



## Research Paper

## Factors that influence working forest conservation and parcelization



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## ABSTRACT

Ownership of private forestland is changing rapidly, especially in areas owned by industrial forest product companies. Following divestment by industrial owners, forested lands are increasingly likely to move from intensive timber production to subdivision of the land, development and other private uses, or alternatively to conservation under public tenure. This research follows a unique dataset of forestland properties previously owned by industrial and corporate owners in Wisconsin from 1999 to 2014. A multinomial logistic regression showed that divested lands were more likely to be publicly purchased outright if they were adjacent to water, adjacent to public land, not adjacent to roads, and had higher housing value, while in contrast the predictors of conservation easement acquisition were location in large blocks outside of zoned townships. Properties were more likely to be parcelized if they were adjacent to a paved road, adjacent to water, smaller, in a zoned township, and had fewer years remaining in their tax program enrollment. In an era of rapid industrial land divestment, these findings indicate an important role played by public policies, including preferential tax programs and funds for land and conservation easement acquisition, in shaping whether private forestland is parcelized, conserved under private ownership, or publicly acquired.

## 1. Introduction

Privately-owned forests around the world are critically important for supporting biodiversity and ecosystem services (Kamal, Grodzińska-Jurczak, & Brown, 2014). These qualities are significantly affected by the goals and management decisions of private owners (Bliss, Sisock, & Birch, 1998; Schaich & Plieninger, 2013). At the end of the twentieth century, the largest remaining areas of privately-owned forestland in the United States were held by large, vertically integrated industrial timber and paper companies (Best & Wayburn, 2001). Since then, ownership of those forestlands has experienced a major shift due to changes in industry structure, tax regulations, and strategy to reduce debt (Clutter, Mendell, Newman, Wear, & Greis, 2005). From 2001 to 2007, vertically integrated companies sold more than twenty-five million acres of forestland in the United States, primarily to new types of private investment owners that more aggressively market forestlands for other uses (Bliss, Kelly, Abrams, Bailey, & Dyer, 2010). Land that leaves working forest use is expected to have a much greater likelihood of property parcelization and development for residential or agricultural use (Gustafson & Loehle, 2006). Governments and conservation organizations have reacted to these changes that threaten contiguous working forestland with a variety of conservation programs. As a result, three possible trajectories have been recognized for former industrial forestlands: continued timber production forestry, 'highest and best use'

parcelization and development, or conservation tenure, each with different economic and social consequences (Bliss et al., 2010). The primary question of this research is, what has happened to former industrial forestlands and what is the current risk of subdivision and development for remaining privately-owned forestlands?

New private forest owners often have different objectives and less interest in management for timber production than previous industrial owners (Gustafson & Loehle, 2008). The corporate purchasers of most former industrial forestland are structured to deliver the greatest possible returns to their investors (Gunnore, 2014) so the properties most valuable for development are expected to be sold rather than retained for continued forest production (Bliss et al., 2010). A number of factors are associated with increased demand for residential development on forestland, including adjacency to paved roads and bodies of water (Froese et al., 2007), distance from urban areas (McDonald et al., 2006), and areas with higher existing housing values (Wear et al., 1999; Zhang & Nagubadi, 2005). Preferential forest tax programs that provide financial incentives may retain landowner participation (Ma et al., 2014), but withdrawal from these public programs signals a reduction in active management and may potentially precede development for other uses.

As forest management declines and the value of land for development begins to exceed the value of timber, parcelization is increasingly likely to occur (Zhang, Zhang, & Schelhas, 2005). Parcelization, or the

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division and sale of land to a greater number of owners, is often a precursor to overall forest loss and fragmentation (Haines, Kennedy, & McFarlane, 2011). These changes have a number of effects on wildlife habitat and biodiversity, the sustainability of forest industries, and exclusion of recreationists from private land (Rickenbach & Gobster, 2003). In many areas, the factors associated with decreasing property sizes and ongoing parcelization are also those associated with decreasing timber harvesting and development, including adjacency to roads and bodies of water (King & Butler, 2005).

Many states have implemented preferential forest-use tax programs to maintain forestland in areas highly susceptible to development. Property tax reductions provide immediate benefits to private landowners, with broader benefits to other stakeholders and the wider public (Ruseva & Fischer, 2013). While tax policies alone are often not enough to stave off development of private forestland (Butler et al., 2012), programs that include specific management plan requirements, withdrawal penalties, and strong financial incentives are the most effective in protecting private forest resources (Ma et al., 2014). Furthermore, while precise data on timberland ownership is often proprietary and difficult to assemble (Bliss et al., 2010; Froese et al., 2007), state forestry tax program records provide detailed information that can reveal broad rates and patterns of ownership changes (L'Roe & Rissman, 2017).

For more than a century, public agencies have purchased and retained or sold former privately owned land (Raymond and Fairfax, 1999). In many areas, a number of different public agencies at the state and county level have acquired forestland from private owners to provide habitat preservation, resource extraction, and recreation opportunities (Davis, 2008). Public ownership and management of productive forestland can have significant economic and environmental importance for local communities (Davis, 2013), but agency purchases are often limited by funding and by existing laws, administrative rules, or policies governing land protection, including those that prioritize acquisitions within existing land protection projects (Carter, Keuler, Pidgeon, & Radloff, 2014).

In recent decades there has been a shift from public purchases of the rights to private properties in their entirety towards the purchase of conservation easements (Merenlender et al., 2004). Conservation easements are a form of partial title transfer between a landowner and a nonprofit land trust or government agency to restrict some land uses in perpetuity to protect conservation values (Rissman et al., 2013), and are less expensive than outright land acquisition. Over time, an increasing number of conservation easements contain provisions for allowing continued management and production activities including timber harvesting (Owley & Rissman, 2016). Working forest conservation easements are less expensive than outright land acquisition and are used by public agencies and conservation organizations to purchase development rights and guarantee continued forest production and recreational access from large private forestlands (Ginn, 2005). In many cases conservation easements are purchased directly by a public agency, while in others private conservation organizations have purchased large blocks of land, and later sold the property, subject to permanent conservation provisions, to private buyers while retaining development rights or selling those rights to public agency buyers.

This study has three primary objectives for understanding the changes occurring on privately-owned forestland in the state of Wisconsin:

- Generally, to examine whether property characteristics and private-land conservation policies were associated with ownership and conservation outcomes on working forest properties.
- Specifically, to assess which characteristics of privately-owned properties were associated with withdrawal from a public tax-incentive program and additional property parcelization, and
- To identify the proportion and location of working forest properties at higher risk of land-use change from remaining privately-owned

working forests.

We hypothesize that properties located in areas with greater development pressure (adjacent to paved roads and water, closer to urban areas, and higher housing values) (Froese et al., 2007) and in smaller, isolated holdings (Gustafson & Loehle, 2006) are more likely to be withdrawn from working forest programs and parcelized (King & Butler, 2005). We also expect to find that properties purchased outright by public agencies are more likely to adjoin existing public land and be located in designated areas of state acquisition priorities and higher development pressure (Carter et al., 2014). In contrast, properties protected through conservation easements are expected to occur in larger contiguous ownerships with lower development pressure (Newburn et al., 2005).

### 1.1. Study area

Forests cover 16 million acres or about 49% of the total land area of Wisconsin. Forest area in the state has been steadily increasing for decades due mainly to the conversion of marginal agricultural land back to forests. Most of Wisconsin's forest types are dominated by hardwoods, including oak-hickory, maple-beech-birch and aspen-birch. There are also large areas of softwoods, including red pine, eastern white pine, tamarack, black spruce, northern white-cedar and jack pine, especially in the northern and central parts of the state. The northern region, much of which is publicly owned, is the most heavily forested, while the central and southeastern region have greater percentages of agriculture and urban areas, and lower percentages of forested and public lands.

Corporate landowners are part of a diverse landscape of ownership in the state of Wisconsin. At the end of the twentieth century, about two-thirds of forested acres in the state were owned by private individuals and corporations (Best & Wayburn, 2001). Forest ownership by vertically integrated timber producers dates back to Frederick Weyerhaeuser's purchase of thousands of acres of land in the 1870's and 1880's (Rutkow, 2012) and corporate forest ownership reached its greatest extent in the period from the 1920's to 1940's (Stearns, 1997). Most of these forestlands were located in the northern and central regions of the state. In addition to their history of supporting timber and paper-production, these forestlands have traditionally been used for hunting, camping, and trail-based recreational activities in a region where the economy is increasingly driven by tourism and recreation (Bawden, 1997; Flader, 1983). Parcelization is a significant factor in landscape change in northern Wisconsin (Haines et al., 2011) and the ongoing parcelization of private forestland has closed land access and increased recreational pressure on remaining lands (Rickenbach & Gobster, 2003). As a result, the state has made significant efforts to maintain production from corporate and other privately-owned forest lands through preferential taxation programs for many years, and more recently through the purchase of development rights through conservation easements. Much of the publicly owned forestland in the northern region was acquired after widespread land abandonment in the cutover period of the early 1900s, and individual counties and several state agencies have the ability to acquire and manage forestland (Davis, 2013).

### 1.2. Wisconsin forest tax programs

Wisconsin's Managed Forest Law (MFL) and Forest Crop Law (FCL) are considered among the most effective state programs in protecting private forests highly susceptible to development (Ma et al., 2014). Both forest tax programs are voluntary tax incentive programs that combine a fixed property tax rate with a yield or severance tax administered by the Wisconsin Department of Natural Resources (WDNR) to encourage timber production and sustainable forestry practices on private lands (Locke & Rissman, 2012). The FCL program was

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