

Monitoring network design influence on assessment of ecological condition in wadeable streams

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We investigated outcomes of three monitoring networks for assessing ecological character and condition of wadeable streams in the Waikato region, New Zealand. Sites were selected 1) based on a professional judgment network, 2) within categories of stream and watershed characteristics where some sites were selected initially based on professional judgment and then supplemented with sites selected randomly (stratified network), and 3) using an unequal probability survey design (probability network). The probability network accurately represented the target population characteristics and provided an unbiased estimate of resources against which other networks were compared. The professional judgment network and stratified networks and all site analyses included more ≥ 4 th order streams, while professional judgment and stratified networks site and survey design analyses incorporated higher quality catchments (more indigenous forest and/or less pasture) with coarser substrates than the probability network survey design estimates. Cumulative frequency distributions indicated that the stratified and/or judgmental networks yielded fewer taxa than the probability network, and that the stratified network provided lower estimates of the Macroinvertebrate Community Index (MCI). Compared to the probability network survey design analysis, the stratified network site analysis underestimated percent stream length classed as 'excellent' by the quantitative MCI, and the professional judgment site and survey design analyses overestimated percent classed 'fair' by the Average Score Per Metric. We conclude that deriving reliable estimates of wadeable stream character and condition requires (i) clearly defining and quantifying the target population for which inferences will be drawn, (ii) accounting for probability of site selection, and (iii) optimising spatial representation across dominant stressor gradients.