1.

$$P_{\boldsymbol{\theta}}(H_t|H_{t-1}, O_t) \propto P_{\boldsymbol{\theta}}(H_t|H_{t-1})P_{\boldsymbol{\theta}}(O_t|H_t) \tag{1}$$

with proportionality constant, $P_{\boldsymbol{\theta}}(O_t|H_{t-1})$. Throughout the text, we write $=$ instead of $\propto$ in the above equation. i changed it where appropriate.

2. upon computing the weights, we have

$$w_t^{(i)} \propto \frac{P_{\boldsymbol{\theta}}(F_t|[\text{Ca}^{2+}]_t)P_{\boldsymbol{\theta}}([\text{Ca}^{2+}]_t|[\text{Ca}^{2+}]_{t-1}, n_t)P_{\boldsymbol{\theta}}(n_t)w_{t-1}^{(i)}}{q(n_t)q([\text{Ca}^{2+}]_t)} \tag{2}$$

considering, A.11 in our text, and plugging in A.7 and A.8, we can simplify the above to:

$$w_t^{(i)} \propto \frac{w_{t-1}^{(i)}}{\mathcal{G}_L(n_t^{(i)}|F_t)} \tag{3}$$

this simplification doesn't follow exactly when we assume a nonlinear observation model, because we then approximate $P_{\boldsymbol{\theta}}(F_t|[\text{Ca}^{2+}]_t)$ for sampling (in the denominator), but compute it exactly for the numerator in (2) . nonetheless, when the approximation is good, then the above simplification is also approximately correct. this, obviously, is not a big deal, but also not something i noticed until just recently (actually, quentin pointed that out to me a while back, but i didn't pay any attention to it at the time). the interesting thing, for me though, is that the weights are then independent of the sampled $[\text{Ca}^{2+}]_t$. i can't tell if that means anything important, but i thought it was worth noting.

3. when having intermittent observations, we only check for weight degeneracy at observation times. i think this is actually a relic from when we thought that sampling from $P_{\boldsymbol{\theta}}(H_t|H_{t-1}, O_t)$ meant that the weights were all equal. in any case, we could compute $N_{eff}$ at every time step, even when observations are intermittent. when severely subsampling, this might be desirable.