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Key Issues and Future Directions of Mechanized Harvesting: Discussions and Guidance from Working Groups

by

Pete Bettinger
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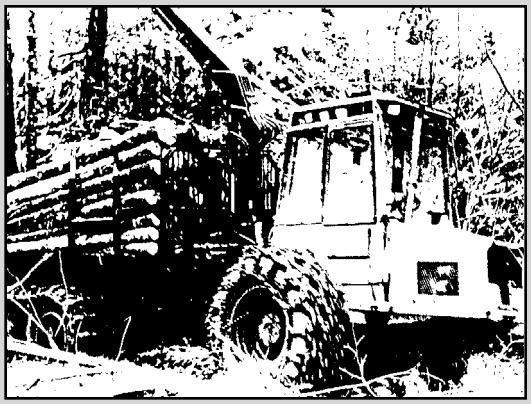

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Acknowledgment

This report was generated from feedback gathered during working-group sessions of the workshop Mechanized Harvesting: The Future is Here, held by the Department of Forest Engineering, Oregon State University (December 17-19, 1991).

The Authors

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Introduction

The Department of Forest Engineering at Oregon State University presented an interactive workshop, Mechanized Harvesting: The Future is Here, in December 1991. One hundred eighty-five people preregistered for the conference; an additional 27 were invited speakers. Eighty-nine percent of the participants were from the western U.S. (Figure 1), with 78 percent of the total from Oregon and Washington. The remaining 11 percent were from Canada, Illinois, and Sweden. Forty-six percent of the participants worked for private industry, which included timber companies, logging contractors, and equipment manufacturers and dealers (Figure 2). Government agencies (U.S. Forest Service, State Forestry organizations, Bureau of Indian Affairs, and Bureau of Land Management) accounted for another 46 percent.

The specific objectives of the workshop were (1) to present information about and experiences with mechanized logging in the Pacific Northwest and areas with similar conditions, and (2) to develop ideas for resolving important issues that will help shape the future of mechanized logging. Program sessions included "Harvesting Conditions for Mechanized Logging," "Harvesting Equipment and Systems," "Site Resource and Harvesting Impact Issues," and "Harvest Planning and Logging Operations Management." A vendor display provided the program participants with practical, detailed views of developments and innovations in mechanized logging equipment. Finally, working-group sessions allowed the participants to discuss key issues and future directions in mechanized harvesting.

This paper examines the organization and effectiveness of the working-group sessions and summarizes the opinions and information exchanged in each session. This knowledge may benefit organization of future conferences and provide insight into the future needs of people involved with mechanized logging.

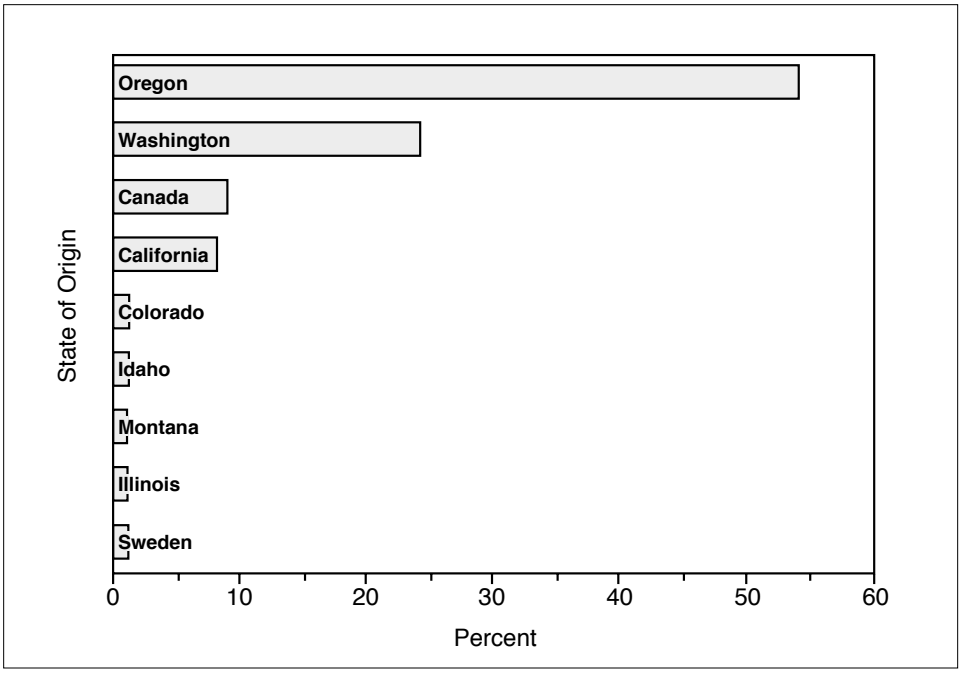

Figure 1. Origin of participants registered for the workshop Mechanized Harvesting: The Future is Here, held by the Department of Forest Engineering, Oregon State University, Corvallis (December 17–19, 1991).

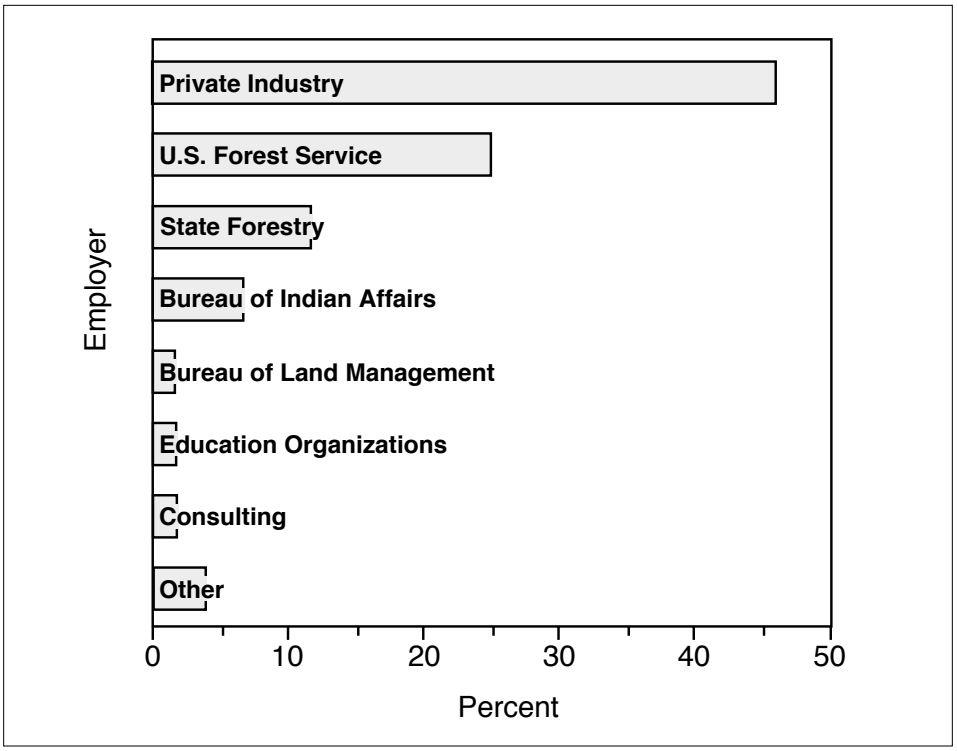

Figure 2. Employers of participants registered for the workshop Mechanized Harvesting: The Future is Here, held by the Department of Forest Engineering, Oregon State University, Corvallis (December 17–19, 1991).

Format and Procedures of Working-Group Sessions

Each working group was to identify key problems within its topic and generate ideas for solutions through discussions among the participants. The working groups were designed not to solve specific problems, however, but rather to share information and discuss alternatives. Summaries of the group discussions brought the major issues to the attention of the general session of the conference.

The organizing committee of the workshop identified five key topics that could be discussed in the time alloted:

- linking operational needs with research
- management of forest residues
- logging safety and insurance
- contracts and policies
- exchange of ideas between equipment dealers and loggers.

The committee also developed introductory questions to help participants start thinking about the topic.

The organizing committee defined the format for the working-group sessions to ensure a consistent approach. Working groups met for 2 hours on the second afternoon of the conference. Each session was to have a brainstorming atmosphere with minimal criticism of viewpoints expressed. At the beginning of the workshop, participants selected two working

groups of interest, and the committee tried to place them in one of their preferred groups. Group numbers were kept roughly even, however, and each group was limited to 35–40 people. Approximately two-thirds of the registrants joined a working group.

The committee selected competent facilitators and recorders for each working group. The facilitators had completed workshops on facilitating meetings and were at least somewhat knowledgeable about the specific topics. Facilitators introduced the topic, reiterated the objectives of the working groups, set the agenda, and maintained focus on the topic. Their opinions and experiences were mostly kept out of the discussions. The recorder wrote all comments and information on flip-chart sheets and taped them to the walls as the session progressed.

The facilitator used the introductory questions to guide the group in thinking about the topic and focusing on specific issues, rather than to lead the discussion. At the end of each topic discussion and at the end of the session, the facilitator summarized the ideas that had been expressed. A volunteer, usually the dominant person in the group discussion, presented a summary of the results to the general session of the conference on the last day of the workshop.

Important Issues Related to Mechanized Logging

The main themes of each group, a summary of the discussion within each group, and the responses of the general session to the working group summaries are presented below.

Linking Operational Needs with Research

Effective working relationships among equipment manufacturers, researchers, landowners, logging contractors, and forest industry are essential to the advancement of the timber industry. This working group focused on (1) identifying operational needs associated with mechanized logging, (2) describing how research can meet these needs, and (3) formulating ways to link groups more strongly and more productively.

The participants assigned top priority to three needs:

1. helping planners and loggers in matching equipment to harvest site conditions;
2. improving the interface between market and harvest;
3. monitoring the field results from different silvicultural treatments and machine impacts on the site.

Other needs identified by the working group included formation of a research-and-development forum or support group, improved information exchange between research and manufacturing, operator selection and training programs, and operator involvement in research.

The group also outlined some specific research needs, including more applied research and integration of stand-management objectives with harvesting studies. Information on equipment and system capabilities

encompassing operational and optimal levels of production is needed. Information exchange with other regions in North America and with the Nordic countries may also be useful.

Opportunities for improving linkages among researchers, equipment manufacturers, landowners, and contractors were also suggested. Use of consultants, creation of an information clearing house, and periodic information updates through mailings, publications, workshops, or videos were recommended. A need for changes in university curricula and increased continuing education or extension programs was also noted. Finally, informal round-table discussions carried on at state, regional, national, and international levels through meetings, telephone, or fax were suggested.

When these results were presented to the general session of the workshop, other concerns were voiced—in particular the importance of monitoring and measuring the effectiveness of various stand treatments in terms of growth responses and ecological objectives.

Management of Forest Residues

Many forest managers are dissatisfied with the amount and location of logging residue (limbs and tops) currently left on the logging site by mechanized logging, primarily by feller-bunchers and grapple skidders pulling whole trees to the roadside. This working group identified four major areas of concern in management of forest residue: market and economic factors, environmental considerations, reforestation, and statutory requirements. The difficulties mentioned included burning restrictions, soil compaction, and long-term site degradation.

Market and economic concerns centered on product mix of the residues, commodity prices and current and short-term demand for the residues, and the return on investment associated with residue management. Environmental considerations encompassed maintenance of site productivity, mitigation of soil compaction, displacement and erosion, and impacts on water and air quality.

Ease of replanting after mechanized logging and the effects of soil compaction on seedling growth were the principal reforestation concerns. Other concerns included moisture availability to seedlings, moisture storage capacity of the soil, and moisture interception and evaporation responses of the site. Impacts on natural regeneration were also considered—specifically, seedbed preparation by logging machines, retention of seed sources (cones left in the woods), and potential competition from grasses and shrubs.

The discussion of statutory requirements associated with residue management covered the use of fire for hazard reduction, smoke management, wildlife habitat constraints, and reforestation requirements.

In response to the concerns of this group, the general session of the workshop noted that there seem to be two schools of thought about residues—those people who see residues as a fiber-utilization opportunity, and those who see them as a handling or disposal issue. The comment was also

made that residue treatments are usually site-specific. The general session felt that adequate information on the subject was not available, other than the experience and advice of extension agents or research reports limited to case studies. A general need was noted for processes that would enable managers to select the appropriate equipment for harvesting each site.

Participants in the general session were interested in knowing whether the land managers would consider the monetary returns from selling residues as an unexpected bonus from harvesting, and to what extent utilizing these residues would impact planning for wildlife. They also requested more research on the impacts of spreading chipped residues back on the site.

Logging Safety and Insurance

The logging safety and insurance working group first described the impacts of mechanized logging on safety issues, which led to a discussion of the needs in those areas. Members of the group stated that mechanized logging has reduced the overall accident rate and physical stress of machine operators, but has not changed the safety hazards associated with machine maintenance. Furthermore, mechanized logging has increased the severity of accidents and the mental stress and long-term health problems of operators.

The discussion led to an evaluation of OSHA personnel associated with logging safety. There was a general consensus that OSHA services available to the logging industry were excellent, but should be better publicized.

The group identified an urgent need for professional machine instructors, who should be provided by the equipment manufacturers. There were also indications of an urgent need for a screening process for operators who are competent, unflappable, and team-players. Members also stated that, although younger operators are easier to train, the experience of older operators must be somehow retained. A major point of the discussion was that insurance rates should recognize fully mechanized operations, which may encourage operators to convert to such systems.

The research needs specified by this working group were many. It gave high priority to measuring and alleviating the long-term health effects associated with mental and biomechanical stresses. Development of criteria for operator selection and of a training machine that simulates machine operations was deemed important. As an aside, this working group stressed the importance of an economic evaluation of the optimal mix of pulpwood and sawlogs required to allow a fully mechanized system to break even.

The response of the general session to these results indicated a need for contractors to become more competitive in the area of safety costs and a need to select systems that both allow high production and are safe to operate. Further, input into safety and insurance issues by the logger associations in the Pacific Northwest is lacking and should be valued by government agencies involved in these areas. It was also noted that equipment is often mismatched to the site (stretching the operability limits) or misused, creating less safe conditions than are desirable.

Contracts and Policies

The contracts and policies working group concentrated on practices of both public and private organizations. The primary conclusion was that contract language concerning mechanized logging should receive more attention. Clearer contract objectives were also desired in order to reduce conflicts and inconsistencies. The feasibility of long-term logging contracts to promote stewardship was noted as an important issue.

Participants felt that policies concerning mechanized logging should be proactive, not reactive. More information and research are needed concerning environmental impacts of mechanized logging equipment and the relative cost of using different equipment. The new size and quality of material generated by certain equipment also should be measured consistently and marketed in order to implement new practices successfully. Finally, communication and leadership were called for to create a vision of the potential uses of mechanized logging and help alleviate problems in writing contracts and developing policies.

The general session added several points to the concerns of the working group. First, the whole process of writing contracts should be revised to take into account the smaller wood now being harvested in the Pacific Northwest. Participants would like consideration of market reactions to increased small wood operations, larger sale areas, and longer contract periods. In addition, research on utilization of juvenile wood was of interest. Whereas these concerns may focus on needs of the customer (the mill), it was noted that managers need to persuade forest supervisors and company executives to rely on these new concepts in order to gain acceptance for mechanized logging. Finally, regional workshops on contract development were desired.

Exchange of Ideas Between Equipment Dealers and Loggers

This working group concluded that the key to successful introduction of mechanized logging is a favorable economic atmosphere based on commitment to three standards:

- a stable work load over 3 to 5 years, in order to justify the investment;
- price stability in contracts; and
- agency contracts that promote mechanized logging.

Training was a second important issue. Operators wanted "hands-on" training in effective use of the machinery. Dealers wanted training in custom-fitting machines to users' needs and in providing technical information, maintenance, and realistic performance information. Resource managers needed training in designing sales, drawing up contracts, and matching machines to particular jobs.

Communication was a third area of importance to both dealers and loggers. On-site demonstrations, post-sale evaluations, and two-way communication between dealers and loggers were listed as the most important issues.

The group felt that innovations seem to flow from the woods to the manufacturer: much of the available equipment comes from users

adopting machinery used in other regions to their needs or from "home improvements." Conversely, machine operators need to stay within the design capabilities of the machines, and timber sales should be matched to machine capabilities.

The general session noted that, since the market is customer-driven, all new mechanized logging equipment should be user-friendly and compatible with landowner and customer needs. Potential incentives for converting to mechanized logging, especially given current market conditions, were discussed. Workshop participants wanted researchers to test mechanized logging equipment and report the results in order to avoid potentially biased or unrealistic information from equipment manufacturers. One comment indicated that loggers may have been "burnt" by unmet expectations in the past. Communication, however, was stressed as the key to most issues.

Evaluation of Working-Group Sessions

Fifty-five percent of the participants in the working group sessions felt that the sessions were effective, 15 percent thought that the sessions were not effective, and 30 percent were neutral.

A number of comments suggested how working group sessions could be improved in future workshops. Some participants perceived the broad topics taken up by each working group as distracting from a main issue; this perception may have resulted from the broad range of ideas generated. Some were concerned that the sessions generated questions, but provided no answers. The participants with this concern may have misunderstood the objectives of the working groups, one of which was to generate ideas and information for guiding future activities. The desire for more structure expressed by some participants could conflict with the brainstorming technique used. Domination by a few members was mentioned as being a problem in some sections. Other participants felt that one of the sessions tended to resemble a "whine session."

One group developed a long list of complaints, probably because the group was comprised of people who were too academic or scientific. Another group, which seemed to emphasize all the positives of the topic, was called a "back-slapping" session by one observer. The other three groups were characterized as intermediate to these extremes.

Benefits commonly identified were generation of many new ideas, verbalization of the state of the business, and increased mutual awareness of the problems and needs of all those involved with mechanized harvesting. Other participants cited as beneficial the chance to exchange information and the opportunity for interaction with other people concerned about these issues.

Participants suggested that future working groups be smaller, involve more logging contractors, and meet for a longer time. Using a group participant to summarize the ideas for the general session of the workshop was considered valuable, except in one case where the summarizer was said to have portrayed the working group's thoughts inaccurately. The persons summarizing the ideas may need more guidance. Finally, some groups may not have needed predefined topics to guide the discussions.

These working groups met the initial objectives effectively. The keys to this success were developing important topics, selecting competent facilitators, providing for total group interaction (not letting a few people dominate the group), recording notes on flip-charts, and summarizing the results during the general session of the conference.

Future Directions for Research in Mechanized Harvesting

Future research in mechanized harvesting should fall into two categories: integrated research projects and communication. The working groups indicated a need for more research in all areas of mechanized logging, from identifying the proper terminology to studies of harvester/forwarder systems and environmental impacts. Research can provide needed links among forest managers, equipment manufacturers and dealers, and logging contractors (Figure 3). Everyone involved has unique expertise to contribute and plays a key role in defining the future of mechanized harvesting in the Pacific Northwest. Interactions in the design and conduct of studies concerning environmental effects, economics, equipment performance and limitations, safety, and training will benefit the industry the most.

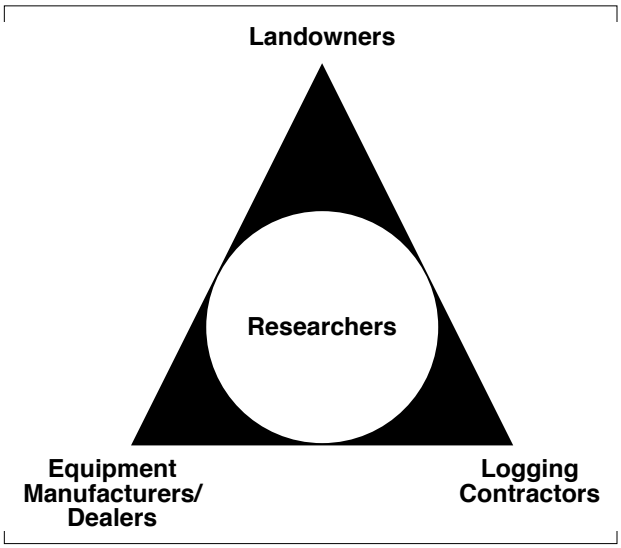

Figure 3. Diagram of lines of communication among landowners, logging contractors, equipment manufacturers and dealers, and researchers concerned with mechanized harvesting issues.

At OSU, we are planning projects in the following areas and will continue to foster strong interactions with others in the forest industry:

1. **Evaluating prospects for mechanized harvesting as an environmentally sound alternative:** Evaluating the environmental impacts (e.g., stand damage and soil compaction) of various mechanized harvesting systems, as desired by several working groups.

2. **Meeting environmentally sound silvicultural prescriptions with mechanized operations:** Matching mechanized harvesting systems to silvicultural prescriptions by taking into account environmental issues, silviculture and wildlife, social issues, safety, redesign of labor force in the forest, and operational efficiency.

3. **Planning and managing mechanized harvesting operations for environmental effectiveness:** Developing tools to help managers in the planning and management of mechanized harvesting systems to meet their broad objectives.

Workshops and other continuing education activities that facilitate interactions continue to be needed. Communications should recognize the questions, needs, and opportunities involved and strive for the development of solutions. The future is here for mechanized harvesting. The overall conclusion from all of the working groups was that strengthened communications and better integration on projects are critical if the forest industry is to meet the challenges ahead.

Bettinger, P., L.D. Kellogg, and E.D. Olson. 1993. KEY ISSUES AND FUTURE DIRECTIONS OF MECHANIZED HARVESTING: DISCUSSIONS AND GUIDANCE FROM WORKING GROUPS. Forest Research Laboratory, Oregon State University, Corvallis. Research Contribution 5. 8 p.

Recognition of the problems and opportunities in mechanized harvesting should help in development of solutions and maximum realization of its potential. This paper presents feedback from five working groups, the members of which were involved in mechanized harvesting issues with various organizations in the Pacific Northwest. The groups identified needs and assigned priorities for research in all areas of mechanized harvesting. Most participants thought the working groups were effective. Suggestions for future workshops included encouraging a broader mix of participants, scheduling a longer session for working groups, and providing more guidance to summarizers. Plans for future studies and stronger interactions with other interests in the forest industry may develop from suggestions of the working groups.

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