

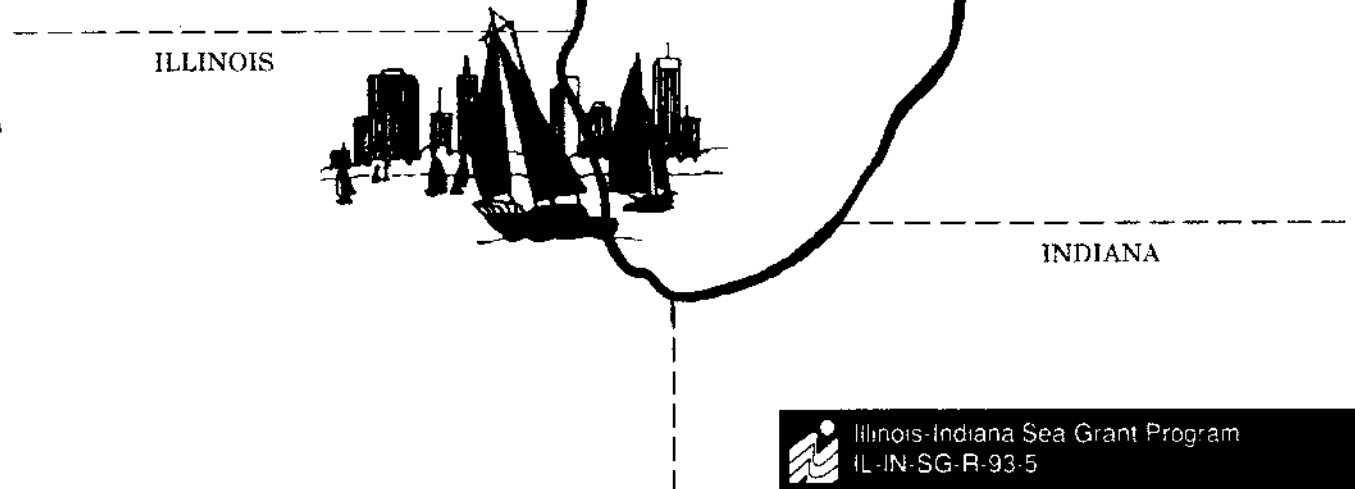
Envirovet, Project II: An Intensive Shortcourse in Aquatic Animal Health/Environmental Toxicology

Dr. Val Beasley
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Envirovet Project II
An Intensive Shortcourse in Aquatic
Animal Health/Environmental Toxicology

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ABSTRACT

The Envirovet summer program, an intensive short course on aquatic animal health and environmental toxicology, was presented to 37 participants from five countries. The goal was to assist animal health professionals pursuing entry into these fields by providing a) a broad introduction to aquatic animal medicine with a strong emphasis on aquatic toxicology, and b) suitable role models and contacts for future training to facilitate genuine specialization. Despite some minor logistical problems, the program was highly successful in accomplishing its goals. Essentially all of the students have indicated that the course has helped them to identify career paths related to environmental problem solving, especially in the area of aquatic toxicology. Several of the students are actively pursuing further education and experience through graduate programs or externships in industrial, academic, or governmental laboratories. Areas for improvement of the Envirovet summer course were identified through feedback from the participants and modifications have been made in the program for 1992. Contacts with faculty and student participants in the 1991 course have led to a number of inquiries with regard to the second offering of the program.

KEYWORDS: aquatic animal health, aquatic toxicology, education, environmental toxicology.

ACKNOWLEDGEMENTS

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INTRODUCTION

The Envirovet short course was conceived and initiated because of the growing need for trained professionals in the area of aquatic animal health and environmental toxicology. After six months of planning, the first Envirovet session was conducted as scheduled with excellent results. Thirty-seven participants from 17 states, Canada, Hungary, Great Britain, New Zealand, and Italy took part in the course. The participants included practicing veterinarians, veterinary students, graduate students, professors, and biologists. They took part in an intensive four-week course involving:

- 1) lectures and laboratories in anatomy, physiology, pathology, toxicology, and aquaculture of aquatic vertebrates and invertebrates, as well as sources of toxicants, environmental fate, risk assessment, and environmental regulatory toxicology;
- 2) sample collecting in the Lake Superior region; and
- 3) visiting laboratories to study sample analysis and biomonitoring methods.

OBJECTIVES

The stated objectives of the proposal were:

- 1) To increase the exposure of veterinary students and other interested professionals in the above mentioned fields by providing both intensive, hands-on exposure and opportunities to externs and/or
- 2) To obtain graduate training in a professional laboratory engaged in this field. It was hoped that such exposure would increase the number of highly qualified scientists entering these areas. To this end, the Envirovet program seems to have succeeded as noted by the comments of the participants. Many have expressed their increased dedication to a career in this area of science, and many are already seeking opportunities to apply what they learned at Envirovet and to further their education.

Two areas not covered to the satisfaction of the directors in the 1991 program will be strengthened in future Envirovet programs. They are:

- 1) the role of amphibians as bioindicators of aquatic environmental integrity
- 2) regulatory toxicology and risk assessment.



Envirovet students examine their catch in a seine used in an iron-ore impacted sound in Lake Superior. Through this, students learn population assessments and environmental pathology techniques.

IMPLEMENTATION

The planning process was accomplished over a six-month period. It was begun with a planning meeting supported by a grant (\$2,000) from the Illinois-Indiana Sea Grant Program. The meeting was attended by Drs. Val Beasley, John Dellinger, Michael Tumbleson, Randall Hicks, Rodney Johnson, Daniel Call, Larry Brooke, and Mary Balcer. Grants were obtained from the Illinois-Indiana Sea Grant Program, Great Lakes Protection Fund, and the Dow Chemical Company, USA to make the 1991 program possible.

The summer program (Appendix 1) went smoothly. The faculty (Appendix 2) went beyond what was expected of them time and again. More than half of the class were doctors of veterinary medicine, and more than half of the DVMs were currently enrolled as graduate students. The students (Appendix 3) were truly exceptional, and nearly all of them were endeavoring to move in the direction of careers in aquatic animal medicine and environmental problem solving. However, because of a lack of interactions with role models, they all had experienced difficulty deciding upon a definitive career direction. They indicated that Envirovet greatly assisted them in addressing this concern.

Problems encountered during the course included the fact that the dormitories housing the Envirovet students and faculty concurrently hosted groups of high school students involved in week-long summer classes. As a consequence, Envirovet participants reported not being able to sleep because of the sometimes noisy conditions.

Another logistical problem was the infrequent availability of vehicles needed to transport students to field excursions. On one occasion, this resulted in delays in getting the exercise underway. In addition, the Wisconsin-Superior campus is approximately 35 minutes from the Duluth International Airport consuming time and increasing mileage expenditures incurred in transporting faculty.

These situations will not be repeated because the directors have moved the program to the campus of the University of Minnesota-Duluth (UM-D) for Envirovet 1992 and beyond. The UM-D campus is much closer to the airport, and does not host high school summer programs. Vehicles are obtainable from UM-D or may alternatively be rented from a local vender.

The Program Directors want to make clear, however, that the faculty and staff of the University of Wisconsin-Superior were highly effective in working in behalf of the Envirovet program and remain one of its strengths. Their classroom and laboratory facilities, the boats, food service facilities, and their faculty and support staff were all essential to the success of the 1991 program.

As mentioned earlier, the coverage of two areas, amphibians (morphology, physiology, infectious, parasitic, and toxicant-induced diseases) and the general use of bioindicators of aquatic environmental quality in formal risk assessment and regulatory toxicology was, in retrospect, less than ideal. An attempt to strengthen the latter area was made near the end of the 1991 course through the involvement of Ms. Dianne Brooke of UW-Superior. Ms. Brooke is a remediation specialist who will again be involved in Envirovet in 1992.

Next year's program, however, will see both these areas covered much more rigorously. Faculty members have been identified to lecture on amphibians. An ecosystem risk assessor and an environmental lawyer, as well as an administrator of the Nature Conservancy will also participate in the summer session.

PROGRAM SUPERVISION

The Program Director was Val R. Beasley, DVM, PhD. Co-Directors were John A. Dellinger, PhD, Thomas E. Eurell, DVM, PhD and Gary Koritz DVM, PhD. Dr. Beasley coordinated all aspects of the project, met and transported faculty about, worked with students to help in development of their educational and career plans, and offered suggestions on scientific organizations with whom the students should interact. Dr. Eurell handled aspects of course design and logistics in those sessions regarding fish, and took the lead with regard to fish pathology on the L.L. Smith. Dr. Koritz was in charge of candidate recruitment and selection, and he coordinated the toxicokinetics aspects of the course. Merianne O'Grady obtained facilities, provided general support, and handled correspondence.

The main duties of the faculty were restricted to lectures and demonstrations in their own fields. Therefore, no substantive training or orientation of the faculty was required apart from discussions as to what they were being asked to cover in relationship to information being presented by others. One technical assistant, Cathy Hill, and two student assistants, all from UW-S, were involved with preparations of labs, classrooms, and field excursions. Since they were working under the leadership of the faculty, no additional training or orientation was required.

Envirovet is related closely to other Sea Grant-funded projects. The Sea Grant program funded Aquavet, the program after which Envirovet was patterned. Envirovet will also help provide many highly astute scientists for the future who, because of the course, will have a superior appreciation of the breadth of the field, the nature of the responsibilities assumed by a range of experts already in the field, and an idea of the areas of specialization open to them. Thus, Envirovet fits well within the Sea Grant mission statement. Judging from the positive responses from aquaculture, academic, industrial, and governmental scientists, the Envirovet program should help them to address their future needs.



On a sandbar in Lake Superior, Dr. Mary Balcer (lower left), University of Wisconsin-Superior, discusses landfill construction and the possible pollution-related impacts on the lake.

EVALUATION

Course evaluation was sought from both the participants and the faculty. At the end of the course, an hour-long session was held where participants freely voiced their opinions on the strengths and weaknesses of the program. The course was also evaluated by the directors as far as its impact on students, effectiveness of instructors, and balance of lecture content and field

time, as well as logistical support and facilities. The enthusiasm of the students, as well as the faculty, and their nearly uniform desire to be involved in future years was most gratifying.

REPORTING, ACCOUNTABILITY, AND PUBLICITY

Envirovet received air time on 'Earthwatch,' a syndicated radio program broadcast in a number of metropolitan areas. Enclosed is the text of the broadcast (Appendix 4). A local television station also taped a segment which was presented on the evening and late night news. In addition, an article was published in the Champaign-Urbana *News-Gazette*, and several articles were published in the veterinary literature (Appendix 5).

Drs. Beasley and Eurell attended the CEIP Fund Environmental Career Day at Northeastern Illinois University in Chicago where an Envirovet booth was stationed. This led to interest not only in Envirovet and the College of Veterinary Medicine, but in the environmental programs of the University of Illinois as a whole.

The Envirovet program also resulted in Dr. Beasley's attendance at the Wildlife Health Education Conference (at no cost to the program). The conference was sponsored by the American Association of Wildlife Veterinarians in Fort Collins, Colorado in August. This helped publicize Envirovet to a wide range of faculty and students in attendance. And, most recently, an article on Envirovet 1991 was published by the *Journal of the American Veterinary Medical Association* (Appendix 5).

BUDGET

Support for the 1991 summer program was obtained from the Illinois-Indiana Sea Grant Program (approx. \$28,000), the Great Lakes Protection Fund (\$35,000), and the Dow Chemical Company (\$4,000). All the support from Sea Grant went toward the on-site expenses of the program at the University of Wisconsin-Superior.

REVIEWERS

Dr. Keith Cooper, Rutgers University, College of Pharmacy, Department of Pharmacology & Toxicology, Rutgers University, Busch Campus, Piscataway, NJ 08854.

Dr. Richard Walker, University of Calgary, Department of Biological Sciences, University of Calgary, Calgary, Alberta, T2N 1N4, Canada.

APPENDIX 1: 1991 ENVIROVET PROGRAM SCHEDULE

The program is scheduled from Sunday, June 16 through Friday, July 12, 1991.

Unit 1, Sunday June 16 through Sunday June 23 : The "normal" animal and the "normal" ecosystem (organized by Drs. Rodney Johnson and Val Beasley)

Sun, June 16, 4:00-6:00 PM: -- Welcome and Introduction to Envirovet: Dr. Val Beasley, U. of Illinois. 4:30 PM -- The Superior/Duluth Area and CLSES: Dr. John Dellinger, Director, U. of Wisconsin-Superior, CLSES

Sun, June 16, 6:00-9:00 PM: Dinner & Get Acquainted - Wisconsin cheese tasting.

Mon, June 17, AM: Comparative morphology of representative organisms: Dr. Howard Evans, New York State College of Veterinary Medicine, Ithaca, NY.

Mon, June 17, PM: Dissection lab, Dr. Evans.

Mon, June 17, 7:00-9:30 PM: Seminars by Envirovet participants.

Tues, June 18, AM: Comparative histology of aquatic vertebrates and invertebrates. Dr. Keith Cooper, College of Pharmacy, Department of Pharmacology and Toxicology, Rutgers, U., Busch Campus, Piscataway, NJ.

Tues, June 18, PM: Histology lab, Dr. Cooper.

Wed, June 19, AM & Thurs, June 20, AM: Comparative physiology. Lectures will be confined to metazoans, specifically to freshwater molluscs, crustaceans, teleost fish and amphibians. Physiological processes under "normal" and stressful" conditions will be discussed, with emphasis on how the animals cope with changes in their environment, whether they be naturally occurring or the result of human intervention. Dr. Richard Walker, Department of Biological Sciences, U of Calgary, Calgary Alberta.

Wed, June 19, PM: Physiology labs involving fishes, invertebrates. Topics covered will include osmo- and ionoregulation, nitrogen metabolism and excretory mechanisms, respiratory physiology including control of ventilation, aerobic and anaerobic metabolism, acid/base balance, and circulation. Various aspects of endocrine and neural control of these systems will be included. Measurement of physiological and biochemical parameters commonly used as "stress" indicators for fish: rainbow trout as the test animal, e.g. oxygen consumption, ammonium excretion, blood ion concentrations, hematocrit, hemoglobin, lactate and glucose. Dr. Walker.

Wed, June 19, 7:00-9:30 PM: Seminars by Envirovet participants.

Thur, June 20, PM: Comparative nutrition. Dr. Roman Lanno, Ecological Services for Planning, Ltd., Guelph, Ontario.

Thurs, June 20, 7:00-9:30 PM: Seminars by Envirovet participants.

Fri, June 21, AM: Introduction to aquatic ecosystems, limnology, energy cycles, population biology, trophic levels, concept of species of interest. Dr. Randy Hicks, University of Minnesota, Duluth.

Fri, June 21, PM: Aquatic ecosystem disruption. Dr. Richard Axler, University of Minnesota - Duluth, Natural Resources Research Institute (NRRI), and Dr. Hicks.

Sat, June 22, AM - PM: L.L. Smith Jr., sampling in "healthy lake environments." "What do you find and what does it mean?" Problems associated with exotic species -- control measures including biocontrol. Dr. Mary Balcer and CLSES staff.

1/2 group AM, 1/2 group PM

Sat, June 22, PM: Discussion of equipment and methods for airborne monitoring of wildlife populations and habitats. Dr. Dellinger.

Overview of problems associated with sampling populations of small mammals; different methods (statistical and otherwise) of handling data; demonstration of several live capture techniques. Dr. Edward Burkett, Biology Department, University of Wisconsin-Superior.

Sun, June 23: Day off

Unit 2, Monday June 24 through Friday June 28: The "abnormal" animal (infectious and parasitic diseases) and the "seriously disrupted" ecosystem (organized by Drs. Randy Hicks and Val Beasley).

Mon, June 24, AM: Sampling in clean streams. Lester River, Duluth. Population studies, fish capture, classical methods for health assessment of resident organisms. Quantify populations. Chemical and physical parameters. CLSES staff, Dr. Carl Richards, NRRI at Duluth, Center for Water and the Environment.

1/2 group AM, 1/2 group PM

Mon, June 24, PM: "Airport Ponds," Duluth. The effects of pesticides on pond mesocosms. Demonstration of sampling methods and equipment. Dr. Stephen Lozano, CLSES.

Mon, June 24, 7:00-9:30 PM: Seminars by Envirovet participants.

Tues, June 25, AM & Wed, June 26, AM: Diseases of fishes including treatments/management. Culturing of fishes for bioassays. Dr. Michael R. Johnson of the Delta Branch Experiment Station, Mississippi State University, Dr. Hugh Ferguson, of the Pathology Department, College of Veterinary Medicine, University of Guelph, Guelph, Ontario, and Dr. David Cone of Saint Mary's University, Halifax, Nova Scotia.

Tues, June 25, PM & Wed, June 26, PM: Labs - Lesions and parasites of fishes. Avoiding infectious and parasitic diseases. Drs. M. Johnson, Ferguson, and Cone.

Wed, June 26, 7:00-9:30 PM: Seminars by Envirovet participants.

Thurs, June 27, AM: Diseases of freshwater aquatic invertebrates (with some information on treatments/management). Dr. Yolanda Brady, Fisheries Department, Auburn University.

Thurs, June 27, PM: Lab - Culturing of aquatic invertebrates for bioassay. Pathology and parasites of freshwater invertebrates. Dr. Brady.

Thurs, June 27, 7:00-9:30 PM: Seminars by Envirovet participants.

Fri, June 28, AM: Infectious diseases and parasitisms of aquatic mammals & waterfowl. Drs. Milton Friend, Barry Campbell, and J. Christian Franson, National Wildlife Health Research Center, US Fish & Wildlife Service, Madison, WI

Fri, June 28, PM: Lab -- Lesions and parasites of aquatic mammals & waterfowl. Drs. Friend, Campbell, and Franson.

Unit 3, Saturday June 29 through Sunday July 7: Introduction to aquatic environmental toxicology (organized by Drs. Ken Wallace, Gary Koritz, and Val Beasley).

Sat, June 29, AM & Mon, July 1, AM: Sources of toxicants, methods to localize sources, airborne and waterborne transport. Biodegradation, sediments, partitioning, movement through foodwebs. Simple vs. complex mixtures. Dr. Gary Ankley, EPA Environmental Research Laboratory, Duluth, MN and Dr. Deborah Swackhamer, University of Minnesota, Minneapolis, MN.

Sat, June 29, PM: Visiting sources of toxicants using chest waders, "Murphy Oil Stream." Sampling methodology in localizing toxicant problems. Bioassay vs. chemical analysis. Dr. Daniel Call, University of Wisconsin-Superior, CLSES.

1/2 group Sat PM, 1/2 group Monday PM

Mon, July 1, PM: Visit to Wisconsin Point, site of an old landfill. How landfills affect the environment. Dr. Balcer/CLSES staff.

Sun, June 30: Day off.

Mon, July 1, 7:00-9:30 PM: Regulatory pharmacology & toxicology, experimental design, Good Laboratory Practices, animal health & welfare considerations. Dr. Monte Mayes, Dow Chemical Co., Midland, MI, and Dr. Ankley

Tues, July 2, 8:00-10:00 AM: Overview of analytical chemistry of organic and inorganic compounds. Dr. Call and CLSES colleagues.

Tues, July 2, 10:30-12:00 AM: Visit CLSES and U.S. EPA - Duluth labs. Demonstration of various analytical methods, typical chromatograms, etc. Strengths, limitations, turn around times, costs of analysis, interpretations of results. Dr. Call.

Tues, July 2, PM & Wed, July 3, AM: Absorption, distribution, metabolism, excretion of xenobiotics by aquatic animals. Individual bioaccumulation and biomagnification in food webs. Principles of quantitative structure activity relationships (QSARs) as they relate to xenobiotic fate. Studies of bioavailability of drugs given to fish in aquaculture. Effects of varying rates and frequencies of exposure. Models which correlate toxic effects and associated chemical residues in fish tissues. Dr. Gary Koritz, University of Illinois, Dr. Steve Plakas, FDA, Dauphin Island, Dr. Mace Barron, Environmental Science and Engineering (ESE), Gainesville, FL.

Carcinogenesis

Tues, July 2, 7:00-9:00 PM: Tumor types, localizing carcinogen sources, Dr. Rodney Johnson, US EPA, Environmental Research Laboratory, Duluth, MN.

Wed, July 3, PM: Pharmacokinetic/toxicokinetic laboratory with fishes. Physiologically based kinetics, Dr. Jim McKim, U.S. EPA lab, Duluth, Drs. Plakas and Barron.

Wed, July 3, 7:00-9:30 PM: Seminars by Envirovet participants.

Thurs July 4: Independence Day - Begin trip to Stockton Island, one of the Apostle Islands in Lake Superior. Leave at 10:30 AM to Bayfield. Ferry boat leaves at 1:30 PM.

Arrive Stockton Island approximately 3-3:30 PM. Hike/boat to campsite. Set up camp.

Fri, July 5:

1/2 group AM - Interpretative hike of the Island to Presque Isle Point with Drs. Dellinger and/or Lozano. Same 1/2 group PM - Board the "Queen of Bayfield" with Dr. John Dellinger and Redcliff fishermen. Commercial fishing techniques.

1/2 group all day - Board L.L. Smith for Chequamegon Bay. From the pristine islands to impacted area near Ashland. (3 hrs. out, 3 hrs. in, plus sampling time). Includes the use of biomarkers and assessment of lesions in specimens from the field with Tom Eurell, University of Illinois, and biologist from the Center for Lake Superior Environmental Studies.

Sat, July 6:

Group that hiked and went on "Queen of Bayfield" on Friday goes to Chequamegon Bay.

Group that went to Chequamegon Bay on Friday, Boards the "Queen of Bayfield" AM and hikes Sat PM.

Sun, July 7, PM: Break camp and return to Bayfield and then back to UWS.

Unit 4, Monday July 8 through Friday July 12: Systemic toxicology, applied problem solving, aquaculture practice (organized by Drs. Ken Wallace and Val Beasley).

SYSTEMIC TOXICOLOGY AND TOXICOPATHOLOGY.

Neurotoxicology

Mon, July 8, AM: Neurotoxicology, review of QSARs with regard to toxic mechanisms. Dr. Charles Drewes, Department of Zoology and Genetics. Iowa State University, Ames, IA. Neurotoxic blue-green algae, Dr. Beasley.

Mon, July 8, PM: Lab on aquatic neurotoxicants: neurophysiologic techniques used to understand neurotoxic mechanisms. Dr. Drewes.

Reproductive & Developmental Toxicology

Tues, July 9, AM: Reproductive toxicology.

Reproductive toxicology of aquatic birds and mammals - Dr. Robert Poppenga, Michigan State University, E. Lansing, MI. Population and community level effects of environmental toxicants in aquatic systems. Dr. Richards.

Tues, July 9, 1:00-3:00 PM: Developmental pathology laboratory: Dr. Cooper.

Other Organ Systems

Tues, July 9, PM: Systemic toxicopathology: Toxicants affecting energy metabolism, and gills. Dr. Cooper.

Tues, July 9, 7:00-9:00 PM: Diagnostic criteria for and effects of selected immunosuppressive toxicants, Dr. Eurell.

Wed, July 10, AM: Toxicants affecting circulatory systems, liver, kidney, and miscellaneous other target organs. Dr. Cooper. Hepatotoxic blue-green algae, Dr. Beasley.

APPLIED PROBLEM SOLVING AND AQUACULTURE PRACTICE.

Wed, July 10, PM: Aquarium medicine. Dr. Brent Whitaker, National Aquarium in Baltimore, Baltimore, MD

Thurs, July 11, AM and 1:00-2:30 PM: Aquaculture medicine and practice. Stresses affecting fishes in aquaculture systems: Temperature effects, ammonia cycle, and biological oxygen demand. Roles of producers, extension specialists and veterinarians in aquaculture practice. Mr. LaDon Swann, Extension Aquaculturist, Purdue University, W. Lafayette, IN.

Species differences, selection of species and strains for aquaculture production, Dr. Robert Sheehan, Southern Illinois University, at Carbondale, IL.

Worldwide aquaculture, Dr. Spike Bealeau, Abbott Laboratories, N. Chicago, IL.

Thur, July 11, 2:30-5:00 PM: Visit fish hatchery. Mr. Swann, Drs. Sheehan and Beleau.

Thur, July 11, 7:00-9:00 PM: Clinical pharmacology for practice of aquaculture medicine. Dr. Beleau.

Fri, July 12, AM - 3:00 PM: Field work, obtaining specimens for clinical pathology, biopsies, necropsies, sampling for infectious, parasitic, and toxicant induced diseases, and discussions of interpretation of probable results. This activity will utilize ideas from Envirovet participants: small boats, L.L. Smith Jr., boats. Drs. Eurell and Balcer, and CLSES staff.

Fri, July 12, 3:00-5:00 PM: Proactive pollution prevention, prioritization of efforts, strategies for the future. Dr. Dan Ness, University of Illinois. Course evaluation/discussion, awarding of certificates. Drs. Beasley, Eurell, and Dellinger.

Fri, July 12, 6:00 PM: Fish boil, crayfish.

Sat, July 13, by noon: Check out.

APPENDIX 2: ENVIROVET 1991 FACULTY LIST

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Dr. Richard Walker
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Dr. Brent Whitaker
National Aquarium in Baltimore
301 East Pratt Street
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Baltimore, MD 21202
Phone: 301-576-3853
Fax: 301-576-8238

APPENDIX 3: ENVIROVET PARTICIPANTS-1991



Standing - Left to Right:

Val Beasley, Gary Koritz, Bob Ross, Erica Black, Deena Gregory, Sue Wojcik, Joe Maret, Vicki Abein, Julie Griggs, Carey Johnson, John Paul, Wendy Reinbold, Heidi Bestgen, Linda Threatt, Thomas Janossy, Andy Radomski, Bob Patyk, Dan Ness, Lisc Wilson, Adrie Voore, Tam Garland, Bill Van Bonn, Dirk Wagner, Murl Bailey

Kneeling - Left to Right:

J.M. Kiel, Kathleen Berg, Kristen Johnson, Dan Bechtel, Maggie Sanders, Lucie Dutil, Janet Whaley, Ravi Gooneratne, Carolyn Fordham, Cecilia Ambrogi, Karen Martin, Mark Mense, Dawn Otsuka

Not Pictured:

John Dellinger, Thomas Eurell, Ra'anah Ariav, Carl Uhland

ENVIROVET PARTICIPANTS-1991

Upper Row:

Dr. Val Beasley is an Associate Professor of Toxicology specializing in pathophysiology and fate of natural toxins and pesticides, and Director of Envirovet.

Dr. Gary Koritz is a Professor of Pharmacology specializing in pharmacokinetics/toxicokinetics at the University of Illinois College of Veterinary Medicine and Co-Director of the Envirovet Program in charge of the Recruitment and Selection Committee.

Dr. Bob Ross earned a Bachelor's degree from Purdue and a DVM from Ohio State University. Bob is currently a retired veterinarian in Niles, Michigan. Following Envirovet, he was accepted into a Master's degree program in aquatic animal medicine as a means of retooling and receiving his career.

Erica Black, a second-year student at Colorado State University College of Veterinary Medicine, is intensely interested in raptors and the effects of persistent organic compounds. She intends to pursue training in wildlife toxicology and to achieve board certification in toxicology. Erica is presently assisting in research projects in wildlife toxicology at Colorado State and volunteers in the Rocky Mountain Raptor Program's rehabilitation effort and at the California Marine Mammal Center. Erica has volunteered to assist in Envirovet 1992.

*Dr. Deena Gregory, a veterinarian with a Bachelor's degree in zoology and a DVM from Oklahoma State University, has nine years of practice experience followed by seven months of work as an analytical toxicology laboratory technician. Deena is the mother of two small children and is presently enrolled in a Master's degree program and residency in toxicology at Oklahoma State University. Deena has been involved with migratory bird toxicoses in her home state.

*Susan Wojick, a third-year veterinary student at the University of Illinois, is a native of Chicago who previously obtained a Bachelor's and a Master's degree from Northwestern University. She is interested in environmental contamination and came to Envirovet to take a closer look at the field.

Dr. Joseph Maret, a native Illinoisan whose family still lives here, is a 1991 graduate of the College of Veterinary Medicine at Colorado State University. Joe is considering whether to go immediately into a graduate program in fisheries biology and environmental toxicology or to go into practice for a year or two before graduate school.

*Vickie Abeln, a third-year veterinary student at Michigan State University, has years of experience in the analytical assessment and control of groundwater pollution in the Traverse City, Michigan area.

*Julie Griggs is a third-year veterinary student at Louisiana State University. The Envirovet program helped Julie to decide upon specialization in exotic and aquatic animal pathology following graduation from veterinary school.

*Carey Johnson, a 1975 graduate of Michigan State University with a Bachelor's degree in fisheries and aquatic ecology, is currently a third-year veterinary student at Michigan State University. Carey was employed by the Michigan Department of Natural Resources for eleven years--five years

* *Recipient of Envirovet scholarship (based principally on economic need).*

as a Water Quality Specialist District Field Supervisor, and six years as an Aquatic Biologist acquiring data and formulating waste water effluent limitations to protect aquatic life. My hope and expectation is that Envirovet will serve to keep Carey involved where she can make the greatest difference--in aquatic animal medicine/toxicology--rather than being drawn toward her other love--small animals.

John Paul Jr., an employee of the U.S. Army's Installation Restoration Program, is currently involved in risk assessment of contaminated sites of Aberdeen Proving Ground where it borders on the Chesapeake Bay. John has a Master's degree in systematics and ecology from the University of Kansas and for five years did ecological research at the University of Delaware. Because his previous education and experience were largely terrestrial and more basic in focus, he came to Envirovet to become reoriented to aquatic environmental contamination problems.

*Wendy Reinbold is a third-year veterinary student at the University of Illinois with a Bachelor's degree from Southern Illinois University where she studied limnology. Wendy has also taken graduate courses in anatomy and neurobiology at St. Louis University, and currently does volunteer work with raptors and other species in the University of Illinois Wildlife Ward. She is keenly interested in the effects of humans on natural environments. Wendy will be returning to Duluth next summer to do an externship at the US EPA freshwater laboratory.

Heidi Bestgen is highly experienced in environmental and wildlife toxicology. She previously earned a Bachelor's degree in wildlife biology and is currently finishing a Master's degree in aquatic toxicology at Colorado State University. Heidi is currently evaluating possible locations for a PhD program including the Great Lakes region and the University of Illinois. During Envirovet, she investigated possible research programs in conjunction with the US EPA ERL in Duluth, Minnesota.

*Linda Threatt earned a Bachelor's degree in biology from Lincoln University (MO) and is currently a second-year veterinary student at Tuskegee University. She resides in Harvey, Illinois, on a tributary of the Calumet River. Linda is a scuba diver and boating enthusiast with an interest in environmental problems especially involving aquatic systems.

*Dr. Thomas Janossy, a DVM from the University of Veterinary Sciences, Budapest, Hungary, is a scuba diver and licensed yacht captain who assisted in establishing the Marine Aquarium of the Zoological Gardens of Budapest, Hungary. He has also taught aquatic ecology, organized an exhibition on Environmental Awareness and Wildlife Protection in Hungary, worked for the Royal Council for Bird Preservation in Titchwell, Norfolk, Great Britain. Most recently, he was employed at the Rappaport Microcirculation Laboratory at the University of Toronto, Department of Medicine. He previously produced an hour-long documentary film, "The Aegean Circle." Thomas is currently establishing a foundation to enable development of a large catamaran-based laboratory to investigate pollution of coastal areas adjacent to third world countries on a continuous basis.

*Andrew Radomski is a third-year veterinary student at the University of Wisconsin-Madison who previously earned a Bachelor's degree in wildlife biology from the University of Wisconsin-Stevens Point with a minor in chemistry. He also has a Master's degree in wildlife science from Texas Tech University. Andrew was also a necropsy technician at the US FWS laboratory in Madison, Wisconsin, and is currently collaborating with R. Ariav (see below) on the incidence of diseases in Lake Michigan Chinook salmon.

* Recipient of Envirovet scholarship (based principally on economic need).

Dr. Bob Patyk earned a Bachelor's degree in biology with a minor in chemistry in 1975 and is a 1979 graduate of the University of Illinois College of Veterinary Medicine. Bob is currently a small animal practitioner in Oconomowoc, Wisconsin, does some aquarium medicine work, and presently is working with local officials in the planning of a sanitary district for protection of groundwater and local lakes. He also regularly attends DNR meetings. Bob is investigating graduate work at the University of Illinois to determine whether and how to redirect his career into full-time involvement in aquatic animal medicine/environmental toxicology.

*Dr. Dan Ness, a graduate of the College of Veterinary Medicine University of Illinois, previously obtained a Bachelor's degree from Wheaton College, Illinois. Dan was in general veterinary practice for two years, and then returned to the University of Illinois to undertake a PhD program and residency in toxicology. He has worked on use of the freshwater planarian as a bioassay system. His PhD research is into the neurotoxic effects of specific congeners of PCBs found in Great Lakes fish and believed to have already caused harmful effects in exposed children.

Dr. Lise Wilson, a 1988 graduate of the College of Veterinary Medicine at Tufts University, is presently finishing a Master's program in environmental health at the same university. Preoccupied with environmental contamination, and without a role model, Lise used Envirovet to investigate ways to combine her veterinary and environmental health training.

Dr. Adrianna Voors, a 1983 graduate of the College of Veterinary Medicine, Louisiana State University, worked as a staff veterinarian for the Louisiana SPCA Clinic in New Orleans for seven years before recently entering into a Master's program in Environmental Health at Virginia Polytechnic Institute.

Dr. Tam Garland earned a DVM from Texas A&M University in 1987 and is currently a Postdoctoral Fellow (PhD student) in toxicology at the same institution doing research in environmental toxicology. Dr. Garland is also involved in teaching several classes in the College of Veterinary Medicine.

Dr. Bill Van Bonn earned a DVM with high honors from Michigan State University in 1986 and has been in private practice since then. Bill is intensely interested in the Great Lakes fisheries and seeking ways to develop the expertise to become involved while at the same time providing for his wife and two daughters. Bill recently enlisted in the U.S. Army Veterinary Corps in order to be able to support his family while obtaining further education in aquatic environmental problem solving.

Dirk Wagner is a third-year veterinary student at Kansas State University. He became interested in aquatic environments as a result of the development and preservation by his family of aquatic habitats--a lake, beaver creek, and swamp--on their home ranch. He is also a scuba diver and works in the Nebraska Raptor Rehabilitation Center when time permits.

Dr. E. Murl Bailey, a DVM, PhD, Diplomate of the American Board of Veterinary Toxicology, is Professor of Toxicology at the College of Veterinary Medicine, Texas A&M University. Murl is a colleague who, during Envirovet, negotiated possible exchange visits between Dr. Jim McKim of EPA ERL and himself to facilitate aquatic animal toxicology research capabilities at Texas A&M. Following Envirovet, Murl obtained an endorsement of the Envirovet program on behalf of the American Board of Veterinary Toxicology.

* Recipient of Envirovet scholarship (based principally on economic need).

Front Row:

Dr. J. M. Kiel, a DVM (1979) born and raised on Lake Erie in Erie, Pennsylvania. J.M. is an avid sailor and formerly an instructor in biology and emergency medicine at the City Colleges of Chicago. During Envirovet, he was also a PhD student in toxicology at Texas A&M University conducting research into risk assessment with regard to contaminated aquatic sediments at a number of superfund sites ranging from Washington state to Illinois.

Kathleen Berg was born in Chicago but has lived in many parts of the USA. She has been an exhibit guide at the National Aquarium in Baltimore, conducted NSF-funded research on the effects of water current velocity on meiofauna colonization rates, cared for otters, elephants, marine mammals, sea lions, and penguins, and worked for the Smithsonian Tropical Research Institution, Naos Island Marine Laboratory. Kathleen is a scuba diver, has advanced life-saving and CPR training, and is a second-year student at the Virginia-Maryland Regional College of Veterinary Medicine. She completed the Aquavet course immediately before coming to Envirovet.

Dr. Kristen Johnson is a 1986 graduate of the College of Veterinary Medicine at Colorado State University who will soon graduate with a Master's degree from the Department of Environmental Health at the same university. Kristen's thesis work involved development and application of new analytical methods for assessing organochlorine residues in neonatal fur seals.

Dan Bechtel is currently completing a Master's degree in Toxicology from the University of Saskatchewan in Saskatoon. His research involves the effects of xenobiotics on rainbow trout liver cells *in vitro*. Dan had previously obtained a Bachelor's degree in agricultural chemistry and was involved for several years in the sales of laboratory chemicals which spurred his interest in the disposal of such substances and their eventual accumulation in aquatic environments.

Dr. Margaret Sanders earned a DVM from Auburn University in 1990 after having worked as a veterinary technician in an emergency clinic for five years. Dr. Sanders is currently Deputy Commander for Veterinary Services at Redstone Arsenal (38,000 acres) in Alabama and has been challenged with dealing with environmental contamination problems on this installation. The Wheeler National Wildlife wetlands reside on the base. Dr. Sanders is currently assisting in the assembly of the proceedings of the 1991 course and is helping to convince the Army to remain involved in future years. For example, Dr. Sanders presented an Envirovet poster session recently at a meeting in San Antonio and will present a similar poster at an upcoming educational meeting of the Veterinary Corps at Walter Reed Hospital in Washington D.C.

Dr. Lucie Dutil earned the DVM degree from the University of Montreal in 1988 and subsequently completed a specialization program in bovine medicine and surgery. Lucie has done volunteer work at the raptor clinic and is a member of a group supervising raptor treatment and rehabilitation, and public education on raptors in Quebec. Lucie will begin a Master's degree in epidemiology and toxicology this September. It is possible that Lucie's major professor will attend Envirovet next year.

Dr. Janet Whaley, 1991 graduate of the College of Veterinary Medicine at the University of Florida, entered veterinary school because of her concern for the effects of environmental deterioration on aquatic animal health. Janet completed Aquavet I and II, and shortly after Envirovet secured a job doing research on contamination of Chesapeake Bay, as well as an opportunity for an internship with the National Aquarium in Baltimore during Envirovet. Janet is also considering doing a PhD degree in toxicology either at Johns Hopkins University or at the University of Illinois.

Dr. Ravi Gooneratne earned a Bachelor's degree in Veterinary Science in Sri Lanka (Commonwealth equivalent of DVM) and a PhD from University of Western Australia. He was a postdoctoral trainee at Murdoch University in Australia and a research scientist for four years at the University of Saskatchewan before becoming a lecturer at Lincoln University in Christchurch, New Zealand. Ravi's research program has focused on the interactions of heavy metals on animal health.

Carolyn Fordham is currently a full-time employee of Environmental Science and Engineering in Englewood, Colorado, and a part-time PhD student at Colorado State University. She earned a Master's degree from Colorado State University and a Bachelor's degree in zoology from the University of Maryland. Carolyn is also owner of Terra Technologies, a private consulting firm. She is a toxicologist and her routine activities include risk assessments especially with regard to wildlife toxicology concerns. She previously worked as an analytical chemist, and before that was a biological technician at NIH for 4 years.

Dr. Cecilia Ambrogi earned a DVM from the University of Pisa in 1989 and began a PhD program in environmental toxicology at the same institution in 1991. Her current interests and PhD project will involve the effects of heavy metals and persistent organochlorines on immune cell function.

Karen Martin is a British citizen who was awarded a Bachelor's degree in chemistry from the Massachusetts College of Pharmacy and Allied Health Sciences in 1983 and a Master of Science degree in Environmental Health Sciences from Harvard in 1985. Presently, she is a second-year student at the College of Veterinary Medicine at Tufts University. In addition, from 1986 to the present, Karen has worked in the Department of Environmental Protection, Office of Research and Standards in Boston, Massachusetts, developing procedures and performing environmental and health risk assessments for pollutants in air, water, fish, and soil.

Dr. Mark Mense earned the DVM degree from the University of Missouri in 1985. For the last two years, he has been a resident in pathology and the Armed Forces Institute of Pathology in Washington, D.C., and has provided pathological support during the 1989 Exxon Valdez Oil spill and for the National Zoological Park in Washington, D.C. Since Envirovet, Mark has been accepted into a PhD program in toxicology.

Dr. Dawn Otsuka earned a Bachelor's degree from Case Western Reserve University in 1976 and is a 1991 graduate of the College of Veterinary Medicine, University of California at Davis. Dawn is a native Hawaiian and is interested in aquaculture of fishes and crustaceans. She has ten years of research experience in audiology and nephrology research laboratories. Dawn has also volunteered in a white sea bass mariculture project, has done an externship at the Nimbus Fish Hatchery during a salmon run, and has worked at a shellfish pathology laboratory.

Not Shown:

*Ra'anan Ariav is currently a fourth-year veterinary student at the University of Wisconsin in Madison. Ra'anan previously earned a Bachelor's degree from the Hebrew University in animal sciences with a minor in aquaculture. He has worked in large scale production of tilapia and Chinese carp. In 1990, he took part in the survey of Chinook salmon health status in Lake Michigan following the spring 88-90 epizootics in the lake. Ra'anan planned two externships involving aquatic animal medicine for his final year in veterinary school--at Mystic Aquarium and at the Fish Disease Laboratory in Nir-David, Israel.

Dr. Carl Uhland, 1990 graduate of the University of Illinois College of Veterinary Medicine, is currently a relief veterinarian who wishes to become more involved in aquaculture. Carl attended the Short Course on Fish Medicine at the University of Florida in the spring of 1990.

**Recipient of Envirovet scholarship (based principally on economic need).*

APPENDIX 4: THE UNIVERSITY OF WISCONSIN-SUPERIOR'S EARTHWATCH RADIO BROADCAST COVERING ENVIROVET 1991

UW-Superior Plays Host to Envirovet Program

Biologists and toxicologists have worked for decades to study the effects of pollution on the Great Lakes. Now, a new program called Envirovet is training another kind of specialist: the veterinarian with experience in aquatic environmental toxicology. Envirovet is an attempt to bring freshwater toxicology studies out of the lab and into the waterways, where veterinarians will use their specialized skills to check living organisms for signs of damage from pollution.

Envirovet is a four-week summer program held at the Center for Lake Superior Environmental Studies (CLSRS), located on the UW-Superior campus. The program is headed by Dr. Val Beasley, a veterinary toxicologist from the University of Illinois at Urbana-Champaign. Thirty-seven students have completed the inaugural session of Envirovet, and Beasley hopes they will contribute to cleaner waters by using animals that range from plankton to muskies as biomonitors.

"By getting people in the field that are really highly effective at diagnosing what's going on with those animals," Beasley said, "We feel like we can recognize and limit aquatic environmental contamination more effectively."

Beasley hopes to continue the Envirovet program in summers to come. Faculty and staff come from the academic, industrial and government sectors. Funding for this year's program came from the Great Lakes Protection Fund, the Illinois-Indiana Sea Grant Program, and Dow Chemical Company.

Mike McCauley

BREEDING BAN PASSES IN CALIFORNIA

In the midst of much controversy, California's San Mateo County Board of Supervisors voted to accept an amended version of an anti-breeding ordinance. (See VETERINARY ECONOMICS, December 1990, page 10).

"I think we made history tonight," Supervisor Tom Nolan said after the law passed, 4-1, in mid-December. Nolan, who introduced the legislation and who recently amended it to include a provision for a breeder's licensing program, is optimistic that such ordinances will catch on nationwide.

"Hopefully we've set a precedent for the rest of the nation to follow in combating the pet overpopulation tragedy," he says.

Starting in July, a six-month moratorium on breeding will begin, during which time a task force plans to develop a breeding licensing program; generated funds will go toward pet overpopulation education.

As early as January 1992, professional and hobbyist breeders will be eligible for breeding

ENVIRONMENTAL EFFORTS: LAKESIDE AND INSIDE

Your midwestern colleagues are helping save the Great Lakes with "Envirovet," a program designed to help protect aquatic life and water quality in the Great Lakes—the largest bodies of fresh water in the world. To help underwrite Envirovet, the governors of states bordering the Great Lakes granted the use of monies from the recently established "Great Lakes Protection Fund."

The annual summer program will offer veterinarians, veterinary students, and others interested in aquatic biology four weeks of intensive training in aquatic animal medicine provided by experts in ecology, aquaculture, and so on.

According to Dr. Val Beasley, an originator of the program and a veterinary bioscientist at the University of Illinois at Urbana: "Program participants will learn how to better interpret and protect life in the Great Lakes and its watershed."

Envirovet will be held at the Center for Lake Superior Environmental Studies in Superior, Wis., under the joint coordination of the Universities of Illinois and Wisconsin-Superior.

.....
You can join forces with your environmentally motivated colleagues by taking steps to clean up your practice through recycling.

The good news is that recycling isn't as much trouble as you might think, and the benefits are bountiful. In fact, by collecting and taking paper to a recycling center, you can relieve landfills of at least 180 pounds of paper per employee *each year*.

Almost all paper used in your hospital can be recycled, including computer printouts, white and colored paper, copy-machine rejects, newspapers, and more. You can't recycle faxes, carbonless copy paper, high-gloss magazine paper, plastic-coated papers, envelopes lined with bubble wrap, or envelopes with "windows"—unless you tear the windows out first. Of course, you also can recycle glass bottles and aluminum cans.

If you've developed an effective environmental program in your practice, we'd like to hear about it. Send your ideas to VETERINARY ECONOMICS, 9073 Lenexa Dr., Lenexa, KS 66215.

permits. Mandatory sterilization will go into effect for all other dogs and cats. The price for noncompliance? \$500.

TELEPHONE TIP

When your receptionist is juggling five incoming clients, your technician is struggling to restrain patients, and you're handling an angry client, the last thing you need is a ringing telephone. But ring it does.

What's the best way to answer the phone in such chaos? *Nicely*, says Nancy Friedman, the Telephone "Doctor." Of course times are hectic, but the caller doesn't know that. Don't give in to rudeness—keep calm and be nice. Besides, the caller isn't the only one unnerved by a sharp, impatient voice—remember those clients within earshot of the conversation.

Instruct your receptionist to take a deep breath, speak slowly, and put a smile into each word. If the call comes at a bad time, ask the caller to call back later, or set up a more convenient time to call. Clients appreciate such patience and service—and won't forget it either. ■

Envirovet offers experiences in aquatic animal medicine

Veterinarians, aquatic animal specialists, environmental toxicologists, and veterinary students trawled Lake Superior for fish, toured aquaculture facilities, and studied the effects of pollution on freshwater animals as part of the new Envirovet program this past summer.

Sponsored by the University of Illinois College of Veterinary Medicine, the University of Wisconsin-Superior, and the University of Minnesota-Duluth, Envirovet's primary goal is to establish an educational program for those pursuing careers in freshwater aquatic animal medicine and environmental health. The program drew 37 participants from 16 states as well as Canada, Hungary, Israel, Italy, and New Zealand.

According to Dr. Thomas Eurell, Envirovet faculty member, the program helps teach participants more about the environmental impact on animals in the ecosystem than can be learned in the classroom. He also said the hands-on experience will be beneficial in securing a job as a veterinary consultant to aquatic facilities or as an employee of a governmental regulatory agency.

Envirovet has been funded by the Great Lakes Protection Fund, the Illinois-Indiana Sea Grant Program, and Dow Chemical Company. A faculty of more than 40 experts in their respective fields includes individuals from the three sponsoring universities, the EPA, the US Fish and Wildlife Service,



An Envirovet participant prepares to submerge a plankton tow into the waters of Lake Superior. The water collected in the tow will be analyzed to determine the biodiversity of the lake's food chain.

and more than 15 other academic institutions, government agencies, and corporations.

The Envirovet program has been approved for 1.5 units (6 hours) of academic credit by the University of Illinois. Enrollment is limited to 35 students per class. Prerequisites for participation include completion of two years of veterinary school or two years of

graduate training in a relevant discipline. The 1992 program will run from June 7-July 3.

Persons interested in the program should contact Dr. Gary Koritz, co-director for recruitment and selection, Department of Veterinary Biosciences, College of Veterinary Medicine, University of Illinois, 2001 S Lincoln Ave, Urbana, IL 61801; (217) 333-7981. ♣

Envirovet funds aquatic research

URBANA, ILL.—A \$35,000 grant to Envirovet, a program designed to help protect aquatic life and water quality in the Great Lakes, will fund an intensive aquatic medicine training course to interested Midwest veterinarians and veterinary students.

The grant, underwritten by the Great Lakes Protection Fund, will help to provide training in aquatic animal medicine throughout a summer course. The program will focus on the comparative morphology and physiology of aquatic animals and the effects of pollutants on them, coordinators say.

"Experts in ecology, risk assessment, pathology, toxicology, epidemiology, and aquaculture will provide training for Envirovet participants," according to Val Beasley, DVM, associate professor of veterinary biosciences at the University of Illinois College of Veterinary Medicine.

Improved detection of the early effects of environmental toxicants on aquatic life and the associated ecosystem damage will also be an area of major emphasis, coordinators say.

Envirovet will be each summer at the Center for Lake Superior Environmental Studies in Superior, Wis. □

Veterinarians launch drive to clean up lakes

By The News-Gazette

University of Illinois veterinarians and colleagues in other Midwestern states are launching a campaign to help clean up their shared freshwater lakes.

The new aquatic program, "Envirotvet," will also give a boost to the fledgling Midwestern aquaculture industry.

"We're getting things started," said toxicologist Val Beasley, who was awarded a Great Lakes Protection Fund grant to help the team accomplish those goals.

"We are trying to take the strengths of veterinary medicine and whole-animal biology to help people recognize pollution-related problems," he said. "And we're visiting with agencies interested

in aquaculture. Producers say they need more veterinarians in the field to diagnose problems."

BEASLEY, ALONG with UI immunologist Tom Eurell and University of Wisconsin-Superior colleague John Dellinger, will use the \$35,000 program grant to conduct a monthlong educational program this summer at Superior. The grant is one of the first made under a fund established by governors in states bordering the Great Lakes.

"Fresh water is in much shorter supply than salt water," Beasley said. "The last thing we can afford to pollute is fresh water, because it's so hard to clean up. We have to have water for drinking,

for agriculture. We all rely on that fresh water, but it's in short supply."

At the summer session, the faculty will teach about 40 veterinary students, post-graduate vets and aquatic biologists more about fish and invertebrate health so they can recognize problems and know how to solve them.

"Part of our goal is to help these young scientists appreciate aquatic species and the complexity of their ecosystems and give them some idea of the movement of toxic substances and their biological fate in an aquatic environment," said Beasley, who will be director of the summer course.

"There are a lot of species out there, and many of them have

limited ranges, like worms in stream beds. But they're essential for the ecosystem, and they could be tremendous indicators of environmental quality if people are trained to understand them."

COURSE GRADUATES will also know more about environments and health problems in confinement fish farming, and be better able to help aquarium owners.

"It's hard to find a veterinarian skilled in aquaculture," said Beasley.

Class work the first two weeks will focus on comparative anatomy, physiology and disease; the second two weeks on toxins, their environmental fate, harmful effects on animals and aquaculture.

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Envirovet Nets "Superior" Reviews from Participants

By Kimberly Meenen

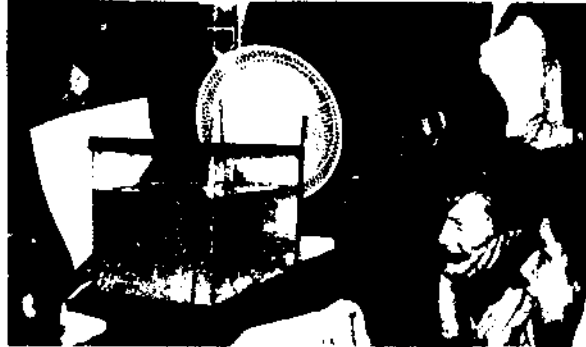
Veterinary students, veterinarians, and aquatic animal and environmental toxicologists trawled Lake Superior for fish, toured aquaculture facilities, and studied the effects of pollution on freshwater animals as part of Envirovet this summer. This new program drew 37 participants from Canada, Hungary, Italy, and New Zealand as well as from 16 states across the U.S.

"I highly recommend the program," says Wendy Reinbold, a third-year veterinary student at the University of Illinois College of Veterinary Medicine. "Envirovet is helping to reach out and create new positions in the veterinary field."

Reinbold says she found the labs during Envirovet most interesting. "I enjoyed the 'hands-on' work. We had a chance to bleed fish and necropsy birds. We did things that you don't normally get to do in veterinary school." Reinbold enrolled in the course because she is interested in pathology, toxicology, and aquatic life, and wants to keep her options open.

Held at the Center for Lake Superior Environmental Studies in Superior, Wisconsin, Envirovet's primary goal is to establish an educational program for those pursuing careers in freshwater aquatic animal medicine and environmental health.

Dr. Val Beasley, an associate professor of toxicology at the college and originator of Envirovet says, "the students recruited



Envirovet students simulate a seiche in an aquarium tank. A seiche is a tide-like rise or fall in water level that occurs in large lakes, bays, or gulfs. Seiches are caused by high pressure systems or strong winds.

Photo courtesy of Dr. Robert Patyk, Oconomowoc, WI

were even more qualified and the faculty more energetic and effective than we thought possible."

Dr. Robert Patyk, a small animal practitioner in Oconomowoc, Wisconsin, attended Envirovet with an interest in aquatic animal medicine and environmental toxicology. He says Envirovet is a quality survey class for those interested in exploring these areas. Dr. Patyk is very active in community environmental issues such as groundwater and lake protection.

In a letter to Sea Grant supporters, Envirovet participant Andrew Radomski writes, ".....The information and 'hands-on' experience that I acquired in the Envirovet Program was invaluable. This program sparked a new and strong interest toward environmental toxicology as well as

enhancing my interest in environmental studies pertaining to freshwater ecosystems (especially within Lake Superior and the other Great Lakes)....." Radomski is a third-year veterinary student at the University of Wisconsin - Madison.

Dr. Beasley hopes Envirovet will bridge the gap between laboratory studies of toxic chemicals and the sick, deformed, or dying animals sometimes seen in polluted ecosystems. ❄️

Envirovet was sponsored by the Great Lakes Protection Fund, the Illinois-Indiana Sea Grant Program, and Dow Chemical Company. Plans for the second Envirovet course at University of Minnesota-Duluth in June and July 1992 are underway. For more information, contact Dr. Val Beasley at 217/333-9360.

The HELM Vol. 8, No. 3, 1991



Veterinary REPORT

'Envirovet' Program to Help Protect Freshwater Resources of the Great Lakes

BY TANIA BANAK

Midwest veterinarians are joining the fight to clean up our nation's water with the blessing of governors from states bordering the Great Lakes.

The governors have chosen to use their recently established "Great Lakes Protection Fund" to help underwrite "Envirovet," a program designed to help protect aquatic life and water quality in the lakes.

The \$35,000 grant to Envirovet is one of the first made from this new fund. The four-week, intensive Envirovet program will provide training in aquatic animal medicine for veterinarians, veterinary students and others interested in aquatic biology.

According to Dr. Val Beasley, an associate professor of veterinary biosciences at the University of Illinois College of Veterinary Medicine at Urbana and director of the Envirovet program, the program will focus on the comparative morphology and physiology of aquatic animals and the effects of pollutants on them.

Envirovet will be held each summer at the Center for Lake Superior Environmental Studies in Superior, Wisconsin. Dr. John Dellinger, director of the Center, has also been involved in setting up Envirovet from its inception.

The program is under the joint coordination of the University of Illinois and the University of Wisconsin at Supe-



rior," Dr. Beasley said. "Experts in ecology, risk assessment, pathology, toxicology, epidemiology, and aquaculture will provide training for Envirovet participants. Program participants will learn how to bet-

ter interpret and protect life in the Great Lakes and its watershed."

Improved detection of the early effects of environmental toxicants on aquatic life and the associated ecosystem damage will be an area of primary emphasis. As diagnosis of the poisoning problems of aquatic animals becomes more efficient, the extent of environ-

mental damage due to water pollution will be more readily controlled.

The Great Lakes are the largest bodies of fresh water in the world, and the governors from bordering states recognize the importance of this resource. They established the Fund to protect the health of the Great Lakes ecosystem, as well as human health, fish, and wildlife.

Envirovet is also working with the Illinois-Indiana Sea Grant Program as well as with industry to obtain funding for the project. For example, The Dow Chemical Company, USA, of Midland, Michigan, has provided a \$2,000 donation. ■

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**"Envirovet" to Help Protect
Freshwater Resources of Great Lakes**

University of Illinois veterinarians and their midwestern colleagues are launching a new aquatic program known as "Envirovet" to help clean up and protect their shared freshwater lakes. This summer, faculty from the U of I College of Veterinary Medicine and the University of Wisconsin-Superior will conduct an intensive four-week workshop at the University of Wisconsin's Center for Lake Superior Environmental Studies. At the workshop, approximately 40 veterinarians, veterinary students, and aquatic biologists will learn about comparative anatomy, physiology, diseases of freshwater aquatic animals, and the effects of pollutants on them. **CONTACT: Kimberly Meenen, (217) 333-2907.**

Photos provided by Dr. Val Beasley