

## **Consequences of outbreaks: relationships between spatial scales of outbreaks and temporal scales of recovery.**

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### **Abstract**

*Spatial models indicate that recovery of coral cover after damage events depends on large-scale system level properties as well as biological ones. Monte Carlo studies showed that the relationship between recovery rate and spatial extent of damage depends on the effective connectivity of the system, which affects availability of larvae for recruitment, and relative magnitudes of larval retention (self-seeding), coral longevity and survivorship of recent pre-damage recruits. Recovery rates (1) may be highly dependent or largely independent of the spatial scale of damage depending on values of these parameters, and (2) may vary with the intensity of damage per reef. At high reef densities coral recovery rates are sensitive to survival of recent pre-damage recruits if coral longevity is short (30 years), but the degree of self-seeding is relatively unimportant. In contrast, if the density of reefs is low, and there is no self-seeding, coral does not recover at all but either stabilises at reduced coral cover or declines, depending on its average longevity. If reef density is low and there is some larval retention (13% cover over 7 days), then recovery depends largely on survival of pre-damage recruits and coral longevity is less important.*