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MODELING HARVESTING BEHAVIOR OF PRIVATE LANDOWNERS IN EASTERN TEXAS ON A MULTI-COUNTY LEVEL

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Background. For many years, timber has ranked as the single most important agricultural commodity in the South, worth as much as three times more than tobacco, the second highest value crop. Depletion of old-growth timber and the removal of large tracts of National Forest lands from timber production in the Northwest signal an even greater dependence on southern timber. Publicly-owned timber contributes less than 10 percent of the South's timber supply. The nonindustrial private forest (NIPF) landowner is the major raw material supplier to southern mills. NIPF timber supply in the future, however, will be largely dependent upon the timber management behavior patterns of the NIPF ownership as a whole.

Mills buy timber within small geographic areas. Timber supply projections at state or larger regional scales mask the variability that may exist among individual mill supply areas. A better understanding of timber management behavior patterns of NIPF landowners relative to their industrial counterparts within a given mill supply region would be useful. A model was developed that estimated the probabilities of harvest given certain biological conditions for two classes of private timberland ownership. The model considered the effect of changes in biological variables such as softwood timber volume, growth and mortality as well as ownership on the harvesting decisions of industrial and NIPF landowners in two mill supply areas of southeastern Texas between 1975 and 1986. The biological variables served as proxies for economic influences. For example, the volume on the stand may represent the value of an enterprise's invested capital. Future research will incorporate economic variables directly. The model was estimated using the U.S. Forest Service's forest survey plot data, which represents the most detailed information available on the forest resource. Mill supply area 1 contained 9 counties: Nacogdoches, Shelby, Angelina, San Augustine, Sabine, Tyler, Jasper, Newton and Hardin. Supply area 2 contained 7 counties: Houston, Trinity, Walker, Polk, San Jacinto, Montgomery and Liberty.

Research Findings. One compelling reason to model timber supplies at sub-state levels is illustrated by the variation in ownership patterns. Industry owns 33 percent of the commercial timberland at the state level, but 68 percent in area 1 and 43 percent in area 2. The age of harvested and unharvested stands for both ownerships provides information about differences in both industry structure and ownership behavior between the two supply areas. Unharvested NIPF

stands were only 5 years younger than harvested stands; the difference was 20 years on industrial stands. These differences may be the result of several factors. First, in area 1 industry used clearcutting on 70 percent of their stands while 75 percent of the NIPF-owned stands were partially harvested. Second, the large gap in mean age between harvested and unharvested industrial stands compared to NIPF stands suggests an industrial timber management system focused on timber production while NIPF owners may have non-timber objectives. Harvested stands on both ownerships were older in area 2 than area 1: 6 years on industry stands and 14 years on NIPF stands. The higher mean age in area 2 suggests that the type of mills found within a supply area can be reflected in forest conditions. Area 1 contains or is adjacent to all but one of the pulp mills in eastern Texas while area 2 contains solid-wood and structural panel mills.

Model results showed that in area 1 volume was a significant indicator of the probability that a stand would be harvested only on industrial stands. Growth, however, significantly influenced the probability of harvest on both ownership types in both supply areas. The role that ordinary mortality plays in harvesting behavior is unclear. Results of the model can be used to quantify how much more likely industrial owners are to harvest stands than NIPF owners while controlling for forest conditions. For example, given a stand with an initial volume of 1500 ft^3 per acre and growing 100 ft^3 per acre per year, an industrial owner is almost 5 times more likely to harvest the stand than an NIPF owner. The likelihood of harvest at various levels of the explanatory variables for each ownership may also be derived. For example, an industrial stand in area 1 with an initial volume of 1000 ft^3 is 3 times as likely to be harvested as a stand with 500 ft^3. However, an industrial stand with an initial volume of 2500 ft^3 is only 1.87 times as likely to be harvested as a stand with 2000 ft^3.

Application. The extent to which harvesting behavior differs by ownership does suggest that NIPF owners do have non-timber objectives. It appears that NIPF harvesting behavior varies by forest conditions and between substate regions. The probability of harvest associated with each plot implicitly reflects the timber management decisions made by the owner of the plot. Consequently, a timber supply projection model that incorporates probabilities will more accurately reflect the actual timber management behavior patterns of both private ownership classes. Such a model will also be useful to regional economic development entities in planning economic development. The production of satisfactory model results based on forest survey data means that updated information will be available every 6 years for reestimating the model, providing a fairly current reflection of private timber management behavior patterns.