

$$X \sim \text{Bernoulli}(Z * \text{Detection Probability})$$

$$Z \sim \text{Bernoulli}(\text{Occupancy Probability})$$

$$\text{logit}(\text{Occupancy Probability}) = \psi.0 + \psi_1 * X_1 + \psi_2 * X_2 + \psi_3 * X_1 * X_2$$

$$\text{logit}(\text{Detection Probability}) = p.0 + p_1 * X_1 + p_2 * X_2 + p_3 * X_1 * X_2$$