Nitrate Storm Flux from Coastal Catchments in Southern California

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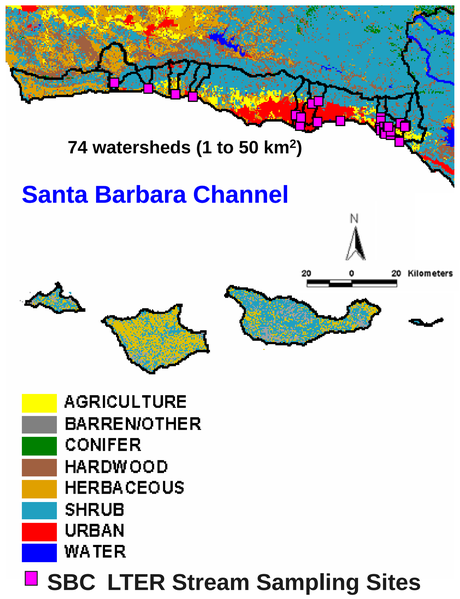

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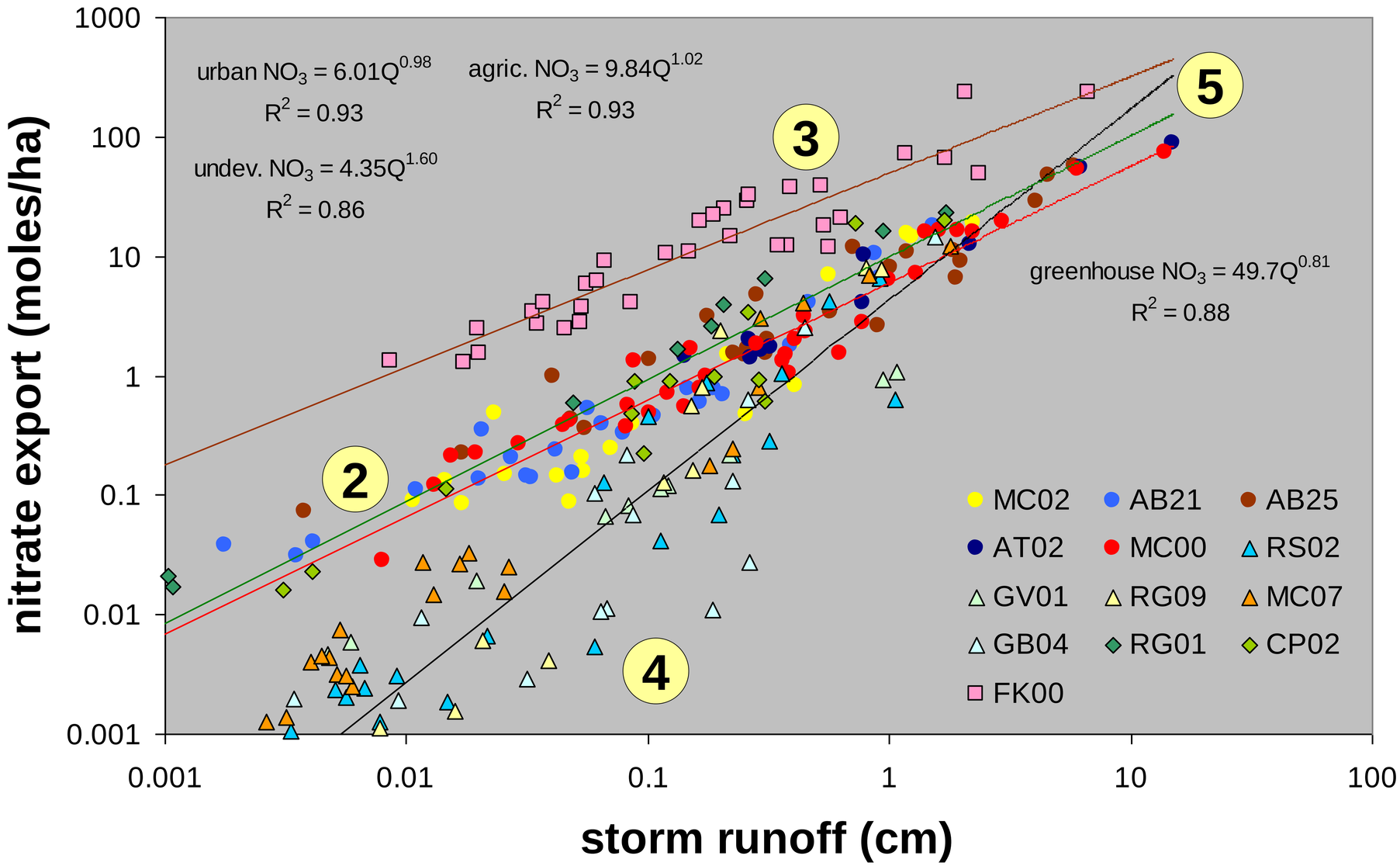
Stormflow nitrate fluxes (moles/ha) are plotted against discharge (cm/unit area) for storm events during the 2001, 2002 and 2003 water years (rainfall 78, 27 and 74 cm/yr respectively) at stream sampling sites shown on the location map. The topography of these small coastal catchments consists of mountainous headwaters and mild sloping coastal plains. Different land uses on the coastal plain produced characteristic nitrate fluxes during stormflow.



2 Storm nitrate fluxes, highly correlated with storm discharge, are similar for catchments that are predominately urban (circles and red regression line) or agricultural (diamonds and green regression line).

3 Greenhouse agriculture (producing flowers for the florist trade), a growing industrial-agricultural development in the area, produces nitrate fluxes (squares) over an order-of-magnitude higher than normal agriculture (avocado, citrus) or urban development.

4 Undeveloped catchments, chaparral and forest (triangles), have an order-of magnitude lower nitrate flux during low runoff events. However, high nitrate concentrations during the falling storm hydrograph from upslope undeveloped areas are a striking feature of storms producing large amounts of runoff.

5 The flux from higher elevation, undeveloped catchment areas exceeds the flux from lower urbanized or agricultural zones for storm runoff exceeding 2 to 5 cm per unit area. Interactions among atmospheric deposition, biological nitrogen fixation and mineralization of organic nitrogen, and seasonal runoff from these areas appears to control the supply and export of nitrate.