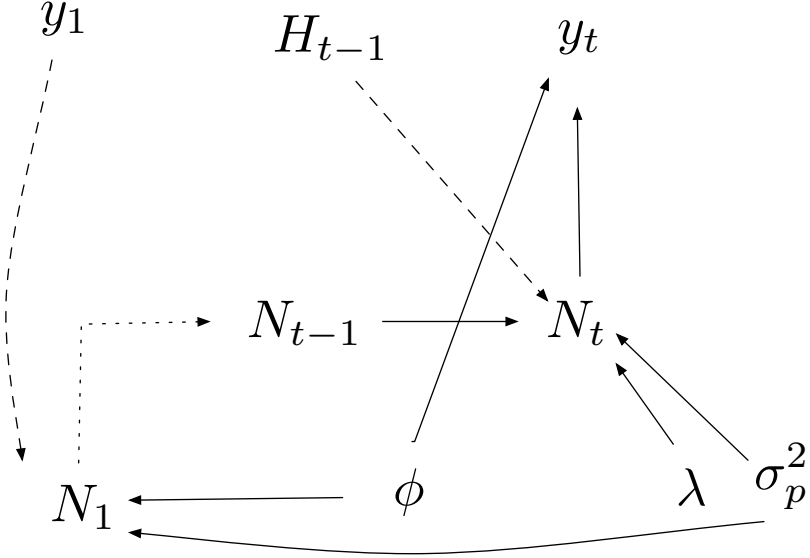

$$y_t \sim \text{Poisson}(N_t \cdot \phi) \tag{1}$$

$$N_t \sim \text{lognormal}(\log(\lambda(N_{t-1} - H_{t-1}), \sigma_p^2) \tag{2}$$

$$\phi \sim \text{beta}(154, 792) \tag{3}$$

$$N_1 \sim \text{lognormal}\left(\log\left(\frac{y_1}{\phi}\right), \sigma_p^2\right) \tag{4}$$

$$\lambda \sim \text{uniform}(.1, 10) \tag{5}$$

$$\sigma_p \sim \text{uniform}(0, 5) \tag{6}$$

$$[\phi, \lambda, \boldsymbol{N}, \sigma_p^2 | \boldsymbol{y}] \propto \prod_{t=2}^{n} [y_t | N_t \cdot \phi][N_t | \log(\lambda(N_{t-1} - H_{t-1})), \sigma_p^2] \times \tag{7}$$

$$[\phi]\left[N_1 | \frac{y_1}{\phi}, \sigma_p^2\right][\lambda][\sigma_p^2] \tag{8}$$