<u>Issue One:</u> Private Forest Landowner Demographic Trends, and Corresponding Land Use Changes

Missouri's family forest landowners are getting older. This trend, paired with other factors such as increasing land prices, real estate taxes and economic hardships are making Missouri's privately-owned forestland increasingly vulnerable to threats such as forest conversion, fragmentation, parcelization and urban sprawl. Issue One explores the ties between these influencers and how they can impact Missouri's forest resources.

Desired Future Conditions:

1. As privately-owned forestland changes ownership, it transitions smoothly to new owners who will maintain or initiate sustainable forest management.
2. There is no net loss of Missouri's total forest acreage.
3. Forest Opportunity Areas & Priority Forest Landscapes (defined in Chapter 4) increase in total acreage of quality forestland.
4. Forests become less fragmented, and less vulnerable to fragmentation.
5. Privately-owned forest tracts remain sufficiently large to maintain various management options, or such management can be achieved across multiple adjoining ownerships.
6. Future residential and commercial development is well planned in order to avoid destroying or negatively impacting important forestland.

A. Private Forest Landowner Demographic Trends

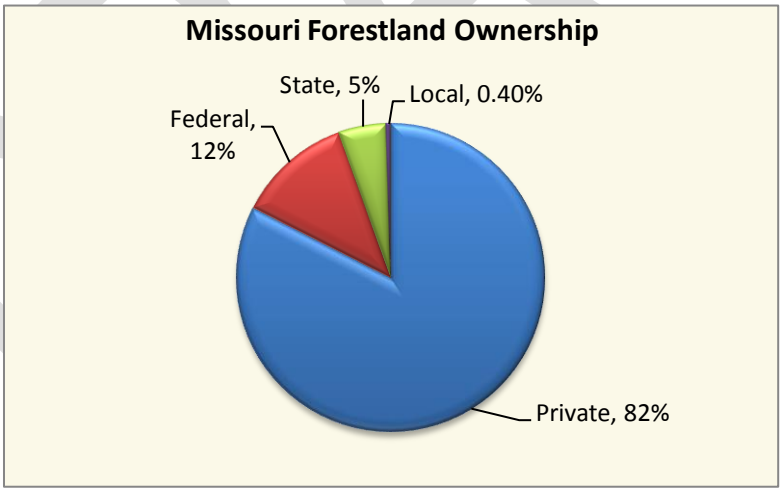

Figure 1.1 Missouri Forestland Ownership[1]

82 percent of Missouri's forestland is in private ownership[1]. Therefore, the future sustainability of Missouri's forests rests largely in the hands of private landowners. Without a doubt, private landowners can be terrific stewards of Missouri's forests. However, we are currently in the early stages of a significant "changing of the guard" in

[1] Butler, B.J. 2008. Family forest owners of the United States, 2006. Gen. Tech. Rep. NRS-27. Newtown Square, PA: U.S. Dept. of Agriculture, Forest Service, Northern Research Station.

terms of our family forest owners, and this adds much uncertainty to the future of these privately owned forests. According to a 2006 survey of Missouri family forest owners, **17 percent of Missouri's family forest land is owned by people 75 years of age or older, and nearly 70 percent is owned by people 55 years of age or older[1]!**

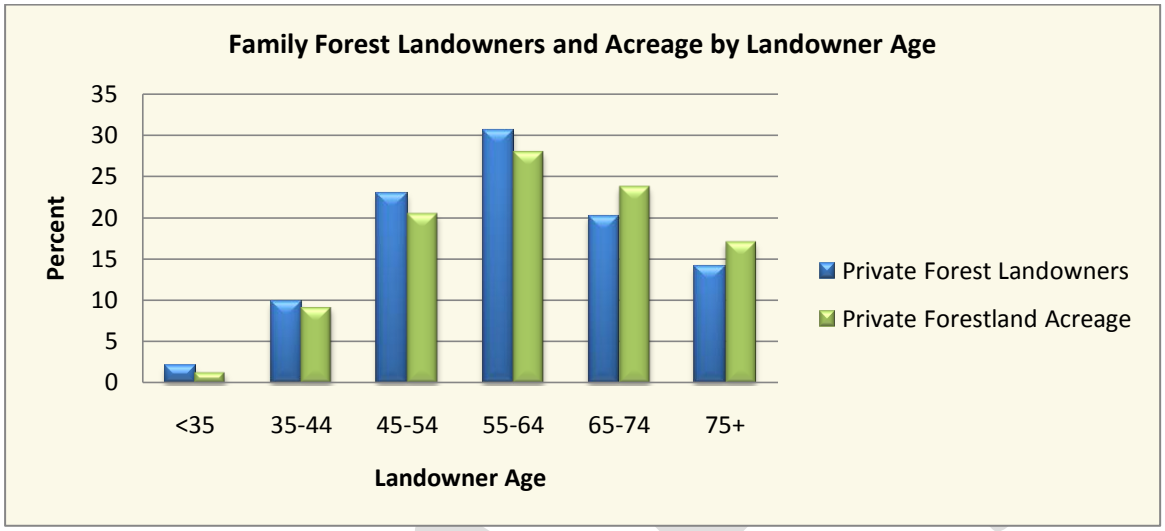

Figure 1.2 Family Forest Landowners and Acreage by Landowner Age[1]

As these forests are passed on to heirs or sold to new owners, any changes in the way in which they are managed will affect us all. These management decisions will have profound implications for clean air and water, wildlife habitat, aesthetics, production of forest products, and numerous other services forests provide. While most family forest owners share a deep respect for their land and a desire to do "the right thing", many do not know just what this means or how to go about achieving their goals. One positive aspect of land ownership turnover is the great opportunity to form new partnerships between forestry organizations (such as MDC) and new family forest owners. New family forest owners are often eager to gain information and assistance to best manage their forested acres. It is important that these connections are made.

Unfortunately, even when these partnerships are formed, economic challenges can sometimes make it difficult for family forest owners to do what is best for conserving Missouri's forests. The combination of financial hardships, increasing land ownership turnover rates, and lack of information are making Missouri's forests especially vulnerable to conversion, fragmentation, parcelization, urban sprawl[2], and unsustainable forest management practices such as timber liquidation. These threats are especially high in the wildland urban interface shown in Figure 1.5 on Page 5.

[2] USFS Northern Research Station Research Review No. 4, Autumn 2008

B. Land Use Changes: Forest Conversion

Forest conversion is deforestation of land for purposes such as development and agriculture. First the good news… While many acres of Missouri's forests are being lost or degraded each year, **Missouri's net forest acreage has actually increased substantially to 15.4 million acres since bottoming out in the 1980's at about 12.5 million acres[3].**

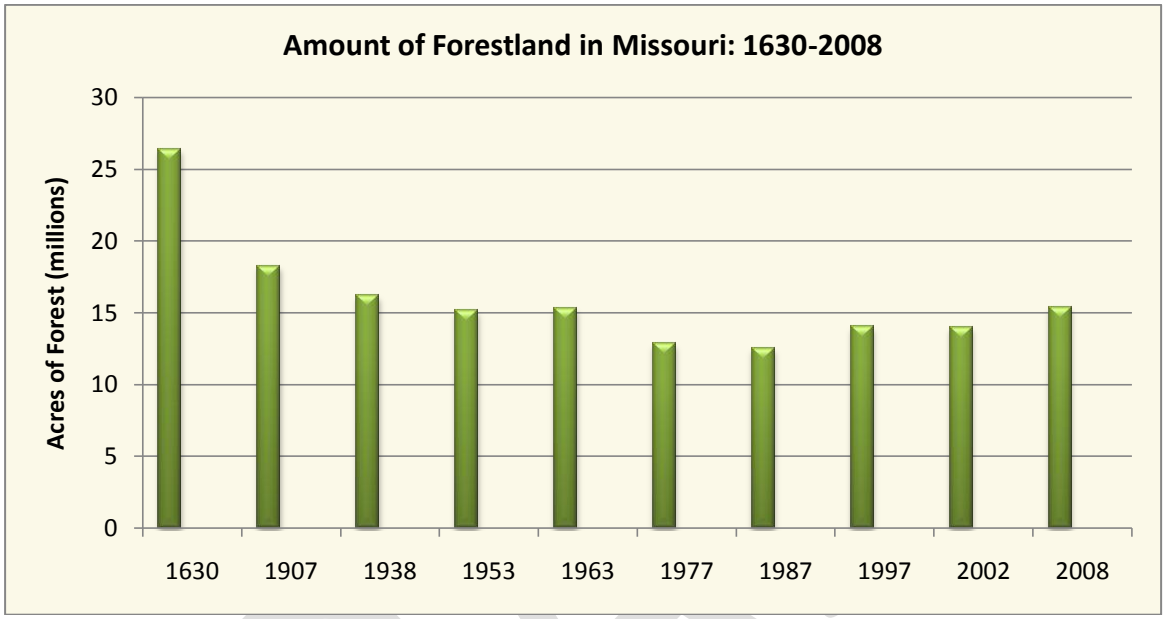

Figure 1.3 Amount of Forestland in Missouri: 1630-2008[3]

Data for 1630 is an estimate for general reference purposes only to convey the relative extent of forest land at the time of European settlement.

Now the bad news… While Missouri's total acreage of forestland is increasing, this is somewhat misleading. Missouri is losing a considerable amount of high quality forestland each year. In the Northern U.S., from 1992-1997, 59% of this loss was to development, 24% was converted to agriculture, and 17% was lost to other purposes[4]. While newly forested acres have somewhat offset these losses, many of these new forest acres are occurring on abandoned cropland, pastureland and glades. These new forests often consist of scrubby species (cedar, locust, boxelder, shingle oak, etc.) which are often of lower value for forest products or for promoting biodiversity compared to the forests being lost. In fact, some of these newly forested acres are actually decreasing biodiversity by replacing rare, but important, natural communities such as glades.

[3] USDA Forest Service, Forest Inventory and Analysis
[4] USDA Natural Resources Conservation Service, Natural Resources Inventory

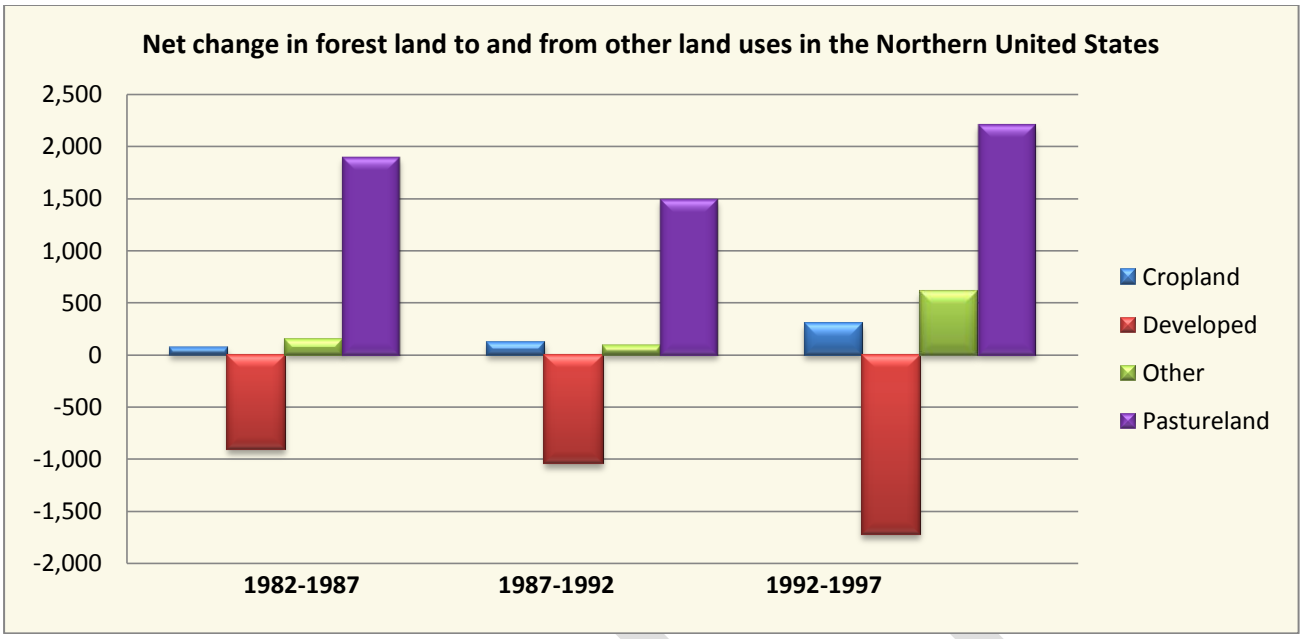

Figure 1.4 Net Change in Forest Land to and from Other Land Uses in the Northern United States[4]

Forest conversion equates to loss of wildlife habitat and important natural communities, decreased capacity for ecosystem services such as water quality, carbon storage, and production of forest products, and exacerbated effects of forest fragmentation described below.

C. Land Use Changes: Forest Fragmentation

A common result of forest conversion is forest fragmentation. **Forest fragmentation** refers to the breaking up of larger forest blocks into smaller, disconnected patches. Most modern fragmentation is caused by residential and commercial development, and expansion of utility infrastructure and transportation networks.

Some of the negative impacts of forest fragmentation include the decline of forest dependent wildlife species requiring large continuous blocks of forest, increased forest vulnerability to insects and diseases (i.e. oak wilt), introduction of aggressive, opportunistic species like brown-headed cowbirds which thrive on forests edges, and exotic plant species such as bush honeysuckle. Fragmentation can also cut off migration corridors for flora and fauna, which could become increasingly important given projected changes in climate. Forest fragmentation also increases the frequency of negative encounters between people and wildlife (vehicle collisions, wildlife damage to landscaping, etc.).

The following map paints a picture of forest fragmentation in Missouri. Areas in red are "urban", areas in light green are "non-forest", areas in dark green are "forest" and areas in orange and yellow are highly fragmented by housing development (the Wildland-urban interface, or WUI). Missouri's WUI has its own unique set of challenges that will need to be addressed in our Strategy.

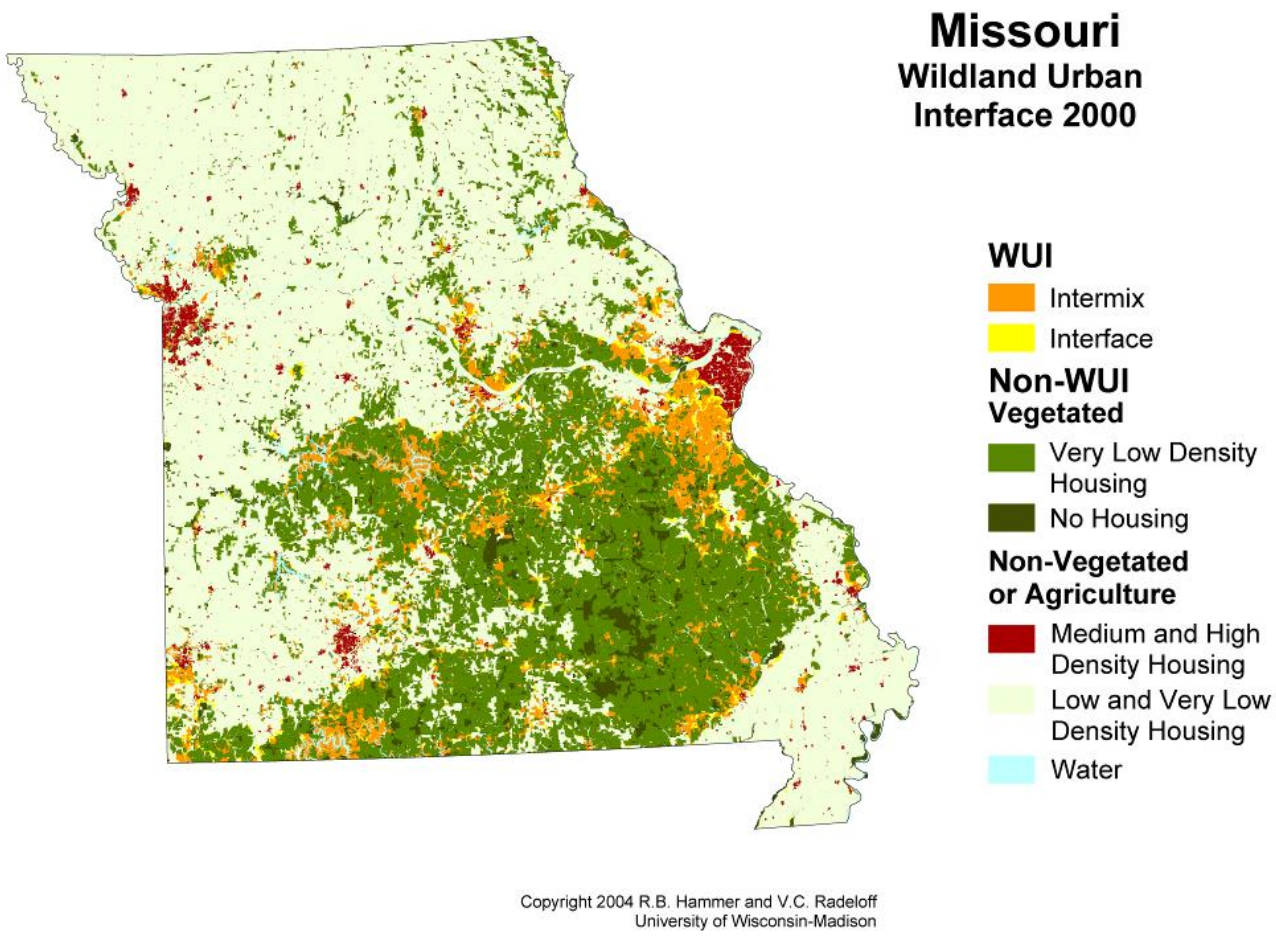

Figure 1.5 Delineation of Missouri's Wildland Urban Interface in Year 2000[5]

[5] Radeloff, V. C., R. B. Hammer, S. I Stewart, J. S. Fried, S. S. Holcomb, and J. F. McKeefry. 2005. The Wildland Urban Interface in the United States. Ecological Applications 15:799-805.

Another way of looking at fragmentation is "Distance from Edge". The following map breaks down Missouri's forestland by it's proximity to "un-natural" edge. Wheras the WUI map focuses on fragmentation from residential development, this map also incorporates other agents of fragmentation (cropland, pasture, roads, commercial and residential development, etc.).

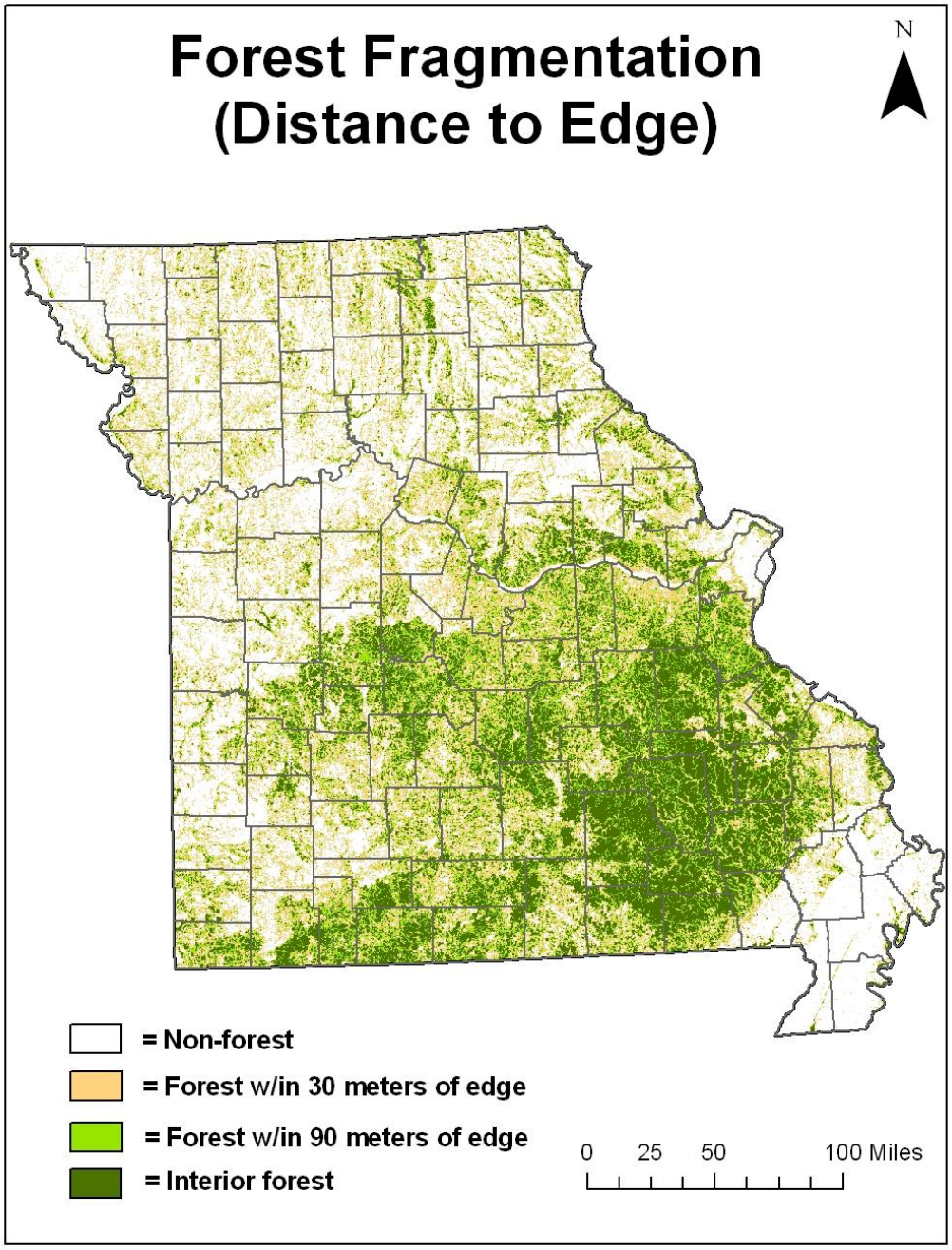

Figure 1.6 Forest Fragmentation (Distance to Edge)[6]

[6] Riemann, Rachel, et al. USFS Northern Research Station. "Development of Issue Relevant State Level Analyses of Fragmentation and Urbanization".

D. Land Use Changes: Forest Parcelization

Forest parcelization, also known as "subdividing", involves the division of a tract of forest into several smaller tracts. Forest parcelization can take many forms. A common example of parcelization is when a landowner divides his/her property into two or more tracts so that it can be passed down equitably to his/her heirs. Another common example involves splitting up a large block of forest into several 5 to 10 acres lots to maximize revenue (smaller lots often sell for a higher price per acre). Parcelization has profound effects on forests. Some of these effects are fairly obvious, and some are not.

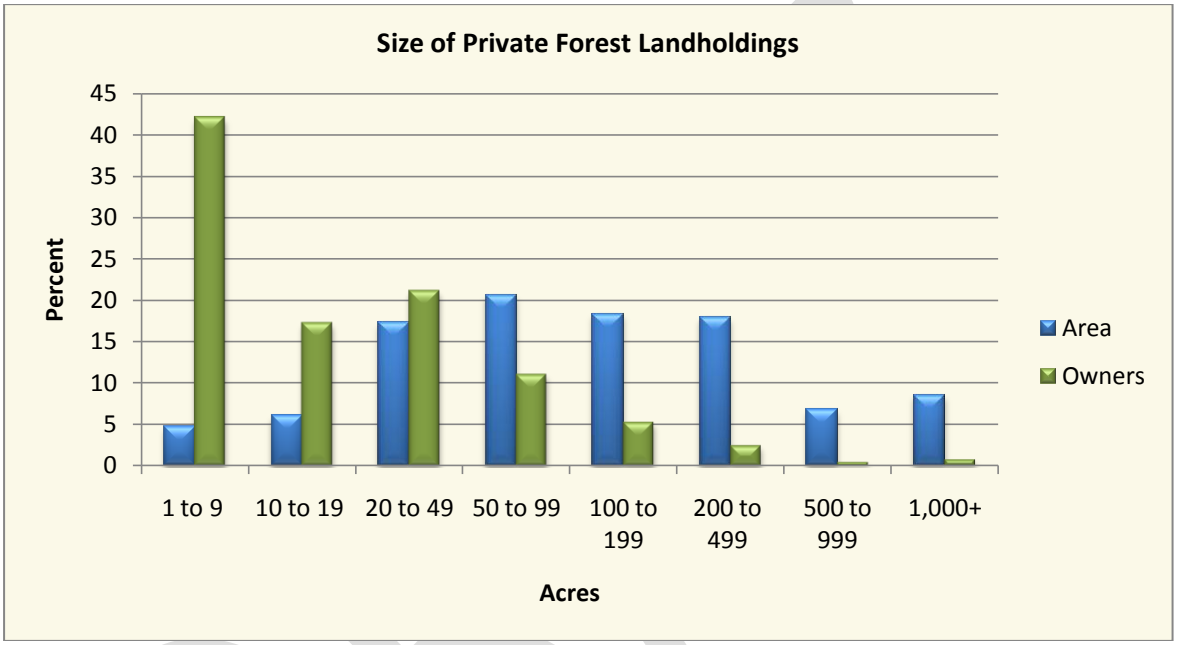

Figure 1.7 Size of Private Forest Landholdings[1]

On smaller tracts of forest, management options are greatly reduced. For example, it is difficult for a logger to cost effectively harvest timber on a tract of 25 acres or less. It can also be challenging to manage and improve wildlife habitat on a smaller tract. Forest improvement and prescribed fire are often impractical; there are limited opportunities for food plots, etc.

As larger forest tracts are subdivided, they become increasingly vulnerable to a variety of other degradations as well. Consider this fairly common scenario: An 80 acre tract of forest is sold off into eight 10 acre lots. New roads are put in to provide access. Half of the new owners build a house on their lot. Significant acreage is converted from forest to other uses in the process. Two of the new owners plant bush honeysuckle in their yards because they love the red berries, resulting in exotic species spreading into the woods. During the road and housing construction, several red oaks were injured and have now acquired oak wilt which will kill these trees and continue to spread into the surrounding woods. Various wildlife species are faced with the need to adapt, succumb or migrate away from the new

presence of people and their pets. The new increase in impervious surface increases storm water flow and erosion and decreases resulting water quality. In very short order, a high quality forest and its services are greatly diminished.

Parcelization also causes great headaches for agencies and professionals who work for and with private forest landowners. In addition to the great limitations on management options, smaller tracts are a huge drain on productivity. It takes about the same amount of time for a forester to assist a landowner who owns 10 acres as it does a landowner with 100 acres. Thus, as land continues to get subdivided, it becomes increasingly difficult for foresters to significantly impact privately-owned forest resources.

E. Land Use Changes: Urban Sprawl

Forest conversion, fragmentation and parcelization are often collectively referred to as **urban sprawl.** While residential and commercial development is necessary and desirable for many reasons, it is important that this growth is well planned. Some areas are well suited to development, and some are not. Many communities in the U.S. are beginning to incorporate green infrastructure planning into their programs and decision making to ensure that development can continue in a manner which works with and complements the natural resource systems. Such planning will help to ensure the long term sustainability, desirability and economic viability of our communities and their growth. On the other hand, without this planning, communities are often stuck with large expenses in dealing with increased storm water and erosion issues, decreased water quality (and increased treatment expenses), and costly road and utility maintenance and construction.

The map below shows Missouri's housing density in the year 2000. Areas in dark red are fully developed, and areas in the darker greens are mostly undeveloped. However, look at how much area lies somewhere in between the extremes. These are areas which currently stand to gain the most through green infrastructure planning and implementation.

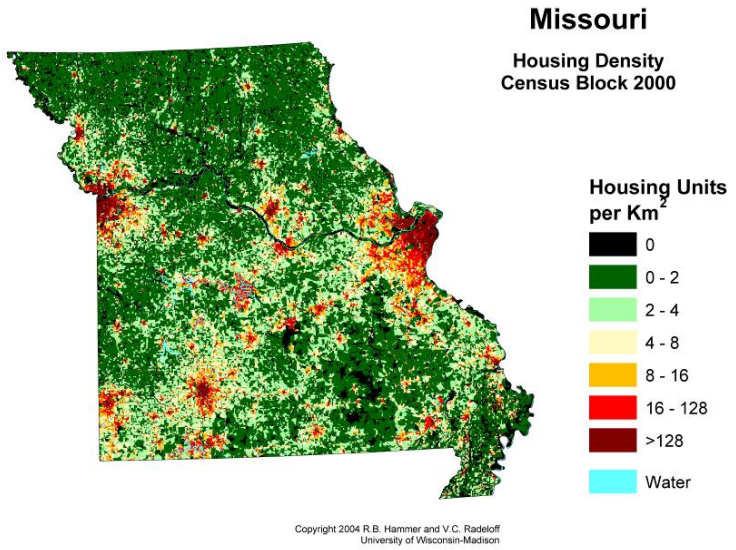

Figure 1.8 Missouri's Housing Density by Census Block in Year 2000[5]

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Issue Implications to the Seven Criteria of Forest Sustainability:

Criterion 1: Biodiversity is affected by loss of habitat, modified or cut off travel corridors, increased "edge effects" on forest interior species (ie. cowbirds), decreased management options on smaller tracts, increased presence of exotic plant species, insects and diseases, introduction of domestic pets, and more.

Criterion 2: Productive capacity is negatively influenced by loss of forest land, and parcelization converting larger tracts into smaller tracts which are impractical to harvest.

Criterion 3: Forests which are heavily parcelized and fragmented are more vulnerable to exotic plant species, tree insect and disease issues, wildfire, decreased management options, and increased grazing pressure from deer (reduced hunting pressure).

Criterion 4: Soil and water resources are negatively impacted by conversion, fragmentation and parcelization due to an increase in impermeable surface (roads, structures, etc.), deforestation (forests tend to produce much less runoff than areas converted to other uses such as lawns, agricultural land, etc.), and reduced filtration of sediment, fertilizers, etc. because of reduced riparian buffers.

Criterion 5: Deforestation negatively impacts climate change and atmospheric carbon levels in two ways. First, the carbon stored in that forest is released into the atmosphere indefinitely. Second, the potential for that forest to store additional carbon is eliminated.

Criterion 6: There are great socioeconomic costs resulting from forest conversion, fragmentation and parcelization. The environmental services provided by affected forests are lost or greatly reduced (soil and water quality, carbon storage potential, etc.), low density housing is very expensive in terms of infrastructure and is generally paid for by the entire community (not just those enjoying the low density housing); wildlife habitat is degraded for many species, etc.

Criterion 7: Parcelized and fragmented forests provide significant hardships on agencies and professionals who are in the business of helping landowners manage and improve their forests. For example, it takes about the same amount of time to visit and help a landowner with 10 acres as it does for a landowner with 100 acres. A forester would have to visit 10 landowners to have the same impact. Furthermore, management options are much more limited on smaller tracts and these tracts are more prone to other issues such as exotic plant species.

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