



**A Bibliography  
Supplement**

# **Trail Planning, Construction and Maintenance**

**Jean Albrecht**

**UNIVERSITY OF MINNESOTA**

**Miscellaneous Publication 76-1992  
Minnesota Agricultural Experiment Station**



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**St. Paul, Minnesota**

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***Acknowledgements***

The author thanks these three people for their assistance in the production of this bibliography: Cheryl Owens, library assistant in the Forestry Library, for her efforts to obtain the documents cited; Vicki Raffle, graduate student in the College of Natural Resources, for her support and programming efforts, and Robert Stolzman, student assistant in the Forestry Library, for data entry.

Publication design and development for the Minnesota Agricultural Experiment Station is by Larry A. Etkin, experiment station editor, Educational Development System, University of Minnesota. Copyediting and preparation assistance provided by Beau Morseth.

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Cover Photo: Root River Trail near Lanesboro, Minnesota, by Jean Albrecht.

## ***Preface***

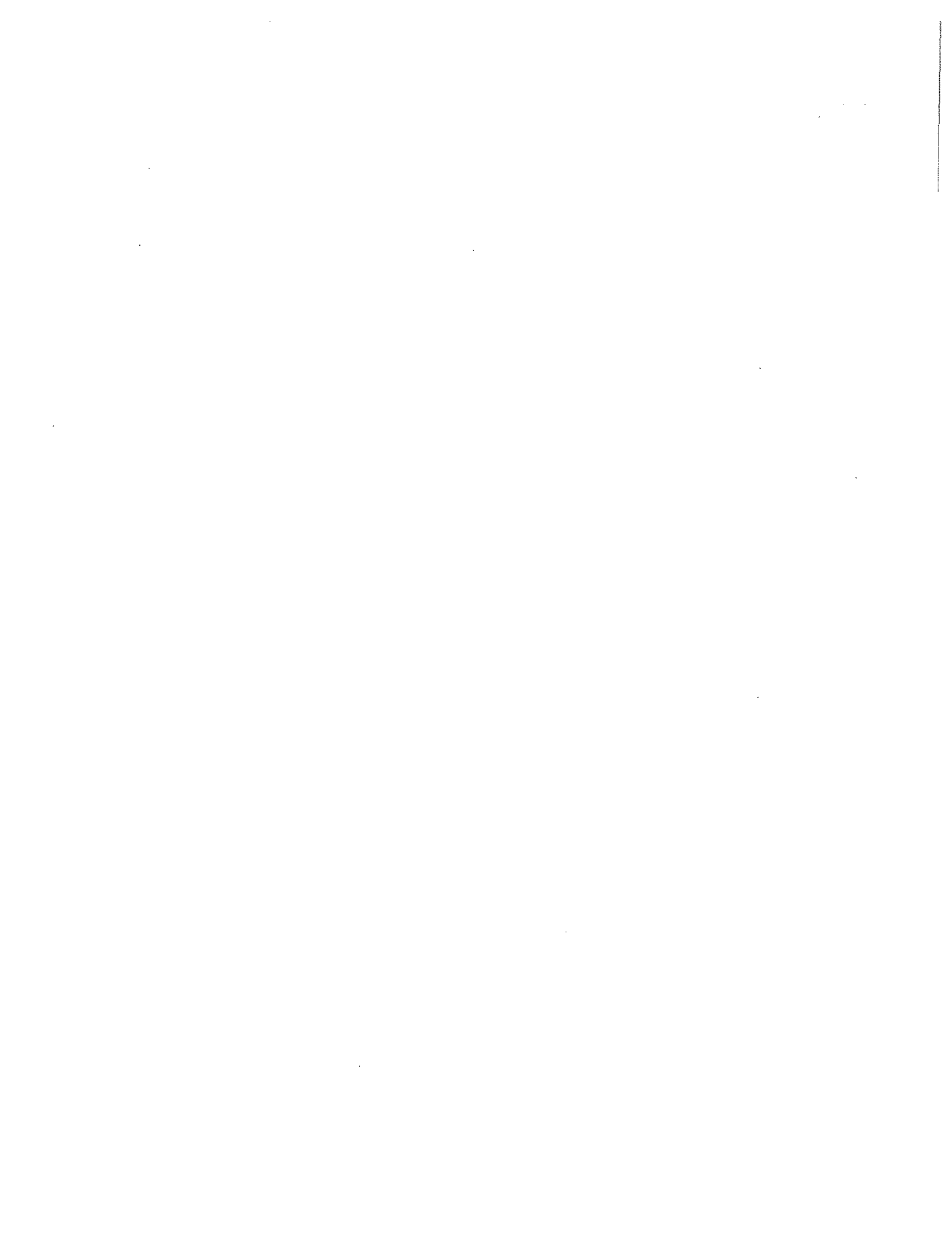
This publication is a supplement to *Trail Planning, Construction, and Maintenance: A Bibliography*, published in 1984 as University of Minnesota Agricultural Experiment Station Miscellaneous Publication no. 26.

The purpose of the bibliography is to bring together literature that will enable trail planners, managers, and users to benefit from what others have learned through research and experience.

The arrangement of the bibliography is by subject, beginning with sections relating to specific types of trail use. The section on trail use studies contains research reports or investigations of trail users and the trails themselves. The planning documents section is concerned with specific geographical areas and trails at all levels of development, from federal to municipal. The final section deals with general trail development. In this section, references are grouped into major problem areas such as trail acquisition, financing, planning and design, construction, and maintenance.

All of the publications cited in this bibliography can be found in the University of Minnesota Libraries. Loans or photocopies of these publications are available from the Interlibrary Loan Division, St. Paul Campus Libraries, 1984 Buford Avenue, St. Paul, MN 55108.

Jean Albrecht  
April, 1992



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# TRAIL PLANNING, CONSTRUCTION AND MAINTENANCE

## A BIBLIOGRAPHY SUPPLEMENT

Jean Albrecht

### TRAIL USES

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#### BICYCLE TRAILS

- 1 Abraham, J., 1989. Bicycle paths and trails: Practical approaches to resolving user conflicts. In: Bicycle Federation of America. Pro Bike 88: Proceedings of the Fifth International Conference on Bicycle Programs and Promotions, Tucson, Arizona, Oct. 8-12, 1988. Washington, D.C., Bicycle Federation of America, Inc. pp. 151-154.  
  
includes design guidelines for hiking trails, off road vehicle trails, bicycle trails, canoe trails, equestrian trails, handicap trails, and interpretive trails.
- 2 Arizona Bicycle Task Force, 1988. Arizona bicycle facilities planning and design guidelines. [Phoenix] Arizona Bicycle Task Force, Facilities Planning Committee. 122 pp.  
  
The purpose of this publication is "to provide for more uniformity in the planning, design and construction of bicycle facilities."
- 3 Baker, N., 1990. Mountain bike management: A tale of three cities. *Western Wildlands* 16(3):36-39.  
  
Describes the ways in which the cities of Missoula, Montana, Boulder, Colorado, and Crested Butte, Colorado dealt with trail conflicts, etc. created by mountain bikes.
- 4 Ballantyne, R., 1979. Considerations for trail design in the State of Louisiana: A handbook of guidelines for trail development in the Pelican State. Louisiana Division of Outdoor Recreation. 87 pp.
- 5 Bicycle Federation of America, 1989. Pro Bike 88: Proceedings of the Fifth International Conference on Bicycle Programs and Promotions, Tucson, Arizona, Oct. 8-12, 1988. Washington, D.C., Bicycle Federation of America, Inc. 274 pp.
- 6 Bicycle Federation of America, 1991. Pro Bike 90: Proceedings of the Sixth International Conference on Bicycle Programs and Promotions, Arlington, VA and Washington, DC, Sept., 1990. Washington, DC, Bicycle Federation of America, Inc. 194 pp.
- 7 Bishop, D., 1989. Design standards: What we have and what we need. In: Bicycle Federation of America. Pro Bike 88: Proceedings of the Fifth International Conference on Bicycle Programs and Promotions, Tucson, Arizona, Oct.8-12, 1988. Washington, D.C., Bicycle Federation of America, Inc. pp. 163-166.
- 8 Black, C., 1989. Low cost improvements for bicycle facilities. In: Bicycle Federation of America. Pro Bike 88: Proceedings of the Fifth International Conference on Bicycle

- Programs and Promotions, Tucson, Arizona, Oct. 8-12, 1988. Washington, D.C., Bicycle Federation of America, Inc. pp. 158-162.
- 9 English, J.W., 1986. Liability aspects of bikeway designation: A special report. Washington, D.C., Bicycle Federation of America. 62 pp.
- 10 Gobster, P.H., 1988. Urban bicycle trails: Use patterns and user preferences. *Trends* 25(3):21-25.
- A case study of the North Branch Bicycle Trail in Chicago.
- 11 Grost, R.T., 1989. Managing the mountain bike. *American Forests* 95(3/4):50-53,75-77.
- 12 Harnik, P., 1991. From rails to trails: Converting abandoned rail corridors into bikeways. In: Bicycle Federation of America. *Pro Bike 90: Proceedings of the Sixth International Conference on Bicycle Programs and Promotions*, Arlington, VA and Washington, DC, Sept., 1990. Washington, DC, Bicycle Federation of America. pp 96-97.
- 13 Jacoby, J., 1990. Mountain bikes: A new dilemma for wildland recreation managers? *Western Wildlands* 16(1):25-28.
- Considers several management issues: (1) Should ATBs be allowed free access to backcountry trails, or should they be restricted as motorized vehicles are? (2) How can conflicts between traditional trail users—hikers and equestrians—be resolved? (3) Do ATBs cause environmental damage?
- 14 Keller, K., 1990. Mountain bikes on public lands: A manager's guide to the state of the practice. Washington, DC, Bicycle Federation of America. 68 pp.
- Includes information on trail review and design.
- 15 Keller, K., Robinson, P., and Seher, J., 1991. Mountain bikes: Planning for shared use. In: Bicycle Federation of America. *Pro Bike 90: Proceedings of the Sixth International Conference on Bicycle Programs and Promotions*, Arlington, VA and Washington, DC, Sept., 1990. Washington, DC, Bicycle Federation of America. pp. 100-102.
- 16 Louisiana Bicycle Advisory Committee, 1990. Report to the 1990 Louisiana Legislature. Louisiana Division of Outdoor Recreation. 13 pp.
- 17 Minnesota Dept. of Transportation, 1983. Bikeway design manual. Minnesota Dept. of Transportation. 45 pp.
- 18 Nevada Legislative Commission, 1990. Study of bicycle safety and bicycle trails in Nevada. Legislative Commission of the Legislative Counsel Bureau, State of Nevada, Bulletin no. 91-2. 132 pp.
- One of the purposes of the study was to evaluate the "desirability and estimated cost of establishing a statewide master plan of bicycle trails." (p.v) Appendices include excerpts from the State of Oregon Bicycle Master Plan, and from the Arizona Bicycle Facilities Planning and Design Guidelines.
- 19 Oregon Dept. of Transportation, 1988. State of Oregon bicycle master plan. Salem, Oregon Dept. of Transportation, Highway Division. 71 pp.
- 20 Oregon Highway Division, 1984. State of Oregon bicycle master plan. Oregon Dept. of Transportation, Highway Division. 71 pp. + map.
- 21 Schwecke, T. et al., 1989. A look at visitors on Wisconsin's Elroy-Sparta bike trail, July-August, 1988. University of Wisconsin, Cooperative Extension Service. 54 pp.
- This study was undertaken to (1) develop a general profile of trail users, and (2) identify the differences and similarities in behavior, trip-related expenditures, and background of users from different market areas. (p.1)
- 22 Smith, D., Jr., 1978. Bikeway planning. *Trends* 15(3):40-46.
- 23 Sorton, A., 1991. Bicycle facility design and legal liability. In: Bicycle Federation of America. *Pro Bike 90: Proceedings of the Sixth International Conference on Bicycle Programs and Promotions*, Arlington, VA and Washington, DC, Sept., 1990. Washington, DC, Bicycle Federation of America, Inc. pp. 50-51.
- 24 Sorton, A., 1989. Bicycle facility design and legal liability. In: Bicycle Federation of America. *Pro Bike 88: Proceedings of the Fifth International Conference on Bicycle Programs and Promotions*, Tucson, Arizona, Oct.8-12, 1988. Washington, D.C., Bicycle Federation of America, Inc. pp. 63-66.
- 25 Spray, R., 1986. The mountain bicycle: Friend or foe? In: *International Congress*

- on Trail and River Recreation, Vancouver, B.C., May 31-June 4, 1986. Proceedings. Vancouver, Outdoor Recreation Council of British Columbia. pp 239-242.
- 26 U.S. National Park Service, 1989. Bicycle trail system study. Phase 1: Corridor study alternatives and environmental assessment; Everglades National Park, Florida. U.S. National Park Service, 42 pp.
- 27 U.S. National Park Service, 1988. Bicycle trail plan, Cape Cod National Seashore, Massachusetts. U.S. National Park Service. 35 pp.
- 28 U.S. National Park Service, 1986. Bike-way needs study, North Beach Developed Area, Assateague Island National Seashore, Maryland. Revised, Nov., 1986. U.S. National Park Service. 23 pp.
- 29 U.S. National Park Service, 1987. Parkwide bicycle trail study/traffic safety study/environmental assessment, Cape Cod National Seashore, Massachusetts. Draft study. U.S. National Park Service. 112 pp.
- 30 Wilkinson, W.C., III and Moran, C.G., 1986. Selecting and designating bicycle routes: A handbook. Washington, D.C., Bicycle Federation of America. 64 pp.
- 31 Wilkinson, W.C., III, 1986. Highway route designation criteria for bicycle routes: Final report. Washington, D.C., Federal Highway Administration, Offices of Research and Development, Report no. FHWA-RD-86/066. 319 pp.
- "This handbook is designed to simplify the task of selecting and designating streets and highways for bike routes."

### SNOWMOBILE TRAILS

- 32 Anderson, D.H., Thompson, J.L., and Sim, S.B., 1991. Minnesota snowmobiling : Results of 1988-89 snowmobile survey. Final report to Minnesota Dept. of Natural Resources, Trails and Waterways Unit, and the Legislative Commission on Minnesota Resources. University of Minnesota, Dept. of Forest Resources. 20 pp.
- This report summarizes data relating to geographic distribution of snowmobile trail use during the 1988-89 season, use of specific types of trails, relative use of specific snowmobile trails (1988-89), distances traveled to snowmobile, and where registered snowmobile owners prefer to have snowmobile revenues spent.
- 33 Colorado Division of Parks and Outdoor Recreation, 1988. Colorado off-highway vehicle recreation plan: State recreational trails program. Denver, Colorado Division of Parks and Outdoor Recreation. 73 pp.
- This is an update of the 1981 State Recreational Trails Master Plan-Motorized. Recommendations are made for support of motorized trail recreation through the State Trails Program. Covers snowmobiles, motorcycles, four-wheel-drive vehicles, and all-terrain vehicles.
- 34 Doyon, M., 1986. Development of the Quebec snowmobile trail system. In: International Congress on Trail and River Recreation, Vancouver, B.C., May 31-June 4, 1986. Proceedings. Vancouver, Outdoor Recreation Council of British Columbia. pp. 71-74.
- 35 Maine Dept. of Conservation, Snowmobile Division, 1984. Snowmobile trail marking techniques. Maine Dept. of Conservation, Bureau of Parks and Recreation, Snowmobile Division. Unpagged folder.
- 36 Minnesota Dept. of Natural Resources, 1985. Minnesota Snowmobile Trails Assistance Program: Instruction manual. Minnesota Dept. of Natural Resources. 23 pp.
- 37 Schomaker, R.W., 1986. Minnesota snowmobiling: Results of 1984-85 snowmobile surveys. Minnesota Dept. of Natural Resources, Trails and Waterways Unit, Trail Programs Section. 40 pp.
- Reports on Minnesota snowmobile trail use.

### OTHER ORV TRAILS

- 38 Ballantyne, R., 1979. Considerations for trail design in the State of Louisiana: A handbook of guidelines for trail development in the Pelican State. Louisiana Division of

- Outdoor Recreation. 87 pp.
- Includes design guidelines for hiking trails, off road vehicle trails, bicycle trails, canoe trails, equestrian trails, handicap trails, and interpretive trails.
- 39 Bury, R.L. and Fillmore, E.R., 1975. Motorcycle area design and location: Impacts on the recreational experience of riders and nonriders. Texas Agricultural Experiment Station and Texas A&M University, Dept. of Recreation and Parks. 8 pp.
- Paper presented at the Workshop for Outdoor Recreation Researchers and Cooperators, Land Between the Lakes National Recreation Demonstration Area, March 9-12, 1975.
- 40 Colorado Division of Parks and Outdoor Recreation, 1988. Colorado off-highway vehicle recreation plan: State recreational trails program. Denver, Colorado Division of Parks and Outdoor Recreation. 73 pp.
- This is an update of the 1981 State Recreational Trails Master Plan-Motorized. Recommendations are made for support of motorized trail recreation through the State Trails Program. Covers snowmobiles, motorcycles, four-wheel-drive vehicles, and all-terrain vehicles.
- 41 Lacey, R.M. and Severinghaus, W.D., 1981. Evaluation of lands for off-road recreational four-wheel drive vehicle use. U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, Technical Report N-110. 79 pp.
- 42 Lacey, R.M. and Balbach, H.E., 1980. Evaluation of areas for off-road recreational motorcycle use. Vol. II: Alternate soil suitability determination methods. U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, Technical Report N-86, vol.2. 52 pp.
- 43 Lacey, R.M., Balbach, H.E., Baran, R.S., and Graff, R.G., 1980. Evaluation of areas for off-road recreational motorcycle use. Vol.I: Evaluation method. U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, Technical Report N-86, vol.1. 70 pp.
- 44 Minnesota Dept. of Natural Resources, 1984. Off-road vehicle use in Minnesota (pursuant to Laws of Minnesota, 1983, Ch.344, Sec.56). Minnesota Dept. of Natural Resources. 94 pp. + appendix.
- 45 Olympia Two-Wheelers Motorcycle Club, 1978. Suggested specifications for trail bike trunk trail. Westerville, Ohio, American Motorcyclist Association. Unpagged pamphlet.
- 46 Roberts, K., 1975. Providing for trail bikes. Australian Parks & Recreation, May, 1975, pp. 17-21.
- 47 Sersland, C.A., 1981. Survey and analysis of Minnesota ORV owners. Minnesota Dept. of Natural Resources, Trails and Waterways Unit. 25 pp.
- The purpose of the survey was to determine the recreational needs of ORV owners such as the locations for ORV use and types of features most important for these locations. Snowmobiles were excluded from the study.
- 48 Tyler, R.M., 1988. A program for off-road vehicle recreation: Planning and management. In: Johnson, J.E., ed. Managing North Central forests for non-timber values: Proceedings of the Fourth Society of American Foresters Region V Technical Conference, Duluth, Nov. 29-Dec. 1, 1988. Bethesda, MD, Society of American Foresters. pp. 103-113.
- This paper describes an ORV management program that was developed by the Michigan Dept. of Natural Resources. Planning, construction, signing, and maintenance of ORV trails are discussed.
- 49 Washington State Interagency Committee for Outdoor Recreation, 1987. 1987 Washington off-road vehicle plan. Tumwater, Washington, Interagency Committee for Outdoor Recreation, Planning Services Division. 57 pp. Includes an assessment of motorized trail needs.
- 50 Wells, C., 1986. A recreational trail bike program: Its value to society. In: International Congress on Trail and River Recreation, Vancouver, B.C., May 31-June 4, 1986. Proceedings. Vancouver, Outdoor Recreation Council of British Columbia. pp. 75-77.
- Discusses a recreational trail bike (ORV) program in Idaho.
- 51 Wells, C., 1980. An outline of the basic criteria needed to develop a trail bike program. Idaho State Parks & Recreation Dept. [18] pp.

Undated; probable date, 1980.

- 52 Wernex, J., 1984. A guide to off-road motorcycle trail design and construction. Wester-

ville, Ohio, American Motorcyclist Association. 39 pp.

### SKI TOURING TRAILS

- 53 Barns, C.V., 1990. Ordering trails from a catalog: An exploratory study to determine cross-country skiers' preferences. University of Minnesota, College of Natural Resources, Plan B Paper. 55 pp. + appendix.

Includes two papers derived from the response to the Minnesota Cross-Country Ski Trails 1989 Catalog: (1) The mail order catalog as a survey technique in establishing trail preferences of cross-country skiers in Minnesota; and (2) Trail preferences of cross-country skiers in Minnesota: Implications for management.

- 54 Gregg, J., 1986. Constructing ski terrain in Colorado in the 1980's. In: Proceedings High Altitude Revegetation Workshop no. 7. Colorado State University, Water Resources Research Institute, Information Series no. 58. pp. 259-267.
- 55 Knopp, T.B. and Barns, C.V., 1988. Mail order ski trails. In: Gaby, E.D., ed. National Trails Symposium, 9th, Unicoi State Park, Georgia, Sept. 11-14, 1988. Proceedings. U.S. Forest Service; Tennessee Valley Authority; National Park Service. pp. 84-86.

The authors describe a catalog format which they developed as a survey instrument to measure user preferences.

- 56 Mjaaland, B., 1981. Cross-country ski facilities in the Oslo forest. In: International Conference on Winter Recreation, Ottawa, 1981. Proceedings. Ottawa, National Capital Commission. pp. 95-98.
- 57 Nordell, P.E., 1984. Mail survey of DNR-assisted cross-country ski trail managers conducted April-May, 1984. Minnesota Dept. of Natural Resources, Trails and Waterways Unit, Trail Planning Section. 13 pp.
- "To investigate the feasibility of standardized cost allocations, trail managers were asked how they had allocated their own time and money over the past year." (p.1)
- 58 Pekuri, R., 1985. Cross-country ski trail planning, development, and operation considerations. U.S. Forest Service, Engineering Field Notes vol.17, Jan.-Feb., 1985, pp. 35-52

### HIKING TRAILS

- 59 Agate, E., 1983. Footpaths: A practical conservation handbook. Wallingford, UK, British Trust for Conservation Volunteers. 192 pp.

This handbook of footpath management was written for those involved in the design, construction, maintenance and repair of paths. It includes sections on path planning, path clearance, drainage, surfacing, erosion control, steps, boardwalks and bridges, stiles and gates, and waymarking.

- 60 Ballantyne, R., 1979. Considerations for trail design in the State of Louisiana: A handbook of guidelines for trail development in the Pelican State. Louisiana Division of Outdoor Recreation. 87 pp.

Includes design guidelines for hiking trails, off road vehicle trails, bicycle trails, canoe trails, equestrian trails, handicap trails, and interpretive trails.

- 61 Burgener, L., 1986. Hiking paths in Switzerland. In: International Congress on Trail and River Recreation, Vancouver, B.C., May 31-June 4, 1986. Proceedings. Vancouver, Outdoor Recreation Council of British Columbia. pp. 23-26.
- 62 Klar, L.R., Jr. and Kavanagh, J.S., 1986. Hiking trail systems in the United States. In: President's Commission on Americans Outdoors. A literature review. Washington, DC, Government Printing Office. pp. Activities 81-89.

- 63 U.S. National Park Service, 1989. Trail plan, New River Gorge National River, West Virginia. U.S. National Park Service. Un-paged, folded map with text on verso.
- Includes guidelines for the design of hiking trails.
- 64 Walker, D. and Harrison, G., 1986. Rehabilitation of alpine hiking trails in the national parks of Canada. In: Proceedings High Altitude Revegetation Workshop no. 7. Colorado State University, Water Resources Research Institute, Information Series no. 58. pp. 204-213.

### **EQUESTRIAN TRAILS**

- 65 Ballantyne, R., 1979. Considerations for trail design in the State of Louisiana: A handbook of guidelines for trail development in the Pelican State. Louisiana Division of Outdoor Recreation. 87 pp.
- Includes design guidelines for hiking trails, off road vehicle trails, bicycle trails, canoe trails, equestrian trails, handicap trails, and interpretive trails.
- 66 Knauf, L.R. and Hammitt, W.E., 1989. Horseback riding experience and its relationship to management of outdoor recreation facilities, services and programs. In: Proceedings 1988 Southeastern Recreation Research Conference, Asheville, NC, Feb. 17-19, 1988. pp. 109-117.
- 67 Miller, J.S., 1983. Construction and maintenance of horse trails in Arkansas state parks. Little Rock, Arkansas State Parks. 32 pp.
- 68 Minnesota Trails and Waterways Unit, 1989. Minnesota's state horse trails. Minnesota Dept. of Natural Resources, Division of Forestry, Division of Parks and Recreation, Trails and Waterways Unit. 11 pp.
- A guide to Minnesota's horse trails.
- 69 Summer, R.M., 1980. Impact of horse traffic on trails in Rocky Mountain National Park. Journal of Soil and Water Conservation 35(2):85-87.
- Disturbances related to the impact of horses on trails were measured. Recommendations for locating and managing horse trails are given.
- 70 U.S. Forest Service, Equipment Development Center, 1988. Techniques and equipment for wilderness horse travel. Revised. U.S. Forest Service, Equipment Development Center, 2300-Recreation, 8123 2804. 42 pp.
- The purpose of this booklet is to instruct wilderness horse travellers regarding good horse handling techniques and innovative equipment in order to minimize negative environmental impact.

### **INTERPRETIVE TRAILS**

- 71 Ballantyne, R., 1979. Considerations for trail design in the State of Louisiana: A handbook of guidelines for trail development in the Pelican State. Louisiana Division of Outdoor Recreation. 87 pp.
- Includes design guidelines for hiking trails, off road vehicle trails, bicycle trails, canoe trails, equestrian trails, handicap trails, and interpretive trails.
- 72 Geiger, R.A., Jr., 1989. National Wildlife Federation's Mountain Laurel Trail. Design A-1053, Summer, 1989, pp. 12-16.
- Describes a self-guiding, fully-accessible nature trail.
- 73 Howe, P., 1990. Update on Chesapeake's nature trail. Washington, DC, American Pulpwood Association, Technical Release 90-R-62. 2 pp.
- Describes the Chesapeake Corporation's public nature trail located near West Point, Virginia.
- 74 Kauffman, R.B., 1979. Owl Trail. Trends 16(2):45-47.
- Describes a rope trail for use by blindfolded people for the purpose of using their non-visual senses.
- 75 Keyes, B.E. and Hammitt, W.E., 1984.

Visitor reaction to interpretive signs on a destination-oriented forest trail. *Journal of Interpretation* 9(1):11-17.

- 76 Knudson, D.M. and Wood, T.L., 1989. Trails that teach. Purdue University, Cooperative Extension Service, Forest Recreation Management Guide F-59. 12 pp.

Describes the construction and maintenance of an interpretive trail. Undated; received in Forestry Library, 1989.

- 77 Trapp, S., Gross, M., and Zimmerman, R.,

1991. Signs, trails, and wayside exhibits: Connecting people and places. Stevens Point, Wis., UW-SP Foundation Press, Inc., Interpreter's Handbook Series [no. 4] 108 pp.

Includes chapters on designing trails, on trail construction and maintenance, and on trail interpretation.

- 78 Young, L., 1984. Interpretive plan for state trails. Final draft. Minnesota Dept. of Natural Resources, Trails and Waterways Unit, Trail Planning Section. 62 pp.

### **FITNESS TRAILS**

- 79 Gill, J., 1986. A guide to building fitness trails. Columbus, Ohio, Publishing Horizons, Inc. 75 pp.

- 80 Hall, K.B., Jr., 1991. Designing fitness trails for seniors. *Parks and Recreation* 26(8):28-31,70.

- 81 Sharkey, B.J., Jukkala, A.H., and Herzberg, R., 1984. Fitness trail: Building, signing, and using the trail. U.S. Forest Service, FS-389. 30 pp.

### **TRAILS FOR THE HANDICAPPED**

- 82 Ballantyne, R., 1979. Considerations for trail design in the State of Louisiana: A handbook of guidelines for trail development in the Pelican State. Louisiana Division of Outdoor Recreation. 87 pp.

Includes design guidelines for hiking trails, off road vehicle trails, bicycle trails, canoe trails, equestrian trails, handicap trails, and interpretive trails.

- 83 Bork, K., 1989. Easy access with Trail Partners. *Parks and Recreation* 24(12):22-26.

Describes the Toledo program, Trail Partners, a service which gives people with disabilities easier access to trails.

- 84 Douglas, R.A., Rickards, E.J., and Golsse, J.M., 1986. Outdoor wheelchair pathways design guidelines for interpretive planners. *Journal of Interpretation* 11(2):33-48.

- 85 Geiger, R.A., Jr., 1989. National Wildlife Federation's Mountain Laurel Trail. Design A-1053, Summer, 1989, pp. 12-16.

Describes a self-guiding, fully-accessible nature trail.

- 86 Lewis, C., 1986. Access to trail and river recreation for people with disabilities. In: International Congress on Trail and River Recreation, Vancouver, B.C., May 31-June 4, 1986. Proceedings. Vancouver, Outdoor Recreation Council of British Columbia. pp. 153-154.

- 87 Nichols, D., 1986. Participation: Trail and river recreation for the differently-able. In: International Congress on Trail and River Recreation, Vancouver, B.C., May 31-June 4, 1986. Proceedings. Vancouver, Outdoor Recreation Council of British Columbia. pp. 155-157.

Describes "the formulation and implementation processes used in the development of a multi-sensory oriented nature trail. . . ." (p.155)

- 88 Park, D.C. and Farbman, A., 1989. Accessible outdoor recreation facilities. Design A-1053, Summer, 1989, pp. 3-11.

Presents the recommendations for accessible trails that were developed by the Federal Working Group on Access to Recreation Facilities.

- 89 Whole Access, 1987. Accessibility and California recreational trails. Redwood City, CA, Whole Access. [14] pp.

## TRAIL USE STUDIES

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### TRAILS

- 90 Bayfield, N.G., 1985. Effects of extended use on footpaths in mountain areas of Britain. In: Bayfield, N.G. and Barrow, G.C., eds. The ecological impacts of outdoor recreation on mountain areas in Europe and North America. Wye, Kent, UK, Recreation Ecology Research Group, R.E.R.G. Report no. 9. pp. 100-111.
- An account of the Recreation Ecology Research Group meeting, Ambleside, Cumbria, Sept., 1983.
- 91 Boucher, D.H. et al., 1991. Recovery of trailside vegetation from trampling in a tropical rain forest. *Environmental Management* 15(2):257-262.
- Co-authors are: J. Aviles, R. Chepote, O.E. Dominguez Gil, and B. Vilchez. The authors studied three trails with varying periods of use and recovery in a tropical rain forest in Costa Rica.
- 92 Bright, J.A., 1986. Hiker impact on herbaceous vegetation along trails in an evergreen woodland of Central Texas. *Biological Conservation* 36:53-69.
- The purpose of this study was to find out how trampling alters the vegetation along the trails in Meridian State Recreation Area.
- 93 Burde, J.H. and Renfro, J.R., 1986. Use impacts on the Appalachian Trail. In: Proceedings—National Wilderness Research Conference: Current Research. U.S. Forest Service, General Technical Report INT-212:138-143.
- 94 Cole, D.N., 1991. Changes on trails in the Selway-Bitterroot Wilderness, Montana, 1978-89. U.S. Forest Service, Research Paper INT-450. 5 pp.
- "Three trails on the Selway-Bitterroot Wilderness were monitored over an 11 year period. Although individual trail segments changed over this period, there was no net erosion from these trail systems." (p.5)
- 95 Cole, D.N., 1990. Ecological impacts of wilderness recreation and their management. In: Hendee, J.C. et al. Wilderness management. 2d ed., revised. Golden, CO, North American Press. pp. 425-466.
- Includes information on recreational impact on trails and monitoring of trail conditions.
- 96 Doucette, J.E. and Kimball, K.D., 1990. Passive trail management in Northeastern alpine zones: A case study. In: More, T.A. et al., eds. Proceedings of the 1990 Northeastern Recreation Research Symposium, Saratoga Springs, NY, Feb.25-28, 1990. U.S. Forest Service, General Technical Report NE-145:195-201.
- "The objective of this study was to quantify the effectiveness of scree walls in protecting and revegetating alpine habitat damaged by hiker trampling in the eastern United States." (p.195)
- 97 Garland, G.G., 1990. Techniques for assessing erosion risk from mountain footpaths. *Environmental Management* 14(6):793-798.
- "The objective of this research was to develop a technique for assessing risk of erosion from footpaths before they are constructed, to be used as a tool for selecting the most viable, cost-efficient routes." The technique was tested on a path in the Drakensberg Mountains in South Africa.
- 98 Hall, C.N. and Kuss, F.R., 1989. Vegetation alteration along trails in Shenandoah National Park, Virginia. *Biological Conservation* 48:211-227.
- "The objective of this study was to determine vegetation changes occurring along trails in an eastern ecosystem supporting second-growth deciduous forest." (p.211)
- 99 Hickler, M.G. and Bratton, S.P., 1979. Patterns of soil erosion and vegetation damage associated with trails and camp-



- sites in Great Smoky Mountains National Park. In: Proceedings of the First Conference on Scientific Research in the National Parks, New Orleans, 1976. 2:1261–1266.
- 100 Kuss, F.R. and Graefe, A.R., 1985. Effects of recreation trampling on natural area vegetation. *Journal of Leisure Research* 17:165–183.
- 101 Kuss, F.R. and Jenkins, W.A., 1985. Effects of footgear design on trail wear: A summary of five years of research. Proceedings Southeastern Recreation Research Conference, 1984. University of Georgia, Institute for Behavioral Research. pp. 39–49.
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- Trampling impact studies were conducted in two eastern forest stands in the White Mountains, New Hampshire. Changes in plant mortality on simulated trails during a trampling period and a recovery period were monitored photographically.
- 106 Marion, J.L., 1988. The design and development of a comprehensive trail survey. In: Gaby, E.D., ed. National Trails Symposium, 9th, Unicoi State Park, Georgia, Sept. 11–14, 1988. Proceedings. U.S. Forest Service; Tennessee Valley Authority; National Park Service. pp. 55–59.
- This paper describes steps designed to guide managers in developing a trail survey for collecting information such as location, condition, maintenance needs, and interpretive features of trails.
- 107 Nagy, J.A.S. and Scotter, G.W., 1974. A quantitative assessment of the effects of human and horse trampling on natural areas, Waterton Lakes National Park. Edmonton, Canadian Wildlife Service. 145 pp.
- 108 Spencer, E.L., Stern, R.J., and Marchand, P.J., 1980. Vegetative and soil responses on the Appalachian National Scenic Trail. In: Proceedings of the Second Conference on Scientific Research in the National Parks, San Francisco, 1979. 9:93–100.
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- Disturbances related to the impact of horses on trails were measured. Recommendations for locating and managing horse trails are given.
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84(11):22-24.

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- 114 Wells, C., 1984. All terrain vehicles on groomed snowmobile trails. Idaho Dept. of Parks and Recreation. 85 pp. + tables.

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- 116 Wilshire, H.G., 1980. The ORV phenomenon—management—impact: The Ballinger Canyon designated motorcycle trail system. In: Andrews, R.N.L. and Nowak, P.F., eds. *Off-road vehicle use: A management challenge*. U.S.D.A., Office of Environmental Quality; University of Michigan, School of Natural Resources; and University of Michigan Extension Service. pp. 78-90.

The author criticizes the designated trail system proposed for Ballinger Canyon as having "no sound foundation for protection of the natural resources of the area." (p.90)

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- 118 Alexander, S.J. and Jansen, G.C., 1977. *Off-road vehicles: Gasoline consumption and patterns of use*. Michigan Dept. of Natural Resources, Office of Surveys and Statistical Services. 19 pp.

- 119 Arkansas Dept. of Parks and Tourism, 1986. 1986 Arkansas statewide trails plan. Arkansas Dept. of Parks and Tourism. 45 pp. + appendix.

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"This paper describes attempts to obtain systematic measurements of conflicts between different users of a canal towing path in northern England." (p.149)

- 121 Barns, C.V., 1990. Ordering trails from a catalog: An exploratory study to determine cross-country skiers' preferences. University of Minnesota, College of Natural Resources, Plan B Paper. 55 pp. + appendix.

Includes two papers derived from the response to the Minnesota Cross-Country Ski Trails 1989 Catalog: (1) The mail order catalog as a survey technique in establishing trail preferences of cross-country skiers in Minnesota; and (2) Trail preferences of cross-country skiers in Minnesota: Implications for management.

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- 123 Bristow, R.S., 1988. The influence of spatial structure on hiking participation. In: Gaby, E.D., ed. *National Trails Symposium, 9th, Unicoi State Park, Georgia, Sept. 11-14, 1988. Proceedings.* U.S. Forest Service; Tennessee Valley Authority; National Park Service. pp. 72-77.
- "The purpose of this paper is to evaluate several measures of spatial structure and to determine the relative significance of each in explaining hiking participation of a statewide sample of Illinois recreationists." (p.72)
- 124 Burde, J.H. and Daum, B.L., 1988. Day hikers at Great Smoky Mountains National Park: Who are they and what do they want? In: Gaby, E.D., ed. *National Trails Symposium, 9th, Unicoi State Park, Georgia, Sept. 11-14, 1988. Proceedings.* U.S. Forest Service; Tennessee Valley Authority; National Park Service. pp. 60-66.
- The objectives of this study were: (1) to assess the magnitude of day hiking in Great Smoky Mountains National Park; (2) to describe the day hiker in terms of demographic characteristics and use patterns; and (3) to identify management problems related to day hiking as perceived by the hikers and management.
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- Effects on hikers of changing the management designation of an area from backcountry to wilderness were examined.
- 130 Gobster, P.H., 1990. The Illinois statewide trail user study: Final report. Springfield, IL, Rails-to-Trails Conservancy, Illinois chapter. 61 pp.
- The aims of the survey were to: 1) determine trail use patterns; 2) identify people's perceptions of and preferences for trails; 3) assess user concern with future trail development issues; 4) profile trail users; and 5) compare study findings across different trail and user groups. Planning and management recommendations for future trail development are included.
- 131 Gobster, P.H., Dwyer, J.F., and Schroeder, H.W., 1988. Trail planning and management: User information is useful information. In: Gaby, E.D., ed. *National Trails Symposium, 9th, Unicoi State Park, Georgia, Sept. 11-14, 1988. Proceedings.* U.S. Forest Service; Tennessee Valley Authority; National Park Service. pp. 67-71.
- This paper describes urban trail research conducted by the U.S. Forest Service's North Central Forest Experiment Station in Chicago.
- 132 Gobster, P.H., 1990. Trends in urban forest recreation: Trail use patterns and perceptions of older adults. In: O'Leary, J.T. et al., eds. *Proceedings of the National Outdoor Recreation Trends Symposium III, Indianapolis, Mar.29-31, 1990.* Sponsored by Indiana University, Dept. of Recreation and Park Administration and others. 1:286-299.

- Trail use by older adults was examined and use and user perceptions were compared across different age groups.
- 133 Gobster, P.H., 1988. Urban bicycle trails: Use patterns and user preferences. *Trends* 25(3):21-25.
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- 134 Gray, J.R. and Fowler, J.M., 1983. Road and trail preferences in the Lincoln National Forest, New Mexico, 1981. New Mexico State University, Agricultural Experiment Station, Research Report 508. 14 pp.
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- This study examined how the satisfaction of backpackers interviewed on two trails in the White Mountains of New Hampshire was affected by user expectations and actual trail use.
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- 138 Huppuch, C. and Pellerin, M., 1985. Validation of trailside registration stations by volunteers. Proceedings Southeastern Recreation Research Conference, 1984.
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- 139 Jackson, E.L. and Wong, R.A.G., 1982. Perceived conflict between urban cross-country skiers and snowmobilers in Alberta. *Journal of Leisure Research* 14(1):47-62.
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- The authors describe a catalog format which they developed as a survey instrument to measure user preferences.
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- 143 Leitch, J.A., West, B.R., and Anderson, R.S., 1983. Characteristics, needs and attitudes of snowmobilers in North Dakota in the eighties. North Dakota State University, Dept. of Agricultural Economics, Agricultural Economics Report no. 175. 39 pp.
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- 147 Manning, R.E. and Potter, F.I., 1982. Wilderness encounters of the third kind: The computer hikes the Appalachian Trail. In: Proceedings of the third annual conference of the Wilderness Psychology Group, West Virginia University, 1982. West Virginia University, Division of Forestry. pp. 1-14.
- This Wilderness Travel Simulation Model was applied to a 63 mile section of the Appalachian Trail in southern Vermont. The model traces or predicts the travel routes of recreationists and records the number of encounters occurring between recreation parties.
- 148 Mitchell, J.E., Schomaker, J.H., and Propst, D.B., 1977. Off-road vehicle users in Idaho: Distribution and activity. University of Idaho, Forest, Wildlife and Range Experiment Station, Bulletin 20. 23 pp.
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- 153 Schomaker, R.W., 1984. Minnesota snowmobiling: Telephone survey of registered snowmobile owners, winter of 1983-84. Minnesota Dept. of Natural Resources, Trails and Waterways Unit, Trail Planning Section. 24 pp.
- 154 Schomaker, R.W., 1986. Minnesota cross-country skiing: Mail survey of licensed cross-country skiers. Minnesota Dept. of Natural Resources, Trails and Waterways Unit, Trail Planning Section. 38 pp.
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- The purpose of the survey was to determine the recreational needs of ORV owners such as the locations for ORV use and types of features most important for these locations. Snowmobiles were excluded from the study.
- 157 Stauty, D.M., Borchert, L.L., and Seybolt, J.W., 1985. Cross-country skier trends and profiles. University of Minnesota-Duluth, Bureau of Business and Economic Research, Working Paper no. 85-17. [43] pp.
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- 159 Watson, A.E., Williams, D.R., and Daigle, J.J., 1991. Sources of conflict between hikers and mountain bike riders in the Rattlesnake NRA. *Journal of Park and Recreation Administration* 9(3):59-71.
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- Discusses the history of the Appalachian Trail, the work of volunteers in maintaining it and the management partnership that exists between state and federal agencies.
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- 179 U.S. Forest Service, Northern Region, 1989. The Continental Divide National Scenic Trail. U.S. Forest Service, Northern Region. [4] pp.
- 180 U.S. Forest Service, Rocky Mountain Region, 1985. Continental Divide National Scenic Trail: Comprehensive plan. U.S. Forest Service. 79 pp. + figures + appendix.
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- Presents four possible alternatives for implementing the New Jersey Coastal Heritage Trail concept.
- 189 U.S. National Park Service, 1987. Parkwide bicycle trail study/traffic safety study/environmental assessment, Cape Cod National Seashore, Massachusetts. Draft Study. U.S. National Park Service. 112 pp.
- 190 U.S. National Park Service, 1990. Paved recreational trails of the National Capital Region: Recommendations for improvements and coordination to form a metropoli-

tan multi-use trail system. U.S. National Park Service. 115 pp.

- 191 U.S. National Park Service, 1991. Report on America's national scenic, national historic, and national recreation trails, 1989-1990. U.S. National Park Service. 25 pp.

Describes the four types of trails that make up the National Trails System and includes information on NPS expenditures for long-distance trails.

- 192 U.S. National Park Service, 1990. Rivers and trails conservation. 1989 annual report of the Rivers and Trails Conservation Programs. U.S. National Park Service. 20 pp.

The National Park Service provides national leadership and assistance on federal, state and local efforts to establish trails.

- 193 U.S. National Park Service, 1990. Roads and trails study and environmental assessment, Ozark National Scenic Riverways. Draft. U.S. National Park Service. [130] pp. + maps.

The study covers roads and traces, horse trails, and foot trails. The purpose of the study was to inventory, classify, and develop management strategies for the roads and trails system. The trails system was evaluated as to its effectiveness in meeting visitor needs while protecting natural resource values.

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- 195 U.S. National Park Service, 1989. The Masau Trail comprehensive management

plan. Draft. Santa Fe, New Mexico, National Park Service, Southwest Regional Office. 28 pp. + maps.

The trail is to use existing public roads to link prehistoric and historic cultural sites in New Mexico and Arizona.

- 196 U.S. National Park Service, 1986. Trail plan, environmental assessment, Buffalo National River, Arkansas. Draft. U.S. National Park Service. 51 pp.

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Includes guidelines for hiking trail design.

- 198 U.S. National Park Service, 1989. [Final trail plan and environmental assessment, Voyageurs National Park, Minnesota.] International Falls, MN, U.S. Dept. of the Interior, National Park Service. 133 pp. + maps.

Includes maps of proposed summer and winter trail development.

- 199 Udall, J.R., 1988. Downhill from here? *Wilderness* 51(181):38-44.

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- 200 Vento, B.F., 1991. Trails—A nationwide system, a national priority. *Trends* 28(4):7-9.

- 201 Wells Associates, Inc., 1985. National forest trails: Neglected and disappearing. National Trails Coalition. 15 pp.

The author argues that the Forest Service has allowed the national trail system to deteriorate.

### **MUNICIPAL, STATE, REGIONAL**

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mission on Minnesota Resources. University of Minnesota, Dept. of Forest Resources. [84] pp.

- 203 Anderson, D.H. et al., 1991. Long distance trails in Minnesota: Planning and management concerns. Final report to Minnesota Dept. of Natural Resources, Trails and Waterways Unit, and the Legislative Com-

This report looked specifically at three trail user groups: hikers, bicyclists, and cross-country skiers. The publication's co-authors (five) are: J.L. Thompson, D.W. Lime, T.D. Schieicher, C.A. Penney, and S.M. Woodrich.



- 204 Arkansas Dept. of Parks and Tourism, 1986. 1986 Arkansas statewide trails plan. Arkansas Dept. of Parks and Tourism. 45 pp. + appendix.
- Includes a 43 page appendix entitled: Trails in Arkansas: A public opinion survey.
- 205 Becker, W.H., 1988. Trail needs assessment through integrated trail planning. In: Gaby, E.D., ed. National Trails Symposium, 9th, Unicoi State Park, Georgia, Sept. 11-14, 1988. Proceedings. U.S. Forest Service; Tennessee Valley Authority; National Park Service. pp. 35-37.
- State trail needs assessment.
- 206 Carter Goble Associates, Inc. and Edward Pinckney Associates, Ltd., 1981. Comprehensive trails system study. South Carolina Dept. of Parks, Recreation, and Tourism. Various pagings.
- Undated; probable date, 1981.
- 207 Carter Goble Associates, Inc. and Schrader, Inc., 1982. Trail opportunities in South Carolina. South Carolina Dept. of Parks, Recreation, and Tourism. Various pagings.
- 208 Colorado Division of Parks and Outdoor Recreation, 1985. State recreational trails master plan, non-motorized. Colorado Division of Parks and Outdoor Recreation. 29 pp. +maps + appendix.
- 209 Eastin, K., 1988. Statewide trail planning in Arkansas. In: Gaby, E.D., ed. National Trails Symposium, 9th, Unicoi State Park, Georgia, Sept. 11-14, 1988. Proceedings. U.S. Forest Service; Tennessee Valley Authority; National Park Service. pp. 21-23.
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