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Searching for an environmental weed

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Abstract

Sampling for rare events, such as a new weed incursion, is not easy. At most of the sample points weeds will be absent. This means that the resultant sample of weed densities has many zero-values, and typically a few large values.

The optimal survey design would be one where initial sample effort is focused on locations where there is a high likelihood of a weed being present. Adaptive, unequal probability survey designs can be used to improve survey efficiency, so that time in the field is spent within locations where weeds are present and minimal time spent where weeds are absent.

We use a GIS-derived spatial model of both weed incursion and spread over time to inform generalized random tessellation stratified (GRTS) sampling strategies for the surveillance and monitoring of environmental weeds. We develop multi-stage adaptive sample designs where, as new information on habitat suitability becomes available, sample designs are modified. Designs include a measure of the trade-off between the cost of failing to detect a weed at a site, and the cost of failing to visit all sites.