The University of Montana consists of the College of Arts and Sciences and professional schools of Business Administration, Education, Fine Arts, Forestry, Journalism, Law, and Pharmacy and Allied Health Sciences. In addition, we maintain twenty-six research units including specialized laboratories, institutes and centers. Off-campus facilities include the Flathead Lake Biological Station at Yellow Bay in northwestern Montana; the Lubrecht Forest, which is the experimental forest for the School of Forestry, located east of Missoula; and the Geology Field Station in southwestern Montana. The University offers a master’s degree in business administration and a master’s degree in administrative sciences on the Malmstrom Air Force Base in Great Falls, in addition to the Master’s of Business Administration at Eastern Montana College in Billings. Our faculty consists of approximately 460 scholars working with some 7,200 undergraduate students and 1,800 graduate students.

This publication illustrates examples of current research and creative activities at the University. These examples contain a strong unifying thread of service to the people of Montana, in addition to individual contributions to various scholarly disciplines.

Service to the state and the region through encouraging economic development has become one of the major missions of the University. Working with Montana State University, we have been designated the lead institution in biotechnology. The Montana Science and Technology Alliance has named us the lead institution in entrepreneurial business assistance, working with Montana State University and Eastern Montana college. Technology, technology transfer and assistance to those businesses that are developing in the state provide the framework for our efforts in this area. The reorganization of our life science programs into one division emphasizes the importance the University places on the life sciences and its role in economic development and research. We have established mutually supported, cooperative relations with a number of Montana biotechnology firms including Ribi ImmunoChem, ChromatoChem and Skyland Scientific. These relations involve research, shared equipment, company employees involved in cooperative instruction and research, and opportunities for graduate students to use the company research facilities.

Our University Affiliated Program for the Developmentally Disabled and the Rural Rehabilitation Training Center has emerged as a leading facility in the state for research, demonstration and outreach. In developing this program we have created cooperative relations with Community Hospital in Missoula and engineering programs at Montana State University.

Our wildlife program continues to expand with studies throughout the world. The Boone and Crockett Club, the national organization founded by Teddy Roosevelt 100 years ago and dedicated to conservation and the publication of North American big-game statistics, has provided us with a ranch on the Rocky Mountain front and is establishing a professorship for wildlife studies. In addition, our research on wildlife management in the People’s Republic of China has been greatly strengthened by the establishment of the Robert M. Lee awards for research on sustained-yield management of wildlife.

Grant and contract awards to University of Montana faculty and staff continue to grow at approximately 10 percent a year, with each year bringing a new all-time record for the University. Our success in recruiting outstanding faculty members last year, many bringing funded research to the University upon arrival, will help to ensure the scholarly productivity of the University and its ability to contribute to economic development and service to Montana.

Raymond C. Murray
Associate Vice President for Research
and Dean of the Graduate School
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Recognizing that the vitality of a university depends greatly upon the quality of its research and other creative endeavor, the University of Montana treasures its outstanding scholars and artists. Each year at commencement one of that estimable company receives the Distinguished Scholar Award for achievement in research and creative ability. First given in 1980, the award carries a $1,000 honorarium from the UM Foundation. Recipients are selected by the University Research and Creative Activities Committee from faculty nominated by their schools and departments.

1986: Jesse Bier, Professor of English

A noted expert on American humor, Bier is the author of the acclaimed book *The Rise and Fall of American Humor*. His other writings include many poems, articles and short stories, as well as the novels *Trial at Bannock* and *Year of the Cougar*. Two years ago, he was a featured speaker at the fourth International Conference on Humor in Tel Aviv, Israel. He recently completed a collection of critical essays and is working on a novel and a play.

1984: Rudy Autio, Professor of Art

Autio, born in Butte, and Peter Voulkos, born in Bozeman—among the most influential figures in the development of American sculptural ceramics—worked together in Helena in the 1950s at the Archie Bray Foundation, which Autio directed until he came to UM in 1957. Autio’s art has taken diverse forms, including large-scale relief murals for buildings. Recently, he has concentrated on hand-formed, slab-constructed, brush-decorated stoneware pieces. Whatever his medium, he draws inspiration from and uses materials of his native landscapes. A retrospective of the celebrated ceramic sculptor’s work from 1952 to 1983 toured the United States in 1983-84.

1987: Walter Hill, Professor of Biological Sciences

Hill, who specializes in physical biochemistry and molecular biology, has longstanding support from the National Institutes of Health and the National Science Foundation for his studies of DNA, RNA and the structure of ribosomes. He is often invited to speak at national and international scientific meetings. In 1986, Hill was one of six Americans invited to present a paper at the International Symposium on the Structure of Biological Macromolecules in Pouschino, U.S.S.R. As the director of the Montana Science and Technology Alliance Biotechnology Center of Excellence at UM, Hill heads the effort to stimulate further biotechnology research, technology transfer and product development in the state.

1985: Donald Hyndman, Professor of Geology

Much of Hyndman’s research concerns the origin and evolution of granitic magma that rises to form stocks and batholiths, such as those found in the Bitterroot and Flint Creek mountain ranges. He also examines aspects of deformation and metamorphism that relate to granite. He has been a member of a National Academy of Sciences review board charged with examining radioactive waste-disposal practices in major industrial nations. He is the author of the leading and most authoritative text on petrology (the study of rocks) available today.

1988: Ray Hart, Professor of Religious Studies

Internationally recognized as the leading scholar in his field, Hart has written and edited many articles, essays and chapters for books about the study of religion, including the influential books, *The Critique of Modernity: Theological Reflections on Contemporary Culture* and *Unfinished Man and the Imagination*. Since 1969, Hart has been on the board of directors and executive committee of the American Academy of Religion. He also is a member of the International Council of Religion’s executive committee for planning the Centennial Congress of World Religions, which will be held in 1993. Hart received UM’s Award for Scholarly Merit of National and International Distinction in 1976.
FROM RENAISSANCE TO ‘ROBOCOP,’
ART HISTORIAN PROBES PAST, PRESENT

Associate Professor Julie Codell, the new chair of the University of Montana art department, researches, writes and talks extensively about Victorian art. But a quick look at the long list of articles she’s published and lectures she’s given shows that her curiosity and expertise are by no means limited to late 19th-century England.

Her topics have included the photographs of Edward S. Curtis; the movie Robocop; Italian Renaissance frescoes; the work of Missoula fiber artist Nancy Erickson; and an exhibit of Hmong textiles at Missoula’s Brunswick Gallery, which Codell co-founded.

Clearly, Codell is an art historian who probes the present as well as the past. “My view is that the art of the past and of the present are in a continuous dialogue both formally and historically and that to understand one it is important to understand the other,” she says.

Art historians all too often stress that the past illuminates the present, she says. “I would like to argue that the present illuminates the past, since we as historians live in the present and are inevitably informed by it.”

She gives the example of cubism, a 20th-century painting technique she says helped people understand the limitations of the one-point perspective system developed hundreds of years earlier during the Renaissance. Cubism is characterized by multiple focal points, the one-point perspective system by a single focal point.

“The old system doesn’t explain cubism as much as cubism reflects on the old system,” Codell says, adding that cubists obviously gave considerable thought to the one-point system before rejecting it. Their rejection was an attempt to incorporate new ideas about space and time expressed by Einsteinian physics and 20th century mathematics.

Studying such painting styles and the lives of famous artists has a long tradition among art historians. Only in the past twenty years have researchers also begun exploring issues such as artists’ relationships with dealers, patrons and collectors, Codell says.

Her interest in such issues has inspired Codell to take on a major study of the network of artists, critics, dealers, patrons, collectors, art schools, galleries and museums in London between 1870 and 1914. Funded by the National Endowment for the Humanities, she recently spent two months in England, her third trip there in pursuit of information for this project.

“I’m trying to find a pattern for the structure of artists’ lives in that period and to see how that pattern—the larger social pattern and then the individual biographical patterns—affected aesthetic values and the role of art in England at that time,” she says.

The era Codell is studying was extremely active. The number of professional artists’ societies, dealers’ galleries, art periodicals, and national and international art exhibits was growing rapidly. Public art museums had sprung into existence only shortly before, in mid-19th century, and art had become a complex status symbol for the burgeoning middle class.

From 1870 to 1914, traditional art by painters such as Sir Frederick Leighton, Sir Hubert von Herkomer and Sir Edwin Landseer was popular in England, Codell says. Few British artists dared offend their buyers and critics by adopting the avant-garde style embraced by their French brethren.

Codell has focused the first part of her research on British art periodicals. Much of this research has centered on Marion Harry Spielmann, a prominent British art and literary critic who edited the highly popular Magazine of Art for seventeen years in the late 1800s. In fall 1986, funded by another NEH grant, Codell flew to Manchester, England, to comb through the 1,300 letters in the John Rylands Library’s Spielmann collection, its second-largest holding.

“It turned out that 1,300 letters were just the tip of the iceberg,” says Codell, who, with a grant from UM, in 1987 traveled to Vancouver, British Columbia, to study Spielmann’s papers there. Many more exist throughout England and in the United States.

“Spielmann knew everybody,” Codell says, explaining that he had a profound effect on artists’ lives and collectors’ tastes. “Yet he appears in nobody’s biography. People tend to hide their commercial ties.”

During her recent trip to Spielmann’s homeland, Codell sought more of his letters in Birmingham, London and Leeds. She also interviewed the heads of artists’ societies and studied their archives and visited galleries that existed during her research period.

Her major research concerns are learning how artists benefited from societies, how societies worked and who patronized and belonged to them, and whether societies competed with one another. She’s also exploring the
relationship between societies and the powerful Royal Academy, which was the major art education and exhibition institution in the 19th century.

Besides researching and teaching art history, Codell teaches art criticism. The subject attracts Codell because it "demands that you look at things that are lost in reproductions, like color relationships, scale, texture, handling, the actual physical skill of the artist," she explains.

"It forces you to create a vocabulary of metaphoric equivalence," she continues. "You can never find a word, a vocabulary, to say what that work of art really is. Otherwise, you could eliminate the work of art and put the words in place of it."

The winner of UM's 1984 Distinguished Teacher Award, Codell finds the hardest part of teaching art criticism is getting students to spend enough time with a piece of art. "We're so used to seeing quickly because the media enforce this habit of seeing," she says. "The result of that is most of the time we don't appreciate the technical skill and intelligence of an artist's work."

Recently, Codell branched out into film criticism, producing an analysis of Robocop for Jump/Cut magazine. "Movies have a profound influence on people's lives," she says. As a result, film "has to be analyzed all the time because it's affecting us in ways we don't even know, and deeply. And I think it's important for artists to know about it because they're competing with it."

Codell's admiration for film by no means detracts from her devotion to art. "Artists are the ones who keep us involved in a discourse on our seeing," she contends, adding that sight is our most important sense. "They question it; they re-evaluate it. These people are vital to our understanding of the world, and they tell us how the world looks, not just physically but psychologically and socially and philosophically."

UM art historian Julie Codell (above) has reviewed the work of local artist Nancy Erickson, whose painted fabric "Cat Coming Down" was in last fall's alumni exhibit.
In 1986 University of Montana Professor Joe Durso gambled that a product developed by Ribi Immuno-Chem Research Inc., a biotechnology lab in Hamilton, could effectively treat his daughter’s horse that had skin cancer. Fat Chance, the name of the eight-year-old appaloosa—not how great the odds—took to the treatment and appears cancer-free today.

Likewise in 1985 when Montana’s economic lesions were spreading throughout the state, the Legislature bet $600,000 on the scientific health of Montana and created the Montana Science and Technology Alliance. From that money, UM has received $200,000 for creating a Center of Excellence for Biotechnology. Together with Montana State University, the center will provide scientific and technological support for private industry.

Although the investment is small and cannot cure all of what ails Montana’s economy, it’s a shot in the arm for Montanans and their institutions.

Besides providing seed money for sprouting biotech enterprises, the center also aims to coalesce the expertise in the state and to call upon that expertise for conferences and seminars for Montana’s scientific community.

“The idea is that once you develop the research potential,” says Walter E. Hill, UM professor of chemistry and director of the biotech center, “the research people will then go ahead and develop ideas and develop technology that isn’t currently available.”

Turning ideas into products can economically benefit and build prestige for the associated researchers, institutions, companies and state, Hill says.

“Idealistic?” Hill asks. “It’s not going to work quickly, but the fact is, it will work.”

Biotechnology, broadly defined as using living organisms to make or modify products or to modify plants or animals through techniques that change genetic structure, is essentially a clean industry providing well-paying jobs. According to the U.S. Office of Technology Assessment, Montana is competing against thirty-two other states that are spending almost $150 million to promote biotech research and development. Hill acknowledges that challenge but remains undaunted.

“I’ve always thought that hungry dogs hunt better,” Hill says. Montana can have a successful hunt, the biotech center’s director says, by strategically targeting its resources.

In addition to Ribi ImmunoChem, biotech trophies already mounted on Montana ground are ChromatoChem Inc. in Missoula, Skyland Scientific Services Inc. in Bozeman and Scentry Inc. in Billings.

Ribi ImmunoChem, incorporated in 1981, develops general immune stimulators for preventing and fighting human and animal cancers and infectious diseases. It is also developing its products for preventing and treating septic shock associated with injury and surgery, as well as collaborating with the U.S. Army in developing a malaria vaccine.

In 1984, Missoula native Richard Hammen founded ChromatoChem and moved it from Pasadena, Calif., to Missoula in 1986. ChromatoChem’s charter is to develop, manufacture and sell high-performance products that separate, purify and analyze high-value chemicals and biochemicals.

For the past decade, Skyland Scientific Services has

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Joanne Beckman, a quality-control specialist for Ribi ImmunoChem, streaks agar plates to isolate bacterial colonies. Beckman, who holds a bachelor’s degree in pre-veterinary medicine/animal science from the University of Nebraska at Lincoln, has been with Ribi for two and a half years.
developed new products for the pharmaceutical and medical-device industry. Recently it moved from Gallatin Field in Belgrade to Bozeman, symbolically close to the south edge of the MSU campus.

In addition to conducting clinical trial studies for pharmaceutical products, Skyland has developed a biological indicator for monitoring sterilization. It also manufactures an eye-wash system for emergency eye care.

Originally with Albany International, Scentry is a subsidiary of ConAgra Inc. Using the chemicals that insects use for communicating, Scentry develops products to beneficially attract insects or control their population without insecticides.

In the public sector, Rocky Mountain Laboratory in Hamilton was founded in the early 1900s and is a federally funded biomedical research lab for studying allergies and infectious diseases. Well known for its vaccine for Rocky Mountain spotted fever, the lab researches rabies and AIDS and is working on vaccines for whooping cough and a strain of chlamydia that causes blindness.

In Great Falls the McLaughlin Research Institute, which is also federally funded, was founded twenty-one years ago by Columbus Hospital and John McLaughlin. The institute conducts basic immunogenetics research in the fight against cancer.

All of the research labs employ Montana graduates, but they need more, especially those with advanced degrees. With about one-fourth of their employees UM and MSU graduates, Ribi ImmunoChem and ChromatoChem plan to expand in research, development and marketing and look to hire Montana graduates.

"We need all that we can get as far as sophisticated, top-quality people are concerned because I sure hate to import all of our scientists," ChromatoChem's Hammen says.

"It's a real hassle."

Since its move to Missoula, ChromatoChem has worked with UM researchers on some aspects of product development and plans to tap other University resources, such as the School of Business and the Mansfield Center, for marketing in the Orient.

Last March, Ribi ImmunoChem firm up its training base for scientists in an arrangement with UM. Under the agreement, UM will appoint selected Ribi ImmunoChem scientists as adjunct professors, while UM graduate students will be able to conduct applied research and pursue postgraduate degrees at Ribi ImmunoChem's labs. Ribi ImmunoChem in turn will teach specialized courses at UM that otherwise would not be available. UM and Ribi ImmunoChem also will share specialized equipment.

"Our business effort is very specialized," Robert E. Ivy, Ribi ImmunoChem's president and chief executive officer, says. "We must have the very best scientists."

From this synergistic cooperation, Ivy says, UM can attract better students and Ribi ImmunoChem can attract better staff.

"We'll be building the economy of the state by building the University and new businesses," Ivy says. "To do this, we must maximize our efforts to train and keep Montanans in Montana."

Other student scientists can find a learning niche at Rocky Mountain Lab, which plans to establish a year-round internship program for UM Cooperative Education students.

Skyland's science adviser, Becky Mahurin, gives high marks to Skyland's Montana-trained scientists, who comprise more than half of Skyland's seventy employees.

"It's somewhat difficult for us to recruit scientists from other areas of the country," Mahurin says. "So we're pleased to find appropriate people in the state of Montana. Our people are our main reason for our success, and many of those people are Montanans. We definitely support the health of higher education in Montana."

At a national conference this year on the biotech industry in the United States, representatives from all aspects of research and industry warned that the U.S. will lose its edge in the world biotech market if personnel shortages in biochemical engineering, structural biology, immunogenetics and chemistry are not filled. In addition to overcoming these shortages, the biotech leaders stressed the need for interdisciplinary training with hands-on, state-of-the-art laboratory experience.

The future of the biotech industry in Montana depends on today's higher education system, ChromatoChem's Hammen says. In order for his company to be internationally competitive, he says, his scientists must be among the best in the country. To assure this growth for his company, the biotech industry and Montana, the University must be strong.

Technology will not grow without a university in its neighborhood, Hammen says. He pointed out that the major centers of technology are based around Stanford University, M.I.T. and Harvard. "The quality of the University is related to industrial growth," he says.

UM's Hill says that since Montana doesn't have large private endowments to support research, what biotech money there is must target areas where Montana researchers have already excelled, such as virology, immunology, sexually transmitted diseases and plant pathology.

For example, the state invested $200,000 in recruiting Hammen's ChromatoChem to Montana. Although such an investment bears a "very substantial risk factor," Hammen says, if his business plan pans out ChromatoChem will generate 700 more jobs in Missoula.

For ChromatoChem, those prospective new jobs, as well as the company's survival, are rooted in strong biotech-related programs at UM.

"I don't believe we could have made it without the University," Hammen says.
Whoever coined the phrase "free as a bird" couldn't have known much about bird ecology, according to UM ornithologist and Professor Richard L. Hutto. Even migrating species of birds that travel thousands of miles annually between their summer and winter homes are highly sensitive to how and where they live, Hutto says.

"Just because most land birds migrate doesn't mean that they are flexible enough to do without their usual wintering grounds," Hutto says. "There's the idea that if the habitat gets destroyed here, they (the birds) can just move over there."

This misconception—common even among natural resource managers—stems from a poor understanding of migrant-bird ecology and the effects human land-use practices may have on the birds.

"We need to determine exactly how restricted the needs of migrants are and how they are affected by current land-use practices," Hutto says.

To do this, Hutto and several research assistants have been studying North American land birds wintering in western Mexico with support from UM, the World Wildlife Fund and the Smithsonian Institution. Spending the winter in western Mexico has its creature comforts for Hutto and his assistants, but it also represents an important change of venue for the study of migrating birds. Most small, migratory land-bird species spend as much as nine months a year on their tropical wintering grounds and only two to three months on their northern temperate breeding grounds.

"Partly because of our north temperate perspective, we've been preoccupied with breeding ecology," Hutto says. "We've virtually ignored the wintering season," he says, often without regard for the alarming rate of deforestation and other human-caused disturbance of the birds as they winter in tropical areas like Mexico.

What happens when prime bird habitat is converted to farmland? Surprisingly, Hutto says, the disturbance helps the migrants, on average. "But averages are probably the wrong way to go for management," he cautions, since averages hide the fact that some species may be lost altogether. Hutto's censuses also show that tropical resident birds—those that live in western Mexico year round—suffer most from habitat disturbance.

In some cases of disturbance, a study site will show a complete turnover of species. "All the original species are gone and you get a whole new set of species moving in," Hutto says. In extreme cases, resident populations may disappear from a site, leaving an area without birds between the annual visits of the migrants.

A number of recent studies have suggested that populations of many long-distance migrants are declining.

"The reported declines are probably consequences of forested land in the U.S. becoming more isolated and fragmented rather than consequences of deforestation in the tropics," Hutto says.

However pristine within, an isolated forest habitat means an increase in the ratio of forest edge to forest interior. This, in turn, means an increase in the risk of egg loss for migrants because nest predators typically enter forests from the edges.

"Undisturbed forests are fast becoming islands in a sea of industrialization and urbanization," Hutto says. "It's an incredible problem in Mexico, but we have exactly the same problem here. Forest fragmentation in both places appears to be affecting migrant populations."

Efforts to manage and protect migratory birds in the United States may be fruitless if unmatched by efforts
elsewhere, Hutto says. Since the summer/winter habitats of long-distance migrants lie in several political domains, these birds may become political prisoners if international cooperation is not forthcoming.

While the plight of migratory birds stirs the conservationist in Hutto, his observations in western Mexico excite the naturalist in him. Hutto’s data show that most long-distance migratory species that breed west of the Rocky Mountains—“our” birds—winter largely or exclusively within a thin, coast-bound strip of western Mexico.

There, the 109 visiting species mix with the resident species, like seasoned tourists. In the highlands, as many as thirty species will flock together to feed, moving like a single superorganism through the forest. These mixed flocks, larger and more diverse than those found anywhere else in the world, defend their group territory fiercely. Hutto says the participation of such large numbers of migrants and residents appears to be unique to western Mexico and makes for fascinating birdwatching.

A typical highland flock might include migrant flycatchers, vireos, yellow-rumped warblers, sapsuckers and tanagers, as well as resident woodpeckers, creepers, bushtits and chickadees.

“You go to your study plot and find the same species that were in your backyard [in Missoula] all summer,” Hutto says, “and they’re flying and feeding together in a completely different setting.”

Education of the public both in the United States and Mexico is the key to successful management of the long-distance migrant. Hutto says, “And,” he adds, “we still have a lot to learn about the needs of migratory birds.”
NEW SPECIES, RIVER THEORIES
SURFACE IN GROUNDWATER STUDIES

What began as a groundwater pollution study five years ago has yielded new species to science, new theories of underground rivers and new questions for researchers.

In charting the aquifer beneath the Flathead Valley for the pollution study, researchers from the University of Montana Flathead Lake Biological Station discovered—among other things—an underworld of water creatures with eons-old ancestors.

"I'd say we're dealing with a total of fifty different species," Jack Stanford, director of UM's biological station, says. "We're finding new ones all the time."

Although he doesn't have a geologic timetable for these underworld wonders, he says their closest relatives are species of warmer climates—a clue they were around when the Rocky Mountain region was a warm sea. Glacial conditions during the Pleistocene Period probably made them seek shelter underground.

"When things are bad above," Stanford says, "the place to go is into the groundwater system."

In the researchers' catch are new species of amphipods, crustaceans called bathynellids and possibly stoneflies. The wells were drilled up to one and a half miles from the Flathead River channel and thirty feet deep. Stanford says underground creatures—similar to those in the Flathead Basin—probably occur in all gravel-bottom rivers, a feature of glaciated valleys.

The findings stem from a 1984 study, funded by a $100,000 grant from the Montana Department of Natural Resources and Conservation. Roger Noble, formerly from the Montana Bureau of Mines in Butte, helped Stanford with the initial project.

The study's purpose was to determine whether household sewage disposal systems in the Evergreen area near Kalispell were polluting the shallow aquifer between channels of the Flathead and Whitefish rivers. Nutrients from malfunctioning drain fields can pollute the aquifer, which drains into the river, and then can cause algal blooms in Flathead Lake. Algal growth decreases water quality.

"When we put the first wells in for the study, we realized there was more to this story," Stanford recalls. "The pollution study was a way to get started on the interesting problem of groundwater food webs."

"My own perception was that septic leakage reaching the groundwater system did occur in the Evergreen area. The question was where those groundwaters went. At that time, we didn't visualize the aquifer as being a river per se. We didn't even hypothesize that.

"We thought of the aquifer as sort of a standing body of water, moving in mass and very slowly. Now we recognize that a whole network of channels in the porous gravels allows the water to move very quickly, rather like a river."

These life-bearing and life-sustaining underground tributaries have broadened the definition of a river, Stanford says. At a rate of eighty feet per day, the underground waters make their way through voids in a thirty-foot gravel layer that ice-age glaciers left behind in the Flathead Valley, he explains.

With a $200,000 grant from the National Science Foundation, the researchers drilled more wells to systematically sample groundwater river channels. The study is expected to continue for at least five years. So far they've collected hundreds per sample of river invertebrates from the seventeen wells.

Stonefly nymphs and other typical river-bottom dwellers were more abundant along or near the river channels, and blind amphipods and other crustaceans more commonly known to groundwaters were found farther from the channels. Surprisingly, several rare stonefly nymphs also showed up in groundwater a mile or more from the nearest channel.

"Before, we could never find young ones," says James Ward, Stanford's research colleague at Colorado State University in Fort Collins. Until these findings, their collections had been limited to mature adults that emerged from the river channel. "For eight or nine months of their lives, nobody knew where they were, but now we know."

Terrestrial adult stoneflies mate; then the females drop their eggs on the river's surface or along the bank, Ward explains. After the hatch the aquatic nymphs move into the groundwater, where they spend most of their entire lives, he says.

Fish and other insect eaters feed on stoneflies. Probably to get away from predators, stonefly nymphs navigate through the groundwaters, Ward explains. Until 1974, when Stanford reported in *Science* of finding stoneflies up to a mile and a half from the channel, a hundred yards was the farthest-known distance stoneflies lived from a river channel.

But how do they get back to the river to mate and lay eggs? In their research report published last fall in *Nature*, Stanford and Ward suggest that stoneflies and other
groundwater creatures may cue in on water temperature changes when they’re near the river channel or by following ion-concentration gradients when far from the river channel.

In other studies, biological station researchers have been collecting data on temperature differences to see what effects water discharged from the Hungry Horse Dam has on the stonefly emergence in the Flathead River.

They haven’t reviewed all the data yet. However, they suspect the discharged dam water helps determine when and how many stoneflies and other water life emerge into the river water. In the winter, dam water is warmer than river water, which is near the freezing point; in the summer, water released from the reservoir’s bottom cools the river water, which can get as warm as 60 degrees (Fahrenheit).

Besides trying to understand the underworld creatures’ habits and habitat, biological station researchers also are studying the diets of groundwater animal life.

“The first task is to recognize the different species,” Stanford says, “and then we can decide what role they play in the underground food web.”

The food chain base in the underground water system appears to be bacteria and fungi feeding on organic matter, he says. Amphipods and isopods are mid chain, and stoneflies are top consumers in the chain. Future lab experiments will involve determining food preferences of the larger groundwater organisms and whether they can be raised in a lab setting.

Bonnie Ellis, Stanford’s research assistant studying the base of the food chain for the project, has identified live diatoms—very large algae needing light to grow—in wells relatively far from the river.

“The most amazing thing is that up to half a mile from the river channel we’re finding great big, happy diatoms, which means the river movement through the system is quite fast,” Ellis says. “This might give us an idea how the river system is tied to the aquifer in terms of movement of food for these organisms.”

“It appears,” Stanford says, “groundwater rivers have food chains as do river channels, but the species are different. The basic structure is there, but fewer and highly specialized species dominate the community.”

Although no sunlight reaches the underworld to drive photosynthesis, he says, the food chain yields high levels of plant-growth nutrients. Instead, he says, the groundwater food chain produces the plant nutrients through decomposition of organic matter.

The groundwater system nutrients accumulate because they’re not used. When the groundwater reaches the river channel, the nutrients spill into the channel to feed the river vegetation.

“That is extremely important,” Stanford says, “because it means the underground river exerts basic control on the river channel.”

The channel’s adjacent groundwater systems may actually control the production of life in the river channel, he explains. This idea, he says, revolutionizes the field of river ecology and places greater importance on the geologic makeup and history of the river basins.

“From a practical standpoint,” Stanford says, “the work demonstrates the importance of maintaining clean, unpolluted groundwaters.

“Research at the biological station will likely evolve around these basic findings, and we will never again be solely concerned with surface waters. Freshwater research must focus on groundwater ecology as well as on surface waters.”
Call it a sign of the times: last April several hundred people, most of them University of Montana students, flocked to a business school forum on "Changing Business Patterns in the Pacific Rim." With each passing term, UM's ties with foreign cultures strengthen, fulfilling President James Koch's dream of making the University a truly international institution.

Speaking at the forum were Professors of Management Maureen Fleming and Richard Dailey, Professor of Accounting Teresa Beed and former Associate Professor of Management Nader Shooshtari.

Through the University of Hawaii's Asian Industrialization in Action program, Fleming and Shooshtari traveled to Japan, Hong Kong, China, Taiwan and Korea in summer 1987 to learn more about how the textile, electronic, pharmaceutical and automotive industries operate there.

Among their stops were Nissan Motors Co., the Toshiba Co. and the Sankyo Pharmaceutical Co. in Japan; Far Eastern Textile Co. and Yue Loong Motors Co. in Taiwan; Motorola Semiconductor/Hong Kong Ltd. and Fang Bros. Knitting Co. in Hong Kong; and Sam Sung Electronics Co. in Korea. At each location, the professors talked with top executives, asked questions and made a point of watching the companies in action.

Fleming was amazed at the advanced level of the pharmaceutical industry in Japan, where one company is experimenting with gene-splicing. "I had not realized the pharmaceutical industry in Japan was going to be like the car industry," she says. "In the near future, we'll be importing pharmaceuticals from Japan."

In Japan and Korea, she was also impressed by employees' commitment to their jobs. They work as many hours as it takes to meet their production goal, she says, and take part in work-involvement programs on their own time for no extra money. The emphasis is on high-quality products, not job satisfaction.

The trip gave Fleming and Shooshtari perspective on the differences between Asian and American industries and cultures. Fleming says that in Asia, workers generally are willing to do a number of jobs and adapt to new situations. Many of them must learn a foreign language like English or German that’s used in their computer programs. The government decides which industries will be highlighted or phased out, and the industries cooperate.

She says that in the United States, by contrast, employees have become overly specialized, and companies are more concerned with economies of scale and short-term profits. They also aren’t as willing to work hard to break into foreign markets. A classic example is General Motors
Corps.'s not making cars with the steering wheel on the right side to accommodate foreign drivers.

"Americans need to learn the platinum rule, not the golden rule: Treat others as they wish to be treated," Fleming says. To give UM students a more international perspective on business, Fleming and Shooshhtari developed an undergraduate course last summer that combines fundamental principles of international business and current international topics. Another new course, which Fleming taught last spring at Malmstrom Air Force Base, in Great Falls, was on "Cross-Cultural Dimensions in International Behavior." The course is part of the master's degree in administrative science program UM offers at the base.

Like Fleming and Shooshhtari, Professor Dailey has extensive experience with Asia. Now on a faculty exchange to Toyo University in Tokyo, Japan, he's teaching business courses and gathering data on Japanese small businesses and entrepreneurship.

"It's an opportunity to develop professional relationships with new colleagues and gain further insight into the Japanese economy and how business practices work there," he says.

In 1987, Dailey traveled to other parts of Asia. In May, he gave a series of lectures at Tamkang University, in Taipei, Taiwan, as the Tamkang Chair lecturer in the College of Management. His lectures to graduate and undergraduate business students focused on small business, entrepreneurship and competition in global industries.

In July and August 1987, he spent three weeks in China as part of a delegation of the International Council for Small Business (ICSB). He and the other members of the group met with university faculty members and government officials to discuss small-business development, management education and entrepreneurship.

During the trip, Dailey also visited textile, electronic, auto-assembly and soft-drink-bottling companies and an agricultural collective that had started a resort hotel.

Then, this past June, he and two other members of the ICSB delegation to China traveled to Boston to take part in the council's annual world conference on "Opportunities for Small Business in the People's Republic of China: An Exchange of Viewpoints."

The Chinese government has allowed small businesses only in the past eight or nine years, Dailey notes. "Their growth has been dramatic," he says. "In 1981, there were about one million. Now there are maybe three million small businesses."

Other changes are afoot in China, Dailey says, such as making agriculture a private enterprise and shifting from grain production to that of high-value crops like watermelon. The Chinese are also interested in forming joint ventures in high technology with the United States and other Western nations—in textiles and soft-drink manufacturing, for example. "The Chinese aren't setting out to become a capitalist economy," he explains. "They want to make a better socialist economy."

He says the Chinese, who number about 1.2 billion and have a per-capita income of around $375, face considerable challenges in improving their economy, including combating inflation, population growth, unemployment and a housing shortage.

Associate Professor Beed's travels took her to another country that borders the Pacific Ocean but is worlds away in terms of culture and economy. She spent January through August 1986 at Massey University, in Palmerston North, New Zealand, where she taught accounting theory and behavioral aspects of accounting.

Beed paints a vivid picture of New Zealand, a country smaller than Montana whose beauty and friendly people are considerable natural resources. Home to three million people and 70 million sheep, New Zealand has a thriving market for wool and mutton, subtropical fruit, wine, tourism, racehorses and aquaculture. To Beed's surprise, New Zealanders also raise deer as they do cattle, selling venison, antlers and fibers around the world.

"New Zealand is the most advanced nation in the world in plantation forestry," she adds. "New Zealanders plan to triple their yield by the end of the century and want to begin processing the lumber themselves."

Beed's trip gave her insight into New Zealanders' economic goals, which include increasing export income. To achieve this end, the government has provided trade-promotion services, introduced economic reform to respond to the needs of international markets, and instituted massive deregulation in the financial sector. Processing raw materials to get added value from their resources will also play a critical role in development, she says.

Summarizing her trip to New Zealand, Beed says it gave her an international perspective that daily comes in handy in the classroom. That sentiment is echoed by Shooshhtari and the other forum participants.

Daily says his trips have been especially useful in his classes on small-business policy and competitive strategy, in which he can now draw many comparisons between American and foreign businesses.

Fleming's travels, which she says have taught her to think and teach in terms of a global economy, have sparked considerable interest among students. "I can't tell you how many students I've had come to me and ask all about my experiences," she says. "They want to know, 'What happened? What did you learn? How will this change my life?'"
At the foot of the Rocky Mountains, about fifteen miles west of the small town of Dupuyer, Mont., sprawls a 6,000-acre ranch where the conservation ethic of former President Teddy Roosevelt thrives.

The land, through which runs trout-filled Dupuyer Creek, is home at least seasonally to a wealth of wildlife species—to every species present at the time of settlement, in fact, with the exception of the bison.

The area is prime winter range for elk and white-tailed and mule deer. These large mammals share the land with eagles, hawks, falcons, owls, grouse, pheasants, partridges, Canada geese and ducks. Other denizens of the ranch and nearby property include grizzly and black bears, mountain lions, mountain goats, bighorn sheep and wolves. The ranch has traditionally supported a considerable number of cattle as well.

Abundant wildlife, suitability for ranching and only limited local oil and gas exploration make the area an ideal site for conservation-oriented research sponsored by the Boone and Crockett Club.

The club, founded almost a century ago by Teddy Roosevelt, bought the Triple Divide Ranch in 1985 and renamed it the Theodore Roosevelt Memorial Ranch. The invitation-only club, whose regular members number just over 100, is an official keeper of statistics on rifle-hunted North American big game. The group also sponsors graduate-level wildlife research, promotes conservation measures and encourages wildlife education for hunters and non-hunters alike.

The University of Montana is a prime beneficiary of the club’s purchase of the ranch. The club is working to raise $900,000 for UM—the interest from which will pay a Boone and Crockett Research Professor’s salary and finance research projects.

The professor, yet to be chosen, will conduct research on the relationship among livestock operations, wildlife needs and vegetation—a subject of great interest to ranchers throughout North America.

"Some ranchers forgo considerable benefits to have wildlife on their ranch," says Dan Poole, an advisory member of the club, a former president of the Wildlife Management Institute and a UM graduate. "We aim to make that forgoing a little bit less painful."

In addition to serving as a field experiment station, the ranch is still in the cattle business. The club has about eighty-five cattle on the property that are managed by neighboring rancher Tom Salansky. Helping him manage the ranch is biologist Tom Stivers, who also distributes hunting permits and handles public relations.

The research professor will have plenty of company at the ranch, where three houses permit researchers to work year round in comfort. State and federal agency researchers, fellow UM faculty members, and graduate and post-graduate students from UM and other universities can perform research there.

Other prospective visitors include ranchers interested in learning how to manage their land for the benefit of both wildlife and livestock. The land is also open to people who get Stivers’ permission to hunt. The exception are Boone and Crockett Club members, for whom the land is off-limits for hunting.

The relationship between the club and UM is an unusual one. "As far as I know, this is an unprecedented sort of arrangement," says Professor Lee Metzgar, director of UM’s Wildlife Biology Program. "It’s not as if we’re getting an endowment and then can go and do our thing forever. The endowment is contingent upon five-year reviews by UM and the club, so the club will remain in perpetuity an active partner in the activities that go on at the ranch."

If a review shows that the ranch program hasn’t met the goals set forth in the club’s agreement with UM, the University will have to return the club’s $900,000.

UM faculty, Boone and Crockett Club members, ranchers, and wildlife and range specialists gathered in Missoula in October 1985 to set priorities for studies to be done at the ranch. The conference drew participants from

Don Bedunah leads a guided tour of the ranch. He and graduate student Russ Offerdahl are preparing a guide to the ranch’s plant communities.
eleven states, the District of Columbia and Alberta, Canada.

The group voted overwhelmingly to give top research priority to the effects of vegetation management on range quality, economic return, wildlife and livestock. Other high-ranked topics were public hunting options, the nutritional quality of plants as used by livestock and wildlife, and the physiological responses of wildlife to their environment.

The group also voted to determine high-priority baseline studies, in which scientists assess the current status of an area so they can monitor changes in it. Vegetation again emerged as the No. 1 priority. Developing an information management system and compiling a history of the ranch that would include human, biological and wildlife aspects also ranked high. A fourth emphasis was documenting wildlife habitat use and birth and growth rates.

So far, UM Associate Professor of Forestry Don Bedunah has conducted vegetation analyses at the ranch and built fences that will let him compare grazed and ungrazed areas. A specialist in range ecology, he also teaches a senior-level range planning class at the ranch and is working with satellite imagery to produce a management plan for the ranch. Future projects may include studying the effect of fire on range conditions and ways to improve riparian areas, which lie beside streams and other bodies of water.

In addition, UM Associate Professor of Forestry Les Marcum has received funding from the Boone and Crockett Club and Rocky Mountain Elk Foundation to study the movements and habitat use of bull elk that winter on the ranch. He works with biologist Gary Olson of the state Department of Fish, Wildlife and Parks, who radio-collars elk via helicopter and tracks their location by plane.

Participants in the 1985 conference at UM have expressed high hopes for the future of the ranch as a research site. Bill Wishart, a wildlife research biologist from Alberta, says Canada eagerly awaits the results of studies done there.

"We don't have a lot of data saying what the best recipe is for managing wildlife, livestock and vegetation," he says. "They may come up with a good recipe here that's applicable to the front ranges on both sides of the Rockies."

University of Nevada wildlife management Professor Don Klebenow, a UM graduate, believes the ranch has great potential as an education center. "They plan to be really selective of graduate students and put them on significant projects," he says. "So there's potential for turning out leaders of national significance in wildlife management."
Two gray wolves gave University of Montana wildlife biologists a rare opportunity in 1982 when they produced a litter of seven pups just north of Glacier National Park, in southern British Columbia.

The event marked the first known reproduction by wolves in the northern Rocky Mountains in fifty or sixty years. Once plentiful in the West, the gray wolf has been on the federal endangered species list since 1973. That was the year UM forestry Professor Bob Ream started the Wolf Ecology Project with the goal of collecting and verifying reports of wolf sightings in the northern Rockies.

The wolves’ reappearance in that area has enabled him and other UM researchers to record the recovery of a species as it occurs and collect data that could help remove the wolf from the endangered species list. “I know of no other study like ours—no place else where biologists witnessed the natural recovery of this species,” Ream says. He emphasizes the distinction between natural recovery and reintroduction by man.

The main goal of government agencies involved with endangered species is recovering an animal population to the point where the animal can be removed from the list, Ream says. If the wolves were removed from the list, agencies would have greater flexibility in managing those animals. For example, government agents could shoot wolves for killing livestock or a great many game animals and could open wolf hunting and trapping seasons to control the population.

When there are at least ten breeding pairs of wolves in the Northwest Montana, Yellowstone and central Idaho areas for three consecutive years, Ream explains, the wolf will be removed from the list. When ten breeding pairs inhabit two of those areas three years in a row, the species will be listed as threatened rather than endangered. Having at least ten breeding pairs in any of the recovery areas for three successive years would downgrade the wolf from endangered to threatened status in that area.

Working to remove the wolf from the endangered species list requires careful monitoring of its numbers—a task Ream and his fellow researchers have devoted themselves to in addition to conducting related research projects on wolves. The researchers are based along the North Fork of the Flathead River. Their study area also encompasses the Flathead National Forest, Glacier National Park and the southeastern corner of British Columbia.

Ream is aided in his research by biologists Diane Boyd and Mike Fairchild. It was Boyd who tracked the two history-making gray wolves into British Columbia in winter 1982 and verified that the female was in breeding condition by examining her urine. Several volunteers work with Ream, Boyd and Fairchild every winter, when wolves are more easily tracked in snow.

Because of Ream, Fairchild and Boyd’s long tenure in the North Fork, the wolves’ recovery has been well documented. By fall 1985, a pack of at least twelve wolves had established itself in Glacier National Park. In 1986, the wolves denned inside the park, which was the first time this had been documented in the American northern Rockies in half a century.

A pair of wolves also denned in Glacier in 1987, and by December of that year the known population was twenty-two. By September 1988, researchers knew of thirty wolves in three packs in the study area that moved back and forth over the Canadian border. Two of the packs denned in Canada in 1988, each producing six pups. “Every wolf in the area now is probably the result of that one litter in 1982,” Ream says.

The researchers trap wolves and outfit them with radio collars. Then, while flying over the study area, the biologists monitor the number of wolves by picking up the radio signals with a receiver and observing the packs. The signals also indicate the size of wolves’ territory—information necessary to their recovery—and the way they establish their territory.

Between ages 1½ and 2½, some wolves leave their pack, says Associate Professor of Forestry Dan Pletscher, who joined the Wolf Ecology Project in 1985. Radio telemetry—tracking animals by radio signals—tells researchers how far from their original packs wolves set up their new territories. One radio-collared wolf from the study area traveled more than 500 miles north, where it was shot by a farmer near Peace River, Alberta.

Ream says it’s unlikely wolves from the study area will venture far from the mountains into eastern Montana. “If and when they do, I think it’s the kind of country in which wolf control could be implemented relatively easily,” he adds.

A recent U.S. Fish and Wildlife Service wolf-control plan details the circumstances under which government agents can kill problem wolves outside the three wolf-recovery areas. “There will be swift and decisive action...
taken when problems do arise outside the recovery areas," Ream says.

Besides studying wolf population, territory size and dispersal, UM researchers are studying wolves’ food habits by examining kills and scats. Wildlife biology graduate students Pat Tucker and Rod Krahmer help Pletscher and Ream with the research.

"We’re interested in learning what they’re eating and what the potential impact is of wolves on deer, elk and moose populations," Pletscher says, adding that the results of their research will undoubtedly be of interest to hunters. Tucker monitors deer population, and Krahmer studies deer habitat.

So far, the researchers have radio-collared sixteen white-tailed deer, fourteen of which were still alive last summer. The remaining deer have worn their collars 2½ years and will soon be due for new ones. Pletscher hopes one day to equip deer with "mortality collars." Such collars transmit a distinctive signal when an animal dies, allowing researchers to locate it and determine the cause of death.

Among UM researchers’ findings is that the wolf pack that settled in the study area in 1982 moved in mid-November 1985 from a winter range with virtually no white-tailed deer to an area where the deer were abundant. Ream says that so far, wolves haven’t killed any livestock in the study area.

After fifteen years of spearheading UM research on wolves, Ream has gathered a wealth of knowledge about those animals. But it wasn’t until he spent three weeks last July on Canada’s Ellesmere Island that he was able to observe a den. Accompanied by L. David Mech, a leading authority on wild wolves, Ream watched the interactions of four adult Arctic wolves and four pups. Because they’d never had bad experiences with humans, the animals were unafraid; a few walked up to Ream to inspect him.

"On Ellesmere Island, I gained a better appreciation for how unique each individual wolf is," Ream says. "Each wolf has a niche within the pack. Younger wolves serve as babysitters to the pups. A yearling male in the Ellesmere pack spent more time with the pups than did the mother."

Ream’s only face-to-face encounter with a wolf in the Flathead was in summer 1986. Imitating a wolf howl, he lured a wolf to within thirty yards of him before it slipped away into the lodgepole forest. (Word of Ream’s ability to imitate the eerie wolf howl spread via a February 1988 New Yorker magazine piece by Deirdre McNamer, a visiting UM English instructor.)

Funding for the Wolf Ecology Project has come from agencies such as the U.S. Fish and Wildlife Service; U.S. Forest Service; National Park Service; and Montana Department of Fish, Wildlife and Parks. Private contributions made through the UM Foundation have also made the research possible.

For several years in the early 1980s, Boyd continued the wolf research without funding. "She is a permanent settler in the North Fork," Ream says. "Her work has been our constant."

Wolves were once common

The timber wolf once was common in the northern Rockies. John James Audubon recorded seeing as many as twenty-five of the creatures a day while heading up the Missouri River in 1843. A fellow early naturalist, Ernest Thompson Seton, once estimated Wyoming’s wolf population at 20,000.

After people had killed most of the native prey in Montana, wolves began eating cattle and sheep. As a result, Montanans eliminated the wolf as a self-sustaining species in the state by 1933. According to Barry Lopez in his book Of Wolves and Men, Between 1883 and 1918, he writes, 80,730 wolves were bountyed for $342,764. Park rangers in Glacier also used strychnine to kill wolves.

By the mid-1900s, wolves in the United States were limited mainly to Alaska and northeastern Minnesota, with isolated packs in Wisconsin and Michigan. About 10,000 wolves live in Alaska now and another 1,200 in northeastern Minnesota. Wolves are still seen in Canada as well, except in the southeastern provinces and south-central prairie.

Wolves weigh from sixty pounds in the eastern United States to 130 pounds in Alaska, with males usually outweighing females by ten pounds. The males in UM’s study average over 100 pounds, the females ten to twenty pounds less, UM Associate Professor of Forestry Dan Pletscher says. Wolves vary in color from white on Arctic islands to black in western Canada and Alaska, but most are gray.

A researcher puts a radio collar on a tranquilized gray wolf.
Families in Milltown, along the Clark Fork River just east of Missoula, have safe, clean drinking water because of Bill Woessner’s subterranean snooping.

Woessner is the University of Montana’s first-ever hydrogeologist. His province is groundwater—the water stored in the rocks, below the land surface and pumped into home taps by most municipalities.

His is applied research. “I solve problems,” he said. When arsenic from century-old mines tainted water wells in Milltown, Woessner sunk the test holes that turned up a new, safe water supply.

When oil fields were capped outside of Glendive, Woessner found brine in the groundwater; the U.S. Forest Service followed with tougher reclamation requirements. When kokanee salmon abandoned spawning grounds at Flathead Lake, Woessner supplied biologists with a map of lakeside groundwater leaks.

“With groundwater, the issues are primarily quantity and quality,” said Woessner. “Does the existing reservoir meet clean water standards? Will the resource last through the next century? Are we extracting too much too fast?”

Groundwater is a natural resource, not unlike precious metals or timber, Woessner said. Suck out too much water in too short a time and you’ve “mined the resource.” Contaminate the water and the result’s the same.

Woessner, an associate professor, joined UM’s Department of Geology in 1981. But “the Montana connection,” he said, dates to 1974 and his work with the Northern Cheyenne Indians while a doctoral candidate at the University of Wisconsin.

On contract with the U.S. Environmental Protection Agency, Woessner provided the southeastern Montana tribe with a report on the impact of coal mining on the tribal water supply. It was a three-year project (1975-1978).

Then came three years as assistant professor and research coordinator for the Water Resources Center at the Desert Research Institute in Las Vegas, Nev. His assignment, in part: study the effect of radioactive waste disposal on groundwater quality.

The offer at UM, Woessner said, was a rare opportunity to “build your own program” in hydrogeology. He took the job—and $4,000 in capital equipment money, enough to buy rudimentary field equipment for monitoring water quality.

By spring quarter 1988, Woessner had presided over thirteen master’s degree students in hydrology. He has averaged between six and eleven graduate students a year since 1982. Another thirty students a year sign on for hydrogeology course work.

Woessner said graduates of UM’s hydrogeology program already include three groundwater specialists in state government, one in private industry in the state, one at the U.S. Geological Survey in Helena and four in private industry out of state.

Woessner works as many as seven grants and contracts at a time. In each case, he is given a problem in need of a solution—be it flooding at the Berkeley Pit in Butte or dry wells in the Jocko Valley near Arlee.

Many projects, he said, rely on the expertise of stratigrapher Johnnie Moore, a professor in UM’s geology department. Nancy Hinman, an expert in aqueous chemistry, has recently joined the faculty.

Here, at a glance, are summaries of four research projects tackled by Woessner, Moore and their graduate students since Woessner’s arrival as UM’s hydrogeologist-in-residence.

**Milltown Water:** A television newscast was Woessner’s introduction to arsenic contamination in water wells at Milltown. The next day, he called the Missoula City-County Health Department with an offer of help.

Woessner and graduate students Marin Popoff, Leslie Sartor and Carolyn Johns spent the winter of 1982 determining the direction of groundwater movement in the Milltown area. The question: Where did the arsenic originate? The answer: At mines in the upper Clark Fork drainage.
Arsenic, manganese and iron liberated in the mining and milling process leaked into the Clark Fork River for nearly 100 years, eventually backing up behind Milltown Dam—a stone’s throw from the tainted water wells. Shortly after Woessner’s initial analysis, Milltown was named to the EPA’s Superfund list. In 1983, with thirty-four families hauling water to their homes, Woessner and Moore were given six months to identify a new, safe water supply for the town. It was their biggest-ticket contract to date—$377,000 from the EPA and the state of Montana.

Woessner’s team, which by then included undergraduate student Mary Lou Sullivan, located two sources of safe drinking water by the deadline. “Our ability to mobilize lots of student power and faculty power was impressive,” he said.

Woessner continues to work at Milltown, where work now focuses on the best long-term solution to soil and water pollution behind the dam. “Do we leave it? Or clear it out?” he asked.

Glendive Oil: Michelle Dewey, an environmental studies graduate student, got Woessner working on studies of groundwater quality near Glendive, in eastern Montana, where brine pits were left untended at capped oil wells.

Water brought to the surface with oil—and contaminated with salt—is dumped alongside drilling sites, then abandoned when wells are abandoned. Dewey wanted to know what happened to the brine. Did it remain in place or trickle down into the groundwater?

Woessner said the Glendive oil fields were situated “right on the floodplain of the Yellowstone River,” where the groundwater was close to the surface. It didn’t take long to determine that brine was indeed contaminating the water.

The Forest Service was first to respond, changing its policies to require the reclamation of brine pits on federal land. The state Bureau of Mines and Geology was next, asking Woessner to predict future contamination problems at the Glendive sites.

Scott Payne, a graduate student in geology, is on the job this go-round. He is using computer models to predict the long-term movement of brine through the groundwater.

Flathead Salmon: Historically, autumn brought thousands of salmon to thirty spawning beds on the east and west shores of Flathead Lake, in northwestern Montana. Now, there is but one spawning bed on the west shore and sporadic use of fifteen east shore sites.

Woessner read about the “kokanee crash” in the newspaper. The next morning, he was on the phone again volunteering his students and expertise; within weeks, he and graduate student Christine Brick were hunting the lakeshore for groundwater leaks.

If salmon deposited eggs in areas with groundwater seepage, Woessner said, then the sack fry wouldn’t be left high and dry when Montana Power Co. lowered the level of Flathead Lake (by ten feet) after Labor Day. The state Department of Fish, Wildlife and Parks responded with a $48,000, three-year research grant.

Woessner’s conclusion: “There are lots of favorable spawning grounds at Flathead Lake. Sack fry in areas where the groundwater is within six inches of the surface will survive, regardless of the yearly drawdown.” (Biologists had earlier discovered hundreds of premature sack fry forced out of the water by the drawdown.)

Unfortunately, Woessner said, something in addition to the fluctuating lake level must have put Flathead salmon on the skids. The Flathead shoreline was once one of three major reproduction areas for kokanee, along with the upper Flathead River and McDonald Creek in Glacier National Park.

Missoula Valley Aquifer: The most recent of Woessner’s projects is a two-year study of groundwater reserves in the Missoula Valley, financed by the state Department of Natural Resources and the Missoula City-County Health Department.

This time, he’s asking about the quality and quantity of groundwater in the upper 150 feet of gravel that provides drinking water for 80,000 valley residents. Then he’ll try to map the movement of water within the aquifer and predict the life of the supply.

To date, Woessner’s graduate students have polished off reports on groundwater pollution from 3,000 in-town storm drains, the recharge-discharge relationship between the Missoula aquifer and the Clark Fork River, and the impact of faulty septic systems on the valley’s west side.

“In this instance, the resource we’re protecting provides 100 percent of the water that comes out of kitchen faucets and bathroom showers,” Woessner said. “If we use the groundwater improperly or contaminate it, we simply will not have any water.”

UM supported Ross Miller, a graduate student in geology who is developing a computer model of the Missoula aquifer. Other graduate students with a hand in the research are Bill Clark and Karen Wogsland, geology; Marge VerHey, environmental studies; and research associate Christine Brick.
Law enforcement agencies in Montana have never been sued for unfair hiring practices, and a University of Montana professor’s fitness test should help keep those police agencies off the court docket.

As part of the procedure for hiring officers, 70 percent of the state’s law-enforcement agencies use a physical skills test designed by Kathleen Miller, a UM professor of health and physical education and chair of the department. The Montana Department of Justice’s council for Peace Officers Standards and Training (POST) has adopted Miller’s pre-employment physical ability test for any law enforcement agency in the state.

“The state of Montana was pro-active instead of reactive,” Miller says the Justice Department’s recommended use of the test for avoiding unfair hiring suits. “We hope this will take care of the problem before it exists.”

The job-related fitness test is used to screen candidate officers to see how fit they are for a particular job. The test applies to all would-be-sworn law-enforcement officers, such as police officers, game wardens and highway patrolmen, because certain skills are common to all branches of law enforcement, Miller says.

“I think it’s a very fair test,” says Captain Bud Carbis of the Helena Police Department, which uses the physical skills test for screening officer applicants. “It really simulates what police officers do every day. I can’t see where it discriminates against anybody.”

Clayton Bain, POST’s executive director, says he’s confident that the test accurately measures a candidate officer’s physical ability and can withstand a discrimination-suit challenge.

“I’m very familiar with other states’ programs and they have countless problems in that they’re not as related to law enforcement functions as ours,” Bain says. One state, he gave as an example, spent about $100,000 on a similar project that in the end repeated much of that state’s old test. “Instead of going to people like Dr. Miller to get expertise, they stay with their own people.

“It’s old ingrained thinking in law enforcement, ‘Well, we’ve been doing it this way so long, we might as well stay with it.’ But they don’t pay enough attention to research or get the right people to do it. With Kathy, no stone is left unturned. You know it’s going to be right.”

The test is designed to measure physical attributes—mainly speed, strength, agility and endurance—officers need on the job. POST is considering making the test mandatory for the state’s law-enforcement agencies and looks to the day when a similar test will be in place for evaluating officers on the job.

Institutions such as Stanford University in California and Dade Community College in Florida and other states such as Arkansas and Tennessee have asked Miller and the Justice Department for information about Montana’s test.

Before officer candidates are allowed to take the test, they must certify they are fit enough to participate. The release form is included in a packet they receive to prepare them for the test and other parts of an agency’s hiring procedure. Their heart rate and blood pressure are tested first and must be below 90 beats per minute and 140/90, respectively, for them to continue with the activity segment of the test.

Four of the test’s five activities are timed: a 100-yard sprint with a change of direction; a weight drag of pulling a 140-pound weight thirty feet; an agility run requiring the runner to change direction, jump over a barrel on its side, roll under a table, walk a foot-high beam; and a half-mile run. A fifth test measures grip strength for both hands.

Each agency administering the test has a procedure manual with directions on building a test course and administering the test. The equipment can be easily assembled or borrowed.

The physical ability test began several years ago when the Missoula Police Department asked Miller to evaluate its fitness test for screening officer applicants.

“They had a test that in my estimation, if we were still to give that test today, we could be taken to court,” Miller says. “They couldn’t show the job validity and job relevancy. They said they were going to do push-ups, pull-
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ups, a shuttle run and a couple things like that, which you
could say are perhaps fitness related. They're not job
related."

As a class project for her graduate course in human
performance and health assessment, Miller and her class
interviewed and surveyed the Missoula police force to
determine the physical activities associated with being an
officer. The county attorney advised them on what was
needed to defend their test in the event of a discrimination
lawsuit.

Officers on Missoula's force took the trial run of the
original test, and the class found some problems with its
test. The revision included minor changes in scoring, fixing
a maximum time for each activity and eliminating the
requirement of carrying a seventy-pound bag.

Since some officers couldn’t complete that part of the
test, the class changed the test's instructions requiring test-
takers to complete all parts of the test or fail. Miller
referred to federal law requiring performance to be judged
on all parts of a series of tests instead of just on one part
of the test.

Miller and her class studied the Federal Register and
case law related to employment practices for additional
guidelines to make the test suit-proof.

"We really worked very, very hard to make sure that
when this whole thing went together that we really did not
leave any loopholes for people to try to find some way to
try to get us," she says. "That's not to say someone may
not, perhaps at some point, have a legitimate case. But I
guarantee with all the work that we put in on this, if I
would have to go to court on it, I'm really not
concerned."

The test, Miller says, is a prevention, not a cure.
"We didn't do this because we were threatened with a
lawsuit," she says. "We did it because we knew it was
good practice, and I wanted to have it in place before it
ever came to that."

Howard "Tripp" Hammer, Justice's personnel officer
who worked with Miller on the test, says it is one of a few
tests in the country validated through a survey assessing job
validity and relevancy, making it less likely to be
challenged in court.

"This cooperative effort between the Department of
Justice and Kathy saved the state in essence hundreds of
thousands of dollars and we invested only $25,000-
$30,000," Hammer says. "We were able to do this
because we broke through the barriers of turfdom and
worked together."

While Miller provided the technical core for the test, law
enforcement provided the base work she didn't have,
Justice's Ed Hall explained. Hall helped collect data and set
up a scoring system for the fitness test. Miller computed
the first 200-300 scores—first long hand and then by
computer. Since then, 600 more men's scores and seventy-
five more women's scores have been added to the data base
at the justice department.

"We're getting to a point now, with a few scores added
to the data base, where we can give a candidate a good
idea of what is required to pass this test," Hall says,
adding law enforcement finds it useful in screening
candidates. "It gives them an impartial way to get away
from the good-old-boy syndrome. They can rely on
objective measures for who is best for this job."
To Irish immigrants in Butte around the turn of this century, the Mining City's landscape of smokestacks, gallows frames and mine yards must have seemed stark in comparison to the Emerald Island's seasides and pastureland. But in Butte's industrial setting, Irish immigrants found a new kind of Hibernian homeland with abundant jobs amid Irish culture. The prospect of a home away from home attracted Irish immigrants to Butte, says University of Montana history professor Dave Emmons.

His book, *The Butte Irish: Class and Ethnicity in an American Mining Town, 1875-1925*, won the Statue of Liberty/Ellis Island Centennial Award and was published by the University of Illinois Press.

He based his research largely on the Irish Collection at Butte's World Museum of Mining. The collection, which covers 1881-1940, primarily documents happenings at Hibernia Hall. Located in Centerville, the hall was a convenient location for the Butte Hill's mostly Irish settlements of Dublin Gulch, Corktown, Centerville and Walkerville. Now a vacant lot at 951 N. Main, the hall was the site of meetings of Irish groups.

The collection includes minutes, membership and financial ledgers, correspondence and reports of the three Butte divisions of the Ancient Order of Hibernians (AOH); an Irish Catholic fraternity; and the Robert Emmet Literary Association (RELA), the Butte camp of the secret and revolutionary Clan-na-Gael. Traces of the Irish Volunteers, Friends of Irish Freedom and American Association for the Recognition of the Irish Republic also appear in the collection.

Around 1880, the Irish were among the first immigrants to settle in the frontier mining camp of Butte. They came from every Irish county, but most hailed from West County Cork, where the English closed the copper mines in 1884. Before reaching Butte, many of them worked in mines in northern Michigan.

Butte lacked the entrenched social classes and anti-Irish prejudice prevalent in other American cities where the Irish had settled. "They were the 'natives,' and that was an enormous advantage to them," Emmons says. "The Irish established a social structure in Butte, and the city came to march to their drumbeat."

For example, a string of Irishmen served as the Anaconda Mining Co.'s chief executive officer from 1875 to 1956, and most of Butte's mayors have also been Irish.

Within twenty-five years, the Irish made up more than a third of the Butte-area population and played a major role in building Butte and nearby Anaconda into a center for one of the world's largest mining and smelting operations.

The Irish were a highly visible and extremely tight-knit group in Butte. The city had Irish-run mines, most owned by the Irish-Catholic Marcus Daly, Emmons says. Irish workers dominated the city's diverse mining population, which also included Finns, Cornish, Italians and Eastern Europeans.

Testament to the strong foothold the Irish had gained in Butte, a sign posted on the door of Daly's Anaconda Syndicate of Mines reportedly said, "No English need apply." Emmons notes, "After all those signs in New York and Chicago saying, 'No Irish need apply,' that sign
was the nicest variation on a theme that the Irish could find.'"

Most of the Irish immigrants planned to work in Butte mines long enough to return home with some sizable savings, but almost three out of four bought homes and settled in the city, Emmons’ research shows.

They worked in Irish-dominated mines and other enterprises, worshipped with Irish priests in Catholic churches and married Irish mates. The immigrants even divided Butte by Irish county, Emmons adds. ‘‘There were saloons that belonged to County Cork and saloons where guys from Donegal might go,’’ he says.

Miners and company bosses alike joined Irish fraternities, and the Irish-dominated Butte Miners’ Union (BMU) owned $50,000 stock in Daly’s mines. The mines even closed for Irish holidays.

The bond between rich and working-class Irish probably accounts for the relative harmony in which Irish-owned mines operated, Emmons says. Irish immigrants worked in dangerous mines and faced the brief expansion of the radical Industrial Workers of the World union. But in its thirty-six-year existence, the BMU—perhaps the largest local union in the world at the time—never led a strike. The union’s concern for the settled miners’ job security also accounted for the lack of strikes, Emmons adds.

‘‘I can’t imagine that they could have been in a better place—except for one thing,’’ he says of the Butte Irish. ‘‘They didn’t live very long.’’

Mining-related accidents and respiratory diseases were the chief causes of miners’ deaths in Butte, records show. Despite their pride in working safely and skillfully, Emmons says, scores of miners were maimed or killed in the Butte mines, rated among the world’s most dangerous around 1900.

Miner’s consumption, or ‘‘con,’’ and other forms of lung diseases killed more people per capita in Butte than in most Northeastern industrial cities, according to 1905-1917 U.S. Census Bureau statistics.

County health records from 1908 to 1912 show the Irish accounted for 59 percent of the 461 Butte residents who died of tuberculosis. Emmons cites research showing that the Irish miners’ susceptibility to TB probably stemmed from their sudden shift from a rural to industrial life and breathing silica dust while power drilling underground.

The Butte Irish united to take care of their own people when others wouldn’t, Emmons says. For example, when the national AOH organization excluded copper miners from its sponsored health insurance plans, its Butte members financed their own relief program for miners and their families.

From 1885 to 1911, the Butte AOH paid out more than $30,000 in sick and death benefits and sponsored members’ wakes and funerals. The RELA also helped its members by donating raffle proceeds and providing a death-watch service where Irishmen stood in as nurses for stricken mates.

The fraternities drew together various segments of Butte’s Irish community, but rifts did develop, Emmons says. First-generation Irish immigrants relied more on their social and fraternal groups than did second-generation Irish, who had both Irish and American allegiances. Membership in Irish groups declined from one generation to the next, and fewer second-generation Irish were willing to work underground.

The deepest division developed between settled Irish miners and transient Irish miners, Emmons says. Settled miners had a deep distrust for their transient brethren, who were less concerned about exposure to silica dust and more careless underground. Most important, the more radical transients wanted more from Butte than just a fair living. In 1914 a group of left-wing insurgents—both Irish and non-Irish—dynamited the Butte Miners’ Union Hall. The old union was rechartered in 1934, but it never recovered from the incident.

In 1917, the Irish miners’ world began to crumble mostly because of the Speculator Mine fire, which killed 165 men, and America’s alliance with Great Britain in World War I. The settled Irish, led by the Metal Mine Workers’ Union (MMWU), went on strike. ‘‘So it was not as if they were timid,’’ Emmons says about the union members. ‘‘They saw protest as a tactic; the end was a fair living. Butte provided them with that.’’

The later organizations, the MMWU and the Butte Mine Workers’ Union, were led by the same radical elements that broke up the BMU, Emmons says. Those two unions, probably aided by the IWW, led the violent strikes in 1917, 1918, 1919 and 1920 that earned Butte a reputation for lawlessness and worker violence.

Industrial peace returned in the 1920s, he says, but the chaos of the war years and post-war unemployment left the Butte-Irish miner enclave battered and confused. It partly recovered but never achieved the strength and cohesion it enjoyed from 1880 to 1910.

‘‘Strong traces of that cohesion mark today’s Butte-Irish community,’’ Emmons says. ‘‘It remains self-conscious, self-confident and aware of its deep historical roots in the community. Witness any Butte St. Patrick’s Day celebration.’’

UM history Professor Dave Emmons won The Statue of Liberty/Ellis Island Centennial Award for his book, The Butte Irish: Class Ethnicity in an American Mining Town. The book was published by the University of Illinois Press.
People new to Montana are often surprised to learn that Montana's code of laws is among the most progressive in the nation. Much of the credit for the up-to-date legal code goes to the University of Montana School of Law, where professors and students draft legislation to eliminate antiquated laws and replace them with new ones.

Because a code of law develops over time, inconsistencies often creep in. According to one Montana statute, decisions affecting a trust with two or more trustees require a unanimous vote of the trustees. According to another Montana statute, decisions affecting a trust with two or more trustees require only a majority vote.

If UM law Professor Edwin Eck has his way, such inconsistencies will be eliminated in a new set of trust laws the next time the Legislature convenes. “We’ll be one of the first five states to adopt a uniform trust code,” says Eck, who has spent a third of his time during the past year on the project. Besides putting together a comprehensive code, he and a committee of lawyers are preparing section-by-section comments for the Montana Code Annotated.

Eck has little doubt that the Legislature will be receptive to the proposals. “The law school is viewed as not having an axe to grind in the trust law. If the practicing bar [proposed revisions] without the law school, or if trust companies did it, they’d be viewed with suspicion,” he says. “They view us as impartial, and we’ve been faithful to that.”

Eck’s work on trust law is only the most recent project in a long history of law school leadership in revising the Montana Code. One of the most comprehensive was the complete rewriting of the state’s criminal law by a commission that included Professors William F. Crowley and Larry M. Elison.

“Our criminal code was a terrible thing,” Crowley says. He notes that a mishmash of prior statutes had been on the books since they were adopted in Bannack in 1864. Even then they were merely adapted from a field code drafted in New York in the 1830s. “The old larceny laws took a whole chapter, but each one covered a narrow, nitpicky thing,” says Crowley, recalling a time when a suspect charged under one of the larceny laws could not be convicted if the evidence showed him guilty of a slightly different one. “We’ve created an omnibus category called theft.”

In the old criminal code, a chapter titled “Miscellaneous Crimes” contained over two hundred laws, some strange indeed. One separate provision made it illegal to brand a horse with a frying pan. Another made it a crime for the governor not to post a reward for the capture of stagecoach robbers. “I told one governor he was a criminal the whole time he was in office for breaking that one,” Crowley says.

In 1953, Crowley, who was then assistant attorney general of Montana, became disgusted with the old laws and started garnering support for reform from attorneys, sheriffs’ departments and police associations throughout the state. Four years later the Montana Supreme Court appointed him to a ten-member commission to draft a new
The code was adopted by the Legislature in 1973. Though the new criminal code is only a quarter the size of the old one, it’s more comprehensive and more understandable, says Crowley, who joined the law faculty in 1966. “At the time, it was recognized as one of the most advanced criminal codes in the country,” he says. “It seems to have stood the test of time.”

According to former Dean Robert Sullivan, Montana legislators trust the law school to be dependable in its proposals. “We’ve always done our homework,” he says. One of the biggest projects was helping the Legislature adopt the Uniform Commercial Code (UCC), now on the books in forty-nine states. The UCC is designed to assist interstate commerce, so a company doing business in several states doesn’t have to operate under an entirely different set of commercial laws in each. “The UCC passed in Montana because of the work of the law faculty, particularly [former professor] David Mason,” he says. Like the UCC, many of the new laws were drafted by the American Law Institute’s 100-year-old Uniform Laws Commission, which is dedicated to helping states eliminate discrepancies in their laws. Sullivan, now a Uniform Laws commissioner, recalls a time when uniform laws passed in Montana would be added onto the other laws, with a general statement at the end saying that all conflicting laws are hereby voided. “You had to go to the Supreme Court to see which laws were in conflict.”

Now a major part of a drafting project is researching the code to see which other laws need to be amended or repealed. For the UCC project, a research assistant at the law school read the code front to back to find places that might be affected by it. “When we got through, we had a bill the thickness of two Montgomery Ward’s catalogues piled on top of each other,” says Sullivan. The bill was so thick that the state couldn’t afford to print it until the next legislative session. It was finally passed in 1953.

“The law school has been tremendously influential,” Sullivan says. He notes that current laws in administrative procedure, civil procedure, rules of evidence and highway safety all took their present form because of the efforts of law school professors.

In one of the more recent efforts, Professors Scott J. Burnham and William L. Corbett helped the Legislature adopt the Arbitration Act, which provides a framework for settling disputes out of court with the help of a neutral third party. Burnham points out that before this act, if any contract contained an agreement to submit disputes to arbitration, that provision was simply void. “It’s a significant reform,” Burnham says. “It’s not the kind of effect you hear about—it’s cases not going to court that otherwise would have. But it has publicized the possibility of arbitration.”

Burnham also worked with Professor Gerry Brenner of the UM Department of English to draft and testify for a Plain Language Law, which requires consumer contracts to be written in a clear and coherent manner, using words that are commonly understood. “I think it’s a good provision,” Burnham says. One problem he notes is that if plain-language laws are too specific about language, they can inhibit interstate commerce by requiring contracts to be in a different form for every state. To overcome that problem, the drafters purposely used subjective terms such as “clear and coherent” in Montana’s law.

“One of the things that’s so great about Montana is how easy it is to improve things,” Burnham says. He points to the state’s small population as one of the chief reasons individuals can have a major impact. “One of the advantages of professors getting involved in this is that we’re working for the public good. We don’t have our own axes to grind,” he says. “We just want our law improved.”

Law students as well as professors have involved themselves in revising the code—not only assisting with research but also proposing their own legislation. Last year, second-year students Marcie Quist and Amy Guth were intrigued when Professor Steven C. Bahls noted that Montana treated mom-and-pop businesses the same way it treated large corporations. No matter how small, a corporation that fails to hold annual meetings, keep minutes and follow other rules risked losing its status as a corporation. When Bahls said that many states have a special set of rules for incorporating small businesses, Quist and Guth asked to see a model statute.

The students drafted a version of the model statute, found a sponsor in the Legislature and traveled to Helena with Professor Bahls to testify on its behalf. The result is the Montana Close Corporation Act, signed into law in October 1987. The act cuts the red tape for small businesses, protects them from liability and makes it harder for an outsider to gain control.

The Women’s Law Caucus, a student organization, has drafted several pieces of legislation and garnered legislative support. One of the most recent was a bill concerning domestic violence. Adopted in 1985, the new law provides that domestic abuse is a crime, with stiff penalties for the third offense. Arrest is now the preferred response in cases of domestic abuse, and police officers need no warrant to make the arrest at night.

The efforts of the School of Law have had a significant impact on the Montana Code, according to former Dean Sullivan. “The law school is a very important resource, and the Legislature is aware of that.”
When he began taking philosophy courses at the University of Montana in 1984, Missoula cardiologist John Stone had no idea his continuing education would one day inspire him to co-found a group aimed at making medical practice more humane.

He enrolled simply because he enjoyed philosophy and continuing to learn. "I just enrolled in the standard philosophy major program, and Dick Walton happened to be my first instructor," he says.

Stone and Walton, an associate professor of philosophy, soon became friends. Then, when Stone discovered that the material in his philosophy course was both broadening his knowledge and improving his relationships with patients, Walton suggested they form a discussion group for doctors and UM professors.

Walton had no trouble enlisting five more professors. For more than two years, the group met a few evenings a month at Missoula's St. Patrick Hospital to discuss works of literature, history and philosophy and their application to medical practice.

Participants were so enthusiastic about their experience they began to look for a way to involve other people from UM and the Missoula medical community. In March 1988 their efforts resulted in the establishment of the Institute of Medicine and Humanities, cosponsored by UM and St. Patrick Hospital.

The hospital provided $50,000 in seed money to allow the institute to begin offering programs. During fall quarter 1988, the institute helped UM bring a visiting philosophy professor, John Moskop, to the University to teach a course there and at St. Patrick Hospital. Moskop, an associate chairman of medical humanities at the East Carolina University School of Medicine, in Greenville, N.C., taught three sections of the course—one on campus for UM students and two at the hospital for medical personnel.

The UM course drew more than fifty students, and about seventeen people enrolled in each of the sections at the hospital, Walton says. The institute had originally limited each section at the hospital to fifteen people, he adds.

Moskop also led a two-week seminar for eleven UM professors to prepare them for teaching medical humanities to medical personnel. At the end of the seminar, the participants presented syllabi for courses they'd like to teach at St. Patrick Hospital and UM.

The University began offering the first two such courses in winter quarter 1989: an English course taught by Professor Stewart Justman and a foreign languages and literatures course taught by Assistant Professor Ludmila Prednewa.

Besides offering two courses each quarter, the institute plans to hold a major public conference on medicine and humanities, Walton says. Long-term plans also call for a research staff that would prepare articles for publication in medical and academic journals. At some point, the institute may sponsor its own scholarly journal.

Such plans take money, but everyone involved with the institute is confident private funds can be found to support its work. John Mitchell, the institute's executive secretary, says officials of charitable foundations have reacted favorably to the institute's inquiries and encouraged the organization to submit formal proposals.

One reason for the officials' enthusiasm is that the
institute encourages better medical care by helping health care professionals understand they’re treating people first and diseases second.

“Physicians and other medical personnel usually go into medicine because they are interested in helping people who happen to be ill,” Stone says, but medical education is mainly aimed at teaching doctors and nurses how to treat diseases.

Medicine is scientifically based, Stone says. “It’s what’s called reductionistic: everything is stripped back down to the essentials at the microscopic or the chemical level.”

Stone, who often advises patients about cardiac catheterizations and other technical procedures, says a more humanistic approach has helped him be a better cardiologist. Studying the humanities has made him appreciate the importance of making sure patients understand the advantages and disadvantages of a procedure before deciding to undergo it.

“This isn’t a dramatic change of my approach but an enrichment of my approach,” he says, adding that he now has a fuller relationship with his patients. “I think they understand and are happier with their decisions, and I certainly feel better about approaching it in a more cooperative manner.”

Stone explains that the institute can help doctors answer questions for which science offers no help. For example, whom should they treat? How can they help people when the treatment doesn’t work? When do heroic, life-sustaining measures become futile and counter-productive?

Medical ethics are only part of the institute’s focus, however. Walton says that studying history, literature and religion can also contribute to the more humane practice of medicine. Taking history as an example, he says, “Medicine as a science has developed very rapidly, so rapidly a good many people have lost their bearings with respect to their origins. So some sense of context is required.”

When the institute surveyed the St. Patrick Hospital staff, it discovered wide interest in learning more about the history of medicine. Walton says studying literature with medical themes is also useful, providing a context for discussing real medical problems.

Stone thinks it will be a measure of the institute’s success if western Montana medical personnel come to realize that continuing education in medical humanities should be as much a part of their continuing education as learning about the newest drug or technique.

The institute’s focus on continuing education for practicing professionals is unusual, Stone says. About 150 medical schools in the nation have incorporated the humanities into their medical curricula to some degree, but most “are trying to wedge it in amidst the basic sciences and many other demands upon medical students’ time,” he says.

Institute founders also believe that medical students often lack the experience with life that will eventually make the lessons of the humanities relevant to their practice.

“The people we are dealing with now are physicians and nurses who have been in the field for a long period of time, know what the problems are and have had to grapple with them,” Mitchell says. “The lessons that will be presented for them will be much more relevant, much more integral to their lives.”
A developer wants to build a forty-lot subdivision near a small Montana town. Without any planning guidelines, the developer makes a common-sense decision and buys the least expensive tract, perhaps twenty acres of raw land within the town’s fire service area. He gets financing, pays for surveying and takes the plans to the local government for approval.

There’s just one problem. The proposed subdivision lies beyond the reach of the town’s sewer and water lines. Those lines lead to $9 million worth of sewer and water plants that have never operated at capacity. If the local government allows forty new houses to be built—houses that can’t be hooked up—the community will lose a chance to help make those multimillion-dollar systems pay.

“We’ve got some huge investments in the public infrastructure,” says Kristina Ford, a University of Montana associate research professor in the political science department. “We have these huge investments and we’ve got existing capacity, and what we need to do is make them pay off by seeing that they’re used efficiently.”

The above dilemma—common in the wide-open, but slow-growing communities of Montana—often throws the local government into a quandary. Approving the subdivision means wasting public resources. But simply rejecting the project means the entrepreneur could lose a large investment. How can the private and public goals be balanced?

The answer may lie in research conducted by Ford, director of UM’s Public Policy Research Institute. With a $101,210 grant from the Northwest Area Foundation, she’s devised an analytical method that can be employed by local governments and private developers. By using the institute’s Guidebook for Committed Lands, these decision makers can identify the best vacant land for future development before plans have been laid and money spent.

“It can show both developers and local governments how to make those public investments more cost efficient—make them pay off,” Ford explains. “In that way, it’s extremely practical.”

Called “Committed Lands Analysis,” the method identifies the vacant land where a local government has already committed itself to providing the high-cost public services: sewer, water and fire protection. The guidebook also provides formulas and worksheets for estimating the actual public cost of servicing a development’s location. Then, with costs in hand, private and public decision makers can target development so that it taps into as many existing public services as possible.

In an essay describing the aim of Committed Lands Analysis, Ford and co-authors political science Professor James Lopach and economics Professor Dennis O’Donnell write that “new development can be used to achieve greater efficiency in public services in places where growth is slow. Our interests are simply these: public investments exist, they cannot be easily reduced, and so prudent public policy would have them used as efficiently as possible.

“If growth could be directed to these already committed lands, rather than allowed to spread where new infrastructure—sewers, roads, etc.—would have to be built, public costs of development would undoubtedly be reduced.”

Ford says the method offers good news for Montana, a state where school buses are driven miles to pick up few children and sewer lines run past acres of undeveloped land. Providing such bus services, for example, means that Montana has spent twice the national per-pupil average.

Kristine Ford, director of UM’s Public Policy Research Institute, has helped prepare a new guidebook for rural planning. Worksheets help developers identify the best vacant land for future development by considering existing public services, such as sewer, water and fire protection.
Montanans also pay 56 percent more per person on roads and 15 percent more per person on sewers.

According to Ford, these high per-capita costs could be reduced by guiding future development to "committed lands."

Taxpayers would spend less on school-bus costs if new subdivisions went in along existing bus routes. Likewise, taxpayers could pay less for sewer and water if new houses and businesses were located within those service areas and hooked up to existing mains.

"When you've got slow growth and you've got these big public investments, ideally each new structure built will improve public efficiency," Ford says. "When a subdivision goes in that doesn't hook up, there is a considerable public cost."

Ford, a former director of the Missoula City-County Planning Office, wants to see the guidebook used by private individuals as well as bureaucrats.

"Anyone can use the manual and figure out the net public benefit for each new project," she says. "This is not something that only government should use. If it's just government, then it's not going to work."

Developers, for example, could use the manual to justify a project's location and obtain approval from a local government. In a way, the manual gives private individuals and small communities the tools to perform sophisticated land-use analysis.

"In a place like Missoula, there are planners. In a lot of other places, there aren't planners....For somebody who wants to figure out whether something is a good idea in fiscal terms, this manual will help."

To encourage the manual's widespread use, Ford has contacted private individuals across the state and region through surveys and newsletters since the study began in 1987.

"I don't think that public-policy research can be successful if the researchers stay in their offices and stay in the library and then emerge with a report," she said.

Since 1987, the Committed Lands newsletter has been distributed to more than 150 subscribers, a diverse group of private individuals, businesses and governments located in Montana and nearby states. Ford has made speeches, contacted professional planners, spoken to the Montana Association of Counties and provided manuals and training upon request.

Those contacts have continuously shown widespread support for the principles of "committed lands." For one thing, in a survey of thirty-nine developers, surveyors and other private "opinion leaders," all but one agreed that a development's location could affect public costs.

Another survey, the 1987 Montana Poll conducted by UM's Bureau of Business and Economic Research, found the same insight among private individuals. Although people generally rated private property rights as more important than the public's right to regulate, nearly 70 percent agreed that a development's location would affect the cost of tax-based public services.

"What we learned on those surveys is that people know that where a development goes can cost taxpayers money," Ford says. "It lets you know how much people are aware of the public cost of private decisions."

That awareness is gratifying to Ford, who's spent years applying planning theory to the solution of real-world problems. A former associate professor at New York University and a research professor at Rutgers University's Center for Urban Policy Research, Ford has devised urban-planning policies, including plans for housing the urban homeless.

Throughout her career, she's found that people often are unaware of land-use issues until a problem arises.

"When decision makers have made good land-use decisions, planning is practically invisible," she says.

"You don't drive into town and think, 'What a well-planned town.' You simply use the town without realizing its efficient planning. When you notice planning is in its absence. For that reason, it's hard to find a constituency for planning."

In 1986, Ford established the Public Policy Research Institute at UM to do research on managing growth in Montana and other slow-growth areas. Future research will address physical development of land and open space, population and economic growth, taxation policies and local finance. For now, though, the institute has concentrated on developing the Guidebook for Committed Lands.

"It's a new way of arguing for public efficiency," she says.

A development that puts the principles of committed lands into practice recently began selling inexpensive houses on Missoula's west side. Called West Central Village, the development placed thirty-four houses and four four-plexes on seven and one-half acres with access to sewers, water and fire service.

"It's the perfect example of what committed-lands analysis advocates," Ford says.

By locating near the intersection of Mount Avenue and Reserve Street, the developers had relatively inexpensive access to public services. The developers even helped pay for the upgrading of Mount Avenue, with new sidewalks and curbs.

"It's an ideal place," Ford says. "Putting new people there isn't going to increase taxpayer costs. You get the benefit of additional tax revenue with a minimum of additional costs."

"In other words, the development uses existing public investments efficiently."
Everyone has bad days. But some people have bad months, even bad years, when coping with the demands of daily life is nearly impossible. Every year, at least 22 million Americans suffer from depression, says University of Montana psychology Professor Janet Wollersheim. The figure may even be as high as 44 million if the milder forms of depression are counted.

People with severe, or “clinical,” depression are haunted by sadness and often by a lack of interest in normally pleasurable activities. They develop a negative self-image and may experience a change in activity level, usually a slowing down. They also may have withdrawal and escapist tendencies, sleep problems, weight loss and a lack of interest in sex.

Although most people with this mood disorder think about suicide, “the vast majority of them won’t kill themselves, even without treatment,” says Wollersheim, who’s studied depression since 1968. “The pull for life is very strong.”

Without treatment, 80 to 95 percent of all depressed people and 90 to 95 percent of depressed people under age thirty will completely recover, she says. Only about 20 percent of depressed people seek help, whether from a clergyman, doctor or psychologist, she adds. The ones who seek help tend to be women, who are more prone to depression than men are.

If the odds of recovering without help are so good, why has Wollersheim spent twenty years developing ways to treat depression? “With competent treatment, people can usually get over depression more rapidly, can get to a higher level of adjustment, and there’s less danger that it will reoccur,” she explains, emphasizing that untreated depression tends to recur.

What she’s come up with is coping therapy, a short-term method for treating depression. Short term means about ten to forty weekly sessions lasting 1 to 1½ hours each. The method is a type of psychotherapy, which Wollersheim says “involves the detailed, systematic and sophisticated use of psychological principles to bring about changes in how people think, feel and behave.”

Coping therapy identifies seven major problems areas of depression and offers ways of dealing with them:

- **Getting started.** The patient must begin helping himself, including accepting his condition. One technique is using “self-talk”—telling himself things like “I’m depressed right now. I hate it. But I’m not going to get down on myself because I’m depressed. This is temporary.”

  The therapist also urges the patient to act contrary to his negative feelings. For example, if he used to enjoy movies, he should force himself to go see one now. “Depressed people have got to keep active,” Wollersheim says. “It will help them to be less preoccupied, self-absorbed and worried. Research shows depressed people greatly underestimate their abilities.”

  The people closest to the patient can help by using “kind firmness,” she says. While showing compassion, they can insist that the person act contrary to his feelings, or they can disagree with his unreasonable ideas.

- **Coping with negative feelings.** The therapist encourages the patient not to believe the messages his negative feelings are sending. “We say, ‘When you get better—and you will—you can evaluate these pessimistic messages, and you will see that many of them are really not accurate,’ ” Wollersheim says.

  Often the therapist will limit or increase the amount of time the patient dwells on his sadness, depending upon the nature of his problem.

- **Energy and motivation.** The patient uses exercises in pleasant imagery to get relief from depression and increase his energy. He might create a fantasy or recall a happy time. The therapist also advocates postponing major decisions whenever possible until the depression is gone.

- **Feeling better by acting better.** Coping therapy teaches problem solving, emphasizing trying rather than succeeding. The patient learns to recognize problems, evaluate ways to solve them, try an approach, get feedback, and modify his approach or try a new one.

  The patient also learns to use self-instruction with self-talk. To get through a situation, he tells himself what he needs to do. Then, as he follows his own instructions, he tells himself what a good job he’s doing.

- **Challenging negative thinking.** Coping therapy helps the patient challenge his unreasonable ideas and replace them with more reasonable and adaptive ones.
• **Self-worth.** The patient must learn to value himself, not think he has to prove anything to anybody. He also must understand that doing something bad doesn’t make him a bad person.

• **The self-defeaters:** guilt, anger, anxiety. Coping therapy holds that these emotions aren’t necessarily bad but should be kept within appropriate bounds.

Over the years, Wollersheim and her doctoral-student researchers have conducted many depression studies, some including Missoula-area residents and inmates of the Montana State Prison. One project studied the types of treatment people prefer for depression; another focused on what happens when a person tells someone he’s depressed.

Three UM studies have specifically tested coping therapy, an approach also being tested at the University of South Dakota and Washington State University. Wollersheim’s major project on coping therapy intensively studied thirty-two moderately to severely depressed patients for nine months. She expects to finish analyzing the complex data this year.

That project sought answers to a number of questions, among them: Is coping therapy better than having a patient read a self-help manual? Is having a psychologist and a self-help manual preferable to having either one alone? Is coping therapy, which is instructional, more effective than supportive therapy? How long must a person be treated before improving significantly?

So far, Wollersheim has learned that all the treatments in the study were effective—including one in which patients were assessed and then had to wait eleven weeks for treatment. “Knowing they’ll get treatment raises people’s hopes and proves very therapeutic,” she says.

She’s also discovered ways to improve coping therapy, including decreasing the number of techniques presented in a session to avoid information overload. Another finding is that, for full recovery, a moderately to severely depressed person needs more than ten therapy sessions, the number in the study.

Wollersheim’s work with depression has carried her around the states and all the way to New Zealand, where in 1986-87 she spent six months at the University of Auckland and Massey University.

At Auckland, she demonstrated coping therapy and suicide-risk assessment to medical students, graduate psychology students, psychologists and psychiatrists. She also made presentations at hospitals affiliated with Auckland’s medical school. At Massey, she gave university-wide talks and addressed the psychology department and psychologists in the area.

Wollersheim’s trip gave her insight into differences in the way New Zealanders and Americans treat depression. One is that “In New Zealand, there’s more of a reliance upon medications and less on psychotherapy,” she says. By contrast, Americans “within the past decade...have demonstrated that depressed people show a marvelous response to psychotherapy.”

It’s just that positive response to treatment that keeps Wollersheim so upbeat about something as miserable as depression. “I know of few other psychological conditions that rival depression in responsiveness to treatment,” she says. “Although depressed people feel they’ll never get well, their prognosis is excellent. It is a real joy to see these extremely distressed people recover.”

**People who are severely depressed often develop a negative self-image, have withdrawal tendencies and lack interest in normally pleasurable activities.**
RELIGIOUS STUDIES

RELIGIOUS LITERACY CRUCIAL TO UNDERSTANDING TODAY’S WORLD

Ray Hart tells a story about answering a knock on his office door a few years ago to find a “big, raw-boned cowboy of a kid” standing there. “I want to be a scholar of religious studies,” the kid said, “and I’ll do anything you tell me to.” Hart invited him in.

After two hours, Hart had learned that the student had lost his father in Vietnam, worked on an agricultural degree at Bozeman, punched cows in the outback of Australia, operated and failed at a logging business, and gone back to school and gotten “turned on” in a humanities class at MSU. The professor there had told him to go to Missoula, see Ray Hart in the UM religious studies department and do whatever he says.

So Hart told him what to do. Within a year, the student was reading scholarly works in German. He was a Watkins fellow his senior year, spent two years at Stanford and is now a scholar himself, finishing his doctorate at the University of Virginia.

“There’s a great deal of satisfaction in students like that,” Hart says, “and we’ve had quite a number of them come through the department.

“The thing about these Montana kids is they’re so wonderfully naive that they just will ask you questions that anywhere else would be dumb. But what it means is they don’t know the answer, and they’re the only people who are teachable. If they want to know, they ask the question.”

Most of Hart’s “Montana kids” probably begin studying under him not knowing they are being taught by the leading scholar in the field of religious studies. Hart won’t tell them, either. But all it takes is a look at Hart’s fourteen-page résumé and a read through the letters his national colleagues wrote last spring for his nomination for UM’s Distinguished Scholar Award, which he won out of fourteen nominees. As fellow professor Paul Dietrich says, the letters speak for themselves.

“In the study of religion, Hart is without peer as a scholar,” writes William Scott Green of the University of Rochester (N.Y.), “and I can think of no other figure whose intellectual influence has extended so consistently over so many people for so long a time.”

Professor William F. May of Southern Methodist University calls Hart “an immensely learned man, a searching and critical thinker,” and “among the handful of national leaders in the academic field or religious studies.”

James B. Wiggins of Syracuse University calls Hart “one of the most deeply intelligent human beings in my acquaintance,” and Mark C. Taylor of Williams College writes, “Rarely does a single individual have such an enormous impact on an entire field.”

It’s been nearly twenty years since Hart came to UM as chairman of the newly formed religious studies department. After earning his Ph.D. at Yale University, then teaching at Yale, Drew and Vanderbilt universities, Hart embarked on a course of intellectual work that has shaped the field of religious studies. With twenty years of work with the American Academy of Religion, Hart has served longer than any other person on the board of directors and the executive committee, including a year as president of the academy. He was editor of the Journal of the American Academy of Religion from 1969 to 1979, during which time he transformed the journal from a small publication of 400 pages annually to a respected, comprehensive journal of 2,000 pages annually.

Hart’s first book “Unfinished Man and the Imagination,” first published in 1968 and since re-issued twice, has had an enormous effect on the field of religious studies. A major review in the (London) Times Literary Supplement repeatedly called the book a “classic.” Hart’s colleague Paul Dietrich calls it a “densely written and brilliant work,” adding, “Hart’s book continues to exercise a major influence on the most significant younger theologians and philosophers of religion in America.”

Hart’s most satisfying accomplishments at UM have been working with students, his involvement with shaping the field of religious studies through the American Academy of Religion and his ten years as principal consultant to the chancellor and board of trustees of the State University of New York, where he helped develop statewide graduate and research programs in religious studies and humanities.

But Hart has an ongoing love for writing. “In the end, there is no satisfaction like writing,” he says. “There is nothing that substitutes for bringing yourself to speech, because you don’t know what you think until you write it. I firmly believe that.”

Hart is a vocal advocate of religious studies and the humanities. We need them to understand the global picture and to do business with other cultures, he says. “You can’t understand a newspaper without understanding religion. How would you ever understand the Middle East conflict, which at bottom is a conflict between two religions over the same piece of real estate? How would you understand what’s going on in Ireland? How would you understand the shape of modern Europe? For that matter, how would you
understand the development of the United States?

"This country has gotten into an awful lot of trouble because of its low level of literacy about religion. For instance, I'm more or less convinced that if the State Department and the Defense Department had known anything about the religious situation in Vietnam, we never would have gotten into that war."

That applies to Montana, too, Hart says. If we want to sell our cattle to Japan, we need to understand Japanese culture and its religious underpinnings. And the relationship between descendants of European homesteaders and Plains Indians still goes back to culture, religion, and differences in how they regard the land and its stewardship.

But economics and politics are not what is ultimately important, Hart says; instead, it's the quality of life.

"Now, you can make a strong case for religious studies, as you can for English, or history, or French, or German, or painting, or piccolo, or piano, or voice, and in the end that justification is not an economic one. Humanities majors, by and large, lead a more meaningful life. They deal with people with greater understanding; they don't have 'mono' vision; they can think about more things than one; they can talk on more subjects.

"We owe it to our kids that they have an education which will permit them to continue educating themselves. That's what a humanist can do."

A large part of the quality in Ray Hart's life comes from his relationship with Montana and his cabin on the North Fork of the Flathead River near Glacier Park. A native of Texas, Hart knew immediately when he first visited the area in 1965 that he wanted to stay. He has fit into the area well, even serving a year as mayor of the North Fork community of Polebridge, a job that involves stoking up the fire in the community hall for square dances and starting the light plant, Hart says with a laugh. Hart spends as much of the summers there as he can, going up Memorial Day in time to plant his garden.

One Memorial Day, he didn't make it. On May 30, 1980, while making his way up the North Fork in his Subaru wagon loaded with books and garden plants, Hart was involved in a head-on collision on Evaro Hill that resulted in eighty-eight fractures and put him in a coma for three weeks. The first thing that Hart asked his doctor was if he could still make his lecturing commitment at Syracuse University in November and the meeting of the American Academy of Religion in Dallas Nov. 2. His doctor had the sense to say, "Of course you can," though he told Hart later that if Hart had asked, he would have told him he would never walk again, or even get out of bed.

Hart learned lots of things during his three-year rehabilitation. First, he says, "The great unsung heros and heroines of medicine are not the doctors, not the nurses, but the physical therapists—they put you back together."

Now able to do almost anything he did before, Hart also learned that an individual makes the choice to live. "You may ask yourself, 'Do you have anything left to do?'" he says. "And if you do, you get about it."

He now takes great delight in ordinary things like standing on his toes and in stopping people on the street to compliment them on the way they walk. "It gives you an appreciation for the ordinary," he says. "You know the old cliché about taking time to smell the roses; that's a banal and cliché-ridden point, but it's terribly important—just the sheer importance of ordinary life, everything you take for granted.

Professor Ray Hart is one of the nation's leading scholars in the field of religious studies. He won UM's Distinguished Scholar Award in 1988.
A University of Montana social work professor has joined forces with a Missoula Youth Court officer to combat teen suicide, a problem that’s risen to national prominence in recent years.

In 1987, Professor Bob Deaton was the main organizer of a conference on teen suicide held in Missoula and cosponsored by UM’s social work department and the state chapter of the National Association of Social Workers. He and Dan Morgan, a UM faculty affiliate who directs the Fourth Judicial District’s Intensive Counseling Program, also were instrumental in forming the Missoula Community Task Force on Teen Suicide Prevention.

Chaired by Morgan, the group drew up guidelines for how schools should deal with teen suicide. The group also surveyed local mental health professionals who work with suicidal youths and their families and shared its findings with schools and agencies.

“You really have to know specific individuals who can be useful and will be available to kids and families beyond 8 to 5,” Deaton says of the need to choose a counselor carefully.

He and Morgan have led training programs and continuing-education weekend seminars on teen suicide throughout the state, as well as in Idaho and Washington. The seminars usually attract sixty to eighty teachers, school counselors, social and youth workers, drug and alcohol counselors, parents and other interested community members.

“We always have people who have recently lost their younger family member to suicide come to these,” Deaton says. “They need a forum where they can share this experience.”

During their programs, Deaton and Morgan discuss introducing the subject of suicide to young people and recognizing suicidal behavior. They cover the incidence and causes of suicide, as well as how schools can help prevent it, intervene in attempts, and handle the period after a suicide or other tragic death.

Deaton and Morgan think adults must give teens clear information about suicide. “They hear about it on the
news, and we know they talk about it among themselves," Deaton says. "By not talking to them about it, we're telling them it's too bad to talk about or that we don't believe it happens."

Clearly, it does happen. Morgan says that nationally, about 6,400 people aged 15-19 commit suicide every year. He points out that although that doesn't sound like a lot of people, over ten years, the total would be 64,000—6,000 more Americans than died in the Vietnam War.

In the past few years, Deaton adds, it's become evident that a considerable number of 8- to 12-year-olds nationwide also commit suicide.

He says that in Montana, suicide—the No. 2 cause of death in this country among people aged 15-24, after accidents—claimed twenty-five people in that age group in 1986. Three 5- to 14-year-olds also committed suicide that year. Deaton estimates another twenty-five to thirty suicides among 15- to 24-year-olds in 1987.

Deaton says a bigger problem than suicide is suicidal behavior, which yearly causes countless accidents. "If somebody commits suicide, he only kills himself," he says. "But when somebody does some self-destructive behavior—especially in an automobile—he very frequently kills another person or permanently injures him."

Today, people know a lot more about the causes of suicide and the symptomatic behavior than they used to, Deaton says. Causes include the loss of status or a relationship, violence in the family, and parents' divorce or over-emphasis on achievement.

Suicidal teens may show sudden changes in behavior, including becoming happy almost overnight. Other clues are drinking or taking drugs, withdrawing, fighting with family members, and giving away possessions.

Morgan says many of the problems teens experience today—including suicidal behavior—stem from the vast societal changes of the past twenty years. "This generation of teen-agers is one of the most difficult we've ever had to deal with," he says. "It's fraught with moral and ethical purposelessness."

He says children no longer enjoy the stability they did about twenty-five years ago, in the era of extended families and close-knit neighborhoods. Single parents and two-income families are struggling to survive, with little time left for children. He adds that baby boomers—part of the "me generation"—are geared toward meeting their own needs, not their children's.

"There's no one around for the kids anymore," Morgan says, "so we've created all kinds of things for kids to do—things for which we don't accept failure."

To keep their children from committing suicide, Morgan says, parents must keep their marriage healthy and create a loving environment in which family members enjoy activities and solve problems together. He says single parents can help their children feel cared for and worthwhile by encouraging them to form healthy relationships with other adults.

Morgan stresses that in dealing with suicidal teens, adults should focus on teens' desire to avoid emotional pain, not death; death is a nebulous concept for them.

Deaton explains that teens don't think they'll really die if they commit suicide. He tells of a girl who, after attempting suicide, said, "It's like a video game. You put in your quarter and play the death game. Even if you lose, it's just a game you can play again. It's not real."

Everyone can help with suicide prevention and intervention, Morgan says. Approaches include listening to teens in a non-judgmental way, defining their problems and possible solutions to them, and getting qualified help quickly.

Deaton says schools can't become suicide-prevention centers rather than educational institutions. But he and Morgan believe schools must have guidelines for dealing with suicidal students, including ones for getting outside help or contacting parents.

They say schools should also train all employees to deal with suicidal behavior and teach students about suicide, self-esteem building, problem-solving and peer-counseling. It's especially important to tell students they should never promise a friend not to reveal his plan to commit suicide, Deaton says.

Deaton and Morgan add that schools must be prepared to offer "post-vention" activities—things done after the tragic death of a student. Those activities include informing people at the school of the student's death in a timely, humane way; offering informal counseling; and holding a memorial service in keeping with the family's wishes.

Deaton says such activities are powerful suicide-prevention tools. "They help kids deal with the reality of death—that their buddy is dead as a mackerel, and he's not coming back."

Deaton and Morgan have led teacher-training programs in Billings, Anaconda, Glendive, Polson and Valier and UM continuing-education weekend courses in Kalispell, Great Falls, Helena, Butte and Livingston.

Morgan says they've gotten many compliments on the programs, including calls from people who say that what they learned during the courses has helped them save a child's life.

On the subject of saving a child's life, Morgan offers one last bit of advice. "We can no longer assume that our kids know we want them to live, because so much around them is filled with violence and destruction," he says. "We need to tell our kids that we want them to live and that we'll do everything in our power to ensure that they will live."
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