

Modelling Carpageddon - the deliberate release of CyHV-3

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The deliberate release of Cyprinid herpes virus 3 (CyHV-3) to control invasive common carp (*Cyprinus carpio*) in the Murray-Darling Basin of south-eastern Australia has been dubbed 'Carpageddon' and is highly controversial. Common carp now represent up to 90% of the biomass in invaded waterways and mortality rates of 70-80% have been observed during outbreaks of CyHV-3 in the northern hemisphere. Hence, the release of CyHV-3 carries the risk that decomposition following mass-mortality of carp may lead to severe oxygen depletion and subsequent anoxic events. I will present mathematical modelling that is the basis for (i) developing a low-risk release strategy, and (ii) advice to the Australian government on the long-term benefits of releasing the virus. The model couples a stage based demographic model with an SEIR-type model; recruitment of young carp is determined by available spawning habitat and the river system hydrology. We show that the long-term virus impact and the dynamics predicted by the model depend largely on the presence of a latent class that allows for virus reactivation and onward infection. The impact of CyHV-3 is also sensitive to where density-dependence occurs in the life cycle of carp because of the potential for virus mortality to either replace, or be in addition to, density-dependent mortality.

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