



Research

## A life course approach to understanding social drivers of rangeland conversion

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**ABSTRACT.** Grassland to woodland conversion, also known as woody plant encroachment (WPE), is a global-scale phenomena caused in large part by changes in social processes that affect rural land use patterns. Woody plant encroachment has raised serious concerns for species conservation, provision of ecosystem services, and viability of rural livelihoods and cultures. We examined the social drivers of WPE using a case study of rangelands in a semi-arid watershed. We employed the life course framework to understand how ranchers have made land ranch management decisions in the context of time, culture, and social change. We interviewed landowners whose families have been on the land for at least two generations to examine (1) the social context influencing a landowner's decision to increase or decrease their involvement in ranching over their life span, and (2) the historical events that facilitated constrained involvement. We relate these changes in involvement to the expansion of woody plants. Three major turning points were related to changes in ranching involvement: graduating high school, retirement, and infirmity of a parent. We found that changes in ranching involvement were influenced by large-scale shifts in culture, market regulations, and land values throughout the 20th century. These shifts led to three behavioral changes on the land that facilitated WPE: (1) changes in livestock following the collapse of the sheep and goat market, (2) increased popularity of hunting, and (3) decreased labor availability on the ranch. These observations illustrate the complex social and ecological forces at work throughout the 20th century that have led to land transformation in central Texas.

**Key Words:** *grassland conservation; land use change; life histories*

### INTRODUCTION

Rangelands in the United States and across the globe are undergoing radical biophysical change, namely grassland to woodland conversion or woody plant encroachment (WPE) (Van Auken 2000, Archer et al. 2001, Eldridge et al. 2011, Walker and Salt 2012). This conversion has been exacerbated in the United States due in part to the decreased profitability of ranching, which has left many private landowners, who own as much as 50% of rangelands in the United States, with little economic incentive to continue managing their rangelands as grassland (Sayre et al. 2012). The increased density of native shrub and woody tree species in rangeland ecosystems has serious consequences for the provision of benefits for wildlife, ecosystem services, and viability of rural livelihoods and culture (Tanaka et al. 2011).

Rangeland landscapes are also undergoing social change due to rural development, and these changes are related to land management decisions. Increased migration into rural areas is the result of pull factors, including proximity to public lands, ski areas, and universities (Robbins et al. 2009). Push factors include an individual's desire to experience the so-called rural lifestyle, the ability to telecommute to work, and the desire to avoid crowded urban areas. These push and pull factors have been described extensively for the eastern forests and intermountain west regions of the United States (e.g., Gosnell and Abrams 2011) as well as Australia (Gill et al. 2010). This stream of research argues that greater landowner heterogeneity on the landscape increases the difficulty of solving complex environmental problems.

Although historical land use and hydrological data can provide a picture of actual landscape-level change, a better understanding of the ranchers themselves—the challenges they face, the choices they make, and the barriers that constrain them—can provide

insight into ranching social systems and the drivers of WPE. Previous research on rangeland conservation has focused on the microlevel factors that influence the individual decisions of landowners, including how land-ownership motivations influence willingness to participate in conservation practices (Sorice et al. 2014), landowner attitudes and goals (Morton et al. 2010), trust among members of cooperative land management groups (Toledo et al. 2014), and perceptions of risk (Kreuter et al. 2008, Toledo et al. 2013), which have all been related to a landowner's willingness to engage in rangeland conservation practices. In addition, feelings of social responsibility and property rights orientations have been connected to landowner decision-making with regard to adopting conservation practices (Kreuter et al. 2006). Lastly, cultural and lifestyle motivations are widely recognized to be more important than economic motivations (Gentner and Tanaka 2002, Torell et al. 2001, 2005, Brunson and Huntsinger 2008). This indicates that people receive multiple satisfactions from ranching, and continue to do so despite its declining profitability.

Additional research has focused on the macroscale social influences on land use change, such as the broad economic and political forces that drive land use patterns, including the forces that drive rural landowners away from ranching (Robbins et al. 2009). Sometimes termed “shifting capitalism,” this literature focuses on the movement away from production-oriented land use toward consumption-oriented land use (Walker 2003). For example, Sheridan (2001) argued that increasing land values, market instability, and policy change, especially as it relates to regulations of grazing on public land, prohibits traditional production use and encourages ranchers to sell their land to amenity buyers or developers. Others have pointed to the myriad economic, political, and social forces working together to drive widespread shifts in ranch ownership, land use motivations, and

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rural social landscapes (e.g., Walker and Fortmann 2003, Gosnell and Travis 2005). Some studies have suggested that governance and regulation guide or constrain ranching livelihoods and land use decisions. For example, most ranchers in a California study felt “over-regulation” was a good reason to stop ranching (Liffman et al. 2000). And ranchers in Colorado rated “public policy” as the second most important reason people would consider selling their ranch (Rowe et al. 2001). In another example, Yoder et al. (2004) highlighted the strict liability laws as discouraging the adoption of prescribed burning among landowners who might otherwise burn as a way to manage shrub encroachment.

Our approach builds upon this literature by considering both macroscale and microscale perspectives of social trends in land ownership and ranching through a life course perspective. We then connect these trends back to the proliferation of WPE. The life course framework recognizes that ranchers make decisions about land use in the context of time, culture, and social change (Hutchison 2005). It situates human behavior and outcomes within the broader social and physical environment. The life course perspective fits well within the social-ecological paradigm because it considers the interaction between microlevel patterns of individual behavior (e.g., human agency) and macrolevel social structures (e.g., organizations, institutions, culture) that provide opportunities and constraints to individual behavior (Folke et al. 2009). Consequently, it can help identify the cultural and governance structures that drive ecological change.

We employed the life course lens to understand the issue of woody plant encroachment from the ranchers’ perspectives by examining the oral histories of multiple-generation landholders in central Texas and the broad social and political context through which their families have ranched. We then qualitatively identified linkages between changes in ranching involvement and management and an increase in woody plants. Specifically, our objectives were to (1) explore life course patterns as a factor in a person’s decision to increase or decrease their involvement in ranching and understand how those decisions impacted the management of their land, (2) understand how historical events and social relationships facilitate or constrain these changes, and (3) identify linkages between changing patterns in ranching and woody plant encroachment in central Texas. Our research contributes to the dialogue on the social drivers of land change by identifying how life course patterns may be related to land change over time.

### **THE LIFE COURSE FRAMEWORK**

The life course framework explicitly considers human lives and development in conjunction with social change (Elder et al. 2003). It is usually employed to understand human development by mapping patterns of behavior within the broader social and historical context in which people live. As such, it merges two traditional ways of studying human lives: the cross-sectional approach of looking at the influence of a person’s surroundings and social relationships on their life and a temporal approach that traces an individual life over time (Giele and Elder 1998).

Research employing the life course framework is diverse, from mother–infant health (e.g., Black et al. 2009) to child development (Caspi et al. 1988, Cooksey et al. 1997) and life course trajectories of criminals (e.g., Sampson and Laub 2005). Other research has

looked at the impact of the Great Depression on the lives of children who lived through it at different ages (Elder 1974). The life course approach has also been applied to study the impact of World War II on the lives of men in different life stages. In this example, Elder (1987) found that men who went to war very early in adulthood suffered less long-term impacts and received greater developmental benefits from the war than those who were enlisted later in life. This is because very young men experienced less disruption of their family responsibilities (i.e., many had yet to start families of their own) and careers, and they were better able to take advantage of mobilizing benefits such as the GI bill at an optimal time of their life.

A key concept in the life course approach focuses on turning points, the “time or event when one took a different direction from that in which one had been traveling” (Clausen 1998:202). Turning points contextualize personal choices in time and the social context. Turning points sometimes set individuals on new trajectories—extended patterns of fluctuating stability and transitions a person experiences throughout their life (Hutchinson 2005).

### **Linked lives**

People and their behavior are rooted in social relationships throughout their life span. Linkages between parents and children, for example, are especially influential in the life course (Cooksey et al. 1997). These relationships not only control and support the individual but also influence their trajectories through “generational succession” (Elder 1994). As such, a transition for one individual (e.g., a parent) will influence the trajectory of another (e.g., their children), and vice versa (Riley 1998, Elder et al. 2003). The principle of linked lives is relevant to the discussion of multiple-generation landowners because, for many families, ranching is much more than just a way to make a living; it is a livelihood that encompasses the economic, social, and cultural well-being of a family and community. It is a way of life that is passed down from generation to generation, not only through inheritance of the land but also through local knowledge and a feeling of rootedness to the land and lifestyle (Sheridan 2007).

### **Human lives in history**

Understanding the timing of human lives in a historical context is critical to the life course approach. In order to understand the social and cultural constraints and influences that impact an individual, it is important to understand the historical context in which that person’s life takes place (Laub and Sampson 1993). In addition, the year in which a person was born relates to the developmental stage (e.g., childhood, mid-career, retirement) that coincides with certain historical events. This, in turn, influences how the event will be experienced and its impact on one’s life. For landowners, historical events such as major droughts, collapsing markets, or war impact their land management decisions and overall level of ranching involvement.

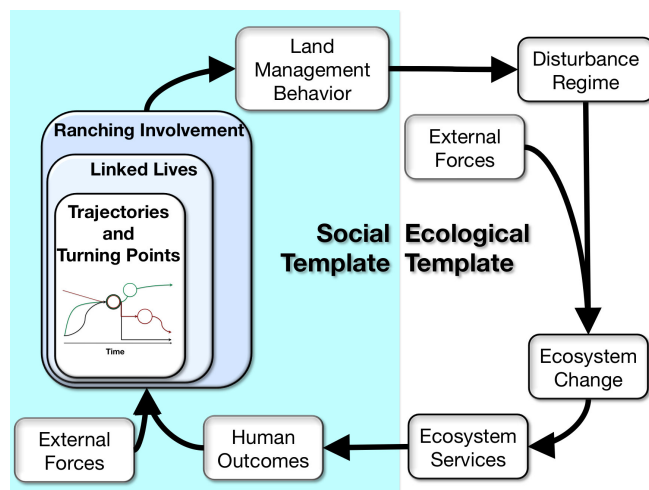
### **Ranching involvement over the life course**

We were interested in the concept of ranching involvement, which is a determinant of land use behavior—the more ranching is central to a landowner’s lifestyle, the more they may be motivated to reduce the risk of woody plant encroachment. That is, the degree to which landowners are engaged in the livelihood of ranching likely relates to some perceived threat from WPE and thus their land management decisions. Further, an individual can

move in and out of the ranching livelihood over the course of his or her lifetime. For example, a child may grow up linked to the ranching livelihood through the family (linked lives and increasing trajectory of ranching involvement as child reaches adolescence), and be expected to inherit the operation (steady trajectory of high involvement). They then find themselves studying at a university (turning point resulting in very low involvement), choosing a different major (turning point that reinforces low involvement), getting married (turning point), moving away, and starting a career in an urban setting (new trajectory with no ranching involvement). When their parents become infirm (linked lives and turning point), they move back to the ranch to take over (new trajectory). They may first decide to take over the operation (high ranching involvement trajectory), and then decide to give up the operation and lease out their land because of the pull of their alternative livelihood (low involvement trajectory).

The life course framework complements the social-ecological framework of Collins et al. (2011). It is situated squarely in the social template of the framework and integrates macro (e.g., ecosystem services, market forces, cultural change) and micro social phenomena with outcomes from ecological changes to position a landowner's future land management behavior (Fig. 1). It is particularly useful as a way to understand how the dynamics of the past may affect current conditions (social legacy) and the future trajectory of the system due to their lasting effects (path dependence) (Chapin et al. 2009).

**Fig. 1.** Integrating the life course perspective with Collins et al.'s (2011) social-ecological framework. Involvement in natural resource management is a function of external forces (e.g., markets), outcomes from changes to ecosystem, as well as internal dynamics such as generational succession.



Our approach uses an emic perspective to identify landowner trajectories, turning points, and linkages, as well as the historical context in which these shifts in trajectories occur. Lett (1990) describes the emic perspective as obtaining accounts and descriptions identified as meaningful by members of the culture whose behaviors are being studied. Thus, we allowed landowners to identify the trajectories, turning points, and social and historical context they identified as salient rather than asking

about researcher-created issues related to the life course (e.g., education, marriage, war). In this way, our research gives voice to landowners in the Southern Great Plains rather than tests hypotheses.

Our retrospective, qualitative approach to elicit histories of ranching families who have owned their land for multiple generations explores the micro, meso, and macro factors that moderate a family's involvement in the ranching livelihood. Based on this perspective, we discuss the implications for connections to landscape-level changes, namely the transformation of grasslands into woodlands.

## BACKGROUND

Our research was carried out in the 3400 km<sup>2</sup> Lampasas Cut Plain watershed of central Texas. The landscape in this region is characterized by hilly post-oak savannah and wide grassland valleys (Griffith et al. 2007). Steep limestone mesas along with shallow rocky soils in many areas make the landscape less suitable for farming (Rhoades 2010). Three counties, Burnet, Mills, and Lampasas, lie within the Lampasas Cut Plain watershed, which had a total population of 67,363 in 2010 (Wilcox et al. 2012). This region is predominantly rangelands that have changed both ecologically, through grassland-to-woodland conversion, and in land ownership motivation (Griffith et al. 2007, Sorice et al. 2014). The economy of the region has traditionally relied heavily on ranching, and most land is owned and managed by cattle ranchers.

Woody plant encroachment has been a concern in Texas and throughout the Southern Great Plains for several decades (Kothmann 1995). Recent research using satellite imagery in the Lampasas Cut Plain watershed has documented the landscape change that has occurred as a result of WPE over 75 years (Berg et al. 2015, 2016). This research showed a steady increase in woody cover (from about 15% total cover to more than 30% total cover) in a semi-urban study site in Lampasas County starting in the 1940s and continuing through the 1970s. The amount of woody cover has remained steady over the last three decades. Rural study sites in Lampasas and Burnett counties also showed a similar overall increase in woody cover beginning later, around 1975. This was after an initial decline from about 25% woody cover in 1937 to about 15% in 1975. The only study site that showed an overall decline in woody cover (from about 40% to 15%) from 1937 to 2012 was in Mills County. The authors associated this decline with a corresponding decline in population coupled with an increase in average farm size. The opposite pattern was observed in the other study sites, where woody cover increased.

In terms of the social landscape, this region of Texas was settled by European or European-American farmers and ranchers in the second half of the 19th century. Mills County settlers were primarily German immigrants, while settlers in Lampasas and Burnet counties came mostly from southern U.S. states such as Tennessee, Kentucky, and Arkansas (Hunt and Leffler 2010, Rhoades 2010). In the early days of farming and ranching, cotton was a major cash crop, along with corn, wheat, and oats. In addition, cattle ranching was central to the economy in the late 19th century (Rhoades 2010). Agricultural crop production began to decline by the early decades of the 20th century due in part to the agricultural depression that came after World War I. As a result, many people diversified their livestock operations by

including sheep and goats (Hunt and Leffler 2010). However, shortly after the middle of the 20th century, the mohair market crashed and the number of sheep and goats declined sharply. Cattle became the primary livestock operation once more. Dependence on farm income declined during this time as well. For example, while as much as 90% of the land in Burnet County was in some type of agricultural production in the early 1980s, approximately 75% of the producers relied on outside sources of income (Smyrl 2010). Agriculture is still central to the economy and culture of the Lampasas region; however, hunting- and fishing-based tourism have also become important in recent decades (Hunt and Leffler 2010, Smyrl 2010).

## METHODS

### Sampling

Our population of interest was landowners who owned their property over two to three generations. These were ranching families who used their land primarily to raise livestock, as farming is not a tenable livelihood in this area. The State of Texas' Department of Agriculture operates the Family Land Heritage program, which formally recognizes families who have owned and operated their land for at least 100 years. We obtained a list of 23 Family Land Heritage landowners as our sampling frame. Once in the field, we increased our sample size and interviewed other landowners outside the Family Land Heritage Program by requesting real estate tax records from the counties within our area of interest, and then using GIS to exclude those parcels that were outside the Lampasas Cut Plain watershed. We used a snowball sampling approach and retained interviews from landowners whose family had been involved in ranching at least as far back as the 1950s.

The life course perspective is greater than a single type of data and methodology (Wingens et al. 2011). The use of "life reviews" or life histories of individuals may vary in factual accuracy, but they can provide great insight into how a person has constructed the "self" given the circumstances that shaped their lives (Clausen 1998). We used a retrospective ethnographic interview approach to elicit landowner perceptions of their and their family's involvement in ranching over time. We asked landowners to describe the factors that influenced their varying level of involvement in ranching over time. Concomitantly, we asked landowners specifically about changes on their land, namely, an ecological shift from grasslands to woody plants (WPE).

Although we attempted to speak with the person who had the most direct experience operating the family ranch, this was not always possible. In some cases, we interviewed widows, siblings, or children who had different levels of knowledge about family history and land use. Consequently, our responses came from a diversity of perspectives. Ranching involvement is not static over the life course, and several of our respondents shifted from one level of involvement to another at least once and sometimes several times in the course of their lives. Thus, interviews represent the most current lens through which landowners viewed ranching involvement.

We conducted 39 face-to-face interviews with landowners in the Lampasas Cut Plain watershed. The second author conducted all interviews. Each interview lasted an average of one to two hours and covered the history of the respondents' family involvement

on their land, including their ranching decisions and their current management practices. We transcribed the interviews and analyzed them using qualitative text analysis, which is an iterative process of identifying recurring themes in the text. We focused our coding on several broad categories based on concepts and principles that are regularly used in life course research.

## RESULTS

All landowners in our sample held property in the region that had been in their family for between 60 and 130 years. The ranches ranged in size from a few hundred to a few thousand acres. At the time of the interviews, three landowners (8%) reported ranching as their family's primary source of income. The others relied on outside sources (employment off the ranch, family member employed off the ranch, social security, or a combination of sources) for much of their income. However, these landowners generally continued to stay heavily involved in ranching for reasons other than purely livelihood motivations: they either ranched as a hobby, for supplemental income, or as a retirement activity. An additional three landowners (8%) leased out their land for cattle and otherwise remained uninvolved in the ranching business.

### Understanding drivers of woody plant encroachment through the life course lens

#### *Turning points*

Turning points throughout the life course can either push landowners away from the ranching livelihood or increase their involvement. From our interviews, we identified three major turning points that influenced landowners' ranching involvement: graduating high school, retirement, and the death or illness of a parent. These turning points represent experiences that were very common among the ranchers we spoke to. The first two turning points are directly related to changes in life stage. Graduating high school corresponds with the beginning of the career life stage and was a driving factor in decreasing ranching involvement because people now relied on outside sources of income. The second turning point, retirement, is the life stage on the opposite end of the career spectrum and was a driver of increased ranching involvement. The death of a parent was almost always followed by land inheritance and new responsibilities as a landowner, while the illness of a parent generally instigated a return to the ranch to help run and manage the land when the older family members were no longer able. We discuss these turning points through the life course principles of "human lives in history" and "linked lives," and draw the connections between the social phenomena described and the ecological issue of WPE.

#### *Human lives in history*

The life histories of our respondents reflected the changing social landscape and economic challenges experienced by ranchers over the past several decades. Landowners agreed that many people in their families began seeking work off the ranch around the middle of the 20th century because of the decrease in the profitability of ranching. The most common explanations for the decreased profitability focused on rising costs and land values. Rising costs included both costs of living as well as operating expenses, which the landowners believe have risen disproportionately to ranching income. Further, cultural shifts during this time changed expectations related to material goods and quality of life. Prior



to World War II, many respondents explained how their parents or grandparents “got by,” through self-sufficiency. A few respondents also expressed the belief that because of their farms’ self-sufficiency, landowners were actually shielded from the most extreme levels of poverty experienced by many during the Great Depression. However, they qualified such statements by explaining that their self-sufficiency was reliant on a high degree of frugality and a lifestyle that was much simpler than people expect today. For example, one landowner described her parents’ experience during the depression:

*Well, they were very frugal and they grew up in the Depression, so they understood how to live without money. And of course, you had a garden, and you know you paid for things as you went along. You didn't buy anything you couldn't pay for. And things like that. I mean, it's just a totally different mindset than what you see today, I think (MGELC202).*

The years following World War II saw better transportation and communication and a thriving U.S. economy. This translated into decreased isolation and increased access to goods and services for ranching families. Several people described a culture that was becoming more materialistic and dependent on outside possessions and services. This shift created an environment where greater income was required to sustain one’s lifestyle, not only due to higher costs but also because expectations of living a comfortable lifestyle had changed.

One common factor that landowners connected to both WPE and declining profitability on the ranch was the collapse of the sheep and goat market in the 1960s. The landowners cited several reasons for this turning point, including importation of wool, an increase in the use of synthetic fabrics, and eventually, the end of the U.S. Department of Agriculture mohair subsidy. However, the most prevalent reason mentioned for decreasing profitability was an increase in the regional coyote population. A few landowners also linked the surge in the coyote population to government protection of coyotes and stricter trapping regulations enacted during this decade.

Landowners connected the collapse of the sheep and goat market to increased WPE by explaining that by eating young cedar trees, goats controlled woody plants. Many respondents made a direct connection between the removal of goats and the time when woody plants began to become a problem. One landowner whose family has been on the land since the 1880s illustrates this idea:

*I think when [woody plant encroachment] started was when the coyotes moved into the country and everybody sold their goats. Because those goats will eat those—they'll eat those mesquite and cedar when they first come up. You know, we didn't have cedar when we had lots of goats (MGEMC309).*

Decreased ranch profitability was also tied to increasing land values. The increase in land values made it harder for people to buy more land to expand their ranching operations. More expensive land also meant higher taxes paid on existing land. The land values in the Lampasas Cut Plain watershed have risen substantially in the past several decades. For example, according to the 2012 agricultural census (USDA 2012), land values in

Lampasas County were \$2511 per acre, up from \$546 (\$1103 adjusted for inflation) per acre in 1987 (USDA 1987) and \$22.19 (\$289 adjusted for inflation) per acre in 1945 (USDA 1945). Mills and Burnet counties have experienced similar changes in land value. Many landowners believed the growing recreation market (i.e., leasing land to hunters) was at least partially responsible for the rising land prices. This demand for hunting land is tied to WPE because it leads to an increased tolerance of woody plants as an attractor of deer. One long-term landowner spoke of the impact of the recreation market on both land values and land cover, illustrating the connection between hunting and WPE:

*In years past, when you could buy land and still make it pay for itself, siblings that stayed, like myself, would be more inclined to buy up their brother and sister's land and keep the ranch together. But the recreation market has made it to where, number 1, you can't afford it, number 2, the recreation market does not want improved land, and by that, I mean, they want that mesquite on it (MGE17).*

#### *Linked lives*

Evidence of the influence of social relationships in determining ranching involvement showed strong cultural connections as well as purely financial ones. From a cultural perspective, many people spoke of local knowledge and the “know-how” that was passed from generation to generation. It was also very common for people to express strong ties to the land that had been in their family for decades, or even a century. These ties are often strong enough to keep people on their land despite experiencing economic hardships and low profitability. For example, ranchers often spoke of their intention to pass their land on to their children instead of selling it, even though selling the land would provide them with much more financial freedom.

As much as older generations can influence the ranching involvement of subsequent generations, younger generations can influence the involvement of older generations. Many landowners spoke of the pressure of decreased labor on the ranch as younger generations moved away. The decrease in family labor on the ranch, coupled with the difficulty or expense of hiring regular outside labor made it necessary for people to manage the ranch with little or no help. This resulted in some landowners having to cut back or change their operations when their children left the ranch for outside careers. For example, one family who spent several years in a larger scale poultry business changed their operation as a direct result of their children leaving for college:

*I always laughed about the fact that mother and daddy started raising turkeys and chickens when I was two and they quit abruptly when my brother graduated from high school because they lost their free help (MGECCF15).*

The issue of reduced labor availability on the ranch also directly ties into the proliferation of WPE. In this region, the most common method of managing woody plants is through mechanical control, which can be costly and extremely time and labor intensive. Without the extra help or affordable labor, woody plant control can become unfeasible. A fourth-generation landowner who lives near her land and wants to keep the land in

her family explained how both she and her children currently hold jobs off the ranch and don't have time to deal with their woody plant problem:

*I want to eradicate as much cedar as I possibly can. I've already been in one cedar program where we took off 230 acres of cedar. But it's come back. It's not come back in droves, but you've got to keep cutting it. Well, I'm sorry, I just don't want to drive around the place every single day for 2 or 3 hours and cut the little cedars. And I cannot afford to hire somebody to do that for me... (MGEBC 63932).*

Despite these labor challenges, parents supported and encouraged their children to leave the ranching livelihood in the hopes of giving them more opportunities in life. Thus, the experiences and economic struggles of one generation have changed the trajectory of the next generation as parents encourage their children to pursue better opportunities off the ranch. This, in turn, affects the parent's operation as younger generations move away.

## DISCUSSION

Our results are consistent with the ranching literature in a number of ways. This includes seeing a trend of out-migration and dual careers on and off the ranch, subdivision of land, and urban sprawl (Brunson and Huntsinger 2008, U.S. Agricultural Census 2012). Further similarities include changing demographics and land use motivations (Sorice et al. 2014), and ranching for lifestyle rather than for economic reasons (Liffman et al. 2000, Rowe et al. 2001, Brunson and Huntsinger 2008). We identified the key turning points, historical events, and social relationships noted by landowners that led to these changes over the past several decades. Our results point to three direct linkages between patterns of ranching involvement and changes that likely have contributed to grassland-to-woodland conversion in the Lampasas Cut Plain watershed: (1) changes in livestock following the collapse of the sheep and goat market, (2) increased popularity of hunting, which incentivizes WPE for habitat, and (3) decreased labor availability on the ranch as younger generations pursue careers off the ranch.

Changes in livestock were tied to a decrease in market demand. This led to the reduction in numbers of goats and a perceived ecosystem service they provided by browsing woody plants. Previous research has documented significant changes in livestock densities in this region (Wilcox et al. 2012). Consistent with our interviews, the number of sheep and goats stocked in the Lampasas Cut Plain peaked around 1945 and dropped sharply after 1960. This was followed by an increase in the number of cattle. Whereas cattle graze grass, goats and sheep browse on leaves, bark, and green stems of plants. Goats and sheep may be effective at keeping plants at bay and may even act as a low-cost alternative or effective supplement to intensive shrub management strategies such as herbicides or mechanical removal (Warren et al. 1984, Campbell et al. 2007). In parts of central Texas (as well as other parts of the United States), goats have already been used strategically to manage juniper encroachment and restore native grasslands (Taylor 2008).

The increased popularity of hunting on private lands (market demand) after World War II (Clawson 2015) coupled with declining profits from ranching and the opportunity to diversify income through fee hunting (Sayre et al. 2012) may have increased

ranchers' tolerances for woody plant cover as a way to attract hunters and wildlife. Similar phenomena have been noted in research conducted in western Montana, where a vast increase in the elk population not only encouraged some landowners to sell their land but also led those who stayed to shift their operations by selling hunting access to their land; thus, they are simultaneously managing elk populations and earning additional income (Haggerty and Travis 2006). This suggests that traditional landowners, while not changing their primary motivations as ranchers, are still influenced by the broader social and economic environment to the extent that they will adapt their land management strategies to the new social and ecological conditions.

Finally, our focus on multiple-generation landowners highlighted the role of family heritage and sense of place in retaining the family ranch. While strong feelings of attachment dissuaded people from selling their land, overall ranching involvement still decreased. This was especially true as younger generations sought careers off the ranch after the middle of the 20th century, which led to reduced labor availability on the ranch. In accordance with the comments made by our respondents, Brunson and Huntsinger (2008) noted that the limited profitability of ranching and the barriers created by unaffordable land prices forces many children of ranchers to pursue different careers. Similarly, Liffman et al. (2000) and Rowe et al. (2001) found the lack of an heir, or their children not staying in ranching, as a reason for ranchers to leave the business themselves or sell their land. These observations are related but slightly different from our findings: the impact of the younger generation leaving the ranch has not yet induced most of the Lampasas landowners we interviewed to consider selling their land or leave ranching altogether despite the impacts of reduced labor. Instead, it has led to older generations owning their land and serving as the primary land manager for longer periods of time. This limits the diversity of livestock operations as landowners face the increased challenges that come with aging (e. g., reduced physical ability). This willingness to hold onto their land is likely related to the strong sense of place and feelings of family heritage in our sample of long-term landowners.

Explicit policy and governance implications can be identified from these observations. First, despite the potential benefit of goats in woody plant management, based on our analysis, it seems unlikely for many landowners to consider raising goats solely for brush management purposes. This is because people expressed beliefs that raising goats is risky, labor intensive, and not profitable. A further understanding of the efficacy of goats in stemming WPE could lead to policies and incentive-based programs that address market dynamics for goat and sheep commodities.

Additionally, an understanding of the decrease in the labor force due to out-migration can lead to policies that recognize this issue. Whereas current cost share programs focus on compensation, programs that pool labor may have as much value to landowners. Voluntary organizations can create a pool of labor from community members who seek mutual benefits from cooperation (Wagner et al. 2007). For example, prescribed burn associations (PBAs) are cooperative groups that provide labor, equipment, and expertise that would be cost prohibitive for any single individual to supply (Toledo et al. 2013, 2014; Twidwell et al. 2013). Not only

could PBAs be further explored or expanded in the Southern Great Plains, other programs that provide similar opportunities for woody plant removal (e.g., mechanical) could be developed.

The life course framework provides a lens for understanding social drivers that influence landowners, their behavior, and ultimately land cover change. This framework recognizes that land management behavior occurs in a socio-political context set against a historical backdrop. Although our study was exploratory and employed an emic perspective (Verd and Lopez 2011), life course research also uses other methodologies. We employed an approach in which landowners identified the micro, meso, and macro (external) factors that influenced their ranching involvement over their lifetime. This approach gives the participants a voice to place events in their own context and is a valid starting point to explore initial linkages and causal factors from an “insider” perspective (Allen and Pickett 1987, Miles and Huberman 1994, Cohler and Hostetler 2003, Elliot 2005). It can be of more limited value when external factors are outside the awareness of the participants (e.g., the role of climate change or macroeconomic forces related to globalization). With an understanding that research to identify linked social and ecological phenomena is an iterative process that often begins with an emic approach to qualitative inquiry, future research can integrate these narratives with external events and other disciplinary perspectives (e.g., economics). Further, we can use the concepts identified in this study to structure interviews or surveys to test the relative roles of life course concepts as driving ranching involvement.

Other approaches that are more quantitative include event-history analysis (sometimes used interchangeably with survival or hazard analysis) where time-to-event data are used to model the probability of the occurrence of discrete events such as leaving the ranch, selling or subdividing family ranch land, or returning to the ranch after a long absence (Elder and Giele 2009). Panel analysis involves cross-sectional observations of the same people over time to understand factors that influence trends or trajectories over time. Future research can explore the usefulness of these methodologies within a social-ecological systems framework.

## CONCLUSIONS

Social, economic, and political factors led to a decrease in profitability of ranching and subsequent decrease in ranching involvement throughout the 20th century for the ranching families with whom we spoke. This was tied to a cultural shift following World War II, the collapse of the sheep and goat market, and rising land values. These changes in ranching involvement and rural livelihoods more broadly are directly connected to three factors that contribute to grassland conversion. First, the collapse of the sheep and goat market encouraged a large-scale decrease in browsing livestock on the landscape, which allowed for the growth of shrubs. Second, the increase in hunting leases as a way to make ends meet on the ranch encouraged a preference for—or at least a tolerance of—a shrubbier landscape. Finally, the decrease in labor availability on the ranch made the continual physical and financial burden of shrub control unrealistic for many landowners, especially as they aged.

Considering grassland to woodland conversion through a life course perspective fits well within the social-ecological paradigm

because it recognizes that human behavior occurs as a function of both a landowner’s agency—their ability to make choices and act—and the fundamentally temporal nature of the social-cultural, economic, and political contexts in which these decisions occur (Wingens et al. 2011). The life course perspective itself has potential for further connecting human behavior to ecological change. It overcomes the micro–macro problem in social research because it focuses on the dynamic interaction between individual behavior and social structure. Thus, it can help uncover path dependencies that ultimately drive feedback loops between ecological change and human outcomes.

Our study was a first attempt to identify dynamics that facilitate WPE in the Lampasas Cut Plain of Texas, and thus employed retrospective life histories of multiple-generation ranching families. A number of methodologies can be employed in the life course approach, including event-history analysis and other longitudinal perspectives (Giele and Elder 1998). We suggest future social research adopt the life course as a theoretical orientation that employs both longitudinal and retrospective methods to more fully capture how social legacy is intertwined with long-term ecological changes.

*Responses to this article can be read online at:*

<http://www.ecologyandsociety.org/issues/responses.php/8990>

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