

LIMNOLOGY NEWS

University of Wisconsin—Madison

Laboratory of Limnology
Lake Mendota

Trout Lake Station
circa 1935

Number 5

Spring 1991



Edward Schneberger in a 1963 DNR photo

Edward Schneberger: A Career with the Wisconsin DNR

"I was interested in fish from the beginning," says Edward Schneberger, a graduate student of Chancey Juday's in the early 1930s. "When I came [to UW] I knew I would be working with Juday. He had me come to Trout Lake as soon as the lab opened in June. . . . My first summer I worked on bottom samples. Joe Morrison checked them for the snails and clams, then I would go over the samples and catalog the

Continued on page 2

Early Underwater Investigation in Lake Mendota

I believe it was 1951 when aqualung diving was first tried at the Lake Lab. That was long before the self-important term SCUBA appeared. The two-hose, Cousteau-Gagnon regulators with compressed air tanks were called aqualungs, so that was the term used for the exercise.

Diving had been tried earlier than that in Lake Mendota, primarily by John Bardach in the late 1940s. It had been done before I arrived in Madison, in the fall of 1949, so I never witnessed it. But I understand that John used to sit on the bottom of Lake Mendota, with a great metal can balanced on his shoulders, air being pumped in from above, as he peered into the green shadows, trying to determine what was going on among the fishes. His comments and recollections would be interesting to have.

The automatic regulator of the aqualung was developed in occupied France, during 1942. Its invention and early use was elegantly described by Jacques Yves Cousteau in "The Silent World." That was the first, and

maybe the best of Cousteau's books. The newness and excitement of free-swimming, underwater exploration was apparent on nearly every page, and most of the problems and errors of aqualung or scuba diving were experienced or foreshadowed.

By the late 1940s, the aqualung was appearing along the warm North American coasts. We heard reports of it from Florida. Art Hasler was much interested then in the daily movement of perch schools in Mendota. He had Office of Naval Research support and a 40-foot naval launch on the lake. He and J. R. Villemonte of Civil Engineering were trying to follow perch schools with echo-sounding devices on the boat and to improve the gear for that purpose.

About this time, the Canadian Department of Fisheries was undertaking the development of underwater television systems for remote, long period observation. Jean-Paul Cuerrier brought a system down from Canada to try

Continued on page 4

News from the Center

The Center for Limnology is entering its second decade of long-term ecological research as the home of the North Temperate Lakes Long-Term Ecological Research site funded by the National Science Foundation. We are one of 18 sites ranging from an Arctic tundra site at Toolik Lake, Alaska, to a tropical site at Luguillo Forest in Puerto Rico, to an ice margin, marine site in the Antarctic at Palmer Station. Sites in the continental United States include deserts, prairies, forests, cornfields, and coastal marine landscapes; ours is the site that focuses primarily on lakes in the landscape. Trout, Crystal, Big Muskellunge, Sparkling, and Allequash Lakes plus two small bog lakes form the core of our site at the Trout Lake Station. We have just received a six-year continuing grant through 1996 for more than \$3 million from the National Science Foundation. This was a major hurdle for us; we are very pleased to be a part of this exciting program which we believe will play an important role in this era of global environmental change.

My thanks to **Ralph Nursall** for sending his enjoyable article about early underwater research on Lake Mendota, which appears in this issue of *Limnology News*. **Linda Holthaus, George Gallepp** and I welcome such contributions and will share as many as we can with you through *Limnology News*.

We announce the completion of recent degrees in each newsletter, but this leaves out news and recognition of departing staff and postdoctorate researchers who were not students here but have made lasting contributions to the

Continued on page 7

Schneberger from page 1

other contents. This was work for Birge and Juday."

Schneberger grew up in Kansas and has always liked fishing and the out-of-doors. He graduated from Kansas State Agricultural College (now Kansas State University) in 1928, but he had been at the Michigan Biological Station in 1926 where he took ichthyology, herpetology and mammalogy. After the summer in Michigan, Schneberger received a two-year fellowship from the Kansas Forestry, Fish and Game Commission to conduct research at Kansas State University where he studied nutrition in channel catfish. Minna Jewell was his major professor. Schneberger completed his master's degree at Kansas State in 1929.

"After I finished my master's, I wrote around for fellowships," Schneberger says. "The one here [UW] was open, so I took it. E. J. Wimmer, who taught physiology at Kansas State, had been a student of Juday's. Hubbs [Carl] was at Michigan and I had had hopes of going to Michigan, but they had no fellowships, scholarships, or teaching assistantships available. . . ."

"Juday didn't push anybody. He was always available for counsel and advice, but you had to go to him. I became very fond of him. He was kind and helpful, and always willing to give time."

Schneberger chose his own Ph.D. project, "The growth of yellow perch (*Perca flavescens* Mitchell) from Nebish, Silver, and Weber lakes in Vilas County, Wisconsin."

"I don't know how it came about, but the Bureau of Fisheries

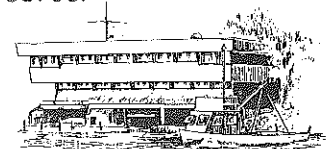
hired Ralph Hile, who had just finished his Ph.D. at Indiana," Schneberger says. "He came directly to Trout Lake. The Bureau bought us gill nets and the two of us worked on fish. We sampled the lakes. I chose to work on perch. Hile chose ciscos and rock bass, and, incidentally, he got classic papers out of that work. He was a brilliant man."

Schneberger received his doctorate in 1933. "I was Juday's first student to graduate after he got his honorary Ph.D. from Indiana. He received that one day and then the next day escorted me through graduation. . . . This was right during the Depression and a Ph.D. wasn't worth much. That year Dr. Guyer [Michael F.], who was chairman of the zoology department, canceled all applications for assistants in the department. He said he wasn't going to train any more people and then throw them out with nothing to do."

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.



George Gallepp, editor
Linda Holthaus, production
manager

So he kept seven of us on to teach quiz sections, labs, and so forth. I did that for a semester."

In March of that year, Schneberger learned that the Wisconsin Conservation Department, now the Department of Natural Resources, wanted a survey of the commercial fisheries of Green Bay. He went down to the Capitol and talked with B. O. Webster in the Department of Fisheries.

"At that time the Bureau of Personnel had no classification for biologist," Schneberger remembers, "so they put me on the payroll as a laborer at \$100 a month and I was damn happy to get it — it was almost double what I was getting before. Mr. Webster allowed a dollar a day for meals to help out. You could eat pretty well for a dollar a day at that time. . . . It wasn't long before they created a classification for biologists and I was given \$150 a month as a junior biologist.

"H. W. ('Mac') Mackenzie was Director of the Conservation Department. Although he was 'rough and gruff,' he was quite far-sighted. In 1937 he created a biological division with a core of biologists to do lake and stream surveys and to study the diseases and nutrition of fish."

In 1934 the Wisconsin legislature gave the Conservation Department the power to set fishing and hunting regulations that had the force of law. Before that, regulations were set by the legislature.

"I was given the commercial fisheries operations and was soon in administration and biological research. So in the early 1940s I

was superintendent of fish management and found myself having to write the fishery regulations. . . . At that time there was continual controversy between the commercial fishermen and the department. No one in the department understood commercial fisheries. There was lots of distrust and misunderstanding between the

Fisheries Society, an organization he had joined in 1936. He rewrote the constitution and by-laws, eliminating obsolete items and updating others.

As Secretary to the State Committee for the Preservation of Scientific Areas, Schneberger was able to get the program funded. "When I inherited the secretary-

"At that time the Bureau of Personnel had no classification for biologist," Schneberger remembers, "so they put me on the payroll as a laborer at \$100 a month and I was damn happy to get it — it was almost double what I was getting before . "

commercial fishermen and the department, but I was able to gain their confidence and cooperation.

"In the 1940s I was appointed to the State Committee on Water Pollution, which was a quasi-judicial body with the authority to hold hearings and issue regulations on the control of water pollution. I spent six or seven years on that committee and was chairman for two years. It was challenging work."

Schneberger also worked with the Great Lakes International Fishery Commission, which was established by a treaty between Canada and the United States. President Harry S. Truman signed on behalf of the United States.

"I was an advisor to many of their committees. Lester Voight [then Director of the Conservation Department] was appointed to the Commission by President Eisenhower and I was Voight's chief advisor."

In 1960 Schneberger served as President of the American

ship of the committee, we had no funds. After the first few meetings I thought we were spinning our wheels and were kind of useless. So the chairman and I worked out a legislative program to get funds, and the program has been funded ever since. The committee now has a budget within the DNR that allows them to hire a staff, as well as purchase areas and provide management."

In 1964 Schneberger was appointed Director of Planning and Research of the Wisconsin Department of Natural Resources. He served in that capacity until his retirement in 1971. He and his wife, Helen, whom he had met at Kansas State when they were undergraduates, now reside in Middleton, Wisconsin.

Annamarie Beckel
Center for Limnology
Trout Lake Station

Underwater from page 1

in connection with Hasler's work. The trials were not particularly successful, in part for technical reasons and in part because of the summertime murkiness of Lake Mendota, as well as the fact that the most significant observations were to be made at dusk and after dark. However, methods of lighting, as we shall see, were not well-advanced. It looked promising, but not much use was made of it then.

For another approach to observing fish, some double-hose aqualung regulators were obtained. Adventurous volunteers were not hard to find, so a small cadre of divers was formed. Some remarkable things took place.

Divers, of whom I was one, outfitted themselves with masks, fins and snorkels, from which the ping pong balls, then popular as valves, were quickly removed. The equipment was not much by today's standards, but we felt ourselves to be pretty impressive anyway. As I remember, Otto von Frisch, a visitor to Wisconsin under Hasler's tutelage, had the finest fins. He had picked them up in Florida. Most of us had limp, black rubber things, much like those children now use at the beach. My face mask was nearly round and made of heavy, red rubber, similar to that used in a rubber plunger, or plumber's helper. I used it for a number of years; the head band soon gave out, to be replaced by a strip of

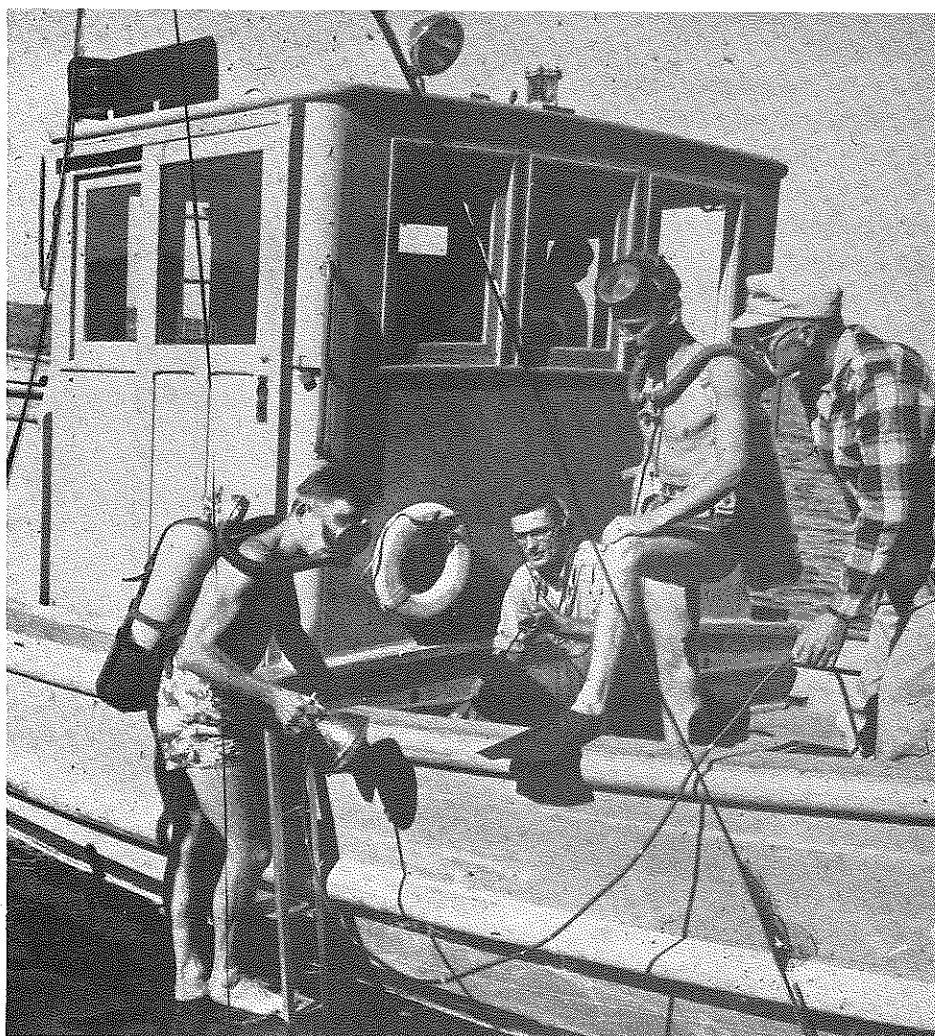
inner tubing.

The idea of a wet suit was not yet current. Designers were trying, most ingeniously, for dry suits. We got an early model, with the expectation that we would be able to stay under water almost indefinitely. That proved to be not quite the case. Our dry suit was a marvellous outfit. One entered it through a hole in the back, feet first. The feet then lodged in what can only be described as galoshes — great rubber boots fused to the legs of the suit — even with galoshes' buckles, if memory serves. Right there we were stymied; no swim fin in the world would fit over the boot, so underwater locomotion was peculiar, at best.

The suit was made of a sort of

sand-colored, thin gum rubber, similar to the rubber used in tubing for bunsen burners. It stretched. That was how you got your head end covered. A helper pulled at the top of the suit as the entrant tried to get the rest of himself into the hole in the back. The entry hole formed sort of a funnel, rather like that on a paper bag ready to be blown up and popped. The funnel, or cuff, was pulled over the head of the diver by brute force. At the same time, the diver was trying to get his arms into the sleeves of the suit. Resistance was stiff, especially as sweat began to accumulate, as it invariably did, for this was a struggle! We tried to ease the entry problem with talcum. It helped some, but mostly it just

Robert Ragotzkie prepares to enter Lake Mendota in this early 1950s photo. On deck are Ross Horrall (earphones), Otto von Frisch (flippers) and Arthur Hasler. Warren Wisby stands ready at the controls in the cabin.



made the sweat thicker. The sleeves were tight, to prevent the ingress of water, for the hands were exposed. There were probably rubber gloves to go on over top when one was properly inserted, but they interfered markedly with manual dexterity and were not much used. The top of the suit formed a hood, tight to the head and the sides of the face. As one slowly snuggled into the suit, that last bit finally snapped into place and one was nearly ready.

Nearly ready. There was still the rubber funnel, like a great, man-eating flower around the opening in the back. To seal the diver in, the helper then went round behind and, throwing a couple of turns of a stout rubber band around the funnel, tried to tie it tightly enough to close the opening. That was about as successful as you might imagine it to have been. Moreover, the diver then had a large, floppy bundle of folded rubber in the middle of his back, right where the air tank was to fit. By this time, the person in the suit was in some danger of expiring from heat prostration and was absolutely soaked with sweat. The struggle continued, to add air tank and regulator, weight belt and mask. You will remember that fins were no problem.

Most of this was done downstairs in the old Lake Lab. Then the diver shuffled out to the wooden dock to get in the water as quickly as possible. The warm body fluids enveloping the diver in the suit were immediately joined by cold lake water, that entered at wrist, face and hole in the back. None entered at the feet or ankles, but it mostly drained down there to accumulate in the ga-

loshes. I suspect that supposed dry suit became an unexpected prototype wet suit. I don't think any diver at the Lake Lab tried the suit on more than twice. Certainly it was never used effectively in any work. Everyone dove only in swim suits after trying it.

A more serious problem was the supply of compressed air. There were no dive shops in Madison then. There was no air

and never for more than 20 or 30 minutes at a time (garbed as we were only in swim trunks), we were in no real danger. What mental anguish these attitudes would engender in a modern-day University Diving Officer.

Those of us who dove practised off shore or went deeper from the launch. Meanwhile, the technical crew struggled with other problems. When there was

Our dry suit was a marvellous outfit. One entered it through a hole in the back, feet first. The feet then lodged in what can only be described as galoshes — great rubber boots fused to the legs of the suit — even with galoshes' buckles, if memory serves. Right there we were stymied; no swim fin in the world would fit over the boot, so underwater locomotion was peculiar, at best.

compressor convenient to the lake at all. What we did was get bottled oxygen and transfer it to our air tanks through metered valves that were rigged up. That, in itself, was an adventure, for we were aware of the dangers of transferring oxygen from container to container. At a time when nearly everyone smoked and oil from outboard motors was liberally spread around, we moved gingerly around the Lake Lab when tanks were being filled. Little else took place then, while people not directly involved were encouraged to be elsewhere and smoking was strictly forbidden.

We were up-to-date with J. S. Haldane's Royal Navy diving tables (1907), so knew about decompression. We knew also of the problem of oxygen toxicity under pressure. We reasoned that since we would never be more than 35 feet beneath the surface and usually less than that,

sufficient light, divers would go down to watch the fish, ascending at intervals to report what had been seen. None of us managed to devise an appropriate method of recording under water. This is a problem for which there are a number of simple solutions, but at that time we did not grasp them. We descended, watched, tried to remember behaviors, numbers, and sequences. When full, the diver rose to the surface to discharge information to a reporter leaning over the gunwale with pencil and pad. Then down he went again.

There was a solution suggested and tried — Air Force throat microphones. The diver wore a microphone around his neck. It was connected by waterproof cable to the earphones of a recorder on board ship, who wrote down everything the diver said. Perhaps "said" overstates it slightly. To speak, in 30 feet of

The diver wore a microphone around his neck. It was connected by waterproof cable to the earphones of a recorder on board ship, who wrote down everything the diver said. Perhaps "said" overstates it slightly. To speak, in 30 feet of water, with teeth firmly clenched on the mouthpiece of a regulator was more than Demosthenes could have overcome. The recorders suffered frustration and desperation as they tried to translate the muffled grunts and foreign syllables that traveled the wire from the deep.

water, with teeth firmly clenched on the mouthpiece of a regulator was more than Demosthenes could have overcome. The recorders suffered frustration and desperation as they tried to translate the muffled grunts and foreign syllables that traveled the wire from the deep. Lots of debriefing took place when divers finished their time under water and recorders strove to put meaning into their notes. Qualitative data was the order of the day — or night.

Nighttime investigation was particularly important — and difficult. Most of our important diving was done at dusk and after dark. This pioneer group started primarily as a night-diving outfit. The problem of how to see at night got a lot of attention. Hand held underwater torches were not available to us and we did not succeed in waterproofing flashlights effectively. There were two quite distinctive solutions improvised, however.

The first solution was to use reflector photoflood bulbs in a waterproof socket, connected to the electric power source of the launch by long, waterproof cables. Each diver would carry one of

these down. It and his throat microphone meant that he was connected to the launch by two cables, so part of his energy was directed to keeping himself and the cables in appropriate relationship to each other. This was not free-swimming in the usual sense. The photofloods were a bit tricky. Off-on control was from the ship. If the light was turned on before the bulb was under water, it shattered explosively the moment water touched it. If turned on under water, the intense heat the bulb generated dissipated satisfactorily. The light itself was superb. The technique that quickly evolved was that a diver would get to a position in the dark that he thought would be useful, then send some preordained gurgle up the microphone line to the recorder, who would order the switch thrown. Once the light was on, the diver could maneuver as he saw fit. The light would be extinguished at command or when the diver surfaced. The light could be taken out of the water while on, but it could not be returned until it had cooled.

The culmination of this phase of the work took place one night in 1952 when I was on the bottom of

Lake Mendota, searching for perch. Suddenly my photoflood exploded and I felt a great jolt. I let out a shout, flung out my arms, let go the cable and shot towards the surface. I burst into the air beside the boat to see a row of wide-eyed heads staring down at me. "What happened?" was the cry. The technical failure had not taken place in secret. My petitionary imprecation "Jee-sus Christ!" was the clearest message that had ever come through the microphone line, and it had nearly blown the earphones off the recorder's head. He told the crew.

I was hauled aboard, none the worse for the event, except that there was a slight cut on the top of my foot where a shard of glass in the light socket had grazed it, as I went up and the socket went down. That was the last use of photofloods.

The second solution to the problem of lighting could be likened to the development of night baseball. The ingenuity and technical talent available around the Lake Lab and in university workshops combined to produce a system of sealed beam lights, mounted around a large rectangu-

lar frame, that was lowered from the launch by winch. The apparatus was lowered to a few feet above the lake bottom in a location judged to be of interest. Divers stationed themselves above and around it, then, at a signal through a microphone, the lights were turned on. A large area was illuminated. The divers would make their mental notes or croak their sounds through the microphone as the nighttime secrets of perch were revealed. The results you can read about in Hasler and Villemonte's 1953 article, *Observations on the daily movements of fishes*, in Science magazine. The acknowledgments provide an honor list, though not complete, of Lake Lab inhabitants of the period.

We learned lots about diving during those times. Terry Durkin was an undergraduate, a Badger football player, and tremendously enthusiastic. He was always first in and first to the bottom. That did him in. He had to retire with a burst eardrum, while the rest of us learned caution. I have worn eyeglasses since fourth grade. I found that my observations were hindered then by my inability to see as clearly as I might, so my contributions were rather less than those of others. But in later diving, I overcame this by the use of lenses added to the mask, even to bifocals for the past 10 years. They became necessary when I found that I could not read my watch underwater. They work splendidly and I'm never late.

Arthur Hasler promoted the Lake Lab tirelessly, as well as the research emanating from it. He

once got UW President E.B. Fred out on Lake Mendota in the naval launch, in order to demonstrate its potential to him. Its echo-sounders, winches, limnological and communications equipment were all proudly displayed.

I was assigned to go overboard, to illustrate the use and importance of the new aqualung equipment. So I did and descended to the bottom, where I made some noises for the microphone. It then occurred to me that I was entirely invisible to those on the boat. It would be an act of faith for the President to believe without doubt that I was where I was said to be. Could there be proof? I scanned the bottom and dug into it with my hands. My fingers closed on a large clam which I clutched tightly and took in triumph to the surface. The President accepted it with a bemused smile and we returned to shore. Art told me afterward that it was a lovely touch, just the sort of thing he wanted to impress the President, to show the initiative and willingness of the Lake Lab crew to venture to the unknown. Ah, it was fun!

John R. Nursall
(Ph.D. 1953 Hasler)
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Ralph Nursall is Emeritus Professor of Zoology at the University of Alberta. He now lives on Cortes Island in British Columbia.

Notes continued from page 2
limnology program at the Center. Several long-time associates have left in the past year. Mary Smith, who helped so many of us as my secretary, has advanced up the professional ladder at the University to a position in the Medical Sciences Center. Mary did finish her bachelor's degree in zoology while she was with us. Paula Kuczmarski Barbian, who has worked with us for 13 years on Sea Grant and Long-Term Ecological Research projects, is leaving the world of zooplankton counting and returning with her husband, Alan, and children, Katie and Daniel, to live nearer to her parents in Rhinelander. David Smith who was so valuable to my Sea Grant research on Green Bay fishes now works for the Wisconsin Department of Natural Resources. Dr. Redwood (Woody) Nero, who worked with Clarence Clay and me on ocean patchiness at the north wall of the Gulf Stream off Cape Hatteras, has taken a position in ocean acoustics with the U.S. Navy at the Stennis Space Center in Mississippi. Woody came to us on a postdoctorate scholarship (Research Council of Canada) after receiving a doctorate at the University of Toronto-Erindale College. Each of these persons has my warm appreciation for her or his influence on the Center as do many others who were with us for a shorter time during the last few years.

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

CFL and DNR Launch Littoral Zone Fisheries Project

Taking a summer swim in some Madison area lakes can be a lot like wading through an untended garden — in each case you're likely to run into a tangle of unwanted weeds.

Swimmers, boaters and anglers all call for culling the nuisance plants, and each year an estimated \$340,000 is spent harvesting weeds and treating the lakes with herbicides. Similar weed control methods are used on lakes throughout the state, but little is known about their impact on lake ecosystems.

Rooted aquatic plants in the lake bottom — called macrophytes — can have a tremendous influence on a lake's physical and biological health. The plants provide cover and forage for fish, recycle nutrients and indicate overall water quality. In an unprecedented study, researchers at the UW-Madison Center for Limnology and the Wisconsin Department of Natural Resources have joined forces to find how macrophyte and fish communities respond to each other and to herbicides and mechanical harvesting.

"The origin of this study is the perception that the Madison lakes are clearing up," said Steve Carpenter, one of the scientists coordinating the study at the Center for Limnology. If water clarity is improving, aquatic plants are expected to flourish, Carpenter said, because sunlight will penetrate deeper into the lake, fueling plant growth.

The new study called the littoral zone fisheries project, will be carried out largely in the lakes' littoral regions, the shallow, near-shore area where there is enough

light for rooted plants to grow.

This research will complement the ongoing Lake Mendota biomanipulation project, where many of the same scientists are working to control algae by altering the food web. The 1.5 million walleye and northern pike stocked in the biomanipulation project will be the primary beneficiaries if the weeds are correctly controlled.

A critical link between a lake's fish and plant communities is the application of herbicides. Each year, Lakes Mendota and Monona are sprayed with Diquat, an herbicide used to treat roughly 12 percent of each lake's shoreline. Nancy Raffetto, a postdoctoral researcher at the Center for Limnology is studying the impact of the herbicide on spawning bass and bluegills.

According to Raffetto, Diquat is most effective when applied during early spring when weeds are small and easily controlled. However, at this time the chemical may kill fish eggs or cause developmental abnormalities in newly hatched fish. Raffetto monitored the reproductive success of individual bass nests in both lakes, while Dave Marshall, of the DNR's Department of Water Resources Management, collected samples to determine concentrations of Diquat in the water column.

To test the impact of the Diquat spraying on spawning fish, early (May 29) and late (June 16-19) spraying dates were set. The second date was meant to evaluate spraying after spawning, but cold spring weather last year and a severe algae bloom delayed optimal spawning conditions, Raffetto said, and both dates

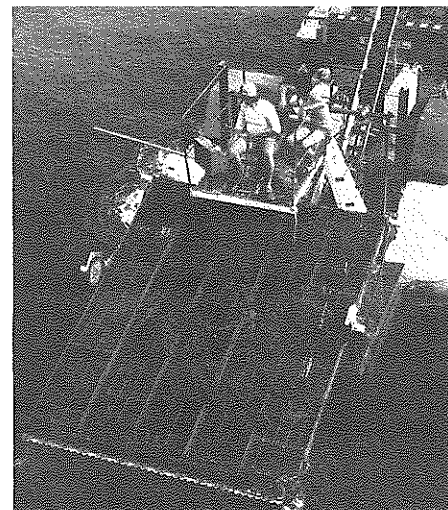
overlapped with bass spawning.

The littoral zone project will focus on how different fish populations relate to the spatial distribution of aquatic plants.

Conventional wisdom suggests that gamefish like bass and walleye grow and reproduce best at intermediate densities of weeds, but this idea has not been tested. In the littoral zone fisheries project, experimental patches of different weed densities will be set up to find an optimal level. Macrophytes will be mechanically harvested on the Madison Lakes, creating model patches. At Fish Lake in northwestern Dane County, the DNR is developing a similar experiment on a whole-lake scale.

"Fish Lake has such a dense ring of macrophytes that predators are prevented from feeding on the prey species," said Brett Johnson, a DNR project biologist and a doctoral student in zoology. "Gamefish may be limited by the amount of food," he said, "and panfish are possibly becoming overabundant because predators can't get through the thick weeds."

Fish Lake is dominated by an



Dane County routinely cuts weeds in some Madison lakes.

invading weed called Eurasian water milfoil, a plant that choked the Madison lakes during the 1960s and 1970s. The milfoil is a weed that cycles in abundance after its invasion. Fish Lake and the Madison lakes, where native weeds are making a comeback, represent the two extremes of the cycle.

"Fish Lake is where the Madison lakes were 20 years ago ecologically," Carpenter said. "It's like having a window on the past."

The whole-lake experiment at Fish Lake involves harvesting the weeds at different rates to determine how all the fish populations respond to changing weed densities. The scientists also will cut channels through the weed beds, creating the edge habitat that

gamefish seem to prefer.

Observing the long-term changes in water chemistry, species succession and food web relationships will provide an ecosystem viewpoint to the study, Carpenter said.

Carpenter said a study of this breadth will provide new and useful lake management information. A detailed survey of the plants in all four Yahara Lakes will assess macrophyte composition and abundance, fish sizes and diets, and a rough analysis of invertebrate and zooplankton abundance. This part of the project will tie directly into the ongoing fish biomanipulation study investigating the relationship between fish predator stocking and water quality.

Close collaboration between the UW-Madison and the DNR for the next 10 years should culminate in a management package for use across the state.

"We'd like a management tool that will allow for manipulation of macrophyte beds, not only to enhance fishing, but for the whole recreational aspect," said Tom Pellett, a DNR researcher.

At the Center for Limnology, Carpenter said the scientists now participating in the project may form a team to develop models and management schemes for other Wisconsin lake districts.

*Matt Keefer
UW-Madison*

*journalism undergraduate
and 1990 Chase-Noland Scholar*



Postdoctoral researcher Nancy Raffetto (right) and Phyllis Boyd, a summer fellowship student from Indiana University, work in the Center's new aquarium facility in the basement of the Water Sciences Building (previously the Hydraulics Laboratory). This extensive facility is shared with the University's Aquaculture Program and was part of a major remodeling to meet needs of the Water Chemistry Program, the Marine Studies Center, and various departments in the School of Engineering.

Funds were obtained in part by civil and environmental engineering professors Erhard Joeres and David Armstrong through a grant from the U.S. Department of Education. The aquarium facilities were designed by Gerald Chipman and Terry Kayes. We now have four rooms covering nearly 2,000 sq. ft. serviced with large volumes of warm, cold, lake, city, and low ion waters. Most of the space is flexible and is equipped with a computer and data logging system for environmental control and the conduct of experiments.

The aquarium room in the Limnology Laboratory has been remodeled into a spacious reading and study room which houses the books, reprints, and government documents donated to the Center over the years.

UPDATE

One reason for this newsletter is to help you keep up-to-date with old friends. If you've written a new book, changed jobs, received an impressive award, or had a new species of arthropod named in your honor, we'd like to tell others of your good fortune. If you have information for the newsletter, send it to: Limnology News, Center for Limnology, UW-Madison, Madison, WI 53706.

People in the News

Jane Brockman (FWQA Trainee 1970-72) is the new president of the Animal Behavior Society.

Jim Elser, Monica Elser, Neil MacKay [Masters candidate (Kitchell)] and Steve Carpenter have received the 1990 annual Lindeman Award of the American Society for Limnology and Oceanography for the best paper by a limnologist under 40 years of age. Their paper, *Zooplankton-mediated transitions between N- and P-limited algal growth*, appeared in *Limnology and Oceanography* 33:1-14, 1988.

John Hunter [M.S. 1958, Ph.D. 1962 (Hasler)] has been chosen by the San Diego Ocean Foundation as the 1990 winner of the Roger Revelle Perpetual Award. He was honored for pioneering research on fishes of the San Diego area and, in particular, for his work on captive spawning and rearing of white seabass. John is Chief of the Coastal Division of the Southwest Fisheries Center.

Gene Likens [M.S. 1959, Ph.D. 1962 (Hasler)] was named the winner of the 1990 AIBS Distinguished Service Award for his dedication to seeking solutions to complex environmental problems. Gene directs the Institute of Ecosystem Studies at the New York Botanical Garden and the Cary Arboretum, in Millbrook, N.Y.

Jim Lorman [M.S. 1975, Ph.D. 1980 (Magnuson)] was one of 49 Ameri-

cans selected by the W.K. Kellogg Foundation for its national fellowship program in improving leadership skills. He will use the three-year \$35,000 grant to focus on teaching higher education and participating in resource management projects in developing countries. Jim is an associate professor of biology at Edgewood College in Madison, Wis.

Recent Degrees

He, Xi

(Ph.D. 1990, Kitchell)
Xi's research evaluated the relative importance of direct (predation) and indirect (predator avoidance) effects on a fish community. He conducted whole-lake experiments by adding or removing northern pike in Bolger Bog, a small lake at the University of Notre Dame Environmental Research Center. Behavioral responses were rapid and dramatic; they dominated community changes caused by predator additions. Xi is currently appointed as a postdoctoral researcher with the Cascade program. He will work as both field party chief and data manager for fish ecology studies within the new (1991-95) project.

Jacobson, Paul T.

(Ph.D. 1990, Clay and Magnuson)
A study of the pattern and process of

cisco distribution in Trout Lake allowed Paul to apply the most current acoustical analyses to interpretation of schooling and feeding behavior. Paul is employed by Versar, Inc., Columbia, Md.

Olson, Robert J.

(Ph.D. 1990, Kitchell)

As part of his ongoing interest in oceanic food webs, Bob's thesis was based on a combination of multivariate analyses of yellowfin tuna diets and a bioenergetics modeling assessment of their role as predators in waters of the Eastern Pacific Ocean. Bob is employed by the Inter-American Tropical Tuna Commission and is based at La Jolla, Calif. Recently, he has been heavily involved in developing a shore-side laboratory in Panama which is designed to enable experimental work with larval and juvenile tunas.

Schneider, Daniel W.

(Ph.D. 1990, Frost and Magnuson)

Dan tested the role of habitat duration in influencing the structure of communities using temporary forest ponds near the Trout Lake Station. He taught limnology on campus last summer and currently has a postdoctorate appointment with Jim Kitchell developing a bioenergetics model for zebra mussels.

Letters

Dear Linda:

I enjoy receiving *Limnology News* and found Annamarie Beckel's article on women in Wisconsin limnology of special interest.

I was a bit disappointed, however, that women students of the 1970s and '80s were not given a few more paragraphs. As the first of the women who arrived there during that interval, I can attest that obstacles still remained. By the time I had

completed my degree, I had gained acceptance and respect, but winning them proved to be a challenge!

Lorna Petty Harrell
Cincinnati, Ohio

Dear Prof. John Magnuson:

I greatly appreciated receiving the number 4 of Limnology News and read it with great interest. I would like to add my warm congratulations that you received the Wisconsin Idea Award in Natural Resource Policy in Madison this year. It's great news and I am delighted to hear it. It's a reward you richly deserve for your many years of splendid service to the applied and basic research in Limnology and fish ecology.

My heartfelt congratulations!

Please give my best regards to Dr. Arthur Hasler, Jim Kitchell, Tom Frost and other faculty in the Center for Limnology.

Liao Guo-zhang
Guangzhou, China

Dear Dr. Magnuson:

I greatly appreciated being placed on the mailing list of Limnology News.

I retired from Nagoya University because of the age limit.

Now I am teaching fish physiology at Tokai University, a private university.

I shall be very happy if I can help any biologists who are coming to Japan.

Tamotsu Tamura
Tokai University

Dear John,

Thank you very much for your kind sending the Limnology News, No. 4.

I am very much pleased to hear that you received Wisconsin Idea Award. Many congratulations to you!

Other issues in the news are also very interesting for me. I am gazing at the photo of Ms. Merrill.

By the way, will you be in Yokohama in the later half of next

August for attending the INTECOL? As the convenor of the INTECOL and the president of the Ecological Society of Japan, unfortunately, I will have very busy time during the congress. But, if you kindly come to the office of the organizing committee, I can meet you.

Hiroya Kawanabe
Kyoto University

Linda-

Thanks so much for sending me Limnology News. I really enjoy hearing news of the CFL and seeing pictures of those friendly faces! I get quite a few reference questions these days related to aquatic sciences and fisheries and I often draw on what I learned at the CFL Library!

Diane Prorak (Poplawsky)
(former CFL librarian)
University of Idaho

Greetings — to all:

I died and went to heaven in Bozeman, Mont., where I have been teaching the fishery management courses for nine years after a similar stint at the other MSU — Michigan State University. But this was not good for my wife's career, so (because it's her turn now), I am retiring to adjunct status on the MSU faculty and will be spending most of the time in Edmonds, a suburb of Seattle, where we have built a home. I will be in Montana at intervals to continue salmonid stream research projects — in collaboration with Cal Kaya.

Ray White
Edmonds, Wash.

Dear Linda:

Thank you so much for sending me the back issues of the newsletter! Many happy memories returned as I read about dear friends from Limnology. I will share them with my sons who also know many of the people from the lab.

Our son Bill took lessons from Ross Horrall's wife. He is now a professor of computer science at the

University of Southern Mississippi at Hattiesburg. He is our bachelor son — married to a computer!!

Son Tom married one of the secretaries from the lab, Jeanne Berray. They celebrated their 20th wedding anniversary on Dec. 26 (which is also Jeanne's birthday). They have two daughters — Kaia 10 years and Kristi 8 years. Tom is professor of psychology at the University of Pennsylvania at Clarion. Jeanne is working on her master's in communication at present and enjoying going back to school.

My husband, Bill, and I are married 46 years this year. We moved to Miami 8 years ago and bought a condo. Last year we bought a cabin in the woods on the edge of Cook Forest State Park which is 10 miles from Clarion, Pa. (and the granddaughters!). We are also within a few miles of the Allegheny National Forest and Clear Creek State Park. Now we spend our summers in Pennsylvania and winters in Miami — 6 months each place. We spend most of our time enjoying and observing the wildlife and birds that flock to the cabin — also with 27 miles of lovely hiking trails in Cook Forest, we spend much time enjoying the park. The Clarion River flows through the park and our son Tom brings his two canoes and we enjoy our river trips.

Please convey our best wishes to Prof. Hasler on his birthday which I believe is about Jan. 7?? Tell him we see many Florida license plates for "Save the Manatees." I think they were introduced to the Florida canals while I was working at the lab.

Best wishes to all for a grand 1991!

Marion Vilberg
(former CFL secretary in 1960s)
Miami, Fla.

Keeping in Touch

George C. Becker, B.S. 1951 (Hasler), Ph.D. 1962 (Neess)

**Department of Biology
UW-Stevens Point
Stevens Point, WI 54481**

George is Professor Emeritus of Biology at the University of Wisconsin-Stevens Point. He is renewing his interest in bird watching and participates in the Kissimmee Audubon Christmas counts. Sylvia and he are planning to fly into the Dry Tortugas in May to see the massive nestings of sooty terns and brown noddies. They are also members of the elite Cypress Cove Nudist Park outside Kissimmee where they enjoy "birds without feathers."

George requests any suggestions or corrections to his "Fishes of Wisconsin" (1983, Univ. of Wis. Press, Madison). An Errata sheet is available upon request from mid-May to mid-October at 105 Redbird Road, Rogers, AR 72756, and from mid-October to mid-May at 2100 Pleasant Hill Rd. #100, Kissimmee, FL 34746.

Philip A. Cochran, Ph.D. 1984 (Kitchell)

**Division of Natural Sciences
St. Norbert College
DePere, WI 54115**

Phil is Assistant Professor of Biology and Coordinator of the Environmental Science major. He teaches several biology courses, advises students engaged in undergraduate research, and has been involved in the internationalization of the college curriculum. He continues to research the ecology of lampreys, but remains easily distracted by a variety of other organisms. Phil was recently awarded the Donald B. King Distinguished Scholar Award presented each year to a St. Norbert College faculty member.

James R. Gammon, M.S. 1957, Ph.D. 1961 (Hasler)

**Dept. of Biological Sciences
DePauw University
Greencastle, IN 46135**

Jim is chairman of the Department of Biological Sciences and teaches courses in ecology, conservation, and statistics. He is also chairman of the Indiana DNR Non-Game Fish Advisory Commission and a member of the Indiana Pesticide Review Board. His research includes a long-term study (since 1967) of the Wabash River ecosystem and a study of the effects of agriculture on fish communities. On leave in 1991, Jim will be evaluating the effects of gold mining on fish in a Yukon River tributary and completing a monograph on the Wabash River Ecosystem.

**Lorna Petty Harrell, M.S. 1972 (Magnuson)
Ohio-Ky.-Ind. Regional Council of Governments**

**801-B West Eighth St., Suite 400
Cincinnati, OH 45203**

Lorna is an environmental planner at a regional planning agency serving a rapidly developing eight-county area. She has been involved in a wide range of water resources projects from watershed management of non-point source pollution to groundwater protection. Working with the region's soil and water conservation districts, she has recently developed a "Homeowner's Conservation Guide" which considers 14 environmental topics of recurring interest to homeowners. She has just become a charter member of the Kentucky chapter of the American Fisheries Society.

Robert L. Hunt, M.S. 1959 (Hasler)

**Dept. of Natural Resources
11084 Stratton Lake Road
Waupaca, WI 54981**

Bob is Trout Research Unit Leader supervising research biologists stationed at Waupaca and

Brule. His personal research centers on evaluations of trout habitat improvement techniques, experimental fishing regulations and new strains of salmonids having potential for sport fisheries use in Wisconsin. Recent advisory roles related to applications of trout habitat improvement techniques included interactions with a touring delegation of Soviet scientists and a field trip to Newfoundland. Bob hopes to participate in a technical session on stream/river management at the World Congress of Fisheries in Athens in April 1992.

Gary W. Karl, M.S. 1970 (Magnuson)

**Dept. of Natural Resources
Bureau of Community Assistance
Management
P.O. Box 7921
Madison, WI 53707**

Gary has worked for the Wisconsin DNR for 27 years in various fields including laboratory analysis, aquatic plant management, and water quality problems in the environment (including the use of pesticides and pesticide application training). Since 1982 he has been a grant coordinator for the Department's Non-Point Source Program (NPS). The objective of the NPS Program is to improve water quality by limiting both rural and urban runoff.

(Horst) Fred Siewert, Ph.D. 1973 (Hasler)

**Department of Natural Resources
Ball State University
Muncie, IN 47306**

Fred is Associate Professor at Ball State University. He is teaching Water Resources and Water Quality Management. During his sabbatical leave he studied wastewater technology in Germany and Austria. During the summer of 1990 he took BSU students on a field study trip to Poland, Germany, Austria and Italy. Fred is conducting research on effects of acid rain and leachates from hazardous waste sites on aquatic organisms.

**Center for Limnology
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Madison, WI 53706**



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