



Research Paper

Spatially and socially segmenting private landowner motivations, properties, and management: A typology for the wildland urban interface



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HIGHLIGHTS

- We examine WUI landowner motivation and management in two Oregon study areas.
- Landowner motivations include amenities, farming, forestry, family, and development.
- Motivations vary with property characteristics and management strategies.
- Secondary data can be used to spatially map motivations and management strategies.
- Targeted policy and planning may reduce landscape risks.

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ABSTRACT

Throughout North America, rapid exurban development is increasing the spatial extent and population density of the wildland urban interface (WUI), exacerbating problems of wildfire risk and biodiversity loss. To address these issues, policy and planning tools need to be targeted toward different types of WUI landowners in the different types of landscape locations they occupy. We developed a typology of WUI landowners in the Willamette Valley foothills of Oregon, USA. We used market segmentation techniques on mail survey data ($n=939$) to develop a typology of four types of WUI landowners in the Willamette Valley foothills of Oregon, USA. We identify differences in each type's land management strategies and property characteristics and use commonly available GIS data to project where different landowner types are likely to occur in the landscape. We conclude with a discussion of the importance of social and spatial heterogeneity in the WUI for strategically targeted policy and planning efforts intended to manage wildfire risk and promote ecological restoration.

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1. Introduction

Throughout North America, rapid expansion of exurban development is leading to pressing environmental concerns (Radeloff, Hammer, & Stewart, 2005; Theobald & Romme, 2007), including increased wildfire risk, biodiversity loss, and declines of productive farm and timber lands. These problems are inherently complex because they are coupled with changes to the social fabric of the

landscape such as diversification of landowner types and increases in residential and other non-traditional rural land uses (Gude, Rasker, & van den Noort, 2008; Maestas, Knight, & Gilgert, 2003; Radeloff et al., 2010). When exurban development abuts or is interspersed with natural vegetation, it is characterized as wildland urban interface, or WUI (Radeloff et al., 2005; Syphard et al., 2007), a type of landscape characterized by a complex mixture of social and ecological processes that requires new types of scientific policy and management tools tailored to its unique characteristics (Bar-Massada, Stewart, Hammer, Mockrin, & Radeloff, 2013). The WUI is not a small or isolated problem – it accounted for approximately 40% of all United States (US) housing in 2000 and has continued its rapid growth as a dominant new geography for residential housing (Hammer, Stewart, & Radeloff, 2009).

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Federal wildfire policy has focused on the WUI as nexus for fuels treatments, disaster preparedness, and community resilience. For example, the National Fire Plan and the Healthy Forest Restoration Act (HFRA) both provide assistance to communities attempting to reduce wildfire risks associated with human and property loss (Platt, 2012). HFRA specifically targets the WUI by mandating that at least 50% of federal funds from the Act for hazardous fuel treatments are allocated to WUI areas (16 USC § 6513 (d)(1)(A)). Roughly 89% of the WUI is privately owned land and about 65% of the WUI occurs in high or high (historically low or variable) severity fire regime classes (Theobald & Romme, 2007). The challenges presented by rapid WUI growth are unprecedented, the consequences of exurban development difficult to assess, and the stakes increased by projections of rapidly changing climatic conditions. However, the social and geographic diversity of the WUI, including heterogeneous land uses that range from intensive agriculture and forestry to multifunctional uses like hobby farms or unmanaged properties that are less dependent on income generation (Wilson, 2006), remains a challenge for planners and researchers attempting to develop wildfire resilience and maintain ecological health (Ager et al., unpublished data; Spies et al., 2014).

Landowner motivations for managing their property are typically reflected in where they live and how they use their land. Motivations may be influenced by dynamics internal to the landowner (e.g., past experience, socioeconomic context, or individual worldviews) or drivers external to the landowner (e.g., environmental and social-economic pressures, policy incentives, regulations, property rights, and trends in agriculture, forestry and exurban demographics) providing both the agency and structure within which management decisions are made (Koontz, 2001; Mayberry, Crase, & Guillifer, 2005; Nielsen-Pincus et al., 2010; Sorice, Kreuter, Wilcox, & Fox, 2012; Valbuena, Verburg, Bregt, & Ligtenberg, 2010). For example, some segments of the WUI population may bring a worldview associated with a strong desire for “naturalness” in their surroundings (Nelson, Monroe, Johnson, & Brower, 2004; Nelson, Monroe, & Johnson, 2005) and a belief that measures such as the creation of defensible space to protect their home from wildfire may reduce the aesthetic value and enjoyment of their property (Hall & Slothower, 2009). In some cases such amenity value conflicts can lead to a rejection of fuels management as interfering with the aesthetics or ecological functions of their land (Collins, 2008; Reams, Haines, Renner, Wascom, & Kingre, 2005). In contrast, fuels management may align well with both the internal dynamics and external drivers of landowners whose management prioritizes maintaining or restoring forest or agricultural productivity, while ecological restoration may not align with landowners whose motives are driven by an anthropocentric worldview or a perception that engaging in ecological restoration could jeopardize their property rights. Technical, financial, and educational interventions may all mediate between the array of internal dynamics and external drivers that frame landowner motivations and their propensities to adopt different types of management (Champ, Brooks, & Williams, 2012; Fischer & Bliss, 2008). Without management or disturbance, fire-adapted ecosystems undergo succession and fuels accumulation, altering their composition, structure, dynamics, and biodiversity. Increased numbers of people, with attendant increases in human-caused ignitions and structures that can burn, are likely to further increase wildfire risk and biodiversity loss, particularly in the context of projections for a warmer climate (Syphard, Radeloff, Hawbaker, & Stewart, 2009). Changes in wildfire risk may be particularly acute for low-to moderate-density rural development due to the intermingling of high fuel loads and structures (Haight, Cleland, Hammer, Radeloff, & Rupp, 2004; Syphard, Keeley, Bar Massada, Brennan, & Radeloff, 2012), especially where land uses, landowner dynamics, or external drivers fail to stimulate sufficient fuels management or restoration

activities. An important goal is thus to understand how different types of landowners in the WUI manage their lands, the internal dynamics and external drivers that guide those decisions, and their effects on the landscape.

The diversity of internal and external influences on landowner decisions has led to the use of typologies to better distinguish different categories of landowners in their respective management contexts such as timber producers, conservation cooperators, affluent weekenders, and others (Finely, Kittredge, Stevens, Schweik, & Dennis, 2006; Kline, Alig, & Johnson, 2000; Majumdar, Teeter, & Butler, 2008). An effective landowner classification system, will produce landowner classes that are (a) readily interpretable, (b) represent distinct suites of landowner motivations, and (c) link those motivations to preferred land management strategies. The work of Kline et al. (2000) and Kendra and Hull (2005) provide useful examples for non-industrial private forest owners in Oregon and Washington and for new forest owners in Virginia, respectively. Further, a classification system that is useful for planning and policy must appropriately segment landowners and relate their motivations and behavioral propensities to the environmental and land tenure characteristics of the land they occupy (e.g., tax parcels) so that specific policies and planning can be targeted to the places they are most appropriate. Finally, classification systems that maintain diversity along multiple social dimensions within each class rather than assuming homogeneity of values for all actors in the same class combine the benefits of a typology with the complexity of the reality.

The heterogeneity of individual decision makers within and among landowner types, spatially overlain on a similarly heterogeneous set of land use and land cover types is what makes the WUI such a diverse social and ecological zone and a complex geography for planners and policy makers. The diversity and complexity that distinguishes the WUI requires fine-grained and place-specific approaches to wildfire risk planning (Collins, 2008; Jakes et al., 2011). Community Wildfire Protection Plans (CWPPs), a common community wildfire planning framework, attempts to incorporate and address the social and ecological diversity of WUI and target the spatial context in which different types of landowners are located (Jakes et al., 2011; Williams et al., 2012). However, even in the context of 1000s of completed CWPPs, wildfire risks continue to mount and more targeted policies and programs are needed to be effective at addressing wildfire risk at the landscape scale (Ager et al., unpublished data; Fischer & Bliss, 2008; Fischer, 2012; Kittredge, 2004).

The goal of our research was to design a WUI landowner classification system in order to support spatially explicit simulations of the effects of alternative policy approaches on future landscape change in the WUI of Oregon's Willamette Valley under rapid population growth and projected climate change (Hulse et al., unpublished data). To this end, we adapted previous approaches to classifying landowner motivations for owning and managing forest and farmland (Kendra & Hull, 2005; Koontz, 2001; Majumdar et al., 2008; Nelson et al., 2005) to WUI settings. Specifically, we used a market segmentation process (Finely et al., 2006; Kendra & Hull, 2005; Majumdar et al., 2008) to (1) identify classes of landowners with distinct land management motivations, (2) characterize these segments through demographics and property characteristics, (3) estimate propensities for each landowner class to pursue different land management strategies, and (4) spatially assign each landowner class to our study area based on environmental and land tenure characteristics.

Market segmentation identifies groups of landowners with shared values or other characteristics, which can be used to foster targeted policy and program strategies that help meet public goals like wildfire risk reduction and ecological restoration. By identifying where on the landscape different types (segments) of

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