

Dunnette, David and Richard Avedovech. "Effect of an Industrial Ammonia Discharge on the Dissolved Oxygen Regime of the Willamette River, Oregon." *Water Restoration*. 17.9 (1983): 997-1007. (Reviewed by Niko Hoskins)

This study, noting the lack of studies pertaining specifically to the occurrence of nitrification in river systems, based its analysis on a USGS study from 1972-74, an Oregon Department of Environmental Quality (DEQ) follow up in 1976 and some ambient data also taken in 1976. The DEQ study focused on ammonia discharges from a pulp and paper plant near Salem which, conveniently, suffered a shutdown for three weeks due to a labor strike. This allowed for data to be taken while the plant wasn't discharging as well as when the plant was operational. The data examined included dissolved oxygen (DO), ammonium (NH₄⁺), biochemical oxygen demand (BOD), nitrate (NO₂⁻), and nitrite (NO₃⁻). The authors examined these levels at four locations along the river and measured them in water, sediment and rock scrapings. During the study, the pulp and paper plant refined its waste procedures and reduced ammonia discharge by 50%.

The study reached several conclusions concerning the effect of the ammonia discharge on the Willamette. First, the data pointed to the 50% reduction in discharged ammonia as the primary cause for a 15% rise in dissolved oxygen. It was also found that the parts of the river with the highest nitrification levels were shallow, fast flowing, highly surface-active areas that also had high levels of ammonia. This is due optimum living situations of the nitrifying bacteria, *Nitrosomonas* and *Nitrobacter*. However, the ammonia findings also confirmed that ammonia mass flow data cannot adequately account for observed DO depressions because of the participation of ammonia in other biochemical nitrogen transformation processes. Overall, the study found active levels of nitrification in the study area, including areas with low numbers of nitrifying bacteria.

Critique

This study seems a bit dated at this point. For example, references to plotting on linear vs. log paper are common. All of the previous studies referenced are dated in the late 1960s to mid 1970s. "Commonly held beliefs" are also referenced far more than conclusions reached by previous studies. This is another problem in this article; in place of a real conclusion at the end of the study, the authors choose to re-iterate their numerical findings and state the numbers as "significant" or "active" rather than explaining their context. When context is given to the numbers it is along the lines of "this confirms work done by..."

With more background knowledge of the chemical nature of nitrification, the role ammonia plays and the overall effect on dissolved oxygen levels this article would have been far more useful. As it is, the authors simply provide a lot of numbers but don't explain why they're relevant.

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