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Publications of the Northeastern Forest Experiment Station - 1983

Publications

Availability of Publications

Most Station publications (Research Papers, Notes, General Technical Reports, and Resource Bulletins) are available from Station headquarters in Broomall, PA. For copies of articles not published by the Station, contact a university library or the Northeastern Forest Experiment Station author or co-author. A list of Station authors by location follows the citations. Full mailing addresses for headquarters and field locations are located on the inside back cover.

Adams, Edward L. **Use of recording watt/varmeter to evaluate the electrical power requirements of a combination edger.** Gen. Tech. Rep. NE-79. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 5 p.

The data provided by a recording watt/varmeter have many uses. We measured power consumed by a combination edger processing red oak material—cants gang-sawed on one side of the edger and boards edged on the other. Log sizes processed through the headrig and sizes of material processed through the edger were also recorded.

Anderson, Christine B.; Fosbroke, David E.; Frank, Robert M.; O'Keefe, Timothy G. **The spruce budworm and you: How to recognize damage and minimize losses.** Orono, ME: University of Maine and USDA Forest Service; 1983. 20 p.

A companion volume to an audio visual presentation.

Anderson, R. Bruce. **Furniture rough mill costs evaluated by computer simulation.** Res. Pap. NE-518. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 11 p.

A crosscut-first furniture rough mill was simulated to evaluate processing and raw material costs on an individual part basis. Distributions representing the real-world characteristics of lumber, equipment feed speeds, and processing requirements are programed into the simulation. Costs of parts from a specific cutting bill are given, and effects of lumber input costs are discussed. GASP IV (A Combined Continuous/Discrete FORTRAN-based Simulation Language) was used.

Andreadis, T. G.; Dubois, N. R.; Weseloh, R. M.; Moore, R. E. B.; Anderson, J. F.; Lewis, F. B. **Aerial spray tests with Bacillus thuringiensis for control of the gypsy moth in Connecticut.** New Haven, CT: Connecticut Agricultural Experiment Station; 1982; Bull. 807. 5 p.

Two experimental strains of Bacillus thuringiensis Berliner, HD-243 and HD-263, and the commercial strain, HD-1, were evaluated against natural infestations of Lymantria dispar (L.) in aerial spray trials. Two weekly applications of HD-1 at 8 BIU/0.4 ha, or a dry weight equivalent for the experimental strains, gave significant reductions in larval density and good foliage protection. HD-243 and HD-263, which previously had been identified as more potent against gypsy moth larvae in laboratory bioassays, were as effective but no better than HD-1 in the field. One application of HD-1 also was effective in reducing larval populations and protecting foliage but did not protect foliage as well as two applications of the same strain.

Andreadis, Theodore G.; Dubois, Normand R.; Moore, Robert E. B.; Anderson, John F.; Lewis, Franklin B. **Single applications of high concentrations of Bacillus thuringiensis for control of gypsy moth (Lepidoptera: Lymantriidae) populations and their impact on parasitism and disease.** Journal of Economic Entomology. 76(6): 1417-1422; 1982.

In aerial spray trials with Bacillus thuringiensis Berliner conducted against dense populations of Lymantria dispar (L.), single applications of 12 and 16 BIU/0.4 ha gave significant reductions in larval density and excellent foliage protection. Less than 4 percent net defoliation was observed in treated plots, compared with 69 percent in untreated plots; this level of control was equivalent to that achieved with two weekly applications at 8 BIU/0.4 ha.

Araman, Philip A. **BLANKS: A computer program for analyzing furniture rough-part needs in standard-size blanks.** Res. Pap. NE-521. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 8 p.

Describes a computer program that allows a company to determine the number of edge-glued, standard-size blanks required to satisfy its rough-part needs for a given production period. Yield and cost information also is determined by the program. A list of the program inputs, outputs, and uses of outputs is described, and an example analysis with sample output is included.

Araman, Philip A. **Program BLANKS analyzes rough-part needs in standard-size blanks.** NE-INF-44-83. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 6 p.

Describes a computer program that will allow a company to determine the number of edge-glued standard-size blanks required to satisfy their rough-part needs for a production period. Yield and cost information are also determined by the program. Lists program inputs, outputs, and uses of outputs. Includes an example analysis with sample output.

Araman, Philip A. **Standard-size blanks for furniture and cabinets.** NE-INF-45-83. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 8 p.

Discusses what standard-size blanks are, why standard sizes are used, who can use them, and how they can be made.

Araman, Philip A.; Hansen, Bruce G. **Conventional processing of standard-size edge-glued blanks for furniture and cabinet parts: a feasibility study.** Res. Pap. NE-524. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 11 p.

Each year the manufacturers of furniture and cabinets use over 2 billion board feet of hardwood lumber. As demand intensifies, we will need to utilize more of the abundant lower grade hardwood resource to assure future supplies at reasonable prices. Conventional processing of standard-size hardwood blanks manufactured from log-run red oak lumber, a resource containing over 40-percent low-grade No. 2 Common lumber, has been shown to be technically and economically feasible. Internal rates of return from 26 to 40 percent are possi-

ble when blanks are produced for outside sales or replace open-market purchases of dimension.

Araman, Philip A.; Hansen, Bruce G. **The dollars and cents of conventional processing of standard-size blanks.** NE-INF-43-83. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 8 p.

A modern conventional processing system, the raw material inputs, and product outputs and yields are presented. The economics are presented to show the product costs to potential producers who wish to use blanks internally and the investment potential to potential producers who wish to sell blanks.

Araman, Philip A.; Reynolds, Hugh W. **Crafts offer new market for edge-glued panels.** Wood & Wood Products. 88(6): 86, 88, 90; 1983.

To find out if craftsmen would be interested in purchasing edge-glued standard-size panels as a supplement to or substitute for hardwood lumber and hardwood plywood, we went to two trade shows and asked them. The results, which were positive, are presented in this report along with some possible steps for the development of this new market opportunity by dimension manufacturers.

Araman, Philip A.; Reynolds, Hugh W. **Craftsmen say "we want edge-glued, standard-size panels."** Res. Note NE-312. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 4 p.

Wood craftsmen would like an alternative to hardwood lumber and plywood and softwood products. They are very interested in edge-glued, standard-size panels. These conclusions are based on interviews with craftsmen at two trade shows, and the results are included in this report along with our recommendations for optimum acceptance by craftsmen of this new product.

Ashby, W. Clark; Vogel, Willis G.; Kolar, Clay A. **Use of nitrogen-fixing trees and shrubs in reclamation.** In: Pope, P. E., ed. Proceedings 3rd annual better reclamation with trees conference; 1983 June 2-3; Terre Haute, IN. West Lafayette, IN: Purdue University, Department of Forestry and Natural Resources; 1983: 110-118.

Auchmoody, L. R. **Using fertilizers to regenerate Allegheny hardwoods.** In: Finley, J.; Cochran, R. S.; Grace, J. R., eds. **Regenerating hardwood stands: Proceedings of a symposium**; 1983 March 15-16; University Park, PA. University Park, PA; Pennsylvania State University; 1983: 160-170.

Establishing vigorous natural regeneration of desirable species after harvest cutting of Allegheny hardwoods is difficult in northwestern Pennsylvania. Seedling growth rates are limited by a combination of heavy deer browsing and severe nitrogen and phosphorus deficiencies in the soil after overstory removal. Research during the past 10 years has shown that forest fertilization can stimulate seedlings and developing regeneration to grow above the reach of deer within one or two seasons.

Baker, C. Jacyn; Melhuish, John H., Jr. **Effect of divalent cations on germination of urediosphores of Uromyces phaseoli.** Phytopathology. 73(6): 964; 1983. Abstract.

Barger, J. H. **European elm bark beetle catches on multilure-baited sticky traps increased by spraying the trap standards with methoxychlor.** In: Hall, Franklin R., compiler. Proceedings, 38th annual meeting, North Central Branch of Entomological Society of America; 1983 March 15-17; St. Louis, MO. Wooster, OH: North Central Branch of Entomological Society of America; 1983. Abstract 55.

In earlier studies, where healthy elms were used, methoxychlor insecticide was sprayed on the boles of some elms to determine if protection against non-captured beetles was needed. Results showed that traps on sprayed elms captured more than twice as many beetles as traps on unsprayed elms. Thus, a study was conducted to determine if this phenomenon was restricted to healthy elms only, if similar results could be obtained on a variety of other standards, and if the type of trap standard affected beetle catches.

Barnard, Joseph E. **Accomplishments and plans in the North.** In: A National Review of Forest Inventory and Analysis Research in the USDA Forest Service; 1983 November 15-16; Washington, DC. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 20-22.

The Forest Inventory and Analysis units of the North Central and Northeastern Forest Experiment Stations have conducted a program of forest inventory in 25 states for nearly four decades. There have been significant past accomplishments in research, inventory, and analysis. Today the program of forest inventory being carried out in the North is multiresource in scope. Future goals relate to the expanded use of this information in state and regional policy and program implementation and continued economic development of the 180 million-acre forest resource.

Barnard, Joseph. **Maine's hardwood resource.** In: Proceedings, hardwood forest management and utilization symposium; 1982 October 25-26; Orono, ME. Misc. Rep. 279. Orono, ME: University of Maine, Maine Agricultural Experiment Station; 1983: 4-5.

Discusses the third inventory of Maine completed in July 1982. Presents some preliminary results available for 12 million of the 17 million acres of forest land in Maine.

Beckjord, Peter R.; Melhuish, John H., Jr.; McIntosh, Marla S.; Hacskaylo, Edward. **Effects of nitrogen fertilization on growth and ectomycorrhizal formation of Quercus alba, Q. rubra, Q. falcata, and Q. falcata var. pagodifolia.** Canadian Journal of Botany. 61(10): 2507-2514; 1983.

Oak seedlings were grown for 105 or 110 days in containers in a greenhouse in a medium with and without vegetative or basidiospore inoculum of the ectomycorrhizal fungi Pisolithus tinctorius and Scleroderma aurantium. At 15 days after planting acorns, nitrogen in the form of sodium nitrate or ammonium chloride was added to each container at the rates of 0.0 or 100 mg nitrogen per seedling. Growth of all seedlings that were not fertilized was significantly less than seedlings fertilized with nitrate or ammonium nitrogen (100 mg N). Ectomycorrhizal development of all seedlings that were not fertilized or fertilized with sodium nitrate (100 mg N) was significantly less than seedlings fertilized with ammonium chloride (100 mg N). Ectomycorrhizal development of oak species varied with different mycorrhizal inocula.

Benoit, L. F.; Skelly, J. M.; Moore, L. D.; Dochinger, L. S. **The influence of ozone on Pinus strobus L. pollen germination.** Canadian Journal of Forest Research. 13(1): 184-187; 1983.

Along the Blue Ridge Parkway in Virginia, branchlets and pollen were collected from native eastern white pine trees that were sensitive, intermediate, and tolerant to oxidant air pollution based on foliar symptom expression. Fumigation of branchlets with 0.10 ppm ozone (O_3) for 4 or 8 hours per day until anthesis did not affect pollen production or germinability. However, the percent germination was significantly ($P \leq 0.01$) reduced in pollen exposed under wet conditions to 0.15 (O_3) for 4 hours. The importance of this finding in the reproduction of pines is discussed.

Benzie, John W.; Smith, Thomas M.; Frank, Robert M. **Balsam fir.** In: Silvicultural systems for the major forest types of the United States. Agric. Handb. 445. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 102-104.

Berry, Frederick H.; Mielke, Manfred E. **How to reduce decay in high-value hardwood trees.** NE-INF-46-83. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 6 p.

Discusses the decay process, how decay enters trees, and how to control decay.

Biller, Cleveland J. **Whole-tree harvesting with a medium capacity cable yarder.** In: Proceedings, 1982 winter meeting American Society of Agricultural Engineers; 1982 December 14-17; Chicago, IL. Paper No. 82-1591. St. Joseph MI: American Society of Agricultural Engineers; 1983. 16 p.

A time study was conducted to monitor productive and nonproductive times during logging with a medium-capacity cable yarder harvesting whole hardwood trees in a clearcut. Prediction equations were developed to estimate the cycle time for the yarder, and yarding cost was calculated at \$3.33 m^3 (\$7.33/cord @ 78 ft^3/cord) for whole-tree chips.

Biller, Cleveland J.; Peters, Penn A. **Harvesting whole-tree Appalachian hardwoods with a Washington 78 yarder.** In: Proceedings, 1983 winter meeting American Society of Agricultural Engineers; 1983 December 13-16; Chicago, IL. St. Joseph, MI: American Society of Agricultural Engineers; 1983: Paper No. 83-1605.

Time studies were conducted on a Washington Iron Works Skylok 78 cable yarder to develop regression equations to estimate production and cost of yarding whole trees in Appalachian hardwoods.

Birch, Thomas W. **The forest-land owners of New York.** Resour. Bull. NE-78. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 80 p.

A statistical analytical report on a mail canvass of private commercial forest-land owners in New York. The study was conducted in conjunction with the third forest survey of New York by the USDA Forest Service. It discusses landowner characteristics, attitudes, and intentions of owners regarding reasons for owning, recreational use, timber management, and harvesting.

Birch, Thomas W. **Northeastern woodland ownership study—the second time around.** In: Bell, John F.; Atterbury, Toby, eds. Renewable resource inventories for monitoring changes and trends: Proceedings of an international conference; 1983 August 15-19; Corvallis, OR. Corvallis, OR: Oregon State University; 1983: 62-65.

How does one select attributes to measure change in the ownership patterns and attitudes of the forest-land owners in the 14 northeastern states? Such important variables as form of ownership; nature of business; owner's occupation, age, education, income, and residence; size class of ownership; number of tracts; past harvesting practices and intention to harvest; and reason for owning forest land are discussed. How this trend information can be used by policymakers to evaluate programs and by forest industry to forecast timber availability will be demonstrated.

Birch, Thomas W. **Private forest-land owners in the United States: Their numbers and characteristics.** In: Royer, Jack P.; Risbrudt, Christopher D., eds. Nonindustrial private forests: A review of economic and policy studies: Proceedings of a symposium; 1983 April 19-20; Durham, NC. Durham, NC: Duke University; 1983: 71-75.

A 1978 survey estimates that 7.8 million ownership units hold 333 million acres of privately owned forest land in the United States. Nearly half of the forest land is in ownerships greater than 500 acres and is owned by less than 1 percent of the ownership units. By occupation group, farmers own 16 percent of the forest land, retired people own 14 percent, white collar people own 15 percent, blue collar and other individuals own 21 percent, and the remaining 34 percent of the forest land is owned by corporations, large partnerships, and estates. Such important variables as owner age, residence, and education are discussed.

Birch, Thomas W. **Who's woods are these?—7.8 million private forest-land owners.** Crossties 64(3): 13-14, 16, 18; 1983.

A 1978 survey estimates that 7.8 million private ownerships own 333 million acres of forest land in the United States. Of these ownerships, 88 percent are either sole proprietors or family ownerships (husbands and wives), and they hold 55 percent of the forest land. Corporations own 27 percent of the forest land and forest industries have a major portion of that. Other information about the owners' occupation, age, residence, and education is discussed.

Blanchard, Robert O.; Shortle, Walter C.; Davis, Weston. **Mechanism relating cambial electrical resistance to periodic growth rate of balsam fir.** Canadian Journal of Forest Research. 13(3): 472-480; 1983.

Cambial electrical resistance (CER) and periodic growth rate (PGR) of canopy balsam fir trees were determined on 26 sites in Maine, New Hampshire, and Vermont, varying in level of spruce budworm defoliation. Determinations of water and potassium concentrations were made of the bark, wood, and vascular cambial zone (VCZ). Low CER was associated with high PGR and vice versa.

Blum, Barton M.; Benzie, John W.; Merski, Edward. **Eastern Spruce-fir type.** In: Silvicultural systems for the major forest types of the United States. Agric. Handb. 445. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 128-130.

Blum, Barton M.; Klaiber, Harold M.; Randall, Arthur G. **Epinette-Sapin du Nord-Est.** In: Les choix de sylviculture dans les forêts de L'est Canadien. Fredericton, NB: Le Service de Consultation Forestière; Ministère des Ressources Naturelles du Nouveau-Brunswick; 1983: 13-19.
French translation of "Northeastern spruce-fir" in Choices in Silviculture for American Forests; Washington, DC: Society of American Foresters; 1981.

Blyth, James E.; Widmann, Richard H. **Pulpwood production in the Northeastern and Central States in 1981.** Northern Logger. 31(9): 10-11; 1983.
Summarizes pulpwood production in the Northeastern and North Central States. In 1981, pulpwood production for the combined area was down 2 percent from 1980.

Bones, James T.; Wharton, Eric H. **Monitoring the changing timberland base in the Eastern United States.** In: Bell, John F.; Atterbury, Toby, eds. Renewable resource inventories for monitoring changes and trends: Proceedings of an international conference; 1983 August 15-19; Corvallis, OR. Corvallis, OR: Oregon State University; 1983: 58-61.
Forest-land area in the Eastern United States has been increasing in recent years, but a significant portion of that total gain has been offset by forest-land clearing. Successive statewide forest inventories verify the trend to increased timber recovery and use. Matching timber from cleared areas with local timber markets often presents a challenge to utilization and marketing foresters. Recent wood product developments and the energy crisis have provided ready markets for material that would have been buried or burned in the past.

Bonyai, Susan A.; Sendak, Paul E. **Vermont's timber economy: a review of the statistics.** Montpelier, VT: Vermont Agency of Environmental Conservation, Department of Forests, Parks, and Recreation; 1982. 27 p.
Summarizes the most current information available on the forests of Vermont and the State's timber-based industries. Timber contributed a total of $505 million to Vermont's economy in 1980.

Born, David J.; Barnard, Joseph E. **FINSYS-2: Subsystem TABLE-2 and OUTPUT-2.** Gen. Tech. Rep. NE-84. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 133 p.
Describes a computer software package for use in developing statistical tables from a resource inventory data set. The flexibility of the system in performing user-designated table-making functions also is described. Full instructions for operating the system are included.

Brann, Thomas B.; Reams, Gregory A.; Solomon, Dale S. **Spruce budworm growth impact study, 1981 report.** Orono, ME: University of Maine; 1983; Misc. Rep. 287. 73 p.
The Maine Spruce Budworm Growth Impact Study was initiated in 1975 as a cooperative effort among the CANUSA program; USDA Forest Service, Northeastern Area State and Private Forestry; and 11 private forestry companies to document the impact of the spruce budworm, on the growth and mortality of the Maine forest.

Brisbin, Robert L.; Rast, Everette D. **Predicting hardwood tree quality.** In: America's hardwood forests--opportunities unlimited: Proceedings, 1982 convention of the Society of American Foresters; 1982 September 19-22; Cincinnati, OH. Washington, DC: Society of American Foresters; 1983: 118-120.
Evaluating hardwood tree quality has become more important in the recent past because of relatively high raw material costs, increased awareness of the variability in tree quality, and a desire to utilize timber for the best use. Hardwood tree grades for predicting factory lumber yields have been developed and are being used by several organizations. Research is in progress on quality classification in young stands to investigate the effects of cultural treatments and management techniques on quality development.

Brooks, Robert T. **Vermont's first forest-wildlife habitat assessment.** Montpelier, VT: Vermont Fish & Game Department, Habitat Highlights. 3(3): 4; 1983.
The Forest Inventory and Analysis unit of the Northeastern Forest Experiment Station, USDA Forest Service, in cooperation with the Department of Forests, Parks, and Recreation of the Vermont Agency of Environmental Conservation, is conducting an inventory of Vermont's forest resources. This inventory will include an assessment of forest wildlife habitat.

Brooks, Robert T.; Porter, William F. **Development of a procedure to establish conditions and monitor changes in regional wildlife habitat quality.** In: Bell, John F.; Atterbury, Toby, eds. Renewable resource inventories for monitoring changes and trends: Proceedings of an international conference; 1983 August 15-19; Corvallis, OR. Corvallis, OR: Oregon State University; 1983: 223-226.
Presents a procedure, built on established, recurring land use and natural resource inventory data, for a national wildlife habitat assessment program. Multivariate statistical methods are used to analyze land cover and wildlife abundance relationships. Established regional relationships between abundance levels of key wildlife species and concurrent land cover conditions can be used to predict the effects of landscape change on habitat quality and wildlife abundance. Preliminary efforts have identified deficiencies in both the data and procedure design. These issues must be recognized, and resolved if possible, before this procedure can be applied to national wildlife habitat evaluation programs.

Brooks, Robert T.; Scott, Charles T. **Quantifying land-use edge from aerial photographs.** Wildlife Society Bulletin. 11(4): 389-391; 1983.
Land use interspersion with its resultant edge is important to many wildlife species' habitat. Land use

edge is most conveniently evaluated on aerial photographs. A cross-hatch and radial-line transect pattern are compared for estimating edge length: the cross-hatch pattern used as part of a double sampling procedure is recommended. Formulas for estimating total edge length and its variance are provided.

Brush, Robert O. **Managing for scenery on private woodlands.** In: Proceedings, 2nd national urban forestry conference; 1982 October 10-14; Cincinnati, OH. Washington, DC: American Forestry Association; 1983: 360. Poster session abstract.

Butler, David A.; LeDoux, Chris B. **Reference manual for THIN: A cable yarding simulation model.** Corvallis, OR: Forest Research Laboratory, Oregon State University; 1983. 35 p.
A computer simulation model called THIN was developed that can evaluate two cable yarding methods: single-state and prebunch-and-swing. The reference manual explains input, execution, output, and evaluation of the simulation. Input variables are data of actual timber stand details: log location, volume, area, terrain, labor, equipment, and yarding method. Output results include the volume and rate of logs harvested by either yarding method. Thus, several costs of cable logging may be estimated. THIN is programmed in FORTRAN IV, uses subroutines of GASP IV, and is fully operational.

Cain, M. D.; Yaussy, D. A. **Reinvasion of hardwoods following eradication in an uneven-aged pine stand.** Res. Pap. SO-188. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station; 1983. 8 p.
Annual application of mechanical and chemical treatments for 12 years only temporarily eradicated hardwood species from an uneven-aged loblolly/shortleaf pine stand in south Arkansas. Eighteen years after treatments ended, an abundance of woody shrubs and hardwood trees had reinvaded the stand and denoted an early stage in successional development from pine to hardwood when compared to four other stands managed at various intensity levels.

Cannon, W. N., Jr. **Effects of density and temperature on gallery construction and oviposition of Scolytus multistriatus.** In: Hall, Franklin R., compiler. Proceedings, 38th annual meeting, North Central Branch of Entomological Society of America; 1983 March 15-17; St. Louis, MO. Wooster, OH: North Central Branch of Entomological Society of America; 1983. Abstract 56.
Presents results of studies on the interactions of temperature and adult density on gallery construction and egg production by female European elm bark beetles.

Cannon, William N., Jr.; DeBald, Paul S.; Worley, David P. **Survival of elms—a guide to Dutch elm disease control performance.** In: Urban and suburban trees: Pest problems, needs, prospects, and solutions; 1982 April 18-20; East Lansing, MI. East Lansing, MI: Michigan State University; 1982: 36-41.
Communities experiencing or facing Dutch elm disease (DED) have the problem of saving as many elms as possible for as long as possible as efficiently as possible. These are linked together by the elm survival rate. Like most real-world problems, the DED problem is transitory; efforts to solve it need to be explicitly and narrowly stated in order to: (1) design relevant research (a scheme to do this is presented), (2) test research results against relevant standards, and (3) communicate research findings in such a form that they can be acted upon. Defining the problem in terms of elm survival rate allows researchers to do this. Since community officials are concerned with saving elms, we have a common means of communication.

Carey, Andrew B. **Cavities in trees in hardwood forests.** In: Snag habitat management: Proceedings of the symposium; 1983 June 7-9; Flagstaff, AZ. Gen. Tech. Rep. RM-99. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station; 1983: 167-184.
Describes the variety and abundance of cavities in second-growth hardwood forests in West Virginia, and provides managers with a better understanding of the cavity resource.

Carey, Andrew B. **Monitoring diurnal, cavity-using bird populations.** In: Snag habitat management: Proceedings of the symposium; 1983 June 7-9; Flagstaff, AZ. Gen. Tech. Rep. RM-99. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station; 1983: 188-199.
Addresses some limited aspects of the monitoring requirements now being addressed by the National Forest System; deals with monitoring populations of cavity-using birds in upland deciduous forests in Appalachia.

Carey, Andrew B.; Gill, John D. **Direct habitat improvements—some recent advances.** In: Snag habitat management: Proceedings of the symposium; 1983 June 7-9; Flagstaff, AZ. Gen. Tech. Rep. RM-99. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station; 1983: 80-87.
Den boxes can be made smaller, more accessible, and more resistant to predators by adding an inside shelf just below the entrance. Boxes placed on the lee sides of trees were preferred by squirrels in winter but not in spring or summer. And den boxes can raise the carrying capacity of young forest for sciurids. Using a chain saw to create tree cavities to be covered with a wooden faceplate is more efficient than routing dens with a drill or creating dens with a chain saw and chisel. Small woodpeckers will excavate cavities in styrofoam cylinders. These "plastic trees" offer some intriguing management and research applications.

Carl, Clayton M., Jr. **Nursery practices.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 47-52.
Summarizes information that will help growers produce plantable sugar maple seedlings.

Carl, Clayton M., Jr. **Seed collection and handling.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 42-46.
Discusses information on sugar maple seed development and on the proper methods of collecting and handling the seeds.

Carl, Clayton M., Jr. **Stratification of sugar maple seeds.** Tree Planters' Notes. 34(1): 25-27; 1983.
Sugar maple seeds collected from 10 trees in northwestern Vermont were stratified at 1° to 3°C for up to 13 weeks. Results indicate that this method is unsatisfactory for obtaining rapid, maximum germination after stratification.

Carroll, J. E.; Tattar, T. A.; Wargo, P. M. **Relationship of root starch to decline of sugar maple.** Plant Disease. 67(12):1347-1349; 1983.
Starch content of roots of streetside sugar maples (Acer saccharum) was scored visually on the basis of intensity of staining of xylem sections treated with I_2-KI. A significant relationship occurred between root starch content in autumn and decline symptoms: trees with declining crowns had the least starch. More trees with low or depleted starch supplies decline in crown condition than trees with moderate or high starch. This technique, used as an indicator of tree health, may be useful for detecting early stages of decline.

Cech, Franklin C.; Keys, Roy N.; Davidson, Walter H. **Establishment and early growth of sweetgum planted on disturbed land.** In: Pope, P. E., ed. Proceedings, 3rd annual better reclamation with trees conference; 1983 June 2-3; Terre Haute, IN. West Lafayette, IN: Purdue University, Department of Forestry and Natural Resources; 1983: 217-228.

Charlton, Philip M. **Utilization of taper systems for estimating total-tree height of Appalachian hardwood species.** Morgantown, WV: West Virginia University, Agricultural and Forestry Experiment Statin; West Virginia Forest Notes Circular. 123(10): 3-6: 1983.
Evaluates four taper equations to estimate total-tree height and to determine predictive potential for Appalachian hardwoods of northern West Virginia.

Choudhury, B. J.; Federer, C. A. **Simulating spatial and temporal variation of corn canopy temperature during an irrigation cycle.** Greenbelt, MD: National Aeronautics and Space Administration, Goddard Space Flight Center; 1983; NASA Tech. Memo 84991. 36 p.
The canopy-air temperature difference may provide an index for scheduling irrigation. Combining the Monteith transpiration equation with both uptake from a single-layered root zone and change in internal storage of the plant, we have explicitly solved the continuity equation for water flux in the soil-plant-atmosphere system.

Considine, Thomas, Jr. **Wildlife needs private forest land management.** Pennsylvania Game News. 54(3): 14-17; 1983.
More than 230 birds and mammals depend on Pennsylvania's 16 million acres of forest. Wildlife populations are generally in good shape, but two forest trends observed in the latest forest survey could influence future population levels. Declining proportions of oak in the timber inventory and increasing areas of sawtimber sized stands are trends likely to continue. Increasing loss of an important food source and habitat diversity are likely results of these trends. Private nonindustrial landowners own the largest amount of forest land and need to get involved in forest management to help future wildlife populations.

Considine, Thomas, Jr.; Barnard, Joseph E. **Current structure and composition of Pennsylvania's forest lands as it relates to future regeneration.** In: Proceedings, Regenerating hardwood stands; 1983 March 15-16; University Park, PA. University Park, PA: The Pennsylvania State University; 1983: 30-36.
Pennsylvania has an abundant and valuable forest resource. Concerns have arisen about the future species composition of Pennsylvania's forests. Forest survey regeneration data are not complete, but available data suggest that changes in species composition are possible.

Corbett, Edward S. **The impact of atmospheric deposition and land use practices on water quality from municipal watersheds.** In: Proceedings, National acid precipitation assessment program; 1983 February 21-25; Raleigh, NC. Raleigh, NC: North Carolina State University; 1983: A5, 29-35.
Recent evaluations of eposodic hydrologic events indicate that substantial depressions in streamflow pH can occur over a relatively short period of time. One such depression occurred during a 4.38-inch rainstorm on a forested watershed when stormflow pH dropped from 7.32 to 4.95 within a 37-hour period and the H^+ concentration increased more than 200 times. Stream alkalinity was almost entirely depleted with only a slight recovery occurring 1 week after the storm. Current research is focusing on evaluating the impacts of eposodic events on stream chemistry for a variety of stream locations.

Corbett, Edward S.; Lynch, James A. **Rapid fluctuations in streamflow pH and associated water quality parameters during a storm flow event.** In: International symposium on hydrometeorology; 1982 June 13-17; Denver, CO. Bethesda, MD: American Water Resources Association; 1983: 461-464.
Three aspects of hydrometeorological significance--the quality of precipitation, the watershed response of converting precipitation into streamflow, and the resulting change in streamflow quality—were studied on a forested experimental watershed in central Pennsylvania.

Craft, E. Paul; Whitenack, Kenneth R., Jr. **A classification system for predicting pallet part quality from hardwood cants.** Res. Pap. NE-515. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 7 p.
A system for classifying cants for pallet part production was developed that more accurately predicts

the pallet parts grade mix that can be sawed from cants than the structural timber grades that are now used. A formula is given to determine value relatives for each cant class.

Crang, Richard E.; Robinson, Susan G.; Noble, Reginald D.; Dochinger, Leon S. **Acid fog effects on yellow-poplar leaf morphology.** Micron. 14(1): 75-76; 1983.
To perform a controlled study of acid fog effects on leaf morphology, 1-year-old seedlings of yellow-poplar were maintained in single pass chambers covered with mylar. The plants were watered 3 times per week and kept on a 16-hour photoperiod at 90 $uEM^{-2}sec^{-1}$ and at a constant temperature of 24°C. Each chamber was equipped with a cool spray vaporizer in which deionized water was adjusted to pH levels of 5.7, 4.5, 3.5 and 2.7 by addition of appropriate amounts of 1N H_2SO_4. Treatment of the experimental plants was for 8 hours per day for 8 weeks.

Crawford, H. S. **Habitat management for birds that prey on spruce budworm.** CANUSA Newsletter. 27; 1982. Abstract.
Populations of birds that prey on spruce budworm can be improved by forest practices that increase (1) the degree of hardwood admixture with softwoods, (2) the proportion of spruce to fir, and (3) the diversity in horizontal and vertical stand structure.

Crawford, H. S.; Titterington, R. W.; Jennings, D. T. **Bird predation and spruce budworm populations.** Journal of Forestry. 81(7): 433-435, 478; 1983.
In northern New England, numbers of birds and amounts of budworm larvae and pupae eaten per bird increased as insect populations increased. Birds ate approximately 2, 23, and 87 percent of the epidemic, transitional, and endemic populations. Blackburnian and Nashville warblers, golden-crowned kinglets, white-throated sparrows, and black-capped chickadees were important predators in stands with endemic budworm populations. Bird communities most effective as budwom predators are found in mature managed forests containing a mix of species and size classes with scattered openings and patches of regeneration.

Crawford, Hewlette S.; Stutzman, Warren L. **Microwave attenuation as an indicator of sampling weight of herbaceous and woody plants in the field.** Forest Science. 29(4): 726-734; 1983.
Attenuation of microwave signals was linearly related to the weight of herbaceous plants and woody shoots <1.27 cm diameter along the transmission path in spruce-fir, northern hardwood, and mixed-wood stands. Hand-held instrumentation gave results equal to those obtained when rigid mounts were used. Signal loss was more closely related to green weight of vegetation in hardwood stands and to dry weight in softwood stands. Signal loss also was linearly related to annual growth of herbaceous and broadleaf woody vegetation.

Cuppett, Donald G. **Low-temperature drying.** Furniture Design and Manufacturing. 54(12): 81-83; 1982.
Experimenters found that variation in drying rates results from differences in temperature, relative humidity, and air velocity to which the lumber is exposed. Six charges were exposed to varying conditions.

Cuppett, Donald G. **Performance of a thin circular headsaw cutting hardwoods.** Forest Products Journal. 33(9): 33-35; 1983.
Past research indicated that 9x10 gage, 1/4-inch-kerf saw used about 15 percent less power and yielded 8 percent more product than a 7x8 gage, 9/32-inch-kerf saw cutting hardwood bolts into pallet parts. But, the experimental sawing time was too short to determine whether the thinner saw would perform equally well under sustained production. In a longer term followup study, the 9x10 gage saw performed as well as the 7x8 gage saw in processing 6- to 13-inch-diameter hardwood bolts. The thinner saw also performed satisfactorily in sawing black cherry sawlogs up to 15 inches scaling diameter, except for logs that would spring or bend substantially during the sawing.

Cuthbert, R. A.; Peacock, J. W.; Wright, S. L. **Emission characteristics of elm bark beetle aggregation attractants from controlled-release dispensers.** Res. Pap. NE-532. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 11 p.
Release rates of the three-component aggregation attractant of the smaller European elm bark beetle from laboratory-aged and field-aged Conrel® and Hercon® dispensers were monitored for 85 days by GLC analysis of cold-trapped volatiles. Both dispensers had relatively low and constant rates of decay for all three attractant components after an initial burst in emission rates. Within limits, the ratio of components released remained constant over time and at various temperatures.

Davidson, Walter H. **Hybrid poplar sprout clumps: Thinning does not improve development.** Journal of Forestry. 81(10): 662-663; 1983.
One growing season after the harvest of a 16-year-old hybrid poplar plantation, sprouts from 100 clumps were thinned to retain the dominant sprout; 100 clumps were left for comparison. After three growing seasons, thinned and unthinned clumps did not differ in total number of sprouts per clump or in diameter of dominant sprouts. Dominant sprouts were significantly taller in the unthinned clumps. Thinning hybrid poplar sprout clumps after a harvest is not recommended.

Davidson, Walter H.; Vogel, Willis G. **Hybrid poplars for reclamation.** In: Better reclamation with trees: 3rd annual conference; 1983 June 2-3; Terre Haute, IN. Lafayette, IN: AMAX Coal Co. and Purdue University, Department of Forestry; 1983: 99-109.
Past research with hybrid poplars has shown that some clones have potential for minesoil reclamation. The most promising clones are identified. Hybrid poplars can be used for energy plantations and esthetic plantings. The wood is used for pulp, fuel, construction, lumber, furniture, veneer, boxwood, and novelty products. Research on plantation establishment and management, growth rates and timber yields, and utilization is reviewed. The report includes studies conducted in Pennsylvania, Maryland, West Virginia, Kentucky, and Ohio.

DeGraaf, Richard M.; Rudis, Deborah D. **Amphibians and reptiles of New England.** Amherst, MA: The University of Massachusetts Press; 1983. 85 p.

This publication provides the most comprehensive information available on the natural histories and habitat associations of the approximately 75 species and subspecies of amphibians and reptiles that live in forest environments of the Northeast. The information will help federal and state land management agencies, as well as private organizations, plan for the habitat needs of these important species in the management of public and private forest lands.

DeHayes, Donald H.; Hawley, Gary J.; Gregory, Robert A. **Variation in balsam fir shoot apex characteristics and shoot growth.** In: Proceedings, Third North Central Tree Improvement Conference; 1983 August 17-19; Wooster, Ohio. (Location of publisher unknown): North Central Tree Improvement Association; 1983: 53-61.
Dormant terminal buds and subsequently developed shoots were removed from several whorls of 17-year-old trees representing four balsam fir provenances and examined for variation in primordia and needle production, apical dome diameter, and the relative contributions of stem unit number and length to shoot growth.

Demeritt, M. E., Jr. **Tree improvement work in the Northeast, especially hybrid poplar.** In: Parker, Bruce L.; Hanson, Patricia M.; Teillon, H. Brenton, eds. Proceedings, 15th annual Northeastern forest insect work conference; 1982 March 11; Portland, ME. MP 108. Burlington, VT: University of Vermont Agricultural Experiment Station; 1983: 14. Abstract.
Lists species and hybrids for which genetic studies and experimental plantations have been established since 1924.

Demeritt, Maurice E., Jr. **Making the most of the hybrid poplar.** Forest Notes. 151: 2-4; Winter 1983.
Growing publicity concerning the hybrid poplar trees' capacity for rapid growth in our soil and potential as a prime source of firewood warrants a review of the facts. Presented are 16 questions and answers that should present a clear picture of the hybrid poplar's place in our forests, and our economy.

Demeritt, Maurice E., Jr. **Planting and care of hybrid poplar.** NE-INF-48-83. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 9 p.
Specifies requirements that have to be met for successful establishment of hybrid poplar: planting site requirements, site preparation, selection and storage of hybrid poplar cuttings or trees, planting of cuttings, spacing, cultivation, fertilization, and pruning.

Demeritt, Maurice E., Jr. **Six-year results of hybrid poplar clonal tests in Pennsylvania and Maryland.** In: 28th Northeastern forest tree improvement conference: Proceedings 1983; 1982 July 7-9; Durham, NH. Durham, NH: University of New Hampshire; 1983: 102-109.
Six-year height and diameter growth were measured and analyzed for 199 hybrid poplar clones at Ephrata, Pennsylvania, and Hampstead, Maryland. Six-year heights differed significantly between and within locations. Six-year diameter at breast height differed significantly within locations. Hybrid poplar clones can be selected for use in Pennsylvania and Maryland at 6 years with predictable performance to about age 12.

Dempsey, Gilbert P.; Hansen, Bruce G.; Araman, Philip A. **Improving the export market for wood products.** Southern Lumberman. 244(3040): 52-54; 1983.
At a time when our Nation's share of international trade is dropping dramatically, our export of wood products continues to expand. Industry leaders predict that exports of U.S. wood products will continue to increase well into the future. However, numerous trade barriers limit the ability of the U.S. producers to expand exports. Before U.S. exports of wood products can achieve their true potential, research is needed to evaluate these constraints to foreign trade.

Dennis, Donald F. **An analysis of Ohio's forest resources.** Resour. Bull. NE-75. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 46 p.
A comprehensive analysis of the current status and trends of the forest resources of Ohio. Topics include forest area, timber volume, biomass, timber products, and growth and removals. Forest area, volume, and growth and removals are projected through 2009. Discusses water, soil, minerals, fish, wildlife, and recreation as they relate to forest resources. Also identified are forest management opportunities for increasing the production of major forest resources and enhancing the benefits derived from Ohio's forests.

Dennis, Donald F. **Tax incentives for reforestation in Public Law 96-451.** Journal of Forestry. 81(5): 293-295; 1983.
Concern about reforestation and to some extent about the financial viability of forest management on private land stimulated passage of Public Law 96-451, which includes tax incentives for reforestation. An economic analysis that measures the impact of the incentives on present net worth, cash flow, and internal rate of return under various landowner and forest situations indicates that the incentives will improve forestry's competitive positions with respect to other long-term capital investments.

DeVito, Anita S.; Miller, David R. **Some effects of corn and oak forest canopies on cold air drainage.** Agricultural Meteorology. 29: 39-55; 1983.
Nocturnal cold air drainage was examined in corn and oak canopies, and over a bare field on a hillside in Storrs, Connecticut. Smoke tracers, and vertical profiles of wind and temperature showed drainage flow development and persistence to be markedly affected by surface cover. The purpose of this study was to examine the effects of a low canopy, corn, and a tall canopy, oak forest, on the incidence and intensity of local nocturnal cold air drainage.

DeWalle, D. R.; Heisler, Gordon M. **Windbreak effects on air infiltration and space heating in a mobile home.** Energy and Buildings. (5): 279-288; 1983.
During winter experiments in central Pennsylvania a windbreak, 61m long and composed of a single row of white pine trees, significantly reduced air infiltration rates and space heating energy needs in a small mobile

home by up to 54 percent and 18 percent, respectively. Greatest reductions in air infiltration rates occurred with the home at one windbreak height (1H) downwind, even though maximum reductions in wind velocity occurred at 2H or 4H downwind. Space heating energy savings were less sensitive to downwind position, with maximum energy savings measured at both 1H and 2H. Maximum energy savings due to the windbreak for an entire winter heating season were estimated to be 12 percent.

DeWalle, David R.; Heisler, Gordon M.; Jacobs, Robert E. **Forest home sites influence heating and cooling energy.** Journal of Forestry. 81(2): 84-88; 1983.
Experiments with small mobile homes in Pennsylvania indicated that shade of trees can significantly reduce solar heating and that by lowering wind speeds forests can lessen infiltration of outside air. Forests and windbreaks are especially effective with poorly sealed houses and in windy weather. On forested sites in most of the United States, energy use can probably be lessened by manipulating forest growth to allow the sun to strike the house in winter. On open sites, windbreaks and carefully located shade trees would lessen year-round energy use.

Dochinger, L. S. **Air pollution impacts on forest trees: Abiotic and biotic stress factors.** In: Alekseyev, V. A.; Martin, J., eds. Publication Advisory Committee Academy of Sciences Estonian Socialist Soviet Republic, Tallinn; 1982: 18-19.
The objectives of this paper are to review the ecological implications of the deposition of atmospheric pollutants in predisposing forests to abiotic and biotic causal agents, and to propose research programs to explain the interactions of air pollutants and causal agents.

Dochinger, Leon S. **The effects of acid precipitation and its gaseous precursors on forest composition, structure, growth, and productivity.** In: National acid precipitation assessment program: Effects research review; 1983 February 21-25; Raleigh, NC. Raleigh, NC: North Carolina State University; 1983: 2-4: 19-23.
In current studies, sustained acid fog at pH 2.7 altered the morphology of yellow-poplar leaves; studies of Drosophila suggest somatic effects and germ line alterations after fumigation with SO_2; exposing field-grown red pines to a linear gradient of SO_2 did not support the hypothesis that the recent emergence of Scleroderris canker in the Northeast is related to increased sulfur oxides; and preliminary analyses suggest that changes in ring width of white pine and red oak in New Hampshire and Ohio are correlated with climate where air pollution is extreme.

Dochinger, Leon S. **The effects of acid precipitation and its gaseous precursors on forest composition, structure, growth, and productivity.** In: National acid precipitation assessment program: Effects research review; 1983 February 21-25; Raleigh, NC. Raleigh, NC: North Carolina State University; 1983: 2-4: A23. Abstract.
See previous reference.

Donley, David E. **Cultural control of the red oak borer (Coleoptera: Cerambycidae) in forest management units.** Journal of Economic Entomology. 76(4): 927-929; 1983.
Treated population levels of the red oak borer were reduced by 63 to 68 percent compared to untreated populations. Treatment of forest management units consisted of felling and sectioning all "brood trees" in ca. 34 ha of east-central Ohio oak/hickory stands. Less than 1 percent of the potential crop trees were sacrificed to treatment in each management unit. Costs ranged from $16 to 18/ha, and benefits ranged from $528 to 1,232/ha, assuming an 80-year timber management regimen. Red oak borer larvae (3- to 6-month-old) in felled trees were preyed on by ants and tunnels made by 12- to 20-month-old larvae were colonized by female ants.

Donley, David E. **Effect of timber stand improvement on population levels of the red oak borer, Enaphalodes rufulus Haldeman (Coleoptera: Cerambycidae).** In: Proceedings, 4th central hardwood forest conference; 1982 November 8-10; Lexington, KY. Lexington, KY: University of Kentucky Press; 1982: 47-50.
Population levels of the red oak borer were estimated over a 4-year period in six 25-year-old oak/hickory stands in east-central Ohio just before, during, and after timber stand improvement (TSI). Treated stands,74 acres in total area had a site index of 60 to 70, an average basal area of 96 ft^2, and an oak component of 44 ft^2. Stand improvement consisted of cull-tree removal, an average 21 ft^2 per acre, by girdling and poisoning. Two stands were treated during the fall of 1977 when red oak borer larvae were in the cambium, and four stands were treated in the fall of 1978 when the borers were in the xylem. Borer attacks per 200-ft^2 units of host bark surface area were used as a population estimate. Treatment generation population levels were not reduced when TSI was applied to stands with larvae in the cambium. Posttreatment generation population levels in these stands were reduced from pretreatment levels by about 12 percent.

Dubois, Normand R. **New and better strains of Bacillus thuringiensis.** In: Proceedings, 1983 gypsy moth annual review; 1983 December 6-8; Albany, NY. Albany, NY: New York State Department of Environmental Resources; 1983: 30-33.
Several new strains of Bacillus thuringiensis (B.t.) were isolated from diseased spruce budworm larvae. Preliminary bioassays of laboratory preparations of these strains against this insect pest showed that three strains, NRD-8, NRD-10, and NRD-12, were about twice as potent as HD-1, the current strain of choice for commercial production of B.t. These observations were confirmed when fermentation beer concentrates of these strains and HD-1 were compared by parallel bioassay against 4th-instar budworm larvae. The potency of the three strains relative to Heliothis virescens and Trichoplusia ni, the insect species used to standardize B.t. products, was about the same as that of HD-1.

Dubois, Normand R. **Research aspects on the use of Bacillus thuringiensis.** In: Proceedings, 1982

National Gypsy Moth Review; 1982 December 7-9; Harrisburg,PA. Middletown, PA: Pennsylvania Department of Environmental Resources; 1983: 82-85.

Reports results of cooperative field studies with the Connecticut Agricultural Experiment Station to determine: (1) comparative field effectiveness between strain HD-1 and two experimental strains; (2) comparison between different application rates of HD-1; and (3) field confirmation of a synergism between Bacillus thuringiensis and Apanteles melanoscelus. Laboratory studies on the alteration of parasitism by Rogas lymantriae and selection of new strains of B. thuringiensis for use against gypsy moth are also reported.

Duchacek, H.; Sendak, P. E.; Laing, F. M. **Commercial-scale tubular maple sap evaporator: operation and economics.** Burlington, VT: University of Vermont Agricultural Experiment Station; 1982; Res. Rep. 31. 16 p.

Dyer, Kenneth, L. **Effects on water quality of coal mining in the basin of the North Fork Kentucky River, Eastern Kentucky.** Water-Resources Investigations Report 81-215. Louisville, KY: U.S. Geological Survey; 1983. 94 p.

A detailed investigation of the effects of mine drainage on stream water quality was carried out on the watershed of the North Fork Kentucky River in 1975. Specific-conductance measurements were made at 415 sites, repeatedly at some of them. Discharge estimates and pH values, were also obtained in most instances while sulfate and chloride data were obtained about half the time.

Dyer, Kenneth L.; Curtis, Willie R. **pH in streams draining small mined and unmined watersheds in the coal region of Appalachia.** Res. Note NE-314. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 6 p.

To better evaluate the effects of surface mining for coal in first-order watersheds in Appalachia, a network of 421 water-quality sampling stations was established in 136 counties in nine states in 1977 and sampled on approximately a monthly basis until August 1979. Three categories of watersheds were sampled: (1) unmined, (2) mined after January 1972, and (3) mined before January 1972. Mean pH values averaged 7.0, 6.7, and 6.3 for these three categories of watersheds, respectively.

Echelberger, Herbert E.; Gilroy, Donna; Moeller, George. **Recreation research publications bibliography 1961-1982.** Washington, DC: U.S. Department of Agriculture, Forest Service; 1983. 94 p.

Annotated list of recreation research publications, 1961-82.

Echelberger, Herbert E.; Leonard, Raymond E.; Adler, Steven P. **Designated-dispersed tentsites.** Journal of Forestry. 81(2): 90-91, 105; 1983.

Simple campsites away from trails and streams were marked in an attempt to disperse campers in heavily used eastern backcountry. Campers who used these sites responded more favorably to the concept of dispersed camping than did those who stayed at trailside sites.

Eck, Ronald W.; Burks, Randall S.; Phillips, Ross A. **Optimal timing for upgrading low-volume rural roads.** In: Proceedings, 1983 winter meeting American Society of Agricultural Engineers; 1983 December 13-16; Chicago, IL. St. Joseph, MI: American Society of Agricultural Engineers; 1983: Paper No. 83-1617.

A two-part approach to optimizing expenditures of road rehabilitation funds is presented. First, guided decisionmaking is used to determine whether a road link is a candidate for upgrading. In the second part, a zero-one integer programming algorithm is used to minimize upgrading, recurring maintenance, and vehicle operating costs for a given budget.

Edwards, Pamela J.; DeWalle, David R. **Spatial distribution of nutrients in throughfall beneath the crowns of three urban tree species.** Res. Briefs. 16(1): 6-8; 1983.

Edwards, Pamela J.; Halverson, Howard G.; DeWalle, David R. **Changes in precipitation chemistry yielded to urban runoff by tree crowns.** In: Proceedings, International symposium on urban hydrology, hydraulics and sediment control; 1983 July 25-28; Lexington, KY. Lexington, KY: University of Kentucky; 1983: 109-113.

Throughfall quantity and quality were measured under three replicate crowns of three urban tree species to assess possible impacts on urban runoff water quality. The interception process removed 17 to 37 percent of the precipitation volume from the runoff cycle for three summer storms. The acidic nature of precipitation was partially neutralized by reactions within the tree crowns. The throughfall had an average pH of 4.19 as opposed to 3.72 for precipitation. Although the sodium load of precipitation was not significantly affected, the loads of nitrogen, calcium, and potassium were increased by the tree crowns.

Eli, Robert N.; Biller, Cleveland J. **Timber harvest cableway location analysis using terrain models.** In: Proceedings, 1983 winter meeting American Society of Agricultural Engineers; 1983 December 13-16; Chicago, IL. St. Joseph, MI: American Society of Agricultural Engineers; 1983: Paper No. 83-1615.

The problem of determining the most efficient layout of cableways in small forest harvest units in the Appalachian region is primarily a function of the steep complex terrain. An automatically drawn Triangulated Irregular Network Digital Terrain Model (TIN-DTM) is developed to provide accurate measures of area, aspect, slope, and distance within the harvested area.

Emanuel, David M. **Comparison of lumber values for Grade-3 hardwood logs from thinnings and mature stands.** Res. Pap. NE-529. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 4 p.

The lumber value per M bf (thousand board feet) by species (red oak, yellow-poplar, and hard maple) obtained from Grade-3 logs from a thinning cut was

higher than that from a mature-stand harvest operation. Red oak and yellow-poplar lumber values per M bf were significantly higher.

Etkind, Paul H.; ODell, Thomas M.; Canada, Andrew T.; Shama, Steven K.; Finn, Amy M.; Tuthill, Robert. **The gypsy moth caterpillar: A significant new occupational and public health problem.** Journal of Occupational Medicine. 24(9): 659-662; 1982.
When volunteers were skin tested with extracts of gypsy moth hairs, there was a strong relationship between reactions and dermatologic and/or pulmonary problems associated with exposure to gypsy moth larvae. This helps explain the outbreak of cutaneous reactions in the general population during the gypsy moth outbreak in 1981.

Fay, S.; Leak, W. B. **Ecological land classification: practice and research on the WMNF.** In: In-place resource inventories: Principles and practices; 1981 August 9-14; Orono, ME. Washington, DC: Society of American Foresters; 1981: 654-658.

Federer, C. A. **Improving forest hydrology research.** In: Proceedings, 1982 Canadian hydrology symposium; National Research Council of Canada; 1982: 653-663.
Hydrology models need to be developed into a component of ecosystem models. The problems of sediment and floods are well enough understood in most geographic areas. The problems of soil nutrient status and acid precipitation effects will require long-term efforts. We are in the early stages of a revolution in the collection of data and the transfer of both data and knowledge. Forest hydrologists have lagged in making their knowledge available to users. Generalization and simplified techniques are needed.

Federer, C. A. **Nitrogen mineralization and nitrification: Depth variation in four New England forest soils.** Soil Science Society of America Journal. 47(5): 1008-1014; 1983.
Examines the dependence of mineralization and nitrification on horizon throughout the soil profile in mature forests, by incubating soil in situ in buried bags.

Fisher, Edward L.; Peters, P. A. **Analysis of eastern United States cable harvesting operations.** In: Proceedings, 1982 Winter Meeting American Society of Agricultural Engineers; 1982 December 14-17; Chicago, IL. St. Joseph, MI: American Society of Agricultural Engineers; 1983: Paper No. 82-1602.

Fleischer, H. O.; Foulger, A. N. **A brief history of the Society of Wood Science and Technology: The first twenty-five years 1958 to 1983.** Madison, WI: Society of Wood Science and Technology; 1983. 28 p.
Founded in 1957, The Society of Wood Science and Technology celebrated its 25th birthday with 524 members in 1982. This paper traces its history for the first 25 years.

Frank, Robert M. **Balsam fir (Pinaceae Abies balsamea) silvics, silviculture, and natural regeneration methods.** In: Wingard, Charles; Koller, Norman, eds. Proceedings, silvicultural guides workshop Chippewa and Superior National Forests; 1983: Febuary 14-18; Grand Rapids, MN. Duluth, MN: USDA Forest Service, Superior National Forest; 1983: 114-136.
Presents the silvics and silviculture of balsam fir and natural regeneration methods for developing forest stands less vulnerable to spruce budworm. Emphasis is on several of the options available for increasing the spruce component in spruce-fir stands.

Frank, Robert M. **A focus on natural regeneration methods for developing a spruce-fir forest less vulnerable to spruce budworm.** In: Proceedings, 1983 Eastern Spruce Budworm Research Work Conference; 1983 January 10-11; Orono, ME. Orono, ME: University of Maine; 1983: 18. Abstract.
Study results from several locations in Maine indicate that natural regeneration and timber-stand-improvement techniques can be successful in developing stands more resistant to spruce budworm attack.

Frank, Robert M., Jr.; O'Keefe, Timothy G. **A transfer system to reach a selected audience: Woodlot owners and mill managers.** In: Proceedings, technology transfer society international symposium; 1983 June 20-22; Chicago, IL. Chicago, IL: Illinois Institute of Technology Research Institute; 1983: 371-378.
Under the USDA Forest Service CANUSA program, a great deal of technical information about control of spruce budworm has been developed. Much of this information has direct application for woodlot owners, and the utilization of budworm-killed timber can be helpful information for mill managers. Unfortunately, only a limited amount of this data has thus far reached these ultimate consumers.

Gabriel, William J. **Genetic improvement in sap-sugar production.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 38-41.
Discusses the difference in the sugar content of tree sap. This difference makes it possible to improve sugarbush production in two ways: existing sugarbushes can be thinned by removing the trees that produce less sugar (as shown in tests of the sap from individual trees), and the productiveness of sugar maple trees can be improved over a long term by selective breeding.

Galford, Jimmy R. **Life history of the red oak borer, Enaphalodes rufulus (Haldeman), in white oak (Coleoptera: Cerambycidae).** Entomological News. 94(1): 7-10; 1983.
Young red oak borer larvae feed horizontally in white oak but mostly vertically in red, black, and scarlet oak. Overgrowths of successful attacks in white oak appear as "L" or reverse "L" marks on the trees. In a study in central and southern Ohio between 1977 and 1981, 27 of 457 trees examined in the basal 6 feet had borer injuries. Only small, suppressed trees were injured.

Gansner, David A. **Update of PA-USFS risk rating project.** In: Proceedings, 1982 national gypsy moth review; 1982 December 7-9; Harrisburg, PA. Harrisburg, PA: Pennsylvania Department of Environmental Resources; 1983: 147.

Field plots installed in advance of gypsy moth outbreaks will be used to monitor impacts of the insect as it spreads to new frontiers of forest vegetation. They will also provide data needed to improve techniques for predicting and evaluating damages.

Gansner, David A.; Casey, Lloyd R. **Hey, woodland owner...Check your value growth rate.** Pennsylvania Forests. 73(5): 4-5; 1983.
Presents an easy method for estimating the current rate of value growth for trees and timber stands. A wise woodland owner keeps close tabs on the financial earnings of his timber. And all he needs is a diameter tape, an increment borer, and the table shown in this paper.

Gansner, David A.; Herrick, Owen W.; DeBald, Paul S.; Acciavatti, Robert E. **Changes in forest condition associated with gypsy moth.** Journal of Forestry. 81(3): 155-157; 1983.
Eight years after the beginning of repeated but not continuous attacks by the gypsy moth, hardwood plots in the Pocono Mountain region of Pennsylvania had outgrown most losses. Basal area averaged close to preattack values, though with wide variation from plot to plot. Volumes per acre had gained an average of 8 percent. Before the outbreak, 87 percent of the plots were fully stocked or overstocked; after 8 years, 79 percent were in this condition but with a reduced oak component.

Gansner, David A.; Herrick, Owen W.; DeBald, Paul S.; Cota, Jesus A. **New turf for gypsy moth: There's more at risk downrange.** Res. Pap. NE-519. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 4 p.
Data collected from 600 field plots in central Pennsylvania forests threatened by gypsy moth point to a greater potential for damage downrange. Though greater than in the Poconos, losses are not expected to be spectacular. Still, some forest landowners will suffer heavy tree mortality to the pest.

Garrett, L. D.; Morselli, M. F.; Jenkins, W. L. **Potential discrepancies in applying U.S. and Canadian syrup color standards.** Maple Syrup Digest. 23(4): 26-28; 30-32; 34-35; 1983.
With both the U.S. visual method and the Canadian spectrophotometric method, we color-graded 120 maple syrups produced and graded in Vermont and 53 syrups produced and graded in Canada. Results indicated that the spectrophotometric measure of variation corresponding to each of the U.S. visual grades is lower than that specified in the Canadian standards.

Garrett, Lawrence D. **Efficiency of wood-fueled evaporators.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 83-86.
Discusses the factors affecting efficiency and economics of using wood fuels.

Garrett, Lawrence D. **Moisture loss from felled eastern hardwood and softwood trees.** In: Proceedings, 6th international FPRS industrial wood energy forum; 1982 March 8-10; Washington, DC. Madison, WI: Forest Products Research Society; 1983: 210-214.

Garrett, Lawrence D.; Huyler, Neil K.; Sendak, Paul E. **Improvements in sap processing techniques.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 87-97.
Describes research to develop a sap preheater that not only achieved the same increase in efficiency as the series flow design, but was easier to make, especially for a sugarmaker; was flexible enough to fit under the many types of steam hoods already in place; and had a lower sap feed head requirement. The design that satisfied these goals was the parallel flow preheater.

Garrett, Peter W.; Fleming, Harvey. **Pitch pine.** In: Silvicultural systems for the major forest types of the United States. Agric. Handb. 445. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 135-136.

Gatchell, Charles J. **Utilizing low-quality hardwoods.** In: Proceedings, hardwood forest management and utilization symposium; 1982 October 25-26; Orono, ME. Misc. Rep. 279. Orono, ME: University of Maine, Maine Agricultural Experiment Station; 1983: 35-40.

Gatchell, Charles J.; Anderson, R. Bruce; Araman, Philip A. **Effect of gang-ripping width on CIF yields from No. 2 Common oak lumber.** Forest Products Journal. 33(6): 43-48; 1983.
Using computer simulation, we gang ripped a 4,200-board-foot oak data bank to 2-, 2-1/2, or 3-inch primary widths with salvage to a minimum size of 1 inch wide by 10 inches long. Overall random-length yield of CIF cuttings was 60 percent regardless of primary ripping widths. Narrower ripping widths produced more individual pieces and a greater number of longer pieces. Half or more of the accumulated surface area of random-length cuttings was in cuttings 40 inches or longer. More than 75 percent of the surface area of cuttings was in pieces with widths of 2 inches or more.

Gatchell, Charles J.; Hansen, Bruce G. **Let's talk the same economic language when evaluating System 6 and standard-size hardwood blanks.** NE-INF-49-83. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 6 p.
Presents the economic terminology and economic analysis approach used by the Forestry Sciences Laboratory in the evaluations of System 6 and standard blanks. Introduces the layman to the terms and procedures described in the technical presentations of our technology transfer workshops.

Gill, J. D. **Wildlife and other multiple use considerations.** In: Proceedings, Fuelwood Management and Utilization Seminar; 1982 Nov. 9-11; East

Lansing, MI. East Lansing, MI: Michigan State University; 1982: 106.

The increased demand for firewood threatens the habitat of many wildlife species. Dead or dying trees that commonly are cut for firewood are vital to wildlife species that nest in tree cavities. Likewise, healthy trees of many species preferred for firewood are important components of wildlife habitat. Tree species or species groups are value-rated for both firewood and wildlife so that the ratings can be used to decide how to manage a woodland for fuel and wildlife.

Gill, John D.; Worley, David P. **Managing nonindustrial private forestlands: a different approach.** In: America's hardwood forests—opportunities unlimited. Proceedings, 1982 Convention of the Society of American Foresters; 1982 September 19-22; Cincinnati, OH. Washington, DC: Society of American Foresters; 1983: 238-242.

Describes and comments on the objectives, framework, and results of a workshop conducted jointly by the Ohio chapters of the Society of American Foresters, the Soil Conservation Society of America, and the Wildlife Society. These chapters explored what may be the entrance to a pathway through a "hopeless morass" of institutional and governmental complexity that may impede efforts to improve management of nonindustrial private forests.

Godwin, P. A.; Shields, K. S. **Some interactions of Serratia marcescens, nucleopolyhedrosis virus and Blepharipa pratensis Dip.[Tachinidae] in Lymantria dispar [Lep.: Lymantriidae].** Entomophaga. 27(2): 189-196; 1982.

The entomopathogens Serratia marcescens Bizio and nucleopolyhedrosis virus were each fed alone and in combination with the parasite Blepharipa pratensis (Meigen) to 4th-instar gypsy moth, Lymantria dispar, (L.) larvae. At LD_{30} for NPV, the presence of the parasite enhanced polyhedrosis about 30 percent, but the total number of gypsy moth larvae and pupae killed (85 percent) was not significantly different from the number killed by the parasite alone (93 percent). When the parasite was combined with S. marcescens, a strain nonpathogenic in L. dispar, total mortality was not significantly different from that in insects exposed only to the parasite (89 and 86 percent, respectively), but parasite survival was reduced about 12 percent. However, deaths not attributable to the parasite could not be ascribed to the bacterium either.

Godwin, Paul A.; Valentine, Harry T.; ODell, Thomas M. **Identifying pine bark weevils by discriminant analysis.** BioScience. 33(3): 198; 1983.

A condensation of "The identification of Pissodes strobi, P. approximatus, and P. nemorensis (Coleoptera: Curculionidae) using discriminant analysis," published in Annals of the Entomological Society of America 75(6).

Goldstein, E. L.; Gross, M.; DeGraaf, R. M. **Wildlife and greenspace planning in medium-scale residential developments.** Urban Ecology. 7: 201-214; 1983.

The spatial arrangement of woody vegetation in residential developments from 40 to 1,000 ha is analyzed in terms of the "species-area curve" and other principles of island biogeography. These principles, which predict the number of wildlife species that will occur in an area as a function of the size, shape, and distribution of vegetation patches in the area, promise to be a powerful tool in greenspace planning. Using birds as an example, we examine some of the trade-offs among wildlife, visual, and recreational amenities which are associated with three different approaches to the arrangement of a given amount of greenspace. These three approaches are examiend both at the scale of small and large subdivisions and at a micro-regional scale of 10 km^2.

Gottschalk, Kurt W. **Management strategies for successful regeneration: oak-hickory.** In: Finley, J.; Cochran, R. S.; Grace, J. R., eds. Proceedings, 1983 Penn State forestry issues conference, regenerating hardwood stands; 1983 March 15-16; University Park, PA. University Park, PA: Penn State University; 1983: 190-213.

To obtain successful oak regeneration, advance oak seedlings of relatively large size with well established root systems must be present before cutting. Establishment and growth of advance regeneration is influenced by site quality, soil moisture, light, predation, and interference from other vegetation. Either central hardwood or Allegheny hardwood guides can be used to determine the adequacy of oak advance regeneration. Successful regeneration of oak can be obtained using even-age management strategies. Both clearcutting and shelterwood cutting are used depending upon the adequacy of advance regeneration. Understory control using an herbicide treatment may also be required. Uneven-age management strategies will usually not regenerate oaks successfully, but group selection cutting may provide some oak regeneration if sufficient advance regeneration was present.

Gottschalk, Kurt W. **Silvicultural alternatives for coping with the gypsy moth.** Connecticut Timber Trends. 4(3): 6-10; 1983.

Silvicultural control of gypsy moth populations is not a new idea. Suggestions for silvicultural control were made as early as 1913 but recently interest again has started to increase, in part due to restrictions on chemical control methods and ever-increasing areas of gypsy moth impact.

Greenblatt, Jane A.; Barbosa, Pedro; Montgomery, Michael E. **Host's diet effects on nitrogen utilization efficiency for two parasitoid species: Brachymeria intermedia and Coccygomimus turionellae.** Physiological Entomology. 7: 263-267; 1982.

Differences in the weight of parasitoid individuals of Brachymeria intermedia (Nees) and Coccygomimus turionellae (L.) (Ichneumonidae) were found to be associated with differences in host diet. The availability of the host nitrogen to the parasitoids differed depending on the sex of the host, Lymantria dispar, and its diet. Nitrogen utilization efficiency (NUE) for both parasitoid species were inversely correlated with host weight and with host nitrogen.

Greenleaf, R. D.; Echelberger, H. E. **Backpacker satisfaction in the White Mountains.** Appalachia. 1982 December: 112-113.

For most backpackers interviewed on two trails in the White Mountains of New Hampshire, the number of parties met on the trail had little effect on their satisfaction. When use levels were well below expectations, most people were unaffected while a few were more satisfied. When use was much higher than expected, most still remained unaffected while a few indicated some dissatisfaction. Privacy and solitude while hiking did not seem to be of great importance in these two settings.

Gregory, G. F. **Fungicide injection and pruning for control of Dutch elm disease in Greenfield Village, Michigan.** In: Proceedings of a conference on urban and suburban trees: Pest problems, needs, prospects and solutions; 1982 April 18-20; East Lansing, MI. East Lansing, MI: Michigan State University; 1982: 49-52.
In a 1974 study, elms with foliar symptoms of Dutch elm disease were injected with 226 ml of 6 g/liter solution of methyl 2-benzimidazole carbamate salt per cm of dbh. Symptomatic limbs were also injected, and later pruned off. After 5.5 years, 25 percent of these trees had no foliar symptoms; of those that had symptoms in less than 10 percent of the crown, 33 percent were symptom-free after 5.7 years.

Gregory, Robert A. **Release of sap sugar and control of sap pressure.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 1-7.
Discusses what controls sap sweetness and what causes sap to flow from a taphole.

Gregory, Robert A.; Hawley, Gary J. **Sap extraction and measurement of soluble sap sugars in sugar maple.** Canadian Journal of Forest Research. 13(3): 400-404; 1983.
Techniques are described for field and laboratory extraction of small quantities of sugar maple xylem sap when pressure in the xylem is less than atmospheric. Accurate estimates of sap sugar concentration can be made with a hand refractometer most of the year. There is, however, appreciable within-tree variation in sap sugar concentration at any given time and within short periods of time.

Grimble, D. G.; Morris, O. N. **Regional evaluation of B.t. for spruce budworm control.** Agric. Inf. Bull. No. 458. Washington, DC: U.S. Department of Agriculture; 1983. 9 p.
The cooperation of regional pest control officials in collecting similar data from their own spray programs has allowed the first comparison of B.t. performance over a wide area. B.t. is the only biological or microbial safe insecticide available for spruce budworm control. Indeed, it is likely to be the only alternative to chemical pesticides in the foreseeable future. B.t. treatments sometimes fail to achieve acceptable results, just as chemical insecticides do, but given reasonable conditions of use, B.t. is usually successful in protecting foliage. At present, B.t. must be considered a viable alternative for chemicals in many situations, especially in environmentally sensitive areas where foliage protection is the goal.

Haeskaylo, E. **Researching the potential of forest tree mycorrhizae.** Plant and Soil. 71(1): 1-3; 1983.
During the last century important ecological and physiological principles in mycorrhizal associations were discovered. Reconsideration of this era of mycorrhizal research is worthy of current consideration since progress particularly in physiology has been slow. To derive the potentially vast benefits from mycorrhizal associations in field applications and to achieve genetic alteration to improve physiological benefits derived from mycorrhizas, fundamental characteristics and biochemical mechanisms in the fungus-root complex must be better understood.

Haeskaylo, Edward. **Effects of extended in vitro culture on infectivity and vitality of selected ectomycorrhizal fungi.** In: Proceedings, 5th North American Conference on Mycorrhizae; 1981 August 16-21; Quebec, Canada. Quebec, PQ: University of Laval; 1981. Abstract.

Hagerty, J. K.; Stevens, T. H.; Allen, P. G.; More, T. **Benefits from urban open space and recreational parks: a case study.** Journal of Northeastern Agriculture Economic Council. 6(1): 13-20; 1982.

Halverson, H. G.; Corbett, E. S.; Heisler, G. M. **USDA studies urban forests and municipal watersheds.** Science in Agriculture. 30(2): 13; 1983.
Summarizes results emerging from the joint and cooperative research between the USDA Forest Service's Northeastern Forest Experiment Station and Penn State. The mission to evaluate forest resource benefits includes studies on: forests examined as sound absorbers, how forests aid home heating and cooling, how timber harvesting aids water resource, and forests and acid rain.

Halverson, Howard G. **Cycling of materials from atmospheric deposition in urban forest ecosystems.** In: Proceedings, national acid precipitation assessment program; 1983 February 21-25; Raleigh, NC. Raleigh, NC: North Carolina State University; 1983: A5, 21-26.
Examines the mediating effects of one type of terrestrial ecosystem, the urban forest, on water quality. Specifically, efforts have been focused on tree surfaces and their impact on throughfall and stemflow chemistry. The impact of other common urban surfaces on water quality is also being investigated.

Halverson, Howard G.; DeWalle, David R.; Sharpe, William E. **Seasonal variations of precipitation, stemflow, and throughfall chemistry in a suburban area.** In: Proceedings, 2nd national urban forestry conference; 1982 October 10-14; Cincinnati, OH. Washington, DC: American Forestry Association; 1983: 352. Poster session abstract.

Hanna, C. Mark; Lynch, J. A.; Corbett, E. S. **Watershed responses and stormflow chemistry changes following precipitation.** Res. Briefs. 16(1): 15-16; 1983.

Hansen, Bruce G.; Reynolds, Hugh W. **The economics of System 6 processing of standard-size blanks.** NE-INF-47-83. Broomall, PA: U.S. Department of

Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 4 p.

Presents System 6, needed raw material, product outputs, and yields. Discusses the economics to show the product costs to potential producers who wish to use the blanks internally, and the investment potential (IRR and NPV) to potential producers who wish to sell blanks.

Harrison, Richard G.; Wintermeyer, Stephen F.; ODell, Thomas M. **Patterns of genetic variation within and among gypsy moth, Lymantria dispar (Lepidoptera: Lymantriidae), populations.** Annals of the Entomological Society of America. 76(4): 652-656; 1983.

Based on analysis of allozyme variation at 20 loci, gypsy moth populations in the United States exhibit extremely low levels of genetic variability compared with European populations. The loss of variability is suggested to be a consequence of the population bottleneck that accompanied the introduction of the moth into North America. A single collection of gypsy moths from Japan not only exhibits high levels of variability but also is genetically distinct from European and North American populations.

Harrje, David T.; Buckley, Charles E.; Heisler, Gordon M. **Building energy reductions: windbreak optimization.** Proceedings of the American Society of Civil Engineers. 108: 143-154; 1982.

Hayslett, Homer T., Jr.; Solomon, Dale S. **A matrix model for predicting foliage weight of trees by age classes.** Mathematical Biosciences. 67: 113-122; 1983.

A Leslie-type matrix has been developed to model the annual growth of foliage on individual trees for any species that retains its foliage for more than 1 year. Although the model is a general one, applicable to any species that has age classes of foliage, it is developed with occasional references to balsam fir. For a data set of 66 dominant and codominant balsam fir trees, the model predicted the weights of the first three age classes of foliage accurately (less than 10 percent error) over a 6-year period. There was a 23 percent error for all age classes combined.

Healy, Bill; Nenno, Sam. **Winter feeding—some food for thought.** Turkey Call. 10(5): 16-18; 1983.

Sportsmen often believe that turkeys must be artificially fed during winter. Feeders may help some birds, but experience has shown that direct feeding has no effect on populations. Individual landowners can manage turkey habitat, but the results are often difficult to assess because of the turkey's large home range. Habitat conditions are improving on public forests in the Northeast, because timber and wildlife activities are well coordinated and the forests are growing older. Direct management of spring seeps, which are key winter feeding areas, is being tried on the Monongahela National Forest. Maintaining turkey populations in the Northeast will depend on the interactions among individual landowners, public land managers, population inventories, and hunting regulations.

Healy, William M.; Nenno, Edward S. **Minimum maintenance versus intensive management of clearing for wild turkeys.** Wildlife Society Bulletin. 11(2): 113-120; 1983.

Clearings are managed for wild turkeys in most eastern states, and we evaluated these practices and the relative values of clearings and young clearcuts. We found that old fields and annually maintained grass/forb communities provided the same benefits for poults as clearings managed by traditional agricultural methods. Poults found more to eat in clearings than in 2-year-old clearcuts, but excellent forest sites (SI 80) produced brood habitat both in clearings, clearcuts, and closed-canopy forest stands. Fair sites (SI 65) produced brood habitat only in clearings. We recommend managing clearings by the simplest method that maintains the herbaceous community.

Healy, William M.; Pack, James C. **Managing seeps for wild turkeys in northern hardwood forest types in West Virginia.** In: Yahner, Richard H., ed. Transactions of the Northeast Section, The Wildlife Society: 40th Northeast Fish and Wildlife Conference; 1983 May 15-18; West Dover, VT. [Publisher unknown];1983: 9-18.

Seeps are important winter feeding areas for wild turkeys. Thinning around seeps increased herbaceous ground cover, average tree diameter, and relative dominance of mast-producing trees. Where white-tailed deer were abundant, clearcutting produced savannah-like openings characteristic of turkey brood range. Where deer were less numerous, 3-year-old clearings were regenerating but were dominated by blackberries. Seeps on southern aspects and lower slopes should be managed as winter feeding areas for turkeys. The choice of treatment will depend on the condition of the surrounding forest and abundance of deer.

Heisler, Gordon, M. **Models of tree shade patterns as tools for designing tree arrangements to save energy.** In: Proceedings, 2nd national urban forestry conference; 1982 October 10-14; Cincinnati, OH. Washington, DC: American Forestry Association; 1983: 351. Poster session abstract.

Helvey, J. D.; Hubbard, John; DeWalle, David R. **Time trends in pH and specific conductance of streamflow from an undisturbed watershed in the central Appalachians.** In: Proceedings, Canadian Hydrology Symposium; 1982 June 14-15; Fredricton, NB. NRCC 20548. Fredricton, NB: National Research Council of Canada, Associate Committee on Hydrology; 1982: 637-651.

A test for a trend in stream pH between 1951 and 1978 was inconclusive because of problems associated with instrument changes in 1966 and 1975. However, the pH of the stream has changed very little, if any, during the past 14 years. Average annual specific conductance has increased significantly since 1968, but the cause is uncertain. Precipitation acidity may be leaching increasing amounts of cations, especially calcium, from the soil matrix.

Helvey, J. D.; Kochenderfer, J. N. **Effects of acid precipitation on nutrient cycling and weathering of minerals in the Central Appalachians.** In: National acid precipitation assessment program effects; research review. [Date of meeting unknown.] Raleigh, NC. Raleigh, NC: North Carolina State University: 47-54; 1983.

Because the Central Appalachians are the first barrier to many storms moving from west to east over highly industrialized areas of the Midwest, atmospheric pollutants from the Midwest have a high probability of being deposited in this area. We need to monitor acid precipitation and the chemical characteristics of streamflow from undisturbed watersheds, especially those where historical records of stream chemistry are available. These watersheds will provide an early warning if and when acid precipitation begins to overwhelm the buffering capacity of the system. If timber harvest significantly reduces watershed buffering capacity, management plans might have to be altered.

Helvey, J. D.; Kochenderfer, J. N. **Effects of acid precipitation on nutrient cycling and weathering of minerals in the Central Appalachians.** In: National acid precipitation assessment program effects; research review. Raleigh, NC; Raleigh, NC: North Carolina State University: 2-3; 1983. Abstract.
See previous entry.

Helvey, J. D.; Patric, J. H. **Sampling accuracy of pit vs. standard rain gages on the Fernow Experimental Forest.** Water Resources Bulletin. 19(1): 87-89; 1983.
Catch in standard (unshielded) rain gages exposed 3 feet above the land surface was compared with catch in pit (buried) gages exposed 1 inch above the land surface. These tests confirmed that catch in standard gages underestimates point rainfall in forest openings, as well as in conventional weather stations. Pit gages caught significantly (P=0.05) more rain than did standard gages at each of four locations tested. Catch increases ranged from 2.3 to 3.4 percent.

Herrick, Owen W. **Estimating benefits from whole-tree chipping as a logging innovation in northern U.S. forests.** Forest Products Journal. 32(11/12): 57-60; 1983.
Two supply schedules were estimated for pulpwood production quantities and prices—with and without adoption of whole-tree chipping technology. Whole-tree chipping in 1979 created benefits equal to a 2 percent cost reduction spread across the entire hardwood pulpwood supply system.

Herrick, Owen W. **Estimating innovation benefits: Whole-tree chipping in Northern U.S. forests.** In: America's hardwood forests--opportunities unlimited. Proceedings, 1982 Convention of the Society of American Foresters; 1982 September 19-22; Cincinnati, OH. Washington, DC: Society of American foresters; 1983: 245-247.
Discusses the link between research and its application that can help direct resources for research and development toward innovations that will do most to improve society's productivity, well-being, or economic status.

Hilt, Donald E. **Individual tree diameter growth model for managed, even-aged, upland oak stands.** Res. Pap. NE-533. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 15 p.
A distance-independent, individual-tree diameter growth model was developed for managed, even-aged, upland oak stands. The 5-year basal-area growth of individual trees is first modeled as a function of d.b.h. squared for given stands. Parameters from these models are then modeled as a function of mean stand diameter, percent stocking of the stand, and site index. A stochastic option for the overall model also was developed. Tests on data from managed stands revealed that the model performed well.

Hilt, Donald E.; Rast, E. D.; Bailey, H. **Predicting diameters inside bark for 10 important hardwood species.** Res. Pap. NE-531. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 7 p.
General models for predicting DIB/DOB ratios up the stem, applicable over wide geographic areas, are developed for 10 important hardwood species. Results indicate that the ratios either decrease or remain constant up the stem. Methods for adjusting the general models to local conditions are presented. The prediction models can be used in conjuncion with optical dendrometer measurements or stem taper equations to convert outside bark diameters to inside bark diameters.

Hornbeck, J. W. **Book review—Acid rain: An issue in Canadian-American relations by J. E. Carroll.** Journal of Forestry. 81(4): 248; 1983.
This book is discussed in terms of its interest and value to the forestry profession.

Hornbeck, James. **Review of "Structure and function of northern coniferous forests,"** T. Persson, ed. Environmental Education and Information. 2(4): 328-329; 1982.

Hornbeck, J. W.; Martin, C. W.; Bloxam, R. M.; Munn, R. E.; Likens, G. E.; Weisman, B. **Relationships of storm type and trajectory to precipitation chemistry.** In: Acid precipitation--Abstracts. A technical symposium on acid rain transport and transportation phenomena; 1983 September 21-23; Burlington, VT. Burlington, VT: University of Vermont; 1983.

Hornbeck, James W.; Kropelin, William K. **Estimating biomass and nutrient removal from a northern hardwood harvest.** Journal of Forestry. 81(5): 287-288, 332; 1983.
We compared actual removals of biomass and nutrients from a whole-tree harvest with estimates made from biomass equations and nutrient data in the literature. The estimated values from the literature were suitable for assessing impacts of nutrient removals, but they overestimated biomass removals by an average of 19 percent.

Hornbeck, James W.; Peterson, Florence; Edwards, Nelson T. **Effects of whole-tree harvesting on soil carbon transfer.** Bulletin of the Ecological Society of America. 64(2): 189; 1983. Abstract.

Horsley, S. B. **Interference with desirable northern hardwood regeneration by herbaceous and woody plants.** In: Finley, J.; Cochran, R. S.; Grace, J. R., eds. Regenerating hardwood stands: Proceedings of a symposium; 1983 March 15-16; University Park, PA. University Park, PA: The Pennsylvania State University; 1983: 81-93.

Interference phenomena play an important role in regeneration of desirable northern hardwood regeneration in Pennsylvania. Allelopathic interference by herbaceous weeds is the primary reason orchard stands and savannahs fail to regenerate. Studies of the independent effects of weeds and deer in shelterwood cut Allegheny hardwood stands demonstrate that under appropriate conditions, each has substantial interfering effects with desirable regeneration. Understories of striped maple and beech frequently exclude desirable species of reproduction. We are presently able to take remedial action in all of these situations with herbicides; however, the challenge of the future is to learn how interference phenomena work, so that they can be avoided.

Horsley, S. B.; Marquis, D. A. **Interference by weeds and deer with Allegheny hardwood reproduction.** Canadian Journal of Forest Research. 13(1): 61-69; 1983.

Deer browsing and interference from forest weeds, particularly hayscented fern, New York fern, and short husk grass, influence the establishment of Allegheny hardwood reproduction. We determined the independent interference by deer and weeds after a seed cut and a removal cut in a two-cut shelterwood sequence.

Horsley, Stephen B. **Competitive and allelopathic interference in Allegheny Plateau forests.** In: Proceedings, North American symposium on allelopathy, program, abstracts and participants; 1982 November 14-17; Champagne-Urbana, IL. Champagne-Urbana, IL: University of Illinois; 1983: 14. Abstract.

Horsley, Stephen B.; Bjorkbom, John C. **Herbicide treatment of striped maple and beech in Allegheny hardwood stands.** Forest Science. 29(1): 103-112; 1983.

Three small-plot experiments evaluated herbicides for killing striped maple and beech. Glyphosate, applied to striped maple or beech in uncut stands, produced a high degree of kill. Applications of 2,4,5-T in an uncut stand killed at least 97 percent of the striped maple, and did not interfere with subsequent development of desirable species of advance reproduction. Bromacil, 5 percent picloram pellets, and 10 percent picloram pellets were applied to striped maple in a 12-year-old clearcut. About 90 percent of the striped maple were killed with all rates of bromacil, rates of 6.72 kg/ha a.i. or more of 5 percent picloram pellets, and 8.96 kg/ha a.i. or more of 10 percent picloram pellets. Survival and height growth of white ash seedlings subsequently planted on the site were not significantly reduced by any rate of application of any of the herbicides.

Houseweart, Mark W.; Jennings, Daniel T.; Welty, Celeste; Southard, Susan G. **Progeny production by Trichogramma minutum (Hymenoptera: Trichogrammatidae) utilizing eggs of Choristoneura fumiferana (Lepidoptera: Tortricidae) and Sitotroga cerealella (Lepidoptera: Gelechiidae).** The Canadian Entomologist. 115(10): 1245-1252; 1983.

Mean daily progeny production by Trichogramma minutum ("Maine strain") was 15.2 in Choristoneura fumiferana and 10.9 in Sitotroga cerealella eggs. Total progeny production was higher in S. cerealella, but not significantly different from that of C. fumiferana eggs. Significantly more eggs were deposited by T. minutum the first day than in subsequent days regardless of host. We found no significant relationship between progeny produced by females and the day of male death as previously reported. Ratio of females: males decreased significantly with increasing age and oviposition activity of the mother. The oviposition period spanned 68 percent of the female's life span when S. cerealella eggs were available; whereas females spent significantly less time (60 percent) ovipositing in C. fumiferana eggs.

Houseweart, Mark W.; Southard, Susan G.; Jennings, Daniel T. **Availability and acceptability of spruce budworm eggs to parasitism by the egg parasitoid, Trichogramma minutum Riley (Hymenoptera: Trichogrammatidae).** The Canadian Entomologist. 114: 657-666; 1982.

Spruce budworm egg deposition spanned 27 days during both 1979 and 1980. The egg deposition curve is essentially a normal bell-shaped distribution with a slight skew to the right. Spruce budworm eggs are most acceptable to Trichogramma minutum for successful parasitism during the earlier stages of host-egg development. Parasitism rates at 2 different temperatures (21°C and 27°C) were significantly greater for 1- to 3-day-old eggs than for 6- to 8-day-old spruce budworm eggs. Major reduction in host-egg acceptability occurred after the 5th day at 21°C and after the 4th day at 27°C.

Houston, D. R. **Effects of parasitism by Nematogonum ferrugineum (Gonatorrhodiella highlei) on pathogenicity of Nectria coccinea var. faginata and Nectria galligena.** In: Proceedings, I.U.F.R.O. beech bark disease working party conference; 1982 September 26 - October 28; Hamden, CT. Gen. Tech. Rep. WO-37. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 109-114.

The mycoparasite Nematogonum ferrugineum (Gonatorrhodiella highlei) was associated commonly with Nectria galligena cankers on Betula lenta in New Hampshire and Connecticut, and was isolated from N. galligena cankers on Juglans nigra from Virginia. In inoculation trials, parasitized isolates of N. coccinea var. faginata and N. galligena spread more slowly than nonparasitized isolates in bark and cambial tissues; parasitized N. coccinea var. faginata produced fewer perithecia.

Houston, D. R. **Influence of lichen species on colonization of Fagus grandifolia by Cryptococcus fagisuga: preliminary observations from certain Nova Scotian forests.** In: Proceedings, I.U.F.R.O. beech bark disease working party conference; 1982 September 26 - October 28; Hamden, CT. Gen. Tech. Rep. WO-37. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 105-108.

Some crustose lichens that colonize the stems of beech trees favor infestation by Cryptococcus fagisuga, while others do not favor infestation. A predominance of species unsuited for infestation seems to be a reason why trees growing on some sites in Nova Scotia are remarkably free of beech bark disease.

Houston, David R. **American beech resistance to Cryptococcus fagisuga**. In: Proceedings, I.U.F.R.O. beech bark disease working party conference; 1982 September 26 - October 8; Hamden, CT. Gen. Tech. Rep. WO-37. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 38-42.
American beech trees that were free of beech bark disease in forests long-affected by beech bark disease were challenged with Cryptococcus fagisuga using the 'foam' technique. Trees were resistant: no insects reached maturity. In Nova Scotia, 12 to 15 disease-free trees per hectare occurred in the stands examined. Many of these trees occurred in groups.

Houston, David R. **Diebacks and declines of urban trees.** In: Proceedings, International symposium on urban horticulture; 1983 June; New York, NY. New York, NY: New York Botanical Garden, Institute of Urban Horticulture; 1983.

Houston, David R. **American beech resistance to Cryptococcus fagisuga**. In: Proceedings, I.U.F.R.O. beech bark disease working party conference; 1982 September 26 - October 8; Hamden, CT. Gen. Tech. Rep. WO-37. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 38-42.
American beech trees that were free of beech bark disease in forests long-affected by beech bark disease were challenged with Cryptococcus fagisuga using the 'foam' technique. Trees were resistant: no insects reached maturity. In Nova Scotia, 12 to 15 disease-free trees per hectare occurred in the stands examined. Many of these trees occurred in groups.

Houston, David R. **Basic concepts of dieback-declines**. In: Urban and suburban trees: pest problems, needs, prospects, and solutions; 1982 April 18-20; East Lansing, MI. East Lansing, MI: Michigan State University; 1982: 57-60.
Diebacks and declines are complex in cause and effect. They are triggered by the predisposing effects of biotic or abiotic environmental stresses, and culminate in attacks, often lethal, by organisms of secondary action. Dieback, a common response to the effects of stress, reduces energy demands and serves as a survival mechanism. With abatement of stress, trees often recover if they have not been lethally invaded by organisms of secondary action. Control of dieback-decline diseases usually focuses on preventing or reducing effects of stress rather than on the mortality-causing organisms.

Houston, David R. **Characteristics of stands susceptible and resistant to gypsy moth defoliation.** In: Proceedings, forest-defoliator—host interactions: A comparison between gypsy moth and spruce budworms; 1983 April 5-7; New Haven, CT. Gen. Tech. Rep. NE-85. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983: 125.
Site conditions strongly influence where gypsy moth defoliation will occur. The often defoliated or susceptible forests characteristically grow on dry sites such as rocky ridges or deep sands. Resistant forests where defoliation is rare characteristically grow on relatively undisturbed sites with well-drained, deep loam soils where moisture is not limiting.

Houston, David R. **Developments in biological control of beech bark disease.** In: Proceedings, 10th international congress of plant protection 1983: Plant protection for human welfare; 1983 November 20-25; Brighton, England. Surrey, England: Forestry Commission; 1983: 1035-1041.
Beech bark disease results when bark of Fagus spp. is altered by the beech scale, and then invaded and killed by fungi of the genus Nectris. Potentially useful biological control factors or agents exist for both causal agents. The hosts, especialy F. grandifolia, exhibit resistance to scale, and some bark epiphytes provide significant levels of protection against the insect. Less clear are the effects of several invertebrate predators and an entomogenous fungus often found in old scale colonies. Nectria spp. are parasitized by a mycoparasite, and other fungi are suspected competitors or antagonists. The significance of these microbial agents is under investigation.

Houston, David R. **Diebacks and declines of urban trees.** In: Proceedings, International symposium on urban horticulture; 1983 June; New York, NY. New York, NY: New York Botanical Garden, Institute of Urban Horticulture; 1983.

Houston, David R. **Diseases, insects, and forest diversity: Silvicultural implications.** In: Natural diversity in forest ecosystems: Proceedings of the workshop; 1982 November 29-December 1; Athens, GA. Athens, GA: University of Georgia; 1983: 235-249.
How diverse a forest is in species composition and structure may determine both its susceptibility and its vulnerability to diseases and insects. Usually, forests low in diversity suffer more serious losses than more diverse forests. But the effects are influenced by such attributes of the pest organisms as their host specificity, means of dissemination, and whether they cause mortality. Insects and diseases, especially those that kill trees, can influence forest diversity in many ways. Although it seems feasible to reduce losses to diseases and insects by regulating forest diversity through silviculture, few trials have been attempted, at least in the East. For many insects and diseases, genetic diversity offers promise that resistant trees can be selected and developed. But this process should be undertaken with the understanding that, because pests also possess intraspecific diversity, increases in host resistance may increase pest virulence.

Houston, David R.; O'Brien, James T. **Beech bark disease.** For. Insect & Dis. Leafl. 75. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983. 8 p.
Beech bark disease causes significant mortality and defect in American beech. The disease results when bark, attacked and altered by the beech scale is invaded and killed by fungi, primarily Nectria coccinea var. faginata Lohman, Watson, and Ayers, and sometimes N. galligena Bres.

Hoyle, M. C. **Automatic mat watering for containerized hardwood seedlings.** In: Thielges, Bart A., ed. Proceedings, 7th North American forest biology workshop; 1982 July 26-28; Lexington, KY. Lexington, KY: University of Kentucky; 1983: 281-286.

Hoyle, M. C. **Hydroponic rooting of birch: I. Solution, leaf age, and position effects.** In: Thielges, Bart A., ed. Proceedings, 7th North American forest biology workshop: 1982 July 26-28; Lexington, KY. Lexington, KY: University of Kentucky; 1983: 237-241.

Greenwood cuttings from paper birch seedlings were successfully rooted (95 percent) in dilute (10 percent full strength) Hoagland's solution #2 (H2). Rooting percentage in H2 was 3 to 4 times greater than in water. Branch cuttings rooted faster and to a higher percentage than stem cuttings. Leaf age was influential: Old leaves promoted rooting; young leaves inhibited rooting. American sweetgum rooted well in 10 percent H2 also.

Huyler, Neil K. **The economics of open-pan evaporators.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 79-82.

To evaluate the total annual cost of production fully, both noncash items, such as interest on capital and depreciation on building and equipment, and cash items, such as labor, fuel, electricity, taxes, insurance, and miscellaneous expenses, should be combined. The sum is the true total annual cost of production.

Huyler, Neil K. **Sap collection systems.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 71-78.

Discusses the economics of the plastic tubing system versus the bucket system, considering factors such as investment, depreciation, interest, operating expenses, taxes, and income.

Janerette, Carol A. **The influence of seedling age at the time of inoculation on mycorrhizae synthesis.** In: Proceedings, 5th North American conference on mycorrhizae; 1981 August 16-21; Quebec, PQ. Quebec, PQ: University of Laval; 1981. Abstract.

Janerette, Carol A. **In vitro development of sclerotia by Pisolithus tinctorius.** In: Proceedings, 5th North American conference on mycorrhizae; 1981 August 16-21; Quebec, PQ. Quebec, PQ: University of Laval; 1981. Abstract.

Jennings, D. T.; Houseweart, M. W. **Field attractiveness of (E)- and (Z)-11-tetradecenal pheromone blends to male spruce budworm moths, Choristoneura fumiferana (Clemens).** Journal of Chemical Ecology. 9(9): 1327-1332; 1983.

E:Z blends of (E)-11-tetradecenal were field tested (three experiments) for their attractiveness to male spruce budworm moths in northern Maine. Blends of 92.5 to 99 percent E isomer caught the most moths (three experiments); blend 95 percent E had the highest cumulative catch throughout two experiments. Rates of catch per hour for the four most attractive blends (92.5 to 99 percent E) showed highly variable responses among experiments; however, similarities were noted for rates of catch within the same experiment. For all experiments and observation hours, blend 95 percent E had the highest mean rate of catch.

Jennings, Daniel T.; Crawford, Hewlette S. **Pine siskin preys on egg masses of the spruce budworm, Choristoneura fumiferana (Lepidoptera: Tortricidae).** The Canadian Entomologist. 115:439-440; 1983.

A male pine siskin consumed more than 2,100 eggs of the spruce budworm. The importance of bird predation on spruce budworm eggs is not known.

Jennings, Daniel T.; Hacker, Susanne C.; Knight, Fred B.; McKnight, Melvin E. **Spruce budworms bibliography.** Supplement 2. Misc. Rep. 268. Orono, ME: Maine Agricultural Experiment Station; 1982. 75 p.

Jennings, Daniel T.; Hacker, Susanne C.; Knight, Fred B.; McKnight, Melvin E. **Spruce budworms bibliography.** Supplement 3. Misc. Rep. 292. Orono, ME: Maine Agricultural Experiment Station; 1983. 59 p.

Jennings, Daniel T.; Houseweart, Mark W. **Parasitism of spruce budworm (Lepidoptera: Tortricidae) eggs by Trichogramma minutum and absence of overwintering parasitoids.** Environmental Entomology. 12: 535-540; 1983.

Egg masses of the spruce budworm were sampled in February and March for overwintering Trichogramma minutum Riley at five locations in central Maine. Egg mass densities and the percentage of parasitized eggs were generally greater in upper and middle crown levels than in the lower crown of balsam fir. Significantly more parasitized egg masses were "chewed" than partially parasitized or normal, eclosed egg masses. Parasitized eggs contained only cadavers of T. minutum pupae; thus, we found no evidence that this species or any other egg parasite overwinters in eggs of the spruce budworm.

Jennings, Daniel T.; Houseweart, Mark W. **Sticky-board trap for measuring dispersal of spruce budworm larvae.** Res. Pap. NE-526. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 7 p.

Describes a new sticky-board trap for measuring early-larval dispersal of the spruce budworm, and evaluates trap-board color and screened versus unscreened traps. Dispersing spruce budworm larvae showed no preference for trap color; fewer nontarget arthropods were caught on dark-colored than on light-colored traps. Screened traps caught significantly more spruce budworm larvae than unscreened traps, and they were easier to examine.

Jennings, Daniel T.; Houseweart, Mark W.; Dimond, John B. **Dispersal of losses of early-instar spruce budworm (Lepidoptera: Tortricidae) larvae in strip clearcut and dense spruce-fir forests of Maine.** Environmental Entomology. 12(6): 1787-1792; 1983.

Strip clearcutting contributed to dispersal losses of early-instar larvae of the spruce budworm. Significantly more L_1 larvae were trapped in uncut residual strips of strip clearcuts than in dense stands. Significantly more L_2 larvae were trapped in cut strips than in resid-

ual strips or in dense stands. Consistently more L_2 larvae were caught than L_1 larvae. Mean percentages of $L_1 + L_2$ larvae trapped represented small fractions (1.4-4.0%) of initial egg populations. Proportionately more larvae were trapped in strip clearcuts (uncut residuals + cut strips) than in dense stands. Estimated combined losses ($L_1 + L_2$) were 1.4 million larvae per hectare for dense stands and 2.9 million larvae per hectare for strip clearcuts.

Jennings, Daniel T.; Stevens, Robert E. **Southwestern pine tip moth.** For. Insect & Dis. Leafl. 58. Washington, DC: U.S. Department of Agriculture, Forest Service; 1982. 7 p.

Describes tree hosts, evidences of infestation, damage, life stages, life history, habits and control of the southwestern pine tip moth.

Jensen, K. F. **Growth relationships in silver maple seedlings fumigated with O_3 and SO_2.** Canadian Journal of Forest Research. 13(2): 298-302; 1983.

Growth analysis was used to measure the impact of low levels of ozone, alone and with sulfur dioxide, on the growth of silver maple seedlings. The seedlings were fumigated for up to 60 consecutive days with either 0.05, 0.1, or 0.2 ppm ozone, alone and with 0.1 ppm SO_2 for 12 hours per day. Dry weight and leaf area development curves were calculated from data collected at 10-day intervals throughout the study. Growth analysis variables were calculated from these curves.

Jensen, Keith F. **Air pollution and vegetative growth of forest trees.** In: Interaction between forest ecosystems and pollutants. Part I. Academy of Sciences of the Estonian Socialist Soviet Republic; Tallinn Botanical Gardens, Botanical Institute of the Academy of Sciences of The U.S.S.R., Tallinn; 1982: 127-131.

Jensen, Keith F. **Air pollution symptom and injury to shade trees.** In: Proceedings, Society of Municipal Arborists; 1982 October 6-7; Dayton, OH. publisher unknown ; 1982: 6 p.

Air pollution, an important environmental stress factor, has received major attention only in the last two decades. Air-pollution problems have arisen because of man's accelerating appetite for energy to travel and to produce industrial goods. This energy is generated mainly by fossil fuel combustion, the combustion by-products being deposited into the atmosphere at a rate far greater than that at which they are removed by natural processes. As the pollutants accumulate in the atmosphere, they may reach concentrations that are harmful to growth processes in vegetation and, if the concentration becomes high enough, cause leaf necrosis or plant death.

Jensen, Keith F. **Atmospheric pollutants reduce the growth of yellow-poplar seedlings.** Misc. Publ. No. 162. Lexington, KY: Botanical Society of America. 1982: 69. Abstract.

One-year-old yellow-poplars were treated with clean air or with 0.1 ppm O_3 alone or in combination with either 0.2 ppm SO_2 or 0.2 ppm NO_2 for 12 or 24 hours per week for 20 weeks. Ten seedlings were harvested from each treatment at 4-week intervals to construct growth curves. Significant differences were found among the curves for leaf area, leaf weight, stem plus leaf weight, and total seedling weight for seedlings in both treatments and for height growth in the seedlings fumigated 24 hours per week. Relative growth analysis parameters were calculated from the curves. Relative growth rate decreased with time and with all the fumigation treatments. Seedlings fumigated with ozone and NO_2 had the lowest relative growth rate.

Jensen, Keith F. **Effects of light, water and pollutant stresses on growth of yellow-poplar seedlings.** Phytopathology. 73(5): 819; 1983.

One-year-old yellow-poplar seedlings were grown in outdoor chambers in either full sunlight or under 30 percent shade cloth. They were watered either daily, twice a week, or once a week. Seedlings from each of these six treatment combinations were exposed to one of four fumigation treatments: control, 0.1 ppm O_3, 0.2 ppm SO_2, or both 0.1 ppm O_3 and 0.2 ppm SO_2. Fumigations ran for 12 hours a day 2 days a week. Ten seedlings were harvested from each of the 24 treatment combinations at 4-week intervals to construct leaf area, leaf weight, and total seedling weight growth curves. Analysis of covariance showed significant differences among the growth curves for all three variables. Relative growth variables were calculated from the curves.

Jensen, Keith F. **Impact of ozone on yellow-poplar seedlings stressed with air pollutants.** American Journal of Botany. 70(5): 86; 1983.

One-year-old yellow-poplar seedlings were stressed with air pollutants by fumigating them with either 0.05 ppm ozone, 0.1 ppm SO_2, or both 0.05 ppm ozone and 0.1 ppm SO_2 for 12 hours per day 7 days a week. The seedlings were than fumigated for 6 hours 1 day a week with 0.2 ppm ozone. The treatments lasted for 20 weeks. Eight seedlings were harvested from each treatment at 4-week intervals throughout the study. Growth response curves for height, leaf area, leaf weight, and total weight were developed and analyses of variance were performed on the data.

Ketchledge, E. H.; Leonard, R. E. **Ecological stability of Adirondack Mountain summit vegetation.** Adirondack. 46 (10): 22-23; 1982.

Kingsley, Neal P. **Who owns Maine's woodlots?** In: Howlett, Duncan, ed. The small woodland owner in Maine: Proceedings of a symposium; 1982 March 24; Orono, ME. Orono, ME: University of Maine; 1982: 22-34.

Using the results of a national land ownership canvass conducted by the USDA Economic Research Service and the results of canvasses conducted by Northeastern Forest Experiment Station in other Northeastern States, we developed a picture of the ownership of Maine's woodlots. This picture shows two distinct ownership patterns in the state. In the north, ownership is predominantly industrial or associated with industry ownerships. In the south, the ownership pattern is more typical of the surrounding states. Ownership size and the attitudes of owners in this region are typical of those in New Hampshire.

Kingsley, Neal P. **Private forests and recreation.** In: Proceedings, New England Section 63rd annual winter meeting: the future of forests in New England and Eastern Canada; 1983 March 9-11; Burlington, VT. SAF 83-05. Burlington, VT: New England Section, Society of American Foresters; 1983: 79-81.

Discusses the results of the northeastern forest landowner studies as they relate to recreational use of private lands. These studies show that 8.3 million acres in the Northeast are held primarily for recreation. This compares to only 7.6 million acres for timber production. Seventy-five percent of the private forest land in northern New England is available to the general public for some form of recreation compared with only 48 percent in southern New England. Most private owners do not prohibit all public use of their land but they do place restrictions and controls on that use.

Knop, Nancy F.; Hoy, Marjorie A.; Montgomery, Michael E. **Altered hatch sequence of males and females from unchilled eggs of a "non-diapause" gypsy moth strain (Lepidoptera: Lymantriidae).** New York Entomological Society. 90(2): 82-86; 1982.

Larvae hatching from unchilled egg masses of a "non-diapause" gypsy moth strain were reared to determine the hatch sequence of males and females. Males tended to hatch from non-diapause egg masses before females, which is the reverse of the hatching sequence of chilled wild egg masses. The reversed hatch sequence is not due to a skewed sex ratio or to differential mortality.

Kochenderfer, J. N.; Wendel, G. W. **Effects of fertilization and aspect on leaf biomass, leaf size, and leaf area index in central Appalachian hardwood stands.** In: Muller, Robert, ed. Proceedings, 4th central hardwood forest conference; 1982 November 8-10; Lexington, KY. Lexington, KY: University of Kentucky; 1982: 102-112.

Leaf biomass production and leaf area indexes were determined on four small hardwood-forested watersheds in West virginia. Leaf area predictive equations were developed from leaf parameters for red and chestnut oak, red maple, and sugar maple. One of each watershed pair was fertilized with 336 kg nitrogen/ha and 224 kg phosphorous/ha. Leaf biomass production was not significantly related to fertilization or watershed aspect, but there was a significant difference among years. The best predictor of leaf area was the product of maximum width and maximum leaf length with R^2 values between 0.87 and 0.93. R^2 values for the correlation between leaf area and leaf weight ranged from 0.61 to 0.79.

Kochenderfer, J. N.; Wendel, G. W. **Plant succession and hydrologic recovery on a deforested and herbicided watershed.** Forest Science. 29(3): 545-558; 1983.

The recovery of a 60-acre watershed nearly barren of vegetation for several years with herbicides was monitored. Increases in water yield returned rapidly to pretreatment levels. Aboveground biomass increased as the woody vegetation became dominant, averaging 14.7 oven-dry tons per acre at the end of 10 growing seasons. There was a close relationship between biomass, height, percent ground cover, and increases in growing-season streamflow.

Lamson, Neil I. **Precommercial thinning increases diameter growth of Appalachian hardwood stump sprouts.** Southern Journal of Applied Forestry. 7(2): 93-97; 1983.

In West Virginia, crop trees were selected from 7- or 12-year-old yellow-poplar, basswood, red maple, black cherry, and nothern red oak stump sprouts. Four treatments were evaluated: (1) control, (2) thinnings, (3) pruning, and (4) thinning plus pruning. Five years after treatment the diameter (d.b.h.) growth of thinned sprouts was 1.5 times greater than that of control sprouts. Pruning did not cause a significant decrease in 5-year d.b.h. growth. Height growth was not affected by the treatments. Most of the epicormic branches produced by pruning were dead 5 years after treatment. Natural pruning was reduced by thinning; the average clear bole length of thinned sprouts was about 2 feet shorter than that of the control sprouts. Survival was nearly 100 percent.

Lamson, Neil I.; Miller, Gary W. **Logging damage to dominant and codominant residual stems in thinned West Virginia cherry-maple stands.** In: Muller, Robert, ed. Proceedings, 4th central hardwood forest conference; 1982 November 8-10; Lexington, KY. Lexington, KY: University of Kentucky; 1982: 32-38.

Previously unmanaged 60-year-old, even-aged stands of cherry-maple in West Virginia were thinned using the Allegheny hardwoods stocking guide. A marked cut was computed for 75, 60, and 45 percent of full stocking; no trees smaller than 17.8 cm d.b.h. were marked for commercial removal. Thinning was done with either a truck-mounted crane or a rubber-tired skidder. In stands thinned with the truck-mounted crane, 4, 2, and 5 percent of the residual dominant and codominant trees (17.8 cm d.b.h. plus) were seriously abraded (with 650 cm^2 or more of exposed sapwood) in the 75, 60, and 45 percent treatments, respectively. In thinning with the skidder, 7, 13, and 22 percent of the residual dominant and codominant trees were seriously abraded in the 75, 60, and 45 percent treatments, respectively.

LaPage, Wilbur F. **Five harmful marketing myths.** Woodall's Campground Management. 14(1): 10; 1982.

The South African camping market is in an early stage of growth. Based on U.S. history, the South African campground industry may be able to avoid certain marketing problems. One must match the interests and needs of consumers with a "market place" of camping equipment and opportunities that is diverse, attractive, convenient, imaginative, priced realistically, and distributed properly.

LaPage, Wilbur F. **Planning and research: forging a partnership for recreation's future.** In: Lieber, Stanley R.; Fesenmaier, Daniel R., eds. Recreation planning and management. State College, PA: Venture Publishing; 1983: 376-381.

LaPage, Wilbur F. **Recreation resource management for visitor satisfaction.** In: Lieber, Stanley R.; Fesenmaier, Daniel R., eds. Recreation planning and management. State College, PA: Venture Publishing; 1983: 279-285.

Recreation managers must not confuse quality and style. A high-quality recreation experience is one which meets or exceeds visitor expectations; this includes managerial interaction with visitors and maintaining specified management standards. A satisfaction monitoring system that is easy and inexpensive to administer is described.

Lautenschlager, R. A.; Crawford, H. S. **Halter-training moose.** Wildlife Society Bulletin. 11(2): 187-189; 1983.
The use of "tamed" wild animals for food habit studies has increased during the last 3 decades. This technique has been used with a variety of wild ungulates. Describes a technique for halter-training moose for food habit studies.

Lawson, H. Randy; Yost, Larry A.; Jennings, Daniel T. **Southwestern pine tip moth: notes on larval descent behavior, predators, and associated shoot borer in northern Arizona.** Southwestern Naturalist. 28: 95-97; 1983.
Mature larvae of the southwestern pine tip moth descend host tree boles between 0400 and 0700 hours. Several ant species, a spider, and a syrphid larva were observed feeding on tip moth larvae; the snakefly accepted larvae as prey in feeding tests. Young ponderosa pines are susceptible to concurrent infestations by the tip moth and the western pine-shoot borer. Infestation rates were 58 percent for E. sonomana, 73 percent for R. neomexicana, and 34 percent for both. The shoot borer prefers larger trees; the tip moth prefers smaller trees.

Leak, W. B. **Maintaining quality growth.** In: Proceedings, hardwood forest management and utilization symposium; 1982 October 25-26; Orono, ME. Misc. Rep. 279. Orono, ME: University of Maine, Maine Agricultural Experiment Station; 1983: 10-12.
Maintenance of quality growth in hardwood stands depends upon maintenance of: (1) desirable species composition, (2) tree form, and (3) high growth rates per acre and per tree.

Leak, W. B.; Tubbs, C. H. **Percent crown cover tables for applying the shelterwood system in New England.** Res. Note NE-313. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 4 p.
Provides tables for estimating residual percent crown cover, using a 10-factor prism, of three species groups: (1) sugar and red maples, yellow and paper birches; (2) white ash, white pine, red spruce, balsam fir, and hemlock; and (3) beech.

Leak, William B. **Stocking, growth, and habitat relations in New Hampshire hardwoods.** Res. Pap. NE-523. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 11 p.
Data from hardwood stands in New Hampshire substantiated the crown-width relationships used to develop the B-line (based on circular crowns) in the 1969 northern hardwood stocking guide, and produced an A-line slightly lower than the original line. Position of the A-line was unrelated to site or forest type.

Diameter growth of hardwoods on moist and dry soils declined rapidly with increasing tree diameter. On fine till, diameter growth was nearly constant over tree diameter but positively related to relative crown size. Based on diameter-growth regressions, calculations of stand growth indicated that the minimum basal area for adequate even-aged stand growth was quite low (30 to 60 square feet) and roughly constant over mean stand diameter.

Leonard, R. E.; McBride, J. M.; Conkling, P. W.; McMahon, J. L. **Ground cover changes resulting from low-level camping stress on a remote site.** Res. Pap. NE-530. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 4 p.
Reports the effects of low-level camping stress on vegetation in a remote site. South Big Garden Island in Penobscot Bay, Maine, was studied because (1) it had no prior recreational use; thus, comprehensive base line data could be obtained; and (2) the exact number of campers could be monitored throughout the study period. The continuous line-intercept method based on a single vegetation transect line was developed to monitor vegetation and ground cover changes over a 2-year period. The low-level use (an average of 50 campers/year) that was recorded did not significantly reduce the total vegetation cover but did have an effect on species composition.

Lewis, F. B. **Deposit assessment techniques for Bt.** Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; CANUSA Data Fact Sheet, 1982 May. 2 p.

Lewis, Franklin B. **Biological insecticides.** In: Proceedings, Southern conference on the gypsy moth; 1982 September 14-15; Crossmore, NC. Raleigh, NC: State of North Carolina Department of Agriculture; 1982: 58-59.

Lewis, Franklin B. **Comparison of spray tower applications of VIRIN-ENSh and GYPCHEK.** In: Ignoffo, Carlo M.; Martignoni, Mauro E.; Vaughn, James L., eds. A comparison of the U.S. (GYPCHEK) and USSR (VIRIN-ENSh) preparations of the nuclear polyhedrosis virus of the gypsy moth, Lymantria dispar: Results of research conducted under Project V-01.0705, microbiological control of insect pests, of the US/USSR joint working group on the production of substances by microbiological means. Washington, DC: American Society for Microbiology; 1983: 50-55.
In spray tower tests, the original sample of VIRIN-ENSh had lower activity than expected at the poly-inclusion-body dose tested, compared to the same GYPCHEK dosages. The activity of VIRIN-ENSh increased substantially after one passage through a U.S. strain of gypsy moth and was comparable to GYPCHEK. Although hemolytic Bacillus was present, the VIRIN-ENSh sample did not contain coliforms nor vertebrate pathogens and was not toxic nor pathogenic to mice.

Lewis, Franklin B. **Comparison of spray tower applications of VIRIN-ENSh and GYPCHEK.** In: Ignoffo, Carlo M.; Martignoni, Mauro E.; Vaughn, James L.,

eds. A comparison of the U.S. (GYPCHEK) and USSR (VIRIN ENSh) preparations of the nuclear polyhedrosis virus of the gypsy moth, Lymantria dispar: Results of research conducted under Project V-01.0705, microbiological control of insect pests, of the US/USSR joint working group on the production of substances by microbiological means. Washington, DC: American Society for Microbiology; 1983: 9. Abstract.
See previous entry.

Lewis, Franklin B. **Gypsy moth NPV research—Hamden.** In: Proceedings, 1982 National Gypsy Moth Review; 1982 December 7-9; Harrisburg, PA. Middletown, PA: Pennsylvania Department of Environmental Resour.; 1983: 124-125.
Reports major findings on gypsy moth nucleopolyhedrosis (NPV) research at the Hamden Center for Biological Control of Northeastern Forest Insects and Diseases. Major activities are centered around formulation-application-processing work, nonconventional (nonaerial) use of NPV, and internal transmission of NPV, detection, and modelling of natural and applied NPV.

Likens, G. E.; Bormann, F. H.; Pierce, R. S.; Munn, R. E. **Long-term trends in precipitation chemistry at Hubbard Brook, New Hampshire.** In: 1st international conference of the Commission on Atmospheric Chemistry and Global Pollution (CACGP); Symposium on tropospheric chemistry; 1983 August/September; Oxford, England. [Place of publication unknown]: [Publisher's name unknown]; 1983. Abstract.

Little, Robert L.; Holtzclaw, Randall D.; Martens, David. **Computer simulation of pallet production—how can it help me?** Pallet Enterprise. 2(6): 25-27; 1983.

Little, W. **Varying effects of fires in the New Jersey Pine Barrens.** In: Good, Ralph. Ecological solutions to environmental management concerns in the Pinelands National Reserve: Proceedings of a conference; 1982 April 18-21; Camden/Cherry Hill, NJ. New Brunswick, NJ: Rutgers University; 1982: 11-16.

Luppold, William G. **An economic analysis of the hardwood lumber market.** In: America's hardwood forests—opportunities unlimited. Proceedings, 1982 convention of the Society of American Foresters; 1982 September 19-22; Cincinnati, OH. Washington, DC: Society of American Foresters; 1983: 248-253.
This economic analysis attempts to isolate and quantify the factors that affect the market. The findings indicate that market fluctuations are internally generated by demanders reacting to current price. The activity of the general economy also contributes to market fluctuations which create uncertainty and limit growth. High interest and wage rates also have limited demand growth. Wage rates and stumpage price have increased production cost of suppliers, while the increases in exports have contributed to the rapid price increases in the late 1970's.

Luppold, William G. **The effect of changes in lumber and furniture prices on wood furniture manufacturers' lumber usage.** Res. Pap. NE-514. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 8 p.
Wood furniture manufacturers' demands for oak, maple, poplar, open-grain, close-grain, and all species of lumber were developed using cross-sectional, time-series estimation techniques.

Luppold, William G. **How lumber and furniture prices affect furniture manufacturers' wood usage.** Southern Lumberman. 244(3039): 70-71; 1983.
Wood furniture manufacturers' demands for oak, maple, poplar, open-grain, and close-grain lumber are estimated using cross-sectional, time series techniques. The analyses indicate that the demand for open-grain species is more price responsive than the demand for close-grain species. The calculated cross-price elasticities indicate that furniture producers do substitute species through style decisions. However, poplar lumber has a negative cross-price elasticity, indicating that it is used with, rather than substituted for, other species.

Lynch, James A.; Corbett, E. S. **Atmospheric deposition: Milford, Pennsylvania.** LW8308. University Park, PA: Institute for Research on Land and Water Resources; 1983. 72 p.

Lynch, James A.; Corbett, Edward S. **Atmospheric deposition: spatial and temporal variation in Pennsylvania 1982.** LW8313. University Park, PA: Institute for Research on Land and Water Resources; 1983. 73 p.

Lynch, James A.; Corbett, Edward S. **Atmospheric deposition: spatial and temporal variation in Pennsylvania 1982.** LW8313A. University Park, PA: Institute for Research on Land and Water Resources; 1983. 204 p.

Lynch, James A.; Corbett, Edward S. **Relationship of antecedent flow rate to storm hydrograph components.** In: International symposium on hydrometeorology; 1982 June 13-17; Denver, CO. Bethesda, MD: American Water Resources Association; 1983: 73-77.
The importance of antecedent flow rate (AFR) as an index of soil moisture conditions on a forested watershed was quantitatively evaluated, and relationships between AFR and individual storm hydrograph components were developed. The relationship between AFR and antecedent soil moisture (ASM) was also obtained.

Lynch, James A.; Corbett, Edward S.; Hanna, C. Mark. **Predicting fluctuations in non-point source pollution from forested watersheds during episodic events.** LW8302. University Park, PA: Institute for Research on Land and Water Resources; 1983. 100 p.

McBride, J. C.; Leonard, R. E. **A system for measuring ground cover changes.** Parks. 7(3): 20; 1982.
Describes a "quadropod" frame that positions a camera to record groundcover changes in 1- x 1.5-meter plots.

McDaniel, Ivan N.; Jennings, Daniel T. **Loxosceles reclusa (Araneae: Loxoscelidae) found in Maine, USA.** Journal of Medical Entomology. 20(3): 316-317; 1983.

During June 1981 a male and female Loxosceles reclusa were found in Maine, USA. Both spiders were probably transported to Maine during midwinter by a family who moved there from Oklahoma. Introduction of female spiders into domestic habitats could potentially establish breeding colonies well beyond the known natural range of L. reclusa. Numerous alleged spider-bite cases have recently been reported in Maine; however, no L. reclusa has been directly associated with these bites.

McKeever, David B.; Martens, David G. **Wood used in U.S. manufacturing industries, 1977.** Resour. Bull. FPL-12. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory; 1983; 32 p.

This study was based on a survey of wood products used by manufacturers in 1977. It found that manufacturers consumed 16.4 billion board feet of lumber, 0.9 billion board feet of logs and bolts, 4.1 billion square feet (3/8-in. basis) of plywood and veneer, 2.1 billion square feet (1/8-in. basis) of hardboard, 0.7 billion square feet (1/2-in. basis) of particleboard and medium-density fiberboard.

McManus, M. L.; Mason, C. J. **Determination of the settling velocity and its significance to larval dispersal of the gypsy moth (Lepidoptera: Lymantriidae).** Environmental Entomology. 12(1): 270-272; 1983.

The settling velocity of newly hatched gypsy moth 1st instars was determined to range from 41 to 117 cm/sec. Settling velocity is proportional to the weight of the unfed larvae, and is modified by attached silk. A 90-cm length of silk causes a 30 to 50 percent reduction in the settling velocity of larvae. The role of settling velocity in the passive dispersal of gypsy moth larvae is discussed in the context of current theories that relate the dispersability of larvae to qualitative differences among populations.

Marquis, D. A. **Ecological and historical background: Northern hardwoods.** In: Finley, J.; Cochran, R. S.; Grace, J. R., eds. Regenerating hardwood stands: Proceedings of a symposium; 1983 March 15-16; University Park, PA. University Park, PA: The Pennsylvania State University; 1983: 9-29.

The present northern hardwood--or Allegheny hardwood-forest type in Pennsylvania originated after a long period of partial cuttings in the 1800's, followed by extensive cleareuttings at the turn of the century. The history of this period of forest cutting is traced and related to the age arrangement, structure, and species composition of present stands.

Marquis, D. A. **Management strategies for successful regeneration: Northern hardwoods.** In: Finley, J.; Cochran, R. S.; Grace, J. R., eds. Regenerating hardwood stands: Proceedings of a symposium; 1983 March 15-16; University Park, PA. University Park, PA: The Pennsylvania State University; 1983: 214-238.

Factors important to regeneration in the northern hardwood forest type of Pennsylvania are summarized, and a systematic procedure for determination of the most appropriate regeneration practices in particular stands is described. Conditions suitable for both all-age and even-age management are considered, and silvicultural procedures including clearcutting, shelterwood cutting, herbicide application fertilization, fencing, and planting are all described.

Marquis, David A. **Regeneration of black cherry in the Alleghenies.** In: Proceedings, 11th annual hardwood symposium of the Hardwood Research Council; 1983 May 10-13; Cashiers, NC. Asheville, NC: Hardwood Research Council; 1983: 106-119.

Regeneration of new hardwood stands containing a desirable mixture of fast-growing, high-value species such as black cherry is made exceptionally difficult in the Alleghenies by excessive browsing by deer, allelopathic interference by understory ferns, inadequate seed production, and inadequate advance seedlings. A series of studies on the germination, survival, and growth of key species has led to a series of regeneration guidelines providing for clearcutting, shelterwood cutting, and herbicide treatment of the understory with the appropriate combination depending upon the particular stand condition present.

Marquis, David A.; Gearhart, Porter. **Cherry - Maple.** In: Silvicultural systems for the major forest types of the United States. Agric. Handb. 445. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 137-140.

Martens, David G. **Pallet mill residues in demand.** Pallet Enterprise. 2(6): 14; 1983.

Martin, A. Jeff. **Optimum tree size for products having a maximum scaling diameter.** Journal of Forestry. 81(7): 438-439; 1983.

Although most primary forest products have only minimum size requirements, some have a maximum limitation as well. For products with a maximum scaling diameter, it was found that optimum tree diameter at breast height (the diameter class with the most product volume per tree) could be easily predicted by using only the maximum scaling diameter and product length. A prediction equation and an optimum-d.b.h. table based on this equation are presented.

Martin, A. Jeff. **The taper equation: A multi-purpose tool for the forester.** The Consultant. 28(2): 42-45; 1983.

The use of a taper equation for estimating stem diameters (inside and outside bark) for given heights, heights to specified diameters, and volumes between any two points on the bole is described. Coefficients are presented for 18 eastern hardwood species. Computations are relatively simple; most hand-held calculators can do them. A computer program that uses the equation for preparing a variety of volume tables is available.

Mathews, Nancy E.; Porter, William F.; Brooks, Robert T. **Assessments of nongame habitat using Forest Service resources evaluation: A regional perspective.** In: Yahner, Richard H., ed. Transactions of

the Northeast Section, The Wildlife Society: 40th Northeast Fish and Wildlife Conference; 1983 May 15-18; West Dover, VT. Publisher unknown ; 1983: 173. Poster session abstract.

Federal legislation enacted during the 1970's mandates comprehensive management planning and assessments of renewable resources. Wildlife habitat is identified as one such renewable resource. The USDA Forest Service is attempting to integrate measures of wildlife habitat into its regional assessments of forest resources. In the Northeast, resource evaluation has been expanded to include measurements of both wildlife habitat and timber oriented variables.

Mielke, Manfred E.; Haynes, Clark; Rexrode, Charles O. **Local spread of oak wilt in northwestern West Virginia during 1970-1982. Plant Disease. 67(11): 1222-1223; 1983.**

In 1982, 41 oak wilt centers originally found in 1970-73 in northeastern West Virginia were revisited to determine the presence of oak wilt and the increase in oak mortality since the time of discovery. Fourteen centers had no dead or wilting trees. Ten centers had wilting trees, and 27 had dead or dying trees within 15.2 m of the tree that died first on the site. Neither cacodylic acid injections nor deep girdling in 1970-73 affected the subsequent incidence of mortality compared with no treatment. The average rate of increase in the 27 centers showing symptoms of oak wilt was 0.39 newly diseased trees per center per year. Total basal area per hectare was affected little by oak wilt.

Mielke, Manfred E.; Houston, David R. **Beech bark disease in West Virginia: Status and impact on the Monongahela National Forest.** In: Proceedings, I.U.F.R.O. beech bark disease working party conference; 1982 September 26 - October 8; Hamden, CT. Gen. Tech. Rep. WO-37. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 27-30.

Cryptococcus fagisuga has infested over 70,000 acres of forest in West Virginia. Beech bark disease is causing heavy mortality in two areas of the Monongahela National Forest and additional scattered mortality. In the areas most affected, per-acre losses total 1,369 board feet of sawtimber and 2.67 cords, with a potential loss of 5,697 board feet and 9.29 cords. Nectria galligena seems to be the only species of Nectria involved in the disease complex.

Montgomery, Michael E. **Biomass and nitrogen budgets during larval development of Lymantria dispar and Choristoneura fumiferana: allometric relationships.** In: Proceedings, forest-defoliator—host interactions: A comparison between gypsy moth and spruce budworms; 1983 April 5-7; New Haven, CT. Gen. Tech. Rep. NE-85. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983: 133-140.

Spruce budworm larvae had a higher relative growth rate (RGR), biomass conversion efficiency (ECI), and nitrogen utilization efficiency (NUE) than gypsy moth larvae. As both species matured, relative rates of growth and consumption and conversion efficiencies declined. The decline in rates with maturation are allometric (related to body size) and can be expressed as $y = aX^b$, where y is the rate and X is the size of the animal.

Montgomery, Michael E. **Foliage chemistry of oaks growing on sites resistant or susceptible to gypsy moth defoliation.** In: Parker, Bruce L.; Hanson, Patricia M.; Teillon, H. Brenton, eds. Proceedings, 15th annual Northeastern forest insect work conference; 1982 March 11; Portland, ME. MP 108. Burlington, VT: University of Vermont Agricultural Experiment Station; 1983: 1. Abstract.

Compares chemistry of and gypsy moth performance on foliage from Quercus rubra and Q. prinus growing on either susceptible or resistant sites. Foliage chemistry as an explanation for site susceptibility supplements other causal factors such as structural features.

Montgomery, Michael E.; Wargo, Philip M. **Ethanol and other host-derived volatiles as attractants to beetles that bore into hardwoods.** Journal of Chemical Ecology. 9(2): 181-190; 1983.

Ethanol, methanol, acetone, and acetaldehyde—chemicals identified in the inner bark of living trees—were used to bait bane traps placed in crowns of oak trees in Connecticut. Ethanol-baited traps caught more cerambycid, scolytid, and clerid beetles than unbaited traps. Buprestidae were not attracted to ethanol. Acetaldehyde and acetone were not attractive to any family. A mixture of ethanol, methanol, and acetaldehyde was no more attractive than ethanol alone. The bane traps were very effective at catching Cerambycidae and Scolytidae, but ineffective compared to sticky panels at catching Buprestidae.

More, Thomas A. **The nonusers of an urban forest interpretative center.** Journal of Interpretation. 8(1): 1-9; 1983.

Users and nonusers of an interpretive museum in a 650-acre day-use recreation area were compared in terms of their social characteristics and motives for visiting the area. Visitors came to the area seeking esthetic and educational experiences in the company of family or friends. Fifty-four percent visited the interpretive center. Although there were no differences between users and nonusers in terms of motive profiles, the likelihood of a person's visiting the center was affected by age, number in party, and the number of prior visits to the area. Understanding why some people are not interested in the interpretive effort is essential if interpreters are to broaden the scope of the audience.

More, Thomas A.; Stevens, Thomas H.; Allen, P. Geoffrey. **Economic valuation of urban open-space resources.** In: America's hardwood forests—opportunities unlimited. Proceedings, 1982 convention of the Society of American Foresters; 1982 September 19-22; Cincinnati, OH. Washington, DC: Society of American Foresters; 1983: 336-339.

We conducted a benefit/cost analysis of four urban parks in Worcester, Massachusetts. The results showed that these 219 acres of urban open space produce an estimated $560,320 of benefits annually for the citizens of Worcester. This exceeds the annual operating cost by a ratio of 4.48 to 1. Further research is needed to determine precisely how different park attributes affect the value of both external and on-site benefits.

Morselli, M. F.; Whalen, M. L.; Baggett, K. L.; Sendak, P. E. **Quality of syrup produced from sap concentrated by reverse osmosis (RO).** Maple Syrup Journal. 1982 June: 18.

Munn, R. E.; Likens, G. E.; Weisman, B.; Hornbeck, J. W.; Martin, C. W.; Bormann, F. H. **A meteorological analysis of the precipitation chemistry event samples at Hubbard Brook, New Hampshire.** In: 1st international conference of the Commission on Atmospheric Chemistry and Global Pollution (CACGP); Symposium on tropospheric chemistry; 1983 August/September; Oxford, England. [Place of publication unknown]: [Publisher's name unknown]; 1983. Abstract.

Nevel, Robert L., Jr. **Veneer, 1980--A periodic assessment of regional timber output.** Resour. Bull. NE-77. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 17 p.
Evaluates regional timber output based on a canvass of the veneer plants in the Northeast and contains statistics for 1980 on the veneer-log production and receipts by states and species, log shipments between states and regions, and the disposition of manufacturing residues. Between 1976 and 1980, veneer log production jumped 19 percent and northeastern veneer plant receipts dropped slightly. Trends in production and an outlook for the industry are presented along with a list and map of veneer plants in the Northeast.

Nevel, Robert L., Jr.; Blyth, James E. **Veneer log production in the Northeastern and North Central States in 1980.** Northern Logger. 31(11): 40-41; 1983.
Twenty of the twenty-one Northeastern and North Central States produced a total of 242.8 million board feet of veneer logs in 1980, up 6 percent from 1976. Four-fifths of the logs harvested in the area came from seven states. Active veneer mills declined from 96 in 1976 to 86 in 1980. In the Northeast, 36 mills used 120.5 million board feet of veneer logs. The 50 mills in the North Central states consumed 91.7 million board feet. Total receipts of veneer logs for the 21-state area dropped by 6 percent since 1976.

Nik, Abdul Rahim Hj; Lee, Richard; Helvey, J. David. **Climatological watershed calibration.** Water Resources Bulletin. 19(1): 47-50; 1983.
This study tests the hypothesis that climatic data can be used to develop a watershed model so that stream flow changes following forest harvest can be determined.

Noble, Reginald D.; Jensen, Keith F. **An apparatus for monitoring CO_2 exchange rates in plants during SO_2 and O_3 fumigation.** Journal of Experimental Botany. 34(141): 470-475; 1983.
An apparatus is described for measuring photosynthetic carbon dioxide assimilation, dark respiration, photorespiration and the CO_2 compensation point by plant materials fumigated with sulphur dioxide and/or ozone. This system uses an infrared gas analyser (IRGA) in a closed-loop system. Sulphur dioxide is added from permeation tubes, and O_3 is generated by ultraviolet light. Regulation of fumigant concentration and scrubbing the fumigants from the system are described.

Northeastern Forest Experiment Station. **Forest research—Berea, Kentucky.** NE-INF-55-83. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 12 p.
Describes the country's most comprehensive research effort on surface-mine reclamation at the Northeastern Forest Experiment Station's Laboratory at Berea, Kentucky. Scientists at Berea are developing practical and cost-efficient methods to reduce damage to the environment and forest resources from surface mining, and to reclaim newly mined and abandoned mined areas for the benefit or enhancement of water quality, timber, wildlife, recreation, range, and esthetic values.

Northeastern Forest Experiment Station. **Progress in forestry research in the Northeast, 1980-1981.** Gen. Tech. Rep. NE-81. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 56 p.
A summary report on highlights of research activities and accomplishments of the Northeastern Forest Experiment Station in 1980-81, including an annotated list of publications.

Northeastern Forest Experiment Station. **Progress in forest research in the Northeast—1982.** Gen. Tech. Rep. NE-83. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 31 p.
A summary report on highlights of research activities and accomplishments of the Northeastern Forest Experiment Station in 1982, including an annotated list of publications.

Nyland, Ralph D.; Marquis, David A.; Whittemore, Donald K. **Northern hardwoods.** In: Choices in silviculture for Eastern Canadian forests. Fredricton, NB: Forest Extension Branch, New Brunswick Department of Natural Resources; 1982: 17-22.
Silvicultural options in the northern hardwood forests of Eastern Canada are described in nontechnical terms to help landowners understand how these forests are best managed for timber production, recreation and wildlife use, and watershed protection.

Nyland, Ralph D.; Marquis, David A.; Whittemore, Donald K. **Feuillus du Nord.** In: Les choix de sylviculture dans les forêts de L'est Canadien. Fredicton, NB: Le Service de Consultation Forestière; Ministère des Ressources Naturelles du Nouveau-Brunswick; 1983: 21-27.
French translation of "Northern hardwoods" in Choices in silviculture for American forests; Washington, DC: Society of American Foresters; 1981.

ODell, T. M.; Mastro, V. C. **Management of sparse gypsy moth populations by using the sterile-male technique.** In: Proceedings, 1982 national gypsy moth review; 1982 December 7-9; Harrisburg, PA. Middletown, PA: Pennsylvania Department of Environmental Resources; 1983: 126-135.

The 5-year gypsy moth sterile male program involving Forest Service, APHIS, and ARS scientists is reviewed. The release of sterile males in Benton Harbor, Michigan, reduced the population below a detectable level. A pilot project to demonstrate the inherited sterility technique is described.

ODell, Thomas M. **Monitoring and assessment of gypsy moth populations: A requirement for effective pest management decisions.** Connecticut Timber Trends. 4(2): 4-5, 8; 1983.

Olsen, Eldon D.; LeDoux, Chris B.; McIntire, John C. **Determining deck size limitationos for small cable yarders.** In: Logger's Handbook. Vol. 43. Edmonds, WA: Timber/West Publications, Inc.; 1983: 11-12, 50.

Patton, Roy L. Garraway, Michael O. **Cell wall and photoplast peroxidase activities in leaves of two hybrid poplar clones that differ in susceptibility to ozone injury.** Phytopathology. 73(5): 820; 1983. Abstract.

Peters, Penn A.; Biller, Cleveland J. **Log attachment methods evaluated by a Latin square design.** In: Proceedings, 1982 winter meeting American Society of Agricultural Engineers; 1982 December 14-17; Chicago, IL. St. Joseph, MI: American Society of Agricultural Engineers; 1983: Paper No. 82-1604.
A Latin square design was used to test the effect of log attachment method on mainline force required to move hardwood logs uphill. The effect of log attachment method was insignificant. Log weight was a simple linear predictor for mainline force accounting for 66 percent of the variation.

Peterson, Jeffrey M.; Rice, William W.; Gatchell, Charles J. **Factors affecting energy self-sufficiency for a System 6 sawmill.** Res. Bull. No. 685. Amherst, MA: Massachusetts Agricultural Experiment Station, University of Massachusetts at Amherst; 1983. 32 p.

Phillips, Ross A. **Skidder load capacity and fuel consumption HP-41C program.** Res. Pap. NE-537. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 7 p.
Program gives log weight that the skidder can move and gives fuel consumption either in liters or gallons per turn. Slope of the skid trail, skidder weight, and skid distance must be entered into the program.

Podgwaite, J. D.; Bruen, R. B.; Shapiro, M. **Microorganisms associated with production lots of the nucleopolyhedrosis virus of the gypsy moth, Lymantria dispar [Lep.: Lymantriidae].** Entomophaga. 28(1): 9-16; 1983.
Samples of a gypsy moth nucleopolyhedrosis virus product, Gypchek®, were taken each day during a 100-day production run and monitored for the presence of pathogenic bacteria and fungi. We did not detect obligate anaerobic or fecal coliform bacteria in any of the samples. Bacillus cereus, Staphlococcus epidermidis, B. licheniformis, Streptococcus faecalis, Serratia liquefaciens, and Aspergillus niger were the most frequently isolated microorganisms. We did not detect primary pathogenic bacteria or fungi, but the presence of opportunistic pathogens indicated that assiduous monitoring of the virus production facility and rigorous quality control of production batches are necessary.

Porter, William F.; Mathews, Nancy E.; Doyle, Terrence J.; Brooks, Robert T. **The U.S. Forest Service inventory: An approach for assessing wildlife habitat.** In: Bell, John F.; Atterbury, Toby, eds. Renewable resource inventories for monitoring changes and trends: Proceedings of an international conference; 1983 August 15-19; Corvallis, OR. Corvallis, OR: Oregon State University; 1983: 628-631.
Studies initiated in 1980 to investigate the capabilities of the Forest Inventory and Analysis survey (FIA) of the USDA Forest Service for assessing wildlife habitat involved a comparison of the faunal community with vegetative and physiographic characteristics of forest stands sampled by the USDA forest Service survey. Population indices for 25 species of songbirds and small mammals, obtained during the summer of 1981 on 82 and 34 FIA plots, respectively, in central New York State, were compared with FIA data collected on the same plots by the Forest Service in 1978-79. Statistical methodology is presented, with some preliminary results and recommendations for future investigations.

Powell, Douglas S.; Cost, Noel D. **Differentiating real resource change from other concurrent inventory differences.** In: Bell, John F.; Atterbury, Toby, eds. Renewable resource inventories for monitoring changes and trends: Proceedings of an international conference; 1983 August 15-19; Corvallis, OR. Corvallis, OR: Oregon State University; 1983: 541-545.
When estimating change that has occurred between periodic resource inventories, extraneous changes in the estimates should be identified and isolated or minimized. Besides changes in sampling techniques and normal error, such extraneous inventory differences may result from changes in definitions, data collection procedures, or data processing techniques. Specific examples illustrate the impact that such inventory differences have on real resource change.

Rafaill, Barbara L. **Establishment of trees on artificially revegetated and abandoned surface mines.** In: Pope, P. E., ed. Proceedings, 3rd annual better reclamation with trees conference; 1983 June 2-3; Terre Haute, IN. West Lafayette, IN: Purdue University, Department of Forestry and Natural Resources; 1983: p. 89. Abstract.

Rast, Everette D. **Proportion of northern red oak veneer logs processed into veneer and byproducts in a half-round slicing operation.** Forest Products Journal. 33(11/12): 54-56; 1983.
The proportion of northern red oak veneer logs processed into slabs and sawdust, backing boards, spurred residue, round-up residue, and veneer in a half-round slicing operation was determined. Overall, 54 percent of the total bark-free log volume is converted into veneer. Slabs and backing boards make up 33 percent of the residue. The relationship between butt and upper

log, the effect of diameter, and log overlengths are discussed. The data base will allow mill managers who monitor production at each phase of the operation to determine operating efficiency.

Reeves, R. Marcel; Dunn, Gary A.; Jennings, Daniel T. **Carabid beetles (Coleoptera: Carabidae) associated with the spruce budworm, Choristoneura fumiferana (Lepidoptera: Tortricidae).** The Canadian Entomologist. 115: 453-472; 1983.

Barrier-pitfall traps and tree bands were used to sample adult carabid beetles in five forest stands of different tree species composition and spruce budworm infestation levels. Twenty genera and thirty-seven species were collected over the 2-year period. Adult carabid populations were highest in the red spruce stand, while carabid species diversity was greater in hardwood and fir stands having the most tree species diversity. Potential adult carabid predators of spruce budworm were identified.

Rexrode, C. O. **Gum spots in black cherry.** Northern Logger. 32(5): 14-15, 24; 1983.

Discusses what gum spots are in black cherry and what agents cause them. Also, discusses the importance of gum spots and how they degrade black cherry. Insects are the primary cause of gum spots in black cherry. Bark beetles cause the most gum spots in both poletimber and sawtimber black cherry. Gum spots cause the most degrade in veneer, veneer logs, and factory grade sawlogs.

Rexrode, Charles O. **Yellow-bellied sapsuckers can damage valuable black cherry trees.** Pennsylvania Farmer. 208(9): 35; 1983.

The yellow-bellied sapsucker attacks black cherry and degrades the wood. Sapsucker-caused gum spots and their effects on the quality of black cherry are discussed and illustrated.

Rexrode, Charles O.; Baumgras, John E. **Preliminary study on decay in second-growth black cherry in West Virginia.** W. Va. For. Notes Circ. Morgantown, WV: West Virginia University, Agricultural and Forestry Experiment Station; 1983; 123(10): 1-2.

Decay was present in 80 percent of 63 poletimber trees and 62 percent of 53 sawtimber trees. However, 73 percent of the sample discs had no decay, and 34 percent had 5.0 cm^2 or less. Most decay gained entry through branch stubs and was confined to overgrown knots that resulted from dead branch stubs.

Rexrode, Charles O.; Brown, H. Daniel. **Oak wilt.** For. Insect & Dis. Leafl. 29. Washington, DC: U.S. Department of Agriculture; 1983. 6 p.

Oak wilt, caused by the fungus Ceratocystis fagacearum (Bretz) Hunt kills oak trees. It has been found in 21 states, with considerable damage occurring in the Midwest. In West Virginia where predominately oak forests cover 70 percent of the land area, oak wilt losses average less than one tree per square mile each year. Oak wilt has also been reported in Texas—outside its main range. No species of oak is known to be immune to this vascular disease.

Reynolds, Hugh W. **When times are good again for furniture and kitchen cabinet makers.** NE-INF-51-83. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 4 p.

During good times, high-quality hardwood lumber prices rise rapidly. During poor times, these prices fall and then rise slowly. We are presently, 1980 to present, in a poor time's situation. The need for an alternate source of parts when good times come again is discussed.

Reynolds, Hugh W.; Araman, Philip A. **System 6: making frame-quality blanks from white oak thinnings.** Res. Pap. NE-520. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 9 p.

Low-grade white oak timber, removed during a timber stand improvement cut on the Jefferson National Forest in Virginia, was made into sawlogs, poles, 6-foot bolts, 4-foot bolts, pulpwood, and firewood. The 6-foot bolts were sawed to two cants per bolt; cants were resawed to 4/4 System 6 boards; boards were dried to 6 percent moisture content and were then made into frame blanks using System 6 technology. The blanks were used by an upholstered furniture company to make frames and were found very satisfactory. Yields of required frame blanks were good, 56 percent, when only the poorest two-thirds of all boards were used. The better boards can be used to make clear-quality blanks.

Reynolds, Hugh W.; Araman, Philip A.; Gatchell, Charles J.; Hansen, Bruce G. **System 6 used to make kitchen cabinet C2F blanks from small-diameter, low-grade red oak.** Res. Pap. NE-525. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 11 p.

Hardwood dimension manufacturers can make profitable use of plentiful small-diameter, low-grade timber when System 6 technology is used. We describe a System 6 plant designed to make clear-two-face (C2F) blanks for the kitchen cabinet industry. Data for plant operation are taken from a study in which red oak bolts (from a reforestation clearcut) were used to make 33-, 29-, 25-, 21-, and 15-inch-long standard-size blanks. Serpentine end matching of short pieces was used to increase the quantity of 25-inch blanks. The economics of two options for plant operation is explained.

Reynolds, Hugh W.; Gatchell, Charles J. **New technology for using low-grade hardwoods: System 6.** NE-INF-50-83. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 8 p.

Presents the System 6 process from the woods through final products. The process uses small-diameter, low-grade hardwood material and produces high-quality, high-valued standard-size blanks. Discusses specifications for materials and expected operating characteristics.

Ribblett, Gary C.; DeWalle, David R.; Helvey, J. David. **Chemistry of leachate from six different Appalachian forest floor types subjected to simulated acid**

rain. University Park, PA: Institute for Research on Land and Water Resources; The Pennsylvania State University; 1982; Final Rep. for USDA For. Serv. Agreement No. 23-557: 40 p.
The chemistry of leachate from six different Appalachian forest floor types subjected to simulated acid rain storms was compared for three storm sizes and three repeated storm applications.

Rice, William W.; Gatchell, Charles J. **Application of System 6 technology to New England red oak.** Northern Logger. 31(12): 10-11, 20-21, 23; 1983.
Presents results of a study to demonstrate that System 6 can convert low-quality wood into high-value furniture. Red oak bolts were processed into kiln dried, edge-glued, C1F and better blanks in sizes to efficiently meet the cutting bills of two Massachusetts furniture manufacturers. Both furniture companies found the blanks very acceptable in size and quality. Return on investment for System 6 is calculated to be 27 percent.

Roth, Richard R.; Gansner, David A.; Birch, Thomas W.; Decker, Daniel J.; Kelly, John W. **Wildlife: A prime output of nonindustrial private forestlands in the Northeast.** In: Royer, Jack P.; Risbrudt, Christopher D., eds. Nonindustrial private forests: A review of economic and policy studies: Proceedings of a symposium; 1983 April 19-20; Durham, NC. Durham, NC: Duke University; 1983: 334-337.
Hunting, fishing, hiking, birdwatching, and other wildlife-related recreation activities are important to the economy and to the personal well-being of the region's residents and visitors. Taxpayer concerns for wildlife are evident from public opinion surveys and in the enactment of laws to improve and manage these resources. A majority of the forest-land owners in the Northeast own their forest land for recreation, esthetic enjoyment, or because it is part of a farm or residence. The primary recreational uses of private forest lands by the public are hunting and hiking. Habitat management is a major component of service forestry. Field foresters need training to incorporate more effectively wildlife habitat values into forest management activities.

Rothwell, F. M.; Hacskaylo, E.; Fisher, D. **Ecto- and endomycorrhizal fungus associations with Quercus imbricaria L.** Plant and Soil 71(1-3): 309-312; 1983.
Ten seedlings were collected from 1-year-old shingle oak grown in fumigated and fertilized seedbeds at a tree nursery in western Kentucky. Root material from the seedlings was washed free of soil and small segments stained for microscopic analysis of mycorrhizae development. External morphology of root segments was typically ectomycorrhizal, with characteristic hyphal mantle and Hartig net development evident in transverse sections of young ectomycorrhizae. In addition a Glomus species was frequently observed in the root cortex.

Rowntree, Rowan. **Geographical variation in urban vegetation structure.** In: Swann, Michael M.; Swann, Patricia Lambert; Lonsdale, Richard E., compilers. AAG Program Abstracts 1983; 1983 April 24-27; Denver, CO. Lincoln, NE: University of Nebraska-Lincoln; 1983. Abstract.
A sample of metropolitan centers across the U.S. provides data for speculation about how natural factors combine with human values and development history to form the contemporary urban forest which varies much less than many visible and invisible elements contributing to the individual character of cities. Cultural plant aggregations can now be understood in terms of the way land uses interact with the environment to create predictable patterns of, for example, forest density; e.g., Dayton, Ohio, and Sioux Falls, South Dakota, possess the same average canopy cover (22 percent) though existing in distinctly different ecological situations with separate development histories.

Rowntree, Rowan A.; Sanders, Ralph A.; Stevens, Jack C. **Evaluating urban forest structure for modifying microclimate.** In: Proceedings, 2nd national urban forestry conference; 1982 October 10-14; Cincinnati, OH. Washington, DC: American Forestry Association; 1983: 136-142.
The City of Dayton, Ohio, is being studied as a field laboratory to gain a better understanding of how the urban forest system operates to modify urban physical environments--air temperatures, air quality, and surface runoff. Based on the Dayton study, we present a 12-step procedure that provides a way to better understand the configuration of urban land use and cover types that make up the structure of an urban forest system. Once the configuration and structure of the urban forest system is quantified, mathematical simulation models can be developed to predict changes in environmental parameters that result from alterations in the urban forest structure.

Rowntree, Rowan; Stevens, Jack C. **Correlation of urban vegetation structure with land use and type.** In: Proceedings, 2nd national urban forestry conference; 1982 October 10-14; Cincinnati, OH. Washington, DC: American Forestry Association; 1983. Poster session.

Safford, L. O. **Silvicultural guide for paper birch in the Northeast (revised).** Res. Pap. NE-535. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 29 p.
This revised guide provides practical information on silvicultural treatments to grow paper birch as a timber crop. It covers treatments for existing stands, the regeneration of new stands, and subsequent culture to maturity. The stocking chart has been revised to reflect results of current growth studies.

Safford, L. O.; Jacobs, Rodney D. **Paper birch.** In: Silvicultural systems for the major forest types of the United States. Agric. Handb. 445. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 145-147.

Sampson, T. L.; Barrett, J. P.; Leak, W. B. **A stocking chart for northern red oak in New England.** Res. Rep. No. 100. Durham, NH: University of New Hampshire, New Hampshire Agricultural Experiment Station; 1983. 14 p.
A stocking chart for northern red oak in New England, with curves representing minimum stocking for full site

utilization (B curve), and normal stand density (A curve) is presented and explained. Silvicultural considerations are discussed and use of the chart is illustrated.

Sanders, Ralph A.; Rowntree, Rowan A. **Classification of American metropolitan areas by ecoregion and potential natural vegetation.** Res. Pap. NE-516. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 15 p.
Classifies 279 American metropolitan areas by ecoregion and potential natural vegetation. The classification forms a baseline of expected vegetation structure and composition that can assist scientists and policymakers in making urban forestry generalizations about classes of cities.

Sanders, Ralph A.; Rowntree, Rowan. **Comprehensive management procedures for the urban forest ecosystem.** In: Proceedings, 2nd national urban forestry conference; 1982 October 10-14; Cincinnati, OH. Washington, DC: American Forestry Association; 1983. Poster session.

Sarles, Raymond L.; Hurst, Homer T., P.E. **Yellow-poplar comes of age.** Northern Logger. 32(4): 6-7; 28-29; 1983.
Yellow-poplar structural lumber was used to construct a four unit apartment in Blacksburg, Virginia. The apartment design was one of 19 award winners from HUD's 1980 Design Competition "Building Value into Housing." The unit was built as a national housing demonstration by HUD and Homer T. Hurst, P.E. The USDA Forest Service gave technical assistance in procuring grade-marked yellow-poplar lumber to project specifications.

Sarles, Raymond L.; Wartluft, Jeffrey L.; Whitenack, Kenneth R. **Chain saw felling in hardwood thinnings.** In: Proceedings, harvesting the South's small trees; 1983 April 18-20; Biloxi, MS. Madison, WI: Forest Products Research Society; 1983: 58-65.
Production and efficiency rates were computed from time study and stem measurement data from four hardwood thinning operations in the central Appalachians. Felled trees averaged 9 to 10 inches in d.b.h. and 38 to 45 feet in merchantable length. Hourly production rates were determined from a regression equation expressing productive felling time as a function of merchantable volume and distance between successively felled trees. The average production rate for the combined operations was 2.4 cords per hour at an average felling efficiency of 49 percent. Efficiency was inversely related to delay time. Causes of delay—the largest time block in each felling cycle—were analyzed. Specialized training in thinning methods and techniques was recommended to increase worker efficiency and productivity.

Schier, G. A. **Sucker regeneration in some deteriorating Utah aspen stands: development of independent root systems.** Canadian Journal of Forest Research. 12: 1032-1035; 1982.
Root-sucker regeneration in deteriorating Utah aspen stands was examined. Suckers in only 1 of 12 clones examined had well-developed independent root systems. Most new roots died the same year they were initiated.

Schier, George A. **Vegetative regeneration of gambel oak and chokecherry from excised rhizomes.** Forest Science. 29(3): 499-502; 1983.
Gambel oak and chokecherry were vegetatively propagated from cuttings of rhizomes (underground stems). Shoots from rhizomes arose singly or in clusters from suppressed buds. Rhizome sprouting capacity was higher in chokecherry than in oak. Rhizomes from dormant oak required a cold treatment before they would sprout. Shoot production by oak and chokecherry rhizomes was significantly higher in light than in darkness. In comparison, shoot production from aspen roots was not affected by light conditions.

Schlitz, Harvey M.; Reams, Greg A.; Warner, William S.; Corcoran, Thomas J.; Brann, Thomas B.; Solomon, Dale S. **Impact of the spruce budworm in Maine 1975-80.** Orono, ME: University of Maine; 1983; Misc. Rep. 290. 35 p.
Combines and analyzes data from several reports to provide a graphic presentation and summary of the current budworm situation.

Schmitt, Daniel M. **Nacht thoughts of a program manager.** In: Corcoran, Thomas J.; Gill, Douglas R., eds. Recent advances in spruce-fir utilization technology: Proceedings of a symposium; 1983 August 17-19; Orono, ME. Washington, DC: Society of American Foresters; 1983: 47.

Schmitt, D. M. C.; Czapowskyj, M. M.; Allen, D. C.; White, E. H.; Montgomery, M. E. **Spruce budworm fecundity and foliar chemistry: Influence of site.** In: Proceedings, forest-defoliator—host interactions: A comparison between gypsy moth and spruce budworms; 1983 April 5-7; New Haven, CT. Gen. Tech. Rep. NE-85. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983: 97-103.
Two Maine spruce-fir stands with different soils were sampled to determine the relationship between spruce budworm weight (fecundity) and foliage quality. Although much of the variation in budworm weight was attributable to other factors, significant correlations between budworm weight and multiple foliar nutrient concentration variables suggest that foliage quality altering silvicultural practices such as fertilization may stimulate populations of the spruce budworm.

Schroeder, Herbert W.; Cannon, William N., Jr. **The contribution of trees to residential landscapes in Ohio.** In: America's hardwood forests—opportunities unlimited. Proceedings, 1982 convention of the Society of American Foresters; 1982 September 19-22; Cincinnati, OH. Washington, DC: Society of American Foresters; 1983: 333-335.
Evaluates and develops models to predict the scenic quality of residential streets in Ohio towns; analyzes the role of shade tree commissions in street tree management.

Schroeder, Herbert W.; Cannon, William N., Jr. **The esthetic contribution of trees to residential streets in Ohio towns.** Journal of Arboriculture. 9(9): 237-243; 1983.

Street trees are an important factor in the attractiveness of residential streets. However, large older trees that are the most attractive to the public are not necessarily the most desirable from a silvicultural point of view. Shade tree commissions, apparently formed in response to losses in esthetically valued trees, can create tree distributions that are less prone to catastrophic losses of attractive trees. Factors other than street trees also contribute to stree esthetics and should be considered in shade tree management.

Schuler, Albert T.; Wallin, Walter B. **A revised econometric model of the domestic pallet market.** Res. Pap. NE-522. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 5 p.
The purpose of this revised model is to project estimates of consumption and price of wood pallets in the short term. The model is intended to provide reliable estimates of the quantity of pallets required and their real price over a relatively short term of 1 to 5 years. It is not intended to be used in determining policy concerning the growth or decline of palletization in materials handling.

Scott, Charles T. **Example of midcycle updating to assess catastrophic change.** In: Bell, John F.; Atterbury, Toby, eds. Renewable resource inventories for monitoring changes and trends: Proceedings of an international conference; 1983 August 15-19; Corvallis, OR. Corvallis, OR: Oregon State University; 1983: 555-557.
The 1982-83 midcycle update in Pennsylvania was designed to assess the impact of the gypsy moth caterpillar on oak forest types. To emphasize the oak resource, the proportion of nonoak sample plots was cut in half. Weighted regression was applied to the remeasured sample to update previous survey statistics to the present. The total cost was roughly one-fifteenth that of the previous full-scale survey.

Scott, Charles T.; Ek, Alan R.; Zeisler, T. R. **Optimal spacing of plots comprising clusters in extensive forest inventories.** In: Bell, John F.; Atterbury, Toby, eds. Renewable resource inventories for monitoring changes and trends: Proceedings of an international conference; 1983 August 15-19; Corvallis, OR. Corvallis, OR: Oregon State University; 1983: 707-710.
Clusters were substantially more efficient for estimating basal area, volume, and biomass, and to a lesser extent, area, than survey designs without clustering. Results were inconclusive for estimating growth.

Sendak, P. E. **Effect of oxygen, carbon dioxide, and nitrogen on maple syrup stored in plastic jugs.** Journal of Food Science. 47(5): 1741-1742; 1982.
Six maple syrups were stored in the dark for 6 months in pigmented and unpigmented high-density polyethylene jugs at room temperature (72°F) in three gas environments—nitrogen, oxygen, and carbon dioxide. The syrup was analyzed for changes in flavor, color, and pH. A taste panel, tasting syrup from pigmented jugs only, detected flavor change in both the oxygen and carbon dioxide environments. There were statistically significant interactions for changes in both color and pH between gas and syrup treatments. The greatest darkening of color and decrease in pH were associated with the carbon dioxide. Jug pigmentation had no detectable effect on the syrup.

Sendak, Paul E. **Consumer attitudes about pure maple syrup.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 103-106.
Discusses the growing desire to expand markets for maple syrup. This means that producer and consumer will be separated by the normal marketing structure: producer—marketing intermediaries—final consumer. Information about consumers in these markets becomes more critical to the success of the marketing effort.

Sendak, Paul E. **Retail containers for pure maple syrup.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 107-109.
Discusses the two problems in packing syrup in the retail container. The first is to use proper packing procedures to ensure a sterile pack; the second is to minimize changes that take place in the syrup in the retail container over time.

Sendak, Paul E.; Bonyai, Susan A. **Firewood delivery systems in northern Vermont.** In: Proceedings, 6th international FPRS industrial wood energy forum; 1982 March 8-10; Washington, DC. Madison, WI: Forest Products Research Society; 1983: 221-225.
The fuelwood market in Vermont has grown quickly to almost 400,000 cords per year in response to dramatic increases in oil price. The purpose of this study was to see how the market was organized for the delivery of fuelwood for domestic heating to the consumer. A literature review and individual case studies of fuelwood producers were used to examine the delivery methods.

Sendak, Paul E.; Jenkins, W. Lyman. **Market structure of the maple industry and syrup grading standards.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 98-102.
Discusses the elements for stabilizing or increasing maple production: Industry organizations have become international, encompassing the whole maple-producing region; government programs have continued in research and extension; new technology, especially in plastic tubing for sap production, has been widely adopted.

Shields, K. S.; Godwin, P. A. **U.S. Forest Service gypsy moth parasite research.** In: Proceedings, 1982 national gypsy moth review; 1982 December 7-9; Harrisburg, PA. Middletown, PA: Pa. Department of Environmental Research; 1983: 136-138.
Discusses current research at the Center for Biological Control of Northeastern Forest Insects and Diseases on

two gypsy moth parasites: Rogas lymantriae (Watanabe), a braconid, and Blepharipa pratensis (Meigen), a tachinid.

Shigo, A. L. **Measuring tree decay and vitality with a Shigometer.** Arbor Age. 3: 17-20; 1983.
By measuring the amount of electrical resistance caused by decaying material in a tree, the Shigometer allows an arborist to determine the extent of a tree's injuries without guesswork.

Shigo, Alex L. **Decay in trees.** In: Trees in the 21st **Century.** Berkhamsted, UK: AB Academic Publishers; 1983: 95-107.

Shigo, Alex L. **Tree Decay.** In: Proceedings, Korea-U.S.A. joint seminar on forest diseases and insect pests; 1982 September 22-30; Seoul, Korea. Seoul, Korea: Korea Science and Engineering Foundation and National Science Foundation, U.S.A.; 1982: 188-203.
A framework for an expanded concept of tree decay is given. The older concept of tree decay is based on the decomposition of wood--the breakdown of heartwood. The expanded concept addresses the orderly response of the living tree to injury and infection--compartmentalization, and the orderly infection of wounds by many microorganisms--successions.

Shigo, Alex L. **The relationship between better trees and better wood products from spruce and fir.** In: Corcoran, Thomas J.; Gill, Douglas R., eds. Recent advances in spruce-fir utilization technology: Proceedings of a symposium; 1983 August 17-19; Orono, ME. Washington, DC: Society of American Foresters; 1983: 217-220.
Many problems in wood products start in living trees. Low-quality trees produce low-quality products. Trees set boundaries to wall off infections. The boundaries and altered wood within boundaries are major causes of problems in products. A better understanding of trees and their care is needed for better products.

Shigo, Alex L. **Targets for proper tree care.** Journal of Arboriculture. 9(11): 285-294; 1983.
Proper tree care starts with a thorough understanding of trees and the many treatments used to help trees stay attractive, safe, and healthy. In the real working world of trees, it is almost impossible to do all the needed treatments perfectly all the time. A professional arborist must know what proper tree care is. Each part of each procedure for proper tree care becomes a target. The degree of professionalism of an arborist centers about knowing where the targets are, and how to hit them. The clearer the targets are to you, the better your chances of hitting them more often. Some of the targets for proper tree care are clarified here.

Shigo, Alex L. **Time to focus on tree health.** In: Proceedings, midwestern chapter International Society of Arboriculture; 1983 February 27-28, March 1; St. Charles, IL. St. Charles, IL: Midwestern Chapter International Society of Arboriculture; 1983.

Shigo, Alex L. **Tree defects: A photo guide.** Gen. Tech. Rep. NE-82. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 167 p.
This guide shows how discoloration and decay form in trees. An expanded concept of tree decay is given. After wounding, trees form boundaries to resist the spread of pathogens. The boundary-setting defense process is called compartmentalization, and a model of the process is CODIT. The expanded concept and the model are used to reexamine many other tree problems. Defects are major causes of low quality in trees. Use of the information in the guide can help foresters and urban foresters to grow healthier, higher quality trees.

Shigo, Alex L. **Trees and treatments. "Vooruitgang wetenschap moet leiden tot verbreding van inzicht."** Tuin & Landschap. 5(19): 25-27, 29; 1983.
A summary in Dutch of tree care information.

Shigo, Alex L. **Trees and treatments. "Verzorgingsmogelijkheden afhankelijk van herstelvermogen van bomen."** Tuin & Landschap. 5(20): 24-25; 1983.
A summary in Dutch of tree care information.

Shigo, Alex L. **Trees and treatments. "Ongeschonden houden van afgrendeling voorkomt erger."** Tuin & Landschap. 5(21): 26-27, 29; 1983.
A summary in Dutch of tree care information.

Shigo, Alex L. **Trees: Treatments and trade-offs.** Arbor Age. 2(6): 16, 17, 20, 21; 1983.
Discusses wound dressings, cavity filling, scribing, cabling and bracing injections, and pruning in light of what a tree is. Indicates that there are always trade-offs that must be made with new adjustments for old treatments.

Shigo, Alex L.; Dorn, Donald; Lee, Herbert C. **Selections of maple and birch trees with high resistance to spread of decay associated with wounds.** In: 28th Northeastern forest tree improvement conference: Proceedings 1983; 1982 July 7-9; Durham, NH. Durham, NH: University of New Hampshire; 1983: 110-117.
Sugar maple, paper birch, and yellow birch trees selected as superior for form on the White and Green Mountain, Allegheny, Monongahela, and Nicolet National Forests were wounded with drill holes. After one and two growth seasons, the columns of discolored wood associated with the wounds were determined with the twisted-wire electrode and the Shigometer. Double-needle electrodes and the Shigometer were used to determine cambial electrical resistance of the superior trees, comparison trees, and from 15 to 30 neighboring trees of the same species. From these data, trees with the smallest columns of defect and the highest vitality were selected as superior for form, growth rate, and the resistance to decay.

Shigo, Alex L.; Roy, Karl. **Violin woods: A new look.** Durham, NH: University of New Hampshire; 1983. 66 p.
Violin woods, especially spruce and maple, are discussed for the violin builder from the viewpoint of new con-

cepts on trees and wood defects, and of new electrical equipment for testing wood. The paper connects information on tree biology and tree response systems to injury and infection in such a way that the results can be easily understood and used by violin builders. Results of studies on wood from tree to finished violin are given. Major consideration is given to the condition of the wood in the living tree as it will affect the characteristics of the wood in the violin.

Shigo, Alex L.; Shortle, Walter C. **Wound dressings: Results of studies over 13 years.** Journal of Arboriculture. 9(12): 317-329; 1983.
Many materials were used in and on experimentally inflicted wounds in many studies over a 13-year period. No material prevented decay. The individual tree had a greater effect on the wound than the treatments. Some individual trees of a species closed and compartmentalized wounds rapidly and effectively, regardless of treatment, while other trees did not close and compartmentalize treated or control wounds. The width of healthy wood behind wounds in red maple was the major factor affecting the course of the wound. Results are given from wounds on 275 treated and dissected trees.

Shortle, W. C.; Ostrofsky, A. **Decay susceptibility of wood in defoliated fir trees related to changing physical, chemical, and biological properties.** European Journal of Forest Pathology. 13(1): 1-11; 1983.
Studies of the physical, chemical, and biological properties of wood from balsam fir trees indicated that as cambial electrical resistance increased in defoliated trees, the susceptibility of wood to decay seemed to increase. Increased susceptibility of wood to decay was associated with decreasing electrical resistance of wood as the tree lost its capacity to compartmentalize decaying wood.

Smith, C. T.; Hornbeck, J. W. **Changes in soil solution chemistry after forest harvest depend on soil drainage class.** Bulletin of the Ecological Society of America. 64(2): 65; 1983.

Smith, H. Clay. **Growth of Appalachian hardwoods kept free to grow from 2 to 12 years after clearcutting.** Res. Pap. NE-528. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 6 p.
Free-to-grow sapling-size yellow-poplars of seedling origin in young stands outgrew similar black cherry and red oak in both d.b.h. and total height. Sugar maple did not respond to the free-to-grow treatment.

Smith, H. Clay; Della-Bianca, Lino; Fleming, Harvey. **Appalachian mixed hardwoods.** In: Final environmental impact statement for regional guide-Eastern Region. Milwaukee, WI: U.S. Department of Agriculture, Forest Service, Eastern Region; 1983: D-4-10.

Smith, H. Clay; Della-Bianca, Lino; Fleming, Harvey. **Appalachian mixed hardwoods.** In: Silvicultural systems for the major forest types of the United States. Agric. Handb. 445. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 141-144.

Smith, H. Clay; Lamson, Neil I. **Precommercial crop-tree release increases diameter growth of Appalachian hardwood saplings.** Res. Pap. NE-534. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 7 p.
Hardwood, codominant sapling crop trees 25 to 39 feet tall in even-aged stands were released in a West Virginia study. Trees were located on two oak sites: good oak site index 75 and fair oak site 63. Species studied were black cherry, sweet birch, and yellow-poplar. Three-year results indicated that the trees generally responded to release; the 3-year d.b.h. growth of released trees was 0.2 to 0.4 inch greater than that of unreleased trees. Height growth did not increase.

Smith, Harvey R. **Gypsy moth predators-can they service woodland management?** Connecticut Timber Trends. IV(4): 6-8; 1983.
At least 50 species of birds and 20 species of mammals are known to eat gypsy moths. Common bird predators include the black-capped chickadee, blue jay, red-eyed vireo, rufous-sided towhee, scarlet tanager, northern oriole, catbird and robin. Mammalian predators include the white-footed mouse, several species of shrews, squirrels, chipmunks, skunks, red-backed voles, raccoons, and opossum. Often foresters and homeowners unknowingly turn good wildlife habitats into unsuitable habitats by removing brush. Reducing food, cover, and nesting sites means a loss in diversity and density of predators.

Smith, Harvey R. **Wildlife and the gypsy moth.** In: Yahner, Richard H., ed. Transactions of the Northeast Section, The Wildlife Society: 40th Northeast Fish and Wildlife Conference; 1983 May 15-18; West Dover, Vt. Publisher unknown ; 1983: 66. Abstract.
Predators of the gypsy moth are opportunistic feeders; selection of gypsy moth is largely a function of the availability of other foods. The gypsy moth predator/prey system is complex; many wildlife species eat gypsy moths. Avian, mammalian, and invertebrate predators are the most common and important, though amphibians, reptiles, and fish occasionally prey on larvae and adults.

Solomon, Dale S. **Changes in growth of spruce-fir stands in the Northeast under varying levels of attack by the spruce budworm.** In: Renewable resource inventories for monitoring changes and trends: international conference; 1983 August 15-19; Corvallis, OR. Corvallis, OR: Oregon State University; 1983: 93-96.
The defoliation of spruce and fir trees in the Northeast causes a reduction in upper bole increment. External influences, such as insect attack, place trees under stress and result in a growth loss and eventual reduction in yield. Measurements of tree characteristics and severity of attack have been related to the resulting radial increment over the bole of tree to predict changes in bole volume growth response for long periods of time. Continued heavy defoliation can result in up to 50 percent reduction in growth that is not regained, and is not part of the harvest yield. The resulting change is noticed first in the upper bole, with no appar-

ent change in the radial increment at breast height. Different patterns of defoliation and varying amounts of protection are analyzed, providing forest managers with methods of predicting the growth of trees in stands under attack.

Solomon, Dale S. **Use of discriminant equations to classify birch in the Northeast.** In: 28th Northeastern forest tree improvement conference: Proceedings 1983; 1982 July 7-9; Durham, NH. Durham, NH: University of New Hampshire; 1983: 77-93.
Leaf, seed, and bract measurements from three species of birch were used to classify intraspecific crosses and their hybrids. Seed and bract measures provide a sufficient basis for discriminating among superior trees that have been selected as potential breeding stock. The occurrence of introgression in both the parents and progeny can be established.

Solomon, Dale S.; Frank, Robert M. **Growth response of managed uneven-aged northern conifer stands.** Res. Pap. NE-517. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 17 p.
The growth response of trees in spruce-fir-hemlock stands was recorded from plots that were managed to control stand density, species composition, length of harvest interval, and salvage of mortality. Basal area, volume, and diameter increment are presented by species and size classification for harvesting intervals of 5, 10, and 20 years.

Solomon, Dale S.; Seegrist, Donald W. **Growth and yield analysis of thinned uneven-aged spruce and fir stands in Maine.** In: Planning, performance and evaluation of growth and yield studies; 1979 September 17-21; Oxford, UK Occas. Pap. 20. Oxford, UK: Commonwealth Forestry Institute; 1983: 149-156.
The selection system of silviculture was used to reduce the growing stock in uneven-aged spruce-fir stands every 5, 10, and 20 years. Statistical procedures were used to estimate mean accretion rates within measurement periods for each of the harvesting cycles. Likelihood procedures for an incomplete multivariate model with correlated observations were used to estimate the mean vectors. Although the treatment means were statistically significant, the differences are small. Differences among treatments may become evident as more measurements are taken.

Solomon, J. D.; Donley, D. E. **Bionomics and control of the white oak borer.** Res. Pap. SO-198. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station; 1983. 5 p.
The white oak borer is one of the most serious trunk borers of young trees in the white oak group in the eastern United States. Adult beetles, emerging from late April through May in the South and from mid-May to mid-July in its northern range, oviposit in the cambium through niches chewed in the bark. Newly hatched larvae tunnel directly into the sapwood. Larval galleries in the trunk extend 2 to 6 cm obliquely upward, 8 to 17 cm vertically, and then turn back to the bark surface. Part of a brood develops in 3 years, while the remainder requires 4 years. The borer attacks trees 3 to 55 cm in diameter at breast height (dbh), but prefers stem diameters from 9 to 20 cm. Open-grown trees are favored for attack. Sap-out mortality and woodpecker predation are the major natural controls. Removal of brood trees and managing for non-host species will help minimize losses.

Southard, Susan G.; Houseweart, Mark W.; Jennings, Daniel T.; Halteman, William A. **Size differences of laboratory reared and wild populations of Trichogramma minutum (Hymenoptera: Trichogrammatidae).** Canadian Entomologist. 114: 693-698; 1982.
Body length, head width, and abdomen width were used to determine size differences between laboratory-reared and wild populations of Trichogramma minutum Riley. Six separate groups of T. minutum were measured: three groups were from Sitotroga cerealella (Olivier) eggs, two from spruce budworm Choristoneura fumiferana (Clemens) eggs, and one from wild populations of spruce budworm. Female T. minutum from spruce budworm (large host) eggs were significantly larger for all body dimensions than T. minutum from S. cerealella (small host) eggs. Male T. minutum from field-collected spruce budworm eggs were significantly larger for all body dimensions than T. minutum reared for more than one generation in S. cerealella eggs.

Stout, S. L. **Computer program helps foresters write prescriptions for Allegheny hardwoods.** Allegheny News. Allegheny Society of American Foresters; 1983 Spring: 14-15.
Research results from the last decade of research at the Warren, Pennsylvania, Forestry Sciences Laboratory have been capsulized into a system of stand inventory, analysis, and prescription. The system, called SILVAH, for Silviculture of Allegheny Hardwoods, is available for both manual and computer implementation. This paper briefly summarizes the inventory procedures, analysis techniques, and prescription-identification procedure called for by the system, and refers the reader to sources of further information.

Talerico, Robert L. **Summary of life history and hosts of the spruce budworms.** In: Proceedings, forest defoliator--host interactions: A comparison between gypsy moth and spruce budworms; 1983 April 5-7; New Haven, CT. Gen. Tech. Rep. NE-85. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983: 1-4.

Talerico, Robert L.; Montgomery, Michael, tech. coords. **Proceedings, forest defoliator--host interactions: A comparison between gypsy moth and spruce budworms;** 1983 April 5-7; New Haven, CT. Gen. Tech. Rep. NE-85. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 141 p.
Fosters communication between researchers with active research projects designed to understand the relationships between the host plant and forest defoliator feeding behavior, growth, and reproduction.

Tilghman, Nancy G. **Breeding birds of urban woodlands.** In: Yahner, Richard H., ed. Transactions of the

Northeast Section, The Wildlife Society: 40th Northeast Fish and Wildlife Conference; 1983 May 15-18; West Dover, VT. Publisher unknown ; 1983: 170. Poster session abstract.
The effects of size of woodland, general vegetation characteristics, and level of human activity on the breeding bird communities of 32 isolated urban woodlands were examined.

Tilghman, Nancy G. **Deer densities and forest regeneration.** In: 1st Eastern wildlife damage control conference, presentation summaries; 1983 September 27-30; Ithaca, NY. Ithaca, NY: Cornell University; 1983: 17. Abstract.

Timson, Floyd G. **The personal-use firewood program on three national forests: a cost analysis.** Res. Pap. NE-527. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 8 p.
The national forests' personal-use firewood program was studied to determine operating costs. Seventeen national forest districts studied expended more than $148,000 to provide more than 25,000 personal-use firewood permits during the calendar year 1981; 86 percent of the permits were for freewood, mostly dead or down wood. The remaining 14 percent was for greenwood sold to households in the form of pickup load sales or personal-size boundaries of marked timber.

Timson, Floyd G. **Size-volume classification of Appalachian hardwood sawlog harvesting residue.** Southern Journal of Applied Forestry. 7(1): 24-26; 1983.
Length and diameter, not quality, limit the use of low-grade roundwood in a number of wood manufacturing processes; therefore the length, diameter, and volume relationship was examined for bolewood hardwood logging residue from sawlog-only harvesting operations. Estimations were made of available residue by length and minimum diameter as well as the volume of bolts or logs of a given diameter and length that can be cut from bolewood residue.

Tippett, J. T.; Bogle, A. L.; Shigo, A. L. **Response of balsam fir and hemlock roots to injuries.** European Journal of Forest Pathology. 12: 357-364; 1983.
Drill wounds in balsam fir and hemlock roots activated the nonspecific resistance mechanisms of compartmentalization in wood and necrophylactic periderm in bark. Tangential bands of resin ducts localized around the wounds constituted the barrier zones in the secondary xylem of conifer roots. Barrier zones were more extensive in roots that showed symptoms characteristic of invasion by fungi and bacteria after wounding. This observation supports an expanded definition of barrier zones; barrier zones may form not only in response to mechanical wounds but also in response to xylem injury caused by pathogens.

Tritton, L. M.; Martin, C. W.; Hornbeck, J. W.; Pierce, R. S.; Federer, C. A. **Organic matter and nitrogen content of a central hardwood forest in Connecticut.** In: Proceedings, 4th central hardwood forest conference; Lexington, KY; Lexington, KY: University of Kentucky; 1982: 271-284.
Four adjacent, 6-ha watersheds in a central hardwood forest in Connecticut are being studied to assess the impact of whole-tree and selective harvesting operations on the forest ecosystem. Since April 1980 we have been collecting baseline data on species distribution, basal area, mass and nutrient content of aboveground living and dead trees, and on the organic matter and nitrogen content of the soil. Before cutting, dominant oak-birch vegetation in the forest was 80 to 110 years old.

Tritton, Louise M.; Valentine, H. T.; Furnival, G. M. **A new procedure for estimation of tree biomass and nutrient content.** In: Problems in forest biomass mensuration and growth and yield studies; 1983 October 3-7; Orleans, France. No. 19. Paris: National Institute of Agronomy Research; 1983: 335-341.
A new procedure for estimation of tree biomass was developed and field-tested on eight felled trees of various species and diameters. A combination of randomized branch sampling and importance sampling was used to select a disk from each tree with probability proportional to size. The fresh weight of each tree was estimated from the weight-per-unit-thickness of the appropriate disk, and the estimate was compared with the actual fresh weight of the tree. Sampling errors ranged from 5.6 to 14.4 percent of the actual fresh weights of the trees. The procedure described is efficient, accurate, and can be used to estimate dry weight, volume, or nutrient content as well as fresh weight.

Tubbs, Carl H. **Avoidance mechanisms in allelopathic relationships of sugar maple and yellow birch.** In: America's hardwood forests—opportunities unlimited. Proceedings, 1982 convention of the Society of American Foresters; 1982 September 19-22; Cincinnati, OH. Washington, DC: Society of American Foresters; 1983: 189-193.
Seedling sugar maple survive far better than yellow birch in environments suitable for good growth of both even though birch is the faster growing species. One reason for the success of maple when growing with birch is that maple produces a chemical that inhibits growth of birch. In spite of this and other advantages of maple, some birch survive; apparently birch and maple partition the soil resource since their root-growth rhythms are opposed. Other possibilities for escape of birch from maple competition are discussed.

Tubbs, Carl H. **Regeneration of quality northern hardwoods.** In: Proceedings, hardwood forest management and utilization symposium; 1982 October 25-26; Orono, ME. Misc. Rep. 279. Orono, ME: University of Maine, Maine Agricultural Experiment Station; 1983: 6-9.
The regeneration of high-quality northern hardwoods and the means of attaining regeneration objectives are discussed.

Tubbs, Carl H.; Jacobs, Rodney D.; Cutler, Dick. **Northern hardwoods.** In: Silvicultural systems for the major forest types of the United States. Agric. Handb. 445. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 121-127.

U.S. Department of Agriculture, Forest Service. **Wood defects - from tree to product.** NE-INF-55-83. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 9 p.

Valentine, Harry T. **An approach to modeling the consequences of beech mortality from beech bark disease.** In: Proceedings, I.U.F.R.O. beech bark disease working party conference; 1982 September 26 - October 8; Hamden, CT. Gen. Tech. Rep. WO-37. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 134-137.
Changes to an extant model of forest growth and transition that allow an evaluation of the consequences of beech bark disease are outlined. Required are a function to scale beech growth for the effects of beech bark disease, a function to predict beech mortality from beech bark disease, and a function that predicts root-sprout regeneration of beech.

Valentine, Harry T. **Budbreak and leaf growth functions for modeling herbivory in some gypsy moth hosts.** Forest Science. 29(3): 607-617; 1983.
Functions are reported that predict percent budbreak and average leaf dry weight from elapsed degree-days (threshold = 4.4°C) for six important hosts of the gypsy moth: Quercus alba, Q. rubra, Q. velutina, Fagus grandifolia, Acer rubrum, and A. saccharum. Budbreak observations are summarized for Betula lenta and B. alleghaniensis. Day 105 was the best single date to start counting degree-days to predict percent budbreak for all species, years, and locations. Simultaneous solution of the red oak leaf growth function and published gypsy moth larval growth and consumption functions predicted that an average larva will consume about 1,115 mg dry leaf weight, and drop about 156 mg.

Valentine, Harry T. **Defoliation induced changes in foliage chemistry and effects on gypsy moth pupal weight.** In: Parker, Bruce L.; Hanson, Patricia M.; Teillon, H. Brenton, eds. Proceedings, 15th annual Northeastern forest insect work conference; 1982 March 11; Portland, ME. MP 108. Burlington, VT: University of Vermont Agricultural Experiment Station; 1983: 2. Abstract.
Results of induced defoliation showed that the concentration of most constituents changed from year to year and that defoliation treatment did little to augment these changes in either species.

Valentine, Harry T. **The influence of herbivory on the net rate of increase of gypsy moth abundance: A modeling analysis.** In: Proceedings, forest-defoliator--host interactions: A comparison between gypsy moth and spruce budworms; 1983 April 5-7; New Haven, CT. Gen. Tech. Rep. NE-85. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983: 105-111.
A differential equation model of gypsy moth abundance, average larval dry weight, and food abundance was used to analyze the effects of changes in foliar chemistry on the net per capita rate of increase in a gypsy moth population. If relative consumption rate per larva is unaffected by herbivory, a reduction in the nutritional value of foliage reduces the net rate of increase at relatively low larval densities, and increases the larval density needed to bring about starvation. This result is achieved by reducing larval assimilation efficiency, or by increasing larval death rate, or both, in response to declining nutritional value of foliage associated with herbivory.

Valentine, Harry T.; Wallner, William E.; Wargo, Philip M. **Nutritional changes in host foliage during and after defoliation, and their relation to the weight of gypsy moth pupae.** Oecologia (Berlin). 57: 298-302; 1983.
Black oak and gray birch trees were defoliated in 0, 1, 2, or 3 successive years. Concentrations of 8 minerals, 4 sugars, and 25 amino acids in the foliage of these trees were measured when gypsy moth reared on them were in instars I, III, IV, and V. These concentrations were tested for changes among years, and changes due to previous- and current-year defoliations. Most foliar constituents varied in concentration from year to year, though relatively few were affected by current or previous defoliations. Some implications of the apparent relations for gypsy moth larval growth and population dynamics are discussed.

Vogel, Willis G. **Ecological considerations in designing and selecting reclamation equipment.** In: Vegetative rehabilitation & equipment workshop: 37th annual report; 1983 February 13-14; Albuquerque, NM. Missoula, MT: Equipment Development Center, USDA Forest Service; 1983: 59-63.
It has been recommended that the Vegetative Rehabilitation and Equipment Workshop identify and promote a better understanding of the ecology of the land to be treated as a first step in designing and modifying equipment. The precept also is applicable to the selection of existing equipment. This paper describes where and how ecological principles may relate to and be considered in the design, modification, and selection of equipment for reclaiming and vegetating disturbed lands.

Vogt, A. R.; Redett, R. B.; Foulger, A. N.; Barnard, J. E. **Ohio's forests are growing.** Ohio Woodlands. 21(4): 4-5, 9; 1983.

Wallace, Oliver P.; Leak, William B. **Returns from short-term ownership of two northern hardwood lots.** In: Proceedings, New England section 63rd annual winter meeting; the future of forests in New England and Eastern Canada; 1983 March 9-11; Burlington, VT. SAF 83-05, Book II. Burlington, VT: New England Section, Society of American Foresters; 1983: 107-111.
Timberland ownership in New England traditionally has had a high turnover rate. Average tenure varies from about 10 to 25 years, depending upon the type of owner. We have assumed a 15-year ownership period, and attempted to assess the consequences of such short tenure on the management of non-industrial woodlots in New Hampshire.

Wallin, Walter B. **Computerized pallet design procedures are here to stay.** Pallet Enterprise. 2(6): 23-24; 1983.

During the past 10 years, the pallet manufacturing industry has graduated from using a trial-and-error process for designing pallets to adoption of a sophisticated computerized process employing the newest engineering design procedures coupled with an economic evaluation of the design. This procedure enables the manufacturer to employ any desired mix of species to produce a pallet that will safely support the loads intended and provide the buyer a pallet with the desired life expectancy and cost per trip. The future of the pallet producing industry is committed to using computers as a necessary tool which is equally as essential as the saws and nailing machines.

Wallin, Walter B.; Whitenack, Kenneth R. **Application of joint performance criteria to pallet design.** Pallet Enterprise. 1(5): 24-26; 1982.

Wallin, Walter B.; Whitenack, Kenneth R. **Fastener equivalence guides—supplementary considerations.** Pallet Enterprise. 2(1): 25-27; 1982.

Wallin, Walter B.; Whitenack, Kenneth R. **Fastener equivalence guides for wooden pallets.** Pallet Enterprise. 1(6): 25-29; 1982.
Procedures are presented for determining equivalent pallet joint performance with respect to the new pallet standards published by the National Wooden Pallet and Container Association. Fastener quality index (FQI) and fastener shear index (FSI) are discussed as they relate to the joint characteristics and the pallet standards. Nail manufacturers can compute the FQI and FSI for their fasteners from measurements of wire diameter, thread-crest diameter, number of helixes per inch, and MIBANT bend angle. The pallet manufacturer, knowing the FQI and FSI of the fastener, can then determine the appropriate fastener for any pallet construction based on the end-use requirements of the pallet user.

Wallner, William E. **Gypsy moth and the forest land manager.** Connecticut Timber Trends. 4(1): 4,5,8; 1983.
The first of a series of articles aimed at providing woodland owners and managers with information upon which to base their decisions about dealing with the gypsy moth.

Wallner, William E. **Gypsy moth host interactions: A concept of room and board.** In: Proceedings, forest defoliator—host interactions: A comparison between gypsy moth and spruce budworms; 1983 April 5-7; New Haven, CT. Gen. Tech. Rep. NE-85. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983: 5-8.
The influence of host type and condition on the bioecology of gypsy moth are discussed from the viewpoint of room and board. Larval establishment was higher on preferred hosts; less than 5 percent migrated off them. Nonpreferred hosts lost 10 to 25 percent of the larvae. Susceptibility of gypsy moth larvae to nucleopolyhedrosis virus increased following 1 or 2 years of defoliation.

Wallner, William E.; Dubois, Normand R.; Grinberg, Phyllis S. **Alteration of parasitism by Rogas lymantriae (Hymenoptera: Braconidae) in Bacillus thuringiensis-stressed gypsy moth (Lepidoptera: Lymantriidae) hosts.** Journal of Economic Entomology. 76(2): 275-277; 1983.
The addition of a sublethal dose of Bacillus thuringiensis Berliner (Bt) to diet fed to Lymantria dispar (L.) prolonged developmental time of 2nd instars up to 3 days. Extension of developmental time increased parasitism by Rogas lymantriae Watanabe, which prefers 2nd instars less than 5 days old. However, L. dispar larvae fed on Bt-diet yielded significantly fewer female R. lymantriae than those fed only diet; Bt reduced L. dispar larval size and prompted ovipositing R. lymantriae to deposit more unfertilized eggs. Use of a sublethal dose of Bt for initial establishment of R. lymantriae and its effect on the level of parasitization of gypsy moth are discussed.

Walters, Russel S. **Sugar maple sap collection.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 16-24.
Discusses methods for collecting maple sap: bucket collection, plastic bags, and plastic pipelines.

Walters, Russell S. **Sugarbush management.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 25-37.
Discusses management needs for improving and developing sugarbushes.

Walters, Russell S.; Yawney, Harry W. **Sugar maple tapholes.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 8-15.
Discusses characteristics of the tapholes, such as diameter, depth, location, number and so on.

Wargo, Philip M. **Armillaria mellea and mortality of beech affected by beech bark disease.** In: Proceedings, I.U.F.R.O. beech bark disease working party conference; 1982 September 26 - October 8; Hamden, CT. Gen. Tech. Rep. WO-37. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 81-88.
The role of Armillaria mellea in the mortality of beech trees affected by beech bark disease was determined by excavating root systems of beech trees infested by beech scale or also infected by the bark fungus, Nectria coccinea var. faginata. Only trees infected by Nectria showed any effect on the root system. They had fewer 4th-order nonwoody branch roots and less starch than trees only infested by scale. A. mellea colonized roots only on Nectria-infested trees and was found consistently on roots associated circumferentially with areas of stem bark necrosis caused by Nectria.

Wargo, Philip M. **Effects and consequences of stress on root physiology.** Journal of Arboriculture. 9(7): 173-176; 1983.

Because roots are out of sight, they are too often out of mind when the effects of stress on overall tree condition are considered. A description and discussion of tree root structure and function is followed by some basic information on root physiology. The effects of various stresses that affect the roots directly and indirectly are considered in relation to root structure and physiology, and the consequences of altered root physiology on tree health are discussed.

Wargo, Philip M. **The interaction of Armillaria mellea with phenolic compounds in the bark of roots of black oak.** Phytopathology. 73(5): 838; 1983. Abstract A574.

Wargo, Philip M.; Houston, David R.; LaMadeleine, Leon A. **Oak decline.** For. Insect & Dis. Leafl. 165. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983. 8 p.
Oak decline is initiated by stresses, which can disappear before effects are manifested. A systematic evaluation of the problem can usually reveal the initiating factors and the agents responsible for mortality. Practices to promote good tree health can reduce the potential impacts of damage by oak decline.

Wargo, Philip M.; Montgomery, Michael E. **Colonization by Armillaria mellea and Agrilus bilineatus of oaks injected with ethanol.** Forest Science. 29(4): 848-857; 1983.
Roots of undefoliated black and white oaks were injected with water or ethanol (5, 20, or 50 percent) to determine if ethanol could induce invasion by Agrilus bilineatus and/or Armillaria mellea--two secondary invaders commonly associated with mortality of defoliated trees. Trees of both species injected with 50 percent ethanol experienced greater attack by A. bilineatus and had the greatest amount of tissue necrosis up the stem than trees in the other treatments. A. mellea colonized roots of both oak species that were injected with 20 or 50 percent ethanol, but colonization was greater in trees injected with 50 percent ethanol. The fungus was confined mainly to tissues killed by the ethanol.

Wartluft, Jeffrey L. **How to season firewood.** Popular Mechanics. 160(3): 122; 1983.
Ten cords of Appalachian hardwood firewood were tested to determine drying time and the effect of season of year, species, piece length, splitting, stacking method, exposure, cover, and solar assistance on the drying rate. Results indicated that firewood should be cut to length, split, and covered at least 4 summer months before the heating season. Use of a solar dryer can double the summer drying rate.

Wartluft, Jeffrey L. **Seasoning Appalachian hardwood firewood.** In: Proceedings, 6th international FPRS industrial wood energy forum '82; 1982 March 8-10; Washington, DC. Dubuque, IA: Kendall/Hunt Publishing Company; 1983: 175-186. Vol. 1.

Wendel, G. W.; Della-Bianca, Lino; Russell, James; Lancaster, Kenneth F. **Eastern white pine, including eastern hemlock.** In: Final environmental impact statement for the regional guide--Eastern Region. Milwaukee, WI: U.S. Department of Agriculture, Forest Service, Eastern Region; 1983: D-74-84.

Wendel, G. W.; Della-Bianca, Lino; Russell, James; Lancaster, Kenneth F. **Eastern white pine, including eastern hemlock.** In: Silvicultural systems for the major forest types of the United States. Agric. Handb. 445. Washington, DC: U.S. Department of Agriculture, Forest Service; 1983: 131-134.

Weseloh, R. M.; Andreadis, T. G.; Moore, R. E. B.; Anderson, J. F.; Dubois, N. R.; Lewis, F. B. **Field confirmation of a mechanism causing synergism between Bacillus thuringiensis and the gypsy moth parasitoid, Apanteles melanoscelus.** Journal of Invertebrate Pathology. 41: 99-103; 1983.

Wharton, Eric H. **Changing attitudes about tree merchantability in the Northeast.** Northern Logger. 32(7): 16-17; 1983.
Merchantability limits only recently have been extended to include tree tops, poorly formed trees, rotten trees, and small trees. This increased resource is being recovered today by whole-tree chipping. Recent tree biomass studies show that 47 percent of the total resource is in nonconventional sources of wood material.

Wharton, Eric H.; Bones, James T. **Biomass assessment of the aboveground wood resource.** In: Proceedings, 6th international FPRS industrial wood energy forum '82. 1982 March 8-10; Washington, DC. Dubuque, IA: Kendall/Hunt Publishing Co.; 1983: 106-109.
In the future, inventory data will be needed for a more complete range of resource attributes so that planners will be able to determine the optimum mix of forest products. For this reason, timber on low productivity lands, dead and down trees, wood on nonforest areas such as fencerows, and scattered trees in urban areas must be given more consideration. And, as wildlife and range habitat information begins to be collected, estimates of shrub biomass will be needed.

White, M. S.; Curtis, M. L.; Sarles, R. L.; Green, D. W. **Effects of outside storage on the energy potential of hardwood particulate fuels: Part I. Moisture content and temperature.** Forest Products Journal. 33(6): 31-38; 1983.
Three fuels—hardwood whole-tree chips, bark, and sawdust—were stored in piles 10, 15, and 20 feet high. Internal pile temperatures rose rapidly during the first weeks to highs of 45°C for whole-tree chips and 73°C for bark and sawdust. In the bark and chip piles, these temperatures fluctuated seasonally. The interior temperature of the sawdust pile was insensitive to ambient temperature changes and declined slowly throughout the remainder of the study. Within the first 60 to 120 days of storage, the surfaces of all piles became saturated with moisture. The interior zones of the bark and sawdust piles remained at or slightly above the original moisture content (MC) while the corresponding regions of the chip pile exhibited some drying. After 1 year's time, the weighted average MCs of chips, bark, and sawdust increased by 84, 108, and 191 percent, respectively, over the original MCs.

White, M. S.; Curtis, M. L.; Sarles, R. L.; Green, D. W. **Effects of outside storage on the energy potential of hardwood particulate fuels: Part II. Higher and net heating values.** Forest Products Journal. 33(11/12): 61-65; 1983.

Higher heating values of hardwood whole-tree chips, bark, and sawdust declined by 9, 7, and 3 percent, respectively by the end of 1 year. These decreases, coupled with increases in moisture content, resulted in significant declines in average net heating values. After 1 year of storage in 15-foot piles, average net heating values of whole-tree chips, sawdust, and bark declined by 24, 40, and 50 percent, respectively. Over half of the decline took place in the first 60 days. Whole-tree chips lost less when stored in 20-foot piles than when stored in 10- or 15-foot piles. Losses can be reduced by storing larger sized particles, increasing pile heights, and shortening storage cycles to 60 days or less.

Wiant, H. V., Jr.; Lamson, N. I. **Site index equations for evenaged stands in northwestern West Virginia.** West Virginia Forestry Notes. 10: 11-12; 1983.

Equations are presented for previously published site-index prediction tables for northern red, scarlet, black, white, and chestnut oaks in northwestern West Virginia. For northern red, scarlet, and black oaks, 88 percent of the formula values were within ±1 foot of the table values; for white and chestnut oaks 93 percent of the formula values were within ±1 foot of the table values.

Widmann, Richard H. **Pulpwood production in the Northeast—1981.** Resour. Bull. NE-76. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 23 p.

This annual report contains information compiled from a canvass of all pulpmills that use pulpwood produced in the 14 Northeastern states. From 1980 to 1981, pulpwood production decreased 2 percent, roundwood production dropped less than 1 percent, and chipped residues dropped 6 percent. Current pulpwood production is 8.3 million cords, of which 6.1 million cords are roundwood and 2.2 million cords are from chipped manufacturing residues.

Widmann, Richard H. **Pulpwood production in the Northeast—1982.** Resour. Bull. NE-79. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 22 p.

The annual report contains information compiled from a canvass of all pulpmills that use pulpwood produced in the 14 Northeastern states. In 1982, 6.3 million cords of pulpwood roundwood were harvested from the forests of the Northeast Region. This was a new high for roundwood production. In addition, 2.1 million cords of chipped sawmill slabs, edgings, and other manufacturing residues were used for the production of pulp. Total pulpwood production was 2 percent more than the 1981 production, making the 1982 production just shy of the record high set for the Northeast in 1980.

Widmann, Richard H.; Brooks, Robert T., Jr.; Rowland, E. Bruce. **Pulpwood harvest intensity in the Northeast—1981.** Tech. Note B51. Norris, TN: Tennessee Valley Authority, Division of Land and Forest Resources; 1983. 19 p.

Graphics illustrating 1981 data for pulpwood production and intensity are shown by county for 14 Northeastern states. A brief explanation of the graphics is included.

Wilkinson, R. C. **A reexamination of the relationship between bark thickness and susceptibility of eastern white pine to white-pine weevil attack.** In: Proceedings, 28th Northeastern forest tree improvement conference; 1982 July 7-9; Durham, NH. Durham, NH: University of New Hampshire; 1983: 134-139.

The relationship between bark thickness at breast height and susceptibility of eastern white pine to repeated attacks by the white-pine weevil was reexamined. The least weeviled trees in a 25-year-old provenance test plantation had the thinnest bark, but overall the correlation between number of weevil attacks and bark thickness was low (r=.24). The least weeviled trees were also the smallest in diameter at breast height (d.b.h.), and the correlation between d.b.h. and bark thickness was high. Mean bark thickness adjusted for variation in d.b.h. by covariance analysis was not significantly related to numbers of weevil attacks, and bark thickness varied widely within trees. Therefore, bark thickness at breast height does not seem to be a reliable criterion for distinguishing highly susceptible from more weevil-resistant white pines.

Wilkinson, R. C. **Seed source variation in susceptibility of eastern white pine to white-pine weevil attack.** In: Proceedings, 28th Northeastern forest tree improvement conference; 1982 July 7-9; Durham, NH. Durham, NH: University of New Hampshire; 1983: 126-133.

Variation in susceptibility of 21 geographic seed sources of eastern white pines to white-pine weevil attacks over an 11-year period in a southern Maine provenance test plantation was examined. Trees from southern and western sources were among the most heavily weeviled but there also was stand-to-stand variation within states. Seed collections from weevil-resistant stands could be used for reforestation of white pine in high-risk areas of New England.

Wilkinson, Ronald C. **Leader and growth characteristics of eastern white pine associated with white pine weevil attack susceptibility.** Canadian Journal of Forest Research. 13(1): 78-84; 1983.

Seven morphological and growth characteristics of 208 eastern white pine leaders, measured when the trees were 22 years old, along with heights and diameters were examined in relation to susceptibility to white-pine weevil attack.

Willis, Raymond B.; Mullins, Gregory L. **Automated analysis for water alkalinity.** Analytical Chemistry. 55(7): 1175-1176; 1983.

The automated method for determining alkalinity has been modified to enable measurement of concentrations from 10 to 500 mg/l of $CaCO_3$. Previous automated methods did not allow measurements below 100 mg/l. Results obtained with two automated instruments and the manual titration method were compared.

Wilson, C.; Shigo, A. L.; Pusey, A. **Long live the peach tree.** American Fruit Grower. 1983 February: 22-24.

Wood, Robert E.; Wargo, Philip M. **Biological evaluation. Rate of decline of Rio Grande cottonwoods subjected to flood plain aggradation and other environmental stresses.** Albuquerque, NM: U.S. Department of Agriculture, Southwestern Region, State and Private Forestry, Forest Pest Management; 1982; For. Pest Mgmt. Rep. R-3 83-4. 6 p.

Rio Grande cottonwoods growing in the wash running through the Chaco Canyon in Chaco Culture National Historical Park, New Mexico, were examined in September of 1982 to determine the extent of dieback and decline caused presumably by a late spring frost in May 1980. Excavation and observation indicated that flood plain aggradation in the wash is continually burying the roots of the tree creating an unfavorable environment for growth and reproduction of the trees. Dieback of the trees had been occurring since at least the mid 1970's and was accelerated, not caused, by the spring freeze in 1980. Except for a few scattered individuals the stand will be dead by 2000 AD; it can only be maintained by artificial regeneration.

Yaussy, D. A.; Brisbin, R. L. **Multivariate regression model for predicting lumber grade volumes of northern red oak sawlogs.** Res. Pap. NE-536. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 11 p.

A multivariate regression model was developed to predict green board-foot yields for the seven common lumber grades processed from northern red oak factory logs. The model may be modified to predict various combinations of lumber grades.

Yawney, Harry W. **Planting sugar maple.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 53-60.

Discusses conditions for planting sugar maple on a suitable site with weed control and protection from animal damage.

Yawney, Harry W.; Donnelly, John R. **Rooting and overwintering sugar maple cuttings.** In: Sugar maple research: sap production, processing, and marketing of maple syrup. Gen. Tech. Rep. NE-72. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982: 61-70.

Discusses rooting sugar maple cuttings, which are the major emphasis in the Northeastern Forest Experiment Station's vegetative propagation program.

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Adams, Edward L.	Princeton
Anderson, R. Bruce	Princeton
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Auchmoody, Luther R.	Warren
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Barnard, Joseph E.	Broomall
Berry, Frederick H.	Delaware
Biller, Cleveland J.	Morgantown
Birch, Thomas W.	Broomall
Blum, Barton M.	Orono
Bonyai, Susan A.	Burlington
Brisbin, Robert L.	Delaware
Brooks, Robert T.	Broomall
Cannon, William N.	Delaware
Carey, Andrew B.	Morgantown
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Considine, Thomas	Broomall
Corbett, Edward S.	University Park
Craft, Edward P.	Princeton
Crawford, Hewlette	Amherst
Cuppett, Donald G.	Princeton
Davidson, Walter H.	Princeton
DeGraaf, Richard M.	Amherst
Demeritt, M. E., Jr.	Durham
Dempsey, Gilbert P.	Princeton
Dennis, Donald F.	Broomall
DeVito, Anita S.	Hamden
Dochinger, Leon S.	Delaware
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Hoyle, Merrill C.	Durham
Huyler, Neil K.	Burlington
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Jensen, Keith F.	Delaware
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Kochenderfer, James N.	Parsons
Lamson, Neil I.	Parsons
LaPage, Wilbur F.	Durham
Lautenschlager, R. A.	Amherst
Leak, William B.	Durham
Leonard, Raymond E.	Durham
Lewis, Franklin B.	Hamden
Luppold, William G.	Princeton
McManus, Michael L.	Hamden
Marquis, David A.	Warren
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Montgomery, Michael	Hamden
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Nevel, Robert	Broomall
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