Multi-Institution Group Studies
Forests' Impact on Greenhouse Gases
by Steve Bertman and Kimberly Edwards

This past summer the sky seemed to fall at UMBS as atmospheric scientists from more than 15 institutions descended on the Station to participate in an intensive study centered at the Program for Research on Oxidants: PHotochemistry, Emissions and Transport (PROPHET) tower site off of Bryant Road.

The study, called CABINEX (for Community Atmosphere-Biosphere INteractions EXperiment), focused on the chemistry that occurs as a result of forest emissions. It coupled ongoing atmospheric measurements at the PROPHET site with atmospheric and biological measurements that had never before been made there to give a better overall picture of the chemistry occurring in and near the canopy.

UMBS is an ideal place to study biosphere-atmosphere interactions that occur in forest canopies. The history of the forest is known, the landscape is representative of Midwestern forests, and there are many useful databases and facilities available that support and strengthen the atmospheric research opportunities.

For the last 12 years, atmospheric scientists associated with PROPHET have collaborated with biologists to understand the varied interactions between the atmosphere and the biosphere. Forests around UMBS, like those in much of the Midwest, currently are composed largely of mixed deciduous trees. Pines are expected to regain some dominance in the near future.

Changes in forest composition affect emission of reactive gases into the atmosphere. Such emissions drive the processes responsible for smog, which is characterized by the presence of ground-level ozone and haze produced from particulate matter. These changes are occurring in the context of global changes to atmospheric composition and climate, all of which will impact future atmospheric chemistry.

Historically, atmospheric chemists have considered forests “black boxes” that influence processes above the canopy by emitting compounds and by acting as a repository for things like acid rain. Scientists are now beginning to understand that much chemistry occurs within the canopy itself.

see CABINEX, p. 7
Hello Alumni, Friends and Neighbors of the Biological Station.

I’m writing as Acting Director while Knute Nadelhoff er is on a much deserved sabbatical leave. For those of you who don’t know me, I’m a Professor in the department of Ecology and Evolutionary Biology and a Curator of Mammals at the University of Michigan Museum of Zoology. I’ve taught at the Station since 1985, mostly in alternate years. In fact, Knute will resume his directorial duties in May 2010, at the same time as I begin preparing to teach Field Mammalogy in the summer semester at UMBS.

Between now and then, we are working on several serious matters. Not surprisingly, the national and state economic woes have reached the university. Though UM has moderated the impact to a remarkable degree through a conservative long-range fiscal approach, some cuts in base budgets are unavoidable. Ours are relatively small but painful nonetheless. And to make things worse, they come at a time when demand for the Station’s classes and facilities is rising rapidly (see graph, below). Our goal is to trim the budget without sacrificing the quality research and instruction you know exists at UMBS, and we’re optimistic that we can do it.

On a more positive note, we are working hard and with good success to raise the Station’s profile within and outside the University. We are already planning for the Organization of Biological Field Stations (OBFS) Annual Meeting, which UMBS will host next September. We are building on several important visits to the Station that happened during the 2009 sessions. Daryl Weinert, Executive Director of the university’s Business Engagement Center, met with Knute Nadelhoff er in June. They began a discussion of how UMBS may partner with private-sector entities to further scientific research.

University Provost Teresa Sullivan visited UMBS in July and met with students, alumni, researchers and faculty. She told the UMBS External Advisory Committee that the Station “fits in very well with the university’s trajectory in the 21st century,” and that the Station is “perfectly poised to lead Great Lakes Research” under the Obama administration. LSA Associate Dean for Natural Sci-
Dr. Francesca (Francie) Cuthbert, a longtime instructor and researcher at the Station, received the U.S. Fish and Wildlife Service’s (USFWS) Recovery Champion award this past March. The award is given to USFWS employees and partners for contributions to the recovery of threatened and endangered species in the United States.

Francie has worked on rebuilding the Great Lakes Piping Plover population for more than 20 years. Her efforts have been two-fold. She has developed protocols for nest protection. She has also pioneered methods for collection of abandoned eggs and rearing of the hatched chicks. Anyone who has visited the Station in early summer has seen older chicks in the wire enclosure where they exercise and feed at the lakeshore.

“Thanks in great part to Dr. Cuthbert’s work, we have the highest plover population since the bird was listed in 1986,” said USFWS Midwest Regional Director Tom Melius. From a low of 12 breeding pairs in the Great Lakes in 1983, the piping plover has rebounded to an estimated 71 breeding pairs in 2009.

Francie formally received her award in March. The USFWS shared the honor — and a cake — with the entire plover “crew” at the station in July.

Enjoy this edition of the Douglas Lake Report. It is a representative snapshot of the people, projects and challenges that make UMBS a worthy recipient of your support. Atmospheric, avian and aquatic research are highlighted in the articles about the CABINEX project, Francie Cuthbert’s Recovery Champion award, and the new meteorological buoy that will be installed on Douglas Lake next summer. The demand for scholarships, and the organizations and individuals that fund them are featured on pages 4-5.

And don’t over look our upcoming events. The Ski Weekend and Garden Party are great opportunities to reconnect with faculty and friends and meet wonderful people who share a love of UMBS.
Funding Partner Hopes to Boost Membership

Each year, the Ann Arbor Branch of the Woman’s National Farm and Garden Association donates scholarship money to UMBS. Amy Mikus, a UM graduate student, was this year’s recipient.

Amy first attended UMBS in the spring of 2005. She was an undergraduate Marquette University.

This past summer Amy returned to the Station. She earned credits and did research toward her dual Master’s degree program in aquatic science and Civil Engineering. Amy took the Biology of Fishes class and conducted her own research in the Maple River. She studied the effect of the physical environment, specifically turbulent flows, on fishes.

The Ann Arbor Branch of the Woman’s National Farm and Garden Association is looking engage new members. Anyone interested in learning more about the organization is encouraged to visit their website, http://www.annarborfarmandgarden.org/.

Record Aid Awarded in 2009

The Biological Station faced more requests for financial assistance than ever for the 2009 semesters.

Thanks to growing support from the Station’s own endowed scholarship accounts, as well as funding from the College of Literature, Science, and the Arts, UMBS offered a record $147,000 in scholarships, fellowships and financial aid.

This year, UM summer tuition is almost $4,000 for in-state undergraduates and almost $11,000 for out-of-state students. Financial aid makes a significant impact on a student’s ability to attend the Biological Station.

Summer Mini-Courses Mix Old and New Favorites

UMBS will be offering mini-courses this June 16 - 20, 2010. These five-day, non-credit courses are designed to let you enjoy being in the field and learn in a friendly atmosphere.

Registration will begin January 15, 2010. For information and registration, visit our website or email Dianne Taylor (taylordi@umich.edu) at the Pellston office.

Summer Mini-Courses and Instructors:

- **Birds of Northern Michigan**, Mary Whitmore and Bob Hess
- **Forest and Landscape Ecology**, Dan Kashian and Burt Barnes
- **Sustainable Urbanism: Urban Design with Nature**, Doug Farr

Amy Mikus wields a seine net and waders during a Biology of Fishes lab as instructor Paul Webb looks on.
In Memorium

The Biological Station notes the passing of alumna Patricia (Pat) McFadden October 9. Pat first attended UMBS in 1947 and described it as “one of the best experiences of my life.” She returned to the Station for mini-courses in the 1990s.

Pat’s life passion was nature. She was the first president of the UMBS Society. She served for many years as a volunteer docent at both the Matthaei Botanical Gardens in Ann Arbor and the Seven Ponds Nature Center in Dryden, Michigan. She wrote, “Our immortality lies in the memories of those whose lives we’ve touched.”

Pat was preceded in death by her husband Stewart (Mac). She is survived by her two daughters, Laurie and Tish. Pat was 82.

Martha Berliner (nee Dresner) died March 4 at the age of 80. She was born in Belgium and lived in Belgium, France and Brazil until coming to the U.S. in 1942.

A life-long scientist, Martha attended UMBS in 1948 and graduated from the University of Michigan with an M.S. in Botany and Natural Resources in 1950.

After receiving her Ph.D. in Botany and Microbiology from Columbia University, Martha worked for 30 years in various private-sector and academic jobs. These included senior scientist at AVCO Corporation; designing experiments for the NASA Biosatellite Program and Lunar module (1958-1965); Senior Research Associate, Dept. of Microbiology, Harvard School of Public Health, Boston, working on vaccines against human fungal infections; and Professor, Microbiology and Immunology, Medical College of Virginia.

Martha was preceded in death by her husband Newton. Martha is survived by her daughter Leni and son Michael.

Dr. Berliner left a bequest for student scholarships at UMBS.

Spring/Summer 2010 Courses

**SPRING (May 23 - June 19, 2010)**

- Introduction to Natural Sciences (Uthus)
- General Ecology (Karowe/Heinen)
- Ethnobotany (Herron)
- Field Training in Archaeology (Howey)

**SUMMER (June 26 - August 21, 2010)**

- Environmental Writing & Great Lakes Literature (Taylor)
- Rivers, Lakes, & Wetlands (Schrank)
- Biology of Birds (Ewert)
- Forest Ecosystems (O’Connor)
- General Ecology (Bach/Pillsbury)
- Natural History & Evolution (Pruett-Jones/Price)
- Biology of Animal Parasites (C. Blankespoor & H. Blankespoor)
- Biology of Insects (Scholtens)
- Field Mammalogy (Myers)
- Algae in Freshwater Ecosystems (Lowe & Kociolek)
- Limnology: Freshwater Ecology (Moore)
- Field Botany of Northern Michigan (Davis & Adelson)
The University of Michigan’s Biological Station and the Marine Hydrodynamics Laboratories have partnered to design and fabricate an environmental monitoring buoy to be deployed in Douglas Lake.

The buoy will measure a long list of meteorological and aquatic features. These include wind speed and direction, wave height and period, air and water temperature, barometric pressure, relative humidity and incident solar radiation. It will also have a thermistor string for vertical temperature measurements as well as probes for water quality measurements.

The buoy’s state-of-the-art monitoring of Douglas Lake will contribute greatly to the existing scientific base of information collected over the past 100 years of UMBS operation. It has long been recognized that the health and evolution of smaller, inland lakes of the Great Lakes basin are closely tied to the physical processes and climatology of the larger Great Lakes which surround them. The buoy will promote collaborative research being done on water bodies elsewhere, both within and outside of the Great Lakes region.

Students will have direct access to real-time environmental data from the lake. The data will be also be universally accessible to the public in near real-time.
There is still a lack of understanding of many of the fundamental atmospheric chemistry processes occurring under the canopy of forest environments. Additionally, the products made from the volatile compounds emitted by the forest can, in turn, influence the health and productivity of the forest.

This summer’s study at PROPHET aimed to further our understanding of these processes and feedbacks. Measurements of biogenic emissions and a range of photoproducts were made at several heights above and below the forest canopy, as well as from a small aircraft, to observe changes in air composition over the course of each day.

After an intense summer in the field exacerbated by very short preparation time, research teams are processing data for analysis to be presented at a special session of the American Geophysical Union next year. The results of this study will hopefully fuel future research and entice researchers back to the PROPHET site.

Steve Bertman is a Professor of Chemistry at Western Michigan University and was Field Coordinator for the CABINEX project. He also is a faculty mentor and executive committee member of the Biosphere-Atmosphere Research and Training (BART) program for graduate students at UMBS. He has been a research faculty member and researcher at UMBS since 1997. Kimberly Edwards is a Visiting Assistant Professor in the Chemistry Department at Oakland University. She was the CABINEX Project Coordinator.
Science from UMBS Featured in New Book


This book examines the changes that geology, meteorology and human settlement have brought to northern Michigan. The results are dramatic, underlaid with hard science and described in a very readable manner.

Knute Nadelhoffer, Alan Hogg and Brian Hazlett edited the book. It includes chapters by 23 scientists affiliated with UMBS.

It is available in hard and soft cover (ISBN 0472050753).