A) Constant Size - Human DFE Real $P_{\psi}(s_j)$ Inferred $P_{\psi}(s_j)$ with fitdadi. Full SFS with between 300–500 1% frequency variants $\psi(\mathbf{s}_j)$ with fitdadi. Full SFS with 300–500 SNPs after taking the segregating sites with variants at all freque Inferred $P_{\psi}(s_j)$ with our method using data from 300 1% frequency variants $P_{\psi}(s_j \mid f, D)$ with our method using data from 300 1% frequency variants 0.01 Probability 1e-04 1e-06 1e-08 45–50 55–60 **s**_j (4Ns intervals) 75-80 85-90 B) Constant Size - Mouse DFE 0.01 1e-04 Probability 1e-06 1e-08 40–45 50–55 60–65 **s**_j (4Ns intervals) 80-85 90-95 20-25 30-35 70-75 C) Population expansion – Human DFE 0.01 1e-04 Probability 1e-06 1e-08 5 50–55 60–65 **s**_j (4Ns intervals) 20-25 30-35 40-45 70-75 80-85 90-95 D) Population expansion - Mouse DFE 0.01 1e-04 Probability 1e-06 1e-08 5 50–55 60–65 **s**_j (4Ns intervals) 20-25 30-35 40-45 70-75 80-85 90-95 10-15 >100