle this morning about how agriculture in Montana is losing group.

Emily: People in towns are not connected [to agriculture]

Lora:

Emily: 56:42 The obvious weak link is communication. None of us are very good communicators. I think it's like a pitfall of people in the academic setting or in an urban community trying to understand and communicate with people in rural settings is that urban people tend to romanticize what it's like out there. People come out and think 'it's so peaceful here'. I think that's a form of lack of communication. What we tend to do is we all make assumptions. We make assumptions based on our own reality of what we think life is like. They're almost inevitably inaccurate.

Lora: So, taking the time to understand the Whole before making any inputs. Taking time to connect.

Emily: Taking time to connect. You start from your own relationships and see how many pitfalls there are in a marriage relationship, sibling relationships, and parental relationships. Then you extrapolate that to a community, and then to two different communities. No wonder our lives can be such a mess.

L: A lot of complexities there.

E: A lot of complexities.

L: I think that relationship piece is really key...

Chase: 1:00:26 I was talking about the difficulties... maybe threatened by... knowing the importance of being progressive, having new ideas, having an open mind. And yet, the conservatism that it takes to make this happen through multitudes of economic cycles, weather cycles, animal health problems, etcetera. Try and know those... Change brings forms of threat... Trying to integrate a new generation. It brings another level of

progressive thinking to the table. Trying to acknowledge that and not discourage it. At the same time you have to be conservative so it does come around to bite you.

E: 1:01:15 All those contradictions that exist in our relationships are what we deal with every day. What everybody deals with every day. It is at the bottom link it is all about relationships. It is trust.

C: It is that level of trust, that's probably the big one. We build those bridges...

L: and you probably feel like you can be more transformable with the transitions with Cooper. One that trust is there it is easier to turn things over.

E: I would say that with ranchers or business people that is a key part that breaks down is that trust level just isn't there. One generation feels like they have all the answers....

C: Not just generational.

Bill Milton Interview
Social wealth

It is a rich topic. There seems to be a lot of people that are instilling a lot of these indicators

Benchmark planning for the land, broad circle relationships – ngos, communities. Often like a mind map to understand various relationships.

Up front, I'm interested in this topic. It's an interesting thing to get into, some are thinking more than others. No templates exist. No perfect way that measures across landscapes.

For examples, I facilitate

Benchmarks that could related to the land. Could relate to a lot of social communities. Facilitate the CMR working group. Large area, rural, history around conflict around wildlife, family ranches, ngo impacted by how benchmarks are being met

Benchmarks on the land, could indicate that conditions are present for certain species. Sage grouse step habitat.

Right now – co-op country natural beef, sell directly to stores

How do you measure stewardship standards? Group in CA called point blue, large ngo, lots of scientists are working with ranchers in central CA. how do we measure the effects of cattle to improve the environment? Carbon sequestration

B-Bar working group, indicators of plant and wildlife health for ranches that were targeted.

State of MT, working groups, ranchers, extension, ngo – is there a methodology to monitor landscapes.

Could work with others to create a template.

What if all the different people agreed to

Shared resources

Shared monitoring – valuable connecting point for stakeholders

Agreed to landscape monitoring for landscape health agreed upon by a large variety of groups. Sharing information in a construction way. Cause and effect on the landscape.

Agree to benchmarks that show if the mark is being met.

Land in production

Triple bottom line for large landscapes. Groups connecting food and the land – whole foods.

How do we benchmark a family?

Savory institute – all the people on the staff Andrea Malmberg, community psychology.

Planning process with family and community

Responding to what's important to people. Combining approaches – quality of life

Quality of life is difficult, because people have a hard time describing what makes them happy. It's not quite so simple.

Many external factors come into play

How to measure is what Andrea is working on

Ranching for Profits – Dave ??,

How to come up with a set of benchmarks for our business. In a sense

If I look at our family business

8 things we have to meet

We have a broad planning process, monitor the land, profitability of business, indicators for all of those. You can look at net worth, production, annual breeding, calf weight return on investment. Cost of production. Important for co-op. Standardized template for benchmarks for the co-op. Only one in the country. Effects quality of life

An example of how dynamic these things can be...

Some guy...look at what they're doing, cost is high \$2000

Asking others for advice

Dana my wife...we're doing fine why do we need to bring another person in, we're meeting benchmarks

Sending email out to team, includes team, conference call to make decision

Lora: important open communication

Most important practice for families, relationships as a team, with the land, listening to each other,

The most important practice is to have a weekly planning meeting. Things are changing all the time. Weather may change things. Employees may have troubles with family that affect work.

When people are choosing to meet regularly, they can check in to keep the connection

Need connection to make sure we're keeping up with things

Relationships need to regularly communicate to be sustained and grow. The meeting is the most important thing we do.

Good functioning neighborhood here.

Is something happening or not happening. Are your needs being met or is there something in the way.

What people or things or agencies are getting in their way for making it what they want it to be

Are people actually achieving what they want to achieve for business, relationships. What are the obstacles?

Landscape groups – come together with conflict. Ask ranchers, what best possible outcome would be. ...I'd like

Something communication, focusing on what people really want – then you can develop a plan to achieve it, rather than working on symptoms.

I continue to train myself to ask people what they really want.

Really work with neighbors, weed management guy conflicts – wanted to spray, took the time to understand what he needed rather than just viewing the differences. We could've gotten into a big brouhaha with him. Instead we collaborated. Resulted in good relationship, available to help with tractor...couldn't afford to lose that relationship That goes with all the neighbors....What bridges are you prepared to burn? Are the bridges still there?

I am starting a workshop...

Benchmarking social well-being in communities. How willing are ranchers to share their feelings with social succession? With a family, talk in an open circle

How willing are people to get together to talk about things? Ranchers tend to be pretty closed about money and social issues. The more people can talk about those the more people can work with those insights

The reality is...I have the 15,000 acre ranch, if all the ranches are having difficulty then we will have difficulty. Their problems become our problems.

When dealing with large landscapes, the most successful ranches are taking care of their resources they bring a positive vibe to the community

People that are struggling become a weight in the community. It is negative energy.

This interdependent social web in a rural community based upon how successful people can be. Resulting in conflict resolution. No family is an island in a community. The more people that are successful and share it. Increase capacity of community.

Social wealth is a huge deal. I love to read examples of how communities are working together.

What is the trust level in the community?

Trust is at the heart of it

How do rate commitment

All very dynamic, a good functioning community

Relationships

In my zen practice, everything is changing and if we are sharing views collectively, there is a lot of opportunity to

How to share with your community?

The most difficult part of participation is agreeing on the question. Need to

What actually

What is the question that I'm trying to answer?

Are there questions that get to be asked?

I would recommend visiting with different people. They don't know

Dave Pratt, Andrea Malmberg

Achieving trust, the world is having trouble with this. We each have to work with the

Be in a place of offering. What does it mean to have a life that offers time to others, trust and safety?

There's a lot of personal work that needs to be done

Follow the fear and you'll figure out where the cause and effect is
 There's a great article in High Country News...Malpai Borderlands group...got into the whole idea of generosity and how people help each other out. People got together to help each other.

Might be useful for me to work with different groups in rural regions around Bozeman.
 Maybe useful to go out into the community

Here are some real examples for what social well-being looks like in a community. See what arises. What are the activities that allow trust to be expressed, confidence to be expressed?

Communities to

Future sustainability for rural areas needs people to work together

If someone were reading about social well-being – groups can get to the core principles how people overcome difficulties

In the rural communities

February 2, 2016

Erik Kalsta

4th generation

Interview Location:

Glen, Montana. At family ranch house built in 1890.

7" precip, typical area for wintering

E: Ranch has always had a diversity of ways to generate income.

Started with sheep, 750 head. Brought in garden crops. Great-grandfather went to Maine and brought back New Brunswick potatoes. Went to Helena and Butte to support those. That's how family got out of debt.

Overtime became dedicated almost solely to cattle.

Went to school at MSU. Parents saw the important in getting an education.

Work with 501 C3.

Sometime people are surprised that rural people are educated. Stigma about ranchers.

Issue in Oregon gives ranches a bad name.

Needed additional income to support ranch early on. Worked in commercial fisheries in Alaska. Herring in March, halibut, and salmon June through September. Acted in the place of buyer. Fisherman with their boats are similar to a little ranch.

Needed to develop strong social networks with them to keep them coming back to you as a buyer. Needed to develop a lot of trust. Successful because it didn't seem any different than sale day at the ranch you're just selling fish instead of calves. Similar people and situations.

4:30. My approaches to agriculture came from my parents and grandparents. People are sometimes surprised when they find out that I'm educated. That is a stigma of ranchers and that gets in the way. People see the guys out in Oregon and paint ranchers with a pretty broad brush.

L: If we look at the forms of wealth on a ranch. There is the obvious economic piece. Then there is the environmental wealth in the grasses, livestock, and things like that. What does your social wealth look like to you?

6:40. E: Do you know what a brush bull is? They are older 5 to 6 years old. As bulls get older, they become a brush bull. Big, dangerous animals. They do what they want when they want. They aren't doing their job any more. They're just hanging in the sage brush. Can be completely ineffective for breeding. They might run younger bulls off and then going back to the sage brush. My wife uses this analogy for ranchers in the state. They have become older enough that they're all a bunch of brush bulls. They don't want to go out and see anyone, they just stay in the brush, and they're not going out and getting their job done. In this case I think what she is referring to is socially. My wife sometimes remind me to not be a brush bull.

8:30. E: It used be that ranchers would get together... We haul our cattle out in the spring and fall. Everyone had these 20 foot long cattle trucks. If you're hauling 300 cattle and you get 10 in trailer, that's 30 hours, 3 hours round trip. So you'd get everybody together. Haul my cows one day, the neighbors, another day, and then aspect, the comradery, and

community I think it is way more difficult to enjoy what you're doing. another. That's one of our issues, that's something we're trying to work on. And I think it's a big one because when you start losing the fun^{9:40} When you talk about wealth, well, a few years ago, my daughter and I were riding the four-wheeler down through the field. She was about 11 years old. And we through some trees and popped into a pasture along the river and there's a wolverine standing in the pasture about 40 yards away. That's the third wolverine I've seen in my whole life. That's something that people don't calculate but I think that is one of the most important aspects for me of what I do. It's the unexpected parts of the day that are not necessarily tied to ranching. They are, but it's the wildlife, it's what I see. I went out the other morning and I think I counted 8 goshawks, 4 rough-legged hawks, 3 bald eagles, a golden eagle, 6 ravens. Just in this little 80 acre field, all going nuts on voles. It was like wow, that's a good morning. That's another component about that wealth.

12:00 L: Thinking about that connection, how does that connection influence your decision-making?

12:24 E: Oh it completely screws it up! I get way to sentimental about that kind of stuff. I have had many offers to sell this place and I've turned them down every time. If it was about good business, I be comfortable well off somewhere else I guess.

L: Yes, it goes back to that connection with the land. That has a lot of value you.

Recording 4 – 6:00 L: What do you think the measure or indicators are for social wealth on the landscape? And, the social part could be broad, not just the community but like the things you talked about, the wildlife connection and just being here on the ground.

E: Well, I guess The obvious, we do try to um...for some reason, my wife and I have kind of an eclectic group, of...like when we do branding and when we do shearing, most of our helpers our professors. Or, they have come to here in various forms, either fishing or some other network of people. We do have a broad group that way.

We try to involve organizations like CFWP. They work with young criminals, youth corp program, generally kids who don't have a great background and don't have a chance. We bring them out and they often brand here. We'll have projects. Sometimes we have ecology projects or do other things. It just depends on the year and the kids. We've branded about ten different times with kids. It's a lot of fun. My wife can't go because, she didn't grow up on a ranch, the guy that used to run the program (former Butte mayor) we grew up together with the idea that well, you get hurt, rub some dirt on it. That's how we always treated this program. MY wife shows and starts worrying about everyone. Then they start worrying about themselves.

L: That's really neat. So, part of with you guys on the ranch is working with a broad community and broad networks

E: Yes we try to. And, we try to work with as many NGOs, like wildlife and conservation NGOs, as many as possible. Wildlife Conservation Society, Big Hole Watershed Foundation. I sit on the board of the foundation. Big Hole Watershed Committee. I sit on the board of Future West which is a, kind of a progressive community/ecology group out of Bozeman. They do a lot of...they help a lot of these small groups to do their work...grants, etc. We work with a lot of groups like that. I have a professor doing a study on bats. We've run Hantavirus studies. All sorts of stuff. A lot of ecology work.

10:00 L: So, your ranch has been a classroom.

E: Yeah, for a long time. Part of what's great about it is...we've got a river gauge down here. The longest operating river gauge on the Big Hole. My great-grandmother used to do it manually. It's USGS, so we have a good data set there. We have a NWS weather station out here for probably 75 years which has given us a fair bit of data on the site too. And, that's all stuff that we enjoy. It gives us a better look forward if we can see behind us.

11:00 L: So, would you say that knowledge is a big part of your social wealth here?

E: Yes.

L: It seems like your management has been adaptable. It doesn't seem like your ones of those ranchers that says this is how we've done it, this is how we're going to do it

E: That's never been a philosophy here in any of the generations. My grandfather's saying was, the impossible just takes a little longer. You have to adapt or you die. At one point we were almost a truck garden, then cattle, and now we're cattle and sheep. And, I'm planting a 400 tree orchard.

L: Wow, what kind of trees?

E: Mostly apple, we're gonna have some pears. One of the things that I have always had is a one hundred year management plan. That's not written in stone. There's a lot of variability in that.

L: You recognize that you may have to go back and tweak some things.

E: Oh yeah, I'm really good with an eraser. But, having that, knowing that my ultimate goal is for my kids and my grandkids to have some part of this. And, the part of this not being a subdivision. It helps me to look forward.

A cow-calf operation needs to have at least 400 head. That's the golden number. I sold way down when the market was high. Our cattle had changed a great deal. I decided to go back to a genetic base that I really like. One of the things that my dad started in 1966 is any time we had to give an antibiotic to a calf, for whatever reason, it got an earmark. That earmark says you are no longer the breeding herd. Over fifty years, we don't need to give a lot of vaccination. I'm trying to retain that and a few other select traits. I'm not a big believer in any specific breed. I was very affective by ...out of Zaire (15:00) related to a cows ability to adapt and thrive in its climate rather than particular breeds.

L: What do you think some of the questions should be, from someone like me, who wants to understand this piece more?

15:45 E: Well, what I'd like to know, is the community that you've outline is big and ethereal it seems like. What about the more local community. Or, the community of agriculture in general. I would like to know how that affects people's willingness to stay in an area. For instance, I grew up with most of the ranchers in this area, we were kids together. Most of them are only a couple miles away from me. I might see them once a year. The local community aspect has changed. Has it changed so much that people are going to move away? Do we need to redevelop those ties? That's a big question for me.

L: Like how do you rekindle that community collaboration that went into moving livestock across the valley.

E: Yeah.

L: It seems to be one more layer that connects you to your resource base. If you don't have the community or something that you feel part that creates some disconnect. People selling out to a subdivision.

E: Or an out-of-state land owner. That creates issues. We did with the lower end of this place. My dad sold it so he could retire. He proceeded to die two years later. Never retire it will kill ya!

L: In what ways, if any at all, do you monitor for positive feedback in social well-being? Maybe this question is too academic!

E: Well my wife tells me if I'm brushing up. That usually means that it's time to get out for a conference or take a break or something. The internet is a fantastic tool because we have access to so much more information, real and fake, that we didn't twenty years ago. I don't have to go visit anyone, I can look something up, research the bejesus out of it, and I can make a move without ever talking to anyone. And, you know, that's not always the best.

The orchard thing, I've researched it for two years. I know about root stocks, insects, what it takes to be organic. I met a guy from New Mexico. He has an orchard at 8000 feet. He has that same data that I do. He can say that I don't care what the book says, when I do ____ it seems to work. When I do this I make money and trees live. You might want to try it.

Those kind of things... We might be calving and get a bad case of the scours. Rotovirus hit here in the late 80s. It devastated people. My dad got on the phone... (21:30) We had neighbors that would suggest, buttermilk and garlic, etc. Through that process... Well there's a vet in Idaho learning that the vaccine isn't addressing the strain.

We're right at 5000 foot. Apples...

At lot of our lower ground, as it gained fertility over the years, the cottonwoods trees don't hold up as long. I've kept those areas down there. At lot of people tear them out. I've kept them because you have to irrigate them less. You run the water through one, their shaded, they create a wind break. There are so many positives to those cottonwoods that now that we are losing them... up here around the house where I have non-productive areas where I could use the apple trees to accomplish come of the same things and get an additional crop off of them. Then the areas down there that are too fertile, we're going to change to a timber that has a higher lumber potential. So, in 65 or 70 years, we'll have a harvestable crop and start thinning those. And, still provide...

L: You're diversifying economic sources.

E: Yes, as far as the lumber goes I see that as a way to make a generational transition. It might be a way for my grandkids to take over and let my kids retire.

L: Are there any questions that I haven't asked that I should be asking?

E: What kind of people are you talking to? ... Will Stademeyer

Location: Zocalo Coffee Shop

Bryan: We certainly identified early that a root issue was the social component of the ranch. It's also frankly the hardest part to fix and keep fixed. I was just talking to Terry our beef manager, about I didn't really think that I would be in people management or a relationship manager. That's really what I do. I'm a relationship manager.

Lora: Keeping people happy!

B: Trying. It's like you need to be a cheerleader, and a coach, and make time to go out and help buck hay bales with them so they don't think you're just in the office all the time. It's like, no relationship can be just left untended.

L: Like the ecological side, if you leave it over rested there are issues.

2:00 B: Yes, it becomes decadent. It's a problem and it dies. The same with the financial part. You wouldn't ignore your finances.

L: Yes, you need to make sure you're watching the numbers. Things are actually penciling out.

B: It's awesome that you're working on it on an education level. Because, where do you learn about it?

L: It's true and frustrating to be because it seems like it should be the starting points for everyone, whether you are an accountant, land manager, consultant, anything you do.

B: Peggy was working with Roland in the early days before I was there. And, they had all these great ideas. No one bought into it. Roland was beating his head up against the wall. Then we get people that are interested in it. Mainly interested in the ecological and financial part of things. Interested in the social part but had no idea what we were managing towards on that level other than saying we want a Quality of Life, we want to spend time with our families, we're going to work 120 hours a week because we're not making any money yet. And, I think that's really my limited experience with other places. That's a real short coming with holistic management. Because people talk about the Quality of Life, but then we work a hundred hours a week.

L: That's a good point. The Quality of Life is the focus, and it is revisited through the Holistic process but it's hard to see progress if you're working 100 hours per week just to keep it all going.

B: To improve the ecological health [long hours] and try to balance our animal performance and financial health. And, all the planning and replanning. Financial planning...it's a lot. Ten years into it we're finally making it a real commitment. Not that we haven't thought about it as important before, but now we're can focus on it more. But, it also comes as a cost, like financially even. Because, if there's 100 hours' worth of work per week and people only want to work 50 hours per week, you need to have more people.

L: It's hard to keep the stool level all the time.

B: The stool is always shifting around. So, do you have specific questions?

L: I have some guiding questions....

6:10 L: How do you think the social piece is currently affecting decision-making?

B: I just go done doing a review process. And, it's different for everyone. It effects personnel policies, it effects operational policies, financial planning, it affects everything.

It all different too for each person. We have A. Anderson and his family, they have four kids under the age of seven. They want to have...they have business and family in TMB and in Centennial. Hillary has range rider programs going on in both valleys. They want a comfortable house to live in too. It's so tied to everything...What was the specific question?

L: How is that influencing decision-making?

B: We take it into account when we have our annual budget meetings. We make decisions about housing, vehicles. When we buy a new pickup, we buy a crew cab pickup. So we can have kids in the trucks. We include parts of it...specifically, Hillary has a team of horses that she likes to work with. We integrate that into our guest program, so we can pay her to do something. And, the guest love it. It's of course brought in the management, compensation, insurance, budgeting.

L: How to balance all of the pieces for just that.

8:12 B: Then you know, when we do the review process, we talk about where we each want to be in 5-10 years. Sort of identify specific goals and objectives to get there. My specific goals are to spend at least one day a week with my kids and wife. And, at least one day a month doing something for myself. That might be with them. There are sort of specific, quantifiable goals that we track. Our goal as a ranch is to average 50 hours per week. But, count that out on an annual basis. You might have some 80 hours weeks and then some 40 hours weeks.

We encourage paid vacations because we want people to have lives outside of the ranch. We encourage continuing education. We just spent three days at a grazing seminar. There's professional growth and also support personal growth stuff if people want. That doesn't necessarily mean we're going to pay for it. We try to give people time off.

L: Try to work with them if there's something they really want to pursue.

B: Yes, so we are definitely making active decisions to integrate it [the social piece]. That stems from...Two or three years ago. Andrew and I were both in the hospital thinking we're having heart attacks. We were so stressed out. We were literally killing ourselves. It kind of had to get to that level. Everyone there is a really hard worker, really driven, really believe in the vision of the ranch. They are willing to sacrifice a lot. But we got to that threshold and we thought wait a minute.

And, this has never come from Peggy, the owner. She says go do yoga...she is promoting this whole time. It's just taken...There's kind of a cultural part to it too. The neighbors, especially in Twin Bridges, say your ?? all the time Bryan. Or, they'll make a comment like, geez I wish I had time like you to go fishing....Well you guys sure have it all figured out. And they're saying that, but there's no way they're ever going to change. Like right now, they're out there calving. And the neighbors will be like, 'Well you guys sure have it made. One person's said those J-L guys are just lazy. They don't want to be out in 30 below weather calving in January.' Well, you're 50% right, we don't want to do that but we're not actually lazy. And they all have their own set of circumstances. But, there's the cultural part.

12:00 L: Yeah, I grew up on a farm and remember hearing those same sorts of things. My dad didn't ever take time for himself or vacation.

B: The ranch that I worked at before, I loved them dearly. But, the guys would get up at 4 or 5 o'clock in the morning and turn the kitchen lights on and go back to sleep on the couch. The neighbor would look at each other to see who was up earlier. Often times he'd be up that early drink coffee. It's a good example of how rooted that is in culture that you have to work seven days a week to feel self-worth. Or, be able to accepted ??

L: Or to prove that you're successful.

B: Yes, we grapple with that. I grew up with that super-worker, work harder, faster...

L: Yes, that's a tough one in rural communities. It's a tough paradigm to move past.

B: But, they'll sit in a coffee shop half the day and talk about each other.

L: Do you think the value of the whole resource base would change if there were a way to measure the social piece more? It sounds like you're doing this in a way with the 5-10 year plan.

B: I'm not totally sure I understand the questions.

L: Would it make a difference if there were a number placed on the social part. I guess one thing that I've seen coming out of these interviews is the role of relationships. Relationships with people and the land. It seems to be that people that are making decisions differently, maybe a little more progressively, are a little bit more adaptable in their relationships. They seem to be more resilient. An individual might be willing to put in the long hours knowing that there is...

15:20 B: I don't know... In our scenario, I have been at the ranch for almost ten years. Steve has been at the ranch for almost ten years. Which is more that 30% of his life. It's like 25% of my life. Andrew has worked there for 8 years. Tristan and ? who are our guest people, have been there for two years. I think there is a high degree of buy in and value of the resource. Our, one of the challenges for us, is that we're a pretty flat organization, I think there's only five of us that work there... We're trying to have the tide come up and all of come up at the same time with responsibilities. At one point I was management and making all the decisions. Now, Andrew has taken on the cattle operation. Steve has taken on the irrigation. They're really managing. Now I have a team of managers and we have seasonal employees that come in. As those responsibilities shift, there's always a little bit of... There's been challenges with roles and responsibilities. That's one of the most challenging parts of Quality of Life is having to take on more responsibility without killing yourself with work.

L: Yes, or feeling overwhelmed.

B: And, that's where it comes back to communication. We're starting to track our hours now. Not in terms of who's working the most. Because I'm really sensitive about... the goal is to work less. There's the inherent risk of 'he worked 45 and I worked 60'. I'm going to pool it all together. Mainly as an indicator. It's kind of hard to pick indicators for Quality of Life.

What we're going to be measuring... [Pulls up document on laptop] We're going to call this thing our dashboard. So, these are the things that we're going to measure. Here's stuff we've identified. Ecological, economic, community, total hours per month, total family hours per month, average labor rate including benefits, etc. Neighbor relations are going to be scored annually.

L: That really cool. So you are actively developing ways to measure in some way.

B: Yes. At the end of each month, for the monthly items, total labor hours worked...I will have them write the number on a piece of paper and throw it into a hat. So it is anonymous. They buy into why...At least two of the four buy into it. The other two haven't bought in because they haven't been there as long. They are the ones that are concerned about what other people think. Super workaholics.

L: So they may need to find a way to shift their ideal.

B: One guy, Rob is that way. Last month I had to sit down with him and ask him to identify his vacation time. I asked him to have it on the schedule in two weeks or I'd dock his pay. I have to kick him off the ranch to stop working. The thing is, that sounds sort of funny or whatever, but it's really sort of dysfunctional. Where it's coming from is him not wanting to deal with his relationship with his wife. He's just hiding at work. And it brings on this attitude of 'well Rob is still here, maybe I should work some more'. That kind of thing really snowballs.

L: Do you think that the list you are working on, with the three pieces, do you think that will give you more adaptability to deal with the social dynamics? Or, what do you think the adaptability is like?

24:30 B: What my objective is, it will give me a gauge. Are we driving down the road and about to run out of gas? I have some feel for it, but...It'll hopefully get people to actively think about this each month and give me some feedback. And, communicating about these things. Bringing them up in meetings. That will give us a test of how we're actually doing. Which will help us be adaptable. It's hard to adapt if you don't know what's going on.

L: Just getting everyone on the same page with communication.

B: And, we can look at it together. Sometime you just get busy, really working, moving cows a bunch, I have to do the financial part because we're not making money. Getting really caught up in working and not thinking about the Quality of Life as frequently as we'd like. Then a year will go by and...people have a propensity to see the negative. What I want to celebrate is the successes. If we document this stuff throughout the year, at the end of the year we can look at ecologically how is the ranch? Financially we have all kinds of worksheets and stuff. Socially, historically we thought about it like, "Well it seems more successful than the year before. We didn't have a heart attack." If you don't have it documented, it's real easy...At the end of the year when we would revisit this stuff. I'm pulling it all together in a couple days. It's like you pull it all together a few days before the meeting its super easy to forget all the things that happen throughout the year. So, you don't have any point of reference. People remember the two wrecks and not the 50 good things that happened in between.

L: It seems that the social piece needs to be monitored just as actively as the other two piece. If not more. You don't monitor your pastures one time once the cattle are there. You monitor frequently to make sure you're achieving goals.

B: That's a great way to think about it. Do you just check your books at the end of the year? And try to think back, where did all the money go or how did we make all this money?

B: So, it's like a relationship bank account. Frankly it is the most uncomfortable, hardest part of the whole business. I really don't like having challenging conversations with people. For some people it comes easier. But, in this business, people don't like talking about feeling.

L: It does put people outside their comfort zone. Even with the Holistic Management class, we start the first part of the course working on the people part. It makes students really uncomfortable.

B: What do you do in the class when you teach it?

L: I talk a lot about the Gibb's Triangle. We talk about establishing a foundation of trust. We talk about paradigms. It's really easy to get set in your way and create black and white situations and it doesn't have to be that way. Last week I was telling them about the Anderson's up in Tom Miner and the wolves. There's a den on the ranch. They've found different ways to live with them. Same thing with you guys over in the Centennial Valley. You're doing the range riding, monitoring for issues, or replan. I shared that piece with the class....It's a tough piece for anyone to work with...

33:00 B: That's great that you do that. Like I said, when Roland was helping us at first, I was interested and bought in. And, the team was super dysfunctional. I was like, yes let's do this. And, it went nowhere. It took two years to iron out. They all had to leave. If I were going to do it again I would deal with it differently. I really wanted to be diplomatic and give people the opportunity to learn and come along. The way they identified Quality of Life was different than ours. Pretty radically different. So to come up with common goals, was drawn out and ugly. They just quit. In hind sight I should have let them go way earlier. And, just been this is how we are going now and we want to give you opportunity to adapt. I spent two years and it wasn't productive at all.

36:25 L: With your list that you have put together. Do you think that will help you monitor for positive change for the Q of L.

B: I think it will. It gives...One thing we have been guilty of is saying we want a Q of L, healthy landscapes, this and that. We never really said how we were going to do it. We didn't have something to hold ourselves accountable. We didn't have a point of reference.

Measuring hours per month is not our goal, but hopefully it's an indicator of the complex context.

L: It gives you an action plan direction for the social piece.

B: And, it's like, sort of the fuel gauge. If the fuel gets low a light should come on. If we see we're working 100 hours a week again. We can look and see okay we shipped out, but if it's like we're working that much for two months straight the fuel gauge needs to come on.

L: A way to recognize it isn't sustainable.

B: If you don't have a fuel gauge, you can recognize that I'm running out of gas, petering out here. But, it's not till you go to the hospital for heart attacks that the fuel light comes on. You need to know when you're getting low.

L: I suppose it has a trickle time effect on your family. If you're using all your gas on the ranch there's nothing left when you get home.

B: The kids aren't happy. You're not recreating. I do think it will help us quite a bit. It will like everything that we monitor, there will be times we're wondering why we are doing it. But if we do at least six we're making progress.

Improving communication has helped with resiliency.

You need to be making more deposits to relationships than withdrawals. The bad days need to be outnumbered by good and great days.

L: I think we've covered everything that I had included. Have I overlooked something that is important to you.

APPENDIX E

CASE STUDY CONVERSATION SUMMARY MATRIX

Case study interview experience matrix summary for adaptability, resilience, and transformability (ART) organized into the Kolb cognitive thinking stages of Feel – Think – Do. The matrix reflects a management decision from each case study participant that is considered or currently practiced.

	Feel	Think	Action
Adaptable	CS #1 Open to receiving and interacting with a broad set of information rather than being narrow. CS #2 Recognizes the importance of new ideas and having an open mind. CS #3 “You have to adapt or you die.” CS #4 When people are choosing to meet regularly, they can check in to keep the connection.	CS #1 Be realistic about the risks of raising livestock in a high predator density area. CS #2 Open to new ways of cattle management. CS #3 The multi-generation philosophy is open to change, meeting economic challenges with the idea that the “impossible just takes a little longer”. CS #4 The most important practice for families, relationships as a team, with the land, is listening to each other. Relationships need regular communication to be sustained and grow.	CS #1 Range riding, knowledge and input from others CS #2 Community connection allowed for adaptable management after the loss of elk habitat in wildfire. CS #3 Connect with broad network including NGOs, Wildlife Conservation Society, Big Hole Watershed Foundation, Future West, CFWP, and local community CS #4 Weekly planning meeting.

	CS #5 Having ways to gauge what we're doing, provide feedback, and improve communication, will help us be adaptable.	The meeting is the most important thing we do. CS #5 Dedicated to lifestyle, ecological component.	CS #5 Developed a tool to measure ecological, economic, and social. Including total family hours per month and neighbor relations
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	Feel	Think	Action
Resilient	CS #1 Open to all possibilities within the relationships and decision-making. CS #2 Feel strongly about the well-being of those connected to the ranch – family & employees. CS #3 Enjoy being able to connect with a larger part of the community. CS #4	CS #1 “You can’t expect it all to go your way.” CS #2 On the people level, want to honor lifestyle, personal development, education, enrichment Recognizes value in personal growth for family and employees. CS #3 Sees value in maintaining ties with community. CS #4	CS #1 Take the loss CS #2 Use scorecard to evaluate the three circles of sustainability. Building bridges of trust with family and community. Part of Devil’s Kitchen Group. CS #3 Connect with broad network including NGOs, Wildlife Conservation Society, Big Hole Watershed Foundation, Future West, CFWP, and local community CS #4

	The more people can talk; the more people can work with those insights. CS #5 Will help retain employees enabling overall social improvement	Future sustainability for rural areas needs people to work together. Communities need collaboration. Benchmarking social well-being in communities. CS #5 Sustainable and reasonable labor requirements	Communities need collaboration to get to the core principles of how people overcome difficulties. CS #5 Relationship bank account and improved labor communication for efficiency increases. Continuing education
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	Feel	Think	Action
Transformable	CS #1 Let go of the ego and need for control. Sees being part of the system as a wonderful piece of the human experience. CS #2 Willingness to give something up CS #3 Ultimate goal is for my kids and my grandkids to have some part of the ranch. CS #4	CS #1 Willing to sacrifice considerably on the economic side for benefit of the whole. CS #2 Planning ways to manage ranch beyond one generation. CS #3 One of the things I have always had is a one-hundred-year management plan. CS #4 Shared monitoring, for large landscape health, valuable	CS #1 Management maintains the integrity of the system. CS #2 Passing management responsibilities down to next generation. CS #3 “Written in pencil not in stone. There’s a lot of variability in that.” Sees being part of the landscape as another component of wealth. CS #4 Landscape monitoring for

	Triple bottom line for large landscapes. Groups connecting food and the land. CS #5 Reduce stresses on entire system resulting in overall improvements	connecting point for stakeholders. CS #5 Communication, emotional, and family needs effect employees which may see traditional	landscape health by a large variety of groups. Sharing information in a constructive way. Agree to benchmarks that show if mark is being met. CS #5 Developed a 'dashboard' to measure ecological, economic, and social, Including total family hours per month and neighbor relations
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APPENDIX F

SURVEY DATA REPORT



March 6, 2017

To Whom It May Concern:

Permission is hereby granted to Lora Soderquist to include the report entitled Ranching Social Wealth: Views and Practices by Andrea Mack dated March 2, 2017, in its entirety as is as an exhibit for her thesis.

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Ranching Social Wealth: Views and Practices

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When you make use of our work for publications or presentations, please be sure to acknowledge the funding we receive from NIGMS using the following: Research reported in this publication was supported by the National Institute of General Medical Sciences of the National Institutes of Health under Award Number P20GM103474. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

prepared for Lora Soderquist

March 2, 2017

1 Background

Lora is studying views and practices in ranching social wealth in Montana. She initially did a qualitative study with five ranchers in western Montana. Using that information, she created a survey titled, "Social Wealth Assessment Survey". With help from the Montana Stockgrower's Association in locating members, she interviewed by telephone 50 members from eastern Montana. Telephone interviews took place until 50 surveys were completed. The final sample, then, represents a convenience sample of 50 members of the Montana Stockgrower's Association members in eastern Montana.

The survey contained 10 paired *feel/think* and *action* questions. The scope of the survey is to:

- (1) Summarize the social wealth views of eastern Montana ranchers.
- (2) Compare views on social wealth to actual practices.

This report begins with statistical summaries and graphical displays describing the respondents. Next we look at paired question summaries in four ways. In the first, both *feel/think* and *action* responses are treated as categorical, and we use both counts and proportions as summary measures. Second we treat the *feel/think* variable as continuous and provide boxplots of responses within each *action* category by question pair. Questions are then grouped by category and estimates of center and variability are provided for the three question categories: adaptable, resilience, and transformable by averaging responses over all questions falling in to each category. Finally, for completeness, we explain two correlation measures and why these data are best explained by other measures.

2 Demographics

The ages are slightly skewed toward lower ages. The average age was about 55 years and the median age was 60 years. Ages ranged from 19 to 88. The sample contained 11 females and 39 males. The median number of years ranching was 40.5, with a mean of 42.2. Ranchers ranged from 5 to 88 years of ranching.

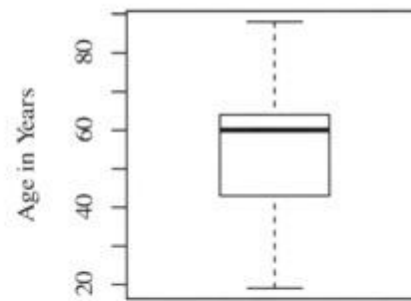


Figure 1: Age breakdown

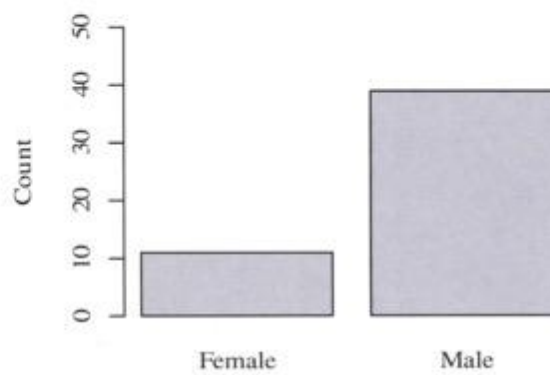


Figure 2: Gender breakdown

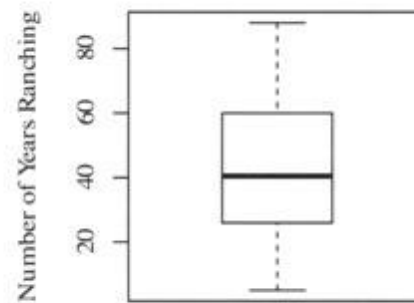


Figure 3: Years ranching breakdown

3 Survey

The *feel/think* questions were measured on a five point likert scale ranging from “Strongly Disagree” to “Strongly Agree”. The *action* questions were measured on a 4 point scale, with levels of 1 = “Uncertain”, 2 = “Never”, 3 = “Sometimes”, and 4 = “Always”.

The paired questions have ordinal responses. The first ten figures below by question pairs visualize the distribution of *action* responses for each level of the *feel/think* variable.

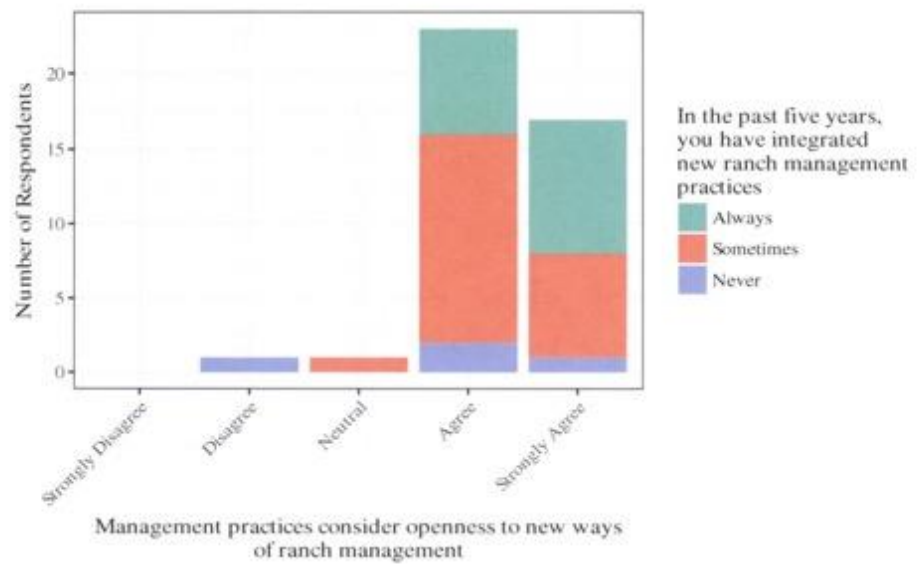


Figure 4: New ranch management

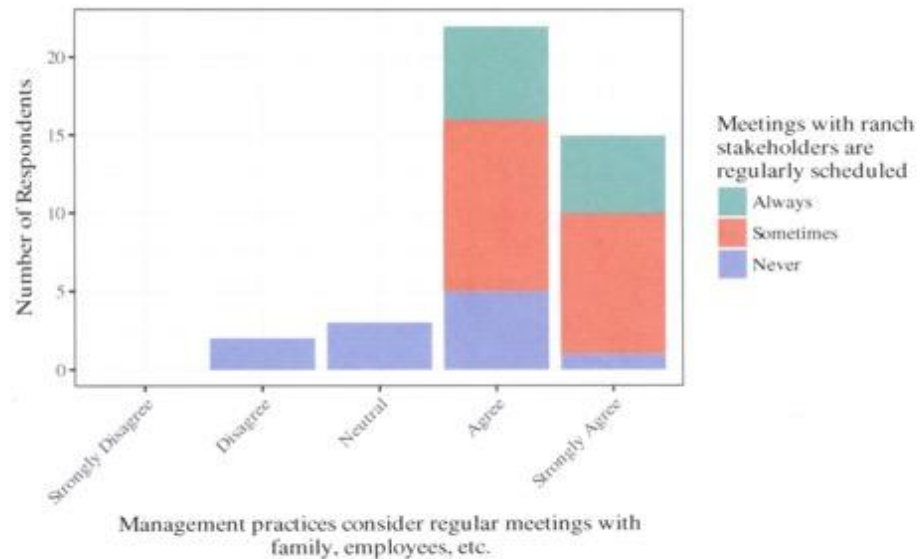


Figure 5: Meeting with ranch stakeholders

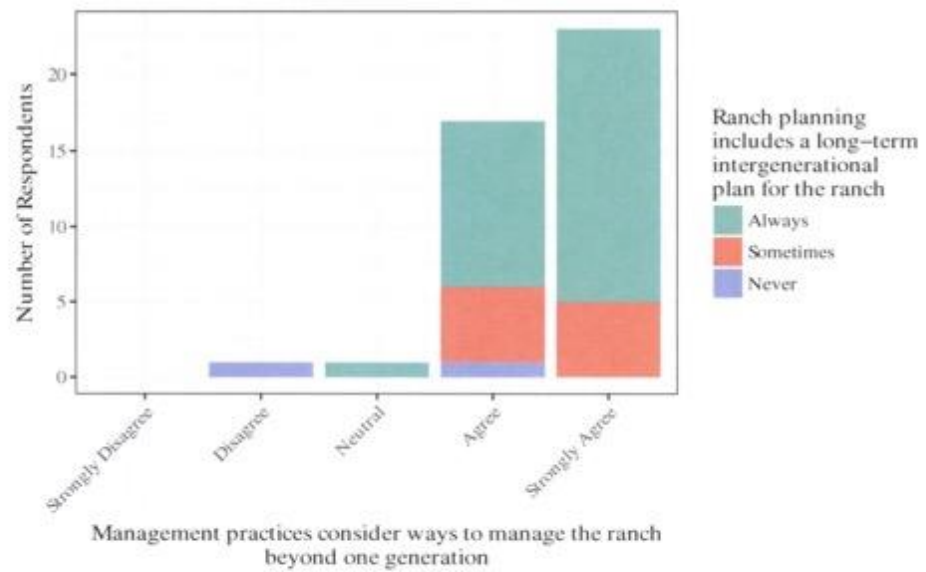


Figure 6: Intergenerational ranch management plan

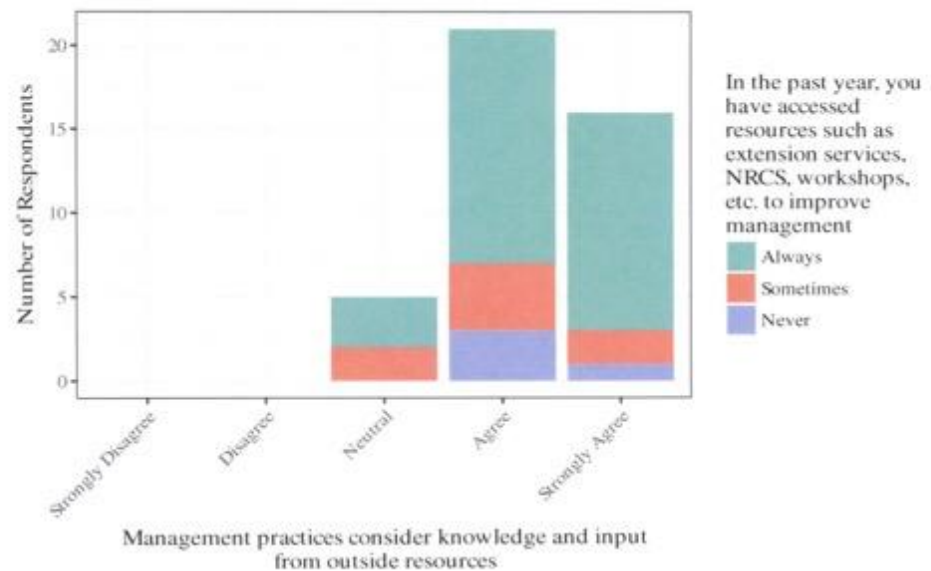


Figure 7: Outside resources knowledge and input

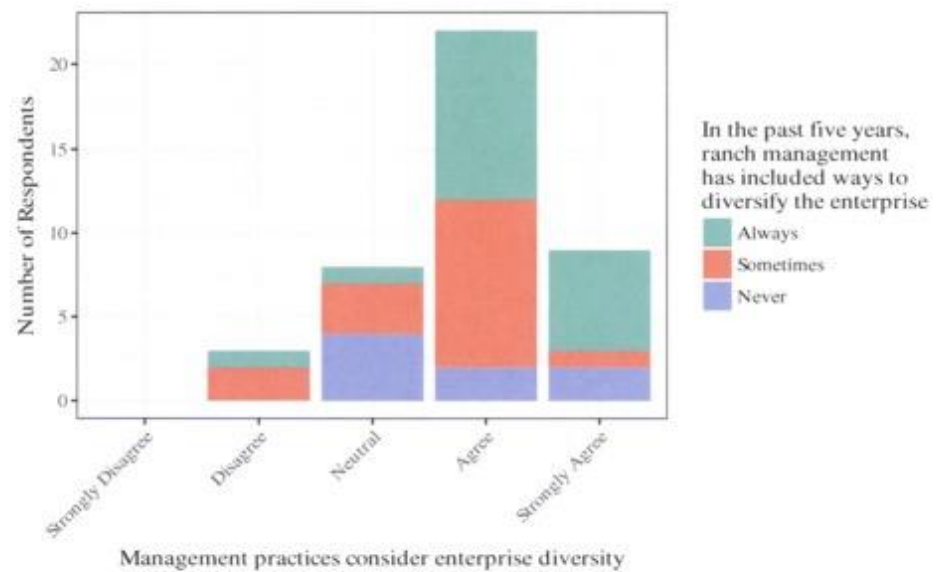


Figure 8: Enterprise diversity

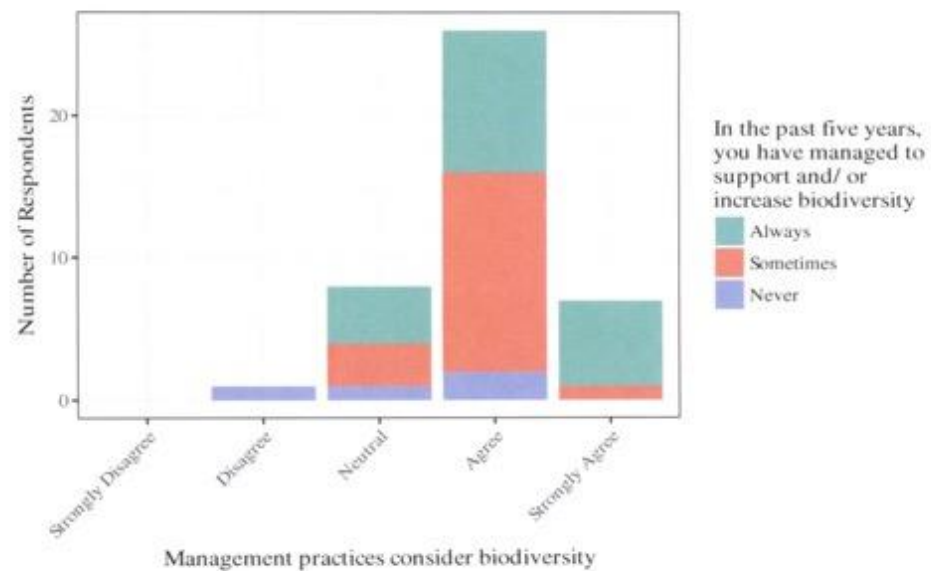


Figure 9: Biodiversity

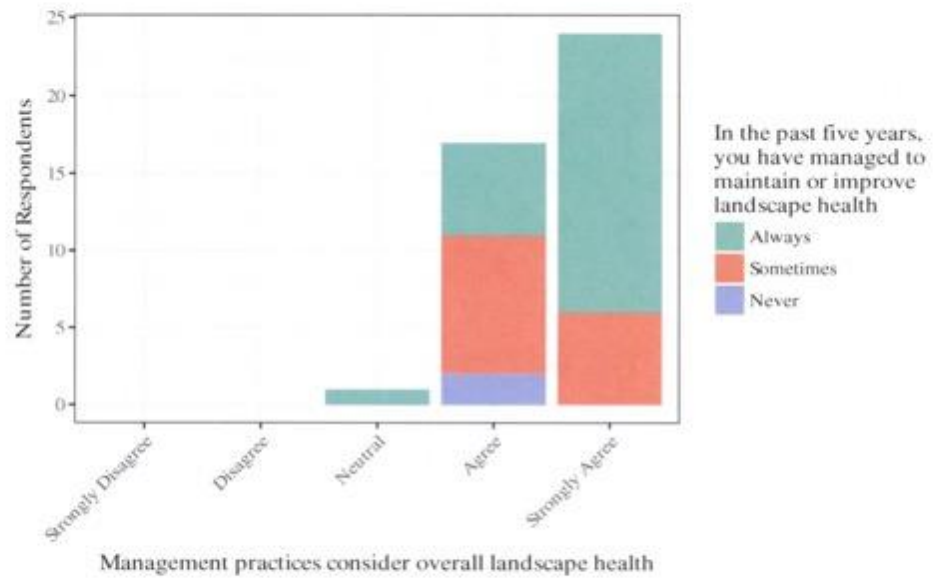


Figure 10: Landscape health

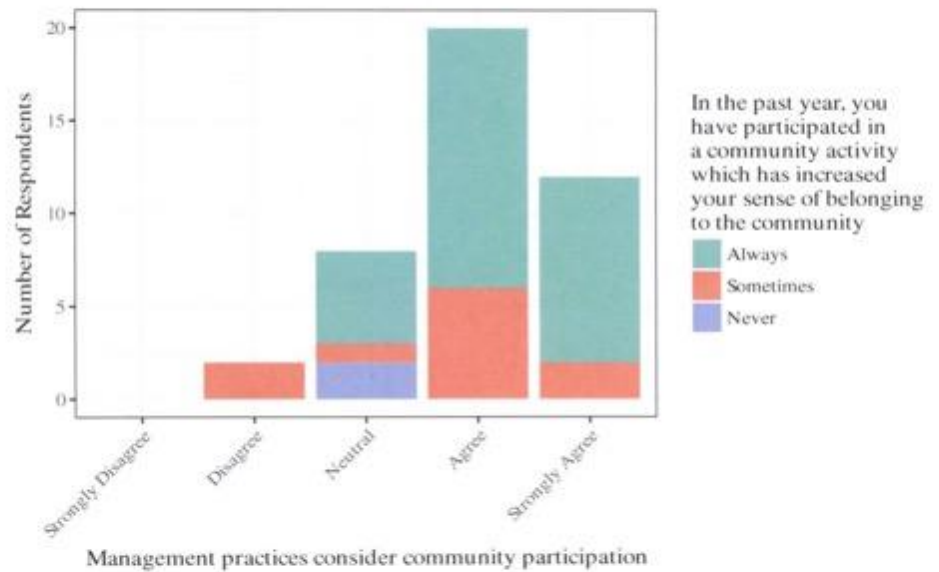


Figure 11: Community participation

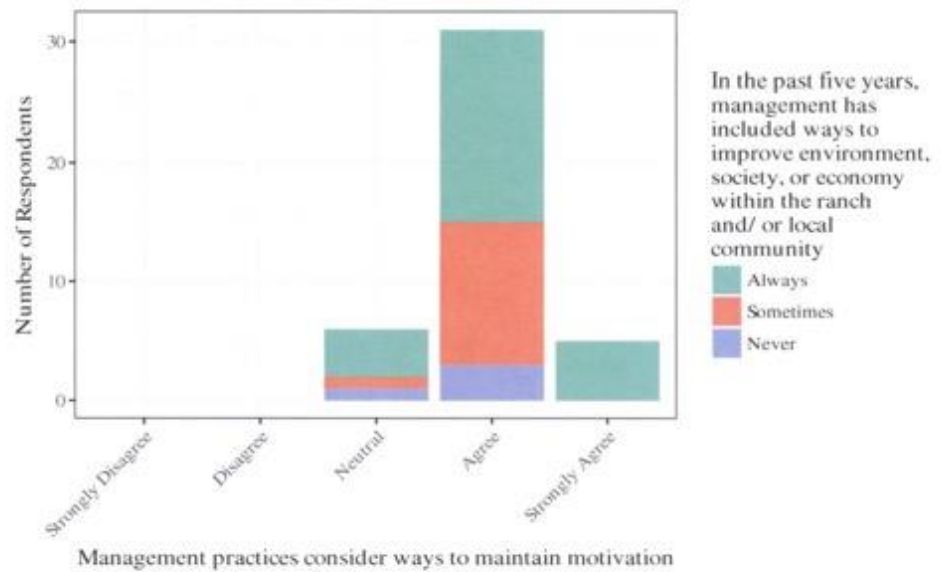


Figure 12: Motivation and ways to improve environment, society, or economy within the ranch and/or local community

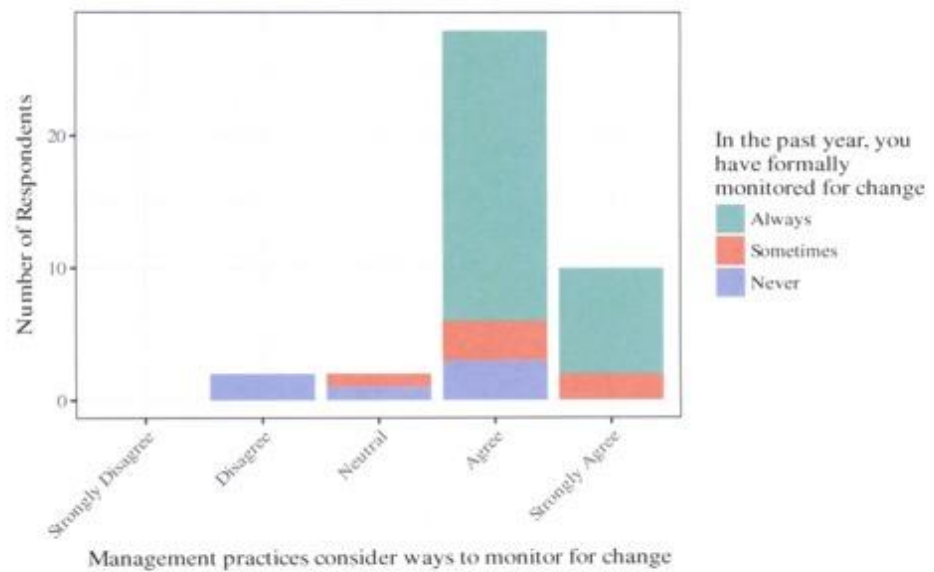


Figure 13: Monitor for change

	Never	Sometimes	Always
Strongly Disagree	0.00	0.00	0.00
Disagree	0.02	0.00	0.00
Neutral	0.00	0.02	0.00
Agree	0.05	0.33	0.17
Strongly Agree	0.02	0.17	0.21

Table 1: New ranch management

	Never	Sometimes	Always
Strongly Disagree	0.00	0.00	0.00
Disagree	0.05	0.00	0.00
Neutral	0.07	0.00	0.00
Agree	0.12	0.26	0.14
Strongly Agree	0.02	0.21	0.12

Table 2: Meeting with ranch stakeholders

	Never	Sometimes	Always
Strongly Disagree	0.00	0.00	0.00
Disagree	0.02	0.00	0.00
Neutral	0.00	0.00	0.02
Agree	0.02	0.12	0.26
Strongly Agree	0.00	0.12	0.43

Table 3: Intergenerational ranch management plan

	Never	Sometimes	Always
Strongly Disagree	0.00	0.00	0.00
Disagree	0.00	0.00	0.00
Neutral	0.00	0.05	0.07
Agree	0.07	0.10	0.33
Strongly Agree	0.02	0.05	0.31

Table 4: Outside resources knowledge and input

	Never	Sometimes	Always
Strongly Disagree	0.00	0.00	0.00
Disagree	0.00	0.05	0.02
Neutral	0.10	0.07	0.02
Agree	0.05	0.24	0.24
Strongly Agree	0.05	0.02	0.14

Table 5: Enterprise diversity

	Never	Sometimes	Always
Strongly Disagree	0.00	0.00	0.00
Disagree	0.02	0.00	0.00
Neutral	0.02	0.07	0.10
Agree	0.05	0.33	0.24
Strongly Agree	0.00	0.02	0.14

Table 6: Biodiversity

	Never	Sometimes	Always
Strongly Disagree	0.00	0.00	0.00
Disagree	0.00	0.00	0.00
Neutral	0.00	0.00	0.02
Agree	0.05	0.21	0.14
Strongly Agree	0.00	0.14	0.43

Table 7: Landscape health

	Never	Sometimes	Always
Strongly Disagree	0.00	0.00	0.00
Disagree	0.00	0.05	0.00
Neutral	0.05	0.02	0.12
Agree	0.00	0.14	0.33
Strongly Agree	0.00	0.05	0.24

Table 8: Community participation

	Never	Sometimes	Always
Strongly Disagree	0.00	0.00	0.00
Disagree	0.00	0.00	0.00
Neutral	0.02	0.02	0.10
Agree	0.07	0.29	0.38
Strongly Agree	0.00	0.00	0.12

Table 9: Motivation and ways to improve environment, society, or economy within the ranch and/or local community

	Never	Sometimes	Always
Strongly Disagree	0.00	0.00	0.00
Disagree	0.05	0.00	0.00
Neutral	0.02	0.02	0.00
Agree	0.07	0.07	0.52
Strongly Agree	0.00	0.05	0.19

Table 10: Monitor for change

The numbers in the tables are the proportion of respondents with each combination of *feel/think* and *action* answers. Across all question pairs, most participants agreed to some degree and either always or sometimes practiced their beliefs. Compared to other question pairs, more ranchers never and sometimes met regularly with ranch stakeholders. Relative to other question pairs, more participants sometimes practiced enterprise diversity and new ranch management than always or never.

Below are heatmaps to visualize the distribution of counts in each category. Dark green indicates 0 answered with that combination, light green indicates 1-4 answered with that combination, yellow indicates 5-9 answered that combination, tan indicates 10-14 answered that combination, pink indicates 15-19 answered that combination, and white indicates 20-24 answered that combination. Of interest may be both the question pairs with the most and least response alignment. An example explanation would be for the new ranch management pair of questions most respondents had an “Agree” belief and “Sometimes” practiced. The second most frequent occurring answered pair of responses are “Agree” and “Always”, “Strongly Agree” and “Always”, and “Strongly Agree” and “Sometimes”.

Questions 1 and 11

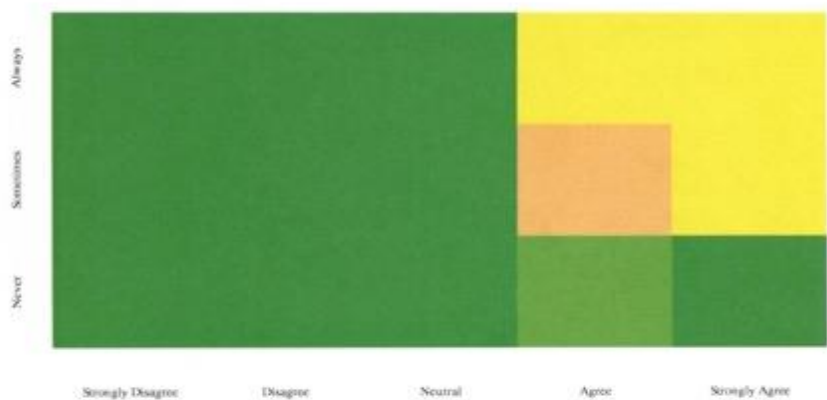


Figure 14: Heatmap: new ranch management

Questions 2 and 12

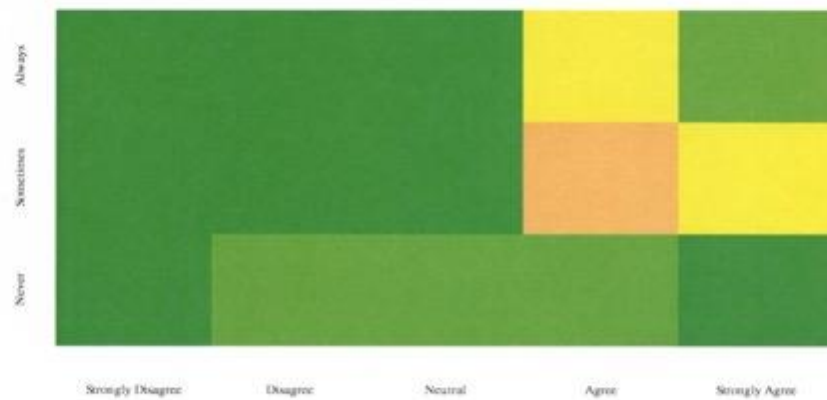


Figure 15: Heatmap: meeting with ranch stakeholders

Questions 3 and 13

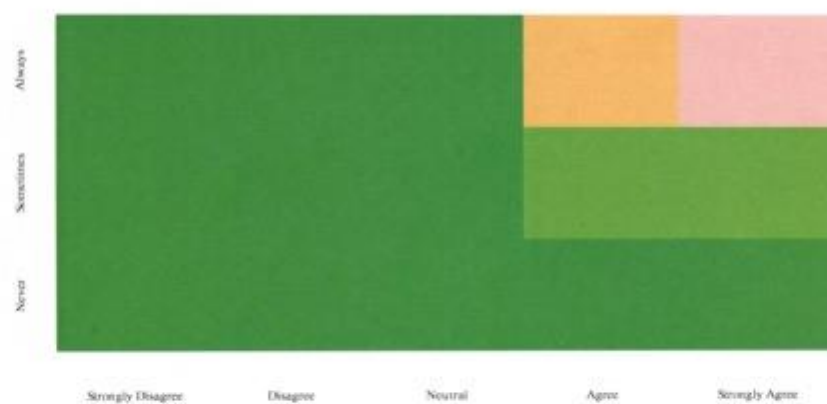


Figure 16: Heatmap: intergenerational ranch management plan

Questions 4 and 14

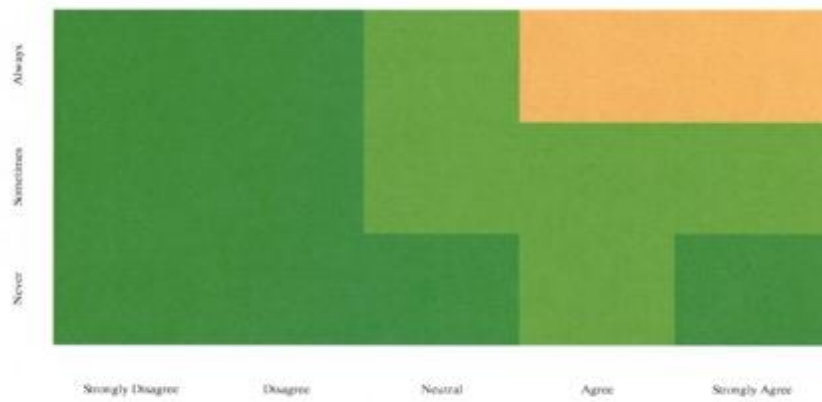


Figure 17: Heatmap outside resources knowledge and input

Questions 5 and 15

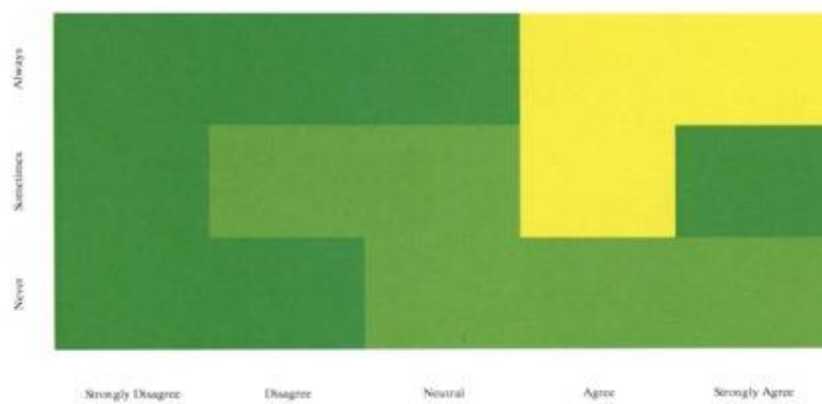


Figure 18: Heatmap: enterprise diversity

Questions 6 and 16

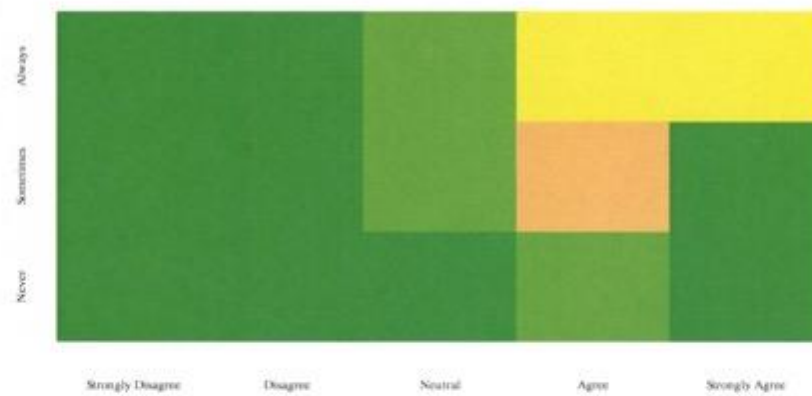


Figure 19: Heatmap: biodiversity

Questions 7 and 17

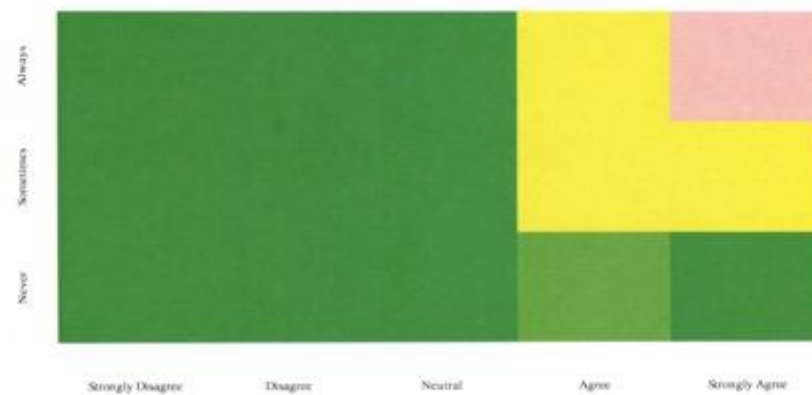


Figure 20: Heatmap: landscape health

Questions 8 and 18

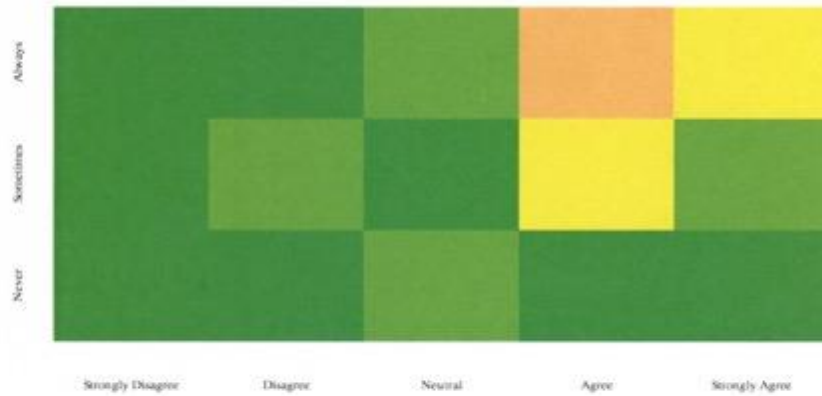


Figure 21: Heatmap: community participation

Questions 9 and 19

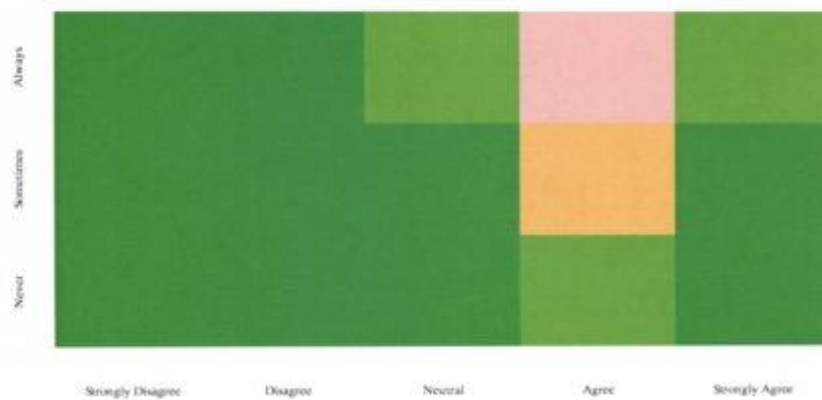


Figure 22: Heatmap: motivation and ways to improve environment, society, or economy within the ranch and/or local community

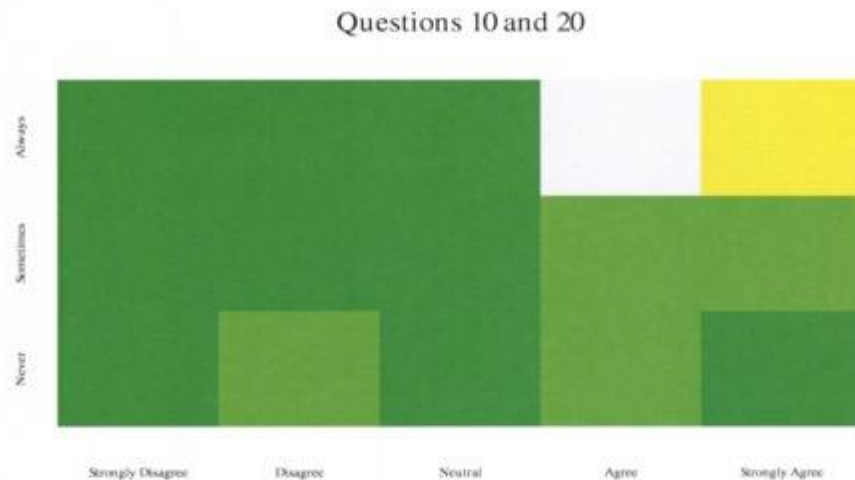


Figure 23: Heatmap: monitor for change

4 Questions by Category

Survey questions were grouped as:

Adaptable:

- Q1/11 - New ranch management
- Q2/12 - Meeting with ranch stakeholders
- Q4/14 - Outside resources knowledge and input

Resilience:

- Q5/15 - Enterprise diversity
- Q6/16 - Biodiversity
- Q8/18 - Community Participation
- Q9/19 - Motivation and ways to improve environment, society, or economy within the ranch and/or local community

Transformable:

- Q3/13 Intergenerational ranch management plant

- Q7/17 - Landscape health
- Q10/20 - Monitor for change

Feel/think responses were treated as continuous and boxplots of *feel/think* responses were then made for each level of the categorical *action* response variable for each question pair. Questions were grouped by the three question categories in the displays.

An example interpretation follows for the “Never” response category within Adapt questions. Among those responding Never to the Adapt questions, the median *feel/think* response was 4 for Q1, 3.5 for Q2, and 4 for Q4. One might look at this plot and see the median *feel/think* response was slightly lower for those responding Never to the corresponding *action* questions in the adaptable category, but that appears to be mainly driven by responses to Q2 rather than responses to Q1 or Q4.

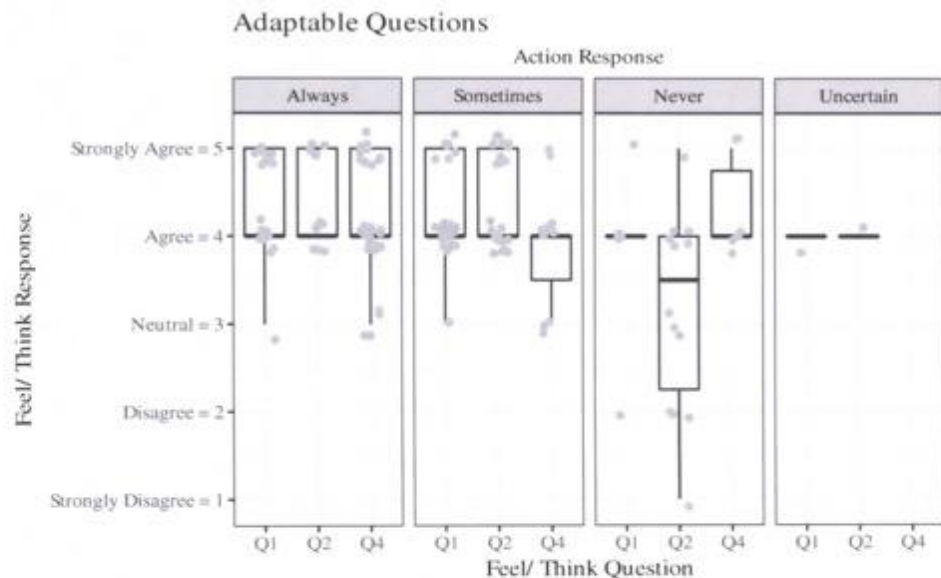


Figure 24: Adaptation Questions

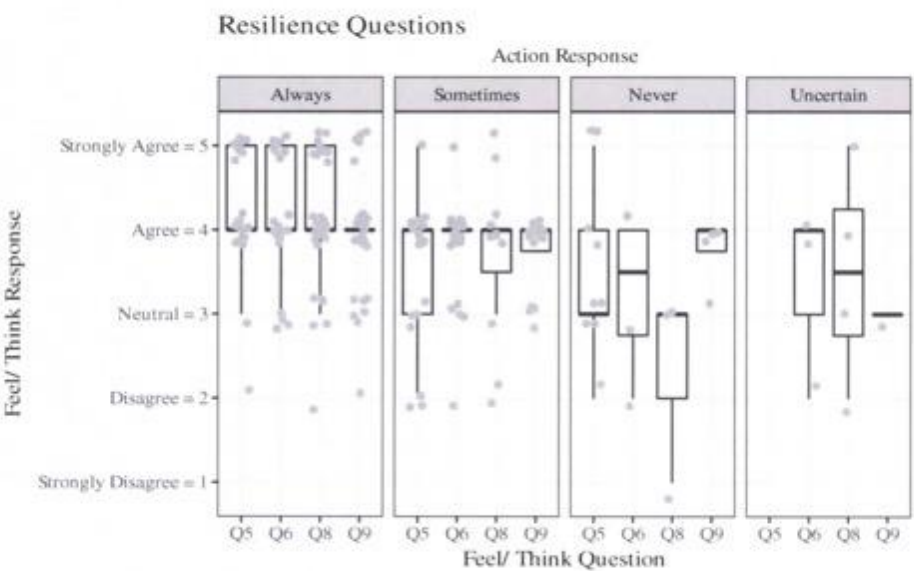


Figure 25: Resilience Questions

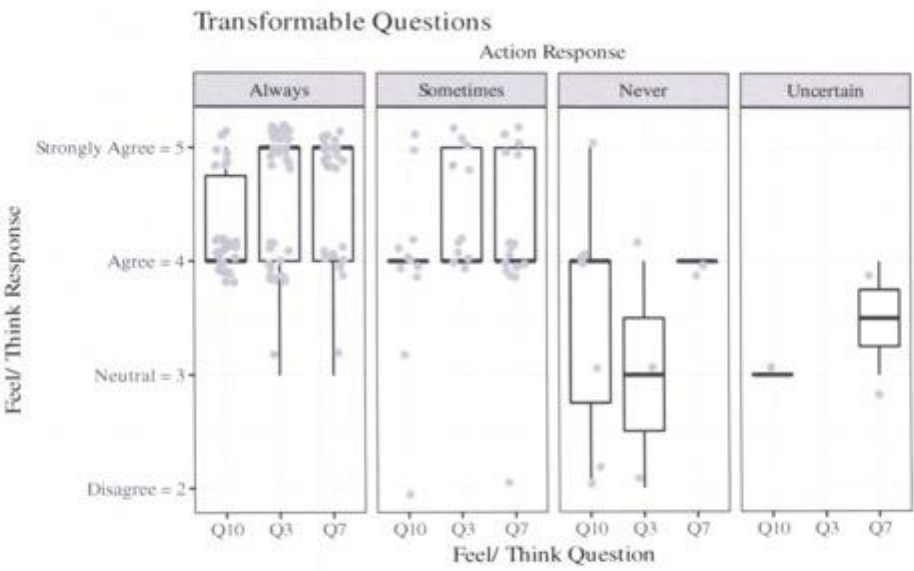


Figure 26: Transformable Questions

4.1 Correlations

Pearson's correlation is a measure of the strength and direction of linear association between two continuous variables. Both *feel/think* and *action* questions had ordinal responses with four and three levels respectively. An aspect of continuous variables that is missing with treating the ordinal responses as integers is the ability to have fractional responses. Considering the one variable (1 dimensional) case as an example, respondents could answer 2 or 3 for the *feel/think* variable, but not 2.5. If we connect the numbers 2 and 3 with a line, we are assuming that relationship holds between 2 and 3. However, with ordinality, we have nothing to measure the relationship between the 2 and 3 responses because such responses are not possible. Therefore, inferring a linear association *between* pairs of points does not make sense a summary measure for ordinal data.

Spearman's correlation orders responses by magnitude and assigns ranks to observations. Correlation is then computed on the ranks. We have computed Spearman's correlation by assigning the average rank of all tied observations. In the presence of many ties, the correlation measure is not useful as many observations have the same rank and we could end up measuring the strength and direction of a linear relationship between very few points. For example, if there end up only being three unique responses for each of the *action* and *feel/think* variables, then we would be measuring the strength and direction of the linear association between three points. Doing so should be done with little credence as summarizing all responses with three numbers for each *action* and *feel/think* question does not provide much information about the data.

First correlations were calculated between *action* and *feel/think* responses for each question pair. Then correlations were calculated between average *action* and *feel/think* responses for each of the three question categories. Note that the "uncertain" category makes the ordering not sequential and so respondents with that response for were excluded in the correlation calculations for that question.

4.2 Question Pairs

Spearman's correlation was computed between the *feel/think* and *action* responses for each question pair, but should not be used with much credence as there were many ties. Spearman's correlations were calculated on the ranks shown in the table below. All correlations are weak; there is a weak positive linear relationship between the *feel/think* and *action* question responses for each question pair. Again, the correlations are not a good representation of the association between responses to the *feel/think* and *action* questions and we recommend looking at the conditional proportions provided in Section 3.

	Q1/Q11	Q2/Q12	Q3/Q13	Q4/Q14	Q5/Q15	Q6/Q16	Q7/Q17	Q8/Q18	Q9/Q19	Q10/Q20
Correlation	0.30	0.43	0.21	0.16	0.29	0.28	0.36	0.31	0.16	0.37

Table 11: Spearman's correlation by question combination

4.3 Question Category

Responses to question pairs were grouped by the three question categories: Adaptable (3 questions), Resilience (4 questions), and Transformable (3 questions). Average responses to both the *action* and *feel/think* questions were computed across questions within each category for each respondent. Correlations were computed between *action* and *feel/think* average responses for each question category. While the range of possible responses is still small, fractional values are observed and therefore we report both Pearson's and Spearman's correlations. All question categories showed positive moderate correlations between the average *action* and *feel/think* responses.

Summary tables of average responses for both the *action* and *feel/think* questions within each question category follow the correlation table and plots. The summary tables provide the minimum and maximum, first and third quartiles, median, and mean of averages responses. The minimum, maximum, and mean are taken to be known. Explanation with examples using other summaries follows.

- First quartile - 25% of average responses are below the first quartile - 25% of respondents had average responses to the adaptable, *feel/think* questions below 4 (Agree) while 25% of respondents had average responses to the adaptable, *action* questions below 3 (Sometimes).
- Median - 50% of average responses are below the median - 50% of respondents had average responses to the adaptable, *feel/think* questions below 4 (Agree) while 50% of respondents had average responses to the adaptable, *action* questions below 3.3.

Note that from the first and third bullet we can conclude that 25% of respondents had average responses to the adapt, *feel/think* questions of 4 (Agree).

- Third quartile - 75% of average responses are below the third quartile - 75% of respondents had average responses to the adaptable, *feel/think* questions below 4.19 while 75% of respondents had average responses to the adaptable, *action* questions below 3.75.

	Adaptation	Resilience	Transforable
Pearson's Correlation	0.54	0.57	0.64
Spearman's Correlation	0.46	0.52	0.58

Table 12: Corrlations of average responses by question category

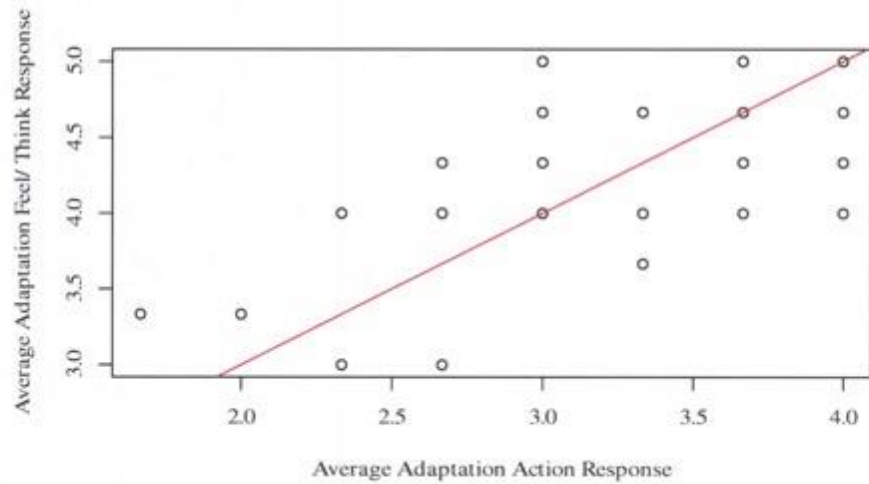


Figure 27: Adaptation correlation plot

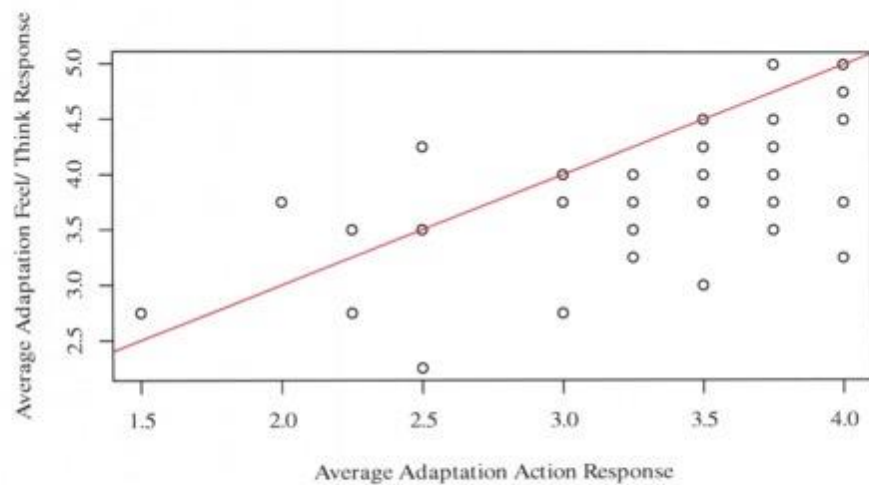


Figure 28: Resilience correlation plot

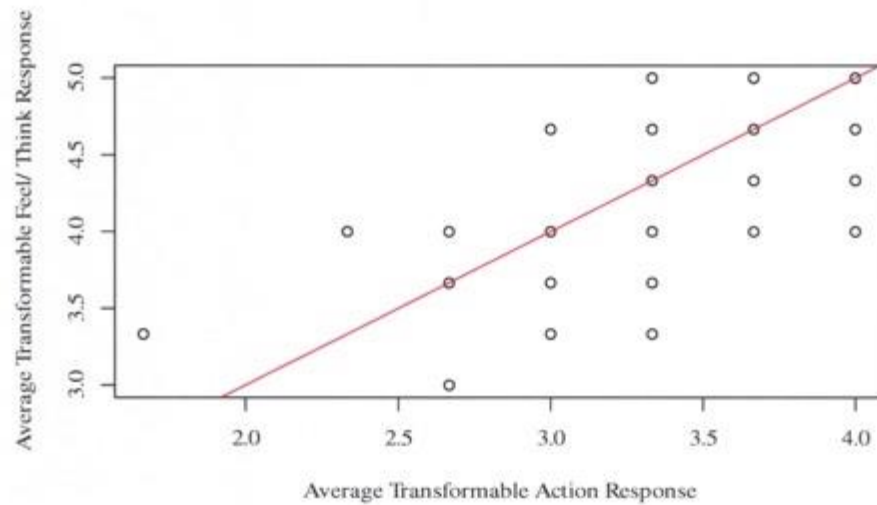


Figure 29: Transformable correlation plot

	Feel/Think	Action
Min.	3.00	1.67
1st Qu.	4.00	3.00
Median	4.00	3.33
Mean	4.18	3.23
3rd Qu.	4.67	3.67
Max.	5.00	4.00

Table 13: Summary of adaptable averages

	Feel/Think	Action
Min.	2.25	1.50
1st Qu.	3.75	3.25
Median	3.75	3.50
Mean	3.84	3.33
3rd Qu.	4.19	3.75
Max.	5.00	4.00

Table 14: Summary of resilience averages

	Feel/Think	Action
Min.	3.00	1.67
1st Qu.	4.00	3.33
Median	4.33	3.67
Mean	4.30	3.51
3rd Qu.	4.67	4.00
Max.	5.00	4.00

Table 15: Summary of transformable averages