Assume that each brown bear $b_i$ has a territory with a midpoint $\mu_i = (\mu_{lat}, \mu_{lon})$. Let $\mathcal{S}$ be the four regions of Sweden we are interested in and let $\mathcal{T}$ be the region of land within $\ell$ kilometers from the border of $\mathcal{S}$ . There are $n$ bears with territory midpoint in $\mathcal{S}$ and $m$ bears with midpoint in $\mathcal{T}$ .

For each bear $b_i$, $Y_i \sim Poisson(\lambda)$ number of spills are expelled in their territory with locations $\mu_i + X_{ij}, j = 1, \dots, n_i$. A bear's territory is a circle with midpoint $\mu_i$ and radius $r = \quad Max \mid\mid \quad |X_{ij} - \mu_i|$. $X_{ij} = (R, \Phi)$ where $R \sim U(0, r)$ and $\Phi \sim U(0, 2\pi)$. The number of spills that are found is $N_i \sim B(Y_i, p_i)$ where $p_i = m\omega_i$ where $\omega_i$ is the ratio of the territory of $b_i$ contained inside $\mathcal{S}$ (Or the probability that $\mu_i + X_{ij}$ lies in $\mathcal{S}$ ) and $m$ is constant and $0 \leq m \leq 1$ . Since we cannot observe $Y_i$ but know that it is poisson distributed with parameter $\lambda$ and that $N_i \sim B(Y_i, p_i)$ we conclude that the distribution for the number of spills found by $b_i$ is $N_i \sim Poisson(\lambda m \omega_i)$ or if we are not specifically interested in exactly what $\lambda$ or $m$ is, $N_i \sim Poisson(\nu\omega_i)$.

The Midpoints $\mu_i$ are distributed uniformly across the integer coordinates $(\mathcal{S} \cup \mathcal{T})/C$ where $C$ is the area that is $l$ coordinate units west from the edge of the Baltic Sea. $\mu_i = (\mu_{lat}, \mu_{lon})$ where $\mu_{lat} \sim U(S, N)$ and $\mu_{lon} \sim U(W_{lat}, E_{lat})$ where $S$ is the southernmost relevant coordinate, $N$ the northern, $W_{lat}$ is the westernmost coordinate at the corresponding lateral coordinate and $E_{lat}$ the same for easternmost.