

ROOTS

on Renewable Natural Resources

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University of Idaho

Volume 10

Forest, Wildlife and Range Experiment Station
College of Forestry, Wildlife and Range Sciences
Moscow, Idaho 83843

A Dean for All Seasons

The Forest, Wildlife and Range Experiment Station and the academic College pause in this 75th anniversary year to reflect. The College has much to be proud of in its accomplishments, alumni, and supporters. Diamond anniversary celebrations began this spring, and a number of events are planned for the coming year. A compilation of the history of the College is in progress.

John H. Ehrenreich signaled the end of another era in July when he announced that he was stepping down as Director of the Experiment Station and as Dean of the College to return to research and teaching. Following a fall sabbatical, he will hold the position of Professor of International Forestry and Range Management. Ernest Ables, Chairman of the Department of Fish and Wildlife Resources, and a former Associate Dean of Academics, will serve as Acting Dean and Director while a search for the new dean is in progress.

Ehrenreich, who came to Idaho from the University of Arizona, has led the FWR teaching and research programs with strength and foresight through the 1970s and into the 1980s. He has brought growth in the research faculty and in support staff for the experiment station. The number of students enrolled at the graduate level has increased, in spite of a drop in forestry-related undergraduate enrollment. Resource managers of the future continue to come to Idaho from all parts of the country.

Ehrenreich has weathered troubled financial times. Economic growth declined in recent years, and reduced domestic demands for lumber caused problems for forest industry dependent states. The budget for the FWR Experiment Station has doubled since 1971 through significant growth in grants and contracts, despite reduced federal support and a series of cuts in state spending. Inflation and depressed economic conditions of the 80s have eroded the value of the dollar allotted for research, putting some projects on hold until outside support can be secured.

Ehrenreich's 13-year directorship has seen program growth and the departmentalization of Forest Resources, Forest Products, Range Resources, Fish and Wildlife Resources, and Wildland Recreation Management. A Cooperative Park Studies Unit was established; other cooperative programs have developed to share research information, such as the Inland Empire Tree Improvement Cooperative, and the Intermountain Tree Nutrition Cooperative. Researchers have enthusiastically embraced computer technology for research applications, creating models which predict timber growth and yield under different management regimes; estimate backcountry hiking enjoyment; select the best available range for cow-calf production, and schedule fish growing to produce a constant supply of fresh fish for restaurant and market.

Research stations were established in and near wilderness areas. Continuing education programs were initiated which offer updates on technical advances in resource management, information techniques, and tips on how to enjoy Idaho's natural resources. The College became the first forestry institution in the country to hire a full-time herbarium curator. The addition of a remote sensing program brought new perspectives to resource management, especially in areas of difficult terrain.

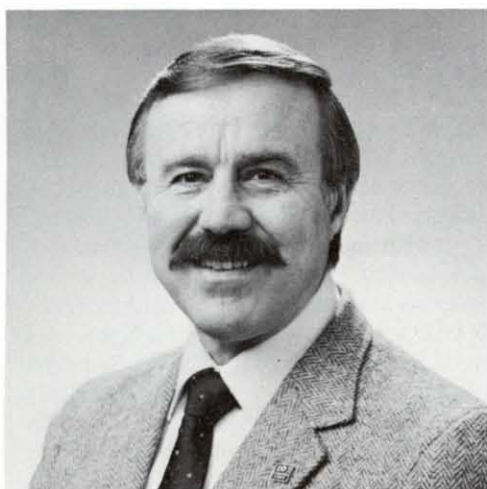
Ehrenreich also brought new perspectives to the college through his interest in international natural resources management. Through his years as dean, faculty members have served on projects in over 50 countries on 5 continents. The college's International Program, which he instituted, currently administers a U.S. AID grant designed to strengthen UI faculty members' abilities to participate in overseas projects. Ehrenreich broke new international ground by establishing a relationship with the Ministry of Forestry of the People's Republic of China, which culminated in an agreement with the ministry whereby the college offers a special program to familiarize Chinese scholars with U.S. forestry practices and technology. These and other international programs widen the scope of knowledge and opportunity for both faculty and students, and increase the potential for trade between Idaho firms and overseas firms and countries.

Finally, Ehrenreich has sought to weld alumni interest in the College as a source of encouragement and direction for students in natural resources. This project was capped with the chartering of an Alumni Association and the appointment of a Board of Directors in April.

The Experiment Station and the College are indebted to John Ehrenreich for his unstinting service to the state, the nation, and to the future of renewable resources.

FOCUS

Volume 10



John H. Ehrenreich

FOREST, WILDLIFE AND RANGE EXPERIMENT STATION

Ernest D. Ables, Acting Director

George H. Belt, Associate Director

Howard Loewenstein, Assistant Director

Susan B. Roberts, Editor

Lorraine Ashland, Artist

Michal Miller, Typesetting

Fiscal 1984 Annual Report

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Cover: By no means the largest tree in Idaho, this specimen belongs to the Heritage Grove of giant western redcedars located on Isabella Creek, North Fork Clearwater River. Professor Fred Johnson stands by this old growth cedar to lend perspective. *Tracey Parker photo*

Forest Resources

Mapping Team Locates Grizzly, Caribou Habitat

Investigators:

Joseph J. Ulliman	Rex Crawford
Bruce Kessler	Doug Bizeau
John Brockhaus	Ron Lietzow

Mapping the position of animals that are constantly on the move is not always practical for a wildlife manager. A preliminary step often involves locating the favorite forage and cover plant species, and creating a wildlife habitat map. Scientists from the Remote Sensing Center in the Department of Forest Resources have been working with USDA Forest Service Wildlife Biologist Paul Harrington to map grizzly bear and caribou habitat on the Panhandle National Forest.

Forest Resource Professor Joseph Ulliman described the mapped area as a "horseshoe shaped area around Priest Lake, up to the Canadian border." The 517 square miles mapped for the project include parts of the Sandpoint, Bonners Ferry and Priest Lake Ranger Districts in the Selkirk Mountains ecosystem and parts of 18 standard 7½-minute quadrangles. Forest cover and other vegetation types were identified from color aerial photographs supplied by the Forest Service, then transferred onto the 1:24,000 scale maps using a zoom transfer scope.

Researchers working with Ulliman to interpret the vegetative composition from aerial photographs were Research Associate Bruce Kessler, Research Instructor John Brockhaus, Rex Crawford as consultant, and Doug Bizeau, a former student.

Forest types identified and mapped were Douglas-fir, lodgepole and ponderosa pine, Engelmann spruce/subalpine fir, western redcedar/western hemlock, western larch, and birch/aspen/cottonwood. Forbs, sedge (wet meadow), grasses (dry meadow), and beargrass types were delineated, as were shrub/seedling areas of huckleberry, alder and mixed species. The mapping team further defined areas as pole/sapling, immature sawtimber, mature sawtimber, and old growth, and identified such features as talus/rock/scree, showchutes, standing water, and riparian stream-bottoms. All vegetation and landform type areas were measured with an electronic area calculator to determine acreage.

In August, Forest Resources graduate student Ronald Lietzow began working with COMARC, a geographic information system computer program offering the possibility of combining many types of geographic data. By putting different habitat area boundaries into computer format, he hopes to match visual map sections with slope, aspect and elevation data, augmenting the final map with

a physical profile for better interpretation of wildlife habitat by wildlife biologists.

The wildlife habitat mapping project is funded by the Panhandle National Forest, USDA Forest Service and partly by the University of Idaho Seed Grant Program.

Insect Conditions Key To Chemical Effectiveness

Investigators:

Molly Stock	Jacqueline Robertson
Jo Ellen Force	

Populations of forest insect pests, such as the western spruce budworm, differ greatly in their response (percent mortality) to treatment with different insecticides. Techniques to improve prediction of mortality from a particular insecticide would be an invaluable aid to forest managers.

Cooperative research between Forest Resources Professors Molly Stock and Jo Ellen Force at the University of Idaho and Supervisory Research Entomologist Jacqueline Robertson at the USDA Forest Service Pacific Southwest Forest and Range Experiment Station (PSW), Berkeley, has produced a computer model to predict insecticide effects on western spruce budworm and the Douglas-fir tussock moth. For the first time, information on both the insects' environment (weather, for example,) and their developmental stages and genetic level of susceptibility to the chemical have been integrated to produce a model of insecticide effectiveness under diverse conditions. Tests showed that the model predicts results of field applications with 73 to 95 percent accuracy. This model thus provides a more rational basis for deciding when and if to use chemical control as part of a pest management strategy. Funding for the cooperative project is through the University of Idaho and the USDA PSW Experiment Station.

Stock and Robertson have recently developed a more generalized version of this model, one that can be used for a wider diversity of both forest insect pests and chemicals. They have also adapted the model for use in field station computers.

This model will help forest managers decide in advance whether a particular chemical should be used as part of a management strategy and under what conditions it will be most effective.

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Record Trees Come in Many Sizes—Mostly Big

Fred Johnson

The next time you take to the woods for a hike, pack along some measuring equipment. Records of the country's biggest tree for a given species have been kept since 1940 by the American Forestry Association. State Big Tree records are kept too. Fred Johnson, Professor of Forest Resources, maintains the records for the state of Idaho. Currently, the state holds national records for 8 different tree species. Among the state record holders, there are also 8 trees which were once the national record holders as well. Johnson believes there are bigger trees waiting to be discovered. "Many haven't been recorded," he said, "because they are in remote areas, where folks don't usually have the instruments to make accurate measurements."

A handsome certificate is presented to the person(s) who nominate the tree, as well as to the owner. Johnson is hoping to find a champion western white pine to reclaim the national record for Idaho's state tree. A Latah County white pine along White Pine Drive holds the state record at 214 feet tall, 82 inches in diameter, with 481 big tree points. A larger tree in Oregon has the national record by only 15 points.

The biggest tree in Idaho? Well, think of a tree 18 feet in diameter and taller than a 17-story building. Those are the dimensions of Idaho's largest western redcedar, the biggest tree known east of the Cascades in the United States. That diameter is greater than that of the largest redwood, and is exceeded by only two or three kinds of trees in the entire country. This forest giant is located on the Clearwater National Forest, just north of Elk River.

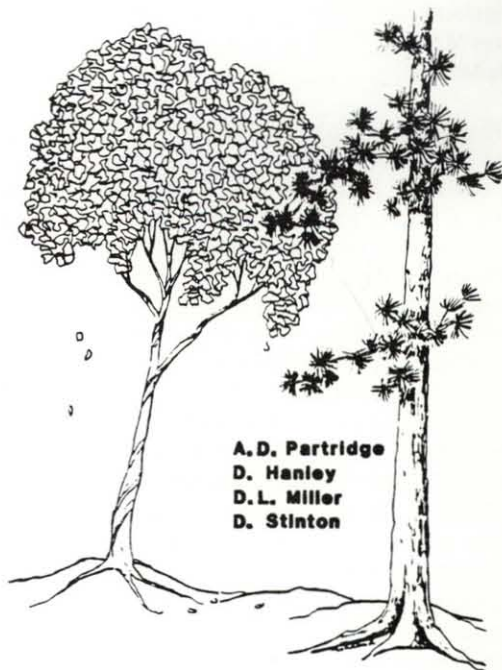
Smallest Idaho tree of record? At a total of 26 points, a Piper hawthorn on Lapwai Creek in Nez Perce County is at the bottom of the point list. But don't sell this diminutive tree short, as it's a former national champion.

For a copy of the latest list of record trees in Idaho, and directions for taking tree measurements, send a long, stamped envelope to Idaho Big Tree Program, College of Forestry, University of Idaho, Moscow, ID 83843.

Help for Shade Tree Owners

Is your shade tree suffering from spray drift, mold, insects, frost cracks, or disease? This handy guide, written for the homeowner, can help provide a healthful diagnosis. A key at the front of the book takes the tree owner through symptomatic problems of bark, leaves or needles, ending with a diagnosis. Descriptions of each tree disorder covers symptoms and control measures. Photographs illustrate most tree problems. Currently in press, the guide is the project of Arthur D. Partridge, Professor of Forest Pathology for the UI College of Forestry, Wildlife and Range Sciences; Donald P. Hanley, former Extension Forester with the Cooperative Extension Service at the University of Idaho, and currently Extension Forester, Cooperative Extension Service, with the College of Agriculture and Home Economics, Washington State University; Daniel L. Miller, Research Forester with Potlatch Corporation, Lewiston; and Donald A. Stinton, former graduate assistant in Forest Resources in the College of FWR.

WHAT'S WRONG WITH MY SHADE TREE?



A. D. Partridge
D. Hanley
D. L. Miller
D. Stinton



University of Idaho

Fish and Wildlife Resources

Usually solitary animals, moose at Denali National Park, Alaska, often congregate or form small herds. These females belong to a population which has not been hunted for sixty years. Dale Miquelle photo



Tracking Moose Through Alaskan Winter Offers Key to Survival Strategies

Investigators:

James M. Peek

Dale Miquelle

Finding out how moose cope with winter means tracking them throughout a winter season—even when the moose reside in Alaska, where the winters are long. Dale Miquelle, a graduate student in Fish and Wildlife Resources will be observing moose survival strategies this winter in Denali National Park, Alaska, in a cooperative program for the National Park Service, the USDA Forest Service Institute of Northern Forestry, and the University of Idaho's Forest, Wildlife and Range Experiment Station.

Miquelle first studied moose on Isle Royale in northern Lake Superior for his master's program. Later, working for the USDA Forest Service in Denali National Park, he monitored habitat requirements and noted foraging and social behavior during summer and fall months. Miquelle plans to extend his observations through the winter to focus on behavior which may be critical to moose survival. During this period of the year, diet is of a lower quality, accessibility of forage is limited because of snow, and the animals' metabolism slows.

While moose are considered one of the most solitary ungulates, Miquelle has already noticed major differences among the Denali moose, a population which has not

been hunted for at least 60 years, and which tolerates human observers as near as 5 to 20 yards. At Denali, Miquelle said, moose congregate more often and exhibit more social behavior. This may be related to the open, sub-arctic environment. In winter cows and younger bulls at Denali congregate in small groups that fluctuate in size and composition. Animals in groups decrease the possibility that they will be preyed upon by wolves. Older bull moose that have spent the fall rutting rather than feeding, stay away from groups, maintaining a low profile in winter. During the mating season, or rut, cow moose at Denali form small herds, increasing competition between bulls and ensuring that future calves are offspring of the fittest males. Cow moose break away from the groups shortly before their calves are born, and raise them alone, Miquelle said.

Quartered in a remote cabin, Miquelle will be tracking radio-collared moose on foot, skis, dogsled, and by car during five months of the Alaskan winter. Fourteen moose, eight males and six females, have been captured, fitted with collars, and released. Signals from the collars will aid in tracking the animals' winter habits.

Information gathered in this study may be applicable to moose in other areas, or to other species. Knowing as much as possible about one species will help in asking pertinent questions about others.

Bennett Receives Outstanding Research Award For Lower Snake River Reservoir Fishery Study

Investigators:

David H. Bennett
Paul M. Bratovich
William Knox

Douglas Palmer
Hal Hansel

Research faculty members in the Forest, Wildlife and Range Experiment Station presented the 1984 Outstanding Research Award to Fish and Wildlife Resources Professor David Bennett for his assessment of the warmwater fishery of the lower Snake River reservoirs.

Bennett's project, begun in 1979, surveyed the species composition and movement of fish living in impoundments formed by four dams on the lower Snake River; determined relative fish abundance, species associations and habitat preferences; and examined angler use and attitudes toward the fishery. Funded by the Army Corps of Engineers, the project provides baseline information for fishery management along the portion of the Snake from the Columbia to the Clearwater rivers, an area of increased population growth. Areas of highest population concentration occur in the Tri-Cities and at Lewiston-Clarkston.

Food habits and preferences of fish, reproductive cycles, age structure and growth also were recorded for

selected warmwater species which dwell in the reservoirs. The researchers correlated fish behavior with water characteristics, such as temperature, dissolved oxygen, transparency, velocity, depth, bottom slope, and distribution of plant food material.

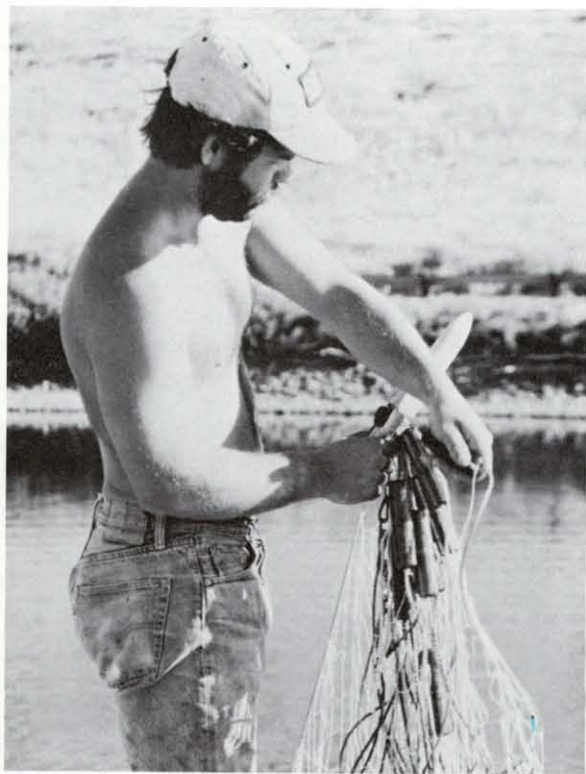
Four graduate students in fisheries worked with Bennett on the project. Paul Bratovich followed the reproductive cycles and juvenile populations of fish in the reservoirs, while William Knox concentrated on angler use and attitudes, and numbers of fish harvested. Douglas Palmer examined the water characteristics of the reservoirs, their relationship to the fish populations, and the adult abundance of fish. Food habits of fish were studied by Hal Hansel. The research team worked on all phases of the project, with individuals taking major responsibility for different areas.

Four dams, Ice Harbor, Lower Monumental, Little Goose and Lower Granite, create impoundments along 137 miles from Pasco to Lewiston. Changes in the shape, water flow, and temperature of the river after dam construction brought changes in the plant and fish life supported by the river. Coldwater salmon and trout which prefer water temperatures below 20 C declined as the water temperatures rose. Warmwater species which were introduced to the river between the 1890s and 1910 flourished as the impounded areas grew warmer. Channel catfish, smallmouth and largemouth bass, crappie and yellow perch now belong to this fishery in abundance, according to Bennett. Largemouth bass do best at temperatures above 26 C. Other fish prefer intermediate temperatures between warm and cold water.

The research team found that water temperatures and dissolved oxygen levels could become critical for trout and salmon during late summer. Native fish were found more often in the upper, free-running, cooler portions of the reservoirs, while the resident warmwater fishes congregated in the reservoir embayments. Ice Harbor Dam has the shallowest reservoir, averaging about 49 feet in depth. Lower Granite, Little Goose and Monumental were more similar, with 56-foot average depths. Relative seasonal boat and angler use of the four reservoirs was determined by aerial survey. The research team conducted angler surveys on the ground at Little Goose reservoir (Lake Bryan) because of its heavy use. Researchers found least angler use at Lower Monumental, and the most pleasure boat use at Ice Harbor, probably due to the larger population area of the Tri-Cities. At Little Goose Reservoir, more than half of the anglers fished from the shore. Similar figures were recorded for the other reservoirs along the lower Snake River.

Surveys showed boat angling parties slightly larger and more successful than shore angling parties. Boat anglers

Please turn to page 8



Douglas Palmer prepares gill net for sampling fish populations on lower Snake River Reservoirs. David Bennett photo



An osprey incubates eggs in a nest resting on pilings at left. Incubating birds returned to their nests quickly after any disturbance, and readily accepted wooden bald eagle-sized eggs (below). Tracy Fleming photos

Osprey Accept Eagle-Sized Eggs in Nest Test

Investigators:

Elwood Bizeau
Donald Johnson

Wayne Melquist
Douglas Bizeau
Tracy Fleming

The soaring flight of our national bird, the bald eagle, is beautiful to behold. But fewer bald eagles now take to the sky than in the early days of this country; remaining eagles have been designated an endangered species in 43 of the lower 48 states and classed as threatened in the other five.

While only four known breeding pairs of eagles have been recorded recently in northern Idaho, nesting pairs of ospreys have increased from 200 to 250 in the last 20 years in eastern Washington and northern Idaho. Wetland habitat in the area supports both cottonwood and coniferous trees suitable for nesting sites. Lakes and rivers provide a plentiful supply of warmwater and salmonid fish species.

To increase the bald eagle population in northern Idaho, Idaho researchers are looking into the possibility of a cross-fostering experiment with ospreys incubating bald eagle eggs. Ospreys are good providers, usually raising two to four young. As a first step, the research team set out to see whether ospreys would return to a disturbed nest where eggs had been removed and switched, and whether the disruption would cause nest desertion or reduced hatching success.

Elwood Bizeau, Assistant Leader of the Cooperative Wildlife Research Unit; Zoology Professor Donald Johnson; Research Wildlife Biologist Wayne Melquist; raptor biologist Tracy Fleming; and former Department of Fish and Wildlife student Douglas Bizeau worked on the project from April through July 1983. The bald eagle "eggs" used in the exper-

iment were produced by the University of Idaho wood-working shop. The lathe-turned fir eggs, painted white and weighted with lead, approximated the size, weight and color of bald eagle eggs—roughly twice the size of the mottled brown osprey eggs. Nests were selected for the project on the Coeur d'Alene, St. Joe, and Spokane river drainages; 36 nests were used as controls, while 25 nests, both in trees and on platforms, were selected for testing.

All eggs were removed from test nests and replaced with wooden eggs after ospreys had established incubating positions for at least 10 days. Researchers moved the osprey eggs to portable incubators for a period of 2 to 8 days, then returned them to their original nests.

Whether osprey eggs were removed gradually, over a

Please turn to page 8



Coldwater Conditioning Tried for Steelhead Trout

Investigators:

Ted C. Bjornn

Joel King

Jim Lukens

Fish hatchery managers at Dworshak and Hagerman National Fish Hatcheries (NFH) are raising steelhead trout to replace wild fish runs which existed before hydroelectric dams were installed along the Snake and Columbia rivers.

Because hatchery water temperatures can be controlled, hatchery raised fish often reach migration-ready size (smolt) after one year. Wild fish took up to two years to rear in the ponds and tributary streams of the Snake before migrating to the ocean for part of their life cycle. Fishery biologists and managers voiced concern that fish reared to smolt size in the warmer hatchery waters might not be fully ready to migrate and survive in sea water.

After working with a pilot project at Hagerman NFH to condition fish in colder water for two to three months before migration, fishery biologists have concluded that cold water conditioning might provide marginal benefits, but is not necessary for transformation to smolt and for seaward migration. Ted Bjornn, Leader of the Idaho Cooperative Fishery Research Unit, and aides Joel King and Jim Lukens worked on the project, which transferred eyed steelhead trout eggs from Dworshak NFH to Hagerman NFH in March, May and November of 1978. Fish were taken from 15 C hatchery water in February of 1979 and placed in a coldwater pond adjacent to the Pahsimeroi River. Water temperature in the pond ranged from 4-8 C during February and March, with temperatures warming to a range of 6-14 C by April. Fish kept in hatchery waters at 15 C were released into the Pahsimeroi River in April. Coldwater conditioned fish began to migrate in April, though most of them did not enter the river until May. Fish were branded or received nose tags for future identification.

Cooperative Fisheries Unit and National Marine Fisheries Service personnel monitored the passage of steelhead through Lower Granite Dam from early April through July 5. Of the fish reaching the dam, the highest numbers were recorded for coldwater conditioned fish 231 mm in length and for unconditioned fish 241 mm in length which migrated from the lower end of the Pahsimeroi River. Smaller unconditioned (170 mm) fish migrated later, or did not migrate at all.

In 1980, similar tests were conducted, this time with two groups of fish receiving coldwater conditioning, and one group unconditioned. The three groups were closer in size, with conditioned fish averaging 227 mm (medium) and 210 mm (small), and unconditioned fish 207 mm in length. Evaluation of coldwater conditioning based on successful migration of smolts to Lower Granite Dam

showed that smaller fish, whether conditioned or unconditioned, had higher percentages of recapture than groups of larger fish. Conditioning did not seem to benefit one size of fish over another.

After migrating, adult fish spend 1 to 3 years in the ocean before returning to freshwater streams or hatcheries to spawn. With two-year migration and return figures in, conditioned fish released in 1979 returned as adults at a rate one-third higher than for unconditioned fish. Smolts of similar size released in 1980 returned at similar rates. Researchers believed that high return rates for larger conditioned smolt released in 1980 may have been due mainly to size and better fish health.

Nongame Birds Check Forest Insect Pests

Investigators:

Edward Garton

Peggy Lawless

Birdwatchers may have noticed that certain species feed most often on the ground, while others feed on shrubs or in trees. Divisions of birds into groups or guilds by their habitat preferences is giving new insight into the role of natural avian predators in controlling forest insect pests.

Fish and Wildlife professor Edward Garton explained that birds in a few guilds are most effective in controlling insects in different types of forest stands. Small nongame birds, predators on western spruce budworm, have been monitored for their preferences for breeding and feeding among young, mature and old forest growth as well. Habits are different even among close groups, such as warblers. Townsend's and the yellow-rumped warbler are part of the conifer foraging guild, while the Nashville, yellow, and MacGillivray's warblers are members of the shrub foraging guild, according to Garton. Graduate student Peggy Lawless has worked with Garton on the project.

Researchers have noted three numerical patterns in terms of western spruce budworm infestations: heavy outbreaks of nine or more years duration, shorter one- to two-year outbreaks, and budworm persistence at sparse densities. Where insect levels have remained at sparse densities, birds are credited with eating 87 percent of the insect population, thus holding a possible outbreak in check.

Garton said the habitat research has made possible guidelines for timber harvesting which will increase bird numbers in managed stands following harvest.

Osprey Accept, cont'd

several-day period, or all at one time did not affect osprey incubation or productivity. When their nests were disturbed, the ospreys flew overhead, most returning to their incubation duties within 2 or 3 minutes after the investigators left the nests. The research team observed each nest several times during the test period to make sure the ospreys continued incubating behavior with the artificial eggs and later with the returned osprey eggs. To check on productivity, all test nests were visited after incubation ended. Investigators did not visit or disturb the control nests in any way during incubation. Nest success and productivity were measured for control nests by a helicopter count of the number of young prior to fledging. Both test and control nests achieved about the same degree of nesting success and productivity.

The test project established that ospreys will incubate eggs the size, weight and color of bald eagle eggs, and that the incubation instinct is so strong that the adult birds will not desert their nests following disturbance.

Cooperation for the project was extended by the Idaho Department of Fish and Game. The University of Idaho Forest, Wildlife and Range Experiment Station provided operating funds and equipment.

The research team is awaiting approval from the U.S. Fish and Wildlife Service to test the cross-fostering technique, using live bald eagle eggs from Alaska.



Moose at Denali National Park, Alaska, often allow observers quite close. Tracking moose through the winter months in this remote area may provide key information on moose survival strategies. See story on page 4. Dale Miquelle photo

Formulas Help Find Elk Helicopter Counts Miss

Investigators:

Michael Samuel

Edward Garton

Concern over reliability of elk counts in evaluating harvest policies and land management changes has prompted researchers to investigate the factors influencing counting methods.

Graduate student Michael Samuel and Fish and Wildlife Resources professor Edward Garton have been working to develop mathematical corrections for actual herd counts from helicopters. Group size, animal behavior, and percent vegetation cover appear to have most influence on count reliability. Snow and weather patterns, distribution patterns, and variations from one drainage to the next may also explain count variation. The estimation of herd size and sex composition requires models that consider several factors at once.

Helicopter counts in open areas often observe about 85 percent of the animals present. Mathematically corrected counts have proven quite accurate.

Because aerial surveys have typically underestimated the number of bulls in the herd and overestimated the number of calves, correction factors should also be applied to age and sex ratios. Research on timbered area models and alternative sampling designs will be the focus of this project over the next year. The models will improve researchers' knowledge of the number, age, and sex of elk which are present in northern Idaho.

Bennett Receives, cont'd

also fished for longer periods of time. Success rates compared favorably with warmwater fisheries throughout the country, and were high in comparison with other reservoirs in the Northwest. Boat anglers caught mostly smallmouth bass; shore anglers caught crappie, smallmouth bass and yellow perch.

Researchers have recommended management of the fishery for warm and cool water resident fish and not for resident salmonids. Stocking of trout could be attempted in the cooler spring and fall months. Providing increased land and water access to backwater areas on the north side of Little Goose and Lower Monumental reservoirs, and installing floating docks in embayment habitats on the reservoirs were suggestions for improving angler opportunities. The research team recommended programs to inform and educate sporting anglers to the species of resident sport fish available in the lower Snake River reservoirs, and the methods needed to catch these fish.

According to Bennett, work put in on the fishery study amounted to 12.5 to 14 person-years-worth of effort, to provide a baseline pool of data for future management of the river and its reservoirs.

Forest Products

Wood Chemist Pursues Natural Adhesive

Investigators:

Alton Campbell
Allan Walsh

Lowering the cost of particleboard manufacture is the focus of a new project by Forest Products professor Alton Campbell and graduate student Allan Walsh. Campbell, wood chemist for the department, is attempting to produce an adhesive for particleboard from kraft lignin, a waste product of pulp and paper mills. This adhesive would be an inexpensive substitute for petroleum-based wood adhesives currently in use.

Campbell explained that during paper manufacture the wood is cooked in a hot lye solution, dissolving the lignin which acts as a glue in the tree to hold the wood fibers together. Potlatch Corporation has donated several gallons of the lignin-containing waste pulping liquor for use in the research. Campbell plans to recover the lignin from

the liquors using an ultrafiltration process, then mix the lignin with formaldehyde to form a commercial adhesive for particleboard. The researchers plan to evaluate the chemical and physical properties of the lignin adhesive.

If the project is successful, the lignin presently burned as a pulping waste product could be sold at a profit by pulp and paper mills. This Idaho wood chemistry project could yield an inexpensive adhesive, benefitting particleboard and plywood operations throughout the Pacific Northwest.

Project May Help Korea Produce Native Products

Investigators:

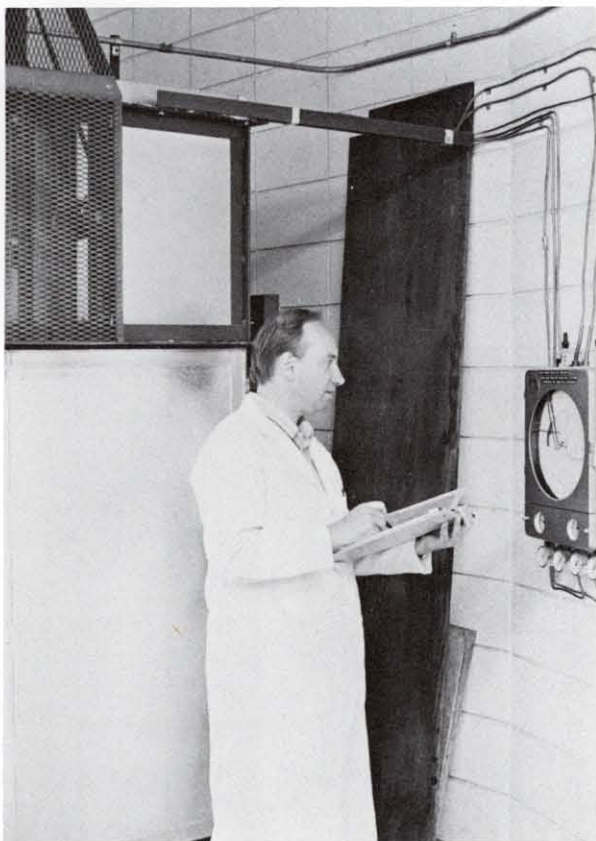
Ali A. Moslemi
Ahn Won Yung

At the conclusion of the Los Angeles Olympics this summer, many athletes will be thinking about the 1988 games to be held in Seoul, South Korea. Because of a cooperative program in forest products research with the University of Idaho, South Korea could be producing structural boards for the 1988 pavilions from native tree species and portland cement.

Forest Products Professor Ali Moslemi said the project involves testing the bonding properties of South Korean wood species particles with portland cement as a binder. The use of inorganic binders, such as petroleum based adhesives has posed problems of supply and expense. In addition, Moslemi said, "Nearly 87 percent of the logs for the South Korean forest products industry are imported. The uncertainty governing the availability and price of raw material imports has created a worrisome environment for the future of this \$5 billion-per-year industry."

If the binder project is successful, local, small native tree species, not presently suited for industrial use, can be used as raw material for structural board construction. Information gained in the study of wood particle interaction with the portland cement binder "is of value both to Koreans and to Idahoans," Moslemi said, because testing methods used on Korean wood species also will apply to Idaho wood species.

The project, conducted through the University of Idaho's Department of Forest Products and South Korea's Seoul National University, is funded jointly by the South Korean office of the Science and Engineering Foundation and the U. S. National Science Foundation. A University of Idaho graduate, Professor Ahn Won Yung, directs the project in South Korea.

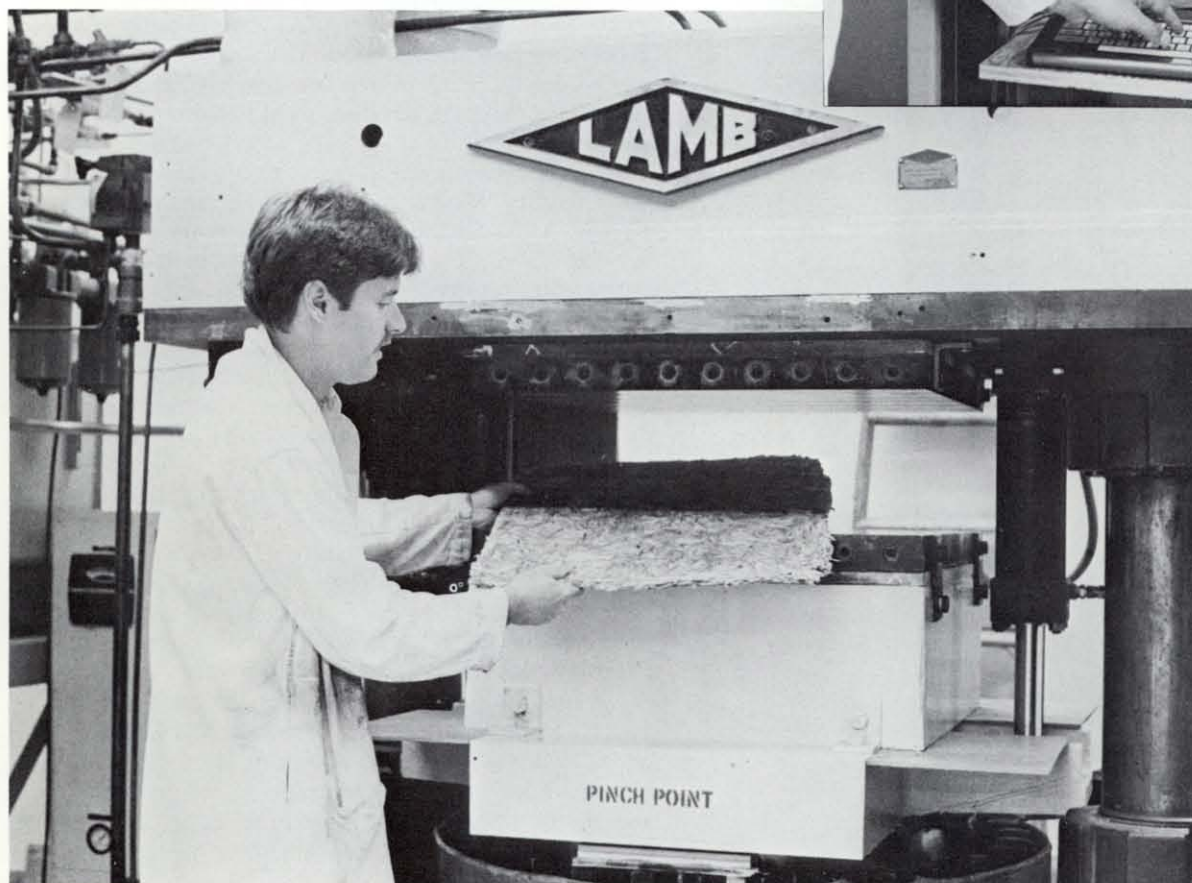


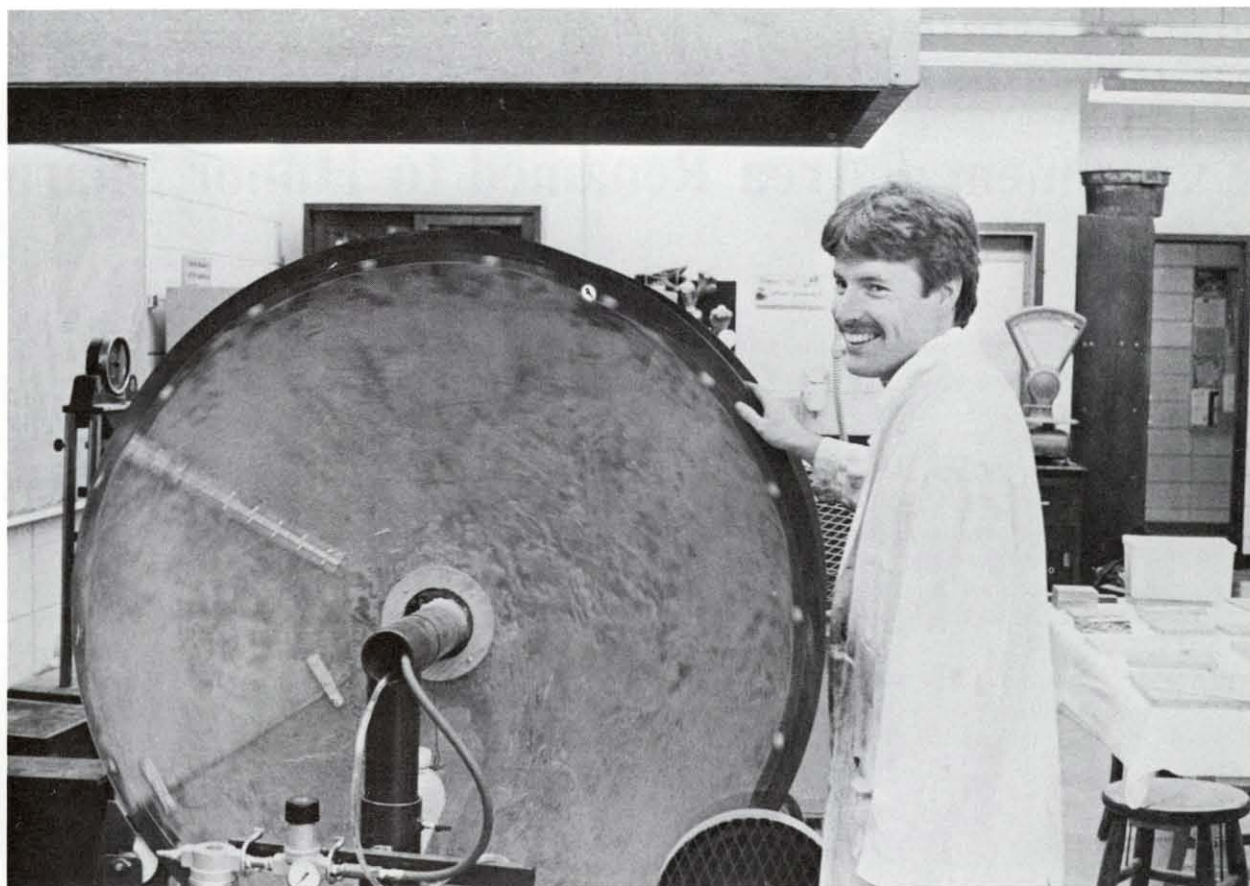
Professor Peter Steinhagen checks readings on the controller recorder for the department's experimental dry kiln. Susan Roberts photo

Flaker, Computerized Press Modernize Lab

A new "high tech" wood flaker has been added to the Forest Products Department. The flaker, specifically designed for research and teaching was donated to the Department by a major producer of industrial chippers and flakers, Canadian Aviation and Electronics' Forest Products Division.

The machine is designed to produce a variety of flakes from practically any wood species. The trial runs have been completed under the direction of Jack Hamilton of the University of Idaho Machine Shop. The addition of this flaker is a part of the continuing program to modernize the laboratory capabilities of the Department. This facility compliments the computerized press which was donated to the Department by the Weyerhaeuser Corporation. Along with a new adhesive blending facility, now under construction, the flaker gives the department substantially expanded capabilities for research and teaching in plywood, particleboard, high-pressure laminates, fiber panels and a variety of other products.





Photos by Susan Roberts

Industry donations of modern equipment have helped the Department of Forest Products expand research and teaching in many wood product areas. Professor Peter Steinhagen (above left) programs the computerized hot press given to the department by Weyerhaeuser Corporation. Mark Lasiter (below left) removes a section of flakeboard from the press. Adhesive and fiber rotate in a drum mixer operated by Lasiter (above). Steve Pfister demonstrates the wood flaker recently donated by Canadian Aviation and Electronics' Forest Products Division (right).



Range Resources

Experimental Area Renamed to Honor Sharp

Investigator:

Lee A. Sharp

The Bureau of Land Management this spring renamed the Point Springs Experimental Area in southern Idaho to honor Lee A. Sharp, the primary founder and animating spirit of the project over the last three decades.

Sharp, professor of Range Resources, and a UI faculty member since 1949, began his work at Point Springs in 1954. He brought together the UI, the Bureau of Land Management, and a group of southern Idaho livestock producers to design, construct, and maintain a grazing experiment area on 640 acres of BLM land about 30 miles south of Burley.

The range experimental area was founded to study methods for combating halogeton, a poisonous weed which invaded southern Idaho rangelands in the 1930s and 1940s.

Sharp began his work at the Point Springs project

site to gather information about best management practices for wheatgrass-seeded rangeland. Little was known about crested wheatgrass, an import from Asia, which was first brought to this country in the 1890s.

The experimental area expanded rapidly as local cattle growers with BLM lease allotments became supporters of crested wheatgrass. Today, the project covers nearly 7000 acres, supporting double the average number of animals per acre during spring and fall grazing seasons. Over 1.5 million acres of western grazing lands have been reseeded to crested wheatgrass.

Sharp has received a letter of appreciation from William Clark, Secretary of the Interior, for "outstanding contributions to grazing management practices on public lands," and a commendation from Robert Burford, BLM director, for his development efforts. Burford also praised Sharp's skills in bringing together academicians, bureaucrats and ranchers to work toward a common goal in making crested wheatgrass a staple food for western range cattle.

Range Resource Guide Compiled

Ronald Robberecht

Jeffrey S. White

Carol Boyd

Gathering information is an important part of research. Department of Range Resources professor Ronald Robberecht, students Jeffrey White and Carol Boyd are compiling a resource guide to range science which will bring together information on range scientists throughout the world, and on institutions of higher education which offer range or applied ecology programs. Range experiment stations will also be listed.

Robberecht said that listings by country are available for Australia, Canada, Mexico and the United States. The rest of the entries will fall into a broad international list. Students interested in pursuing study in range resources should be able to use the directory to pinpoint programs which interest them and to find researchers working in specific subject areas, according to Robberecht.

Range scientists throughout the world will be listed by name, address and specialty area. The directory will include addresses of international range organizations, consulting firms, equipment suppliers and manufacturers of scientific equipment. The resource guide will also show what research is in progress in range and applied ecology. The completed directory, expected to be about 100 pages in length, will be available next spring. By using a computer program to prepare the data, the compilers will be able to update the material to keep the directory current.



Range professor Lee A. Sharp poses beside the entrance to the experimental area which now bears his name. Sharp initiated grazing research at the 640-acre site near Point Springs in 1954.

A family from northern Portugal cuts and loads shrubs to use for winter livestock feed. Taken near Pedras Salgadas. Stephen Bunting photo



Prescribed Burning Aids Reforestation Project

Investigators:

Stephen Bunting
Francisco Rego

In the Tras-os-Montes region of northern Portugal, University of Idaho expertise in prescribed burning and range nutrition is at work on a major reforestation project. Range Resources professor Steve Bunting and Range graduate student Francisco Rego are in the second year of a three-year project to determine the best fire interval for controlling understory fuel levels and improving livestock forage.

Much of Portugal has been deforested through heavy disturbance from fire, goats, sheep, cows, and logging. Reforestation with a number of conifer species has periodically occurred during this century to produce paper, particleboard, nondimensional lumber and pine tar for the Portuguese economy. Frequent wildfires are hampering the reforestation efforts.

As the forests develop, grazing values for livestock often decline. Bunting and Rego are studying the effects of burning understory vegetation to predict the best rate of forest increase with the least impact on grazing use. By clipping shrub growth after burning, they can measure the vegetal composition and nutritive values, such as minerals,

protein, digestibility, and plant energy. The scientists are also noting the effects of fire on soil characteristics and fire control in established *Pinus pinaster* forests which have been growing for 30 or more years.

Cattle, sheep and goats are important to the people of Portugal both culturally and economically. The animals are grazed on public lands, all eating the same forage plants. Grass is grown at home on winter pastures, and owners cut gorselike ulex shrubs year-round for animal feed. Bunting and Rego have reasoned that reforestation will be better accepted where adequate vegetative composition and nutritional quality are maintained for grazing. Fire is already used in Portugal for controlling brush on nonforested lands, and appears to improve tree regeneration efforts where burns are conducted before timber harvest, lowering the amount of litter on the forest floor. Finding the best timing for prescribed fires to benefit grazing and tree growth is the object of the research, which is supported in part by an A.I.D. University Development Program administered through Purdue University.

Rego, a faculty member at the Instituto Universitario de Tras-os-Montes e Alto Douro at Vila Real, Portugal, looked for a school which offered established programs in both range and prescribed fire use before selecting the University of Idaho for his doctoral research.

Continuing Education/Extension

Remote Sensing Workshop Offered in Kenya

Joseph Ulliman

Most of the workshops listed in this section are offered in Idaho. Last spring, by special request, Remote Sensing Professor Joseph Ulliman travelled to the Regional Remote Sensing Facility in Nairobi, Kenya where he conducted a six-week-long workshop to train professionals to map their forests and fuelwood resources. The actual mapping process began during the workshop, with imagery supplied by the center in Nairobi.

Fifteen individuals from Uganda, Kenya, Tanzania, Malawi, Botswana, Swaziland and Zimbabwe participated in the course. Most were working with land management agencies as foresters or range managers.

Workshop participants learned how to interpret different renewable resources on the imagery, taken from satellites between 1972 and 1979. The project was planned by Energy Initiatives for Africa and the Regional Remote Sensing Facility, funded partly by the Agency for International Development and partly by the participating countries.

Nesting Boxes Give Bluebirds Better Chance

Edward Garton

Members of the student chapter of the Wildlife Society at the University of Idaho built about 200 bluebird boxes last year, which were given away to any Idaho residents who wanted them. Nongame wildlife checkoff funds from the Idaho State Income tax returns supplied the materials. The 200 boxes will increase bluebird numbers in the Palouse. This year they may have helped the birds hold their own, as bad weather put nesting 2 to 3 weeks behind schedule. Bluebirds need an acre or so of grass and open area around their nesting site, and prefer nesting boxes placed on fences. Wrens also will use the boxes if they are fastened to trees or close to trees.

During the previous summer, Rusty Scalff, a student, had placed 100 bluebird boxes in various locations on the Palouse. Scalff and Wildlife professor Edward Garton banded 150 young bluebirds from the nesting boxes in 1983. Garton encouraged those who have nest boxes to clean them out after the nesting birds have raised their young. "Bluebirds will often re-nest," Garton said, "but they need clean nesting boxes. Parasites of the young birds accumulate in the nest material, so it is important to clean it out after the young birds have flown."

Fuelwood is heavily used in African countries. Through the mapping project, Energy Initiatives hoped to demonstrate awareness of fuelwood sources and to encourage better management of those resources. Other projects associated with their effort currently underway are to build better fuel stoves, kilns for turning wood into charcoal, and to develop grazing and cropping projects in line with agroforestry. Growing trees as crops for windbreaks, forage and fuelwood offers new possibilities for developing African nations.

FWR Enters New Area With Elderhostel Course

Welcome to Elderhostel. Nature photography and the outdoors at McCall, Idaho. The subject matter and locale may have you reaching for the application blank, but there is a catch. You have to be over 60!

The College of Forestry, Wildlife and Range Science's latest addition to its shortcourse offerings was greeted with enthusiasm this past summer at McCall. Thirty-six residents of eight states arrived for the week-long learning experience "for adults only," which covered slide show presentations, nature photography and plant identification.

The popular new university elderhostel programs offer material geared to adults in vacation settings. The courses are short enough to fit into a travel vacation, and help the participants learn about the area they are visiting at the same time. University facilities or field stations are used, often during the off-season, with the kind of instruction only experts in the field can bring.

Ross Tomlin, FWR director of Continuing Education, organized Idaho's course at the McCall Field Station. Acting Dean Ernest Ables offered tips on tracking and finding wildlife in natural areas. FWR Herbarium Curator Steve Brunsfeld covered plant identification techniques, and answered questions on plants in the McCall area. Wildland Recreation Management professor Sam Ham outlined the main points to be covered in preparing automated slide presentations. In a course-ending finale, Ham offered an overview of the week's highlights in slide form, featuring many of the participants in the elderhostel program.



SHORTCOURSES, WORKSHOPS, AND SEMINARS

Throughout the year, research scientists in the Forest, Wildlife and Range Experiment Station conduct workshops, shortcourses and seminars on campus and throughout Idaho and the West. Continuing Education programs which were sponsored, co-sponsored, or produced in cooperation with the Experiment Station or departments of the College of Forestry, Wildlife and Range Sciences over the last year are shown below.

1983		February 20	Aquaculture/Fish Health Management—Asheville, NC
July 24-30	Advanced Wildlife Ecology and Management Workshop—McCall	February 27-March 9	Forestry Remote Sensing Workshop—Moshi, Tanzania
August 2-3	First Annual Inland Empire Forest Products Marketing Conference	March 12-15	Range Shortcourse on Coordinated Management—Idaho Falls
Fall Semester	Boise Cascade Seminar—Moscow	March 14-16	Forest Pesticides Shortcourse—Spokane
October	Video Course—Statistical Methods and Data Analysis for Fish and Wildlife Biologists—Moscow	March 15	Range Monitoring Workshop—Malad
October 5-7	Northwest Regional Workshop, Association of Interpretive Naturalists—Moscow	March 19-22	Management of Issues—A Workshop—Moscow
October 11-13	First National Wilderness Management Workshop—Moscow	March 19-April 6	Continuing Education in Fire Management (CEFM)—Moscow
October 17-20	Second Annual Inland Empire Dry Kiln Workshop—Moscow	April 12-14	Natural Resources Week—Moscow
October 24-November 18	Continuing Education in Forest Ecology and Silviculture (CEFES)—Moscow	April 14	Woodlot Management—Clark Fork
1984		April 16-May 25	Forest Energy/Natural Resources Assessment Workshop/Project—Nairobi, Kenya
		April 23-26	Fire Information Officer Shortcourse—Boise
January 12-13	Board for International Food and Agriculture Development (BIFAD)—Moscow	April 25-26	Transaction Evidence and Timber Appraisal Workshop—North Idaho College
January 27-May 19	Project W.I.L.D. Two-Day Workshops, held in the following locations:	May 16-18	Wildlife Habitat Relationships Shortcourse—Colville Indian Reservation
	Emmett Mountain Home	May 19	Cultural/Historical Look at Northern Idaho—Clark Fork
	Caldwell Clark Fork	May 19-20	Forest Products Research Society, Pacific Northwest Section—Portland
	Lewiston Moscow	June 4-8, and	Statistical Methods and Data Analysis for Fisheries and Wildlife Biologists—Moscow
	Jerome Salmon	June 11-15	
	Idaho Falls Boise	June 11-15	Natural Resources Youth Workshop—Ketchum
	Weiser Challis		
	Pocatello Burley	June 12-July 6	Wildland Ecology Shortcourse—McCall
	Coeur d'Alene Ketchum	June 16-17	For Bird Lovers Only—McCall
	Montpelier	June 16	Pine Butterfly Workshop—McCall
January 28-29	Winter Life in Northern Idaho—Clark Fork	Also June 23	At Cascade
February 3-4	Idaho Chapter—The Wildlife Society—Boise	June 25-29	Forest Habitat Types of Southeastern Idaho—Ashton
February 6-10	Aerial Photo Interpretation/Aerial Photography Workshop—Moscow	July 9-13	Forest Habitat Types of Northern Idaho—Fenn Ranger Station
February 9-10	Inland Empire Forest Engineering Conference/Logging Conference		
February 16-18	American Fisheries Society—Idaho Chapter—Moscow		

Wildland Recreation Management



Photos by
Susan Roberts



Conference participants gathered from all parts of the country for the landmark wilderness management workshop. At right, Russell E. Dickenson, Director of the National Park Service, departs at Pullman-Moscow Airport.

Wilderness System Management Action Plan Born

Edwin E. Krumpe
Michael Frome
William McLaughlin

An important new program for management of wilderness on federal lands throughout the country is now nearing reality, spurred by a conference and follow-up action centered at the University of Idaho.

Max Peterson, Chief of the Forest Service, called the First National Wilderness Management Workshop, held at the university in October 1983, a "landmark conference." The workshop theme, "Taking Care of What We've Got," focused attention on problems and challenges in administering 80 million acres of public land in the National Wilderness Preservation System. Four federal agencies—the Forest Service, the National Park Service, the Bureau of Land Management, and the U.S. Fish and Wildlife Service—are charged with management of wilderness areas which fall within their boundaries.

The wilderness management workshop, conducted under the auspices of the University of Idaho's Wilderness Research Center attracted nearly 400 representatives

of federal and state agencies, industry, and environmental, wildlife and recreation organizations. In addition to major speeches and panel discussions, the conference featured small group sessions (based on groups of ten) which became the unique core of ideas for the management action program.

Participants in the group sessions discussed and set down on paper their own ideas of pressing wilderness management issues and ranked them by priority. Before the conference was over and this process completed, leaders of the four federal agencies requested the Wilderness Research Center to continue the study with broadened public input.

As a result, a steering committee was established, including representatives of the four federal agencies, and representatives of public conservation, preservation, wildlife management, outfitter and recreation user groups, resource industries, and state agencies. Data generated at the workshop were collated and sent for review and comment to all participants and other interested parties, then refined to the point where the steering committee could highlight issues of principal concern.

More than 1100 individual ideas on wilderness management needs were received. These were grouped in five



Conference speakers included Forest Service Chief Max Peterson (above), Idaho Senator James McClure (below) and U.S. Fish and Wildlife Service head Robert A. Jantzen (right).



major categories: Educating the public; Education and training for managers; Interagency coordination and consistency; Capacity and concentrated use; and Wilderness management practices.

The steering committee completed its work in a meeting last June at the Clark Fork field station of the UI College of Forestry, Wildlife and Range Sciences. Its action program is designed to meet the most urgent management needs of the next five years. Recommendations have been sent to directors of the four federal agencies and will be made public.



Returning to Moscow for the wilderness workshop were U. S. Forest Service delegates and UI alumni Bruce Hronek, left, from Wisconsin; and David W. Scott, right, from Portland. At center is William McLaughlin, Wildland Recreation Management Department Chairman.

Wilderness System Management Action Plan

"Though funding concerns were highly ranked by conference participants, we concentrated on building a strong action program that agencies and the public will find worthy of support," Edwin E. Krumpe, director of the Wilderness Research Center, and steering committee chairman, explained.

"Likewise, there is no call for new legislation, though wilderness is an issue of continuing discussion by Congress. The principal point is that for all the emphasis on designation of wilderness, little attention has been given to the best means and methods of administering it.

"The success of the workshop clearly reflected widespread interest and need to upgrade wilderness management. Hopefully the action program will do that."

Another workshop follow-up involves publication of *Issues in Wilderness*, a 250-page book, under the joint auspices of the Wilderness Research Center and Westview Press, of Boulder, Colorado. *Issues*, while based on workshop presentations, does not follow the pattern of normal conference proceedings. It is scheduled for publication in November.



Forest Service Chief Peterson talks with Mary Williams of the Intermountain Forest and Range Experiment Station during a break.

River Rafting Patterns To Guide Management

Investigators:

Edwin E. Krumpe
William J. McLaughlin
Murray Feldman

How to organize a river system? As most resource managers have found, managing a natural resource often means managing the users. University of Idaho Wildland Recreation Management students turned out again last summer to survey rafters and other river recreationists on nine river segments within the state of Idaho.

Funded by the Idaho Department of Parks and Recreation, the project is aimed at finding who uses the rivers, how experienced they are, why they choose a certain river segment, how they regard the prospect of an Idaho river recreation system, and what management practices they would advocate. Nearly 2500 floaters completed questionnaires in 1983, the first year of the study.

Ninety percent of surveyed floaters approved of the idea of a state river system to protect certain rivers for recreational use. Allocating water rights to maintain minimum stream flow on rivers protected through a state system appealed to 74 percent of the river users.

To fund such a river system, 62 percent supported an income tax checkoff; 41 percent supported licensing of all watercraft; while only 30 percent backed a user fee for floaters. Sixty percent of 1983 floaters surveyed were

Idaho residents. Out of state use varied from 4 to 53 percent, depending on river segment surveyed.

Limiting shoreline development and providing information on rivers and their recreational opportunities were ranked highest as needed river management practices.

Directing research for the cooperative project are Wildland Recreation Management professors William McLaughlin, Edwin Krumpe, James Fazio and Graduate Research Assistant Murray Feldman; with a student survey team of Scott Edgerton, Amy Braithwaite, Nancy Ray, Michaela Touhey, and Wim Goedhart.

Rivers to be surveyed during the summer of 1984 included: Snake River segments from American Falls Dam to Massacre Rocks State Park, and from Murtaugh Bridge to Twin Falls Reservoir; Henry's Fork, from Island Park Dam to Warm River; Falls River, from Kelly School Bridge to Kirkham Bridge; Payette River from Banks south for 8 miles; South Fork Payette from Deadwood Campground to Alder Creek Bridge; Priest River from Dick-sheet Campground to Priest River (town); Moyie from Meadow Creek Bridge to Moyie Springs Dam; and North Fork Clearwater from Orogrande Creek to Aquarius Campground.

River user information provides a base for planning and management by the Idaho Department of Parks and Recreation and federal land management agencies. It also serves as a basis for state comments to the Federal Energy Commission's permit review process.

Appendix

EXPERIMENT STATION SCIENTISTS

Stoszek, Milena J.
Director of the FWR Nutritional Lab and Research
Associate Professor

Pym, Geneva
Research Technician

DEPARTMENT OF FISH AND WILDLIFE RESOURCES

Ables, Ernest D.
Acting Dean, College of Forestry, Wildlife and Range
Sciences; Acting Director of FWR Experiment Station;
and Professor

Bennett, David H.
Professor
Warmwater fishery management, fish ecology

Bizeau, Elwood G.
Assistant Leader, Cooperative Wildlife Research Unit and
Professor
Birds, principally waterfowl and marsh

Bjornn, Theodore C.
Leader, Cooperative Fishery Research Unit and Professor
Fish ecology and management

Chacko, A. Jim
Fishery Research Scientist
Parasites and parasitic diseases of fish, anatomy and
histology of fishes

Congleton, James
Assistant Leader, Cooperative Fishery Research Unit and
Associate Professor
Marine ecology, environmental physiology

Dalke, Paul D.
Professor Emeritus
Wildlife management

Drewien, Roderick C.
Research Wildlife Biologist
Wildlife, migratory birds, endangered species

Falter, C. Michael
Professor
Reservoir limnology, stream ecology

Garton, Edward O.
Associate Professor
Wildlife population biology, systems ecology

Hornocker, Maurice G.
Leader, Cooperative Wildlife Research Unit and Professor
Population ecology, predator-prey interactions

Hungerford, Kenneth E.
Professor Emeritus
Wildlife management

Irving, John
Fishery Research Associate

Kessler, Winifred B.
Associate Professor
Range management/wildlife relationships

Klontz, George W.
Professor
Diseases and rearing problems of aquatic animals

MacPhee, Craig
Professor Emeritus
Fish behavior, ecology, toxicology

Melquist, Wayne
Research Wildlife Biologist

Moffitt, Christine M.
Visiting Assistant Research Professor
Fish ecology and management, fish passage

Nelson, Lewis, Jr.
Acting Department Head and Extension Professor

Peek, James M.
Professor
Big game management, habitat relationships

Reese, Kerry P.
Assistant Professor
Wetland ecology

Ringe, Rudy
Fishery Research Associate

Wright, R. Gerald, Jr.
Cooperative Park Studies Unit Project Leader—Biology,
and Associate Professor
Range systems ecology, simulation modeling

DEPARTMENT OF FOREST PRODUCTS

Campbell, Alton G.
Assistant Professor
Wood Chemistry

Govett, Robert L.
Assistant Professor
Forest products marketing

Christophersen, Kjell A.
Extension Forester/Associate Professor
Forest products marketing, production economics

Hofstrand, Arland D.
Professor
Anatomy and mechanical properties of wood

Howe, John P.
Professor Emeritus
Wood Science and technology

Johnson, Leonard R.
Professor
Forest engineering, industrial engineering, mathematical modeling

Lee, Harry W.
Assistant Professor
Forest engineering

Moslemi, Ali A.
Department Head and Professor
Panel products technology, wood residue utilization

Steinhagen, Peter H.
Associate Professor
Heat and mass transfer applied to wood

DEPARTMENT OF FOREST RESOURCES

Adams, David L.
Department Head and Professor
Silviculture, forest management (growth and yield)

Bassler, Gregory
Logging Superintendent, Forester and Research Associate

Belt, George H.
Associate Dean for Research, FWR Experiment Station
Associate Director, Director of International Programs and Professor
Hydrology, meteorology, planning, forest management

Brockhaus, John
Research Instructor

Brunsfeld, Steven
Research Associate

Burlison, Vernon H.
Extension Forester Emeritus and Extension Professor
Emeritus

Canfield, Elmer R.
Associate Professor Emeritus
Forest Pathology

Crookston, Nicholas L. II
Research Associate

Dennis, Brian
Assistant Professor
Statistical ecology

Deters, Merrill E.
Professor Emeritus
Forest Silviculture

Fins, Lauren
Executive Director, Inland Empire Tree Improvement
Cooperative and Associate Professor
Forest genetics

Force, Jo Ellen
Assistant Professor
Modeling, land use planning, biometry

Goudie, James W.
Research Associate

Hatch, Charles R.
Professor (on leave with USAID Joint Career Corps in India)
Mathematical stand modeling, mensuration

Heller, Robert C.
Research Professor Emeritus
Remote sensing, photo interpretation, forest entomology surveys, and evaluation

Johnson, Frederic D.
Professor
Forest ecology, forest communities, forest botany

Kemp, William
Research Associate

Kessler, Bruce
Research Associate

Knox, Diane
Research Technician

Laursen, Steven B.
Research Associate

Loewenstein, Howard
FWR Experiment Station Assistant Director and Professor
Forest soils and tree nutrition

Machlis, Gary E.
Cooperative Park Studies Unit Project Leader—Sociology, and Associate Professor
Interpretation, human ecology, environmental sociology

Mahoney, Ronald
Extension Forester/Assistant Extension Professor

McKetta, Charles W.
Assistant Professor
Timber production economics, forest management, forest taxation

Medema, E. Lee
Associate Professor
Forest resource economics, forest policy, stumpage market analysis

Mika, Peter G.
Research Associate

Moore, James A.
Director, Intermountain Tree Nutrition Cooperative, and Associate Professor
Silviculture, quantitative methods, forest production

Neuenschwander, Leon F.
Associate Professor
Fire ecology, fire management, prescribed burning, general ecology

Osborne, Harold L.
Manager, University of Idaho Experimental Forest and Assistant Professor
Silviculture, harvesting

Partridge, Arthur D.
Professor
Forest Pathology

Schenk, John A.
Professor
Forest entomology, insect ecology, silviculture, and biological control of forest insect pests

Seale, Robert H.
Professor Emeritus
Forest economics

Stark, Ronald W.
Professor
Population dynamics and integrated pest management of forest insects

Stiff, Charles
Assistant Professor
Mensuration, mathematical tree and stand modeling

Stock, Molly W.
Professor
Forest insect population genetics and biosystematics

Stoszek, Karel J.
Professor
Silviculture, forest protection, forest entomology

Strong, Allan E.
Assistant Forest Manager and Research Associate

Tennyson, Larry C.
Associate Professor
Watershed

Ulliman, Joseph J.
Professor
Aerial photography, mapping, aerial photo interpretation, remote sensing

Vander Ploeg, James
Research Associate

Wang, Chi-Wu
Professor Emeritus
Forest genetics

Wenny, David L.
Forest Nursery Manager and Assistant Professor
Silviculture, forest regeneration

Young, Bruce
Research Associate

DEPARTMENT OF RANGE RESOURCES

Bryant, David
Department Head and Professor
Range and livestock management

Bunting, Stephen C.
Associate Professor
Fire ecology, range ecology

Ehrenreich, John H.
Professor of International Forestry and Range Management
Dean, College of FWR 1971-1984

Hironaka, Minoru
Professor
Range ecology, synecology, autecology

Kingery, James L.
Assistant Professor
Range improvements, natural resource policy and economics

Richmond, Raymond L.
Systems Development Analyst

Robberecht, Ronald
Assistant Professor
Physiological plant ecology, range ecology

Sanders, Kenneth D.
Extension Professor
Range management

Sharp, Lee A.
Professor
Grazing practices, rangeland policy considerations, range improvements

Tisdale, Edwin W.
Professor Emeritus
Range resource evaluation and management, native range vegetation types, ecology of range weeds, vegetation habitat relationships

DEPARTMENT OF WILDLAND RECREATION MANAGEMENT

Fazio, James R.
Associate Dean of Academics and Professor
Communication and principles of natural resource
management, environmental interpretation, continuing
education delivery systems, conservation history

Frome, Michael
Visiting Associate Professor
Communications

Ham, Sam H.
Assistant Professor
Interpretation, communication, environmental education

Harris, Charles C., Jr.
Assistant Professor
Economic evaluation of recreation resources, consumer
behavior, recreation management and planning

Krumpe, Edwin E.
Director of Wilderness Research Center and Associate
Professor
Social psychology, decision processes in recreation,
communications and interpretation

McLaughlin, William J.
Department Head and Associate Professor
Regional and recreation planning methods, citizen
participation, recreation behavior, perception and visual
resource management

ADMINISTRATIVE SERVICES

Akenson, Jim and Holly
Managers, Taylor Ranch

Ashland, Lorraine
Graphics Artist/Illustrator

Bone, Sharon
Coordinator of Continuing Education

Bottger, Richard F.
Director of Administrative Services

DeWald, Dan
Manager, Clark Fork Experiment Station

George, Willard L.
Motor Pool Technician and Property Controller

Roberts, Susan B.
FWR Experiment Station Editor

Sargent, Marilyn
Assistant Director, International Programs

Savage, George H.
Director of Information Services, Managing Editor and
Adjunct Associate Professor of Natural Resources
Communications

UNIVERSITY OF IDAHO EXPERIMENTAL FOREST AND FOREST NURSERY

Osborne, Harold L.
Manager, University of Idaho Experimental Forest and
Assistant Professor

Bassler, Gregory
Logging Superintendent, Forester and Research Associate

Strong, Allan E.
Assistant Forest Manager and Research Associate

Wenny, David L.
Forest Nursery Manager and Assistant Professor

Cindy Worrell
Nursery Technician

RESEARCH PROJECTS AND INVESTIGATIONS

This listing of projects shows the range of work in progress through the experiment station; it is not a publication listing. To save space, abbreviated project titles are given. If additional information is needed, please write to the principal investigators or to the Associate Director, Forest, Wildlife and Range Experiment Station, University of Idaho.

DEPARTMENT OF FISH AND WILDLIFE RESOURCES

- Effects of wolf predation on survival of blacktail deer fawns. E.D. Ables, I. Hatter
- Wildlife use of habitat plantings adjacent to a reservoir. E.D. Ables, L. Mettler
- Habitat partitioning by behavioral mechanisms among bighorn sheep, elk and mule deer. E.D. Ables, H. Akenson
- An endangered species management plan for China. E.D. Ables, Y. Song
- Population ecology studies. E.D. Ables, Z. Fan
- A waterfowl management plan for the Bardawil Lagoon (North Sinai) of Egypt. E.D. Ables, A.G. El-Attar
- Coyote population methods. E.D. Ables, M.G. Hornocker, R.L. Crabtree
- Development of a methodology to evaluate the success and consequences of establishing exotic fishes in Idaho waters. D.H. Bennett, T.J. McArthur
- Fish and habitat inventory of the Lewiston levee ponds and development of a management plan. D.H. Bennett, F.S. Shrier
- Recruitment, growth and survival of largemouth bass (*Micropterus salmoides*) in the Coeur d'Alene Lake system. D.H. Bennett, E.C. Bowles
- Reestablishment of whooping cranes in western United States. E.G. Bizeau, R.C. Drewien
- Habitat use and reproductive success of an introduced population of Rio Grande turkeys in southwestern Idaho. E.G. Bizeau
- Evaluation of the feasibility of cross-fostering bald eagle eggs to osprey nests in northern Idaho. E.G. Bizeau
- Experimental release of captive greater sandhill cranes at Grays Lake, Idaho. E.G. Bizeau
- Fish time and size for release. T.C. Bjornn, C.M. Moffitt, D. Lam
- Evaluation of methods for controlling bacterial kidney disease in Snake River chinook salmon. T.C. Bjornn, C.M. Moffitt
- Transportation of spring chinook salmon from Snake River dams to the Columbia Estuary. J.L. Congleton, T.C. Bjornn, C.A. Robertson
- Effects of stress on the viability of chinook salmon transported from the Snake River to the Columbia Estuary. J.L. Congleton, T.C. Bjornn, B.D. Watson, B.H. Burton
- Bluegreen algae toxicity in North Idaho lakes. C.M. Falter, J. Kann
- Phytoplankton and zooplankton of Dworshak Reservoir. C.M. Falter
- Status of boreal owls in Idaho. E. O. Garton, G. Hayward
- Development of aerial census methods for elk populations. E. O. Garton
- Development of baseline data gathering system for Research Natural Areas in Idaho. E. O. Garton
- Avian predation on western spruce budworm. E. O. Garton
- Ecology of a reintroduced fisher population. M.G. Hornocker
- Ecology of the bobcat in the River of No Return Wilderness Area. M.G. Hornocker
- Ecology of the jaguar in Brazil. M.G. Hornocker
- Population dynamics of black bears. M.G. Hornocker
- A study of grizzly bear populations and habitat in northern Idaho. M.G. Hornocker
- Ecology of the endangered ocelot in South Texas. M.G. Hornocker
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Agency and Funding Support

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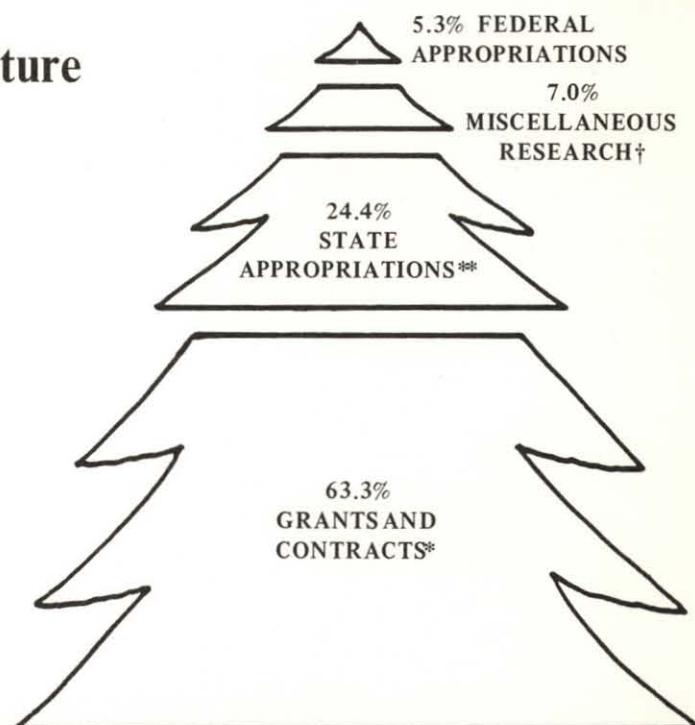
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Fiscal Year 1984 Financial Picture

Research expenditures, shown by funding source,
totaled \$5,302,600 for the Fiscal Year 1983-84.



* Includes "in-kind" funds

** Includes FWR Experiment Station, Wildlife, Fisher-
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