

Aggregation of sites within the UK Seabird Monitoring Programme dataset

Text S1. Details for the range of breeding colonies used in the demographic modelling for each species, ranging from four colonies for Atlantic puffin, up to 40 colonies for black-legged kittiwakes (Table).

Table S1. Summary of number of colonies that met the minimum data requirements (9 or more years of data of the relevant type) for the analysis of productivity, the span of years over which observations were available, and the total number of breeding colony by year combinations used within each model.

Species	Number of breeding colonies	Observed years	Number of breeding colony by year combinations
Atlantic puffin	4	1986-2018	90
Common guillemot	10	1986-2018	206
European shag	19	1986-2018	251
Northern gannet	6	1986-2018	144
Razorbill	9	1986-2018	114
Herring gull	19	1989-1992, 1994-2018	102
Great black-backed gull	12	1991-2018	79
Black-legged kittiwake	40	1986-2018	785

Text S2. Seasonal definitions

Each terrestrial and marine climate variable was aggregated into a value across the set of months most relevant to each species in terms of pre-breeding attendance at colonies, incubation and chick-rearing. The biological periods are based on those used within the NERC MERP at-sea seabird distribution modelling (Waggitt et al. 2020), and were selected to reflect when a substantial portion of the local population of a particular species remains close to the colony (Waggitt et al. 2020; Table S2, Table S3).

Waggitt JJ, Evans PGH, Andrade J, Banks AN and others (2020) Mapping of cetacean and seabird populations in the North-East Atlantic. *J Appl Ecol* 57: 253–269

Table S2. Definition of breeding season months for each of the eight species; note that ‘breeding season’ includes both the main breeding season and outlying periods (pre-laying and post-fledging) for all species.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Atlantic Puffin												
Black Legged Kittiwake												
Common Guillemot												
European Shag												
Herring Gull												
Great Black-Backed Gull												
Northern Gannet												
Razorbill												

Text S3. This resulted in a set of ‘pre-breeding’ months, ‘breeding season’ months, and ‘preceding year’ months for each of the eight species (Table S3), which were used within the demographic models.

Table S3. Set of months used to define the biological periods to be used to create synthesised climate variables within the demographic models.

Species	Pre-breeding months	Breeding season months
Atlantic puffin	February - March	April – August
Black-legged kittiwake	February – March	April – August
Common guillemot	February – March	April – July
European Shag	February – March	March – August
Herring gull	February – March	April – July
Great black-backed gull	February – March	April – July
Northern gannet	February – March	April – October
Razorbill	February - March	April – July

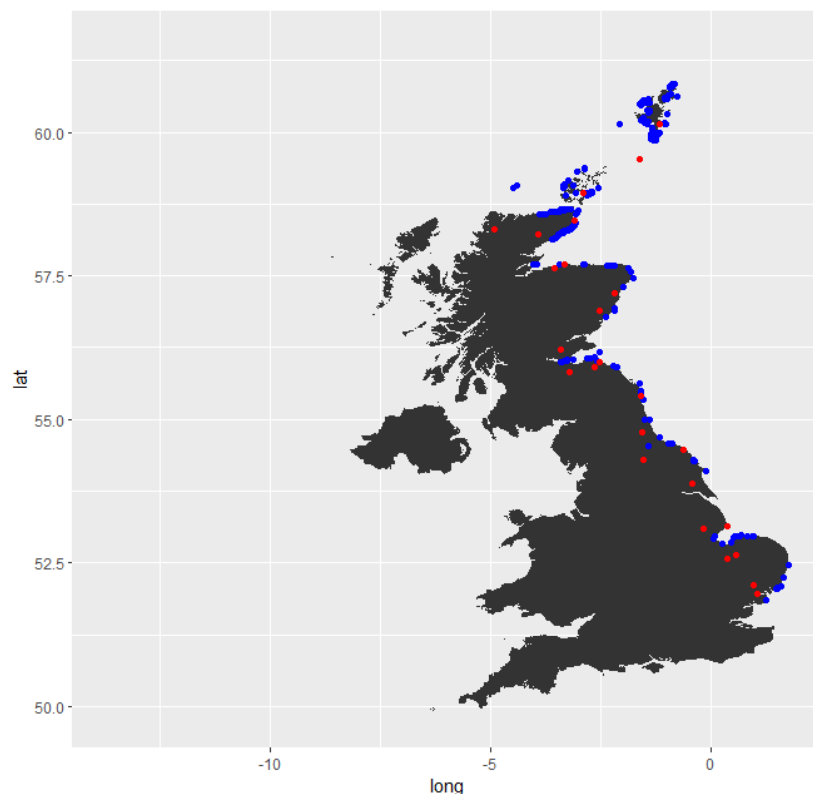


Figure S1. Locations of nearest UK weather stations (red) for the selected seabird breeding colonies (blue) on the East coast of the UK.

Table S4. Summary of mean values for climatic variables used in demographic modelling over the period for which all demographic data were available (1986-2018), the period used as the ‘baseline’ (2014-2018), and the projected future climate scenario (2070-2099). NAO hindcast and forecasts were provided by Jonathan Tinker at the UK Met Office and originate from simulation models detailed in Tinker et al (2016, *Progress in Oceanography* 148: 56-73). (<https://www.sciencedirect.com/science/article/pii/S0079661116301847>).

	Pre-breeding season	Breeding season	Pre-breeding & breeding season
Sea Surface Temperature (°C)			
1986-2018	6.571	10.368	9.285
2014-2018	6.649	10.653	9.510
2070-2099	7.718	11.955	10.743
Sea Surface Salinity in parts per thousand			
1986-2018	34.527	34.593	34.574
2014-2018	34.530	34.564	34.554
2070-2099	34.399	34.434	34.424
North Atlantic Oscillation based on normalized winter average (Dec, Jan, Feb)			
1986-2018	0.017	0.040	0.055
2014-2018	0.039	0.092	0.127
2070-2099	-0.091	-0.214	-0.296
Mean of daily terrestrial minimum air temperature (°C)			
1986-2018	2.323	7.919	6.318
2014-2018	2.636	8.336	6.706
2070-2099	3.578	9.983	8.181
Summed daily terrestrial precipitation (mm)			
1986-2018	1.744	1.988	1.919
2014-2018	1.928	2.469	2.318
2070-2099	0.186	0.112	0.132

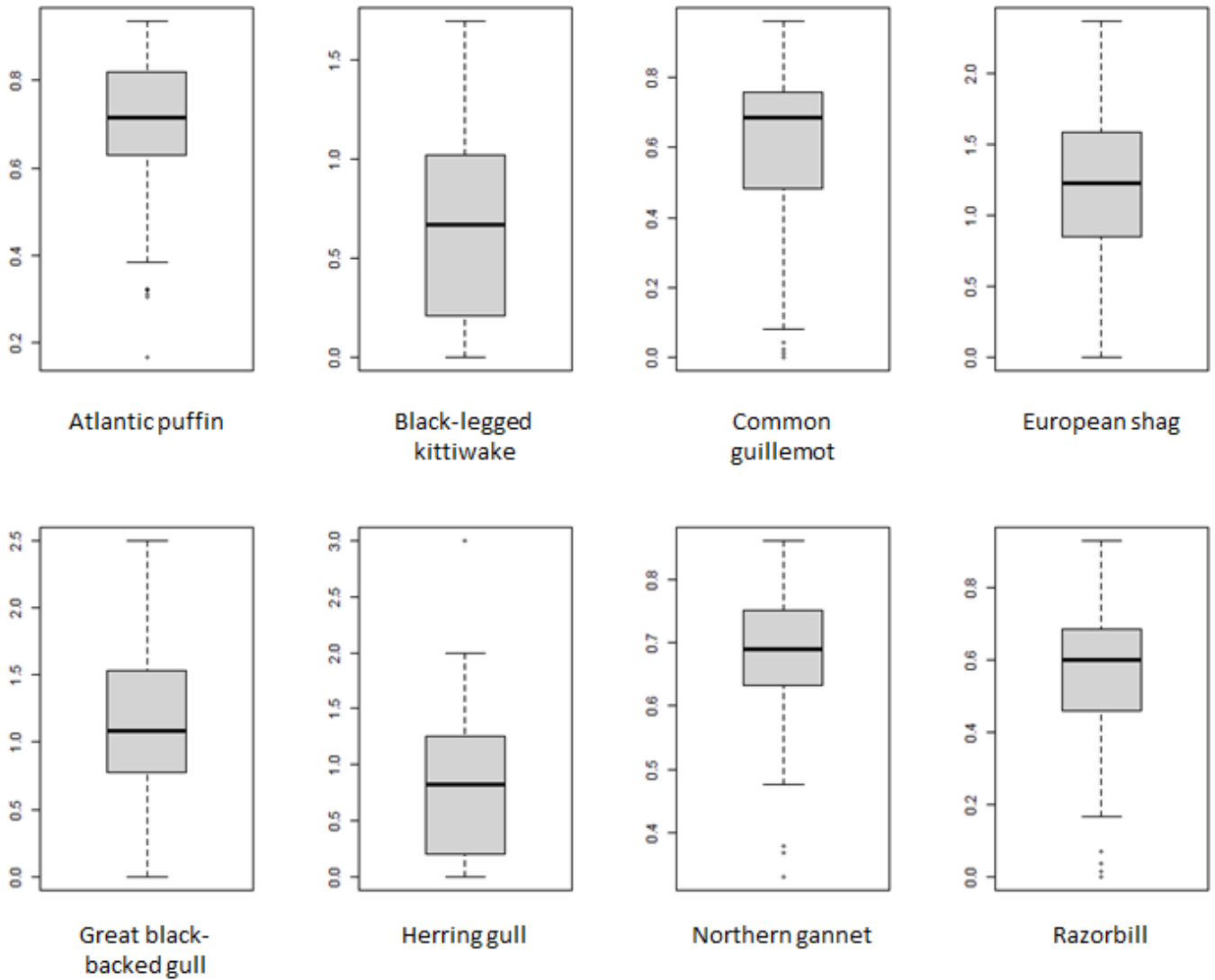


Figure S2. Summary of observed variation in breeding success (number of chicks fledged/number of nests) in eight species of seabirds from breeding colonies along the eastern seaboard of the UK over the previous three decades. Boxplots show median (solid black line), interquartile range (IQR, grey box, 25%-75% of values), data range (dotted lines), and outliers (right outliers: third quartile + 1.5 * IQR; left outliers: first quartile – 1.5 * IQR).

Table S5. Support in the data for competing models (Δ AIC to best supported model) relating seabird productivity to environmental covariates for each of the eight seabird species. Only models within five Δ AIC to the best supported model are shown. Environmental variables included North Atlantic Oscillation ‘NAO’, sea surface temperature ‘SST’, sea surface salinity ‘SLM’, mean terrestrial temperature ‘Temp’, and summed terrestrial precipitation ‘Rain’). Models for each species were fitted to three seasonal definitions: pb: pre-breeding period; bs: breeding season period; and pbbs: pre-breeding plus breeding season periods. All models contained random effects for colony, year, and colony*year. A null model containing only random effects and no environmental covariates was also fitted.

Atlantic puffin	
Model	ΔAIC
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb}$	0.00
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb}$	1.51
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb}$	1.52
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{SLM.pb}$	1.66
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{rain.pb}$	1.70
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb}$	3.12
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb}$	3.18
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{temp.pb}$	3.28
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	3.30
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{rain.pb}$	3.33
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{SLM.pb} + \text{rain.pb}$	3.37
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	4.90
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{temp.pb} + \text{rain.pb}$	4.90
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{temp.pb}$	4.92
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{rain.pb}$	5.00
Black-legged kittiwake	
Model	ΔAIC
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	0.00
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	1.40
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	1.97
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	3.36
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{temp.pb}$	3.93
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{rain.pb}$	4.79
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{rain.pb}$	4.86
Common guillemot	
Model	ΔAIC
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{rain.pb}$	0.00
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb}$	0.80
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{rain.pb}$	0.97
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{temp.pb} + \text{rain.pb}$	1.10
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{rain.pb}$	1.68

$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	1.93
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	2.10
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{temp.pb}$	2.42
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb}$	2.49
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{SLM.pb} + \text{rain.pb}$	2.62
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb}$	2.67
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{temp.pb} + \text{rain.pb}$	2.82
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	3.00
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pbbs} + \text{rain.pbbs}$	3.46
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	3.64
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pb} + \text{rain.pb}$	3.64
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	3.82
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{temp.pb}$	4.14
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb}$	4.24
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{SLM.pb}$	4.35
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	4.37
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{rain.pb}$	4.81
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	4.81
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	4.97
European shag	
Model	ΔDIC
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pb}$	0.00
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pb} + \text{rain.pb}$	0.75
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{temp.pb}$	1.55
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{temp.pb}$	1.83
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{temp.pb}$	1.86
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs} + \text{temp.pbbs}$	1.93
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	2.03
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{temp.pb} + \text{rain.pb}$	2.32
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	2.32
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pbbs}$	2.41
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{temp.pb} + \text{rain.pb}$	2.59
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{rain.pb}$	2.85
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs}$	2.88
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs}$	3.04
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs} + \text{temp.bs}$	3.12
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb}$	3.15
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs}$	3.32
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pbbs} + \text{rain.pbbs}$	3.34
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SLM.pb} + \text{temp.pb}$	3.38
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs}$	3.43

$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb}$	3.54
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs}$	3.54
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{temp.pb}$	3.67
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs} + \text{rain.pbbs}$	3.77
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	3.86
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	3.88
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{temp.pbbs}$	3.89
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{temp.pbbs}$	3.95
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.bs}$	4.00
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	4.01
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{rain.pbbs}$	4.02
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs} + \text{temp.bs} + \text{rain.bs}$	4.05
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	4.09
$y \sim 1 + (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year})$	4.10
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{temp.pb} + \text{rain.pb}$	4.13
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs}$	4.14
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs}$	4.24
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs}$	4.33
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{SLM.pbbs}$	4.36
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SLM.bs} + \text{temp.bs}$	4.46
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs}$	4.49
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs} + \text{temp.bs}$	4.49
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{rain.pb}$	4.56
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs} + \text{rain.bs}$	4.58
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{SLM.bs}$	4.60
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{rain.pb}$	4.69
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb}$	4.83
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{rain.pb}$	4.85
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs}$	4.92
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	4.93
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	4.95
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs} + \text{rain.pbbs}$	4.98
Great black-backed gull	
Model	ΔDIC
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs} + \text{temp.bs}$	0.00
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SLM.bs} + \text{temp.bs}$	1.02
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs} + \text{temp.bs} + \text{rain.bs}$	1.79
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs} + \text{temp.bs}$	1.91
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.bs}$	2.70
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SLM.bs} + \text{temp.bs} + \text{rain.bs}$	2.88

$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{SLM.bs} + \text{temp.bs}$	2.93
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.bs} + \text{rain.bs}$	3.62
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs} + \text{temp.bs} + \text{rain.bs}$	3.70
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{temp.bs}$	3.95
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{temp.bs}$	4.67
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{SLM.bs} + \text{temp.bs} + \text{rain.bs}$	4.79
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{temp.bs} + \text{rain.bs}$	4.99
Herring gull	
Model	ΔDIC
$y \sim 1 + (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year})$	0.00
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs}$	0.24
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs}$	0.65
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.bs}$	0.73
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs}$	0.85
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pbbs}$	1.05
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs}$	1.11
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb}$	1.34
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{rain.pbbs}$	1.55
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{rain.pb}$	1.66
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs}$	1.72
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb}$	1.72
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs}$	1.72
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs} + \text{temp.bs}$	1.83
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs}$	1.83
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pb}$	1.90
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SLM.bs}$	1.91
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{rain.bs}$	1.93
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb}$	1.94
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs}$	2.05
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{temp.bs}$	2.08
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs} + \text{temp.pbbs}$	2.12
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs} + \text{rain.bs}$	2.20
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SLM.pbbs}$	2.33
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs} + \text{rain.pbbs}$	2.41
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pbbs} + \text{rain.pbbs}$	2.42
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs}$	2.49
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{rain.pbbs}$	2.53
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{temp.pbbs}$	2.55
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{temp.bs}$	2.59
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.bs} + \text{rain.bs}$	2.61
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{rain.bs}$	2.66
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs}$	2.84
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{temp.pbbs}$	2.97
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SLM.pb}$	3.04

$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb}$	3.05
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{rain.pb}$	3.14
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{temp.pb}$	3.15
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{rain.pbbs}$	3.26
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SLM.bs} + \text{temp.bs}$	3.27
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{rain.pb}$	3.40
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{SLM.bs}$	3.45
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pb} + \text{rain.pb}$	3.59
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{rain.pb}$	3.61
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{temp.pb}$	3.61
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs}$	3.63
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{rain.bs}$	3.63
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb}$	3.70
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs} + \text{rain.pbbs}$	3.72
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs} + \text{rain.bs}$	3.73
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{SLM.pbbs}$	3.74
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs} + \text{temp.bs}$	3.75
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	3.76
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs} + \text{temp.bs} + \text{rain.bs}$	3.76
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SLM.bs} + \text{rain.bs}$	3.85
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	3.87
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{temp.pb}$	3.90
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{temp.bs} + \text{rain.bs}$	3.90
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{temp.bs}$	4.01
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs}$	4.02
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SLM.pbbs} + \text{rain.pbbs}$	4.08
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{rain.pbbs}$	4.25
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{rain.bs}$	4.25
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	4.34
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{temp.bs} + \text{rain.bs}$	4.42
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{temp.pbbs}$	4.54
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SLM.pb} + \text{temp.pb}$	4.83
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{SLM.pb}$	4.83
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SLM.pb} + \text{rain.pb}$	4.86
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{rain.pb}$	4.90
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	4.99
Northern gannet	
Model	ΔDIC
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs}$	0.00
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SLM.bs}$	0.13
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs}$	0.35
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SLM.pbbs}$	0.48
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{SLM.bs} + \text{temp.bs}$	0.50

$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{SLM.bs}$	0.86
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs}$	0.86
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{SLM.pbbs}$	1.08
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs} + \text{temp.bs}$	1.08
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs}$	1.14
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs} + \text{rain.bs}$	1.30
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs}$	1.31
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SLM.bs} + \text{rain.bs}$	1.48
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs} + \text{rain.pbbs}$	1.67
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs}$	1.74
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SLM.pbbs} + \text{rain.pbbs}$	1.82
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs} + \text{temp.bs}$	1.99
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SLM.bs} + \text{temp.bs}$	2.09
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{SLM.bs} + \text{temp.bs} + \text{rain.bs}$	2.18
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs} + \text{temp.pbbs}$	2.29
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs}$	2.40
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{SLM.bs} + \text{rain.bs}$	2.42
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	2.43
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb}$	2.62
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs}$	2.62
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs}$	2.62
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs} + \text{rain.bs}$	2.62
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{SLM.pbbs} + \text{rain.pbbs}$	2.63
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs} + \text{temp.bs} + \text{rain.bs}$	2.68
$y \sim 1 + (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year})$	2.72
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs} + \text{rain.pbbs}$	2.81
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb}$	2.87
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SLM.pb}$	2.91
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs}$	3.09
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{rain.pbbs}$	3.11
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{temp.bs}$	3.12
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{rain.pbbs}$	3.15
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{rain.bs}$	3.22
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{rain.bs}$	3.22
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	3.25
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs} + \text{temp.bs} + \text{rain.bs}$	3.30
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs}$	3.43
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SLM.bs} + \text{temp.bs} + \text{rain.bs}$	3.46
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{rain.pb}$	3.63

$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	3.64
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs}$	3.67
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{temp.pbbs}$	3.69
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{rain.pb}$	3.76
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	3.77
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs}$	3.88
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{temp.bs}$	4.02
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{rain.bs}$	4.08
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{temp.bs} + \text{rain.bs}$	4.21
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{rain.pbbs}$	4.21
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb}$	4.22
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{SLM.pb}$	4.35
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	4.37
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{rain.pb}$	4.39
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SLM.pb} + \text{rain.pb}$	4.40
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{temp.bs}$	4.47
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{rain.bs}$	4.49
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{temp.pbbs}$	4.52
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{rain.pbbs}$	4.54
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb}$	4.61
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{temp.pb}$	4.62
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pbbs}$	4.65
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{temp.pb}$	4.65
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.bs}$	4.65
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb}$	4.70
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pb}$	4.70
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{temp.pbbs}$	4.74
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SLM.pb} + \text{temp.pb}$	4.82
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{temp.bs} + \text{rain.bs}$	4.93
Razorbill	
Model	ΔDIC
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs}$	0.00
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb}$	0.25
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs}$	0.33
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs}$	0.66
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs}$	0.82
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs}$	0.85
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{temp.pb}$	0.90
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb}$	1.10
$y \sim 1 + (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year})$	1.13
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs} + \text{temp.bs}$	1.28
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs}$	1.60
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.bs}$	1.66
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb}$	1.67

$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SLM.bs}$	1.73
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pbbs}$	1.82
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb}$	1.93
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs} + \text{rain.bs}$	1.94
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs} + \text{temp.pbbs}$	1.99
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SLM.pbbs}$	2.05
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb}$	2.14
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{rain.pb}$	2.20
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs} + \text{rain.pbbs}$	2.32
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs}$	2.48
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs} + \text{rain.bs}$	2.48
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{SLM.bs}$	2.53
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs}$	2.64
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs} + \text{temp.bs}$	2.65
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{SLM.pbbs}$	2.66
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{temp.pb}$	2.71
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs}$	2.72
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb}$	2.72
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs}$	2.72
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{rain.bs}$	2.73
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{rain.pbbs}$	2.74
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{temp.pb} + \text{rain.pb}$	2.75
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SLM.pb}$	2.80
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs} + \text{rain.pbbs}$	2.82
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pb}$	2.83
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{temp.pbbs}$	2.84
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{rain.pb}$	2.92
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{rain.pbbs}$	3.05
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{rain.bs}$	3.07
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{temp.pb}$	3.10
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{rain.pb}$	3.12
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SLM.bs} + \text{temp.bs}$	3.15
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.bs} + \text{temp.bs} + \text{rain.bs}$	3.17
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.bs} + \text{rain.bs}$	3.26
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{temp.bs}$	3.36
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{SLM.pb}$	3.38
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs}$	3.39
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{rain.pb}$	3.48
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{temp.bs}$	3.50
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{temp.pbbs}$	3.56
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SLM.bs} + \text{rain.bs}$	3.67
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	3.71
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pbbs} + \text{rain.pbbs}$	3.73
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs}$	3.77

$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{rain.pb}$	3.87
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	3.99
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{SLM.pb} + \text{temp.pb}$	3.99
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SLM.pbbs} + \text{rain.pbbs}$	4.03
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs}$	4.31
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{rain.bs}$	4.35
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{SLM.bs} + \text{rain.bs}$	4.37
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{temp.pb}$	4.39
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{SLM.bs} + \text{temp.bs} + \text{rain.bs}$	4.47
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{SLM.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	4.47
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{SLM.bs} + \text{temp.bs}$	4.53
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{rain.pbbs}$	4.54
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SST.pb} + \text{temp.pb} + \text{rain.pb}$	4.56
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SLM.pb} + \text{rain.pb}$	4.60
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{temp.pbbs}$	4.63
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{rain.pbbs}$	4.65
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pbbs} + \text{SST.pbbs} + \text{SLM.pbbs} + \text{rain.pbbs}$	4.66
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{rain.pb}$	4.70
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.pbbs} + \text{temp.pbbs} + \text{rain.pbbs}$	4.74
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.pb} + \text{SLM.pb} + \text{temp.pb}$	4.79
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{temp.pb} + \text{rain.pb}$	4.82
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SST.bs} + \text{temp.bs} + \text{rain.bs}$	4.87
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{NAO.bs} + \text{SST.bs} + \text{rain.bs}$	4.88
$y \sim (1 \text{Colony}) + (1 \text{Year}) + (1 \text{Colony:Year}) + \text{SLM.pb} + \text{temp.pb} + \text{rain.pb}$	4.92