

David B. Baker, Ph.D. (1936-2021)

In 1966, Heidelberg College graduate (1958) David Baker returned to his *alma mater* as the newest member of the Department of Biology after having received his Ph.D. in plant physiology from the University of Michigan, performed a year-long Postdoc at the University of Tübingen, Germany and taught for two years as an Assistant Professor at Rutgers University. A large part of the young professor's duties involved teaching an Introductory Biology course with eight laboratory sections. He soon developed some thoughts on how to liven up the freshman lab by immersing students in a real-world research project assessing water quality in the region's most prominent natural resource, the Sandusky River.

Here's David describing the "River Labs" component of that course: "Beginning in the Fall of 1967, for a three-week period...each of the eight, 24-student laboratory sections was divided into three groups that rotated through colorimetric phosphorus, coliform bacterial, and BOD testing. Teaching staff collected water samples twice a week at 24 locations along a 90-mile section of the Sandusky River, bracketing three municipal sewage treatment plants, and at four U.S. Geological stream gauges, as well as at the mouths of major tributaries. Each lab section analyzed samples from 6 stations, along with a blind replicate; and each group of eight students was divided into two so that duplicate analyses of each sample would be produced..."

For an Introductory Biology course.

Already Baker's penchant for experimental designs that generate copious amounts of information—one of his nicknames was Data Dave—was proving problematic. In the second year of the new program a fourth week had to be added to provide students time to analyze and compare the data within and between laboratory sections.

Problematic but exceptionally fruitful. As would become an oft-repeated pattern, within two years, the data on nearly 100 miles of the river led Baker to consider extending Heidelberg's riverine studies into new areas of investigation. The receipt of a \$47,650 dollar grant from the Federal Water Pollution Control Administration (one of the forerunners to the EPA) allowed for the equipping of a small research laboratory in the basement of the sciences building and the hiring of the lab's first full time technician, the incomparably talented Jack Kramer.

Thus, it is reasonable to date the origin of Heidelberg's "Water Lab" as an independently funded research facility to the January 1969 initiation of year-round research in the Sandusky River Project, predating the first Earth Day (Apr 22 1970) and the creation of the EPA (Dec 2, 1970) by over a year.

Over the decades since, the Lab under Dr. Baker and his successors has managed to attract and fully engage the talents of an extraordinary corps of technicians and scientists in pursuing its expanding research agenda. But the Baker-Kramer dyad merits special attention because it pertains to the question that has so often puzzled scientists visiting from larger, well-staffed Research I institutions:

How is it that a world-class research facility came to exist—and thrive—at a small liberal arts institution without even a Master’s-level graduate program to provide a steady supply of workers to undertake the arduous task of collecting and analyzing the masses of data that are the raw fuel of any successful laboratory?

More than one member of the Lab commented on Dave and Jack’s working relationship “like an old married couple” who would bicker back and forth over the feasibility of some idea of Dave’s for a new project until they had co-arrived at a workable solution. Each knew the other’s strengths and weaknesses and their disagreements over what *might be* vs. what *could be* were often strident and almost always productive.

Staff members soon learned to recognize the danger signs of another intellectual storm in the making: Watch out if, after a morning of pouring over the latest data, Dave came into the Lab with a coffee cup in hand and a certain twinkle in the eye. And as Jack looked up warily from the litter of whatever piece of gear he was disassembling, Dave would begin, “Now wouldn’t it be interesting if…”

Because of the tireless efforts of Dave (and succeeding Directors) in promoting the Lab and communicating its results, there is today a high level of appreciation for the NCWQR’s work within the Great Lakes region. Its data are currently being used to assess progress towards reducing phosphorus entering Lake Erie, forecast bloom severity in the western Lake Erie basin, examine the of the H2Ohio agricultural and wetland practices being implemented under Governor DeWine, to model the needed practices and coverage to improve water quality in the region, and determine how much nitrogen and phosphorus comes from different sources in each of the major watersheds in Ohio.

Dave was a remarkably humble man. He was the first to say he didn’t have a degree in water science and that he did not have a strong background in statistics. And yet, Ken Krieger (NCWQR Director, 2010-2015) recalls that Dave was a staunch defender of scientific integrity, which included the correct use of the NCWQR’s data. He was so familiar with the Lab’s datasets that he could immediately tell if someone outside the Lab had analyzed its findings in an inaccurate or misleading way, and he was brave in exploring problematic implications of Lab’s data before doubtful audiences.

Ellen Ewing, the longest-serving member of the Lab with 45 years as technician and Lab Manager, remembers Baker seeking the staff’s feedback on a practice talk for a particularly important presentation he was about to give. “I just want people to believe this is the most honest assessment of the data I can make at this time.”

That, in a nutshell, was David Baker’s professional creed.

In his eulogy at David’s funeral service, Ken Krieger reminded us that Baker was a visionary, always looking at the bigger picture of where future research might—and should—go next. He was adaptive and persuasive, finding ways to cobble together funding from multiple sources to sustain the lab’s work within an environment of constantly changing government priorities and programs. He was persistent, explaining to all who would listen (and some who preferred not to)

about the powerful impact of excessive phosphorus, in its various forms, on aquatic ecosystems. He initiated and published on an array of significant projects well after his (second) official retirement in 2007. In fact, two days prior to his passing visitors found Dave with a three-ring binder on his lap trying to work out how a set of nitrite values might affect future research.

And he was unassuming, never boasting about himself, quick to credit the Lab's staff in his public presentations, and sincerely interested in the views of other stakeholders in the issues he cared about. Indeed, part of Baker's success in working with farmers and policymakers stemmed from his earnest efforts to understand the environmental, economic, and cultural issues affecting the agricultural community as an integral component of the complex of factors impacting the agriculture-aquatic ecosystems interface.

Outside of work, Dave's focus was on family, church, and community. For years he sang in the back row of choir, a quick sight-reader who was always on pitch. He was involved with Habitat for Humanity, sat on the Board of the Franciscan Earth Literacy Center in Tiffin, was a founder of the Sandusky River Watershed Consortium and loved sports, fishing, camping, canoeing, and traveling.

Well into his later years, he remained one hell of a speed walker.

David leaves behind his loving wife, Peg (Margaret) of 60 years, three children Sarah (Eric) Jome, Mark (Patsy) Baker, Susan (Robert) Cramer and seven grandchildren. A brief note about Peg: her enduring encouragement and support in so many ways made Dave's life work possible. Long-time members of the NCWQR considered her a *de facto* member of the Lab.

Following is a small but representative selection of comments on the importance of Dave Baker's career:

In addition to at least 73 scientific publications, book chapters and reports that Dr. Baker authored or co-authored, he also dedicated himself to outreach, at one point giving over 50 presentations to all manner of audiences while serving as Director of the Lab. He strived to ensure that scientific findings actually reached land management policymakers. To cite just one example, after noting alarming increases in dissolved phosphorus in the early 2000s, he played a pivotal role in bringing experts together to form the first Ohio Phosphorus Taskforce. –Laura Johnson, Director of the NCWQR, 2016-present.

My group has issued seasonal forecasts of the severity of the cyanobacterial bloom in Lake Erie for nine years, 2021 will be the tenth. It would have been impossible to do this without the water quality monitoring program that Dave established. Dave was a wonderful collaborator. He sparkled with dedication and enthusiasm. When I first approached Dave in 2011 for help in trying to forecast the Lake Erie blooms, we didn't know each other; but he dove into helping me. He clarified nutrient data, answered questions, and made it work. And that started a long collaboration with Dave and Heidelberg, phenomenal sources of expertise and data. –Rick Stumpf, NOAA.

Who knows where I would be without this amazing and dedicated scientist? The lab he founded, and the resulting major was the reason I went to Heidelberg. I worked in the lab throughout

college and met so many amazing people and gained such great experience. He always had time for students. Even after his retirement I would run into him at meeting & conferences, where he was still working away and writing papers. I always beam with pride when little old Heidelberg's lab and amazing dataset is mentioned at Great Lakes and international science meetings. –Sara Creque Thomas, Michigan DNR, Fisheries Division.

Anyone who is concerned about nutrient and sediment loading to the Great Lakes owes Dave a huge debt of gratitude. He developed and maintained a 40+ year dataset of nutrient and sediment loading to Lake Erie from a number of major tributaries including the Maumee, Portage, Raisin, and Cuyahoga Rivers, with samples being collected three times/day, 365 days/year. We could not have developed phosphorus loading targets for Lake Erie without Dave's data. –Jeffrey Reutter, Retired Director of Ohio Sea Grant and Stone Laboratory.

Dr. Baker was the first to understand that we needed to bring together water resource and agriculture experts to understand newly developing trends about tributary loads and resulting impacts to Lake Erie. The work of the Lake Erie Phosphorus Task Force was consequential in establishing agreement about the science behind these trends and the key lines of inquiry we needed to pursue to answer the many remaining questions. –Gail Hesse, Director, Great Lakes Water Programs, NWF.

The Heidelberg Lab is David Baker's legacy to the people of Ohio. –Scott Davis, USDA NRCS

In in *A Farewell to our Founder* letter from the Lab's current Director on the Lab's website, Laura Johnson has written, "Dave Baker will forever be missed, but is also our constant inspiration to do more and always ask 'I wonder if...'. As long as the NCWQR continues to exist, so does the spirit of Dave Baker. That spirit lives on in his original ideas on how to monitor watersheds and how to communicate those results, and in the lives of each of us at the NCWQR as we intend to sample on!"

(The full story of the remarkable progression of the "Water Lab" from its 1969 origin as the Sandusky River Project to its fiftieth year anniversary is presented in the book, *The National Center for Water Quality Research at Heidelberg University, 1969-2019*—downloadable for free at <https://ncwqr.org/2017/05/10/news1/>.)