Figure S1. Distributions of fluorescence decay rates, $P(k)$, for Dns50cyt obtained with no inclusion of entropy $S$ parameter (LSQNONNEG analysis; blue) and with simultaneous minimization of $\chi^2$ and maximization of $S$ (ME analysis; red).
**Figure S2.** Distributions of $D$-$A$ distances, $P(r)$, for five Dns-labeled variants at pH 2.0, 18 °C and different concentrations of Na$_2$SO$_4$ from LSQNONNEG analyses of the FET kinetics. The analyses yielded lower limits for the distribution widths consistent with our data.
Figure S3. Distributions of $D\mathbf{-A}$ distances, $P(r)$, for Dns4cyt, Dns39cyt, and Dns99cyt at pH 2.0, 18 °C and different concentrations of Na$_2$SO$_4$ from maximum-entropy analyses of the FET kinetics. The analyses yielded upper limits for the distribution widths consistent with our data.
Figure S4. Experimental potential energy functions $U(r)$ (maximum-entropy analyses) for the molten globule at pH 2.0 and 1.0 M Na$_2$SO$_4$ (blue) and for the native state at pH 7.0 (red).
Figure S5. Distributions of $D$-$A$ distances, $P(r)$, (maximum-entropy analyses) in Dns4cyt, Dns39cyt, and Dns99cyt for the native state at pH 7.0 ($N$); the molten globule, at pH 2.0 and 1.0 M Na$_2$SO$_4$ ($MG$); the transient species formed 1 ms after stopped-flow triggered refolding (0.2 M GuHCl, 0.15 M imidazole, pH 7.0) ($I^*$); and the unfolded state at 2 M GuHCl, 0.15 M imidazole, pH 7.0 ($U$). The coarser spacing of the distance vector $\{r\}$ in the latter distributions arises from lower S/N levels of the FET kinetics in single-shot compared to equilibrium measurements.