Supplementary Table 1: Hyperparameters used in the DRM.

Parameter	Prior.Distribution
$\beta_{obs,1}$	Normal $\sim (0.001, 0.1)$
$\beta_{obs,0}$	Normal $\sim (-100, 4)$
z	Normal $\sim (0, 1)$
σ_{proc}	Normal $\sim (0.2, 0.1)$
σ_{obs}	Normal $\sim (0.21, 0.2)$
$width$	Normal $\sim (4, 2)$
T_{opt}	Normal $\sim (18, 2)$
d	Normal $\sim (0.01, 0.1)$
β_{tax}	Normal $\sim (0, 2)$
α	Beta $\sim (12, 20)$
μ_r	Lognormal $\sim (7, 5)$
m_e	Exponential ~ 2.3

Supplementary Table 2: Linear regressions of sea bottom temperature (measured in the trawl surveys) on year within each patch during the model training interval (1972-2006). Values are rounded to three digits.

Patch	Estimate	Standard Error	P-value
35	0.002	0.040	0.956
36	0.045	0.023	0.049
37	0.056	0.022	0.012
38	0.030	0.017	0.089
39	0.047	0.013	0.000
40	0.019	0.006	0.001
41	0.027	0.008	0.001
42	-0.003	0.004	0.493
43	0.003	0.005	0.479
44	0.006	0.010	0.546

Supplementary Table 3: Linear regressions of sea bottom temperature (measured in the trawl surveys) on year within each patch during the model testing interval (2007-2016). Values are rounded to three digits.

| Patch	Estimate	Standard Error	P-value
35	0.159	0.235	0.500
36	0.226	0.176	0.202
37	0.161	0.153	0.295
38	-0.042	0.111	0.708
39	0.089	0.090	0.321
40	0.360	0.044	0.000
41	0.158	0.059	0.007
42	0.168	0.029	0.000
43	0.174	0.035	0.000
44	0.253	0.045	0.000
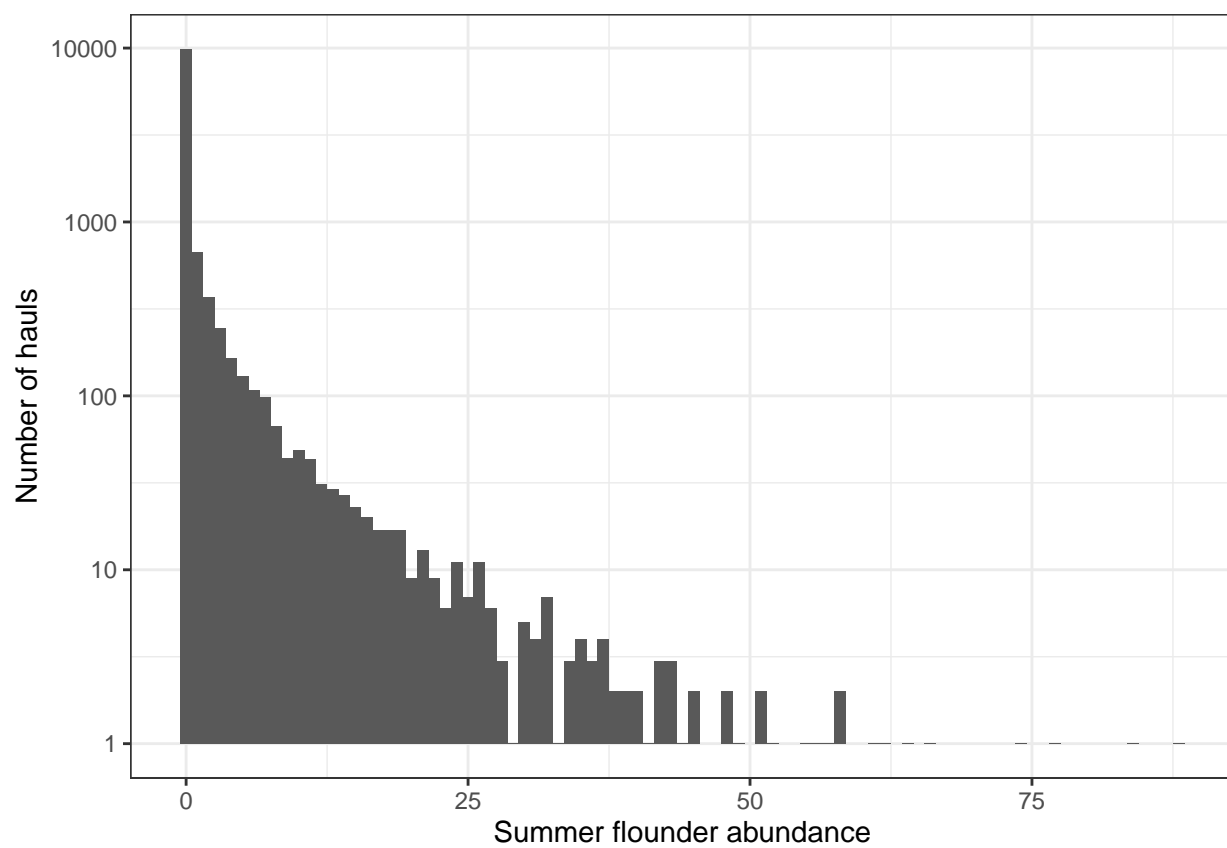
Supplementary Figure 1: Frequency distribution of summer flounder abundance in all hauls used in the analysis (testing and training data combined; $n = 12{,}203$).
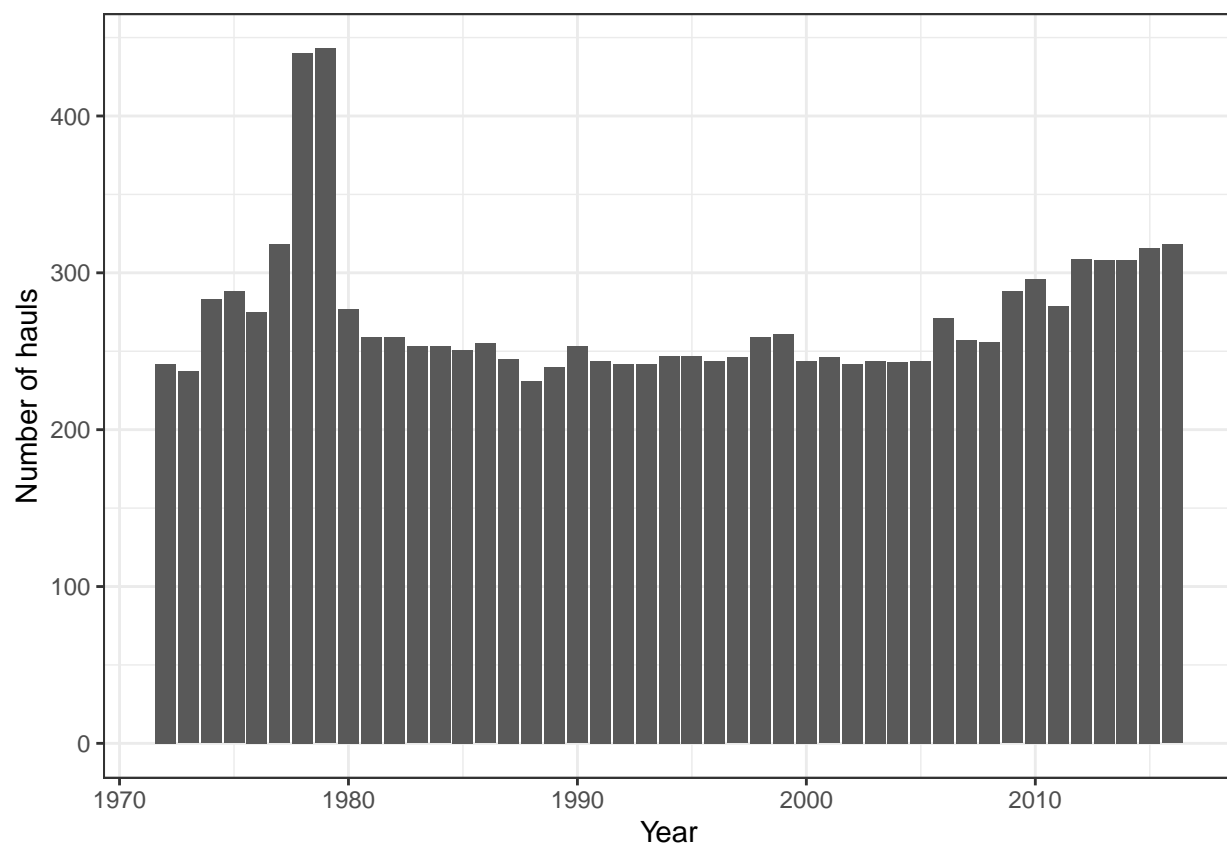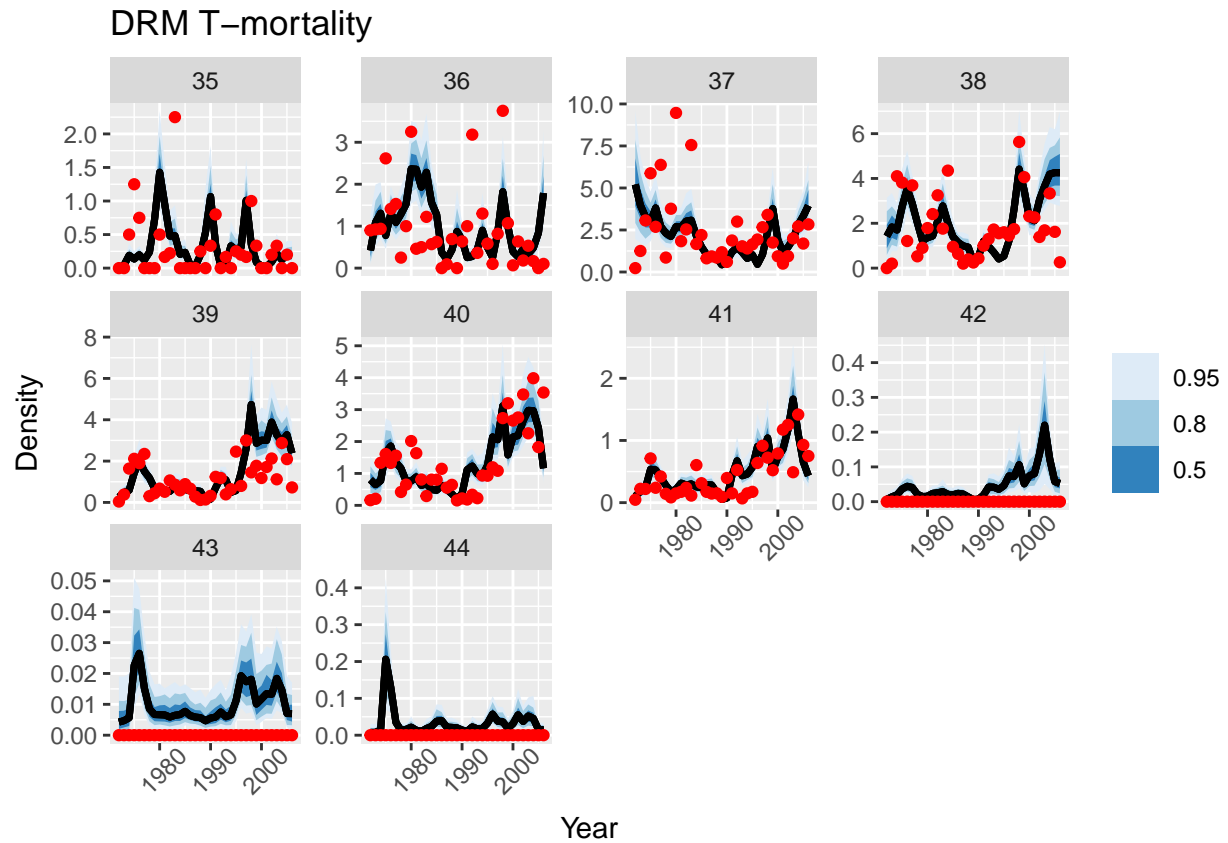
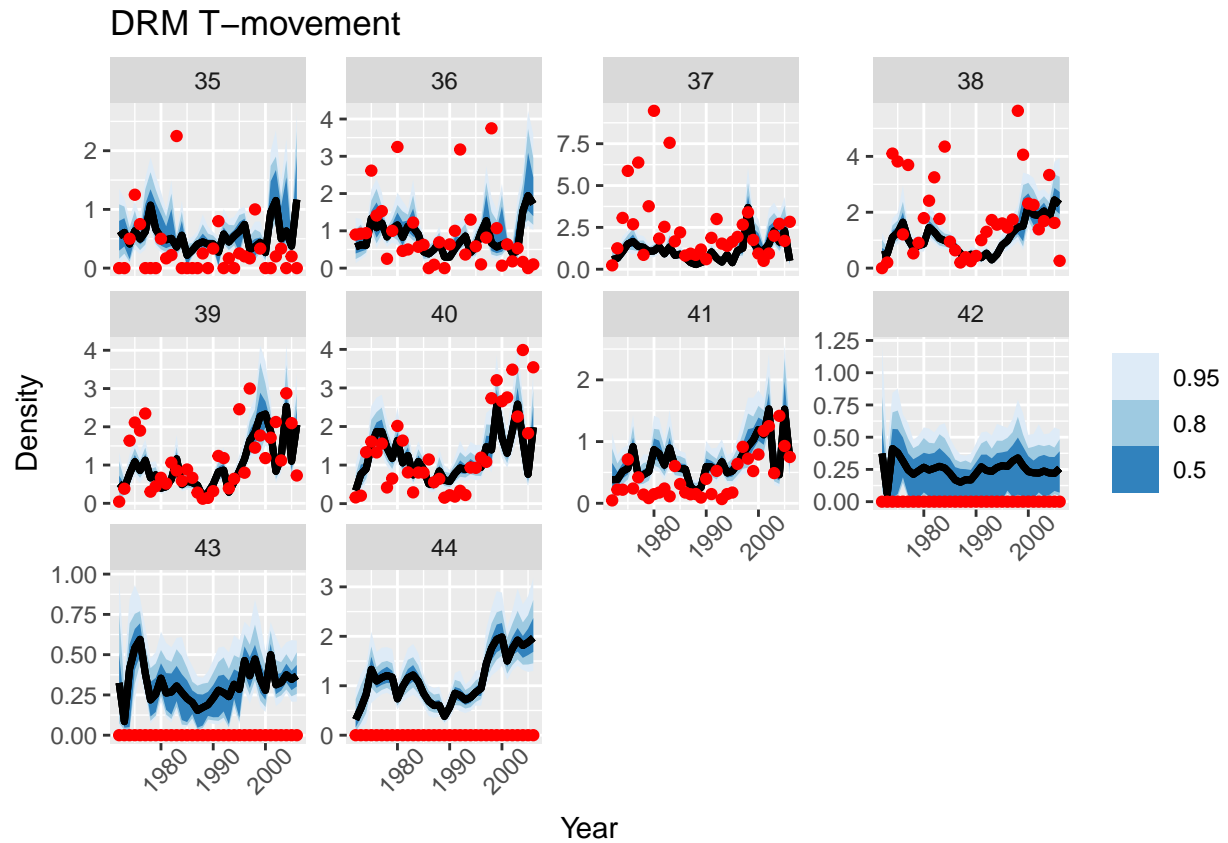Supplementary Figure 2: Number of hauls per year; $n = 12{,}203$.
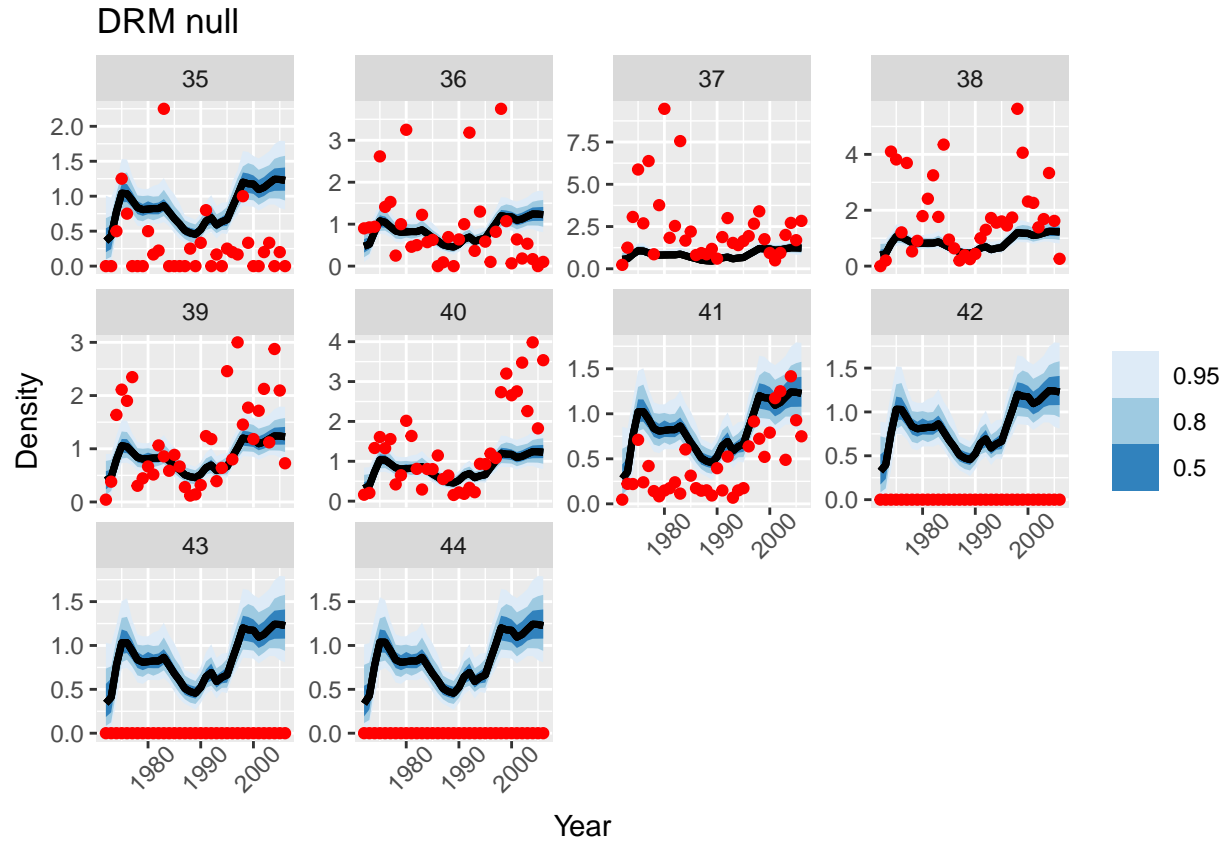
Supplementary Figure 3: Median density estimated by the null DRM in the training dataset by patch and year (black line). Blue shading represents the 50%, 80%, and 95% credible intervals. Red points are the observed data. Note that y-axes vary by patch.
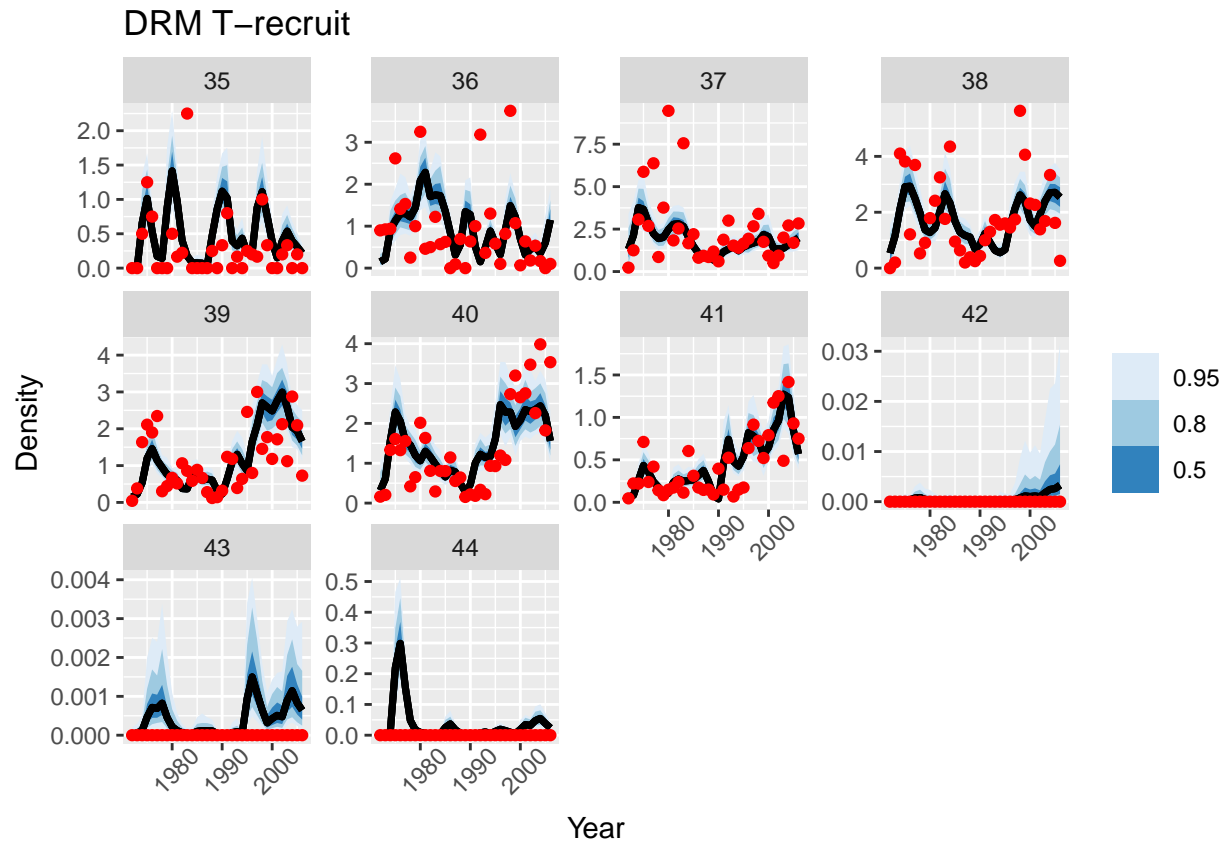
Supplementary Figure 4: Median density estimated by the temperature-dependent recruitment DRM in the training dataset by patch and year (black line). Blue shading represents the 50%, 80%, and 95% credible intervals. Red points are the observed data. Note that y-axes vary by patch.

Supplementary Figure 5: Median density estimated by the temperature-dependent mortality DRM in the training dataset by patch and year (black line). Blue shading represents the 50%, 80%, and 95% credible intervals. Red points are the observed data. Note that y-axes vary by patch.

Supplementary Figure 6: Median density estimated by the temperature-dependent movement DRM in the training dataset by patch and year (black line). Blue shading represents the 50%, 80%, and 95% credible intervals. Red points are the observed data. Note that y-axes vary by patch.
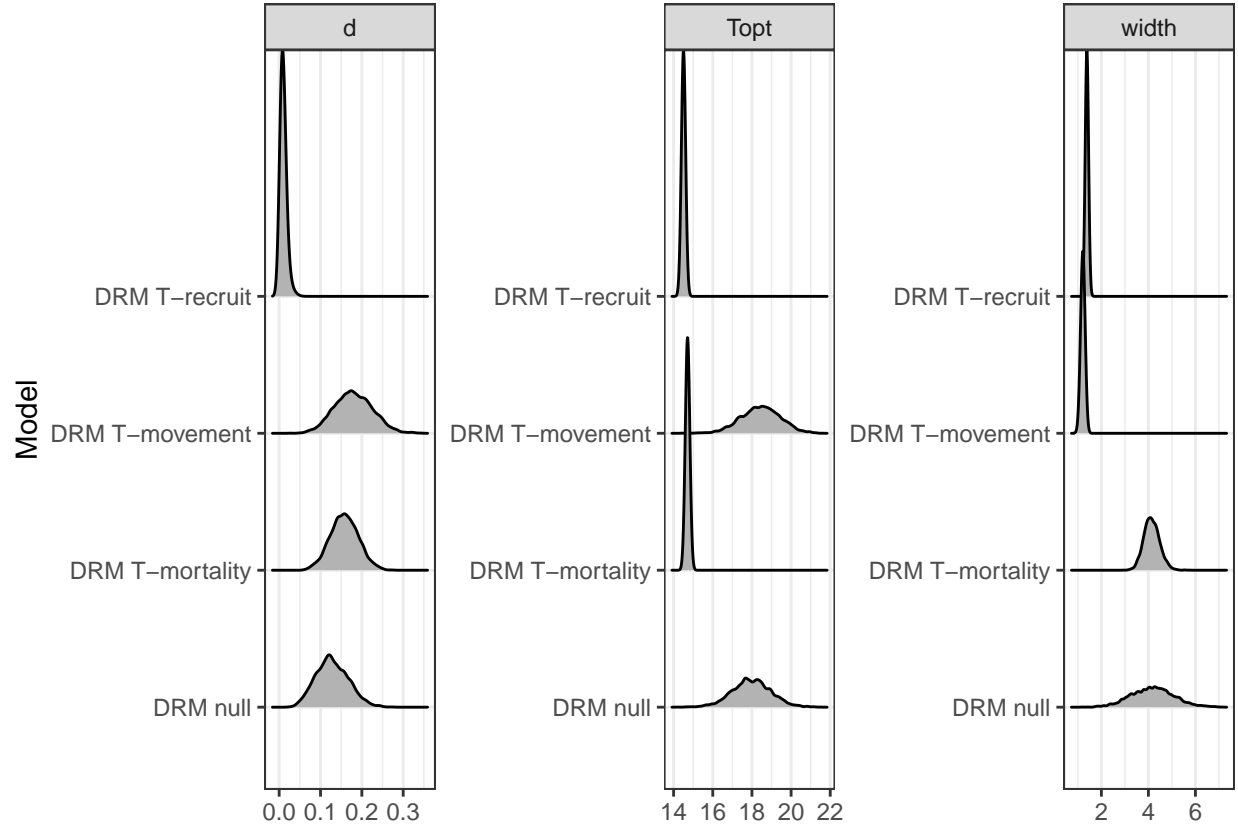
Supplementary Figure 7: Posterior distributions of three important parameters from the four fitted DRMs. These parameters are *d*, the annual dispersal rate between adjacent patches; *Topt*, the optimal temperature estimated for whichever process (movement or recruitment or mortality) was estimated as temperature-dependent; and *width*, a parameter controlling how sensitive the modeled process was to temperature.