Predictors of recruitment for willows invading riparian environments

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Research scope

The factors affecting recruitment success of sexually and asexually derived *Salix* recruits in South-east Australia has been investigated. Habitat-prediction models were constructed to investigate the relative importance of river disturbance, availability of propagule sources and competition for recruitment space on successful willow recruitment. The analysis had 4 aims:

(i) to provide insight into the ecological processes that produce the current distribution pattern of *Salix* recruits in southeastern Australia;

(ii) to determine whether recruitment of asexual and sexual propagules responds to different phenomena;

(iii) to identify the most plausible and parsimonious model of recruitment; and

(iv) to test the predictive capacity of this model with an independent dataset.

A variety of statistical models were developed which combine multiple predictor variables, derived from competing biological hypotheses concerning the processes contributing to willow abundance. Model selection methods were applied to identify the most plausible model and clarify the relative importance of different predictor variables on the abundance of willow recruits.

Factors affecting seedling recruitment have also been investigated in field populations of *Salix nigra* located on the shores of Blowering Dam near Tumut. This data has been compared with experimental data produced from rhizopods, cylindrical growth chambers attached to a central reservoir which enables adjustment of water levels to conform to specific experimental water table regimes.

Results to date

Model results indicate that the frequency of mating partners within the environment is of greater importance than river disturbance indicators in determining abundance of sexually derived *Salix* recruits, whereas for asexual recruits physical characteristics of the river (relative disturbance, channel sinuosity) are the most useful predictors of abundance.

Implications for management / research gaps

1. Model performance for prediction of the abundance of asexual recruits was poor. The inclusion of additional environmental variables; or measurement of variables at finer scales, in combination with surveying a greater diversity of riparian environments is required to clarify habitat preferences for asexual recruits.

2. Develop a methodology to determine the geographical scale over which willow management strategies need to be co-ordinated for sexually-produced recruits, ie. identify which neighbouring catchments produce seeds and eliminate plants in these areas. Use of molecular techniques is needed to achieve this.

Related publications

Stokes, K.E. & Cunningham, S.A. (2006) Predictors of recruitment for willows invading riparian environments in south-east Australia: implications for weed management. *Journal of Applied Ecology*, 43, 909-921.

Acknowledgements