

*Pi - ne - tum 1991*

*The Journal of the College of Forest Resources*

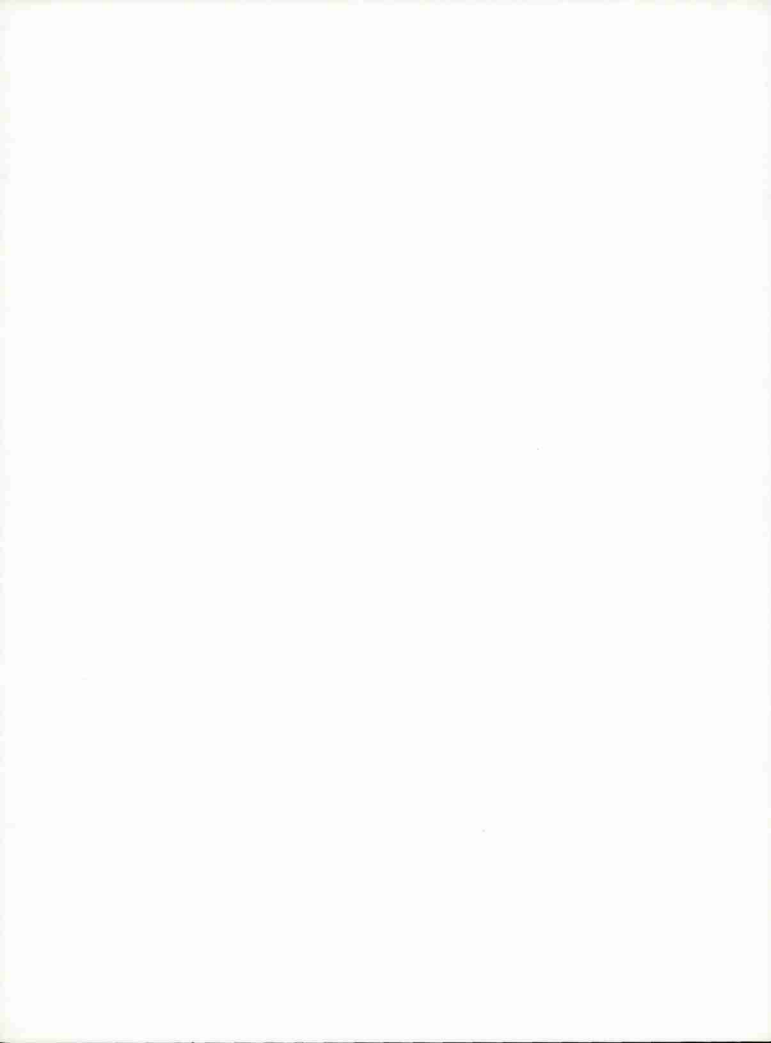
*Volume LVII*

**1991 PI-NE-TUM**

**Journal of The College of Forest Resources**

**Stephen M. Daniels, Editor-in-Chief  
North Carolina State University  
Raleigh, North Carolina  
Volume LVII**

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## COMMENTS FROM THE DEAN

Larry W. Tombaugh, Dean

My comments this year are mostly directed to the members of the Class of 1991. The period of time over which your academic career extended will be recorded as among the most significant in history. You observed first-hand the chilling effects that a repressive government can have on a society trying to become free when the events in Tiannamen Square unfolded on our television screens. The incredible changes in Eastern Europe, with the virtual elimination of communism as a major influence on world affairs, will affect you for the rest of your days. The lightening-like Allied actions in the Middle East virtually stopped another repressive leader in his tracks and liberated another country to pursue freedom.

While all of this was going on internationally, concerns over recession and unemployment in the United States became an increasing source of concern. As this issue of the PI-NE-TUM is published, it is not clear how serious the economic conditions will become over the next few months as you enter the job market.

One thing is clear, however, and that is that, unless another cataclysmic world event occurs, the attention of the American public will focus sharply on the public agenda. At the top of this agenda will be the economy, education, and environment and natural resources. This latter set of concerns will increasingly place professionals from programs such as yours at the forefront of some of the most difficult policy issues facing this nation.

No nation can remain strong in the long run without maintaining a strong, competitive manufacturing sector. It is through the manufacturing of new products that wealth is created. It turns out that the United States is blessed with natural resources and other attributes that gives it a competitive advantage in the manufacturing of certain forest products. Pulp and paper is the most obvious example, but there are others. Many graduates from the Class of 1991 will



be involved in some aspect of the manufacturing process, either through their work in forestry or in the production process. One of the great challenges you will face, and one for which you should be uniquely prepared, is assuring that all phases of the manufacturing process are economically sound and environmentally sustainable. Knowing how to strike this balance and having the will to do so will enable you to make enormous contributions to society.

Just as a strong nation needs a strong manufacturing base, a healthy nation needs access to diverse and high quality leisure and recreation opportunities. Here, again, graduates of our programs are well qualified to serve society by helping to provide these opportunities.

Temporary weaknesses in the economy may result in short-term barriers to some of you in obtaining the ideal employment opportunity immediately after graduation. In the longer run, each of you have the skills and the training to play meaningful roles in helping to resolve some of the most important issues facing this nation. I hope you will keep your sights set high, maintain your confidence, and have the most satisfying of career experiences. Best of luck to the Class of 1991.



## PROFESSOR RONALD G. PEARSON

Retirement on June 30, 1991 will mark the end of 22 years of service to North Carolina State University by Professor Pearson. During this time, he has made many contributions to teaching, research, and extension activities of the department. His area of specialization has been concerned with the mechanical properties of wood. Prior to coming to NC State, he worked 23 years for the Commonwealth Scientific and Industrial Research Organization, Australia. He attained the rank of Principal Research Scientist in the Timber Mechanics and Engineering Division.

Professor Pearson's major teaching responsibilities at NC State were the senior courses known as "Wood Mechanics" and "Structural Design", or WPS 441 and 442. He brought rigor and a strong mathematical foundation to the wood mechanics course while still retaining the practical aspects and applied examples which provided relevance for the students. Students consider his course to be very difficult, and, although not always at the time, worthwhile. Also very much appreciated by the students was Professor Pearson's willingness to spend as much time as necessary to help them understand the difficult concepts of wood mechanics. He condensed a vast amount of available information on

this topic into a form usable to the needs of wood technologists rather than engineers. Professor Pearson was also responsible for teaching one-third of WPS 540, a graduate course concerned with wood composites. Other important assignments were undergraduate advising of sophomores, serving as the department's Graduate Administrator for eleven years, and representing the College on the Administrative Board of the Graduate School for five years.

Professor Pearson's scholarly efforts ranged from applied to basic research. His fundamental research mechanics attracted wide interest and stimulated applications of this technique in other laboratories. Further recognition came when he was asked to speak on this topic at a North Atlantic Treaty Organization Science Committee Conference. Other significant research contributions were concerned with the mechanical properties of juvenile wood. His publications were among the first to call attention to the many problems the industry faces today as they deal with plantation grown wood with its high juvenile wood content. Likewise he has published several papers concerned with the novel concept of using computers to assist in wood identification. Current research includes the effect on the mechanical properties of the high temperatures involved in the press drying of southern pine lumber. Furthermore, Professor Pearson made numerous significant contributions to the Hodges Wood Products testing and product evaluation program. Moreover, his wide knowledge of computers, both hardware and software, made him essential to the faculty and staff as the department entered the computer age. In fact, some think that without his help, we would still be trying.

Professor Pearson graduated with a Bachelor of Engineering from the University of Melbourne, Australia. He also earned a B.A. and a Master of Engineering from the same institution. Upon graduation in 1942 with his Civil Engineering degree, he joined the Royal Australian Engineers and saw service in New Guinea and Borneo during World War II.

Professor Pearson is known as a demanding but fair teacher, a productive and knowledgeable researcher, a man with exceptional patience, and one who is always ready to help.

## ACADEMIC AFFAIRS

Douglas Wellman

Garrison Keillor used to begin his "News from Lake Wobegone" monologue each week with this line: "It has been a quiet week in Lake Wobegone, my home town." Well, it has emphatically not been a quiet year in Academic Affairs. The College of Forest Resources is a bustling, exciting place to be. In the space allotted here, I can only point out some of the year's highlights.

One of the major challenges facing schools of natural resources in the past decade has been declining enrollments. Now, however, student interest in environmental affairs and the fruits of Pulp and Paper's strong recruiting efforts are helping the College begin to reverse the trend. Currently, CFR is the only college at NCSU where applications and acceptances are moving upward. Whereas the university as a whole is down approximately 7 percent from last year, the College of Forest Resources is up over 12 percent in applications and 14 percent in acceptances.

To help us continue this favorable trend, we started an aggressive recruiting program this past year. In 1990, with support from the Forestry Foundation, CFR alumnus Leonard Killian prepared a recruiting plan. On the basis of Leonard's insightful study, the Foundation decided to provide support for a full-time recruiter. Paula Gray, a 1990 graduate in Forest Management, was hired for this position in September. Paula works with high schools, community colleges, youth groups and others throughout the state to provide prospective students with information on careers and on our educational programs. In a major effort, we have produced a videotape on natural resources careers and educational opportunities at NCSU. Work on this outstanding videotape was directed by Jim Woodman, with support from many of the faculty. Working through alumni, Paula Gray has placed copies of this video in the counseling offices of every public high school in North Carolina. She has also given many presentations to middle- and high-school science classes and arranged for talks by members of our faculty. She also provides leadership in responding to student inquiries, arranging

open house presentations, developing new brochures and other informational material, and in a host of other activities. It's a good thing she has lots of energy and loads of enthusiasm for her job.

Under my predecessor, Bud Saylor, CFR assumed a position of national leadership for recruiting minority students into natural resources careers. This year, we were successful in obtaining a competitive grant from the U.S. Forest Service to continue and expand this work. Among the many initiatives we have taken to increase the diversity of our student population, three stand out. First, Jerry Bettis has made numerous presentations on renewable natural resources topics to middle-school and high-school science classes in predominantly minority schools. Second, we have worked to activate the 3+2 agreement with North Carolina A&T, and we are now in the process of preparing a brochure on the program. Finally, we are developing a recruiting videotape focused on minorities, and many of the natural resource professionals featured in the video are NCSU graduates or faculty.

Another major initiative in this, my first year, has been development of two new campus-wide curricula, one in Natural Resources and the other in Environmental Sciences. These two new programs recognize that interest and expertise are located in many different colleges at NCSU. They seek ways for the various interests to work together to provide educational offerings that could not be provided by any one college. Each of the two new programs is based on a core of approximately 90 hours of science, math, English, humanities, social sciences, and other common educational experiences. With that as foundation, interested colleges at NCSU can develop specific concentrations. For example, under Natural Resources, Jim Gregory is developing a concentration in "Ecosystem Assessment" and Dave Adams is developing one in "Administration and Policy". Other units on campus are also working on concentrations in soils, geology, and economics. Students in Natural Resources will all take an introductory course, which will be a modification of Forestry 110, and will be taught by Art Cooper, as well as a capstone course being developed by Bob Abt of the Forestry faculty. Similar efforts in Environmental Sciences will be patterned after those in Natural Resources.

Working on these recruiting and curricular efforts has been time-consuming and exciting. But in thinking about new efforts like these, we must not overlook the steady, continuing work that makes this a great place to be a student. Charlotte Swart and Ruth Allen, in particular, provide support for

our students that is unmatched at this university or anywhere else in my experience. Without their outstanding contributions, none of the new initiatives would be possible. Taken all together, this is a terrific place to work, and I'm happy to be a part of it.

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## Mississippi Conclave 1990

Tom Margo



Axes, crosscut saws, peavies, and 25 woodsman team members loaded the bus early one Wednesday evening. The rear seats were removed for added comfort. I'm not sure comfort was the proper word to describe a 16 hour ride on a 25' bus, but we used the word in hope of making the trip more pleasurable.

Dean Tombaugh and his trusty dog enlightened us with tales of Michigan and Penn State while we loaded the bus. Of course, Charlotte was there with her big bag of goodies and her crafty wisdom that makes her a mom away from home.

The bus pulled out of Hodges about 9 P.M. A van driven by Bill Smith accompanied the bus. The two vehicles strolled south on Interstate 85 towards Greenville, S.C. In Greenville we were to meet Timmy McCracken and Rodney Buchanan.

The trip down was relatively quiet except for a few outbursts by Steven Tucker. I believe if Tucker would have been driving we would never have made it to Mississippi, but the Waffle House franchise would have shown a record increase in sales. We ate breakfast in Birmingham and managed to get caught in stop and go traffic for about an hour. Crossing the Mississippi State Line, morale was low. This years Woodsman's team was young with only a few veterans returning.

It was about 1 o'clock Thursday afternoon when the bus rolled into camp. It was a warm and muggy day. I guess average for a day in the swamp. We unloaded the bus and settled into our cabins. The rest of the day was spent socializing and giving our equipment some last minute fine-tuning.

When we woke Friday morning, it was a beautiful 40 degree misty rainy Mississippi morning. The day was a typical Conclave opener - rain, cold, and mud. But this did not dampen our spirits too much.

The competition started at 8 A.M. with the sawing and technical events. In the mens crosscut sawing event, times were close. Arkansas and SFA were dominating as usual. But we had a secret. Dave Markowski, a graduate from way back, just happened to be in the area to cheer us on. He brought along an old friend, a Simmons 503. This saw is notorious for eating wood and spitting it out at the competition. David Lane and Steve Hyde picked up that old Simmons and settled into the sawing position. Not a word was spoken nor a practice cut taken (I do believe I heard a growl though) and within 7 seconds it was all over. They not only won first place but also set a new Conclave record.

Anna Beam and Melanie Burke were not to be outdone. They picked up the saw and pulled a

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second place finish behind SFA. I believe if our girls had a little more facial hair and if their voices were a few octaves lower, they might have won.

In the Jack and Jill event, Tom Margo and Anna Beam pulled a third place which later turned into a DQ (disqualification) after several protests from SFA. This DQ would later haunt us by bump-

ing us down from third place overall to fifth.

To end the day, with all the spectators standing high and dry, 14 competitors had to test the cool waters in log birling. Our own aquatic slug wart Steve Hyde managed to birl to a second place finish.

Saturday brought better weather and worse officiating. A questionable call may have cost John

## Virginia Conclave - 1991

### Highlights

Each year's conclave article is generally published in the Pinetum the year following its occurrence. What follows is a brief summary of this year's results, included for those who will graduate or will for other reasons not see next year's edition.

Overall Standing 5th  
Technical events 9th  
Physical events 4th

### Individuals Placing

Compass & Pacing...Fred Schatzki, 3rd  
Photogrametry.....Steve Daniels, 2nd  
Axe Throw.....Mike Rhodes, 2nd  
Bowsaw.....Rodney Buchanan, 2nd  
Men's Crosscut.....David Lane  
Stephen Tucker, 1st  
Log Chop.....Chris Stewart, 3rd  
Log Roll.....David Lane  
Stephen Tucker, 2nd



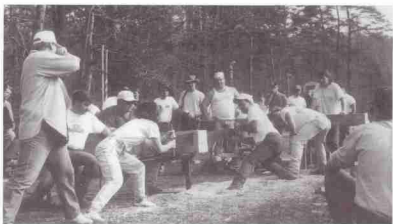
"Red Beard" Willis a place in pole climbing. The controversy over the Jack and Jill protest continued to wear on.

Phillip Whitlow took the gold in pole classification. I think he used the same tactic that he used at Clemson, dumping out his glass and filling up his opponent's glasses with the beverage of their choice. He denies this tactic and insists it was all hard work and skill. To close the day, Tom Margo took third place honors in the speed chop.

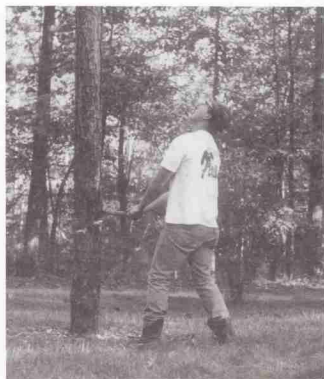
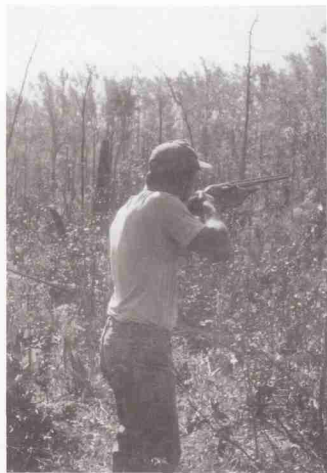
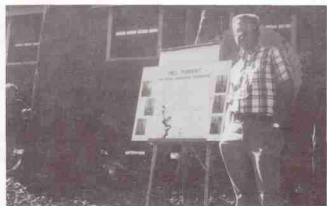
The Woodsman's team members left Mississippi as third place winners. Four weeks later we

received a note that the scores were tallied incorrectly and that we came in fifth place. Nevertheless, we were fairly strong through the competition for a young team. Our spirits were high and we hung in there as a team.

I would like to thank Larry Jervis for supplying the Woodsman's team with competition wood and Mr. Gilmore for milling it into cants. Thanks are also in order to Charlotte and Ruth for helping us with all the important details. Also, thanks to Deans Tombaugh and Wellman for their support, and to Bill Smith for traveling and guiding us through the hectic trip.



ROLLEO



AN ECONOMIC ANALYSIS OF ALTERNATIVE THINNING REGIMES  
TO ENHANCE WILDLIFE HABITAT

STEPHEN M. DANIELS

The increasing demand for multiple use of forestland necessitates that forest managers develop plans that both promote fiber growth as well as manage for some non-timber yields. Often, timber management is criticized as being incompatible with these other values, especially wildlife management. In sensitive cases, as with rare or endangered species, this may be true. However, in many cases, these values can be protected with little or no loss in timber revenue.

This paper deals with the economic effects and feasibilities of various thinning regimes for improving wildlife habitat. The topic immediately narrows to include only those species that benefit from thinning, such as white-tailed deer, turkey, quail, rabbits and some song birds. For this study, however, only deer management was considered. The same approach can be applied to other species. The case study developed for this paper shows that for this instance the forest manager can provide good deer habitat at a reasonable cost. Developing habitat for other species may not be as compatible with intensive management and may lead to a different conclusion.

### Background

White-tailed deer depend mainly on browse as a food source. Browse consists of vines, shrubs and hardwood sprouts. Studies have shown that twig growth of browse plants is up to 7 times greater for plants grown in the open than those grown beneath a canopy (Halls and Alcanitz, 1968 in Wildlife, 1980). Because thinnings create such openings they can be used to improve habitat in terms of browse. In addition to increasing total browse yield, thinning also increases the amount of palatable browse with respect to non-palatable browse (Blair, 1960). Common palatable species include trumpet creeper (Campsis radicans), yellow jessamine (Gelsium sempervirens), virginia creeper (Parthenocissus quinquefolia), greenbriers (Smilax spp.), flowering dogwood (Cornus florida), haws (Crataegus spp.), blackgum (Nyssa sylvatica), willow oak (Quercus phellos), and blackberries (Rubus spp.) (Blair, 1960). The increased browse persists until the canopy closes and shades it out. The benefits in one case were found to peak in 2-3 years after thinning (Hurst and Warren, 1982). Blair found that browse levels did not return to prethin levels for 10 years (1971).

Based on the above information, beneficial thinning regimes were developed and tested from an economical standpoint on a simulated plantation. Loblolly pines were planted on a 8'x 8'

Table 3. Net Annual Equivalent Values at 6% and Years of Habitat Produced For Each Alternative

Alternative	NAE <sub>6%</sub> (after tax)	Years of Habitat
A	\$ -0.35	NA
B	1.98	7
C	1.77	7
D	1.21	7
E	0.46	14
F	-0.19	14
G	-0.29	7
H	0.51	14
I	0.06	14
J	-0.11	7
K	0.68	14
L	0.03	14
M	-1.22	14
N	-0.10	21
O	-0.88	21
P	0.43	7
Q	1.35	14
R	0.65	14

The alternative with the highest NAE was selected and was used to measure the cost of the other alternatives. The cost of each regime was calculated as the difference between its NAE and the highest NAE. This cost is analogous to the opportunity cost; that is, to implement a given regime you must give up the most profitable regime. It will be referred to as the regime cost.

Because different regimes yielded different numbers of years of good habitat, it was necessary to find the cost/acre/year of good habitat. This was found by dividing the regime cost by the number of years of habitat provided. Formula 1 below shows this cost equation.

$$\text{cost/ac/year of good habitat created} = \frac{\text{NAE highest} - \text{NAE } i\text{th regime}}{\text{years of good habitat } i\text{th regime}} \quad (1)$$

### Results

Alternative B, with no thins at ages 6 and 13 and a heavy thin (to 65 sq ft) at age 20 had the highest NAE. It was worth \$1.98 per year and provided 7 years of good habitat. (The 5 years

of good habitat prior to age 6 are common to all regimes and so are left out of all calculations).

Since the most profitable regime provides 7 years of habitat, all other alternatives providing only 7 years of habitat but with less annual value can be immediately eliminated as inferior. This removed 5 treatments from further consideration.

This action assumes that a year of good habitat anywhere in the life of the stand is the equivalent of a similar year anywhere else in its life. It makes no provision for continuity of good habitat. Continuity may be important in keeping individuals in the stand once they are there rather than letting them leave and trying to get them back. Making such a provision was beyond the scope of this study.

Of the remaining regimes, all produce either 14 or 21 years of habitat. Since 7 years can be best accomplished by alternative B, only the cost of the years above and beyond 7 need to be calculated. This value would be the marginal cost of the additional years. Formula 2 below, modified from formula 1, shows how to calculate this marginal cost.

$$\begin{aligned} & \text{marginal cost/ac/year of good habitat} \\ & = \frac{\text{NAE highest} - \text{NAE } i\text{th regime}}{\text{years of good habitat } i\text{th regime} - 7} \quad (2) \end{aligned}$$

Table 4 shows this calculation for alternatives E through R that are not already eliminated.

Table 4. Total Costs and Marginal Costs per Year of Good Habitat Provided for All Alternative that Survived Initial Screening

Alternative	Additional Years	Cost <sup>1</sup> of Regime	Annual Cost per acre
E	7	\$ 1.51	\$0.22
F	7	2.17	0.31
H	7	1.47	0.21
I	7	1.92	0.27
K	7	1.30	0.19
L	7	1.95	0.28
M	7	3.20	0.46
N <sup>2</sup>	14	2.08	0.15
O	14	2.86	0.20
Q <sup>2</sup>	7	0.63	0.09
R	7	1.33	0.19

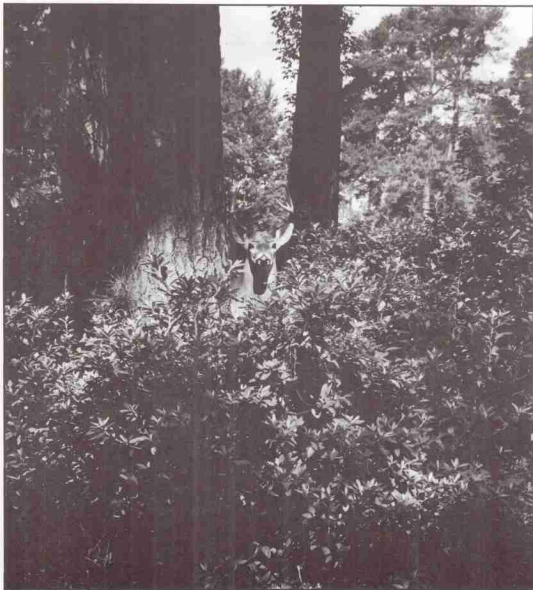
The thinning intensities (residual tpa or basal area) were based on a loblolly pine stocking chart developed by Westvaco Corporation in 1970. The goal was to reduce to or to maintain stocking levels in the lower range of the well stocked region on the chart. This left enough trees per acre to fully capture the sites' growth potential but left few enough to provide sufficient openings. The method of thinning was to select leave trees and thin around them, creating a series of open patches. This approach is supported by the literature (Wildlife, 1980 ).

After age 20 no further thins were included. This is because after the stand has been thinned 3 times, additional thins would reduce it below full stocking. In some trial runs the volumes actually increased with ridiculously heavy thins. This is probably because the plantation yield model does not accurately reflect what happens. It does not account for wolf trees (open grown trees that exhibit large diameter growth but little height growth and excessive branching) nor for increased windthrow losses that occur with too few trees. The regimes are assumed to be mutually exclusive.

After applying the treatments, the stands were allowed to grow until the mean annual increment (MAI) was equal to the periodic annual increment (PAI), at which point they were judged mature and harvested. Because the harvest ages varied, some criterion other than net present value had to be used for comparisons. The net annual equivalent value, or NAE, was used. It computes the value of each regime on a yearly basis (Holley, course notes). The NAE values were computed at 6% after taxes.

#### **Analysis Criteria and Assumptions**

Ideally, an analysis of the regimes would consider the amount of browse each one created. Unfortunately, no data relating browse to basal area or stocking were found in the literature. An additional problem is that once a good habitat is created there is no assurance that deer will utilize it. They cannot be forced (excluding preserves, etc.). Due to these constraints the success must be measured in terms of the number of years good habitat is produced. It is assumed that once good habitat is created, it will be utilized. Table 3 shows the alternatives, their NAE's, and the years of habitat they produce. As mentioned, these calculations do not include the first 5 years prior to age 6 that are common to all alternatives.



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spacing (681 tpa) on SI(50) 85 land. The site was chopped once and burned. Management costs and stumpage values used are listed in Table 1.

Table 1. Costs and Stumpage Values used in the Analysis.

<u>Management Practice</u> <sup>1</sup>	<u>Cost</u>
Planting (including seedling)	\$ 0.08/seedling
Single chop	65.47/acre
Burn (drip)	9.70/acre
Precommercial thin	
- light (age 6)	20.00/acre
- heavy (age 6)	30.00/acre
- Age 13	49.54/acre
Marking	11.58/acre
<u>Stumpage</u> <sup>2</sup>	
Pine Sawtimber	\$ 121/mbf (scribner)
Chip-n-saw	29.52/cord
Pine pulpwood	11.71/cord

1. 1988 data. Forest Farmer.

2. 1988 Timber Mart South - North Carolina.

All work was figured on a per acre basis. Stocking, growth, and yield were determined from NCSU - Managed Pine Plantation Growth and Yield Simulator version 3.1, by W.L. Hafley and W.D. Smith 1989.

### Developing The Regimes

With the given spacing, the crowns can be expected to begin touching by age 5 or 6. Prior to this the stand is assumed to be good habitat. The first age selected for thinning was age 6. (Even in plantations it is important to consider precommercial thinnings because they can be used to maintain continuous good habitat and hopefully retain any individuals already present). Subsequently it was assumed that each thin would provide an average of 7 years of good habitat before thinning was again needed.

At age 6 the options were to defer thinning, thin lightly (to 500 tpa), or thin heavily (to 400 tpa). Seven years later, age 13, options included deferring, and heavy and light thinnings. It should be noted that activity in one period can limit or restrict activity in the next thinning period (i.e. if you thin to 400 tpa at age 6 you cannot thin again to 400 tpa at age 13 and so must defer).

Alternatives for a commercial thin at age 20 include reducing basal area to either 65 sq ft (heavy), 85 sq ft (light), or deferring. Again, this is affected by previous activity. These options led to a total of 18 alternatives.



The alternatives tested are shown below in a flowchart in Figure 1.

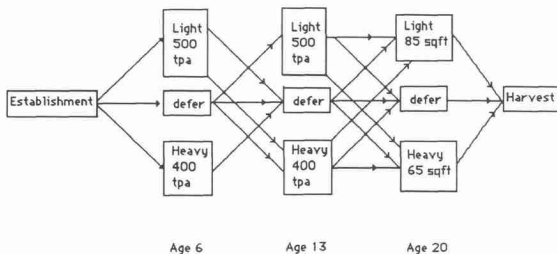


Fig. 1. Alternative Treatments at Years 6, 13, and 20.

Table 2 summarizes these alternatives and assigns a letter to be used as identification.

Table 2. Alternatives at Each Time Considered

Alternative	AGE		
	6	13	20
A	defer	defer	defer
B	defer	defer	heavy
C	defer	defer	light
D	defer	heavy	defer
E	defer	heavy	heavy
F	defer	heavy	light
G	defer	light	defer
H	defer	light	heavy
I	defer	light	light
J	heavy	defer	defer
K	heavy	defer	heavy
L	heavy	defer	light
M	light	heavy	defer
N	light	heavy	heavy
O	light	heavy	light
P	light	defer	defer
Q	light	defer	heavy
R	light	defer	light

1. The difference between the highest NAE and the given regime NAE.
2. Q is the least costly regime to provide an additional 7 years (14 total). Using Q as a base, an additional 7 years (21 total) are best achieved with N. The marginal cost for years 14-21 is

$$(1.35 - 0.1) / 7 = 0.21. \quad (\text{From Table 3})$$

Averaging this with the cost of years 7-14 yields:

$$(0.21 + 0.09) / 2 = 0.15 ,$$

which is equivalent to the value shown in the table.

An additional 7 years (14 total) can be achieved at the lowest cost by alternative Q (thinning lightly at 6, deferring at 13, and heavily at 20). It only costs \$0.09/acre/yr to provide 7 more years of habitat. To provide a total of 21 years of habitat, alternative N is the least costly, costing only \$0.15/acre/year (on the average, see note at bottom of table 4).

#### Discussion

Since these costs are on an annual basis it is easy for a landowner or forest manager to determine if these alternatives are justifiable. One needs only to determine if this cost can be recovered in annual hunting leases (per acre per year) or if the loss of income is acceptable because of increases in personal satisfaction. With most leases being at least a dollar or two per acre, such activity can easily be justified if the land is leased (assuming roads and posting exist, etc.). In this particular study, implementing intensive wildlife management is a very feasible alternative.

This approach can be applied to any wildlife species. The manager must first identify the species requirements, then identify the timber management alternatives that meet these requirements. In some cases, what is good for tree growth will be good for the wildlife species considered. Implementing a thinning regime such as the one selected here would actually increase revenues if hunting rights were leased.

Unfortunately, the goals will often conflict. In the case of management for non-game species for instance, timber revenues may be decreased with no possibility of revenue from hunting. However, as it becomes more and more important to manage the forests for multiple uses and yields, accepting a small loss to protect wildlife, water, soils or other values may become more and more necessary, even desirable.

## Works Cited

Blair, Robert M. 1960. Deer Forage Increased by Thinnings by Thinnings in A Louisiana Loblolly Pine Plantation. J. Wildlife 24:401-405.

\_\_\_\_\_. 1971. Forage Production after Hardwood Control in a Southern Pine-Hardwood Stand. Forest Science 17(3): 279-284.

Forest Farmer. March 1989. vol. 48, no 5 pp 8-14.

Holley, D.L. NC State University. Course notes.

Hurst, George A and Randy C. Warren. 1982. Proceedings of the Annual Conference, Southeastern Association of Fish and Wildlife Agencies 36:420-426.

Wildlife Management Techniques Manual. 1980. Sanford D. Schemnitz, editor. The Wildlife Society, Washington, DC.

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## Society of American Foresters Student Chapter

Ron Miers and Steve Daniels

The SAF student chapter here at North Carolina State University recognizes that as an organization we must take an active role in providing information and educating other people about the benefits and uses that our natural resources can provide. This year, the SAF chapter began holding meetings apart from the forestry club. Some goals of our student chapter are to schedule informal seminars with speakers from a wide array of professions to increase our knowledge of current issues and topics that are shaping the way resource managers make decisions and the policies that guide these decisions. Another goal is to provide projects or events that encourage students to get involved and to communicate with each other. Below are some of the events that the organization held in the 1990/1991 school year:

In September, an informational film called *Ancient Forests* was shown. Following the film, spirited discussions concerning clearcutting, the spotted owl, and the role that the Forest Service plays in managing these forests provided many insights on the complexity of these issues.

In October, Mr. Derb Carter, a lawyer with an environmental law firm, spoke about wetlands and current policies that affect wetland management. He discussed several aspects of the 404 permitting process.

In November, Dr. Gene Namkoong, a professor of genetics and forestry at NCSU, talked about the subject of biodiversity. He touched on the difficulties involved with measuring and managing for diversity given the ever-changing land uses and the increased demand for other resources.

In the spring, the chapter hosted three more speakers. Lark Hayes, an attorney with an environmental law firm, spoke on the legal issues affecting forestry. She explained the management plan appeal process that currently involves the US Forest Service and led discussions about the types of suits filed by environmental groups.

Chuck Berry-Jensen, the Corps of Engineers



Project Forester from Falls Lake, spoke in March. This topic was very timely in that several students were completing an assignment pertaining to Falls Lake. We learned the history of this reservoir and the process by which the Corps conducts a project.

For the final meeting, the chapter was privileged to host Mike Phillips from the US Fish and Wildlife Service Alligator River National Wildlife Refuge. Mr. Phillips is the project leader for the Red Wolf release project on the refuge. He spoke about the challenges faced when introducing animals into the wild. The project has been successful, however, as a small population has been established. This was easily the best program of the year and about 10 wildlife students attended as well.

The SAF student chapter at NC State would like to invite anyone to attend the meetings.



## Appalachian SAF Convention, Charleston, SC

Steve Daniels

For three days and two nights 13 students from the NCSU Student SAF Chapter attended the regional convention in Charleston. The conference was held in the Omni Hotel on January 30, 31 and February 1. The major theme was Resolving Conflict in Forestry. Discussions considered various forms of conflict that occur at the national, state and local levels, within agencies, between agencies, with private industry, and with the public.

The meeting began with a brief speech by Mayor Riley of Charleston. He told how the city had been repaired and rebuilt after Hurricane Hugo. The economy was healthy and peoples spirits were high. Recent projects have renovated old parts of the city, increased police staffing, and have resulted in a safer city. Mayor Riley welcomed us to Charleston and wished us a successful conference.

There were several speakers from the US Forest Service that shared their experiences with National Forest Management Plan appeals. In such appeals, the general public and numerous interest groups disagreed with the proposed management of the federal land. It was up to the Forest Service personal to resolve the various interests and opinions and to develop a plan that would accommodate the goals presented. These speakers discussed how to solicit opinions, hold meetings, and make decisions in ways that made all parties feel that their interests were accounted for.

Panelists representing different sides of various issues answered questions and debated issues. This allowed everyone to hear and gain an understanding of many of the various viewpoints that exist and that must be considered.

There was an extensive poster display on exhibit throughout the conference that showed many of the recent developments and projects undertaken by government agencies and by private industries. Many displays included computers with new software, new equipment, or recent publications. The poster exhibits gave students and others a chance to meet and talk with the movers and shakers within the forestry field. This allowed students to make poten-

tially valuable job contacts, as well as learn about different opportunities available.

There was time set aside on the second day for a student forum. Several panelists addressed student concerns about coursework, jobs, and important issues that we would be likely to face. This was another good opportunity to meet prospective employers. Several students actually interviewed with one of the panelists several months later.

The final session was a discussion of the reforestation and rebuilding taking place following Hur-



ricane Hugo. We concluded with a tour of the Francis Marion National Forest and saw how the Forest Service was dealing with the varied management problems it faced. Some challenges included restoring red-cockaded woodpecker habitat, repairing recreation areas, and conducting site preparation and planting operations in sensitive areas.

The trip was a great success. It was educational, enjoyable, and provided the opportunity to play a role in the SAF. I would recommend attending the convention next year.

We would all like to thank the North Carolina Forestry Foundation for their financial support, without which the trip would not have been possible.

## Tree Jobs

Phillip Whitlow

In an effort to raise money to finance activities, the Forestry Club provides a tree removal service to residents of the Triangle Area. Tree jobs also provide an excellent learning opportunity for students. Students can apply classroom knowledge to the small woodlots of urban dwellers. Common problems include deciding which trees to remove, why they died (or will they die?), what species a tree is, or what disease it has. To the Tree Job Chairman, this tree removal service becomes much like a small business with constant demands and challenges.

However, it can be the most rewarding and challenging position in the Forestry Club. Help is always needed and is welcome at these jobs. On a job, upperclassmen are always willing to share their experience and knowledge to help others grow as foresters.

The 1990-1991 academic year was very successful for tree jobs. Phillip Whitlow served as Tree Job Chairman in the fall and Chris Stewart served as Chairman in the spring. Over \$4000 was earned over both semesters which was used to finance club activities. Both Phillip and Chris were recognized as outstanding Club Members during the semester in which they served as Chairman. The opportunities are available to grow, to learn, and to be involved with tree jobs. The challenge awaits your participation.

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## Wood for Warmth

Tom Margo

The NCSU Forestry Club participated in the annual Wood for Warmth program this year. We had a tough task this year for the wood to be cut and split was piled head- high. Much of the wood was 20 inches or greater in diameter. To begin the task we called our buddies at Wilson's Outdoor Equipment. They in turn called a few dealers to see what kind of equipment could be donated. After a few calls, three dealers agreed to loan saws. Mid Atlantic Sthil donated two saws with 36 inch bars to tackle the big stuff, the Sachs Dolmar dealer donated two saws, and the Echo dealer donated two saws. In addition, we rented 3 log splitters to ease our backs and quicken



the splitting process. After a day of sawing, splitting, and piling we produced about 20 cords of firewood for those in Wake County that needed it. Thanks to all those that helped or donated equipment. Thanks also to Dr. Gregory for coming out and spending the day with the club and putting in an



**An Economic Analysis of Altering Harvest Methods  
to Enhance Aesthetics**

**Phillip Whitlow**

**A Real World Forestry Problem**

Each year foresters notice a decrease in the timber base available for harvesting. This reduction in timber base is caused by private landowners shifting their land use values from timber production to non-timber uses. Some non-timber uses of the land which many landowners would value might include aesthetics, wildlife for game or recreation, hiking, camping, riding mountain bikes, and horse back riding. These non-timber uses are more valuable to many landowners than the revenues which could be earned by managing for timber. The implications of this change in values by landowner are highly important to the procurement forester who is trying to buy timber from private landowners to supply the mills.

**INTRODUCTION**

The purpose of this paper is to examine how different harvesting methods affect revenues and aesthetics. Nine different harvesting methods will be compared and contrasted for their effects on aesthetics and net present value.

**METHODS**

Using the N.C.S.U. Natural Yield and Plantation Yield computer programs, simulations were run to find the yield and growth when different types of harvesting strategy were employed. The Quick-Silver financial analysis software was used to compare the net present values of each harvesting strategy. The U.S. Forest Service's scenic beauty equation was used to compare the visual quality enhancement or degradation resulting from each harvesting method. All of the simulations started with the same given stand (table 1).

**Table 1  
Given Stand Data**

Natural stand of loblolly pine on an upland site with a hardwood understory:	
site index (base age 50)	90
current age	40
trees per acre - pine	160
basal area per acre - pine	130
trees per acre - hardwood	450
basal area per area - hardwood	25
acres of management area	100

The simulations of the different harvesting methods were run for 50 years. A simulation period of 50 years was chosen for several reasons. First, any revenue discounted more than 50 years is insignificant. For example, a \$100 in 50 years is only worth \$5.42 today with a 6% discount rate. Secondly, a 50 year management period allows sufficient time for regenerated stands to reach financial maturity. By having the stand reach financial maturity, the difference in net present values are more dramatic. With a short management period, young immature stands which have no commercial value, would have to be economically evaluated for their contribution to net present value.

The primary management objective was to maintain a pine overstory. There were several reasons for maintaining a pine overstory. First, a pine overstory allowed for a wider variety of alternative harvesting methods. A seed tree cut and a shelterwood cut would not be options with a hardwood stand. Simulating uneven aged hardwood management would also be very difficult. Second, since hardwood mature at a older age than pines, a longer management period would have been needed. With a longer period, the differences in net present value would be less dramatic.

The following information will give a brief summary of each of the harvesting methods.

- 1) Unmanaged - The natural stand was allowed to grow for 50 years without harvesting any timber.
- 2) Natural Thin - The natural stand was thinned three times at years 0, 15, and 30. Thinning from above was implemented at each thinning to reduce basal area to 75 sq.ft./ac.
- 3) Shelterwood - A three cut shelterwood harvest was implemented over a 15 year period. The preparatory cut removed 30 sq.ft. of basal area per acre at age 0. The establishment cut in year 5 reduced basal area to 40 sq.ft./ac. and the remaining volume was removed at year 15.
- 4) Seed Tree - The natural stand was basically clearcut, only leaving enough trees to regenerate the next forest. Approximately 1,200 bd.ft. of volume per acre was left in the residual seed trees. The regenerated stand was thinned at age 35 to enhance diameter growth.
- 5) Intensive Forestry - The natural stand was clearcut and replanted to loblolly pine. The plantation was thinned twice at ages 18 and 25. The plantation was clearcut at age 30 and a second plantation was established. The



second plantation was managed for a pulpwood rotation.

- 6) Patch Clearcut - Small, one half acre clearcuts were equally spaced over the entire 100 acre forest. Every ten years, 20% of the natural stand was harvested. Harvesting started in year 0 and continued until the entire natural stand was harvested.
- 7) Plylog Production - The natural stand was clearcut and intensive site prep was conducted before the establishment of a plantation. The spacing of the plantation was 7 ft. by 12 ft., in order to allow bushhogging between the rows on every third year. By bushhogging every third year, a thick understory of hardwoods could develop which would enhance the visual appeal. Harvesting in this stand involved three thinnings at ages 15, 22, and 28. At age 15, after the thinning, 90 trees were selected, pruned, and marked to remain until the final harvest at which time they would be merchandized as plylogs.
- 8) Uneven given - The natural stand was managed on an uneven age basis with harvest at 15 year intervals.
- 9) Uneven 5 - Another stand with a lower sawtimber to pulpwood ratio was managed on an uneven age management to compare with the given stand which had a high sawtimber to pulpwood ratio. This new stand had 130 sq.ft. of merchantable basal area per acre with 30 sq.ft. in the sawtimber class.

The following timber prices and silvicultural treatment costs were used during the nine simulations.

Timber Mart South - 1989 - Average Stumpage Price:  
Piedmont of North Carolina

Pine sawtimber (Scrib.)	\$ 149/mbf.
Pine pulpwood	\$ 11.49/cord.
Mixed hardwood sawtimber (Scrib.)	\$ 81/mbf.
Hardwood pulpwood	\$ 7.07/cord.

Silvicultural Treatment Cost

Price from 1988 March issue of Forest Farmer  
Price/ac.

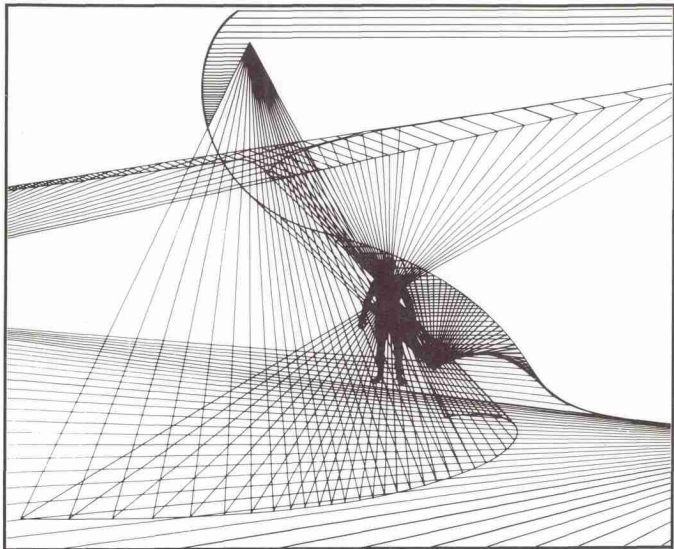
Timber cruising	\$ 2.47
Precommercial thinning	55.50
Site prep. (burning)	10.00
Marking for thinning	7.24

The uneven 5 shows that to manage on an uneven age basis, a relatively young stand is preferable. With the uneven 5, a greater volume of sawtimber was removed every 5 years than with the uneven given, which was only cut every 15 years. The only reason the net present values are not more dramatically different between the two harvesting methods, is that the uneven given had three times more sawtimber volume at the final harvest. Finally, the unmanaged stand only had the value of the final harvest to discount back to year 0.

The patterns of visual quality over time and average visual quality value relative to each other, are highly representative of what a well-trained forester would anticipate. A quick examination of the U.S. Forest Service's equation will explain why the results were favorable. The U.S. Forest Service's equation for scenic beauty has three components for comparing stands for visual quality. The three components are volume of pine sawtimber, hardwood sawtimber, and hardwood pulpwood. Pine pulpwood, which is considered undesirable, is discriminated against when stands have low volumes of pine sawtimber. This equation simulated what most people would consider visually appealing.

However, the scenic beauty values have no quantitative units. Therefore, the numbers are only relative to each other. For example, a stand with a visual quality value of 60, may or may not be twice as appealing as a stand with a visual quality value of 30. Nevertheless, it is certain that a value of 60 is more appealing than a value of 30. In the simulations, the stands which had the highest concentrations of pine pulpwood generally had negative visual quality values (Table 2). Visual quality values for the different harvesting methods increased as the volume of pine sawtimber residue increased. The two extremes, which will illustrate this point, would be the intensive forestry method and unmanaged method (Table 2 and Figure 2). An 83.2 point increase occurred in visual quality value, with a shift from a total pine pulpwood stand (intensive forestry) to a pine sawtimber stand (unmanaged) with an understory of hardwood pulpwood.

The final summary relationship between net present value and scenic beauty is illustrated in Table 3. As scenic beauty increased, net present value decreased. For the given stand, if we chose to maximize scenic beauty we would forgo 2846 dollars of net present value. The given thin would produce the best compromise between scenic beauty and net present value. With the given thin, the second highest scenic beauty rating would be reached while only losing 1396 dollars of net present value, which is only \$291 above the mean average cost of the nine harvesting methods.



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Figure 1  
Net Present Value

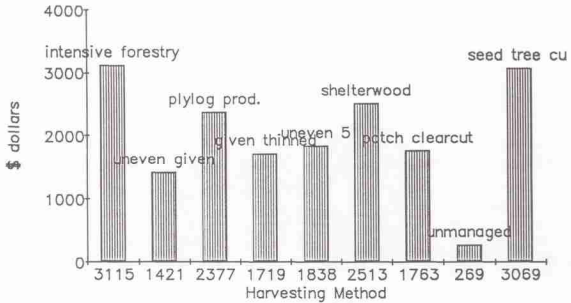


Figure 2  
Visual Quality/Time

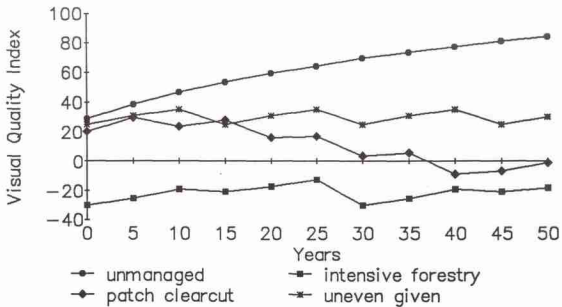


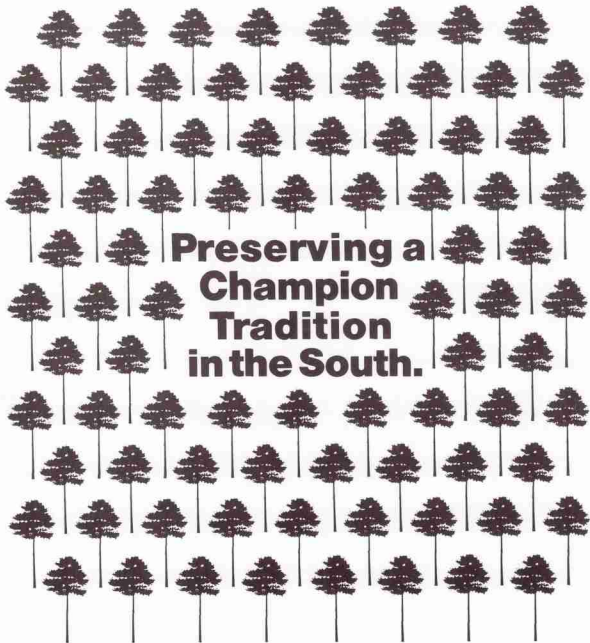
Table 2  
Visual Quality by Age for each Harvesting Method

age	MH 1	MH 2	MH 3	MH 4	MH 5	MH 6	MH 7	MH 8	MH 9
0	28.6	10.8	9.4	-30	-30	20	-30	24.8	-7.8
5	38.5	20	-0.3	-25.4	-25.4	29.4	-22.9	30.8	1.2
10	46.6	26	3.7	-19.2	-19.2	23.7	-18.4	35	-7.8
15	53.5	27	-25.4	-20.6	-20.6	27.7	-16.4	24.8	1.2
20	59.5	33.4	-19.2	-19.5	-17.3	15.7	-14	30.8	-7.8
25	64.1	39.5	-20.6	-12.5	-12.8	16.9	-6.2	35	1.2
30	69.5	38.6	-19.5	-4.56	-30	3.5	0.9	24.8	-7.8
35	73.7	43.8	-12.5	1.1	-25.4	5.7	6.8	30.8	1.2
40	77.5	48.9	-4.9	8.06	-19.2	-8.8	11.9	35	-7.8
45	81.1	53.2	2.6	14.47	-20.6	-6.6	16.2	24.8	1.2
50	84.2	57.3	9.7	20.3	-18.4	-1.2	20	30	-7.8
-----									
TT	676.8	398.5	-77	-87.83	-238.9	126	-52.1	326.6	-40.8
Ave.	61.5	36.2	-7.0	-8.0	-21.7	11.5	-4.7	29.7	-3.7
Legend					MH 1 = Unmanaged				
MH 2 = Natural Thin					MH 3 = Shelterwood				
MH 4 = Seed Tree					MH 5 = Intensive Forestry				
MH 6 = Patch Clearcut					MH 7 = Plylog Production				
MH 8 = Uneven Given					MH 9 = Uneven 5				

## DISCUSSION

The net present value shows a dramatic difference because of the time period in which the timber was harvested. The intensive forestry, seed tree, plylog, and shelterwood methods harvested the present stand. These harvesting methods had large revenues in the first year, which do not have to be discount. This group of harvesting strategies basically started with 2800 dollars worth of net present value. It is interesting to note that managing for plylogs and implementing a shelterwood cut cost more than the revenues generated. The loss of revenue for the plylog production is explained by the \$30 per acre bushhogging cost every third year and the \$200 per acre intensive site prep which removed the stumps to allow for the bushhogging. The losses with the shelterwood cut are results of extending the harvest over 15 years with low volume removals during each cut.

The given thin and the patch clearcut were nearly equal in net present value because relatively the same volume was removed on the same time-frame. The major difference between the patch clearcut and the given thin was the way in which the timber was removed. The given thin removed the highest value trees during three thinnings, starting in year 0, whereas the patch clearcut removed 1/5 of the volume every 10 years in the form of 1/2 acre clearcuts.



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Planting	.08/tree
Regeneration cut marking	6.87
Assumed	
Intensive site prep.	\$ 200.00
Bushhogging	30.00
Pruning	2.5/tree

Two additional assumptions were made about timber prices relating to partial cuts and thinnings: First, a 20% reduction in timber price if volumes were below 5 mbf/ac; Second, a 25% reduction in pulpwood price removed during thinning and partial cuts. The main reason for the reduction in sawtimber and pulpwood price is the logging cost. Logging cost are directly related to volume per acre and diameter size. The reduction in sawtimber price is to compensate for low volumes per acre. Pulpwood prices are affected substantially by volume per acre and diameter class. Also, loggers do not like to do thinning because of the constraints placed on performance to minimize damage to the residual stand.

## RESULTS

The simulations yielded some dramatic differences in the net present values for the different harvesting methods. Intensive forestry and seed tree cut had net present value in excess of 3000 dollars per acre (Figure 1). The next two highest values were the shelterwood cut and plywood production. The unmanaged stand had the lowest net present value. The remaining four harvesting methods were grouped around 1600 dollars per acre (Figure 1).

The visual quality results from the simulations were very representative of what a forester would anticipate if he spent some time considering the effects of various harvesting methods on visual quality (table 2). The unmanaged stand or the strategy of not harvesting, produced an increase in visual quality over time (Figure 2). The uneven given and natural thin harvesting strategies basically maintained the current visual quality of the stand (chart 3). The patch clearcut harvesting showed a slow decline in visual quality over time (Figure 2 and Table 2). The remaining five harvesting methods had negative average visual quality values with intensive forestry being the worst (Table 2).

Even though these simulations were centered around pine production, the same relationships would hold true for hardwoods in the mountains. The scenic beauty values would be higher, but the relative relationship would be the same for the different harvesting methods. The net present value would also follow the same relationship. However, the values are somewhat more affected by volume harvested, quality of the product, and logging costs.

Also, it is interesting to note that no management is the best management for aesthetics. By leaving a stand to grow without harvesting, the visual quality is being enhanced as the stand becomes bigger and older.

**Table 3**  
**Profit Lost By Not Managing for Intensive Forestry**  
**Rating for Scenic Beauty from Best to Worst**

	NPV	SB Rating
Intensive Forestry	\$ 0	9
Seed Tree	41	8
Shelterwood	602	7
Plylog Production	738	6
Uneven 5	1277	5
Patch Clearcut	1352	4
Given Thin	1396	2
Uneven Given	1694	3
Unmanaged	2846	1
Mean	1105	

#### CONCLUSION

The cost of altering harvesting methods to enhance visual quality is substantial. However, many landowners are willing to forgo potential revenues in exchange for more pleasing aesthetic values. It is important for foresters to remember this when acting on behalf of the landowner, as a forest manager or as a procurement forester for an industry. The land management forester needs to remember that he or she is not always trying to maximize revenue. On the other hand, the procurement forester needs to remember that harvesting methods can be altered if stumpage prices are reduced.





## CRABFEST '90

Well, if this year's Crabfest was anything, it was memorable! NC State took a small group to West Point, Virginia, and gave the competition our best shot, having a lot of fun in the process. The weekend began with the usual camp-out on the river - no rain this time! Saturday morning started with the parade and many laughs as Fred got roped into riding in a cage wearing a Dick Tracy mask. After the parade, the teams warmed up for the afternoon competition. Somebody please remind Randy that

photographers are supposed to take pictures, not throw axes or hang out in hospital emergency rooms! Although NC State only brought eight competitors, we put up a good fight and came in third place by a very close margin. West Virginia took the trophy once again. That evening found the NC State and VPI teams back on the river enjoying steamed crabs, hot dogs, and plenty of cold BEvERages! Despite a few injuries and a last place finish, we had a great time and can't wait until next year. Thanks Chesapeake!



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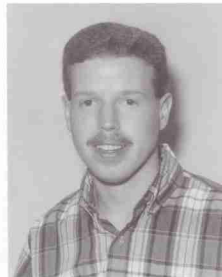
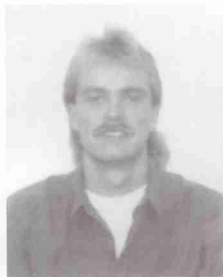
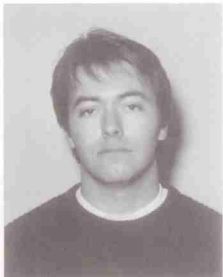
Phone (919) 469-5054

Bruce J. Zobel

William E. Ladrach



## SENIOR PICTURES

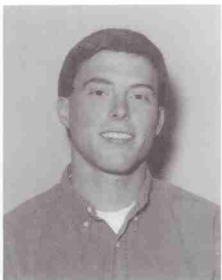
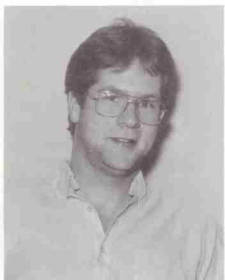
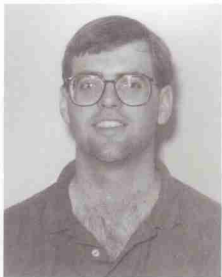
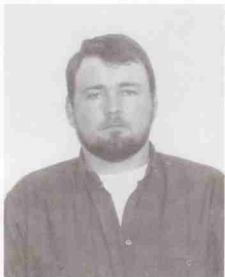
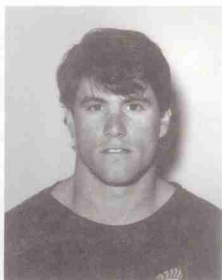
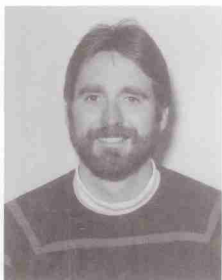


Clyde Arnette  
Robbie Binns  
David Blevins

Steve Daniels  
Chip Futrell  
William Johnson

David M. Lane  
Tom Margo  
Brent McClendon

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Brad McGuire  
Andy Meadows  
Andy Norris

Kevin Nunnery  
Fred Schatzki  
Allen Turner

John Weatherington  
Phillip Whitlow

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## Senior Activities

Tony Amitrano, Wood Science & Technology  
FPRS, Sigma Chi Fraternity

Clyde Arnette, Wood Science & Technology  
FPRS, Xi Sigma Pi

Robbie Binns, Forestry Club, SAF

David P. Blevins, Forestry Council, Co-op with  
NC Forest Service. Xi Sigma Pi, Secre-  
tary/Treasurer. SAF

Steve Daniels, SAF Chairman, Pinetum, Forestry  
Club, Xi Sigma Pi, Student Government

Chip Futrell, Instructor, NCSU Cloggers; Rho  
Phi Lambda, Recreation Majors Club,  
major-PRTM, minor-Arts Studies, Presi-  
dent of NC Clogging Council, Inc.

William Johnson, SAF, Forestry Club, Co-op  
with Champion, Xi Sigma Pi, Baptist  
Student Union

David M. Lane, Forestry Club President, Co-op  
with Champion, SAF

Tom Margo, Forestry Club, SAF, Co-op with  
Champion.

Brent McClendon, Forestry

Brad McGuire, Forestry Club, SAF

Andy Meadows, Forestry Club, SAF, Forestry  
Council

Andy Norris, PPT & Chemical Engineering,  
TAPPI, Xi Sigma Pi

Kevin Nunnery, Forestry Club, Co-op with ITT-  
Rayonier, Xi Sigma Pi

Fred Schatzki, Forestry Council President,  
Forestry Club, SAF, Co-op with Canal  
Forest Resources and ITT Rayonier

Allen Turner, Pulp and Paper Tech and Chemi-  
cal Engineering, TAPPI, Xi Sigma Pi  
Vice President, CFR Council Secretary

John Weatherington, Wood Science & Technol-  
ogy, FPRS

Phillip Whitlow, "Prince Albert," Forestry  
Club, Tree Job Chairman, Vice President,  
Co-op with NC Forest Service, SAF

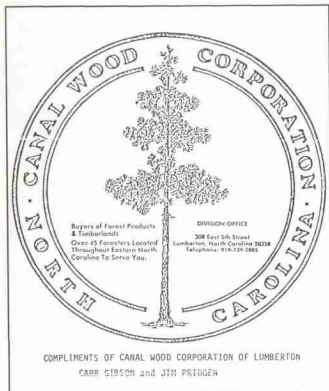
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## Patrons

ALLEN, SCOTT C.	
ALTMAN, JAMES	1949
ARCENEUX, MAUREEN MURPHY	1984
ARTMAN, J. O.	1931
AUGSPURGER, D. E.	1965
BARBER, JOHN C.	1950
BAREFOOT, A. C.	1950
BARTON, W. J.	1947
BEAL, J. M., JR.	1973
BEAVANS, GWEN W.	1988
BEAVANS, SAMUEL CLARK, JR.	1987
BESSE, JOHN D.	1952
BEYRLE, LORI L.	1981
BIENIAS, RONALD M.	
BOST, RONALD M.	1960
BOYETTE, RICHARD C.	
BRUNN, JAMES A.	1931
BURKE, MELANIE A.	1990
CALDWELL, HARRY T.	1956
CANAL WOOD CORPORATION	
CAPPS, WELDON C.	1959
COMBS, DAVID C.	1976
COMFORT, C. W. T.	1935
CONNER, BUDDY W.	1963
COVINGTON, H. K., III	1971
CREIGHTON, CHARLES A.	1967
CROKER, THOMAS C., JR.	1933
CURTIS, WILLIE R.	1956
DANUCK, WILLIAM M.	1990
DAVEY, BARBARA L.	1979
DAVIS, DICK	1940
DAVIS, PAUL L.	1937
DECELLES, MARCEL	
DETER, DENNIS S.	1987
DORSEN, ROBERT	1947
DUNCAN, DOUGLAS V.	1977
DUNN, W. B.	1940
EAKES, JAMES C.	1963
EDWARDS, ACIE C.	1950
EDWARDS, KATHERINE L.	1983
EPPS, PHILLIP O.	
ETHERIDGE, JAMES N.	1943
EVANS, JOE T.	1950
FAIRCLOTH, ASHLEY K.	
FORT, STEPHEN R.	
FOUST, GENE R.	1959



FRANKLIN, B. D.	1948
FRANKLIN, E. CARLYLE	1963
FREEMAN, MIKE H.	1982
GARDINER, THOMAS B.	1935
GENTRY, BILL W.	1951
GIBBONS, WILLIAM E.	1940
GIBBS, GEORGE S.	1957
HAGLER, GERALD C., JR.	1978
HARRIS, RICHARD W.	
HARTSFIELD, MARSHALL B.	1982
HASSELL, T.M. JR.	
HATLEY, CLYDE W., JR.	1984
HAYES, ALEX	
HERLEVICH, V. W.	1948
HILTON, SUSAN K.	
HINSON, KAREN B.	
HOBBS, L.H.	1938
HODUL, NORMAN P.	
HOLCOMBE, ROBERT A.	1944
HOKE, JOHN W.	1974
HOOD, WILLIAM W., JR.	
HOWELL, JERRY F., JR.	1963
HUBBARD, JAMES B.	1938
HUDSON, SAMUAL T., JR.	1957
HUGHES, JOSEPH H.	1967



MOORE, PAMELA & STEPHEN	1979/1986
MORRIS, DONALD J.	1930
MOULTHROP, GRAYDEN B.	
MYERS, SUSAN S.	1985
OVERBEY, JOHN W.	
PALMER, JOHN	1973
PARDUE, JEFF	1978
PARKER, J. ANDREW	1970
PETTIT, CHARLES C.	
PICKARD, JOHN E.	1971
PLASTER, DON & MILDRED	
POWELL, DAVID A., JR.	1990
RAMIREZ, J. RICHARD	
RAPER, CHARLES F.	1954
RAYMOND, A. G. & CO.	1969
REEVES, JAMES F., JR.	
REID, JAMES R., JR.	1951
REID, JOSEPH B.	1952
RHYNE, THOMAS S., JR.	1950
ROSS, VINCENT R.	1952
ROWE, FLOYD	1951
SANDERS, GREG G.	1989

HUGHES, SAMUAL M.	1952
JACKSON, G. E.	1935
JENKINS, DONALD L., JR.	1985
JENKINS, ROBERT G.	
JOHNSON, DAVID	1989
JOHNSON, J. FRED	1949
JORDAN, R. B., III	
KENDAL, WORTH A.	1961
KILIAN, LEONARD A., JR.	1956
KING, R. M.	
KNISS, JANET F.	1983
LAMPE, JOHN G.	1958
MAHONE, RICHARD D.	1947
MARKOWSKI, DAVID A.	1987
MARTIN, ALLEN L.	1956
McINNIS, DAN	1969
McIVER, JOHN E.	1941
McMILLAN, ED LEIGH, II	1962
McNATT, JAMES D.	1960
MEAD, RUTH H.	1981
MEHDIZADEH, PRAVIZ, DR.	1966
MILLER, THOMAS	1962
MOORE, BERNIE	1967





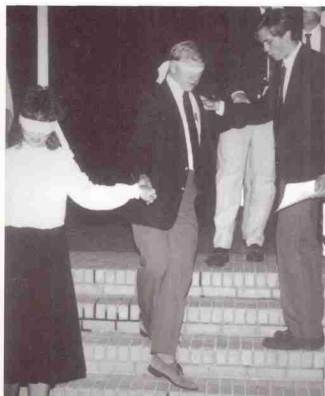
SELDON, CHARLES W., III	1960
SHAFER, CHARLES H.	1931
SHERRILL, JACK	1972
SHOTWELL, JAMES F.	1965
SMEARMAN, SCOTT A.	1982
SMITH, GEORGE E., JR.	1938
SMITH, LEWIS J.	
SMITH, WALTON R.	1934
SONTAG, EDWARD	1989
SYKES, PAT D.	1951
TAYLOE, RALPH P.	1973
THOMPSON, EMMETT F.	1960
THOMPSON, MARSHAL O.	1989
THORNE, FRANCIS LEWIS	
TILLMAN, DONALD M.	1964
TISSUE, O. C., JR.	1953
TUGWELL, E. GERALD	1980
UTLEY, WILLIAM H.	1936
VALENTINI, ANNA R.	1988
VASS, JOHN S. VENUTO, ERNIE	
WALLINGER, R. SCOTT	1960
WARD, MELVIN F.	1950
WARD, W. B.	1931



WARREN, LYNN C.	1985
WHELESS, JAMES H.	1953
WHITFIELD, FRED E.	
WHITFIELD, STEPHEN A.	1982
WHITE, BENNETT B.	1954
WILKINSON, JAMES M.	1950
WILLIAMS, CHARLES C.	1972
WILMER, LAURA V.	1980
WILSON, S. LEIGH	1941
WOOD, ROY L.	
YOUNG, JOHN M.	
ZAMBRANA, JOSE	

IN MEMORY OF:

PHELPS, W. ROBERT	1950
GERBER, TED	1939



## Editor's Page

This has been a patience-testing year as editor. We began short staffed. We then lost two photographers, one to a co-op job, one to the other side of campus. Our deadline for Patron donations, January 15, 1991, turned out to be a far more important deadline on the other side of the world. This, and the sluggish economy, led to fewer donations and ad sales than expected, thus a smaller budget to work with. All things considered, its amazing this publication exists.

As you have undoubtedly noticed, this year's Pi-ne-tum varies from others in recent years. We attempted to develop a journal format as well as maintain the traditional yearbook features. The Pi-ne-tum is, after all, the JOURNAL of the College of Forest Resources. To achieve this format we included two articles written for a requirement in Forestry (FOR) 405. These articles were selected from 12 that were reviewed by a faculty member independent of the Pi-ne-tum staff. Additionally, ads were interspersed throughout the text, as in a journal, rather than grouped together in the back. Hopefully, this format will highlight the variety of student activities and increase the visibility of paid advertisements.

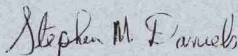
This year's edition has focused on forestry issues and events. This is because every staff member and every person willing to write an article was associated with forestry. We hope this is not the case next year. We hope that future editions will continue to incorporate student articles and include those from other curricula.

In closing, I would like to extend a hearty thanks to the following people:

to the staff

Melissa Dewey, Assistant Editor,  
Fred Hampton, Business Manager,  
Randy Byrd, Photographer,  
Jeff Leonard, Photographer,

to Gary Blank, without whose layout assistance this edition would not have been possible,  
to Charlotte Swart and Ruth Allen for helping with the mailings and other headaches,  
to Dean Tombaugh, the CFR Council, and the Forestry Foundation for financial backing,  
to all those who purchased ads or made donations, and finally,  
to Virginia Woodruff for helping us keep our books straight.



Stephen M. Daniels, Editor

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