

Conservation Reserve Program Public Issues and Policy Education for Sustainable Agriculture Through Forestry¹

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Abstract

Georgia has the largest commercial forest in the U.S. almost 24 million acres, 65% of total land area. Forestry in Georgia ranks number one in employment, output, and value added of all manufacturing industries. Georgia's 1994 total value of timber harvested was almost 30% of the \$2.9 billion total value of agricultural crops and timber. A 1988 study showed that of Georgia's agricultural crop acres, 1,864,000 were marginal for crop and pasture production, including 659,000 acres of highly erodible cropland, and would yield higher landowner returns if planted to long-term sustainable forest crops. In Georgia, 645,931 acres of pine plantations were established between 1986 and 1992 under the Conservation Reserve Program (CRP). Georgia Cooperative Extension Service Specialists in forestry recognized that landowners considering planting trees under provisions of the CRP were in great need of help for economic analysis of enterprises and decision making. To meet this need they developed an education program with seven sequential goals: economic comparison between common agricultural crops and trees; enrollment of qualified landowners in the CRP; analyses CRP scenarios; assess the economic efficiency of controlling weed competition in pines; examine CRP sign up acres; management assistance as contracts near expiration; evaluate impacts of the CRP. Audiences included county extension agents, qualified landowners, involved agency and organization staff, forest industry, forestry professionals, policy makers, governmental units, and extension, teaching and research faculty. Teaching methods and activities included the use of international, national, regional, state, area, district, multi-county, and county extension meeting formats with: 13 training meetings for 400 extension agents; 36 public meetings for 1,639 landowners; 2 training meetings for 75 Georgia Forestry Commission district foresters; and, 3 international, 5 national, and 28 regional papers, plus 4 poster presentations. Publications include: 3 journal articles, 6 extension bulletins, 15 CRP leaflets, and 21 professional meeting proceedings.

Key Words: Afforestation, pine plantations, extension forestry, forest management

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Introduction

Georgia has 37,068,000 acres of total land area of which 65 percent or 23,631,000 acres is forested; more forest acres than any other state. Of Georgia's timber acres, 752,000 are in national forests, 894,000 are non-forest corporate, 4,990,000 are owned by forest industry, and 16,995,000 acres are owned by farmers and other private individuals. Georgia's timberland owners number around 650,000.

In the manufacturing sector of the Georgia economy, forest industry ranks number one in employment, output, and value added. In 1990, of 305,256 manufacturing workers in Georgia, forest industry (wood and paper processing) employs 23% of workers directly, 69,292 workers, and another 107,008 workers indirectly. In relation to all manufacturing in Georgia, forest industries in 1990 produced 24% of output, \$11 billion directly, and another \$8 billion indirectly. In relation to all manufacturing in Georgia, forest industries in 1990 earned a value added performance of 22% of the group's total, \$3.5 billion in value added directly, and another \$4.5 billion indirectly.

In Georgia in 1994 the total value of major agricultural crops and timber harvested was \$2.9 billion. Timber harvested totaled almost 30% of the total value of agricultural crops and timber. For every dollar Georgia forest landowners receive, \$15 is generated in the state's economy. In Georgia, in 1994, \$13,854,467 was collected in county ad valorem taxes from timber at harvest or at sale for harvest.

In response to the Conservation Reserve Program (CRP) provision of the Food Securities Act of 1985 (1985 Farm Bill legislation), 645,931 acres of pine plantations were established in Georgia between 1986 and 1992. The CRP sought to: reduce soil erosion; improve water quality through reduced soil erosion; curb production of surplus commodities; enhance fish and wildlife habitat; reduce sediment in streams and along roadsides; and provide income support to farmers (Glaser 1986). Highly erodible crop lands were targeted for conversion from annual row crop production to less intensive uses. Land use options fostered by the CRP included establishment of permanent grasses, legumes, forbs, shrubs, and trees.

The CRP is funded through the Commodity Credit Corporation and administered through the Consolidated Farm Service Agency (CFSA). Payments are authorized to landowners for one-half cost-share for establishment of the conservation practice, along with an annual payment for maintenance of the practice over the 10-year contract period.

A 1988 study showed that of Georgia's agricultural crop acres, 1,864,000 were marginal for crop and pasture production, including 659,000 acres of highly erodible cropland, and would yield higher landowner returns if planted to long-term sustainable forest crops. According to a 1988 USDA report, after the CRP enrollment, there are still 1.1 million marginal cropland and pasture acres in Georgia that if planted to forest crops would earn higher producer incomes than the current crops and pasture uses.

Nationwide, 36.4 million acres have been enrolled under the CRP (USDA 1993). The 2.4 million acres of CRP tree plantations are predominantly in the South. CRP tree planting account for 91.4 percent (645,931 acres) of the 706,459 acres enrolled in Georgia (USDA-ERS 1994).

A precedent has been set for the long-term retention and management of these CRP plantations. From 1956 to 1960, the Soil Conservation Reserve Program (SCRIP) was established as part of the Soil Bank Act to foster conservation of erodible cropland. Under the 1956 to 1960 Soil Conservation Reserve Program (Soil Bank), 693,499 acres of new pine plantations (afforestation) were

planted on erosion-prone cropland in Georgia. In a pattern similar to present CRP enrollment, 1,926,628 acres of pine plantations were planted across the South. Long-term retention of the SCRP stands has been impressive. In a 1976 study, when the plantations averaged 18 years of age, 83.1 percent of the Georgia tree plantings remained (GFC 1976). Another 14.5 percent had been harvested without specific plans for regeneration. Only 2.5 percent of the plantings had been converted to uses other than trees. In a later study at age 33 years, 23 percent of the Georgia SCRP acreage remained in the original pine plantations, with 73 percent of the initial acres harvested and regenerated to pine (Kurtz et al. 1994). Overall, 96 percent, or 665,759 acres of the original SCRP acres remained in timber production after 33 years.

Extension Education Program Goals

Georgia Cooperative Extension Service Specialists in forestry recognized that landowners considering planting trees under provisions of the CRP were in great need of help for economic analysis of enterprises and decision making. To meet this need they developed an education program with sequential goals as follows:

- 1st Provide row-crop farmers with a needed basis of economic comparison between common agricultural crops and trees when considering enrollment in the CRP.
- 2nd Coordinate with other appropriate organizations and agencies to assist enrollment of qualified landowners in the CRP.
- 3rd Develop an economic analysis of various CRP scenarios using trees, grass, and program benefits to give potential program participants valid decision criteria for evaluating their options related to the CRP. This analysis would allow potential CRP participants to evaluate returns to this program.
- 4th Help tree farmers assess the economic efficiency of controlling weed competition in pines in old-fields.
- 5th Examine CRP sign up acres in Georgia based on Land Capability Class as a measure of pine site productivity, model forest management rotation scenarios, and estimate total CRP pine plantation economic returns and wood-flow over time.
- 6th Provide management assistance to CRP program participants as their contracts near expiration through educational/training materials and meetings.
- 7th Evaluate impacts of the CRP for program participants, the state economy, and the effectiveness of the CRP-focused extension program of public issues and policy education.

Program Structure

Audiences Targeted

Audiences for public issues and policy education with the CRP include county extension agents, qualified landowners, involved agency and organization staff, forest industry, forestry professionals, policy makers, governmental units, and extension, teaching and research faculty.

Teaching Methods and Activities

Use of international, national, regional, state, area, district, multi-county, and county extension meeting formats has greatly improved the efficiency of technology transfer. These formats have also made it possible to reach a greater total number of clientele and do so in a shorter time frame as detailed in the section below.

- C **Agent Training** - 13 training meetings were held for 400 extension agents since 1987 to cover CRP topics. These professional educators then held landowner meetings and instruction back in their areas of operation.
- C **Public Meetings** - 36 public meetings were held in Georgia since 1987 to cover CRP opportunities for qualified landowners. More than 1,639 landowners attended these meetings. Numerous county extension agents, forestry professionals, and representatives of forest industry also attended these CRP up-dates.
- C **State Agency Meetings** - To implement a CRP education program, two training meetings were held for a total of 75 Georgia Forestry Commission district foresters. These education professionals were given one day of in-depth instruction on use of the CRP training materials. These district foresters then held landowner meetings and instruction back in their home counties.
- C **Professional Forestry Meetings** - 3 international, 5 national, and 28 regional paper presentations, plus 4 poster presentations have been made by Georgia extension service specialists in forestry on CRP pine management and related topics since 1988 addressing directly more than 1,953 forestry education and research specialists.

Publications/Outreach

Use of public television, radio, extension news releases, news letters, magazine articles, research reports, and department bulletins greatly multiplied the efforts of the program. Publications include: 3 journal articles, 6 extension bulletins, 15 CRP leaflets, and 21 professional meeting proceedings. In addition, there were 7 newsletter, newspaper, and magazine articles, 5 radio, and 1 television programs. These mass media presentations reached an audience of over 10 million state-and region-wide.

Related Publications and Activities

To accomplish this broad public issues and policy education program for the CRP, a number of related publications and activities were undertaken as follows:

- C Per acre returns were calculated for corn, soybeans, and loblolly pine on CRP soils in Georgia. Comparisons were made across soil types, yield levels, and market regions. This crop comparison information was published in an extension bulletin. Additionally, another extension bulletin contains information to allow prospective forest producers to calculate their individual estimates of forest returns. Finally, a journal article quantified the competitive position of pine trees relative to corn and soybean production.
- C An applied research and extension project was funded by the State of Georgia for \$40,000 in 1995. This project provided resources to fund a graduate student thesis on the characteristics of CRP landowners in Georgia. Grant funds were used to upgrade computer technology, pay travel and meeting expenses, cover publications costs, and hire technical assistants. In Georgia, 82 percent of the surveyed CRP landowners indicated that they will continue timber production after expiration of the

annual contracts (Kammholz 1996). Following harvest of these stands 70 percent intend to replant these acres in pine. This compares favorably with the history of the SCRP pine plantations in the state. Additionally, one department publication and one extension newsletter have been published with circulation in excess of 10,000 copies.

- C A set of 15, two-to-four page leaflets on various CRP-related pine management topics was published in cooperation between the Warnell School of Forest Resources and the Georgia Forestry Commission. Leaflets on an additional 15 topics are currently in production. The coauthors and contributors serve to strengthen the bulletin and broaden its support and use.
- C The department publication and leaflet notebooks covering CRP topics were distributed to and coordinated with all 159 county extension offices and the Georgia Forestry Commission district foresters. The additional distribution and coordination greatly increased the effectiveness of the extension education program as these entities also conducted meetings and trainings for CRP landowners.

Results Achieved

Public Issues and Policy Education

This CRP extension public issues and policy education program was carried out closely with involved agencies such as the Consolidated Farm Service Agency and the Georgia Forestry Commission. It has been instrumental in helping to guide the entire process of development and implementation of the CRP. All 7 of the extension education program goals were met. Furthermore, it is illustrative of an optimum extension education process. The program included needs assessment, county agent in-service training, education for landowners and the general public, and provision of assistance to the CRP participants in Georgia through presentations at 87 meetings, speaking directly to 4,067 meeting participants. In addition, 49 CRP-related publications have been published and distributed at the state, national, and international levels.

Other Benefits

Some 14,718 qualified Georgia land owners enrolled 706,459 acres in ten year covenants with the U.S. government during 12 sign up periods from 1985 through 1992. CRP payment of initial crop establishment cost share was \$34.20 per acre, a \$24,160,898 total one time payment. Annual land rent payments earned by these individuals, over the duration of contracts, averaged \$43.06 per acre per year, \$30,420,125 per year for ten years, or \$304,201,250 total rent payment in Georgia. CRP contracts began expiring during October 1995 with almost 50,000 acres in the tenth contract year in Georgia. Contracts for the bulk of CRP acres in Georgia will mature between 1996-1999 (Figure 1).

Examinations of land capability classes indicate that only erosion prone, productivity limited land was enrolled in the CRP in Georgia. Land capability classes IIe, IIIe, and IVe represented 58, 25, and 17 percent, respectively, of the CRP acres enrolled in Georgia. Each of the classes represent moderate to severe crop production limitations. The average erosion rate before the CRP was 13.59 tons/acre/year, and on soils under the program erosion was reduced to 1.08 tons/acre/year (EWG, 1995). Therefore, major CRP objectives of reducing soil losses and improving water quality were achieved in Georgia.

Modeling 20-year pulpwood (Tables 1 and 2) and 33-year multiple product rotations (Tables 3 and 4) indicated profitable enterprises. The multiple product rotation produced greater wood-flow and better financial returns over a longer planning horizon than the 20-year pulpwood rotation (Figure 2).

In addition, 33-year rotations (Figure 3) smooth wood-flows across time and product classes to better meet future fiber and timber demand. This longer term product availability should benefit landowners. Haynes (1995) projects a 35 percent increase in softwood harvests from 1990 to 2040. Real prices of softwood sawtimber and lumber are expected to rise steadily from present levels until 2010 to 2015. Maturing pine stands on both industrial and non-industrial lands, including the nearly 1.3 million acres of CRP in the South will support these increases.

Longer rotations provide landowners improved flexibility to meet multiple objectives and can spread risks of timber production over longer time periods and more product markets. The SCRP resulted in an impressive retention rate of 96 percent over 30+ years since the program began. These stands continue to produce fiber and solid wood products and represent permanent conversions of erodible, marginally productive crop land to a sustainable and profitable, long term financial asset.

Overall, the CRP likely represents a long term addition to Georgia's forest land base as did the SCRP. Wood-flows from longer rotation management scenarios from 2004 through 2025 fit well with projected state and regional fiber and sawtimber demands. Additionally, marginally productive land was effectively diverted from unprofitable annual row crop production with significant reductions in annual soil loss.

Studies conducted by Georgia extension specialists on forestry examining the CRP have shown that, on average, annual row crop production on CRP soils is not profitable and leads to excessive soil loss (Moorhead and Dangerfield 1995). Additionally, annual losses from crop production on these types of marginal soils weaken local economies by related job and personal income losses. Establishment of tree crops represents a long-term commitment by landowners to fiber and timber production. These future stumpage supplies are expected to have significant economic impacts on local, state, and regional economies as stands reach merchantable size and harvests begin. Both short rotation pulpwood (<25 years) and longer rotations (>25 years) producing multiple products are typical options for pine plantation management in the South.

The impacts of CRP plantations on agricultural and personal income, and employment were examined in the Georgia. State-wide, landowners received \$30,421,000.00 in direct annual payments to establish and maintain plantations. Annual crop losses (soybean and wheat) on the converted CRP acres had averaged \$60 million. Fully regulated, CRP pine plantations have a projected annual wood-flow net returns of \$29 million. Real net increases in annual agricultural income in nearly \$90 million after land use conversion to sustainable forestry production under the CRP. Across the state, the shift from intensive, but unprofitable, annual crop production to forestry created 500 jobs and a \$9 million increase in personal annual income.

Evaluation Methods

Instructor Evaluation - An instructor evaluation form was used to evaluate teaching effectiveness in the CRP education program for 6 training meetings held for over 500 CRP landowners, county extension agents, and Georgia Forestry Commission district foresters. This form is based on a ranking system where excellent = 5, above average = 4, average = 3, below average = 2, and poor = 1. The summary of evaluations shows that teaching effectiveness ranked between 4 and 5 on each of the following 4 categories:

Category	Rating
! Subject covered thoroughly	4.40
! Method of presentation	4.45
! Instructor effectiveness	4.45
! Handouts	4.47
! Overall rating of instructors	4.44

In addition, program participants indicated that the value of the meeting they attended was worth \$251 per acre of CRP trees they owned. These ratings are indicative of a high level of teaching performance and effectiveness during this CRP program.

The knowledge of the extension specialists involved with the CRP has been greatly increased by working on this program by sharpening their expertise on land productivity valuation techniques, and yields and economic returns estimates for agricultural and forest crops. Also, procedures have been refined for the conduct of integrated extension public issues and policy education programs in Georgia.

This extension program meets three of eight of the Cooperative Extension System's National Initiatives that respond to important societal problems of broad national concern. The three met are revitalizing rural America, sustainable agriculture, and water quality.

Awards

For their work in this area, extension specialists in forestry have been recognized nationally, receiving the "Outstanding Forestry Communications Award - Best Forestry Publication for 1995" for *Landowner Opportunities for Trees after the Conservation Reserve Program (CRP) Ends in Georgia* Bulletin 95-010, presented by the National Woodland Owners' Association. In 1996, they received the Award for Excellence Regional Project - Conservation Reserve Program Opportunities, from the Southern Extension Forest Resource Specialists.

Continuing Work in the CRP Area

On-going projects in the CRP area include:

- C A number of CRP leaflets are in progress, due to be released this fall.
- C A thinning study is under way in Mitchell county, Georgia of a 27-year old Soil Bank stand to model CRP oldfield pine plantation growth.
- C A sub-soiling test demonstration is ongoing in Tift county, Georgia on a 10 year old CRP pine plantation.

References

- Dangerfield, C.W., Jr., D.J. Moorhead, and D.H. Newman. 1995. *Landowner Opportunities for Trees after the Conservation Reserve Program (CRP) Ends in Georgia*, Extension Forest Resources Bulletin 95-010, University of Georgia Cooperative Extension Service, D.B. Warnell School of Forest Resources, May 1995. 23 p.
- EWG. 1995. Conservation Reserve Program report: Georgia summary. Environmental Working Group, Washington, DC. 5 p.
- GFC. 1976. Interim summary-analysis of the current status of the Soil Bank (C.R.) pine plantations established in the state of Georgia (during the period 1956-1961). Georgia Forestry Commission. 3 p.
- Glaser, L.K. 1986. Provisions of the Food Securities Act of 1985. USDA Economic Research Service, Agricultural Information Bulletin No. 498. 105 p.

- Haynes, R.W., D.M. Adams, and J.R. Mills. 1995. The 1993 RPA timber assessment update. USDA Forest Service General Tech. Rpt. RM-GTR-259. 66 p.
- Hepp, T.E. 1994. YIELDplus 4.0 timber yield forecasting and planning tool. Tennessee Valley Authority, Norris, TN. 120 p.
- Kammholz, C-P. 1996. Disposition of Conservation Reserve Program forest land in Georgia. M.S. thesis, D.B. Warnell School of Forest Resources, The University of Georgia, Athens, GA. 90 p.
- Kurtz, W.B., T. A. Noweg, R.J. Moulton, and R.J. Alig. 1994. An analysis of the retention, condition and land use implications of tree plantings established under the Soil Bank Program, the Forestry Incentives Program and the Agricultural Conservation Program. University of Missouri, Columbia, MO. Agricultural Experiment Station SR 464. 80 p.
- Moorhead, D.J., and C.W. Dangerfield, Jr. 1995. Evaluating the impact of tree planting under the Conservation Reserve Program in Laurens County, Georgia. Pp. 418-429 In Proceedings of the 25th Southern Forest Economics Workers Meeting. New Orleans, LA.
- Smith, E.H. 1991. Soil survey of Johnson and Laurens counties, Georgia. USDA Soil Conservation Service. 133 p.
- USDA. 1988. The South's Forth Forest: Alternatives for the future. For. Resour. Rep. No. 24. USDA Forest Service, Washington, DC. 512 p.
- USDA. 1993. Conservation Reserve announces 12th sign-up results. Washington Update (December). 7 p.
- USDA-ERS. 1994. RTD updates: Conservation Reserve Program. No. 2 (January). 4 p.

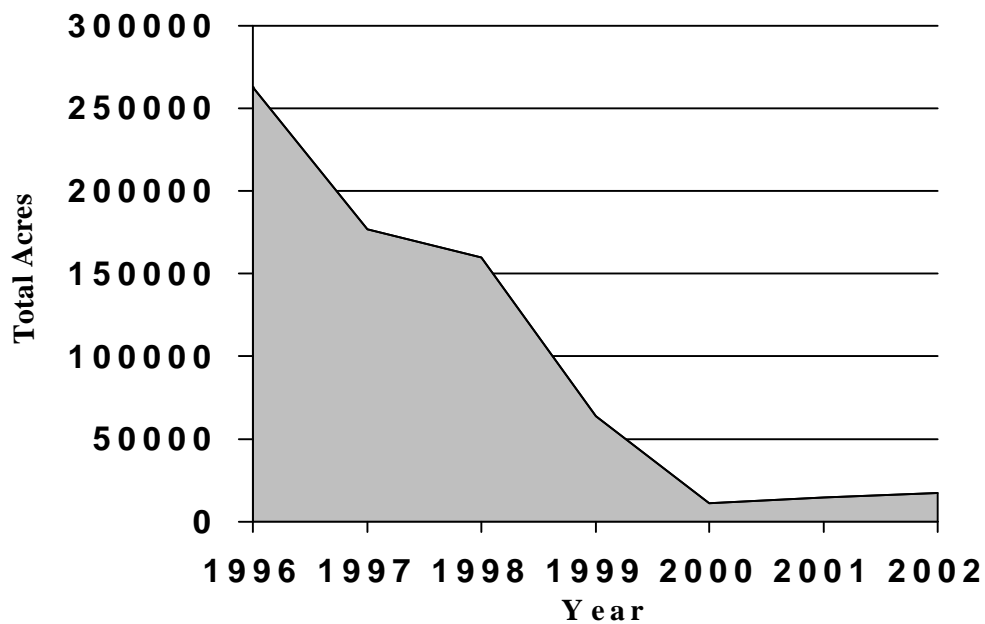


Figure 1. Release of Conservation Reserve Program acres from initial 10-year contracts.

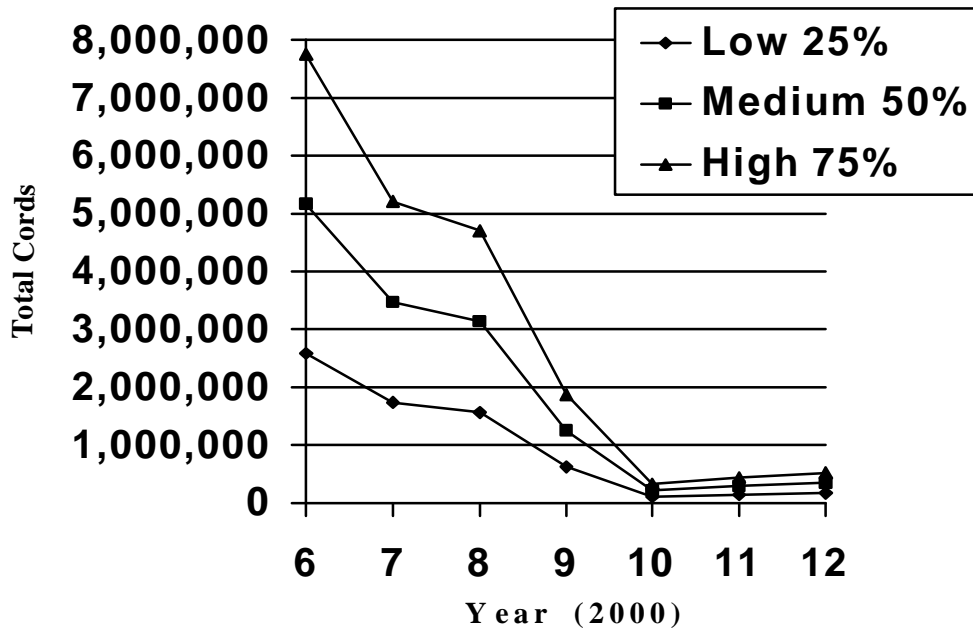


Figure 2. Total cord production in 25, 50, and 75 percent of the total Conservation Reserve Program acres available for harvest in 20-year pulpwood rotations.

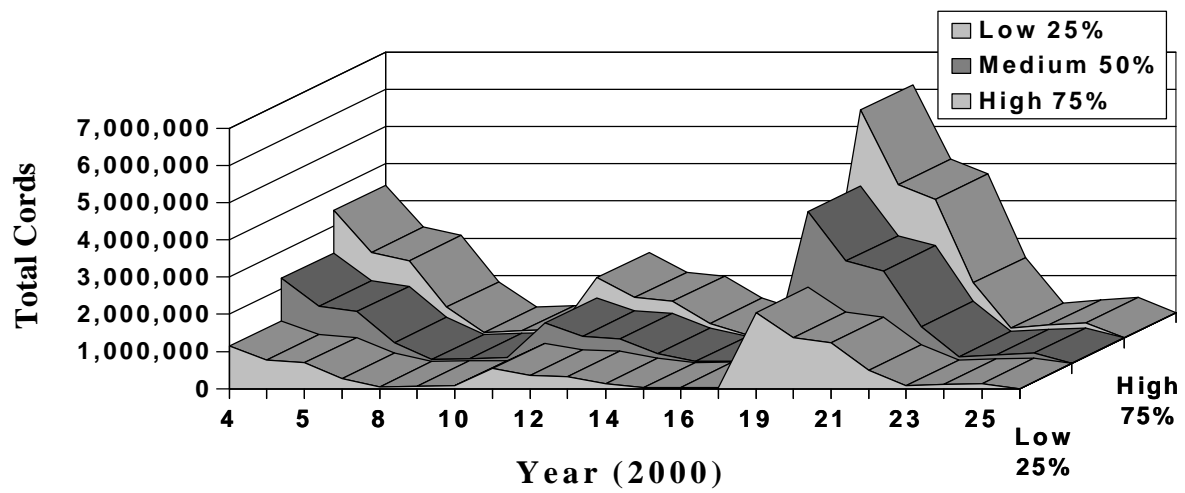


Figure 3. Total cords available at 25, 50 , and 75 percent of Conservation Reserve Program acres available for harvest in a 33-year rotation with thinnings at ages 18 and 25.

Table 1. Planted loblolly pine wood-flow projections for 20-year, un-thinned pulpwood rotations¹, Coastal and Piedmont Georgia.

Site Index ² (feet)	Volume Harvested ³ (cords)
60	37
65	43
70	49

¹ 750 surviving trees per acre at age 0 in 1986, Scribner rule.

² Site index = average height in feet of dominant and co-dominant trees at age 25 years.

³ Cord equivalents: pulpwood top diameter = 4"; Cords = Cuft/[77.1 + 1.4(dbh)]; Max. Cuft/cord = 100; Min. pulpwood dbh = 4.5"; Min. sawtimber dbh = 10.0".

Table 2. Planted loblolly pine financial performance projections for 20-year unthinned pulpwood rotations¹, Coastal and Piedmont Georgia.

Site Index ² (feet)	NPW ³ (\$/ac)	IRR ⁴ (%)	AEV ⁵ (\$/ac/yr)	Cash-Flow ⁶ (\$/ac)
60	94	11.3	10	381
65	147	12.6	15	506
70	209	13.8	21	650

¹ 8% discount rate; 1986 Prices: PW = \$17/cord, C-N-S = \$36/cord, ST = \$145/MBF, Big ST = \$157/MBF (inflated at 3.5% per year);

² Site index = average height in feet of dominant and co-dominant trees at age 25 years.

³ Net present worth is calculated with revenues discounted to present year less costs discounted to present year at the 8% discount rate.

⁴ Internal rate of return is the interest rate at which discounted revenues equal discounted costs. It assumes that all intermediate revenues are reinvested into the project.

⁵ Annual equivalent value is the net present worth expressed as an annuity over the planning horizon, computed at the discount rate.

⁶ Total net, uninflated cash-flow dollars.

Table 3. Wood-flow cord equivalent volume projections for a 33-year loblolly pine rotation.

Site Index 25 Years	Total Volume			Volume Harvested		
	18 yrs	25 yrs	33 yrs	18 yrs	25 yrs	33 yrs
--feet--	-----cords-----					
60	32	44	54	15	8	32
65	37	50	61	19	9	34
70	43	57	69	22	10	37

Table 4. Financial projections of internal rate of return (IRR), annual equivalent value (AEV), net present worth (NPW) and cash-flow for a 33-year loblolly pine rotation.

Site Index 25 Years	Internal Rate of Return	Annual Equivalent Value	Net Present Worth	Cash-flow ¹
----feet----	---percent---	---\$/ac/yr---	-----\$/ac-----	
60	12.7	23	267	1,193
65	13.7	31	356	1,447
70	14.7	40	465	1,757

¹total net, uninflated 1986 dollar values of wood-flow