OKLAHOMA'S PRESCRIBED BURN ASSOCIATIONS: SOCIAL CAPITAL'S APPLICATION AND SOLUTIONS

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Abstract: Over the past millennia anthropogenic changes to natural environments have compounded into problematic and devastating effects. Among these problems are the increased presence of wildfires and loss of historical grassland habitats in Oklahoma. Oklahoma's Prescribed Burn Associations (PBAs) seek to use prescribed fire to remediate environmental degradation and increase potential for financial returns on land management practices. However, these groups face social barriers to their practices, limiting the ability to engage in social uses of prescribed fire. PBAs are not-for-profit groups primarily composed of rural landowners, farmers, and ranchers. So far, sociological contributions are limited and do not concentrate on PBAs' perspectives for what limits or supports social uses of fire. My qualitative research focuses on PBAs' social capital and the success and barriers they face as they navigate social networks and interact with groups with varying levels of similar of dissimilar fire management ideologies. For this reason five volunteer fire department and 15 PBA member were interviewed in a semi-structured format. By situating this research in the Community Capitals Framework, I provided context to sociological insights that can be more readily adapted for landowner use and understanding. The primary sociological focus stems from concepts in social capital theories. Bonding, bridging, and linking social capital helped define and direct this research to better capture PBA member responses. The semi-structured interviews yielded findings that suggest PBAs engage with social uses of fire for both anthropocentric and ecocentric purposes. Social barriers were lessened when direct personal interaction occurred to provide information about prescribed fires and connection to PBAs. Furthermore, directly seeing prescription effects increased public acceptance of prescribed fires. Volunteer fire departments were open to concepts of prescribed fire when personal contacts were made and PBAs followed prescription protocols. Implications of these findings suggest that PBAs' social capital is capable of accessing a wide variety of stakeholders.

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CHAPTER I

INTRODUCTION

Fire is a natural part of our environment and plays a significant role in the daily lives of humankind. While the human capability to harness and control different combustion processes has revolutionized our world in many ways, a fear of fire's potential for devastation remains. Recent wildfires across the United States have drawn attention to the disastrous consequences that can occur at the intersection of the control of fire, the natural environment, and human systems. The relationship between these is a relevant sociocultural topic that requires exploration.

There is much academic literature, in both natural and social sciences that details various aspects of wildfire. Due to the compounding socio-environmental problems related to fires, attention to prescribed fire is on the rise. Prescribed fire is the use of wildland fire under specific weather, land, and human resource conditions that is written and deployed according to a land management prescription. While there is an uptick in research about prescribed fire, the current research does not adequately address the social aspects and issues associated with groups that seek to use calculated and organized fire as a productive tool. These groups, called Prescribed Burn Associations (PBAs) are groups of rural landowners working together in volunteer groups to utilize studied prescription techniques. PBAs across the state of Oklahoma seek to utilize fire as a productive land management tool. These groups are at the forefront of combating years of mismanaged land and reacting to changes in localized climate.

Research through Oklahoma State University's Established Program to Stimulate Competitive Research (EPSCoR) project has touched on some of the complications that PBAs face. While this research does not capture the social components of these groups, it does focus on physical natural science results related to PBAs' work. Research presented at the annual state conference in 2018 detailed innovative techniques and new findings related to land management issues (okepscor.org). Research on woody plant dynamics in fragmented Great Plains landscapes highlighted how the past three decades have seen a steady increase in numbers of wildland fires throughout Oklahoma (Scholtz, Polo, Tanner, and Fuhlendorf. 2018). Climate change and other forms of anthropogenic influence were attributed to proliferation of woody plant cover in aggregation with decreased fire frequency. Decreased fire frequency was concomitant to the encroachment of eastern redcedar, *Juniperus virginiana*. Jie Want and colleagues are in the process of developing an algorithm to identify and map this encroachment (2018). Wang sought to use this technique to quantify the spatial and temporal dynamics of this invasive species. Eastern redcedar was of further discussion as Tanner, Fuhlendorf, and Polo quantified how this species moderated thermal conditions and acted as a habitat for ticks (2016). Their most surprising finding was that 70% of ticks collected were found in the canopy area of eastern redcedars and 3% in grasslands. Of the ticks collected in the canopy, there was an 89% prevalence of Ehrlichia chaffeensis and 83% prevalence of E. ewingii bacteria. Each of these bacterium species are pathogenic to humans and can cause various flu like symptoms. Lastly, research contributions from Al Sutherland employed a decision support model to help determine if a problem is real or perceived, personal or societal, and current or future (2017).

The problems facing PBAs across Oklahoma are an amalgamation of all aforementioned research topics. Wildfires pose great risk to Oklahomans, especially landowners who not only suffer from loss of built capital, but also loss of livestock and other forms of financial capital. These wildfires are partially due to increased fuel loads and encroachment of redcedars from the

exclusion of ecological fire from the landscape. The Great Plains is a fire adapted ecosystem and without fire there is not only increased ecological disruption there are major public health concerns to humans (Bidwell et al. 2014). Eastern redcedars create habitat and opportunity for disease vectors, like ticks, to transmit disease such as Lyme disease and the previously mentioned diseases found by Tanner, Fuhlendorf, and Polo (2016). Fire helps to control tick population by eliminating individual ticks and habitat, thereby diminishing chances of infection. The goal of Prescribed Burn Associations is to restore fire to Oklahoma landscapes as a solution to these economic, environmental, and public health issues. However, there is a gap in the research surrounding how they can do this effectively and sustainably. These groups face challenges of membership sustainability and participation, and disapproval from other stakeholders such as general public and local fire departments. Research from other disciplines has called for more collaboration and need for social science research to identify barriers and how to overcome them to implement the land management practice of prescribed fire (Symstad and Leis 2017). This research seeks to detail the social interactions of Oklahoma's PBAs to better determine solutions to barriers faced by these groups. It also aims to find support tools that will enable these stakeholders greater capacity to reach their desired goals. Both ecological and sociological concepts are used throughout with a primary focus on social capital.

This research intersects with multiple issues including but not limited to, wildland fire mitigation, ecological restoration, drought and water concerns, public health, agricultural production efficiency, and wildfires at the interface of rural and urban environments. These complex issues do not impact a single landowner or property; there are cascading and compounding issues affecting all Oklahomans. Furthermore, this research has the potential to shape future and cross-boundary policy decisions related to preservation and conservation of lands throughout the Great Plains.

Purpose:

The purpose of this research is to connect stakeholders with similar, and seemingly disparate, needs and goals so these groups can be more successful in the future. By connecting the most invested stakeholders with high levels of existing social capital and weak ties there is potential to create favorable procedure and public understanding about the need to reintroduce ecological fire to natural landscapes. By doing so we can combat woody plant encroachment in the Great Plains, mitigate high intensity large scale wildland fires, create more productive and valuable landscapes, help restore the natural ecology and water absorption, create better health outcomes by decreasing the presence of eastern redcedar's pollen and disease vector habitat, and combat overall effects of climate change at a more localized scales. This research furthers understanding of Oklahoma PBAs through application of social capital theories and contributes to literature on volunteer land management and participation in conservation programs.

Below are three research questions that drove my qualitative research. These questions are both refined and broad enough to focus my research. The first research question focuses primarily on bonding social capital and how it can and has helped to sustain PBAs. The second research questions is concerned with how PBAs interact with and rely on their networks and fire management ideologies that either align or misalign with other entities. The final question is most concerned with the interactions between rural volunteer fire department and local PBAs.

Research Questions

1. What elements of bonding social capital do PBAs exhibit to sustain membership and create capacity to achieve goals?
2. How do elements of bridging social capital hinder and/or encourage cooperation between entities in local communities?

3. How does linking social capital help sustain PBAs and further influence their ability to achieve goals?

Community Capitals Context

Using the community capitals framework as a broad lens to more readily focus and situate social capital theories, strengths and barriers to PBAs' goals are assessed (Flora, Flora, and Gasteyer (2016). Seven capitals comprise this framework: Natural, Built, Human, Financial, Political, Cultural, and Social. These capitals are highly interrelated yet distinctly different, creating an interlaced structure rendering a more holistic understanding of PBAs' social capital and their rural connections to other groups and institutions related to natural resource and land management. To develop a rural community group perspective for PBAs I begin with the seven community capitals. (See Figure 1 [Mattos 2015]).

Figure 1. Community capitals framework

Natural Capital- resources such as oil and natural gas, air, water, land, minerals and soil, vegetation, wildlife, weather, and ecological stability and resilience (Flora, Flora, and, Gasteyer 2016. Ritchie and Gill 2011). Natural capital is arguably most important to a sustainable

community. Human systems are dependent upon available natural capital above all other capitals. The foundational well-being of a community depends on clean water and necessary food supply. Human activity both influences and is influenced by available natural capital. Resource extraction along with farming and ranching production are key aspects to Oklahoma's economic stability.

Human Capital- physical ability, health, knowledge and skills, untapped potentials, and education. Cultural elements often define the utility of human capital. Members of groups contribute their personal human capital by interacting through set parameters related to their goals.

Built Capital- physical infrastructure, facilities and structures, equipment, and general human engineered designs required to accomplish desired tasks. Built capital is most readily effective when it purposefully augments other capitals' strengths. Newly built resources can have deleterious effects on other capitals when deployed without regard to existing interactions and structures.

Financial Capital- income, investments (including land and built capital), available credit, monies, and savings.

Cultural Capital- language, attitudes, competencies, rituals, symbols, preferences, and overall orientations. Pervasive cultural elements determine worldviews, how individuals connect to seen and unseen phenomena, what is sacred or profane, and what is believed possible to change.

Political Capital- power and efficacy to influence surrounding groups and communities to achieve desired goals, and ability to access resources that are public, private, or otherwise. Political capital manifests itself, or fails to manifest, as a group seeks to turn its norms and values into standards meant to be upheld by surrounding groups.

Social Capital- social networks, associations and connections, reciprocity and trust created and used by individuals and groups at a variety of levels. Moreover, this involves collective identity and working together toward a sense of shared goals.

These seven capitals create a platform for which the literature review is written. While social capital is the primary sociological theory through which this research was conducted, the other capitals provide context for both researchers and general public. Following the literature review, methods are discussed and findings are presented. Qualitative interview data are presented and then put into context later in the thesis text under "PBAs' social capital in community capitals framework context" as part of the discussion chapter, with emphasis on social capital findings.

CHAPTER II

LITERATURE REVIEW

The following literature review utilizes Flora and Flora's Community Capitals as a structural framework, to organize and orient information (Flora, Flora, and Gasteyer 2016). Although all seven community capitals offer valuable contributions aiding to understand rural group perspectives, it is beyond the scope of this research and literature review to give equal attention to all types of community capitals. Social capital theory is the primary lens through which this research is structured and analyzed. This research topic follows dynamic paths in socio-ecological systems with auxiliary roots in disaster research, requiring flexibility in researching both subjective and objective experiences. The Community Capitals framework lends clarification to this research topic, PBAs and their member experiences and practices. While literature expounding on each capital is not directly related to PBAs, it is closely linked to the system as a whole, granting a more nuanced understanding of rural community groups that are Prescribed Burn Associations. Keeping in mind definitions above, each subsection that follows begins with a community capital and what is currently known about the role of each in PBAs.

Natural Capital

The exclusion of naturally occurring wildland fires from Oklahoma's landscapes for the past millennia has caused dysfunctions in both human systems and in natural ecology. Unplanned wildfires that escape initial attempts of human suppression and control quickly spread into volatile high intensity burns. These wildfires wreak havoc on human systems near wildland-urban interfaces and on rural landowners' built systems. These wildfires often consume vast acres of land where fire has been absent for much longer periods than what would normally occur in a natural fire adapted ecosystem (Dombeck, Williams, and Wood 2003). The regular and purposeful exclusion of fire from those naturally occurring fire adapted ecosystems has led to problematic conditions of disease, abundant fuel loads, invasive species, biodiversity loss, and overall disruption of the natural ecology (Harrison, Marlon, and Barlein 2010).

These conditions are further exacerbated by climate change (Walther et al. 2002). Warmer winters allow parasitic insects such as ticks and mosquitos more opportunity to survive and increase their numbers in the next generation. This further increases the chance of disease in both human and animal species. Exclusion of regular ecological fire from the natural landscape contributes to plant and animal pests and disease outbreaks. Perhaps even more salient is the fact that climate is a primary control factor of wildland fire's life cycle along with fuel loads (Harrison et al. 2010). Longer periods of drought, coupled with increasing masses of fuel loads, contribute to potentially devastating conditions that lead to wildland fire on massive scales. Climate change also contributes to the spread of invasive species in areas where they were formerly unable to survive. Such is the relevant case for eastern redcedar, *Juniperus virginiana*, prevalent throughout Oklahoma's landscape.

The eastern redcedar, colloquially known as "cedar tree", has exponentially increased its numbers across the state of Oklahoma dotting rangelands, interlacing beneath hardwood groves,

and popping up in peoples' backyards at wildland-urban interfaces. Encroachment of this specific invasive species is well documented in research literature related to rangeland ecology and highlights the biodiversity loss and harmful economic costs to landowners (Briggs, Hoch, and Johnson 2002). Furthermore, this aggressively spreading species decreases local forage production, reduces stream flow and groundwater recharge, and is a volatile fuel in wildland fires (Starks, Venuto, Eckroat, and Lucas 2011. Starks and Moriasi 2017. Acharya et al. 2016). These elements coupled with increased exposure to drought and variable weather, both from climate change, create barriers to landowner success and further disrupt natural historical ecology of these rangelands. There have been proposals from other researchers to use the invasive species as a biofuel (Ramli and Epplin. 2017). However, these methods appear potentially disruptive to conservation and preservation of natural ecology as they would create a market niche for redcedar biomass thereby creating a "place" and deceptive demand for them in Oklahoma's rangelands. Several methods are available to landowners to use in redcedar suppression such as hand-mechanical removal, machine removal with tractors and various attachments, chemical controls, and prescribed burning (Wilson and Schmidt 1990). However, the most cost effective and historically efficacious is the naturally occurring presence of fire, or in this case, prescribed fire (Van Liew et al. 2012). It is important to consider the impact of excluding fire from historically fire adapted ecosystems and effects on ecology and its peoples; coupling this with the presence of climate change only exacerbates the existing and continuing problems of wildland fires.

Human Capital

During the mid-1990s local landowners and stakeholders in the southern Great Plains began forming cooperatives in order to start restoring fire to the natural landscape (Toledo et al. 2012. Weir, Twidwell, and Wonkka 2016). Stakeholders embarked on a grassroots type movement creating PBAs — sometimes called prescribed burn cooperatives. These stakeholders, mostly farmers, ranchers, and conservationists saw the need to limit the woody plant

encroachment happening on their land and regain land management agency (Weir and Bidwell 2005). Within Oklahoma a volunteer board of directors oversees institutional statutes such as grant acquisition and allocation and other financial responsibilities. Furthermore, this board, the Oklahoma Prescribed Burn Association (OPBA), helps organize resources for local PBAs and is further comprised of local PBA leaders. Overall, PBAs are non-governmental, non-profit, volunteer-driven organizations. These associations are composed of those stakeholders who desire to use prescribed fire in a safe and effective manner to achieve their various goals. Restoration to rangeland ecosystems ravaged by non-native invasive species and native woody plant species prompted the usage of wildland fire as a means to limit loss of productive space, resources, and natural grasslands. Invasive species and promulgation of woody plant species use limited resources such as water, sunlight, and nutrient resources in soil. While various stakeholders make up the social networks of PBAs, majority of members are private landowners, ranchers and farmers seeking to use prescribed fire for reasons above (Twidwell et al. 2013).

As of 2017 there were 19 registered PBAs across the state of Oklahoma, down slightly from 2015 and 2016 with a high of 21 PBAs (ok-pba.org). During 2015 and 2016, 12,742 acres were burned each year for a total of 25,482 acres burned and 148 burns conducted in that two year period. However, in 2017 the lesser number of PBAs conducted more burns, 118, for a total of 34,155 acres burned across the state. This evidence suggests that Oklahoma PBAs are gaining experience and setting foundations for continued burns. This is supported by information collected during these years by the state board of representative leaders for OPBA. Incidents of spot fires, fires that start on undesignated areas, were present less than a tenth of a percent during both 2015 and 2016. 2015 saw spot fires burn less than 100 acres, while in 2016 less than 1 acre of spot fires occurred. No legal action was taken by any party or stakeholder as a result of spot fires. By far, the largest reason for burning was for eastern redcedar control — followed by

livestock production — which appears to have a commensurate relationship with desires to suppress encroachment of woody plant species (ok-pba.org).

Introduction to Prescribed Fire Understanding and Techniques (Weir 2009)

The following content details understanding needed to conduct prescribed fires. Information provided is not an exhaustive explanation; rather it is a foundation for understanding how PBAs conduct prescribed fires so that their perspectives might be better understood. Before any prescribed fire begins there are multiple fire related items assessed. Land is typically assessed by experienced professionals before creating a prescription. Similar to pharmaceutical prescriptions, remedy and treatment of land are specific to the landowner's parcel and goals.

Specifically related to land and to provide best remedy in the prescription plan fuel load, fire breaks, topography, and weather are considered. Fuel loads vary depending on vegetation type, soil, historical practices, and seasonality. It is extremely important to assess the level and type of fuel before starting a burn. Fire breaks are used to create a circumscribed perimeter around the intended burn area helping to contain the fire. There are several methods to create fire breaks; each techniques' goal is to decrease fuel load and slow or stop fire. Roadways, mowed grass, cleared or bulldozed land, and plowed earth are common breaks. This process is labor intensive requiring ample preparation by landowners, often taking months to prepare. Topography advises how fire will progress as it is ignited and allowed to continue. Are there any large hills or rocky ravines that might cause the fire to stop or speed up? Will the fire crew lose sight of one another at any time? These questions are answered through understanding topographical conditions. Weather conditions inform how fire will act on a specific day. Humidity, wind direction and speed, and temperature are most commonly needed to understand fire behavior as it relates to local weather. Timing these elements as the burn-day progresses is key as conditions often change according to time of day. Additionally, relative humidity changes

with fluctuation in temperature and can further be influenced by factors such as vegetation and topography. Highly specific relative humidity parameters exists to advise safest windows of opportunity.

Through research and help from local groups using prescribed burns, a template document has been developed to aid with prescription management (Weir et al. 2001). Information required to complete this form guides those responsible for burning. The fire boss is commonly in charge of orchestrating pre-ignition sequences, checklists, and personnel during and after ignition. They can be the landowner but this is not required. If the fire boss is not the respective landowner, both the landowner and fire boss closely work together to ensure proper procedure. It is the responsibility of landowners to contact neighbors and relevant agencies prior to burn day. These procedures help mitigate fire hazard risk for personnel and the local community by addressing known potentials. There is always potential for escaped and spot fires to occur during any burn event. Each burn plan should address mitigation of spot fires and have an escaped fire plan in place. This plan includes parameters for when and how local fire departments should be contacted in case an escaped fire cannot be contained quickly and effectively.

Cultural Capital

The legacy of fire is to control it by suppression, lest something of anthropogenic value be lost. During the 1800s and early 1900s, many fires devastated the Midwest and Western regions of the United States leading federal leaders to institute policies and procedures that attempted to exclude fire from the natural landscape (Dombeck et al. 2004). Industrialization contributed tools that could aid in suppression of wildland fires as the philosophy that “all fire is bad” spread (Dellasala et al. 2004). Many saw this as mitigation of potential fire hazards. However, the thought that fire can be excluded from both natural and built environments is

simply an ecological illusion, especially considering natural landscapes. Fire has and will forever have a place in the natural ecology of landscapes throughout the world and especially in Oklahoma's Great Plains. "Much of our western landscape evolved with wildfire and depends on this natural process to recycle nutrients, improve soil productivity, start plant succession processes, and contribute to overall watershed health." (Dombeck et al. 2004, p. 884). Oklahoma and its diverse topography and ecology is a fire adapted landscape requiring fire for continued health.

The history of fire suppression is both produced and sustained through the legacy of the Smokey Bear campaign, along with natural tendencies and fear of fire. Arguably the most successful ad campaign, it was instituted by the federal government to motivate behavioral change. The purpose of the campaign is to suppress wildland and forest fires (Earle 2000). The campaign's slogan is nothing short of an ohrwum (German word describing a catchy tune or phrase that one cannot get out of their head) with multiple generations capable of reciting it, partially due to the fact that it is the longest running wildfire education campaign (Ballard et al. 2012). Smokey Bear's cultural influence on the suppression of forest fires comes from the historical legacy of European, especially German, influence on the early years of the United States' Forest Service (Donovan and Brown 2007). Additionally, this influential fire regime and culture used pejorative terminology such as "savages" to describe the light burning of underbrush and small trees in established forests (Donovan and Brown 2007). It was considered wasteful to burn potential lumber products. The sociohistorical legacy of the Smokey Bear campaign trickled into the Great Plains where open grasslands formerly dominated the landscape. With anthropogenic domination over fire suppression, native and invasive trees propagate along with the encroachment of woody plant species. The Smokey Bear legacy has contributed to the exclusion of fire where it was once used for centuries as a restorative and productive tool by Native American tribes (Minor and Boyce 2018). Various tribes would use fire as a way to clear

underbrush and small vegetation from the prairie landscape and to further encourage game animals to visit hunting grounds. So why have we removed these beneficial practices and how do communities view prescribed fire today?

Ecologists and other environmental scientists have conducted nationwide quantitative studies and focus groups at state levels regarding public perceptions associated with prescribed fire usage for land management purposes. In general, most of the research indicates high approval for using prescribed fire as a tool. There are various caveats and concerns mediating this approval, leading to nuanced and complex perceptions and attitudes. Public approval revolves around the major issues of smoke, fire control, and trust. Nonetheless, there is still an 80% or higher approval of prescribed burns among the findings (McCaffrey 2006). Concerns with smoke are mostly due to potential health issues such as asthma, and possible loss of visibility along roadways. Many public respondents see prescribed fire as a potential for an escaped wildland fire that would cause major damage to homes, lands, and people. However, findings have shown escaped fires receive more attention than the numerous successful prescribed burns without negative incidents (McCaffrey 2006). Perhaps more than any other aspect, public approval is dependent on trusting the organization conducting the burn. The perception of organizational competency is paramount to the acceptance of prescribed burns and is further reliant on the local context and historical record of fires in that region. Interestingly, sociodemographic characteristics have little consistency in predicting perceptions. Overall, familiarity with prescribed burns and the associated ecological benefits, along with hands-on learning experiences, are the most effective elements contributing to positive public perceptions.

In the more localized context of the Great Plains, specifically Texas and Oklahoma, several studies have focused on perceptions of landowners, the public, and PBA members (Elmore, Bidwell and Weir 2010; Kreuter, Woodard, Taylor, and Teague 2008). Survey questions from these studies focused on concerns of conducting a prescribed burn, acceptance of the

practice across the different groups, reasons for conducting a burn, and overall attitudes associated with the practice. In correspondence with other less localized research it was found that both general populations and landowners supported the use of prescribed fire as a land management tool (Jacobson, Monroe, and Marynowski 2001; Brunson and Shindler 2004) but had differing levels of concern for the practice. Contrary to other findings there were less concerns about smoke, loss of forage, and timber production. Respondents were most concerned with damage to private property and risk to human safety. Landowners and the public were more concerned with loss of value closely related to human life and built systems rather than those elements of natural ecology, flora, and fauna. This partially accounts for findings that suggest prescribed fire is more accepted if it is applied in selected areas away from human built environments consistent with a "not in my backyard" ideology. Instances of mismanaged fire are retained in memories far longer than do the positive outcomes of fire. The local context of fires and the cultural history is important for holistically understanding perceptions of intentional fire and social approval or disapproval of prescribed burns.

Political Capital

Political capital consist of individuals and groups engaging in social connections and exchanges with distinct end goals in mind. Communities exercise power, voice, and connections as they attempt to turn values and norms into standardized and enforceable laws and regulations. Individuals and groups with power are more capable of turning their values and norms into policy. Power is a primary defining characteristic of political capital. Power is the ability to make something happen when it would have otherwise not occurred. Within dynamics of power exist social control on and within communities. Rural communities face challenges as they navigate smaller populations and less diverse economic opportunities. Economic and social status positions often result in concentrated political power to a few elites. PBAs comprised of rural

landowners in small communities increase their political capital due to their collective nature. However, these groups are still subject to small town politics and resulting social control.

Fire management regimes historically follow a total suppression of wildfires (Steelman and McCaffrey 2011). This fire management policy continues to be tightly regulated. However, one of the greatest limiting factors to easing this a less suppressive fire regime is that of internal political capital of fire departments despite policy changes (Steelman and McCaffrey 2011). Formal and informal practices shape decisions to treat wildfires, and fire in general, as something to be totally suppressed which is further influenced by external factors and internal agency factors. Political capital of fire personnel and communities members are often in conflict with each other but can also act to reinforce management practices (Wilson, Paveglio, and Becker 2018). As the wildland urban interface (WUI) continue to expand with human settlement, those with more financial capital will continue to exert political capital to protect personal built capital (Schoennagel et al. 2017). To better enhance resilient communities and natural systems it is paramount to adapt to the sociopolitical perceptions and desires of groups that come into contact with each other.

Financial Capital

Financial capital encompasses both income and wealth that is capable of producing further financial capital. In this way these forms are liquid and flexible. Income is monetary acquisitions that occur over a period of time, usually within a year, while wealth is previously accumulated assets that can decrease or increase in value over time. For many individuals and families, homes are one of the primary forms of wealth. Homes are considered built capital; many forms of built capital readily translate into financial capital as they are capable of leveraging credit or wealth. Landowners engage in cycle patterns of financial investments in built capital that result in better outcomes in financial capital. Building fences, barns, and corrals show returns on

investment. Resources that are incapable or unutilized to further financial investments or income are not considered to be forms of financial capital. Purchases that are more frivolous in nature, such as luxury vehicles or “toys”, do not contribute to concepts of financial capital as they do not assist in financial returns. PBAs engage with various forms of financial capital as they navigate returns on investment when conducting prescribed fires.

PBAs are not-for-profit organizations who readily engage with fire to encourage their own profit making abilities. Membership dues range from 25 to 45 dollars annually. Membership provides individuals access to pooled resources such as a labor power, knowledge, and a burn trailer containing prescribed burn equipment such as drip torches, backpack blowers, safety vests, radios, fuel, and fire suppression hand tools. Access to these resources augment individual capability to increase financial capital.

Many PBA members are cattle producers effected by wildfires. During April of 2018 wildfire, Woodward and Dewey Counties had a total of 350,000 acres burned. It has been estimated that this wildfire complex in the western part of Oklahoma cost cattle producers an estimated 26 million in losses from burned feed crops, cattle, and fencing (Peel 2018). During March of the same year Beaver, Harper, and Woodward counties had an estimated economic impact exceeding $16 million in losses during which 310,000 acres burned (Peel 2018). Other estimates detail that financial deployment to extinguish a single 40,000 acre wildfire in southwestern Oklahoma cost 5 million dollars (Weir, Reid, and Fuhlendorf 2012). Wildfires cause various financial impacts to Oklahomans such as destroyed homes and disrupted commerce. PBAs engage in activities that help to suppress wildfires and resulting impacts that greatly effect built capital.

Built Capital

Built capital are those services and structures that support human activities. Common forms of built capital found in most all communities are roads, utility services such as water and electricity, fire protection services, civil services, schools, recreational facilities, and water treatment facilities. These services support productive capital investments and returns. While these services are meant to ensure economic health of communities, there are undoubtedly power struggles between differing groups of people resulting in unequal distributions or exclusions. Both public and private sector institutions attend to various forms of built capital. Unintended consequences result when one group is more capable of accessing built capital's productive features which is further influenced by those in control of the services. With the heightened presence of climate variability, water resources and reliable electricity are increasingly problematic. Rural communities are more vulnerable to crumbling infrastructures that support economic activities. Built capital intersects with public health and safety, financial stability, natural resources conservation and preservation, and overall social outcomes. PBAs help to protect built capital, especially personal structures, by engaging in prescribed burns that suppress wildfires.

Social Capital

One of the greatest benefits of joining a PBA is the ability to share and utilize pooled resources such as labor power, knowledge, and tools. This allows individuals to engage in prescribed fire practices where they would otherwise be unable to do so, since a single individual is highly limited in their capability to carry out a prescription. In a recent survey of PBA members and non-members, 67 percent of respondents indicated that they had not used prescribed fire because they lacked the resources, knowledge, labor, and fire management equipment necessary to do so; likewise, these concerns resulted in fear of liability issues (Toledo et al. 2012). Joining a PBA allows stakeholders access to and affiliation with professional entities such as the Natural Resources Conservation Service (NRCS) and other like institutions. Greater than 90 percent of

groups have their burn plans written by experts at the NRCS (Weir, Twidwell, and Wonkka 2016). Membership into a PBA helps alleviate prescribed fire apprehensions by granting access to group knowledge, resources, and networks. Engaging in these social networks makes this land management choice more approachable and achievable.

However, PBAs face barriers to success as social dynamics constrain windows of prescribed burn opportunity. Quoted from Oklahoma State University's Cooperative Extension Service detailing how to develop a PBA, "Foster good relations between neighbors and within the community in regards to the use of prescribed fire" (Weir and Bidwell 2005). This is obviously easier said than done and requires strong social connections among numerous stakeholders. Arguably, social capital is the most appropriate sociological concept to view the barriers and interactions within and between PBAs and various stakeholders. In general, social capital represents actors' ability to acquire benefits by way of membership in social networks and structures. "Whereas economic capital is in people's bank accounts and human capital is inside their heads, social capital inheres in the structure of their relationships." (Portes 1998).

There is no single attribute that can explain current success or barriers to PBAs'; social capital allows for the local context of history, attitude, and norms to illuminate dynamic social interactions and networks between various groups. It is not simply proximity or demographics of groups that determine ongoing interactions. Rather, ever-evolving social capital determines and is determined by the context of historical inequalities, power differentials, and social exclusion of various groups (Flora, Flora, & Gasteyer 2015). These differential qualities mark some barriers PBAs face as they attempt to find assistance and local strategies to better achieve their goals.

Social capital definitions vary. Generally, there are two aspects to social capital — a structural and a cognitive component — (Ferlander 2007). Structurally there are physical networks of institutions or groups that are more or less formal. Cognitively, individuals have

subjective thoughts and emotions revolving around norms of reciprocity and trust, which allows for ongoing expectation and action to occur (Ferlander 2007). Bourdieu defined social capital as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationship of mutual acquaintance or recognition" (1985, p. 248). Social capital's dynamic characteristics are highlighted here. It is the interaction of people and groups that help create, maintain, or degrade social capital. Similarly, Coleman (1988) details this concept:

> *"Social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors – whether person or corporate actors – within the structure. Like other forms of capital, social capital is productive, making possible the achievement of certain ends that in its absence would not be possible. …social capital inheres in the structure of relations between actors and among actors. It is not lodged either in the actors themselves or in physical implements of production." (1988, p. S98.).*

The importance of action on the part of actors plays a valuable role in social capital formation. While actors can possess needed and useful qualities, i.e., human capital, there is no utilization of these qualities without action from those actors who are connected through networks.

> *"…with notions of physical capital and human capital – tools and training that enhance individual productivity – "social capital" refers to features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation." (Putnam 2000, p.2).*

While skill and knowledge must be applied to conduct a prescribed burn, organized and safe prescribed fire would be unlikely without social networks and structures required for coordination and cooperation between group members.

While social networks are important to PBAs' overall success, social norms and trust are extremely salient topics because of the presence of potentially dangerous fire. Trustworthiness of the social environment, as described by Putnam (2000), infers that obligations will be repaid and

upheld, situationally translating that fire safety and expectations can be dynamically trusted, scrutinized, or mistrusted, depending on history and perceptions of fire at both a personal psychosocial level and at a larger organizational level. Falk and Kilpatrick (2000) argue that trust is a critical component of any social cohesion, and rightly so especially for those dealing with hazardous circumstances. Trust can be further separated and detailed into objective and subjective ties between individuals (Paxton 1999). Objectively, structural component ties exist in social space with a tangible social network between a group and an individual or another group. Subjectively however, there must be ties between individuals that are positive in nature and contain elements of reciprocity, expectation, and norms; this is the more cognitive component. Trust can be considered an effect of social capital, while the initial source of social capital is social ties. Where trust already exists it can also be considered a precursor to social capital. Further detailing distinctions in trust, researchers separate trust into informal and formal social capital, where the former is trust between individuals and the latter is trust in an organization (MacGillivray & Walker 2000). This is a key dimensional quality. Trust in various organizations can ebb and flow depending on personal and collective experiences or perceptions. When dealing with fire, trust can be especially salient as we saw with perceptions of prescribed burning.

These dimensional qualities exist in three distinct types of structural social capital: bonding, bridging, and linking (Ferlander 2007). Each of these can have varying degrees of strength of ties. Bonding social capital has horizontal ties — friends, neighbors, and family with similar social class and characteristics (Woolcock 2001). This subset of social capital has strong elements of shared identity and culture. Bridging social capital is similarly oriented horizontally and is composed of more distant friends, group members, colleagues, and general acquaintances. However, differing social characteristics and demographics within these voluntary associations characterize this form. Bridging capital includes those people across social groups and organization that are more or less heterogeneous. Putnam (2000) states that “bridging social

capital can generate broader identities and reciprocity, whereas bonding social capital bolsters our narrow selves" (p. 23). Similarly, Ferlander posits that "The value of weak bridging ties lies in the provision of wide informational support" (2007, p. 119). Weak ties connect differing groups or individuals with needed knowledge and information. Linking social capital is vertically oriented and is composed of colleagues, ties between citizens and civil servants, and is further accompanied by unequal hierarchical positions (Woolcock 2001). These connections allow individuals and groups to access resources outside of their immediate social circles. Both formal and informal ties are deployed as members navigate up or down the vertical social scale in their pursuit of connecting to desired resources (Woolcock 2001; Ferlander 2007; Field 2003.). Depending on the ongoing dynamic relationships within and between groups or individuals, imposes potential for PBA success or barriers to success.

Within these three distinct types of social capital I chose four specific elements that characterize subtle nuances. These four pieces help give coherency and grasp to bonding, bridging, and linking social capital definitions (Woolcock and Narayan 2000; Grootaert et al. 2004):

Norms are social phenomena characterizing acceptable or unacceptable actions which dictate behaviors. Norms can be built and reinforced by engaging in collective action within and between groups, developing collective identity, and participating in other processes of expectation. Norms are specific to groups and individuals and can vary widely.

Shared sense of future develops before, during, and after group formation. Goals and objectives shape perceptions of a shared sense of future by providing either clear or implicit directives and inhere certain beneficial outcomes.

Trust is the capacity to believe an individual or group will uphold expectations and intentions rooted in mutuality. Interpersonal or institutional trust are degrees of trust found in social capital.

Norms of reciprocity are those elements closely related to gift giving. Time, financial and physical resources, and knowledge contribute to norms of reciprocity as they are constantly reaffirmed by participant actions.

Through these four composing facets of social capital, the findings are further separated into these smaller elements. A primary goal of the research was to learn more about PBAs' social capital by interviewing members and other stakeholder representatives such as volunteer fire departments. By following the directive of the three research questions coupled with the above sociological theories, I was able to further examine my qualitative data and capture the richness of participants' narratives.

CHAPTER III

METHODOLOGY

Qualitative Considerations and Philosophy

I used a qualitative paradigmatic lens as a way to discern how social capital is built and present in and across PBAs, and how this further influences the sustainability and goal efficacy of these groups. Applying a hermeneutic tradition allows for potentially biased conceptions that these groups are beneficial to rural towns and individual landowners, as well as, to the preservation and conservation of Oklahoma's natural ecology. Implementing the ontological perspective of the interpretive strand allows for emergent design and conceptualization of the study according to the participants, and further allows for better understanding social construction and participant interpretation of adjustment responses (Hesse-Biber 2016). The elements of the interpretive strand such as symbolic interactionism and social constructionism are highly relevant since this study deals with contested use of fire, perceptions and values, and resulting group actions. Furthermore, the iterative process of this qualitative research confines the research development so that a biased view is not upheld throughout the research process. Successful iteration, despite the researcher's bias, depends on the participants' response and the development of research techniques from their responses. For these reasons, I used semi-structured interviews to produce the data needed for analysis to obtain the answers to the proposed research questions.

The interview process, rather than a more quantitative survey instrument, allowed the research questions to discover subtle nuances that might otherwise go undiscovered. Ascertaining the initial response mechanisms according to social fabric will allow for future understanding as the social reality of this topic develops alongside natural science's substantiation of fire's role in maintaining the natural ecology. Qualitative methodology, therefore, was best suited for this particular research focus since "The point is not to prove, beyond doubt the existence of particular relationships so much as to describe a system of relationship to show how things hang together in a web of mutual influence or support or interdependence… to describe the connections between the specifics..." (Becker 1996:56). The focus of this research question and perspective addresses the need to discover subtle nuances while providing an accurate depiction of the complexities surrounding the topic.

The importance of this methodology is that it provides foundations, not only for further qualitative studies, but also for future quantitative research instruments on topics of PBAs, their future needs, potential effective resources, and their ties and interactions with various groups involved with landowners, agriculturalists, hunters, and other entities in contact with the natural landscape.

Data Collection/Population

Identified from prior research through the EPSCoR[1] project, PBAs within Oklahoma are composed of landowners who make up an important role in the social fabric of rural communities and contribute to the management of local ecology. PBAs were identified by previous research participants in the EPSCoR project as a valuable subpopulation that can contribute to better

[1] This project's work is primarily concerned with climate variability. Social implications of climate variability are numerous, with previous work identifying a need to better understand landowners' adoption and implementation of various management strategies.

understanding of land management, wildland fire mitigation, and overall fire utilization as it pertains to climate variability. These groups are found throughout Oklahoma in all five watersheds and have affiliation with Oklahoma State University Extension Services and various other state wide groups. PBAs within Pawnee, Creek, Woodward, Canadian, and Blaine County have been identified as the most salient representatives of the study population. These counties represent three of the four watersheds within the EPSCoR project. Pawnee and Creek County reside in the Cimarron watershed, Woodward County resides in both the Cimarron and North Canadian watersheds, and Canadian and Blaine County belongs to the Washita watershed. The purposive sample population, PBAs were identified by previous interviewees and regional experts with some contact information collected.

Oklahoma State University's local expert on prescribed fire and PBAs was used as a key informant on the location and status of these groups. This expert (John Weir), was requested to participate in this study and provide valuable insight. During three different informal meetings I gathered salient information and began conceptualizing a sociological perspective. I asked questions related to the needs and concerns of Oklahoma PBAs, prompting detail oriented conversations. I took handwritten notes during these meetings which provided a record for the development of the conversations had during the initial contact period.

I formed a strong rapport with local experts during the initial meetings and I received an invitation to attend Oklahoma Prescribed Burn Association's (OPBA) biannual board meeting at the beginning of 2018. Leadership from several of Oklahoma's local PBAs was present as well as a member of Quail Forever. The executive leadership of the state-wide collective PBAs conducted usual business and allowed me to introduce myself, explaining my proposed thesis topic. I requested that the leadership encourage their members to participate in an interview process that would allow me to collect valuable data. The response was overwhelmingly positive and encouraging, as they saw benefits of the social research. I gathered contact information from

various individuals and catalogued it for future use in the research process. From the contacts made through Oklahoma State University's local expert and OPBA board meeting interviews were collected.

Interviews

I used face-to-face semi structured interviews employing an interview guide were used to facilitate the data collection process. A total of 20 interviews were collected, from the various watershed regions with established PBAs. Interviews were transcribed with additional commentary of observed implicit and interpreted observations covering nonverbal communication, syntax, and other noteworthy interpretations. Five interviews were from rural volunteer fire departments (VFDs) and 15 were from PBAs. These interviews took place at the location of the participants choosing. I made sure to give the primary options to conduct the interview at the participant's home or other familiar location. By giving the choice to the participant where to conduct the interview, my intention was that they would be comfortable during the interview process, which helped facilitate a fruitful interview. Before conducting any interview a short period of informal conversation took place in order to build rapport and gain a better understanding of proper or improper probes, sub-questions, and non-verbal gestures leading toward better data collection. The interview structure readily allowed participants' perspectives to be captured. Due to the varying opinions of fire and the desired landowner goal, insider perspectives were paramount. Their perspective helped inform most beneficial and effective development of future tools for landowners, PBA members, and conservationists.

Additionally, in cases where face-to-face interviews could not be held, I conducted four telephone based interviews. I conducted four phone-call based interviews toward the end of the data collection process. While these interviews took less time to conduct, undoubtedly sacrificing those beneficial face-to-face interactions and observations, they nonetheless provided concise

valuable data. Timing of these interviews took 30 to 50 minutes while face-to-face interviews lasted from one hour 10 minutes to as long as two hours and 15 minutes.

These interviews allowed for reflexivity and emergent themes to be more readily accessed as the data collection process proceeded. I used a reflexive process throughout the research development, even during initial phases, and data collection process. The best utilized physical method to ensure reflexivity throughout data collection was writing memos and rereading or listening to interviews. After each interview I wrote memos about the interview process itself, and reread hand written notes and observations after each account as previous researchers deemed a fruitful method (Mauthner and Doucet 2003).

All of the semi-structured interviews were transcribed and will be kept on a secure external hard drive for five years after completion of the project. I used a transcription service for efficiency, allowing more time for analysis, introspection, and data collection. After the first sixteen interviews, all subsequent interviews were personally transcribed. This process aided in better familiarization of data during coding and writing. Individual interview data was anonymized so personal identifiable information cannot be traced back to the interviewee. Furthermore, the interview process allowed for a more intimate relationship to be formed, especially face-to-face, and offered more opportunity for observation and gathering of PBA member perspective.

Ethical Considerations

Since my research was qualitative and used face-to-face interaction I took special care to think about the ethical considerations and potential implications. The informed consent form directly specified that participants could stop the interviewing process at any time and retract their voluntary participation at any time during contact with the researcher. Additionally, since this research is affiliated with Oklahoma State University (OSU) and there was potential for contact

overlap between the institution and landowners; those choosing not to participate or cease participation after starting were assured that their relations with OSU will not be altered in any way. Special care was taken to assure participants that no detrimental circumstances would occur if they decided to cease involvement since there was potential for overlap of contact between Oklahoma State University and said landowners. There were no interviewees who declined or requested to cease the interview process. Measures were taken to insure participants' answers and personal activities are confidential. Participants referring another landowner were explicitly insured protection of confidentiality. The interview process involved divulging personal information and some emotional scenarios occurred. In those cases the researcher provided immediate support by stopping the interview, consoling the participant as best as possible, and further sympathized or empathized with the individual. During those seldom scenarios the rapport built before the interview helped facilitate resolving the problem and reminding the participant of their rights. Luckily, those participants were encouraged by this practice and self-elected to continue interviewing.

Analysis (coding process)

The design of this research methodology was an inductive process. The analysis reflected inductive purpose throughout data analysis. Audio recording of the interviews were transcribed verbatim by a transcription service and myself, when applicable. After the transcript was received I looked over the transcripts and cross referenced with notes taken during the interview to actively engagement with the "research material from the beginning of data collection." (Hesse-Biber 2017:309). The interview data was analyzed using NVivo 12 computer software, through qualitative content analysis. Due to the number of interviews and extensive response length, content analysis allowed for categorization and understanding through a systematic approach (Stemler 2001). Content analysis ensured effective and applicable coding to highlight participants' voices, as well as, employed techniques that discovered underlying themes (Saldaña

2013). I anticipated that the participants of this study would not use academic terminology associated with disasters, climate change, and/or perceptions of wildland fire to describe their personal experiences. Therefore, the methodology employed helped balance the need to give participant voice primacy to better understand their perspective and employ sociological understanding to better capture a larger picture of the socio-ecological. There were two distinct phases of coding, a first cycle and a second cycle.

First Cycle Coding

Since literature on PBA landowners' social networks and social capital is relatively unstudied, initial coding, or open coding, was utilized in the first cycle coding method to allow for emergent coding schemes. This inductive coding scheme provided the primary framework for understanding the developed social capital and perceptions of fire related goals. These initial codes were directed strictly by the content of interview data, which allowed for basic understanding and interpretation of the responses. This followed the conventional content analysis approach (Hsieh and Shannon 2005). I anticipated that the initial codes would be numerous and varied with much overlap and rarely mutually exclusive since this is a discrete line by line process detailing the minutia of the interview data (Lofland et al. 2005.). This aided in the emergence of more broad categories, leading to themes, which were directed by the respondents. Codes such as "Stewards of the land/earth", "Smokey Bear", "Limited Resources", "Neighbors Helping Neighbors", and "Land Improvements" were examples of these types of initial codes. To ensure the balance between respondents' contributions and slightly more theoretical understanding of participants' actions, process coding was utilized in the first cycle.

Process coding, also known as action coding, was used for coding actions of the participants. Corbin and Strauss detailed the utility of this methods as especially useful for researching "ongoing action/interaction/emotion taken in response to situations, or problems,

often with the purpose of reaching a goal or handling a problem." (Hesse-Biber 2017 p. 96). This was important for my research since it applied to actions taken to achieve PBA' goals that were often the interaction between differing groups and with natural landscapes and associated land management techniques. Furthermore, a secondary goal of this research was to potentially provide effective tools for PBA landowners to better engage with neighbors and state officials such as local fire department and policy makers. This coding strategy helped highlight the existing strategies landowners utilized for land management and reasons of usage for those management techniques. Process coding blended well with open coding since it used the voice of the participant in the first cycle coding process, and therefore framed the initial research analysis around the respondents' narratives. Codes such as "Fragmentation of Lands", "Building Fire Breaks", "Land Access Problems", "Redcedar Encroachment", "Trust Building", "Neighbor/Local Responses", and "Need for Younger Members" were a few of the codes that came from this coding. Process coding and initial/open coding provide the foundation for the participant driven analysis while the second cycle coding will provide for more theoretically driven coding schemes as themes start to emerge from the interview data.

Second Cycle Coding

Since the foundation of the analysis was formed from the first cycle of coding, it was important to implement theoretical contributions from the existing literature to better frame the social capital of PBAs. In order to do this, focus coding was used to sift through the numerous codes generated during first cycle coding process. I focused numerous codes by placing similar codes under other codes that best related to each other to create broader themes. These broader themes had multiple sub-codes. However, focus coding did not completely resolve the numerous codes produced since sharp boundaries are rarely developed and certain degrees of similarity existed between codes (Saldaña 2013). Therefore, upon completion of focus coding, theoretical coding was applied to the focused codes. This helped to form more generalizable interpretations

and further created a theoretical understanding of landowner relations, social capital, and resulting prescribed fire actions. Theoretical coding was used to further clarify themes under a theoretical umbrella by placing appropriate themes into categories of my three research questions. Once the three research questions were full of rich narratives, I used elements of social capital to better detail participant narratives. I used norms, norms of reciprocity, trust, and shared sense of future as a way to write about a more detailed understanding of PBAs' social capital — this is reflected in the findings section—.

Memos

Throughout the development of the analysis, analytic memos were utilized to detail the progression of my understanding. Memo writing promoted reflection and effective pathways to verbalize the connection between different categories, bridging data collection, and the theory employed throughout the study (Hesse-Biber 2017). These memos allowed for organization of ideas and certain data to present themselves in importance and salience (Lofland et al. 2005). During the first cycle of coding the memos were mostly used for organization and for understanding the longitudinal development of my ideas. During the second cycle of coding memos started to be used as a tool to potentially generate code and categories as major themes start develop.

Confidentiality

As mentioned previously, all data was stored on a password protected external hard drive. To further ensure the security and confidentiality of the data the participants were assigned an ID number which corresponded with their name on an Excel spreadsheet stored separate from all other data on another password protected external hard drive. Participant names were given a pseudonym when represented in the findings chapter of this document.

CHAPTER IV

FINDINGS

The following findings are composed in such a way as to allow for collected data to be fully represented. Data driven themes emerged as notes, memos, and codes were reviewed and reorganized. Reorganization of codes took place throughout the coding process as gleaned information was compiled. It is not possible to show all data; quotes provided in these findings are those which best represent groups and individuals and those aspects contributing to various forms of social capital. Underlined words, phrases, and sentences are those which I deemed particularly noteworthy.

Researching this topics presented challenges as participants had difficulty in elaborating on various social topics that are often subconscious or taken for granted. Present in every interview, conversations gravitated toward technical aspects of prescribed fire such as fire behavior, equipment, ecology, and proper procedures. Prompting participants and redirection occurred to when conversations focused too much on technical procedures. Dyad conversations required back and forth prompting and clarification to better illicit responses more closely related to the research topic. For this reason my responses are presented some of the time and where possible, paraphrased.

Findings are presented from bonding, to bridging, and then linking social capital. Each of these three forms is further detailed by more nuanced aspects of social capital: norms, sense of shared future, trust, and/or norms of reciprocity. Ending the findings chapter is a consolidated version of the findings detailing both strengths and weakness at levels of cognitive and physical structures inherent to social capital theory as detailed in the literature review. Organization into these categories allows for better application to the community capitals framework. The community capitals framework is discussed following the findings' chapter with particular emphasis to situate more holistic implications. Implications of these findings are presented in the discussion chapter. Names presented throughout this chapter are pseudonyms of actual PBA members.

Bonding Social Capital

Bonding Ties

Bonding social capital has horizontal ties with friends, neighbors, and family with similar social class and characteristics are represented. Furthermore, it has strong elements of shared identity and culture. Displays of bonding social capital do not typically fall under categories of socializing or old friends getting together for a cup of coffee. In the case of PBAs, bonding social capital is that between members within a PBA. While members do become closer as a result of spending time together in these group settings, they do not readily form bonding social capital reminiscent of close friendship or kinship. As a local PBA president, Mr. Hill, and longtime cattle producer with many years of experience explained:

> "*[Do I spend time with members] outside of PBA events? I have not had a chance to really spend much time outside of PBA events with any of these folks. No, [we don't typically spend time outside of prescribed burn stuff].*

We're scattered all over the county. No, that's not a ... We don't, don't do that." –Mr. Sonny

After talking with other PBA members of this same chapter is was evident that Mr. Hill was highly respected. He was given many verbal accolades as the foundation for that specific chapter. They remarked that without his many years of service and leadership as president, there would not have been as many prescribed burns conducted. Even though there was warm neighborly respect, members described a lack of interaction outside of PBA sponsored events. These examples illustrate that even though members have nothing against participating in activities outside of PBA events they do not readily engage in personal leisurely activities. Distance and time often limit potential for more personal interactions as neighbors in rural areas are many miles apart. The only woman I interviewed, who was also a cattle producer and responsible for organizing educational programs at a local institution, described rural connections as:

"I call him our neighbor. You know how in the country goes, he's probably five miles away, but he's our neighbor and we run our cows on his land in the summer time." – Mrs. Torch

Larger distances do not deter members of PBAs and rural communities from forming bonds. It does however limit the type of interaction. While bonding social capital is present, membership in a PBA does not resemble a social club. Participation in this social group is mainly for productive reasons. As described in the next section, a shared sense of future drives participation in these groups.

Shared Sense of Future

Participants strongly supported the need to participate in collective activities to gain access to various resources. While members might need help conducting a prescribed burn, they are most bonded through collective action by a sense of shared future. Common goals, land management, stewardship of the land, and economic interests contribute to this.

"I like setting fires. I like doing it because I know it improves the grass, gets rid of all the [old growth], it also, it'll help with wildfire prevention, because

it keeps cedar trees down and you keep all the dead fuel down. Cattle eat the grass better after it's burned, because that new growth, they just love it. They'll work tar out of it…And it's a fresh green growth, you'll have to fence 'em off of it for a while. The lovegrass, that's the only thing. We did a burn down here by [a local town] and the kid made a mistake after we burned it, instead of puttin' them in right away, he went and fertilized and waited like a month and it came back so much the cattle couldn't keep it eaten down so we had to burn it the next year." –Mr Jones

Participation towards common goals within group settings greatly contribute to a shared sense of future. Many interviewed members said they enjoyed watching fire burn eastern redcedars. They viewed this almost as a leisure event. Understanding that burning cedars contributes to better land management outcomes or the enjoyment of seeing immediate effects after a burn, one thing is certain, members enjoy watching fire. Often, land management is the common goal nicely illustrated here by this well respected cattle rancher:

"The biggest reason to conduct it is basically for fuel management, and when I say fuel ... Fire has to have something to burn, so that's the fuel. If your land has been burned there's going to be less there that can burn in the event of a wildfire. There's lots of other reasons. It's good for the grass, it's good for stimulating the growth of native plants, and all sorts of range land ecology reasons. Most people don't know or really care about that, especially your two and a half or five acre city folks who've moved to the country next to your ranch and hate it when you burn. The big thing that they need to know is, if I burn my land I'm going to have fresh grass growing this summer. When that wildfire comes in August it's going to have less to burn and the firefighters will be better able to get a handle on it in that event." –Mrs. Torch

Fire's multifaceted utility allows for members to participate in burning even with differing end goals. The common goal of land management actions contributes to bonding social capital. General health of natural ecology and decreased fuels are reasons members seek to use prescribed fire. This goes as far as influencing the name of local PBAs. As a young multi-generational cattle rancher who is also a prescribed burn coordinator told me:

"Our PBA is called Arbuckle Range Restoration Association. We kind of did that because, we could be just regular burn association. But there is more to it than just burning. There is building fire breaks and ultimately what you're

doing is restoring the land. So that's kind of how they decided on the name."
–Mr. Black

Mr. Black has deep family ties in his local community and offered many examples of neighbor anecdotes providing or receiving a helping hand. While not overly specific, restoration of land encompasses that sense of shared future which was espoused throughout interviews with members. When asked about the greatest strengths of his local PBA Mr. Jones, who told me he graduated from a local high school and "tech school", then went straight to farming and ranching, in his community stated that:

"We do a lot of neighbors helping neighbors type stuff… One of our biggest strengths is probably the pool of resources that we have… Equipment and knowledge, I would think. Because now that I've been in it for five years, I have a lot better understanding of the "Why" behind prescribed burning, and knowing that it's good. Growing up in agriculture that's just something you kind of know, that fires go ... Like Indians used to burn all the time."-Mr. Jones

Understanding the "why" behind PBAs' actions is maintained through group members' knowledge. As supported through the literature review, "Indians used to burn" because they knew the positive ecological implications. As Mr. Jones has experienced through his five years of membership, knowledge substantiating reasons to burn have become more ingrained even as a lifetime of agriculture already allowed him to understand burn benefits. Group knowledge further informs overall group goals, as an older gentleman, cattle rancher, farmer, and part-time dozer operator from western Oklahoma described:

Well, I would say the biggest goal we have as a PBA would be livestock production, and then wildlife management out here. There's people, I had a guy come to me, wanting me to give him a bid on what it would take to make his place where he could burn it. Half section and it's nothing but cedar trees, big cedar trees. And I told him, I just have to come over and do some work, and see what I can get done in a day to get the trees pushed back far away from the roads and from the neighbors. By the time you did that half section, you might as well clear them all." –Mr. Edge

Many members report using prescribed burns to help increase their ability to provide forage for their cattle, thereby increasing stocking rates of cattle. Other reasons include desires to better wildlife management practices. As discussed in the upcoming bridging social capital section, wildlife management provides opportunities to increase bridging. One of the biggest contributing factors to bonding social capital is a shared sense of future. Furthermore, belief in land management and stewardship also contribute to this. Understanding the "why" behind prescribed burning is a cognitive component possessed by many PBA members interviewed. Land stewardship encourages belief in something greater than self, helping to foster collective action and participation when activities do not readily benefit a specific landowner.

Norms

Norms are often dependent on specific interactions between individuals and their group affiliation. PBA members experience and support norms closely related to technical aspects of prescribed fire. While some of these technical aspects are not explicitly social, they do elicit expectations resulting in certain norms. Norms of safety and diligent protocol highly characterized group involvement and further dictate interactions, especially during a burn.

> *My biggest concern when conducting the fires is ... not paying attention. I'm guilty of this as well. Not paying attention to what's going on behind you. I mean, you're moving along the fire line. You're spread out. Smoke tends to dictate where people are spread out to. You can't just sit there in smoke all day long. But as you're moving along that fire line, keeping an eye on what's going on behind you, to make sure that that is moving in the way it's supposed to, that you're getting stuff in black, that flame heights aren't getting to the point, or a wind gust doesn't come down and lay a tall flame over, have it jump over a firebreak. So on my property, it's expensive. Like I said, I don't have a whole lot of the capital to do a bunch of stuff. We've got some grazing lease agreements where we trade grass for equipment use, and so I can get someone to go out and do a mowed firebreak very easily. I'm comfortable using a mowed firebreak. Not a lot of people are. I know that a lot of the PBAs, because everyone's a volunteer, and they don't necessarily have a lot of formal training, there's a lot of informal training they can get, or at least some that they can get online through OK State, and through other organizations around the country, that is at no cost or minimal cost, but they*

don't really have a lot of the training that would allow someone to do something like a mowed firebreak really easily. So on my property, I talked [the president] into letting me get away with a mowed firebreak, and so that is the even different situation, because you mow it, but you still got grass. All it does is you got short grass, it slows down a fire, but it'll still creep across, and o it's always being aware. Every fire is different, every 10 feet can be different, and it's that constant looking over your shoulder, being aware, and just, again, that attention to safety for the crew members, and then for the adjacent neighbors, because when you get in a scape, you've got some liability protections, but you're also ... if they don't want that burn, they don't want that burn for whatever reason, that they don't want that fire on them, and so it's personal safety, personnel safety, and then safety for the landowner that we're burning on, ultimately, so that we can ensure that they maintain decent relationships with their neighbors round them, who may or may not be supportive of those types of burning efforts. -Mr. Waters

Norms dealing with aspects of safety and proper prescribed fire training and preparation are at the epicenter of participant concerns. Fire is respected and consequently dealt with in such a manner. As seen in this example above it is important to understand that fire can burn bridges between neighbors if negligent or inconsiderate practices are used. The last thing members want is for safety norms to be ignored. Members without as much financial or built capital as others seem extremely aware of fire risks. Norms of safety create potential sanctions that could exclude a landowner of valuable shared resources. These safety norms go as far as to limit the number of possible burns. A local landowner and retired rancher and farmer wanting to rejuvenate his late stated:

"No, but it does seem like we don't get as many burns as I would think we would. I don't know how many but several people attend those meetings but I don't know what reasons they have but everybody doesn't get burned off that joins that association. And it might be like me they're too many requirements, too many ... they don't have the fire breaks made. I spent a fortune making those fire breaks for the bulldozer and putting in fire roads. I probably spent 10,000 dollars to make that place where we could burn it safely." –Mr. Cook

Norms of safety, while extremely valuable to groups, can dampen morale, and as discussed later, limit positive attitudes towards norms of reciprocity. Many do not feel that enough fire is getting on the ground for all PBA members' land. These safety norms permeate to levels of group language. As this landowner maintained:

"Yeah, but they always say, You hear on the news, "A controlled burn got out of control and it burned all 300 bales of hay." So, prescribe burn they don't want to have you even say control burn. And I think they would kick you out of that if you ever did something that silly. You say prescribed burn because control burn is just a bunch of guys get together and go out and set it on fire and it gets out of control." –Mr. Cook

Active members are highly cognizant of expectations resulting from norms within PBAs. Language and safety go hand-in-hand as exemplified above. More experienced members have better internalized norms of safety and language. Those with higher levels of social capital resulting from group participation often exhibit and advocate for safety norms. Members act and react to these norms and often understand consequences can result. Sanctions, either explicit or implicit can occur if members do not follow group expectations. One landowners with strong community ties to his hometown and the OPBA, stated that:

"The PBA we really rely very heavily on those OPBA burn consultants and I am one of them actually and that's one of my jobs. I've got other co-workers we will call out here…we have members that come out too. You know there is a fine line between good help and bad help because a lot of people are wanting to get experience burning and I understand that and I'm all for that to provide them every opportunity for them to do that. But, out here as big as some of these units are we get afraid of having someone out here not familiar with the property. We don't want them to get lost out here while we're burning. If something were to happen…so we try to just have people out that are really familiar and hopefully that will change. We get more cedar trees knocked back and we are hoping these burns become less risky. I'd say your learning curve is going to be experience, like knowing how to spray water and how to conserve it, knowing not how to panic, you can see here where it jumped. You know we need someone who is going to be calm, not panic. You really just have to build a relationship with those people over time so you feel like you can trust them to be out on something like this. Because if we would've had one of our guys calling the fire department right here and they say "no I'm out here on the fire and it's escaped from…blah, blah, blah, we would never have that person out here again. Just because they broke the chain of command you know. We also need people that are fit and take care of themselves." -Mr. Black

Following procedures and norms of fire protocol and safety is extremely important to group affiliation. Sanctions occur when individuals "break the chain of command," not following designated fire prescription. Perceptions of these groups is highly contingent on safety and not

allowing a wildland fire to cause destruction to neighbors or the rest of the community is extremely important. If members break the chain of command they are liable to experience sanctions, whether implicit or explicit. However, PBAs do not avoid calling fire departments at all cost. From a local PBA president with minor respiratory problems who continues to ranch:

> *"Well, the more ... Every time we do a prescribed burn and it's successful, and even if ... I mean when you start a burn, and the way it's handled after that. You know, the way it's handled. And the thing about the prescribed burn, in that burn plan, there's a situation. When it comes time to call that fire department out for assistance, it's time. And it's noted in that burn plan." – Mr. Hill*

As stated in the literature review, part of the prescription plan is to know when exactly to call the local rural fire department. Mr. Hill, the local PBA president, was extremely admit about this practices but also argued for "chain of command" structures when deciding to call other fire professionals, similar to Mr. Black's statement above. When it is time to call other fire professionals, such as local volunteer fire departments, the prescription plan continues to focus actions even during more emergency situations. While each PBA differs according to individual members, burn plan safety remains similar.

Norms are felt throughout these groups, not just with safety, but also with individual practices. Active PBA members with high levels of existing bonding social capital exhibit in-group and out-group dynamics where belonging can be contingent on farming and ranching lifestyle, knowledge, and experience with wildland fire. When discussing land's ability to rebound after decades of mismanagement, one of the youngest PBA members I interviewed described the following:

> *"We got [a really good kill of cedars], you clear all those needles out and then all the grass seeds can see sunlight and they germinate then you get grass under the cedars trees so if we can come back within the next two to three years we are hoping to get an even better kill. See on that hillside over there where there is a lot of grass that was actually two year ago summer burn and this fire burnt up to that point and went out. So we are learning some different tricks about that. So if we want it to stop somewhere we can*

burn it. So this year this burn right here we are wanting it to go out right here. So we are going to come back next august and do this right here. We are going to manipulate that with grazing so we are going to move some grazing animals in right here this winter and just like we talked they are going to hammer this right here. Our cattle are going to hammer this. There used to be sheep up in this area for a long time. We aren't just set up for that or familiar with sheep. There is just such a huge knowledge "slash" education gap that we, anyone would have to overcome. I think it's just a fear of the unknown and that's why a lot of people don't do that up here. Plus socially, social acceptance if you are the guy running 2,000 head of goats you're gonna get made fun of." –Mr. Black

Landowners comprising a vast majority of PBA membership exhibit cultural norms about forms of production. All members interviewed were aware of social sanctions to their actions. While seldom stated in explicit terms like this, there were many implicit understandings I noticed through the research process. These in-group and out-group features are displayed when individuals seeking to join PBAs must provide evidence to their competency about land management and norms of fire safety.

Trust

Trust at the level of bonding social capital encapsulates many of the interactions between individuals leading up to prescribed burns and especially during. Trust is strengthened and formed by engaging in potentially hazardous situations together through expectations of competency and safety. Prescribed fire situations are ripe with aspects of trust formation, or even degradation leading to mistrust.

"It takes a lot of trust to burn with these guys… How do you even build trust with someone you've never built trust with before? I guess you just have them, I don't know if you say meet them around town and stuff like that but you have them out for some of your smaller burns and the more you use them and the more comfortable you become with working with each other and what to expect with fires. I know we had, I had a guy come out and help with us from Norman, his name is [John]. Which everybody was really mad at me because I got someone that had never burned with us before but by the end of the day they were all like "Man, we are really glad you called John, thank you". And now every time we call John when we are going to burn. He might not be able to make it but he still gets a phone call. We love good help. [He is

not a cattleman], he is a real estate guy, I guess joined the PBA. I'm not even sure how he got into prescribed fire to tell you the truth, he just fell in love with it and he just does this as a past time hobby. He comes and helps out. He knows it is good for the land. He just enjoys it. And you really see that a lot in the older generation, those guys that are beginning to retire but still in good shape, they have nothing to do and they love to come out and help with stuff like this. So I have been trying to do my best to meet with people like that." – Mr. Black

"Good help," or human capital, readily translates into trust. Newer prescribed burners seeking experience often find it difficult to quickly build hands-on learning due to a narrow time periods to burn, conflicts in attending educational seminars and field days, and reluctance by more experienced members to let strangers participate in burning alongside them when learning higher risk techniques, such as setting backfires and giving commands. In this case, forming trust was mediated by one individual vouching for the outsider even when bonding social capital between experienced members was tested, "…everybody was really mad at me because I got someone that had never burned with us before…" Reluctant members saw John as a potential risk to their safety. Two factors are relevant to discuss here. First, John was an outsider who did not have a similar farming and/or ranching lifestyle, unlike these particular experienced members. Secondly, he lacked hands-on experience. John might understand that "[fire] is good for the land" and it was not clear whether he had referenced prescribed fire literature, but we do know that his lack of hands-on experience greatly impeded formation of social capital regardless of his technical understanding. However, apprehension to allow a stranger on the burn crew quickly dissipated as his ability was exemplified throughout the day.

Many members reported strong bonds of trust with current members they are working with regularly. Trust seemed to be mediated through mutual understanding of competency in prescribed fire knowledge. Members did not expect everyone to be at the level of leadership displayed by fire bosses, however, there expectations of competency and helpfulness. A

landowner whose primary income is not through farming or ranching described his PBA membership interactions as:

> *"I definitely trust the people I'm working with, [Bob] and [TC], they're just, well they're so knowledgeable, they forgot what most people ever know. And they won't do something unless they know that they can control it. We doubled the size of the burn this year, last year, because ... Or no it was this year. This year because the conditions I'd done make it so much better. With the improved roads, the fire roads we put in. So, we burned off twice as much. There are a lot of volunteers. Some of the positions are not high level positions, unlike running the drip torches and things like that. But that has its pitfalls too. I mean you can get ahead sometimes they like [TC] has to wait and tell them don't go so far out there. But I think everybody that's helped with us has been so accommodating and very helpful" –Mr. Waters*

Norms of safety improve trust among individuals as they engage in processes of prescribed fire. As norms are tested, holding up to scrutiny, trust increases among group members. Trust formation following shared burn experience shows how more fire can be applied to a greater acreage. Knowledge of proper practices and procedures of prescription displays competency, which also helps form trust. Trust and comfort levels between members increases over time when safety norms are upheld. When asking a slightly less experienced member in his early 40s about his trust with the local PBA he described trust in terms of comfort:

> *"I'm pretty comfortable. I haven't burned with any of the other Prescribed Burn Associations, but I'm very comfortable with the [our] crew, and I do have to credit Mr. Hill and Mrs. Torch for that level of comfort that I have. Mr. Hill, he's the president, and he's got quite a bit of experience with burns, and he's been with the Oklahoma Burn Association a number of years. I think he was on the group that kind of helped get it kicked off. He's very adamant about crew sizes, and sticking with the ... I mean, if you say you need six people, he wants eight people out there. If you say you need four people, and five show up, and he's good with that, but particularly on bigger burns, if you identify you need 8 or 10 people, you need 8 or 10 people. That's where my comfort level is derived from, is that he really sticks to the, "This is the plan, this is what we said we needed, and if you don't have it, we're just not going to do it." So, yeah, it's very safety-focused, and as long as you stay safety-focused, you're not going to have anyone get hurt. This last burn that we did with Mr. [Donald] and his place, we had a couple of folks drive up from Ardmore. It was a really ... There's no such thing as a smooth burn, but it*

went really smoothly, and no surprises, and we were able to just get it ringed and get stuff done that we needed to get done, and I didn't speak with him directly, but in some ... just a few comments they made with me, and then I overheard while they were finishing up and loading up, is that they were complimentary of the crew and that we had out there" –Mr. Smith

When individuals, specifically fire bosses, do not sacrifice prescription protocol, trustworthiness is reaffirmed. Putting trust into safety norms, which are upheld by those with more experience and knowledge, allows for those with less burning experience to achieve their goals. Without dedicated members to pass on norms of safety, trust formation can, and is often, stifled. When asked about how much trust there is between members a president and fire boss stated:

"I think that we're pretty close... you always got a core group in any organization that's the one that's really dedicated, and well it's kind of like old Tim and Jan when I brought them, they take care of me. That's the way my troops do, whenever I was in the military. You let them make as many decisions on their own as they can so that they can grow, and I just, my philosophy's always been, let people do their job and try to train them the best that you can, and then when we meet next time, we'll debrief one another on this big fire over there. What went right, what went wrong, and we try to debrief but we don't really do that after every fire, because after you've been out there for 8 or so hours, you're tired and spent. We should do more of that but we do talk about what to do for the next burn and with what happened at the last one." –Mr. Hill

These committed members have participated in affirming and reaffirming dedication as the core group of individuals. Trust formation occurred throughout their involvement as knowledge and experience were revealed. This dedicated core group has shown reliability time and time again. These scenarios allow for specific practices and types of jobs to be given but can lead to burnout. When prompted about trust and the experience of members, a long time cattleman in western Oklahoma who is now retired and not as active as he once was stated:

"Well, yeah. You gotta trust them. It depends how many burns they've been on what position we put them in. The ones out drip torching, they usually have done it and the ones ... if they haven't had a lot of experience, we put them on the back to where they're more on cleanup after the burn. It's all black and it's pretty well out… [Experience and trust] is a work in progress, it's learn by doing. I prefer to do a small burn and kinda see how that works and then ... like last year I helped with some guys north of Woodward there, we burnt like 2200 acres, but they'd done a lot and they got, some of them have those big six by six military units set up and they ... so that helps them. I've been to several that [JD] has been in charge of, and [AG] and it just ... and we've had others that have been doing it for some time, I don't know, it's just experience helps. That way you can kinda see how the best way to do it, how far to go in and then it's fun because we'll set the back fire and we'll get it in about two or three hundred feet and then we'll start working up on each side and then once we get it burned in so far on the side then we light the head fire, and man, they just come together and that pretty much puts it out." –Mr. Jones

Direct experience, that which is considered hands-on learning, is highly valued by members. Those who are able to gain this valuable experience are granted responsibilities considered to be riskier than other tasks. Interestingly, smaller amounts of initial trust are awarded to those who have little experience by simply joining and showing up to a burn. "You gotta" trust those who are willing to participate. This bodes well for initial trust building in newly emerging groups and memberships. However, trust does not extend to everyone willing to show up. When to provide a scenario that exemplified trust

Some of them I trust enough to do stuff. I have some concern. Because we have some guys, and I have to just watch them very carefully, but we have some guys that don't want to do anything but go, go, go. They get on a drip torch that they're not supposed to stop until they get to the other end. They can get you in trouble real fast. I think it's kind of important that I know, or whoever's conducting that burn, know who those people are, and put them in a spot where they're not carrying a drip torch, but putting out the fire behind that drip torch on the, you know, protecting the firebreak area. I've got two guys on our team, and they're usually at most burns, but if they're on a drip torch, and one of them carries a propane torch with them, I have to watch them constantly, and slow them down sometimes by saying something." –Mr. Dune

Trust, at varying levels, is relegated to certain jobs. While you can trust someone to do one job, they cannot always be trusted to do another job. This is not because of inability to do

certain jobs; rather, it is the inability to follow proper safety norms or lack of competent experience. Knowing personal information, how certain personal traits are affective such as those who “don’t want to do anything but go, go, go,” can limit trust. Sanctions occur when something must be addressed by those in higher positions and can relegate individuals to less technical jobs such as cleaning up already burnt areas.

Norms of Reciprocity

Norms of reciprocity are highly tied to feelings of trust and understanding of safety norms. Norms of reciprocity are consistent with gift giving, either physical or symbolic. Time, energy, knowledge, and physical labor are all norms that can be given and received. Members are more likely to contribute to group efforts when trust and safety norms are strong. Additionally, repayment of group offerings are more likely to occur when positive experiences are received and perceived.

> *“Within the organization, yeah. That's one of the things, is once you're a member, especially if we come help you do your burn, you're unofficially expected to then turn around and come help somebody else do their burn. It's not just about you, it's about being able to give back also. Because one of the main benefits of being in the association is we have, I don't know, through I think OSU and Turkey or Quail Forever or something, we had a grant, and so we have, we call it the burn trailer, I'm actually going to go pick it up after.”*
> *–Mrs. Torch*

An implied norm of reciprocity is that of helping others do their burns. While time and distance limit possibilities of individuals participating in burns it is still their responsibility to do their best to help with as many as possible. It is especially important for those who received collective resources to “turn around and come help somebody”. These collective resources are highly valued and inhere certain qualities demanding of reciprocity. Limitations in time, resources, and labor create problematic scenarios for norms of reciprocity. The following quote shows how norms of reciprocity can become complicated:

"It does seem like we don't get as many burns as I would think we would. I don't know how many but several people attend those meetings but I don't know what reasons they have but everybody doesn't get burned off that joins that association. And it might be like me they're too many requirements, too many ... they don't have the fire breaks made. I spent a fortune making those fire breaks for the bulldozer and putting in fire roads. I probably spent 10,000 dollars." –Mr. Cook

It takes time and other precious resources to even prepare for a prescribed burn. If landowners lack time, motivation, or money to participate in proper safety norms then prescribed burns do not occur. There is a hidden advantage for members with more disposable financial capital used to create fire breaks. Creating these fire breaks is typically the responsibility of landowners. It is only after these fire breaks are created that pooled resources such as human and built capital can be readily shared. Those dedicated members part of the core group can unknowingly feel entitled to their turn even if there are other members he need more assistance. Those who properly prepare their land and assist other's burning build their bonding social capital but can limited opportunities for others. Those with more resources, say "10,000 dollars", can facilitate a speedy preparation process. Landowners with fewer resources and physical abilities such as older adults can find it difficult to achieve these land preparations. Rural communities are typically composed of an aging populations with fewer young and able-bodied people and must rely on group efforts or financial capital to supplement work. When asked about drawing younger membership to his local PBA the local chapter president suggested:

"I think there might be some come through. I talked to a young guy the other day that's, he actually was a captain with the Milfay Fire Department. Just run across him by chance, I was buying cattle and got into a little political head butting. And that's, this little volunteer fire department has a lot of issues… so he said, "I'm not going out on no more fires, but I'll work on your trucks." And when I got to telling him about it, and this guy said, "Wild land fire training ..." He's serious about it. He's dedicated. So I'm going to try to bring him in, and he's about… he's still young enough to climb a hill. <u>So I'd like to have some younger folks, but I think until it's accepted, more widely accepted, we're just going to have to work with what we've got.</u> What the OPBA is doing, like [KG] and [SC], you know we got them on contract [as prescribed burn consultants]. That's, for our situation here, that's tremendous. And they said, "Call us any time," but we won't if we don't need

them. You see what I'm saying? That's an excellent resource to have." –Mr. Hill

Overall there was little suggestion for how to actually increase younger membership. While there might be a core group of individuals, as previously described, there are still limiting factors for participation. In order for each PBA member to have prescription prescribed there needs to be sufficient member reciprocity. One of the greatest barriers faced by PBAs is sustaining membership and attracting younger members willing and able to take on a leadership role. As described by the oldest cattle rancher interviewed and PBA member, who was also a well-respected chapter president:

> *"We started this organization in 2014. We called a group of people together. The big problem we've got here in this county is redcedar, which is not uncommon to most counties, and especially in this area. But for Dale, our conservation district, it was kind of his opinion that the only way we're going to ever get cedar under control is through fire, and we're not going to get much fire on the ground if we don't organize in some way. So we called a meeting of people that was interested in controlling cedar. Had [JD] came down and made a presentation. They decided to go ahead and organize a burn association. Of course, then they started looking for people to take a lead and take a role in getting it going. I got elected president. I didn't realize it was a lifetime thing, but I'm still there since 2004. We started out. None of us really knew what a prescribed burn was, other than the Dale." –Mr. Sonny*

Older members willing to take leadership positions strengths initial stages of group formation. Knowledge and respect facilitate cooperation as social capital is built. However, without permeable and finite terms on leadership individuals often experience burnout. Lack of younger members capable of contributing physical labor to preparation of land for burning leads to fewer burns. When there is only a dedicated handful of members with prepared land, norms of reciprocity can be limited to those individuals. According to an older active member who is retired out in western Oklahoma with limited physical ability:

> *"We got membership of about twenty-five, thirty guys, we haven't got that many guys that really got into it, they're interested in it, but they, it just pullin' the trigger and preparing their land to where they can a little easier, like clearing the ground and pushing it back to the middle to where they can*

put their fire breaks. Well, they want to, but the expense. A lot of them are older people, and I say older, like had one guy he's in his mid-eighties. He'd like to but he just can't do it, and he doesn't wanna spend the money to hire somebody to do it, to prep for a burn, like cut the trees and movin' them back three hundred feet. And then mowing around where he can.... disk and make a fire break. It just, we had one guy that was a hundred years old and he wanted to do something, but he's in a nursing home now. He could where it would do good, so he's out of the loop now." –Mr. Jones

Norms of reciprocity are limited by age and ability of members to prepare lands, and motivation to "pull the trigger". When dedicated members hold themselves accountable to each other they create smaller in-groups with higher levels of bonded social capital inadvertently excluding members with less resources. Valuable resources such as "the burn trailer", manpower, and knowledge are readily available for those with already prepared lands. Additionally, members express an expectation to provide food and water to those helping burn their property. This detail is not as important to a larger picture as this norm of reciprocity occurs when engagement is already high, but it is important to note that some members counted this as a financial burden.

Members continue to engage with one another in order to access shared capital through the PBA. Both physical and human capital encourage members to renew membership and participate in collective activities. These collective activities may not always benefit the individual but the ability to share valuable pooled resources engenders desires to utilize such resources in the future. During my travels to western Oklahoma a local PBA leader, longtime and now retired cattle producer, and grant recipient for local wildlife preservation provided a nice summary statement:

"I guess the main thing is to do the burn safely and have access to our equipment to help them burn, like the drip torches we've got a torch lighter and we also get help to do it. And that's the whole thing, we want ... I don't wanna have to go particularly hire somebody to help me do it, and I guess I didn't say, we have seven two hundred gallon slide in spray units and then one fifty five gallon, and we've got the drip torches and stuff like that. If we can get seven or eight, nine people to help do the burn it's just a lot safer. We got radios, too, that we also got from PBA and the soil conservation district so we can communicate…It's just working together to get the common goal and if

there's ... they want you to look at it like, we did one north of town here, [two members] both say let them get it ready, and then you go look at it 'cause you might see something they think's fine, but it may be a potential fire escape. It might get away from you so you say, well we need to make this fire guard a little wider here or move the trees a little farther back in to where ...Safety and equipment and help, it's just a group thing." –Mr. Jones

Bonding social capital between members comes with a variety of strengths and challenges. The "biggest thing is to do the burn safely," following norms implemented through technical procedures and local culture. Before the burn can be conducted there must be trust between members which is scrutinized and affirmed through competency and experience. Common goals are achieved through fire's multifaceted benefits to the landscape contributing to a sense of shared future. The pool of shared resources is important for reciprocity but when members are able to access those resources adequately.

Bridging Social Capital

Bridging social capital is composed of more distant friends, colleagues, and general acquaintances. However, differing social characteristics and demographics within these voluntary associations characterize this form by including people across social groups and organization that are more or less heterogeneous. Bridging social capital is composed of weaker ties, compared to bonding social capital, and allows for exchange of resources and information that would otherwise go unshared.

As PBAs seek to maintain membership they find it difficult to recruit new members. Bridging social encompasses those aspects which help define success and barriers to participation. This sections details aspects of out-group perceptions, support, and opposition to PBAs and their goals. Individuals and groups are discussed throughout with specific focus on groups outside PBAs that participate in social interactions.

> *"I think there's been a little bit of a sea change around prescribed fire in some parts of the state, or in some parts of Creek County where I was more familiar with, specifically, where there's still a lot of folks that just like, "I don't want anything to do with fire. It's dangerous. What are you going to do if it gets off of you?" And then there's others that just ... They understand it. They understand what the liability protections are in the law and the state, and they're willing to do a burn plan. Then there's other places like in Osage County, just here earlier this spring, you probably saw on the news as well, where they're just dropping matches or doing whatever, and it gets away, and, well, it is what it is." –Mrs. Torch*

Community Ties

> *"We definitely have good relationships with our neighbors, and that kind of plays a big part, just being friendly with your neighbors and you don't even have to like them but if you can at least have a working relationship with them that is the main thing. That is what fire is all about is having a working relationship with the people around you otherwise if you are burning and it gets onto that neighbor's property and he is upset with you because of that he could try to sue you, you know make everything in his power to make it difficult on you so that doesn't happen again so if both of you realize that fire is good and so we both say "good we've got that same mentality so how can*

we work together to manage our property with that" so I guess sharing the same core values with…it is all about understanding what is good for the land and what is bad for the land, not over stocking not over grazing things like that that a lot of people lose site with like with your exotic grasses like Bermuda, that people introduce, it does grow a ton of forage, but it also gives people the mentality that they can over graze their pasture every year and there be no negative effect. Environmentally or economically." –Mr. Black

PBA members espouse the need for strong relationships to neighbors and communities surrounding land designated to be burned. Without a "working relationship" supported by a common understanding of intent then neighbors can make life difficult. Intentions of land management objectives must be clear. "Sharing the same core values" is paramount to formation of bridging social capital with community members. Differences in land management strategies engender types of potential disagreement depending on education and knowledge transfer. Within the community it is important to create a working relationship, the foundation of which is built on trust and norms, to better ease transfer of knowledge. This is especially beneficial when suggesting to use management procedures that are perceived to be antithetical to internalized knowledge. Those ties to community members are constantly tested when land management practices are seen. However, historical family ties to place and community encourage understanding, especially when similar core values are shared. These core values help form foundations for a sense of shared future.

Sense of Shared Future

Developing a sense of shared future is derived from core values of individuals and groups. Understanding the reasons to use prescribed fire do not just apply to those within PBAs. The reasons PBAs use fire are the same reasons others might want to use prescribed fire as well. These reasons are multifaceted, often differing from reasons farmers and ranchers use prescribed fire. One of the youngest PBA members I interviewed provided an eloquent and passionate narrative during the interviewer that summarizes many points needed to understand a sense of shared future within bridging social capital:

"I butt heads with my brother every day because he wants to plant Bermuda. And we are not going to plant it out here because it is just too rocky, that will never be an option, he wants us to go purchase some bottom ground somewhere, which would be a smart move for us to do. But I would never take anything that is in native grasses and put it back into, well they call them improved forages, or I call them exotic forages, Because yes, they grow that much, but they require just as much inputs in order to do so. And these will grow just as much but people don't understand how to manage them so that that can happen. I think the primary deal is fire has been bad for so long, people no longer know how to burn or why to burn. I mean look at Smokey the Bear and everything people have been told since the early 1900 all the way to know. I mean think about it today, fire, prescribed fire, controlled fires, whatever you want to call it, fires that are lit intentionally today, they are fighting a hundred years of negative marketing, that is the real issue here. People know, the Noble Foundation has come out and said, the best thing for your property is to burn it, especially with the native grasses in native plant communities, burn it. That is the best thing in this part of the world but the negative connotations about fire have been out there for so long if you go to your grandfather and talk to him, "you can't burn, that's terrible, what about erosion, and all this other stuff they have come out with". You even look at OSU and their publications from the 1950s and they will say something like "graze it, don't blaze it". They have actual signs that they did of why not to burn, land grant university did that and that is because they didn't, they don't understand native plant communities or didn't at the time…they didn't realize and some of them still don't that fire is a natural process that takes place more frequently than we like to think. I mean look at the Edwards Plateau of South Texas, I mean that is nothing but a cedar canopy forest and I bet if we look back at the early settlers photographs there wouldn't hardly be any trees except for down in the valley… It is kind of like building your home in a flood zone and saying, "oh it will never flood here". Same thing with the coast and having a hurricane, it is just understanding those natural environmental process that take place and how often that is going to occur. And the Indians burned it, and there is a quote, and I forget which Indian chief said it but basically he says that when the Europeans came to the Americas and if you call it "took" over the lands and let the lands go wild. In other words they stopped managing it or they tried to plow everything and everything they couldn't plow just grew up in trees. While the Indians where trying to burn everything they could every year because you know, a lot of them, those tribes except the civilized tribes that were back east that had been working with the settlers the entire time and had learned how to farm and learned the Eastern way of life, the European way of life. The western guys were still living as nomads and what's the best thing for this grass, burn it. How do you get Buffalo on a particular spot in the winter time, burnt grass and so they would burn it then come back to their burns and campout through the winter and summers and that's where they'd hunt, that burnt grass. Because buffalo if they are going to graze just like any grazing animal they are not going to stick their face in bunch grass, get poked in the eye, get parasites and all kinds of

stuff in their face. They are going to go where there is the least amount of graze resistance and the plants are the most palatable and nutritious, and so if you burn it and you get all of those. And so they would burn and then come hunt buffalo on the burnt ground. That's where are these woody plants are coming from. I wonder how many of these tree species are truly native to this area and how many were just planted outside cities and town and eventually encroached out into rural communities because everyone wants a tree in their front yard. I'm not saying there is anything wrong with that but that just kind of what happened people like their shade and they like homes above ground and so they built and planted trees and consequently they have slowly grown and got out into these grass ecosystems… I would say fire is the main thing, no there is nothing else besides fire and grazing and those two interactions on this property and that is how we are trying to combat these cedar trees." –Mr. Black

Using prescribed fire to increase quality of forage is a boon for landowners raising livestock. This element is also an element contributing to bonding social capital. However, land management practices can be shared across differing groups. Not all land management is for increased forage quality for livestock. Decreased fuel loads mitigate extreme wildfire instances. The history of fire management, as partially described above, is ripe with potential to connect differing groups and is also a potential point of contention. Many environmental preservation and conservation facets are presented above as in the literature review. Prescribed fire is often used as a tool for other goals as well. A middle aged cattle rancher in the same area as Mr. Black, working tirelessly to improve his pastures stated:

"But the leasee sees that his lease loses value every year that those trees grow up and it is not as aesthetically pleasing to his visitors. So this last year we had some burns set up but it didn't end up happening I guess they had too many thing going on and this spring we have some things going on and we have some burn plans…Again, they are our neighbors and so if we can get [Him] and us to work together and burn and I can get him confident enough that we aren't going to have a problem or an issues. He is great. He shares the same core values as we do, as far as wanting the land to stay in grasslands instead of eastern red cedar encroached forest."- Mr. Brown

Other community members wanting to use prescribed fire do so not because they want to improve forage quality but because they want to see aesthetic improvement. Neighbors in this community want to remove eastern redcedar so as to improve aesthetic quality of land. There is an economic

incentive to do this so more money can be made from the leasee. These people perceive that others enjoy the look of fire adapted ecosystems. Community members resist perceptual changes due to internalized norms about fire but can experience changes when benefits are shown. As described by a cattleman who is a PBA member and also holds a leadership position in a wildlife management institution:

> *"It's amazing people that are now saying after the fires out here in western Oklahoma "Oh, we want to cut our cedar trees." They weren't concerned about it when they were green so why in the heck would they be concerned about it when they're black, when they're dead? I had a conversation this morning with a guy that's a landowner who's too lazy to take care of his property and it's his cedar forest that consequently got smoked in the fire…But I had to explain the response of the grass and what would come with the forage to start with when the grass would come and over time, and if we get decent rains at all, the grass will recover in four to five years. You make a prescribed fire, clean the skeletons up, and have the ranch land back to where it should be at. People's perspective, they didn't know what to think. He's scared of fire. But he's seen the benefit to it. And now, it's going to be a cultural change to get these guys to start using fire. And more prescribed fire can shift that culture." –Mr. West*

Viewing a burned area highly facilitates better understanding of prescribed fire benefits. PBA members discuss cultural changes fairly often. Most proposed solutions to resistance against prescribed burn cultural changes are for others to see more often the benefits of fire. Fear of wildfires prevent cultural changes, especially in areas where wildfires occur more often. Lack of prepared adaptation to any fire situation is partially do mismanaged land and lack of motivation. Exclusion of fire in fire adapted ecosystems has created norms of fire exclusion. Members argue community members have perceptions that fire does not exist so readily in the local native ecosystems. The next quote details the "lightbulb moment" about perceptual changes to benefits of prescribed fire that can contribute to forming a sense of shared future as described below:

> *"Whenever someone who's been a burn naysayer sees the benefit of it first hand, and then their light bulb goes off, and they're like, "Oh, that was a good thing," that to me is like a victory. That happened in 2014 when we burned our land, because we got a lot of pushback from our local volunteer fire department. Because honestly that first burn that we did, it did not go well. It*

ended up okay, but a lot went not very good. Really wasn't anything that we did or didn't do, it was just the weather and the fuel that we were burning. Subsequent burns after that, we got a lot of angry phone calls and stuff. Then when the other wildfire happened, and when it burned to us and it quit, they were like, "Oh, if we burn this off the whole countryside won't burn down." When that aha moment happens it's like, "Thank you Jesus!"…It's hard to be able to share that with everybody, because you can show them pictures all you want, but when they see it in their own backyard, or with their own eyes, it's a different impact." –Mrs. Torch

Change in perception is of course a cognitive component. Retaining information about prescribed fires is both connected to previously internalized information along with space and place. Seeing "it in their own backyard", greatly increases social acceptability of PBA practices. This is especially true when effects can be seen in contrast to unintended fire that creates hazardous events. The "lightbulb" that goes off is linked to many cognitive processes. However, seeing physical events in their own backyard creates believers. As described by Mrs. Torch:

"…probably tapping into that (hunters) would definitely be a good resource. Especially for those landowners who don't necessarily use their land, but they lease it out for hunting. That could probably be part of the agreement, like if you're going to hunt there then you're going to help us do this burn. Not that you want to have to force people to participate, but I can see that being an avenue to expose more people to burning. Actually, I keep going back to this fire in 2014, that land that we had leased. It was leased separately to hunters, and so that winter, early spring that we were preparing for this burn, we got a lot of pushback from them because we asked them to move their deer stands and move their deer feeders and do all this stuff, and clean out around your little hunting cabin, make sure it's protected, bla-bla-bla. They were jerks about it. They ended up ... doing other stuff. Then after we burned they actually came back either the next year or the year after that and said, "We have seen more deer and more turkey and more quail in this place since you burned, and we're sorry for being such jerks"." –Mrs. Torch

Again, seeing is believing. Even groups within a community for example, hunters, who have a vested interest and knowledge about resource extraction are part of a culture seeking to exclude wildland fire. Initial mistrust and hesitancy about fire create barriers between groups even when both could profit. This culture is so pervasive that sense of shared future is scattered and highly

fragmented. Those living in close proximity to each other engaging in outdoor activities do not have a foundational understanding capable of leading to a sense of shared future.

> *"I think people pay attention in Oklahoma. They're starting to reconsider. But the people that we're not reaching, there's just a strong fear of fire, and hate, and I'm one of them. I understand. Every time we do a prescribed burn and it's successful, and even if ... I mean when you mess up and the way it's handled after that. The assistance, when you start out below zero, it's hard to build up, but I do think the wildlife is doing a lot. I do think they have the potential to influence more people ...it's just not an easy thing. Fire department cooperation would be good because all they got to do is get out and say, "We'll intercept this so-called prescribed burn, and we was out two days fighting." You see what I'm saying? But they'll never say anything if it goes well. But that's just life, that's just life." –Mr. Hill*

PBA members share similar fears of wildland fire. Respect and avoidance of fire differ between members and non-members in that one group can see benefits while others mainly perceive destruction and danger. Neighboring landowners, hunters, and fire departments can all benefit but lack trust in a shared future. Experience from previous intentional burns without prescription that have had unintentional negative consequences is retained with strong emotion attached to them. Social networks of these individuals are weak, lacking interaction. Knowledge transfer about norms and lack of trust are excluded here causing little to nonexistent senses of shared future. Landowners seeking to conduct prescribed burns seek out groups to help them achieve their goals. These landowners are dissimilar to others in that they already see the benefits of fire and want to join PBAs. As an elderly gentleman who mentioned his mortality during our interview described:

> *"I just think that this prescribed burn gives me hope that we can turn that ranch around and try to preserve it. That's my family's legacy. My parents, not many people can say they've owned a property for three quarters of a century. Look, most of the time people die off they're sold off. And but things were just fell in place for me that I could buy out the other heirs most people couldn't do that. And say that and now I have some solace knowing that that ranch will be preserved and people can learn a lot from that." –Mr. Cook*

There is potential for prescribed burn associations to leave a legacy of preservation and restoration that goes well beyond a lifetime. Tapping into feelings such as this described above is a powerful tool for building and maintaining bridging social capital.

Access to Shared Capital

> *"I've been a member for two years, maybe going on three years now, and I primarily joined because the Oklahoma Burn Association has provided grants to a lot of people to get set up and buy equipment. So currently the County PBA fee is $25 annually, and I think it ranges from 25 to maybe 50, if not more than that. So for me, it was a very inexpensive way to gain access to equipment and people for not necessarily self-serving means or needs, but it was ... I personally don't have a lot of equipment. I don't have a lot of capital to hire help. So when I heard that Creek County had a PBA, I contacted the central tech, talking to Mrs. Torch, and joined. I think I joined within 48 hours." –Mr. Waters*

Landowners seeking to join cooperative groups do so mainly for access to human capital and burn equipment resources. These individuals already understand intentions to return fire to a more normalized interval. PBAs incentivize group membership by possess of shared resources. Challenges arise when enticing members to join. Burn equipment gives non-members a chance to see resources that are distributed to users. This contributes to a sense of shared future by giving mental attachment to physical objects rather than obscure practices.

One of the greatest resources to access through joining a PBA is knowledge. Burn coordinators or consultants help during the initial stages of the prescription development. As described by one of the consultants who is also a PBA member:

> *"People will call us and want us to make sight visits and say "can we burn this or not" and we will give them, this will be a success, no you have to defer grazing a little longer until next year. Because that is the primary, you have to build up fuel loads Those site visits, that way it is not wasted because it does cost money, it cost to not graze something. And going out there and helping those people out that is kind of the primary job that I have been doing. I've noticed and people are realizing that I'm writing burn plans and doing all this stuff. My work schedule has actually pickup quite a bit and I've got those 10 thousand acre ranches over here, they want me to write a burn plan for their entire property so as we complete burns I'll do one burn plan for each little*

unit and we have 3 scheduled for next year and that is going to be 2,500 acres and hopefully we will schedule 3 more for the next year and that is kind of how we will play that game instead of me just writing one giant burn plan." - Mr. Brown

One challenge facing consultants is convincing landowners to defer grazing, thereby limiting short-term profits. However, one of the greatest challenges finding best practices for working with local landowners with smaller amounts of land. It seems it is more worthwhile to help out 10,000 acre ranches as compared to 100 acres. This presents barriers for smaller landowners seeking to access shared capital when they may not be as viable compared to larger land holdings.

Norms

As seen within bonding social capital, norms of fire safety are highly prevalent. When discussing norms at the level of bridging social capital, fire safety remains a salient topic but is just as important as other norms. Land management norms in communities do not encourage or readily rely on use of fire. For fire to supplant lack of or alternative land management practices, understanding return on investments in prescribed fire is paramount. Often there are blind spots when deciding whether or not to engage in group activity that requires reciprocity with time and resources. Furthermore, returns on investment seem veiled and uncertain because of long-term consequence and lack of temporally close instances of prescribed fire near communities.

The following two quotes take place in the truck of a single individual who is a PBA member and burn consultant, cattleman, and volunteer fireman. We drove around pasture land scattered with redcedar and rocky outcropping discussing social and technical aspects of prescribed fires. This interview yielded extremely valuable data as we were able to discuss and relate certain topics to specific physical markers. These physical markers prompted many topics compared to more traditional face-to-face interviews.

"You can see over here where we had out head fire. There is some crowning that happened here. It seems like, our cedar encroachment is so bad, it seems

> *like every time we go to burn it is at a threshold state. Consequently our burns match the state so we are burning under a little more extreme conditions than most people would be doing it. I guess it has its pros and cons. It is what it is we kinda have to, where under the gun, we have to burn either way. If we don't burn we are going to lose it completely, if we do burn we want it to be as effective as possible. Your typical set of standards whatever conditions you would burn under, a lot of times you can't get the kill that we want with that. You talk about, do we buy land, I like to think of this as buying land look at all that land that was 100 percent canopy forest, which now here in the next 10 to 20 years will turn into a grassland again. So technically we do kinda buy some land every year because we get rid of those cedar trees bit by bit. This is long term. Everyone up here has liked wildfires because of the cedar trees and again if they over graze it doesn't burn and dad was kinda the pioneer, he worked for the Noble Foundation as their pasture and range consultant for 30 years. So you know they always advised people to burn but then that question, "okay how am I going to do that?" I would say I think, for us and our family, my father was the first one to really take advantage of these improvements like we did like the roads and start burning. And that's the whole thing, you don't learn what you need to do until you start. Little things like that over time you can't do it all at once but like we burned that and we want to get that fire break built within the next 3 to 5 years."- Mr. Black*

For ranchers, deciding to use fire presents many challenges. Even when landowners seek advice from consultants they find it difficult to start this process because of unfamiliarity with practices. The only way to learn is to start engaging in hands-on activity. While this is a short-term challenge, long-term challenges present themselves as blind spots of return on investments. Fire does have immediate consequences but beneficial effects can take several years to compound. Since use of productive fire is unfamiliar compared to other techniques it is difficult to envision several years in the future. It could take "10 to 20 years" to turn red cedar encroached area back into historical grasslands. Decades of woody plant encroachment, that of which has been gradual, creates norms of tolerable landscape types. Stewardship of land or land management comes in various types of norms:

> *"…the goal of proper land management, of being better stewards of the land because that's what is, you know, that is what it all comes back to, stewardship of our private lands, you know, I would say how to manage, is how to manage naturally is being lost because a lot of people you get this one time application of this chemical and it kills of you woodies for that year, a lot of people don't realize that we're going to have the same woodies back next*

> *year. You do in some places, unless you're in the foothills of Kansas where they have sprayed it for 30, 40 years straight, you know, and that is why there are no trees up there. And fire has something to do with that too, not only do they have to spray but they burn a lot of years and we are seeing good results with fire in woody control, you know. They're doubling down and have been for a long time." –Mr. Black*

Currently, PBA members perceive that the typical cattle producer utilizes as much grazing area as possible with highest possible stocking rates, often leading to over grazing. Economically this makes sense as these business people seek to increase profits. Deferment of grazing for the purpose to build up fuels creates inconsistent norms in short-term cognition. This dissent hinders potential understanding of long-term benefits. PBA members might not understand all benefits but do, to a greater degree, understand enough to participate in a long-term commitment.

Fire safety norms at the bridging level are similar and distinct from those at the bonding level. When groups in a community connect with one another they take extra precautionary steps to limit exposure to potential harms. More remote perceptions of closeness and ties create different scenarios compared to connections of individuals in groups. Fire safety norms at the level of bridging social capital related back to a sense of shared future. As described here by a water quality specialist:

> *So I'd say the Oklahoma State Extension Office in Creek County. I think they have ... Their main office is in Kellyville, but I think they have satellite offices in Drumright. But so Creek County Extension Agency, or Service, and they've come to a couple of our meetings, and NRCS has been pretty good, and that's been pretty educational to me. The local NRCS person, he indicated that he was a little bit more uncomfortable with the range ... So in a prescribed fire ... in your prescription, in your burn plan, you can set minimum and maximum temperature ranges. You set the minimum/maximum wind ranges, which I always did with 515, but temperature can be 10 degrees if you want to do it. I don't know why anyone would want to be out there doing at that, but I tend to stay with just above freezing, so 33 to 110, and the preference is 40 to 85. But then you can have humidity, and that's a big ... Humidity is the most important factor, I think, more than winds, even, or dispersion, depending on where you are, of course. But the humidity is that I'll usually have a range like 50 to 75 or 80. The NRCS, much like the Fish and Wildlife Service ... So NRCS is USDA, the US Fish and Wildlife Service is Department of Interior, but they tend to have narrower ranges on humidity. In the service, I understand their*

reasoning a little bit more than the NRCS, but he had made a comment that the ranges on humidity precluded him from being able to really sign off on a burn plan. So if you go to the NRCS and ask them to help you write a burn plan, they're going to put in a humidity range that they're allowed to operate in by regulation of the agency, it's policies and regulations. So there's a policy or a regulation that says, "This is the range for humidity." And it's based on personnel safety. I mean, it's a safety factor. The lower the humidity, the more dangerous the fire. So ... I thought that was real interesting, but that is an organization that can help write burn plans, and if you use their burn plan, and they sign off on it, then you've got to stay within that prescription. It's less flexible in terms of being able to start a fire in the morning and finish by noon. Sometimes you want to be safe. It is what it is. Once you start the fire, you're there with it until it's out. However, if you limit yourself to ... 50 to 75, and in the morning humidity's not going to get ... it's at 78 or 79, and it's not going to be below 75 until 11 o'clock in the morning. You got everyone standing out there, you need to do something. And it doesn't burn as well. Get it ... it might not meet your full prescription, or your ... not your prescription. It might not meet your full management objective, but it meets 90% of your management objective, and you're in 100% prescription. So you afford yourself the liability to actually." –Mr. Waters

When landowners seek assistance from groups with which they do not have direct ties, those low in bonded social capital and high in bridging social capital, they are often limited in their prescription abilities. These organizations mentioned, similar to others not mentioned in the quote, must follow their own norms of safety. These norms are more closely regulated and scrutinized for the sake of individual and community safety. While prescribed burning is still available and encouraged, burn objectives do not always meet desired land management outcomes. These organizations have differing standards for a variety of reasons, lacking holistic understanding and sense of shared future. Microcosms in historical agency structures, research objectives, and intended purpose contribute to those differing norms.

Trust

Dangerous or hazardous situations retain in individual memories longer and leave lasting impacts that can facilitate formation of deeper ties in social capital or create mistrust. Community member that join PBAs begin initial stages of group interaction. These first interactions are based on shared desires. As shared experiences and interactions occur, exchanges develop a deepening

internalization of norms and shared sense of future. Bridging social capital develops into bonding social capital when ties are deepened. These ties contribute to elements of homogeneity as individuals are socialized into the group. When a PBA with a core group of members engaging in shared experiences a foundation of knowledge and norms are shared, facilitating greater formation of trust. Trust is constantly built and rebuilt during these interactions as shown below. When asked about a memorable moment, a cattleman in his mid-50s reminisced about one of the first burn experiences he had:

> *"Memorable moment. Well, there are a couple, but one is that on one place that we've burned multiple times now is that ... and it goes back to some of the safety that I was talking about, is that we had an escape the first time we burned it. Going up a hill, winds doing squirrelly stuff, and this spring, when we burned that same property, going up that same hill, at about almost the exact same location ... I turned my back for a minute, and [Will] pointed his finger, and I looked around and there's a damn wall fire on the other side of the fire break, turning into, you know, and it was not as bad as the last time, but got it out. But it was just the same, exact point on the same hill, the same property, and it just ... we just kind of laughed about it. He said, "What are the chances that happened?" I said, "That will happen every time we come up this hill from now on, the next time we burn this." And he said, "Well, I'm not going to be here forever." So that was pretty memorable." –Mr. Cane*

In all instances of asking members this questions, they reported examples of aberrant prescription fire behavior. These instances consist of times when members needed to engage in improvised organization and deployment of learned strategies. Members recalling memorable moments described these instances as high excitement. This is interesting because fire is already respected to such a degree that they limit, as much as possible, moments like this. However, it appears these scenarios greatly facilitate trust formation between these individuals which further engenders group identity. Responding to events like this reinforce competency and ability as displays of these elements are seen by others. This reinforces internal perceptions of competency and external perceptions as well.

> *"Well, it's not necessarily, it's something I'll always remember, and I look back on it with a lot of humor, but at the time, it didn't seem very humorous.*

But I can share that with you, if you'd like. We were doing a burn…on a fairly large piece of ground. There was an extremely large brush pile on this place. I was standing downwind at the direction of [Valery] standing downwind on another man's property. The property was completely denuded of any grass…was only maybe half an acre in size. It had grass that was knee to waist deep. There were pickups, cars, vehicles, equipment, all kinds of stuff just stacked around in there. I'm watching embers light land in front of me, and then, somehow, it had the wherewithal. I heard a crackle. I looked behind me, and it's one fire. I spent some frantic moments there getting it put out. I was very grateful that I got it put out, and then, I was also I gave a great deal of praise to [Valery] for sending me over there. I look back upon that with a lot of happiness, I guess. But at the moment that that happened, it was not very happy." –Mr. Edge

Surprisingly, sense of humor is used to describe these scenarios. Why members consider moments such as this to be humorous after the fact is unclear but it does suggest they are undeterred by such instances. After moments of fire outside of prescription boundaries have been subdued, members feel relief. Two individuals were able to improvise commands and actions in order to get the burn back within prescription boundaries. Ties become closer as norms of safety, reciprocity, and competency are relied upon which further to strengthen and build trust. Deployed bridging capital does not always transition into bonding social capital. Trust can be degraded depending on interactions, especially with organizations independent to PBAs. One of the few individuals who has both ties as a PBA member and another professional agency related to land management commented:

"A lot of your bigger, traditional ranches out here do not use a NRCS or FSA [Farm Service Agency]. They don't plow the ground, they don't have ag-ground, so they're not "in" with FSA. They don't have confidence in the Natural Resource Conservation Service and people they have in positions… Part of that is historical and part of it's personnel. I work with guys that have got 45,000 acres. Anywhere from 40,000-45,000 is the, actually 53,000 is the biggest acres that I work with. But a lot of these guys are historical ranches that their families come in the land run. And they've put together pride that has morphed into huge properties. And they're very dependent. And they don't trust people unless they know people. They're educated, couple of them's got PhDs that I work with, in range-management. And I had been with some of them trying to get them into programs and some of the personnel that went had no experience, they had a college degree. But they don't know one cow from another. And they don't understand which end the cow eats and they're

giving advice. And once they burn one bridge, it burns it for everybody in that." –Mr. West

Bridging social capital extending to organizations that engage in management and policy consultations must uphold certain norms and values. When these norms and values are not upheld individual or group sanctions degrade trust or completely impede initial formations. Opportunities for knowledge transfer through bridging social capital are not as important as experience or displays of competency through experiential examples. Historical legacies in communities create more homogenous identities of ownership and belonging creating less permeable boundaries. Both positive and negative social capital develop from these historical ties to space and place. Norms that are violated create fewer chances for boundaries to be penetrated. Historical legacies retain influential aspects to attitudes and perceptions as described here by one of the youngest PBA members interviewed:

"I think the locals kind of don't worry about it anymore because they have grown accustomed to burning as often as we do. But what the problem is your typical highway traffic going from fort worth to OKC interstate right is all those people on the interstate are trying to be good Samaritans are calling and saying 'Oh my gosh there is a wildfire'. 'send the fire departments out here" –Mr. Black

Local communities become accustomed to changes in their environments. Use of prescribed fire is normalized through time as PBA members continue their objectives. Signs of wildland fires do not put citizens on high alert in these areas because of familiarity with seasonal prescribed burns. Members describe their communities' familiarity in localized terms. Current productive fires, as compared to wildfires, do not gather as much public attention. Prescribed fires are highly localized and tied to their community. Non-locals respond to signs of fire, such as smoke, as if it were actually a wildfire. Locals trust PBAs to practice prescribed burns because of norms resulting in trust.

Norms of Reciprocity

Formation and sustainability of groups can be difficult. Group members seeking to engage with one another need to determine degrees of expected exchange. These norms of reciprocity are upheld through the development of PBA interactions. Certain dilemmas arise when group formations are confronted with challenges of members capable of helping each other. One of the biggest problems with sustaining a PBA and engendering norms of reciprocity described below by a PBA member who was born, raised, and now a respected professional in his rural area:

> *"It's communication. It's education. I mean, communication, education! (Makes emphatic hand motion) It's the whole deal. And it's getting-- The burn associations are reaching out, we're getting more burn associations. One of the struggles with the burn association, I think, getting one established is getting somebody that's a real landowner to step up and play, to take the first pitch. To be like, "Alright, I'll be the president. We got a secretary here. We got--" You know, put a committee together to get it going. You've got to have somebody that's motivated and getting that right person's tough. You got to find the right, motivated person to run it. And that's the hard part." –Mr. West*

As with other quotes, finding motivated individuals is difficult. One of the greatest difficulties is finding someone who is motivated enough to shoulder responsibilities of leadership. Major distinctions in motivation "to step up and play, to take the first pitch" are uncertain. Do those in leadership positions who help facilitate prescribed burns on others' property receive greater return on of benefits? Or do these individuals sacrifice more time and resources compared to other members? While these leaders do benefit, the degree of reciprocal benefit is tied to others' in the "core group" of individuals. Similarly, internalized norms of reciprocity in members' void of leadership responsibility could be less robust. Reasoning behind this could originate from many places. The next quote gives a glimpse at potential reasons as described by the eldest PBA member interviewed:

> *"I guess I get a little concerned with our association… We only have a few members that are stable members. It seems like every year we get a lot of people coming in. They want to be a part of it, but it's almost like having to train a whole different crew every year. I'd like to see a little more stability in*

our membership, but I've not been able to bring that about. I don't know, maybe if someone else was president, they could, but I… We're in kind of a strange county. It's kind of a bedroom for Oklahoma City or Tulsa. A lot of people work in this county and drive to those places to work. They'll have anywhere from 10 to a section or a quarter section of land. I've had a lot of them, "Well, we've got a quarter of land down here," and might get involved and learn how to do it. But still, they'll never come to a burn that we do. I don't know. It's frustrating to a degree, but I try to work with all of them, do the best we can." –Mr. Sonny

Perspectives on bridging social capital can be complicated. While, in this case, the president of the local PBA desires to spread knowledge and norms of reciprocity to their community, frustration abounds as others have not fully committed to the organization. It appears these norms of reciprocity do not fully extend into assisting in others' prescribed fires. Knowledge transfer, or learning, about technical procedures and protocols does not constitute great enough cause to volunteer on a burn squad. Even if those members with bridging social capital pay their dues and receive training, current norms of reciprocity dictate that they are not required to continue in the loop of resource sharing. This factor contributes to interference in transforming bridging social capital to bonding social capital. Other members, report additional obstacles to norms of reciprocity and sustainability, and as quoted from a PBA president in his mid-60s:

"I thought and thought, and I thought you know the best way to do this, to get these new members in, is the fire plan intimidates them. It did me, it's just intimidating, looking at it. But it's not. So I put together, we do a class when I get two or three new ones, we got to hold a class. And it's at least three hours. And we just bring up that burn plan on the screen, and we walk through every element of it. And most of that burn plan, only they can fill out. It's like contact people, legal descriptions, and once they see that, and I said, then there's the technical section, and I say, "This right here, we'll take care of that when we go to see your burn site But they know, the landowner ... everything has got a set protocol. And once that was put together it, and when they come to it they say, "That's too much for me." So you cull them out right in front of you. And then we walk them all the way right through that." –Mr. Hill

Many landowners lack time and energy or are simply intimidated by the level of work needed to join a PBA and abide by their expectations. Participants reported that the burn plan is by far the most intimidating portion during initial stages of group involvement. Technical documents are a major cognitive barrier for new and non-members. Filling out these documents, or even thinking about doing this task, can elicit feelings of incompetency. Feelings of inadequacy contribute to lack of reciprocity. When individuals feel they do not have anything of major value to contribute then they are more reluctant to participate in maintaining norms of reciprocity. However, some feel they do not need collective assistance and bypass beneficial reciprocal ties.

> *"Had another guy call me, he has a big ranch on highway 51 on the Payne County line, and I think he thought we were for hire. He contacted us because he wanted a prescribed burn done to his land. Then I explained to him that's not how this works. We're not for hire. If you join and become a member then we will help you do the preparation and help you write the burn plan. Pool resources. Once you have your land prepared then we can help put together a crew and come do it. He goes, "What do you mean prepare my land?" I was like, "You'll have to have burn breaks and x, y, and z." He goes, "Oh. I'll call you back." Never heard from him again. I knew I wouldn't either. Because he didn't want to do the work. He just wanted it done for him. Probably less than a week later his ranch burned." –Mrs. Torch*

This quote highlights how those with capital other than social capital, i.e. financial, built, or human capital, can use their own resources as a proxy to achieve their land management goals. When non-PBA members choose to set a controlled fire they can be choosing to burn outside PBA guidelines and expectations of prescription. While it should not be said that these landowners are looking out for their sole benefit, this does raise questions about norms of reciprocity within PBAs. These norms could potentially be viewed as too taxing, requiring the giving of precious resources to others that would not in-turn contribute to compounding benefits for self. Chances are, this is not a decision made on complete rational economic heuristics and is tied to feelings of self-reliance and projections of group inefficiencies. Participants appear to believe their collective resources are not as valued by those members in the community who conduct prescribed burns without joining a PBA. Refusal to participate in norms of reciprocity

contributes to declines in social capital. Motivations of these individuals do not align with a sense of shared future. When seeking to burn, landowners who do not join a PBA lose an opportunity to increase their social capital.

> *"They're not part of the PBA. Let me rephrase that. They have paid dues in the past, I don't know if they went to the last meeting and paid their dues. They may have sent them in. But they have built their own equipment, I showed them what they needed. And they've seen a prescribed burn, equipment that the burn associations have got. And because, normally, when everybody's doing prescribed burns it's all the equipment-- so these guys built their own. They have got a lot-- they've got more resources. This is a non-traditional ranch. Their income is outside of the ranch."* –Mr. West

For landowners with more disposable income and wealth, that are do not join a local PBA, the most valuable resource used for prescribed burning is the equipment. Other pooled resources such as knowledge and labor did not seem to be as important to these landowners, as they seemed to have confidence in their own knowledge. Social engagement did not seem to be a priority, especially at group level involvement. Norms of reciprocity in PBAs potentially contribute to reasons for not joining the organization. Members without as much disposable income valued pooled resources at a greater level and were content to share their time and labor power. However, for those fewer more elite landowners', group affiliation was not as valued when they were capable of substituting other disposable resources for bridging social capital.

Linking Social Capital

Linking social capital is vertically oriented and is composed of colleagues, ties between citizens and civil servants, and is further accompanied by unequal hierarchical positions. Primarily, vertical formal ties are described with emphasis on who has power and influence over prescribed burns.

Specific attention to Volunteer Fire Departments (VFDs) is focused on here. Connection to other organizations with varying degrees of social influence and power are also addressed. VFDs possess authority over emergency call situations related to wildland fire which means they hold hierarchical power over PBAs. PBAs described barriers to their goals from lack of assistance or more direct restriction coming from VFDs. The following quotes in this section are from both PBAs and VFDs, whose intended objectives closely align with one another but with stark variation in ideologies and aspects of social capital.

> *"Locals are still concerned, I think they've just seen it. I don't know why. We go to church and there is a guy that is kind of like radio. And this guy prayed one Sunday that we would get some rain to put out the wildfires. And we had been burning for about three weeks that summer. There were a lot of people that thought it was wildfires out here. And but I think again that people have grown accustomed to seeing smoke and not thinking as much about it. I think the other thing too is that the fire departments. We have fire radios which are tied in to the dispatch receivers. And so we can talk to dispatch before they send anybody out and we can tell them "ya, don't do it". And we're always really good now about calling in to departments, and so they know ahead of time they know what is taking place. Because we call in and tell them hey we are burning today they know they will probably get 400 calls or more from the interstate. I mean it will be nonstop." –Mr. Cane*

Direct communication with local VFDs at the time of prescribed burns facilitates a good working relationship. Not all PBAs are capable of such practices. However, those who contact their local authorities ahead of time find less friction to their practices. Building strong linking social capital with local authorities engenders sense of more trusting communities through cooperation and understanding. Many goals and outcomes of both PBAs, VFDs, general local authorities and agencies are shared.

Sense of Shared Future

To introduce this section the next quote is from a particularly educated and involved PBA member. This member's declarations categorize much of what can be seen in a sense of shared future for cross-organizational involvement. As previously described, prescribed fire's multifaceted benefits cross-cut many networks. Situating this within linking social capital, there are many potentials. One PBA members who is also part of a well-respected engineering institution:

> *"Well, one of the mission areas for the Corps of Engineers is wildlife management. Navigation, flood control, rec ... Oh, well, flood control, flood damage is reduced. Rec, environmental stewardship ... support to the military. So we're primarily a civil works, but we also support active army as well. Within the environmental stewardship and recreation missions, the Corps will apply prescribed fire to manage invasive species, like cedar, or to help control even other invasive species. It's an inexpensive way to get rid of wooded debris after ice storms and stuff like that. That's the rec side, so then on the environmental stewardship side, we have areas that we manage to address ...So the activities that the PBA, those align really well. PBAs are using similar management techniques to what we're using, only they're managing for cattle production, and we're managing for wildlife production, they're very complementary. They may not be the same end goal, but they're very complimentary, and so that's where these burn associations around the state, when they're working with landowners that are adjacent to federal properties, not just Corps but US Fish and Wildlife Service properties, National Park Service properties, Forest Service properties, they ... all those agencies use prescribed fire for one reason or another, and the PBA activities would always be complementary to those in a lot of ways." -Mr. Waters*

With this specific organization, environmental stewardship is extremely important in implicit and explicit action. This insider perspective to both a PBA and other organization shows the flexibility and benefit of prescribed burning. While "the same end goal" does not always align, practices and outcomes are complementary across groups. Stewardship of land, that which is both positive for human systems and natural ecology, finds a stronghold in sense of shared future.

Sense of Shared Future in VFDs and PBAs

> *"The biggest problem with getting to wildfires is entrance into the properties, trees, mainly cedars, depending on what part of the area it's in, terrain, getting to them using back roads, breakdowns. But then it goes back to manpower too… I mean, you get into blackberry briars and stuff. Then you got your government lakes, which there's limited access to those, and stuff like that. It's easier for us to wait on it to come out the other side or back burn in to it. The biggest problem for us is the accessibility."-Mr. Reds, Fire Chief*

Local VFDs feel the effects of woody plant encroachment when they are unable to access private land with emergency vehicles responding to wildland fire. Increased fuels resulting from absence of fire and changing farming dynamics and less landowners practicing farming, cause access problems and create more intense wildfires. Both PBAs and VFDs benefit from lessening the presence of woody plant encroachment thereby granting better access for emergency response vehicles. As a small rural community volunteer firefighter remarked:

> *"We average anywhere from 70 to 120 a year, some big some small, probably five to 20 acres. It varies." –Mr. Green, VFD*

The amount of wildland fires requiring VFD deployment is not a small number. While most of these cases are not considered to be large wildfires they do require use of precious resources of time, labor power, and various expenditures. These are not isolated incidents. Most VFD respond to wildland fires as their primary emergency calls. So why do VFDs not help more than they currently do? According to an elderly fire chief of a very small rural VFD:

> *"Well, you get into a situation there where, and we have done it before, but we can raise some funds that way. Then the problem is, is when you help them then you leave your district unprotected. That's the only bad part about that, you earn money, but then you leave your area unprotected. We did a few, and we have people ask all the time for us to help with one, but with manpower shortage it's hard to do. We also risk ruining equipment or putting more wear stuff that's already old and falling apart." –Mr. Reds*

Use of personnel and equipment not for use of emergency call response is viewed as not aligning with goals and missions of VFDs. This is further viewed as neglectful when their areas are left unattended and potential emergencies could occur when they are busy with non-emergency

situations like assisting prescribed burns. VFDs report that financial burdens necessitate conservation of finite resources such as equipment, fuel, and time. Weak sense of shared future is partially due to historical legacy of agency identity and current norms of fire protocol.

> *"I think this is one way to do it, [coordinate with VFD to mitigate wildfires that is]. If we could ever get coordinated with the local fire departments and get them as part of the players. Well, they're fire fighters, and we're fire managers. They're trying to put fires out. We set them. But we only set them whenever it's in our favor. If there ever is such a thing in Oklahoma. I've been cultivating the one that I belong to down here at [local town] and they're about ... They're just skeptical of it, you know, and I understand them. But they miss the other part of it, and all they see is the potential wildfire that gets away. And most all places that we burn, I mean it's got unmanaged land right next to it. And if you're setting right next to a tinder box setting fires... I think some of them know how to fight wildland fires, but they have such a turnover, because they're volunteer." –Mr. Hill*

PBA members believe their goals are antithetical to those of VFD and vice versa. A sense of shared future is negated by legacies of responsibility in fire suppression. PBA see themselves as the fire managers and VFD as fire fighters. Focusing on this distinction has created a rift between measures to strengthen linking social capital. However, these distinctions, as viewed from the perspective of PBA members, does not appear to be wholly accurate. A fire chief of about 40 years old in a small central Oklahoma town who regularly responds to wildland fires, describes the situation as:

> *"If [PBAs] follow all the rules and guidelines I don't have a problem with it, not only that, it helps me, it helps the landowner later on when it comes back, but I don't know. It does help us, it does help them." –Mr. Banks*

And according to a relatively new VFD positioned in the Cross-timbers of Oklahoma, the fire chief stated:

> *"I never really, as far as prescribed burns, BoA [Bureau of Indian Affairs] is the biggest folks out here, we got along well, we had one problem where it was miscommunication, county didn't call me and tell me they were going to do it, and we just got off one big fire, that's two years ago, right, two years ago, and we looked to the northeast and all you see is big fire, so we go flying over there and it was one of their fires, but the county didn't call us and tell they're over there. As far as prescribed burns I don't have a problem with it if they're done right, if you follow all the channels you're supposed to, and I*

know they've changed here lately, but if you cross all your T's dot all your I's I don't have a problem with it. Done right, doing what you're supposed to, know what you're doing, usually we don't even mess with them, they do everything they need to do and we never go back to worry about it." –Mr. Gray

In all conversations with VFDs, all were open to concepts of prescribed fire and application by well-trained groups. They espoused concerns of proper protocols and procedures and were dissuaded by those who were negligent of fire safety and protocol norms. VFDs are concerned with eroding norms of fire safety, such as fire exclusionary norms found in the Smokey Bear campaign that engender public compliance to such norms. The following two quotes are from a rural fire chief and volunteer firefighter speaking in a conversational order with myself:

"Well, I've heard about PBAs through the social media, they've been posting a lot of their prescribed burns on Facebook and using drone footage of the fires. So they put the drone up and end up posting videos so you can see how their control lines held and all that kind of stuff. If people are going to burn, then that'd be the way to do it. Definitely controlled. But I don't think more people should be burning…" –Mr. Gray

"That's kind of a double-edged sword, [Mr. Gray]. You're talking large amounts of land, one of the biggest ways to handle it is to burn it off. But without understanding the practices behind it, you're not burning with regard to the safety of your neighbors. So unless you understand the practices of how to do it, how to do it safely, you can get a group of friends out to help, then it's not a good idea." –Mr. Grayson

Rural fire departments are wary of the potential for eroding norms of fire safety and standards. Without personal connection to PBA members to better understand their practices there is little support for burning off large amounts of land. Landowners seeking to increase the presence of prescribed fire would potentially be changing the exclusionary culture of purposeful wildland fire. Encouraging trained groups to participate in this behavior could encourage other, less trained, groups to burn more as well. As stated above, it is a "double-edged sword" for VFD to

encourage prescribed burns. Both VFDs and PBAs suffer from similar barriers as described below by a small town rural fire chief at a VFD:

> *"The problem that we would have with it is, being a volunteer organization, then you have to take members away from their families and stuff to go burn other people's property, and if you do it for one, then the next guy wants to do it, and pretty soon you'll find yourself spending your time and resources burning people's property. We've learned to survive and we manage. It's tight sometimes, but we manage. In the beginning it was kind of rough, I mean they saw the need for a fire department because of our location and it takes so long to get a town to respond out here, so there's definitely a need for it, and they see that. But people don't ... in the past we've heard stuff like, "Well, you're a volunteer fire department. Why do you need money?" Well, there's gasoline, there's insurance, there's worker's comp, there's fuel for the gas and electric for the fire station, there's pager bills, there's on and on, you know."*
> *–Mr. Orval*

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> *"The biggest problem is manpower. Volunteer wise, I live in a community where the average age is 60 and over, probably 70 and over to be closer. 66 square miles and probably 98% of my people live in another town about 10 miles away or surrounding areas, they have to drive from there to here." – Mr. Gray*

Both VFDs and PBAs describe limited resources as a primary barrier. Labor power, financial capital, and equipment are needed elements defined by both groups. VFDs partially reason they cannot help with prescribed burns because of these limitations in their volunteer organization. VFDs feel similar constraints and frustrations as PBAs. It is difficult to see similarities in shared futures when other problems distract from potential collaborations.

Norms

Fire procedure and training norms are perceived by PBA members to be antithetical. Norms of fighting fire or managing fire, as described in the Shared Sense or Future section, classify distinctions between groups. Ability to accurately determine what is considered to be proper protocol can elucidate those social norms. Here we discover responses from both VFDs and PBAs.

"I don't think our local VFD get a lot of wildland fire training and I know they would argue this point with me, but they still can't understand the concept of back fire. I mean, if the fire's coming to the Turn turnpike, close down the Turn turnpike, and back fire the turnpike. They don't do that. It's just not in their DNA. This is just mere assumption, okay? This may not be correct, but I'm pretty sure that it's not a common practice. If it's jumping roads, and it's going mile to mile to mile to mile to mile, hey, let's back fire something. Let's make a plan, and back fire it, cut it off somewhere. I just wonder why they don't use that practice more, if it works. Again, it's not going to work in every situation. If you've got 60, 70, 80 mile and hour winds, it's probably not going to work." –Mr. Cane

PBA members reported that rural VFDs did not understand prescribed fire techniques. This disconnect permeated throughout the majority of PBA members. Numerous examples detail this phenomenon. In this particular case the respondent did not have any particular evidence besides assumptions made from normative group culture. PBAs further contribute these disconnects to wildfires experience in their communities.

"They're volunteer and Woodward got some of the ... you get Dewey county and Woods county and Ellis county and Roger isn't and the fire departments, because most of those people are farmers and ranchers, so they wanting to come help but our fire chiefs here in Woodward county they kind of wanting to keep us stifled. Well, we've had so many wildfires they're afraid we're just going to go out there and set off fires, and we've never had an issue and we've burned, the last 5,000 acre burn and we haven't had any issues, they just don't like setting fires, they wanting to put them out." –Mr. Jones

Pushback from VFDs is partially due to historical legacies of wildfires in communities ravaged by entropic fire. Experiences of emergency disasters create desires to further limit exposure to fire. The main objective, from the standpoint of PBAs, is for VFDs to put out any and all wildland fire. The pervasive nature of these ideologies is not wholly ubiquitous to experiences.

"We've had the [VFDs] come to some of our meetings. I'm not going to say we've got a great relationship with every fire department, but some of them we have a great relationship with. I've had good support from our local one. I've had good relationships with the other VFD where I've got some other land too. I belong to both of their associations through dues. These two haven't been against us burning. The Chandler Fire Department, which is probably the largest one in the State, I've had a good relationship with them.

The fire chief has been helpful. They sent a representative from their fire department to our field day that we had here. He talked about prescribed burning, and the need for it, and everything. We've had a pretty good relationship. Now we've had some fire departments that, "Oh, you're not going to burn in our area," during a burn ban. That was the case there, which we can do. We can burn during most burn bans, if we get the proper permission from the fire department. I understand their concern, but we try to be responsible." –Mr. Sonny

Positive linking social capital is fostered from interactions that share sense of shared future. Personal conversations described by this PBA member detailed sense of shared future and responsible fire norms. At the most basic level, respect is built between VFDs and PBAs through understanding of fire norms and a willingness to trust their objectives align with larger fire safety norms. Regardless of fire officials' concerns inaction is not a potential option for these landowners.

"My personal experience was that in [Mounds] I expected to have a little bit of pushback from the volunteer fire department. When I called the fire chief, he said, "I'm familiar with prescribed fire. I use prescribed fire on my property. Who you burning with?" I said, "I'll have a burn plan. Do you need to see a copy of the burn plan?" "No, oh, I know that the law says you need to send me one, but I'll trust that you got it, and you're burning with the [PBA]?" And I said, "Yes, yes, yes." But he also knows the guy who lives adjacent to us, who helps us feed in the wintertime. He knows [Ben] and I told him [Ben] had given me his cell phone number, and that probably helped smooth some of that, as well, but he was very familiar with prescribed fire, didn't have a concern with it. I told him, "We're going to be starting a fire 20 minutes, and we put signs out "Do not report, prescribed fire." All the stuff that we normally do." But he was real supportive… and my experience has been with the highway department, with the highway patrol. They're familiar with it. You notify them, they just say ... they mention they want you to let them know where you are... There are a lot more volunteer firefighters now that, in my experience, that are willing ... younger ones that are willing to come out if you invite them, and they're just some that own property, and they see the value of prescribed fire. They've participated in it personally, that they're able to ... a lot of the rural fire departments are becoming more accepting of the practice." –Mr. Waters

Interactions with local VFDs in rural communities are typically positive when PBA members find common experience and understanding of prescribed fire. Familiarity with differences in prescribed fire and controlled fire fosters more positive relations. Those agencies with authority

capable of stopping prescribed burns are more likely to support local groups when forewarn knowledge and familiarity of practices is present. Lastly, most PBA members have positive perceptions of younger generations' ability to accept and support prescribed burn practices and groups. Changing dynamics in historical legacies and fire ideology have deep roots in these organizations.

> *"…the fire department thing, we've talked about this a lot at the meetings, and we can't come up with a good way to ... I think, in my mind, I think if [VFDs] are going to have to do reoccurring training, which I think they're required to, they should at least devote three hours of explaining to firefighters, explaining to them what it is. And encouraging them to send their people out on the local burns. If nothing else just to observe, so's that they're comfortable with it. Now my local fire department, but it took me two years, and I took them DVDs, everything. But it's just, it's a mindset[…] I think it's well founded because, you know I assume that they hate wildfires as much as me or they probably wouldn't be doing it. Or they just like the excitement. I don't need excitement any more, you know, except certain kinds." –Mr. West*

PBA members argue that VFDs should have more training related to wildland fires and would like to see participation in local burns. They view this opportunity as a learning experience in continued education. They also believe this would encourage a greater comfortability and acceptance with their practices. PBAs also see disconnects between organizational purposes and underlying ideologies.

> *"I think [VFDs] don't understand fires on purpose, and they're conditioned to put fire out. They've just probably not been directly exposed to the process of conducting a prescribed burn. For example, our local fire chief, I know him fairly well. He does some safety training for Central Tech, and I've talked to him on a casual basis, and talked to him about prescribed burning. He's told me he's not interested in being involved, but if we ever do one close by he'd be interested to come and see how it's done, to give him a better understanding." –Mrs. Torch*

PBA members believe fire personnel do not have a full grasp on concepts. Even when benefits are understood they do not fully comprehend the techniques foreign to their day to day practices. Shared hands-on knowledge and experience are vital to cross-organizational communication and norm formation.

Trust

Aspects of trust at the level of linking social capital are different from bridging and bonding levels. This is in large part due to organizational connections that enable trust through oversight and regulation. Non-profit volunteer organizations that are oriented under specific landowner rights, create specific challenges for linking social capital's authority orientation. Relying on an organizations requirement to follow specific laws and regulations related to negligence or maleficence does not readily apply to these groups, therefore trust is not built on an organizations' requirement to follow laws. Trust and mistrust are built on reputation, subjective experiences, and norms.

> *"I think prescribed burns are great. It kills the fuel load, it cuts the fuel load, but the problem is we've got so many people out there that aren't educated enough to do a prescribed burn. They call it a prescribed burn and they don't call their fire departments, and they don't ask about weather conditions, and they'll just kind of light it off. They might have fire breaks, dozer paths, or short grass on their fence lines or whatever, but a lot of times they'll set the fire on an otherwise poor day. It'll be low humidity and high winds. Usually the prescribed burn associations, I know the one in [our] County, they work closely with [Mrs. Torch] out at Central Tech, and she'll go out and help them do some burns." –Mr. Banks*

VFDs do not trust those landowners burning outside of fire safety norms. Asking for assistance from local experts is valued but when norms are not followed mistrust forms in the community. Furthermore, reputations of PBAs showed that positive burn records encourages trust. Most fire departments trust PBAs that follow protocol. Those that are not part of a PBA can be more mistrusted due to past escaped burns. This shows that PBAs hold group value for those that join. Based on other examples, PBAs can act as a buffer for mistrust formation by adding collective positive track records to single negative instances of an individual. However, one individual can hinder formation of positive linking social capital by adding to negative experiences with fire.

"…the only concern I would have is I want to make sure that they do contact their local fire departments. I trust them if they're educated and if they follow their plan. I do. There's some guys south of us here, and I won't name names but there's one guy that takes care of some property south of here that does prescribed burning and he's been through some training, but it seems like he never picks the best days. I would say he probably burns five or six prescribed burns a year and I would say at least one a year gets away from him. Once he called in and said, "Hey, I'm going to do a prescribed burn." I said, "I wouldn't do it today, the weather at 3:00 is going to be really bad. If you set this fire you're going to be calling us out there at 3:00." It was I think 3:07 he called and said, "I need the fire department." –Mr. Gray

Negative experiences are easily recalled when describing experiences of trust. When describing instances of trust among local PBAs, recalling instances of negative experiences more readily came up as opposed to more positive instances. Positive experiences that help to create trust appear to be less explicitly understood at a conscious level. When asking about trust, fire personnel do not point to one particular instance that helped define positive trust formation. However, many reported one specific instance that contributed to mistrust of prescribed burners.

Norms of Reciprocity

Reciprocity at the linking social capital level varies more than from bonding to bridging social capital. Reciprocal benefits are often further removed from giver and recipient. When one organization offers a type of benefit to another group the giver has certain expectations and believes certain outcomes will occur. Givers of gifts often do not expect similar or equal gifts in return. However, they do expect an investment in something contributing to a sense of shared future. When asked about PBAs' greatest resources:

"I really feel like the burn association, the board of directors, we've got grant money through NRCS, ODWC, Conoco Philips. To take that to buy equipment and train and work with the landowners—we'll, work with the burn association and landowners to get it going. I think that's been a huge, huge thing. It'd be great if there's a burn association in every county. I don't think that can happen, but that'd be a pretty lofty goal. But it is something that's-- I think that's put more fire on the ground, I truly do. We've gotten these grants through land management goals. It's land management deals." –Mr. Edge

The specific groups allocating grants to PBAs are those who believe in land management through prescribed burning. Grant donors expect their dollars will be spent on proper equipment and training for landowners' benefit. Through investments of shared resources in a group synergistic outcomes may transpire. Those willing to give grant money expect a reciprocal benefit to land, not organization. Often these donations have tax incentives or conspicuous agendas such as gaining social status. Nonetheless, these offerings represent an agreement to restore collective commons such as water, air, wildlife and biodiversity, and holistic economic benefits accompany land management objectives.

> *"Like the Fish and Game, I have a friend up here that got a grant from the Fish and Game Department to help cut his cedar trees. Well, that was one of the stipulations was that after he got the trees all cleared, that he every three to five years he had to burn. Sometimes you can't that first five years, the conditions aren't right, there's not enough moisture, there's not enough fuel or whatever. But once it was and we were able to get in there ... I think he had let them know whenever he did burn so they'd know that he had done his part... but most people just are doing it on their own. It's kinda like me, I tried to get a grant from the NRCS to remove cedar trees, well didn't have enough population per acre to justify it." –Mr. Jones*

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> *"Quail Forever, they made a nice donation to us, initially. I think it was $500 or something, but just some seed money to help us get started. Again, they see the benefit of getting rid of cedar in upland game birds. They were very beneficial and helpful to us. The Oklahoma Conservation Commission has been highly supportive in our efforts to do prescribed fire. I'm going to, this isn't meant to be a negative remark, but I would like to see more involvement, or sincerity to help, from our rural firefighters. They could be so beneficial, and there are some rural firefighting departments in the state of Oklahoma that really get it. They really understand that if they're out here doing some pre-planning and some prescribed fire, then it ultimately, in the end, it's going to avoid some wildfires, in the future. But unfortunately, there are some fire departments that just don't do that. They've got their Smokey the Bear concept, and this great fear of any fire. That's how we got in the trouble we're in. We've quit burning, and now, we just have so much fuel everywhere that when we have a fire, it's just enormous." –Mr. Cane*

Certain grants come with stipulations on received benefits that help hold receivers accountable to their intentions. These stipulations seem to be flexible due to nature's variable role. It also

appears that those organization giving assistance do so with intentions to make the largest impact with their valuable resources by identifying certain characteristics of land, such as cedar density, which makes landowners eligible or not. PBA members identified those organizations that provided assistance to them and seemed to have positive relationships with them.

Synthesis of Findings

Bonding social capital

Active PBA members while neighborly to each other, do not exhibit ties resembling kinship or social clubs. Rather, these members participate in collective action for the purpose of a sense of shared future. Land management practices through means of prescribed fire connected these individuals. Land management is multifaceted, serving to increase economic opportunity and capacity, increase biodiversity by eliminating eastern redcedar and other woody plant encroachment, decrease potential wildfire fools, and augment natural ecology and landscape aesthetics. Pooled resources such as burn equipment, labor power, and knowledge enable these activities and further contribute to a sense of shared future by desiring to use such resources. More importantly, the local PBA facilitates norm formation through hands-on learning experiences from more knowledgeable expert members. These norms are highly contingent on fire safety through detailed abidance in burn plans, preparation, use of equipment, and physical abilities. Trust facilitated collective action through norm expectations, and is further built and reaffirmed via shared experience in potentially hazardous situations. In fire scenarios, trust, especially for newer members, is contingent on conspicuous experiential competencies. Active PBAs exhibit norms of reciprocity where when one landowner receives group benefits they are unofficially obligated to return those benefits. Norms involving safety often limit reciprocal capacity.

Bridging social capital

Strong community ties such as historical family legacies and a good reputation, encouraged cooperation with locals and/or non-yet-members of PBAs. Sharing similar core values, especially those in land management, contributed to a sense of shared future. Some local non-members did understand the value of prescribed burns; however understanding is not equated with acceptance of the practice. PBA members reported perception changes of local community members when they saw for themselves the benefits of prescribed fire that could personally relate to them. Formation of a sense of shared future was dependent of physically seen firsthand accounts rather than traditional information from books or word-of-mouth. PBA members described community member accounts of prescribed burners as less than competent and contributed this to a strong fear of wildfires. Norms of older land management types and encroachment of woody plants created barriers for PBAs and successful implementation of fire.

For newer, less experiences members, trust was built through shared experiences of aberrant fire behavior that was perceived as potentially dangerous. Bridging social capital can transform into bonding social capital when newer members experience firsthand, competency and ability. Landowners mistrusted knowledge transfer when norms were violated, even when this transfer came from reputable agencies. Community members become accustomed to prescribed fires with exposure over time as they came to the realization they can trust PBAs. Finding individuals in local communities to shoulder responsibility was and is difficult. Norms of reciprocity relied heavily on a core group of individuals with leadership responsibilities that were often lifetime appointments. PBA members reported frustrations with outsiders who bypass PBA membership because they were capable of supplementing other capital for social capital and did not contribute to their norms of reciprocity.

Linking social capital

Communication with local fire personnel before and during prescribed fire facilitated positive relationships. Sense of shared future was somewhat fragmented across groups but existed in less formalized agendas. For those agencies using prescribed fire, end goals did not allows align but desires to use prescribed fire existed cross organizationally. VFDs espoused needs to access land during wildfires but found it difficult to do because of fragmented land encumbered with woody plant encroachment. VFDs and PBAs both suffered from lack of labor power, funds, and equipment. Furthermore, sense of shared future found that VFD were open to prescribed fire but were reluctant of untrained groups conducting burns. The greatest worry of these groups was that if they encouraged prescribed fire they would erode fire norms geared at fire exclusion to landscapes by untrained people. PBAs believed VFDs did not understand prescribed fire techniques and norms. When evidence contrary to this belief were present, they believed VFDs were there to put fires out while they thought of themselves as fire managers. PBAs wished VFDs would participate in local prescriptions so as to offer training opportunities and familiarity with group procedures. VFDs recalled negative experiences more easily and pointed to a single instance that formed mistrust but had difficulty detailing events of trust formation with PBAs even when describing trust in acceptable fire management practices.

Physical Networks

Utilized physical networks depended on each PBA and their ties to those organizations. When PBA leadership has a long standing history with an entity or a personal relationship with personnel working for an agency then that PBA is more likely to seek assistance there. Negative features of social capital develops when miscommunication or confrontations occur between individuals causing reluctance to seek assistance again. These physical networks provide numerous opportunities to gather prescribed burn knowledge and assistance. Some organizations promote prescribed fire by giving financial resources while others provide technical consultation. Below is a list of those entities which PBA members described connections to:

Natural Resource Conservation Service (NRCS), Oklahoma Conservation Commission, Oklahoma Department of Wildlife Conservation (ODWC), Quail Forever, Pheasants Forever, National Wild Turkey Federation, Oklahoma State University, Cooperative Extension Agency, Oklahoma Prescribed Burn Association, Kerr Center, Noble Research Institute, Bureau of Indian Affairs, Rural Volunteer Fire Departments (VFD), Oklahoma Department of Agriculture, Oklahoma Forestry Services, Oklahoma Department of Environmental Quality (DEQ).

CHAPTER V

DISCUSSION AND CONCLUSION

PBAs' Social Capital in a Community Capitals Framework Context

Gleaned social capital elements and structures provide theoretical contributions to understanding of trust, norms, reciprocity, and sense of shared future. These elements are highly influential to and influenced by those capitals found in the community capitals framework. PBAs' working space in their respective local communities subject neighboring landowners, local officials, fire personnel, and public at large to their impacts. These multidimensional impacts, whether perceived as positive or negative, will continue compounding into future generations. Situating both sociological and ecological impacts provides valuable insight to future trajectories and how these trajectories might be harnessed for greater collective good in Oklahoma. Beginning the community capitals framework discussion with social capital builds a foundation for my research and its implications when traversing these intertwined topics.

PBAs' social capital at its most rudimentary function allows landowners to maneuver through complex practices of prescribed fire. Neighbors helping neighbors ideology promotes greater community cohesion which is especially important in an aging and shrinking rural

population. Greater civic engagement in rural Oklahoma through participation in groups such as PBAs create better outcomes in health and financial stability as they navigate challenging landscapes (Ferlander 2007). Joining a PBA presents low risk as there is low financial investment and higher investment in personal time and reciprocal sharing of labor power and knowledge. Financial capital is saved through group connection and further bolstered through effects of prescribed fire. Social capital deriving from PBAs creates linkages between landowners that would not typically occur. Sense of shared future encourages bridging social capital between landowners across counties. Furthermore, aspects of sense of shared future such as environmental stewardship possesses potential to connect seemingly disparate groups together.

PBAs foster creation of greater human capital by connecting various knowledge holder through educational settings. These setting are often hands-on which is consistent with findings in andragogy research showing this is how adults learn best — when motivated internally and knowledge is problem-centered — (Van Den Berg, Dann, & Dirkx 2009). Complex purposes to restore fire cycles intersects with topics such as agriculture, land stewardship, and technical wildland fire procedures. Augmentation in local human capital from fire education results in more resilient communities by actively mitigating wildland fire fuels, bettering knowledge of ecological benefits, and providing space and place for civic engagement. Untapped stakeholders present opportunities to offer education and experience to individuals with varying motivations. Lastly, it should be noted that fire has the ability to promote better health outcomes by limiting the presence of cedar pollen and abundant tick populations with associated diseases.

Cultural capital can be described in several forms such as from internal group culture and surrounding community culture. PBAs are the largest volunteer civic groups using prescribed fire, lacking affiliation to state agencies. While general public trust in local agencies is uniform when relatively high, there is still more potential to foster public relations through positive perceptions of fire. This can be done through the lens of local landowners benefitting from compounding

impacts of fire. Collective norms and sense of shared future found in aspects of social capital, contribute to culture. These contributions have greater potential to foster a collective culture in Oklahoma that views fire as beneficial and fertile to lands. Accessing more variable stakeholders through fire's multidimensional benefits can result in greater diffusion of ideology. Viewing use of prescription as land stewardship bodes well for cultural acceptance and adaptation. However, PBAs main motivation for fire implementation is for improved financial returns on lands, and then as a byproduct, benefits to general ecology. To better increase cultural adoption of fire practices, more research is needed on the long-term financial benefits to Oklahomans.

Political capital of citizen groups and fire personnel are often at odds with each other. While rural fire departments pursue community safety by putting out wildland fires, PBAs seek to manage fire prescriptions. Fostering a more inclusive fire culture encourages more fire awareness and support for local fire personnel. Working together and not against each other creates synergistic effects at rural, suburban, and urban areas whereby greater capacity is built to advocate for facets fire personnel believe to be important for Oklahoma. Group efficacy to achieve desired objects becomes augmented when these groups focus on similarities rather than differences. VFDs espoused concerns about local officials using their political capital to limit their abilities. While VFDs and PBAs can and often do work well together in select communities, there is greater need for cohesion across counties throughout Oklahoma.

Fragmentation of land in Oklahoma will, according to historical trends, continue to become more fragmented. This will be especially true for areas nearer to larger cities and more dense townships as larger tracks of land are sold to the local affluent. Inevitable problems arise from this. What is good for general environmentalism and ecology is for more application of prescribed fire across as much land as possible. Smaller landowners, especially farmers and ranchers, seeking to use this technique could potentially face intersections of resource mobilization that exclude those smaller tracts of land and landowners. Community members with

less disposable resources, those of the less elite, would do well to join local PBAs to better gain access to favorable political capital. This political capital would allow their voices to be heard as they seek to acquire benefits that would not usually be available to them.

As for natural capital, environmental stewardship plays a large role in landowner decisions to utilize fire. While the desired outcome might be to clear land and create a greater capacity to stalk livestock, landowners are emboldened by sense of responsibility as stewards of the land. These individuals are gatekeepers to public resources, or commons, such as clean air and water, historically placed biodiversity and landscapes, and capacity for carbon sequestration. Oklahoma's lands are over ninety-five percent privately owned, making landowners the key stakeholder group to conservation and preservation efforts. Decreasing and aging rural population coupled with detached sense of land attachment, i.e., attenuation in proportion of population earning a living from agricultural practices, greater importance is needed to access landowner to better manage Oklahoma's natural resources.

The greatest natural resource to conserve for future generations is water. As increasing woody plant encroachment occurs, especially that of eastern redcedar, water recharge rates into aquifers will continue to diminish along with downstream water flows. Evapotranspiration[2] characteristics of redcedar encroached lands limit available fresh water resources. Water tourism for lakes, rivers, streams, and springs heavily relies on these resources. One particular PBA member espoused concerns that a local water tourism attraction would dwindle in the future due to concerns of water availability. While prescribed fire is not a fix all is a starting point for other mitigation efforts.

For financial capital, specific examples presented in the findings chapter clarified that landowners in the local community with more disposable income and other resources were

[2] Refers to the process by which water is evaporated from surfaces to surrounding atmosphere

capable of substituting this for membership in a PBA. Bypassing social networks built on norms of safety and reciprocity limit sense of shared future. While objectives for PBA members might be to augment their own financial capital those choosing to burn independently miss opportunities to access human capital, social capital, and further augment their own financial and natural capital. Additionally, these non-members contribute to a culture seeking to exclude wildland fire since they experience pushback from both fire personnel and the local community for their lack of affiliation and connection to reputable groups.

Financial capital of PBAs is tied to individual members pooling their resources and other groups giving grants. Norms of reciprocity in sharing resources is key since grants supply the majority of equipment. Accessing these grant networks is vital for group sustainability. By identifying and advocating to other more diverse stakeholders PBAs can find favorable assistance. Grants from organizations such as Quail and Pheasants Forever provided initial impetus but now should focus on diversifying shared financial capital for collective good.

Prescribed fire has additional effects on built capital. While the greatest fear of prescriptions burns is an escaped wildfire current norms, reputation, and track record assuage these fears when competency and benefits are seen firsthand. Wildfires throughout Oklahoma have caused historic damage due to exclusion of regular burning intervals. Valuable built resources, especially those near wildland-urban interfaces, require mitigation. Applying prescribed fire norms to local communities will allow for protection of built capital. As climate variability continues with commensurate changes in water flows, resulting in both flooding and draught, water supply systems will grow in demand and attention. Both built and natural augmentation of water quality and access require consideration to the benefits of prescribed fires and risks of wildfires.

Conclusion

The rich qualitative data provided opportunities to apply social capital theories to individual and group level phenomena and further provided discovery of strengths and weakness found in PBAs. While this research does not directly contribute to academic theoretical rhetoric, it does however add to a growing body of literature deploying sociological concepts to challenging social problems. Additionally, this research bridges gaps between natural sciences and social science by detailing effects of human systems on natural environments, and vice versa, through a sociological focused lens. To better understand anthropogenic impacts and starting from human centered understanding, it provides greater opportunity to lessen environmental degradation instead of focusing on technical solutions that are unlikely to be adopted socially.

Social capital extending to levels of bonding, bridging, and linking yielded PBAs' social phenomena and their ecological ties. Landowners comprise valuable stakeholders who are gatekeepers to Oklahoma's natural resources. These stakeholders who become PBA members both receive and create social capital through their actions. Sense of shared future, norms, trust, and norms of reciprocity characterize each level of social capital. Interestingly, this research found that bridging social capital can evolve in bonding social capital through shared experience in PBAs. The major impetus for this was that individuals started from a common sense of shared future and engaged in collective action that built trust through competency and deployment of norms. As this socialization process unfolded, groups become more homogenous in their social capital but still retained their individuality.

Bonding social capital, specifically elements of trust, bypasses lengthy legalities found within bridging and linking social capital. As distance and dissimilarity in groups becomes greater, institutions form formal arrangements to decrease liability attachments. More informal networks found in the volunteer groups ease regulatory oversight by substituting trust, norms, and norms of reciprocity. In order to conduct more prescribed burns, regulatory agencies would do well to assist these volunteer collectives. These assistance types consist of expert knowledge

sharing, but more importantly in physical resources and diffusion of prescribed wildland fire norms.

While VFDs and PBAs retain their differences, PBAs assert there are shifting ideologies favorable to prescribed fire. The linking social capital between these organizations becomes negative when non-PBA members attempt to conduct controlled fires outside of prescription norms and cause escaped wildland fires. Negative experiences such as this form mistrust easier than trust is built. VFDs suffer from similar volunteer ailments such as labor and resources shortages which contributes to a sense of shared future in local communities.

By accessing more variable stakeholders who all benefit from regular intervals of wildland fire Oklahomans can augment their community capitals. Community capitals framework deployment shows the dynamic nature of prescribed fire and its benefits to social, human, cultural, political, financial, built, and natural capital. Situating social science findings of ecological based objectives within this framework allows for holistic understanding, offering greater potential to reach a wider variety of stakeholders.

REFERENCES

Acharya, B. S., Hao, Y., Ochsner, T. E., & Zou, C. B. (2017). Woody plant encroachment alters soil hydrological properties and reduces downward flux of water in tallgrass prairie. *Plant and Soil*, *414*(1-2), 379-391.

Al Sutherland (2017). Decision Support Workshop: Agriculture and Weather Applications. Retrieved June 6th, 2019. http://www.okepscor.org/sites/default/files/u6/Agriculture%20and%20Weather%20Applications%20by%20Al%20Sutherland.pdf

Ballard, H. L., Evans, E., Sturtevant, V. E., & Jakes, P. (2012). The evolution of Smokey Bear: environmental education about wildfire for youth. *The Journal of Environmental Education*, *43*(4), 227-240.

Becker, H. S. (1996). The epistemology of qualitative research. *Ethnography and human development: Context and meaning in social inquiry*, *53*, 71.

Bidwell, Terrence., David, E., Masters, R., Weir, J. (2014) Fire Effects in Oklahoma. *Oklahoma Cooperative Extension Service*. F-2877.

Bourdieu P. (1985). The forms of capital. In the *Handbook of Theory and Research for Sociology of Education*, ed. JG Richardson, pp.241-58. New York: Greenwood.

Brondizio, E. S., Ostrom, E., & Young, O. R. (2009). Connectivity and the governance of multilevel social-ecological systems: the role of social capital. *Annual review of environment and resources*, *34*, 253-278.

Brunson, M. W., & Shindler, B. A. (2004). Geographic variation in social acceptability of wildland fuels management in the western United States. *Society and Natural Resources*, *17*(8), 661-678.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology* (pp. S95-S120).

Crowder, L. (2019). Prescribed fire gains momentum. *California Agriculture*, *73*(1), 5-8.

Dellasala, D. A., Williams, J. E., Williams, C. D., & Franklin, J. F. (2004). Beyond smoke and mirrors: a synthesis of fire policy and science. *Conservation Biology*, *18*(4), 976-986.

Dombeck, M. P., Williams, J. E., & Wood, C. A. (2004). Wildfire policy and public lands: integrating scientific understanding with social concerns across landscapes. *Conservation biology*, *18*(4), 883-889.

Donovan, G. H., & Brown, T. C. (2007). Be careful what you wish for: the legacy of Smokey Bear. *Frontiers in Ecology and the Environment*, *5*(2), 73-79.

Earle, R. (2000). The art of cause marketing: How to use advertising to change personal behavior and public policy. New York, NY: McGraw Hill.

Elmore, R. D., Bidwell, T. G., & Weir, J. R. (2009). Perceptions of Oklahoma residents to prescribed fire. In *Proceedings of the 24th Tall Timbers Fire Ecology Conference: The Future of Prescribed Fire: Public Awareness, Health, and Safety. Tall Timbers Research Station, Tallahassee, Florida, USA* (pp. 000-000).

Falk, I., & Kilpatrick, S. (2000). What is social capital? A study of interaction in a rural community. *Sociologia ruralis*, *40*(1), 87-110.

Field, J. (2003) *Social Capital*. London: Routledge.

Ferlander, S. (2007). The importance of different forms of social capital for health. *Acta sociologica*, *50*(2), 115-128.

Flora, C.B., J.L. Flora, & S.P. Gasteyer. (2016). Rural Communities: Legacy and Change. 5th ed. *Westview Press.*

Fuhlendorf, S. D., Engle, D. M., Elmore, R. D., Limb, R. F., & Bidwell, T. G. (2012). Conservation of pattern and process: developing an alternative paradigm of rangeland management. *Rangeland Ecology & Management*, *65*(6), 579-589.

Grootaert, C., Narayan, D., Jones, V. N., & Woolcock, M. (2004). *Measuring social capital: An integrated questionnaire*. The World Bank.

Hesse-Biber, S. N. (2016). *The practice of qualitative research: Engaging students in the research process*. SAGE Publications.

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative health research*, *15*(9), 1277-1288.

Jacobson, S. K., Monroe, M. C., & Marynowski, S. (2001). Fire at the wildland interface: the influence of experience and mass media on public knowledge, attitudes, and behavioral intentions. *Wildlife Society Bulletin*, 929-937.

Keeley, J. E., & Syphard, A. D. (2019). Twenty-first century California, USA, wildfires: fuel-dominated vs. wind-dominated fires. *Fire Ecology*, *15*(1), 24.

Kolden, C. A. (2019). We're Not Doing Enough Prescribed Fire in the Western United States to Mitigate Wildfire Risk. *Fire*, *2*(2), 30.

Kreuter, U. P., Woodard, J. B., Taylor, C. A., & Teague, W. R. (2008). Perceptions of Texas landowners regarding fire and its use. *Rangeland Ecology & Management*, *61*(4), 456-464.

Lofland, J. (2005). J. Lofland, D. Snow, L. Anderson, LH Lofland. *Analyzing social settings: A guide to qualitative observation and analysis*.

MacGillivray, A., & Walker, P. (2000). Local social capital: Making it work on the ground. *Social capital: Critical perspectives*, 197-211.

Mattos, D. (2015). Community Capitals Framework as a Measure of Community Development.

Mauthner, N. S., & Doucet, A. (2003). Reflexive accounts and accounts of reflexivity in qualitative data analysis. Sociology, 37(3), 413-431.

McCaffrey, S. M. (2006). Prescribed fire: What influences public approval. In *Fire in eastern oak forests: Delivering science to land managers, proceedings of a conference* (pp. 192-196).

McNeil, I. (Ed.). (2002). An encyclopedia of the history of technology. *Routledge.*

Minor, J., & Boyce, G. A. (2018). Smokey Bear and the pyropolitics of United States forest governance. *Political Geography*, *62*, 79-93.

okepscor.org/research/presentations/ok-nsf-epscor-2018-annual-state-conference-presentations-abstracts

Paxton, P. (1999). Is social capital declining in the United States? A multiple indicator assessment. *American Journal of sociology*, *105*(1), 88-127.

Peel, Derrell. (2018). Oklahoma Wildfires Cause $26 Million in Damages for Cattle Ranchers. Oklahoma State Cooperative Extension Services. *www.drovers.com/article/oklahoma-wildfires-cause-26-million-damages-cattle-ranchers.* Accessed November, 2019.

Penman, T. D., Christie, F. J., Andersen, A. N., Bradstock, R. A., Cary, G. J., Henderson, M. K., ... & York, A. (2011). Prescribed burning: how can it work to conserve the things we value?. *International Journal of Wildland Fire*, *20*(6), 721-733.

Pretty, J., & Smith, D. (2004). Social capital in biodiversity conservation and management. *Conservation biology*, *18*(3), 631-638.

Portes, A. (1998). Social capital: Its origins and applications in modern sociology. *Annual review of sociology*, *24*(1), 1-24.

Putnam, R. D. (2000). Bowling alone: America's declining social capital. In *Culture and politics* (pp. 223-234). Palgrave Macmillan, New York.

Ramli, N. N., & Epplin, F. M. (2017). Cost to produce liquid biofuel from invasive eastern redcedar biomass. *Biomass and Bioenergy*, *104*, 45-52.

Russell-Smith, J., Cook, G. D., Cooke, P. M., Edwards, A. C., Lendrum, M., Meyer, C. P., & Whitehead, P. J. (2013). Managing fire regimes in north Australian savannas: applying Aboriginal approaches to contemporary global problems. *Frontiers in Ecology and the Environment*, *11*(s1), e55-e63.

Saldaña, Johnny. (2013). The Coding Manual for Qualitative Researchers. *Sage Publications Ltd.*

Scasta, J. D., Weir, J. R., & Stambaugh, M. C. (2016). Droughts and wildfires in western US rangelands. *Rangelands*, *38*(4), 197-203.

Schoennagel, T., Balch, J. K., Brenkert-Smith, H., Dennison, P. E., Harvey, B. J., Krawchuk, M. A., ... & Turner, M. G. (2017). Adapt to more wildfire in western North American forests as climate changes. *Proceedings of the National Academy of Sciences*, 114(18), 4582-4590.

Scholtz, R., Polo, J. A., Tanner, E. P., & Fuhlendorf, S. D. (2018). Grassland fragmentation and its influence on woody plant cover in the southern Great Plains, USA. *Landscape ecology*, *33*(10), 1785-1797.

Spoerl, J. S. (2004). A brief history of iron and steel production. *Academia.edu*

Steelman, T. A., & McCaffrey, S. M. (2011). What is limiting more flexible fire management—public or agency pressure?. *Journal of Forestry*, 109(8), 454-461.

Stemler, S. (2001). An overview of content analysis. *Practical assessment, research & evaluation*, *7*(17), 137-146.

Starks, P. J., Venuto, B. C., Eckroat, J. A., & Lucas, T. (2011). Measuring eastern redcedar (Juniperus virginiana L.) mass with the use of satellite imagery. *Rangeland Ecology & Management*, *64*(2), 178-186.

Starks, P. J., & Moriasi, D. N. (2017). Impact of Eastern redcedar encroachment on stream discharge in the North Canadian River basin. *Journal of Soil and Water Conservation*, *72*(1), 12-25.

Tanner, E.P., S.D. Fuhlendorf, J. Polo (2016). Landscapes as Moderators of Thermal Conditions: Implications for Ecological Patterns and Processes. Retrieved June 6th, 2019. http://www.okepscor.org/sites/default/files/u6/TannerEPSCOR2018.pdf

Toledo, D., Kreuter, U. P., Sorice, M. G., & Taylor Jr, C. A. (2012). To burn or not to burn: ecological restoration, liability concerns, and the role of prescribed burning associations. *Rangelands*, *34*(2), 18-23.

Toledo, D., Kreuter, U. P., Sorice, M. G., & Taylor Jr, C. A. (2014). The role of prescribed burn associations in the application of prescribed fires in rangeland ecosystems. *Journal of environmental management*, *132*, 323-328.

Toledo, D., Sorice, M. G., & Kreuter, U. P. (2013). Social and ecological factors influencing attitudes toward the application of high-intensity prescribed burns to restore fire adapted grassland ecosystems. *Ecology and Society*, *18*(4).

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

Twidwell, D., Rogers, W. E., Fuhlendorf, S. D., Wonkka, C. L., Engle, D. M., Weir, J. R., ... & Taylor, C. A. (2013). The rising Great Plains fire campaign: citizens' response to woody plant encroachment. *Frontiers in Ecology and the Environment*, *11*(s1).

Van Den Berg, H. A., Dann, S. L., & Dirkx, J. M. (2009). Motivations of adults for non-formal conservation education and volunteerism: Implications for programming. *Applied Environmental Education and Communication*, *8*(1), 6-17.

Van Liew, D., Conner, J.R., Kreuter, U.P., Teague, W.R., 2012. An economic assessment of prescribed extreme fire and alternative methods for managing invasive brush species

in Texas: a modeling approach. *The Open Agriculture Journal* 6, 17–26.

Walther, G. R., Post, E., Convey, P., Menzel, A., Parmesan, C., Beebee, T. J., & Bairlein, F. (2002). Ecological responses to recent climate change. *Nature*, *416*(6879), 389.

Wang, J., Xiao, X., Qin, Y., Doughty, R. B., Dong, J., & Zou, Z. (2018). Characterizing the encroachment of juniper forests into sub-humid and semi-arid prairies from 1984 to 2010 using PALSAR and Landsat data. *Remote sensing of environment*, *205*, 166-179.

Wilson, P., Paveglio, T., & Becker, D. (2018). The Politically Possible and Wildland Fire Research. Fire, 1(1), 12.

Weir, J. R., Derek Scasta, Russell Stevens, and Terrency Bidwell. (2001). Burn Plan for Prescribed Burning. *Oklahoma Cooperative Extension Service.* NREM-2893

Weir, J. R. (2009). Conducting prescribed fires: a comprehensive manual. Texas A&M University Press.

Weir, J. R. Angela Reid, Sam Fuhlendorf (2012). Wildfires in Oklahoma. *Oklahoma Cooperative Extension Service.* NREM-2888

Weir, J. R., Twidwell, D., & Wonkka, C. L. (2015). Prescribed burn association activity, needs, and safety record: a survey of the Great Plains. *Great Plains Fire Science Exchange. GPE Publication*, *6*, 19.

Weir, J. R., Twidwell, D., & Wonkka, C. L. (2016). From grassroots to national alliance: the emerging trajectory for landowner prescribed burn associations. *Rangelands*, *38*(3), 113-119.

Weir, J.R., and T.G. Bidwell. (2005). Prescribed Fire Associations. Stillwater, OK, USA: Cooperative Extension Service NREM-2880.

Woolcock, M. (2001). The place of social capital in understanding social and economic outcomes. *Canadian journal of policy research*, *2*(1), 11-17.

Woolcock, M., & Narayan, D. (2000). Social capital: Implications for development theory, research, and policy. *The world bank research observer*, *15*(2), 225-249.

APPENDICES

Interview Guide

Research Questions:

1. What elements of bonding social capital do PBAs exhibit to sustain membership and create capacity to achieve goals?
2. How do elements of bridging social capital hinder and/or encourage cooperation between various groups?
3. How does linking social capital help sustain PBAs and further influence their ability to achieve goals?

Probes- "Tell me a little about…", "That's really interesting, tell me more about…", "What about this…", "What do you mean?"

Interview Questions:

1. Could you please begin by describing your role in the organization? How much time does this usually take per month?
2. How did you get involved in the PBA? Why?
3. What do you like most about your role and time spent in the organization? What do you like least?
4. How do you usually keep in communication with one another?
5. Since joining the organization, how has your life changed? Do you spend more time with different people? Do you have more interaction with neighbors? Do you learn new information regularly?
6. Do you spend time with other PBA members outside of PBA ran events?
7. What are volunteer organizations do you participate in?
8. In your own words, what is the major goal of your PBA? (ecology, financial incentive, social, firebug). Do you have trouble achieving these goals? Could you tell me about some of the barriers?
9. What are your major concerns when using prescribed fire? And working with other PBA members? How much do you **trust** the members to conduct a prescribed burn?
10. What people, groups, or organizations have been beneficial for the PBA?

11. What helps the most in the process to get fire on the ground? Is there a major resources used besides major state agencies?
12. What are the greatest strengths of the organization? What are some improvements you might suggest?
13. Could you tell me about one of the most memorable moments working in the field or with your involvement in the PBA?
14. Do you have any concluding remarks or final thought?
15. Could you tell me about anyone else that might be interested in participating in the interview?

VITA

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