Equations that may be useful:

$$g_{ij} = G_{ij} - \mu$$

$$a_i = \frac{t_{ii}}{p_i} g_{ii} + \sum_{j \neq i} \frac{\frac{1}{2} t_{ij}}{p_i} g_{ij} = \sum_j t(ij \mid i) g_{ij}$$

$$a_i = \sum_j p_j g_{ij}$$

$$\alpha_i = \frac{a_i}{1+f}$$

$$\sigma_g^2 = \sum_{ij} t_{ij} g_{ij}^2$$

$$h_B^2 = \sigma_g^2/\sigma_p^2$$

$$\sigma_a^2 = \sum_{ij} t_{ij} g_{aij}^2$$

$$h^2 = \sigma_a^2/\sigma_p^2$$

$$\sigma_d^2 = \sigma_g^2 - \sigma_a^2$$

$$\rho_{po} = \frac{\frac{1}{2}\sigma_a^2}{\sigma_p^2} = \tfrac{1}{2} h^2$$

$$b_{o\bar{p}} = \rho_{\bar{p}o} \sqrt{\frac{\sigma_o^2}{\frac{1}{2}\sigma_p^2}} = \sqrt{\tfrac{1}{2}}\, h^2 \sqrt{\frac{1}{\frac{1}{2}}} = h^2$$

$$\rho_{s1,s2} = \frac{\text{Cov(full sibs)}}{\sigma_P^2} = \frac{\frac{1}{2}\sigma_a^2 + \frac{1}{4}\sigma_d^2}{\sigma_P^2} = \tfrac{1}{2} h^2 + \tfrac{1}{4} \frac{\sigma_d^2}{\sigma_P^2}$$

$$R = Sh^2$$

$$\Delta p = \frac{p}{\bar{w}} a_A$$

$$\Delta \bar{w} = \frac{\sigma_a^2}{\bar{w}}$$

$$\bar{w}_{eq} = \mathrm{w}(x_{eq}) + \tfrac{1}{2} \mathrm{w}''(x_{eq}) \sigma_{eq}^2(x)$$

$$\Delta p = \frac{p}{\bar{w}} a_A + \Delta p(\text{other})$$

$$q_{eq} = \sqrt{\frac{\mu}{s}}$$

$$q_{eq} = \frac{\mu}{hs}$$

$$q_{eq} = \frac{\mu}{fs}$$

$$\Delta p_1 = \frac{p_1}{\bar{w}} a_A - m(p_1 - p_2)$$

$$\Pi = \frac{\sum_{i=1}^{j} \sum_{j=2}^{n} 2\pi_{ij}}{n(n-1)}$$

$$\Theta = \frac{S}{\sum_{k=1}^{n-1} \frac{1}{(n-k)}} = \frac{S}{\sum_{i=1}^{n-1} \frac{1}{i}}$$

$$D = \frac{\Pi - \Theta}{\sqrt{\mathrm{Var}(\Pi - \Theta)}}$$

$$\sum_i c_i \left(\frac{1}{w_i} - 1 \right) > 0 \iff \sum_i \frac{c_i}{w_i} > 1 \iff \frac{1}{\sum_i \frac{c_i}{w_i}} < 1$$

$$\sum_i c_i \left(\frac{1}{v_i} - 1 \right) > 0 \iff \sum_i \frac{c_i}{v_i} > 1 \iff \frac{1}{\sum_i \frac{c_i}{v_i}} < 1$$

$$\bar{v} = \sum_i z_i v_i < 1 \text{ and } \bar{w} = \sum_i z_i w_i < 1$$

There exists at least one niche such that $w_i < 1 - m$

OR $\dfrac{1}{\sum_i c_i / [1 - (1 - w_i)/m]} < 1$

There exists at least one niche such that $\omega_{\mathrm{i}} \leq 1 - m$

where $\omega_{\mathrm{i}} = (1-m) w_i + m \sum_i z_i w_i$ OR

$$\frac{1}{\sum_i z_i / [1 - (1 - \omega_i)/m]} < 1$$

$$\ell_c = \frac{\ell}{\sqrt{s}} = \frac{\ell}{\sqrt{b\Delta}} = d\sqrt{\frac{m}{b\Delta}}$$

$$v_1 > v_2 v_1^2 \Rightarrow v_1 v_2 < 1$$

$$w_1 > w_2 w_1^2 \Rightarrow w_1 w_2 < 1$$

$$\Pr(A \text{ survives}) = \frac{2s}{1 + s + \sigma_s^2}$$

$$R_0 = \sum_{x=0}^{\max age} \ell_x m_x b_x$$

$$1 = \sum_{x=0}^{\max age} e^{-rx} \ell_x m_x b_x$$

$$r = \frac{1 - \frac{1}{R_0}}{\bar{T}} \text{ where } \bar{T} = \frac{\sum_{x=0}^{\max age} x \ell_x m_x b_x}{\sum_{x=0}^{\max age} \ell_x m_x b_x}$$