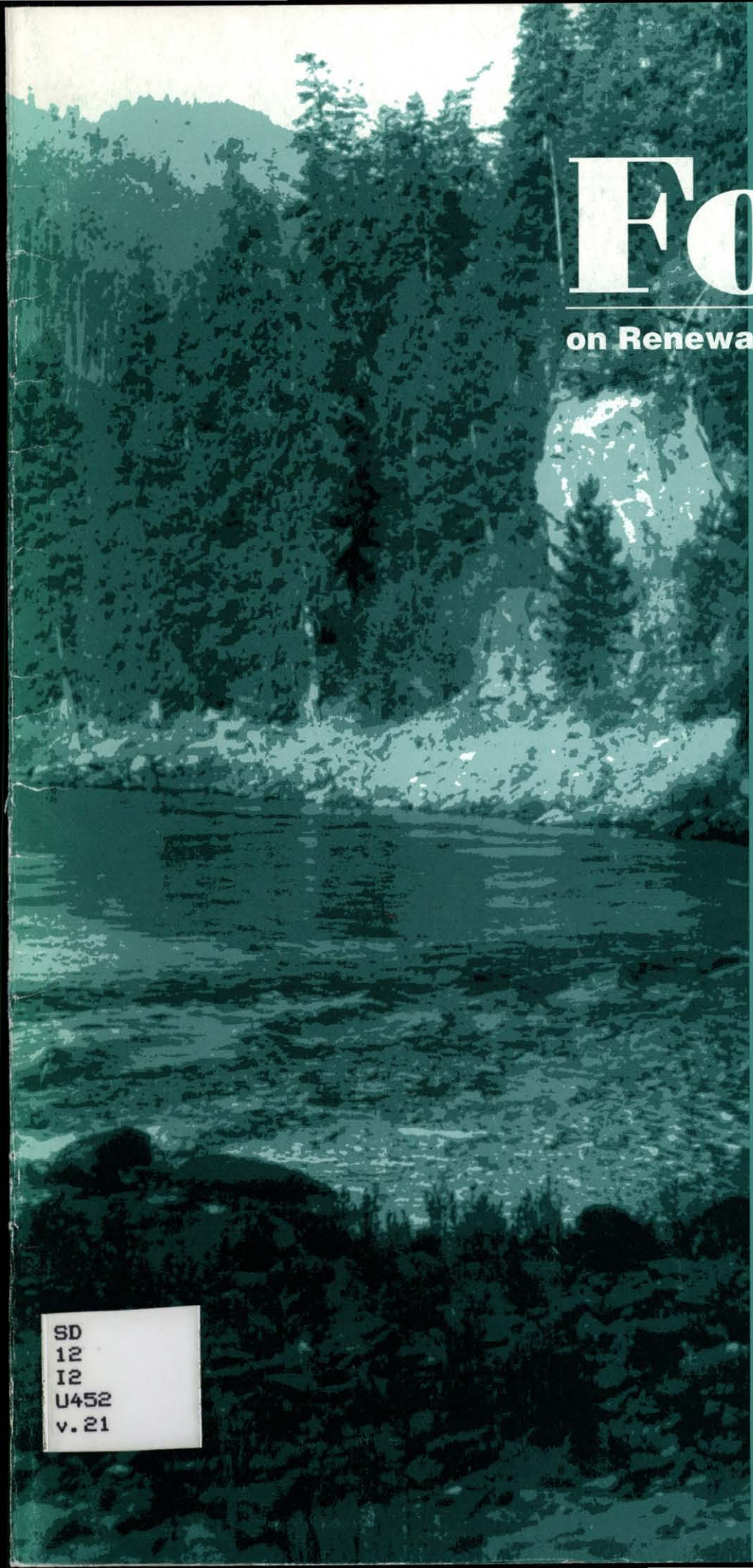


Focus

on Renewable Natural Resources

Annual Report
Fiscal Year 1996

Volume 21

College of Forestry, Wildlife
and Range Sciences

Idaho Forest, Wildlife and
Range Experiment Station

Moscow, Idaho 83844-1130

University of Idaho

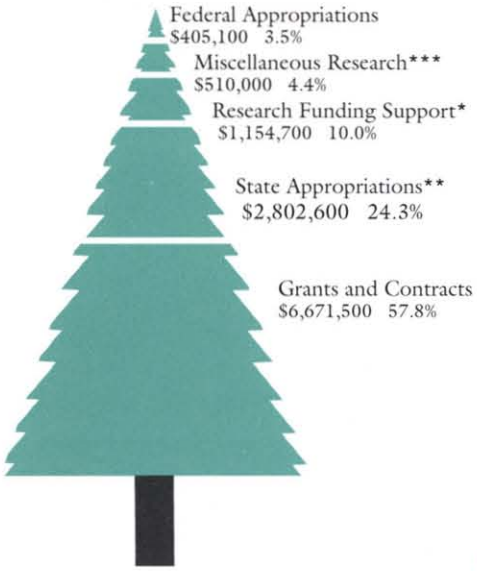
What Did Fiscal 1996 Look Like?

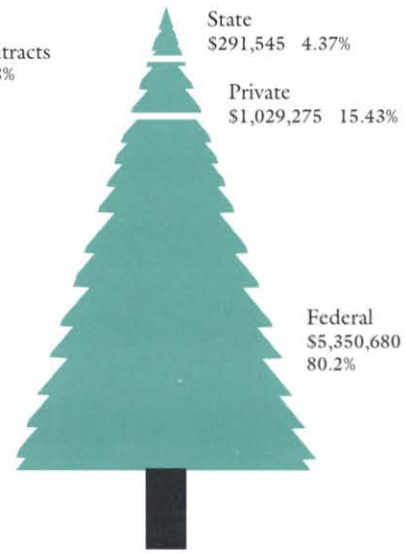
Research expenditures, shown by funding source, totaled $11,543,900 for fiscal year 1996.

*Includes overhead allowances, external matching, outside federal unit support, and external cooperative research support

**Includes FWR Experiment Station, Wildlife, Wilderness, and Forest Utilization Research

***Includes Forest Research Nursery, Experimental Forest, Idaho Research Foundation, Taylor Ranch, and Clark Fork Field Campus





Where Did We Transfer Technology?

- 14 communities served just in Idaho FY 1996
- 18 courses delivered to Boise since 1991

Boise
Bonners Ferry
Clark Fork
Coeur d'Alene
Harrison
Horseshoe Bend
Idaho Falls
McCall
Moscow
Post Falls
Potlatch
Priest River
Sandpoint
St. Maries

Focus

on Renewable Natural Resources

Annual Report 1996

Volume 21

Idaho Forest, Wildlife and Range Experiment Station

Charles R. Hatch, *Director*
Richard F. Bottger, *Assistant Director*
Denise Ortiz, *Editor*
UI Printing and Design Services

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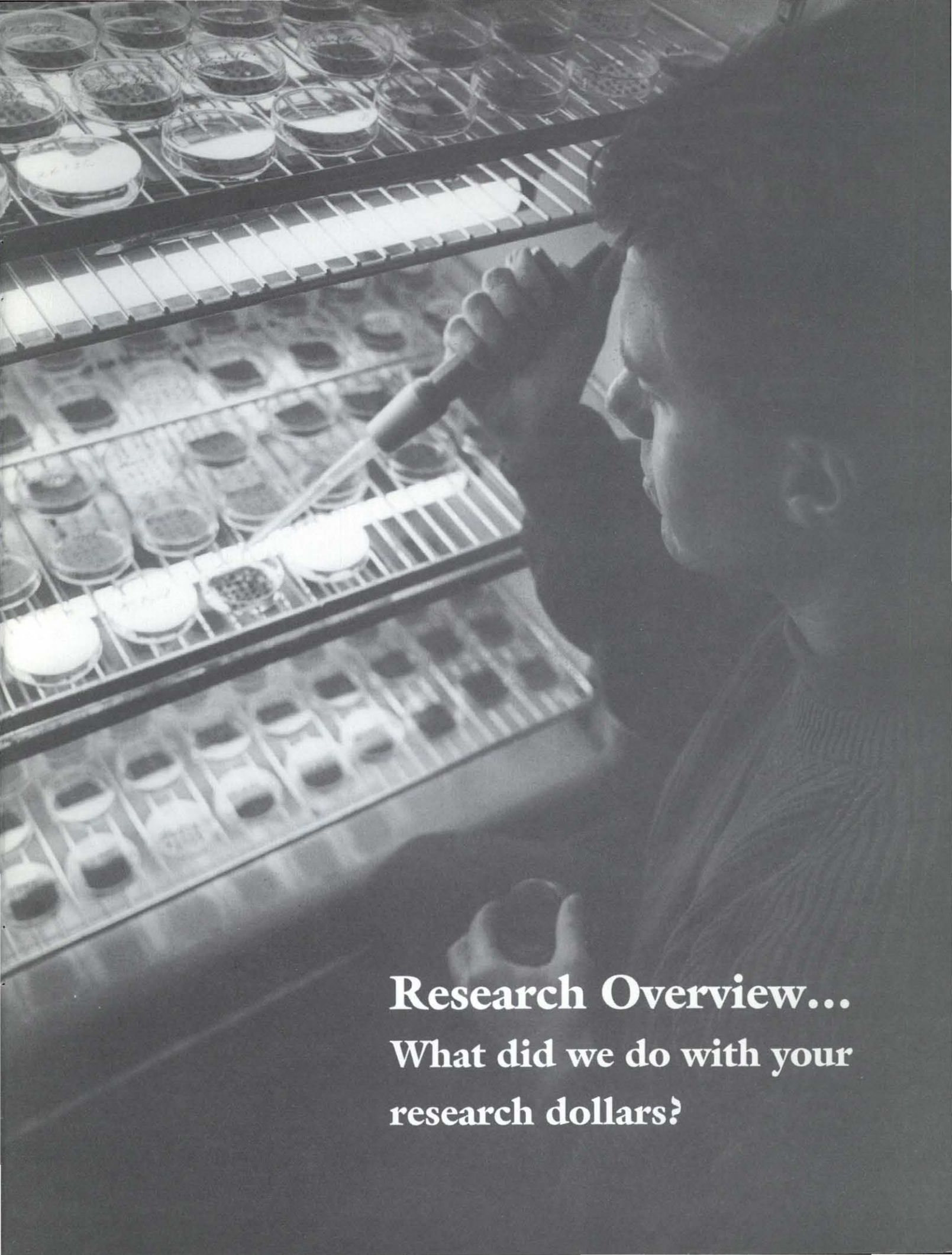


Research Overview...

What did we do with your research dollars?

The Economics of Idaho Resources

Scientists

Charles C. Harris
Specialties: Resource management, policy, and planning; organizational psychology of resource management; natural resource tourism, impacts, and market analysis, recreation and amenity values

Charles W. McKetta
(FWR Experiment Station Economist)
Specialties: Forest policy, international forestry, fire and fuel management economics, forest economics and finance, land use allocation, integrated resource modeling

Lee E. Medema
Specialties: Forest economics and finance, forest policy, social forestry

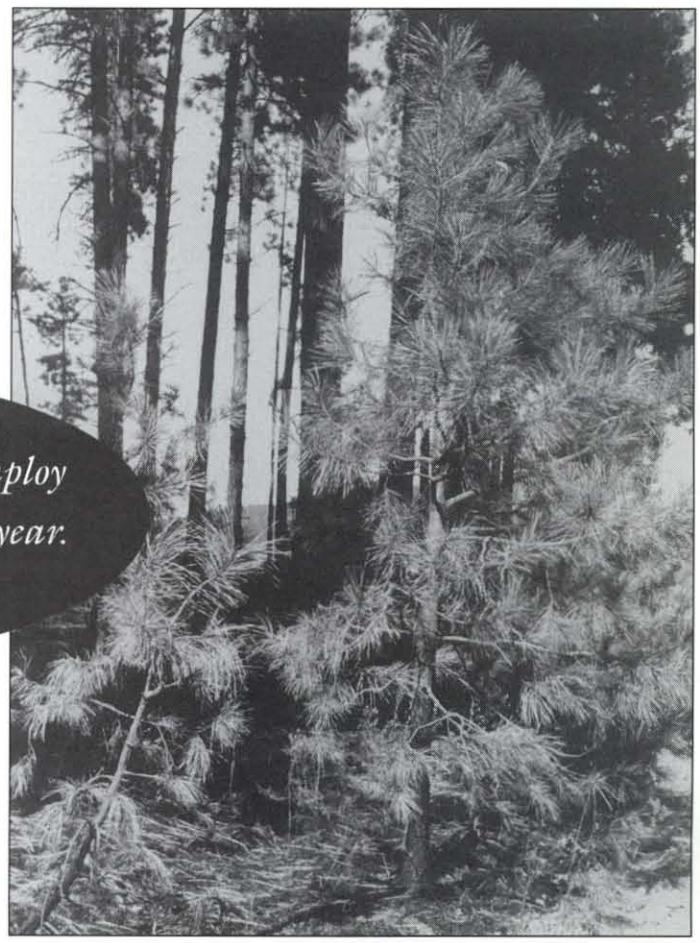
Jay O'Laughlin
(Idaho Policy Analysis Group)
Specialties: Natural resource economics and policy analysis, structural changes in wood-based industries

Related 1996 Publications

Current status of federal grazing fees. *Wyoming Stockman-Farmer Magazine* 102(4):8-9. L.W. VanTassell, N.R. Rimbey.

An analysis of the one-percent initiatve and its possible impacts on rural Idaho communities, White Paper, Idaho Forestry, Wildlife and Range Experiment Station, College of Forestry, Wildlife and Range Sciences, University of Idaho, Moscow, Idaho. C. C. Harris.

Idaho forest industries employ about 20,000 people each year.



Ecosystem Management

Scientists

David L. Adams
Specialties: Silviculture, forest health, forest regeneration, agroforestry

Sam H. Ham
Specialties: Enviromental education and interpretation, natural resource communication, natural resource tourism, reserve management in developing Latin American countries

Charles C. Harris
Specialties: Resource management, policy, and planning; organizational psychology of resource management; natural resource tourism, impacts, and market analysis, recreation and amenity values

Gary E. Machlis
(Chief Social Scientist, U.S. National Park Service) Cooperative Park Studies Unit (NPS)
Specialties: Sociology of natural resources, human ecology, conservation biology

James A. Moore
(Director, Intermountain Forest Tree Nutrition Cooperative)
Specialties: Forest growth and yield modeling, mineral nutrition of forest trees, quantitative silviculture

Penelope Morgan
Specialties: Fire ecology and management, landscape ecology, silviculture and forest ecology, ecological modeling, forest health

Harold L. Osborne
(Manager, UI Experimental Forest)
Specialties: Silviculture, harvesting, forest regeneration

Arthur D. Partridge
Specialties: Forest disease and insects, urban forestry, wildland conservation

Charles T. Stiff
Specialties: Mensuration, growth, and yield modeling; forest inventory

Karl J. Stoszek
Specialties: Forest protection, silviculture, forest health

Related 1996 Publications

Release and Management of Understory Western Redcedar: A Literature Review. Idaho Forest, Wildlife and Range Experiment Station Bulletin 65, University of Idaho, Moscow. J.W. Fields, D.L. Adams.

Forest Health Concepts andEcosystem Management; Timber Harvesting and Ecosystem Management—The New Environment. Idaho Forest, Wildlife and Range Experiment Station Contribution No. 805, University of Idaho, Moscow. J. O'Laughlin.

The need for an environmental restoration decision framework. *Journal of Ecological Engineering.* S.H. Ham, J. Wyant, R. Meganck.

(1995) A planning and decision-making framework for ecological restoration. *Environmental Management* 19(6):789-796. S.H. Ham, J. Wyant, R. Meganck.

Rural communities in the Inland Northwest—An assessment of small communities in the Interior and Upper Columbia River basins. Final report submitted to the Interior Columbia River Basin Ecosystem Management Project, Walla Walla, Washington. Idaho Forestry, Wildlife and Range Experiment Station, College of Forestry, Wildlife and Range Sciences, University of Idaho, Moscow, Idaho. C.C. Harris (with assistance from G. Brown, W.J. McLaughlin, C. Wall, J. Haley).

People make change work in the rural communities of the Columbia River Basin. *Focus—on Renewable Natural Resources*, Vol. 20:12-13, Idaho Forest, Wildlife and Range Experiment Station, University of Idaho, Moscow, C.C. Harris.

Ongoing Research

Ecosystem management and the American West. G.E. Machlis, P. Morgan

The human ecosystem as an organizing concept in ecosystem management. G.E. Machlis, J.E. Force, W.R. Burch

Implications of adaptive forestry practices. D.L. Adams, H.L. Osborne

Economic feasibility of pruning western white pine for blister rust control. D.L. Adams, K.E. Mattson

Evaluation of simulated animal damage on northern Rocky Mountain conifers. D.L. Adams, T.J. Helgenberg, R.T. Graham, T. Jain, J. Kinger

The need for an environmental restoration decision framework. *Journal of Ecological Engineering.* S.H. Ham, J. Wyant, R. Meganck.

(1995) A planning and decision-making framework for ecological restoration. *Environmental Management* 19(6):789-796. S.H. Ham, J. Wyant, R. Meganck.

Development and management of the cedar/hemlock ecosystem. P. Morgan, R. Graham.

Regeneration and development of western white pine. P. Morgan, T. Jain , R. Graham

Landscape planning for ecosystem sustainability in cedar-hemlock-white pine forests. P. Morgan, S. McConnell

Natural terrestrial disturbance regimes and spatial patterns of aquatic habitat. P. Morgan, P. Green, K. Lohman

Social indicators for monitoring ecosystem management. J.E. Force, G.E. Machlis

Continuing Education and Outreach

October 16-27	Understanding People, Process, and Place: Integrated Assessment, (1995) Analysis, and Monitoring (CEEM: Continuing Education in Ecosystem Management)—Moscow
December 8 (1995)	Current Topics in Forest Health—Moscow
December 15 (1995)	Current Topics in Forest Health—Coeur d'Alene
February 8, 15, 22, 29	Forest Management Short Course—Coeur d'Alene
March 7, 14	Forest Management Short Course—Priest River
March 12	Inland Empire Forest Reforestation Council Meeting—Post Falls
April 11, 18, 25	Forest Management Short Course—Newport, Washington
May 2, 9, 16	Forest Management Short Course—St. Maries
May 14	Forest Fertility Field Day—Moscow
June	Future Foresters of America (FFA) Forestry Contest—Moscow
June 10-15	Natural Resource Workshop—Ketchum
June 15	Forest Fertility Field Day—Coeur d'Alene
June 16-22	Natural Resource Workshop—Harrison

Understanding the social, cultural, and economic conditions within a region is crucial for successful ecosystem management.

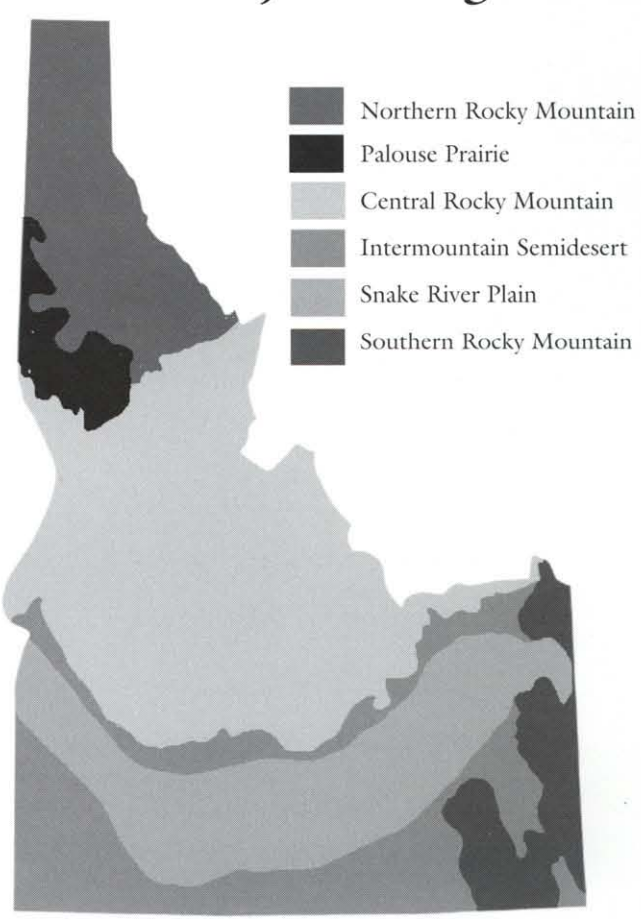
Related Theses/Dissertations

Evaluating weather effects on individual tree diameter growth in western Montana using the forest vegetation simulator. H. Cheng. *Major professor: J.A. Moore*

Response of advance lodgepole pine regeneration to overstory removal in eastern Idaho. T.E. Lewis-Murphy. *Major professor: D.L. Adams*

Relating soil, vegetation, and site characteristics to Douglas-fir response to nitrogen fertilization in the Inland Northwest. J.M. Mital. *Major professor: J.A. Moore*

Idaho's Major Ecoregions



Environmental Education

Scientists

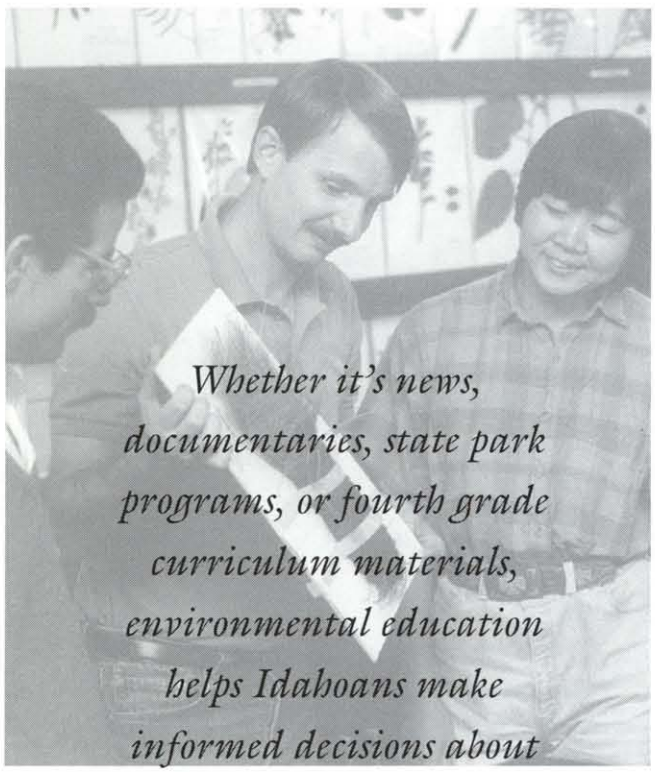
James R. Fazio
Specialties: Resource communication, environmental interpretation, conservation history, urban and community forestry, continuing education

Sam H. Ham
Specialties: Environmental education and interpretation, natural resource communication, natural resource tourism, reserve management in developing Latin American countries

Ronald L. Mahoney
(Forestry Extension)
Specialties: Silviculture, natural resources education

Related 1996 Publications

Educacion Ambiental El Papel Estrategico de la Comunicacion en el Desarrollo Sostenible en America Central. Technical paper for Costa Rican National Biodiversity Institute. San Jose, Costa Rica: National Biodiversity Institute (INBio). S.Ham.



Whether it's news, documentaries, state park programs, or fourth grade curriculum materials, environmental education helps Idahoans make informed decisions about the stewardship of their natural resources.

Observations and Recommendations for Environmental Education in the Russian Far East. Report to Hornocker Wildlife Research Institute, Siberian Tiger Project, University of Idaho. S. Ham.

A belief-centered approach to designing messages for nonformal environmental education programs. Pages 1-7 in: *Proceedings of the International Symposium of the North American Association for Environmental Education.* S.H. Ham, E.E. Krumpe.

Applications of theory-based environmental interpretation to biodiversity conservation in Central America. In: *International Symposium of the North American Association for Environmental Education Conference.* S.H. Ham, E.E. Krumpe.

A belief-centered approach to identifying strategic audiences and messages for environmental education (keynote). In: *International Symposium of the North American Association for Environmental Education Conference.* S.H. Ham, E.E. Krumpe.

Social Marketing and Program Planning for Salvadoran Environmental Educators. Final report of the Six-Week Course. Final report to Development Associates, Washington, DC and US Agency for International Development, El Salvador. M. Whiteman, S.H. Ham.

Ongoing Research

Applications of theory-based environmental interpretation to biodiversity conservation in central America. *S.H. Ham, E.E. Krumpe*

Analysis of the beliefs of key audiences in the Russian Far East for environmental education on the Siberian Tiger. *S.H. Ham, H.Quigley*

Development of a model for selecting ecologically and socially significant wildlife monitoring species. *S.H. Ham, L. HaySmith*

Related Theses

A comparison of the views between extensionists and rural community leaders toward training programs and methodologies in eastern Guatemala. Mirna L. Carranza. *Major professor: Sam Ham*

Status of environmental education at the Escuela Agricola Panamericana in Honduras. Z. Moncada. *Major professor: T. Armstrong*

Expert Systems and Computer-Aided Teaching

Scientists

Ronald Robberecht
Specialties: Ecophysiology, autecology, range ecology, computerized teaching

Molly W. Stock
Specialties: Artificial intelligence/expert systems applications in natural resource management, multimedia training and advisory systems

Related 1996 Publications

The New Frontier: Computer-aided education in natural resources. *Idaho Forester* 1996:59-60. R. Robberecht.

AI Applications. Volume 10 (3 issues). M.W. Stock, editor.

Estimating the risk of escape of prescribed fires: An expert system approach. *AI Applications* 10(2):63-73. M.W. Stock, J. Williams, D.A. Cleaves.

Ongoing Research

Development of multimedia modules for instruction and electronic books for computer-aided education. Ron Robberecht

Goal oriented management and planning for forest nurseries:Interactive computer applications for effective use of forest resources. R. Robberecht, M.W. Stock, D.L. Wenny

Fire monitoring expert system—Interactive, multimedia advisory system for monitoring effects of prescribed fire. B. Leenhouts, M. Miller, F. Boden, M.W. Stock

Technology transfer issues with resource models—Factors influencing resource managers' intentions to adopt decision-aiding software. R. Wight, A. Gardiner, M.W. Stock

Dissertation

Decision-aiding software in natural resource management: A study of intentions to adopt. A. Gardner. *Major professor: M.W. Stock*

Extension & Service

Scientists

James R. Fazio
Specialties: Resource communication, environmental interpretation, conservation history, urban and community forestry, continuing education

Gary E. Machlis
(Chief Social Scientist)
Cooperative Park Studies Unit, NPS
Specialties: Sociology of natural resources, human ecology, conservation biology

Ronald L. Mahoney
(Extension Forestry)
Specialties: Silviculture, natural resources education

Related 1996 Publications

Devils Tower National Monument. Visitor Services Project Report. Cooperative Park Studies Unit, University of Idaho, Moscow. G. Gill.

Manassas National Battlefield Park. Visitor Services Project Report. Cooperative Park Studies Unit, University of Idaho, Moscow. K. FitzGerald, M. Littlejohn.

Adams National Historic Site. Visitor Services Project Report. Cooperative Park Studies Unit, University of Idaho, Moscow. K. FitzGerald, M.A. Patterson.

Dry Tortugas National Park. Visitor Services Project Report. Cooperative Park Studies Unit, University of Idaho, Moscow. G. Gill.

Grand Teton National Park. Visitor Services Project Report. Cooperative Park Studies Unit, University of Idaho, Moscow. M. Littlejohn.

San Francisco Maritime National Historical Park (Maritime Museum and Hyde Street Pier). Visitor Services Project Report. Cooperative Park Studies Unit, University of Idaho, Moscow. M. Littlejohn.

Wrangell-St. Elias National Park and Preserve. Visitor Services Project Report. Cooperative Park Studies Unit, University of Idaho, Moscow. M. Littlejohn.

Yellowstone National Park. Visitor Services Project Report. Cooperative Park Studies Unit, University of Idaho, Moscow. M. Littlejohn.

Bandelier National Monument. Visitor Services Project Report. Cooperative Park Studies Unit, University of Idaho, Moscow. M.A. Patterson.

Booker T. Washington National Monument. Visitor Services Project Report. Cooperative Park Studies Unit, University of Idaho, Moscow. M.A. Patterson.

Chiricahua National Monument. Visitor Services Project Report. Cooperative Park Studies Unit, University of Idaho, Moscow. C. Wall.

Fort Bowie National Historic Site. Visitor Services Project Report. Cooperative Park Studies Unit, University of Idaho, Moscow. C. Wall.

Mahoney, R.L., Y. Carree, and C. Schnepf, eds. *Woodland Notes.* Vol. 7 (1-4). University of Idaho Cooperative Extension System.

Idaho Community Trees Newsletter. Idaho Dept. of Lands, Coeur d'Alene. J.R. Fazio, ed.

Fazio, J.R., ed. *The Forest Steward* (Newsletter). Vol. I (1-6). The National Arbor Day Foundation, Lincoln, Nebraska.

Fazio, J.R., columnist. World of trees. In: *Arbor Day.* The National Arbor Day Foundation, Lincoln, Nebraska.

Ongoing Research

Visitor Services Project (VSP) studies in U.S. national parks. G.E. Machlis

Development of customer service evaluation card for the U.S. Fish and Wildlife Service and National Park Service. G.E. Machlis, J. Haley

Continuing Education and Outreach

March 25-27	Silviculture and Water Quality—Moscow
March 28-30	Silviculture and Water Quality—Sandpoint
April 18-20	Silviculture and Water Quality—Horseshoe Bend
June	Small-Scale Forestry Equipment Demonstrations—Coeur d'Alene, Potlatch
June 3-6	Quality Control in Lumber Manufacturing—Moscow
June 8	Small-Scale Logging Technology—Coeur d'Alene
June 12	Small-Scale Logging Technology—Potlatch
June 17-21	Wood...A Remarkable Fiber—McCall

Fire

Scientists

Stephen C. Bunting
Specialties: Fire ecology, range ecology, range management

Penelope Morgan
Specialties: Fire ecology and management, landscape ecology, silviculture and forest ecology, ecological modeling, forest health

Leon F. Neuenschwander
Specialties: Fire ecology and management, forest health

Related 1996 Publications

Fire Regimes in the Interior Columbia River Basin: Past and Present. Final Report RJVA-INT- 94913. P. Morgan, S.C. Bunting, A.E. Black, T. Merrill, S. Barrett.

FIRE-BGC--A Mechanistic Ecological Process Model for Simulating Fire Succession on Coniferous Forest Landscapes of the Northern Rocky Mountains. Research Paper INT-RP-484. Ogden, Utah: U.S.D.A. Forest Service, Intermountain Research Station. R. E. Keane, P. Morgan, S.W. Running

The impacts of fire suppression on ecosystem dynamics and processes on dry and subalpine forests in central Idaho. In: *Proceedings, Tall Timbers Fire Ecology Symposium*, Boise, Idaho.P.F. Kolb, D.L. Adams, G. McDonald.

Ongoing Research

Modeling fire regimes for Swan Valley, Montana. P. Morgan, D. Long.

Changing structure of dry grand-fir forests. P. Morgan, S. Stewart, J. Landsberg

Fire, insects, and disease: Disturbance interactions in subalpine forest landscapes in the Entiat Watershed, Washington. P. Morgan, P. Flanagan, R. Everett, P. Hessburg

Mapping past and potential fire regimes in Rocky Mountain wilderness landscapes. P. Morgan, T. Swetnam, M. Rollins

Human and biophysical factors influencing landscape change. P. Morgan, A. Black

Reducing tree mortality from wildfires in ponderosa pine plantations, Andean-Patagonian region, Argentina. P. Morgan, N. Rodriguez

Modelling succession and disturbance in forest vegetation in the Interior Columbia River Basin. P. Morgan, S.C. Bunting

Historical and current fire regimes in the Interior Columbia River Basin. P. Morgan, S.C. Bunting

Continuing Education and Outreach

February 3	Landscaping for Fire Prevention—Moscow, Idaho Falls
April 8	Landscaping for Fire Prevention—Coeur d'Alene

Fish Health and Management

Scientists

David H. Bennett
Specialties: Fisheries ecology, fisheries management and population dynamics, farm ponds, Payette/ Pend Oreille Lakes, Lower Snake River Reservoirs

Theodore C. Bjornn
(Idaho Cooperative Fish & Wildlife Research Unit)
Specialties: Salmonid stream ecology, salmon and steelhead migrations, wild trout management

Ernest L. Brannon
(Aquaculture Research Institute)
Specialties: Sockeye/Kokanee salmon, salmonid aquaculture, Redfish Lake, Columbia River sturgeon, fish behavior and life histories, salmon orientation and migration

James L. Congleton
(Idaho Cooperative Fish & Wildlife Research Unit)
Specialties: Disease resistance in fish/immunology, stress physiology, comparative physiology of wild and hatchery salmonids

Larisa A. Ford
Specialties: Aquatic animal health, bacteriology, immunology, aquaculture, Atlantic salmon

George W. LaBar
Specialties: Fisheries management and ecology, predator/prey interactions, bioenergetic modeling

Kirk Lohman
Specialties: Stream and riparian ecology, water quality, amphibians and reptiles, environmental law

Christine M. Moffitt
Specialties: Biology, health and management of anadromous fish, aquaculture chemicals, host-parasite interactions

Dennis L. Scarnecchia
Specialties: Salmon and trout research, paddlefish research, Atlantic salmon, population dynamics, community ecology in large rivers

Related 1996 Publications

Comparison and Dynamics of the Benthic Macroinvertebrate Communities of Lower Granite, Little Goose, and Lower Monumental Reservoirs. Completion Report. D.H. Bennett, T.L. Nightengale.

Effects of Fine Sediments on the Survival of Kokanee Salmon Embryos in the North Fork of the *Payette River, Idaho.* Project INT93849 RJVA Completion Report. D.H. Bennett, J.W. Garrett.

(1995) *Effects of Forest Practices on Westslope Cutthroat Trout Distribution and Abundance in the Coeur d' Alene River System, Idaho.* Completion Report. D.H. Bennett, J.L. Dunnigan.

Evaluation of Substrate Quality for Embryo Incubation of Fall Chinook Salmon in the Snake River, Idaho-Washington. Report to U.S. Fish and Wildlife Service. D.H. Bennett, C. Eaton.

Fish-Interactions in Lower Granite Reservoir, Idaho-Washington. Report to U.S. Army Corps of Engineers. D.H. Bennett, M.A. Madsen, S.M. Anglea, T.A. Cichozs, T.J. Dresser Jr, S.R. Chipps.

(1995) *Spatial Distribution of Westslope Cutthroat Trout Within the Coeur d' Alene River Basin.* Report to U.S. Forest Service Intermountain Research Station. D.H. Bennett, J.L. Dunnigan.

Larval fish abundance associated with in-water disposal of dredged material in Lower Granite Reservoir, Idaho-Washington. Pages 333-337 in: *Water Quality.* D.H. Bennett, T.J. Dresser Jr.

Effects of in-water disposal of dredged material on fishes in Lower Granite Reservoir, Snake River. Pages 328-332 in: *Water Quality '96: Proceedings.* D.H. Bennett, T. Barila, C. Pinney.

Comparison of net mesh sizes for estimating abundance of the opossum shrimp *Mysis relicta* from vertical hauls. *North American Journal of Fisheries Management.* S.R. Chipps, D.H. Bennett.

Trends in resident fish abundance associated with use of dredged material for fish habitat enhancement. Pages 338-341 in: *Water Quality '96: Proceedings.* S.R. Chipps, D.H. Bennett, T.J. Dresser Jr.

Monitoring for early detection of *Aeromonas salmonicida* to enhance antibiotic therapy and control furunculosis in Atlantic salmon (*Salmo salar*). Progressive Fish-Culturist 58: 203-208. R.C. Cipriano, L.A. Ford, J.T. Nelson, B.G. Jensen.

Control of external *Aeromonas salmonicida*: topical disinfection of salmonids with chloramine-T. *Journal of Aquatic Animal Health* 8: 52-57. R.C. Cipriano, L.A. Ford, C.E. Starliper, J.D. Teska, J.T. Nelson, B.N. Jensen.

Epizootiological study of bacterial cold-water disease in Pacific salmon and further characterization of the etiologic agent, *Flexibacter psychrophila. Journal of Aquatic Animal Health* 8: 28-36. R.C. Cipriano, W.B.

Schill, J.D.Teska, L.A. Ford.

Interferon-like activity produced byanterior kidney leucocytes of rainbow trout simulated in vitro by IHN virusor Poly I:C. *Diseases of Aquatic Organisms* 25:185-195. J.L. Congleton, B. Sun.

Smoltification and stressindices in migrating smolts of wild and hatchery spring chinook salmon sampled at Snake River dams. Pages 59-62 in: *The Physiology of Migratory Fish Symposium Proceedings, International Congress on the Biology of Fishes.* Physiology Section, American Fisheries Society. J.L. Congleton, C.B. Schreck.

Evaluation of the Effects of Descaling on Short-Term Survival of Migrating Juvenile Salmonids. Report to U.S. Army Corps of Engineers, Walla Walls District. J.L. Congleton, W.J. LaVoie, C.B. Schreck, L.E. Davis.

The condition, performance, and behavior of Snake River juvenile salmonids within the Corps of Engineers' transportation program. Pages 45-48 in: *The Physiology of Migratory Fish Symposium Proceedings, International Congress on the Biology of Fishes.* Physiology Section, American Fisheries Society. L.E. Davis, C.B. Schreck, J.L. Congleton.

Health management of the Atlantic salmon restoration effort. *Women in Natural Resources* 17(3): 27-33. L.A. Ford, P.A. Barbash.

Evaluation of fine sediment intrusion into Whitlock-Vibert boxes. *North American Journal of Fisheries Management* 16:448-452. J.W. Garrett, D.H. Bennett.

Enhanced incubation success for kokanee spawning in groundwater upwelling sites in a small Idaho stream. *North American Journal of Fisheries Management.* J.W. Garrett, D.H. Bennett, F.O. Frost.

Growth and survival of rainbow smelt and their role as prey for stocked salmonids in Lake Champlain. Transactions of the American Fisheries Society 125:87-96. R.A. Kirn, G.W. LaBar.

Walleye and northern pike: Boost or bane to Northwest fisheries? *Fisheries* 21(8): 6-13. T.E. McMahon, D.H. Bennett.

Field trials for investigational new animal drugs. *Human and Veterinary Toxicology.* C.M. Moffitt.

Optimal dosages of erythromycin thiocyanate in a new feed additive to control bacterial kidney disease. *Journal of Aquatic Animal Health* 8:229-240. C.M. Moffitt.

Evaluation of Facilities for Collection, Bypass, and Transportation of Outmigrating Juvenile Salmonids: 1992-1994. Report to U.S. Army Corps of Engineers, Walla Walls District. C.B. Schreck, L.E. Davis, J.L. Congleton, W.J. LaVoie.

Evaluation of nonreturning angler participation and harvest in the Columbia River Basin Northern Squawfish Sport Reward Fishery. *North American Journal of Fisheries Management.* S.S. Smith, D.H. Bennett.

(1995) *Methods for control of Infectious Hematopoietic Necrosis.* Report to Western Regional Aquaculture Consortium. J.M. Winton, *et al.*

Ongoing Research

Effects of physiography and disturbance regimes on patterns of distribution and abundance of bull trout and westslope cutthroat trout. K. Lohman, P.E. Green, P. Morgan

North Fork Coeur d'Alene cutthroat trout/habitat relationships. D. Bennet, A. Abbott, K. Lohman

Control of infectious hematopoetic necrosis: nonspecific resistance factors. Funded by Western Regional Aquaculture Consortium. J.L. Congleton

Effects of physiography and disturbance regimes on patterns of distributionand abundance of bull trout and westslope cutthroat trout. K. Lohman, P. Morgan, P.E. Green

Energy reserves in wild and hatchery smolts of chinook salmon outmigrating from the Snake River Basin. S. Rocklage

Evaluation of facilities for collection and transportation ofjuvenile salmonids at Snake River dams. T.C. Bjornn.

Fish health assessment of speckled dace in Paradise Creek, Idaho. L. Ford.

Habitat use, abundance, timing, and factors related to the abundance of subyearling chinook salmon rearing along the shorelines of Lower. D.H. Bennett, T.J. Dresser Jr., M.A. Madsen.

Immuostimulation of fishes. L. Ford.

Monitoring fish community activity at disposal and reference sites in Lower Granite Reservoir, Idaho-Washington Year 6. D.H. Bennett, T.J. Dresser Jr., S.R. Chipps, M.A. Madsen

Seasonal variation of bacterial, coldwater disease. L. Ford

Registration of erythromycin feed additive to control bacterial kidney disease in salmonids. C.M. Moffitt, M. Jepson, A. Haukenes, B. Graeb

Registration of erythromycin injectable to control bacterial kidney disease in salmonids. C.M. Moffitt, M. Jepson, A. Haukenes, J. Erickson

Effect of growth rate on the maturation schedule of kokanee salmon. S. Patterson, D.L. Scarnecchia

Continuing Education & Outreach

July 7-13 (1995)	Fish and Wildlife Ecology Workshop—McCall
July 14-20 (1995)	Project WILD II—McCall
July 21-27 (1995)	Advanced Project WILD II—McCall
January 5-7	Human Dimensions of Fish and Wildlife Management—Boise

Related Theses/Dissertations

Factors limiting the abundance of northern squawfish in Lower Granite Reservoir. T.A. Cichosz. *Major professor: D.H. Bennett*

Nocturnal fish-habitat association in Lower Granite Reservoir, Washington. T.J. Dresser, Jr. *Major professor: D.H. Bennett*

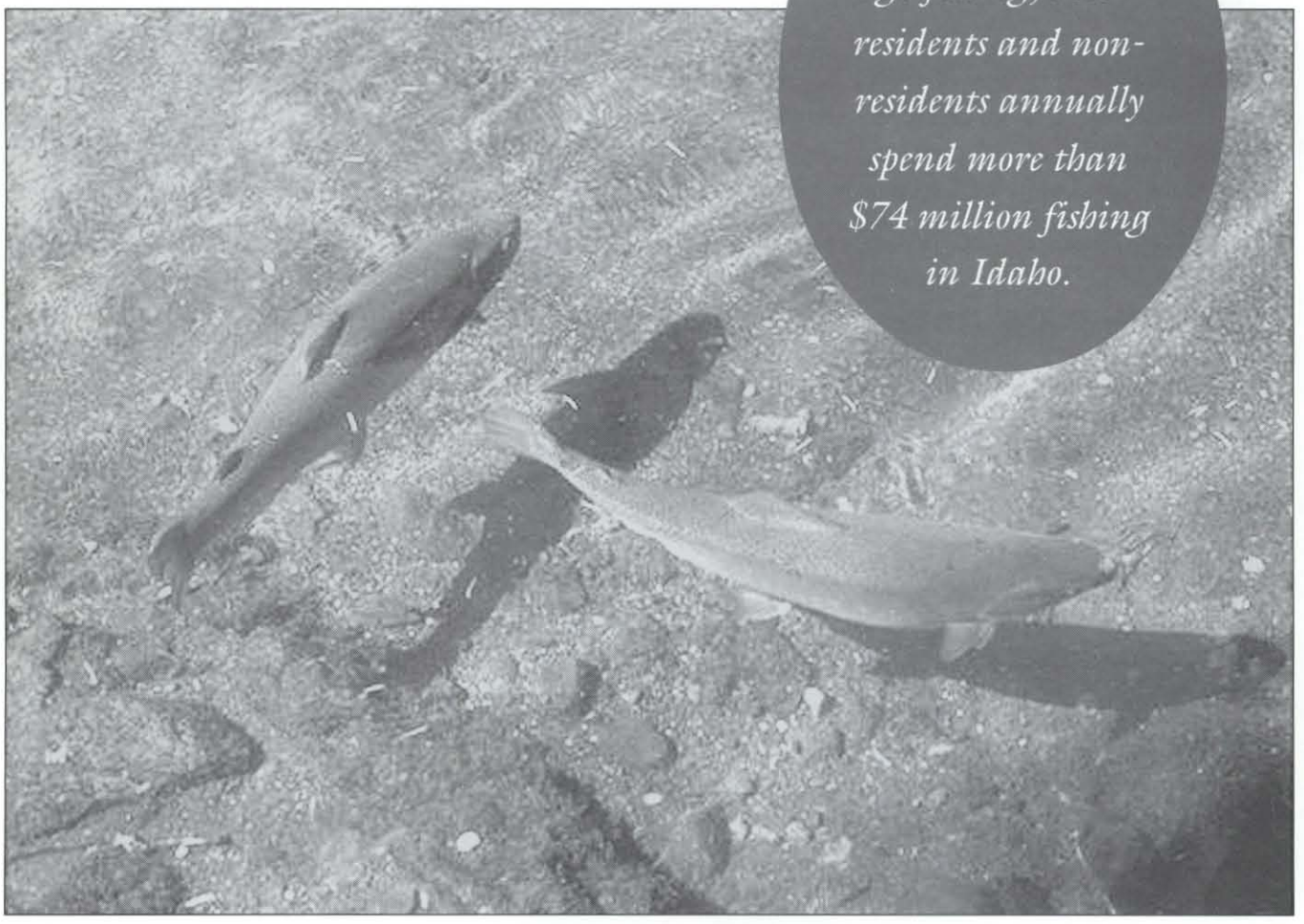
Evalution of passage of adult steelhead at the Lower Snake River Dam and reservoir projects under zero- and normal-nighttime flows. P. Keniry. *Major professor: T.C. Bjornn*

Feeding ecology of selected piscivorous fishes in upper Lake Sakakawea, North Dakota. C.K. Parken. *Major professor: D.L. Scarnecchia*

Genetic relationships between maternal lineages of sympatric anadromous and resident forms of *oncorhynchus nerka* determined through PCR RFLP analysis of MtDNA. B.D. Robison. *Major professor: E.L. Brannon*

Investigations into chinook salmon supplementation strategies and techniques. C. Peery. *Major professor: T.C. Bjornn*

18% of Idahoans go fishing; both residents and non-residents annually spend more than $74 million fishing in Idaho.



Forest Genetics and Nursery Research

Scientists

Steven J. Brunsfeld
(Director, FWR Research Herbarium)
Specialties: Ecology, genetics, synecology, dendrology

Lauren Fins
(Director, Inland Empire Tree Improvement Cooperative)
Specialties: Forest genetics, tree improvement, urban forestry, population biology

John D. Marshall
Specialties: Tree physiology, ecology, forest ecosystem processes

David L. Wenny
(Director, Forest Research Nursery)
Specialties: Forest nursery technology and production, forest regeneration, nursery techniques, biotechnology, forest regeneration, silviculture

Related 1996 Publications

Impact of foliar fertilization on container-grown ponderosa pine seedling viability. *Western Journal of Applied Forestry* 11:114-119. M.E. Montville, D.L. Wenny, R.K. Dumroese.

Gliocladium virens in an alginate prill ineffective as a biological control of *Fusarium* root disease in container-grown Douglas-fir. *New Forests* 12:113-124. R.K. Dumroese, R.L. James, D.L. Wenny.

Growth and form of western larch stecklings: Plagiotropism and reiteration. *Canadian Journal of Forest Research* 26:1273-1283. J.L. Edson, D.L. Wenny, L. Fins.

Western White Pine Seedling Mortality—USDA Forest Service Nursery, Coeur d'Alene, Idaho. USDA Forest Service Forest Health Protection Northern Region Report 96-6. R.L. James, R.K. Dumroese, C.J. Gilligan.

Vegetative multiplication to improve western white pine. Page 37 in: *Return of the Giants: Genetics and White Pine in the Inland Empire—Abstracts of Presentations of the 23rd Annual Meeting.* Inland Empire Tree Improvement Cooperative, University of Idaho, Moscow. J.L. Edson, D.L. Wenny, L. Fins.

Growing conservation seedlings by the square foot—Making it pay. Pages 56-59 in: *National Proceedings, Forest and Conservation Nursery Associations*, T.D. Landis, B. Cregg, tech. coords. USDA Forest Service Pacific Northwest Research Station General Technical Report PNW-365. D.L. Wenny.

A Plan to Micropropagate Hackelia venusta *for reintroduction.* Final Report. J.L. Edson, D.L. Wenny.

Micropropagation of *Carex hystricina* and *Astragalus columbianus* for a plant adaptability test. Pages 1-17 in: *Rare Plant Assessment and Monitoring Protocols*, Final Report to USDA Forest Service Pacific Northwest Research Station. J.L. Edson, D.L. Wenny, A.D. Leege-Brusven.

Interspecific and temporal variation in herbivore responses to hybrid willows. *Oecologia* 108:121-129. R.S. Fritz, B.M. Roche, S.J. Brunsfeld, C.M. Orians.

Correlated population differences in dry matter accumulation, allocation, and water-use efficiency in three sympatric conifer species. *Forest Science* 42(2):242-249. J. Zhang, J.D. Marshall, L. Fins.

Nursery waste water: The problem and a possible remedy. Pages 89-97 in: *National Proceedings, Forest and Conservation Nursery Associations*, T.D. Landis, B. Cregg, tech. coords. USDA Forest Service Pacific Northwest Research Station, General Technical Report PNW-365. R.K. Dumroese, D.L. Wenny, D.S. Page-Dumroese.

Re-introduction of showy stickseed in the Cascade Range of the American Pacific Northwest. *Re-introduction News* 12:10-11. J.L. Edson.

Improved vegetative propagation of Scouler willow. *Tree Planters' Notes* 46(2):58-63. J.L. Edson, A.D. Leege-Brusven, D.L. Wenny.

Using micropropagation to conserve threatened rare species in sustainable forests. In: *Proceedings of International Conference, Sustainable Forests: Global Challenges and Local Solutions.* J.L. Edson, D.L. Wenny, A.D. Leege-Brusven, R.L. Everett.

Using micropropagation to conserve threatened rare species in sustainable forests. *Journal of Sustainable Forestry* 5(2):285-296. J.L. Edson, D.L. Wenny, A.D. Leege-Brusven, R.L. Everett.

Redesigning the IETIC ponderosa pine seed orchards: Blocking to improve adaptedness. In: *Nineteenth Progress Report of the Inland Empire Tree Improvement Cooperative*, Moscow, Idaho. L. Fins, M. Rust.

Molecular genetics of bitterbrush. In: *Proceedings of the Symposium on Wildland Shrub and Arid Land Restoration*, B. Rowdy, D. McArthur, compilers. USDA Forest Service Intermountain Forest and Range Experiment Station. M. Jabbes, S.J. Brunsfeld.

Evaluation of root growth of selected *Medicago* and *Medysarum* species. In: *Proceedings of the Symposium on Wildland Shrub and Arid Land Restoration*, B. Rowdy, D. McArthur, compilers. USDA Forest Service Intermountain Forest and Range Experiment Station. M. Jabbes, D. Johnson, P. Doscher.

Botrytis cinerea carried by adult fungus gnats (*Diptera: Sciaridae*) in container nurseries. *Tree Planters' Notes* 46(2):48-53. R.L. James, R.K. Dumroese, D.L. Wenny.

Fusarium proliferatum is a common, aggressive pathogen of container-grown conifer seedlings. *Phytopathology* 85:1129. R.L. James, R.K. Dumroese, D.L. Wenny.

Genetic variation in foliar nutrient concentration among field planted families of Douglas-fir. In: *Nineteenth Progress Report of the Inland Empire Tree Cooperative*, Moscow, Idaho. V.J. Walker, L. Fins.

Production of container-grown juniper for conservation plantings. Pages 97-99 in: *Growing a Sustainable Future; Proceedings: Fourth North American Agroforestry Conference*, J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. University of Idaho. D.L. Wenny, A.D. Leege-Brusven, R.K. Dumroese, J.L. Edson, S. Morrison.

Ongoing Research

Assessment of rust resistance mechanisms in the Moscow White Pine Seed Orchard, IETIC, White Pine Species Group. L. Fins

Water use efficiency of Douglas-fir. L. Fins, J.W. Zhang

Evaluation of performance of pedigreed Douglas-fir seedlings over six years and four environments. L. Fins, M. Rust, B.Wilson

Genetics, nutrition, and forest health. L. Fins, J. A. Moore

Genetic mapping of blister rust resistance in western white pine. L. Fins, S.J. Brunsfeld, J. Schnurr

Genetic analyses of chemical variation and resistance to a diverse phytophage community on willow hybrids. S.J. Brunsfeld

Molecular genetics of ponderosa and Washoe pines. A. Patten, S.J. Brunsfeld

Molecular genetics and ecology of bitterbrush. M. Jabbes, S.J. Brunsfeld

Ecological genetics of the Clearwater Basin. S.J. Brunsfeld

Genetics and ecology of *Asarum wagneri*. C. Baldwin, S.J. Brunsfeld

Conservation biology of *Collomia mazama*. C. Baldwin, S.J. Brunsfeld

Inland Empire Tree Improvement Cooperative. L. Fins

Using genetic markers to solve species identification problems in *Botrychium*. L.M. Swartz, S.J. Brunsfeld

Micropropagation of Georgia plume. J.L. Edson, D.L. Wenny, J. Ruter

Micropropagation of western white pine. D.L. Wenny, J.L. Edson, R. Tripepi, L. Fins

Opportunities to improve western larch planting stock: Reducing plagiotripism and increasing apical dominance in rooted cuttings. L. Fins, D.L. Wenny, J.L. Edson

Micropropagation of *Collomia mazama* for reintroduction at Crater Lake, Oregon. J.L. Edson, C. Baldwin, D.L. Wenny, A. Leege-Brusven

Collecting forest tree seeds to grow seedlings. R.K. Dumroese, T.D. Landis, D.L. Wenny

Propagation of mature bitterbrush clones for forest restoration. J.L. Edson, A.D. Leege-Brusven, D.L. Wenny

Interactions between copper-coated containers, hot water cleaning and *Fusarium* root disease. D.L. Wenny, R.L. James, R.K. Dumroese

Cylindrocarpon on western white pine seedlings: Effects on survival and growth after outplanting and persistence of the pathogen. R.K. Dumroese, R.L. James, D.L. Wenny

Western white pine seed germination. R.K. Dumroese, D.L. Wenny

Applying a micropropagation strategy to increase planting stock from white pine seed orchards. J.L. Edson, A.D. Leege-Brusven, D.L. Wenny, L. Fins

Micropropagation of difficult-to-root white pine clones from ortet buds, and propagating white pine fascicles from scarce material. J.L. Edson, A.D. Leege-Brusven, D.L. Wenny, L. Fins

Micropropgation plan to conserve *Hackelia venusta*. J.L. Edson, R. Everett, D.L. Wenny, A.D. Leege-Brusven

Rooting branch cuttings of *Picea pungens* selections. J.L. Edson, D.L. Wenny

Embryo dormancy in *Pinus monticola* and other selected pine. J.L. Edson, R.K. Dumroese, D.L. Wenny

Improving the quality if Rocky Mountain juniper stecklings. J.L. Edson, A.D. Leege-Brusven, D.L. Wenny

Testing cold hardiness of giant sequoia clones. J.L. Edson, L. Fins, D.L. Wenny

Evaluation of the efficacy of non-pathogenic *Fusarium oxysporum* to control *Fusarium* root disease of container-grown Douglas-fir seedlings. R.L. James, R.K. Dumroese, D.L. Wenny

Evaluation of planting stock type in conifer plantations in the northern Rocky Mountains. D.L. Adams, D.L. Wenny, R.T. Graham, T. Jain

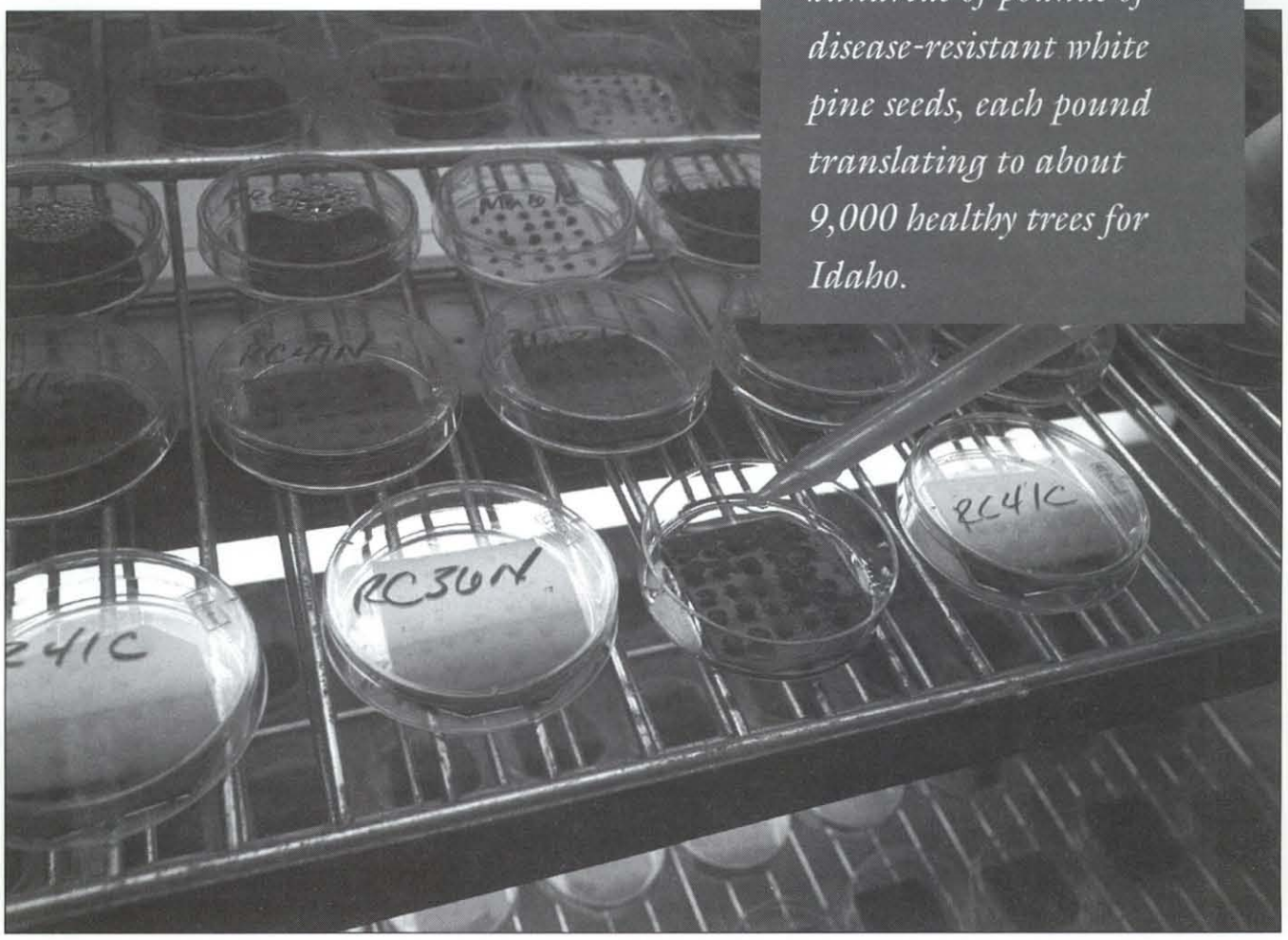
Factors related to success of planted western redcedar in northern Idaho. D.L. Adams, J. Mackey

Continuing Education and Outreach

July 18-19 (1995)	Collecting Forest Seed—Coeur d'Alene
September 28-29 (1995)	Intermountain Container Seedling Growers Association Meeting
November 8, 15, 21, 29	Collecting Forest Seed—Coeur d'Alene
December 6, 13 (1995)	Collecting Forest Seed—Coeur d'Alene
March 13-14	Inland Empire Tree Improvement Cooperative Meeting—Post Falls

About 29 million seedlings are grown each year in Idaho for state and federal conservation and reforestation efforts. That's a value of about $5 million in costs and profits.

Our genetic research currently produces hundreds of pounds of disease-resistant white pine seeds, each pound translating to about 9,000 healthy trees for Idaho.



Forest Health & Nutrition

Scientists

David L. Adams
Specialties: Silviculture, forest health, forest regeneration, agroforestry

James A. Moore
(Director, Intermountain Forest Tree Nutrition Cooperative)
Specialties: Forest growth and yield modeling, mineral nutrition of forest trees, quantitative silviculture

Related 1996 Publications

Forest Health Concepts andEcosystem Management; Timber Harvesting and Ecosystem Management—The New Environment. Idaho Forest, Wildlife and Range Experiment Station Contribution No. 805, University of Idaho, Moscow. J. O'Laughlin.

Report on Forest Health of the United States by the Forest Health Science Panel, for Charles Taylor, Member, United States Congress, 11th District, North Carolina. C. Oliver, D.L. Adams, T. Bonnicksen, J. Bowyer, F. Cubbage, N. Sampson, S. Schlarbaum, R. Whaley, H. Wiant, J. Sebelius.

Intermountain Forest Tree Nutrition Cooperative, Annual Report. J.A. Moore

A Policy Analysis of Forest Health Problems and Their Effects on Fish and Wildlife Habitat. Report to Intermountain Research Station, USDA Forest Service, Boise. J.E. Force, K.J. Rogers.

Is there a forest health crisis in this country? (opinion). *The Forestry Source* 1(6): 7. J. O'Laughlin.

Ongoing Research

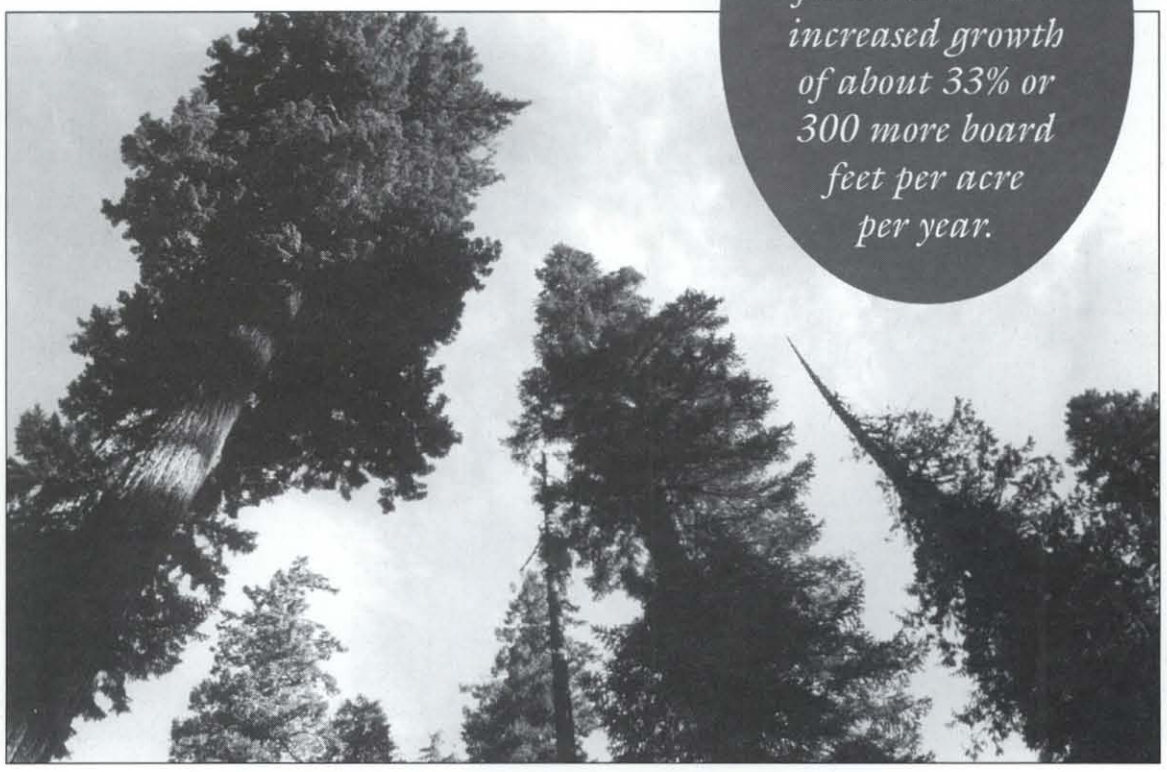
Genetics, nutrition, and forest health. L. Fins, J. A. Moore

Development of prediction equations for tree growth and mortality as a function of site localized weather forecasts based on synoptic predictions from global climate models. J.A. Moore

Development of operational guidelines and best management practices for forest fertilization. J.A. Moore

Intermountain Forest Tree Nutrition Cooperative. J.A. Moore

Idaho industries using fertilizers on their forests have seen increased growth of about 33% or 300 more board feet per acre per year.



International Forestry

Scientists

David L. Adams
Specialties: Silviculture, forest health, forest regeneration, agroforestry

John H. Ehrenreich
Specialties: International forest and range management, agroforestry, range ecology

Jo Ellen Force
Specialties: Forest planning and policy, social forestry, agroforestry, community stability, land use planning, society and natural resources

Sam H. Ham
Specialties: Environmental education and interpretation, natural resource communication, natural resource tourism, reserve management in developing Latin American countries

Charles R. Hatch, Dean
Specialties: Forest mensuration and statistics, international forestry

Related 1996 Publications

Agroforestry potential in Punjab, Pakistan. Pages 77-79 in: *Proceedings of the Fourth North American Agroforestry Conference, 1995.* J.H. Ehrenreich, C.R. Hatch.

Collaborative Community Forestry Research: Experiences and Opportunities Between the University of Idaho, USA and the Institute of Forestry, Nepal. Report to Ford Foundation, New Delhi, India. J.E. Force, W.J. McLaughlin, J.W. Fields.

Global forestry: International students in US schools. *Journal of Forestry* 94(11):26-28. J.E. Force.

Black locust (*Robinia pseudoacacia* L.) Agroforestry systems: Effect on soil properties. Pages 35-39 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. I., Ahmed, R.L. Mahler, J.H. Ehrenreich.

Agroforestry Extension and Technology Transfer to Farmers in Pakistan. Pages 102-108 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. Baig, M.B. and J.H. Ehrenreich.

Effect of Sesbania (*Sesbania aculeata*) and phosphorus fertilization on rice production under saline-sodic soil conditions. Pages 40-46 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. M.B. Baig, M.S. Zia, J.H. Ehrenreich.

Effect of sesbania (*Sesbania aculeata*) and gypsum on rice production under saline-sodic conditions in Pakistan. Pages 147-148 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. M.B. Baig, M.S. Zia, J.H. Ehrenreich, M. Aslam, F. Hussain.

Effect of Sesbania (*Sesbania aculeata*) and farm yard manure on rice production under saline-sodic soil conditions in Pakistan. Pages 174-175 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. M.B. Baig, M.S. Zia, J.H. Ehrenreich.

The prospects and problems of agroforestry in Pakistan. Pages 174-175 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. J.H. Ehrenreich, M.B. Baig.

Agroforestry potential in Punjab, Pakistan. Pages 77-79 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. J.H. Ehrenreich, C.R. Hatch.

Fresh vegetable production: A description of an urban farming system in the Congo. Pages 151-153 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. J. Mouell, J.H. Ehrenreich.

Factors facilitating or impeding success of agroforestry projects in developing countries. Pages 108-110 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. M.R. Whiteman, M.B. Baig, J.H. Ehrenreich.

Biological potentials of poplar agroforestry in the Caspian Sea region of northern Iran. Pages 100-101 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. S. Yassemi, J.H. Ehrenreich.

Use of urban trees to ameliorate increasing temperatures of cities. Pages 170-172 in: a *Growing Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W.

Lee, eds. A. Zahoor, J.H. Ehrenreich, J.H. Kielbaso.

Environmental Planning for Salvadorans: Final Report of the Nine-Month Course to Development Associates, Washington, DC and US Agency for International Development, El Salvador. M. Whiteman, S.H. Ham.

Global forestry: International students in U.S. schools. *Journal of Forestry* 94(11):26-28. J.E. Force.

Collaborative Community Forestry Research: Experiences and Opportunities Between the University of Idaho, USA and the Institute of Forestry, Nepal. Report to Ford Foundation, New Dehli, India. J.E. Force, W.J. McLaughlin, J.W. Fields.

Ongoing Research

A gender analysis of participation in Nepal's community forestry program. J.W. Fields, J.E. Force

Black locust-legume-grass interactions on rehabilitation of rangelands in Kashmir. J.H. Ehrenreich, I. Ahmed

Analyzing black locust and poplar agroforestry systems in northern India. J.H. Ehrenreich

Analyzing black locust, poplar and alder agroforestry systems in northern Iran. J.H. Ehrenreich, S. Yassemi

Development of GIS systems for livestock and wildlife management in Balouchistan. J.H. Ehrenreich, M.. Kaleemulah

Effect of agroforestry systems in the hill areas of Philippines. J.H Ehrenreich, B. Advincula

Effect of urban forestry on climate in Lahore, Pakistan. J.H. Ehrenreich, A. Zahoor

Effect of Agroforestry on soils of the coastal plains of the Congo, Africa. J.H. Ehrenreich, J. Mouelle

Effect of silvopastoral and agroforestry systems in arid tropics of Cameroon, Africa. J.H. Ehrenreich, S. Olson

Soil-plant interactions in agroforestry systems in Pakistan. J.H. Ehrenreich, M. Baig

Computer-assisted design of a LEISA (Low Input Sustainable Agriculture) agroforestry system for the production of cacao in the Department of Meta, Columbia. D.L. Adams, B. Barber

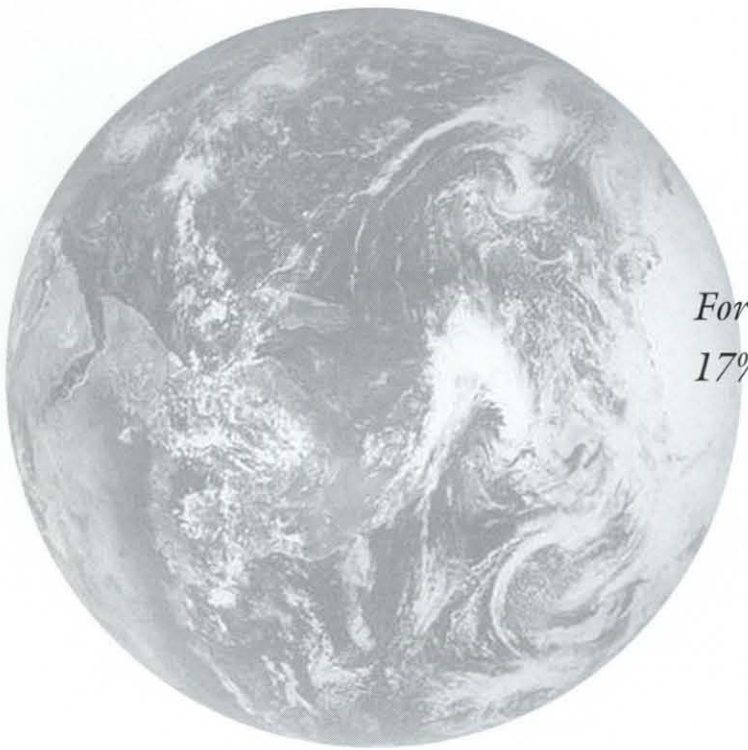
Effects of management and site factors on forest regeneration in Mali. D.L. Adams, Z. Sanogo

A gender analysis of participation in Nepal's community forestry program. J.W. Fields, J.E. Force

Related Theses & Dissertations

Role of agroforestry extension and sesbania (*Sesbania aculeata*) rice production on salt-affected soils of Pakistan. Mirza Baig. *Major professor: John H. Ehrenreich*

Impacts of eucalyptus PF1 *Pinus caribaea* on soil properties and potential for silvopastoral systems in southern Congo. Jean Moulle. *Major professor: John H. Ehrenreich*



Foreign nations purchase 17% of Idaho's houselogs.

Mapping & GIS*

Scientists

Paul E. Gessler
Specialties: Remote sensing, GIS mapping of natural resources

J. Michael Scott
(Leader, Idaho Cooperative Fish and Wildlife Research Unit)
Specialties: GAP analysis, ecosystem management, endangered species management, systems approaches to conservation biology and ecology

Joseph J. Ulliman
(Director, FWR Remote Sensing Center; Co-Director, UI Remote Sensing Research Unit)
Specialties: Aerial photographic interpretation, mapping and remote sensing

Related 1996 Publications

Comparison of DEM - Derived slope and aspect with on-site measurements. Poster Presentation. Annual Convention, Society of American Foresters, Albuquerque, New Mexico. D.R. Unger, J.J. Ulliman.

Evaluation of EIS methods for mapping relative temperature zones in forest ecosystems. Pages 157-160 in: *Proceedings, 26th International Symposium on Remote Sensing of Environment.* Vancouver, British Columbia. D.R. Unger, J. J. Ulliman.

Use of Landsat thematic mapper thermal infrared data to map relative temperature zones within the University of Idaho Experimental Forest. In: *Proceedings, Southern Forestry GIS Conference.* Athens, Georgia. D.R. Unger, J.J. Ulliman.

Gap Analysis for biodiversity survey and maintenance. In: *Biodiversity: Getting the Job Done* (E.O. Wilson, M.L. Reaka-Kudla, D.E. Wilson ,eds.), National Academy Press, Washington, D.C. J.M. Scott, B. Csuti

Idaho's major vegetation types cover about 53.5 million total acres, according to satellite data gathered by our researchers.

The application of GAP analysis to national park system planning. Pages 187-194. In: J.M. Scott, T. Tear, F. Davis, eds. *Gap Analysis.* American Society for Photogrammetry and Remote Sensing. R.G. Wright.

Ongoing Research

Small format aerial photograpy. J.J. Ulliman

GIS methods for mapping temperature zones within the University of Idaho Experimental Forest. D.R. Unger, J.J. Ulliman

Inland northwest remote sensing laboratory for bioregional analysis. P.E. Gessler, L. Fox, J.M. Scott

Development of remotely sensed land cover change detection training course for the USDA Forest Service. P.E. Gessler, L. Fox, J.J. Ulliman

Upper Midwest Aerospace Consortium. P.E. Gessler, J.J. Ulliman

Enhancing Ag-Link with soil survey data. P.E. Gessler

Topographic evolution of volcanic islands. O.A. Chadwick, P.E. Gessler

Effects of topography on soil carbon dynamics. O.A. Chadwick, P.E. Gessler

An explicit treatment of topography in soil carbon modeling. O.A. Chadwick, P.E. Gessler

Evaluation of methods used to estimate numbers of animals. J.M. Scott

Preserve design at the continental and regional level. J.M. Scott

Determining limiting factors and designing recovery strategies for endangered species. J.M. Scott

Implementing proactive approaches to protecting biological diversity. J.M. Scott

Mapping of black locust agroforestry systems in the Palouse Prairie (WA/ID) areas with GIS. J.H. Ehrenreich, T. Arisawa

Related Theses

The significance of forest canopy structure and species type in the effective operation of global positioning systems. B. Elwell. *Major professor: J.J. Ulliman*

LANDSAT TM-based vegatation classifications of the Boise and Colville National Forests. T. Tady. *Major professor: J.J. Ulliman*

*Geographic Information Systems

Policy Analysis

Scientists

Jo Ellen Force
Specialties: Forest planning and policy, social forestry, agroforestry, community stability, land use planning, society and natural resources

Charles C. Harris
Specialties: Resource management, policy, and planning; organizational psychology of resource management; natural resource tourism, impacts, and market analysis, recreation and amenity values

Gary E. Machlis
(Chief Social Scientist,U.S. National Park Service)
Cooperative Park Studies Unit (NPS)
Specialties: Sociology of natural resources, human ecology, conservation biology

Jay O'Laughlin
(Idaho Policy Analysis Group)
Specialties: Natural resource economics and policy analysis, structural changes in wood-based industries

Related 1996 Publications

Resource-Dependent Community Research Program. Report to USDA Forest Service Pacific Northwest Research Station, Portland, Oregon. J.E. Force, G.E. Machlis.

Early and late adopters of stewardship planning. Pages 222-229 in: *Proceedings of the 1996 Symposium on Nonindustrial Private Forests: Learning from the Past, Prospects for the Future*, Melvin J. Baughman, ed. J.E. Force, P.W. Graesser.

Learning with farmers for policy changes in natural resource management. *Forest, Trees and People Newsletter* No. 31(September 1996):14-19. M. Gakou, J.E. Force.

Modeling human factors that affect the loss of biodiversity. *Conservation Biology* 10(4):1253-1263. D.J. Forester, G.E. Machlis.

Extending Gap Analysis to include socioeconomic factors. In: *Gap Evaluators and Landscape Approach to Biodiversity Planning,* J.M. Scott, T. Tear, F. Davis, eds. American Society of Photogrammetry and Remote Sensing. D.J. Forester, G.E. Machlis, J.E. McKendry.

Research needs for biodiversity management: New Forestry, neo-politics, and voodoo economics. In: *A Struggle to Adapt: The Social Ecology of Natural Resource Organizations in the 1990s*, W.R. Burch, ed. Westview Press, Boulder, Colorado. G.E. Machlis.

The relationship between socioeconomic factors and biodiversity loss: First efforts at theoretical and quantitative models. In: *Biodiversity in Managed Landscapes: Theory and Practice*, R. Szaro, ed. Oxford University Press. G.E. Machlis, D.E. Forester.

Maps, models, and natural resources management: Powerful tools from the social sciences. In: *Human Dimensions in Natural Resource Management*, A. Ewart, ed. G.E. Machlis, J.E. McKendry.

Usable Knowledge: A Plan for Science and the National Parks. Cooperative Park Studies Unit, University of Idaho, Moscow. G.E. Machlis.

A Social Science Plan for South Florida National Park Service Units. Cooperative Park Studies Unit, University of Idaho, Moscow. G.E. Machlis, J.E. McKendry, M.E. Correia.

California cloud seeding and Idaho precipitation. *Journal of Weather Modification* 28: 39-49. J.G. MacCracken, J. O'Laughlin.

Grizzly Bear Recovery Policy: Analysis of Two Competing Positions. Idaho Forest, Wildlife and Range Experiment Station Contribution No. 815, University of Idaho, Moscow. J.G. MacCracken, J. O'Laughlin.

Serving the Visitor 1996: A Report on Customers of the National Park Service. Cooperative Park Studies Unit, University of Idaho, Moscow. G.E. Machlis, M. Littlejohn, G. Gill.

Idaho Water Quality Policy for Nonpoint Source Pollution: A Manual for Decision-Makers. Report No. 14, Idaho Forest, Wildlife and Range Policy Analysis Group, University of Idaho, Moscow. J. O'Laughlin.

Is there a forest health crisis in this country? (opinion). *The Forestry Source* 1(6): 7. J. O'Laughlin.

Who owns northern Idaho forests? How does that influence management? 3 Pages in: *Dynamics of Northern Idaho Forests: A Symposium on Plants, Animals, and People.* U.S. Forest Service, Coeur d'Alene. J. O'Laughlin.

Collaborative Learning Workshop for the Clearwater, Nez Perce, and Idaho Panhandle National Forests: An Evaluative Summary. Contribution No. 811, Idaho Forest, Wildlife and Range Experiment Station, University of Idaho, Moscow. J. O'Laughlin, P.S. Cook.

Idaho's forests at the crossroads, and "The water is gin clear." *Evergreen Magazine* (March/April 1996):39-40, 51. Evergreen Foundation, Medford, OR. J. Peterson, J. O'Laughlin, *et al.*

Ongoing Research

Community social change in resource-dependent communities. J.E. Force, G.E. Machlis

Women's participation in northwest Forest Service planning. R. Movich, J.E. Force

The human ecosystem as an organizing concept in ecosystem management. G.E. Machlis, J.E. Force, B. Burch

Federal land ownership and management policy in Idaho. J.O'Laughlin, *et al*

Policies affecting Idaho timber harvests: Getting a grip on sustainability. P.S. Cook, J.O'Laughlin, F.G. Wagner, K. Reese, *et al*

Designing BMPs (best management practices) for riparian grazing: Analysis of scientific literature. J.C. Mosley, A. Griffis, P.S. Cook

Factors limiting salmon and steelhead populations in Idaho. J. O'Laughlin, *et al*

Development of an interactive atlas of biodiversity gap analysis for the Puget Sound region. G.E. Machlis, J. McKendry, S. Engle

Development of an operational database and accompanying user's guide. G.E. Machlis, G. Gill

Social science research and planning in cooperation with the National Park Serive and other agencies. G.E. Machlis

Social science needs assessments addressing various needs for the National Park Service. G.E. Machlis

Development of comparative sister park relationship to assess environmental and economic attitudes of park visitors in the U.S. and South Africa regarding conservation of water and energy in arid region parks. G.E. Machlis

Using expert opinion and the analytical hierarchy process to weight a model of biodiversity loss. J. Forester, G.E. Machlis, B. Grigsby

Related Theses/Dissertations

Wildlife conservation officers and the use of discretion. Kristin Fitzgerald. *Major professor: G.E. Machlis*

Women and northwest Forest Service planning: Interests, motivations, and barriers to participation. Randi Movich. *Major professor: J.E. Force*

The adoptability of coooperative business enterprises among American Indian tribes. David Smith. *Major professor: G.E. Machlis*

Ecosystem and community: Community-level policies for managing the implementation of ecosystem management. C.J. Wall. *Major professor: C.C. Harris*

Idaho policy is especially important since 2/3 of the state is public land.

Private Forestry

Scientists

James R. Fazio
Specialties: Resource communication, environmental interpretation, conservation history, urban and community forestry, continuing education

Ronald L. Mahoney
(Extension Forestry)
Specialties: Silviculture, natural resources education

Related 1996 Publications

A Private Landowner's Guide to Managing Northwest Bluebird Habitat. Agricultural Cooperative Extension Bulletin 778, University of Idaho, Moscow. P. Town, R.L. Mahoney.

Harwood Plantations for the Inland Northwest. Idaho Forest, Wildlife and Range Experiment Station Bulletin 57, University of Idaho, Moscow. Y. Carree, R.L. Mahoney, R.K. Dumroese.

Evaluating Private Forest Ecosystems for Silvicultural Prescriptions and Ecosystem Management Planning. Idaho Forest, Wildlife and Range Experiment Station Bulletin 59, University of Idaho, Moscow. R.L. Mahoney, H.L. Osborne, P. Town.

Evaluating Wildlife Habitat for Managing Private Forest Ecosystems in the Inland Northwest. Idaho Forest, Wildlife and Range Experiment Station Bulletin 60, University of Idaho, Moscow. P. Town, R.L. Mahoney.

Are Your Streams Healthy? Stream Quality Survey for Managing Private Forest Ecosystems. Idaho Forest, Wildlife and Range Experiment Station Bulletin 61, University of Idaho, Moscow. P. Town, R.L. Mahoney.

The Idaho Forest Owners Assistance Directory: Forestry, Educational, Technical, and Financial Assistance Programs for Idaho Forest Landowners. Idaho Forest, Wildlife and Range Experiment Station Bulletin 66, University of Idaho, Moscow. Y. Carree, C. Schnepf, S. Osborne.

Technology transfer and agricultural extension in Asia. Pages 118-123 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. M.B. Baig, M.B., G.S. Straquadine, J.H. Ehrenreich, W.S. Sleight, J.O. Derry.

Transfer of technology: From acceptance to action in international agroforestry development. Pages 110-114 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. G.S. Straquadine, M.B. Baig, J.H. Ehrenreich.

Assessing probable success: Applying Rogers' "Diffusion of Innovations" Theory to agroforestry. Pages 115-117 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. M.R. Whiteman, M.B. Baig, J.H. Ehrenreich.

Ongoing Research

High-value hardwoods for the Pacific Northwest. R.L. Mahoney, Y. Carree

Reforesting marginal farmlands. R.L. Mahoney

Evaluating private forest ecosystems for timber, wildlife habitat, and water quality. R.L. Mahoney, Y. Carree

Care of forest soils. R. Brooks

Continuing Education & Outreach

January 19	Non-Industrial Private Forestry (NIPF) Foresters Workshop—Spokane, Washington
February 17	Backyard Forests—Moscow
March 7-8	Southern Idaho Non-Industrial Private Forestry (NIPF) Workshop—Boise
March 25-26	Regional Non-Industrial Private Forestry (NIPF) Workshop—Moscow
May 6	Backyard Forests—Moscow
May 20-21	Reforesting Marginal Farmlands—Moscow
June 22	Thinning and Pruning Field Day—Bonners Ferry

10.5% of Idaho forests are owned by small, non-industrial landowners, mostly farmers and ranchers.

Rangelands & Range Health

Scientists

Stephen C. Bunting
Specialties: Fire ecology, range ecology, range management

Kendall L. Johnson
Specialties: Shrubland ecology and management, range extension

James L. Kingery
Specialties: Forest grazing policy and management, rangeland rehabilitation, range management

Karen Launchbaugh
Specialties: Range animal nutrition and behavior, grazing management

Ronald Robberecht
Specialties: Ecophysiology, autecology, range ecology, computerized teaching

Kenneth D. Sanders
Twin Falls Research and Extension Center Manager, Lee A. Sharp Experimental Area
Specialties: Range extension, range livestock nutrition, grazing systems

Related 1996 Publications

Herbivory in the Intermountain West, An Overview of Evolutionary History, Historic Cultural Impacts, and Lessons From the Past. Idaho Forest, Wildlife and Range Experiment Station Bulletin 58, University of Idaho, Moscow. J. Wayne Burkhardt.

Black Locust (*Robinia pseudoacacia* L.) agroforestry systems for the Palouse Priairie region of Idaho and Washington. Pages 33-34 in: *Growing a Sustainable Future: Proceedings of 4th North American Agroforestry Conference.* J.H. Ehrenreich, D.L. Ehrenreich, H.W. Lee, eds. J.H. Ehrenreich, R.L. Mahler, I. Ahmed.

Effects of competition on the postfire recovery of two bunchgrass species. *Journal of Range Management* 49(2):137-142. G.E. DeFossé, R. Robberecht.

Future ecological and socio-economic strategies for the rangelands of the Chubut province, Argentina. In: *Proceedings, International Development Symposium,* Society for Range Management, Denver, Colorado. G.E. Defossé, R. Robberecht.

Germination characteristics of *Festuca pallescencs,* a Patagonia bunchgrass with reclamation potential. *Seed Science and Technology* 23(3). G.E. Defossé, M.B. Bertiller, R. Robberecht.

Pinus ponderosa seedling establishment and the influence of competition with the bunchgrass, *Agropyron spicatum. International Journal of Plant Sciences.* 157:509-515. Kolb, P.F. and R. Robberecht.

High temperature and water stress effects on the survival of *Pinus ponderosa* seedlings. *Tree Physiology.* 16:665-672. P.F. Kolb, R. Robberecht.

Fire effects on grasses in central semi-arid Argentina. *Journal of Arid Environments* 32:259-269. R.M. Boo, D.V. Palaez, S.C. Bunting, O.R. Elia, M.D. Mayor.

Range Management After Drought. CL560 in: 2nd Edition, *Cow-Calf Management Guide-Cattle Producer's Library.* W. Reg. Ext.Publ. Moscow. C.C. Gibson, K.D. Sanders, N.R. Rimbey, J.C. Mosley.

Conservation and management of rangeland resources. Pages 280-310 in: G.W. Sharpe, C.W. Hendee, W.F. Sharpe, and J.C. Hendee, *Introduction to forest and renewable resources* (6th ed.). McGraw-Hill, Inc., New York, New York. K.L. Johnson.

Dietary overlap among cattle and cervids in northern Idaho forests. *Journal of Range Management* 49:8-15. J.L. Kingery, J.C. Mosley, K.C. Bordwell.

The relative sensitivity of two bunchgrass species to fire. *International Journal of Wildland Fire* 5:127-134. R. Robbercht, G.E. Defossé.

Ongoing Research

The effect of interspecific plant competition on the productivity of tree seedlings during the regeneration of forest stands.

Effect of enhanced UV-B radiation on carbon dynamics in selected tree species. R. Robberecht, J.H. Bassman, G.E. Edwards

Freezing tolerance, cold acclimation, and photosynthetic capacity of coniferous seedlings and bunchgrasses: Consequences for forest regeneration and responses to global climate change. R. Robberecht, J.D. Marshall

Fire ecology of caldenal vegetation of central Argentina. S.C. Bunting, R.M. Boo

Heat flow into soils during simulated fire and post-fire response of *Agropyron spicatum.* S.C. Bunting

Grazing effects on reclaimed mine lands in southeastern Idaho. J. Kingery, S.C. Bunting

Seedling ecology of shrubs associated with the Snake River Plain Wyoming sagebrush vegetation. S.C. Bunting, M. Hironaka

Fire regime classification for the vegetation of the Columbia Basin. P. Morgan, S.C. Bunting

Revegetation of pipeline disturbances. K.L. Johnson

Long-term ecological change of shortgrass prairie. K.L. Johnson

Photographic studies of vegetation change. K.L. Johnson

A functional interpretation of herbivory resistance in mesic grasslands. K.L. Launchbaugh, D.D. Briske

Life after juniper invasion: Increasing juniper consumption by livestock. K.L. Launchbaugh, C.A. Taylor

Using sheep to manage noxious plants in Idaho. K.L. Launchbaugh, J.W. Walker

Relationships of animal use to tree establishment, survival, and growth in plantation settings. J.L.Kingery

Forest succession and animal use. J.L. Kingery

Reseeding arid rangelands. K.D. Sander

Short duration grazing system on crested wheatgrass. K.D. Sanders

Control of broom-snakeweed on rangelands. K.D. Sanders

Evaluation of salt-desert shrub communities through time. L.A. Sharp, K.D. Sanders

Factors affecting Idaho ranch values. N.R. Rimbey

Cattle dispersion methods and riparian ecosystems. N.R. Rimbey, P.A. Momont, J. Tanaka, T. DelCarfo

Black locust-legume-grass soil interactions on rehabilitation of depleted Palouse Prairie (WA/ID) farming areas. J.H. Ehrenreich, B. Mahler, I. Ahmed

Effect of black locust-legume agroforestry systems in the Palouse Prairie (WA/ID) areas on wildlife populations.J.H. Ehrenreich, J.Peek, S.Olsen

Continuing Education & Outreach

Jan.-May	Rangeland Ecology—Boise
Jan.-May	Rangeland Vegetation Ecology—Boise
Jan. 16-18	25th Annual Pacific Northwest Range Management Short Course—Boise
Jan. 25	Forestland Grazing—Bonners Ferry

Related Theses/Dissertations

Effects of seasonal sheep grazing on browse in northern Idaho. Michael J. Alpe. *Major professor: James Kingery*

Evaluation of two techniques for differentiating nonpoint source fecal pollution by wild and domestic ungulates. Neal W. Darby. *Major professor: Jeffrey C. Mosley*

Evaluation of four seed mixtures for revegetating rangeland following a wildfire in southern Idaho. Marlene Eno. *Major professor: Jeffrey C. Mosley*

Influence of herbage removal on soil nutrient status of a riparian meadow: Water quality implications. Thomas A. Lance. *Major professor: Jeffrey C. Mosley*

Effects of sheep grazing on tree seedlings in a northern Idaho conifer plantation. Steven J. MacRae. *Major professor: Jeffrey C. Mosley*

Effect of season of use on quality and botanical composition of sheep diets within a northern Idaho conifer plantation. Theogene Mbabaliye. *Major professor: James Kingery*

Landscape dynamics of an island range: Interrelationships of fire and whiteback pine (*Pinus albicaulis*). Michael Murray. *Major professor: Steve Bunting*

35% of Idaho's land is or was primarily sagebrush and grasses.

Recreation and Tourism

Scientists

Charles C. Harris

Specialties: Resource management, policy, and planning; organizational psychology of resource management; natural resource tourism, impacts, and market analysis; recreation and amenity values

John D. Hunt

Specialties: Tourism planning, development, marketing, and management; integration of natural resource uses with tourism and recreation development; human behavior aspects of tourism and recreation development

William J. McLaughlin.

Specialties: Regional planning including natural resources, nature conservation, tourism, economic development, group facilitation for decision-making and conflict resolution, social science research methods

Nick Sanyal

Specialties: Recreation planning, recreation behavior, human dimensions of fish and wildlife management, research methodologies, survey research

Related 1996 Publications

Idaho Statewide Comprehensive Outdoor Recreation and Tourism Planning: Assessment and Policy Plan. Idaho Forest, Wildlife and Range Experiment Station Contribution No. 825, University of Idaho, Moscow. N. Sanyal, W.J. McLaughlin.

Idaho Winter Sports and Recreation: Alpine Skiing 1994-1995. Idaho Forest, Wildlife and Range Experiment Station Contribution No. 795, University of Idaho, Moscow. J.D. Hunt, S. R. Leidner, N. Sanyal, J. Parrish.

Keeping Pace with U.S. Travel Trends, 1995 Nevada Governor's Conference on Travel and Tourism. J. D. Hunt.

From Lewis and Clark to modern tourism: A 200-Year journey. In: *Proceedings of the First Annual Lewis and Clark Bicentennial Planning Workshop*, National Lewis and Clark Bicentennial Council, Stevenson, Washington. J.D. Hunt.

Idaho Tourism & Recreation Chronicle. Vol. 1 (1-4). Department of Resource Recreation and Tourism, University of Idaho.

Human dimensions of the Priest Lake Ecosystem: Spatial analysis of recreation and tourism activities. Idaho Forest, Wildlife and Range Experiment Station Contribution No. 820, University of Idaho, Moscow. N. Sanyal, K. Morten, J. Parrish, W.J. McLaughlin, S. Leidner, D. Wilkins.

Recreation pays: Idaho saw a total $196.3 million in lodging receipts during 1996.

1994-1995 Idaho Resident Recreation and Travel. Idaho Forest, Wildlife and Range Experiment Station Contribution No. 808, University of Idaho. J. Parrish, N. Sanyal, J.D. Hunt.

Idaho Winter Sports and Recreation: Snowmobiling 1994-1995. Idaho Forest, Wildlife and Range Experiment Station Contribution No. 813, University of Idaho, Moscow. J. Parrish, S. Leidner, J.D. Hunt, N. Sanyal.

Idaho Winter Sports and Recreation: Cross-country Skiing 1994-1995. Idaho Forest, Wildlife and Range Experiment Station Contribution No. 812 , University of Idaho, Moscow. J. Parrish, S. Leidner, J.D. Hunt, N. Sanyal.

The 1994-95 Idaho Outdoor Recreation Facilities Inventory (ORFI) Report. Idaho Forest, Wildlife and Range Experiment Station Contribution No. 801, University of Idaho, Moscow. N. Sanyal, J. Parrish.

Human Dimensions of the Priest Lake Ecosystem: Recreation and Tourism. Idaho Forest, Wildlife and Range Experiment Station Contribution No. 803, University of Idaho, Moscow. N. Sanyal, K. Morten, J. Parrish, W.J. McLaughlin, S. Leidner.

Facultad de Ciencias Exactas y Naturales Proceso de Planificacion Estrategica 1996-2000. Universida Nacional de Costa Rica. T.L. Comneno, J.M. Coto, W.J. McLaughlin.

Ongoing Research

Human Dimensions of the Priest Lake Ecosystem. N. Sanyal, W.J. McLaughlin (also Priest Lake State Lessees' Association; Priest Lake Chamber of Commerce; Division of Environmental Quality, Idaho Department of Health and Welfare; Priest Lake Ranger District, Idaho Panhandle National Forests).

Idaho Statewide Comprehensive Outdoor Recreation and Tourism Planning. C.C. Harris, J.D. Hunt, N. Sanyal (also Idaho Department of Parks and Recreation).

Idaho Tourism and Recreation Chronicle. J.D. Hunt (also Idaho Department of Commerce).

The Idaho Outdoor Recreation and Tourism Planning Project for providing outdoor recreation and tourism opportunities in Idaho for development of 1994 Recreation and Tourism Assessment and Policy Plan for the state. N. Sanyal, J.D. Hunt

Identification of barriers and development of organizational structures, processes, and procedures for combining the Costa Rican Park Service, Forest Service, and Fish and Wildlife Service into The System of National Conservation Areas Project. W.J. McLaughlin, J. Courrau

Study of human dimensions of the Priest Lake Ecosystem for development of recreation and tourism elements of watershed planning. W.J. McLaughlin, N. Sanyal

Development and implementation of a participatory strategic planning process for the College of Exact and Natural Sciences. W.J. McLaughlin, J.C. Coto, T. Lascaris

Development of a participatory planning methodology for the Rio Segundo Watershed in Costa Rica. W.J. McLaughlin, M.V. Sanchez, B.A.C. Benavides, J.C. Coto, T. Robinson

Related Theses

Analysis of characteristics and opinions of visitors to Tikal National Park, Peten, Guatemala. M. Lopez. *Major professor: C.C. Harris*

Small rural community autonomy within the interior Columbia River Basin: A correlational study. S. Bales. *Major professor: J.D. Hunt*

A case study of potential spatial and temporal displacement of lakeside campers in the Priest Lake Basin, Idaho. K. Morten. *Major professor: N. Sanyal*

Visitor profile and preferences of the Craig Mountain Management Area. R. Griffith. *Major professor: E.E. Krumpe*

Timber & Logging

Scientists

Leonard R. Johnson
Specialties: Timber harvesting systems, wood energy, recovery and processing of forest residues

Harry W. Lee
Specialties: Harvesting systems, road design, site productivity, soil-water relationships

Related 1996 Publications

Sawtimber valuation and allocation through simulation of Texas sawmills. *Interfaces.* F.G. Wagner, F.G., J.A. Brody, D.S. Ladd, and J.S. Brand.

Forest operations in the Intermountain West. *Forest Products Journal* 46(6):17-20.

Blending old and new harvesting technologies to meet environmental objectives. In: *Proceedings of the IUFRO XX World Congress*, Division 3.07. IUFRO Secretariat, Vienna, Austria (1995). L.R. Johnson.

Forest operations in the Intermountain West. *Forest Products Journal* 46(6):17-20. L.R. Johnson.

Calculating Timber Removal Costs Under Ecosystem Management. Idaho Forest, Wildlife and Range Experiment Station Bulletin 62. College of Forestry, Wildlife and Range Sciences, University of Idaho, Moscow. H.W. Lee, and L. R. Johnson.

Contracting for Timber Harvest Under Ecosystem Management. Idaho Forest, Wildlife and Range Experiment Station Bulletin 63. College of Forestry, Wildlife and Range Sciences, University of Idaho, Moscow. H.W. Lee and L.R. Johnson.

Small Scale Systems for Applications to Overstocked, Small Diameter Stands. Report to USDA Forest Service Pacific Northwest Research Station.

Ongoing Research

Simulation of new timber harvesting systems under adaptive forestry prescriptions. L.R. Johnson

Summer Education in Wood for Teachers. L.R. Johnson

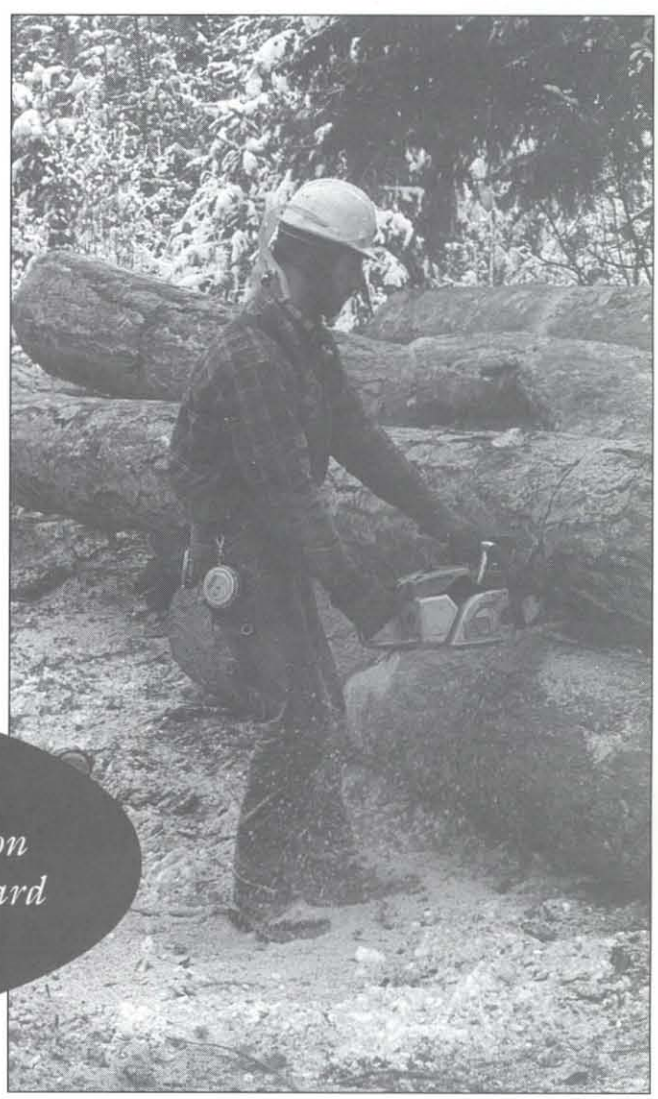
Small scale systems for applications to overstocked, small diameter stands. Peter Schroder, Leonard Johnson

Small scale harvesting systems. L.R. Johnson

Harvesting costs under silvicultural optims in western Washington. L.R. Johnson

RC skidder for waste recovery and forest management. H.W. Lee, D. Edwards

Evaluation of impacts of cut-to-length harvesting on soil and residual stand. H.W. Lee



Idaho ranks 7th in the nation for lumber production at slightly under 2 billion board feet per year.

Water Quality & Wetlands

Scientists

George Belt
Specialties: Forest hydrology and watershed management, social forestry, agroforestry

C. Michael Falter
Specialties: Ecology and management of lakes, streams, and reservoirs; aquatic pollution ecology - pond management & urban runoff; water quality; Middle Snake River

Kirk Lohman
Specialties: Stream and riparian ecology, water quality, amphibians and reptiles, environmental law

Related 1996 Publications

Agricultural impacts on water quality in Latvia and Lithuania: A report of the U.S. Young Investigator Program. In: *Proceedings of the Latvian Academy of Sciences.* J.D. Baker, P. Bosch, S. Bukaveckas, S. Deets, K. Hatfield, P. Heglund, A. Kazakevicius, K. Lohman, A. Mitchell, E. Petrovskis, I. Runge, A. Zale.

An examination of land cover and stream water quality among physiographic provinces of Missouri, U.S.A. *Verhandlungen der Internationalen Vereinigung für Theoretische und Angewandte Limnologie.* B.E. Perkins, K. Lohman, E. Van Nieuwenhuyse, J.R. Jones.

Baseline Study of Water Resources on Craters of the Moon National Monument, Idaho. Final report to U.S. National Park Service. C.M. Falter, R.J. Freitag.

Middle Snake River Productivity and Nutrient Assessment. Final report to Division of Environmental Quality, Idaho Department of Health and Welfare, Boise. C.M. Falter, C. Burris.

Ongoing Research

Distribution and abundance of stream amphibians in relation to timber harvest in northern Idaho. K. Lohman

Use of riparian habitats by amphibians and reptiles along the Lower Snake River. K. Lohman, S.L. Small

Effects of forest stand age and structure on the distribution and abundance of stream amphibians. K. Lohman, B. Hossack

Influence of riparian herbage on water quality of rangeland streams. J.C. Mosley, C.M. Falter, J.W.alker, D.E. Lucas, T.A. Lance

Can aquatic vegetation be an indicator of the effectiveness of nutrient management practices along the Middle Snake River? C.M. Falter, J. O'Laughlin

Stream habitat assessment in the Payette Lake watershed, Idaho. C.M. Falter

Management of hypereutrophication in the mid-Snake River, Idaho. C.M. Falter

Effects of higher winter water levels of Lake Pend Oreille, Idaho, on zooplankton and rooted aquatic plant communities. C.M. Falter

Limnology and management of Lake Waha, Idaho. C.M. Falter

Assessment of catastrophic landslides on stream habitat on the Clearwater National Forest, Idaho. C.M. Falter

Continuing Education & Outreach

February 23-March 9	Wild and Scenic River Management—Boise
March 25-27	Silviculture and Water Quality (LEAP/Logger Education to Advance Professionalism)—Moscow
March 28-30	Silviculture and Water Quality (LEAP/Logger Education to Advance Professionalism)—Sandpoint
April 18-20	Silviculture and Water Quality (LEAP/Logger Education to Advance Professionalism)—Horseshoe Bend

Related Thesis

Evaluation of forest fire effects on snowpack accumulation and melt in the Fourth of July Creek drainage of northwest Montana. Brady Dodd. *Major professor: G.H. Belt*

In northern Idaho alone, at least 42 public water systems depend for their domestic water on surface waters collected from forested watersheds.

Wilderness and Parks

Scientists

John C. Hendee
Director, UI Wilderness Research Center
Specialties: Human behavior aspects of resource management—public involvement, conflict resolution, social impact analysis; wilderness, recreation, wildlife, and forest policy and management; use of natural environments for personal growth, therapy, and leadership development

Edwin E. Krumpe
Specialties: Wilderness and dispersed recreation management, recreation and tourism behavior and the decision process, interpretation and communication, administration, group facilitation for decision-making

R. Gerald Wright, Jr.
(Idaho Cooperative Fish and Wildlife Research Unit)
Specialties: wildlife management in national parks and wilderness, ungulate (deer, elk, moose) ecology and habitat use, resolution of ecological problems, natural resource data management and GIS, human dimensions of wildlife

Related 1996 Publications

Wilderness Vision Questing and the Four Shields of Human Nature. Distinguished Wilderness Resource Lecture, May 1996. S. Foster, M. Little. Wilderness Research Center, University of Idaho, Moscow.

An inventory and classification of wilderness experience programs. Page 143 in: *Proceedings Abstracts, Sixth International Symposium on Society and Resource Management: Social Behavior, Natural Resources and the Environment.* G.T. Friese, J.C. Hendee.

Studies of the Use of Wilderness for Personal Growth, Therapy, Education and Leadership Development: An Annotation and Evaluation. G.T. Friese, J. T. Pitman, J.C. Hendee. Wilderness Research Center, University of Idaho, Moscow.

Hendee, J.C., ed. *International Journal of Wilderness.* Vol. 2 (1-6).

Wanted: Local Wilderness Advocacy. *International Journal of Wilderness* 2 (2):4. J.C. Hendee.

Wilderness—The World's Living Laboratory. *International Journal of Wilderness* 2 (1):4. J.C. Hendee

Human values and codes of behavior: Changes in Oregon's Eagle Cap Wilderness visitors and their attitudes. *Natural Areas Journal* 16(2):89-93. A. Watson, J.C. Hendee, H. Zaglauer.

A wilderness discovery program for urban, youth-at-risk at the Atlanta Job Corps Center. In: *Proceedings, Wilderness and Natural Areas in the East Conference.* K. Russell, J.C. Hendee, L. Hall, B. Galvin.

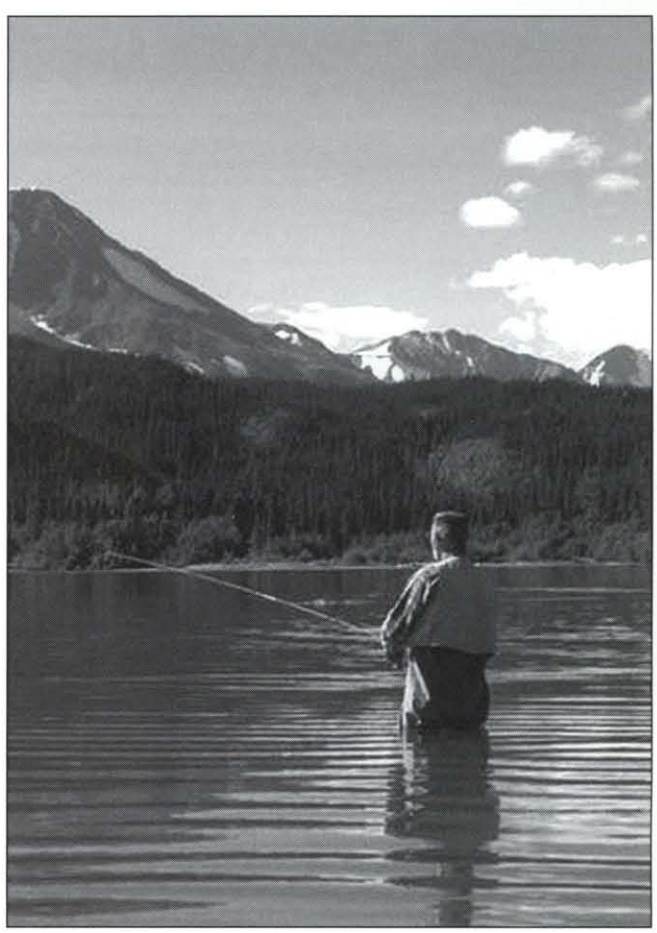
Wilderness Discovery Design and Evaluation of A Wilderness Experience Program for Job Corps. Report to U.S. Dept. of Labor, Job Corps, and USDA Forest Service. Wilderness Research Center, Universityof Idaho, Moscow. J.C. Hendee, K. Russell.

The Federal Advisory Committee Act—Implications for U.S. wilderness management. *International Journal of Wilderness* 2(2):18-21. L. Merigliano, E.E. Krumpe.

Trapper Creek Job Corps Center and Wilderness Discovery (TV documentary). Planet Grande Studio:ABC. 23 Jan.1997. D. Gager.

National Parks and Protected Areas: Their Role in Environmental Protection. Blackwell Science Inc. Cambridge, MA. R.G. Wright., ed.

Expansion of the U.S. National Park System in Alaska. Pages 165-172 in: *National Parks and Protected Areas,* R.G. Wright, ed. R.G. Wright.



The origin and purpose of national parks and protected areas. Pages 3-14 in: *National Parks and Protected Areas.* R.G. Wright, ed. R.G. Wright.

Ongoing Research

Wilderness vision questing: Foundations, benefits, and effects on people's lives. J.C. Hendee

The measuring of wilderness experience to socially and economically disadvantaged youth. T. Welton, J.C. Hendee

The effects of new student orientation with a wilderness experience on academic adjustment and progress. P. Farmer, J.C. Hendee

Primal hypotheses: The role of naturalness and solitude in producing wilderness benefits for people.D. White, J. C. Hendee

Environmental preferences of South African Parliament members on the Committee on the Environment in response to wilderness experience. J.C. Hendee, A. Muir

Wilderness stewardship: Revision to 3rd edition of textbook *Wilderness Management.* J.C. Hendee

7th edition of *Introduction to Forests and Renewable Resources*, McGraw-Hill. Sharpe & Sharpe, J.C. Hendee

Comparison of foraging preference and trampling impact caused by grazing of llamas and horses. E.E. Krumpe, H. Schantz

Related Theses/Dissertations

The effectiveness of belief-based communications on low impact camping behavior in the Sawtooth Wilderness. Andrew Boyd. *Major professor: E.E. Krumpe*

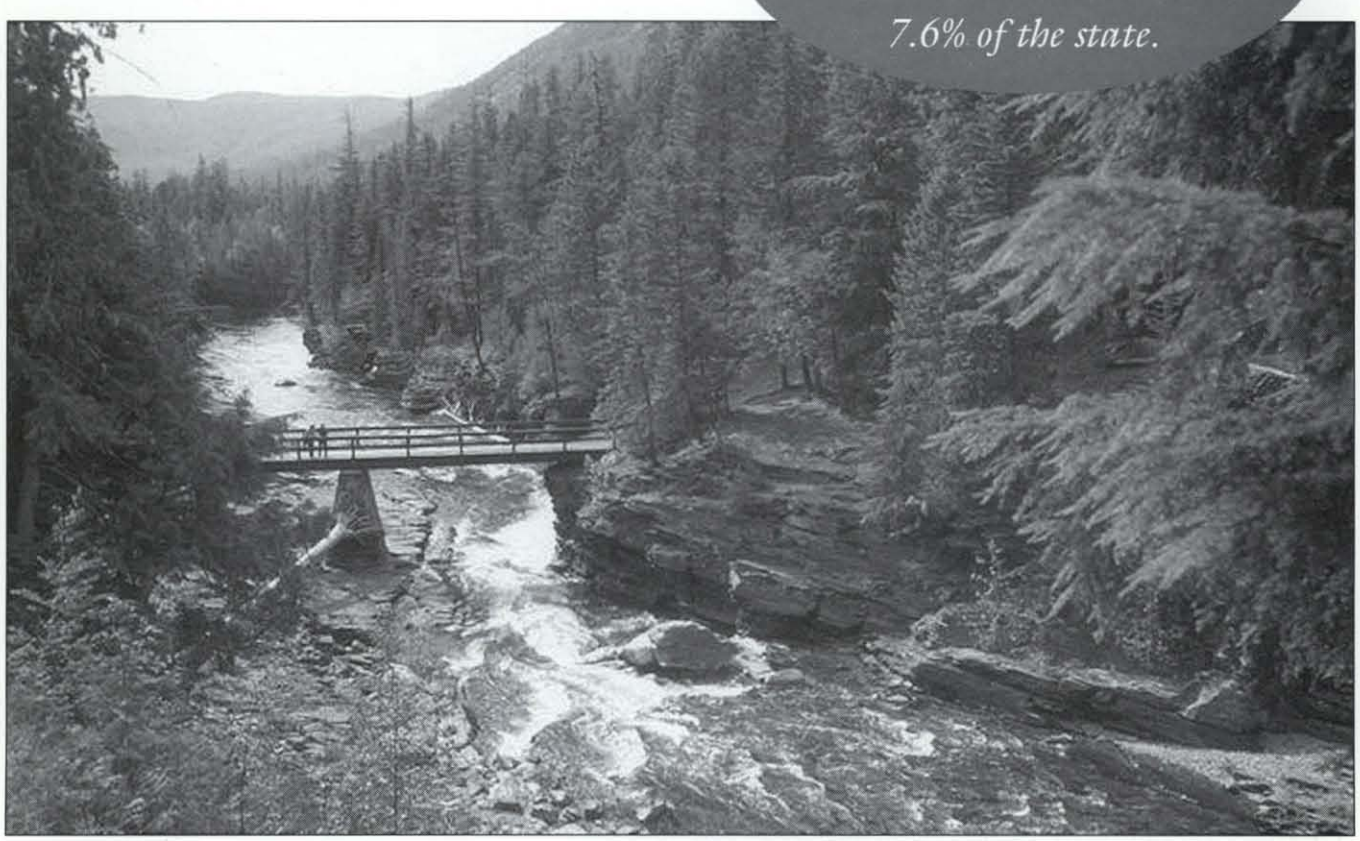
And inventory and classification of wilderness experience programs. Gregory Friese. *Major professor: J.C. Hendee*

Agency policies and wilderness managers' attitudes toward wilderness experience programs: A nationawide study of the U.S. Forest Service, National Park Service, Bureau of Land Management, and U.S. Fish and Wildlife Service. Dan Gager. *Major professor: J.C. Hendee*

Visitor profile and preferences of the Craig Mountain Management Area. Randy Griffith. *Major professor: E.E. Krumpe*

Potential social and economic contributions of Wilderness Discovery as an adjunct to the federal Job Corps Program. Keith Russell. *Major professor: J.C. Hendee*

Six wilderness areas in Idaho cover 4 million acres, or 7.6% of the state.



Wildlife and Game

Scientists

Brian Dennis
Specialties: Statistical ecology, biometrics (biological stats), mathematical modeling

Edward O. Garton
Specialties: Dynamics/management of bird/mammal populations, population estimation, modeling/simulation of population processes, forest bird ecology—woodpeckers and song birds, large mammal ecology—elk, mule deer, carnivores

Dennis Murray
Specialties: Predator/prey interactions, big game ecology

James M. Peek
Specialties: Big game habitat, ecology, and management

John T. Ratti
Specialties: Avian ecology (birds), waterfowl ecology/management, upland bird ecology, research design/techniques, wetland ecology, habitat analysis

Kerry P. Reese
Specialties: Upland game bird ecology and management, waterfowl and wetland ecology, avian ecology and habitat relationships

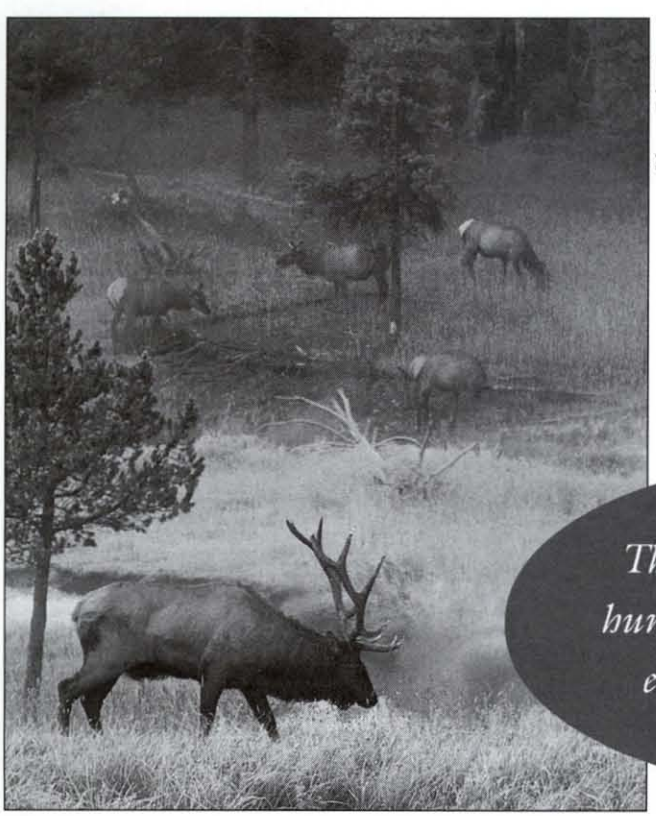


Photo: John Ratti

J. Michael Scott
(Idaho Cooperative Fish and Wildlife Research Unit)
Specialties: Gap Analysis, animal ecology, conservation biology, reserve design, Endangered Species Act, Condors/Hawaiian birds

Lisette Waits
Specialties: Wildlife conservation, biology and genetics, molecular ecology, evolutionary biology

R. Gerald Wright, Jr.
(Idaho Cooperative Fish and Wildlife Research Unit)
Specialties: Wildlife management in National Parks/wilderness, ungulate (deer, elk, moose) ecology and habitat use, resolution of ecological problems, natural resource data management and GIS, human dimensions of wildlife

Related 1996 Publications

The efficacy of anthelmintic treatment on the parasite abundance of free-ranging snowshoe hares. *Canadian Journal of Zoology* 74(9):1604-1611. D.L. Murray, L.B. Keith, L.B., J.R. Cary.

An investigation on fire effects within xeric sage grouse brood habitat. *Journal of Range Management* 49:194-198. R.A. Fischer, K.P. Reese, J.W. Connelly.

(1995) Mountain quail: High jumpers. *Idaho Wildlife* (Fall):4-8. P.E. Heekin, C.A. Vogel.

(1995) In quest of the mountain quail. *Idaho Wildlife* (Fall). P.E. Heekin, C.A. Vogel, P. Zager.

Science and management of Rocky Mountain grizzly bears: A model and some considerations. *Conservation Biology* 10:1013-1025. D. Mattson, S. Herrero, R.G. Wright.

Reproductive ecology and habitat selection of tundra swans on the Arctic National Wildlife Refuge. *Journal of Wildlife Management* 58. M.J. Monda, J.T. Ratti, T.R. McCabe.

The average resident hunter spends $100 per elk hunt in Idaho.

Results of a pilot study: Survey of Mountain Quail in Big Canyon Creek, Idaho. Report to Idaho Power Co., Idaho BLM, Idaho Dept. of Fish and Game, and USDA Forest Service. K.P. Reese, A.M. Smasne.

Long-term population analysis of gray partridge in eastern Washington. *Journal of Wildlife Management* 60:817-825. J.J. Rotella, J.T. Ratti, K.P. Reese, M.L. Taper, B.Dennis.

Wolf and moose populations in Isle Royale National Park. Pages 74-95 in: *Science and Ecosystem Management in the National Parks*, W.E. Halvorson, G. Davis, eds. D. Mattson, S. Herrero, R.G. Wright. University of Arizona Press, Tucson. R.G. Wright.

Ongoing Research

Mule deer fawn survival. E.O. Garton, C. Bishop, J. Unsworth

Effectiveness monitoring for elk populations. E.O. Garton, M. Wisdom, S. Hayes

Monitoring woodpecker and snags on national forests. E.O. Garton, L. Bate, R. Dixon

Impact of wolf reintroduction on Yellowstone ungulate populations. E.O. Garton

Aerial census methods for elk, moose, bighorn sheep, and mule deer populations. E.O. Garton, D. Leptich, J. Unsworth

Survival analysis of reintroduced red wolves. D.L. Murray

Moose population dynamics in Minnesota. D.L. Murray

Coyote behavioural ecology and energetics in snow. D.L. Murray

Assessing habitat quality using population fitness parameters: a remote sensing/GIS based habitat-explicit model for sage grouse. K.P. Reese, F. Edelmann, M. Ulliman, M. Wisdom, J. Connelly

Contributions of blue grouse life history stages to population growth under differing grazing intensities. K.P. Reese, H. Miyasaki

Distribution, movements, and habitats of sage grouse on the upper Snake River Plain: changes from 1950's to 1990's. K.P. Reese, K. Leonard, J. Connelly

Ecology of Columbian sharp-tailed grouse in east-central Washington. K.P. Reese, M. McDonald, M. Schroeder

Ecology of Merriam's wild turkeys in southwestern Idaho with special reference to habitat selection. K.P. Reese, J. O'Neill

Effects of predator management on ring-necked pheasant populations in southern Idaho. K.P. Reese, G. Nohrenberg, J. Connelly

Evaluation of a Columbian sharp-tailed grouse reintroduction including a test of a habitat suitability index (HSI) model. K.P. Reese, S. Gardner, J. Connelly

Movement, habitat use, and productivity of chukars. K.P. Reese, A. Lindbloom, P. Zager

Movements, habitat use, and population characteristics of mountain quail. K.P. Reese, T. Heekin, P. Zager

Movements, productivity, and survival of chukar partridge in southeastern Oregon. K.P. Reese, W. Hanspeter

Sage and Columbian sharp-tailed grouse seasonal movements and habitat use on altered sagebrush communities. K.P. Reese, T. Apa, J. Connelly

Sage grouse response to fire in mountain big sagebrush habitat. K. P. Reese, P. Bell, J. Connelly

Continuing Education and Outreach

January - May	Large Mammal Ecology—Boise
July 7-13 (1995)	Fish and Wildlife Ecology Workshop—McCall
July 14-20 (1995)	Project WILD II—McCall
July 21-27 (1995)	Advanced Project WILD II—McCall

Related Theses/Dissertations

Biology of the wolverine in central Idaho. J.P. Copeland. *Major professor: J.M. Peek*

Ecology of white-headed woodpeckers in the central Oregon Cascades. R.D. Dixon. *Major professor: E.O. Garton*

Landscape ecology, elevation, and habitat association of breeding land birds in west-central Idaho. A.M. Rocklage. *Major professor: E.O. Garton*

Nutritional ecology of moose and vegetation succession on the Copper River Delta, Alaska. T.R. Stephenson. *Major professor: J.M. Peek*

Wood Construction

Scientists

Thomas M. Gorman
Specialties: Wood construction and design, physical properties of wood, secondary wood products manufacturing, moisture problems in wood-frame houses

Ali A. Moslemi
Specialties: Wood composites, inorganic bonded wood composites, wood technology

Peter H. Steinhagen
Specialties: Drying of lumber and wood particulates, heat transfer in frozen and nonfrozen wood systems, wood preservation

Francis G. Wagner
Specialties: Lumber manufacturing, operations research techniques applied to wood products manufacture

Related 1996 Publications

Building an affordable house. *Fine Homebuilding* (Dec./Jan.). B.A. Caswell.

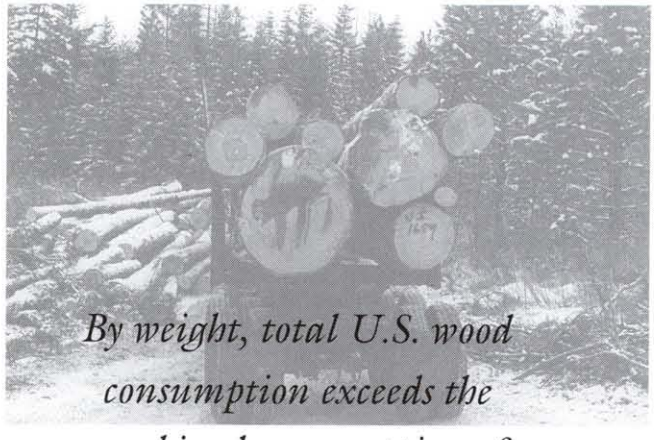
Moslemi, A.A., columnist. Matrix. In: *Panel World.* Panel World Incorporated, Montgomery, Alabama.

Evaluation of reduced-thickness studs. *Forest Products Journal* 46(11/12):63-66. T.M. Gorman, B.A. Caswell, F.G. Wagner.

Impact of kiln variables and pre-sorting by weight on moisture content uniformity of grand fir lumber. *Forest Products Journal* 46(11/12):43-46. F.G. Wagner, T.M. Gorman, R.L. Folk, H.P. Steinhagen, R.K. Shaw.

Wood...A remarkable fiber: A teacher short course. *Forest Products Journal* 46(3):27-29. L.R. Johnson, A.G. Campbell, F.G. Wagner, T.M. Gorman.

The laminated log industry: An overview of production and distribution. *Forest Products Journal* 46(3):80-82. T.M. Gorman, C.M. Hamanishi, J.R. Callison.



combined consumption of concrete and steel.

Ongoing Research

Idaho's wood products manufacturers directory and electronic database. T.M. Gorman

Sustainable housing. T.M. Gorman

Determining the leachability of preservative-treated PSL. T.M. Gorman

MSR testing of lumber from small-diameter trees. T.M. Gorman

Recycling waste lumber into F-J studs. T.M. Gorman

Veneer block conditioning. H.P. Steinhagen

Cost/benefit of block conditioning in Chile. H.P. Steinhagen

Drying *Nothofagus dombeyi.* H.P. Steinhagen

Furniture center. H.P. Steinhagen

Auditing Chilean veneer and plywood mills. H.P. Steinhagen

Visualization of pine log data. F.G. Wagner

Inland Northwest Forest Products Research Consortium. L.R. Johnson, F.G. Wagner, Washington State University, University of Montana.

Market opportunities for inorganic-bonded wood and fiber composites in North America. A.A. Moslemi

Application of low-level carbon dioxide to cement-bonded particleboard. A.A. Moslemi

Use of recycled fibers for fiber-cement composites. A.A. Moslemi

Continuing Education & Outreach

February 14-15	The Economics of Lumber—Moscow
February 27-28	Annual Inland Empire Forest Engineering Conference, Moscow
April 8-12	Wood Products Academy Level I—Moscow

Wood Wastes

Scientists

Alton G. Campbell
Specialties: Pulp and paper science, waste treatment and resource recovery

Richard L. Folk
Specialties: Wood energy, silviculture/wood quality, utilization of wood processing wastes

Ali A. Moslemi
Specialties: Wood composites, inorganic bonded wood composites, wood technology

Related 1996 Publications

How and how much? Measuring dry kiln emissions. *FOCUS On Renewable Natural Resources* 20:6-7. Idaho Forest, Wildlife and Range Experiment Station, University of Idaho, Moscow. R.L. Folk.

Variation and utilization of densified wood pellet combustibles on small-scale: A case study and investment model. In: *Proceedings, Chilean Energy Congress.* R.L. Folk.

Evaluating pulp and paper sludge as a substitute for peat moss in container media. *Journal of Environmental Horticulture* 14(2):91-96. R.R. Tripepi, M.W. George, A.G. Campbell, B. Shafii.

Use of raw and composted paper sludge as a soil additive or mulch for cottonwood plants. *Compost Science and Utilization* 4(2):26-36. R.R. Tripepi, X. Zhang, A.G. Campbell.

Ongoing Research

VOC emissions from lumber drying. R.L. Folk

Assessment of wood pellet fuel quality and characteristics for Idaho and the Intermountain West. R.L. Folk

Continuing Education & Outreach

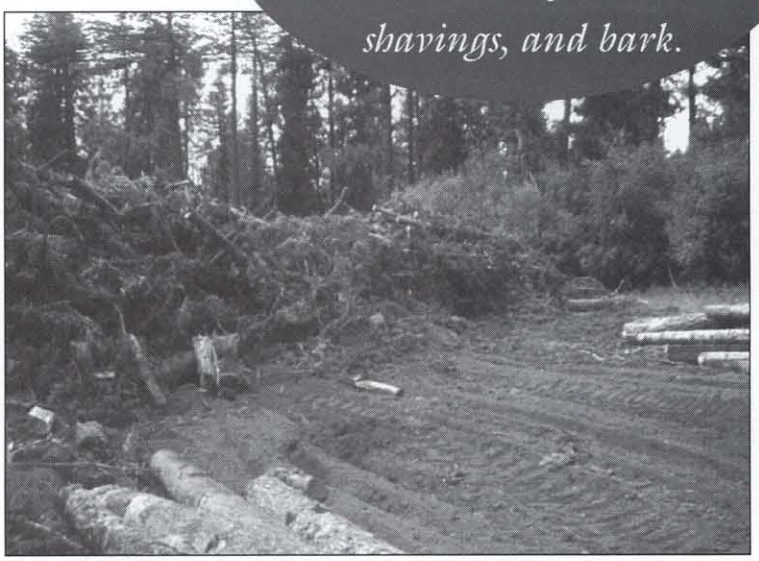
October 2-6 (1995)	Annual Inland Empire Dry Kiln Workshop—Moscow

Related Student Theses

Wet strength of CCA-treated southern pine parallam PSL. Derek A. Ratchford. *Major professor: Thomas M. Gorman*

The influence of an integrated moisture gradient on the stiffness properties of kiln-dried Douglas-fir lumber. Blair H. Wilding. *Major professor: Thomas M. Gorman*

Idaho reuses over 90% of its wood wastes; that's almost 3 million tons of sawdust, shavings, and bark.



Who Supported Us in FY 1996?

Agency for International Development
Agriculture Research Service
Alaska Fish and Game Department
American-Scandinavian Foundation
Bennett Lumber Company
Blue Mountain Elk Cooperative
Boise Cascade Corporation
Boise National Forest
Bonneville Power Administration
Curt and Adele Berklund
Champion Timberlands
Clearwater National Forest
Clearwater-Potlatch Timber Protective Association, Inc.
Clearwater Resource Conservation and Development Council
Colorado State University
Colville Confederated Tribes
Consortium for International Development
Cooperative State Research Service
DeVlieg Family Endowment
Energy/Development International
Environmental Protection Agency
Environmental Science and Research Foundation
Evergreen Forest Products
Flathead National Forest
Ford Foundation
Foundation for North American Wild Sheep
Fremont Forest
Glacier National Park
Government of Honduras
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Hoff Companies
Idaho Department of Commerce
Idaho Department of Fish and Game
Idaho Department of Health and Welfare
Idaho Department of Lands
Idaho Department of Parks and Recreation
Idaho Forest Industries
Idaho National Engineering Laboratory
Idaho Nuclear Energy Commission
Idaho Power Company
Idaho Research Foundation, Inc.
Idaho Travel Council
Idaho Water Resources Board
Idaho Water Resources Research Institute
Inland Empire Paper Company
Inland Empire Tree Improvement Cooperative
Inland Northwest Growth and Yield Cooperative
Intermountain Forest Industries Association
Jefferson National Expansion Historical Assoc., Inc.
Konkolville Lumber
Latah County
Martin Marietta
Monsanto
Montana Fish and Wildlife
Montana State University
National Aeronautics and Space Administration
National Arbor Day Foundation
National Council of the Paper Industry
National Fish and Wildlife Foundation
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
National Rifle Association of America
National Science Foundation
National Wildlife Federation
North Atlantic Treaty Organization
North Dakota Fish and Game
North Idaho Forestry Association
Northwest Area Foundation
Oregon Department of Fish and Wildlife
Oregon Hunters Association
Oregon State University
Pacific Northwest Power Company
Pack River Lumber Company
Payette National Forest
Pheasants Forever
Potlatch Corporation
PUD #1, Pend Oreille County
QB Corporation
Riley Creek Lumber
Rocky Mountain Elk Foundation
Shearer Lumber
Simpson Timber Company
South Idaho Forestry Association
Stillinger Trust
TJ International
U.S. Army Corps of Engineers
USDA Cooperative Research
USDA Extension Service
USDA Forest Service, Intermountain Forest and Range Experiment Station
USDA Forest Service, Northeastern Forest Experiment Station
USDA Forest Service, Pacific Northwest Forest and Range Experiment Station
USDA Office of International Cooperation and Development
U.S. Department of Commerce
U.S. Department of Energy
U.S. Department of Navy/Naval Undersea Center
U.S. Office of Naval Research
USDI Bureau of Indian Affairs
USDI Bureau of Land Management
USDI Bureau of Reclamation
USDI Fish and Wildlife Service
USDI National Biological Survey
USDI National Park Service
University of Alaska
University of Arizona
University of Idaho Experimental Forest
University of Idaho Forest Research Nursery
University of Maine
University of Minnesota
University of Montana
University of Washington
Washington State Department of Natural Resources
Washington State University
Washington Water Power Company
Western Forestry and Conservation Association
West One
Weyerhaeuser Company
WILD Foundation
The Wilderness Society
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