



Family Forest Ownerships Trends in the United States, 2013–2023: Results from the USDA Forest Service, National Woodland Owner Survey

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Received: 17 November 2025 / Accepted: 31 March 2026

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Abstract

An estimated 37% of the forestland across the United States, excluding Interior Alaska, is controlled by family forest ownerships. This paper examines trends in family forest ownerships with 4+ ha (10+ ac) based on data from the 2013, 2018, and 2023 iterations of the USDA Forest Service's National Woodland Owner Survey (NWOS). The overall profile of family forest ownerships remained relatively consistent between 2013 and 2023, but there were some significant changes. The percentage of ownerships with a primary decision-maker older than 68 years (the median age in 2023) increased from 32 to 46%. Several reasons for owning forestland and concerns for their land decreased, but the only ones that were significantly different were timber production as a reason for owning, which went from 23 to 21%, and concern about wildfire, which went from 64 to 57%. Harvesting trees for sale and for personal use significantly decreased from 18 to 14% and 41 to 35%, respectively. Participation in preferential property tax, conservation easement, and green certification programs increased from 15 to 18%, 2 to 4%, and 1 to 2%, respectively. These results provide important information for understanding the motivations and needs of family forest ownerships and are essential for monitoring the impacts of existing programs and services, as well as informing future programs and services.

Keywords Private forest owners · Non-industrial private forest owners (NIPF) · Nonindustrial private forest owners (NIPF) · Small-scale forestry · Forest Inventory and Analysis (FIA) · National Woodland Owner Survey (NWOS)

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Introduction

How are America's family forest ownerships changing? And equally important, how are they staying the same? To answer these questions, results from the latest iterations of the USDA Forest Service (Forest Service)'s National Woodland Owner Survey (NWOS) are presented. This is a companion article to the "Family Forest Ownerships of the United States, 2023" report (Butler et al. [In press](#)) which provides descriptive statistics for the results but is selective in the trends shown and purposefully avoids discussion of the results.

Family forests provide countless benefits, from timber and nontimber products to wildlife habitat to places for recreation (Caputo and Butler [2017](#)). The production and distribution of these benefits is determined by the owners and managers of these lands, working within the given biophysical and socioeconomic environments. Thus, anyone interested in the conservation of forest resources should also be interested in the human dimension of forests, including forest landowners.

Across the United States, as throughout many countries (FAO [2020](#)), family forest ownerships—families, individuals, trusts, estates, and family partnerships—are the predominant forest ownership type. An estimated 37% (105 million ha or 259 million ac) of forestland across the nation, excluding Interior Alaska, is owned by family forest ownerships (Fig. [1](#); Butler et al. [In press](#)). This is more than any other ownership type. While forest ownership patterns vary substantially across the United States, with private forests dominating in the east and public forests dominating in the west, there is substantial acreage of family forests in all states (Fig. [2](#)).

This article uses the terms forestland and family forestland as defined by the Forest Service Forest Inventory and Analysis program. Forestland is land that is at least "1 acre (0.4 ha) in size and 120 feet (36.6 m) wide" and "has at least 10 percent canopy cover of trees of any size, or has had at least 10 percent canopy cover of trees in the past, based on the presence of stumps, snags, or other evidence, and that will be naturally or artificially regenerated" (USDA FS [2023a](#), p. 10). This definition, which is the official US definition, differs from the international definition used in some reports, primarily due to the threshold for inclusion of lower productivity forests (Murray et al. [2025](#)). Family forest ownerships are "families, individuals, trusts, estates, and family partnerships that own at least one acre [0.4 ha] of forest land in the United States" (Butler et al. [In press](#)).

There are an estimated 11 million family forest ownerships with forest holdings of 0.4 ha (1.0 ac) or more in the United States (Butler et al. [In press](#)). Most ownerships (67%) have holdings of 0.4 to 3.9 ha (1 to 9 ac) of forestland (Fig. [3](#)). But most family forest acreage (76%) is in forest holdings of 4 to 404 ha (10 to 999 ac). Looking at just ownerships with 4+ ha (10+ ac) of forestland, there are an estimated 3.6 million family forest ownerships (36% of family forest ownerships) that own 97 million ha (239 million ac), which accounts for 92% of the family forest acreage. Ownerships with less than 4 ha of forestland are often excluded from many traditional forestry assistance programs, such as preferential property tax programs (Frey et al. [2019](#)), and are substantially less likely to have a forest management plan,

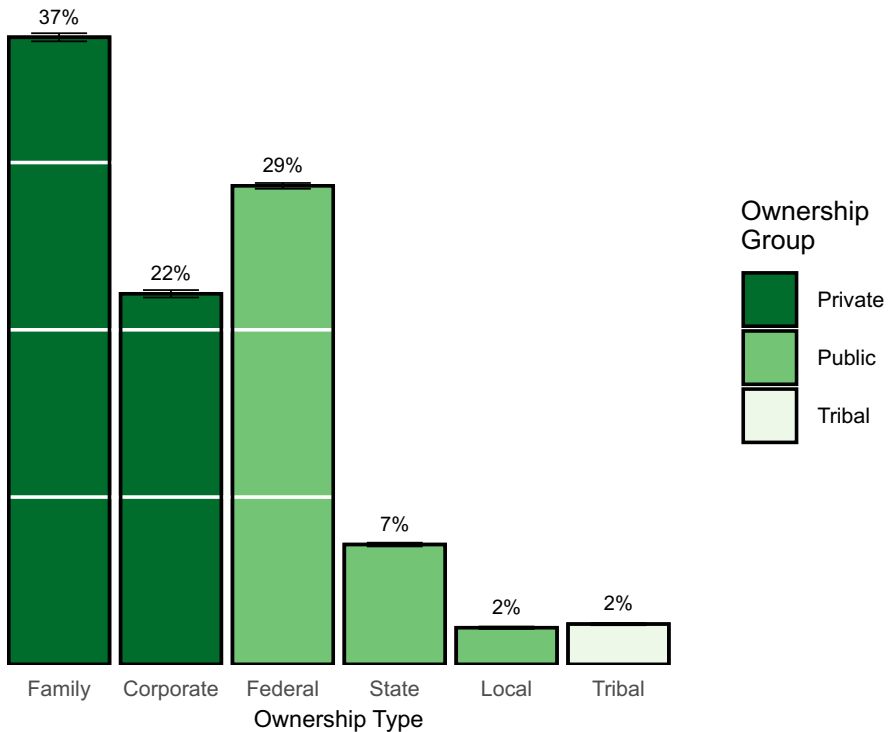


Fig. 1 Distribution of forestland by ownership group and type, United States*, 2023. Error bars, which are small and difficult to discern in this figure, represent 95% confidence intervals. Data source: Forest Service Forest Inventory and Analysis, Nationwide Forest Inventory. * Excluding Interior Alaska

commercially harvest trees, or otherwise participate in traditional forest management activities (Butler et al. 2021b).

Over the past decades, there have been hundreds of research articles focused on family forest ownerships in the United States and a few reviews of this literature (Beach et al. 2005; Silver et al. 2015; Floress et al. 2019; Butler et al. 2023a). Butler et al. (2023a) conducted a systematic review of US family forest literature published between 2010 and 2019. They (Butler et al. 2023a) found the primary research topics to be forest management, policies and programs, and owner and land characteristics. Common findings across these studies included: many landowners having relatively low engagement in traditional forest management practices, such as commercial timber harvesting; landowners having low awareness and participation in assistance programs; most owners being older than the general population; amenity values, such as privacy and nature protection, being important reasons for owning land; size of forest holdings being a relatively strong predictor of other attributes, such as timber harvesting; and overall, the statistical models having low predictive power for behaviors such as program participation (Butler et al. 2023a). Beach et al. (2005) and Silver et al. (2015) found

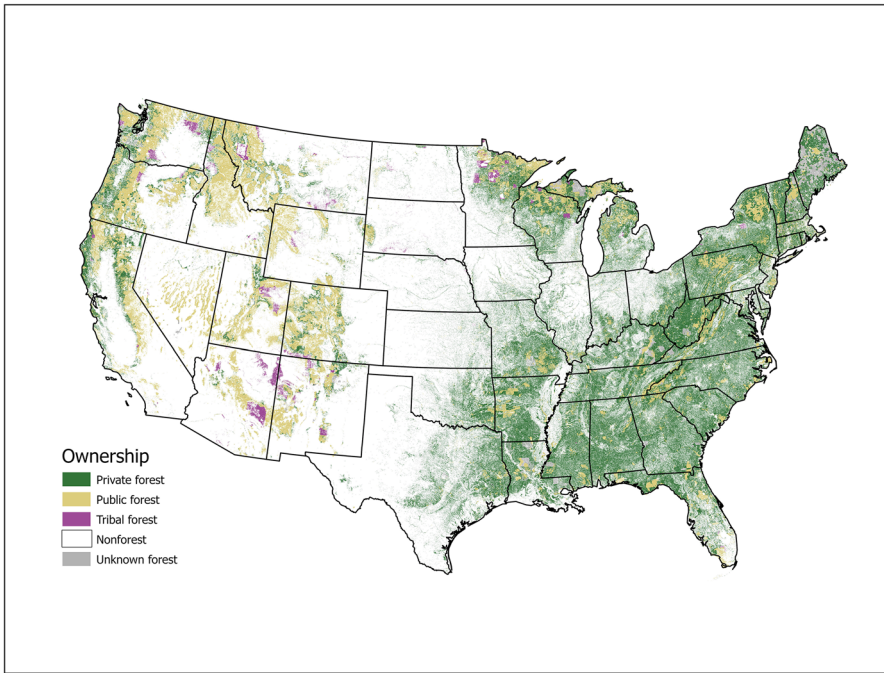


Fig. 2 Forest ownership across the conterminous United States, 2022 (Harris et al. 2025)

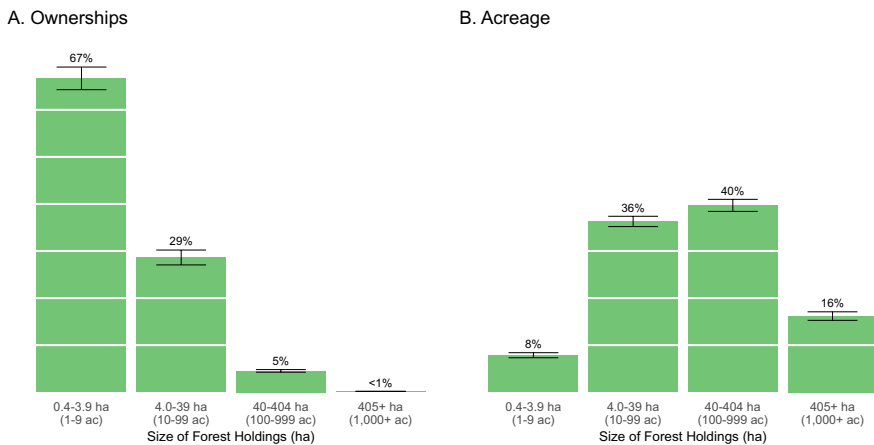


Fig. 3 Percentages of family forest **A)** ownerships and **B)** acreage by size of forest holdings, United States*, 2023. Error bars represent 95% confidence intervals. Data source: Forest Service Forest Inventory and Analysis, National Woodland Owner Survey. * Excluding Interior Alaska

variables included in timber harvesting models of nonindustrial private or family forest owners to be inconsistent and the relationships with harvesting to also be inconsistent. The most common variables tested were stumpage price, size of

holdings, growing stock, and owner income. Stumpage price, size of holdings, and growing stock tended to be positively associated with harvesting, while association with owner income was mixed. Looking across a broader set of family forest owner behaviors, Floress et al. (2019) found owner characteristics, ownership objectives, policy tools, past and future behaviors, and stand conditions to be common categories of variables tested with the significance and directions of the associations varying across studies. Most studies of family forest ownerships in the US were state-level, and of those conducted at the national level, the NWOS was the dominant data source. Most studies were conducted only once. The primary example of a study with repeat measurements is the NWOS (Sass et al. 2023).

The NWOS (<https://research.fs.usda.gov/programs/nwos>) is part of the Forest Service's Forest Inventory and Analysis program, which is legislatively mandated to conduct and keep current an inventory of the forests of the United States (PL 95–307 § 3, PL 105–185 § 253). The most recent iteration of the NWOS was implemented between 2019 and 2023 (Butler et al. *In press*). Previous iterations were conducted between 2017 and 2018 (Butler et al. 2021a), between 2011 and 2013 (Butler et al. 2016), between 2002 and 2006 (Butler 2008), and in 1993 (Birch 1996). These iterations are referenced by their terminal years for brevity. Comparisons are limited between iterations due to changes in sampling and estimation methods and questions asked, all of which stabilized starting with the 2013 NWOS. This paper goes beyond the Forest Service reports, which focus on providing summary, tabular data and are intentionally limited in terms of discussion of the results. Huff et al. (2019) was a methodologically focused paper that examined the potential of using the NWOS in a longitudinal analytical framework. Sass et al. (2023) analyzed the NWOS data using a panel analytical framework, as is done here, but they did not have access to the 2023 NWOS data and examined a different set of attributes.

This article presents trends in family forest ownerships of the United States between 2013 and 2023 based on findings from the Forest Service's National Woodland Owner Survey. The focus is on family forest ownerships with forest holdings of 4+ ha (10+ ac). The goal of these analyses is to quantify what is and what is not changing in terms of family forest ownership attributes in the United States.

Methods

The data in this article come from three iterations of the Forest Service's National Woodland Owner Survey (NWOS): 2011–2013 (Butler et al. 2016), 2017–2018 (Butler et al. 2021a), and 2019–2023 (Butler et al. *In press*), each referenced by its terminal year. Although some content varied, as detailed below, the methods used to implement these three iterations of the NWOS were identical. The NWOS is conducted by the Family Forest Research Center, a joint venture between the Forest Service and the University of Massachusetts Amherst. Survey content and methods were approved by the US Office of Management and Budget (OMB No. 0596–0078) and the University of Massachusetts Amherst Institutional Review Board (UMass IRB No. 684 2016–2908). A summary of the methods is provided below, and

additional details are available in the referenced technical reports, as well as in Butler and Caputo (2021) and Butler and Caputo (2022).

Survey Methods

The NWOS uses an area-based sample design with inclusion probabilities proportional to size of forest holdings. A hexagonal grid was created for each state with the grid cell sizes based on the target number of responses (i.e., 250 family forest ownerships per state), area of family forestland, and anticipated response rates. A randomly located sample point was identified in each cell. The ownerships were identified from public tax records and land uses were determined using a combination of aerial photography and field verification. Family forest ownerships with forested sample points were invited to participate in the NWOS.

The Tailored Design Method (Dillman et al. 2014) was used to implement the NWOS. The primary contact mode for the NWOS is mail-based because names and addresses are the only contact information consistently available from the sampling frame. Each ownership was contacted up to four times. The first contact was a postcard alerting them to a forthcoming questionnaire. The second mailing contained the questionnaire, a cover letter, and a postage-paid, business-reply return envelope. The third mailing was a thank you/reminder postcard. For those who had not yet responded, they received another mailing containing the questionnaire, a cover letter, an insert with a URL for completing the questionnaire online, and a post-paid, business-reply return envelope.

Returned questionnaires were digitally scanned and data were captured using optical mark/optical character recognition software. All data were subsequently verified by a person, and a series of range and logic checks were performed. Questionnaires with less than 75% of the qualifying questions completed were treated as nonresponse. Missing responses in the remaining questionnaires (e.g., 3% percent of the values for the 2023 NWOS) were imputed using chained equation, multivariate imputation (van Buuren 2018).

Cooperation rates for family forest ownerships for the 2013, 2018, and 2023 NWOS iterations were 52%, 40%, and 29%, respectively (Butler et al. 2016, 2021a, Butler et al. *In press*). This represents a substantial decrease over the 10-year period but is higher than most comparable surveys and is consistent with broader trends in decreasing response rates for mail-back surveys (Stedman et al. 2019). Nonresponse assessments for each iteration showed similar findings with little evidence for significant nonresponse bias. If bias is present, it appears to be towards ownerships that are more “engaged.” For example, the NWOS 2023 nonresponse assessment (Butler et al. *In press*) showed that early responders, as compared to late responders, were slightly more likely to have rated timber as an important or very important reason for owning their forestland, have longer land tenure, have a written forest management plan, have harvested timber for sale, have participated in a property tax program, have received forest management advice, and have older primary decision-makers. The two groups did not significantly differ in terms of size of forest holdings, having forestland as part of their primary residence, rating beauty/scenery as an important

or very important reason for owning their forestland, rating keeping land intact for heirs as a concern or great concern, or rating transferring land in the next five years as likely or extremely likely.

The samples for the analyses presented in this article were limited to family forest ownerships with 4+ ha (10+ ac) of forestland in the United States. The sample was further constrained to geographies that had at least two responses in each of the sampling periods. This resulted in the dropping of Interior Alaska (see Cahoon et al. [2020] for a delineation of this region), Nevada, and Wyoming; the remaining geographies represented over 99% of the family forestland in the United States. The sample sizes for the analyses were 7,393, 8,323, and 10,912 family forest ownerships with 4+ ha of forestland for the 2013, 2018, and 2023 NWOS iterations, respectively.

Data Coding/Recoding

Of the 235 numeric variables from the 2023 NWOS, 35 were selected for highlighting in this article. There were too many variables in the full set to coherently analyze in a single article. The highlighted variables were purposively selected to represent the breadth of family forest ownership attributes. The selection was based on published literature and the author's personal experience as the director of the NWOS for 25 years and co-director of the Family Forest Research Center for more than 20 years. Metadata for the variables, including descriptions, question wording, and coding, are provided in Appendix 1. Descriptive statistics and analyses for all 235 variables are included in Appendix 2.

To allow cross-comparisons and simplify analyses and discussion, all variables were coded as binaries. Of the highlighted variables, 20 were simple categorical variables, 11 were Likert-scale variables, 3 were continuous variables, and 1 was a "check one" categorical variable.

The simple categorical variables were inherently yes/no binary variables. "Yes" responses were coded as 1 s and "no" responses were coded as 0 s. For questions with "don't know" or "not applicable" options, these responses were treated as "no" responses (i.e., coded as 0 s).

The Likert-scale questions were recoded using a "box-2" approach. A response was coded as 1 if the respondent rated a statement as a "4" or "5" on a five-point scale and 0 otherwise. All levels on the Likert-scale questions were labeled on the questionnaire. The 4s and 5s correspond to "important" and "very important" for the reasons for owning questions, "concern" and "great concern" for the concerns questions, and "likely" and "extremely likely" for the future land transfer question.

For continuous variables, responses were recoded as 0 if they were less than or equal to the median value of that variable and recoded as 1 if they were greater than the median value. The median values were taken from the 2023 population-level ownership estimates. These were 11 ha (27 ac) for size of forest holdings, 23 years for land tenure, and 68 years for age of the primary decision-maker.

Respondents were asked to select one option from a list of ownership types. If they selected “individual” or “joint, with husband or wife,” their response was coded as 1. Otherwise, it was coded as 0.

Data Estimation

Analyses were based on population-level estimates, which were presented in terms of percentages of family forest ownerships with 4+ ha of forestland in the United States. Percentages allowed for simplification of interpretation of results and helped mitigate issues related to changes in total family forestland area. Presenting just ownership-based statistics, and excluding area-based statistics, simplified presentation and discussion of the results. The correlations between the ownership- and area-based percentages were very high ($\rho = 0.97$) and the results showed very similar patterns. Both ownership- and area-based results are provided in Appendix 2 and a discussion of “Ownerships versus Acreage” is included below.

Population-level estimates were initially generated in terms of totals and subsequently converted to percentages. The sample design, including selection probabilities, were incorporated into the estimators following the approach outlined by Valliant et al. (2023). Variances were estimated using a bootstrapping approach (Efron and Tibshirani 1986). Standard errors (SE; i.e., $\sqrt{\text{Variance}}$) and 95% confidence intervals (i.e., $1.96 \times SE$) were calculated for all estimates. Due to the NWOS sample design, estimates were generated at the state-level and then summed to generate estimates for the United States. Estimates may not match previously published results due to how variables were recoded and because of the subset of states used.

Trend Analyses

Trend analyses were conducted by comparing national-level estimates for each pair of NWOS iterations (i.e., 2013 to 2023, 2013 to 2018, and 2018 to 2023) where there were variables in common. The 2018 and 2023 NWOS iterations asked the same questions, but there were some differences from the 2013 NWOS iteration primarily due to restructuring of questions (e.g., breaking up of matrix and other questions that had high item-nonresponse rates or were found to be difficult for respondents to answer) and the addition of a couple of new topics (e.g., carbon sequestration programs). The metadata in Appendix 1 indicates the variables that were included in each iteration.

Statistical differences between iterations were assessed using a bootstrapping approach, as outlined in Sass et al. (2023). Ninety-five percent confidence intervals were calculated for each variable and pair of NWOS iterations. Non-overlapping confidence intervals were deemed significantly different. Cohen’s h (Cohen 1988) was used to assess effect sizes or the magnitudes of the differences.

To interpret changes, it is important to understand the current values. As such, the first subsection of the results section presents the 2023 NWOS estimates for the variables selected for trend analyses in the subsequent section. The other subsection in the results provides summaries of the trend analyses. Ten-year percentage

point differences were reported. For variables available in all iterations, the differences between 2013 and 2023 iterations were reported. For variables only available in 2018 and 2023, the 5-year differences were multiplied by two to convert them to 10-year changes and make them comparable to the other variables.

Results

Results are presented for current (i.e., 2023) family forest ownership attributes and trends. Both sections are organized into four subsections:

- A. General Land and Ownership Characteristics: size of forest holdings, land tenure, type of ownership, whether forestland is associated with their primary residence or farm, intentions for transferring land, and age and sex of the primary decision-maker.
- B. Attitudes: reasons for owning and concerns
- C. Behaviors: past and future activities including timber harvesting, wildlife habitat improvement, invasive plant management, and wildfire hazard mitigation
- D. Management Practices and Programs: written forest management plans, receipt of forest management advice, and participation in property tax, conservation easements, cost-share, green certification, and carbon sequestration programs.

Results for the full set of NWOS variables, in terms of both ownerships and acreage, are available in Appendix 2.

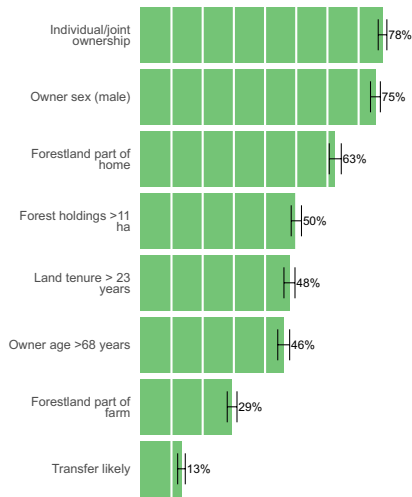
Current

Regarding current land and ownership characteristics (Fig. 4A), the median size of forest holdings for family forest ownerships with 4+ ha is 11 ha, and the median land tenure is 23 years. Most family forest ownerships are owned by one or two people (78% of family forest ownerships with 4+ ha of forestland in the United States) and are associated with a primary residence (63%). The median age of the primary decision-makers is 68 years, and most are male (75%).

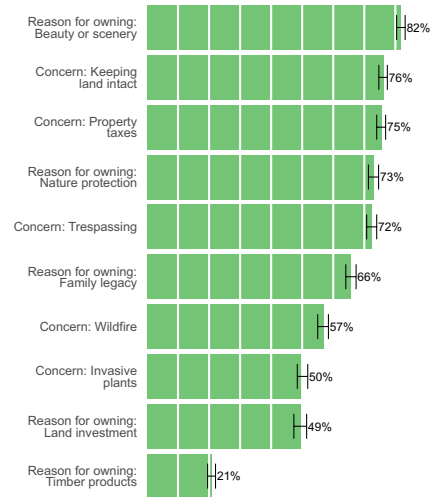
Most family forest ownerships have multiple reasons for owning their land, as well as multiple concerns (Fig. 4B). Many of the most common reasons for owning are related to amenity values, including beauty/scenery (82%) and nature protection (73%). Another common reason is family legacy (66%). Common concerns are related to their ability to keep their land intact for future generations (76%), high property taxes (75%), and wildfire (57%).

Forest management activities have occurred on the land of many family forest ownerships in the previous 5 years, and many expect some type of activity to occur in the subsequent 5 years (Fig. 4C). Thirty-five percent have harvested trees for their own use over the previous 5 years. Invasive plant management (24%) and wildlife habitat improvement (24%) are also relatively common activities.

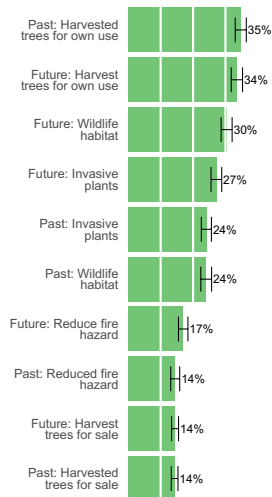
A. General land and ownership characteristics



B. Attitudes: Reasons for owning and concerns



C. Behaviors: Past and future activities



D. Management practices and programs

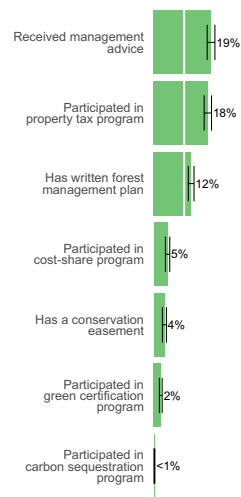


Fig. 4 A) General characteristics, B) attitudes, C) behaviors, and D) management practices of family forest owners with 4+ ha of forestland in the United States*, 2023. Error bars represent 95% confidence intervals. Data source: Forest Service Forest Inventory and Analysis, National Woodland Owner Survey. * Excluding Interior Alaska, Nevada, and Wyoming

Participation in forestry management and assistance programs is generally low (Fig. 4D). The most common practices are receiving forest management advice (19%) and participating in property tax programs (18%). Twelve percent have written forest management plans, and 5% or less have participated in cost-share, conservation easements, green certification, or carbon sequestration programs.

Trends

Across the 35 variables, the 10-year changes ranged from -7 to $+14$ percentage points with a mean change of 0 percentage points (Fig. 5). Twenty-six percent ($n=9$) of the variables significantly changed, with four of these variables increasing

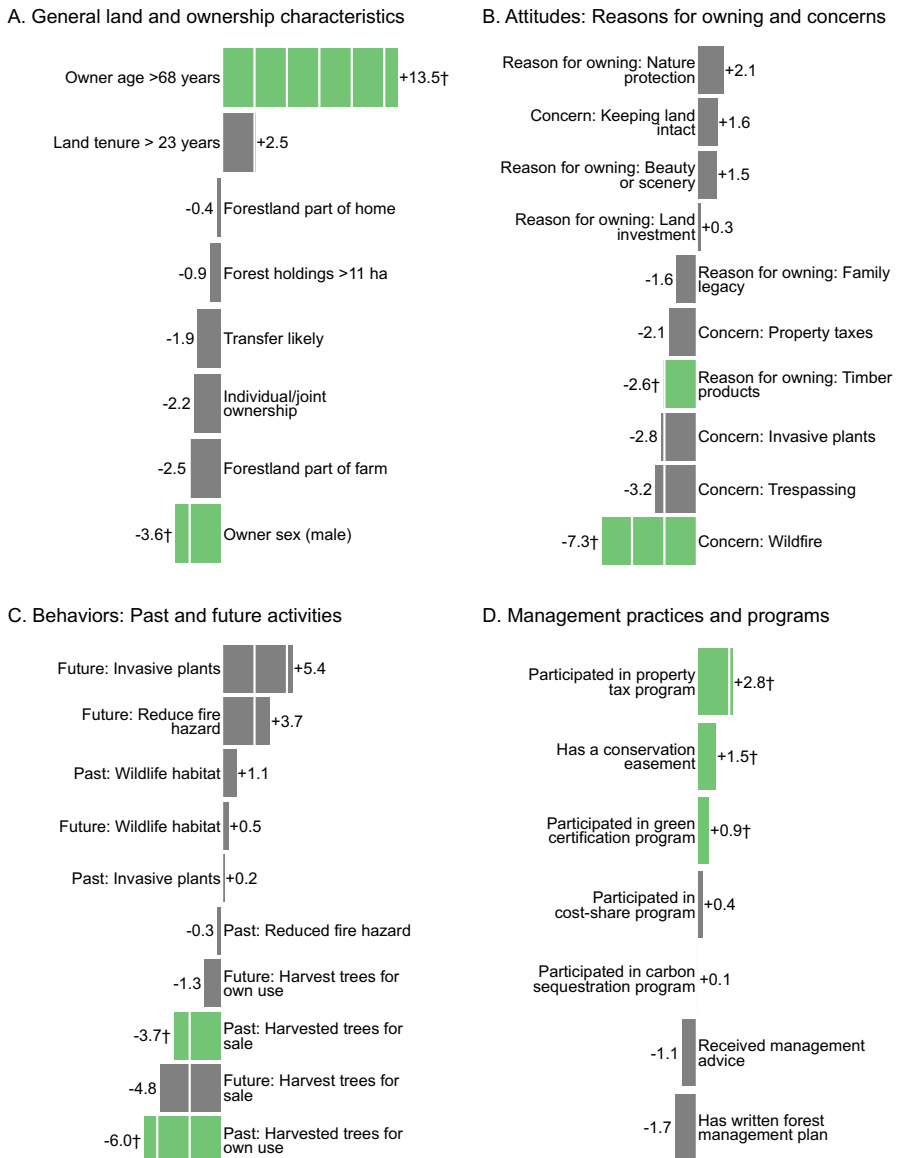


Fig. 5 Ten-year trends in **A)** general attributes, **B)** attitudes, **C)** behaviors, and **D)** management practices of family forest ownerships with 4+ ha of forestland in the United States*, 2013–2023. Data source: Forest Service Forest Inventory and Analysis, National Woodland Owner Survey. * Excluding Interior Alaska, Nevada, and Wyoming. Notes: Values are percentage point differences

and five decreasing. The effect sizes of the variables that were significantly different ranged from 0.06 to 0.28, with one greater than 0.2, 3 between 0.1 and 0.2, and the rest less than 0.1.

Among the land and ownership attributes, there was a significant increase in landowner age and a significant decrease in male landowners (Fig. 5A). Between 2013 and 2023, the percentage of family forest ownerships that had primary decision-makers that were 68 years of age or older increased by 14 percentage points, from 32 to 46% of the ownerships. The percentage of ownerships with tenure greater than 23 years also increased, but it was not statistically significant. The percentage of male primary decision-makers decreased from 79 to 75%, or stated otherwise, the percentage of female primary decision-makers increased from 21 to 25%. Ownerships with forestland associated with their primary residence and having forest holdings of at least 11 ha had small, statistically nonsignificant, decreases. The likelihood of transferring land in the next 5 years, land being owned by individuals/jointly with a spouse, and having forestland associated with a farm showed greater decreases, but were also not statistically significant.

The reasons and concerns analyzed were split in terms of increases and decreases, but only two differences were statistically significant (Fig. 5B). Owning forest for timber production purposes had a small, but statistically significant, decrease from 23 to 21% of the ownerships. Reasons for owning forestland that changed, but not statistically significantly, included nature protection (increased), beauty and scenery (increased), land investment (relatively unchanged), and family legacy (decreased). Concerns about wildfire significantly decreased from 64 to 57%. Concerns related to trespassing, invasive plants, and property taxes all decreased and concerns about keeping land intact for future generations increased, but the differences were not statistically significant.

Many of the past and future activities related to harvesting trees decreased and most other activities increased, but only two of the differences were statistically significant (Fig. 5C). The percentage of ownerships that harvested trees for sale in the past 5 years significantly decreased from 18 to 14%, and those that harvested trees for personal use in the past 5 years significantly decreased from 41 to 35%. Intentions for doing these activities in the next 5 years showed similar, but slightly smaller, trends, but the differences were not statistically significant. The largest, albeit not statistically significant, increases were for intentions to manage invasive plants and reduce fire hazards in the next 5 years.

Participation in programs increased and the percentage of ownerships that have written management plans or received advice decreased, but not all differences were statistically significant (Fig. 5D). The largest, and statistically significant, increases in program participation were for property tax programs, conservation easements, and green certification. For example, the percentage of ownerships participating in preferential property tax programs increased from 15 to 18%. Having management plans and receiving advice decreased by 1 or 2 percentage points, respectively, but the differences were not statistically significant.

Discussion

Most attributes of family forest ownerships in the United States are staying relatively constant, but there are a few attributes that are changing. The biggest changes in terms of general characteristics are an increase in the percentage of primary decision-makers who are over 68 years old and a decrease in the percentage primary decision-makers who are male. Given the relatively long tenure of ownerships (median = 23 years), the increase in age is logical. Tenure also increased but not as much as age. This discrepancy may be related to joint ownerships and the primary decision-maker changing (e.g., if a spouse or another partner has passed away), but additional research is needed. The distributions of family forest ownerships and acreage show that substantial percentages in terms of both metrics are held by ownerships who are older (Fig. 6). Age has been shown to be associated with landowner attributes such as recreational activity, forest management activity, program participation, and preferences for methods for receiving information (Nagubadi et al. 1996; Joshi and Arano 2009; Butler et al. 2017). There are also important ties between age and land transfer (Markowski-Lindsay et al. 2017): as a person gets older, the probability of them transferring land increases. Tailoring programs and assistance to owners of different ages could increase uptake of programs – e.g., developing programs that assist landowners with land transfer and targeting communications about these programs at older owners.

The decrease in the percentage of male primary decision-makers also means there is a commensurate increase in female primary decision-makers. Some of the shift may be due to the relatively advanced age of owners and survivorship patterns, which are tied to age and sex (Caputo et al. 2023). Many family forests in the United States are jointly owned between spouses (Butler et al. *In press*), and it is not uncommon for husbands to die before wives, i.e., women in the United States have

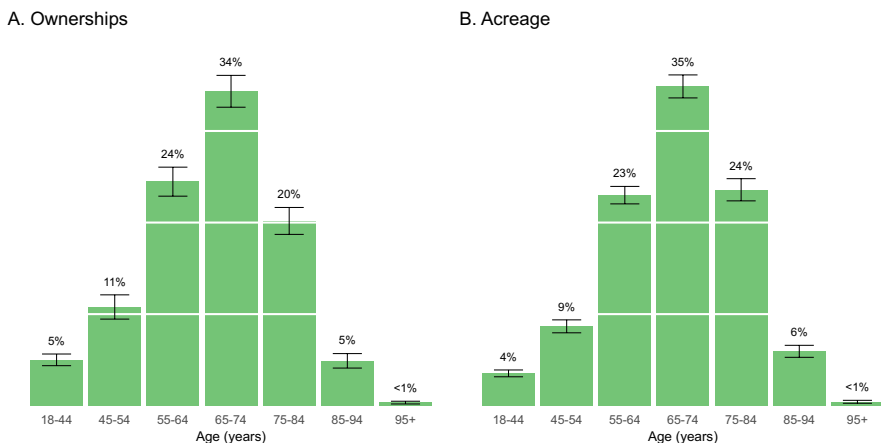


Fig. 6 Percentages of family forest **A)** ownerships and **B)** acreage by age of the primary decision-maker of family forest ownerships with 4+ ha of forestland in the United States*, 2023. Error bars represent 95% confidence intervals. Data source: Forest Service Forest Inventory and Analysis, National Woodland Owner Survey. * Excluding Interior Alaska, Nevada, and Wyoming

an average life expectancy of 5.8 years more than men (Yan et al. 2024). Regardless of the reason, this shift in sex can have important implications for how landowners interact with their land and forestry programs. For example, female landowners tend to have more diverse reasons for owning and rate amenity values higher than male landowners (Kuhlman et al. 2023) and female landowners tend to have lower participation rates in forest conservation programs (Butler et al. 2018).

Family forest ownerships continue to be owned for multiple reasons, which are dominated by amenity values, such as aesthetics and nature protection. The shifts, most of which are not statistically different, tend to strengthen these patterns and decrease the importance of extractive uses, such as timber harvesting. This has important implications for timber supply (Silver et al. 2015) and other forest management practices. Various techniques have been used to create ownership typologies based on ownership objectives to better predict behaviors and increase the effectiveness of communications and outreach (e.g., Butler et al. 2007). But these attempts have not been fully satisfactory due to the heterogeneity of ownerships and a lack of clear differentiation into ownership “types” (Ficko et al. 2019; Ekström et al. 2024). Related approaches based on place-based attachments (Leahy and Lyons 2021), social milieus where people are grouped according to values and lifestyles (Aurenhammer et al. 2025), and other approaches that incorporate variables beyond objectives warrant additional investigation.

Family forest owners continue to have many concerns about their forestlands. Most owners report moderate levels of “concernedness” across a range of concerns – concerns tend to be positively correlated with each other and relatively few owners rate specific concerns substantially higher or lower than other concerns (Shanafelt et al. 2025). The relative levels of most concerns are decreasing, although not all of the differences are statistically significant. One concern that is increasing is keeping land intact for future generations, but again the difference was not statistically significant. A large, statistically significant decrease was observed for concern related to wildfire. This seems contrary to the increasing severity and frequency of wildfires (Iglesias et al. 2022). Danley et al. (2021) found only a marginal connection between wildfire hazard potential and concern about wildfire and similarly Butler et al. (2023b) found wildfire concerns to be a poor predictor of past wildfire reduction activities and intentions for future wildfire reduction activities. Part of these disconnects may be due to what Edgeley and Colavito (2022) noted as the differences individuals can experience from the same wildfire event.

Most family forest ownerships continue to be actively doing things on their land, but most are not engaging with traditional forest management tools or assistance. Extractive activities, such as harvesting sawlogs or firewood, are decreasing. Forest health related activities, such as management of invasive species, are increasing. Some of these changes may be related to changes in attitudes and other observed attributes, although the review by Floress et al. (2019) found mixed results in terms of these associations. Providing more outreach and programs related to activities owners are doing, such as invasive species management (Clarke et al. 2021), can help owners in their current pursuits and serve as pathways to potentially engage in other activities. But it is also worth noting that passive forest management can be a cognizant decision that is well suited for some owners and their land (Denaroso et al. 2025).

Participation in traditional landowner programs is low with some metrics trending up and some trending down. Receiving management advice and writing management plans continue to remain low, a pattern that has long been observed (VanBrakle 2015), and are slightly decreasing. These numbers will likely remain low unless alternative tools and ways of engaging owners are used. Part of the issue may have to do with a mismatch between owners' needs and objectives and what programs have to offer. Efforts such as Master Forest Owners programs (Kueper et al. 2013), Woods Forums (Ma et al. 2012), and the Women Owning Woodlands network (WOWnet; Redmore and Tynon 2011) offer insights into non-traditional methods of engaging landowners.

Although there is a notable span, participation in assistance and other activities remain low. Of the financial programs, preferential property tax programs remain the programs with the highest participation rates and showed the greatest increase in participation rates. Property tax rates and the attributes and qualifications of preferential property tax programs vary substantially across United States (Frey et al. 2019) and participation rates vary dramatically from over 50% in New Hampshire, New Jersey, Pennsylvania, and Rhode Island to less than 1% in Arkansas, Kansas, Missouri, Nebraska, and Oklahoma (Butler et al. *In press*). The importance of these programs makes sense given the recurring costs and the high concerns related to property taxes. Explanations related to enrollment in other programs may stem from some being newer (e.g., carbon) and some having longer enrollment processes (e.g., easements). And overall, the programs may again be missing the mark with many owners, especially for owners whose forests are "running in the background," i.e., they are not thinking about the management of their forests on a regular basis (Kittredge 2004).

Ownerships Versus Acreage

It is important to reiterate that the results above are in terms of ownerships. Ownership and acreage statistics are highly correlated ($\rho=0.97$), but there are some differences. One of the biggest differences is the distribution of size of forest holdings, with the distribution of ownerships being skewed towards smaller holdings and the distribution of acreage being more normally distributed (Fig. 3). While most of the ownerships (67%) have forest holdings between 0.4 and 3.9 ha, most of the acreage (76%) is in forest holdings between 4 and 404 ha. The results presented above are constrained to ownerships with 4+ ha in part to help address these discrepancies and to provide information more in line with the target audiences of many programs.

Of the 35 highlighted variables in this article, the acreage values are on average 6 percentage points higher than the ownership values. Besides size of forest holdings, the other variables with substantially higher percentages in terms of acreage (between 10 and 15 percentage points higher) are cutting trees for sale (past 5 years and next 5 years), having timber production as an important reason for owning, wildlife habitat improvement activities (past 5 years and next 5 years), having a written forest management plan, and having a farm associated with their forestland (see Appendix 2). The one variable that was substantially higher in terms of ownerships

was owning land as an individual or jointly, or to put this differently, family LLCs are more common among ownerships with larger holdings. Most of the notable differences are related to timber harvesting or other business/financial related attributes and similar relationships have been documented in previous literature (e.g., Silver et al. 2015; Butler et al. 2021b).

The differences between ownerships and acreages in terms of *changes* are even smaller. The mean difference for the 35 variables examined in this paper is less than 1 percentage point, and no differences have an absolute value of more than 5 percentage points.

Study Limitations

The NWOS provides a unique dataset due to its robust sample size, large geographic extent, repeat measurements, and consistent implementation, at least since the 2013 iteration of the NWOS. But there are of course limitations in the dataset and the analyses presented above.

As with all surveys, there is the potential for survey errors. For example, differences between respondents and nonrespondents. These differences may manifest in not just the point estimates, but in examining differences over time.

The number of variables highlighted in this article was limited due to space constraints, a desire to not overwhelm the reader, and the ability of the author to present a comprehensible analysis. This is not a limitation of the underlying data and in the interest of providing additional information and full transparency, analyses of all variables are provided in Appendix 2. While I tried to be judicious in my selection of variables, there are important topics that were omitted, for example, there is no discussion of recreational trends.

Only national results are presented and there could be important differences compared to regional and state patterns. Again, this is not a limitation of the underlying data but is due to space and other constraints. Follow-up work could look for commonalities and differences across regions and states.

The biggest omissions are lack of analyses of trends in the acreage of family forestland (e.g., land use and ownership dynamics) and parcellation. The impetus for this paper was the publication of the 2023 NWOS results, hence the focus on those results. The other topics will need to be the focus of future papers.

Conclusions

Family forest ownerships control a plurality of the forestland in the United States. The general profile of family forest ownerships has remained relatively constant over the past decade, but there are some notable trends. And even small changes can be important, especially if they continue over time.

As of 2023, the median size of forest holdings is 11 ha, and the median land tenure is 23 years. The median age of the primary decision-makers is 68 years, and 75% are male. Family forests are owned for multiple reasons, with amenity reasons, such

as aesthetics and nature protection, being very common. But owners also have multiple concerns including property taxes and their ability to keep their land intact for future generations. Many family forests have management activities happening with the most common being harvesting trees for personal use (e.g., firewood), improving wildlife habitat, and managing invasive species. But most ownerships do not have written forest management plans nor are they participating in programs.

Family forest ownership attributes that significantly changed between 2013 and 2023 include the primary decision-makers getting older and being more likely to be female. There was a decrease in timber production as a reason for owning, which may be tied to the observed decreases in harvesting trees for sale and harvesting trees for personal use. There was a decrease in the concern about wildfire, which is counter to the general rise in threats from wildfires. There were increases in participation in preferential property tax programs, conservation easements, and certification programs, but the rates are still low, 18%, 4%, and 2%, respectively.

Despite the plethora of past research (Butler et al. 2023a), there is still a lot of research that would help shed light on family forest ownerships and the issues they are facing. Maintaining the consistent, long term data collection of the NWOS is important, as is increasing harmonization across studies, both within the United States and internationally, to help with comparative studies (Sjølie et al. 2026). Basic issues related to land use change and parcellation are largely, but not wholly, lacking from the existing literature. Knowing why owners do or do not do certain activities or enroll in programs would be very useful, but most studies lack the ability to identify casual pathways; cohort studies, randomized controlled trials, and more qualitative research can help fill this void. While there has been research in predicting forest area, tree composition, and other forest attributes (e.g., US Department of Agriculture Forest Service 2023b), there has been little research focused on predicting who future (family) forest owners will be and how their attitudes and behaviors may differ from current owners. But there will be new family forest owners as the older generation passes on their land. Knowing the attitudes and behaviors of these new owners will be important.

Family forest ownerships will continue to be important to the future of the forests of the United States. These lands and owners will continue to face many challenges, but there are also many opportunities for the natural resource community to help these owners meet their needs and those of future generations. Private property rights are sacrosanct in the United States, so approaches that limit owners' decision spaces will be of limited appeal for many owners. Efforts that recognize owners' needs and desires and are aimed at helping them know their options and how to pursue their options could prove most effective.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s44392-026-00090-z>.

Acknowledgements Thank you to the landowners who responded to the survey and the members of the Family Forest Research Center who facilitated the research. Thanks also to Jesse Caputo, Laura Vachula, and the reviewers who provided useful comments on earlier drafts of the manuscript.

Funding This research was funded by the USDA Forest Service (20-JV-11242305–074, 24-JV-11242305–073).

Data Availability Due to data confidentiality, the raw survey results cannot be made publicly available. Summaries of survey questions are available in various publications and data access tools which can be accessed at <https://research.fs.usda.gov/programs/nwos> or by contacting the author.

Declarations

Conflicts of interest The author declares that he has no conflicts of interest.

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