

Concentrations of Nitrous Oxide in Two Western Rivers

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Concentrations of nitrous oxide in river water were measured along a 90-km reach of the South Platte River, northeastern Colorado, and in the Arkansas River, southeastern Kansas, during January and February 2000. Concentrations of nitrous oxide varied with land use and ground-water discharge to the river. Land use along the South Platte River varied in a downstream direction from an urban to an agricultural setting. Land use along the Arkansas River was predominantly agricultural. The study reach on the South Platte River gains flow from ground-water discharge, whereas the Arkansas River loses streamflow to the alluvial aquifer. Nitrous oxide concentrations from four sites in the South Platte River ranged from 18 to 527 nM, with a median concentration of 59 nM. The concentrations peaked downstream from Denver's largest wastewater-treatment plant and decreased in a downstream direction. Nitrous oxide concentrations increased at the downstream end of the study reach where nitrogen-enriched ground water discharges to the river. Nitrous oxide concentrations from four sites in the Arkansas River ranged from 3.3 to 5.9 nM, with a median concentration of 3.6 nM. The relatively small nitrous oxide concentrations in the Arkansas River are an indication of the lack of nitrogen inputs to that river compared to inputs to the South Platte River. Concentrations of total inorganic nitrogen in the South Platte River ranged from 567 to 819 μM and were derived from Denver's wastewater-treatment plant and ground-water discharge from agricultural fields. Concentrations of total inorganic nitrogen in the Arkansas River were about one third of that measured in the South Platte River because of much smaller municipal wastewater discharges and no ground-water discharge to the river. Results from this preliminary study demonstrate the importance of land use and its affect on nitrogen inputs to the production of nitrous oxide in these two western rivers.