

The inorganic nitrogen transformations in tributaries impacted by fertilizer and ranch activity, the Santa Fe River

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Our objectives were to investigate various inorganic nitrogen transformations, including nitrification, ammonification, and denitrification, in tributaries impacted by nursery and ranch operations within the western Santa Fe River watershed. In high organic matter sediments impacted by fertilizer, the nitrate was removed by denitrification due to high TOC and the ammonium produced by mineralization or fertilizer was accumulated in the system. In the low organic sediments in this stream, the potential denitrification rate was very low, such that nitrate would likely accumulate or flow into another system. In high organic sediments in the stream impacted by ranch activity, the high rate of mineralization supplied ammonium into the system, which was likely oxidized into nitrate by Archaeal and Bacterial nitrifiers. In turn, this nitrate was reduced into nitrogen gas by denitrification. In the low organic sediments in this system, all rates of potential inorganic nitrogen transformations were low. In both tributaries, genes encoding Archaeal ammonia monooxygenase (*amoA*) and the *nirS* form of nitrite reductase were dominated, while Bacterial *amoA* and the *nirK* form of nitrite reductase were rare. Further research will focus on the relationships between nitrification and denitrification at these sites and the microorganisms controlling these processes.

Inorganic nitrogen transformation, denitrification, nitrification, ammonification, Santa Fe River