

Migration, pop size  $M^{(k)}, G^{(k)}, N^{(k)}$

on  $t_{k-1} \leq t < t_k$   $\leftarrow$   $t_0 = 0$   
 let  $S_k = t_k - t_{k-1}$ .

1) if  $t < t_1$ , then  

$$r_{xy}(t) = \sum_z (e^{tG^{(1)}})_{xy,zz} \frac{1}{N_z^{(1)}}$$

2) if  $t_1 \leq t < t_2$ ,

$$r_{xy}(t) = \sum_{uv} P_{xy,uv}^{(1)} (e^{(t-t_1)G^{(2)}})_{uv,zz} \frac{1}{N_z^{(2)}}$$

$$P_{xy,uv}^{(1)} = (e^{S_1 G^{(1)}})_{xy,uv}$$

3) if  $t_{k-1} \leq t < t_k$

$$r_{xy}(t) = \sum_{uv} P_{xy,uv}^{(k)} (e^{(t-t_{k-1})G^{(k)}})_{uv,zz} \frac{1}{N_z^{(k)}}$$

$$P_{xy,uv}^{(k)} = (e^{S_k G^{(k)}} \dots e^{S_1 G^{(1)}})_{xy,uv}$$

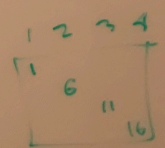
Let  $q_{xy}(t) = \sum_{uv} (P^{(k)} e^{(t-t_{k-1})G^{(k)}})_{xy,uv}$   
 $t_{k-1} \leq t < t_k$

$$r_{xy}(t) = \sum_z (P^{(k)} e^{(t-t_{k-1})G^{(k)}})_{xy,zz} \frac{1}{N_z^{(k)}}$$

For  $K_x$  samples in loc  $x, \dots$

the cal rate at time  $t$  is

$$r(t) = \frac{\sum_{x=1}^n \sum_{y=1}^n K_x (K_y - \delta_{xy}) r_{xy}(t)}{\sum_{x=1}^n \sum_{y=1}^n K_x (K_y - \delta_{xy}) q_{xy}(t)}$$



$$\delta_{xy} = \begin{cases} 1 & \text{if } x=y \\ 0 & \text{otherwise} \end{cases}$$

