

Laboratory of Limnology
Lake Mendota

LIMNOLOGY NEWS

University of Wisconsin-Madison
College of Letters and Science



Trout Lake Station
circa 1935

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My Career in Science

by Lorna Petty Harrell, Watershed Coordinator, Butler County, Ohio

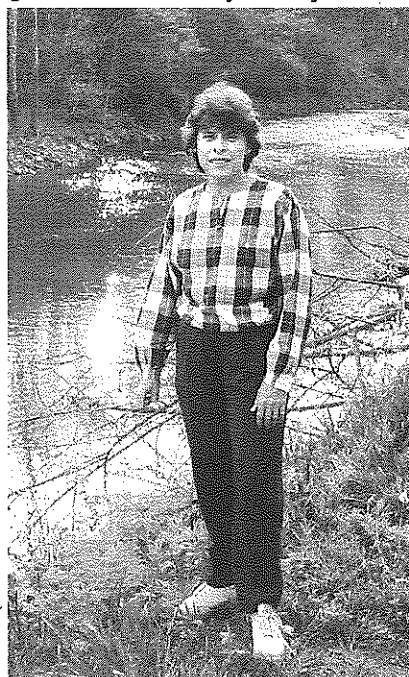
Some people have careers that appear as seamless progressions of accomplishment, but I am not one of them. My career to date has been more analogous to a patchwork quilt, with some squares that don't quite match and others still to be sewn. It hasn't been what I had envisioned; but in some ways, the patchiness seems characteristic and inevitable. Looking back on my patchwork career, two factors have strongly influenced its pattern: my gender and my far-ranging interest in water resources issues.

The gender factor comes first because it so often confined and defined the earlier years of my career. In preparing this article, I reread an essay, "Gender Issues in the Workplace," which appeared in *Fisheries* (October 1994). It was dismaying and sad to read, for it confirmed that women fisheries professionals today are struggling against many of the same stereotypes that confronted me in the mid-70s.

Misconceptions associated with women biologists include

that we are not serious about our careers, we disrupt or cannot do field work, and we are better suited to clerical tasks. I have experienced all of these misconceptions. And, yes, my career path was profoundly altered as a result.

Like many young women graduating from high school in the 60s, I received little career guidance from my family or from



Lorna Petty Harrell

school. For as long as I can remember thinking about it, I assumed I would be a teacher. (What else could a woman do and fulfill her familial duties?) Luckily, my high school biology teacher, a bright and energetic woman, encouraged me to apply for a National Science Foundation summer scholarship. The summer after my Junior year, I spent six wonderful weeks at Clemson University. It was a pivotal experience, providing an exciting introduction to the career diversity possible in the life sciences.

Throughout college, I followed my plan to teach and in 1969, I received a bachelor's degree in zoology and science teaching from Miami University in Oxford, Ohio. Eager to launch my career, I accepted a position teaching biology and zoology at a premier college prep high school in Cincinnati. That year dashed my idealism about teaching and stimulated me to pursue graduate studies. I chose aquatic ecology because of my interest in ecologi-

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News from the Center

by John Magnuson, Director

All is well in Limnology. I invite you to stop and visit the Center with its two field stations, the Trout Lake Station in the north and the Limnology Laboratory on Lake Mendota.

Jim Kitchell is back, catalyzed from his 1996-97 sabbatical at the University of Washington in Seattle, the University of New Mexico in Albuquerque, and the Center for Ecological Synthesis in Santa Barbara, California.

Tom Frost is spending a year or two as a program director in the Division of Environmental Biology at the National Science Foundation in Washington, D.C. We thank Tom for taking on this important service for us all.

Tim Kratz has taken over the helm at Trout Lake in Tom Frost's absence.

Steve Carpenter is doing great things by taking a sabbatical in place here at the Center mixed with some occasional globe trotting.

We continue to be favored by our past.

Art Hasler comes in every morning. We celebrated his 90th birthday on January 5, 1998, and presented him with the *Arthur Davis Hasler Lake Laboratory Garden*. The garden of native wildflowers and shrubs will extend across the west end of the lab and down the lake path about 50 feet.

Hattie Bell Merrill, the first woman Zoology faculty member at Madison and research assistant to E. A. Birge in the early

years of limnology, has come alive to us through a new book by her niece **Merrilyn L. Hartridge**, *The Anandrous Journey, Revealing Letters to a Mentor*, Amherst Press (P.O. Box 296, Amherst, WI 54406), 1997. The book is largely reproduced letters and writings by Hattie Bell including many from South America, where she traveled collecting zooplankton. The headline for the book review in the Madison paper read, "Portrait of a pioneering scientist - Blazing trails for women, science, Hattie Merrill explored the world."

We continue to be exposed to new ideas.

We have been active in developing a network of ecologists all across the Madison campus by helping to establish the **Madison Ecology Group (MEG)**. I had the pleasure of being the chair in the first year. The purposes are to be an advocate for ecological sciences; help coordinate teaching, research and outreach; and participate in campus governance. The head count of self-identified ecologists on the campus exceeds 140 faculty from 30 departments.

Ecology on the Madison campus is highly ranked by the National Research Council; limnology is pleased to be a part of that larger network of scholarly activity.

Each year the Center brings in exciting leaders in limnology and ecology through the **William V. Kaeser Visiting Scholars** program. This year it will be **Nancy Grimm**, a desert stream ecologist and lead investigator

for one of NSF's new Urban Long Term Ecological Research (LTER) sites. The Kaeser gifts made it possible for us to bring **Peter Vitousek**, Stanford University (1997), **Kai Lee**, Williams College (1996), **Robert Naiman**, University of Washington (1995) and **C.S. Holling**, University of Florida (1994).

We continue to take on new challenges.

We are moving forward to add a fourth faculty member to the Center in the area of ecology of floodplain rivers. This ties well into the NSF traineeship we sponsor jointly with the University of Washington on the integration of lake and stream ecology.

We conducted two international workshops as part of our Long-Term Ecological Research Program on North Temperate Lakes. One workshop covered the analysis of **Ice Phenology of Lakes and Rivers** for insights on climate change and variability around the Northern Hemisphere. We unearthed 689 time series of which 165 were longer than 50 years and 27 longer than 100 years. We have a symposium scheduled for the *Societas Internationalis Limnologiae* (SIL) meeting in Dublin in August 1998. The second workshop analysed the **Organization of Lake Districts**, which studies lakes from a landscape perspective with ideas such as the position of lakes in the landscape (analogous to the stream continuum) and factors controlling the temporal synchrony among lakes.

Little Rock Lake Recovery Phase

by Thomas Frost, Associate Scientist

Following a Wisconsin tradition of experimental limnology developed under Arthur Hasler, we've been studying the effects of acidification with an experimental manipulation of Little Rock Lake, near the Trout Lake Station.

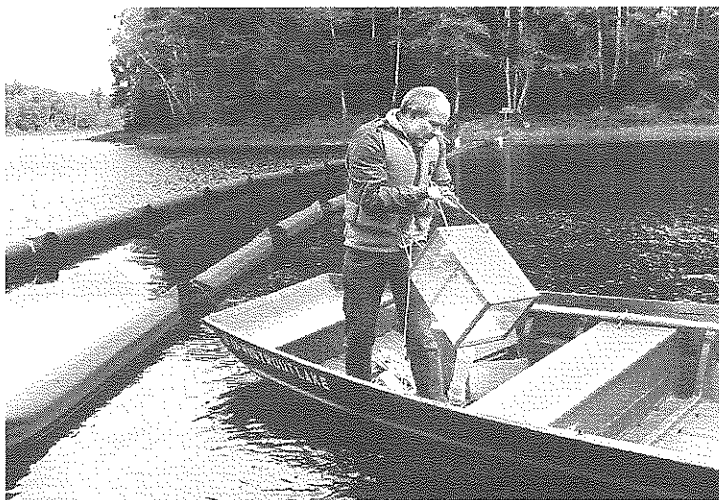
We assessed acidification's effects over seven years and examined the lake's recovery since we stopped adding acid in 1990. Researchers represented the Center for Limnology, the Wisconsin Department of Natural Resources, the University of Wisconsin-Superior, the University of Minnesota and the U.S. Geological Survey.

We divided the hour-glass-shaped lake in half with a vinyl curtain. After a one-year baseline period in 1984, we acidified the north basin with sulfuric acid, the dominant form of aerial deposition in our area. The south basin served as a reference. The treatment basin's pH dropped in three, two-year stages from its original 6.1 to 5.6, to 5.1, and then 4.7 — about 24 times more acid than the reference basin. We monitored both basins, following physical, chemical and biological features.

Acidifying the treatment basin produced many changes, and they increased substantially as it became more acid. Striking

changes were

- the development of extensive growths of a filamentous green alga, which covered much of the basin's bottom;
- a decrease in the concentration of dissolved organic carbon and a major increase in visible and UV light penetration;
- failure of large mouth bass — the lake's dominant fish eater — to survive their first winter of life; and
- the development of a fundamentally different zooplankton community.



Tom Frost at the Little Rock Lake curtain (photo by Jeff Miller, UW-Madison News/Public Affairs)

Few of the fish and zooplankton changes were direct responses to the acid itself. Ecosystem processes — such as energy flow through food chains and nutrient cycling — in the treatment basin were much more resistant to acidification than were the species involved in those functions. A few key

species, which had been rare before the treatments, increased and were largely responsible for maintaining ecological function.

Since we last added acid in 1990, chemical recovery has proceeded quickly. The treatment basin returned to pH 6.1 in 1996. However, some of the basin's biological features, particularly the zooplankton community, have lagged well behind chemical recovery. The treatment basin's zooplankton community remains nearly as different from the reference basin's as it was during the experiment's most acidic stage. Surprisingly, the species whose populations maintained zooplankton function during acidification declined quickly to pre-acidification levels.

However, their decreases have not been matched by the return of the species that dominated the basin before acidification.

Taken together, the responses to and recovery from acidification in Little Rock Lake have produced important insights into ecosystem responses to stress. The differences between biological and chemical recoveries remains

intriguing, and we continue to observe and analyze them.

The U.S. Environmental Protection Agency and the National Science Foundation funded this research, and the National Science Foundation continues to fund assessments of the lake's recovery.

"Harrell" continued from page 1

cal systems and a life-long fascination with lakes and streams.

In July 1970, I entered the graduate program at the Laboratory of Limnology where I became the first woman grad student in many years. Because of my innocent intrusion into this male domain, I became an object of curiosity and, at times, considered myself a social pariah. In short, my first year at UW-Madison was hard and lonely.

At the same time, my adviser John Magnuson, was as determined as I that I succeed, and he generated funds, ideas and perpetual challenges to assure that I did. Bill Neill (Ph.D. 1971) was the mentor for my thesis work on the effects of heated effluent on lymphocystis (a viral disease) in age 0 bluegills near the power plant outfall in Lake Monona. My second year in Madison was one of the best in my life. I felt accepted for who I was, and my research began to coalesce, thanks to a lot of field help and moral support from many including Ken Mills, Roy Stein, Bill Shaffer, Bruce Quirk, Tom Byles, Paul Baumann and Frank Eustace. I also felt less pressure to prove myself when two more women entered the limnology program in 1971.

As I finished my degree in June 1972, I came under intense pressure from my family to return to my home in Northern Kentucky, because my mother was seriously ill. There also was a young man in Cincinnati who wanted to marry me. It's hard to

capture my feelings that summer day when I pulled away from the lab with all my belongings. I remember stopping to take a long look back before I headed south.

Within a month of my arrival home, I landed my first post-graduate "position"—washing test tubes in the water quality lab at Procter & Gamble. It was a "stepping stone" to the position I was offered at the end of the summer, as a technician counting algae. As my boss explained, "P&G doesn't allow women in staff positions." I decided to continue my job search.

credentials), if I did an acceptable job of writing a plankton report gratis. I did, they liked it, and soon I was promoted to an ecologist position.

During the next three hectic years at Dames & Moore, I worked on myriad environmental impact projects in several states, including proposed nuclear power plants, oil pipelines, and an open pit copper mine. I collected plankton samples during a spring snowstorm in Northern Wisconsin, picked condoms (and a few fish) from seines near a power plant on the Ohio River, and lost my waders and electroshocking

"My second year in Madison was one of the best in my life. I felt accepted for who I was, and my research began to coalesce, thanks to a lot of field help and moral support from many...I also felt less pressure to prove myself when two more women entered the limnology program in 1971"

That September, I presented my thesis work at the American Fisheries Society meeting in Little Rock, won the award for the best student paper, and caught the attention of someone with connections at Dames & Moore, a consulting firm where I had been trying to land an interview. Within a few weeks, I was married, my husband started law school, and I became the bread winner — counting algae at Dames & Moore! This time was different, however, because I was promised a staff position (just like the men with similar academic

gear when our boat overturned in the Brazos River in Texas.

During it all, I was the only woman biologist among the seventeen assigned to our Cincinnati office. I rose to project manager, but I never did become "one of the boys." When the bottom dropped out of nuclear power planning in the mid-70s, my name was high on the list for down-sizing. Their rationale was that my husband, who had just graduated from law school, had a good job. It was October, 1975, and I was unemployed and pregnant.

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The next several years were a career abyss that is hard to chronicle. They were also years of parenting two small children, homemaking, pediatrician and nursing home visits, limited child care options, and utter exhaustion as I tried with difficulty to keep my resume alive. During this time, my mother's health deteriorated further, other family problems mounted and, as the only daughter, I found myself in the "sandwich generation" before the phrase was ever coined.

For more than 10 years, I maintained some semblance of a career by doing various things—subcontract consulting work, directing the program of a small museum, supervising a summer research program at

agency for the eight-county, tri-state area of Greater Cincinnati, which includes more than 160 units of local governments in a 2,500-square-mile area. The agency works on an array of regional issues related to transportation planning, commuter services, and air and water quality. Our water quality team works on issues related to public water supplies, wastewater treatment, groundwater protection, non-point pollution, and watershed management. We interact with many other agencies including the U.S. and Ohio EPA, Ohio DNR, U.S. Army Corps of Engineers, health departments, conservation districts, and local elected officials, ranging from township trustees to the mayor of Cincin-

While groundwater protection continues to be an important focus for OKI, my current special interests are volunteer stream monitoring and watershed management. I facilitate a multi-jurisdictional watershed steering committee for Mill Creek, a blighted stream running through the heart of Cincinnati. I am immersed in writing a watershed management plan to guide the process and leverage funding for a long-term improvement effort. At the same time, I am managing a contrasting project on a rural stream prone to serious streambank erosion because of glacial geology and intense agricultural activity.

My days are long and full with these projects, along with the constant need of local governments to do more with less money. I gain perspective when I realize that, in time, these projects also will become squares in the patchwork design of my career. As I reflect on obstacles I've overcome and mistakes I've made in piecing it all together, I know the design isn't perfect, but at least it's mine. And, it isn't finished yet.

Editors note:

Since this was written, Lorna has begun another "patchwork square" with the Butler Co. (Ohio) Soil & Water Conservation District. Her new position is Watershed Coordinator for a nonpoint source pollution education project in the headwaters of Mill Creek. In the interim, her two children have gone off to college, she has turned 50 and, like Hillary Clinton, she is contemplating what's next.

I acknowledged being a "big picture" person

Thomas More College, and teaching introductory biology labs and ichthyology at Northern Kentucky University. I even worked on the 1980 Census.

In late 1986, I made a cold call to the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) and within a few weeks began working there as an environmental planner in water resources. OKI would have seemed an unlikely place of employment earlier in my career, but it seemed suitable at this juncture, because it combined technical expertise with writing, public education, and interacting with other governmental agencies and elected officials. I acknowledged being a "big picture" person.

OKI is the regional planning

nati.

During my first few years at OKI, many of my activities focused on groundwater planning and management, a new area for me. Initiatives included securing federal Sole Source Aquifer designation for the Great Miami Buried Valley Aquifer System, one of the nation's most productive groundwater resources, and developing maps, reports, and inventories of potential pollution sources as tools for wellhead protection.

Since 1992, I have served as OKI's Environmental Services Manager with overall responsibility for the water quality program. I have tried to broaden the scope of our activities as local needs and funding opportunities present themselves.

Walt Haag: Cared Well for Trout Lake

by Tom Frost, Associate Scientist, and
Janet Blair, Program Assistant

CFL's Trout Lake Station is devoted to scientific research. For 18 years, Walt Haag maintained the facilities and equipment, so everyone from hourly helpers to the most distinguished professor could get his work done.

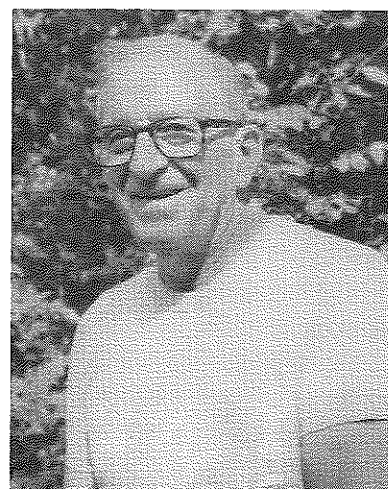
Walt retired in January 1994. At a retirement dinner in Boulder Junction, Walt listened as friends and associates remembered their experiences with him.

Born and raised in Boulder Junction, Walt left the area only long enough to serve in the military, squeeze in a little time in college and work the White Pine mine in Michigan's Upper

Peninsula. After returning to Boulder Junction, Walt chaired the town board of supervisors and became active in area affairs.

"...We bid you a warm and rewarding retirement," wrote Art Brooks from the UW-Milwaukee's Center for Great Lakes Studies. "You helped to launch us on our rounds of the northern lakes, and in so doing, you aided in launching the careers of many aquatic scientists."

Walt's special talent was to take an insurmountable task and pound it into shape. Although his primary domain was the physical facility, people at the



Walt Haag

station also captured Walt's unending curiosity.

"I thank Walt Haag for looking out for my physical well-being during my under-ice diving expeditions," Bill Horns wrote in his 1983 doctoral thesis, "and for

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Charlotte Stein: O&L Grad Program Spirit

by Ann McLain, Graduate Program Coordinator

Charlotte Stein, coordinator of the Oceanography and Limnology and Water Chemistry Graduate Programs, retired in June, 1996. For many graduate students, Char was the personal face of the program. Generally, she was involved from the student's first contact with the program to the deposition of the thesis.

It's hard to distinguish exactly when Char's affiliation with O&L began. She signed the minutes of an O&L faculty committee meeting in 1969, when she was a secretary at IES. She became an admissions examiner for O&L in 1973, and a few years later, her title

changed to project assistant. As the O&L Graduate Program grew, so did Char's responsibilities. In 1981-82, Char moved the program office from Atmospheric and Oceanic Sciences to the Center for Limnology's Lake Mendota lab, where it has been ever since.

Char sent out program information to prospective students, tracked applications, arranged student visits, and got fellowship applications into the right offices on deadline. Overall, she served as an academic marriage broker, connecting stellar students with mentors. She organized O&L committee activities such as the capital



Charlotte Stein

equipment exercise, the annual faculty meeting, and the distribution of Anna Grant Birge summer fellowship money.

For graduate students, most of these activities were invisible. Char's role was one of informa-

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Madison's "fair" lakes, *A Template for Development*

*Fair lakes, serene and full of light,
Fair town, arrayed in robes of white,
How visionary ye appear!*

— American poet Henry Wadsworth Longfellow, about the four lakes of Madison. Written in January 1870.

By Brian Mattmiller
Modified from articles that first ran in On Wisconsin magazine, March/April 1995 and The Wisconsin Week, Oct. 19, 1994

The four lakes of the Yahara River chain so define the Madison landscape that it would be hard to find someone who isn't drawn, either by recreation, vocation or pure emotion, to their mesmerizing shores.

In the two centuries of Madison's growth into a major city, the shorelines of Mendota, Monona and Wingra have served as a template for development, a source of irresistible natural borders to build around. Their shores beckon swimmers, boaters and anglers by the thousands every summer. And for UW-Madison students frazzled by the harried pace of academic life, Mendota offers a slice of solitude, a setting that helps put it all in perspective.

Next to the constant turnover of seasons, semesters and graduations, this remnant of a 10,000-year-old sheet of glacial ice feels timeless.

Yet Lake Mendota — a Native American term meaning "Great," and the largest of the Madison chain — offers a classic example

of how urbanization and lake environments have an uneasy coexistence.

While 10,000 years is a mere heartbeat in the total life of a lake, the past hundred and fifty years have altered Mendota dramatically. Surrounding Mendota to the north is some of the most productive farm land in Wisconsin, and the resulting soil erosion and pollutant runoff has loaded the lake with sediment and excess nutrients. Prior to 1971, cities north of Mendota released treated sewage directly into the tributaries that feed Mendota, further eroding water quality. Add to the mix in the 1960s the invasion of an exotic plant species called Eurasian milfoil, and you have many of the ingredients of Mendota's modern troubles: Water that turns pea-soup green during summer algae blooms, or clogged with weedy salads during milfoil outbreaks.

Given this backdrop of natural charm and biological troubles, it seems fitting that one of the nation's premier limnology (or lake ecology) programs thrives on the campus shore of Mendota. Since 1877, when former UW-Madison Chancellor E.A. Birge initiated limnological studies, Lake Mendota has

served as a backyard laboratory that has greatly advanced the world's understanding of how lakes function. Mendota's waters have been continually seined and shocked and filtered and centrifuged, giving it the moniker of the most studied lake in North America.

In part, this tradition helped UW-Madison land a National Science Foundation grant that will define the next wave of limnological research on Mendota. As a Long-Term Ecological Research site, researchers will be able to study the effects of human activity on lakes over many decades, rather than the limited life of a typical research grant. Under this program, researchers hope that Mendota and other Dane County lakes will serve as models for understanding the interactions between humans and lakes in agricultural and urban settings.

"Scientists often get accused of knowing more and more about less and less," said John Magnuson, director of the Center for Limnology. "But this particular project will allow us to synthesize and generalize on a scale much larger than one lake."

Steve Carpenter, a UW-Madison limnology and zoology professor, said Mendota makes an ideal lake on which to make broad conclusions, since it suffers from the No. 1 problem facing lakes across the globe: cultural eutrophication.

In the 1980s, it looked as though the lake had turned a corner on the problem. After sewage treatment was diverted from the lake in 1971, Carpen-

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ter said the expectation was for a gradual turnaround in water quality, since the lake would take about six years to "flush" in a new cycle of lake water. It turned out, however, that the clearer water in the 80s was "a result of a drought cycle, which produced less spring runoff. In the 1990s, the algae blooms came back with a vengeance."

"In 1993 we saw the highest algae levels in 20 years, and last year was even higher," he said. "Right now I would say that the water quality is disappointing, and it's been very sobering to us."

Patricia Soranno, for her doctoral thesis, developed studies on how different types of land use influence the amount of phosphorus coming into a lake. She estimates that the amount pouring into Mendota today is about six times the amount prior to settlement. And with Dane County's trend of fast urban development, and the corresponding rise in phosphorus, she said the effects on water quality could be severe.

"It's at a point now where it's manageable, but we haven't found the right way to manage it yet," Soranno said.

One great hope for improving Mendota's water quality was a recent effort called biomanipulation (*Food Web Management: A case study of Lake Mendota*. James F. Kitchell, ed. Springer-Verlag, New York, 1992), which attempted to alter the food chain to reduce algae. It had a nice, natural symmetry to it: Increase stocking of sport fish to have the lake teeming with walleye and northern pike. Those fish would feed en masse on the small fish

that eat zooplankton. And with more zooplankton around to gobble the microscopic plant life that cloud the lake, the result would be a clearer lake more pleasing to everyone.

But that attempt at altering the food chain greatly underestimated the species at the top end: anglers. Researchers found that all the publicity surrounding the UW-Madison and Department of Natural Resources stocking campaign, in which nearly 90 million walleye and northern fry were sent swimming in the lake from 1987-89, grabbed the attention of anglers across the Midwest. Carpenter estimated that the number of anglers on Mendota jumped by

reduce phosphorus levels in Mendota.

Dick Lathrop, a doctoral student at CFL and a DNR scientist who has studied Madison lakes since the mid-1970s, said the Mendota watershed management project will go "barnyard by barnyard, field by field" in an attempt to help farmers control non-point sources of erosion. The long-term research at UW-Madison will play a role in studying the effects of the project and deciding how much phosphorus reduction is needed to improve the lake.

"As we've gotten away from family farms, where people have always been concerned about

Mendota's waters have been continually seined and shocked and filtered and centrifuged, giving it the moniker of the most studied lake in North America

a factor of 4 to 10.

"Probably the most important lesson we learned was that angler response was tremendous," he said. "We feel like fishing had a huge impact on the research results. In fact, it will turn out that anglers basically removed the walleye that were added, and that reduced or possibly eliminated the effect lower in the food chain."

The results of biomanipulation and other water-improvement efforts have left scientists disappointed, but not discouraged. In fact, a new \$20 million "priority lakes project" on Mendota administered by the DNR will be the largest single effort in decades in trying to

the long-term productivity of their land, we are more into cash-cropping and rental situations," Lathrop said. "I think that has exacerbated the pollutant loads in Mendota."

Lathrop said unbridled urban development also clouds Mendota's future. Agricultural land is being sold for residential development at an unprecedented pace in Dane County, and county growth scenarios anticipate another 100,000 residents by the year 2020.

This development places Lake Mendota and other city lakes in a Catch-22.

As a natural asset, the lakes provide one of the finest selling

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"Lakes" continued from page 9

points for the region. But the more development they attract, the less "attractive" they are likely to remain.

"I think it's not just an emotional issue, a matter of simply deciding whether we want to live around clean lakes and remember Madison and Lake Mendota as a pleasant place," said Carpenter. "There will be hard economic values associated with the degradation of our lakes." Carpenter cited a recent study by the North American Lake Management Society

systematic planning process that says yes, we can have development and yes, we can have clean lakes. And here are the routes for getting there."

With more than a century of research already logged on Mendota, Carpenter said UW-Madison will be a key player in finding those solutions.

The remainder of this article is from Wisconsin Week, Oct. 19, 1994

Beginning in October, 1994, the National Science Foundation doubled the size of the North Temperate Lake Long-Term

strong influence.

"There's no way we can talk about how lakes are working without including people as part of that puzzle," he said. "This enhanced project will put us right in the center of the action, where human beings are a large part of the ecosystems."

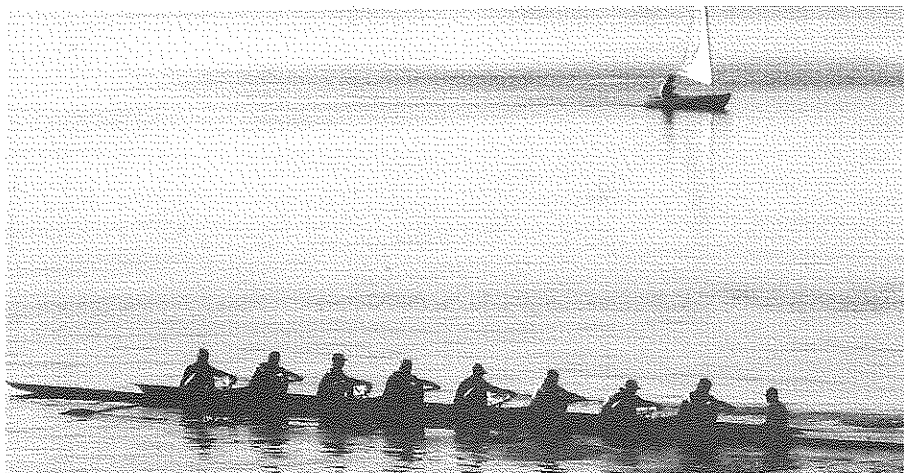
The LTER project should provide important clues on how land-use issues such as agriculture and urban sprawl affect lakes. Rather than a present-day snapshot, LTER provides a way of understanding slow changes and predicting the future.

Magnuson said landscape-scale changes brought about by people and the introduction of exotic species are all important "details" in the overall scheme of things. What LTER attempts to discover is what these changes as a whole mean to the future of lakes in urban and agricultural and forested settings.

"We'd like to say more than just what might happen to Lake Mendota," he said. "We'd like to move to a generalization of how people affect lakes and how lakes affect people."

Long-term research got strong backing 20 years ago, when a panel of scientists advised the NSF that changes were needed in how to study ecosystems, Magnuson said. Two- or three-year studies weren't long enough for scientists to develop an understanding of how ecological factors are integrated.

The NSF responded by starting the LTER program in 1983, making the lakes near Trout Lake Station one of the first five sites.



Lake Mendota from the lake laboratory (photo by J. Magnuson)

which found the average recreational lake provides \$1,000 per acre in economic value to a region. For Lake Mendota, that would be more than \$10 million per year — probably higher, Carpenter suspects, because of the broad usage it receives.

"With the deterioration of the lakes, people will start to turn their backs on them as recreational resources, and Madison will have lost a lot of its charm," Carpenter added. "We need a

Ecological Research program to include the Madison area lakes.

The Center extended its long-term ecological research on northern Wisconsin lakes in forested landscape to include two lakes from primarily agricultural landscapes, Fish Lake and Lake Mendota, and two lakes from an urban landscape, Lakes Monona and Wingra.

According to John Magnuson, director of the Center, the goal of the expanded program was to add lakes where people exert a

***"Stein"** continued from page 6*

tion central, den mother, and cheerleader. For the nitty gritty of getting connected in Madison, understanding grad school regulations, and surviving the final semester, Char was the guiding light.

As a grad student at the Center, I was particularly grateful that Char cheerfully accepted all the Center's grad students as part of her flock, regardless of their departmental affiliation.

Now that I have moved into her office and understand how many separate functions are involved in this job, my appreciation of her accomplishments has grown.

After Char retired in June 1996, she filled in until I was hired in December, 1996. Since then, she has been travelling, volunteering, and devoting time to her family, including a new granddaughter.

***"Haag"** continued from page 6*

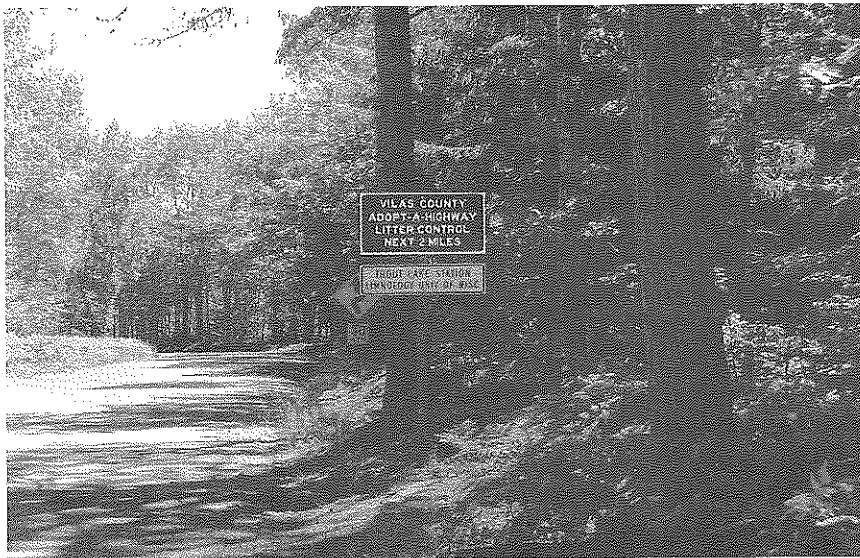
giving me a sense of wonder. 'I wonder why you're doing that,' he said."

"Walt Haag performed daily miracles in keeping the ice auger operating, which was crucial for the completion of the winter work," Tonn wrote in his master's thesis. "But it was the interactions with Walt on a personal level that were among my most rewarding experiences at Trout Lake these last three years."

Daniel Schneider (Ph.D. 1995) had head-to-head confrontations with Walt while completing his doctoral research. "I couldn't have done my work without the help of Walt Haag," Schneider acknowledged, "and wouldn't have enjoyed it half as much if he weren't at Trout Lake. Walt and I agree on what's important, but almost totally disagree on how to achieve it."

The station lost more than a property caretaker with Walt's retirement. He took great care of the station, but he took even better care of its people.

Keeping it clean!



Above: Trout Lake Station is an official player in the state's Adopt-A-Highway program, thanks to the efforts of Mike Pecore, TLS custodian.

Right: In Madison, Mendota Lake Lab people will soon participate in the 13th Annual Trash Party, a tradition started by Program Assistant Supervisor Linda Holthaus. Through these innovative programs, CFL is proud to maintain the aesthetics of our environment.



People in the News

- **Arthur D. Hasler** was voted a 1996 Outstanding Member of Phi Kappa Phi by the University of Wisconsin-Madison Chapter.
- The UW-Graduate School recognized **James Kitchell** with a senior faculty award of \$65,000 in support of his research during 1995-2000. This award also allows the recipient to name the professorship in honor of an eminent scientist. Jim is now the *Arthur Hasler Professor of Zoology*.

Jim served as president of the *Association of Ecosystem Research Centers (AERC)* for 1995-1996.

- **Joan Riera** was awarded a post doctoral fellowship from Catalan Science Funding Agency of the Interdepartmental Council for Research and Technological Innovation for 1995 to present.

Riera completed a post-doctoral fellowship from the Spanish Ministry of Education and Science in 1995.

- **Stephen Carpenter** received a 1995 Pew Scholar in Conservation and the Environment Award. This three-year award totals \$150,000.

Steve won the Per Brinck Award in Limnology from Lund University, Sweden, in 1996.

- **William Vogt Kaeser** passed away on April 13, 1995. Mr. Kaeser was a nationally recognized architect, who designed the University of Wisconsin Laboratory for Limnology on Lake Mendota. (See also *News from the Center*)
- **Gene Likens** (Ph.D. 1962, Hasler) received the Einar Naumann-August Thienemann Medal, given to scientists who have contributed greatly to the development of limnology, at the 26th Congress of the International Association for Theoretical and Applied Limnology in 1995. At the annual meeting of the Ecological Society of America, Gene received the 1995 Eminent Ecologist Award.

Student Awards

- **Shelley Arnott**, (1995-1997) received the Dorothy Powers Grant and Eugene Lodewick Grant Memorial Scholarship Award.
- Chase Noland Undergraduate Awards in Limnology went to **Masako Ochiai** in 1994, **Joe LeBouton** in 1995, **Alison Colby** in 1996 and **Sean Geib** in 1997.
- Anna Grant Birge Memorial Awards in 1994 went to **Shelley Arnott, Dorothy Boorse, Kathy Cottingham, Janet Fischer, Thomas Hrabik, Pat Soranno**; in 1995 to **Lucy Buchan, Dorothy Boorse, Thomas Hrabik, Jennifer Klug, George Lauster, Deb Nieuwenhuis, Jonathan Shurin** and **Karen Wilson**. In 1996 the awards went to **Dorothy Boorse, Tom O'Keefe, Madeline Fisher, Tom Hrabik, Sue King, Evan Lau**, and **David Lewis**. And in 1997, the recipients were **Evan Lau, Michael Zorn, Chris Harvey** and **Theodore Willis**.

<http://limnosun.limnology.wisc.edu/~webadmin/>

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Ph.D. project concerns the relations between antipredator adaptations of snails and the chemical and biological limnology of lakes. Because the position of lakes in the landscape has great influence on lake biology and chemistry, these antipredator adaptations of snails occur systematically across the lake district around Trout Lake.

• **Nathan Nibbelink**

(M.S. 1996, Carpenter)

Nate developed an individual-based model of habitat choice by bluegill, which he tested by conducting field studies in several lakes of southeast Wisconsin. He was also involved in several publications on fish responses to macrophyte harvesting. Nate is moving into a Ph.D. program with Frank Rahel (Ph.D. 1982 with Magnuson) at Wyoming.

• **David Post**

(M.S. 1996, Kitchell)

David conducted an evaluation of the interactions between spawning date, growth rate and mortality that regulate recruitment success for young-of-the-year largemouth bass in Paul Lake, Michigan. He also evaluated the effect of planktivory by juvenile bass and their trophic ontogeny as a component of food web interactions. David is currently pursuing a Ph.D. at Cornell University while working jointly with Nelson Hairston and Mike Pace.

• **Beth Sanderson**

(M.S. 1994, Frost and Magnuson)

Beth's M.S. project contrasted the factors controlling dinoflagellate populations in two bog lakes

that are studied as part of the North Temperate Lakes, Long-Term Ecological Research Project. Beth is continuing a Ph.D. program examining factors generating substantial year-to-year differences in water clarity in Crystal Lake that seem to be linked to difference in year-class strengths of fish that do not operate through typical top-down mechanisms.

• **Daniel E. Schindler**

(Ph.D. 1995, Kitchell)

Daniel's dissertation research evaluated the roles that fishes play in linking benthic and pelagic habitats in lakes. A combination of field studies and simulation modeling demonstrated that benthic foraging by fishes results in substantial flows of energy and limiting nutrients from inshore to offshore habitats. (See **Post Docs**)

• **Patricia Soranno**

(Ph.D. 1995, Carpenter)

Pat's dissertation combined landscape ecology and limnology to address land use, phosphorus inputs, and blue-green algae blooms in Lake Mendota. (See **Post Docs**)

• **Anett Trebitz**

(Ph.D. 1995, Carpenter)

Anett developed and compared 3 approaches for modeling the effects of littoral vegetation on growth and interactions of bluegill and largemouth bass. She also documented the continued recovery of Lake Wingra from the Eurasian milfoil invasion of the 1960s. After a brief postdoc at the EPA lab near Cincinnati, Anett moved to a permanent position as an ecosystem researcher with the EPA lab in Duluth, Minnesota.

• **Melissa J. Weaver**

(Ph.D. 1995, Magnuson)

Melissa received two degrees from Wisconsin, an M.S. in Biometry in 1995 with Murray Clayton and a Ph.D. in Oceanography and Limnology. She analyzed and developed multivariate statistical models relating juvenile and adult fishes to macrophyte structure in Lake Mendota. She is now a post-doctoral researcher at the University of Tennessee investigating streams of southern Appalachia.

• **Karen A. Wilson**

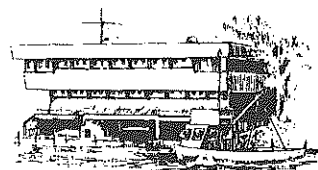
(M.S. 1996, Magnuson)

Karen completed her masters in Zoology. Her research analyzed the interactions between bluegill and predaceous fishes at the ecotone between macrophyte beds and open water in Fish Lake. She is continuing her Ph.D here.

LIMNOLOGY NEWS

University of Wisconsin—Madison

The University of Wisconsin-Madison Center for Limnology publishes Limnology News for its alumni and friends. Comments on the newsletter, articles and article ideas are welcome. Contact Limnology News, Center for Limnology, 680 N. Park St., University of Wisconsin, Madison, WI 53706.



Editors
Janet Blair
Linda Holthaus

Recent Degrees

• Dave Christensen

(M.S. 1995, Carpenter) Dave's research covered 3 diverse topics: phytoplankton vertical profiles in lakes as a function of water color and phosphorus input; factors that affect color in manipulated lakes; and reduction in amounts of coarse woody debris due to cottage development in lakes of Vilas County. Dave has returned to the Pacific Northwest to work on applied problems of riparian management.

• Rigel Cisneros

(M.S. 1994, Magnuson) Rigel, a Fulbright Scholar from Nicaragua, received his Masters in Oceanography and Limnology. He devised a method of detecting cryptic invasions and extinctions from long-term (LTER) data on fishes. He has returned to Nicaragua.

• Kathryn Cottingham

(Ph.D. 1996, Carpenter) As a NSF fellow at Wisconsin, Kathy published on topics as diverse as measures of ecosystem resilience and impacts of zebra mussels on Green Bay. Her dissertation analyzed 4 years of phytoplankton data from experimentally eutrophied lakes with contrasting food webs. Kathy is currently doing postdoctoral research at the National Center for Ecological Analysis and Synthesis in Santa Barbara. Beginning in September 1998 she will be an Assistant Professor at Dartmouth College.

• Lisa Eby

(M.S. 1995, Kitchell) Lisa's master's thesis was based on a series of bioenergetics modeling analyses of preda-

tor-prey interactions in Lake Michigan. She evaluated the response of lake trout growth rates to changes in prey availability, and conducted a comparison of production-predation rates for smelt, alewife and deepwater cisco. Lisa is pursuing a Ph.D. at Duke University Marine Laboratory with Larry Crowder.

• Janet Fischer

(M.S. 1994, Ph.D 1997, Frost and Magnuson) Janet's M.S. project evaluated the factors underlying a substantial increase in the population of the phantom midge larva, *Chaoborus punctipennis*, during the Little Rock Lake acidification experiment. Janet was supported in this work by an NSF graduate fellowship. She continued in a Ph.D. program investigating the phenomenon of functional compensation in aquatic ecosystems. Following her NSF support, Janet also received one of the first EPA graduate fellowships and is now an NSF post doc at Cornell.

• Jeffrey Houser

(M.S. 1998, Carpenter) Jeff has been funded by the Cascade project for experimental ecosystem research. His thesis addressed the effects of nutrient enrichment and food web structure on sedimentation and recycling of phosphorus. Jeff will continue on with Ph.D. work on hypolimnetic metabolism and carbon cycling in experimental lakes.

• Thomas Hrabik

(M.S. 1996, Magnuson) Tom completed his masters in Oceanography and Limnology. His thesis topic was the competition between exotic rainbow

smelt and native yellow perch in Crystal Lake. He is continuing on with the Ph.D. on the inlake distribution of pelagic fishes and the dispersal of rainbow smelt in Northern Wisconsin.

• Timothy Johnson

(Ph.D. 1995, Kitchell) Tim was partially supported by a Canadian NSERC research fellowship to explore the longterm relationship between planktivorous fish and zooplankton in Lake Mendota using historical reconstructions, field sampling and bioenergetic modeling. Tim is now a Research Scientist with the Ontario Ministry of Natural Resources based in Wheatley (Lake Erie) where he is studying the fisheries and limnology of the Great Lakes ecosystem.

• Richard Lathrop

(Ph.D. 1998, Carpenter) An employee of the Wisconsin Department of Natural Resources, Dick returned to campus for doctoral studies. His thesis featured a synthesis of a century of secchi disk data from Lake Mendota, a study of phosphorus loading and blue-green algal blooms for 1976-1996, and an analysis of P inputs, grazing and water-column mixing as drivers of water transparency during the summers of 1976-1996. Dick has returned to the WDNR Bureau of Integrated Science Services as a researcher, and continues his collaboration with Center staff through the NTL-LTER program.

David Lewis

(M.S. 1997, Magnuson) David's M.S. and continuing

continued

Postdocs

- **Sarig Gafny** worked with Carpenter on the Littoral Zone Project. He returned to Israel in fall 1995, where he is teaching ecology at Tel Aviv University.
- **Lee Jackson** worked with Carpenter on contaminant cycling in the Great Lakes. In August 1997, Lee moved back to Canada to take an assistant professor position at the University of Calgary.
- **Doran Mason's** work was conducted as part of Kitchell's Sea Grant-sponsored work on food web interactions in Lake Superior. In August, 1997 he became an assistant professor of Biology in the Department of

Forestry and Natural Resources at Purdue University, West Lafayette, Indiana.

- **Mark Olson** worked on the Littoral Zone Project (Carpenter) and the Bosque del Apache project (Kitchell). In spring 1996, Mark moved to a faculty position at Cornell University's Shakleton Point Field Station.
- **Daniel Schindler's** work involved a continuation of his participation in the Cascade project and collaboration with Kitchell modeling interactions of predation and fisheries for Nile perch in Africa's Lake Victoria. Daniel began a position as Assistant Professor of Zoology at

the University of Washington, Seattle this past fall.

- **Craig Stow** worked with Carpenter on contaminant cycling in the Great Lakes and probabilistic water quality models used to plan reductions of nonpoint phosphorus inputs for Lake Mendota. In August 1996, Craig moved to a faculty position at Duke University.
- **Patricia Soranno** worked with Tim Kratz on the North Temperate Lakes LTER comparative regional limnology study. In August 1996, she became an Assistant Professor at Michigan State University.

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