

Laboratory of Limnology
Lake Mendota

LIMNOLOGY NEWS

University of Wisconsin—Madison



Trout Lake Station
circa 1935

Number 1

Spring 1987

Welcome to Our First Newsletter

Each of us has at least two families, our biological family and our professional family. This new newsletter has the goal of fostering communication among the professional family of Wisconsin limnologists, a social system requiring communication to exist and flourish. Those of us here in Madison would like the newsletter to serve as a vehicle for you to tell others what you are doing, to let us tell you what is going on here, to foster communication among your past associates and to help link the generations of Wisconsin limnologists.

The audience for and contributors to this newsletter will be past and present graduate students, post-doctoral students, faculty, visiting scientists, staff and others who have participated in or been touched by limnology programs at Wisconsin. George Gallepp (M.S. 1970, Ph.D. 1974) has agreed to be our editor. Special thanks to Linda Holthaus, from the Center, who helped put this issue together and Kandis Elliot who designed our masthead. We plan one or two informal newsletters per year.

This edition contains a short article on a new biomanipulation project on Lake Mendota, excerpts from a new book on limnology at Wisconsin, a brief autobiography of Andy Dizon (M.S. 1966, Ph.D. 1971), updates on past graduates and information about the ASLO meeting which will be held in Madison in June 1987.

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New Book Examines 100 Years of Wisconsin Limnology

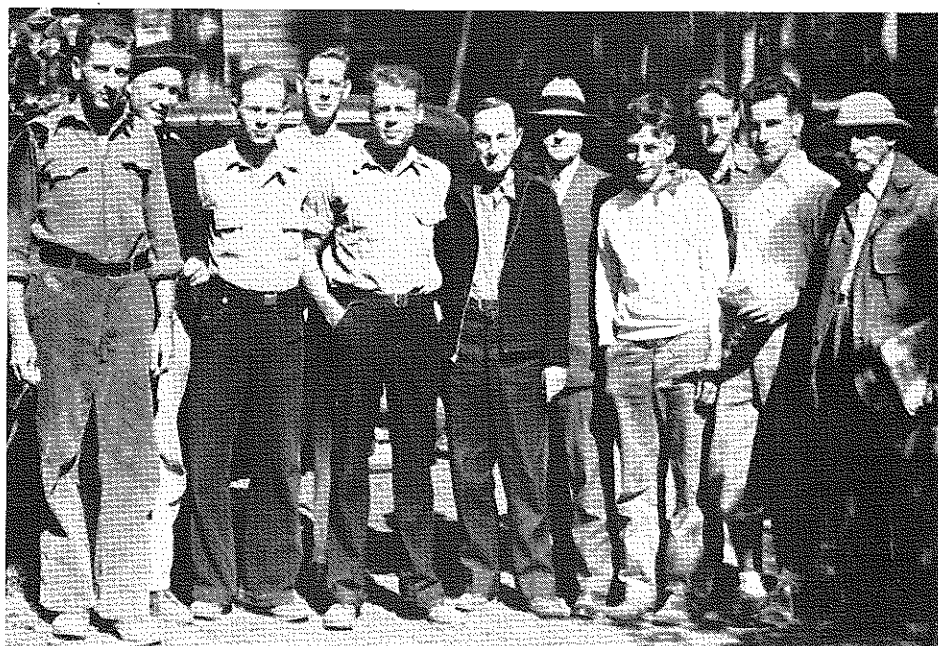
Most of you with roots in aquatic ecology at the University of Wisconsin-Madison will appreciate *Breaking New Waters: A Century of Limnology at the University of Wisconsin*, an upcoming book that covers Wisconsin limnology from Edward A. Birge's arrival in Madison in 1875 until Arthur D. Hasler's retirement in 1978.

Annamarie Beckel, a technical writer and researcher for the Center for Limnology, wrote the first four chapters. These chapters deal with the eras of Birge and Juday (chapters 1 and 2) and Hasler (chapters 3 and 4). Annamarie largely based her narrative on the memories of 13 "old-timers" who gathered at Trout Lake

in 1983 to recount their early experiences in limnology, and on other former students and colleagues whom she interviewed or who wrote her in response to a questionnaire. This is history from the perspective of those who lived it. I pirated many of my favorite quotes and included them below to give you a sense of the book.

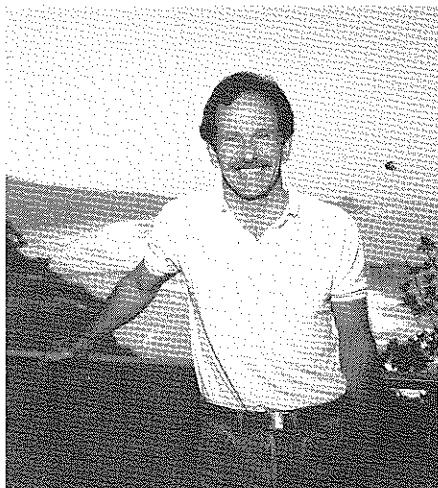
Science historian Frank Egerton from the University of Wisconsin-Parkside wrote the last chapter, which compares the outlook, approach and achievements of Birge and Juday with those of Hasler. This gives those of us who know some of the principles the opportunity to see

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Scientists and assistants at the Trout Lake research station, 1934. From left: David Frey, Martin Baum, John Shreiner, Don Kerst, H.A. Schomer, Chancey Juday, E.B. Fred, Dick Juday, Arthur Hasler, Paul Parceck, Edward A. Birge.

Andy Dizon: From White Bass Vision to Dolphin DNA



I have always been more interested in the process of science rather than in the science itself and, in retrospect, that attitude has shaped my career. I have ricocheted from ecological to molecular biological. An opportunity to participate in a new study sends me off on a new tangent, abandoning any tenuous hold I had on the knowledge of the last. (I will obviously never have a unit named for me although the "diz" has a certain whimsical cachet.) I have, however, seen the way science is practiced in a variety of disciplines and have, hopefully, been able to bring a broadly based general knowledge of science to what I do.

In 1964, I received a bachelor's degree in chemistry from the University of Wisconsin; at the same time, I was working as an electronic technician at the Limnology Laboratory. Art Hasler, at Henry Eichhorn's urging, offered me support to study vision in the white bass if I was interested in a graduate program. My chemistry investment was quickly abandoned for the new and exciting world of biology. Art and Fran Henderson (Ph.D. 1963) had to work hard to give me some understanding of limnology and ecology and Philip Ruck for sensory physiology. This effort to learn a new field culminated with a master's degree in 1966, and a thesis dealing with rod spectral sensitivity of the white bass.

For a doctorate degree, I had the opportunity to decide between Harvard, to work with George Wald,

or Yale, to work with Tim Goldsmith, both excellent visual physiologists. I chose Goldsmith at Yale. Three months later Wald got the Nobel Prize. Yale was a shock to this midwestern boy: they talked funny, they wore sport jackets to class and the best work in vision seemed to be done by physicists (transduction event stuff). In short, I was unhappy at Yale.

I returned to Wisconsin in the fall of 1967 to start a degree program under Art and in 1971 received my doctorate. My thesis work involved imprinting salmon smolts with synthetic odors and examining their responses using electrophysiological methods. Besides Art, John Magnuson and Jim Kitchell deserve much credit (or blame) for shaping my scientific attitudes.

At that time, John, Bill Neill (also finishing up [Ph.D. 1971]) and I produced a proposal to examine thermal responses in skipjack tuna and submitted it to the National Marine Fisheries Service. One of the reasons that the proposal was accepted and Bill and I were hired by NMFS was that Frank Hester, the director of the Honolulu Lab, thought the three of us and the project would revitalize the tuna behavior and physiology program. The program had fallen on hard times ever since John Magnuson had left it to come to Wisconsin.

By the time Bill jumped ship to accept a position at Texas A&M, we had indeed revitalized the tuna program. By the time I finally left in 1982, at least five students received degrees for work they did at Kewalo Basin on various aspects of tuna behavior and physiology and numerous academic scientists visited to study the captive tuna. Besides Magnuson, Neill and me, the Wisconsin people included Jim Kitchell, Chris Boggs (M.S. 1980, Ph.D. 1984), Sherry Steffel (M.S. 1973), Cal Kaya (M.S. 1967, Ph.D. 1971) and Prof. Warren Porter. Warren, Chris and Jim along with George Yates and Ted Wu at Cal Tech were all involved in a multi-institutional NSF grant studying the

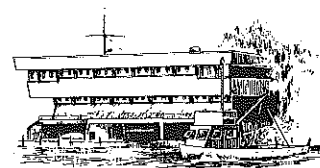
hydromechanics and physiology of tuna swimming. The collaboration grew out of a conference on the physiological ecology of tunas, which was held in early 1977.

Also in 1978, I was still working on thermal preference. Work was progressing nicely, but was terminated when the utility almost doubled electrical charges. It was once again time for a change. I had gotten acquainted with Joe Kirschvink, a geologist from Cal Tech. He was interested in magnetite, a magnetic iron oxide found in bacteria and other animals. People were speculating that this was the long sought magnetic sensory organ. Joe and I reasoned that tunas ought to be likely candidates for a magnetic sense because they swim deep and migrate long distances. Joe, Mike Walker (a new graduate student who wanted to work on tuna orientation) and I borrowed some time on the University of Hawaii's magnetometer to test whether skipjack and yellowfin tuna and kawakawa had magnetite. And we began to rebuild the thermal preference training tanks to study behavioral responses by tunas to changes in the magnetic field. The magnetite work yielded results immediately—tunas had highly localized grains of magnetite in their ethmoids. The behavioral work yielded results more slowly, but the success of both avenues of research was evidenced by Mike Walker's doctoral dissertation and numerous papers, one in the magazine *Science*.

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 John Magnuson, Center for Limnology, 680 N. Park St., University of Wisconsin, Madison, WI 53706.



Edited by George Gallepp

Ten years had now elapsed since my wife and I arrived in Hawaii. In 1971 when we went to Hawaii, I had promised her that after that amount of time I would make an effort to find a new position on the mainland. I made the effort and in the beginning of 1982, Iz Barrett (Director of the Southwest Fisheries Center) transferred me to the "home office" in La Jolla.

By that time, we knew the magnetic material in the ethmoids was magnetite and was of biological origin, rather than an exogenous contaminant. What we now needed was some way to test whether marine animals actually used magnetic information in their migrations. Towards this end, we were able to show that cetacean stranding locations tended to be areas where the magnetic field was low (local magnetic minima). We suggested that migrating animals follow the predominantly north-south running magnetic "valleys" and strandings occur in locations when, for some reason, cetaceans deviate from the north-south tracks of magnetic minima onto side branches which cut across the coastline. Also, Mike (by then a postdoc with me), Joe and I were able to show that migrating fin whales followed magnetic minimas during their annual north-south migrations.

At the same time, I was studying fishery stocks by characterizing mitochondrial DNA (mtDNA). Besides my learning a great deal about how the genetic engineers work their wonders, we were actually able to work a few of our own. We cloned and characterized the mtDNA of a small dolphin, measured the genetic distance between Atlantic and Pacific skipjack and albacore tunas, and demonstrated that the morphologically distinct stocks of the fishery-exploited spinner dolphins maintain genetic contact. It was to Iz's credit that he was able to convince NMFS headquarters of the importance of these and other long-term, more basic and less applied research areas, and convince them to fund them for many years. However, resources for these types of studies have now almost completely dried up in NMFS. In fact, the tuna physiology

and behavior work pioneered by John Magnuson, and continued by Bill Neill and me and many other talented visitors and students, and subsequently taken over by Rich Brill (one of the students who had received a doctorate in the tuna behavior and physiology study) has not been funded this fiscal year.

In October, 1986, I took over the position of scientific editor of the *Fishery Bulletin*. The balance of my time is spent finishing up the last manuscripts which have come from the DNA work. But, I have high hopes that eventually I will be able to convince some funding source that DNA and its rapidly evolving methodologies hold great promise for investigating the recurring stock problems in fishery science. We are also looking for funding to continue the cetacean magnetic orientation studies.

Meanwhile, in my new role as editor, I hope that Art Hasler, John Magnuson and Jim Kitchell's apprentices—who all must be doing exciting and seminal research—will submit their manuscripts to the *Bulletin*. All Limnology Laboratory alumni get fast, accurate reviews and are assured rapid publication.

Andy Dizon
Southwest Fisheries Center
La Jolla, California

The Center for Limnology

On July 1, 1982, the Center for Limnology was established as a free-standing research institute in the College of Letters and Science. The Center operates an aquatic research program and two field stations—the Trout Lake Station and the Limnology Laboratory on Lake Mendota. John J. Magnuson, who joined the faculty of Zoology in 1968, was appointed director. James F. Kitchell and Thomas Frost are Associate Directors for the Mendota and Trout Lake laboratories, respectively. Academic programs remain in the respective departments, the Oceanography and Limnology Graduate Program and the Water Resources Management Program.

Food Web Manipulation of Lake Mendota

The Center for Limnology and the Wisconsin Department of Natural Resources have joined forces to assess the potential for improving the water quality of Lake Mendota through food web manipulations. The DNR is evaluating their stocking program in hopes of achieving a management plan that improves both fishing and lake water quality. To accomplish these goals, stocked piscivores would have to reduce the number of small planktivores, leading to an increase in *Daphnia* numbers, a decrease in phytoplankton and improved water clarity. The fish management division of DNR plans to stock approximately 500,000 walleye and 50,000 northern pike fingerlings in the summers of 1987, 1988 and 1989.

This study follows in the tracks of similar biological manipulations of lakes in the upper peninsula of Michigan by Jim Kitchell and co-workers. Their success at reducing algal standing stocks by introducing largemouth bass into oligotrophic lakes provided the impetus for the present study of eutrophic Lake Mendota. If food web manipulations prove a successful tool for lake management, Wisconsin residents will benefit from both improved water quality and better fishing conditions for walleye and pike.

John Magnuson and Jim Kitchell will coordinate efforts by Center researchers to assess the impact of this predator introduction on populations of planktivorous fishes, zooplankton and algae. Two postdoctoral associates, Chris Luecke and Mike Vanni, and three graduate students will be involved in the experimental and field monitoring programs. DNR personnel will monitor survivorship and growth rates of stocked piscivores, and continue their basic limnological monitoring. This joint research venture is funded over the 1986-88 period from revenue, designated for fisheries-related projects, generated by federal sales tax on sporting equipment.

Chris Luecke
Center for Limnology
UW-Madison

them through the eyes of an informed, impartial observer.

We'll keep you posted on the status of the book as it gets closer to publication.

Birge, sounding almost like Twain, in his 1936 speech, "A House Half Built":

"... the most important result in the end [of the founding in 1897 of the Wisconsin Geological and Natural History Survey] was that it made possible the presence and work of Dr. Juday. . . . He was the first and for years the only limnologist in the country, and we knew the fact though we did not discover the word for a good many years."

After a trip to the AAAS meeting in Columbus in 1940, Juday wrote Stillman Wright:

"One of the striking things about the limnological sessions was the large attendance, from 100 to 200 at all sessions—most of them youngsters. Limnology is certainly on the boom; everybody is talking about it now and all kinds of colleges and universities are offering courses in it. I am wondering how long the boom will last."

Robert Pennak (Ph.D. 1938) at the 1983 Trout Lake conference:

"In a rare confessional moment, Juday told me that most of his ideas for research programs at Trout Lake and elsewhere came to him when he was just about to fall asleep at night."

L.R. Wilson, at the 1983 Trout Lake conference, speaking about what it was like to be a graduate student under Juday:

"Most of us were given a free hand, told to go do it, report in your observations whenever you can. Whenever you want to talk about it, fine."

Donald Halverson, who spent many summers at Trout Lake in the 1930s:

"Birge and Juday were colleagues, but not necessarily friends. . . . Birge and Juday went their separate ways socially. . . . Juday was always willing to show you what was going on if you were interested. He was cordial and helpful and liked you as long as you were interested in limnology."

Martin Gillen, a former student and friend of Birge's, related the following story at the First Symposium on Hydrobiology in 1940:

"I asked him [Birge] one evening, 'How many tests have you made with your "light machine" in the northern lakes?' He said, '19,952.' I replied, 'Well, Doctor, it will not be very long now before you will be able to announce a solution of this problem.' He stopped a moment, shook his head, and said, 'Martin, I think after this work is kept up 25 or 30 years longer, we may have the answer to it all.'"

(For years, Birge courted Gillen, hoping he would will his property on the Wisconsin-Michigan border to the University of Wisconsin. Gillen, a Catholic, owned a large parcel with many lakes, including Peter and Paul. "In the end," Hasler once told me, "the priests got to Gillen on his deathbed and he left the property to Notre Dame.")

Art Hasler at the 1983 History Conference recalling Birge's strength:

"One of Birge's great contributions was his ability to go across the university and find the experts he needed. Birge's political savvy and his aggressiveness, combined with his having attained a leadership role in the university at a very young age, enabled him to get both money and experts."

Juday's opinion of fish stocking policies as expressed in a 1939 letter to Stillman Wright:

"This heterogeneous mixture of various species of fish without knowing anything about the possible effects of introducing exotic forms is typical of the modern fisherman. He thinks any kind of water ought to produce any kind of fish, so he goes in for variety, which is the worst thing he can do in many cases."

Edward Schneberger (Ph.D. 1933) related Birge's now notorious instructions to a student assistant whose tasks included taking water temperatures in Lake Mendota when the ice was thin:

"If you start going through, throw the thermometer towards shore. It's the only one we have."

(Neither Birge nor Juday could swim.)

Hasler at the 1983 Trout Lake conference:

"Having been raised in a department of molecular biologists and cytologists, it's been quite a chore to justify being an experimental scientist to them. . . . We've always had a battle to convince them that what we were doing experimentally was legitimate. They think we're at Trout Lake fishing or sunning ourselves."

Hasler in a 1983 statement:

"The initial attempt to dig ponds [in the UW Arboretum's Gardner Marsh] with explosions of dynamite failed. The force lifted the peat straight in the air and it cascaded right back down. This became known in Arboretum circles as 'Hasler's Folly.'"

Clyde Voightlander (Ph.D. 1971) in 1983 on his memories of the "Lake Lab":

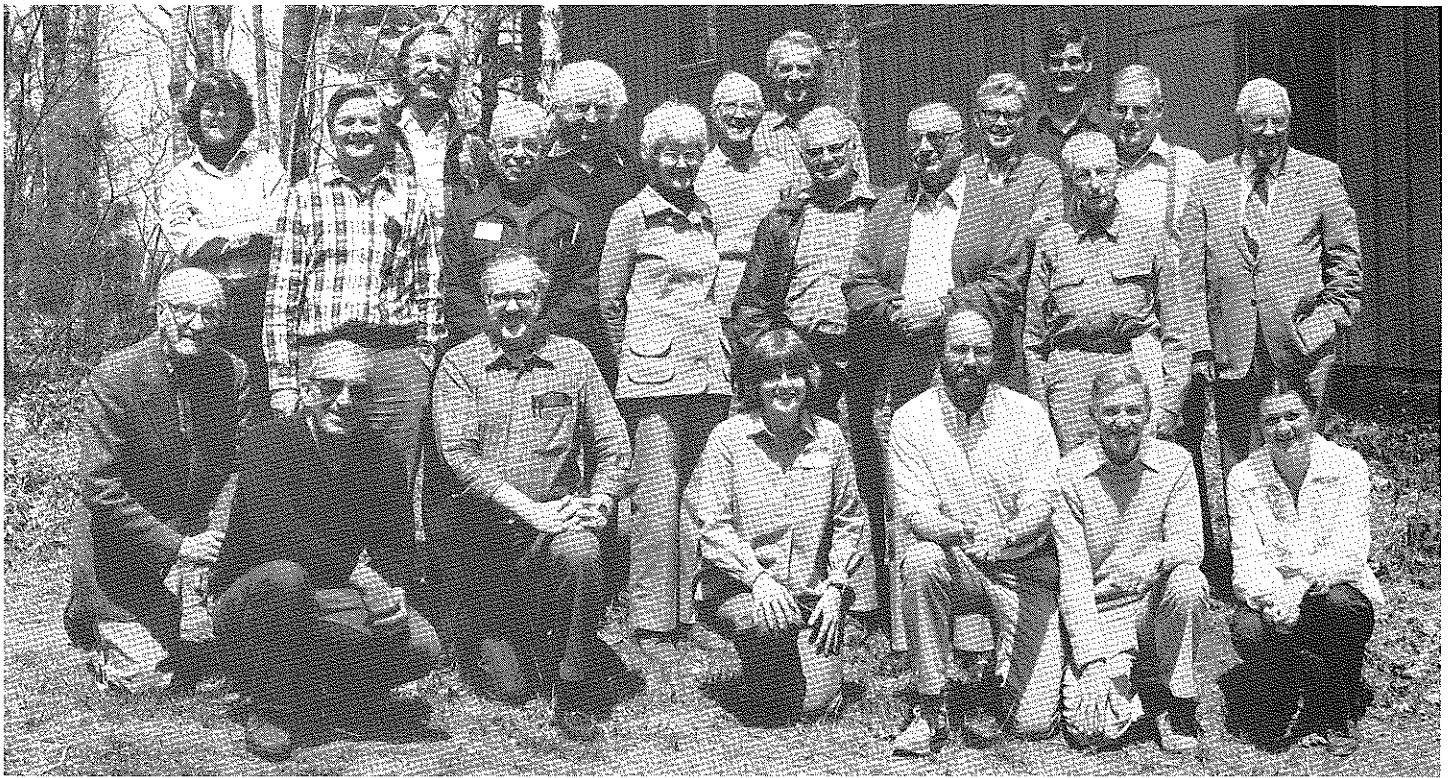
"Students had to be independent to survive. The lake lab was no place for someone who was dependent. . . . Students had to define their own projects, their own lines of inquiry, preferably in a proposal on paper. Hasler was hard-nosed about research, but he allowed a great deal of latitude."

Hasler in 1983:

"Neither Birge, Welch, nor Hutchinson emphasized the fish of lakes and rivers. It was one of my goals to correct this neglect. Only in 1982 was a textbook published [Goldman] that had even a chapter on fish communities."

David LeCren (M.S. 1947) recalling a two-day trip he, Hasler, John Neess (Ph.D. 1949), John Bardach (Ph.D. 1949) and Ed Nelson (Ph.D. 1947) took to Trout Lake in 1947:

"One of the stores in Madison had recently bought a batch of ex-Army 'jungle hammocks' that they were selling off at \$5 each. Several of us had bought one of these and we thought that we would try them out at Trout Lake. . . . Ed disdained the hammocks, which, considering his weight was wise, and settled down in his sleeping bag on the sand. The rest of us chose pairs of pine trees and tied up the ropes of our hammocks. The hammocks had fly sheets over the top of them



Participants in the 1983 "History of Limnology in Wisconsin" conference with the Trout Lake Laboratory in the background. First Row: Arthur D. Hasler, Walt Haag (CFL facilities manager), Frank Egerton (UW-Parkside historian), Annamarle Beckel (CFL assistant researcher), Thomas Frost (CFL Associate Director for the Trout Lake Station), Robert Ragotzkie (former student of Hasler), Paula Barbian (CFL research specialist). Second Row: John Magnuson (CFL Director), Robert Pennak (former student of Juday), Gail Kirkpatrick, L.R. Wilson (former associate of Birge and Juday), Edward Schneberger (former student of Juday), Gerald Prescott (former associate of Birge and Juday), Herbert Dutton (former associate of Juday). Third row: Jean Lang (University-Industry Research Program), Carl Bowser (UW Dept. Geology and Geophysics), David Frey (former student of Juday), Charles Kirkpatrick (former associate of Juday), William Helm (former student of Hasler), Fredrick Stare (former associate of Birge and Juday), Timothy Kratz (CFL assistant scientist), Richard Juday (son of Chancey Juday).

connected to the hammock proper by mosquito netting. One had to open a zip, insert one's top half and then leap off the ground and pull one's legs in. This was easier said than done, and most of us promptly ended upside down in the fly sheet. I believe that Art actually rotated two or three times before coming to rest. It then became apparent that the strings on which the hammocks were suspended had been quietly rotting away while stacked in some damp Army store. There was a succession of loud reports, as under tension, first one and then another gave way under the strain of shaking laughter that had by now afflicted the party."

George Gallepp
College of Agriculture
and Life Sciences
UW-Madison

ASLO Meets in Madison June 14-18

Just a reminder, the American Society of Limnology and Oceanography meeting will take place on the shores of Lake Mendota this spring. Among the special symposia will be one on experimental limnology in honor of Arthur Hasler's contributions to the field.

The meeting will include a traditional bratwurst and beer picnic, and a soon-to-be-traditional Lake Mendota perch fry. The Center for Limnology will host a reception for alumni and friends at The Wisconsin Center from 7:30 to 9:30 p.m. on June 16 following an open house at Limnology and Water Chemistry. We invite you to come to Madison, attend the reception and visit the Center for Limnology.

Tom Frost, Assoc. Director
Trout Lake Station and
Chair, ASLO '87
Organizing Committee

Welcome, *cont. from page 1*

We are a loosely connected family of scholars and friends linked by some common experiences, education and traditions. I'm deeply pleased to be a part of this family. With warmth and sentiment we initiate this newsletter.

John J. Magnuson, Director
Center for Limnology
UW-Madison

Missing in Action

Can you help us? We need current addresses for the following graduates: Christopher T. Lind, Ph.D. 1967; Paul D. Lutz, M.S. 1958; Edward M. Nelson, Ph.D. 1947; Howard Snow, M.S. 1972; M.C. Sparr, Jr., Ph.D. 1960; and Roderick C. Stone, M.S. 1961.

Keeping in Touch

Jay Andrews, Ph.D. 1946 (Hasler)
Virginia Marine Institute of Science
Yorktown, VA 23480

Jay retired in 1983 as Senior Marine Biologist. He worked on reproduction and diseases of oysters.

E. David LeCren, M.S. 1947 (Hasler)
New Garbridge, Roman Road
Appleby, Cumbria, CA16 6JB
England

David retired as Director of the Freshwater Ecological Association Laboratory at Windermere and is currently writing up his research on perch and trout. From September 1986 to April 1987 he was a Visiting Professor at the Department of Fisheries and Wildlife, Virginia Tech.

John Bardach, Ph.D. 1949 (Hasler)
Department of Geography
University of Hawaii at Manoa
2424 Maile Way
Honolulu, HI 96822

John retired in October 1985. He is currently teaching graduate courses at the university and coordinating ocean-related interdisciplinary programs for the Environment and Policy Institute at the East West Center in Honolulu.

Clifford Brynildson, M.S. 1950 (Hasler)
5710 Thrush Lane
Madison, WI 53711

Clifford retired recently as Madison Area Fish Manager with the Wisconsin DNR where he was in charge of the fisheries in Dane, Green, Rock and Jefferson Counties. He conducted investigations on trout streams and the biology of smallmouth bass.

Warren Wisby, Ph.D. 1952 (Hasler)
RSMAS
4600 Rickenbacker Causeway
Miami, FL 33149

Warren is the Associate Dean of the Rosenstiel School of Marine and Atmospheric Science where he administers the graduate and research programs. He also coordinates work at an experimental hatchery facility on the early life history and behavior of marine organisms.

Oscar Brynildson, Ph.D. 1958 (Hasler)
Rt. 2, Box 25-A-5
Black River Falls, WI 54615

Oscar has retired as the DNR Water Resources Research Group Leader, based at Hartman Creek State Park, Waupun, WI, where he worked on trout and stream ecology and lake limnology.

Ross Horrall, Ph.D. 1961 (Hasler)
Meteorology and Space Science
University of Wisconsin
Madison, WI 53706

Ross is a Scientist working on olfactory imprinting and early life history of lake trout in Lakes Michigan and Superior.

Gary Hergenrader, Ph.D. 1967 (Hasler)
Department of Forestry, Fisheries and Wildlife
University of Nebraska
Lincoln, NE 68583

Gary is the Head of the Department of Forestry, Fisheries and Wildlife and Nebraska State Forester. In addition he teaches limnology courses and is interested in reservoir limnology.

Ronald Berg, M.S. 1969 (Magnuson)
9616 Stikine Street
Juneau, AK 99801

Ron is a Commercial Management Fisheries Biologist with the National Marine Fisheries Service. He manages foreign and U.S. commercial ground fish fisheries and reviews research done by management teams to develop annual harvest quotas.

Roy Stein, Ph.D. 1975 (Magnuson)
1735 Neil Avenue
Department of Zoology
Ohio State University
Columbus, OH 43210

Roy is an Associate Professor. In addition to teaching, he is examining factors influencing the success of stocked predatory fishes. At Trout Lake he is studying how predators influence the structure of snail assemblages.

Clifford Kraft, M.S. 1977 (Kitchell)
Sea Grant ES-105
University of Wisconsin
Green Bay, WI 54301-7001

As a Field Agent for the Sea Grant Program, Cliff conducts outreach programs on their Great Lakes research. He recently received Sea Grant's "Outstanding Marine Advisory Services Program Award" for work on high lake levels in the Great Lakes

Steven Bartell, Ph.D. 1978 (Kitchell)
Environmental Sciences Division
Oak Ridge National Laboratories
Oak Ridge, TN 37830

Steve is a Research Staff Scientist. He develops computer models of toxic chemical movements in aquatic ecosystems, applies scale and hierarchy concepts to carbon, nitrogen and phosphorus flow through the Walker Branch watershed, and studies the relationship between nutrient cycling and stability.

Allan Scholz, M.S. 1977, Ph.D. 1980 (Hasler)
Department of Biology
Eastern Washington University
Cheney, WA 99004

All is Associate Professor of Biology and Director of the Upper Columbia United Tribes Fishery Center. In addition to teaching, he studies the effect of trout-zooplankton interaction on phytoplankton in Medical Lake and does computer simulation modeling to determine trout stocking levels for Medical Lake.

**Christofer Boggs, M.S. 1980,
Ph.D. 1984 (Kitchell)**
National Marine Fisheries Service
Honolulu Laboratory
2570 Dole St.
Honolulu, HI 96822-2396

Chris is a Fisheries Biologist in the Pelagic Ecosystem Program working on tropical tuna ecology with emphasis on condition factors and natural mortality. He also works on physical oceanographic features and their effects on tuna availability and abundance, tracks tuna movements and designs tagging studies.

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