

DIGITAL SUPPLEMENT E[†]

Model fit and model selection information.

Table E1. Model fit and selection statistics for non-zero count data in (a) Spring, (b) Summer, (c) Fall, (d) Winter. Maximum likelihood estimates of the best-fitting parameters for each of the top three candidate distributions are shown for each species. Model selection statistics (AICc and log-likelihood values) are also given. For each species, the top three models are shown ranked from lowest to highest AICc. The top-ranked model (lowest AIC) was used for subsequent analyses (see Tables 4 and 5 in main document). Species appear in the same order within each season as in Table 4 of the main document. [Pages 2-10]

Figures E1-E74. Model fit plots. Maximum likelihood model fits (lines) and observed probabilities (black dots) for non-zero count data for all modeled species. Fits are shown for the top four models, ranked in the legend from lowest to highest AICc. Plots are presented grouped by season, with species appearing in the same order within each season as in Table 4 of the main document: [Pages 11-88]

Figures E1-E19. Spring [Pages 12-30]

Figures E20-E37. Summer [Pages 32-49]

Figures E38-E59. Fall [Pages 51-72]

Figures E60-E74. Winter [Pages 74-88]

[†]A digital file supporting OCS Study BOEM 2012-101 / NOAA Technical Memorandum NOS NCCOS 158

Citation for main document:

Kinlan, B.P., E.F. Zipkin, A.F. O'Connell, and C. Caldow. 2012. Statistical analyses to support guidelines for marine avian sampling: final report. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Herndon, VA. OCS Study BOEM 2012-101. NOAA Technical Memorandum NOS NCCOS 158. xiv+77 pp.

Table E1a. Model fit and selection statistics for non-zero count data in **Spring**. Maximum likelihood estimates of the best-fitting parameters for each of the top three candidate distributions are shown for each species. Model selection statistics (AICc and log-likelihood values) are also given. For each species, the top three models are shown ranked from lowest to highest AICc. The top-ranked model (lowest AIC) was used for subsequent analyses (see Table 4a in main document).

Species	Model	Rank	AICc	Parameter estimate(s)	
				Parameter 1	Parameter 2, if applicable
herg	Discretized lognormal	1	20473.0	0.138	1.857
	Zeta decay	2	20644.9	1.422	0.006
	Yule	3	20699.0	0.711	
noga	Discretized lognormal	1	13042.5	-0.367	1.870
	Yule	2	13114.1	0.835	
	Zeta decay	3	13116.6	1.526	0.008
gbbg	Yule	1	10908.7	0.892	
	Discretized lognormal	2	10912.5	-1.453	2.217
	Zeta decay	3	10951.7	1.667	0.002
nofu	Discretized lognormal	1	8987.8	-0.387	2.095
	Yule	2	9047.6	0.722	
	Zeta decay	3	9050.3	1.497	0.003
wisp	Discretized lognormal	1	7004.0	0.009	1.683
	Yule	2	7067.6	0.836	
	Zeta decay	3	7090.8	1.539	0.006
colo	Discretized lognormal	1	3151.4	0.027	1.104
	Zeta decay	2	3161.3	1.254	0.157
	Logarithmic	3	3166.0	0.803	
ltdu	Discretized lognormal	1	6568.3	2.328	1.639
	Zeta decay	2	6848.9	1.112	0.001
	Logarithmic	3	6869.6	0.998	
sosh	Discretized lognormal	1	2974.3	-3.227	2.683
	Yule	2	2974.5	0.937	
	Zeta decay	3	2976.8	1.705	0.002
susc	Discretized lognormal	1	5152.7	2.099	1.519
	Negative binomial	2	5158.6	14.639	0.236
	Zeta decay	3	5160.3	0.739	0.016
blki	Discretized lognormal	1	2201.0	-0.779	1.716

	Zeta decay	2	2202.0	1.579	0.029
	Yule	3	2208.2	1.086	
coei	Discretized lognormal	1	4984.9	1.924	2.461
	Zeta decay	2	5031.7	1.149	0.000
	Logarithmic	3	5066.2	0.999	
grsh	Discretized lognormal	1	2665.4	0.552	1.554
	Zeta decay	2	2688.5	1.267	0.020
	Logarithmic	3	2706.5	0.962	
wwsc	Discretized lognormal	1	2645.7	0.762	1.589
	Zeta decay	2	2663.0	1.186	0.019
	Logarithmic	3	2671.2	0.970	
razo	Negative binomial	1	2506.8	3.586	0.324
	Zeta decay	2	2507.1	0.621	0.089
	Discretized lognormal	3	2511.6	1.171	1.178
lagu	Discretized lognormal	1	1100.6	-0.460	1.199
	Zeta decay	2	1103.5	1.626	0.119
	Yule	3	1104.0	1.687	
cote	Discretized lognormal	1	1610.8	0.307	1.392
	Zeta decay	2	1621.6	1.295	0.043
	Logarithmic	3	1629.8	0.925	
reph	Discretized lognormal	1	3629.3	2.580	2.324
	Zeta decay	2	3681.9	1.092	0.000
	Yule	3	3755.1	0.307	
rtlo	Zeta decay	1	926.5	1.695	0.078
	Discretized lognormal	2	927.2	-0.846	1.419
	Yule	3	927.3	1.548	
blsc	Discretized lognormal	1	1541.1	1.141	1.619
	Logarithmic	2	1542.3	0.979	
	Zeta decay	3	1544.2	1.030	0.020

Table E1b. Model fit and selection statistics for non-zero count data in **Summer**. Maximum likelihood estimates of the best-fitting parameters for each of the top three candidate distributions are shown for each species. Model selection statistics (AICc and log-likelihood values) are also given. For each species, the top three models are shown ranked from lowest to highest AICc. The top-ranked model (lowest AIC) was used for subsequent analyses (see Table 4b in main document).

Species	Model	Rank	AICc	Parameter estimate(s)	
				Parameter 1	Parameter 2, if applicable
wisp	Discretized lognormal	1	31045.0	0.304	1.875
	Zeta decay	2	31332.9	1.392	0.005
	Yule	3	31436.8	0.667	
grsh	Discretized lognormal	1	22485.0	0.292	1.929
	Yule	2	22760.5	0.650	
	Zeta decay	3	22859.8	1.488	0.001
gbbg	Discretized lognormal	1	8336.0	-0.150	1.368
	Yule	2	8401.2	1.164	
	Zeta decay	3	8451.4	1.670	0.021
herg	Yule	1	6930.4	1.217	
	Discretized lognormal	2	6934.8	-0.938	1.670
	Zeta decay	3	6977.0	1.816	0.008
cosh	Discretized lognormal	1	6353.0	-0.921	1.848
	Yule	2	6362.0	1.021	
	Zeta decay	3	6383.3	1.683	0.008
sosh	Yule	1	4852.5	0.958	
	Zeta	2	4857.8	0.783	
	Zeta decay	3	4859.6	1.781	0.000
lesp	Discretized lognormal	1	3283.8	-0.648	1.642
	Yule	2	3289.8	1.114	
	Zeta decay	3	3308.3	1.720	0.011
cote	Discretized lognormal	1	3021.2	-0.626	1.784
	Yule	2	3029.3	0.974	
	Zeta decay	3	3035.5	1.607	0.012
noga	Yule	1	1653.3	1.879	
	Zeta decay	2	1653.9	1.997	0.055
	Discretized lognormal	3	1654.6	-1.702	1.565
lagu	Discretized lognormal	1	2075.7	-0.074	1.334

	Zeta decay	2	2087.4	1.447	0.060
	Yule	3	2097.3	1.151	
nofu	Discretized lognormal	1	2047.6	-0.848	1.852
	Yule	2	2047.8	0.996	
	Zeta decay	3	2060.3	1.693	0.005
ltdu	Discretized lognormal	1	3559.4	1.771	1.545
	Negative binomial	2	3580.9	7.265	0.112
	Zeta decay	3	3582.4	0.879	0.015
susc	Negative binomial	1	3128.7	8.166	0.187
	Zeta decay	2	3128.9	0.785	0.023
	Discretized lognormal	3	3139.9	1.710	1.530
coei	Discretized lognormal	1	3101.1	1.642	2.525
	Zeta decay	2	3102.4	1.115	0.001
	Logarithmic	3	3111.5	0.998	
colo	Geometric	1	734.4	0.621	
	Discretized lognormal	2	735.3	0.103	0.686
	Zeta decay	3	736.1	0.219	0.871
aush	Yule	1	987.3	1.442	
	Discretized lognormal	2	990.8	-1.330	1.653
	Zeta decay	3	992.8	1.887	0.020
wwsc	Logarithmic	1	1551.5	0.964	
	Zeta decay	2	1551.8	1.109	0.029
	Discretized lognormal	3	1552.0	0.717	1.584
razo	Discretized lognormal	1	1398.6	1.023	1.326
	Logarithmic	2	1404.2	0.959	
	Negative binomial	3	1405.4	1.688	0.088

Table E1c. Model fit and selection statistics for non-zero count data in **Fall**. Maximum likelihood estimates of the best-fitting parameters for each of the top three candidate distributions are shown for each species. Model selection statistics (AICc and log-likelihood values) are also given. For each species, the top three models are shown ranked from lowest to highest AICc. The top-ranked model (lowest AIC) was used for subsequent analyses (see Table 4c in main document).

Species	Model	Rank	AICc	Parameter estimate(s)	
				Parameter 1	Parameter 2, if applicable
herg	Discretized lognormal	1	25829.0	0.298	1.655
	Zeta decay	2	26099.0	1.403	0.011
	Yule	3	26194.8	0.762	
grsh	Discretized lognormal	1	26166.9	1.168	1.623
	Zeta decay	2	26509.0	1.145	0.011
	Logarithmic	3	26584.9	0.984	
gbbg	Discretized lognormal	1	17027.0	-0.315	1.819
	Yule	2	17124.4	0.851	
	Zeta decay	3	17144.0	1.541	0.007
noga	Discretized lognormal	1	10575.7	-0.143	1.481
	Zeta decay	2	10648.1	1.515	0.030
	Yule	3	10667.2	1.041	
blki	Discretized lognormal	1	7584.7	0.036	1.583
	Zeta decay	2	7654.8	1.481	0.016
	Yule	3	7663.0	0.888	
cosh	Discretized lognormal	1	5178.4	-0.449	1.727
	Zeta decay	2	5203.1	1.560	0.015
	Yule	3	5203.6	0.956	
nofu	Discretized lognormal	1	4855.0	-0.347	1.657
	Yule	2	4885.8	0.974	
	Zeta decay	3	4905.2	1.631	0.009
wisp	Yule	1	3312.4	1.034	
	Discretized lognormal	2	3316.1	-1.051	1.888
	Zeta decay	3	3330.9	1.719	0.005
colo	Discretized lognormal	1	2130.0	-0.081	1.018
	Zeta decay	2	2133.5	1.249	0.232
	Logarithmic	3	2134.7	0.736	
ltdu	Discretized lognormal	1	5898.6	2.021	1.556

	Negative binomial	2	5904.9	12.954	0.195
	Zeta decay	3	5907.7	0.785	0.015
lagu	Discretized lognormal	1	2814.7	0.097	1.375
	Zeta decay	2	2825.6	1.340	0.056
	Logarithmic	3	2843.7	0.900	
susc	Negative binomial	1	5942.7	23.612	0.263
	Zeta decay	2	5943.8	0.713	0.011
	Discretized lognormal	3	5961.7	2.412	1.620
coei	Zeta decay	1	5037.9	1.075	0.001
	Discretized lognormal	2	5042.3	1.838	2.471
	Logarithmic	3	5043.0	0.998	
wwsc	Discretized lognormal	1	3502.5	1.240	1.647
	Logarithmic	2	3513.8	0.983	
	Zeta decay	3	3515.2	1.037	0.016
poja	Logarithmic	1	878.8	0.467	
	Zeta decay	2	880.8	0.983	0.770
	Discretized lognormal	3	883.1	-0.280	0.758
cote	Discretized lognormal	1	2250.0	-0.044	1.898
	Zeta decay	2	2251.5	1.368	0.012
	Yule	3	2267.8	0.736	
razo	Discretized lognormal	1	1931.5	1.322	1.216
	Negative binomial	2	1946.8	4.062	0.232
	Zeta decay	3	1948.2	0.737	0.057
blsc	Discretized lognormal	1	2108.4	1.278	1.679
	Logarithmic	2	2120.1	0.985	
	Zeta decay	3	2120.9	1.065	0.012
rtlo	Zeta decay	1	978.5	1.692	0.033
	Discretized lognormal	2	981.7	-2.144	2.039
	Yule	3	983.0	1.238	
dove	Discretized lognormal	1	1412.0	1.142	1.532
	Logarithmic	2	1416.5	0.976	
	Zeta decay	3	1418.5	1.018	0.023
lesp	Discretized lognormal	1	655.4	-0.644	1.334

	Yule	2	655.4	1.560	
	Zeta decay	3	656.2	1.671	0.084
aush	Yule	1	747.7	1.193	
	Discretized lognormal	2	747.9	-0.855	1.653
	Zeta decay	3	751.9	1.732	0.018

Table E1d. Model fit and selection statistics for non-zero count data in **Winter**. Maximum likelihood estimates of the best-fitting parameters for each of the top three candidate distributions are shown for each species. Model selection statistics (AICc and log-likelihood values) are also given. For each species, the top three models are shown ranked from lowest to highest AICc. The top-ranked model (lowest AIC) was used for subsequent analyses (see Table 4d in main document).

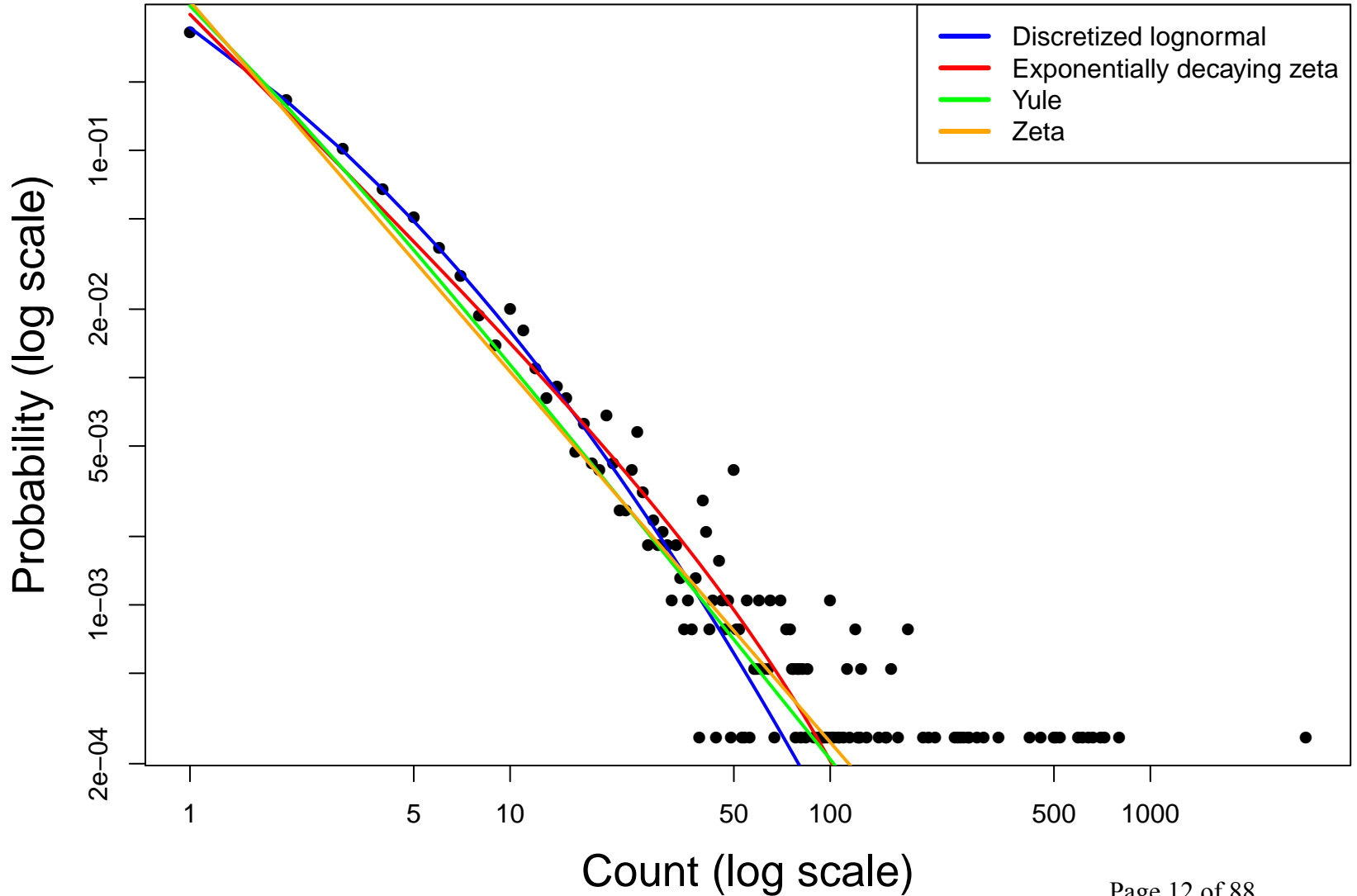
Species	Model	Rank	AICc	Parameter estimate(s)	
				Parameter 1	Parameter 2, if applicable
herg	Discretized lognormal	1	13107.2	-0.455	1.874
	Yule	2	13166.1	0.857	
	Zeta decay	3	13206.0	1.582	0.005
blki	Discretized lognormal	1	14747.3	0.595	1.591
	Zeta decay	2	14964.2	1.346	0.010
	Yule	3	15045.1	0.705	
gbbg	Yule	1	11283.1	0.866	
	Discretized lognormal	2	11303.4	-1.815	2.386
	Zeta decay	3	11330.8	1.665	0.001
noga	Discretized lognormal	1	8098.9	-0.738	1.844
	Yule	2	8113.8	0.966	
	Zeta decay	3	8163.5	1.691	0.003
nofu	Discretized lognormal	1	7452.8	0.659	1.742
	Zeta decay	2	7546.9	1.322	0.007
	Yule	3	7596.3	0.635	
ltdu	Discretized lognormal	1	11186.1	2.559	1.492
	Negative binomial	2	11485.2	26.140	0.155
	Zeta decay	3	11495.9	0.842	0.006
susc	Discretized lognormal	1	9014.7	2.647	1.497
	Negative binomial	2	9078.6	30.537	0.309
	Zeta decay	3	9084.8	0.669	0.010
coei	Discretized lognormal	1	8136.6	1.847	2.648
	Zeta decay	2	8182.3	1.143	0.000
	Yule	3	8315.5	0.336	NA
razo	Discretized lognormal	1	5013.1	1.310	1.254
	Negative binomial	2	5023.7	4.188	0.244
	Zeta decay	3	5025.4	0.716	0.058
wwsc	Discretized lognormal	1	5489.1	1.334	1.626

	Zeta decay	2	5545.7	1.070	0.012
	Logarithmic	3	5547.4	0.986	
colo	Discretized lognormal	1	2261.8	-0.024	0.990
	Zeta decay	2	2278.3	1.315	0.206
	Logarithmic	3	2282.0	0.742	
dove	Discretized lognormal	1	2067.4	0.207	1.627
	Zeta decay	2	2076.7	1.346	0.021
	Yule	3	2093.1	0.802	
blsc	Zeta decay	1	2579.0	1.145	0.011
	Logarithmic	2	2584.3	0.983	
	Negative binomial	3	2587.7	0.602	0.010
bogu	Yule	1	1627.6	0.854	
	Discretized lognormal	2	1627.8	-2.297	2.547
	Zeta decay	3	1628.1	1.614	0.004
rtlo	Yule	1	855.1	1.928	
	Zeta decay	2	855.6	1.854	0.101
	Discretized lognormal	3	856.1	-1.109	1.360

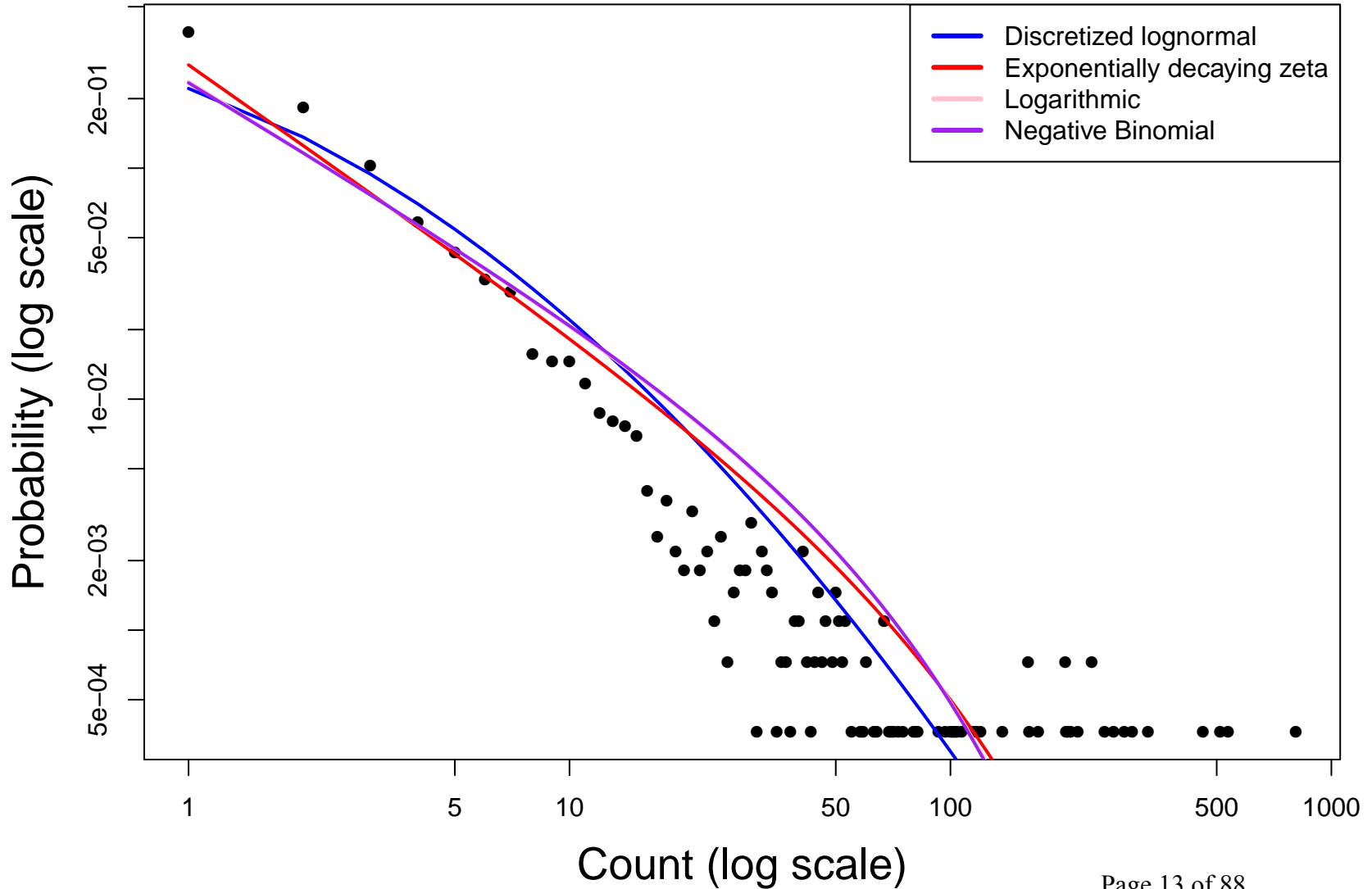
Figures E1 to E74. Model fit plots. Maximum likelihood model fits (lines) and observed probabilities (black dots) for non-zero count data for all modeled species. Fits are shown for the top four models, ranked in the legend from lowest to highest AICc.

Figures E1 to E19. Model fit plots for SPRING season:

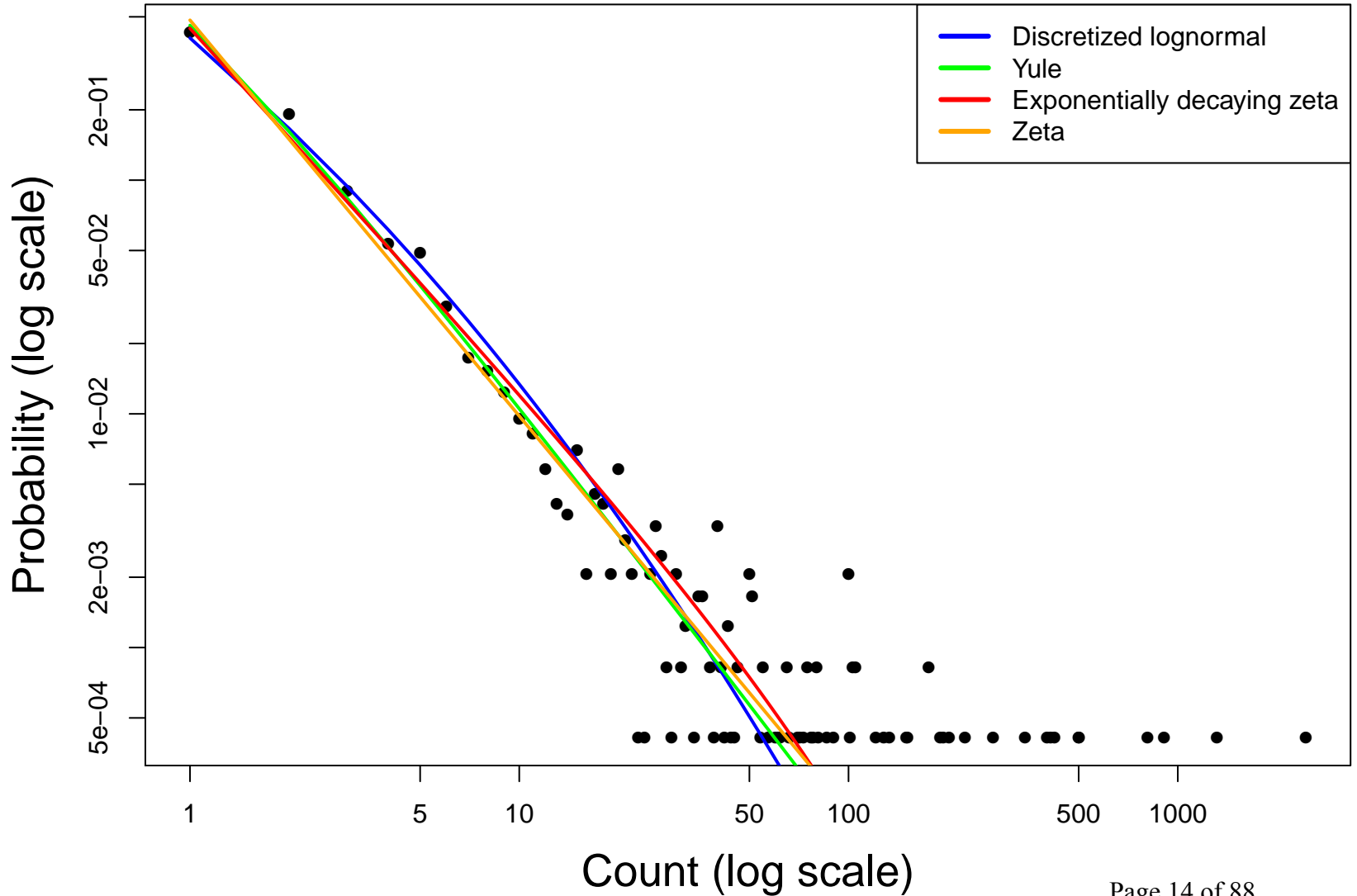
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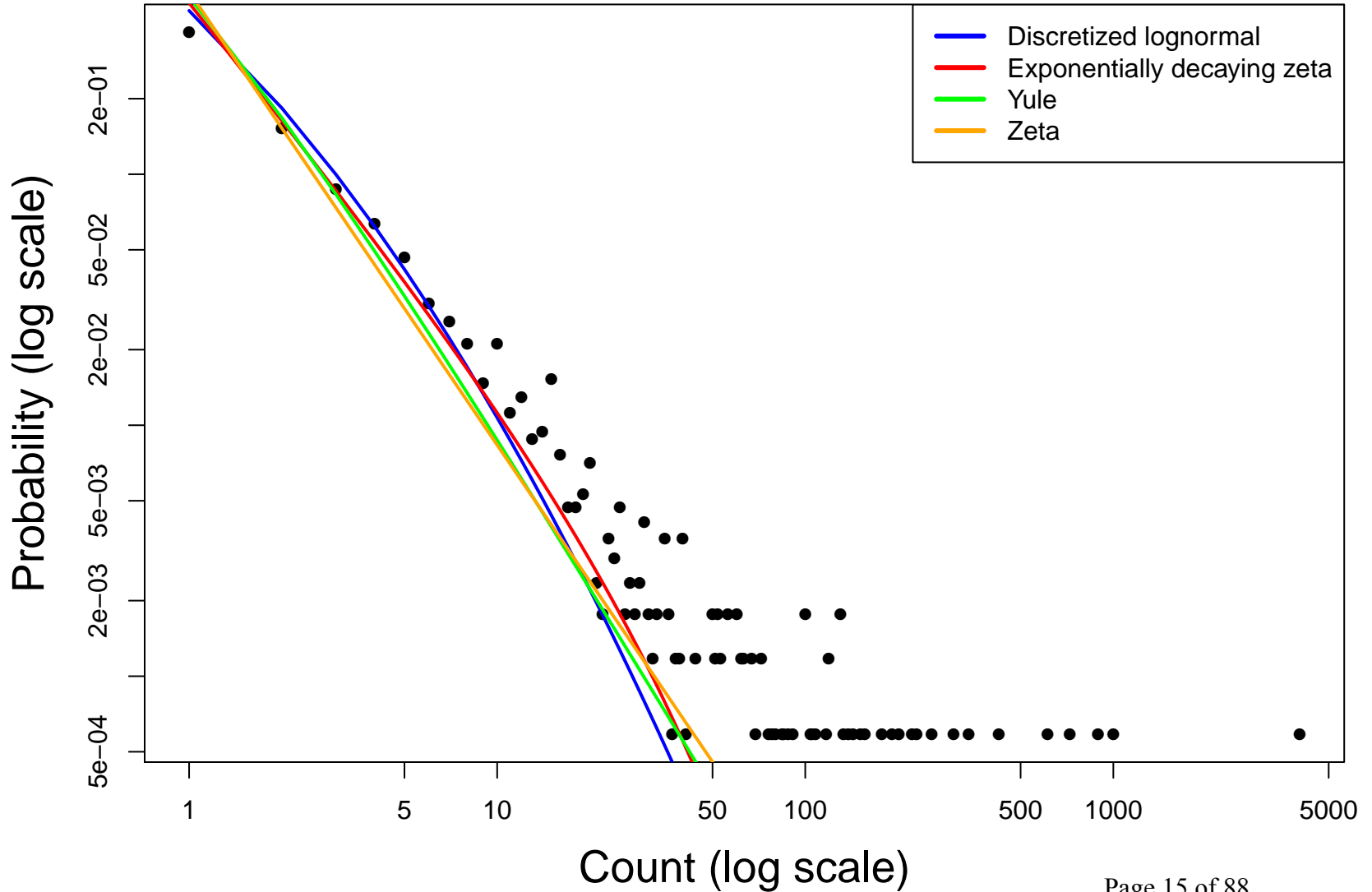
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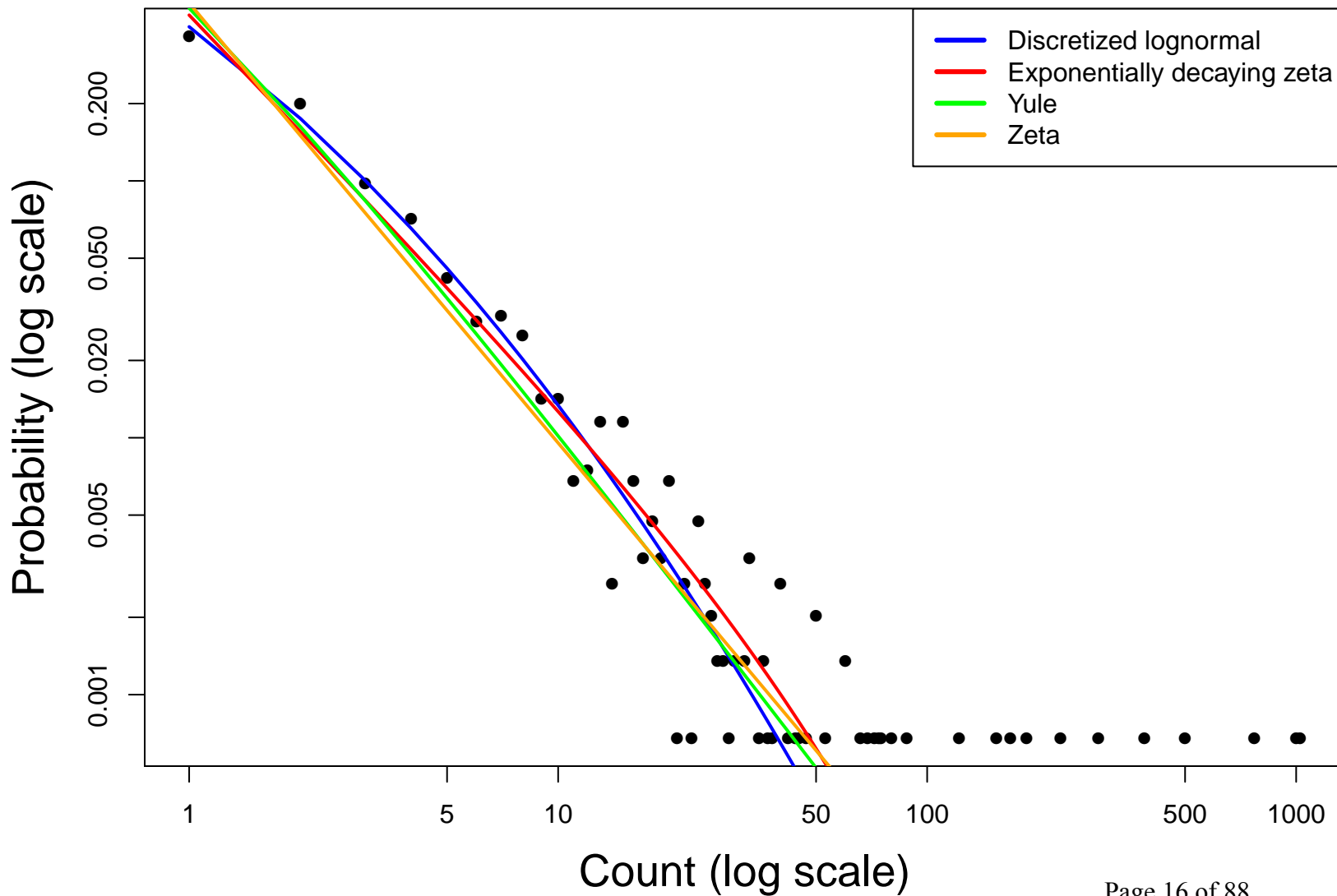
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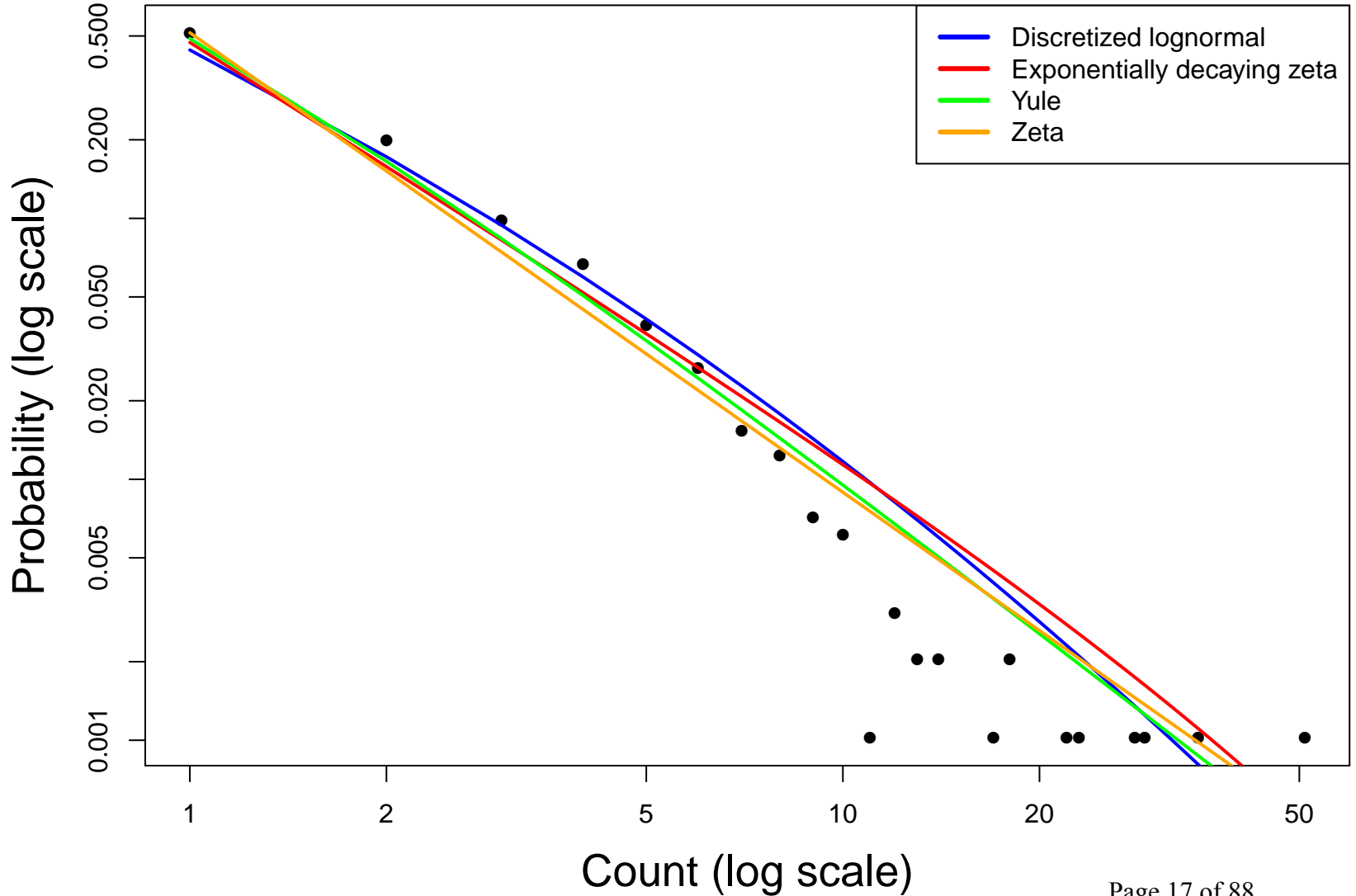
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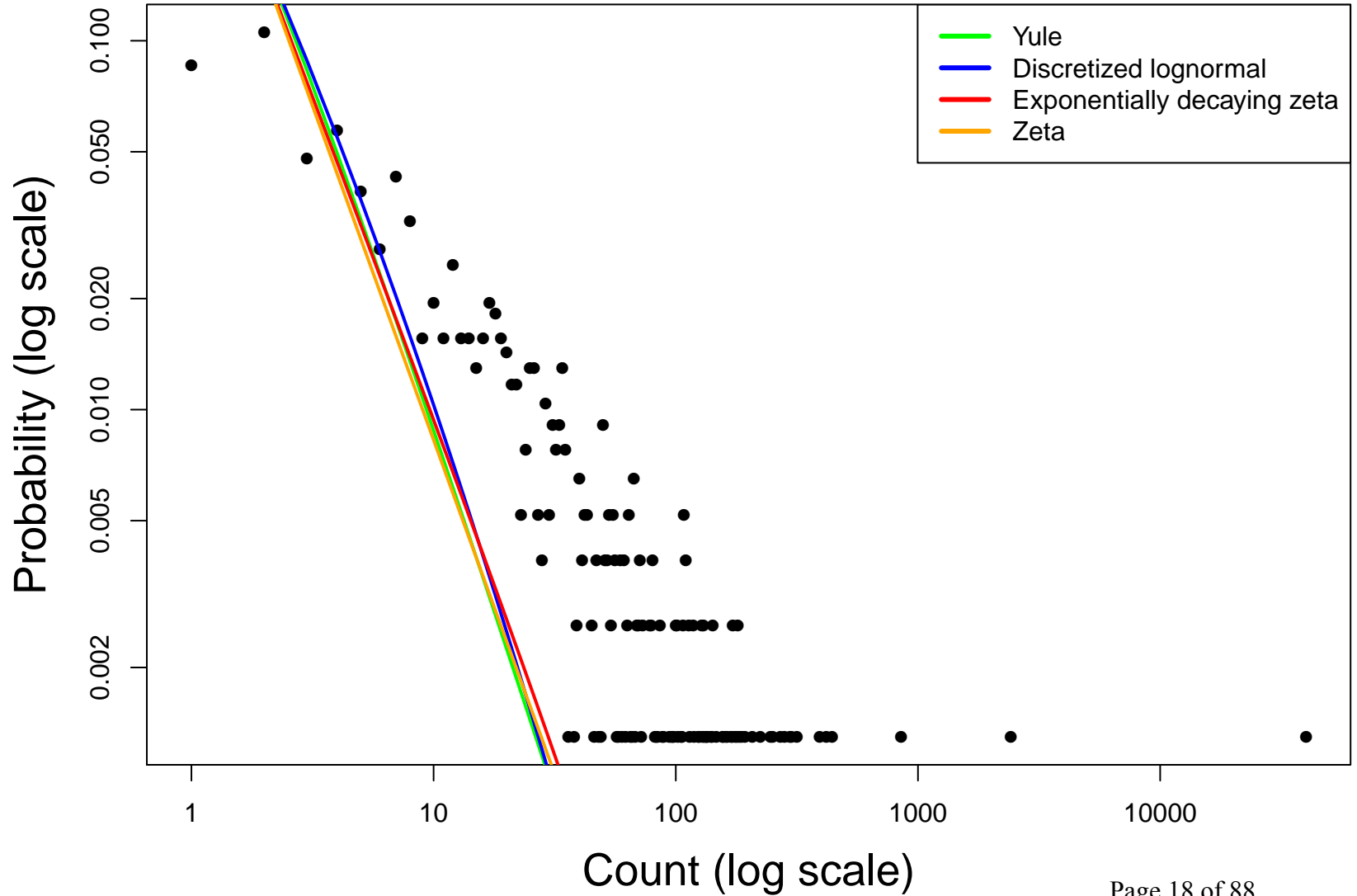
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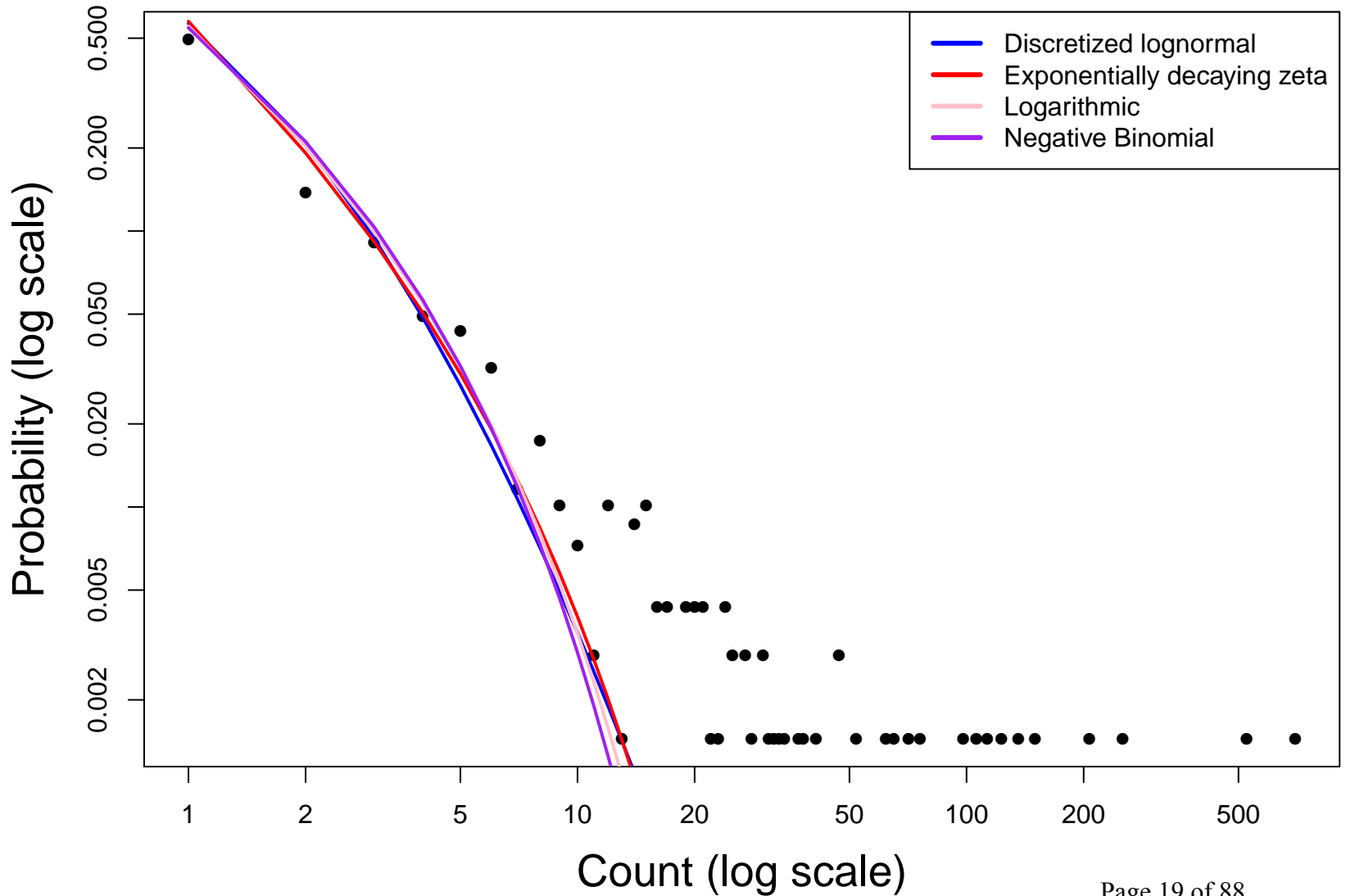
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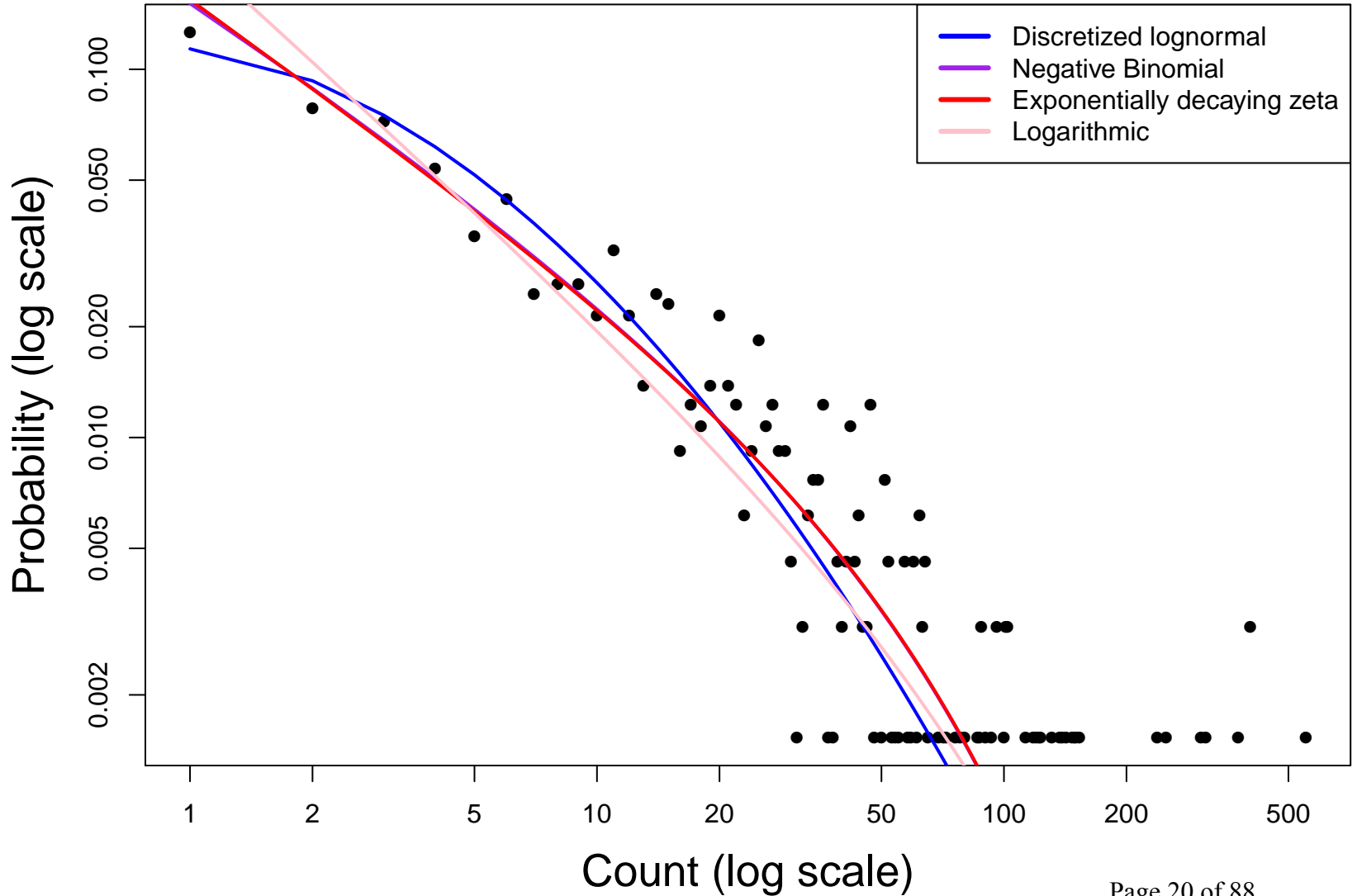
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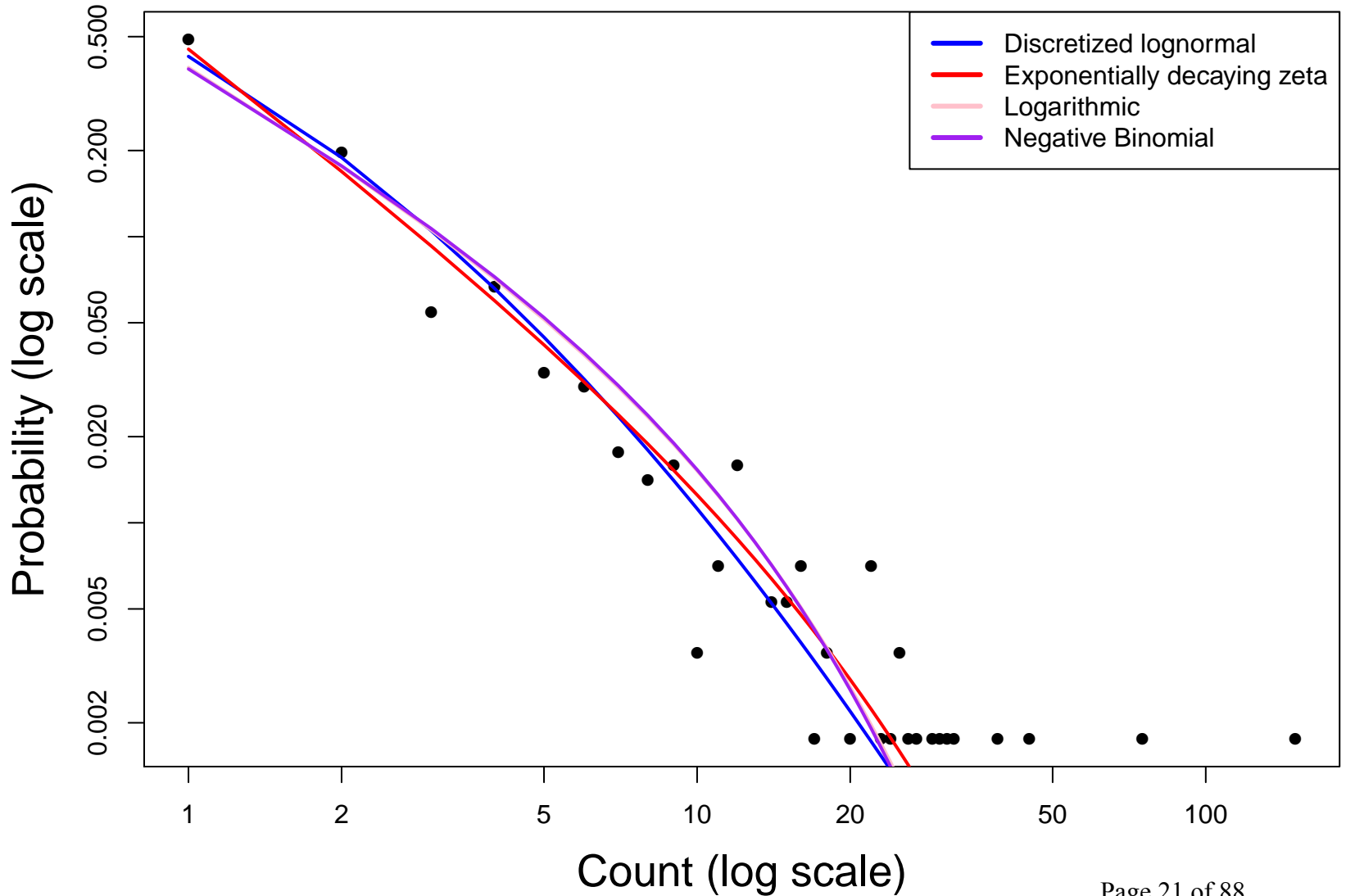
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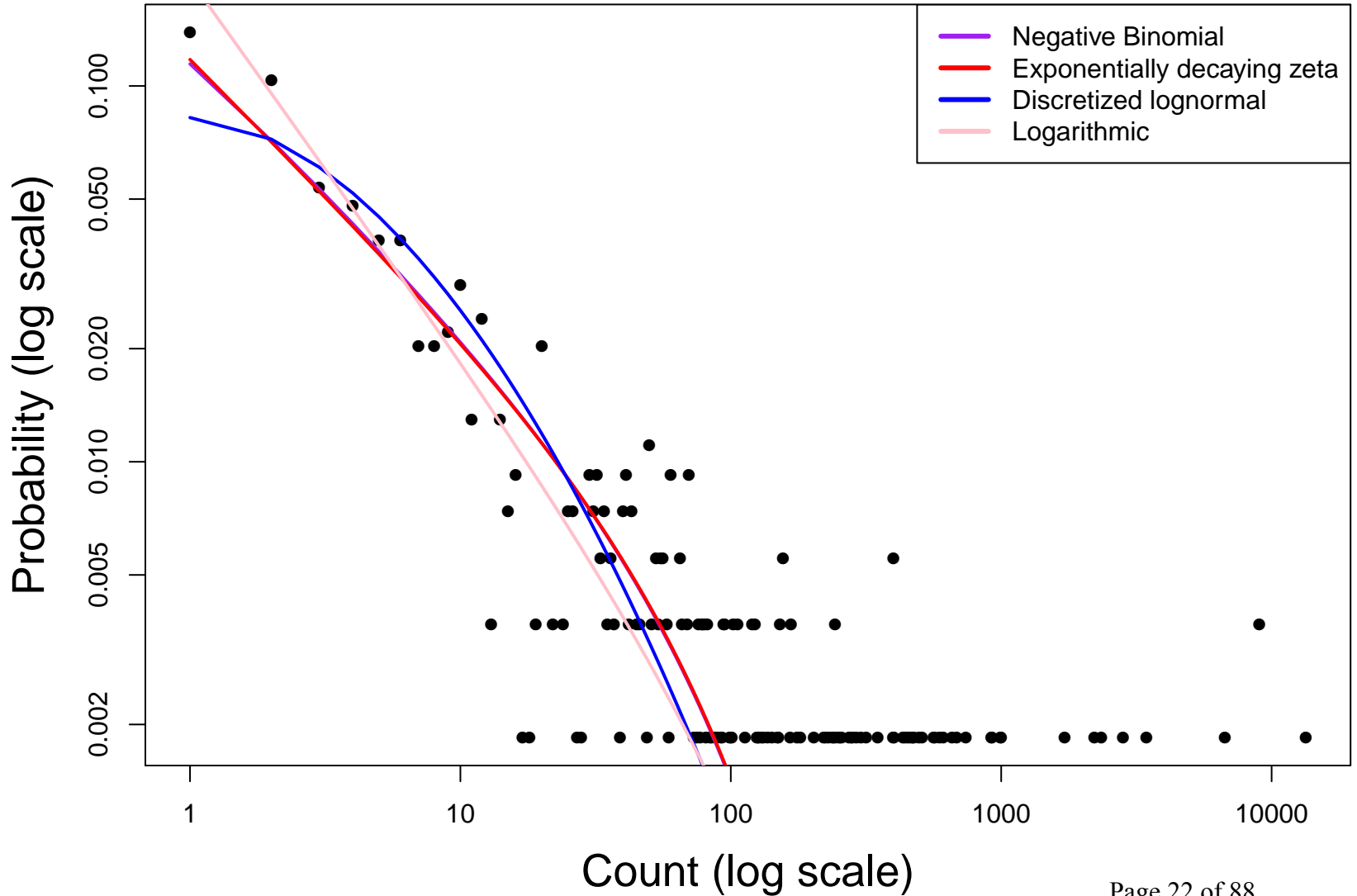
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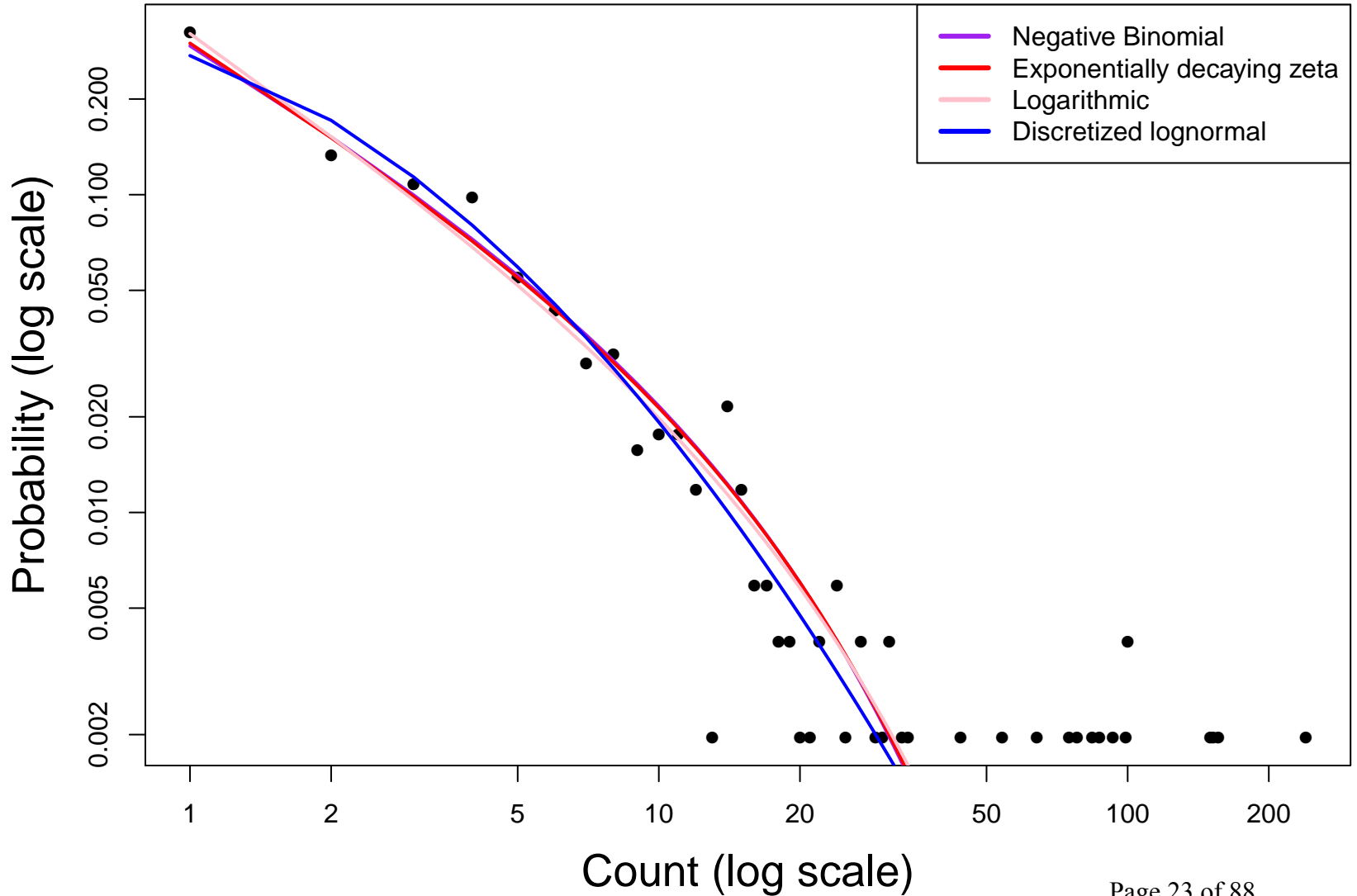
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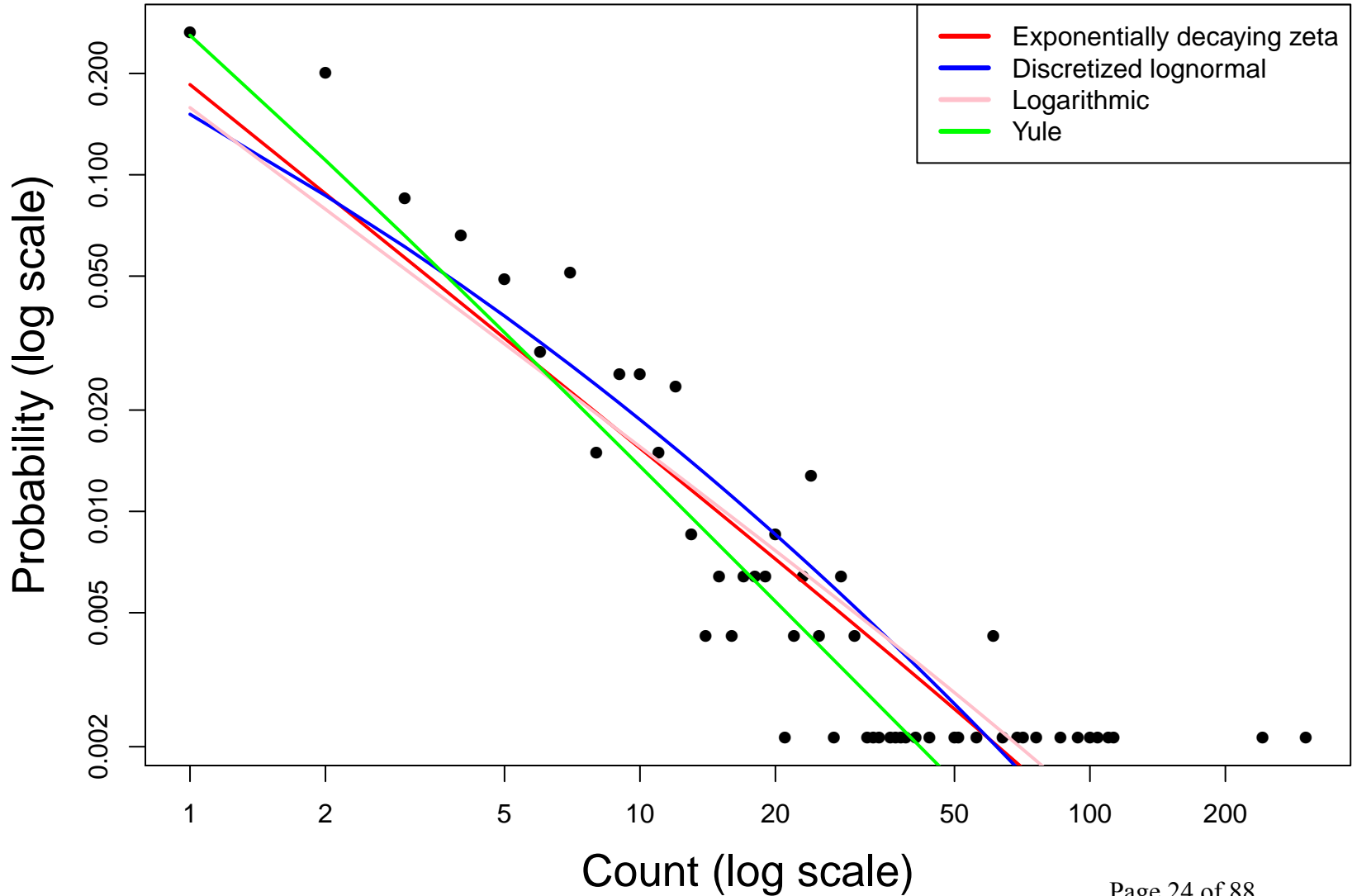
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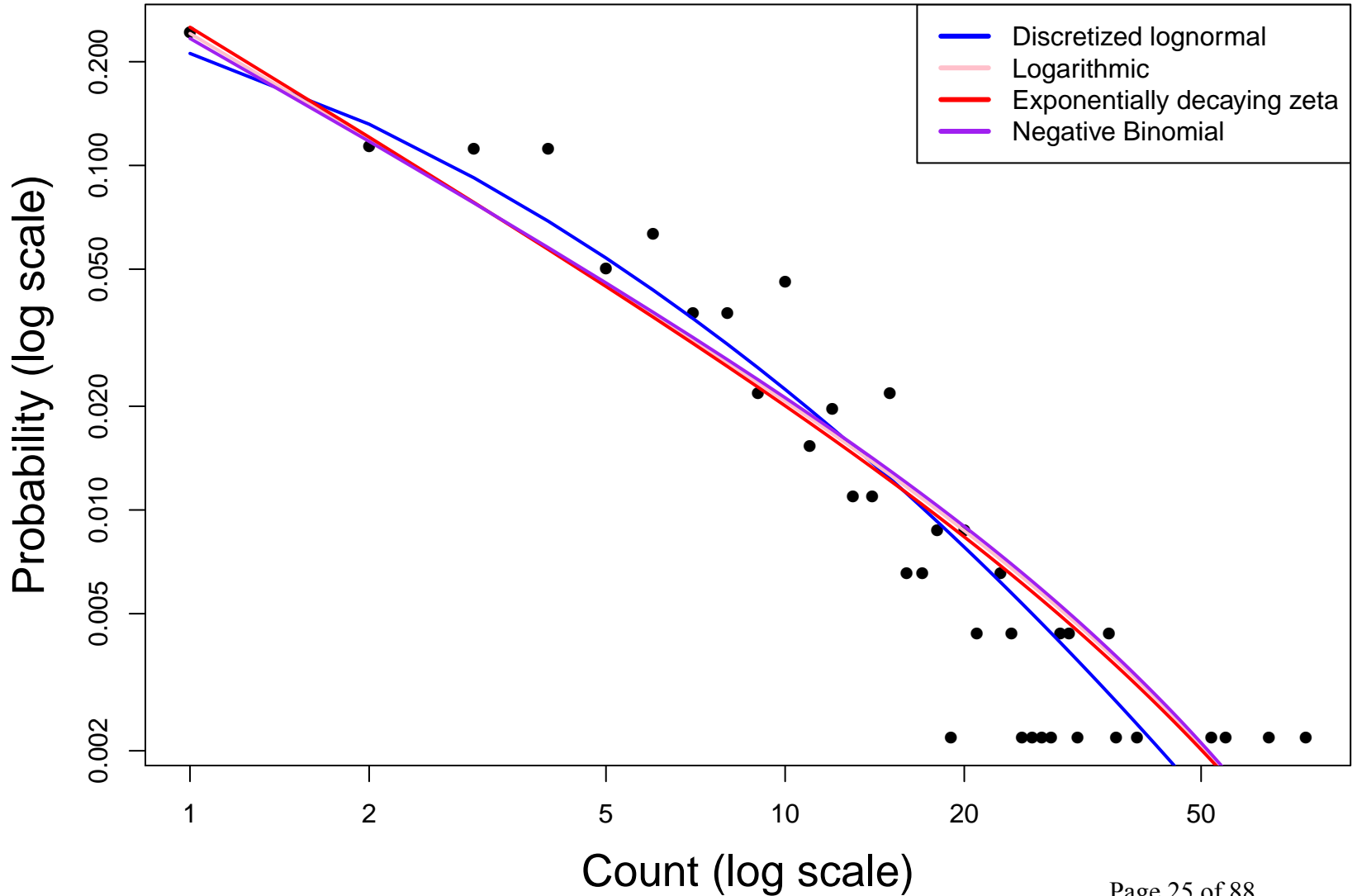
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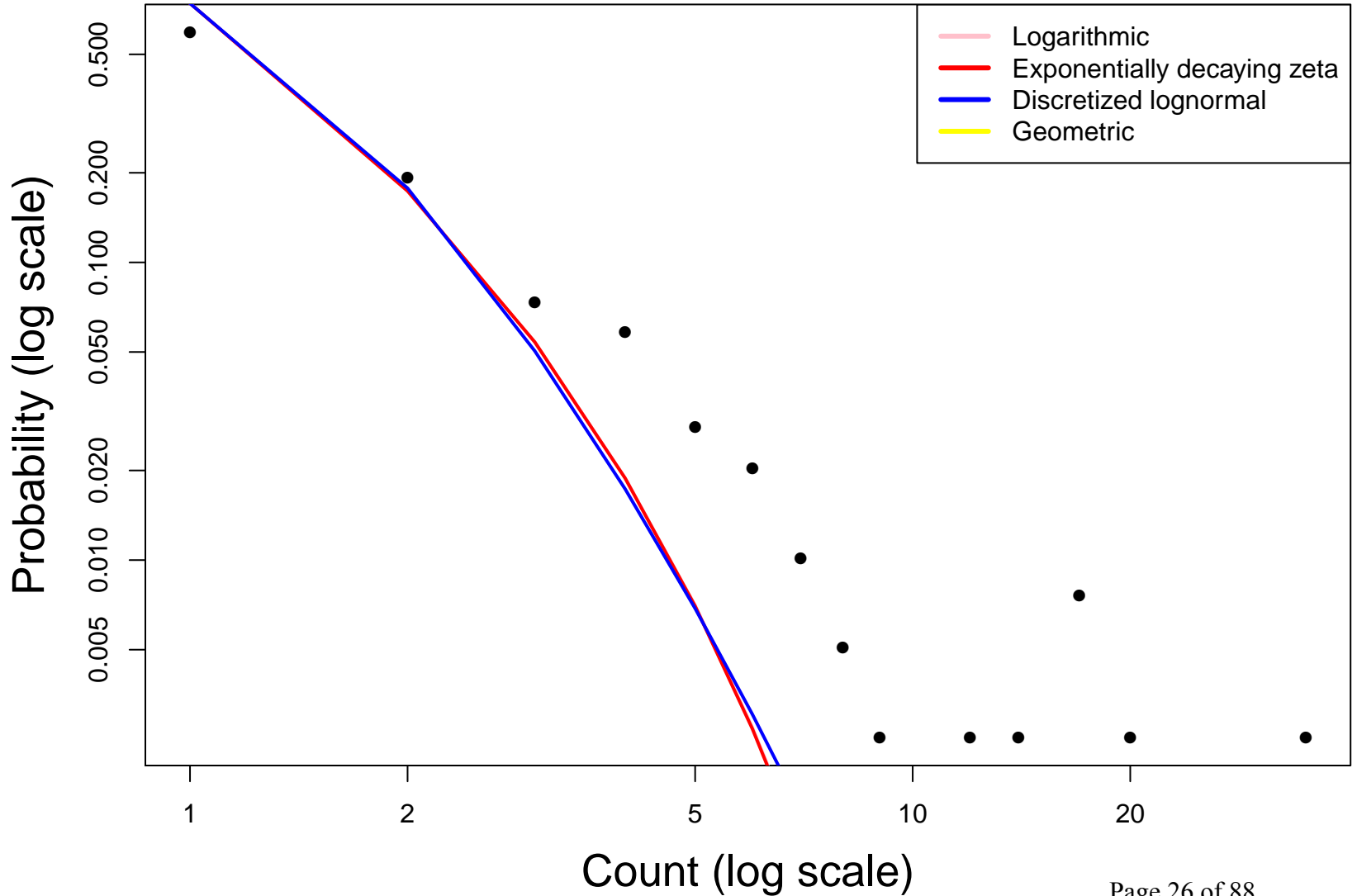
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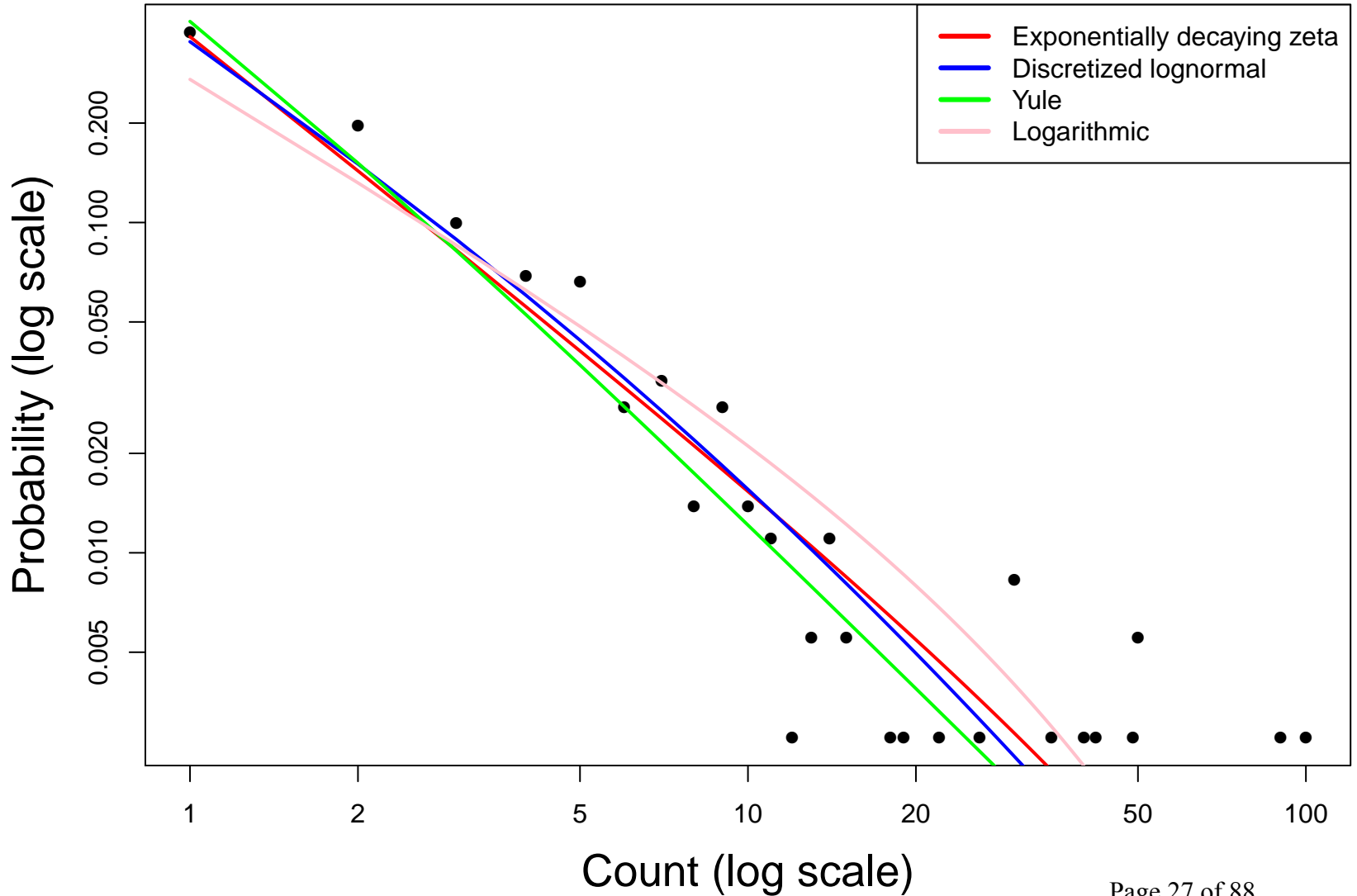
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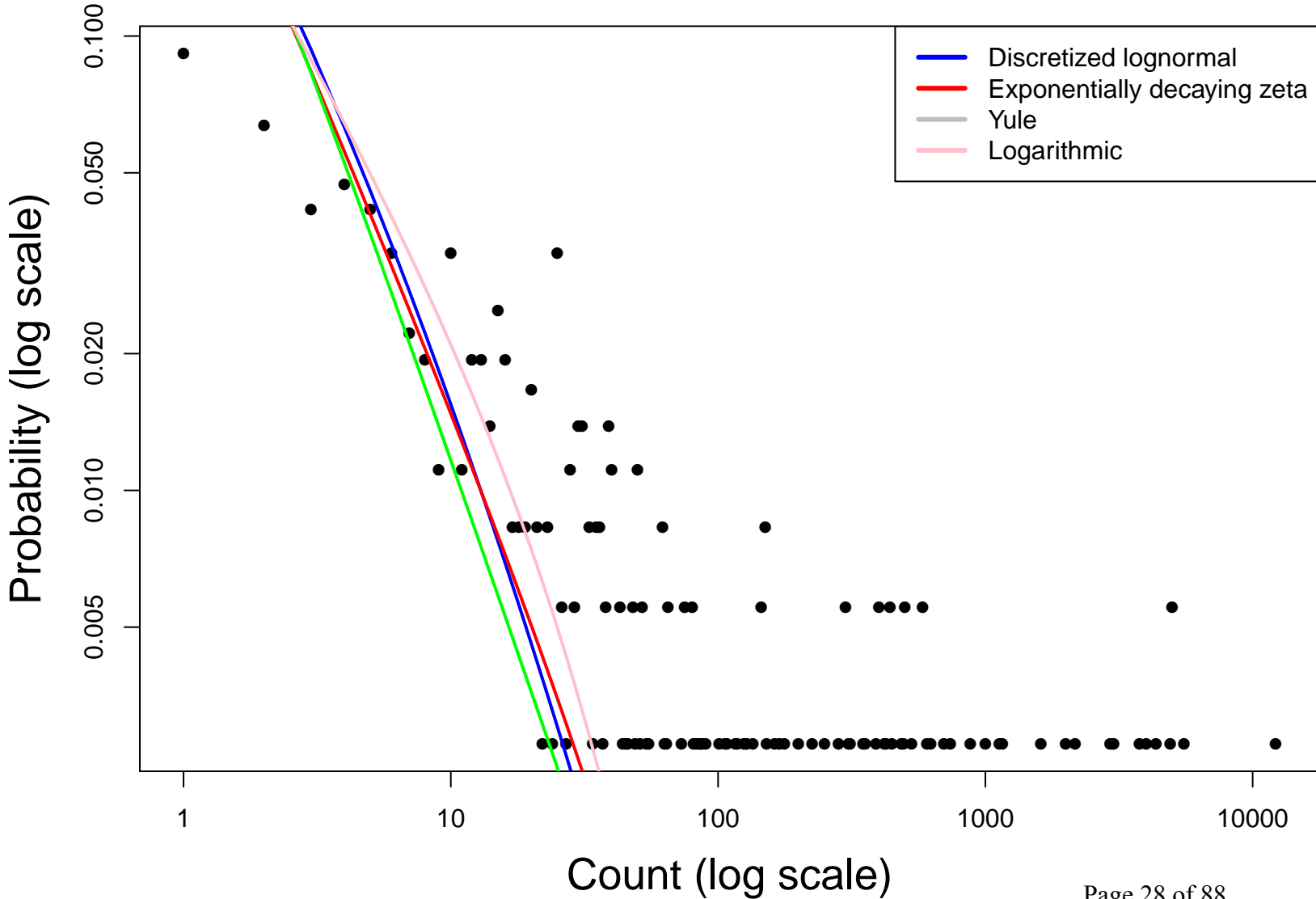
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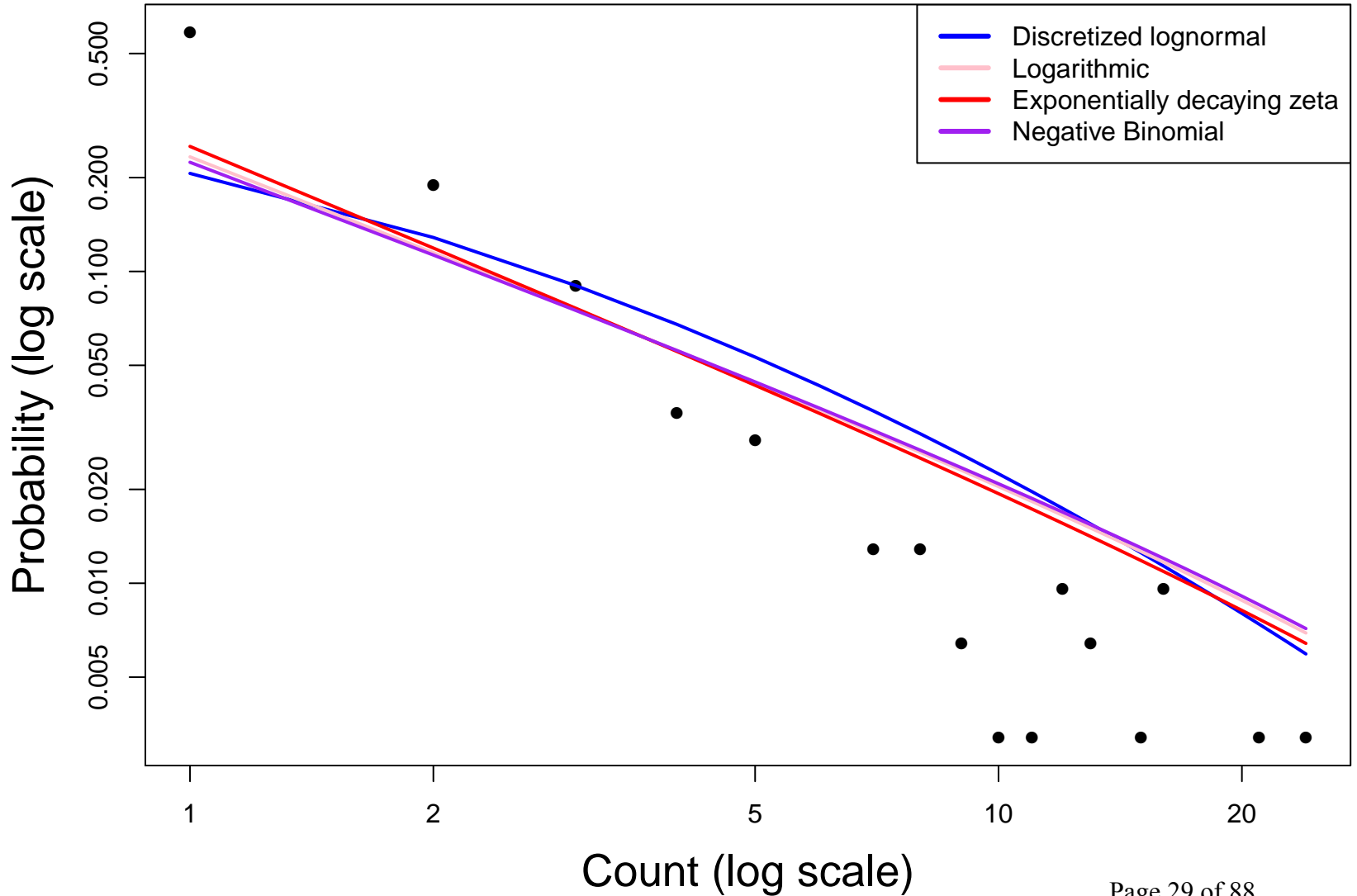
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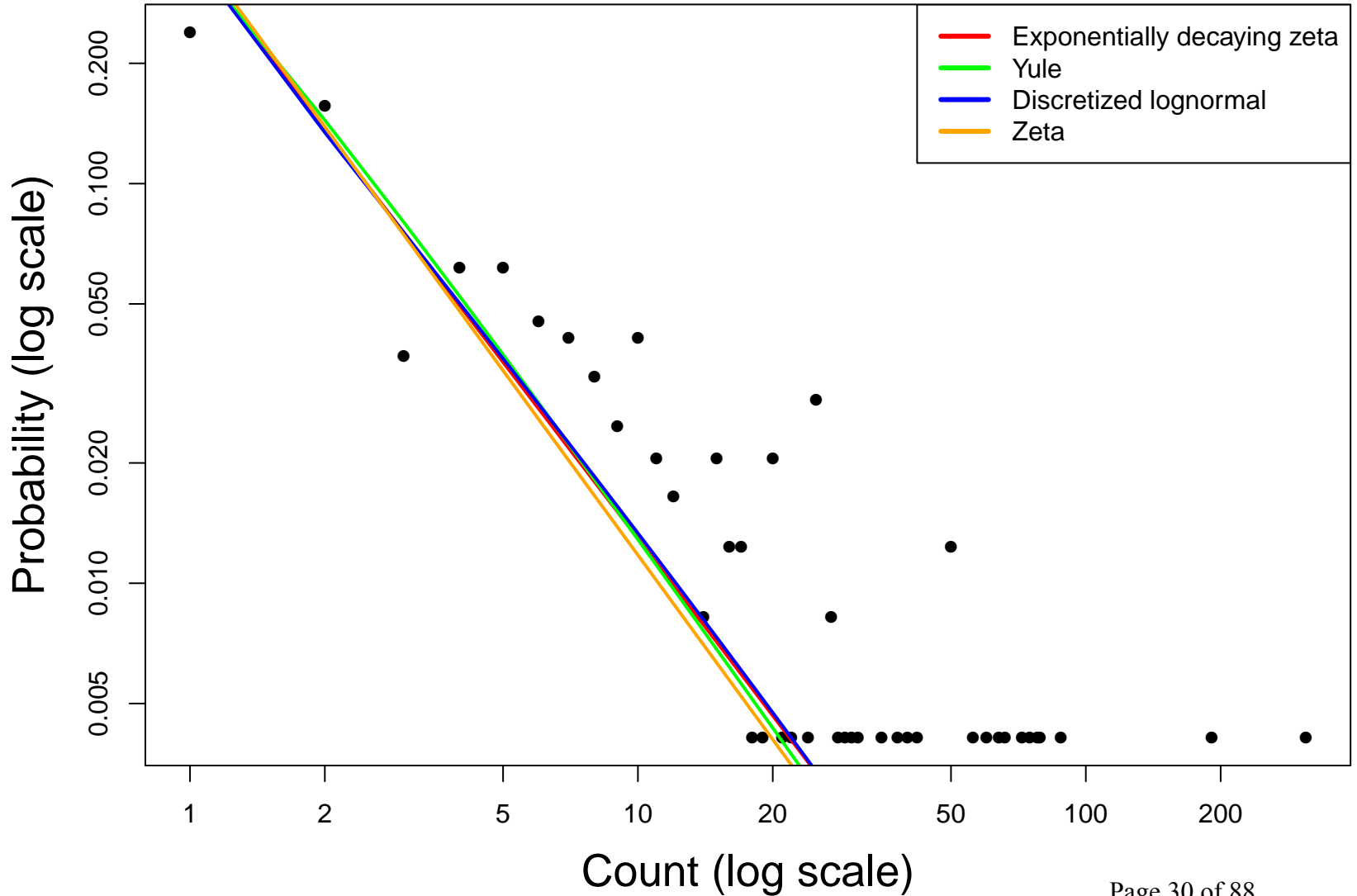
reph



rtlo



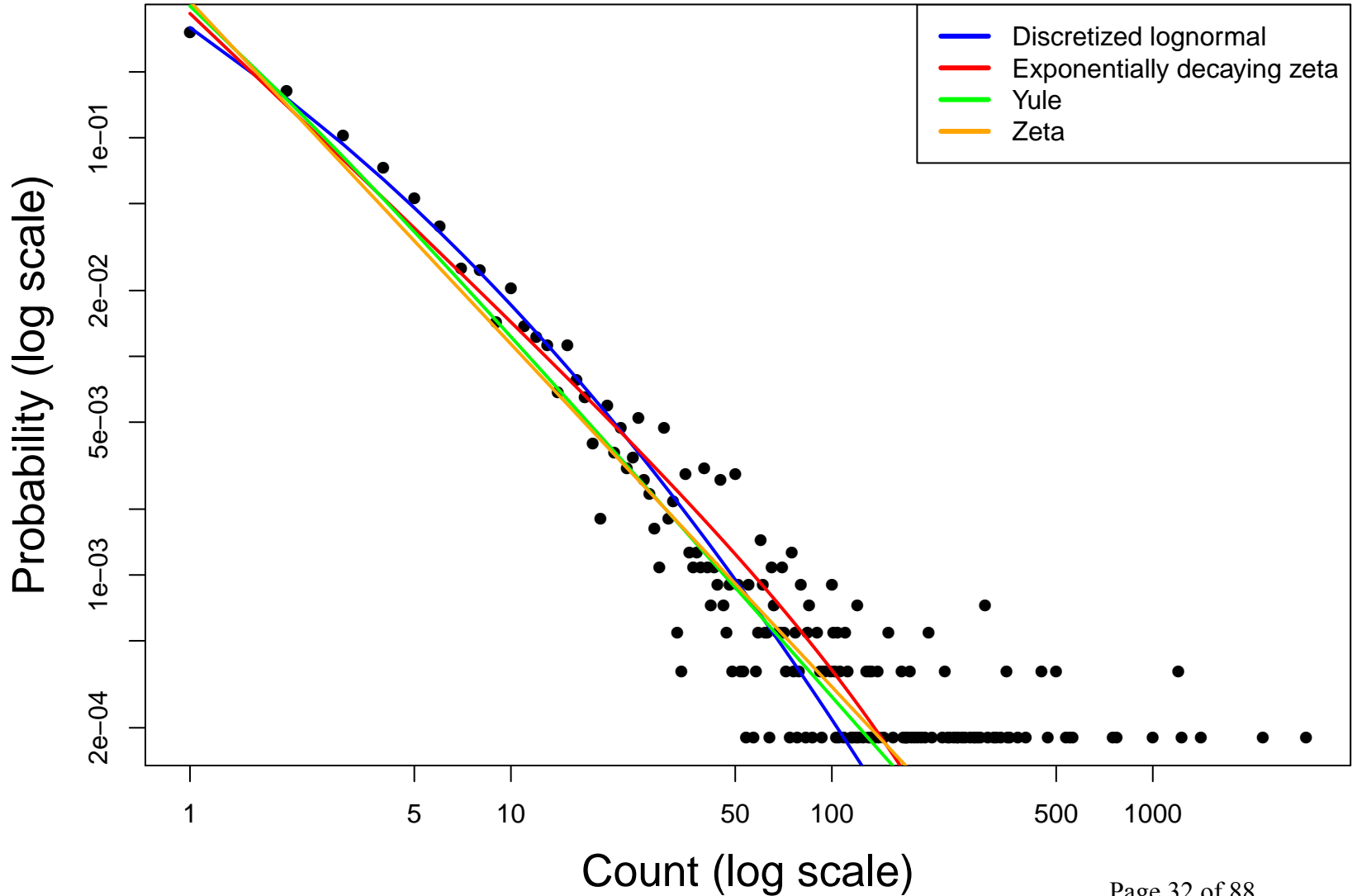
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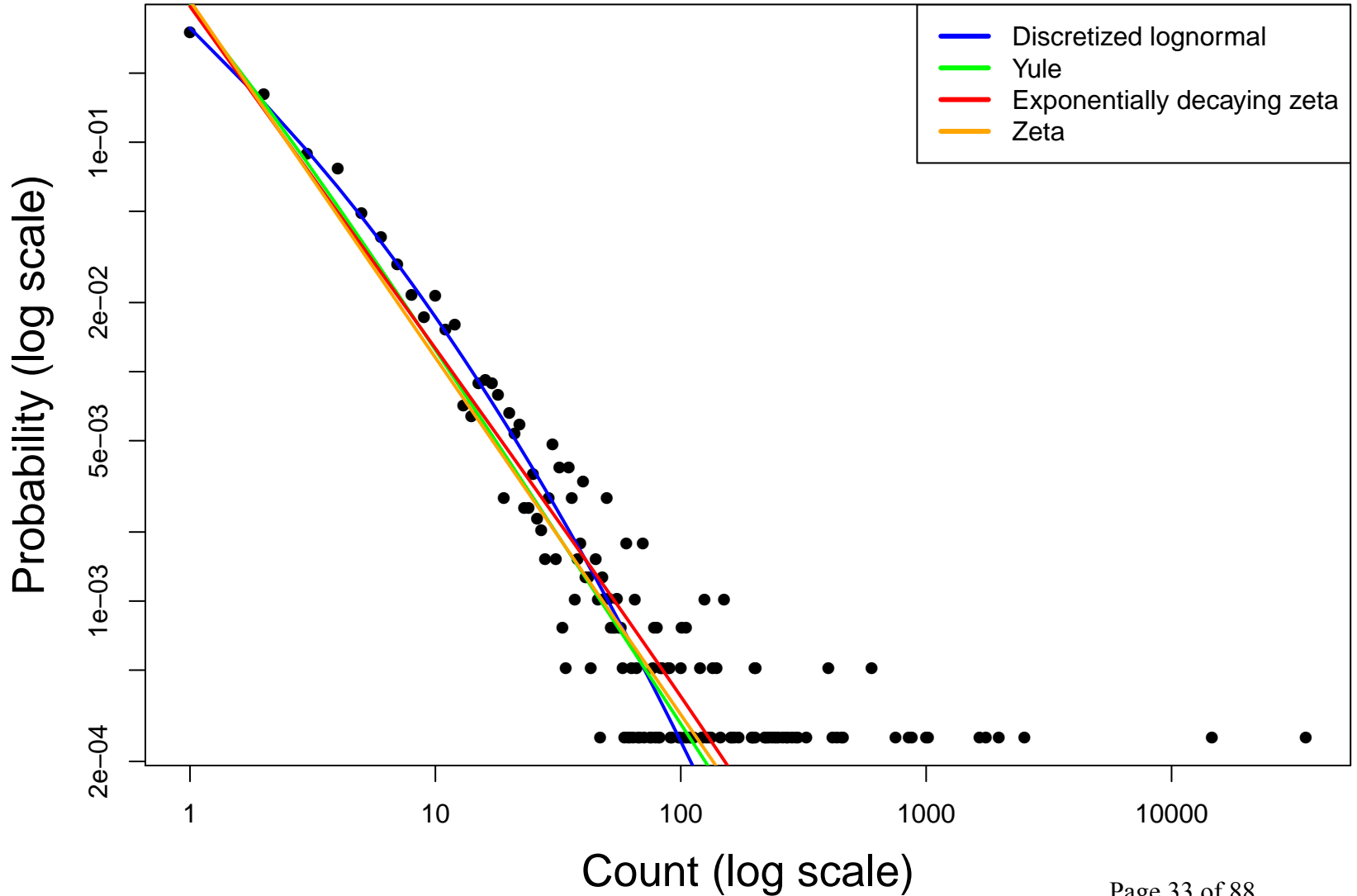
Figures E1 to E74. Model fit plots. Maximum likelihood model fits (lines) and observed probabilities (black dots) for non-zero count data for all modeled species. Fits are shown for the top four models, ranked in the legend from lowest to highest AICc.

Figures E20 to E37. Model fit plots for SUMMER season:

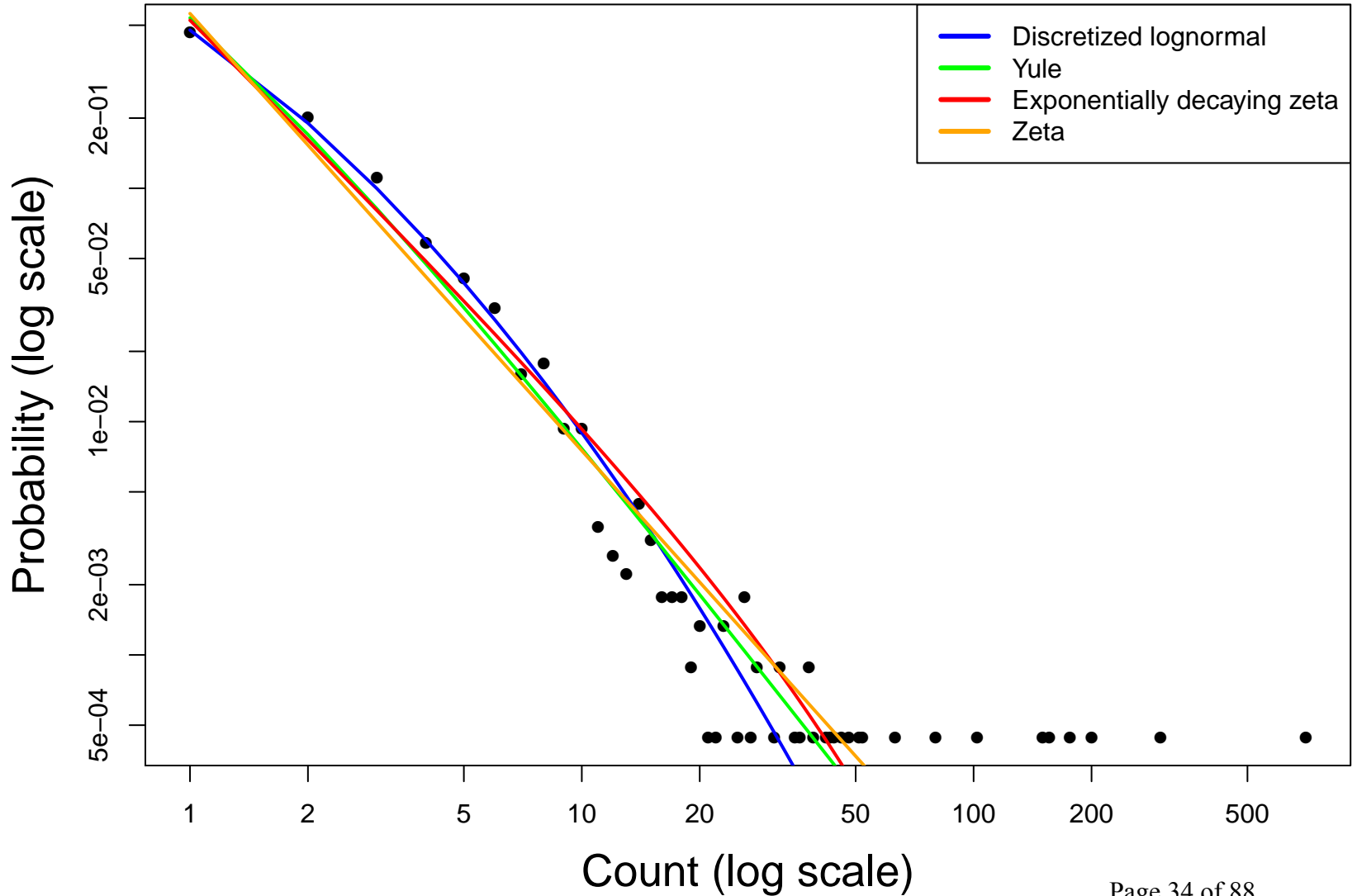
wisp



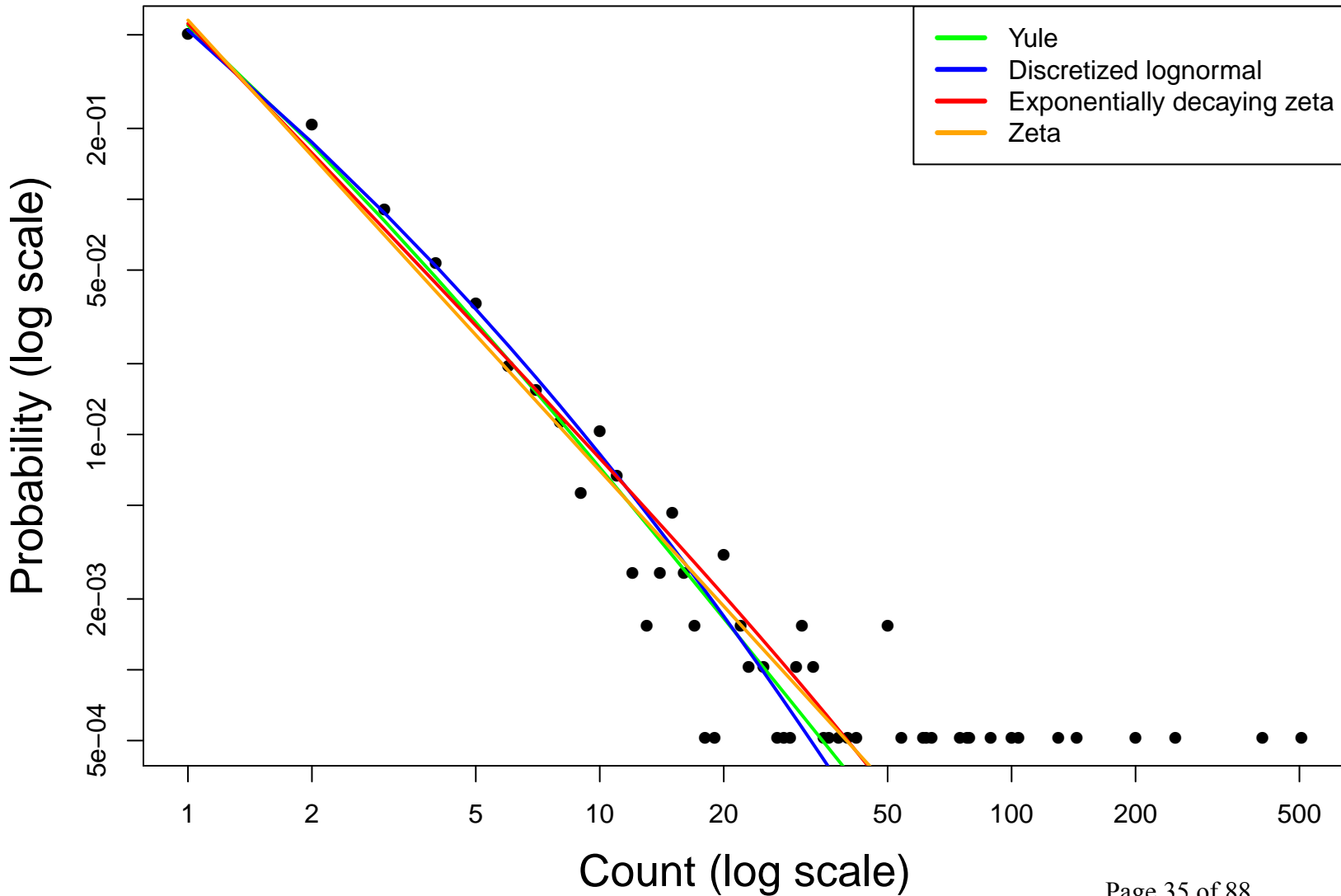
grsh



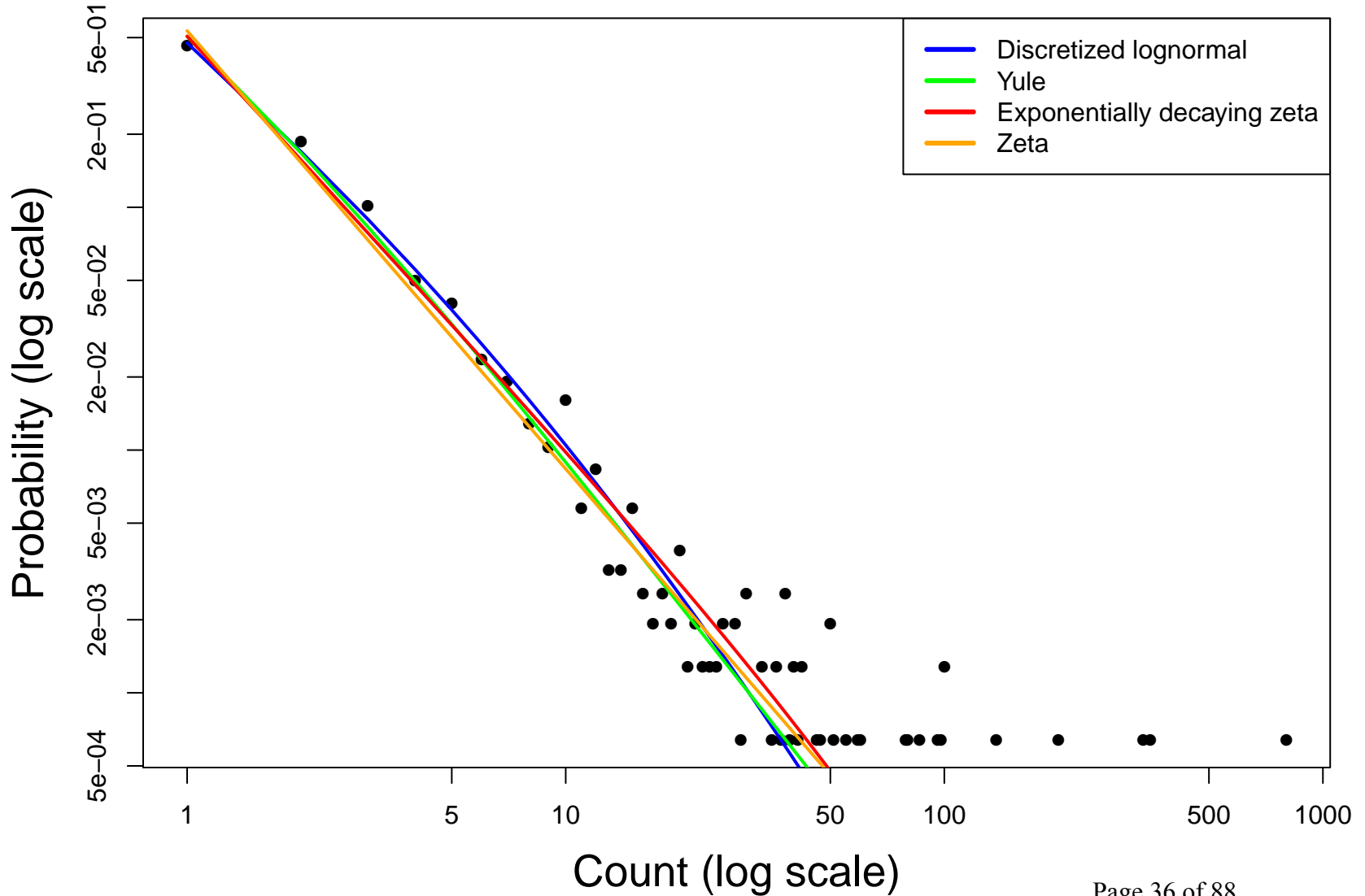
gbbg



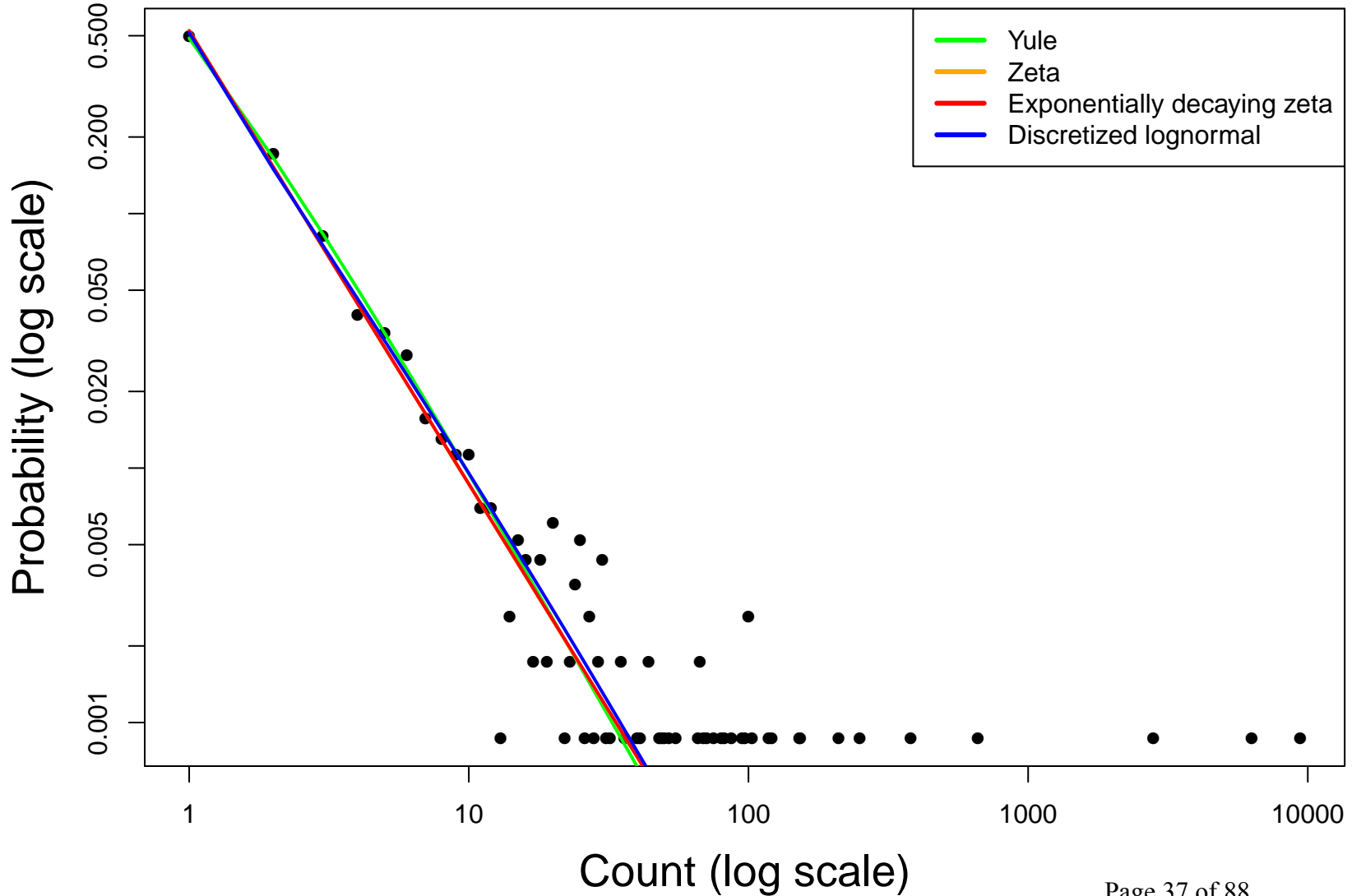
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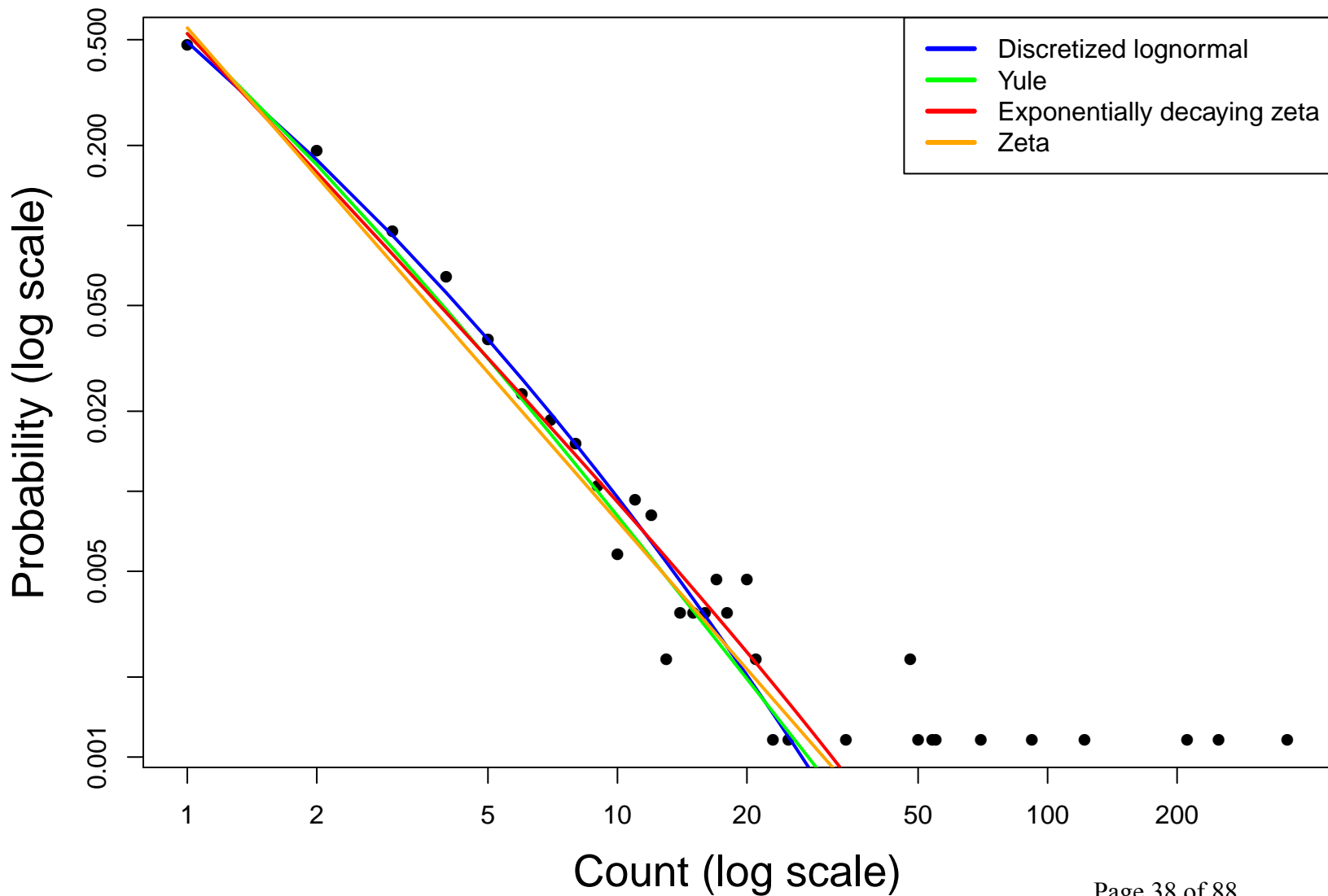
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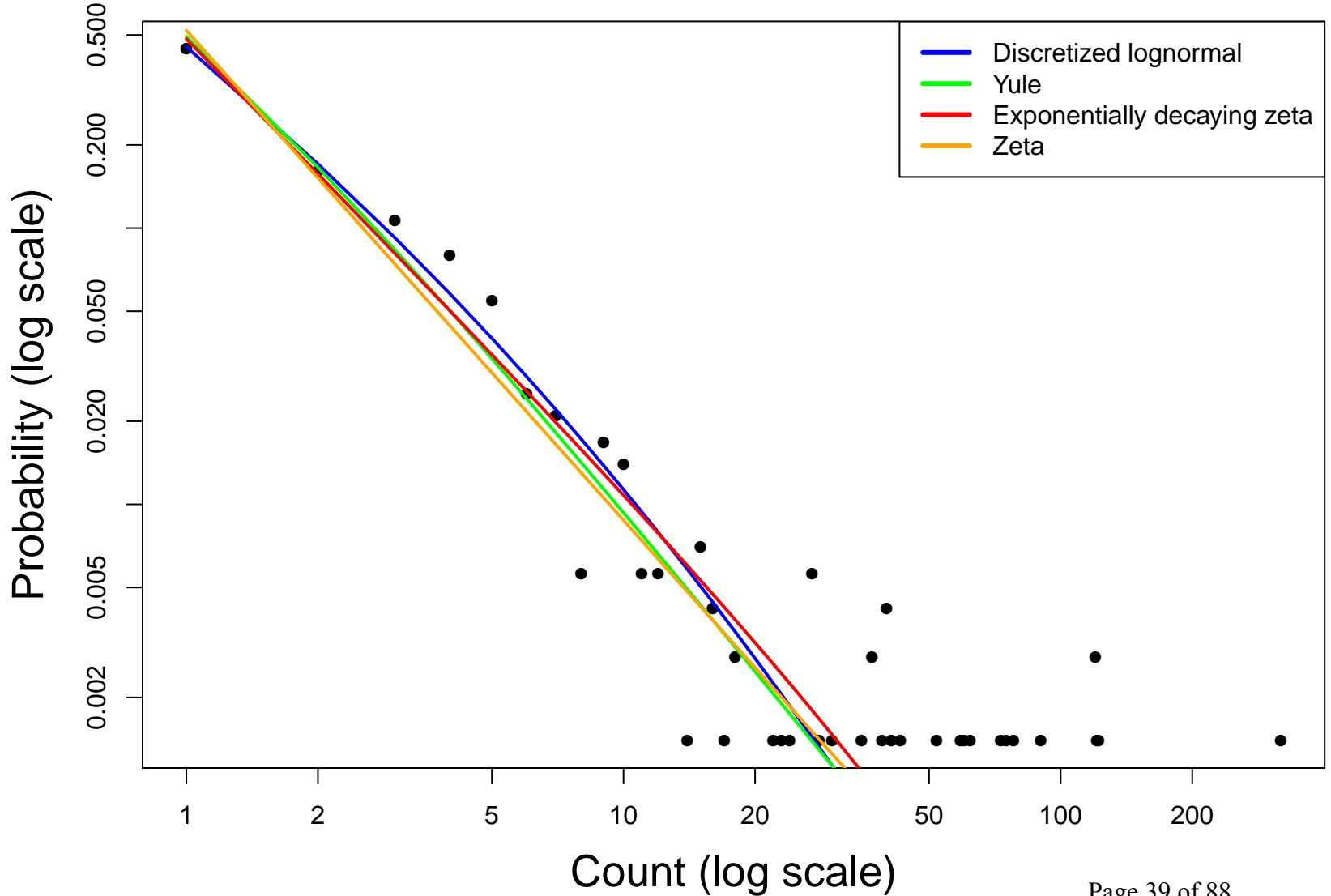
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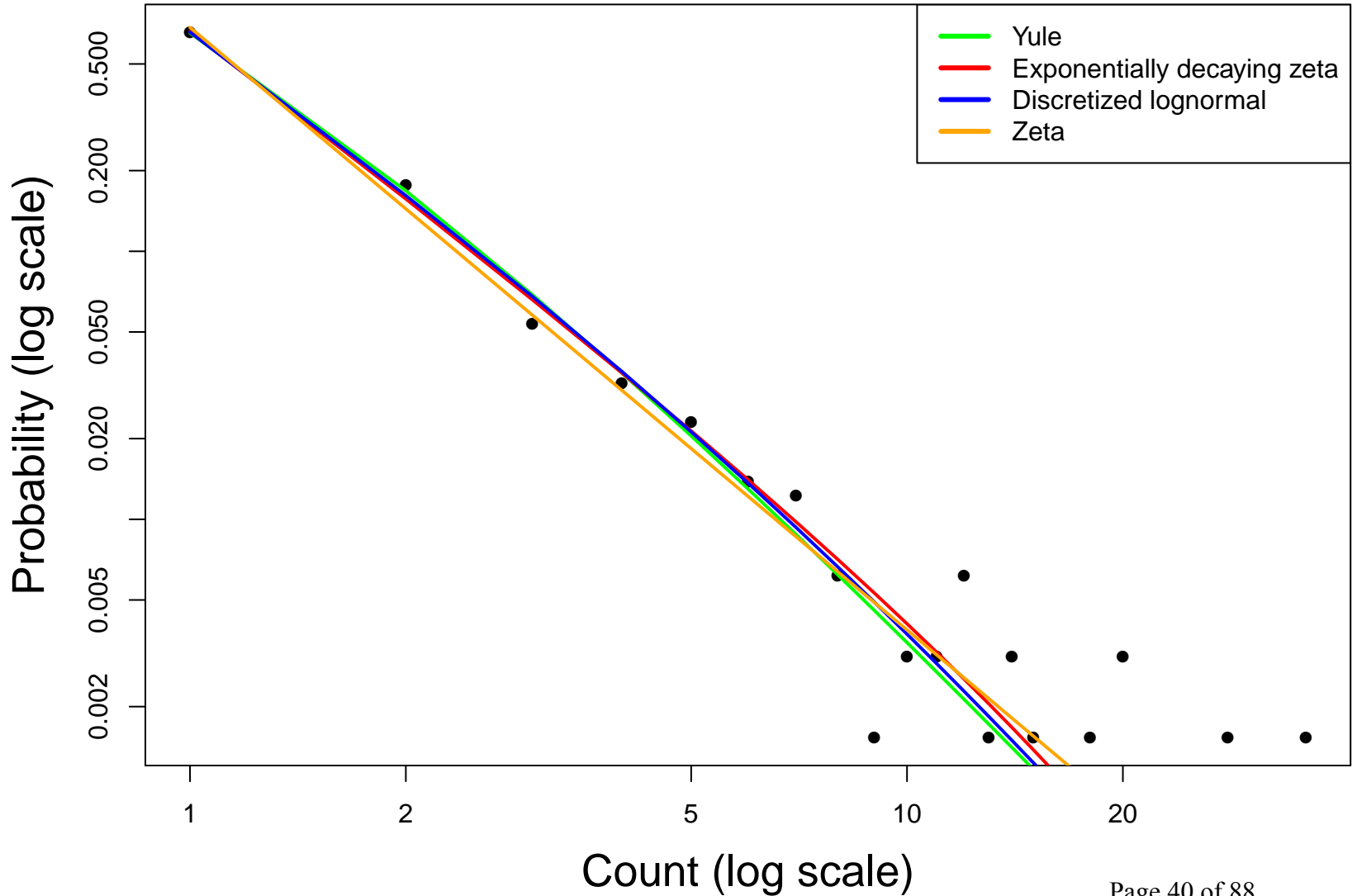
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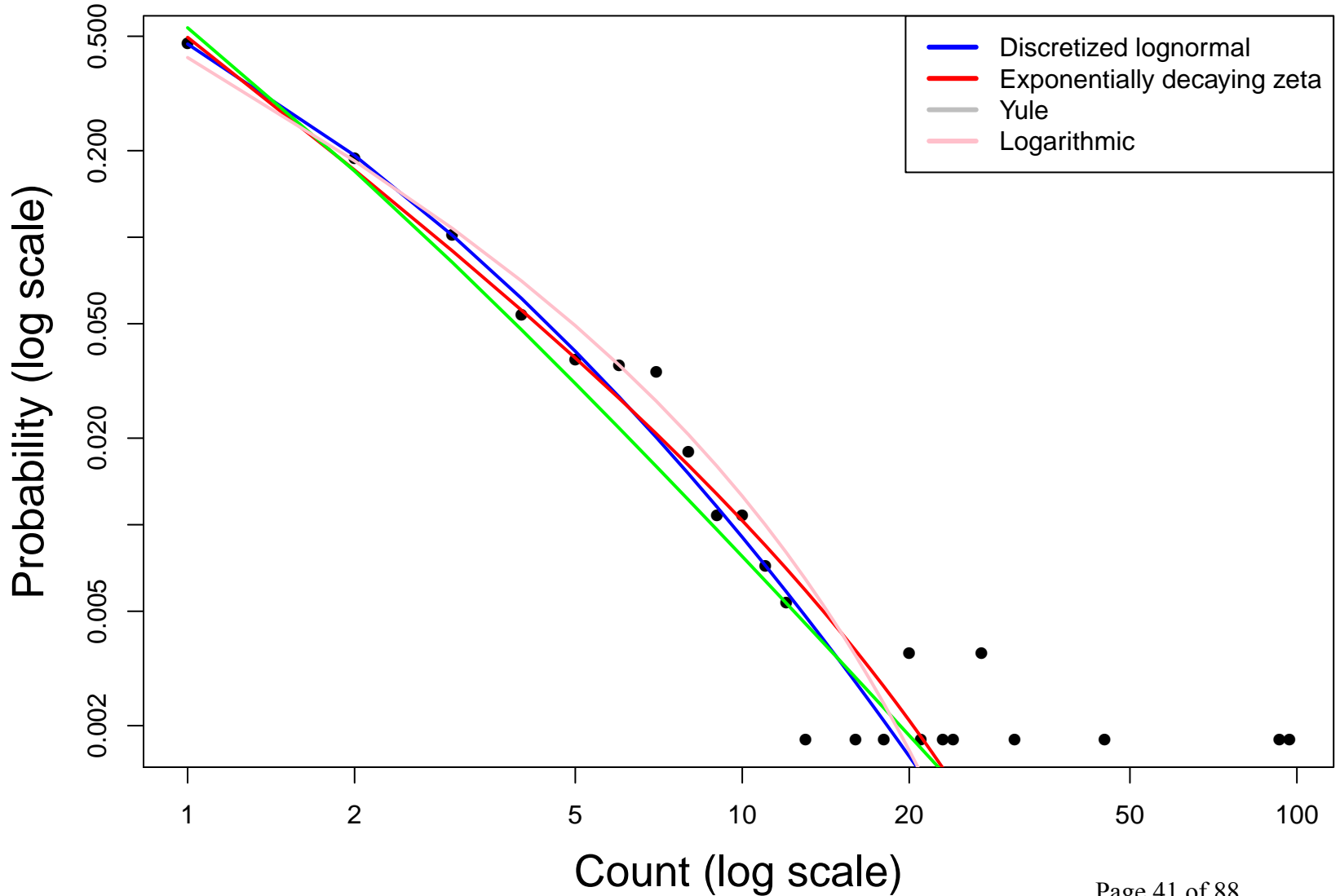
cote



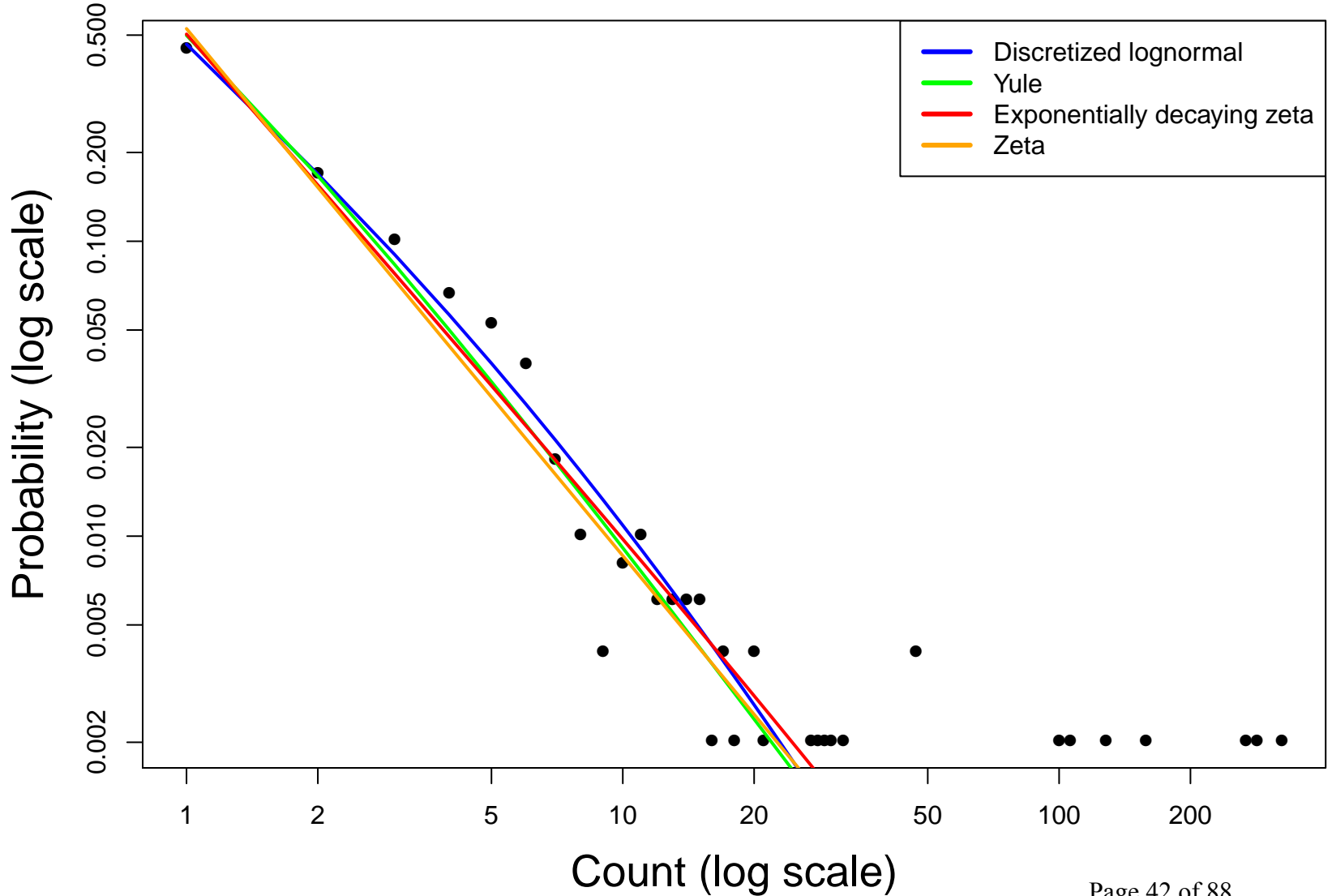
noga



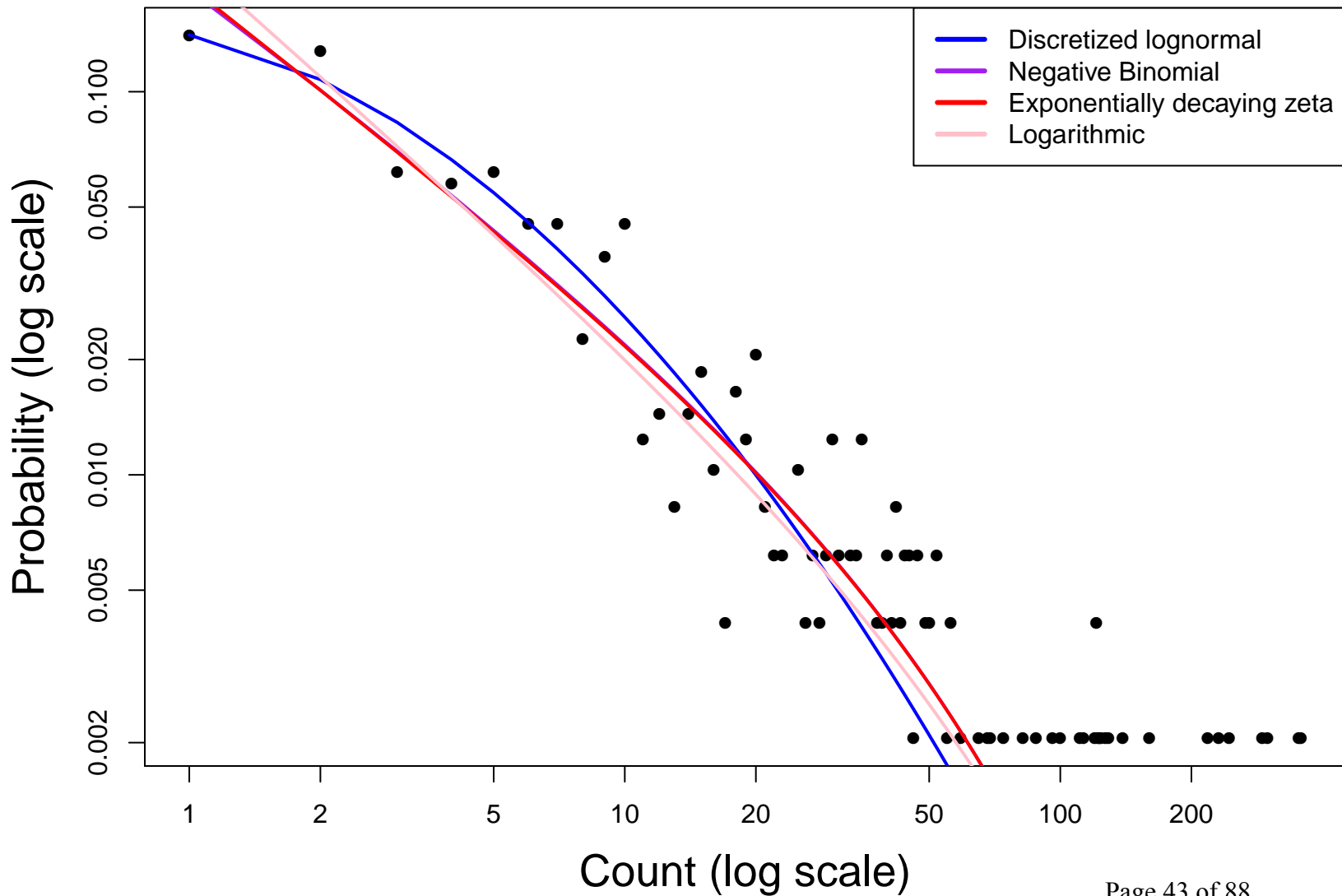
lagu



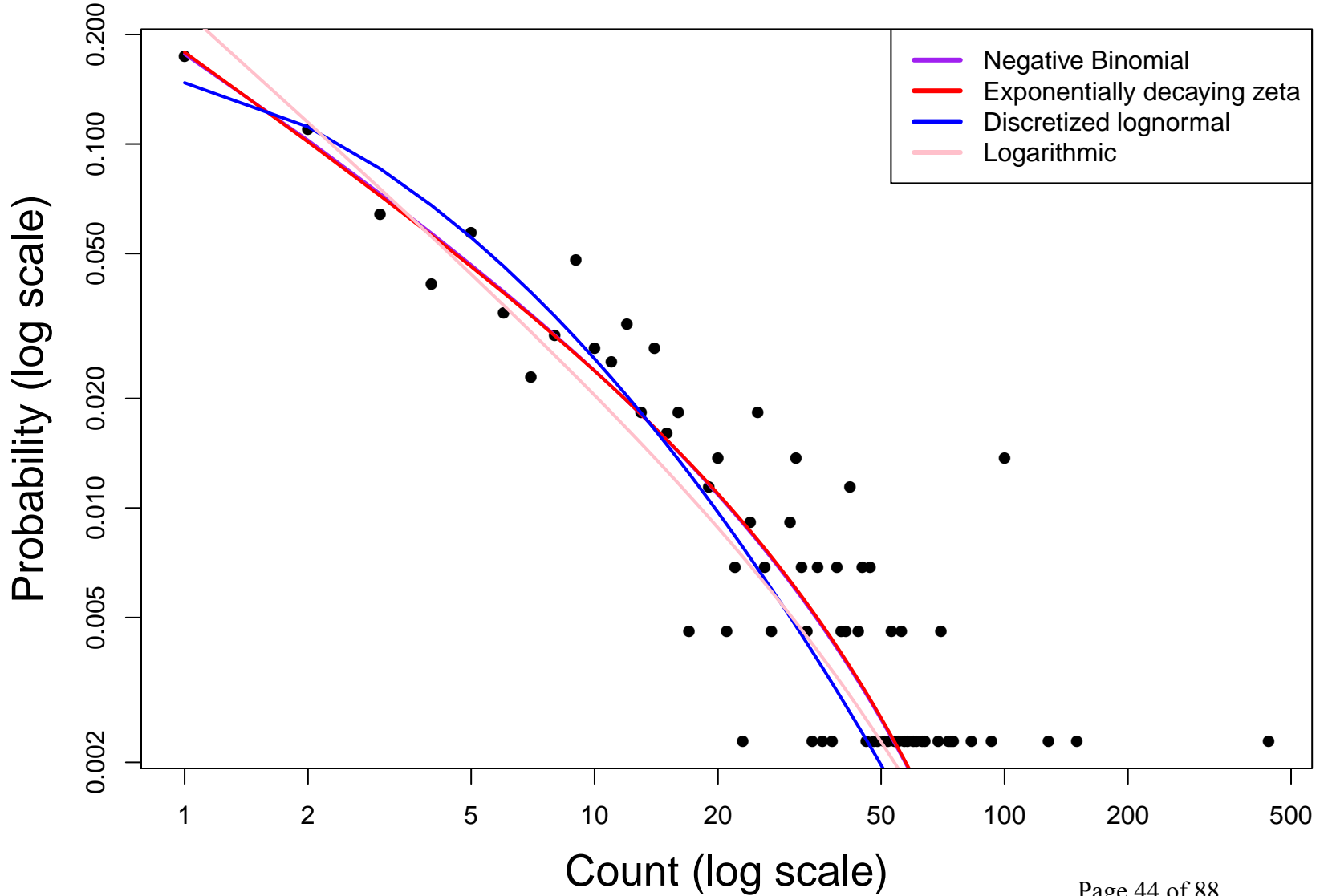
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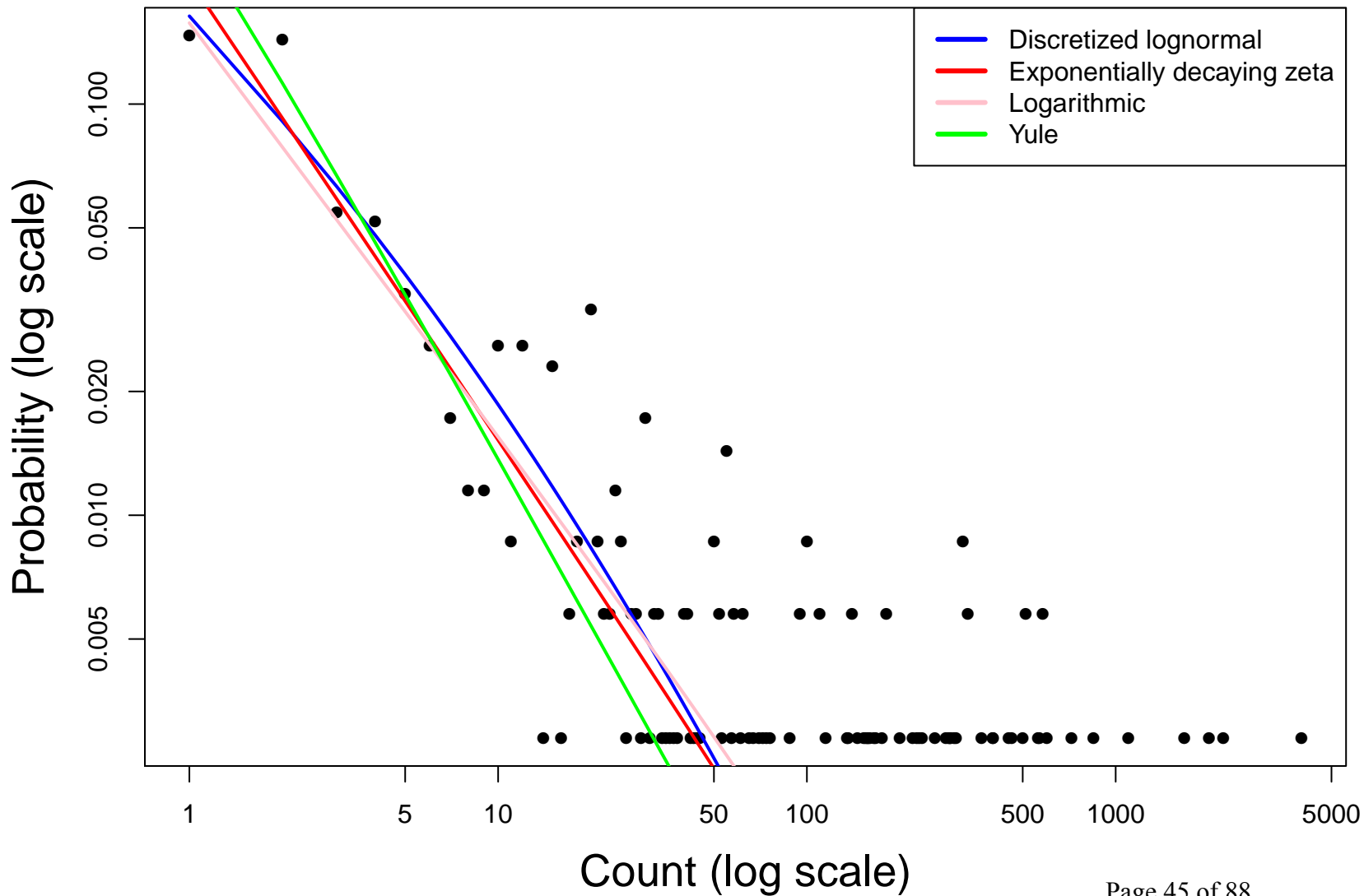
Itdu



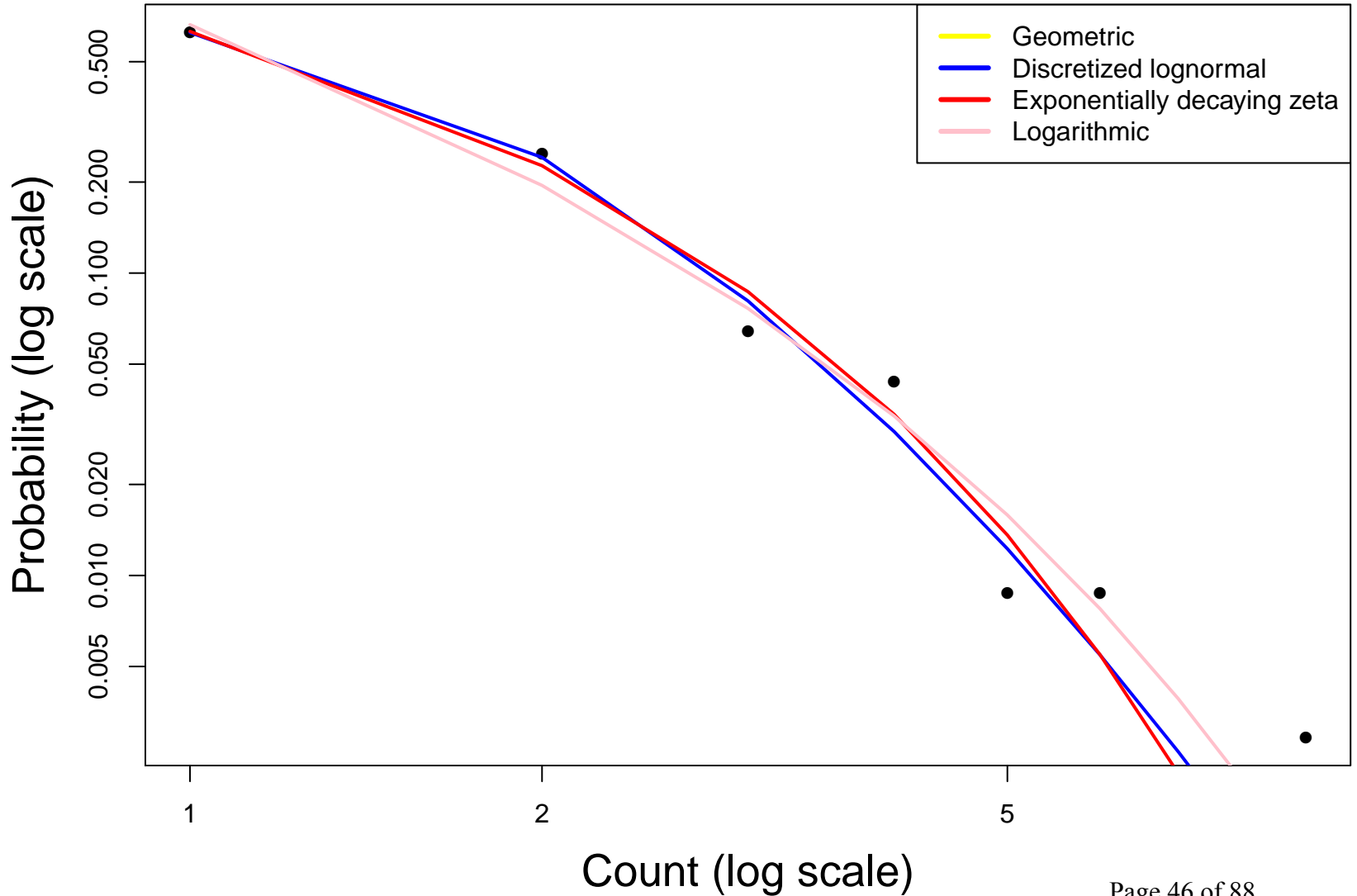
SUSC



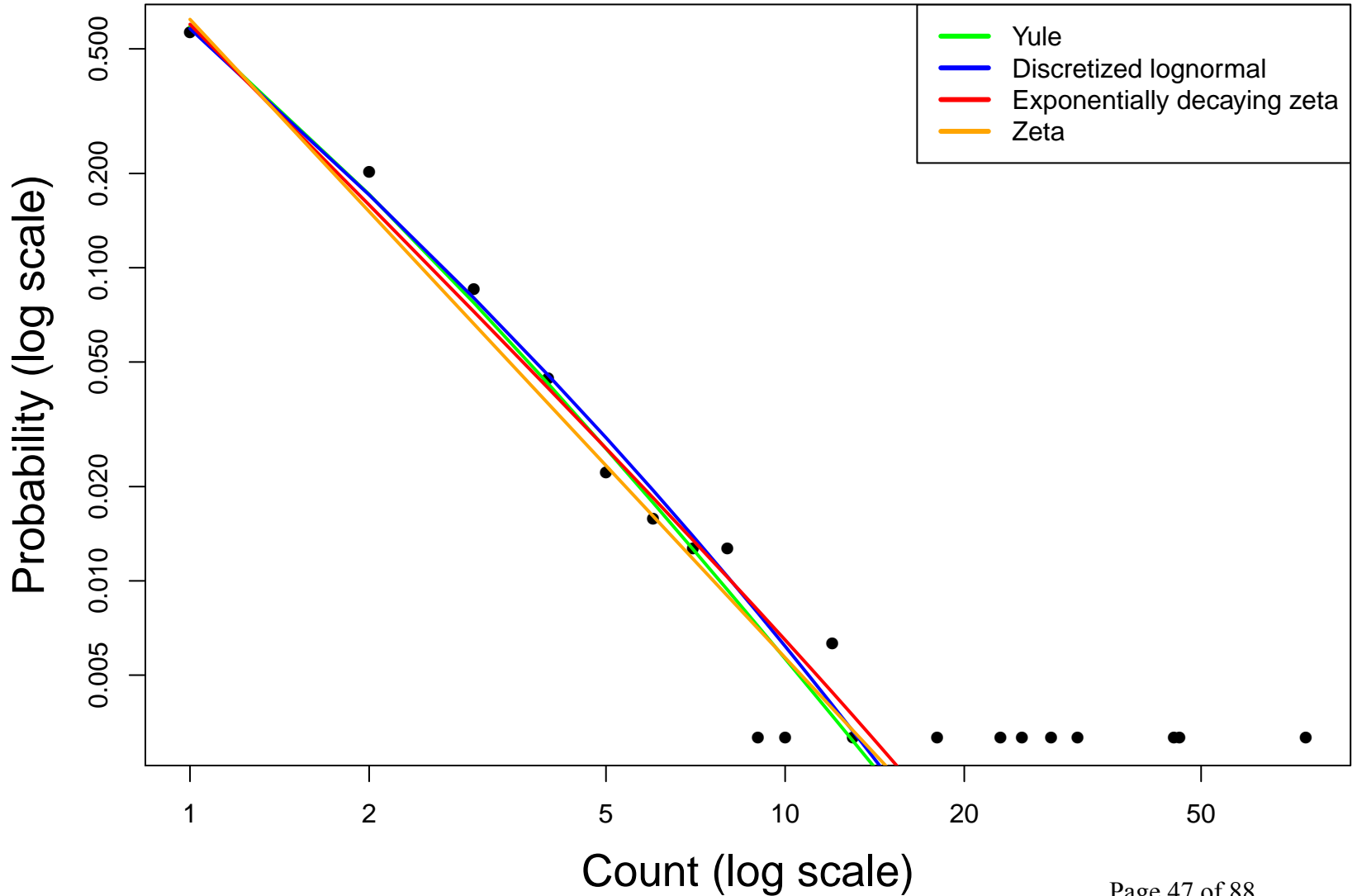
coei



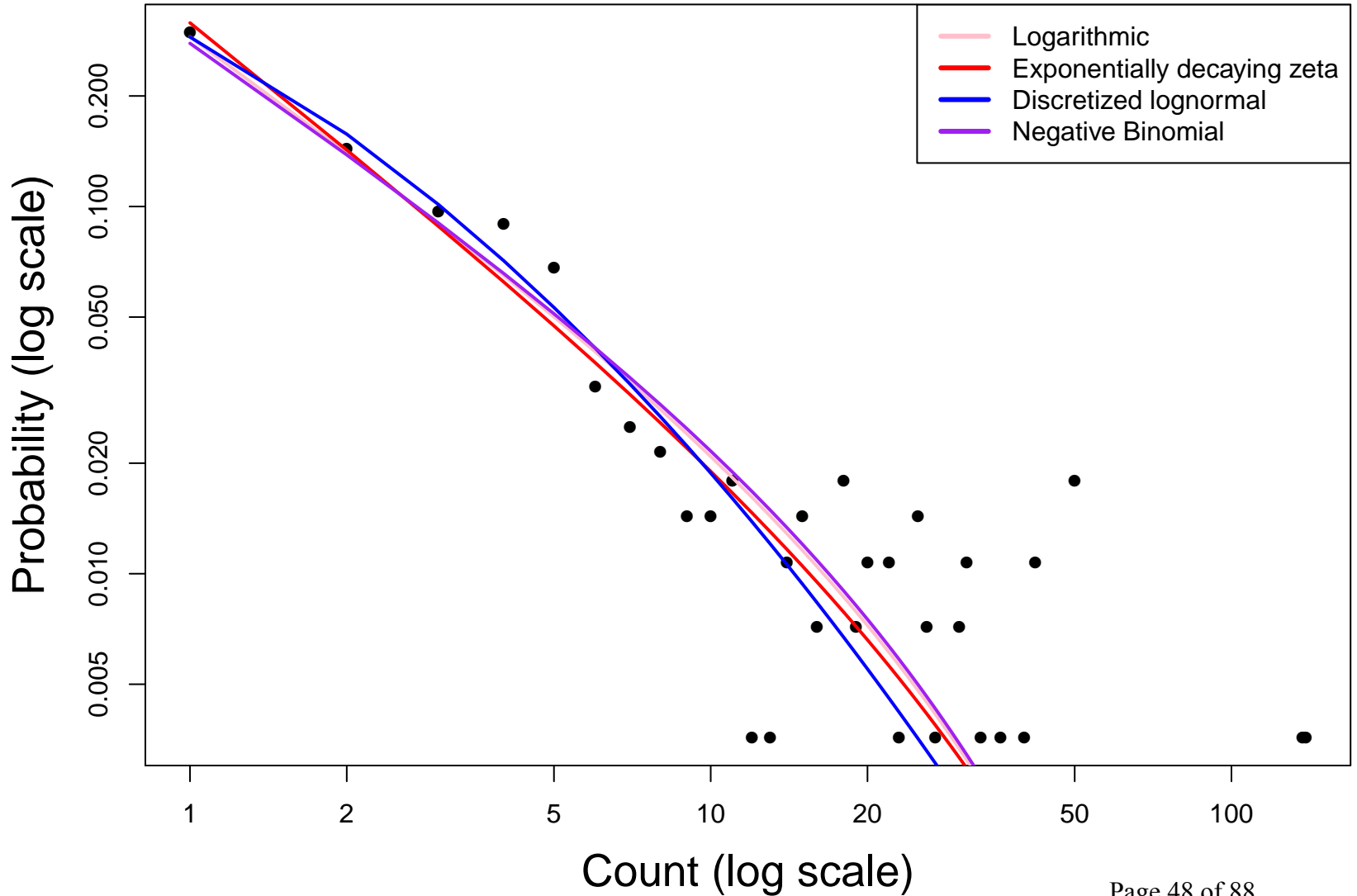
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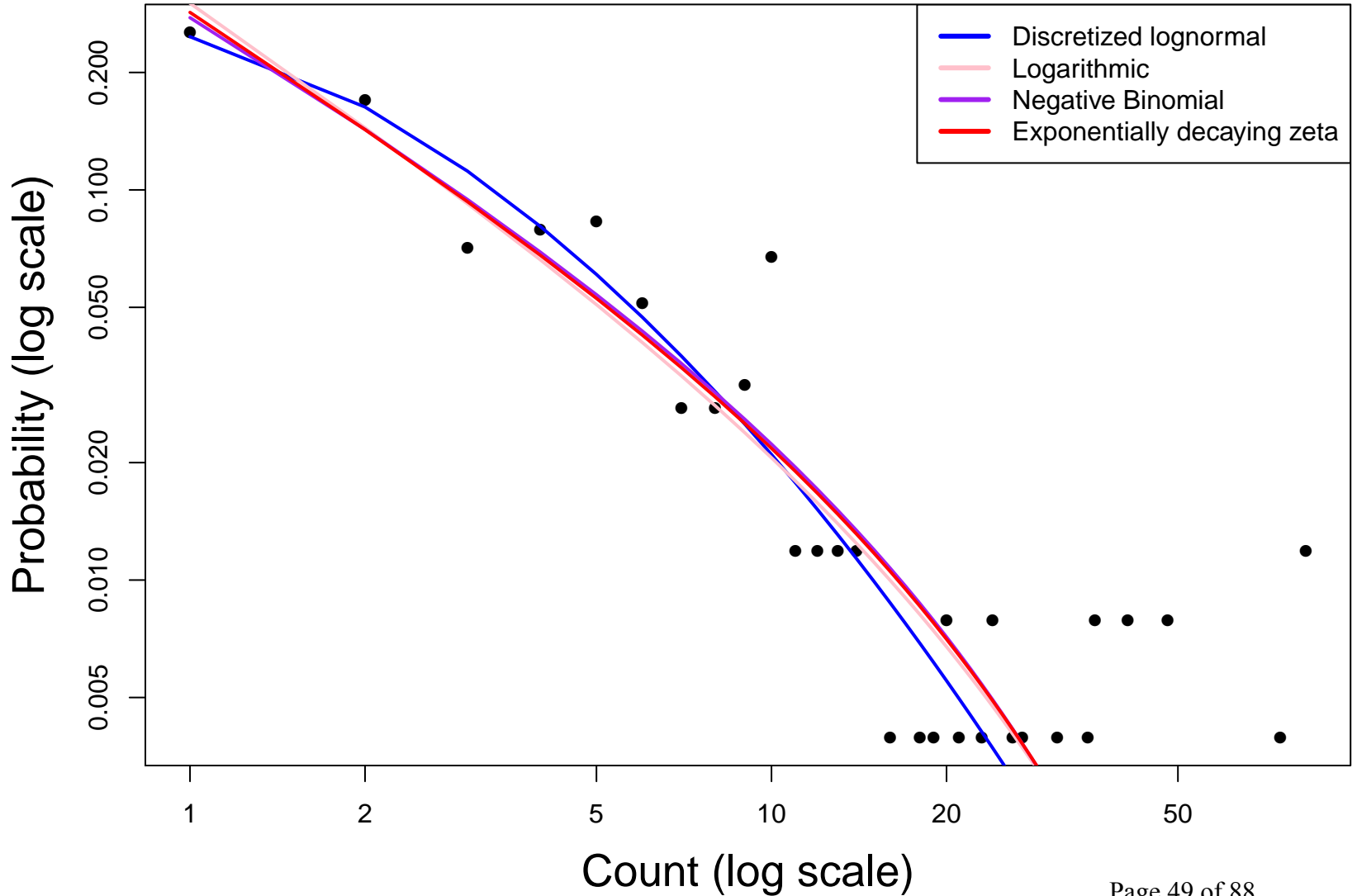
aush



WWSC



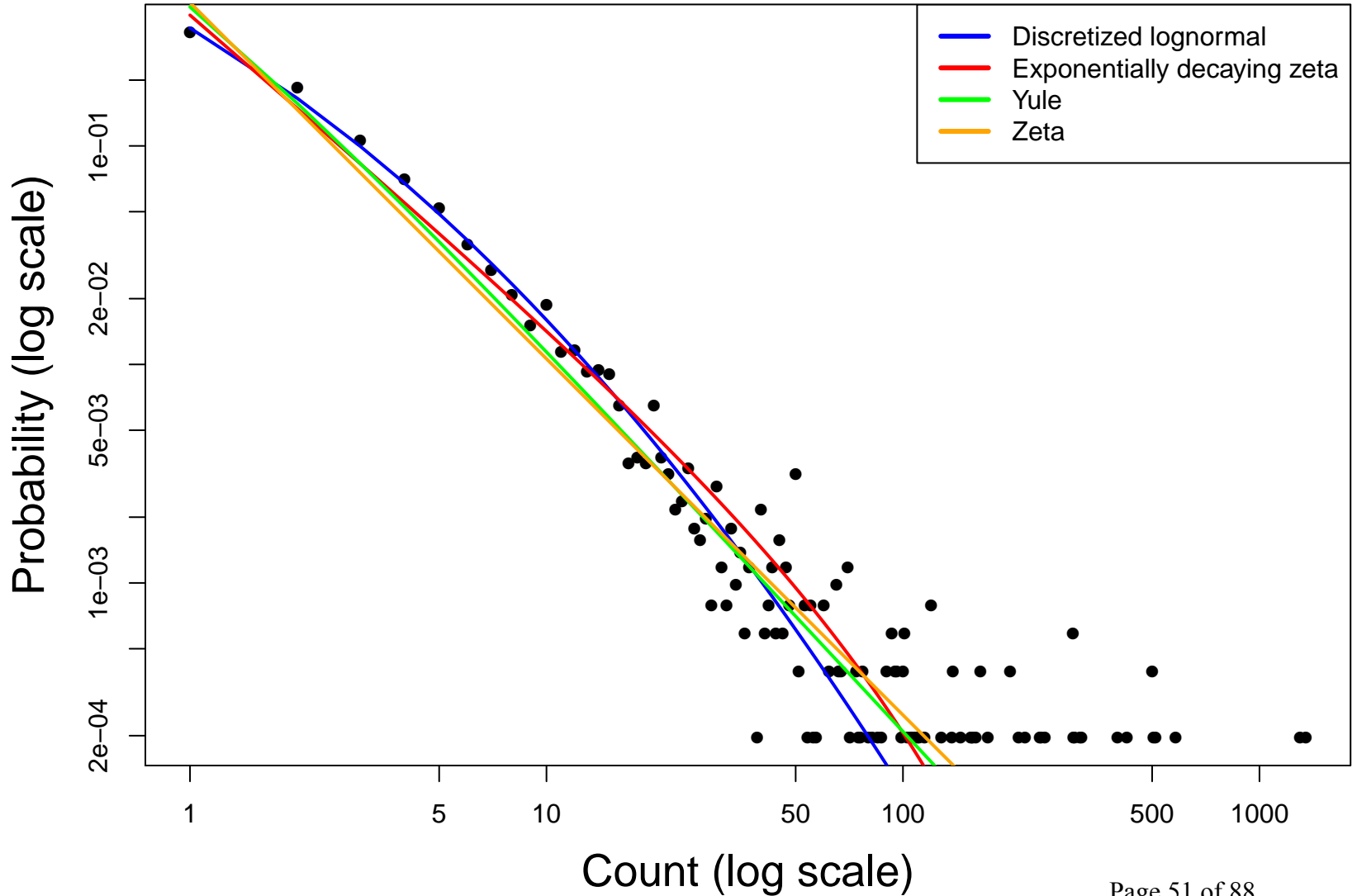
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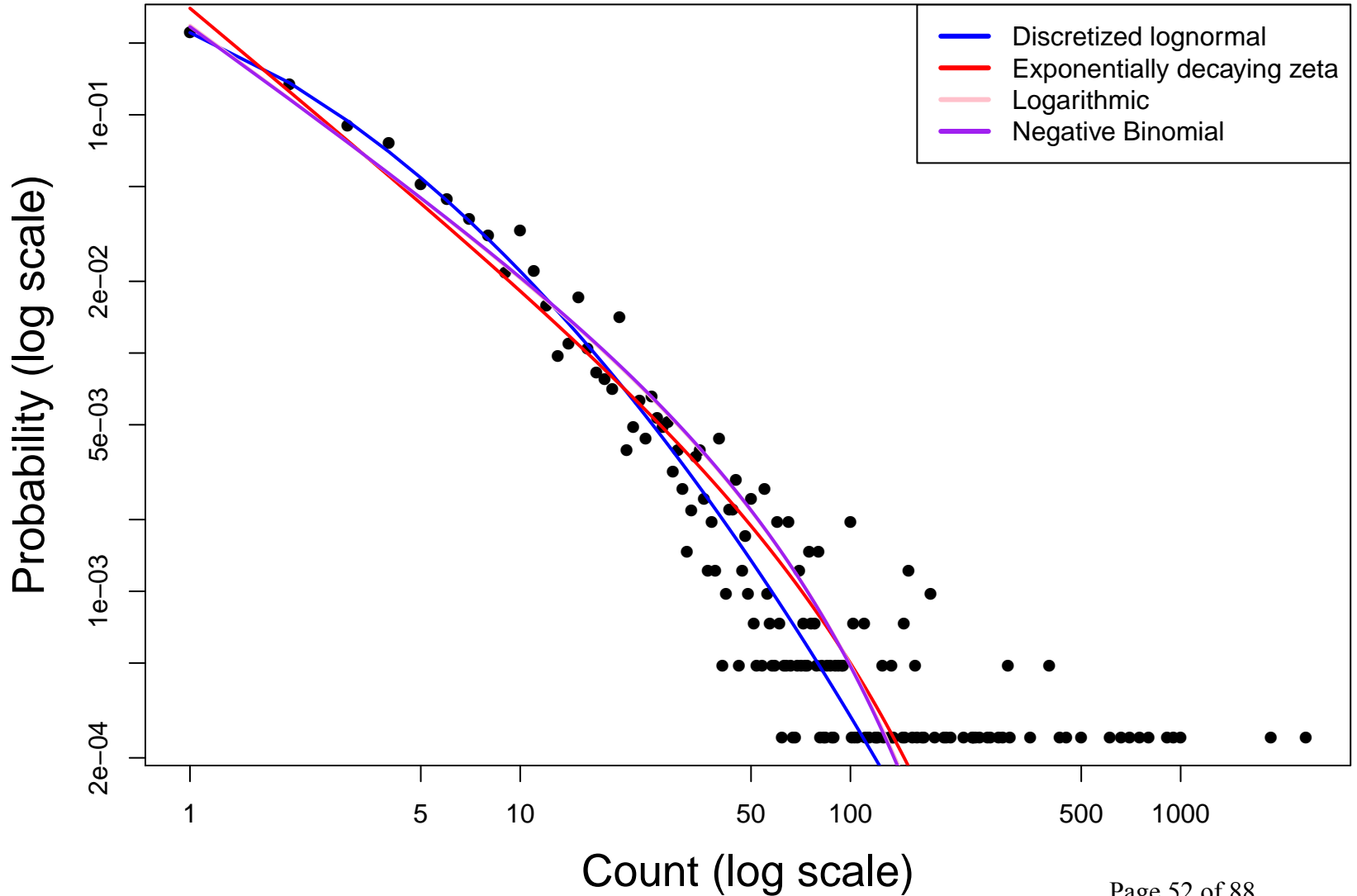
Figures E1 to E74. Model fit plots. Maximum likelihood model fits (lines) and observed probabilities (black dots) for non-zero count data for all modeled species. Fits are shown for the top four models, ranked in the legend from lowest to highest AICc.

Figures E38 to E59. Model fit plots for FALL season:

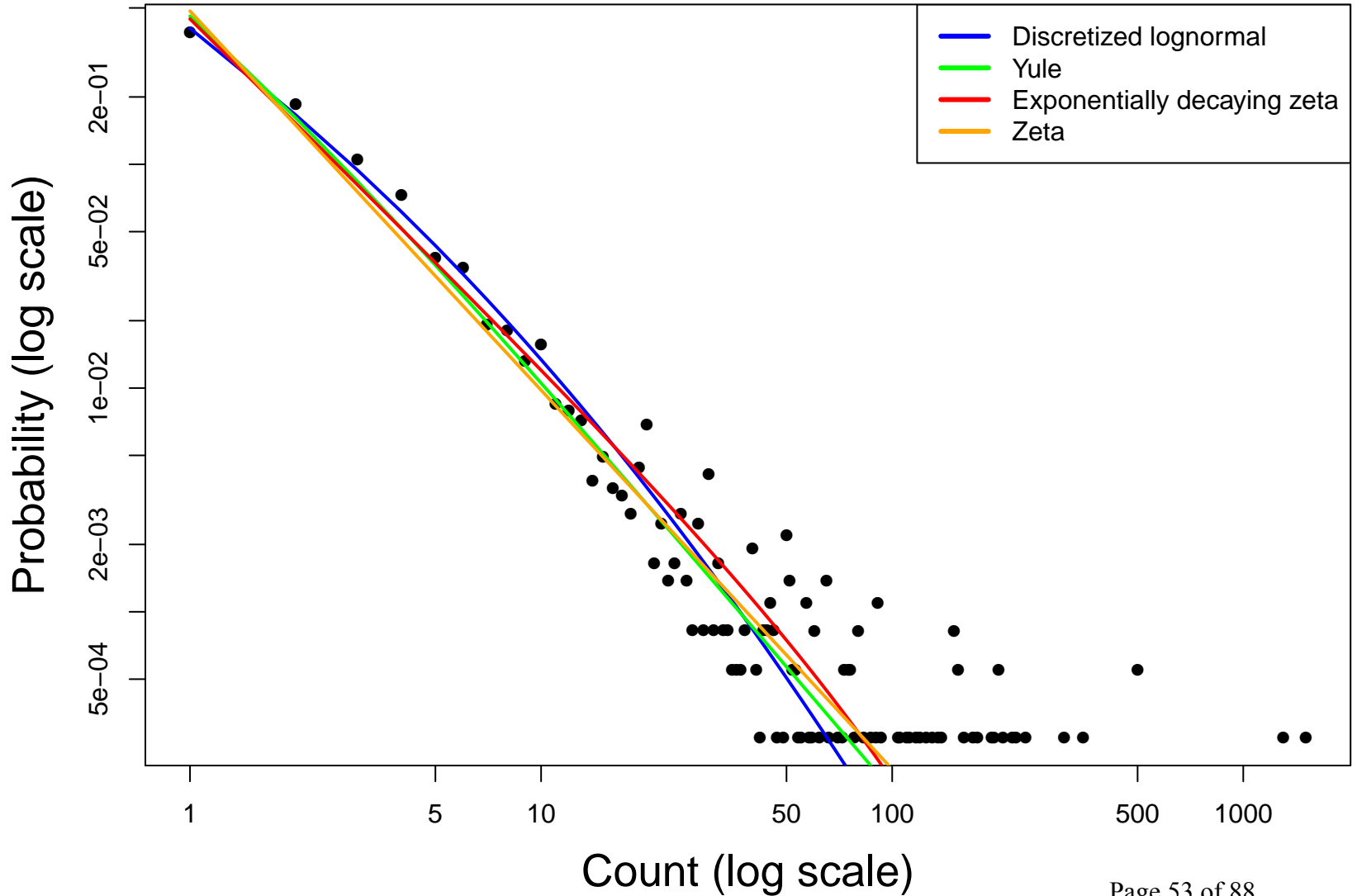
herg



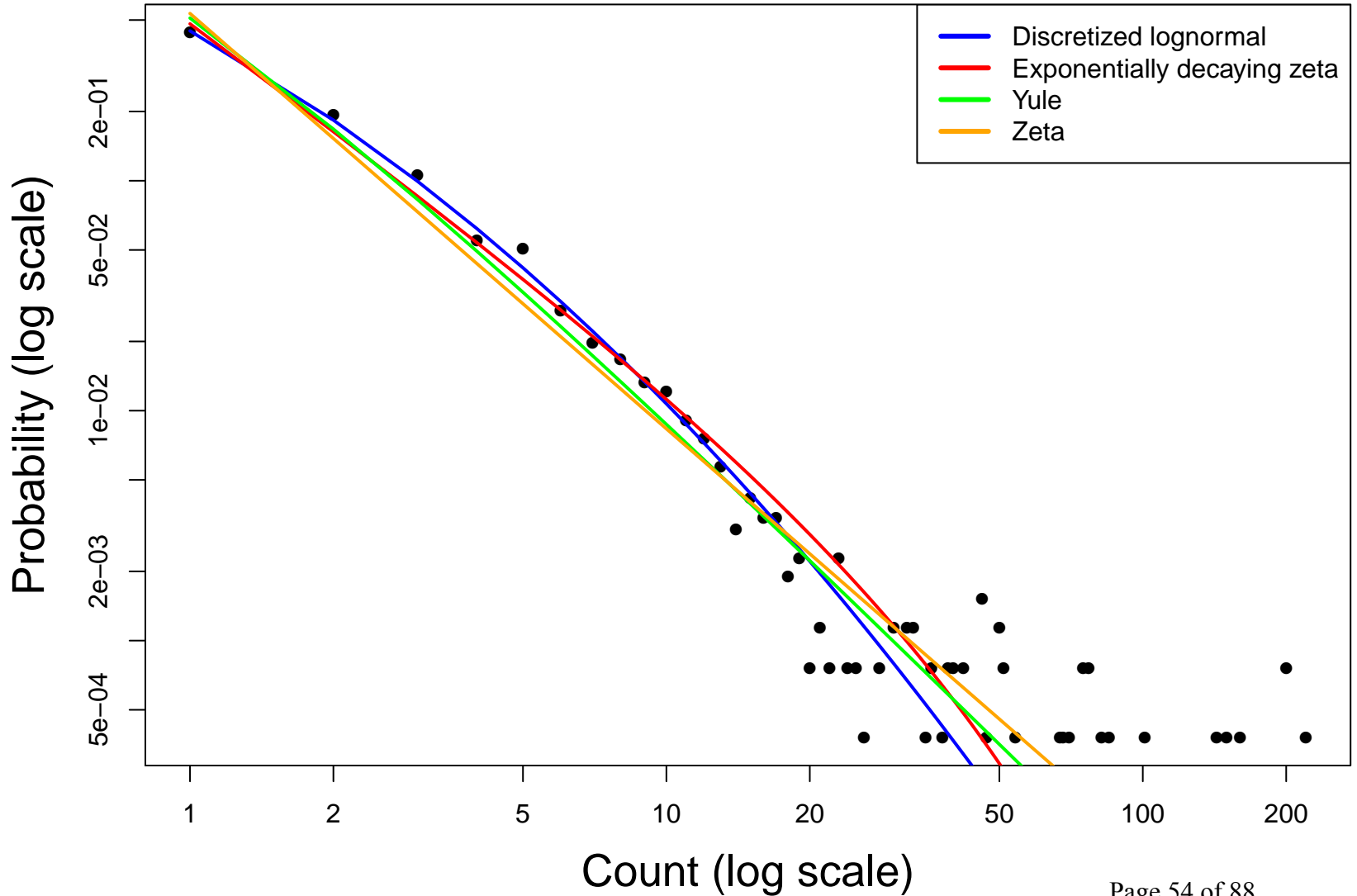
grsh



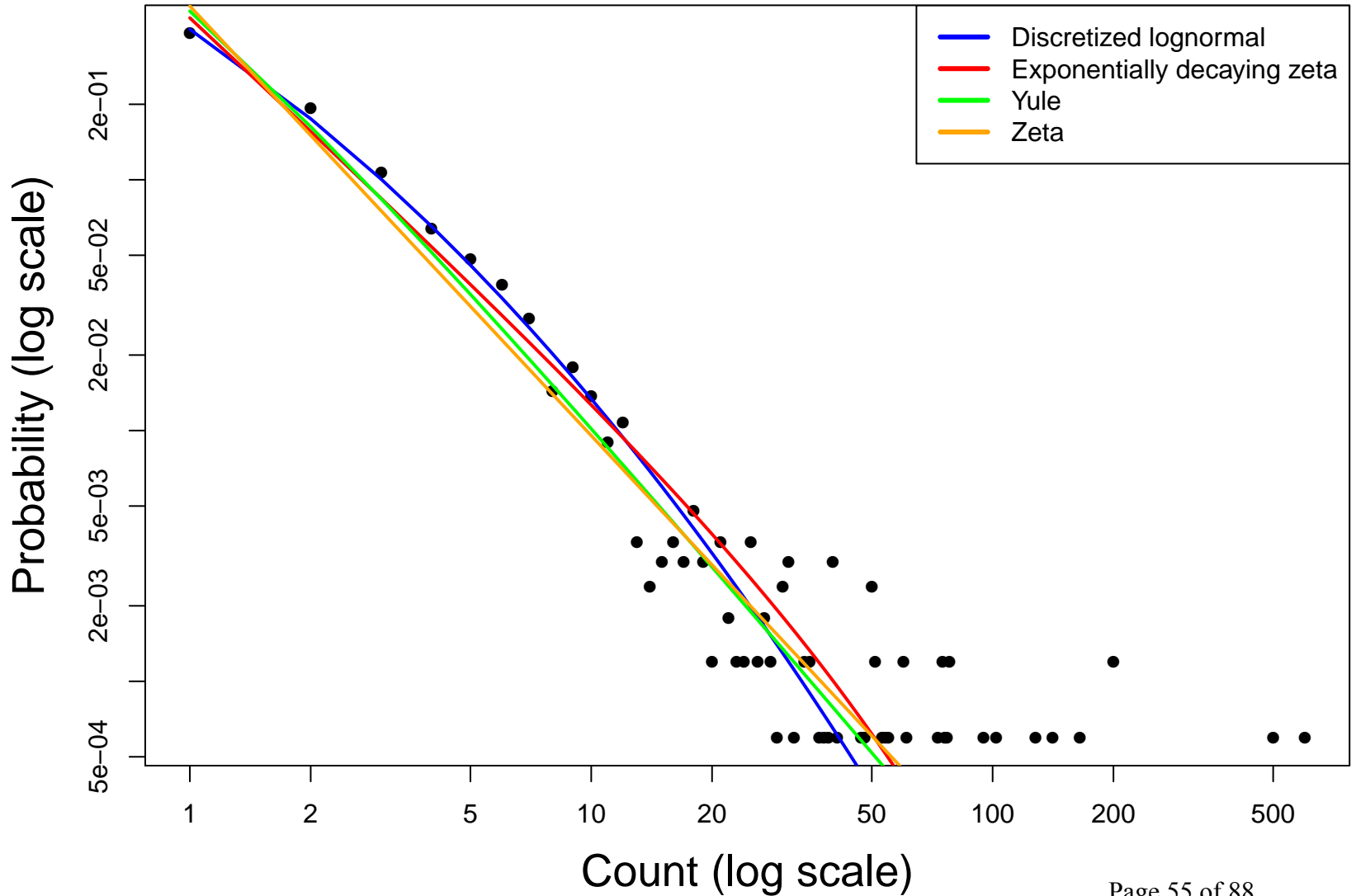
gbbg



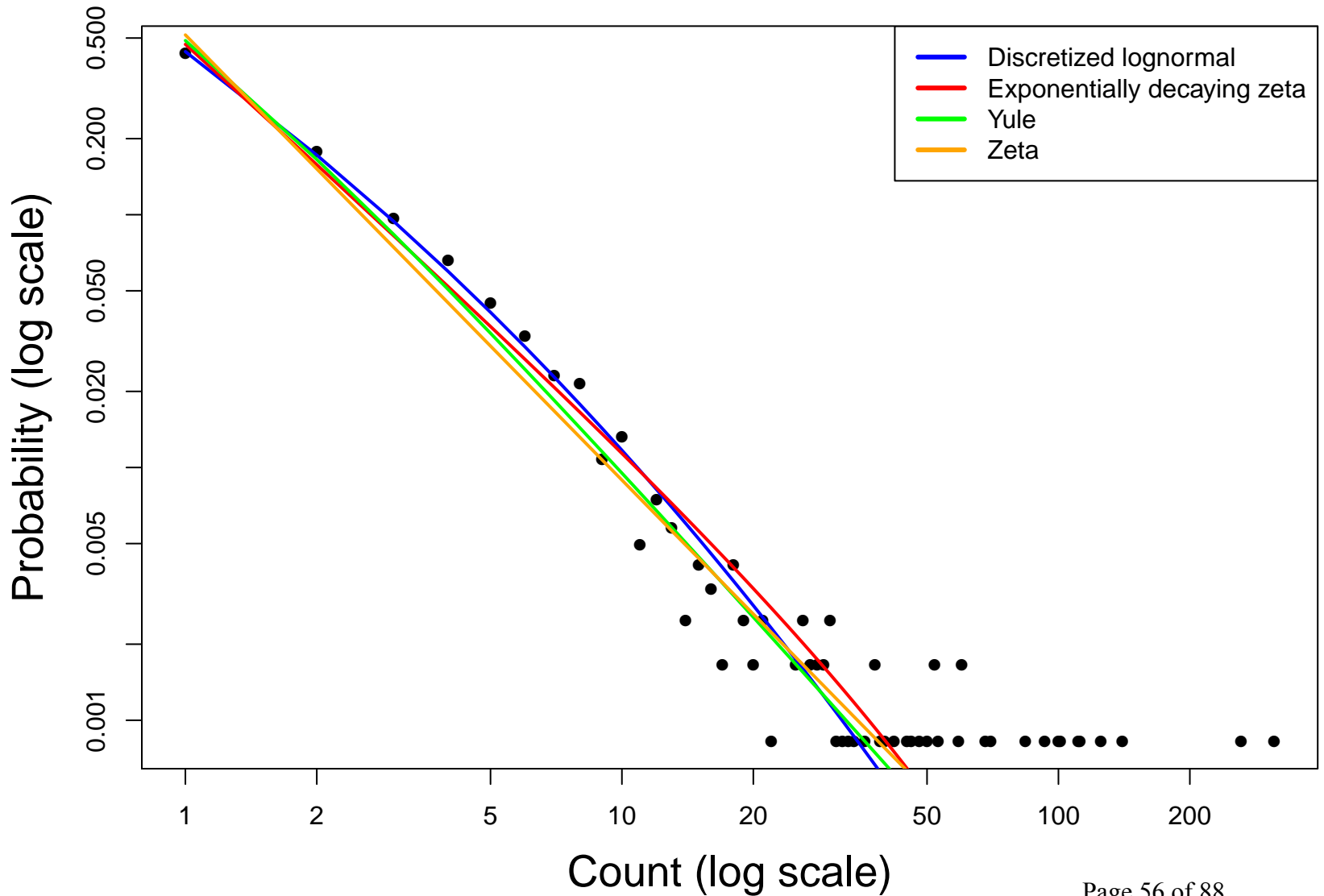
noga



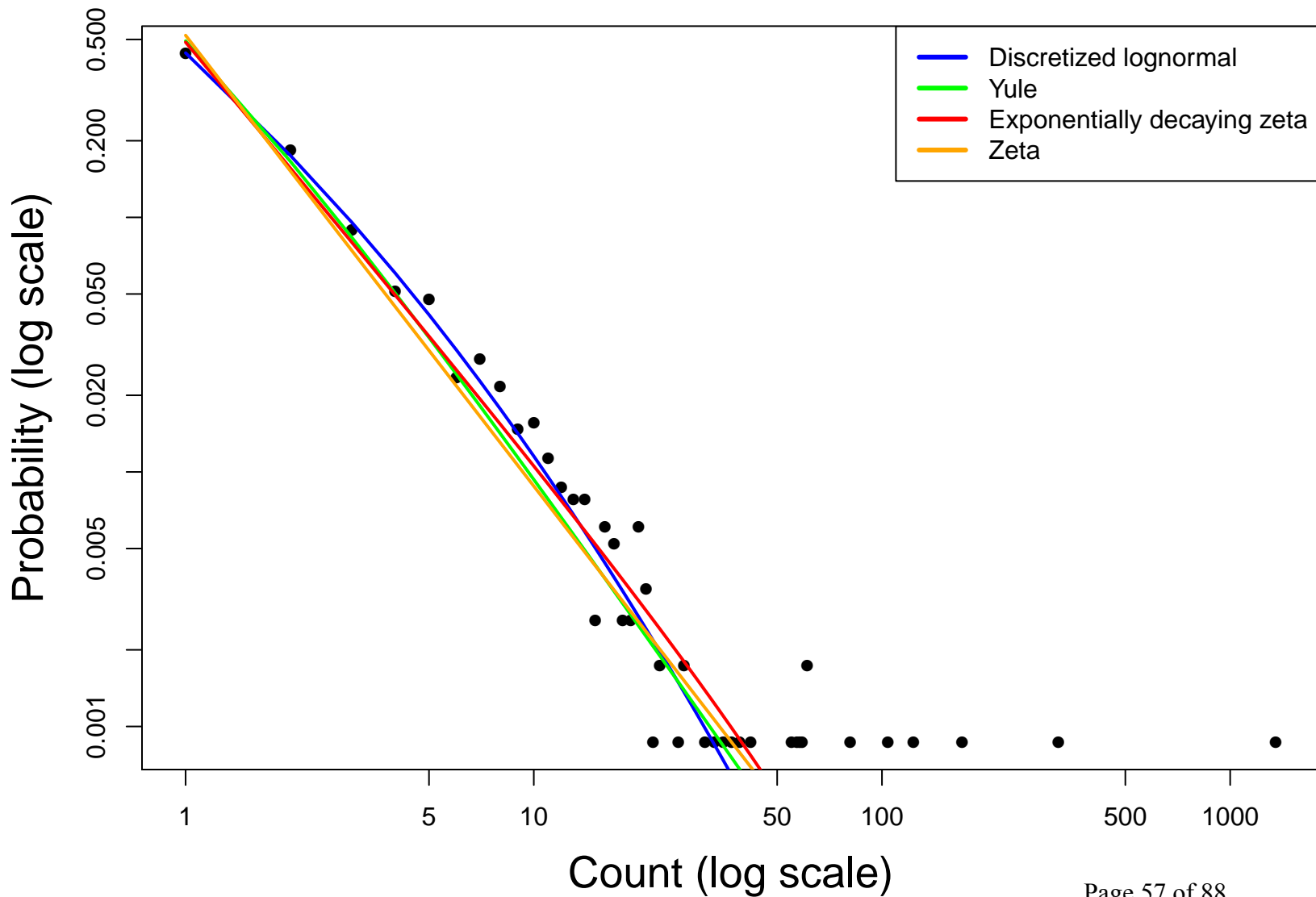
blki



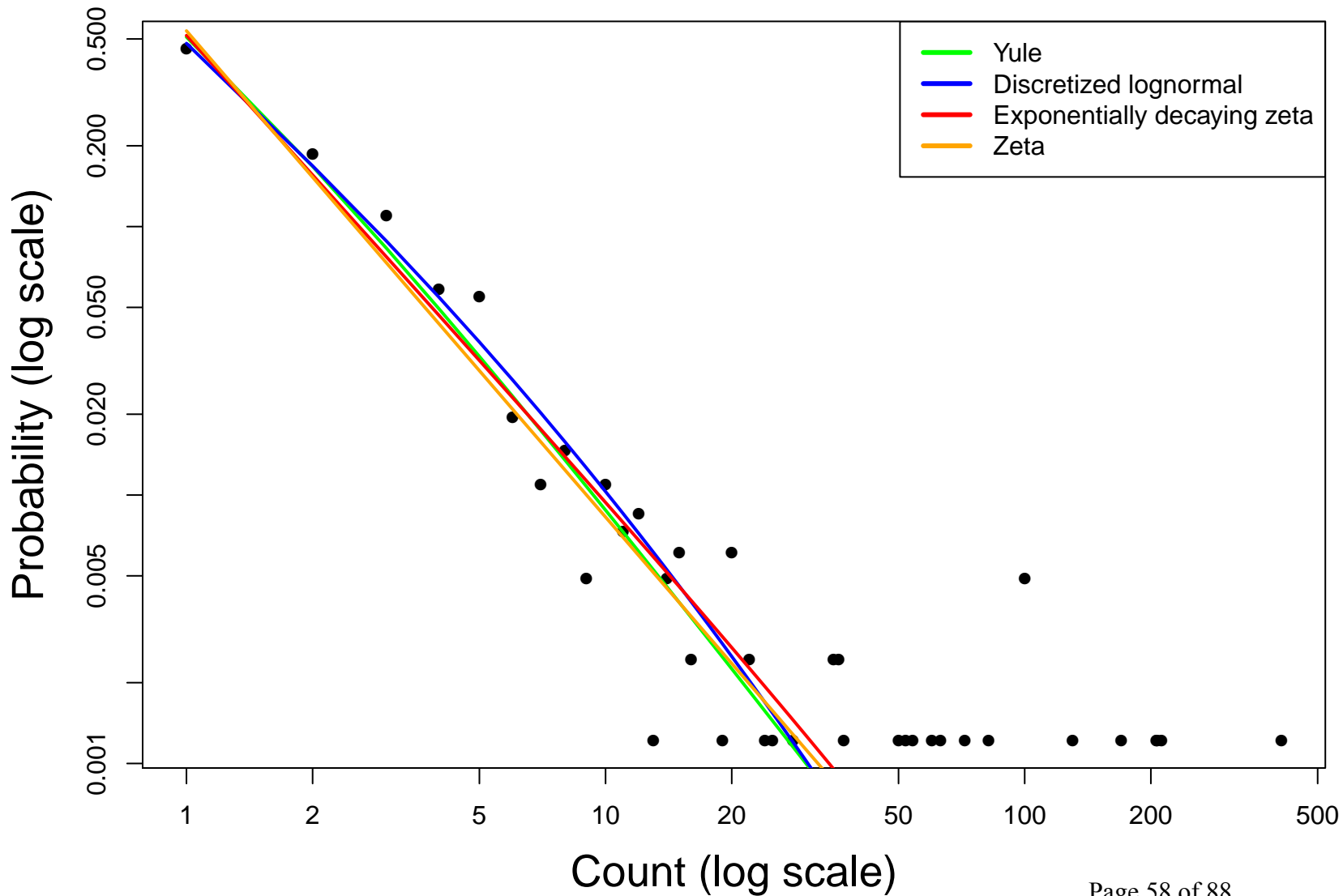
cosh



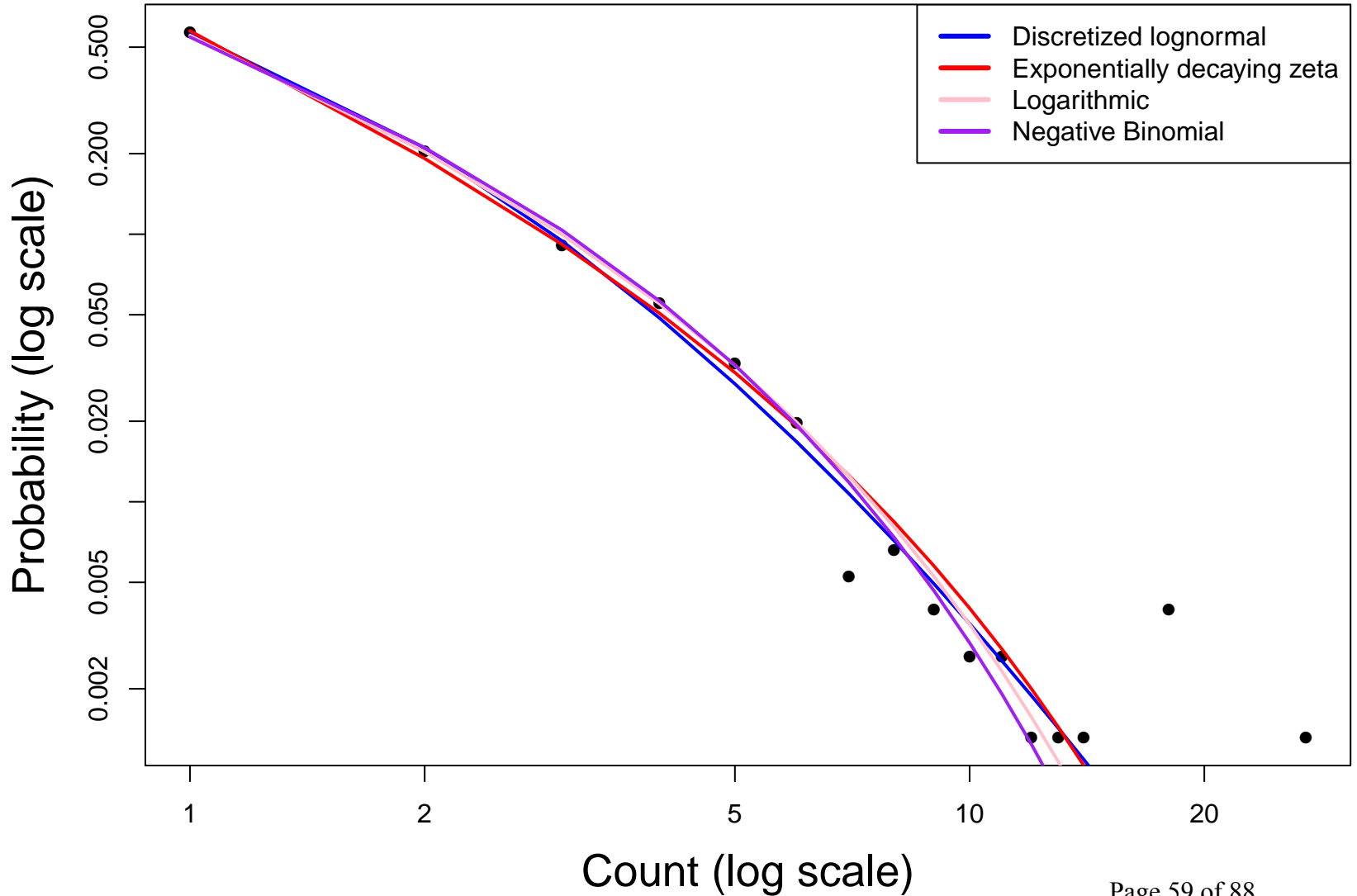
nofu



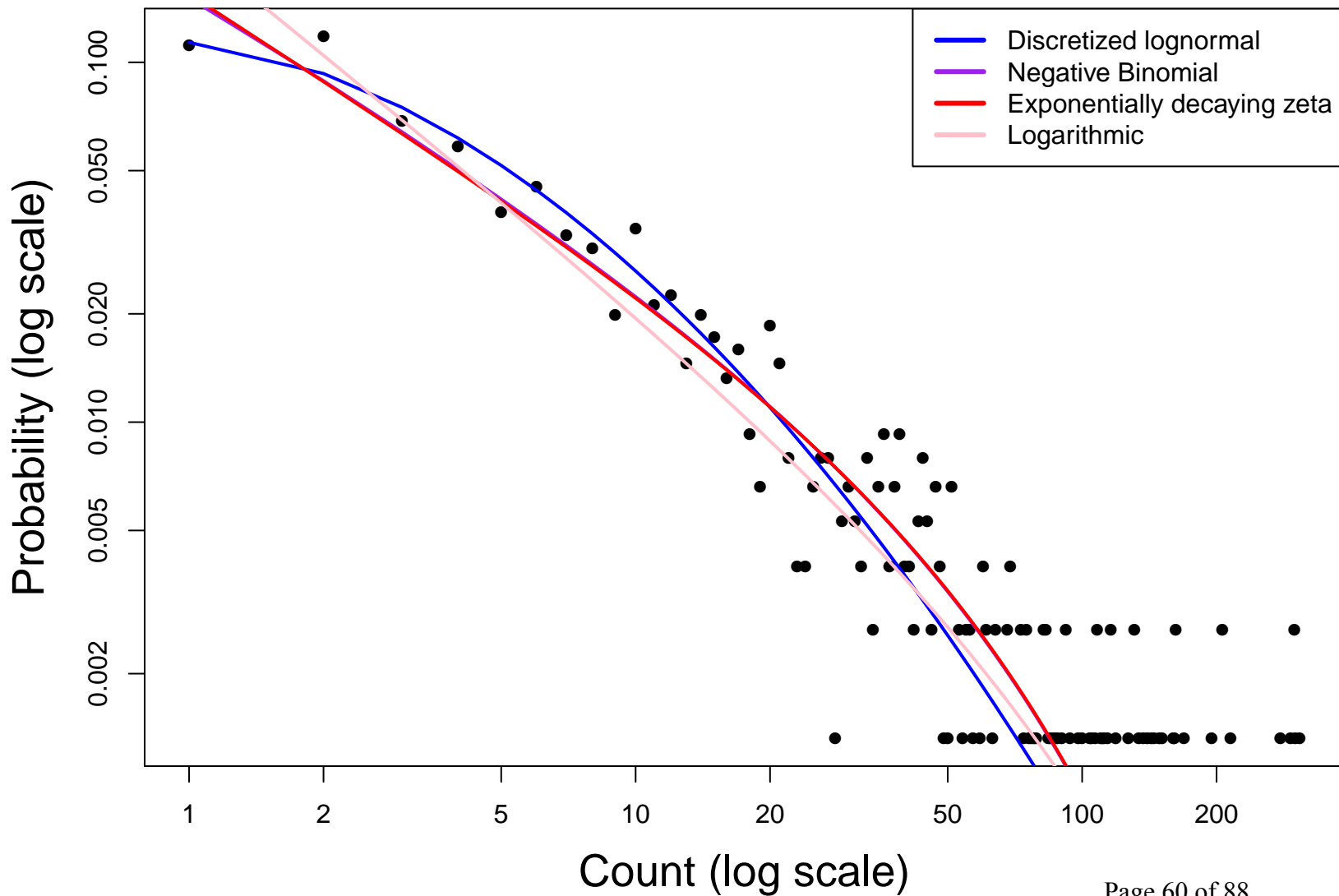
wisp



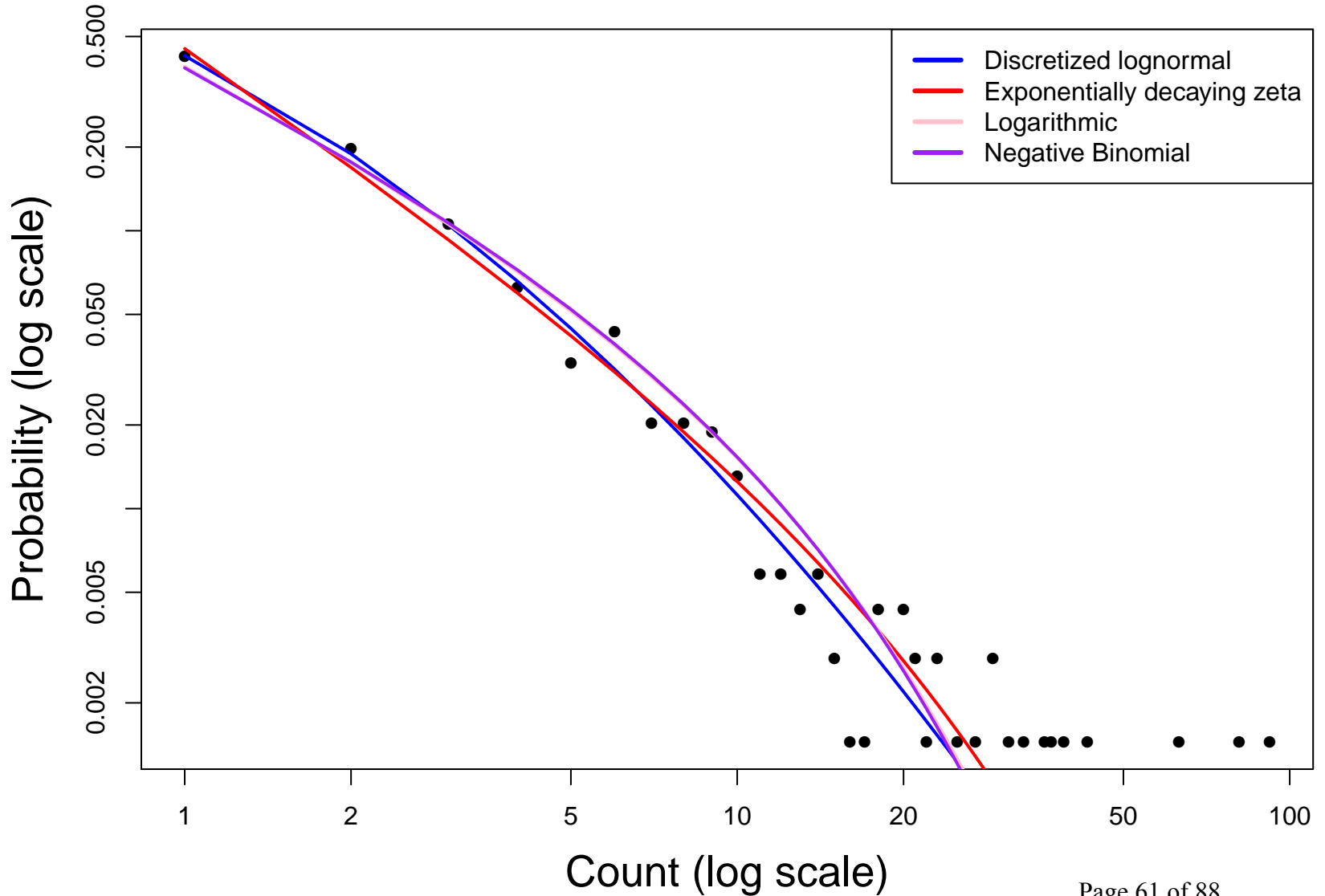
colo



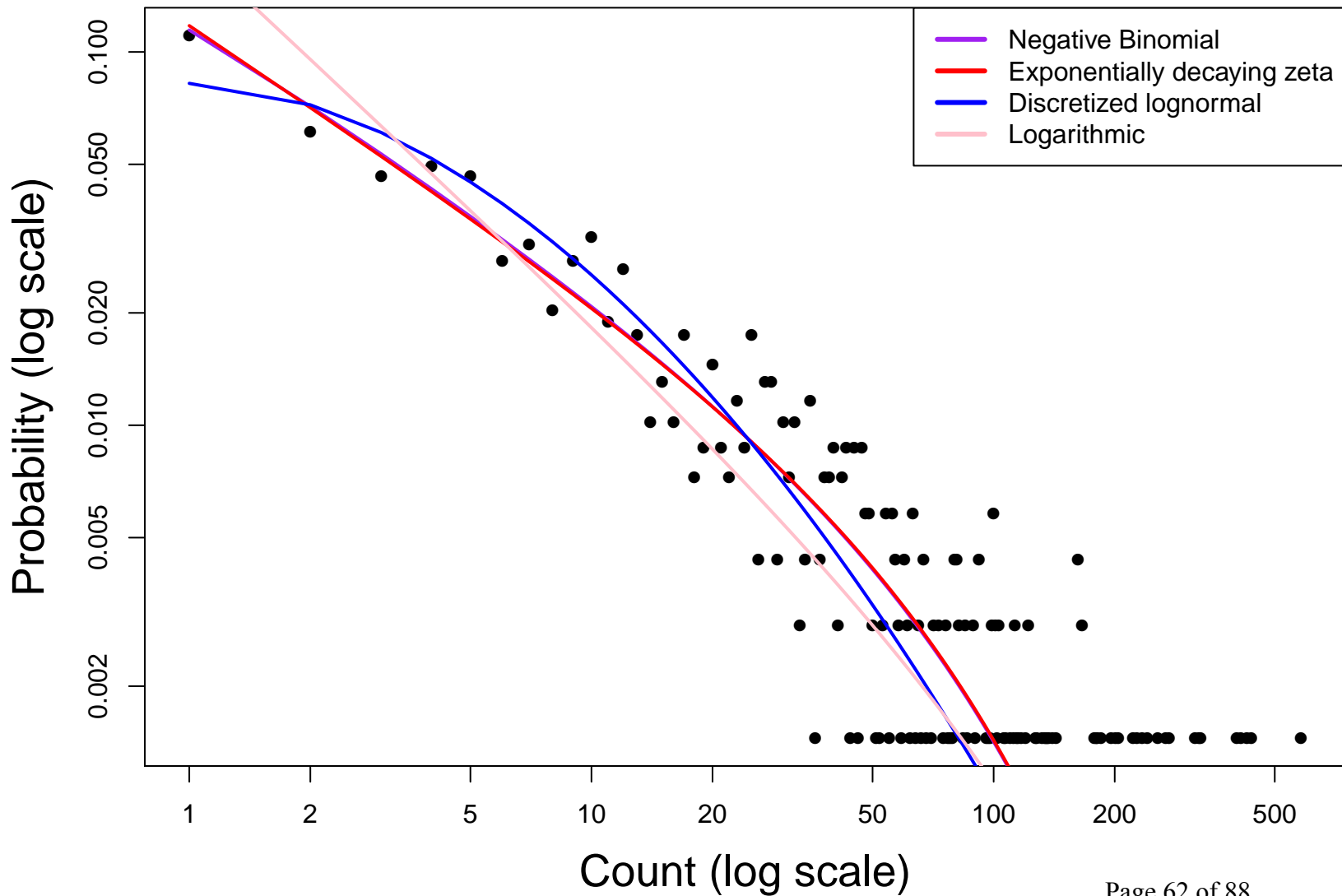
Itdu



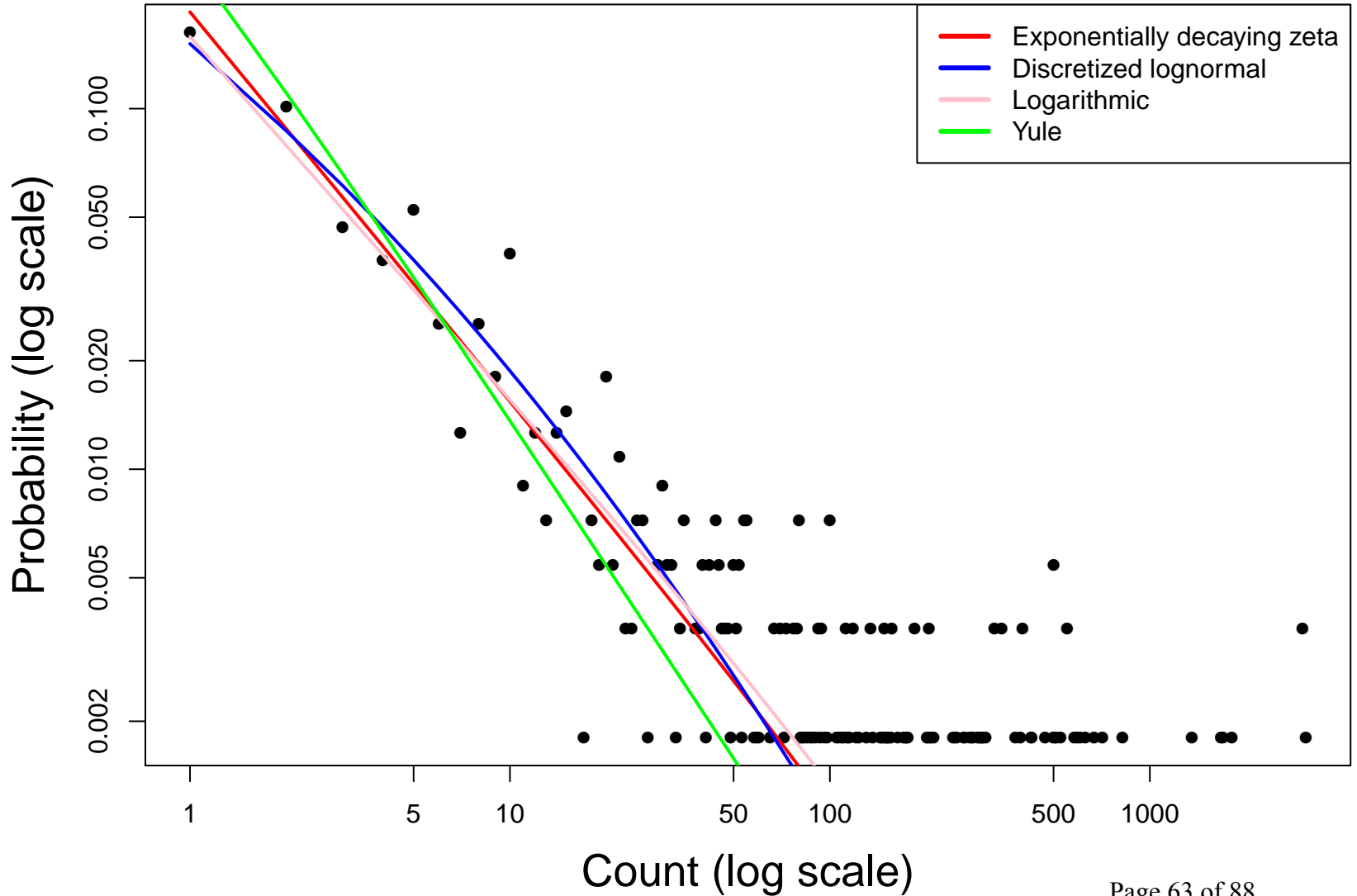
lagu



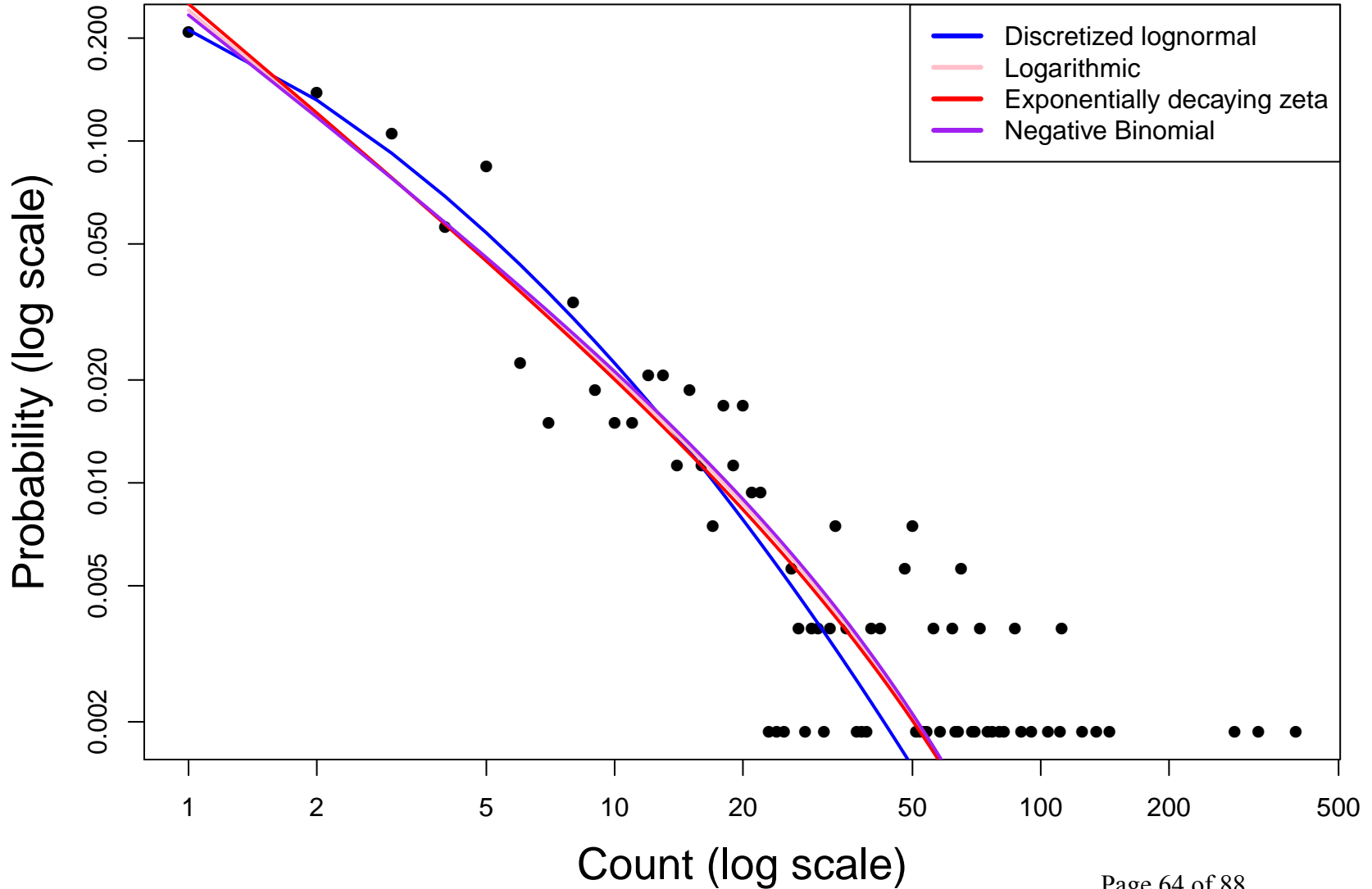
SUSC



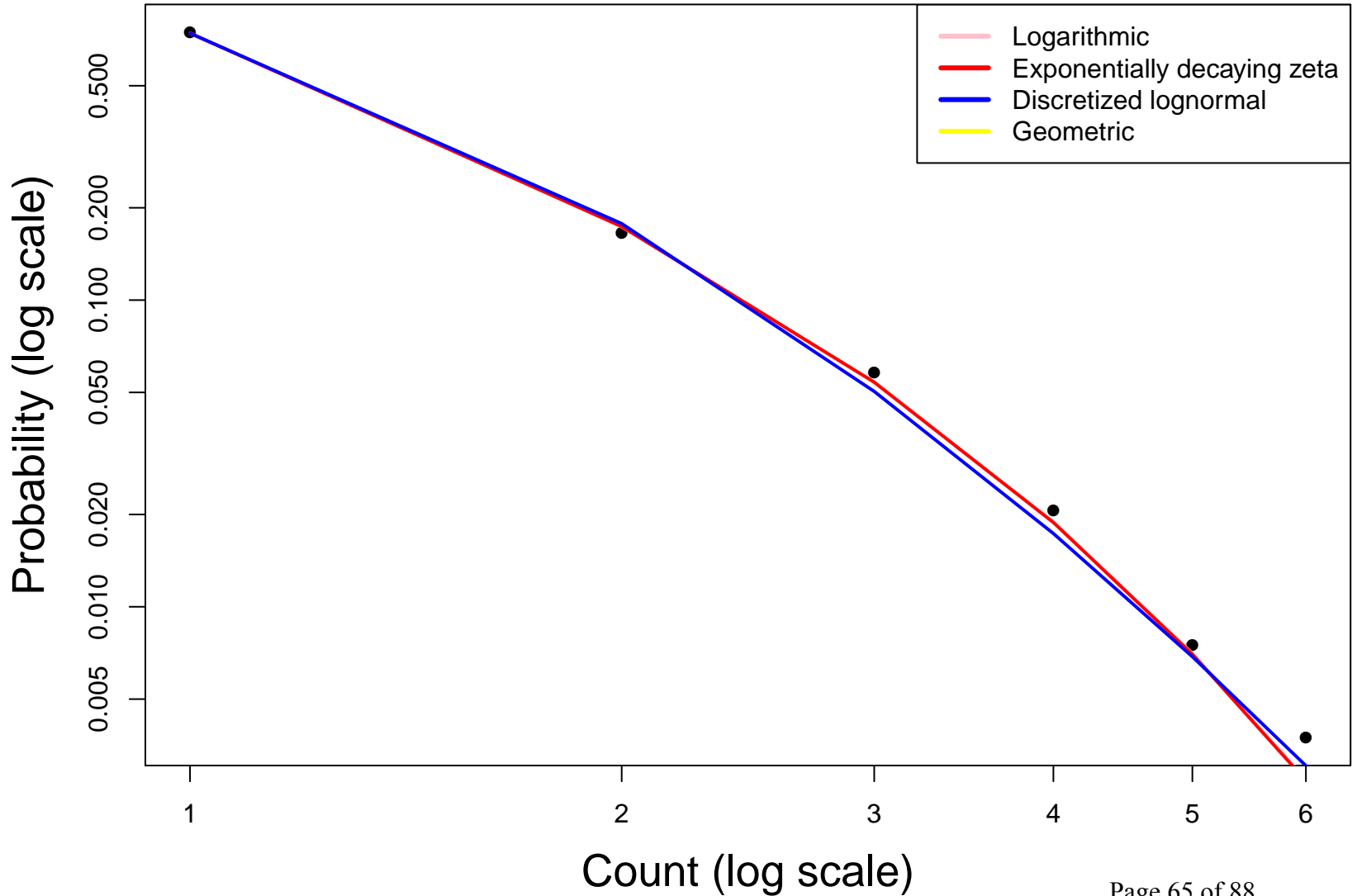
coei



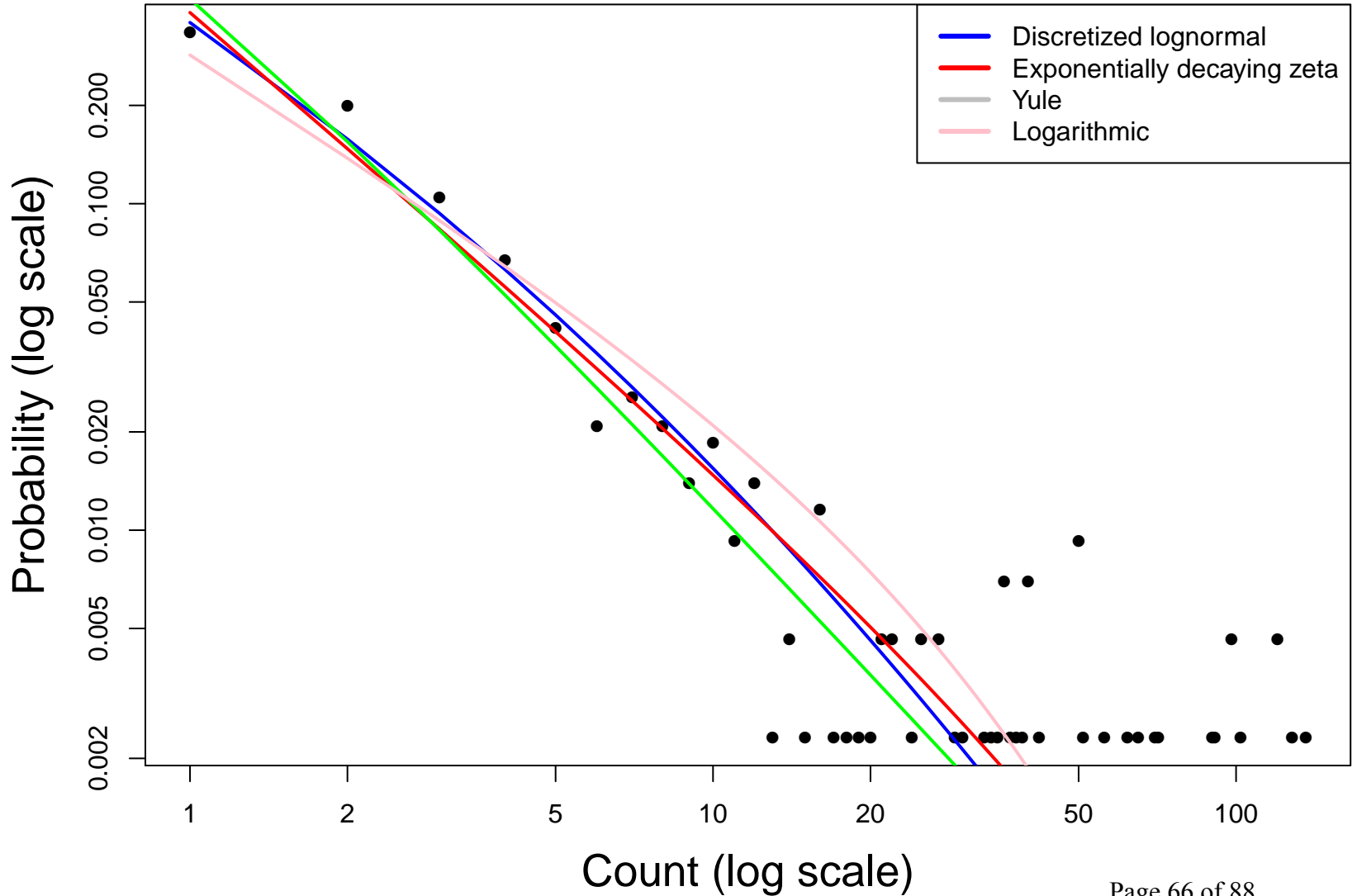
WWSC



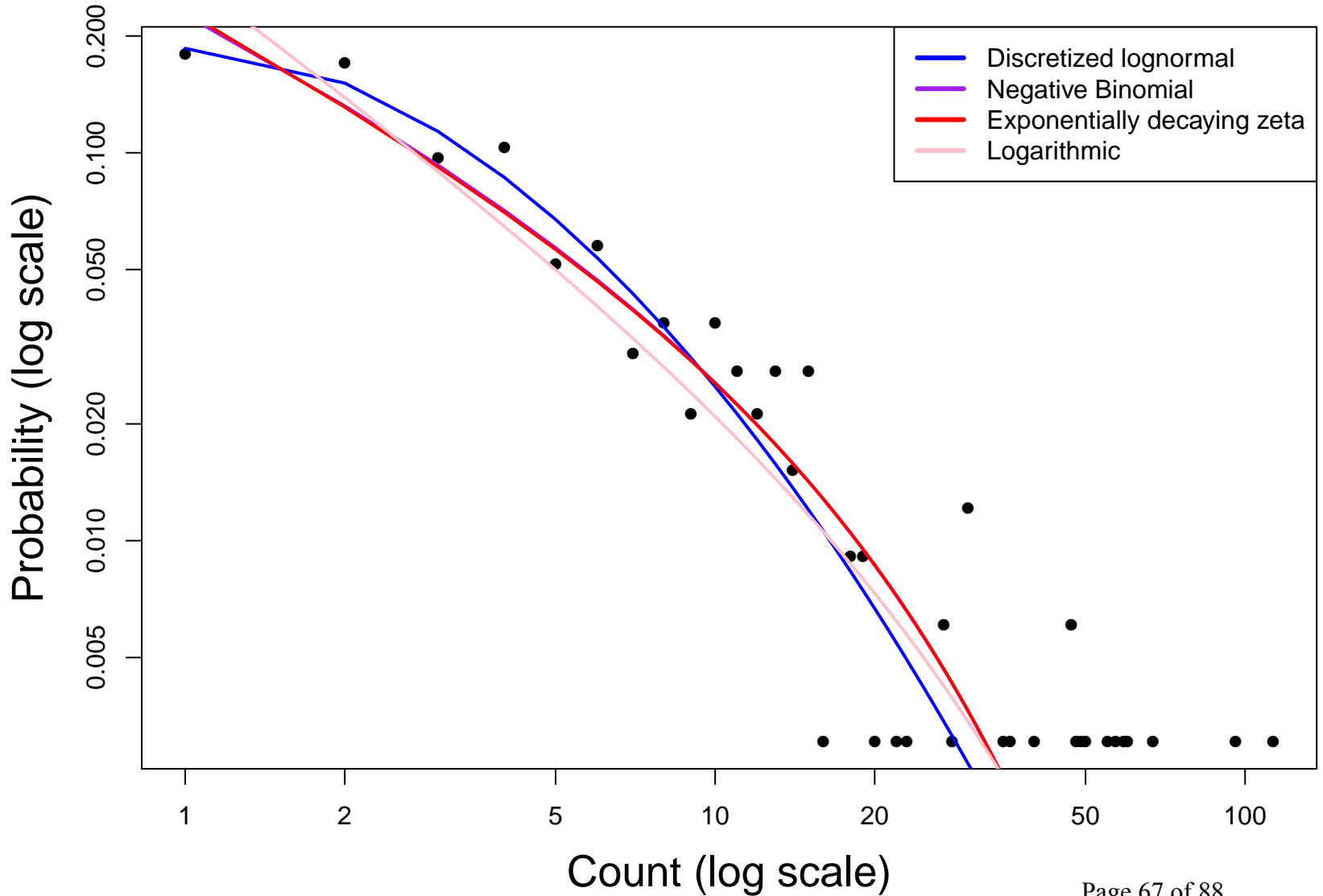
poja



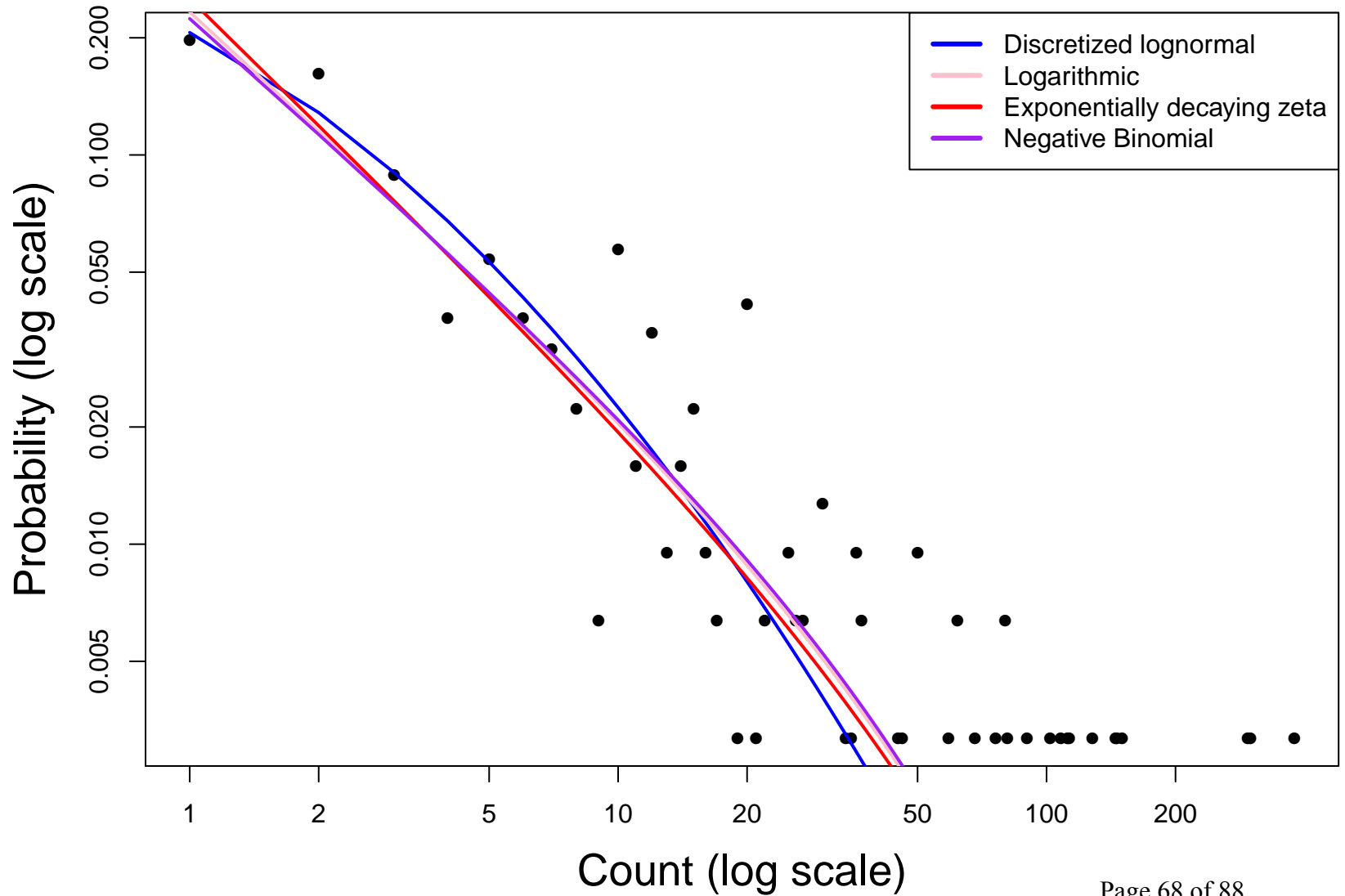
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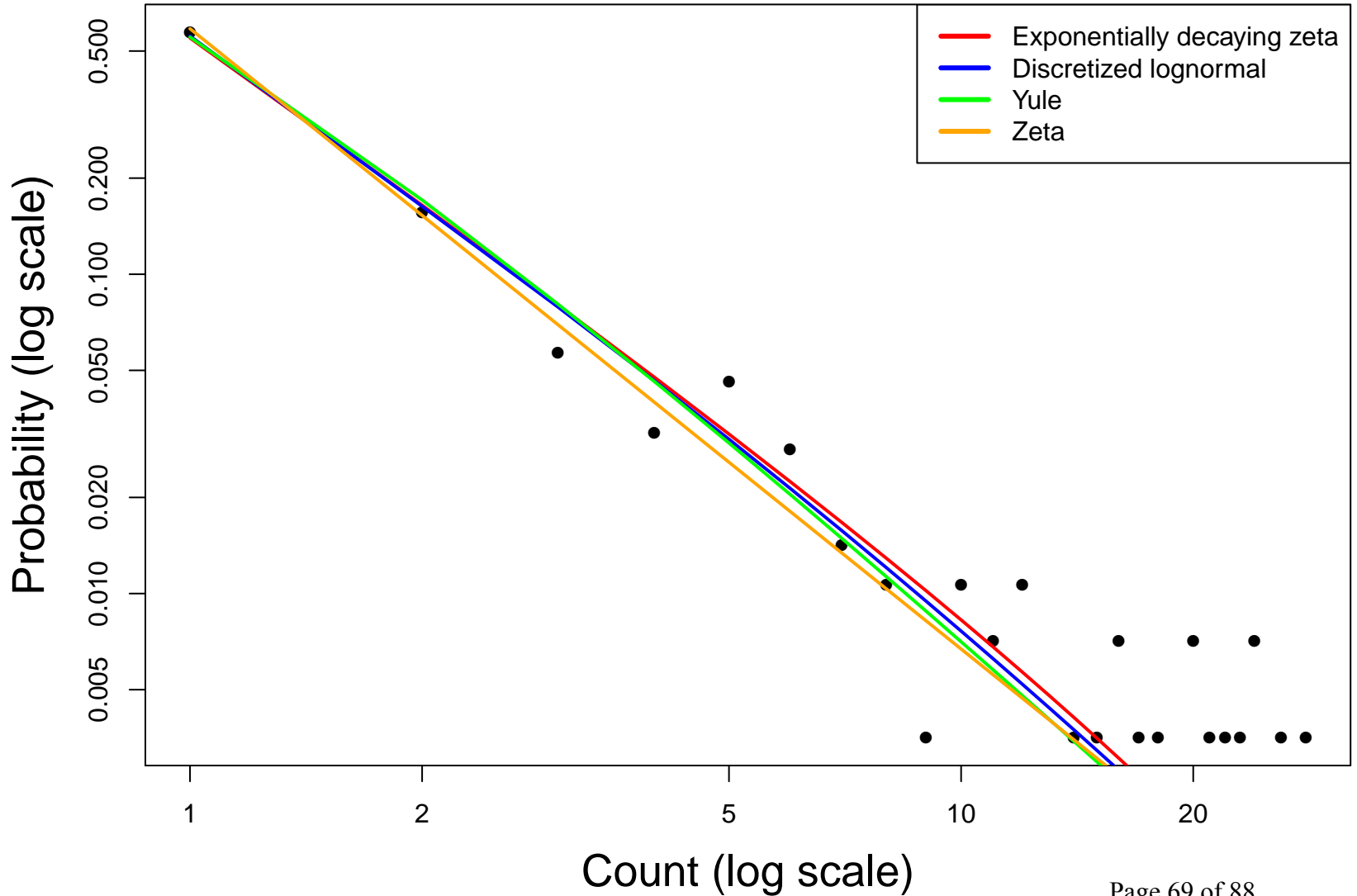
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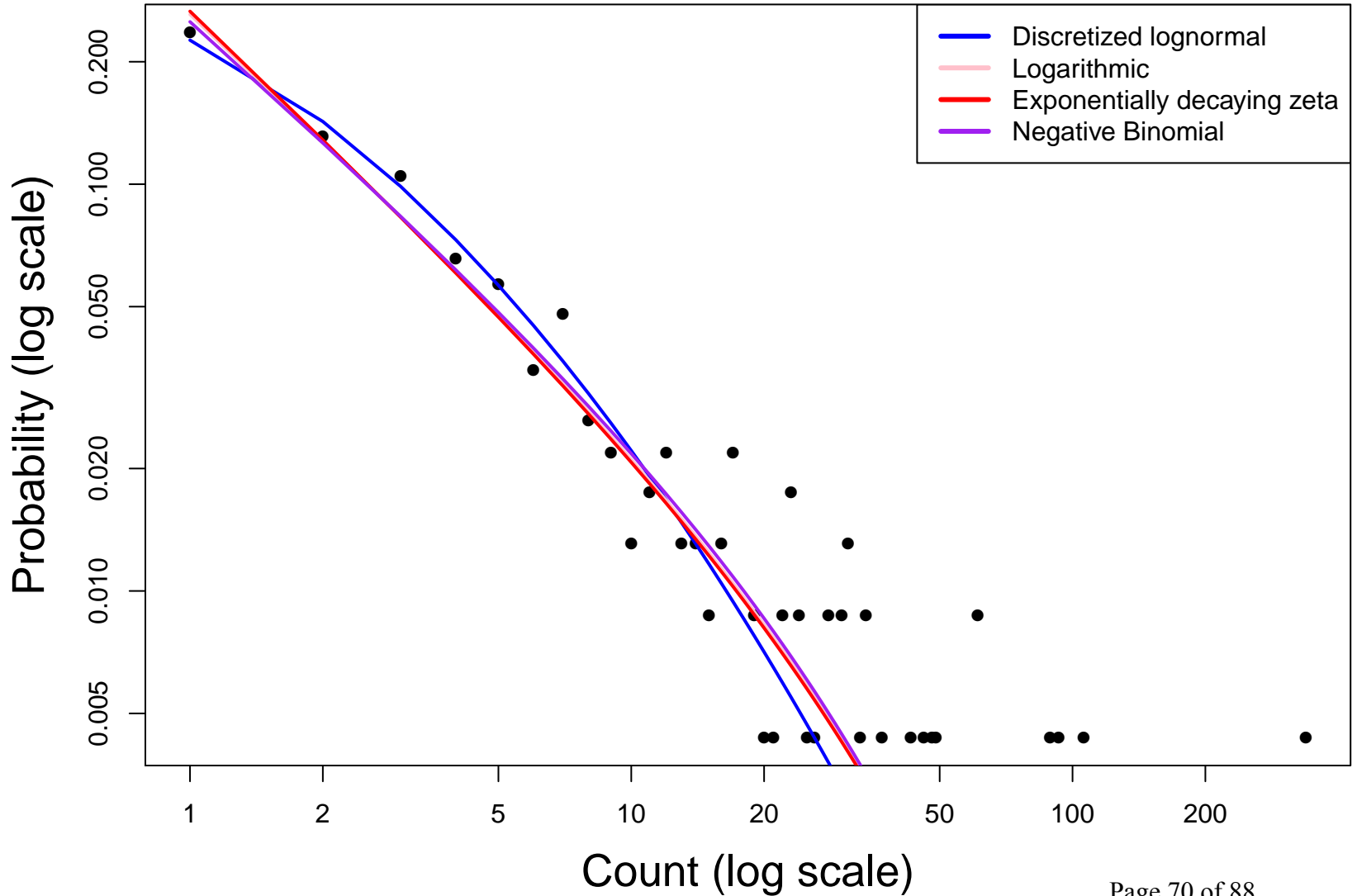
blsc



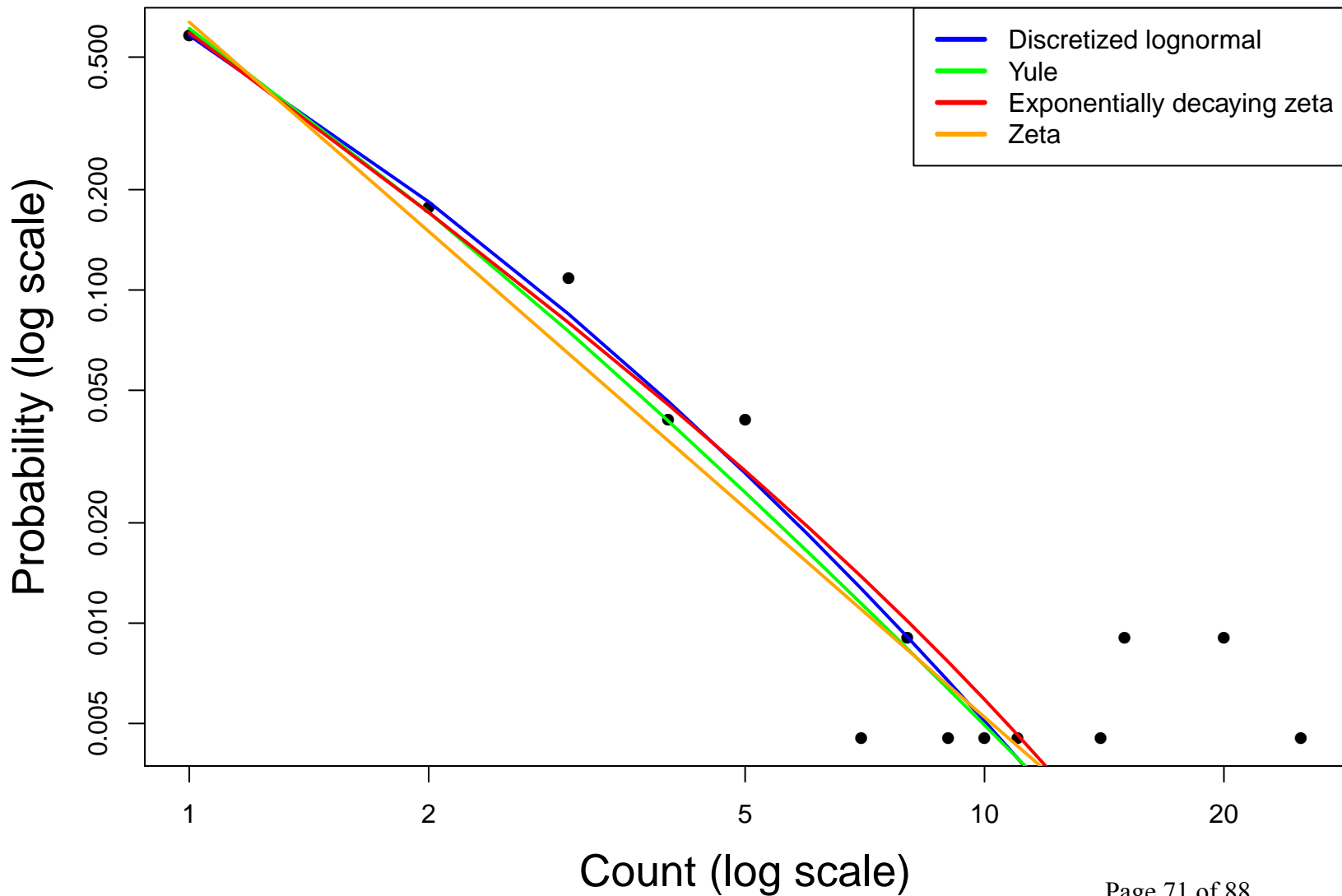
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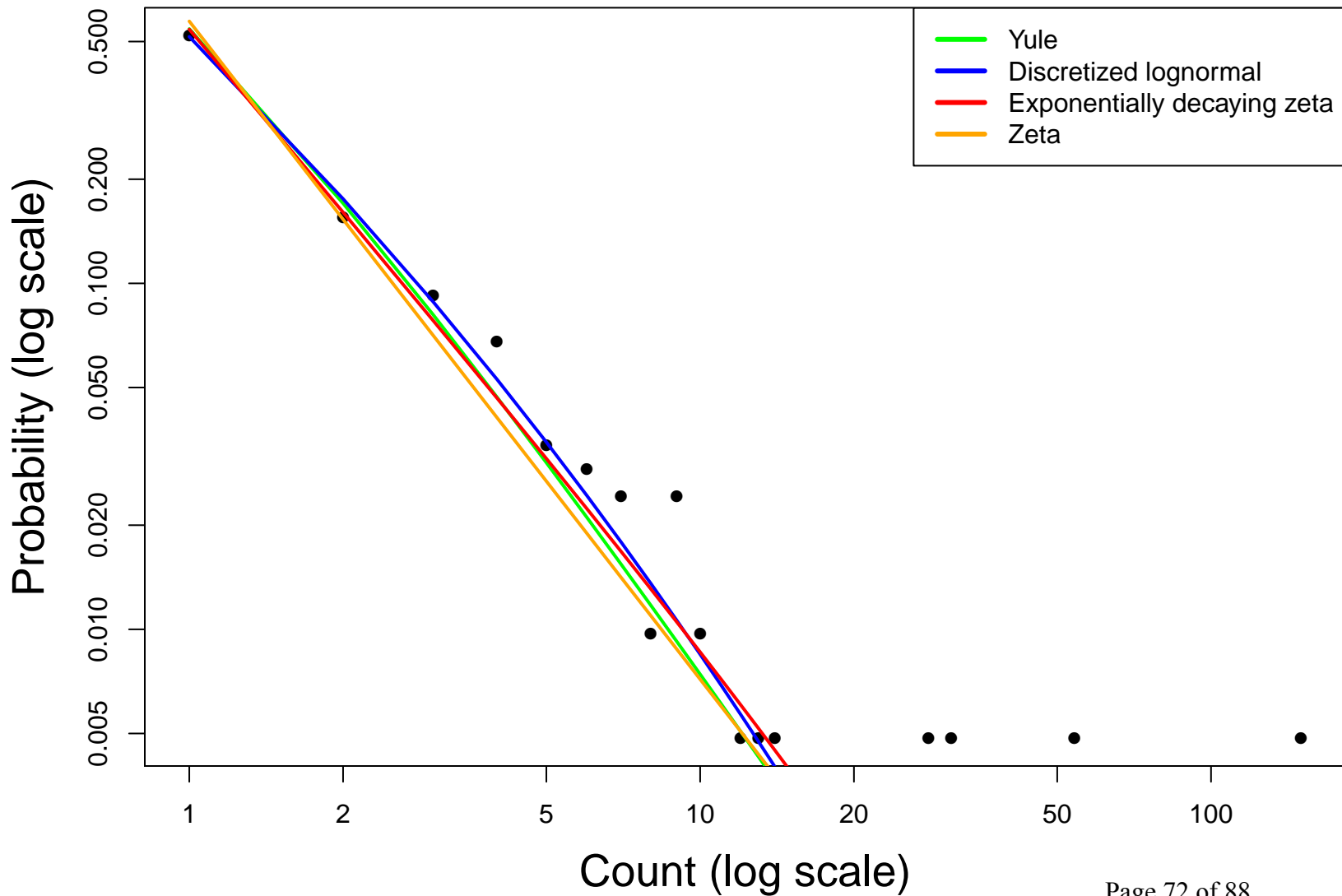
dove



lesp



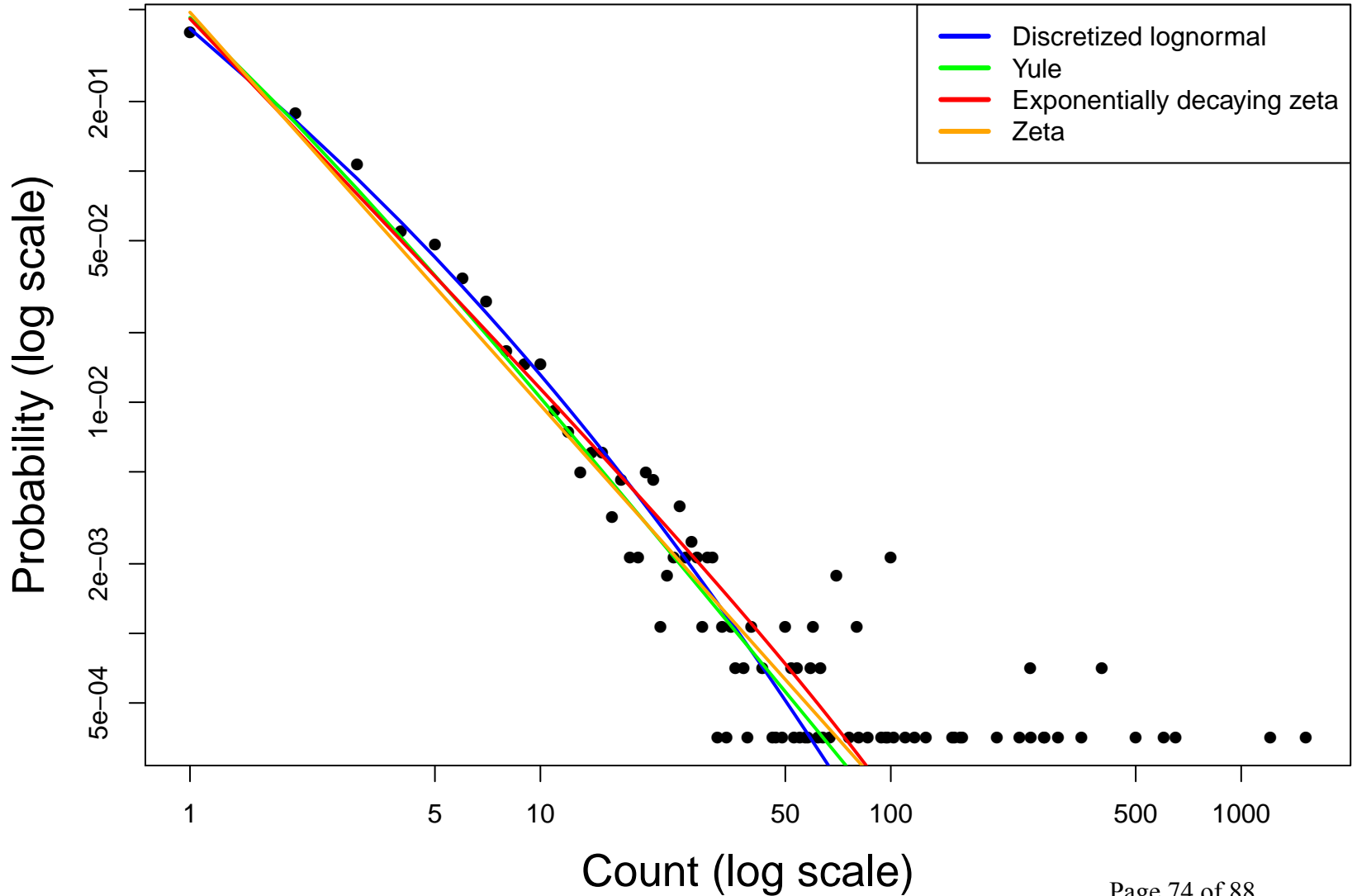
aush



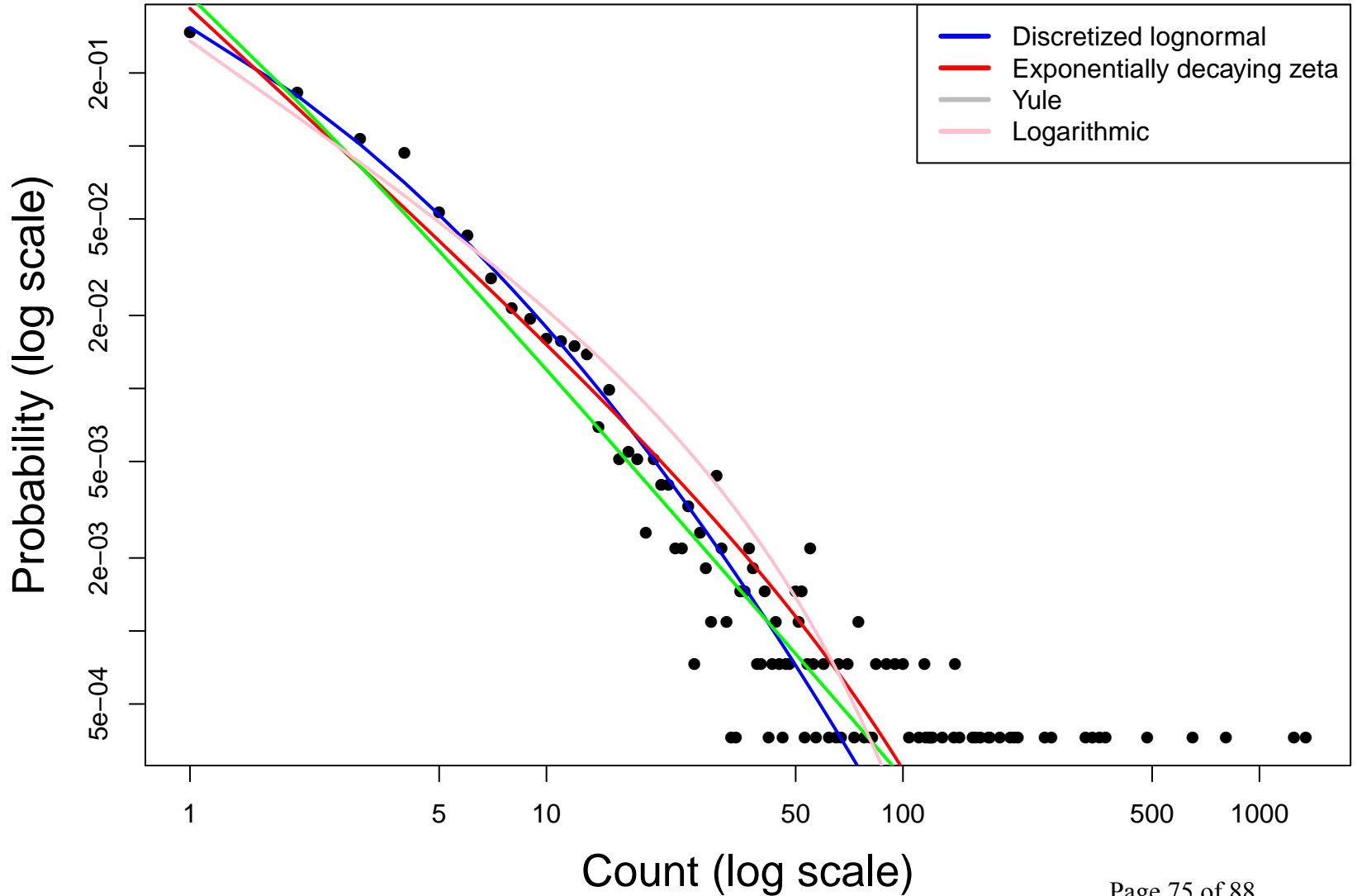
Figures E1 to E74. Model fit plots. Maximum likelihood model fits (lines) and observed probabilities (black dots) for non-zero count data for all modeled species. Fits are shown for the top four models, ranked in the legend from lowest to highest AICc.

Figures E60 to E74. Model fit plots for WINTER season:

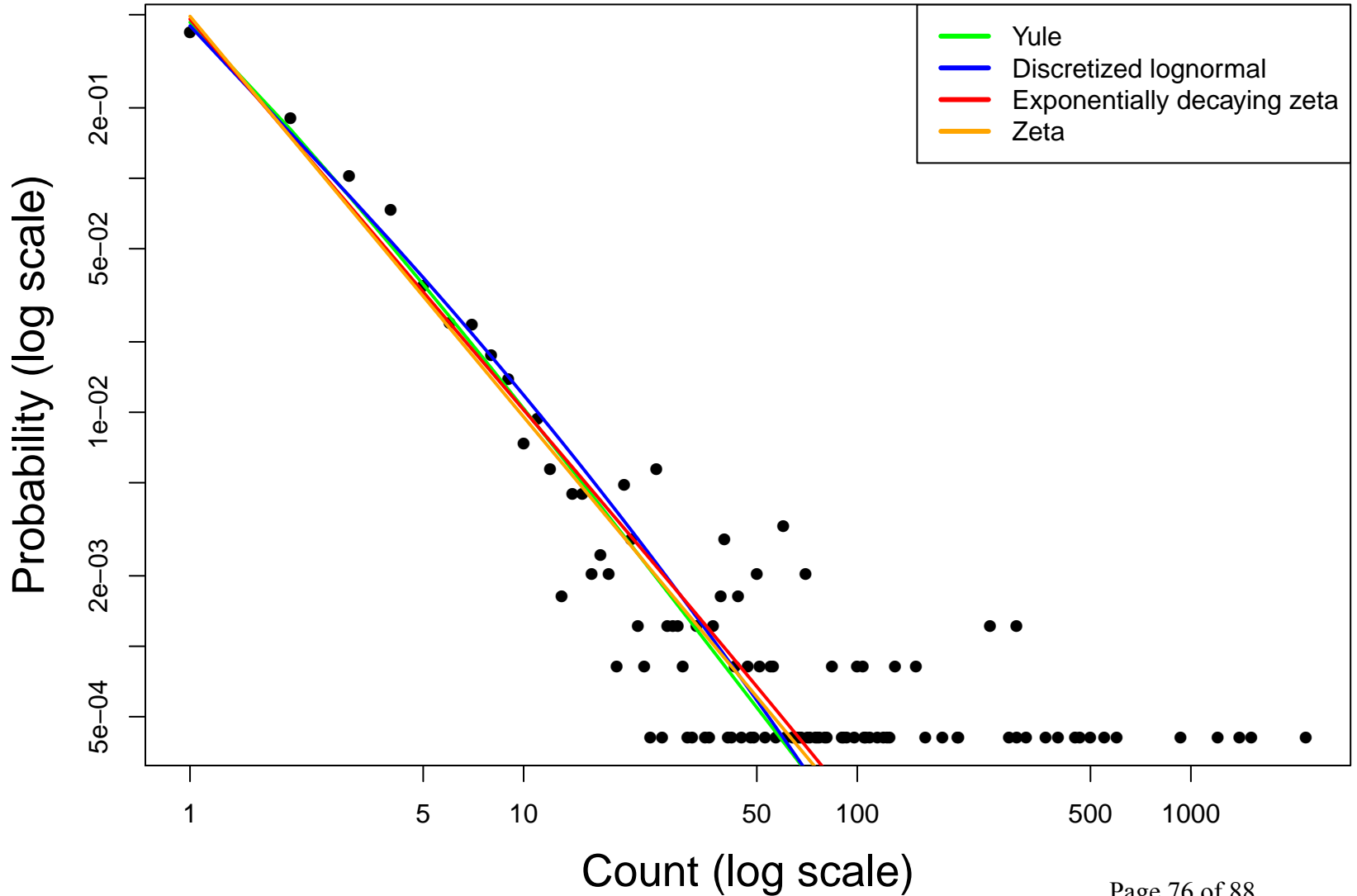
herg



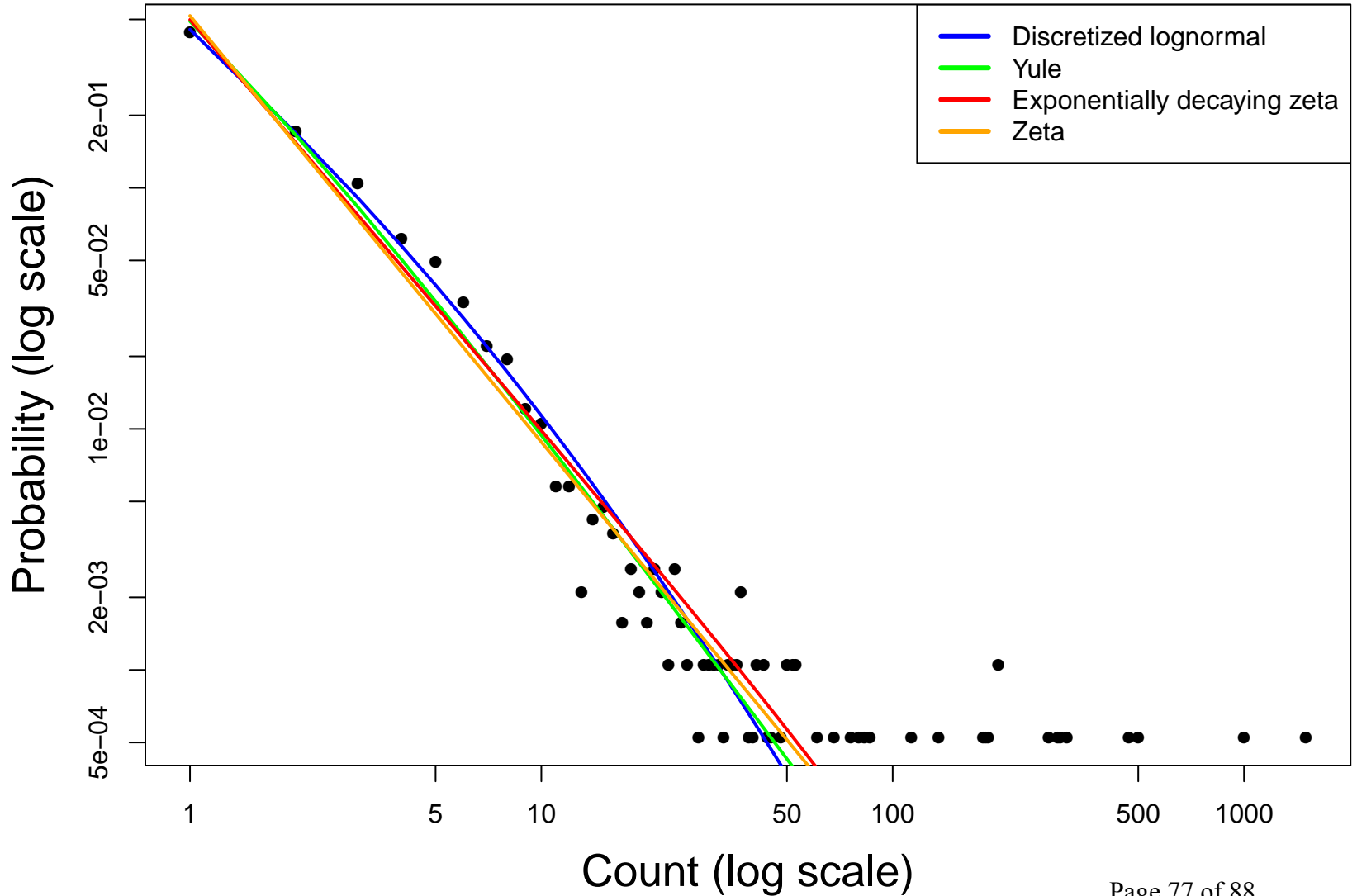
blki



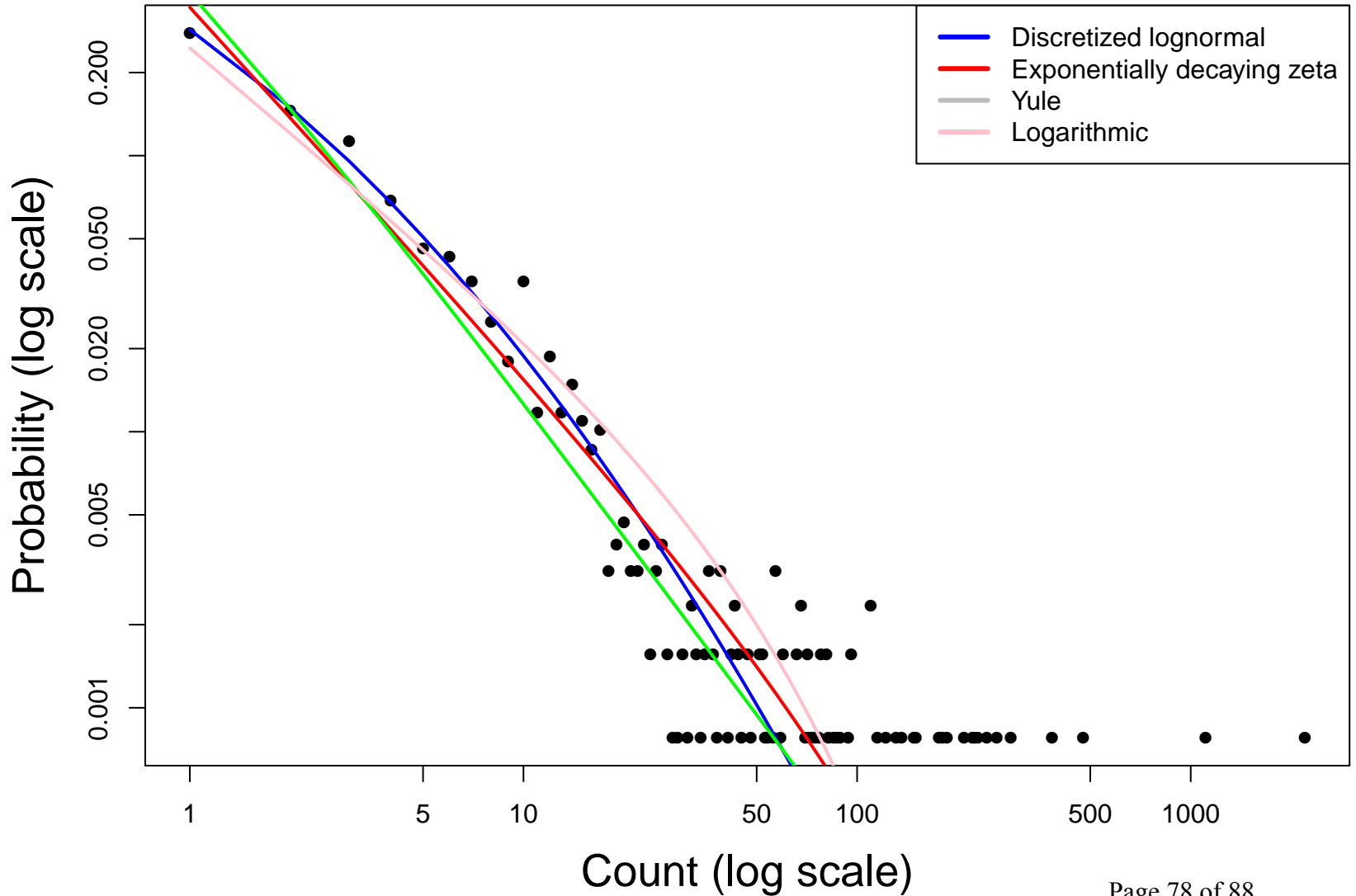
gbbg



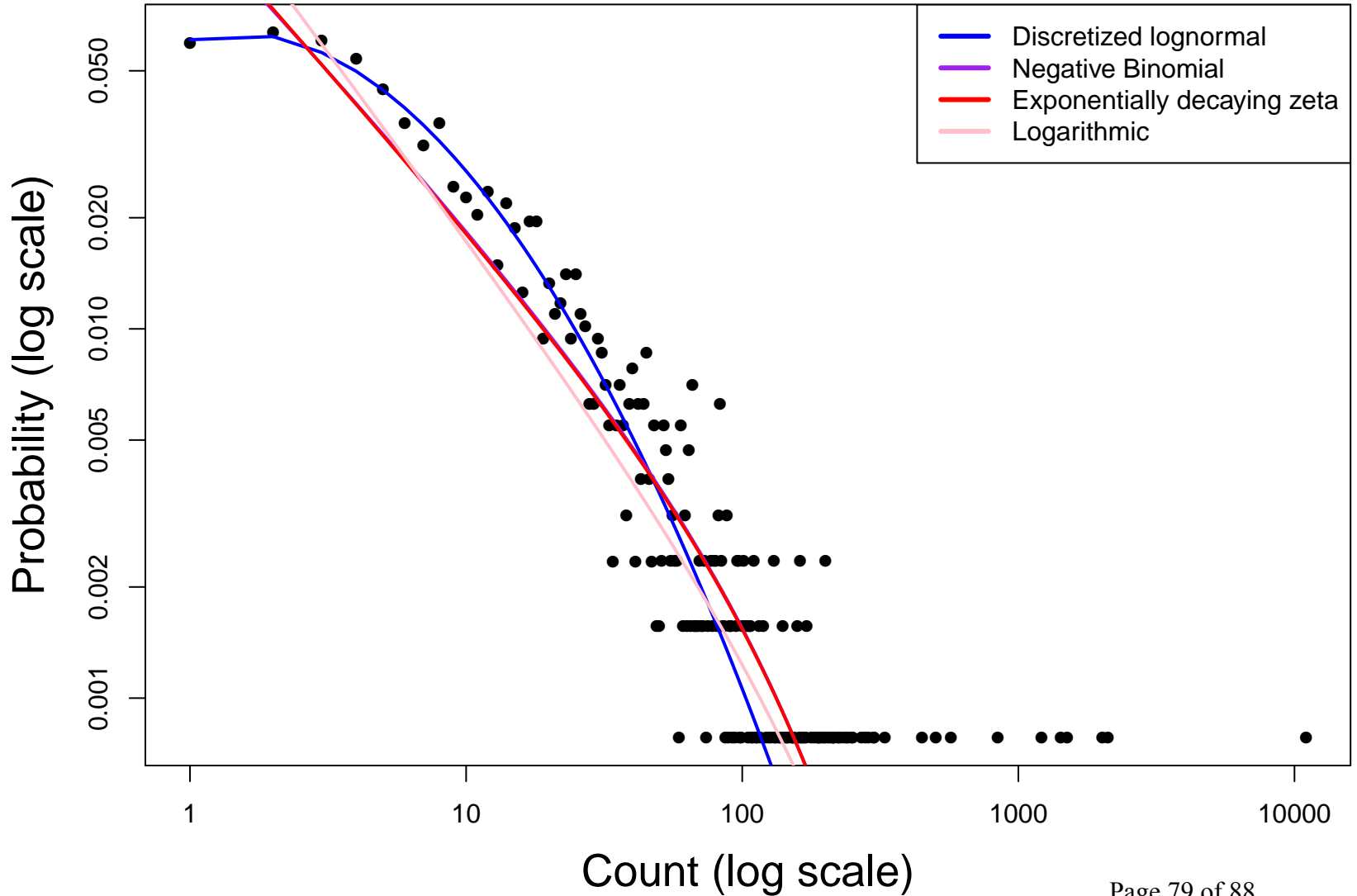
noga



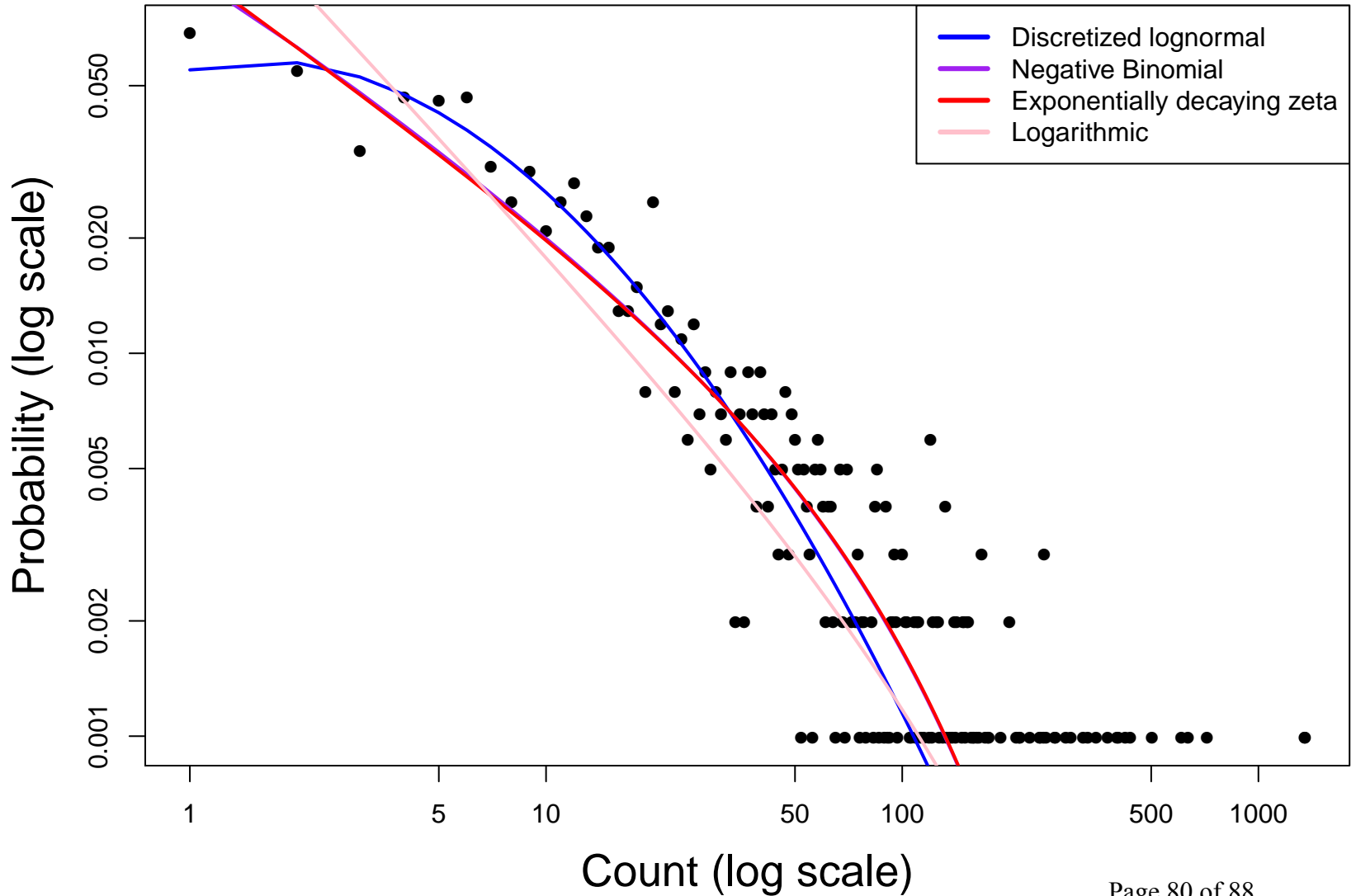
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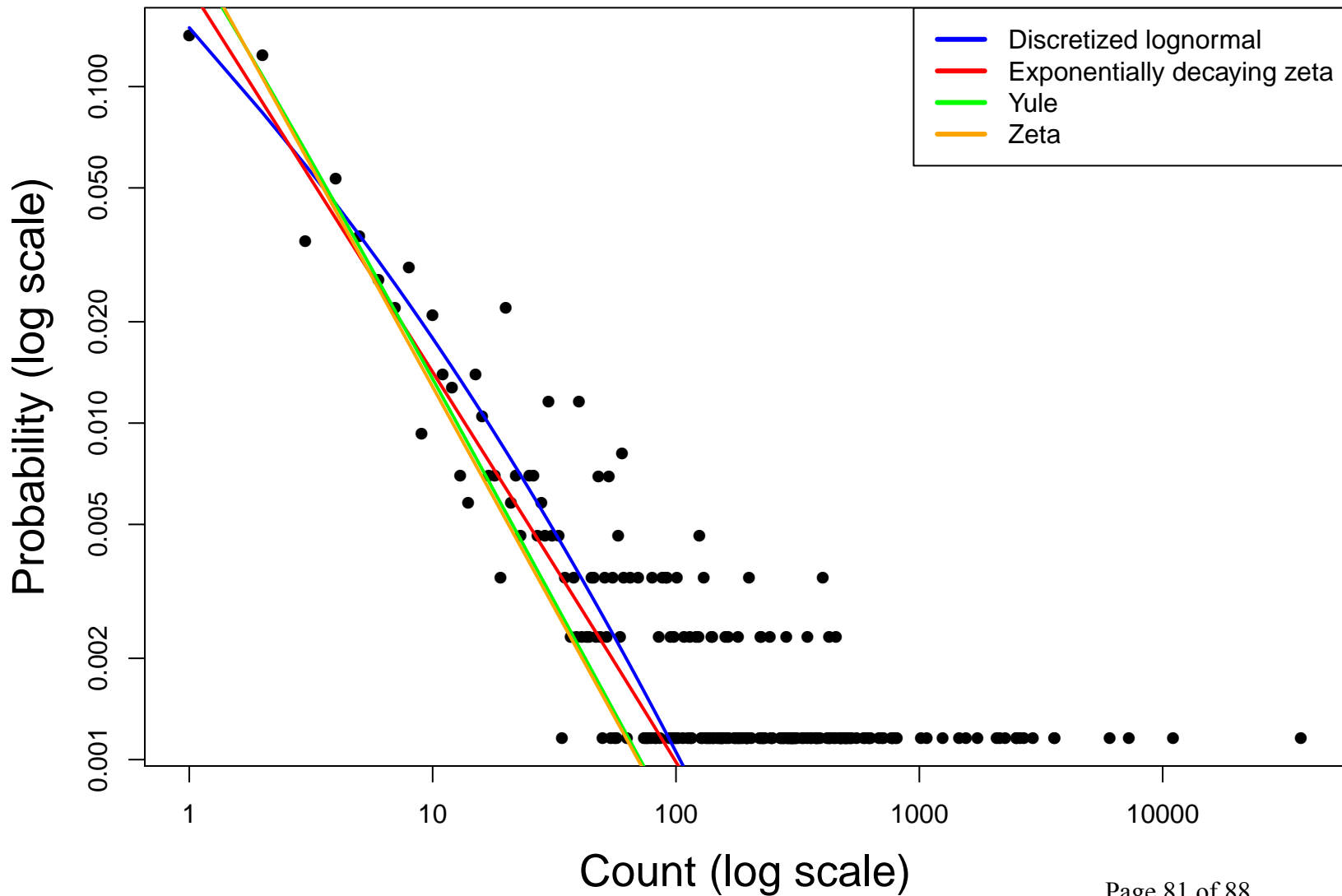
Itdu



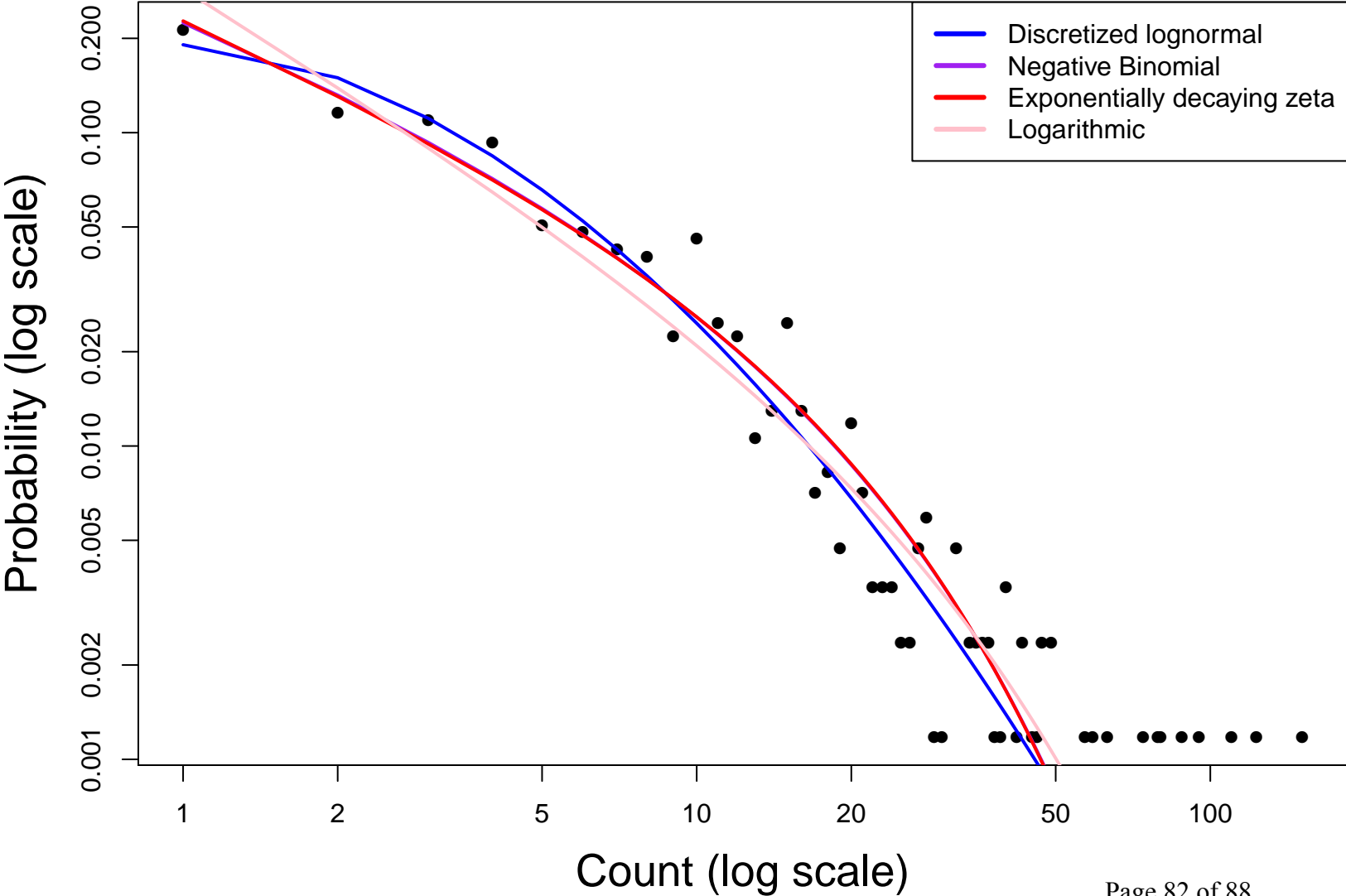
SUSC



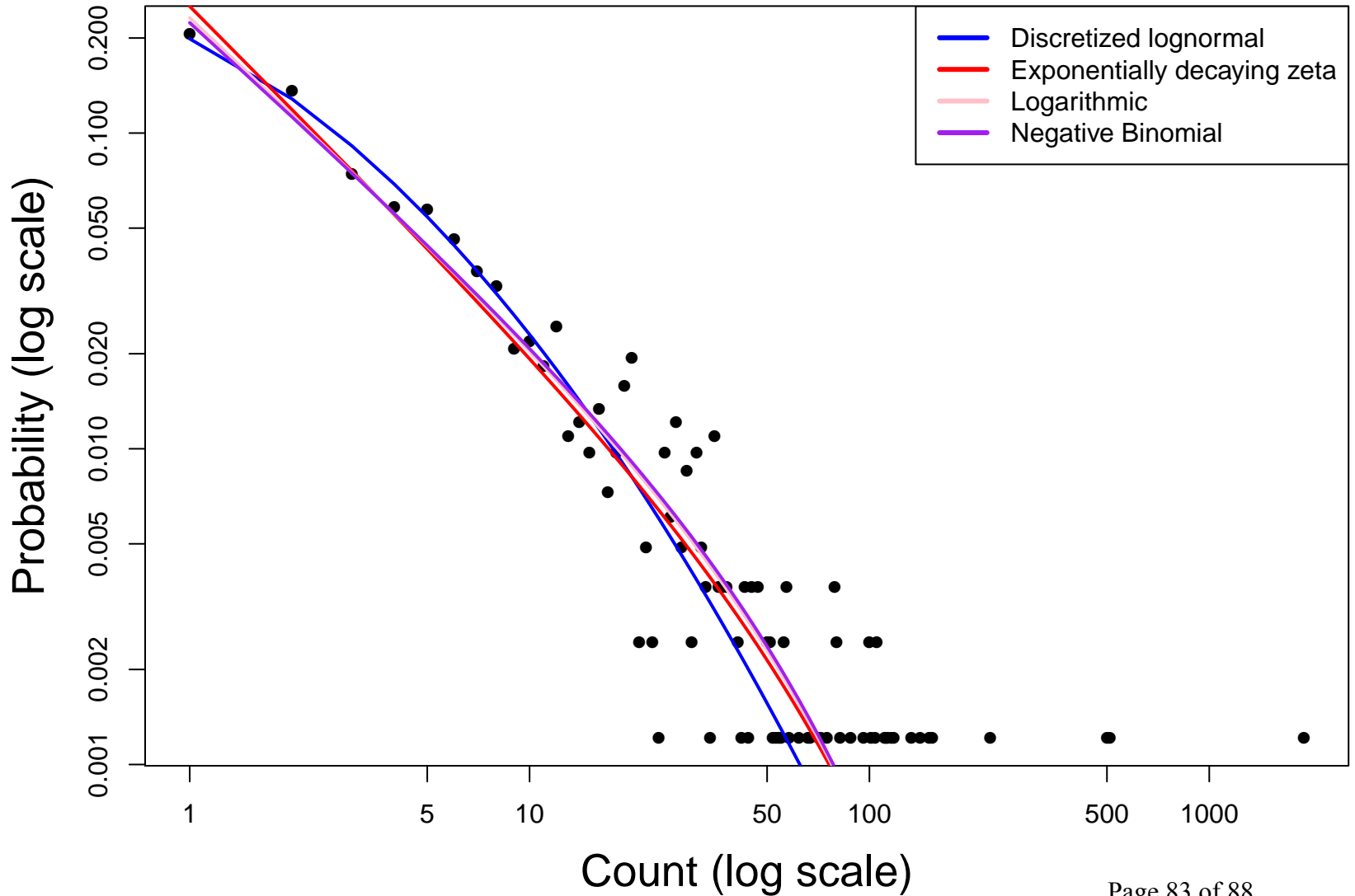
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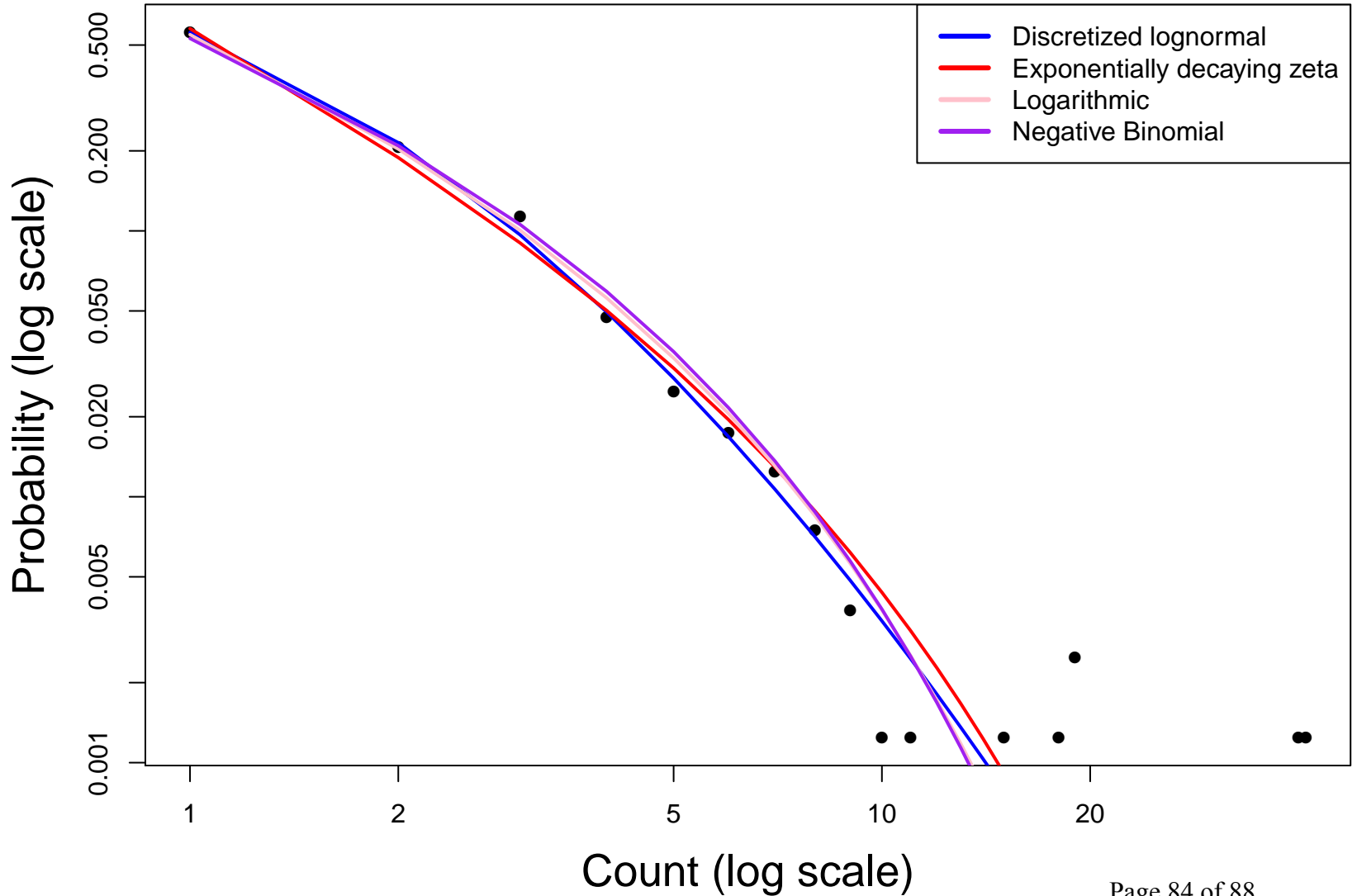
razo



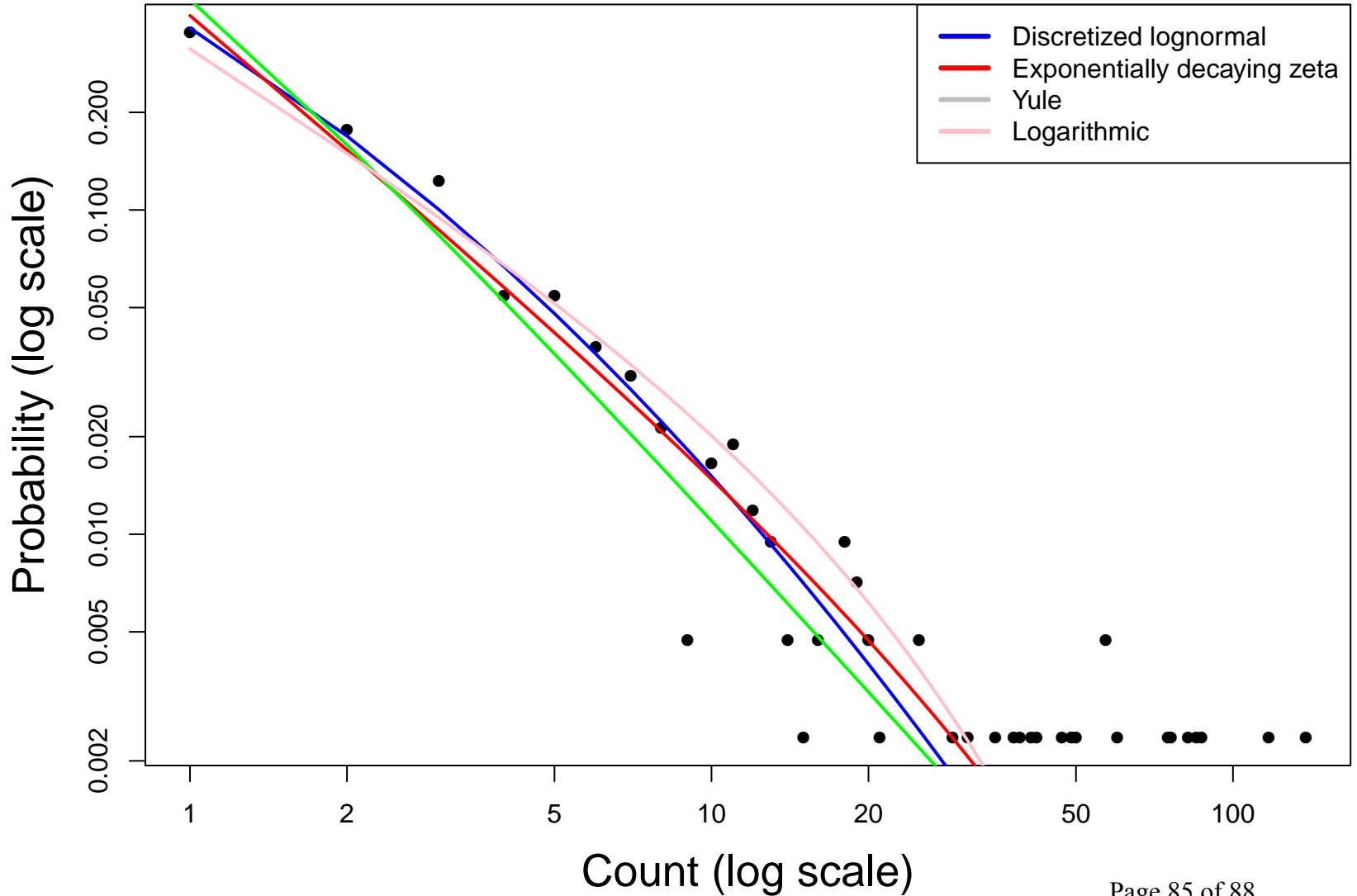
WWSC



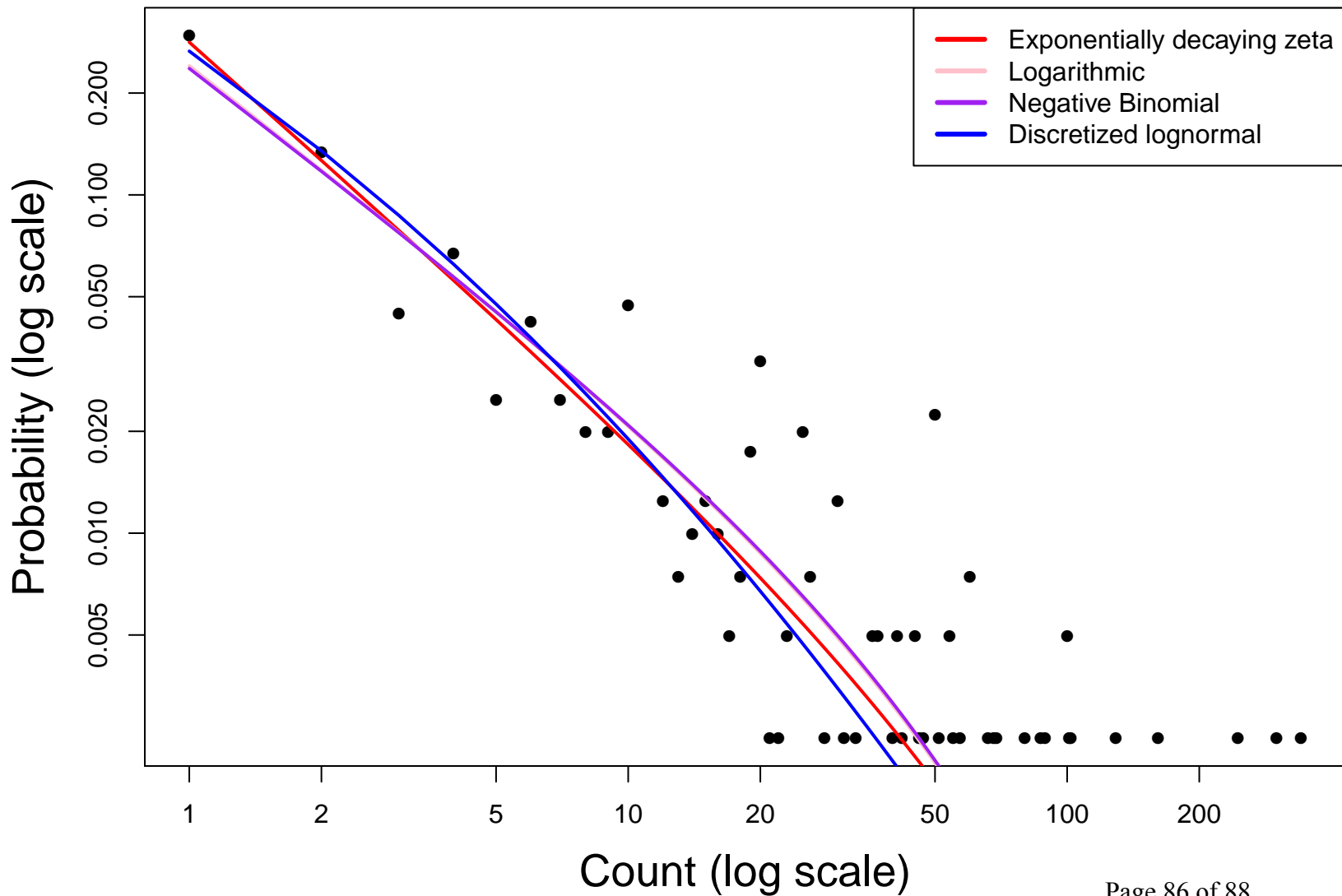
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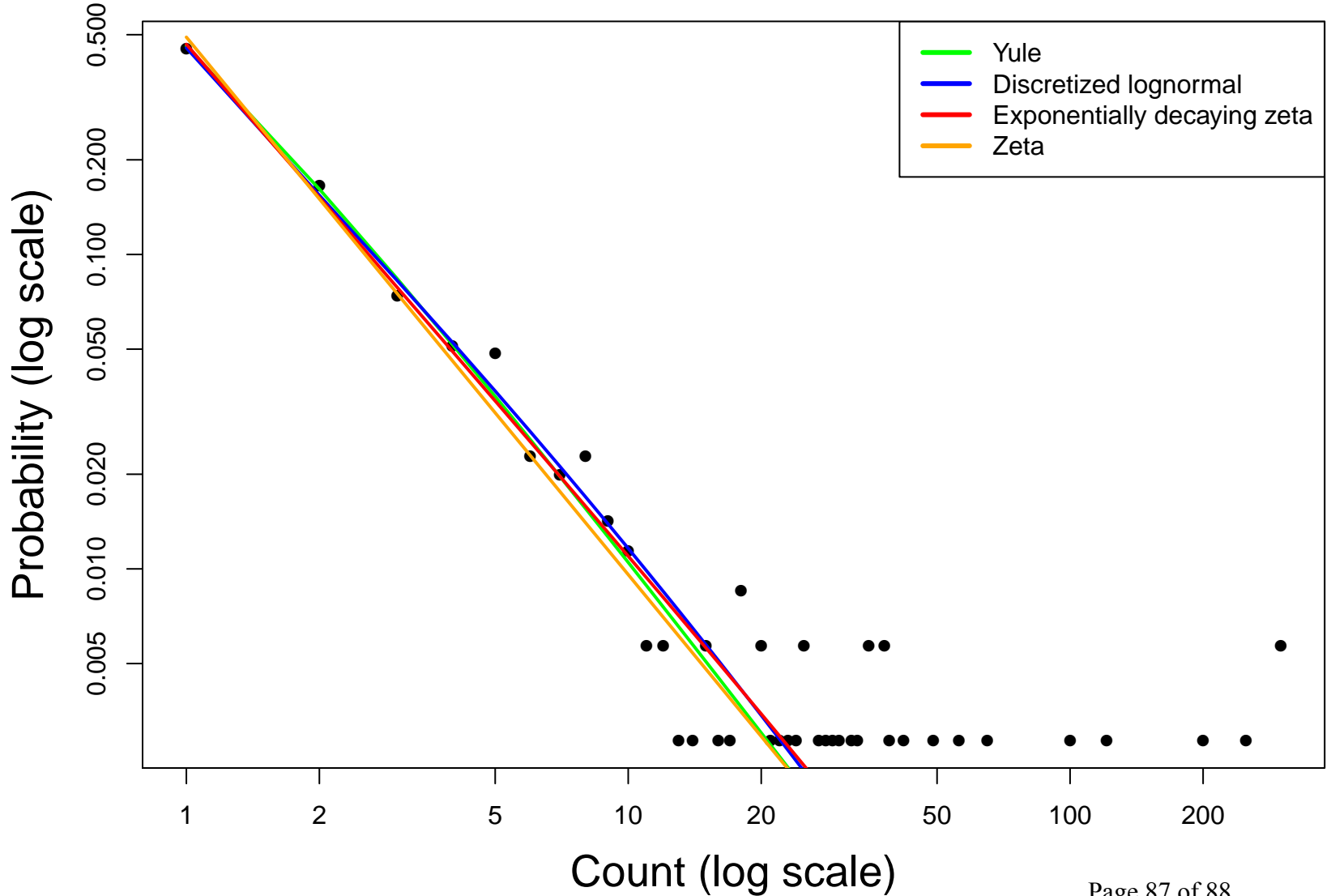
dove



blsc



bogu



rtlo

