



**Figure S4** Binding sites with lengths that start above (light gray line) or below (dark gray line) the stable region (dashed black lines) both evolve towards values inside the stable region. Due to selection being stronger on binding site length below the stable region than above it, as shown in Fig. S3, binding sites that are too short increase in length much more quickly than binding sites that are too long decrease in length. Time series show evolution of  $n$  with fixed information content per site  $r = 1.6$  and a rate of mutations to binding site length of  $u_n = 10^{-8}$ . All other parameters are the default values given in Table 1. Populations are started from equilibrium with binding site lengths of  $n = 1$  (dark gray line) and  $n = 20$  (light gray line)