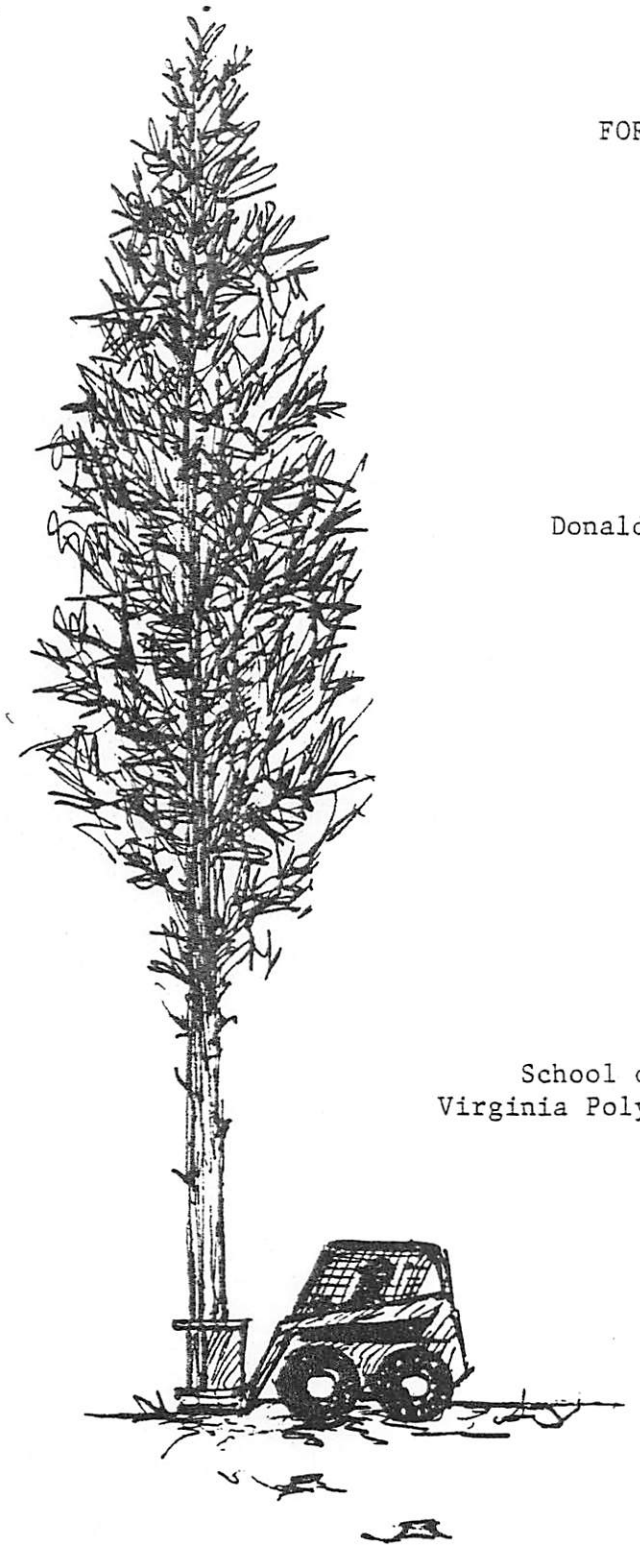

PROCEEDINGS

of the Second Annual
FOREST ENGINEERING COUNCIL WORKSHOP

1979

Donaldson Brown Continuing Education Center
Blacksburg, Virginia

Sponsored by

School of Forestry and Wildlife Resources
Virginia Polytechnic Institute and State University

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Donaldson Brown Continuing Education Center
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October 10, 11, 12, 1979

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Virginia Polytechnic Institute and State University

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Program of Meeting

Wednesday, October 10, 1979

11:00 a.m. - 1:00 p.m.	-	Registration ·Theme - A Survey of Needs for Forest Engineers
1:00 p.m. - 1:15 p.m.	-	Welcome - Dr. J. F. Hosner
1:15 p.m. - 1:30 p.m.	-	Purpose and Scope of Meeting - Dr. T. A. Walbridge, Jr.
1:30 p.m. - 2:15 p.m.	-	The Need for Forest Engineers in Teaching
2:15 p.m. - 3:00 p.m.	-	The Need for Forest Engineers in Research
3:30 p.m. - 4:15 p.m.	-	The Need for Forest Engineers in Extension and Continuing Education
4:15 p.m. - 5:00 p.m.	-	Appointment of Working Groups, Subjects to be Discussed, and Ground Rules for Discussion and Reporting

Thursday, October 11, 1979

·Theme - Biomass as a New Forest Product
- Problems and Opportunities

8:30 a.m. - 10:00 a.m.	-	Group Meetings - Session 1 Teaching - Problems and Opportunities
10:30 a.m. - 12:00 p.m.	-	Group Meetings - Session 2 Research - Problems and Opportunities
1:30 p.m. - 3:00 p.m.	-	Group Meetings - Session 3 Extension and Continuing Education Problems and Opportunities
3:30 p.m. - 5:00 p.m.	-	Group Leaders Meeting Summarization of Problems and Opportunities
5:00 p.m. - 7:30 p.m.	-	Social Hour
7:30 p.m. - 9:00 p.m.	-	Banquet

Program of Meeting

Friday, October 12, 1979

Summary and Conclusions

9:00 a.m. - 9:45 a.m. -	Summary of Teaching Problems and Opportunities
10:15 a.m. - 11:00 a.m. -	Summary of Research Problems and Opportunities
11:00 a.m. - 11:45 a.m. -	Summary of Extension and Continuing Education Problems and Opportunities
11:45 a.m. - 12:00 p.m. -	Discussion
12:00 p.m. -	Adjourn

Format of Meeting

The workshop was divided into three relatively discrete parts. On Wednesday, October 11, 1979, the first afternoon met the request of the Executive Committee's desire for survey papers concerning the need for Forest Engineers in teaching, research, and extension and continuing education. The three "survey" papers were presented by:

- Teaching: T. C. Bjerkelund
- Research: Penn A. Peters - Universities and Government Agencies
  and
  T. A. Wildman - Industry
- Extension and Continuing Education: B. J. Warren

On Thursday, October 11, 1979 the entire day was devoted to group discussions of the problems and opportunities in teaching, research, and extension and continuing education if biomass were considered to be a new forest product. The attendees were divided into four working groups. Each group, under the direction of a group leader, sequentially discussed the subjects with regard to the above. In this way all attendees were able to address each area, rather than being arbitrarily assigned to only one group. Group Leaders were as follows:

- Teaching: Tony Short
  Rich Oderwald
  Ken Kelley
- Research: Rodger Arola
  Tom Wildman
  Earl Headley
  Andy Fraser
- Extension and Continuing Education: Dennis Curtin
  John Garland
  Art Wimble

At the end of the day the four group leaders for each topic summarized the results of their group discussions and gave their respective Program

Chairman the results.

Friday morning October 12, 1979 Program Chairmen, or their delegates presented the summaries to the attendees. The summaries were presented by:

- Tony Short - Teaching
- John Erickson - Research
- Earl Deal and John Garland - Extension and Continuing Education

Recruitment of Research Forest Engineers

Penn Peters

Today I would like to consider with you the problem of recruitment of research forest engineers. I will address the problem of recruitment as it affects the Forest Service engineering research projects, primarily. I have been asked to consider the need of universities, also, and will do so briefly. We will consider some of the sources of candidates, the desirable qualifications of candidates, and some of the internal constraints that affect the ability of an organization to recruit.

There are four common sources of candidates for research forest engineers: recent university graduates, university faculty, high technology company engineers, and men in the organization currently employed in other than a research capacity. Let's consider each of these candidates in order with regard to their necessary qualifications and our ability to recruit if we are a university or the Forest Service.

The recent university graduate should have the Ph.D. to be readily employable by a university. While the Ph.D. is more an institutional requirement than it is a necessary qualification for the research position, the individual without one is at a disadvantage in the university environment. I have frequently seen advertisements from universities for forest engineers to teach harvesting courses and conduct research with a recommended salary range of less than $20,000. It is not surprising that these positions are hard to fill. The university graduate should have a Masters degree in an engineering discipline to be readily employable by the Forest Service. Even at the Masters' level, his theoretical background will often be insufficient

in some area (usually in Mathematics) and will need to be strengthened by additional coursework. Recruitment of recent university graduates is one of the more popular methods of staffing Forest Service engineering research projects. Invariably the recruit will come from the university in the city in which the engineering project is located. Why is this the case? The engineering project frequently has strong ties to the university and has a good line on potential candidates, he may have been employed part-time by the engineering project, he may be reluctant to leave the area, and the projects' ability to recruit outside the immediate area may be limited. The last point may require some clarification. A candidate from a distance will likely base his decision primarily on the financial considerations and often the Forest Service starting salary offer and moving expense benefits will not be competitive. The starting salary offer depends on his GS-rating which in turn is heavily dependent on the number of publications he has written. Moving expense benefits are much better for a Forest Service employee who transfers than for a new employee.

A second source of research forest engineers is the university faculty member. Obviously, he is a potential source of talent for other universities, but since he is already employed in a university, I will restrict my remarks to his potential as a research engineer in the Forest Service. The Forest Service cooperates with universities in the conduct of research, oftentimes with financial as well as technical support. His knowledge of the university system and their requirements would be helpful. The Forest Service wants someone with a good publication record who preferably has done research in the forest engineering area. He should be a member of the graduate faculty. What are the prospects of the Forest Service attracting this man? Financially, they should be excellent. His strong record of publications will qualify

him for a high GS-rating and moving benefits, while not good relative to inservice transfers, are at least as good as most universities. The faculty member's decision whether or not to accept the research position will depend strongly on factors outside the control of the Forest Service. Will he miss teaching? Will he miss day-to-day contact with the students? What are his consulting opportunities at the university? How secure is his position at the university?

A third source of research forest engineers are engineers from high technology companies. An engineer from a high technology company can be a strong addition to a research team because he can bring in special analytical skills and a fresh outlook. This individual will normally not have a Ph.D., so he is rarely a candidate for a university position. He will usually have a Masters degree, but not always. What you are buying with this individual, if you get the right man, is an analytical approach to problem solving that you may not be able to get from any other source. How do you recognize this individual? If his company is organized into a line organization with staff support, he is probably in staff. Typically, he has been involved in computer program development work. He prepares logic and writes programs more than he runs them. In the analytical and mathematical courses he got his best grades while in school. What are the chances of the Forest Service getting this man? Now very good. The high technology company has few amenities to offer, so a good man will normally have a high salary. He may have few publications, if any, depending on the company he is working for. Most of the individuals I know that came into engineering in the Forest Service from this background took a cut in pay to accept the position.

The last source I'd like to consider are engineers presently employed in the Forest Service in other than a research capacity. Like the recent

university graduate, this individual should have a Masters in engineering to function effectively in research. If a qualified recruit can be found, a competitive offer can be made. Due to a shortage of qualified logging engineers, the Forest Service has conducted a special two-year training program in cooperation with Oregon State University in which trainees receive two years post-graduate instruction and are assigned special Forest Service engineering projects. Trainees normally obtain a Masters degree in Forest Engineering. Two of the graduates from this program have taken research positions in the Forest Service.

We have considered four possible candidates for a research forest engineer: the recent university graduate, the university faculty member, the high technology company engineer, and the organization man. Of course, many individuals do not fit neatly into any one type, but are a composite of the above. Indeed, if you are responsible for building a research team, the most effective team is a good mix of the potential recruits we have considered.

Biomass as a New Forest Product

Tom Wildman

PROBLEMS INVOLVED WITH:

1) Researching Biomass

   A) What areas need to be researched

      1) Depletion of forest nutrients

      2) Soil compaction and erosion

      3) Oxygen content of the air we breathe

      4) Crop rotations

      5) Biomass as a byproduct or main crop

      6) Animal, plant, micro-organisms effect

      7) Insects, disease - what effect

      8) Species determination

      9) When should biomass become such - at what stage in stand life - we often lose material due to natural thinning

      10) What would we classify as forest biomass

   B) What should be the source of funding for research

      1) Grants - state and federal sponsored

      2) Special taxes on forest products

      3) Contributions from forest industry

      4) Monies from state and federal forestry research funds

      5) Individual grants to schools

   C) Cooperative research with schools and government agencies - Problems

      1) Different areas of country - research needs would differ

      2) Proper coordination regarding types of research being done

3) Possible conflict of interest - should we harvest biomass - forest service

BIOMASS AS A NEW FOREST PRODUCT

D) Who should have proprietary rights regarding developments under industry research

E) Working with equipment manufacturers - what are some of the problems

1) Sales - any profit

2) Who has proprietary rights

3) Justification of funds

OPPORTUNITIES INVOLVED WITH BIOMASS AS A NEW FOREST PRODUCT

1) Opportunities to develop

A) New harvesting machines (stand improvement work)

1) Thinning machines

2) Mulchers

3) Chippers

4) Transporters

5) Swath cutters

6) Feller bunchers

7) Energy harvesting machines

8) Hogs

9) Mobile chippers

10) Stump harvesters

11) Balers

12) Bags for chips

BIOMASS AS A NEW FOREST PRODUCT

B) New Systems (How will we process biomass)

What will we process as biomass and when

1) Thinnings - corridor - straight lines or meandering

a) Feller buncher

Transporter

Roadside chipper (hog or mulcher) (baler)

b) In woods feller-chipper-transporter

c) Hand felling

Winch skidding

Corridor transporting

Roadside chipping (hog or mulcher) (baler)

d) A machine that will handle tree length, broken pieces, stumps, limbs, and tops

e) Delimbers and toppers

f) What about obstacles - how do we get around them

g) Species and geographic differences

2) Biomass as a crop - clearcutting

a) Harvester as chips, mulch, hogged, baled

b) Combination of machines - feller buncher, transporter, roadside processor

c) Swath cutter-chipper-transporter

3) Labor - Who will cut wood for pulp, paper, and lumber if labor is busy harvesting biomass? In other words, will we have a shortage of labor? Is there a need to improve labor productivity?

BIOMASS AS A NEW FOREST PRODUCT

C) Development and marketing of the new product

1) What markets exist? Short-term - Long-term

a) Wood fuel (many different processes)

b) Mulch

c) Fiber for pulp* Is this more important?

d) Particle boards (plywood competition)

e) Cattle or livestock feed

f) Roadbuilding - sub-base

D) How to foster cooperation with educational institutions, private industry, and government agencies

1) Get on the same plane - talk at the same level

2) More cooperative meetings pulling together these individuals

3) Trade-offs of experience - practical as well as technical

4) More industry people involved in classroom instruction

5) Summer camps at all universities whereby practical experience is gained

6) Some softening or better guidelines regarding anti-trust

THE NEED FOR FOREST ENGINEERS AND PROGRAMS IN EXTENSION AND CONTINUING EDUCATION

B. Jack Warren
Forestry Update, Inc.
Long Beach, Mississippi

INTRODUCTION

There is an apparent void of people and programs to meet educational needs in the operational or engineering business of forestry.* The objective of this paper is to identify the clientele groups and educational programs needed and to discuss the qualifications of specialists to do the job. In order to meet this objective, the state cooperative extension services and continuing educational units of the universities must be challenged to develop and conduct the necessary programs since they are the most logical agencies to be involved.

CLIENTELE GROUPS

Those forestry businesses that are suffering most because of a lack of available educational programs are listed in order of greatest need below:

- Timber Harvesters and Wood Suppliers - these include logging contractors, pulpwood producers, independent contractors and wood dealers who supply the raw material to wood using complexes.
- Equipment Manufacturers - personnel of companies who develop and market forestry equipment to be used in logging, road construction, site preparation, fire suppression, regeneration, mill yard application, etc. Company marketing and development personnel along with dealer sales representatives are included in this group.

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*Forest engineering is the application of engineering principles to the resolution of forestry problems associated with the regeneration, growing, harvesting, handling, transporting and processing of timber.

- Forest Industry - personnel with pulp and paper companies, sawmills, plywood and pole plants who are responsible for purchasing and supplying raw material.
- Timberland Owners - non-industrial private owners of timber to include farmers, bankers, lawyers, etc.--both resident and non-resident owners.
- State and Federal Agencies - United States Forest Service and state forestry commission personnel.
- Other - site prep and regeneration contractors, concentration yards, transportation agencies and research and development projects.

PROGRAMS

For each of the clientele groups there are certain educational programs which need to be developed and conducted by extension and continuing education personnel.

I. Timber Harvester and Wood Supplier

A. Business Management - cost analysis, record keeping, contracts, cash flow, tax analysis, etc.

B. Regulations - state, federal, employment laws, OSHA, EPA, etc.

C. Equipment Management - selection, purchase, new technology, maintenance, operator training, depreciation, etc.

D. People Management - human relations, handling people, motivation and use of incentives and rewards.

E. Systems Analysis - machine interaction, terrain, timber size, balance, production, etc.

F. Safety - training programs, unsafe acts, near accidents, reporting, etc.

G. Roads - construction and maintenance.

II. Equipment Manufacturers

A. Basic Forestry - terminology, industrial forestry organizational structure, timber management, harvesting, site prep and regeneration.

B. Applications and New Equipment Needs - proper use, design, etc.

C. Customer Assistance - demonstrations, support materials, use of machines as related to conditions.

D. Operator Training - designing programs, follow-up, etc.

E. Safety - application and new developments.

III. Forest Industry

A. Timber Harvesting - update methods, techniques, indoctrinations, etc.

B. Timber Procurement - methods, systems of wood supply, landowner relations, contracts, cost analysis, etc.

C. Financial Management - accounting principles, business analysis ratios, capital gains, etc.

D. Site Preparation and Regeneration Practices - methods, applications, soil conditions, site quality, equipment use, etc.

E. Supervisory Management - personnel relations, communications, labor relations, time management, employee evaluations, etc.

F. Logging Roads - design, construction, maintenance, machine applications, etc.

G. Woodyard Management - foremanship, operator training, maintenance programs, safety programs, transportation methods, job improvement, etc.

H. Engineering Economy - cost and production analysis

I. Heavy Equipment Management - equipment purchase, operator training, work rates, equipment economics and maintenance programs.

J. Safety Programs - cost control, effective programs, evaluation procedures, etc.

IV. Forest Landowners

A. Identifying Reliable Loggers and Wood Buyers

B. Selecting Harvesting and Replanting Systems

C. Reducing Residual Damage

D. Bids and Contracts

V. State and Federal Agencies

A. Forest Engineering Awareness Programs - development of new methods and machines, effective engineering systems (harvesting, site prep and regeneration).

B. Sale Layout and Design - pre-sale operations, designing silvicultural systems, road layout, cost of sale and harvest.

C. Equipment Evaluation and Testing Programs

D. Joint Educational Programs

VI. Other Audiences

A. Equipment Development Agencies

B. Site Prep and Regeneration Contractors

C. Conduct Equipment Demonstrations

D. Trade Associations

QUALIFICATIONS FOR FOREST ENGINEERING SPECIALIST

I. Degree in Forestry - graduate work in engineering, economics, statistics and business.

II. Experience with Forest Industry and/or Equipment Manufacturer

III. Basic Knowledge of Developing and Conducting Educational Programs

IV. Good Communicator - speak and write fluently, communicate on all levels (labor to upper management).

V. Familiar with Wood Procurement and Logging Systems

VI. Interpret Research Data and Disseminate to Clientele

VII. Use of Mass Media - TV, newspaper, magazines and journals

CHALLENGE TO EXTENSION AND CONTINUING EDUCATION

Since the Cooperative Extension Services and Divisions of Continuing Education at various universities are charged with the responsibility of adult education, they are the most logical agencies to conduct forest engineering programs. At the present time, there are only three states conducting such programs for the forestry community, and only two or three other states involved on a very limited basis.

One of the reasons for a lack of programs is because of a shortage of qualified specialists and another is the lack of commitment by extension and continuing education administrators. Also, there is a void in forest engineering research which would logically give the basis for educational programs.

In order to meet the adult educational needs in forest engineering, it is going to take an all out effort by the universities, industry and other interested agencies. The universities have the responsibility to conduct the necessary research to support programs, to teach curricula to develop specialist and to develop and conduct adult related courses. Forest industry is responsible for supporting such programs with funds and expertise.

With the right combination of cooperation between the forest community and the universities, adult educational programs in forest engineering could be developed to serve all clientele groups. The possiblity of funds being

legislated for the Extension Expanded Forestry Program could certainly assist in generating interest in forest engineering programs within the various states. Most Continuing Education Divisions within the university system could maintain a forest engineering program through funds generated by fees charged to participants.

The key to success with these programs is the desire of the universities to serve the overall needs of the forest community and their willingness to cooperate with other agencies.

C.A.(Tony) Short, P.Eng.,
Associate Professor
Department of Forest Engineering
U.N.B.

1979 FOREST ENGINEERING COUNCIL WORKSHOP

TEACHING PROBLEMS AND SOLUTIONS
SUMMARY

A. PROBLEMS:

1. Definition of biomass - we need to agree
   - post harvest residual?
   - trees only?
   - all woody vegetation?
   - all vegetation?

2. Define markets for biomass
   - feedstock for various processes to other products
   - traditional uses - pulp, construction material
   - energy

3. Define forms of biomass
   - small particles
   - large chunks

4. Define quantities of biomass
   - need more precise information relative to inventories
   - need more precise information concerning value relative to fluctuating market conditions

5. Collection and handling methods need to be developed
   - small materials
   - large, odd shaped materials
   - more interaction between processes
   - higher costs and hence lower profit margins
   - energy expenditure relative to fibre recovery and energy content of the fibre recovered.

6. Stand re-establishment
   - planting and treatment for intensive bio-mass production
   - equipment
   - methods
   - nutrient cycles and costs

At this point, from a philosophical standpoint it was agreed that we should.....

.....reconsider "biomass" as a theme
- a currently fashionable buzz word
- a red herring focus
- best put into a more manageable perspective by considering biomass (regardless of how it may be defined) as simply a new product form
- we can handle whole tree, tree length, short wood, chips
- so now we should retain our innovative, flexible stance and add other forms as needed!
- really an extension, or restatement of concept of complete tree utilization

So having put "biomass" per se into a somewhat less formidable perspective, let's look at some more general problem areas in F.E.

7. Lack of people having industrial experience in teaching
   - FE is an APPLIED field so faculty must keep current
   - need to get into the forest, i.e. travel, so need travel funds

8. Lack of good source material/information base to construct a teaching curriculum - no good current texts available - copyright laws prohibit distribution of journal articles.

9. F.E. role is uncertain - perhaps an underlying reason for our inability to agree upon a concise definition of a Forest Engineer

So, and here we start to look at the opportunities, we should:

B. <u>OPPORTUNITIES</u>

1. Concentrate on basic principles

2. Teach more problem definition courses

3. Avoid over-specialization (i.e. <u>don't</u> produce an F.E. capable of designing harvesting machines but <u>do</u> provide enough principles of mechanics/ mechanization/machine design)

4. Consider creating joint appointments in teaching - extension to facilitate one-to-one interaction between faculty and industry personnel

5. Encourage interaction with other disciplines such as silviculture to foster mutually compatible team approaches to mechanized, biologically oriented treatments.

6. Teach more systems oriented courses to help students cope with highly inter-related problems
   - Industrial Engineering
   - Systems Analysis

7. FOREST ENGINEERING COUNCIL
   to co-ordinate preparation of a catalogue of available publications suitable for use in F.E. courses such as
   a) - Caterpillar Handbook
      - John Deere "Fundamentals of Service" series
      - Vickers "Industrial Hydraulics" and "Mobile Hydraulics" manuals.
   b) "homegrown" course materials, audio visual aids, manuals

   and to circulate this (the catalogue)

8. FOREST ENGINEERING COUNCIL
   to prepare the specifications for a good text in the forest operations area with elements dealing with (relative to a typical industrial career path)
   - operations - technical orientation
   - management - supervisory orientation
   - budgeting - financial orientation

   and to encourage an individual, or group of individuals, to prepare such a text.

THE PROBLEMS AND OPPORTUNITIES FOR RESEARCH IF BIOMASS IS ACCEPTED AS A NEW FOREST PRODUCT

John R. Erickson
USDA Forest Service

Four group discussions were held during the October 10-12, 1979 Forest Engineering Council meeting dealing with the research problems and opportunities of utilizing greater volumes of biomass. Estimates developed from existing forest survey and other data indicates that about 485 million dry tons of biomass are biologically available in the United States annually after conventional products are used (approximately 175 million dry tons are currently used). The excess wood biomass includes the difference between growth and drain, logging residues, dead material, cull trees, urban waste, mill wastes and land clearings. These figures are shown in the following summarization.

Obviously, there is an opportunity to greatly increase that utilization of wood biomass if it can be recovered economically, and if markets were either available or developed. The discussion groups were charged with looking at the total biomass as a new forest product. Although the summarization shows both the problems and opportunities, it is felt that many of the problems restated would describe opportunities for good applied research. The group number is provided for each issue raised during the discussions.

BIOMASS AVAILABILITY

	Million Dry Tons
I. Forest	375
II. Urban	70
III. Other	40
	485

1. Based on outlook for timber.
2. Includes est. beyond merch. bole.
3. Does not include stump or root system.

SUMMARIZATION APPROACH

1. Overview of est. biomass availability.
2. General problem statements.
3. Specific problem statements
   - -- Resource
   - -- Processing/harvest/transport
   - -- Marketing
   - -- Environmental
   - -- Mis.
4. Opportunities

PROBLEMS

General Comments

1. Descriptions are needed on anticipated problems/not current.
2. Equipment development requires long-term view of market and forest management.
3. Current successful systems evolutionary rather than revolutionary.
4. Many failures due to improper applications.
5. Equipment must be competitive/backed by strong marketing.
6. Universities need research funds and equipment.
7. Funding should be made available from industry, fed and private - non-industrial sources for needed research.
8. There is a great need for more cooperative research between all sectors recognizing the many problems of agreements.
9. A strong need to work more closely with equipment manufacturers. Objectives -- communications, identification of needs, trainig.

RESOURCE RELATED PROBLEMS

	Group
1. Definition of biomass	2, 3
2. Define biomass availability	1
*No need - collate information we now have.	4
3. Need for information on biomass components for design of systems.	4
4. Need for biomass inventory systems.	2
5. Need for suitable or optimum silvicultural systems.	2
6. Need for biomass valuation for tax purposes.	2
7. Need for below ground biomass quantification.	4

HARVESTING RELATED PROBLEMS

	Group
1. Need concepts and systems development to harvest; small trees, residues, stumps, short rotation intensive culture.	2, 3, 4
2. Need improved inwoods processing systems -- Alternatives to chips -- Multi-product highest value use systems -- Delimbing hardwoods	2, 4
3. Packaging biomass for handling & transport i.e. bundling - compaction.	1, 4
4. Evaluation and development of non-traditional transport methods.	1, 4

		Group
5.	Definition of energy and cost trade-offs in production and harvesting.	1
6.	Research should define the problem rather than the specs. or solution. Industry should provide the solution.	3

MARKETING RELATED PROBLEMS

Groups 2 and 3 (and probably the other groups) mentioned the market problems including distribution systems for energy wood.

ENVIRONMENTAL RELATED PROBLEMS

Group 2 discussed the problems of increased removal of biomass on environmental concerns.

MISCELLANEOUS PROBLEMS

		Group
1.	There is a need to obtain landowners acceptance of total biomass utilization.	2, 3
2.	Researchers must be aware of the political pressure involved in more complete biomass utilization, i.e. energy.	2
3.	Need for research on stand establishment.	4
4.	Petrochemical substitutes.	4
5.	Foliage utilization.	4

OPPORTUNITIES

		Group
1.	Develop economics and business management in F.E.	1
2.	Define biomass in terms suitable for equipment design.	1, 3
3.	Utiliza wood for energy	1, 3
4.	Economic studies of the form in which biomass should be grown.	1
5.	Support innovators in the field.	3
6.	Promote concept work in research.	3
7.	Consider workshop sessions to move from concept to design.	3
	-- Design a team effort - Engineering & F.E.	
8.	Develop standard carriers	3
	-- Attachments may be best developed at the machine shop level.	
9.	Coordination and good communication is needed.	2

APPENDIX A

Minutes of 1978

National Workshop on Forest Engineering and Harvesting

MINUTES

Final Working Session
National Workshop on Forest Engineering and Harvesting

School of Forestry
Corvallis, OR 97331
4 p.m., August 10, 1978

The final session of the 1978 National Workshop on Forest Engineering and Harvesting was chaired by George W. Brown, Program Chairman for the Workshop. Those attending the final session voted unanimously to form an organization on Forest Engineering. Further, they directed by unanimous vote that the policy council elected earlier in the day (Boyd, Brown, Erickson. Plummer, Silversides) was to determine the nature of this organization, a time table for the next meeting and the extent of the membership for the organization.

The next item of business considered during the session focused on the selection of a name for the organization. Eight names were proposed, two which received the most support. The first name was, "Council on Forest Engineering." A second that was proposed was "Council on Forest Engineering and Harvesting." After a vote of those attending "Council on Forest Engineering" was selected as the organizational name. Chairman Brown directed that materials prepared for the next workshop include a very strong orientation to harvesting in order to specifically include northeastern and southern professional foresters working in this field.

Organization of the 1979 meeting at VPI was the next order of business considered. At the close of the Tuesday session on August 8, the membership had considered organizing the next meeting with a program committee consisting of people from each region of the United States and Canada. After further discussion on August 10, it was unanimously agreed that the program be structured around functional groupings of teaching, research and extension, with each region contributing persons to participate on the program planning for each of those three areas. Those attending the final session further directed that the policy committee should select persons for the programming committee to assist Tom Walbridge in next years's conference planning. Furthermore, they directed that the policy committee should suggest to the programming subcommittees that two types of papers be presented. These are surveys and summaries of teaching, research, and extension needs plus subject matter technical papers. It was also suggested that the policy committee give due consideration to the name selected and come to the 1979 meeting prepared to either support or suggest another more fitting name for the organization.

Brown thanked the Planning Committee, those presenting the papers and those attending for their participation and hard work during the conference. The conference was closed officially at 5 p.m., August 10, 1978.

Signed

John J. Garland
Acting Secretary

8/4/79
djm

APPENDIX B

List of Theses in Forest Engineering

Forestry Theses Accepted by Colleges and Universities in the United States July 1966-June 1973

Compiled by

Michael P. Kinch
Oregon State University Press
Corvallis, Oregon

COLORADO
Colorado State University

Groff, W. An experimental logging operation. 1970 (M)

INDIANA
Purdue University

Perkins, R. H. Skyline logging systems design. 1967 (P)

LOUISIANA
Louisiana State University

Coleman, N. A. Application of classical thinning methods in a slash pine plantation in southeastern Louisiana. 1969 (M)

Harper, J. L. Factors affecting log loader production in southeast Louisiana. 1971 (M)

Keister, T. D. Thinning methods in slash pine plantations. 1966 (P)

Perkins, J. R. A production-cost analysis of choker and grapple logging skidders in southeastern Louisiana. 1971 (M)

Stuckey, H. J. Cost comparisons of chipping versus slashing in pulpwood production in Arkansas. 1969 (M)

Trewolla, W. P. The feasibility of balloon logging in the South. 1969 (M)

White, M.C., Jr. Factors affecting productivity of hydraulic tree shears in Southern logging. 1969. (M)

MAINE
University of Maine

Field, D. The application of line balancing techniques and mathematical models to the planning and design of pulpwood harvesting systems. 1968 (M)

Milmine, C. E. A descriptive technique for information dissemination on timber harvesting systems. 1968 (M)

Sarna, R. P. Discrete computer languages in the simulation of forest harvesting systems. 1973 (M)

Wimble, A. W. Application of a linear programming model to analyze pulpwood procurement scheduling. 1969 (M)

MICHIGAN
Michigan Technological University

Dye, G. W. Harvesting hardwood logging residue: an operations and cost analysis. 1972 (M)

University of Michigan

Miller, R. K. The characteristics and significance of contract oggerss in Michigan's Upper Peninsula. 1972 (P)

MINNESOTA
University of Minnesota

Alm, A. A. Environmental conditions produced by mechanized logging and their impact on establishment of coniferous reproduction. 1971 (P)

MISSISSIPPI
Mississippi State University

Jones, B. C. Automated record keeping for timber harvesting contractors. 1973 (M)

NEW YORK
State University of New York

Bell, L. G. A discussion of methods and equipment for logging and transport in the Latin American tropical rain forests. 1972 (M)

Cunningham, J. P. Road simulation: a subsystem for land management decision making. 1970 (M)

Edmonds, R. L. Laws and governmental regulations affecting independent logging contractors in New York State. 1971 (M)

OREGON
Oregon State University

Lammel, R. F. Natural debris and logging residue within the stream environemtn. 1973 (M)

Richards, D. P. The efficiency of resource use in the logging industry. 1971 (P)

SOUTH CAROLINA
Clemson University

Lanford, B. L. Cost analysis of shortwood and tree-length harvesting systems. 1970 (M)

Lawton, F. A., Jr. Cost analyses for rubber-tired skidders in the coastal plain of South Carolina. 1968 (M)

Stock, W. G., Jr. Time factors affecting the performance of rubber-tired skidders. 1968 (M)

WASHINGTON
University of Washington

Akre, B. Economical considerations and evaluation of harvesting methods adaptable to thinning of second-growth Douglas-fir on steep ground. 1967 (M)

Carson, W. W. Dynamic characteristics of skyline logging cable systems. 1973 (P)

Hsu, T.-H. A survey of current logging practices in Taiwan--Ta-Shu-Shan Forestry Corporation--and recommendations. 1968 (M)

Swarthout, C. D. Aerodynamic forces on logging balloons. 1967 (M)

WISCONSIN
University of Wisconsin

Tritch, J. W. Harvesting costs as a factor in timber management investment decisions. 1967 (M)

THESES AND DISSERTATIONS

I.F.O. Program

Department of Forestry

Virginia Tech 1975-1979

Name of Author	Title	Degree Awarded	Date
Earl C. Ford, III	Predictions of Tree Weights and Center of Gravity for Various Species of Appalachian Hardwoods	M.S.F.	1976
R. F. Thienpont	Tract Size and Timber Harvesting System Relationships in the Southeast	M.S.F.	1976
Fred H. Baggott	The Feasibility of an Informational Decision Support System for Industrial Forestry Operations.	M.S.F.	1976
J.D. Jolley	Analysis of the Baling Concept for Increased Fiber Recovery on Harvested Forest Sites	M.S.F.	1977
S. E. O'Hearn	Economic and Performance Comparisons Between Full Tree Chipping and Conventional Harvesting Systems on a Variety of Stand Types in the Southeast	M.S.F.	1977
Scott A. Shartle	An Analysis and Documentation of Southern Pine Plantation Characteristics relevant to Harvesting System Design	M.S.F.	1977
E. H. Stephenson	The Potential for Economic Primary Processing of Low Quality Appalachian Hardwoods with the Chipping Canter	M.S.F.	1977
Reinaldo H. Ponce	The Potential for Increased Mechanization of Shortwood Harvesting in the Man-made forests of the State of Sao Paulo.	M.S.F.	1978
John Wade Spittle	Sales Area Handbook for Forestry Equipment Salesmen.	M.F.	1978
Thomas B. Brann	Analyzing the Pulpwood Transportation Network with Linear Programming	Ph.D	1979
Carl D. Porter	The Economic Feasibility of Modifying Six Conventional Harvesting Systems to Recover Logging Residues for Fuel and Fiber	M.S.F.	1979
Trenor Hypes	The Impact of Tree Size on the Performance of Longwood Harvesting Functions and Systems in Clearcut Harvesting of Southern Pine Stands	M.S.F.	1979
Robert A. Topp	Development of an Infeed for a Prototype In-Woods Baler	M.S.F.	1979

Forestry Theses
Accepted by
Oregon State University
1974-1979

FOREST ENGINEERING DEPARTMENT

Sinner, Hans-Ulrich. Simulating skyline yarding in thinning young forests. 1974. (M.S.)

LeDoux, Chris B. Simulation of a helicopter yarding system in old growth forest stands. 1975. (M.S.)

McGreer, Dale Jay. Stream protection and three timber falling techniques: a comparison of costs and benefits. 1975. (M.S.)

Sears, James Zolla. Yarding system and carriage development: a case study. 1975. (M.F.)

Kellogg, Loren D. A case study of prebunching and swinging: a thinning system for young forests. 1976. (M.F.)

Iff, Ronald H. An analysis of the slackpulling forces encountered in manually operated carriages. 1977. (M.F.)

McRae, James R. A force analysis of directional falling. 1977. (M.F.)

Ohmstede, Robert H. Production rates and skidding cost of the FMC model 210 CA high-speed skidder. 1977 (M.F.)

Ortman, Thomas L. Rock bolt anchors for cable logging systems. 1977. (M.F.)

Stryker, Edwin A. Gradeability of log trucks. 1977. (M.F.)

Van Winkle, Denis J. An analysis of road changes on several cable logging operations. 1977. (M.F.)

Brantigan, Richard T. Critical conditions for carriage passage at the support jack for uphill yarding. 1978. (M.S.)

Henshaw, John R. A study of the coefficient of drag resistance in yarding logs. 1977. (M.S.)

Nickerson, Devon B. A model for the determination of otpimum setting dimensions for tractor yard/swing operations. 1978 (M.S.)

Schnare, Jon Keith. Factors that affect USDA timber sale layout time in the Pacific Northwest. 1978. (M.S.)

Neilson, Dennis A. The production potential of the Igland-Jones Trailer Alp yarder in thinning young growth Northwest conifers: a case study. 1978. (M.F.)

Schneider, Ernest W. A log truck loading study in the Intermountain Region: production and costs. 1978. (M.F.)

Sedlak, Jerome P. The loading of second-growth Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) to simulate the forces acting on an intermediate support tree. 1978. (M.F.)

Sherar, James R. Production rates and a comparative analysis of fuel consumption for a live, standing skyline, and highlead cable yarding system. 1978. (M.F.)

Bradshaw, George R. The effect of preplanned skid trails and winching on a partial-cut. 1979. (M.F.)

Curtis, Richard J. Production rates of skyline, balloon, and helicopter yarding systems from gross time study analysis. 1978. (M.F.)

Kramer, Brian W. The production performance of the Igland-Jones Trailer Alp yarder in clearcut Northwest hardwoods: a comparative analysis of two case studies. 1979. (M.F.)

Scherer, Timothy E. Release-conversion of hardwood stands with a small skyline yarder. 1979. (M.F.)

Mann, John W. Skyline logging production in the southern Sierra Nevada Mountians: a case study. 1979. (M.F.)

APPENDIX C

List of Attendees

1979 Forest Engineering Council Workshop

NATIONAL CONFERENCE ON FOREST ENGINEERING EDUCATION

Rodger A. Arola
U.S. Forest Service
Forestry Science Lab.
Houghton, MI 49931

D. Ed Aulerich
Century West Engineering Corp.
POB 952
Corvallis, OR 97330

Tom C. Bjerkelund
Dept. of Forest Engr.
Univ. of New Brunswick
Box 4400
Fredeickton, New Brunswick
CANADA E 38 5A3

George W. Brown
Dept. of Forest Engr.
Oregon State University
Corvallis, OR 97331

Alan E. Carlson
WESTVACO Corp.
Box 577
Rupert, W.VA 25984

Edmond Byrl Collins
644 Lashley St.
Morgantown, W.VA 26505

Dennis Curtin
T.V.A.
Forestry Bldg.
Norris, TN 37828

Earl L. Deal
N.E. State University
3033 Biltmore Hall
Raleigh, NC 27607

John R. Erickson
14th & Independence
South Agri. Bldg.
U.S. Forest Service
Washington, DC 20013

H.D. Franklin
U.S. Forest Service
1720 Peachtree Rd. NW
Atlanta, GA 30309

Andrew P. Fraser
c/o National Sales
Caterpillar Tractor Co.
Peoria, IL 61629

John Garland
Forest Engr. Dept.
221 Peary
Oregon State University
Corvallis, OR 97331

Gray S. Henderson
1-30 Agri. Bldg.
University of Missouri
Columbia, MO 65211

Earl Hoadley
International Paper Co.
POB 2328
Mobile, AL 36601

Keith C. Jones
K.C. Jones & Assoc. Ltd.
33 Fuller St.
Ottawa, Ont.
CANADA KIY 3R9

Tony King
U.S. Forest Service
Devall St.
Auburn, AL 36839

Charles N. Lee
Coll. of Environ. Sci. & Forestry
S U N Y
Syracuse, NY 13210

Alfred D. Longhouse
378 Elmhurst
Morgantown, W.VA 26505

Joseph G. Massey
Texas A & M University
Dept. of Forestry
College Station, TX 77843

George E. Miller
Ext. Ag. Engr. Coop. Ext.
University of California
Davis, CA 95616

Penn A. Peters
820 Augusta Ave.
Morgantown, W.VA 26505

Elmo Renoll
Ag. Engr. Dept.
Auburn University
Auburn, AL 36830

C. A. Short
Dept. of Forest Engr.
University of New Brunswick
POB 4400
Frederickton, N.B.
CANADA E38 5A3

Steven A. Sinclair
Univ. of Minn.
Dept. of Forest Products
Kaufert Lab.
2004 Folwell Ave.
St. Paul, MN 55108

Don Studier
U.S. Forest Service
School of Forestry
Oregon State University
Corvallis, OR 97331

B. Jack Warren
Forestry & Harvest. Trng. Ctr
Gulf Park Campus
Long Beach, MS 39560

W. F. Watson
Miss. State University
P.O. Drawer FD
Miss. State, MS 39762

Thomas Alton Wildman, Jr.
198 Highland Ave.
Millinocket, MD 04462

Art Wimble
American Pulpwood Assoc.
1619 Mass. Ave. NW
Washington, DC

Glendon G. Young
Univ. of British Columbia
2075 Westbrook Mall
Vancouver, BC V6T 1W5

Emil J. David
R.R. 3
Thunder Bay, Ont. CANADA

Bobby L. Lanford
Dept. of Forestry
Auburn University
Auburn, AL 36830

Richard V. Lee
Coll. of Environ. Sci. & Forestry
S U N Y
Syracuse, NY 13210

David G. Palmer
Paradise Hill Drive
Union Springs, NY 13160

Robert A. Tufts
Dept. of Forestry
Auburn University
Auburn, AL 36830

Kenneth Kelly
Eaton Yale Ltd.
969 Luliana Dr.
Woodstock, Ontario
CANADA N4S 8A3

VIRGINIA TECH
Blacksburg, VA 24061

Dean Haugh
Agricultural Engr.

Miles Lovingood
Agricultural Engr.

Phil Mason
Agricultural Engr.

John Perumpral
Agricultural Engr.

Bill Stuart
Dept. of Forestry

Tom Walbridge
Dept. of Forestry

Rich Oderwald
Dept. of Forestry

APPENDIX D

Draft of Organizational Charter

Council on Forest Engineering

DRAFT - ORGANIZATIONAL CHARTER

COUNCIL ON FOREST ENGINEERING

ARTICLE I

Name

The name of this organization shall be the Council on Forest Engineering, hereinafter referred to as the Council.

ARTICLE II

Objects

The objectives of the Council are:

1. To foster the development of forest engineering in industry, government, and in university teaching, research, and extension programs in order to promote the best methods of managing and operating forests, both private and public.

2. To service the Council and its members in such matters.

3. To serve the forestry profession on matters of policy in the area of forest engineering.

4. To facilitate the exchange of technical information in forest engineering subjects.

ARTICLE III

Functions

In order to carry out these objectives, the Council shall:

1. Collect, compile, analyze and distribute information, and institute studies of such matters as are deemed of general interest.

2. Institute co-operative action between members, governments and the general public.

3. Keep in touch with opinions and problems of members.

4. Investigate, and when possible, seek solutions to problems of industry as related to forest engineering practice.

5. Formulate and advocate, through the Council, legislative and educational measures.

6. Assist in representation by the Council or its members in negotiations with governments where desired.

7. Maintain through the Council close and friendly contact with other associations so as to develop common overall policies wherever possible.

8. Perform such other functions as are deemed desirable.

9. Meet annually at a place and time selected by the membership.

10. Exchange information using a semi-annual newsletter.

11. Encourage the coordination of educational programs in Forest Engineering.

ARTICLE IV

Membership

Membership in the Council on Forest Engineering shall consist of the following classes:

Members
Student members
Retired members

1. MEMBERS - A member shall be actively engaged in forest engineering in any area where engineering principles are applied to the solution of problems on forest land. A member may be employed in the forest based industries, or an organization closely related thereto; or in a scientific institution or trade school relating to forestry; or with a consulting firm in the field of forestry; or with a firm manufacturing or supplying equipment, supplies or services used in the forest based industries.

2. STUDENT MEMBERS - A student member shall be pursuing a course of instruction in a university, technical school, or trade school related to forest engineering.

3. RETIRED MEMBERS - A retired member shall have been employed in the field of forest engineering, in good standing for a period of twenty-five [25] years, who on retirement from active duty with his employers, wishes to remain affiliated with the Council on Forest Engineering. Upon approval of the Council, he shall be entitled to retired membership for life.

ARTICLE V

Officers

Officers of the Council on Forest Engineering shall include:

Chairman
Vice Chairman
Past Chairman
Policy Committee Chairman
Membership Committee Chairman

Such officers shall comprise the Executive Committee of the Council on Forest Engineering. Their duties shall be as follows:

1. Chairman: The principal duties of the chairman are to organize and arrange the annual meeting of the Council, including publicity, registration, arrangements, and publication and distribution of any proceedings. During his term of office he shall represent the Council where required, serving as liaison with other professional organizations and responsible for the conduct of Council business. His term of office is one year.

2. Vice Chairman: The Vice Chairman will assist the Chairman in all matters pertaining to the conduct of Council business, serving as Chairman if required. The Vice Chairman will be responsible for the program of the annual meeting of the Council. The Vice Chairman will serve in this office for one year, automatically succeeding the Chairman in the next year.

3. Past Chairman: The Past Chairman will serve for one year on the Executive Committee of the Council, assisting the Chairman and Vice Chairman with the annual meeting and the conduct of Council business.

4. Policy Committee Chairman: The Policy Committee is a standing committee of the Council, organized to promite and facilitate the development of the Council on Forest Engineering during its formative years. The Chairman of the Committee shall lead the committee in its resolution of such issues as membership, refinement of goals and objectives, identification of policy issues facing the profession, and organization of the Council.

5. Membership Committee Chairman: The Membership Committee is a standing committee of the Council of Forest Engineering, organized to identify those persons actively involved in teaching, research, and extension programs in forest engineering in North America. The Chairman of the Committee shall lead the committee in its effort to obtain a list of such persons in industry, government and university organizations. The Committee shall strive to provide an up-to-date listing of such persons to the Chairman of the Council in time for publicity activites in support of the annual meeting.

6. The Executive Committee of the Council: This committee shall consist of the chairman, vice-chairman, past chairman, policy committee chairman and membership committee chairman. It shall be led by the Chairman of the Council and will convene at least once per year to consider the business of the Council.

APPENDIX E

Memorandum Regarding Time and Place

of

Council on Forest Engineering Workshop

Department of
Forest Engineering

Oregon State University

Corvallis, Oregon 97331

October 15, 1979

MEMORANDUM

TO: Forest Engineering Education Program Leaders

FROM: George Brown, Head
Forest Engineering Dept.

Participants at the 1979 annual meeting of the Forest Engineering Council agreed to hold the next meeting in June, 1980 at the LSU/MSU Logging Center at Long Beach, Miss. They further suggested that this meeting include an opportunity for educators to exchange teaching materials for improvement of FE courses. Given the general lack of texts and other published data, such an exchange will undoubtedly be a valuable source of information for our teaching faculties.

Please bring the following teaching materials to next year's meeting at Long Beach:

1. Syllabi of FE courses offered by your department including outline and references.

2. Published workbooks or other written and locally distributed materials your faculty may have prepared.

3. Lists of audio-visual materials used with information about how they may be obtained. Slides you would be willing to allow copied would also be helpful.

4. Any manufacturer's literature that you have found helpful would also be useful.

5. Any sets of notes you would be willing to share.

If you or your faculty are unable to attend the 1980 meeting, please send your materials to:

Dr. W. F. Watson
Department of Forestry
Mississippi State University
Mississippi State, MS 37950

or to me. Exchanges such as these are the reason the Council was formed. It should be a valuable source of information and assistance in a new rapidly developing

field such as Forest Engineering, where there is a notorious lack of available teaching material.

We look forward to your participation.

GWB:lh