**FISH 558: Lecture 4 (Use of JAGS/STAN)**

You are interested in the presence of an invasive species in a particular habitat. The habitat consists of a large number of plots. The data you are provided with were collected by selecting plots at random and then making a number of counts in each plot. The effort during each count is not the same. The objective of this assignment is to develop a posterior distribution for the parameters of a model that represents the presence of the invasive species. The structure of the model is as follows (see Lecture4.dat: columns [plot number, effort, count]):

* The rate of density of the invasive species among plots is log-normally distributed, i.e., .
* Each count is Poisson-distributed with a mean given by the product of a plot-specific rate and the effort for the count, i.e., .

You can assume that the prior for the mean rate in log-space is U[-1000,1000] while the prior for the precision is U[0,1000].

**Tasks**

1. Use JAGS/STAN (use the method you are least familiar with) to find a posterior distribution for the mean and the standard deviation of the log for the distribution for the rate of density among plots. Base the MCMC analysis on 5 chains.
2. Compute the posterior distribution for the density at each plot.
3. Compute the posterior predictive distribution for each count (do this using R).
4. Compute a posterior predictive distribution for the count at a new plot. Show results for effort levels of 5, 10, and 15 (do this using R).