

WAR IN THE
NORTH WOODS

PREVENTING SCHOOL
DROPOUTS IN MAINE

GREENLAND'S ICE SHEET
A SERIOUS HOT SPOT

UMaine Today

CREATIVITY AND ACHIEVEMENT AT THE UNIVERSITY OF MAINE

JANUARY/FEBRUARY

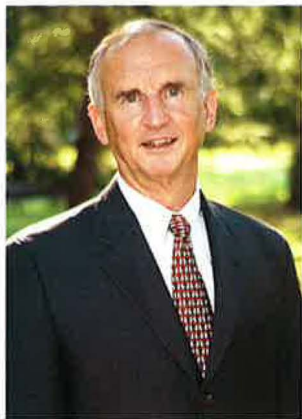
2007



Pleasing Palates

Maine artisanal food
producers find their niche
with the help of science

President's Message



INNOVATION AND ENTREPRENEURISM are key indicators of intellectual vitality at a modern college or university, and I am pleased to note the exceptional degree to which University of Maine faculty members, students and staff are applying their skill and creativity to creating new knowledge, new products and services, and new ways to solve problems.

UMaine, which generates more intellectual property than the rest of Maine's research institutions combined, has a proud history of innovation and creativity. Only three states generate more spin-off business, per dollar of state investment in university research, than Maine. The state's success is directly attributable to the university's focus on business development activities, largely through the Target Technology Incubator facility in Orono.

We are expanding and further formalizing our efforts related to entrepreneurship. The new Student Innovation Center will provide space for classes and programming related to our innovation engineering curriculum. More important, it will bring together those "big thinkers" whose ideas will help to define the future. The Student Innovation Center will fuel the kind of creative energy that will inspire UMaine students and others to invent, to innovate and to develop their ideas.

As you will see throughout this issue of *UMaine Today*, the entrepreneurial spirit is alive and well at the University of Maine. Renowned inventor and UMaine graduate Doug Hall inspired us all when he spoke at the Student Innovation Center ribbon-cutting in October. Doug reminded us that education drives innovation, but true success requires the ability to bring together creativity, courage and knowledge in a way that solves problems and improves our lives and our communities.

Robert A. Kennedy
President



ON THE COVER: Homemade food is an art form. From its color and texture to its wholesome ingredients and taste, it is crafted with attention to detail and made with pride. Such artisanal food is often developed from family recipes for the sake of heritage and good taste, or invented as value-added products. But when food artisans decide to share their passion with the public, their romantic, kitchen-based utopia gets dicey. They become small business owners, putting it all on the line — money, time, energy, livelihoods — to enthusiastically follow their instincts and dreams, courageously facing the harsh realities of the marketplace and the daunting maze of state and federal food safety rules and regulations.

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Printed by University of Maine
Printing and Mailing Services

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University of Maine profile

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 88 bachelor's, 64 master's and 25 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.

UMaine Today is produced six times a year by the Department of University Relations, University of Maine, 5761 Howard A. Keyo Public Affairs Building, Orono, Maine 04469-5761, 207-581-3744.

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Printing and distribution of *UMaine Today* are underwritten by the University of Maine Foundation and the Office of the Vice President for Research.

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Longtime UMaine food scientist Al Bushway and his colleagues receive hundreds of inquires a year about small-scale food production in the state. The scientists are instrumental in helping Maine's artisanal producers succeed in the specialty food industry.

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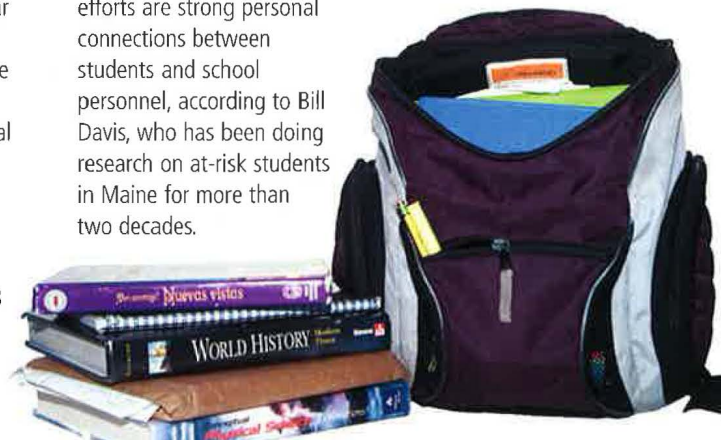
Personal Intervention

At the heart of effective school dropout prevention efforts are strong personal connections between students and school personnel, according to Bill Davis, who has been doing research on at-risk students in Maine for more than two decades.

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WAR IN THE NORTH WOODS

UMaine forest pathologists are working to understand bark disease that is decimating beech

By David Munson

MAINE'S FORESTS are at war. Facing new foreign invaders at every turn, the signature species of the state's vast forestlands are falling, one by one, to imported pathogens that not only kill individual trees, but change entire ecosystems in the process.

First to fall was the American chestnut, whose stately branches were wiped from the landscape by a fungal blight near the turn of the last century. The chestnut was soon followed by the American elm, which fell by the thousands after an epidemic of Dutch elm disease. Right now, Maine's beech trees are facing a second wave of disease by foreign invaders, leaving landowners and scientists alike worried that the beech may follow in the footsteps of the chestnut and the elm.

Enter Matt Kasson.

Kasson, a master's degree candidate in the University of Maine School of Forest Resources, is a key player in the battle to assess the future of Maine's beech trees, having made it his mission to understand the disease that is rapidly turning one of the state's top trees into

so much cordwood. Logging in thousands of miles on dusty dirt roads and seemingly endless stretches of northern highway, Kasson, with the help of a few dedicated undergrads, has bush-whacked his way to beech stands in more than 20

townships, drilling core sections and gathering bark samples that he hopes will lead to new information that could help explain the deadly blend of afflictions that cause beech bark disease.

"What we're seeing is not just a pathogen, it's a complex," says Kasson, arranging a set of crimson-colored cultures in an incubator in the lab. "There are a number of factors that can lead to the same result. We're trying to determine what factors contribute to high mortality in these stands so that we can better understand how this disease is affecting the trees and the forest."

Kasson has collected more than 2,200 tree cores — pencil-size cylinders of wood that provide a record of growth, from the tree's days as a sapling to its most recent annual ring — in which he hopes to find important clues about how the disease kills. Beech trees can live as



Graduate student Matt Kasson shows the invading fungus responsible for beech bark disease that's decimating the species.



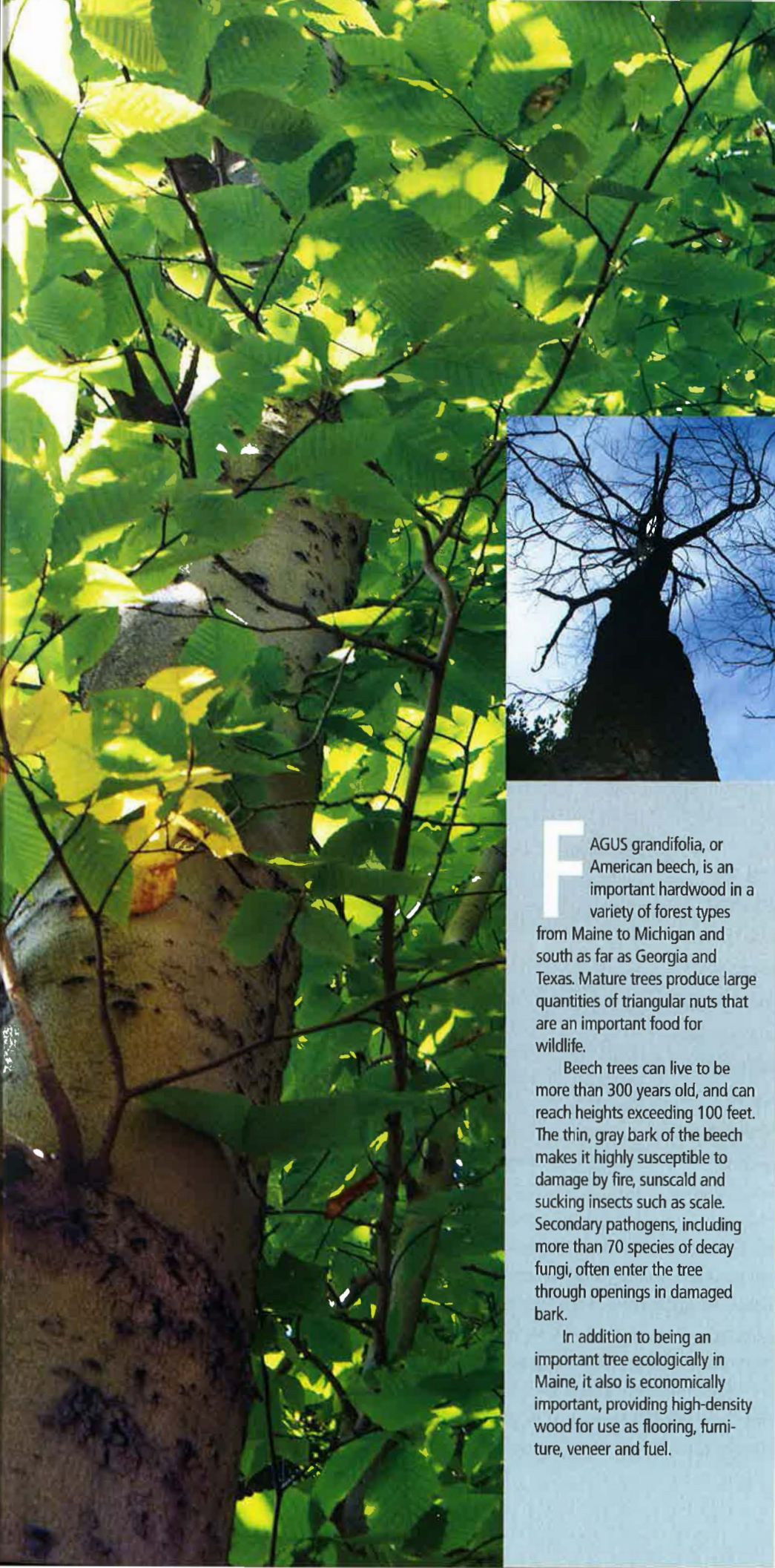


Photo courtesy of Matt Kasson

FAGUS grandifolia, or American beech, is an important hardwood in a variety of forest types from Maine to Michigan and south as far as Georgia and Texas. Mature trees produce large quantities of triangular nuts that are an important food for wildlife.

Beech trees can live to be more than 300 years old, and can reach heights exceeding 100 feet. The thin, gray bark of the beech makes it highly susceptible to damage by fire, sunscald and sucking insects such as scale. Secondary pathogens, including more than 70 species of decay fungi, often enter the tree through openings in damaged bark.

In addition to being an important tree ecologically in Maine, it also is economically important, providing high-density wood for use as flooring, furniture, veneer and fuel.

long as 300 years, despite hosting more types of decay fungi than almost any other American tree. By comparing cores from beech and other tree species unaffected by the disease, Kasson may be able to determine what environmental conditions contribute to both the spread of beech bark disease and the likelihood that it will kill its host.

“By looking at the tree rings in the cores, we can determine whether environmental conditions such as drought play a role in tree mortality,” says Kasson. “We can also better understand what factors may have determined why some beech stands were hit harder than others. We found evidence of lower mortality in north-facing slopes, for instance, which may offer us some insights into the conditions that are necessary for the disease to kill.”

PATHOGENS CAUSING beech bark disease were introduced to North America in the 1890s, arriving in Nova Scotia in a shipment of contaminated beech seedlings from England. From there, the pathogens spread west and south, reaching Maine’s coastal region by the 1930s. The primary pathogen is an exotic scale insect, *Cryptococcus fagisuga*, which provides access channels into the host tree’s tissues for the second pathogen, an invading fungus.

“The scale weakens the tree, but the fungus kills it,” said Kasson. “The roots usually survive, sending up dense thickets of young shoots that have no resistance to the pathogens.”

Strangely, while *Neonectria faginata*, one of the fungi that helped cause the disease, was introduced from Europe, the other, *Neonectria ditissima*, is a native of North America, just like the beech.

Kasson is examining the unique relationship between the two fungi to see how their interaction may affect the occurrence and expression of the disease across the landscape. He collects small bark discs from both healthy and infected trees, removes any



Matt Kasson has collected more than 2,200 tree cores — pencil-size cylinders of wood that provide a record of tree growth — in which he hopes to find important clues about how the disease kills.

Photos by Michael Mardosa

fungal spores that are present and then grows the fungi in the lab. Once the cultures are identified using morphological characteristics and DNA analysis, Kasson plans to set up trials to see how the fungi interact with one another. Initial observations suggest that the foreign species may be replacing the native fungus in the disease complex.

WHEN THE FIRST wave of the disease spread across Maine in the middle portion of the last century, many large trees and beech populations in more northerly stands were spared. A second “killing front” that has been slowly moving through the North Woods during the past decade has been much less merciful. Kasson believes that the relationship between the native and European fungi may hold the key to the virulence of the current outbreak.

Kasson also is looking at *Fusarium*, another fungi common throughout Maine’s

forests. Kasson and his research colleagues have observed unusually high concentrations of two *Fusarium* species in the bark of trees infected with beech bark disease — a fact that he believes may be significant in the complex interrelationship between the two *Neonectria* fungi and the scale insect causing the disease.

“When we take bark samples, *Fusarium* is everywhere. It’s in more than 80 percent of the samples,” says Kasson. “We plan to explore the role of *Fusarium* as a side project. If it is selective toward the native species of *Neonectria*, that could explain some of what we are seeing in the second wave of beech bark infection. *Fusarium* is ubiquitous, but it’s occurring so often, it seems to be more than just background noise.”

Working under the guidance of UMaine forest resources professor Bill Livingston, Kasson is taking a comprehensive approach

to studying the disease, examining not only how the disease has spread across the state and the forest, but how it moves through the stand and the individual tree. The ongoing research, funded by the U.S. Forest Service, has benefited greatly from the cooperation of the Maine Forest Service and northern Maine’s landowners, many of whom are understandably concerned about the effects beech bark disease may have on the state’s woodlands.

According to Kasson, less than 2 percent of the state’s beech population has shown resistance to the disease, and nearly a third of the beech trees in northern Maine have died.

Kasson hopes that what he learns through his research can be used to save the surviving beech trees in Maine and across the country.

“The fact that beech bark disease came into Maine first means we are on the front lines,” said Kasson. “We need to find out as much as we can now. It’s moving into Pennsylvania, Virginia, Michigan and elsewhere, and what we have here may just be a preview of coming attractions.” ■

“We’re trying to determine what factors contribute to high mortality in these stands so that we can better understand how this disease is affecting the trees and the forest.”

Matt Kasson



Personal best

NINTH GRADE was a watershed for Adi Levy.

Diagnosed that year with mononucleosis and forced to give up competitive swimming for nearly 18 months, Levy came to the realization that “water is my life.” As a result, she became more determined than ever to return to the sport.

The high school freshman also fell in love with computer programming, which for her became “a way of thinking” about the world around her.

Today at the University of Maine, the sophomore from Givatayim, Israel pursues both her life-passions. Levy is majoring in computer science, and considering a minor in mathematics or secondary education. As a member of the women’s swimming and diving team, her events are the butterfly and freestyle.

“The important thing in life is to learn as much as you can,” says the 21-year-old. “The detail involved in computer science is so interesting. Swimming is



Photos by Michael Mardosa

challenging and fun, an opportunity to be the best that you can.”

In her first year at UMaine, Levy was one of 39 Top of the Class students in the College of Liberal Arts and Sciences with a

3.75 or better GPA. Any downtime poolside found her studying.

During the swimming and diving season that begins in October, the team is in the pool every afternoon, with additional 6 a.m. practices two days a week. In her first year, she placed second in the 200 butterfly and set two UMaine records in the 800 free relay and 400 medley relay at the America East Championships.

In the off-season at UMaine, Levy and her teammates teach swimming classes for youngsters in Wallace Pool on campus.

Levy has been swimming competitively since age 12. Before coming to UMaine, she served two years of mandatory military duty in Israel.


She came to UMaine on the recommendation of her friend, Karin Feldman from Israel, who swam for UMaine until she graduated in 2005. One of Levy’s teammates, Tal Shpaizer, also is from Israel.

Levy’s plans include graduate school to continue her work in computer science.

“The important thing in life is to learn as much as you can. The detail involved in computer science is so interesting. Swimming is challenging and fun, an opportunity to be the best that you can.”

Adi Levy

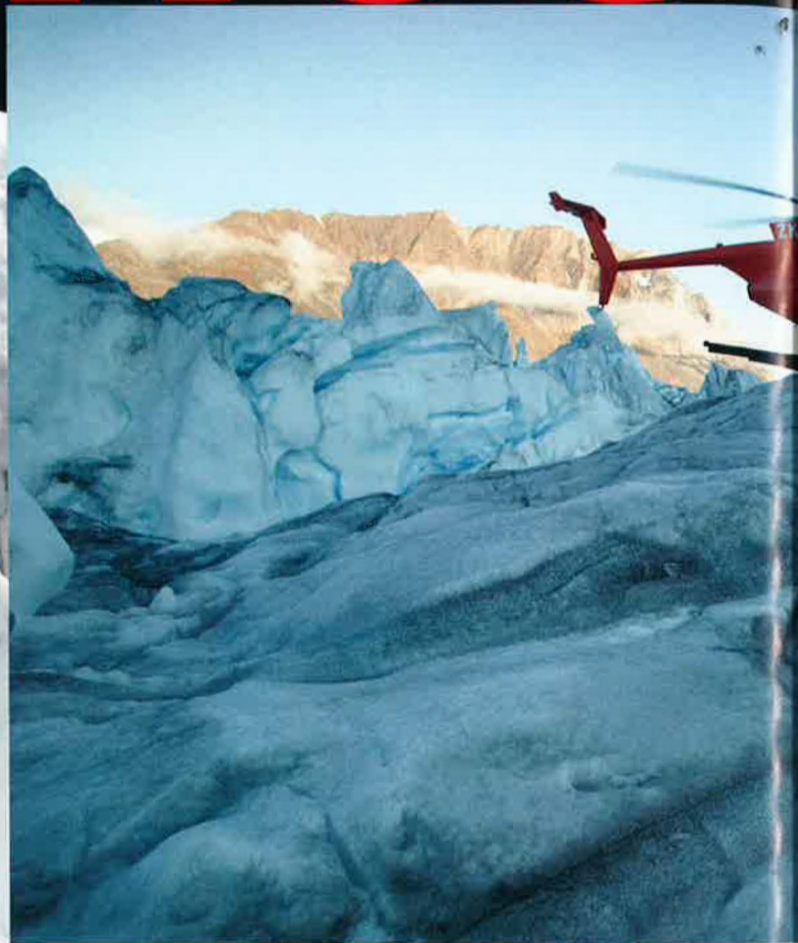
Hot



HER TRUSTY DOG Hudson at her side, University of Maine graduate student Leigh Stearns has spent the last two years exploring the jagged spires of ice and huge, yawning crevasses that make up the glacial ice fields of Greenland. Aimed primarily at tracking glacier speed and movement with the goal of understanding how ice sheets contribute to sea level, Stearns' research has led her to some of the most inaccessible and inhospitable places on the planet — and she has done most of it in a T-shirt and sandals.

Working under the guidance of Gordon Hamilton, an associate research professor in UMaine's Climate Change Institute, Stearns and master's student Bill Sneed have uncovered many of Greenland's secrets from their campus laboratory. The facility serves as the team's base of operations when the researchers are not in the field in places like Greenland and Antarctica. In the lab, they analyze, assemble and interpret data collected by high-tech equipment located in one of the few places colder than the poles: outer space.

Stearns and Hamilton, who braved Greenland's unfriendly weather not once but three times in 2006, have opened a new chapter in glacier research using ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) — advanced sensor technology found on NASA's Terra satellite. Looking down from 440 miles above the surface, ASTER captures unique, stereoscopic images of Earth's glaciers, supplying the researchers with an unprecedented tool for measuring the size and tracking the movements of the planet's frozen water reserves.

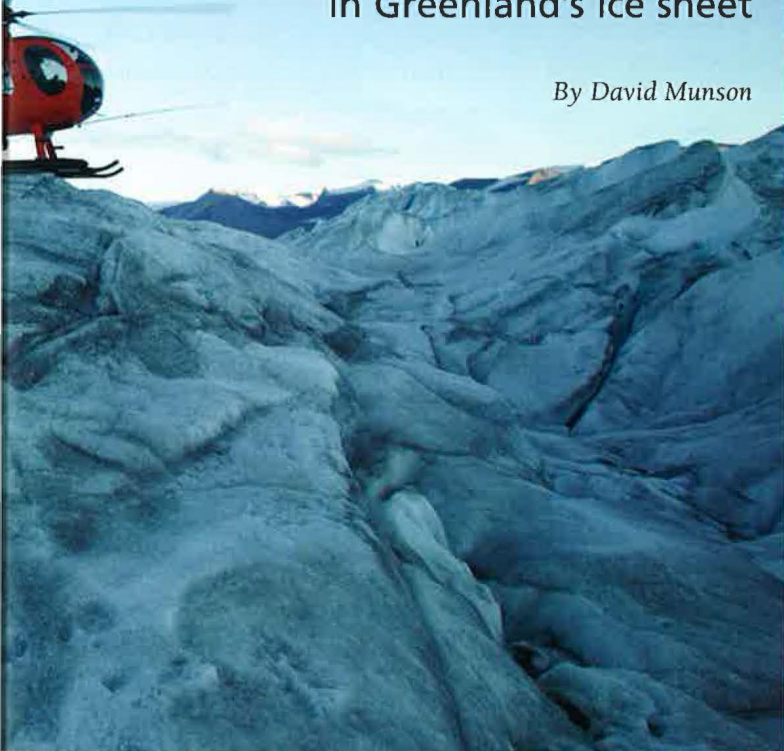


Collecting reliable field measurements is critical to establishing a clear picture of how Greenland's ice sheet is changing, but there are risks involved in traversing the unpredictable glaciers. Fieldwork requires a small helicopter flown by a pilot skilled enough to land in difficult spots. The researchers drill holes in the ice to position poles fitted with

spot

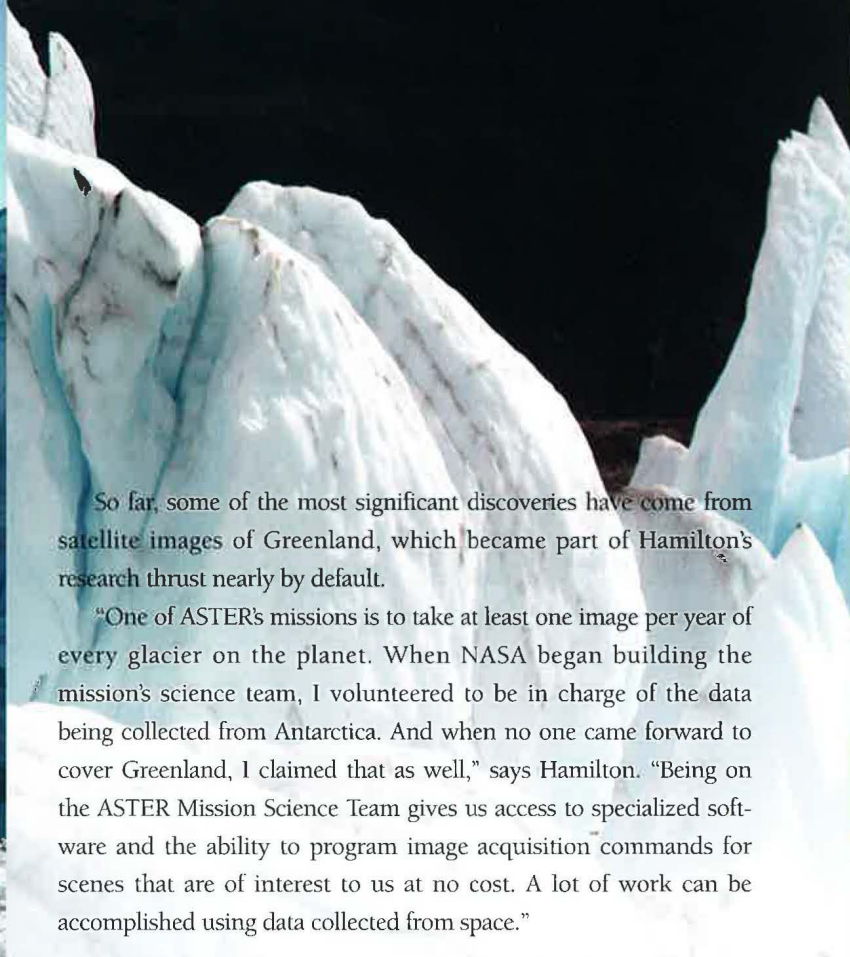
Climate change researchers use NASA technology to study the dramatic changes in Greenland's ice sheet

By David Munson



Photos ©Greenpeace/Morgan

GPS receivers that collect high-resolution data every five seconds. The scientists are looking at the possibility that surface water may help accelerate the glaciers' movement. Calculations done using ASTER satellite imagery have shown increases in meltwater volume of more than 300 percent in less than a week on the surface of some glaciers.



So far, some of the most significant discoveries have come from satellite images of Greenland, which became part of Hamilton's research thrust nearly by default.

"One of ASTER's missions is to take at least one image per year of every glacier on the planet. When NASA began building the mission's science team, I volunteered to be in charge of the data being collected from Antarctica. And when no one came forward to cover Greenland, I claimed that as well," says Hamilton. "Being on the ASTER Mission Science Team gives us access to specialized software and the ability to program image acquisition commands for scenes that are of interest to us at no cost. A lot of work can be accomplished using data collected from space."

CHARGED WITH FINDING a way to track the movements of Greenland's glaciers over time, Stearns adapted techniques used with other types of satellite imagery to develop an advanced method for identifying specific areas on the surface of glaciers. Acting as a kind of glacial fingerprint, the patterns of light and shadow revealed in images of icy ridgelines and crevasses can be precisely identified in a series of images using a computer, allowing Stearns to determine the speed of the glacier by calculating the distance it traveled over time.

Surface water assessment is another facet of the research being done using ASTER's sophisticated sensors. Standing out as brilliant blue pockets in a vast sea of snowy white, lakes of meltwater may provide important insights into why some of Greenland's glaciers are accelerating. Sneed, a former computer systems specialist, utilized the expertise of UMaine marine scientist Emmanuel Boss to apply techniques used in oceanography to the problem of measuring

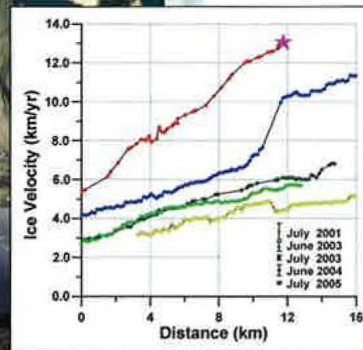
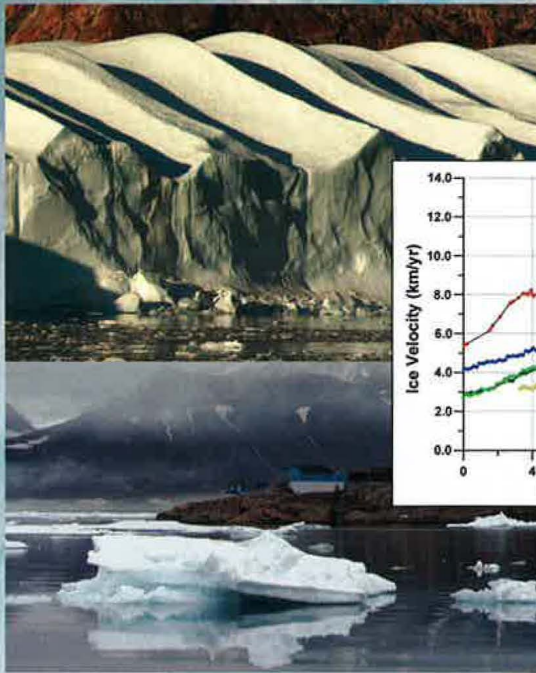
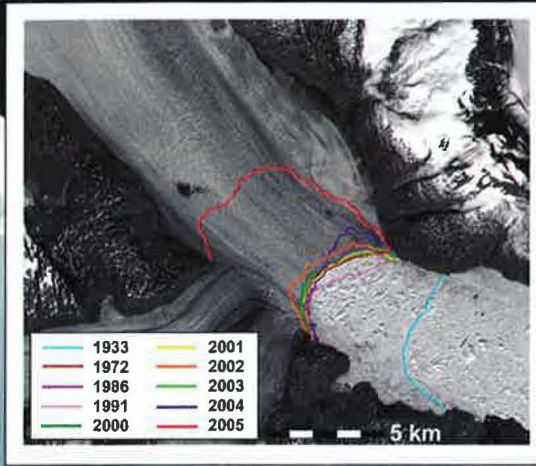
surface water volumes on glaciers. By comparing variations in the penetration of different wavelengths of light into the lakes and frigid floodplains, Sneed is perfecting a technique for determining the water's depth, which, combined with the less challenging calculations for surface area, provide a glimpse into the surprising volume of water that rides the back of Greenland's ice on its way to the ocean.

"The lakes are obvious, but when you look closely you realize that there is an enormous amount of water on the surface of the ice," says Sneed, pointing out that much of what appears as ice fields in satellite imagery is actually shallow meltwater and slush.

THE ADVANCES MADE by Hamilton and his team in applying space-based technology to earth systems have added to the tool box used by climate change researchers, but the discoveries made with those technologies has set the field of glacier research on its ear. Perceived by many to be relatively constant, slow-moving systems, Greenland's glaciers were found to be accelerating at a disturbing rate.

"Our results showed that things are happening in Greenland a lot faster than anyone thought," says Hamilton. "Now the rush is on to find out why it's happening and if it's going to continue."

After analyzing hundreds of ASTER images and comparing tens of thousands of data points, Stearns'



ASTER images allow researchers to compare exact locations on the Greenland ice sheet to see changes over time. UMaine climate change researchers Gordon Hamilton and Leigh Stearns can analyze tens of thousands of data points from one pair of images — a technological breakthrough that complements the data collection in the field. The pair braved Greenland's unfriendly weather three times in 2006, gathering data directly from the glaciers using GPS and other technologies. On one field visit, the team lowered a device for measuring water depth into one of the many meltwater lakes that form on the surface of Greenland's glaciers. Hamilton and Stearns had expected to see fluctuations in depth that could help to verify Bill Sneed's remote measurements of surface water, but when they returned just six weeks later, the equipment — and the lake — was gone. Hamilton and Stearns continue to monitor the rate at which Greenland's glaciers are melting into the sea, but their primary focus now is to determine why the changes are occurring and if they can be expected to continue.

calculations showed that three of Greenland's largest glaciers had accelerated as much as 300 percent in the last four years, racing to the ocean at an incredible 14 kilometers a year — three times faster than what had been previously considered fast-moving for a glacier. Dumping hundreds of cubic kilometers of meltwater into the Atlantic, the accelerating glaciers could cause a significant rise in sea level and dramatic changes to ocean currents and salinity.

ASTER's ability to provide images taken at multiple angles allowed Hamilton and Stearns to map the topography of Greenland's ice sheet as well, revealing that many of the glaciers are not only speeding up, they are thinning.

"There are only about 50 major glaciers in Greenland, and approximately half of all the ice lost from the ice sheet in 2005 came from just 10. With three of those glaciers rapidly accelerating, you get a pretty significant result," says Stearns, a NASA Graduate Fellow who recently presented her research at the 2006 International Astronautical Congress in Valencia, Spain. "You don't need many glaciers to change the effects of fresh water entering the Atlantic and throw off the mass balance of the ocean." ■

perspective Innovation engineering



Doug Hall

Title: Professional inventor, corporate rebel, small business advocate, University of Maine alumnus

Research focus:

Entrepreneurship and invention

Years at UMaine: Four as an undergraduate majoring in chemical engineering

Milestones: Master Marketing Inventor with Procter & Gamble; founder of Eureka! Ranch, which has been named America's No. 1 Idea Team by *Inc.* magazine, *A&E* Top 10 and *CIO* magazine; panelist on ABC TV's *American Inventor*

Photo by Michael Mardosa

Question: How do you view the new Student Innovation Center that opened this past fall on campus?

Answer: This is a place where ideas and entrepreneurship come together, where education fuels dreams and where creativity will intersect with capitalism. It's a place where optimistic radicals and revolutionaries — bold and brave thinkers — will gather to solve the world's problems. The purpose of the center is to facilitate ideas, insights and inspiration to support these revolutionaries who will invent meaningful solutions to the challenges before us — from global warming to our dependence on oil, from diabetes and obesity to our falling to 16th in the world in the levels of new scientists and engineers.

Question: You helped conceptualize the Innovation Engineering Program and the Student Innovation Center. What will be your ongoing role?

Answer: I and my Eureka! Ranch team will provide mentoring, testing and research, workshops and seminars. The Student Innovation Center will be the best in the world, offering invention team support, business incubation, mentoring and even a living/learning community in a residence hall. Anyone with an idea, primarily students, as well as faculty and members of the community, can come to get insights and inspiration to turn their dreams into reality.

Question: How does the philosophy behind the Student Innovation Center dovetail into the innovation engineering initiative at UMaine?

Answer: Innovation engineering began in 2005 as an interdisciplinary studies course, designed to help students develop a systematic engineering approach to inventing, evaluating and selling innovative ideas with commercial viability. Innovation engineering is now trademarked as a branded educational program of the University of Maine. My dream is that people from around the world will come to the center, home of the Innovation Engineering Program, to learn, become certified and trained.

Question: Why are student innovation and entrepreneurship so important?

Answer: What drives creativity is education. But in today's world, it's not enough to just have knowledge; you've got to be able to apply it. Patents are given to entrepreneurs who have the power and courage to break the rules and make a difference in the world. Change is good. What we must do is give ideas, insight and inspiration to the change agents — the optimistic revolutionaries — with the courage to transform problems into opportunities to make a better university, state, nation and planet.





Pleasant Palates

Science helps Maine speciality food producers find their niche

By Margaret Nagle

HOMEMADE FOOD is an art form all its own. Made with the freshest, healthiest ingredients, often locally grown and organic. Made with love — and pride. Often fashioned from family recipes for the sake of heritage and good taste, or invented as value-added products.

No matter the method, the handcrafting satisfies. And, at the height of perfection, the creation is always shared.

But it's when food artisans decide to share their passion with the public that their romantic, kitchen-based utopia gets dicey. They become small business owners. Food entrepreneurs who put it all on the line — money, time, energy, livelihoods — to enthusiastically follow their instincts and dreams, and courageously face the harsh realities of the marketplace, say nothing of the daunting maze of state and federal food safety rules and regulations.

Make no mistake about it. Consciously or otherwise, theirs is a quiet yet all-out revolt against conglomerate food producers distributing highly processed products that rely on additives, preservatives and low-cost ingredients for ultimate profitability and shelf life. Part of the “slow food movement” denouncing fast food, small food producers offer a healthy alternative for consumers interested in closer connections to their sources of sustenance. Artisanal food producers and their customers share discriminating tastes that come at a higher price — and a distinct difference in quality of life.

“These food producers have a lot in common with the creative economy,” says Jim McConnon, a University of Maine Cooperative Extension business and economics specialist and associate profes-

Pleasing Palates



For the past 27 years, University of Maine food scientist Alfred Bushway has been the go-to guy for food producers, large and small, in the state. His depth of expertise is unfathomable. His commitment to putting food science to work for the benefit of the state and its people is well known. Among Maine food producers, you can refer to Al and they all know whom you're talking about. They describe him as down to earth and caring. Able to translate science into layperson's terms. Patient enough to answer even the smallest question and knowledgeable enough to take on the biggest challenges. He is always just a phone call or e-mail away. Even those in the industry for years contact Bushway as often as every other week. For some, he's on speed dial. Anecdotal evidence abounds about the encouragement he offers fledgling food entrepreneurs. The artisanal producers know and appreciate that his counsel is science-based, and, as a result, his responses aren't always what they'd love to hear. And at times, support from UMaine food scientists involves helping the entrepreneurs keep the goal in sight, no matter what the hurdles.

sor of resource economics and policy, who has worked with these companies for the past 17 years. "They are innovative, customer-driven people — and have to be."

The specialty or value-added food producer is an important component of Maine's overall microbusiness economy, in which 135,000 businesses with up to five employees account for 22 percent of the state's employment base, says McConnon, who recently completed an extensive study of microbusinesses in Maine and New England.

"One of the future growth areas in rural economies is the rise in value-added businesses to support the growing, overall economy," McConnon says.

MAINE HAS 6,000 LICENSED food businesses, from home bakeries to potato, blueberry and seafood processors, according to David Gagnon, director of the Division of Quality Assurance and Regulations in the Maine Department of Agriculture, Food and Rural Resources. An estimated 672 are producing foods considered non-potentially hazardous, typically not requiring refrigeration.

For start-up food producers in Maine, expertise is available through numerous agencies, including the state Department of Economic and Community Development; the Maine Department of Agriculture, Food and Rural Resources; the Maine Technology Institute; and UMaine Cooperative Extension.

To meet state and federal regulations, small food producers in Maine and other northern New England states have their food products and processes reviewed at the University of Maine in the Department of Food Science and Human Nutrition food microbiology laboratory of Alfred Bushway. In the last 15 years in Maine and New Hampshire, Bushway has done nearly 700 process reviews for acid and acidified foods that are canned or bottled, such as jams, pickles and salsa — a step-by-step laboratory analysis of recipes, paying particular attention to heating and cooling times and temperatures.

MAINE'S FOOD PROCESSORS range from one person working out of a home kitchen to multinational corporations, yet they have common needs and interests: product development, packaging, marketing, quality control, "economies of scale" for cooperating small businesses, and changing technology that improves processing and opens worldwide markets. For small processors, networking — connecting people to the resources — is particularly important.

Bushway and Beth Calder, University of Maine Cooperative Extension food science specialist, field more than 400 calls, e-mails and letters a year about small-scale food production, including some queries that begin: "I've got this new product that I'm making in my kitchen. Where should I go from here?"

Bushway helps guide food entrepreneurs through the federal and state regulations regarding food processing, while Calder and Connie Johnson, Matthew E. Highlands Pilot Plant manager, focus on product development and offer grant writing assistance — review, input and letters of support.

Maine's successful food entrepreneurs share common characteristics, the experts agree. They are people who have energy, ambition and drive. They're willing to take a chance and resilient enough to take the ups and downs that come with commercializing a food product.

"These are people who are trying to improve some aspect of their lives," says Calder. "Their products have personal stories behind them. (Consumers should have) pride in knowing these are Maine people going through with their labors of love and coming out with these great products."



Caviar and munchies

ROSEMARY AND CRAIG GLADSTONE have a sixth sense about what people like. Nutritious fruit and nuts. Romantically dark, organic lavender chocolate. The Maine mystic.

The ingredients combine to make nearly 20 kinds of Maine Munchies, sold under the Gladstone's Under the Sun label.

"Eighty percent of people buy our product after they sample it," says Craig. "We offer healthy snacks with the call of Maine."

The now trademarked Maine Munchies began in the Gladstone's kitchen. The snack bags were hand-packed. The bright labels were run off an inkjet printer.

By the end of their second year, Gladstone's Under the Sun products were being carried by Eastern Mountain Sports and L.L. Bean.

In 2005, the company with its five employees outgrew its Bar Harbor production site and relocated to a facility in Ellsworth.

Gladstone's Under the Sun received two seed grants from the Maine Technology Institute (MTI), first to explore a healthier, more nutritious preservation method for Maine blueberries and other fruit, and then to develop a manufacturing process to satisfy commercial need.

Last October, Gladstone's also received one of MTI's four development awards for its process to dry wild blueberries and cranberries without the use of high-fructose corn syrup. The nearly \$250,000 award will fund test production and development of commercialization plans.

The Gladstones worked with University of Maine food scientist



Al Bushway to find ways to reduce the use of high-fructose corn syrup in the drying process. Related product development research has been undertaken by UMaine graduate students.

Similar expertise has been offered by engineers and scientists in UMaine's Advanced Manufacturing Center.

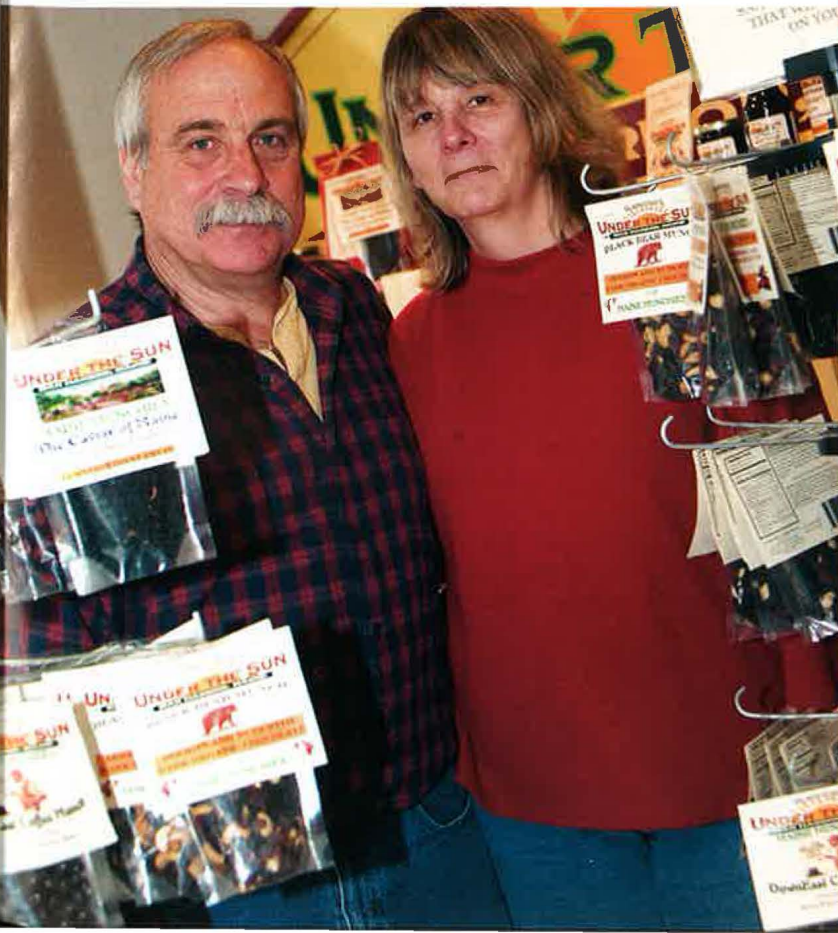
Savoring sophistication

THE TANGY, PIQUANT AROMA of fresh ginger and cashews electrifies the spacious commercial kitchen where a thick, golden sauce is cooking in a 70-gallon steam-jacketed kettle, nearly ready for bottling.

As he does with every batch of the all-natural products he makes, Jeff Johnson, owner of Pemberton's Gourmet Foods, taste tests. It's just one of the many small steps that combine to create a "hand-crafted" food product line.



It was while packaging Yankee Doodle Dandy mix — dried wild blueberries and cranberries with vanilla chips — that Craig and Rosemary Gladstone of Bar Harbor, left, "discovered" Maine caviar, the name they trademarked for their dried and canned wild blueberries, sold as one of their Gladstone's Under the Sun products. Jeff Johnson, above, and his wife, Sarah (not pictured), set out to "create a brand from scratch and give it meaning." The result: Pemberton's Gourmet Foods, headquartered in Gray.



Pleasing Palates

Two decades ago, Johnson and his wife, Sarah, were in Boston, working for a marketing agency with giant clients like Nabisco, when they found themselves wishing for careers in which they could control the food process from beginning to end.

Plus, Sarah was a terrific, intuitive, natural cook.

In 2000, the Johnsons bought two Maine companies, including 'Stache Foods, maker of the Death by Chocolate specialty line. What started with upward of 80 recipes has been streamlined to a company based in Gray offering up to 40 gourmet products. Under the Pemberton's brand, the Johnsons introduced pasta sauce and olive pesto, salsas that are not tomato-based, and cooking sauces.

The biggest challenge has been finding the balance between growth and management efforts, says Johnson. For other challenges, like ingredient interaction in prototype products, the Johnsons tapped the expertise of UMaine food scientist Al Bushway. Regardless of the food product, Bushway provided technical expertise.

"I have a reason to call or e-mail at least once every couple weeks," says Johnson. "It's a match made in heaven."

Spreading success

EVERY YEAR AROUND the holidays, Carla Portwine's friends received a rich, edible gift — a delectable, amber-colored spread made with five cheeses and assorted spices. Friends would ask her to make extra for them to give to their friends. It was that good.

But the last big batch Portwine made for gift giving was in 2002. Dec. 27 of that year, more than a thousand workers lost their jobs at Great Northern Paper Co., in Millinocket. Portwine's husband was one of them.

"When the mill went down and my husband lost his job, the only thing I knew how to do was cook," says Portwine.

Portwine launched her company, Portwine of Maine, with \$58 and the help of seven friends who shared her vision and volunteered their talents. The women, who like Portwine are in their 50s, helped to convert an abandoned downtown building into a small processing facility, complete with a licensed kitchen containing some equipment donated by members of the community.

In spring 2004, Portwine took her cheese spread to UMaine's Department of Food Science and Human Nutrition for the process review needed to commercialize the product.

"He tasted (the cheese spread) and said I had one problem. It's addictive," says Portwine, still tickled by the initial reaction of UMaine food scientist Al Bushway.

Smokin'

CARL JOHNSON HAS DEVOTED his life to food. The well-known executive chef on Mount Desert Island was overseeing the food service in four of Bar Harbor's hotels when a near-fatal car crash in 1995



During her busiest sales seasons, Carla Portwine, above, makes nearly 120 pounds of cheese spread a week. Her workdays at Portwine of Maine in Millinocket begin at 4 a.m. At Grindstone Neck of Maine in Winter Harbor, Carl Johnson, above right, uses all-natural ingredients like wild blueberry honey as sweetener in smoked salmon. Even the wood chips used for smoking are FDA-certified, free of precipitative contamination. In Franklin, Maine Coast Sea Vegetables remains committed to serving the needs of individual customers. The company has long-since discovered the efficiency of selling "big boxes of little bags" to distributors. Yet owner Shep Erhart, right, never forgets that filling the direct mail orders of individuals is just as critical to sharing the wonders of seaweed.

>> Read more about these artisanal food entrepreneurs on UMaine Today magazine's Web site (umainetoday.umaine.edu).

Photos by Bill Drake and Michael Mardosa



changed his life. It was food that saved it.

Johnson bought the Fisherman's Inn Restaurant in Winter Harbor and got down to basics. He served dishes made with locally produced foods and smoked his own seafood to achieve chef-quality standards.

In 2002, the enthusiasm of his restaurant patrons encouraged Johnson to launch his own smoked seafood business, Grindstone Neck of Maine. Johnson started the business with longtime friend Roger Billings. The Winter Harbor company in a former hardware store specializes in "handcrafted, gourmet smoked" salmon and other seafood that is either wild caught or organically raised.

With his decades of food experience, Johnson can discern at a glance subtle differences in smoked seafood. But at the start of his company, what he needed most was help navigating the myriad of health and safety regulations concerning food production.

At the University of Maine, food scientist Al Bushway helped Johnson and Billings with their FDA-required Hazard Analysis and Critical Control Point (HACCP) Plan for food safety.

Not only is the smoked seafood industry highly competitive, it is one of the most FDA-regulated food products, second only to canned fish, Johnson says. But the attention to detail is in keeping with the philosophy of Grindstone Neck of Maine.

"We're perfectionists in what we do," says Johnson.

Sea veggie savvy

SHEP AND LINETTE ERHART moved to Down East Maine in the early '70s to homestead, living off the land and an income of \$3,000 a year. They did the seasonal work to earn enough money to buy what they couldn't raise. Seaweed imported from Japan, their substitute for meat, was their most costly expense.

One day while having a picnic at Schoodic Point near low tide, they found seaweed resembling the dried fronds they crumbled into their miso soup. The epiphany that summer day changed their lives.

In 1971, they became pioneers in sea vegetable production and launched their company in Franklin, Maine Coast Sea Vegetables.

A watershed moment came in the mid-'80s, when Maine Coast Sea Vegetables outgrew the Erharts' house and relocated to their barn. It was also during this time that the marketplace started changing.

"People were more savvy and asking harder questions, such as what about the proteins of seaweed are assimilable. That's when I would call Al (Bushway)," Erhart says.

Other UMaine experts also work with Maine Coast Sea Vegetables. Food scientist Rod Bushway, Al's brother, has analyzed the active ingredients of seaweed that make it a "healing food." In 1989, nutritionist Debra Ahern published a study about the beneficial effects on hypertension from the seaweed found in the company's Sea Seasonings. In addition, Erhart has worked with marine scientist Susan Brawley, whose research focuses on algae.

Pleasing Palates

Pickled potential

GROWING UP ON a potato farm in Aroostook County, Mike Henderson was surrounded by fresh produce and home cooking. One of the foods he most fondly remembers: pickles made by his grandmother, aunts and mother. A staple on the lunch and dinner table.

Henderson admits that he still can't make pickles as good as his 85-year-old mother can, but that's news to fans of Mike's Maine Pickles.

Henderson took a handful of favorite recipes and added "a pinch of something." And the look — clear pint canning jars with no-frill lids and miniscule labels — is right off the kitchen pantry shelf.

His first sales were at craft fairs, county fairs and farmers' markets. He drove from one to another. He traveled Route 1 throughout Maine and into New Hampshire, stopping at mom-and-pop shops, selling out of the trunk of his '86 Lincoln Town Car.

Each of Henderson's recipes underwent process review at the University of Maine. In recent years, he's counted on UMaine food scientist Al Bushway to help him meet federal Food and Drug Administration standards for food security that only got stricter after Sept. 11, 2001. And it was Bushway who was particularly helpful in troubleshooting what has become one of Henderson's signature products — pickled garlic.



Mike's Maine Pickles in Easton offers old-fashioned bread and butters, dilly beans, and pickled eggs and sausage, but owner Mike Henderson, above, also cranks up the volume by offering "hot" varieties of the traditional favorites. Even his candy carrots have a certain zing. X Café's liquid coffee extract, manufactured in Portland using a patented process invented by Paul Kalenian, right, is made into a ready-to-dispense product with a non-refrigerated shelf life of four months.

"Everyone who was doing pickled garlic ended up with the garlic turning green," Henderson says. "With Al's expertise, we discovered that enzymes were setting off sulfur, so we came up with a process that gave me an edge."

The X factor

EVEN WHEN THE HIGHEST quality Arabica coffee beans are roasted and shipped fresh to the finest restaurants, there is no guarantee of a great cup of coffee. That's because of human error during both brewing and handling, says coffee entrepreneur Paul Kalenian.

"If the coffee's already made and has been sitting, it will taste stale. If it is already brewed and you don't sell it all, that's a big financial loss," he says.

X Café has eliminated that inconsistency by developing a coffee extract that has all the flavor and aroma of fresh brewed. A measured amount of filtered water (30 parts) and coffee extract (1 part) produces a cup of coffee with clarity and consistency, cup after cup.

Kalenian's patented coffee extraction process began with a small extractor he built in his basement. He and his wife, Cathy, launched X Café as an offshoot of their coffee roasting company near Boston.

Kalenian worked with UMaine food scientist Al Bushway to install an extraction system at Schlotterbeck & Foss, a longtime specialty food manufacturer and distributor in Portland, Maine. It was Bushway's suggestion to install a reverse-osmosis water purification system, which dramatically improved the taste of the coffee, Kalenian says.

Today, X Café's state-of-the-art facility produces 4,000-plus gallons of liquid coffee extract in 10 hours — the equivalent of 2 million cups of coffee. ■





Protecting salmon rivers

THE QUIET BACKWATERS of the Pleasant and Narraguagus Rivers in Washington County are a popular destination for many, offering paddlers and hikers alike scenic views of scented woods and rolling pastures. University of Maine doctoral student Lucner Charlestra has spent untold hours on the small rivers of coastal Maine, but he doesn't go there for the scenery.

He's looking for the rivers' dark side.

Charlestra is working with UMaine Professor of Chemistry Howard Patterson to determine the concentrations of harmful pesticides in Maine's salmon rivers. Charlestra first came to Maine from Haiti in 2003, using his Fulbright Fellowship to pursue his master's degree in environmental science and ecology. His research included a successful pilot project that pioneered the use of the Polar Organic Chemical Integrative Sampler (POCIS) to measure concentrations of dioxin.

Charlestra went home to Haiti this past summer, planning to continue his research in the fall as a UMaine Ph.D. student. However, his return to the States took considerable political wrangling.

New federal requirements for international students led to a nearly impenetrable tangle of bureaucratic red tape. But with letters of support from UMaine and Sen. Susan Collins, Charlestra's return to the state was finally approved and the second phase of his research began.

"We were the first to use the POCIS device for these pesticides. Now that we have proved that it works, we need to develop techniques that increase the accuracy of the measurements and we need to gather more data," says Charlestra, who is determining sampling parameters in the lab and will return to the field this summer.

Pesticides used on blueberry fields and farms, and in residential applications often find their way into Maine's rivers and streams, but in most areas, their concentrations are largely unknown. Under a federal mandate to protect populations of endangered Atlantic salmon in Maine's rivers, policymakers are looking for ways to better understand the relationship between the use of pesticides and the health of the rivers' fish populations.

According to Charlestra, the POCIS device has a distinct advantage over traditional water sampling techniques in measuring the concentration of pesticides and other compounds. Rather than measuring concentrations at a single moment in time, POCIS allows researchers to study changes in concentrations during longer periods by suspending the specialized sampler in the water column for several days or weeks.

Charlestra hopes that his research, supported by the Maine Department of Environmental Protection, the Atlantic Salmon Commission, the Environmental Protection Agency and the U.S. Geological Survey, will provide new information for scientists and policymakers.

"In order to protect Maine's salmon populations, we need to better understand the extent to which they are exposed to contaminants," he says.

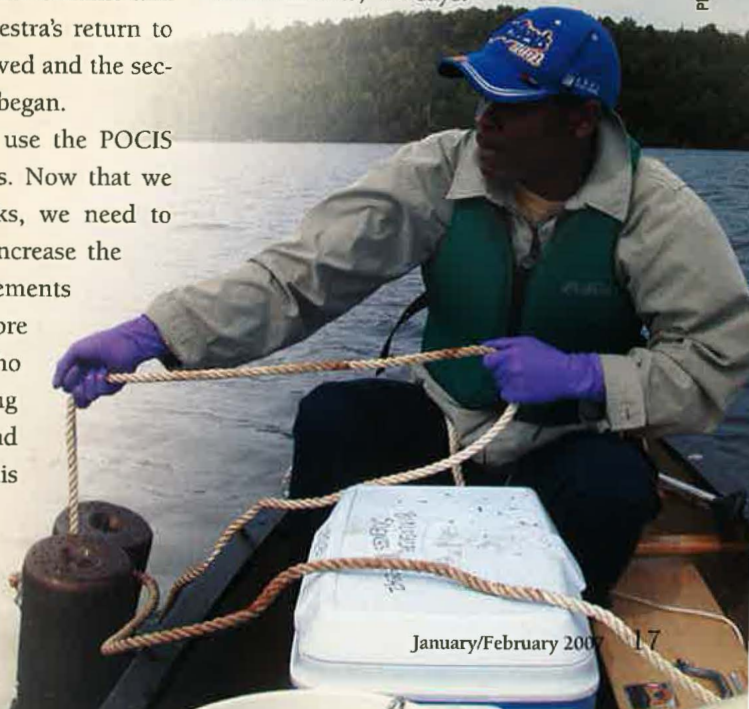


Photo courtesy of Lucner Charlestra

AMY'S FAMILY MOVED so often that she never stayed in the same school long enough to make friends or learn very much. She dropped out in the 10th grade.

Ellen left school in the 11th grade because all she wanted to do was stay at home and sleep. No one realized she suffered from depression.

Alcohol and marijuana were Erik's undoing. Jason simply found school unbearably boring.

These four Maine youngsters are not necessarily typical high school dropouts. But neither is anyone else. There are nearly as many reasons for dropping out as there are students who make that choice, according to William Davis, professor and founder of the University of Maine Institute for the Study of Students at Risk, part of the College of Education and Human Development.

Davis has researched, taught and written about students who drop out for more than 20 years. Last spring, he and two of his colleagues produced the *Maine Dropout Prevention Guide*, the most comprehensive and authoritative work on the subject ever developed for the state's teachers, principals and superintendents.

"A lot of people, including educators, tend to define the potential for dropping out almost exclusively in terms of poor academic performance," Davis says. "But very often it is a combination of academic and social problems in school. And sometimes dropping out has little if anything to do with academic or behavioral difficulties.

Strong connections between students and school personnel are key to dropout prevention efforts

By Dick Broom

Personal intervention





“Many of these kids just don’t feel any personal relationship with school. They range in intelligence from extremely bright to borderline, but they don’t see any real value in attending school.”

They apparently think — if they think about it at all — that they will somehow beat the odds and not have a tough life. But compared to high school graduates, dropouts as a group have lower incomes, higher rates of unemployment and substance abuse, greater chance of being arrested and imprisoned, and higher likelihood of needing public welfare assistance.

DAVIS MAKES IT clear that the *Dropout Prevention Guide* offers no magic formulas for keeping every student in school; the problem is much too complex. Rather, he recommends the kinds of policies and programs — and, above all, the attitudes — that have been shown to help prevent dropouts.

“One key is the willingness to be flexible to meet the needs of students who might require a different schedule or a different way of meeting academic, social and/or behavioral objectives,” Davis says.

“That doesn’t mean letting the student off easy. People often

interpret dropout prevention programs as a watering down of the curriculum, but that’s not the case. The programs that are most effective provide students with reasonable challenges and achievable goals. The students are respected; they are asked to be accountable.”

At the heart of effective dropout prevention efforts are strong personal connections and relationships between students and school personnel, Davis says.

Richard Curtis, superintendent and principal of the K–12 Forest Hills Consolidated School in Jackman, Maine, has taken Davis’ graduate-level course, *Students at Risk and Their Families*, and has attended the Dropout Prevention Institute, held every summer at UMaine.

Through the years, Curtis has adopted strategies that Davis advocates for keeping students in school. And while it might be just a coincidence, in most years, not a single student drops out in Jackman.

“Bill has made a wonderful difference for people like me,” he says.

IN MAINE, AS throughout the country, students who chronically struggle with schoolwork or live in extreme poverty are much more

Effective programs provide students with reasonable challenges and achievable goals.

Keys to dropout prevention

The Maine Dropout Prevention Guide from the Institute for the Study of Students at Risk lists the essentials of a successful dropout prevention program. Among them:

1. Teachers who are well trained and have the time, administrative support and encouragement to provide individualized attention and instruction to students.
2. A challenging academic curriculum that is integrated with the personal and social needs of students.
3. Flexible scheduling and flexibility for students to earn credits toward a high school diploma.
4. Clear rules regarding students’ expectations and behaviors, along with consistent and fair consequences for violations.
5. An environment in which students feel safe and cared for, and in which they learn to care for others.
6. Collaborative partnerships with public agencies, community organizations and citizens.



likely to leave school before graduating. Also at high risk are students who experience difficulty adjusting to the conventional school structure and programs, as well as students with disabilities or chaotic home lives, or those who have babies of their own.

In 2003, the most recent year reported, the national high school dropout rate was 4 percent a year. In the Northeast, the rate was 3.6 percent.

The dropout rate in Maine for the 2004–05 school year was 2.8 percent, with 1,739 students leaving school. However, Davis says it is important to recognize that student dropout rates tend to substantially underestimate the percentage of students who drop out.

Nearly 2,000 dropouts a year are a lot to lose, says Shelley Reed of the Maine Department of Education, who specializes in the areas of truancy, dropouts and alternative education. But that number might well be larger if not for Davis' two decades of research and recommended strategies for keeping them in school.

"He has been the No. 1 champion for at-risk kids in the state of Maine," she says. "He raises the consciousness and provides the solid information to point people in education in the right direction."

For example, Davis cites research findings that children who are held back and made to repeat a grade — even an early grade — are much less likely to finish high school.

"And more than one retention almost guarantees that a student will eventually drop out," he writes in the *Dropout Prevention Guide*. "Given the strong accountability provisions of both No Child Left Behind and Maine's System of Learning Results, increasing pressures exist to retain students."

THE TRANSITION FROM middle school to high school is particularly difficult for some students, both academically and socially. Students are most likely to fall behind in ninth grade, where course failure is the single strongest predictor for eventually dropping out.

Pregnancy also is high on the list. Having a child can permanently derail plans for finishing high school and maybe going on to college. But for some girls already at high risk for dropping out, pregnancy gives them a reason to get their lives back on track.

"I've never seen a teen mom who didn't want to be a good mother," says Jana Burgoyne, who teaches pregnant, parenting and other at-risk students at the Maine Children's Home in Waterville. "They all want to

get their education so they can be proud for their child."

While Davis is a great source of information and insight for special education and alternative schoolteachers, Burgoyne says he probably is even more valuable to the "regular ed" teachers who take his course or attend his summer institute.

"He helps you understand what some kids' lives are like and the difficulties they have to deal with at home, things that most of us probably can't even imagine," Burgoyne says. "He realizes that it's a miracle if they come to school at all. I think teachers who are exposed to Bill have a whole different understanding, level of compassion and ability to be flexible."

Davis reminds us that we can't afford not to offer special programs or other support for at-risk students, Burgoyne says, "because the costs of those kids not completing school and becoming contributors to society are a lot greater, and not just financially."

DAVIS TAUGHT MIDDLE school before earning his doctorate and joining the UMaine faculty in 1968. His teaching and research have focused on special and alternative education, and school psychology. In the 1980s, as he worked with teachers and parents of children with special needs, he became aware of the high dropout rate in that

population of students. That led to his interest in dropouts in general.

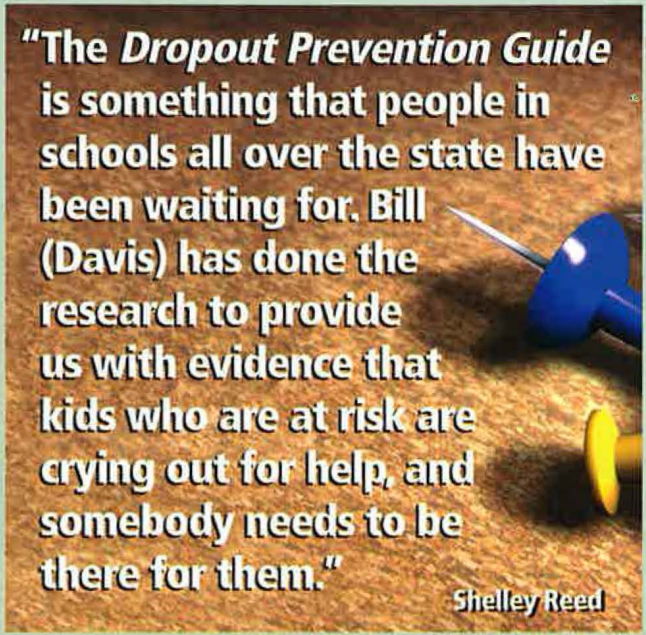
The conclusions he has drawn about why students drop out and what is needed to keep them in school are based on extensive scholarship and research, both academic and observational. Through the years, he has gotten to know hundreds of dropouts and would-be dropouts, visiting many of them in their homes.

"Bill is so good with young people because he doesn't judge them; he respects them," Burgoyne says.

By law, every school in Maine is required to have a dropout prevention committee. The *Dropout Prevention Guide* offers advice on the structure and function of these committees, and on creating local dropout prevention plans. The guide also analyzes a number of different dropout prevention strategies, including early childhood education, reading and writing programs, monitoring and tutoring.

Sometimes, just one such somebody is all it takes. For Jeff, who graduated from high school in June 2005, that person was a social studies teacher he called Mr. B.

"I thought about dropping out many, many times, and I almost did. Mr. B. just kept talking to me and convinced me to stay. I'm happy that I did," he says. ■



"The Dropout Prevention Guide is something that people in schools all over the state have been waiting for. Bill (Davis) has done the research to provide us with evidence that kids who are at risk are crying out for help, and somebody needs to be there for them."

Shelley Reed

Cash vs. Card

A STUDY OF the effectiveness of monetary and nonmonetary incentives in surveys found that more people responded when offered \$2 cash than when provided \$2 and \$5 phone cards, according to findings recently published in the *International Journal of Public Opinion Research*.

In addition, the research found that those who took the \$1 cash or \$2 or \$5 phone card incentives provided very different survey responses, an indication that biases in data can result by attracting individuals from certain segments of a population.

Resource economists Mario Teisl from the University of Maine and Brian Roe from Ohio State, and Michael Vayda, an associate dean in the College of Agriculture and Life Sciences at the University of Vermont, surveyed people in Maine and throughout the U.S. concerning their perceptions of food and food processing. They also wanted to gauge consumers' knowledge about the prevalence, risks and benefits of genetically modified (GM) foods.

Most of the more than 2,200 responses — 34 percent — came from survey recipients who received \$2 incentives.

The response rates were similar using \$1 cash, and \$2 and \$5 phone cards. However, there were important differences across incentive groups in how individuals evaluated the risks and benefits of GM foods.



Crossing the Line

THE INSTALLATION of centerline rumble strips and median barriers could significantly reduce or eliminate the number of head-on motor vehicle crashes that result in almost half of all fatalities on Maine rural roads, according to University of Maine Professor of Civil Engineering Per Garder.

Two major reasons were cited for why people cross the centerline and have head-on collisions: speeding and driver inattention.

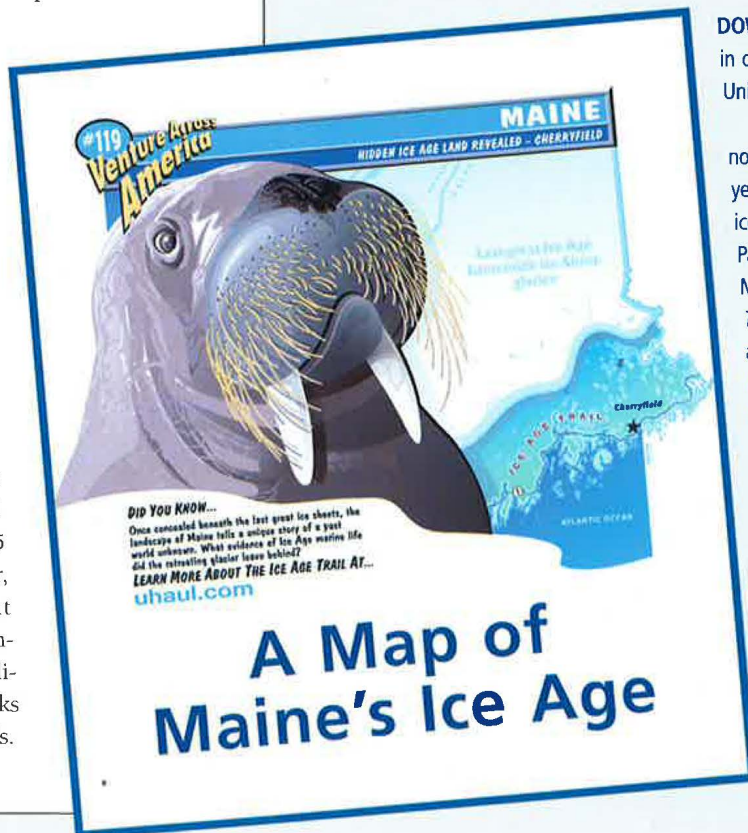
Garder analyzed three years of Maine Department of Transportation data, from 2000–02, during which there were 3,136 head-on crashes reported. He found more than two out of three of all fatal



crashes in Maine during this period occurred on two-lane collector or arterial roads, the result of driver error or misjudgment.

Two in three fatal head-on crashes occurred on straight segments of road and 67 percent of these were on dry pavement.

According to Garder, whose findings were published in the journal *Accident Analysis and Prevention*, higher speed limits lead to a higher percentage of crashes resulting in fatalities or incapacitating injuries. He also found the severity of crashes increases with wider shoulders and more travel lanes.



DOWN EAST MAINE'S Ice Age trail is now mapped in detail in a travelers' guide, newly published by the University of Maine.

The trail stretches from Mount Desert Island north along the state's rugged coast, where, 16,000 years ago, the last great North American continental ice sheet sculpted the mountains of Acadia National Park and left the spectacular sand barrens where Maine's wild blueberry crop grows. *Maine's Ice Age Trail: Down East Map & Guide* provides directions and information about more than 46 geological features visible or accessible along roads and highways in the state.

Development of the map and guide, spearheaded by UMaine glacial geologist Harold Borns and cartographer Michael Hermann, was funded by a grant from the National Science Foundation.

A graphic publicizing the trail nationwide is found on 1,200 new moving vans as part of U-Haul International's Venture Across America Campaign.

More information about *Maine's Ice Age Trail: Down East Map & Guide* is on the Web (iceagetrail.umaine.edu).

Parents as Academic Predictors

PARENTS' PERCEPTIONS of their preschoolers' language impairments are the best predictors of the children's reading, writing and math achievement once they get in school, according to a University of Maine study.

The findings, published recently in the *Journal of Communication Disorders*, support the need to go beyond standardized testing in measuring preschool speech and language. They also underscore the contribution that parental input can make in developing a comprehensive profile of children's communication abilities and an effective plan for managing language impairment.

From a longitudinal database compiled in a National Institutes of Health study, UMaine researchers Nancy Hall and Veronica Segarra looked at what preschool speech and language measures were most predictive of later academic achievement in

The researchers found that reports of parents were the best predictors of school-age academic achievement because they reflected the children's communicative competence, including skills such as problem solving. Such parental input also can help clinicians and teachers better understand the youngsters' verbal and nonverbal abilities — and treatment needs that are so vital in addressing future academic outcomes.

reading, spelling, writing and math. They studied data compiled on 35 children with language impairments, beginning when they were preschoolers through age 9.

The researchers found that reports of parents were the best predictors of school-age academic achievement because they reflected the children's communicative competence, including skills such as problem solving. Such parental input also can help clinicians and teachers better understand the youngsters' verbal and nonverbal abilities — and treatment needs that are so vital in addressing future academic outcomes.

"Parent input is crucial to understanding a child's speech, language and academic potential," says Hall, an associate professor and chair of the Department of Communication Sciences and Disorders. "It should be sought — and valued."

When the UMaine study began, Veronica Segarra was a high school student in the Math-Science Upward Bound Program. She is now a graduate student at the University of Connecticut in communication sciences and disorders.



For Religious Reasons

UNMARRIED ADULTS who are religious are more likely than those who are less religious to have fewer sexual partners, in part because of the moral disapproval of premarital sex, according to a new study by a University of Maine sociologist.

Using data from the national General Social Survey, Steven Barkan found that the religiosity of never-married adults has a consistent, fairly strong and statistically significant deterrent effect on the number of sexual partners. The belief that premarital sex is wrong was a major reason for this effect.

Barkan's study, one of the first to look at the relationship between religiosity and adult sexuality, is part of a growing body of research on the deterrent effect of religion. Most research on religiosity and deviance has involved adolescents.

The findings were recently published in the *Journal for the Scientific Study of Religion*.



Winning lessons on lady beetles



INVASIVE LADY BEETLES were in the spotlight in Vienna, Austria, this past fall when University of Maine Ph.D. student Christy Finlayson placed first in the 4th European Conference on Biological Invasions poster competition with her project "Considering Biocontrol and Biological Invasions: An Experimental Unit for Primary and Secondary School Classrooms."

Selected from more than 200 other posters, Finlayson's entry was the only one that focused on education with regard to biological invasions. The poster, created by Finlayson and schoolteachers Charlotte Carrier, Storie Brown and Arthur Libby, was based on her work with fourth-fifth and 10th-12th graders as a National Science Foundation GK-12 Fellow. The GK-12 program connects graduate students with primary and secondary school students and their teachers.

Finlayson's research focuses on lady beetles and the effects of non-native species on native populations in agricultural and natural systems. She says her work as a GK-12 Fellow helped her learn how to speak to people outside of the scientific community about the impact of invasives and what can be done about them.

Finlayson's poster outlined her collaboration with teachers in the Brewer, Bucksport and Hampden school systems, where she used hands-on activities to teach about biocontrol techniques and bioinvasions using lady beetles. The students raised potato plants infested with aphids and tested lady beetles against other methods for controlling the pests. Lady beetles are good predators of aphids, but can, themselves, become invasive.



Eating Close to Home

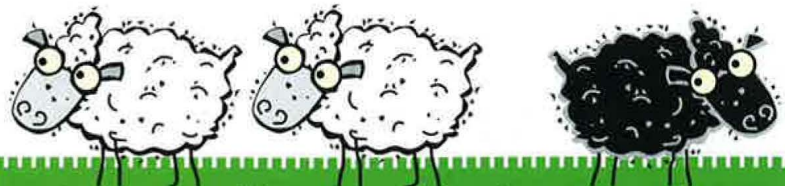
SEALS ARE A MAJOR CAUSE of loss for salmon farmers. But that loss can be minimized by siting future farms 2.5 miles from seal haul-outs, according to two University of Maine wildlife ecologists.

A three-year study found that Maine's marine salmon farms could significantly reduce predation by establishing a minimum distance from seal resting areas and by limiting concentrations of finfish aquaculture sites close to haul-outs.

Wildlife ecologists Jim Gilbert and Marcy Nelson also found that it didn't matter how many harbor seals are found at haul-outs near salmon farms, because it only takes repeated visits by a few insatiable individuals to raise havoc.

Patterns of seal predation were documented at Maine's more than 35 marine salmon farms, located between the bays of Blue Hill and Cobscook. The majority of farm managers in Maine's finfish aquaculture industry say that the greatest predatory threat to stock comes from seals, which are protected under the Marine Mammal Protection Act.

The researchers' findings were reported in the *Canadian Journal of Fisheries and Aquatic Sciences*.



Excluding Black Sheep

DISSENSION IN THE RANKS can threaten any group. One way to tackle it is by devaluing those who stray from the group's norms. Another is to recategorize the deviate as "not one of us."

In a recent psychology study, real-world groups (i.e., pro-war Republicans) were asked to evaluate a deviant group member before or after setting acceptable boundaries for members' views. Not surprisingly, those who challenged the group were devalued. More interesting, these "black sheep" were evaluated more positively if they first were excluded from the group's boundaries. These findings suggest that devaluation of black sheep had as its goal their removal from the group.

Social psychologist Scott Eidelman from the University of Maine and colleagues from the University of North Carolina at Greensboro and the University of Kansas published their findings in a recent issue of the *Personality and Social Psychology Bulletin*.



Changing Owners, Changing Harvesting

Sales of several tracts of timber investment owners' land to loggers between 2000 and 2004 suggest that the timber investment management organizations may be willing to turn over some forest holdings in a shorter time, compared to the nonindustrial owner group.

BETWEEN 1994 AND 2000, almost 80 percent of the industrial forests in a nearly 4.5 million-acre study area in northwestern Maine changed ownership, influencing timber harvest intensity over time.

Using satellite imagery, University of Maine forest scientists Suming Jin and Steven Sader evaluated the timber harvest patterns in an effort to better understand current and future forest composition and structure over multiple ownerships.

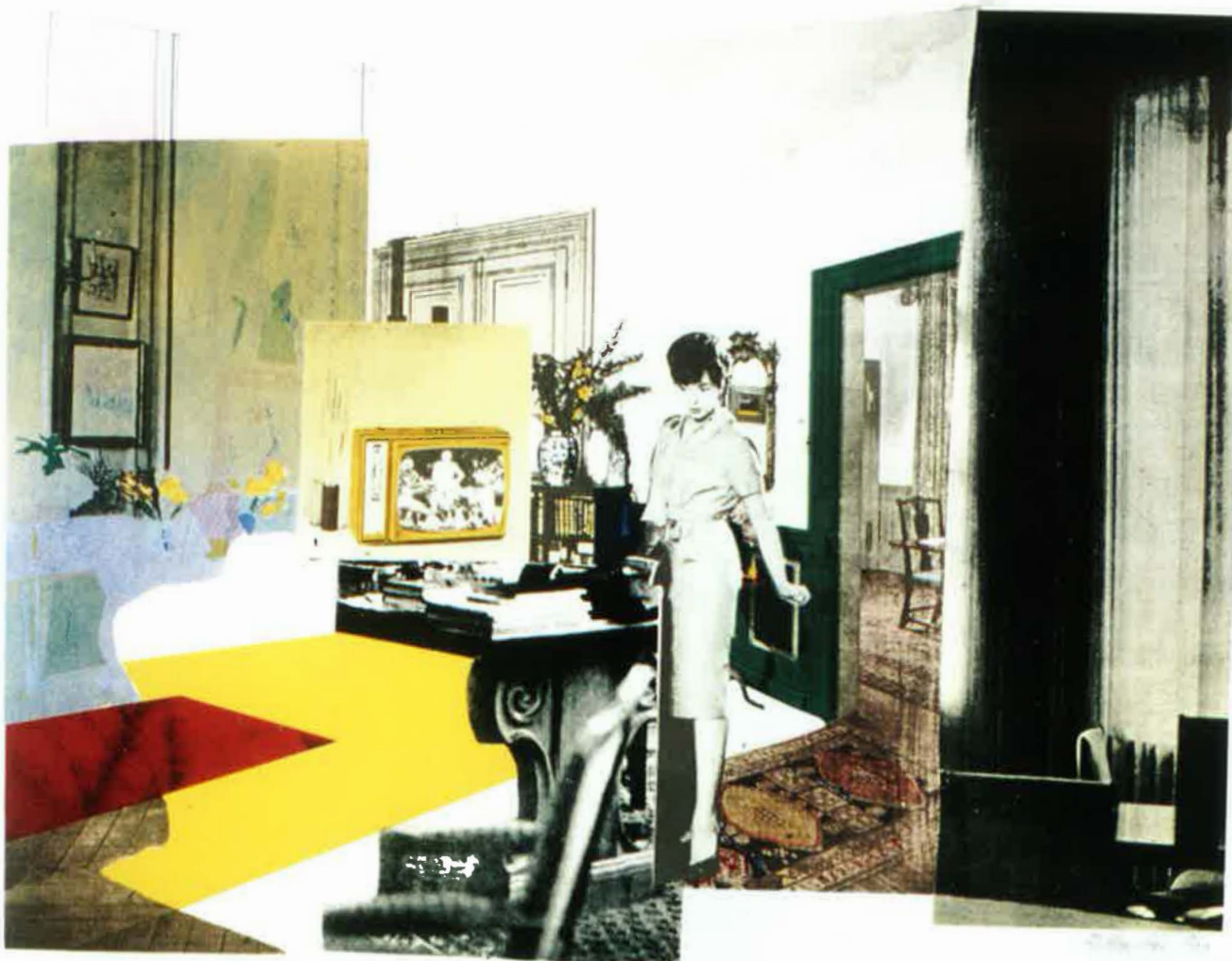
During the six-year period, approximately 75 percent of the forestlands were sold to timber investment management organizations, with 25 percent sold to other industrial owners, who then parceled tracts to nongovernment organizations and loggers/short-term investors. The UMaine researchers found that, in the 1990s and

early 2000s, timber investment management organizations and logger/short-term investors had higher harvesting rates than industrial owners. Nonindustrial private forest owners demonstrated more stable rates of harvesting over time.

Forestland with no ownership changes had significantly lower harvest rates than those that changed hands between 1994 and 2000.

Sales of several tracts of timber investment owners' land to loggers between 2000 and 2004 suggest that the timber investment management organizations may be willing to turn over some forest holdings in a shorter time, compared to the nonindustrial owner group.

The researchers' findings were recently published in the journal *Forest Ecology and Management*.



Interior, 1964
Richard Hamilton
Screen print from eight stencils on Crisbrook paper
22" x 31"
2004.9.67
Bequest of Robert Venn Carr, Class of 1938

BEGINNING IN 1986 and continuing for more than a decade, University of Maine alumnus Robert Venn Carr Jr., donated nearly 300 modern and contemporary prints to the University of Maine Museum of Art. The collection includes some of the finest works on paper by Pablo Picasso, Josef Albers, Alexander Calder, Käthe Kollwitz, Willem de Kooning, Frank Stella, Andy Warhol, Roy Lichtenstein, David Hockney, Joan Miró, Robert Delaunay and Richard Hamilton.

Richard Hamilton (b. 1922) became the seminal figure in the formation of England's Pop idiom through his analytical investigations of the media's influence on our perception of reality. As an active member of London's progressive Independent Group in the early 1950s, he first studied the impact of popular culture on art and created collages incorporating advertisements from mass-circulation newspapers and magazines, a technique that served as the basis for *Interior*. Hamilton claimed that any interior is "a set of anachronisms, a museum, with the lingering residues of decorative styles that an inhabited space collects." In this print, he contrasts an elaborately decorated interior with uncluttered colored planes reminiscent of modernist architecture and design. He made his first Pop collage in 1956. From 1957–61, he taught interior design at the Royal College of Art.

Interior was on display for the first time at the University of Maine Museum of Art in Bangor as part of an exhibition of works in the Maine Print Project, a statewide collaboration of 25 art museums and nonprofit arts institutions celebrating 200 years of printmaking in Maine. At the museum, *Interior* and other works from UMaine's permanent collection were exhibited concurrently with the prints of Richard Estes and John Marin.


On campus as part of the Maine Print Project, the UMaine Department of Art exhibited *The Art of Printed Books and Artists' Multiples*.

Interior remains on display, joined by three other works by Hamilton in the permanent collection, during the museum's newest exhibition, *Witty, Sexy, Gimmicky: British Pop Art*, Jan. 26–April 14.

Works in the Robert Venn Carr Jr., Collection can be seen online at UMaine's Fogler Library Web site (www.library.umaine.edu/carr).



Strengthening testing



ENGINEERS ARE always near the breaking point in a Boardman Hall laboratory at the University of Maine. Here, materials and components such as shear plates, concrete cylinders and wooden trusses are tested for strength using hydraulic machines that can actuate forces of up to 400,000 pounds.

The Materials Testing Laboratory in the Department of Civil and Environmental Engineering provides hands-on learning opportunities for undergraduates taking materials courses. The facility also has been a particularly

important resource in the research and development efforts of UMaine's Advanced Engineered Wood Composites Center.

Thanks to the newly established RICHARD AND JEAN HIGGINS MATERIALS TESTING LABORATORY FUND IN THE UNIVERSITY OF MAINE FOUNDATION, which supports the ongoing academic and research mission of the facility, the laboratory is able to maintain the highest level of standards to enhance student engineering learning experiences.

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