

# Family Forest Owner Trends in the Northern United States

Brett J. Butler and Zhao Ma

ABSTRACT

Understanding forest ownership trends is critical for understanding forest trends. In the northern United States, where 55% of the forestland is controlled by families and individuals, it is imperative that we understand the trends within this complex and dynamic group of owners. The US Forest Service conducted forest landowner surveys across this region, and the rest of the United States, in 1993 and 2006. The published results are not directly comparable because of differences in what was reported and how the data were processed. Fortunately, the same sample designs were used and a subset of identical or near identical questions was asked on both surveys so that reprocessing the data allows for trends to be accurately assessed. The average size of family forest holdings decreased from 25 to 20 ac, reasons for owning remained amenity centered, and the owners are now more likely to be older, retired, have a higher income, and more educated.

**Keywords:** private forest owners, nonindustrial private forest owners, National Woodland Owner Survey, parcelization, demographics

There are an estimated 4.7 million family forest owners across the 20 state region defined by the US Forest Service as the northern United States (Figure 1; Butler 2008, Smith et al. 2009). This group of owners includes families, individuals, estates, trusts, family partnerships, and other unincorporated groups of individuals who own at least 1 ac of forestland (Butler 2008). Collectively, these family forest owners control 94 million ac of forestland or 55% of all forestland across the northern United States (Butler 2008).

To understand the state of the forest, surveys are conducted of the biophysical resources and the social contexts within which these forests exist. The biophysical inventories, such as the one conducted by the US Forest Service's Forest Inventory and Analysis (FIA) program, provide important information on species distributions, volumes, growth and removals, and related topics (LaBau et al. 2007). It is through surveys of the forest owners, such as the FIA's Woodland Owner Survey, that we understand who these people are, why they own forests, and how they use them (Butler 2008).

Knowing the basic patterns of forest ownership is important, but knowing the trends is even more important. Best and Wayburn (2001) and Sampson and Decoster (2000), among others, have discussed the dynamics of family forest ownership patterns and their implications for forests and forestry. Decreasing parcel size, coupled with other landowner characteristics, is making sustainable forest management more difficult to practice. Unfortunately, there are little data to quantify these trends and most of these assumptions are based on anecdotal observations or weak analyses.

Forest landowner surveys have been conducted in United States since at least the 1940s (Barraclough and Rettie 1950) and three of these surveys were national in scope (Birch et al. 1982, Birch 1996b, Butler 2008). When making comparisons among surveys, the greater the similarities among the populations of interest, sampling

procedures, questionnaires, and data processing, the more accurate are the conclusions that can be made. Unfortunately, most surveys have differed by one or more of these attributes. Most forestland owner studies have focused on different areas, asked different sets of questions, used different wording/formatting for the questions that were in common, targeted different subpopulations, used incompatible sampling methodologies, and/or used different estimation procedures.

The objective of this article is to quantify trends in family forest ownership patterns across the northern United States. The US Forest Service conducted national surveys of private forest owners in 1978 (Birch et al. 1982), 1993 (Birch 1996b), and 2006 (Butler 2008). The raw data from the 1978 survey were not available and therefore were dropped from this analysis. Although similar methods were used in the 1993 and 2006 surveys, the published results are not directly comparable (Butler 2008). There were some differences between the 1993 forest area data used by Birch (1996b) and other contemporary data sources describing forest resources across the United States, such as Powell et al. (1993). The regionwide differences were small, less than 1%, but for some states the differences were as much 7%. In addition, the reports for the 1993 and 2006 surveys focused on different populations of interest. In 1993, the population of interest was private landowners, i.e., corporations, family forest owners, and other private owners, and in 2006 it was just a subset of this group, i.e., family forest owners. For this article, we have taken the raw data from the 1993 and 2006 surveys and reprocessed the data using the same methods with compatible forest area estimates and for the same population of interest, i.e., family forest owners. We analyzed the data elements in common between the two surveys: size of forest holdings; reasons for owning; land tenure; absentee ownership; farm ownership; harvesting practices; and age, income, education, and occupation of the owners.

Received September 11, 2009; accepted May 18, 2010.

Brett J. Butler (bbutler01@fs.fed.us), US Forest Service, Northern Research Station, 160 Holdsworth Way, Amherst, MA 01003. Zhao Ma (zhao.ma@usu.edu), Department of Environment and Society, Utah State University, 5215 Old Main Hill, Logan, UT 84322. The authors are grateful to the three anonymous reviewers whose comments helped us improve this article. This article is a product of the Family Forest Research Center ([www.familyforestresearchcenter.org](http://www.familyforestresearchcenter.org)), a joint venture between the US Forest Service and the University of Massachusetts-Amherst.

Copyright © 2011 by the Society of American Foresters.

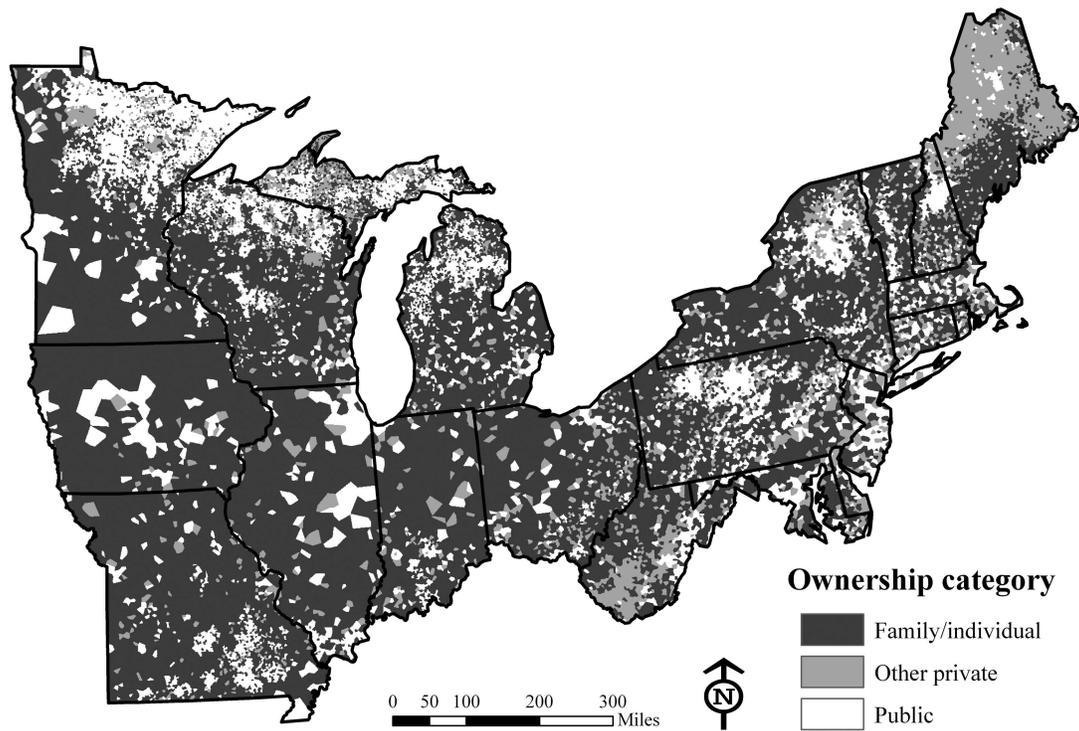


Figure 1. Generalized forestland ownership patterns across the northern United States. See text for methods, interpretation, and caveats.

## Methods

As noted previously, the US Forest Service conducted surveys of forest owners in 1993 (Birch 1996a) and 2006 (Butler 2008) that spanned, among other areas, the northern United States. Both surveys used an area-based sampling frame. A stratified, random set of points was distributed across the 20 states. Each point was classified as forest or nonforest using remotely sensed data and ground truthing and, for the forested points, ownership information was collected from property tax records. All private landowners were then mailed self-administered questionnaires. The numbers of respondents were 6,180 in 1993 and 9,280 in 2006 with cooperation rates of 48 and 56%, respectively. The years 1993 and 2006 are nominal dates. The earlier data were collected between 1989 and 1993. The latter data were collected between 2002 and 2006.

Estimates of the numbers of forest owners were made using a probability-proportional to size estimator (Butler et al. 2005). This approach is needed because the sampling frame is area based and, hence, the probability of an owner being selected is a function of the total area of forestland, the sampling intensity, and the acres of forestland he/she owns. The forest area statistics used in Birch (1996a) were not documented. To maximize comparability between the 1993 and 2006 surveys, a common data source for forest area statistics was used—the Renewable Resource Planning Act (RPA) Assessments that are published once every 5 years with a major emphasis on trend analysis. The 1993 numbers came from the 1992 RPA (Powell et al. 1993) and the 2006 numbers came from the 2007 RPA (Smith et al. 2009). The raw data from the 1993 owner survey were reprocessed using these forest area numbers and procedures identical to those used for the 2006 data (Butler et al. 2005). All analyses were limited to family forest owners.

In calculating the percentages reported later, respondents who failed to respond to a specific question (i.e., item nonresponse) were treated as missing values and were excluded from the percentage

calculations. In the absence of this approach, changes in item non-response could obscure signals in the data. Statistical differences in Table 1 were assessed using two-tailed, two-proportion  $z$ -tests (Fisher and van Belle 1993).

The landownership map (Figure 1) represents broad ownership patterns across the northern United States. To create this map, we first created a point coverage of the ownership categories observed at each FIA sample point; the exact coordinates were fuzzed. We then converted this point coverage into a raster coverage and assigned values to the unknown cells based on the value of the nearest known value, i.e., the nearest FIA sample point. The nonforest pixels could have then been masked, but we opted not to do so because it would have obscured the ownership patterns. Ours is a simplistic method that shows general patterns, but it is of little use at fine scales. The accuracy of the map increases with sampling intensity and homogeneity of ownership patterns and breaks down where there is relatively little forestland.

## Results

Although the number of acres owned by family forest owners increased slightly between 1993 and 2006 across the northern United States, the number of family forest owners increased appreciably. In 1993, there was 93.5 (sampling error of 1.1%) million ac of family forestland and in 2006, there was 94.0 (SE = 0.6%) million ac. In 1993, there were 3.8 (SE = 5.5%) million family forest owners and in 2006, this number increased to 4.7 (SE = 3.2%) million owners. The average size of family forest holdings decreased from 25 ac in 1993 to 20 ac in 2006—a 20% reduction.

When comparing family forestland and owners across forest holding size categories, the largest change was the increase in the number of family forest owners with small, 1–9 ac, holdings (Table 1; Figure 2). Although 6.6% of the family forestland was in holdings of 1–9 ac in 1993, this percentage increased to 9.5% in 2006. The

**Table 1. Percentage of family forestland and owners in the northern United States by selected attributes, 1993 and 2006.**

Attribute	Area (%)		Owners (%)	
	1993	2006	1993	2006
Size of forest holdings (ac)				
1–9	<b>6.7</b>	<b>9.5</b>	<b>53.6</b>	<b>61.0</b>
10–19	7.9	8.5	15.3	13.6
20–49	20.3	20.7	16.8	14.4
50–99	21.9	21.5	8.5	6.7
100–199	<b>19.5</b>	<b>18.1</b>	<b>3.9</b>	<b>3.0</b>
200–499	<b>15.5</b>	<b>13.6</b>	<b>1.7</b>	<b>1.1</b>
500–999	4.1	3.9	0.2	0.1
1,000+	4.2	4.3	0.1	0.1
Distance from forestland to primary residence				
<1 mi (resident)	66.8	65.8	76.3	76.9
>1 mi (absentee)	33.2	34.2	23.7	23.1
Harvested trees				
Yes	<b>69.7</b>	<b>66.3</b>	<b>49.1</b>	<b>46.8</b>
No	<b>30.3</b>	<b>33.7</b>	<b>51.0</b>	<b>53.2</b>
Land tenure (yr)				
<10	15.9	16.6	25.9	22.3
10–24	35.9	34.9	<b>38.7</b>	<b>40.0</b>
25–49	39.3	40.5	<b>29.3</b>	<b>33.7</b>
50+	<b>8.8</b>	<b>7.9</b>	<b>6.1</b>	<b>4.0</b>
Occupation				
White collar	<b>29.8</b>	<b>26.4</b>	<b>34.2</b>	<b>28.9</b>
Blue collar	15.6	15.0	<b>20.5</b>	<b>18.5</b>
Farmer	<b>17.3</b>	<b>8.0</b>	<b>10.0</b>	<b>3.8</b>
Homemaker	<b>2.5</b>	<b>0.9</b>	1.9	1.5
Retiree	<b>34.7</b>	<b>49.7</b>	<b>33.3</b>	<b>47.2</b>
Age (yr)				
<45	<b>16.3</b>	<b>9.9</b>	<b>26.9</b>	<b>13.0</b>
45–64	<b>45.1</b>	<b>50.5</b>	<b>41.4</b>	<b>53.1</b>
65+	38.7	39.6	<b>31.8</b>	<b>33.9</b>
Annual household income (\$1,000)				
<50	<b>61.9</b>	<b>44.7</b>	<b>66.8</b>	<b>45.4</b>
50–99	<b>24.5</b>	<b>33.7</b>	<b>23.4</b>	<b>36.7</b>
100+	<b>13.6</b>	<b>21.6</b>	<b>9.9</b>	<b>17.9</b>
Education				
Bachelor's degree or higher	34.5	34.3	<b>29.6</b>	<b>32.1</b>

Bold numbers are significantly different at the 0.05 level.

largest decreases were in the 100- to 199-ac (from 19.5 to 18.1%) and 200- to 499-ac categories (from 15.5 to 13.6%).

Across the 20 states in the region, the smallest average holding sizes were found in the most densely populated states; Connecticut, Delaware, Maryland, Massachusetts, New Jersey, and Rhode Island had averages of less than 10 ac (Figure 3). The largest average holding sizes, of 30 or more ac, were found in Missouri, Vermont, and West Virginia. Changes in average holding sizes between 1993 and 2006 varied considerably across the region (Figure 4). Relatively little change was observed in Missouri, Pennsylvania, or West Virginia. Large, 25% or greater, decreases were observed in 11 states: Delaware, Illinois, Indiana, Iowa, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, and Rhode Island.

The relative importance of the reasons for owning remained relatively constant across the two time periods with amenity values remaining the dominant reasons (Table 2). Based on area, aesthetics and recreation were the top two reasons in both 1993 and 2006. Based on number of owners, part of home and aesthetics were the top two reasons in 1993 and 2006. In addition to this stable trend, there were slight shifts in the rankings of several specific reasons. In area terms, aesthetics, part of farm, and timber production decreased slightly in relative importance from 1993 to 2006; and recreation, family legacy, and land investment increased in relative importance. In owner terms, part of home and part of farm decreased in relative

importance from 1993 to 2006; and aesthetics, family legacy, and land investment increased in relative importance. Although financial reasons for owning were consistently low in 1993 and 2006, the relative importance of timber production and land investment flipped and now land investment is a more important financial objective than timber production.

Land tenure and absentee ownership remained fairly constant between 1993 and 2006 (Table 1). The percentage of area owned by absentee owners stayed around one-third and the percentage of absentee owners around one-quarter. Most land was owned from moderately long (10–24 years) to long (25–49 years) periods of time. The average length of land tenure in 2006 was 23 years.

The percentages of family forestland and owners who have harvested trees decreased. Although the difference is statistically significant, the percentage change is small—a decrease of between 2 and 3 percentage points.

The demographics of the family forest owners changed appreciably. On average, family forest owners are now more likely to be older, have a higher nominal income, and be more educated (Table 1). Occupationally, the largest changes were an increase in the percentage of retirees and a decrease in the percentage of farmers.

## Discussion

This article provides evidence of the direction and magnitude of changes in family forest ownership trends across the northern United States. Parcelization is occurring on the landscape. This seems like a given, but before this study, it has not been well quantified. As the size of the parcel decreases, the ability of landowners to commercially manage their land for timber production also decreases (Sampson and DeCoster 2000). From a landowner services and education perspective, the increasing number of owners, particularly those with smaller parcels, is a challenge that many agencies and professionals are now facing and trying to address (Hull et al. 2004). There is also an untested assumption that parcelization leads to fragmentation—the physical breaking up of the forest resource—and the myriad ecological impacts that can ensue.

From 1993 to 2006, the amount of family forestland increased 500,000 ac across the 20 northern states. This number could reflect a shift from industrial land to family forestland. It is important to understand the interactions among different landownership groups. Particularly, concerns have been raised in recent years regarding forest product companies divesting their timberland, land being sold to institutional investors, Timber Investment Management Organizations (TIMO), or Real Estate Investment Trusts (REIT), and, subsequently, subdividing and selling land to individual families and developers (Bliss and Kelly 2008). In 2006, TIMOs and REITs were involved in transactions amounting to more than 7 million ac of forestland across the United States (Fernholz et al. 2007). Because TIMOs and REITs are obligated to manage their properties for the benefit of their investors, this priority is reflected in the type of forest management that is practiced—when keeping forestland intact and well managed does not bring in competitive economic returns for their investors, TIMOs and REITs are obligated to sell land. Further efforts are needed to better understand the dynamics among industrial owners, TIMOs, REITs, and family forest owners, and the implications for forest management, forest parcelization, and forest conversion.

Amenities, such as aesthetics and privacy, remain the most prevalent reasons for family forest owners to have land in the northern United States. An interesting change is that the relative importance

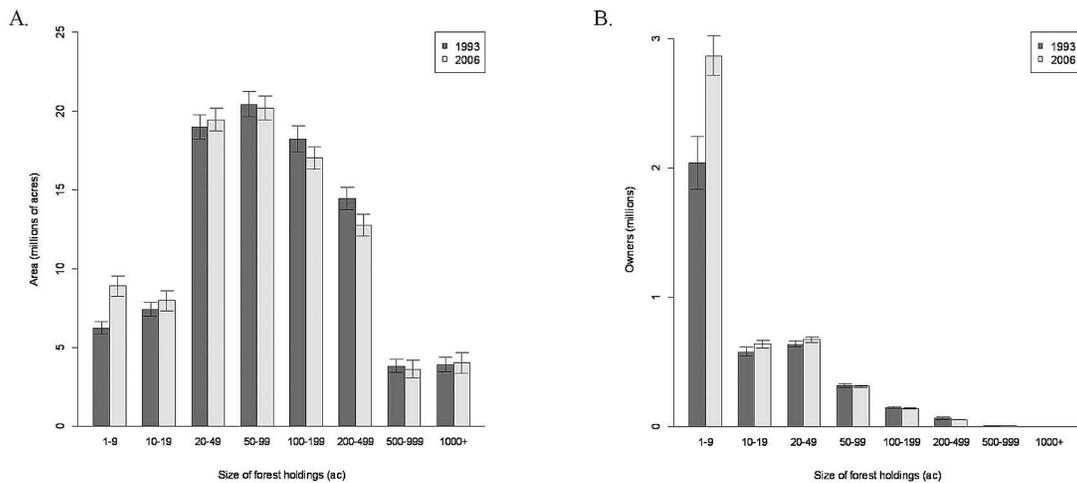


Figure 2. (A) Family forestland and (B) family forest owners by size of forest holdings in the northern United States, 1993 and 2006.

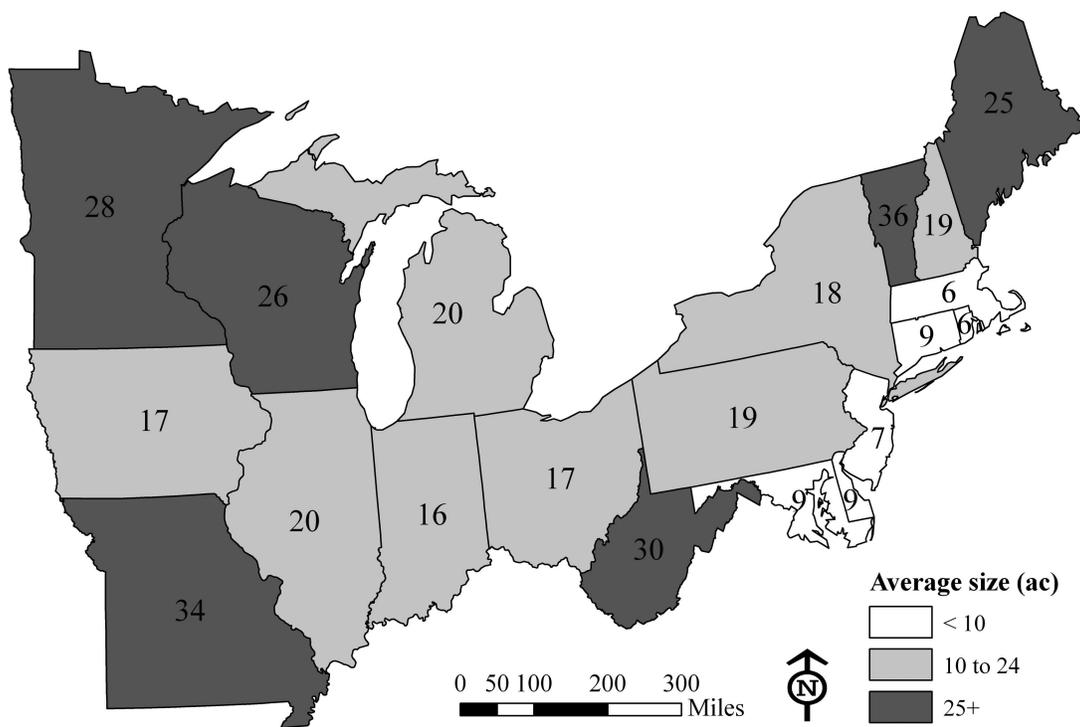


Figure 3. Average size of family forest holdings in the northern United States by state, 2006.

of owning land as an investment increased slightly between 1993 and 2006 based on both area and number of owners. If land is an investment, the owner may be less emotionally attached to the land. As development pressures and land values increase, these investment properties are therefore more susceptible to be sold and converted to nonforest uses. This presents a new challenge for forestry professionals to design outreach programs that target these owners, identify additional financial opportunities, and reduce the potential of development.

A slight decrease was observed in the relative importance of timber production based on area, which is consistent with results presented in other studies. Although timber production is not an important objective for a majority of owners, nearly one-half have harvested trees (Table 1). An implication here is that when communicating with family forest owners, forestry professionals do not

need to shy away from discussions about harvesting, but harvesting should not be discussed solely for the purposes of timber production, but in light of the owners' primary reasons for owning, such as maintaining the aesthetics of the land.

Of all the comparisons made in this article, the comparison of reasons for owning was the most difficult. Making comparisons between ranking and rating responses is tenuous; thus, our results need to be viewed cautiously. However, we present this comparison because we believe it is an important topic and our approach does provide new information and contributes to the trend analysis.

Decreasing average forest holding size along with changing land-owner characteristics is changing how owners view their land—the opportunities and barriers they perceive in meeting their personal goals. Services and programs directed toward family forest owners



Figure 4. Decreases in average size of family forest holdings in the northern United States between 1993 and 2006 by state.

Table 2. Relative importance of reasons for owning family forestland in the northern United States, 1993 and 2006.

Reason for owning	Area (rank)		Owners (rank)	
	1993	2006	1993	2006
Aesthetics	1	2	2	1
Recreation	2	1	3	3
Part of home	3	3	1	2
Part of farm	4	6	4	6
Family legacy	5	4	5	4
Timber production	6	7	7	7
Land investment	7	5	6	5

need to readjust to meet this situation. How will landowners respond to the most recent economic crisis? Will they be receptive to carbon sequestration programs? What is their willingness to harvest trees for biomass? Where is forestland most threatened by development? These, and many others, are questions that revolve around the changing characteristics of family forests and family forest owners.

Making comparisons by aggregating all responses from a given survey (i.e., panel data), as was done here, is a common practice, but it is less than ideal. By making comparisons using point remeasurement, more precise changes can be calculated and change matrices can be constructed. This would prove particularly useful for examining parcelization. The National Woodland Owner Survey is planning to begin this type of remeasurement during its next iteration (Butler et al. 2005). In addition to looking at changes within the family forest owner category, it will also be useful to bring in dynamics associated with other ownership categories and other land uses, e.g., development.

The reliability of survey statistics is dependent on sample size, heterogeneity, response rates, and other factors (Dillman 2001). By aggregating state-level samples, the regional sample size is significantly larger and the resulting confidence intervals for the estimates

are much tighter than those for individual states. For many states in the region, the sample sizes are robust, but for others, such as Connecticut, Delaware, Maryland, Massachusetts, New Jersey, and Rhode Island, in particular, they need to be augmented. Sample sizes and sampling errors for state-level estimates for the 2006 data are discussed by Butler (2008).

Although this article focuses on the northern United States, similar analyses should be doable for other regions of the country. In the southern United States, family forest owners control 59% of the forestland and in the public lands dominated West, they control 12% (Butler 2008). Looking at differences in the state-level forest areas reported by Birch (1996b) and Powell et al. (1993), the differences in the southern United States are moderate, whereas those in the West are often very large. These differences need to be fully investigated to ensure trend analyses that are as accurate as possible.

## Conclusions

Family forest ownership patterns are changing. This article presents quantitative evidence of this phenomenon that most forestry professionals have been observing for years. Parcelization is a fact that the forestry and natural resource community must adapt to. It is likely that this trend will continue and the issues associated with it will be further exacerbated.

Apart from parcelization, there are important demographic and attitudinal shifts among the owners. There is a continual turnover of landowners, about 17% of the land was owned by “new” owners. Not only are they likely to own smaller parcels, but they are less likely to be farmers and, hence, have a different relationship with the land. Amenity values are paramount for family forest owners and will, in all likelihood, continue to be. This is important when trying to understand and reach family forest owners (Butler et al. 2007). The change in relative importance between timber production and land investment is an interesting phenomenon that deserved further investigation.

Although this article presents solid trend information for family forest owners of the northern United States, improvements can be made. Additional efforts, additional resources, and better planning will allow for more detailed and accurate trends to be assessed in the future. Apart from the methodological issues, family forest owners are dynamic and periodic reassessments are required if we desire to fully understand the forest resources of the northern United States.

## Literature Cited

- BARRACLOUGH, S., AND J.C. RETTIE. 1950. *The ownership of small private forest-land holdings in 23 New England towns*. US For. Serv., Northeast. For. Exp. Stn. Pap. No. 34. 32 p.
- BEST, C., AND L.A. WAYBURN. 2001. *America's private forests: Status and stewardship*. Island Press, Washington, DC. 268 p.
- BIRCH, T.W. 1996a. *Private forest-land owners of the northern United States, 1994*. US For. Serv., Northeast. For. Exp. Stn. Resour. Bull. NE-136. 293 p.
- BIRCH, T.W. 1996b. *Private forest-land owners of the United States, 1994*. US For. Serv., Northeast. For. Exp. Stn. Resour. Bull. NE-134. 183 p.
- BIRCH, T.W., D.G. LEWIS, AND H.F. KAISER. 1982. *The private forest-land owners of the United States*. US For. Serv. Resour. Bull. WO-1. 64 p.
- BLISS, J.C., AND E.C. KELLY. 2008. Comparative advantages of small-scale forestry among emerging forest tenures. *Small Scale For.* 7(1):95–104.
- BUTLER, B.J. 2008. *Family forest owners of the United States, 2006*. US For. Serv., North. Res. Stn. Gen. Tech. Rep. NRS-27. 73 p.
- BUTLER, B.J., E.C. LEATHERBERRY, AND M.S. WILLIAMS. 2005. *Design, implementation, and analysis methods for the National Woodland Owner Survey*. US For. Serv., Northeast. Res. Stn. Gen. Tech. Rep. NE-336. 43 p.
- BUTLER, B.J., M.G. TYRRELL, S. FEINBERG, L. VANMANEN, WISEMAN, AND S. WALLINGER. 2007. Understanding and reaching family forest owners: Lessons from social marketing research. *J. For.* 105(7):348–357.
- DILLMAN, D.A. 2001. *Mail and internet surveys: The tailored design method*. Wiley, New York. 464 p.
- FERNHOLZ, K., J. BOWYER, AND J. HOWE. 2007. *TIMOS & REITS: What, why, & how they might impact sustainable forestry*. Dovetail Partners, Inc., Minneapolis, MN. 13 p.
- FISHER, L.D., AND G. VAN BELLE. 1993. *Biostatistics*. Wiley, New York. 991 p.
- HULL, R.B., D.P. ROBERTSON, AND G.J. BUHYOFF. 2004. Boutique forestry: New forest practices in urbanizing landscapes. *J. For.* 102(1):14–19.
- LABAU, V.J., J.T. BONES, N.P. KINGSLEY, H.G. LUND, AND W.B. SMITH. 2007. *A history of the forest survey in the United States: 1830-2004*. US For. Serv. FS-877. 82 p.
- POWELL, D.S., J.L. FAULKNER, D.R. DARR, Z. ZHU, AND D.W. MACCLEERY. 1993. *Forest resources of the United States, 1992*. US For. Serv., Rocky Mtn. For. and Range Exp. Stn. Gen. Tech. Rep. RM-234. 132 p.
- SAMPSON, R.N., AND L. DECOSTER. 2000. Forest fragmentation: Implications for sustainable private forests. *J. For.* 98(3):4–8.
- SMITH, W.B., P.D. MILES, C.H. PERRY, AND S.A. PUGH. 2009. *Forest resources of the United States, 2007*. US For. Serv. Gen. Tech. Rep. WO-78. 336 p.