



Investigating the spread of infectious salmon anemia in Atlantic salmon farming – with some thoughts on the strength of statistical studies

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Abstract

Infectious salmon anemia is an infectious disease of farmed salmon. The first outbreak was in Norway in 1984. Control strategies have not yet succeeded in controlling the spread in Norway and North America. The purpose of this research was to investigate the relative importance of the main risk factors associated with different routes of transmission. We study proximity to an infectious farm, measured by seaway distance and contact network, and the amount of biomass at farm sites. We allow for a further un-identified transmission route, possibly representing boat traffic or infected smolt. We suggest a stochastic space-time model for the disease along the farm sites of the Norwegian coast. We analyse data between 2000 and 2005, containing 73 cases and about 1100 farm sites. We shall present the model, results and implications. (This is joint work with Ida Scheel, Magne Aldrin and Peder A. Jansen.)

We will also briefly report on a second project: Climatically driven synchrony of gerbil populations allows large-scale plague outbreaks. In central Asia, the great gerbil (*Rhombomys opimus*) is the main host for the bacterium *Yersinia pestis*, the cause of bubonic plague. In order to prevent plague outbreaks, monitoring of the great gerbil has been carried out in Kazakhstan since the late 1940s. We use the resulting data to demonstrate that climate forcing synchronizes the dynamics of gerbils over large geographical areas. As it is known that gerbil densities need to exceed a threshold level for plague to persist, synchrony in gerbil abundance across large geographical areas is likely to be a condition for plague outbreaks at similar large scales. Here, we substantiate this proposition through autoregressive modelling involving the normalized differentiated vegetation index as a forcing covariate. Based upon predicted climate changes, our study suggests that during the next century, plague epizootics may become more frequent in central Asia. (This is joint work with Kyrre Linné Kausrud, Hildegunn Viljugrein, Mike Begon, Stephen Davis, Herwig Leirs, Vladimir Dubynskiy, Nils Chr. Stenseth.)

We shall conclude with some general remarks on the strength and on the level of speculation of statistical analysis for complex systems.