

UMaine Today

CREATIVITY AND ACHIEVEMENT AT THE UNIVERSITY OF MAINE

SUMMER 2002

**Maine's
'coastal conscience'**

**The art of
non-toxic printmaking**

**Ancient Peruvian culture
on the half shell**

From the President

IT IS DIFFICULT TO OVERSTATE how much Maine's future depends on the quality of education provided within and across the state. Education is the driving force that will determine Maine's ability to create economic prosperity and to provide a rewarding and satisfying quality of life for residents, and for those it hopes to attract. Education at every level is the arena where the most difficult challenges we face are addressed and resolved for future generations.

The University of Maine has a major responsibility for ensuring the state's overall quality of education. Besides being the state's largest single producer of college graduates, UMaine also serves as the state's largest preparer of educators. Nearly one-third of the teachers educated in the state received at least one degree from UMaine. A large percentage of principals, superintendents, and guidance counselors hold UMaine degrees as well. Through those graduates, UMaine continues to affect the quality, nature, and performance of Maine's education system.



Photo by Toby Hollis

In light of those facts, The University of Maine Board of Visitors has taken a strong interest in the future of K-12 education in Maine. It has discussed the subject in detail with professors, with K-12 educators, and with Governor King and legislators. To support the Board's effort, I created a K-12 Task Force to systematically review UMaine's role with regard to K-12 education.

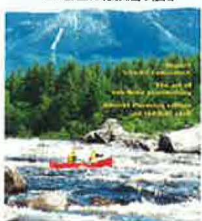
The recommendations of the Board of Visitors and the detailed Task Force report on which the recommendations were based: The synergistic relationship between the University and Maine's elementary and secondary schools is fundamental to the state's success. Beyond preparing teachers, the University also provides professional development for teachers and administrators. UMaine also helps the process of school reform through outreach efforts.

Contrary to common assumptions, these functions are responsibilities of the entire University, not simply those of our College of Education and Human Development. That is why the University has announced a new initiative to connect our academic disciplines more broadly, thoroughly, and effectively with Maine's schools and their needs. Several major federal grants are enabling professors in engineering, mathematics, and the sciences to become directly involved in Maine K-12 classrooms.

UMaine aspires to be a national leader and innovator in integrating University resources with K-12 education. We believe that the University will learn and gain as much through this interaction as Maine's schools. The Board's recommendations, and the Task Force's detailed assessment, will help us meet the challenge. I invite you to review the full set of recommendations on our Web site (www.umaine.edu/bov/k12).

Peter S. Hoff
President

UMaine Today



ON THE COVER: Every May Term for 27 years, University of Maine Associate Professor of Physical Education Walter Abbott has led an outdoor leadership course that prepares students to meet the challenges of coordinating wilderness trips and conducting outdoor education classes. One of the learning environments is the West Branch of the Penobscot River in northern Maine, where Mt. Katahdin in Baxter State Park is the backdrop. The emphasis is on leadership, safety and liability in outdoor education, with students developing and evaluating experiences beyond the classroom. Abbott's outdoor leadership course is legendary, attracting a total of more than 2,000 majors and non-majors in kinesiology and physical education through the years. *Photo by Monty Rand*



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Located in Orono, Maine, The University of Maine is the state's land-grant and sea-grant institution. UMaine serves its home state through its explicit statewide teaching, research, and public service outreach mission. Offering 90 four-year, 61 master's, and 24 doctoral degree programs, UMaine provides the most varied and advanced selection of programs available in Maine. The Carnegie Foundation for the Advancement of Teaching classifies UMaine as a Doctoral Research Extensive University, the highest classification.

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Illustration by Valerie Williams

In a Roundabout Way

UMaine Engineer Takes to the Road to Improve Safety

ASK PER GÅRDER about traffic safety and he'll give you a roundabout answer.

The University of Maine professor of civil engineering has been a strong advocate for modern roundabouts which, he is quick to point out, bear little resemblance to yesterday's rotaries. His research on accident rates,

personal injuries and traffic flow at 23 intersections in seven states, including Maine, has convinced him that highway engineers in the United States can use roundabouts to save lives and reduce congestion.

Roundabouts may look like traditional rotaries to the untrained eye. The difference is they are designed with specific geometric

angles, slowing entering traffic to 15-25 miles per hour, instead of the 35 miles per hour or more of rotaries. New roundabouts also offer better visual cues, such as signs and well-marked islands at exits and entrances that help drivers maintain a comfortable, orderly flow.

An analogy to flowing water is fitting for the roundabouts advocated by Gårder, who

once considered studying hydraulics in college. Rather than working with plumbing systems that channel water molecules through networks of pipes and valves, he focuses on systems of roads and intersections that safely and efficiently get vehicles from one place to another.

A bus route

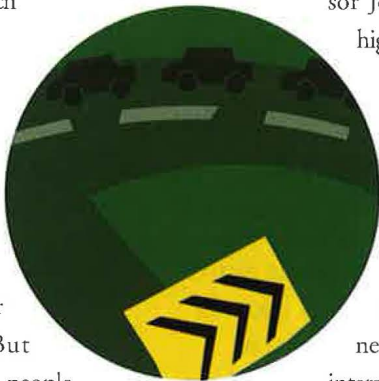


For his master's thesis at the Lund Institute of Technology in Sweden, Gärder developed new ways to design networks of public bus routes. A drawback to many public transportation systems, he says, is their tendency to funnel all riders downtown. If a person needs to go from one suburb to another, the bus ride can take much longer than necessary.

"When everybody works in the central business district, that's good for commuting. But nowadays, when people

live in one outskirt and work in another, it is difficult for public transportation to meet people's needs. That's one of the reasons that people don't use public transportation in the United States," he says.

Even more important for Gärder is reducing the number of accidents that take about 42,000 lives and cause about 1.6 million disabling injuries annually in the U.S. Together with the 25 million other traffic accidents that don't cause death or injuries, the total bill comes to more than \$100 billion.



At about 16 deaths per 100,000 people, the U.S. has one of the worst records for traffic fatalities in the developed world, he says. With an average of 200 traffic-related deaths per year, Maine is near the national standard.

"Northern states like Maine do slightly better than Southern states, but if we compare to the United Kingdom, Norway or Sweden, they are all slightly below six fatalities per 100,000 people," Gärder says.

Rumbling Along



Shortly after he came to UMaine in 1992, Gärder made a significant contribution toward improved safety on U.S. highways. Working with former civil engineering professor John Alexander, he demonstrated that highway rumble strips, lines etched into the pavement just outside the travel lanes, could save lives. The noise of tires hitting rough pavement can avert one of the most significant problems on interstate highways — drivers who doze off at the wheel and drift off the road. Before rumble strips were installed, nearly half of all fatal crashes on Maine's interstates were caused by people falling asleep.

Gärder and Alexander did not invent the technology. Some states had been experimenting with rumble strips since the 1950s. However, their project was the first academic study of this simple life-saving technology in the country and has been credited with spurring more widespread use.

Their results showed what engineers consider an astounding cost/benefit ratio of more than 1 to 100, meaning that for every dollar invested, more than \$100 would be saved in property damages, healthcare expenses and other costs.

"Our first paper was refused by the reviewers because they thought that no measure would ever have a benefit cost ratio of 100 or above," says Gärder. However, a new federal report on rumble strips cites the same results, confirming that Gärder and Alexander were right.

The Maine Department of Transportation published two reports on rumble strips and began installing them along I-95 in 1994.

"For a couple of years after that, I was getting e-mails and phone calls once or twice a week from people who had been awakened by the rumble strips," says Gärder. "They were thanking me for saving their lives."

While the benefits are clear, every technology has some negative consequences. Rumble strips are no exception. In 2000, a motorcyclist reported that by moving across a rumble strip to stop along the highway, she lost control and crashed.

Gärder takes such possibilities seriously. He also points to the overwhelming evidence of lives saved and property damage reduced. In fact, since rumble strips were installed, the number of accidents that have been linked to sleepy drivers on I-95 has gone down about 37 percent.

Roundabouts



While rumble strips have been well accepted, roundabouts are another story. Proponents in engineering firms, universities and state transportation departments are touting the benefits, but the public is not so sure. Newspaper accounts of public meetings in Florida, California and Illinois reflect citizen discomfort with roundabouts that some view as "an accident waiting to happen."



Gårder suggests that the American aversion to roundabouts is the result of experience with poorly designed rotaries. "In the United States, we had a lot of circular intersections built in the 1920s and 1930s," he says. "Some of them worked reasonably well, and some of them were too big and designed for speeds that are too high."

States began constructing modern roundabouts in the early 1990s. With some design assistance from Gårder, the Maine Department of Transportation opened one at the intersection of routes 202 and 237 in Gorham in 1997. The goal of the project was to reduce the accident rate and waiting times for the 13,000 vehicles that travel through that junction on an average day.

Gårder's evaluation after only one year of operation showed that the roundabout was working as planned. He found that the accident rate had dropped from 1.36 per million vehicles to 0.8. Even better, personal injuries were down. Three accidents had occurred at the roundabout, but none caused injuries. They were all sideswipe accidents. Broadside or head-on collisions that are more common at traffic lights and stop signs tend to be far more dangerous.

On the Road



The Maine experience is not unique. In Florida, Vermont, Colorado and other states, roundabouts have performed with similar results. In 2001, Gårder and colleagues at Ryerson Polytechnic University in Toronto and the Insurance Institute for Highway Safety published a landmark study based on accident reports for 23 roundabouts in seven states. They compared accidents before and after the roundabouts were constructed.

Just as important, they used statistical techniques to account for variability in traffic flow and what traffic engineers call a randomness factor. Stated simply, a small number of accidents can happen randomly anywhere because behavior is unpredictable. Drivers fall asleep, have heart attacks and drive drunk. Animals wander onto roads. No intersection or highway is fool-proof.

"If you don't take randomness into account, you end up with even better numbers for the roundabout," says Gårder. "But taking it into account makes it a more complicated but more honest analysis."

Their results showed that the 23 roundabouts achieved a 40 percent reduction in all accidents, an 80 percent reduction in injury-causing accidents and a 90 percent reduction in fatalities. The strength of their case earned the paper a prestigious award from the Transportation Research Board, as one of the four best research papers out of 2,000 submitted in 2001.

"My strong belief is that fewer people are seriously injured at a roundabout than at any traffic signal you will ever have," says Gårder. "The reason is that the roundabout reduces the speed of almost everyone to about 15–20

miles per hour. At a traffic signal, a lot of people will not reduce their speed, especially when the light is yellow. The typical person believes that traffic signals are perfectly safe because when it's red, people stop and when it's green, they go."

Despite their demonstrated safety, Gårder wouldn't build roundabouts at all intersections

now controlled by stop signs or signals. However, where roundabouts would be particularly useful is on rural highways at the outskirts of small towns and villages.

"We have 45–50 mile per hour highways going through towns without changing geometric standards," he explains. "We have a lot of accidents in these small towns, partly because people do not slow down. They continue to drive at 45 miles per hour, even if the signs say 25 miles per hour."

Roundabouts would be an effective way to slow traffic down where rural highways enter developed areas, Gårder says. They also could offer drivers equal access to the business district or a downtown bypass.

Giving through traffic the chance to stay out of downtowns would help reduce the congestion for which some small communities have become famous.

"We should not accept people being killed for reasons that are avoidable. Traffic fatalities are not fully avoidable, but we could reduce the number a lot," says Gårder.

by Nick Houtman



The modern roundabout slows entering traffic to 15-25 mph, instead of the 35 mph or more of rotaries. In addition, roundabouts offer better visual cues, such as signs and well-marked islands at exits and entrances that help drivers maintain a comfortable, orderly flow.



COMPLETE

BETH WIEMANN USES TECHNOLOGY TO CREATE ELECTRONIC MUSIC FULL OF TEXTURE AND TONE

COMPOSURE

BETH WIEMANN SAYS THAT composing a piece of music is like solving a puzzle.

The final product comes to the listener as an integrated whole, a collection of sounds built one upon the other to create a unified message. But if that music was deconstructed piece by piece, it would be revealed as stunningly complex.

"I'm attracted to the sound aspect of problem solving," Wiemann says.

Wiemann, an assistant professor of music at The University of Maine, has been composing classical music for more than 20 years. She also is a concert clarinetist.

But most recently, it's her electronic musical compositions, incorporating computer-generated sounds with the music of a live performer, that have received critical acclaim.

Her works have been performed in New York, Boston, San Francisco and Washington, D.C.; in England, Cuba and elsewhere by orchestras, ensembles and singers. Her compositions have won awards from the Colorado New Music Festival, American Women Composers, Marimolin and the Orvis Foundation. This summer, she has a fellowship at the Virginia Center for the Creative Arts.

Wiemann describes her work as abstract and full of texture with tone-color combinations. She admits that it is not conventional, but she does not consider it experimental.

She uses electronic sounds to construct a "sound environment" in which live performers adjust and interact. The electronic sounds, she explains, perform the same function as the supporting instruments in a full acoustic composition.

Wiemann did not begin composing electronically until the early 1990s, when new technologies made it more accessible. Electronic composing was part of her required coursework at Oberlin College and Princeton University.

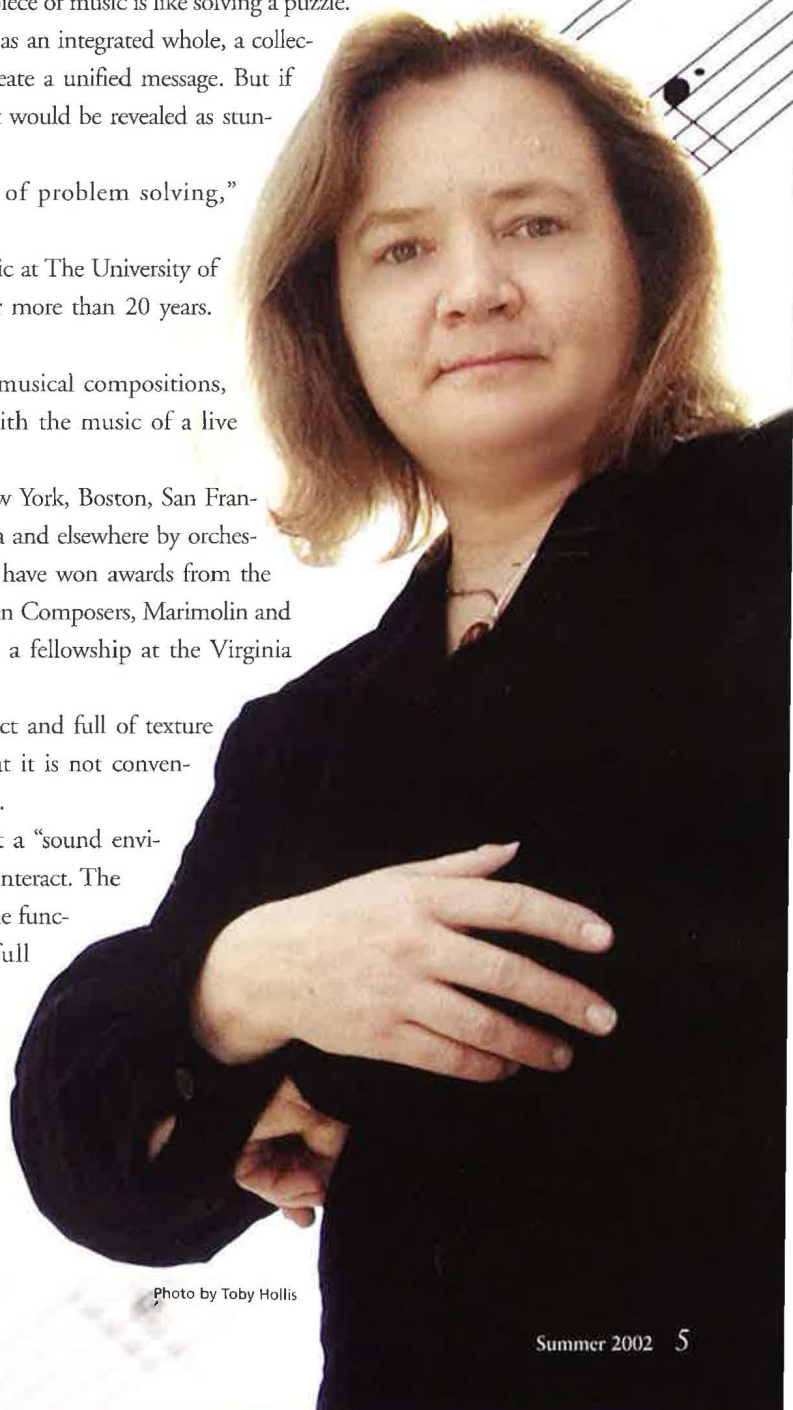


Photo by Toby Hollis

"When I was studying, the technology at that time was not 'real time' — you had to wait a long time to hear what you had done. It was not gratifying. When the software became desktop publishing-style, and you could hear what you had done right away, I got back into it," she says.

Wiemann uses sampling, digital signal processing and notation programs to generate electronic sounds. That technology has enabled her to direct her creative energies in a rapidly developing field that is pushing the boundaries of contemporary music.

IT MAY START WITH a single sound. A bird's call. A harmony. A line from a poem. For Wiemann, these are the building blocks for what becomes a musical composition.

"It's trial and error," Wiemann says of the composing process. "I assemble sounds and piece them together in a problem-solving way. I don't go into the process with the shape of a piece set to go."

Wiemann often accepts commissions. She says that working at UMaine, where many members of the faculty are performers, has provided additional opportunities for her music to reach audiences.

For instance, in 1998 she wrote *Swan Song* for associate professor of music and violinist Anatole Wieck, who requested a piece using bird calls. She also produced *Italy* for UMaine's Women in the Curriculum program, a song premiered by soprano Nancy Ogle that set the poetry of English professor Constance Hunting to music.

Other commissioned works include *Moose Next 5 Miles*, premiered by the Howlin' Winds Flute Choir at the National Flute Convention in Arizona, *So Suave* and *An Immorality* for the Composers Ensemble at the Dartington Festival in England, and *Logic and the Magic Flute* for the New York Camerata.

Currently, Wiemann is working on compositions for students at the Asa Adams Elementary School in Orono, Maine, requested by music teacher Jan Smith.

"If you want to be a good musician, you have to think about the music on the page and how it's related to how it's performed."

Beth Wiemann





Photos by Toby Hollis

“Young composers have to learn the building blocks of traditional music. If they don’t have a good foundation in traditional music, they wind up spending a lot of time trying to make electronic music sound traditional,” says Beth Wiemann.

Wiemann also is writing an opera at the request of Ron Singer of New York.

Wiemann says that when she is immersed in the composing process, she doesn’t try to “guess” what her listeners will like.

“If you are a composer, you have to write for yourself. It’s nice if the listeners appreciate what I do, but that’s a secondary issue. I’m more concerned with if the performers enjoy doing it,” Wiemann says.

Susan Narucki, a Grammy Award-winning soprano from New York, has performed Wiemann’s work in the U.S. and abroad. *Night Thought* for voice and piano was selected for recording by Narucki and Alan Feinberg for Americus Records in 2001. Narucki also will record *Poem and Postlude* for tape, voice and clarinet in spring 2003.

“The way Beth sets poems for the voice is fantastic. She’s imaginative, very moving and witty. She picks texts I love and makes the poems live,” Narucki says.

“Every single time I perform her work, people want to know who wrote the pieces. There is something in her work that people are responding to. She has a very fresh approach — modern but accessible. She’s a voice for our time.”

Wiemann credits much of her effectiveness as an electronic composer to her early training in traditional classical music. Today, her compositions are still split nearly evenly between electronic music and more traditional acoustic pieces.

Wiemann, who was in high school when she decided she wanted to be a composer, received a Ph.D. at Princeton. There, she was one of just three students accepted to study composition, and one of the few who both composed and performed music.

Wiemann has been at UMaine for the past five years, where she teaches clarinet, orchestration, tonal counterpoint, 20th-century musical techniques, composition and gradu-

ate-level theory seminars. She continues to perform, and has been the principal clarinetist for the Bangor Symphony Orchestra.

This spring, Wiemann toured with the Empyrean Ensemble on the West Coast, performing a concerto written for her by David Rakowski, her husband and a professor at Brandeis. Previously, she has premiered works in the Fellows Concert Series of the American Academy in Rome, and recorded pieces by Robert Ceely of the New England Conservatory and Ross Bauer of the University of California at Davis.

She premiered her work for clarinet and tape, *Canto Compleanno*, at the Spring in Havana 2000 Festival in Cuba.

WIEMANN STRIKES a delicate balance as teacher, performer and composer. During the academic year, she devotes about two-thirds of her time to teaching and one-third to playing clarinet. She uses vacation time to focus on her compositions.

And she expects her students to exhibit similar dedication. For most of the young artists, composition is not their specialty. But many are intrigued by contemporary classical music techniques. She also teaches her students that a basic understanding of composition is necessary.

“If you want to be a good musician, you have to think about the music on the page and how it’s related to how it’s performed.

“In my composition class, students write regularly and plan toward four medium pieces. They learn to know how all the little bits need to fit into the larger piece,” Wiemann says.

It’s her way of helping her students learn how to put their own puzzles together.

by Gladys Ganiel

Hear Beth Wiemann’s composition *Fables of La Fontaine* on the Web
www.umaine.edu/umt/

UMaine is a leader
in the development of
non-toxic printmaking
techniques



Artist Susan Groce was a student when she first learned about the beauty — and inherent dangers — of intaglio printmaking.

“I was afraid to put the plates in the nitric acid for fear of losing my fingers,” Groce says. “But at the same time, the mystery of it was very, very intriguing.”

In this form of intaglio, known as etching, metal plates are coated with acid-resistant grounds (a varnish-like substance) and an image is created using a variety of tools to expose the metal. An acid bath creates grooves that carry ink (and image) to paper.

Concern about the chemicals used led Groce to include ways of developing safer methods for handling toxic printmaking materials in her graduate school research at the University of Michigan. “The problem was,” she says, “we were asking the wrong question. We were looking at goggles, gloves and



Photos by Toby Hollis

Goings

vent systems. But now there has been a paradigm shift, and we are looking instead at safer materials.”

Five years ago, The University of Maine Professor of Art joined The Edinburgh Printmakers Workshop in Scotland, one of the few international print studios dedicated to experimental intaglio printmaking using non-toxic materials. Groce joined a growing number of artists throughout the world who are substituting new methods and alternative materials, such as common household products, for traditional etching processes using acids and organic solvents.

Today at The University of Maine, Groce leads one of the few full-system programs worldwide that offer high-quality intaglio printing that is safe to health and environment.

With training in non-toxic printmaking methods, it is not only possible to achieve comparable-quality prints, but to employ a much wider range of visual options and possibilities in the artwork.

“This has put UMaine on the map internationally,” says Groce, who has been a printmaker for 25 years. “In the fine art print world, The University of Maine is well

regarded for innovative printmaking. We have established international affiliations through projects and residencies in Northern Ireland, England, Scotland, Canada and Australia, and we have brought renowned printmakers to campus in an effort to draw together global perspectives.”

Safe intaglio printmaking got its start in the early 1990s, when Canadian Keith Howard began experimenting with materials in etching, replacing petroleum-based products with acrylics. Edinburgh Printmakers took up the challenge of adapting Howard’s methods using acrylic products produced in the United Kingdom.

After her initial visit to Edinburgh Printmakers, Groce began to work closely with Friedhard Kiekeben, who also was developing the innovative Edinburgh Etch, in which nitric acid is replaced with ferric chloride (corrosive salt) and citric acid (used in beverages). Together, the artists worked to find alternatives for acid-resistant grounds in a

system referred to as acrylic-resist etching. They also experimented with photo-polymer etching, which combines photo-polymer films used in the electronics industry with traditional printmaking methods.

At UMaine, Groce adapted the Edinburgh techniques to an American setting. She enlisted the help of her students in testing materials, and Kiekeben traveled from Scotland to contribute to the research. They succeeded in developing the Orono Ground, which is now recognized as one of the most versatile and flexible multi-purpose acrylic-resist grounds in the field.

In addition to teaching printmaking and drawing at UMaine, Groce has given workshops in safer printmaking techniques throughout the United States, UK, Canada, and Australia. In 2000, Groce was an artist-in-residence at Edith Cowan University in Perth, where she worked with students and faculty to adapt non-toxic intaglio techniques to Australian products.

An exciting extension of this work involves bringing these materials and techniques to some of Australia’s renowned

Today at The University of Maine, Susan Groce leads one of the few full-system programs worldwide that offers high-quality intaglio capabilities that are safe to health and environment.



Groce



Kris Sader, *9 Squares, Two Intaglio*, Monotype Collage

With training in non-toxic printmaking methods, it is not only possible to achieve comparable-quality prints, but to employ a much wider range of visual options and possibilities in the artwork.

aboriginal artists through Open Bite Australia print workshop at Edith Cowan University.

“Printmaking is evolving at a fast pace,” says Groce, who uses non-toxic printmaking in her award-winning art, which has been featured in nine international and 12 national juried exhibitions in the past five years.

“It’s important to encourage artists to be just as creative with concepts, content and aesthetics as with materials and process. But most artists are not trained as chemists and are less inclined to do materials research. We are bringing a bit of the scientific method into the print studio and encouraging students to be involved with invention.

“UMaine printmaking students have found it both exciting and empowering to be integrally involved in revolutionizing the print process through the materials research.”

In 1998, UMaine began to invest in specialized equipment for safe photo-etching processes in the Department of Art printmaking studio. First was the acquisition of an integrated ultraviolet light unit for exposing photo-polymer films. This academic year, Groce received a University of Maine System Trustee Professorship that enabled acquisition of state-of-the-art digital equipment for



Isaac Dupere, *Untitled*
Acrylic-Resist Etching

research in integrating photographic, reprographic, handwork and digital imagery with the new acrylic-resist intaglio, and photo-polymer printing methods.

Groce believes that with the improving quality in digital technologies, such as cameras and scanners, the hazards of using the darkroom to create photo-positives can now also be bypassed. She is using these high-quality digital positives to transfer imagery to the photo-polymer light-sensitive films and into the intaglio printing process.

The crossover to the new photo-polymer films requires a fair amount of testing to determine a variety of factors to produce positives for museum-quality prints.



Photo by Toby Hollis



Claire Rau, *Marie's Cruise*
Photo-Polymer Etching

“UMaine has been distinct because we are, and continue to be, committed to research in new technologies, methods and equipment to develop safer printmaking practices that also push the limits of our aesthetic and conceptual possibilities,” Groce says.

The projected construction of UMaine’s new studio art building, to include a customized print shop, will further enhance the University’s capabilities and leadership in the field.

“The printmaking processes we are currently developing are very much in demand, and will be in sync with projected changes in the field internationally. It’s very exciting to explore the current technical and aesthetic cross section of ideas about this medium. There is an explosion of possibilities,” Groce says.

by Gladys Ganiel

“UMaine has been distinct because we are, and continue to be, committed to research in new technologies, methods and equipment to develop safer printmaking practices that also push the limits of our aesthetic and conceptual possibilities,” says Susan Groce, pictured here with student Lauren Sawchyn, foreground.

Total Involvement

ONATHAN LABONTE'S GRADUATION in May culminated a four-year academic career in which coursework in chemical engineering was as important to him as involvement in extracurricular activities. And not just any out-of-class experiences.

As a sophomore, the Auburn, Maine, student joined the Phi Kappa Sigma fraternity, where he focused on community service. LaBonte volunteered with two Old Town, Maine, student groups, the high school ACES — Awareness, Change, Education and Solutions — and the middle school Junior ACES, both associated with the community-building River Coalition. He not only joined the young teens in some of their activities, but he encouraged other UMaine students to do the same.

“He did a great job motivating his peers and serving as a role model,” says Shawn Yardley, River Coalition director of programs. “To our students, Jon represented the University. He gave them opportunities to see college students having fun without alcohol and drugs. The more you expose young people to the real versus the stereotype, the better.”

LaBonte is a quiet leader, absolutely determined to make a difference. In his junior year, LaBonte assumed the first of his student leadership roles as president of the Interfraternity Council on campus. As a senior, he was president of his fraternity, vice president of the Off-Campus Board, a student senator, and a member of both the President's Student Life Cabinet and the Student Alcohol Advisory Board.

LaBonte also points to one of his most satisfying academic activities, an educational co-op experience with a specialty chemical supplier to the pulp and paper industry, as an opportunity for honing “people skills.”

His semester and summer of co-op experience helped him to land his first full-time job as a field engineer and loss prevention consultant. It was one of several employment offers he had early in his senior year.



Photo by Toby Hollis

Studying clam cells

SCIENTISTS HAVE KNOWN FOR YEARS that there is a high incidence of gonadal tumors in Down East softshell clams, but the cause has been hard to pin down. For her University of Maine undergraduate degree in biochemistry,

Kristen Harring of Beverly, Mass., has been looking for a genetic explanation.

The tumors are not thought to be fatal to the clams or harmful to humans; scientists are just starting to look closely at whether the tumors affect clam reproduction.

Possible causes of the tumors have focused on herbicides, but only indirect evidence has been found. “We haven't been able to induce tumors specifically, but we've been able to induce an undifferentiated gonad, which means that you can't tell if it's male or female,” she says.

One of the characteristics of the tumors is that they arise from very early cells. Harring now thinks it may be these undifferentiated gonads that are predestined for tumors.

Harring's research has focused on proteins that might be involved in tumor development. Previous student researchers, Linda Rhodes and Melissa Kelley, found higher concentrations of E3 in gonads and tumors of dioxin-exposed clams. E3 proteins are part of a normal cell's cleanup system. One of the proteins that the E3 protein may target is a tumor suppressor.

In her research, Harring works closely with Rondi Butler, a post-doctoral scientist in the laboratory of Rebecca Van Beneden, a professor in UMaine's School of Marine Sciences.

Harring just completed her bachelor's degree and will begin her master's at UMaine in 2003.



Photo by Toby Hollis

A Sea Change

Discovery of ancient clamshells provides new clues to the connection between climate and culture

The summer sun beats unmercifully on the hot dry beaches of

northern Peru. Just south of the equator, the landscape is anything but lush. Beyond the river valleys that drain the snowfields of the Andes, there is practically no vegetation. In fact, the Pacific coastline is so barren that NASA once came here to better understand the surface of Mars.

Just outside the industrial town of Chimbote, archaeologist Dan Sandweiss and a Peruvian colleague, Alfredo Narváez, drive their aging Land Cruiser off the PanAmerican Highway and onto a makeshift road of hard cobble that runs atop a ridge above the beach. They've come to look at the ridges, some 15 feet high, that snake for miles up the coast north of Chimbote.

No one knows why the ridges are here or how old they are. They hold far too much rock to be the result of human activity.

Sandweiss, an expert in seashells as they relate to marine resources used by humans, and Narváez strike out across the ridges toward an ancient bay that is now a salt flat. A nearly 8-foot cliff circles the flat like the lip of a giant bowl. The slope is littered with clam, oyster, cockle and scallop shells, most of which have no business being there.

"I had been focusing on shellfish for two years, reading everything I could find. I knew most of the species and knew these shouldn't be here," says Sandweiss of the discovery made in 1980.

Sandweiss took a few of the shells to a malacologist (mollusc specialist) at the Peruvian Institute of the Sea, who made a surprising identification — the shells are warm-water species on the cold-water coast of Peru.

That finding propelled Sandweiss, then a Cornell University graduate student, into the heart of discussions about marine resources, cultural development and climate change. His is a story about institutions and individuals responding to dramatic natural events over which they have no control.

Sandweiss and other archaeologists are listening for the faint echo of those struggles.



In the remains of ancient Peruvian settlements, the appearance — and disappearance — of shells of mollusc species are indicators of dramatic climate changes.



Photos by Dan Sandweiss

Sandweiss, a University of Maine associate professor of anthropology and Quaternary and climate studies, first conducted research on clams as a Yale University student. He analyzed shells and other remains at a historical site in the New Haven, Conn., harbor, harvesting quahogs and weighing the meat. He wanted to understand how significant they might have been in the diets of an earlier generation of residents.

Soon after, he was introduced to Peruvian studies and a controversial theory proposed in 1975 by archaeologist Michael Moseley. Sandweiss' interest in marine resources dovetailed nicely with Moseley's theory that the sea could provide a foundation for ancient cultural development.

At the time, the idea was a bit of heresy. Archaeologists generally agreed that irrigation agriculture — not the sea — was the bedrock of civilization. But Moseley and others demonstrated that in Peru, marine resources fueled a growing population that began building permanent stone structures starting about 6,000 years ago.

In fact, middens, or garbage heaps left in even older settlements, showed heavy dependence on fish and shellfish throughout what is known as Peru's Preceramic Period (about 11000–2250 B.C.). It was a time when humans were gradually shifting from living in nomadic hunter-gatherer bands to permanent settlements. In short, Moseley was arguing that clams and culture were intertwined.

Moseley suggested that if Sandweiss really wanted to understand the role of marine resources in Peru's ancient history, he needed to talk to modern fishermen. Sandweiss spent a summer conducting interviews. He became familiar with the fish and shellfish that Peruvian fishermen harvested, and learned about the preservation methods using salt and woven drying racks.

Moseley was right. The information turned out to be a key to the past. At archaeological sites, Sandweiss soon was able to recognize the pattern of postholes and the remains of materials used in fish drying racks.

Sandweiss didn't return to Peru until 1979, when he was a graduate student at Cornell University. His discovery of the ancient clam bed near Chimbote thrust his work into discussions about El Niño, the Pacific Ocean phenomenon that can affect weather around the globe.



Photo by Alfredo Narváez

Exploring Peru's pyramids with Thor Heyerdahl

IN 1987 IN CHICLAYO, PERU, researcher Dan Sandweiss had a chance encounter with Norwegian explorer and scientist Thor Heyerdahl, one of the most famous figures in modern archaeology.

Heyerdahl pioneered studies of potential interactions among ancient cultures. His book, *Kon-Tiki*, describes the voyage of a balsa wood raft that he sailed from Peru to Raroia, a Polynesian island, a distance of 4,300 miles, to prove such a journey possible.

With a three-year grant from the Timex Corp., Sandweiss eventually joined the legendary archaeologist at Túcume, a pyramid complex in northern Peru. With them was Sandweiss' longtime friend and colleague Alfredo Narváez. They wrote about their research in *Pyramids of Túcume: The Quest for Peru's Forgotten City*, published in 1995.

Sandweiss, associate professor of anthropology and Quaternary and climate studies at The University of Maine, continued to work with Heyerdahl through the Foundation for Exploration and Research on Cultural Origins, or FERCO. As president of the FERCO Scientific Committee, Sandweiss helps to select proposals for research that furthers the foundation's mission of understanding the origins and relationships among ancient civilizations.

In 1998, Heyerdahl was named a distinguished research associate with the UMaine Institute for Quaternary and Climate Studies. He died this spring at the age of 87.

Was El Niño an ancient phenomenon and did it affect cultural development in Peru? No one knew, but archaeologists were raising questions. One of them, James Richardson III of the Carnegie Museum of Natural History and the University of Pittsburgh, had found similar evidence farther north along Peru's coast more than 10 years before. His dissertation on molluscs as a possible indicator of a climate change suggested that a shift in species, and thus climate, occurred about 5,800 years ago.

Sandweiss also worked with two other University of Pittsburgh scientists, Harold Rollins and Jack Donahue. At Chimbote, they inspected the beach ridges and shells that Sandweiss found by the ancient bay. They sought to explain the mystery of the warm-water clams found in locations where, today, the cold Peruvian coastal current prevents tropical marine species from getting a foothold.

The strong El Niño of 1982 was a wake-up call. Northern Peru was hit with a dramatic warming of coastal waters, torrential rains and flooding. Houses and irrigation structures were washed away. The globally significant anchovy fishery crashed. Even in southern Peru, where the impact was weaker, the temporary warming eliminated cold-water clams from areas where they had thrived.

The clam species Sandweiss discovered required a warm, stable environment, not the stormy temper tantrum brought on by El Niño. In other words, El Niño as we know it today could not have existed.



Photo by Dan Sandweiss

Following a climate shift 5,800 years ago, ancient cultures in central Peru began exhibiting signs of a more complex social organization, building pyramids and temples. Such sites were abandoned around 2,800 years ago, when El Niño started occurring more frequently, causing such extreme conditions as droughts and floods.

Instead, the ocean system must have been bringing warm water from the tropics. Ancient people in northern Peru may have lived in a grassland savanna with shrubs and trees instead of a barren desert. That is, until ocean currents changed, allowing cold water to stretch farther north.

Such a climate change would have created cold-water conditions like those found off the Peruvian coast today. The clams Sandweiss discovered are indicators of the climate change, which included El Niño.

In 1986, with Rollins as the lead author, Sandweiss and his colleagues presented their views in a new scientific journal, *Geoarchaeology*. They suggested that about 5,800 years ago, rising sea level and a shift in ocean currents led to a major environmental change along the northern Peruvian coast in a short 500-year period.

"The clams we found were in living position in a bay which had uplifted or dried catastrophically," Sandweiss says.

"They were not imported by people. It was a reproducing, stable population that indicated very different conditions.

"My problem," he says, "was how to go about proving it."

After Sandweiss joined The University of Maine faculty in 1993, he and his colleagues worked with Dan Belknap and Kirk Maasch of UMaine's Department of Geological Sciences and Institute for Quaternary and Climate Studies, and Elizabeth Reitz, a University of Georgia scientist who specializes in the identification of fish bones in archeological sites.

Ancient shells and fish bones, knotted reeds and postholes are similar to those found in today's fishing villages. An example: fish drying racks, pictured right. It appears that cultural habits have been retained for more than 12,000 years.

Photos by Dan Sandweiss



Their subsequent research strengthened the climate change theory and gave it a global context. The 5,800-year-old story could now be told by shells and fish bones in other Peruvian middens, pollen in Australia, and molluscs in the Sea of Japan and off the coast of Greenland.

In 1996, the researchers' story was published in *Science*, one of the world's top scientific journals. The article generated media headlines around the world and caught the attention of scientists studying climate change from South America to New England.

The climate change that gave birth to El Niño set the stage for a cultural revolution that is seen today in the ruins of cities and water control structures.

People appear to have responded to the new environment by specializing in fishing and irrigated agriculture. Trade networks grew. Systems of political control evolved to manage the labor necessary to construct elaborate buildings and feed a growing population.



Photo © Holly Hobbie

Archaeologists have unearthed many structures built by people who harvested riches from the sea and cultivated cotton, gourds, beans and other plants in irrigated valleys. As long as the destructive floods did not come too often, civilization could thrive.

“After the climate shift 5,800 years ago, you get people building monuments, exhibiting signs of a more complex social organization, not just bigger, not just settled, but something else entirely — communal labor to build the pyramids and temples.

“I don't think climate drives culture,” Sandweiss adds, “but climate creates opportunities and necessities. It gives some people entrepreneurial opportunities to garner power and control.”

Knowing how El Niño got started and how people responded is important if we want to understand how environmental changes affect people today, says Sandweiss. “Archaeology has a lot to say about what the natural world was like in the past and how people have adapted.”

In the past 20 years, Sandweiss has excavated sites older and younger than those in the Chimbote area. On flat ground above a river in southern Peru, at a place called Quebrada Jaguay, he led teams of Peruvian and UMaine archaeologists that found evidence of human activity dating back about 13,000 years. No one knows if the people were seasonal visitors or residents, but it's clear they knew what they were doing.

“This was a targeted fishing site. They were drying fish and molluscs, which was an excellent source of protein. This is the oldest dated fishing site in the New World,” says Sandweiss.

Charcoal, shells and knotted reeds found in layers of debris suggest that Quebrada Jaguay was occupied intermittently for thousands of years. Remarkably, the pattern of postholes and the shape of the reed knots are nearly identical to those used in that area today. It appears that people retained cultural habits over a span of more than 12,000 years.

The story of ancient Peruvians, their use of the seas and their struggles with environmental changes is far from complete. This summer, Sandweiss is headed to the mountains east of Quebrada Jaguay, some more than 10,000 feet above sea level, to study the places where ancient people mined black obsidian rock to make tools.

Like the clams at Chimbote, the rock is expected to provide another window on the earliest chapters of human civilization in a country where cultures arose out of the struggle between humans and their environment.

by Nick Houtman

“Knowing how El Niño got started and how people responded is important if we want to understand how environmental changes affect people today.”
Dan Sandweiss

TAKING

UMaine financial analyst Bob Strong says there may be a 'whole



Photo by Toby Hollis

Bob Strong is University Foundation Professor of Investment Education and professor of finance at The University of Maine. He has been a visiting professor of finance at Maine Maritime Academy and Harvard University. A chartered financial analyst, Strong's consulting focuses on risk management and asset valuation. His current research interests center on investor asset allocation. His fourth book, *Derivatives: An Introduction*, was published last year.

EVERYONE WANTED TO talk to Bob Strong in the days following the Enron implosion last winter. Financial reporters and others sought his perspective on the scandal and the effects it might have on investor confidence.

Strong is University Foundation Professor of Investment Education and professor of finance at The University of Maine, and his stock market insights are widely respected.

Some of the questions people were asking immediately after the Enron scandal broke have been answered. (No, investors didn't flee the stock market in droves. Yes, some accounting reforms are needed.) But anxieties remain, and people still have questions, such as: Should investors be worried that other big companies — perhaps some in their own portfolios — are heading for an Enron-like collapse?

While there are no guarantees that it won't happen again, Strong says it is less likely that companies will be engaging in the sorts of questionable deal-making and hocus-pocus accounting practices that turned Enron into a house of cards.

"I think firms will be much less willing to push the envelope and do things in unusual ways," he says. "Accounting rules have always provided management with a certain amount of flexibility as to how they handle a particular transaction, but people are very sensitive to what happened in the Enron case."

In addition to new regulatory guidelines, he says, "I think we will see voluntary actions on the part of firms to make sure they avoid accounting scandals. From the investors' perspective, that is something positive that comes out of the Enron situation."

Another positive effect may be renewed respect for the traditional principles of investing, which Strong says were often ignored during the dot-com mania of the late 1990s. In those days, investors sometimes paid more attention to the flash and dazzle of new Internet-related companies than to what the companies were actually delivering, sending stock prices soaring. Even before Enron became front-page news, many of the dot-com darlings had failed.

"People were willing to pay huge sums on the basis of good ideas that they hoped would work," Strong says. "Valuations got very high, but a lot of these firms weren't making any money."

"Enron has reinforced the fact that you can't spend sales; you can only spend earnings. So, I think there is going to be a return to the notion of looking at the extent to which a company is realistically selling its products for more than it costs to make them."

Daily fluctuations in the price of a stock often are caused by psychological factors that have little or no direct bearing on the company or its industry. Alan Greenspan sneezes or a civil war heats up on the other side of the world, and stocks chase each other up or down.

"Enron has reinforced the fact that you can't spend sales; you can only spend earnings. So, I think there is going to be a return to the notion of looking at the extent to which a company is realistically selling its products for more than it costs to make them." Bob Strong

STOCK

different way of thinking' about investments in the post-Enron era

"But in the long run, it's earnings that overwhelmingly contribute to shareholder value," Strong says. "If a company isn't making money, then where is the value going to come from?"

The stock market isn't the only place where people can invest their money, of course. There are corporate bonds, government bonds, real estate and savings plans of various kinds.

"How you distribute your money has always been the single most important decision an investor makes," says Strong, whose primary research interest currently is asset allocation.

Historically, stocks have earned a higher rate of return than other, less risky types of investments. However, Strong says it appears that the size of the difference between the returns of common stocks and government bonds, for example, is shrinking.

"There is increasing evidence that the historical size of the difference is not going to be sustainable in the future," he says. "It is not clear where money is going to come from to support the level of return in the stock market that we have had in the past."

Does that mean people should take their money out of stocks? Not necessarily. Stocks in general still outperform bonds and, according to most experts, will continue to do so. But they are not likely to outperform bonds and other investments to the same extent that people have come to expect.

"It suggests a whole different way of thinking about the investment business than we have been accustomed to for the last 50 years," Strong says. "It's quite thought-provoking, and it's going to make for some interesting headlines in the next year or two."

One thing that isn't likely to change is the biggest mistake people make when it comes to investing: They don't do it soon enough. The money lost in the Enron debacle is a pittance compared to the amount people lose to procrastination.

"People say they can't afford to start an investment program now because they've got to pay for a new washer and dryer or wait until a child finishes college," Strong says. "Any investment program is usually better than none at all, but a lot of people never get around to starting one."

Another common mistake, he says, is not fully understanding the concept of "risk" and, as a result, investing too conservatively. This is often true of people who begin investing through a 401(k) plan at work or an employer's pension plan.

"They think the stock market is too risky when, in fact, as a long-term investor, if you stay completely out of the stock market, you are taking a fairly substantial risk that your investment is not even going to earn the rate of inflation."

This finding is based, in part, on Strong's work with computer simulations of thousands of investment scenarios. He also found that putting as little as 10 or 12 percent of one's investments in stocks can dramatically increase the chance of at least keeping up with inflation.

"Adding more stocks than that doesn't really improve the likelihood very much," he says. But if the goal is to do better than simply match the rate of inflation, then putting a higher percentage of money in stocks is, for many investors, the best bet.

by Dick Broom

Planting ideas

Cooperative Extension Demonstration Garden trials the newest flowers and foliage

IT'S LIKE GETTING A SNEAK PEEK

or a backstage pass, a preview of what promises to be next year's stars. And what a line-up.

There's a geranium called Black Magic Rose and an ornamental pepper dubbed Chilly Chili. The "supertunias" of petunias — Blushing Princess and Priscilla — make an appearance, as do the Dark Star and Red Petticoats varieties of coleus.

In The University of Maine Cooperative Extension Penobscot County Master Gardener Demonstration Garden, field trials of annuals introduce the newest flowers and foliage.

The one-acre garden is in full color from early July through mid-September. A public field day is Aug. 17.

In 2001, almost 70 new vegetative annuals were planted in a trial garden at the University's Rogers Farm, a research facility dedicated to sustainable agriculture. The plants are all new varieties being considered for commercial introduction. The display and trial gardens are designed to give home gardeners to horticulturists a chance to evaluate the annuals a year before they're commercially available.

Performance data are collected on all the plants grown in the demonstration garden, and commercial growers and home gardeners attending field days during the summer are surveyed about their preferences.

"In the last five to 10 years, there's been a shift in what gardeners want. It's not just marigolds and petunias any more, but plants



"Gardens within a garden" are featured at The University of Maine's Rogers Farm.

that were not part of our industry until a decade ago," says Lois Stack, Extension's ornamental horticulture specialist who co-coordinates the demonstration garden with Penobscot County Extension Educator Gleason Gray.

The demonstration garden actually is made up of "gardens within a garden," including a "moon garden" and "pollinator garden," designed by master gardener volunteers.

Stack conducts field trials of vegetative annuals (annuals propagated by stem cuttings rather than seed) and a garden of All-America Selections (AAS), plants that the international testing organization has cited as winners for next year and in the past five years. In addition, Stack conducts hardiness trials of shrub roses. In cooperation with the University of Vermont, 130 varieties of shrub roses have been growing since 1997; recommendations about the best varieties for northern New England climes are just starting to be made.

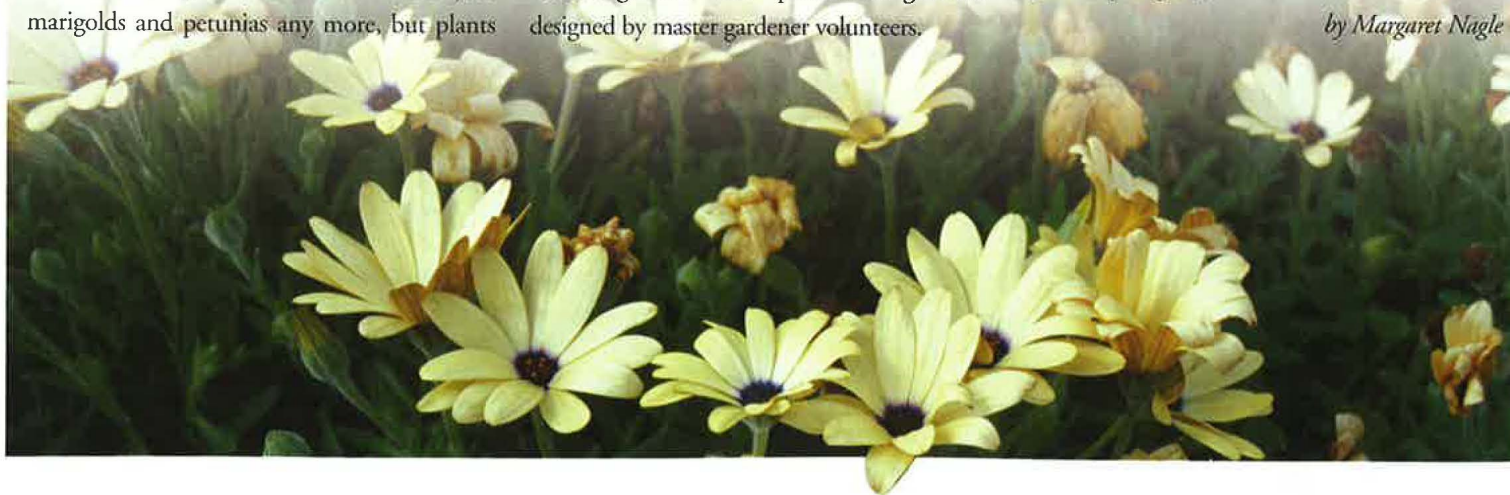
"The flower industry has changed," Stack says. "People are looking for plants that do well all season or in containers, foliage plants for accent, and more perennials and tropical plants as annuals. People also want a bonus — flowers that attract birds or butterflies."

What's important to remember, Stack says, is that gardens are more than a collection of plants.

"Plants don't make the garden. It's how you use them, put them together, that makes a garden come alive. An idea makes a garden."

Some of the most popular garden "ideas" in recent years incorporate old-fashioned plants, vegetables and herbs as ornamentals, flowers and foliage to achieve sophisticated use of color and texture, and even aspects of garden humor and personality, such as "zoo gardens," containing plants with animal names (i.e. snapdragons).

by Margaret Nagle



Shifting Shorelines

Geologist Joe Kelley's research and passion are dedicated to protecting the Maine coast



Background Photo, Popham Beach, Maine, 1976, Photo by Maine Geological Survey; Inset left, Rockland, Maine, 1996, Photo by Steve Dickson; Inset right, Popham Beach, Maine, 1983, Photo by Dan Belknap

JOE KELLEY CAN'T sit still. In the Bryand Global Sciences Center on The University of Maine campus, he fairly leaps in and out of his chair, juggling rolled-up seafloor charts in a chaotic office that resembles a wallpaper store hit by a tornado.

With an athlete's restless body language and a ready smile that shows all his teeth, Kelley radiates energy. And it's clear on this spring day in Orono that the marine geologist itches to be outside, to be walking the beaches and bluffs of his native Maine, to be on or under the familiar waters of the Gulf of Maine or Cobscook Bay.

For 20 years, Kelley has pugnaciously guarded the well-being of the state's natural coastal resources. He was lead author of the 1989 "bible" of Maine coastal management, *Living with the Coast of Maine*, and was a guiding force behind the most environmentally protective coastal management regulations in the nation. The Maine Audubon Society has called him "Maine's coastal conscience."

"When I came back to Maine in 1982 after being gone for a decade, I saw the same fights developing that I had seen in New Jersey and Louisiana over how close people could

build to the water," says Kelley, a professor in the Department of Geological Sciences and School of Marine Sciences. "I didn't want Maine to make the same mistakes."

His book is now 13 years old, and many battles — if not the war — have been won. The inexorable rise of sea level at a rate of more than one foot per century is now accepted by the most hard-headed of his opponents. And there have been enough highly visible failures of engineered "solutions" to shoreline erosion that even schoolchildren know it's a devil's bargain to tinker with the powerful natural cycles of beach migration.



Brunswick, Maine, 1997. Photo by Joe Kelley

But Kelley hasn't relaxed his vigilance. In fact, he left his long-time job as the state's marine geologist at the Maine Geological Survey in 1999 to join the faculty at UMaine, in part because the former position prohibited discussions with state legislators on coastal management issues dear to his heart.

"I'm not against development. I'm against construction that impinges on the public's right to have access to a coastal area," Kelley says. "But those rights are terminated by homeowners who prevent access by putting up fences and walls, and by practices like building seawalls or groins that, in the end, eliminate the area altogether."

KELLEY FONDLY recalls "extensive areas of pristine, accessible shore" back in the '50s and '60s when he was growing up in Portland, the son of first-generation immigrants from Galway, Ireland.

He earned a full scholarship to Boston University with every intention of attending medical school. Then — "just fascinated" by a required geology course and its fieldtrips — Kelley changed majors and went on to Lehigh University in Pennsylvania for a Ph.D. At Lehigh, Kelley met his future wife, Alice, a geologist who is now a UMaine instructor and a Ph.D. candidate in Quaternary studies.

It was at Cape May in southern New Jersey that Kelley saw the "worst sorts of coastal construction." From the book: "I found a black humor in the plight of residents who lost poorly sited, but fabulously expensive properties to the changing shoreline. I could not comprehend the mentality or the motives of developers who constructed high-rise buildings so near to the margin of the sea."

This "New Jerseyization" of the shoreline was evident on a larger scale in coastal Louisiana when Kelley accepted a teaching job at the University of New Orleans in 1979. Appalled by costly and destructive efforts to stabilize a shoreline ravaged by reckless development in the face of the rising sea, he and Alice wrote *Living with the Louisiana Shore*.

In 1982, Kelley was hired by the Maine Geological Survey and returned to the state he loved as a self-described "beach-hugger" and Audubon Society stalwart. His glimpse of the future down South was motivation enough to lead the charge for sane management of the Maine coast before it was too late.

THE TOURIST-BROCHURE image of Maine as an unchanging, unyielding bedrock sanctuary from the raging sea is a reassuring one, but geologist Kelley knows better. In the past 20,000 years, mile-thick glacial ice covered the state and depressed the Earth's crust with its weight. The coast and major river valleys were flooded far inland as the glaciers melted.

Today, sea level is again on the rise, and the 3,500-mile Maine "tidal shoreline" is responding unevenly. Down East is drowning rapidly because of land subsidence possibly related to earthquakes, he says. The central coast is fairly stable, while southern areas are sinking more slowly than the northern coast.

With the rising sea and natural erosion caused by storms and tides, the bottom line is that anyone who builds on the "soft coast" — Maine's beaches and shoreline bluffs of unstable "Ice Age mud," as opposed to classic granite promontories — is playing "real estate roulette," Kelley says.

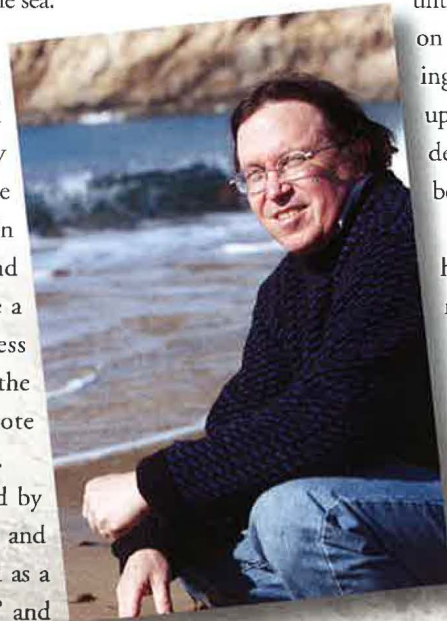
His philosophy is reflected in a set of simple truths: The beach is a natural system in dynamic equilibrium; erosion isn't a problem

until a structure is built on the shore; intervening to protect a beach upsets the balance and destroys what was to be saved.

"Let the lighthouse, beach cottage, motel, or hot dog stand fall when its time comes," he writes with typical wit and candor.

That logic informs Maine's Sand Dune Law governing coastal development that Kelley helped to

strengthen and expand in the late 1980s into a model for other states. A strong law was critical in Maine because of the state's extensive



Joe Kelley
Photo by Toby Hollis

(97 percent) private ownership of the coast, he says. Among its progressive provisions: if more than half of a shoreline structure such as a seawall is destroyed in a storm, it cannot be rebuilt.

Not everyone agrees with Kelley's logic. He says the bitter, prolonged fight over the dredging of Wells Harbor was "the worst" of his battles, not the least because of head-butting with the U.S. Army Corps of Engineers.

Historically, the harbor was a shallow tidal inlet of the Webhannet River between Wells and Drakes Island beaches, accessible only at high tide. In the 1960s, when recreational boaters wanted to deepen Wells Harbor, the Corps of Engineers bracketed the inlet with jetties and dredged a channel,⁷ dumping the sand on an adjacent salt marsh.

But the harbor repeatedly filled in and the beaches began disappearing, thanks to complex sand migration patterns disrupted by the jetties. Further dredging was halted under the modern regulations. An environmentally acceptable compromise was recently implemented.

Not surprisingly, Kelley was front and center during the debate and made few friends in Wells. "I'm a pretty aggressive person," he says. "I don't take it personally. I can laugh and tell a joke in the middle of an argument, and it just drives them crazy."

KELLEY'S CHARM AND energy are assets in appearances before the state legislature, citizen groups and media. The father of three is a licensed pilot and a certified diver, runs 5-6 miles a day and leads an annual cross-country skiing trek with his students across Baxter State Park. He writes fiction, cooks with a Cajun accent and wears green on St. Patrick's Day.

But he's first and foremost a researcher, and his arguments about responsible coastal development demand attention. Kelley travels widely on research projects, to Alaska, Ireland, Portugal, China, the West Indies.

Kelley applies solid science to what was almost medieval prognostication just decades

ago. He uses a full technological arsenal: ground-penetrating and side-scan sonar, remote-controlled submarines, satellite and airplane imagery, robot buoys recording every twitch of the ocean.

He's been instrumental in developing a series of maps classifying Maine's coast according to risk for erosion or landslides. Another effort mapped seafloor topography.

Much of his local funding comes from the Maine Sea Grant Program, including support for a project he hopes is a prototype for the future. In collaboration with UMaine colleague Dan Belknap and Steve Dickson of the Maine Geological Survey, Kelley recruited a volunteer force of 70 "stakeholders" — property owners, teachers, scientists, environmen-

talists — to record regular beach profiles at 10 locations in southern Maine. The goal is to develop a database of sand migration patterns correlated with weather and ocean activity.

"Awareness levels have improved tremendously since 1982," he says. "But continuing education is the key.

"I want my kids to have the same opportunity to grow up along a beautiful shoreline that I had, but I'm no longer so naive to believe that will simply happen without effort."

And will Joe Kelley be there when the Sand Dune Law comes up for review in public hearings this summer? "Oh yeah, I'll testify," he says with a big smile.

by Luther Young



A structure on the coast in Jonesport, Maine, in 1994, and the same building in 1996, showing an abatement attempt with rocks to slow erosion.

Photos by Joe Kelley

Lobster College

A course complete with melted butter on the side

CLASSES ON MAINE'S premiere crustaceans are in session again this summer. The second annual Lobster College, organized by the Lobster Institute at The University of Maine, is Sept. 12-15.

Lobster College is an educational vacation on the Maine coast — a chance to learn about lobster biology and ecology, value-added products, lobster cuisine, stock management and other areas of the lobster industry. And of course, there's plenty of lobster to eat.

Fieldtrips take participants throughout the Schoodic Peninsula and Frenchman Bay area, where hands-on learning is led by lobstermen and lobster dealers, as well as several University of Maine faculty such as Robert Bayer, executive director of the Lobster Institute.

"We'll be taking a trip on a real lobster boat and seeing how traps are hauled, we'll visit a tidal lobster pound and a working lobster wharf, and we'll provide lectures on a variety of lobster-related topics. We'll even show how to bait a trap. Last year's Lobster College graduates had such a great time, they started talking about a reunion before the weekend was even over," Bayer says.

In addition to being an educational program, Lobster College is a fundraiser for the Lobster Institute's endowment fund. The Lobster Institute is a research and outreach organization with a mission of protecting, conserving and enhancing the vitality of the lobster, and lobstering as an industry and a way of life. It was founded by members of the lobster industry and UMaine faculty.

Lobsters come in many colors but, except for the white ones, they all turn red when cooked.



UMaine scientist leading Clean Air Act study

THE U.S. Environmental Protection Agency has tapped a University of Maine scientist to lead a national evaluation of the 1990 Clean Air Act.

Steve Kahl, director of the Senator George J. Mitchell Center for Environmental and Watershed Research at UMaine, will work on the project at an EPA research center in Corvallis, Ore.

According to John Stoddard, director of EPA's Environmental Monitoring and Assessment Program, Surface Water Division, 1990 Clean Air Act Amendments require the EPA to report to Congress in 2002 on the effectiveness of the act's acid rain provisions.

Kahl will compile and analyze the latest information, including his own research, to evaluate the trends in surface waters relevant to future Clean Air Act legislation. Much of the regional EPA data has come from Kahl's laboratory for the past decade.

For 20 years, Kahl has conducted research with scientists from UMaine and other insti-



tutions on the environmental consequences of atmospheric deposition on lakes, streams and soils. One of the signature programs of the Mitchell Center is PEARL, a Web-based, searchable environmental information resource.

"Maine has some of the longest records and largest datasets for lake and stream chemistry in the U.S., with the important advantage of the samples being collected and analyzed by the same laboratory for the entire period of the Clean Air Act," says Kahl.

The Mitchell Center is named for the senator from Maine who was the key author of the Clean Air Act of 1990.

Since the early 1980s, the Mitchell Center has been awarded more than \$14 million for watershed research funded by the National Science Foundation, EPA and U.S. Geological Survey. Most recently, Kahl and Steve Norton, a UMaine geologist, received an \$860,000 EPA grant to continue studying chemical trends in lakes and streams from Maine to the Adirondacks in New York.

Competitive management

THE UNIVERSITY OF MAINE was one of 12 universities from the United States and seven other countries invited to the McGill International Management Competition this spring in Montreal.

Canada's Concordia University won the competition.

UMaine's team of four undergraduate students — three from Maine and one from Bulgaria — was advised by UMaine Professor of Management John Mahon.

"The quality of our undergraduate program was a factor in our selection," says Mahon, the John M. Murphy Chair of International Business Policy and Strategy.

At the competition, the teams were given 24 hours to analyze a case and prepare a 20-minute presentation for two panels of judges. The teams were required to analyze the same case, in which a new start-up firm was developing human resource-centered employee software.

Mahon took teams to similar competitions when he was on the faculty at Boston University. He prepares the students to work hard and to perform to their potential, rather than focusing on winning the competition.

"It's nerve-wracking, but exciting at the same time," says Erin Plourde, a senior marketing and public relations major from Skowhegan, Maine. "But we all wouldn't have chosen to be involved in business if we didn't like the challenge."



Jonathan Dunn, 19, plays Bingo with 92-year-old Lillie O'Bana, a resident at the Washington Home, Washington, D.C.

What they did on their spring vacation

MORE THAN 60 MEMBERS of the University community spent a week of their March vacation helping others in need by participating in UMaine's LET'S Volunteer program — Learning and Exploration Through Service.

This is the fifth year of the University's Alternative Spring Break, which took volunteers to Washington, D.C., New York City, New Orleans, Atlanta, Georgetown, S.C., and Eustis, Fla., to work with AIDS patients, troubled teens, community organizers and chronically ill children.

Alternative Break programs immerse students in often vastly different cultures, to heighten social awareness and to advocate lifelong social action.

The experiences of the volunteers in Washington, D.C., were the focus of national stories, the first of which ran in the *Washington Post*.



Improvement in Movement

RESEARCHER NELLIE CYR keeps bringing deadly sensitive statistics to the public table: Maine claims the most obese people in New England, and the No. 4 spot nationally for lifestyle-related illnesses and disabilities.

People need to make better choices, says Cyr, a University of Maine specialist in the effects of exercise, diet and smoking on disease processes, and in employee health promotion programs.

"You can experience the benefits of appropriate activity at any age," says the assistant professor of kinesiology and physical education. "It's a matter of looking for ways to expend calories, not for the closest parking spot."

Cyr's research documents positive effects that a change in physical activity can have on important health variables, such as weight, blood pressure, cholesterol, strength and heart recovery rate.

For instance, a recent assessment of the 12-week "Move and Improve" initiative at Eastern Maine Medical Center in Bangor found participants had statistically significant positive differences in such areas as systolic blood pressure, total cholesterol, ratio of total cholesterol to high-density lipoproteins, and push-ups and sit-ups accomplished in one minute.

The greatest changes were evident in mean total cholesterol and recovery heart rate.

A WIND SURFING BOARD made of paper helped a team of engineering students from The University of Maine bring home a \$5,000 third-place prize from the national Energy Challenge.

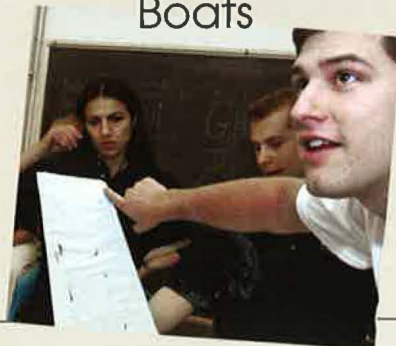
The competition, held this year near Atlanta, is sponsored by the U.S. Department of Energy and the Institute of Paper Science and Technology.

A team from the Georgia Institute of Technology took first, and Miami University (Ohio) came in second, just 0.03 of a point above the UMaine squad.

Last year, UMaine's paper sail for a sailboat took second; three years ago, it was a paper kayak that brought first-place honors to the University.

The goal of the competition is to develop paper production techniques that emphasize energy conservation.

Paper Floats Their Boats



THE NATIONAL Folk festival

THE NATIONAL FOLK FESTIVAL is coming to Bangor, Maine, Aug. 23-25, with the help of the Maine Folklife Center at The University of Maine.

The three-day festival, to be held on the banks of the Penobscot River, will feature demonstrations, exhibits, performances and activities designed to showcase folk arts of our region.

The festival is produced by the National Council for the Traditional Arts, Bangor Convention and Visitors Bureau, the City of Bangor, and Eastern Maine Development Corp., in partnership with the Maine Folklife Center.

"This will be an opportunity to highlight the importance of folk arts in this region, and the research and public programming we do at the University," says Pauleena MacDougall, the center's associate director.

The Maine Folklife Center holds the nation's leading collection of folklore, oral history, traditional music and photographs of Maine and eastern Canada. The center's staff, directed by James Moreira, is lending its expertise to the material culture segments of the festival.

This year's festival will focus on traditions of the Maine woods, including lumbering heritage, a specialty of the center, with canoe and basket making, traditional woodcarving skills and storytelling, and preparation of old-time foods like bean hole beans.

The Maine Folklife Center also will take advantage of the traditionally large turnouts for the National Folk Festival to do interviews as part of its ongoing Veterans Oral History Project. The project is conducted in cooperation with the Veterans History Project of the American Folklife Center in the Library of Congress.



The Nature of TOURISM

MAINE IS FAMOUS FOR its hunting and fishing camps, as well as sea and lakeshore vacation resorts. Finding out what makes them successful has been the mission of Marc Edwards, a master's student in The University of Maine's Parks, Recreation and Tourism Program.

With the information, Edwards hopes to help the state's nature-based tourism industry grow and diversify.

Working with Will LaPage, an associate professor in the program, Edwards interviewed owners and operators of 16 Maine businesses that offer a variety of experiences — from white-water rafting and retail outfitting to boat cruises, dog sledding trips, mountain biking and wilderness canoeing.

"Some of these companies are micro-enterprises," says Edwards. "The owners do it because they love the lifestyle, and they are successful because they focus on customer service. Some of them really make an effort to provide life-changing experiences for their customers."

In a spring symposium, Edwards shared the results of his research with representatives of these businesses in what he hopes is a first step toward forming a professional association for nature-based tourism enterprises. Such a group could offer assistance to fledgling businesses and development opportunities to the industry.

Nature-based tourism represents a significant segment of the state's industry. "Outdoor recreation and nature-based tourism account for more than 20 percent of Maine's overnight marketable travel mix," says Nat Bowditch, assistant director of the Maine Office of Tourism.

Timing could be everything

WHEN IT COMES TO understanding why shipworms have caused such a problem along the Maine coast in recent years, Danielle Rioux, a University of Maine junior in marine biology, says the problem may come down to timing.

In the past two years, shipworms (*Teredo navalis*) have raised alarms in Maine, where they have damaged pilings, docks and aquaculture facilities. Last year, Rioux studied shipworm biology with Kevin Eckelbarger, director of the UMaine Ira C. Darling Marine Center in Walpole, Maine.

In the ocean, it is the larvae that start an attack by chewing pinholes in wood and burrowing tunnels. As adults, they continue to eat, and the tunnels grow larger.

Finding out when shipworms attack could lead researchers to understand what triggers their voracious eating habits. Rioux, a native of Falmouth, Mass., conducted experiments in



Maine's Damariscotta and Medomak rivers, where shipworm problems have been reported.

She and Eckelbarger also worked in the laboratory, where they confirmed that temperature is a critical factor in shipworm infestation. Using the Darling Center's flowing seawater lab, she varied the temperature to see if she could coax the shipworms to release larvae.

She found that when the water temperature reached 70 degrees F, the shipworms started releasing their larvae.

"We still don't know for sure why shipworms have become so much worse these past two years in Maine. Some people have said it's cyclical and that there was a previous infestation about 30 years ago," Rioux says.

Rioux finished her junior year at James Cook University in Australia. She will return to complete her degree at UMaine before heading to graduate school.



Talk from around the world

SHANE KEADY LOVES to talk about two of his favorite subjects — sustainable agriculture and Gaelic. The native of Ireland is one of 10 University of Maine students who serve as language tutors in UMaine's Critical Languages Program.

For nearly a decade, the Department of Modern Languages and Classics has offered courses in languages that are considered "critical" — those less commonly taught yet "critical to world affairs." They have included Japanese, Bulgarian, Italian, Greek, Portuguese, Gaelic, Vietnamese, Chinese, Dutch, Turkish, Arabic and Swedish.

Two-hour weekly classes feature as few as two students — often people working or visiting abroad, and others interested in pursuing a heritage language of their ancestors. Their tutors are UMaine international students or community members for whom the language is native. The Critical Languages Program is directed by Professor of Spanish Kathleen March.

Eva Möldre of Estonia, an international affairs major and member of the UMaine women's basketball team, speaks six languages and has been a Swedish language tutor.

"I like to see how students get better and better in the language over time," she says. "I know how hard it is to learn a language, so I help students find ways to make it easier."

Learning in the Critical Languages Program is a two-way street. For Keady, who has lived in Boston since age 9, tutoring has helped him learn how to communicate effectively — whether with a language student or a farmer in the field.

*S*ixteen years ago, the curtain went up on the first performing arts season of the *Maine Center for the Arts at The University of Maine.*



IT LAUNCHED A NEW ERA of cultural opportunities for eastern, central and northern Maine — dozens of performances annually, in Orono, featuring some of the world's most accomplished performers.

The initial performance Sept. 20, 1986, was indeed memorable. Internationally renowned violinist Isaac Stern and cellist Yo-Yo Ma took to the stage with the more than 70-member Bangor Symphony Orchestra, under the direction of Werner Torkanowsky.

A crowd of 1,600 filled the MCA's Hutchins Concert Hall, named in honor of longtime UMaine benefactors Ruth and Curtis Hutchins. In addition, the sold-out concert was televised live statewide by Maine Public Television. The broadcast was the first of many radio and TV broadcasts to share MCA performances and events with statewide and regional audiences.

Over the years, the MCA's Hutchins Concert Hall has featured scores of performances by award-winning artists, such as Rudolf Nureyev, the

Academy of St. Martin in the Fields, the New York City Ballet, Ella Fitzgerald, Tony Bennett, The Chenille Sisters, Bob Dylan, Judy Collins, Wynton Marsalis and the Dave Matthews Band, as well as comedians Jerry Seinfeld, Ellen DeGeneres and Jay Leno. In addition, each year the hall hosts numerous lectures, ranging in interests from anthropologist Richard Leakey to world leaders such as then-Secretary of State Madeleine Albright.

Along with Hutchins Concert Hall, MCA is home to UMaine's Hudson Museum and its world-renowned collection of pre-Columbian artifacts.

In each issue, "Lasting Impression" features a memorable person or event in UMaine history.

Yo-Yo Ma and Isaac Stern at the Maine Center for the Arts, 1986

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THE WILLIAM S. COHEN CENTER

for International Policy and Commerce



U.S. Secretary of Defense William Cohen speaking at a tribute dinner in his honor, Jan. 12, 2001, Bangor, Maine Photo by Michele Stapleton

IN 1996, AS HE CONCLUDED A STELLAR 24-year career in Congress, then-Senator Bill Cohen bestowed a great honor and responsibility on The University of Maine by donating to it his official papers. The donation coincided with the University's creation of the William S. Cohen Center for International Policy and Commerce. In 2001, he added to that impressive historical archive by donating his public papers from his four years of service as U.S. Secretary of Defense.

Cohen's affiliation to UMaine dates back

to 1968, when he taught business law as a member of the University's business school faculty. Throughout his public career, he maintained an active interest in UMaine, returning often and working closely with administrators, faculty and staff. The establishment of the Cohen Center reflected a shared interest of both the University and Cohen: to foster understanding of international policy issues; to use and coordinate the resources of the University to enhance the international competitiveness of U.S. businesses; and to

make a difference in ways that expand Maine's place in the global marketplace and economy.

Thanks to Cohen, international figures such as then-Secretary of State Madeleine Albright and former senator and astronaut John Glenn have lectured at UMaine, providing perspectives that have enriched the Cohen Center's leadership role in promoting economic diversity, commerce and growth. An endowment for support of the Cohen Center is managed by the University of Maine Foundation.