

Wisconsin's Young and Early Successional Forests



The acreage of both young (0-20 years) and early successional forests has decreased significantly since the early part of the twentieth century. Young forests were not common prior to Euro-American contact but increased dramatically with the extensive harvesting of the late 19th and early 20th centuries. The fires which followed created ideal conditions for new forests especially early successional types like jack pine, paper birch and aspen.

The acreage in young stands decreased since 1968 by about a third for all forest types. Since 2003, however, all major types have gained acreage with the exception of jack pine and aspen. These two types are particularly dependent on disturbance for regeneration.

Young forests provide essential habitat to Neotropical migrants and other bird species. For instance, Kirtland's Warbler requires young jack pine forests between 8 and 20 years of age. The American Woodcock requires young aspen stands for cover with adjacent alder swamps for food.

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What are young forests and why are they important?

Young forests are generally considered to be less than 20 years of age and are characterized by dense thickets of small stems. There may be an overstory of older trees but the canopy is dominated by seedlings and saplings. Young forests are often created by stand-replacing events such as fire, tornado or harvest. These newly disturbed areas are initially filled in by advanced regeneration already in place, available seed sources or by early successional or pioneer species such as aspen, paper birch and pines. These species occupy the site quickly and grow very rapidly.

Young forests are important for a variety of reasons. Not only do they regenerate the forests of the future, they also provide habitat for a multitude of species, including reptiles, small and large mammals, and many birds. This habitat is essential to the survival of species such as the American Woodcock, the Golden-winged Warbler and Ruffed Grouse which are all declining in population (Figure 1).



Figure 1. American Woodcock (left) and Ruffed Grouse (right)

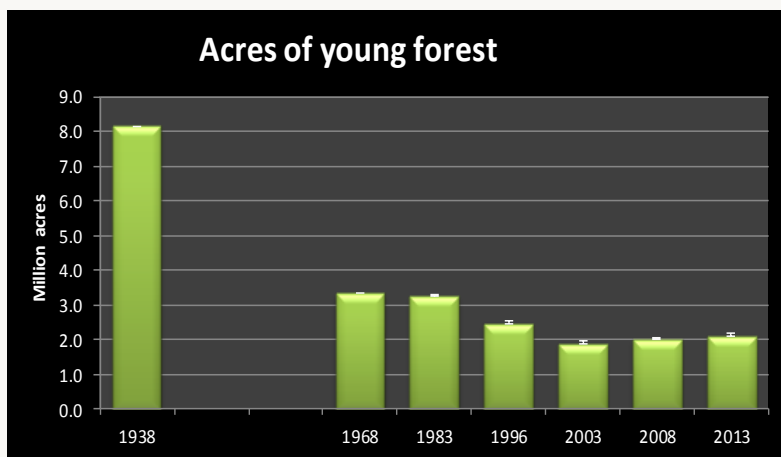


Figure 2. Area of timberland under 21 years of age (Forest Inventory and Analysis).

The acreage in young forests has been declining since the cut-over days of the early twentieth century. As Wisconsin's forests have recovered and matured, the area in young forests decreased. Data from Forest Inventory and Analysis (FIA) indicate, however, that this trend may be reversing and the area of young forest seems to be increasing in the twenty-first century (Figure 2).



Trends in acreage in young stands

This increasing trend is not consistent for all forest types, regions of the state or ownership categories. For instance, acreage in young aspen/birch continues to decline throughout the state (Figure 3). Whereas, in 1968 young aspen accounted for 1.4 million acres or 10% of all forestland, in 2013 there were less than 800,000 acres or 5% of all timberland, a drop of 43%.

There was no change in acreage of young forests in northern and central Wisconsin. A decline in young aspen, jack pine and paper birch in these areas was balanced by an increase in young oak / hickory, red pine and northern hardwoods. Acreage has almost doubled in the southwest and has tripled in the southeast since 2003 but remains much lower than in the rest of the state (Figure 4).

On federal lands, the area in young stands has decreased steadily since 1996 whereas on private lands, acreage has increased significantly since 2003 (Figure 5). This increase in private lands occurs mostly in the southern part of the state.

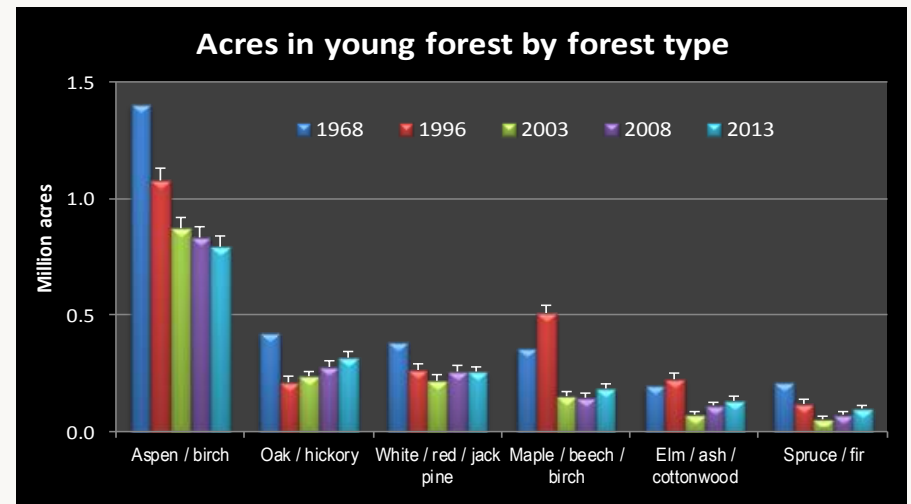


Figure 3. Area of timberland (0-20 yrs) by forest type (Forest Inventory and Analysis).

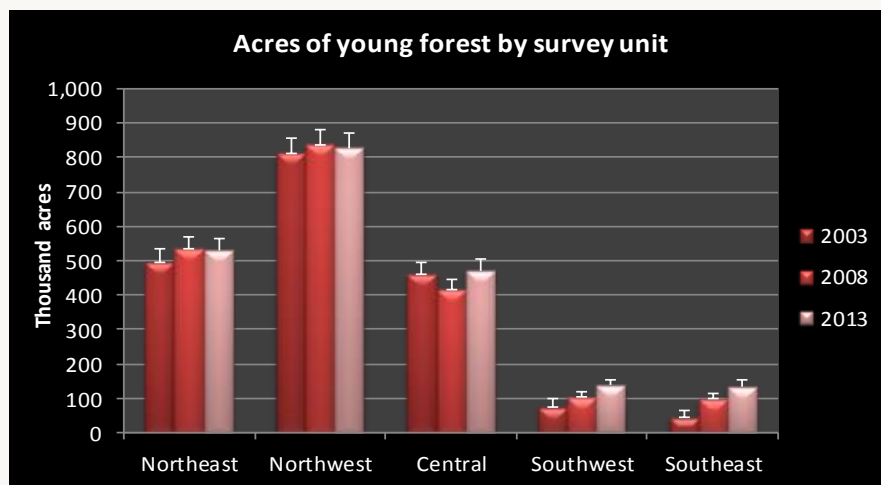


Figure 4. Acreage of young timberland (0-20 yrs) by survey unit (Forest Inventory and Analysis).

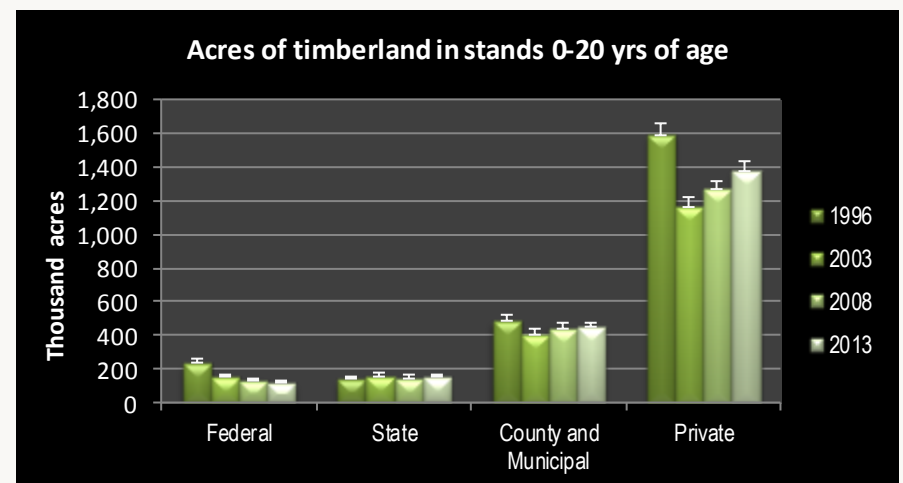


Figure 5. Acreage of young timberland (0-20 yrs) by owner group (Forest Inventory and Analysis).



What are early successional forests and why are they important?

Early successional forests are composed of fast-growing species that require full sun. They can populate a disturbed site quickly but may be replaced by more shade-tolerant species as the stand ages. Aspen and paper birch were much more common in the first part of the twentieth century as early successional forests populated land that had been cut-over and repeatedly burned. They also replaced cleared farmland that had proven to be unproductive and was subsequently abandoned.

After 1930, fire suppression became common reducing the amount of disturbance, a necessary factor in regenerating stands of early successional species. Over time, these stands were often replaced by later successional forest types. Aspen, paper birch, jack pine and spruce / fir each saw a decrease in acreage of young stands (<21 years of age) of 76-88% between 1938 and 2013 (Figure 6).

These pioneer types are maturing and are often not replaced by young stands. From 1996 to 2013, acreage in stands less than 60 years of age decreased 19% while acreage in stands over 60 increased by 33% (Figure 7).

Early successional forests are an important part of the ecosystem. Several wildlife species, such as Neotropical migrant birds, are early successional obligates. Their populations have decreased dramatically and, according to Lorimer and White (2003*), several species would be threatened with local extinction if these forests decrease any further.

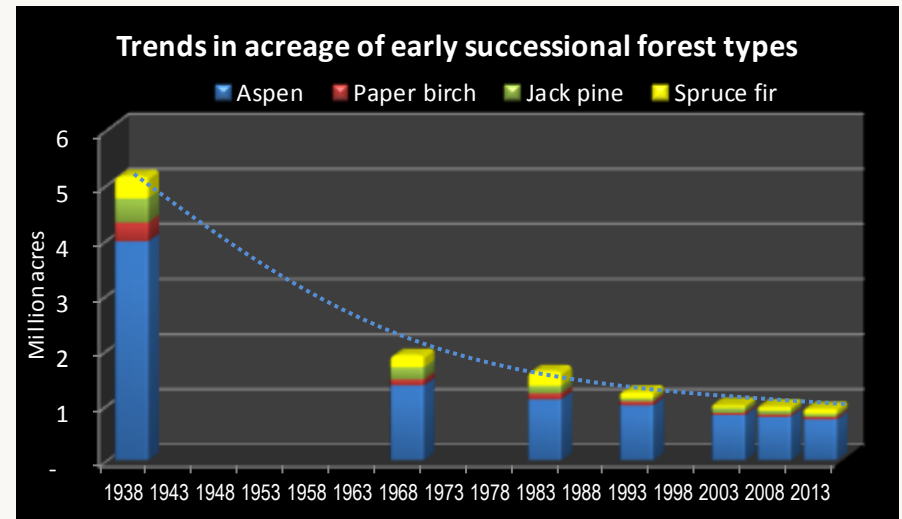


Figure 6. Acreage of early successional forests aged 0-20 years (Forest Inventory and Analysis). The acreage for 1938 is classified as “restocking land”.

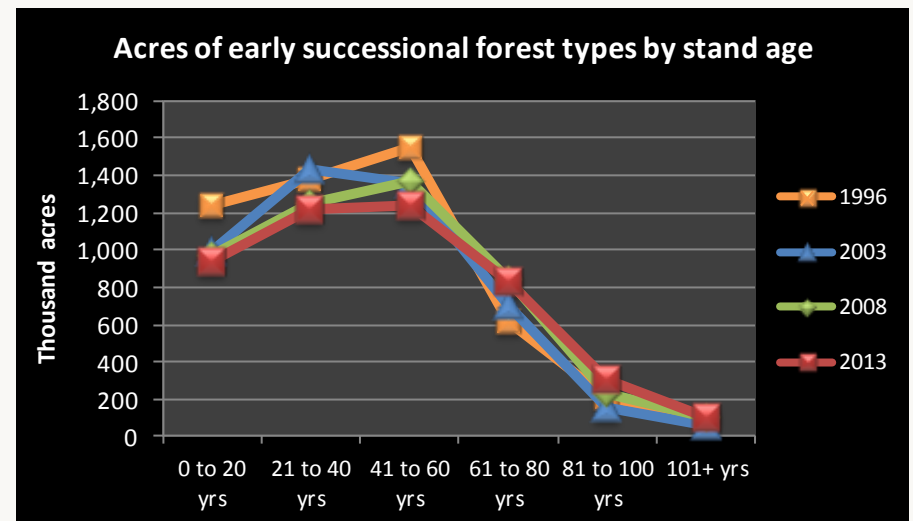


Figure 7. Trends in acreage distribution by stand age for aspen, jack pine, paper birch and spruce fir forest types (Forest Inventory and Analysis).

*Lorimer, C.F., A.S. White. 2003. Scale and frequency of natural disturbances in the northeastern US: implications for early successional forest habitats and regional age distributions. *Forest Ecology and Management* 185 (2003) 41-64.



Young jack pine forests

Acreage of young jack pine (<21 years old) has decreased 88% since 1938 (Figure 8). In the last ten years, the decline in young jack pine was most prominent in planted pine in central Wisconsin and for naturally occurring pine in northeast Wisconsin (Figure 9). Between 2008 and 2013, 45,854 acres or 58% of young jack pine had either converted to another type or matured past 20 years in 2013. But in 2013, there were only 23,127 additional acres of young jack pine (1,600 acres of newly regenerated jack pine and 21,550 acres converted from another type to the jack pine type) for a net loss of 22,000 acres.

The vast majority of jack pine that converted to another type was to red pine and mostly in Central Wisconsin. The decrease in acreage is only apparent for privately-owned stands (Figure 10).

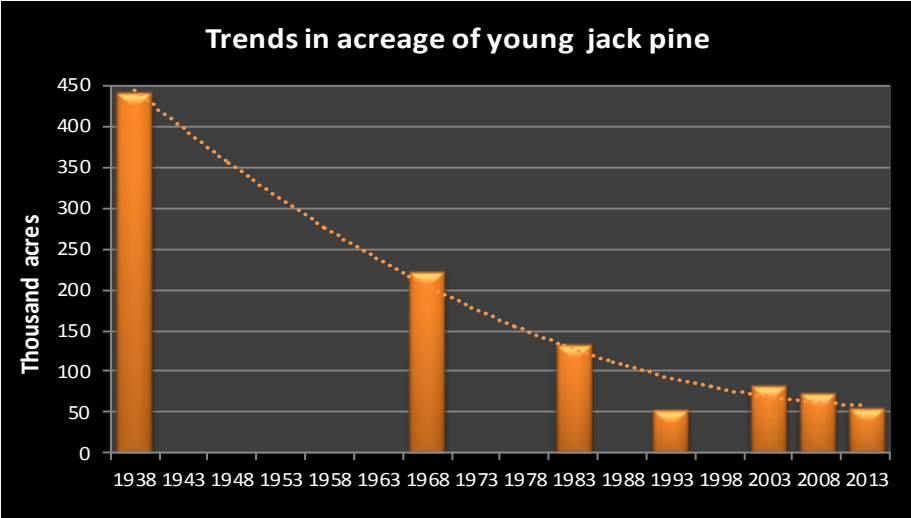


Figure 8. Trends in acres of young (0-20 yrs) jack pine (for 1938 the acres of “restocking land” are reported).

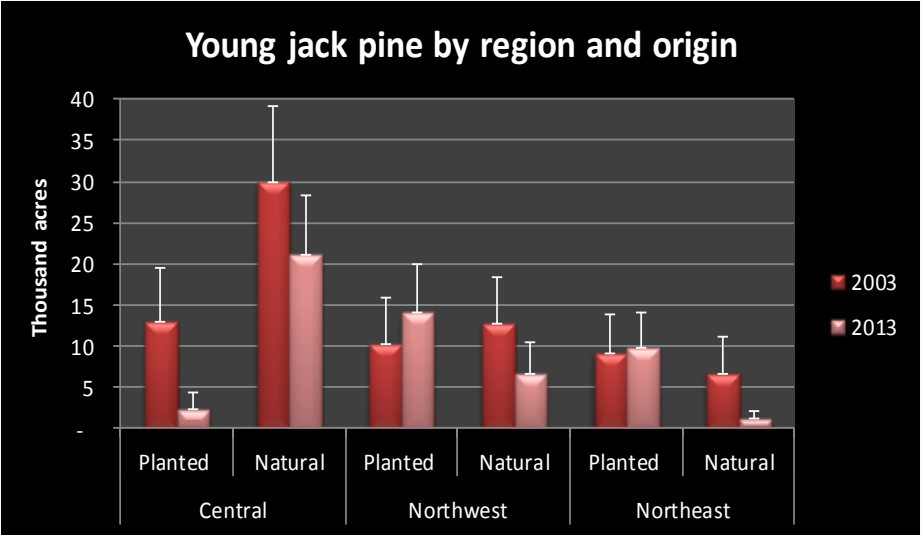


Figure 9. Acres of young (0-20 yrs) jack pine forest type by region (Forest Inventory and Analysis).

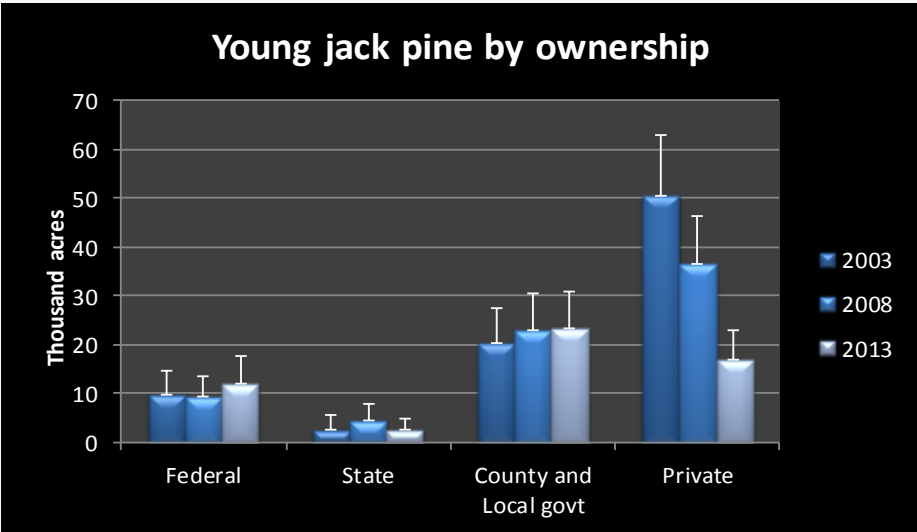


Figure 10. Acres of young (0-20 yrs) jack pine forest type by owner group (Forest Inventory and Analysis).



Young aspen forests

Acreage in young aspen (0-20 yrs old) has decreased 81% since 1938 and 9% since 2003 (Figure 11). Between 2003 and 2013, the largest decrease was in central and northwest Wisconsin (Figure 12). For the period between 2008 and 2013, about 294,000 acres transferred out of the 0-20 year age class (192,000 acres matured out and 102,000 acres converted to another type). For the same period, only 251,000 acres were added to this age class (148,000 acres of newly regenerated aspen and 103,630 acres converted from another type into aspen), for a net loss of about 40,000 acres or 5%.

Privately-owned acreage did not change but acres of young aspen decreased by 53% on federal lands and by 34% on state lands (Figure 13). Aspen provides valuable habitat for several migrant bird species including the chestnut-sided warbler, indigo bunting, and golden-winged warbler.

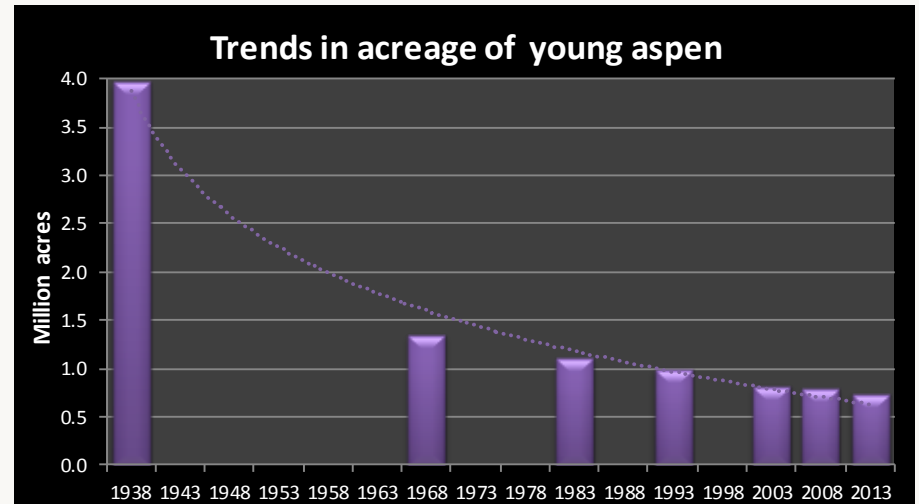


Figure 11. Acres of young (0-20 yrs) aspen (for 1938 the acres of "restocking land" are reported).

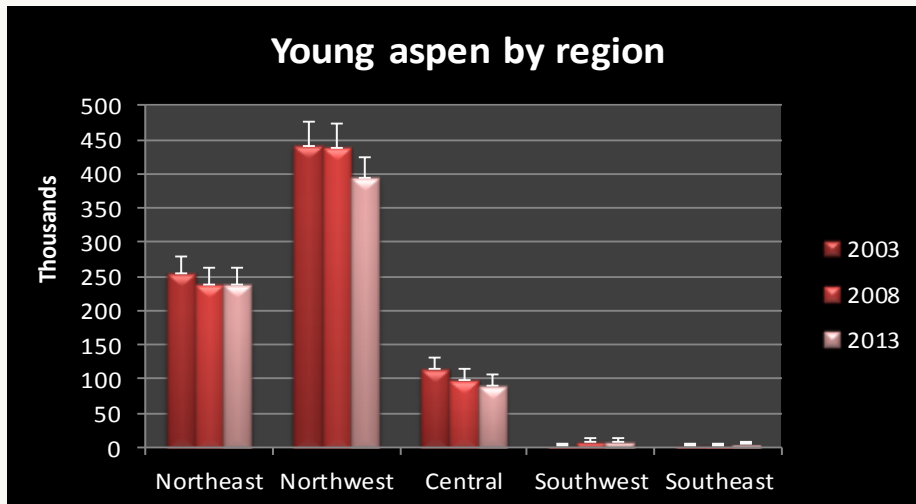


Figure 12. Acres of young (0-20 yrs) aspen forest type by FIA region (Forest Inventory and Analysis).

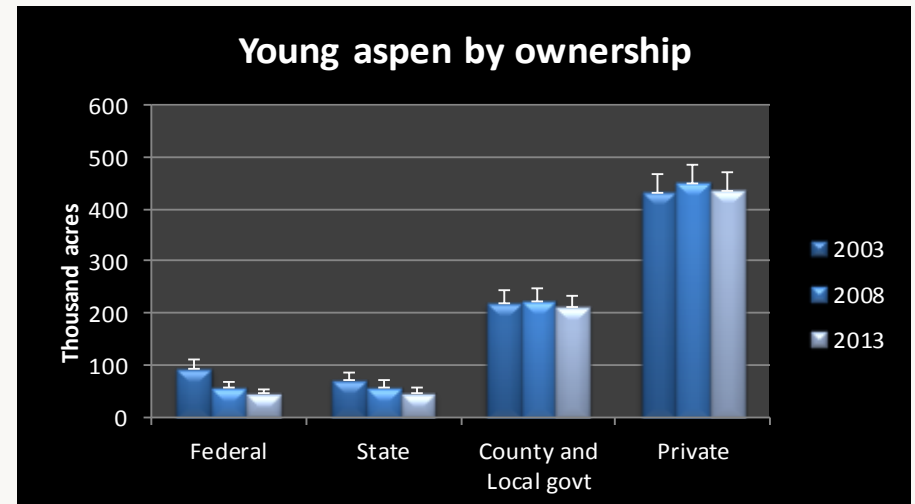


Figure 13. Acres of young (0-20 yrs) aspen forest type by owner group (Forest Inventory and Analysis).



Young paper birch forests

Acreage in young paper birch (0-20 years old) has decreased 87% since 1938 (Figure 14). Between 2003 and 2013, the only significant change in acreage was a 9-fold increase in southwest Wisconsin but sampling error was too large to make other conclusions (Figure 15). There was an increase in state-owned young paper birch (Figure 16).

Between 2008 and 2013, 26,500 acres transferred out of the 0-20 year age class (10,000 acres matured out and 16,500 acres converted to another type) while 28,900 acres entered the 0-20 year age class (5,200 acres of newly regenerated acreage and 24,000 acres converted from another type to paper birch) for a slight gain in acreage.

Young paper birch is a prime browse species for deer and moose but also provides food for birds like the redpoll, pine siskin, chickadee and grouse.

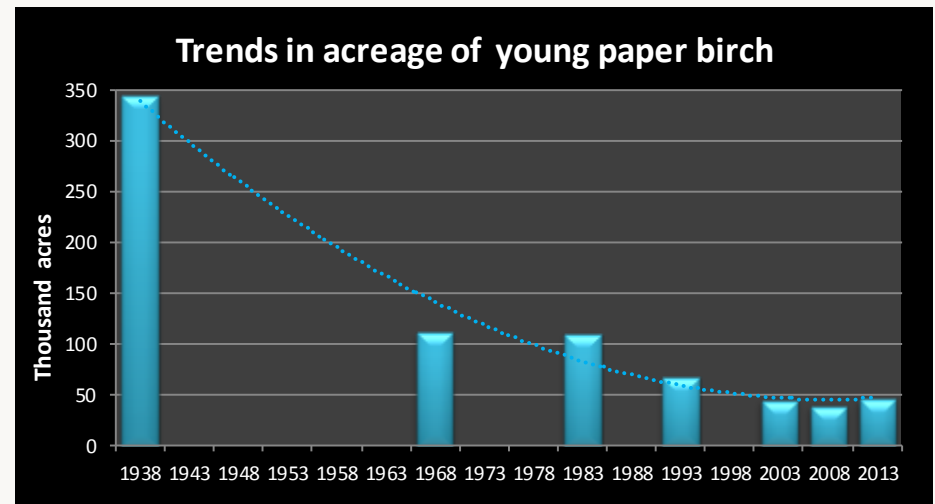


Figure 14. Acres of young (0-20 yrs) paper birch (for 1938 the acres of "restocking land" are reported).

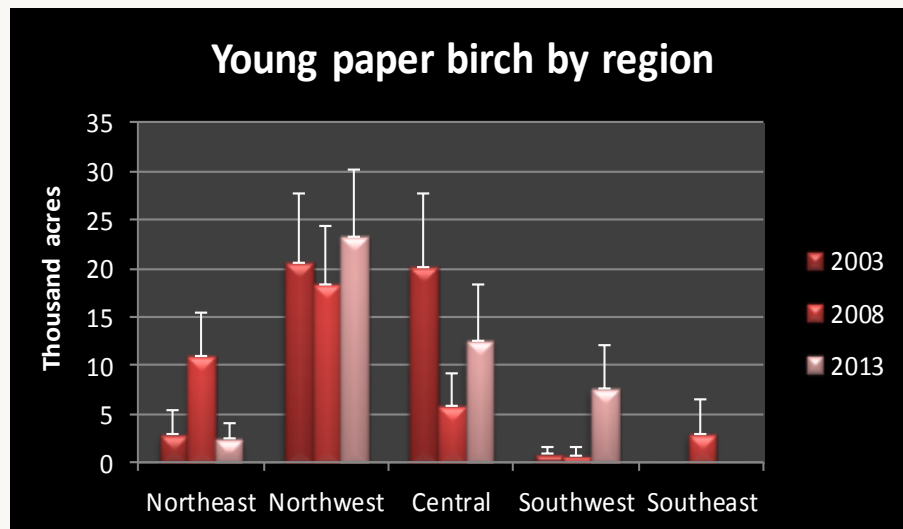


Figure 15. Acres of young (0-20 yrs) paper birch forest type by FIA region (Forest Inventory and Analysis).

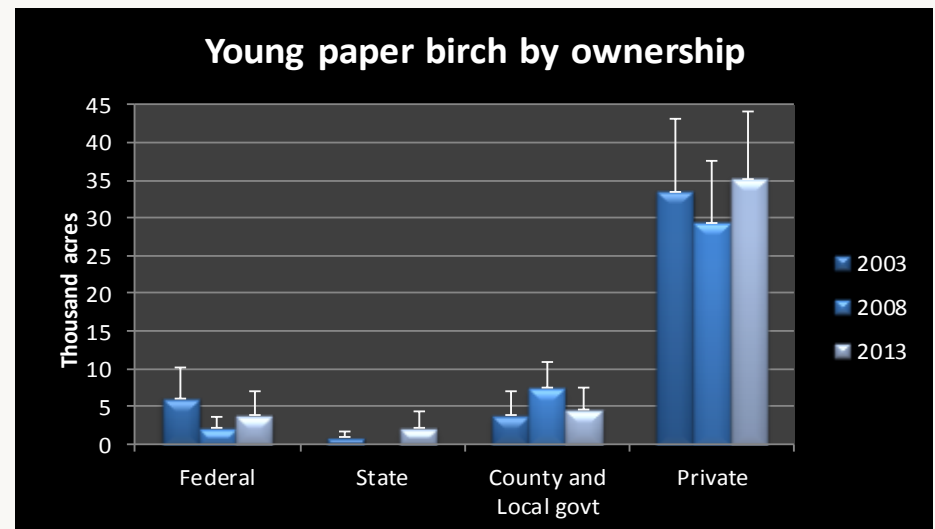


Figure 16. Acres of young (0-20 yrs) paper birch forest type by owner group (Forest Inventory and Analysis).



Young spruce fir forests

Acreage in young spruce fir (0-20 years) has decreased 76% since 1938 but increased 82% since 2003 (Figure 17). Between 2003 and 2013, acreage increased dramatically in northwest, central and southeast Wisconsin (Figure 18). There were significant increases in acreage of young spruce fir on both federal and state lands (Figure 19).

Between 2008 and 2013, 26,000 acres or 32% of young spruce fir matured past 20 years but only 7,700 acres were added by regenerating stands. More land is converted from other forest types into spruce fir than was converted from spruce fir into other types. For instance, 14,300 acres were converted from spruce fir to other types but 23,000 acres were converted to spruce fir.

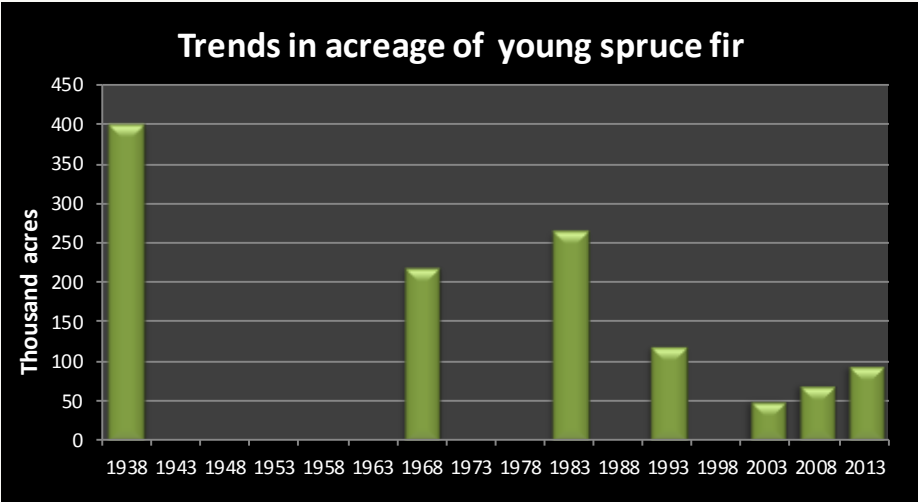


Figure 17. Acres of young (0-20 yrs) spruce fir (for 1938 the acres of "restocking land" are reported).

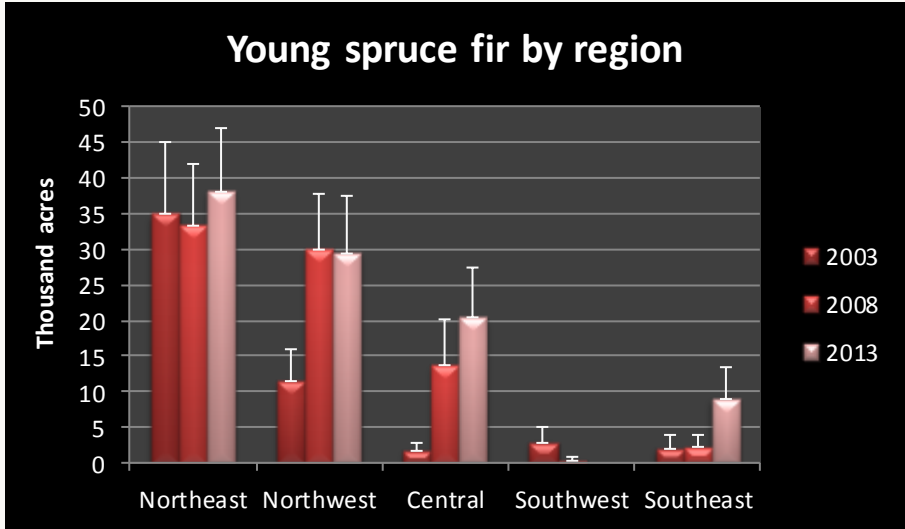


Figure 18. Acres of young spruce fir forest type by FIA region (Forest Inventory and Analysis).

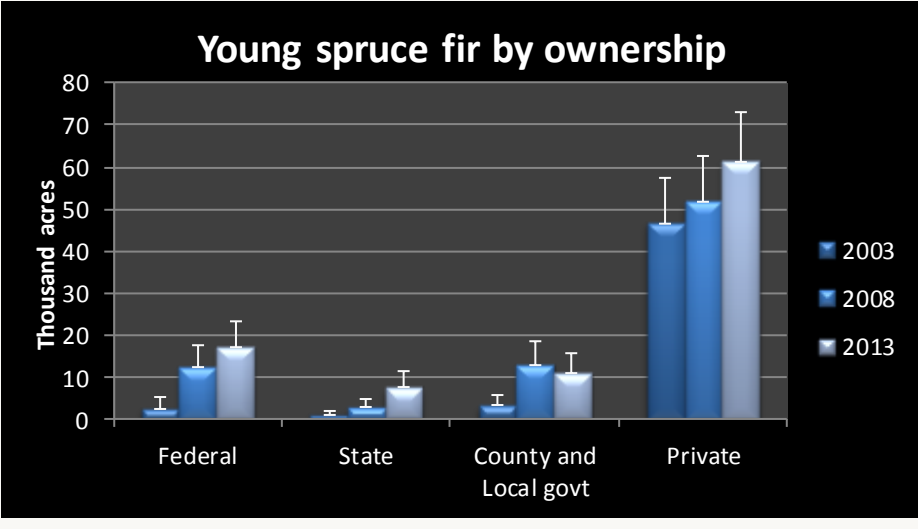


Figure 19. Acres of young (0-20 yrs) spruce fir forest type by owner group (Forest Inventory and Analysis).



Young forests and American woodcock habitat

The population of the American woodcock has been declining for several decades. This species depends on several distinct habitats for different life stages. For instance, the American woodcock requires young or early successional forest that is less than 20 years old. The high density of woody stems offers protection from predators and affords excellent nesting and brood rearing habitat. They also require areas of rich moist soil such as alder swamps where an abundance of invertebrates provides the bulk of their diet.

In Wisconsin, management for the American woodcock focuses on areas which combine areas of high density alder with nearby young aspen stands (Figure 20). Forest Inventory and Analysis data can be used to locate areas where both alder and young aspen are present. The map on the left below depicts the probability of alder occurrence on forested land and the map in the center shows priority management zones delineated by the Fish and Wildlife Service for woodcock rehabilitation. In the map on the right these management zones are overlain on the map of alder and young aspen plots. It is notable that most of the areas where aspen and alder co-occur fall within priority management zones.

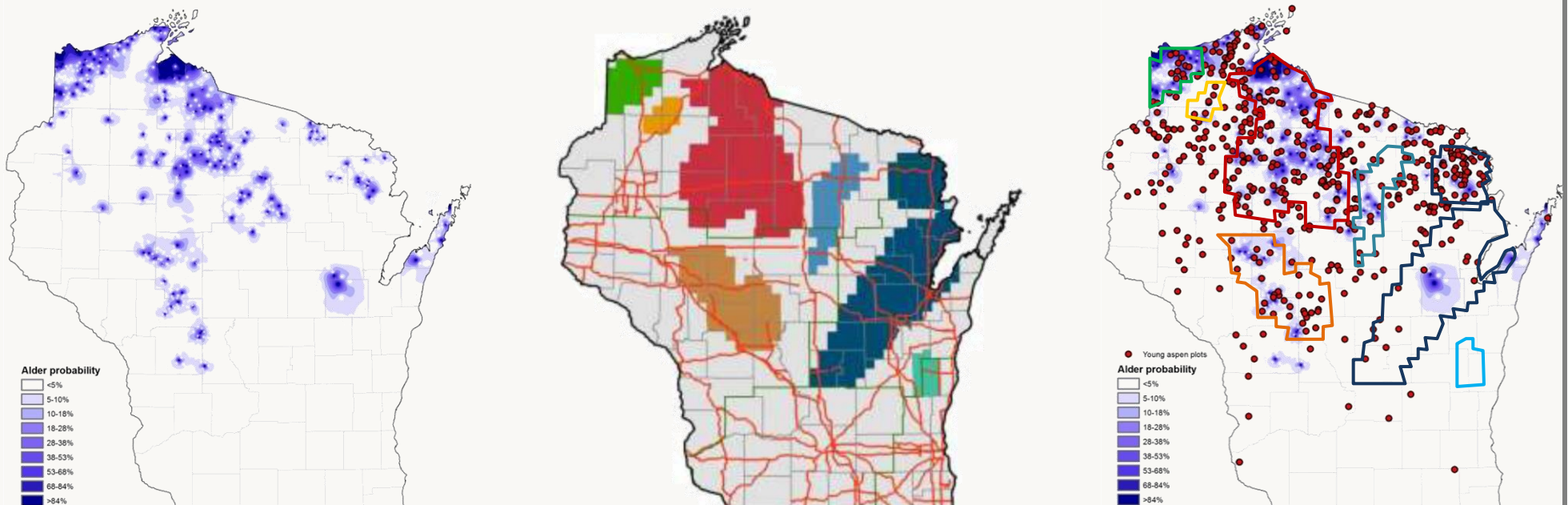


Figure 20. Left: Probability of finding alder on forested land (based on 1996 FIA data). Center: High priority management zones for American woodcock based on predicted abundance and habitat suitability (map by Brad Potter, USFWS). Right: Priority zones overlain on the alder map also showing the location of FIA plots with young aspen.



Young forests and Kirtland's Warbler habitat

Kirtland's warbler has been Federally listed as an endangered species since 1967. Numbers have fallen dramatically as a result of lack of nesting habitat and cowbird parasitism.

nest on the ground in large stands of young jack pine age 6 to 22 years. It is thought that trees of this age have enough lower branches to conceal nests from predators. Stands need to be at least 30 to 40 acres in size with trees 5 to 20 feet tall. In the past, free burning fires helped maintain wide expanses of this age of jack pine.

The first Kirtland warbler nest was observed in Wisconsin in 2007. Annual surveys and banding have been conducted since 2008. In addition, cowbirds have been trapped in order to reduce nest parasitism. Sightings have occurred in Adams, Marinette, Bayfield and Douglas counties (Figure 21). The US Fish and Wildlife Service recommends that there be at least 38,000 acres of appropriate habitat in Michigan and Wisconsin, with as much as 4,000 acres of newly regenerated jack pine created each year. In Wisconsin alone in 2013 there were 68,000 acres of jack pine age 6-22 years but 60% of this was over 15 years old (Figure 22). In 2013, there were only about 1,600 (±1,100) acres of jack pine that had been regenerated in the previous five years.

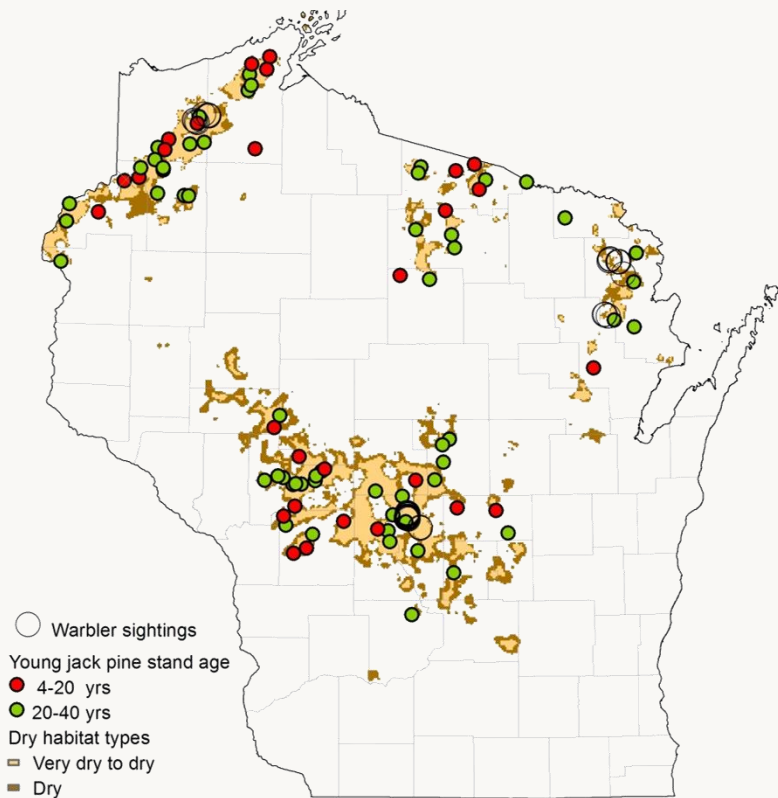


Figure 21. Map of young FIA jack pine plots overlaid on 2014 sightings of Kirtland's warbler.

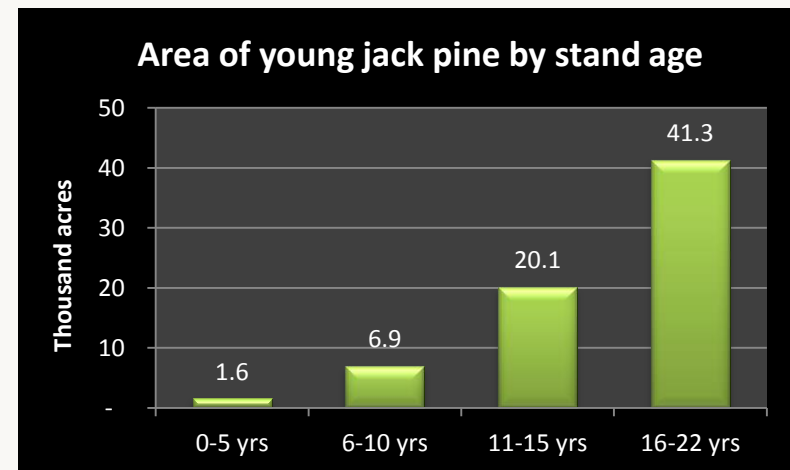


Figure 22. Acreage of young jack pine in Wisconsin by stand age class (2013 FIA data).

Comparison with other states in the Northeast and Midwest

Wisconsin ranks second only to Minnesota in the percentage of total forest land in the 0-20 year age class (Figure 23). In 2014, there were 2.1 million acres of young forest in Wisconsin compared to 2.8 million acres in Minnesota and 1.9 million acres in Michigan.

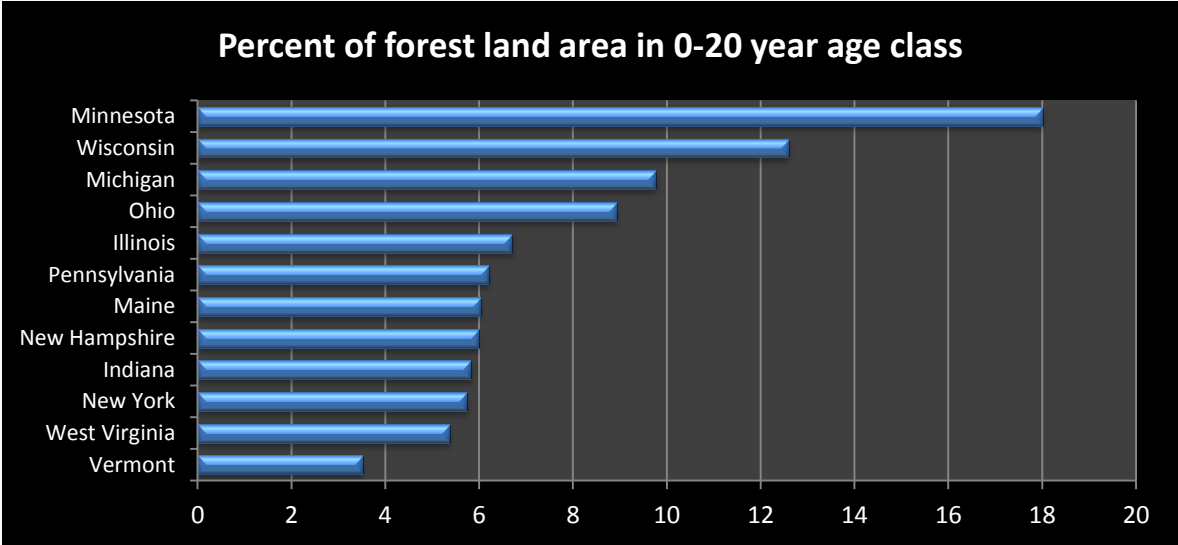


Figure 23. Percentage of all forest land in the 0 to 20 year age class by state (2013 and 2014 FIA data).

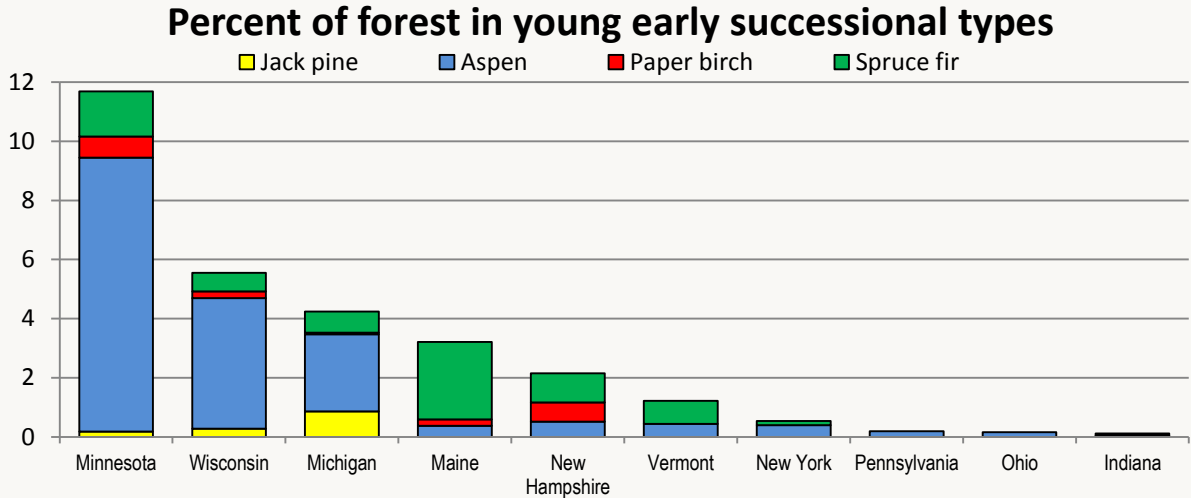


Figure 24. Percentage of all forest land in the 0 to 20 year age class in jack pine, aspen, paper birch and spruce fir forest types by state (2013 and 2014 FIA data).

Wisconsin also ranks second to Minnesota in the percentage of total forest land in the 0-20 year age class in the early successional types, jack pine, aspen, paper birch and spruce fir (Figure 24). In 2014, 0.9 million acres of young forest in Wisconsin were in the early successional types compared to 1.8 million acres in Minnesota and 0.8 million acres in Michigan.