Abstract

In the southeastern United States, non-industrial private forest landowners (NIPFL) have experienced reduced product market availability and increase price uncertainty. NIPFL’s need additional management options for the most commonly grown southern pine species – loblolly pine (Pinus taeda L.). Profitability and cash flow of production forestry enterprises need to be improved. At the same time, NIPFL’s desire increased flexibility to achieve marketable forest products. This paper examines feasibility, profitability, and cash flow of a mixed product, 33-year rotation with management options for loblolly pine plantations that incorporate management activities such as thinning, wildlife food plots, and hunting leases under alternative levels of productivity and product prices. Calculated financial measures of profitability include soil expectation value (SEV), annual equivalent value (AEV), and internal rate of return (IRR). With 7% of the acreage in food plots and hunting lease values of $8, $10, $12, and $14 per acre per year, IRR values were 11.14%, 11.62%, 12.31%, and 12.67% respectively. Hunting leases add income for NIPFL’s but landowners worry about liability risk. Studies analyzing lawsuits showed that perceived risk was greater than actual exposure. Landowners can take simple precautions to reduce liability risk when leasing land for recreation.

Keywords: Internal Rate of Return, liability risk, hunting lease, wildlife management, timber management

Introduction

Non-industrial private forest (NIPF) landowners across the South question whether to plant loblolly pine on cutover and old-field sites. They also question spending moderate to large sums of money on intensive forest management under current and anticipated stumpage prices and economic uncertainty. Landowners seek options to maximize returns from their forestland. Hunting leases can provide an additional income stream for some landowners. Simple hunting leases may require little financial investment by the landowner. However, lease prices can often be improved by incorporating forestry practices such as thinning and land management practices such as creating food plots. Landowners need information on the financial benefits of these practices (Glover and Conner 1988).
Other authors have discussed related issues such as non-timber forest product enterprises (Chamberlain and Predny 2003), timber management for northern bobwhite quail and gray squirrel (Barlow et al. 2003), and compatibility of agriculture and natural resource based enterprises (Waide 2003).

In 2006, hunting leases for white-tailed deer (*Odocoileus virginianus*) had an estimated farm gate value of 108.2 million dollars in Georgia (Boatright and McKissick 2006). The economic impacts of hunting in Georgia exceeded $651 million in 2006 (USFWS 2006). The farm gate value of timber in Georgia declined from approximately 720 million dollars per year in 1999 to approximately 585 million dollars per year in 2006 (Boatright and McKissick 2006). During the same period, the total farm gate revenue from deer hunting leases increased from approximately 50 million dollars in 1999 to 108 million dollars per year in 2006.

Hunting leases have many benefits for landowners including income generation, public relations (for both industrial lands and private lands), and property protection. Problems related to leasing may include road damage, trash, illegal hunting including over harvest, fire, damage to timber and liability exposure (Morrison et al. 2001).

The objectives of this paper are to review the financial results of various timber management scenarios with and without hunting lease assumptions. In addition, I will briefly discuss hunting lease liability issues.

**Methods**

**Common assumptions**

Cost figures for food plots are difficult to obtain - numbers are available in the wildlife literature but are very variable due to assumptions made by previous authors. The total cost to produce one ton of forage can vary from $45.76 per acre to $107.20 per acre (Wear et al. 1997). Costs include lime, fertilizer, and seed. Equipment cost is often ignored, as is labor cost because it is frequently assumed that the landowner and/or hunter perform the work. Additional specifics related to assumptions and management scenarios are given in Mengak et al. (2004). General recommendations are for 5 to 10 percent of the tract to be in food plots to have any measurable impact on ecological carrying capacity and thus, herd size. However, individual animal size and hunter probability of successfully harvesting any deer increase with even one small food plot. White-tailed deer readily use food plots (Kamermeyer et al. 1993, Hehman and Fulbright 1997, McDonald and Miller 1995). No one knows how much larger the individual animal becomes, nor does any literature indicate the difference in harvest probability.

I assumed a landowner has 160 acres (1/4 section) and puts seven percent of the acreage into food plots (1/2 in cool season forage; 1/2 in warm season forage). That would amount to 11.2 acres of food plots in this example. These acres could be 11 one-acre food plots evenly distributed over the tract. Alternatively, one could plant several two- or three-acre plots strategically located for deer, with one larger acreage plot planted to attract doves (*Zenaida macroura*) and/or turkeys (*Meleagris gallopavo*).

Food plot area is now foregone timber income, i.e., timber income is reduced seven percent. I assumed a mid-range cost of the food plots ($60/ac or $672 on the 160-acre tract). The average
price of a deer lease in Georgia was $12.00 per acre per year, or $1,920 per year for 160 acres (Boatright and McKissick 2006).

The rotation age was set at 33 years for loblolly pine plantations with two thinnings to produce an even mix of pulpwood, chip-n-saw, and sawtimber. I used a discount rate of 8 percent for the next-best alternative investment to calculate soil expectation value (SEV) and annual equivalent value (AEV). The calculation of internal rate of return (IRR) assumes that intermediate, positive cash flows are reinvested in the enterprise at the IRR, not the discount rate. We assumed fire protection cost at $2/ac/yr, stand management at $2/ac/yr, and property taxes at $5/ac/yr. Thus, the total annual cost for each year of the rotation was $9/acre. This value cost goes in the transaction table as an annual cost during the rotation. The present value of this net, annual cost flow is $103.63 during the 33-year rotation (The multiplying factor for present value of an annual terminating series at eight percent for 33 years is 11.51389). I report results in constant dollars, before taxes. Throughout the scenarios, I assumed the land is already owned.

Site Preparation and Planting Costs

Site preparation and planting (SP&PL) costs total $125/acre (Dubois et al. 1999). These costs represent the following site preparation and planting scenario: The relatively low site preparation and planting cost of $125/acre could include machine planting and the use of a post-planting herbicide to control herbaceous weeds on an old-field site or glyphosate at 1 gallon/ac or prescribed burning (low level) site preparation and rough land machine or hand planting on a cutover site.

Site preparation options and associated costs vary extensively by location, prior stand history, harvesting utilization, landowner objectives, monies available, and anticipated future stumpage value and demand. The assumption was that the level of site preparation intensity matched the level of competition control needed so that wood-flows were comparable within site productivity levels, after site preparation and planting. If the establishment cost is greater than the relatively low SP&PL cost used in this paper, then SEV, AEV, and IRR will be reduced (Dickens et al. 2005).

Product class specifications

Product class specifications are: pulpwood (PW) at a dbh of 4.6 to 9 inches to a 3 inch top; chip-and-saw (CNS) at a dbh of 9 through 12 inches to 6 inch top; and, sawtimber (ST) with a dbh greater than 12 inches to a 10-inch top (inside bark) were assumed.

Georgia stumpage prices, reported through Timber Mart-South (TMS 2004) for 1st quarter year 2004 average, used in this analysis for loblolly pine, were net of property taxes at harvest (2.5 percent) and net of marketing costs (8 percent). The low TMS prices for PW and CNS were used for thinning prices and average TMS prices for pulpwood, CNS, and ST were used for the clearcut.

Thinning

All scenarios include two thinnings at 15 and 24 years old for the 33-year rotation. Residual basal area (RBA), after thinning (5th row with selection from below), was set at 65 sq. ft./ac. To address questions related to profitability of timber management and hunting leases, we used the
Georgia Pine Plantation Simulator (GaPPS 4.20) growth and yield model developed by Bailey and Zhao (1998).

Species-specific assumptions

Loblolly pine survival is assumed to be 500 TPA at age 5-years. The mean annual increment (MAI) for loblolly is assumed to be 2.15 cds/ac/yr (5.77 tons/ac/yr) through age 33-years with the two thinnings.

Scenarios

The ten loblolly pine scenarios examined were: (1) No food plots, no hunting lease, i.e., 100% forested tract, (2) 7% unplanted openings, no hunting lease, (3) 7% food plots, no hunting lease, (4) 7% food plots, $2/ac/yr hunting lease, (5) 7% food plots, $4/ac/yr hunting lease, (6) 7% food plots, $6/ac/yr hunting lease, (7) 7% food plots, $8/ac/yr hunting lease, (8) 7% food plots, $10/ac/yr hunting lease, (9) 7% food plots, $12/ac/yr hunting lease, and (10) 7% food plots, $14/ac/yr hunting lease.

Results

Internal rate of return (IRR) for all ten scenarios ranged from 9.47-12.67 (pine scenarios with site preparation and planting cost of $125/ac, food plot establishment costs of $60/ac, seven percent of area in food plots and variable hunt lease price using the aforementioned assumptions; Figure 1). Generally, the levels of forest management are economically justifiable in these cases, even using low to medium 1st quarter 2004 stumpage prices (TMS 2004) for Georgia.

Establishing the entire tract in pine with no food plots or hunting lease resulted in an IRR value of 10.41 percent. Keeping seven percent of the tract out of pine production and with forest openings, but no food plots, lowered the IRR value to 10.1% (Figure 1). However, establishing seven percent of the tract in food plots, but with no hunting lease, further lowered IRR to 9.47 percent.

Adding income in the form of a hunting lease changes the IRR values. Greater income from a hunting lease leads to higher IRR values in a nearly linear fashion (Figure 1). Compared to the 100 percent forested tract, the tract with seven percent of the acreage in food plots and a hunting lease of approximately $5 per acre per year earns a comparable IRR. Generally, increasing management, including the addition of food plots and securing a hunting lease, increased internal rates of returns for our 160-acre tract of land.

Rotation has thinning in years 15 and 24 to a residual basal area (RBA) of 65 square feet per acre, with site prep and plant (SP&PL) cost of $125/acre. Comparison is made between a 100 percent forested tract, a tract with no hunting lease with seven percent of tract in unplanted openings, and a tract assumed to have seven percent of area in food plots with increasing levels of hunting lease price per acre. Food plot establishment costs were set at a mid-range of $60/acre. MAI is 2.01 cds/ac/yr (5.40 tons/ac/yr); wood-flow is 34% PW, 37% C-N-S, and 29% ST.
Figure 1. Relationship of hunt lease price to internal rate of return (IRR in %) and annual equivalent value (AEV in $s/ac/yr) value for a 160-acre tract of a 33-year loblolly pine plantation.

Discussion

Adding pine straw income from the plantation would greatly improve IRRs. The 2.15 eds/ac/yr MAI (5.77 tons/ac/yr) productivity levels at age 33-years for loblolly can be achieved on cut-over sites with good fertility and soil moisture holding capacity soils using a low cost chemical site preparation achieve adequate competition control (Pienaar and Rheney 1996) and is conservative on most old-field sites.

The profitability of food plots is influenced by several factors including timber price, forage yield and lease price. The tendency of food plots to attract and hold deer depends on surrounding habitat. I know of no studies that document the certainty of food plots to produce high quality deer or more deer in the absence of sound wildlife management. While producing a mature buck takes 3 or more years (McBryde 1995) and trophy buck management can be inefficient (DeYoung 1989, 1990) the installation of food plots can have an immediate impact on deer harvest. However, unlike cattle producers or row-crop production, timber growers who convert acreage from pine production to food plots may not easily revert to pine. In this case, a
commitment to forego timber must be recognized as a long-term (at least through the current pine rotation) investment.

The value of food plot management for non-economic returns such as non-game wildlife, plants, and insects is largely unknown. I recognize that non-game values are increasing. Net economic value of wildlife watching is estimated at $51/day (USFWS 2003). Nature-based tourism, turkey hunting leases and duck hunting leases have an estimate annual value in Georgia of $51 million, $6.0 million, and $2.2 million, respectively (Boatright and McKissick 2006). Values for wildlife watching activities nationwide are also increasing (USFWS 2006). Potential returns from all wildlife values, when coupled with our analysis of financial returns for deer hunting leases, shows that wildlife management and timber management can increase the financial returns to landowners.

The financial analysis does not include management fees for items such as legal advice or liability insurance. I acknowledge the importance of liability coverage. However, insurance rates are difficult to determine. Individual factors (including history, size of the hunt club, number of acres, location of the property, and coverage amount) determine premium rates. For example, one company in South Carolina advertises a minimum premium rate of $364 per million dollars of coverage. Landowners should have liability insurance and should require lessees to acquire adequate liability coverage amounts. Wright et al. (2003) concluded that the myth and perception of liability is greater than the actual risks but landowners must educate themselves and act to protect their interests.

Non-industrial private forest landowners do have some attractive forest management options with loblolly pine even when using low to medium stumpage prices (TMS 2004). Generally, increasing forest management activities (thinning, fertilization, adding pine straw) increased internal rates of return at the wood growth increments used (Dickens et al. 2005). If an internal rate of return of eight percent or better is a landowner goal with the stumpage prices used (TMS 2004) and the wood production rates of 2.15 cdfs/ac/yr (5.77 tons/ac/yr), then all loblolly pine scenarios at the lower site preparation and planting establishment costs achieved that as shown by models in other papers (see Dickens et al. 2005). Food plot establishment costs do not push IRR value below 9.5 percent.

If an internal rate of return of 10 percent or better is a landowner objective under these assumptions, then a hunting lease for as little as $4/ac achieves that. This price is well below the $12/ac average deer hunting lease price reported for Georgia counties.

An internal rate of return of 12 percent or better is realized at the highest deer hunting lease prices of $12/ac and $14/ac. These prices are reasonable and we have anecdotal evidence of deer hunting lease prices approaching $25/ac in some areas of Georgia.

Landowners often express concerns over liability issues related to leasing lands for hunting. The issue of leasing and liability was the subject of several recent papers (Mozumber et al. 2007, Wright et al. 2002). As noted by Wright et al. (2002), “Generally, landowners perceptions of liability are not balanced with the reality of legal risks.” Numerous authors have noted the distinction in U.S. common law for three groups of recreational users (Wright et al. 2002). Trespassers receive the lowest level of protection. A trespasser is defined as a person on the property of another without any authority or permission. A licensee is a person who enters the
property by permission only and without any economic or other inducement to the landowner. This would include social guests as long as their use of the property is gratuitous and not economically beneficial to the landowner. The third recreational user is the invitee. The invitee is a person who is invited onto the property for a public or business purpose. This group would include the hunter who pays a lease fee.

Generally, the highest standard of care is expected for the invitee. Landowners have a duty to inspect the property and facilities, to warn users about hazards, and to keep the property in reasonably safe repair. Landowners should anticipate foreseeable activities and take precautions to protect users. Georgia state law (OCSG 51-3-20 through 51-3-26) explicitly shields landowners from civil liability for injuries to persons using land for recreational purposes without charge. Recently, an amendment to Georgia law (OCSG 21-3-1) extends this protection to landowners and lessees who give permission to hunt or fish with or without charge.

Wright et al. (2002) reviewed 637 recreation cases involving injury or death nationwide since 1965. In Georgia, five cases were brought against public agencies but none resulted in a judgment of liability. Also, eighteen cases in Georgia were brought against private landowners and only two resulted in an adverse judgment. As noted in Wright et al. (2002), of 23 total cases in Georgia since 1965, eight were related to swimming accidents and no cases related to hunting, camping, picnicking, hiking or nature study resulted in adverse judgments against landowners.

Of course, the filing of a lawsuit by a recreational user can result in both emotional and financial hardship to the landowner. Properly drafted leases and liability release clauses, drawn by qualified lawyers and signed by all parties and members of hunting clubs will greatly reduce the liability exposure for landowners (Mozumber et al. 2007). Adequate insurance coverage by both the landowner and leasing party is strongly recommended. As shown in this paper, hunting leases can provide positive improvement to IRR calculations when used in conjunction with sound timber management and wildlife management practices. The perception of landowner liability is often less than the actual risk. Landowners should consider adding hunting leases and wildlife management activities to their intensive forest management regime to increase cash flow and improve overall returns on investment.

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**Literature Cited**


