Public Comment by Dr. James E. Garvey

I am submitting this public comment letter to the Illinois Pollution Control Board as a follow-up to my testimony during the November 2007 hearing regarding proposed changes to the state's current dissolved oxygen standard. As you know, I am an Associate Professor in the Department of Zoology and Fisheries and Illinois Aquaculture Center at Southern Illinois University. Previously, my participation in this process was through a service to the Illinois Association of Wastewater Agencies (IAWA). I am no longer under contract with IAWA in this matter and am filing this comment as an interested and concerned private citizen of Illinois.

I would like to provide further findings from my analysis of the continuous monitoring data from the streams described in my November 2007 testimony. As you recall, one of the most significant findings was the positive relationship between dissolved oxygen concentrations and discharge in several of the study streams. During the November hearing, I had not yet found a plausible mechanism for the rise in dissolved oxygen with a rise in discharge. After adding water temperature to the analysis, I found that the rise in dissolved oxygen concentration was simultaneous with a decline in temperature. Knowing that water's capacity for oxygen increases with declining temperature, it further supports the supposition that increased flow plus reduced temperatures (combined with increased aeration) are predominately involved in dissolved oxygen dynamics in many Illinois streams. These physical factors cannot be regulated by statute, although regulating instream flow might be an issue worth some focus.

After the last hearing, I was approached by a respected colleague and friend who noted that I was wrong about my statement that habitat may supersede water quality in most streams. I think it is important that I expand my definition of "habitat". In my view, habitat is the physical and biological template organisms need to be successful in an area. Recent findings by Dr. David and others in Illinois streams suggest that habitat is also a component of streams that allows the systems to be robustly resistant to changes in water quality and perhaps resist dramatic physical changes such as in dissolved oxygen or temperature. Habitat also has a spatial component, in that "enough" of it must be available to allow an organism to carry out its life history requirements and avoid local extinction. For sturgeon and paddlefish, this may by thousands of kilometers; for darters it may only be tens of kilometers (although adequate gene flow among populations may require much larger ranges and connectivity). In streams, continuity among habitats within the spatial extent of an organism is important. Thus, occasional drops in dissolved oxygen in portions of an organism's extent will not be a problem if the organism has refuges down- or up-stream. The problem is that habitat is becoming continually fragmented due to development in the north and increased agriculture mid-state. The natural tendency for portions of streams to dip in dissolved oxygen concentration becomes a problem when refuges are unavailable due to fragmentation. To alleviate this problem, I would love to elevate the concentration within all portions of Illinois streams to whatever level biologists want during whatever time of the year is convenient for the resident organisms. Unfortunately, the weight of the data collected to date suggests that

dissolved oxygen concentrations in streams sag during the summer when flow declines and temperature rises. This is a natural tendency linked to physical factors currently beyond the biologist's control and are often independent of water quality. Thus, we need to be quite careful about developing rules that cannot be met. The regulatory focus needs to be about habitat, including its internal connectivity. We need to avoid spending ever-limited state agency resources on this issue and find and then focus on the important (and often more difficult) ones such as creating large stretches of connected streams with well-developed riparian corridors and stable, functioning habitat. This also includes abating non-point sources of pollution such as nitrogen export from farm fields that may not be a large problem in Illinois waters but is a huge problem downstream in the Mississippi River delta.

As was much noted during the last hearing, I am an officer of the Illinois Chapter of the American Fisheries Society (ILAFS). I expect ILAFS to file public commentary as well. I would like to note that given any apparent conflict of interest (again please note that I am no longer under retainer by IAWA), I recused myself of any participation in recent deliberations leading to the Chapter's commentary about the proposed rulemaking.

I appreciate the opportunity to provide my comments before the Board. It has been a great learning experience and an opportunity for me to stand on a soap box – always a joy for an academic. As a scientist and teacher, I am always willing to change my mind based on the data available to me. I hope the debate that has occurred during the past two years will lead to fruitful research that refines our understanding of the dynamic relationships among oxygen, the physical environment, and organisms in Illinois streams.