

**Name of Method:** Metapopulation models

**Summary of Method:** A meta population can be described as a set of populations of the same species that are more or less isolated from each other in discrete patches of habitat. The populations may exchange individuals through migration and colonisation. Examples of such populations may include populations linked by larval dispersal, populations with several delineated breeding/spawning areas and island species. As such, the structure of a meta population will be more clearly defined for some species than others, particularly for sessile species.

The idea behind a meta population model is to model the entire population, including all discrete populations, and to use the quantification of rates of migration to mathematically determine the minimum number of discrete populations or number of individuals required to support the overall population. The approach taken is based on the initial population level at a discrete location at the start of the model, with emigrants and immigrants identified. Depending on the complexity of the model, it may include environmental impacts, mortality following migration, information regarding birth, death and growth rates, whether the migrations are affected density, age or distance, local extinctions and subsequent recolonisations etc. The assumptions made will therefore need to be clearly marked.

To undertake such a model, a good level of understanding of the ecological processes involved for the species population is required. Applications of meta population models can include issues connected to disparate protected sites, spawning stocks, habitat protection and fisheries.

**Advantages of Method:** Detailed model to provide specific information regarding discrete populations.

**Limitations of Method:** Lack of data can be a significant drawback for the model. The technical nature of the model can mean additional cost and time requirements. The method is used for specific purposes only and therefore as an additional input to the overall cause-effect assessment and not as a stand alone process.

**References:** Anon, 2002. Survival of Species in Fragmented Landscapes.  
Hakoyama, H and Iwasa, Y, 2005. Extinction of a meta population: aggregation approach.