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Dynamics of Large Corporate Forestland Ownerships in the United States

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Abstract

Ownership of forestland in the United States has changed in recent decades, including the proliferation of timber investment management organizations (TIMOs) and real estate investment trusts (REITs), with the potential to alter forest management and timber supply. This article quantifies forest ownership transitions among ownership categories between 2007 and 2017 and investigates how and why large corporate ownerships own and manage their forestlands. Ownership transitions were determined from refined USDA Forest Service, Forest Inventory and Analysis data; we also conducted a survey of large corporate forestland ownerships. Corporate forestland acreage increased between 2007 and 2017, while family and public forestland decreased. Large corporate landowners report multidimensional, financially focused land management, although industry, timber investment management organizations, real estate investment trusts, and other owners report some different motivations and income streams. This work provides a baseline to track future ownership transitions and the behaviors of large corporate forestland owners.

Study Implications: Corporations own a substantial portion of US forestland, and the structures of corporate ownerships have shifted dramatically in the past few decades. In the last decade, there has been a net gain in corporate forestland and a net loss of forestland to nonforest uses. We found corporate owners' objectives, actions, and concerns to be consistent with their current income streams. Policies and programs could be used to support sustainable management approaches and maintenance of intact forestland by corporate ownerships, and should be tailored to accommodate their financial motivations.

Keywords: Forest Inventory and Analysis, National Woodland Owner Survey, private forest owners, timber investment management organizations (TIMOs), real estate investment trusts (REITs), survey

The wide diversity of forestland ownership patterns across the United States plays a critical role in influencing current and future forest landscape composition and structure, as well as the flow of ecosystem services, including timber supply. Corporations own 137 million acres (standard error [SE] = 755,000),

or 19.5% of total forestland, in the United States (excluding interior Alaska), and are the third largest ownership group after family and federal ownership categories (Butler et al. 2020). A substantial portion of this corporate forestland is held by large ownerships (i.e., those with more than 45,000 acres). This threshold differentiates large from small corporate ownerships because those with holdings above this size are more likely to have different management objectives and behaviors (Caputo et al. 2017).

The composition of large corporate forestland ownerships has shifted dramatically over the past few decades with the large-scale divestiture of vertically-integrated forestry companies through company restructuring and outright land sales. The primary reasons for these divestures include reducing tax burdens, reducing debt, undervaluation of forestland, and a stable timber supply with decreasing demand (Binkley et al. 1996, Butler and Wear 2013). Beginning in the 1980s, much of the industrial timberland that was sold was purchased on behalf of institutional investors, including pension funds, endowments, insurance companies, and individuals of exceptionally high net worth (Binkley et al. 1996, Bliss et al. 2010). These transactions were often made by timber investment management organizations (TIMOs), which are entities that manage and often purchase timberland for investors, but that do not usually own the land themselves. Many of these transactions were also made by real estate investment trusts (REITs), corporations that invest at least 75% of their total assets in real estate and who are required to distribute 90% of their taxable income to their investors; the investors pay income tax on those dividends, and the REITs avoid corporate income tax for that income. Some forest industry companies divested most of their wood processing facilities, set up the rest of their processing facilities in a "taxable REIT subsidiary," and chose to focus on land investment using the REIT structure (Wang 2011, Gunnoe et al. 2018). TIMOs and REITs own and manage around 40 million acres of timberland in the United States (Gunnoe et al. 2018), as well as substantial acreage in Canada, South and Central America, Australia and New Zealand, and other regions (Myers and Buran Evans 2014).

Large corporate landowners have the potential for different goals, concerns, and plans for their land than other ownership groups (Binkley et al. 1996), and researchers posit that forestland management under TIMOs and REITs could be different than vertically-integrated forestry companies because of shorter time horizons and pressure to provide returns to investors instead of the need to provide wood to a mill (Gunnoe et al. 2018). Zhang et al. (2015) found that TIMOs were more responsive than other ownership types to stumpage price, whereas REITs were the least responsive to price, and Sun et al. (2015) found that in the southern United States, TIMOs, REITs, and industrial ownerships were more likely to reforest than nonindustrial private forest ownerships. Studies have also noted subtle changes that may be part of larger trends, such as shorter rotation lengths for TIMOs and REITs because of shorter time horizons and market pressures (Gunnoe et al. 2018). There have also been shifts away from open access to hunting and recreating on TIMO- and REIT-held lands (Gunnoe et al. 2018) and some evidence suggests lower investments in forestry research (Clutter et al. 2005) and reduced resources to combat wildfire (Hatcher Jr. et al. 2012). There is a question about whether TIMOs and REITs have the same willingness to implement BMPs as industrial owners (Hickman 2007), although some studies show high compliance by these companies (e.g., Coats 2018). Despite measured or potential differences with TIMOs and REITs, there is also the potential for maintenance of vertically-integrated dynamics even where companies separated forestland from processing through long-term timber contracts (Sun and Zhang 2011), although these may no longer profitable under current conditions (Restrepo et al. 2020).

The hypothesis that large tracts of forestland face increased liquidity and parcelization as they change hands and ownership types has been widely considered (Clutter et al. 2005, Fernholz et al. 2007, Bliss et al. 2010), although there is little evidence to support it (Zhang et al. 2012). On one hand, as corporations that have divested from wood processing do not need to supply timber to their own mills, they can more easily fragment and convert land to "highest and best use," especially close to urban areas where development demand is highest (Gunnoe et al. 2018) or when fragments are worth more than the whole (Kay 2018). However, some corporations have traditionally taken advantage of real estate opportunities, increasing fragmentation along the urban-rural interface (Clutter et al. 2005). There is also the opportunity for acquisition by governmental or nonprofit conservation organizations when land is sold (L'Roe and Rissman 2017).

Previous work studying land ownership transitions and the potential attitudinal and behavioral differences between ownership groups has largely focused on a specific activity, such as timber harvesting (Butler and Wear 2013, Zhang et al. 2015), or focused

on dynamics in a specific state or region, such as the Southeast (Clutter et al. 2005), Pacific Northwest (Bliss and Kelly 2008), or Wisconsin (L'Roe and Rissman 2017). Data on TIMO and REIT timberland transactions are tracked by private firms, but much of this information is proprietary and not publicly accessible.

This article aims to provide a national-scale perspective on two fundamental aspects of large corporate ownership: (1) forestland ownership dynamics among ownership groups from 2007 to 2017 and (2) how and why large corporate ownerships own and manage their forestlands. First, we quantify ownership transitions across the United States based on USDA Forest Service, Forest Inventory and Analysis (FIA) data augmented with information on TIMO, REIT, and large corporate status. Second, we summarize the results of a survey that was sent to large corporate forestland ownerships across the United States, focusing on their structure, reasons for owning land, management, uses, and concerns. The Large Corporate Forest Landowner Survey is the first known example of a national survey explicitly targeted to large corporate forestland ownerships. This study provides initial insights into their management goals and actions, as well as information on how to better survey this group, including navigating the complicated and diverse corporate structures.

Box 1

Key Definitions

- Family Forest Ownerships: Individuals and families, including trusts, estates, and family partnerships that own forestland (Butler et al. 2020).
- Forestland: Land with at least 10% percent cover by live trees, that is at least 1 acre in size and 120 feet wide (Burrill et al. 2018). This includes land that formerly had such tree cover and will be naturally or artificially regenerated, for example, land that has been harvested or burned.
- Large Corporate Forestland Ownerships: Corporate ownerships that hold 45,000+ acres of forestland in the United States. (Caputo et al. 2017).
- Limited Liability Company (LLC): A business structure where the owner may include individuals, corporations, or other LLCs; details are determined by state statute.
- Ownership: A legal entity that controls one or more parcels of land; an ownership may be composed of one or more individuals, may be a legal entity such as a corporation or a trust, or may be a public agency (Butler et al. 2020).
- Real Estate Investment Trust (REIT): Corporations that invest at least 75% of their total assets in real estate and are required to distribute 90% of their taxable income to their investors. The investors pay income tax on those dividends, and the REIT does not pay corporate income tax for that income (Zhang et al. 2015).
- Timber Investment Management Organization (TIMO): Entities that buy, sell, and manage timberland and have fiduciary responsibility on behalf of institutional investors (Butler and Wear 2013).

Methods

Forestland Ownership Distributions and Transitions

To understand forestland ownership patterns and dynamics, we used the USDA Forest Service FIA plot data on ownership and location, which provide a point-based, historical record of forest attributes across the United States (Burrill et al. 2018). The inventory is conducted using a random survey design stratified by state (Bechtold and Patterson 2005). Each state is divided into approximately 6000-acre hexagons, and a random point is selected within each hexagon for inventory. If the random point falls on forested land, ownership type is determined from local government records or other data (Table 1; Burrill et al. 2018); ownership information from plot center was used in this analysis. Each plot is inventoried every 5 to 10 years, depending on the state, which allows quantification of changes over time.

We further refined the FIA ownership categories for corporate owners to identify TIMOs, REITs, and large corporate forestland ownerships. For corporate forested plots, we standardized names and addresses to identify common ownerships, and identified the acreage of each ownership based on the number of points they owned in each state. These acreages were summed across the entire United States, and ownerships with 45,000 or more forested acres were considered "large corporate" (Caputo et al. 2017). We determined whether each large corporate ownership was a TIMO or REIT by comparing their name and address to the 2017 FORISK North American Timberland Owner and Manager list (Forisk Consulting, LLC 2017), web searches, and expert opinion. The scope included FIA plots from 1999 to 2017; however, the focus of our analysis was on transitions occurring within the 2007 to 2017 timeframe. We chose to analyze change in 10-year increments because remeasurement time scale varies by state (Burrill et al. 2018), and it was important to capture a consistent remeasurement period across all states. The area held by each ownership group in each state was calculated with the use of:

$$a_{o,s} = \frac{p_{o,s}}{p_s} * A_s * Adj_{o,s}$$

Table 1. Ownership categories used in this article based on acreage, expert opinion, and Forest Inventory and Analysis (FIA) database ownership codes.

Manuscript Ownership Classification	Other Criteria	FIA Ownership Code(s)	FIA Ownership Type
Federal	NA	11, 12, 13, 21, 22, 23, 24, 25	National Forest, National Grassland and/or Prairie, other Forest Service land, National Park Service, Bureau of Land Management, Fish and Wildlife Service, Departments of Defense/Energy, and other federal
State	NA	31	State including state public universities
Local	NA	32, 33	Local (county, municipality, etc.) including water authorities and other nonfederal public
Small Corporate	<45,000 acres	41	Corporate, including private universities, foundations, and international companies
Large Corporate	45,000+ acres	41	Corporate, including private universities, foundations, and international companies
TIMO/REIT	45,000+ acres and name/address recognition	41	Corporate, including private universities, foundations, and international companies
Other Private	NA	42, 43, 46	Nongovernmental conservation / natural resources, unincorporated partnerships / associations / clubs, and undifferentiated private
Tribal	NA	44	Native American (Indian)—within reservation boundaries
Family	NA	45	Individual and family, including trusts, estates, and family partnerships, family ranch

where $a_{o,s}$ is the area of ownership group o in state s, $p_{o,s}$ is the number of plots held by ownership group o in state s, p_s is the number of plots in state s, A_s is the total land area in state s, and Adj is the adjustment factor for ownership o in state s to align our area estimates with FIA area estimates. Adjustment factors were a ratio of estimated acres of forestland from FIA to acres estimated by the data for each ownership group in each state (Butler et al. 2020). Large corporate, small corporate, and TIMO/REIT were combined to determine the adjustment factor, because those categories are not differentiated in the FIA area estimates. To capture the full range of variability, adjustment factors were not used when calculating sampling error. We calculated the acreage of each ownership group from 2002 to 2007 (nominal year 2007) and compared that with the ownership group that owned the plot from 2012 to 2017 (nominal year 2017); this analysis was restricted to the conterminous United States where data were more reliably available. We designated large corporate, small corporate, and TIMO/REIT only for 2017, because ownership data were not consistently available for the 2007 data; all corporate ownerships were included as a single category in 2007. We also included plots that were considered "nonforest" and their transitions into and out of forested ownership categories in the analysis. For the transitions, plots that were missing data for 2007 or 2017 were excluded; therefore, the transitions do not represent all acres on the landscape.

Corporate Survey

The Large Corporate Forest Landowner Survey is a component of the FIA National Woodland Owner Survey (NWOS) (Butler et al. 2020), with modifications to the base methods to capture the unique ownership aspects of corporate ownerships with the largest holdings. It was conducted by the USDA Forest Service FIA program and the University of Massachusetts–Amherst with relevant approvals from the Office of Management and Budget and Institutional Review Board, respectively. The survey content was designed to better understand corporate forestland ownership across the United States and included the following topic areas: company forestland and structure, objectives, forestland acquisitions and sales, forest use and

management, concerns, community relations, income generation, and workforce. Interviews were conducted with representatives from a range of companies to confirm that questions were reasonable and correctly interpretable. The survey instrument is available in Appendix I.

We identified the sample of large corporate forestland ownerships as described above and avoided contacting subsidiaries of parent companies wherever possible to prevent double-counting. Surveys were sent to 215 companies following the four-wave Dillman method (Dillman et al. 2014) in October, 2018. Where email addresses were available, an electronic version of the survey was sent; otherwise, a paper version was mailed. If they did not complete the first survey they received, all respondents were mailed a paper survey. Survey materials were addressed to land managers, CEOs, or other appropriate individuals or to a "representative" if no specific name was found. In pretesting, participants shared that they would need to consult others in the company to complete the survey, and that they would be willing to do so. After mail-out, adjustments were made for corporations in and out of the sample that were larger or smaller than 45,000 acres or were determined to be subsidiaries of other companies; the corrected sample included 108 unique corporations. We received 48 responses, including 27 digital and 21 mail surveys, resulting in a 44.4% cooperation rate.

Follow-up phone calls were made to companies that did not respond to the survey. Eighteen company representatives were willing to take a shortened phone version of the survey and were asked about the structure, holdings, and management patterns of the company. Mann-Whitney U tests and chi-square tests were conducted for continuous and categorical data, respectively, and no differences were found between respondent and nonrespondent companies; *P*-values ranged from 0.4–0.9. However, some of the corporations with the highest acreages of forestland ownership did not respond to the survey, limiting our extrapolation to dynamics at the upper bound. Due to the small study sample, all figures and results are in terms of the number or percent of survey respondents; estimates for the entire population are not presented.

Results

Ownership Transitions

In the conterminous United States as of 2017, family ownerships hold 272 million acres, more forested acres than other groups, with federal holding the second largest amount with 193 million acres and corporate holding 135 million acres (Figure 1A). Small corporate ownerships account for more than half of corporate acreage with 70 million acres, followed by TIMOs and REITs with 41 million acres and large corporate ownerships (other than TIMO/REITs) with 24 million acres (Figure 1A). Forestland in the Pacific Northwest and Rocky Mountain Regions is predominantly publicly owned and in the Southern and Northern Regions is owned largely by families (Figure 1B). At the state level, Maine has the largest acreage of forestland in TIMO/REIT ownership category (6.3 million acres), followed by Alabama (2.8 million acres) and Oregon (2.0 million acres) (Figure 2).

From 2007 to 2017, the largest net increase in forestland is to corporate ownerships (11.1 million acres); the largest net decreases are from forestland held by family (11.3 million acres) and federal ownerships (6.8 million acres; Figure 3). There was also a net loss of forestland to nonforest uses (7.5 million acres; Figure 3). In all ownership categories, the majority

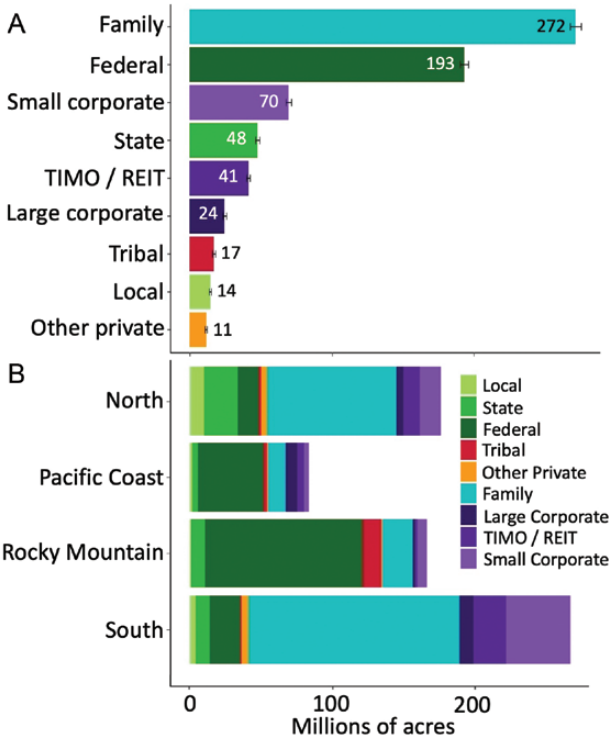

Figure 1. A: Total acres of forestland held by ownership category, conterminous United States, 2017. Error bars represent standard error. B: Forest ownership by region in the conterminous United States. Regions are defined by the U.S. Forest Service Resource Planning Act (Oswalt et al. 2019).

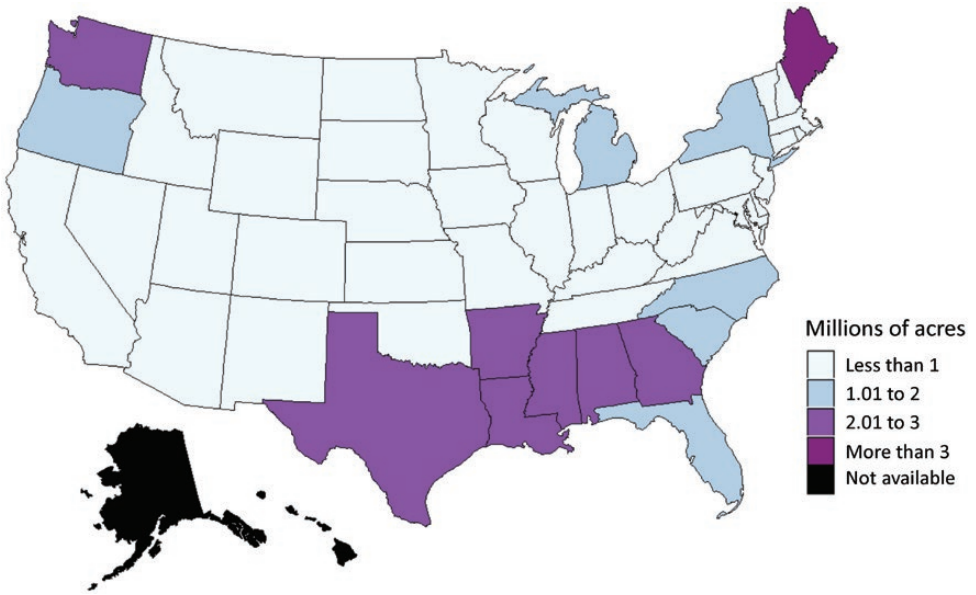

Figure 2. Acres of forestland held by TIMOs and REITs, 2017.

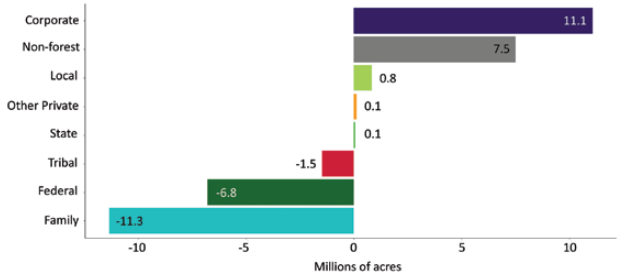

Figure 3. Net gains and losses by forest ownership and nonforest categories, conterminous U.S., 2007 to 2017.

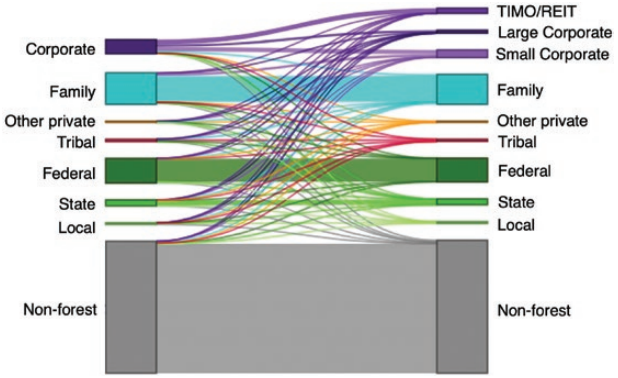

Figure 4. Relative acreage held by ownership categories in 2007 and 2017, conterminous United States. Lines colors match the type of ownership that owned the land in 2017. Ownership boxes in 2007 and 2017 and line weights represent acreage relative to the total.

of the land remained in the same ownership category between 2007 and 2017 (Figure 4, Appendix II). All corporate ownerships are counted as a single category in 2007 due to data limitations, and are divided into large corporate, TIMO/REIT, and small corporate in 2017; the majority of acreage in each of these categories in 2017 is in corporate ownership in 2007 (Figure 5, Appendix II). The second largest contributor to corporate forestland in 2017 is family ownership (Figure 5). Another prominent transition is forested land in family and federal ownerships in 2007 that is converted to nonforest uses by 2017 (Figure 5).

Corporate Survey

Of the 48 companies that responded to the Large Corporate Forest Landowner Survey, 12 identify as TIMOs or REITs and 16 report having mills or other primary processing facilities; one company that identifies as a TIMO or REIT also has a mill—they are included as a TIMO/REIT for the remainder of this article. The median acreage of US holdings of the companies that responded to the Large Corporate Forest Landowner survey is 172,000 acres (inter-quartile range = 449,592), with the majority of companies reporting holdings of 250,000 acres or smaller, but the plurality of TIMOs and REITs reporting holdings over 1,000,000 acres (Figure 6). Thirty-six percent (SE = 7%) of all companies that responded are Limited Liability Companies (LLCs), 26% (SE = 6%) are privately held C corporations, 19% (SE = 6%) are privately held S corporations, 15% (SE = 5%) are publicly traded, and the remaining 4% (SE = 3%) identify as another or a combination of structures.

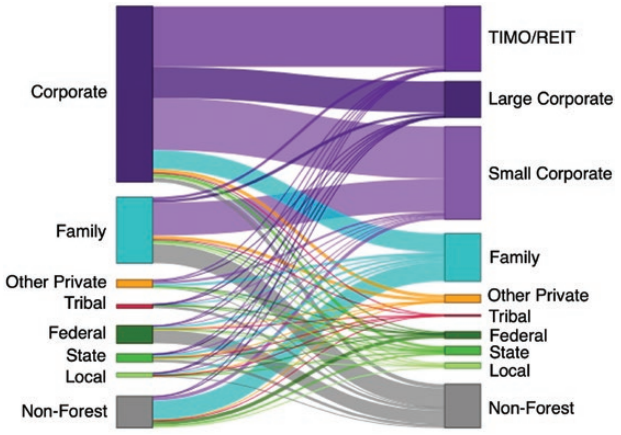

Figure 5. Relative acres that changed ownership categories between 2007 and 2017, conterminous United States. Lines colors match the type of ownership that owned the land in 2017. Acres that were held by the same ownership category in 2007 and 2017 have been removed to allow higher resolution of the transitions. Ownership boxes in 2007 and 2017 and line weights represent acreage relative to the total.

Companies report a diverse range of objectives, but timber production, land investment, and to protect water resources were rated as "Important" or "Very Important" by 94% (SE = 4%), 83% (SE = 5%), and 81% (SE = 6%) of respondents, respectively. Protecting or improving wildlife habitat and protecting nature or biological diversity are both considered "Important" or "Very Important" by more than half of the respondents (wildlife 58%, SE = 7%; nature 54%, SE = 7%, Figure 7). All companies report road construction or maintenance and cutting trees for sale in the past five years. More than three quarters of companies also report improving wildlife habitat, using herbicides, and eliminating or reducing invasive plants in the past five years (Figure 8). The most commonly reported activities that companies collected money for are hunting, mineral extraction, recreation, and agroforestry (including grazing; Figure 9).

Most companies (77%, SE = 6%) have a written management plan covering all of their land, and 92%

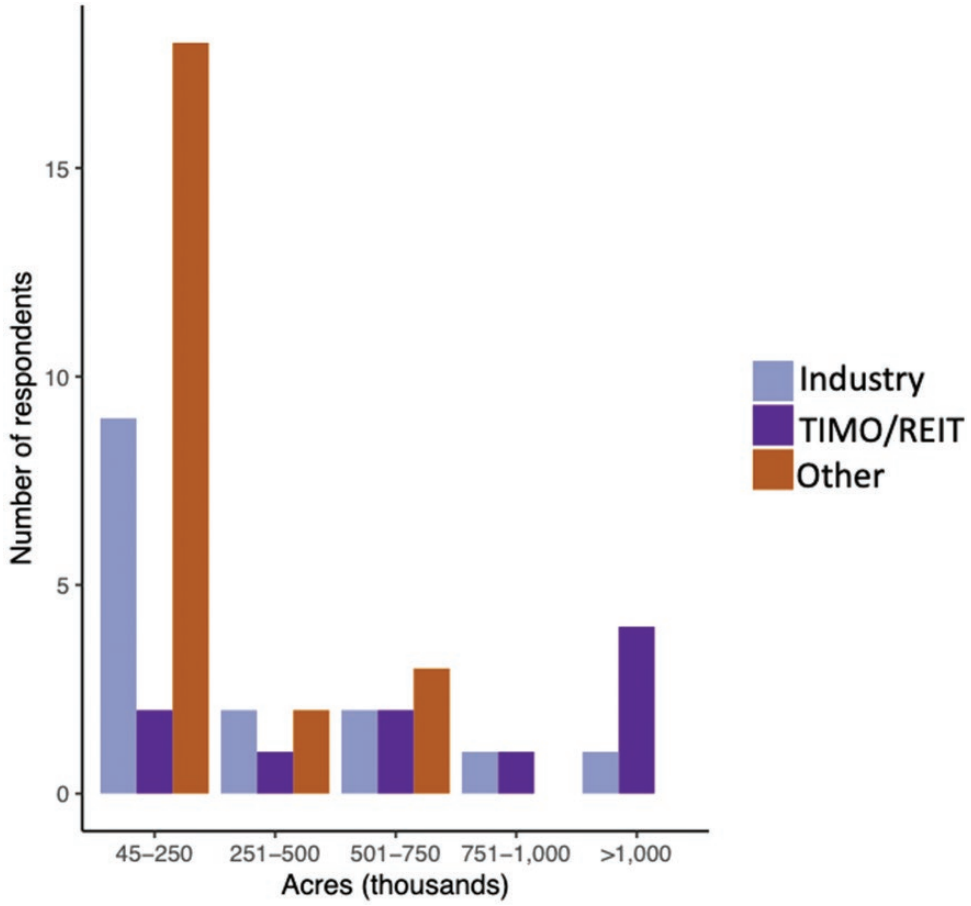

Figure 6. Reported forested acreage in the United States of respondents to the survey, 2018.

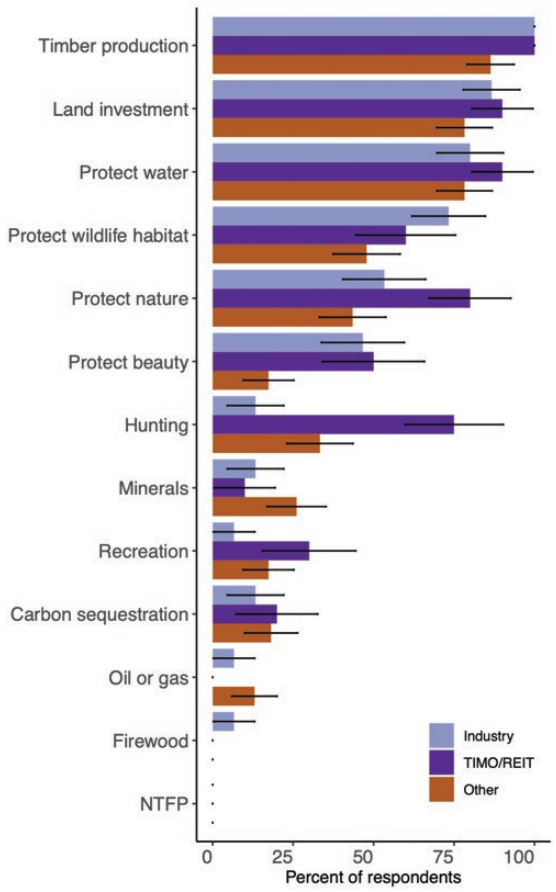

Figure 7. Percentage of large corporate ownerships that reported each objective as "Important" or "Very Important;" other options were "Moderately Important," "Of Little Importance," "Not Important," and "Not Applicable," United States, 2018. Objectives were not mutually exclusive; n = 48. NTFP = Non-timber forest products. Error bars represent standard error.

(SE = 4%) of the companies have a management plan covering at least half of their forestland. Certification, including through the Sustainable Forestry Initiative and Forest Stewardship Council, is common; three-quarters of companies report certification, and about two-thirds of these certify all of their land. About half of companies report having some land under a conservation easement, and 19% (SE = 6%) have at least a quarter of their land covered by an easement. Fiber or timber supply agreements were uncommon, with 0% (SE = 0%) of TIMOs or REITs, 25% (SE = 13%) of industrial owners, and 10% (SE = 7%) of other corporations reporting having one. The majority of industrial companies reported deriving less than half, and TIMOs/REITs derived more than half, of their income from their forestland operations (Figure 10).

The most commonly reported concerns relate to regulations and changes to taxes and markets. Biological

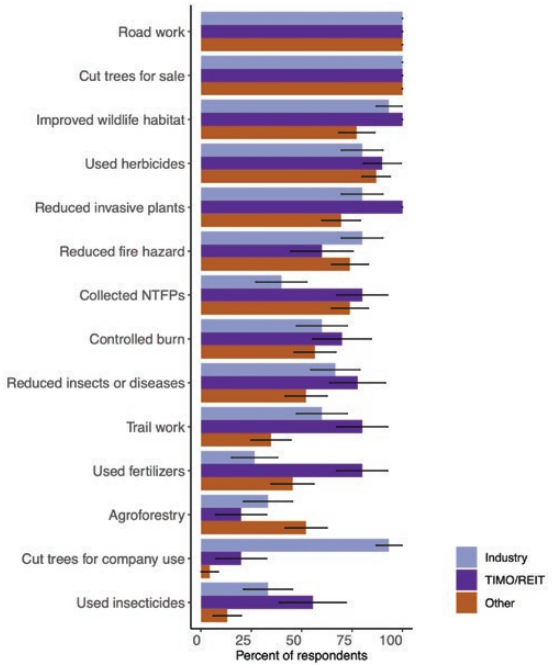

Figure 8. Percentage of large corporate forestland ownerships that reported conducting the following activities in the past five years, United States, 2018. Activities were not mutually exclusive; n = 48. Error bars represent standard error.

and environmental issues, including insects, disease, invasive plants, and wildfire, are also "Important" or "Very Important" to more than half of the respondents. Issues that are of least concern ("Important" or "Very Important" to less than one-quarter of respondents) include air pollution, development of nearby lands, securing seedling planting stock, and water pollution (Figure 11).

Companies report high community engagement, with 91% (SE = 4%) donating to charities, 81% (SE = 5%) providing direct outreach and education to the general public, and 79% (SE = 6%) providing direct outreach and education to landowners. About one-third of companies (34%, SE = 7%) report providing technical assistance to landowners, including writing forest management plans. Companies also report high rates of involvement in forest management research, with 80% (SE = 6%) participating in research co-ops, 49% (SE = 7%) funding research projects, and 34% (SE = 7%) conducting in-house research.

Discussion

Corporate ownerships hold an increasing proportion of the nation's forestland, with the largest net acreage gain of any ownership category between 2007 and 2017. As

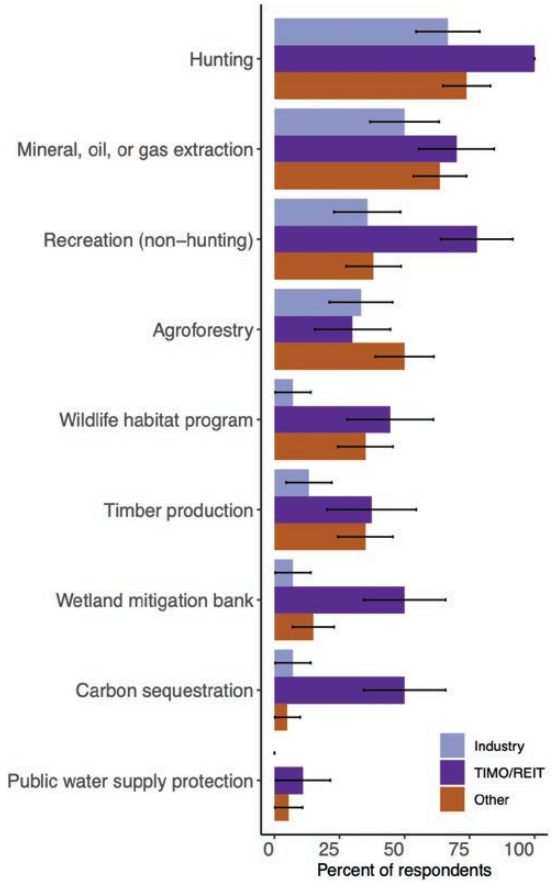

Figure 9. Percentage of large corporate forestland ownerships that reported collecting money for the following uses, United States, 2018. Uses were not mutually exclusive; n = 48. Error bars represent standard error.

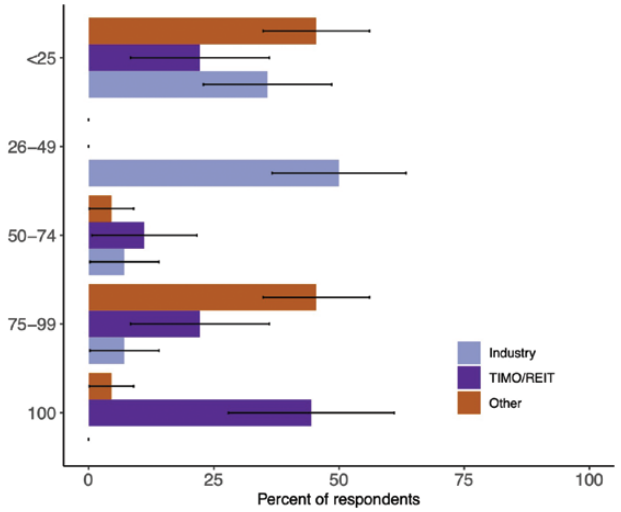

Figure 10. The percentage of income derived from forestland operations reported by large corporate forestland ownerships, United States, 2018. Errors represent standard error.

has been well documented, much of the corporate land is owned by large corporations and TIMOs and REITs (Bliss et al. 2010, Gunnoe et al. 2018), with the highest representation of TIMOs and REITs in the southern region (Butler and Wear 2013), Maine (Jin and Sader 2006), and the Pacific Northwest. In this paper, all corporate lands are included as one category in 2007 due to data limitations, so we are unable to track when they transitioned to specific categories; however, now that the corporate categories are refined, we will be able to track them individually moving forward.

The net transition of forestland to nonforest land use is concerning, especially with the loss primarily coming from family- and federal-owned land. Although almost as much land was converted from nonforest to family forestland as vice versa, much less nonforest land was converted into federal ownership. Family forestland is more likely to occur within a mosaic of agricultural and developed uses than other ownership types (Riitters and Costanza 2019), and it is possible that family forestland is going in and out of forest edge or marginal forest. The loss of federal forestland to nonforest came largely from the Rocky Mountain region, with New Mexico and Utah each accounting for a net transition of over a million acres, and a net transition of 600,000 to 900,000 acres in Arizona, California, and Nevada. This loss may reflect the challenge of determining and defining forestland in these states over time or may reflect real loss, or both, and warrants further investigation. However, it is unlikely that these losses are due directly to fire, insects, or other events that damage or remove trees, because as long as trees will grow again, the plot is still considered forest.

Another notable transition is the large shift of acres from family ownership in 2007 to corporate ownership in 2017, which may be an artifact of family ownerships restructuring as LLCs for tax or other purposes. In this restructuring, the land is held by the same owners and is not expected to change the way the land is managed, so these LLCs would ideally continue to be classified as family land. However, due to challenges in separating LLCs that operate as family forestland from LLCs that function as corporate forestland, some of these may be misclassified as corporate, inflating the corporate acreage in 2017 and the family-to-corporate transition. This is supported by the much larger shift from family to small corporate than either family to large corporate or family to TIMO and REIT. A similar percentage of forestland in the South is owned by TIMOs and

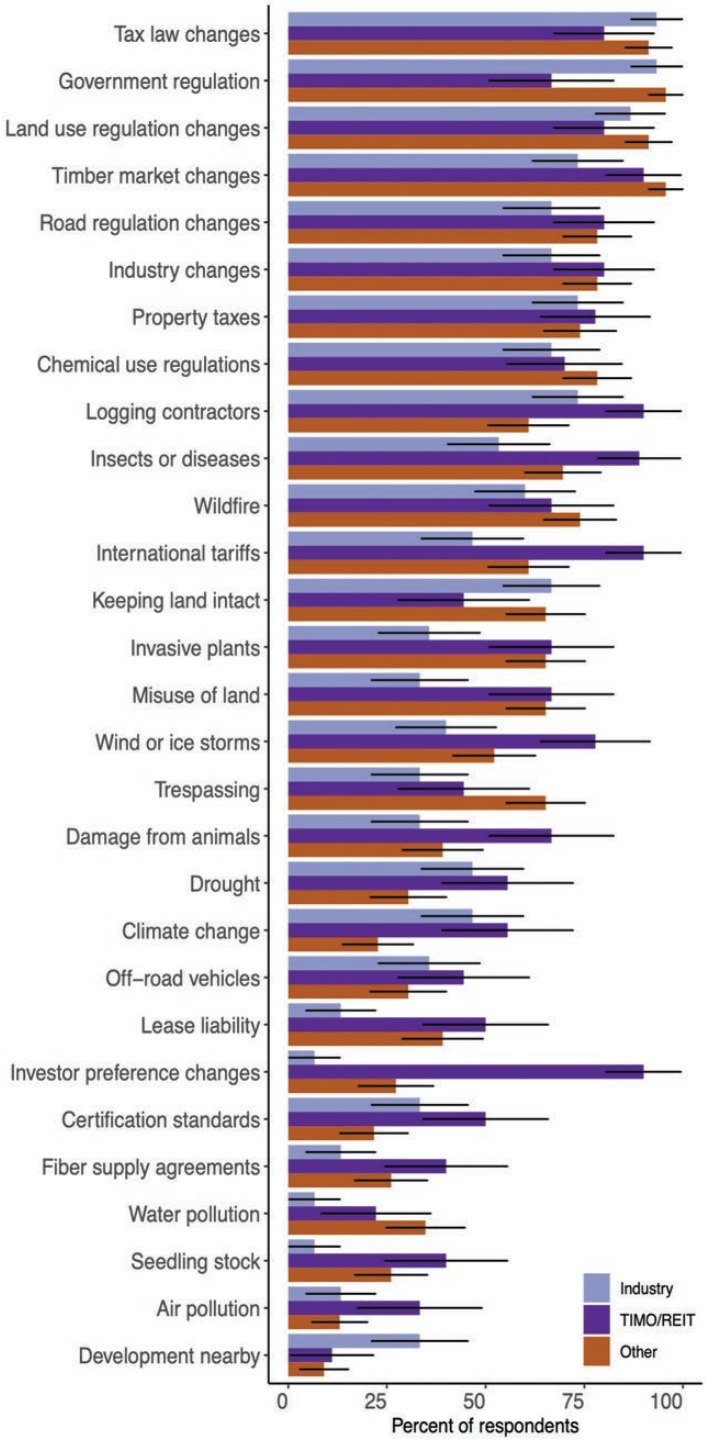

Figure 11. Percentage of large corporate forestland ownerships reporting that a concern was of "Great Concern" or "Concern," United States, 2018. Concerns were not mutually exclusive; n = 48. Error bars represent standard error.

REITs as was found by Zhang et al. (2012) as of 2010, suggesting that there has not been a large net gain by this ownership type in more recent years.

The survey responses from the large corporate forestland ownerships show priorities, actions, and concerns that are consistent with financial motivations (Gunnoe et al. 2018). The most commonly reported reasons for owning forestland are for timber production and land investment, all respondents report cutting timber for sale and supporting logging infrastructure

through building and maintaining roads, and the most commonly reported concerns revolve around taxes, regulation, and markets.

Most of these ownerships obviously started with profit-oriented motivations and obligations to shareholders (i.e., they are businesses), but other land stewardship responsibilities are also important. Protecting water resources, wildlife habitat, and nature in general are reported as important or very important objectives for forestland ownership by most companies. These results may be counter-intuitive, but they suggest that companies perceive noncommodity (as well as commodity) objectives as being important, and although these reasons are perhaps not why the land was purchased, they appear to underlie and potentially inform management. This may also reflect the aim of complying with best management practices or with certification standards (Hickman 2007). Between 2008 and 2018, a regional report on compliance of southern states (Southern Group of State Foresters 2018) found a high level of implementation of BMPs with a general increase across most practices over this time, indicating that many companies seem to follow through on water quality and nature priorities. Most companies (85%) report improving wildlife habitat in the last five years. Although this may be a secondary benefit from other management, such as the creation of early seral habitat following a harvest, it still demonstrates multiobjective forest management.

Similarly, more than three quarters of respondents report collecting money from hunting, and almost half report collecting money for recreation other than hunting, so that their multiple objectives overlap with revenue streams. The high rate of fee-based hunting and other recreation on large corporate forestlands may represent a shifting dynamic, where land may have historically been more freely accessible (Gunnoe et al. 2018). Respondents also report acting to support their goals in the longer term, including high levels of support for forestry research and investing in charities and the local community; however, it is not possible to discern the level of support for research and community efforts from these data. TIMOs and REITs in particular appear to have diverse management objectives and income streams, and the majority report owning their forestland for hunting and protecting nature. More than half of TIMOs and REITs also report collecting money for carbon sequestration and wetland mitigation banking in the last five years.

Surveying large corporate ownerships presents several challenges. First, the ownership structure and interconnectedness of these large companies is often opaque. Even after extensive refinement of the sample prior to sending the survey, about half of the corporations surveyed were found to be subsidiary companies. Similarly, the range of questions asked in the survey may exceed the knowledge of a single individual at a large national company. Although individuals in the pretest conversations were willing to talk to others in their company to answer the variety of questions, this may have presented a barrier to some respondents. Also, due to a known lack of response by some companies with the largest holdings, we are unable to estimate dynamics at the upper bound and calculate estimates for the population. Future work should focus explicitly on gathering information from corporations across the size spectrum.

The current survey results do not address intensity or area covered by specific activities and their ecological implications. Future research should combine on-the-ground observations, such as those from the FIA forest inventory plots, with more detailed ownership information. In addition, more efforts are needed to quantify temporal and spatial patterns at both national and subnational levels.

Conclusions

Corporate ownerships have increased their holdings between 2007 and 2017, with a substantial area held by large corporate ownerships, TIMOs, and REITs. Dividing corporate ownerships by size and ownership type will allow individual tracking of ownership transitions in the future. Large corporate forestland ownerships, including some TIMOs and REITs, reported high levels of engagement with the management of their forestland in a multidimensional way, with responsiveness to their goals and financial incentives. Large corporate forestland owners have diverse structures, objectives, and income streams, which may continue to evolve in the future.

Supplemental Materials

Supplementary data are available at *Journal of Forestry* online.
Appendix I. Large Corporate Forestland Owner Survey Instrument.
Appendix II. Acreage transitions among ownership groups from 2007 to 2017. All corporate groups were included as one category in 2007 and were separated in 2017.

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