

DIVERSIFYING FARM INCOME THROUGH WOODLOT MANAGEMENT: CHARACTERISTICS OF FARMER-OWNED NIPF LAND IN ILLINOIS

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ABSTRACT.— The lessening dependence on public lands for the supply of timber and a shift in the focus of timber procurement from the western U.S. to the South and Midwest, coupled with the indications of increasing lumber production rates in the Midwest, may signal a significant opportunity for NIPF landowners in Illinois. The objective of this study is to determine the forest characteristics and spatial patterns of farmer-owned NIPF timberland for counties in Illinois in an effort to identify those areas in Illinois where farmers have the greatest opportunity to capitalize on existing NIPF acreage. The study is the first step in quantifying the opportunities for increased timber harvesting from this NIPF ownership group within Illinois. Counties located in western and southern Illinois may have the greatest potential for increased timber harvesting on farmer-owned NIPF based upon forest acreage, growing-stock volume, site classification, and forest tract size.

As a result of litigation and changes in public sentiment, timber harvesting has declined on publicly owned land throughout the United States and, in particular, the West. This reduction in the available supply of timber resources from publicly owned lands have shifted the focus of timber supply to nonindustrial private forest (NIPF) lands. Increasing demand for timber resources from NIPF land may suggest that timber supplies in the Midwest will fall under increased procurement pressure from forest products industry (Callahan 1980, Wiedenbeck and Araman 1993). Recently, an increase in the production of hardwood lumber from states located in the lower Midwest has been documented by Luppold and Dempsey (1994).

The lessening dependence on public lands for the supply of timber and a shift in the focus of timber procurement from the western U.S. to the Midwest and South, coupled with indications of increasing hardwood lumber production in the Midwest, may signal a significant income opportunity for NIPF landowners in Illinois. Those NIPF landowner groups with propensity to harvest timber will have the greatest chance

of benefiting from increased demand on the NIPF timber supply. Within Illinois, farmer-owned NIPF timber acreage has the greatest rate of harvest of all NIPF groups in the State (Birch 1996). In general then, farmers in Illinois, who own existing NIPF acreage may be in a good position to benefit from increasing demand for timber.

The degree to which Illinois farmers will be able to capitalize on increased demand for timber will be determined by the degree to which small NIPF tracts can satisfy the biological and economic constraints of harvesting operations. Loggers and timber buyers in Massachusetts who purchased timber from small NIPF tracts identified growing-stock volume and timber quality as the biological characteristics of greatest concern when deciding to bid on a potential harvesting operation (Kittredge and others 1996). Additionally, timber tract sizes must be of sufficient size to satisfy the economic constraints of operation costs.

The objective of this study is to determine the forest characteristics and spatial patterns of

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farmer-owned NIPF timberland for counties in Illinois in an effort to identify those areas in Illinois where farmers have the greatest opportunity to capitalize on existing NIPF acreage. This study is the first step in quantifying the opportunities for increased timber harvesting from the farmer-owned NIPF within Illinois.

DIVERSIFIED FARM INCOME

Agriculture in Illinois is highly concentrated in soybean and corn production. In 1997, 90 percent (20 million acres) of the State's cropland was dedicated to corn and soybean crops. Concordantly, 75 percent of the farm income was manifested from the sale of corn and soybean production to the market. Such figures suggest that Illinois has significant opportunity to diversify agriculture production, and thereby income sources, through the planting of a greater variety of crops and the inclusion of alternative production in farm strategies. The harvesting of timber from existing farmer-owned NIPF land is one means of diversifying Illinois' monotonic agriculture production using an alternate production strategy.

Income generated from forestry activities has been shown to positively impact gross farm income within the Midwest and Illinois. A study of corn growers in the 16 major corn-producing states found that 5.5 percent received some income from forestry operations in 1996 (Kelson 1999). While the number of farmers taking advantage of forest income is small, the income created can be substantive.

Income from forest related activities created an average of \$10,378 in gross income (9.1 percent of total farm gross income) for those farms that included forestry activities in their production strategies in 1996 (Kelson 1999). Total gross income created through forestry activities for all corn producers in the study was \$207 million in 1996 (Kelson 1999). Farmers in Illinois created over \$3 million in income from the sale of forest products (excluding Christmas tree and maple syrup sales) in 1997 according to the National Agriculture Statistics Service (NASS). Statewide in 1997, 719 farms in Illinois created income from the sale of forest products (NASS 1997).

Small to moderate-sized farms struggling to remain successful competing in concentrated crop production markets may do well to allocate more land (and resources) to forest production. This may be particularly applicable to Illinois where a steady decline in the number of farms in operation has occurred over the last 3

decades. Farms most likely to fail in Illinois are those owned by individuals or partnerships and those that are less than 500 acres in size. This is opposite to the growth trends found in farms owned by corporations and of farms greater than 500 acres in size. Additional income created through forestry activity may be a means for small to moderate size farm groups to remain in operation in the face of a concentrating agriculture production market in Illinois.

SMALL-TRACT HARVESTING

The feasibility of harvest operations on small tracts is often of concern when considering increased harvesting levels from NIPF timberland. Concerns about operability of small-tract harvesting are often centered on the perception that small NIPF tracts suffer from poor stocking levels, poor quality, and low growing-stock volume—qualities not sought after by would-be timber buyers and loggers. Consequently, a common notion is that successful harvesting operations on small NIPF tracts are limited to those tracts with only the highest quality species, and those with the largest growing-stock volumes.

In a study addressing the economic availability of timber for production in Tennessee, May and LeDoux (1992) elicited the characteristics of upland hardwood forests that were found to be economically feasible for harvest. The authors used the profitability model ECOST version 2 (Ledoux 1988) and FIA datasets to determine the average characteristics of 35-acre timber tracts located in Tennessee that were profitable to harvest. The model simulated clearcut harvesting systems using chainsaw felling and rubber-tire skidders. Though the willingness for NIPF owners in the Central States to use clearcut operations is in doubt (Roberts and others 1995), the study results provide a clear baseline for comparison of forest characteristics.

In their study, May and LeDoux (1992) found that the average 35-acre tract, profitable to harvest under moderate logging costs, has a mean tree diameter of 10.7 inches and a harvested growing-stock volume of 1,795.8 cubic feet/acre. While these average characteristics are most appropriate for Tennessee, the findings suggest that biological characteristics of economically feasible timber tracts are certainly attainable and not limited only to most productive NIPF tracts.

Studies of the characteristics of farmer-owned NIPF timberland have been completed in the states of Florida, South Carolina, and Virginia

(Thompson 1997, 1999; Thompson and Johnson 1996). The studies suggest that farmer landowners in each of the studies were most likely to own forest tracts between 11 to 50 acres in size—a range that includes the 35-acre tract size of May and LeDoux (1992). Volume of growing stock per acre was compared across six tract size classes in each of the southeastern studies (Thompson 1997, 1999; Thompson and Johnson 1996).

While significant difference in growing-stock volume was found when testing for differences among all tract size classes in the Thompson studies, no specific differences were established due the absence of post-hoc analysis in the report. However, little practical difference in the volume of growing stock per acre is evident between the 11 to 50, 51 to 100, and 101 to 200-acre tract size classes. If this is the case, little variation may exist in degree of stocking between less than 200-acre tract categories. This is particularly important when comparing the potential basal area/acre available from tracts of different acreage. While the total available harvest volume will certainly be greater in a cumulative sense for large forest tracts, the similarity in growing stock per acre may suggest that small tracts may be a competitive option for timber buyers in a market with a large number of less than 200-acre tracts.

The willingness of loggers and timber buyers to purchase timber from small NIPF tracts is certainly of paramount interest in determining any opportunities for Illinois farmers to capitalize on an expanding hardwood market. Kittredge and others (1996) surveyed loggers in Massachusetts to determine their attitudes toward tract characteristics and their associated willingness to bid on timber. Loggers operating in Massachusetts were found to be willing to bid, on average, on tracts of 5.3 acres with a total volume of only 17.1 mbf.

The biological factor that most affected their willingness to purchase a tract of timber was wood quality/value—suggesting that loggers find moderate to high-quality, small-acreage tracts valuable opportunities for harvesting (Kittredge and others 1996). These specific numbers are not directly applicable to Illinois due to differences between the two States in forest resource base and industry. However, the acceptance by loggers of small tracts of timber as viable timber harvests (assuming quality is high enough to offset costs) suggests loggers are

willing to purchase small tracts associated with farmer-owned NIPF timberland.

METHODOLOGY

Two databases were queried to obtain information related to NIPF land on farms in Illinois: the Census of Agriculture database (AgCensus) (NASS 1997) and the Forest Inventory and Analysis database (FIA) (Forest Inventory and Analysis Research 2000). Farms are defined by the federal government as “a place which produced and sold, or normally would have produced and sold, \$1,000 or more of agricultural products” (NASS 1997). The FIA data is collected on a rotating basis by USFS experiment station personnel and the database is administered by the Southern Research Station of the USFS. The AgCensus database is compiled every 5 years by the NASS via a census of farm operators. The FIA dataset does have some limitations related to the sampling accuracy and applicability of data to fine scale analysis; however, its usefulness in timber production studies is documented (May and LeDoux 1992, LeDoux and others 1995, 1996; Worthington and others 1996). All spatial analysis was completed using ArcView 3.2.

General forest data relating to farmer-owned NIPF land was collected from the AgCensus database for all counties in the State. This data, at the county level of measurement, included the number of farms in operation, farm acreage, number of farms with woodlots, and farm woodlot acreage. From this dataset a spatial database was created that identified for each county in the state the number of farms identified as having woodland, total farmer-owned woodland acreage, and the percentage of farm acreage dedicated to woodland. From the resulting spatial database, target regions within Illinois with the greatest occurrence and extent of farmer-owned NIPF lands were identified. Further analysis using specific forest data from the FIA datasets were completed for only these regions.

The FIA electronic database was queried for the following data reported at a county level of measurement:

- 1) timberland acreage,
- 2) volume of growing stock of all species, and
- 3) acreage of timberland with site classification greater than or equal to 85 cubic feet/acre/year.

Data were collected only for lands classified as being “farmer/rancher” ownership. No FIA data were available for the counties of Edwards, Richland, Mason, and Scott within the target area.

Average tract size of farmer-owned timberland was calculated for NIPF land in the target areas based upon AgCensus figures (NASS 1997). The average farmer-owned forest tract size per county was calculated by dividing the number of woodlot acres per county by the number of farms in the county reported as having a woodlot. While this is a coarse measurement, the calculation is useful for general analysis at a county level of measurement. The tract size calculation operates under the assumption that the timberland acreage reported by farmers in the AgCensus is based upon continuous forest tracts.

RESULTS AND DISCUSSION

General Characteristics of Illinois' Farmer-Owned NIPF Land

Illinois has 4 million acres of timberland as reported by the USDA Forest Service's Forest Inventory and Analysis (FIA) database (FIA 2000). Timberland is defined by the USFS as "forest tracts greater than 1 acre in size capable of producing greater than 20 cubic feet/acre/year of growing stock" (FIA 2000). Of the State's total timberland acreage, NIPF landowners own 3.6 million acres (greater than 90 percent of the total forest acreage). Nearly 45 percent (1.6 million acres) of the NIPF land is owned by Illinois' farmers.

The frequency and extent of farm woodlots, as reported in the AgCensus, is spatially divergent across the State. Those regions of the State where farmer-owned forest land is most prevalent (and thereby potential harvesting opportunities the greatest) are clearly evident when depicted spatially. Counties located in southern and western Illinois clearly have a greater frequency of farm woodlots (fig. 1), greater farm acreage (fig. 2), and a greater percentage of farmland dedicated to woodlots (fig. 3). The lack of forest land frequency and acreage throughout Champaign County and the central Illinois region is consistent with that Region's greater rowcrop productivity and topography more suitable for traditional agriculture. Farmers located in western and southern regions of Illinois have a greater opportunity to capitalize on existing forest acreage and are the target regions for further analysis.

Farmer-Owned NIPF Characteristics

Within the 56 county target region, farmers own 1.24 million acres of timberland. Thereby farmers—NIPF owners—in the 56 county target area own roughly 75 percent of the State's total farmer-owned forest acreage. The mean farmer-owned acreage per county is 24,000 acres is

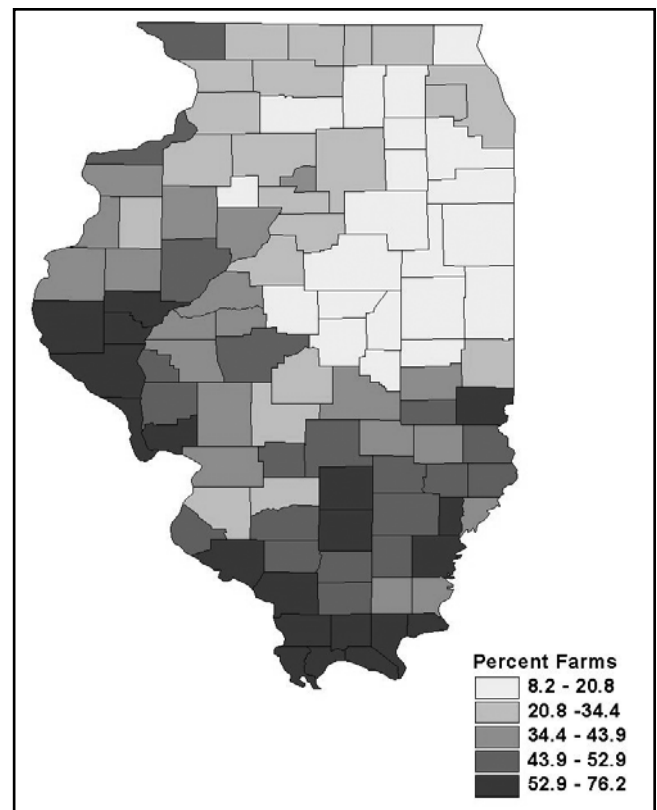


Figure 1.—Percentage of operating farms having a "woodlot". (Source: NASS 1997)

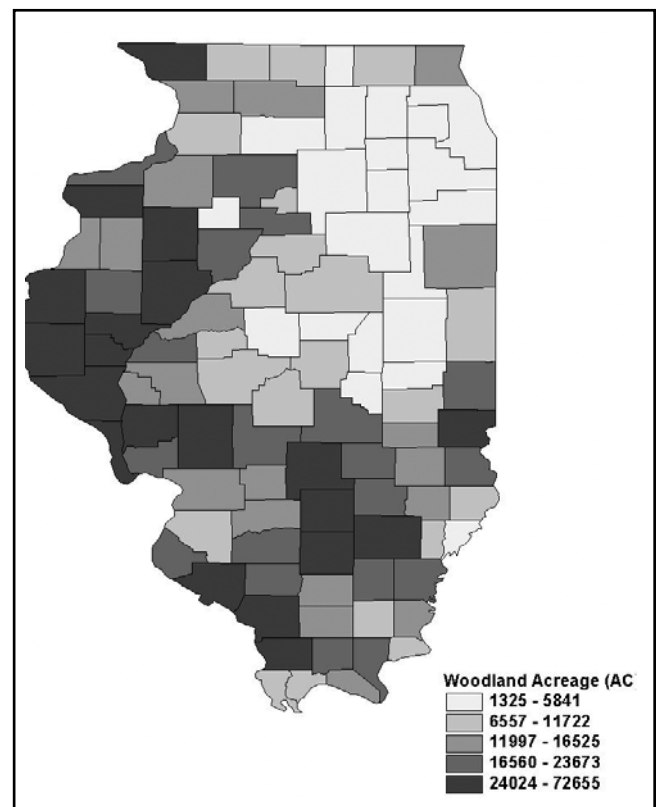


Figure 2.—Acreage of farmer-owned "woodlots". (Source: NASS 1997)

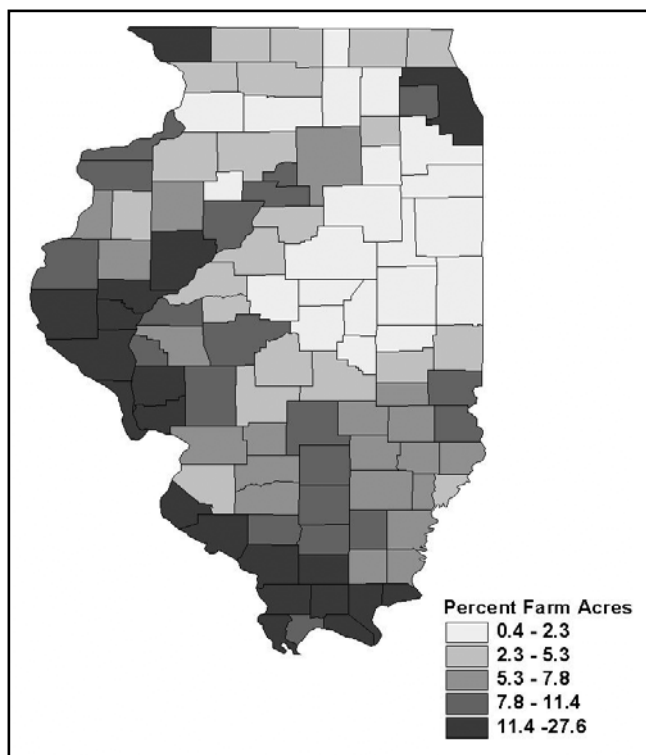


Figure 3.—Percentage of farmland acreage classified as "woodlot". (Source: NASS 1997)

highly variable with a standard deviation of 18,400 acres (fig. 4). Pike County had the greatest individual county acreage with 93,600 acres of timberland. St. Clair County had the lowest single-county acreage of 3,600 farmer-owned acres. Those counties with the highest total acreage are located along the I-57 corridor and the northwestern corner of the target region.

Total growing-stock volume within the region is 1,435 mmcf. Pike County with its large forest acreage has the greatest per county volume of growing stock with 111.7 mmcf (fig. 5). Likewise St. Clair County has the least growing-stock volume with only 4.5 mmcf. The mean growing stock per county is 27.6 mmcf (standard deviation of 20.7 mmcf).

The FIA database identifies site classification as the potential growth of fully-stocked natural stands (FIA 2000). That farmland acreage classified as being moderate to high production sites may have the greatest potential for timber production. Within the study area 535,900 farmer-owned acres are classified as being able to produce greater than 85 cubic feet/acre/year—43 percent of the timberland growing on farmer-owned acreage (fig. 6).

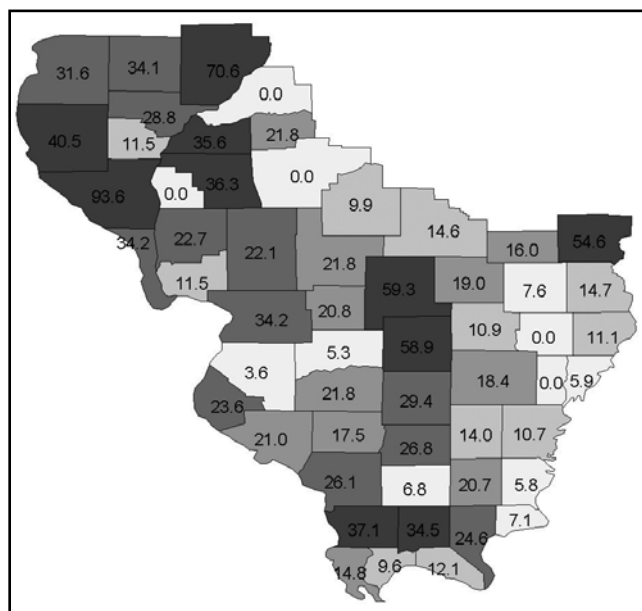


Figure 4.—Farmer-owned timberland acreage (1000's) for counties in southern and western Illinois. (Source: FIA 2000)

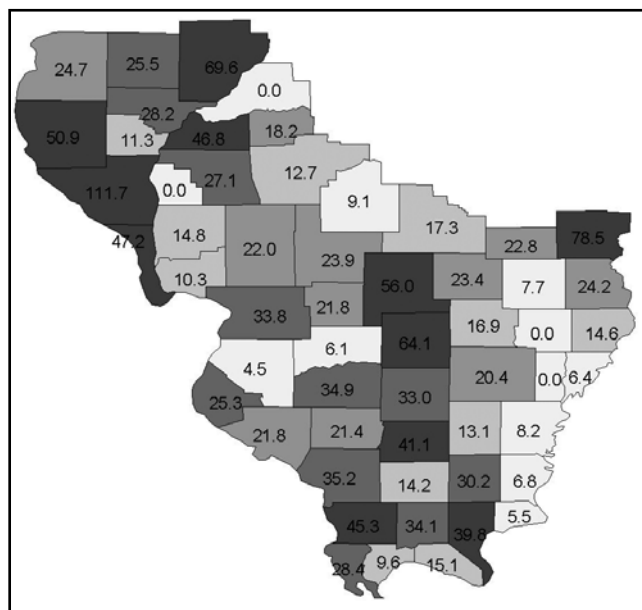


Figure 5.—Volume of growing stock (mmcf) on farmer-owned timberland in southern and western Illinois. (Source: FIA 2000)

A comparison of biological attributes for counties in the target region identifies the range of biological potential, at the county level, for farmer-owned NIPF timber harvesting. To control for differences in measurement unit, the values of the above biological components were standardized for each county. These standardized values were then summed to identify those counties with the largest value combinations of the three biological components. Figure 7 suggests that

while southern and western Illinois have biological characteristics most able to support increased timber harvesting from farmer-owned NIPF compared to the rest of Illinois, large variation in biological characteristics still exists. Successful implementation of programs directed at increasing harvesting on existing farmer-owned NIPF might depend upon identifying and targeting counties that have the greatest biological potential.

County tract size calculations for all southern Illinois counties yielded an average forest tract size per county of 70 acres (standard deviation 26 acres) (fig. 8). Mean farm size in the area is 363 acres. The greatest average tract size for farmer-owned acreage is 161 acres in Gallatin County in the southeastern portion of the State. Madison County has the smallest average tract size of only 38 acres. The average tract size owned by farmers per county reported is consistent with the average county tract size of all NIPF ownership as reported by the Illinois Forestry Development Council (IFDC 1999).

SUMMARY AND FUTURE RESEARCH

Farmers in southern and western Illinois who own existing forest tracts may experience positive economic impacts from timber harvesting operations. Within the target region, farmer-owned NIPF acreage, growing-stock volume, and site quality is of sufficient quantity to suggest that farmers in southern and western Illinois

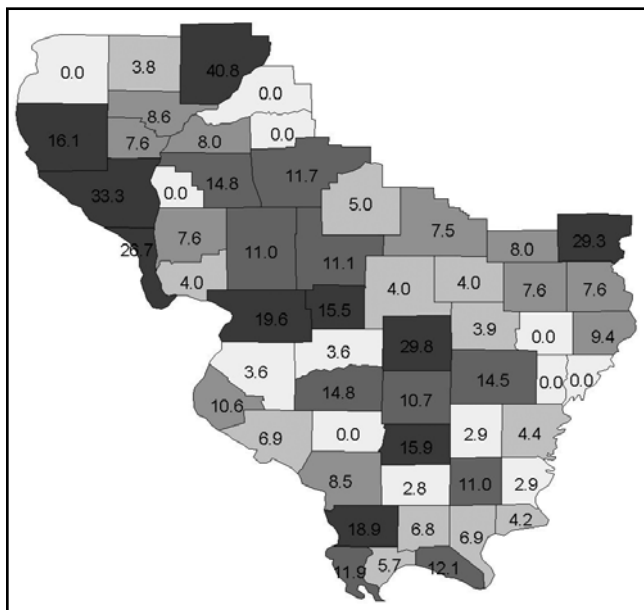


Figure 6.—Acres (1000's) of farmer-owned timberland with a moderate to high site classification per county. (Source: FIA 2000)

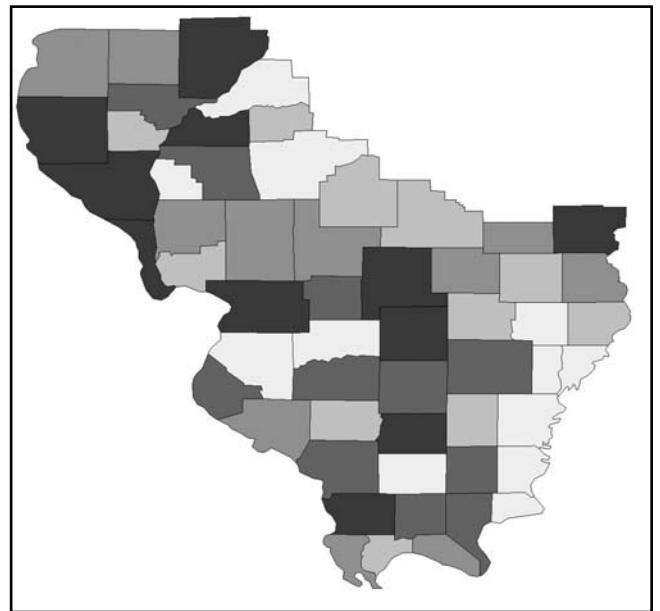


Figure 7.—Counties with the greatest opportunity for timber harvesting on farmer-owned timberland based upon acreage, growing-stock volume, and moderate to high site classification values.

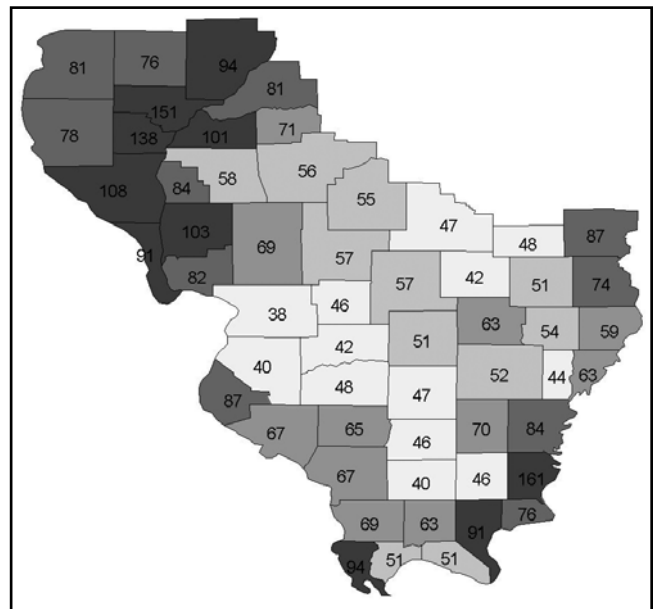


Figure 8.—Average tract size of farmer-owned timberland in southern and western Illinois.

have a substantial opportunity to benefit from increased timber harvesting. Forest Inventory and Analysis figures suggest that 75 percent of the farmer-owned acreage in the State occur within the 56 county target region identified. Nearly half of this farmer-owned NIPF in southern Illinois is moderate to highly productive and able to produce greater than 85 cubic feet/acre yearly.

Cumulative values of biological characteristics suggest that counties within the target area have divergent biological capabilities. However, those counties within the target area have greater potential for increased farmer-owned NIPF timber harvesting than other counties in the State. To insure that the productivity and sustainability of the resource is maintained, efforts should be taken that promote scientifically-based management of farmer-owned NIPF. In the absence of sound management the extensive farmer-owned NIPF resource may be lost to excessive timber harvesting or simple neglect.

Future activities will be directed toward

- 1) integrating this research with a model of timber mill procurement influence within Illinois to further identify areas within the State where farmers may have the greatest opportunity to sell timber from existing NIPF land;
- 2) analysis of the feasibility of timber harvesting on specific farmer-owned tracts or site types within southern and western Illinois; and
- 3) promoting the greater use of forest management plans by NIPF landowners, and particularly farmers, within the State.

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