by A. Jeff Martin
and Paul E. Sendak

OPERATIONS RESEARCH IN FORESTRY: A BIBLIOGRAPHY

USDA FOREST SERVICE GENERAL TECHNICAL REPORT NE-8
1973

NORTHEASTERN FOREST EXPERIMENT STATION
FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE
6816 MARKET STREET, UPPER DARBY, PA. 19082
WARREN T. DOOLITTLE, DIRECTOR

The Authors

A. JEFF MARTIN attended Michigan State University, receiving a degree in forestry in 1965, an M.S. degree in forest management in 1966, and a Ph.D. degree in forest management in 1969. He joined the staff of the Northeastern Forest Experiment Station at the Forest Products Marketing Laboratory, Princeton, West Virginia, in 1969. He is conducting research in the marketing of primary wood products, the application of system-analysis procedures to the transportation of Appalachian roundwood products, and logging residue.

PAUL E. SENDAK received his B.S. degree in forestry from Rutgers University in 1965. He received his M.S. degree in forestry in 1968 and his Ph.D. in forestry economics in 1972 from the University of Massachusetts. He joined the Northeastern Forest Experiment Station in 1969 at the Forest Products Marketing Laboratory in Princeton, West Virgina. He is now working in the Maple Products Marketing Project at the Experiment Station's Sugar Maple Laboratory in South Burlington, Vermont.

OPERATIONS RESEARCH IN FORESTRY:
A BIBLIOGRAPHY

Contents

INTRODUCTION

ONE WHO CONSULTS the literature sources today is struck by the increasing amount of attention paid to operations research in forestry and forestry-related fields. We are living in the computer age at a time when operations research confronts us almost continuously, yet it is also a time when many managers and researchers are just getting their hands wet in this pool of quantitative techniques.

Operations research is one of the most comprehensive approaches to problem solving. It embraces a number of analytical techniques sharing certain common characteristics. Ackoff and Sasieni (*1968*) have defined the operations-research approach as: "(1) The application of scientific method, (2) by interdisciplinary teams, (3) to problems involving the control of organized (man-machine) systems so as to provide solutions which best serve the purposes of the organization as a whole."

Operations research is known by a variety of names: operational research — or simply OR — operational analysis, operation evaluation, systems analysis, systems research, management science, and others.

The operations-research analyst customarily formulates his problem in terms of a mathematical model. Many of these models have been generalized and adopted for problem solving by scientists in a variety of disciplines. Some OR models have been developed and applied to such a great extent that they are considered important subject matter in themselves. The linear programming model is an example.

The table of contents of any introductory operations research text provides a list of OR techniques. Included among the techniques applied to forestry problems are the Bayesian approach to decision-making, decision trees, dynamic programming, linear programming, integer programming, parametric programming, input-output analysis, Markov processes, Monte Carlo and other simulation techniques, management games, PERT, queuing models, and inventory models.

The purpose of this bibliography is to aggregate the literature sources (prior to 1971) concerned with OR applications to problems involving forest-produced goods and services. The major classes of forest products include wood products; other plant products, such as maple syrup and naval stores; animal products, both domestic and wild; forest-oriented recreation environment; and water resources.

An important decision criteria for evaluating a source is its emphasis on the forest or forest product. Therefore we excluded material with little or no emphasis on the forest resource. Exceptions to this rule are certain texts and expository publications that, although not related to the resource, are considered excellent reference material for the OR-oriented manager or scientist.

The bibliography was printed by FAMULUS, a computer program maintained at the Computer Services Library, Pacific Southwest Forest and Range Experiment Station, Berkeley, California.

KEY-WORD INDEX

Numbers refer to numbered items in the bibliography.

BIBLIOGRAPHY

1. ACKOFF, R. L., AND M. W. SASIENI. 1968. FUNDAMENTALS OF OPERATIONS RESEARCH. 455 P. NEW YORK: JOHN WILEY AND SONS, INC. INTRODUCTION: THE NATURE OF OPERATIONS RESEARCH; PROBLEM FORMULATION; MODEL CONSTRUCTION; DERIVING SOLUTIONS FROM MODELS; ALLOCATION PROBLEMS; ASSIGNMENT AND DISTRIBUTION OF RESOURCES; THE GENERAL LINEAR ALLOCATION PROBLEM; INVENTORY PROBLEMS; REPLACEMENT, MAINTENANCE, AND RELIABILITY PROLEMS; DYNAMIC PROGRAMMING; QUEUING PROBLEMS; SEQUENCING AND COORDINATION (PERT AND CRITICAL PATH) PROBLEMS; ROUTING PROBLEMS IN NETWORKS; COMPETITIVE PROBLEMS; SEARCH PROBLEMS; TESTING THE MODEL AND THE SOLUTION; IMPLEMENTING AND CONTROLLING THE SOLUTION. EPILOGUE: FRONTIERS OF OPERATION RESEARCH.

2. ALMQUIST, A. 1968. (A SIMULATION MODEL FOR A FELLER-BUNCHER.) EKON. FORSKNSTIFT. SKOGSARB., STOCKH. (7), 4 PP. (IN SWEDISH WITH ENGLISH VERSION.) A DESCRIPTION OF A MODEL, MODIFIED FOR SWEDISH CONDITIONS FROM ONE DEVELOPED BY NEWNHAM, AND EXAMPLES OF ITS USE TO DETERMINE THE EFFECT OF CHANGES IN STAND OR MACHINE CHARACTERISTICS.

3. AMIDON, E. L., AND G. S. AKIN. 1968 DYNAMIC PROGRAMMING TO DETERMINE OPTIMUM LEVELS OF GROWING STOCK. FOREST SCI. 14(3):287-291. THE DEVELOPMENT OF A DETERMINISTIC, ONE-DIMENSIONAL, DISCRETE DYNAMIC PROGRAM IS DESCRIBED. THE MODEL'S ANALYTIC AND COMPUTATIONAL ADVANTAGES ARE DEMONSTRATED BY ITS APPLICATION TO DATA FROM PINUS TAEDA GROWING STOCK PREVIOUSLY ANALYZED BY MARGINAL ANALYSIS. DYNAMIC PROGRAMMING IS APPROPRIATE WHERE THE MENSURATIONAL RELATIONSHIPS OR ECONOMIC DATA INDICATE INTERDEPENDENCE BETWEEN LEVELS OF GROWING STOCK.

4. ANDERSON, W. C., AND H. F. KAISER, JR. 1970. ECONOMIC IMPLICATIONS OF CHIPPING HEADRIGS FOR MILLING SOUTHERN PINE. FOREST PROD. J. 20(3):42-46. LINEAR AND PARAMETRIC PROGRAMMING ARE USED TO ANALYZE THE EFFECT ON SAWMILL OPERATING METHODS AND NET REVENUE WHEN CHIPPING HEADRIGS ARE INSTALLED. A SAWMILL WAS SYNTHESIZED BY MODIFYING A CONVENTIONAL MILL USING DATA FROM OPERATIONS OF CHIPPING HEADRIGS AT SEVERAL COOPERATING MILLS.

5. ANDERSSON, S. 1964. (THE MONTE CARLO METHOD AS A TOOL IN PLANNING LOGGING OPERATIONS.) SVENSKA SKOGSVFOREN TIDSKR. 62(3):359-363. (IN SWEDISH.) A DESCRIPTION OF A MONTE CARLO METHOD TO ARRIVE AT

PROBABLE OPTIMUM COMBINATIONS OF PRODUCTION FACTORS. IN THE EXAMPLE GIVEN, THESE ARE THE NUMBERS OF TRACTORS AND MEAN EXTRACTION DISTANCE TO BE USED IN FEEDING A MOBILE TRIMMING MACHINE.

6. ANDERSSON, S., AND G. LONNER. 1963. THE TRANSPORT PROBLEM - LOGGING ALL THE YEAR ROUND. SVENSKA SKOGSV FIREN. TIDSKR. 61(3):261-268.(IN SWEDISH.) THE TRANSPORTATION METHOD (A SPECIAL CASE OF LINEAR PROGRAMMING) IS EXPLAINED BY ITS APPLICATION TO A FICTITIOUS LOGGING SITUATION. QUANTITIES LOGGED ARE SPREAD OVER THE FOUR SEASONS AT FIVE SITES, WHERE MORE RESTRICTIONS OPERATE AND COSTS VARY FROM SITE TO SITE AND SEASON TO SEASON.

7. ANONYMOUS. 1966. MATHEMATICAL MODELS IN FOREST MANAGEMENT. FOREST REC. FOREST COMM. 59, 47 PP. LONDON (UNIV. EDINBURGH MTG. PROC. (1965), APRIL 12-13) AN INTRODUCTION TO MATHEMATICAL PROGRAMMING STUDIES. A PROTOTYPE COMPUTER ORIENTED SYSTEM FOR OPERATIONAL PLANNING, LINEAR PROGRAMMING IN PAPER MILLS, MONTE CARLO SIMULATION METHODS, CRITICAL PATH ANALYSIS, AND A MATHEMATICAL MODEL FOR NURSERY PLANNING AND PRODUCTION IS OUTLINED.

8. ANONYMOUS. 1966. OPERATIONS RESEARCH: TOOL FOR GROWTH AT BOISE CASCADE. FOREST PROD. J. 16(2):6-7. BOISE CASCADE IS APPLYING OPERATIONS-RESEARCH TECHNIQUES TO CUT WASTE TO GET THE MOST OUT OF PRODUCTION OPERATIONS, AND TO CREATE THE BEST VALUE FROM THE BASIC RAW MATERIAL.

9. ARIMIZU, T. 1956. (APPLICATION OF LINEAR PROGRAMMING TO FORESTRY.) YOKYO UNIV. FOR., MISC. INFORM, NO. 11, PP. 49-76. (IN JAPANESE WITH ENGLISH SUMMARY.) AN APPLICATION OF LINEAR PROGRAMMING TO AN ECONOMIC EVALUATION OF A SAWMILL AS AN ALTERNATIVE TO TRADITIONAL MARGINAL ANALYSIS. LP HAS CONSIDERABLE MERIT FOR LARGE MILLS, HOWEVER, THE GREATEST OBSTACLE TO ITS USE ARE THE REQUIREMENTS IN THE MODEL-BUILDING PHASE.

10. ARIMIZU, T. 1958. (WORKING GROUP MATRIX IN DYNAMIC MODEL OF FOREST MANAGEMENT.) JAP. FOREST. SOC. J. 40(4):185-190. THE FIRST STEP IN REACHING THE GOAL OF A DYNAMIC MODEL OF FOREST MANAGEMENT IS TO CONSTRUCT A WORKING GROUP MATRIX. ACTIVITY ANALYSIS IS THEN USED IN BUILDING THE DYNAMIC MODEL.

11. ARVANITIS, L. G. 1966. DECISION RULES FOR DESIGN OF FOREST SAMPLING SYSTEMS: A CONTRIBUTION TO

METHODOLOGY BASED ON COMPUTER SIMULATION. DISS. ABSTR. 27B(3):65B-659. THE STUDY WAS DESIGNED TO SHOW THE USE OF A COMPUTER SIMULATION METHOD IN DETERMINING FOREST SAMPLING EFFICIENCY. THE RESULTS PROVIDE LIMITED ANSWERS TO THE PROBLEM OF OPTIMUM COMBINATION OF NUMBER AND SIZE OF PLOTS IN SAMPLING FORESTS, AND STRESS THE VALUE OF INTRODUCING CONCEPTS FROM PRODUCTION ECONOMICS, AND USING SIMULATION AND COMPUTERS.

12. ARVANITIS, L. G., AND W. G. O'REGAN. 1967. COMPUTER SIMULATION AND ECONOMIC EFFICIENCY IN FOREST SAMPLING. HILGARDIA 38(2):133-164. SIMULATION TECHNIQUES WERE USED TO OBTAIN VARIANCE FUNCTIONS FOR VARIOUS PARAMETERS AND FORESTS. TO SOLVE THE PROBLEM OF MAXIMIZING INFORMATION ABOUT A POPULATION, UNDER A FIXED-BUDGET CONSTRAINT; OR THAT OF A SPECIFIED AMOUNT OF INFORMATION AT MINIMUM COST, THE AUTHOR DEVISED COST FUNCTIONS FOR EACH ESTIMATE, AND ECONOMICALLY EFFICIENT SAMPLING PLANS WERE THEN DEVELOPED.

13. ARVANITIS, L. G., AND W. G. O'REGAN. 1969. SAMPLING SIMULATION COMPUTER PROGRAMS. I. FIXED AND VARIABLE PLOTS. UNIV. WISC. COLL. AGR. & LIFE SCI. RES. REP. 49, 48 PP. MADISON. A FORTRAN PROGRAM IS PRESENTED THAT IS CAPABLE OF SIMULATING EQUAL AND VARIABLE PROBABILITY SAMPLING RULES APPLICABLE TO FOREST, RANGE, AND RELATED INVENTORIES. BASED ON A LOCATIONAL MAP OF THE ELEMENTS; AND INPUT INFORMATION ON THE VARIABLES OF INTEREST, THE PROGRAM INSTRUCTS THE COMPUTER (1) TO IDENTIFY CLUSTERS OF ELEMENTS ASSOCIATED WITH A NUMBER OF POINTS AND (2) TO CONSTRUCT WEIGHTED MEASUREMENTS AT THOSE POINTS AND VARIANCES AMONG POINT MEASUREMENTS.

14. ATROHIN, V. G., AND A. M. KOROTKOV. 1967. (REGULATION OF STAND COMPOSITION BY MEANS OF THINNINGS.) LESN. Z., ARHANGEL'SK 10(2):10-13. (IN RUSSIAN.) LINEAR PROGRAMMING IS USED IN MAKING THINNING DECISIONS (ON WHICH AND HOW MANY TREES TO REMOVE), WITH EXAMPLE DATA FROM AN 18-YEAR-OLD STAND OF OAK, ASPEN, BIRCH, AND SPRUCE (TOTAL VOLUME 57.6 CU. M/HA., 10,060 TREES/HA.). FOR A 40-PERCENT THINNING (BY NUMBER OF STEMS), THE LP METHOD SHOWED THAT 380 BIRCH AND 3,620 ASPEN/HA. SHOULD BE REMOVED.

15. BAMPING, J. H., AND J. L. CLUTTER. 1964. COST EFFICIENCIES IN A FOREST ENTERPRISE. COST CONTR. IN SOUTH. FORESTRY. (ED. BY R. W. MCDERMID, 13TH ANNU. FORESTRY SYMP.: 35-43.) 131 PP. BATON ROUGE:

LA. STATE UNIV. PRESS. TECHNIQUES GENERALLY REFERRED TO AS OPERATIONS RESEARCH AND SYSTEMS ANALYSIS USED IN THE SELECTION OF A PROGRAM UPON WHICH FUNDS ARE TO BE EXPENDED, AND THE EXECUTION OF THE PROGRAM AT MINIMUM COST CONSISTENT WITH MAXIMUM EFFECTIVENESS IN A FOREST ENTERPRISE, CAN BE PRACTICABLE ONLY WHEN OFFERED AS A COMPLEMENT TO JUDGMENT AND INTUITION.

16. BARE, B. B. 1969. THE DEVELOPMENT AND EVALUATION OF A FOREST MANAGEMENT GAME. PH.D. DISS., PURDUE UNIV., LAFAYETTE, IND. THE PRIMARY OBJECTIVE OF THIS STUDY WAS DEVELOPMENT OF A COMPUTERIZED FOREST MANAGEMENT GAME THAT WOULD PROVIDE FORESTRY STUDENTS WITH AN OPPORTUNITY TO VISUALIZE THE OPERATIONAL PROBLEMS OF THE FOREST MANAGER FROM THE TOTAL SYTEM POINT OF VIEW. AN EVALUATION WAS MADE OF THE EDUCATIONAL VALUE OF THE GAME FOR TEACHING BIOLOGICAL AND FINANCIAL INTERRELATIONSHIPS, OF THE EFFECTIVENESS OF SELECTED CRITERIA FOR MEASURING GAME PERFORMANCE, AND OF THE ROLE OF INVENTORY INFORMATION AS IT AFFECTED MANAGERIAL PERFORMANCE.

17. BARE, B. B. 1970. PURDUE'S FOREST MANAGEMENT GAME. J. FOREST. 68(9):554-557. SYSTEMS ANALYSIS IS VERY EFFECTIVE IN DETERMINING THE OVERALL EFFECT OF BIOLOGICAL AND FINANCIAL DECISIONS ON A TOTAL FOREST-MANAGEMENT SYSTEM. THE USE OF A COMPETITIVE SIMULATION MODEL IN TEACHING ENABLES STUDENTS OF FOREST MANAGEMENT TO VISUALIZE THE OPERATIONAL PROBLEMS OF THE FOREST MANAGER FROM THE TOTAL SYSTEMS POINT OF VIEW.

18. BARE, B. B., AND E. L. NORMAN. 1969. AN EVALUATION OF INTEGER PROGRAMMING IN FOREST PRODUCTION SCHEDULING PROBLEMS. PURDUE UNIV. AGR.EXP. STA. RES. BULL. 847, 7 PP. LAFAYETTE, IND. A NEW INTEGER PROGRAMMING ALGORITHM IS APPLIED TO FORESTRY PROBLEMS DEALING WITH THE PREPARATION OF CUTTING SCHEDULES. TWO SMALL EXAMPLE PROBLEMS ARE DISCUSSED AND EVALUATED WITH THIS TECHNIQUE.

19. BAXTER, M. O. 1969. IMPLICATIONS AND RECOMMENDATIONS FOR THE USE OF OPERATIONS RESEARCH FOR SAWMILL MANAGERS. OPER. RES. APPL. TO SAWMILLS. PROC.: 57-63. UNIV. GEORGIA, ATHENS. OPERATIONS RESEARCH SEEMS FEASIBLE FOR CONTINUOUS APPLICATION TO LARGER SAWMILLS AND FOR PERIODIC USE BY SMALLER ONES. IMPLEMENTATION OF OPERATIONS RESEARCH INVOLVES DEVELOPING THE INITIAL STUDY, MAINTAINING A CURRENT MODEL, DEVELOPING RECOMMENDATIONS FROM COMPUTER SOLUTIONS, AND

IMPLEMENTING THE RECOMMENDATIONS.

20. BAXTER, H. O. 1969. SIMULATION CAPABILITIES WITHIN THE BASIC LINEAR PROGRAMMING MODEL. OPER. RES. APPL. TO SAWMILLS, PROC.: 31-43. UNIV. GEORGIA, ATHENS. AFTER THE BASIC LINEAR PROGRAM HAS BEEN DEVELOPED, IT IS POSSIBLE TO DETERMINE THE EFFECTS OF ANTICIPATED OR PROPOSED CHANGES BY SIMULATING THEM IN THE MODEL. CHANGES IN THE LEVEL OF LOG INPUT, EFFECTIVE OPERATING TIME PER HOUR, PRICE OF OUTPUTS, AND IN MILL LAYOUT AND EQUIPMENT ARE SIMULATED.

21. BELLMAN, R. 1957. DYNAMIC PROGRAMMING. 342 PP., ILLUS. PRINCETON, N. J.: PRINCETON UNIV. PRESS. THIS IS THE PIONEERING BOOK ABOUT DYNAMIC PROGRAMMING.

22. BENGSTON, S. J. 1966. A MATHEMATICAL MODEL FOR OPTIMUM TIMBER ALLOCATION. M.S. THESIS, OREG. STATE UNIV., CORVALLIS. LINEAR PROGRAMMING IS USED TO SOLVE A HYPOTHETICAL PROBLEM OF HOW MUCH COMPANY TIMBER AND HOW MUCH GOVERNMENT TIMBER SHOULD BE ALLOCATED TO A SAWMILL IN A GIVEN YEAR. OTHER OPERATIONS RESEARCH TECHNIQUES PRESENTED IN CONNECTION WITH THE ALLOCATION PROBLEM ARE POSTOPTIMALITY ANALYSIS AND REGRESSION ANALYSIS.

23. BENTLEY, W. R., AND H. F. KAISER, JR. 1967. SEQUENTIAL DECISIONS IN TIMBER MANAGEMENT: A CHRISTMAS TREE CASE STUDY. J. FOREST. 65(10):714-719. THE RELATIONSHIP OVER TIME OF PRODUCTION DECISIONS, CHANCE EVENTS, AND VALUE OUTCOMES IS PRESENTED AS A DECISION TREE. THE DECISION-TREE APPROACH HAS APPLICATION TO PRACTICAL TIMBER-MANAGEMENT PROBLEMS BECAUSE IT INTEGRATES TECHNICAL INFORMATION, ECONOMIC ANALYSIS, EXPERT OPINION, AND MANAGEMENT JUDGMENT.

24. BETHEL, J. S., AND C. HARRELL. 1955. THE APPLICATION OF LINEAR PROGRAMMING TO PLYWOOD PRODUCTION AND DISTRIBUTION. N.C. STATE COLL., SCHOOL OF FOR., RALEIGH. MIMEO. ESSENTIALLY THE SAME MATERIAL AS FOUND IN THE FOLLOWING CITATION.

25. BETHEL, J. S., AND C. HARRELL. 1957. THE APPLICATION OF LINEAR PROGRAMMING TO PLYWOOD PRODUCTION AND DISTRIBUTION. FOREST PROD. J. 7(7):221-227. A LINEAR PROGRAMMING SYSTEM CAN BE USED TO ARRIVE AT OPTIMUM SOLUTIONS TO VARIOUS PLYWOOD PRODUCTION AND DISTRIBUTION PROBLEMS. A LINEAR PROGRAMMING SYSTEM IS SHOWN TO PROVIDE A QUANTITATIVE MEASURE OF THE COSTS OF ALTERNATIVE

PRODUCTION AND DISTRIBUTION PROCEDURES.

26. BETHUNE, J. E. 1967. FOREST OPERATIONS ANALYSIS: NEW APPROACH TO MANAGEMENT PLANNING. FOREST FARMER 26(5):16, 22, 23. A GENERAL DESCRIPTION OF SOME OPERATIONS-RESEARCH TECHNIQUES THAT CAN BE APPLIED TO FORESTRY ACTIVITIES, AND SOME POSSIBLE AREAS OF APPLICATION AND PROSPECTS FOR FUTURE USE.

27. BETHUNE, J. E. 1967. MATHEMATICAL PROGRAMMING APPROACHES TO THE ALLOCATION OF RESOURCES TO PUBLICLY SUPPORTED TIMBER MANAGEMENT RESEARCH. PH. D. THESIS, UNIV. GEORGIA, ATHENS. DIFFERENT MODELS ARE COMPARED FOR USE IN DEVELOPING A PLAN FOR ALLOCATING FUNDS IN THE FOREST-RESEARCH PROGRAM IN GEORGIA.

28. BETHUNE, J. E., AND J. L. CLUTTER. 1969. ALLOCATING FUNDS TO TIMBER MANAGEMENT RESEARCH. FOREST SCI. MONOG. 16. WASHINGTON, D. C. 22 PP. THIS STUDY SEEKS TO ADOPT AND DEVELOP QUANTIFIABLE CRITERIA AND OBJECTIVE METHODS TO ASSIST IN ALLOCATING FUNDS TO TIMBER-MANAGEMENT RESEARCH. REPRESENTATIVE ALLOCATION MODELS ARE ADAPTED TO PORTIONS OF THE PROBLEM OF ALLOCATING FUNDS TO FORESTRY RESEARCH IN GEORGIA. A DYNAMIC PROGRAMMING MODEL IS USED TO ALLOCATE RESEARCH FUNDS AMONG BROAD TYPES OF PROGRAMS.

29. BIOMETRICS - OPERATIONS RESEARCH SECTION. 1968. MAX - MILLION: A COMPUTERIZED FOREST MANAGEMENT PLANNING SYSTEM. UNIV. GEORGIA SCHOOL FOREST RES. 61 PP. ATHENS. THIS PUBLICATION CONTAINS INSTRUCTIONS FOR OPERATING AND INTERPRETING OUTPUT FROM A COMPUTERIZED FOREST MANAGEMENT PLANNING SYSTEM. THE COMPLETE SYSTEM IS COMPOSED OF TWO LARGE COMPUTER PROGRAMS. THE FIRST OF THESE CARRIES OUT CALCULATIONS OF AN APPRAISAL NATURE WHILE THE SECOND PERFORMS A SCHEDULING FUNCTION FOR HARVESTING AND REGENERATION USING LINEAR PROGRAMMING TECHNIQUES.

30. BOCHSBICHLER, K., AND U. SCHMOTZER. 1969. IS FORESTRY COMPETITIVE AS AN ECONOMIC ACTIVITY OF PEASANT FARMERS IN MOUNTAIN AREAS? MITT. FORSTL. VERSANST. WIEN, 85, 352 PP. IN GERMAN, SUMMARIES IN ENGLISH, FRENCH, AND RUSSIAN. A STUDY IN A RURAL MOUNTAIN VALLEY IN STYRIA, USING LINEAR PROGRAMMING TECHNIQUES FOR THE DEVELOPMENT OF MODELS. THOUGH MANY OF THE DATA HAD TO BE ESTIMATED ON THE BASIS OF GERMAN PUBLICATIONS, RESULTS SUGGEST THAT , FOR FARM HOLDINGS ON SLOPES, THEIR FORESS ARE OF CONSIDERABLE

IMPORTANCE, AND EVEN AT LOW YIELDS ECONOMICALLY SUPERIOR TO GRASSLAND HUSBANDRY.

31. BOOT, J. C. G. 1967. MATHEMATICAL REASONING IN ECONOMICS AND MANAGEMENT SCIENCE. 178 PP. ENGLEWOOD CLIFFS, NEW JERSEY: PRENTICE-HALL BOOK COMPANY. CONTENTS: CHARACTERISTIC ROOTS AND VECTORS; DIFFERENCE EQUATIONS; ASSORTED PROBLEMS IN PROBABILITY THEORY; MARKOV CHAINS, DECISION CRITERIA, AND UTILITY CURVES; GAME THEORY; STRATEGIES; DYNAMIC PROGRAMMING; SENSITIVITY ANALYSIS; ELEMENTARY INVENTORY MODELS; GROWTH MODELS; LEONTIEF MODELS.

32. BOTWIN, M. 1966. (METHODS OF LINEAR PROGRAMMING AS APPLIED TO FORESTRY.) SYLWAN 110(2):17-25. (IN POLISH.) TWO EXAMPLES ARE PRESENTED FOR THE DETERMINATION OF AN OPTIMAL MANAGEMENT PLAN WITH THE AID OF LINEAR PROGRAMMING. THE AUTHOR INDICATES THAT MANY FORESTRY PROBLEMS CAN BE SOLVED WITH A VARIETY OF MATHEMATICAL METHODS.

33. BOUGHTON, W. C. 1967. PLANNING THE CONSTRUCTION OF FOREST ROADS BY LINEAR PROGRAMMING. AUST. FOR. 31(2):111-120. AN APPLICATION OF LP TO THE PLANNING OF FOREST ROAD CONSTRUCTION IS ILLUSTRATED. MOVEMENT OF EARTH FROM REGIONS OF EXCESS CUT TO REGIONS REQUIRING ADDITIONAL FILL IS ANALYZED AS AN ALLOCATION PROBLEM, AND AN OPTIMUM SOLUTION IS OBTAINED BY LINEAR PROGRAMMING. THE USE OF BORROW AREAS AND WASTE AREAS, IN ADDITION TO THE MOVEMENT OF MATERIAL FROM ONE SECTION OF THE ROAD TO ANOTHER, IS SHOWN TO BE EASILY HANDLED IN THE LINEAR-PROGRAMMING SOLUTION.

34. BROIDO, A., R. J. MCCONNEN, AND W. G. O'REGAN. 1965. SOME OPERATIONS RESEARCH APPLICATIONS IN THE CONSERVATION OF WILDLAND RESOURCES. MANAGE. SCI. 11(9): 802-814. FIVE EXAMPLES OF OPERATIONS RESEARCH APPLICATIONS ARE GIVEN. THE FIRST IS AN APPROACH TO THE PROBLEM OF MINIMIZING WILDLAND FIRE COSTS. THE SECOND CONCERNS INSECT PEST CONTROL. A THIRD DEALS WITH THE APPLICATION OF LINEAR PROGRAMMING TO THE PROBLEM OF MANAGING A WILDLAND AREA AS A CONTINUING SOURCE OF ONE OR MORE PRODUCTS OR SERVICES. FINALLY, TWO EXAMPLES OF SIMULATION TECHNIQUES APPLIED TO FOREST MANAGEMENT AND FOREST SAMPLING ARE PRESENTED.

35. BROSS, IRWIN, D. J. 1953. DESIGN FOR DECISION. 276 PP., ILLUS. NEW YORK: MACMILLAN CO. A METHOD OF REACHING DECISIONS AND SOLVING PROBLEMS BY "STATISTICAL DECISION," WHICH COMBINES

PRINCIPLES DERIVED FROM SUCH AREAS AS THE THEORY OF GAMES, COST ACCOUNTING, INFORMATION THEORY, LOGIC, AND ECONOMICS IS DESCRIBED. FOLLOWING AN EXPLANATION THAT DECISION-MAKING INVOLVES: (1) PREDICTIONS AND A KNOWLEDGE OF PROBABILITIES, (2) VALUE JUDGMENTS, AND (3) CRITERIA FOR ACTION, THESE FACTORS ARE RELATED MATHEMATICALLY TO PROVIDE A SYSTEM OF DECISION MAKING APPLICABLE TO A WIDE VARIETY OF PROBLEMS. DETAILS OF MATHEMATICAL STATISTICS ARE AVOIDED IN FAVOR OF AN EXPLANATORY TREATMENT OF THE METHODS AND PROCEDURES IN REACHING DECISIONS USABLE NOT ONLY AS SCIENTIFIC METHOD, BUT ALSO IN COMMERCIAL AND SOCIAL PROBLEMS.

36. BROWN, K. M. 1969. A DENSITY DEPENDENT MODEL OF INDIVIDUAL TREE DEVELOPMENT. M.S. THESIS, PURDUE UNIV., LAFAYETTE, IND. THE DEVELOPMENT OF A TREE EXPRESSED AS RATE AND DISTRIBUTION OF GROWTH IS SIMULATED UNDER DIFFERENT STAND DENSITIES.

37. BUNCE, M. W. F. 1968. AN ANALYSIS OF FOREST REGULATORY CONCEPTS IN TERMS OF TECHNOLOGICAL AND SOCIAL DYNAMICS. DISS. ABSTR. 28(10):3949B. A DISCUSSION OF EXISTING METHODS OF DETERMINING THE ANNUAL CUT AND THE NEED FOR A NEW APPROACH THAT WILL CONSIDER CHANGES IN MARKET FACTORS AND TECHNOLOGY THAT MAY OCCUR DURING THE ROTATION. A PROPOSED MODEL, IN THE FORM OF A FLOW CHART, IS ALSO INCLUDED.

38. BUONGIORNO, J. 1969. EVALUATION OF ALTERNATIVE FOREST REGULATION METHODS: A LINEAR PROGRAMMING APPROACH. M.S. THESIS, STATE UNIV. N.Y. COLL. FORESTRY, SYRACUSE. LINEAR PROGRAMMING IS USED TO DETERMINE WHETHER THERE ARE CIRCUMSTANCES UNDER WHICH AN ADVANTAGEOUS ALTERNATIVE TO EVEN-FLOW MANAGEMENT EXISTS, SUCH AS ACCELERATED-CUT MANAGEMENT.

39. BURNS, R. 1964. SIMULATION OF TIMBER STAND STRUCTURES RESULTING FROM NATURAL SUCCESSION ON ABANDONED FARM LAND IN SOUTHERN NEW YORK. M.S. THESIS, STATE UNIV. N.Y., COLL. FORESTRY, SYRACUSE. A PRESENTATION OF A MONTE CARLO SIMULATION THAT ESTIMATES THE RESULTS OF MAKING LITTLE OR NO INITIAL INVESTMENT TO ESTABLISH THE TIMBER-GROWING PROCESS ON ABANDONED FARM LAND. THE METHOD, RATHER THAN THE RESULTING CONCLUSION, IS EMPHASIZED.

40. BUSSELL, W. H., ET. AL. 1969. PULPWOOD HARVESTING SYSTEMS RESEARCH AT AUBURN UNIVERSITY. FOREST

ENG. CONF. PROC. 1968:69-70. MICHIGAN STATE UNIV., E. LANSING. THE FIRST PHASE OF THE STUDY WAS DIRECTED AT IMPROVEMENT OF THE OPERATION OF LARGE EXISTING SYSTEMS, AND HAS BEEN DIVIDED INTO THREE SEGMENTS: (A) OPERATIONAL CHARACTERISTICS--USING A COMPUTER SIMULATION MODEL, (B) FINANCIAL ASPECTS--USING BREAK-EVEN ANALYSIS, AND (C) ORGANIZATIONAL ASPECTS OF SYSTEMS--ATTEMPTING TO PRODUCE A "SYSTEMS SYNTHESIZER". THE SECOND MAJOR PHASE OF THE AUBURN PROJECT IS CONCERNED WITH THE SYNTHESIS OF NEW SYSTEMS SPECIFICALLY DESIGNED FOR OPERATION UNDER THE CONSTRAINTS OF THE SOUTHEAST.

41. CARLSON, B. 1969. INCREASED PRODUCTION WITH LOGGING EQUIPMENT THROUGH COMPUTERIZED PLANNING. FOREST ENG. CONF. PROC. 1968:66-68. MICHIGAN STATE UNIV., EAST LANSING. THE PLAN IS FORMULATED AS A LINEAR PROGRAMMING PROBLEM. A 1-YEAR PLAN GIVES OPTIMUM STORAGE QUANTITES AT LANDING AND MILL AND OPTIMUM TRANSPORT QUANTITY FOR EACH MONTH FOR LOGS AND PULPWOOD AND FOR EACH OF TWO GEOGRAPHICAL REGIONS.

42. CARR, C. R., AND C. W. HOWE. 1964. QUANTITATIVE DECISION PROCEDURES IN MANAGEMENT AND ECONOMICS. 383 PP. NEW YORK: MCGRAW-HILL BOOK CO. CHAPTERS ON: FOUNDATIONS AND METHODS OF SINGLE-STAGE UNIVARIATE ANALYSIS, LINEAR PROGRAMMING, INTEGER PROGRAMMING, NONLINEAR PROGRAMMING, STEPWISE MAXIMIZATION, AND DYNAMIC PROGRAMMING.

43. CARROLL, C. W. 1960. AN OPERATIONS RESEARCH APPROACH TO THE ECONOMIC OPTIMIZATION OF A KRAFT PULPING PROCESS. TAPPI 43(4):305-312. A HYPOTHETICAL KRAFT PULPING PROCESS IS SIMULATED WITH A MATHEMATICAL MODEL TO MAXIMIZE NET DOLLAR RETURN FROM THE OPERATION.

44. CESARIO, F. J. 1965. MONTE CARLO SIMULATION OF SOME LOGGING OPERATIONS. M.F. THESIS, MONTANA STATE UNIV., MISSOULA. COST, PROFIT, AND WASTE MATERIAL WERE USED AS MEASURES OF EFFECTIVENESS IN THIS MONTE CARLO SIMULATION OF LOGMAKING. THE FOLLOWING SIMULATION RUNS WITH THE MODEL ARE REPORTED: (1) VARYING THE PRODUCTION RATE, (2) CHANGING PRODUCTION POLICIES, (3) VARYING THE AMOUNT OF DEFECTIVE MATERIAL, AND (4) COMPARING PAYMENT SCHEMES.

45. CESARIO, F. J. 1969. OPERATIONS RESEARCH IN OUTDOOR RECREATION. J. LEISURE RES. 1(1):33-51. OPERATIONS RESEARCH METHODS ARE NEEDED FOR PREDICTING TRAVEL FLOW FROM POPULATION CENTERS TO

RECREATION SITES AND ESTIMATING PRIMARY ECONOMIC BENEFITS OF OUTDOOR RECREATION.

46. CHAPPELLE, D. E. 1963. LINEAR PROGRAMMING AND FARM FORESTRY. J. FOREST. 61(1):56-57. THE AUTHOR CRITICIZES THE TWO SHORTCOMINGS MENTIONED IN STOLTENBERG'S ARTICLE (1962): (1) THE GOAL USUALLY ASSUMED WHEN USING LINEAR PROGRAMMING SELDOM IS THE TRUE GOAL OF FARMERS; AND (2) THE OPTIMAL SOLUTION IN FARM PLANNING MUST BE STABLE, BUT LINEAR PROGRAMMING SOLUTIONS ARE LIKELY TO BE UNSTABLE.

47. CHAPPELLE, D. E. 1966. ECONOMIC MODEL BUILDING AND COMPUTERS IN FORESTRY RESEARCH. J. FOREST. 64(5):329-333. A CLASSIFICATION OF MODELS, AND THE STEPS IN THE MODEL-BUILDING PROCESS. TESTING THE ADEQUACY OF MODELS IS ALSO DISCUSSED FOR THE VARIOUS TYPES. THE ROLE OF DATA PROCESSING EQUIPMENT AT EACH STAGE IS POINTED OUT.

48. CHARNES, A., AND W. W. COPPER. 1961. MANAGEMENT MODELS AND INDUSTRIAL APPLICATIONS OF LINEAR PROGRAMMING. VOL. 2, 393 PP. NEW YORK: JOHN WILEY & SONS, INC. CONTENTS: THE MODIFIED SIMPLEX AND DUAL METHODS AND THE REVISED SIMPLEX CODE FOR ELECTRONIC CALCULATORS, TRANSPORTATION-TYPE MODELS, DYADIC MODELS AND SUBDUAL METHODS, THE DOUBLE-REVERSE METHOD, NETWORKS AND MODELS OF INCIDENCE TYPE, AND GAME THEORY.

49. CHARNES, A., W. W. COOPER, AND A. HENDERSON. 1953. AN INTRODUCTION TO LINEAR PROGRAMMING. NEW YORK: JOHN WILEY & SONS, INC. THIS WORK IS AN ECONOMIC INTRODUCTION TO LINEAR PROGRAMMING, AND GIVES APPLICATIONS, STRAIGHTFORWARD PROGRAMMING CALCULATIONS, AND SOME OF THE MORE DIFFICULT PROBLEMS. LINEAR PROGRAMMING IS DEFINED AS A SCIENCE CONCERNED WITH THE PROBLEM OF PLANNING A COMPLEX OF INTERDEPENDENT ACTIVITIES IN THE BEST POSSIBLE FASHION. A SYSTEMATIC INTRODUCTION TO THE GENERAL THEORY AND SPECIAL ASPECTS OF THE SUBJECT ARE PRESENTED. A BIBLIOGRAPHY IS INCLUDED.

50. CHERNOFF, H., AND L. E. MOSES. 1959. ELEMENTARY DECISION THEORY. 364 PP. NEW YORK: JOHN WILEY & SONS, INC. CHAPTERS ON: DATA PROCESSING, INTRODUCTION TO PROBABILITY AND RANDOM VARIABLES, UTILITY AND DESCRIPTIVE STATISTICS, UNCERTAINTY DUE TO IGNORANCE OF THE STATE OF NATURE, THE COMPUTATION OF BAYES STRATEGIES, INTRODUCTION TO

CLASSICAL STATISTICS, MODELS, TESTING HYPOTHESIS, AND ESTIMATION OF CONFIDENCE INTERVALS.

51. CHOW, V. T., AND D. D. MEREDITH. 1969. WATER RESOURCES SYSTEMS ANALYSIS. URBANA DEPT. OF CIVIL ENG., UNIV. OF ILL. HYDR. ENG. SERIES 19,20,21, & 22, 295 PP. CONTENTS: PART 1. ANNOTATED BIBLIOGRAPHY ON STOCHASTIC PROCESSES. PART 2. ANNOTATED BIBLIOGRAPHY ON PROGRAMMING TECHNIQUES. PART 3. REVIEW OF STOCHASTIC PROCESSES. PART 4. REVIEW OF PROGRAMMING TECHNIQUES.

52. CHRISTIANSEN, N. B. 1966. CAPITAL BUDGETING UNDER CONDITIONS OF UNCERTAINTY. PH. D. DISS. STATE UNIV., N.Y. COLL. FORESTRY, SYRACUSE. A METHOD IS PROPOSED WHICH TAKES INTO ACCOUNT THE THEORY OF DECISION MAKING UNDER CONDITIONS OF UNCERTAINTY AND THE ACTUAL PRACTICES OF 32 FIRMS IN THE PULP AND PAPER INDUSTRY. THE METHOD IS TESTED BY APPLYING IT TO TWO INVESTMENT PROJECTS IN A PULP AND PAPER FIRM. THE RESULTS OF THE TEST INDICATE THE METHOD IS WORKABLE ALTHOUGH IT REQUIRES SOME UNDERSTANDING OF PROBABILITY THEORY ON THE PART OF COMPANY PERSONNEL.

53. CHRISTIANSEN, N. B. 1968. FOREST RESOURCE MANAGEMENT AS A SYSTEM. J. FOREST. 66(10):778-781. SYSTEMS ANALYSIS IDENTIFIES INFLUENTIAL ELEMENTS IN A PROCESS, DESCRIBES THEIR INTERACTIONS, AND RECOGNIZES THEIR CONTEXT. A SYSTEMS APPROACH HAS MANY USES IN FORESTRY, NOTABLY TO PREDICT OUTCOMES AND THUS GUIDE DECISIONS.

54. CHRISTOPHER, J. F., AND S. GUTTENBERG. 1967. TIMBER CONVERSION FACTORS AND ECONOMIC BREAK-EVEN POINTS. AMER. PULPWOOD ASSOC., SOUTHWEST. TECH. DIV. MTG. AT BATON ROUGE, LA. 14 PP WHEN CHOICES ARE NUMEROUS AND INTERRELATED, AS THEY ARE FOR THE PULP INDUSTRY IN DEALING WITH CHIP MILLS, PLYWOOD PLANTS, OR MODERN SAWMILLS, THE BREAK-EVEN POINTS AMONG CHIPS AND PULPWOOD AND ALTERNATIVE PRODUCTS ARE FAR FROM OBVIOUS. LINEAR PROGRAMMING STUDIES OF LUMBER AND PLYWOOD PRODUCTION SHOW THAT IT PAYS TO PULP CLASSES OF LOGS AS LARGE AS 16 INCHES IN SCALING DIAMETER AND GRADE 2.

55. CHURCHMAN, C. W., R. ACKOFF, AND E. L. ARNOFF. 1957. INTRODUCTION TO OPERATIONS RESEARCH. 645 PP., ILLUS. NEW YORK: JOHN WILEY & SONS, INC. A GENERAL INTRODUCTION TO METHODS CONCERNING INVENTORIES, LINEAR PROGRAMMING, WAITING LINE,

REPLACEMENT, AND COMPETITIVE SITUATIONS IS PROVIDED. CASE EXAMPLES ARE USED, AND THE EMPHASIS THROUGHOUT IS ON THE APPLICATION OF OPERATIONS RESEARCH TO INDUSTRIAL PROBLEMS.

56. CLAPHAM, J. C., AND T. A. LAMBE. 1961. AN OPERATIONS RESEARCH APPROACH TO LUMBER SORTING. FOREST PROD. J. 11(4):181-184. THE USE OF QUEUING THEORY FOR ESTIMATING THE EFFECT OF SORTING-CHAIN ALTERATIONS ON MANPOWER REQUIREMENTS IS PRESENTED, WITH APPLICATIONS IN REDUCING LABOR OR INDICATING PROFITABLE MECHANIZATION.

57. CLAPMAN, J. C. 1960. OPERATIONS RESEARCH CAN HELP THE LOGGER. CAN. PULP AND PAPER IND. 13(7):51-54. OPERATIONS-RESEARCH TECHNIQUES SHOULD BE APPLIED TO LOGGING PROBLEMS THAT ARE CLOSELY PARALLEL TO MINING PROBLEMS ALREADY BEING ATTACKED BY THE OPERATIONS-RESEARCH APPROACH.

58. CLAXTON, H. D. 1968. A DYNAMIC PROGRAMMING DECISION MODEL AND COMPUTER SIMULATION OF THE CEDAR PENCIL SLAT DRYING PROCESS. PH.D. DISS., UNIV. CALIF., BERKELEY. COMPUTER SIMULATION MODELS ARE DEVELOPED FOR A MOISTURE TRANSFER PROCESS AND FOR THE OPERATING CHARACTERISTICS OF A BATCH DRY KILN--BOTH PHASES IN THE DRYING OF CEDAR PENCIL SLATS. THE SIMULATORS ARE THEN USED IN A DYNAMIC PROGRAMMING ALGORITHM TO OBTAIN OPTIMUM DRYING SCHEDULE

59. CLEMMONS, J. W. 1967. NEW TECHNIQUES IN INDIVIDUAL TREE DESCRIPTION FOR THE BASIS OF ECONOMIC DECISION MAKING. SOC. AMER. FOREST. PROC. 1966:197-200. A DYNAMIC PROGRAMMING MODEL MAKES IT POSSIBLE TO SIMULATE CONDITIONS THAT AFFECT THE VALUE OF A TREE, ALLOWING ECONOMIC EVALUATION OF SIZE, GRADE, OR QUALITY, AND EFFICIENCY OF THINNING AND FERTILIZATION.

60. CLUTTER, J. L., AND J. E. BETHUNE. 1969. MAXIMUM PRODUCTIVITY FROM INDUSTRY-OWNED FOREST LANDS. AMER. ASTRONAUT. SOC., NAT. MEET. 15 AND OPER. RES. SOC. 35, PAP. III B4:69-54, DENVER, COLO. SET OF PROCEDURES DESIGNED TO APPRAISE EACH CUTTING UNIT OF A FOREST UNDER ALL FEASIBLE HARVESTING SCHEDULES, SELECT AN OPTIMUM SET OF HARVEST STRATEGIES WITHIN CONSTRAINTS ON PRODUCT FLOW AND HARVESTING AND REGENERATION CAPABILITIES, AND PROJECT PRODUCT AND CASH FLOWS GENERATED BY THE SELECTED STRATEGY.

61. CLUTTER, J. L., AND J. H. BAMPING. 1966. COMPUTER

SIMULATION OF AN INDUSTRIAL FORESTRY ENTERPRISE. SOC. AMER. FOREST. PROC. 1965:180-185. PRESENTATION OF A MODEL SIMILAR TO GOULD AND O'REGAN'S (1965) BUT INVOLVING A LARGER ENTERPRISE AND A MORE REALISTIC TREATMENT OF BIOLOGICAL AND ECONOMIC FACTORS.

62. CORCORAN, T. J. 1962. OPTIMIZING THE MARKET ALLOCATION OF TIMBER PRODUCTS FROM WOODLANDS IN MULTIPLE PRODUCT SITUATIONS. DISS. ABSTR. 23(2):382. LINEAR PROGRAMMING IS SUGGESTED AS A TECHNIQUE FOR DETERMINING THE OPTIMUM ALLOCATION OF RESOURCES WHERE A PRODUCER IS FACED WITH ALTERNATIVE MARKETS. THE STANDING TREE IS CONSIDERED AS A SOURCE OF A VARIETY OF POTENTIAL PRODUCTS. ESTIMATES OF INPUTS AND OUTPUTS (COSTS AND PRICES) FROM PUBLISHED SOURCES ARE USED IN A SIMPLEX LINEAR PROGRAMMING MODEL DEVELOPED AROUND SOME TYPICAL MARKETING AND OPERATING CONSTRAINTS.

63. CORCORAN, T. J. 1964. SCHEDULING THE PALLET TRUCKS IN PULPWOOD OPERATIONS. UNIV. OF MAINE, AGR. EXP. STA., BULL. 77, 22 PP. ORONO. AN ILLUSTRATION OF A METHOD FOR PALLET SCHEDULING BASED ON DATA FROM OPERATIONS IN MAINE. FINES AND COSTS ARE ANALYZED BY LINEAR PROGRAMMING. AND THE ORGANIZATION OF TRUCKS NEEDED TO HANDLE A CONTINUOUS FLOW OF PULPWOOD BETWEEN MULTI-DELIVERY POINTS ARE DETERMINED.

64. CORCORAN, T. J. 1966. OPERATION RESEARCH AND MANAGEMENT IN WOOD-USING BUSINESS. AMER. PULPWOOD ASSOC. TECH. PAP.:25-27. A GENERAL DISCUSSION OF OPERATION RESEARCH, WITH TIPS ON HOW TO APPLY THE METHODS SUCCESSFULLY; SPECIFICALLY, THE CONCEPTS OF LINEAR PROGRAMMING, SIMULATION, AND QUEUING THEORY.

65. CORCORAN, T. J. 1969. SCHEDULING WITHIN HARVESTING SYSTEMS IMPROVED WITH MATHEMATICAL MODELS. FOREST ENG. CONF. PROC. 1968:74-75, MICHIGAN STATE UNIV., EAST LANSING. TRUCK DELIVERIES ARE SCHEDULED BY USING LINEAR PROGRAMMING AND THE TECHNIQUE OF LINE BALANCING IS USED TO ESTABLISH A MORE EFFICIENT HARVESTING SYSTEM.

66. CORCORAN, T. J., D. I. SCHROEDER, AND D. B. THOMPSON. 1966. AN EVALUATION OF THE DISTRIBUTION OF TRUCKED PULPWOOD IN EAST CENTRAL MAINE UNIV. OF MAINE, AGR. EXP. STA., BULL. 640, 11 PP. ORONO. THE TRANSPORTATION MODEL (A LINEAR PROGRAMMING TECHNIQUE) PROVIDES FOR MOVEMENT OF PULPWOOD SUCH THAT TOTAL TRUCK MILEAGE FOR DELIVERY OF THE

YEAR'S PULPWOOD SUPPLY IS A MINIMUM.

67. COUTU, A. J. 1966. ESTIMATION OF INCOME AND HYDROLOGIC EFFECTS OF ALTERNATIVE WATERSHED PROGRAMS. IN, ECONOMICS OF WATERSHED PLANNING, 2ND PRINTING, IOWA STATE UNIV. PRESS:339 PP. MATHEMATICAL PROGRAMMING CAN PROVIDE DATA FOR AN EVALUATION OF ALTERNATIVE WATERSHED SYSTEMS. LIMITATIONS INCLUDE (1) INCOMPLETE INPUT-OUTPUT SCHEDULES FOR CONSERVATION INPUTS, (2) NECESSITY FOR EVALUATING NET FARM REVENUES OVER MORE THAN A SINGLE YEAR, AND (3) NEED FOR INCORPORATING CHANGES IN RESOURCE RESTRICTIONS AND PRODUCT PRICES INTO THE PROGRAMMING MODEL.

68. COUTU, A. J., AND B. W. ELLERTSEN. 1960. APPLICATION OF LINEAR PROGRAMMING PROCEDURES TO FARM FORESTRY PROBLEMS. FOREST MANAGE. CONTR. CONF. PROC.:177-190. PURDUE UNIV., LAFAYETTE, IND. A LINEAR PROGRAMMING MODEL IS USED AS PART OF THE PARKER BRANCH WATERSHED STUDY IN NORTH CAROLINA TO DETERMINE THE MOST PROFITABLE COMBINATION OF AGRICULTURAL AND FORESTRY ENTERPRISES FOR SPECIFIC FARM SITUATIONS. SOLUTIONS FOR A 20-ACRE PART-TIME FARM AND A 250-ACRE DAIRY FARM, INDICATING BEST USE OF AVAILABLE LAND, LABOR, CAPITAL, AND MANAGERIAL ARILITY, ARE TABULATED.

69. COUTU, A. J., AND B. W. ELLERTSEN. 1960. FARM FORESTRY PLANNING THROUGH LINEAR PROGRAMMING. TVA REP. 236-60. 31 PP. A PRESENTATION OF A PROCEDURE THAT MAY HELP TO DETERMINE THE OPTIMUM ROLE OF THE FOREST IN THE TOTAL FARM ENTERPRISE. THE APPENDICES CONTAIN ILLUSTRATIVE DATA FOR A LARGE FARM AND A SMALL FARM UNDER THE ACTUAL CONDITIONS IN THIS AREA OF THE TVA.

70. CUNNINGHAM, J. P. 1969. ROAD SIMULATION--A SUBSYSTEM FOR LAND MANAGEMENT DECISION MAKING. M.S. THESIS, N.Y. STATE UNIV., ALBANY. A COMPUTERIZED METHOD FOR FINDING THE SHORTEST ROUTE BETWEEN TWO POINTS WITHIN PHYSIOGRAPHIC CONSTRAINTS.

71. CURLEY, R. M., R. L. SCHOCK, AND B. E. WYNNE. 1965. SIMULATION APPLIED TO PROJECT RISK ANALYSIS. WEYERHAEUSER CO. OPER. RES. DEP. PAP., 24 PP. TACOMA, WASH. THIS PAPER IS CONCERNED WITH THE APPLICATION OF RISK ANALYSIS IN EVALUATING POTENTIAL INVESTMENT OPPORTUNITIES THROUGH THE USE OF A SIMULATION MODEL. THE MODEL GENERATES PROBABILISTIC STATEMENTS ABOUT RATE OF RETURN.

72. CURTIS, F. H. 1962. LINEAR PROGRAMMING THE MANAGEMENT OF A FOREST PROPERTY. J. FOREST. 60(9):611-616. LINEAR PROGRAMMING IS APPLIED TO THE BUCKEYE CELLULOSE CORPORATION'S PLAN FOR IMPROVING POOR PINE FOREST IN FLORIDA WITH CLEAR-FELLING, BULLDOZING, AND REPLANTING.

73. CURTIS, J. R. 1967. OPERATIONS RESEARCH AS AN AID TO DISTRIBUTION MANAGEMENT. THE DYNAMIC ROLE OF PHYS. DISTRIB. MANAGE. PROC.18:23-34. SYRACUSE UNIV., COLL. OF ENG. AND BUS. ADMIN., SYRACUSE. LINEAR PROGRAMMING AND SIMULATION ARE USED BY SCOTT PAPER COMPANY IN ANALYZING MANUFACTURING INVENTORY STORAGE, INVENTORY HANDLING, STOCK TRANSFER, AND FREIGHT TO DESTINATION.

74. DANE, C. W. 1965. STATISTICAL DECISION THEORY. J. FOREST. 63(4):276-279. STATISTICAL DECISION THEORY AND BAYES' THEOREM ARE USED TO ANALYZE FOREST ENGINEERING PROBLEMS AS DEMONSTRATED IN A HYPOTHETICAL LOGGING PROBLEM.

75. DANE, C. W. 1966. OPERATIONS RESEARCH, PART I: A MANAGERIAL DECISION-MAKING TOOL FOR THE FOREST INDUSTRY. FOREST IND. 93(2):36-38. OPERATIONS RESEARCH IS A NEW METHOD OF ANALYZING BUSINESS PROBLEMS THROUGH THE USE OF ADVANCED STATISTICS AND MATHEMATICS.

76. DANE, C. W. 1966. OPERATIONS RESEARCH, PART II: THE MANY POWERS OF MATHEMATICAL PROGRAMMING. FOREST IND. 93(6):28-30. MATHEMATICAL PROGRAMMING - - SPECIFICALLY LINEAR, INTEGER, NONLINEAR, AND DYNAMIC PROGRAMMING - - CAN AND ARE BEING USED TO SOLVE FOREST INDUSTRY PROBLEMS.

77. DANE, C. W. 1966. OPERATIONS RESEARCH, PART III: SYSTEMS AND SIMULATION. FOREST IND. 93(11):36-38. SIMULATION IS AN OPERATIONS-RESEARCH TECHNIQUE DEALING WITH SITUATIONS WHERE EXACT DATA ARE UNAVAILABLE AND DIFFICULT TO OBTAIN, OR INTERACTIONS AMONG FACTORS ARE COMPLEX. THE SYSTEMS CONCEPT IS A CONVENIENT WAY OF HANDLING ORGANIZATIONAL PROBLEMS WHEN SIMULATION IS APPLIED.

78. DANE, C. W. 1967. OPERATIONS RESEARCH: PRACTICE AND POTENTIAL FOR FOREST PRODUCTS INDUSTRIES. FOREST PROD. J. 17(1):13-17. A BRIEF EXPLANATION OF THE USE OF OPERATIONS RESEARCH IN THE FOREST PRODUCTS INDUSTRY AND EXAMPLES OF ITS USE IN FILLIGG SHIPMENT ORDERS OF A PAPERMILL. LINEAR PROGRAMMING, DYNAMIC PROGRAMMING, SIMULATION,

ECONOMETRICS, AND DECISION THEORY ARE DISCUSSED.

79. DANE, C. W. 1968. OPERATIONS RESEARCH AND THE FOREST PRODUCTS INDUSTRY. OREG. BUS. REV. 27(2):1, 4-7. OPERATIONS RESEARCH IS APPLIED TO WOOD-CONVERSION PROBLEMS. MOST OF THE USE OF OR HAS INVOLVED LINEAR PROGRAMMING. HOWEVER, SIMULATION AND DYNAMIC PROGRAMMING ARE THE TWO TECHNIQUES WITH THE GREATEST POTENTIAL BENEFIT FOR SOLVING PROBLEMS IN THE FOREST PRODUCTS INDUSTRY.

80. DANTZIG, G. B. 1963. LINEAR PROGRAMMING AND EXTENSIONS. 625 PP., ILLUS. PRINCETON, N.J.: PRINCETON UNIV. PRESS. A THOROUGH TREATMENT OF LINEAR PROGRAMMING THEORY AND APPLICATION INCLUDING EXTENSION OF THE THEORY TO OTHER TYPES OF DECISION PROBLEMS. THE FIRST THREE CHAPTERS DEAL WITH THE CONCEPTS, ORIGINS, AND FORMULATION OF LINEAR PROGRAMS. THERE ARE SEVERAL CHAPTERS ON THE SIMPLEX METHODS OF SOLUTION OF LINEAR PROGRAMS. THERE ARE CHAPTERS ON RELATED THEORY, THE PRICE CONCEPT IN LINEAR PROGRAMMING, GAME THEORY, TRANSPORTATION AND RELATED PROBLEMS, INTEGER PROGRAMMING, AND UNCERTAINTY. THE LAST CHAPTERS ARE DISCUSSIONS OF THE APPLICATION OF LINEAR PROGRAMMING TO TWO ACTUAL PROBLEMS.

81. DASH, J. F., AND C. BERENSON. 1969. TECHNIQUES IN MARKETING RESEARCH. HARVARD BUS. REV. 47(5):14-16, 19, 21, 22, 24, 26, 155. A MANAGER'S GUIDE TO THE MEANING OF 24 SCIENTIFIC METHODS (SUCH AS REGRESSION, SAMPLING, MATHEMATICAL PROGRAMMING, INPUT-OUTPUT ANALYSIS SIMULATION, PERT, QUEUING MODELS) OFTEN MENTIONED IN PRESENTATION TO MANAGEMENT.

82. DAVIS, J. B. 1968. FOREST FIRE CONTROL DECISION MAKING UNDER CONDITIONS OF UNCERTAINTY. J. FOREST. 66(8):626-631. GAME THEORY AND DECISION THEORY COULD HELP A FIRE BOSS EVALUATE STRATEGIES TO USE IN FOREST FIRE CONTROL. SEVERAL TYPES OF MATRIX GAMES, SUBJECTIVE UTILITY, AND VARIOUS CRITERIA FOR STRATEGY SELECTION ARE DESCRIBED. THE USE OF DECISION THEORY IN A FICTITIOUS FIRE-FIGHTING PROBLEM IS SHOWN.

83. DAVIS, J. B. 1968. WHY NOT PERT YOUR NEXT RESOURCE MANAGEMENT PROBLEM? J. FOREST. 66(5):405-408. PERT (PROGRAM EVALUATION AND REVIEW TECHNIQUE) HAS BECOME A VALUABLE MANAGEMENT TOOL IN BOTH GOVERNMENT AND INDUSTRY BUT HAS NOT BEEN WIDELY USED IN RESOURCE MANAGEMENT. IT IS A MEANS OF DEFINING THE RELATIONSHIP BETWEEN THE VARIOUS

ACTIVITIES COMPOSING A PROJECT AND FOR ESTIMATING THE TIME REQUIRED TO COMPLETE EACH ACTIVITY AND THE ENTIRE PROJECT. THE PAPER EXPLAINS HOW PERT WORKS, ILLUSTRATING IT WITH AN EXAMPLE OF A SLASH BURN.

84. DAVIS, J. B. 1969. ELEMENTARY ALLOCATION MODELS - - HOW TO USE THEM IN FORESTRY OPERATIONS. USDA FOREST SERV. PACIFIC S.W. FOREST AND RANGE EXP. STA. RES. NOTE PSW-187, 8 PP. BERKELEY, CALIF. THE OPTIMUM SOLUTION TO THE ALLOCATION OF AVAILABLE FORESTRY RESOURCES IS BEST ACHIEVED BY USING COMPLEX MATHEMATICAL TECHNIQUES AND COMPUTERS. BUT NOW THAT SIMPLIFIED VERSIONS OF THESE TECHNIQUES HAVE BEEN DEVELOPED, IT IS POSSIBLE TO USE SOME ALLOCATION MODELS WITHOUT COMPUTER HARDWARE. TRANSPORTATION AND ASSIGNMENT MODELS ARE EXPLAINED THROUGH EXAMPLES OF THEIR APPLICATION TO FORESTRY PROBLEMS.

85. DAVIS, J. B. 1970. SYSTEMS ANALYSIS AND THE FIRE DEPARTMENT: PROBLEMS IN DESIGN. FIRE J. 64(2):84-87. A NUMBER OF PROBLEMS ARISE WHEN SYSTEMS ANALYSIS IS APPLIED TO RURAL FIRE PROTECTION. AMONG THESE PROBLEMS ARE PUBLIC VERSUS PRIVATE GOOD, RESEARCH OBJECTIVES AND MEASURE OF EFFECTIVENESS, POLITICAL SUBDIVISIONS, WILLINGNESS OF MANAGEMENT TO INNOVATE, IN-HOUSE CAPABILITY TO COMMUNICATE AND IMPLEMENT RECOMMENDATIONS, MODELS AND DATA, LEVEL OF FINANCING, AND IVORY TOWERISM.

86. DAVIS, L. S. 1967. USE OF MULTI-STATE, SPATIAL EQUILIBRIUM PROGRAMMING MODELS FOR ANALYSIS OF THE SOUTHERN APPALACHIAN HARDWOOD LUMBER INDUSTRY. ANN. MTG., SOUTH. ECON. ASSOC., NEW ORLEANS, LA., 21 PP. A PRESENTATION OF A TECHNIQUE FOR REGIONAL STUDIES SEEKING (1) PRODUCTION COST AND MARKET INFORMATION FOR RECOMMENDING COST-REDUCING CHANGES; (2) QUANTITATIVE PREDICTIONS OF THE PROBABLE FUTURE COMPOSITION, ORGANIZATION, AND LOCATION OF THE INDUSTRY; AND (3) GUIDES AND RECOMMENDATIONS FOR PUBLIC POLICY IN THIS INDUSTRY.

87. DAY, R. H. 1964. LINEAR PROGRAMMING AND RELATED COMPUTATIONS: A GUIDE TO USDA LP/90. USDA ECON. RES. SERV., FARM PROD. ECON. DIV., WASHINGTON. 273 PP. THIS FIVE PART HANDBOOK INCLUDES A GENERAL INTRODUCTION (PART I), AN INTRODUCTION TO LINEAR PROGRAMMING AND RELATED COMPUTATIONS (PART II),, THE DESIGN AND USE OF USDA LP/90 (PART III), SAMPLE COMPUTATIONS WITH USDA LP/90 (PART IV), AND

A REFERENCE GUIDE TO THE AGENDUM ROUTINES (PARTV).

88. DI ROCCAFERRERA, G. M. F. 1964. OPERATIONS RESEARCH: MODELS FOR BUSINESS AND INDUSTRY. 966 PP. PLUS APPENDICES 126 PP. CINCINNATI: SOUTH-WESTERN PUBLISHING CO. CHAPTERS ON: UNIVARIATE ANALYSIS, BIVARIATE ANALYSIS, MULTIVARIATE ANALYSIS, CURVE FITTING, DETERMINANTS, VECTORS AND MATRICES, INPUT-OUTPUT ANALYSIS, INVENTORY ANALYSIS, LINEAR PROGRAMMING, TRANSPORTATION MODELS, THE SIMPLEX METHOD, DYNAMIC MODELS, WAREHOUSE-TYPE PROBLEMS, QUEUING THEORY, MONTE CARLO TECHNIQUES.

89. DISSESCU, R. 1966. (DETERMINATION OF THE FINAL COMPOSITION (OF A MIXED STAND) BY THE METHOD OF LINEAR PROGRAMMING.) REV. PADURILOR 81(12): 671-676. (RUMANIAN, WITH SUMMARIES IN RUSSIAN, GERMAN, FRENCH, ENGLISH.) A PRESENTATION OF A MATHEMATICAL MODEL FOR DETERMINING THE OPTIMUM FINAL COMPOSITION (AT TIME OF EXPLOITATION) OF A MIXED STAND, AND AN ILLUSTRATION OF ITS OPERATION BY THE USE OF SIMPLE ALGORITHMS ON A HYPOTHETICAL SPRUCE-FIR-LARCH-BEECH STAND.

90. DOBIE, J. 1966. PRODUCT YIELD AND VALUE, FINANCIAL ROTATIONS, AND BIOLOGICAL RELATIONSHIPS OF GOOD SITE DOUGLAS-FIR. (ABSTR.) FOREST. CHRON. 24(2):211-212. QUANTITY AND VALUE OF THE ASSORTMENT YIELD OF FOUR NATURAL STANDS (AGE 63-145) OF DOUGLAS-FIR IN BRITISH COLUMBIA ARE ANALYZED, USING LINEAR PROGRAMMING TECHNIQUES TO DETERMINE THE OPTIMUM ASSORTMENT YIELD FROM EACH STAND. FINANCIAL ROTATIONS AT TWO LEVELS OF ESTABLISHMENT COSTS AND THREE INTEREST RATES ARE EXAMINED, AND MATHEMATICAL MODELS OF THE RELATIONSHIP BETWEEN TREE VALUE, TREE VOLUME, AND BIOLOGICAL VARIABLES ARE PRESENTED.

91. DONNELLY, R. H. 1964. MATHEMATICAL PROGRAMMING IN THE MANAGEMENT OF LOGGING OPERATIONS. SOC. AMER. FORESTERS PROC. 1963:58-61. AN EXPOSITION OF THE USE OF LINEAR PROGRAMMING BY THE SITUATION FACING THE WOODLANDS MANAGER OF A HYPOTHETICAL PULP MILL IN THE NORTHEASTERN UNITED STATES.

92. DONNELLY, R. H. 1965. DECISION MAKING IN GROWING AND HARVESTING PULPWOOD. DISS. ABSTR. 25(8):4332. A LINEAR PROGRAMMING MODEL IS CONSTRUCTED THAT REPRESENTS CONDITIONS IN A HYPOTHETICAL WOODLANDS DEPARTMENT IN NORTHERN MAINE.

93. DONNELLY, R. H. 1966. LINEAR PROGRAMMING IN PLYWOOD MANUFACTURING. SEMINAR ON OPER. RES. IN FOREST PROD. INDUS. PROC.:22-39. IBM CORP., LOS ANGELES, CALIF. LINEAR PROGRAMMING, AS APPLIED TO PLYWOOD MANUFACTURING, ASKS THE FOLLOWING QUESTIONS: (1) WHAT DECISIONS, (2) WHAT ALTERNATIVES, AND (3) WHAT DATA, CAN PROVIDE A BASE FOR MAKING GOOD SEQUENTIAL DECISIONS, BOTH IN MANUFACTURING AND SALES

94. DONNELLY, R. H. 1967. A SAMPLE OF DECISION THEORY IN THE FOREST PRODUCTS INDUSTRY. SEMINAR ON DECIS. THEOR. PROC.:29-36. UNIV. BRITISH COLUMBIA, VANCOUVER. DECISION THEORY IS APPLIED TO A U.S. LUMBER AND PLYWOOD FIRM. TWO MAIN SOURCES OF DIFFICULTY ARE OBTAINING INFORMATION FOR THE PAYOFF MATRIX AND FINDING A SYSTEMATIC PROCEDURE FOR SELECTING THE BEST DECISION RULE.

95. DONNELLY, R. H., R. W. GARDNER, AND H. R. HAMILTON. 1963. INTEGRATING WOODLANDS ACTIVITIES BY MATHEMATICAL PROGRAMMING. BATTELLE MEM. INST. (FOR AMER. PULP ASSOC.) 16 PP. A MATHEMATICAL MODEL OF OPERATIONAL AND PLANNING PROBLEMS FACED BY THE WOODLANDS MANAGER EVALUATES THE FOLLOWING: EXTENSIVE AND INTENSIVE FORESTRY, LAND OWNERSHIP (RATE OF RETURN), TAX CONSIDERATIONS (AS WELL AS TAX CHANGE), OPTIMUM FOREST PRACTICES, AND EFFECTS OF CHANGING EXTERNAL CIRCUMSTANCES.

96. DORFMAN, R. 1951. APPLICATION OF LINEAR PROGRAMMING TO THE THEORY OF THE FIRM. 98 PP., ILLUS. BERKELEY: UNIV. CALIF. PRESS. THIS WORK APPLIES LINEAR PROGRAMMING TO THE SHORT-RUN BEHAVIOR OF THE INDIVIDUAL FIRM OR ENTREPRENEUR AND ASSESSES ITS VALUE AND USES IN THIS CONTEXT. PROGRAMMING IS DESCRIBED IN TERMS OF ITS RELATIONSHIP TO THE ECONOMIC THEORY OF THE FIRM. A HISTORICAL PERSPECTIVE OF THE THEORY IS GIVEN; AND ASSUMPTIONS, LIMITATIONS, AND POSSIBILITIES OF THE TOOL ARE EXAMINED IN DETAIL. A LIST OF REFERENCES COMPLETES THE TEXT.

97. DORFMAN, R. 1960. OPERATIONS RESEARCH. AMER. ECON. REV. 50(4):575-623. SURVEY OF OPERATIONS RESEARCH. THE CONVENTIONAL BUSINESS-CONSULTANT APPROACH TO A PROBLEM IS CONTRASTED TO THE OPERATIONS-RESEARCH APPROACH. A DISCUSSION OF THE LP MODEL, INFORMATION THEORY, GENERAL SYSTEMS ANALYSIS, INVENTORY MODELS, QUEUING MODELS, COMBINATORIAL (SEQUENCING) MODELS, AD HOC MODELL, SIMULATION, AND GAMING.

98. DORFMAN, R., P. A. SAMUELSON, AND R. SOLOW. 1958. LINEAR PROGRAMMING AND ECONOMIC ANALYSIS. 525 PP. NEW YORK: MCGRAW-HILL BOOK CO. CONTENTS INCLUDE: BASIC CONCEPTS OF LINEAR PROGRAMMING, THE ALGEBRA OF LP, THE TRANSPORTATION PROBLEM, APPLICATION TO THE FIRM, NONLINEAR PROGRAMMING, THE LEONTIEF SYSTEM, DYNAMIC ASPECTS OF LINEAR MODELS, ELEMENTS OF GAME THEORY, AND INTERRELATIONS BETWEEN LP AND GAME THEORY.

99. DOWDLE, B. 1966. LOG ALLOCATION DECISION MAKING. SEMINAR ON OPER. RES. IN FOREST PROD. INDUS. PROC.: 83-97. IBM CORP., LOS ANGELES, CALIF. THE USE OF PRICES (TRANSFER PRICES IN THE VERTICALLY INTEGRATED FIRM), ON WHICH CURRENT DECISIONS ARE LARGELY BASED IS COMPARED WITH LINEAR PROGRAMMING FOR MAKING ALLOCATION DECISIONS.

100. DUERR, W. A. 1967. FOREST RESOURCE MANAGEMENT: SOME DECISION THEORY AND ILLUSTRATIONS. A SEMINAR ON DECISION THEORY PROC.: 58-62, UNIV. BRITISH COLUMBIA. A MODEL IS PRESENTED OF A FORESTRY DECISION SYSTEM COMPOSED OF TWO PARTS: A SIMULATOR FOR IDENTIFYING ALTERNATIVES, AND A SET OF AXIOMS FOR EVALUATING THE ALTERNATIVES AND - - IN CASES OF EXTREME UNCERTAINTY - - FOR REACHING A DECISION DIRECTLY.

101. DYSON, P. J. 1964. A TECHNIQUE FOR A SYSTEMS ANALYSIS OF THE LOG BREAKDOWN PROCESS IN NORTH CAROLINA SAWMILLS. PH.D. THESIS, N.C. STATE UNIV., RALEIGH. SYSTEMS ANALYSIS IS USED TO PREDICT CHANGES IN OUTPUT, COSTS, AND RETURNS RESULTING FROM CHANGES IN PHYSICAL INPUTS OR TECHNOLOGY.

102. EDGE, C. G. 1965. THE PROFIT CONTRIBUTION OF LINEAR PROGRAMMING TO THE MANAGEMENT OF A FOREST INDUSTRY COMPANY. OPER. RES. SOC. AMER. NAT. MTG., 13 PP, HOUSTON, TEXAS. A DISCUSSION OF THE APPLICABILITY OF LINEAR PROGRAMMING TO ALLOCATING WOODLAND RESOURCES; THE NATURE OF THE CONSTRAINTS; AND SIMILARITIES WITH THE OIL INDUSTRY. ILLUSTRATIONS ARE TAKEN FROM A CASE STUDY OF THE INTRODUCTION OF LINEAR PROGRAMMING INTO A BRITISH COLUMBIA PULP AND LUMBER OPERATION.

103. ENGLERTH, G. H., AND O. E. DUNMIRE. 1966. PROGRAMMING FOR LUMBER YIELDS. FOREST PROD. J. 16(9):67-69. THE APPLICATION OF THE FOREST PRODUCTS LABORATORY COMPUTER PROGRAM TO PRESCRIBE THE CUTTING AND PREDICT THE YIELD OF 1-1/2 X

25-1/4 INCH CLEAR-ONE-FACE CUTTINGS FROM 4/4 NO. 2 COMMON HARD MAPLE GAVE RESULTS THAT WERE IN CLOSE AGREEMENT WITH A COMMERCIAL RUN OF SIMILAR MATERIAL.

104. EVARTS, H. F. 1964. INTRODUCTION TO PERT. 112 PP. BOSTON: ALLYN AND BACON, INC. CHAPTERS ON: THE PERT NETWORK; COMPUTATIONAL PROCEDURE; NETWORK ANALYSIS; PERT IN THE FUTURE.

105. EVERETT, J. P. 1967. AN EXPERIMENTAL APPLICATION OF LINEAR PROGRAMMING TO PLYWOOD PRODUCTION. M.F. THESIS , UNIV. WASH., SEATTLE. LINEAR PROGRAMMING IS USED IN THE FORMULATION OF PLYWOOD PRODUCTION DECISIONS TO MAXIMIZE PROFIT FROM THE PROCESSING OF A GIVEN LOG MIX INTO A BASIC PRODUCT LINE. THE DATA MATRIX WAS PREPARED FROM INDUSTRY SOURCES AND THE MODEL WAS SOLVED SEVERAL TIMES-RELAXING DIFFERENT CONSTRAINTS, AND FINALLY SENSITIVITY ANALYSIS WAS APPLED BY VARYING THE PRIME FACTORS WITHIN THE MODEL

106. FABISZEWSKI, W. 1965. (RAW MATERIAL RESERVES FOR THE FIBERBOARD INDUSTRY: USE OF LINEAR PROGRAMMING FOR OPTIMAL TRANSVALUATION OF INDUSTRIAL PROCESSED WOOD.) POZNAN, INSTYTUT, TECHNOLOGII DREWNA., 56 PP. (IN POLISH.) LINEAR PROGRAMMING IS USED TO CALCULATE THE OPTIMAL ALLOCATION OF USES FOR VARIOUS WOOD ASSORTMENTS IN POLAND.

107. FARKAS, V. 1967. (THE SOLUTION OF A DEPOT PROBLEM BY LINEAR PROGRAMMING.) ERDERZ. KUTATAS., BUDAPEST 63(1/3):325-338. (IN HUNGARIAN, WITH SUMMARIES IN RUSSIAN AND ENGLISH.) AN APPLICATION OF THE METHOD TO TRANSPORT TIMBER FROM FELLING SITES, VIA DEPOTS, TO DESTINATION POINTS SO AS TO FIND THE OPTIMUM LOCATION AND CAPACITY OF DEPOTS.

108. FARQUHAR, J. D. 1967. AN APPROACH TO THE ECONOMIC ALLOCATION AND USE OF RESOURCES FOR FORESTRY AND ALLIED PURPOSES. DISS. ABSTR. 27A(9):2666. AN INPUT/OUTPUT RELATIONSHIP IS STUDIED IN A SIMPLIFIED FORM, USING ONLY FOUR OUTPUT GROUPS (STUMPAGE, FORAGE, RECREATION, AND WATER). AND CONCLUSIONS ARE SUMMARIZED IN THE FORM OF A LINEAR PROGRAMMING TABLEAU FOR OBTAINING MAXIMUM OUTPUT. THE PROBLEMS OF DECISION-MAKING ARE DISCUSSED IN DETAIL.

109. FASICK, C. A. 1969. FORMULATION OF A LINEAR PROGRAMMING MODEL. OPER. RES. APPL. TO SAWMILLS PROC.:13-18, UNIV. GEORGIA, ATHENS. A LINEAR

PROGRAMMING MODEL IS STRUCTURED TO MAXIMIZE NET REVENUE OF A SAWMILL. IT IS DESIGNED TO COMPUTE OPTIMUM SOLUTIONS FOR VARIOUS MANAGERIAL PROBLEMS. THE MODEL USES DATA GENERATED FROM STATISTICALLY VALID PREDICTION EQUATIONS TO ARRIVE AT THE OPTIMUM SOLUTION.

110. FASICK, C. A. 1969. INTERPRETATION OF LINEAR PROGRAMMING INPUT AND OUTPUT AND AVAILABILITY OF COMPUTER PROGRAMS. OPER. RES. APPL. TO SAWMILLS PROC.: 25-29. UNIV. GEORGIA, ATHENS. MOST DATA-PROCESSING INSTALLATIONS HAVE AVAILABLE MANY BASIC COMPUTER PROGRAMS FOR THE STATISTICAL ANALYSES AND MATHEMATICAL PROGRAMMING REQUIREMENTS FOR AN OPERATIONS RESEARCH APPLICATION. INTERMEDIATE PROGRAMS THAT TRANSLATE STATISTICAL ANALYSIS OUTPUT INTO LP INPUT AND LP OUTPUT INTO OPERATIONAL RECOMMENDATIONS TO MANAGEMENT ARE NOT STANDARDIZED PROGRAMS THAT CAN BE READILY ADAPTED TO VARYING APPLICATIONS.

111. FASICK, C. A., AND G. R. SAMPSON. 1966. APPLYING LINEAR PROGRAMMING IN FOREST INDUSTRY. USDA FOREST SERV., SOUTH. FOREST EXP. STA., RES. PAP. NO. 50-21, 12 PP. NEW ORLEANS, LA. THIS PAPER BRIEFLY SHOWS HOW LP CAN BE APPLIED TO PLYWOOD PRODUCTION AT A PINE STUD MILL, AND LUMBER MANUFACTURE; AND INCLUDES INSTRUCTIONS ON PREPARING CARDS FOR INPUT DATA AND INTERPRETING OUTPUT FOR USE WITH THE USDA LP/90 COMPUTER PROGRAM (DAY 1964).

112. FASICK, C. A., AND G. R. SAMPSON. 1968. CAN MATHEMATICAL PROGRAMMING IMPROVE SAWMILL PROFITS? SOUTH. LUMBERMAN 217(2704):155-156. A GENERAL ARTICLE ADVOCATING THE USE OF MATHEMATICAL PROGRAMMING TO CERTAIN SAWMILL PROBLEMS.

113. FAUX, M. C., JR. 1970. MANAGING COMPLEXITY USING COMPOSITE ECONOMIC MODELS AND LINEAR PROGRAMMING. FOREST PROD. J. 20(8):34-38. A DESCRIPTION OF THE USE OF COMPUTERS, MATHEMATICAL MODELS, AND LINEAR PROGAMMING IN A SYSTEM THAT PERMITS OPERATING PERSONNEL TO EFFECTIVELY MANAGE HIHGLY COMPLEX PROCESSES. THREE YEARS OF EXPERIENCE HAVE DEMONSTRATED THAT PLYWOOD MANAGERS CAN UNDERSTAND AND USE MATHEMATICAL MODELS TO FIND AND IMPLEMENT NEAR-OPTIMUM SOLUTIONS FOR THEIR ACTUAL OPERATING SITUATIONS.

114. FIELD, D. B. 1968. THE APPLICATION OF LINE BALANCING TECHNIQUES AND MATHEMATICAL DESCRIPTION MODELS TO THE PLANNING AND DESIGN OF PULPWOOD

HARVESTING SYSTEMS. M.S. THESIS, UNIV. MAINE, SCHOOL FOREST RES., 177 PP., ORONO. AN INVESTIGATION OF WHETHER PROCEDURAL LOGIC AND TECHNIQUES DEVELOPED IN THE ANALYSIS OF LINE BALANCING PROBLEMS IN FACTORY PRODUCTION COULD BE APPLIED TO THE REDUCTION OF CERTAIN IMBALANCES IN PULPWOOD HARVESTING SYSTEMS. A MATHEMATICAL MODEL WAS CONSTRUCTED FOR DESIGNING A HARVESTING SYSTEM IN WHICH MEN AND EQUIPMENT ARE SO UTILIZED THAT TIME AND MONETARY LOSSES DUE TO SYSTEM IMBALANCE ARE MINIMIZED.

115. FIND, N. I. 1968. (SIMULATION OF STANDS AND INCREMENT.) SVERIGES SKOGSV FORB. TIDSKR. 66(8):715-730. (SWEDISH WITH SUMMARIES IN SWEDISH, ENGLISH.) SIMULATION RESULTS SUGGEST THAT THERE IS (WITH CERTAIN QUALIFICATIONS) FOR A GIVEN STAND AND PRODUCTION AIM, ONE BEST MANAGEMENT SOLUTION (OF THINNING SCHEDULES AND ROTATION) OR AT MOST ONLY A FEW; AND IT IS LARGELY INDEPENDENT OF PRICE LEVEL, PRICE RELATIONS FOR DIFFERENT DIMENSIONS, AND INTEREST RATES (> 3 - 4 PERCENT).

116. FORRESTER, J. W. 1961. INDUSTRIAL DYNAMICS. 464 PP. CAMBRIDGE, MASS.: M.I.T. PRESS. CHAPTERS ON: INDUSTRIAL DYNAMICS, AN INDUSTRIAL SYSTEM, THE MANAGERIAL USE OF INDUSTRIAL DYNAMICS, MODELS, PRINCIPLES FOR FORMULATING DYNAMIC SYSTEM MODELS, STRUCTURE OF A DYNAMIC SYSTEM MODEL, SYSTEMS OF EQUATIONS, SYMBOLS FOR FLOW DIAGRAMS, REPRESENTING DELAYS, POLICIES AND DECISIONS, AGGREGATION OF VARIABLES, EXOGENOUS VARIABLES, JUDGING MODEL VALIDITY, AND EXAMPLES OF DYNAMIC SYSTEM MODELS.

117. FORSTER, R. H. 1968. OPTIMIZING THE MARKET ALLOCATION OF HARDWOOD TIMBER IN MULTIPLE PRODUCT SITUATIONS. DISS. ABSTR. 28B(11):4370. A COMPUTER MODEL IS USED TO DETERMINE THE EFFECTS OF DISTANCE TO MARKETS, CUBIC FEET, WEIGHT OF THE TREE, AND CHANGES IN PRICES ON THE ALLOCATION OF LOGS TO AN ASSORTMENT OF PRODUCTS.

118. FRENCH, C. E. 1960. MANAGEMENT SCIENCE FOR MODERN FORESTRY OPERATION. FOREST MANAGE. CONTROL CONF. PROC.:208-215. PURDUE UNIV., LAFAYETTE, IND. A GENERAL DISCUSSION OF AUTOMATION AND THE USE OF COMPUTERS IN FORESTRY WITH REFERENCE TO LINEAR PROGRAMMING AND SIMULATION.

119. FROMER, R. 1965. (A DYNAMIC MODEL OF FOREST ENTERPRISES.) SCHWEIZ. Z. FORSTW. 116(4/5):346-356. (IN GERMAN, SUMMARY IN FRENCH.) NO ENGLISH SUMMARY IS AVAILABLE.

120. FUKUNAGA, Y. 1962. STUDY OF THE MARGINAL SUBSTITUTIONAL VALUE OF FORESTRY IN FARM MANAGEMENT. HOKKAIDO UNIV. COLL. AGR. EXP. FOREST RES. BULL. 22(1):5-32. LINEAR PROGRAMMING IS USED TO DETERMINE THE ROLE FORESTRY ENTERPRISES PLAY IN OPTIMAL FARM PLANS FOR THREE DISTRICTS IN JAPAN - - MAKUBETSU, TOYOKORO, AND CHURUI IN EASTERN HOKKAIDO. THE CONCLUSION WAS REACHED THAT FOREST ENTERPRISES ENTER OPTIMAL FARM PLANS ON MARGINAL LANDS.

121. GABRIEL, W. J. 1970. AN APPROACH TO PROBLEM SOLVING. APPL. FOREST. RES. INST., MISC. REP. 3, 11 PP. STATE UNIV. N. Y., COLL. FOREST., SYRACUSE. THE APPLICATION OF OPERATION RESEARCH, ONE OF THE MOST COMPREHENSIVE APPROACHES TO PROBLEM SOLVING, IS AVAILABLE TO THE FOREST PRODUCTS INDUSTRY.

122. GAMACHE, A. E. 1969. DEVELOPMENT OF A METHOD FOR DETERMINING THE OPTIMUM LEVEL OF FOREST FIRE SUPPRESSION MANPOWER ON A SEASONAL BASIS. PH.D. DISS., UNIV. WASHINGTON. SIMULATION OF SEASONAL FOREST FIRE OCCURRENCE AND SUPPRESSION ACTIVITY WAS USED TO DETERMINE OPTIMUM SEASONAL FOREST FIRE SUPPRESSION MANPOWER. THE SIMULATION WAS USED TO GENERATE THE DATA NECESSARY FOR THE IMPLEMENTATION OF A COST-PLUS-LOSS MODEL AND TO DETERMINE THE SEASONAL MANPOWER LEVEL THAT WOULD MINIMIZE COST-PLUS-LOSS. A HYPOTHETICAL SITUATION AND ACTUAL DATA FROM THE STATE OF WASHINGTON WERE USED TO TEST THE PROCEDURE.

123. GANE, M. 1968. POLICY, PROFITS, AND PREDICTIONS IN FORESTRY. COMMONWEALTH FOREST. REV. 47(1):27-33. SIMULATION OF THE ENTIRE WOOD-BASED SECTOR OF A NATION'S ECONOMY IS POSSIBLE, USING MATHEMATICAL MODELS THAT PROVIDE PREDICTIONS OF THE PROBABLE OUTCOME OF ANY MANAGEMENT OPTIONS THE FORESTER MAY WISH TO CONTEMPLATE. MODELS FOR TRINIDAD ARE ALREADY IN OPERATION, AND FURTHER MODELS ARE PLANNED FOR FIJI AND THE UNITED KINGDOM.

124. GANE, M. 1969. PRIORITIES IN PLANNING: COST-BENEFIT METHODOLOGY AND SIMULATION WITH SPECIAL REFERENCE TO FORESTRY AND ECONOMIC DEVELOPMENT IN TRINIDAD. COMMONWEALTH FOREST. INST. PAP. 43, 101 PP. THIS STUDY OF THE PROBLEMS OF ALLOCATING RESOURCES IN LESS-DEVELOPED COUNTRIES BEGINS WITH A CRITICAL EXAMINATION OF THE RELEVANT CONCEPTS AND CRITERIA, USING THE COMPLEX CONDITIONS IN TRINIDAD AS AN EXAMPLE. THIS IS FOLLOWED BY A DESCRIPTION OF THE DEVELOPMENT AND APPLICATION OF SIMULATION MODELS USED IN APPLYING THESE THEORETICAL CONCEPTS AND

CRITERIA TO A STUDY OF THE WOOD-BASED SECTOR OF THE TRINIDAD ECONOMY.

125. GARCIA, O. 1969. PROBLEMS AND MODELS IN THE MANAGEMENT OF FORESTRY PLANTATIONS. M.S. THESIS. UNIV. CHILE, SANTIAGO. OPERATIONS RESEARCH AND CONTROL THEORY ARE USED IN DEVELOPING MODELS FOR FOREST PLANTATION MANAGEMENT.

126. GASS, S. I. 1964. LINEAR PROGRAMMING. ED. 2, 280 PP. NEW YORK: MCGRAW-HILL BOOK CO. CHAPTERS ON: MATHEMATICAL BACKGROUND, THE GENERAL LP PROBLEM, THE SIMPLEX COMPUTATIONAL PROCEDURE, THE DUALITY PROBLEMS OF LP, THE REVISED SIMPLEX METHOD, DEGENERACY PROCEDURES, PARAMETRIC LINEAR PROGRAMMING, ADDITION COMPUTATIONAL TECHNIQUES, THE TRANSPORTATION PROBLEM, GENERAL LINEAR PROGRAMMING APPLICATIONS, LINEAR PROGRAMMING, AND THE THEORY OF GAMES.

127. GATEJ, P. 1968. (A MATHEMATICAL MODEL FOR DETERMINING ALLOWABLE CUT IN A REGULAR HIGH FOREST.) INST. POLIT. BRASOV BULL. (SER. B, ECON. FOREST.) 10:193-197. (RUMANIAN, WITH SUMMARIES IN ENGLISH, GERMAN, RUSSIAN.) A DISCUSSION OF THE FEASIBILITY OF USING MATHEMATICAL PROGRAMMING IN FOREST MANAGEMENT, AND A PROPOSED MATHEMATICAL MODEL FOR DETERMINING ALLOWABLE CUT IN A FOREST OF NORMAL AGE STRUCTURE.

128. GEISLER, O. 1968. (PLANNING AND UTILIZATION OF CAPACITY.) IN, MODERN MATHEMATICAL TECHNIQUES SOZIAL. FORSTW. 18(9):257-269. BERLIN. (GERMAN.) A DESCRIPTION OF OPTIMIZING TECHNIQUES FOR DETERMINING THE NUMBER AND TYPES OF MACHINES REQUIRED FOR REFORESTATION IN COTTBUS DISTRICT, AND THE USE OF NETWORK AND CRITICAL-PATH ANALYSIS FOR THE PLANNING OF THEIR OPTIMUM UTILIZATION DURING THE YEAR.

129. GOULD, E. M., JR. 1967. SIMULATION AND FORESTRY. INT. UNION FOREST. RES. ORGAN. CONGR. 14 PAP. VOL. 6:96-104. MUNICH. A COMPUTERIZED MODEL OF THE FOREST IS DISCUSSED.

130. GOULD, E. M., JR., AND W. G. O'REGAN. 1965. SIMULATION - A STEP TOWARD BETTER FOREST PLANNING. HARVARD FOREST PAP. 13, 86 PP. THE READER IS INTRODUCED TO THE USEFULNESS OF MODELS IN PLANNING, ESPECIALLY FOR COMPARING THE PROBABLE OUTCOME OF FOREST MANAGEMENT ALTERNATIVES. A SAMPLE PROBLEM OF A SIMPLE FOREST OPERATING UNIT IS PRESENTED TO AID THOSE INTERESTED IN THE

TECHNIQUE OF SUBMITTING A PROBLEM TO THE COMPUTER.

131. GREVATT, J. G., AND P. A. HAROLE. 1967. TWO MATHEMATICAL MODELS TO AID IN NURSERY PRACTICE. INT. UNION FOREST. RES. ORGAN. CONGR. 14 PROC. PT. VI, SECT. 25:361-370. MUNICH A SIMULATION MODEL, DEVELOPED BY THE FORESTRY COMMISSION IN BRITIAN, WAS DESIGNED TO INDICATE PROGRAMS OF SOWING, TRANSPLANTING, AND STORAGE TO YIELD THE REQUIRED PLANTING STOCK AT LEAST COST. A MODEL WAS ALSO DEVELOPED FOR CALCULATING THE ALLOCATION OF STOCK TO NURSERIES IN RELATION TO SUPPLY, DEMAND, AND TRANSPORT COSTS.

132. GUE, R. L., AND M. E. THOMAS. 1968. MATHEMATICAL METHODS IN OPERATIONS RESEARCH. 385 PP. NEW YORK: MACMILLAN CO. CONTENTS INCLUDE: CLASSICAL OPTIMIZATION TECHNIQUES, LINEAR PROGRAMMING, NONLINEAR PROGRAMMING, DYNAMIC PROGRAMMING, THEORY OF QUEUES, DECISIONS AND GAMES, GRAPHS AND NETWORKS, AND MATRIX ALGEBRA.

133. GUTHRIE, T. L. 1966. OPTIMUM MANAGEMENT PLANNING FOR A SMALL UNEVEN-AGED WOODLAND THROUGH SIMULATION. M.S. THESIS, PURDUE UNIV., LAFAYETTE, IND. AN EXPLORATION THROUGH SIMULATION OF THE POSSIBILITY OF SUBDIVIDING SMALL WOODLANDS INTO A GROUP OF COMPARTMENTS FOR MANAGEMENT PURPOSES. THE MODEL SIMULATES MANAGEMENT ALTERNATIVES AND DETERMINES THE OPTIMUM PLAN BASED UPON THE DISCOUNTED CASH FLOW CRITERION. RESULTS INDICATE THAT SUCH COMPARTMENTATION IS DESIRABLE AND THAT PROBLEMS CAN BE RESOLVED BY USING SHORT CUTTING CYCLES AND LOGGING INTERVALS.

134. GUTTENBERG, S., AND C. FASICK. 1968. ECONOMICS OF PLYWOOD PRODUCTION IN THE SOUTHERN PINE REGION. FOREST PROD. J. 18(5):43-47. LINEAR PROGRAMMING MODELS FOR ANALYZING PLYWOOD PRODUCTION POSSIBILITIES ARE DEVELOPED FOR A COMPLETE LINE OF SOFTWOOD PLYWOOD. THE OBJECTIVE FUNCTION IS TO MAXIMIZE NET REVENUE OF PLYWOOD PRODUCTION BASED ON: PRICES FOR VENEERS, CORES AND CHIPS; YIELDS OF VENEER, CORES, AND CHIPS; COSTS FOR LOGS; AND LOG VOLUME BY DIAMETER CLASSES.

135. HADLEY, G. 1962. LINEAR PROGRAMMING. 520 PP. READING, MASS.: ADDISON-WESLEY PUBLISHING CO. CHAPTERS ON: MATHEMATICAL BACKGROUND, THEORY OF THE SIMPLEX METHOD, COMPUTATIONAL ASPECTS OF THE SIMPLEX METHOD, THE DEGENERACY PROBLEM, DUALITY, TRANSPORTATION PROBLEMS, NETWORK FLOWS.

APPLICATION OF LP TO INDUSTRIAL PROBLEMS AND ECONOMIC THEORY.

136. HADLEY, G. 1964. NONLINEAR AND DYNAMIC PROGRAMMING. 484 PP. READING, MASS.: ADDISON-WESLEY PUBLISHING CO. CHAPTERS ON: MATHEMATICAL BACKGROUND, CLASSICAL OPTIMIZATION METHODS AND PROPERTIES OF CONVEX FUNCTIONS, APPROXIMATE METHODS FOR SOLVING PROBLEMS INVOLVING SEPARABLE FUNCTIONS, STOCHASTIC PROGRAMMING, KUHN-TUCKER THEORY, QUADRATIC PROGRAMMING, INTEGER LINEAR PROGRAMMING, GRADIENT METHODS, AND DYNAMIC PROGRAMMING.

137. HADLEY, G., AND T. M. WHITIN. 1963. ANALYSIS OF INVENTORY SYSTEMS. 452 PP. ENGLEWOOD CLIFFS, N.J.: PRENTICE-HALL, INC. THIS BOOK ALSO DISCUSSES ELEMENTS OF STATISTICS, MARKOV PROCESSES, AND EVEN DYNAMIC PROGRAMMING AND ITS USES IN INVENTORY MODELS.

138. HALL, O. F. 1960. FOREST VALUATION USING INVENTORY DATA. FOREST MANAGE. CONTR. CONF. PROC.:199-207. PURDUE UNIV., LAFAYETTE, IND. THREE METHODS OF VALUATION OF FORESTED PROPERTY ARE DISCUSSED: VALUE FOR IMMEDIATE LIQUIDATION, MARKET VALUE TO ANY OWNER FOR CONTINUOUS PRODUCTION, AND STRATEGIC VALUE TO A PARTICULAR OWNER. AN ILLUSTRATION IS GIVEN USING LINEAR PROGRAMMING TECHNIQUES FOR FINDING THE OPTIMUM METHOD OF OPERATION FOR A SMALL PULPMILL WITH ALTERNATIVE SOURCES OF WOOD (VIZ. LAND PURCHASE, LAND ALREADY OWNED, FARM WOODLANDS, RAIL TRANSPORT FROM A DISTANCE).

139. HALL, O. F. 1967. NEW TOOLS FOR PLANNING AND DECISION MAKING. J. FOREST. 65(7):467-473. MANAGEMENT SCIENCE IS BEGINNING TO PRODUCE ANALYTICAL METHODS BETTER ABLE TO ANSWER POLICY QUESTIONS FACING MANAGERS OF FOREST LAND. ORGANIZATIONS HAVE COMMON CHARACTERISTICS, WHOSE STUDY (KNOWN GENERALLY AS THE SYSTEMS APPROACH) HAS LED TO MORE DEFINITIVE AND QUANTIFIABLE DESCRIPTIONS OF ORGANIZATIONS. THE DECENTRALIZED APPROACH WITHIN PLANTS THROUGH INVESTMENT (PROFIT) CENTERS IS ANOTHER RECENT AND IMPORTANT MANAGEMENT CONCEPT. SPECIFIC TOOLS FOR DECISION-MAKERS, INCLUDING SIMULATION, MATHEMATICAL PROGRAMMING, DISCOUNTED CASH FLOW, AND REAL-TIME MANAGEMENT INFORMATION SYSTEMS ARE DESCRIBED, AND EXAMPLES OF THEIR APPLICATION ARE CITED.

140. HAMILTON, H. R. 1963. RESEARCH TAKES AIM AT HARVESTING AND WOODFLOW PROBLEMS IN THE SOUTH. PULP AND PAPER MAG. CAN. 37(1):51-53. BATTELLE

MEMORIAL INSTITUTE, UNDER SPONSORSHIP OF THE AMERICAN PULPWOOD ASSOCIATION, IS CONDUCTING RESEARCH ON PULPWOOD PROBLEMS IN THE SOUTHEAST. THE PURPOSE OF THE PROJECT (WHICH INVOLVES A DYNAMIC MATHEMATICAL MODEL), THESOCIAL AND PHYSICAL SCIENCES CONTRIBUTING TO IT, AND THE PROBLEMS IT FACES - - SUCH AS SMALL WOODLANDS, MAN-HOUR, AND MILL-SUPPLIER RELATIONSHIPS - - ARE DISCUSSED.

141. HAMILTON, H. R. 1963. SUMMARY REPORT TO AMERICAN PULPWOOD ASSOCIATION ON A SUMMARY OF THE SOUTHERN PULPWOOD PRODUCTION RESEARCH PROJECT. BATTELLE MEMORIAL INST., 20 PP. THE 1955 AND 1959 WOOD SHORTAGES FOCUSED INDUSTRY ATTENTION ON PULPWOOD HARVESTING AND PROCUREMENT. IN ADDITION TO SPECIFYING CHANGES IN TECHNOLOGY TO LOWER COST, THE REPORT RECOMMENDS IMPROVEMENT OF TECHNOLOGY AND MANAGEMENT PROCEDURES. LINEAR PROGRAMMING IS SHOWN TO BE A USEFUL TOOL IN SELECTING FOREST PRACTICES.

142. HAMILTON, H. R. 1964. ATTACKING A PAPER INDUSTRY PROBLEM BY SIMULATION. TAPPI 47(11):678-683. A DYNAMIC MATHEMATICAL MODEL OF WOOD PROCUREMENT IN THE SOUTHEASTERN UNITED STATES WAS CONSTRUCTED USING THE INDUSTRIAL DYNAMICS TECHNIQUE. SIMULATION WITH THE MODEL POINTS TO THE DESIRABILITY OF CHANGING THE WOOD-HAULING PORTION OF THE PROCUREMENT SYSTEM FROM PRODUCER-HAULING TO CONTRACT-HAULING.

143. HAMILTON, H. R. 1966. HIGHLIGHTS OF THE BATTELLE STUDY OF SOUTHEASTERN PULPWOOD HARVESTING. AMERICAN PULPWOOD ASSOC. TECH. REL. 66-R-10, 25 PP, NEW YORK. PRIMARILY A GENERAL DISCUSSION OF ALL ASPECTS OF THE STUDY. HOWEVER, ON PAGES 22 TO 25, THE COMPUTER SIMULATION MODEL IS DISCUSSED, INCLUDING THE RESULTS THAT WERE OBTAINED WHEN LABOR SHORTAGES AND WEATHER WERE VARIED IN THE MODEL.

144. HAMILTON, H. R., AND A. L. PUPH, III. 1963. PROGRESS REPORT TO AMERICAN PULPWOOD ASSOCIATION ON A DYNAMIC, MATHEMATICAL MODEL OF PULPWOOD PRODUCTION IN THE SOUTHEAST. BATTELLE MEMORIAL INST., 32 PP. PLUS APPENDICES. CONTRACT HAULING OFFERS A MEANS FOR THE PRODUCER TO EFFECTIVELY ALTER CREW SIZE WITHOUT MAKING LONG-TERM FINANCIAL COMMITMENTS. PRODUCERS SHOULD ALSO EXAMINE FINANCIAL AND OPERATIONAL ALTERNATIVES TO THE FLUCTUATING SEASONAL INVENTORY POLICIES NOW COMMON IN THE SOUTHEAST.

145. HAMMERSLEY, J. M., AND D. C. HANDSCOMB. 1964. MONTE CARLO METHODS. 178 PP. LONDON: METHUEN AND CO., LTD. A SURVEY OF MONTE CARLO TECHNIQUES.

146. HAYNES, R. W. 1968. AN APPROACH TO CONSIDERING UNCERTAINTY IN DEVELOPING LONG-TERM, LEAST-COST WOOD PROCUREMENT POLICIES. M.S. THESIS, VA. POLYTECH. INST., BLACKSBURG. UNCERTAINTY IS INTRODUCED INTO A WOOD PROCUREMENT PROBLEM THROUGH THE USE OF A PARTIAL STOCHASTIC LINEAR PROGRAM.

147. HETRICK, J. C. 1968. ROLE OF THE COMPUTER. FIFTH ANN. FOREST INDUS. MARKET. CONF. PROC. (THE DYNAMICS OF DISTRIBUTION):31-51. UNIV. OREG., FOREST INDUS. MANAGE. CENTER, PORTLAND. A COMPUTERIZED MODEL CAN BE DEVELOPED TO REPRESENT THE DISTRIBUTION SYSTEM OF A COMPANY. THE MODEL TELLS MANAGEMENT THE VARIOUS OPTIONS IT HAS IN DECIDING OPTIMUM INVENTORY SIZE AND NUMBER OF WAREHOUSES IN RELATION TO VOLUME AND PATTERN OF SALES DEMAND.

148. HEWSON, T. A. 1960. SIMULATION OF PULPWOOD INVENTORY DYNAMICS IN THE OPERATION OF AN INTEGRATED PULP AND PAPER MILL. TAPPI 43(6):518-527. A MATHEMATICAL MODEL WAS CONSTRUCTED FOR ONE OF ST. REGIS' INTEGRATED PULP AND PAPER MILLS. THE MODEL IS DESIGNED TO EXPOSE PROPOSED OPERATING POLICIES AND PROCEDURES AS WELL AS CONTEMPLATED CHANGES IN PRODUCTION CAPACITY TO THE FULL RANGE OF EFFECTS OF WEATHER, LABOR, TRANSPORTATION, STUMPAGE, MACHINE SCHEDULES, ETC., WHICH ARE LIKELY TO BE ENCOUNTERED.

149. HIRSHLEIFER, J. 1961. THE BAYESIAN APPROACH TO STATISTICAL DECISION: AN EXPOSITION. J. BUS. 34(10):471-489. THIS ARTICLE BEGINS WITH A BRIEF AND LUCID GENERAL DISCUSSION OF THE DIFFERENCE BETWEEN THE BAYESIAN APPROACH AND THE PROCEDURE WHICH LEADS TO SIGNIFICANCE TESTS BASED ON RULE-OF-THUMB SUBJECTIVE METHODS. DIFFERENCES BETWEEN THE TWO APPROACHES ARE EXPLORED BY USING AN EXAMPLE PROBLEM.

150. HOFLE, H. H. 1967. BEST MECHANICAL ORGANIZATION IN THE PRODUCTION OF SOFTWOOD PRODUCTS THROUGH THE USE OF LINEAR PROGRAMMING. AUS. DEM INSTITUTE FUR FORSTBENUTZUNG UND FORSTLICHE, ARBEITSWISSENSCHAFT DER UNIVERSITAT FREIBURG. 236 PP. (IN GERMAN, SUMMARY IN ENGLISH.) PRINCIPLES OF SYSTEMS ANALYSIS EXEMPLIFIED BY THE FOREST FIRM CONVERTING SMALL-DIAMETER WOOD TO SALABLE PRODUCTS. STEPS IN MODEL BUILDING, CONCEPTS OF

LINEAR PROGRAMMING.

151. HOLLAND, I. I., AND G. G. JUDGE. 1963. ESTIMATED INTERREGIONAL FLOWS OF HARDWOOD AND SOFTWOOD LUMBER. J. FOREST. 61(7):488-497. THE FLOW OF HARDWOOD AND SOFTWOOD LUMBER BETWEEN REGIONS IN THE UNITED STATES IN 1958 IS DESCRIBED. TRANSPORTATION COSTS OF LUMBER FLOWS BETWEEN SURPLUS AND DEFICIT REGIONS ARE MINIMIZED BY USE OF A LINEAR PROGRAMMING TRANSPORTATION MODEL.

152. HOLLEY, D. L. 1968. A LINEAR PROGRAMMING ANALYSIS OF THE POTENTIAL FOR MAJOR SOFTWOOD TIMBER REGIONS TO COMPETE IN PLYWOOD AND LUMBER MARKETS. PH.D. DISS., N.C. STATE UNIV., RALEIGH. LINEAR PROGRAMMING WAS USED TO SOLVE A SPATIAL EQUILIBRIUM MODEL THAT WAS DESIGNED: TO DETERMINE THE POTENTIAL FOR THE PLYWOOD INDUSTRY TO EXPAND IN THE SOUTH AND IN THE INLAND AREAS OF THE WEST, TO DETERMINE WHAT AFFECTS THE REGIONAL SHIFT IN PLYWOOD PRODUCTION WILL HAVE ON THE LOCATION OF THE LUMBER INDUSTRY, AND TO DETERMINE THE EFFECTS THAT REGIONAL SHIFTS IN PLYWOOD AND LUMBER PRODUCTION WILL HAVE ON STUMPAGE AND PRODUCE PRICES.

153. HOLLEY, D. L. 1969. POTENTIAL GROWTH OF THE SOUTHERN PINE PLYWOOD INDUSTRY. USDA FOREST SERV., SOUTH. FOREST EXP. STA., RES. PAP. NO. SO-41, 22 PP, NEW ORLEANS, LA. THE OPTIMUM DISTRIBUTION OF PLYWOOD PRODUCTION IN THE UNITED STATES WAS ESTIMATED BY MEANS OF LINEAR PROGRAMMING. THE RESULTS INDICATE THAT IN 1975, THE SOUTH WILL BE SUPPLYING 30 PERCENT OF THE TOTAL PROJECTED NATIONAL CONSUMPTION OF SOFTWOOD PLYWOOD AND MAINTAINING ITS OUTPUT OF SAWN TIMBERS.

154. HOLLEY, D. L. 1970. SOFTWOOD PLYWOOD AND LUMBER INDUSTRIES: A REGIONAL PROGRAMMING ANALYSIS. LAND ECON. 46(2):127-137. AN ANALYSIS OF THE CURRENT STATE OF LOCATIONAL INSTABILITY IN THE PLYWOOD AND LUMBER INDUSTRIES USING A SPATIAL EQUILIBRIUM TRANSPORTATION MODEL. USING 1965 PRODUCTION DATA, THE ANALYSIS MEASURES HOW FAR THE LOCATION OF THE TWO INDUSTRIES HAS DRIFTED FROM THE PERFECTLY COMPETITIVE IDEAL.

155. HOOL, J. N. 1965. A DYNAMIC PROGRAMMING - - MARKOV CHAIN APPROACH TO FOREST PRODUCTION CONTROL. PH.D. DISS., PURDUE UNIV., LAFAYETTE, IND. A PRESENTATION OF A MATHEMATICAL CONTROL METHOD THAT CONSIDERS THE EFFECTS OF INCOMPLETELY CONTROLLED

INFLUENCES ON RENEWABLE NATURAL RESOURCES. THIS APPROACH COMBINES DYNAMIC PROGRAMMING, A GENERAL MATHEMATICAL SOLUTION METHOD, WITH MARKOV CHAINS.

156. HOOL, J. N. 1966. A DYNAMIC PROGRAMMING - - MARKOV CHAIN APPROACH TO FOREST PRODUCTION CONTROL. FOREST SCI. MONOG. 12, 26 PP. WASHINGTON, D.C. WHEN THE DYNAMIC PROGRAMMING-MARKOV CHAIN METHOD IS USED IT IS POSSIBLE TO PRESCRIBE FOR ANY PLANNING INTERVAL AND, AT ANY POINT WITHIN IT, THE OPTIMAL CONTROL ACTIVITY FOR EVERY POSSIBLE CONDITION OF THE SYSTEM. AN EXAMPLE CONCERNED WITH FOREST PRODUCTION IS PRESENTED.

157. HOOL, J. N. 1966. A DYNAMIC PROGRAMMING - PROBABILISTIC APPROACH TO FOREST PRODUCTION CONTROL SOC. AMER. FOREST. PROC. 1965:191-193. A BRIEF EXPOSITION OF A PROBABILISTIC DECISION-MAKING METHOD THAT CAN BE USED IN PRESCRIBING FOREST YIELD-REGULATION OPERATIONS SUCH AS THINNING AND HARVESTING OVER ANY LENGTH OF TIME WHILE ALLOWING FOR RANDOM DEVELOPMENT IN THE FOREST SYSTEM. THE METHOD COMBINES STOCHASTIC AND OPTIMIZATION TECHNIQUES FOR PRESCRIBING THE OPERATIONS.

158. HOOL, J. N. 1968. AN UNIVARIATE ALLOCATION ALGORITHM FOR USE IN FORESTRY PROBLEMS. J. FOREST. 66(6):492-493. A DYNAMIC PROGRAMMING ALGORITHM FOR THE OPTIMIZATION OF UNIVARIATE ALLOCATION PROBLEMS IS ILLUSTRATED BY A HYPOTHETICAL MAXIMIZATION PROBLEM. THE ALGORITHM REQUIRES THE EVALUATION OF ONLY A FRACTION OF THE TOTAL NUMBER OF POSSIBLE ALLOCATION COMBINATIONS.

159. HOWARD, R. A. 1965. A MODEL FOR TREE GROWTH. M.S. THESIS, UNIV. CALIF., BERKELEY. THE PRESENTATION OF A MODEL THAT GENERATES ANNUAL VALUES FOR HEIGHT AND DIAMETER GROWTH, ANNUAL RING SUMMERWOOD PERCENT, AND SPECIFIC GRAVITY AT BREAST HEIGHT FOR AN INDIVIDUAL TREE. OPERATING RULES TO DESCRIBE THE EFFECT OF SITE QUALITY, STAND DENSITY, AND CLIMATIC FACTORS ON THE DESIRED OUTPUTS WERE DEVISED FROM PUBLISHED RESEARCH FINDINGS. THE MODEL IS PROGRAMMED FOR COMPUTER SIMULATION ANALYSIS OF A 40-YEAR PERIOD OF GROWTH.

160. HOWELL, R. A. 1963. LINEAR PROGRAMMING FOR THE SELECTION OF AN OPTIMUM FOREST HARVESTING SCHEDULE. M.S. THESIS, UNIV. FLA. GAINESVILLE. THE TRANSPORTATION METHOD OF LINEAR PROGRAMMING WAS USED TO DETERMINE A BEST HARVESTING SEQUENCE FOR THREE DIFFERENT MANAGEMENT OBJECTIVES (AREA

CONTROL, FUTURE AREA CONTROL, AND VOLUME CONTROL). IN EVALUATING THE EFFECTIVENESS OF THE PROGRAM, THE POOREST POSSIBLE HARVESTING SCHEDULE WAS COMPUTED FOR EACH TYPE OF MANAGEMENT. IN EACH CASE, IT WAS FOUND THAT THE LINEAR PROGRAMMING SOLUTION COULD HAVE PROVIDED A SUBSTANTIAL INCREASE IN THE PRESENT VALUE OF PROPERTY.

161. HUGHES, J. M. 1970. FORESTRY IN ITASCA COUNTY'S ECONOMY - - AN INPUT-OUTPUT ANALYSIS. UNIV. MINN., AGR. EXP. STA., MISC. RPT. 95, FOREST. SERIES 4, 98 PP. MINNEAPOLIS. A 39 BY 39 SECTOR INPUT-OUTPUT MODEL OF THE ITASCA COUNTY (MINN.) ECONOMY FOR 1966 WAS CONSTRUCTED, AND MULTIPLIERS WERE DEVELOPED FOR ESTIMATING SHORT-RUN IMPACTS OF POTENTIAL CHANGES. FORESTRY-RELATED SECTORS, INCLUDING TIMBER PRODUCTION, SAWMILLING, AND TIMBER OPERATORS WERE GIVEN MAJOR ATTENTION, SINCE THESE ACTIVITIES HAVE EXPANSION POSSIBILITIES IN THE COUNTY AND PERHAPS REPRESENT SOME OPPORTUNITIES FOR FUTURE DEVELOPMENT. SEVERAL EXAMPLES OF POSSIBLE CHANGES ARE ALSO PRESENTED.

162. HUGHES, J. M. 1970. SMALL AREA INPUT-OUTPUT STUDIES OF FORESTRY-RELATED ACTIVITIES IN MINNESOTA. PAPER PRESENTED AT MINN. CHAMBER OF COMM. INPUT-OUTPUT CONF., 10 PP. MINNEAPOLIS. THE HIGHLIGHTS OF THE ITASCA COUNTY INPUT-OUTPUT STUDY ARE DISCUSSED (SEE PREVIOUS CITATION) AND BRIEF DESCRIPTIONS OF TWO ADDITIONAL INPUT-OUTPUT STUDIES ARE PRESENTED.

163. HURWICZ, L. 1955. GAME THEORY AND DECISIONS. SCI. AMER. 192(2):78-83. A NONTECHNICAL EXPLANATION OF GAME THEORY ILLUSTRATED BY SIMPLE MATHEMATICAL PROBLEMS. THE THEORY PROVIDES A WAY IN WHICH PROBLEMS INVOLVING UNCERTAINTY CAN BE TREATED SCIENTIFICALLY BY MEANS OF THE MATHEMATICS OF PROBABILITITY. THERE IS A SHORT DISCUSSION OF THE VARIOUS STRATEGIES AN INDIVIDUAL CAN EMPLOY TO MAXIMIZE HIS GAIN AND MINIMIZE HIS LOSS.

164. INSTITUTE OF FOREST ECONOMICS. 1968. ANNUAL REPORT NO. 7. AGR. COLL. NORWAY, VOLLEBEKK, NORWAY. 72 PP. A DISCUSSION OF THE USE OF OPERATIONS RESEARCH IN FORESTRY, ESPECIALLY DYNAMIC PROGRAMMING, IS INCLUDED.

165. JABLOKOV, A. N. 1965. (THE USE OF ELECTRONIC COMPUTERS FOR CALCULATING MAXIMUM OUTTURNS OF SAWN TIMBER.) LESN. Z. ARHANGEL'SK 8(6):152-159. (IN RUSSIAN.) A THEORETICAL STUDY IN WHICH THE AUTHOR ANALYZES CONVENTIONAL MATHEMATICAL MODELS

USED IN SAWMILLING FOR CALCULATING FRAME-SAW SCHEDULES THAT WILL GIVE OPTIMUM BOARD OUTTURN FROM GIVEN LOG DIMENSIONS IN ORDER TO DERIVE AN ALGORITHM FOR PROGRAMMING ANALOG AND DIGITAL COMPUTERS TO CARRY OUT THESE CALCULATIONS.

166. JACK, W. H. 1967. A SIMPLE EXAMPLE OF MANAGEMENT PLANNING. N. IRE. FOREST. 8(2):8-13. LINEAR PROGRAMMING IS USED IN A SIMPLE EXAMPLE TO DETERMINE THE BEST MARKET FOR A MIX OF PRODUCTS AND FORESTS.

167. JACKSON, N. D. 1958. A METHOD OF DETERMINING THE OPTIMUM WAYS OF CONVERTING SAWLOGS INTO LUMER. M.S. THESIS, N.C. STATE COLL., RALEIGH. TWO DIFFERENT TYPES OF PROBLEMS, PROFIT MAXIMIZATION AND PRODUCTION MAXIMIZATION, ARE EXAMINED TO ILLUSTRATE HOW LINEAR PROGRAMMING CAN BE APPLIED TO THE SAWMILL INDUSTRY. THE FIRST PROBLEM DEMONSTRATES THAT LINEAR PROGRAMMING CAN BE EFFECTIVELY USED TO COMPUTE OPTIMUM SAWING METHODS TO PRODUCE LUMBER THAT WILL RETURN MAXIMUM PROFITS. THE SECOND PROBLEM DEALS WITH ALLOCATION OF MACHINE AND LABOR TIME SO THAT DAILY PRODUCTION OF THE MILL IS MAXIMIZED.

168. JACKSON, N. D., AND G. W. SMITH. 1961. LINEAR PROGRAMMING IN LUMBER PRODUCTION. FOREST PROD. J. 11(6):272-274. A TECHNIQUE FOR DETERMINING THE OPTIMUM COMBINATION OF LUMBER SIZES TO BE CUT FROM EACH LOG IS DESCRIBED, TAKING INTO ACCOUNT AVAILABLE LOG SIZES, SALES RESTRICTIONS IMPOSED BY THE PURCHASER, CONVERSION COSTS, AND PRICES FOR THE DIFFERENT DIMENSIONS YIELDED BY EACH LOG; AND ILLUSTRATED BY DATA FROM ELEVEN NORTH CAROLINA MILLS.

169. JEFFERS, J. N. R. 1964. MATHEMATICAL MODELS IN FORESTRY RESEARCH. COMMONWEALTH FOREST REV. 43(2):159-168. THE ADVANTAGES OF MATHEMATICAL MODELS FOR SIMULATING PRACTICAL SITUATIONS FOR PURPOSES OF DESCRIPTION, PREDICTION, AND DECISION-MAKING ARE PRESENTED. THE MAINTENANCE OF FOREST SEED STOCKS, THE PRODUCTION AND ALLOCATION OF NURSERY STOCK, THE RECRUITMENT OF INDUSTRIAL LABOR, THE COST OF ESTBLISHMENT OF PLANTATIONS, THE ALLOCATION OF SUPERVISORY STAFF, AND PRODUCTION PLANNING PROVIDE EXAMPLES OF THEIR USE.

170. JONES, T. A. 1960. LINEAR PROGRAMMING APPLIED TO A WOOD SUPPLY PROBLEM. FOREST MANAGE. CONTR. CONF. PROC., PURDUE UNIV., LAFAYETTE, IND. A PRESENTATION OF A METHOD FOR MINIMIZING COSTS IN A

SUPPLY SYSTEM AS IT ACTUALLY EXISTS IN THE PULP AND PAPER INDUSTRY. WOOD OF DIFFERENT SPECIES, BARKED AND DEBARKED, IS ALLOCATED TO SEVERAL PULPMILLS OVER RAIL OR BY TRUCK.

171. KAISER, H. F., JR. 1965. CHRISTMAS TREES, DECISION TREES, AND MODERN CAPITAL MANAGEMENT. M.S. THESIS, IOWA STATE UNIV., IOWA CITY. A QUANTITATIVE MODEL BUILT ON THE DECISION-TREE CONCEPT IS PRESENTED TO SERVE AS AN AID TO AN INVESTOR INTERESTED IN THE EVALUATION OF SEQUENTIAL DECISIONS INVOLVING CHRISTMAS TREE PRODUCTION. THE MODEL DEMONSTATES THE INTERACTION BETWEEN PRESENT DECISIONS, CONDITIONAL PROBABILITIES, AND POSSIBLE FUTURE DECISIONS.

172. KAISER, H. F., JR. 1968. INTERINDUSTRY MODEL OF THE U.S. FOREST PRODUCTS ECONOMY. FOREST PROD. J. 18(11):15-18. AN IMPUT-OUTPUT MODEL IS DEVELOPED TO SHOW THE FLOW OF GOODS THROUGH THE FOREST PRODUCTS ECONOMY. DATA FROM THE 1963 CENSUS OF MANUFACTUREPES ARE USED TO ANALYZF EACH FOREST INDUSTRY'S CONTRIBUTION TO THE ECONOMY. DIRECT AND INDIRECT EFFECTS OF AN INCREASE IN FINAL DEMAND FROM EACH INDUSTRIAL SECTOR ARE DETERMINED.

173. KAISER, H. F., JR. 1969. INPUT-OUTPUT ANALYSIS OF THE SOUTHERN FOREST ECONOMY, 1963. USDA FOREST SERV., SOUTH. FOREST EXP. STA., RES. PAP. SO-43, 18 PP. NEW ORLEANS, LA. AN INPUT-OUTPUT MODEL IS DEVELOPED TO SHOW THE FLOW OF GOODS THROUGH THE SOUTHERN FOREST ECONOMY. ANLYSIS OF UNPUBLISHED DATA FROM THE 1963 CENSUS OF MANUFACTURES INDICATES THAT PRIMARY PROCESSING INDUSTRIES PRODUCED $5,126 MILLION WORTH OF OUTPUT WHILE PURCHASING STUMPAGE COSTING $335 MILLION. SECONDARY PROCESSING INUSTRIES CONVERTED A PORTION OF THIS OUTPUT INTO PRODUCTS WORTH $3,365 MILLION. COLLECTIVELY, FOREST-RELATED INDUSTRIES PAID $2,181 MILLION IN WAGES TO SOUTHERNERS.

174. KASATKIN, M. G. 1966. APPLYING A DETERMINISTIC MODEL TO A DYNAMIC PRODUCTION SCHEDULING. SEMINAR ON OPER. RES. IN FOREST PROD. INDUS. PROC.:40-51. IBM CORP., LOS ANGELES, CALIF. AN ALLOCATION MODEL IS USED IN A PRODUCTION-SCHEDULING PROBLEM THAT CONSISTS OF DIRECTING ORDERS OF VARIOUS GRADES AND WEIGHTS OF PAPER TO THE PROPER MACHINE FOR THE MOST EFFICIENT AS WELL AS PROFITABLE SOLUTION.

175. KEMENY, J. G., A. SCHLEIFER, JR., J. L. SNELL, AND G. L. THOMPSON. 1962. FINITE MATHEMATICS WITH

BUSINESS APPLICATIONS. 482 PP. ENGLEWOOD CLIFFS, N.J.: PRENTICE-HALL, INC. CONTENTS: COMPOUND STATEMENTS, SETS AND SUBSETS, PARTITIONS AND COUNTING, PROBABILITY THEORY, VECTORS AND MATRICES, MATHEMATICS OF FINANCE AND ACCOUNTING, LINEAR PROGRAMMING, AND THE THEORY OF GAMES.

176. KENNEDY, J. J., JR. 1966. THE ECONOMIC IMPACT OF OUTDOOR RECREATION ACTIVITIES ON A RURAL AREA ECONOMY: AN INPUT-OUTPUT APPROACH. M.S. THESIS, PENN STATE UNIV., UNIVERSITY PARK. A VARIATION OF THE LEONTIEF INPUT-OUTPUT MODEL DESIGNED AND CONSTRUCTED BY H. B. GAMBLE (1965) WAS APPLIED TO ESTIMATE THE ECONOMIC IMPACT OF OUTDOOR RECREATION EXPENDITURES UPON RURAL AREA ECONOMICS. THE QUANTITATIVE CONCLUSIONS RESULTING FROM INPUT-OUTPUT ANALYSIS MUST BE SUPPLEMENTED WITH QUALITATIVE CONSIDERATIONS OF THE SHORT AND LONG RUN CONSEQUENCES OF SUCH ALTERNATIVES.

177. KIDD, W. E., JR. 1965. A LINEAR PROGRAMMING APPROACH TO EVALUATING FOREST MANAGEMENT ALTERNATIVES. M.S. THESIS, VA. POLYTECH. INST., BLACKSBURG. THE APPROPRIATENESS OF ADAPTING LINEAR PROGRAMMING TO EVALUATION OF TIMBER-HARVESTING ALTERNATIVES IS EXAMINED. USE OF LINEAR PROGRAMMING RATHER THAN ONE OF SEVERAL OTHER ECONOMIC ALLOCATION MODELS IS JUSTIFIED. THE BASIC MODEL DESCRIBES ALTERNATIVE THINNING AND HARVESTING OPPORTUNITIES ON THE SEWARD FOREST AT TRIPLETT, VIRGINIA, AND THE SOLUTION DESCRIBES A COURSE OF ACTION FOR THE FOREST MANAGER OVER THE NEXT 50 YEARS.

178. KIDD, W. E., JR., E. F. THOMPSON, AND P. H. HOEPNER. 1966. FOREST REGULATION BY LINEAR PROGRAMMING - A CASE STUDY. J. FOREST. 64(9):611-613. THE APPLICATION OF LINEAR PROGRAMMING TO THE REGULATION OF TIMBER HARVESTS FROM A GIVEN FOREST IS SHOWN. THE CONCLUSION IS THAT LP CAN BE USED TO PROVIDE OPTIMUM SOLUTIONS TO FOREST REGULATION PROBLEMS. LP CAN ALSO ENABLE A FOREST MANAGER TO PREDICT THE EFFECT OF A CHANGE IN MANAGERIAL CONSTRAINTS.

179. KILANDER, K. 1966. THE NEW TRENDS OF THINKING IN FOREST MANAGEMENT METHODS. 6TH WORLD FOREST. CONGR., MADRID. 7 PP. (IN ENGLISH, FRENCH, AND SPANISH.) THE GROWTH OF ANALYTICAL METHODS INCLUDES MATHEMATICAL APPROACHES SUCH AS LINEAR AND DYNAMIC PROGRAMMING, THE THEORY OF GAMES, ETC. THE POSSIBILITIES OF USING THESE TECHNIQUES DIRECTLY ON PRACTICAL FOREST-MANAGEMENT PROBLEMS

ARE OFTEN FEWER THAN THEY SEEM AT FIRST.

180. KILKKI, P. J. 1967. ECONOMIC MODELS FOR SCHEDULING TIMBER CUTTING ACTIVITIES. M.S. THESIS, UNIV. CALIF., BERKELEY. PLANNING MODELS BASED ON A SPECIFIED CASH FLOW GOAL OF THE FOREST OWNER ARE DEVELOPED. A SIMULATION MODEL WAS FIRST DEVELOPED, HOWEVER, THIS DID NOT INSURE THAT THE OBJECTIVE FUNCTION WOULD BE MAXIMIZED. THEREFORE A LINEAR PROGRAMMING MODEL FOR PLANNING CUTTING BUDGETS WAS ALSO DEVELOPED. THE SIMULATOR WAS FOUND TO BE SLIGHTLY PREFERABLE TO THE LP MODEL IF COMPUTER PROGRAMS ARE AVAILABLE FOR BOTH.

181. KILKKI, P. J. 1968. (INCOME-ORIENTED CUTTING BUDGET.) ACTA FOREST. FENN. 91, 54 PP. (ENGLISH, WITH SUMMARIES IN ENGLISH, FINNISH.) TWO CUTTING BUDGET MODELS ARE DEVELOPED BY THE APPLICATION OF SIMULATION AND LINEAR PROGRAMMING; THESE ARE APPLICABLE ONLY TO EVEN-AGED PINUS SYLVESTRIS FORESTS ON THREE DIFFERENT SITES, BUT THEY COULD EASILY BE ADAPTED TO OTHER SPECIES AND MANY MORE SITES. THE CUTTING BUDGET MODELS IN THIS STUDY ASSUME THAT THE GOAL OF THE FOREST OWNER LIES IN THE INCOME DERIVED FROM HIS FOREST UNDERTAKING.

182. KILKKI, P. J. 1968. (LINEAR PROGRAMMING IN FOREST PLANNING.) METSATALOUDELLINEN AIKAKAUSLEHT 85(2):42-43, 57. HELSINKI (IN FINNISH WITH SUMMARY IN ENGLISH.) AN EXAMPLE IS DRAWN TO ILLUSTRATE LINEAR PROGRAMMING IN FOREST REGENERATION. A FOREST AREA COMPRISING THREE SITES IS TO BE REGENERATED BY MEANS OF EITHER PLANTING OR NATURAL REGENERATION. THE AIM IS THAT OF MAXIMIZING THE DISCOUNTED NET REVENUES FROM THE REGENERATION AREA. IN ADDITION TO THE REGENERATION AREA, THE LABOR AND THE CAPITAL AVAILABLE FORM THE CONSTRINTS FOR THE LINEAR PROGRAMMING PROBLEM.

183. KILKKI, P. J., AND U. VAISANEN. 1970. (DETERMINATION OF THE OPTIMUM CUTTING POLICY FOR THE FOREST STAND BY MEANS OF DYNAMIC PROGRAMMING.) ACTA FOREST. FENN. 102, 23 PP. HELSINKI. (IN FINNISH.) DYNAMIC PROGRAMMING IS USED TO DETERMINE THE OPTIMUM CUTTING PROGRAMS FOR EVEN-AGED SCOTCH PINE STANDS IN SOUTHERN FINLAND. THREE LOGGING COST LEVELS, THINNING FROM ABOVE AND BELOW, AND INTERST RATES FROM 1 TO 5 PERCENT, ARE APPLIED. THE ECONOMIC RESULTS OF BOTH OPTIMUM ROUTES AND DIFFERENT CUTTING PROGRAMS ARE ANALYZED.

184. KINNE, S. B., III. 1966. MAXIMIZING RETURNS OF A

FARM-FOREST ENTERPRISE USING A DYNAMIC LINEAR PROGRAMMING MODEL. M.S. THESIS, PURDUE UNIV., LAFAYETTE, IND. A DYNAMIC LINEAR PROGRAMMING MODEL THAT PERMITS THE CONCURRENT PLANNING OF FARM AND FOREST ACTIVITIES IS DEVELOPED. THIS TECHNIQUE PERMITS THE VARIOUS ACTIVITIES TO COMPETE FOR AVAILABLE LABOR. IT ALSO ALLOWS DIFFERENT GROWTH RATES TO BE CONSIDERED FOR DIFFERENT AREAS OF THE WOODLAND, AND THE GROWTH RESULTING FROM THE WOODLAND ACTIVITIES TO ACCUMULATE FOR HARVEST AT LATER TIMES.

185. KOENIGSBERG, E. 1960. APPLYING LINEAR PROGRAMMING TO THE PLYWOOD INDUSTRY. FOREST PROD. J. 10(9):481-486. LINEAR PROGRAMMING TECHNIQUES PROVIDE MANAGEMENT WITH IMPROVED INFORMATION TO AID IN DECISIONS ON LOG PURCHASES, PEELING OF VENEERS, AND USING THE VENEERS TO PRODUCE A MORE PROFITABLE PRODUCT MIX.

186. KOOPMANS, TJALLING, C., ED. 1951. ACTIVITY ANALYSIS OF PRODUCTION AND ALLOCATION. 404 PP., ILLUS. NEW YORK: JOHN WILEY & SONS, INC. LINEAR PROGRAMMING CONSISTS OF THE DETERMINATION OF NON-NEGATIVE VARIABLES, WHICH OPTIMIZE A LINEAR FORM SUBJECT TO LINEAR CONSTRAINTS. THIS BOOK REPORTS A CONFERENCE ON LINEAR PROGRAMMING HELD IN CHICAGO UNDER THE AUSPICES OF THE COWLES COMMISSION FOR RESEARCH IN ECONOMICS. TWENTY-FIVE RESEARCH PAPERS DEALING WITH LINEAR PROGRAMMING PROPER, AND SUCH RELATED TOPICS AS INTER-INDUSTRY INPUT-OUTPUT MODELS ARE INCLUDED.

187. KORINEK, J. 1966. (THE POSSIBILITIES OF USING THE METHOD OF LINEAR PROGRAMMING IN THE NEW FORESTRY CONTROL SYSTEM.) BRNO, UNIV. AGR. ANNIV. AGR. STUD. SCI. SYMP. 150:64-65. (CZECHOSLOVAKIAN WITH SUMMARIES IN ENGLISH, RUSSIAN, FRENCH, AND GERMAN.) THE SIMPLEX MODEL IS USEFUL IN FINDING THE MOST PROFITABLE ASSORTMENT OF TIMBER TO PRODUCE, IN PLANNING PRODUCTION AND SUPPLY, IN WEIGHING TIMBER-MARKETING POSSIBILITIES, IN FINDING THE OPTIMUM PROCEDURE FOR HANDLING TIMBER AT LUMBER SHIPPING YARDS, AND IN PLANNING THE CAPACITY AND LOCATION OF TIMBER YARDS.

188. KOURTZ, P. H. 1967. FORECASTING FOREST FIRE DANGERS BY COMPUTER. FOREST FIRE RES. INST. INFORM. REP. FF-X-7, 18 PP. OTTAWA, ONT., CAN. A DESCRIPTION OF THE CANADIAN FIRE-DANGER RATING SYSTEM, THE EXISTING FIRE-DANGER FORECASTING PROCEDURE, AND THE PREPARATION OF A COMPUTER PROGRAM AVAILABLE FROM THE FOREST FIRE RESEARCH INSTITUTE, FOR

HANDLING THE FIRE-DANGER FORECASTING WORK OF THE MARITIME PROVINCES.

189. KOURTZ, P. H. 1968. COMPUTERS AND FOREST FIRE DETECTION. FOREST. CHRON. 44(2):22-24. A GENERAL DESCRIPTION OF A COMPUTER SIMULATION PROGRAM FOR FIRE DETECTION BASED ON HISTORICAL DATA. THE ELAPSED TIME A FIRE BURNS BEFORE DETECTION CAN BE USED TO CALCULATE THE AREA BURNED BY EACH FIRE, WHICH IN TURN CAN BE USED TO SELECT THE MOST DESIRABLE DETECTION ALTERNATIVE.

190. KOURTZ, P. H., AND W. G. O'REGAN. 1968. A COST-EFFECTIVENESS ANALYSIS OF SIMULATED FOREST FIRE DETECTION SYSTEMS. HILGARDIA 39(12):341-366. THE MOST EFFECTIVE COMBINATION OF LOOKOUTS AND AIRCRAFT IS FOUND FOR FOREST FIRE DETECTION WITHIN A GIVEN BUDGET.

191. KUDINOV, A. A. 1966. (DETERMINING CRITERIA OF THE PSYCHOLOGICAL LOAD ON THE OPERATORS OF CROSSCUTTING UNITS.) LESN. Z. ARHANGEL'SK 9(1):149-154. (IN RUSSIAN.) AN ANALYSIS BASED ON INFORMATION THEORY SHOWS THAT A MAN OPERATING A LOG CROSSCUTTING UNIT HAVING A THROUGHPUT OF 300 CU. M./SHIFT HAS TO HANDLE INFORMATION AT THE RATE OF 4.18 BITS/SEC. THIS IS CLOSE TO OR BEYOND THE LIMIT OF HIS MENTAL POWERS, SO FOR THROUGHPUTS > 300 CU. M./SHIFT, HE WOULD BE INCAPABLE OF SELECTING THE OPTIMUM CROSSCUTTING PROGRAM; THEREFORE, AUTOMATIC PROGRAMMING DEVICES ARE NEEDED.

192. LA BASTIDE, J. G. A., AND M. BOL. 1969. (SIMULATION AS A TOOL IN FORESTRY RESEARCH.) FORSTARCHIV 40(1):7-11. (IN GERMAN WITH ENGLISH SUMMARY.) THE METHOD IS CONSIDERED PARTICULARLY SUITABLE FOR COMPLEX PROBLEMS WITH INTERACTING VARIABLES. AN EXAMPLE IS GIVEN OF ITS APPLICATION TO PROBLEMS DEALING WITH THE COST OF SKIDDING TREE-LENGTH THINNINGS FROM STANDS OF DIFFERENT SIZE, DENSITY, VOLUME, ETC. TREATMENT VARIABLES ARE SIZE AND SPACING OF STACKS (IF ANY) AND EXTRACTION METHODS.

193. LAPSAKOV, I. D., AND V. V. OVCINNIKOV. 1964. (PROGRAMMING THE CROSS-CUTTING OF TREE-LENGTH LOGS.) LESN. PROM. (1M):6-8. (IN RUSSIAN.) SATISFACTORY CROSS-CUTTING PROGRAMS CAN BE WORKED OUT FOR TREE-LENGTH LOGS IF THE SPECIFS, HEIGHT CLASS, AND LOG LENGTH ARE KNOWN; AN EXAMPLE OF SUCH A PROGRAM FOR SOFTWOODS IS GIVEN. COMPARISON OF THE YIELD FROM AUTOMATED CROSS-CUTTING BY THIS PRESET PROGRAM AND BY THE USUAL VISUAL-INDIVIDUAL

METHOD, SHOWED THAT THE PROGRAMMED METHOD MARKEDLY INCREASED PRODUCTIVITY AND CAUSED VIRTUALLY NO REDUCTION IN THE AMOUNT OF LUMBER OBTAINED.

194. LAWRENCE, J. D. 1969. DATA COLLECTION AND STATISTICAL ANALYSIS OF OPERATIONS RESEARCH INPUT DATA. OPER. RES. APPL. TO SAWMILLS PROC.:19-23. UNIV. GEORGIA, ATHENS. DATA COLLECTION IS AN IMPORTANT PHASE OF OPERATIONS RESEARCH. DATA ARE USED TO DEVELOP FUNCTIONAL RELATIONSHIPS THAT PREDICT PROCESSING TIME AND YIELDS OF OUTPUTS. REGRESSION ANALYSIS IS A USEFUL TOOL IN THE DEVELOPMENT OF THESE FUNCTIONAL RELATIONSHIPS FOR GENERATING LINEAR PROGRAM INPUT DATA.

195. LAWRENCE, J. D. 1969. INITIAL INVESTMENT AND MAINTENANCE COSTS OF A MATHEMATICAL PROGRAMMING ANALYSIS. OPER. RES. APPL. TO SAWMILLS PROC.:45-49. UNIV. GEORGIA, ATHENS. COST OF A MATHEMATICAL PROGRAMMING ANALYSIS DEPENDS UPON THE COMPLEXITY OF THE MODEL FORMULATED AS DETERMINED BY THE OBJECTIVES OF MANAGEMENT. THIS PAPER EXPLAINS INITIAL COSTS AT TWO LEVELS FOR EACH OF 10 PHASES DEFINED WITHIN THE OPERATIONS RESEARCH PROCEDURE: ''OPTIMISTIC'' - - WHEN THE USER HAS SOME FAMILIARITY WITH OPERATIONS RESEARCH APPLICATIONS; AND ''EXPECTED'' - - WHEN THE USER IS LESS FAMILIAR WITH THESE APPLICATIONS.

196. LEAK, W. B. 1964. ESTIMATING MAXIMUM ALLOWABLE TIMBER YIELDS BY LINEAR PROGRAMMING. USDA FOREST SERV. NE FOREST EXP. STA. RES. PAP. NE-17, 9 PP. UPPER DARBY, PA. A PRESENTATION OF GENERAL EQUATIONS, AND ILLUSTRATION OF THE USE OF LINEAR PROGRAMMING IN COMPLEX MANAGEMENT SITUATIONS, WITH TWO HYPOTHETICAL EXAMPLES.

197. LEAK, W. B. 1964. SOME COMMENTS ON ''THE DEVELOPMENT OF AN OPTIMAL PROGRAM FOR SUSTAINED-YIELD MANAGEMENT''. J. FOREST. 62(11):828-829. A CRITICAL REVIEW OF THE LONG-TERM PLANNING AND SCHEDULING OF YIELDS FROM PARTIALLY-CUT STANDS IN THE LINEAR PROGRAMMING METHODS APPLIED IN D. P. LOUCK'S ARTICLE (J. FOREST. 62(7):485-490, JULY 1964).

198. LEAK, W. B. 1968. BIRCH REGENERATION: A STOCHASTIC MODEL. USDA FOREST SERV. NE FOREST EXP. STA. RES. NOTE NE-85, 7 PP. UPPER DARBY, PA. THE REGENERATING OF A CLEAR FELLING WITH PAPER OR YELLOW BIRCH IS EXPRESSED IN AN ELEMENTARY STOCHASTIC (PROBABILISTIC) MODEL THAT IS COMPUTATIONALLY SIMILAR TO AN ABSORBING

MARKOV-CHAIN. IN THE GENERAL CASE, THE MODEL CONTAINS 29 STATES, BEGINNING WITH THE DEVELOPMENT OF A FLOWER (AMENT) AND TERMINATING WITH THE ABORTION OF A FLOWER OR SEED, OR THE DEVELOPMENT OF AN ACCEPTABLE STEM, UNACCEPTABLE STEM, DEAD SEEDLING, OR NONGERMINATE (THE SIX ABSORBING STATES). EXPRESSIONS ARE GIVEN FOR THE EXPECTED MEAN NUMBER OF OCCURRENCES OF EACH STATE, AND THE PROBABILITY OF ARRIVING AT ANY ABSORBING STATE AFTER THE OCCURRENCE OF ANY TRANSIENT STATE.

199. LEAK, W. B. 1970. SAPLING STAND DEVELOPMENT: A COMPOUND EXPONENTIAL PROCESS. FOREST SCI. 16(2):177-180. THE DEVELOPMENT OF AN EVEN-AGED STAND DURING THE SAPLING STAGE IS EXPRESSED AS A THEORETICAL STOCHASTIC MODEL REFERRED TO AS THE COMPOUND EXPONENTIAL PROCESS. GIVEN A SUITABLE ESTIMATE OF THE ONE PARAMETER OF THE PROCESS, WE CAN PREDICT THE PROBABILITIES AND EXPECTATIONS OF FUTURE NUMBERS OF TREES BY DIAMETER CLASSES. THE PROCESS APPEARS TO HAVE INTERESTING IMPLICATIONS TO THE PROBLEM OF EVALUATING THE FUTURE STOCKING OF REGENERATION OR SAPLING STANDS.

200. LEAK, W. B., AND S. M. FILIP. 1970. CUTTING STRATEGIES AND TIMBER YIELDS FOR UNBALANCED EVEN-AGED NORTHERN HARDWOOD FORESTS. USDA FOREST SERV. NE FOREST EXP. STA. RES. PAP. NE-153, 19 PP., UPPER DARBY, PA. LINEAR PROGRAMMING IS USED TO DEVELOP CUTTING STRATEGIES FOR FOUR HYPOTHETICAL EVEN-AGED NORTHERN HARDWOOD FORESTS WITH UNBALANCED AGE DISTRIBUTIONS THAT MAXIMIZE BOARD-FOOT YIELDS AND PRODUCE BALANCED AGE DISTRIBUTIONS BY THE END OF THE FIRST ROTATION. MANAGED (THINNED) AND UNMANAGED (CLEARCUTTING ONLY) APPROACHES ARE COMPARED, REVEALING LARGE DIFFERENCES IN BOARD-FOOT YIELDS.

201. LEARY, R. A. 1970. SYSTEM IDENTIFICATION PRINCIPLES IN STUDIES OF FOREST DYNAMICS. USDA FOREST SERV. N. CENTRAL FOREST EXP. STA. RES. PAP. NC-45, 38 PP., ST. PAUL, MINN. NONLINEAR ORDINARY DIFFERENTIAL EQUATIONS ARE USED TO DESCRIBE SYSTEM DEVELOPMENT, AND EQUATION PARAMETERS ARE ESTIMATED BY CONSIDERING OBSERVATIONS AS BOUNDARY CONDITIONS IN A NONLINEAR MULTIPOINT BOUNDARY VALUE PROBLEM. APPLICATIONS ARE MADE TO FOREST STAND DEVELOPMENT.

202. LEE, YAM. 1967. STAND MODELS FOR LODGEPOLE PINE AND LIMITS TO THEIR APPLICATION. PH.D. THESIS, UNIV. BRITISH COLUMBIA, VANCOUVER, CAN. NEWNHAM'S SIMULATION STAND MODELS ARE CRITICALLY EXAMINED AND FULLY DESCRIBED. A REVISED SIMULATION MODEL

IS BUILT FOR LODGEPOLE PINE STAND GROWTH AND THE METHODS USED ARE DESCRIBED. THE MODEL CAN BE USED TO SIMULATE THE GROWTH OF MANY KINDS OF LODGEPOLE PINE STANDS FROM AGE 15 TO AGE 100, OR MORE.

203. LENHART, J. D. 1965. SIMULATION OF BUSCHCOMBINE OPERATIONS IN SLASH PINE PLANTATIONS. UNPUBL. M.S. THESIS, UNIV. GEORGIA, ATHENS. PERFORMANCE CHARACTERISTICS OF TWO BUSCHCOMBINES OPERATED BY UNION BAG-CAMP CORPORATION WERE EVALUATED BY USING COMPUTER SIMULATION TECHBIQUES. THE D PAPER CORPORATION WERE EVALUATED BY USING COMPUTER SIMULATION TECHNIQUES. THE OBJECTIVE WAS TO DETERMINE PRODUCTION RATES FOR BUSCHCOMBINES OPERATING IN SLASH PINE PLANTATIONS OF VARYING STAND AGES, SITE QUALITIES, AND STAND DENSITIES. A WIDE RANGE OF PRODUCTION RATES WERE CALCULATED BY ITERATIVE TECHNIQUES USING THE SIMULATION MODEL WITH THE VARYING STAND PARAMETERS.

204. LEONTIEF, W. W. 1951. THE STRUCTURE OF AMERICAN ECONOMY, 1919-1939. ED. 2, 264 PP., ILLUS. NEW YORK: OXFORD UNIV. PRESS. THIS IS THE ORIGINAL WORK CONCERNED WITH INPUT-OUTPUT MODELS.

205. LEONTIEF, W. W. 1966. INPUT-OUTPUT ECONOMICS. 257 PP. NEW YORK: OXFORD UNIV. PRESS. A COLLECTION OF ARTICLES ON: PROPOSAL FOR BETTER ECONOMIC FORECASTING; INPUT-OUTPUT ECONOMICS; WAGES, PROFITS, PRICES, AND TAXES; THE STRUCTURE OF DEVELOPMENT; DOMESTIC PRODUCTION AND FOREIGN TRADE; FACTOR PROPORTIONS AND THE STRUCTURE OF AMERICAN TRADE; INPUT-OUTPUT ANALYSIS; THE STRUCTURE OF THE U. S. ECONOMY; AND MULTIREGIONAL INPUT-OUTPUT ANALYSIS.

206. LIITTSCHWAGER, J. M., AND T. H. TCHENG. 1967. SOLUTION OF A LARGE-SCALE FOREST SCHEDULING PROBLEM BY LINEAR PROGRAMMING DECOMPOSITION. J. FOREST. 65(9):644-646. THE LINEAR PROGRAMMING DECOMPOSITION SOLUTION OF A LARGE-SCALE FOREST-SCHEDULING PROBLEM INVOLVING THE CUTTING OF 1,166 WOODLANDS OVER THE NEXT 24 YEARS IS DISCUSSED. THE ORIGINAL PROBLEM WAS TOO LARGE (28,000 VARIABLES AND 1,200 RESTRAINT EQUATIONS) FOR A COMPUTER SOLUTION TO BE ACHIEVED BY USUAL SIMPLEX METHODS. THE DECOMPOSITION APPROACH TREATS A LARGE LP PROBLEM AS SERIES OF SMALLER SUBPROBLEMS. ALTHOUGH THE DECOMPOSITION PROCEDURE WAS HERE TERMINATED AFTER THE SOLUTION OF 930 SUCH SUBPROBLEMS, THE GAIN IN YIELD WAS EXTREMELY SMALL AFTER 240 ITERATIONS.

207. LONNER, G. 1963. (LINEAR PROGRAMMING - = THE SIMPLEX TECHNIQUE: PLANNING OF TIMBER ASSORTMENTS.) SVENSKA SKOGSVARDSFOR. TIDSK. 61(4):375-382. (IN SWEDISH.) IN SWEDEN, THOSE FOREST OWNERS WHO HAVE AN ALTERNATIVE MARKET FOR THEIR TIMBER PRODUCTS CAN PERHAPS USE THE LINEAR-PROGRAMMING MODEL TO MAKE THE MOST PROFITABLE CHOICE. BY COMPARING PRICES, COSTS, AND RESOURCE DEMAND, THE OWNERS CAN REALIZE A MAXIMUM NET INCOME BY USING THIS TECHNIQUE. CONSTRAINTS ARE MANPOWER, MACHINE POWER, AND VOLUME OF INDIVIDUAL PRODUCTS.

208. LONNER, G. 1964. (A PROBLEM OF QUEUING THEORY: MOBILE SERVICE STATIONS FOR THE REPAIR OF TRACTORS.) SVENSKA SKOGSVARDS FOR. TIDSK. 62(1):15-21. (IN SWEDISH.) A FICTITIOUS EXAMPLE IS SOLVED BY MEANS OF A TECHNIQUE DESIGNED TO CONSIDER THE NUMBER OF UNITS REQUIRING AND OFFERING A GIVEN SERVICE AND THE MANNER IN WHICH NEED ARISES, ETC.; AND ESTIMATES THE NUMBER OF SERVICE LEASES NECESSARY TO ENSURE MINIMUM IDLE TIME FOR THEM AND FOR THEIR ''CUSTOMERS'' THE TRACTORS ON LOCATION.

209. LOUCKS, O. P. 1964. THE DEVELOPMENT OF AN OPTIMAL PROGRAM FOR SUSTAINED-YIELD MANAGEMENT. J. FOREST. 62(7):485-490. A DISCUSSION OF THE USE OF LINEAR PROGRAMMING IN DEVELOPING SUSTAINED-YIELD FELLING SCHEDULES. TWO MODELS ARE PRESENTED. THE FIRST MAXIMIZES VOLUME TO BE FELLED SUBJECT TO THE VARIOUS CONDITIONS IMPOSED BY NATURE AND REQUIRED BY THE MANAGEMENT PLAN; THE SECOND MINIMIZES THE AREA TO BE FELLED WHILEENSURING A SPECIFIED YIELD FOR EACH FELLING PERIOD. THE SOLUTION OF A HYPOTHETICAL MANAGEMENT PROBLEM IS GIVEN AS AN EXAMPLE.

210. LUCE, R. D., AND H. RAIFFA. 1957. GAMES AND DECISIONS: INTRODUCTION AND CRITICAL SURVEY. 509 PP., ILLUS. NEW YORK: JOHN WILEY & SONS, INC. THIS WORK ATTEMPTS TO COMMUNICATE THE CENTRAL IDEAS AND RESULTS OF GAME THEORY AND RELATED DECISION-MAKING MODELS UNENCUMBERED BY THEIR TECHNICAL MATHEMATICAL DETAILS. IT PRESENTS THE MAIN STRUCTURE OF THE THEORY AND ATTEMPTS TO SERVE AS A CRITICAL INTRODUCTION TO THE THEORY AND ITS LITERATURE, BASICALLY FOLLOWING THE STRUCTURING OF VON NEUMANN AND MORGENSTERN. THE BOOK INCLUDES MANY NEW ADDITIONS TO THE THEORY. EXAMPLES ARE DRAWN FROM THE SOCIAL SCIENCES, WITH THE EMPHASIS ON APPLICATIONS AND THEORETICAL CONCEPTS. AN EXTENSIVE BIBLIOGRAPHY IS INCLUDED.

211. LUNDELL, S., ET. AL. 1969. (ECONOMIC PLANNING OF PRIMARY PRODUCTION IN FORESTRY.) SVERIGES SKOGSVFORB. TIDSK. 67(6):539-563. (IN SWEDISH WITH ENGLISH SUMMARY.) A MODEL DESIGNED FOR LINEAR PROGRAMMING OF MANAGEMENT ACTIVITIES WITH VARIOUS ECONOMIC GOALS, RESTRAINTS, AND INTEREST RATES, IS DESCRIBED. RESULTS OF ITS APPLICATION TO A 70-HA. PRIVATE FOREST ARE GIVEN, SHOWING THE EFFECT ON ANNUAL CUT, AREAS THINNED, OR FERTILIZED, ETC

212. LUSSIER, L. J. 1959. OPERATIONS RESEARCH IN LOGGING. PULP AND PAPER MAG. CAN. 60(11):10-146---14-150. A GENERAL ARTICLE DEVOTED TO AN INTRODUCTION OF OPERATIONS RESEARCH. THE PAPER DISCUSSES OR APPLICATIONS TO PRODUCTION PLANNING, PRODUCTION CONTROL, DEVELOPMENT WORK AND WORK ANALYSIS, MACHINERY REPLACEMENT, AND INVENTORY CONTROL.

213. LUSSIER, L. J. 1960. THE USE OF OPERATIONS RESEARCH IN DETERMINING OPTIMAL LOGGING LAYOUTS. CANAD. PULP AND PAPER ASSOC., WOODLANDS SECT. INDEX (A-2-A). A DISCUSSION OF THE USE OF ANALYTICAL (DETERMINISTIC) AND SIMULATION TECHNIQUES FOR THE OPTIMIZATION OF LOGGING LAYOUTS. THE PROBLEM IS TO OBTAIN THE OPTIMUM NUMBER OF SLASHER LOCATIONS, THE OPTIMUM SPACING BETWEEN SKID ROADS AND THE OPTIMUM SKIDDING ROAD STANDARD WHILE MINIMIZING LOGGING COSTS. BOTH THE ANALYTICAL AND SIMULATION TECHNIQUES HAVE THEIR ADVANTAGES AND DISADVANTAGES, HENCE, A COMBINATION OF THE TWO IS PRESENTED FOR SOLVING THE PROBLEM.

214. LUSSIER, L. J. 1961. PLANNING AND CONTROL OF LOGGING OPERATIONS. THE FOREST RES. FOUND., 135 PP. ILLUS. QUEBEC, CANADA. METHODS OF PREPARING PRODUCTION STANDARDS IN FOREST EXPLOITATION, CLASSIFICATION OF WORK PLACES, PRODUCTION PLANNING IN LOGGING, PRODUCTION CONTROL INLOGGING, MACHINERY REPLACEMENT AND MACHINE RATES, INVENTORY CONTROL, INFORMATION AND COMMUNICATION, REVIEW OF MATHEMATICS FOR OPERATIONS RESEARCH IN LOGGING-PROBLEMS.

215. LUSSIER, L. J. 1963. A GAMBLER'S APPROACH TO LOGGING PROLEMS. PULP AND PAPER MAG. CANADA 64(9):WR354-364. MONTE CARLO SIMULATION IS APPLIED TO PROBLEMS OF TREE LENGTH LOGGING. THE AUTHOR DEFINES MODEL, SIMULATION, AND SIMULATED SAMPLING AND THEN EXPLAINS THE USE OF RANDOM NUMBERS IN GENERATING INFORMATION ABOUT A LOGGING SYSTEM. A LUCID EXPLANATION OF THE CONSTRUCTION OF A SIMPLIFIED MONTE CARLO MODEL FOR FELLING AND

SKIDDING, AND ITS OPERATION IS INCLUDED.

216. LUSSIER, L. J., AND G. TARDIF. 1967. USE OF OPERATIONS RESEARCH IN THE FOREST INDUSTRY. PULP AND PAPER MAG. CAN. 68(9):WR396-WR402. A GENERAL DESCRIPTION OF OPERATIONS RESEARCH. THE AUTHOR DEFINES THE APPROACH AND OUTLINES SOME OF ITS CONTRIBUTIONS TO INDUSTRY. A BRIEF DISCUSSION OF THE CONCEPT OF A MATHEMATICAL MODEL AND THE CORRESPONDING VARIABLES AND CONSTRAINTS.

217. LYONS, E. F. 1969. INDUSTRIAL ORGANIZATION OF THE APPALACHIAN HARDWOOD LUMBER-USING INDUSTRY. PH.D. DISS., VA. POLYTECH. INST., BLACKSBURG. THE STUDY CONCERNS A METHOD FOR ANALYZING THE PRODUCTION INTEGRATION OF THE SPATIALLY DISPERSED HARDWOOD-USING INDUSTRY BY MEANS OF A MATHEMATICAL MODEL FORMULATED FOR ANALYSIS BY LINEAR PROGRAMMING TECHNIQUES (AN ADAPTATION OF THE TWO DIMENSIONAL TRANSPORTATION MODEL).

218. MACHOL, R. E. 1960. A DEMONSTRATION OF LINEAR PROGRAMMING. FOREST MANAGE. CONTR. CONF. PROC.:168-176. PURDUE UNIV., LAFAYETTE, IND. A STEP-BY-STEP EXPOSITION OF AN ASSIGNMENT PROBLEM. THE AUTHOR WORKS THROUGH A 3x3 AND A 10X10 MATRIX, DEVELOPING THE SIMPLE RULES NECESSARY TO SOLVE THE PROBLEM.

219. MACTAVISH, J. S. 1965. ECONOMICS AND FOREST FIRE CONTROL. CAN. DEP. FISH. & FOREST. PUB. 1114, 19 PP. OPTIMUM FIRE-CONTROL PLANS DEPEND UPON ACCURATE AND COMPLETE DATA ON THE RELATIONSHIPS OF THE PHYSICAL AND ECONOMIC INPUTS AND OUTPUTS OF FIRE CONTROL. COMPUTER ANALYSIS WITH SIMULATION TECHNIQUES SEEMS WELL-SUITED TO SEVERAL FACETS OF THE FIRE-CONTROL PROBLEMS.

220. MAGEE, J. F. 1964. DECISION TREES FOR DECISION MAKING. HARVARD BUS. REV. 42(4):126-138. THE FIRST OF TWO ARTICLES DEALING WITH THE APPLICATION OF DECISION TREES TO MANAGEMENT PROBLEMS. THE PROCEDURE IS INTRODUCED WITH A VERY SIMPLE EXAMPLE CONTAINING ONE DECISION AND TWO CHANCE EVENTS. ADDTIONAL EXAMPLES ARE THEN PRESENTED THAT SHOW APPLICATION TO MORE COMPLEX BUSINESS DECISION PROBLEMS.

221. MAGEE, J. F. 1964. HOW TO USE DECISION TREES IN CAPITAL INVESTMENT. HARVARD BUS. REV. 42(5):79-96. THE SECOND OF TWO ARTICLES ON THIS SUBJECT, GIVING FURTHER DISCUSSION OF HOW THE TECHNIQUE MAY BE APPLIED TO INVESTMENT DECISIONS.

222. MALMBORG, G. VON. 1967. (ECONOMIC PLANNING FOR THE COMBINED FORESTRY - AGRICULTURAL FIRM.) JORDBRUKETS UTREDNINGSINSTITUT, INSTITUTIONEN FOR SKOGSEKONOM, 241 PP. SKOGSHOGSKOLAN, STOCKHOLM. (IN SWEDISH, SUMMARY IN ENGLISH.) LINEAR PROGRAMMING IN FORESTRY IS DESCRIBED WITH SPECIAL REFERENCE TO PLANNING FOR THE FARM-FORESTRY FIRM. THE DIFFICULTY OF OBTAINING DATA IS ALSO DISCUSSED.

223. MALMBORG, G. VON. 1969. ECONOMIC PLANNING OF THE FARM FOREST OPERATING UNIT. STUD. FOREST. SUEC. 71, 55 PP. SKOGSHOGSKOLAN, ROYAL COLL. FORESTRY, STOCKHOLM. A METHOD FOR LONG-TERM PLANNING BASED ON GROSS MARGIN CALCULATIONS, LINEAR PROGRAMMING, AND THE USE OF COMPUTERS IS PRESENTED. THE INVESTMENT MODEL CONSIDERS ALL INVESTMENTS, THEIR FINANCING, AND THE NEED FOR LIQUID FUNDS.

224. MANETSCH, T. J. 1964. COMPUTER SIMULATION OF THE ECONOMICS OF THE UNITED STATES SOFTWOOD PLYWOOD INDUSTRY. UNIV. OREGON AGRI. EXP. STA. SPEC. RPT. 180, 181 PP. ILLUS., CORVALLIS. THE U. S. SOFTWOOD PLYWOOD INDUSTRY IS ANALYZED AS A FEEDBACK SYSTEM AND SIMULATED ON A LARGE SCALE DIGITAL COMPUTER. THE GENERAL SYSTEM MODEL IS MADE UP OF SEVEN INTERACTING SECTORS. THE SECTORS ARE DEFINED TO INCLUDE FIRMS TENDING TO RESPOND HOMOGENEOUSLY TO CHANGES IN DEMAND AND PRICE. THE MODEL IS PROGRAMMED IN DYNAMO. RESULTS OF SIMULATED TESTS ARE COMPARED TO ACTUAL INDUSTRY DATA.

225. MANETSCH, T. J. 1965. SIMULATION AND SYSTEMS ANALYSIS OF THE UNITED STATES SOFTWOOD-PLYWOOD INDUSTRY (ON A LARGE-SCALE DIGITAL COMPUTER). DISS. ABSTR. 26(3):1523. FOR ABSTRACT, SEE PREVIOUS CITATION.

226. MANETSCH, T. J. 1966. COMPUTER SIMULATION OF THE ECONOMICS OF THE UNITED STATES SOFTWOOD-PLYWOOD INDUSTRY. SEMINAR ON OPER. RES. IN FOREST PROD. INDUS. PROC.:134-145. LOS ANGELES, CALIF. FOR ABSTRACT, SEE PREVIOUS SOURCES.

227. MANNING, G. H. 1969. RESOURCE ALLOCATION AND NON-MARKET BENEFITS. FOREST ECON. RES. INST., INFORM. REP. E-X-4, 30 PP. OTTAWA, ONT., CAN. A SYSTEM IS PRESENTED FOR THE ALLOCATION OF RESOURCES AMONG MULTIPLE USES THAT CONSIDERS THE UNMEASURED BENEFITS OF SOME ACTIVITIES. A PORTION OF THE SYSTEM CONSISTS OF LINEAR PROGRAMMING, THE REMAINDER INTRODUCES THE OPPORTUNITY COST OF

PROVIDING NON-MARKET BENEFITS.

228. MANTHY, R. S. 1966. ECONOMIC-BASE PROJECTIONS FOR RIVER BASIN PLANNERS. SOC. AMER. FORESTERS PROC. 1965:94-97. FOUR METHODS ARE USED TO PROJECT INDUSTRIAL ACTIVITY IN RIVER BASINS IN NORTHEASTERN UNITED STATES. THREE OF THESE ARE TERMED "PARTIAL PLANNING MODELS." THE FOURTH IS A CLOSED DYNAMIC SIMULATION MODEL INCORPORATING A FEEDBACK MECHANISM THAT ELIMINATES THE NEED FOR INDEPENDENT STUDIES OF SUPPLY AND DEMAND. BECAUSE THE MODEL IS CLOSED, IT IS POSSIBLE TO TIE THE PROJECTION OF DEMAND TO SUPPLY AND SYSTEMATICALLY TO RELATE THE NEED FOR GOVERNMENT PROGRAMS TO THE COSTS OF THE PROGRAMS.

229. MARTIN, A. J. 1969. EVALUATING TIMBER STAND IMPROVEMENT OPPORTUNITIES IN NORTHERN LOWER MICHIGAN USING THE DECISION-TREE APPROACH. PH.D. DISS., MICH. STATE UNIV., EAST LANSING. THE DECISION-TREE APPROACH IS EMPLOYED FOR PURPOSES OF SIMULATING THE DECISION-MAKING SEQUENCE OF A WOODLAND OWNER FACED WITH 30 ALTERNATIVES CONCERNING TSI. INTERNAL RATES OF RETURN ARE USED AS THE MEASURE OF EFFECTIVENESS FOR JUDGING THE VARIOUS OPTIONS. IRR VALUES RANGE FROM 1 TO 20 PERCENT, AVERAGING 8-1/2 PERCENT FOR THE "BEST" FIVE ALTERNATIVES. THE ORIGINAL MODEL WAS SUBJECTED TO SENSITIVITY ANALYSIS, AND RESULTS INDICATE THAT THE IRR IS MOST RESPONSIVE TO CHANGES IN THE ANNUAL COST.

230. MATER, M. H. 1967. PERT - A NEW TECHNIQUE FOR REDUCING SAWMILL MODERNIZATION COSTS. FOREST IND. 94(7):36-39. A DISCUSSION OF THE APPLICATION OF PERT (PROGRAM EVALUATION AND REVIEW TECHNIQUES) TO THE SAWMILL PROBLEM OF INSTALLING A BANDMILL TO REPLACE A CIRCULAR HEADRIG. PERT, OR CRITICAL PATH SCHEDULING CONSIDERS ALL OPERATIONS IN THIS DECISION AND PROVIDES A RATIONAL FORMULA FOR PROJECTING DELAYS AT EVERY STEP. AND IT SHOWS GRAPHICALLY THE EFFECTS OF DELAYS ON OTHER PARTS OF THE PROJECT. PERT GIVES THE USER REALISTIC ESTIMATES OF TIME AND COST.

231. MAURER, D. 1968. AN APPLICATION OF QUEUING THEORY TO THE SAWMILL PRODUCTION PROCESS. M.S. THESIS, STATE UNIV. N.Y., COLL. FORESTRY, SYRACUSE. QUEUING THEORY IS APPLIED TO THE PRODUCTION PROCESS IN THE SAWMILL FROM THE HEADSAW THROUGH THE TRIMMER.

232. MAWSON, J. C. 1968. A MONTE CARLO STUDY OF DISTANCE

MEASURES IN SAMPLING FOR SPATIAL DISTRIBUTION IN FOREST STANDS. FOREST SCI. 14(2):127-139. TWO RULES USING DISTANCE MEASURES WERE STUDIED: (1) THE MEASUREMENT FROM A RANDOM POINT TO THE T-TH NEAREST TREE AND (2) THE MEASUREMENTS TO THE T-TH NEAREST TREE IN EACH OF FOUR SECTORS. A STATISTICAL FRAMEWORK WAS DEVELOPED TO DETERMINE THE PERFORMANCE CHARACTERISTICS OF THE RULES AND BOTH THEORETICAL AND INTUITIVE ESTIMATORS OF THE NUMBER OF TREES AND BASAL AREA PER ACRE TO USE WITH THEM. THREE TYPICAL FOREST PATTERNS WERE EXAMINED. WITH EITHER OF THESE RULES, IT SEEMS UNLIKELY THAT UNBIASED ESTIMATORS OF DENSITY OR BASAL AREA CAN BE DEVELOPED FOR MOST NONRANDOM BIOLOGICAL POPULATIONS.

233. MCADOO, J. C. 1969. COMPUTER SIMULATION OF SMALL-LOG MILL PROCESSING. FOREST PROD. J. 19(4):34-35. THE GENERAL PROGRAMMING PROCEDURE USING AS AN EXAMPLE, THE CENTERSAWN PROCESSING OF 16-FOOT LOGS, 10 INCHES IN DIAMETER, IS PRESENTED. PRODUCT VALUES WERE DETERMINED UNDER A VARIETY OF CONDITIONS. FURTHER APPLICATION OF THE METHOD ARE ALSO LISTED.

234. MCCLOSKEY, J. F., AND F. N. TREFETHEN, EDS. 1956. OPERATIONS RESEARCH FOR MANAGEMENT. VOL. 1., 409 PP. BALTIMORE: JOHNS HOPKINS PRESS. PART I, GENERAL FEATURES FIVE PRESENTATIONS ON THE HISTORICAL BACKGROUND, OPERATIONS RESEARCH AS A SCIENCE, ORGANIZING FOR OPERATIONS RESEARCH, AND THE ROLE OF MANAGEMENT CONSULTING AND OPERATIONS RESEARCH. PART II, METHODOLOGY COMPRISES NINE PRESENTATIONS WITH CONCENTRATION ON THEORIES AND MEDIA: GAME THEORY, INFORMATION THEORY, QUEUING THEORY, SYMBOLIC LOGIC, LINEAR PROGRAMMING, STATISTICAL INFLUENCES AND USE, POTENTIAL, AND THE USE OF COMPUTING MACHINES. PART III IS DEVOTED TO CASE HISTORIES COVERING OPERATIONS RESEARCH IN SUPERMARKETS, PRINTING INDUSTRY, SALES ANALYSIS AND FORECAST, USE OF MANPOWER, AGRICULTURE, TECHNICAL INSTRUMENTATION IN THE AIRCRAFT INDUSTRY, AND IN GENERAL COMMERCIAL AREAS SUCH AS MAIL ORDER BUSINESS, DEPARTMENT STORES, AND NEWSPAPER ADVERTISING.

235. MCCLOSKEY, J. F., AND J. M. COPPINGER, EDS. 1956. OPERATIONS RESEARCH FOR MANAGEMENT. VOL. II. 556 PP. BALTIMORE: JOHNS HOPKINS PRESS. A COMPENDIUM OF CASE STUDIES SHOWING OPERATIONS RESEARCH IN ACTUAL USE, WITH DETAILED DISCUSSIONS OF THE NEWEST OPERATIONS RESEARCH METHODS. A SPECIAL SECTION ON ON INFORMATION HANDLING INORGANIZED

GROUPS AND AN EXHAUSTIVE BIBLIOGRAPHY ON QUEUING THEORY ARE INCLUDED.

236. MCCONNEN, R. J., D. I. NAVON, AND E. L. AMIDON. 1966. EFFICIENT DEVELOPMENT AND USE OF FOREST LANDS: AN OUTLINED OF A PROTOTYPE COMPUTER-ORIENTED SYSTEM FOR OPERATIONAL PLANNING. FORESTRY COMM. FOREST REC. 58:16-32 LONDON. IN THIS APPROACH: (1) THE MAP INFORMATION ASSEMBLY AND DISPLAY SYSTEM IS TO PROVIDE NUMERICAL SUMMARIES OF RESOURCE MAPS; (2) A LINEAR PROGRAMMING MODEL IS FORMULATED AND THE REQUIRED DATA ARE OBTAINED; (3) OPTIMAL SOLUTIONS ARE GENERATED AND INTERPRETED; AND (4) THE COMPUTER IS USED TO ASSIST ON-GROUND OPERATIONS AND TO PROCESS INFORMATION FOR FUTURE USE.

237. MCCONNEN, R. J., E. L. AMIDON, AND D. I. NAVON. 1966. THE USE OF OPERATION RESEARCH TECHNIQUES IN DETERMINING ALLOWABLE CUT. SOC. AMER. FOREST. PROC. 1966:109-115. OPERATIONS RESEARCH TECHNIQUES CAN BE USED TO DETERMINE THE OPTIMUM PATTERN OF MANIPULATION OF A FOREST ECOSYSTEM. A GENERAL MODEL OF THE FOREST ECOSYSTEM IS DEVELOPED FROM TWO APPROACHES - "WHAT IS" AND "WHAT SHOULD BE". DEFINING GOALS AND MANIPULATION ACTIVITIES IS DISCUSSED AS WELL AS METHODS OF SOLUTIONS AND IMPLEMENTATION AND FEEDBACK. AN EXAMPLE OF A MULTI-PRODUCT, MULTI-GOAL MODEL IS PRESENTED.

238. MCCURDY, D. R. 1961. A LINEAR PROGRAMMING SITUATION OF AN INDIANA WOODLAND. M.S. THESIS, PURDUE UNIV., LAFAYETTE, IND. FOUR RESTRICTIONS - - INTENSITY OF FOREST MANAGEMENT, INTEREST RATE, PRESENCE OF A PULPWOOD MARKET, AND THE INCLUSION OF PULPWOOD IN THE RESIDUAL STAND AFTER EACH CUT - - ARE VARIED TO OBTAIN 24 MEASUREMENT SITUATIONS. LINEAR PROGRAMMING IS USED TO DERIVE A CUTTING SCHEDULE FOR EACH SITUATION TO OBSERVE THE EFFECTS OF CHANGING RESTRICTIONS.

239. MCKENZIE, C. R. 1968. OPERATIONS RESEARCH IN FORESTRY WITH SPECIAL EMPHASIS ON LINEAR PROGRAMMING. M.F. THESIS, UNIV. MICH. ANN ARBOR. OPERATIONS RESEARCH IS DISCUSSED IN GENERAL TERMS AND THE APPROPRIATENESS OF LINEAR PROGRAMMING FOR FOREST SCHEDULING IS QUESTIONED. THE AUTHOR ALSO DISCUSSES THE FUTURE OF OPERATIONS RESEARCH IN FORESTRY.

240. MCKILLOP, W., AND S. HOYER-NIELSEN. 1968. PLANNING SAWMILL PRODUCTION AND INVENTORIES USING LINEAR PROGRAMMING. FOREST PROD. J. 18(5):83-88. A

COMPUTER PROGRAM IS DEVELOPED, BASED ON A REPRESENTATIVE MILL SETUP FOR STUD (SCATLING) PRODUCTION IN NORTH COASTAL CALIFORNIA. ITS APPLICATIONS TO CHANGING CONDITIONS AND TO OTHER ASPECTS OF THE FOREST-PRODUCTS INDUSTRY ARE DISCUSSED.

241. MCKILLOP, W., AND S. HOYER-NIELSEN. 1968. PRODUCTION AND INVENTORY PLANNING IN LUMBER MANUFACTURING. UNIV. CALIF. AGR. EXP. STA. BULL. 837, 32 PP. QUANTITATIVE DECISION MAKING TECHNIQUES ARE NEEDED FOR PLANNING PRODUCTION AND INVENTORY LEVELS IN LUMBER MANUFACTURING. LINEAR PROGRAMMING IS USED TO SPECIFY OPTIMAL LEVELS OF PRODUCTION AND INVENTORY FOR A 12-MONTH PERIOD.

242. MCMASTERS, A. W. 1967. WILDLAND FIRE CONTROL WITH LIMITED SUPPRESSION FORCES. DISS. ABSTR. 27B(8):2561. MODELS AND COMPUTER EXAMPLES ARE USED TO ANALYZE THE INFLUENCE OF LIMITED FORCES ON ATTACK AND CONTROL OF FIRES WHEN FORCES FOR A NEW FIRE CAN COME (1) ONLY FROM RESERVES, OR (2) FROM RESERVES OR BY TRANSFER FROM EXISTING FIRES. FACTORS CONSIDERED INCLUDE THE OPTIMUM SIZE OF FORCE IN RELATION TO NEW FIRE, EXISTING FIRES AND THE RISK OF ADDITIONAL FIRES, AND COSTS OF TRANSPORT BETWEEN FIRES.

243. MCMILLAN, C., AND R. F. GONZALEZ. 1965. SYSTEMS ANALYSIS: A COMPUTER APPROACH TO DECISION MODELS. 336 PP. HOMEWOOD, ILL.: RICHARD D. IRWIN, INC. CHAPTERS ON: SYSTEMS AND MODELS, SIMULATION, INTRODUCTION TO PROGRAMMING, THE INVENTORY SYSTEM UNDER CERTAINTY, PROBABILITY CONCEPTS, MONTE CARLO SIMULATION, BASIC QUEUING CONCEPTS, PROCESS GENERATORS, SIMULATION OF QUEUING SYSTEMS, MANAGEMENT PLANNING MODELS, LARGE-SCALE SIMULATION MODELS OF THE FIRM, INDUSTRIAL DYNAMICS, A STUDY IN TOTAL SYSTEMS SIMULATION, AND EXPERIMENTATION.

244. MCMILLAN, T. A. 1968. OPERATION ANALYSIS OF AN ALABAMA LUMBER MANUFACTURING PROCESS. M.S. THESIS, AUBURN UNIV., AUBURN, ALA. A SOUTHERN PINE LUMBER MANUFACTURING OPERATION IS EXAMINED USING A SYSTEMS ANALYSIS APPROACH. THE PROCEDURE IS TO DETERMINE THE LOG DISTRIBUTION, SAWING PATTERNS, SAWING TIMES, AND MACHINE UTILIZATION RATIOS. THESE RESULTS ARE COMBINED WITH THE COSTS AND RETURNS OF THE OPERATION TO OBTAIN THE OPERATING MARGIN PER DIAMETER CLASS LOG.

245. MELICHAR, J. 1963. FIRST PRACTICAL APPLICATION OF LINEAR PROGRAMMING TO SAWMILL PRODUCTION.

PRZEMYSL DRZEWNY 14(11):2-4, WARSAW. (IN POLISH.) NO ENGLISH SUMMARY IS AVAILABLE.

246. MELICHAR, J. 1964. (THE USES OF MATHEMATICAL METHODS IN PLANNING OPERATIONS IN SAWMILLING.) HOLZTECHNOL., DRESDEN 5(4):259-264. (IN GERMAN WITH GERMAN, RUSSIAN, AND ENGLISH SUMMARIES.) A DESCRIPTION OF THE ADVANTAGES OF LINEAR PROGRAMMING OVER CONVENTIONAL METHODS OF WORKING OUT CUTTING PROGRAMS FOR THE PRODUCTION OF DESIRED ASSORTMENTS FROM AVAILABLE LOGS IN THE MOST ADVANTAGEOUS MANNER.

247. MELICHAR, J. 1965. (SOME EXPERIENCES IN SAWMILL INDUSTRY PRODUCTION CONTROL BY MEANS OF LINEAR PROGRAMMING IN CZECHOSLOVAKIA.) FAO, ECON. COMM. FOR EUROPE VOL. 2, PP. 340-359. (IN ENGLISH, FRENCH, AND RUSSIAN.) TO HELP SOLVE ECONOMIC PROBLEMS OF THE SAWMILLING INDUSTRY BY MEANS OF LINEAR PROGRAMMING, THE FOLLOWING INITIAL DATA MUST BE AVAILABLE: (1) MARKET DEMAND DURING THE PROGRAMMING PERIOD ACCORDING TO QUANTITY, DIMENSIONS AND QUALITY; (2) QUANTITY OF RAW MATERIAL BY SPECIES, DIMENSIONS AND QUALITY; AND (3) YIELD OF INDIVIDUAL ASSORTMENTS OF SAWN TIMBER WITH ALL TECHNICALLY PRACTICAL ALTERNATIVES OF CUTTING.

248. MELICHAR, J., AND S. VEJMOLA. 1968. (ALGORITHM FOR DETERMINING SAWING SCHEDULES AND OUTPUT OF CANT SAWN TIMBER. (BASIS FOR WRITING A COMPUTER PROGRAM) I & II.) DREV. VYSKUM 1(2):37-49, 103-112. (IN CZECHOSLOVAKIAN, RUSSIAN WITH GERMAN AND ENGLISH SUMMARIES.) (I) A PRESENTATION OF AN ALGORITHM ALLOWING AUTOMATIC PRODUCTION CONTROL OF MIDDLE AND SIDE-CUT BOARDS. THE ALGORITHM MAY BE PROGRAMMED FOR COMPUTER SOLUTION. (II) THE BASIC MATHEMATICAL FORMULAE ARE DEVELOPED TO COVER PRODUCTION OF SQUARE-EDGED LUMBER, SHORTS, WANEY-EDGED BOARDS, AND SLABS, AND MILLING WASTE ACCORDING TO PRE-DETERMINED MILLING SCHEDULES.

249. METZGER, R. W. 1963. ELEMENTARY MATHEMATICAL PROGRAMMING. 246 PP. NEW YORK: JOHN WILEY & SONS, INC. CONTENTS INCLUDE: DISTRIBUTION METHODS, THE SIMPLEX METHOD, APPROXIMATION METHODS, TYPICAL PROBLEMS AND THEIR SOLUTIONS, COMPUTERS AND MATHEMATICAL PROGRAMMING, PRODUCTION PLANNING, MATERIAL HANDLING SCHEDULING, AND JOB AND SALARY EVALUATION

250. MIERNYK, W. H. 1965. THE ELEMENTS OF INPUT-OUTPUT ANALYSIS. ED. 2, 156 PP. NEW YORK: RANDOM HOUSE.

CHAPTERS ON: INPUT-OUTPUT ANALYSIS, APPLICATIONS OF INPUT-OUTPUT ANALYSIS, REGIONAL AND INTERREGIONAL INPUT-OUTPUT ANALYSIS, INTERNATIONAL DEVELOPMENTS, THE FRONTIERS OF INPUT-OUTPUT ANALYSIS, AND THE RUDIMENTS OF INPUT-OUTPUT MATHEMATICS.

251. MITCHELL, K. J. 1967. SIMULATION OF THE GROWTH OF EVEN-AGED STANDS OF WHITE SPRUCE. PH.D. DISS., YALE UNIV., NEW HAVEN, CONN. A COMPARISON OF THE ACTUAL AND SIMULATED GROWTH OF PERMANENT SAMPLE PLOTS SHOWED CLOSE AGREEMENT IN TERMS OF BOLE AND CROWN PARAMETERS. THE MODEL IS DESIGNED TO REPLACE CONVENTIONAL YIELD TABLES AND PROVIDE A TOOL FOR TESTING SILVICULTURAL PRACTICES AND MANAGEMENT PLANS. IT CAN BE APPLIED OVER LARGE AREAS WITH INFORMATION FROM LOW-LEVEL AERIAL PHOTOGRAPHS, THUS EXPEDITING THE COLLECTION OF DATA.

252. MITCHELL, K. J. 1969. SIMULATION OF THE GROWTH OF EVEN-AGED STANDS OF WHITE SPRUCE. YALE UNIV. SCHOOL FORESTRY, BULL. 75, 48 PP., NEW HAVEN, CONN. SEE PREVIOUS ANNOTATION.

253. MUSZYNSKI, Z. 1966. (THE APPLICATION OF LINEAR PROGRAMMING TO THE REGIONAL DISTRIBUTION OF TIMBER DISPATCHING FROM DEPOTS TO WOODWORKING PLANTS.) SYLWAN 110(2):27-40. (IN POLISH.) A BETTER ANALYSIS IS SOUGHT FOR THE PROBLEM OF REGIONAL DISTRIBUTION OF WOOD SUPPLIES, BASED UPON THE CRITERION OF THE MINIMIZATION OF THE TOTAL NUMBER OF TON-KILOMETERS. THE SPACING METHOD, AN LP TECHNIQUE, IS USED TO SOLVE AN EXAMPLE PROBLEM OF M DEPOTS DISPATCHING A/I WOOD TO N WOODWORKING PLANTS, TO WHICH B/J UNITS OF THE SAME ASSORTMENTS ARE BEING DELIVERED.

254. MYERS, C. A. 1968. SIMULATING THE MANAGEMENT OF EVEN-AGED TIMBER STANDS. (REV. 1969) USDA FOREST SERV. ROCKY MT. FOREST AND RANGE EXP. STA. RES. PAP. RM-42, 32 PP. FORT COLLINS, COLO. THE PRESENTATION OF A COMPUTER PROGRAM, WRITTEN IN FORTRAN IV, FOR SIMULATING THE MANAGEMENT OF EVEN-AGED TIMBER STANDS. CHANGES THAT WERE COMPUTED INCLUDE TREE GROWTH, HARVEST CUTS, PERIODIC THINNINGS, AND CATASTROPHIC LOSSES. ANNUAL COSTS AND RETURNS ARE SUMMARIZED IN VARIOUS STATEMENTS OF MONEY VALUE.

255. NAGUMO, M., AND H. MINOWA. 1967. (ANALYSIS OF THE REGULATION OF YIELD BY LINEAR PROGRAMMING.) TOKYO UNIV. FOREST. BULL. 63:235-265. (IN JAPANESE

WITH ENGLISH SUMMARY.) THEORETICAL EQUATIONS ARE PRESENTED FOR CALCULATING THE MAXIMUM TOTAL YIELD FROM A FOREST COMPOSED OF EVEN-AGED STANDS OF SIMILAR SPECIES MANAGED UNDER A CLEAR-FELLING SYSTEM. THEIR FIELD APPLICATION IS ALSO EXAMINED UNDER VARIOUS CONDITIONS.

256. NAGUMO, M., AND Y. HIRONAKA. 1968. (AN APPLICATION OF LINEAR PROGRAMMING TO THE EXPLOITATION OF NATURAL FORESTS (I) AND (II).) TRANSL. DEP. FOR. CAN., NO. 260, 10 PP., AND NO. 261, 12 PP. (IN JAPANESE.) THE LP METHOD IS USED TO DETERMINE THE MOST ECONOMICAL PLAN FOR ROAD CONSTRUCTION IN, AND EXPLOITATION OF , A HITHERTO UNEXPLOITED (INACCESSIBLE) 4000-HA. PRIVATE FOREST IN CENTRAL HONSHU.

257. NAUTIYAL, J. C. 1966. OPTIMUM RATE OF FOREST HARVESTING. FOREST. CHRON. 42(4):337-345. OUTLINES ECONOMIC CONDITIONS THAT MUST HOLD GOOD FOR: (1) AN EFFICIENT ALLOCATION OF PRIMARY FACTORS OF PRODUCTION FOR HARVESTING FOREST RESOURCES, AND (2) ALLOCATION OF THESE RESOURCES BETWEEN PRESENT AND FUTURE USE. THE CONCEPT OF USER COST IS APPLIED TO SPECIFY TEMPORAL EFFICIENCY IN HARVESTING OF RESOURCES, AND A PRACTICAL METHOD FOR COMPUTING THIS COST IS DEVELOPED. LINEAR PROGRAMMING IS APPLIED TO MAXIMIZE THE PRESENT WORTH OF A FOREST WHILE CONVERTING IT TO SUSTAINED YIELD.

258. NAUTIYAL, J. C., AND P. H. PEARSE. 1967. OPTIMIZING THE CONVERSION TO SUSTAINED YIELD: A PROGRAMMED SOLUTION. FOREST SCI. 13(2):131-139. THIS PAPER DEMONSTRATES HOW LINEAR PROGRAMMING TECHNIQUES CAN BE USED TO SPECIFY THE ECONOMIC OPTIMUM PATTERN OF HARVESTS FROM AN IRREGULAR FOREST DURING THE PERIOD OF ITS CONVERSION TO SUSTAINED YIELD.

259. NAVON, D. I. 1967. COMPUTER-ORIENTED SYSTEMS FOR WILDLAND MANAGEMENT. J. FOREST. 65(7):473-479. INCREASING COMPETITION AMONG GRAZING, RECREATION, TIMBER, AND WATER PRODUCTION MAKES IMPERATIVE THE RATIONAL ALLOCATION OF WILDLAND RESOURCES AMONG THESE USES. ANY METHOD USED TO ALLOCAT RESOURCES MUST BE CAPABLE OF ADJUSTING ITS SOLUTION TO CHANGES IN ESTIMATED AND ECOLOGICAL RELATIONSHIPS AS WELL AS IN THE PROJECTED PATTERN OF DEMAND. A COMPUTER DATA-PROCESSING SYSTEM INTEGRATED WITH A LINEAR-PROGRAMMING ALLOCATION MODEL IS CAPABLE OF MEETING THIS CHALLENGE. THE MAP INFORMATION ASSEMBLY AND DISPLAY SYSTEM (MIADS) IS PRESENTED

AS A COMPUTERIZED DATA-PROCESSING SYSTEM.

260. NAVON, D. I., AND R. J. MCCONNEN. 1967. EVALUATING FOREST MANAGEMENT POLICIES BY PARAMETRIC LINEAR PROGRAMMING. USDA FOREST SERV. PACIFIC SW FOREST AND RANGE EXP. STA. RES. PAP. PSW-42, 13 PP., BERKELEY, CALIF. AN ANALYTICAL AND SIMULATION TECHNIQUE, PARAMETRIC LINEAR PROGRAMMING EXPLORES ALTERNATIVE CONDITIONS AND DEVISES AN OPTIMAL MANAGEMENT PLAN FOR EACH CONDITION. APPLICATION IN SOLVING POLICY AND DECISION PROBLEMS IN THE MANAGEMENT OF FOREST LANDS IS ILLUSTRATED.

261. NAYLOR, T. H., J. L. BALINTFY, D. S. BURDICK, AND K. CHU. 1966. COMPUTER SIMULATION TECHNIQUES. 352 PP. NEW YORK: JOHN WILEY & SONS, INC. CHAPTERS ON : INTRODUCTION TO COMPUTER SIMULATION; PLANNING COMPUTER SIMULATION EXPERIMENTS; TECHNIQUES FOR GENERATING RANDOM NUMBERS; ELEMENTS OF NUMBER THEORY; GENERATION OF STOCHASTIC VARIATES FOR SIMULATION; COMPUTER MODELS OF QUEUING, INVENTORY, AND SCHEDULING SYSTEMS; SIMULATION OF ECONOMIC SYSTEMS; SIMULATION LANGUAGES; THE PROBLEM OF VERIFICATION; AND DESIGN OF SIMULATION EXPERIMENTS.

262. NEMHAUSER, GEORGE L. 1966. INTRODUCTION TO DYNAMIC PROGRAMMING. 256 PP. NEW YORK: JOHN WILEY & SONS, INC. CONTENTS INCLUDE: BASIC THEORY; BASIC COMPUTATIONS; COMPUTATIONAL REFINEMENTS; RISK, UNCERTAINTY AND COMPETITION; NONSERIAL SYSTEMS; INFINITE-STAGE SYSTEMS.

263. NEUBURGER, A. 1965. REPORT OF A STUDY INTO THE USE OF AIRCRAFT IN THE CONTROL OF FOREST FIRES. XV, 211 PP. UNITED AIRCRAFT OF CAN., LTD., LONGUEIL, QUE. FROM THE PARAMETRIC RELATIONSHIPS DERIVED, A MODEL IS CONSTRUCTED THAT GIVES A METHOD OF COMPUTING FINAL FIRE SIZE, TIME REQUIRED FOR SUPPRESSION, NUMBER OF MEN NECESSARY, ETC. THE INFORMATION FOR MODEL DEVELOPMENT WAS OBTAINED FROM PAST CANADIAN FIRE RECORDS.

264. NEVALAINEN, M. 1969. (THE APPLICATION OF LINEAR PROGRAMMING IN AN INTEGRATED WOODWORKING COMPANY.) PAP. JA PAU. 51(8):606-609. (IN, FINNISH, SUMMARY IN ENGLISH.) A LP MODEL WAS DEVELOPED TO DETERMINE THE MOST PROFITABLE DISTRIBUTION OF AVAILABLE TIMBER TO THE PRODUCTION OF PLYWOOD, LUMBER, WOODEN SPOOLS, AND SULPHATE AND SULPHITE PULPS. A SIMPLE MATRIX REPRESENTATION OF THE MODEL IS INTRODUCED AND THE APPLICATION OF THE MODEL IS DISCUSSED.

265. NEWNHAM, R. M. 1966. THE DEVELOPMENT OF A STAND MODEL FOR DOUGLAS-FIR. DISS. ABSTR. 26(7):3567-8. A DESCRIPTION OF THE DEVELOPMENT OF A MATHEMATICAL MODEL, WHICH SATISFACTORILY REPRESENTS TREE GROWTH (ESPECIALLY DIAMETER GROWTH AND ITS RELATION TO CROWN WIDTH) IN STANDS AGED 10 TO 100 YEARS. THE MODEL EMBRACES A WIDE RANGE OF SITE CONDITIONS, STAND DENSITIES, AMOUNTS AND DISTRIBUTIONS OF MORTALITY, AND THINNING REGIMES.

266. NEWNHAM, R. M. 1966. A SIMULATION MODEL FOR STUDYING THE EFFECT OF STAND STRUCTURE ON HARVESTING PATTERN. FORESTRY CHRON. 42(1):39-44. A SIMPLE SIMULATION MODEL IS DESCRIBED WHICH IMITATES THE PASSAGE OF A MECHANICAL HARVESTER THROUGH A PULPWOOD STAND. USING THIS MODEL, WHICH HAS BEEN PROGRAMMED FOR AN IBM 1620 COMPUTER, IT IS POSSIBLE TO STUDY THE EFFECT THAT STAND STRUCTURE AND MACHINE SIZE HAVE ON HARVESTING PATTERN. MODIFICATIONS TO THE MODEL TO INCLUDE ESTIMATES OF OPERATING TIME ARE SUGGESTED.

267. NEWNHAM, R. M. 1967. A FORTRAN PROGRAM TO SIMULATE PULPWOOD HARVESTING MACHINES. FOREST MANAGE. RES. SERV. INST. INFORM. RPT. FMR-X-7, 32 PP., OTTAWA, ONT., CAN. THE COMPUTER PROGRAM AND DESCRIPTION OF ITS USE.

268. NEWNHAM, R. M. 1967. A PROGRESS REPORT ON THE SIMULATION MODEL FOR PULPWOOD HARVESTING MACHINES. CANADA DEP. FORESTRY AND RURAL DEVELOP. INFORM. RPT. FMR-X-6, 41 PP. A MODEL, PROGRAMMED FOR AN IBM SYSTEM/360 COMPUTER IS DESCRIBED WHICH SIMULATES THE PASSAGE OF A FELLER-BUNCHER, SUCH AS THE L.R.A. FELLER-BUNCHERS AND THE BELOIT TYPE OF TREE HARVESTER, THROUGH A STAND OF PULPWOOD.

269. NEWNHAM, R. M. 1968. THE GENERATION OF ARTIFICIAL POPULATIONS OF POINTS (SPATIAL PATTERNS) ON A PLANE. FOREST MANAGE. INST. INFORM. REP. FMR-X-10, 28 PP. OTTAWA, ONT., CAN. A NEW METHOD OF GENERATING ARTIFICIAL POPULATIONS OF POINTS BY USING AN IBM SYSTEM/360 COMPUTER IS DESCRIBED. THE STUDY WAS UNDERTAKEN AS PART OF A PROJECT TO SIMULATE THE OPERATION OF HARVESTING MACHINES IN PULPWOOD STANDS IN WHICH THE SPATIAL PATTERNS OF THE TREES WAS ONE OF THE VARIABLES TESTED. THE METHOD PRODUCES A RANGE OF SPATIAL PATTERNS VARYING FROM UNIFORM (REGULAR) THROUGH RANDOM TO CLUMPED (AGGREGATED). THE COMPUTER PROGRAM FOR THE POPULATION GENERATOR CAN ALSO DRAW UP POPULATION MAPS WITH A CALCOMP PLOTTER.

270. NEWNHAM, R. M. 1968. MINIMUM MERCHANTABLE TREE SIZE AND MACHINE PRODUCTIVITY - A SIMULATION STUDY. PULP AND PAPER MAG. OF CAN. 69(10):227-229. THE RESULTS OF A SIMULATION STUDY TO TEST THE EFFECT ON HARVESTING-MACHINE PRODUCTIVITY OF VARYING THE MINIMUM MERCHANTABLE DIAMETER. THE TEST WAS CONDUCTED IN STANDS CONTAINING 150, 300, AND 450 TREES PER ACRE. MINIMUM MERCHANTABLE DIAMETER WAS TESTED AT 1-INCH INTERVALS BETWEEN 5 AND 11 INCHES. RESULTS SHOWED THAT HARVESTING TIME PER UNIT REACHED A MINIMUM BETWEEN 9 AND 10 INCHES AND THEN INCREASED AGAIN.

271. NEWNHAM, R. M. 1968. SIMULATION MODELS IN FOREST MANAGEMENT AND HARVESTING. FOREST. CHRON. 44(1):7-12. THE ADVANTAGES AND DISADVANTAGES OF SIMULATION MODELS ARE DESCRIBED AND EXAMPLES ARE GIVEN OF THEIR USE IN FORESTRY. STAND MODELS AND A SIMULATION MODEL FOR PULPWOOD-HARVESTING MACHINES ARE DESCRIBED IN SOME DETAIL.

272. NEWNHAM, R. M. 1969. SIMULATION OF PULPWOOD HARVESTING MACHINES. FOREST ENG. CONF. PROC. 1968:71-73, 111. MICH. STATE UNIV., E. LANSING. A DESCRIPTION OF PAST WORK ON A SIMULATION MODEL FOR MACHINES SUCH AS THE BELOIT TREE HARVESTER AND THE L.R.A. LOG-ALL. SOME OF THE DEVELOPMENTS AND MODIFICATIONS OF THE SIMULATOR TO HANDLE A GREATER VARIETY OF STAND THINNING EQUIPMENT ARE PRESENTED IN DETAIL.

273. NEWNHAM, R. M. 1970. PRODUCTIVITY OF HARVESTING MACHINES DESIGNED FOR THINNING: ESTIMATION BY SIMULATION. FOREST MANAGE. INST. INFORM. RPT. FMR-X-25, OTTAWA, ONT. CAN.. 29 PP. BY EMPLOYING A MECHANIZED THINNING SIMULATOR (NEWNHAM AND SJUNNESSON, 1969), THE PARAMETERS DESCRIBING THE B105 FELLER-PROCESSOR AND ITS OPERATION HAVE BEEN TESTED OVER A RANGE OF VALUES TO ESTIMATE POTENTIAL PRODUCTIVITY OF THE MACHINE AND TO SUGGEST POSSIBLE IMPROVEMENTS IN ITS DESIGN. MAXIMUM BOOM REACH, STRIP WIDTH, DELAY TIME, BOOM IN/OUT SPEED, AND BOOM SLEWING SPEED WERE THE MOST CRITICAL FACTORS IN INFLUENCING PRODUCTIVITY. IMPROVEMENTS IN THE HARVESTING MACHINE FOR DECREASING FELLING CYCLE TIME ARE ALSO RECOMMENDED.

274. NEWNHAM, R. M., AND G. T. MALOLEY. 1970. THE GENERATION OF HYPOTHETICAL FOREST STANDS FOR USE IN SIMULATION STUDIES. CAN. FOREST SERV. FOREST MANAGE. INST. INFORM. REP. FMR-X-26, 73 PP. A MATHEMATICAL MODEL, PROGRAMMED IN FORTRAN IV FOR A

UNIVAC 1108 COMPUTER IS DESCRIBED THAT GENERATES HYPOTHETICAL FOREST STANDS. INPUT CONSISTS OF SPATIAL PATTERNS REPRESENTING THE TREES, AND THE MEAN AND STANDARD DEVIATION OF EACH TREE VARIABLE (D.B.H., HEIGHT, CROWN LENGTH). THE MODEL SHOULD BE ABLE TO PRODUCE REALISTIC STANDS FOR A VARIETY OF SIMULATION STUDIES.

275. NEWNHAM, R. M., AND S. SJUNNESSON. 1969. A FORTRAN PROGRAM TO SIMULATE HARVESTING MACHINES FOR MECHANIZED THINNING. FOREST MANAGE. INST., INFORM. RPT. FMR-X-23, OTTAWA, ONT., CAN. A COMPUTER PROGRAM WRITTEN IN FORTRAN IV IS DESCRIBED THAT SIMULATES THE PASSAGE OF A HARVESTING MACHINE THROUGH A FOREST STAND THAT IS BEING THINNED. THE PROGRAM STUDIES THE EFFECT OF MACHINE SIZE AND CONFIGURATION, AND OPERATING SPEEDS ON PRODUCTIVITY. THE MODEL MAY BE USED TO SIMULATE FELLER-PROCESSORS, FELLER-BUNCHERS, OR STRIPROAD PROCESSORS. DATA REQUIREMENTS ARE GIVEN AS WELL AS SAMPLE INPUT AND OUTPUT.

276. NEWNHAM, R. M., AND SMITH, J. H. G. 1964. DEVELOPMENT AND TESTING OF STAND MODELS FOR DOUGLAS-FIR AND LODGEPOLE PINE. FOREST. CHRON. 40(4):494-502. METHODS USED IN THE DEVELOPMENT AND TESTING OF STAND MODELS FOR DOUGLAS-FIR AND LODGEPOLE PINE ARE DESCRIBED BRIEFLY. THE IMPORTANCE OF KNOWING DISTRIBUTION AS WELL AS AMOUNT OF MORTALITY IS STRESSED AND ILLUSTRATED. USE OF THE MODEL FOR STUDYING THINNING IS DESCRIBED. THESE MODELS ARE EASILY MANIPULATED TO PROVIDE SIMULATION ANALYSES ON A COMPUTER.

277. NORMAN, E. L. 1968. A LINEAR PROGRAM FOR FOREST PRODUCTION CONTROL. M.S. THESIS, UNIV. GA., ATHENS. THIS STUDY WAS AN ATTEMPT TO REFINE AND QUANTIFY THE BASES FOR MANAGEMENT DECISIONS INVOLVING THE REGULATION OF UNEVEN-AGED HARDWOODS ON THE FORESTED LANDS OF THE OAK RIDGE NATIONAL LABORATORY IN NORTHEASTERN TENNESSEE. THE OBJECTIVE FUNCTION OF THE LP PROBLEM WAS TO SCHEDULE THE PRESENT HARVEST TO MAXIMIZE THE VALUE OF THE RESIDUAL STAND AT THE TIME OF THE NEXT CUTTING CYCLE DISCOUNTED TO THE PRESENT.

278. NORMAN, E. L., AND J. W. CURLIN. 1968. A LINEAR PROGRAMMING MODEL FOR FOREST PRODUCTION CONTROL. OAK RIDGE NAT. LAB. REP. 4349, 48 PP. OAK RIDGE, TENNESSEE. A MATHEMATICAL MODEL IS PRESENTED THAT ANNUALLY OPTIMIZES THE CUTTING SCHEDULE IN TWO ARBITRARILY SELECTED COMPARTMENTS ON THE OAK RIDGE RESERVATION. YIELD EQUATIONS WERE DEVELOPED

FOR THREE MAJOR TIMBER TYPES; AND SITE QUALITY WAS USED AS AN INDEPENDENT VARIABLE IN THE YIELD EQUATIONS. THE OBJECTIVE FUNCTION WAS MAXIMIZED OVER ONE CUTTING PERIOD (12 YEARS), AND SELECTED MANAGEMENT ALTERNATIVES WERE PROPOSED AND EVALUATED SUBJECT TO VARIOUS MANAGEMENT RESTRICTIONS. THE MODEL SELECTS FOR CUTTING THOSE ALTERNATIVES THAT MAXIMIZE THE VALUE OF THE RESIDUAL STAND DISCOUNTED TO THE PRESENT.

279. NOVOTNY, M. 1967. (MANAGEMENT PROLEMS OF ENTERPRISE TRANSPORT AND THE APPLICATION OF LINEAR PROGRAMMING.) COMMUN. INST. FOR. CSL.5:203-212, (ENGLISH, SUMMARY IN RUSSIAN.) AN ENGLISH VERSION OF THE PREVIOUS CITATION.

280. NOVOTNY, M. 1967. (POSSIBILITIES FOR THE APPLICATION OF LINEAR PROGRAMMING IN LOG HAULING IN FOREST ENTERPRISES.) CZECH. MIN. ZEMED. LES. HOSPOD. USTAV. VEDECKOTECH., INFORM. LES. CAS. 40(9):769-784. (CZECHOSLOVAKIAN, ENGLISH SUMMARY.) LINEAR PROGRAMMING IS SUCCESSFULLY APPLIED AS THE DECISION MAKING ALGORITHM IN THE HAULING OF TIMBER IN FOREST MANAGEMENT UNITS.

281. NOVOTNY, M., AND J. MERVART. 1969. (THE USE OF LINEAR PROGRAMMING IN ECONOMIC ANALYSES OF TIMBER TRANSPORT.) LESNICTVI 15(6):475-484. (CZECHOSLOVAKIAN, SUMMARIES IN RUSSIAN, ENGLISH, GERMAN, AND FRENCH.) WORK RECORDS FROM SEVEN FOREST ENTERPRISES IN CZECHOSLOVAKIA ARE USED TO GIVE TWO EXAMPLES OF APPLYING LINEAR PROGRAMMING TO IMPROVE THE ECONOMIC ORGANIZATION OF TIMBER TRANSPORT, VIZ., (1) ON THE LEVEL OF THE INDIVIDUAL ENTERPRISE, AND (2) ON THE LEVEL OF THE MANAGEMENT UNIT AS A WHOLE.

282. O'REGAN, W. G. 1966. A SIMULATION APPROACH TO TIMBER MANAGEMENT. SEMINAR ON OPER. RES. IN FOREST PROD. IND. PROC.; 113-132. IBM CORP., LOS ANGELES, CALIF. TWO SIMULATION MODELS ARE DEVELOPED FOR USE IN STUDYING AND TEACHING TIMBER-MANAGEMENT DECISION-MAKING. PRELIMINARY AND ILLUSTRATIVE RESULTS ARE PRESENTED FOR SOME SIMPLE MANAGEMENT PLANS.

283. O'REGAN, W. G., AND L. G. ARVANITIS. 1969. SAMPLING SIMULATION COMPUTER PROGRAM. II. COST EFFECTIVENESS AND SAMPLING EFFICIENCY. UNIV. WISC. COLL. AGR. ; LIFE SCI. RES. REP. 50, 31 PP., MADISON. THE APPLICATION OF A COST-EFFECTIVENESS APPROACH TO FOREST SAMPLING IS DEMONSTRATED BY A NEW FORTRAN IV COMPUTER PROGRAM. THE INPUT

INFORMATION INCLUDES THE VARIANCE OF AN ESTIMATOR AS A FUNCTION OF PLOT AREAS OR BASAL AREA FACTORS, AND A COST FUNCTION. CONCEPTS OF PRODUCTION ECONOMICS ARE USED TO IDENTIFY OPTIMUM COMBINATIONS OF PLOT NUMBERS OR POINTS AND CERTAIN SAMPLING RULES. THE OBJECTIVE IS TO MINIMIZE THE VARIABLE COST OF SAMPLING FOR A DESIRED PRECISION LEVEL.

284. O'REGAN, W. G., AND M. N. PALLEY. 1965. A COMPUTER TECHNIQUE FOR THE STUDY OF FOREST SAMPLING METHODS. FOREST SCI. 11(1):99-114. A REPORT ON THE RESULTS OF USING A COMPUTER PROGRAM TO SIMULATE CIRCULAR-PLOT SAMPLING OF FOREST STANDS. THE CHARACTERISTICS OF INTEREST IN THESE STANDS ARE (1) TOTAL FREQUENCY, (2) TOTAL DIAMETER, (3) TOTAL BASAL AREA, AND (4) TOTAL VOLUME.

285. O'REGAN, W. G., L. G. ARVANITIS, AND E. M. GOULD, JR. 1966. SYSTEMS, SIMULATION, AND FOREST MANAGEMENT. SOC. AMER. FOREST. PROC. 1965: 194-198. DETROIT, MICH. A REPORT OF WORK ON TWO COMMON PROBLEMS FACED BY FORESTERS: (1) THE SEARCH FOR EFFECTIVE METHODS OF GATHERING DATA-MAXIMIZING SAMPLING INFORMATION FROM A FIXED BUDGET, AND (2) THE DEVELOPMENT OF SIMULATORS TO CLARIFY MANAGEMENT OPTIONS-CONSTRUCTION OF A FOREST MODEL REGARDED AS A 'WOOD GENERATOR.'

286. OVERTON, C. E. 1969. A MODEL FOR DEVELOPING MANAGEMENT PLANS AND PLANNING CRITERIA FOR MULTI-ENTERPRISE, NON-RESIDENT OWNERS OF LARGE INTERMINGLED LAND HOLDINGS. M.S. THESIS, PURDUE UNIV., LAFAYETTE, IND. A LINEAR PROGRAMMING MODEL IS DEVELOPED TO AID THE SHORT-RUN MANAGEMENT PLANNING OF LARGE LAND HOLDINGS MADE UP OF WIDELY SCATTERED FARM-FORESTRY ENTERPRISES.

287. PAINE, D. W. M. 1966. ANALYSIS OF A FOREST MANAGEMENT SITUATION BY LINEAR PROGRAMMING. AUST. FOREST. 30(4):293-303. ANALYSIS OF A FOREST BY LINEAR PROGRAMMING TO DETERMINE THE OPTIMUM HARVESTING PROGRAM, FOR LEAST REDUCTION OF CURRENT SAWTIMBER GROWTH, PRODUCED RESULTS THAT WERE SUITABLE FOR USE IN THE FIELD AS A SET OF PRESCRIPTIONS FOR TREE MARKING. SUPPLEMENTARY ANALYSIS BY PARAMETRIC PROGRAMMING SHOWED THE EFFECTS OF VARYING SOME OF THE FACTORS INVOLVED.

288. PARKER, H. V., III. 1969. THE APPLICATION OF LINEAR PROGRAMMING OPTIMIZATION TECHNIQUES TO KRAFT PULP AND PAPER MILL EFFLUENT TREATMENT. M.S. THESIS, N. C. STATE UNIV., RALEIGH. TWO APPROACHES ARE

PRESENTED TO THE OPTIMIZATION OF KRAFT PULP AND PAPER MILL EFFLUENT TREATMENT SYSTEMS. LINEAR PROGRAMMING MODELS ARE DEVELOPED TO DESCRIBE THE ENTIRE SYSTEM, INCLUDING THE MILL, THE EFFLUENT TREATMENT PLANT, AND THE RIVER. THE FIRST APPROACH ATTEMPTS TO MINIMIZE THE COST OF EFFLUENT TREATMENT, AND THE SECOND ATTEMPTS TO MAXIMIZE THE OVERALL MILL PROFIT.

289. PARKS, G. M. 1964. DEVELOPMENT AND APPLICATION OF A MODEL FOR SUPPRESSION OF FOREST FIRES. MANAGE. SCI. 10(4):760-766. EQUATIONS TO MINIMIZE TOTAL COSTS OF FIRE SUPPRESSION AND FIRE DAMAGE (DERIVED FROM A SIMPLE FIRE-GROWTH MODEL USING O.R. TECHNIQUES) WERE APPLIED TO DATA FROM 139 FIRES IN THE PLUMAS NATIONAL FOREST, CALIFORNIA. RESULTS INDICATE THAT LARGER FIRE CREWS WOULD REDUCE TOTAL FIRE COSTS, AND THAT 75 PERCENT OF ALL THE FIRES WERE UNDERMANNED.

290. PATRONE, G. 1965. PROGRAMMAZIONE LINEARE IN SELVICOLTURA. (LINEAR PROGRAMMING IN FORESTRY.) 160 PP. FLORENCE: BRUNO COPPINI AND CO. (IN ITALIAN.) CHAPTERS ON: INFORMATION IN WORK STUDIES, MATHEMATICAL THEORY OF LP, ECONOMIC SIGNIFICANCE OF LP, GRAPHIC REPRESENTATION OF PROBLEMS WITH TWO CONSTRAINTS, THE SIMPLEX METHOD OF CALCULATION, THE GEOMETRIC SIGNIFICANCE OF THE SIMPLEX METHOD, THE PROBLEM OF DISTRIBUTION, AND PROBLEMS OF LP IN FORESTRY.

291. PAULL, A. E. 1956. LINEAR PROGRAMMING: A KEY TO OPTIMUM NEWSPRINT PRODUCTION. PULP AND PAPER MAG. CAN. 57(4):145-150. TWO APPLICATIONS OF LINEAR PROGRAMMING IN THE PULP AND PAPER INDUSTRY ARE DISCUSSED: TRANSPORTATION SCHEDULING AND TRIM SCHEDULING. BOTH OF THESE APPLICATIONS HAVE BEEN SUCCESSFULLY PUT TO USE AT ABITIBI. TRANSPORTATION SCHEDULING CONCERNS ASSIGNING VARIOUS ORDERS TO SEVERAL MILLS SO AS TO MINIMIZE THE TOTAL COMPANY FREIGHT BILL. TRIM SCHEDULING IS CONCERNED WITH MACHINE ASSIGNMENTS AND COMBINATIONS TO MINIMIZE OVERALL TRIM LOSS.

292. PAULL, A. E., AND J. R. WALTER. 1955. THE TRIM PROBLEM: APPLICATION OF LINEAR PROGRAMMING TO THE MANUFACTURE OF NEWSPRINT PAPER. ECONOMETRICA 23(3):336. ABITIBI MANUFACTURES ROLLS OF NEWSPRINT PAPER TO MEET CUSTOMERS' SPECIFICATIONS WITH REGARD TO WIDTH AND DIAMETER. IN CUTTING THESE ROLLS FROM LARGER REELS OF PAPER, TRIM LOSSES ARE INCURRED. THIS STUDY DESCRIBES AN APPLICATION OF LINEAR PROGRAMMING METHODS TO THE

REDUCTION OF TOTAL TRIM LOSS INCURRED BY SIX OF THEIR PAPER MACHINES.

293. PAYANDEH, B. 1968. A COMPUTER SIMULATION STUDY OF THE RELATIVE EFFICIENCY OF SEVERAL FOREST SAMPLING TECHNIQUES AS INFLUENCED BY THE SPATIAL DISTRIBUTION OF TREES FOUND IN FIVE MAJOR FOREST TYPES OF THE PACIFIC NORTHWEST. DISS. ABSTR. 28B(11):4371-4372. A STUDY TO DETERMINE THE RELATIVE EFFICIENCY OF SYSTEMATIC, STRATIFIED, AND SIMPLE RANDOM SAMPLING FOR ESTIMATING CROWN AREA AND TREE FREQUENCY. ALSO, AN EVALUATION WAS MADE OF SOME COMMON METHODS OF ESTIMATING SPATIAL DISTRIBUTION COEFFICIENTS, AND TO DETERMINE THE EFFECT OF SPATIAL DISTRIBUTION ON THE RELATIVE EFFICIENCY OF TWO-DIMENSIONAL SYSTEMATIC SAMPLING. THE BASIC DATA (FROM AERIAL PHOTOS) WERE THE LOCATION AND SIZE OF EACH TREE CROWN.

294. PEARSE, P. H., AND S. SYDNEYSMITH. 1966. METHODS FOR ALLOCATING LOGS AMONG SEVERAL UTILIZATION PROCESSES. FOREST PROD. J. 16(9):87-98. LINEAR PROGRAMMING IS USED FOR ASSIGNING LOGS AND INTERMEDIATE PRODUCTS TO USES AS LUMBER, VENEER, CHIPS, PULP, PLYWOOD, AND LOG FUEL FOR MAXIMIZING THE NET ECONOMIC VALUE OF OUTPUT. THE UTILIZATION OF THE 1962 LOG SUPPLY IN BRITISH COLUMBIA IS COMPARED TO THE OPTIMUM UTILIZATION OBTAINED BY SOLUTION OF THE LP MODEL.

295. PENICK, E. B., JR. 1966. TURNING FOR PROFIT: AN APPLICATION OF OPERATIONS RESEARCH TECHNIQUES TO A WOOD-TURNING PLANT. FOREST PROD. 16(1):24-27. LINEAR PROGRAMMING WAS APPLIED TO THE OPERATIONS OF A SMALL FIRM WHICH MAKES WOOD TURNINGS BY CONTRACT FOR A BROAD RANGE OF CUSTOMERS. THE LP SOLUTION HELPED THE PLANT MANAGER ELIMINATE PRODUCTION BOTTLE-NECKS, GAVE HIM GUIDELINES FOR COMPETITIVE BIDDING, AND TOLD HIM WHICH ORDERS WOULD GIVE THE MOST PROFIT.

296. PENICK, E. B., JR. 1968. LINEAR PROGRAMMING: APPLICATION TO MACHINE LOADING IN A FURNITURE PLANT. FOREST PROD. J. 18(2):29-34. THE PROCESS FOUND THE COMBINATION OF FURNITURE PIECES THAT MOST NEARLY OPTIMIZED LOADS ON AVAILABLE MACHINERY. SUCH PROGRAMMING SHOULD LEAD TO MORE EFFECTIVE USE OF MACHINE AND LABOR RESOURCES AND THUS REDUCE PRODUCTION COSTS.

297. PENICK, E. B., JR., AND G. E. FRICK. 1965. APPLICATION OF AN OPERATIONS RESEARCH TECHNIQUE TO A WOOD-TURNING PLANT. UNIV. OF NEW HAMPSHIRE.

AGR. EXP. STA. MIMEO. 38, 17 PP. AN APPLICATION OF LINEAR PROGRAMMING TO THE PROBLEM OF PRODUCT SELECTION IN A SMALL WOOD-TURNING FIRM. THE PROBLEM DEALS WITH MAKING THE MOST EFFICIENT USE OF LIMITED LATHE TIME THROUGH SELECTION OF THE MOST PROFITABLE COMBINATION OF PRODUCTS.

298. PETROVSKY, V. S. 1963. (ALGORITHMS FOR PROGRAMMING THE CROSS-CUTTING OF TREE-LENGTH LOGS.) LESN. PROM. (7):10-12. (IN RUSSIAN.) THE OPTIMUM SCHEDULE FOR CROSS-CUTTING EACH STEM IN A SAWMILL SHOULD SECURE (1) THE MAXIMUM YIELD FROM LOGS IN TERMS OF MONEY AT PREVAILING PRICES, (2) THE MAXIMUM YIELD FROM LOGS BY VOLUME, (3) THE MAXIMUM YIELD OF THE MAIN ASSORTMENT, E.G. SAWTIMBER, AND (4) THE MAXIMUM VOLUME OF CYLINDRICAL LOGS. ALGORITHMS, USING SPECIES, STEM QUALITY, STEM LENGTH, STEM DIAMETER, AND BOT DIAMETER AT BUTT, ARE DEVELOPED FOR EACH OF THESE REQUIREMENTS WITH AN EXPLANATION OF THEIR MATHEMATICAL DERIVATION, AND A COMBINED MAXIMIZING ALGORITHM FOR OPTIMUM CROSSCUTTING IS PRESENTED.

299. PETROVSKY, V. S. 1964. (CONSTRUCTION OF AN AUTOMATIC OPTIMIZATION SYSTEM FOR CROSS-CUTTING STEMS, WITH THE AIM OF USING DIGITAL COMPUTERS TO CONTROL THE BREAKING DOWN OF TREE-LENGTH LOGS.) LESN. Z. ARHANGEL'SK 7(4):147-157. (IN RUSSIAN WITH RUSSIAN SUMMARY.) A DETAILED MATHEMATICAL EXPOSITION.

300. PETROVSKY, V. S. 1968. (ALGORITHMS FOR THE CROSS-CUTTING OF STEMS INTO SAWLOGS, DESIGNED TO MAXIMIZE THE VOLUME YIELD OF EDGED TIMBER.) LESN. Z. ARHANGEL'SK 11(4):122-126. (IN RUSSIAN.) AN ALGORITHM IS DEVELOPED FOR OPTIMIZING YIELD IN THE FIRST STAGE OF LOG BREAKDOWN. COMPUTER CALCULATIONS USING A PROGRAM WRITTEN ON THE BASIS OF THIS ALGORITHM HAVE SHOWN THAT OPTIMIZATION CAN PRODUCE A 2 PERCENT INCREASE IN YIELD.

301. PHELPS, R. B. 1969. THE APPLICATION OF A LINEAR PROGRAMMING TECHNIQUE TO THE PROCUREMENT OF PULPWOOD. M.S. THESIS, NC STATE COLL., RALEIGH. LINEAR PROGRAMMING IS USED TO CALCULATE A LEAST COST PROGRAM FOR THE PURCHASE OF PULPWOOD BY AN INDIVIDUAL PULPMILL.

302. PLEINES, W. E. 1967. (LINEAR PROGRAMMING OF YIELD AND FELLING PLANS.) SCHWEIZ. Z. FORSTW. 118(9):551-560. (IN FRENCH WITH GERMAN SUMMARY.) LINEAR PROGRAMMING IS USED TO DETERMINE THE ANNUAL CUT (IN PURE, EVEN-AGED SPRUCE) OVER A 10-YEAR

PERIOD THAT WOULD MAXIMIZE NET REVENUE. THE RESULTS INCLUDE THE DISTRIBUTION OF FINAL FELLINGS AND THINNINGS OVER THE VARIOUS FICTITIOUS SITE AND AGE CLASSES, AND THE EFFECT OF MONETARY AND OTHER RESTRAINTS.
INTS.

303. POPOVIC, U. D. 1965. APPLICATION OF LINEAR PROGRAMMING TO THE PROBLEMS OF FOREST ECONOMICS. SUMARSTV 18(3-5):121-133. (IN SERBO-CROATIAN, SUMMARY IN ENGLISH.) IN CONTINUATION OF HIS STUDY, THE AUTHOR EXPLAINS THE GENERAL TECHNIQUE OF CALCULATING BY THE SIMPLEX METHOD. INSTRUCTIONS FOR PREPARING THE SIMPLEX TABLES, CALCULATING THE VALUES IN SUCH TABLES, AND THEIR EXPLANATIONS ARE GIVEN. AN EXAMPLE OF CALCULATING THE OPTIMAL NUMBER OF PRODUCTS (TABLES AND CHAIRS) FROM THE FIXED MATERIAL IN A WORKSHOP WHILE SIMULTANEOUSLY ATTAINING THE HIGHEST PROFIT IS INCLUDED.

304. POULIOT, J. M. 1966. THE APPLICABILITY OF LINEAR PROGRAMMING TO A TIMBER-ALLOCATION PROBLEM. M.S. THESIS, STATE UNIV. N.Y. COLL. FORESTRY, SYRACUSE. THE PURPOSE OF THIS STUDY IS TO EXPLORE THE APPLICATION OF THE TRANSPORTATION MODEL OF LINEAR PROGRAMMING TO THE TIMBER-ALLOCATION PROBLEM. THE STUDY APPLIES THE TECHNIQUE TO A HYPOTHETICAL PROBLEM AND RELATES THE RESULTS TO THE ACTUAL PROBLEM THAT EXISTS IN QUEBEC. THE MODEL CONSIDERS THE LOGGING AS WELL AS THE TRANSPORTATION OF TIMBER FROM DIFFERENT SOURCES TO DIFFERENT MILLS.

305. PRUDIC, Z. 1962. (LINEAR PROGRAMMING AND ITS USE FOR DETERMINING PRODUCTION (ECONOMIC) OBJECTIVES.) LESNICTVI 8(4):251-262. PRAGUE. (CZECHOSLOVAKIAN, RUSSIAN, WITH SUMMARY IN FRENCH.) NO ENGLISH SUMMARY AVAILABLE.

306. PRUDIC, Z. 1968. (FORESTRY AND GAME THEORY.) LESNICKA PRACE 47(3):121-125. (IN CZECHOSLOVAKIAN.) NO ENGLISH SUMMARY IS AVAILABLE.

307. RAIFFA, H., AND R. SCHLAIFER. 1961. APPLIED STATISTICAL DECISION THEORY. 356 PP. CAMBRIDGE, MASS.: HARVARD UNIV., DIV. RES., GRAD. SCHOOL BUS. ADMIN. CONTENTS INCLUDE: GENERAL THEORY OF DECISIONS, SUFFICIENT STATISTICS AND NONINFORMATIVE STOPPING, CONJUGATE PRIOR DISTRIBUTIONS, LINEAR TERMINAL ANALYSIS, SELECTION OF THE BEST OF SEVERAL PROCESSES, UNIVARIATE

NORMALIZED MASS AND DENSITY FUNCTIONS, MULTIVARIATE NORMALIZED DENSITY FUNCTIONS, BERNOULLI PROCESS, POISSON PROCESS, NORMAL PROCESSES, AND NORMAL REGRESSION PROCESS.

308. RAMSING, K. D. 1965. A LINEAR PROGRAMMING MODEL FOR THE ALLOCATION OF LOGS FOR THE MANUFACTURE OF AN OPTIMUM PLYWOOD MIX. D.B.A. THESIS, UNIV. OREG., PORTLAND. RESULTS FROM THE LINEAR PROGRAMMING SOLUTION: QUANTITY OF LOGS BY GRADE TO BE MANUFACTURED INTO EACH VENEER THICKNESS; QUANTITY OF EACH KIND OF PLYWOOD PANEL TO BE MANUFACTURED IN ORDER TO MAXIMIZE PROFIT.

309. RAMSING, K. D. 1966. HOW THE CRITICAL PATH METHOD CAN ASSIST ROAD CONSTRUCTION - PART I. FOREST IND. 93(13):66-69. THE CRITICAL PATH METHOD (CPM) COORDINATES ACTIVITIES INVOLVED IN A SINGLE PROJECT. THE CONSTRUCTION OF LOGGING ROADS PROVIDES A GOOD APPLICATION FOR CPM.

310. RAMSING, K. D. 1967. HOW THE CRITICAL PATH METHOD CAN ASSIST ROAD CONSTRUCTION - PART II. FOREST IND. 94(1):180-183. A CONTINUATION OF THE PREVIOUS CITATION.

311. RAMSING, K. D. 1968. LINEAR PROGRAMMING FOR THE PLYWOOD MIX PROBLEM. FOREST PROD. J. 18(4):98-101. TWO VENEER-TO-PLYWOOD PROBLEMS ARE SOLVED WITH LINEAR PROGRAMMING TECHNIQUES. A SIMPLIFIED VERSION IS APPROACHED BY GRAPHICAL SOLUTION AND A MORE COMPLICATED PROBLEM IS SOLVED BY THE SIMPLEX APPROACH. THE APPLICATION OF LP TO NEW PRODUCT DEVELOPMENT IS ALSO DISCUSSED.

312. RAMSING, K. D. 1969. HOW THE CRITICAL PATH METHOD CAN ASSIST LOGGING ROAD CONSTRUCTION. PHILLIP. LUMBERMAN 15(11-12):34, 35, 37, 28-31. THE MATERIAL IN TWO PREVIOUS CITATIONS (RAMSING, 1966 AND 1967) IS PRESENTED IN THESE ARTICLES.

313. RANDEL, W. C. 1964. LINEAR PROGRAMMING IN A SMALL FOREST PRODUCTS FIRM. DISS. ABSTR. 25(3):1468. THE SIMPLEX METHOD OF LINEAR PROGRAMMING IS USED TO DETERMINE AN OPTIMUM PRODUCTION SCHEDULE FOR A SMALL FIRM MAKING A LIMITED VARIETY OF GOODS. DETAILED TIME AND COST STUDIES WERE MADE OF THE PROCESSES, MATERIALS, AND PRODUCTS INVOLVED. THREE ALTERNATIVE OPTIMUM SOLUTIONS ARE PRESENTED, EACH REPRESENTING A DIFFERENT SET OF CONDITIONS IN FORCE AT THE TIME OF SOLUTION.

314. REIMER, D. R. 1969. DEVELOPMENT OF A LEONTIEF

INPUT-OUTPUT MODEL AND ITS APPLICATION IN THE ANALYSIS OF THE ECONOMIC IMPACT OF A NEW FOREST INDUSTRY ON THE ECONOMIC GROWTH AND DEVELOPMENT OF AN UNDERDEVELOPED MICRO-REGION IN SOUTHERN INDIANA. PH.D. DISS., PURDUE UNIV., LAFAYETTE, IND. THE STUDY ATTEMPTED TO DETERMINE THE ECONOMIC CONTRIBUTION OF A NEWLY ESTABLISHED PARTICLEBOARD PLANT AT EVANSTON, INDIANA, TO THE LOCAL ECONOMY. A LEONTIEF-TYPE INPUT-OUTPUT MODEL WAS CONSTRUCTED FOR EVALUATING THE PARTICLEBOARD PLANT AND THREE OTHER WOOD-USING INDUSTRIES THAT WERE CONSIDERING ESTABLISHMENT WITHIN THE LOCAL AREA. INDICATIONS WERE THAT AN INTEGRATED SAWMILL-VENEER-PLYWOOD COMPLEX WOULD PROVIDE GREATER ECONOMIC BENEFITS THAN EITHER THE PARTICLEBOARD PLANT, A PULP MILL, OR A PULP AND PAPER MILL.

315. REYNOLDS, H. W. 1970. SAWMILL SIMULATION: DATA INSTRUCTIONS AND COMPUTER PROGRAMS. USDA FOREST SERV. NE FOREST EXP. STA. RES. PAPER NE-152, 41 PP., ILLUS. UPPER DARBY, PA. INSTRUCTIONS AND COMPUTER PROGRAMS FOR COMPUTER PROGRAM DEFECT TO SIMULATE SAWING LOGS INTO BOARDS. LOG SAMPLES ARE SAWED, AND THE TYPE AND LOCATION OF ALL DEFECTS ARE ENCODED INTO THE COMPUTER. THE LOGS ARE IN EFFECT REASSEMBLED WITHIN THE COMPUTER AND CAN BE SAWED REPEATEDLY WITH DIFFERENT SAWING PATTERNS. THE PROGRAM SHOWS HOW DEFECTS APPEAR ON EACH NEW BOARD FOR EACH NEW SAWING PATTERN. THE INSTRUCTIONS INCLUDE HOW TO USE COMPUTER PROGRAM YIELD TO SIMULATE THE RIPPING AND TRIMMING OF BOARDS GENERATED BY PROGRAM DEFECT.

316. RIIKONEN, R., AND J. RYHANEN. 1965. (ELECTRONIC DATA-PROCESSING IN THE OPTIMIZATION OF SAWMILL PRODUCTION.) PAP. JA PUU 47(9):497-502. (IN FINNISH WITH FINNISH AND ENGLISH SUMMARIES.) A COMPUTER PROGRAM IS DESCRIBED THAT SIMULATED DIFFERENT ALTERNATIVES IN SAWING A LOG, CHOOSING THE ONE THAT WILL GIVE THE MOST PROFITABLE ECONOMIC RESULT. ACCOUNT IS TAKEN OF VARIATIONS IN QUALITY BY CALCULATING THE RESULTS GIVEN BY BOTH A GOOD AND A POOR QUALITY LOG. THE PROGRAM IS INTENDED PRIMARILY AS A HELP IN SELECTING THE BEST INCH-CLASS LIMITS FOR SAWLOG ASSORTMENT AND IN CHOICE OF SAW SPACING.

317. RILEY, V. 1953. AN ANNOTATED BIBLIOGRAPHY ON OPERATIONS RESEARCH. CHEVY CHASE, MD.: OPER. RES. OFFICE, JOHNS HOPKINS UNIV. THIS VOLUME CONTAINS THE FIRST FOUR SECTIONS OF A COMPLETE ANNOTATED BIBLIOGRAPHY OF OPERATIONS RESEARCH.

OPERATIONS RESEARCH IS DEFINED BY THE AUTHOR AS THE SCIENCE THAT PROVIDES ADMINISTRATORS WITH A SCIENTIFIC EVALUATION OF ALTERNATIVE COURSES OF ACTION AND A QUANTITATIVE BASIS FOR DECISION. THESE FOUR SECTIONS INCLUDE THE LITERATURE DEALING WITH HISTORY AND METHODOLOGY, MILITARY APPLICATIONS, INDUSTRIAL APPLICATIONS, AND GOVERNMENT PLANNING USING OPERATIONS RESEARCH.

318. RILEY, V., AND J. P. YOUNG. 1957. BIBLIOGRAPHY ON WAR GAMING. CHEVY CHASE, MD.: OPER. RES. OFFICE, JOHNS HOPKINS UNIV. IT IS THE PURPOSE OF THIS WORK TO PRESENT REFERENCES TO HISTORICAL AND CONTEMPORARY EFFORTS THAT HAVE BEEN INSTRUMENTAL IN THE DEVELOPMENT OF THE TECHNIQUES OF WAR GAMING. WAR GAMES ARE DEFINED AS IMAGINARY MILITARY OPERATIONS. ALL OF THE EARLY WAR GAMES ARE LISTED IN CHRONOLOGICAL ORDER WITHIN THEIR RESPECTIVE CATEGORIES. THE MODERN WAR GAMES ARE CLASSIFIED INTO THEORETICAL GAMES THAT INCLUDE MATHEMATICAL MODELS AND GAMES WITH NO SPECIFIC MILITARY APPLICATION; AND MILITARY GAMES DEVELOPED PRIMARILY FOR THE SOLUTION OF MILITARY PROBLEMS INVOLVING LAND, SEA, OR AIR WARFARE.

319. RIPLEY, T. H., AND D. O. YANDLE. 1969. A SYSTEMS ANALYSIS-ECOLOGICAL CONTROL APPROACH TO MULTIRESOURCE FOREST MANAGEMENT. J. FOREST. 67(11):806-809. A GENERAL ARTICLE OUTLINING AN APPROACH FOR CONSIDERING MULTI-PRODUCT AND SERVICE ALTERNATIVES IN MANAGING A FOREST PROPERTY. THE USE OF LINEAR PROGRAMMING, DYNAMIC LINEAR PROGRAMMING, AND DYNAMIC PROGRAMMING IN RESOURCE MANAGEMENT IS BRIEFLY DISCUSSED.

320. RISVAND, J. 1970. (ECONOMIC ANALYSIS OF CUTTING PROGRAMS APPLYING DYNAMIC PROGRAMMING.) NORSKE SKOGFORSOKSV. MEDD. 28(1), 110 PP. (IN NORWEGIAN WITH SUMMARY IN ENGLISH.) DYNAMIC PROGRAMMING WAS USED AS THE BASIS FOR CONSTRUCTING AN ECONOMIC MODEL TO MANAGE A GIVEN FOREST STAND. THE PROFITABILITY CRITERION (MAXIMUM PRESENT VALUE) WAS THE ONLY ELEMENT OF PURPOSE. THE STATE OF THE FOREST STAND IS DESCRIBED IN TERMS OF THE VOLUME PER HECTARE AND MEAN DIAMETER. THE DEVELOPMENT OF THE STAND IS THEN ESTIMATED FROM A GIVEN INITIAL STATE.

321. RISVAND, J., AND K. HOBBELSTAD. 1968. (MODERN PLANNING METHODS.) LANDBRUKETS ARBOK, SKOGBRUK. 21 PP. (IN NORWEGIAN.) A GENERAL REVIEW OF OPERATIONS RESEARCH METHODS WITH SPECIAL REFERENCE TO LINEAR PROGRAMMING.

322. RONDE, F. V. 1957. BIBLIOGRAPHY ON LINEAR PROGRAMMING. OPER. RES. 5(1):45-62. THIS BIBLIOGRAPHIC ESSAY CONTAINS 266 REFERENCES AND COVERS THE DEVELOPMENT OF LINEAR PROGRAMMING AND ITS VARIOUS APPROACHES AND PROBLEMS.

323. RONNBO, C. A. 1963. (THE PLANNING OF ROAD NETWORKS - - A PROBLEM OF STOCK SIZE DETERMINATION BY OPERATIONAL ANALYSIS.) SVENSKA SKOGSV FOREN. TIDSKR. 61(4):383-389. (IN SWEDISH.) TECHNIQUES OF STOCK SIZE DETERMINATION ARE APPLIED TO OPTIMIZE QUANTITIES OF CORDWOOD PER LANDING (BEFORE MACHINE BARKING AND SELLING) FOR THE PURPOSE OF DEMONSTRATING THAT THE PLANNING OF OPTIMUM-DENSITY ROAD NETWORKS MAY BE SOLVED BY THE SAME MATHEMATICAL APPROACH.

324. ROW, C., C. FASICK, AND S. GUTTENBERG. 1965. IMPROVING SAWMILL PROFITS THROUGH OPERATIONS RESEARCH. USDA FOREST SERV. SOUTH. FOREST EXP. STA. RES. PAPER SO-20. 26 PP. NEW ORLEANS, LA. THE OPERATIONS OF A HIGH-SPEED SOUTHERN PINE SAWMILL ARE ANALYZED IN FOUR PARTS: (1) A YIELD ANALYSIS OF LOGS SAWN, (2) TIMES REQUIRED ON EACH MACHINE, (3) ESTABLISHING CONSTRAINTS ON INPUT, TIMES, AND SALES, AND (4) ANALYSIS OF ALL THESE DATA BY LINEAR PROGRAMMING. RESULTS ARE TABULATED AND IT IS SUGGESTED THAT THIS METHOD HAS WIDE APPLICATION IN SAWMILL OPERATION.

325. RUPRICH, J., AND J. KORINEK. 1968. (AN ANALYSIS OF THE LABORIOUSNESS OF APPROXIMATION METHODS IN THE SOLUTION OF THE TRANSPORT PROBLEM IN FORESTRY.) LESN. CAS. 14(5):405-420. THE VOGEL APPROXIMATION TO LINEAR PROGRAMMING IS COMPARED TO THREE OTHER TECHNIQUES FOR SOLVING PROLEMS OF TIMBER REMOVAL. THE VOGEL APPROXIMATION METHOD WAS BETTER SUITED FOR LARGER PROBLEMS HAVING MATRICES ON THE ORDER OF 50 X 20.

326. RYKUNIN, S. N. 1966. THE LINEAR PROGRAMMING METHOD AND ITS USE IN PLANNING THE SAWING OF LOGS. TRANSL. COMMONW. SCI. INDUS. RES. ORGAN. AUST. 7747. 5 PP. (TRANSL. BY J. A. COLLINS FROM LESN. PROM. 7, PP. 25-27, 1965.) THE USE OF LINEAR PROGRAMMING IN PLANNING THE OPTIMUM OR NEAR-OPTIMUM CONVERSION OF ROUNDWOOD TO LUMBER IS DISCUSSED.

327. RYTI, N., AND M. KIRJOSNIEMI. 1968. (SEARCH FOR AN OPTIMUM PROGRAM FOR THE WOODWORKING INDUSTRY WHEN WOOD RAW MATERIAL IS A LIMITING FACTOR.) PAP. JA PUU. 50(3):109-116. HELSINKI. (IN FINNISH WITH

ENGLISH SUMMARY.) LINEAR PROGRAMMING IS APPLIED TO A WOODWORKING INDUSTRY FACED WITH A LIMITED SUPPLY OF WOOD AS THE MAJOR CONSTRAINT.

328. SAATY, T. L. 1961. ELEMENTS OF QUEUING THEORY. 440 PP., ILLUS. NEW YORK: MCGRAW HILL BOOK CO. PRESENTS A VARIETY OF QUEUING RAMIFICATIONS, METHODS OF TREATMENT. MOST OF THE FUNDAMENTAL IDEAS OF QUEUES ARE DISCUSSED AND DEVELOPED, AS ARE MANY APPLICATIONS, IN ADDITION TO A DISCUSSION OF BOTH POISSON AND NON-POISSON QUEUES WITH DIFFERENT QUEUING DISCIPLINES.

329. SADLER, R. K. 1970. BUFFER STRIPS, A POSSIBLE APPLICATION OF DECISION THEORY. U.S. DEP. INTERIOR BUR. LAND MANAGE. TECH. NOTE 6512, 11 PP. DECISION THEORY IS USED IN WEIGHING FISHERY VERSUS TIMBER VALUES.

330. SAJECHNIKOV, V. G., AND P. I. GORYSHIN. 1968. APPLICATION OF METHODS OF LINEAR PROGRAMMING. CENT. SCI. RES. INST., 23 PP. MOSCOW. ECONOMIC USE OF LOG TRUCKS ON STATE-OWNED FORESTS.

331. SAKAMOTO, T. 1966. (STUDY ON THE RISK PROGRAMMING OF FORESTRY MANAGEMENT.) KYUSHU UNIV. FOREST. BULL. 40:91-239. (IN JAPANESE WITH ENGLISH SUMMARY.) THE PRESENTATION OF A PROGRAMMING METHOD SUITED TO LONG-RUN FOREST-MANAGEMENT PLANNING THAT CONSIDERS RISK AND UNCERTAINTY, OPPORTUNITY COSTS OF INVESTMENT, AND NET PROFIT. THE MODEL LEADS TO RESULTS SIGNIFICANTLY DIFFERENT FROM THE TRADITIONAL METHODS.

332. SAMPSON, G. R. 1969. THE MAJOR DISADVANTAGES AND ADVANTAGES OF USING OPERATIONS RESEARCH AS A MANAGEMENT INFORMATION TECHNIQUE. OPER. RES. APPL. TO SAWMILLS PROC.:51-55. UNIV. OF GEORGIA, ATHENS. THIS PAPER PRESENTS MAJOR DISADVANTAGES OF THE APPLICATION OF OPERATIONS RESEARCH TO A SAWMILL AND REVIEWS SOME MINOR PROBLEMS. MAJOR AND MINOR ADVANTAGES OF USING THIS MANAGEMENT INFORMATION TECHNIQUE ARE ALSO SUMMARIZED.

333. SAMPSON, G. R. 1969. A REVIEW OF OPERATIONS RESEARCH IN THE FOREST INDUSTRY. OPER. RES. APPL. TO SAWMILLS PROC.:5-11. UNIV. GEORGIA, ATHENS. THE CONCEPTION OF OPERATIONS RESEARCH IS DESCRIBED AND A REVIEW OF HOW THESE METHODS HAVE DEVELOPED IN FOREST MANAGEMENT, HARVESTING, PLYWOOD MANUFACTURING, SAWMILL OPERATIONS, AND MULTI-PLANT FACILITIES IS PRESENTED.

334. SAMPSON, G. R., AND C. A. FASICK. 1970. OPERATIONS RESEARCH APPLICATION IN LUMBER PRODUCTION. FOREST PROD. J. 20(5):12-16. AN OPERATIONS RESEARCH APPROACH IS USED TO ANALYZE THE OPERATION OF A SOUTHERN PINE SAWMILL. A LINEAR PROGRAMMING MODEL IS USED TO SIMULATE OPERATIONS OF THE MILL. THE ANALYSIS INCLUDES THE EFFECTS OF DOWNTIME ON NET REVENUE, THE EFFECTS OF DIFFERENT LEVELS OF INPUT ON NET REVENUE, AND RECOMMENDATIONS FOR PROFIT MAXIMIZATION.

335. SCHALEK, M. 1965. (APPLICATION OF LINEAR PROGRAMMING IN THE SOLUTION OF TRANSPORTATION OF LOGS.) LESNICKA PRACE 44(9):407-410. (IN CZECHOSLOVAKIAN.) NO ENGLISH SUMMARY IS AVAILABLE.

336. SCHLAIFER, R. 1959. PROBABILITY AND STATISTICS FOR BUSINESS DECISIONS: AN INTRODUCTION TO MANAGERIAL ECONOMICS UNDER UNCERTAINTY. 732 PP. NEW YORK: MCGRAW-HILL BOOK CO. A TEXT AND GENERAL SURVEY OF BAYESIAN DECISION THEORY. A DISCUSSION OF THE BASIC PROBABILISTIC PROCESSES THAT PLAY A CENTRAL ROLE IN FREQUENTIST APPROACHES (BERNOULLI PROCESS, BINOMIAL, AND PASCAL PROBABILITIES, POISSON PROCESS, ETC.). RESULTS ARE USED IN A BAYESIAN FRAMEWORK WITH CONSIDERABLE EMPHASIS ON PRIOR PROBABILITIES.

337. SCHMIDT, J. W., JR., W. D. TORLANE, J. BYRD, AND M. R. FEDORKO. 1970. FEASIBILITY STUDY ON THE RETRIEVAL AND USE OF PRIMARY WOOD RESIDUE. WEST VA. UNIV. ENG. EXP. STA. RPT. 11, 250 PP. MORGANTOWN A COMPUTER SIMULATION MODEL IS DISCUSSED AND PRESENTED (FLOW CHART AND LISTING ARE GIVEN). THIS MODEL ANALYZES THE FEASIBILITY OF REMOVING AND UTILIZING WOOD WASTE LEFT IN THE FOREST IN THE APPALACHIAN REGION AFTER COMPLETION OF PRIMARY LOGGING OPERATIONS. RESULTS INDICATE THAT AT THE PRESENT TIME IT IS UNLIKELY THAT PRIMARY WOOD WASTE CAN BE ECONOMICALLY RETRIEVED FROM THE STUMP AREA.

338. SCHOPFER, W. 1967. (A SAMPLING SIMULATOR FOR RESEARCH AND TEACHING.) ALLG. FORST U. JAGDZTG. 138(12):267-273. (GERMAN WITH SUMMARIES IN GERMAN, ENGLISH, AND FRENCH.) A COMPUTER PROGRAM ''STIPSI'' (FROM GERMAN ''STICHPROBENSIMULATOR''), IS NOW BEING DEVELOPED AT THE BADEN-WURTTEMBERG FOREST RESEARCH INSTITUTE. IT IS WRITTEN IN FORTRAN IV FOR AN IBM 7040 AND AT THE PRESENT STAGE, COVERS VARIOUS METHODS OF SAMPLING FOR BASAL AREA AND STEM NUMBERS.

339. SCHREUDER, G. F. 1968. OPTIMAL FOREST INVESTMENT DECISIONS THROUGH DYNAMIC PROGRAMMING. PH.D. DISS. YALE UNIV., NEW HAVEN, CONN. THE ENTIRE PRODUCTION PROCESS FROM TREE SEEDLING TO FINAL PRODUCT IS VIEWED AS A STRING OF REVENUE AND COST FUNCTIONS, WHICH TOGETHER FORM THE OBJECTIVE FUNCTION TO BE MAXIMIZED.

340. SCHREUDER, G. F. 1968. OPTIMAL FOREST INVESTMENT DECISIONS THROUGH DYNAMIC PROGRAMMING. YALE UNIV. SCHOOL FORESTRY BULL. 72, 70 PP. SEE PREVIOUS CITATION.

341. SCHULTZ, R. D. 1964. DECISION MAKING IN A WILDLAND FIRE GAME. PH.D. DISS., UNIV. CALIF., BERKELEY. A WILDLAND FIRE GAME SIMULATION IS DEVELOPED FOR USE IN MEASURING THE EFFECTS OF ALTERNATIVE FIRE-DEFENSE SYSTEMS. THE MODEL IS A MODIFICATION OF THE MILITARY WAR GAME, AND PERMITS DIFFERENT FIRE MANAGERS TO BE CONFRONTED BY THE SAME FIRE SITUATION IN A LABORATORY ENVIRONMENT. THE SIMULATOR COMBINES VARIOUS INPUTS TO OBTAIN THE RESULTS OF CONFLICT BETWEEN THE FIRE AND THE FIRE-DEFENSE SYSTEM.

342. SCHULTZ, R. D. 1966. GAME SIMULATION AND WILD LAND FIRE. J. FOREST. 64(12):791-800. THE USE OF GAME SIMULATION (MODELED ON THE MILITARY WAR GAME) FOR EVALUATION OF ALTERNATIVE FIRE-SUPPRESSION DEFENSE SYSTEMS BY DIFFERENT MANAGEMENT TEAMS IN A POTENTIALLY CATASTROPHIC FIRE IN CALIFORNIA WILD LANDS IS DESCRIBED. POSSIBLE RELATIONSHIPS BETWEEN SIMULATION RESULTS AND POLICY-MAKING ARE OUTLINED.

343. SCHWEITZER, DENNIS L. 1970. THE IMPACT OF ESTIMATION ERRORS ON EVALUATIONS OF TIMBER PRODUCTION OPPORTUNITIES. USDA FOREST SERV. N. CENTRAL FOREST EXP. STA. RES. PAP. NC-43, 18 PP., ILLUS. ST. PAUL, MINN. ERRORS IN ESTIMATING COSTS AND RETURNS, THE TIMING OF HARVESTS, AND THE COST OF USING FUNDS CAN GREATLY AFFECT THE APPARENT DESIRABILITY OF INVESTMENTS IN TIMBER PRODUCTION. PARTIAL DERIVATIVES ARE USED IN SENSITIVITY ANALYSES TO MEASURE THE IMPACTS OF THESE ERRORS ON THE PREDICTED PRESENT NET WORTH OF POTENTIAL INVESTMENTS IN TIMBER PRODUCTION. GRAPHS THAT ILLUSTRATE THE IMPACT OF EACH TYPE OF ESTIMATION ERROR AND A COMPUTER ROUTINE TO PERFORM THE NECESSARY COMPUTATIONS ARE INCLUDED.

344. SEALE, R. M. 1966. FORESTRY AS A SYSTEM. PH. D. DISS. STATE UNIV. N.Y., COLL. FORESTRY, SYRACUSE,

THE FUNCTIONAL CONCEPT OF A SYSTEM IS STRESSED. FORESTRY IS POSTULATED AS A SYSTEM THAT COMBINES FOREST RESOURCES WITH OTHERS, TRANSFORMS THEM SO AS TO CREATE OR ENHANCE UTILITY, AND YIELDS GOODS AND SERVICES. THE ECOSYSTEM CONCEPT WAS EMPLOYED AS A MEANS BOTH OF ILLUSTRATING THE SYSTEM CONCEPT AND OF DEMONSTRATING THE SYSTEM NATURE OF CERTAIN PHYSICAL-BIOLOGICAL COMPONENTS OF FORESTRY. THE MANAGERIAL SUBSYSTEM THAT GOVERNS THE WHOLE FORESTRY SYSTEM WAS ALSO ADDED.

345. SHAFER, E. L., JR. 1970. THE NAME OF THE GAME IS RECREATION RESEARCH. ENVIRON. EDUC. 2(1):30-34. THE SYSTEMS-ANALYSIS APPROACH IS PROPOSED AS A METHOD OF PREDICTING RESULTS OF DIFFERENT RECREATION-MANAGEMENT DECISIONS. SINCE THE KNOWLEDGE IS LACKING FOR MANY RECREATION-RESEARCH PROBLEMS, THIS PAPER EXPLORES THE POSSIBILITIES OF USING SYSTEMS ANALYSIS AND ATTEMPTS TO DEVISE A METHODOLOGY FOR CLASSIFYING CERTAIN ASPECTS OF THE APPROACH.

346. SHUBIK, M. 1955. THE USES OF GAME THEORY IN MANAGEMENT SCIENCE. MANAGE. SCI. 2(1):40-54. THE ESSENCE OF GAME THEORY IS DISCUSSED IN RELATION TO DECISION-MAKING IN MANAGEMENT. THE ELEMENTS OF GAME THEORY ARE INTRODUCED AND APPLIED TO BUSINESS PROBLEMS IN GENERAL AND PROBLEMS OF ADVERTISING, DISTRIBUTION, PRODUCTION, STATISTICS, CONTRACT BIDDING, PRICE WARS, COMPETITION, COMMITTEE USE AND VOTING POWER, AND TEAMWORK.

347. SILVERSIDES, C. R. 1963. A SYMPOSIUM - LINEAR PROGRAMMING APPLIED TO WOOD PROCUREMENT. PULP AND PAP. MAG. CANADA 64(9):WR347, WR350-352, WR354-356, WR358, WR360, WR362-364. THE LINEAR PROGRAMMING MODEL CONCERNS OVERALL OPERATIONAL AND INVESTMENT DECISIONS IN EVALUATING COMPETING WAYS OF SUPPLYING A PARENT PULP MILL WITH WOOD. A SECOND APPROACH IS GAME THEORY, DERIVED FROM THE PROBABILITIES OF FACTORS AFFECTING MANAGEMENT AND LOGGING OPERATIONS.

348. SILVERSIDES, C. R., ET. AL. 1968. THE USE OF COMPUTERS IN WOODLANDS MANAGEMENT RESEARCH IN CANADA. PULP AND PAPER MAG. CAN. 69(11):101-110. THREE PAPERS, INTRODUCED BY C. R. SILVERSIDES, ON THE USE OF COMPUTERS IN FOREST INVENTORIES, LOGGING OPERATIONS, PULPWOOD MEASUREMENTS AND WOODLANDS ACCOUNTING (D. S. GILLAM), THE CONSTRUCTION OF STAND MODELS AND HARVESTING SIMULATORS (R. M. NEWNHAM). PAPER RESEARCH INSTITUTE (H. I. MINER).

349. SITTER, R. M. 1969. LINEAR PROGRAMMING USUALLY PROVIDES A GOOD SOURCE OF IDEAS FOR CREATING BETTER PROFIT LEVELS. BRITISH COLUMBIA LUMBERM. 53(5):31-35. LINEAR PROGRAMMING IS APPLIED TO FOREST-PRODUCTS MANAGEMENT BY MEANS OF A SIMPLIFIED EXAMPLE, IN THE FORM OF AN IMAGINARY COMPANY WITH INTEGRATED LOGGING, SAWMILLING, PULPING AND PLYWOOD INTERESTS.

350. SJUNNESSON, S. 1969. SIMULATION, A TOOL FOR EVALUATING MECHANIZED THINNING SYSTEMS. INT. UNION FOR. RES. ORGAN. MTG.:254-266. STOCKHOLM. A SIMULATION MODEL AIDS IN CHOOSING THE BEST THINNING SCHEDULE AND HARVESTING MACHINE SYSTEM IN ANY TYPE OF FOREST STAND. AND SIMULTANEOUSLY THE MODEL PROVIDES AN ESTIMATE OF THE OPERATION'S PROFITABILITY.

351. SKAAR, R. 1966. DIGITAL SIMULATION OF WAITING-LINE PROBLEMS AND ITS APPLICATION IN AN ANALYSIS OF A WOOD-HANDLING MODEL. M.S. THESIS, STATE UNIV. N.Y. COLL. FORESTRY, SYRACUSE. AN EXPLORATION OF SIMULATING A WAITING-LINE (QUEUING SITUATION) AND THE DESCRIPTION OF A SIMULATION MODEL FOR A HYPOTHETICAL WOOD PROCUREMENT PROBLEM.

352. SMITH, G. W. 1958. A METHOD OF DETERMINING THE OPTIMUM WAYS OF CONVERTING TREES INTO SAWLOGS. M.S. THESIS, NORTH CAROLINA STATE COLL., RALEIGH. LINEAR PROGRAMMING IS APPLIED TO THE LOG-MAKING PHASE OF THE LUMBER INDUSTRY. FIELD DATA WERE OBTAINED FOR CONSTRUCTING A STAND TABLE; THEN, VARIOUS METHODS WERE DEVISED FOR CUTTING TREES INTO LOGS, AND TIME AND COST VALUES AND NET PROFITS WERE CALCULATED PER TREE CLASS. THE LP SOLUTION THEN DETERMINED THE BEST LOG-MAKING PROCEDURE FOR MAXIMIZING THE PROFIT FUNCTION.

353. SMITH, G. W., AND C. HARRELL. 1961. LINEAR PROGRAMMING IN LOG PRODUCTION. FOREST PROD. J. 11(1):8-11. THE MODEL MAXIMIZES PROFIT, USING THE PRICES OF SAWTIMBER AND PULPWOOD, AND THE COSTS OF VARIOUS OPERATIONS, PARTICULARLY CROSSCUTTING, INVOLVED IN THE CONVERSION FOR EACH DIAMETER CLASS. THE LIMITATIONS OF THE MARKET, POSTULATING CERTAIN RELATIONSHIPS BETWEEN THE QUANTITIES OF THE VARIOUS LOG LENGTHS OFFERED, ARE ALSO CONSIDERED.

354. SMITH, J. H. G., NEWNHAM, R. M., AND HEJJAS, J. 1965. IMPORTANCE OF DISTRIBUTION AND AMOUNT OF MORTALITY CAN BE DEFINED BY SIMULATION STUDIES. COMMONWEALTH FOREST REV. 44(3):188-192. THE

DISTRIBUTION OF MORTALITY IN PLANTATIONS AND NATURAL STANDS IS CONSIDERED. THE EFFECTS OF VARIOUS INTERMEDIATE AMOUNTS AND DISTRIBUTIONS OF JUVENILE MORTALITY CAN BE SIMULATED BY MANIPULATION OF STAND MODELS ON AN IBM 7040 COMPUTER. THE MODELS CAN ALSO BE USED TO TEST VARIOUS KINDS OF THINNING REGIMES.

SOBOLEV, I. V., AND GONCARENKO, N. A. 1965. (ALGORITHM FOR PLANNING THE BREAKING DOWN OF SAWLOGS.) LESN. Z., ARHANGL'SK 8(5):154-161. (IN RUSSIAN.) AN ALGORITHM IS DEVELOPED FOR PLANNING THE BREAKING DOWN OF SAWLOGS AS A STAGE IN THE UTILIZATION OF ELECTRONIC COMPUTERS FOR AUTOMATION OF SAWMILLING.

SOCIETY OF AMERICAN FORESTERS. 1968. DECISION MAKING IN FORESTRY. J. FOREST. 66(10):760-803. A SERIES OF ARTICLES DEVOTED TO DECISION-MAKING IN FOREST RESOURCE MANAGEMENT.

SOKOLOV, I. I., AND V. N. SMIRNICKAJA. 1968. (MATHEMATICAL PROGRAMMING IN THE WOODWORKING INDUSTRY.) IZDATELSTVO 'LESNAJA PROMIJSLENNOST', 193 PP. MOSCOW. (IN RUSSIAN.) A BOOK MAINLY CONCERNED WITH EXPLAINING AND POPULARIZING THE USE OF LINEAR PROGRAMMING AND ELECTRONIC COMPUTERS FOR ORGANIZATION AND PLANNING IN THE WOODWORKING INDUSTRY.

SPEIDEL, G. 1970. (DECISION THEORY AS A BASIS OF RATIONALIZATION IN FORESTRY.) FORSTARCHIV. 41(2):25-30. A GENERAL ARTICLE WHICH INCLUDES A MODEL FOR MAXIMIZING SOCIAL-PRODUCT AND OTHER FOREST BENEFITS. THE IMPORTANCE OF INFORMATION AND DOCUMENTATION, AND OF TRAINING IN DECISION MAKING (GAME THEORY, ETC.) IS STRESSED.

STANG, H. 1964. (MODELS AS AIDS IN SOLVING PLANNING PROBLEMS: AN EXAMPLE SHOWING THE LAYOUT OF SKIDDING TRAILS.) FORSTARCHIV. 35(12):245-250. (IN GERMAN WITH GERMAN SUMMARY.) THE USES AND LIMITATIONS OF MATHEMATICAL MODELS IN FORESTRY ARE DISCUSSED AND A DETAILED ANALYSIS OF THE METHOD USING AN EXAMPLE OF SKID-TRAIL LAYOUT IS PRESENTED.

STEINLIN, H. 1970. MEANS OF REDUCTION OF DEPRECIATION OF PULPWOOD BETWEEN FELLING AND MANUFACTURING AT THE MILL. INT. UNION FOREST. RES. ORGAN. MTG.:192-200, ROYAL COLL. FORESTRY, STOCKHOLM. METHODS OF OPERATIONS RESEARCH CAN BE USED TO DETERMINE THE BEST MEANS OF LOGGING

TRANSPORTATION AND STORAGE OF PULPWOOD AND THE SCHEDULING OF THESE PROCESSES USING KNOWN VARIABLES.

361. STITELER, W. M., III. 1965. THE GENERATION OF FOREST MODELS BY SIMULATION ON A COMPUTER. M.S. THESIS, PA. STATE UNIV., UNIVERSITY PARK. COMPLETE DESCRIPTION OF THE SIMULATION MODEL, COMPUTER PROGRAM, AND OUTPUT IS PRESENTED FOR THE RESEARCH DESCRIBED IN THE FOLLOWING CITATION (STITELER, 1971).

362. STITELER, W. M., III, AND F. Y. BORDEN. 1967. THE GENERATION OF FOREST MODELS BY SIMULATION ON A COMPUTER. PA. STATE UNIV. SCHOOL FOREST RESOURCES, RES. BRIEFS 2(1):14-16. UNIVERSITY PARK. A BRIEF DESCRIPTION OF A PROJECT DESIGNED TO INVESTIGATE THE POSSIBILITY OF WRITING A FOREST MODEL-GENERATING PROGRAM FLEXIBLE ENOUGH TO GENERATE MODELS FOR A VARIETY OF SIMULATION PROBLEMS. THE PROGRAM (WRITTEN IN FORTRAN II) SUCCESSFULLY GENERATED MODELS FOR AN EVEN-AGED AND AN UNEVEN-AGED OAK STAND AND TWO SPECIFIC MIXED HARDWOOD STANDS.

363. STOCKTON, R. S. 1963. INTRODUCTION TO LINEAR PROGRAMMING. 112 PP. BOSTON: ALLYN AND BACON, INC. AN ELEMENTARY TEXT INCLUDING CHAPTERS ON: LINEAR PROGRAMMING AND THE DECISION PROCESS, LINEARITY AND LINEAR EQUATIONS, THE GRAPHICAL METHOD, THE SIMPLEX METHOD, AND THE TRANSPORTATION METHOD.

364. STOLTENBERG, C. H., AND G. W. THOMSON. 1962. OBSERVATIONS ON THE USEFULNESS OF LINEAR PROGRAMMING IN FARM FORESTRY. J. FOREST. 60(10):724-728. LINEAR PROGRAMMING IS A SPECIFIC TECHNIQUE FOR THE SELECTION OF THE BEST COMBINATION OF ACTIVITIES. HOWEVER, WITH RESPECT TO FARM FORESTRY, THERE ARE TWO SHORTCOMINGS: (1) MAXIMUM INCOME FROM AVAILABLE RESOURCES IS AN INADEQUATE EXPRESSION OF THE GOAL; AND (2) OPTIMUM SOLUTIONS MUST BE STABLE TO BE USEFUL IN PLANNING FARM FORESTRY ACTIVITIES, BUT SOLUTIONS DERIVED FROM LINEAR PROGRAMMING ARE LIKELY TO BE UNSTABLE.

365. STRAND, L. 1967. (PRICE TABLES FOR SCOTS PINE BY MEANS OF DYNAMIC PROGRAMMING.) MELDING, INSTITUTT. FOR SKOGTAKSASJON, NORGES LANDBRUKSHOG-SKOLE, VOLLEBEKK, 8:8-10, 63. (IN NORWEGIAN WITH ENGLISH SUMMARY.) DYNAMIC PROGRAMMING IS USED TO SELECT THE LOG LENGTHS (FROM CROSSCUTTING) THAT WILL GIVE THE BEST PRICE.

A TABLE SHOWING THE GROSS VALUE PER TREE AND THE NUMBER OF LOGS FOR TREES OF DIFFERENT SIZES IS INCLUDED.

366. SUZUKI, T. 1967. (FOREST TRANSITION AS A STOCHASTIC PROCESS; PARTS 1 AND 2.) CAN. DEP. FOREST. TRANSL. 157:12, 10. (TRANSL. FROM JAP. FOREST. SOC. 48(12):436-439, 1966, 49(1):17-19, 1967.) (IN JAPANESE.) A MATHEMATICAL STUDY IN WHICH THE DYNAMICS OF CHANGE IN A FOREST ARE INTERPRETED IN STOCHASTIC TERMS.

367. SWAN, R. J. 1963. INVESTMENT DECISIONS IN MILL WOODWORKING BY THE USE OF CURRENT AND SIMULATED MATHEMATICAL MODELS. M.S. THESIS. OREG. STATE UNIV., CORVALLIS. THE STUDY OF INVESTMENT DECISIONS BY THE USE OF MATHEMATICAL MODELS VERIFIES HOW MODELS AID IN ACCUMULATING AND PRESENTING INFORMATION TO MANAGEMENT IN THE EVALUATION OF A COMPLETE SUBSYSTEM. CONSTRUCTION OF MODELS UNCOVERS MORE COMPREHENSIVE DATA THAN THE INFORMATION USUALLY COLLECTED IN THE CONVENTIONAL ANALYSIS APPROACH. THE MATHEMATICAL MODELS WERE APPLIED TO A WINDOW AND DOOR FRAME FACTORY, AND THEORETICALLY WORKABLE AND OPTIMAL SYSTEMS WERE DEVELOPED.

368. SYDNEYSMITH, S. 1964. AN APPLICATION OF LINEAR PROGRAMMING TO LOG ALLOCATION IN THE FOREST INDUSTRY OF BRITISH COLUMBIA. M.S. THESIS, UNIV. BRITISH COLUMBIA, VANCOUVER. A LINEAR PROGRAMMING LOG-ALLOCATION MODEL IS PRESENTED, BASED ON AN INTEGRATED INDUSTRY IN THE COASTAL REGION OF BRITISH COLUMBIA. THE MODEL ENCOMPASSES THREE MAIN CATEGORIES OF LOG-USE; SAWMILLING, PLYWOOD PRODUCTION, AND PULPWOOD PRODUCTION, AND DEMONSTRATES HOW A GIVEN SUPPLY OF LOGS MAY BE OPTIMALLY DISTRIBUTED AMONG THESE STRUCTURALLY DIFFERENT LOG-CONVERSION PROCESSES.

369. SZABO, K. 1970. LINEAR PROGRAMMING OF SAWMILL PRODUCTION. TRANSL. DEP. FISH. FOR. CAN. 0FF-87, 41 PP. (TRANSL. FROM FAIP. KUTATAS, PP. 217-245, 1967.) THE PAPER APPLIES LINEAR PROGRAMMING TO PRODUCTION CONTROL IN THE SAWMILL INDUSTRY. ALL POSSIBLE CUTTING COMBINATIONS ARE ARRANGED IN A TABLE SHOWING THE RESULTING YIELDS FROM ONE CUBIC METER OF WOOD FOR EACH CUTTING ALTERNATIVE. BASED ON THE TABLE, CONSTRAINTS ARE SPECIFIED ON THE QUANTITIES OF LUMBER PRODUCED BY ALTERNATIVE CUTTING METHODS. THE OBJECTIVE FUNCTION IS TO MINIMIZE THE TOTAL AMOUNT OF RAW MATERIAL (LOGS) TO ACHIEVE A GIVEN PRODUCTION MIX.

370. TABOR, H. B. 1968. DETERMINING CHIP-PIPELINE POTENTIALS WITH LINEAR PROGRAMMING. FOREST PROD. J. 18(6):29-32. A PROGRAMMING MODEL IS DEVELOPED, BASED ON CONDITIONS IN SOUTHWEST ALABAMA FOR DETERMINING OPTIMUM FLOW PATTERNS FOR TRANSPORT OF WOOD CHIPS BY WATER SLURRY.

371. TCHENG, T. H. 1966. SCHEDULING OF A LARGE FORESTRY-CUTTING PROBLEM BY LINEAR PROGRAMMING DECOMPOSITION. PH.D. DISS., UNIV. IOWA, IOWA CITY. A LINEAR PROGRAMMING DECOMPOSITION MODEL IS DEVELOPED FOR THE OPTIMAL SCHEDULING OF AN ACTUAL HARVESTING PROBLEM INVOLVING 1,166 WOODLANDS OVER A 24-YEAR PERIOD. THE COMPUTATIONAL ALGORITHM AND COMPUTER PROGRAM FOR THE DECOMPOSITION METHOD ARE ALSO DEVELOPED. BOTH INTEGER AND NONINTEGER SOLUTIONS ARE CONSIDERED IN THE COMPLEX PROBLEM, WHICH HAD TO BE TERMINATED AFTER THE 960TH ITERATION BECAUSE OF COMPUTER ROUND-OFF ERROR. HOWEVER, RESULTS SHOW THAT TERMINATION CAN BE APPLIED SOONER WITHOUT SIGNIFICANT LOSS IN TOTAL WOOD PRODUCTION.

372. TCHENG, T. H. 1966. SCHEDULING OF A LARGE FORESTRY-CUTTING PROBLEM ON A DIGITAL COMPUTER BY DECOMPOSITION OF LINEAR PROGRAMMING. INST. MANAGE. SCI. (TIMS) MTG. PAP. DALLAS, TEX. DECOMPOSITION OF A LINEAR PROGRAMMING MODEL FOR THE SCHEDULING OF A VERY LARGE FOREST-CUTTING PROBLEM IS PRESENTED. A COMPUTATIONAL ALGORITHM AND A COMPUTER PROGRAM PACKAGE DESIGNED FOR THIS MODEL ARE DISCUSSED.

373. TEEGARDEN, D. E., AND H. L. VON SPERBER. 1968. SCHEDULING DOUGLAS-FIR REFORESTATION INVESTMENTS: A COMPARISON OF METHODS. FOREST SCI. 14(4):354-368. A COMPARISON WAS MADE OF THE USE OF (1) LINEAR PROGRAMMING, (2) CAPITAL BUDGETING, AND (3) A RULE-OF-THUMB METHOD (BASED ON PROFESSIONAL EXPERIENCE AND JUDGMENT) IN THE PLANNING OF AN AFFORESTATION SCHEDULE IN ROSEBURG DISTRICT, WESTERN OREGON, WITH THE OBJECTIVE OF MAXIMIZING NET PRESENT VALUE. RESULTS DEMONSTRATE THE IMPORTANCE OF SELECTING THE CORRECT ECONOMIC MODEL AND ILLUSTRATE THE ADVANTAGES OF LP IN THE ANALYSIS OF COMPLEX PROBLEMS INVOLVING CONSTRAINTS BY A NUMBER OF INTERDEPENDENT LIMITING FACTORS.

374. TERTICKIJ, M. I. 1964. (THE PREREQUISITES OF ALGORITHMS FOR (PROGRAMMING) CALCULATION AND PLANNING WORK IN LOGGING.) LESN Z., ARHANGEL'SK 7(4):158-164. (IN RUSSIAN.) NO ENGLISH SUMMARY AVAILABLE.

375. TEXAS FOREST PRODUCTS LABORATORY. 1970. OPERATIONS RESEARCH IN THE FOREST PRODUCTS INDUSTRY. TEX. IND. WOOD SEMINAR 4, 62 PP. LUFKIN, TEX. CONTENTS: SURVEY OF OPERATIONS RESEARCH, COST MODELING, OPTIMIZATION, COMPUTER USES IN OPERATIONS RESEARCH AND OPERATIONS-RESEARCH APPLICATIONS IN THE FOREST PRODUCTS INDUSTRY.

376. THEIL, H., J. C. G. BOOT, AND T. KLOEK. 1965. OPERATIONS RESEARCH AND QUANTITATIVE ECONOMICS, 258 PP. NEW YORK: MCGRAW-HILL BOOK CO. CHAPTERS ON: LINEAR PROGRAMMING, THE OPTIMUM PATH AND THE CRITICAL PATH, INPUT ANALYSIS, ECONOMETRIC MACROMODELS, ECONOMIC FORECASTS, UNCERTAINTY AND PROBABILITY, THE CONCEPT OF A STRATEGY, GAME THEORY, QUEUES, SIMULATION AND MANAGEMENT GAMES, PRODUCTION AND INVENTORY DECISIONS, THE STATISTICAL SPECIFICATION OF ECONOMIC RELATIONS, AND THE CONSUMER'S DOLLAR.

377. THEILER, T. 1959. LINEAR PROGRAMMING AND OPTIMAL CUTTING PRACTICES. AMER. PAPER IND. 41(6):384-388. A COMMON PROBLEM OF WOODLAND MANAGERS IS TO DETERMINE AN OPTIMUM CUTTING POLICY TO SUPPLY THE NEEDS OF THEIR PULP AND PAPER MILLS. THIS ARTICLE SHOWS HOW THE MANY CONSIDERATIONS INVOLVED IN AN OPTIMUM CUTTING POLICY CAN BE EXPRESSED IN MATHEMATICAL TERMS, REDUCED TO A MATRIX FORM, AND SOLVED BY LINEAR PROGRAMMING TECHNIQUES. THE AUTHOR WORKS WITH HYPOTHETICAL DATA CONCERNING A PAPER MILL AND FOUR WOODLAND AREAS THAT CAN SUPPLY THE MILL WITH PULP.

378. THOMPSON, E. F. 1963. COMMENTS ON OBSERVATIONS ON THE USEFULNESS OF LINEAR PROGRAMMING IN FARM FORESTRY. J. FOREST. 61(1):57-58. THE OBJECTIVES AND AVAILABLE RESOURCES ALONG WITH THE QUANTITATIVE RESTRICTIONS PLACED ON THESE RESOURCES BOTH PHYSICALLY AND BY THE FARMER'S OBJECTIVES ARE THE CORE OF ANY LINEAR PROGRAMMING PROBLEM. THESE FACTORS DETERMINE THE DECISION. ALL LINEAR PROGRAMMING DOES IS GUARANTEE THAT THIS DECISION IS THE OPTIMUM - - GIVEN THE OBJECTIVES, RESOURCES, AND RESTRICTIONS.

379. THOMPSON, E. F. 1967. CONSIDERATION OF UNCERTAINTY IN FOREST MANAGEMENT DECISION MAKING. DISS. ABSTR. 27(8):2562B-2563B. BAYESIAN DECISION THEORY ALLOWS UNCERTAINTY TO BE SYSTEMATICALLY RECOGNIZED IN THE PROCESS OF MAKING DECISIONS. DECISIONS MADE TODAY ARE DEPENDENT UPON THE UNCERTAIN FUTURE LEVELS OF VARIOUS FACTORS.

380. THOMPSON, E. F. 1968. THE THEORY OF DECISION UNDER UNCERTAINTY AND POSSIBLE APPLICATIONS IN FOREST MANAGEMENT. FOREST SCI. 14(2):156-163. BAYESIAN DECISION THEORY IS APPLIED TO TWO FOREST-MANAGEMENT DECISION-MAKING PROBLEMS UNDER UNCERTAINTY: (1) WHETHER OR NOT TO PRUNE, AND (2) OPTIMUM SIZE OF FIRE SUPPRESSION CREW.

381. THOMPSON, E. F., AND D. P. RICHARDS. 1969. USING LINEAR PROGRAMMING TO DEVELOP LONG-TERM, LEAST-COST WOOD PROCUREMENT SCHEDULES. PULP AND PAPER MAG. CAN. 70(C):172-175. WOOD PROCUREMENT IS CHARACTERIZED AS AN ALLOCATION PROCESS SOLUBLE BY LINEAR PROGRAMMING. AN EXPLANATION IS GIVEN OF A MODIFICATION OF THE GENERAL LINEAR PROGRAMMING MODEL, LINEAR PROGRAMMING OVER TIME, WHICH IS THE APPROPRIATE TECHNIQUE WHEN THE ALTERNATIVES ARE TO BE ALLOCATED AMONG PERIODS WITHIN A FIXED TIME SPAN.

382. THOMPSON, E. F., ET. AL. 1968. LINEAR PROGRAMMING OVER TIME TO ESTABLISH LEAST-COST WOOD PROCUREMENT SCHEDULES. VA. POLYTECH. INST. RES. DIV. BULL. 29, 70 PP. BLACKSBURG. LINEAR PROGRAMMING OVER TIME IS EXPLAINED AND IS PRESENTED AS AN EFFICIENT TECHNIQUE FOR SOLVING THE GENERAL WOOD-PROCUREMENT PROBLEM OF AN INTEGRATED FOREST PRODUCTS COMPANY. ITS USE IS ILLUSTRATED BY A CASE STUDY IN WHICH AN ACTUAL FIRM'S PROCUREMENT PROBLEM IS FORMULATED AND SOLVED; THE SOLUTION PROVIDING A SCHEDULE OF ACTIVITIES THAT WOULD MINIMIZE THE PRESENT VALUE OF WOOD-PROCUREMENT LOSSES FOR THE NEXT 20 YEARS.

383. TILGHMAN, W. B. 1967. LINEAR PROGRAMMING APPROACH TO MINIMIZING WOOD PROCUREMENT COST FOR INTEGRATED FOREST PRODUCT FIRMS. M. S. THESIS, VA. POLYTECH. INST., BLACKSBURG. A LINEAR PROGRAMMING COST MINIMIZATION PROBLEM IS PRESENTED, USING AN INTEGRATED FOREST PRODUCTS FIRM WHOSE OBJECTIVE IS TO MINIMIZE THE PRESENT VALUE OF WOOD PROCUREMENT COSTS OVER A 20-YEAR PERIOD. THE FIRM'S PRESENT AND THREE ALTERNATIVE PRICE STRUCTURES ARE USED. PRODUCT QUALITY AND MANAGERIAL CONSTRAINTS ARE USED AND TIMBER GROWTH IS INCORPORATED INTO THE SELECTION OF PROCUREMENT ALTERNATIVES.

384. TORIN, L. R., AND J. S. BETHEL. 1969. VENEER RECOVERY PREDICTION AND ANALYSIS THROUGH COMPUTER SIMULATION. WOOD + FIBER 1(2):97-107. THE PROJECT WAS DESIGNED TO ASSEMBLE A DATA BANK OF INFORMATION ON VENEER QUALITY AND A SIMULATION MODEL TO BE USED IN EVALUATING VENEER GRADE

RECOVERY IN RELATION TO QUALITY SPECIFICATIONS AND MANUFACTURING CRITERIA. GREEN-VENEER CHARACTERISTICS FROM PHOTOGRAPHS TAKEN BEHIND THE LATHE ARE CONVERTED TO DIGITAL INPUT DATA BY MEANS OF AN X-Y COORDINATE SYSTEM. THE SIMULATOR ALLOWS FOR MANIPULATION OF GRADE REQUIREMENTS, SHEET WIDTHS, AND CLIPPING SPECIFICATIONS.

385. TSOLAKIDES, J. A. 1968. A SIMULATION MODEL FOR LOG YIELD STUDY. DISS. ABSTR. 29B(6):1904. A MODEL IS PROGRAMMED IN FORTRAN, FOR DETERMINING THE EFFECT OF ALTERNATIVE SAWING METHODS ON THE GRADE AND VOLUME YIELD OF A LOG.

386. TSOLAKIDES, J. A. 1969. A SIMULATION MODEL FOR LOG YIELD STUDY. FOREST PROJ. J. 19(7):21-26. SIX OAK LOGS, SAWN INTO 1-INCH DISCS, PROVIDED INPUT DATA ON THE EXTERNAL AND INTERNAL QUALITY CHARACTERISTICS, INCLUDING SIZE AND LOCATION OF DEFECTS. INPUT ALSO INCLUDED VARIANTS ON THREE METHODS OF SAWING TO GIVE 164 POSSIBILITIES. THE COMPUTER TECHNIQUE DEVELOPED INDICATED THE LUMBER GRADE YIELDS AND VALUE FOR EACH SAWING VARIANT, AND IS INTENDED TO PROVIDE A METHOD FOR DECIDING HOW BEST TO CONVERT GRADED LOGS.

387. TURNER, G. J. 1966. LINEAR PROGRAMMING IN CHIP FIBER AND PULP MARKETING. SEMINAR ON OPER. RES. IN FOREST PROD. IND. PROC.:7-21. IBM CORP., LOS ANGELES, CALIF. PRACTICAL USE OF AVAILABLE TOOLS FOR LINEAR PROGRAMMING IN MARKETING OF PULP: PROBLEM DEFINITION, DATA PROCUREMENT, AND THE VERIFICATION AND USE OF RESULTS.

388. TURNER, G. J. 1969. PLANNING FOR MATERIAL FLOW ORGANIZATIONS IN WOOD PRODUCTS INDUSTRIES. DISS. ABSTR. 29A(9):2844-2845. A LINEAR PROGRAMMING MODEL IS DEVELOPED FOR MID-TERM PLANNING IN A WOOD-PRODUCTS FIRM. ASSUMING PRODUCT PRICES, SALES VOLUME, YIELD VECTORS, AND CONVERSION COSTS; THE SELECTION OF AREAS TO BE LOGGED, THE ALLOCATION OF LOGS TO PROCESSES, THE DETERMINATION OF EFFICIENT CONVERSION CAPACITIES, AND PRODUCT-MIX, CAN BE ANALYZED SIMULTANEOUSLY. FOR SHORT-TERM OPERATIONS, MECHANISMS ARE PROPOSED FOR RESPONDING TO ORDERS, ALLOCATING ORDERS TO MILLS, ETC.

389. UNITED AIRCRAFT OF CANADA, LTD. 1966. A STUDY INTO THE USE OF AIRCRAFT IN THE CONTROL OF FOREST FIRES. THE OPERATIONS MODEL. PART I - ANALYSIS, PART II - RESULTS. UNITED AIRCRAFT OF CAN. REP. M-1035, 58 PP. LONGUEUIL, QUE., CAN. A DETAILED

COMPARATIVE ACCOUNT OF SIX MODELS DESIGNED TO SIMULATE FOREST FIRE SUPPRESSION OPERATIONS (FIVE BASED ON USE OF FIXED-WING AIRCRAFT AND HELICOPTERS IN BOTH TRANSPORT AND WATER-BOMBING ROLES, AND ONE ON OPERATIONS WITHOUT AIRCRAFT), AND TO PERMIT A DETAILED ESTIMATE AND ANALYSIS OF COSTS.

390. VAJDA, S. 1961. MATHEMATICAL PROGRAMMING. 310 PP., ILLUS. READING, MASS.: ADDISON-WESLEY PUBLISHING CO. CONTENTS: THE ALGEBRA OF LINEAR INEQUALITIES, THE ALGEBRA OF DUALITY, THEORY OF GRAPHS AND COMBINATORIAL THEORY, GENERAL ALGORITHMS, SPECIAL ALGORITHMS, USES OF DUALITY, SELECTED APPLICATIONS, PARAMETRIC LINEAR PROGRAMMING, DISCRETE LINEAR PROGRAMMING, STOCHASTIC LINEAR PROGRAMMING, NONLINEAR PROGRAMMING, AND DYNAMIC PROGRAMMING.

391. VALO, L. 1966. SIMULATION OF FOREST STAND GROWTH. UNIV. OREG. FOREST INDUS. MARKET. CONF. PROC. 3:43-50. BY USING MATHEMATICAL MODELS TO SIMULATE FOREST STAND GROWTH, FOREST MANAGERS CAN ESTIMATE QUANTITY AND QUALITY OF TREES TO BE HARVESTED, TIMING OF HARVEST, AND KIND AND AMOUNT OF INVESTMENT NEEDED TO ACHIEVE DESIRED FOREST-MANAGEMENT OBJECTIVES.

392. VAN DYNE, G. M. 1966. APPLICATION AND INTEGRATION OF MULTIPLE LINEAR REGRESSION AND LINEAR PROGRAMMING IN RENEWABLE RESOURCE ANALYSES. J. RANGE MANGE. 19(6):356-362. PRELIMINARY RESULTS OF SPECIFYING THE RELATIONSHIPS BETWEEN CERTAIN FACTORS AND VARIOUS NUTRIENT PRODUCTION MEASURES ARE PRESENTED. THESE RELATIONSHIPS ARE USED IN LINEAR PROGRAMMING MODELS TO DETERMINE THE OPTIMUM PROTEIN PRODUCTION ON A FOOTHILL RANGE. SITE CHARACTERISTICS FOR OPTIMUM PROTEIN PRODUCTION WERE CONSTRAINED TO FALL WITHIN THE RANGE OF VARIABLES MEASURED AND WERE CONSTRAINED TO SATISFY CERTAIN INHERENT RELATIONSHIPS KNOWN ABOUT THESE VARIABLES.

393. VASILEV, S. 1965. (LINEAR PROGRAMMING AND ITS APPLICATION IN FOREST PLANNING.) GORSKO STOPANSTVO 21(11):14-21. (IN BULGARIAN.) NO ENGLISH SUMMARY AVAILABLE.

394. VILLA, W. 1967. (THE POSSIBLE USE OF CRITICAL PATH ANALYSIS AND THE PROGRAM EVALUATION AND REVIEW TECHNIQUE (PERT) IN FORESTRY.) ARCH. FORSTW. 16(6/9):957-960. (IN GERMAN.) THESE METHODS ARE ILLUSTRATED IN THE RATIONAL PLANNING OF TIMBER

CONVERSION OPERATIONS.

395. VON NEUMANN, J., AND O. MORGENSTERN. 1953. THEORY OF GAMES AND ECONOMIC BEHAVIOR. ED. 3, 641 PP. ILLUS. PRINCETON: PRINCETON UNIV. PRESS. A MATHEMATICAL THEORY IS PROPOSED THAT MAY BE APPLIED BOTH TO GAMES AND TO ECONOMIC AND SOCIOLOGICAL PROBLEMS. THIS WORK ATTEMPTS TO SHOW THAT THERE IS A RIGOROUS MATHEMATICAL APPROACH TO THOSE SUBJECTS THAT INVOLVE QUESTIONS OF PARALLEL OR OPPOSITE INTEREST, PERFECT OR IMPERFECT INFORMATION, FREE RATIONAL DECISION OR CHANCE INFLUENCES. THIS THEORY PROVIDES A NEW APPROACH TO MANY ECONOMIC AND SOCIOLOGICAL PROBLEMS.

396. WAGGONER, P. E., G. M. FURNIVAL, AND W. E. REIFSNYDER. 1969. SIMULATION OF THE MICROCLIMATE IN A FOREST. FOREST SCI. 15(1):37-45. A MODEL OF THE ENERGY EXCHANGE WITHIN A CANOPY OF LEAVES IS PRESENTED IN TERMS OF A SYSTEM OF SIMULTANEOUS LINEAR EQUATIONS. OBSERVATIONS OF THE EXCHANGE OF ENERGY AND THE MICROCLIMATE WITHIN A PINE CANOPY ARE MIMICKED BY THE MODEL.

397. WAGNER, H. M. 1957. A SUPPLEMENTARY BIBLIOGRAPHY ON LINEAR PROGRAMMING. OPERATIONS RESEARCH 5(4):555-563. THIS BIBLIOGRAPHY OF 193 ITEMS SUPPLEMENTS THE BIBLIOGRAPHY OF LINEAR PROGRAMMING BY F. V. RHODE IN THE FEBRUARY, 1957 ISSUE OF OPERATIONS RESEARCH.

398. WALTON, G. S. 1965. A STUDY TO DEVELOP A COMPUTER PROGRAM FOR FOREST MANAGEMENT SIMULATION. M.S. THESIS, HARVARD UNIV., CAMBRIDGE, MASS. AN EXPLANATION FOR THE FOREST MANAGER OF THE WORKINGS OF THE HARVARD FOREST SIMULATOR AND THE INFORMATION PROVIDED BY THE COMPUTER. DIRECTIONS FOR ASSEMBLING DATA IN PUNCHED CARD FORM ARE GIVEN AND AIDS FOR ALTERING THE PROGRAM ARE PROVIDED.

399. WARDLE, P. A. 1965. FOREST MANAGEMENT AND OPERATIONS RESEARCH: A LINEAR PROGRAMMING STUDY. MANAGE. SCI. 11(10):B260-B270. THE VALUE OF LINEAR PROGRAMMING IS ILLUSTRATED BY A STUDY OF AN 8,500-ACRE FOREST BLOCK IN SOUTHERN ENGLAND TO DETERMINE NET DISCOUNTED REVENUE (NDR) POSSIBILITIES UNDER ALTERNATIVE MANAGEMENT AND OPERATIONAL DECISIONS; THE PROBLEMS ARE ANALYZED, OBJECTIVE (MAXIMUM NDR) FORMULATED, AND SOLUTIONS TABULATED.

400. WARDLE, P. A. 1966. THE APPLICATION OF LINEAR PROGRAMMING TO PROBLEMS OF TIMBER TRANSPORT

SCHEDULING THE SUPPLY TO A PULPMILL. FAO/ECE/ILO STUDY GROUP ON METHODS OF ORGAN. OF FOREST WORK, GENEVA. 7 PP. EXEMPLIFIED BY A STUDY OF OPTIMUM CUTTING PROGRAMS FOR A GROUP OF BRITISH FORESTRY COMMISSION FORESTS LOCATED AT DIFFERENT DISTANCES FROM THE PULPMILL.

401. WARDLE, P. A. 1966. THE APPLICATION OF LINEAR PROGRAMMING TO THE SOLUTION OF FOREST MANAGEMENT PROBLEMS. 6TH WORLD FORESTRY CONGR. 7 PP. (IN ENGLISH, FRENCH, AND SPANISH.) LINEAR PROGRAMMING IS A VALUABLE TOOL IN THE MANAGEMENT OF A COMPLEX FOREST ENTERPRISE. ITS USE HAS ONLY RECENTLY BEEN EMPHASIZED, AND IMPROVEMENTS IN THE COMPUTATION PROCEDURES THAT WILL MAKE IT MORE READILY AND MORE GENERALLY APPLICABLE TO PRACTICAL PROBLEMS WILL CONTRIBUTE TO ITS ACCEPTANCE.

402. WARE, G. O. 1968. A MATHEMATICAL PROGRAMMING SYSTEM FOR THE MANAGEMENT OF INDUSTRIAL FORESTS. PH.D. THESIS, UNIV. GA., ATHENS. A THREE-PHASE SYSTEM INVOLVING: (1) AN APPRAISAL PROCEDURE TO CALCULATE DISCOUNTED VALUES OF FUTURE INCOMES AND EXPENSES FOR THE HARVESTING SCHEDULE; (2) A PROCESS TO SELECT THE HARVESTING SCHEDULE, MAXIMIZING PRESENT NET VALUES WHILE OBSERVING OPERATIONAL CONSTRAINTS; AND (3) A SIMULATION PROCEDURESHOWING WOOD REMOVALS, CASH FLOW, AND FUTURE STAND CHARACTERISTICS.

403. WASSERMAN, P., AND F. S. SILANDER. 1958. DECISION MAKING: AN ANNOTATED BIBLIOGRAPHY. 111 PP. CORNELL UNIV., SCHOOL OF BUS. AND PUBLIC ADMIN., ITHACA, N. Y. THE CITATIONS ARE DIVIDED INTO THE FOLLOWING GROUPS: THE DECISION MAKING PROCESS, VALUES AND ETHICAL CONSIDERATIONS IN DECISION MAKING, LEADERSHIP AS A FACTOR, PSYCHOLOGICAL FACTORS, DECISION MAKING IN SMALL GROUPS, COMMUNITY DECISION MAKING, COMMUNICATIONS AND INFORMATION HANDLING, MATHEMATICS AND STATISTICS IN DECISION MAKING INCLUDING DECISION THEORY, GAME THEORY, AND OPERATIONS RESEARCH.

404. WATT, A. J. 1967. THE FAIR LABOR STANDARDS ACT OF 1938 AND SOUTHERN PULPWOOD PRODUCTION PATTERNS. M.S. THESIS, DUKE UNIV., DURHAM. SIMULATION IS USED TO EXAMINE HOW A PULPWOOD LOGGING SYSTEM MAY BE AFFECTED BY CHANGES IN ITS INSTITUTIONAL ENVIRONMENT (PRIMARILY A REVOCATION OF THE 12-MAN EXEMPTION IN THE FAIR LABOR STANDARDS ACT), AND HOW THESE EFFECTS, IF ANY, MAY BE TEMPERED IN THE SHORT RUN BY ADJUSTMENTS WITHIN THE SYSTEM. THE REVOCATION OF THIS EXEMPTION WOULD CAUSE A RISE IN

THE SUPPLY PRICE OF PULPWOOD.

405. WATT, K. E. F. 1963. DYNAMIC PROGRAMMING, ''LOOK AHEAD PROGRAMMING'', AND THE STRATEGY OF INSECT PEST CONTROL. CAN. ENTOMOL. 95(5):525-536. OPTIMIZATION PROBLEMS IN RESOURCE MANAGEMENT CAN BETTER BE HANDLED BY DYNAMIC PROGRAMMING THAN CLASSICAL ANALYSIS, BECAUSE OF THE LARGE NUMBER AND COMPLEX NATURE OF CONSTRAINTS IMPOSED ON THE SYSTEMS. COMPUTER EXPERIMENTS ON STRATEGY EVALUATION PROCEDURES, USING DYNAMIC PROGRAMMING (AND A MODIFIED VERSION WITH TWO-STAGE ''LOOK AHEAD''), ARE PRESENTED. DATA FOR THE MODEL CAME FROM 60 YEARS OF WEATHER AND INSECT-POPULATION OBSERVATIONS IN GERMANY.

406. WATT, K. E. F. 1964. COMPUTERS AND THE EVALUATION OF RESOURCE MANAGEMENT STRATEGIES. AMER. SCI. 52(4):408-418. A DISCUSSION OF THE APPLICATION OF COMPUTERS AND OPERATIONS RESEARCH TECHNIQUES TO THE STUDY OF ECOLOGICAL SYSTEMS. PROBLEMS OF SYSTEMS MANAGEMENT IN NATURAL RESOURCES CONTAIN CHARACTERISTICS PROHIBITING THEIR SOLUTION WITH CLASSICAL OPTIMIZATION TECHNIQUES; YET APPLICATION OF CERTAIN NEW APPROACHES MAKE SOLUTION OF SUCH PROBLEMS FEASIBLE.

407. WILLIAMS, J. D. 1954. THE COMPLEAT STRATEGYST. 270 PP., ILLUS. NEW YORK: MCGRAW-HILL BOOK CO. THIS PRIMER ON GAME THEORY EXPLAINS IN LAYMAN'S TERMS THE CONCEPT OF STRATEGY, THE DISTINCTIONS AMONG PLAYERS, THE ROLE OF CHANCE EVENTS, AND THE NOTION OF MATRIX REPRESENTATION OF THE PAYOFF. SIMPLE MATHEMATICS IS USED AND BASIC PROBLEMS ARE OFFERED FOR SOLUTIONS ACCORDING TO GAME THEORY. POSSIBILITIES FOR PROBLEM-SOLVING INHERENT IN GAME THEORY ARE POINTED OUT, EXAMPLES OF THE THEORY ARE SUGGESTED, AND HISTORICAL BACKGROUND IS DETAILED.

408. WILSON, B. F., AND R. A. HOWARD. 1968. A COMPUTER MODEL FOR CAMBIAL ACTIVITY. FOREST SCI. 14(1):77-90. THIS MODEL SIMULATES ON A DAILY BASIS CELL DIFFERENTIATION IN A RADIAL FILE OF FUSIFORM CELLS, CELL DIVISION IN THE CAMBIAL ZONE, CELL ENLARGEMENT IN THE SECONDARY PHLOEM, AND ENLARGEMENT AND CELL WALL THICKENING IN THE SECONDARY XYLEM. THE MODEL (WHICH IS FLOW CHARTED) IS WRITTEN IN FORTRAN IV FOR USE ON AN IBM 7094 COMPUTER.

409. WIMBLE, A. W. 1969. APPLICATION OF A LINEAR PROGRAMMING MODEL TO ANALYZE PULPWOOD PROCUREMENT SCHEDULING. M.S. THESIS, UNIV. MAINE, ORONO. A

STUDY WAS MADE TO DEVELOP A HYPOTHETICAL PULPWOOD PROCUREMENT SCHEDULING MODEL THROUGH THE USE OF LINEAR PROGRAMMING TECHNIQUES. THE "BLOCK-METHOD" IS USED FOR BUILDING A MATHEMATICAL MODEL IN A STEP-WISE FASHION OF THE COMPLEX ORGANIZATIONAL STRUCTURES CHARACTERISTIC OF CONTEMPORARY WOOD PULP FIRMS. THE HYPOTHETICAL FIRM WAS ASSUMED TO HAVE FOUR SOURCES OF WOOD: COMPANY OPERATIONS, CONTRACTED DEALERS AND JOBBERS, UNCONTRACTED SOURCES, AND OPEN-MARKET PURCHASES.

410. WINER, H. I., AND R. H. DONNELLY. 1963. LINEAR PROGRAMMING APPLIED TO WOOD PROCUREMENT. PULP AND PAPER MAG. CAN. 64(9):WR347-WR353. THE PAPER OUTLINES BRIEFLY A TYPE OF FOREST PROBLEM TO WHICH LINEAR PROGRAMMING MAY BE APPLIED, THE REQUIREMENTS FOR EFFECTIVE SOLUTIONS, THE NATURE AND APPLICATION OF RESULTS, AND THE USEFULNESS OF PRESENT AND POTENTIAL APPLICATIONS.

411. WODZINSKI, C., AND E. HAHM. 1966. A COMPUTER PROGRAM TO DETERMINE YIELDS OF LUMBER. USDA FOREST SERV. FOREST PROD. LAB., 34 PP. MADISON, WIS. THE PROGRAM, WRITTEN IN FORTRAN IS DESIGNED TO DETERMINE YIELDS OF LUMBER FOR THE PURPOSE OF CUTTING A BOARD FOR MAXIMUM YIELD. THE PROGRAM ANALYZES THE LOCATION OF DEFECTS, FINDS THE CLEAR AREAS, AND LOCATES THE CUTTINGS TO GIVE MAXIMUM UTILIZATION.

412. WOODLAND, A. C. 1969. HOW TO CHOOSE A LOGGING SYSTEM ELECTRONICALLY. CAN. FOREST IND. 89(4):46-47. A NOTE DESCRIBING THE USE OF A COMPUTER SIMULATION MODEL BY THE SPRUCE FALLS POWER AND PAPER COMPANY TO ANALYZE THE MERITS OF NEW MECHANIZED LOGGING SYSTEMS.

413. WYNNE, B. E. 1966. LINEAR PROGRAMMING: AN ESTABLISHED MANAGEMENT TOOL. 3RD ANN. FOREST IND. MARKET. CONF. PROC. (THE FOREST INDUSTRIES IN TRANSITION.):36-42. UNIV. OREG., PORTLAND. LINEAR PROGRAMMING CAN BE READILY UTILIZED FOR DECISION-MAKING IN THE WOOD-USING INDUSTRIES -- FOR ALLOCATING LOGS AMONG SEVERAL PLANTS AND PRODUCT LINES, FOR DETERMINING CAPACITY LIMITATIONS OF VARIOUS MANUFACTURING CENTERS, AND FINALLY AS A TOOL FOR GUIDANCE IN PRODUCT-MIX AND PRICING DECISIONS.

414. YAPTENCO, R. C. 1967. A SYSTEMS APPROACH TO A PRODUCTION SCHEDULING PROBLEM INVOLVING ASSEMBLY. PH.D. THESIS, MICH. STATE UNIV., EAST LANSING. A

SCHEDULING PROBLEM INVOLVING ASSEMBLY OF THE TYPE THAT GENERALLY CHARACTERIZES PLYWOOD MANUFACTURING IS IDENTIFIED AND MODELED MATHEMATICALLY IN TERMS OF ALGEBRAIC AND DIFFERENCE EQUATIONS. THE MATHEMATICAL FORMULATION IS SHOWN IN CONSIDERABLE DETAIL TO ILLUSTRATE THE LOGIC OF THE APPROACH TAKEN.

415. YAPTENCO, H. C., AND A. E. WYLIE. 1970. A QUANTITATIVE APPROACH TO PLYWOOD PRODUCTION SCHEDULING. FOREST PROD. J. 20(3):54-59. A SCHEDULING PROBLEM INVOLVING ASSEMBLY OF THE TYPE THAT GENERALLY CHARACTERIZES PLYWOOD MANUFACTURING IS IDENTIFIED AND MODELED MATHEMATICALLY IN TERMS OF ALGEBRAIC AND DIFFERENCE EQUATIONS. THE SYSTEM IS THEN STRUCTURED FOR OPTIMAL SOLUTION BY LINEAR PROGRAMMING TECHNIQUES.

416. YOHO, J. G., AND C. H. ROW. 1958. METHODS OF EVALUATING REHABILITATION PROGRAMS BY LINEAR PROGRAMMING. IND. FOREST MANAGE. CONF. PROC. 3:92-104. DUKE UNIV., DURHAM, N.C. LINEAR PROGRAMMING IS USED TO DETERMINE WHAT SITE-PREPARATION PROCEDURES COULD BE USED MOST PROFITABLY TO CONVERT DIFFERENT TYPES OF LAND.

REFERENCE

Ackoff, R. L. and M. W. Sasieni.
1968. FUNDAMENTALS OF OPERATIONS RESEARCH.
John Wiley & Sons, New York. 455 p.

U.S. GOVERNMENT PRINTING OFFICE: 1973— 712-535:599

THE FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.