

Estimation of Total Dissolved Nitrate Load in Natural Stream Flows Using an In-stream Monitor

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Abstract. Estuaries respond rapidly to rain events and the nutrients carried by inflowing rivers such that discrete samplings at weekly or monthly intervals are inadequate to catch the maxima and minima in nutrient variability. To acquire data with sufficient sampling frequency to realistically model the Yaquina River, Oregon, USA, data were collected hourly for over 18 months using an in-stream monitor. The results for the Yaquina river indicate that dissolved nitrogen averages $1 \pm 0.4 \text{ mg l}^{-1}$ ($70 \mu\text{M} \pm 30 \mu\text{M}$) throughout the year. The lowest values occur during late summer and low river flow, whereas the higher values occur during the initial period of high rainfall events.

Also during late summer, nitrate, specific conductance, temperature and pH covary, suggesting a down-river source for part of the nitrate at that time. During winter, the high influx of low conductivity, fresh water indicates that the source of nitrate is from the surrounding watershed. Nutrient load calculations indicate that the annual nitrate load is directly related to river flow. Thus in high rainfall years, more nitrate is brought into the estuary from the river, relative to low rainfall years. The particular benefit of the in-stream semi-continuous monitor is the ability to document short-term changes such diel and tidal fluctuations.

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