SC/69A/IA/01

Sub-committees/working group name: IA

In-Depth Assessment of western North Pacific common Minke whales: Baseline results for the A and B Hypotheses

C.L. de Moor, C. Allison, I. Katara and A.E. Punt



INTERNATIONAL
WHALING COMMISSION

Papers submitted to the IWC are produced to advance discussions within that meeting; they may be preliminary or exploratory.

It is important that if you wish to cite this paper outside the context of an IWC meeting, you notify the author at least six weeks before it is cited to ensure that it has not been superseded or found to contain errors.

In-Depth Assessment of western North Pacific common Minke whales: Baseline results for the A and B Hypotheses

C.L. de Moor[1], C. Allison[2], I. Katara[3] and A.E. Punt[4]

[1] Marine Resource Assessment and Management (MARAM) Group, Department of Mathematics and Applied Mathematics, University of Cape Town, Rondebosch, 7701, South Africa
[2] Independent Consultant, Cambridge, U.K.
[3] International Whaling Commission, 135 Station Road, Histon, Cambridge, CB3 0QQ, U.K.
[4] School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA 98195, U.S.A.

This paper provides baseline conditioning results for the A and B hypotheses for the In-Depth Assessment of North Pacific common Minke whales. Diagnostic plots are produced to assist the Scientific Committee in determining if Conditioning has been satisfactorily achieved for these two hypotheses. Conditioning for the third hypothesis (Hypothesis E) is ongoing.

The In-Depth Assessment of western North Pacific common Minke whales involves three fundamental hypotheses to account for patterns observed in the results from the genetic analyses (see Figure 1 for sub-areas):

(i) there is a single J-stock that occurs to the west of Japan (Sea of Japan/East Sea and Yellow Sea) and the Pacific coast of Japan (sub-areas 2C, 7CS, 7CN, 11 and 12SW) and a single O-stock in sub-areas to the east and north of Japan (2C, 2R, 3, 4, 7CS, 7CN, 7WR, 7E, 8, 9, 9N, 10E, 11, 12SW, 12NE and 13) (referred to as hypothesis A);
(ii) as for hypothesis (A), except there is a third stock (Y) that resides in the Yellow Sea (sub-areas 1W, 5 and 6W) and overlaps with J-stock in the southern part of sub-area 6W (referred to as hypothesis B); and
(iii) there are four stocks, referred to as Y, J, P, and O, two of which (Y and J) occur in the Sea of Japan/East Sea, and three of which (J, P, and O) are found to the east of Japan (referred to as hypothesis E). Stock P is a coastal stock.

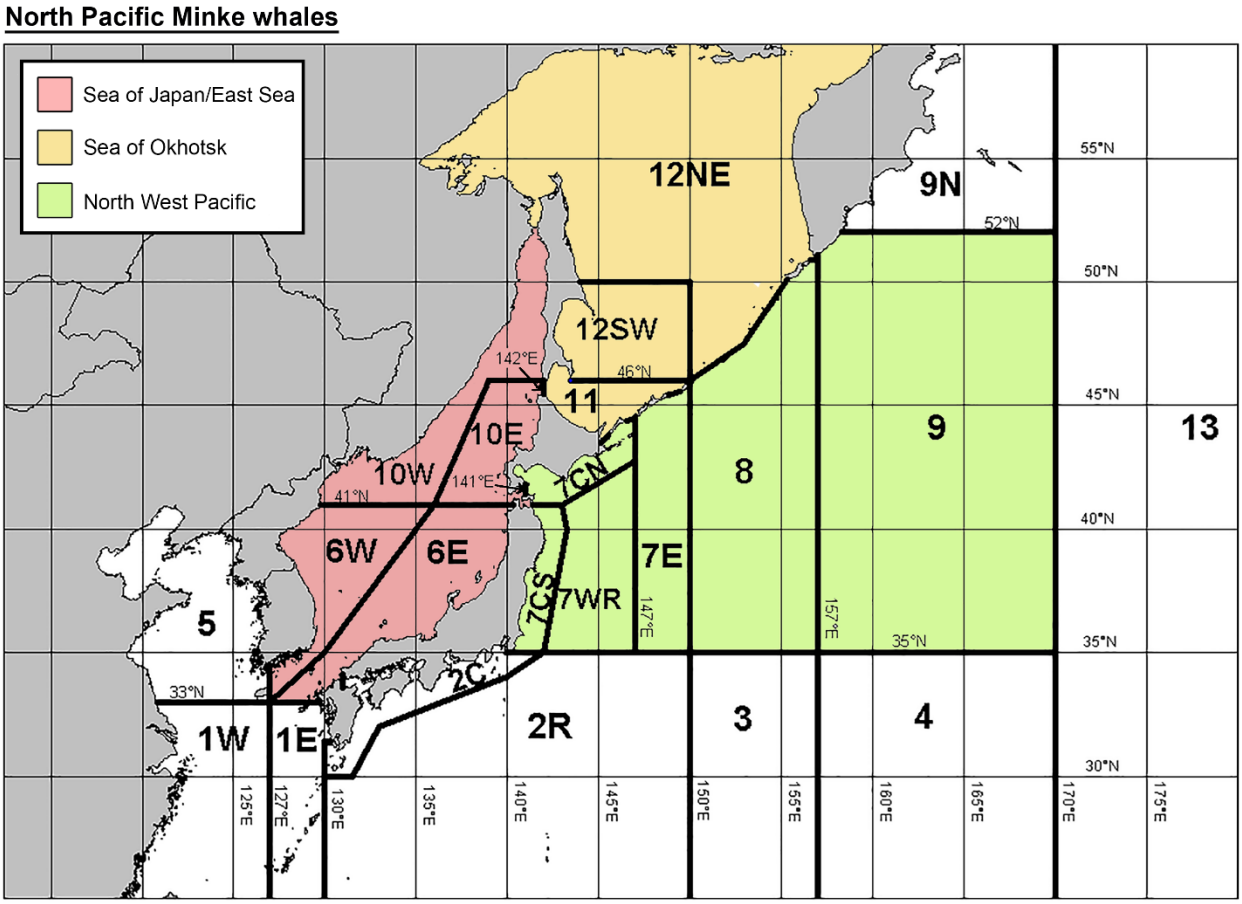


Fig. 1. The 22 sub-areas used in the *In Depth Assessment* for North Pacific minke whales

The operating models have been conditioned to fit the deterministic 'best' values for the abundance and stock proportion estimates, as well as 100 replicates of these data. The following pages give diagnostic plots for the baseline trials for the A and B hypotheses with MSYR at 1% on the 1+ population and 4% on the mature population, named trials A01-1L, A01-4L, B01-1L and B01-4L. Conditioning for the E hypothesis is ongoing. The figures shown are ordered as follows:

Plot 1: The deterministic (red solid line), median (black dashed line) and 90%ile (grey shaded area) of the number of mature females and 1+ population by stock.

Plot 2a: The deterministic average 1+ population by sub-area in May-June (red) and August-September (blue), including estimates (x), minima (∇), maxima (Δ) and zero abundances (▲), to give an overview of sub-areas for which there are/not abundance estimates and an overview comparison of population distribution between the sub-areas.

Plot 2b: The deterministic (red solid line), median (black dashed line) and 90%ile (grey shaded area) 1+ population fits to the abundance estimates by sub-area and month combination.

Plot 3: The deterministic (black solid line), median (dashed line) and 90%ile (shaded area) model fits to the stock proportions from genetic samples. The stocks are represented by different colours (green for J-stock, orange for O-stock, purple for P-stock). Expected proportions are calculated from the 1+ population if samples were from bycatches and the recruited population if samples were from special permit catches or a combination of bycatches and special permit catches. The aggregated data to which the model is conditioned are shown with thick 90% CIs, while the annual data are shown with thin 90% CIs (excluding cases of 0% or 100%) for information purposes. (See Trial specifications, Table 7a for the data.)

Plot 3b: The deterministic (solid lines), median (dashed line) and 90%ile (shaded area) model fits to the J-stock proportions based on mtDNA and microsatellite samples in sub-area 6W. These do not apply to the A hypothesis in which only J-stock are assumed in sub-area 6W. (See Trial specifications, Table 7b for the data.)

Plot 4: The deterministic model-predicted bycatches compared to those observed.

Plot 5: The number and percentage of individuals by age group/sex for each month and sub-area from the deterministic fit.

Plot 6: The monthly age/sex distribution of individuals by sub-area in 1930 and 2020 from the deterministic fit. The area of the circles is proportional to the abundance in each sub-area.

Plot 7: The monthly age/sex distribution of individuals by sub-area in 2020 from the deterministic fit. The area of the circles is standardized for all sub-areas.

Plot 8: The monthly age/sex distribution of individuals by sub-area and stock in 1930 and 2020 from the deterministic fit. The area of the circles is proportional to the abundance in each sub-area.

The realized mixing matrices after conditioning (and all the γ parameters have been estimated) are given below.

The resultant estimated mixing matrices for Baseline Trial A01-1 (rounded to 2 decimal places)

J-Stock Baseline A01-1 (Matrix J-A)

Age/	Mon	Sub - Area																			
Sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE
Juv	J-M	0.02	0.02	0.02				0.10	0.10	0.16	0.01	0.00						0.48	0.09			
	Apr	0.02	0.02	0.02				0.10	0.10	0.16	0.01	0.00						0.48	0.09	0.00	0.00	
	May	0.02	0.02	0.02				0.10	0.10	0.15	0.01	0.00						0.48	0.09	0.00	0.00	
	Jun	0.02	0.02	0.02				0.08	0.08	0.12	0.01	0.00						0.38	0.07	0.11	0.11	
	Jul	0.02	0.02	0.02				0.08	0.08	0.12	0.01	0.01						0.38	0.07	0.11	0.11	
	Aug	0.02	0.02	0.02				0.08	0.08	0.12	0.01	0.01						0.38	0.07	0.11	0.11	
	Sep	0.02	0.02	0.02				0.08	0.08	0.12	0.01	0.01						0.38	0.07	0.11	0.11	
	O-D	0.02	0.02	0.02				0.09	0.09	0.14	0.01	0.01						0.42	0.08	0.12		
Ad.M	J-M	0.02	0.02	0.01				0.09	0.18	0.14	0.01	0.00						0.44	0.08			
	Apr			0.01				0.10	0.10	0.08	0.02	0.00						0.50	0.18	0.00	0.00	
	May			0.01				0.07	0.07	0.05	0.02	0.00						0.66	0.12	0.00	0.00	
	Jun			0.01				0.06	0.06	0.05	0.01	0.01						0.59	0.11	0.04	0.08	
	Jul			0.01				0.09	0.09	0.07	0.01	0.01						0.45	0.08	0.06	0.13	
	Aug			0.01				0.09	0.09	0.07	0.01	0.01						0.45	0.08	0.06	0.13	
	Sep	0.02	0.02	0.01				0.09	0.18	0.14	0.01	0.01						0.44	0.08			
	O-D	0.15	0.15	0.04				0.31	0.31		0.03	0.02										
Ad.F	J-M	0.02	0.02	0.01				0.09	0.18	0.14	0.00	0.00						0.45	0.08			
	Apr			0.01				0.07	0.07	0.05	0.01	0.00						0.67	0.12	0.00	0.00	
	May			0.00				0.00	0.00	0.00	0.00	0.00						0.01	0.00	0.33	0.66	
	Jun			0.01				0.07	0.07	0.06	0.01	0.00						0.68	0.12	0.00	0.00	
	Jul			0.01				0.11	0.11	0.09	0.01	0.01						0.56	0.10	0.00	0.00	
	Aug			0.01				0.11	0.11	0.09	0.01	0.01						0.56	0.10	0.00	0.00	
	Sep	0.02	0.02	0.01				0.09	0.18	0.14	0.00	0.00						0.44	0.08			
	O-D	0.15	0.15	0.04				0.31	0.31		0.01	0.01										

O-Stock Baseline A01-1 (Matrix O-AB)

Age/	Mon	Sub - Area																				
Sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE
Juv	J-M			0.00	0.33	0.33	0.33				0.00								0.00			
	Apr			0.01	0.06	0.06	0.06				0.04	0.01	0.02	0.02	0.03	0.05			0.00	0.09	0.26	0.30
	May			0.01	0.06	0.06	0.06				0.04	0.01	0.02	0.01	0.03	0.05	0.02		0.00	0.09	0.25	0.29
	Jun			0.00	0.06	0.06	0.06				0.02	0.02	0.02	0.01	0.02	0.13	0.02		0.00	0.09	0.23	0.27
	Jul			0.00	0.06	0.06	0.06				0.06	0.02	0.01	0.01	0.02	0.12	0.02		0.00	0.08	0.22	0.26
	Aug			0.00	0.06	0.06	0.06				0.06	0.02	0.01	0.01	0.02	0.12	0.02		0.00	0.08	0.22	0.26
	Sep			0.00	0.06	0.06	0.06				0.06	0.02	0.01	0.01	0.02	0.12	0.02		0.00	0.08	0.22	0.26
	O-D			0.00	0.27	0.27	0.27				0.15	0.03							0.00			
Ad.M	J-M			0.00	0.33	0.33	0.33				0.00								0.00			
	Apr			0.00	0.04	0.04	0.04				0.01	0.01	0.04	0.03	0.06	0.05			0.00	0.05	0.14	0.50
	May										0.00	0.01	0.03	0.02	0.04	0.04	0.02		0.00	0.04	0.10	0.71
	Jun										0.00	0.01	0.02	0.02	0.04	0.09	0.02		0.00	0.04	0.10	0.67
	Jul										0.01	0.01	0.02	0.02	0.04	0.09	0.02		0.00	0.04	0.10	0.66
	Aug										0.01	0.01	0.02	0.02	0.04	0.09	0.02		0.00	0.04	0.10	0.66
	Sep										0.02	0.01	0.04	0.03	0.06	0.13	0.01		0.00	0.05	0.14	0.50
	O-D			0.00	0.31	0.31	0.31				0.04	0.02							0.00			
Ad.F	J-M			0.00	0.33	0.33	0.33				0.00								0.00			
	Apr			0.00	0.04	0.04	0.04				0.00	0.00	0.02	0.02	0.03	0.03			0.00	0.06	0.16	0.56
	May										0.00	0.00	0.01	0.00	0.01	0.01	0.03		0.00	0.03	0.15	0.77
	Jun										0.00	0.00	0.01	0.00	0.01	0.04	0.02		0.00	0.03	0.14	0.75
	Jul										0.01	0.00	0.00	0.00	0.01	0.04	0.02		0.00	0.03	0.14	0.75
	Aug										0.01	0.00	0.00	0.00	0.01	0.04	0.02		0.00	0.03	0.14	0.75
	Sep										0.01	0.01	0.01	0.01	0.02	0.08	0.02		0.00	0.05	0.29	0.51
	O-D			0.00	0.31	0.31	0.31				0.04	0.02							0.00			

The resultant estimated mixing matrices for Baseline Trial A01-4 (rounded to 2 decimal places)

J-Stock Baseline A01-4 (Matrix J-A)

Age/	Mon	Sub - Area																			
Sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE
Juv	J-M	0.02	0.02	0.02				0.10	0.10	0.16	0.01	0.00						0.47	0.09			
	Apr	0.02	0.02	0.02				0.10	0.10	0.16	0.01	0.00						0.47	0.09	0.00	0.00	
	May	0.02	0.02	0.02				0.10	0.10	0.16	0.01	0.00						0.47	0.09	0.00	0.00	
	Jun	0.02	0.02	0.02				0.07	0.07	0.12	0.01	0.00						0.36	0.07	0.12	0.12	
	Jul	0.02	0.02	0.02				0.07	0.07	0.12	0.01	0.01						0.35	0.07	0.12	0.12	
	Aug	0.02	0.02	0.02				0.07	0.07	0.12	0.01	0.01						0.35	0.07	0.12	0.12	
	Sep	0.02	0.02	0.02				0.07	0.07	0.12	0.01	0.01						0.35	0.07	0.12	0.12	
	O-D	0.02	0.02	0.02				0.08	0.08	0.14	0.01	0.01						0.40	0.08	0.14		
Ad.M	J-M	0.02	0.02	0.01				0.09	0.18	0.15	0.01	0.00						0.44	0.08			
	Apr			0.01				0.10	0.10	0.08	0.02	0.00						0.49	0.19	0.00	0.00	
	May			0.01				0.07	0.07	0.06	0.02	0.00						0.66	0.12	0.00	0.00	
	Jun			0.01				0.06	0.06	0.05	0.01	0.01						0.56	0.11	0.05	0.10	
	Jul			0.01				0.09	0.09	0.07	0.01	0.02						0.42	0.08	0.07	0.15	
	Aug			0.01				0.09	0.09	0.07	0.01	0.02						0.42	0.08	0.07	0.15	
	Sep	0.02	0.02	0.01				0.09	0.18	0.14	0.01	0.02						0.43	0.08			
	O-D	0.15	0.15	0.04				0.31	0.31		0.03	0.03										
Ad.F	J-M	0.02	0.02	0.01				0.09	0.18	0.15	0.01	0.00						0.44	0.08			
	Apr			0.01				0.07	0.07	0.06	0.01	0.00						0.67	0.13	0.00	0.00	
	May			0.00				0.00	0.00	0.00	0.00	0.00						0.00	0.00	0.33	0.66	
	Jun			0.01				0.07	0.07	0.06	0.00	0.00						0.67	0.13	0.00	0.00	
	Jul			0.01				0.11	0.11	0.09	0.01	0.01						0.56	0.10	0.00	0.00	
	Aug			0.01				0.11	0.11	0.09	0.01	0.01						0.56	0.10	0.00	0.00	
	Sep	0.02	0.02	0.01				0.09	0.18	0.15	0.00	0.00						0.44	0.08			
	O-D	0.15	0.15	0.04				0.32	0.32		0.01	0.01										

O-Stock Baseline A01-4 (Matrix O-AB)

Age/	Mon	Sub - Area																				
Sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE
Juv	J-M			0.00	0.33	0.33	0.33				0.00								0.00			
	Apr			0.01	0.06	0.06	0.06				0.04	0.01	0.02	0.02	0.03	0.05			0.00	0.10	0.25	0.30
	May			0.01	0.06	0.06	0.06				0.04	0.01	0.02	0.01	0.03	0.05	0.02		0.00	0.10	0.25	0.30
	Jun			0.01	0.06	0.06	0.06				0.02	0.02	0.02	0.01	0.02	0.12	0.02		0.00	0.09	0.23	0.27
	Jul			0.00	0.05	0.05	0.05				0.06	0.02	0.01	0.01	0.02	0.12	0.02		0.00	0.09	0.22	0.26
	Aug			0.00	0.05	0.05	0.05				0.06	0.02	0.01	0.01	0.02	0.12	0.02		0.00	0.09	0.22	0.26
	Sep			0.00	0.05	0.05	0.05				0.06	0.02	0.01	0.01	0.02	0.12	0.02		0.00	0.09	0.22	0.26
	O-D			0.00	0.27	0.27	0.27				0.15	0.03							0.00			
Ad.M	J-M			0.00	0.33	0.33	0.33				0.00								0.00			
	Apr			0.00	0.04	0.04	0.04				0.01	0.01	0.04	0.03	0.06	0.05			0.00	0.05	0.14	0.51
	May										0.00	0.01	0.03	0.02	0.04	0.04	0.02		0.00	0.04	0.10	0.71
	Jun										0.00	0.01	0.02	0.02	0.04	0.09	0.02		0.00	0.04	0.09	0.67
	Jul										0.01	0.01	0.02	0.02	0.04	0.08	0.02		0.00	0.04	0.09	0.67
	Aug										0.01	0.01	0.02	0.02	0.04	0.08	0.02		0.00	0.04	0.09	0.67
	Sep										0.02	0.01	0.04	0.03	0.06	0.13	0.01		0.00	0.05	0.14	0.51
	O-D			0.00	0.31	0.31	0.31				0.04	0.02							0.00			
Ad.F	J-M			0.00	0.33	0.33	0.33				0.00								0.00			
	Apr			0.00	0.04	0.04	0.04				0.00	0.00	0.02	0.02	0.03	0.03			0.00	0.06	0.16	0.56
	May										0.00	0.00	0.01	0.00	0.01	0.01	0.02		0.00	0.03	0.14	0.77
	Jun										0.00	0.00	0.00	0.00	0.01	0.04	0.02		0.00	0.03	0.14	0.75
	Jul										0.00	0.00	0.00	0.00	0.01	0.04	0.02		0.00	0.03	0.14	0.75
	Aug										0.00	0.00	0.00	0.00	0.01	0.04	0.02		0.00	0.03	0.14	0.75
	Sep										0.01	0.01	0.01	0.01	0.02	0.08	0.02		0.00	0.06	0.28	0.51
	O-D			0.00	0.31	0.31	0.31				0.04	0.02							0.00			

The resultant estimated mixing matrices for Baseline Trial B01-1 (rounded to 2 decimal places)

J-Stock Baseline B01-1 (Matrix J-B)

Age/	Mon										Sub -	Area									
Sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE
Juv	J-M		0.01	0.01					0.13	0.23	0.01	0.00						0.49	0.12			
	Apr		0.01	0.01					0.12	0.22	0.01	0.00						0.47	0.12	0.02	0.02	
	May		0.01	0.01					0.12	0.22	0.01	0.00						0.47	0.12	0.02	0.02	
	Jun		0.01	0.01					0.10	0.18	0.00	0.00						0.38	0.10	0.11	0.11	
	Jul		0.01	0.01					0.10	0.18	0.00	0.00						0.38	0.09	0.11	0.11	
	Aug		0.01	0.01					0.10	0.18	0.00	0.00						0.38	0.09	0.11	0.11	
	Sep		0.01	0.01					0.10	0.18	0.00	0.00						0.38	0.09	0.11	0.11	
	O-D		0.01	0.01					0.11	0.20	0.01	0.01						0.43	0.11	0.13		
Ad.M	J-M		0.01	0.00					0.23	0.21	0.01	0.00						0.44	0.11			
	Apr			0.01					0.12	0.11	0.02	0.00						0.48	0.24	0.01	0.01	
	May			0.00					0.08	0.08	0.01	0.00						0.64	0.16	0.01	0.01	
	Jun			0.00					0.07	0.07	0.00	0.00						0.58	0.14	0.04	0.09	
	Jul			0.00					0.12	0.11	0.01	0.01						0.45	0.11	0.07	0.13	
	Aug			0.00					0.12	0.11	0.01	0.01						0.45	0.11	0.07	0.13	
	Sep		0.01	0.00					0.22	0.21	0.01	0.01						0.43	0.11			
	O-D		0.12	0.03					0.78		0.03	0.04										
Ad.F	J-M		0.01	0.00					0.23	0.21	0.00	0.00						0.44	0.11			
	Apr			0.00					0.09	0.08	0.01	0.00						0.66	0.17	0.00	0.00	
	May			0.00					0.09	0.08	0.01	0.00						0.66	0.16	0.00	0.00	
	Jun			0.00					0.08	0.07	0.00	0.00						0.61	0.15	0.03	0.05	
	Jul			0.01					0.13	0.12	0.00	0.00						0.49	0.12	0.04	0.09	
	Aug			0.01					0.13	0.12	0.00	0.00						0.49	0.12	0.04	0.09	
	Sep		0.01	0.00					0.23	0.21	0.00	0.00						0.44	0.11			
	O-D		0.13	0.03					0.81		0.02	0.02										

O-Stock Baseline B01-1 (Matrix O-AB)

Age/	Mon										Sub -	Area										
Sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE
Juv	J-M			0.00	0.33	0.33	0.33				0.00								0.00			
	Apr			0.00	0.05	0.05	0.05				0.04	0.01	0.02	0.01	0.02	0.04			0.00	0.13	0.20	0.36
	May			0.00	0.05	0.05	0.05				0.04	0.01	0.02	0.01	0.02	0.04	0.02		0.00	0.13	0.20	0.35
	Jun			0.00	0.05	0.05	0.05				0.02	0.02	0.01	0.01	0.02	0.12	0.02		0.01	0.12	0.18	0.33
	Jul			0.00	0.05	0.05	0.05				0.05	0.02	0.01	0.01	0.02	0.11	0.02		0.01	0.12	0.18	0.32
	Aug			0.00	0.05	0.05	0.05				0.05	0.02	0.01	0.01	0.02	0.11	0.02		0.01	0.12	0.18	0.32
	Sep			0.00	0.05	0.05	0.05				0.05	0.02	0.01	0.01	0.02	0.11	0.02		0.01	0.12	0.18	0.32
	O-D			0.00	0.27	0.27	0.27				0.15	0.03							0.01			
Ad.M	J-M			0.00	0.33	0.33	0.33				0.00								0.00			
	Apr			0.00	0.03	0.03	0.03				0.01	0.01	0.03	0.03	0.05	0.05			0.00	0.07	0.11	0.57
	May										0.00	0.00	0.02	0.02	0.03	0.03	0.02		0.00	0.05	0.07	0.76
	Jun										0.00	0.01	0.02	0.02	0.03	0.07	0.01		0.00	0.04	0.07	0.72
	Jul										0.01	0.01	0.02	0.02	0.03	0.07	0.01		0.00	0.04	0.07	0.72
	Aug										0.01	0.01	0.02	0.02	0.03	0.07	0.01		0.00	0.04	0.07	0.72
	Sep										0.02	0.01	0.03	0.03	0.05	0.11	0.01		0.00	0.07	0.10	0.56
	O-D			0.00	0.31	0.31	0.31				0.04	0.02							0.00			
Ad.F	J-M			0.00	0.33	0.33	0.33				0.00								0.00			
	Apr			0.00	0.03	0.03	0.03				0.00	0.00	0.02	0.02	0.03	0.03			0.00	0.08	0.12	0.62
	May										0.00	0.00	0.00	0.00	0.01	0.01	0.02		0.00	0.03	0.10	0.82
	Jun										0.00	0.00	0.00	0.00	0.01	0.03	0.02		0.00	0.03	0.10	0.80
	Jul										0.00	0.00	0.00	0.00	0.01	0.03	0.02		0.00	0.03	0.10	0.80
	Aug										0.00	0.00	0.00	0.00	0.01	0.03	0.02		0.00	0.03	0.10	0.80
	Sep										0.01	0.01	0.01	0.01	0.01	0.07	0.02		0.00	0.07	0.21	0.58
	O-D			0.00	0.31	0.31	0.31				0.04	0.02							0.00			

Y-Stock Baseline B01-1 (Matrix Y-B)

Age/	Mon	Sub - Area																			
Sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE
Juv	J-M	0.32						0.32	0.37													
	Apr	0.17						0.70	0.13													
	May	0.17						0.70	0.13													
	Jun	0.17						0.70	0.13													
	Jul	0.19						0.77	0.04													
	Aug	0.19						0.77	0.04													
	Sep	0.17						0.35	0.48													
	O-D	0.30						0.30	0.41													
AdM	J-M	0.32						0.32	0.37													
	Apr	0.17						0.70	0.13													
	May	0.17						0.70	0.13													
	Jun	0.17						0.70	0.13													
	Jul	0.19						0.77	0.04													
	Aug	0.19						0.77	0.04													
	Sep	0.17						0.35	0.48													
	O-D	0.30						0.30	0.41													
AdF	J-M	0.32						0.32	0.37													
	Apr	0.17						0.70	0.13													
	May	0.17						0.70	0.13													
	Jun	0.17						0.70	0.13													
	Jul	0.19						0.77	0.04													
	Aug	0.19						0.77	0.04													
	Sep	0.17						0.35	0.48													
	O-D	0.30						0.30	0.41													

The resultant estimated mixing matrices for Baseline Trial B01-4 (rounded to 2 decimal places)

J-Stock Baseline B01-4 (Matrix J-B)

Age/	Mon	Sub - Area																			
Sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE
Juv	J-M		0.01	0.01					0.13	0.24	0.01	0.00						0.48	0.12			
	Apr		0.01	0.01					0.12	0.22	0.01	0.00						0.46	0.12	0.03	0.03	
	May		0.01	0.01					0.12	0.22	0.01	0.00						0.46	0.12	0.03	0.03	
	Jun		0.01	0.01					0.10	0.18	0.00	0.00						0.36	0.09	0.13	0.13	
	Jul		0.01	0.01					0.10	0.18	0.00	0.01						0.36	0.09	0.13	0.13	
	Aug		0.01	0.01					0.10	0.18	0.00	0.01						0.36	0.09	0.13	0.13	
	Sep		0.01	0.01					0.10	0.18	0.00	0.01						0.36	0.09	0.13	0.13	
	O-D		0.01	0.01					0.11	0.20	0.01	0.01						0.41	0.11	0.14		
Ad.M	J-M		0.01	0.00					0.23	0.21	0.01	0.00						0.43	0.11			
	Apr			0.01					0.12	0.12	0.02	0.00						0.47	0.24	0.01	0.01	
	May			0.00					0.08	0.08	0.01	0.00						0.63	0.16	0.01	0.02	
	Jun			0.00					0.07	0.07	0.00	0.00						0.56	0.14	0.05	0.10	
	Jul			0.00					0.11	0.11	0.01	0.01						0.43	0.11	0.08	0.15	
	Aug			0.00					0.11	0.11	0.01	0.01						0.43	0.11	0.08	0.15	
	Sep		0.01	0.00					0.23	0.21	0.01	0.01						0.43	0.11			
	O-D		0.12	0.03					0.78		0.03	0.04										
Ad.F	J-M		0.01	0.00					0.23	0.21	0.00	0.00						0.43	0.11			
	Apr			0.00					0.09	0.08	0.01	0.00						0.66	0.17	0.00	0.00	
	May			0.00					0.09	0.08	0.01	0.00						0.66	0.17	0.00	0.00	
	Jun			0.00					0.08	0.07	0.00	0.00						0.60	0.15	0.03	0.06	
	Jul			0.01					0.13	0.12	0.00	0.00						0.48	0.12	0.05	0.10	
	Aug			0.01					0.13	0.12	0.00	0.00						0.48	0.12	0.05	0.10	
	Sep		0.01	0.00					0.23	0.21	0.00	0.00						0.43	0.11			
	O-D		0.13	0.03					0.81		0.02	0.02										

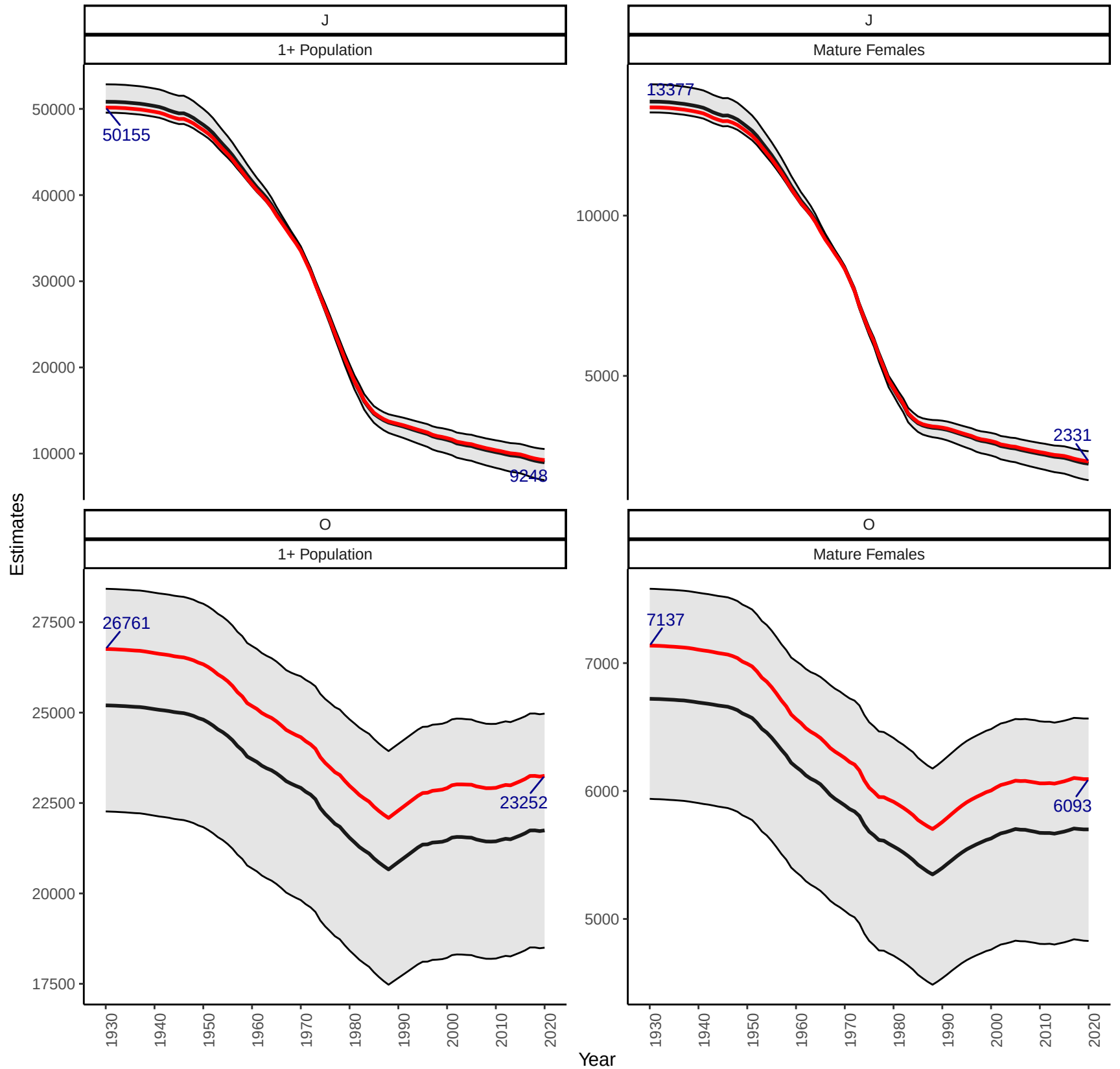
O-Stock Baseline B01-4 (Matrix O-AB)

Age/	Mon	Sub - Area																			
Sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE
Juv	J-M			0.00	0.33	0.33	0.33				0.00								0.00			
	Apr			0.00	0.05	0.05	0.05				0.04	0.01	0.02	0.01	0.02	0.04			0.00	0.13	0.19	0.37
	May			0.00	0.05	0.05	0.05				0.04	0.01	0.02	0.01	0.02	0.04	0.02		0.00	0.13	0.19	0.36
	Jun			0.00	0.05	0.05	0.05				0.02	0.02	0.01	0.01	0.02	0.12	0.02		0.01	0.12	0.17	0.33
	Jul			0.00	0.05	0.05	0.05				0.05	0.02	0.01	0.01	0.02	0.11	0.02		0.01	0.12	0.17	0.32
	Aug			0.00	0.05	0.05	0.05				0.05	0.02	0.01	0.01	0.02	0.11	0.02		0.01	0.12	0.17	0.32
	Sep			0.00	0.05	0.05	0.05				0.05	0.02	0.01	0.01	0.02	0.11	0.02		0.01	0.12	0.17	0.32
	O-D			0.00	0.27	0.27	0.27				0.15	0.03							0.01			
Ad.M	J-M			0.00	0.33	0.33	0.33				0.00								0.00			
	Apr			0.00	0.03	0.03	0.03				0.01	0.01	0.03	0.03	0.05	0.05			0.00	0.07	0.10	0.58
	May										0.00	0.00	0.02	0.02	0.03	0.03	0.02		0.00	0.05	0.07	0.76
	Jun										0.00	0.01	0.02	0.02	0.03	0.07	0.01		0.00	0.04	0.06	0.73
	Jul										0.01	0.01	0.02	0.02	0.03	0.07	0.01		0.00	0.04	0.06	0.72
	Aug										0.01	0.01	0.02	0.02	0.03	0.07	0.01		0.00	0.04	0.06	0.72
	Sep										0.02	0.01	0.03	0.03	0.05	0.11	0.01		0.00	0.07	0.10	0.57
	O-D			0.00	0.31	0.31	0.31				0.04	0.02							0.00			
Ad.F	J-M			0.00	0.33	0.33	0.33				0.00								0.00			
	Apr			0.00	0.03	0.03	0.03				0.00	0.00	0.02	0.02	0.03	0.03			0.00	0.08	0.11	0.63
	May										0.00	0.00	0.00	0.00	0.01	0.01	0.02		0.00	0.03	0.10	0.82
	Jun										0.00	0.00	0.00	0.00	0.01	0.03	0.02		0.00	0.03	0.09	0.80
	Jul										0.00	0.00	0.00	0.00	0.01	0.03	0.02		0.00	0.03	0.09	0.80
	Aug										0.00	0.00	0.00	0.00	0.01	0.03	0.02		0.00	0.03	0.09	0.80
	Sep										0.01	0.01	0.01	0.01	0.01	0.07	0.02		0.00	0.07	0.21	0.59
	O-D			0.00	0.31	0.31	0.31				0.04	0.02							0.00			

Y-Stock Baseline B01-4 (Matrix Y-B)

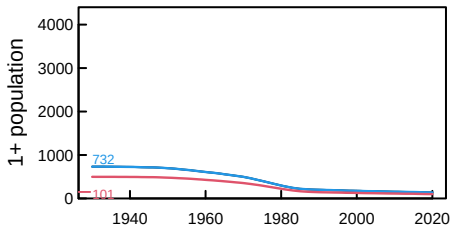
Age/	Mon	Sub - Area																			
Sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE
Juv	J-M	0.31						0.31	0.37													
	Apr	0.17						0.69	0.13													
	May	0.17						0.69	0.13													
	Jun	0.17						0.69	0.13													
	Jul	0.19						0.77	0.04													
	Aug	0.19						0.77	0.04													
	Sep	0.18						0.35	0.47													
	O-D	0.30						0.30	0.40													
AdM	J-M	0.31						0.31	0.37													
	Apr	0.17						0.69	0.13													
	May	0.17						0.69	0.13													
	Jun	0.17						0.69	0.13													
	Jul	0.19						0.77	0.04													
	Aug	0.19						0.77	0.04													
	Sep	0.18						0.35	0.47													
	O-D	0.30						0.30	0.40													
AdF	J-M	0.31						0.31	0.37													
	Apr	0.17						0.69	0.13													
	May	0.17						0.69	0.13													
	Jun	0.17						0.69	0.13													
	Jul	0.19						0.77	0.04													
	Aug	0.19						0.77	0.04													
	Sep	0.18						0.35	0.47													
	O-D	0.30						0.30	0.40													

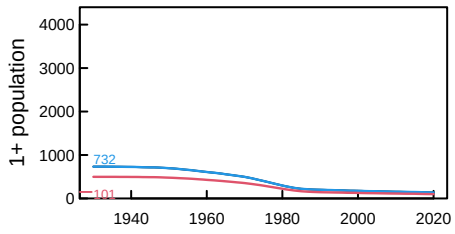
A01−1 Baseline Conditioning Plot 1: Stock Trajectories

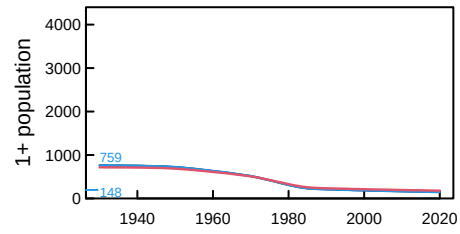


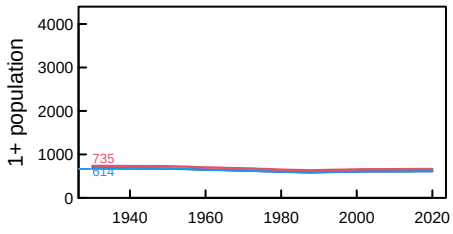
Trajectories 8 median best fit

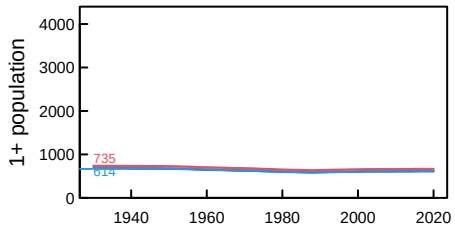
A01−1L Hyp. A 1% Baseline Conditioning Plot 2a: May/Jun (red) & Aug/Sep (blue)

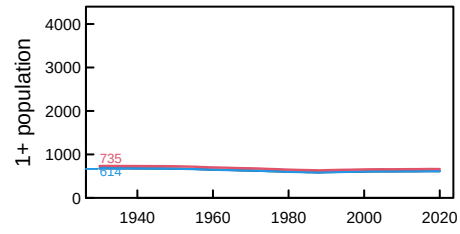


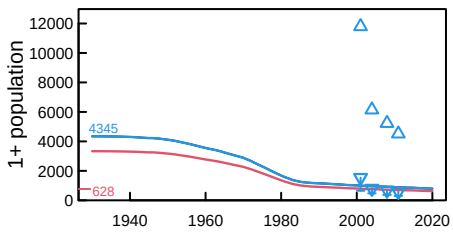


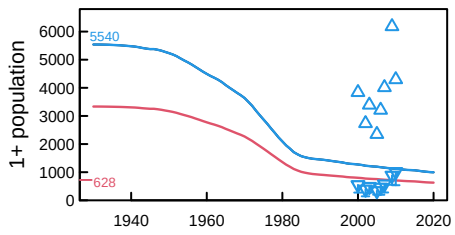


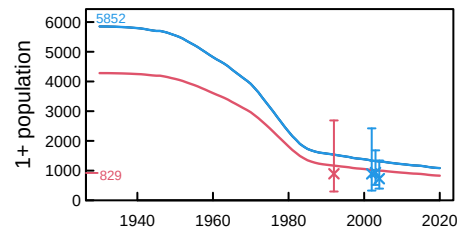


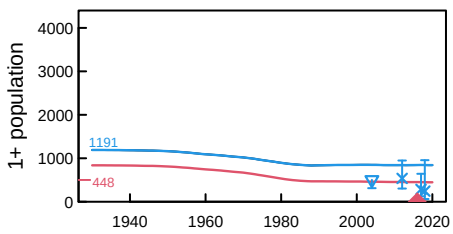


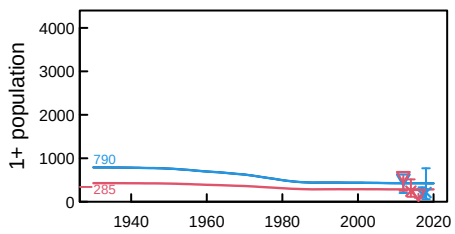


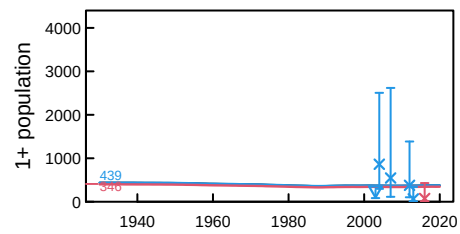


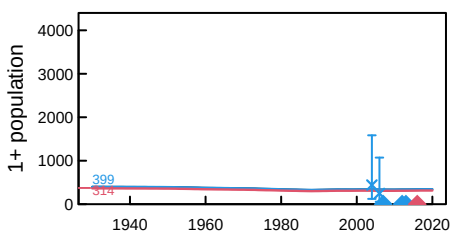


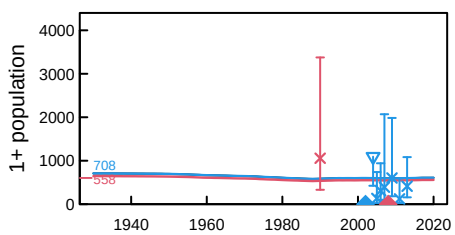


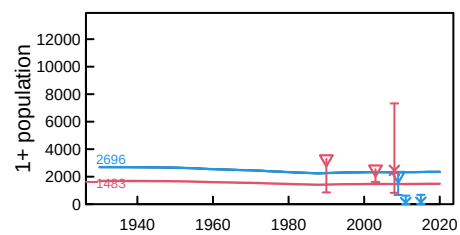


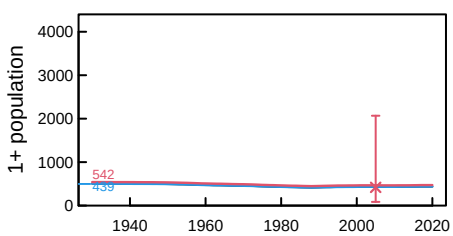


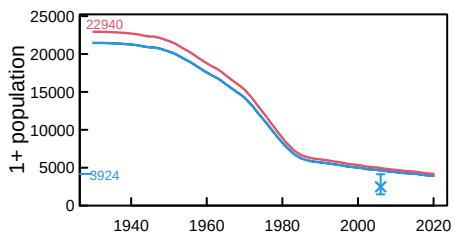


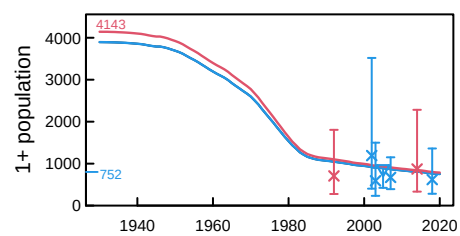


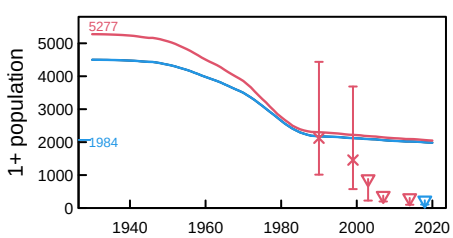


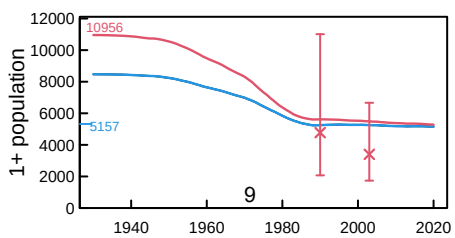


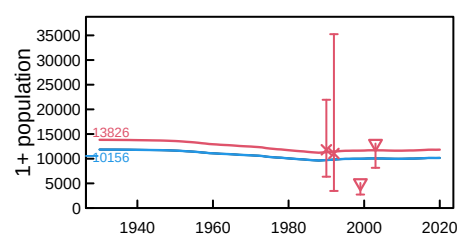




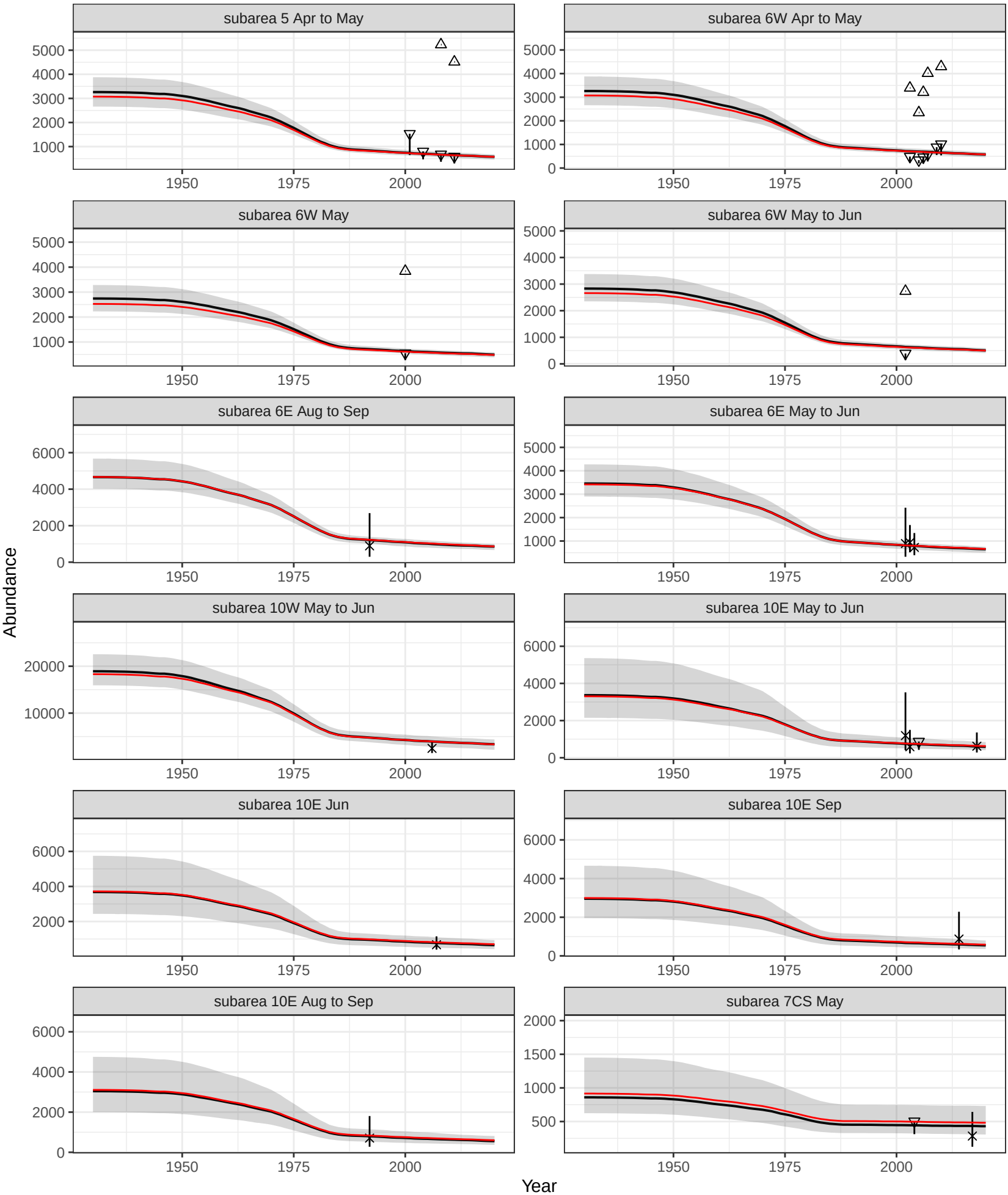








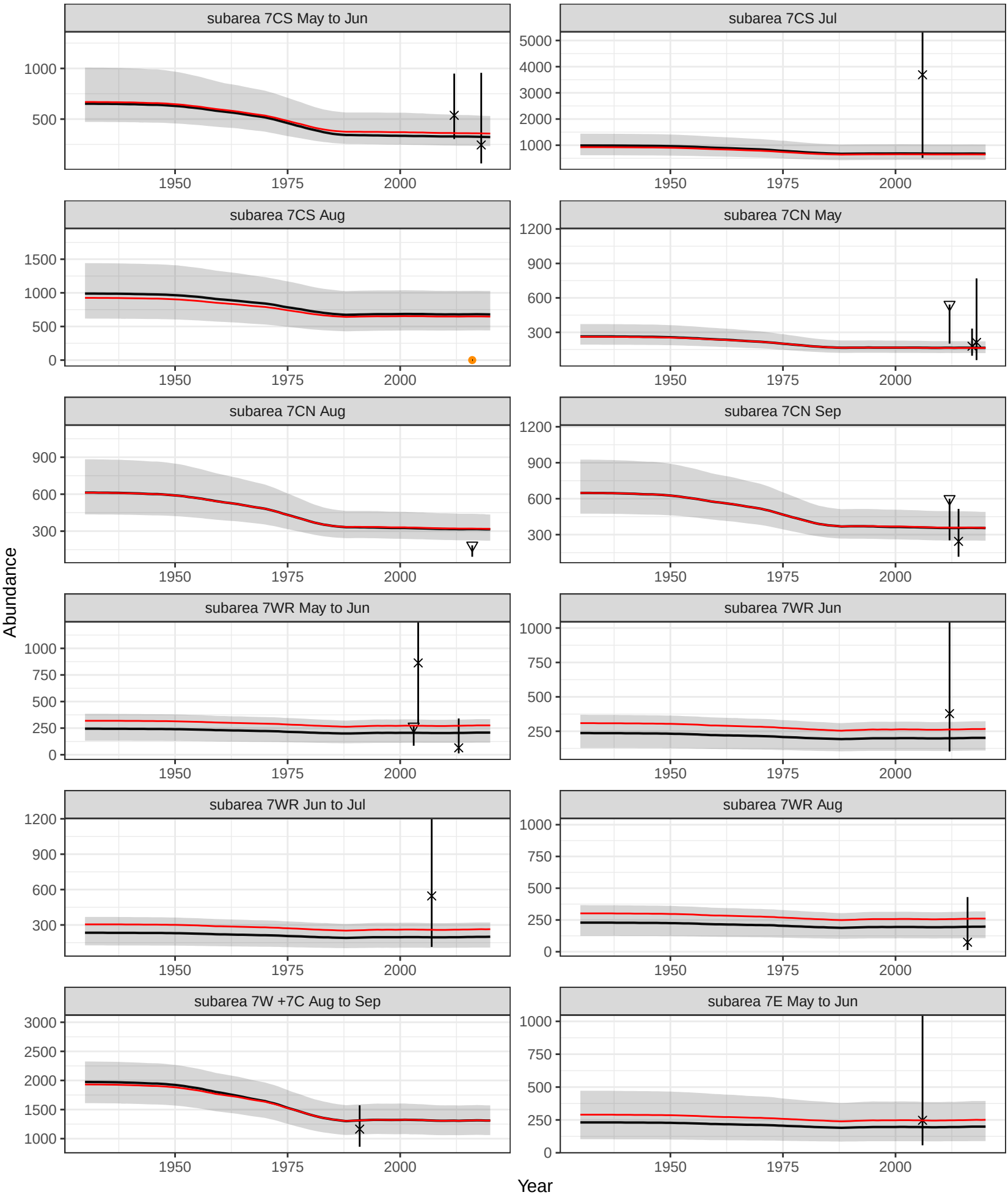
A01−1 Baseline Conditioning Plot 2b: Fits to Data



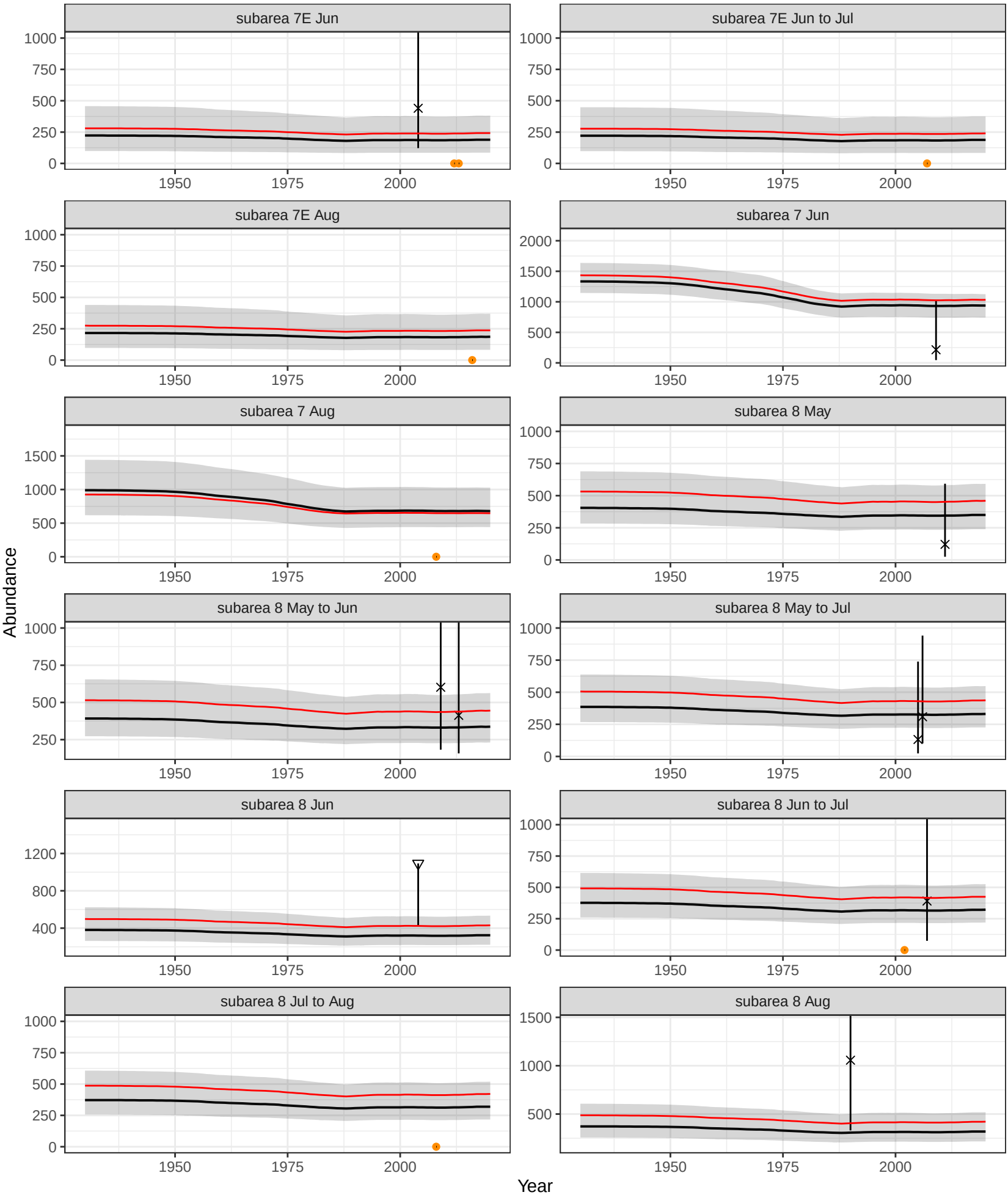
Type ● 0 estimate × estimate △ max estimate ▽ min estimate

best fit = red, median = black

A01−1 Baseline Conditioning Plot 2b: Fits to Data

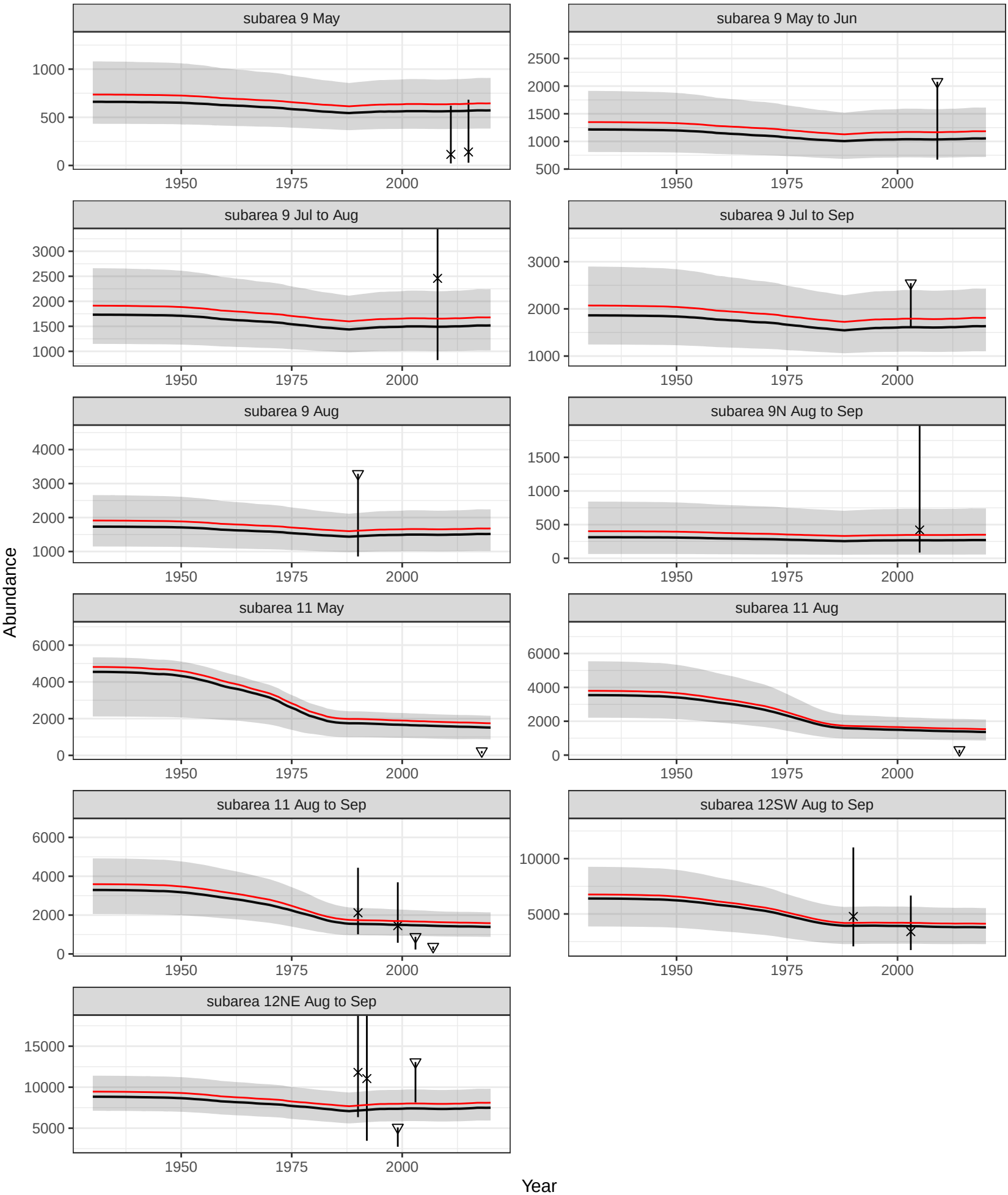


A01−1 Baseline Conditioning Plot 2b: Fits to Data



best fit = red, median = black

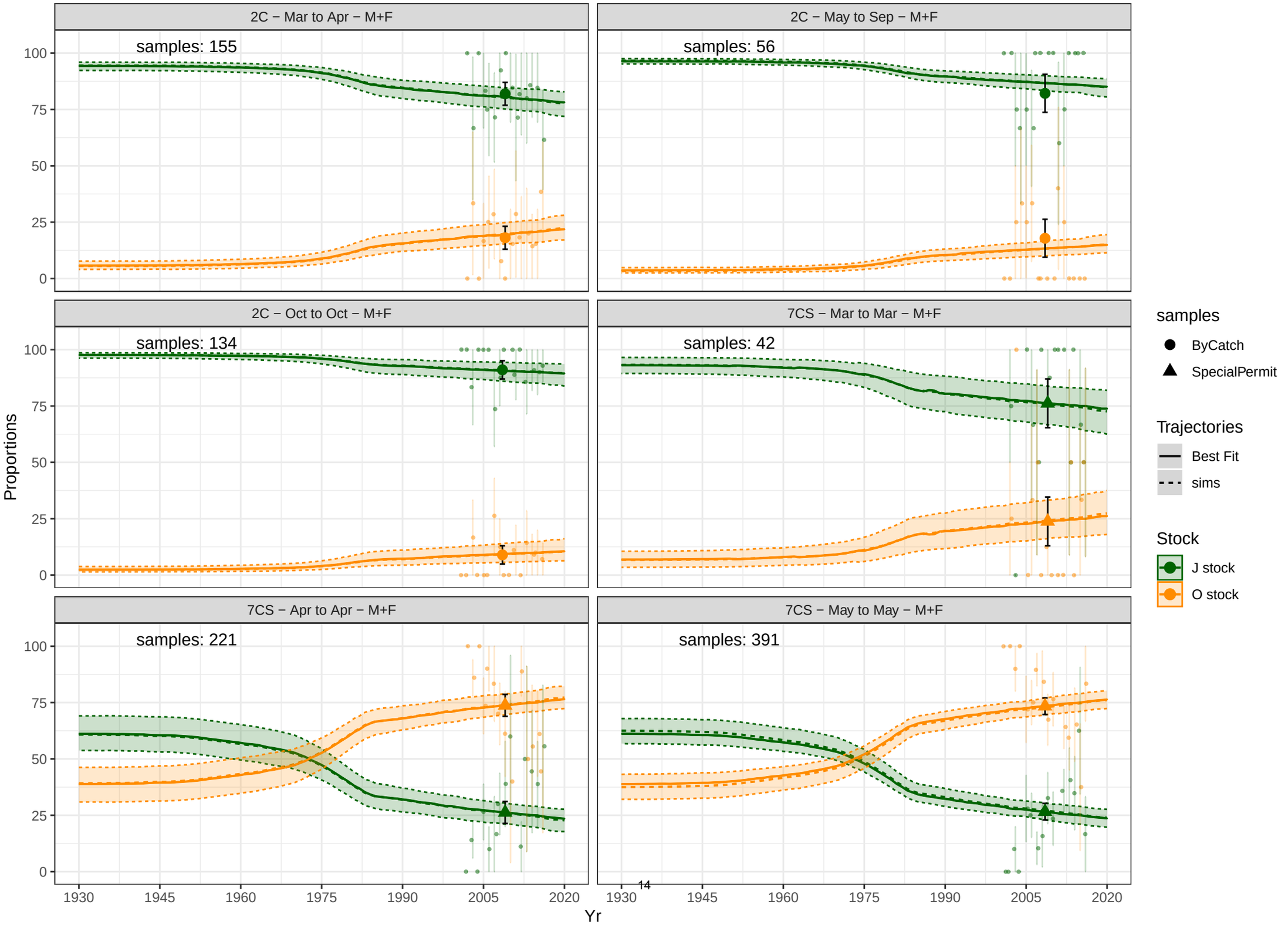
A01−1 Baseline Conditioning Plot 2b: Fits to Data



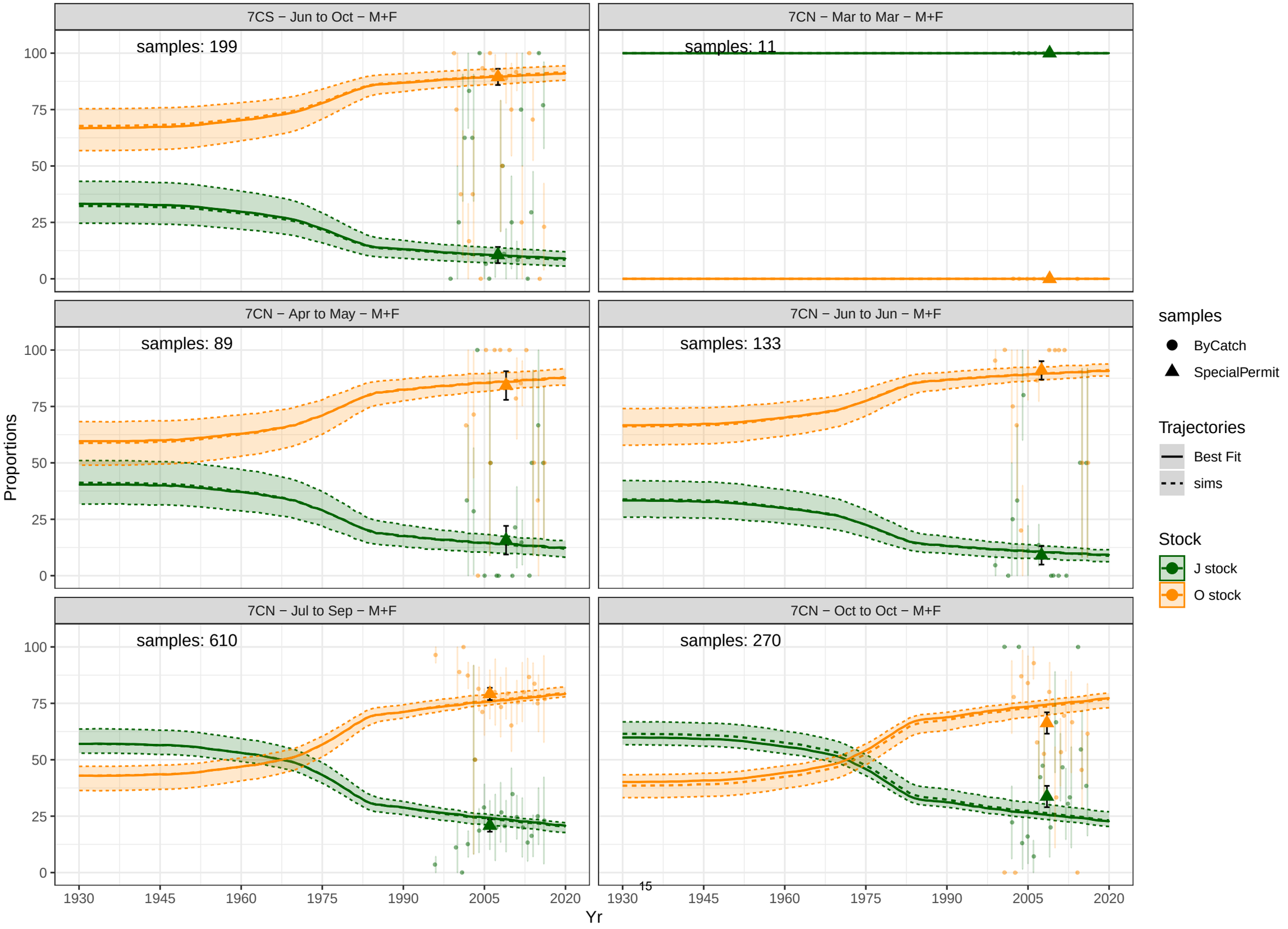
Type ● 0 estimate × estimate △ max estimate ▽ min estimate

best fit = red, median = black

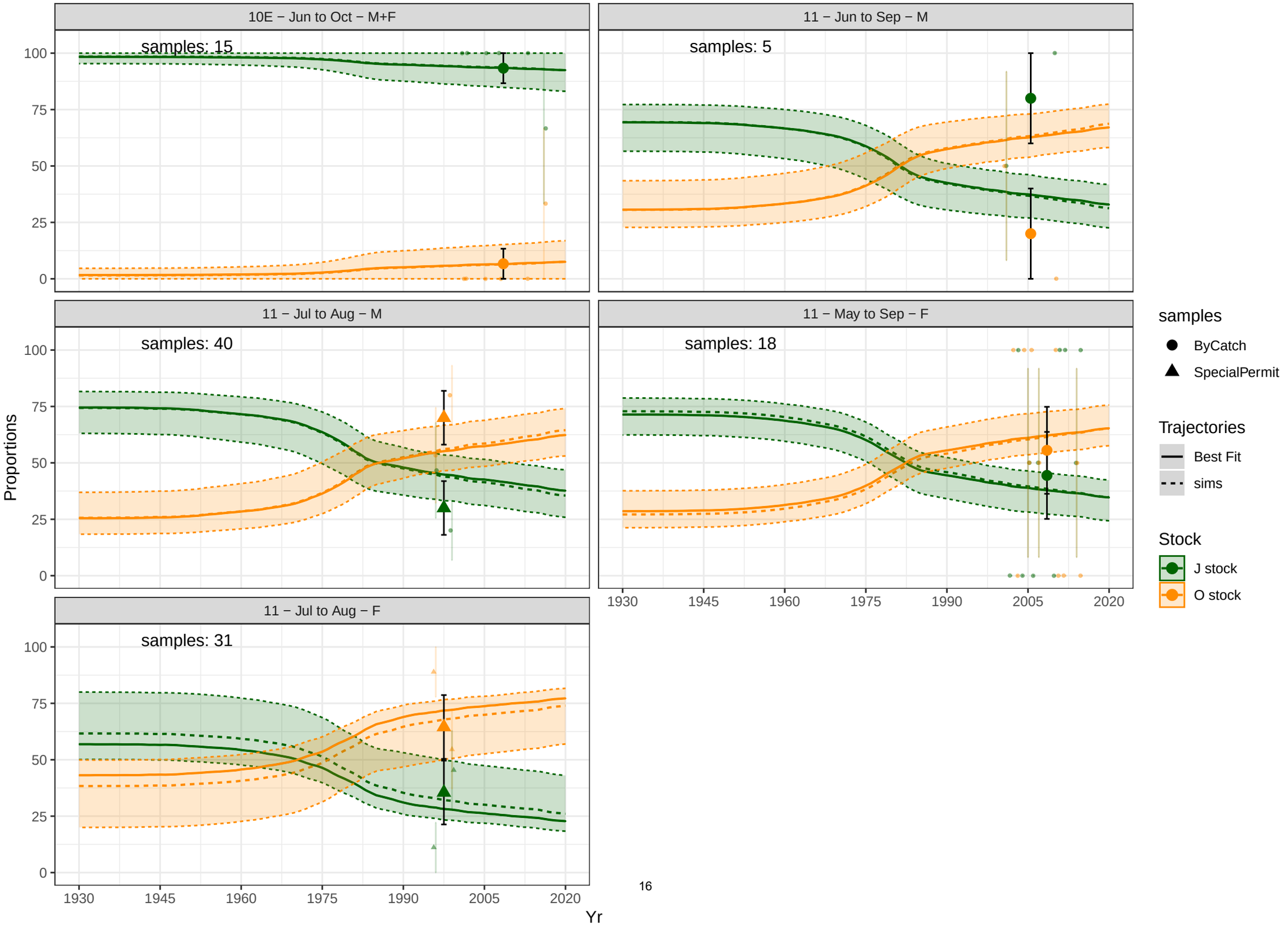
A01−1 Baseline Conditioning Plot 3: Fits to Data



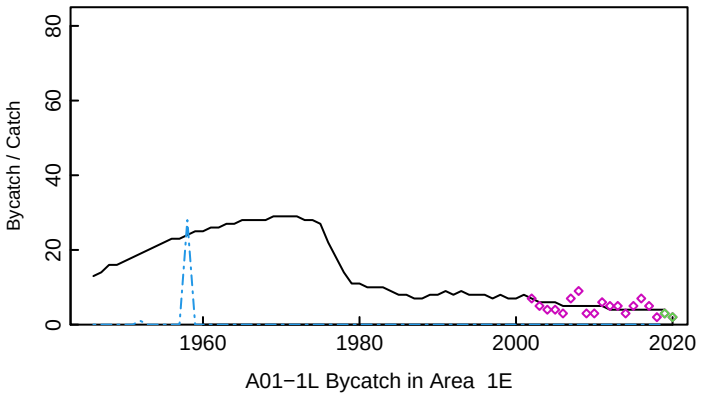
A01−1 Baseline Conditioning Plot 3: Fits to Data

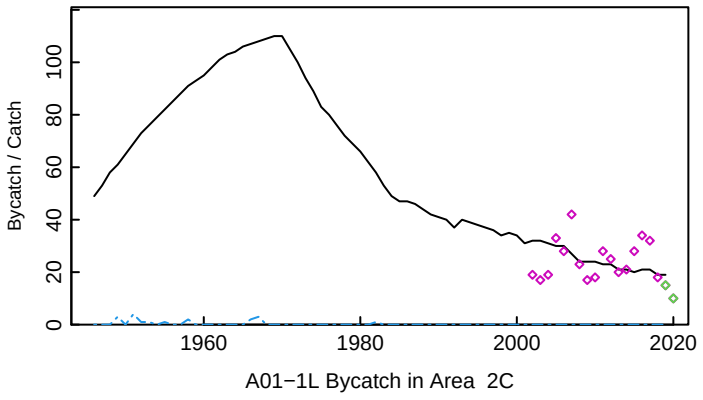


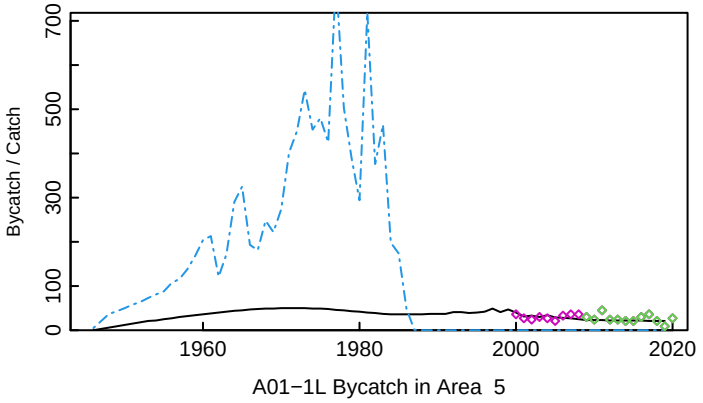
A01−1 Baseline Conditioning Plot 3: Fits to Data

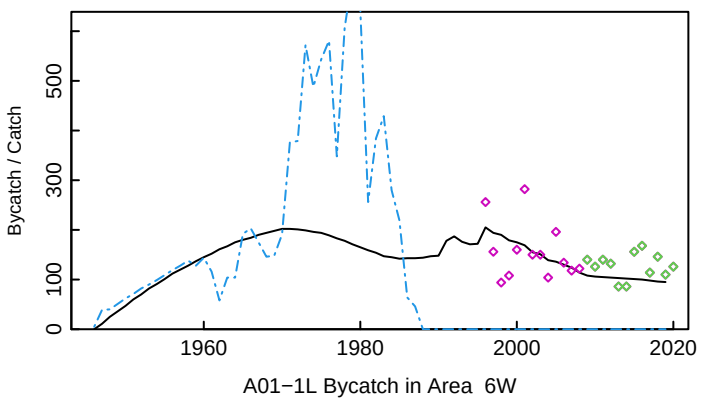


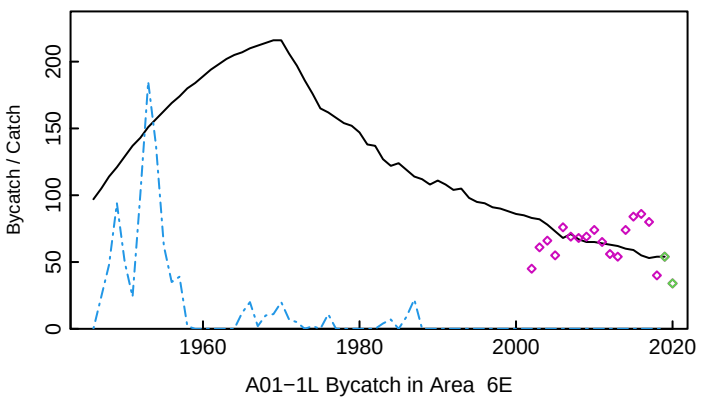
A01−1L Hyp. A 1% Baseline Conditioning Plot 4a: 'Best Fit' Bycatches

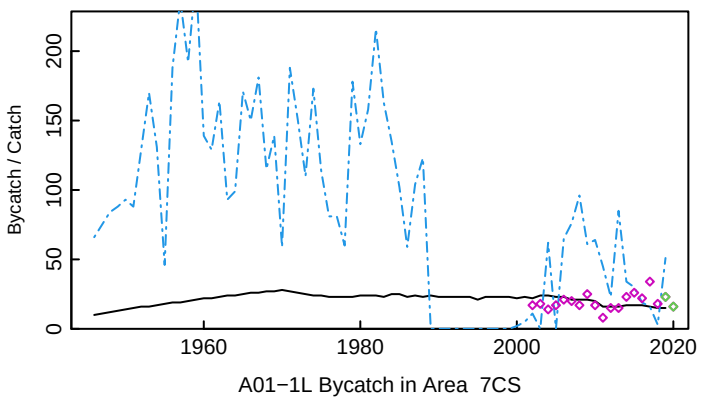


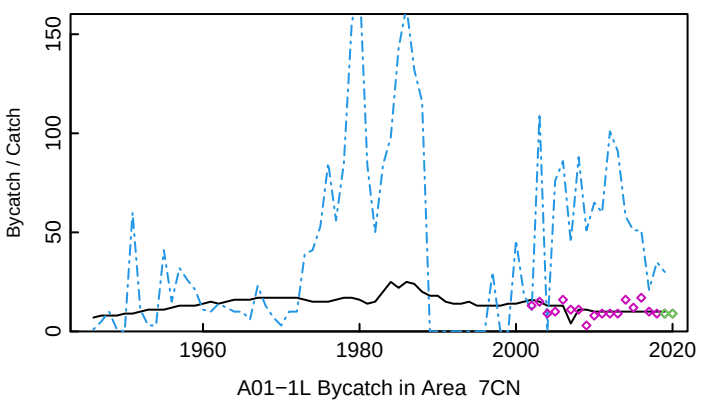


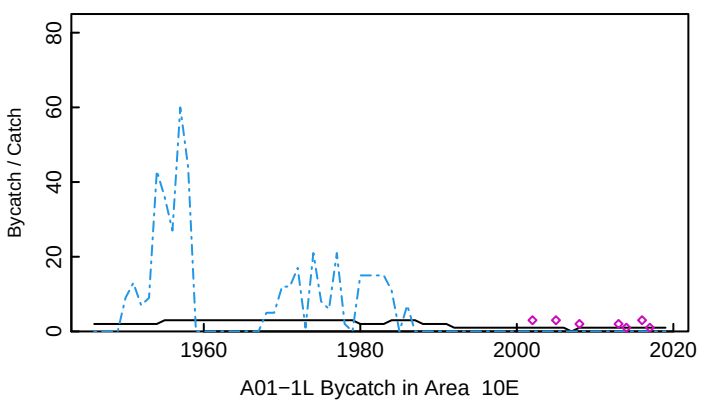


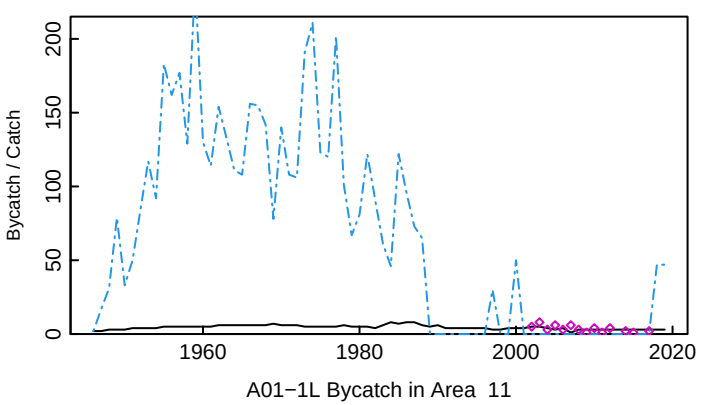


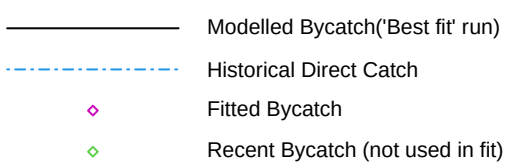




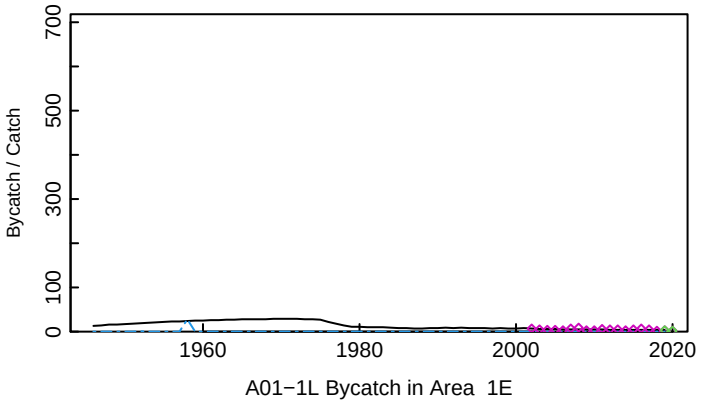


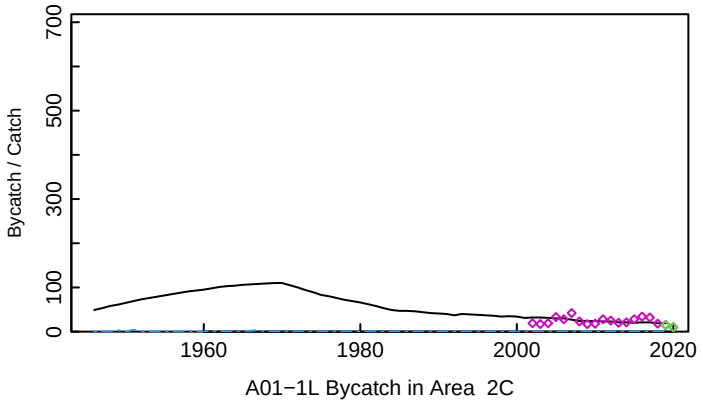


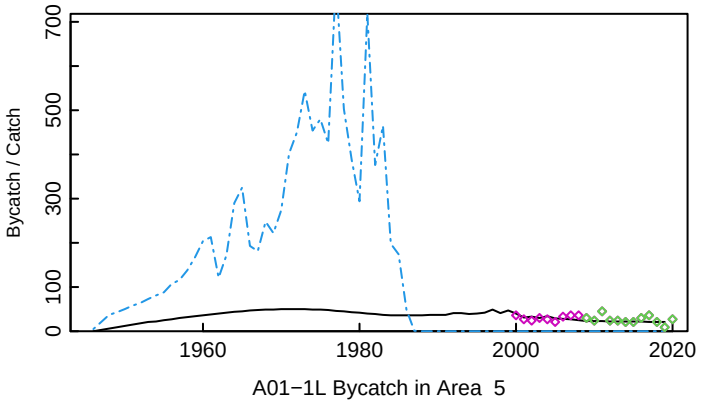


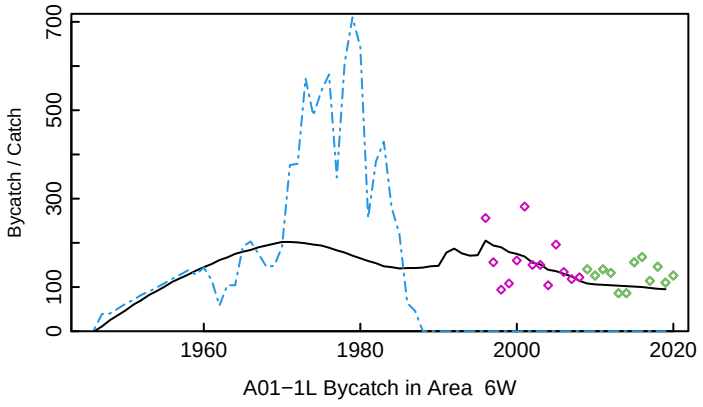


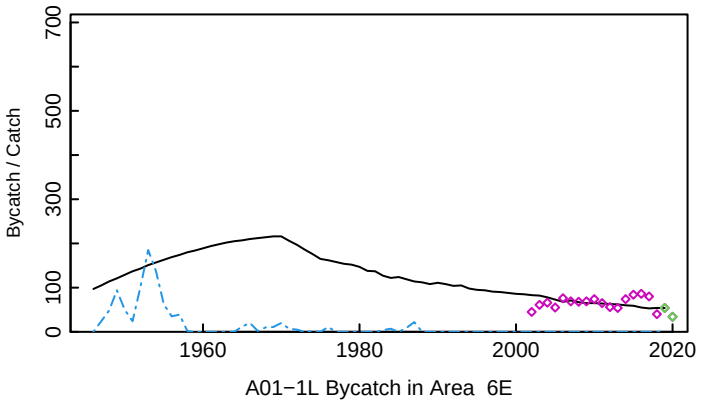
A01−1L Hyp. A 1% Baseline Conditioning Plot 4b: 'Best Fit' Bycatches On Same Scale

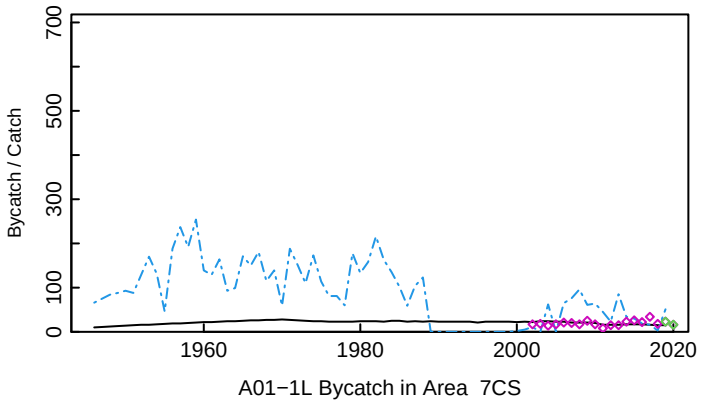


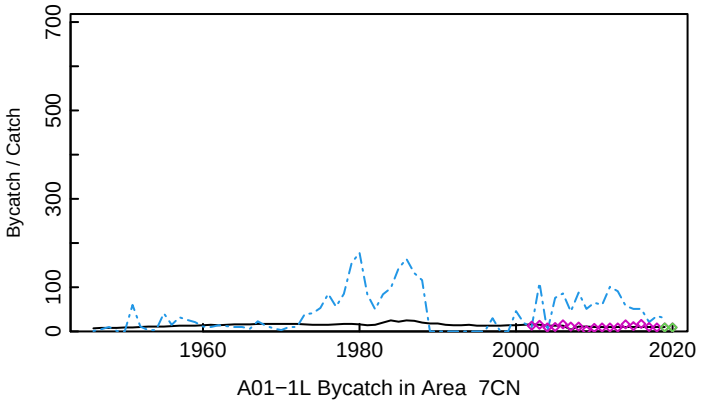


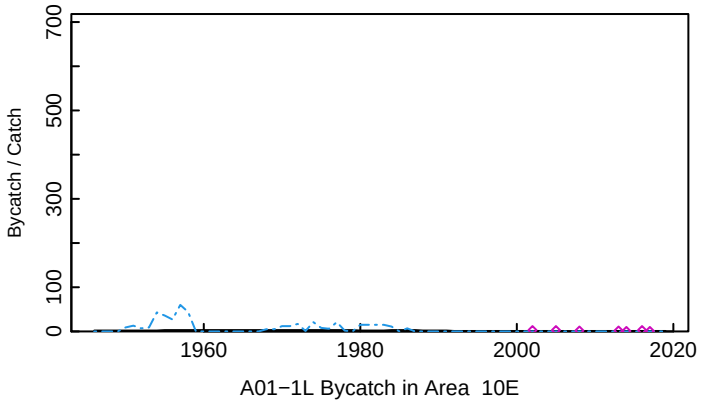


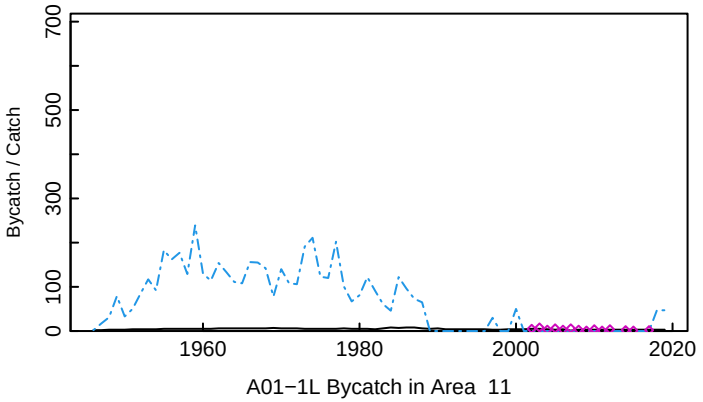


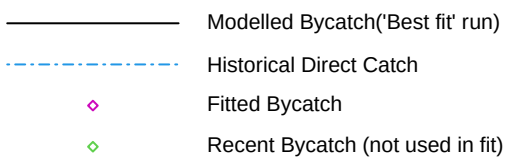




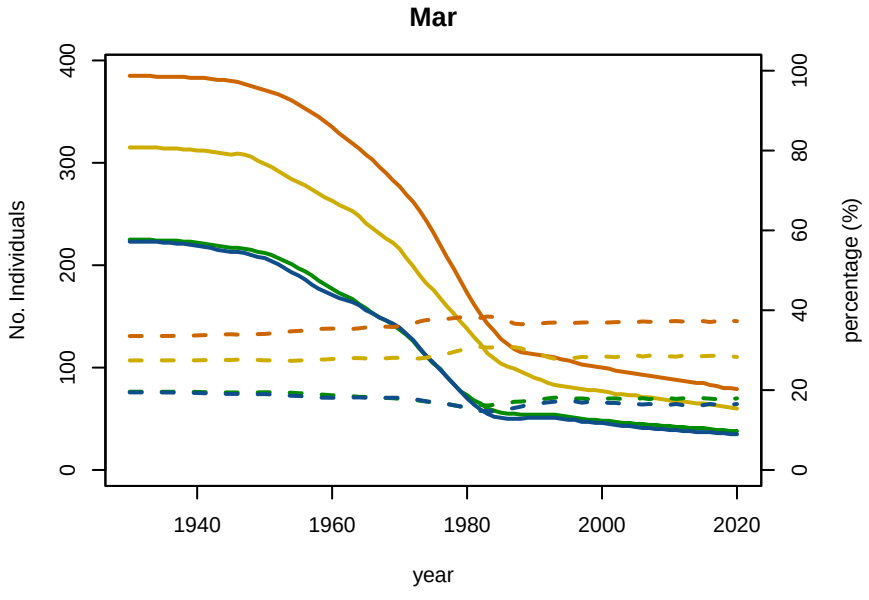


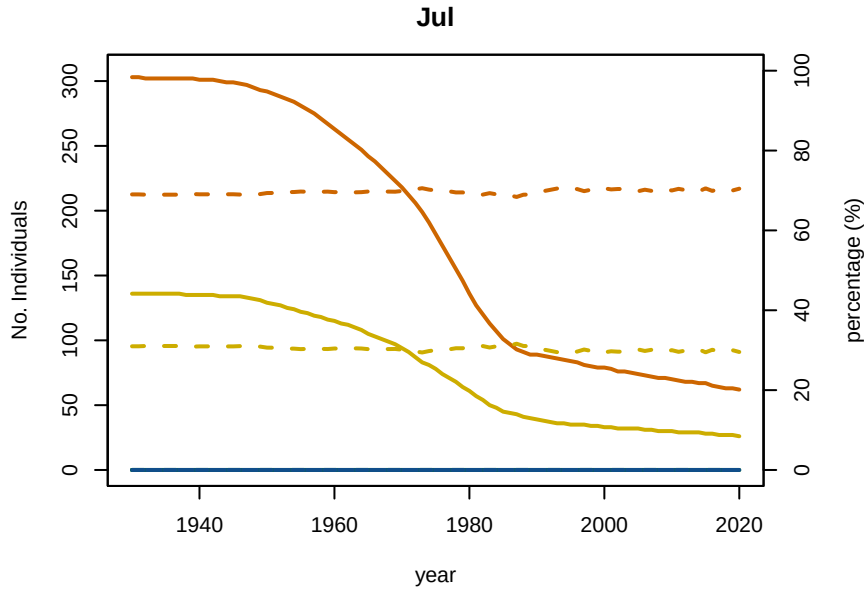


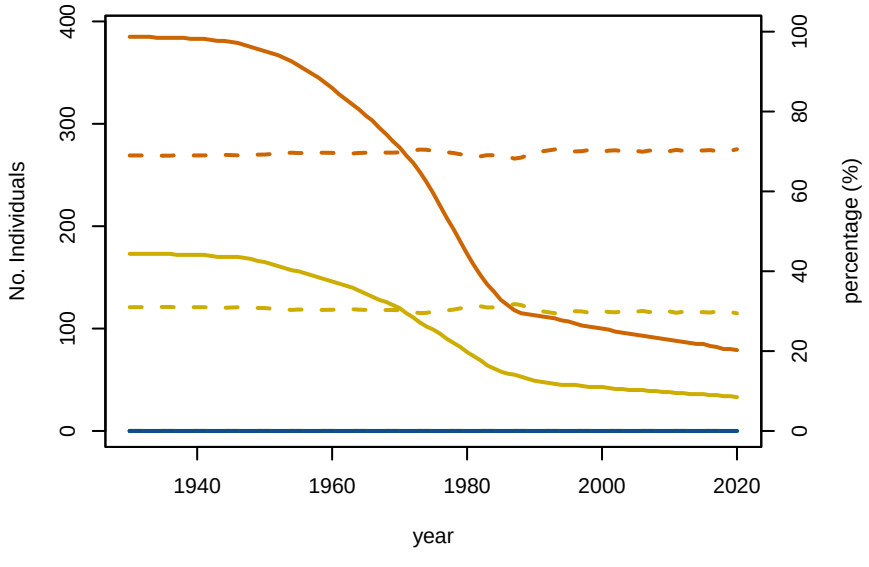


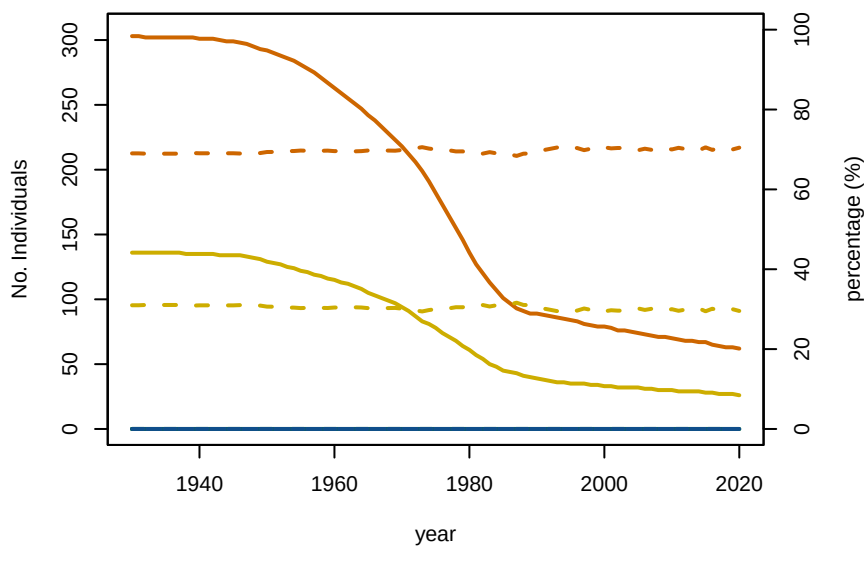


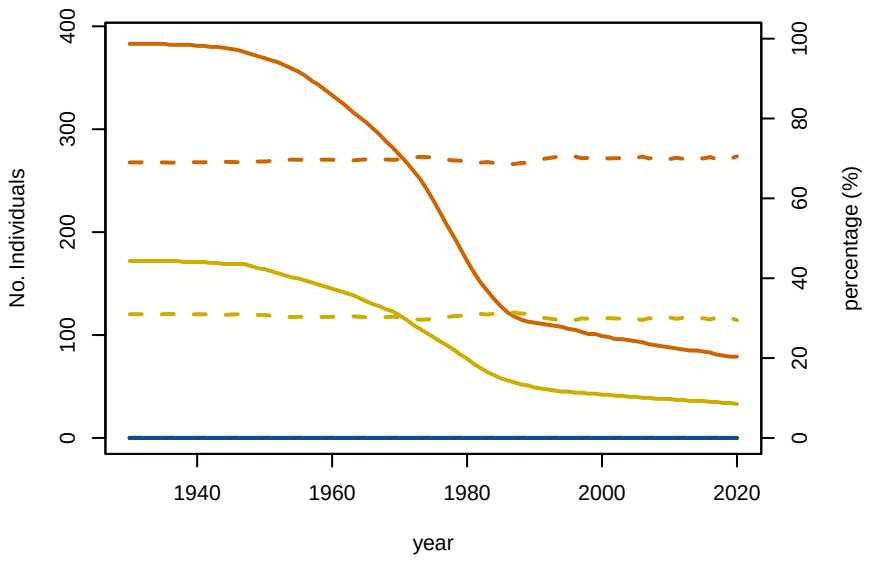
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 1E

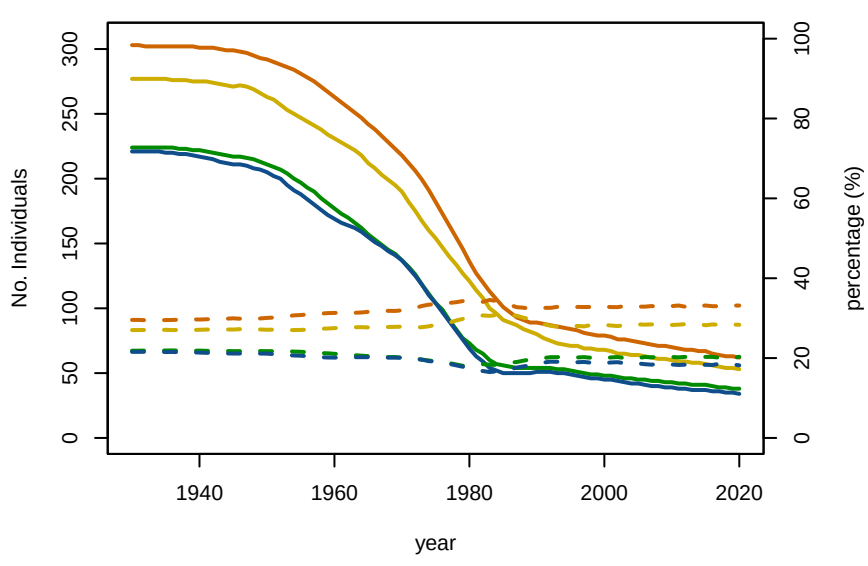


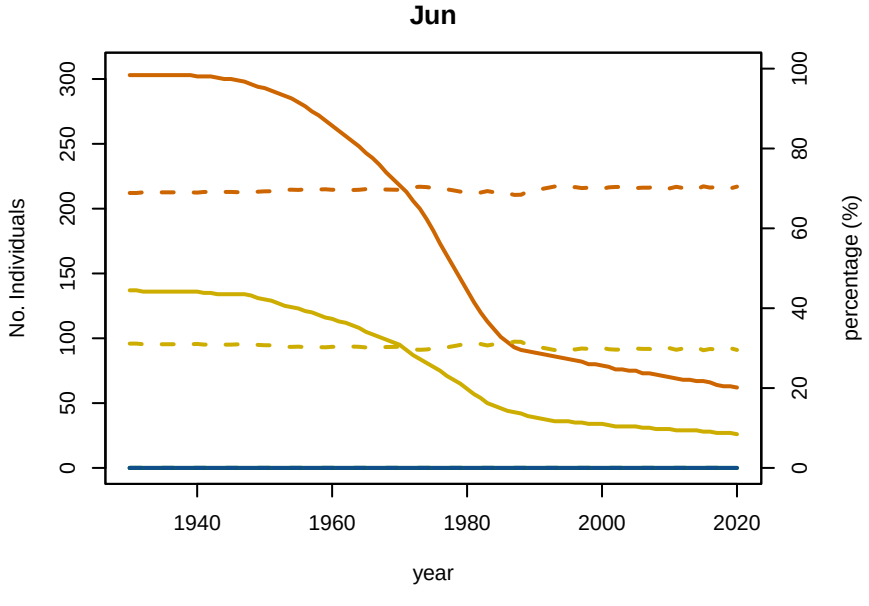


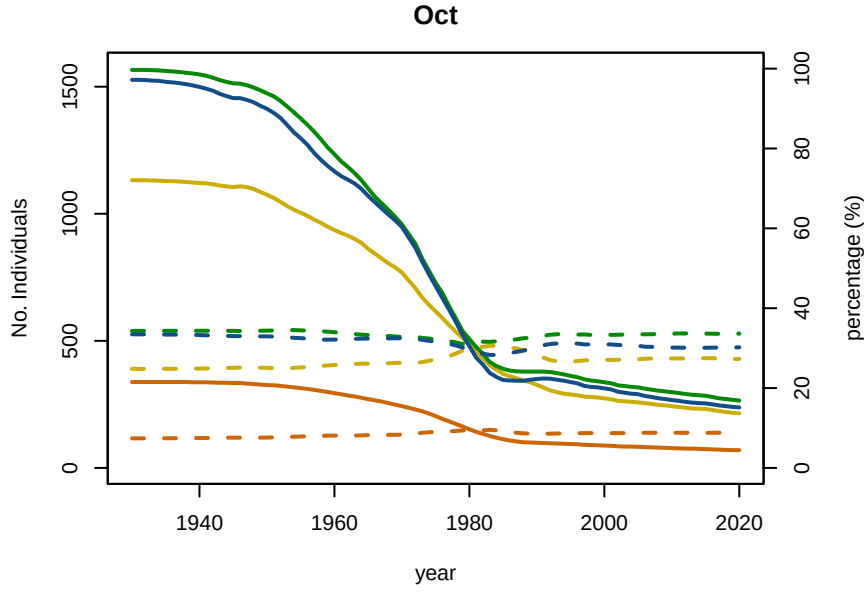






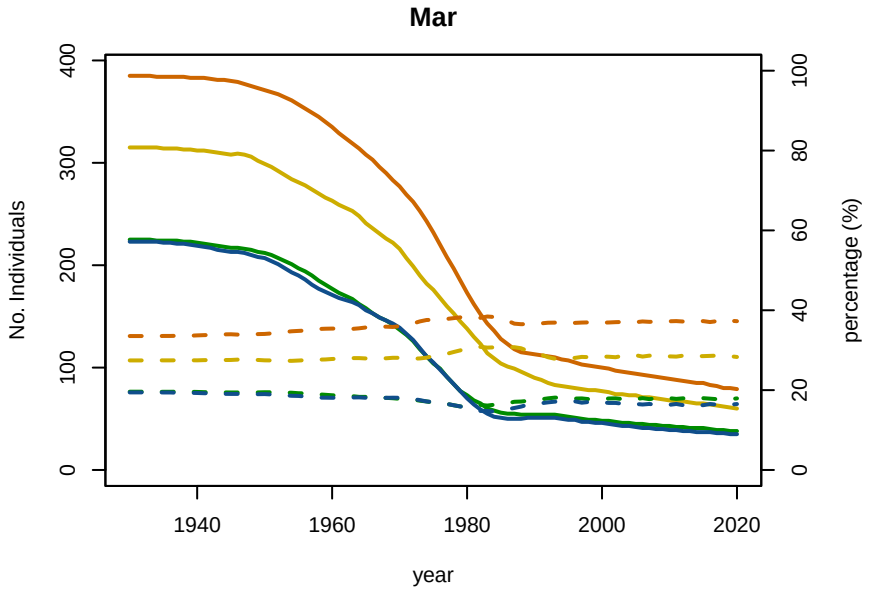


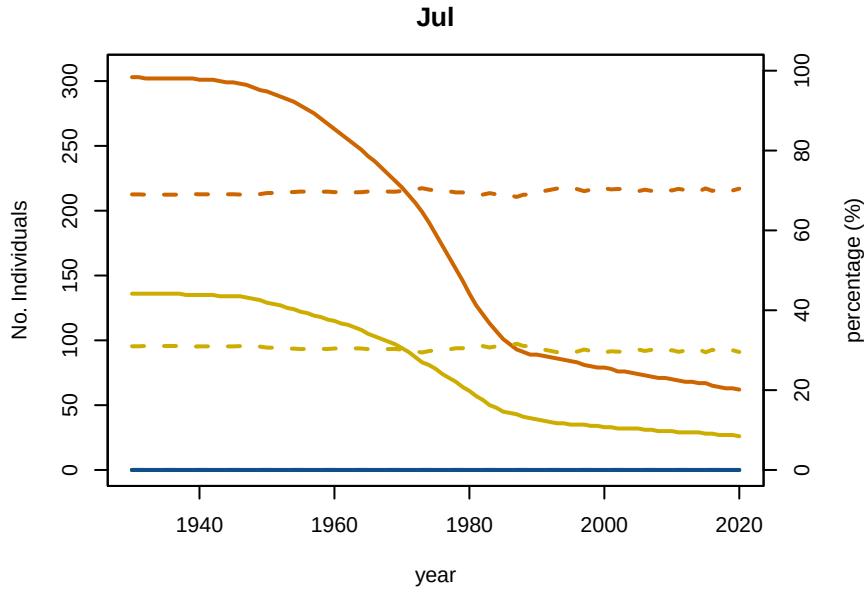


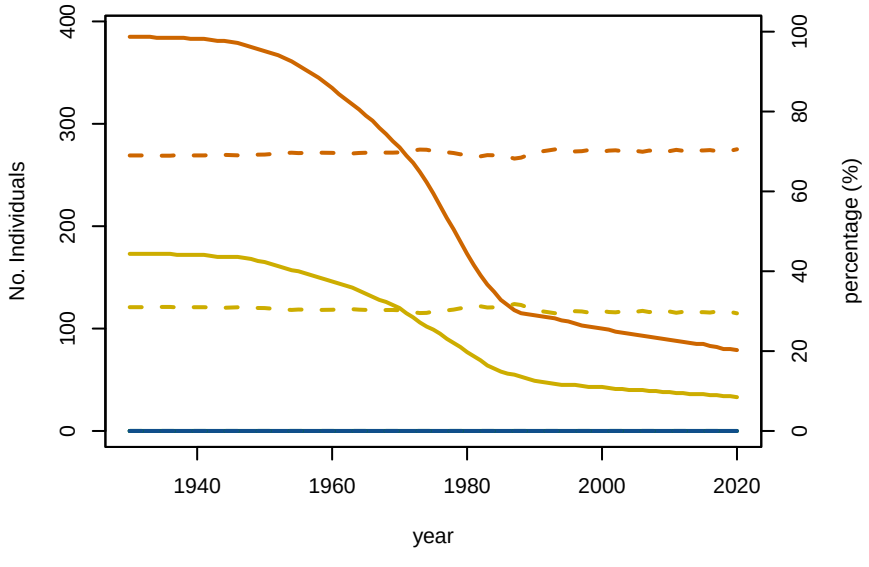


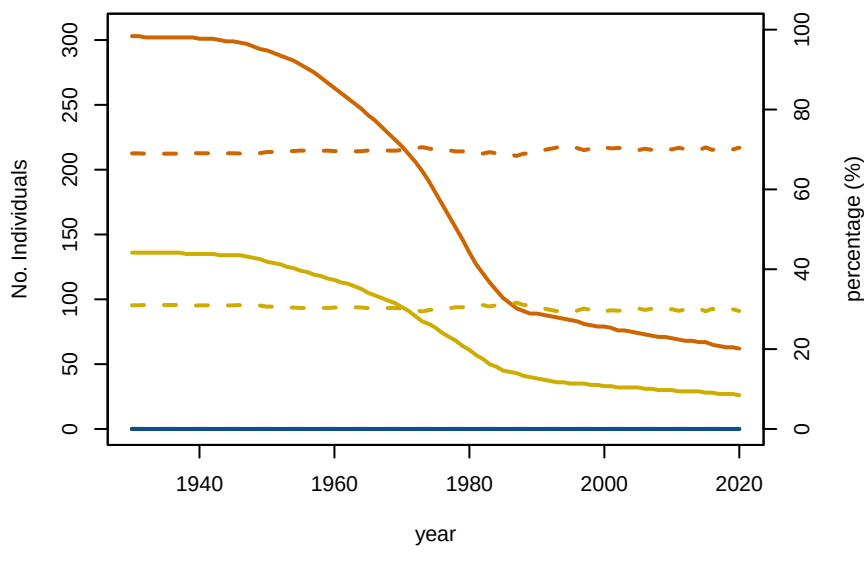
A1−4 A5−9 MatF MatM No Individuals percentage

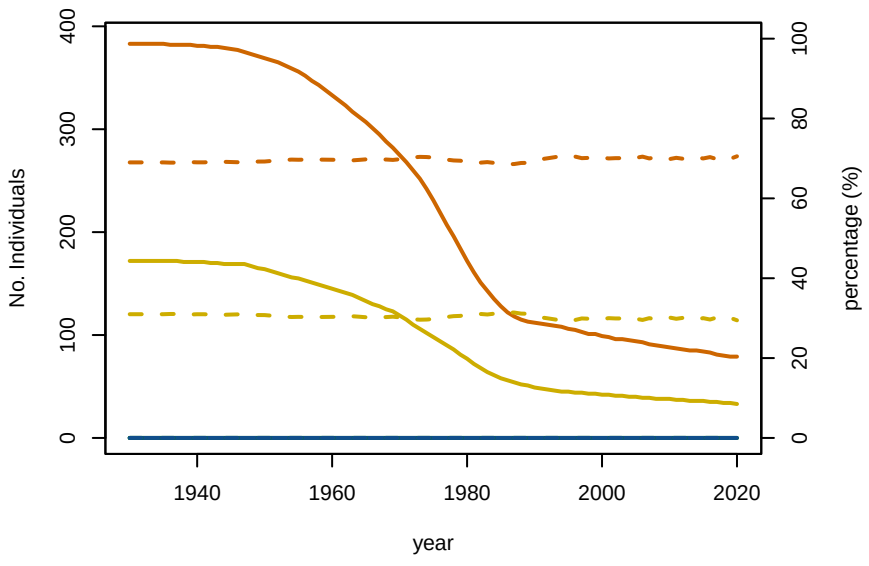
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 1W

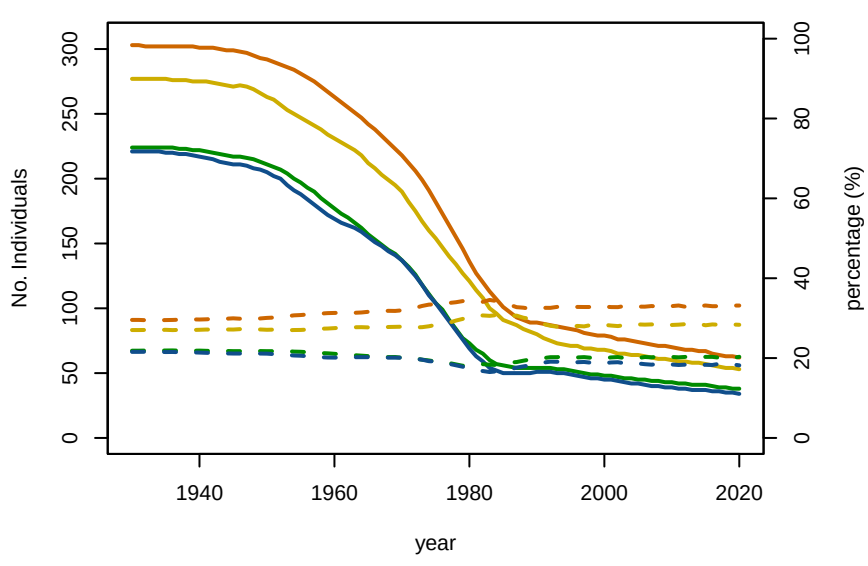


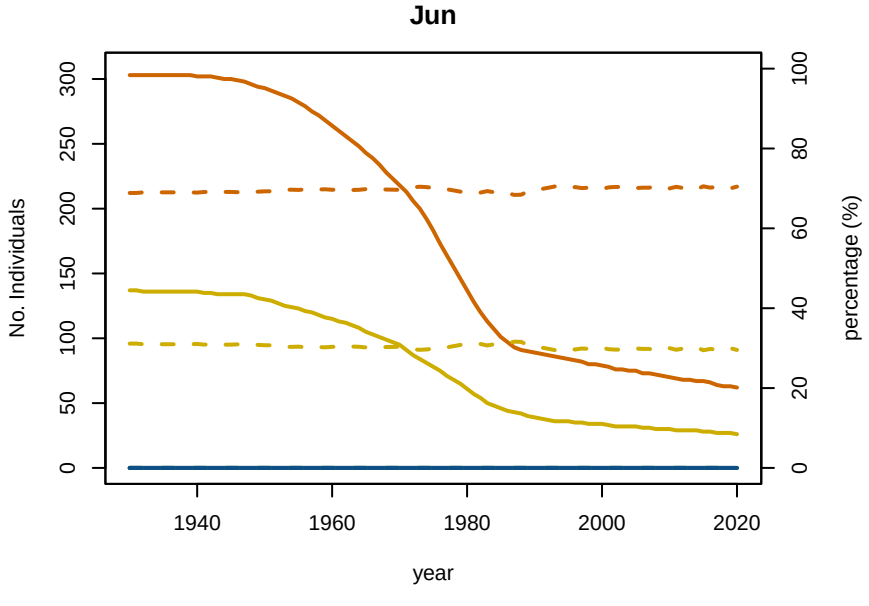


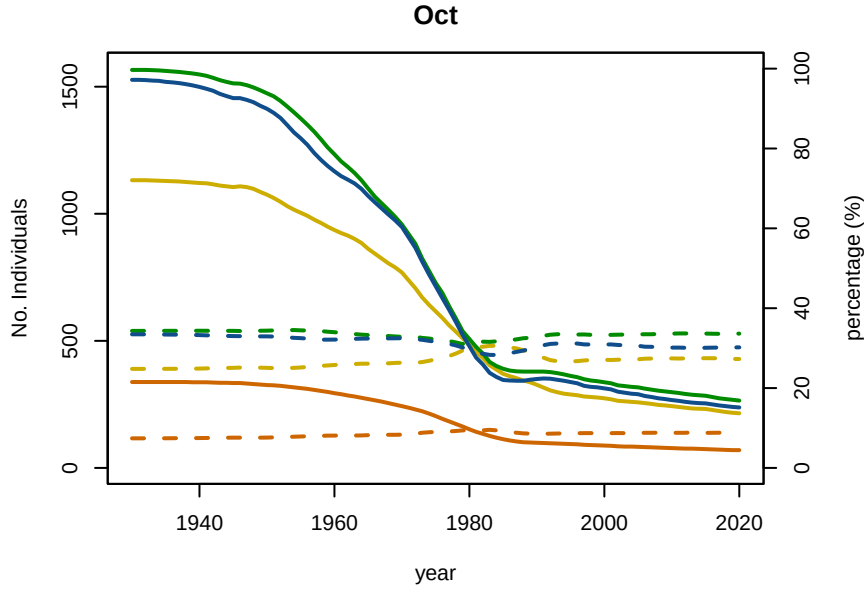






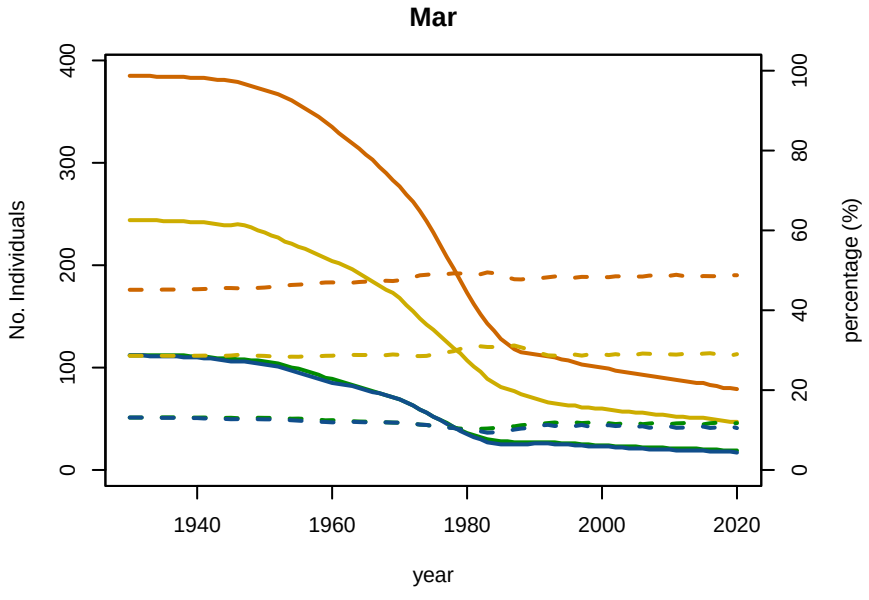


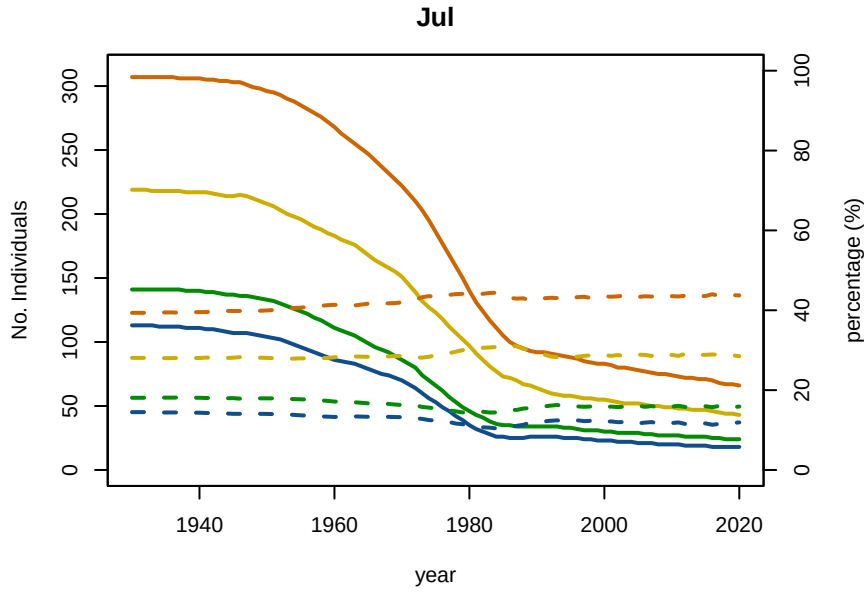


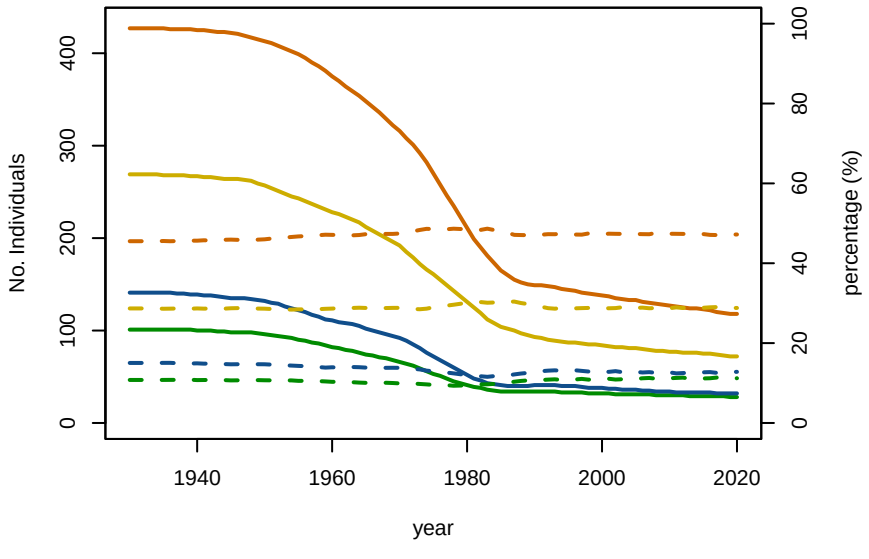


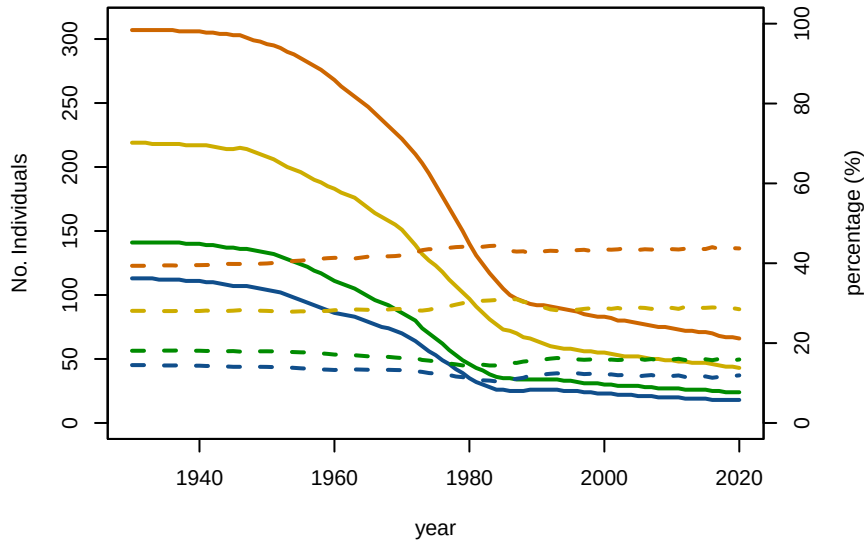
A1−4 A5−9 MatF MatM No Individuals percentage

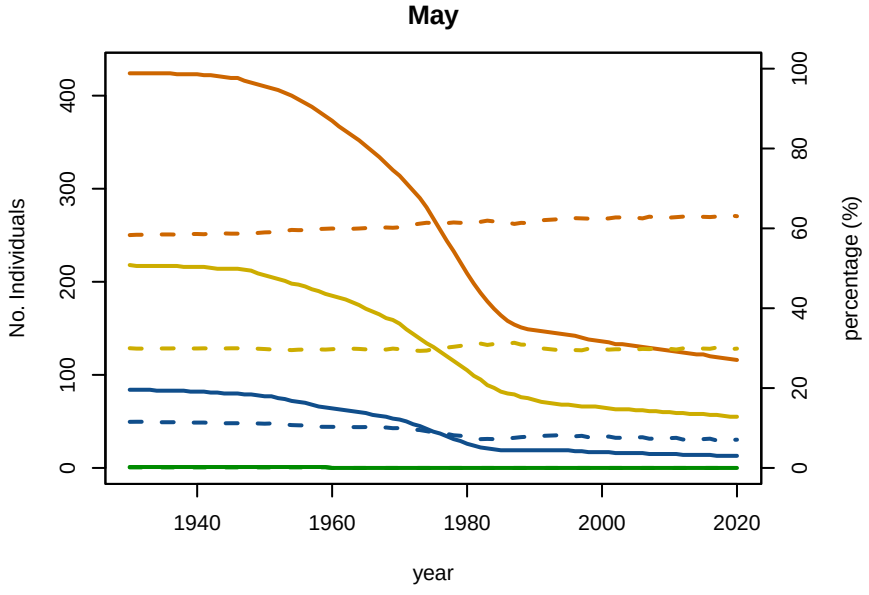
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 2C

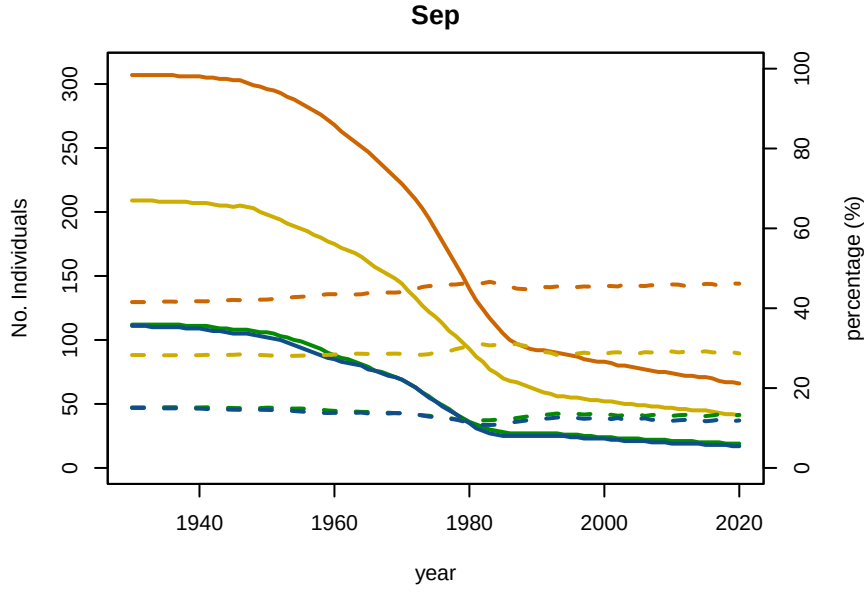


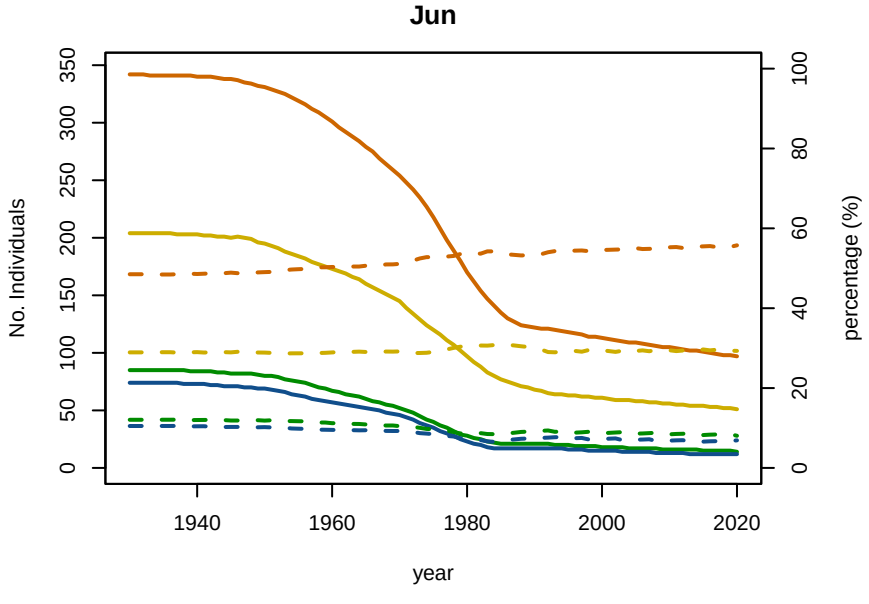


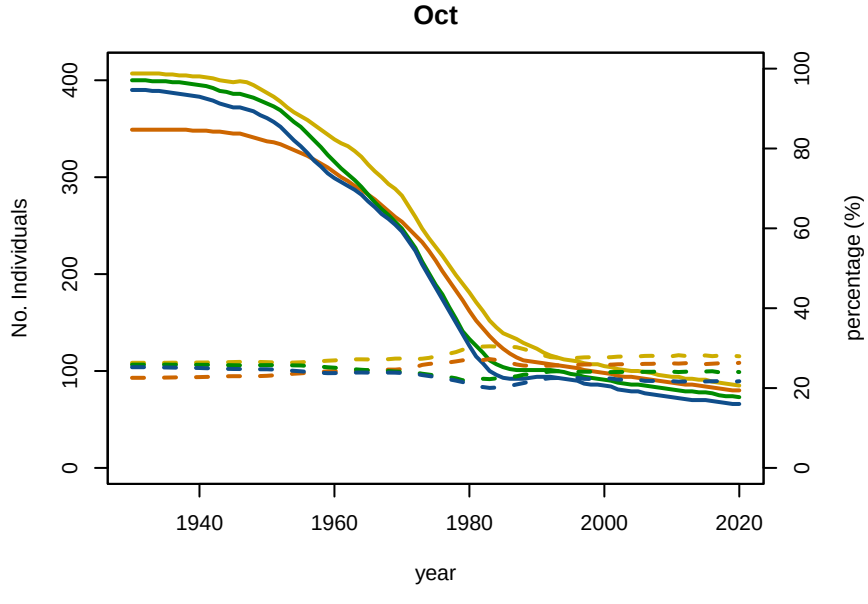






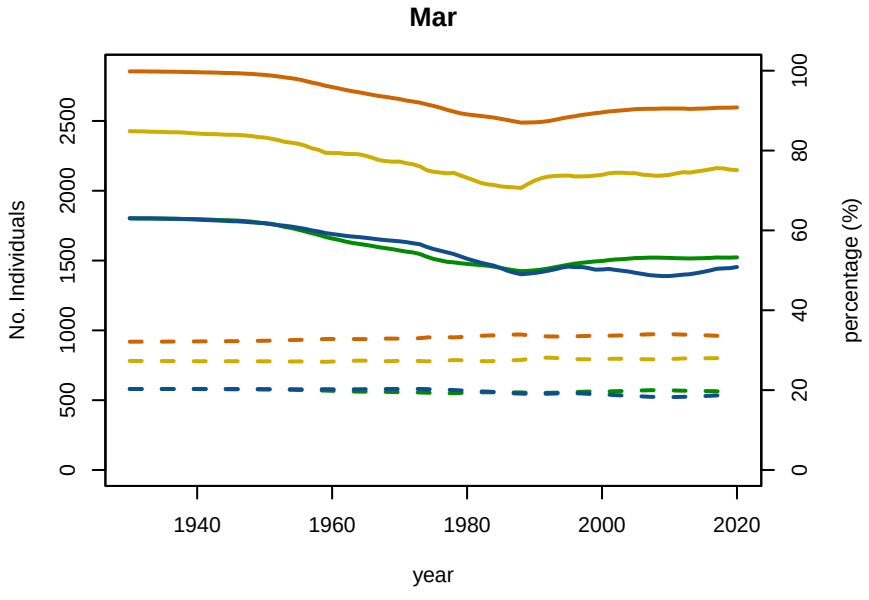


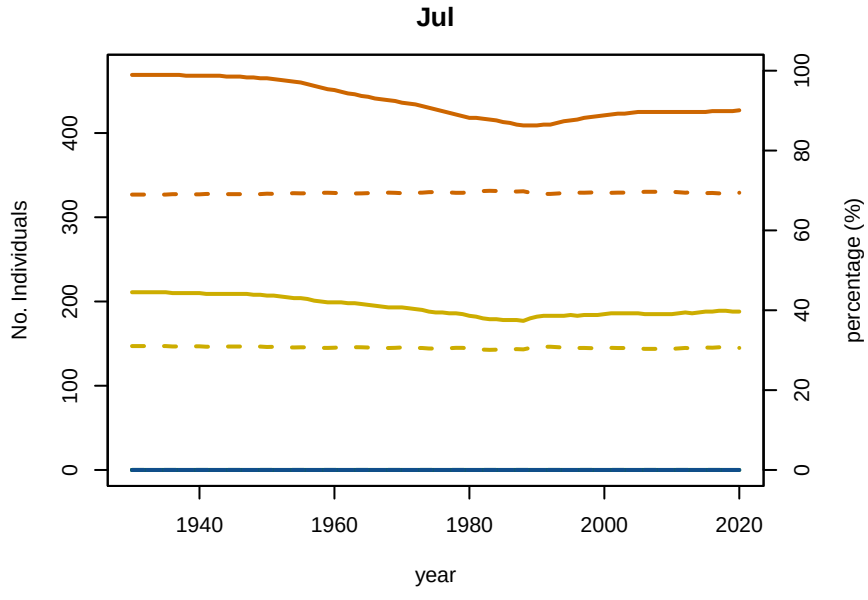


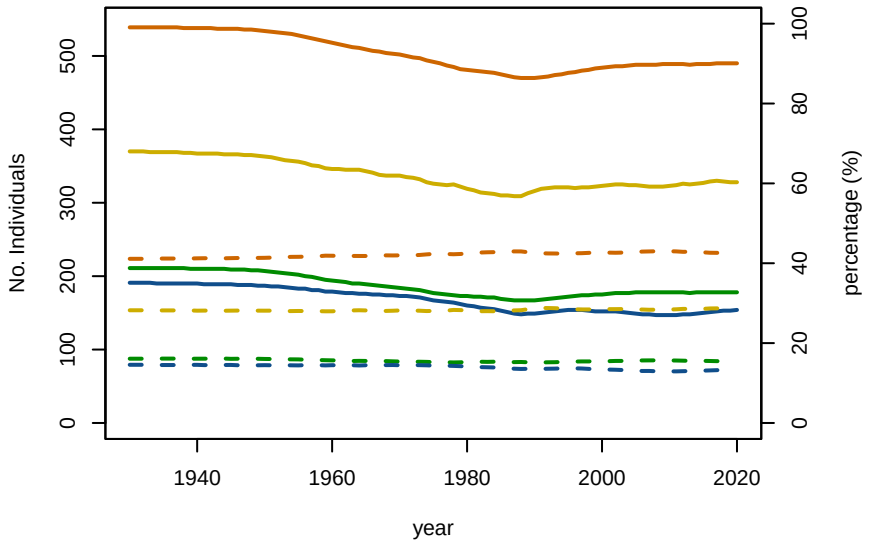


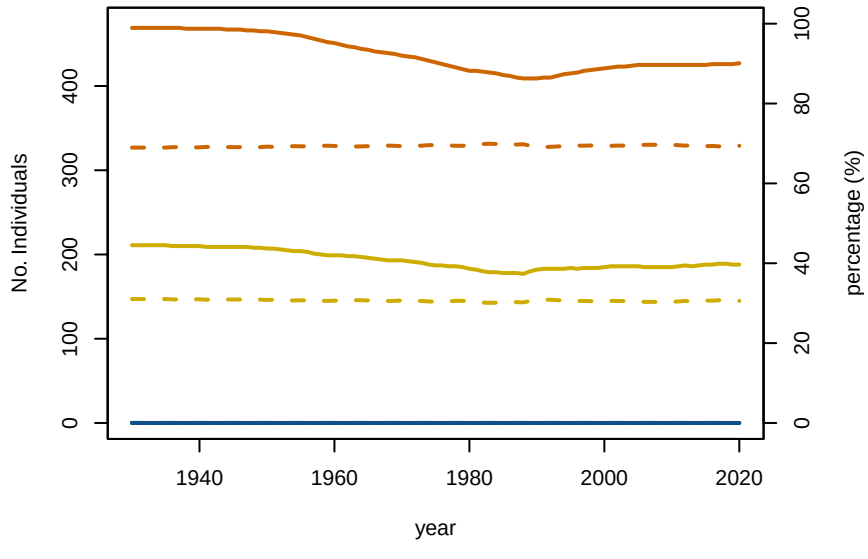
A1−4 A5−9 MatF MatM No Individuals percentage

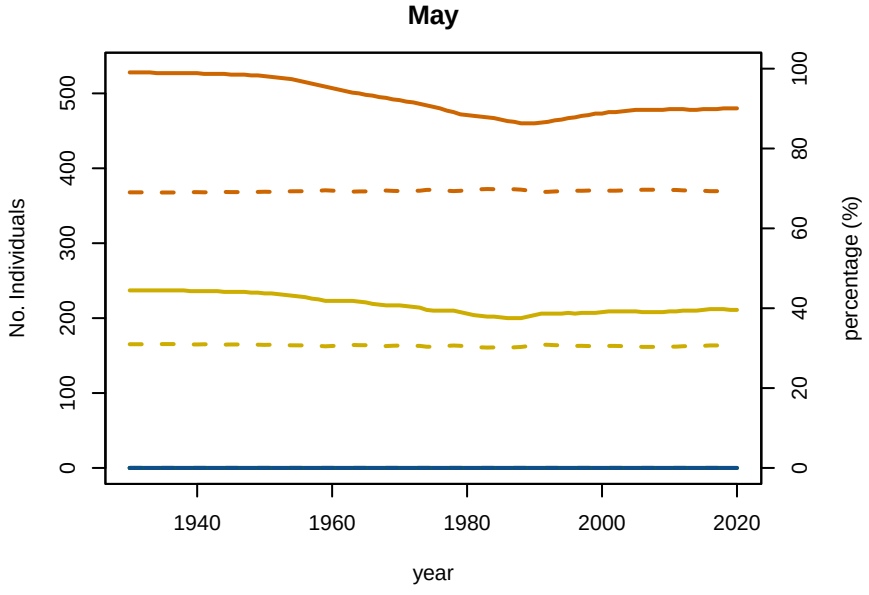
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 2R

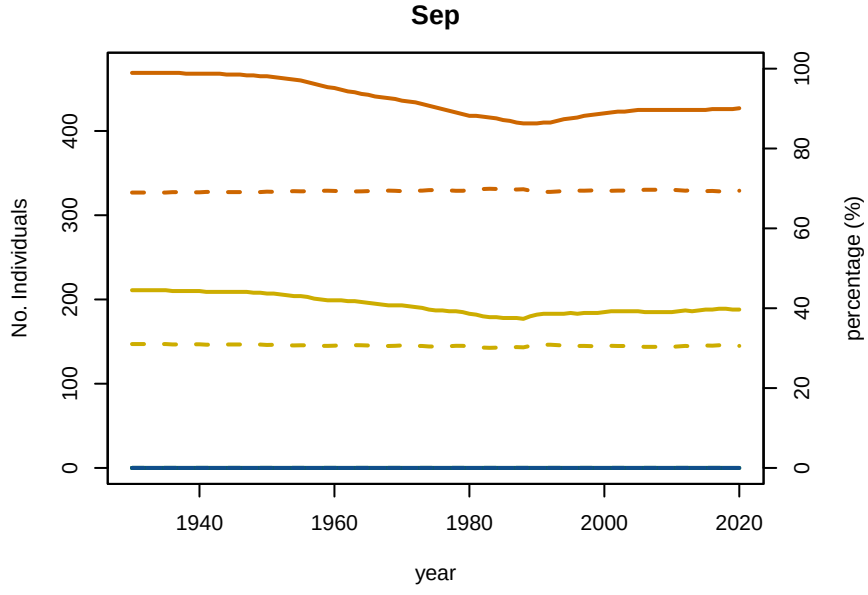


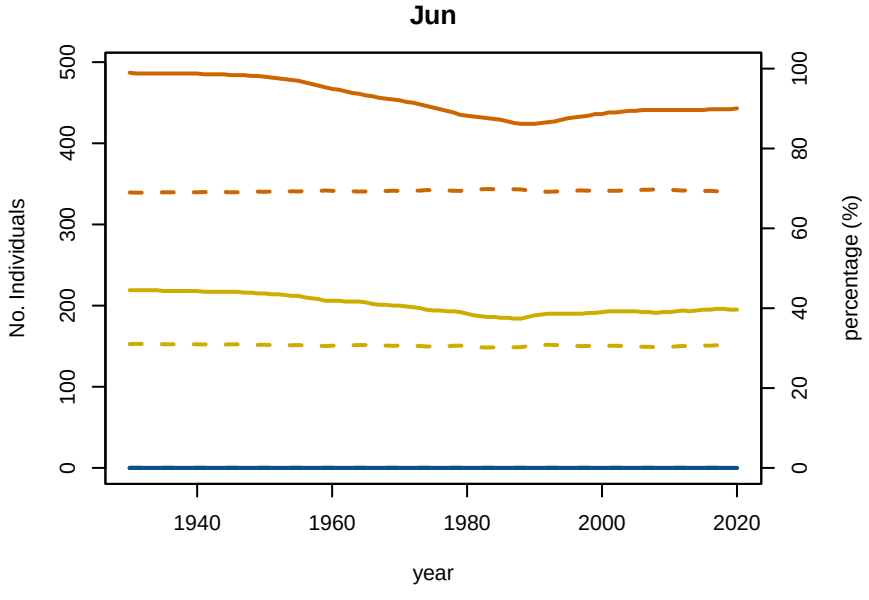


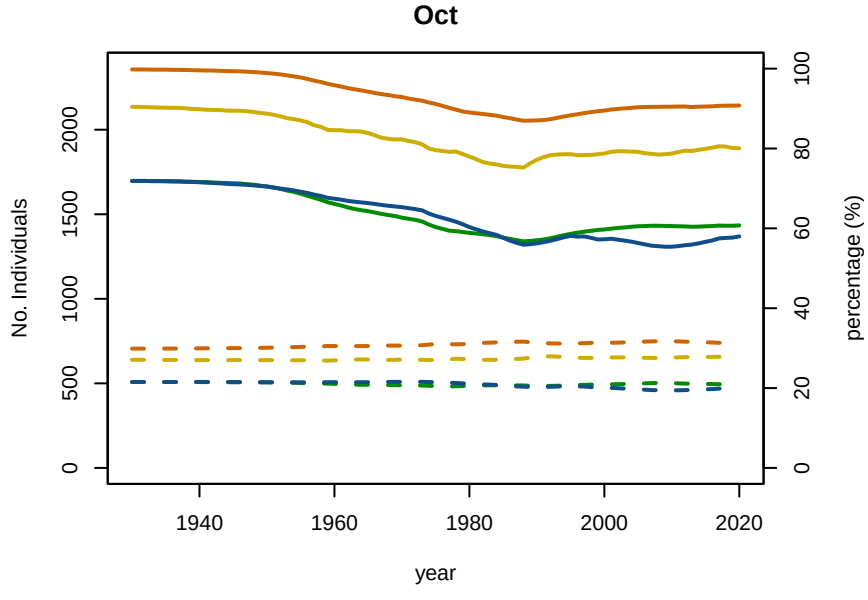






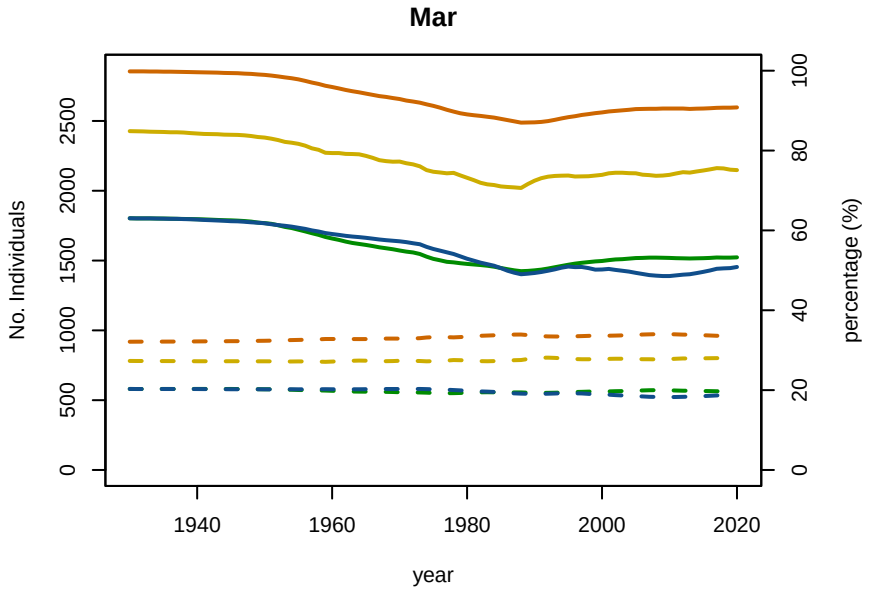


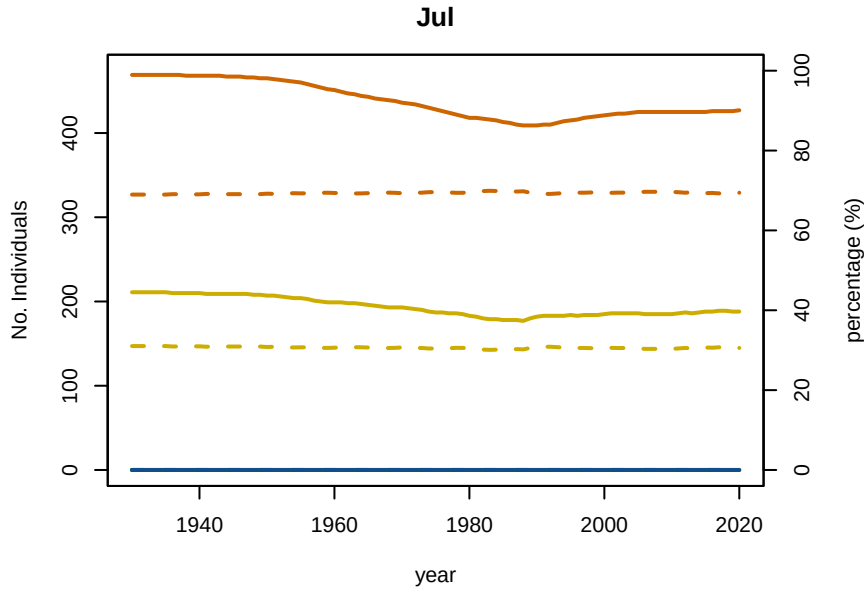


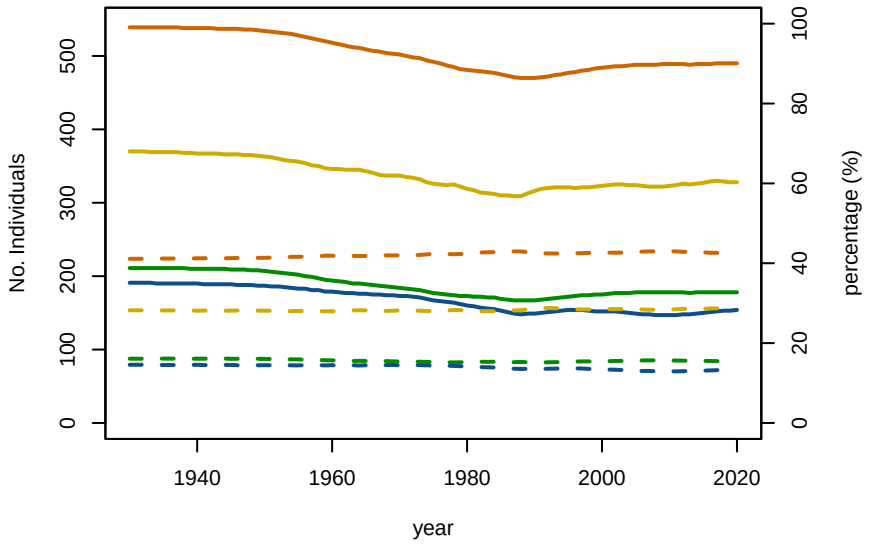


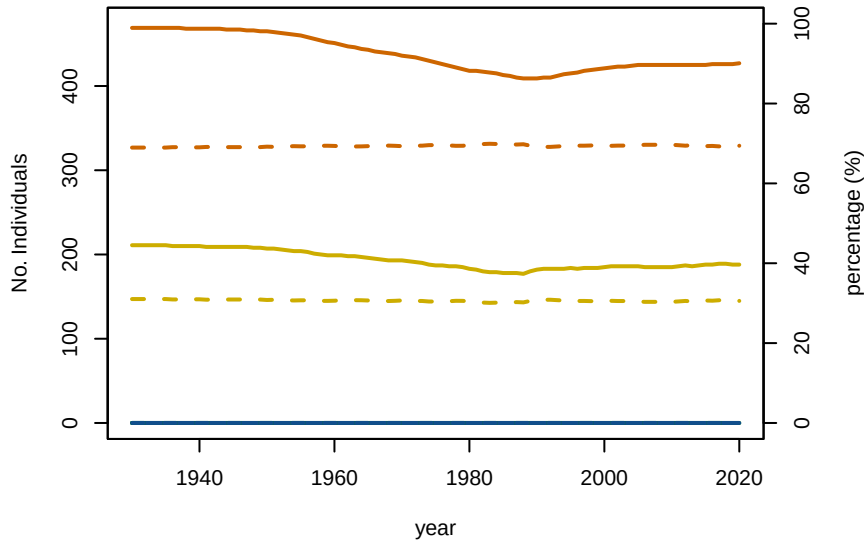
A1−4 A5−9 MatF MatM No Individuals percentage

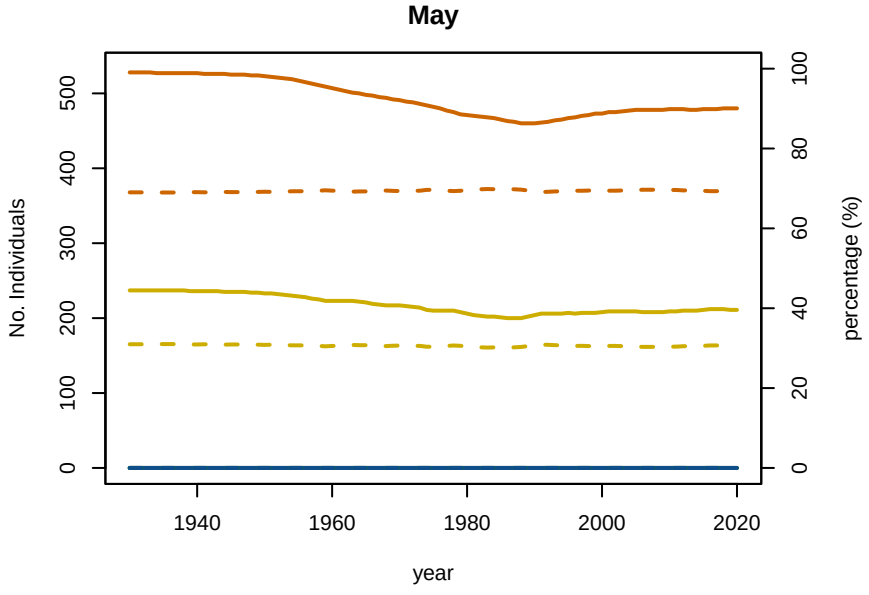
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 3

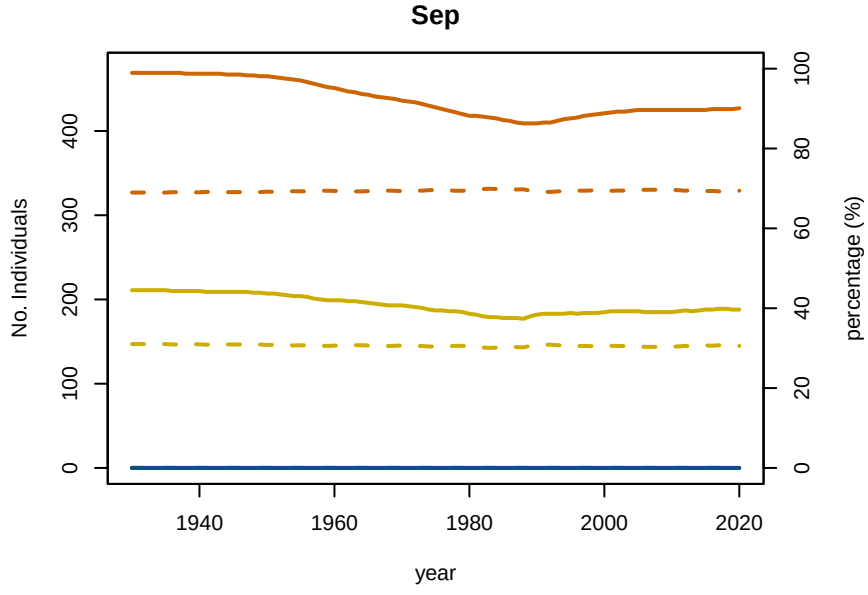


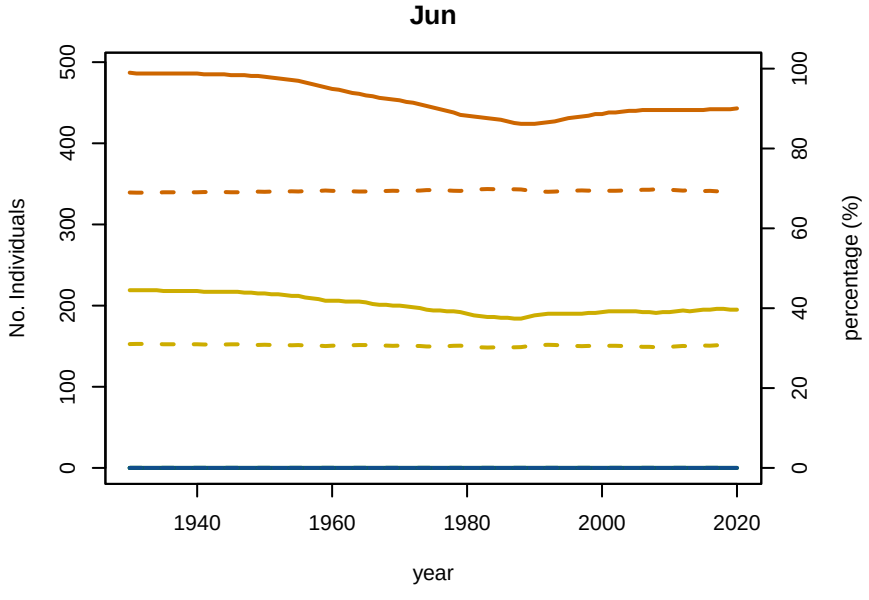


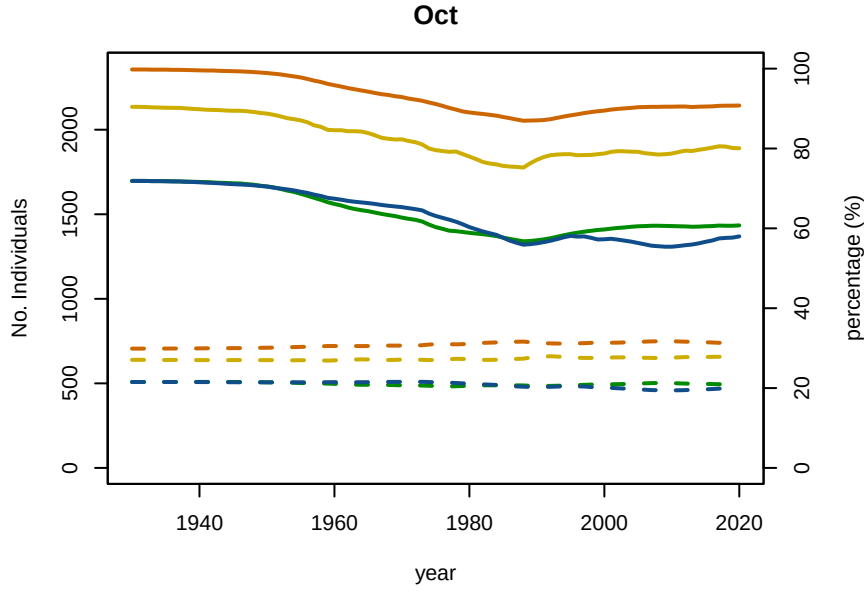






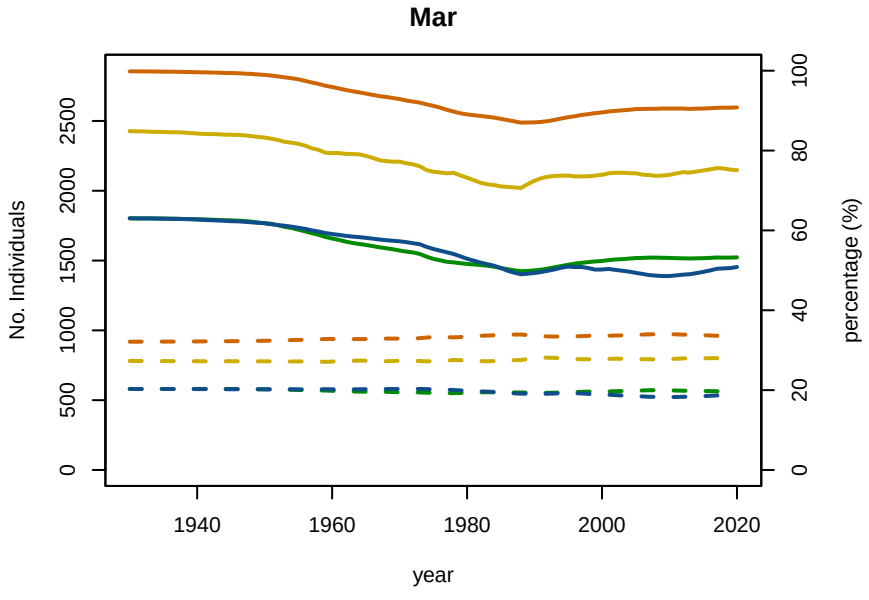


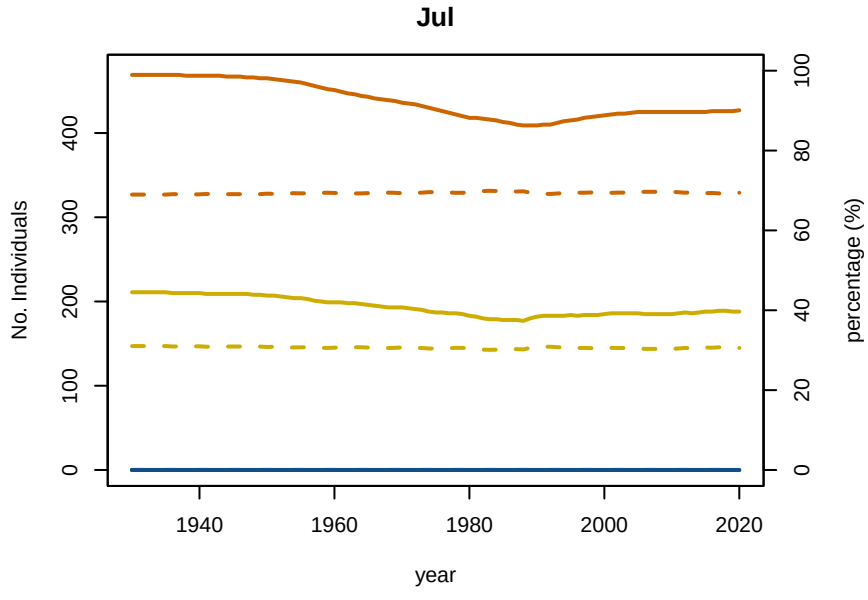


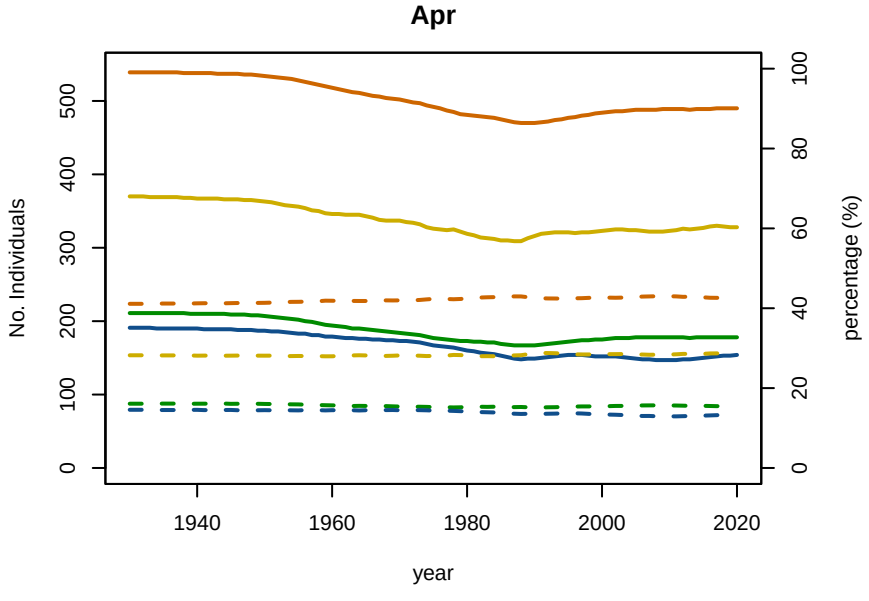


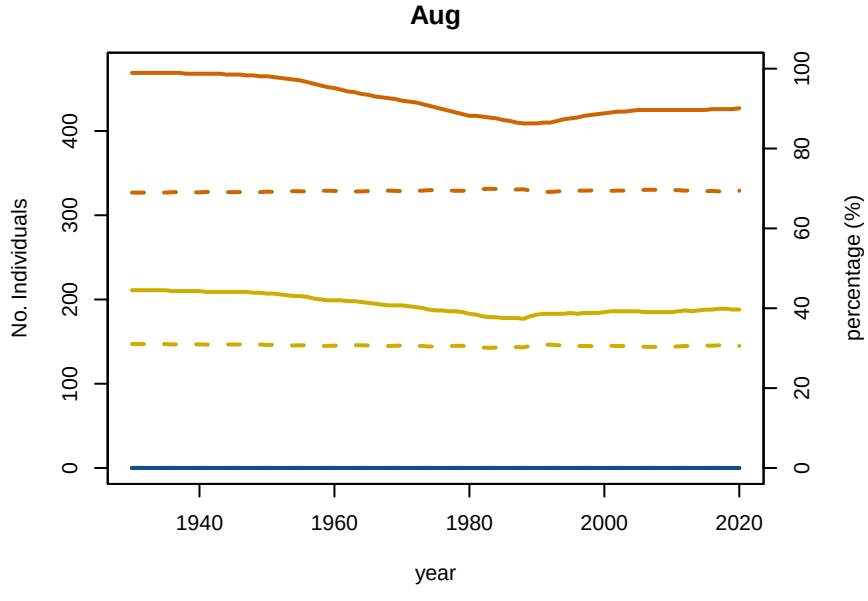
A1−4 A5−9 MatF MatM No Individuals percentage

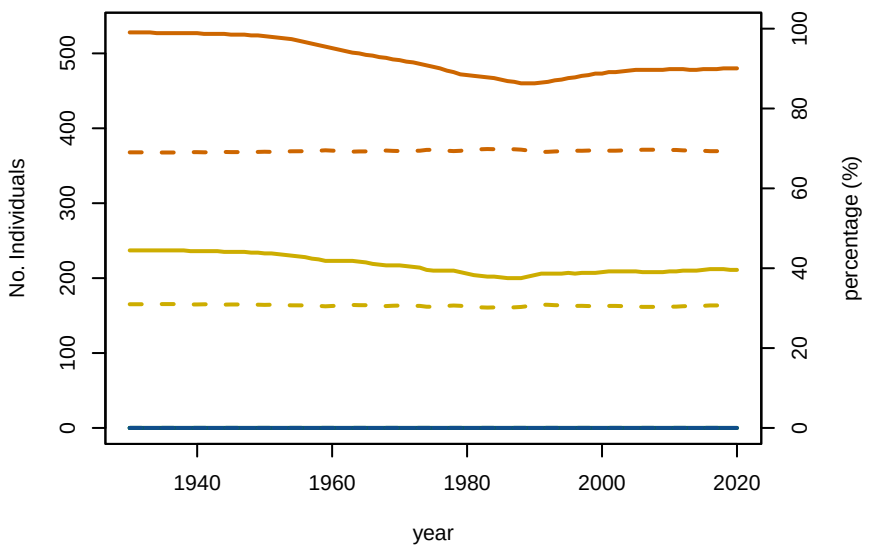
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 4

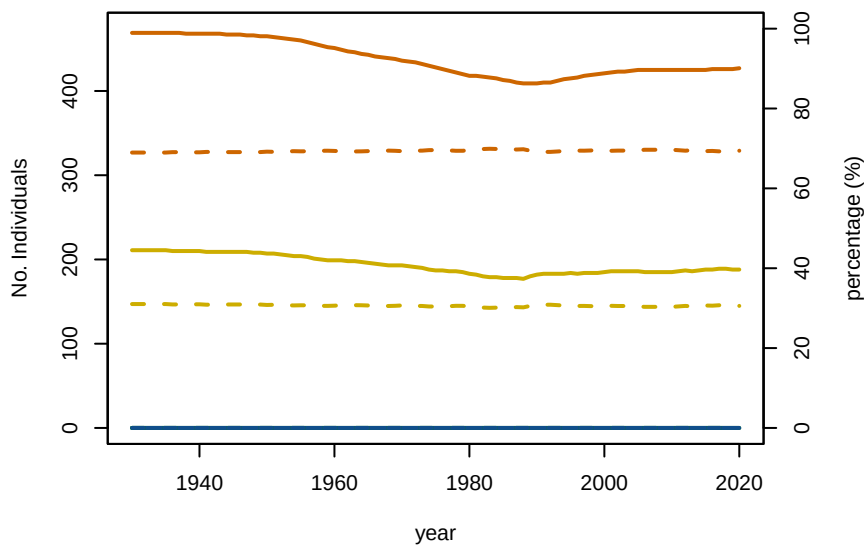


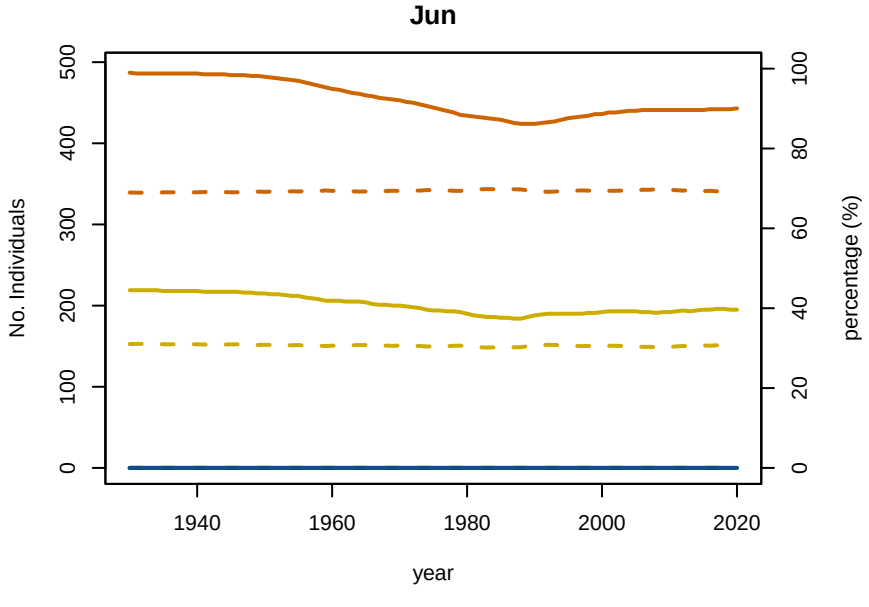


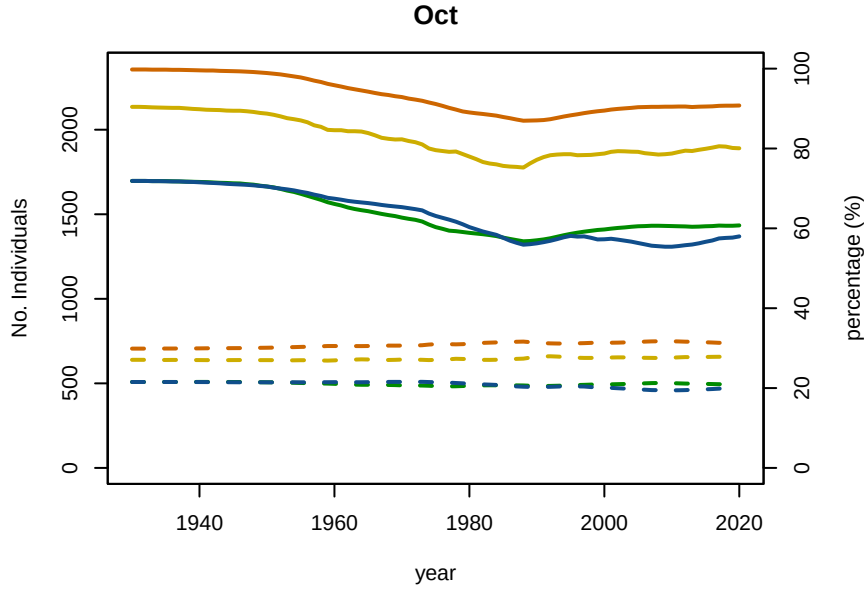






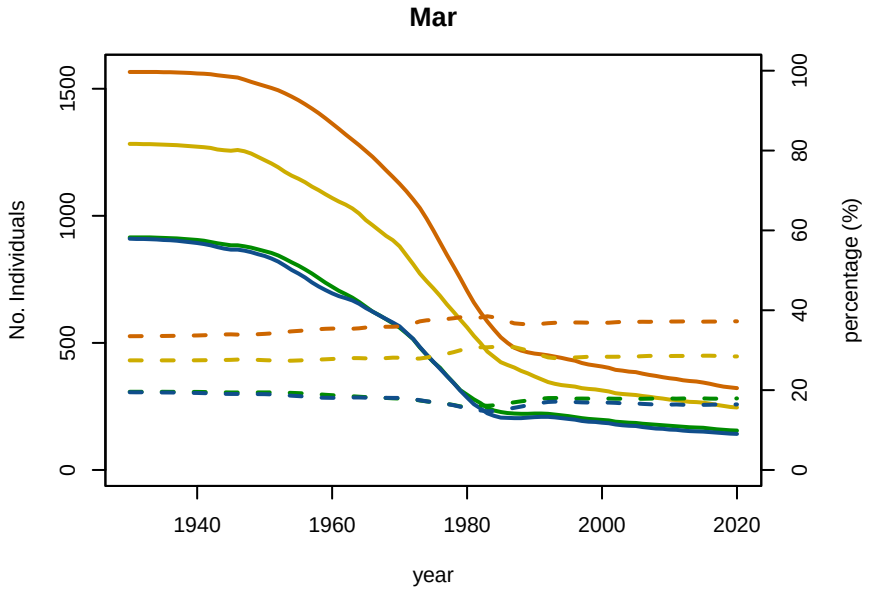


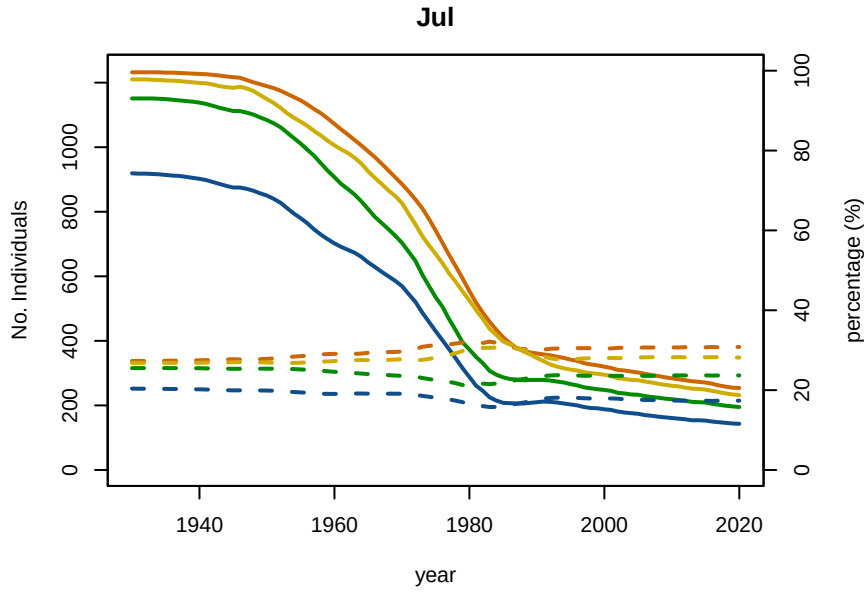


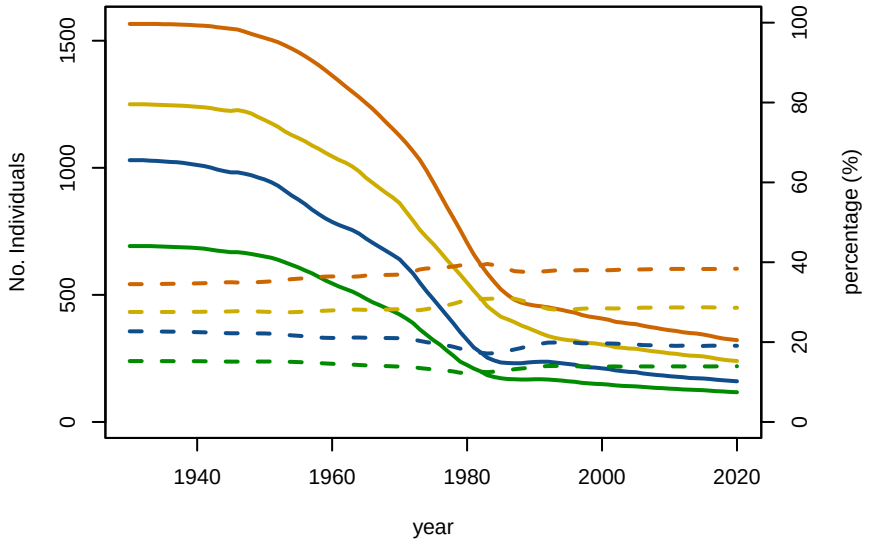


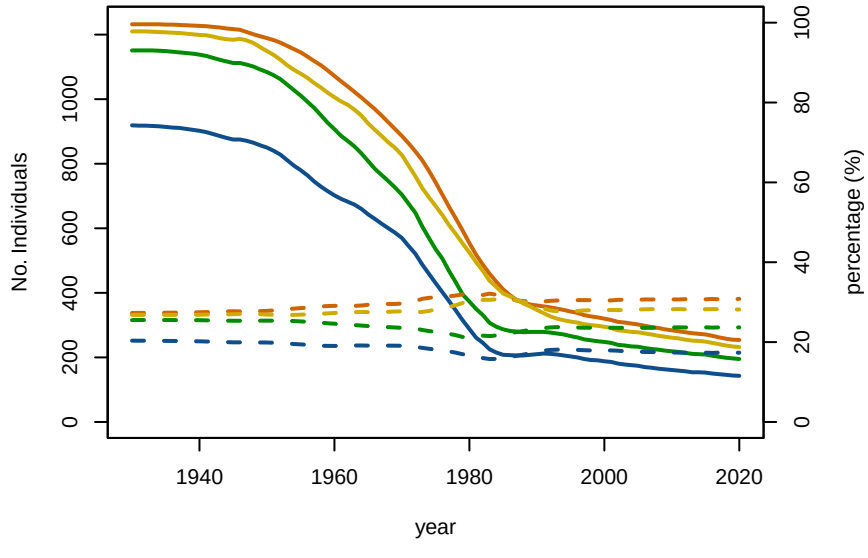
A1−4 A5−9 MatF MatM No Individuals percentage

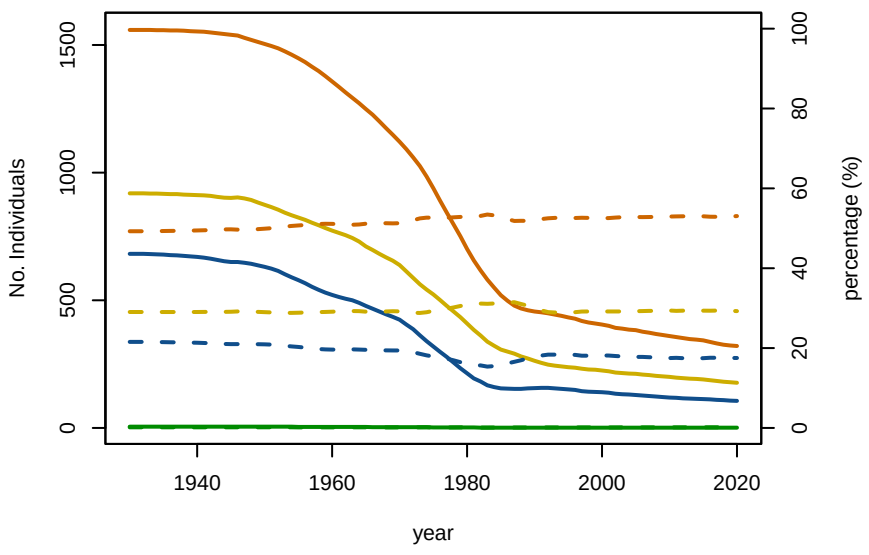
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 5

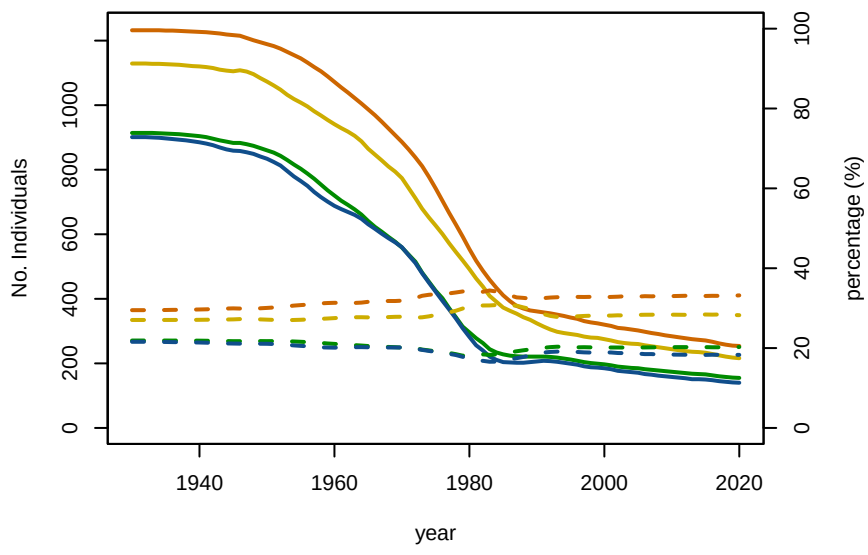


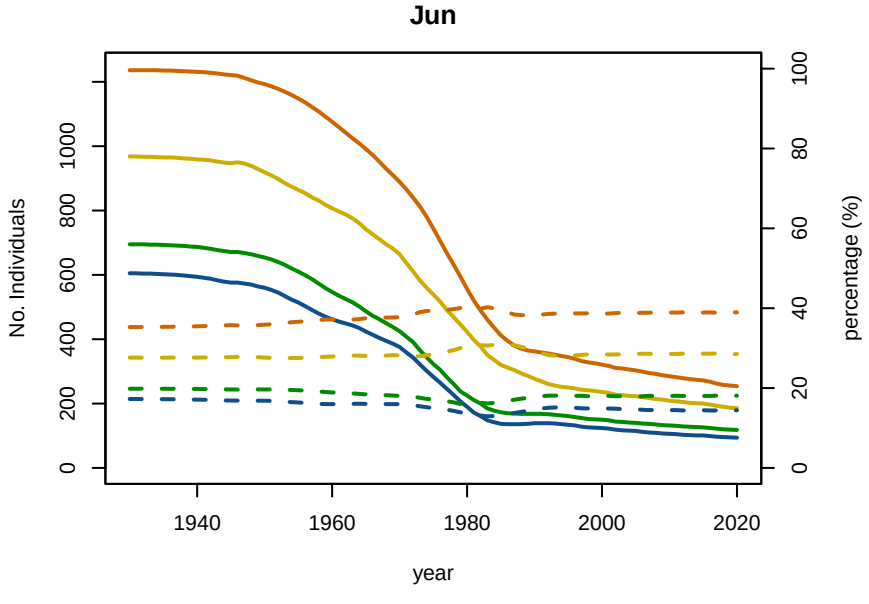


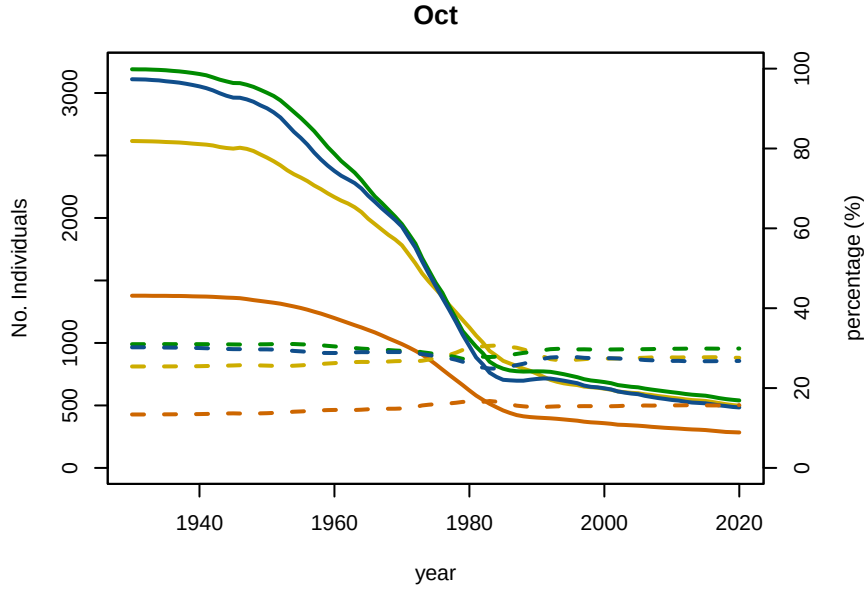






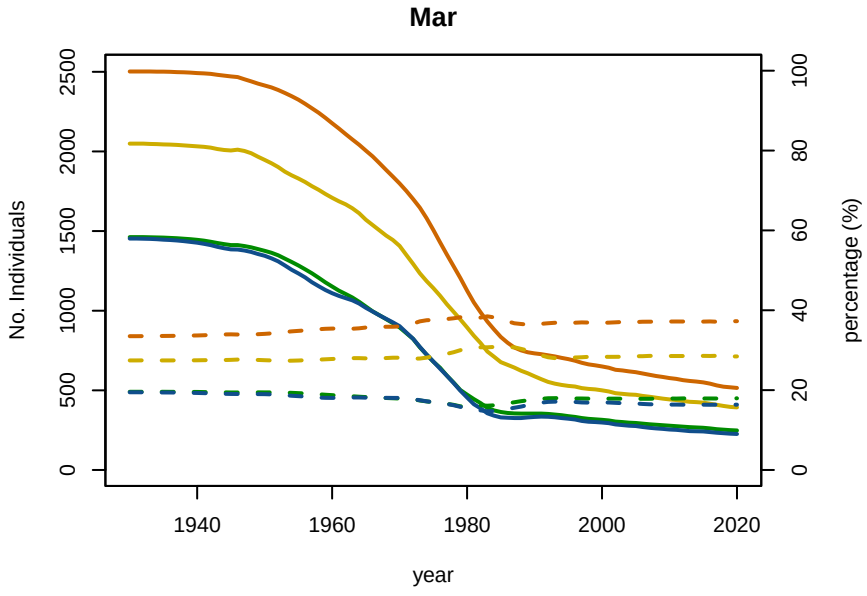


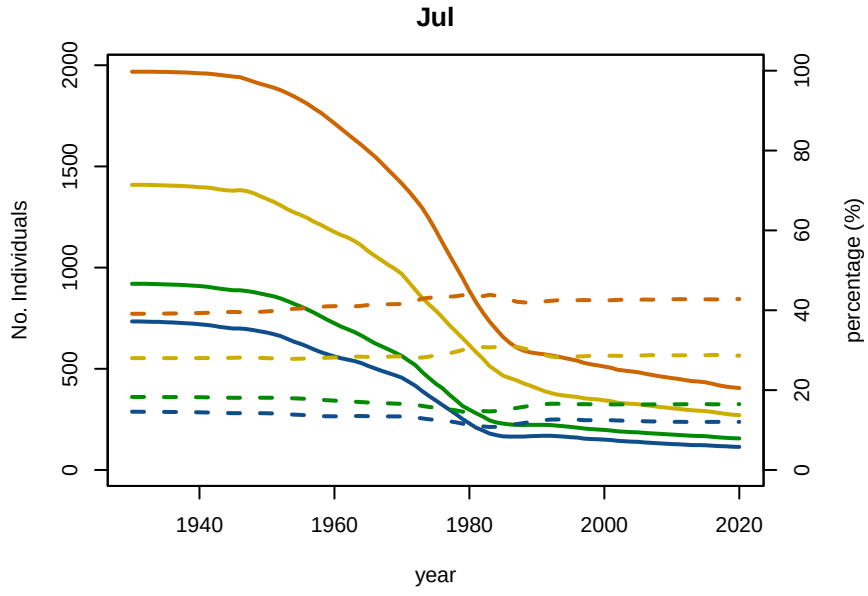


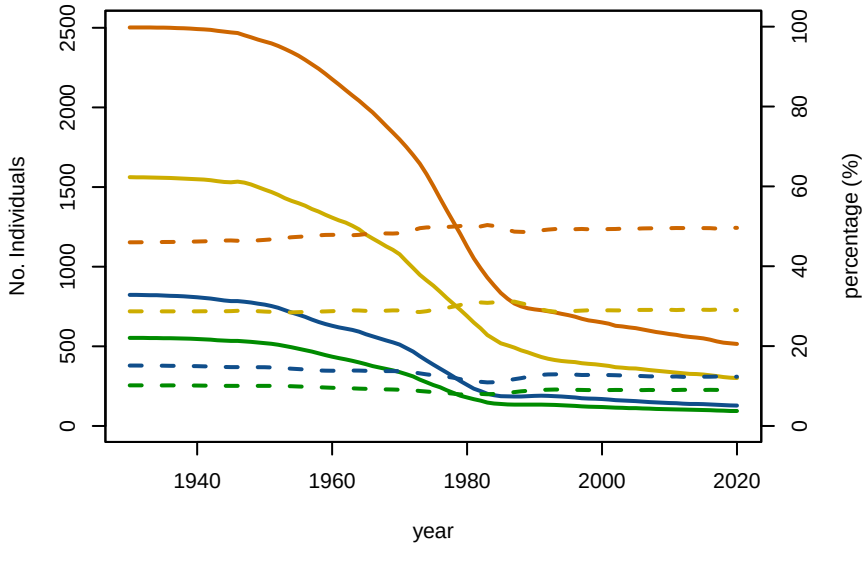


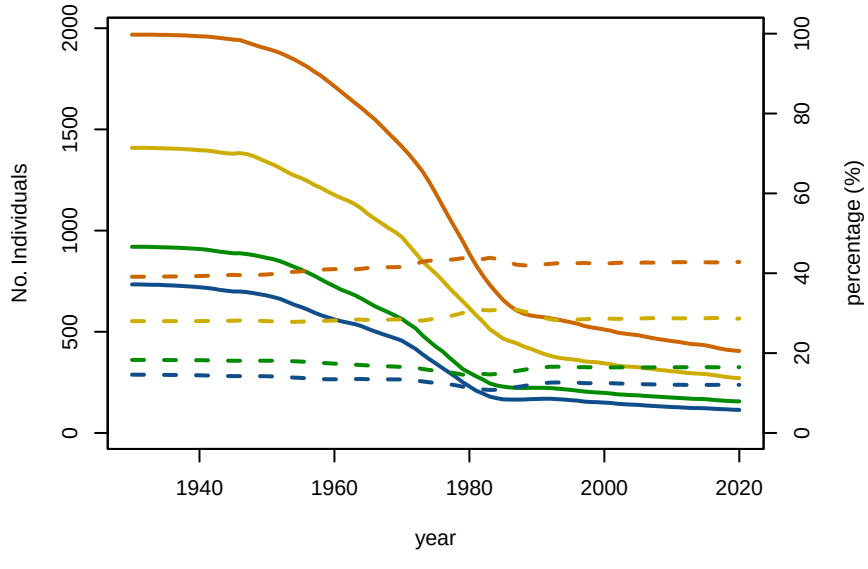
A1−4 A5−9 MatF MatM No Individuals percentage

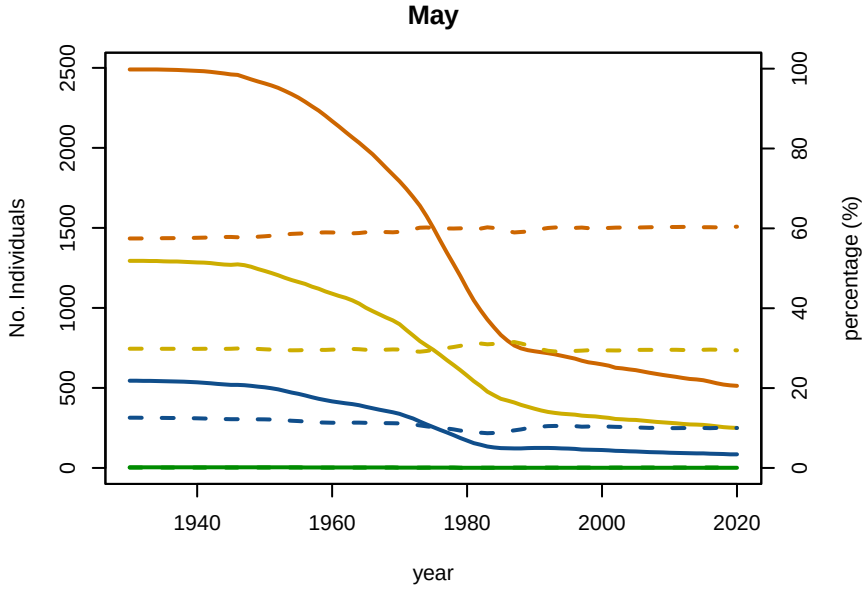
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 6E

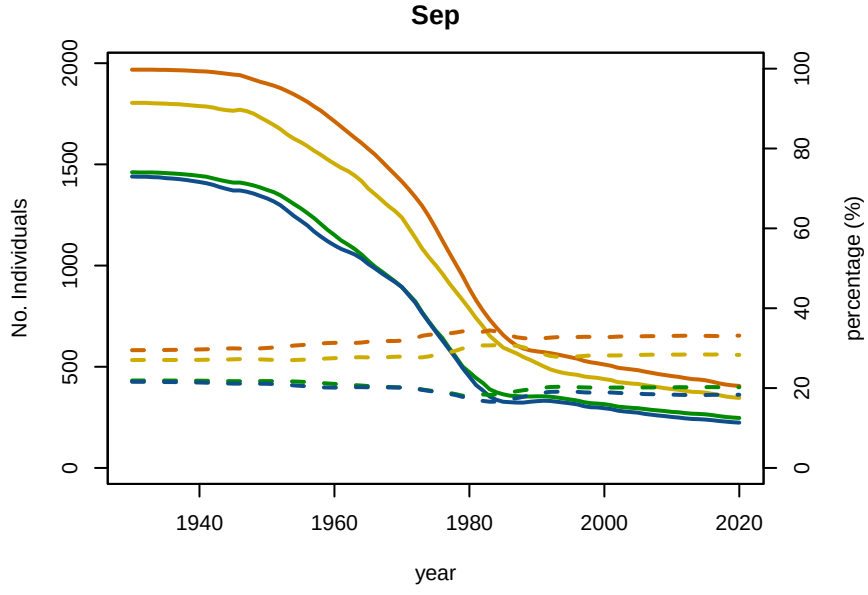


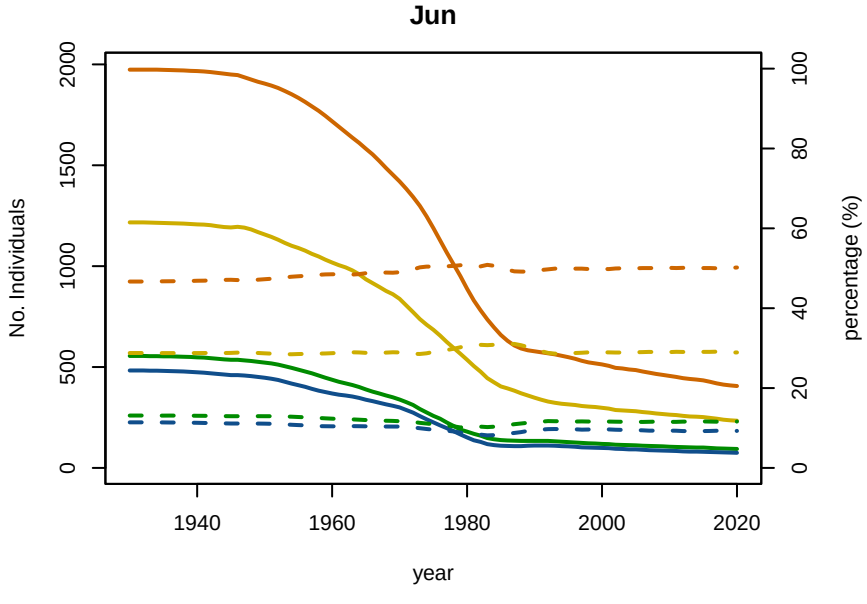


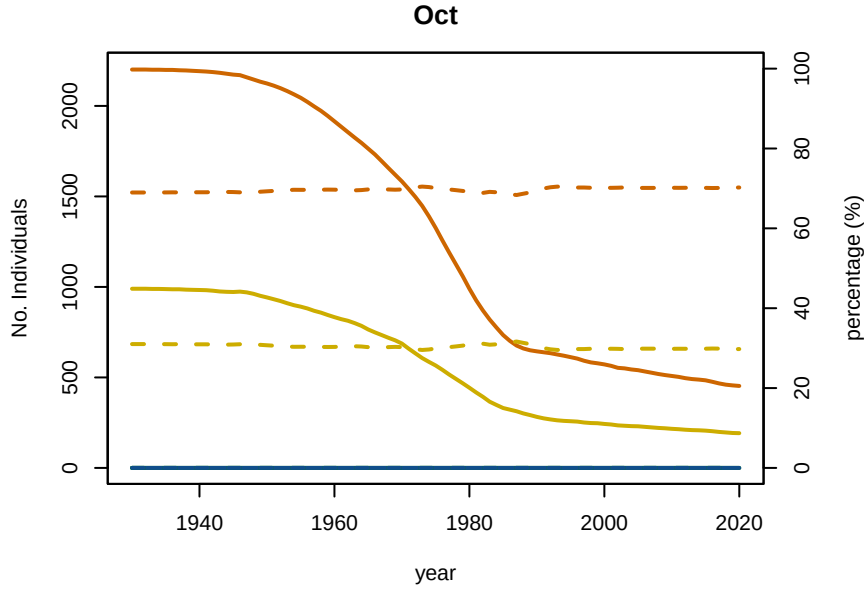






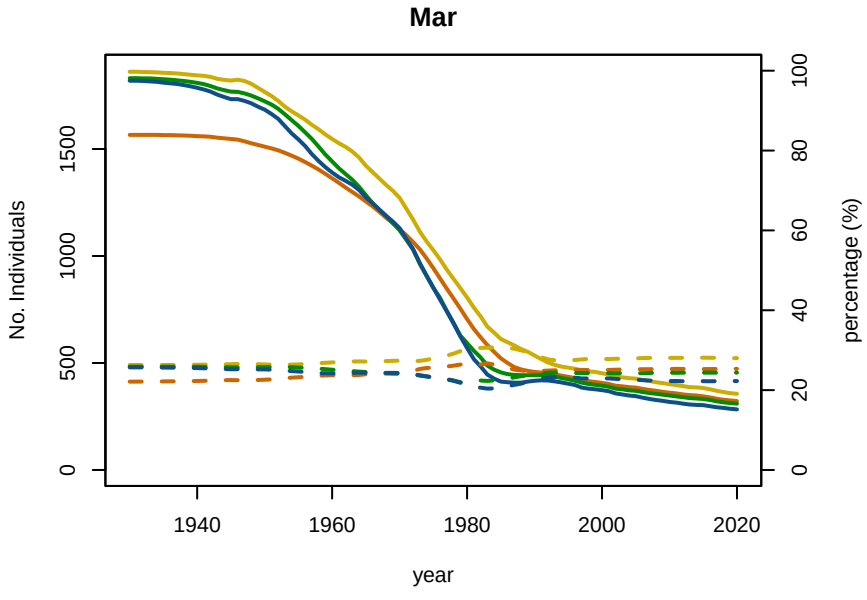


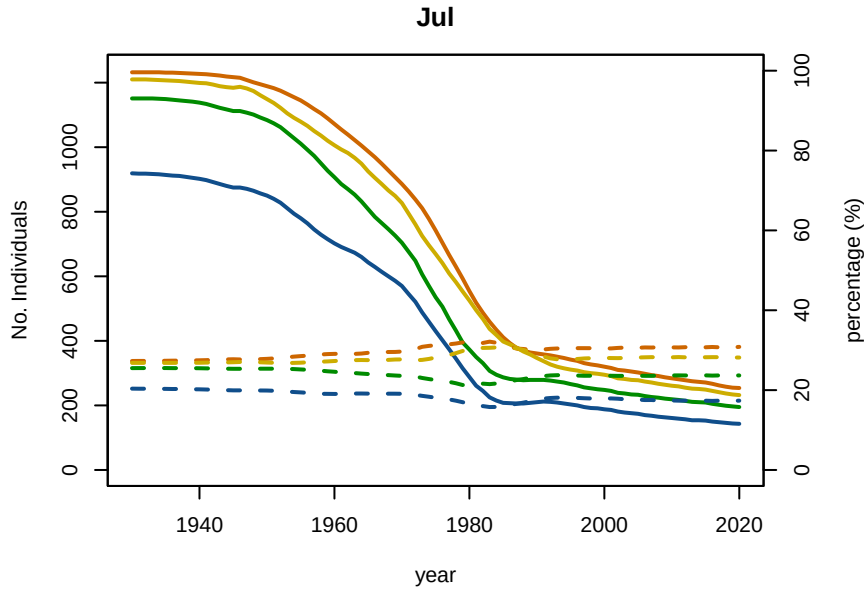


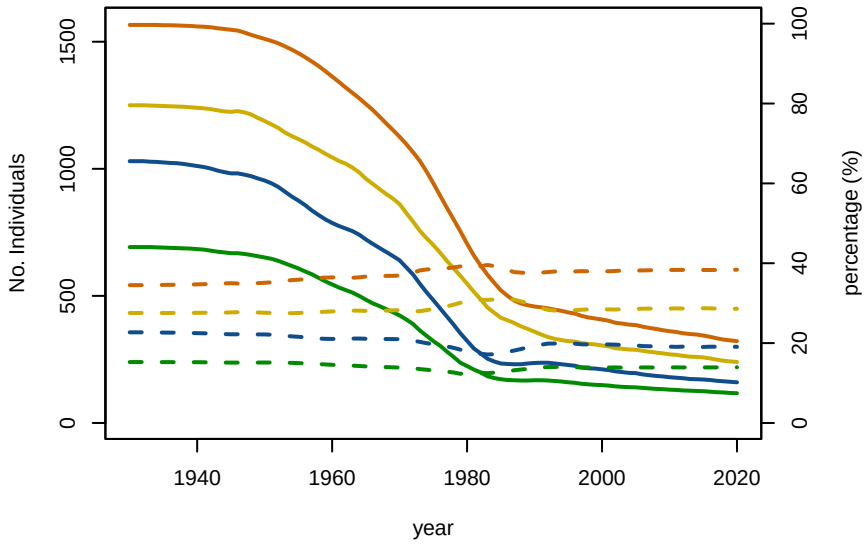


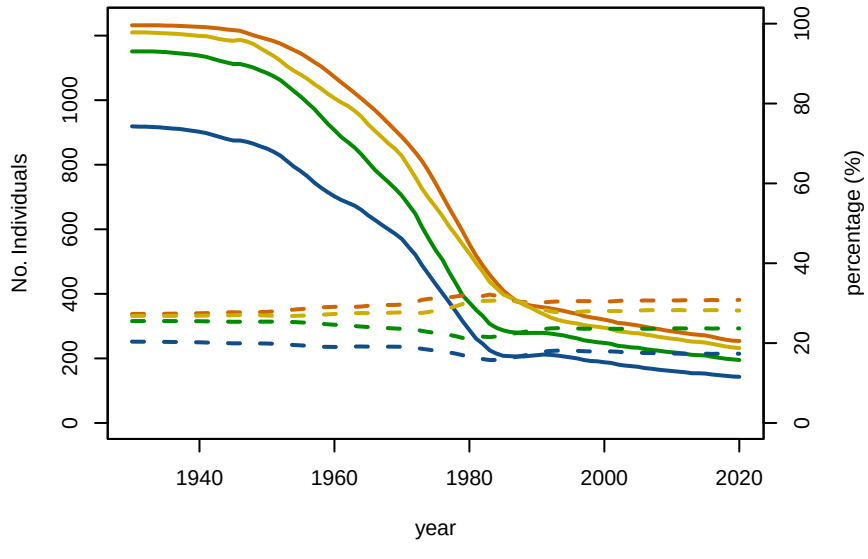
A1−4 A5−9 MatF MatM No Individuals percentage

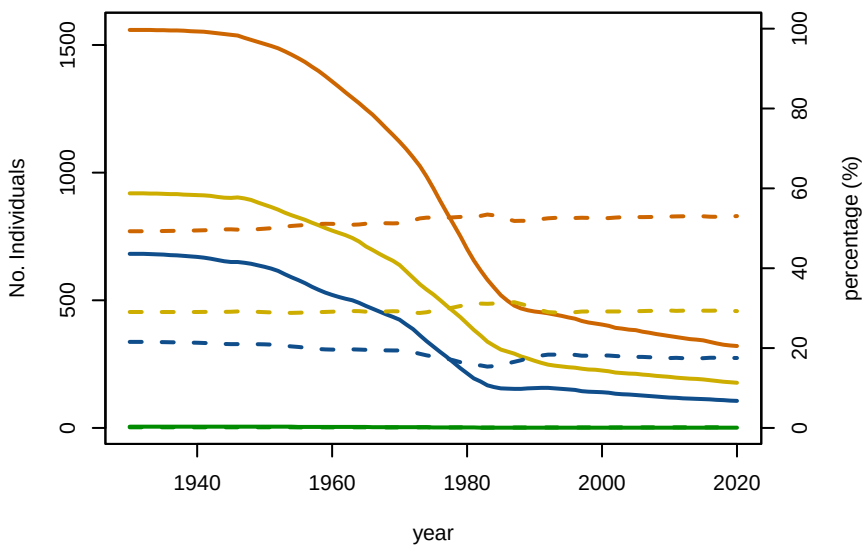
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 6W

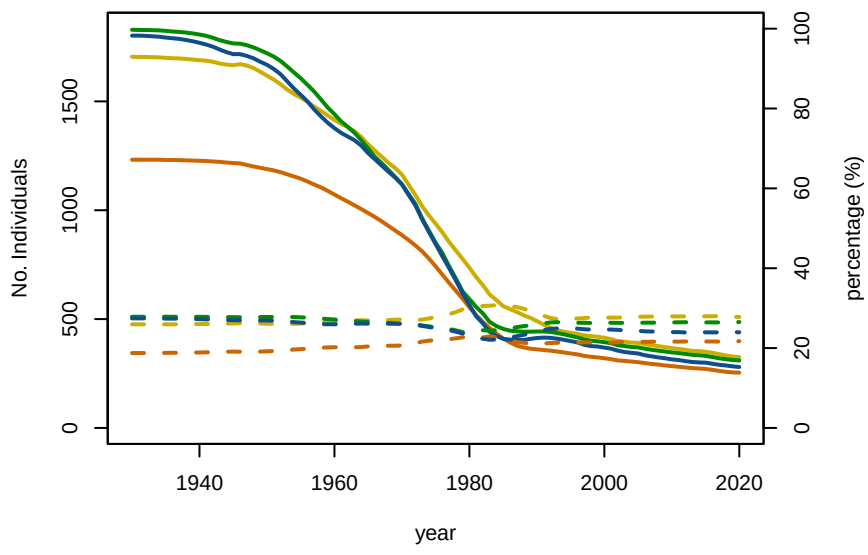


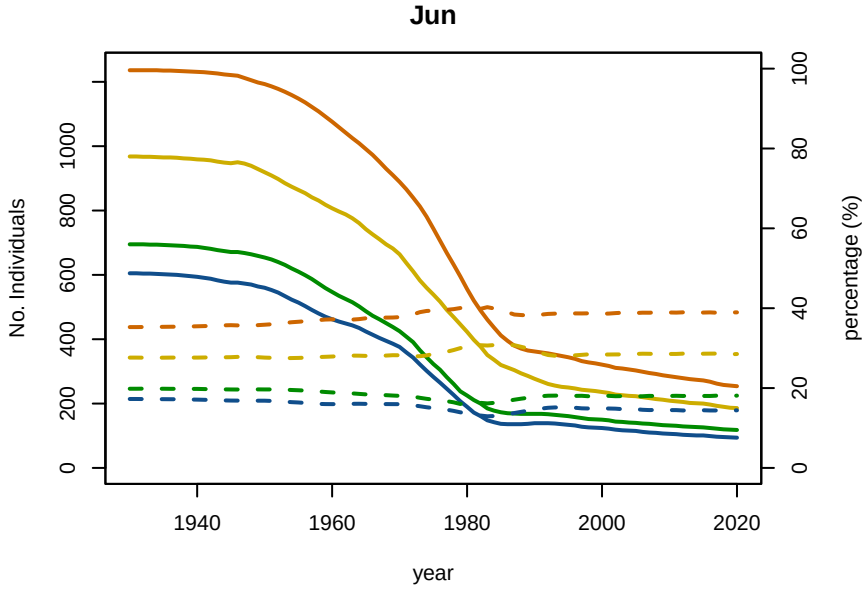


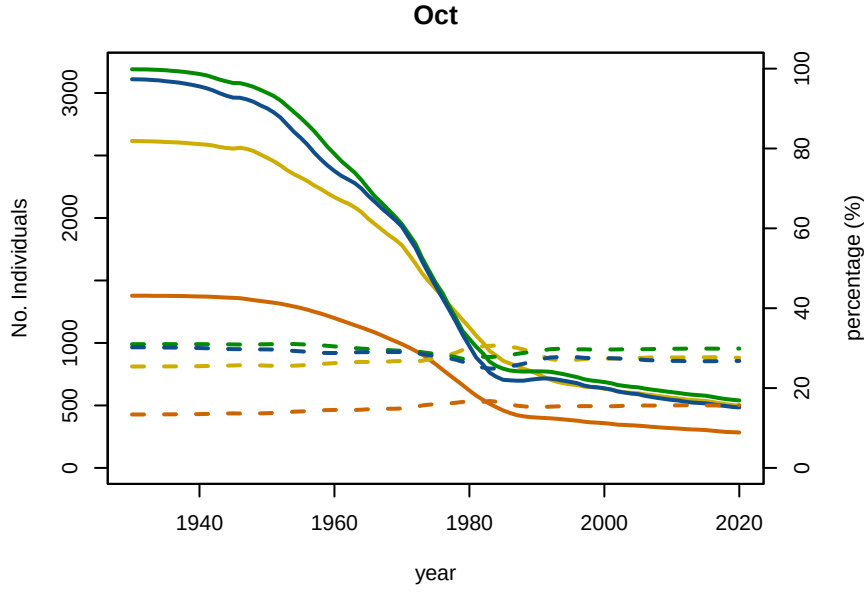






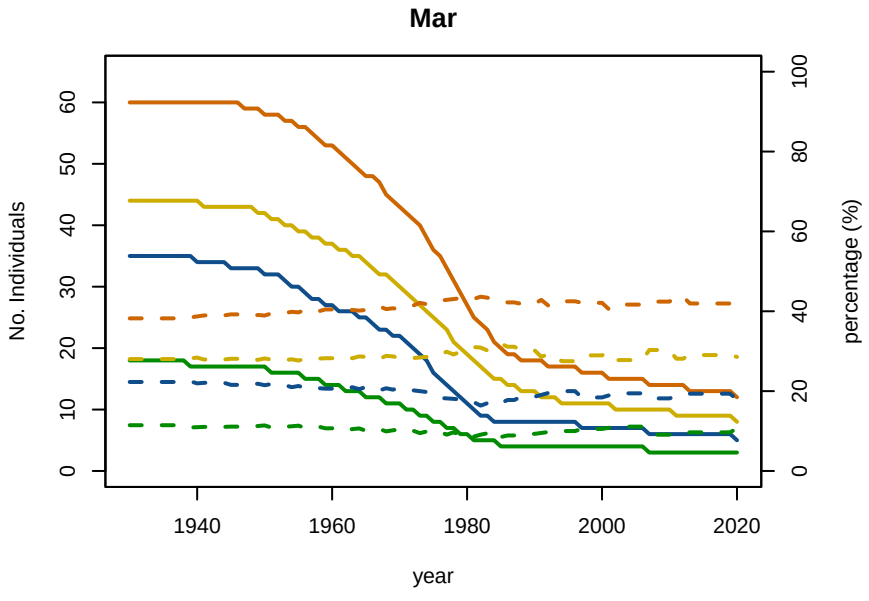


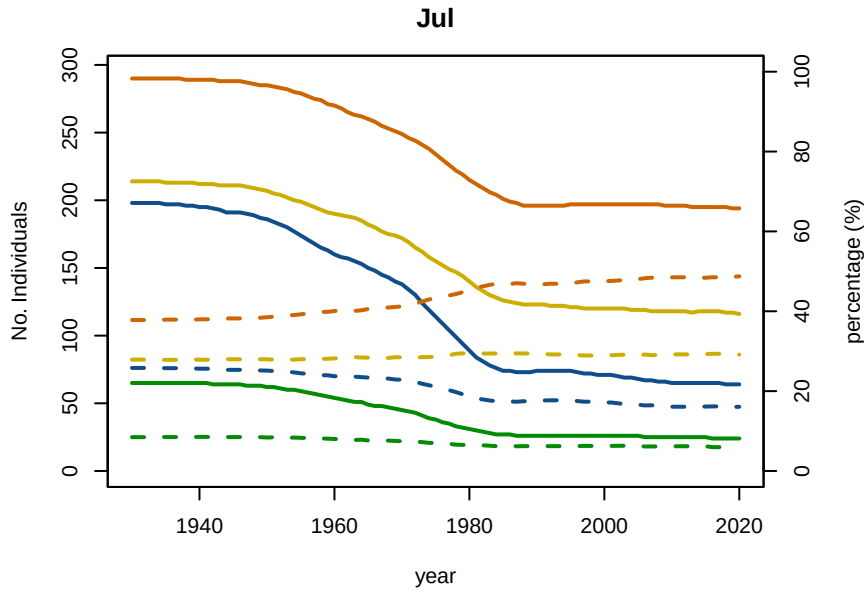


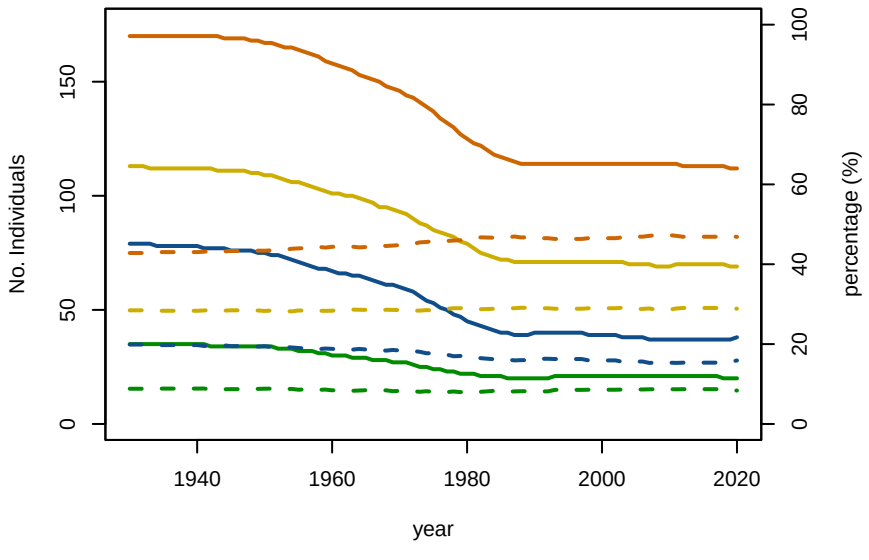


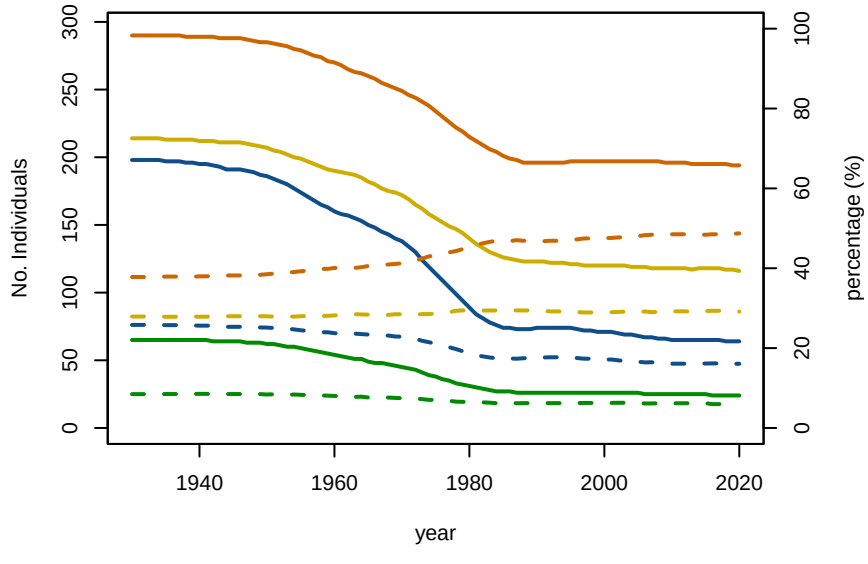
A1−4 A5−9 MatF MatM No Individuals percentage

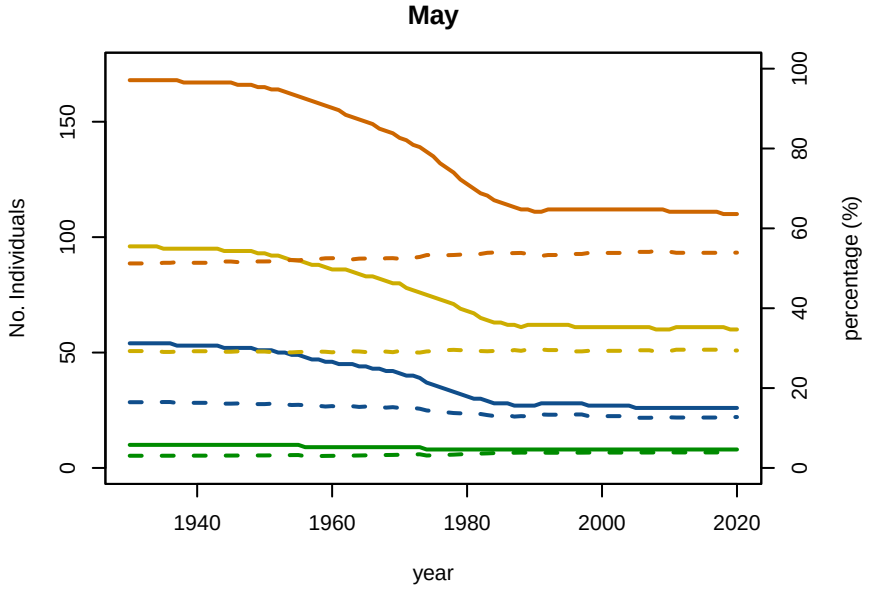
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7CN

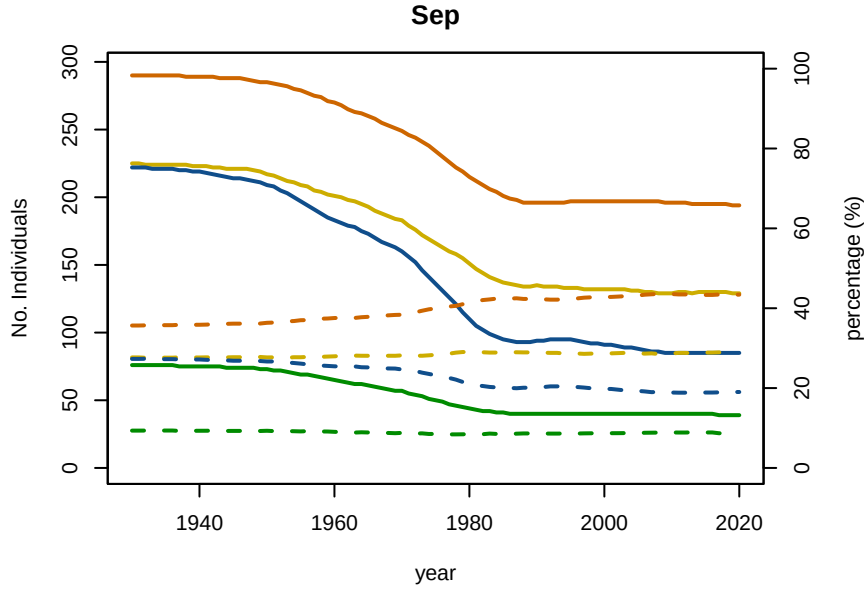


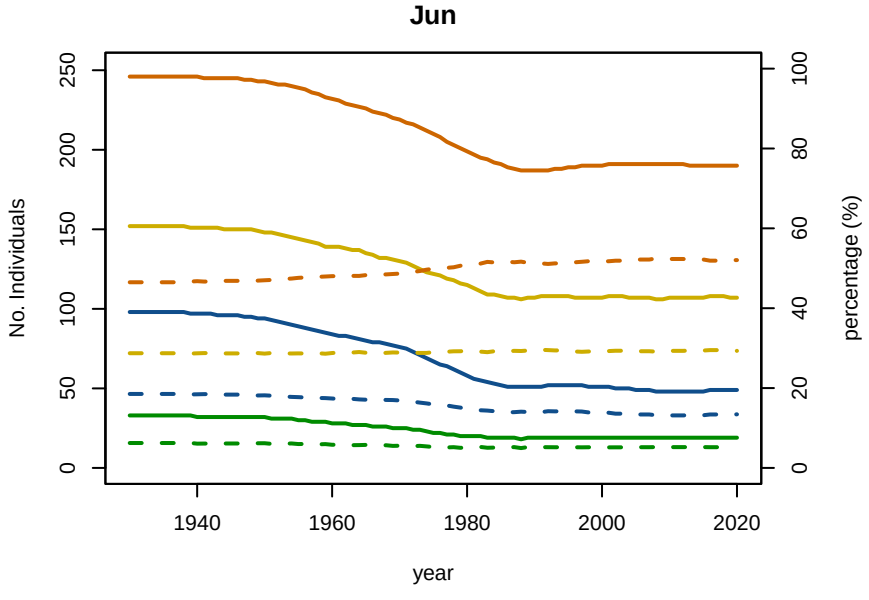


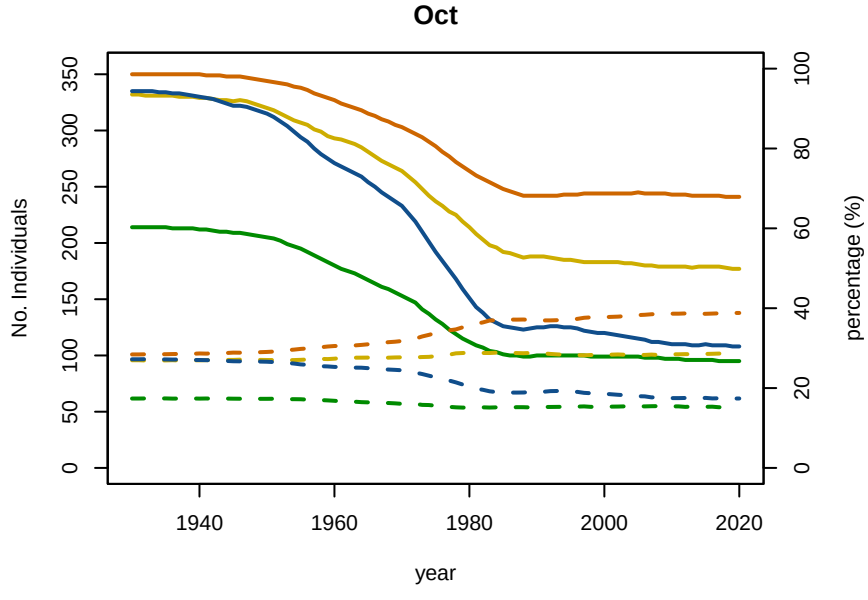






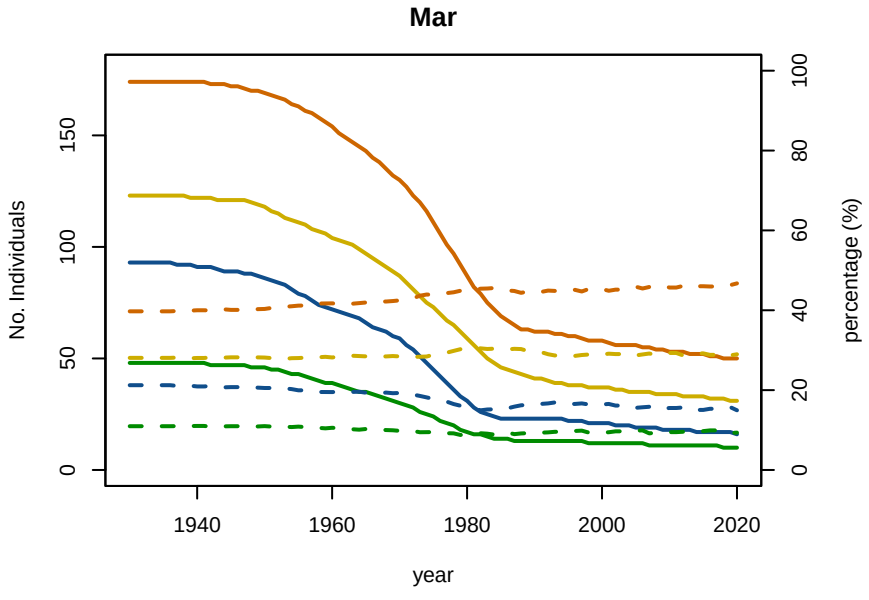


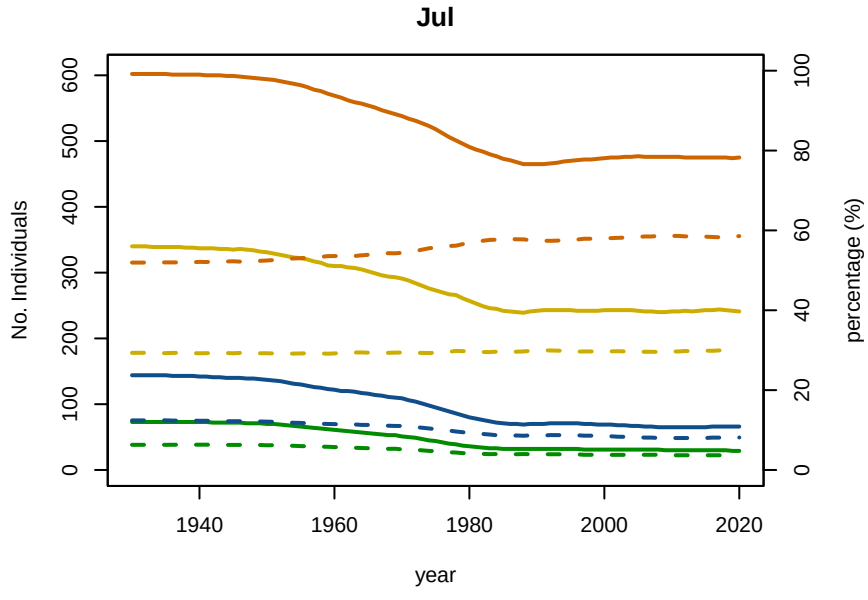


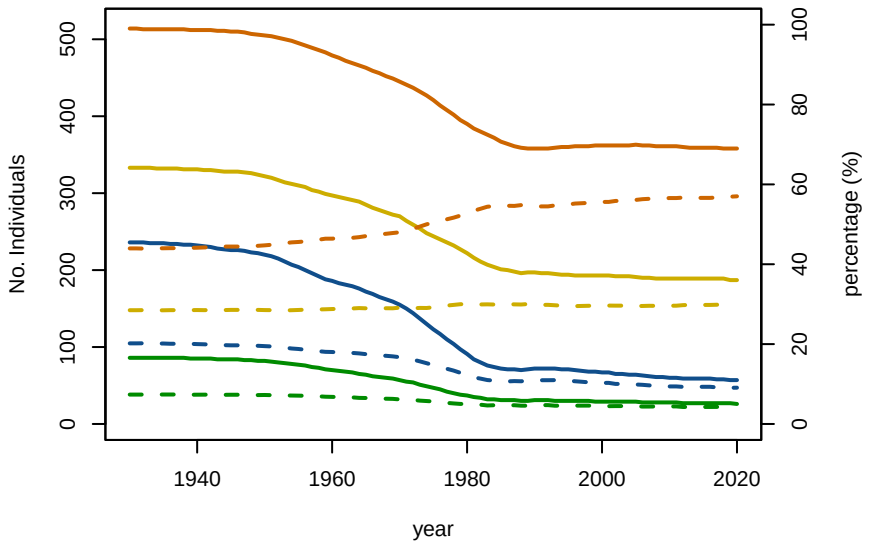


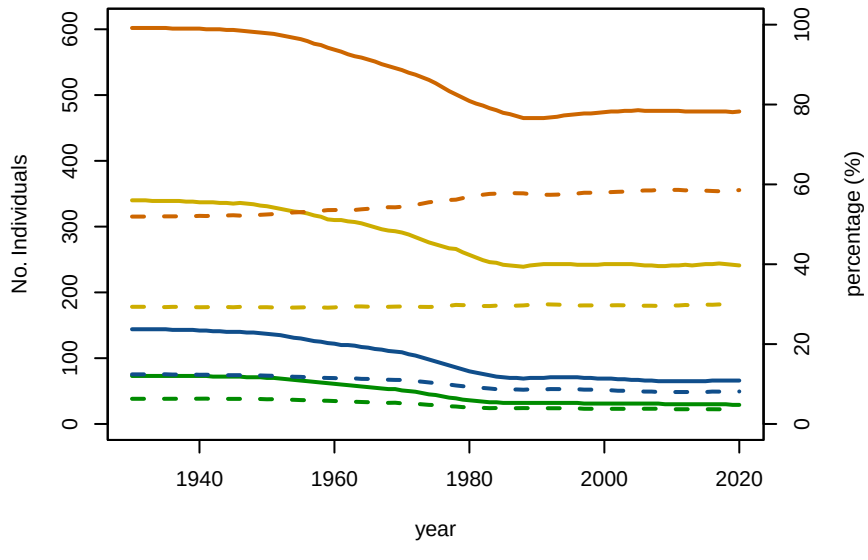
A1−4 A5−9 MatF MatM No Individuals percentage

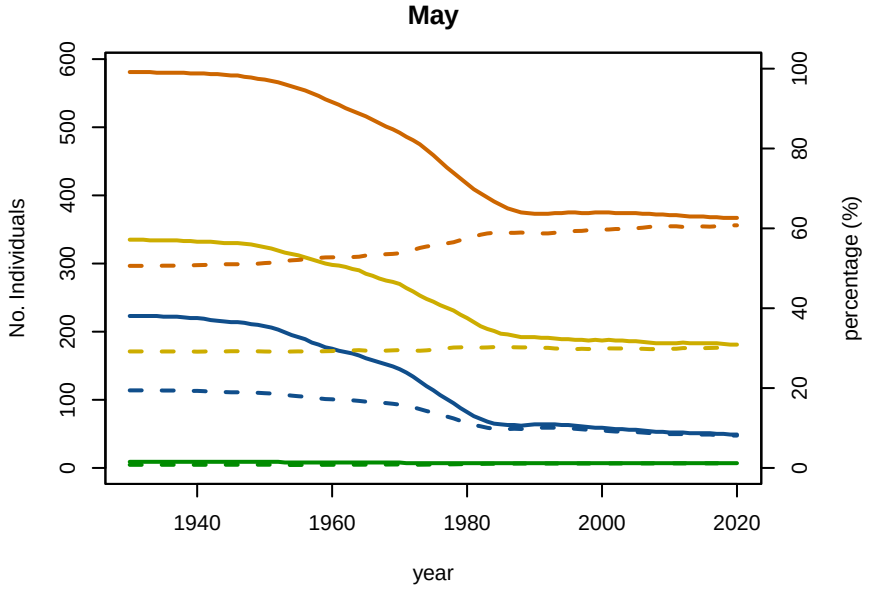
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7CS

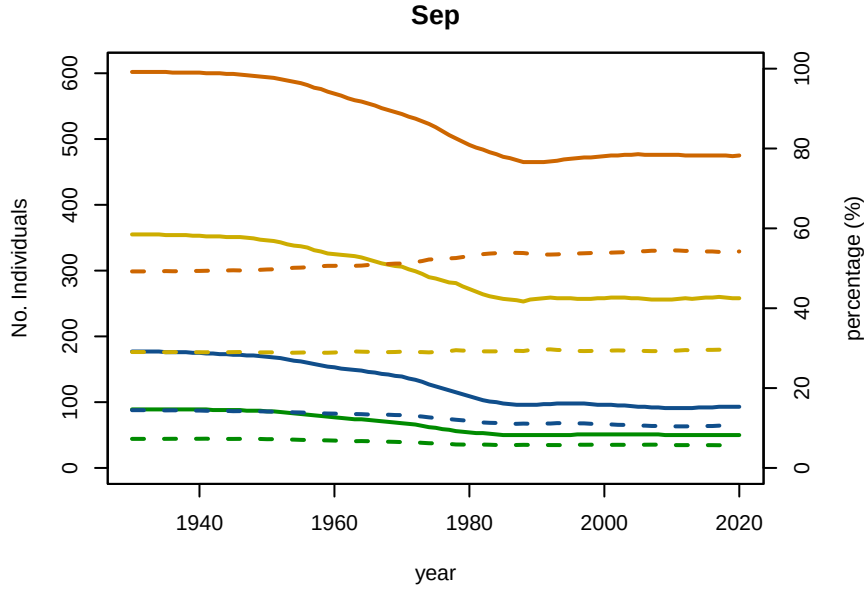


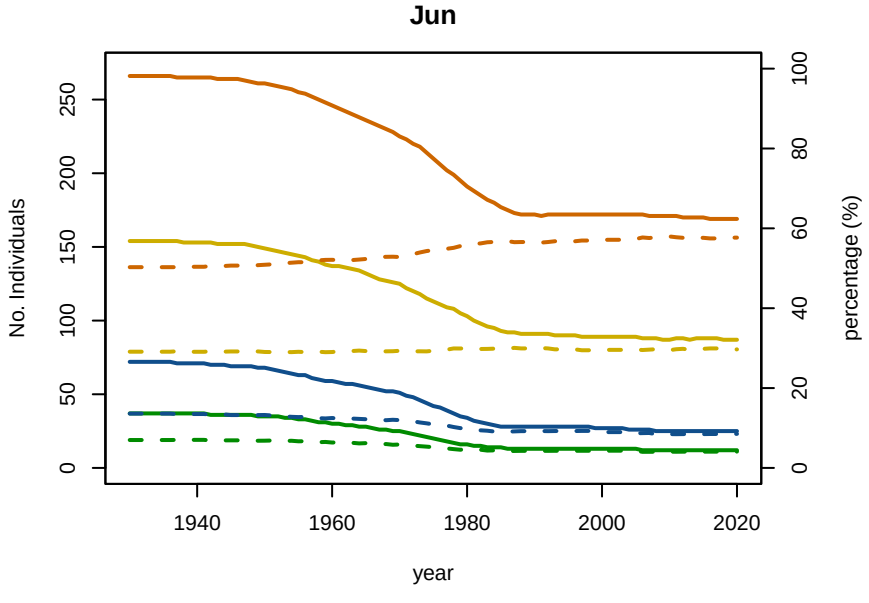


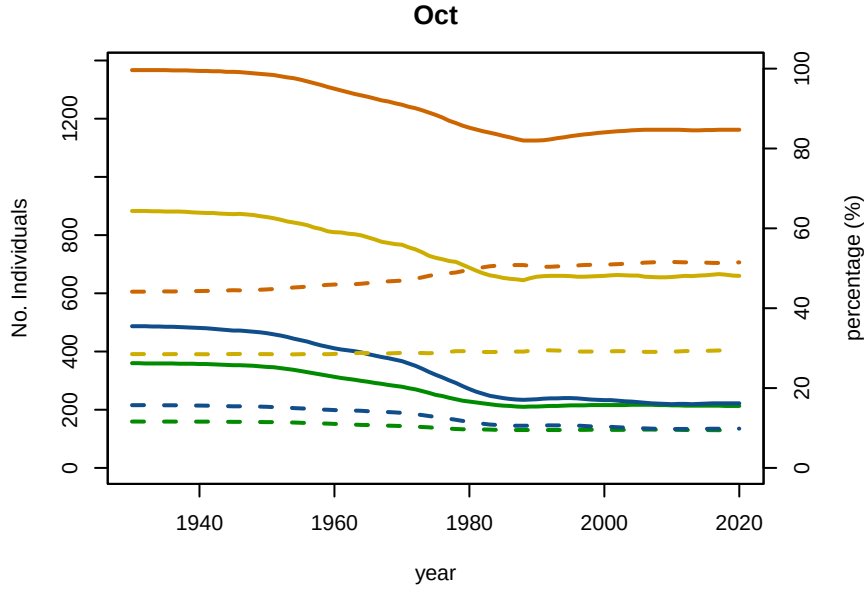






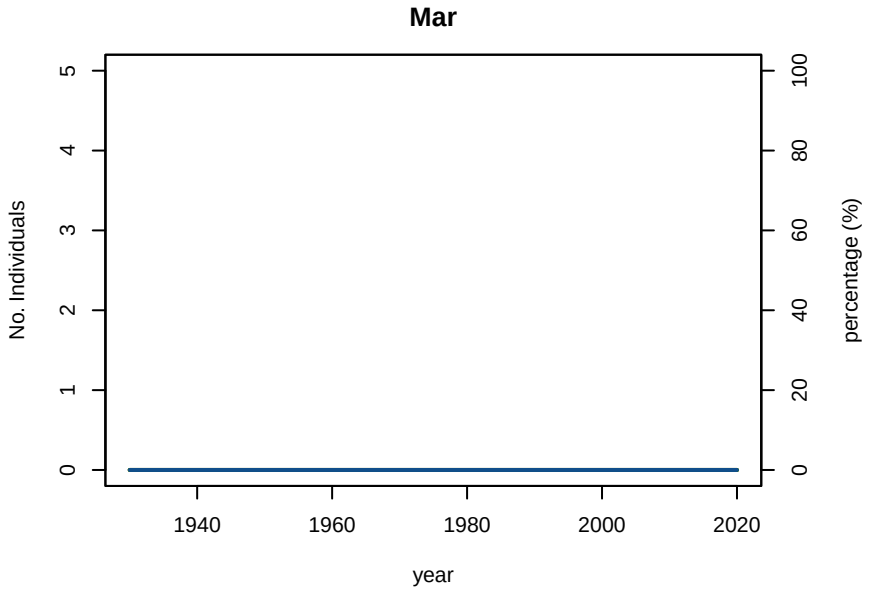


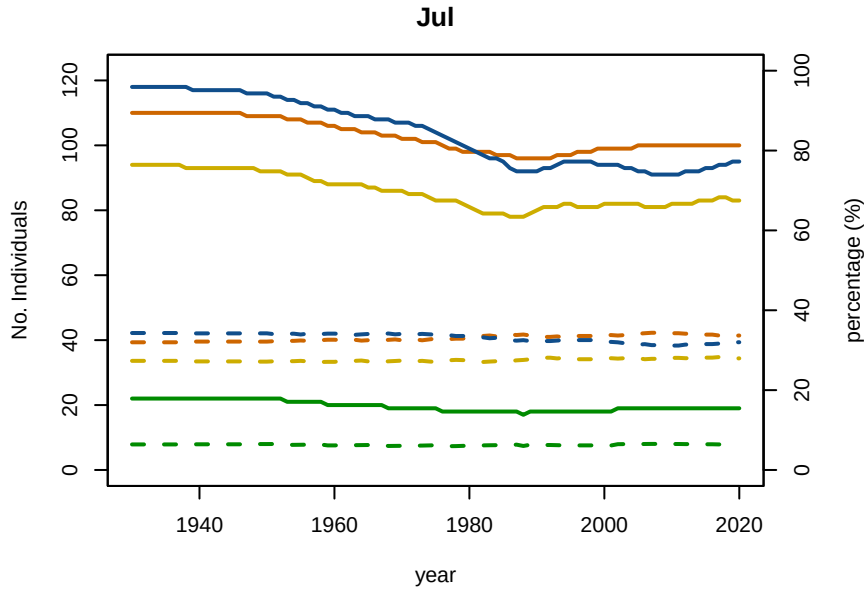


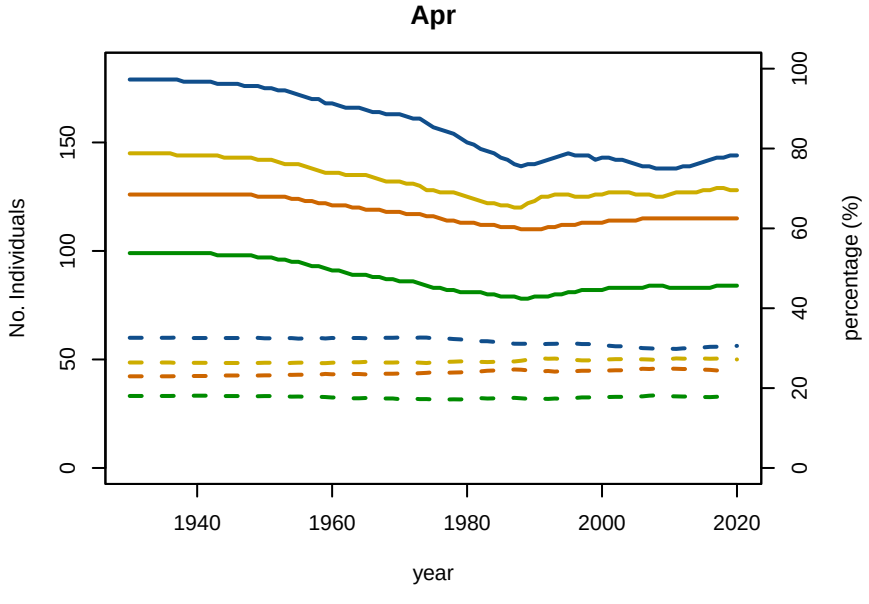


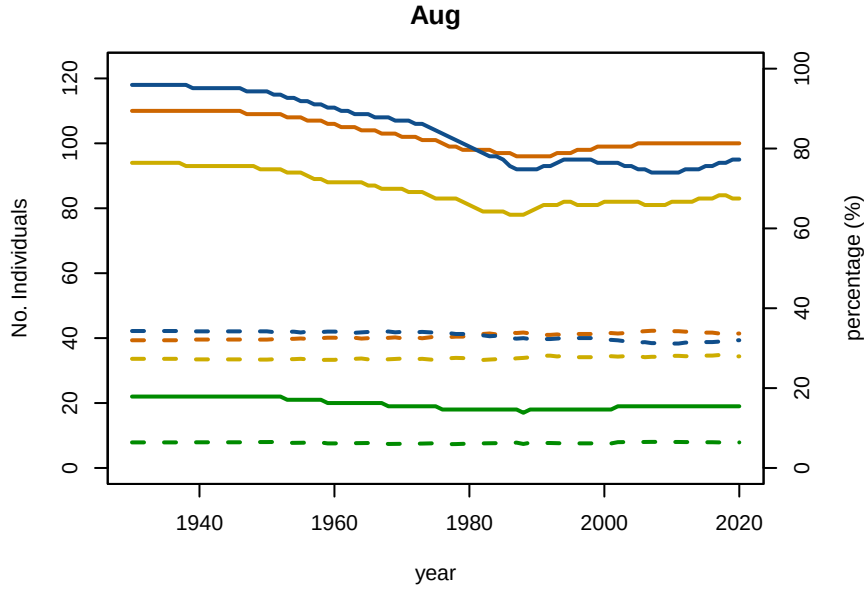
A1−4 A5−9 MatF MatM No Individuals percentage

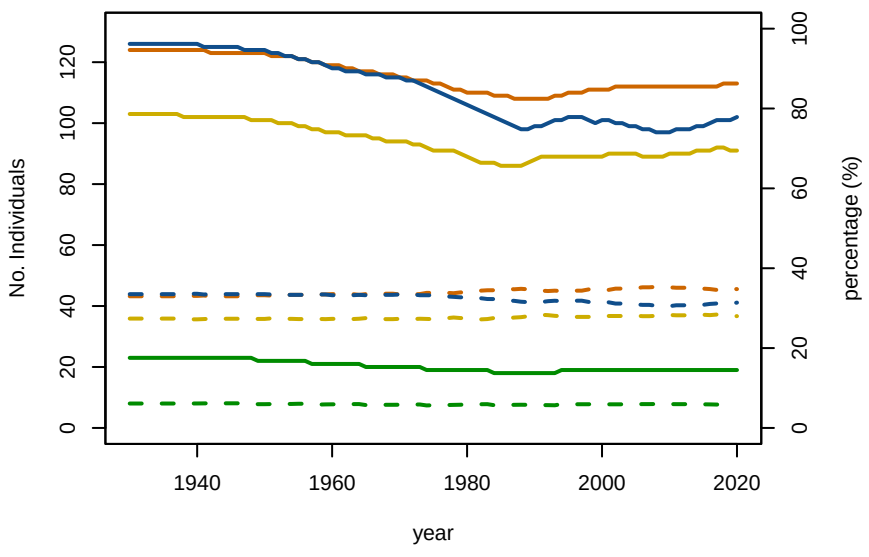
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7E

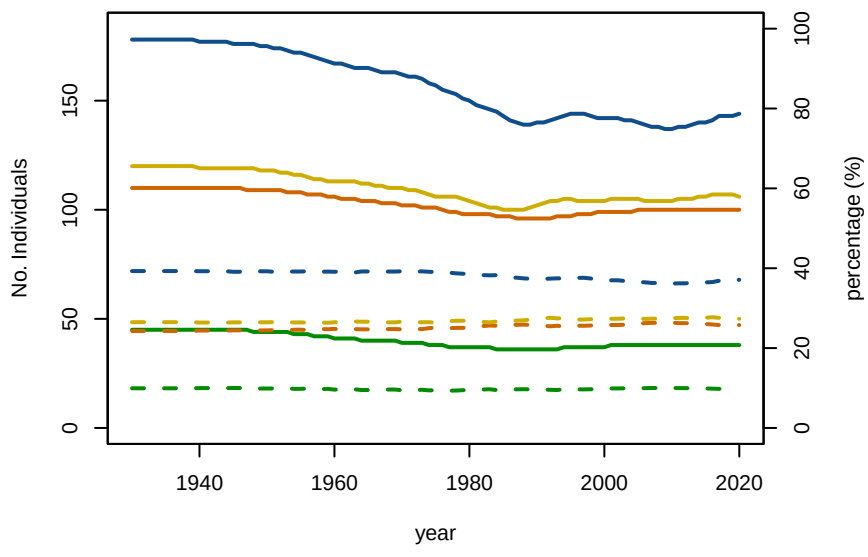


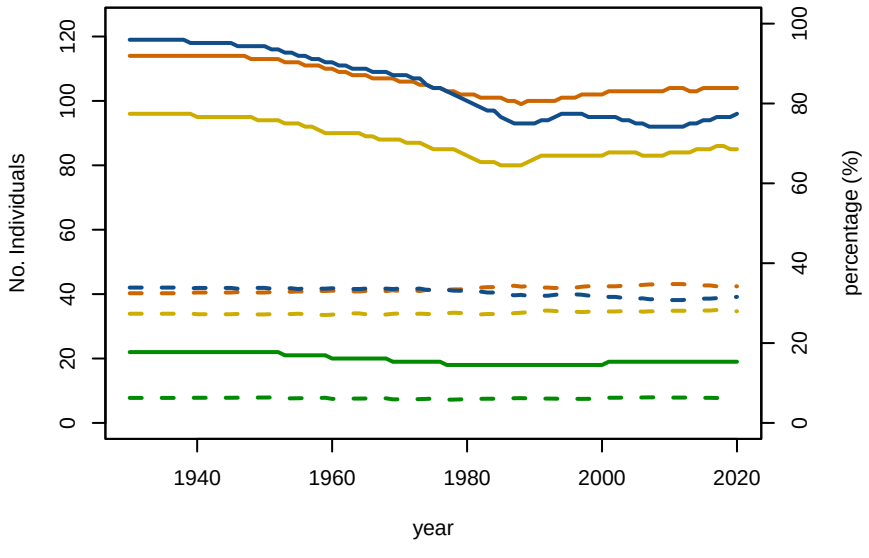


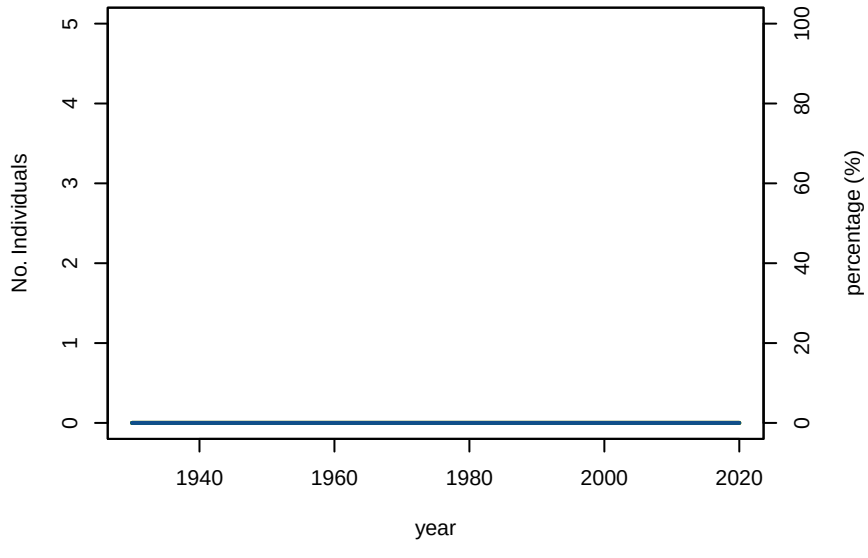






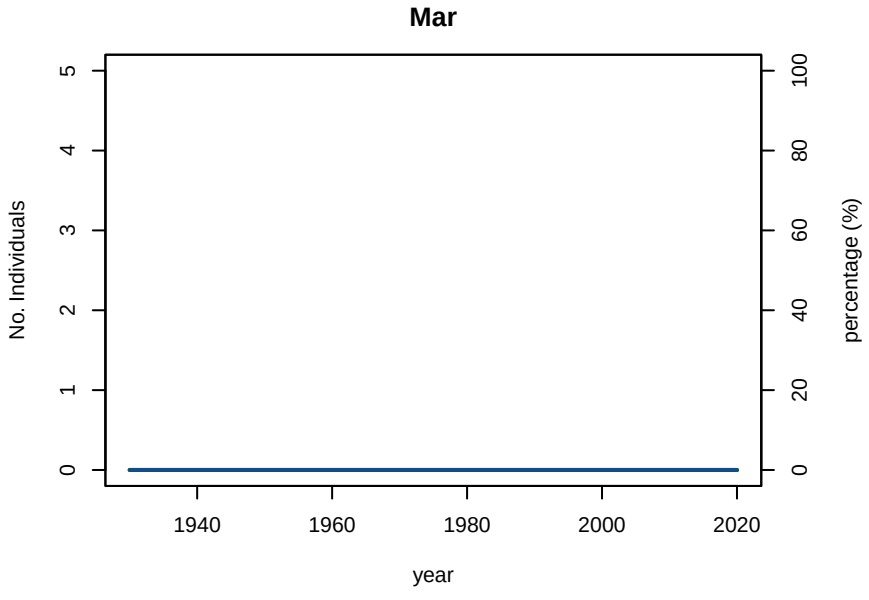


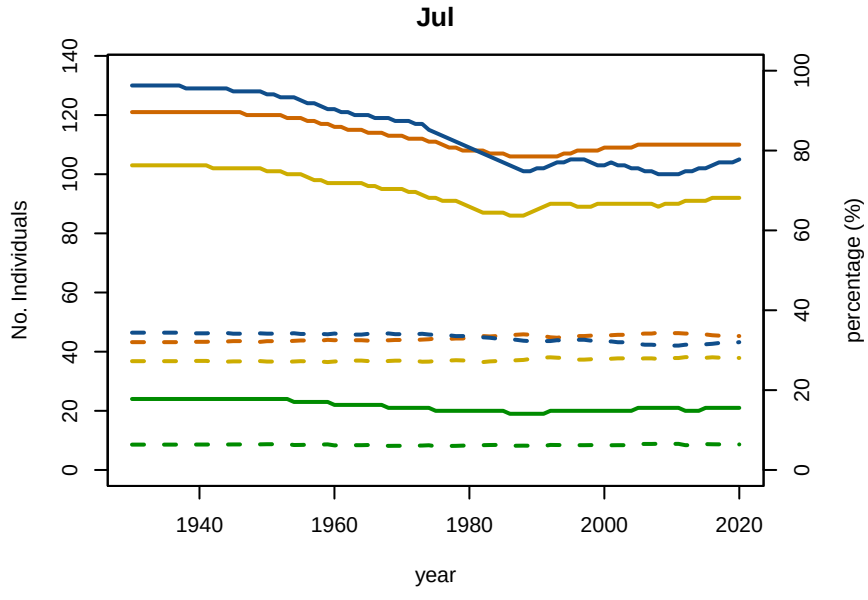


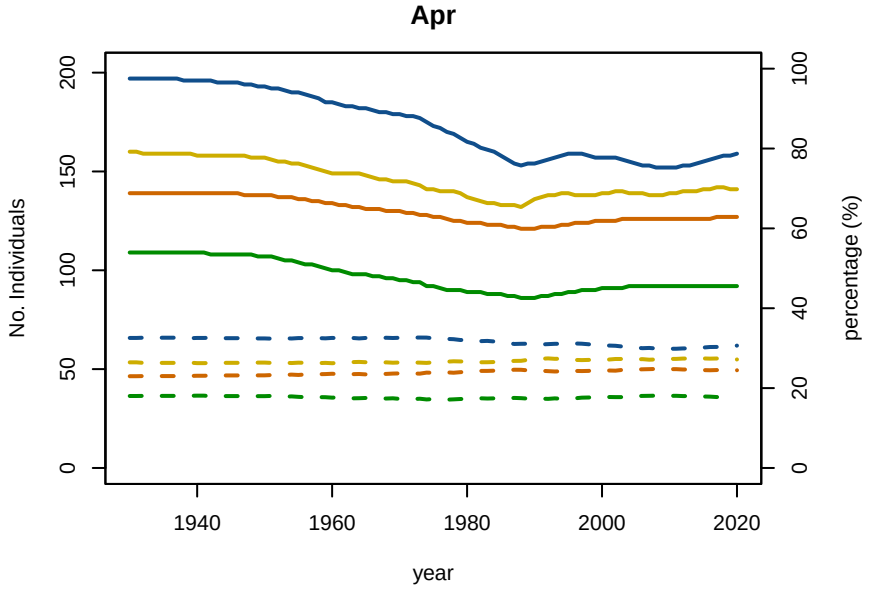


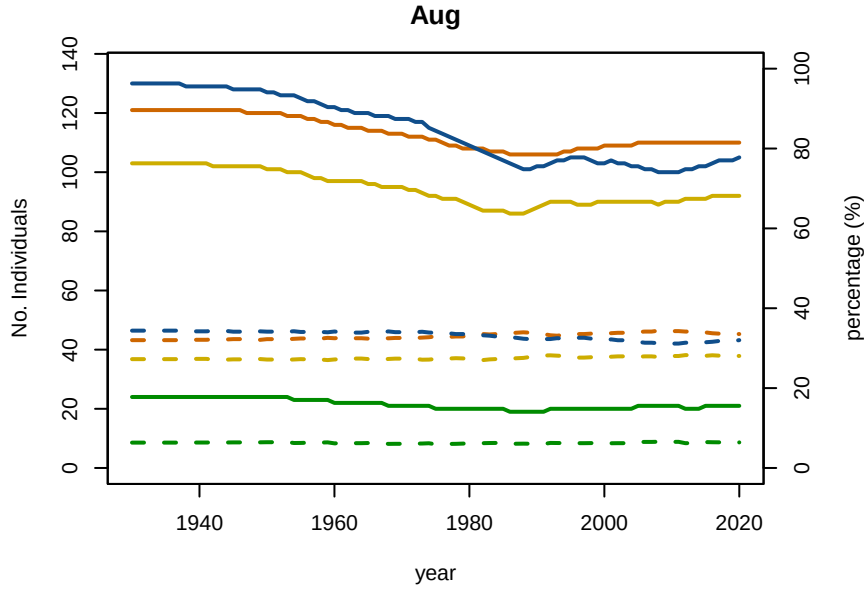
A1−4 A5−9 MatF MatM No Individuals percentage

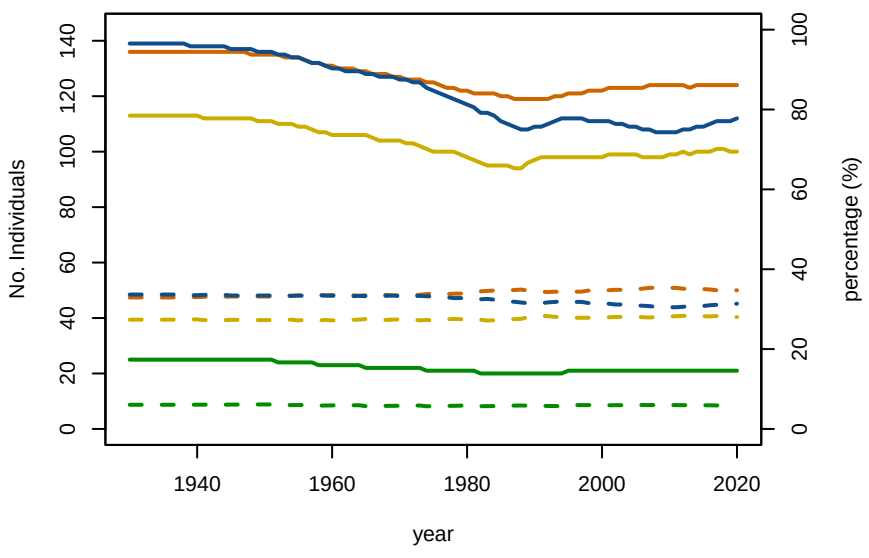
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7WR

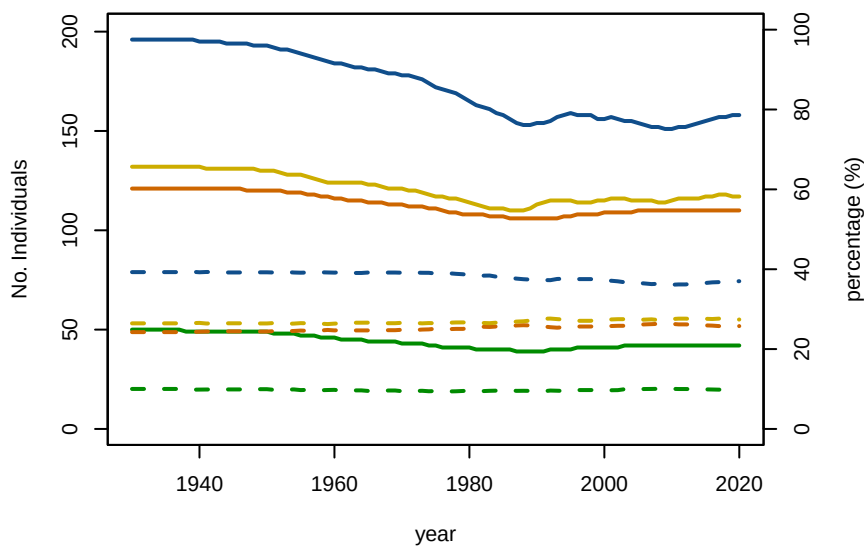


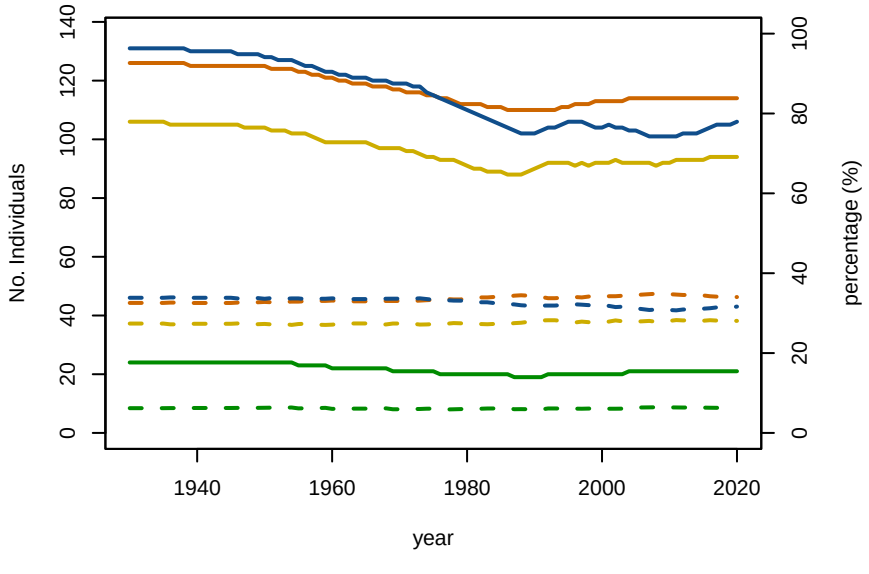


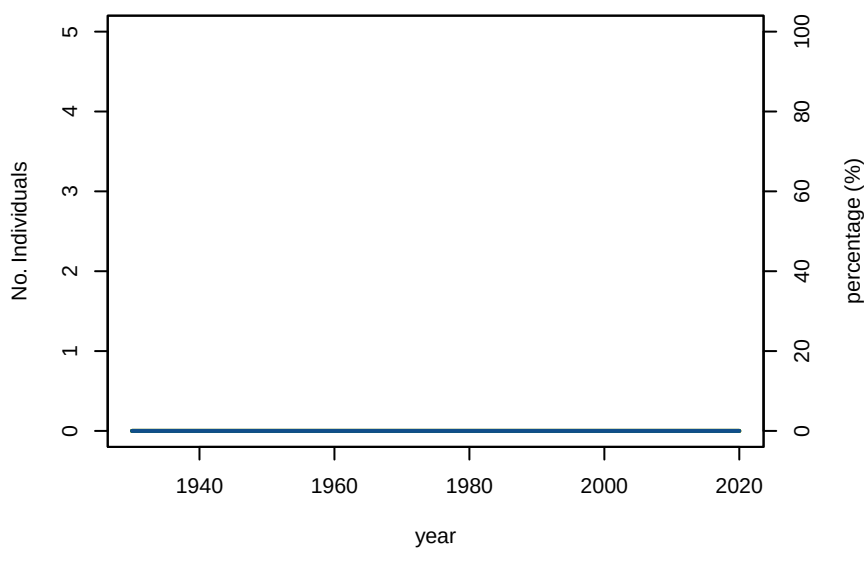






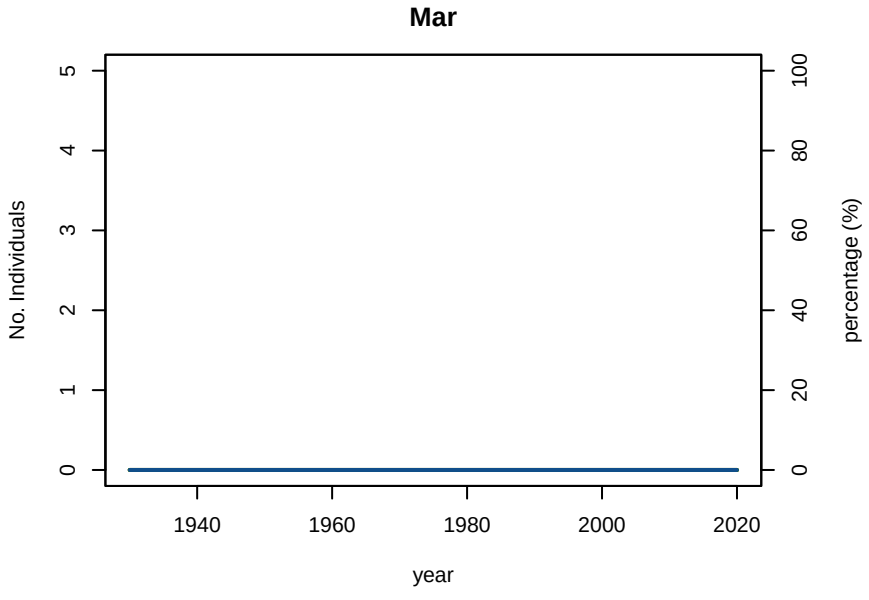


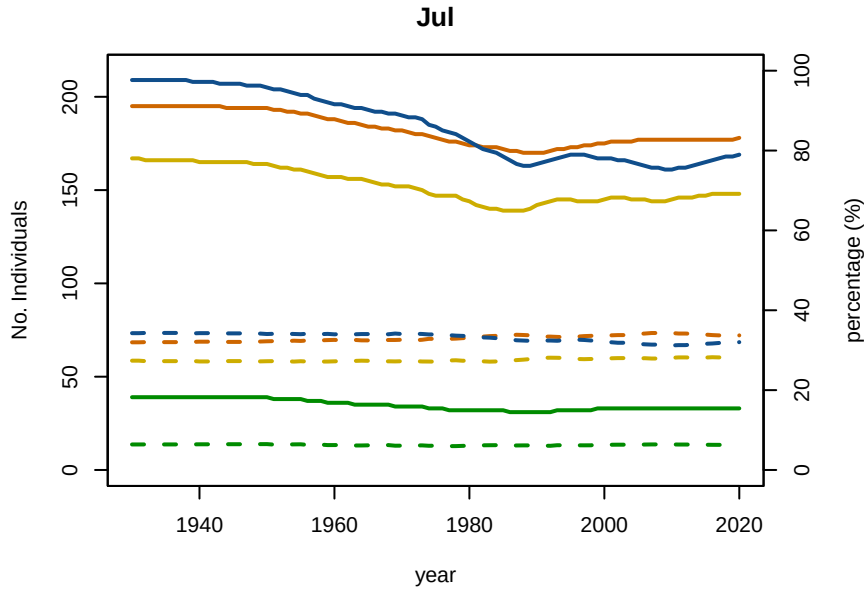


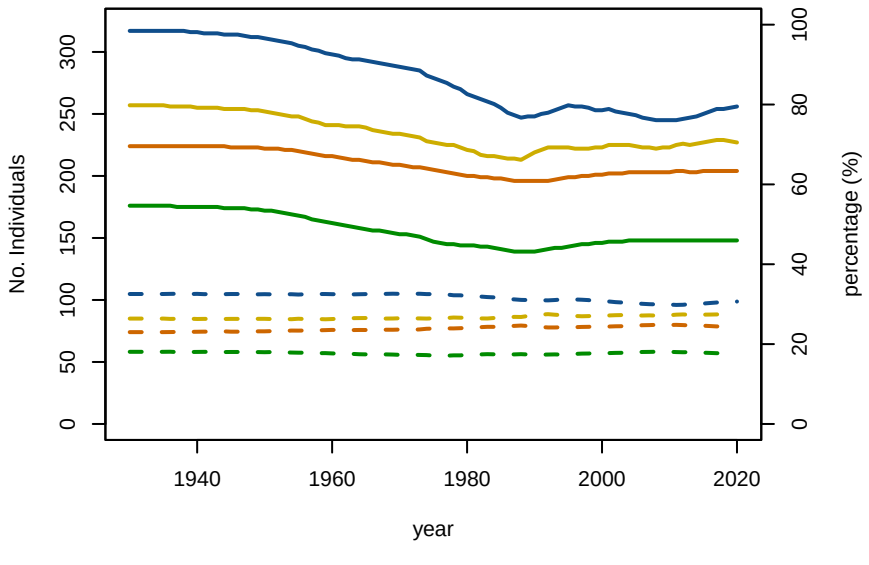


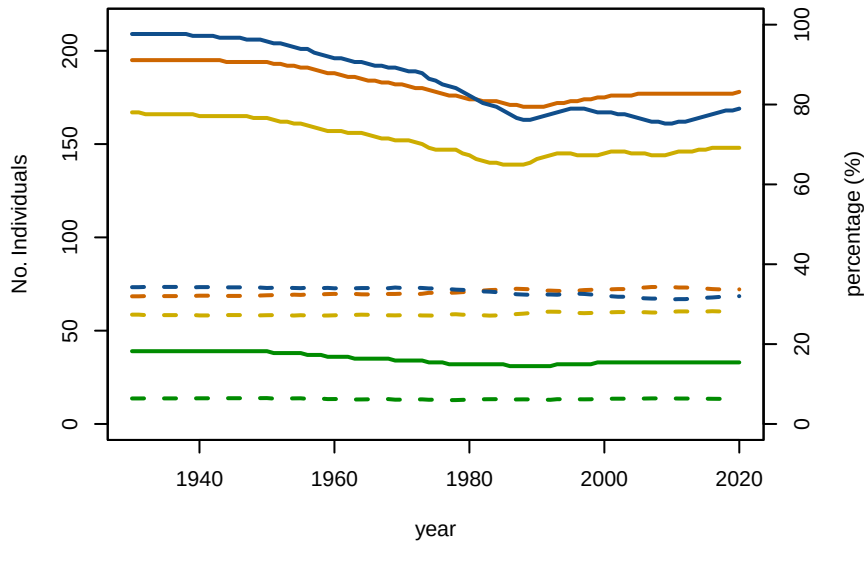
A1−4 A5−9 MatF MatM No Individuals percentage

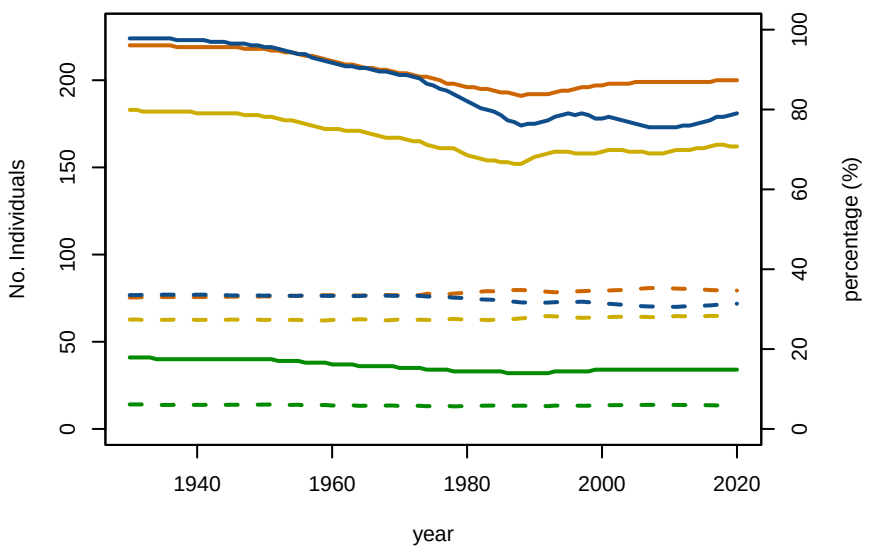
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 8

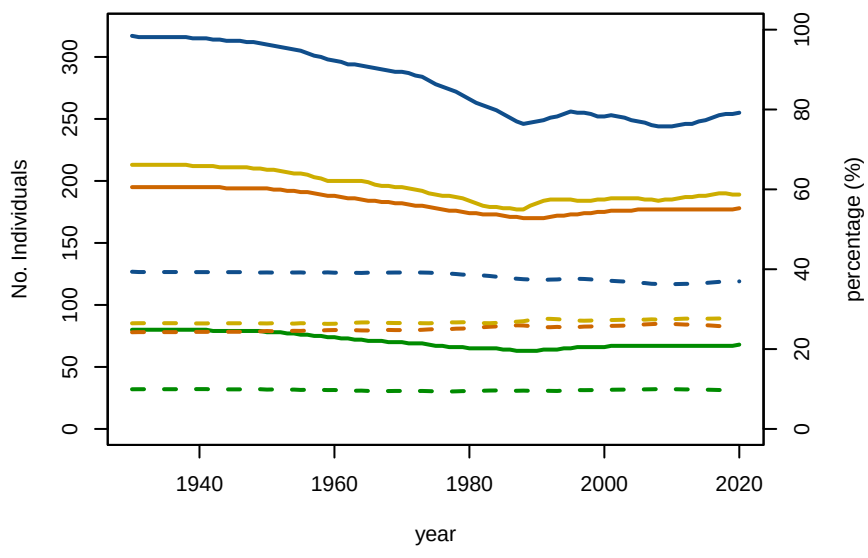


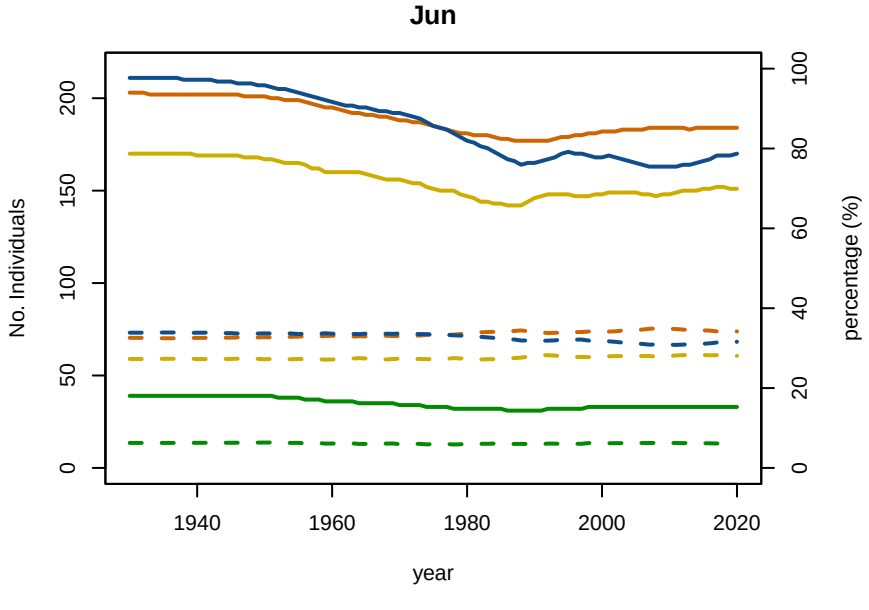


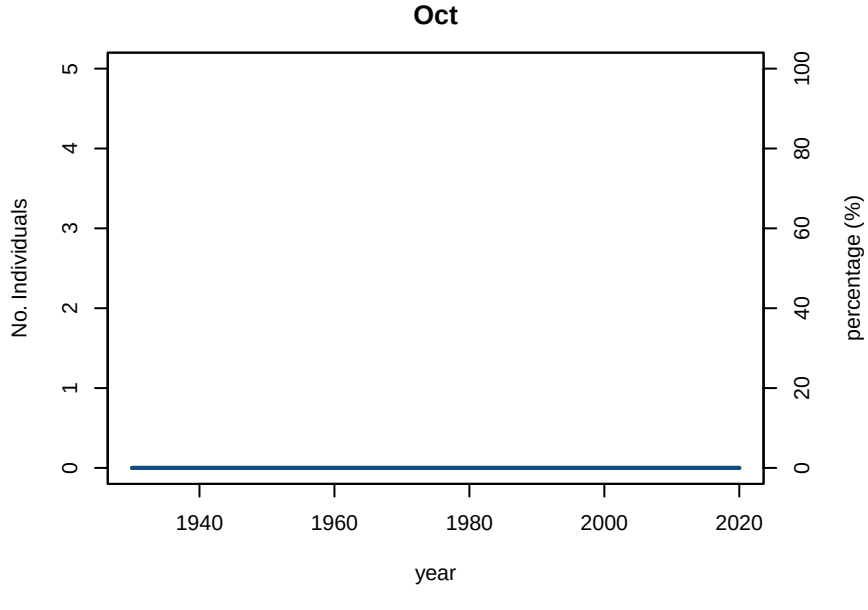






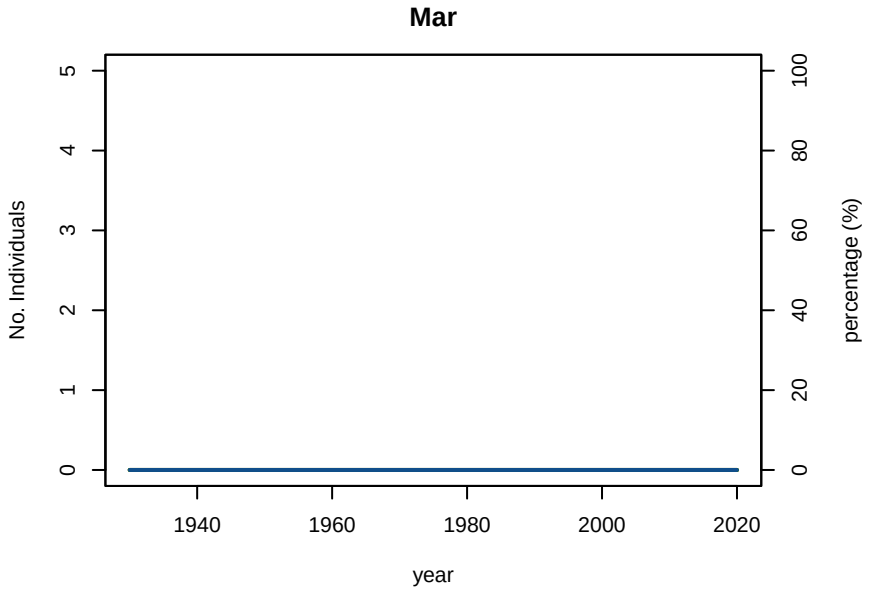


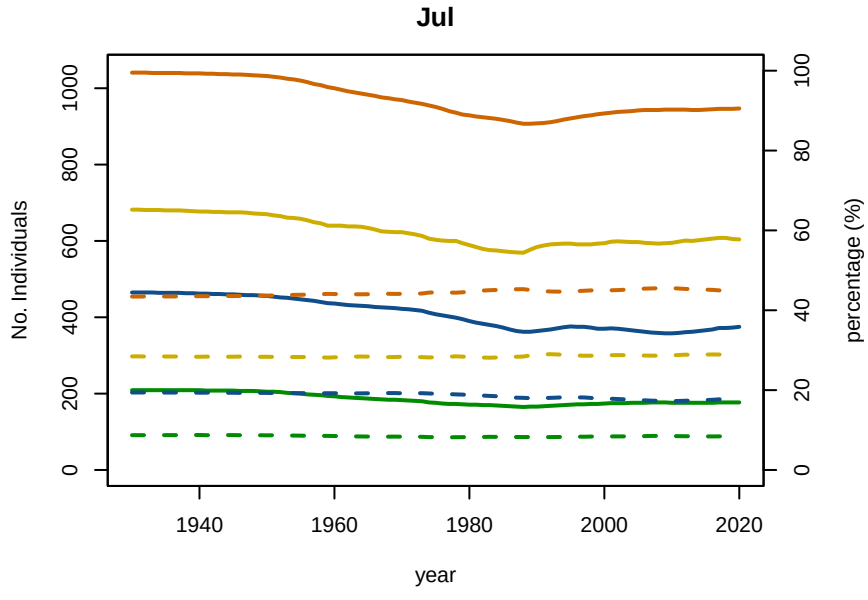


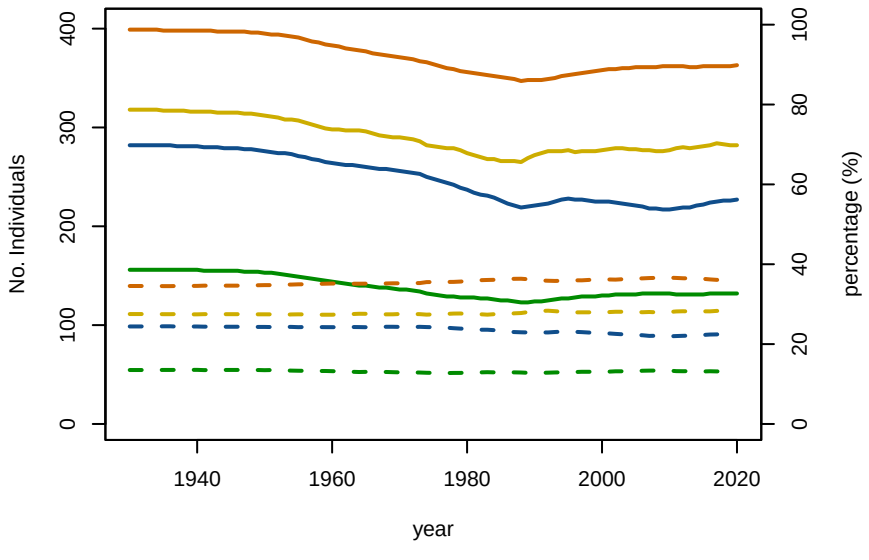


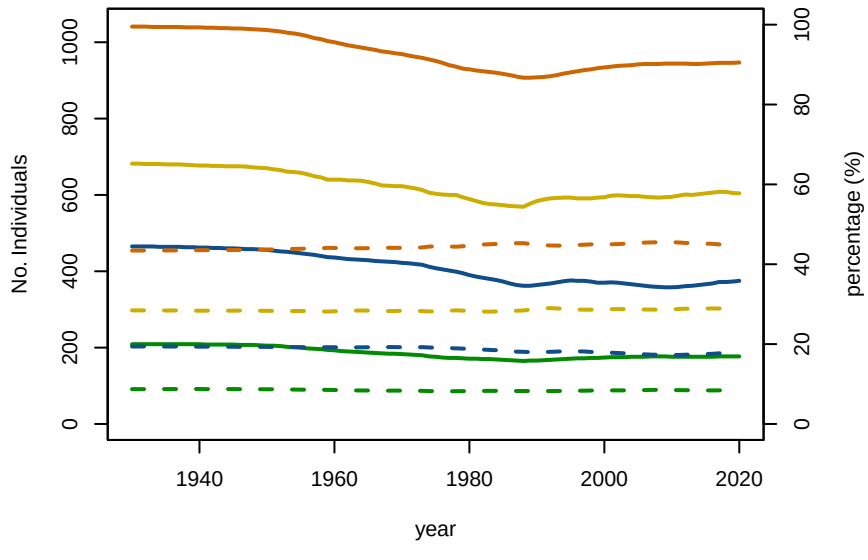
A1−4 A5−9 MatF MatM No Individuals percentage

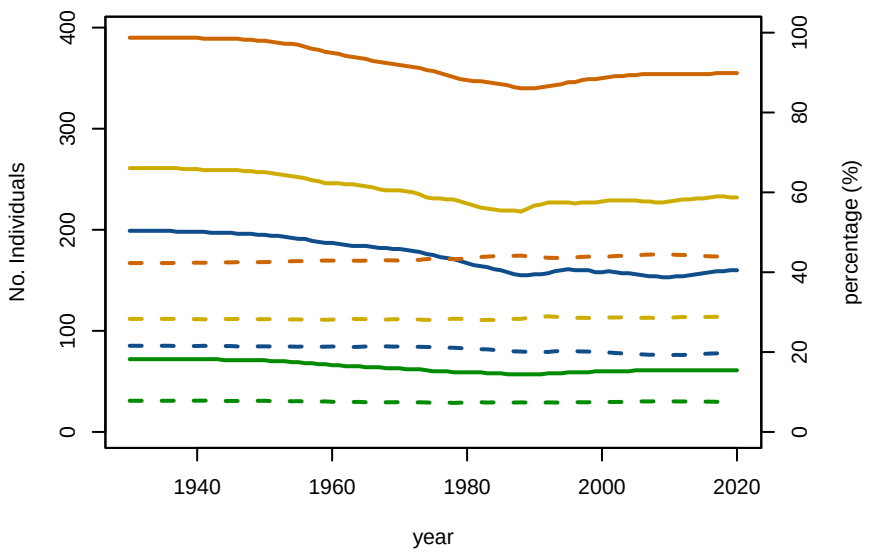
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 9

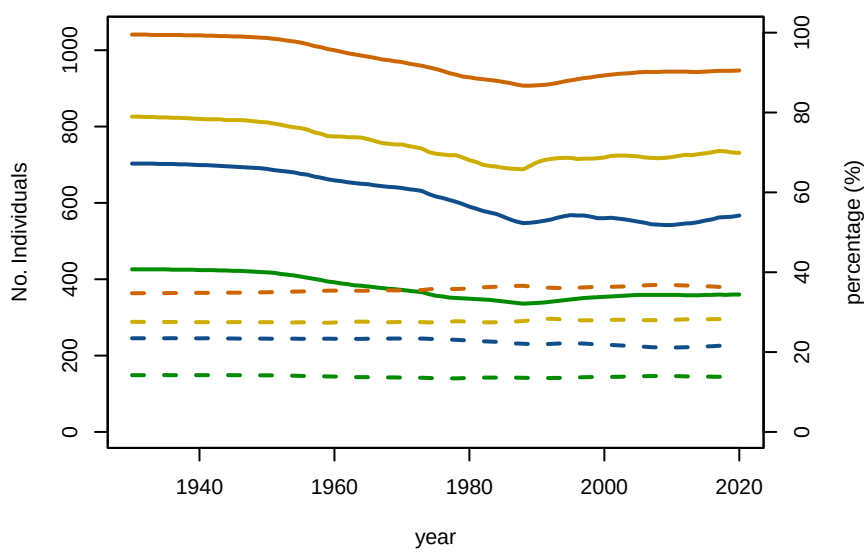


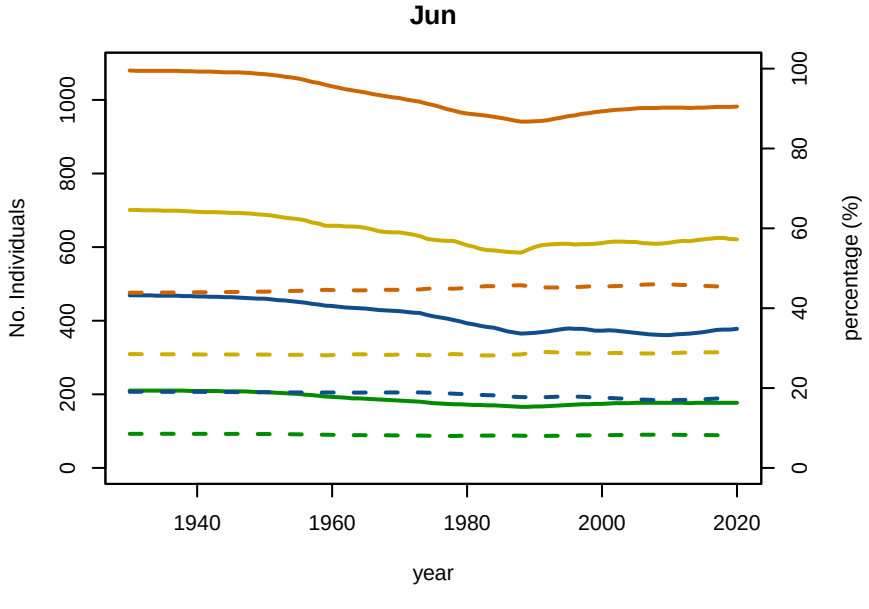


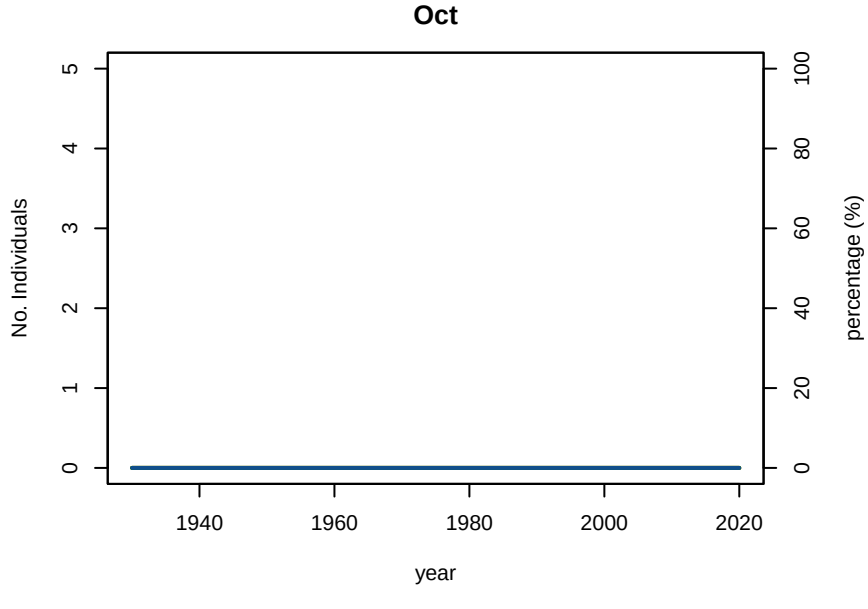






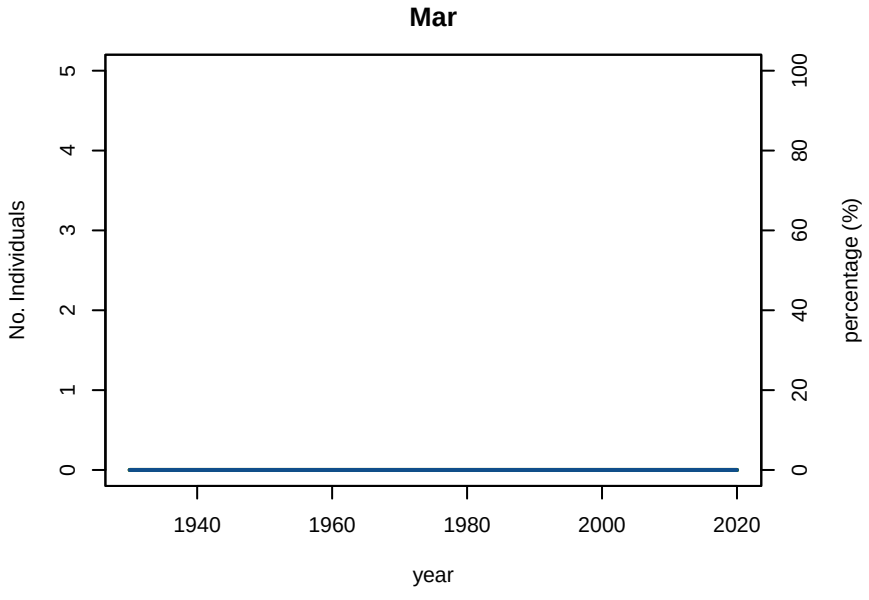


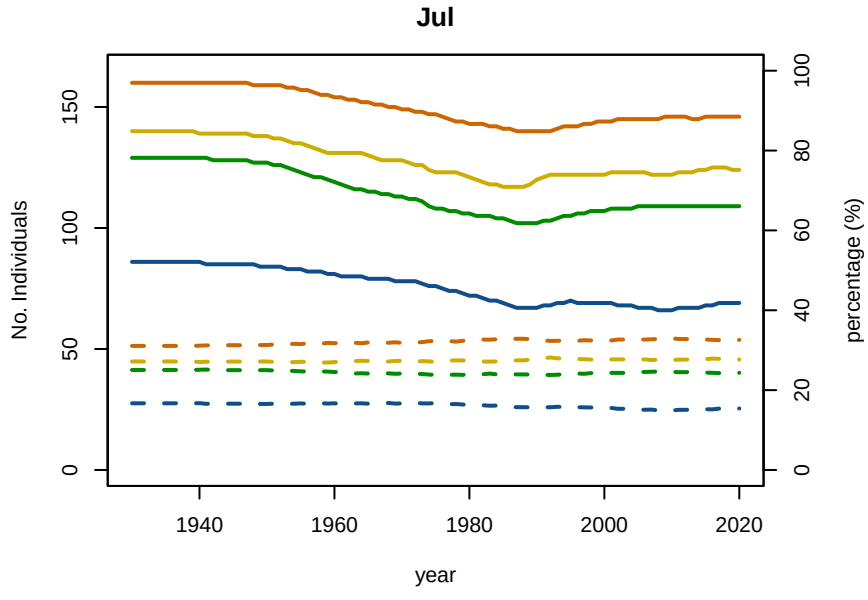


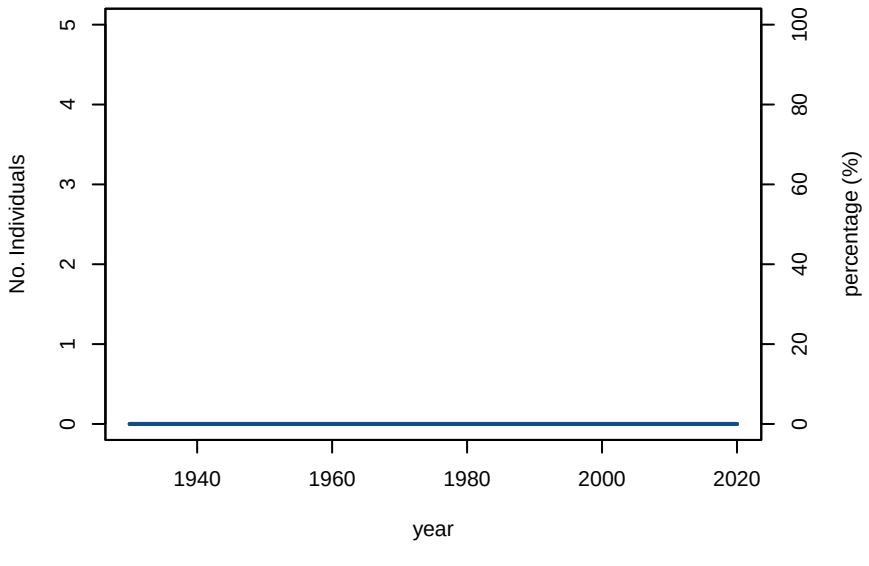


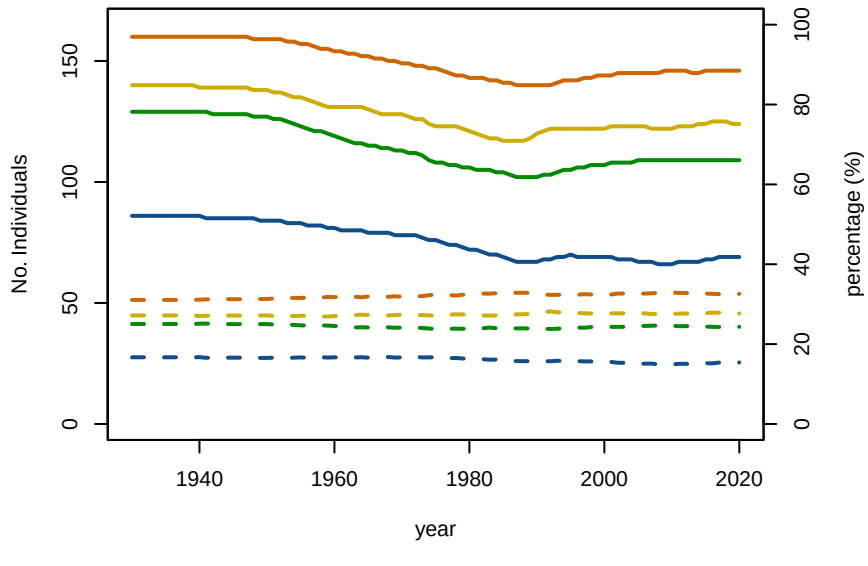
A1−4 A5−9 MatF MatM No Individuals percentage

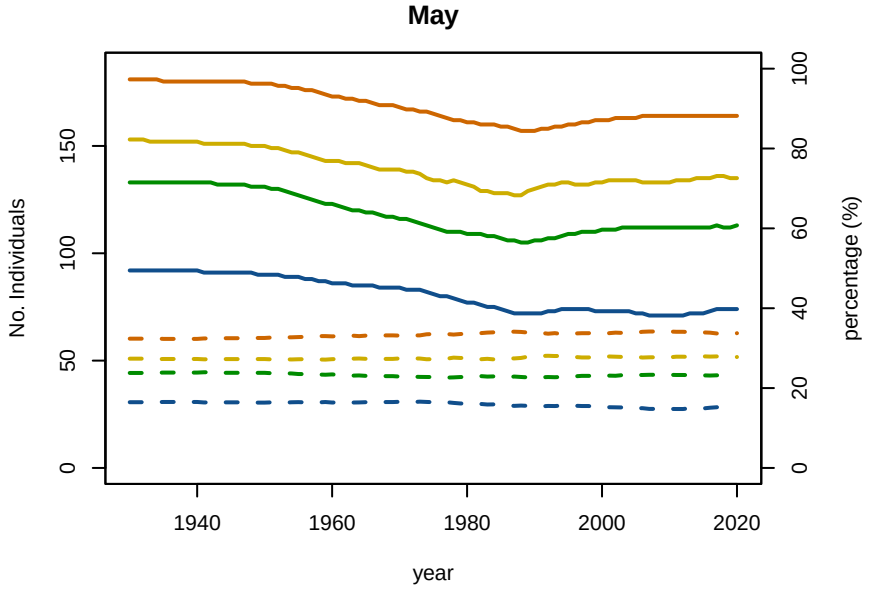
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 9N

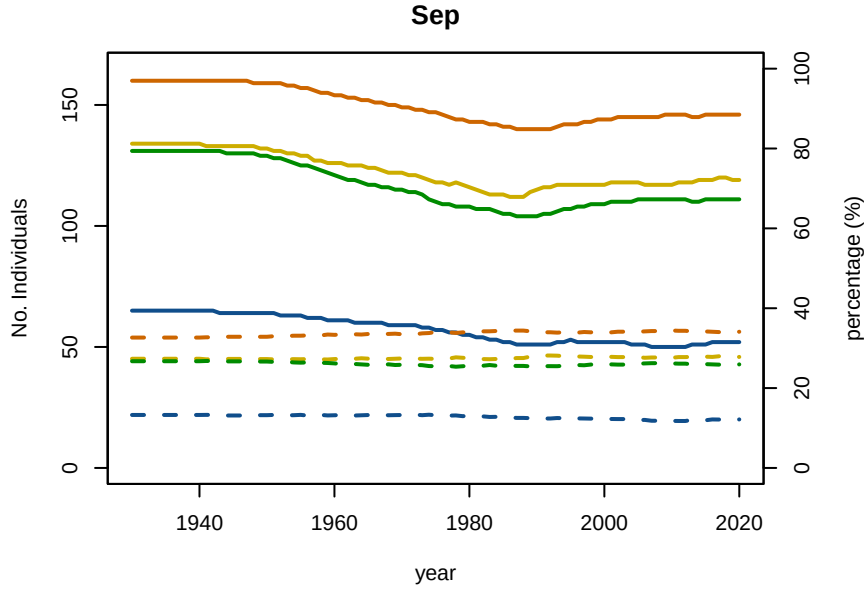


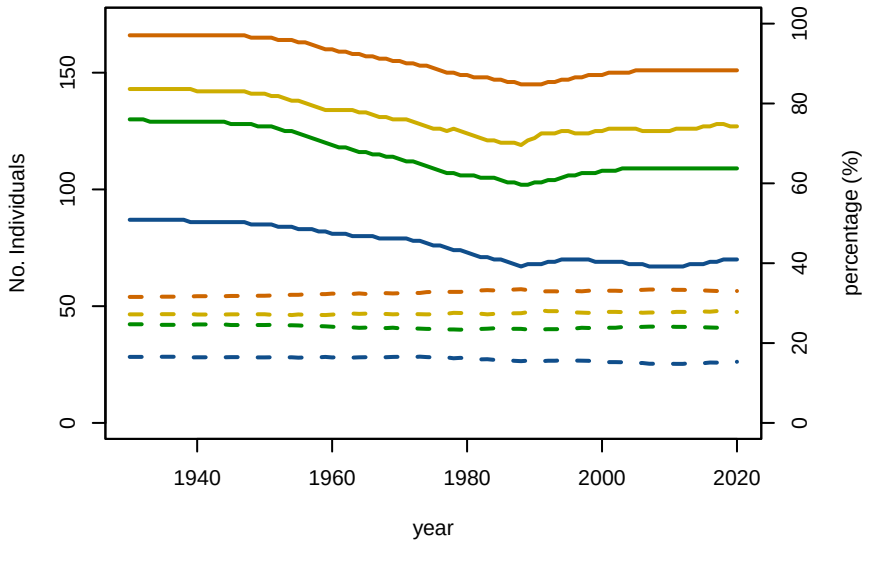


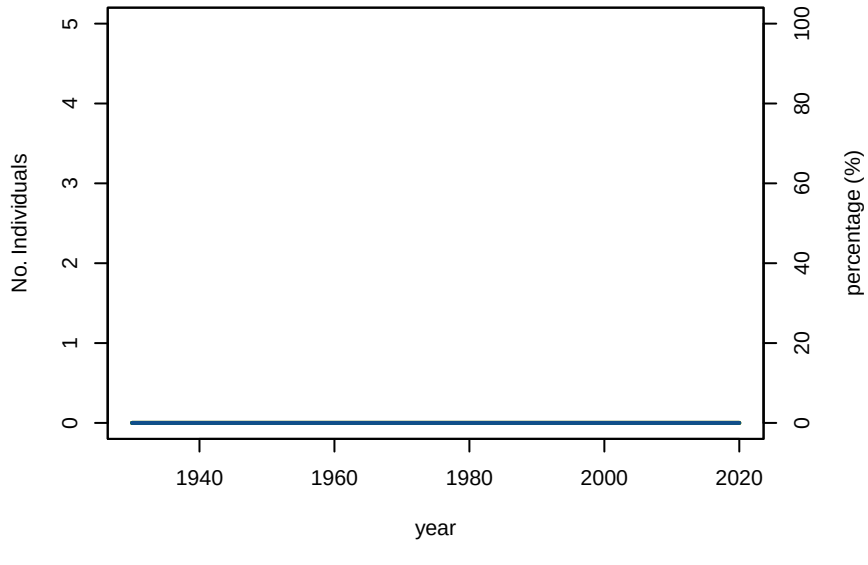






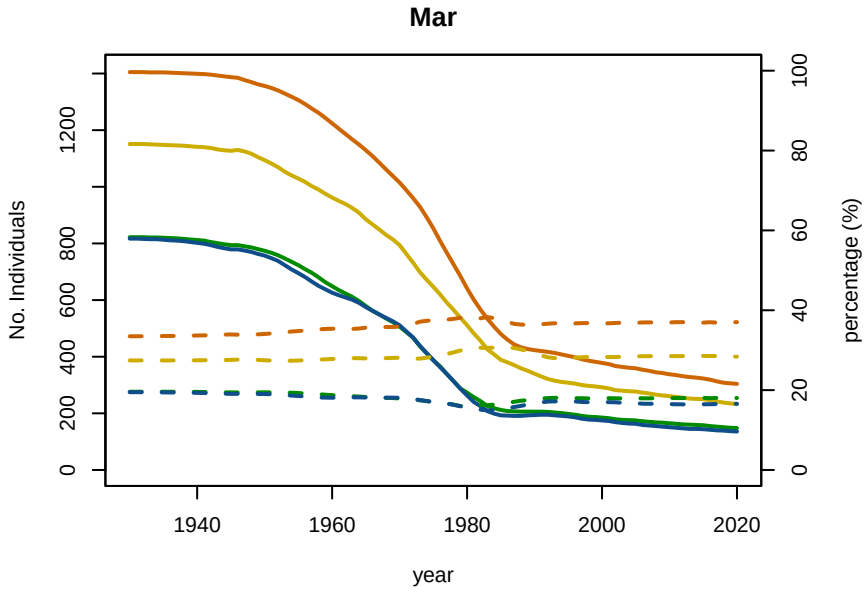


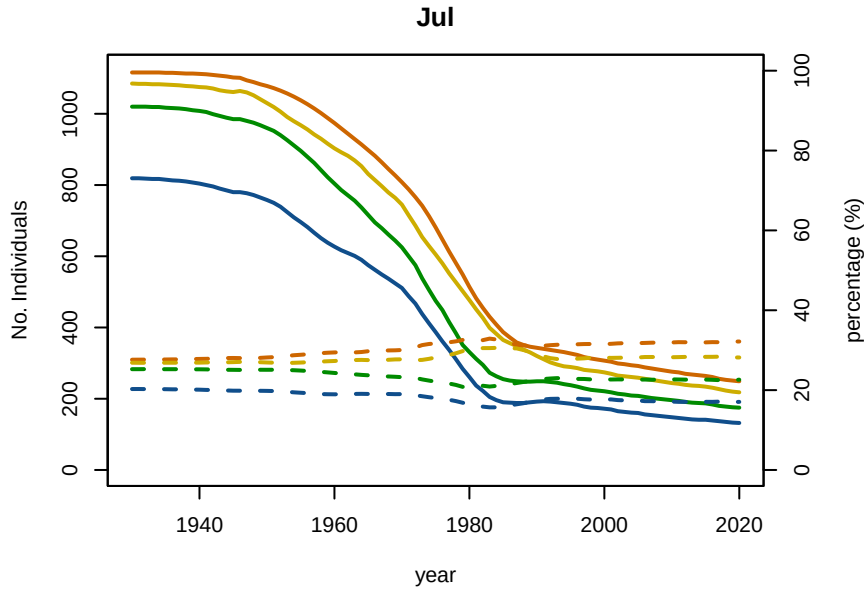


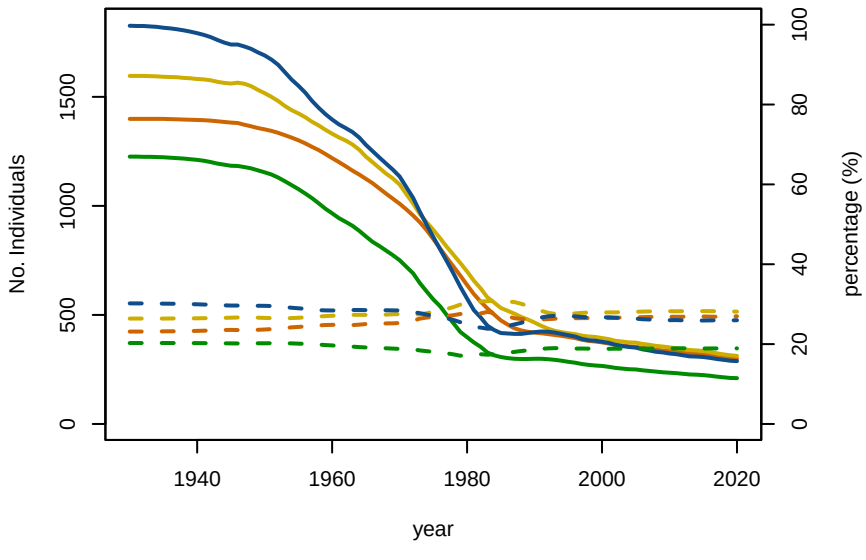


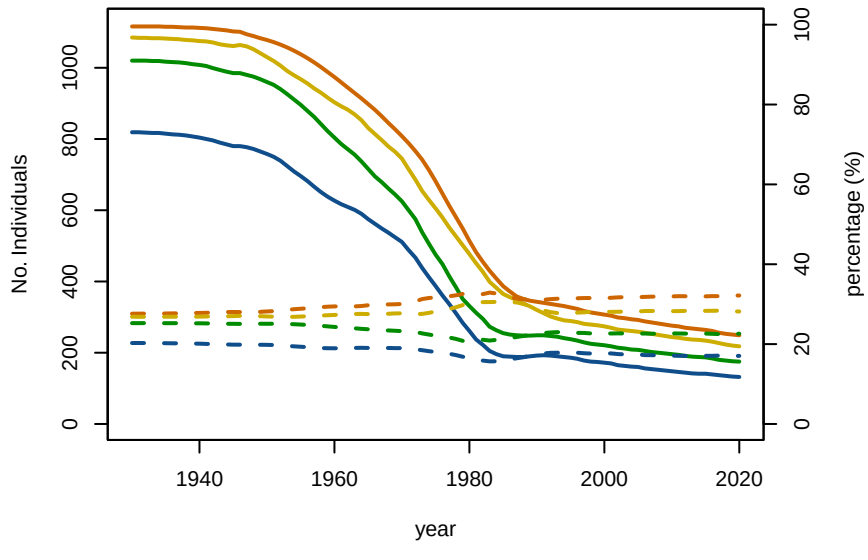
A1−4 A5−9 MatF MatM No Individuals percentage

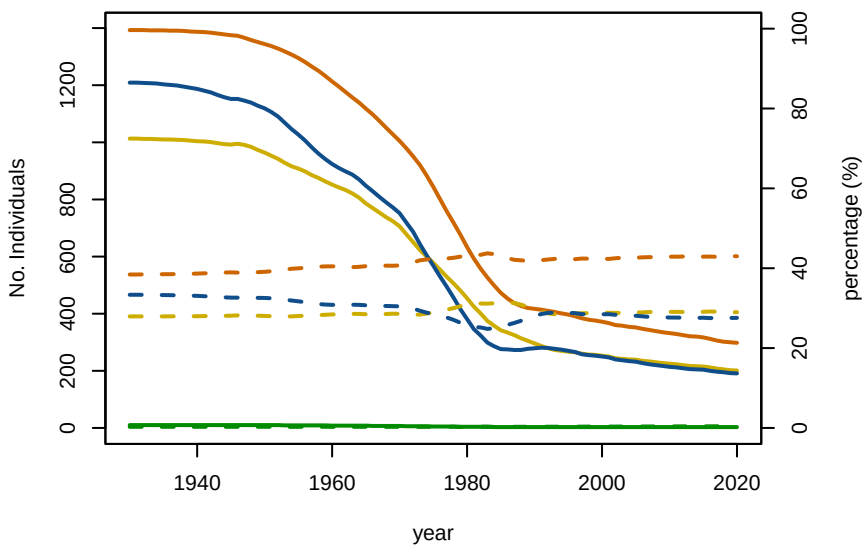
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 10E

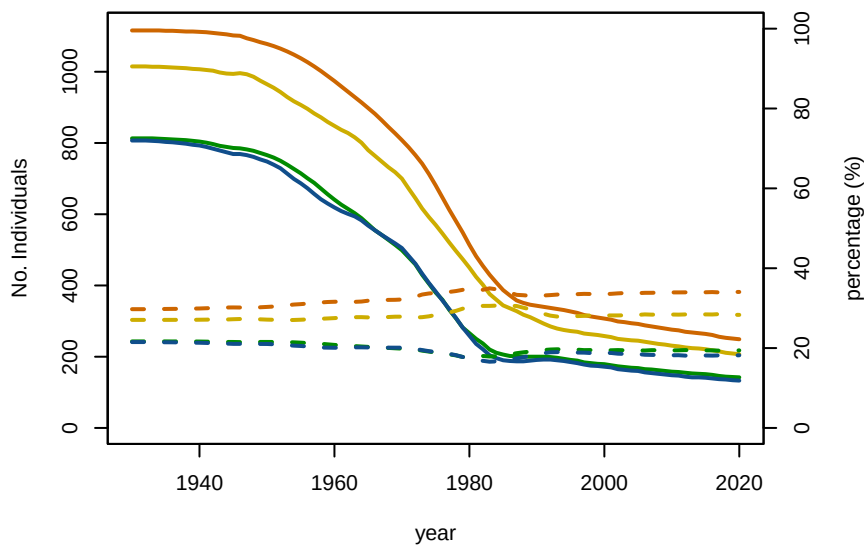


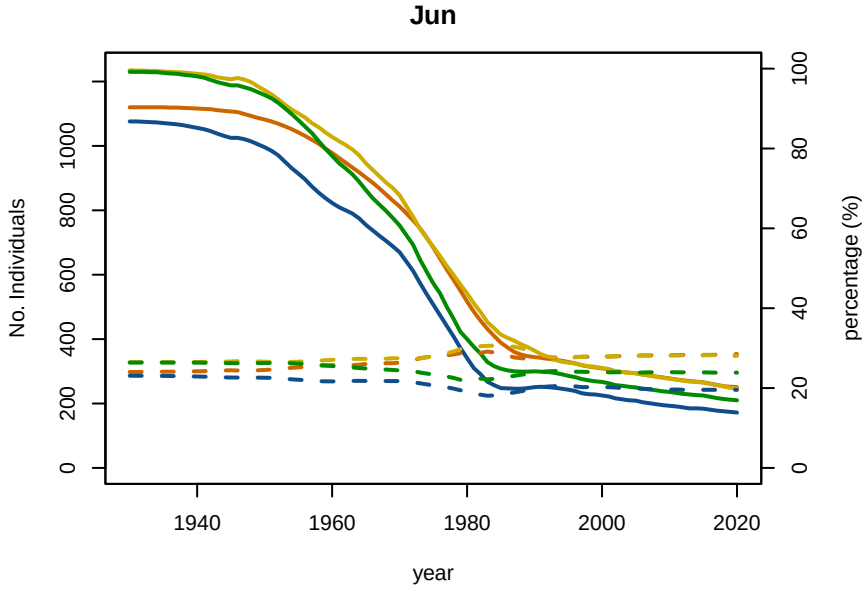


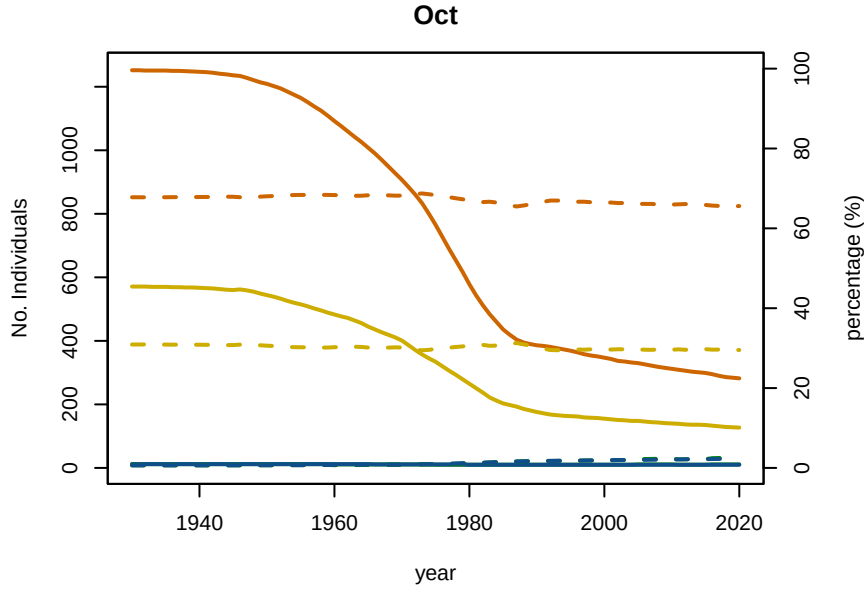






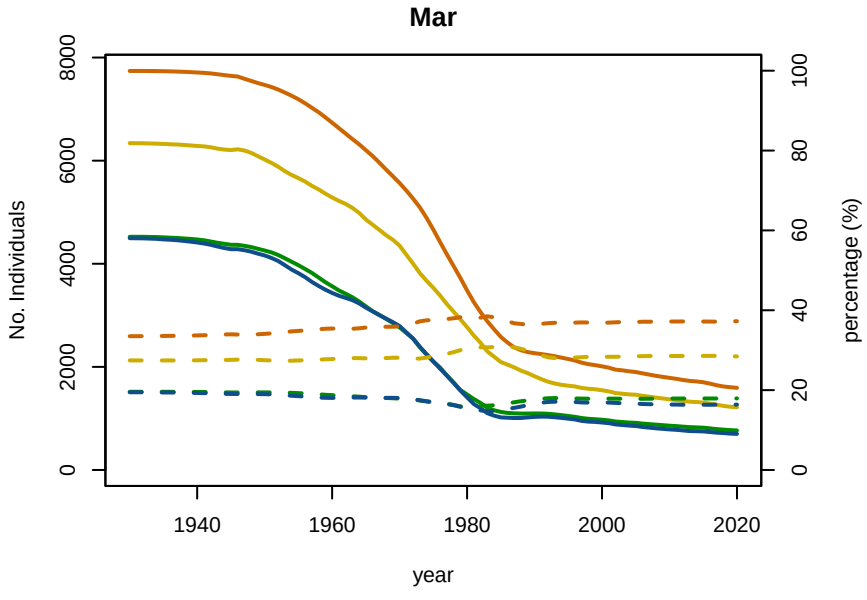


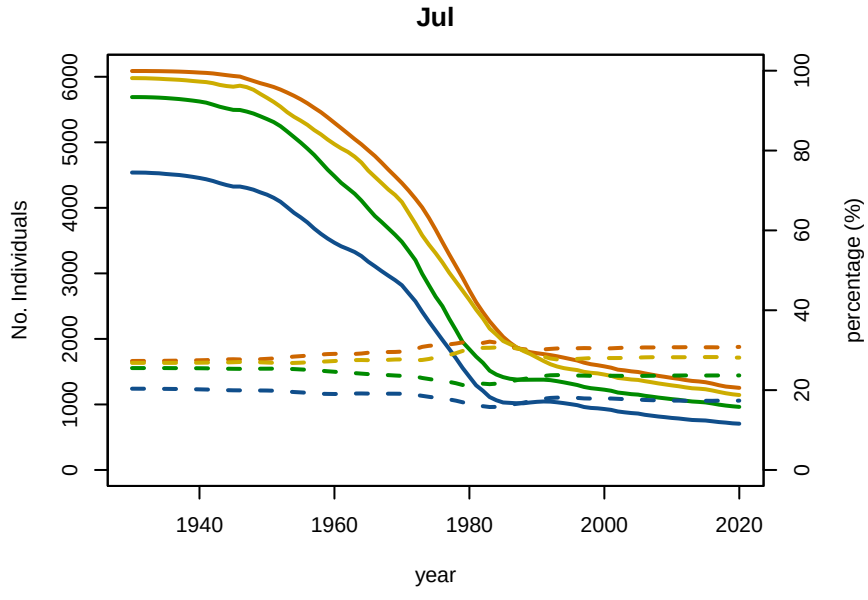


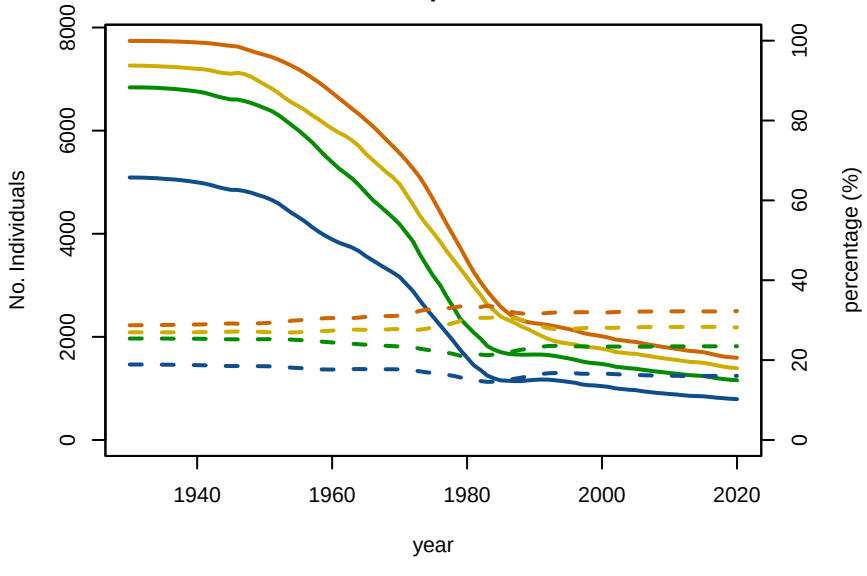


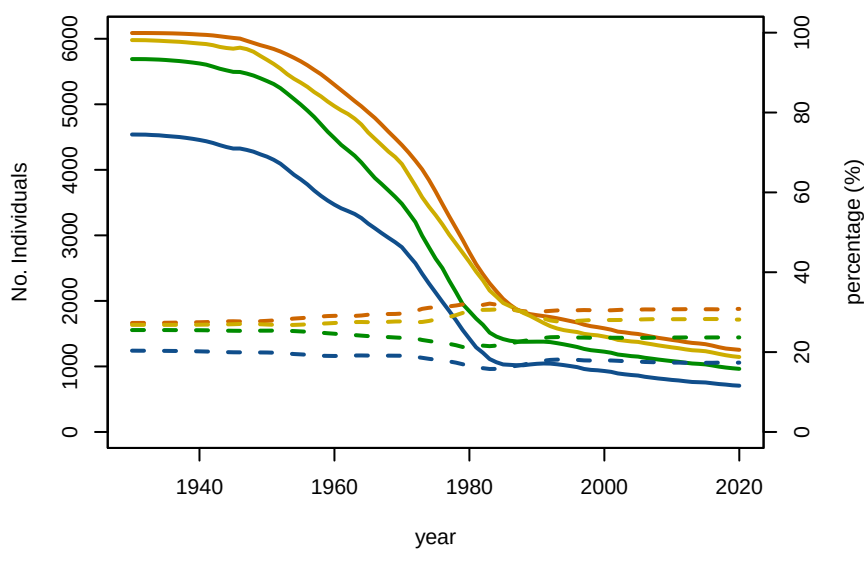
A1−4 A5−9 MatF MatM No Individuals percentage

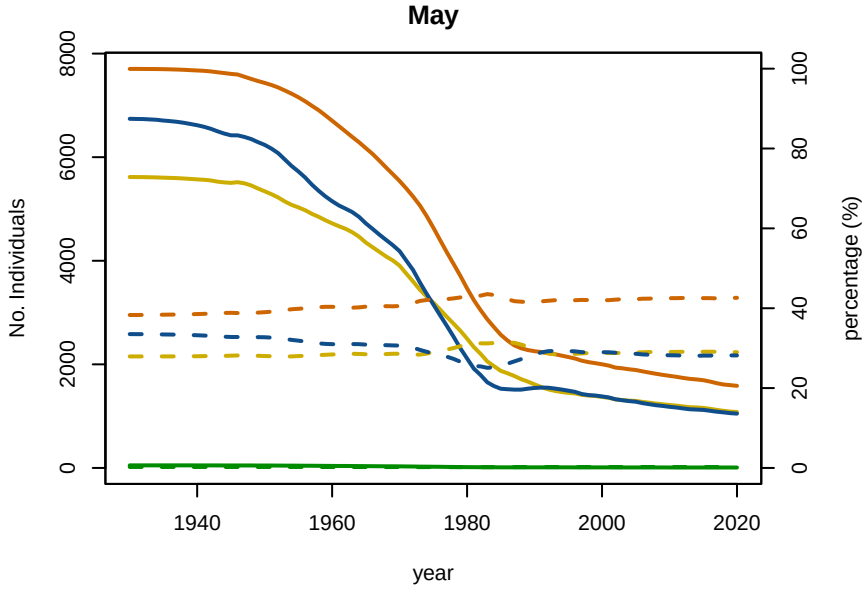
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 10W

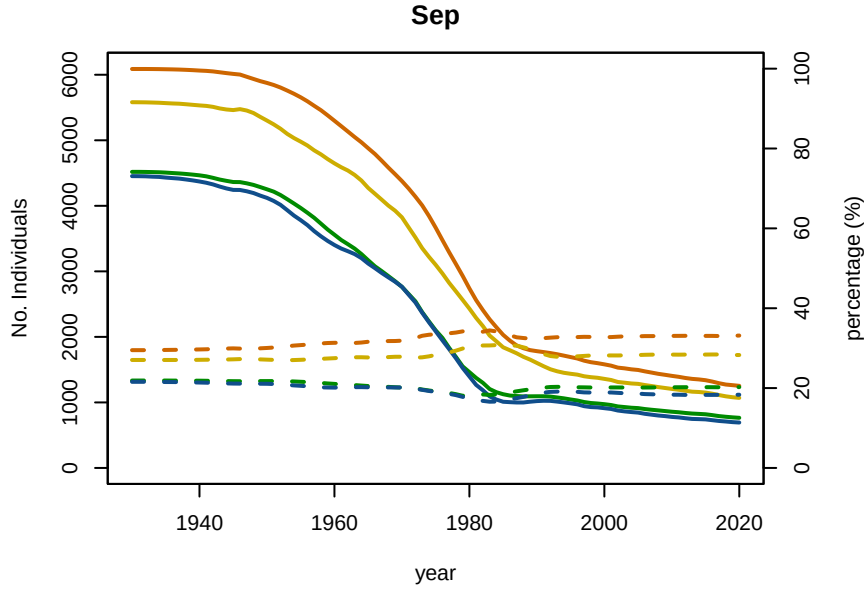


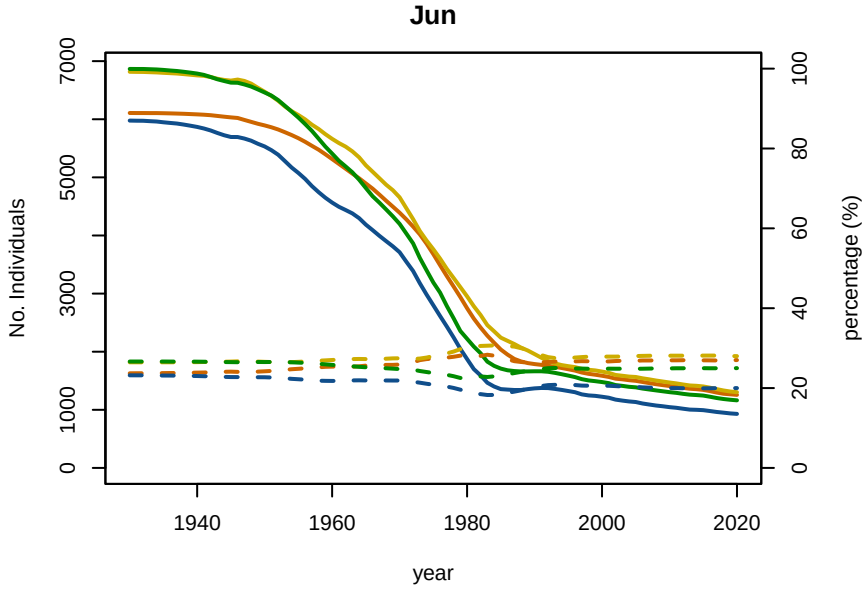


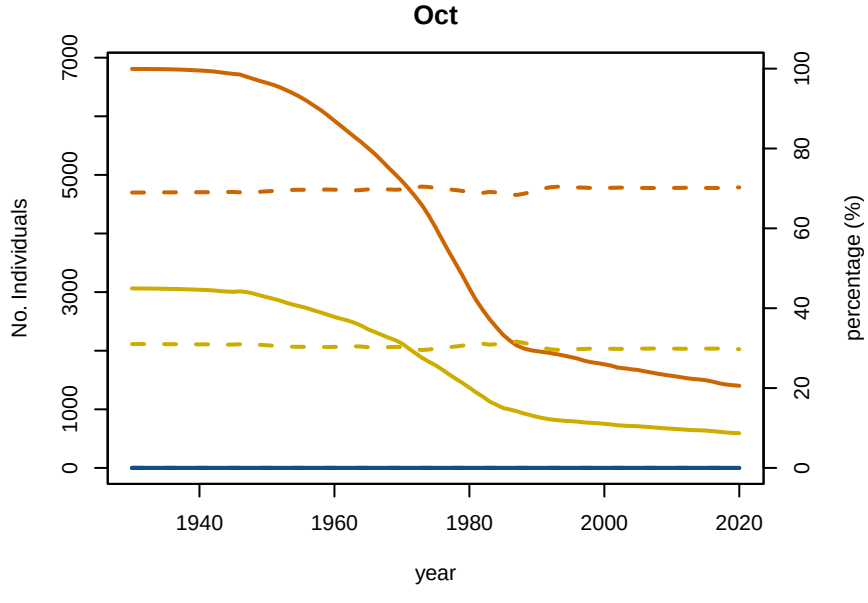






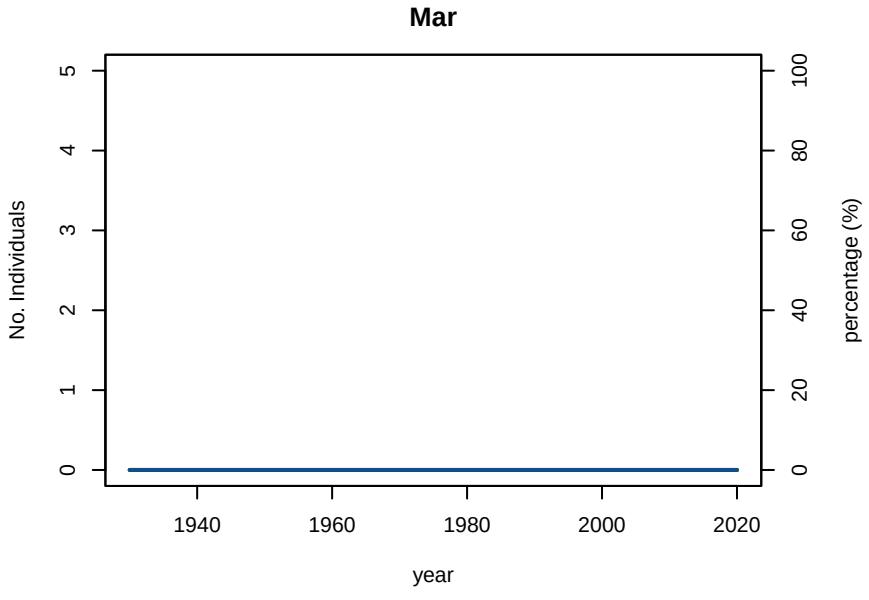


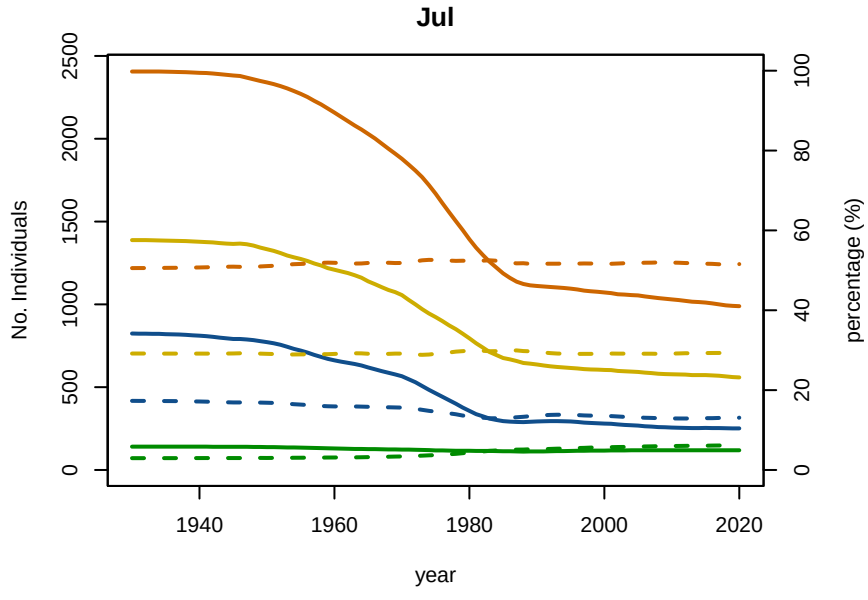


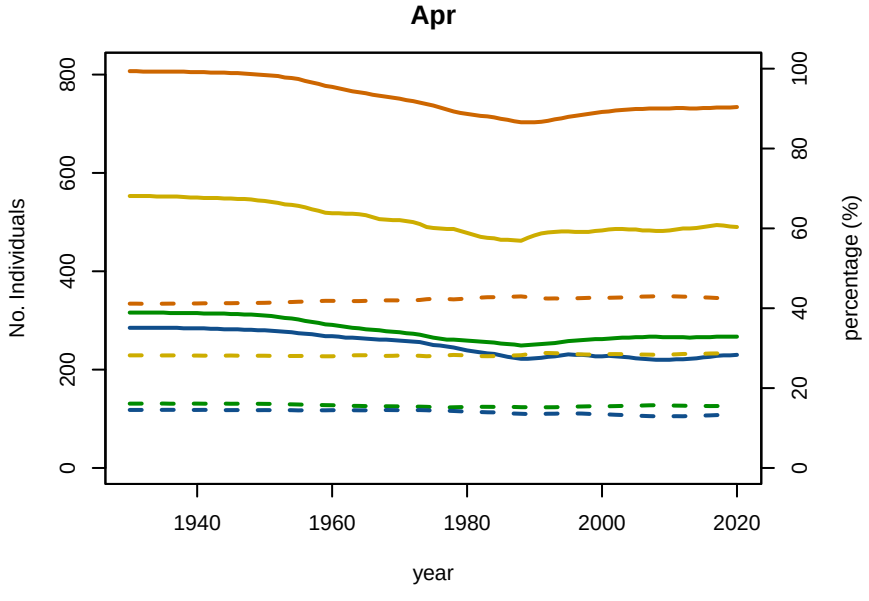


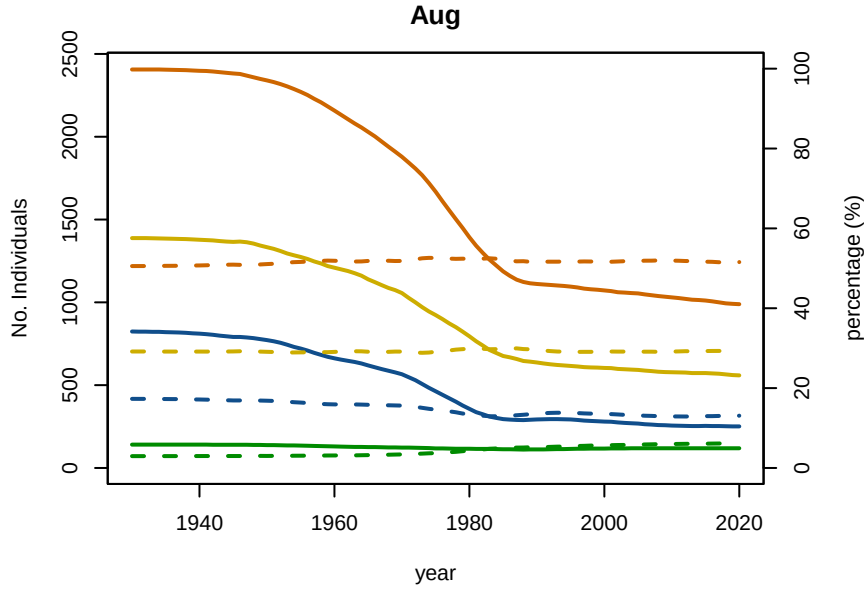
A1−4 A5−9 MatF MatM No Individuals percentage

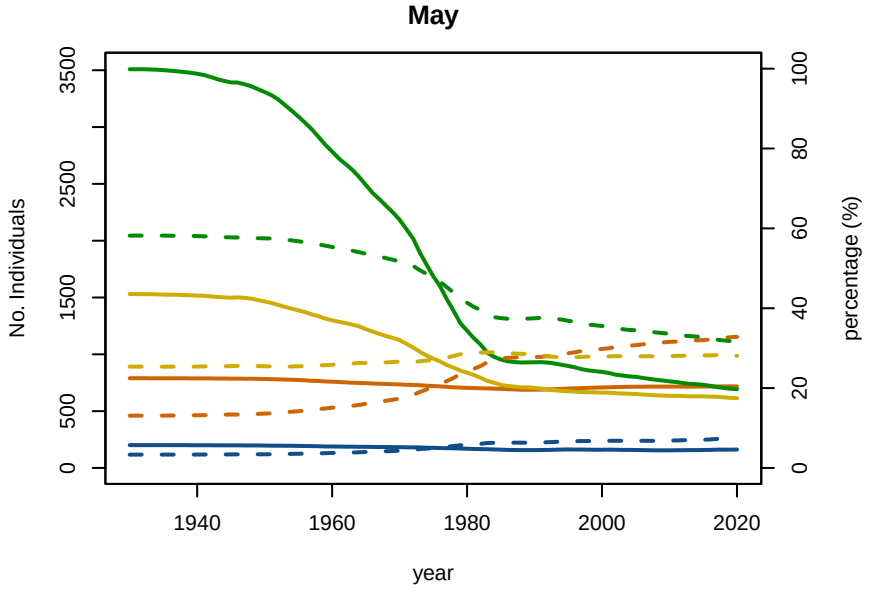
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 11

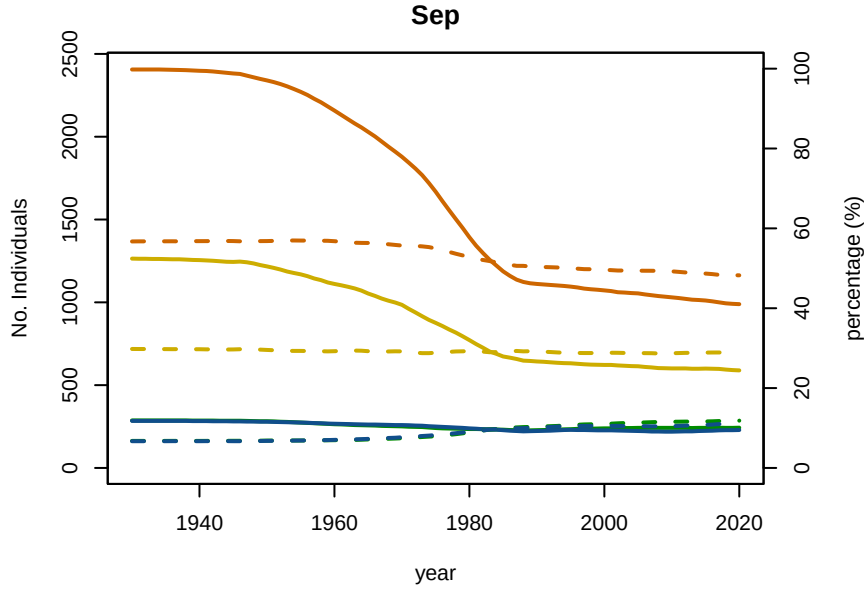


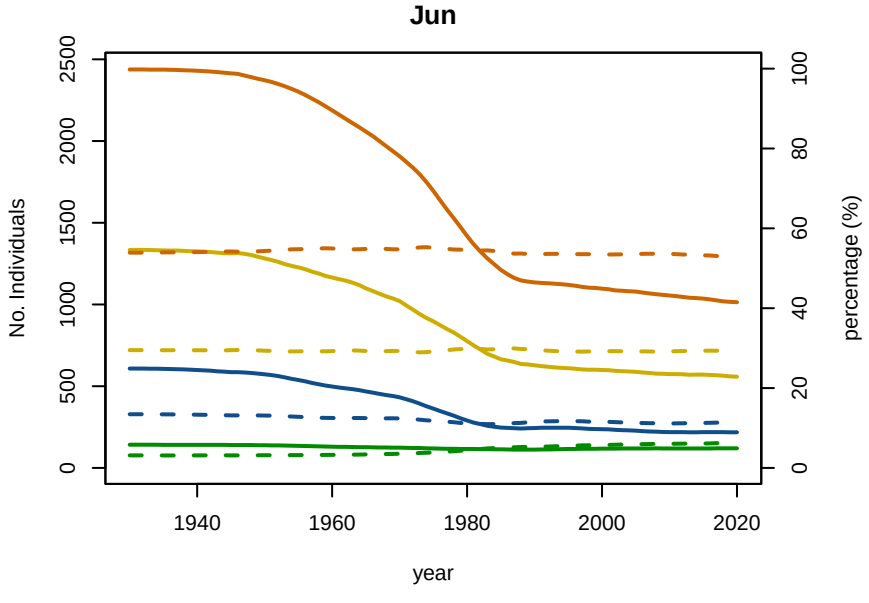


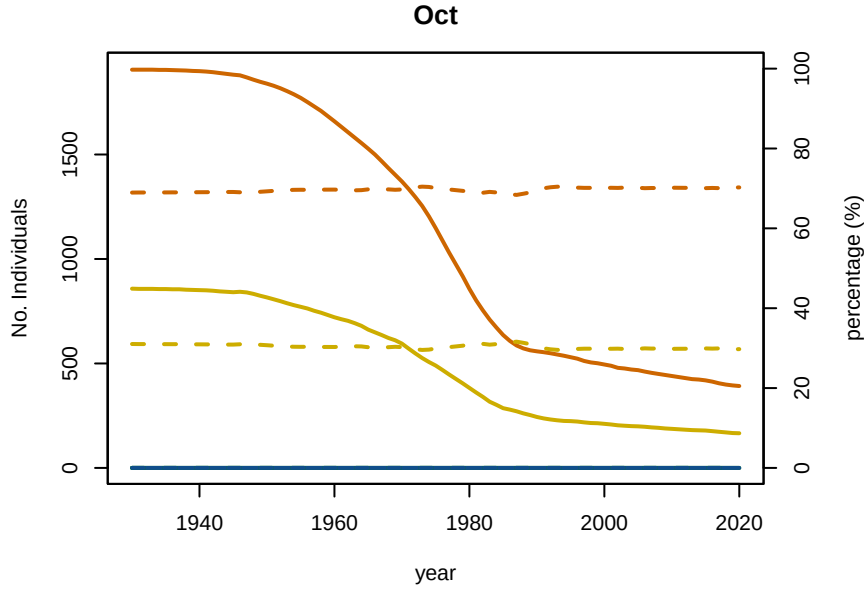






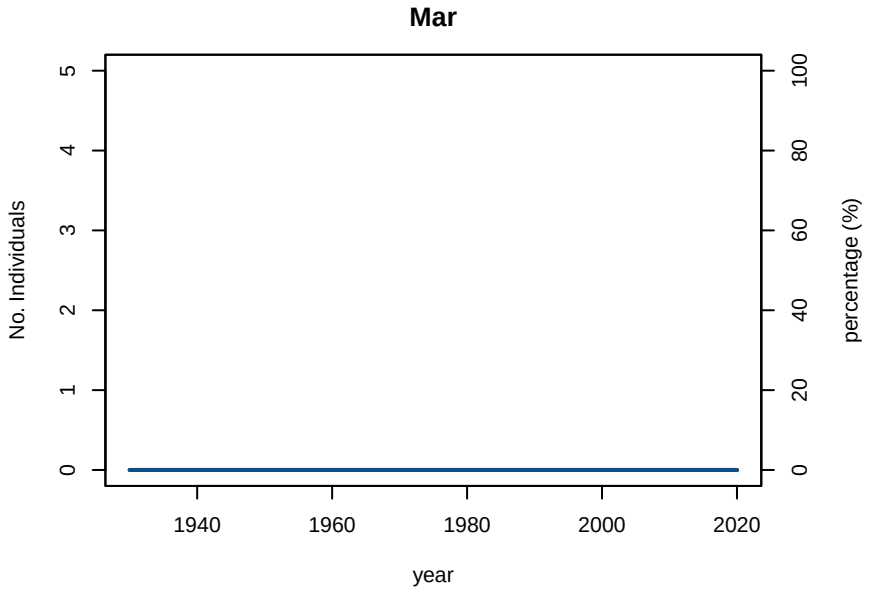


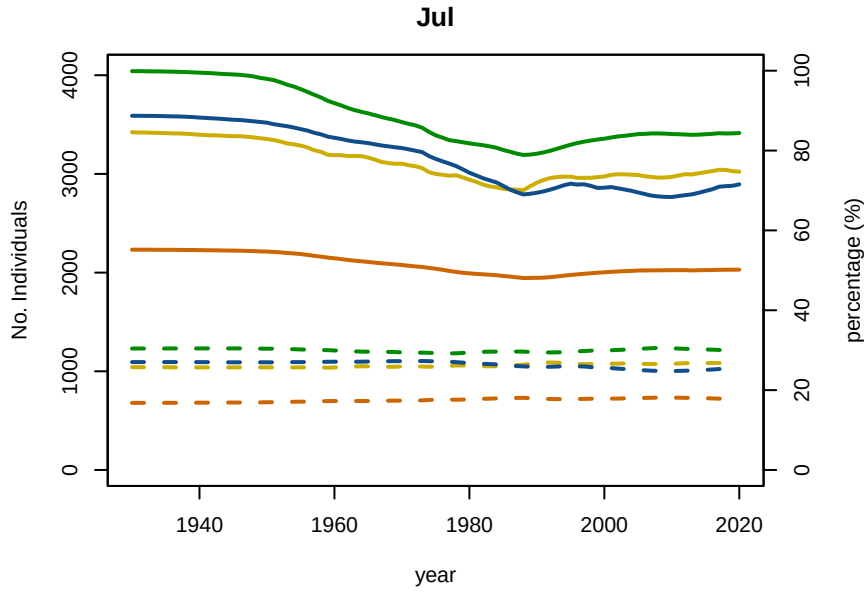


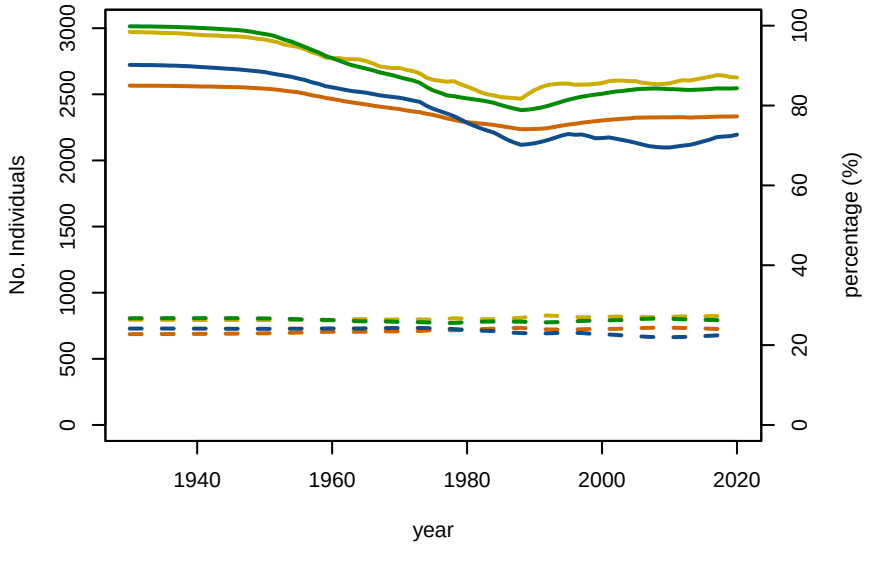


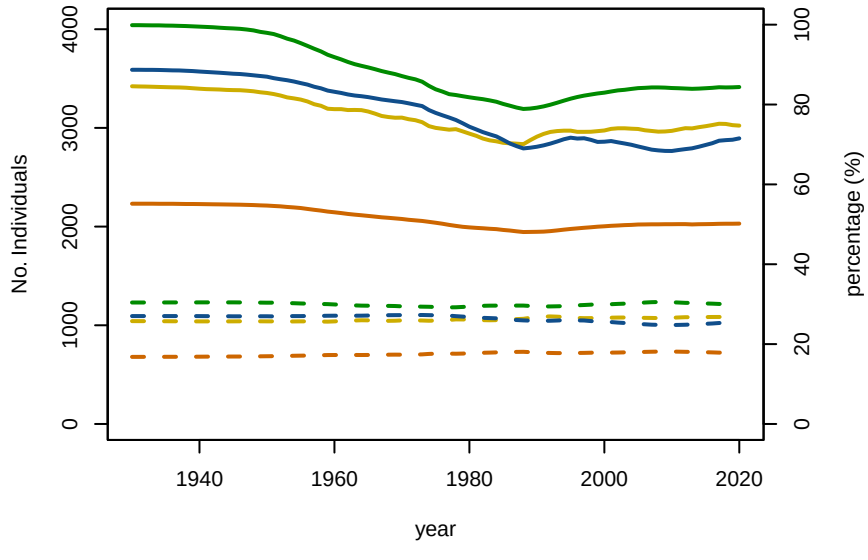
A1−4 A5−9 MatF MatM No Individuals percentage

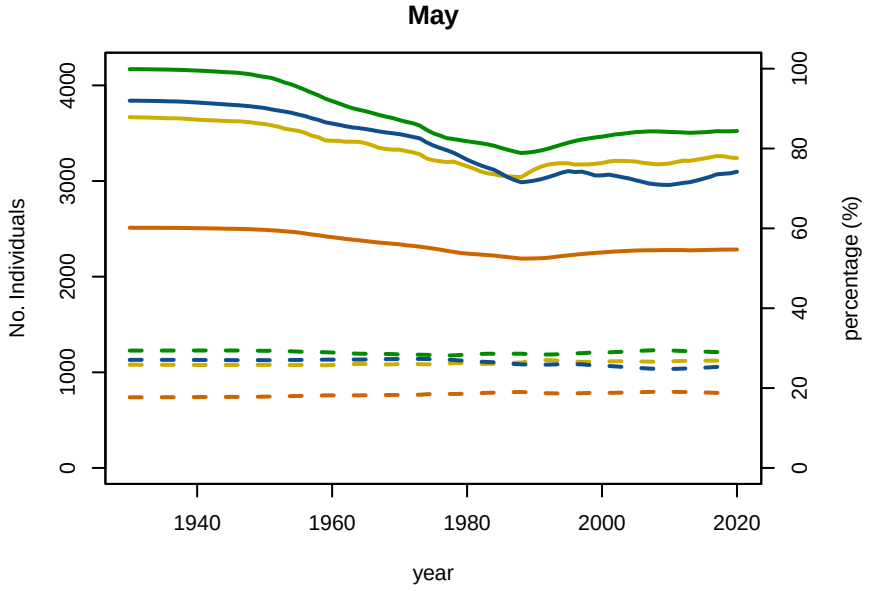
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 12N

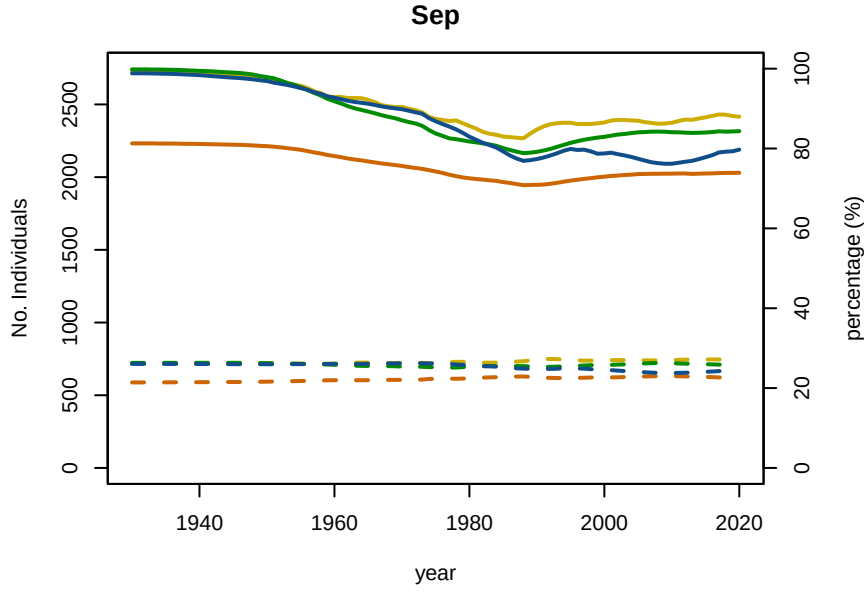


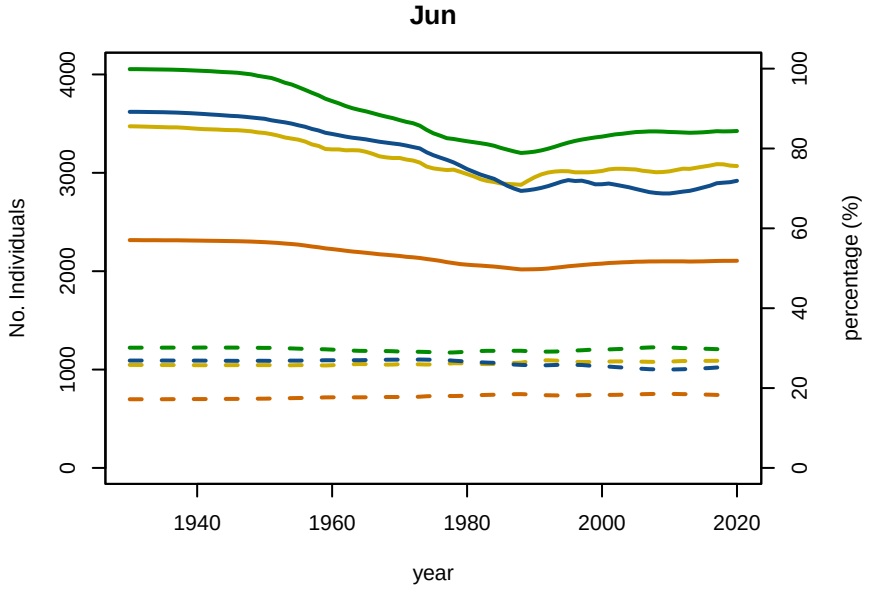


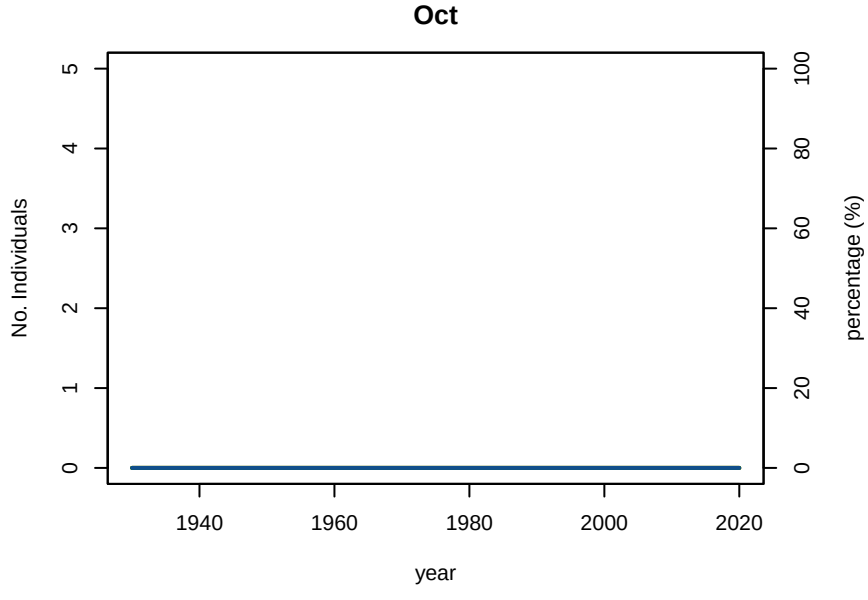






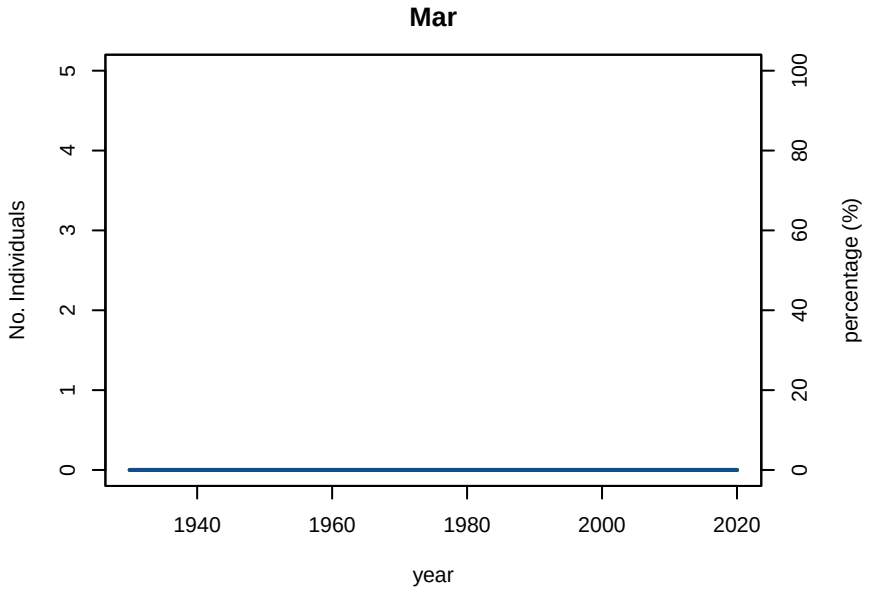


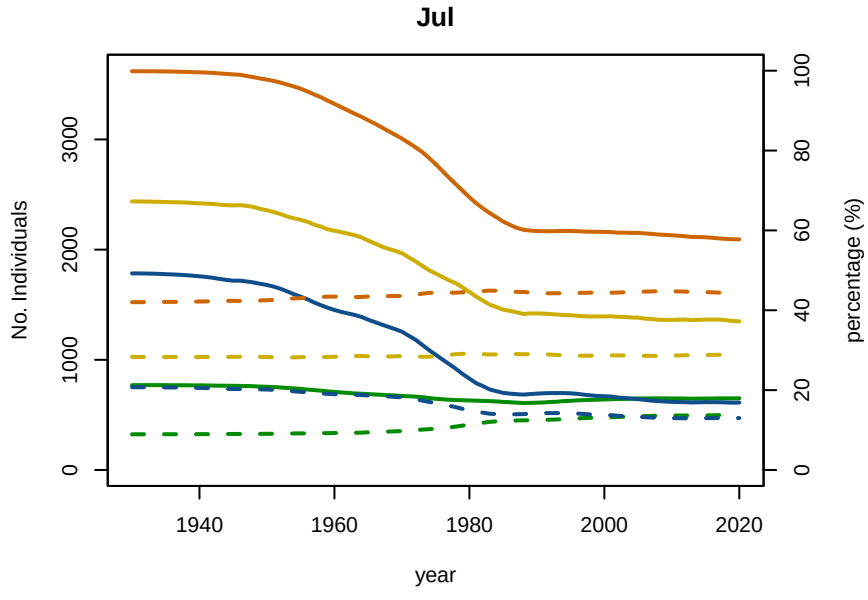


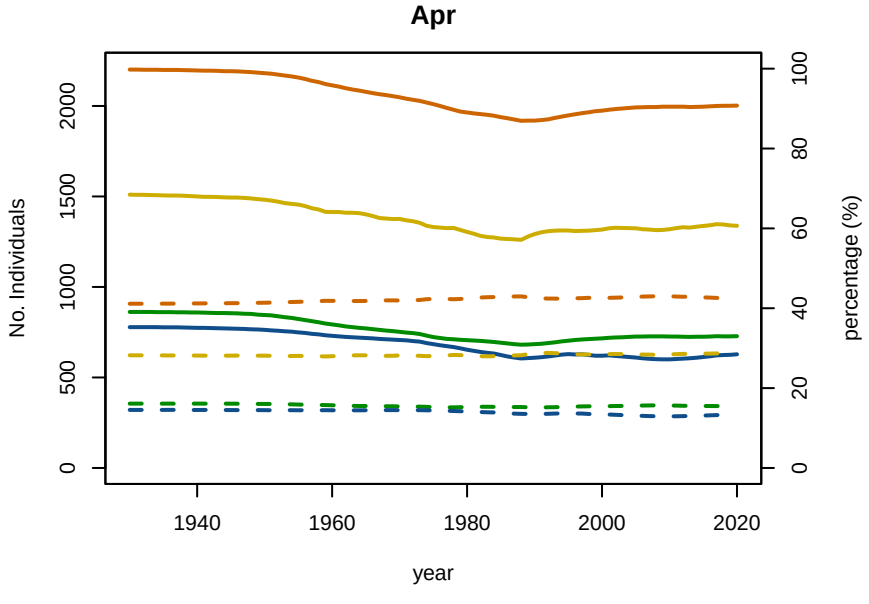


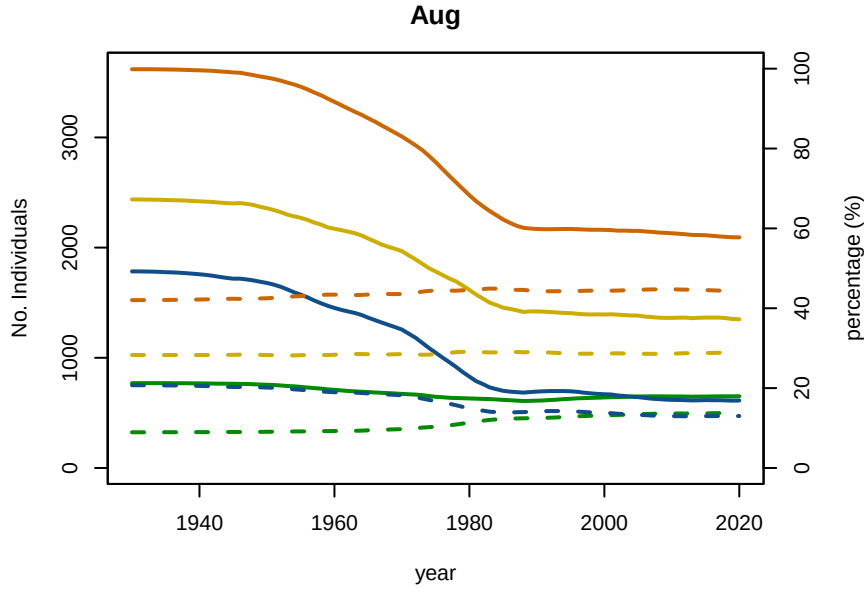
A1−4 A5−9 MatF MatM No Individuals percentage

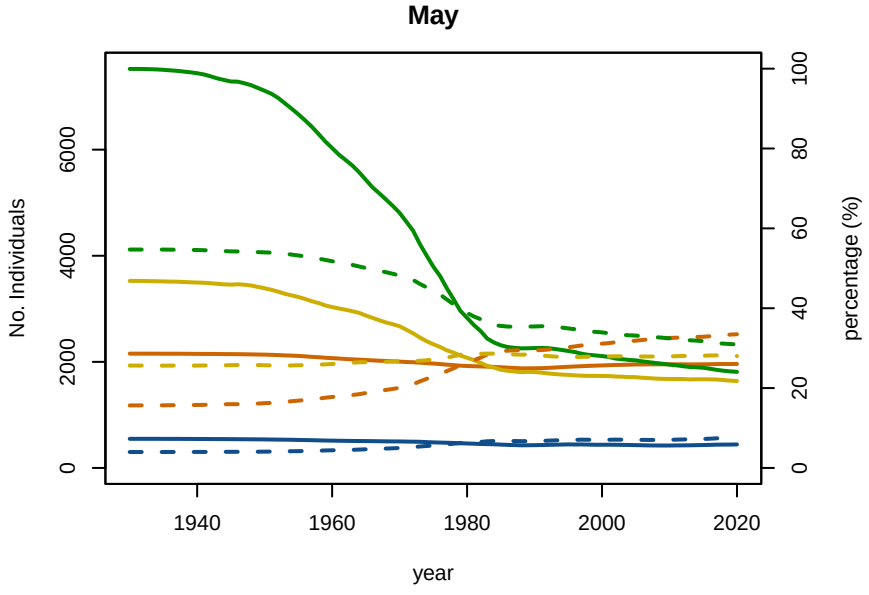
A01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 12S

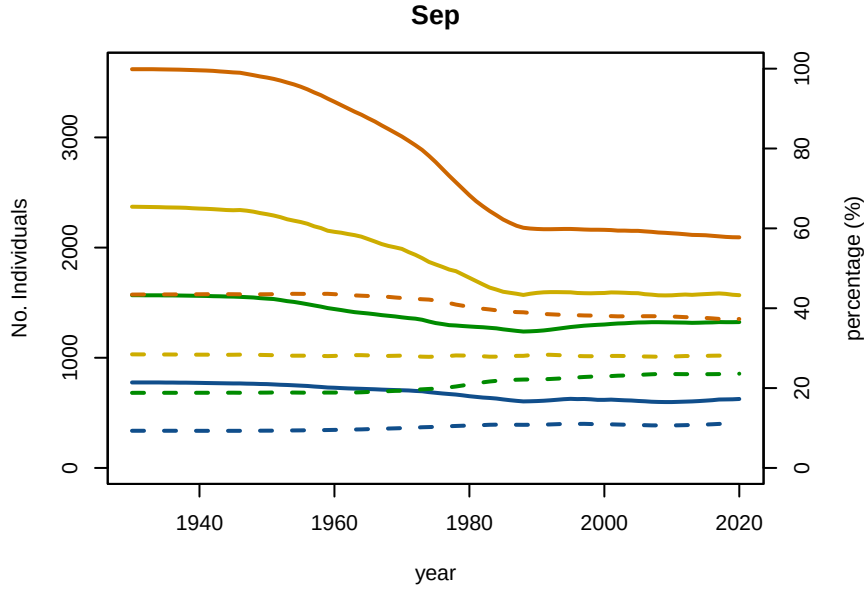


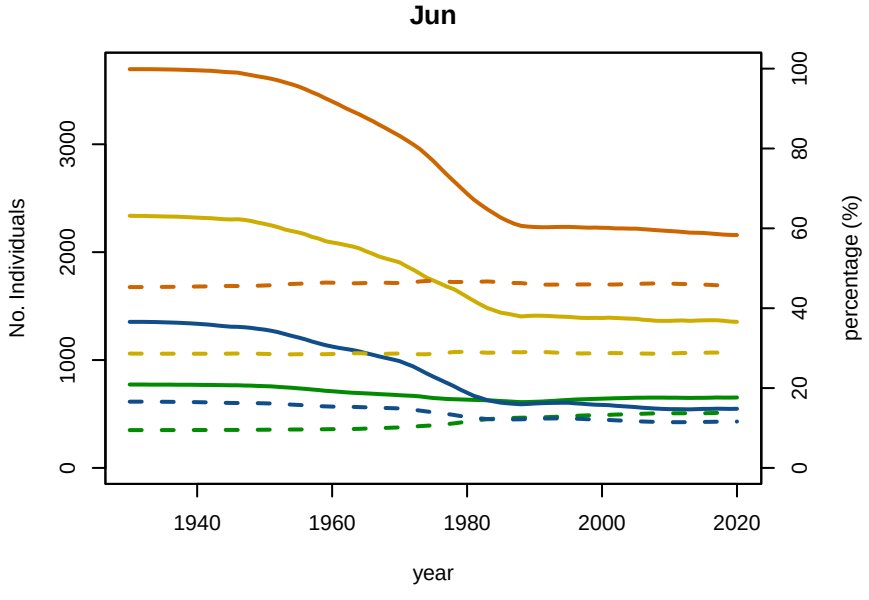


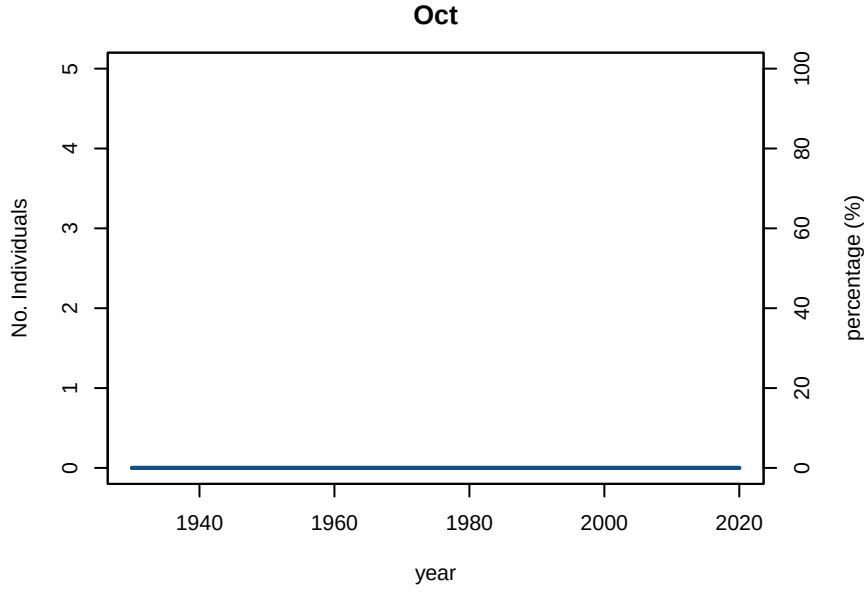




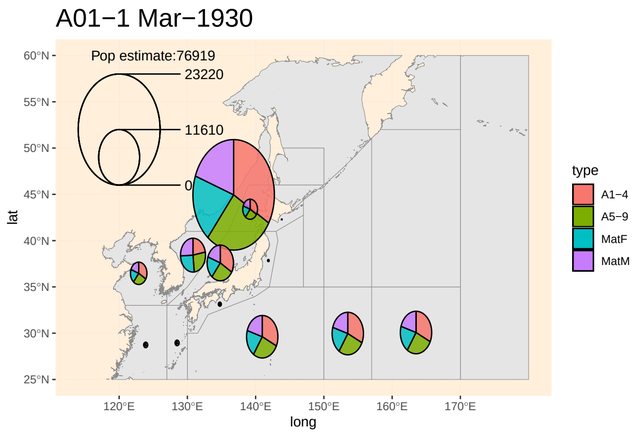


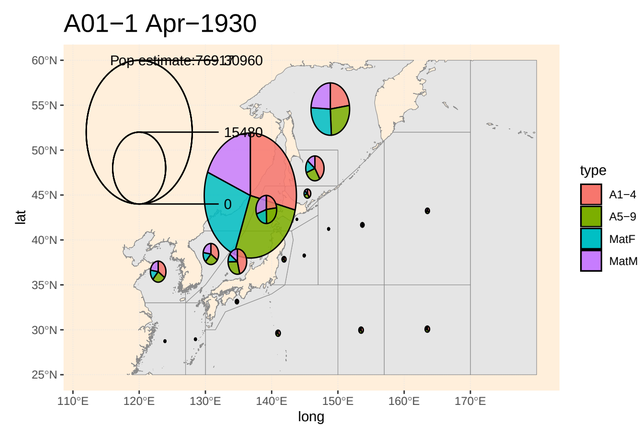


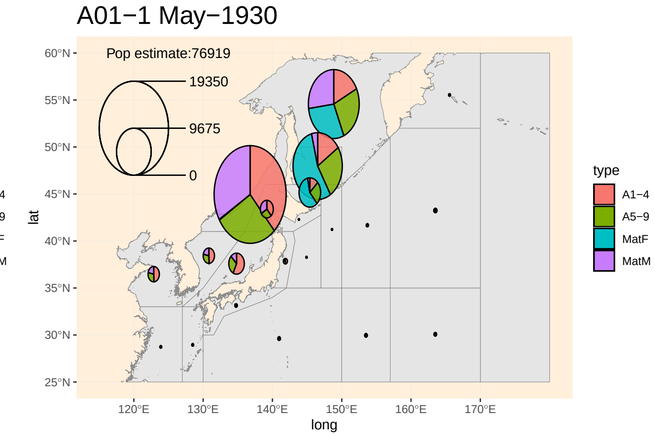


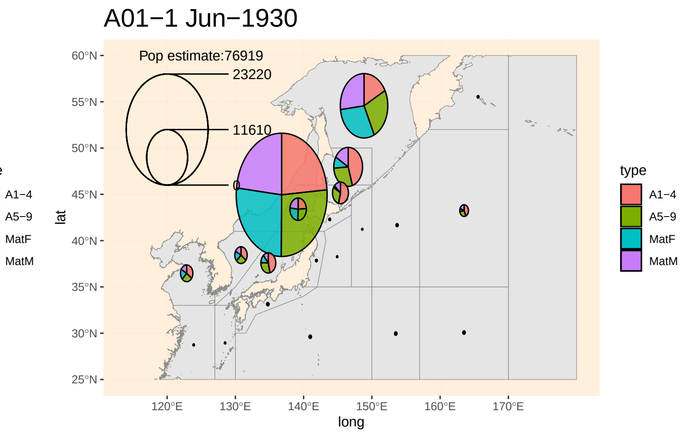


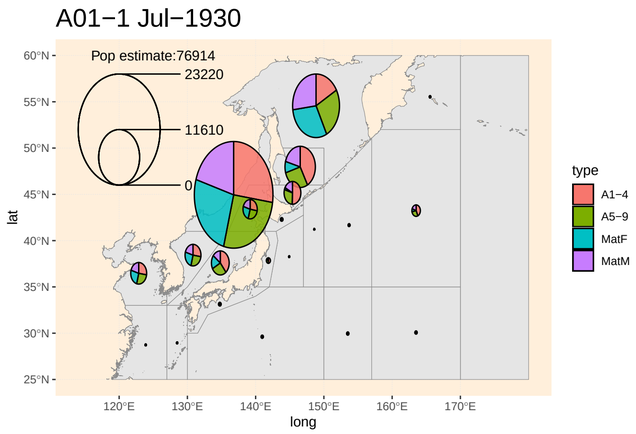
A1−4 A5−9 MatF MatM No Individuals percentage

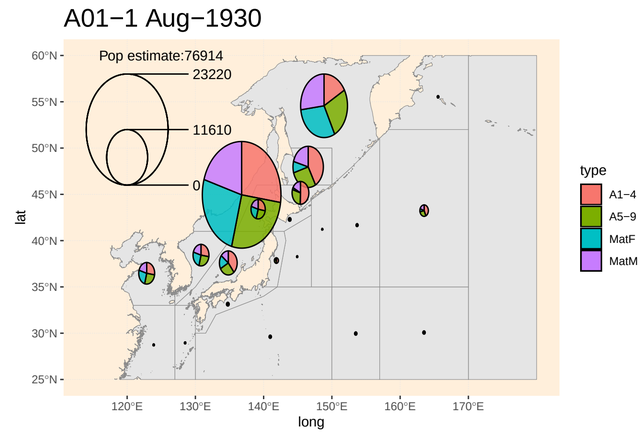

A01−1 Mar−1930
Pop estimate:76919
23220
11610
0
type
A1−4
A5−9
MatF
MatM
lat
long

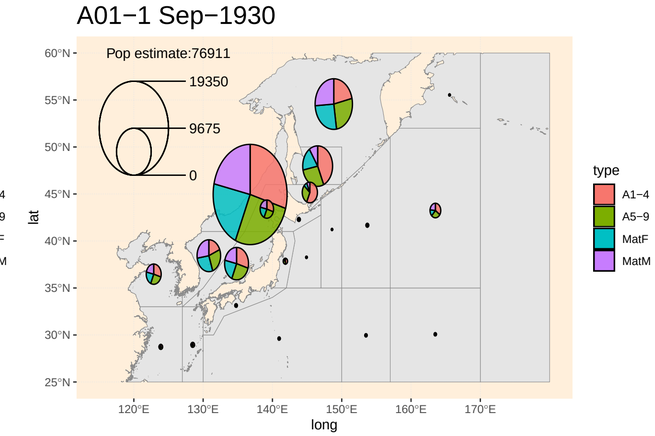

A01−1 Apr−1930
Pop estimate:76913
30960
15480
0
type
A1−4
A5−9
MatF
MatM
lat
long

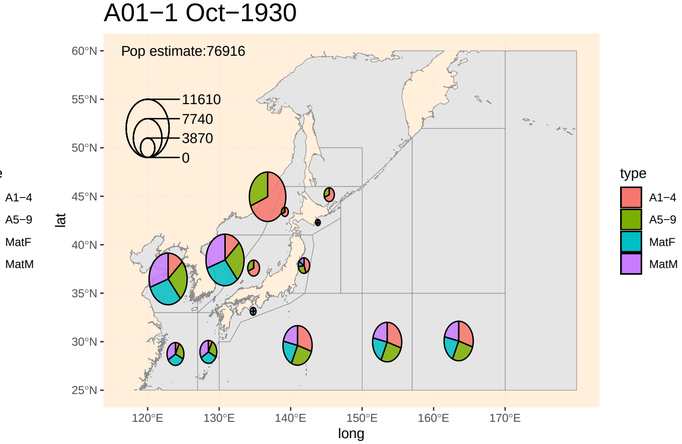

A01−1 May−1930
Pop estimate:76919
19350
9675
0
type
A1−4
A5−9
MatF
MatM
lat
long


A01−1 Jun−1930
Pop estimate:76919
23220
11610
0
type
A1−4
A5−9
MatF
MatM
lat
long

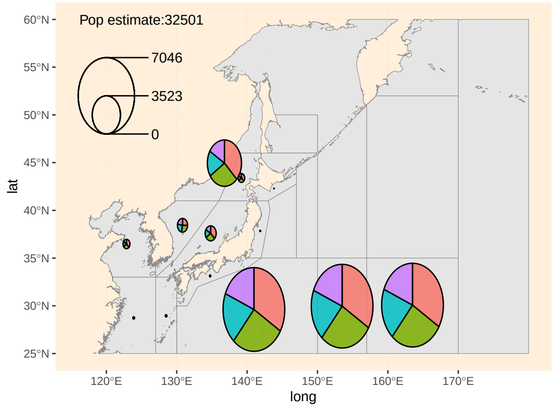

A01−1 Jul−1930
Pop estimate:76914
23220
11610
0
type
A1−4
A5−9
MatF
MatM
lat
long


A01−1 Aug−1930
Pop estimate:76914
23220
11610
0
type
A1−4
A5−9
MatF
MatM
lat
long

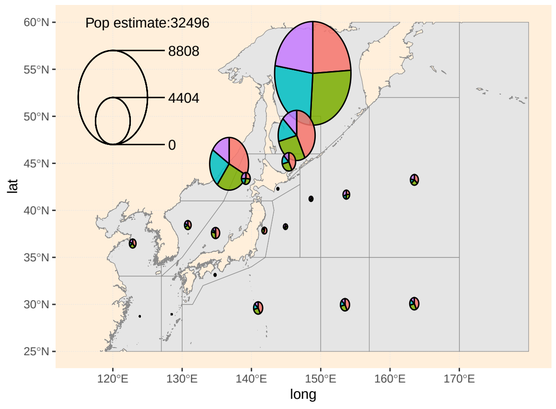

A01−1 Sep−1930
Pop estimate:76911
19350
9675
0
type
A1−4
A5−9
MatF
MatM
lat
long


A01−1 Oct−1930
Pop estimate:76916
11610
7740
3870
0
type
A1−4
A5−9
MatF
MatM
lat
long

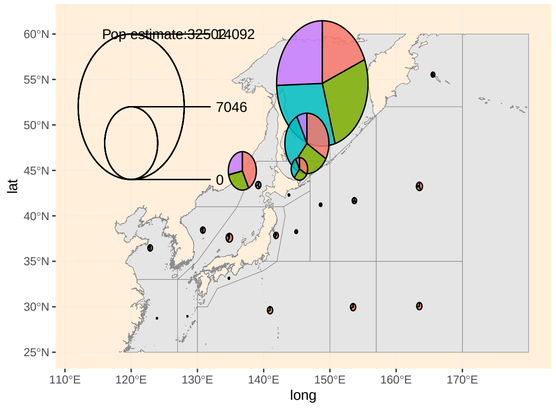
A01−1 Mar−2020



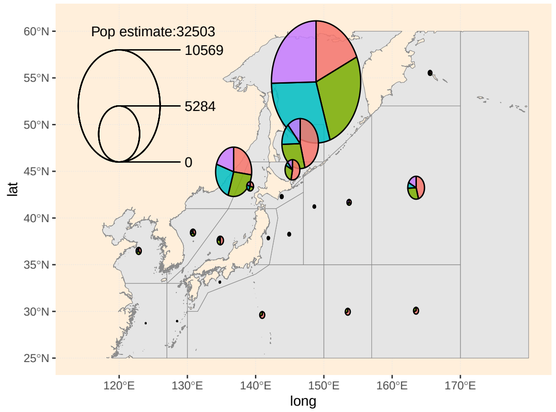
A01−1 Apr−2020



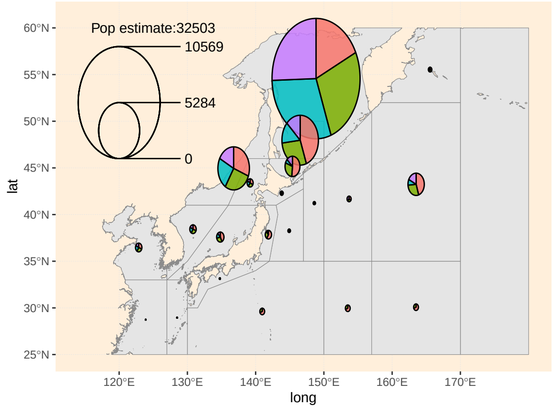
A01−1 May−2020



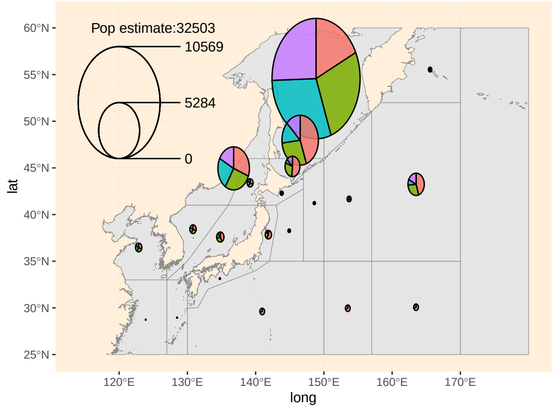
A01−1 Jun−2020



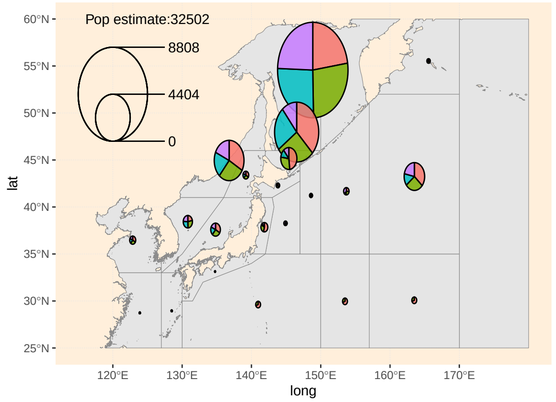
A01−1 Jul−2020



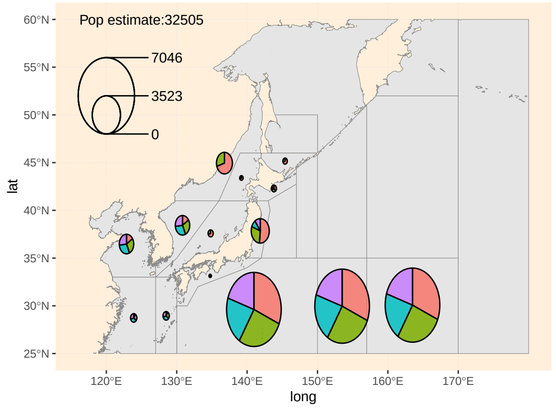
A01−1 Aug−2020



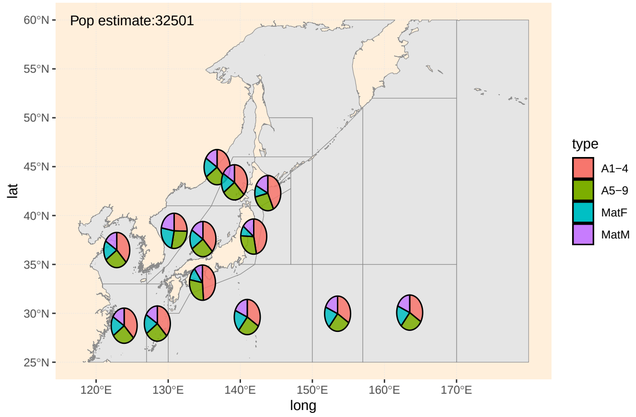
A01−1 Sep−2020



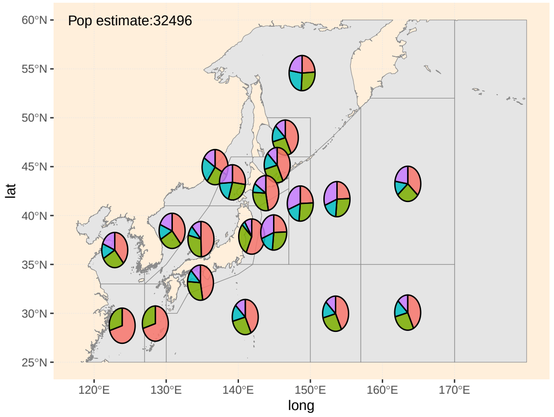
A01−1 Oct−2020



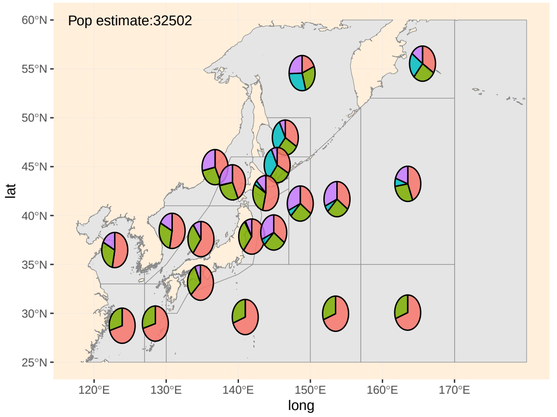
A01−1 Mar−2020



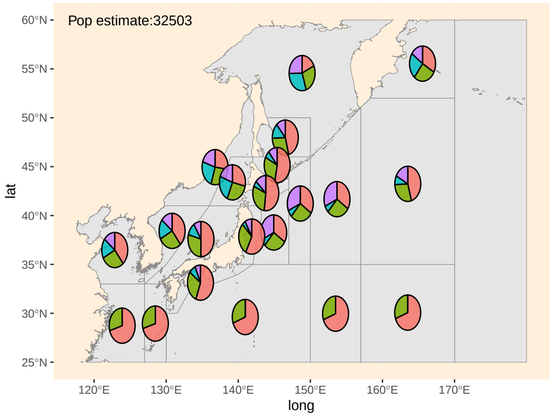
A01−1 Apr−2020



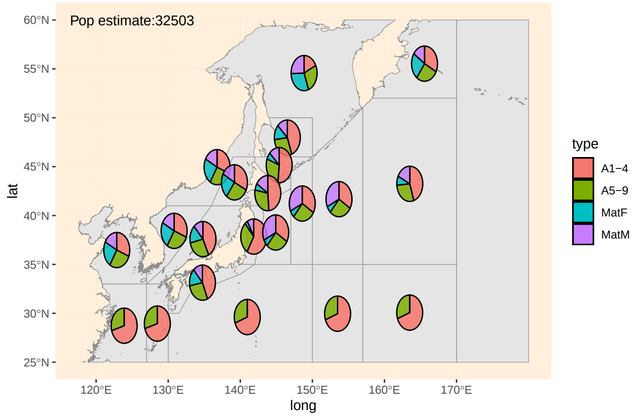
A01−1 May−2020



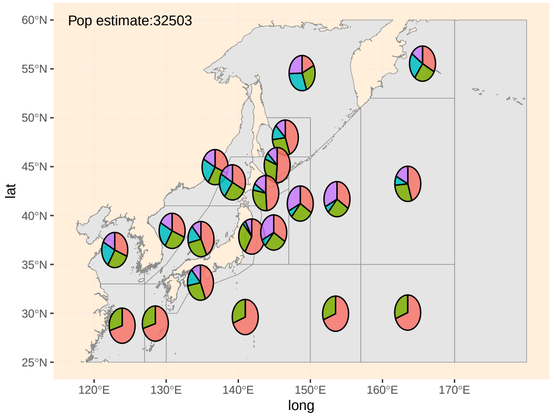
A01−1 Jun−2020



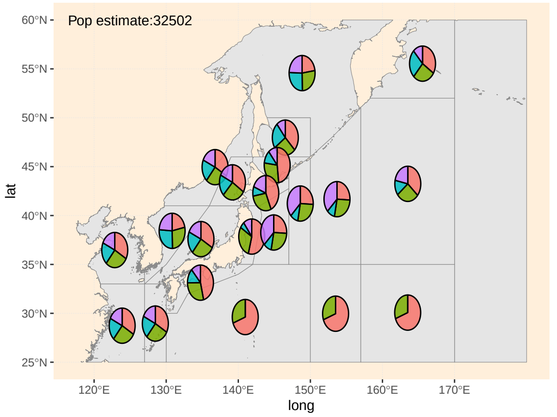
A01−1 Jul−2020



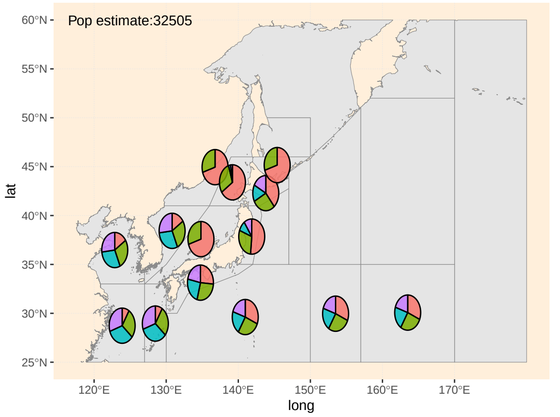
A01−1 Aug−2020



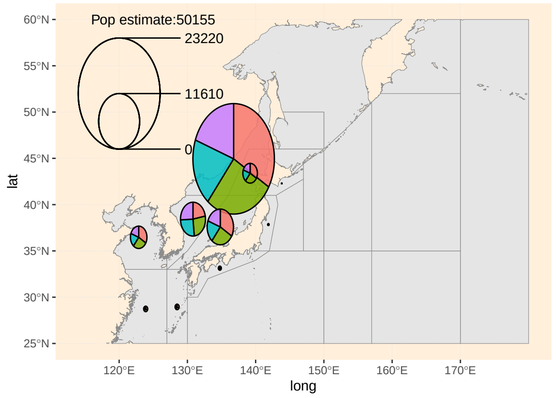
A01−1 Sep−2020



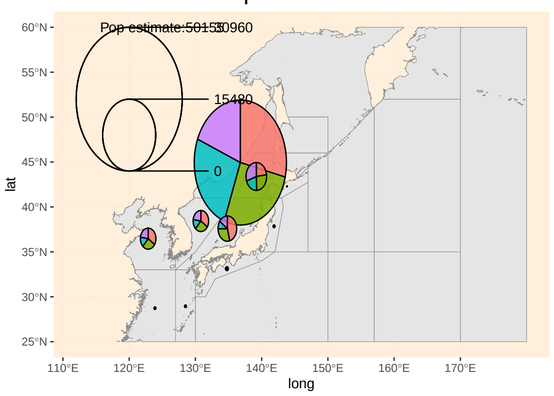
A01−1 Oct−2020



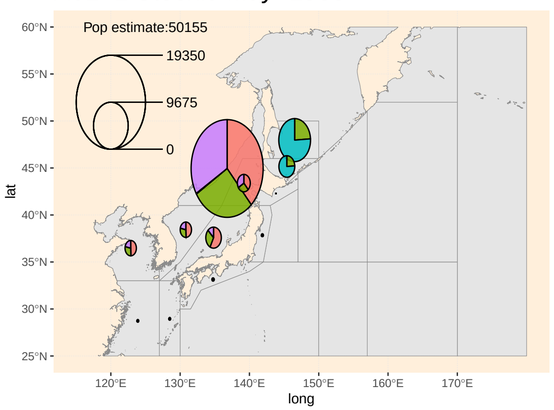
A01−1 Stock:J Mar−1930



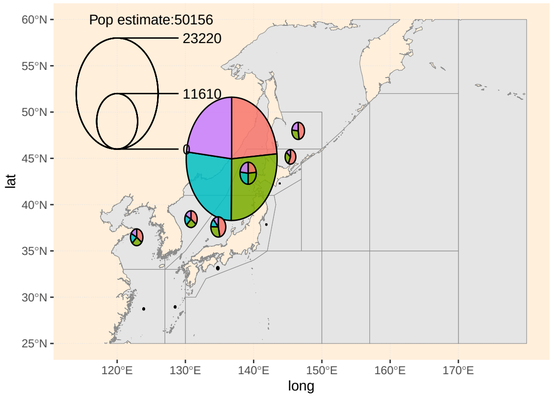
A01−1 Stock:J Apr−1930



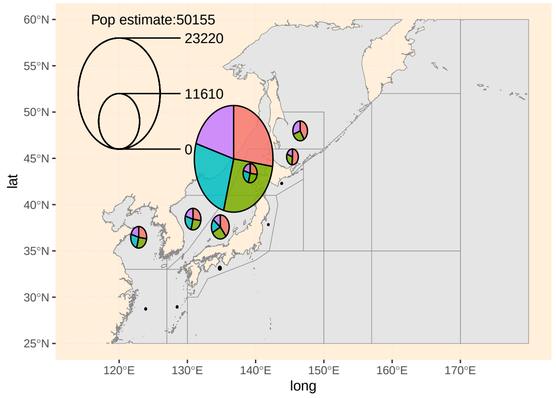
A01−1 Stock:J May−1930



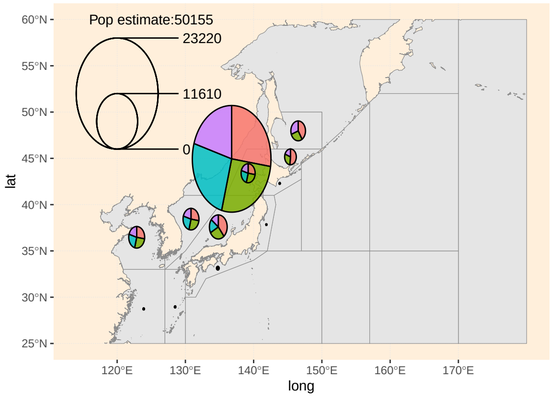
A01−1 Stock:J Jun−1930



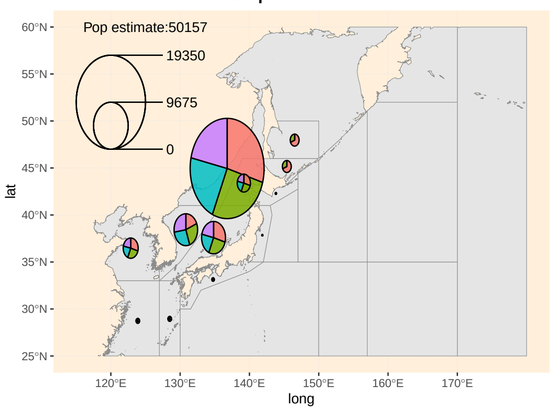
A01−1 Stock:J Jul−1930



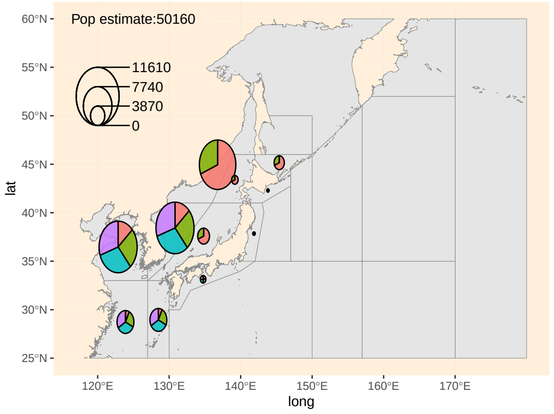
A01−1 Stock:J Aug−1930



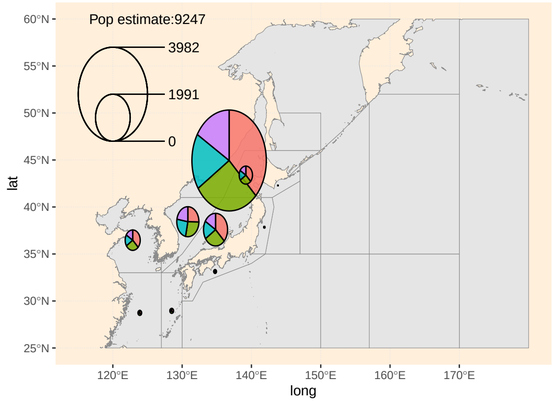
A01−1 Stock:J Sep−1930



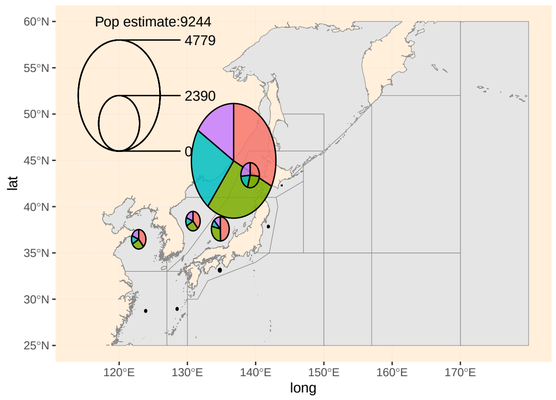
A01−1 Stock:J Oct−1930



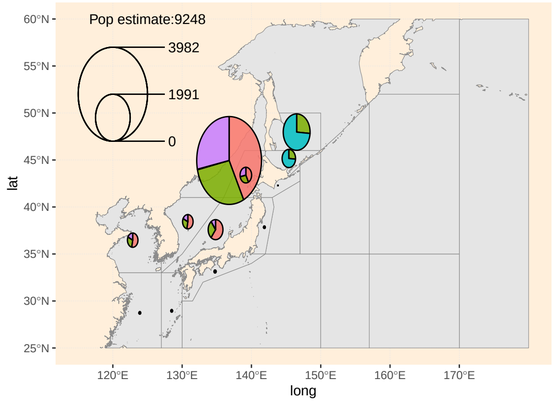
A01−1 Stock:J Mar−2020



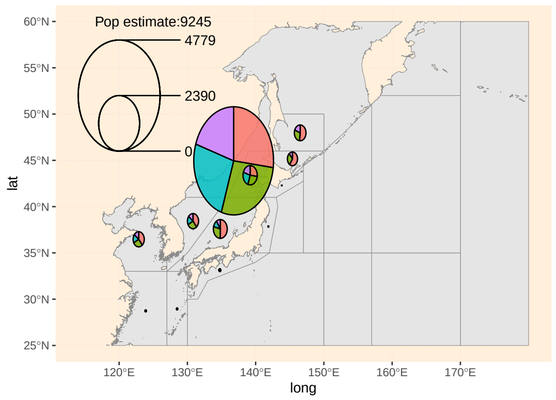
A01−1 Stock:J Apr−2020



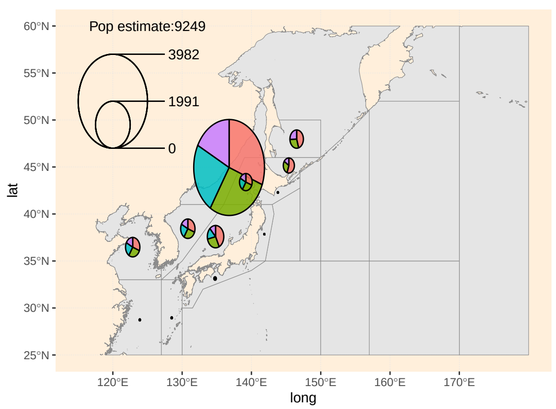
A01−1 Stock:J May−2020



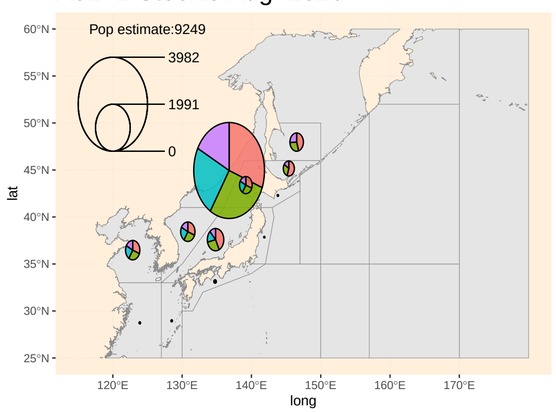
A01−1 Stock:J Jun−2020



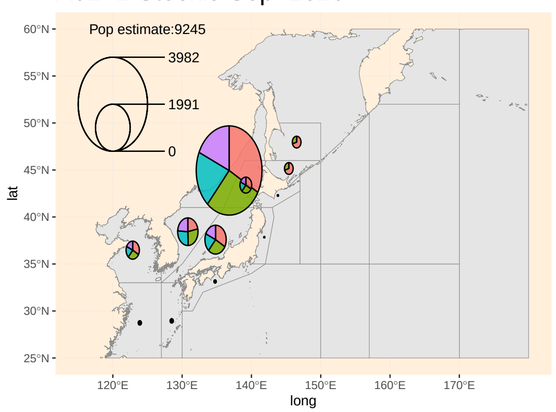
A01−1 Stock:J Jul−2020



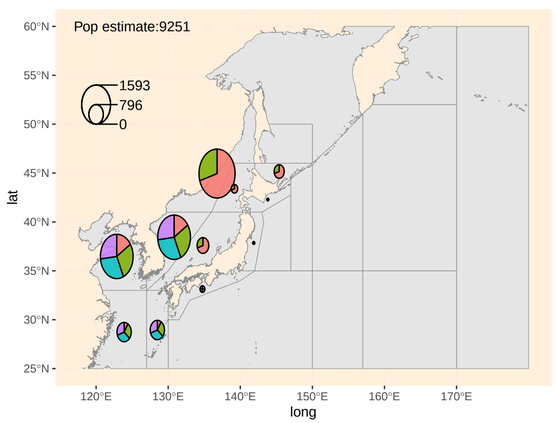
A01−1 Stock:J Aug−2020



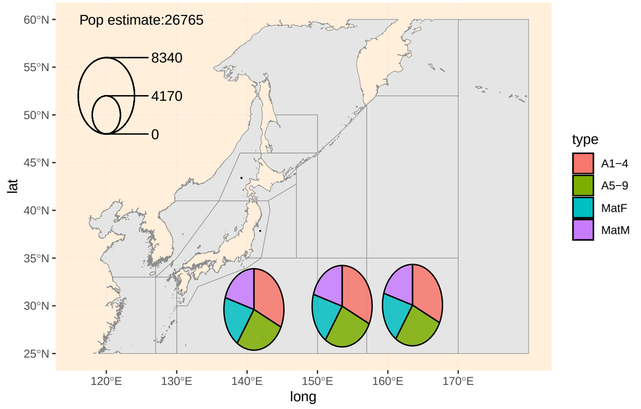
A01−1 Stock:J Sep−2020



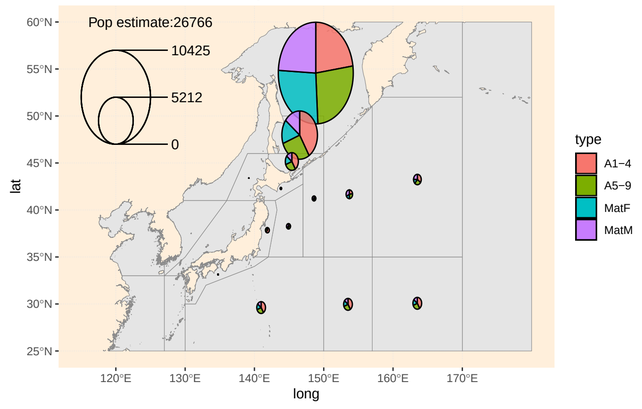
A01−1 Stock:J Oct−2020



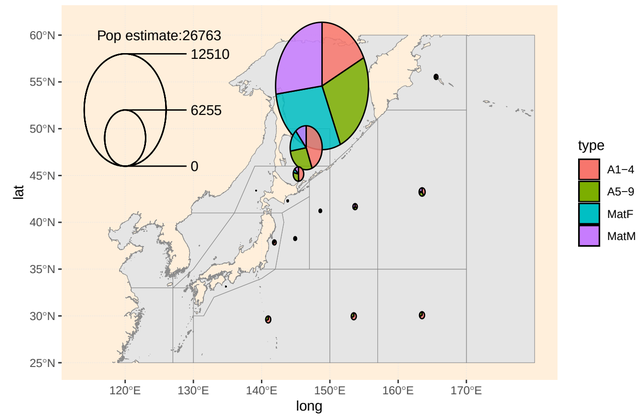
A01−1 Stock:O Mar−1930



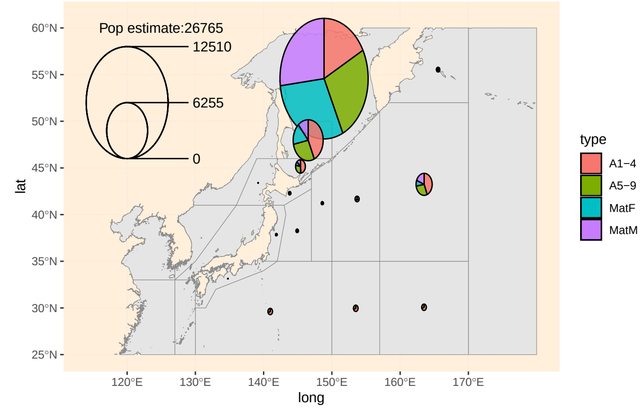
A01−1 Stock:O Apr−1930



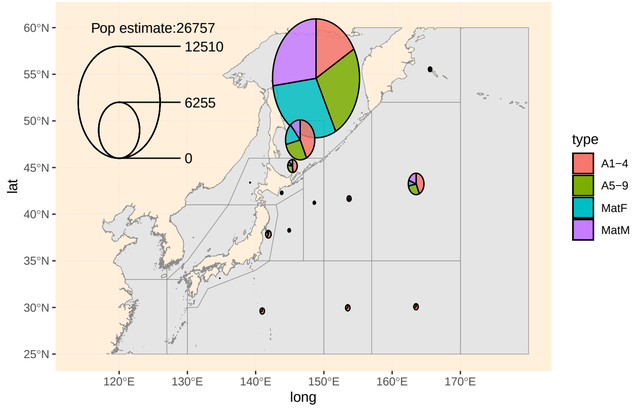
A01−1 Stock:O May−1930



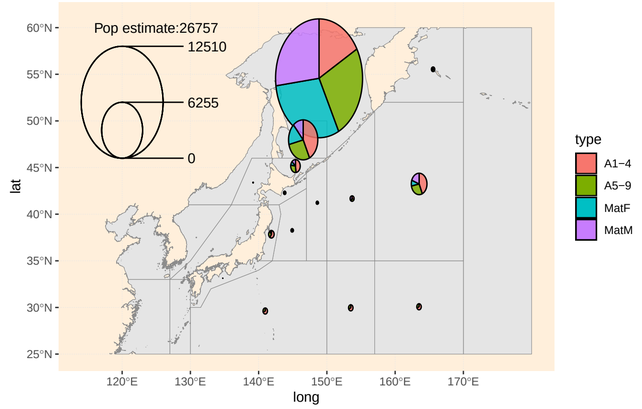
A01−1 Stock:O Jun−1930



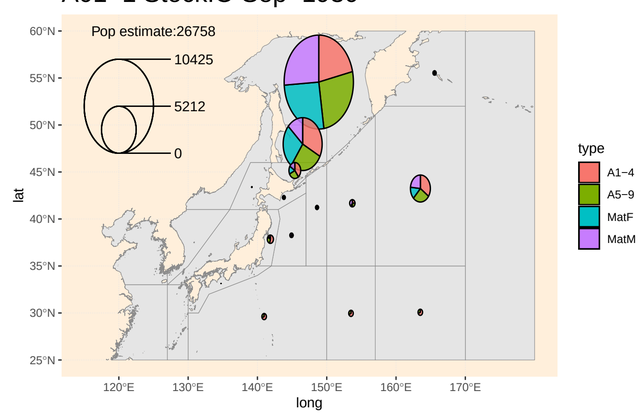
A01−1 Stock:O Jul−1930



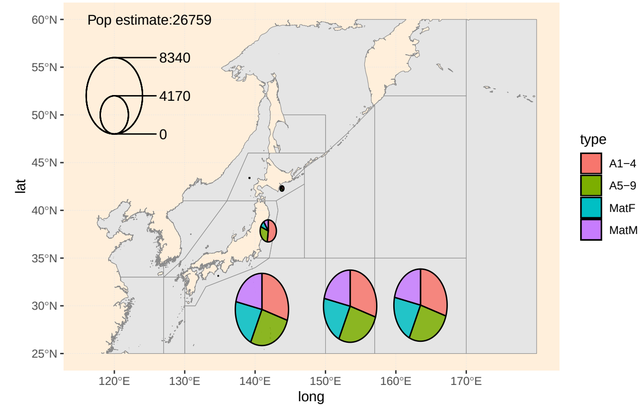
A01−1 Stock:O Aug−1930



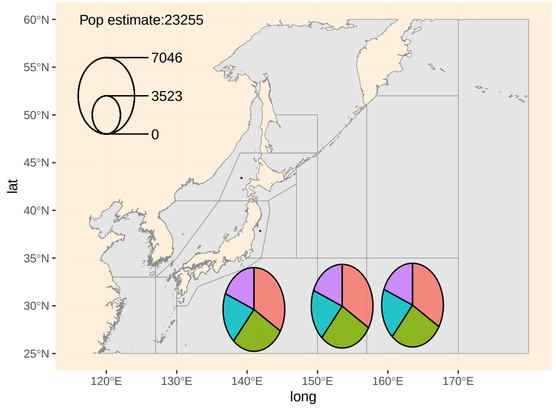
A01−1 Stock:O Sep−1930



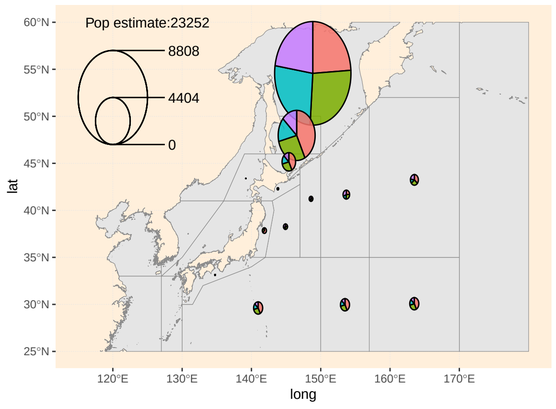
A01−1 Stock:O Oct−1930



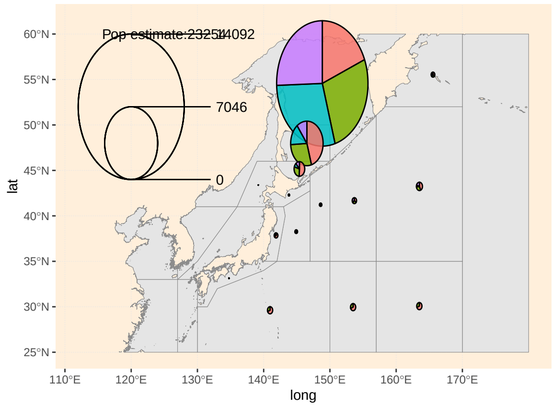
A01−1 Stock:O Mar−2020



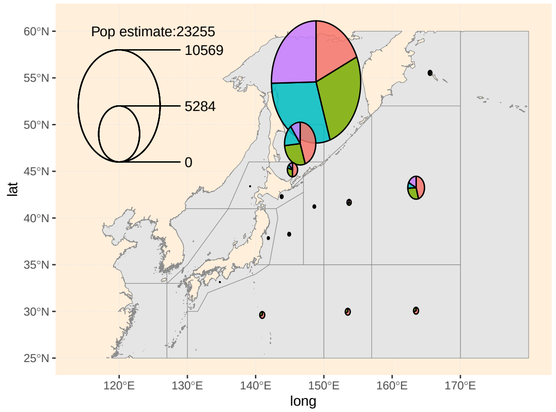
A01−1 Stock:O Apr−2020



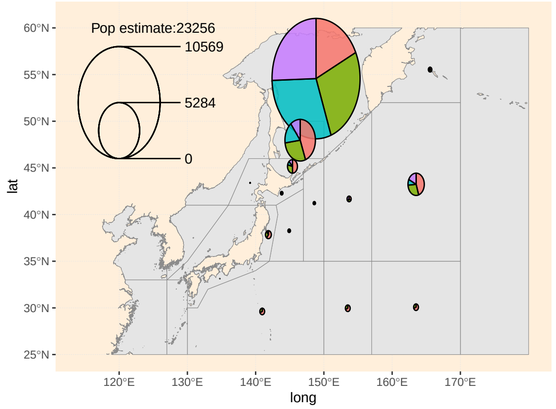
A01−1 Stock:O May−2020



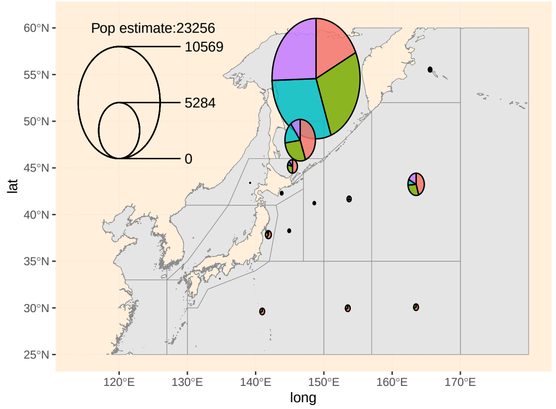
A01−1 Stock:O Jun−2020



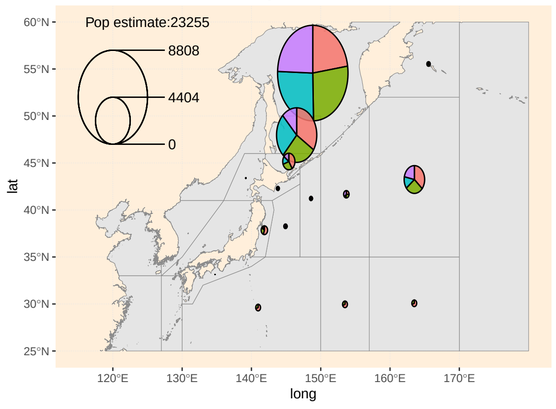
A01−1 Stock:O Jul−2020



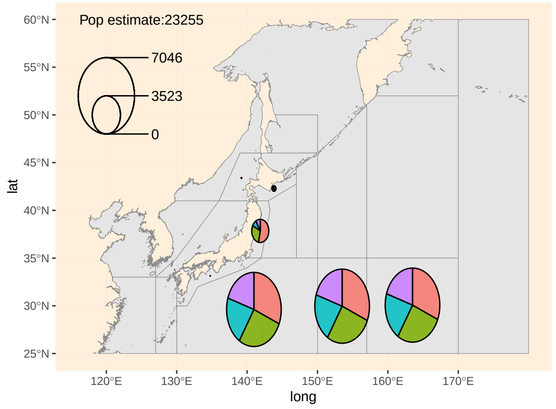
A01−1 Stock:O Aug−2020

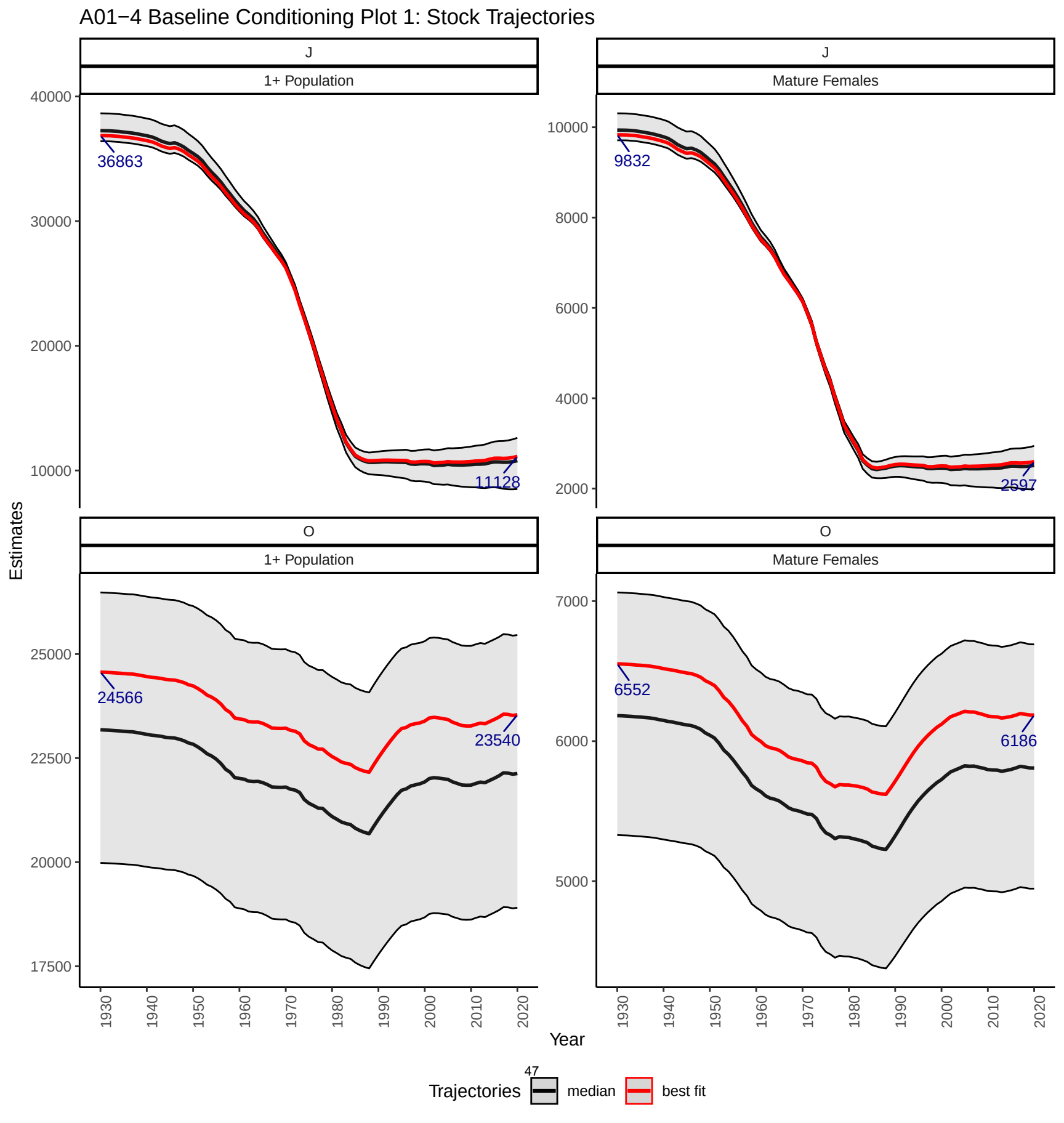


A01−1 Stock:O Sep−2020

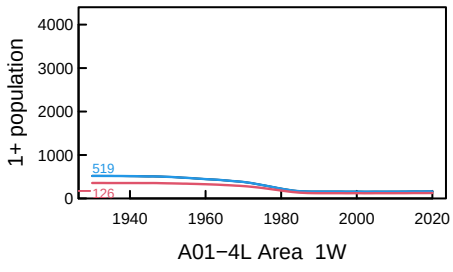


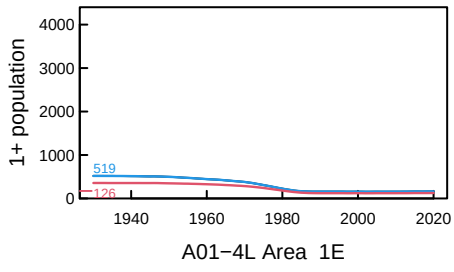
A01−1 Stock:O Oct−2020

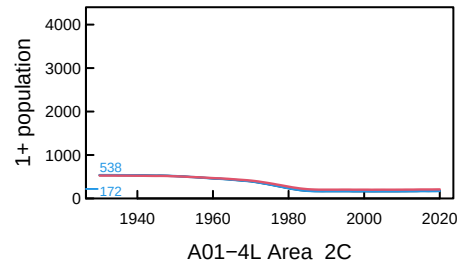


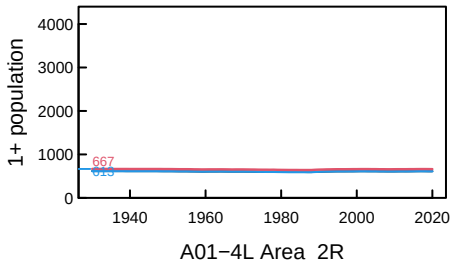

A01−4 Baseline Conditioning Plot 1: Stock Trajectories
J
1+ Population
J
Mature Females
O
1+ Population
O
Mature Females
Estimates
Year
36863
11128
9832
2597
24566
23540
6552
6186
Trajectories
47
median
best fit

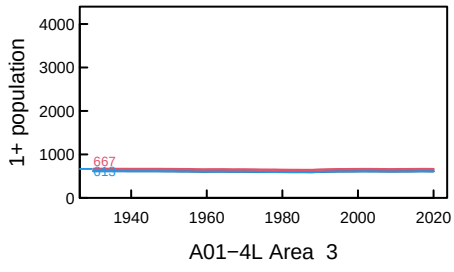
A01−4L Hyp. A 4% Baseline Conditioning Plot 2a: May/Jun (red) & Aug/Sep (blue)

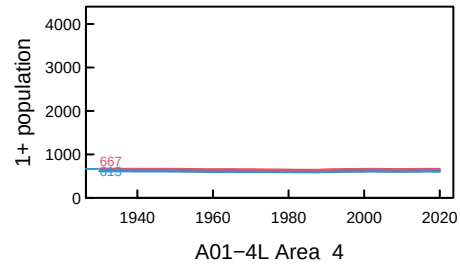


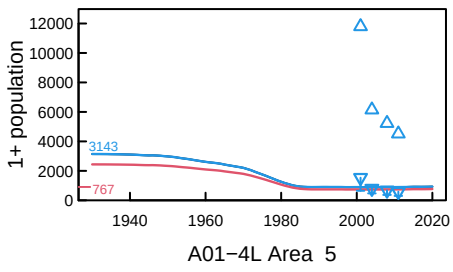


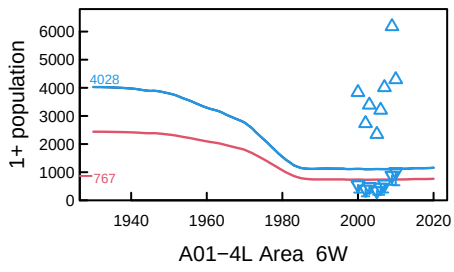


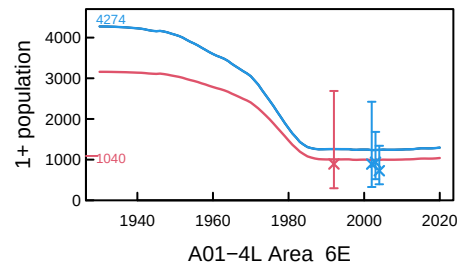


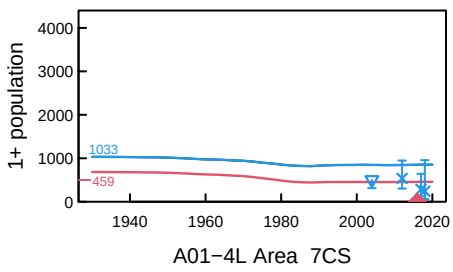


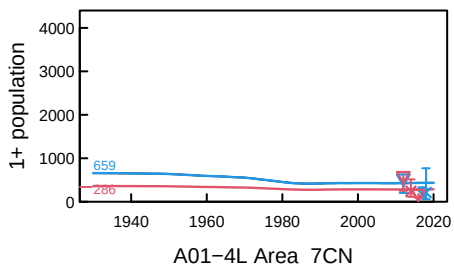


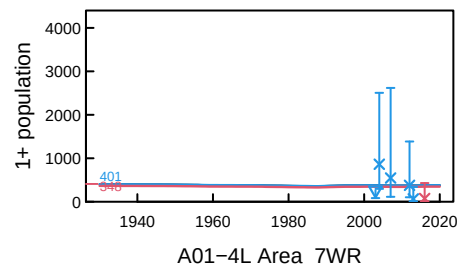


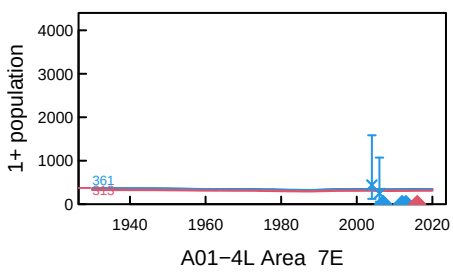


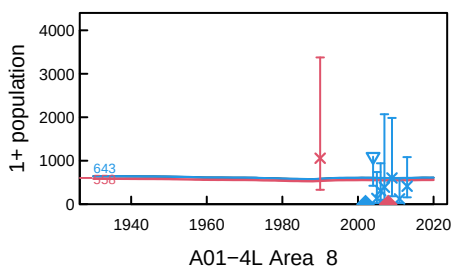


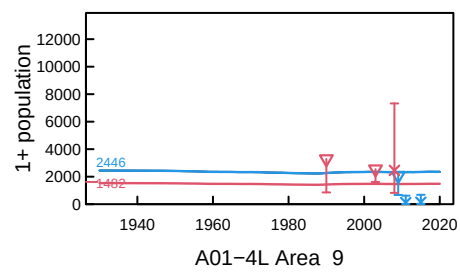


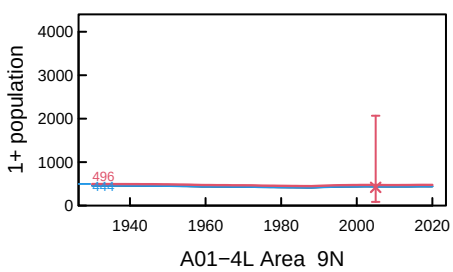


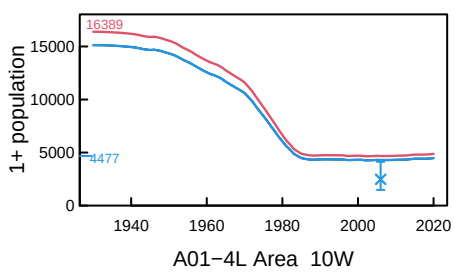


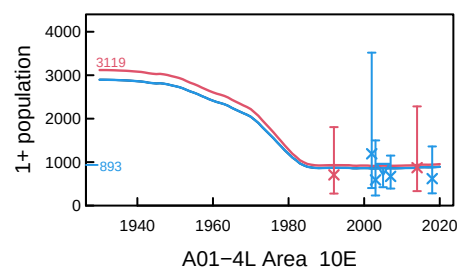


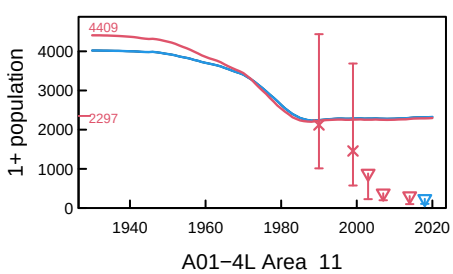


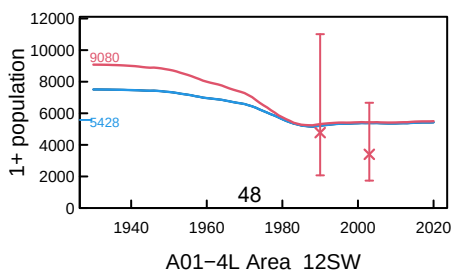


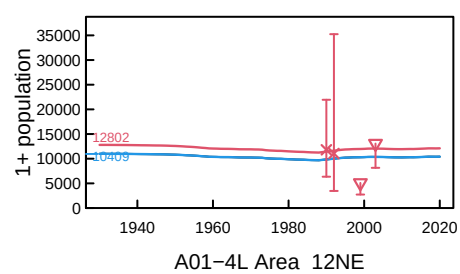




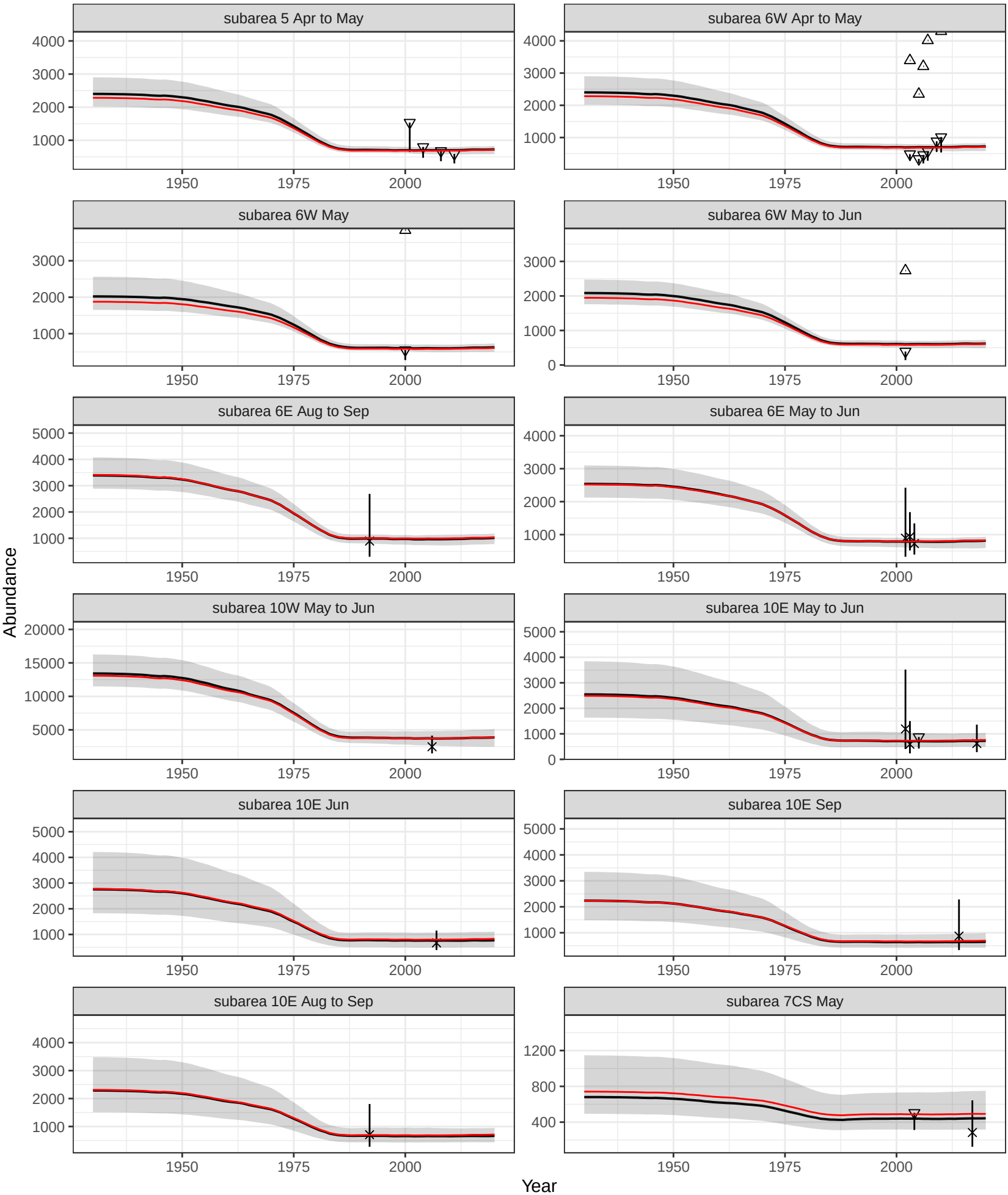








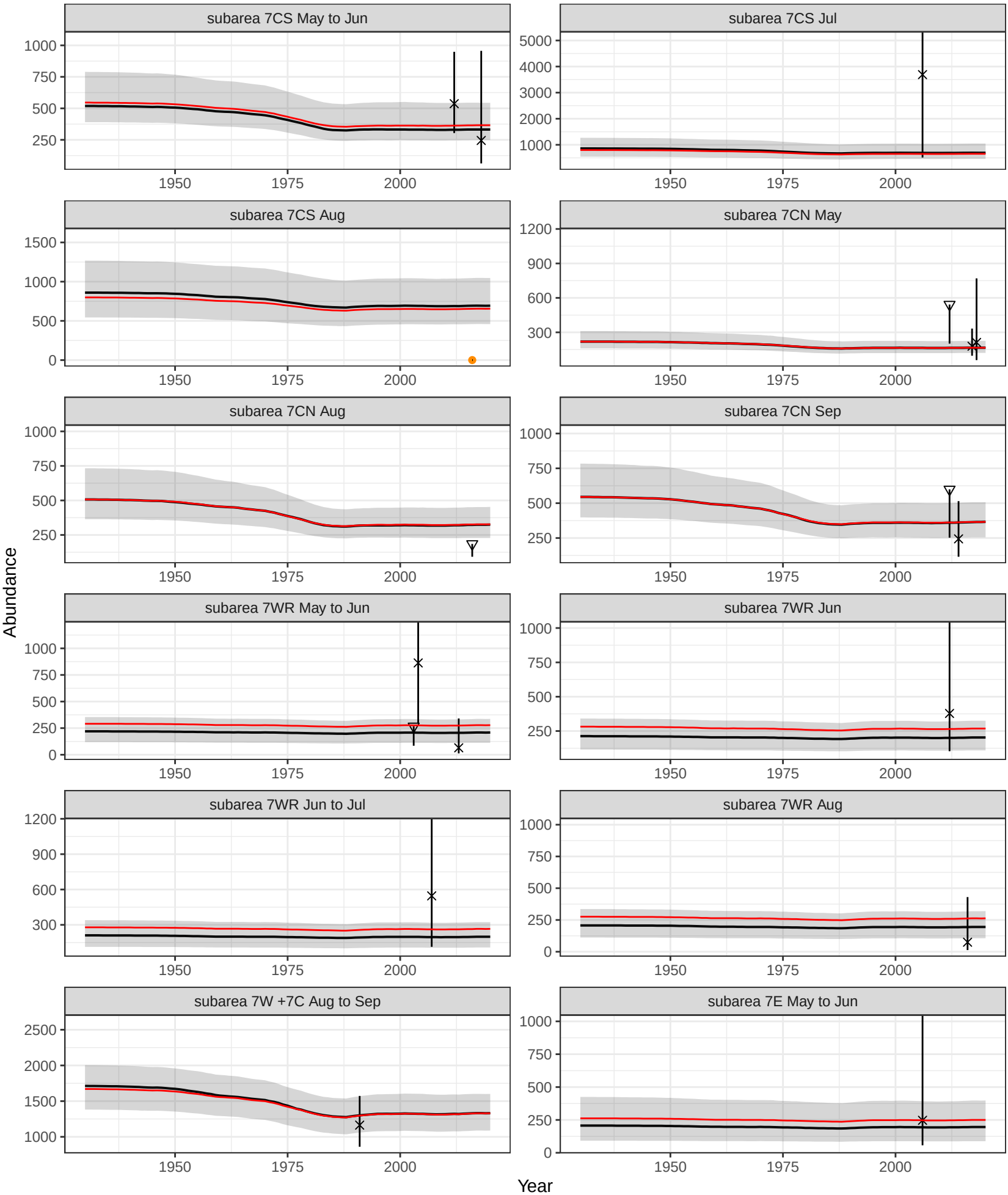
A01−4 Baseline Conditioning Plot 2b: Fits to Data



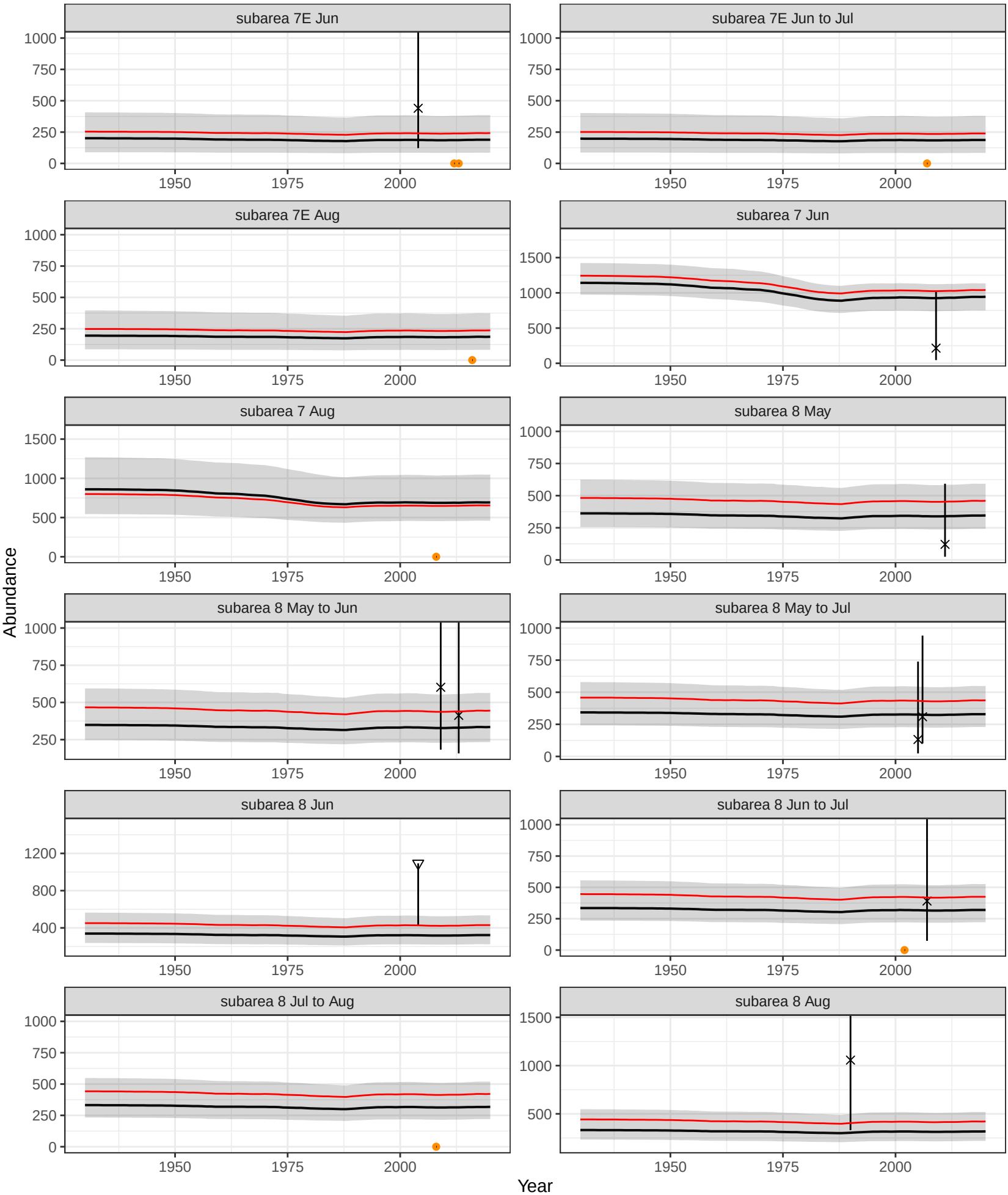
Type ● 0 estimate × estimate △ max estimate ▽ min estimate

best fit = red, median = black

A01−4 Baseline Conditioning Plot 2b: Fits to Data

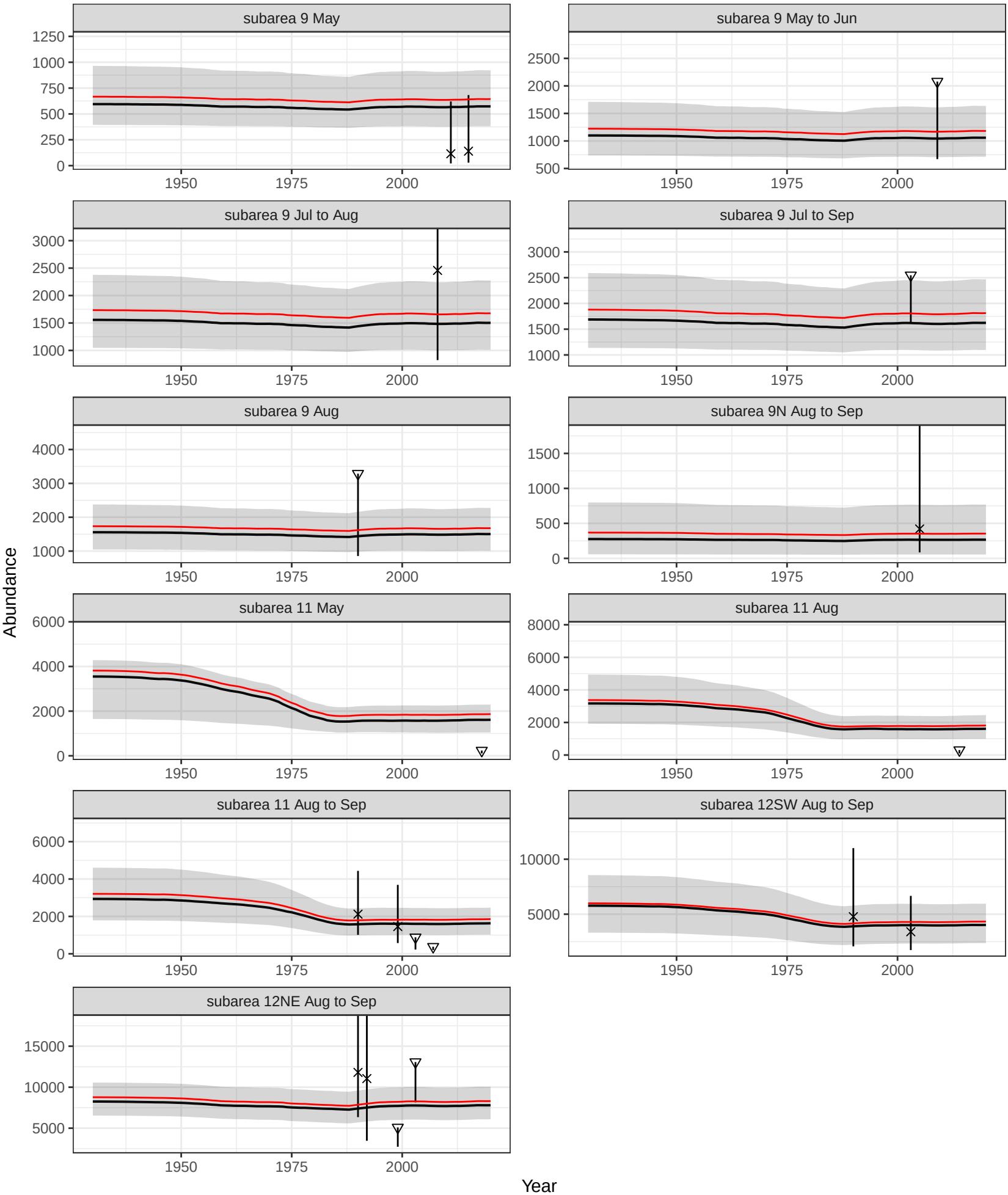


A01−4 Baseline Conditioning Plot 2b: Fits to Data



best fit = red, median = black

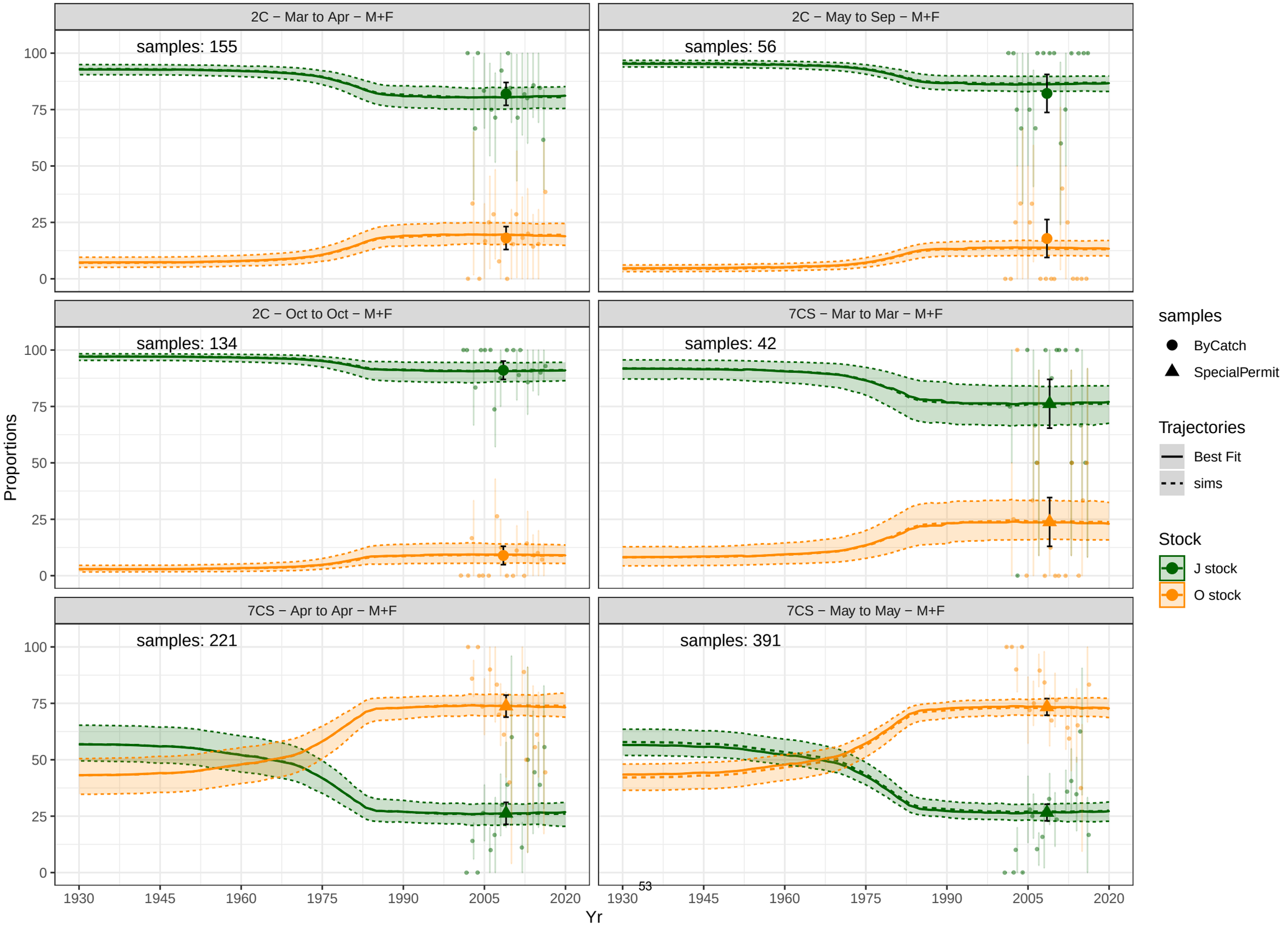
A01−4 Baseline Conditioning Plot 2b: Fits to Data



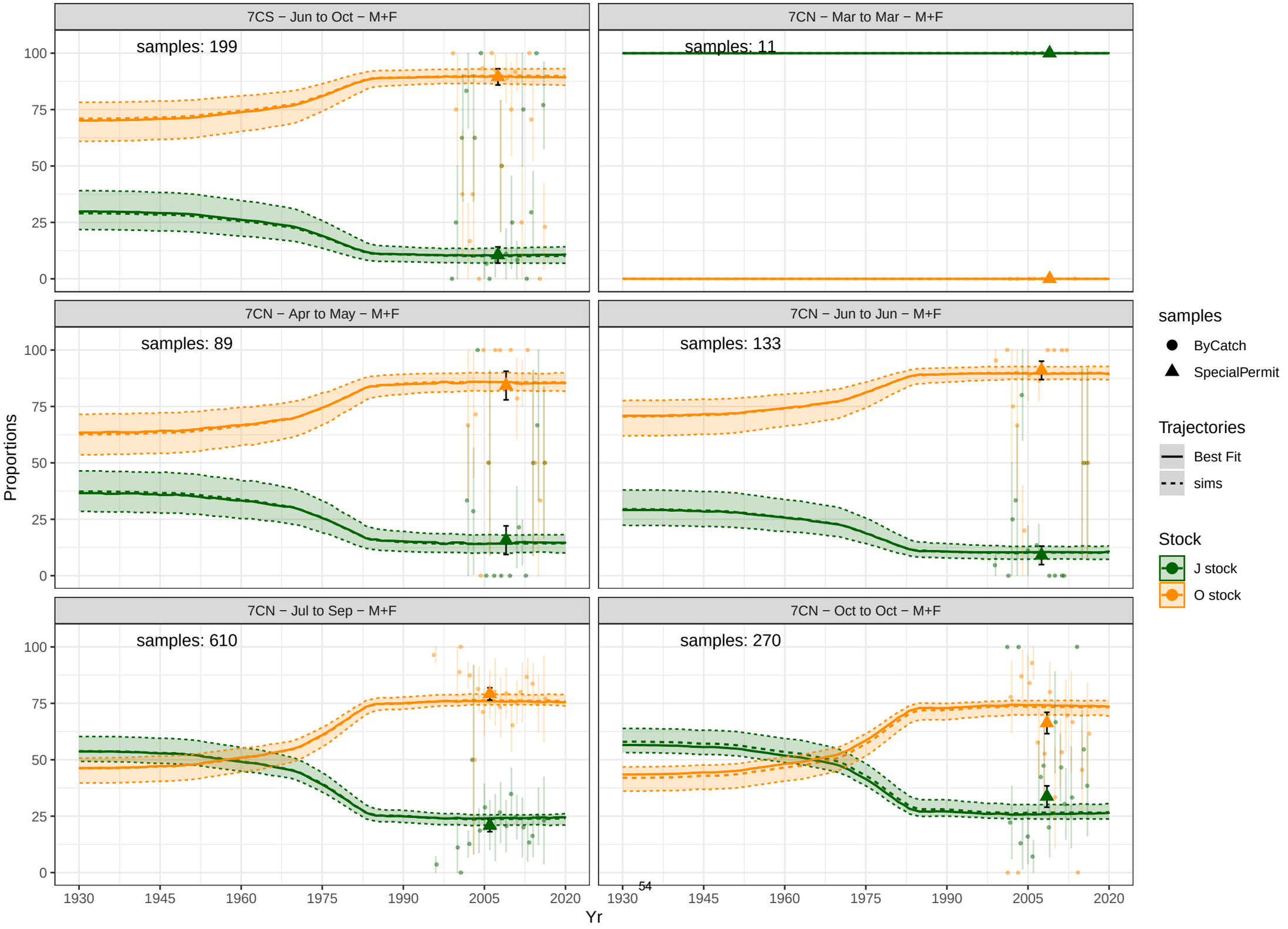
Type ● 0 estimate × estimate △ max estimate ▽ min estimate

best fit = red, median = black

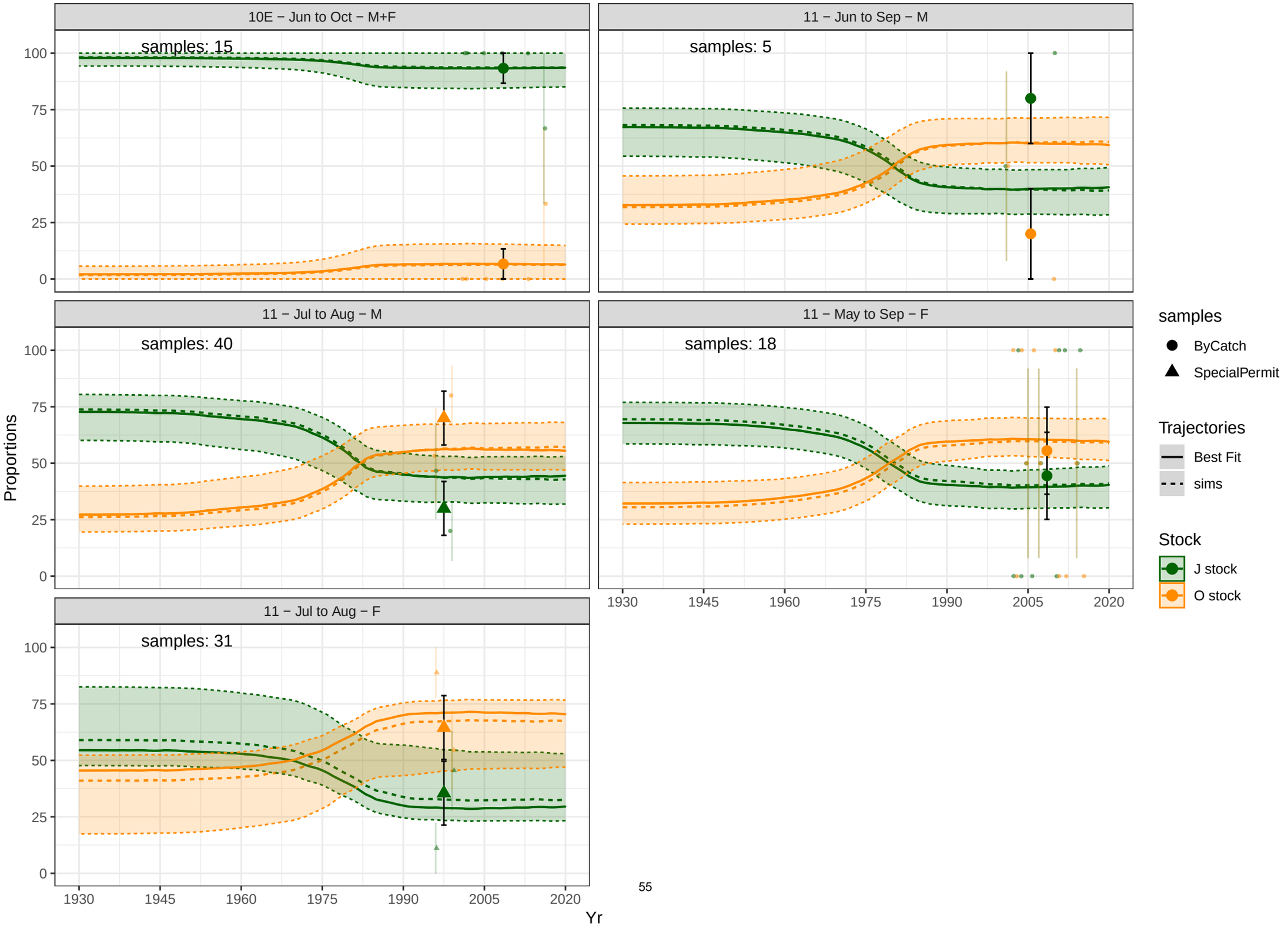
A01−4 Baseline Conditioning Plot 3: Fits to Data



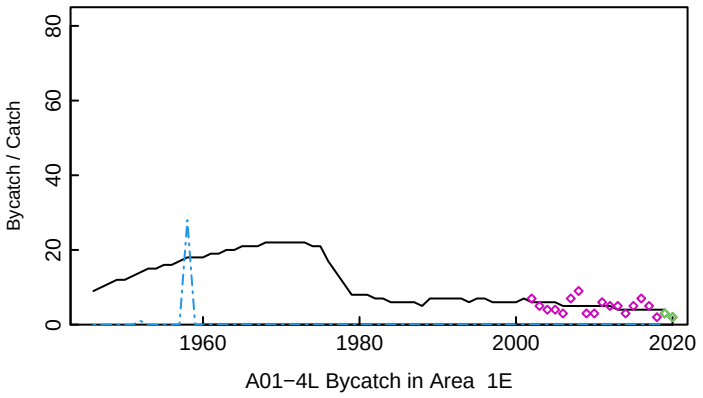
A01−4 Baseline Conditioning Plot 3: Fits to Data

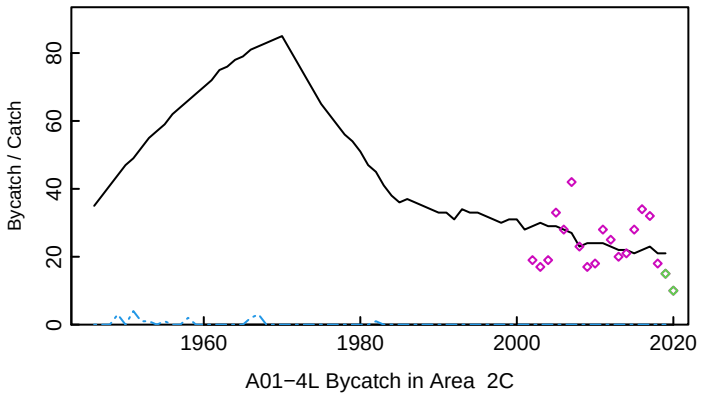


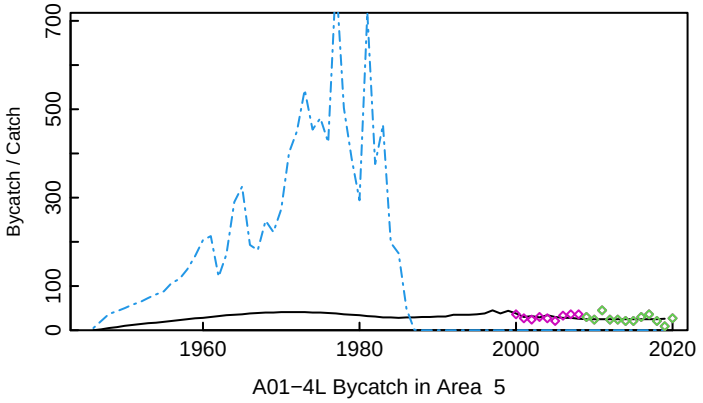
A01−4 Baseline Conditioning Plot 3: Fits to Data

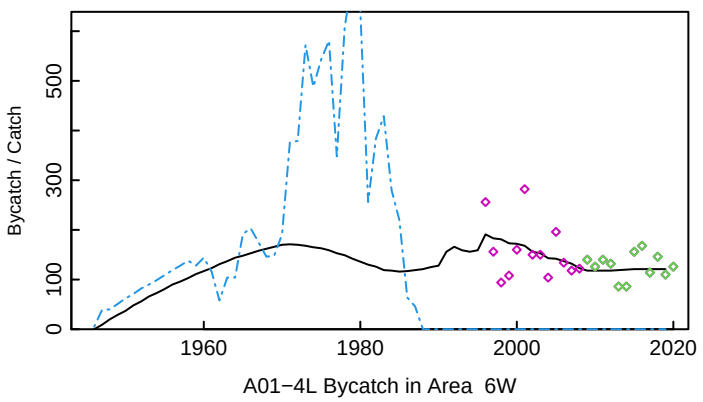


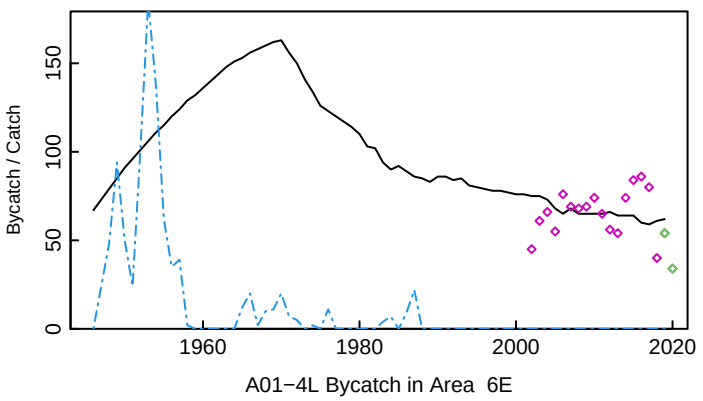
A01−4L Hyp. A 4% Baseline Conditioning Plot 4a: 'Best Fit' Bycatches

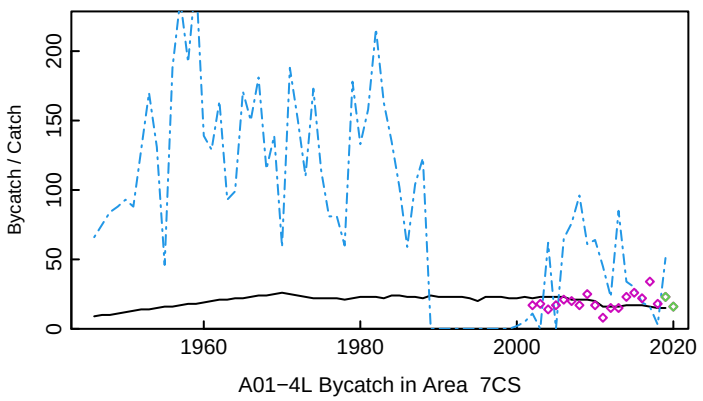


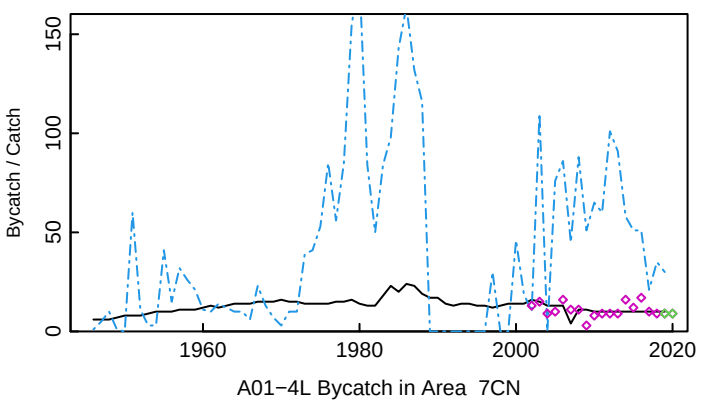


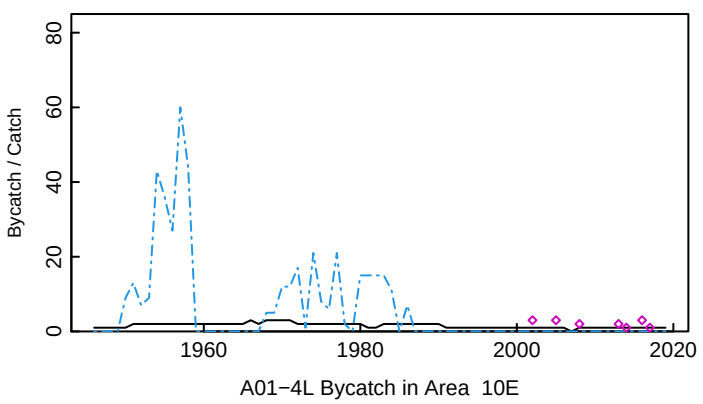


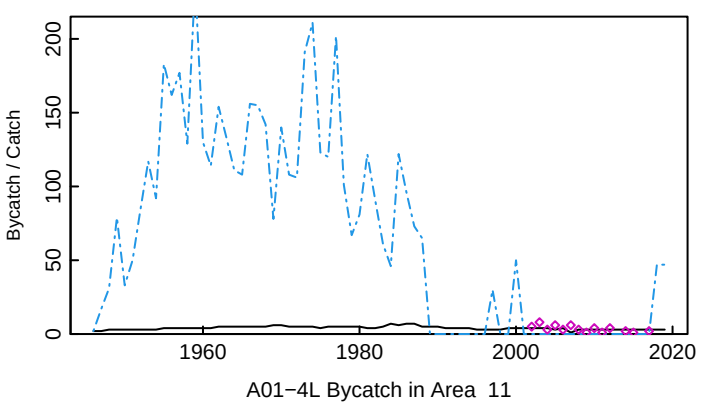


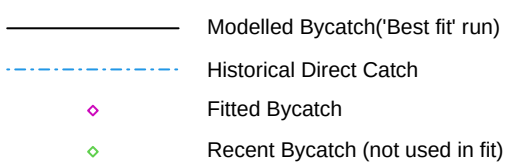




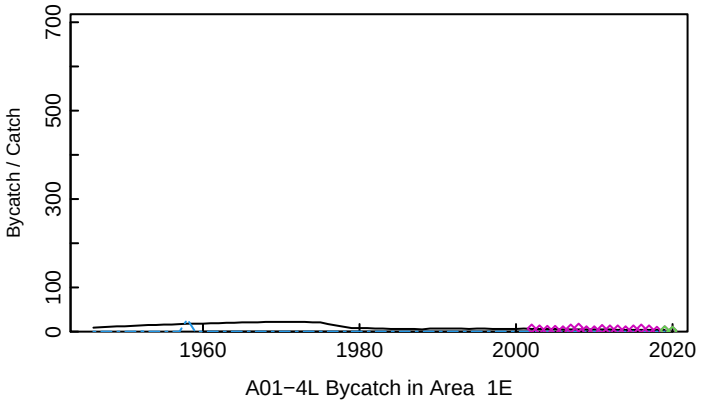


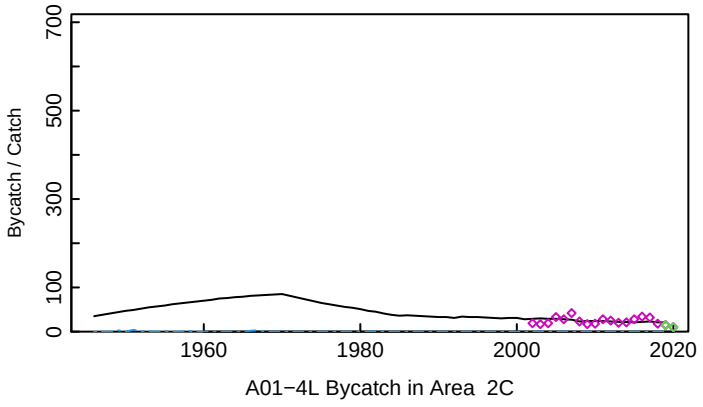


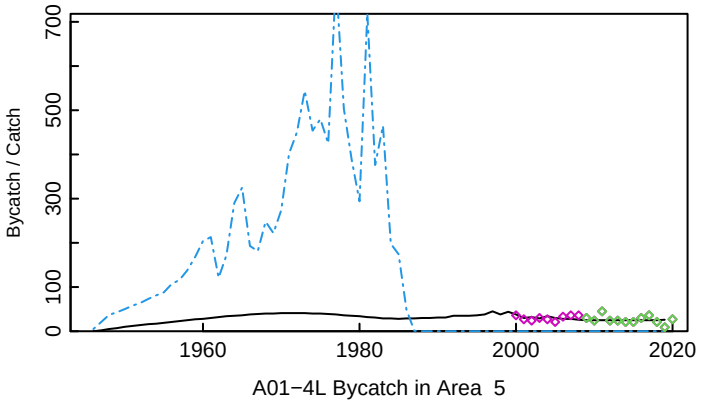


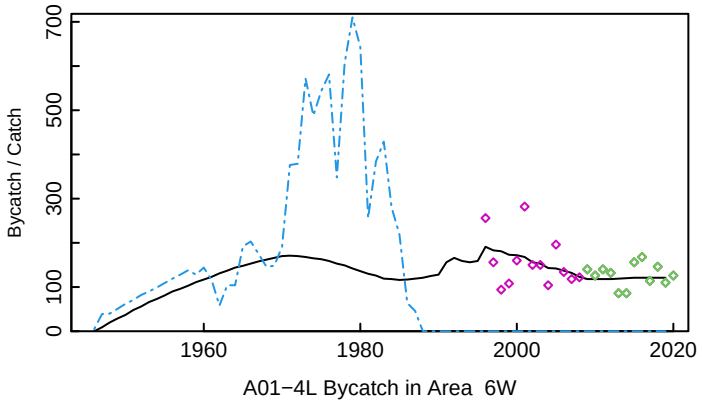


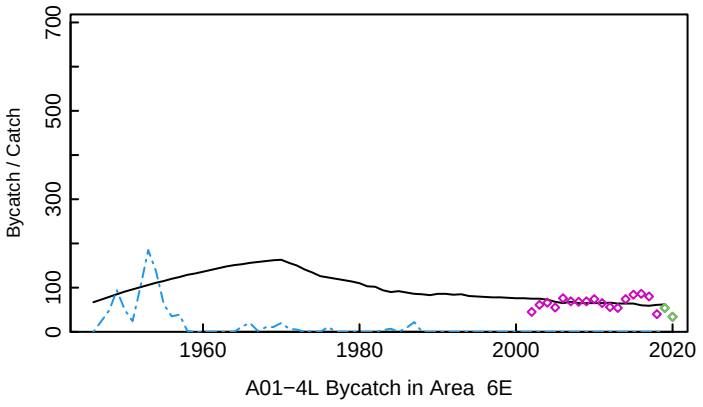
A01−4L Hyp. A 4% Baseline Conditioning Plot 4b: 'Best Fit' Bycatches On Same Scale

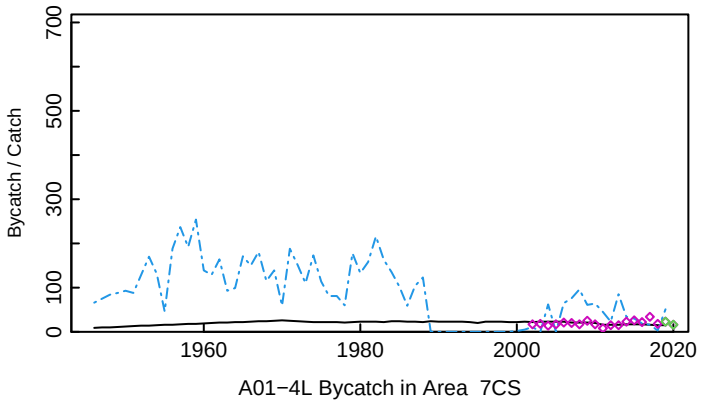


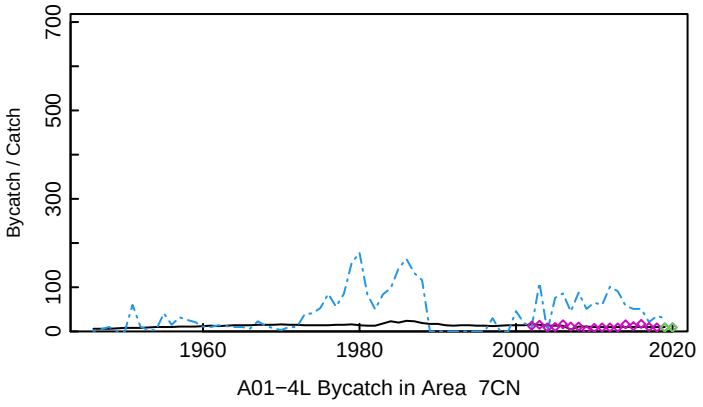


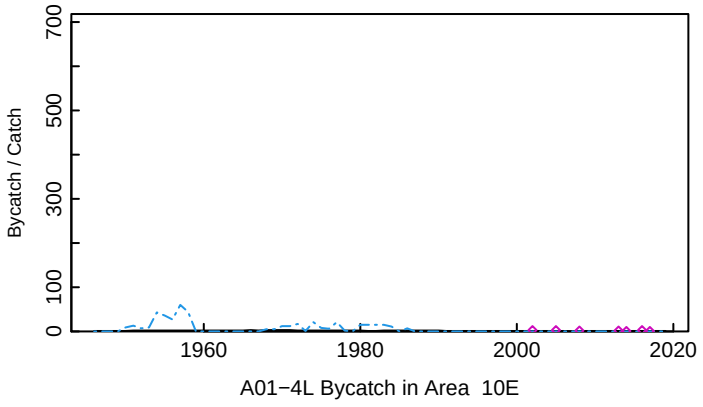


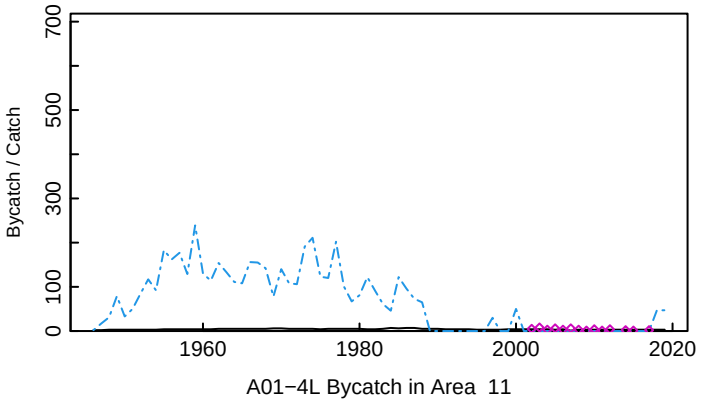


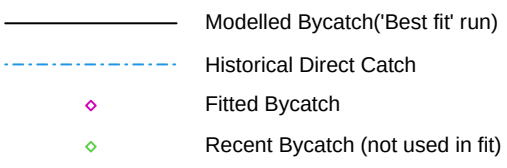




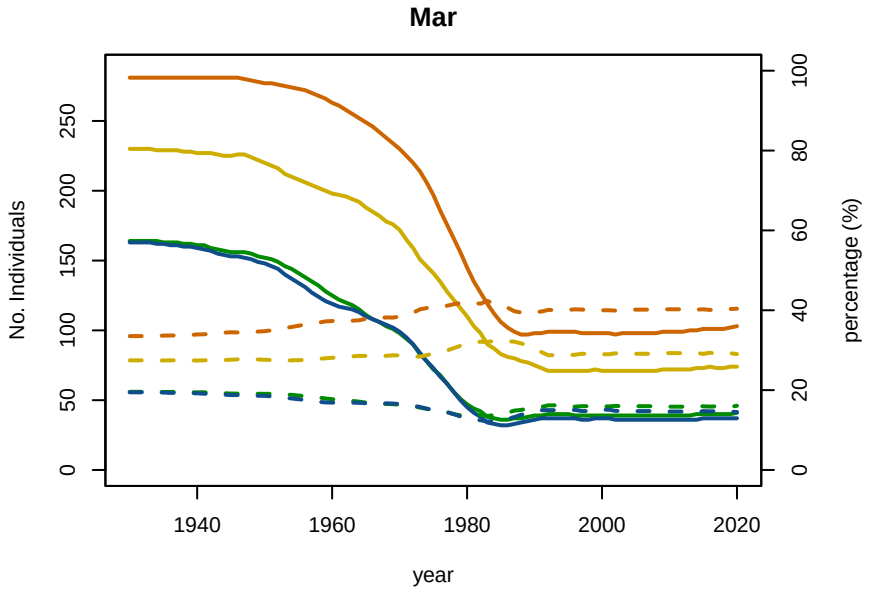


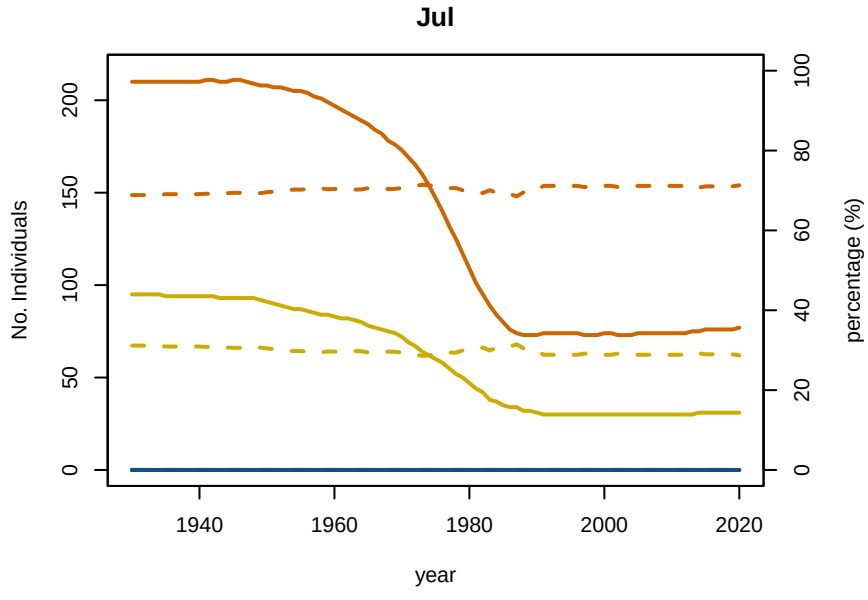


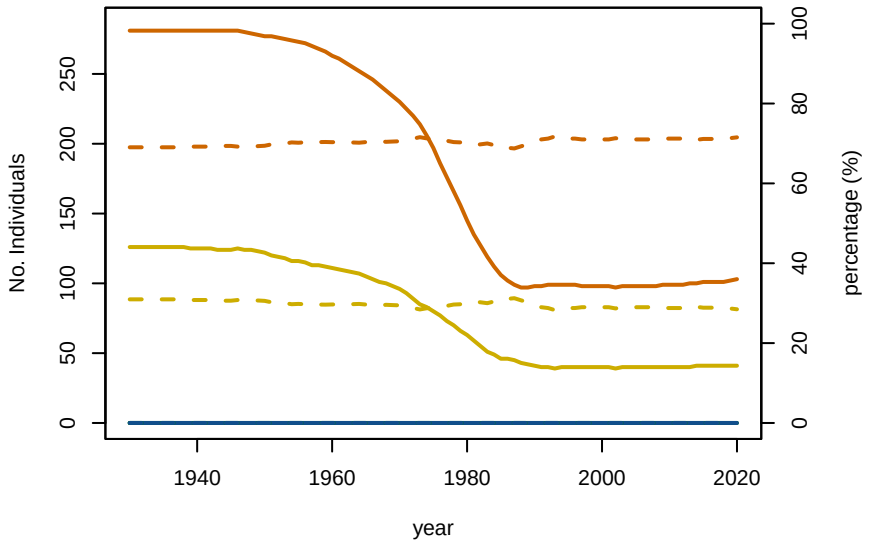


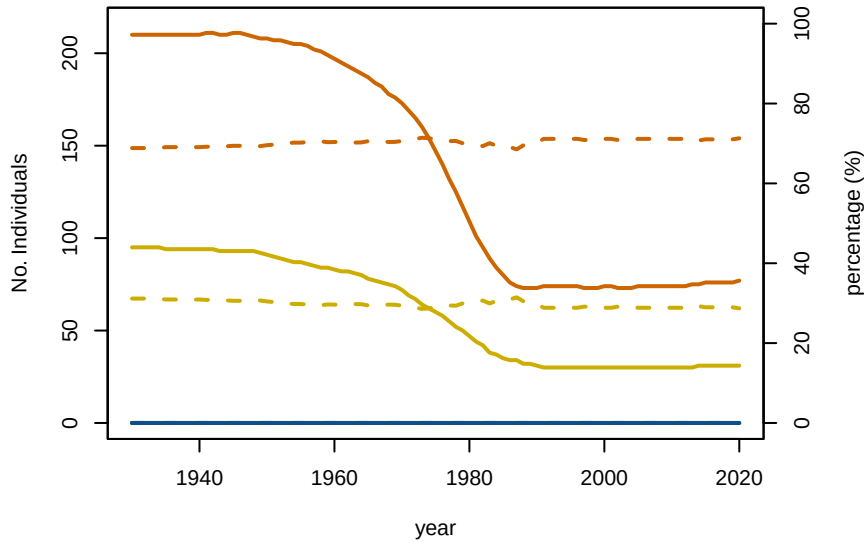


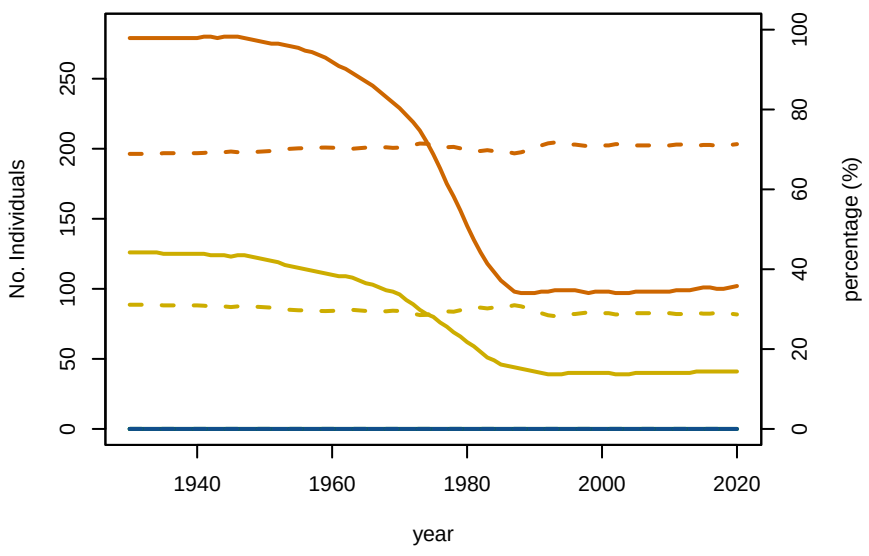
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 1E

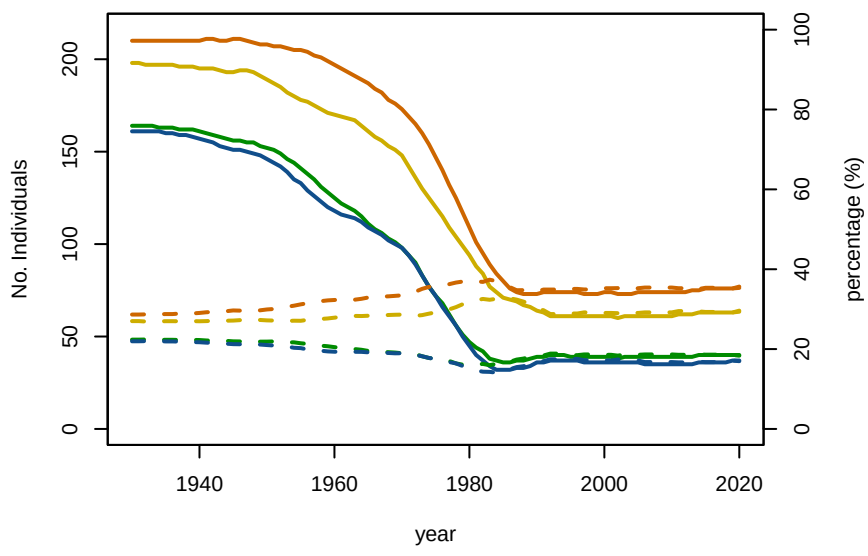


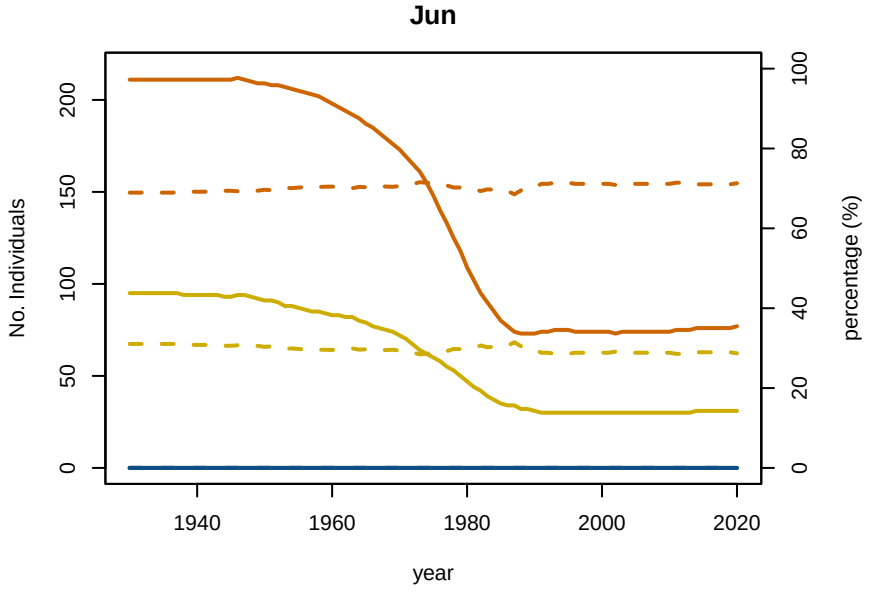


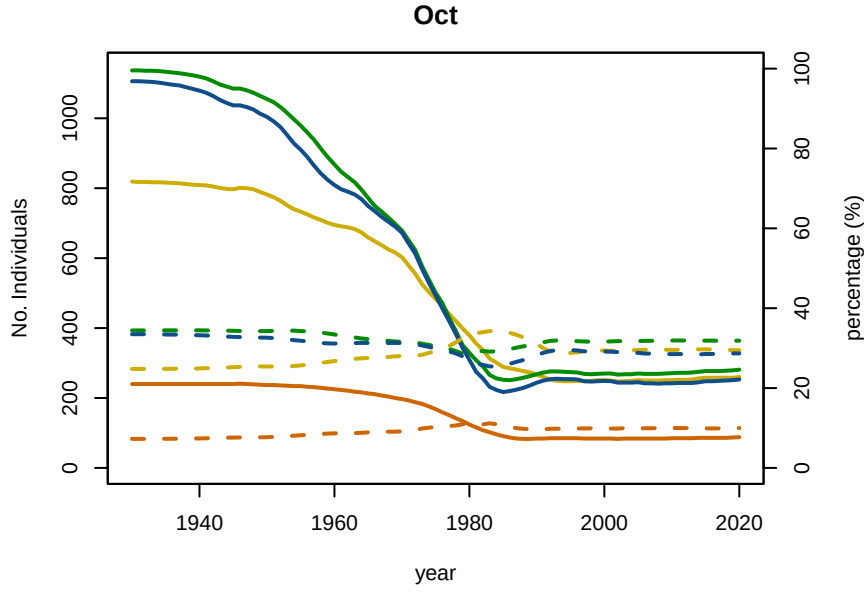






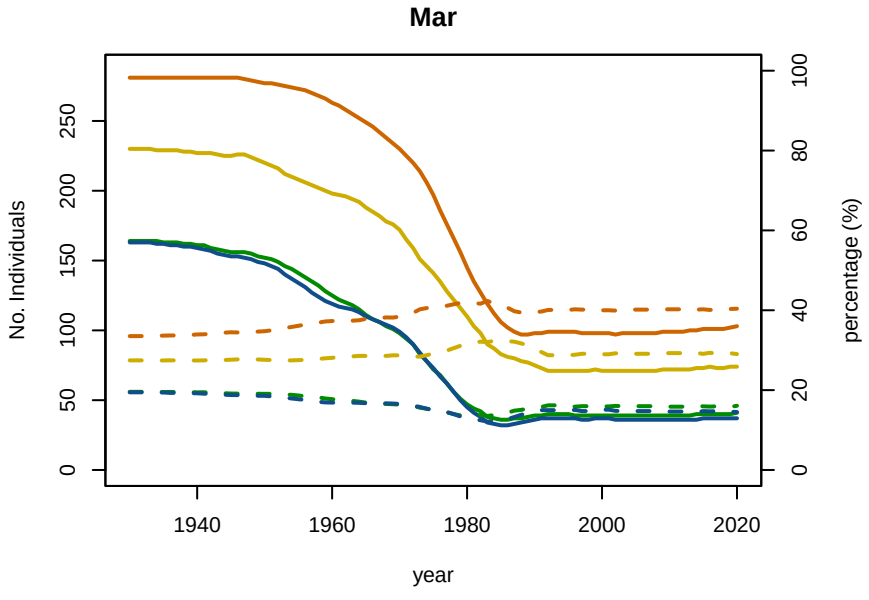


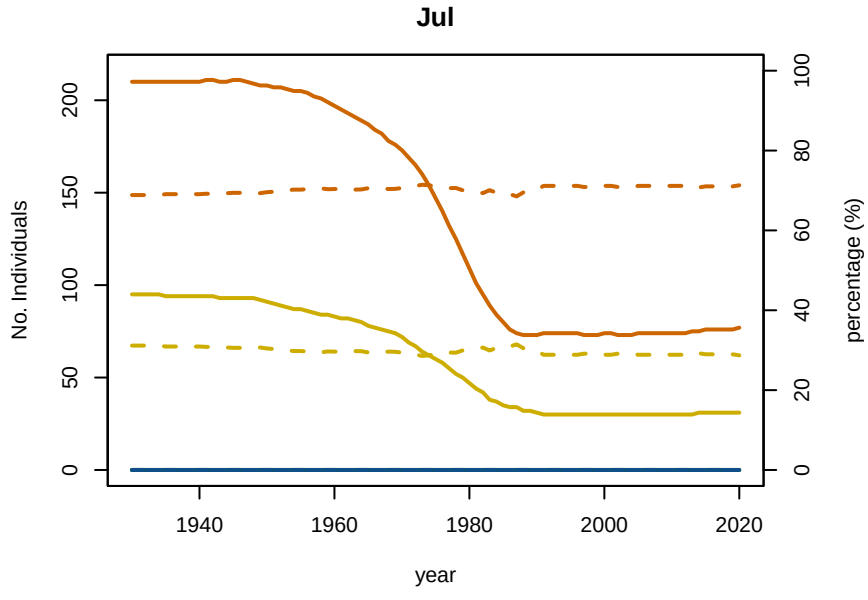


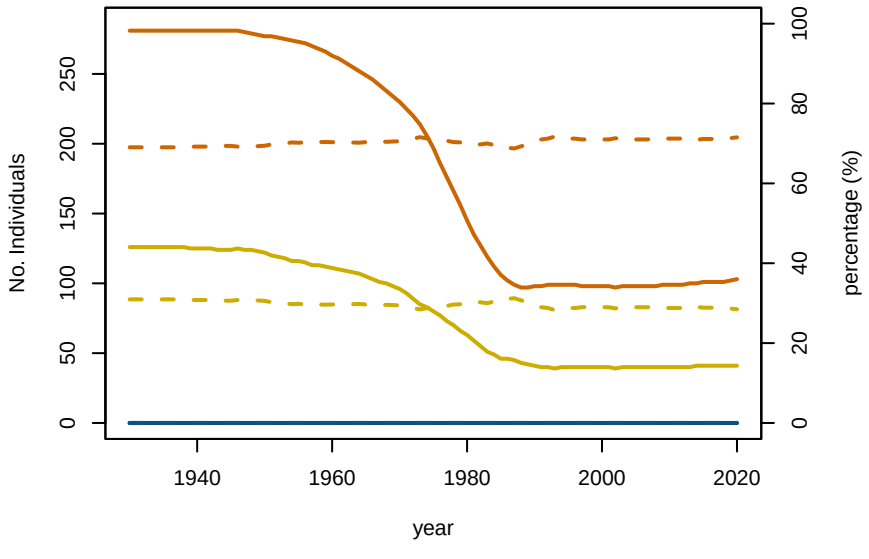


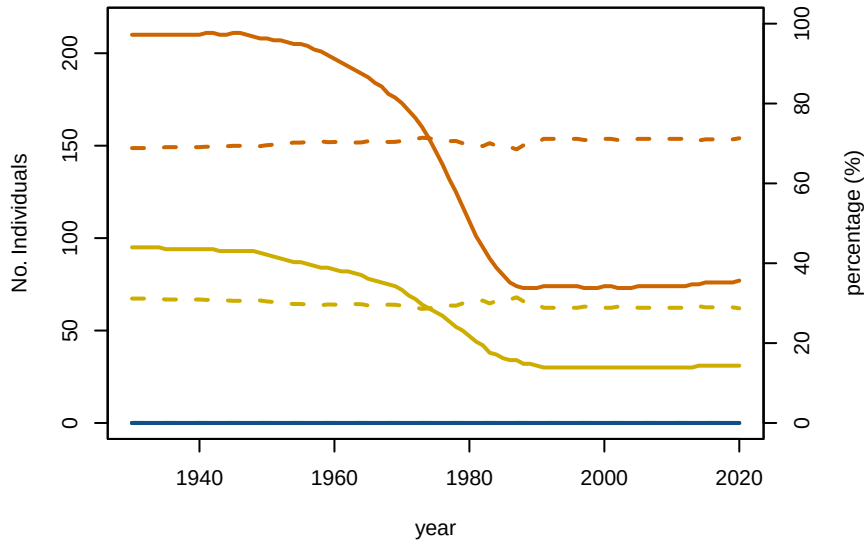
A1−4 A5−9 MatF MatM No Individuals percentage

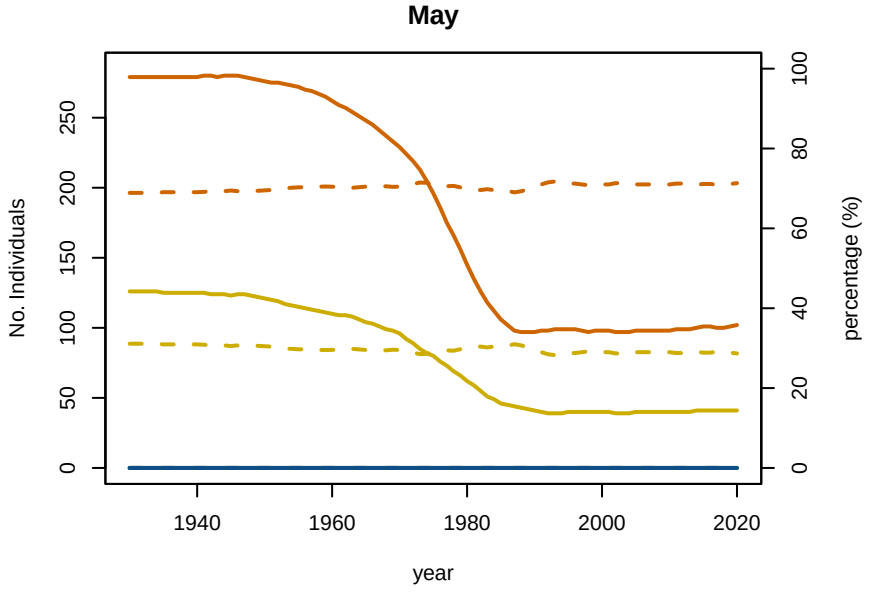
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 1W

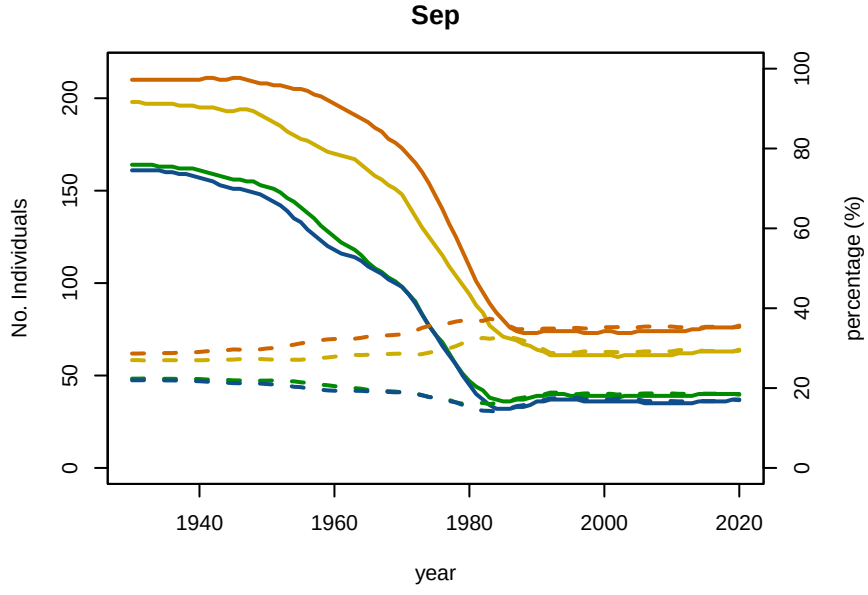


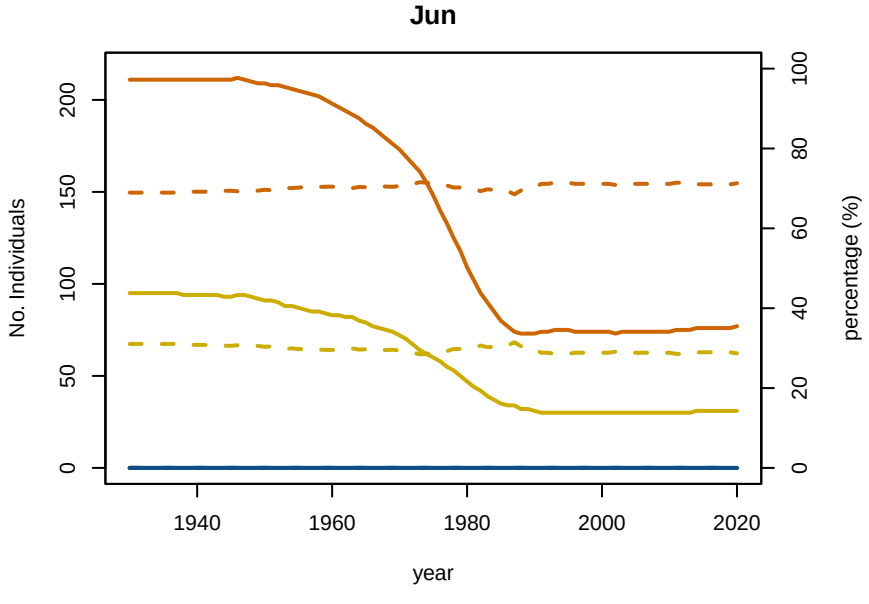


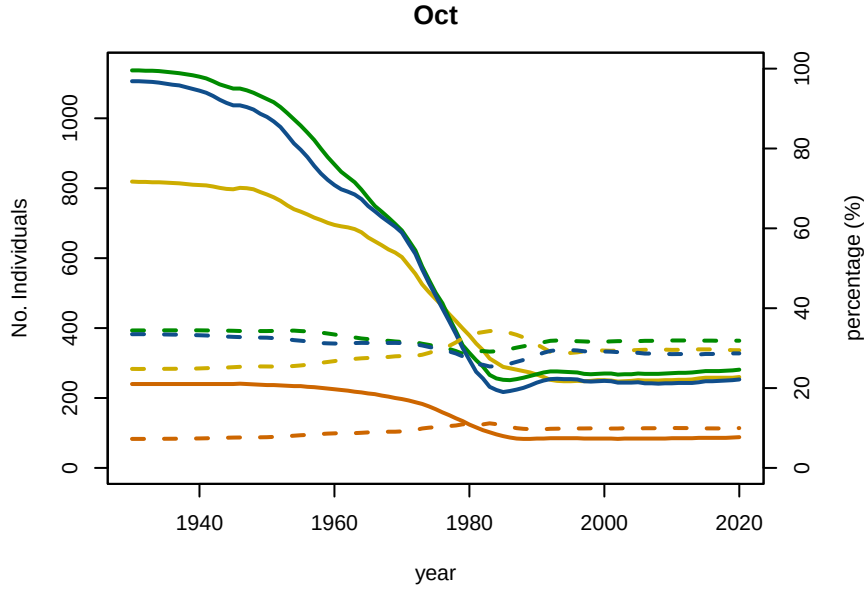






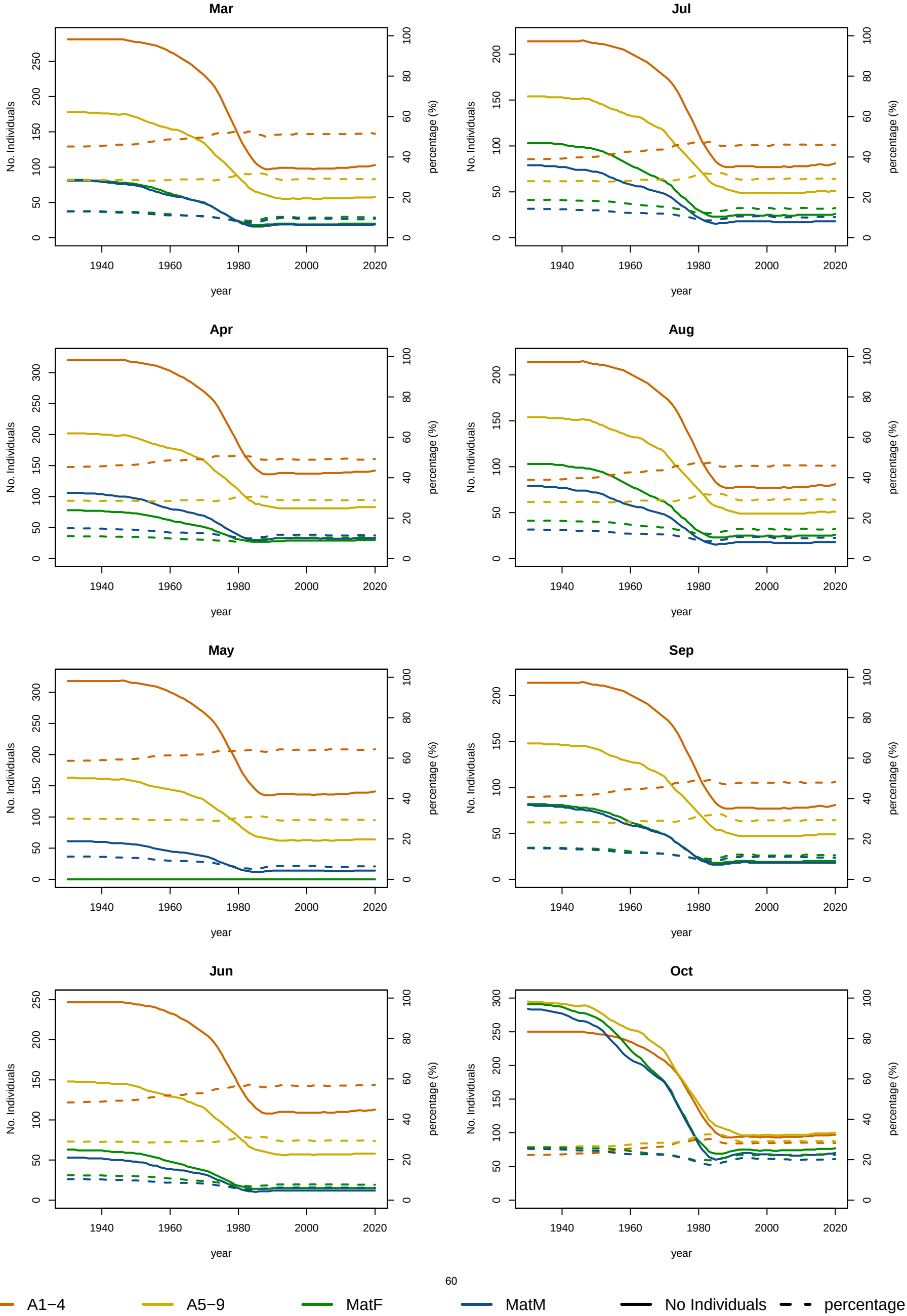




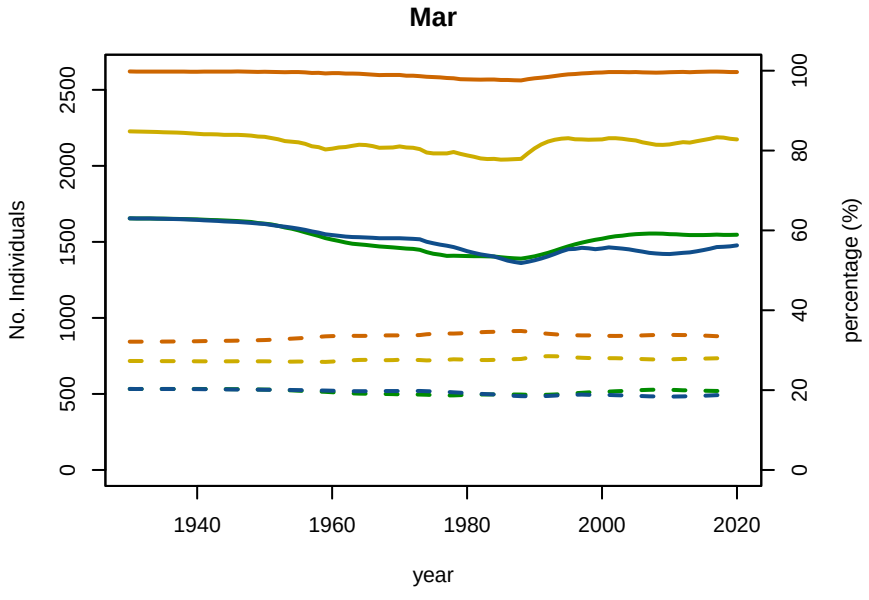


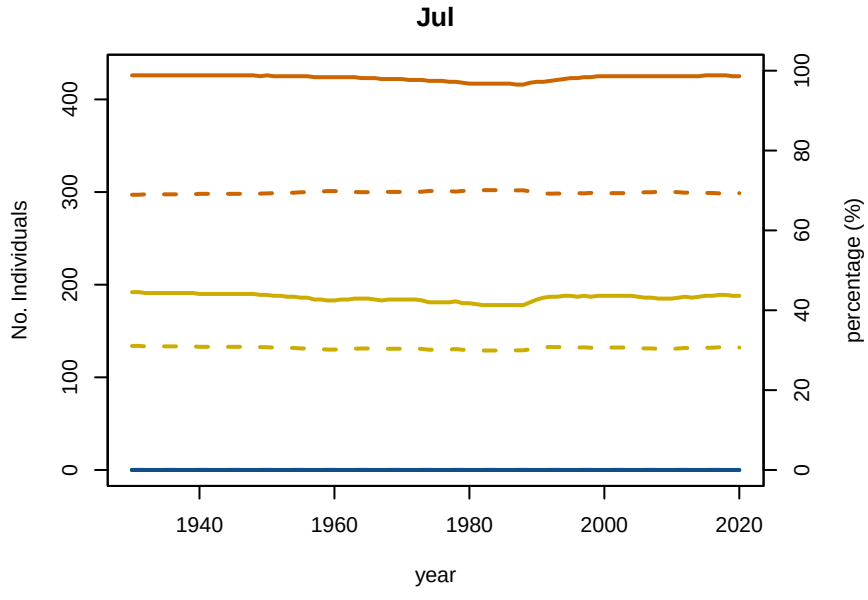
A1−4 A5−9 MatF MatM No Individuals percentage

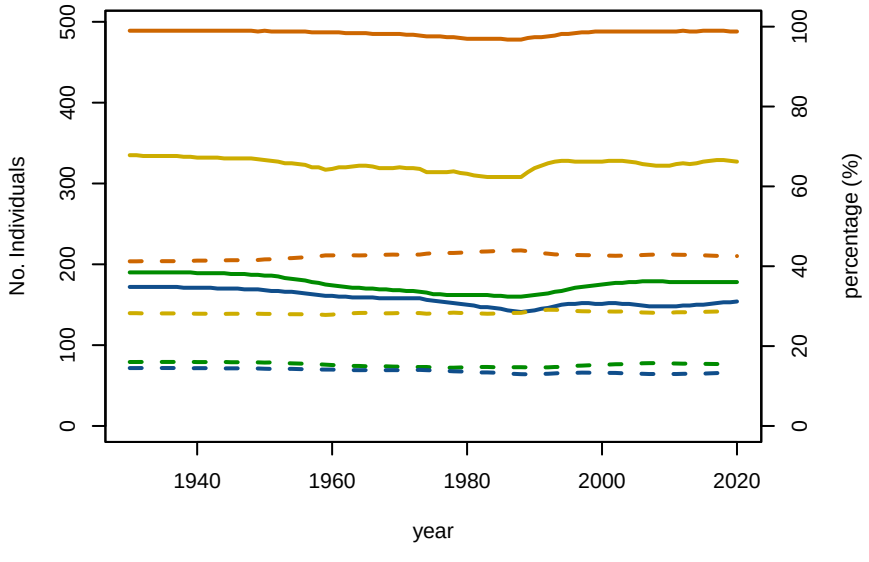
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 2C

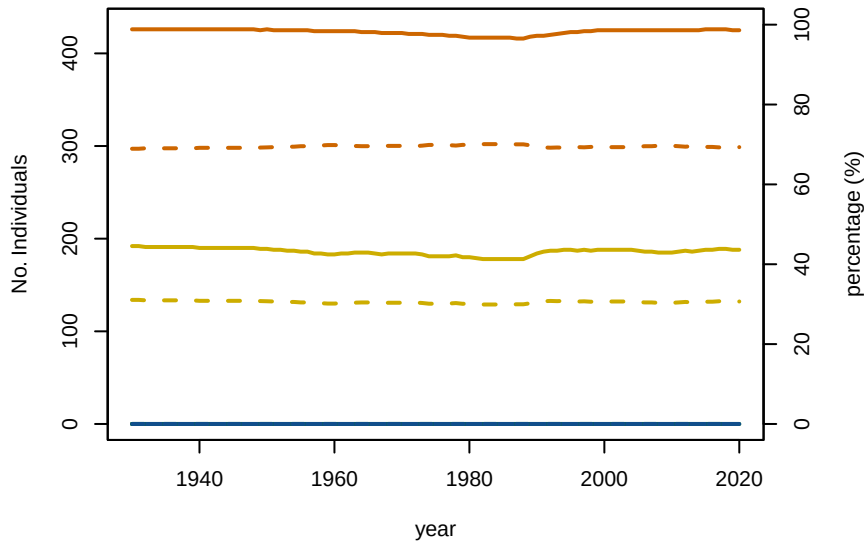


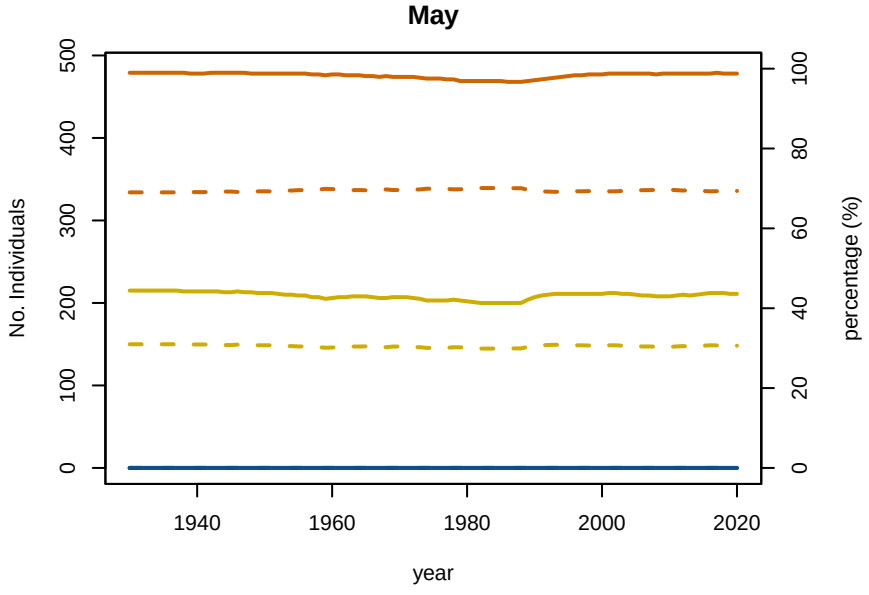
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 2R

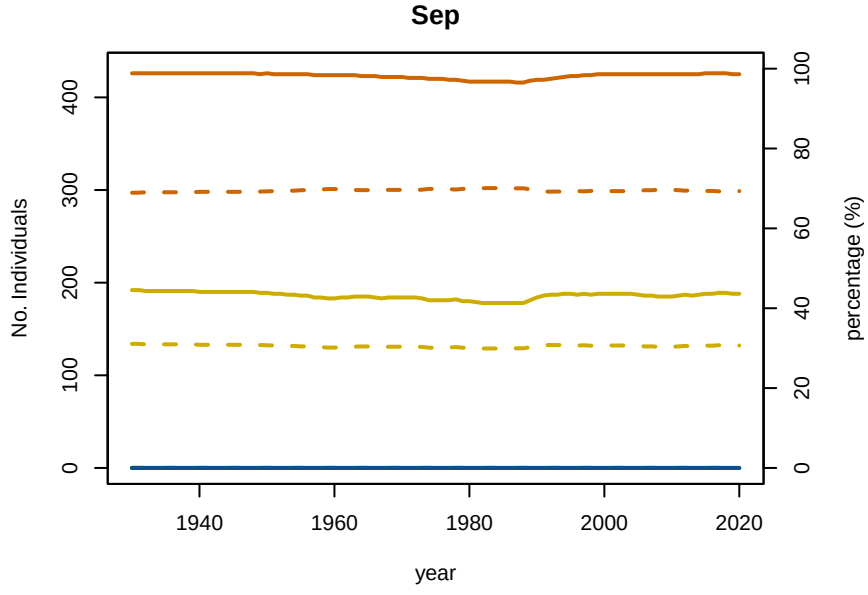


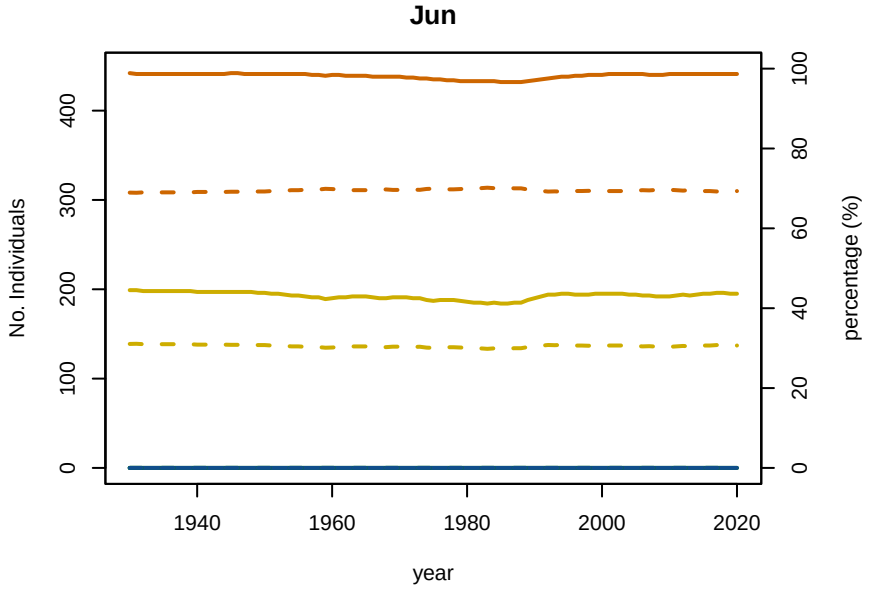


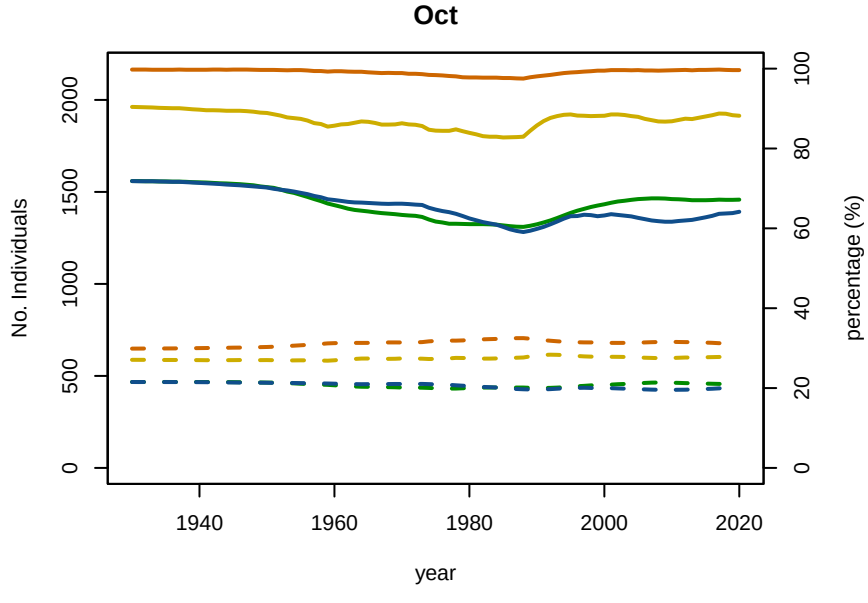






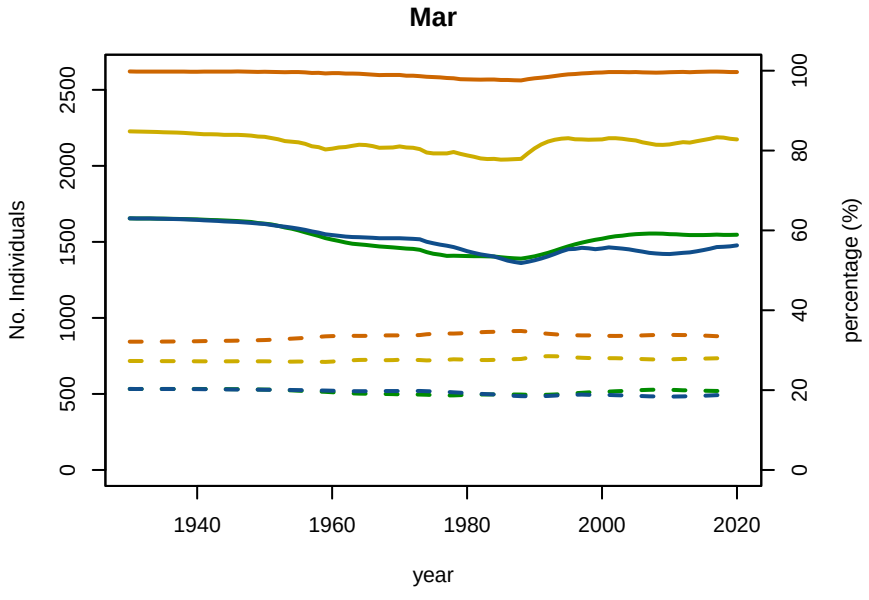


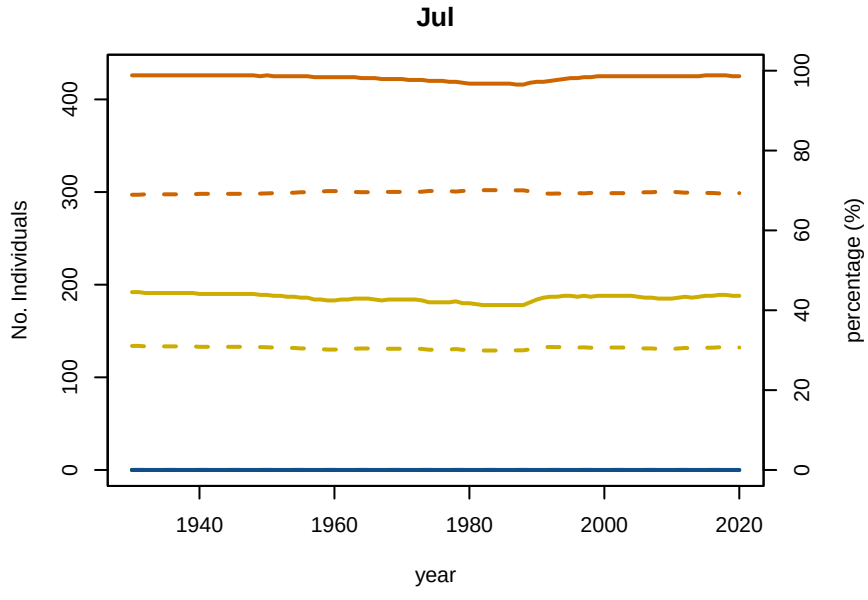


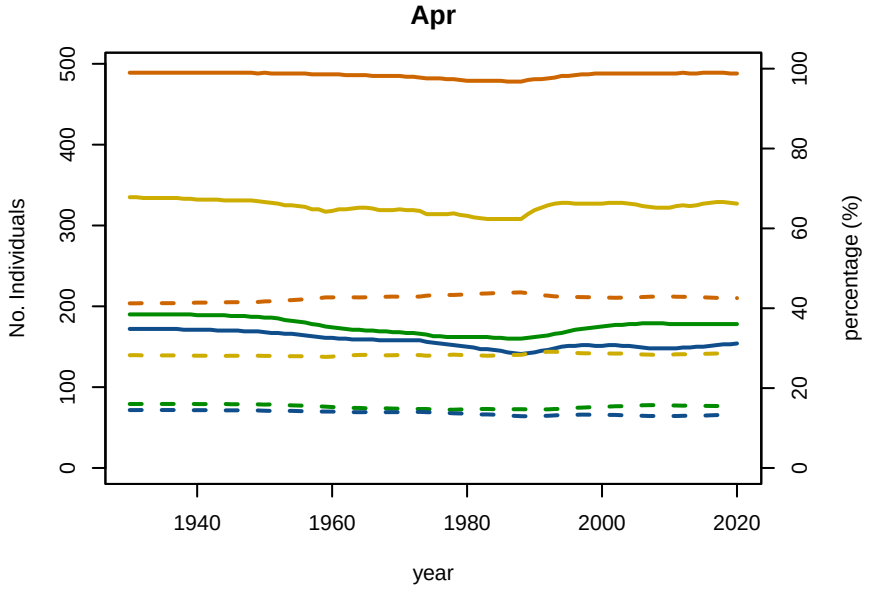


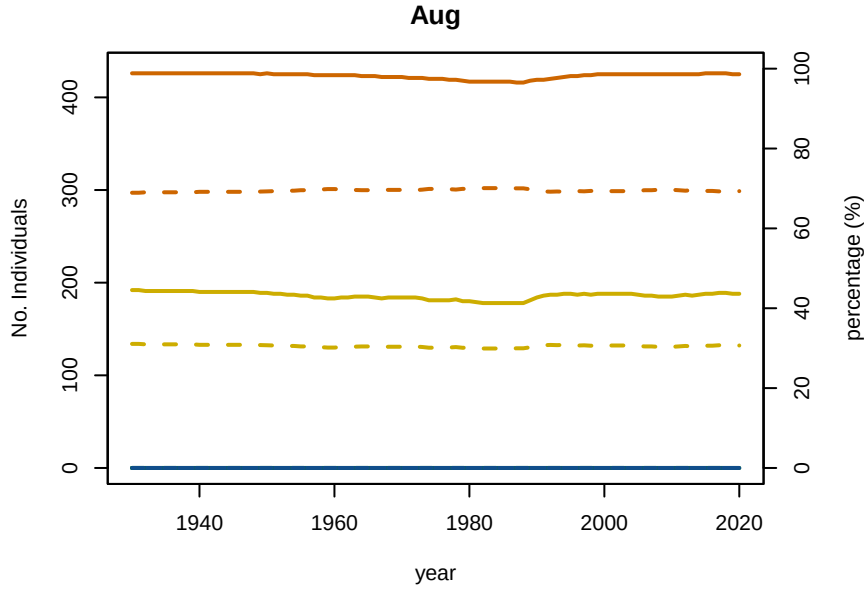
A1−4 A5−9 MatF MatM No Individuals percentage

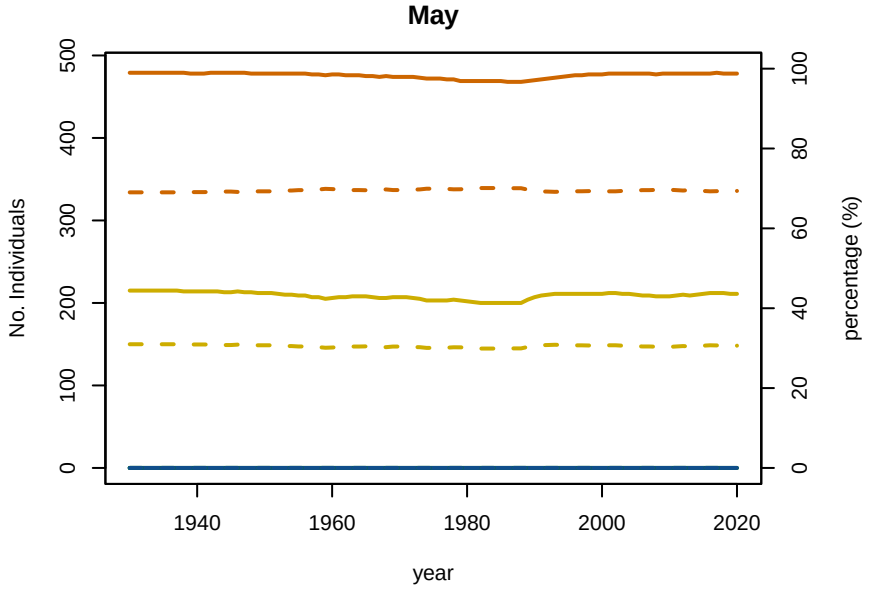
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 3

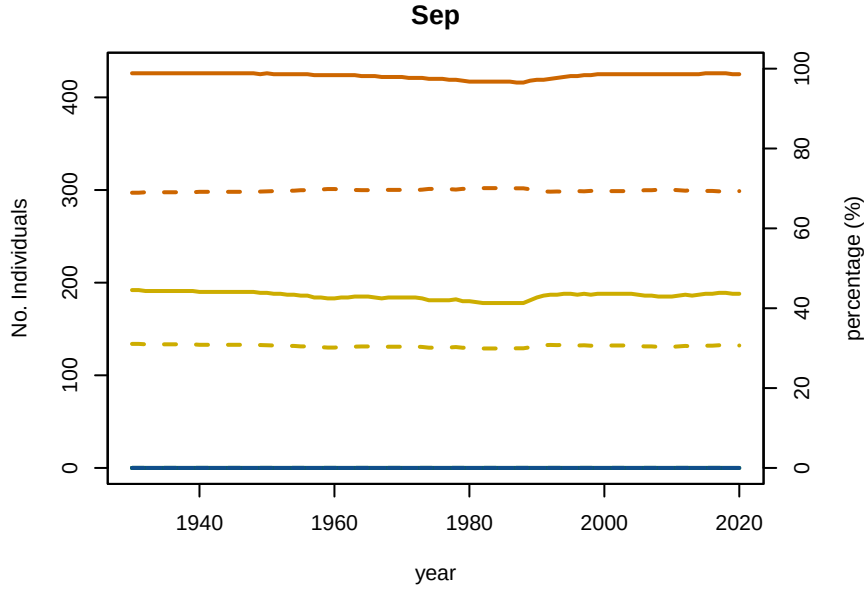


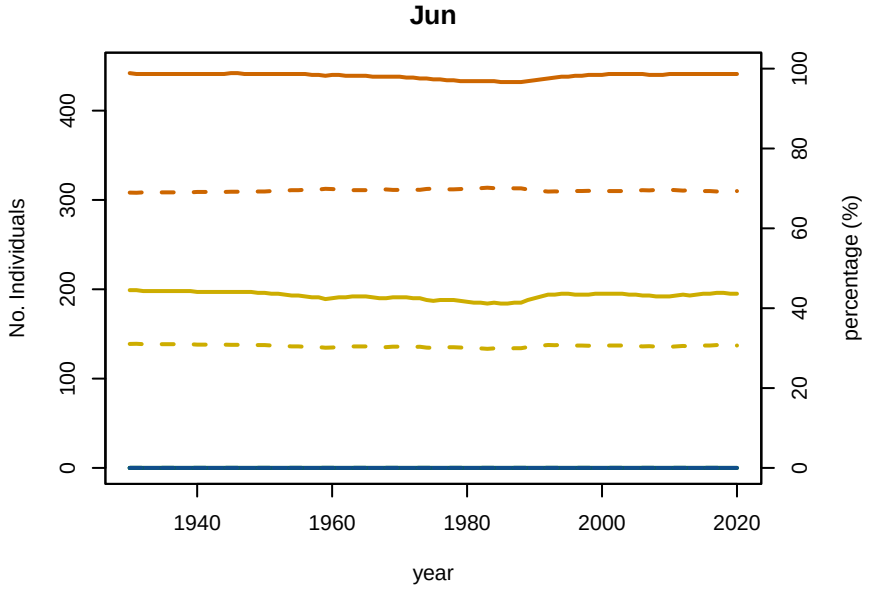


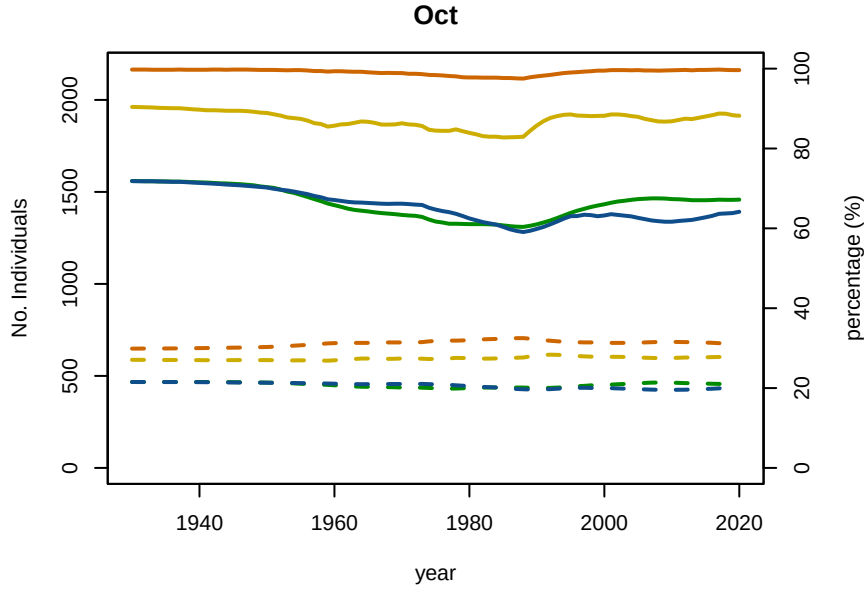






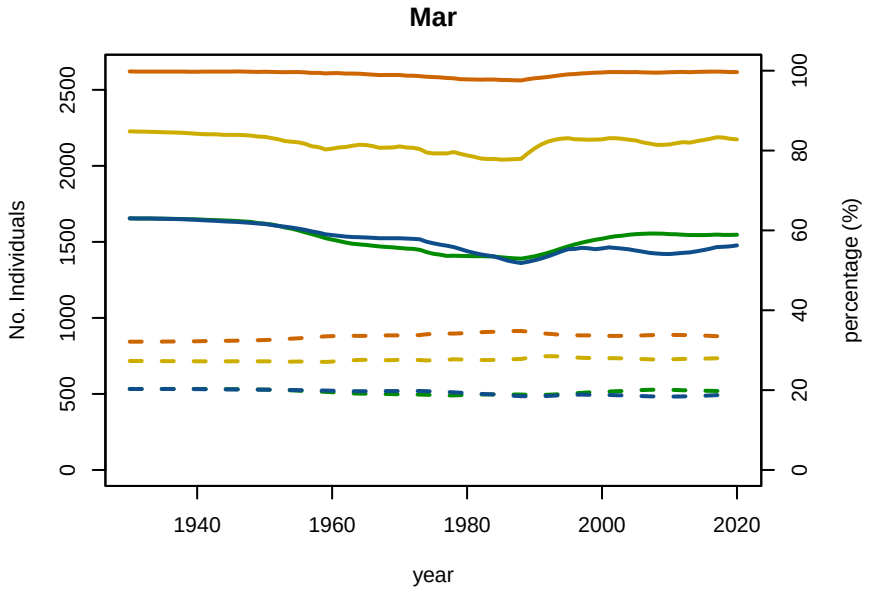


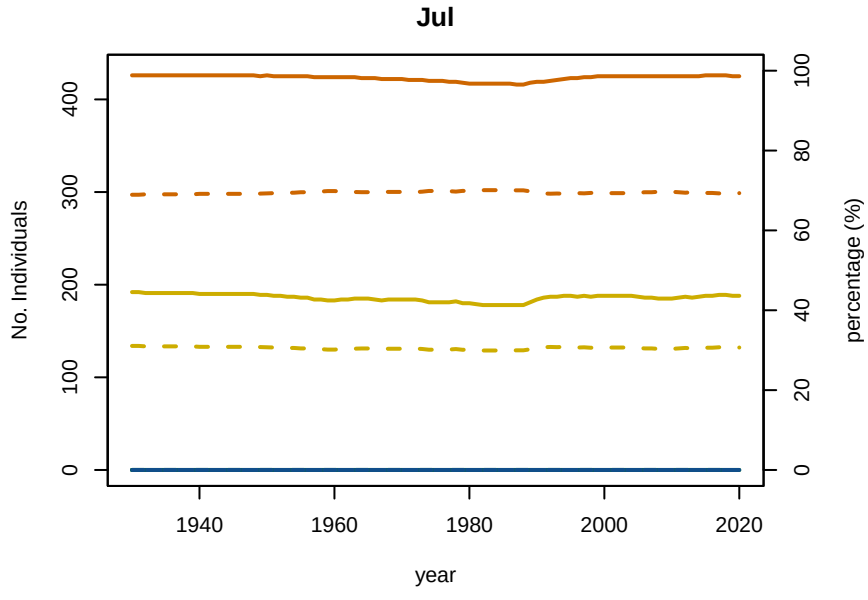


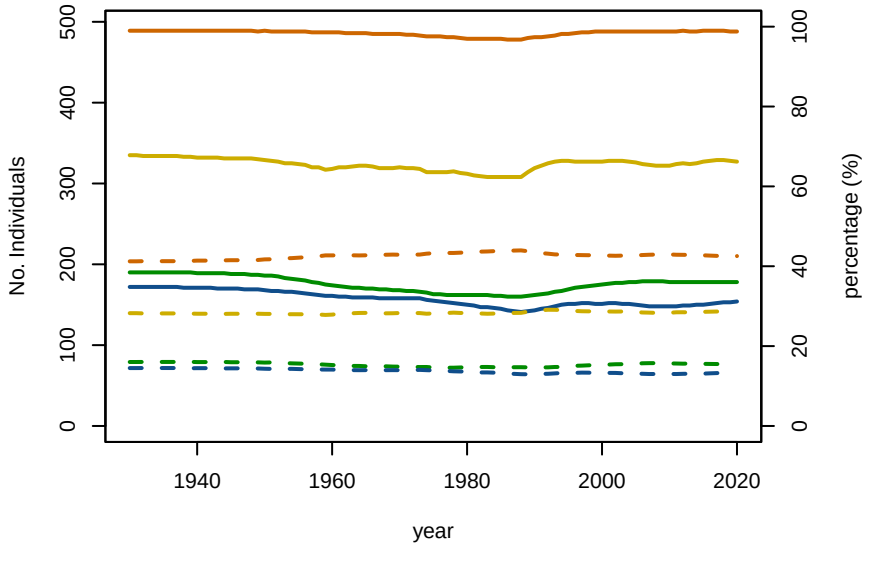


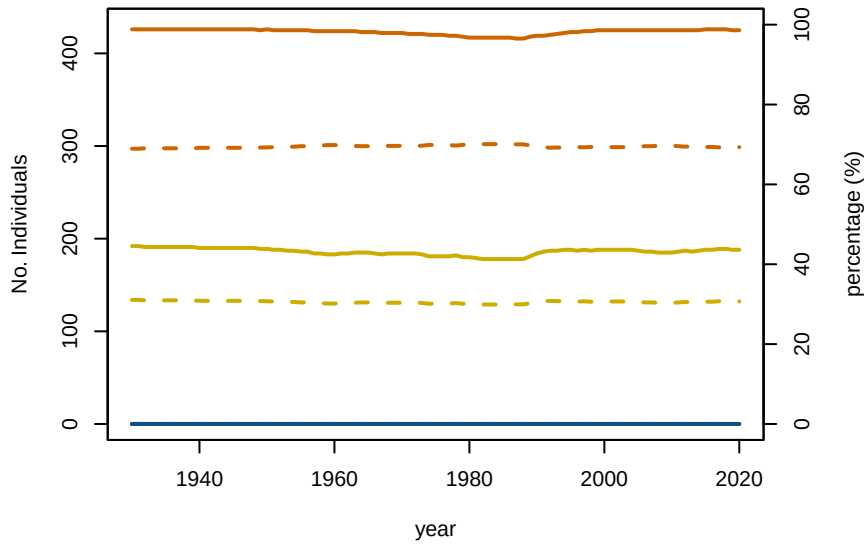
A1−4 A5−9 MatF MatM No Individuals percentage

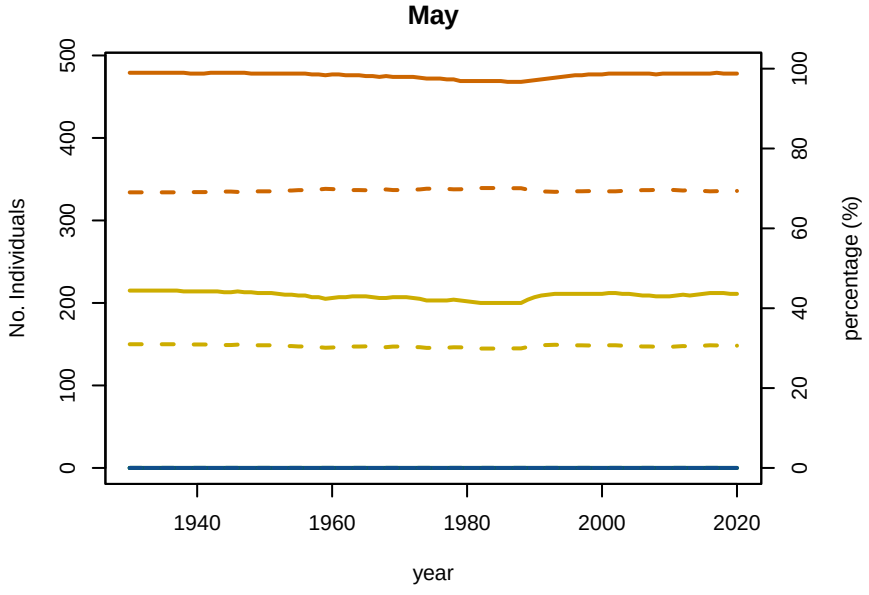
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 4

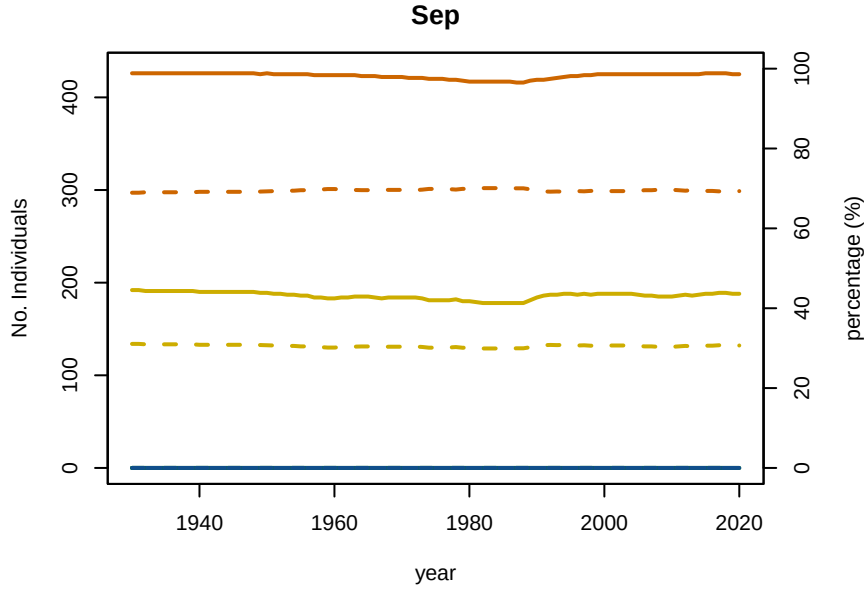


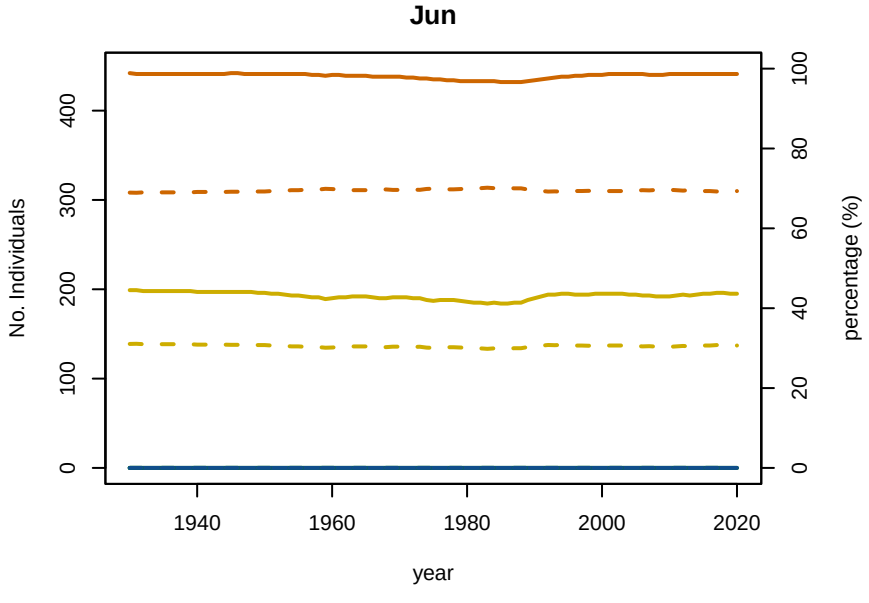


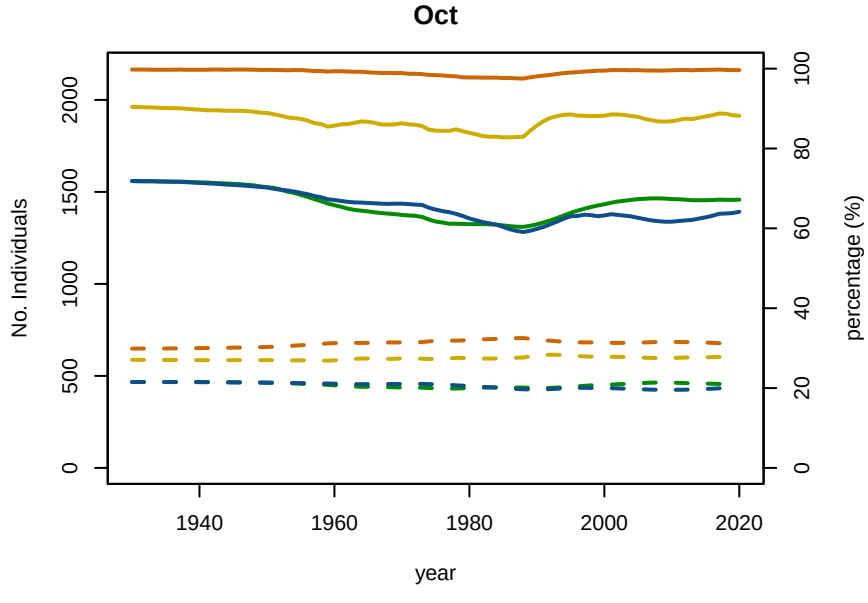






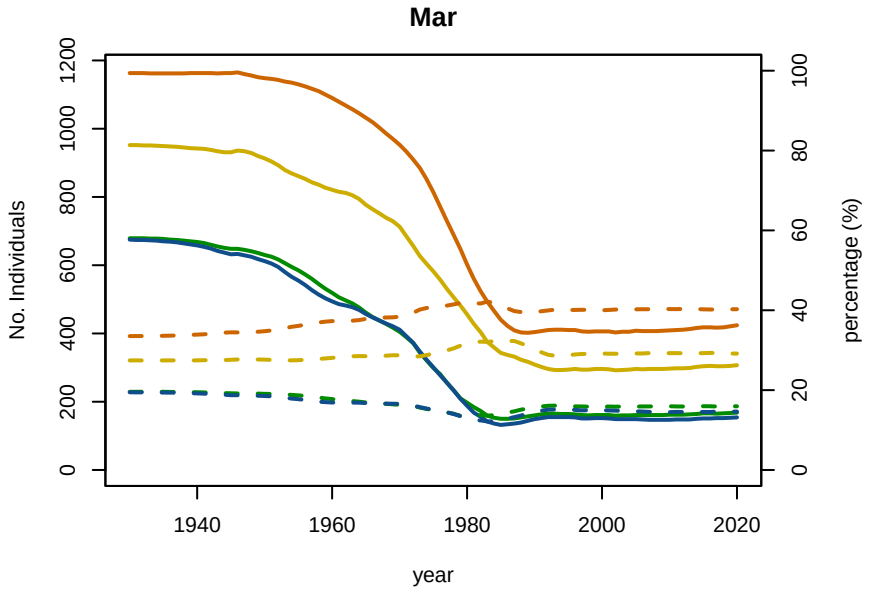


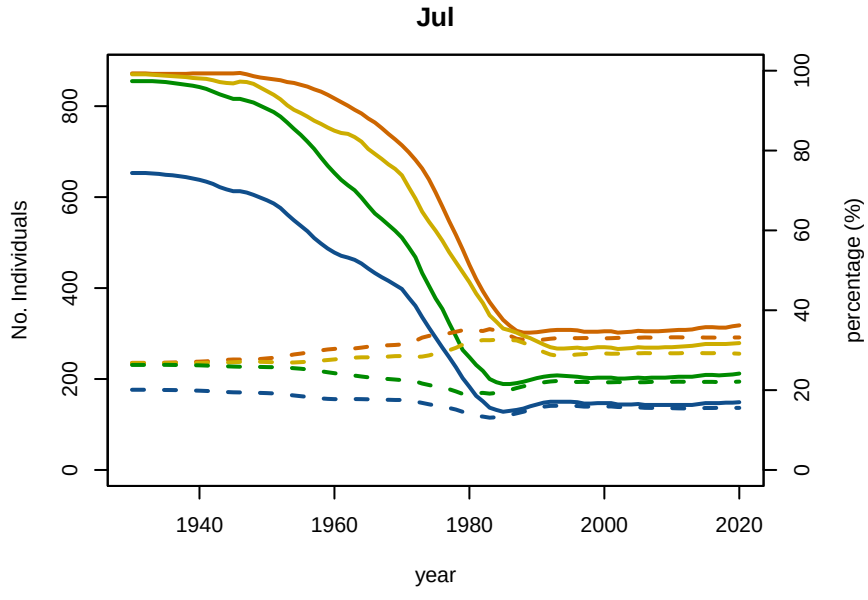


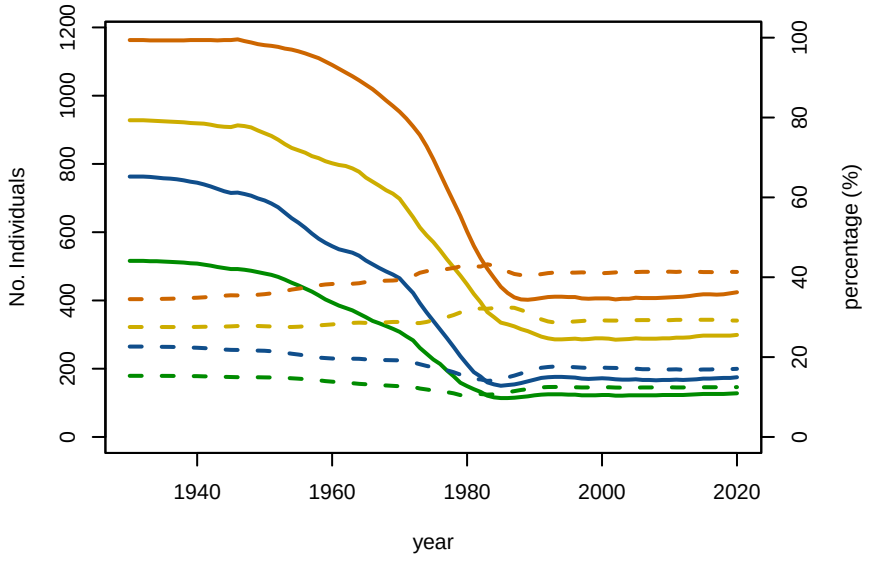


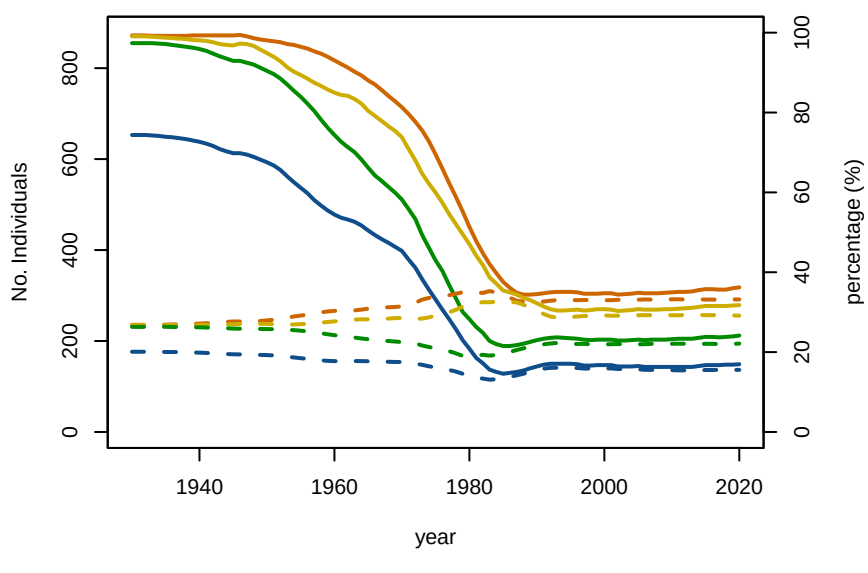
A1−4 A5−9 MatF MatM No Individuals percentage

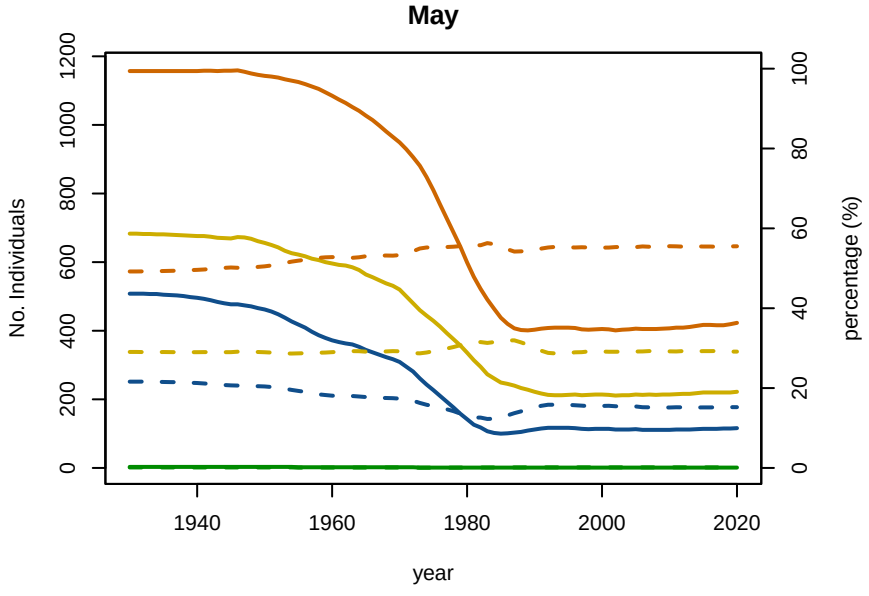
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 5

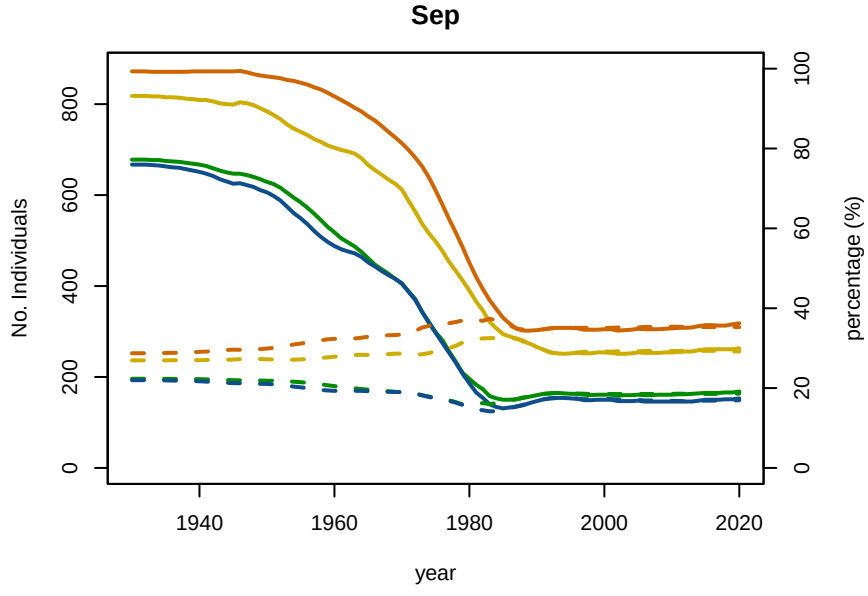


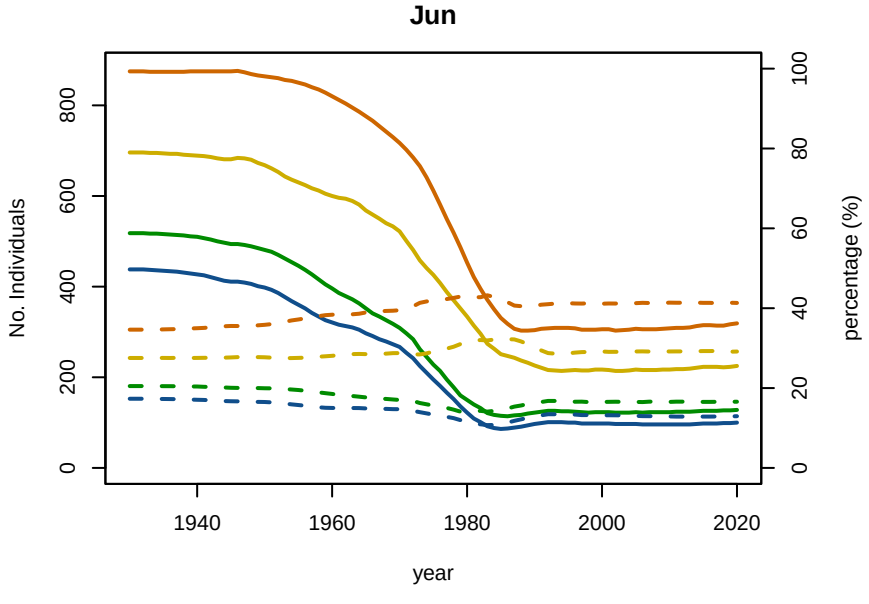


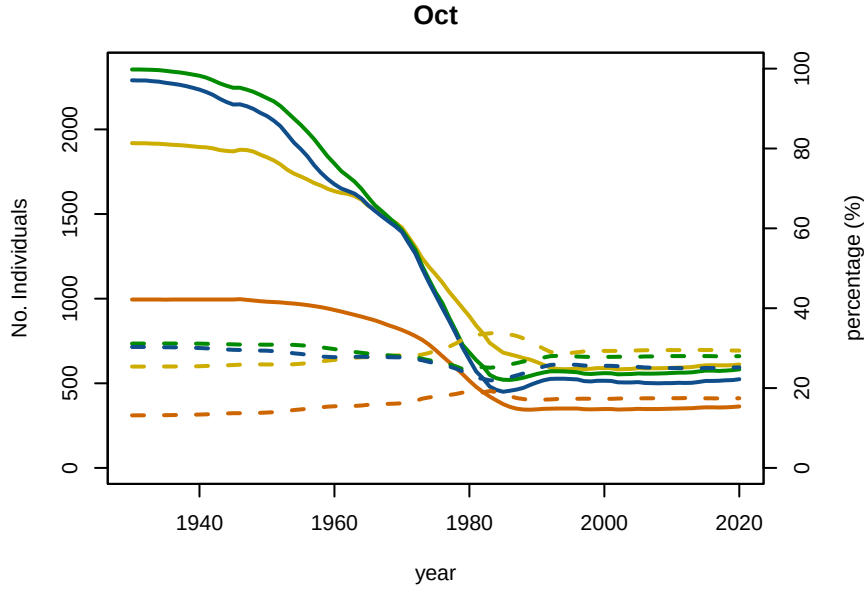






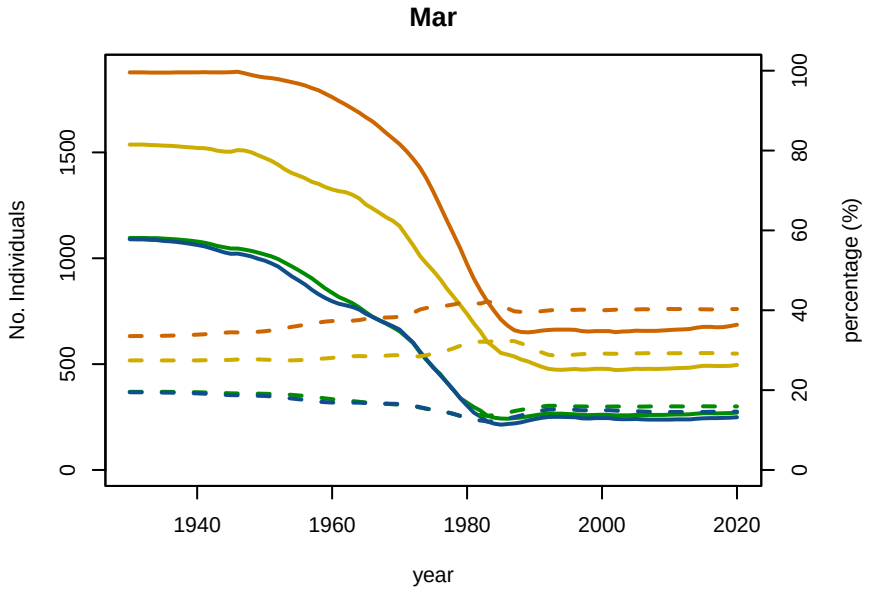


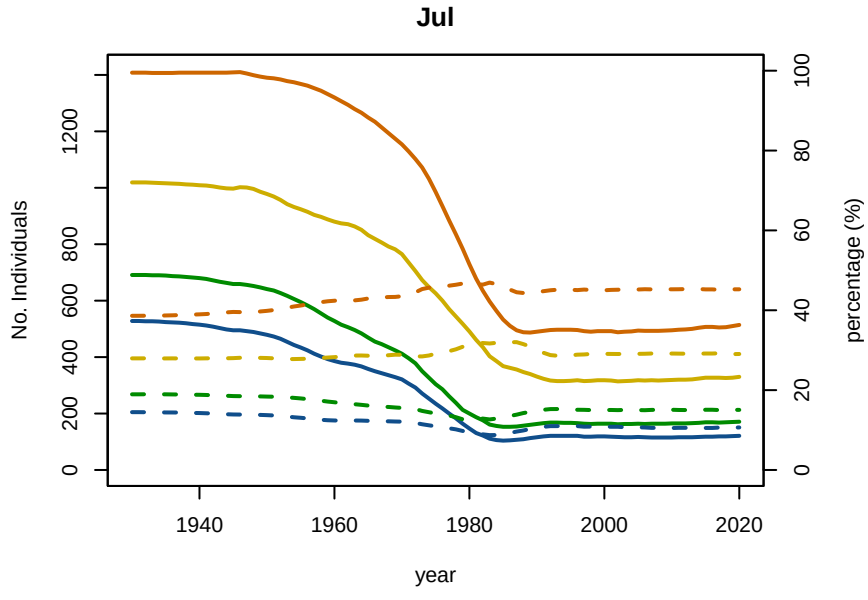


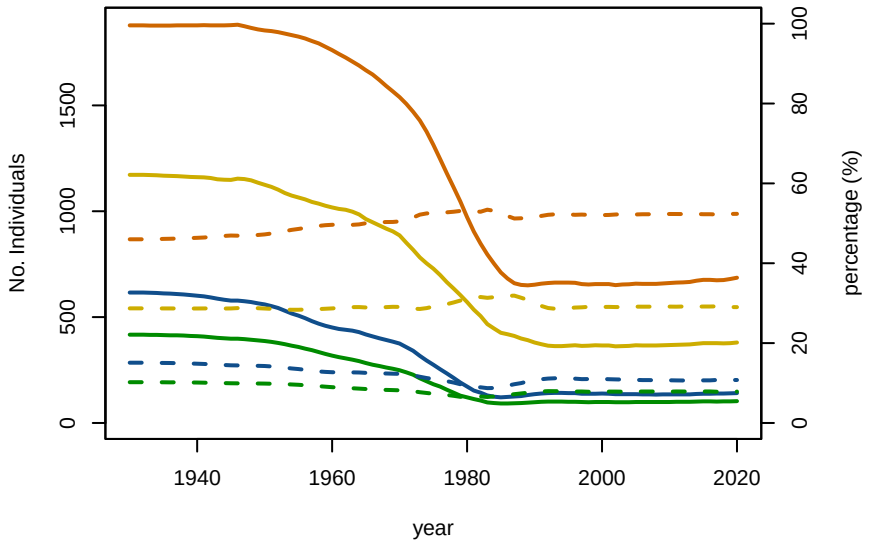


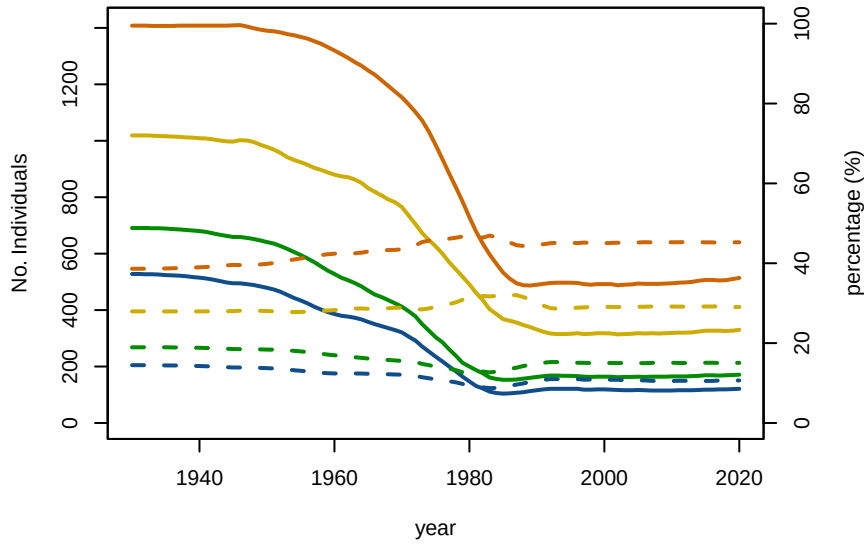
A1−4 A5−9 MatF MatM No Individuals percentage

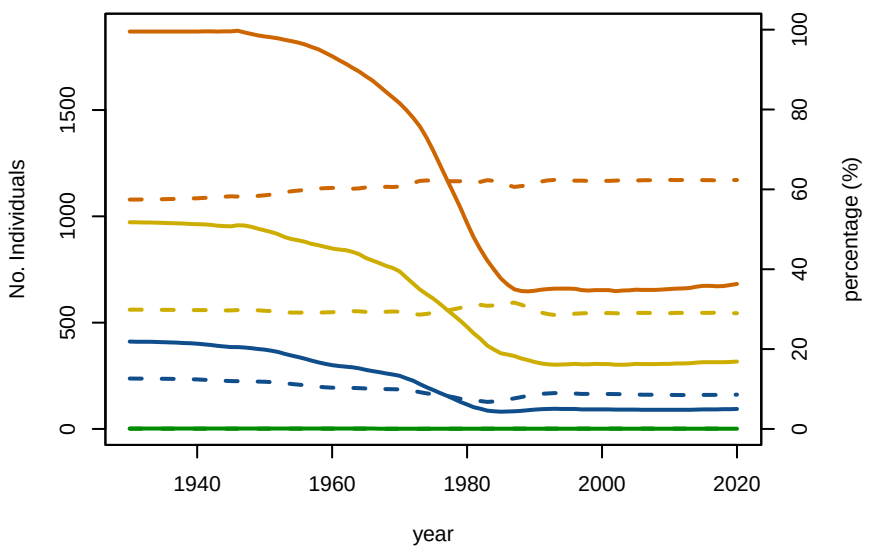
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 6E

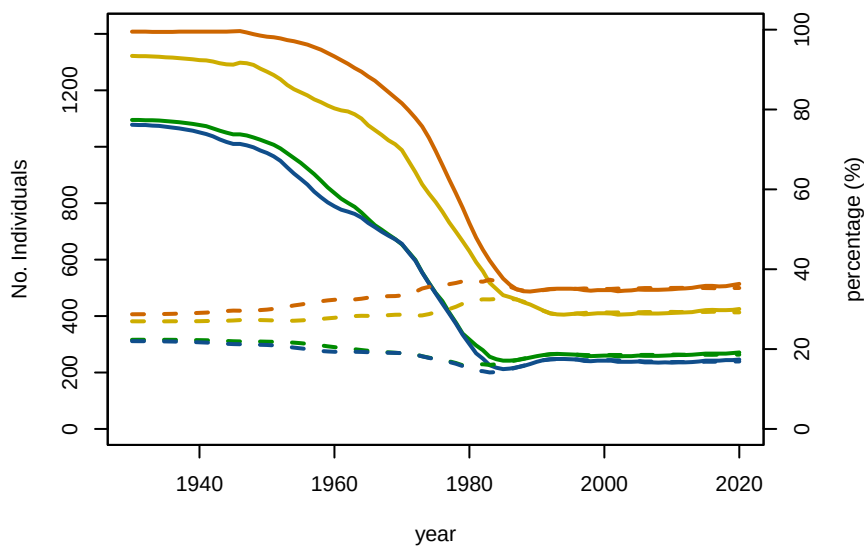


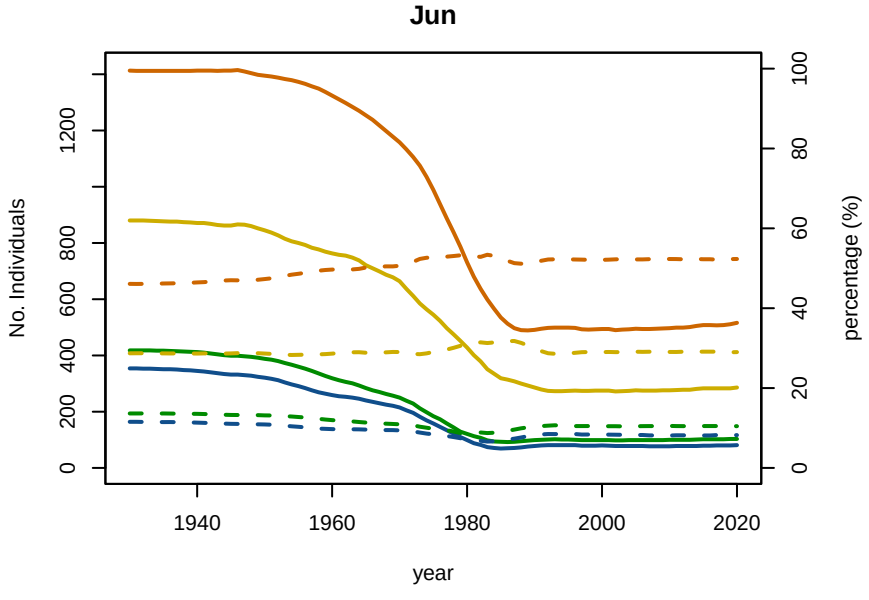


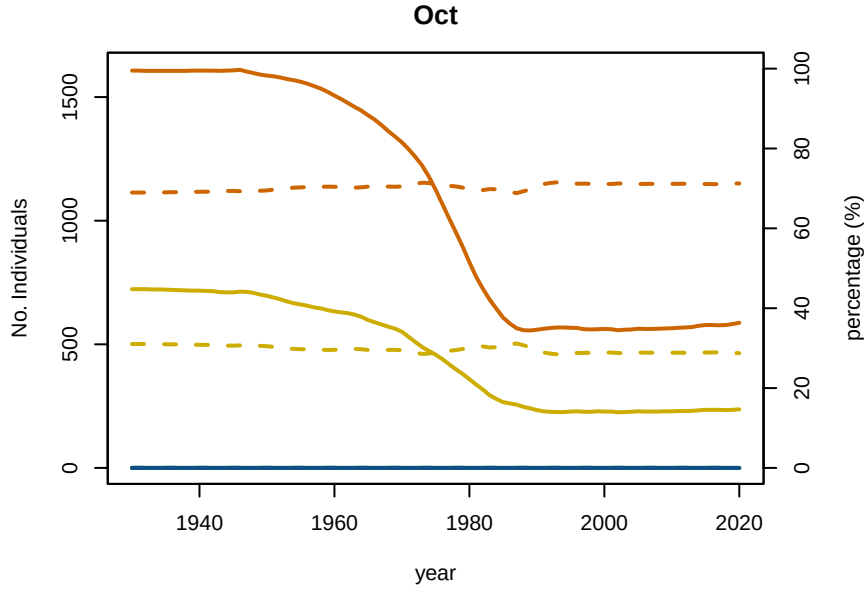






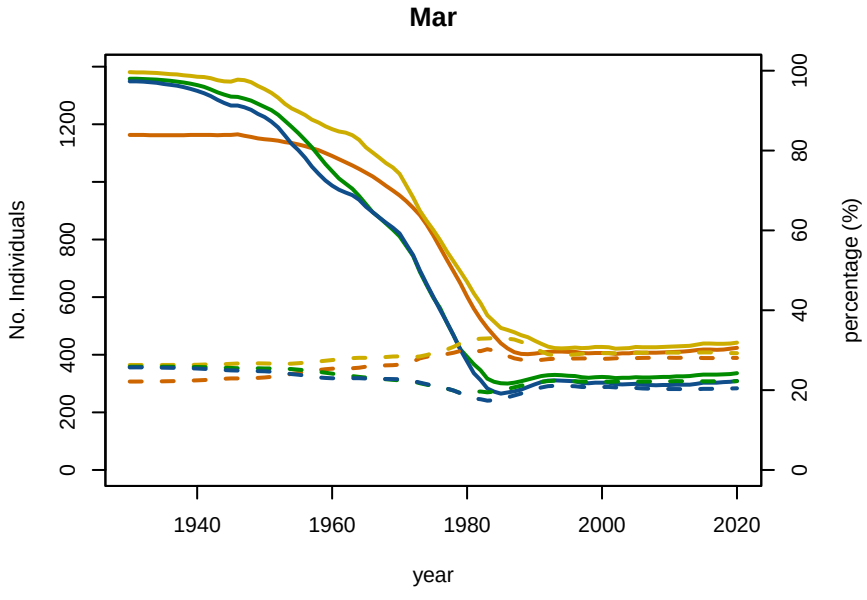


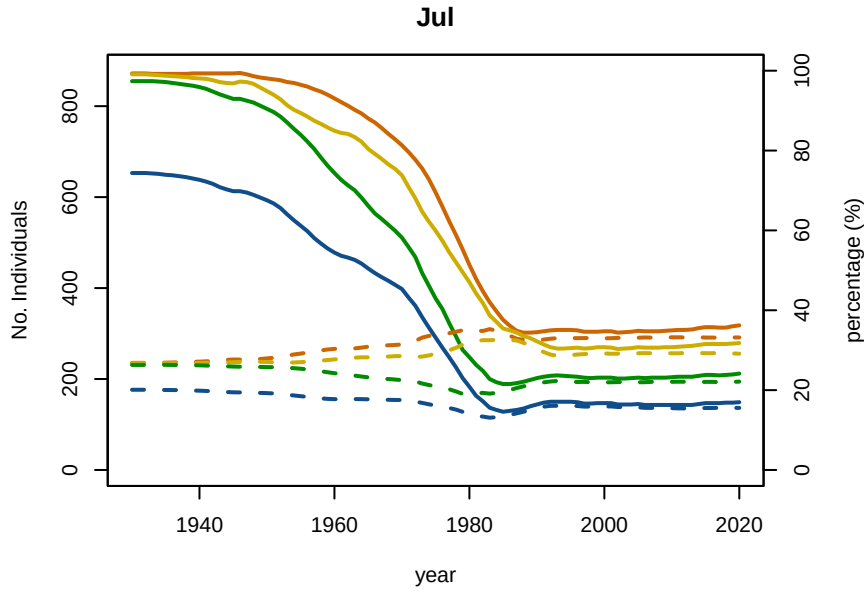


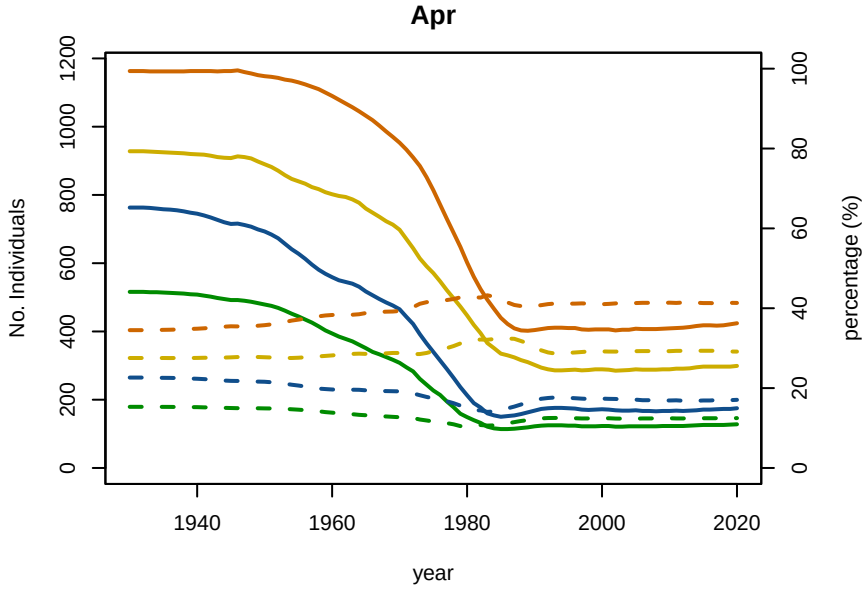


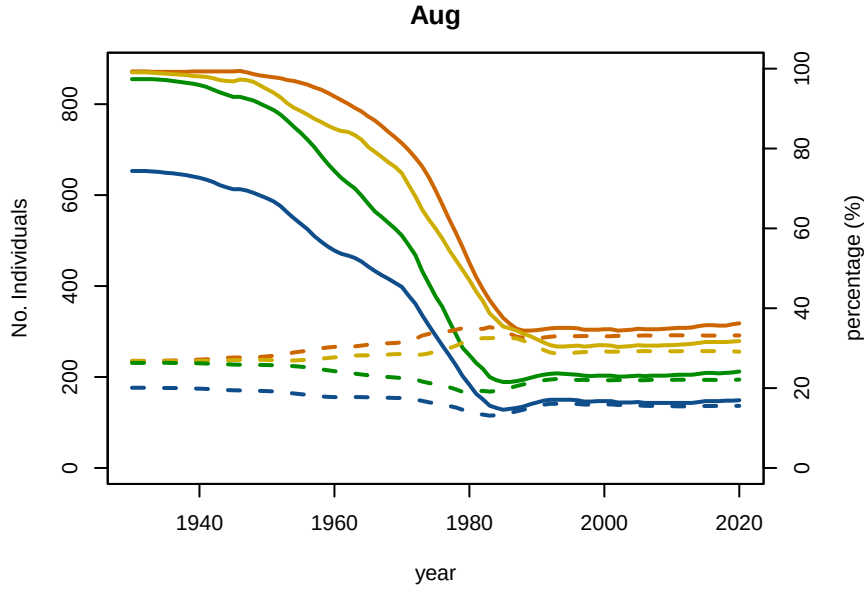
A1−4 A5−9 MatF MatM No Individuals percentage

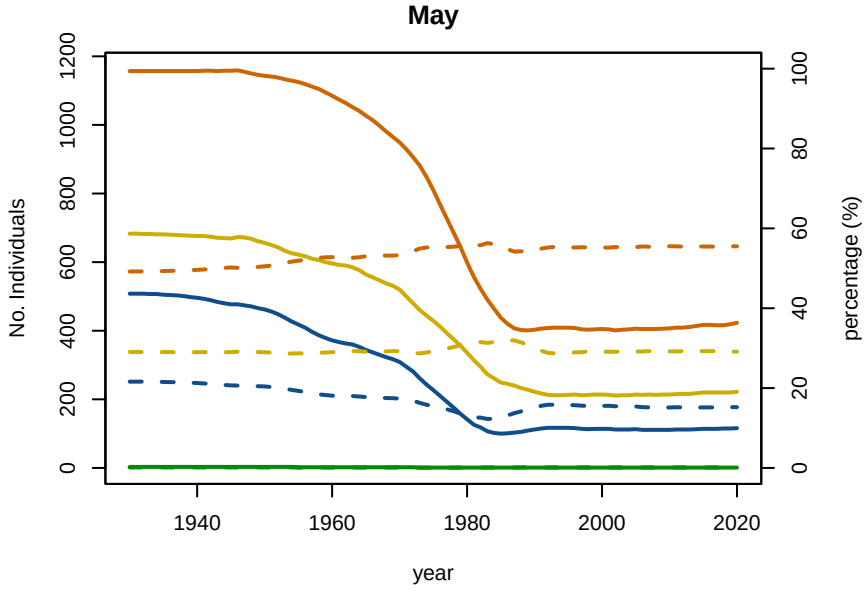
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 6W

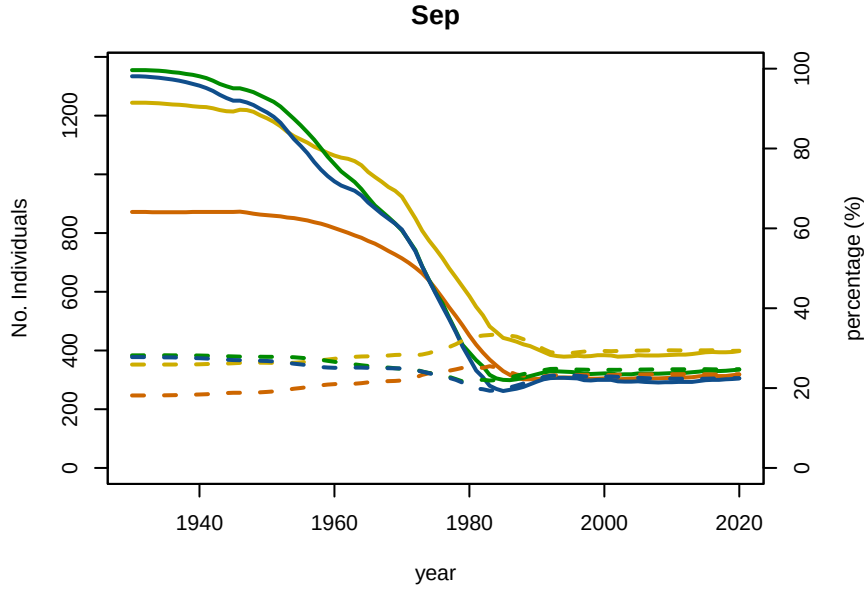


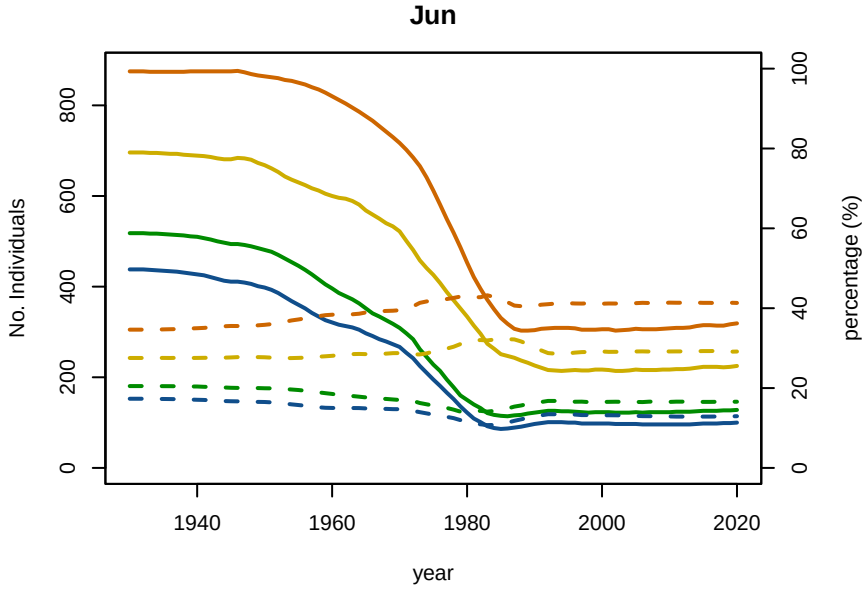


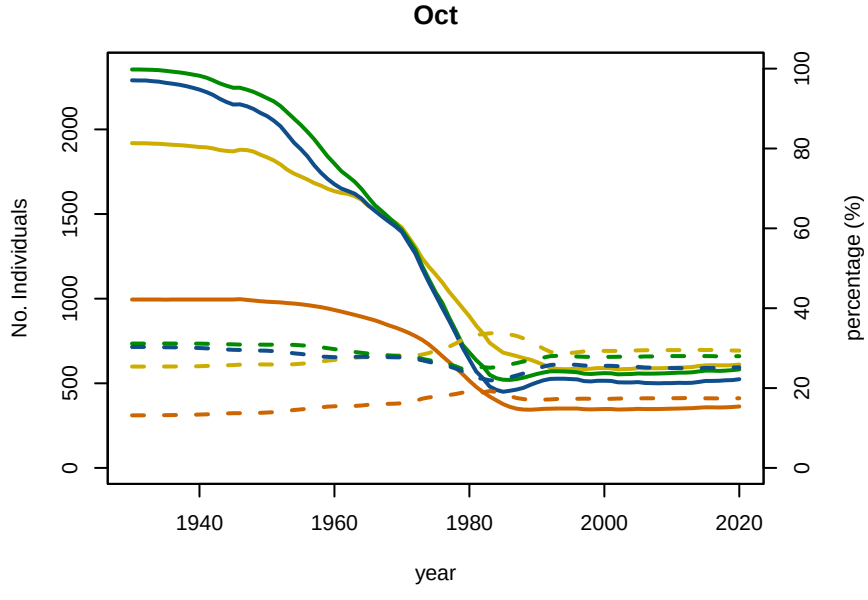






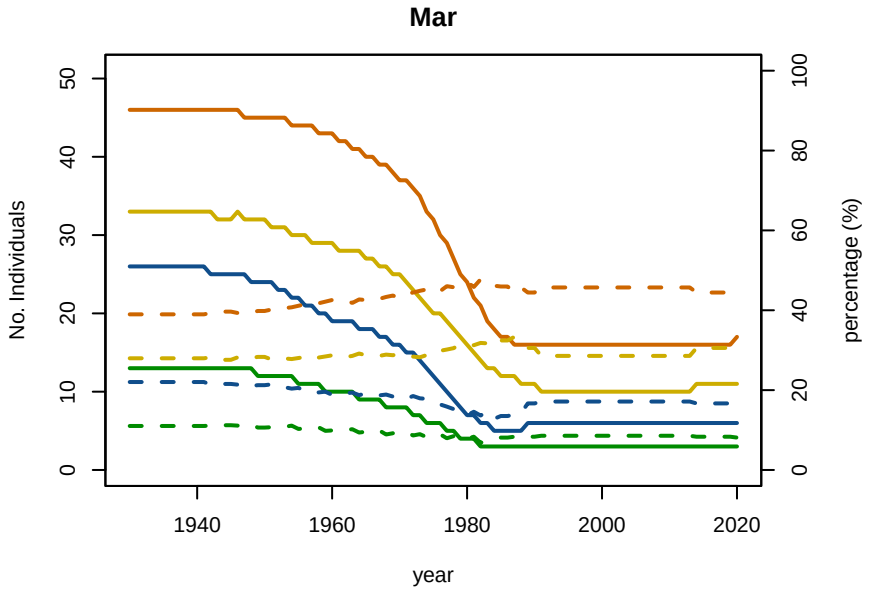


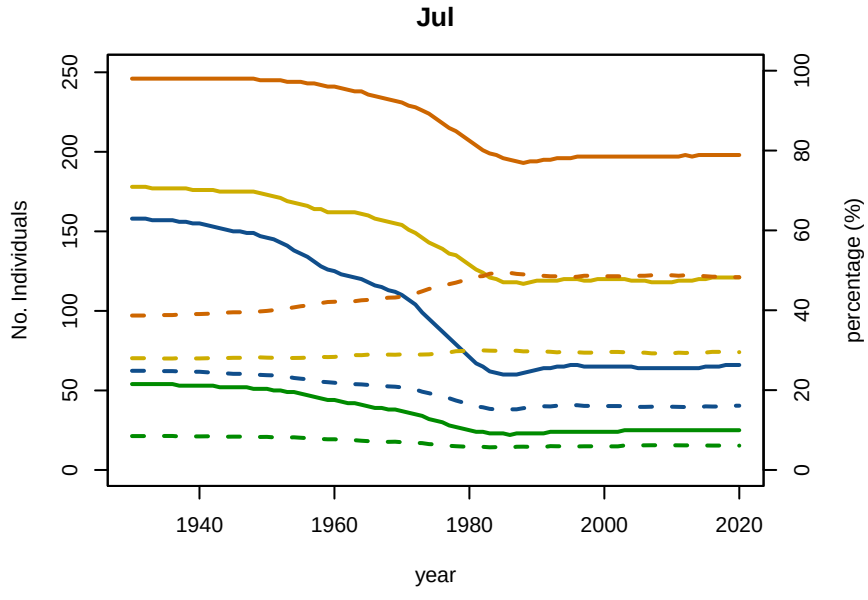


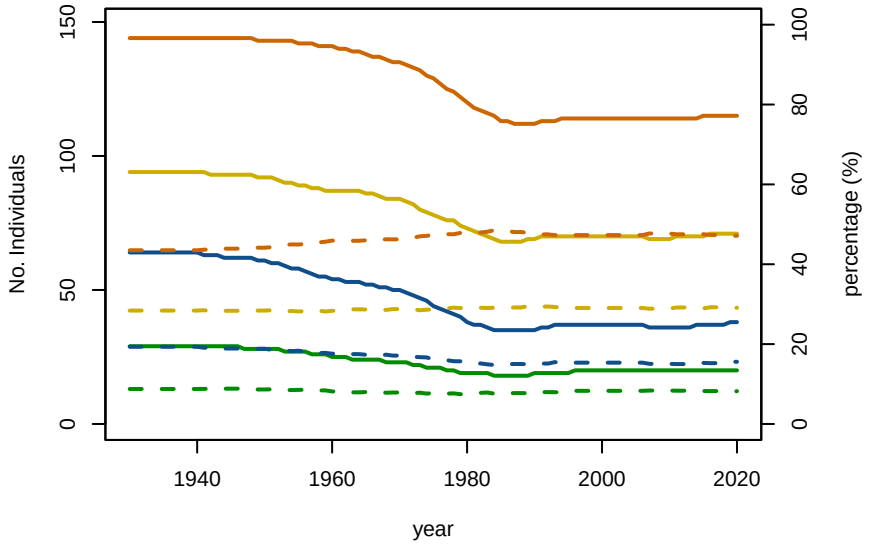


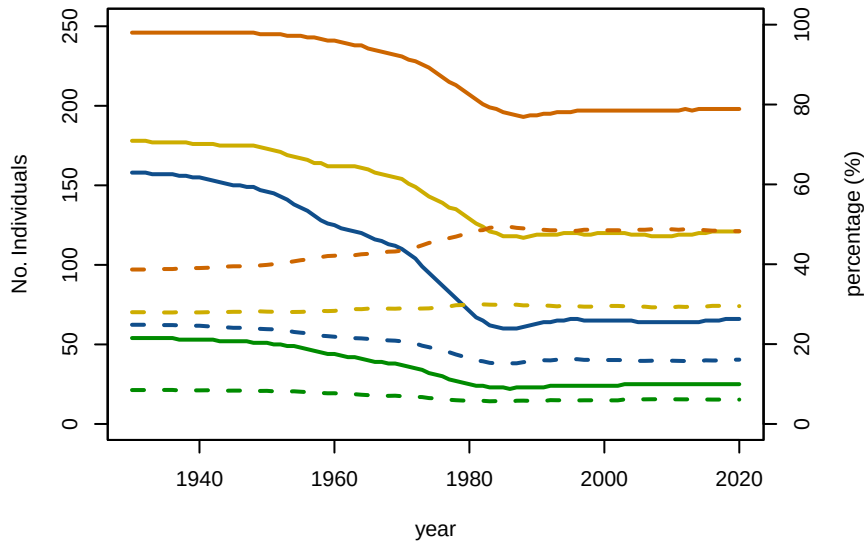
A1−4 A5−9 MatF MatM No Individuals percentage

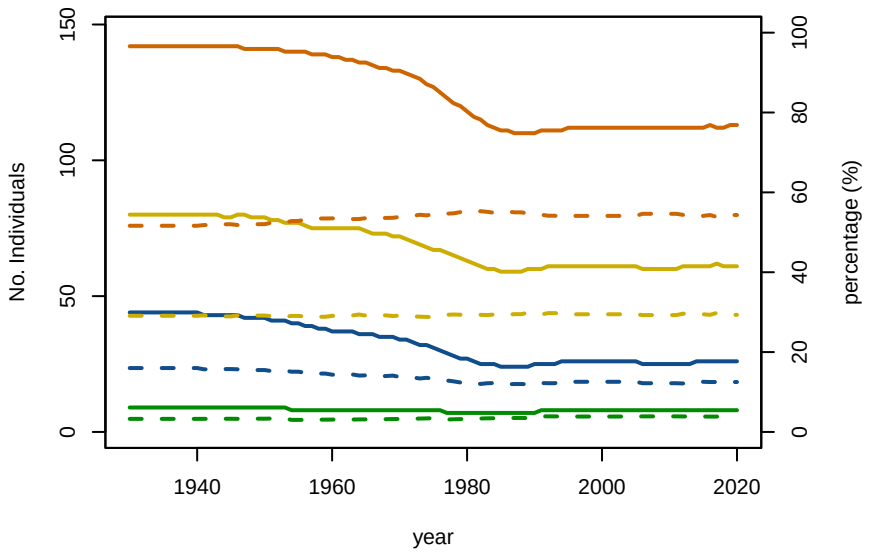
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7CN

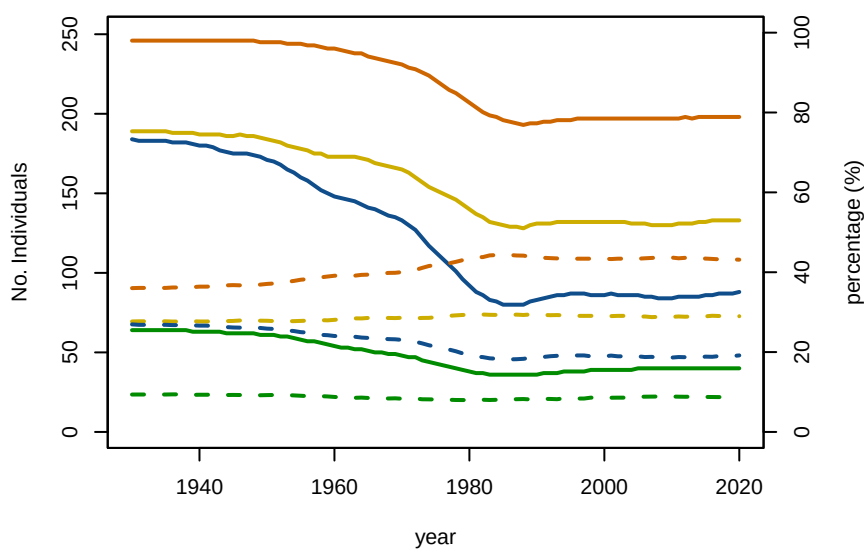


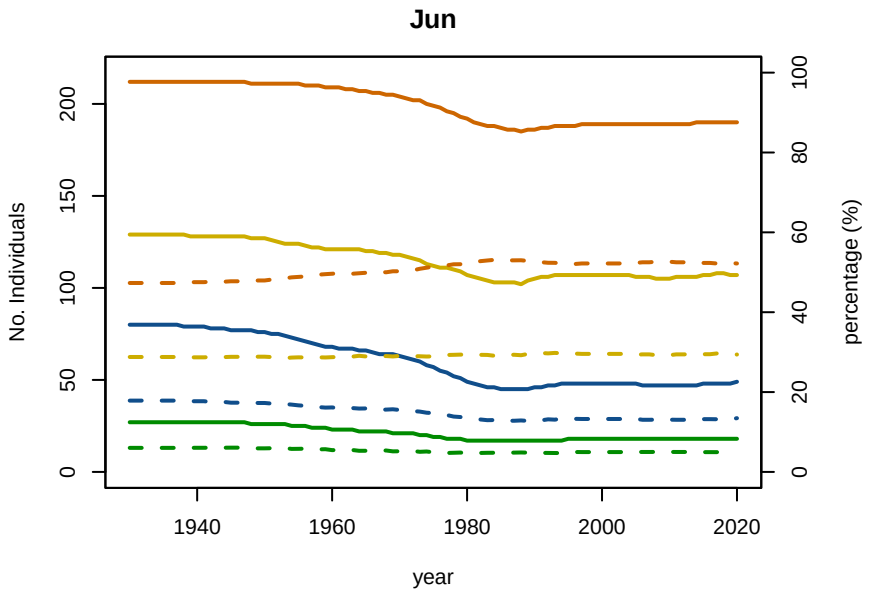


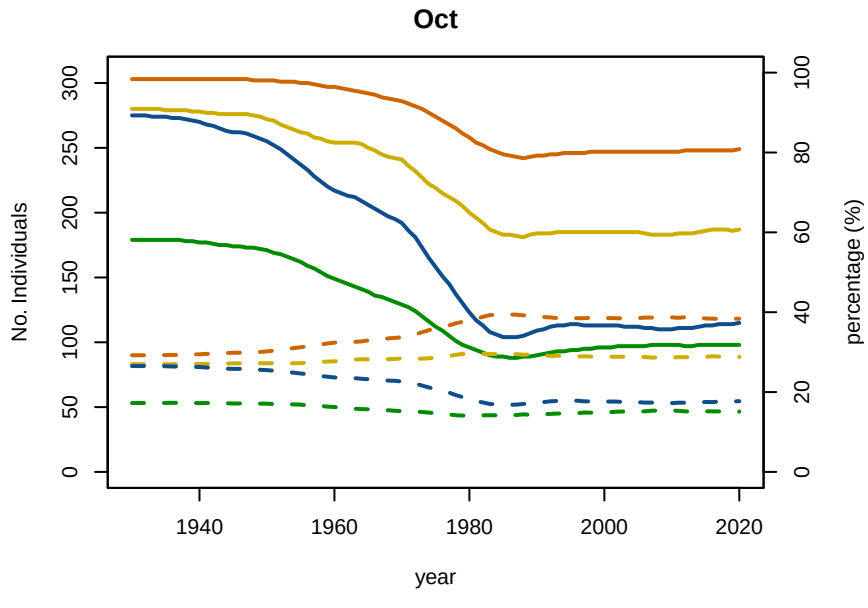






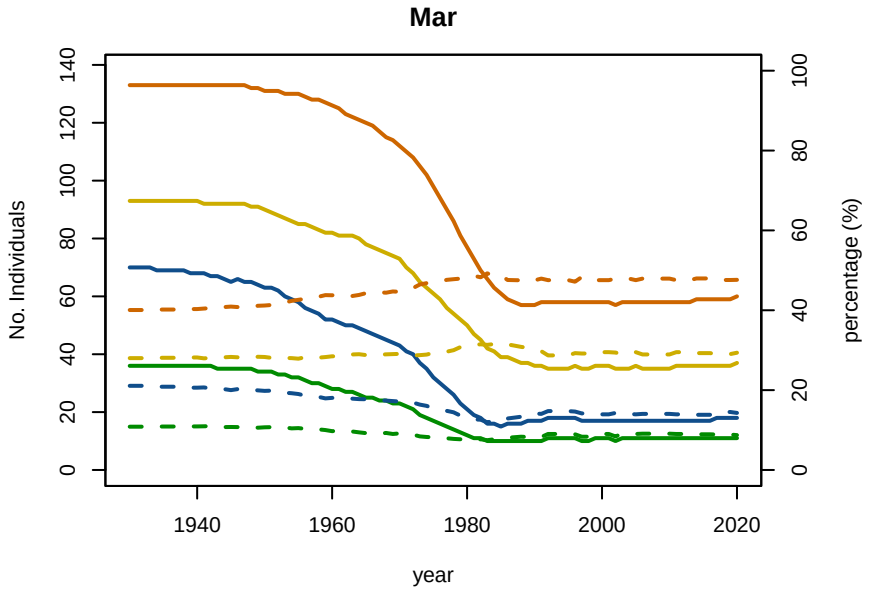


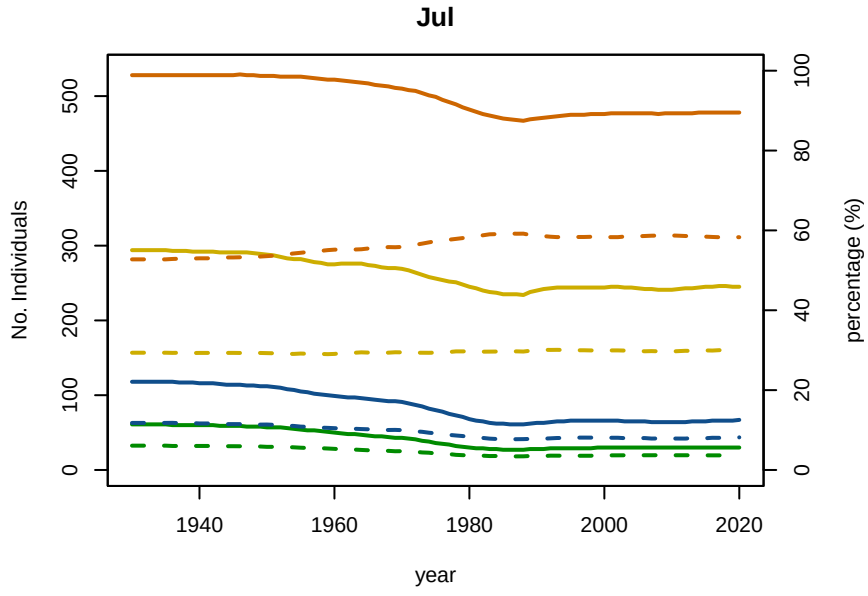


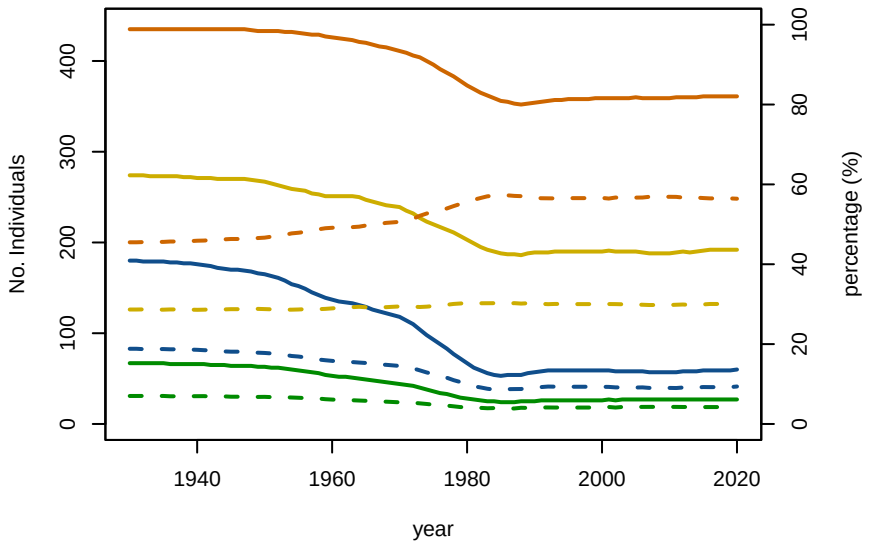


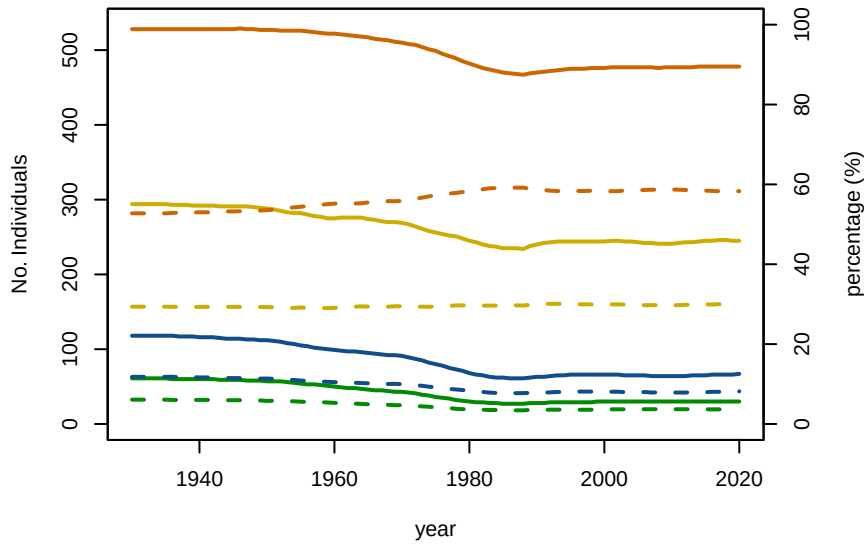
A1−4 A5−9 MatF MatM No Individuals percentage

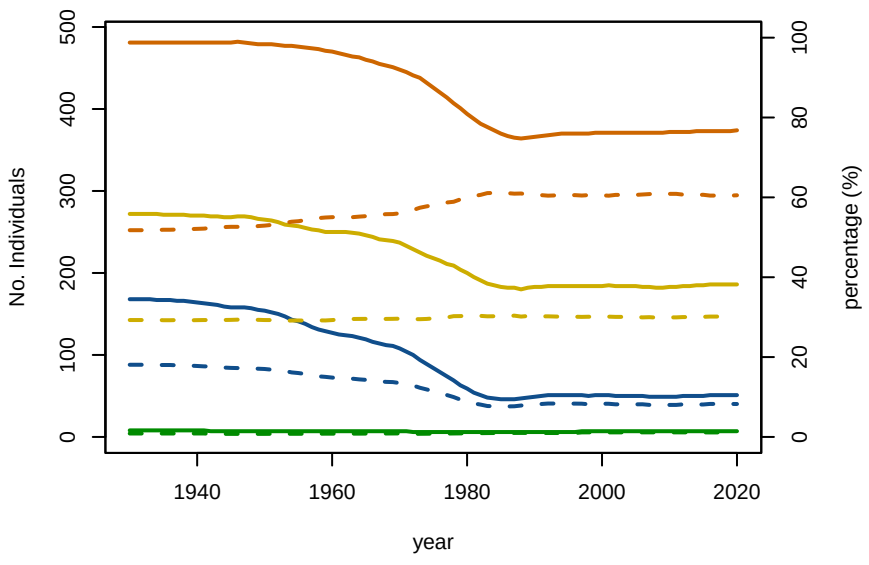
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7CS

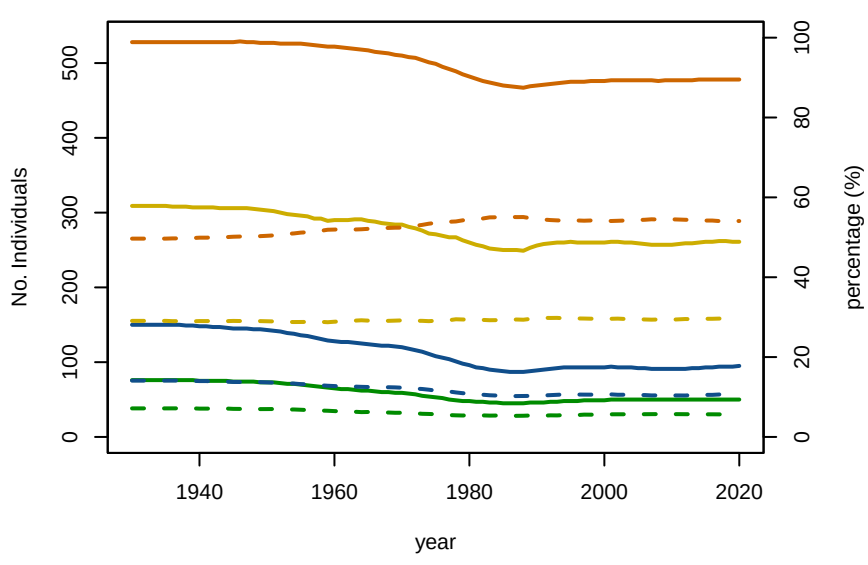


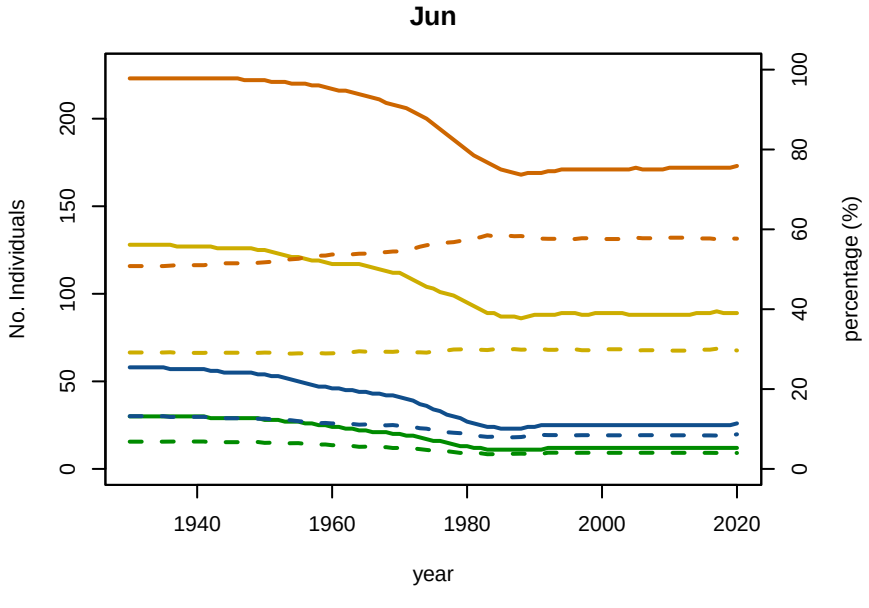


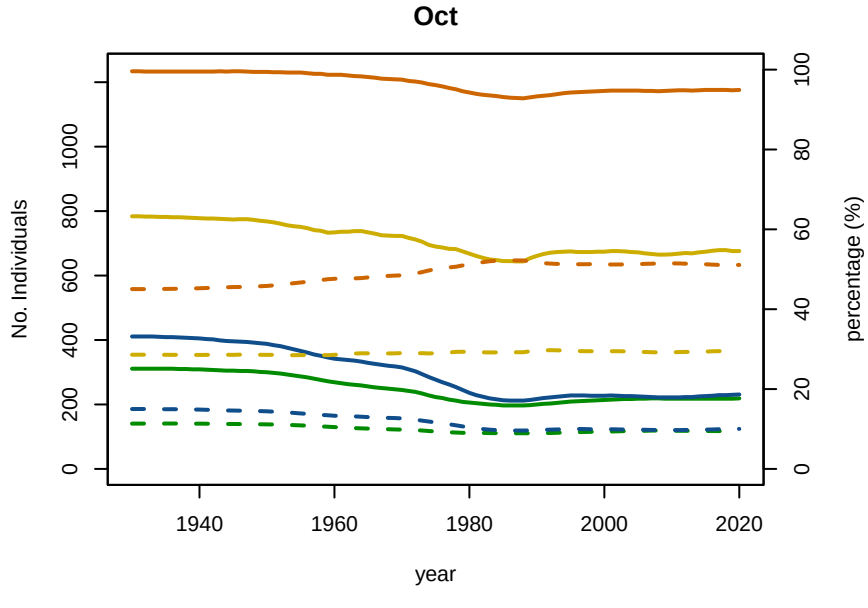






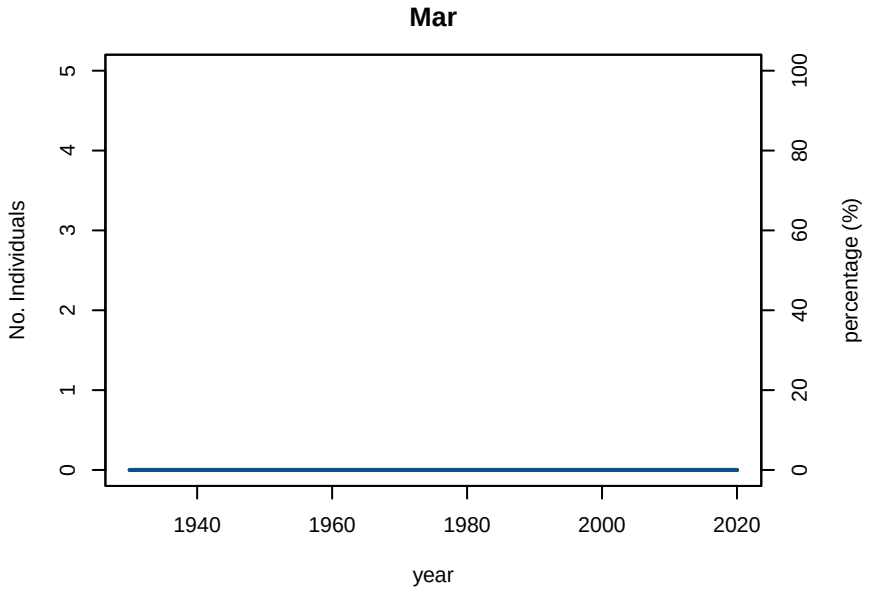


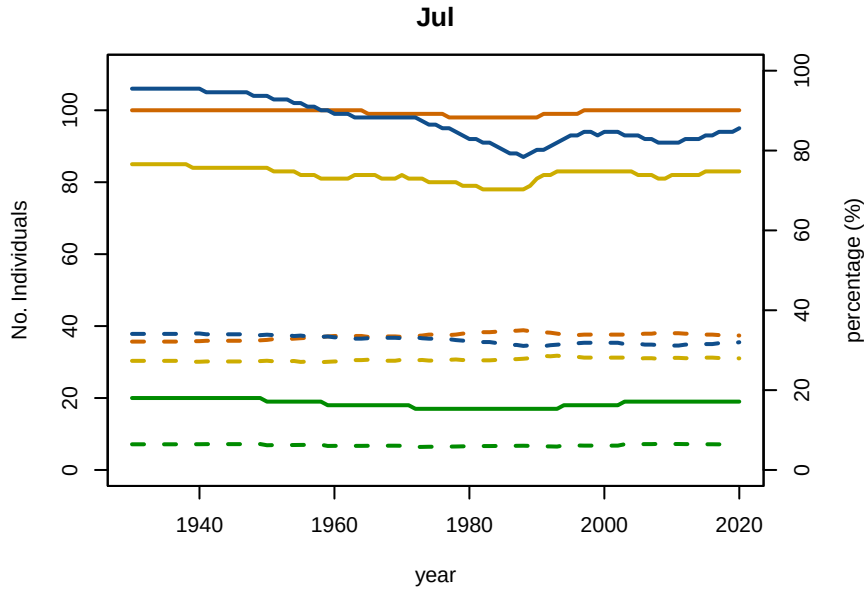


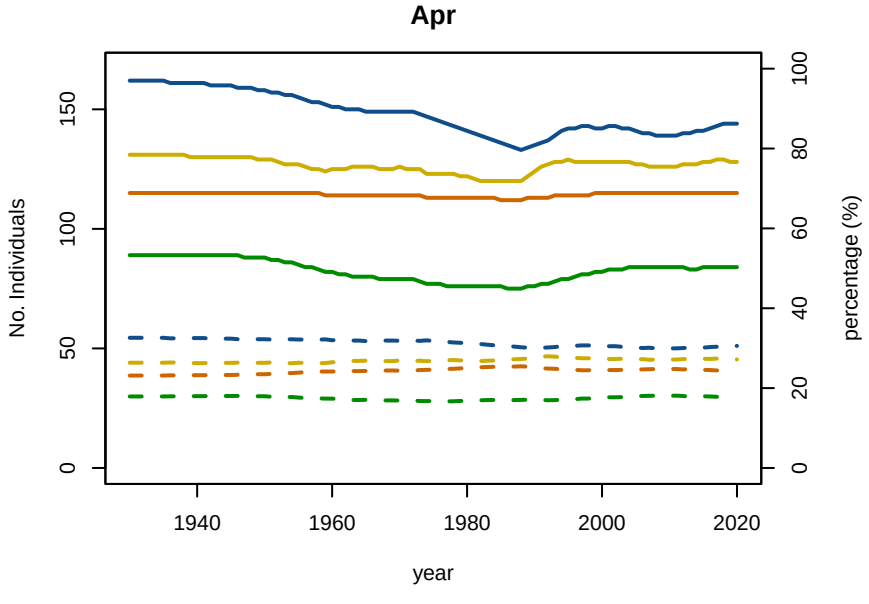


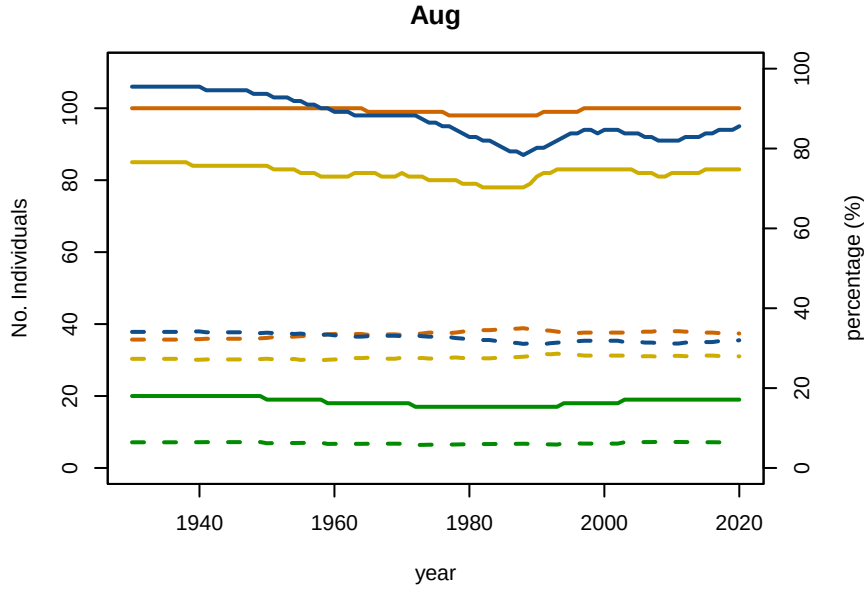
A1−4 A5−9 MatF MatM No Individuals percentage

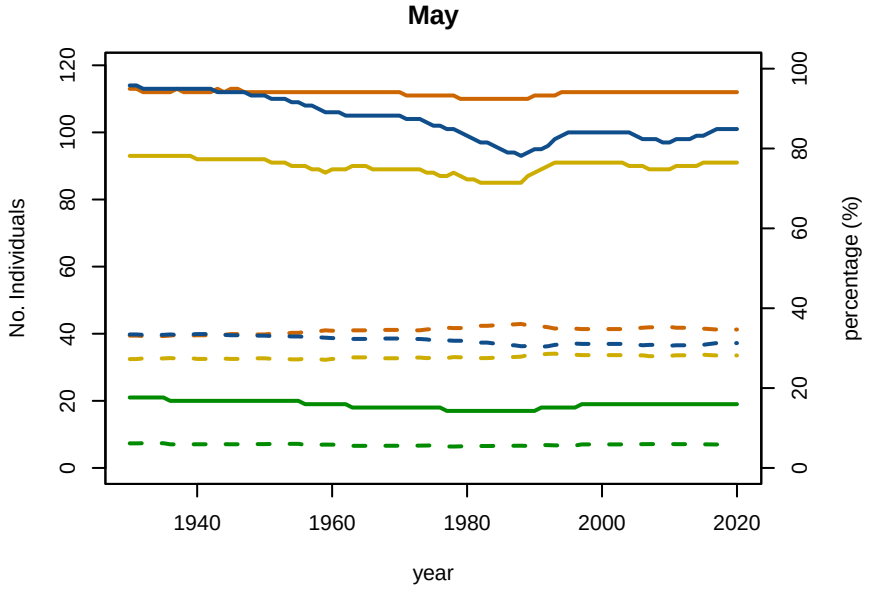
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7E

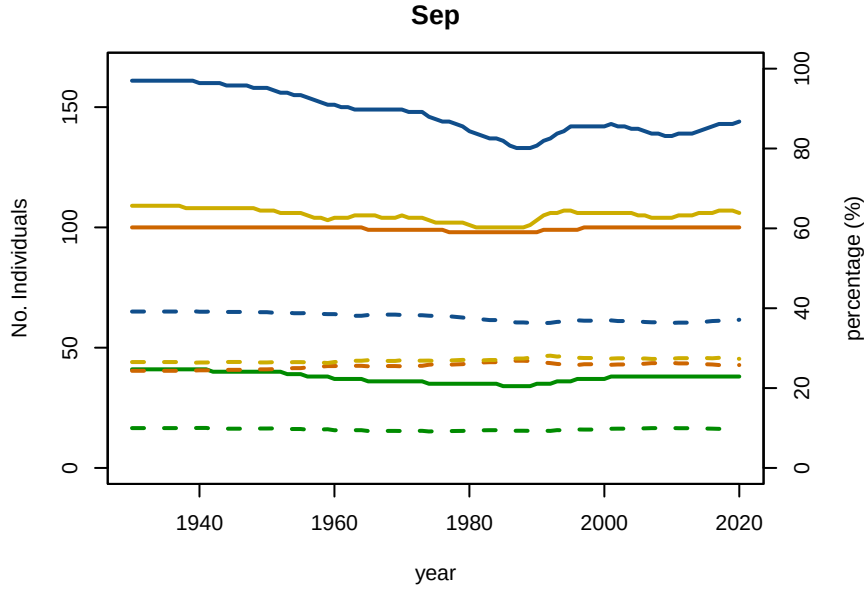


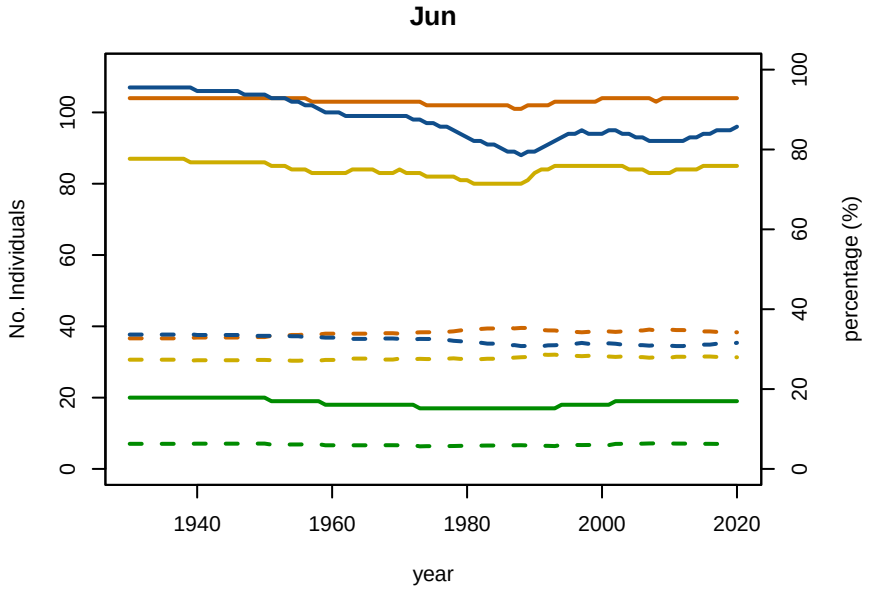


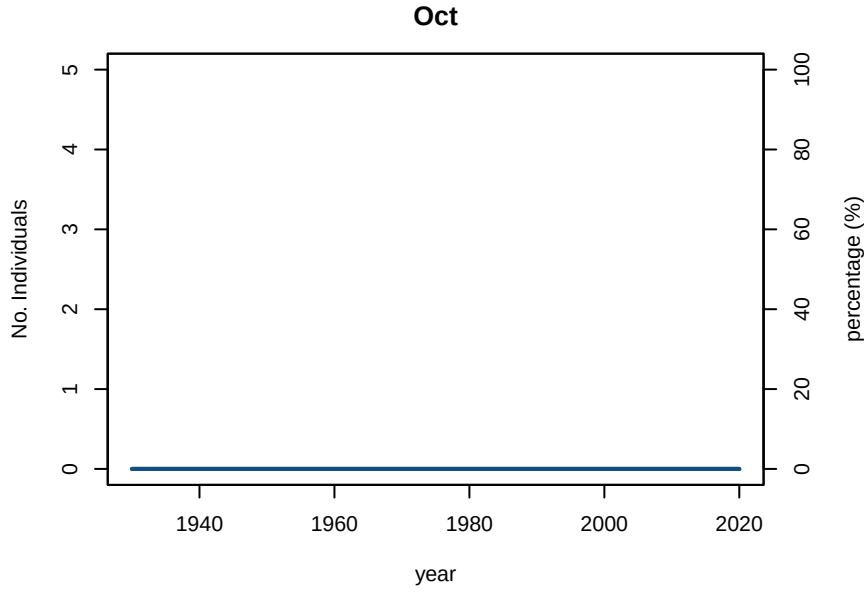






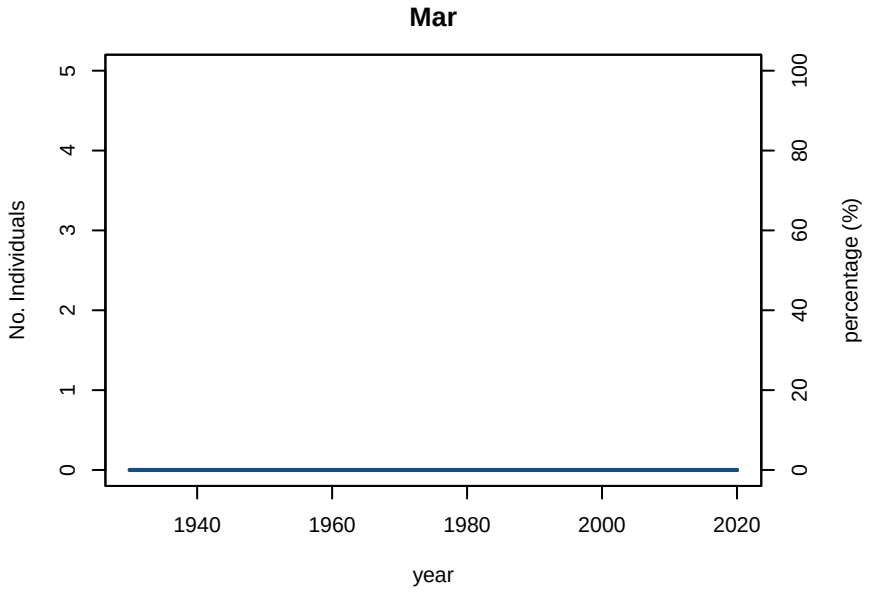


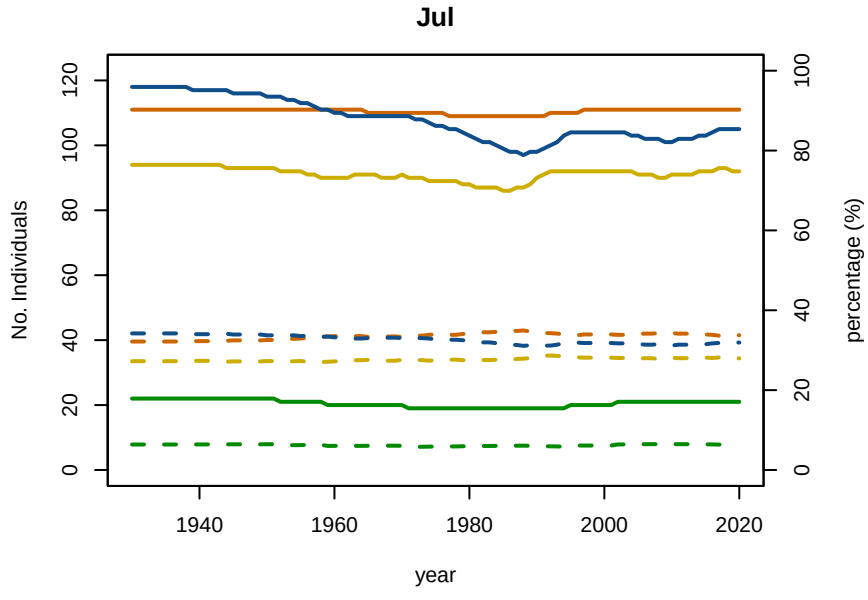


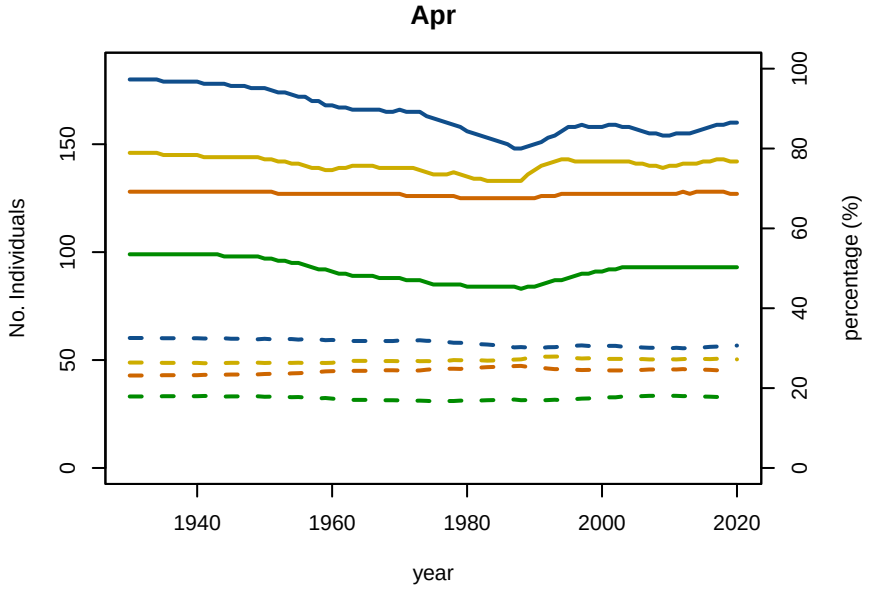


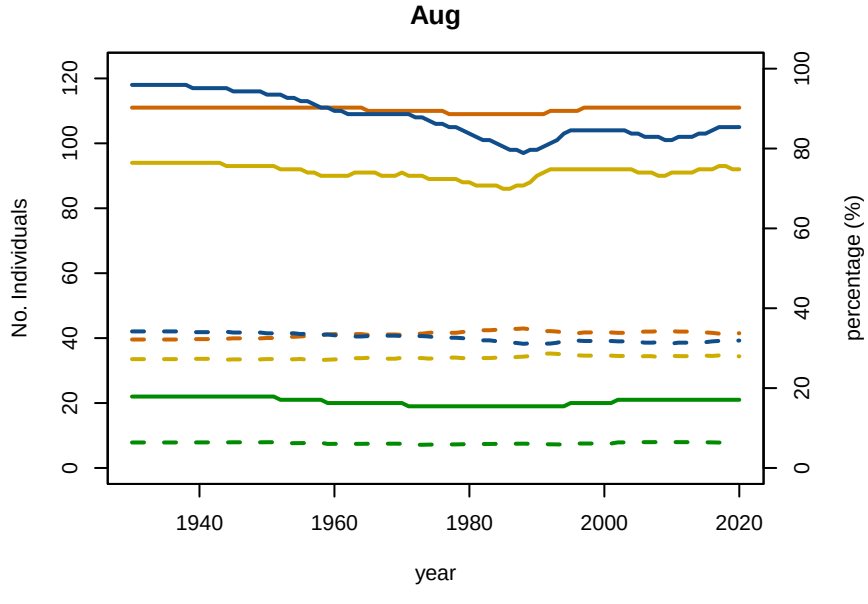
A1−4 A5−9 MatF MatM No Individuals percentage

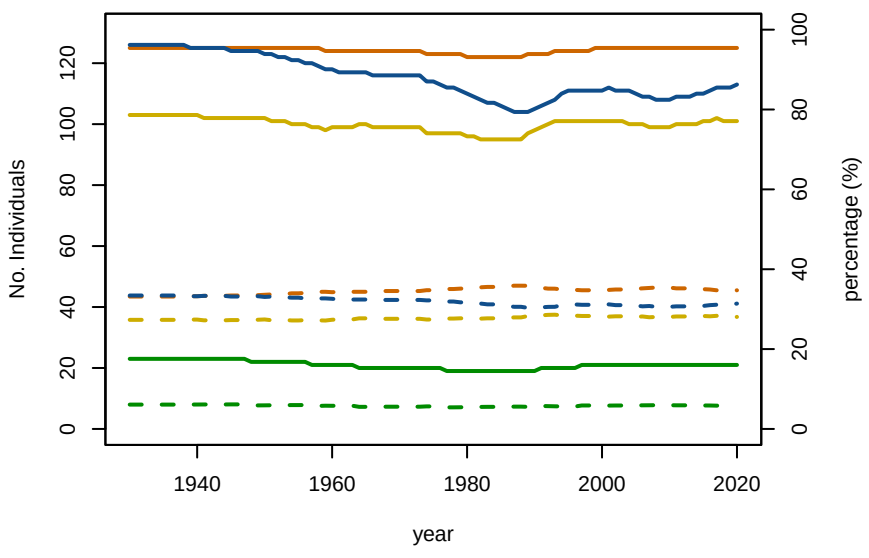
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7WR

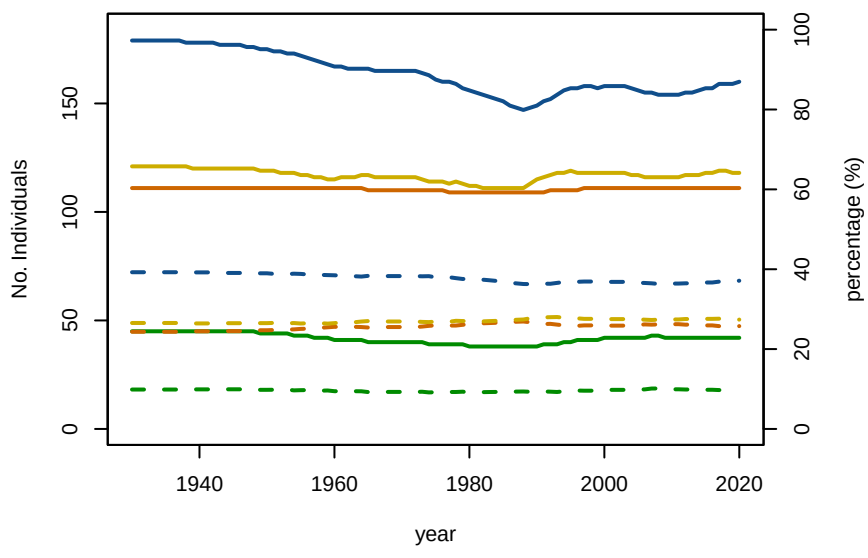


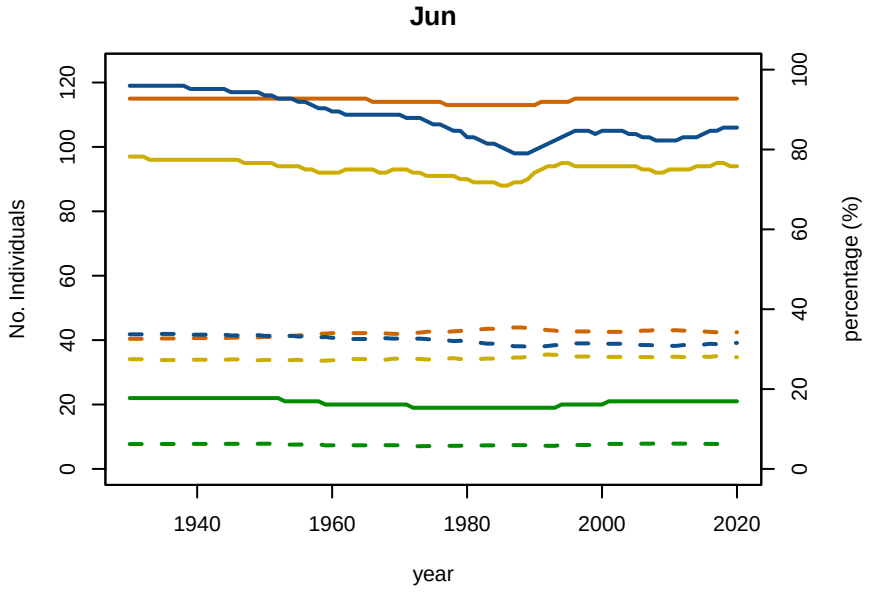


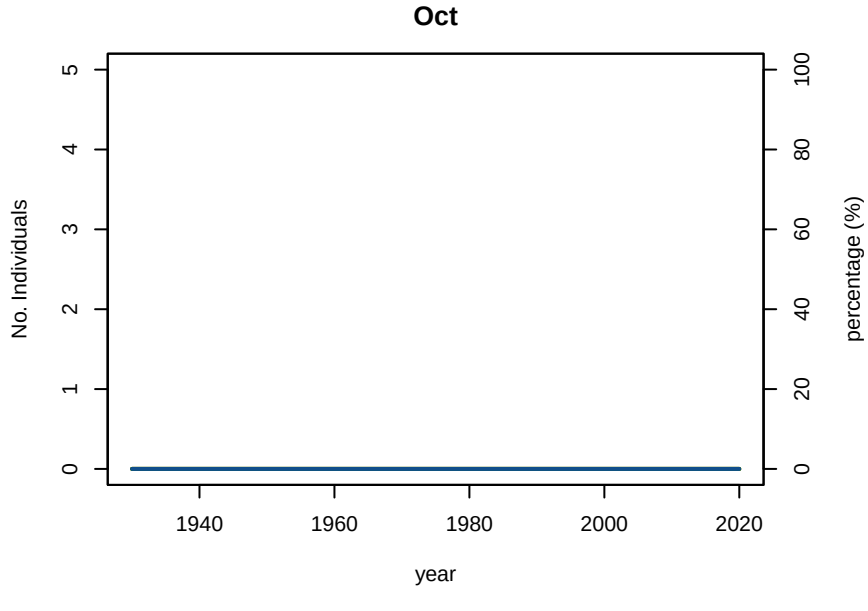






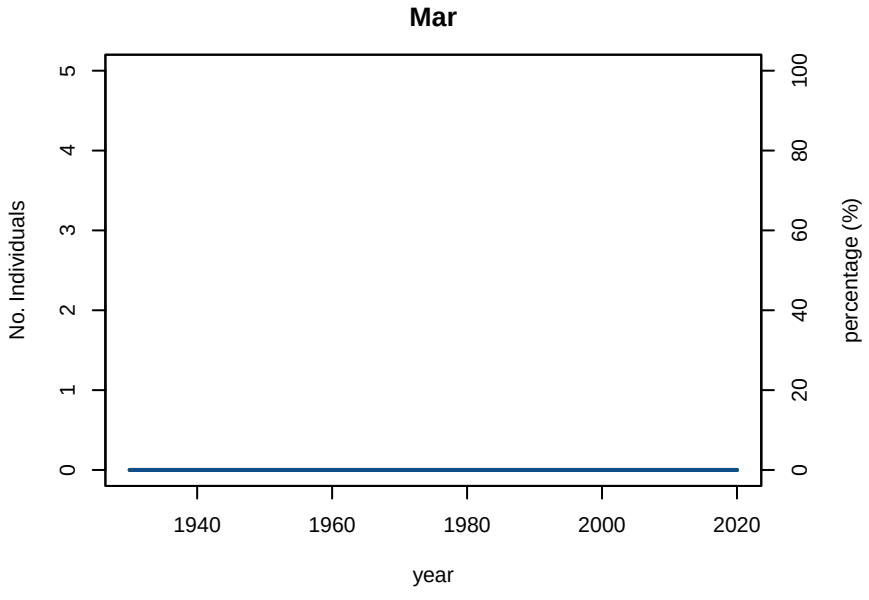


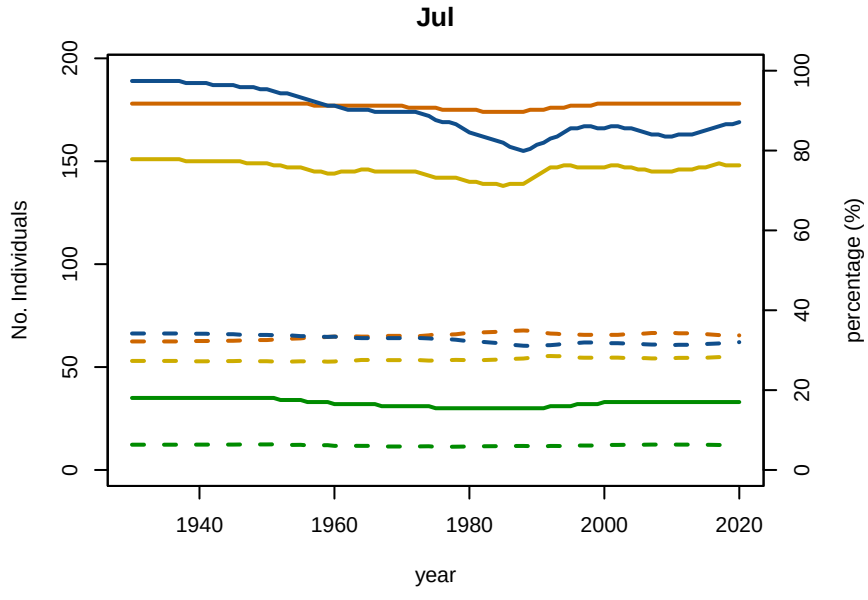


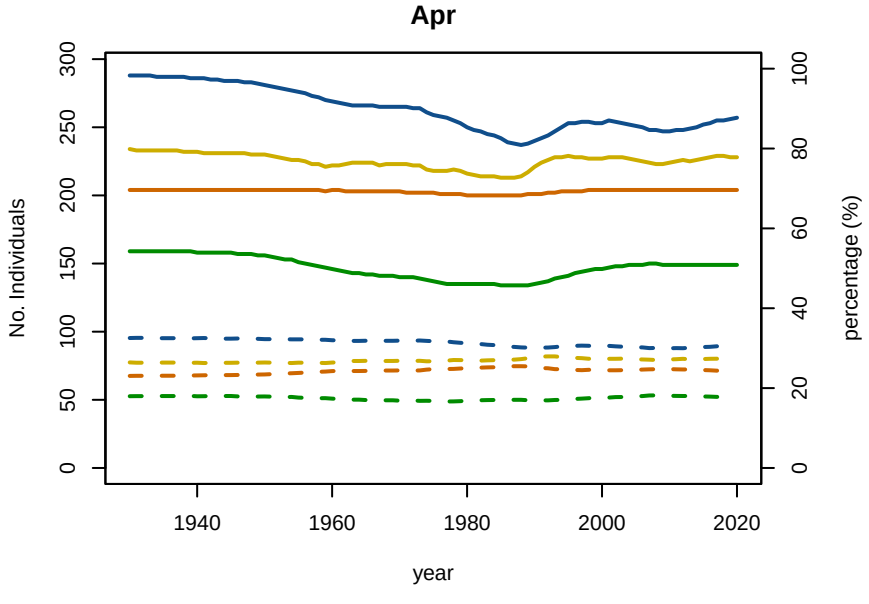


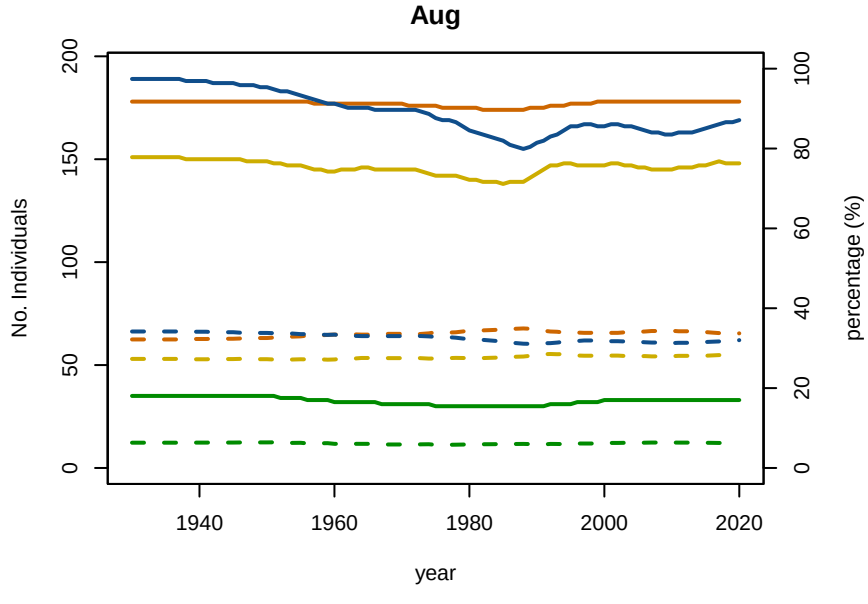
A1−4 A5−9 MatF MatM No Individuals percentage

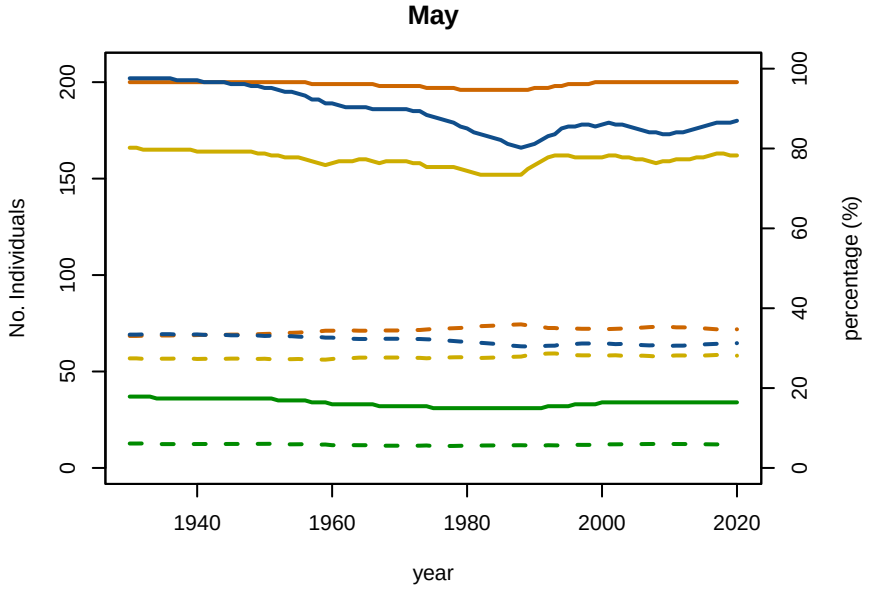
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 8

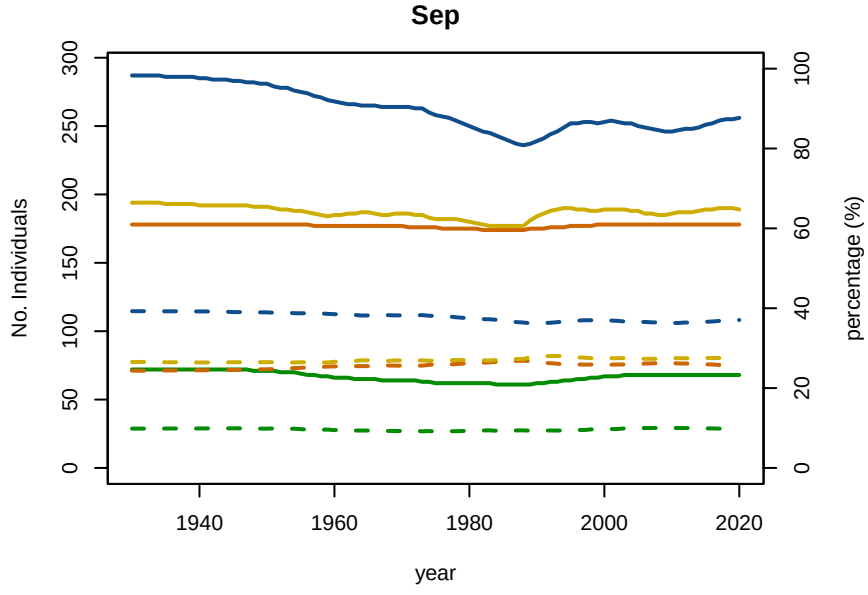


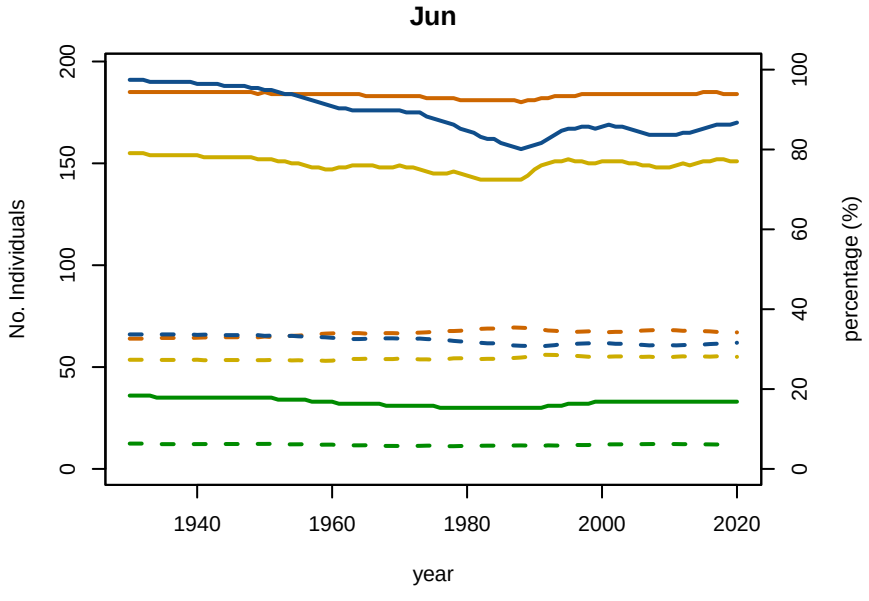


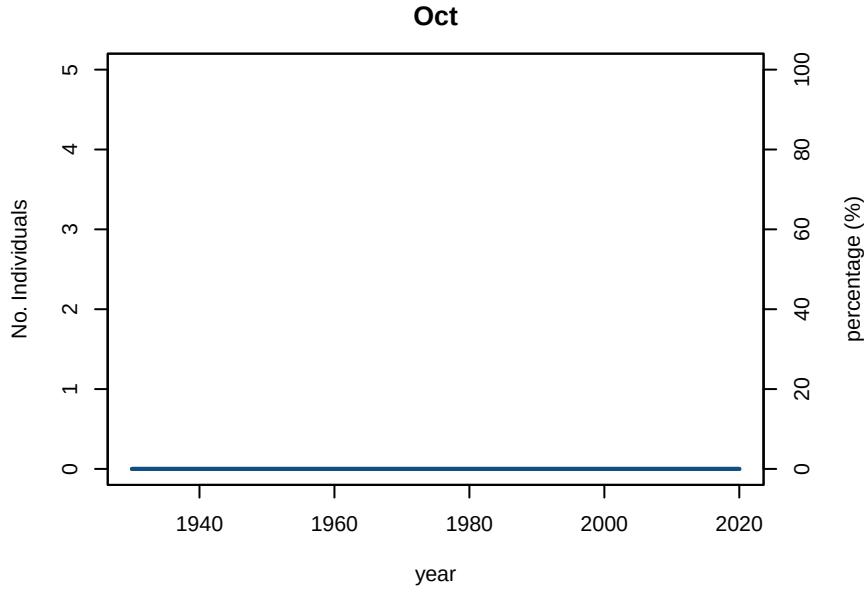






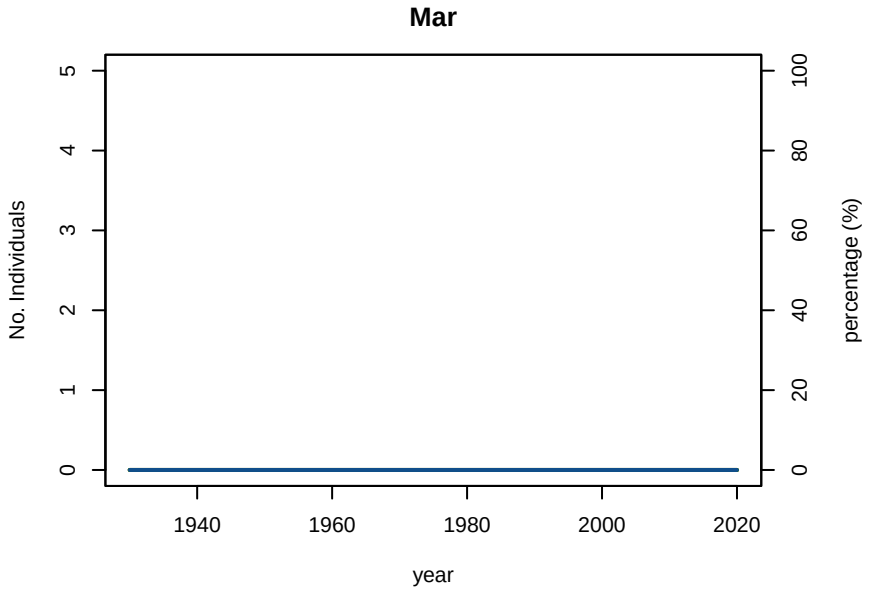


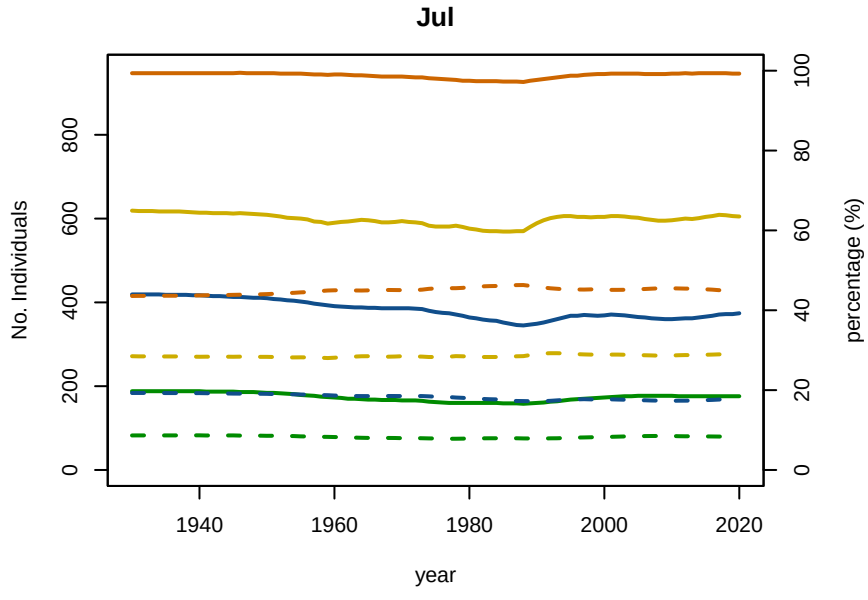


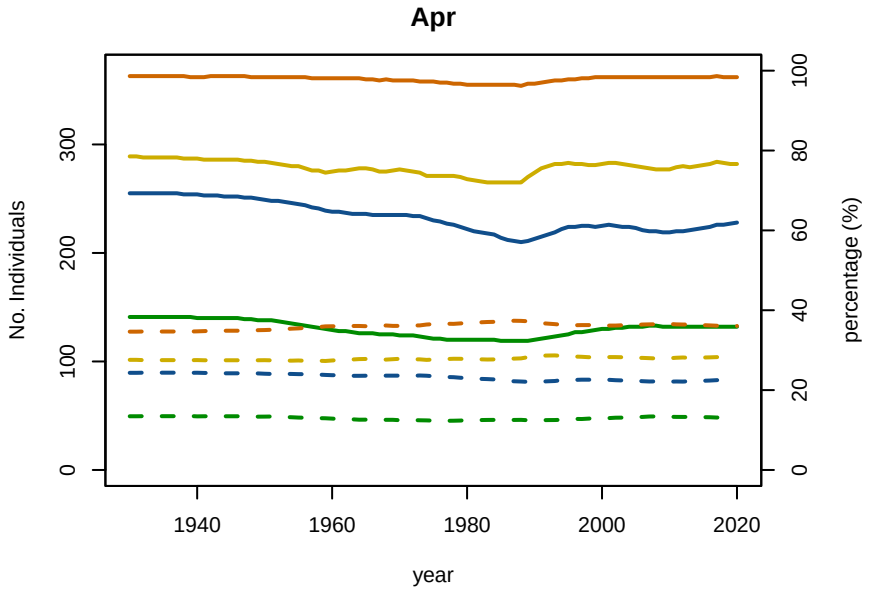


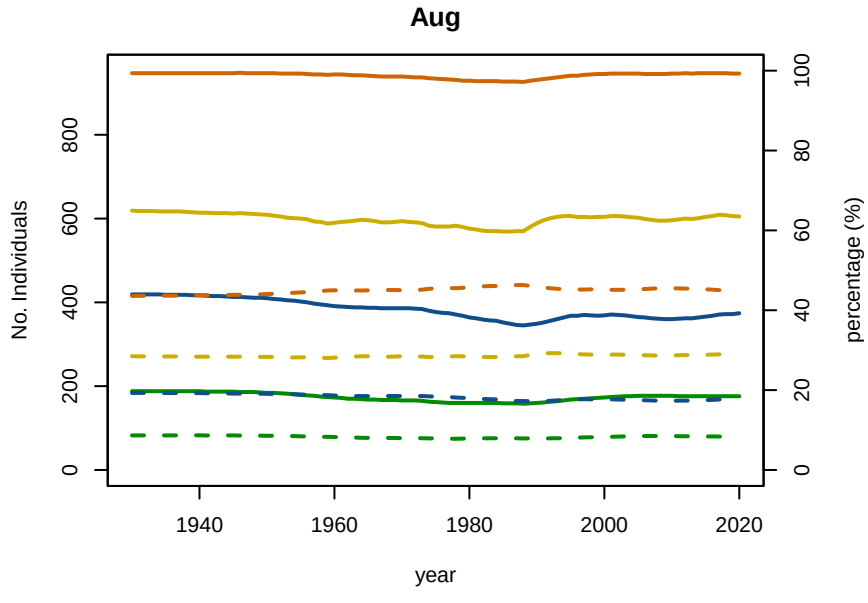
A1−4 A5−9 MatF MatM No Individuals percentage

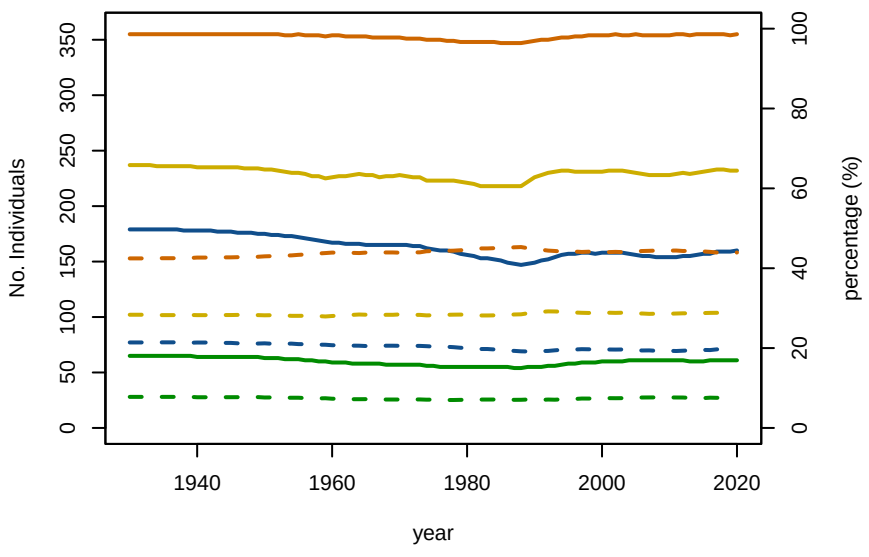
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 9

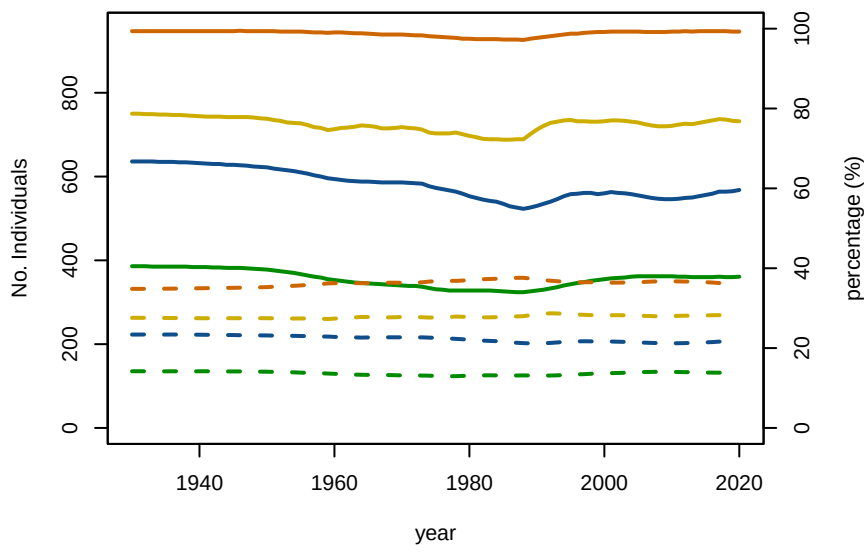


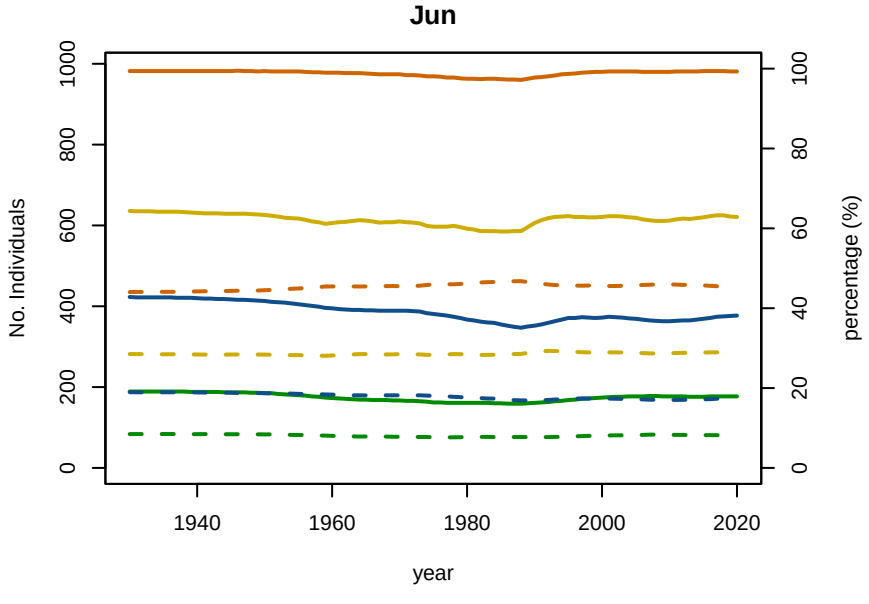


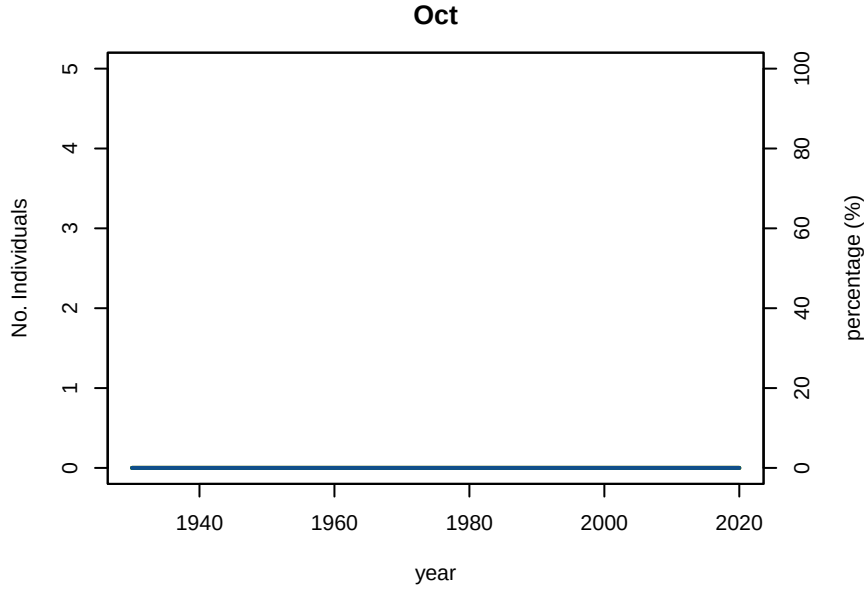






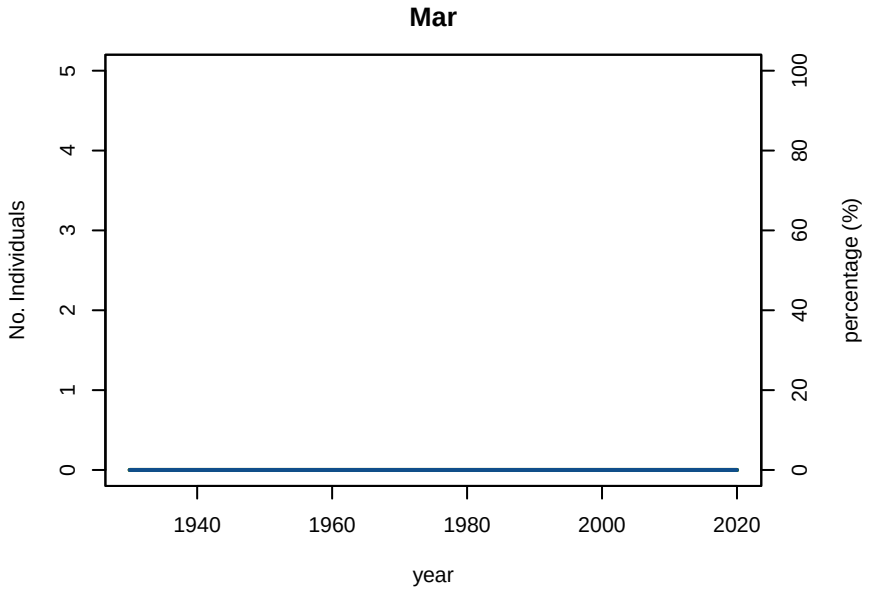


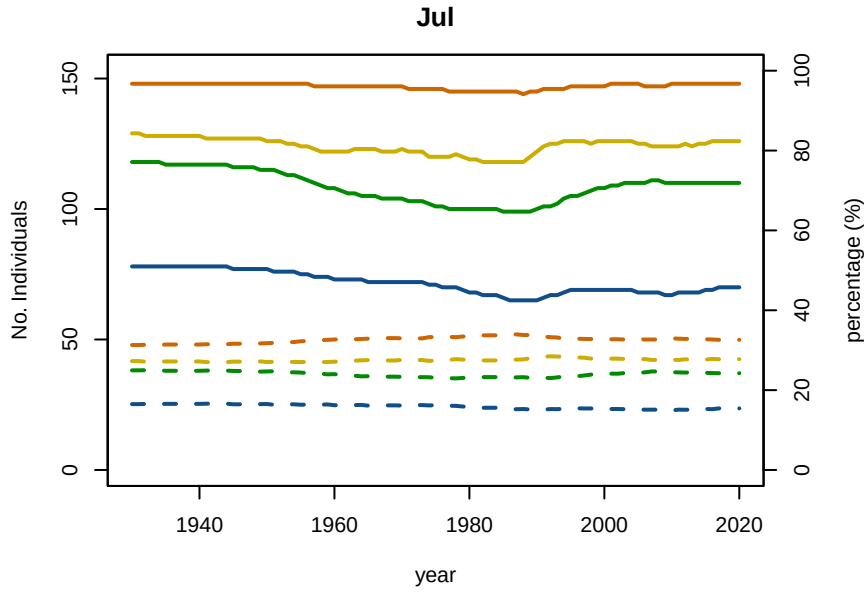


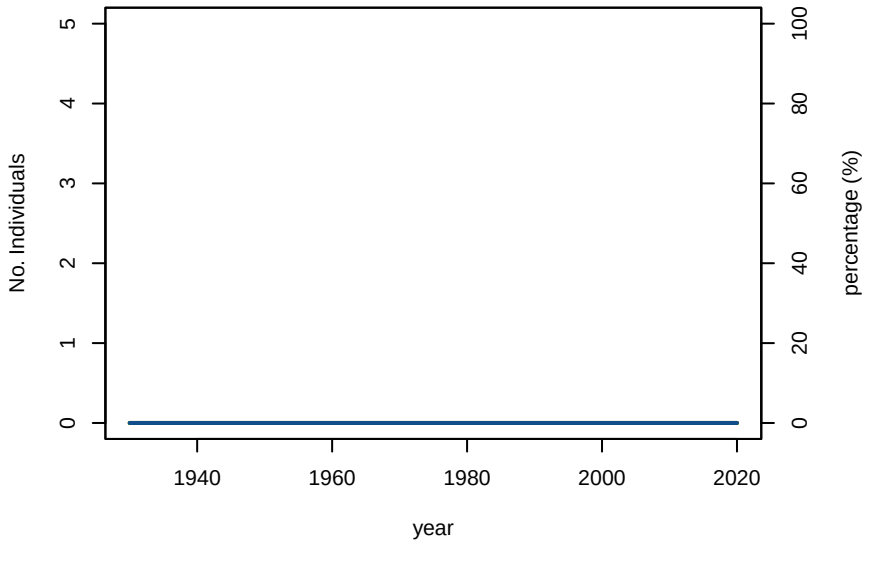


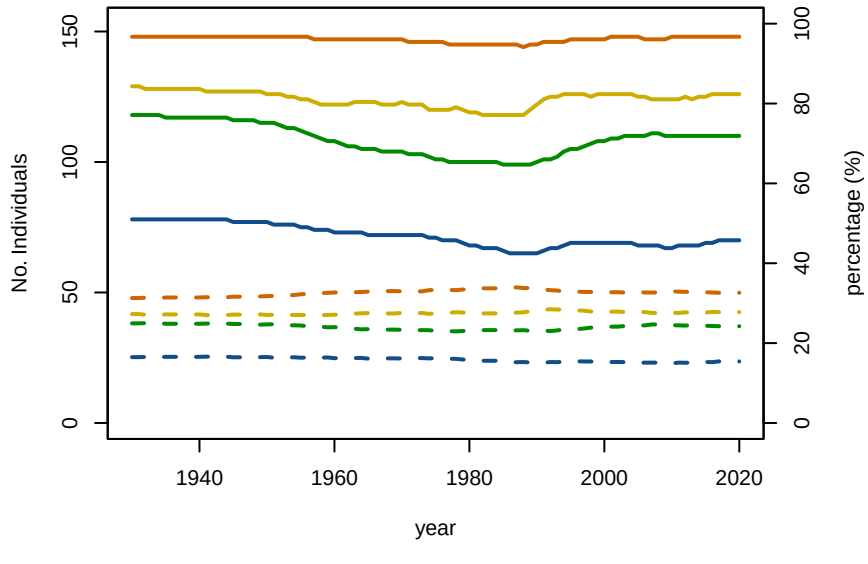
A1−4 A5−9 MatF MatM No Individuals percentage

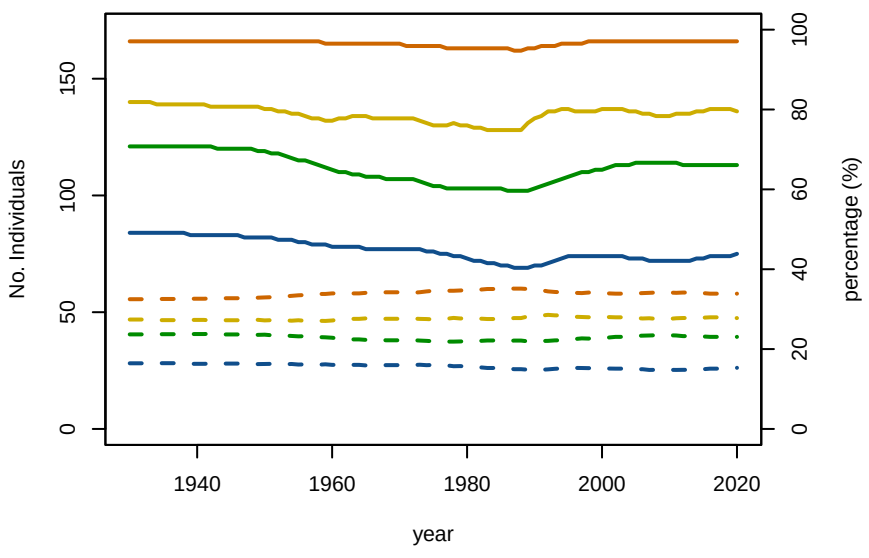
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 9N

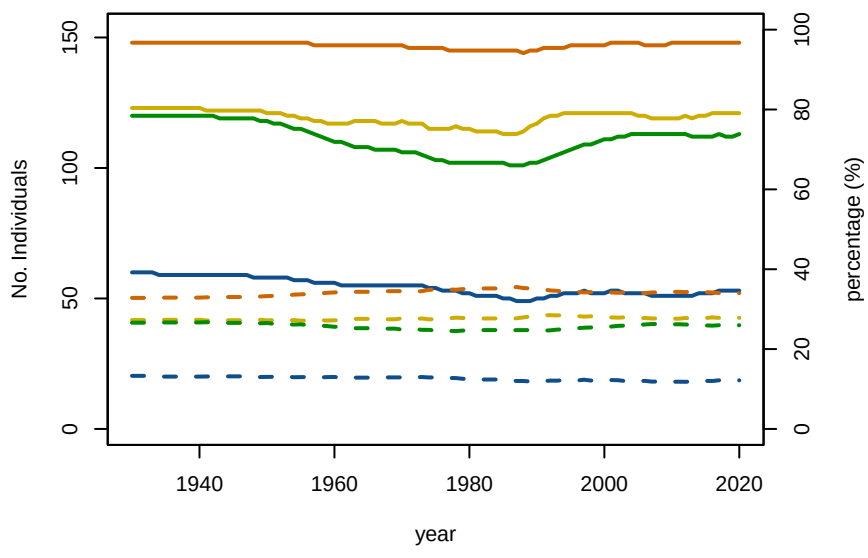


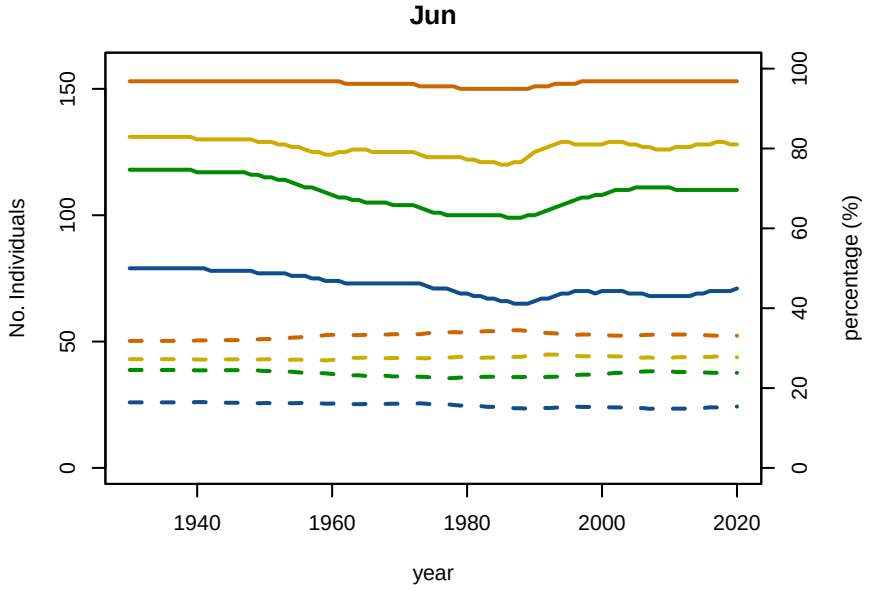


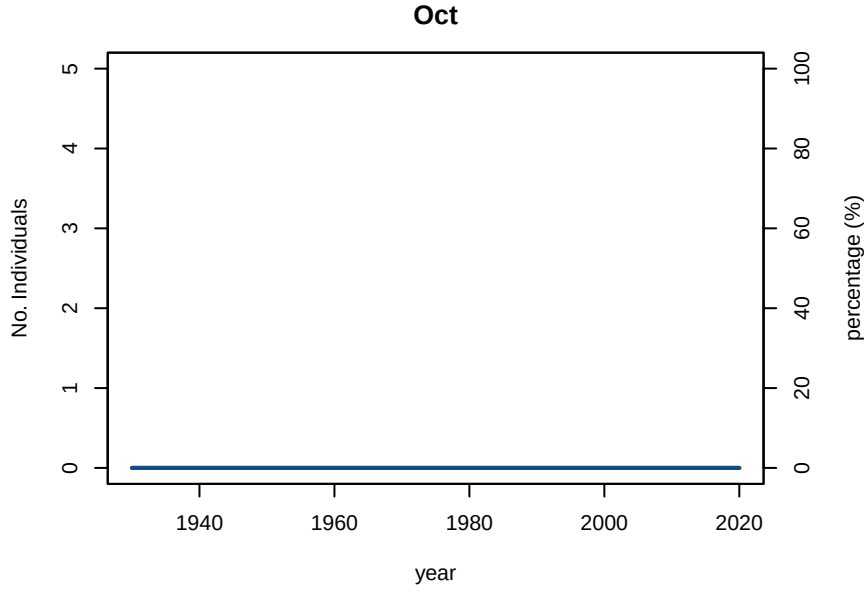






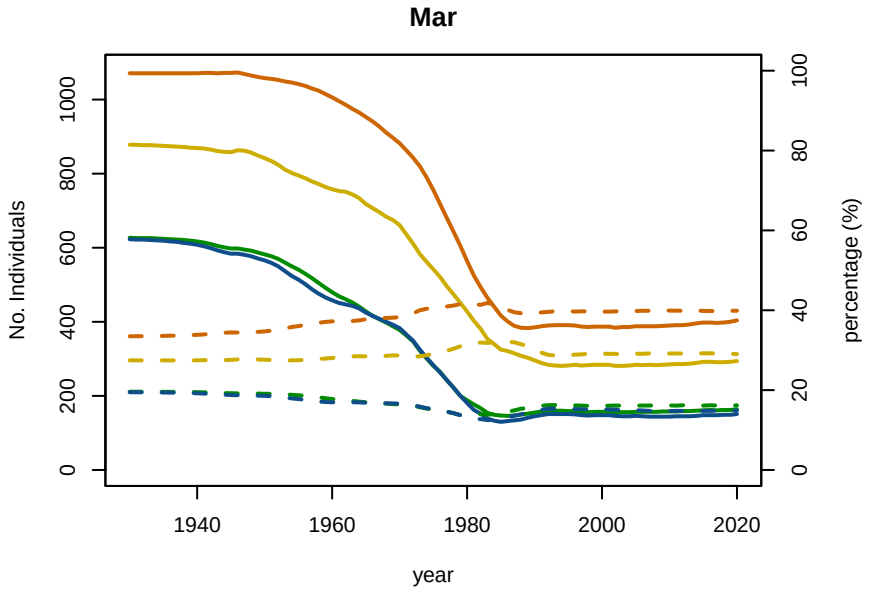


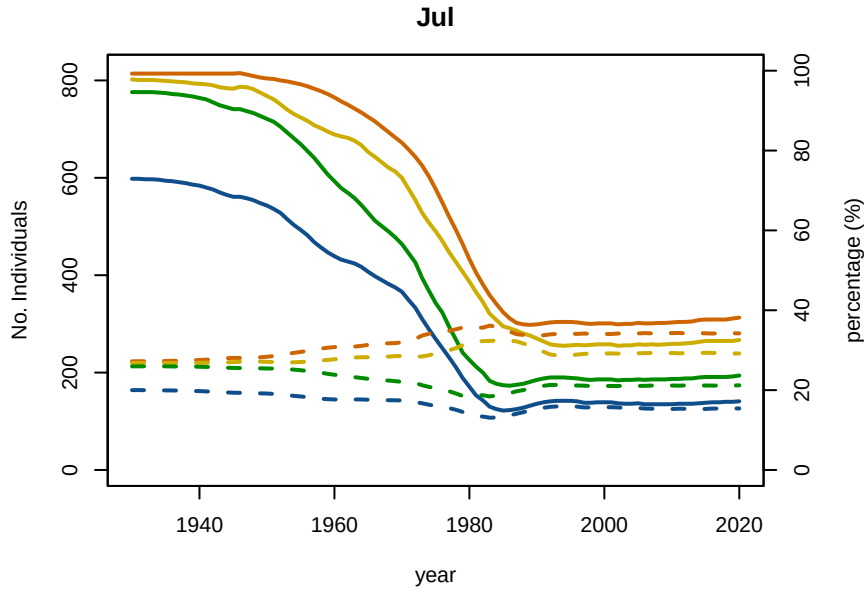


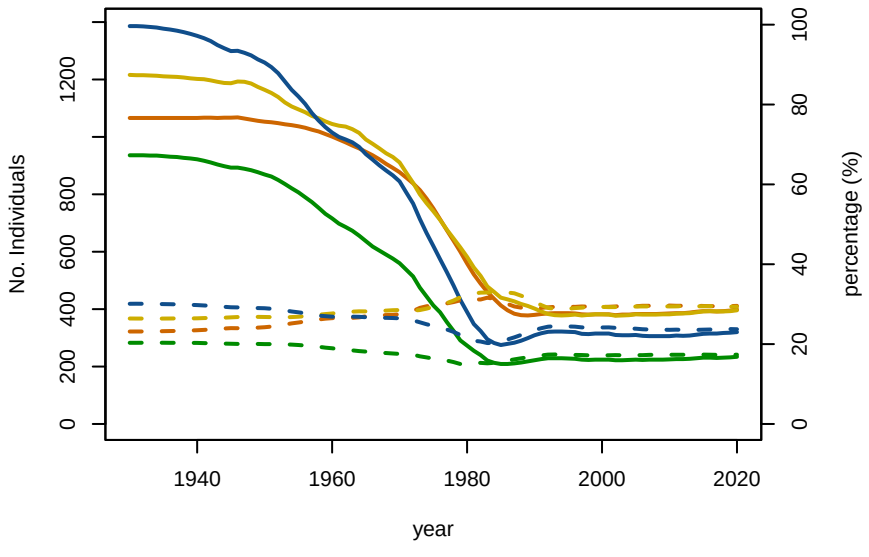


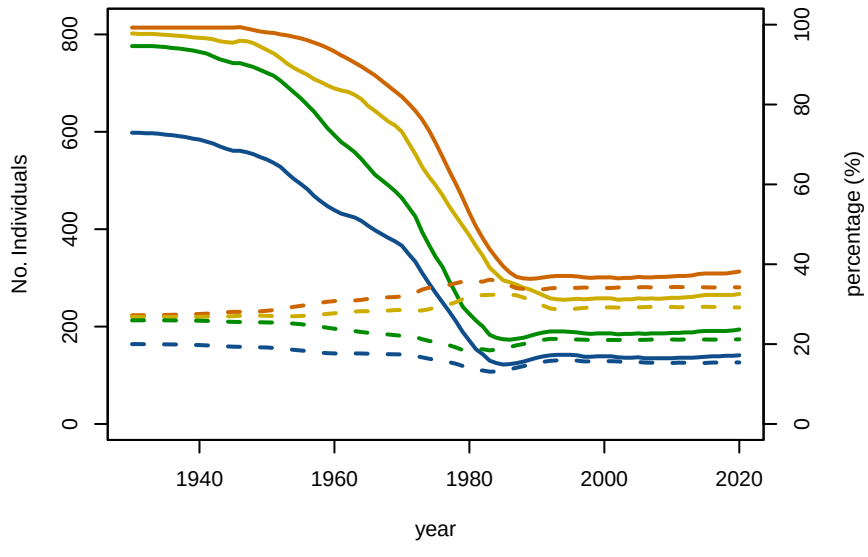
A1−4 A5−9 MatF MatM No Individuals percentage

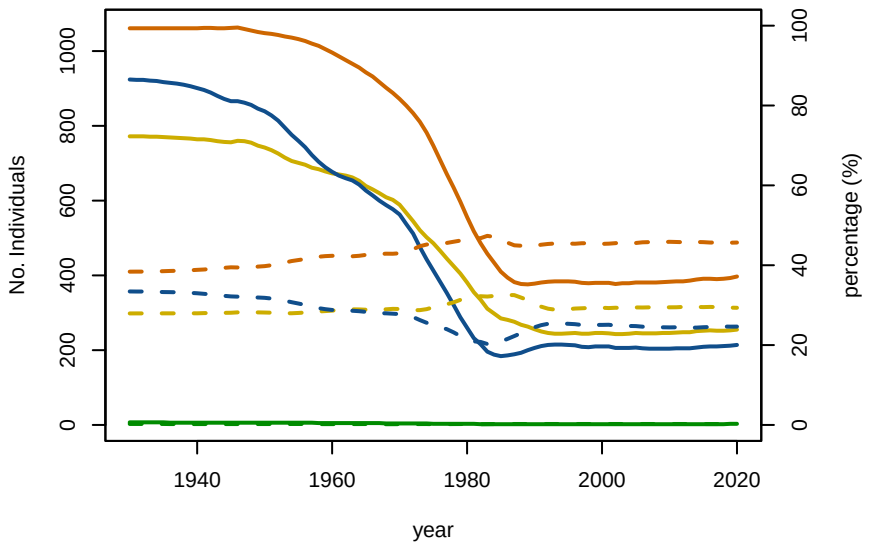
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 10E

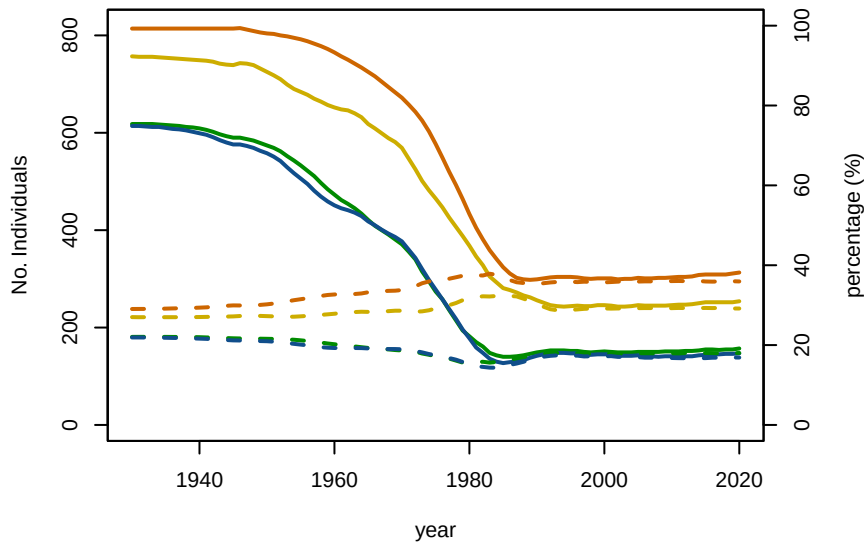


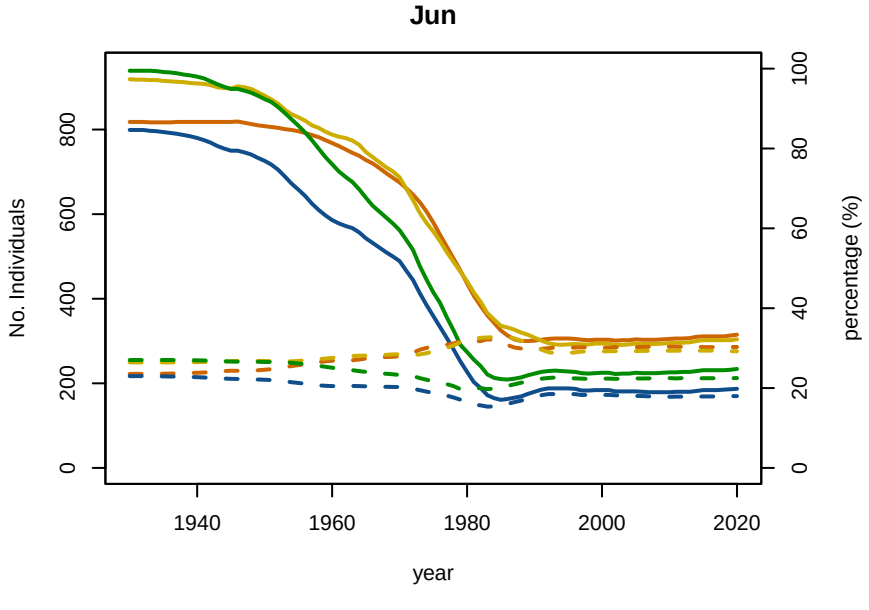


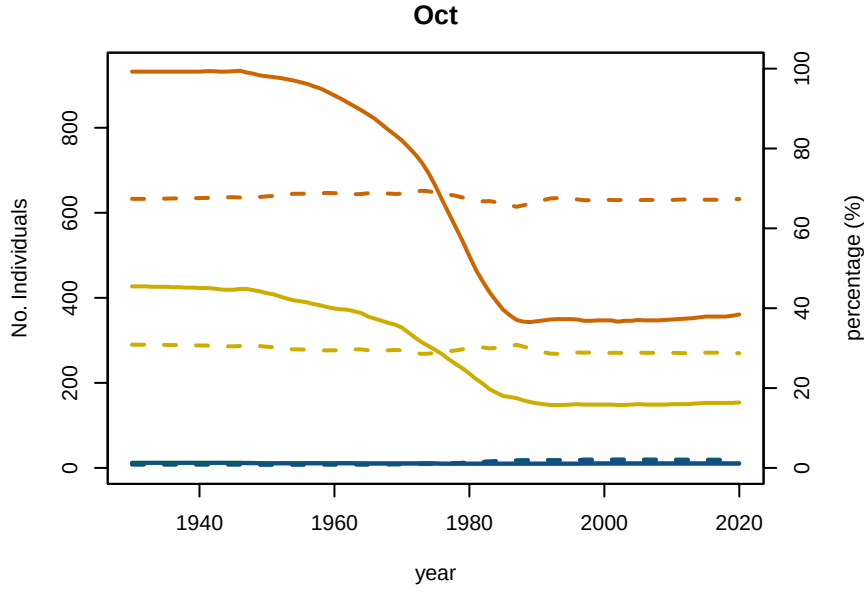






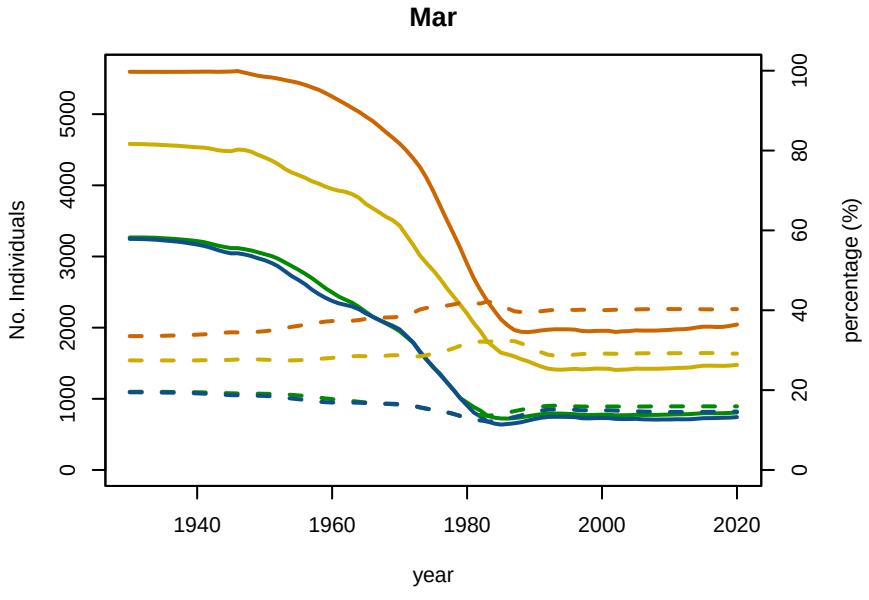


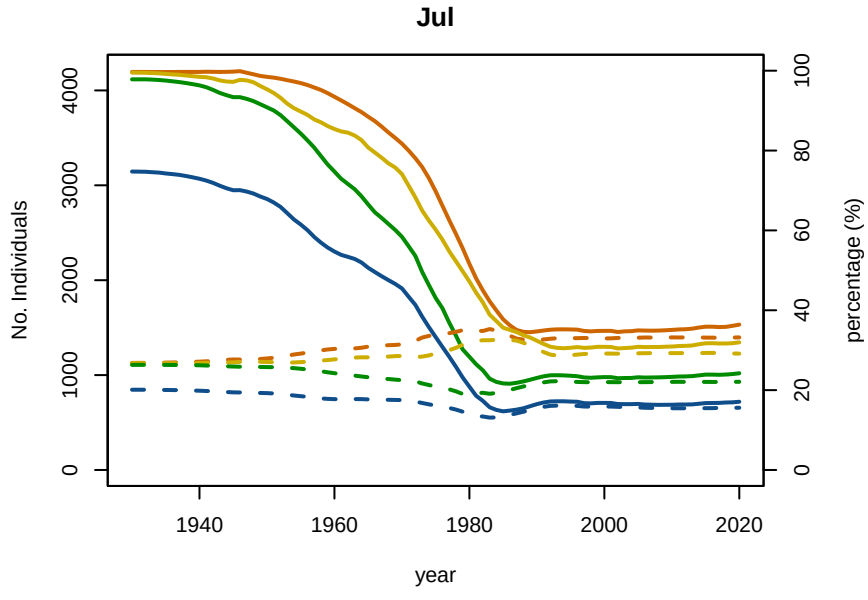


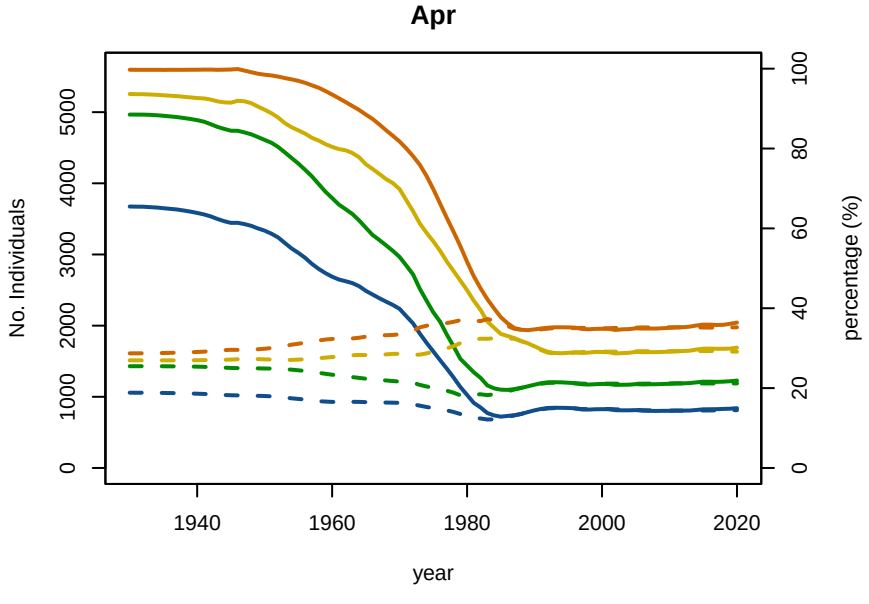


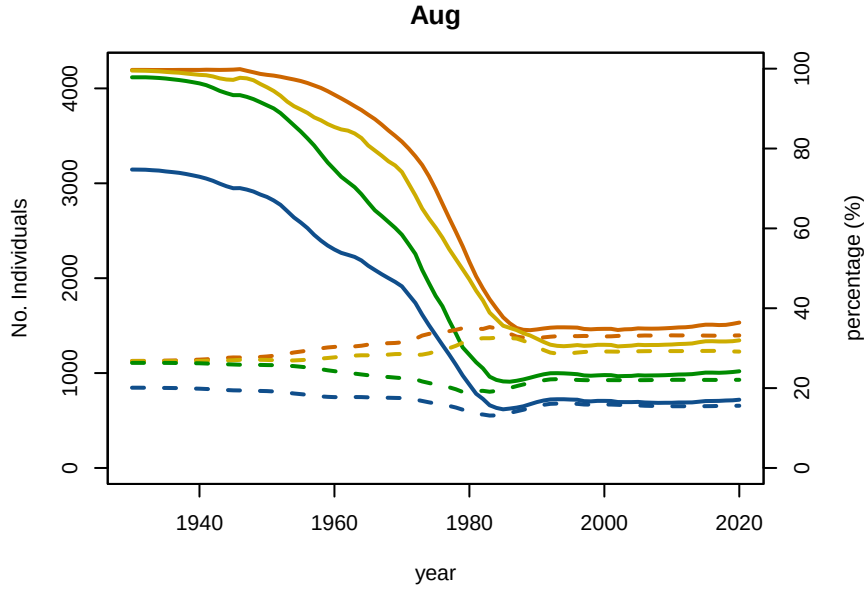
A1−4 A5−9 MatF MatM No Individuals percentage

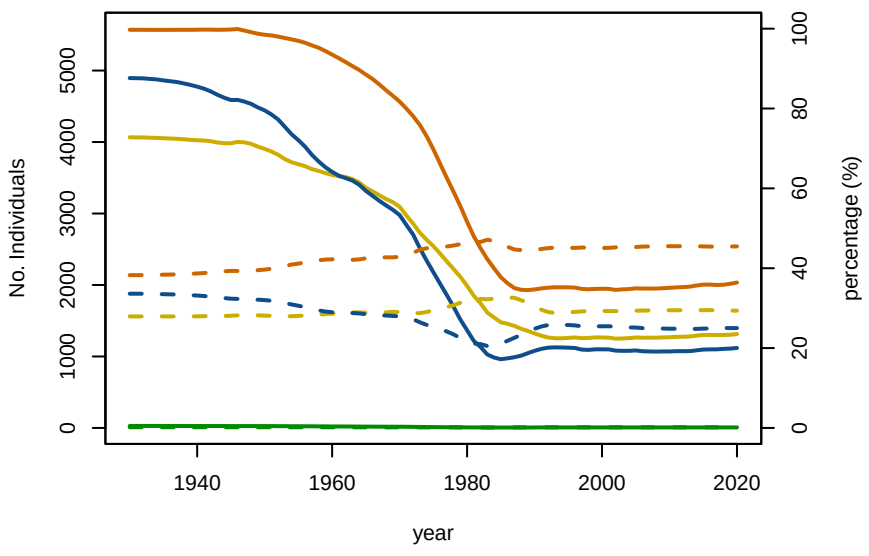
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 10W

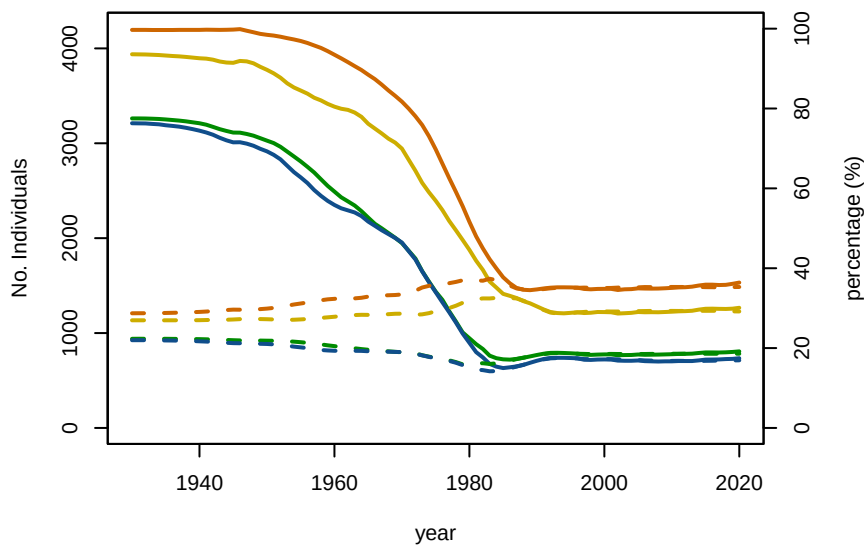


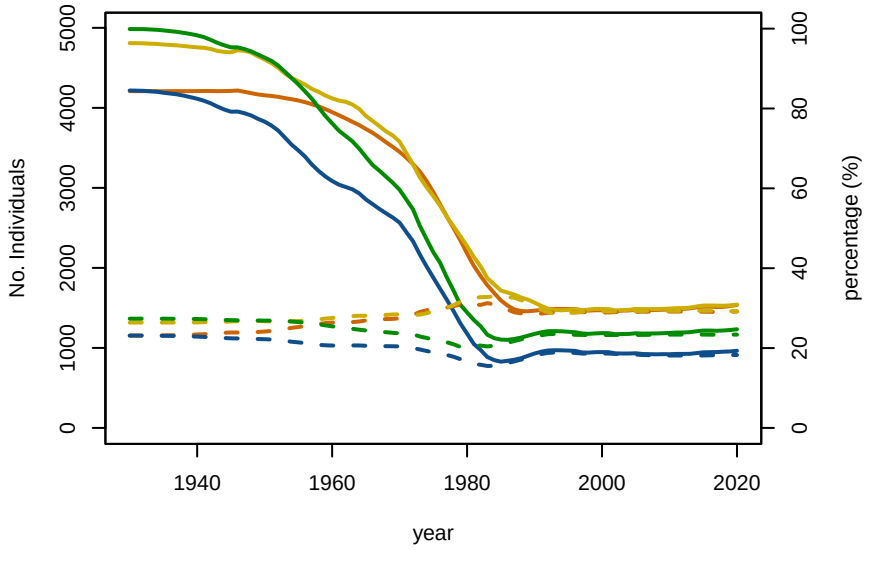


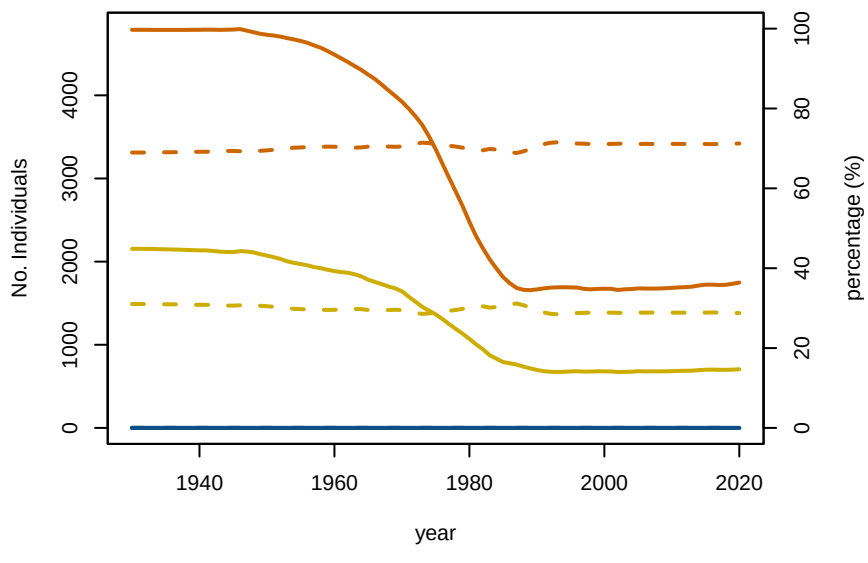






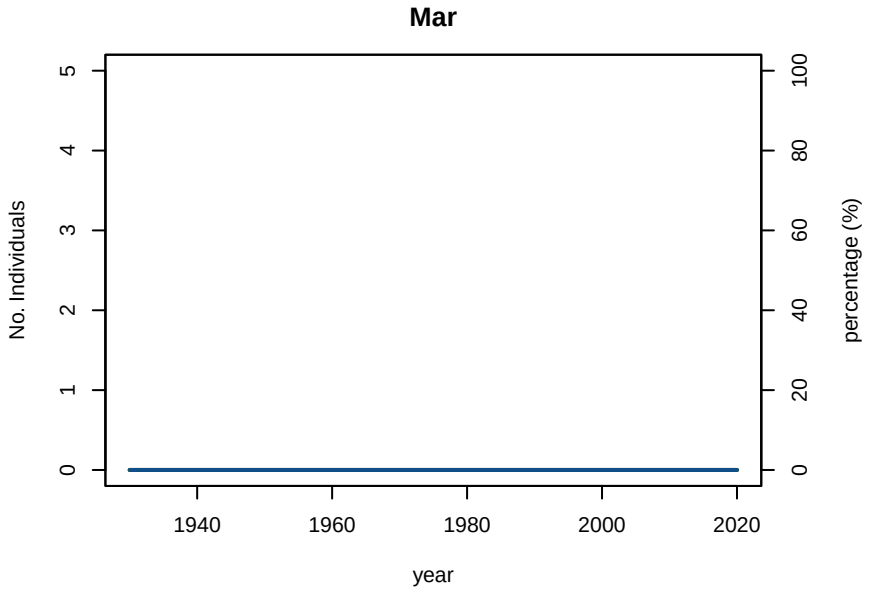


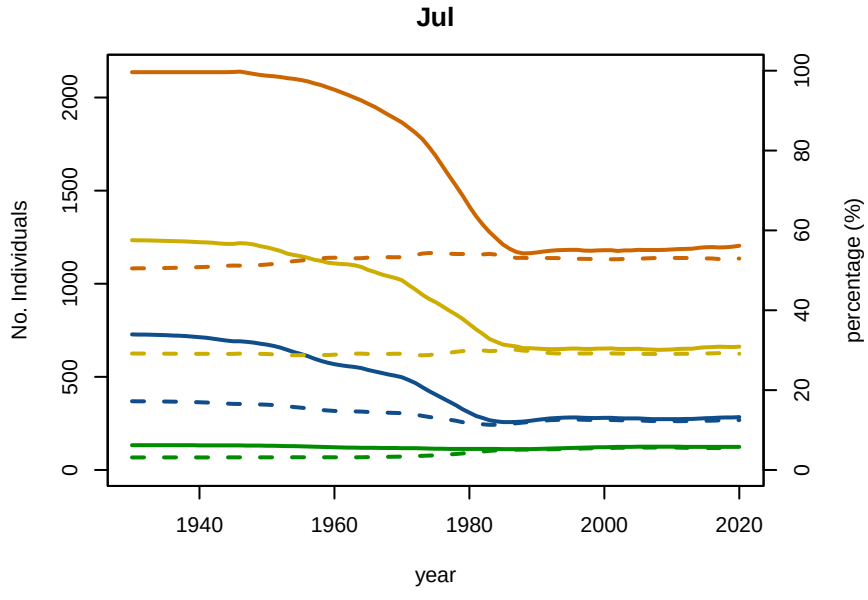


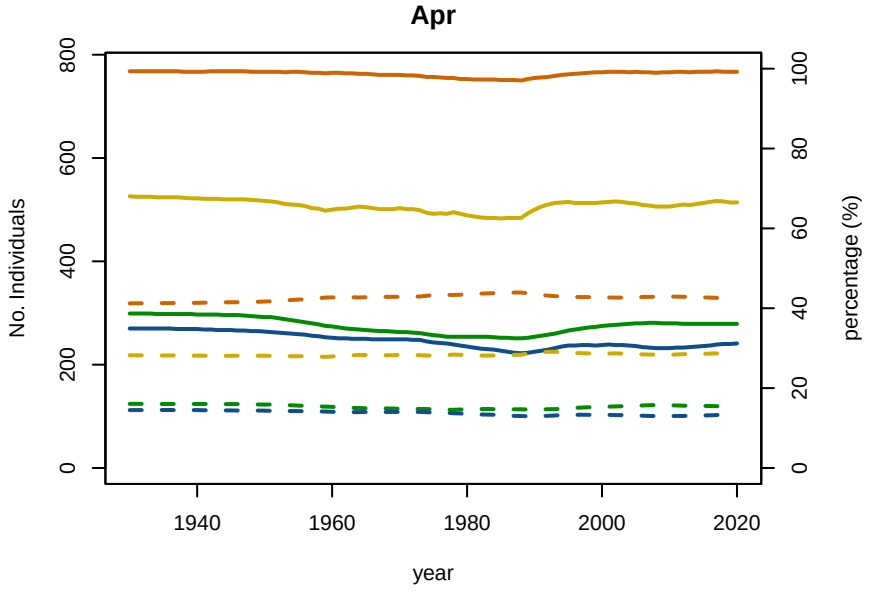


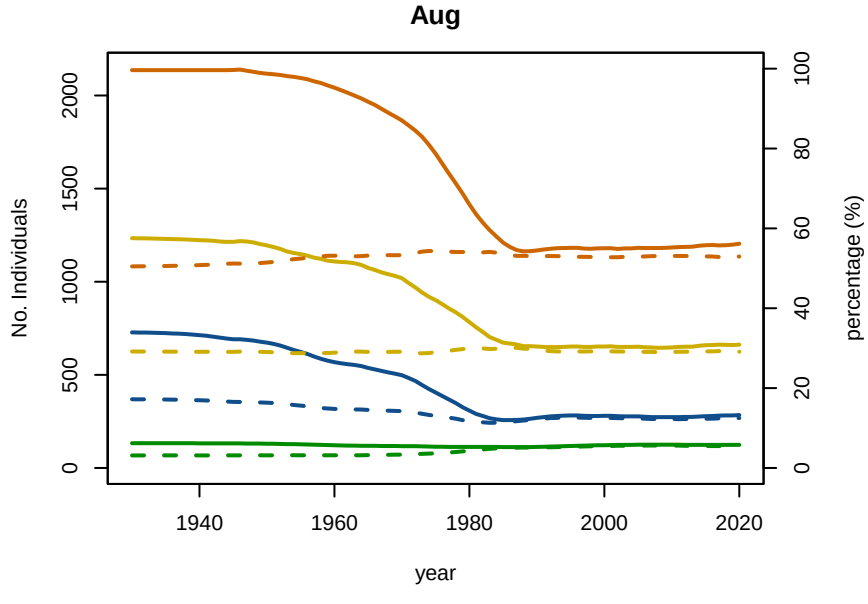
A1−4 A5−9 MatF MatM No Individuals percentage

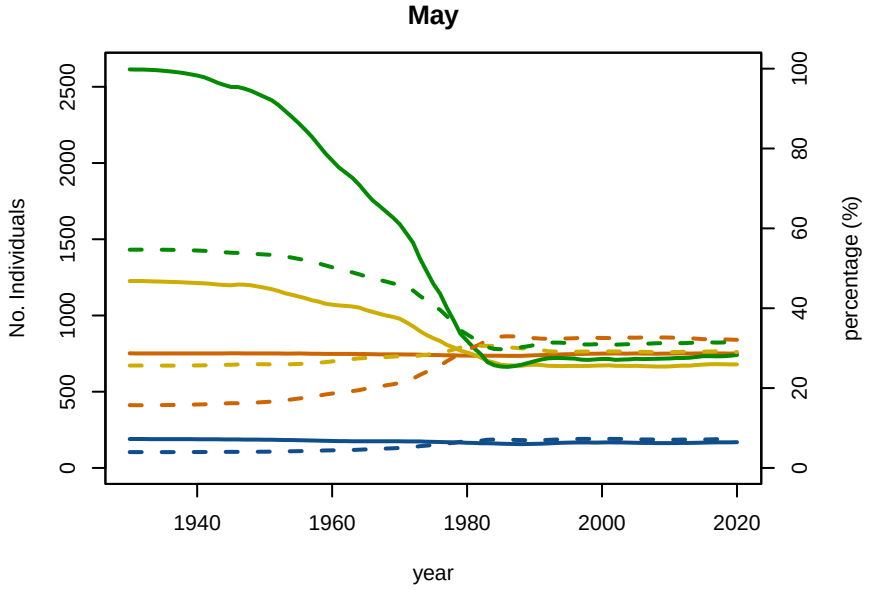
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 11

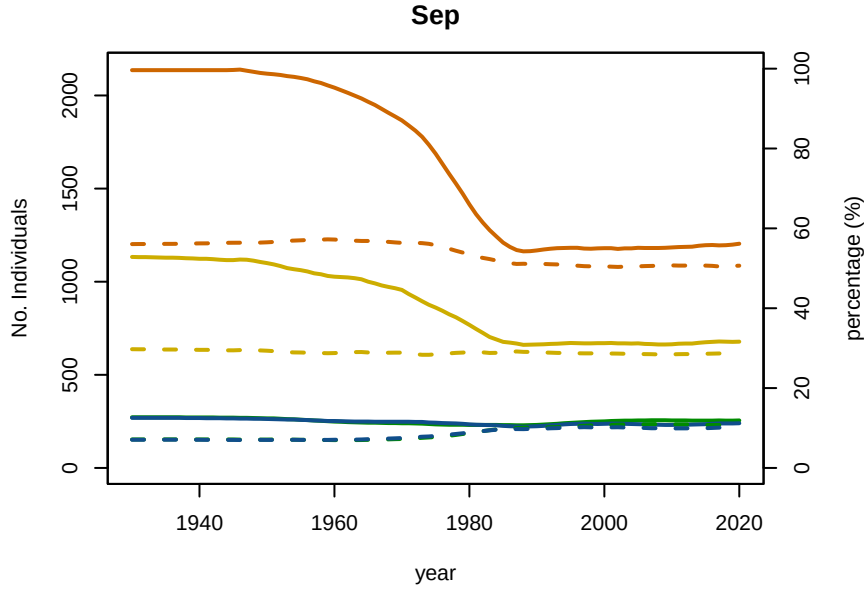


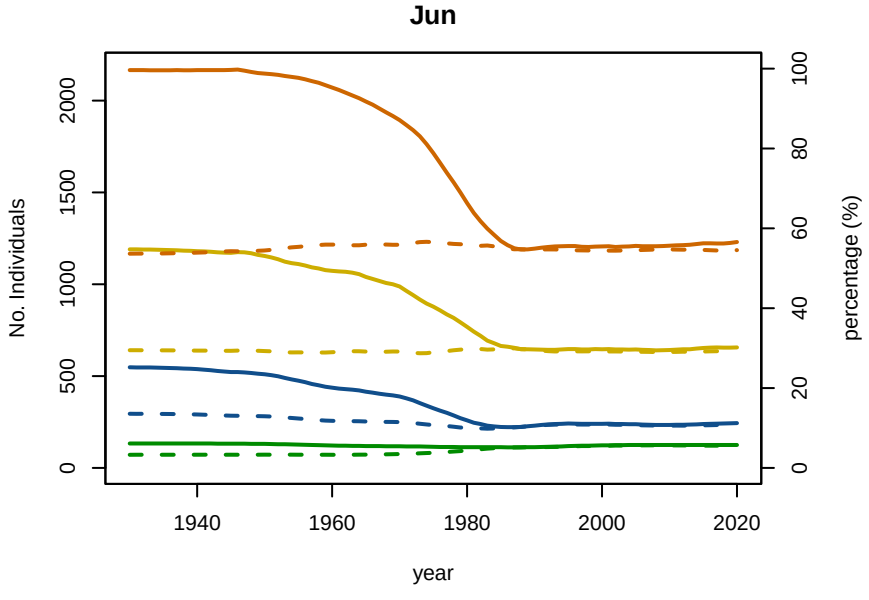


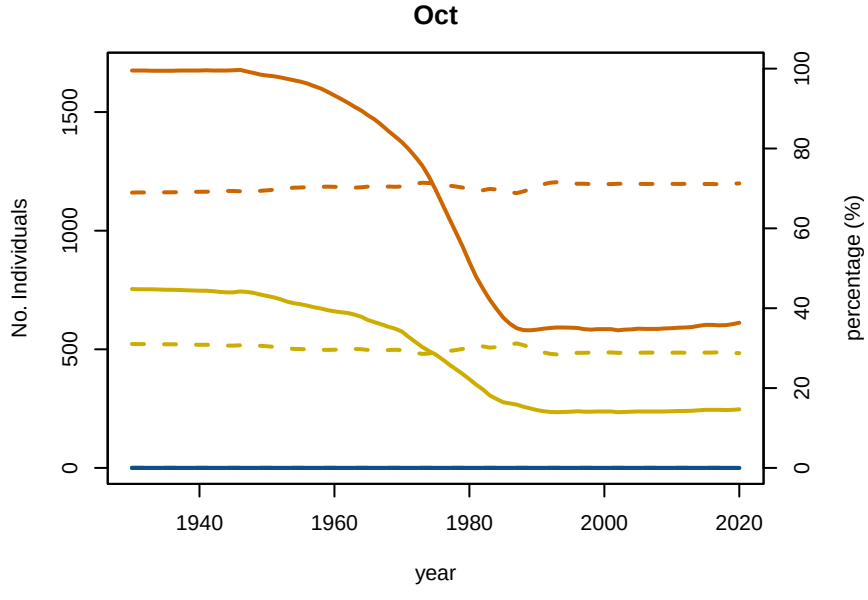






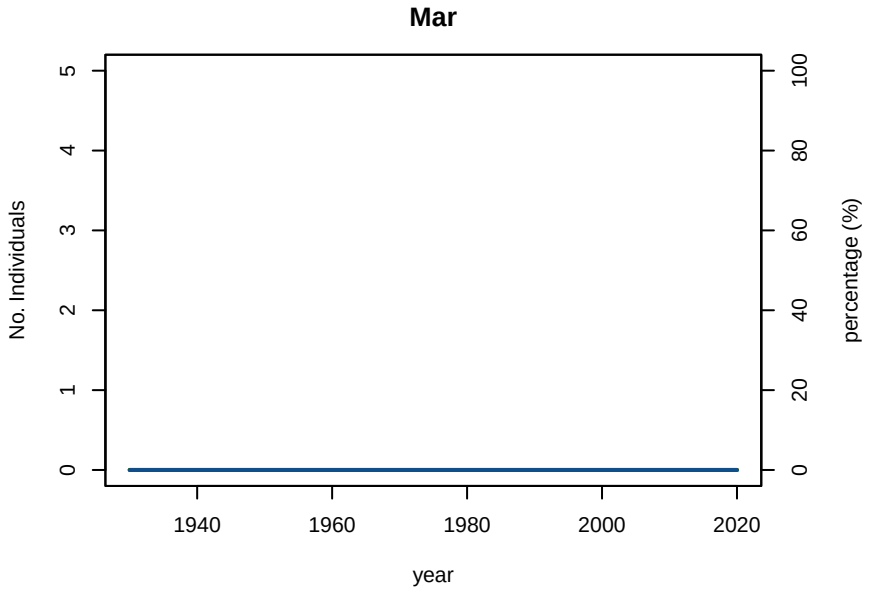


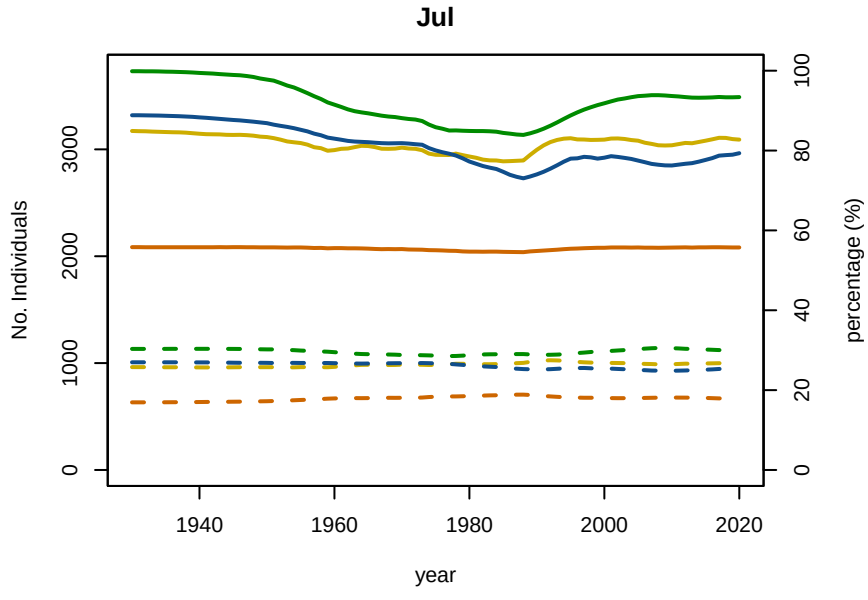


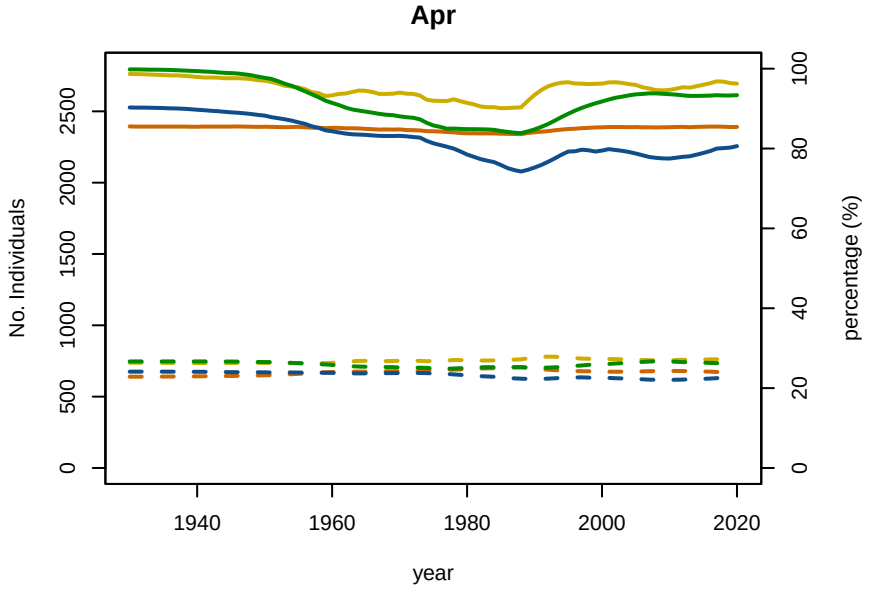


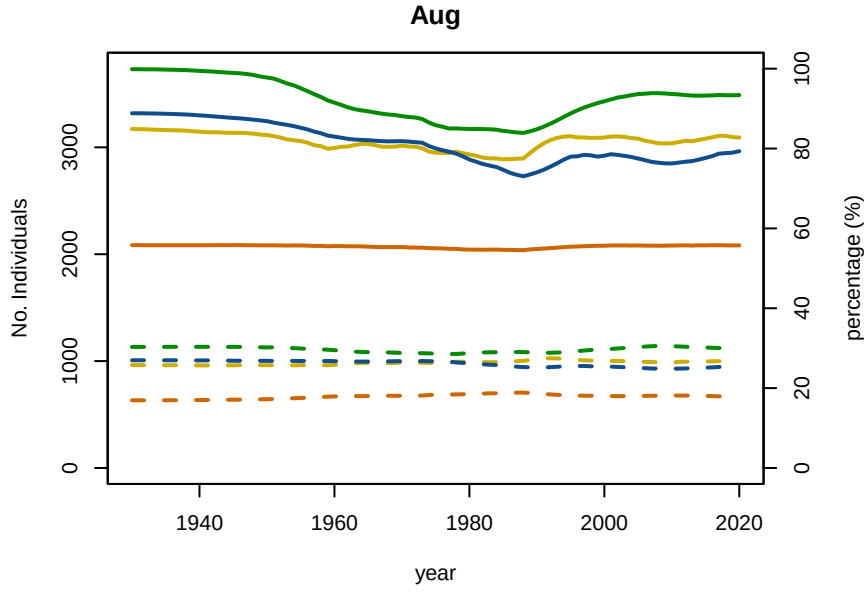
A1−4 A5−9 MatF MatM No Individuals percentage

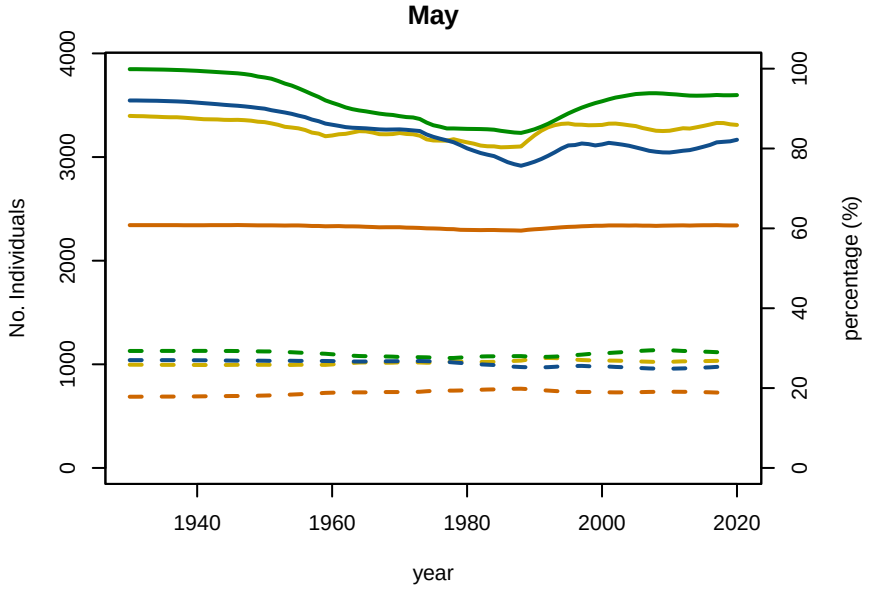
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 12N

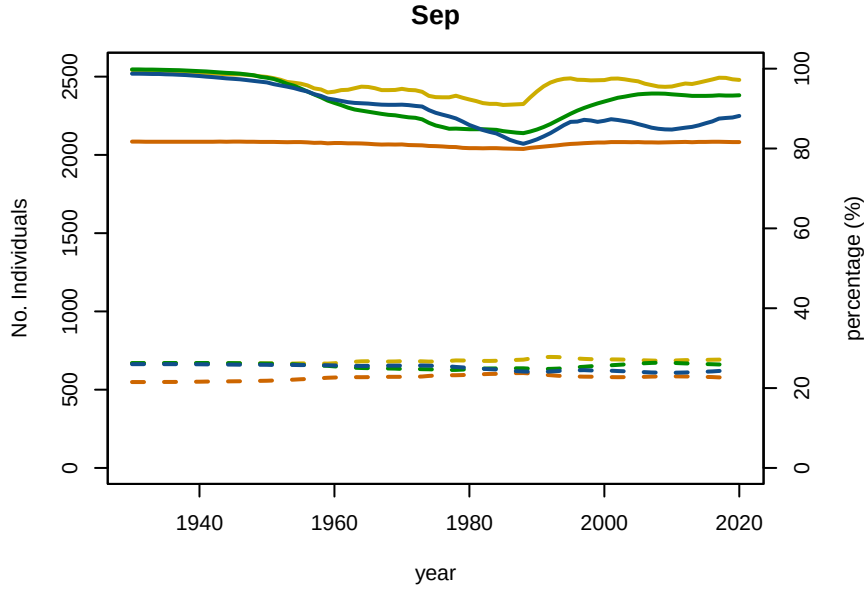


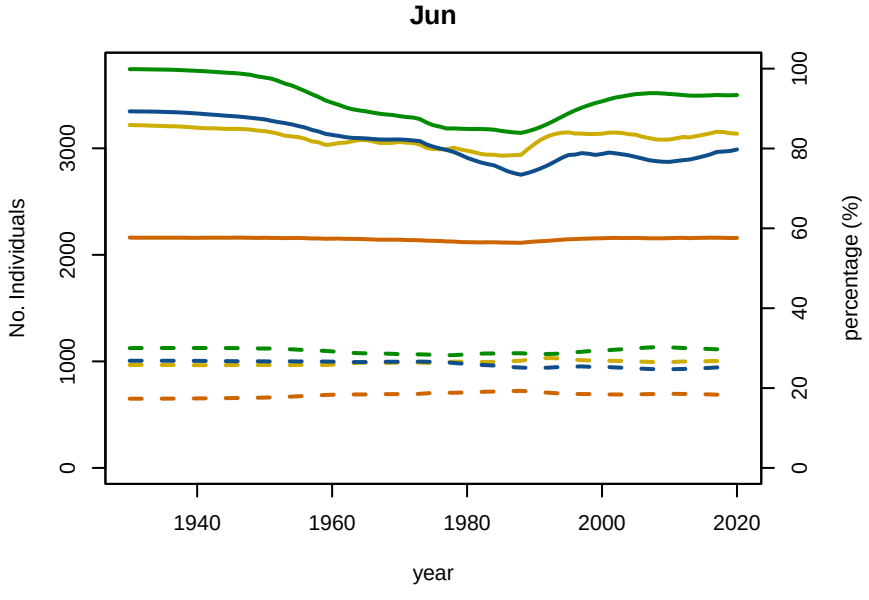


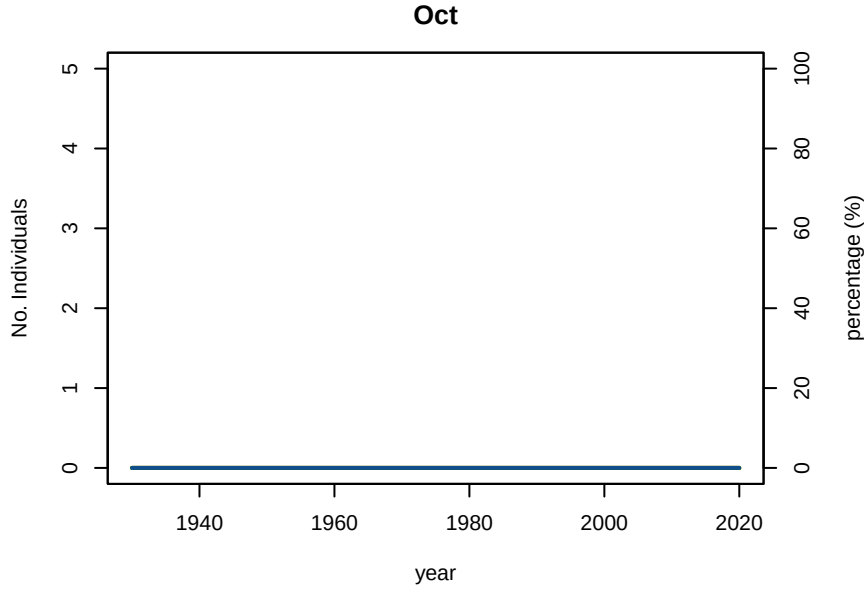






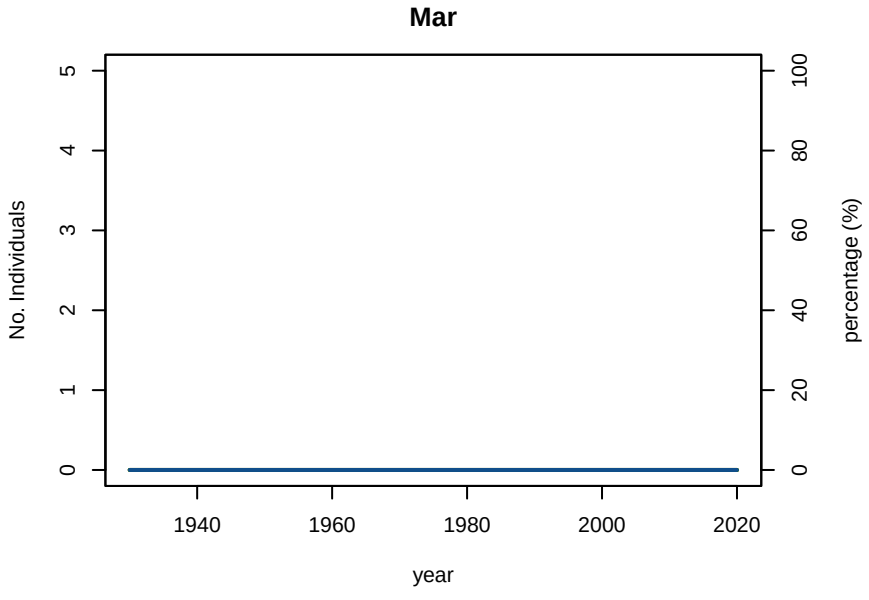


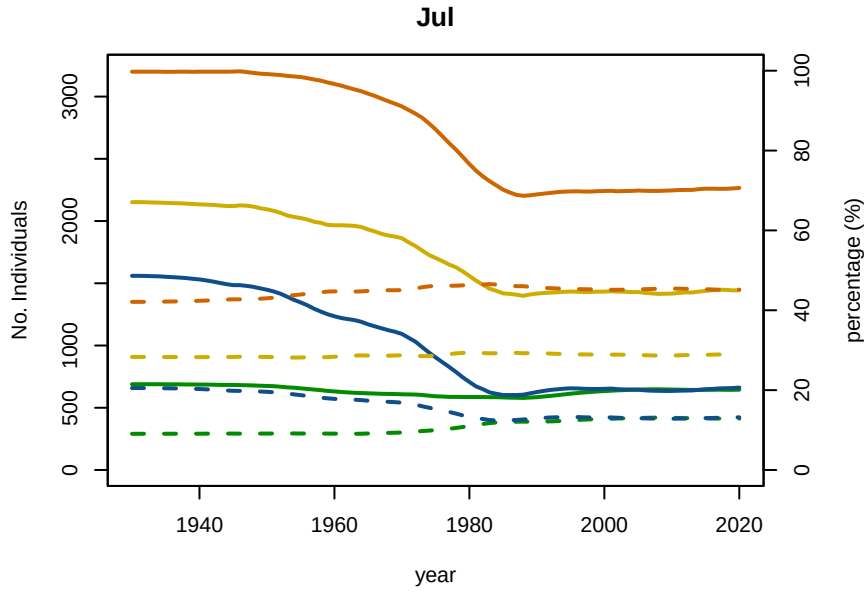


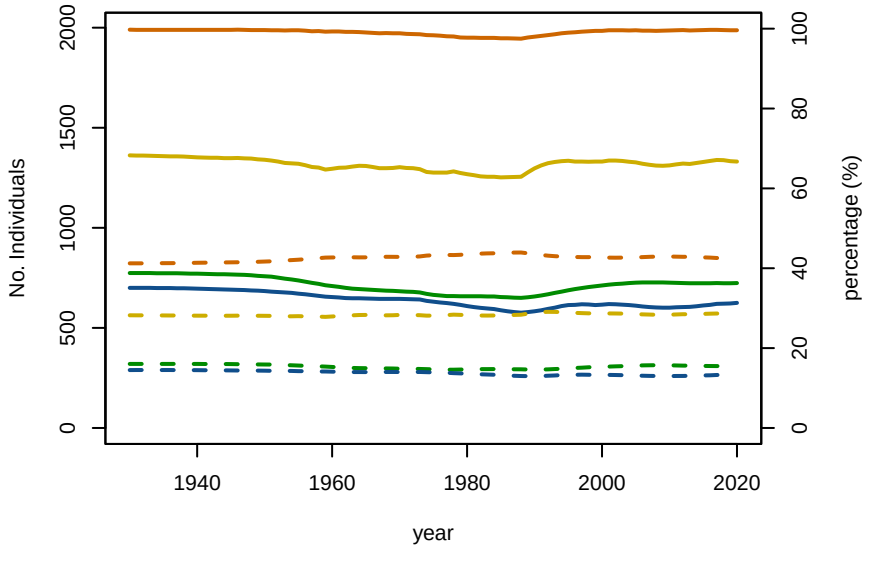


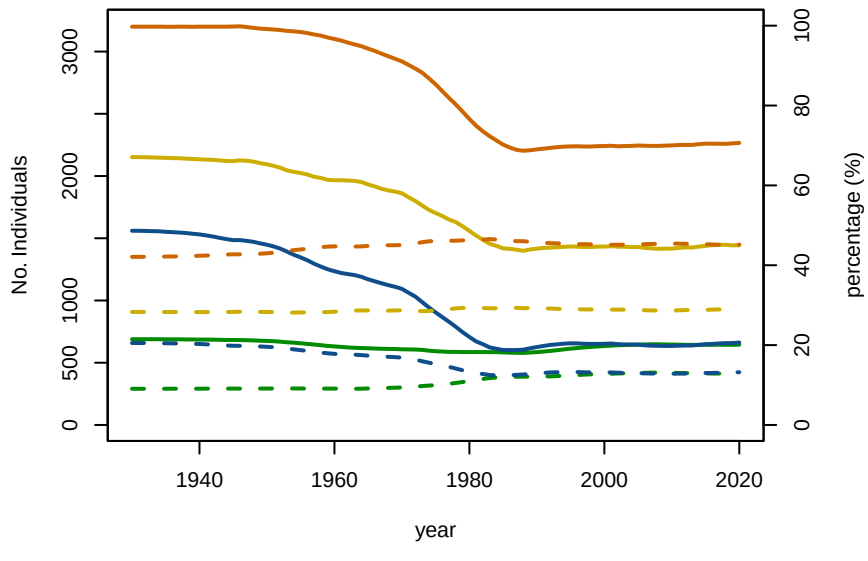
A1−4 A5−9 MatF MatM No Individuals percentage

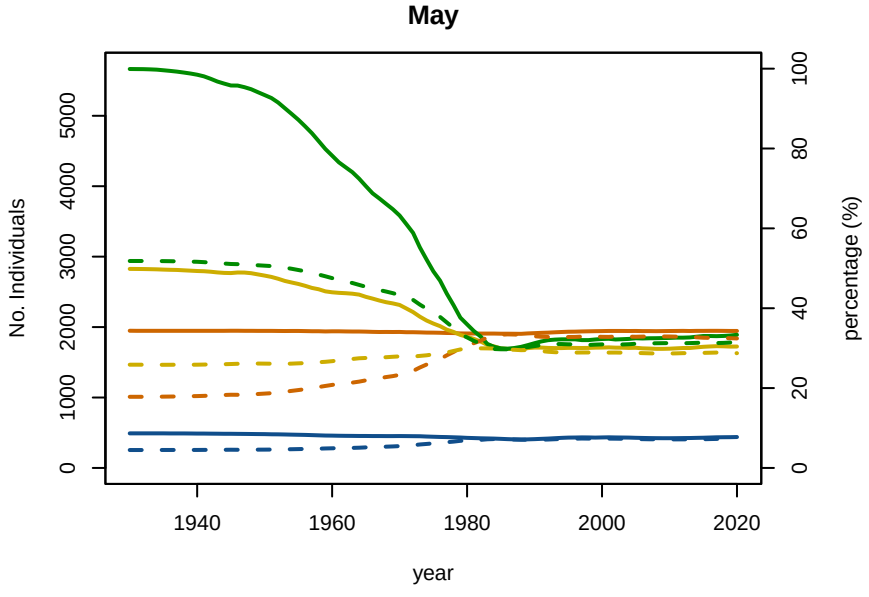
A01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 12S

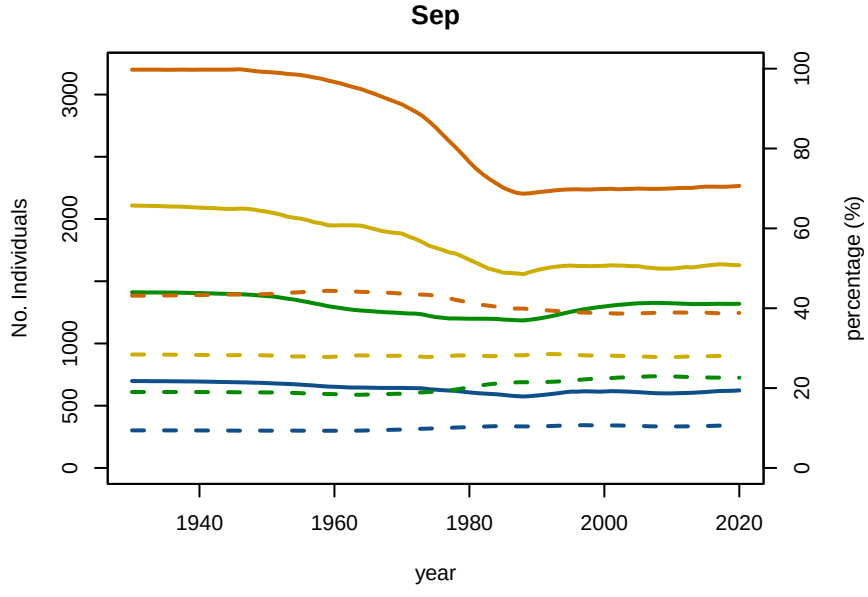


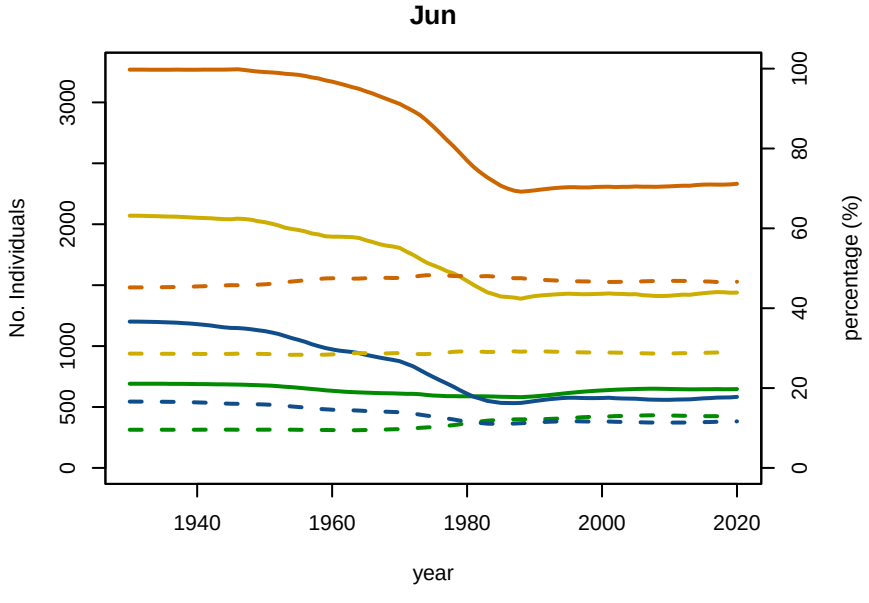


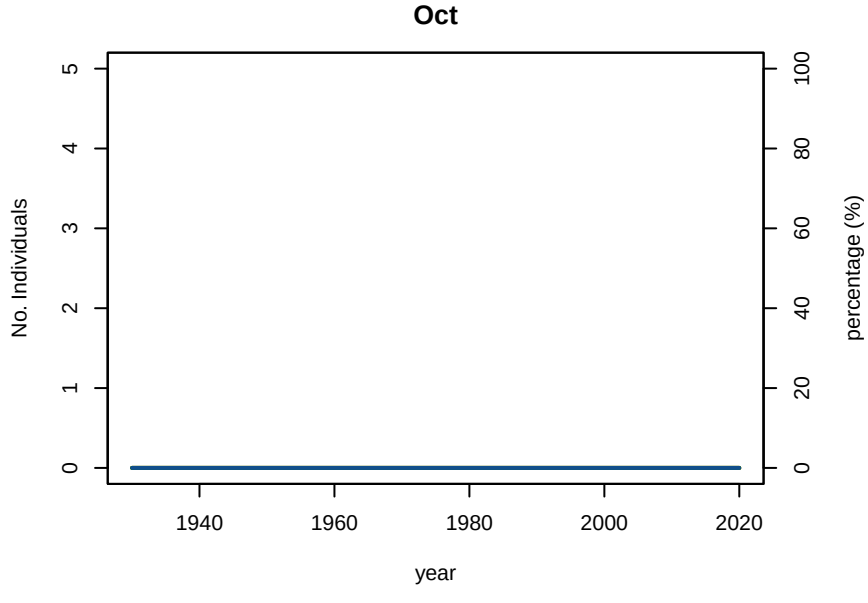






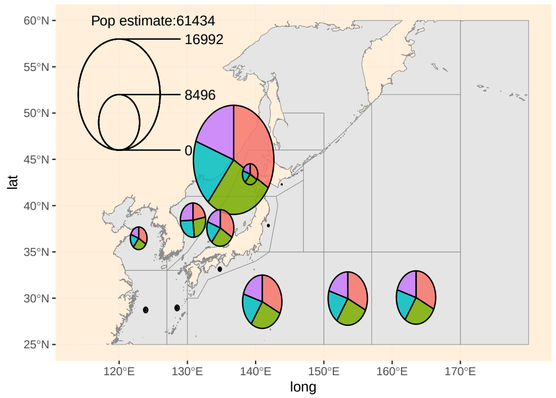




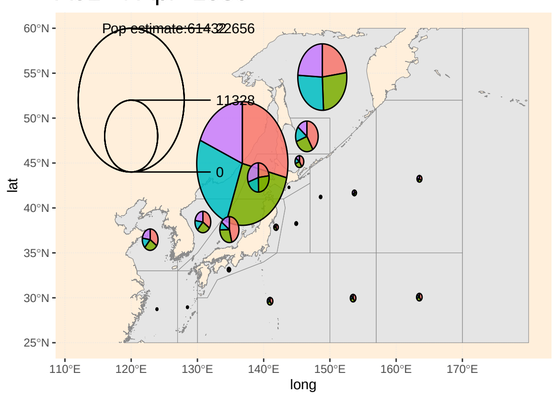


A1−4 A5−9 MatF MatM No Individuals percentage

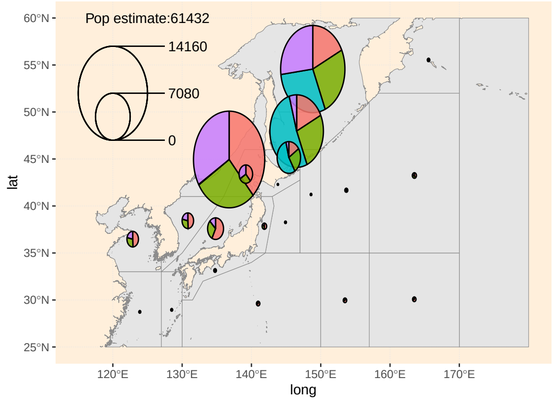
A01−4 Mar−1930



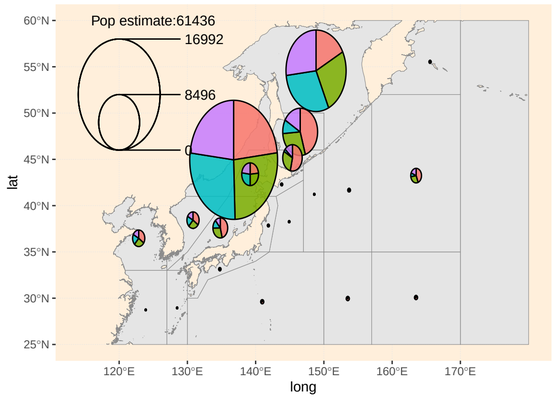
A01−4 Apr−1930



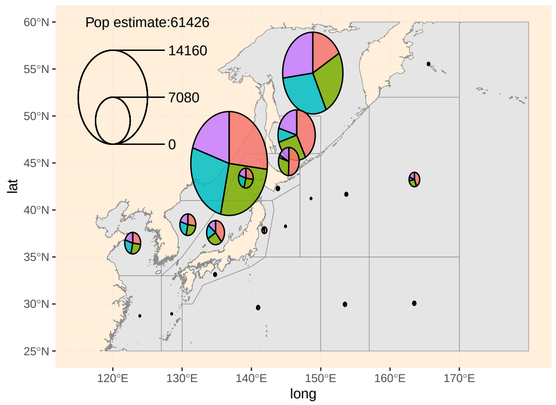
A01−4 May−1930



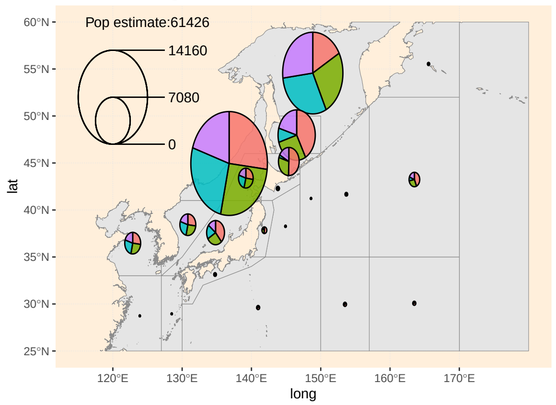
A01−4 Jun−1930



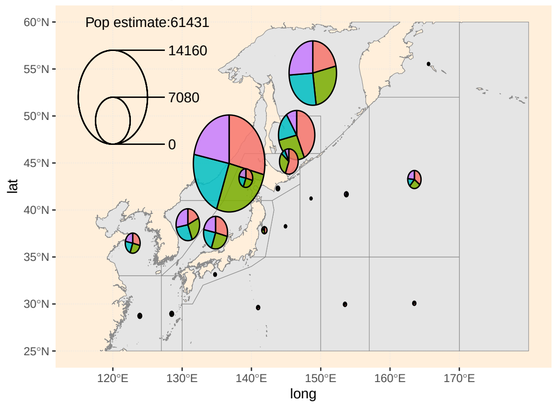
A01−4 Jul−1930



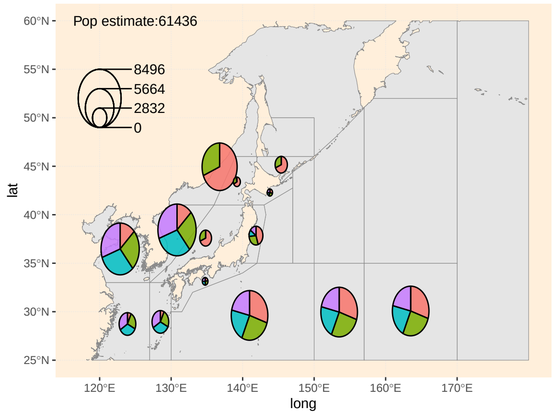
A01−4 Aug−1930



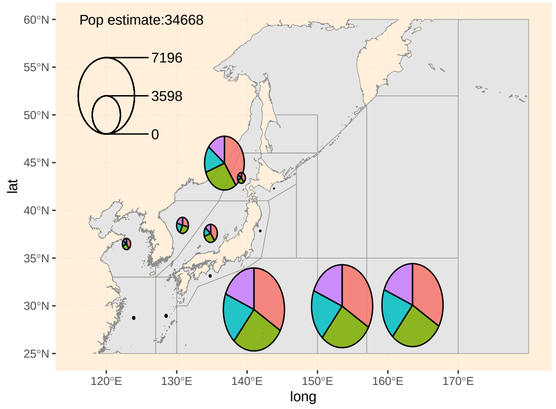
A01−4 Sep−1930



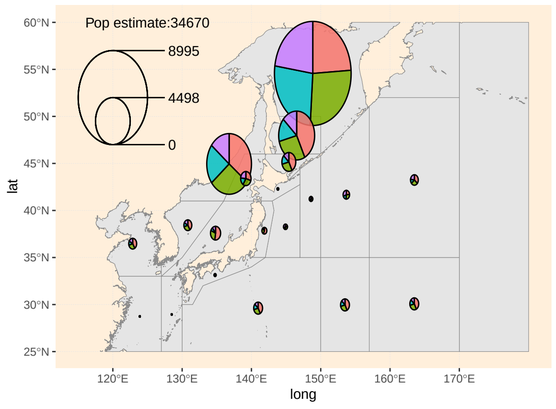
A01−4 Oct−1930



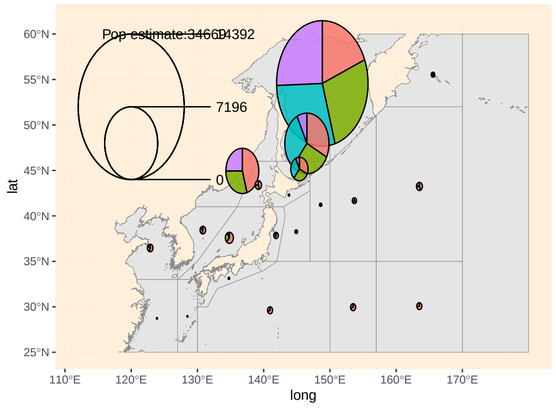
A01−4 Mar−2020



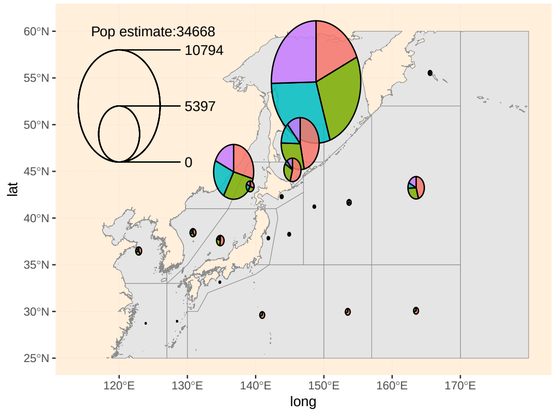
A01−4 Apr−2020



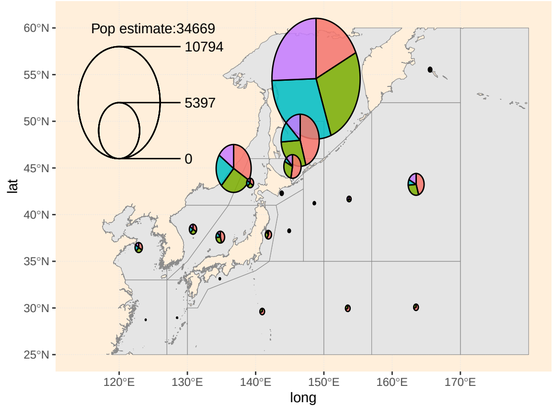
A01−4 May−2020



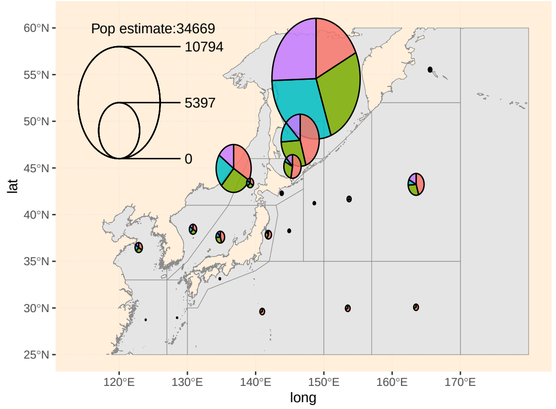
A01−4 Jun−2020



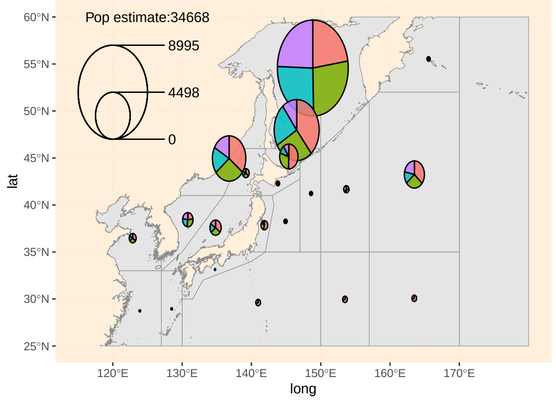
A01−4 Jul−2020



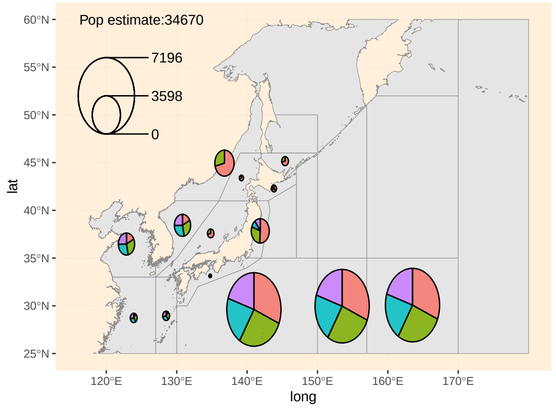
A01−4 Aug−2020



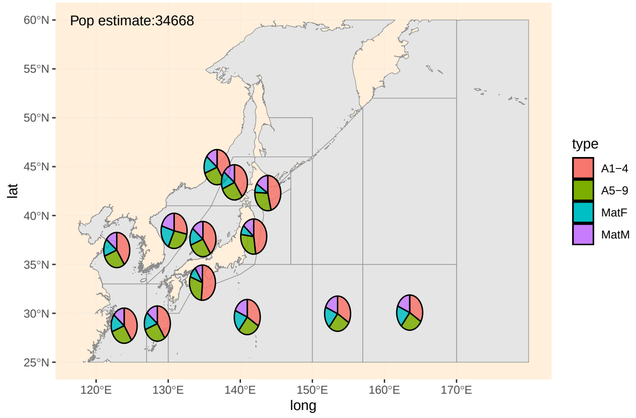
A01−4 Sep−2020



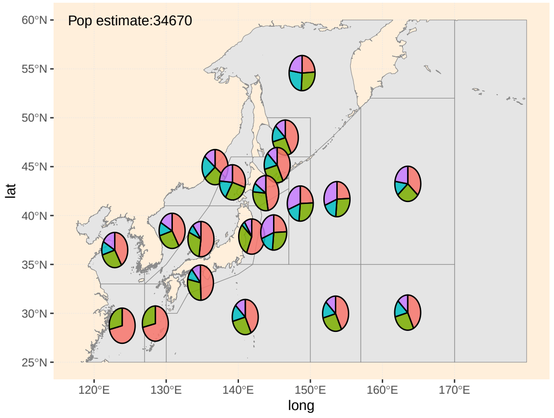
A01−4 Oct−2020



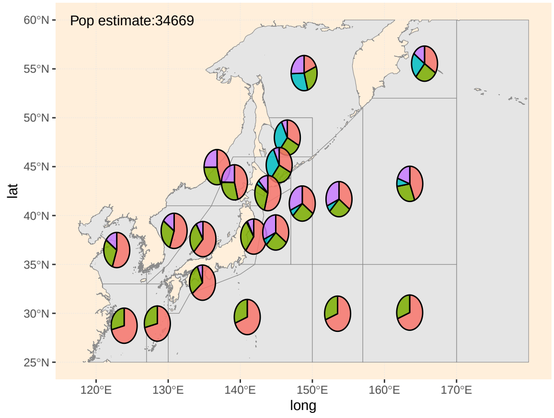
A01−4 Mar−2020



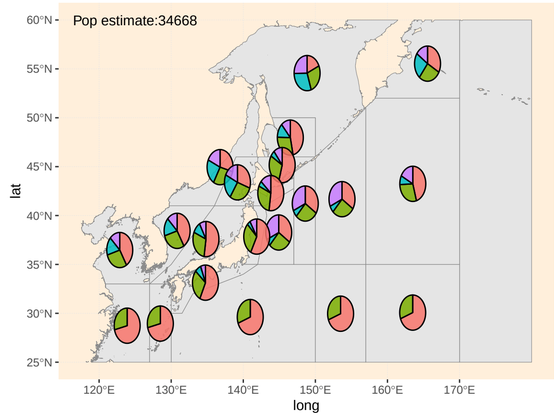
A01−4 Apr−2020



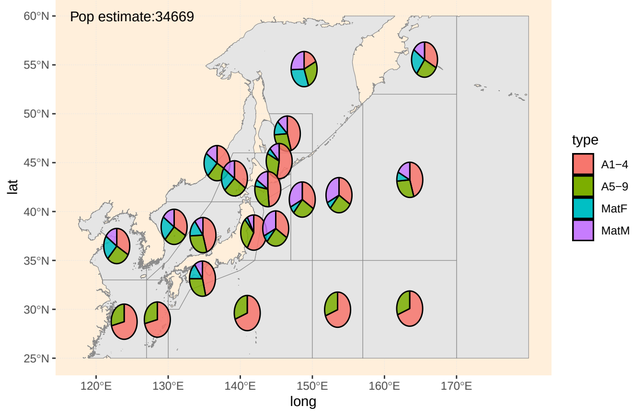
A01−4 May−2020



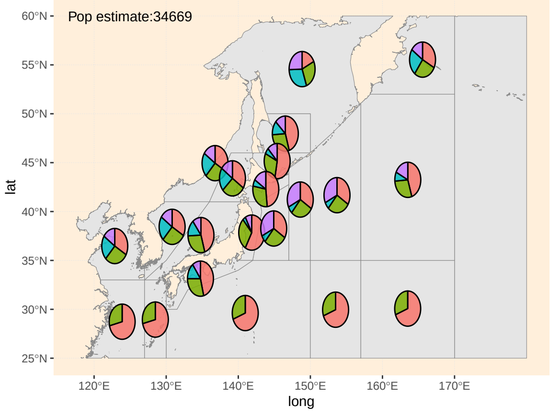
A01−4 Jun−2020



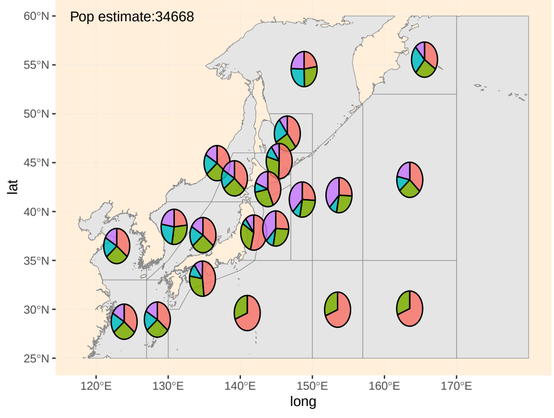
A01−4 Jul−2020



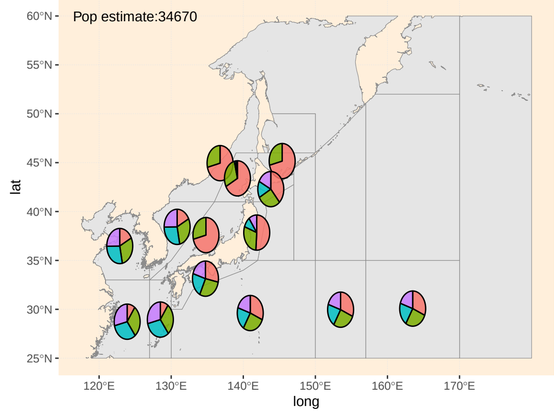
A01−4 Aug−2020



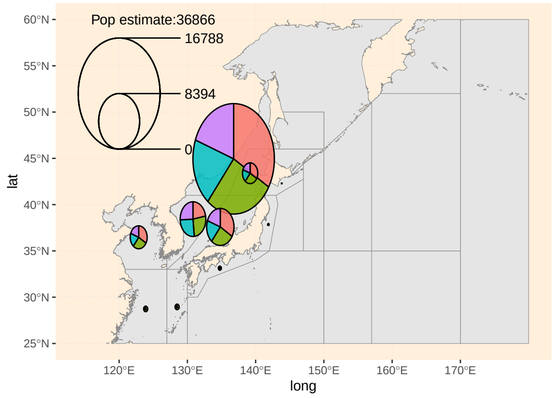
A01−4 Sep−2020



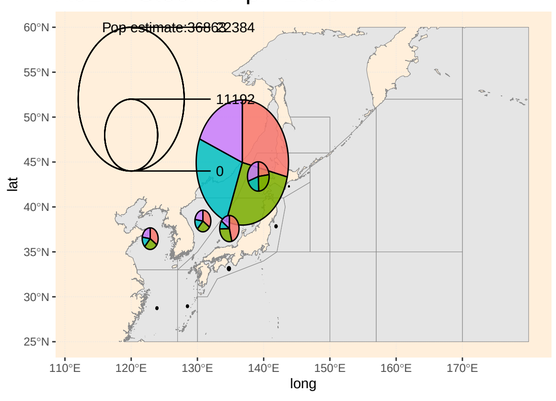
A01−4 Oct−2020



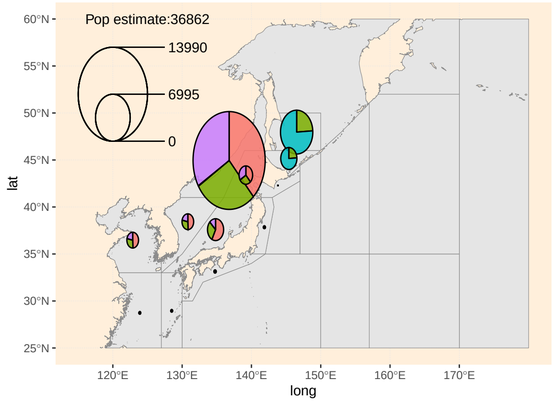
A01−4 Stock:J Mar−1930



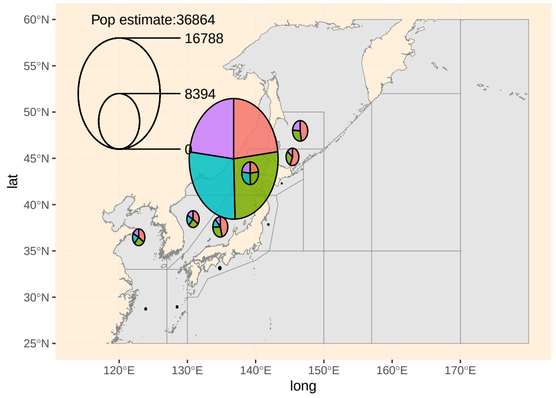
A01−4 Stock:J Apr−1930



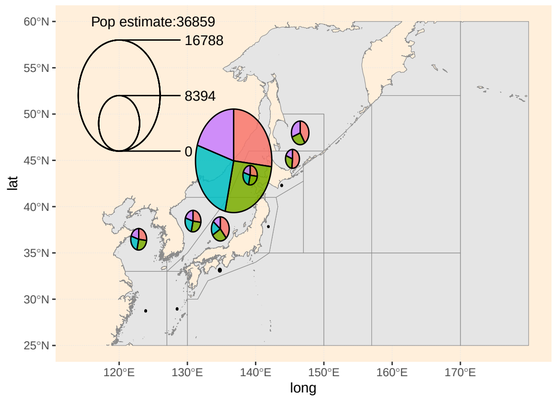
A01−4 Stock:J May−1930



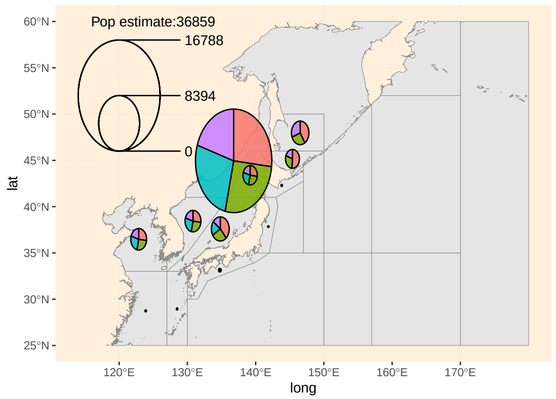
A01−4 Stock:J Jun−1930



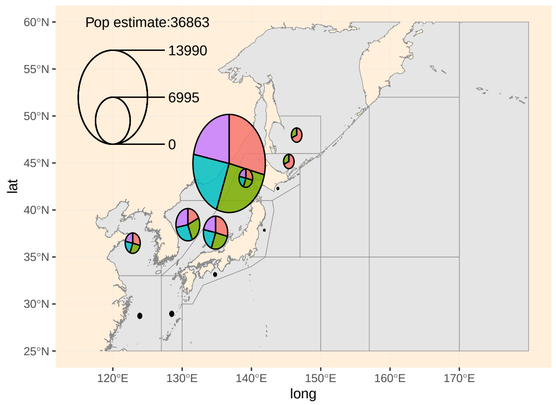
A01−4 Stock:J Jul−1930



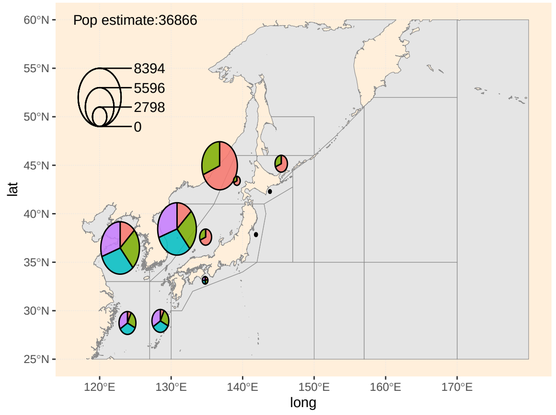
A01−4 Stock:J Aug−1930



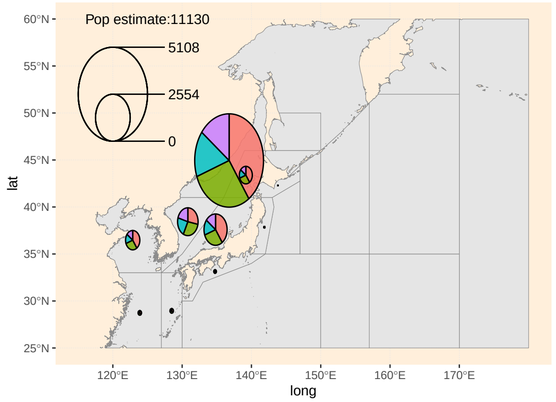
A01−4 Stock:J Sep−1930



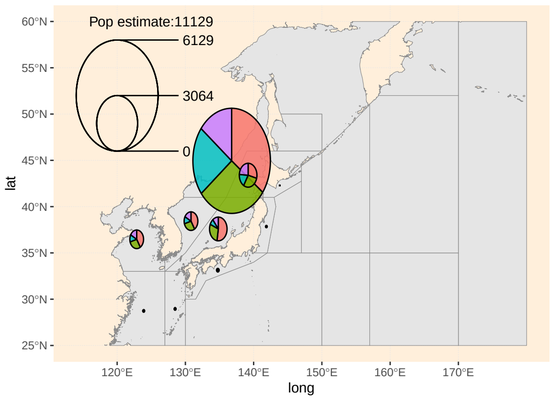
A01−4 Stock:J Oct−1930



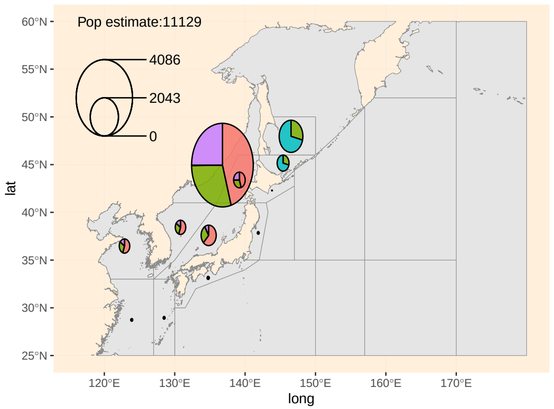
A01−4 Stock:J Mar−2020



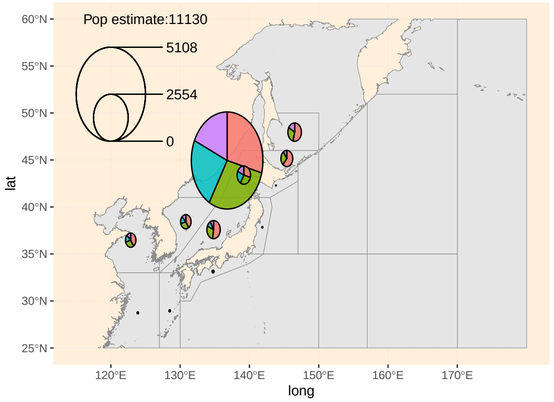
A01−4 Stock:J Apr−2020



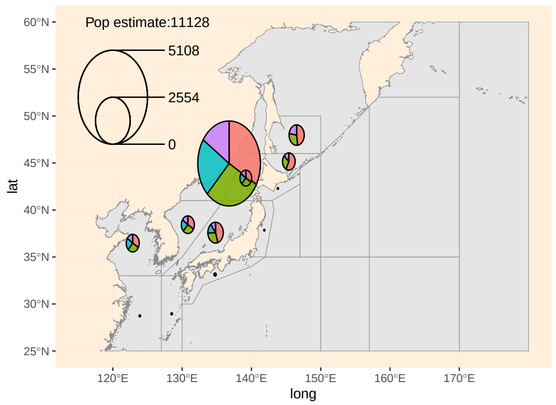
A01−4 Stock:J May−2020



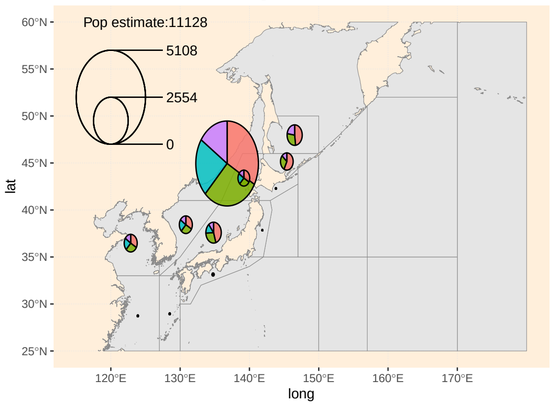
A01−4 Stock:J Jun−2020



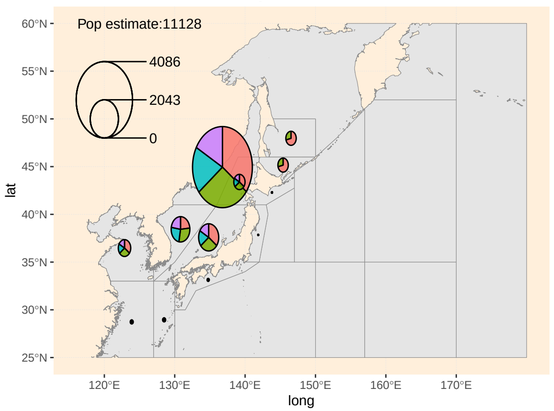
A01−4 Stock:J Jul−2020



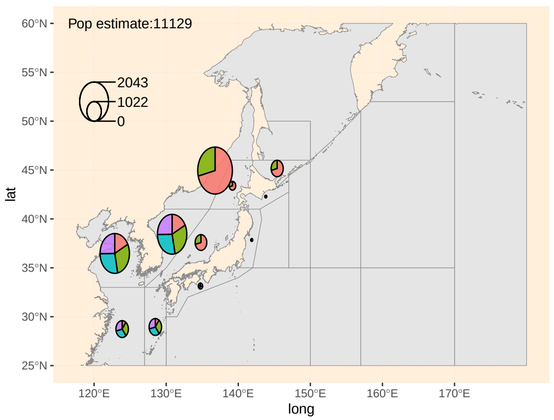
A01−4 Stock:J Aug−2020



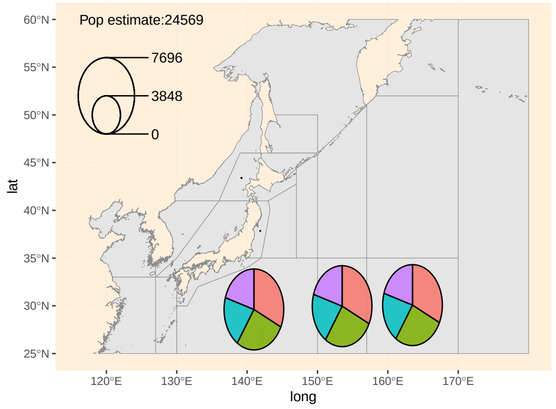
A01−4 Stock:J Sep−2020



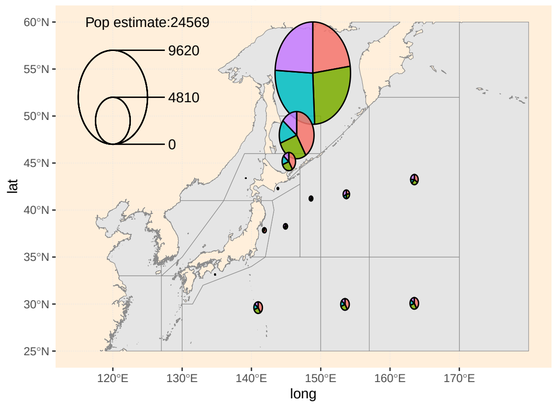
A01−4 Stock:J Oct−2020



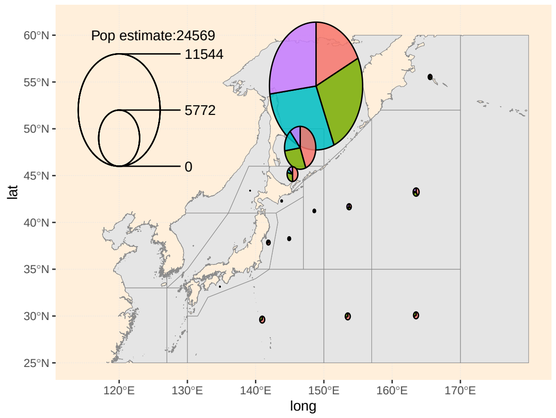
A01−4 Stock:O Mar−1930



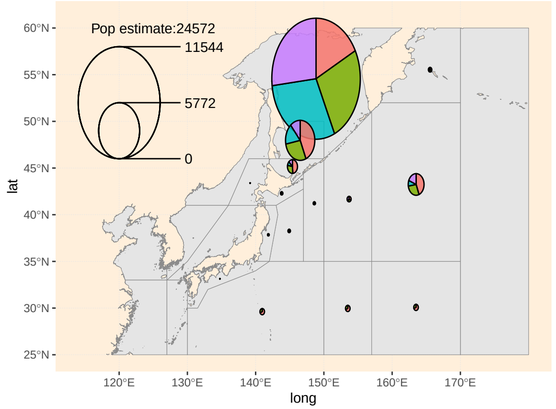
A01−4 Stock:O Apr−1930



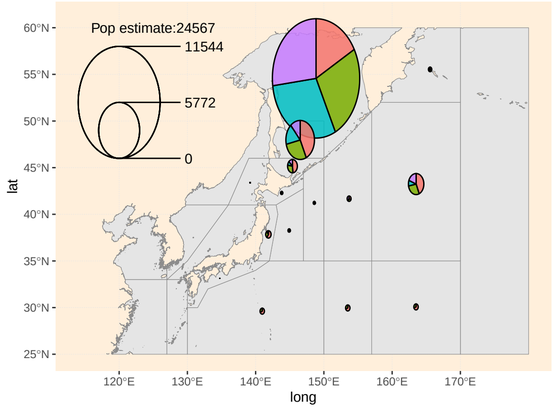
A01−4 Stock:O May−1930



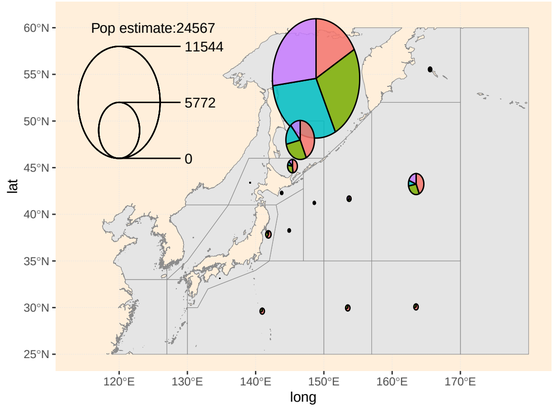
A01−4 Stock:O Jun−1930



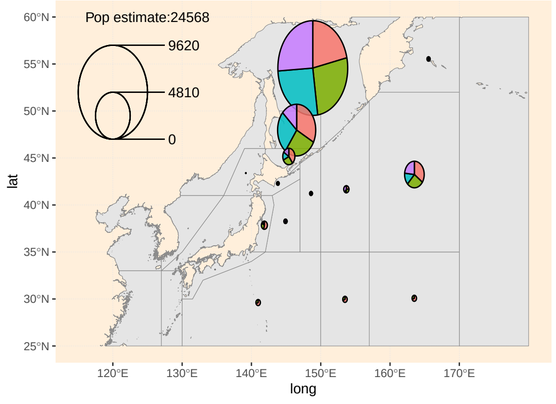
A01−4 Stock:O Jul−1930



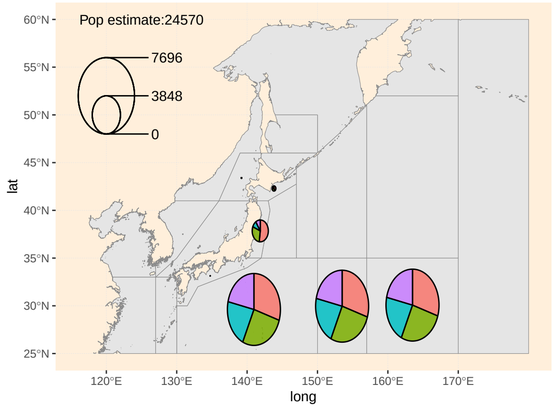
A01−4 Stock:O Aug−1930



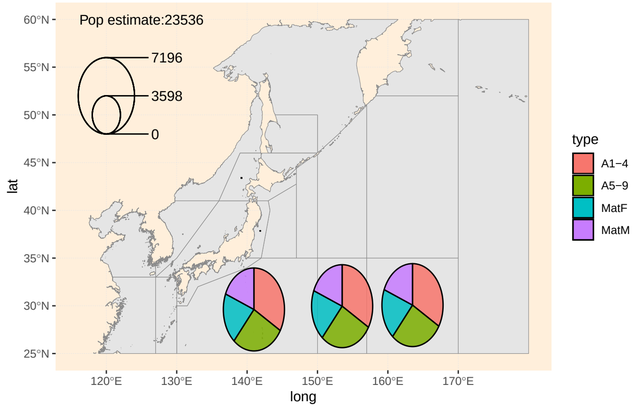
A01−4 Stock:O Sep−1930



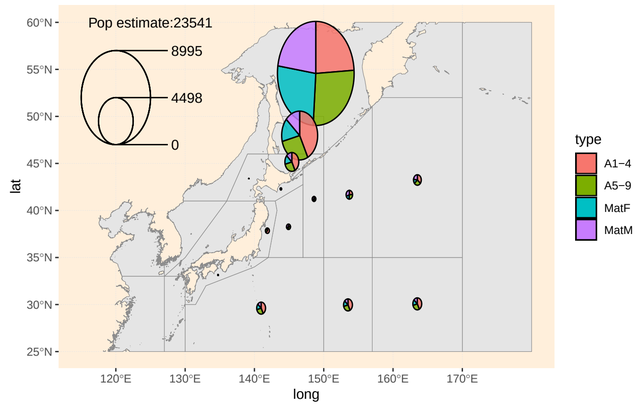
A01−4 Stock:O Oct−1930



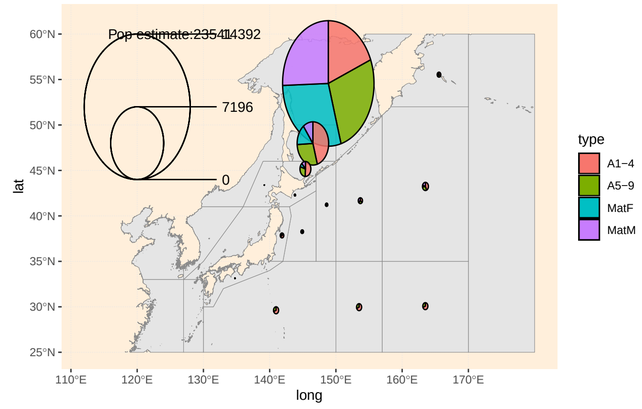
A01−4 Stock:O Mar−2020



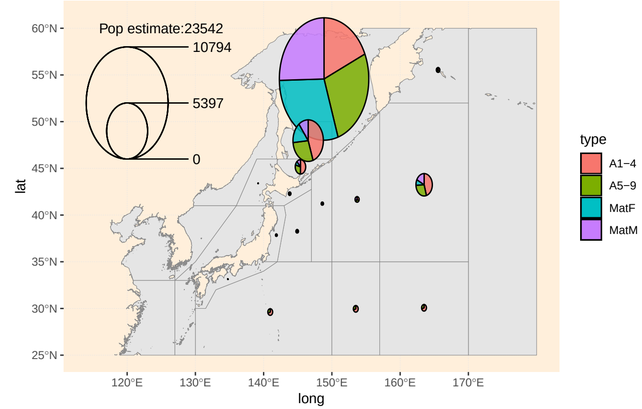
A01−4 Stock:O Apr−2020



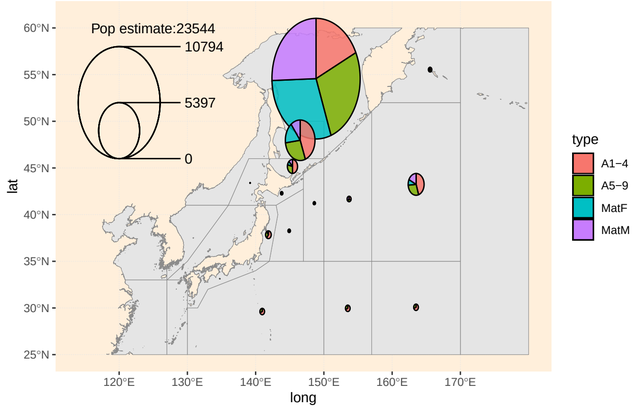
A01−4 Stock:O May−2020



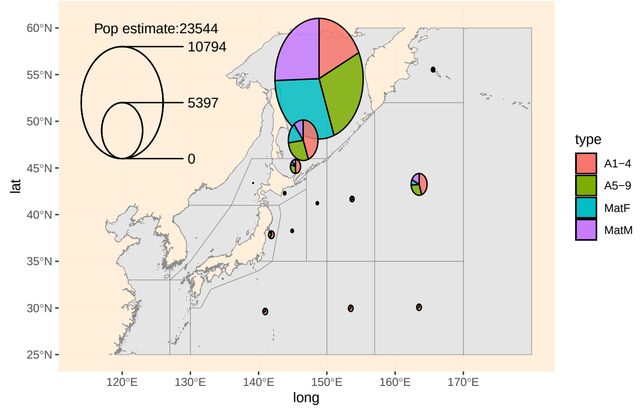
A01−4 Stock:O Jun−2020



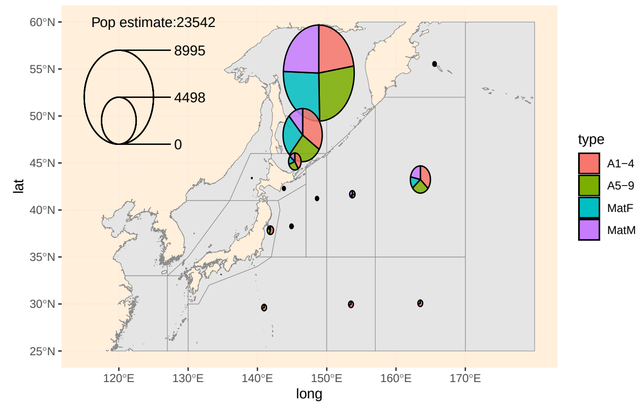
A01−4 Stock:O Jul−2020



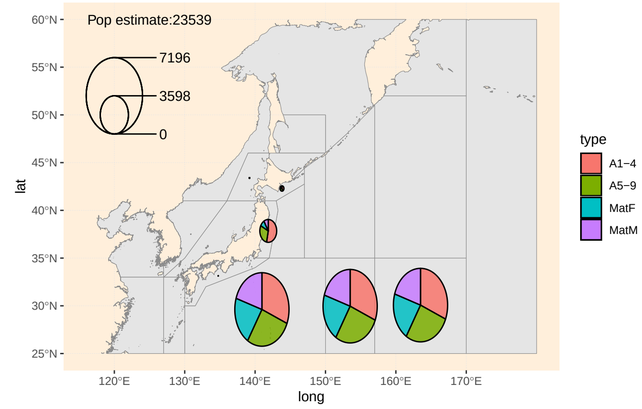
A01−4 Stock:O Aug−2020



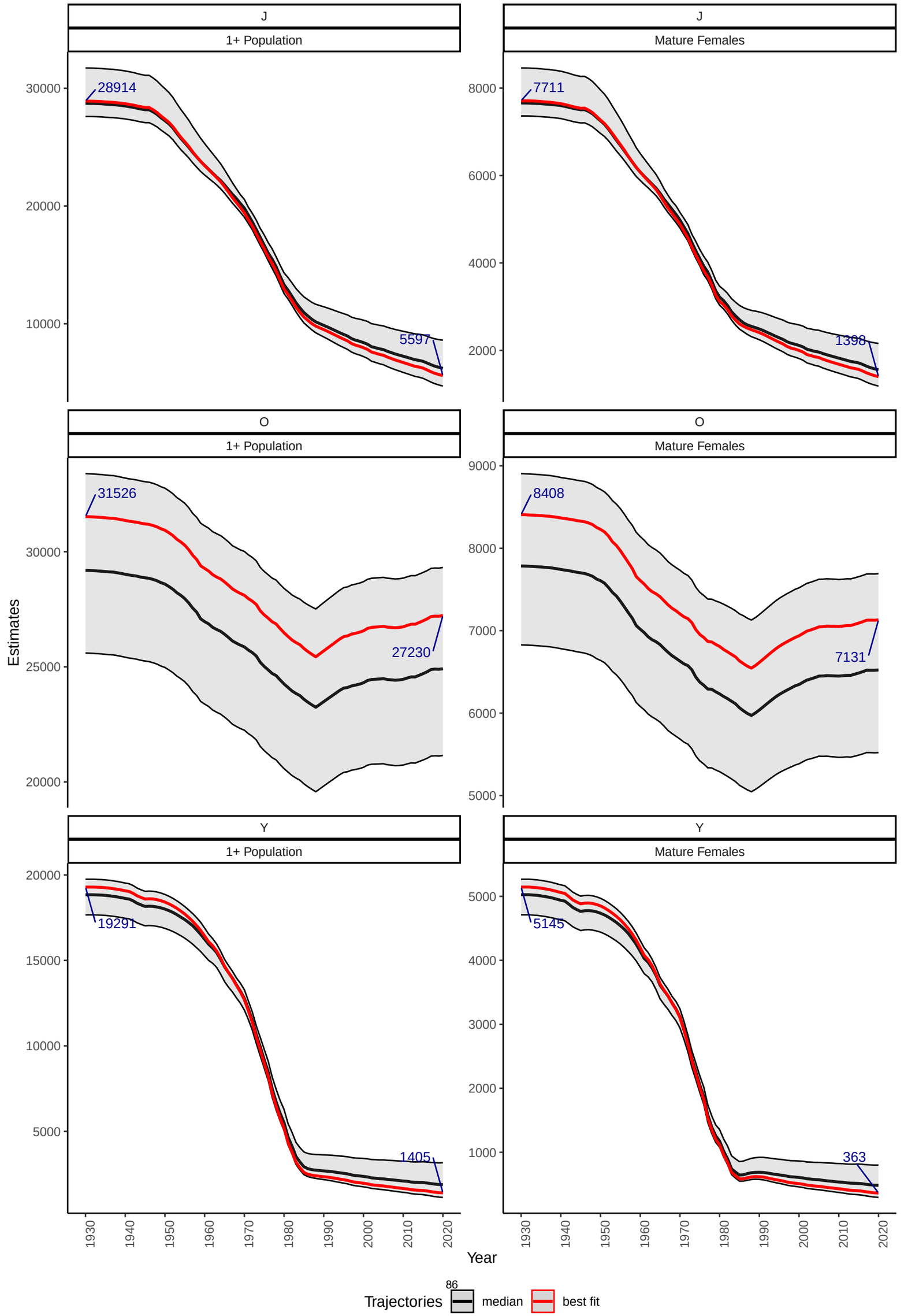
A01−4 Stock:O Sep−2020



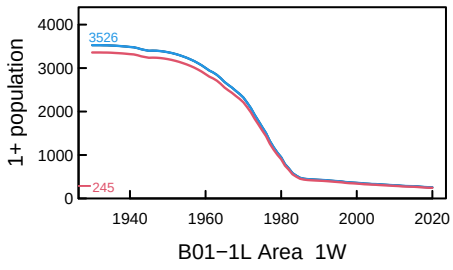
A01−4 Stock:O Oct−2020



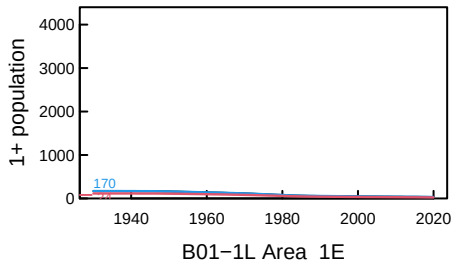
B01−1 Baseline Conditioning Plot 1: Stock Trajectories



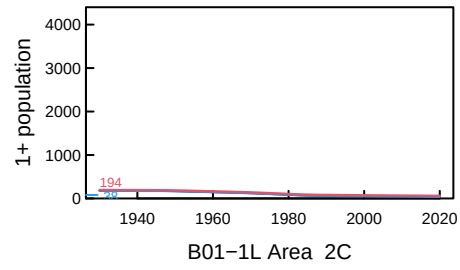
B01−1L Hyp. B 1% Baseline Conditioning Plot 2a: May/Jun (red) & Aug/Sep (blue)



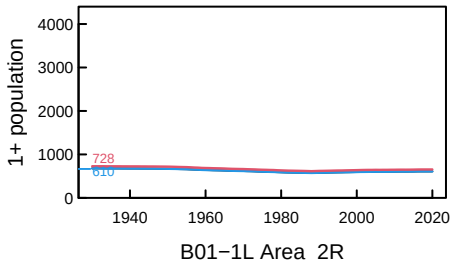
B01−1L Area 1W



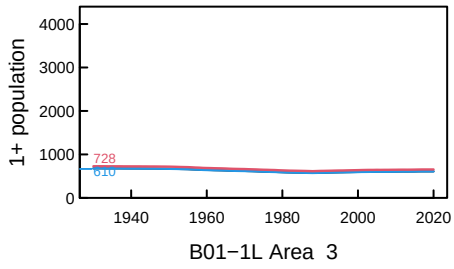
B01−1L Area 1E



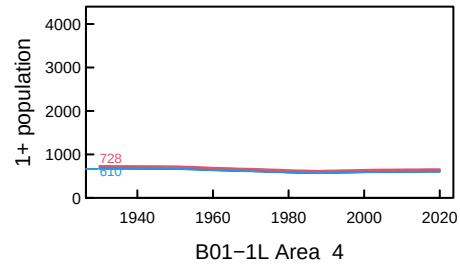
B01−1L Area 2C



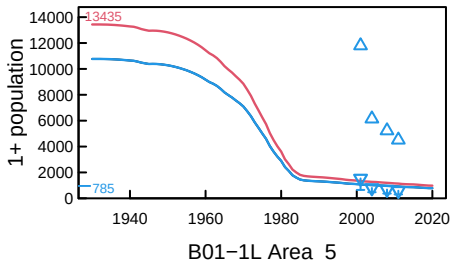
B01−1L Area 2R



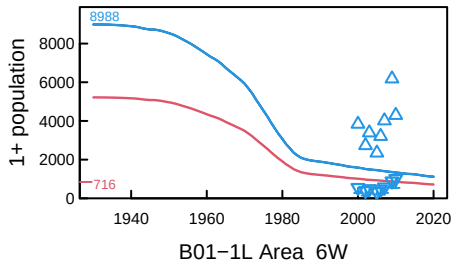
B01−1L Area 3



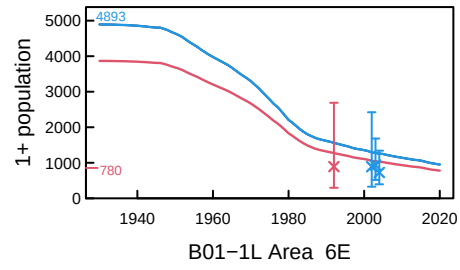
B01−1L Area 4



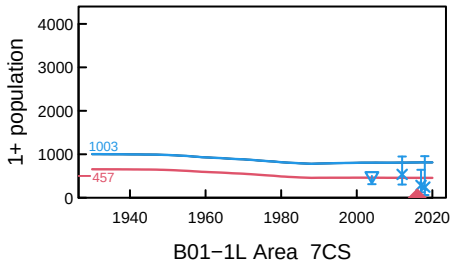
B01−1L Area 5



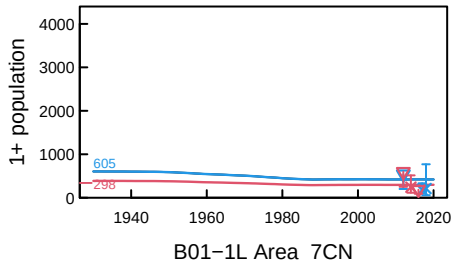
B01−1L Area 6W



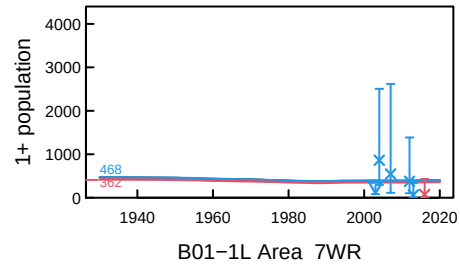
B01−1L Area 6E



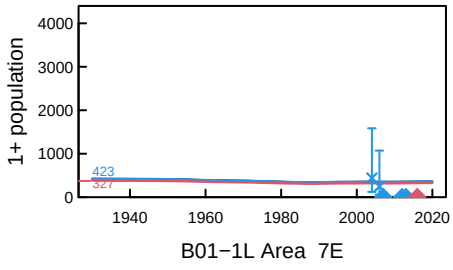
B01−1L Area 7CS



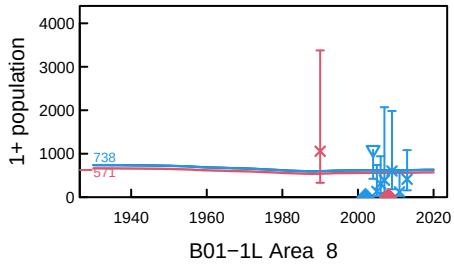
B01−1L Area 7CN



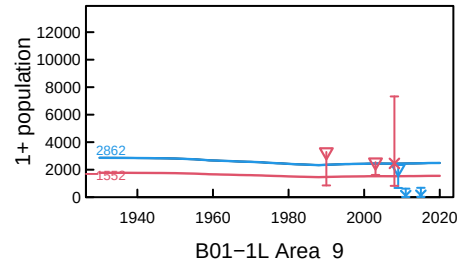
B01−1L Area 7WR



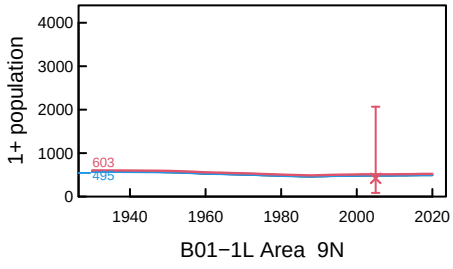
B01−1L Area 7E



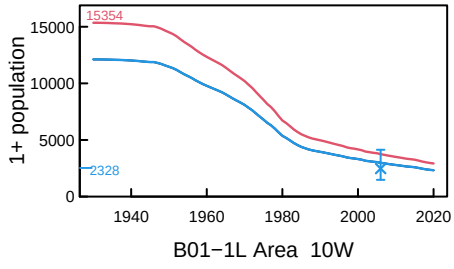
B01−1L Area 8



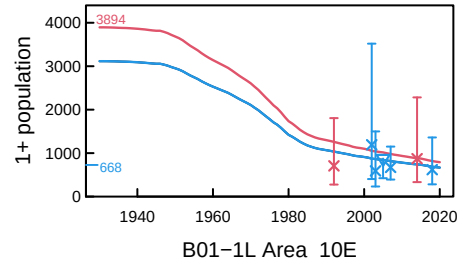
B01−1L Area 9



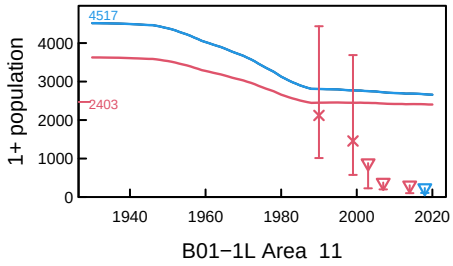
B01−1L Area 9N



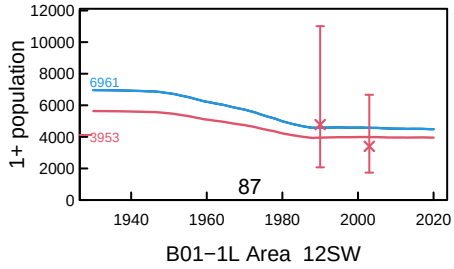
B01−1L Area 10W



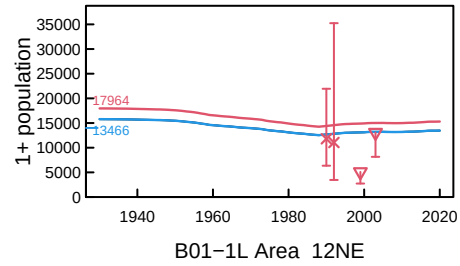
B01−1L Area 10E



B01−1L Area 11

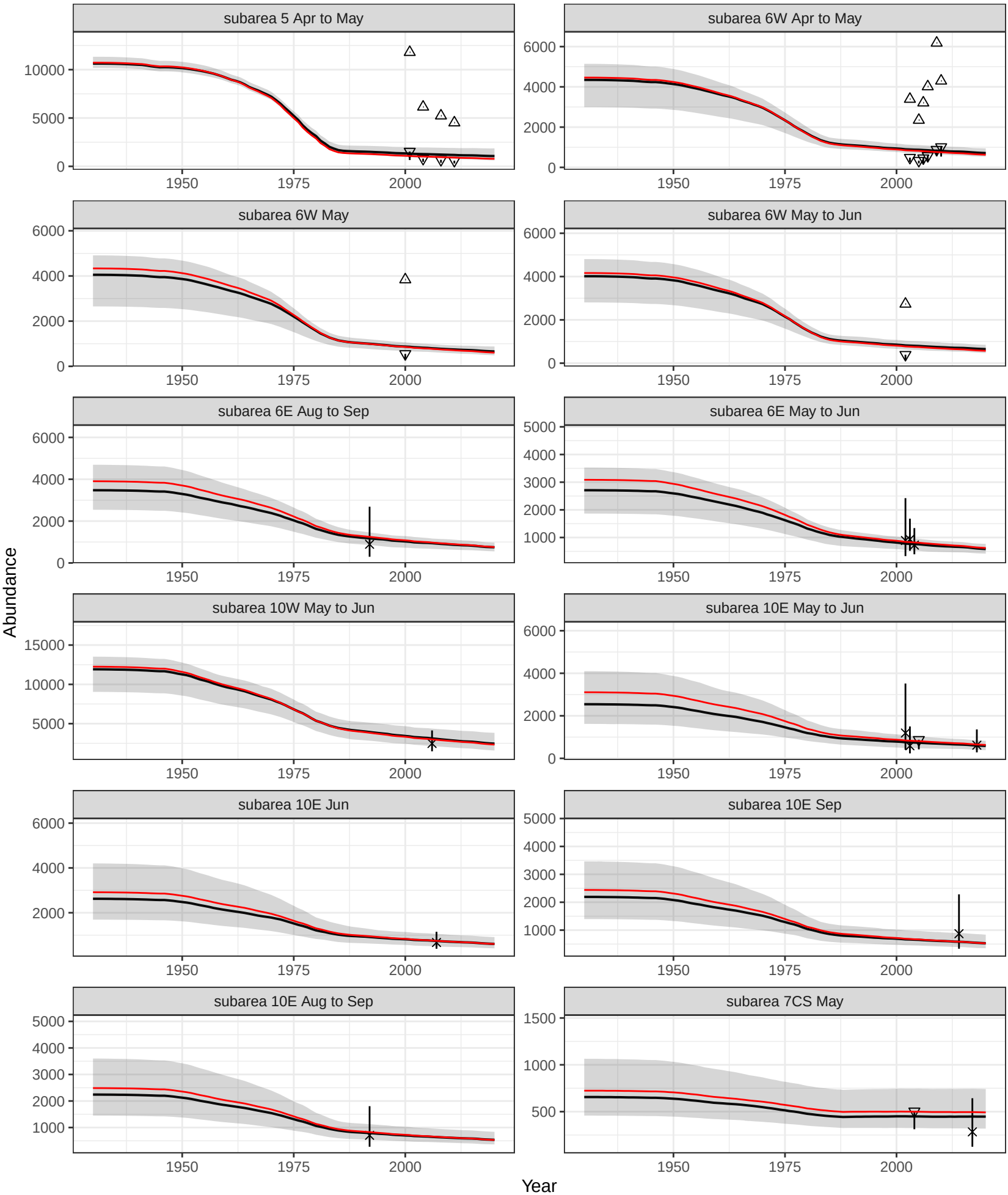


B01−1L Area 12SW



B01−1L Area 12NE

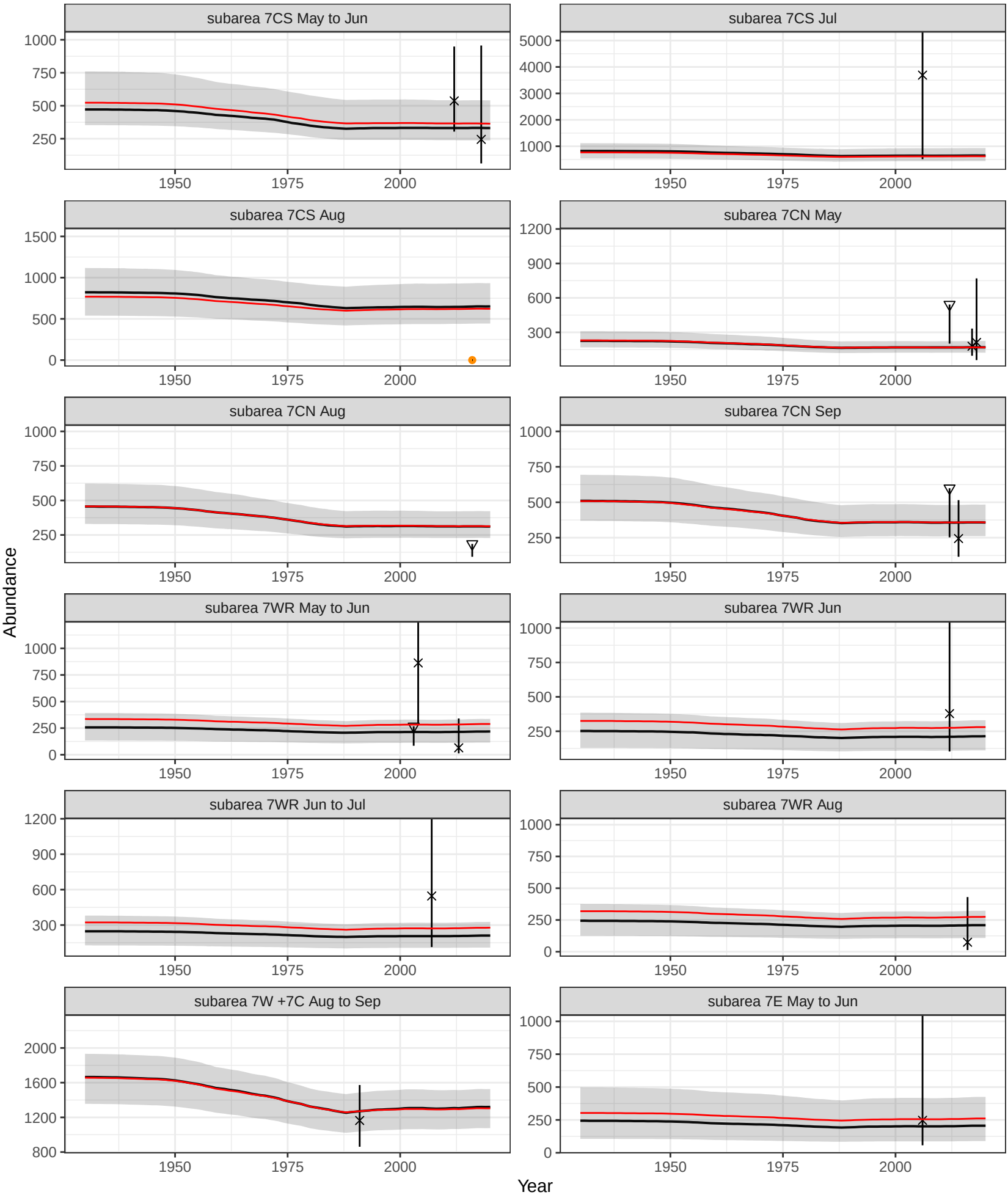
B01−1 Baseline Conditioning Plot 2b: Fits to Data



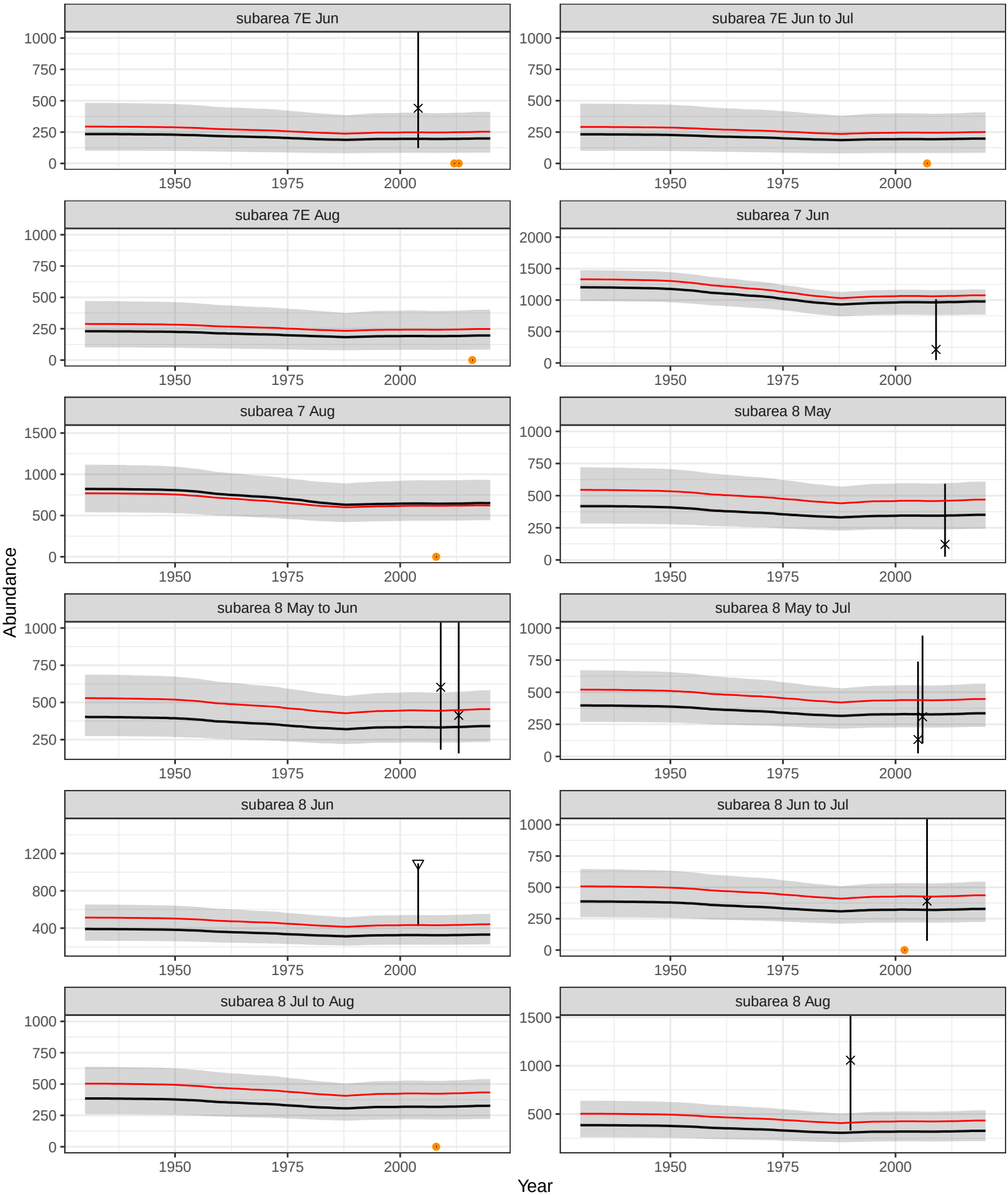
Type ● 0 estimate × estimate △ max estimate ▽ min estimate

best fit = red, median = black

B01−1 Baseline Conditioning Plot 2b: Fits to Data

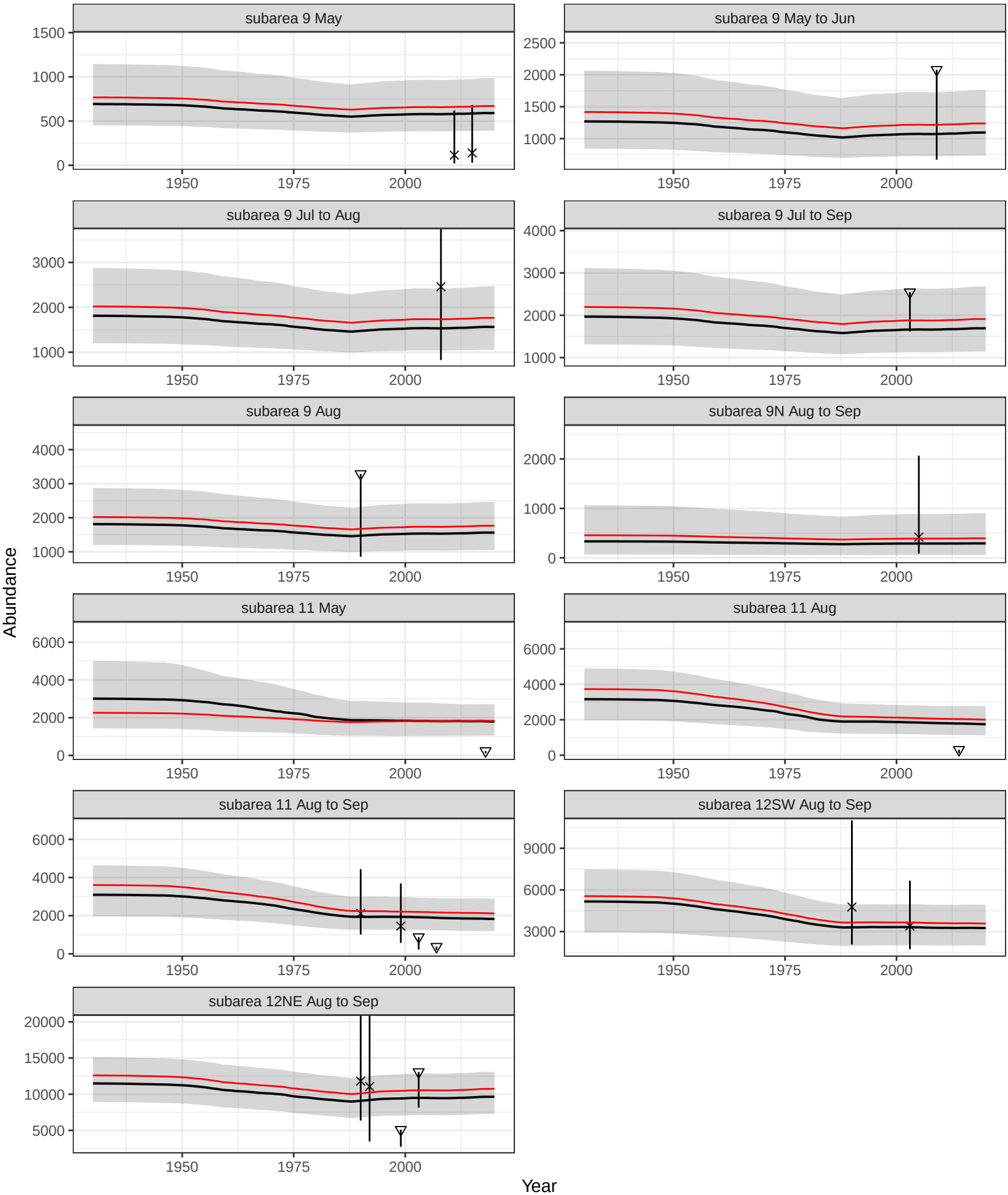


B01−1 Baseline Conditioning Plot 2b: Fits to Data



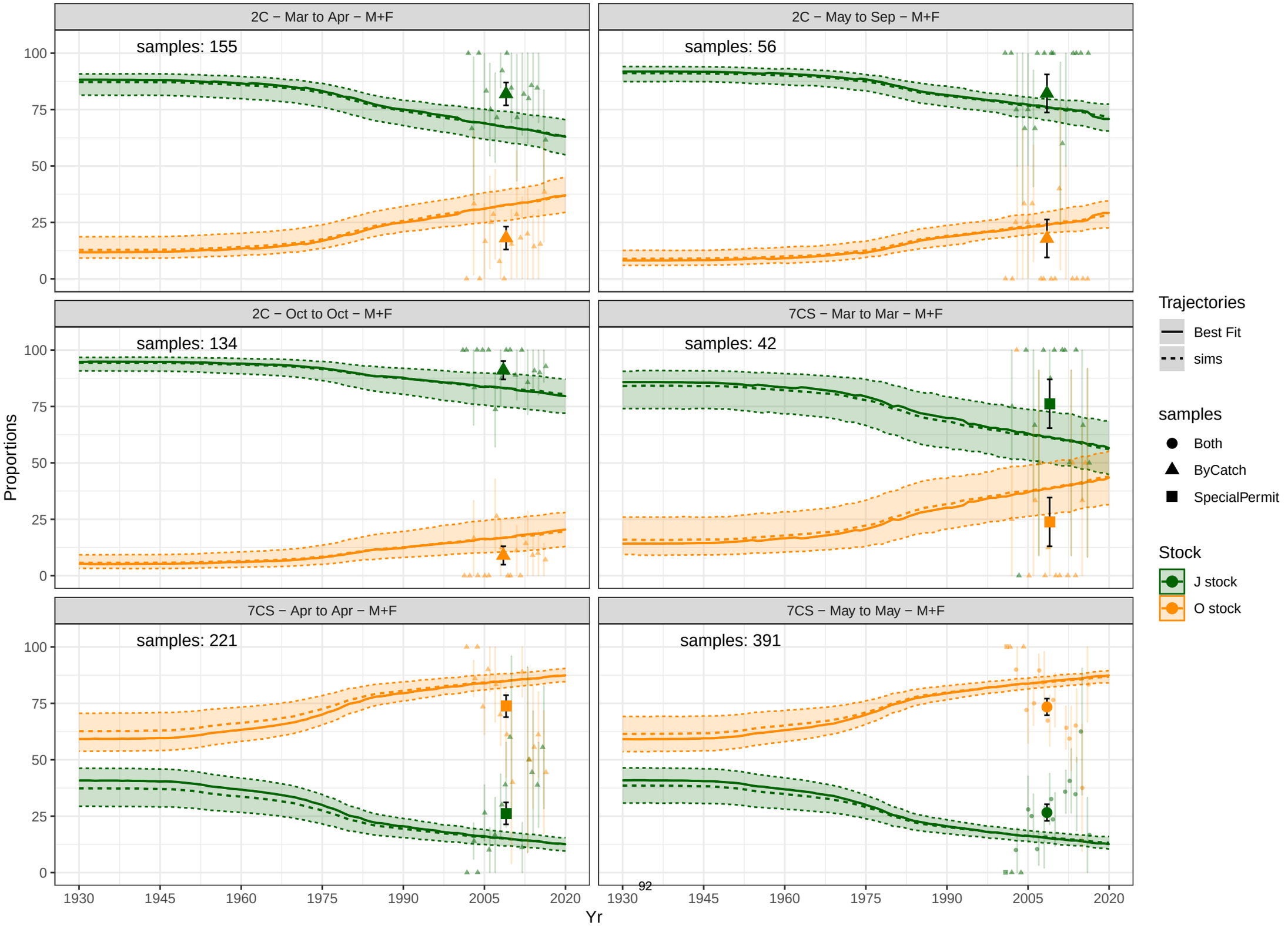
best fit = red, median = black

B01−1 Baseline Conditioning Plot 2b: Fits to Data

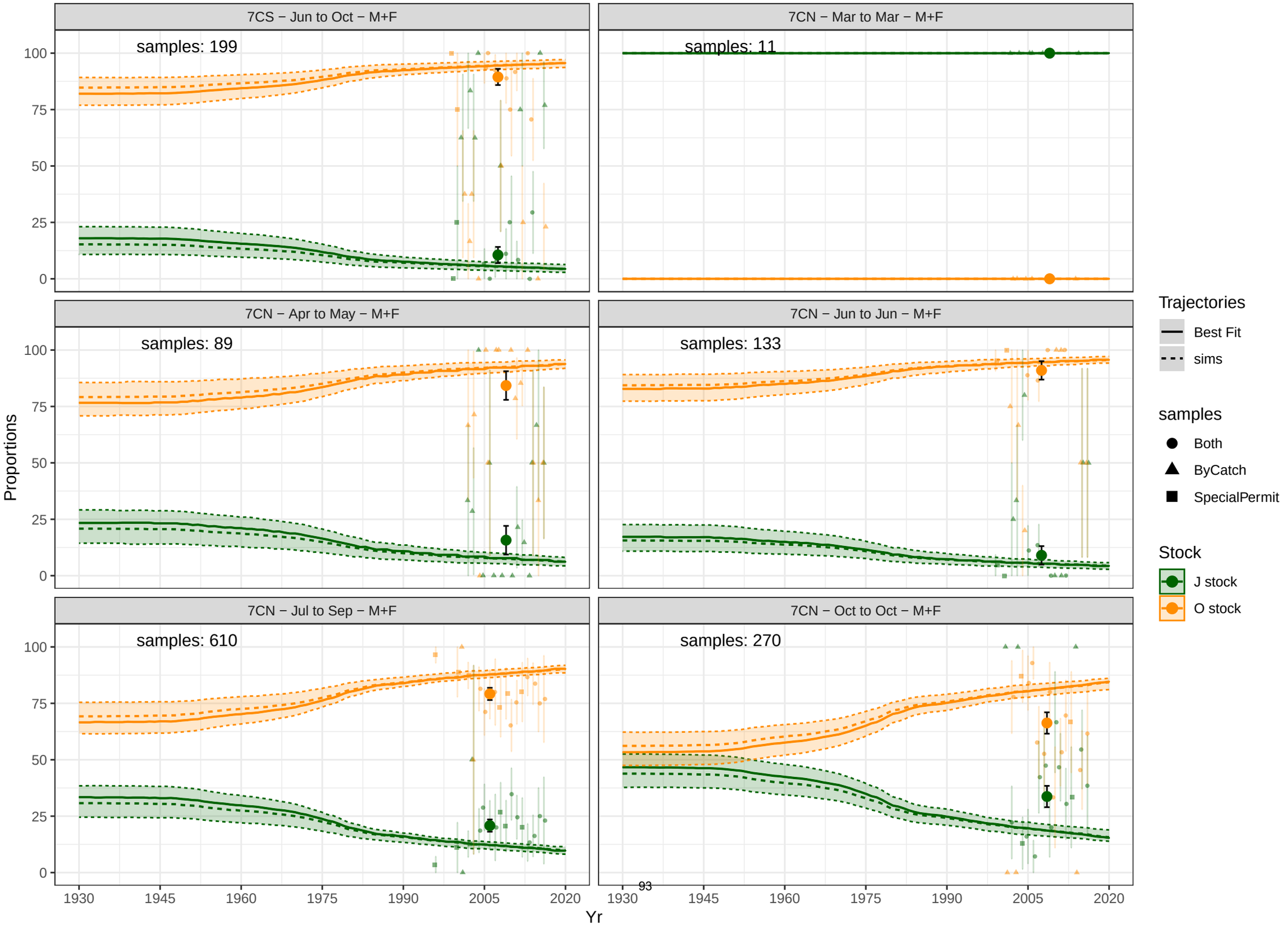


best fit = red, median = black

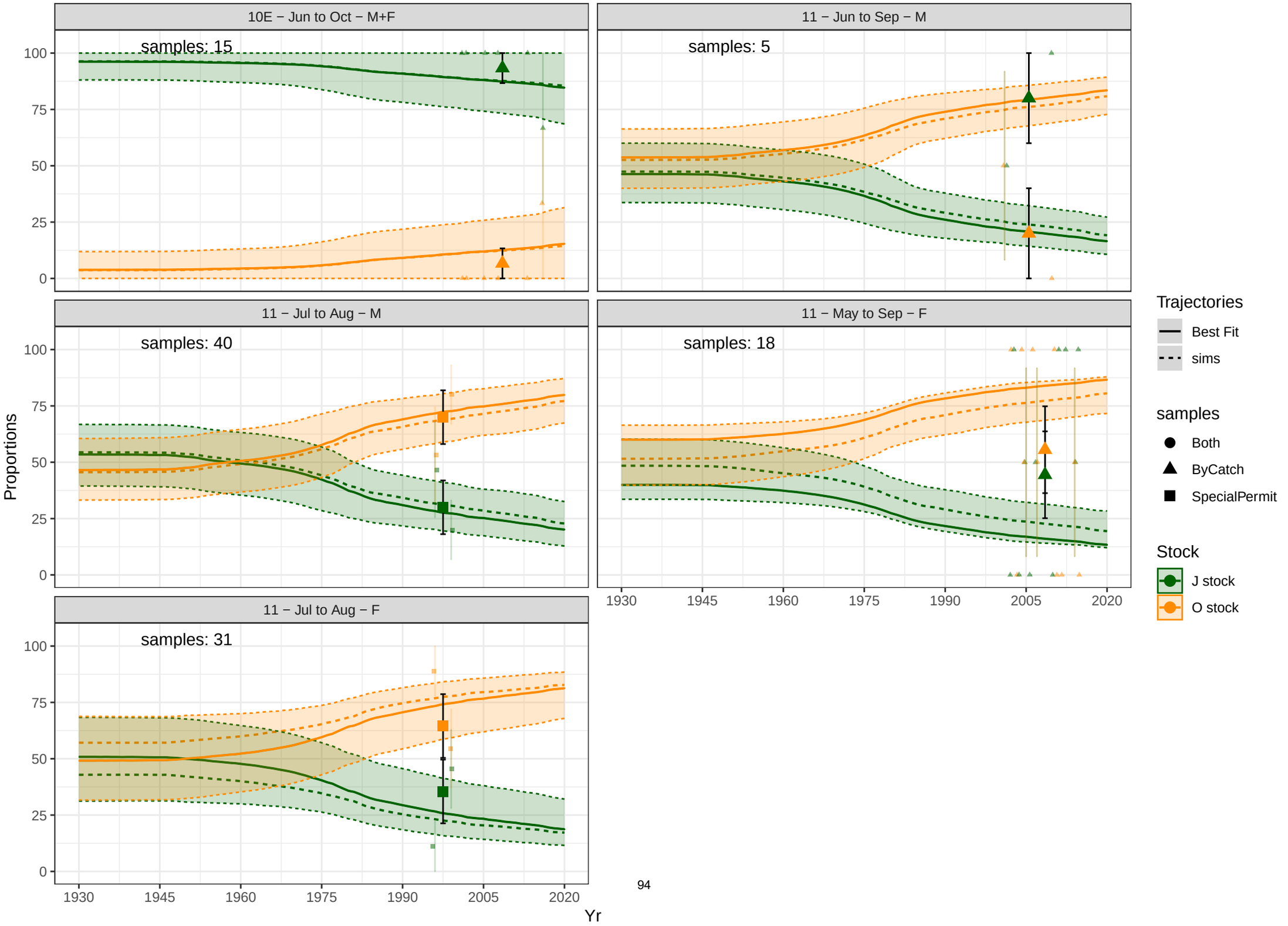
B01−1 Baseline Conditioning Plot 3: Fits to Data

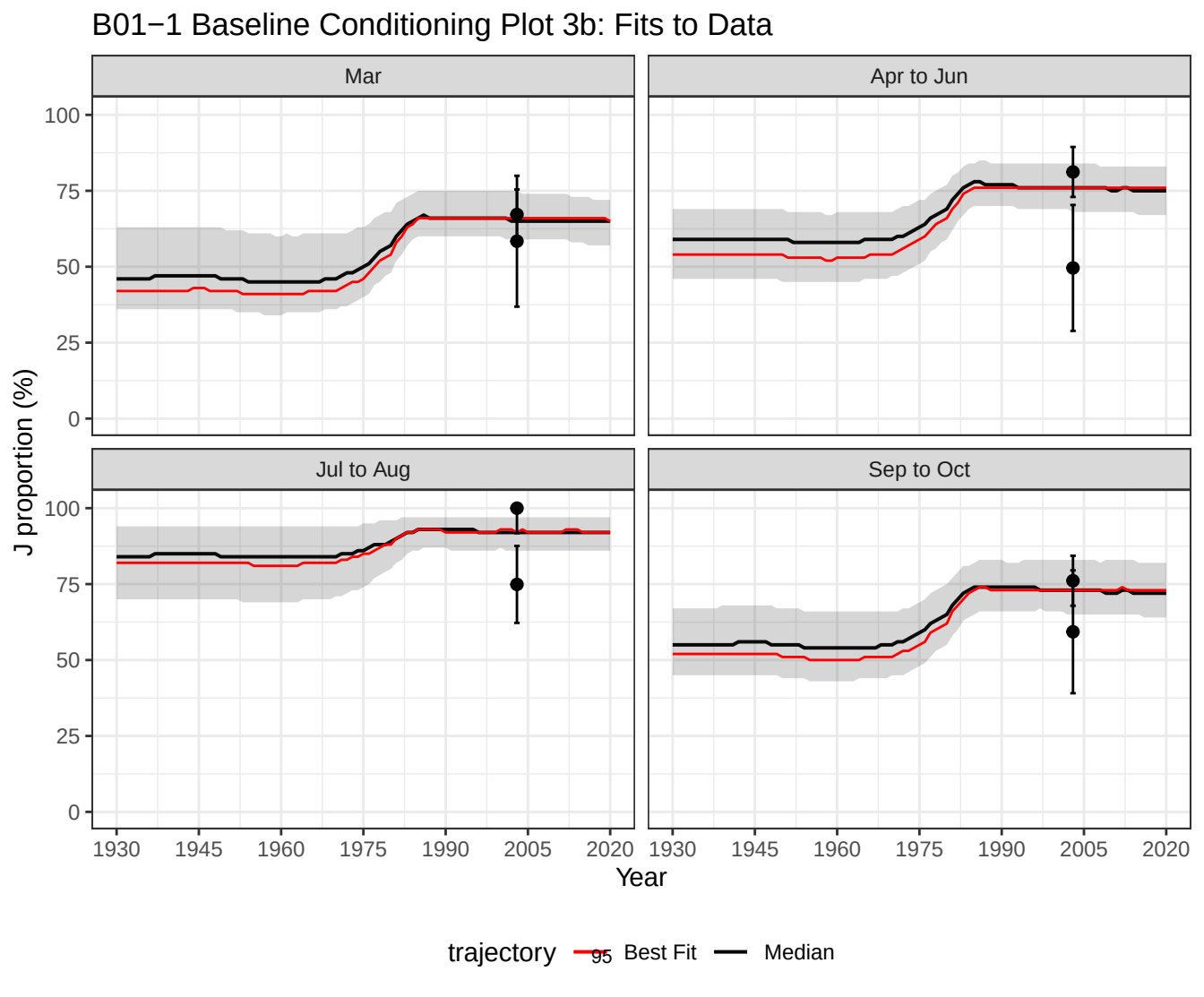


B01−1 Baseline Conditioning Plot 3: Fits to Data

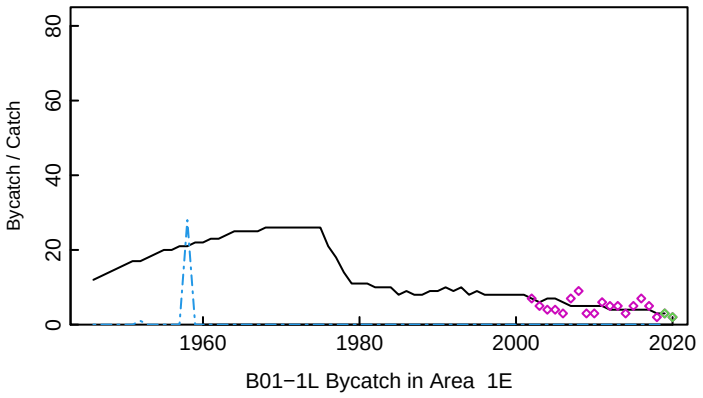


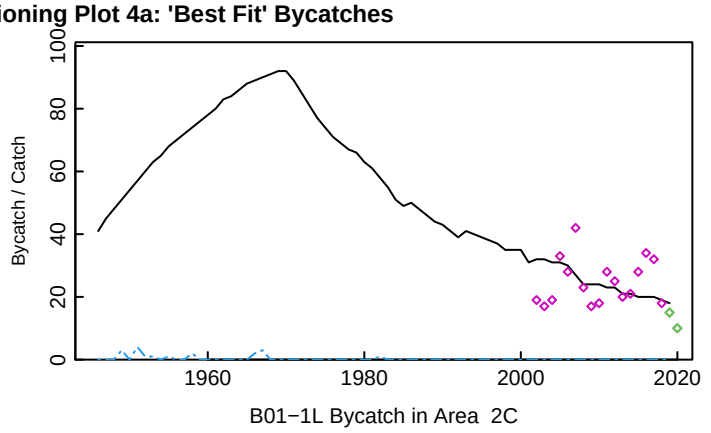
B01−1 Baseline Conditioning Plot 3: Fits to Data

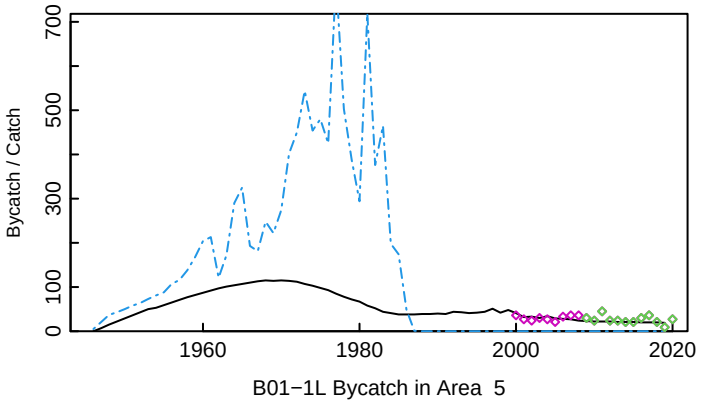


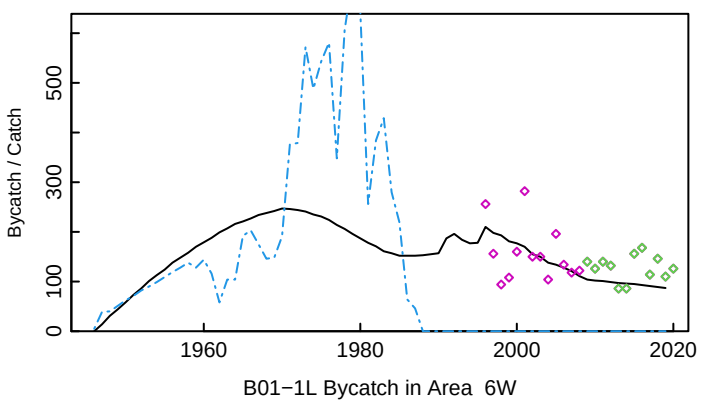

B01−1 Baseline Conditioning Plot 3b: Fits to Data
Mar
Apr to Jun
Jul to Aug
Sep to Oct
J proportion (%)
100
75
50
25
0
1930
1945
1960
1975
1990
2005
2020
Year
trajectory
95
Best Fit
Median
Subarea 6W

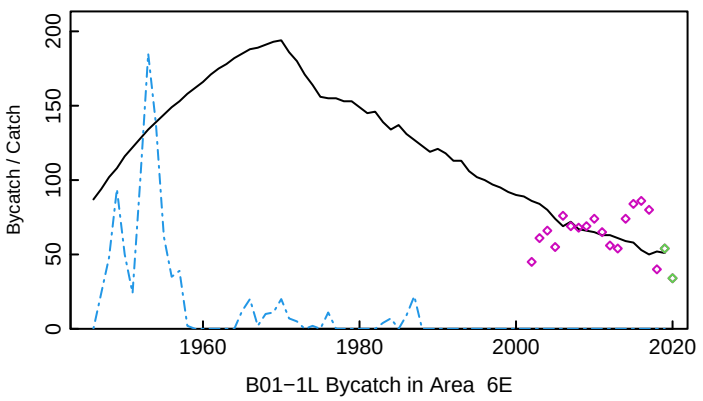
B01−1L Hyp. B 1% Baseline Conditioning Plot 4a: 'Best Fit' Bycatches

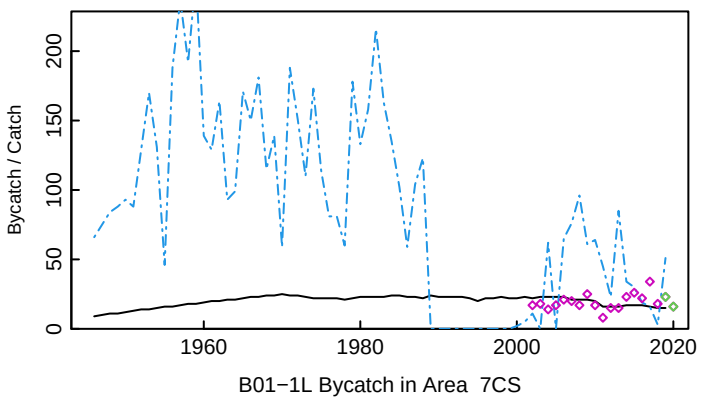


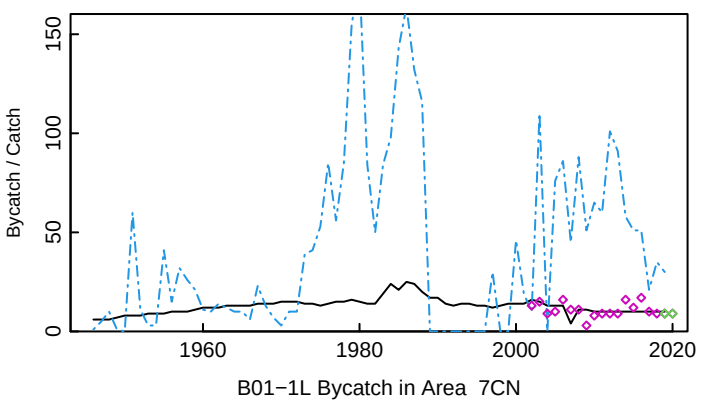


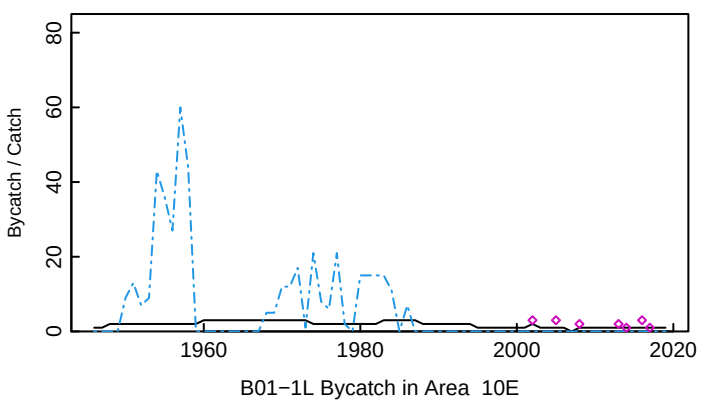


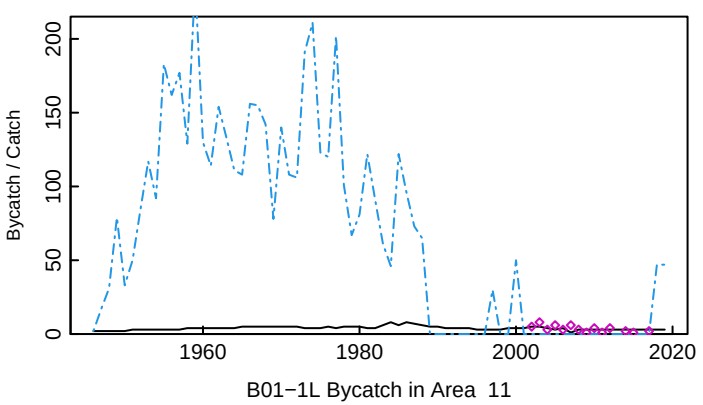


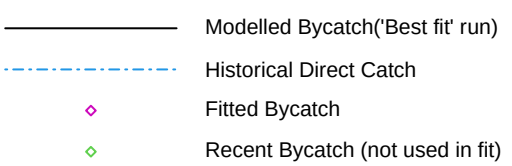




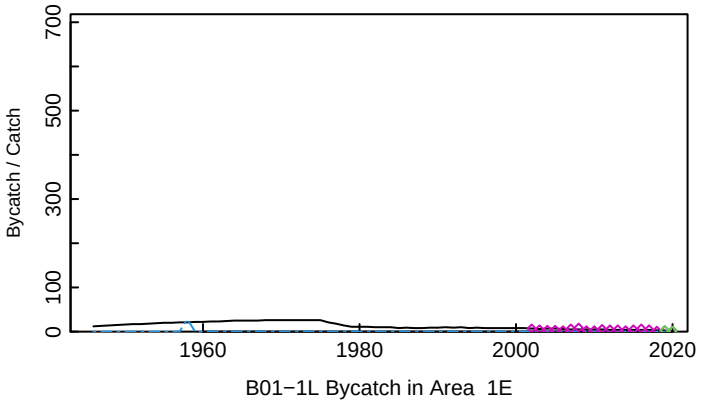


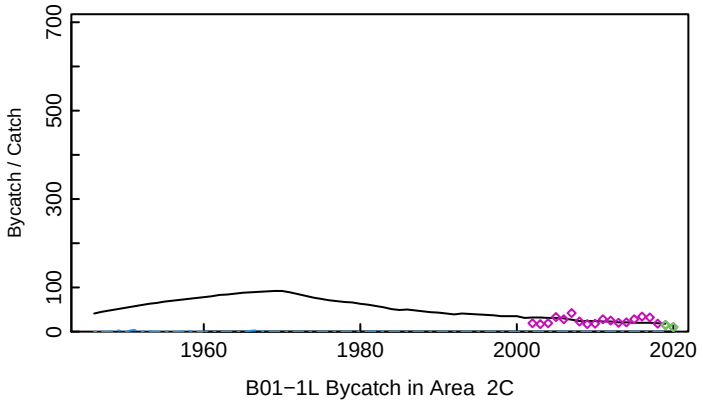


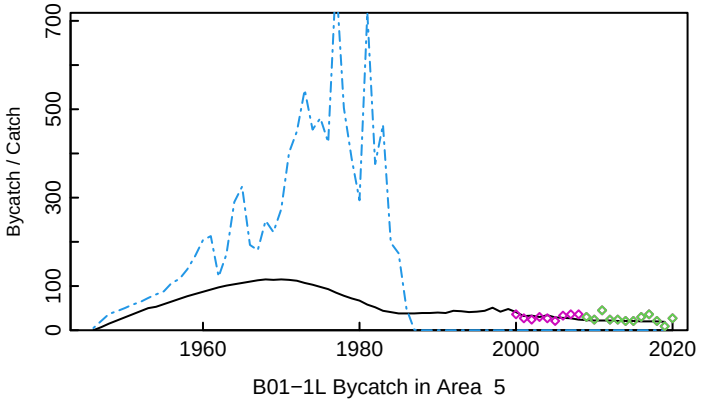


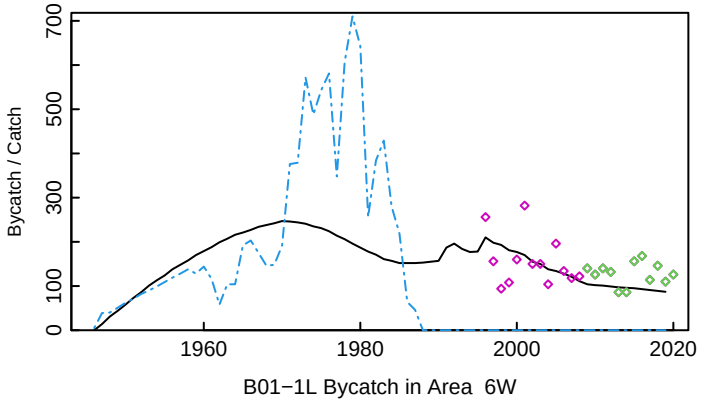


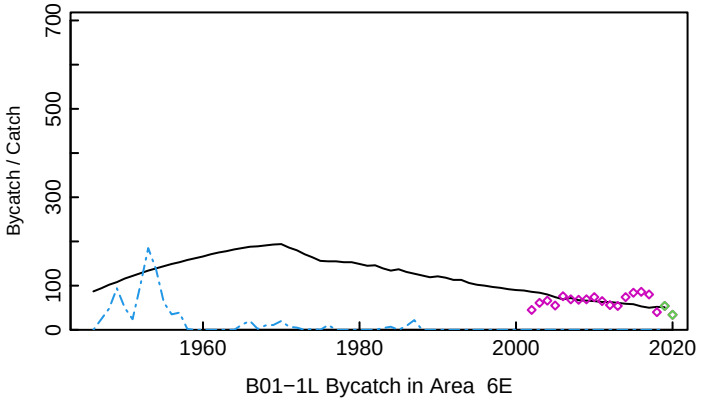
B01−1L Hyp. B 1% Baseline Conditioning Plot 4b: 'Best Fit' Bycatches On Same Scale

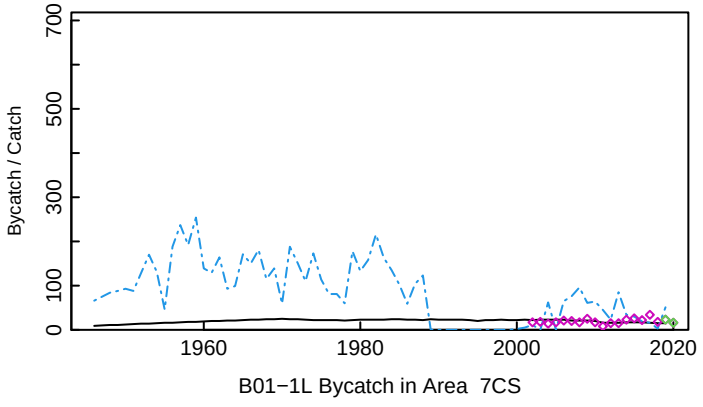


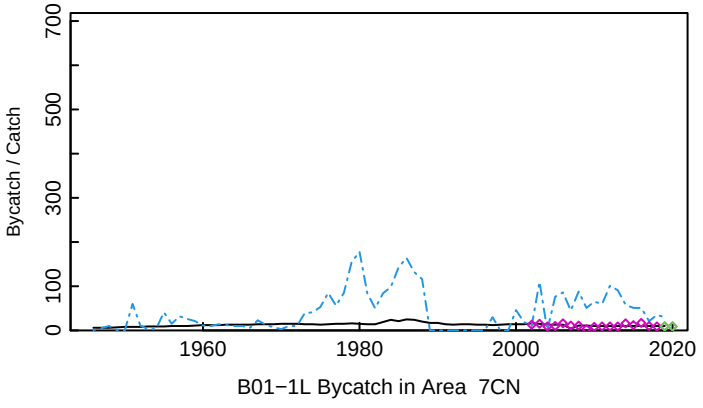


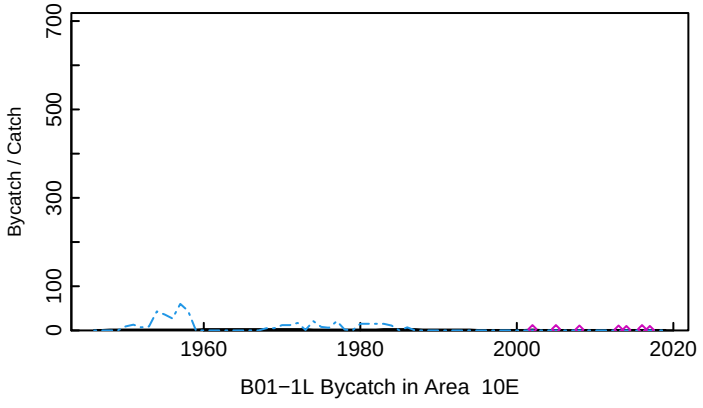


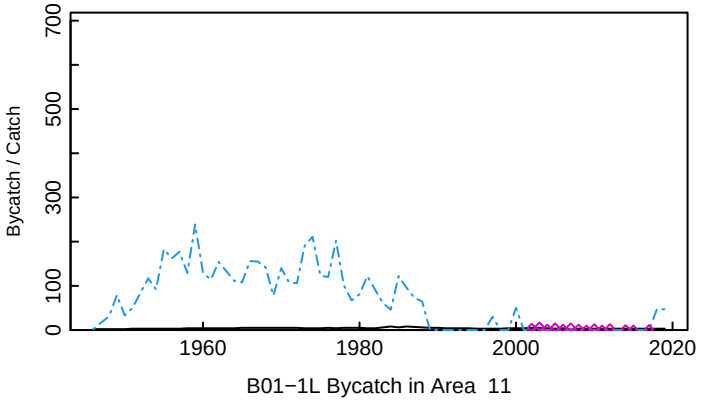


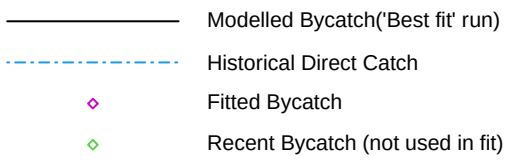




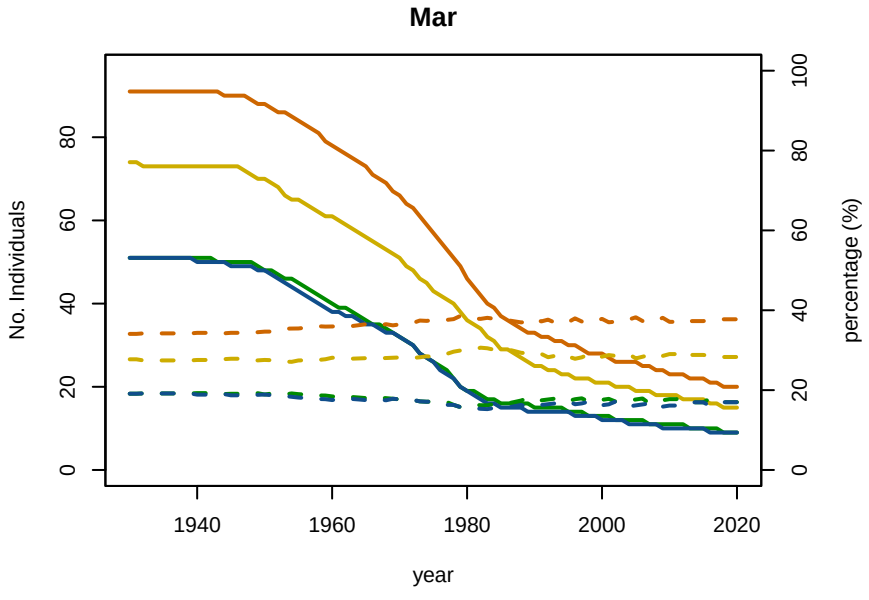


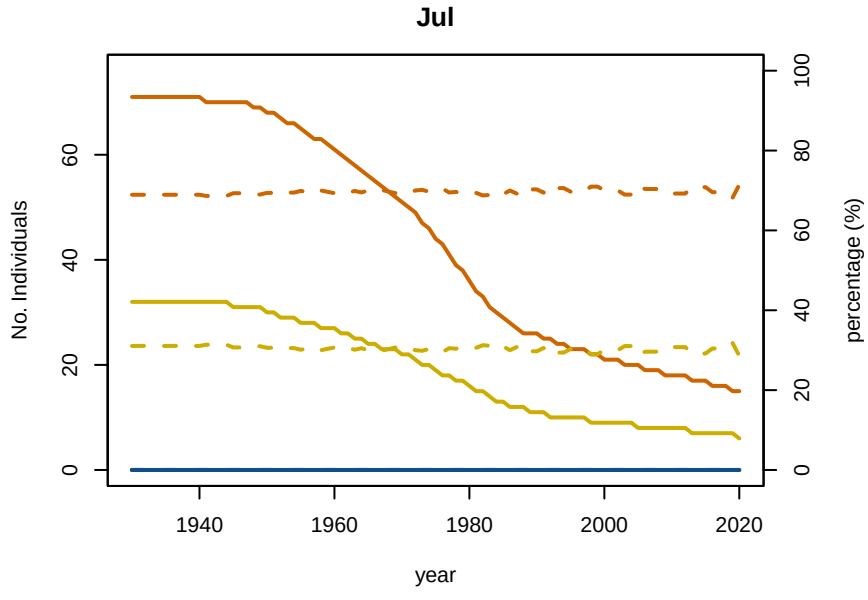


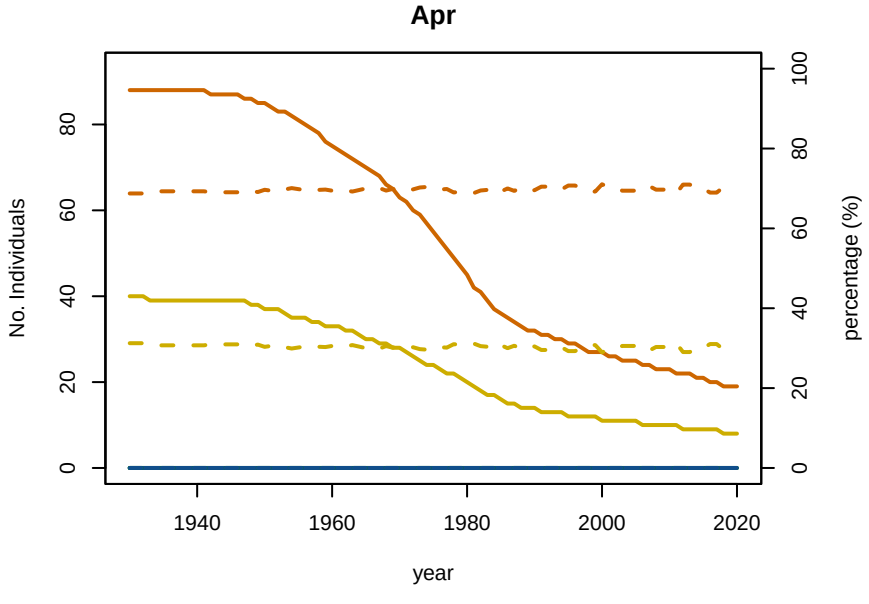


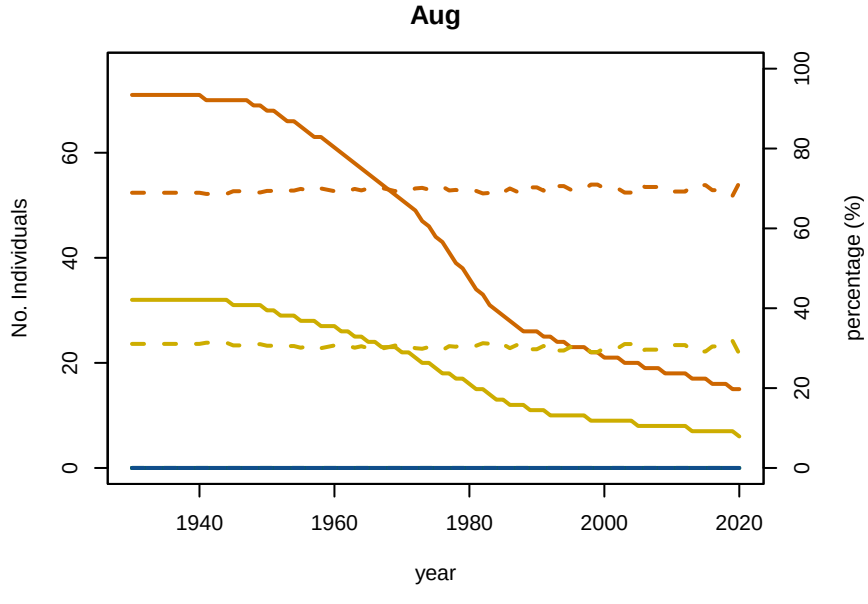


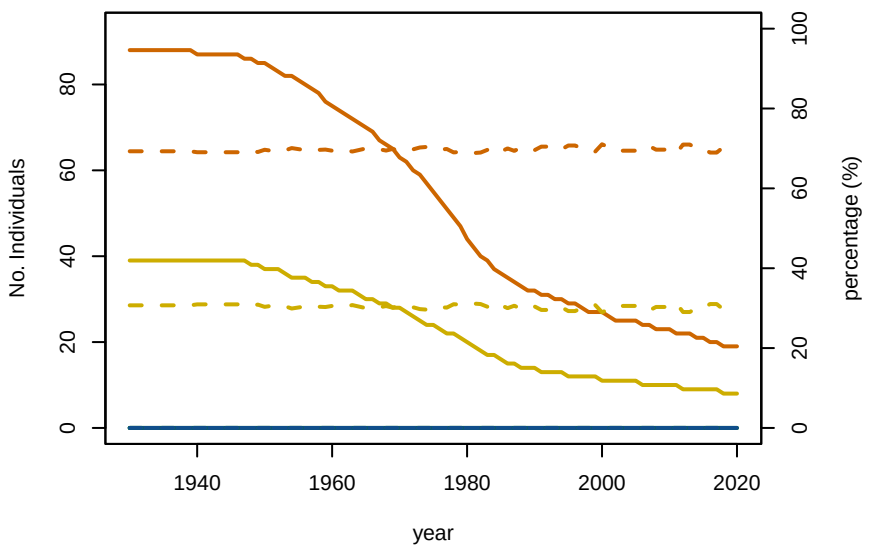
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 1E

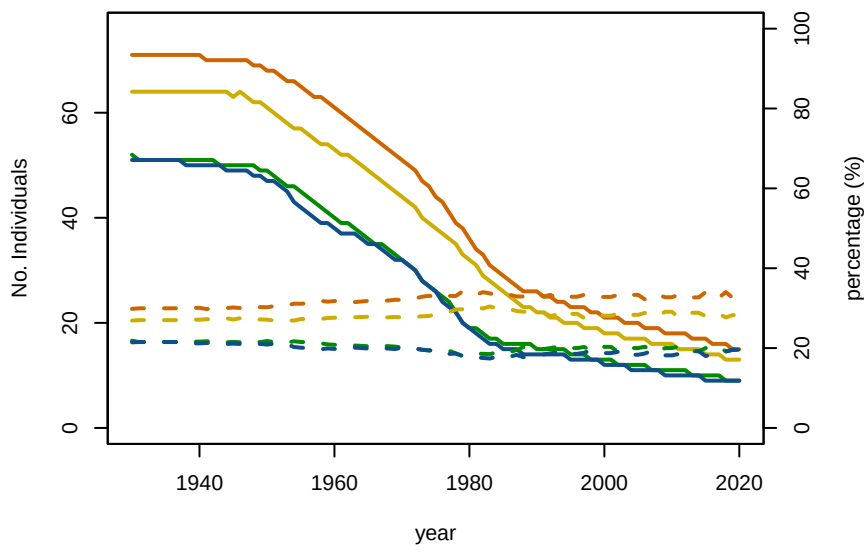


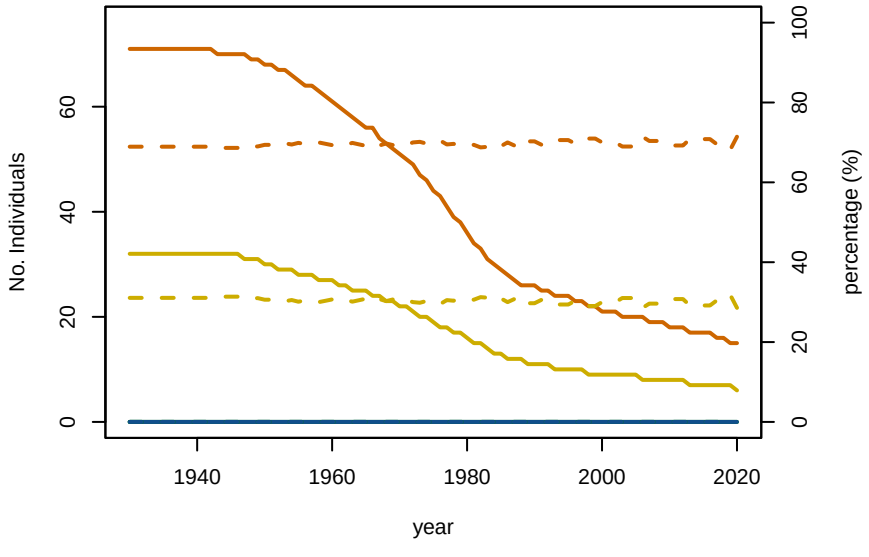


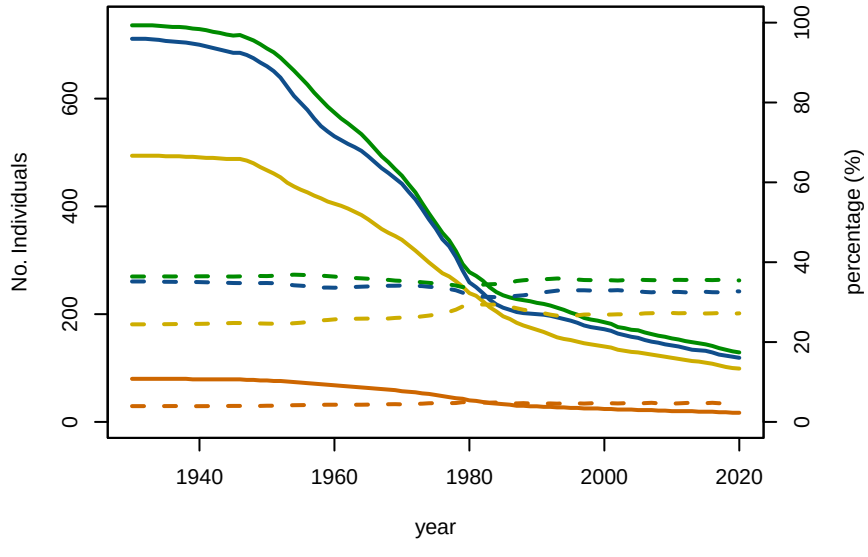






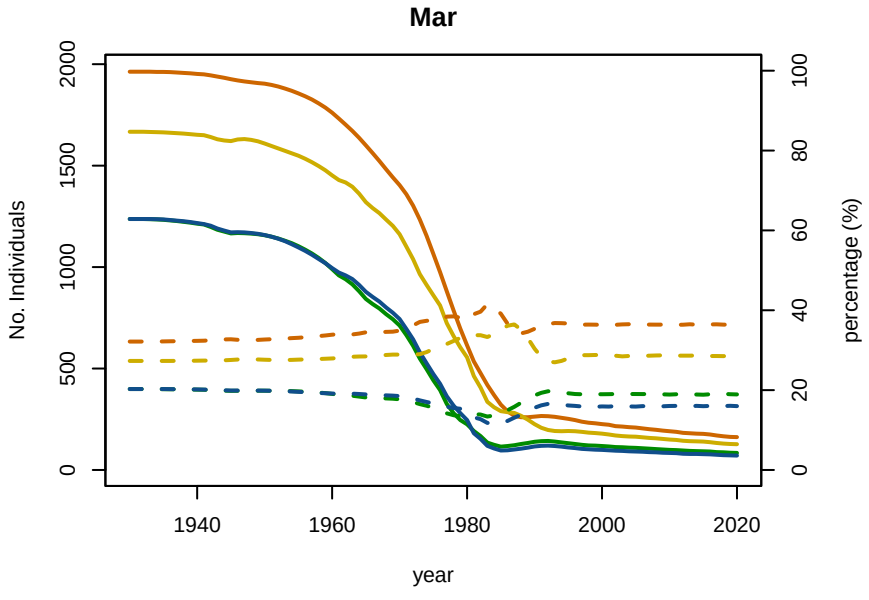


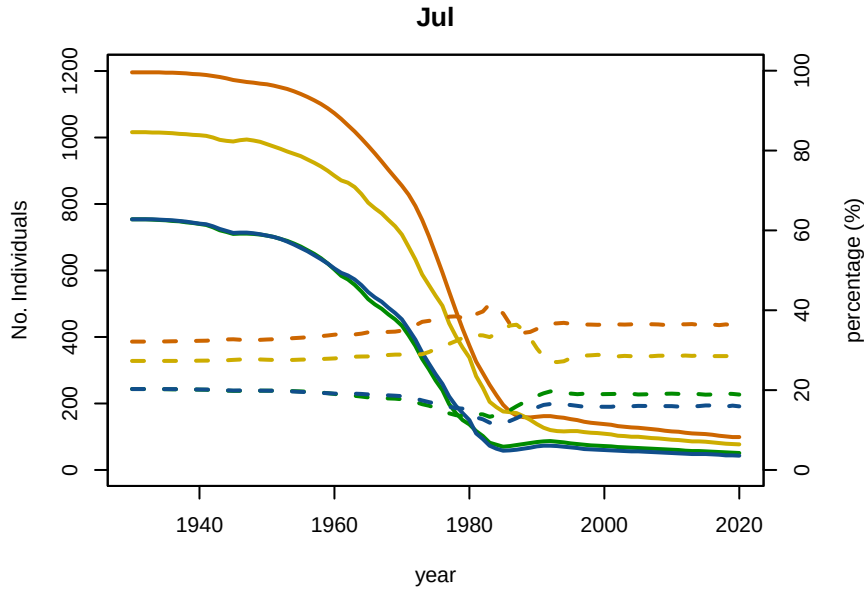


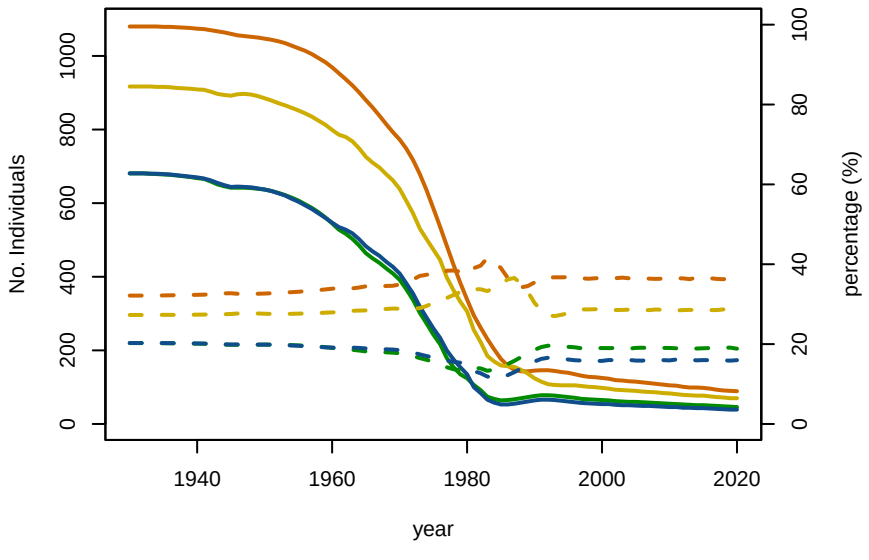


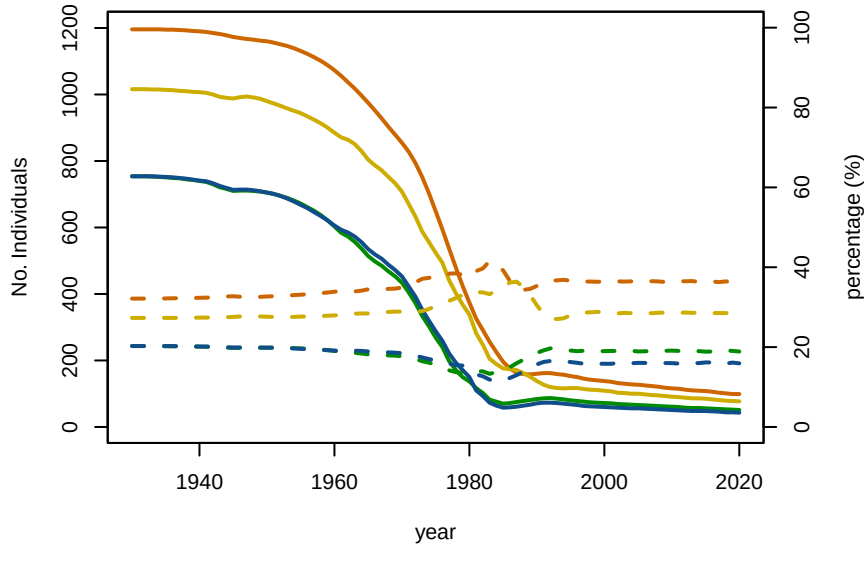
A1−4 A5−9 MatF MatM No Individuals percentage

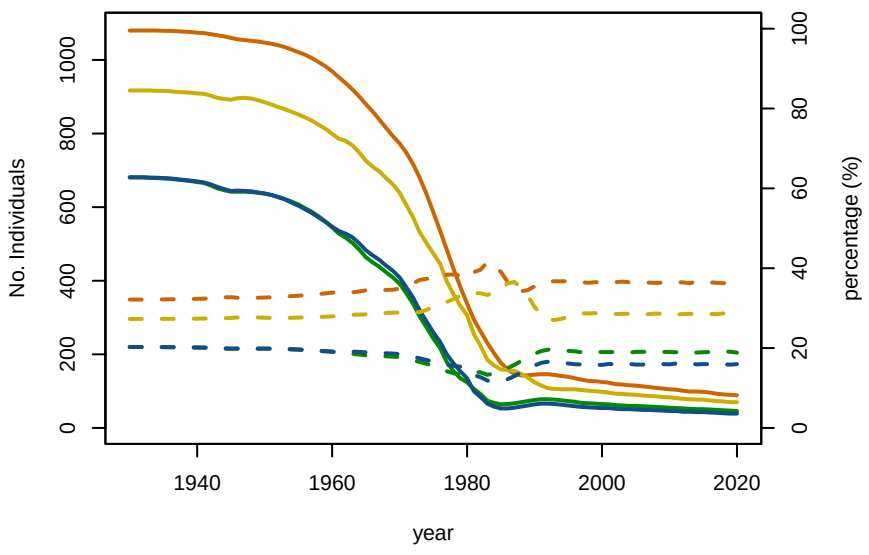
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 1W

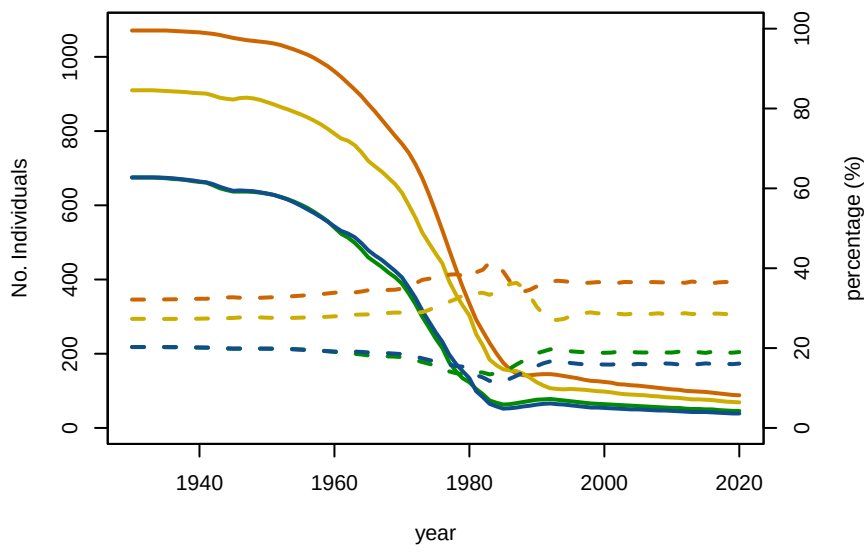


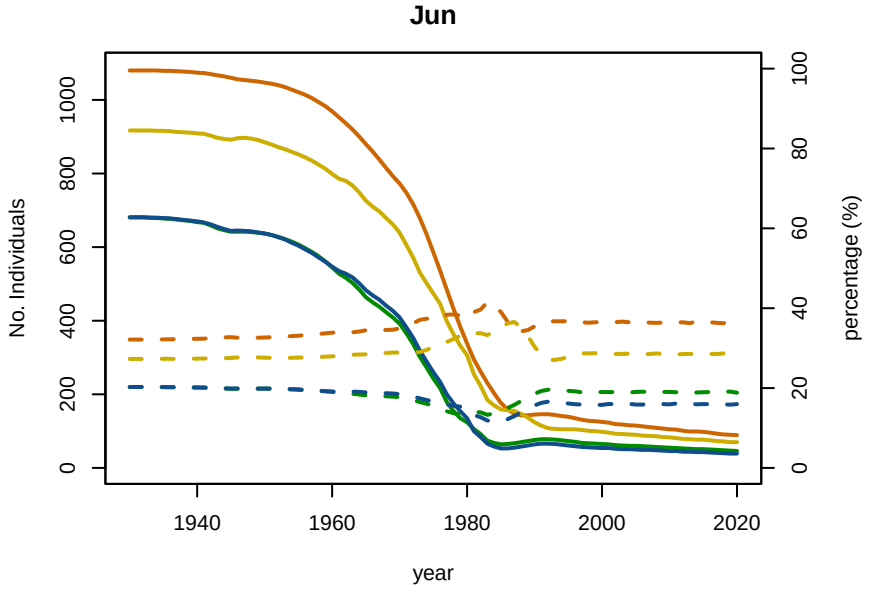


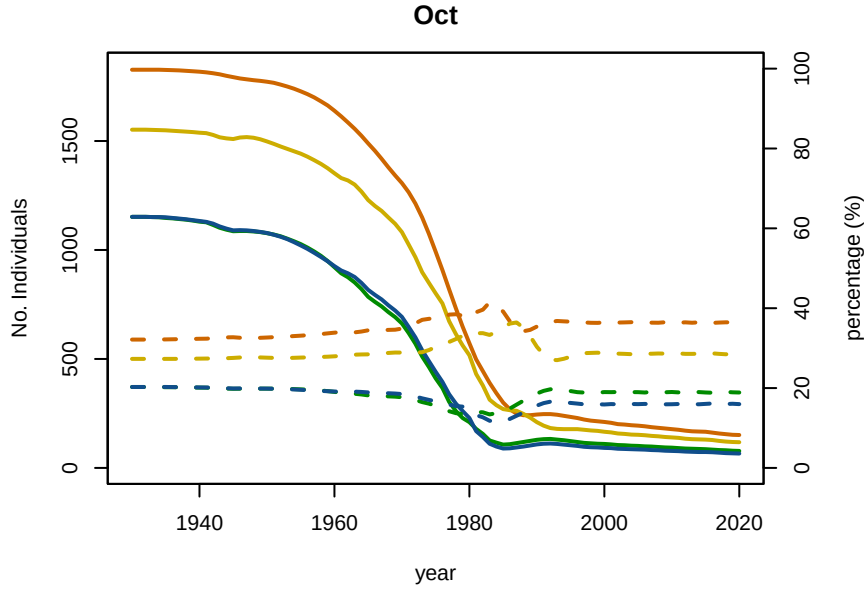






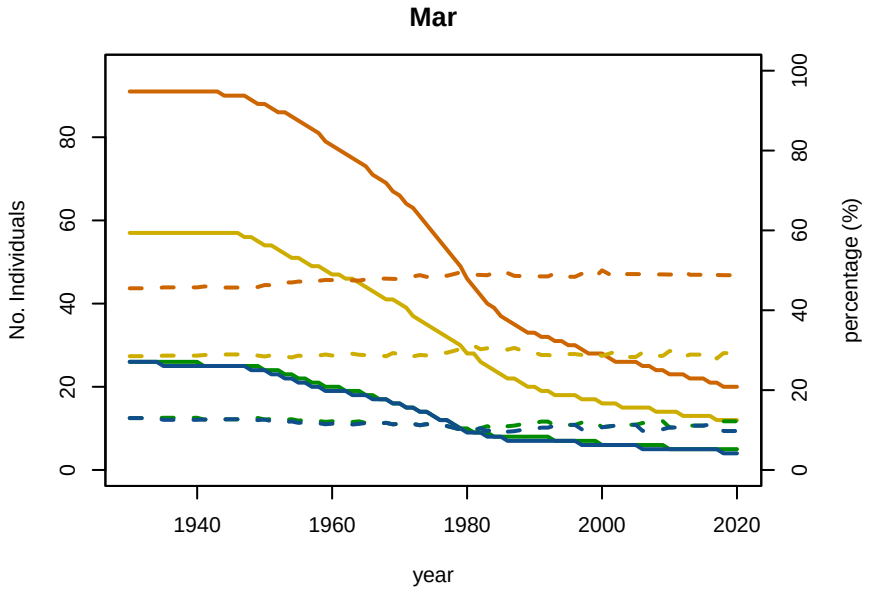


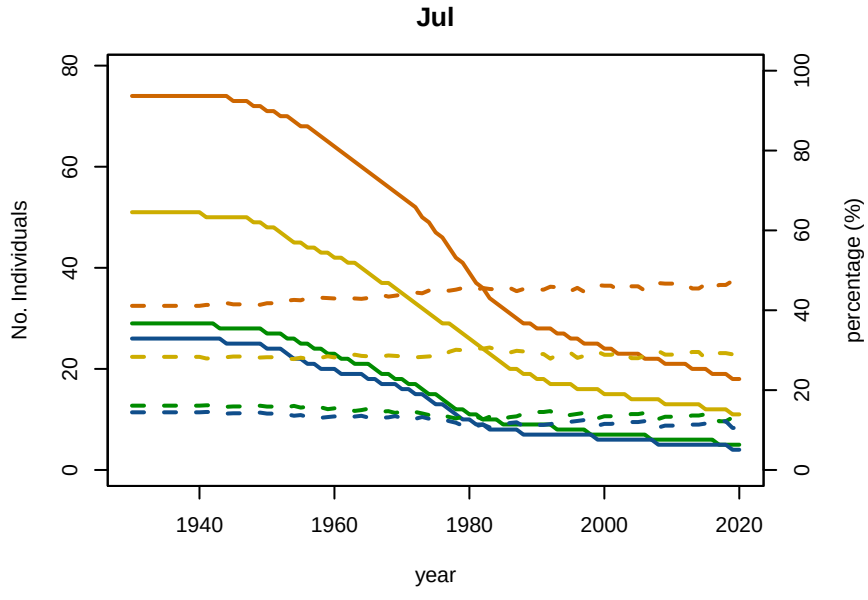


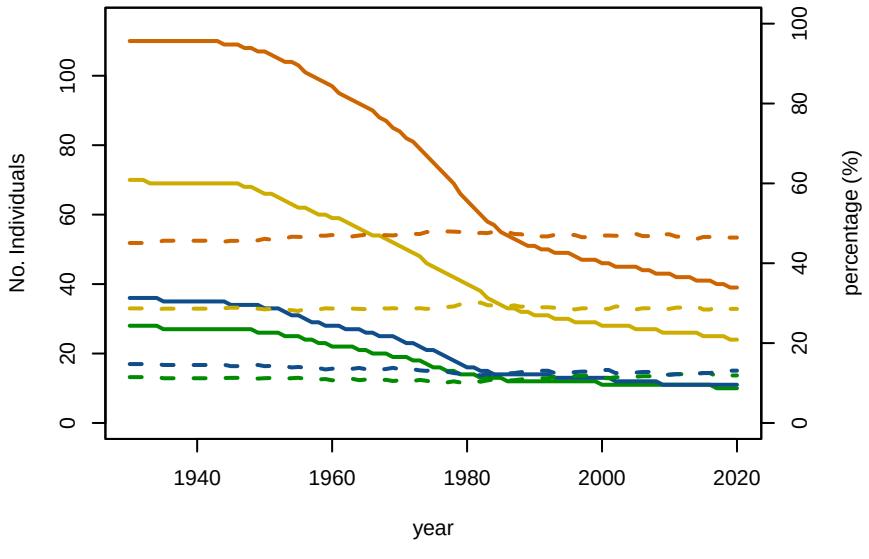


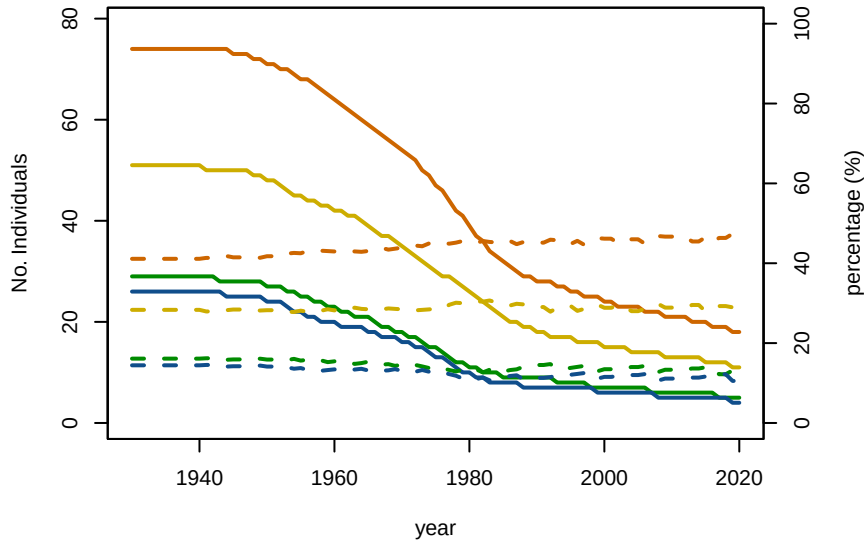
A1−4 A5−9 MatF MatM No Individuals percentage

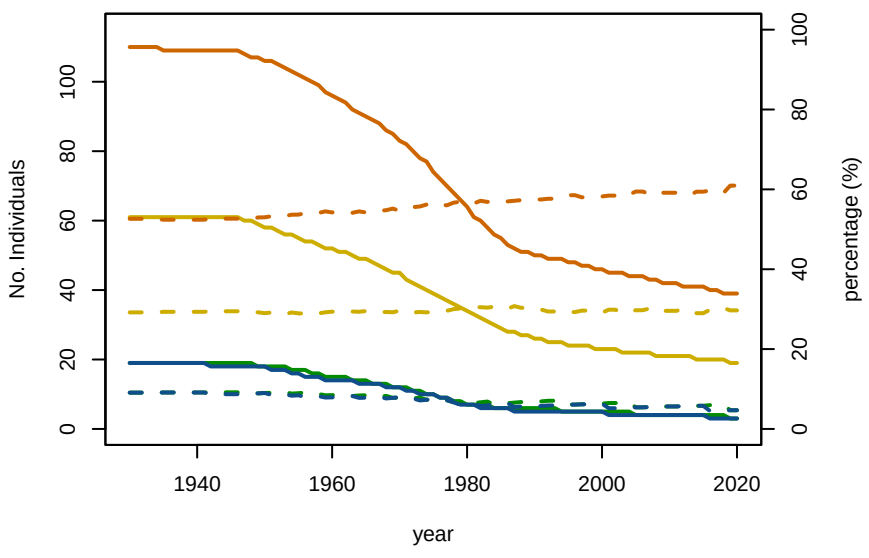
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 2C

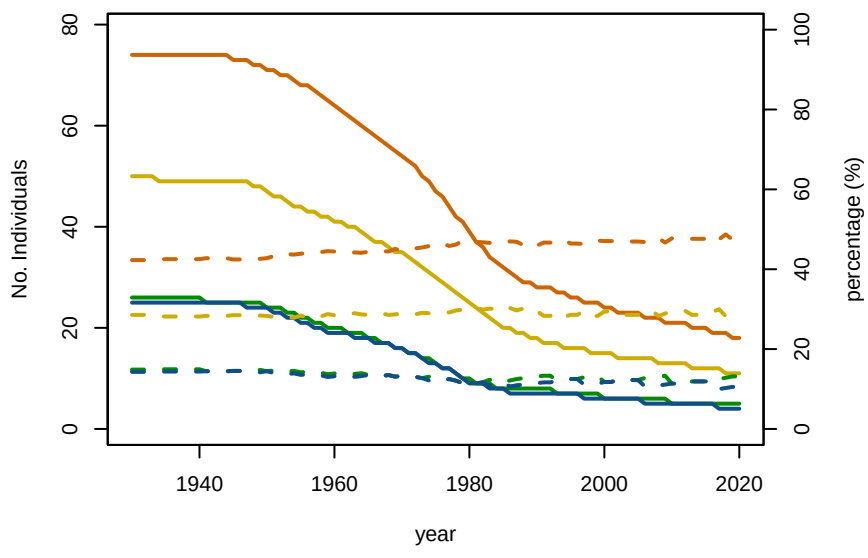


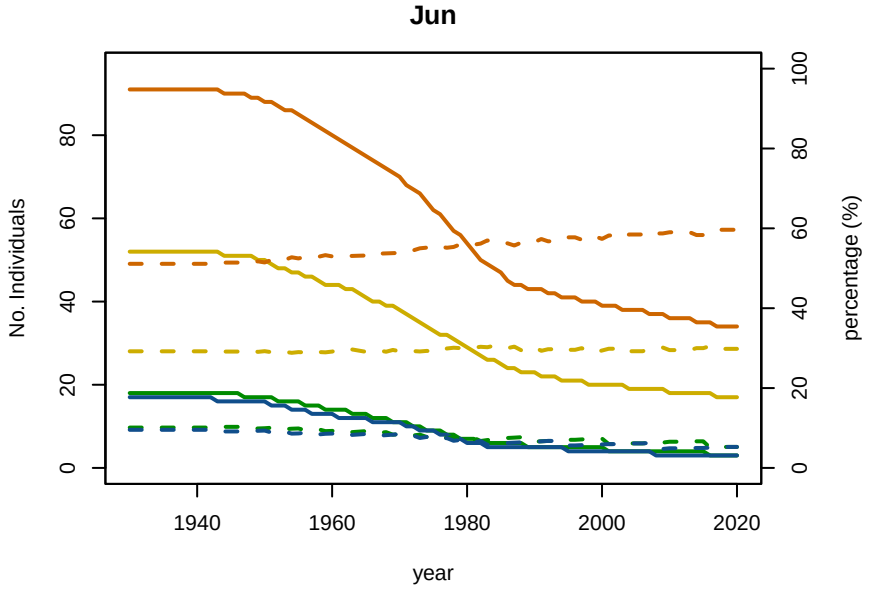


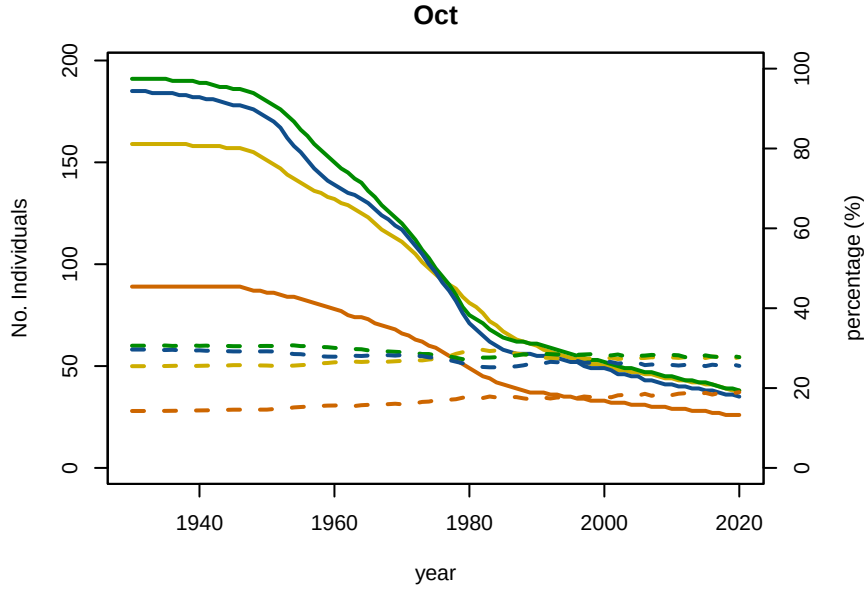








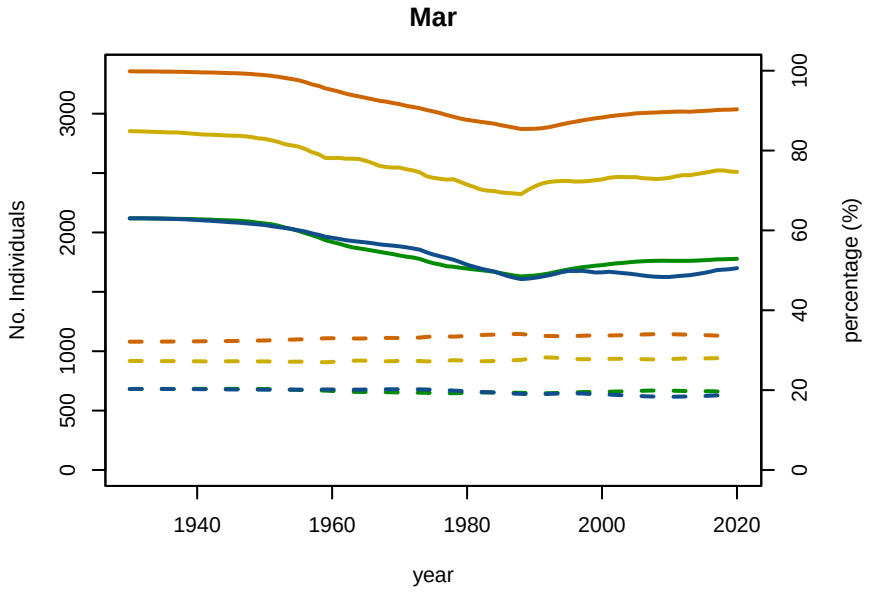


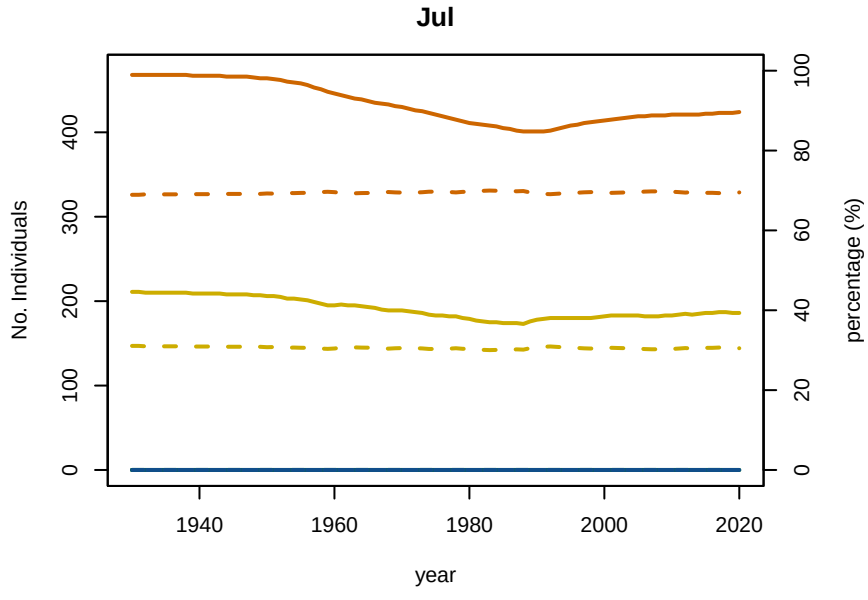


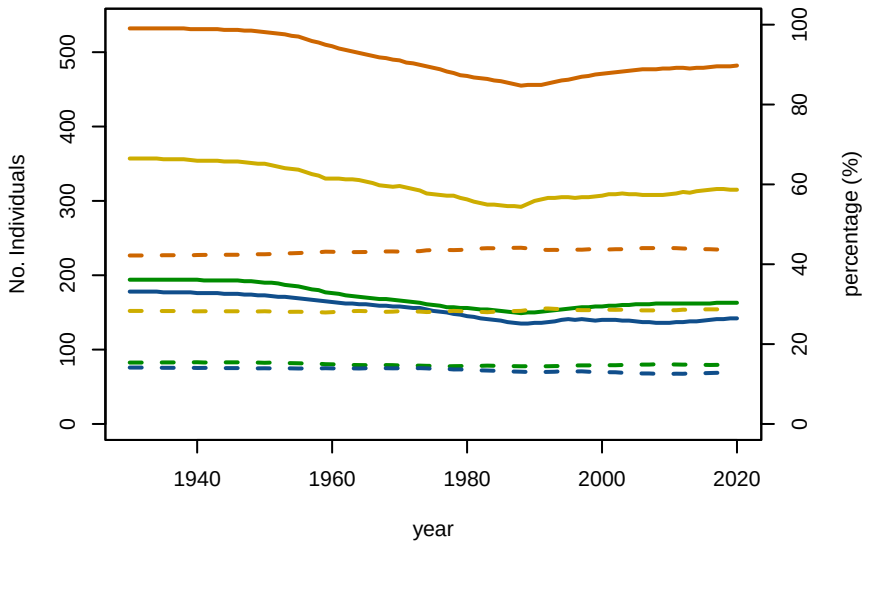
100

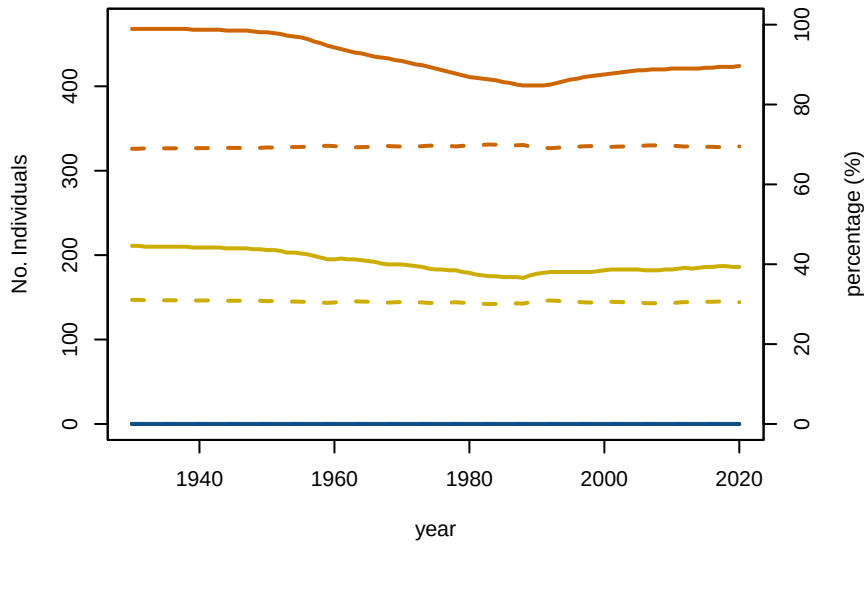
A1−4 A5−9 MatF MatM No Individuals percentage

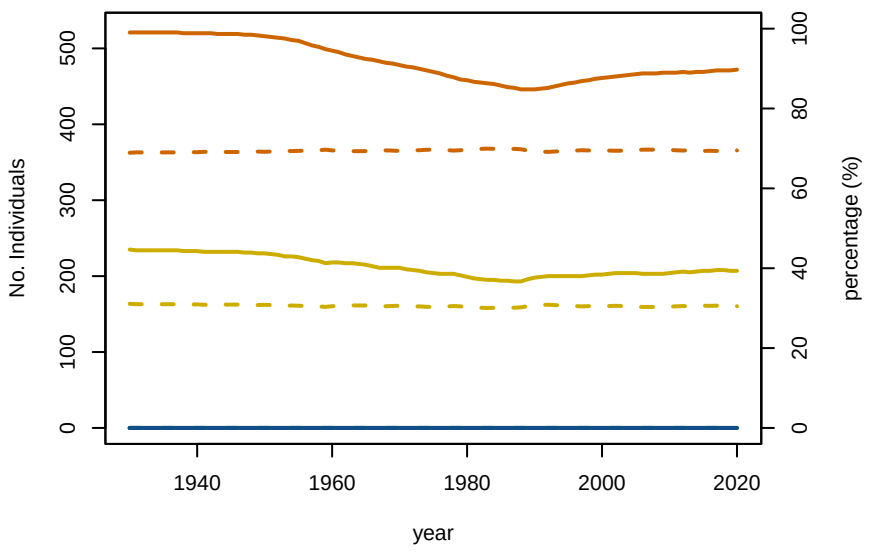
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 2R

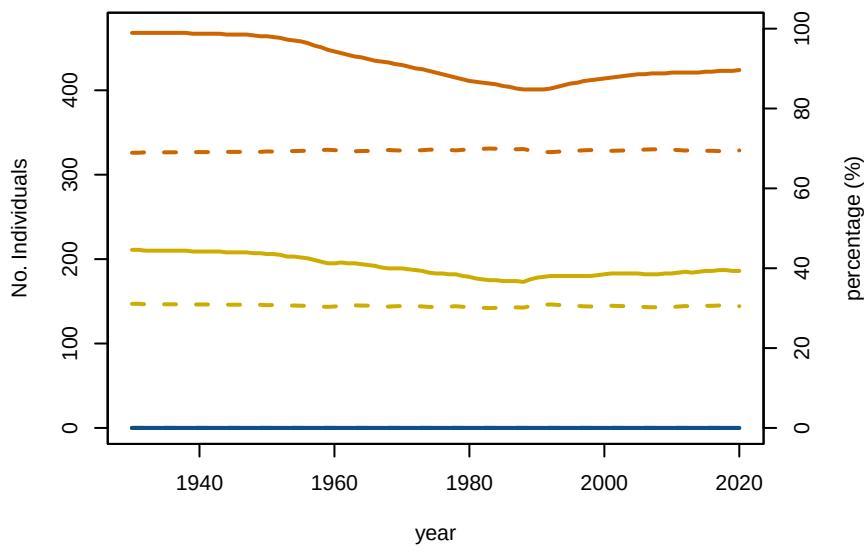


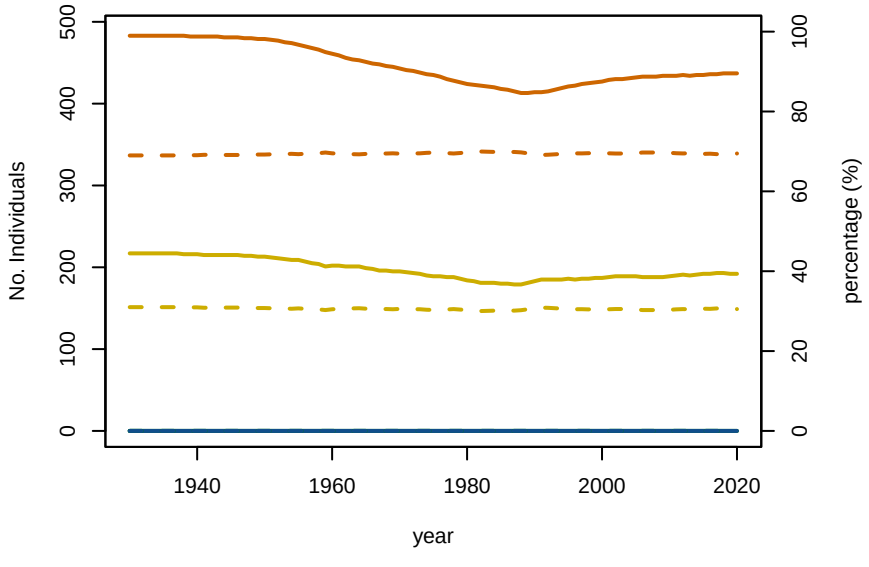


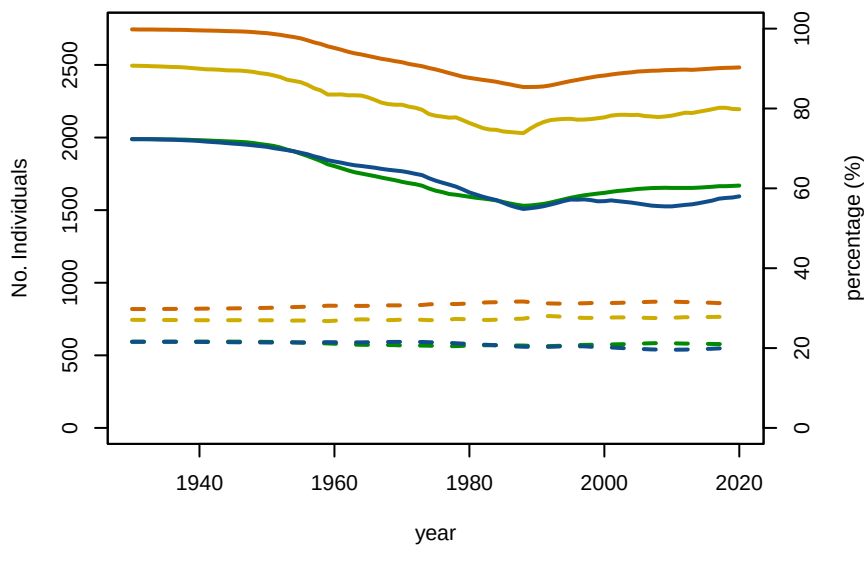






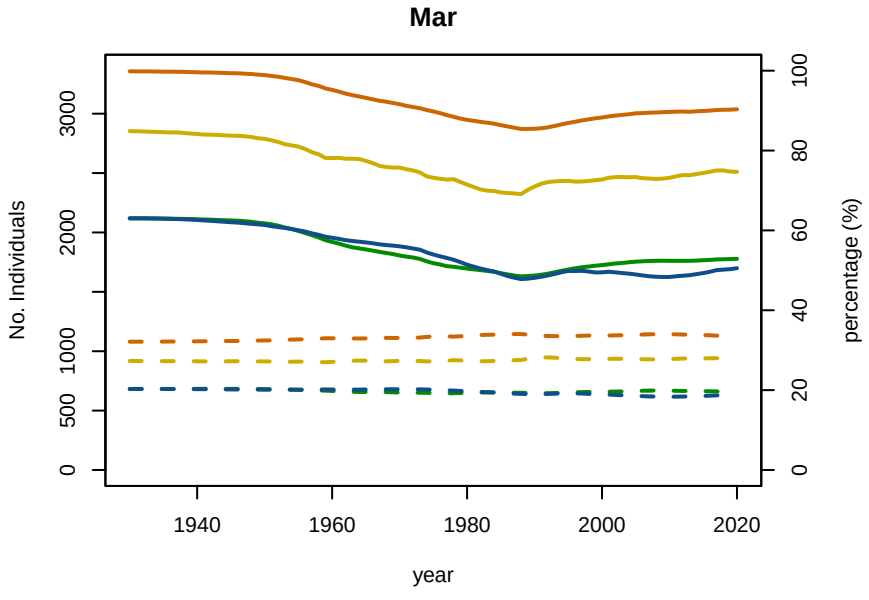


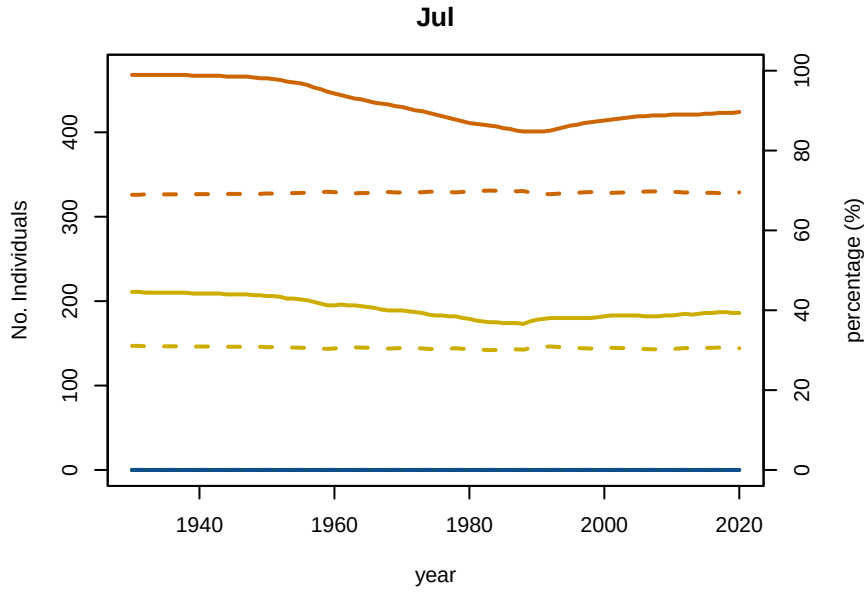


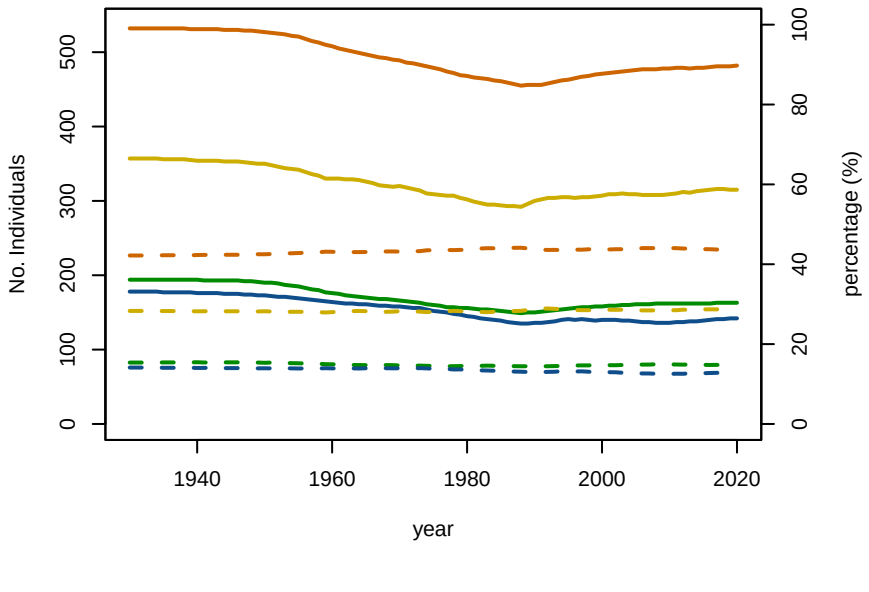


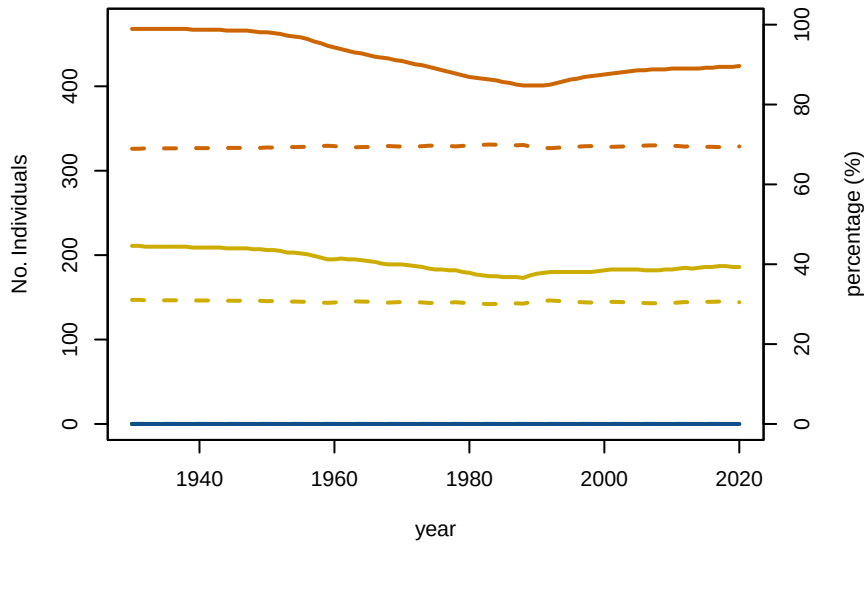
A1−4 A5−9 MatF MatM No Individuals percentage

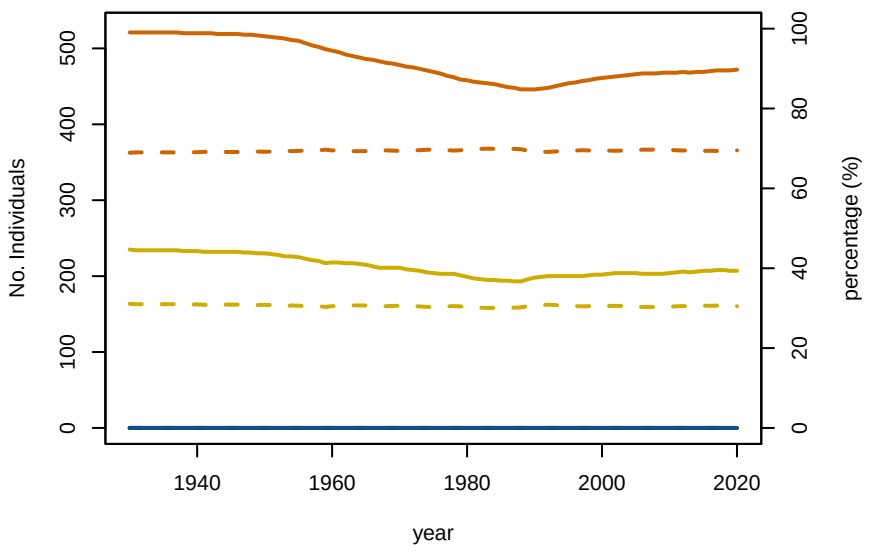
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 3

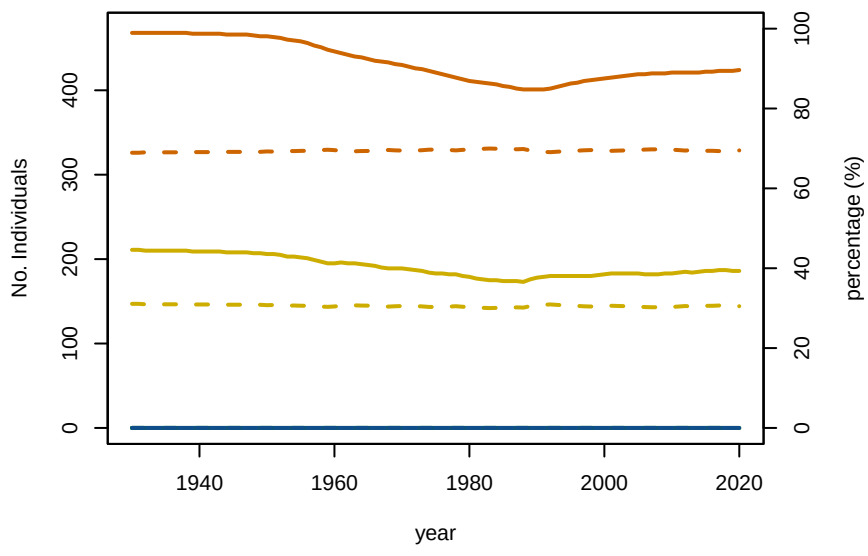


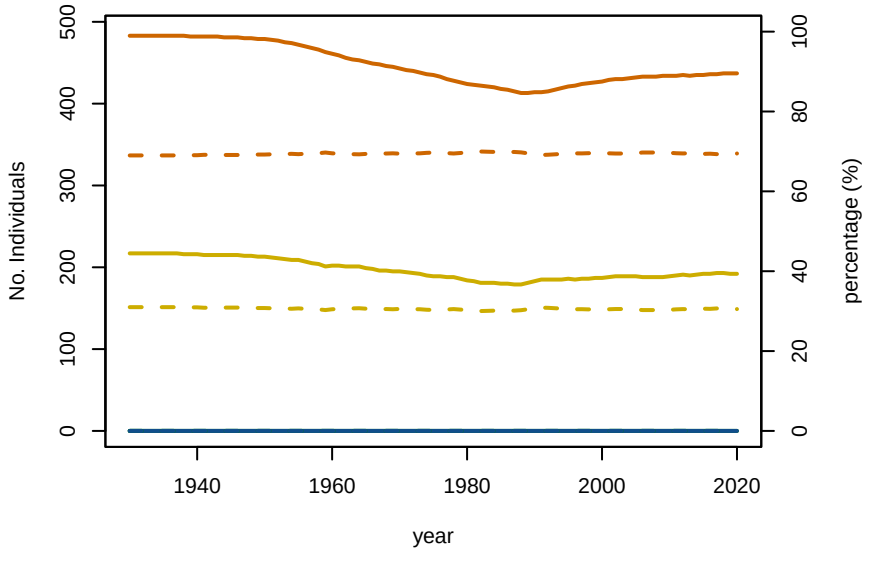


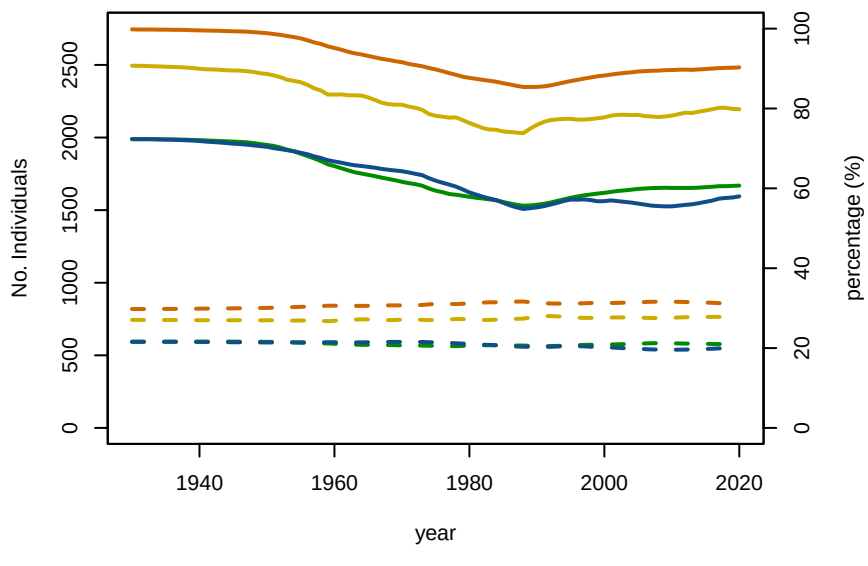






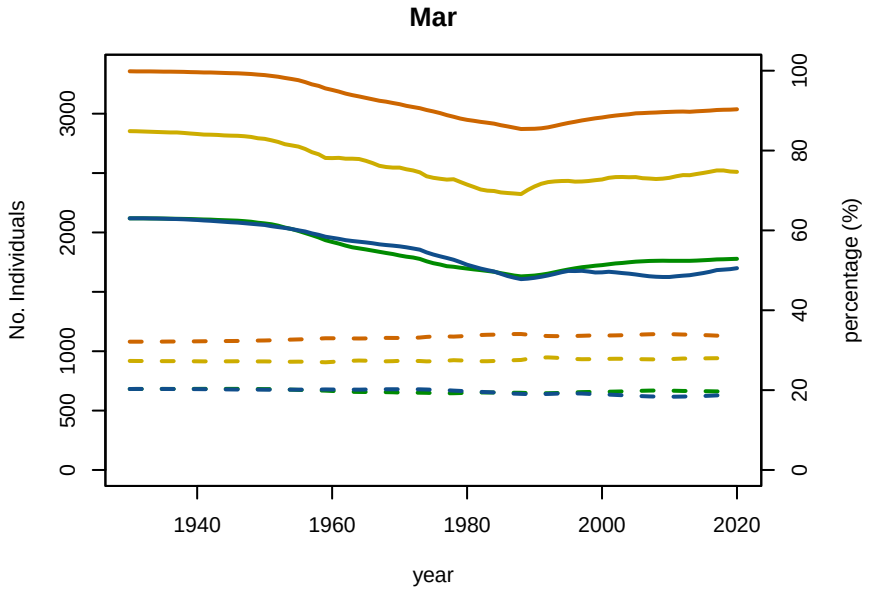


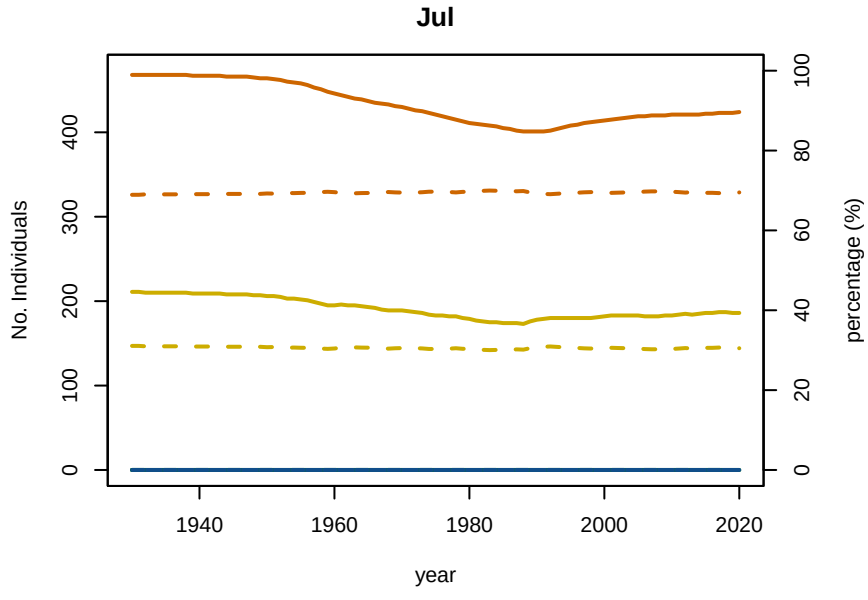


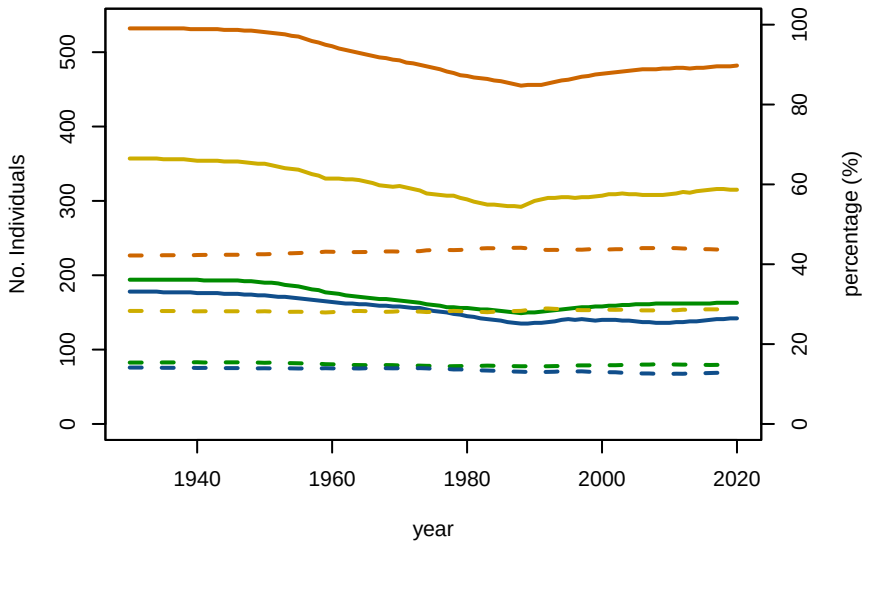


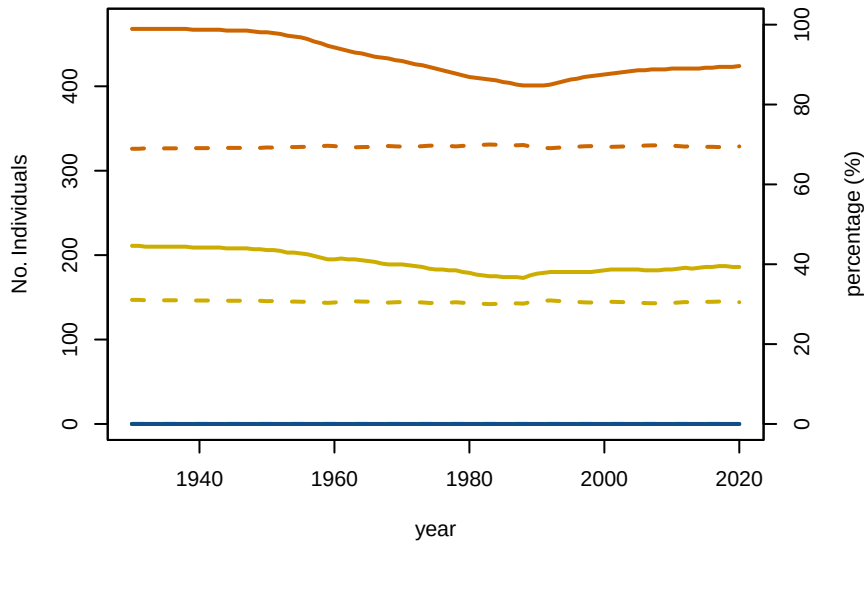
A1−4 A5−9 MatF MatM No Individuals percentage

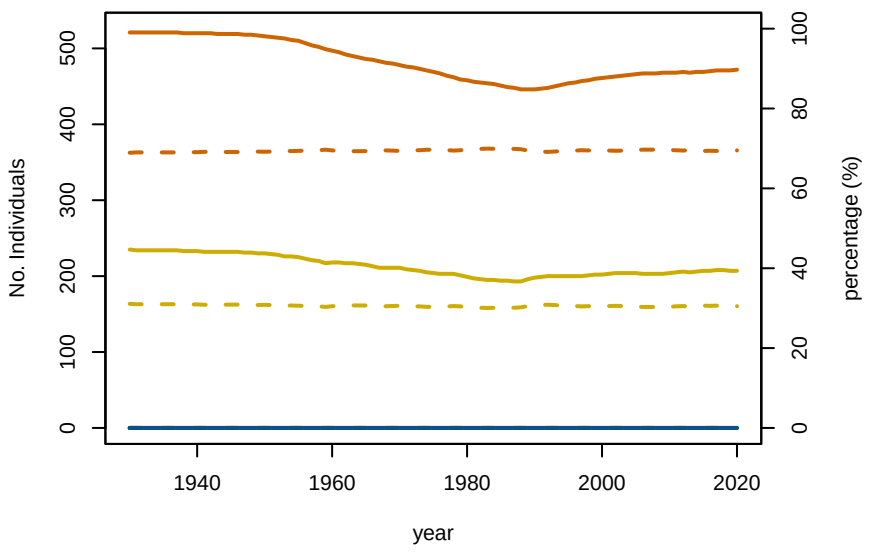
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 4

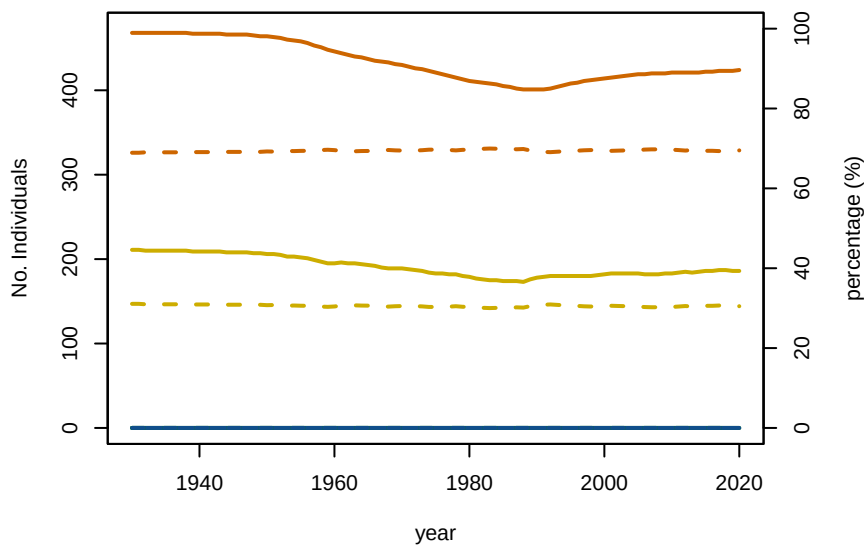


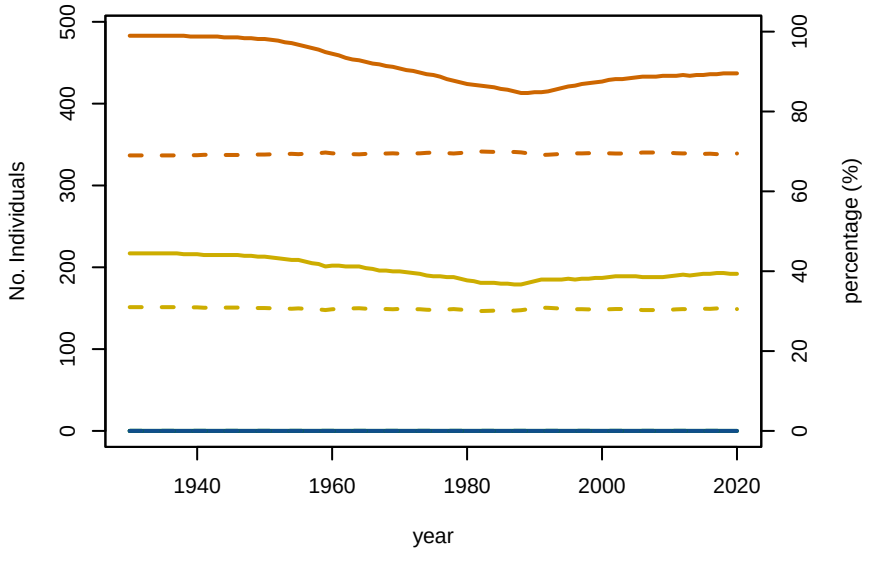


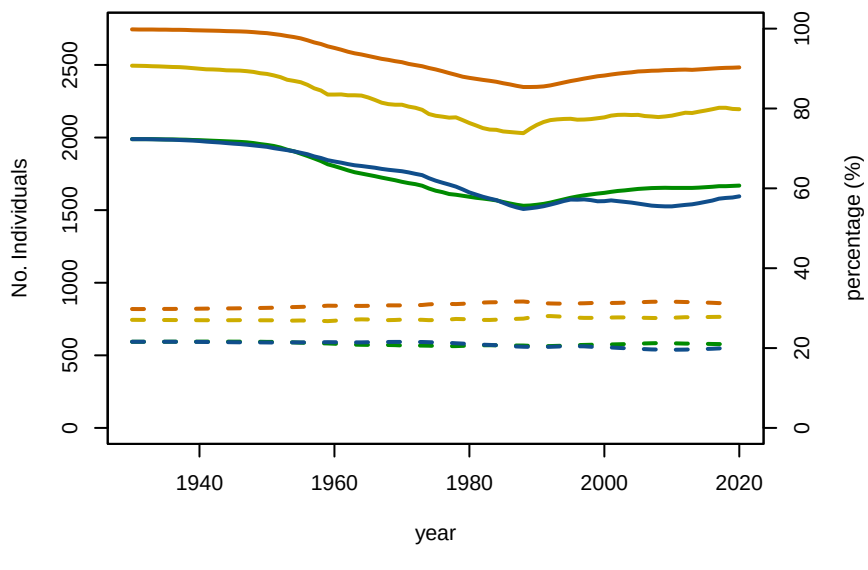






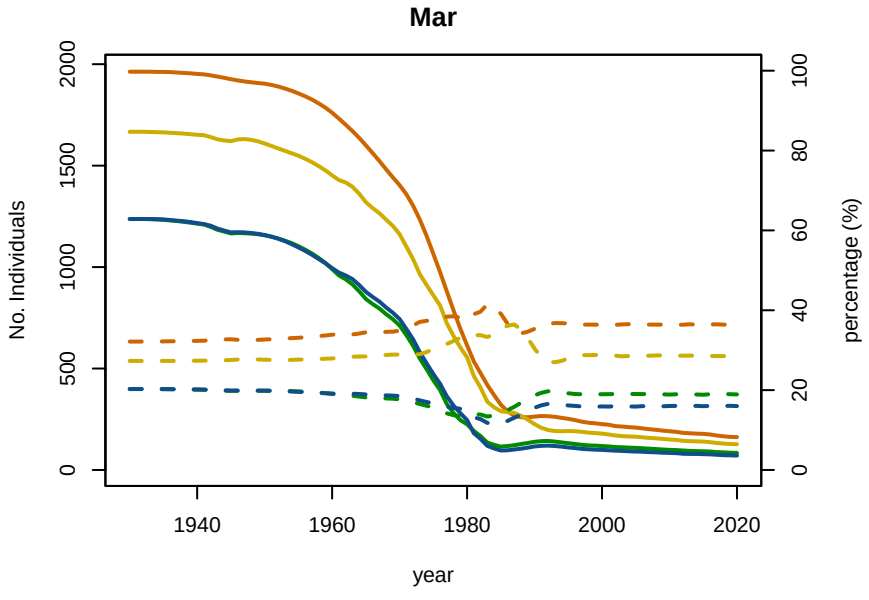


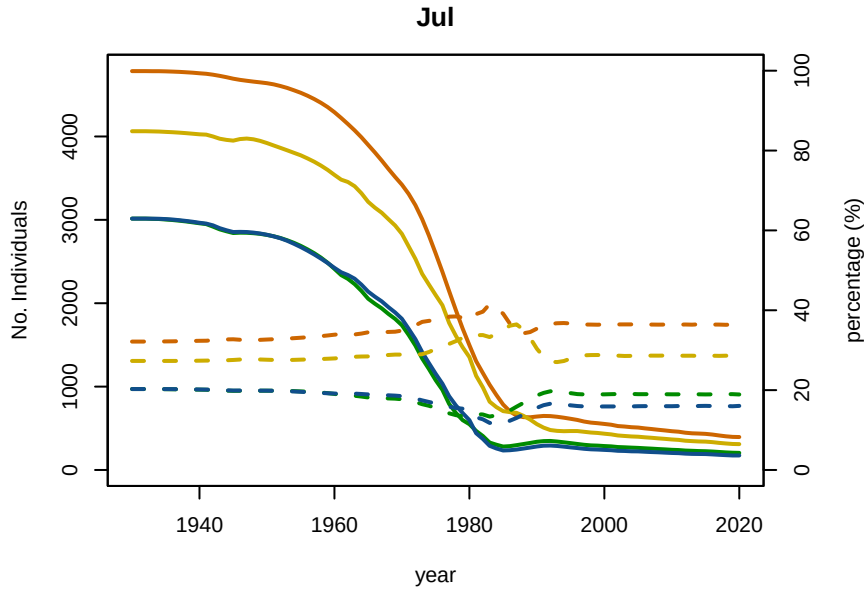


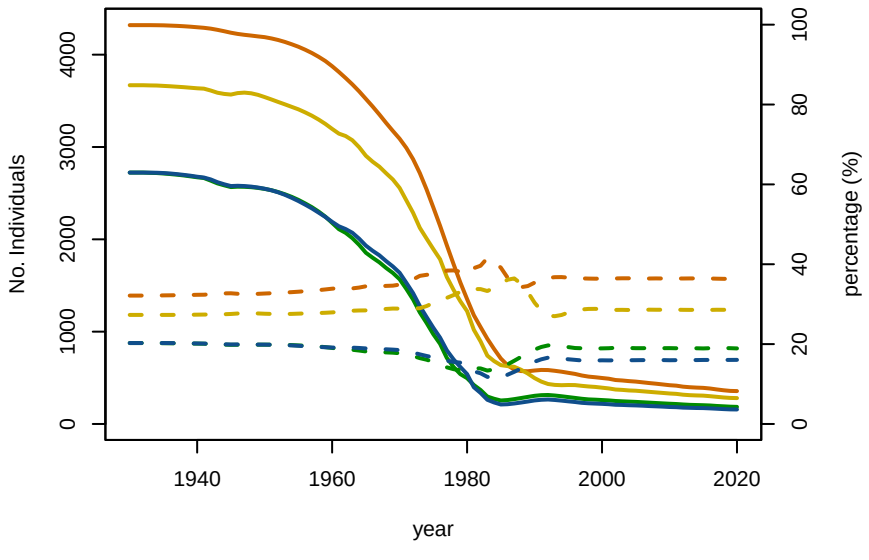


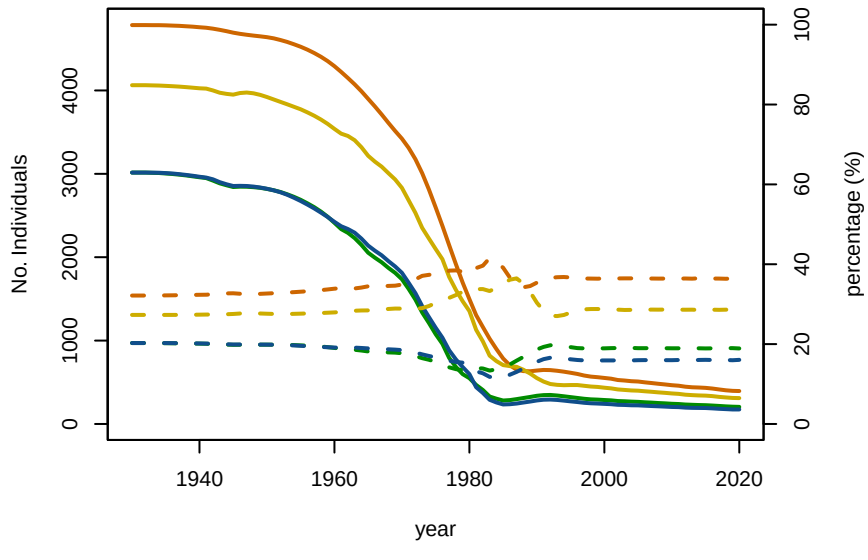
A1−4 A5−9 MatF MatM No Individuals percentage

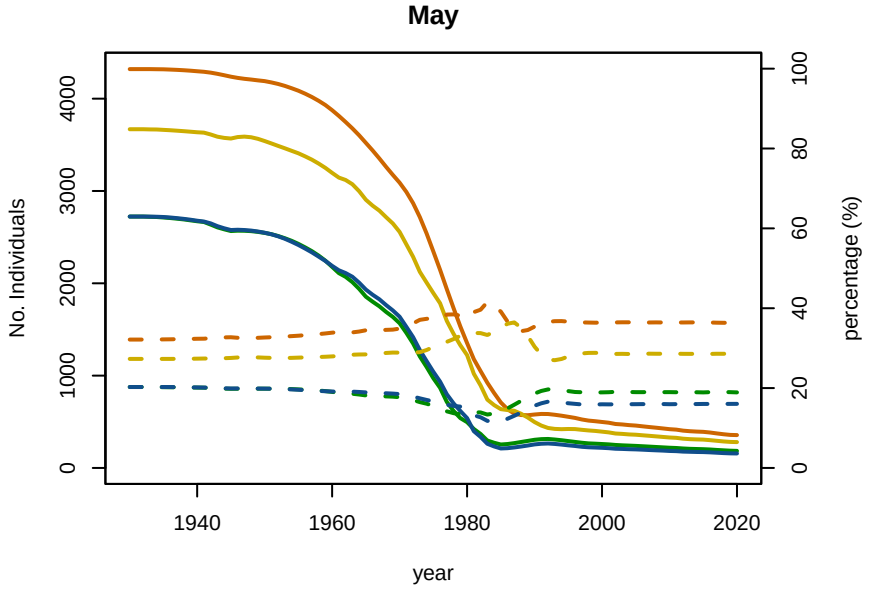
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 5

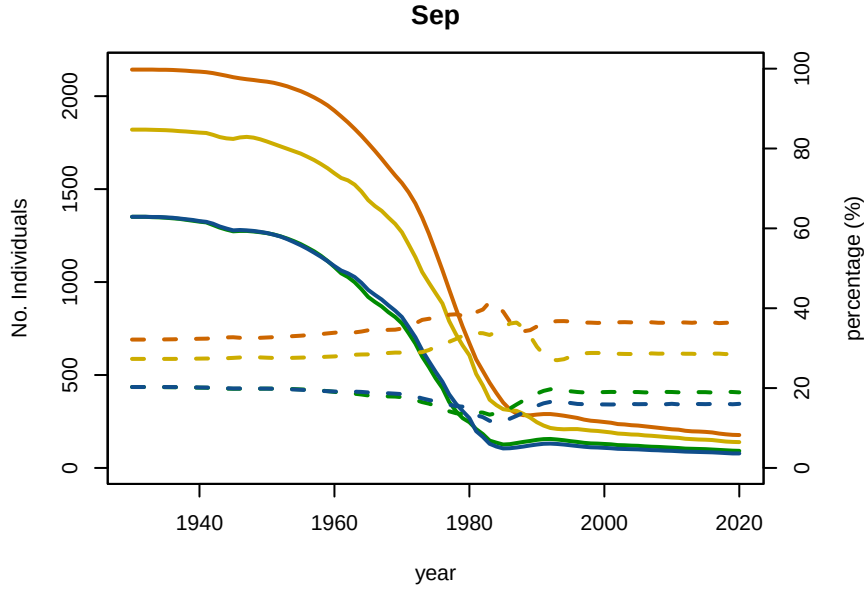


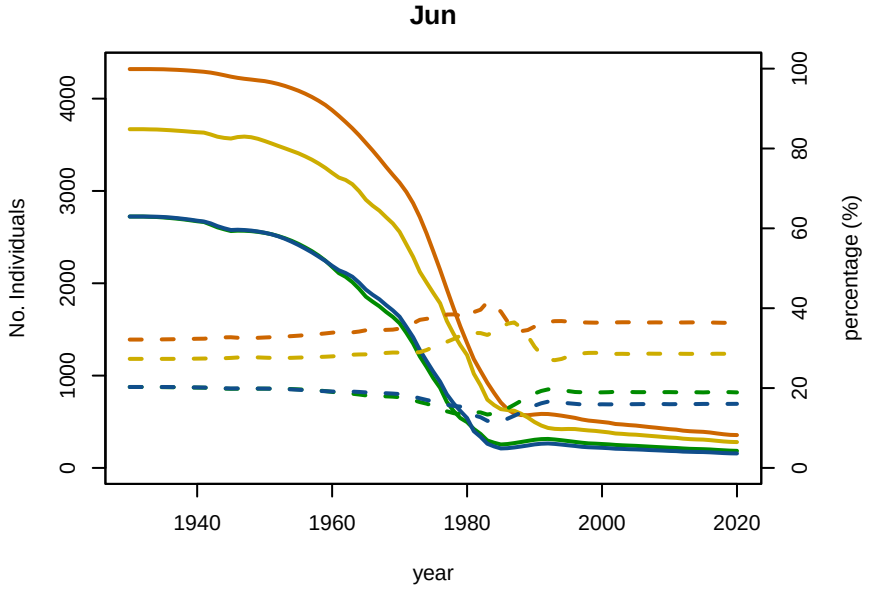


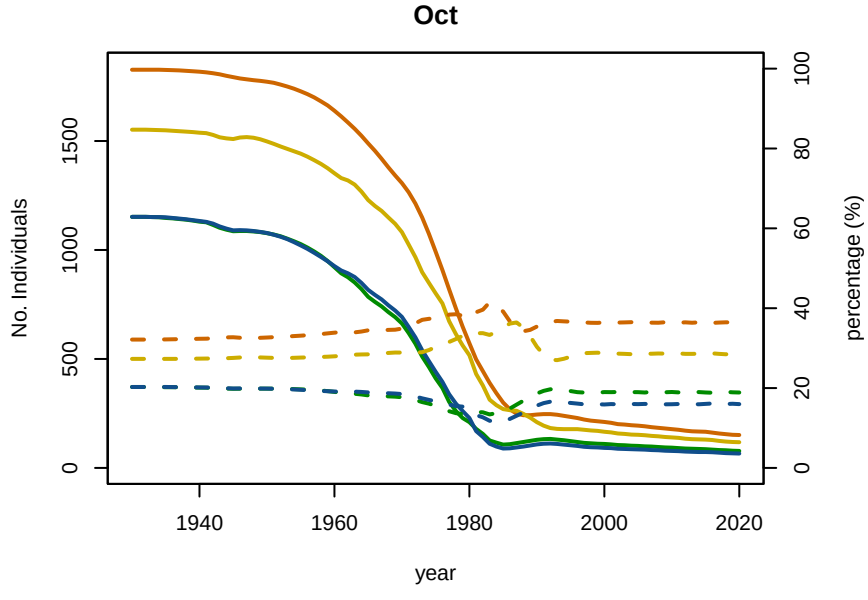






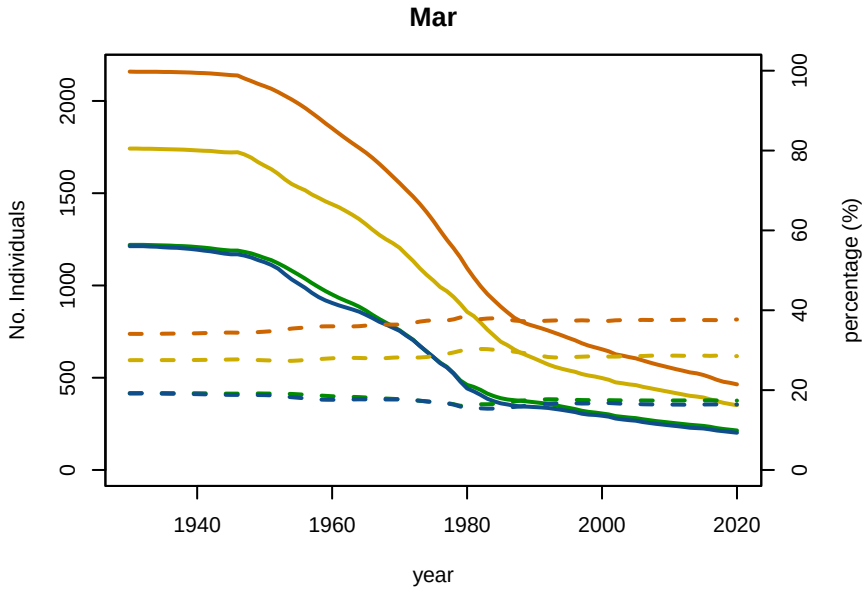


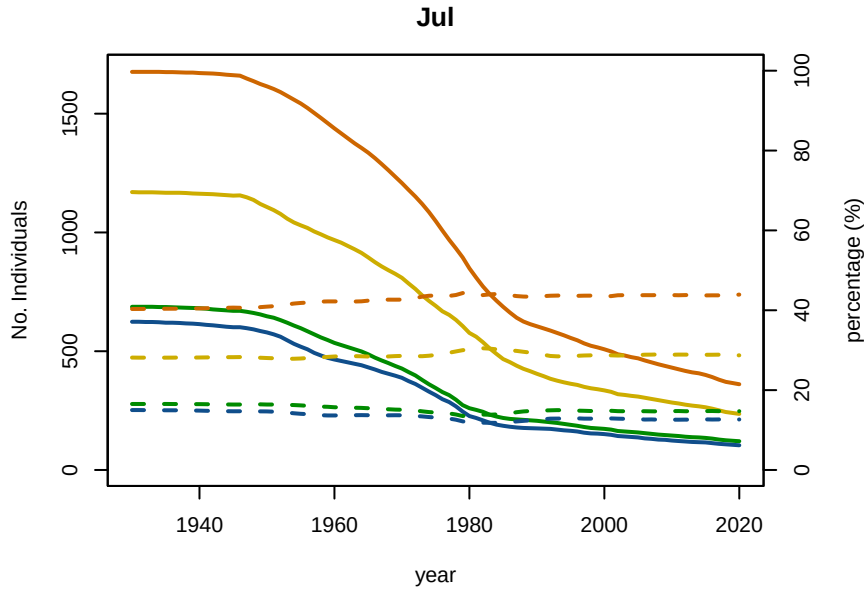


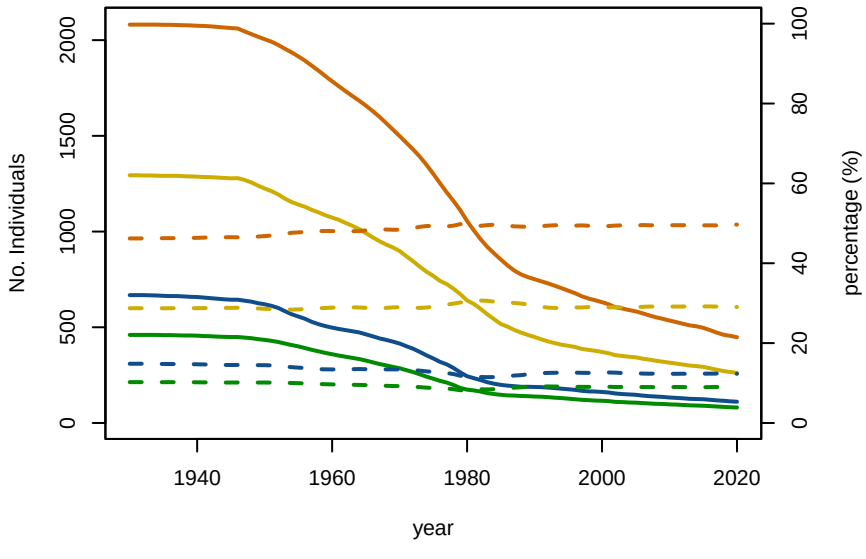


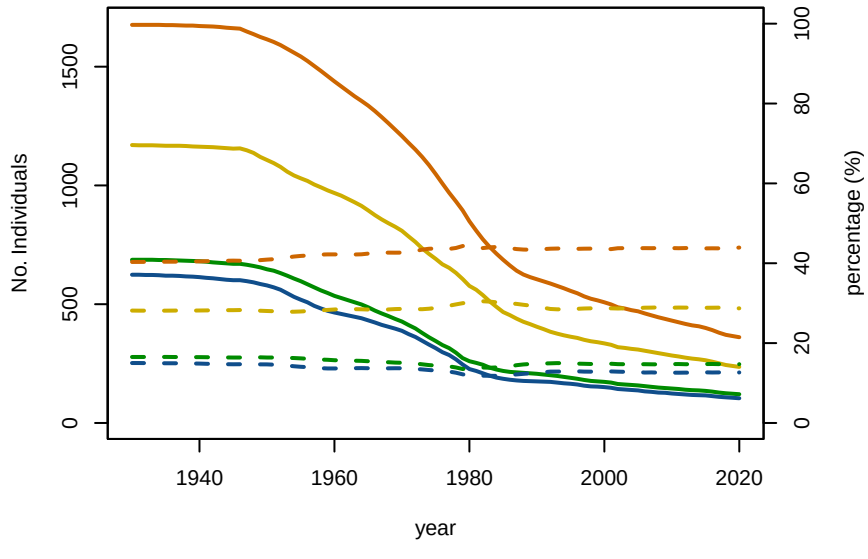
A1−4 A5−9 MatF MatM No Individuals percentage

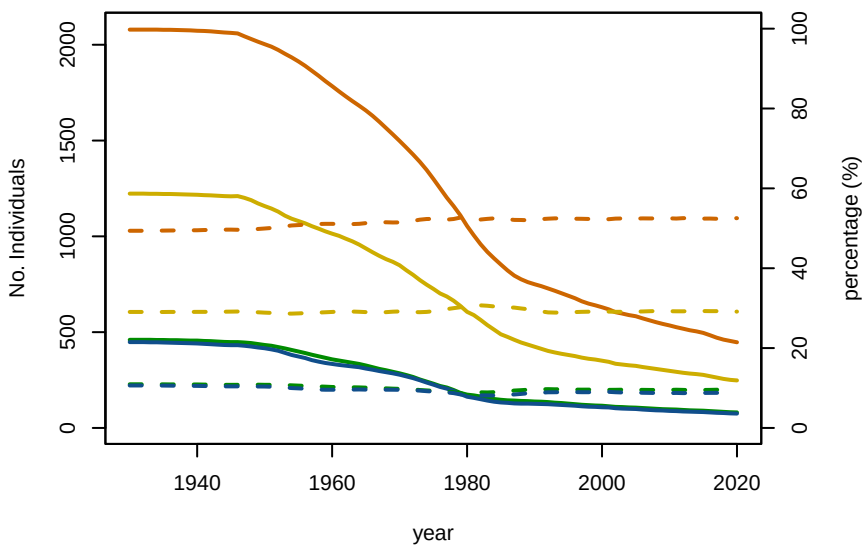
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 6E

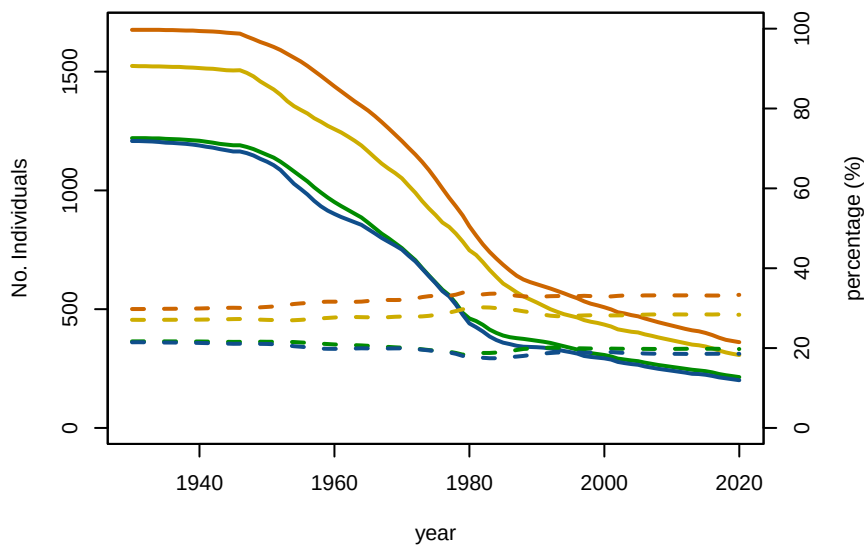


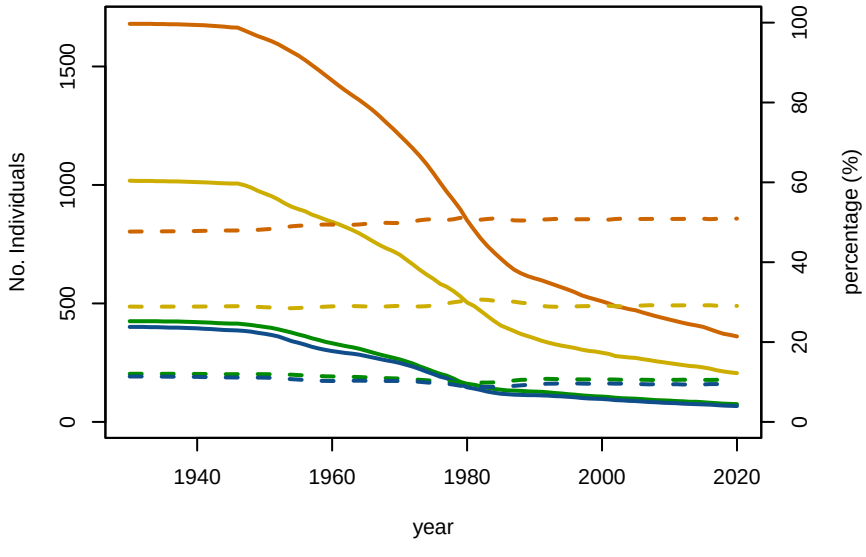


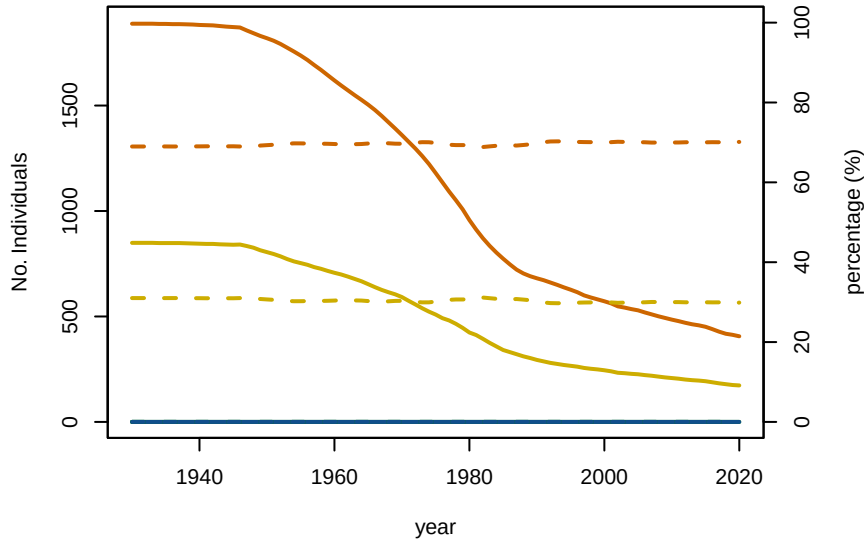






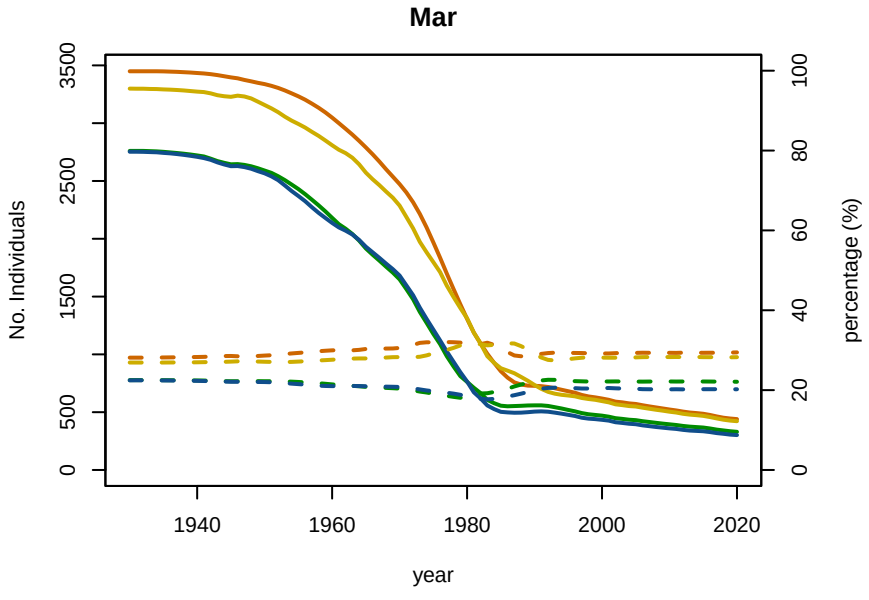


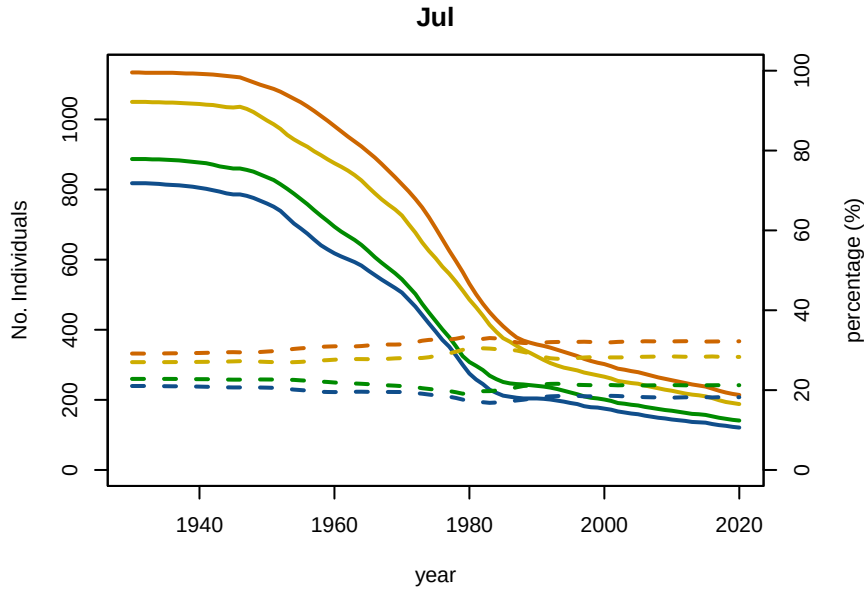


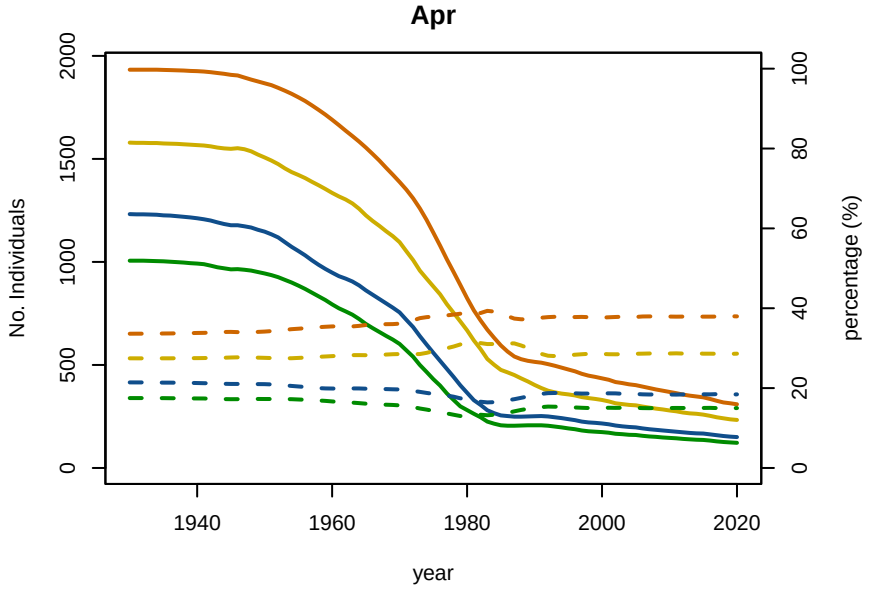


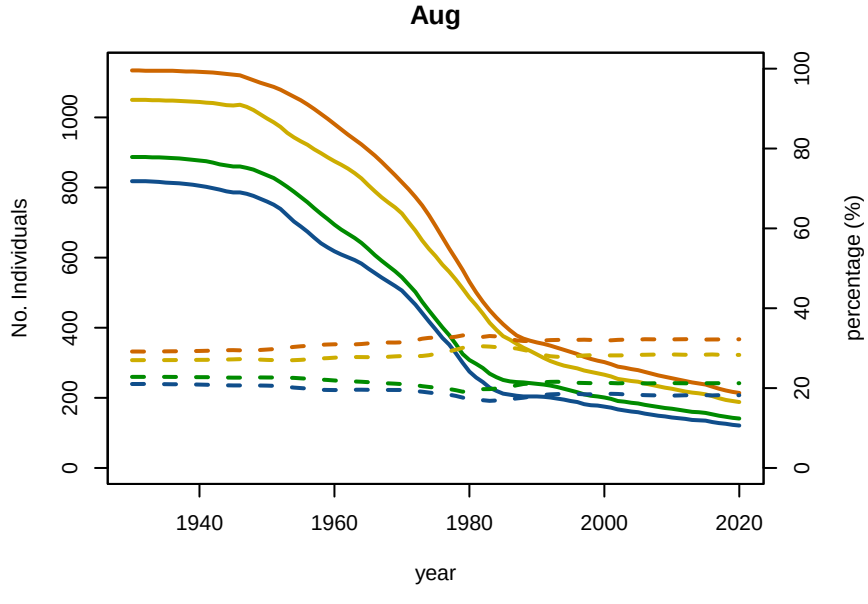
A1−4 A5−9 MatF MatM No Individuals percentage

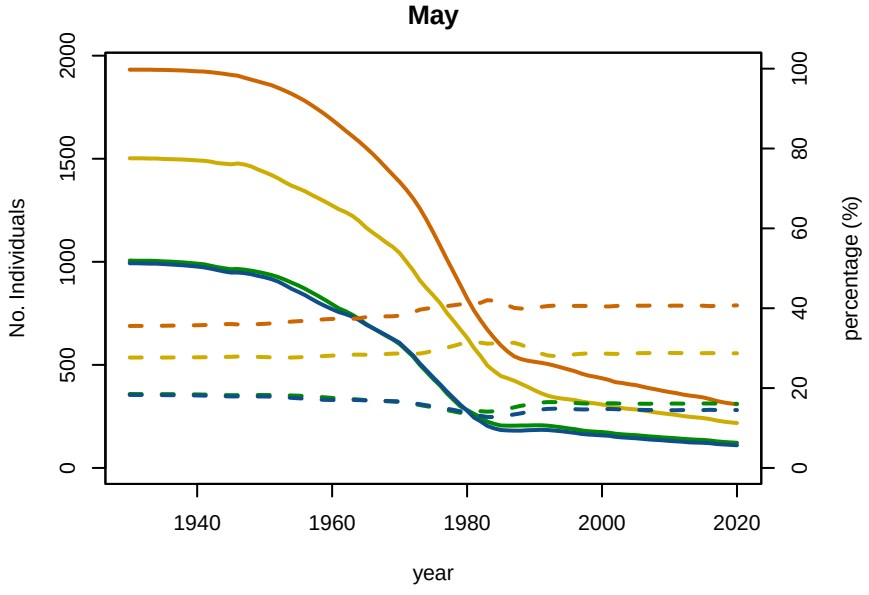
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 6W

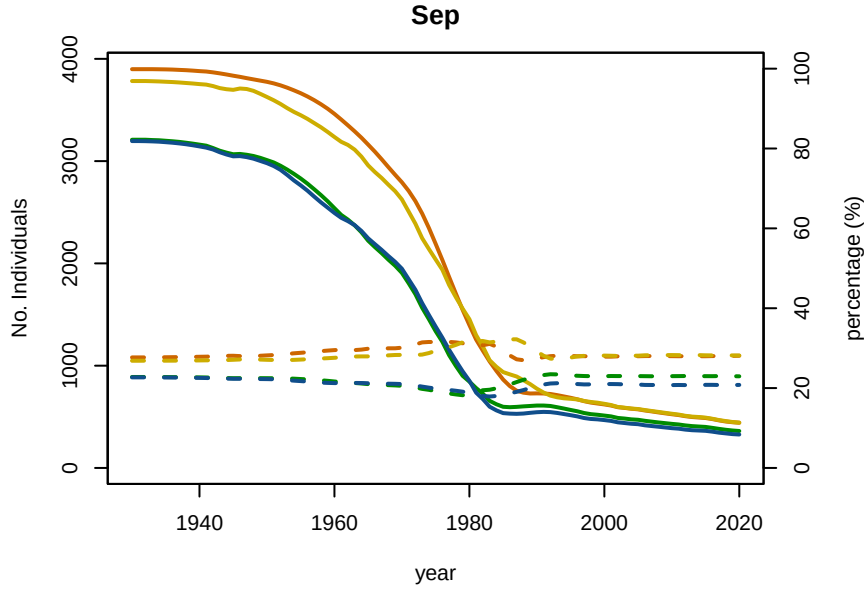


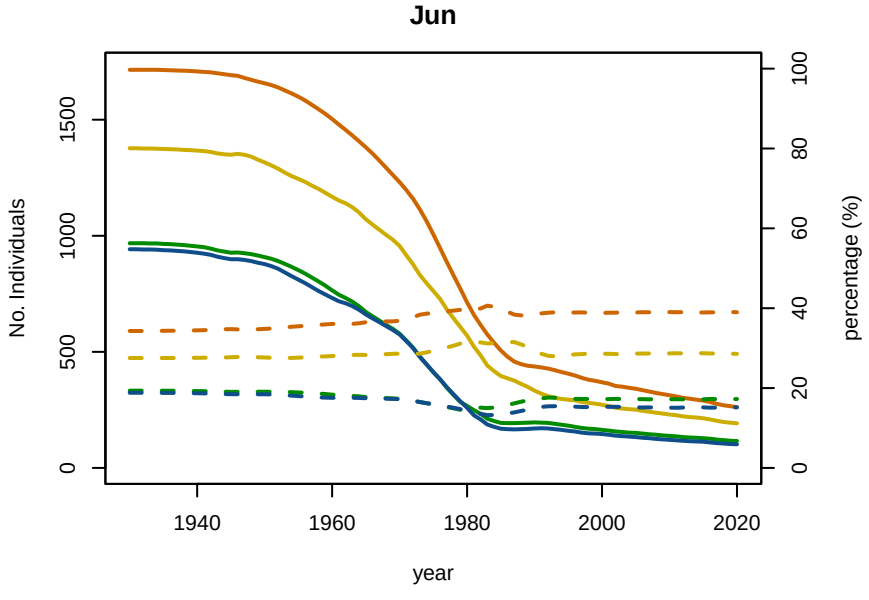


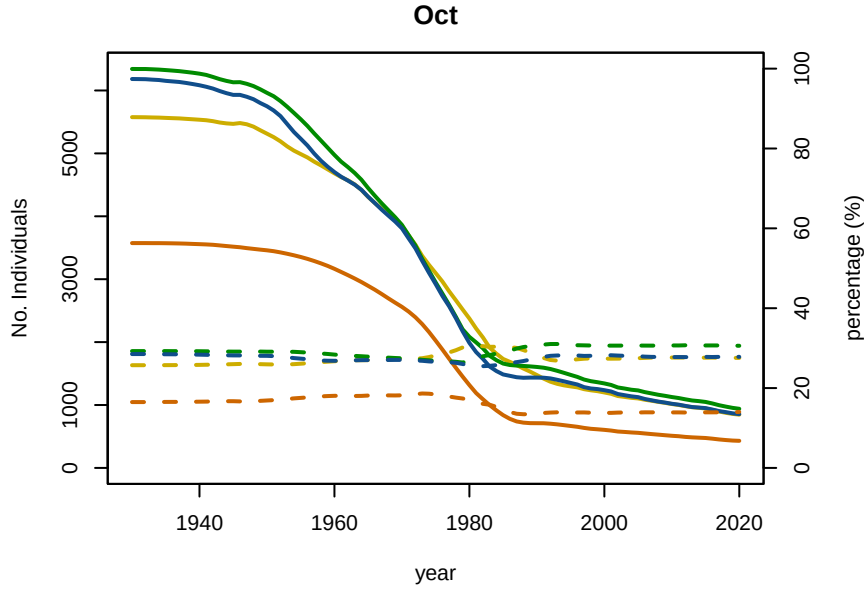






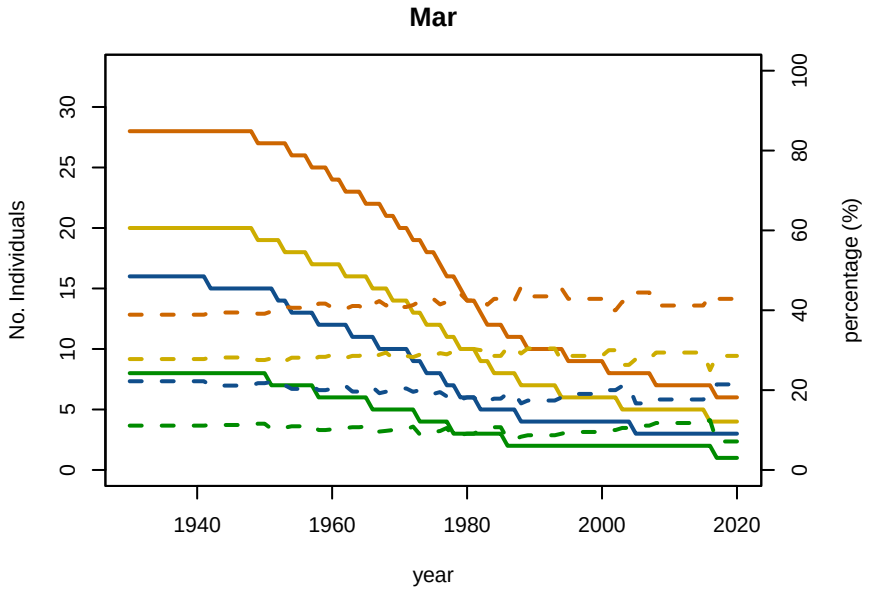


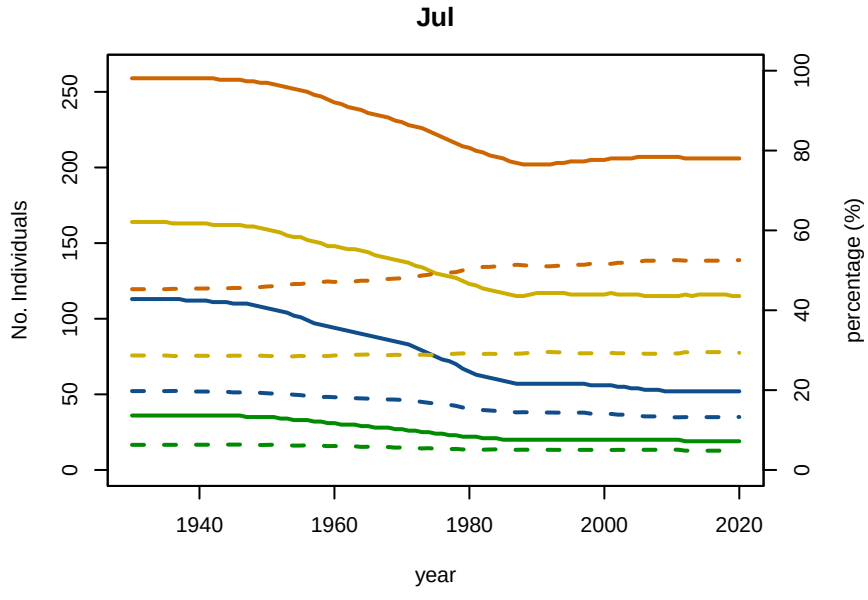


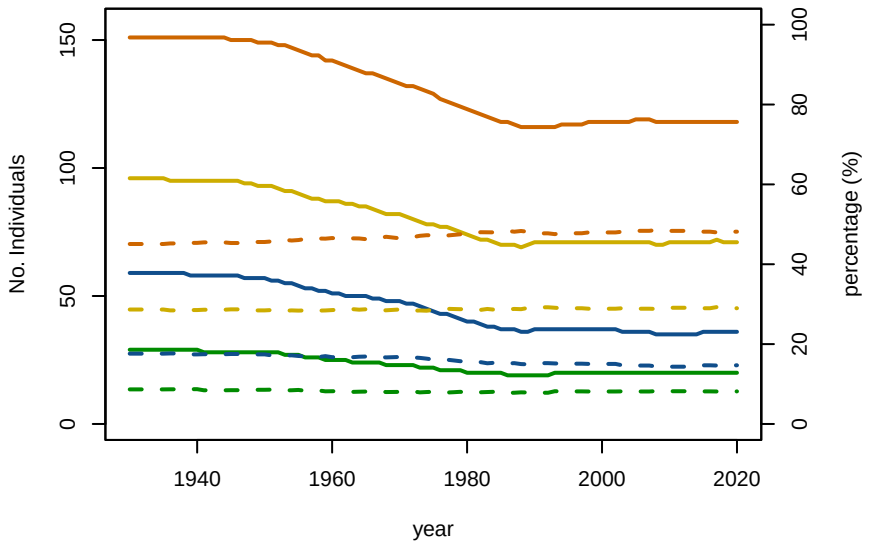


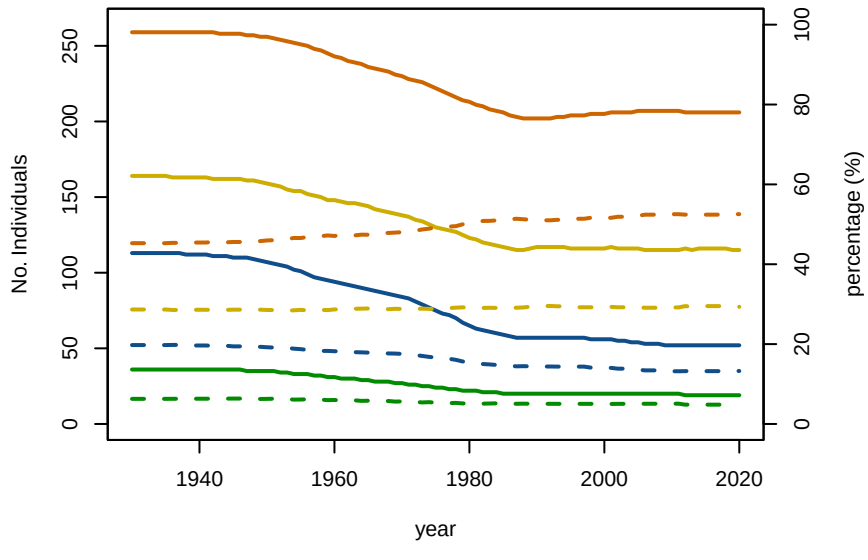
A1−4 A5−9 MatF MatM No Individuals percentage

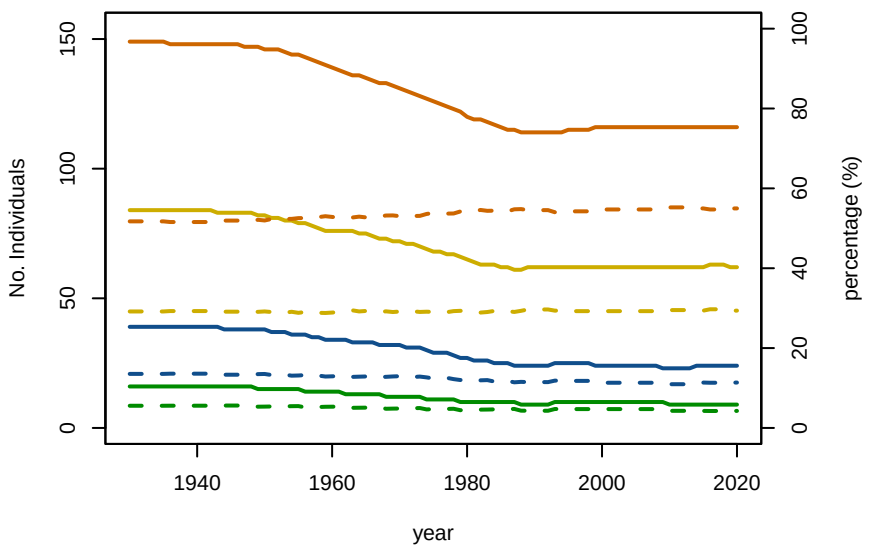
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7CN

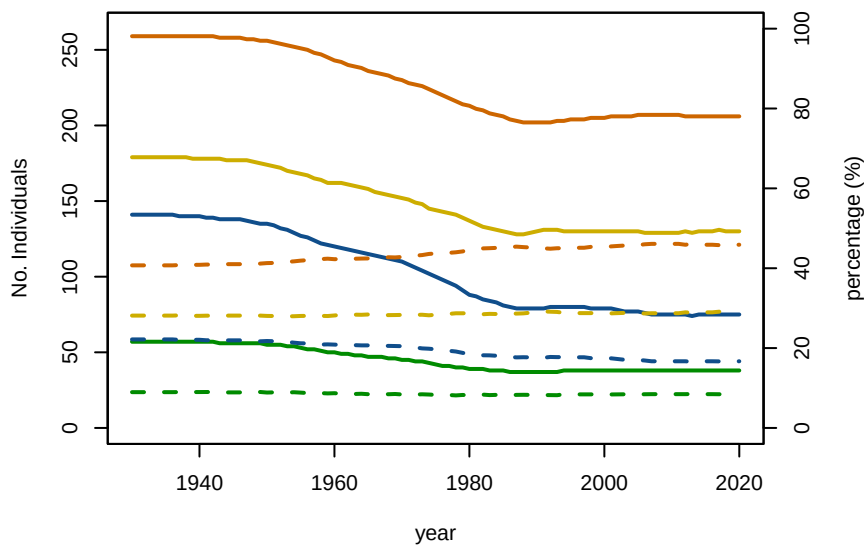


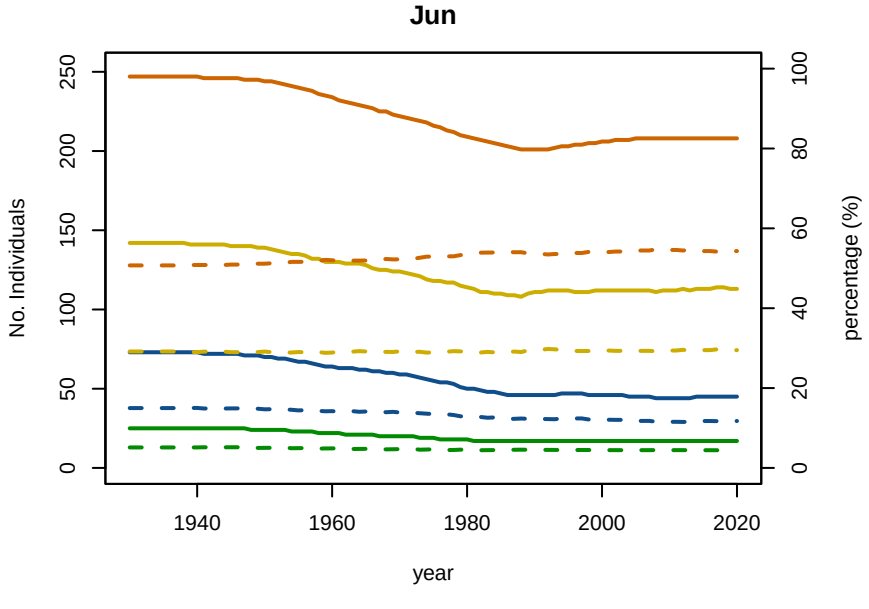


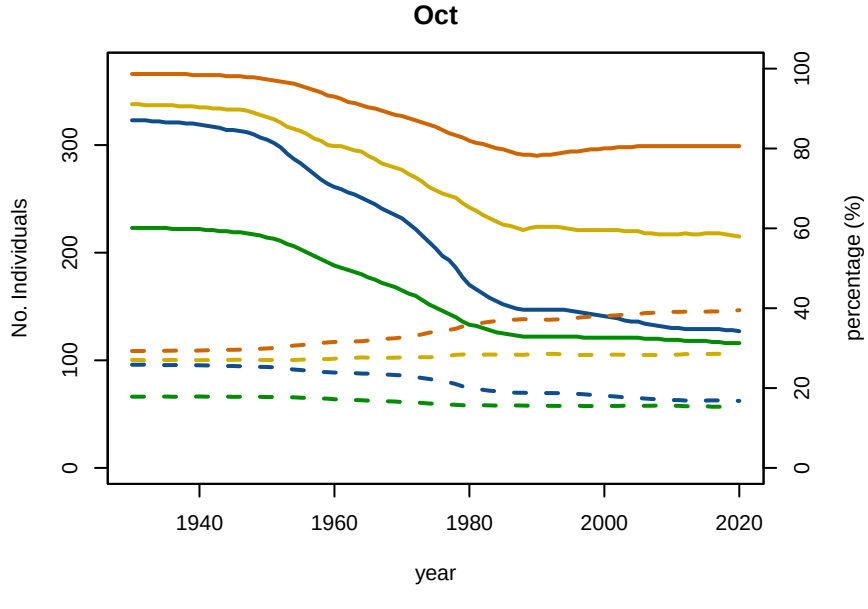






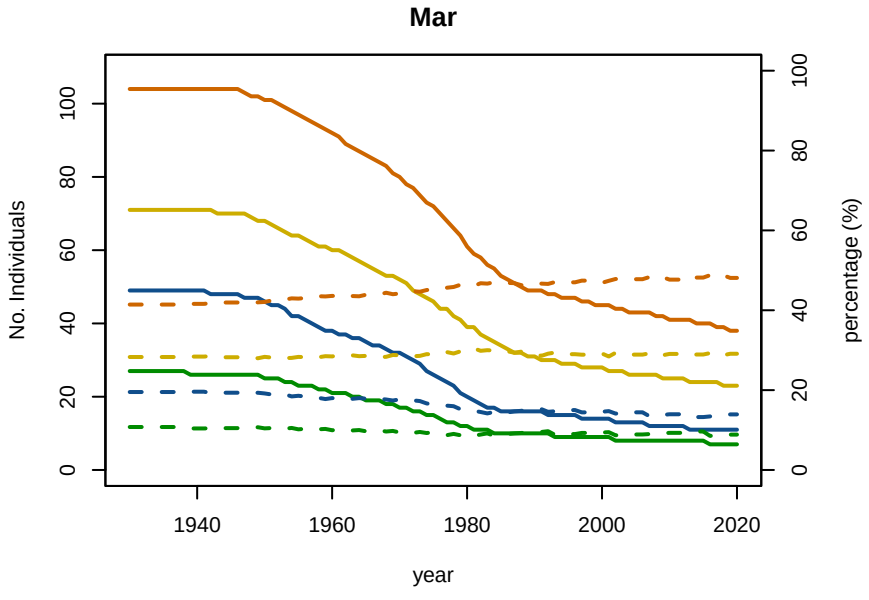


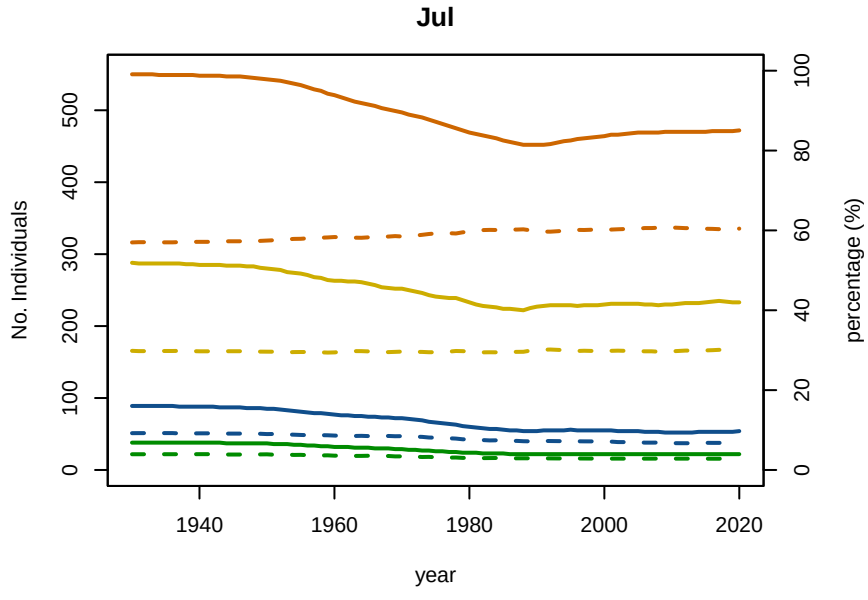


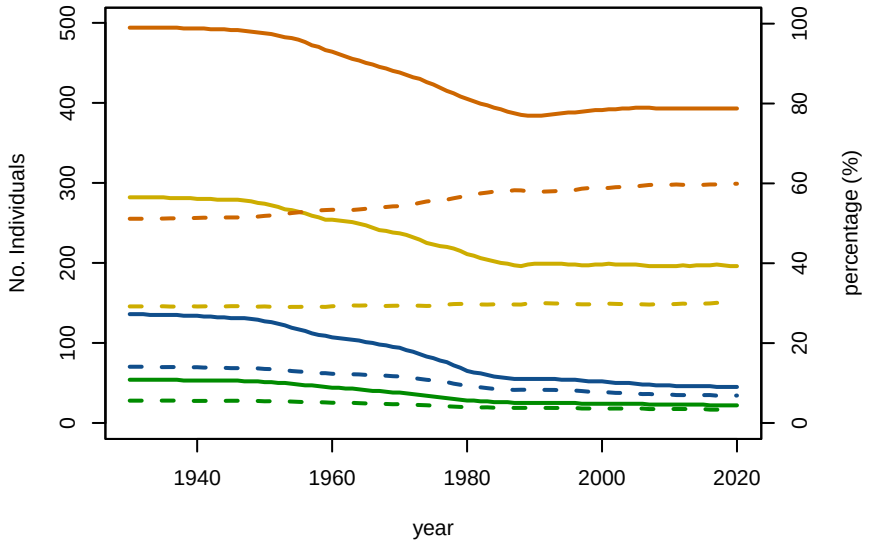


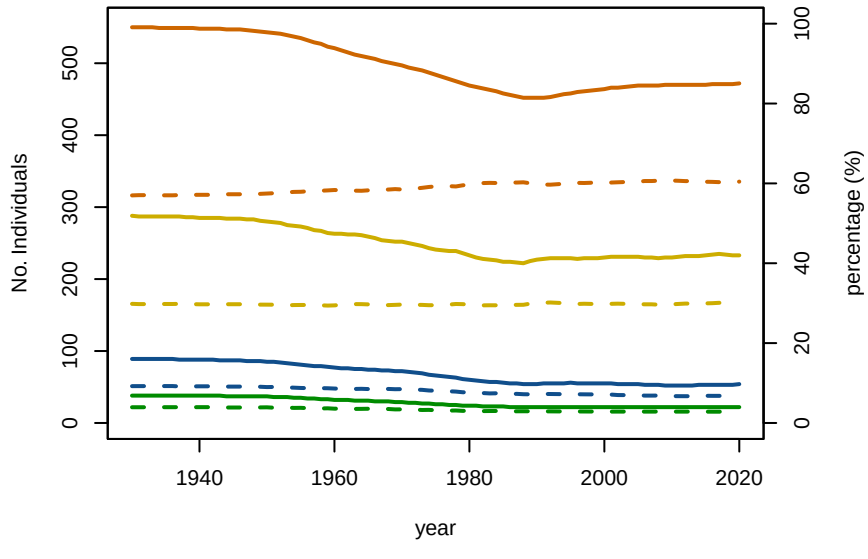
A1−4 A5−9 MatF MatM No Individuals percentage

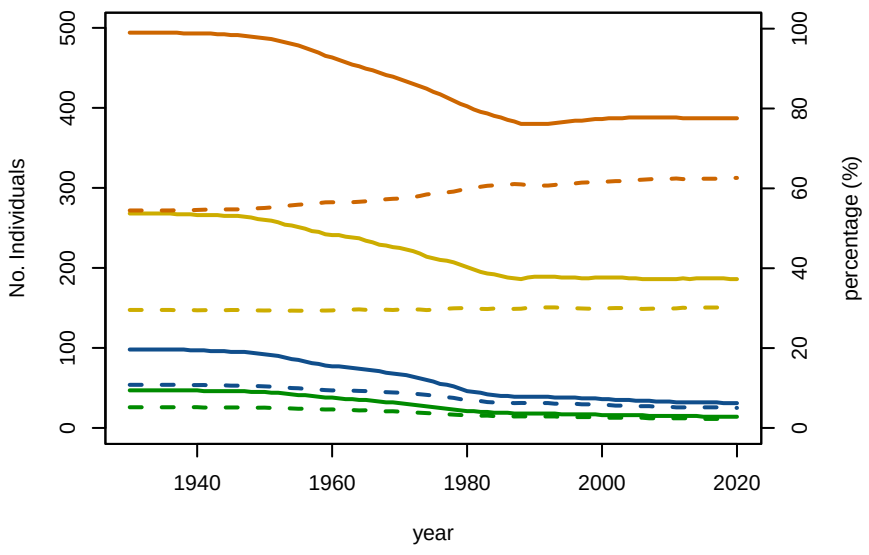
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7CS

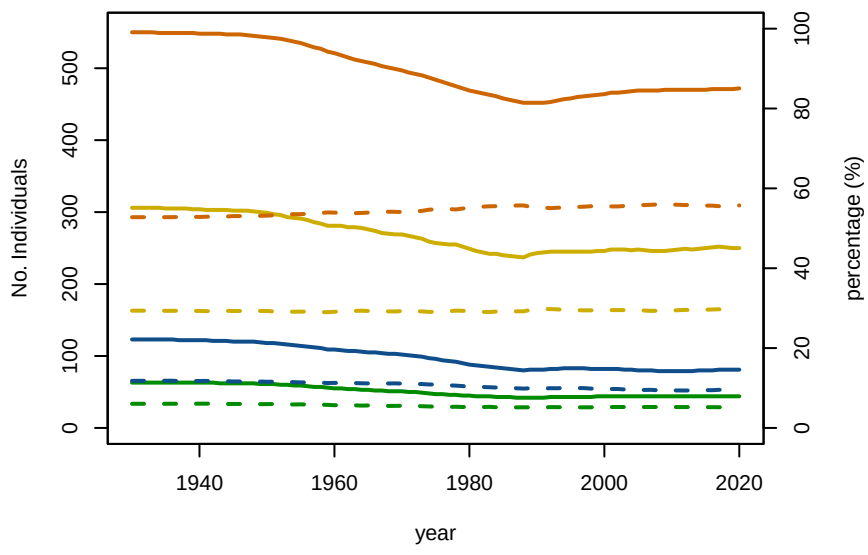


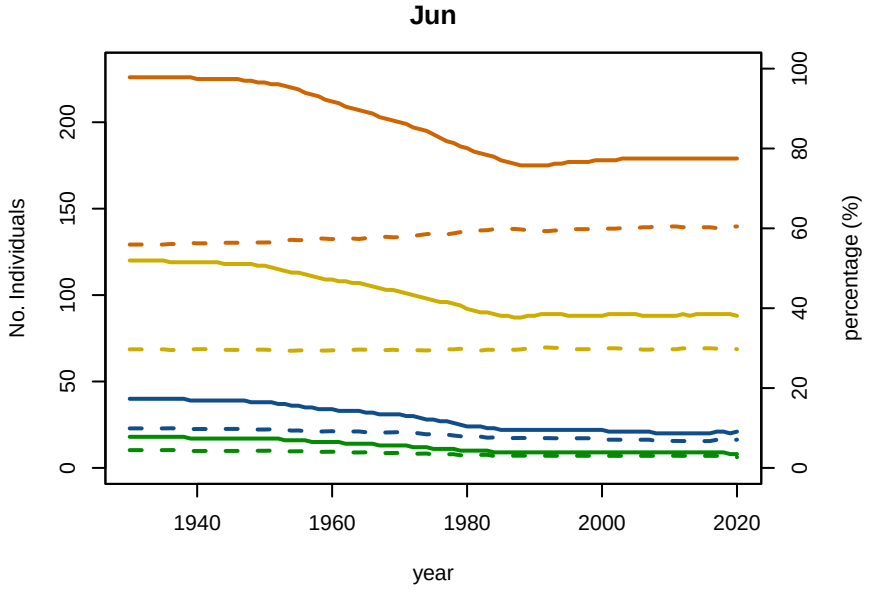


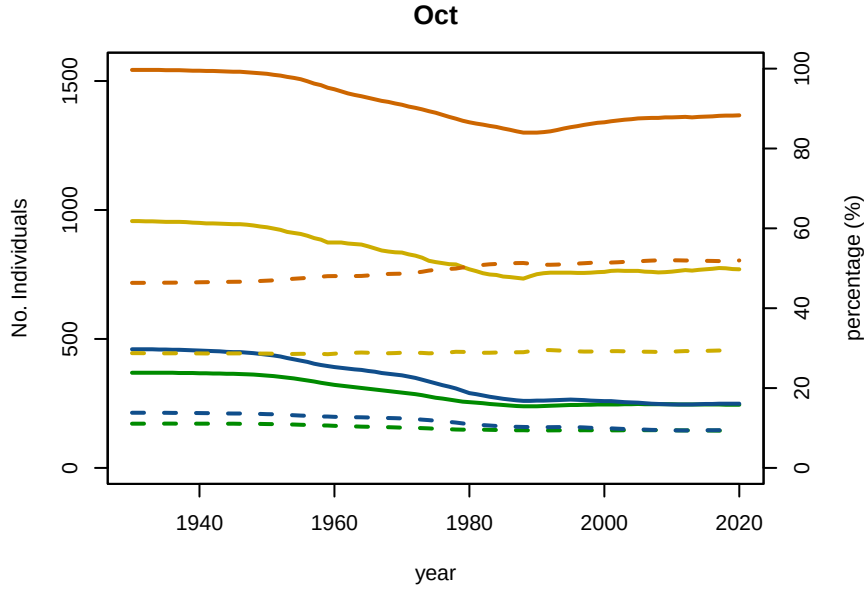






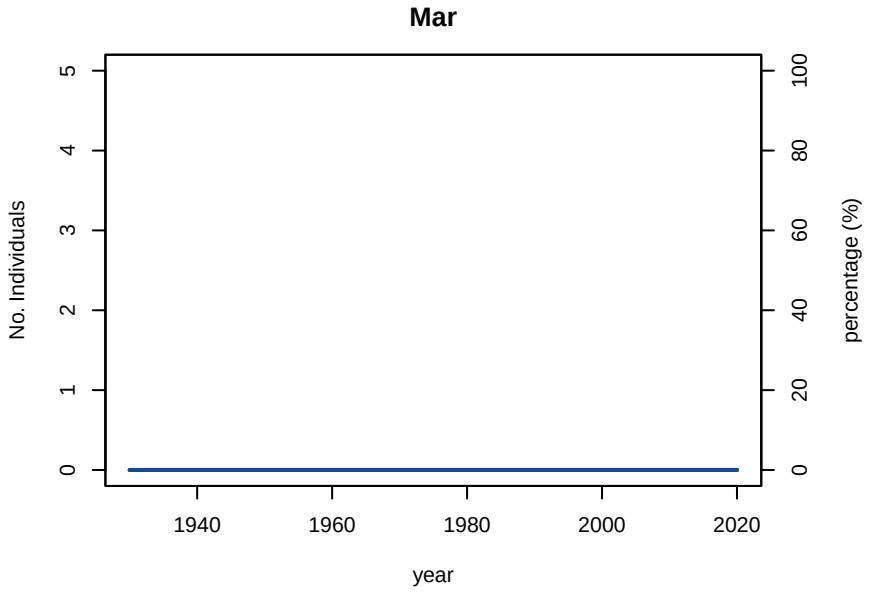


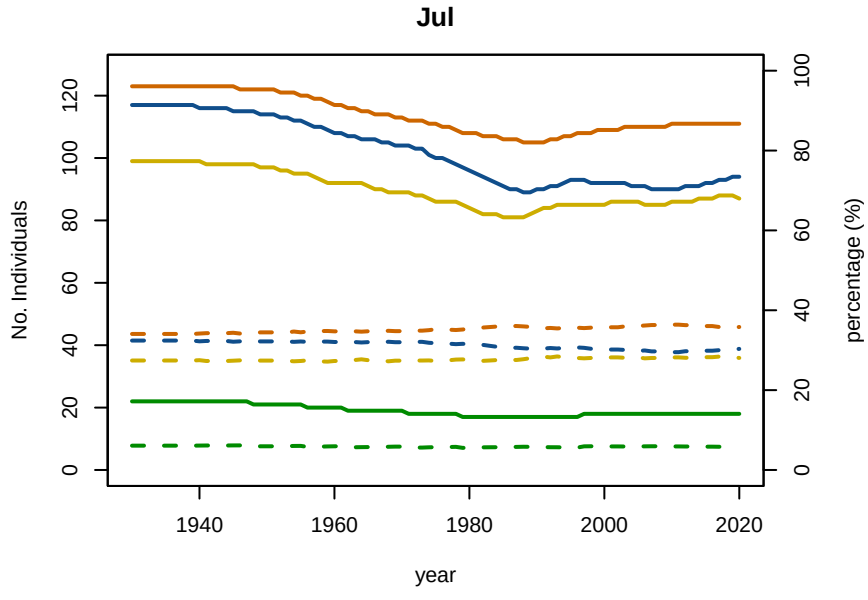


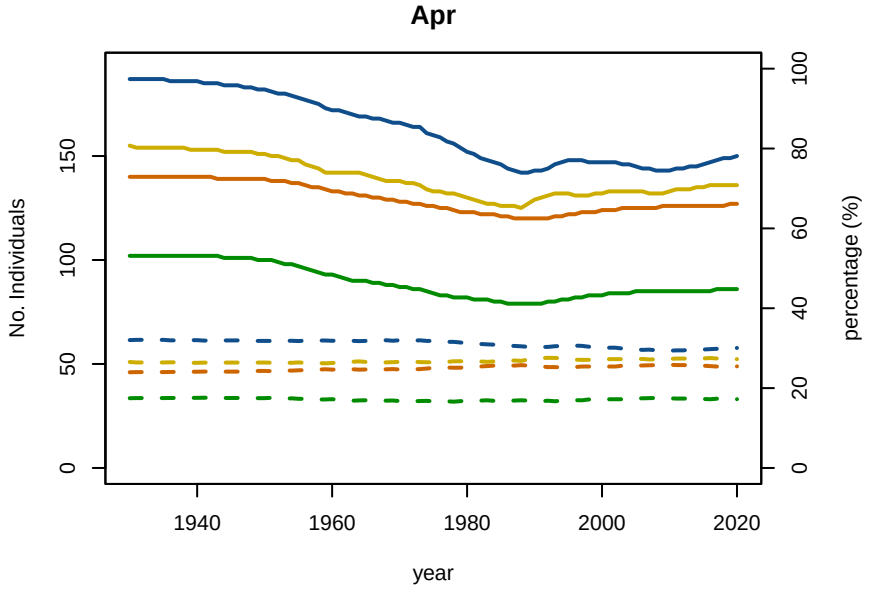


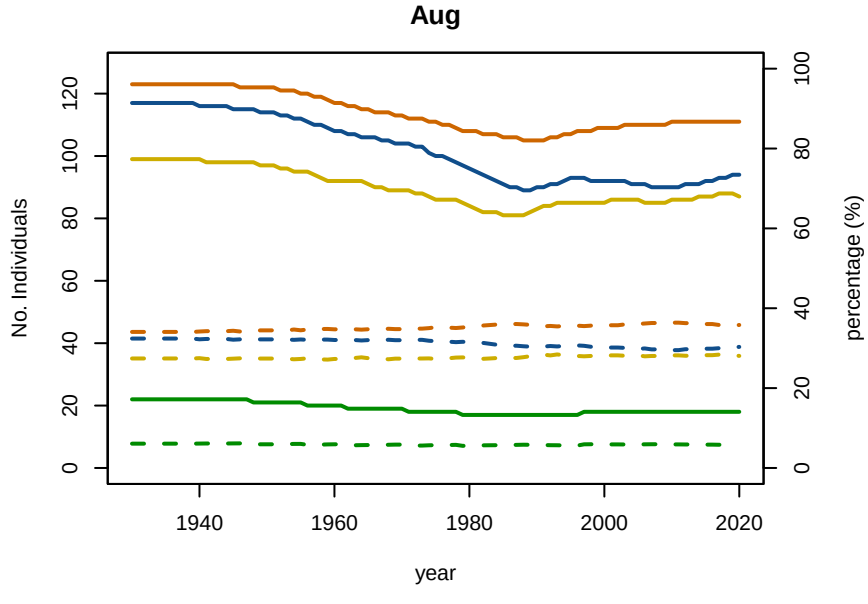
A1−4 A5−9 MatF MatM No Individuals percentage

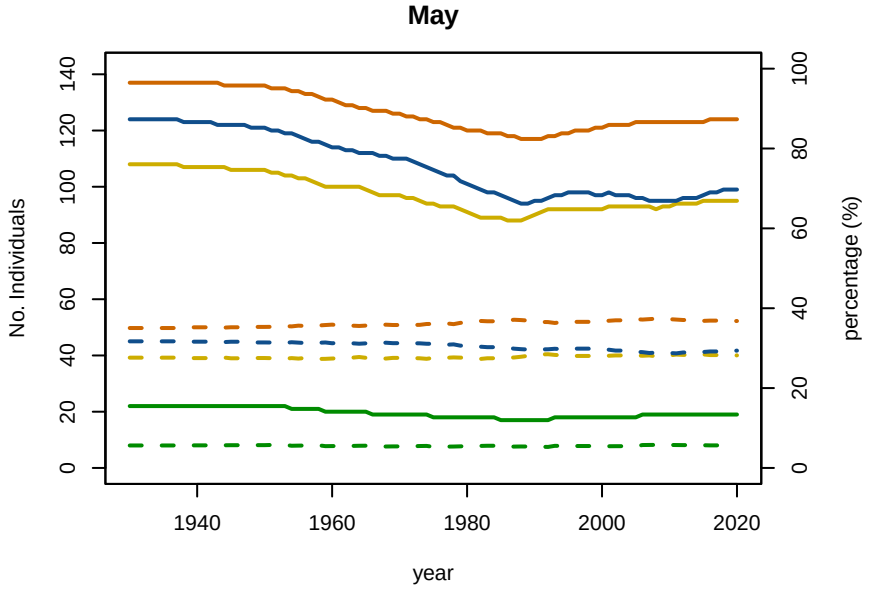
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7E

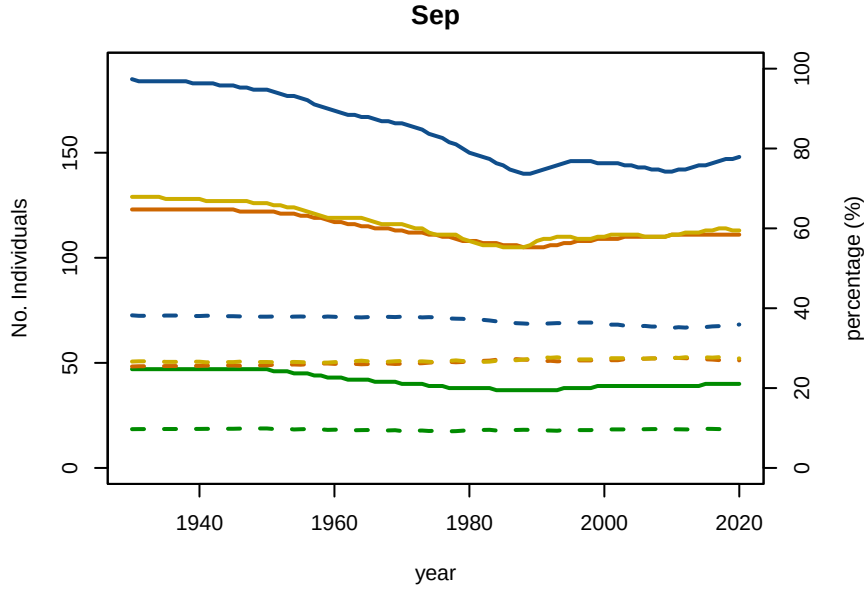


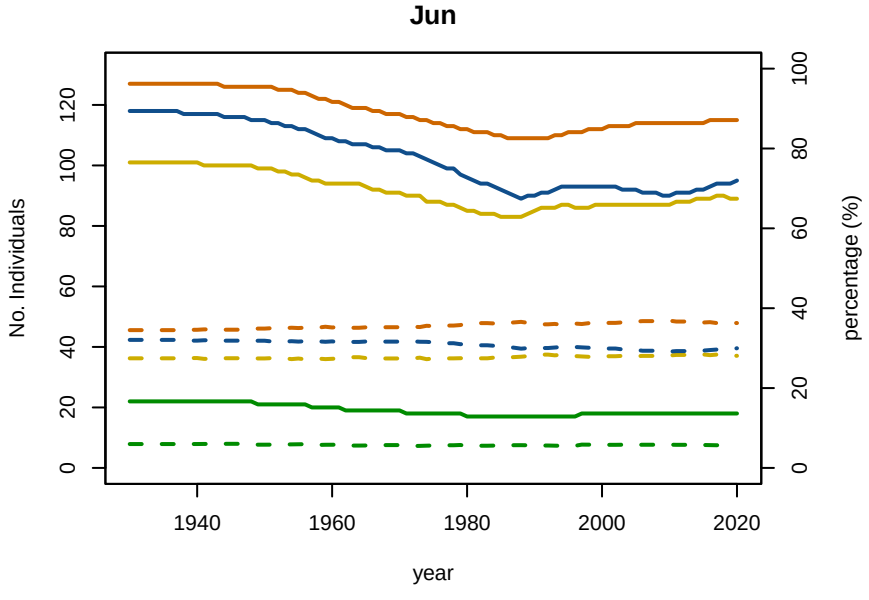


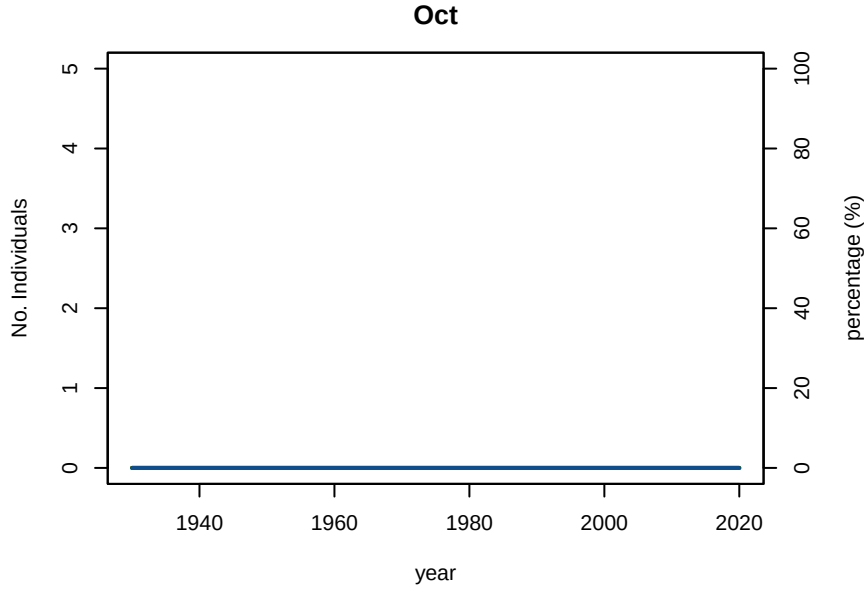






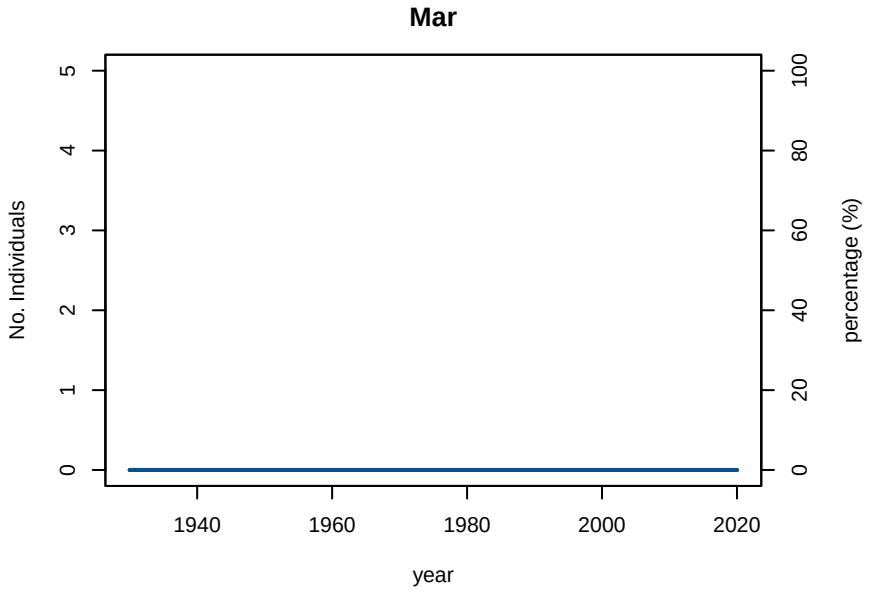


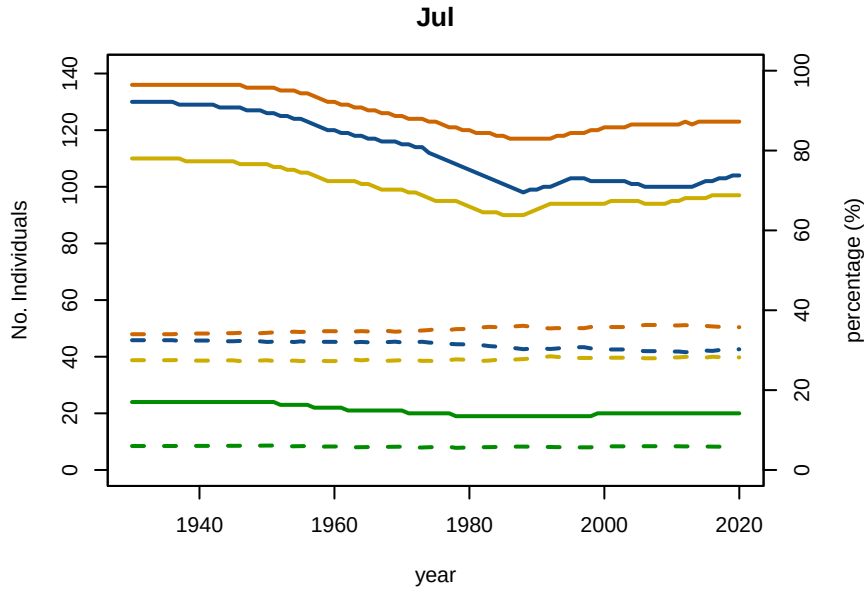


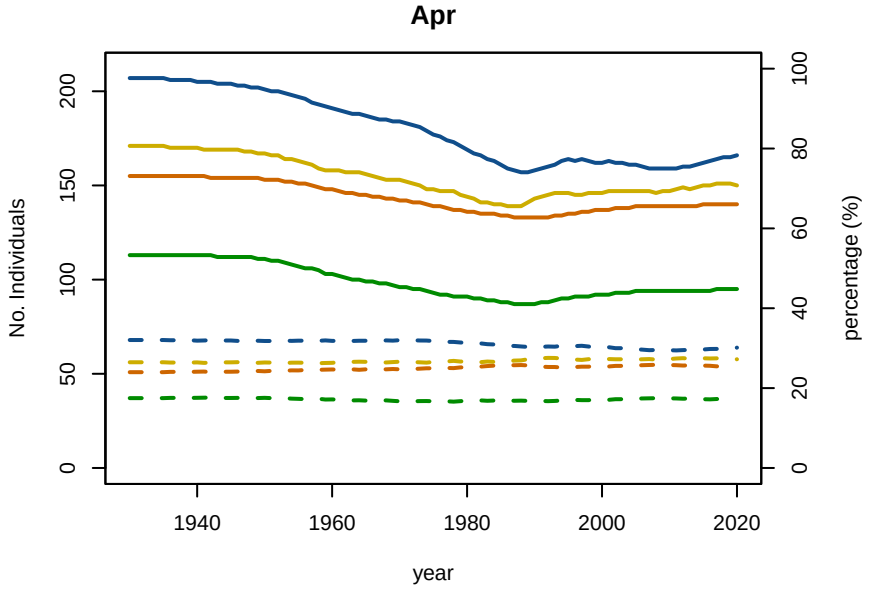


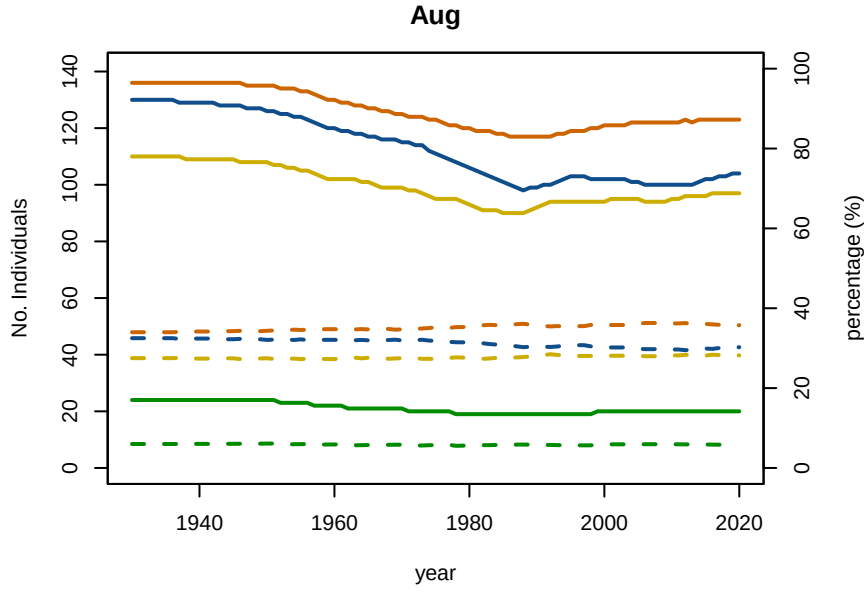
A1−4 A5−9 MatF MatM No Individuals percentage

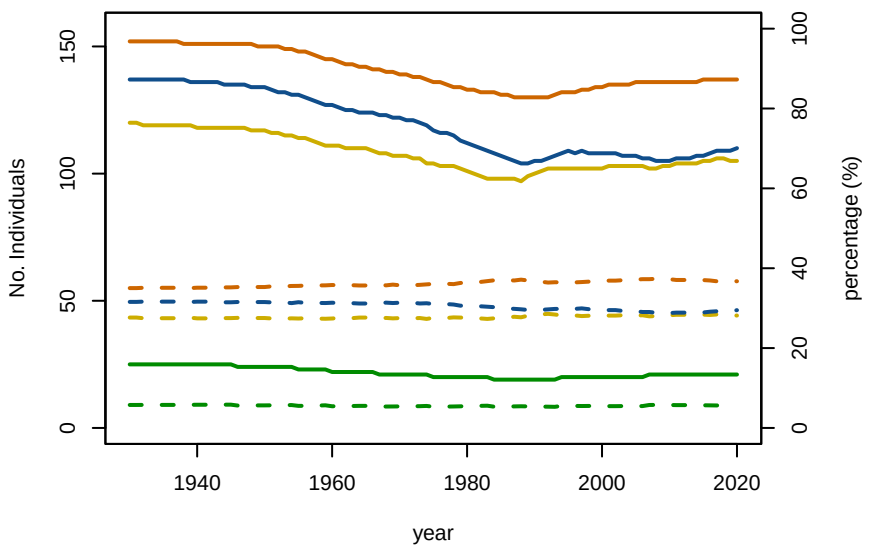
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7WR

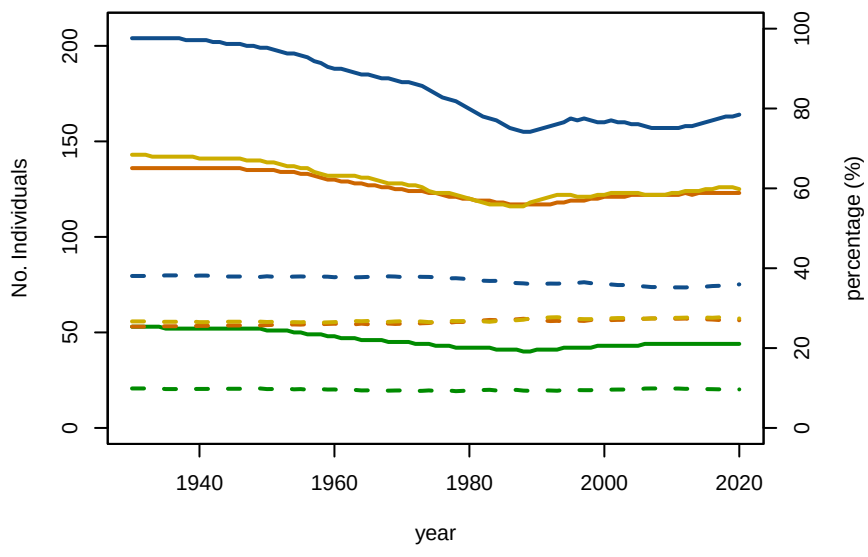


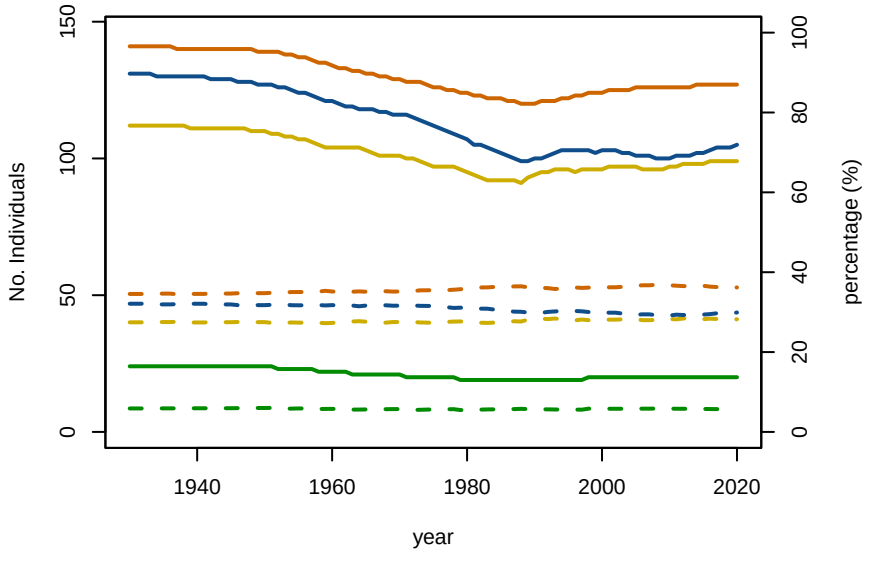


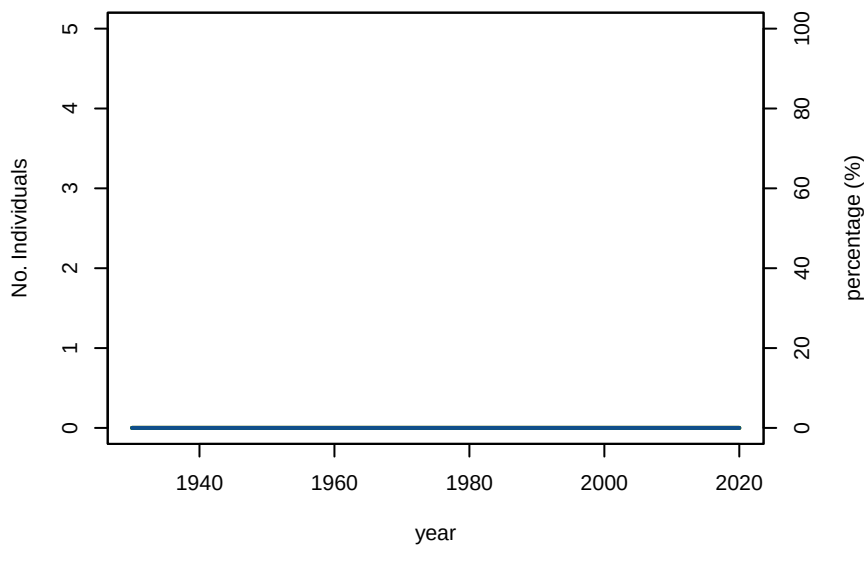






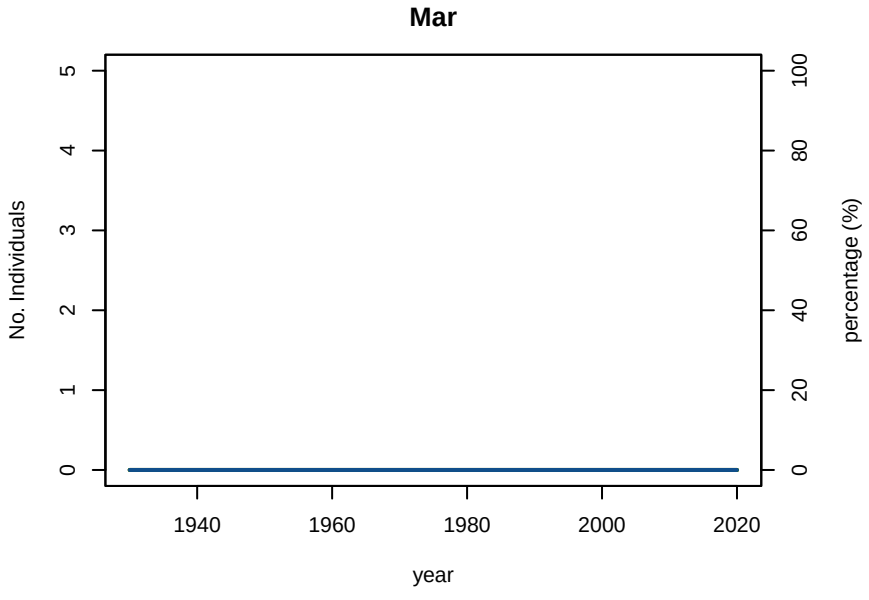


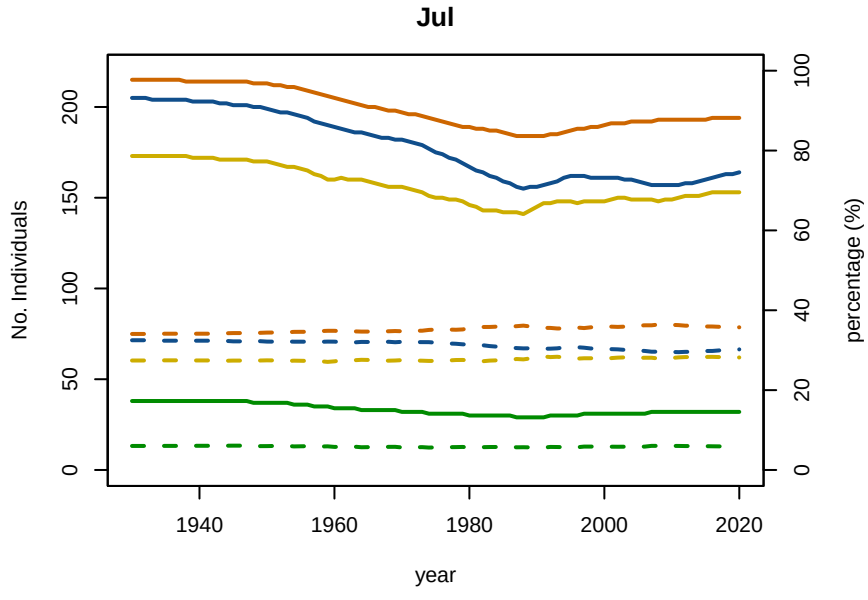


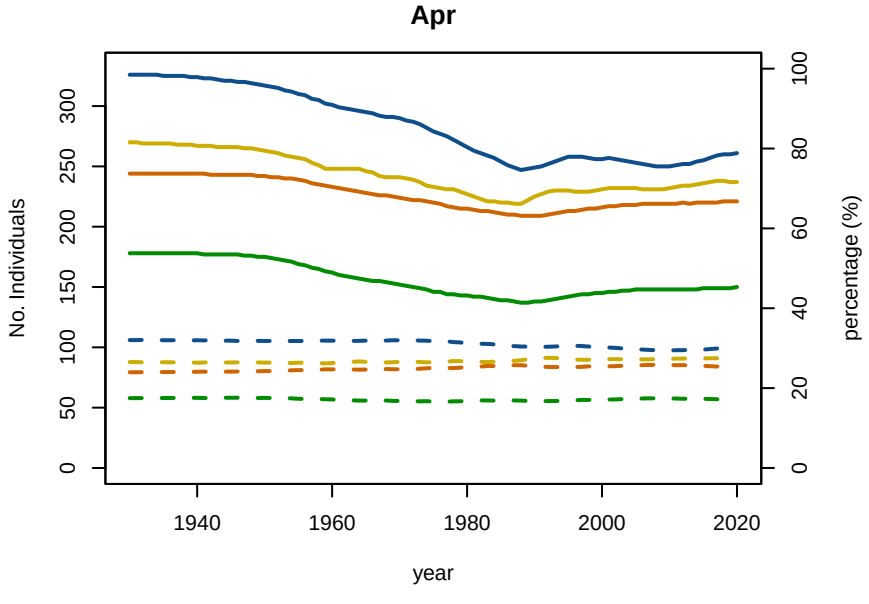


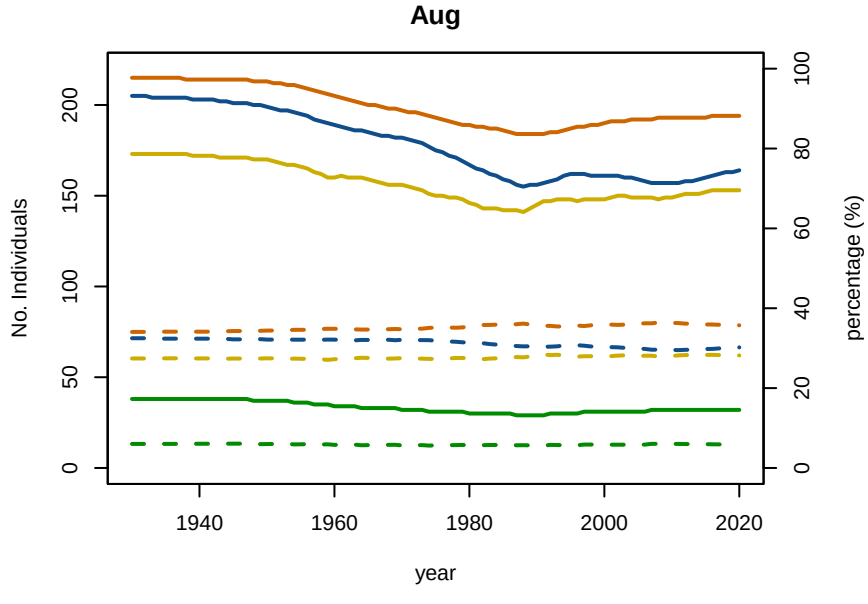
A1−4 A5−9 MatF MatM No Individuals percentage

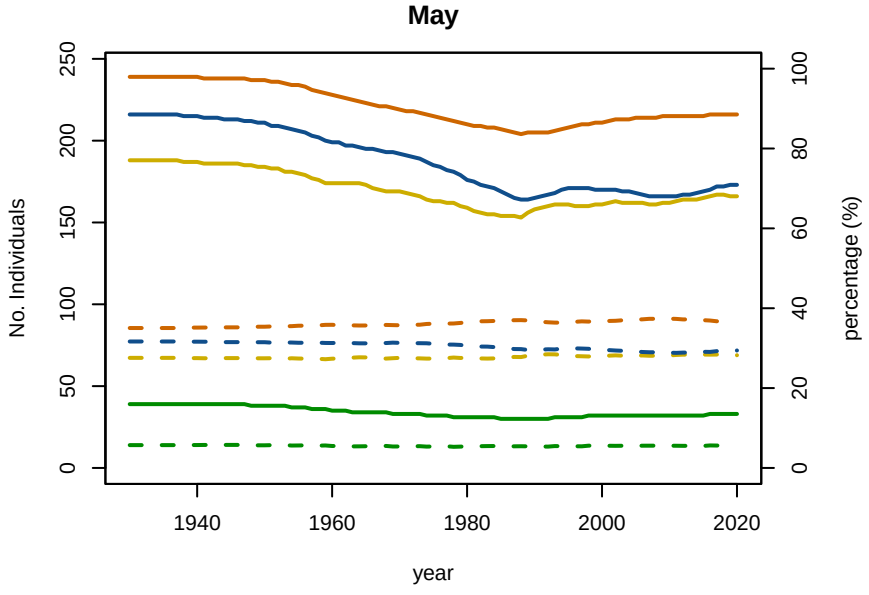
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 8

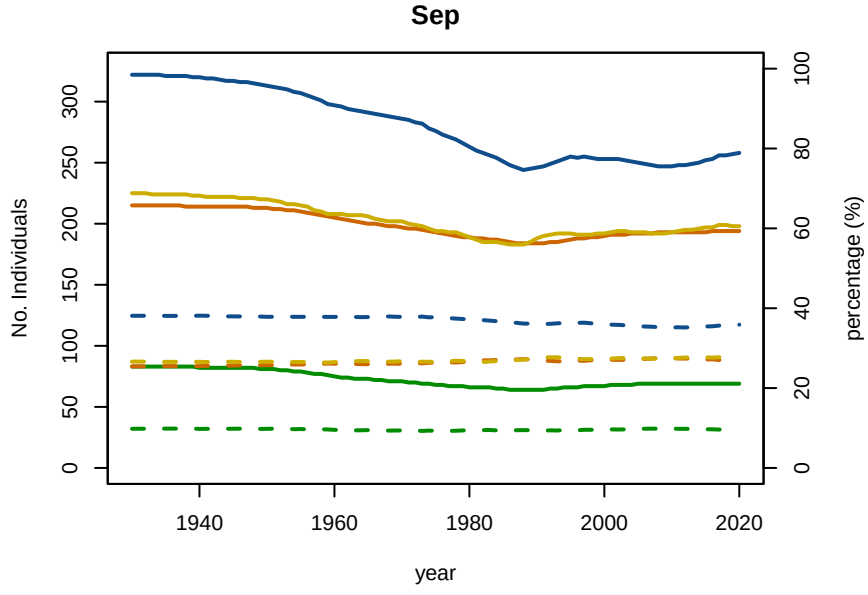


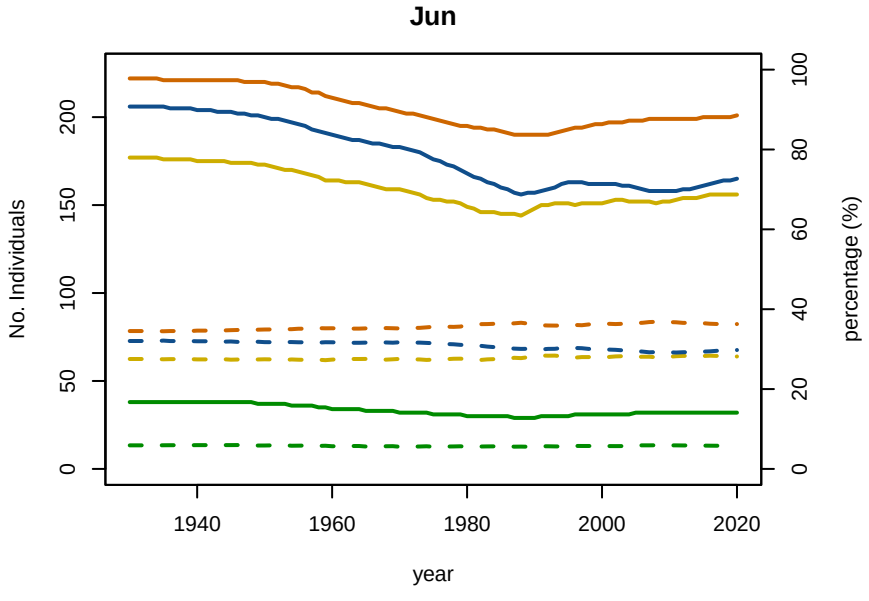


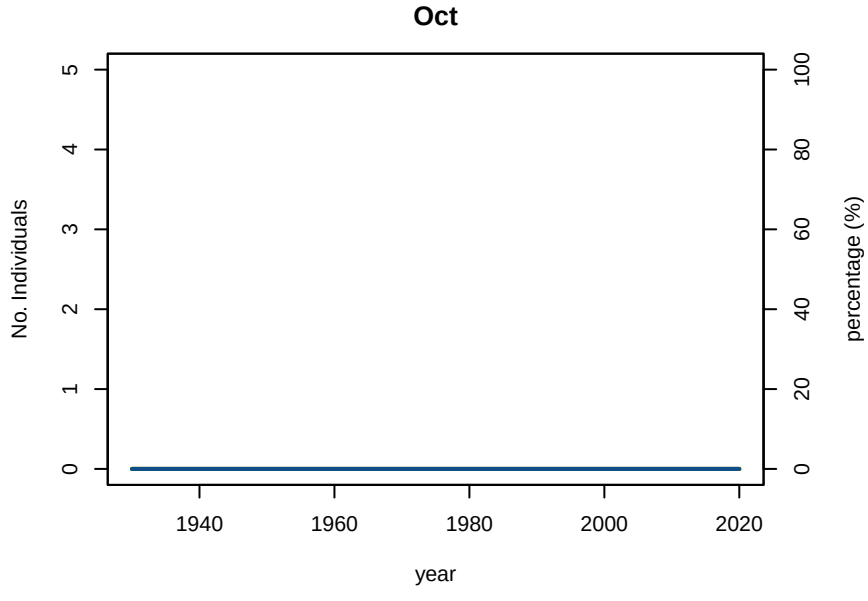






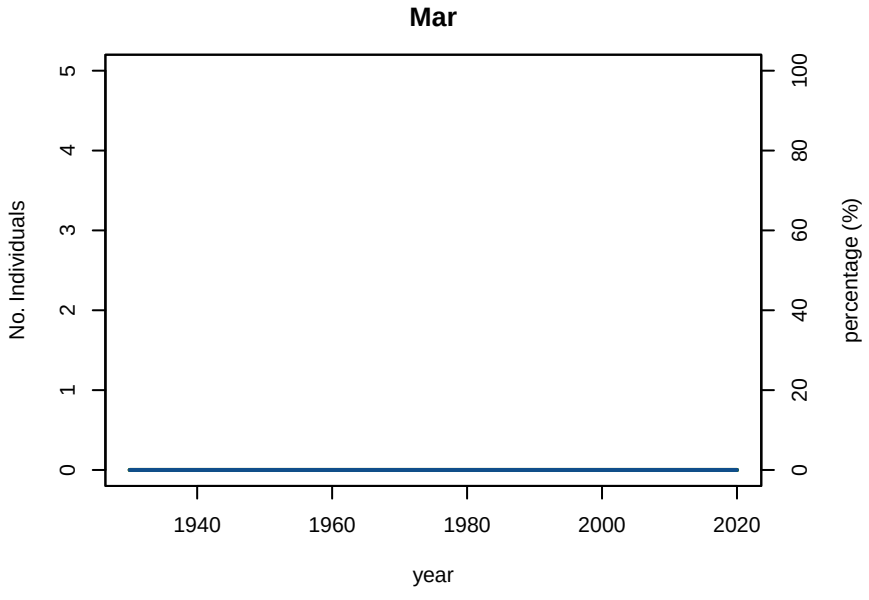


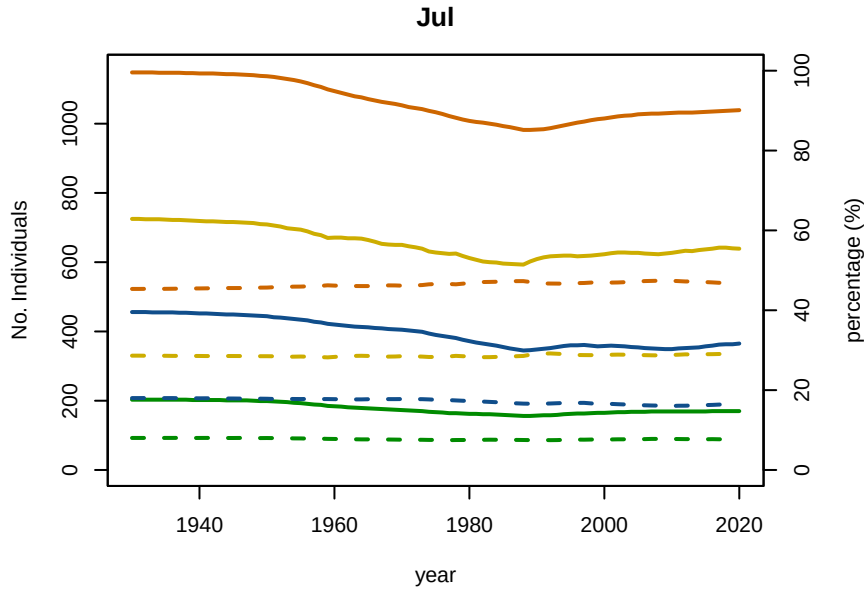


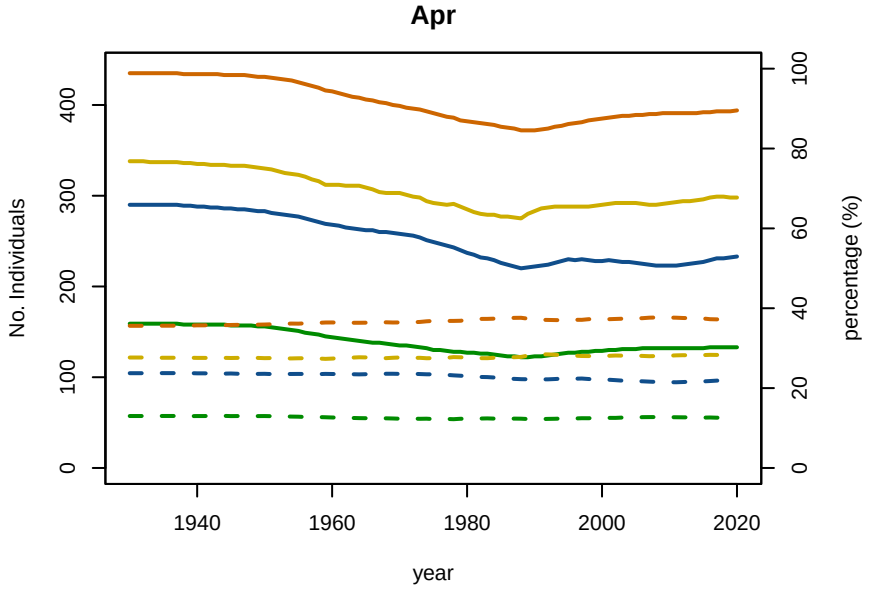


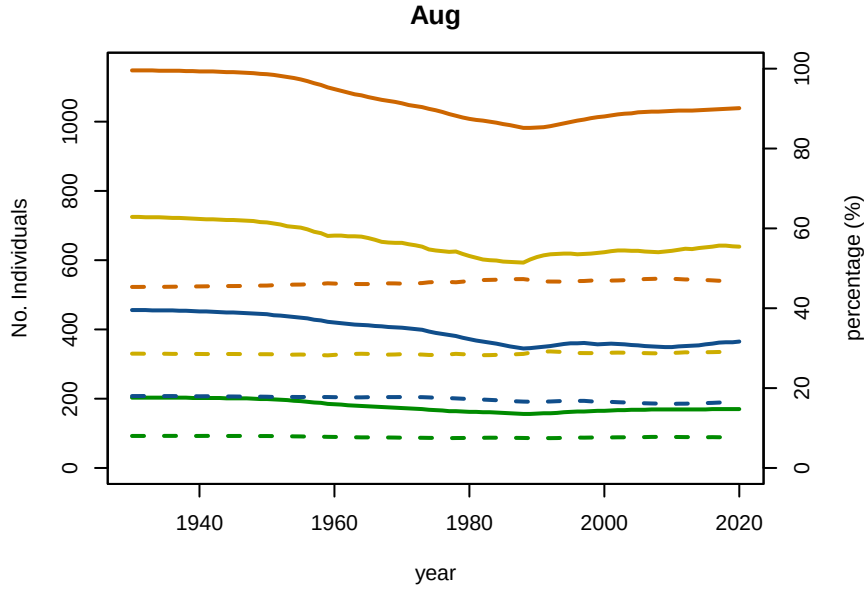
A1−4 A5−9 MatF MatM No Individuals percentage

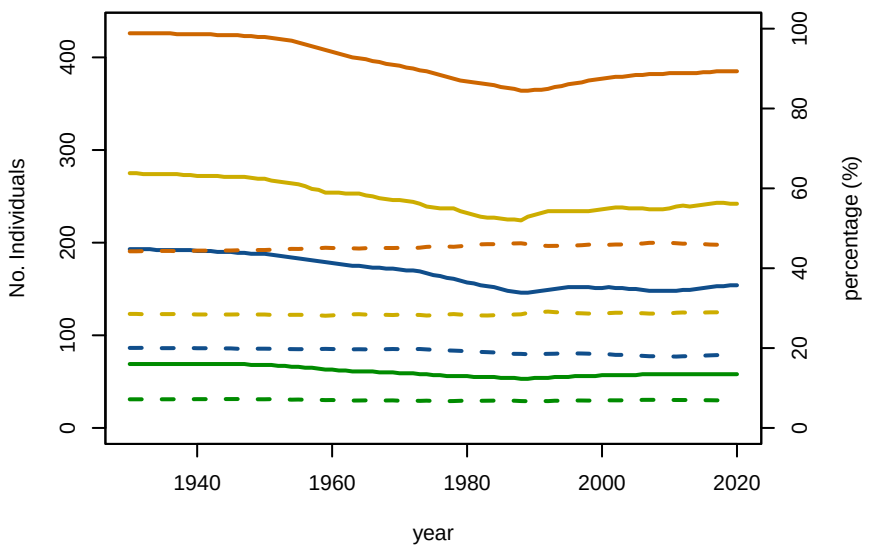
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 9

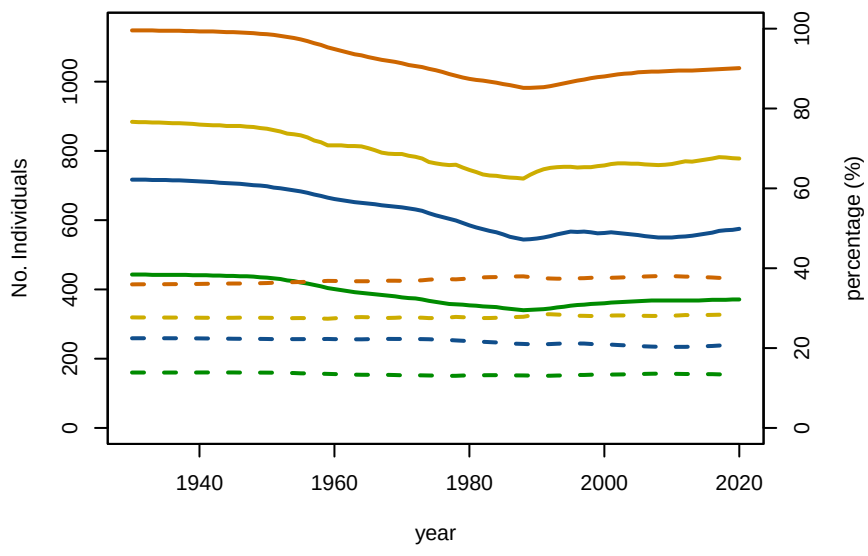


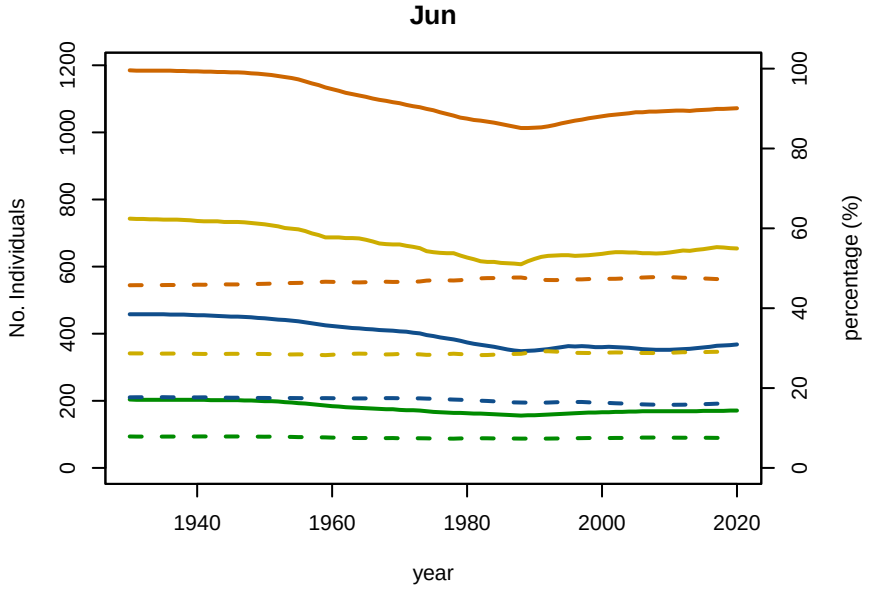


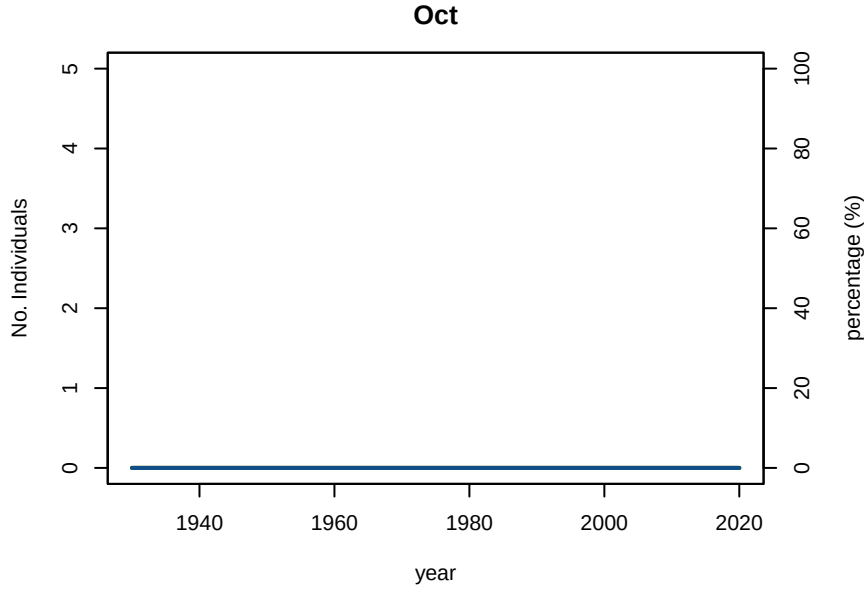






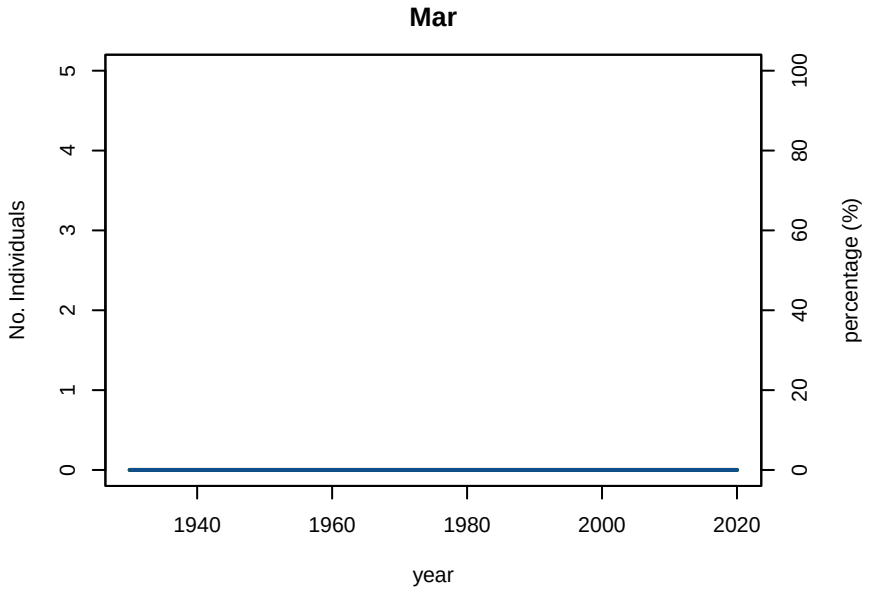


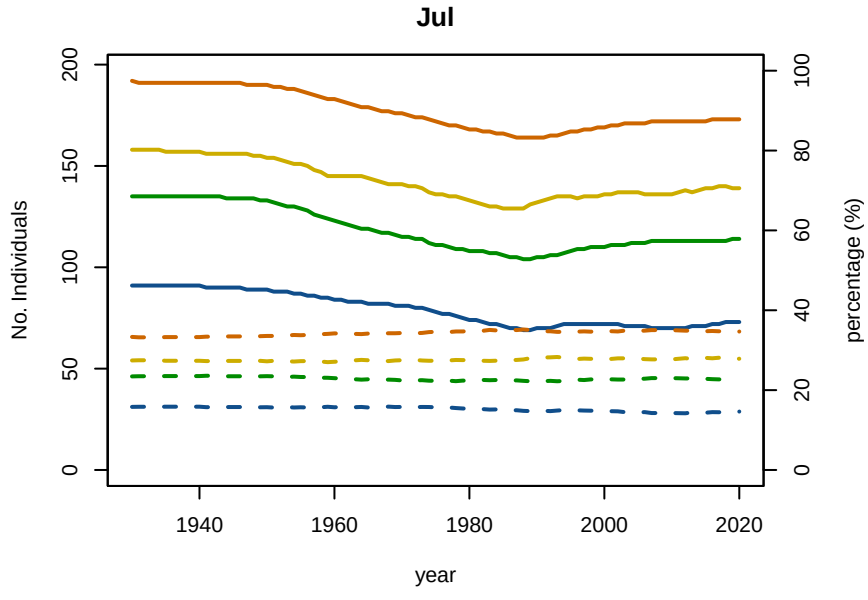


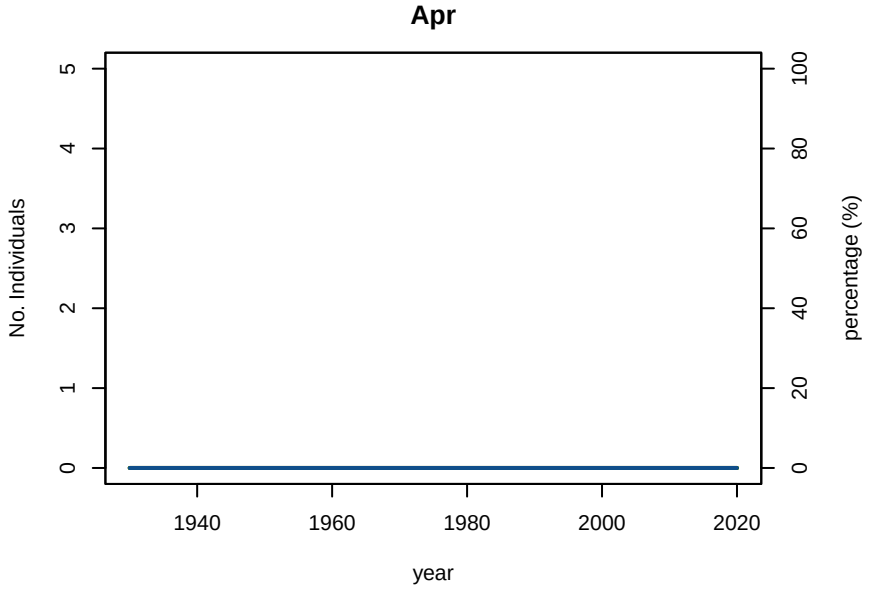


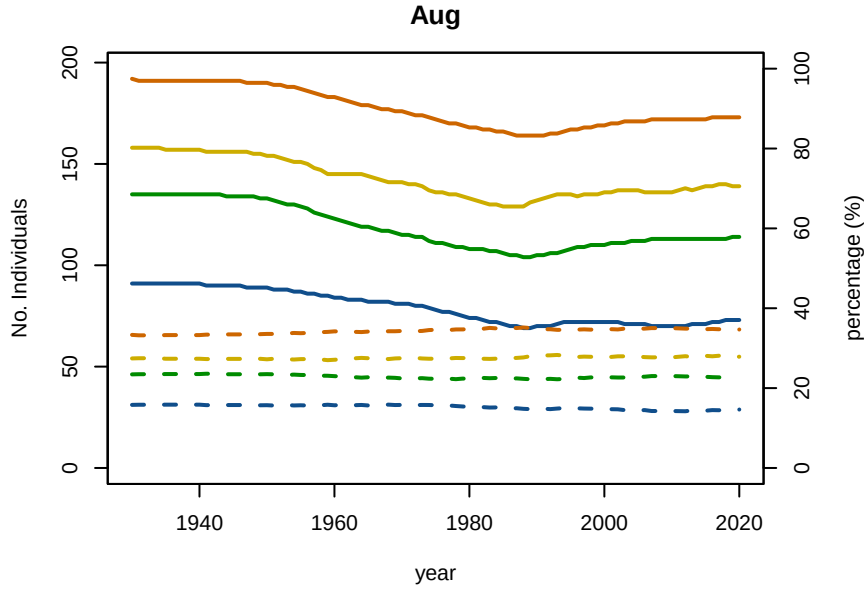
A1−4 A5−9 MatF MatM No Individuals percentage

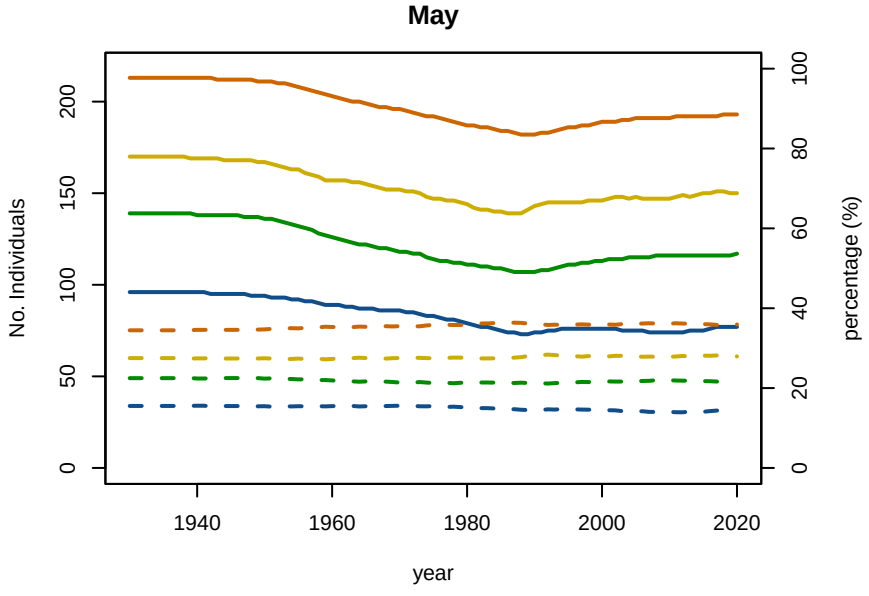
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 9N

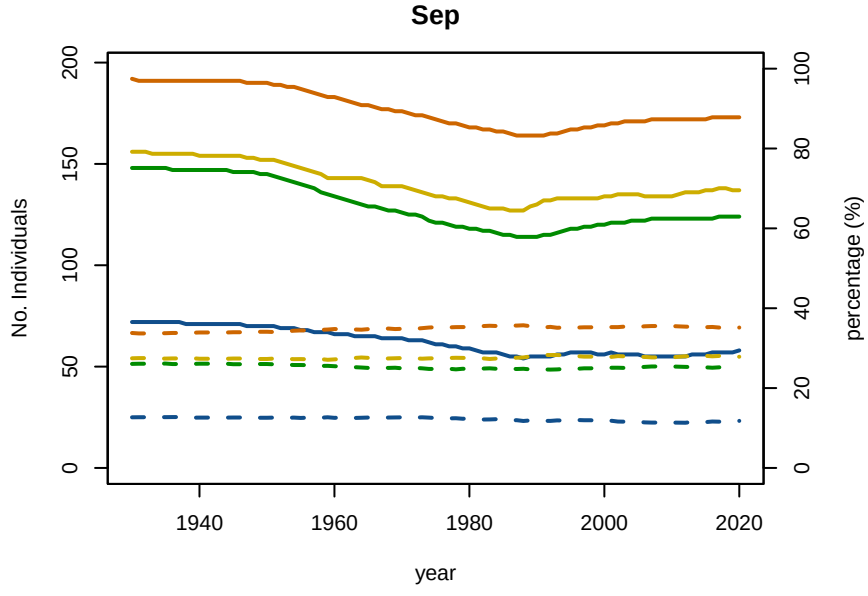


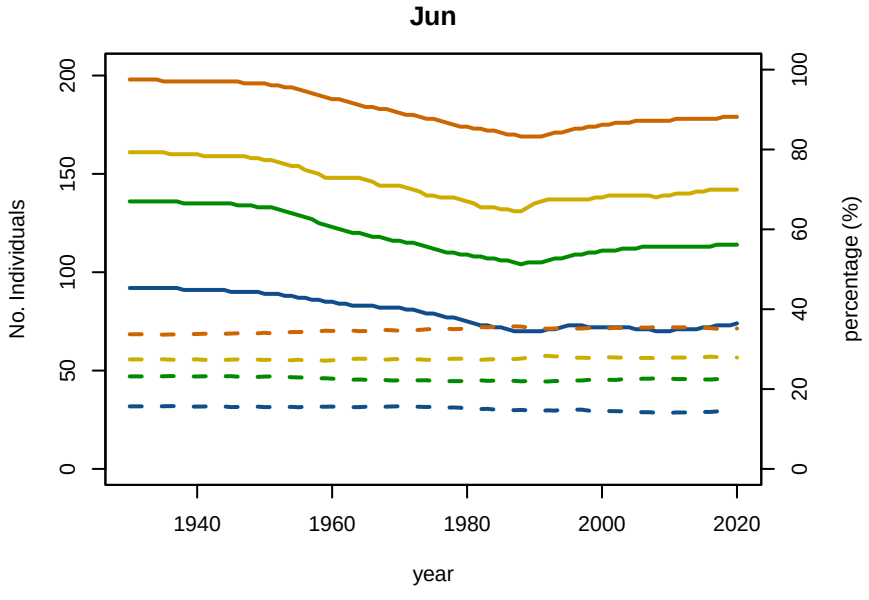


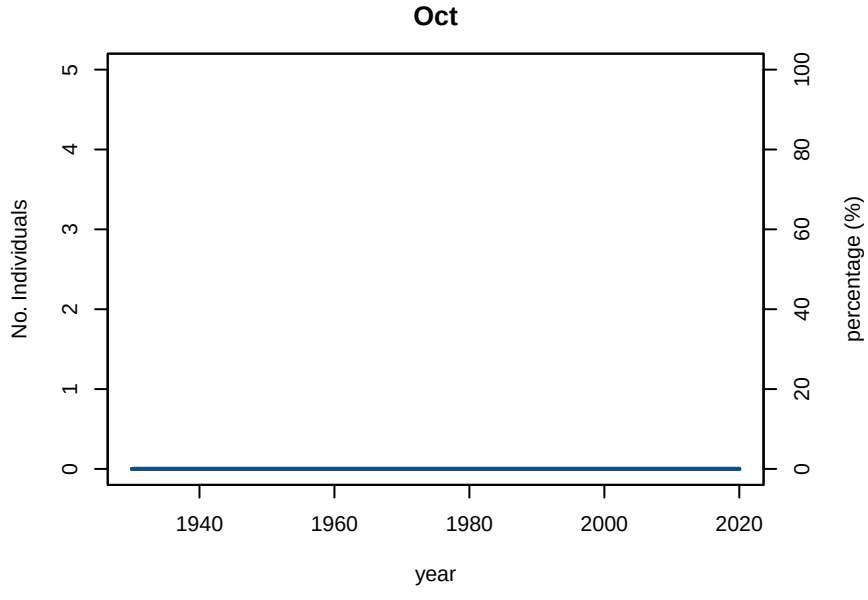






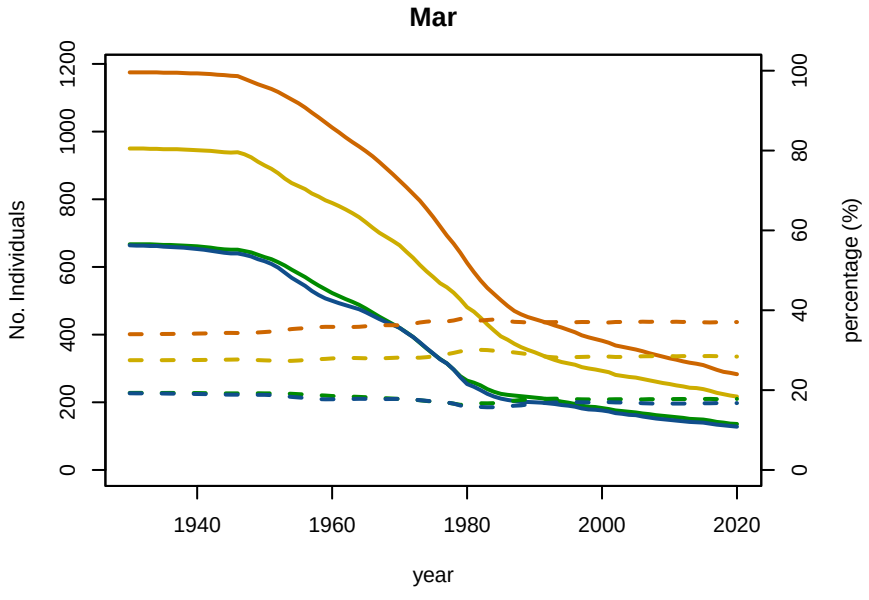


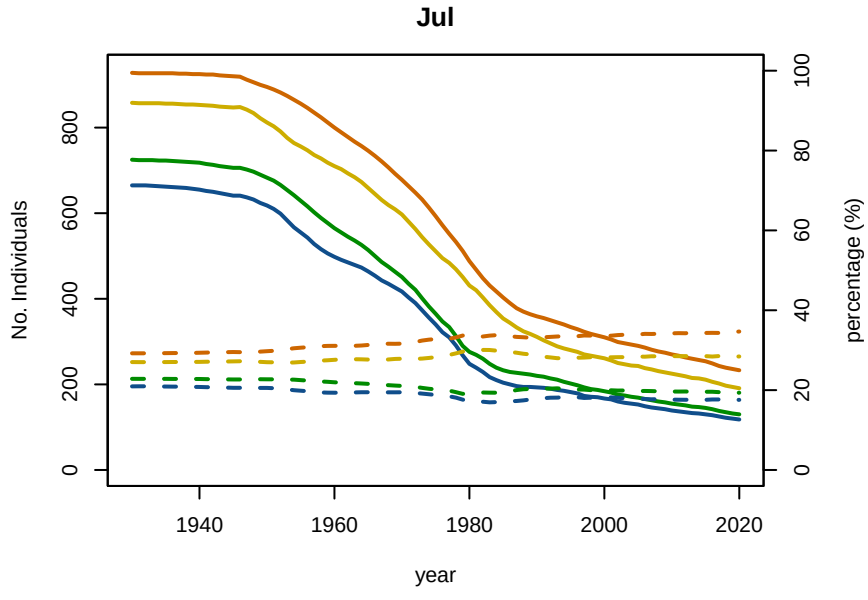


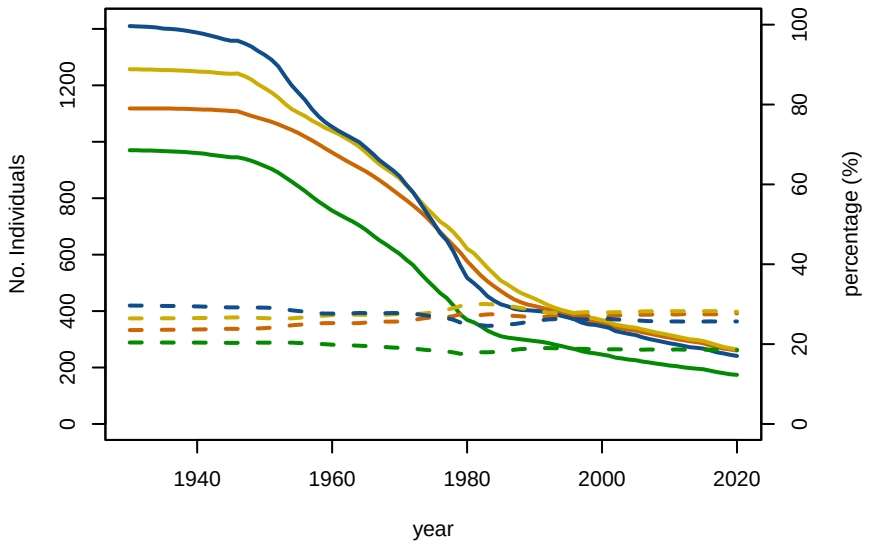


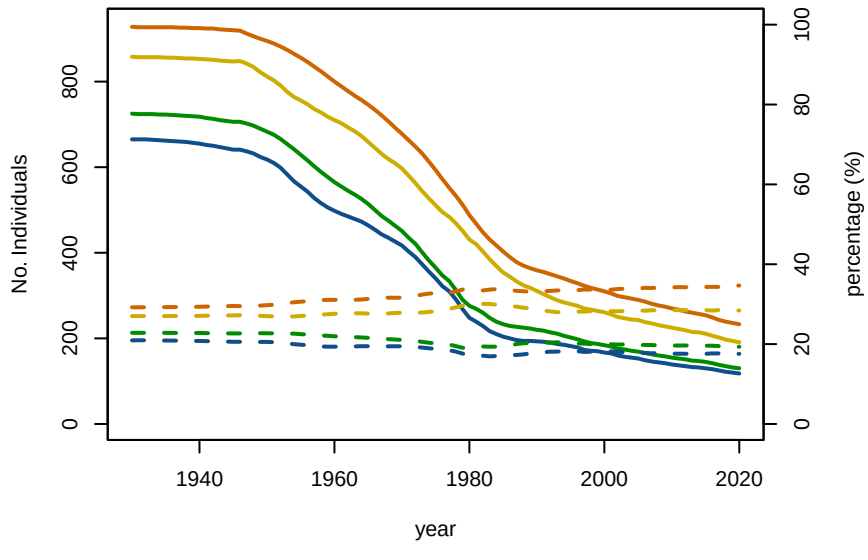
A1−4 A5−9 MatF MatM No Individuals percentage

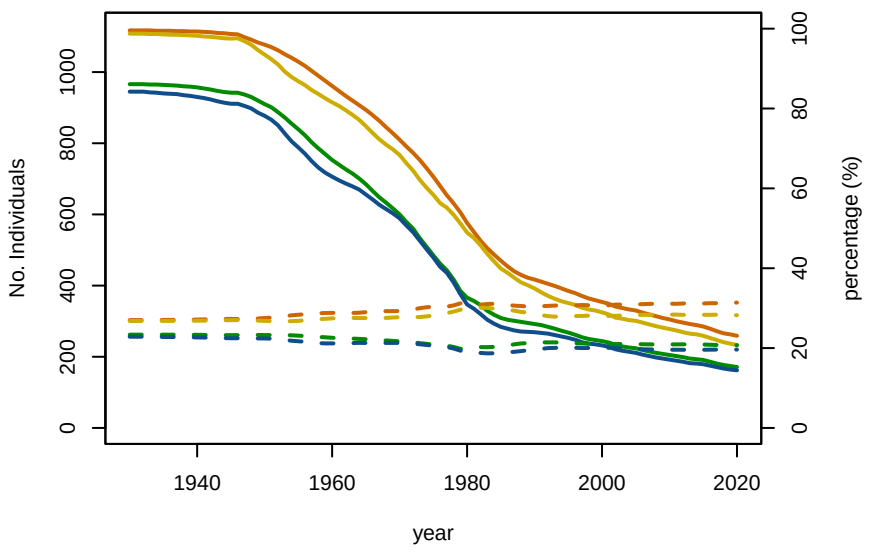
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 10E

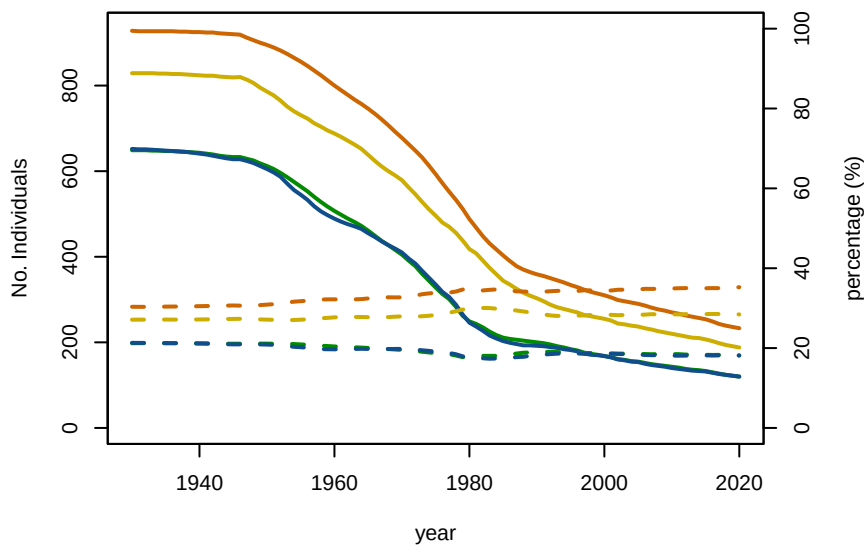


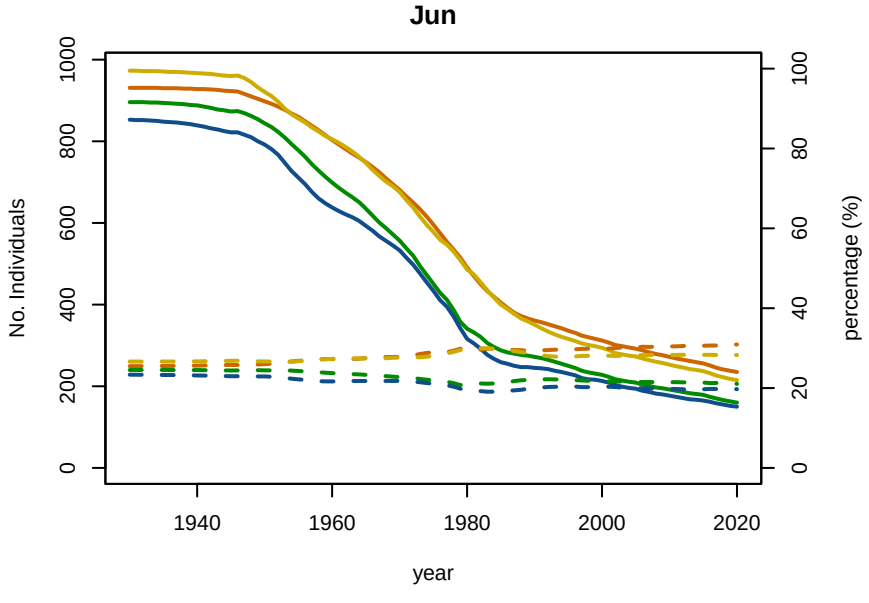


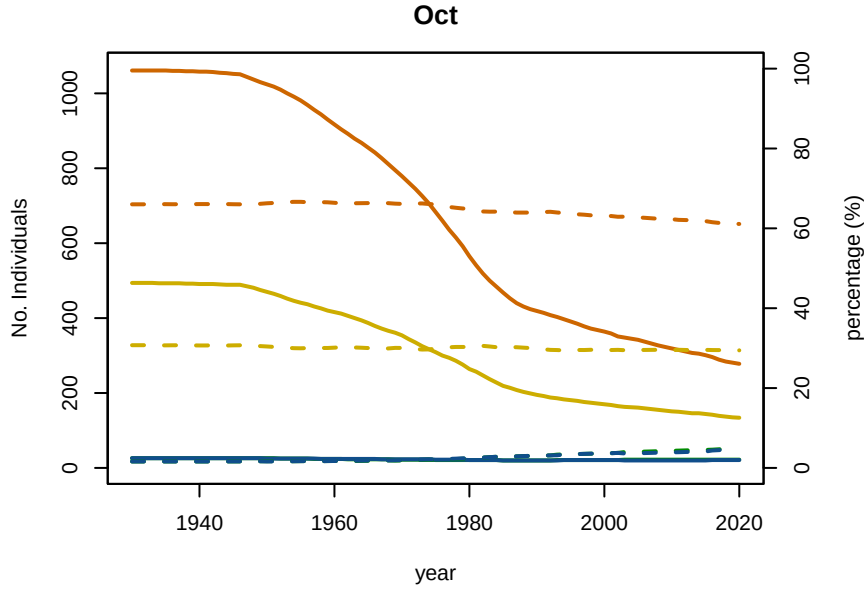






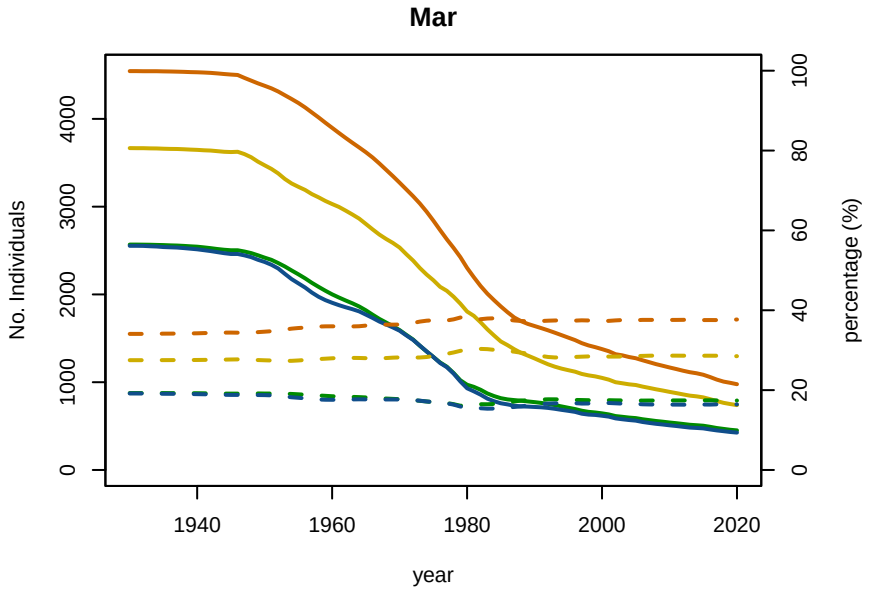


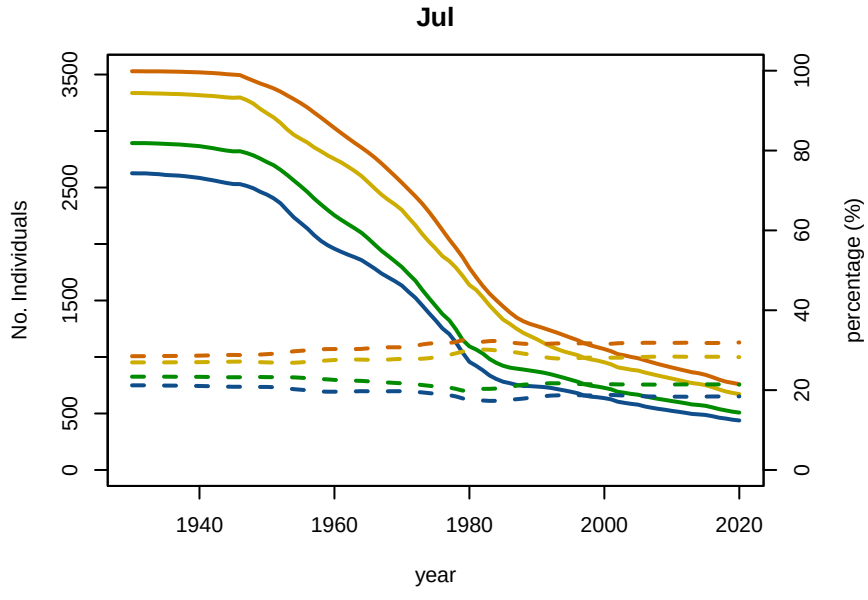


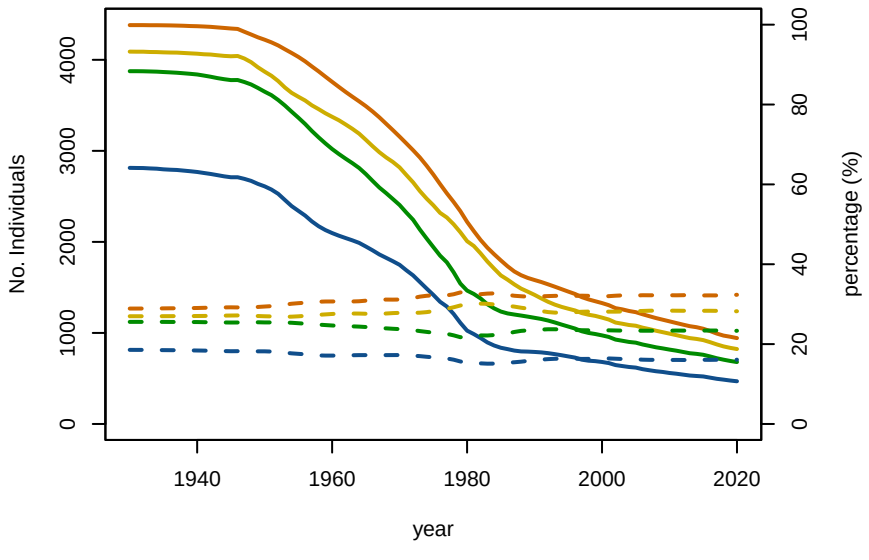


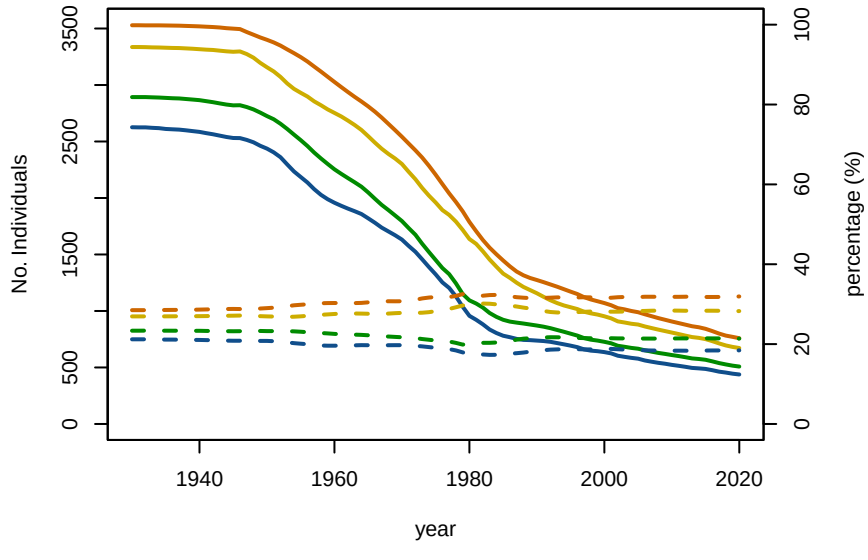
A1−4 A5−9 MatF MatM No Individuals percentage

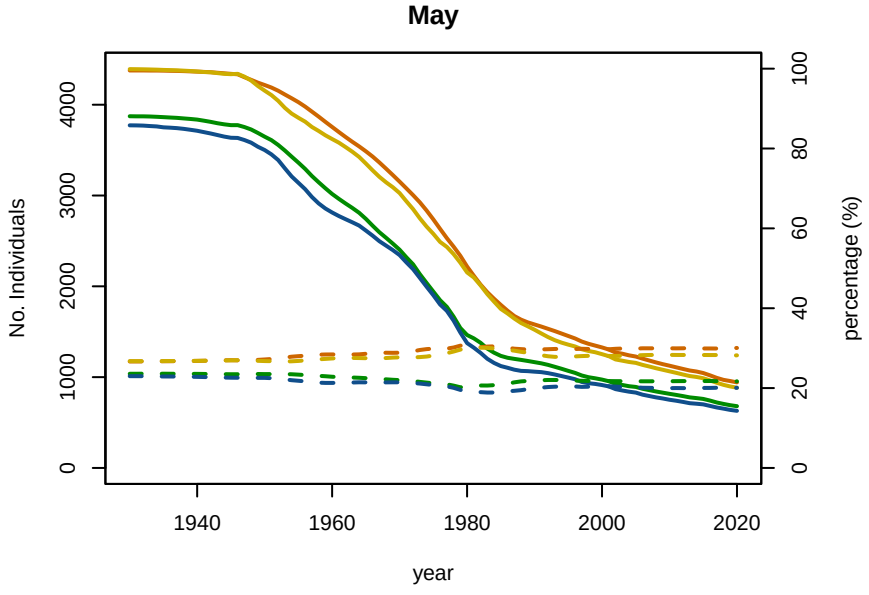
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 10W

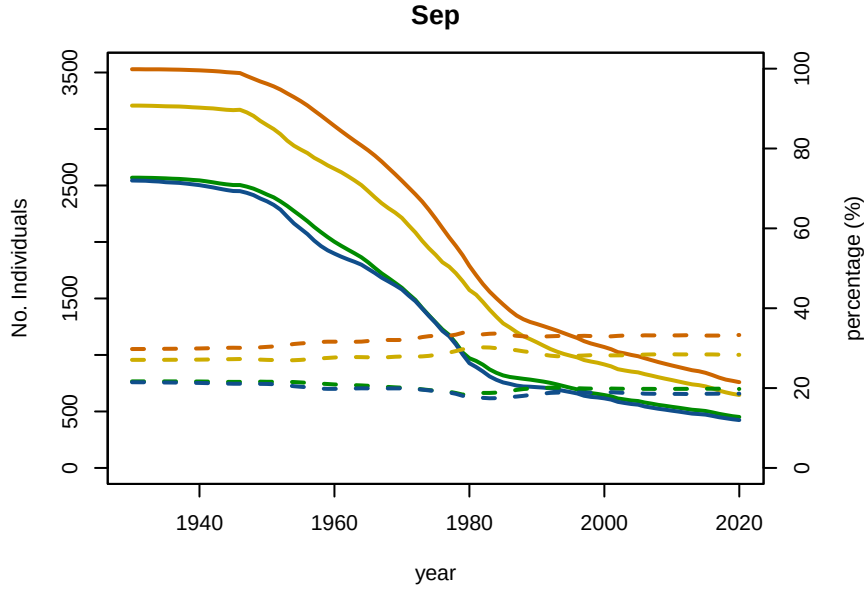


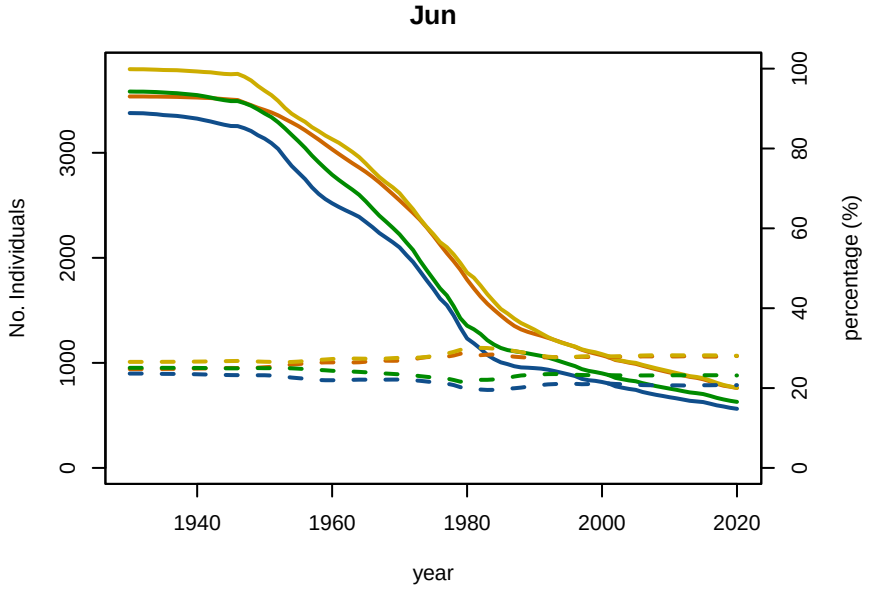


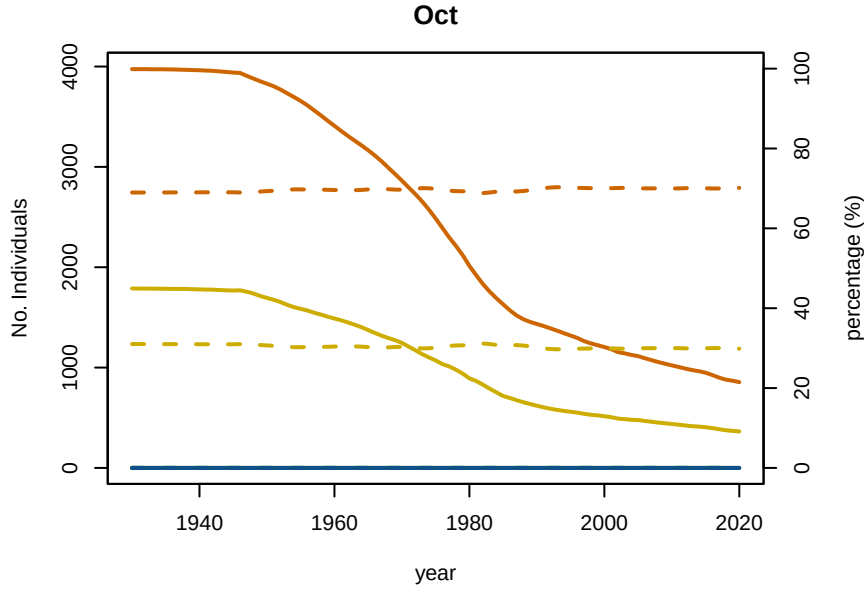






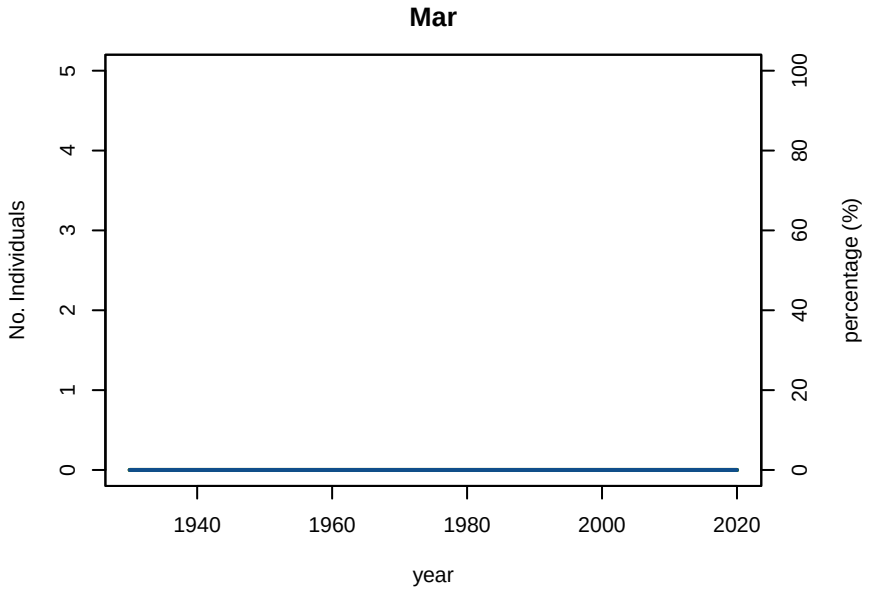


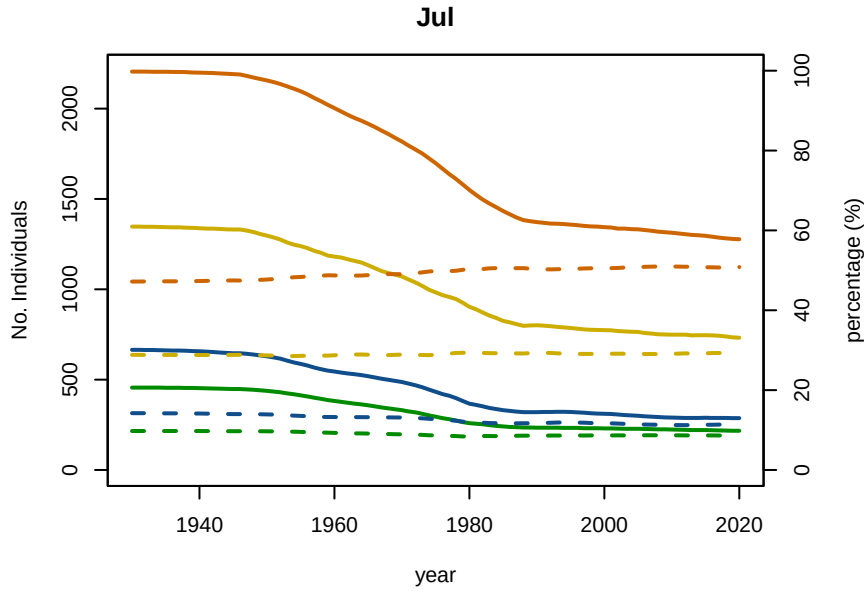


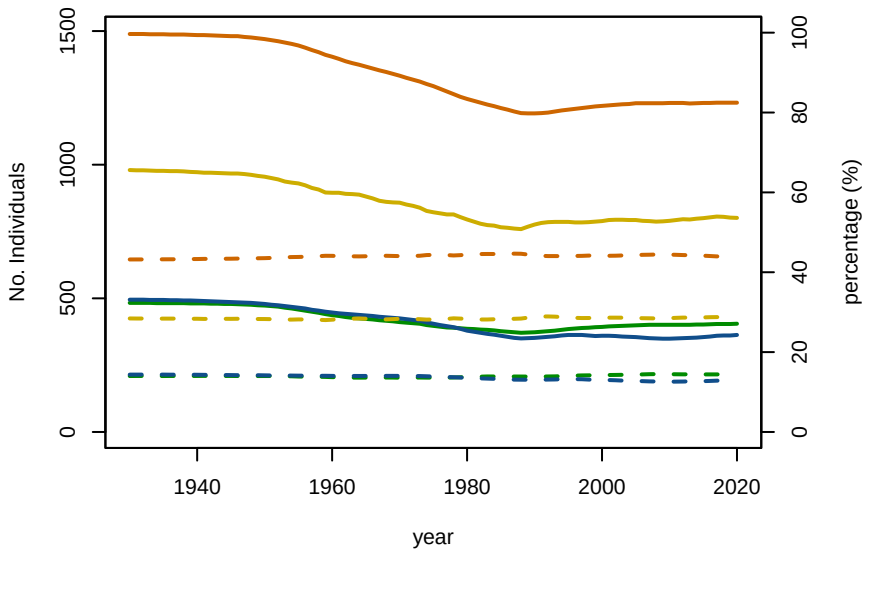


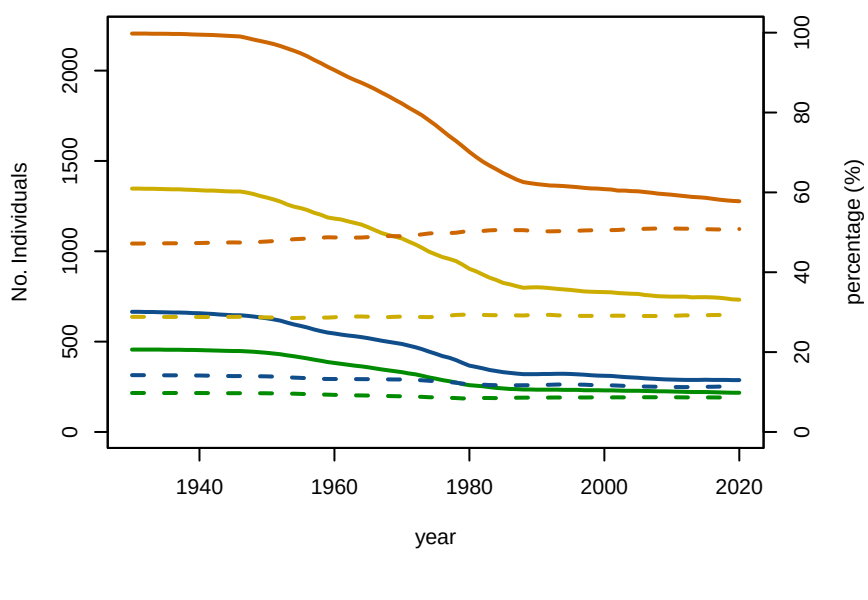
A1−4 A5−9 MatF MatM No Individuals percentage

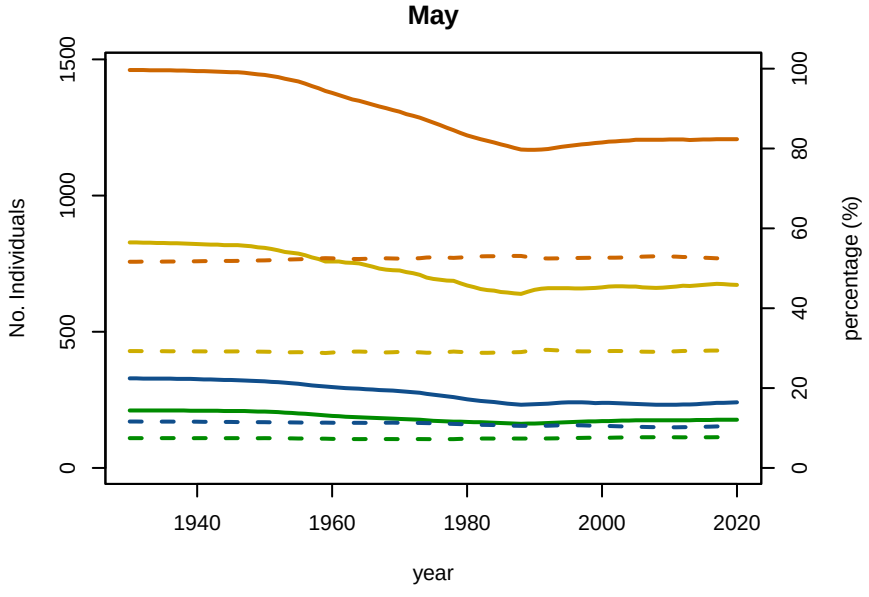
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 11

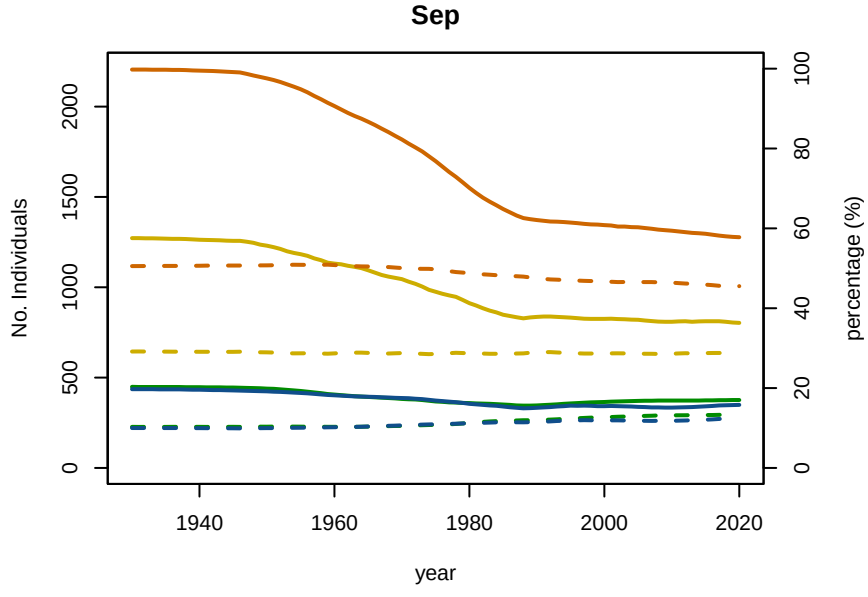


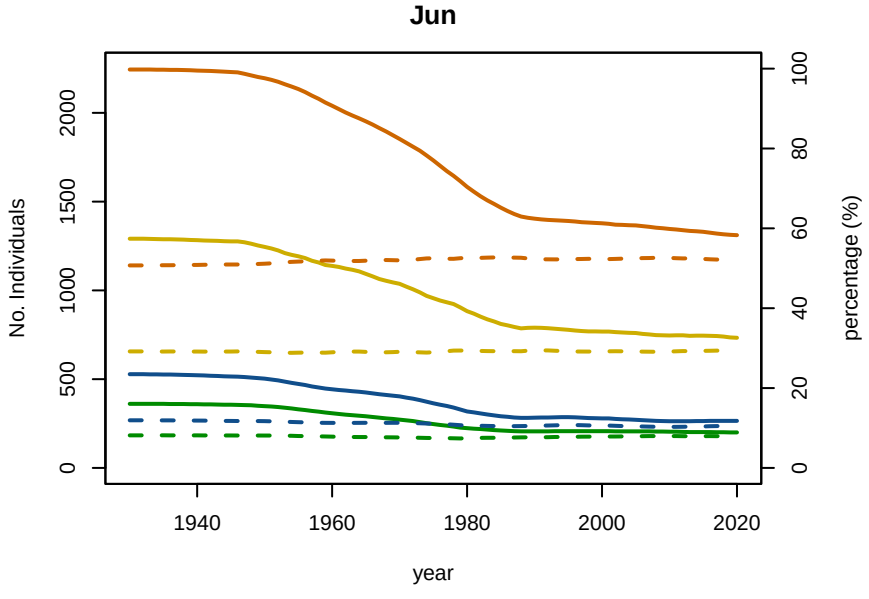


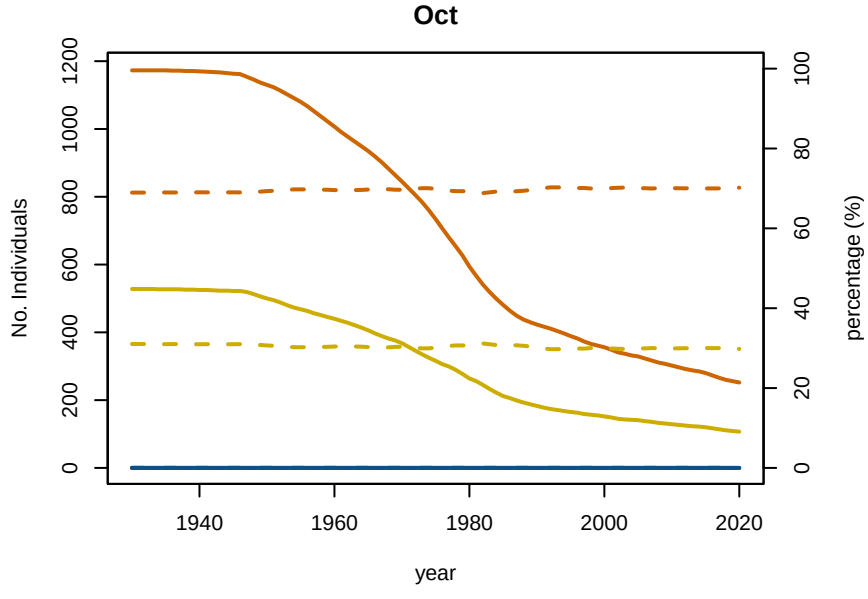






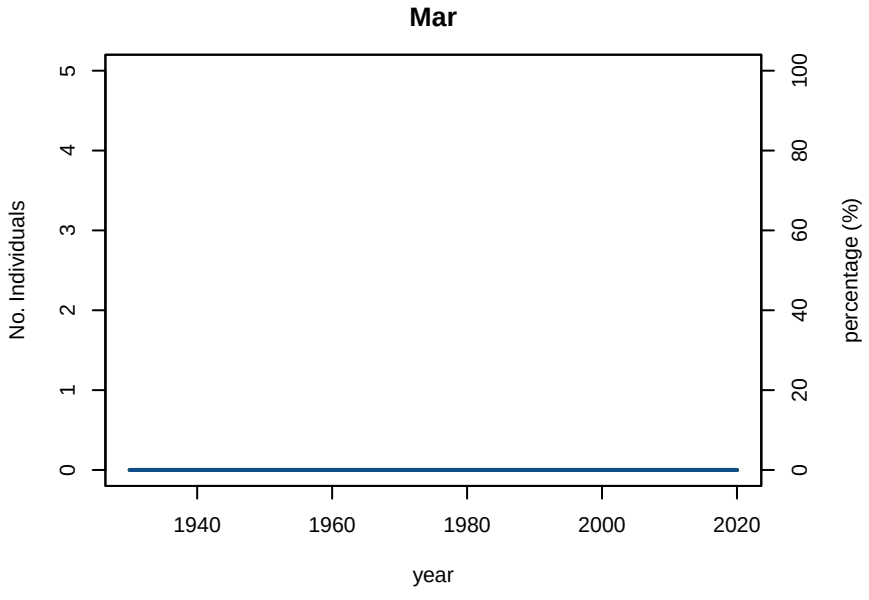


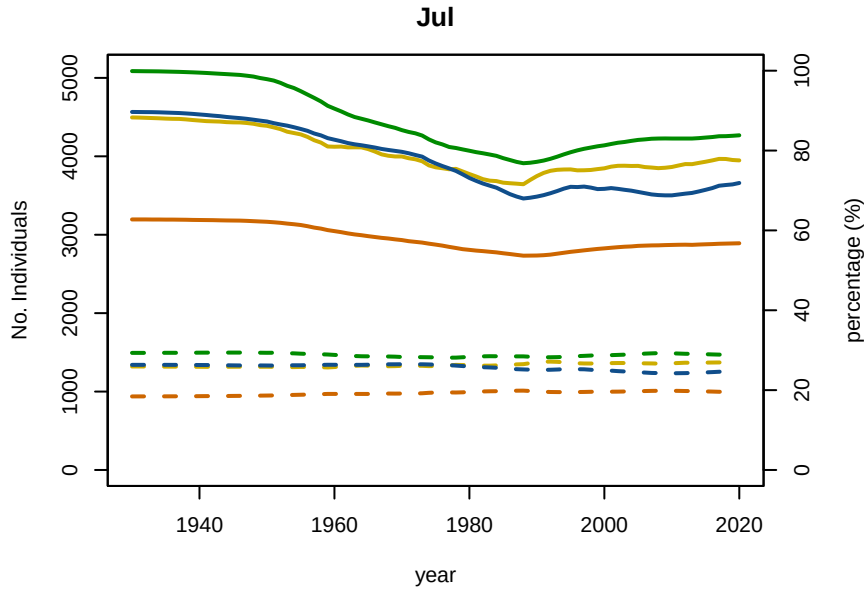


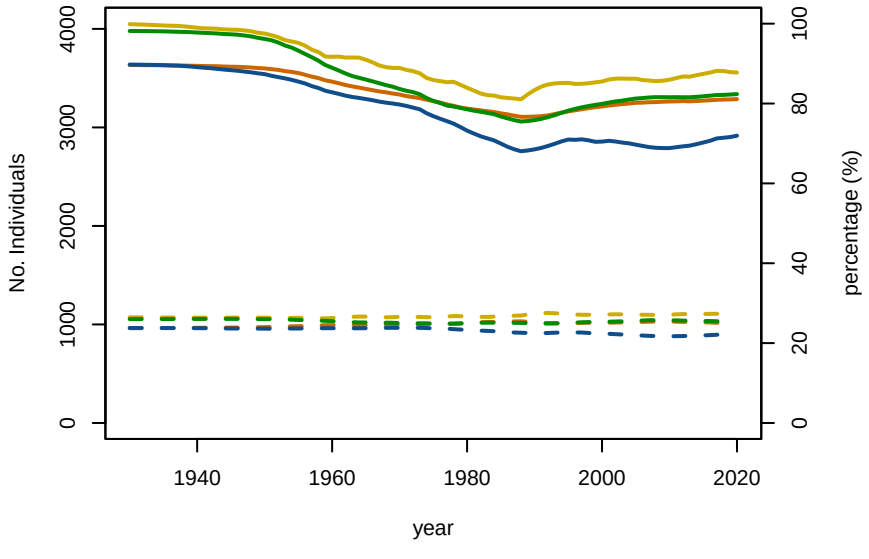


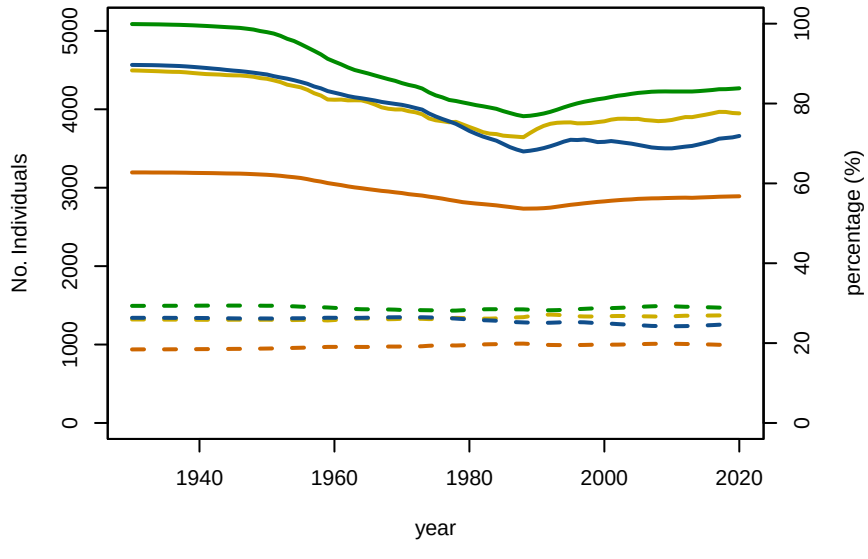
A1−4 A5−9 MatF MatM No Individuals percentage

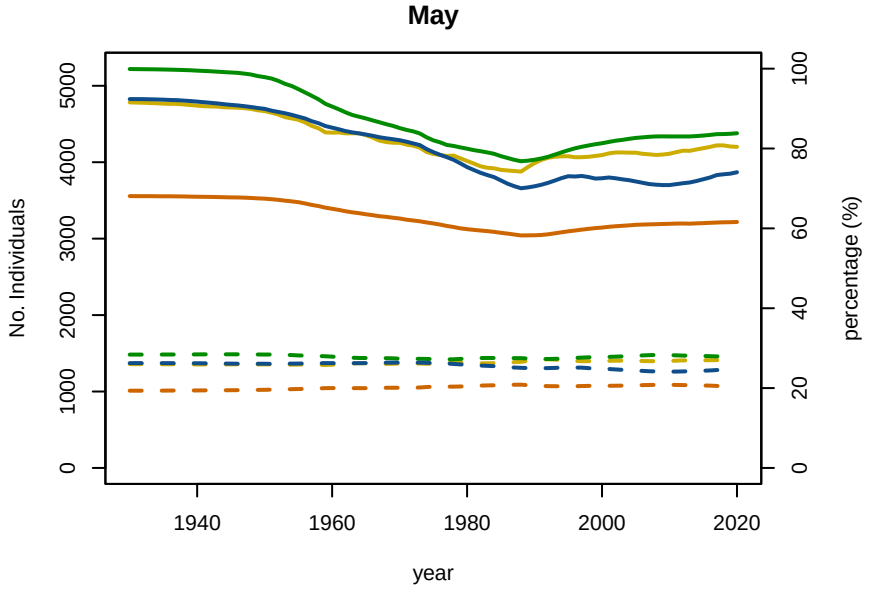
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 12N

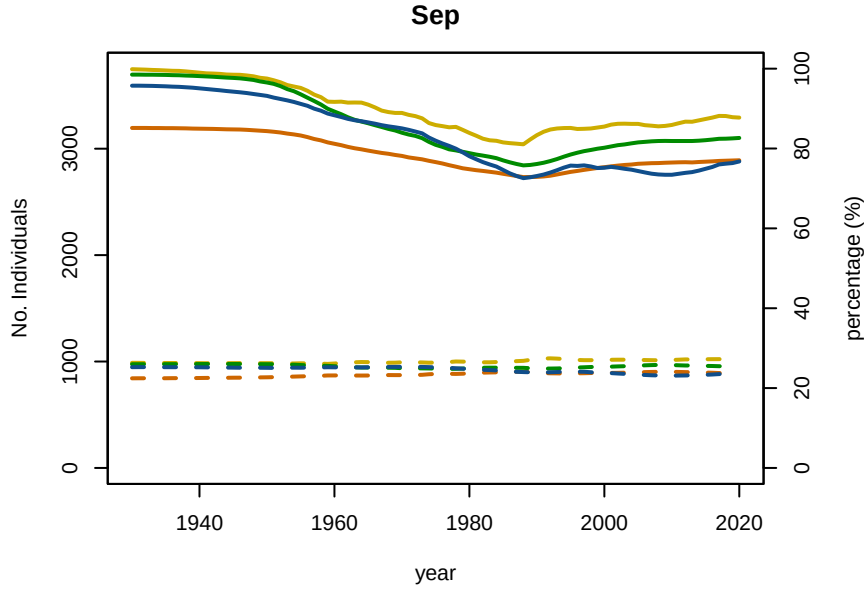


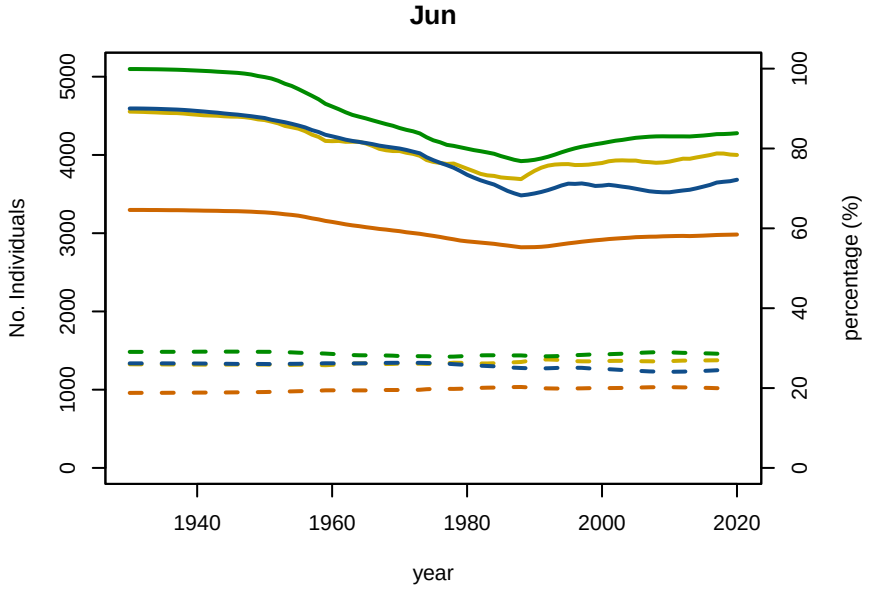


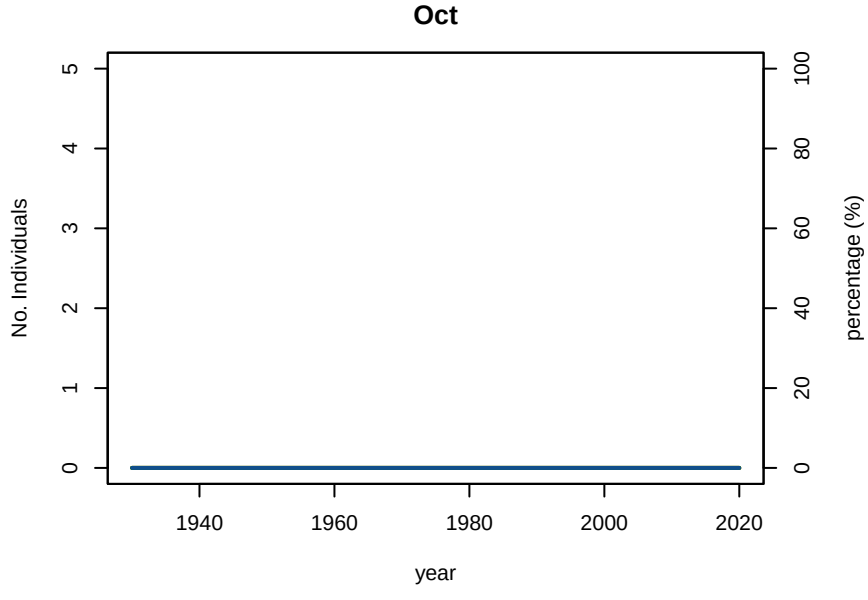






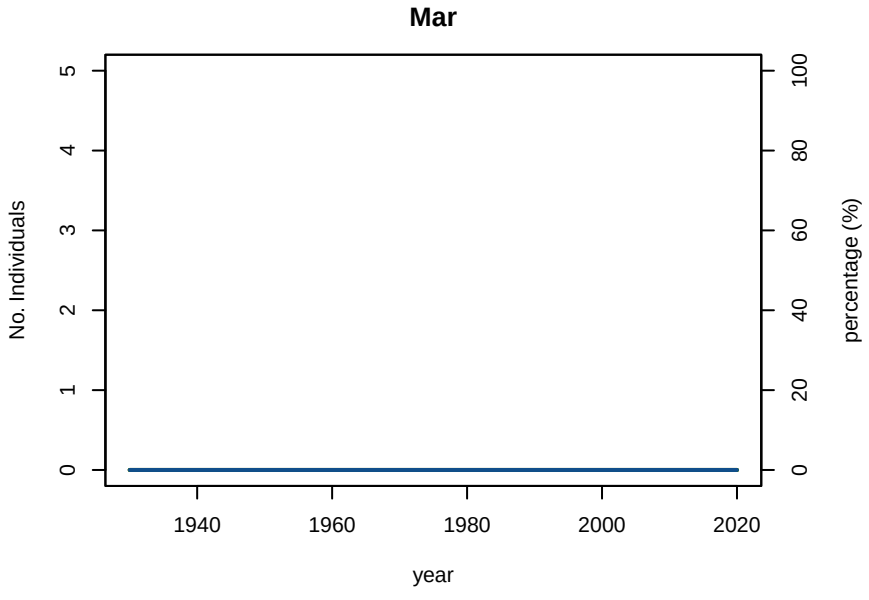


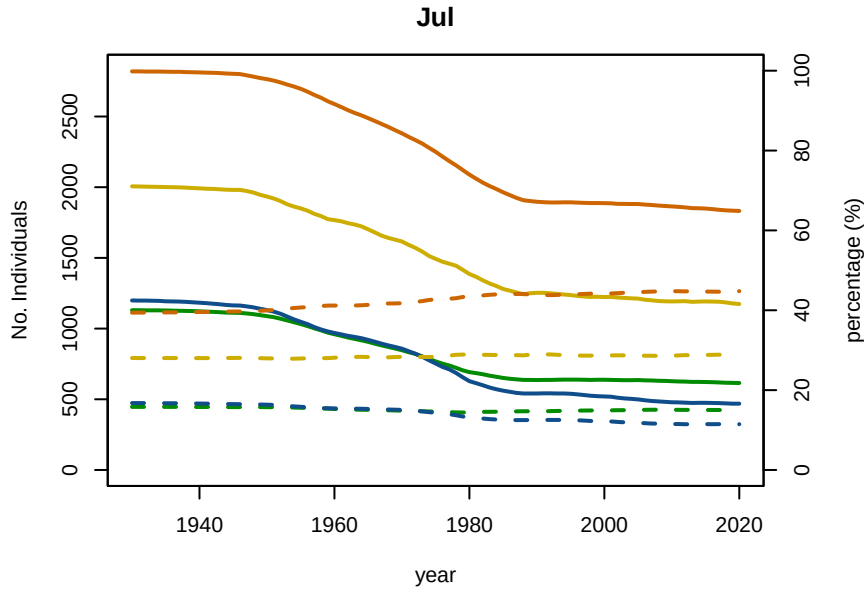


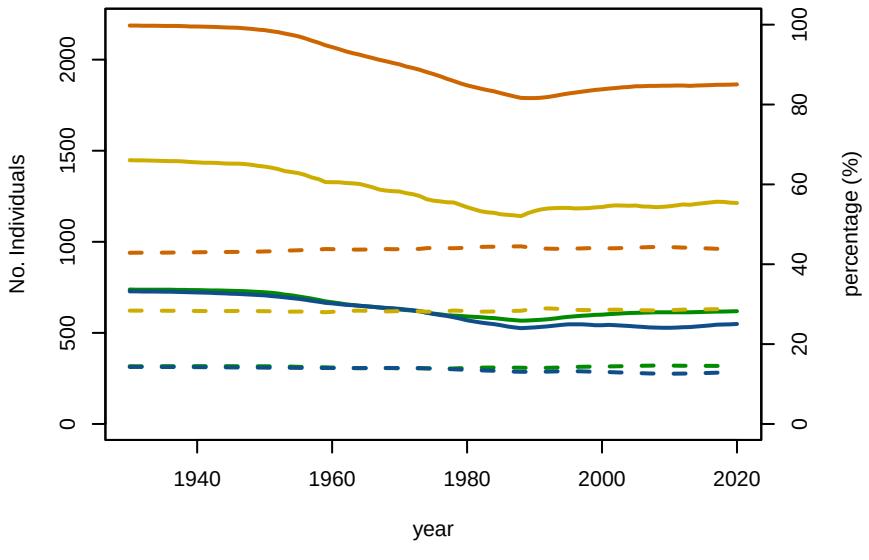


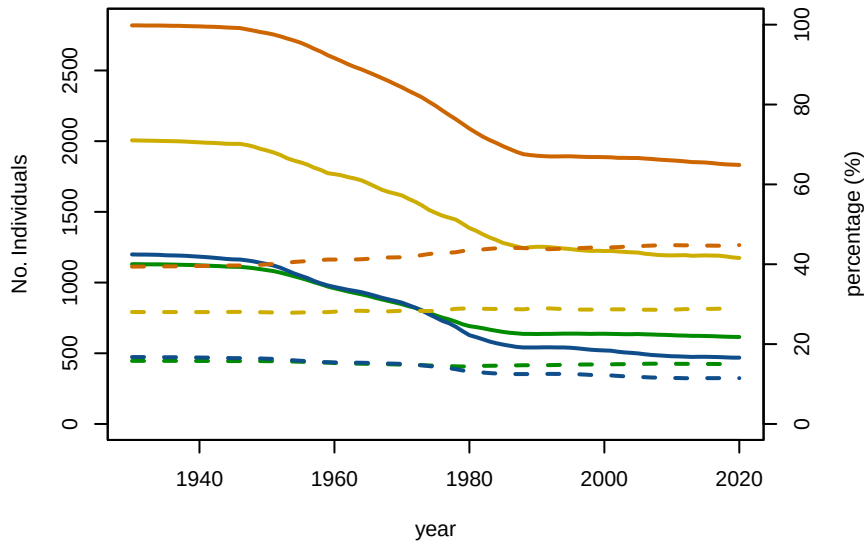
A1−4 A5−9 MatF MatM No Individuals percentage

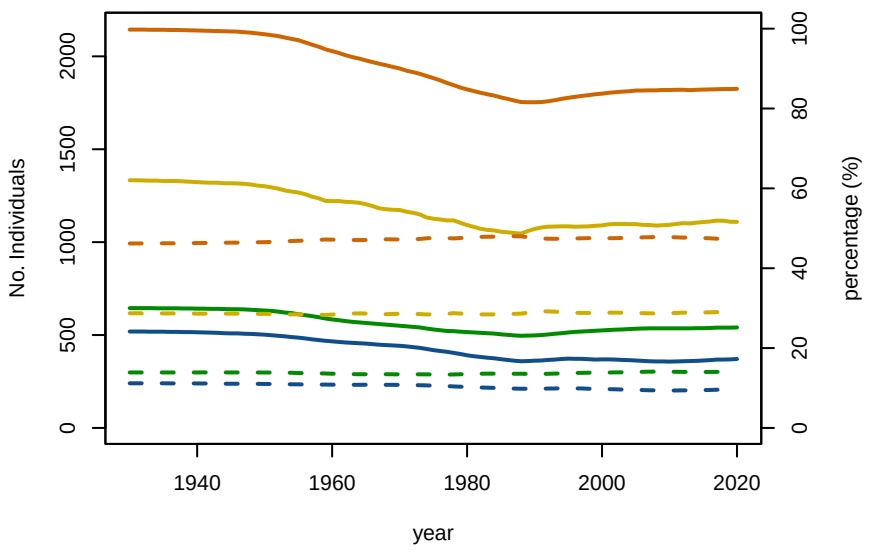
B01−1 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 12S

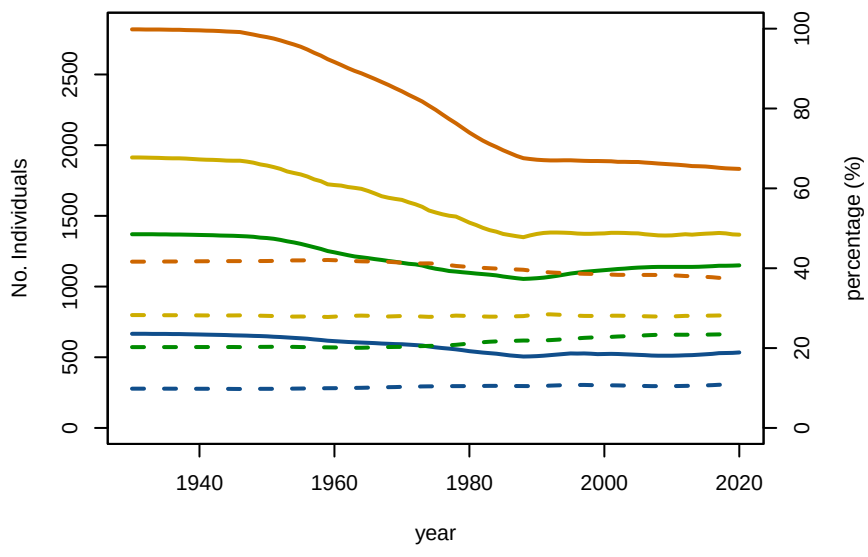


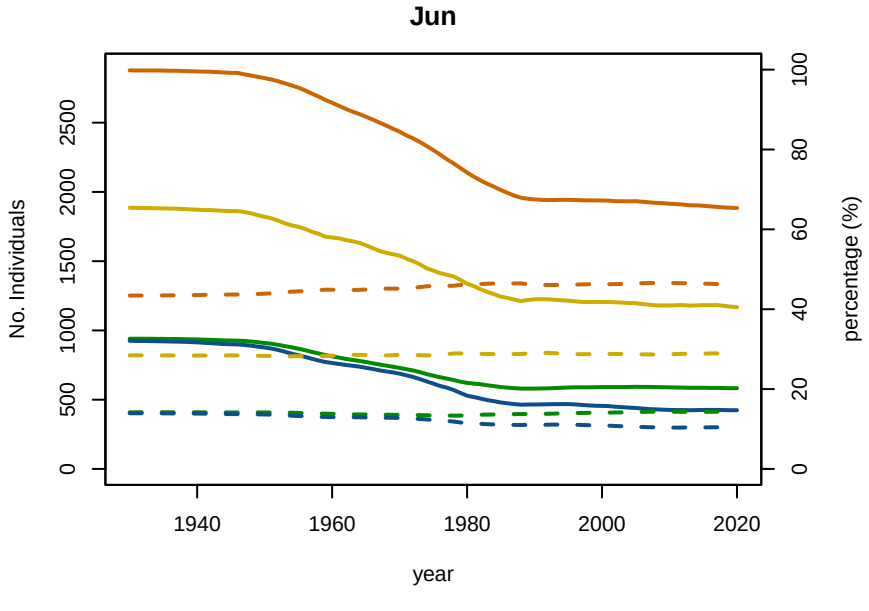


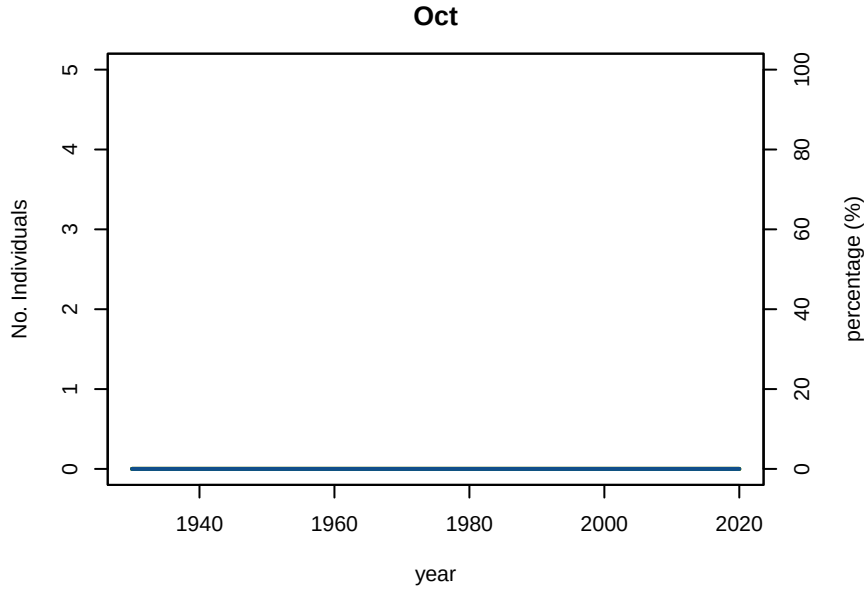






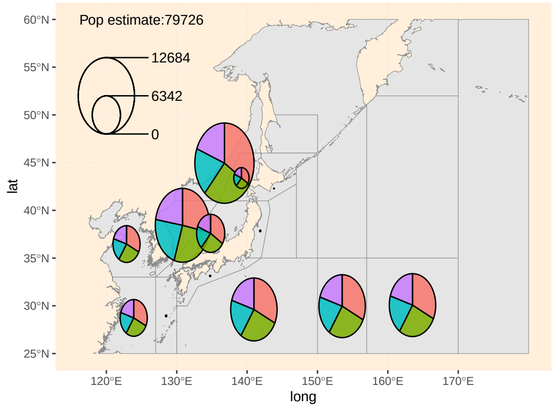




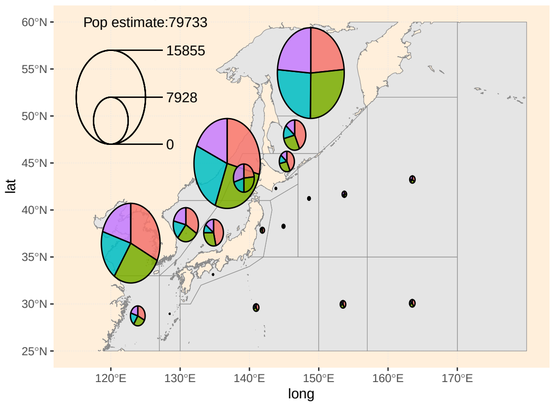


A1−4 A5−9 MatF MatM No Individuals percentage

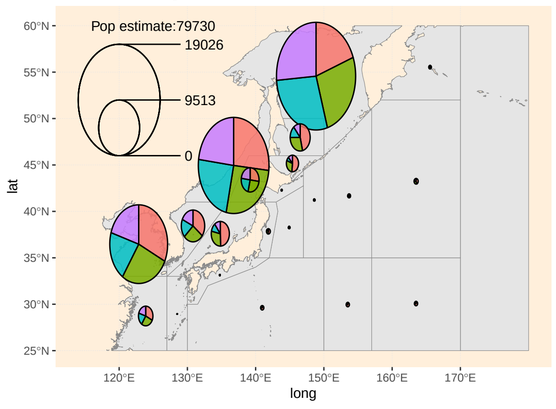
B01−1 Mar−1930



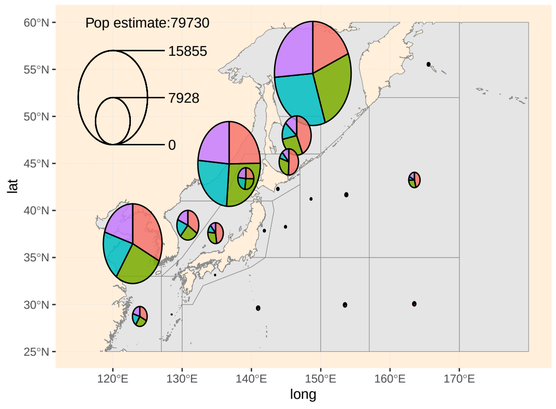
B01−1 Apr−1930



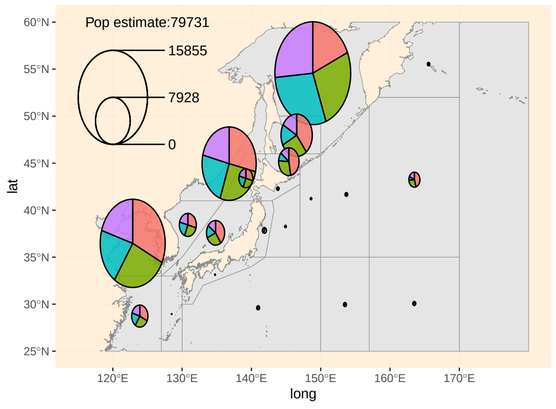
B01−1 May−1930



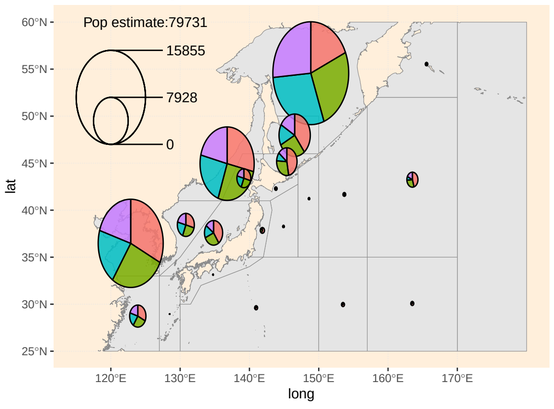
B01−1 Jun−1930



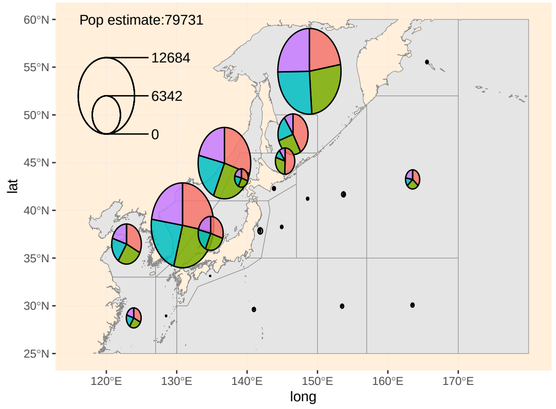
B01−1 Jul−1930



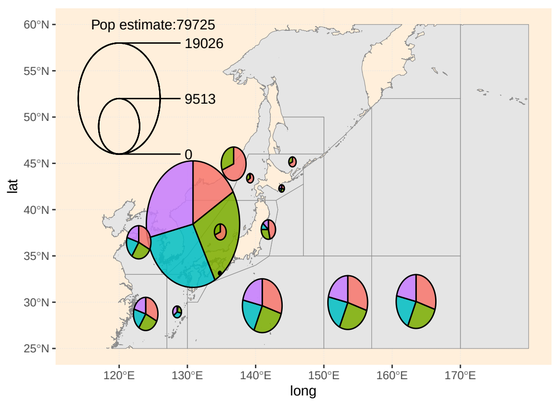
B01−1 Aug−1930



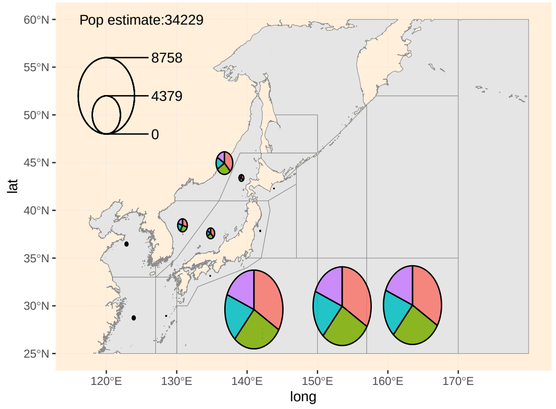
B01−1 Sep−1930



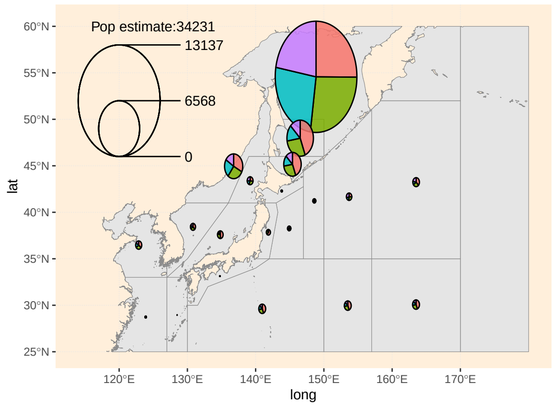
B01−1 Oct−1930



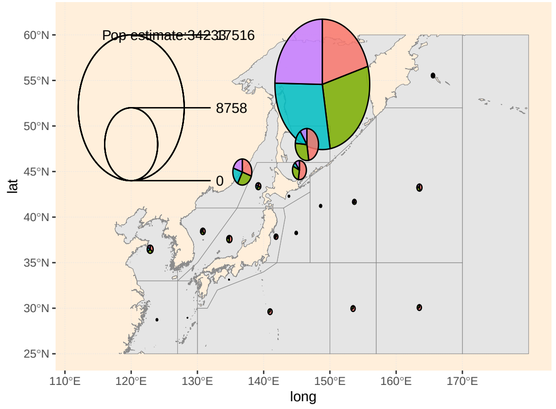
B01−1 Mar−2020



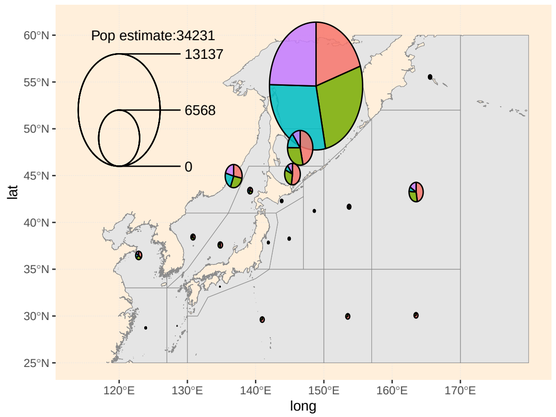
B01−1 Apr−2020



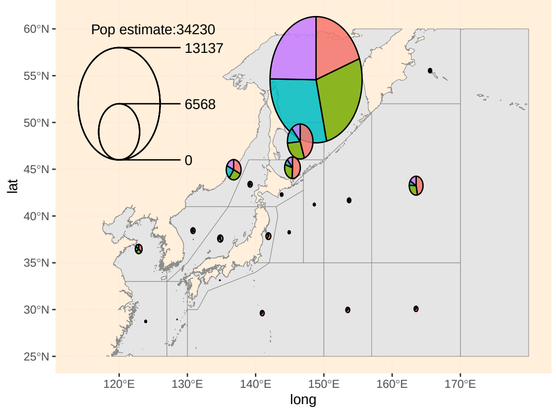
B01−1 May−2020



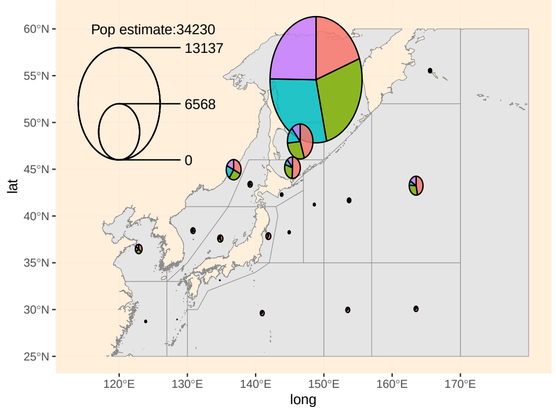
B01−1 Jun−2020



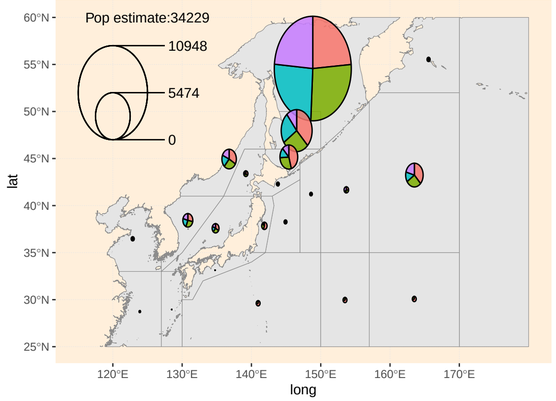
B01−1 Jul−2020



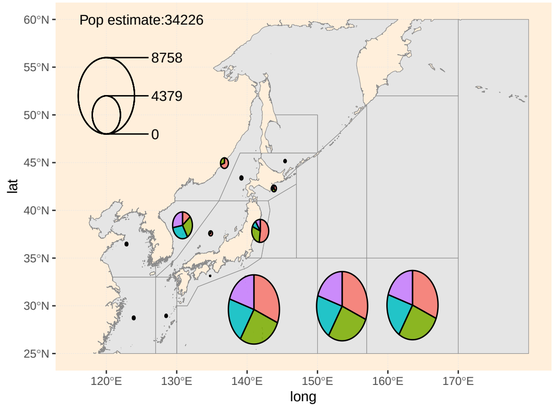
B01−1 Aug−2020



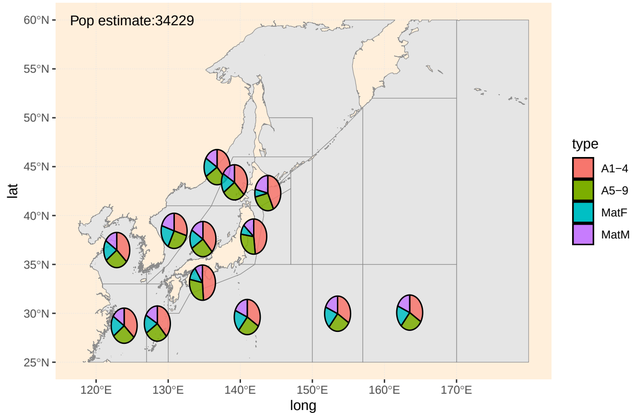
B01−1 Sep−2020



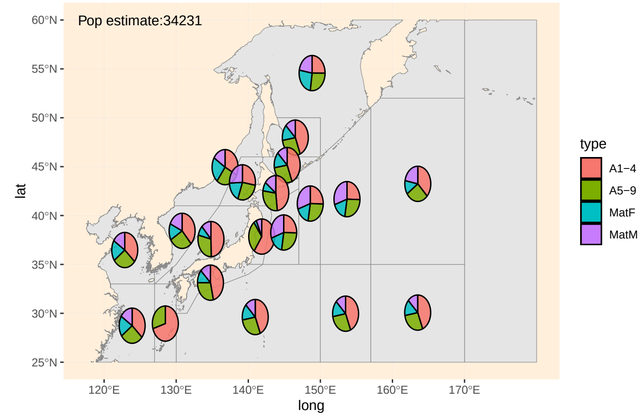
B01−1 Oct−2020



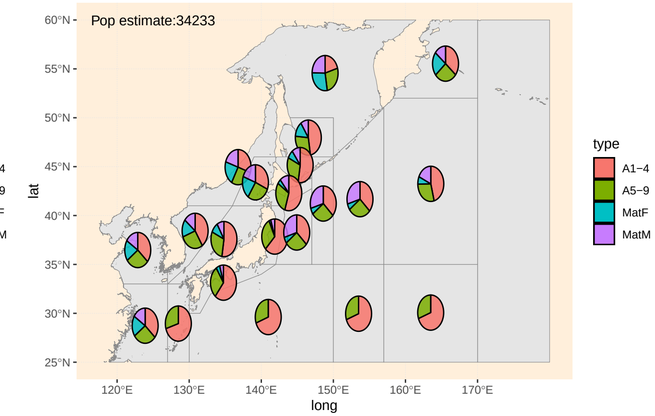
B01−1 Mar−2020



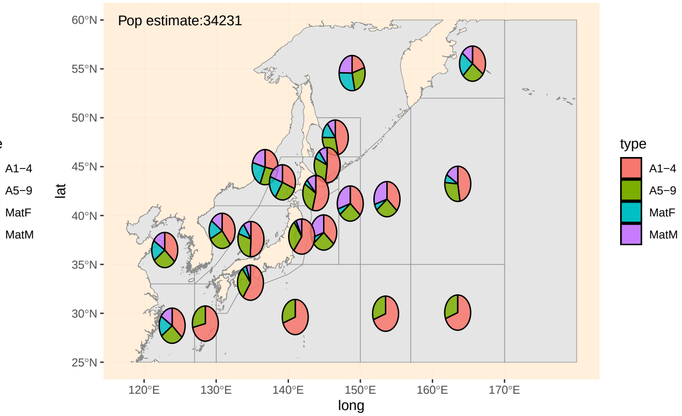
B01−1 Apr−2020



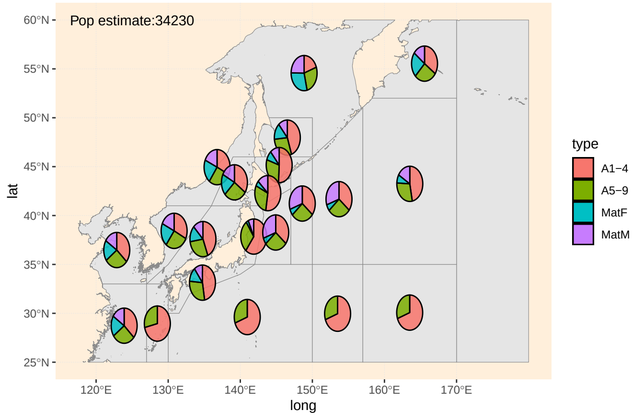
B01−1 May−2020



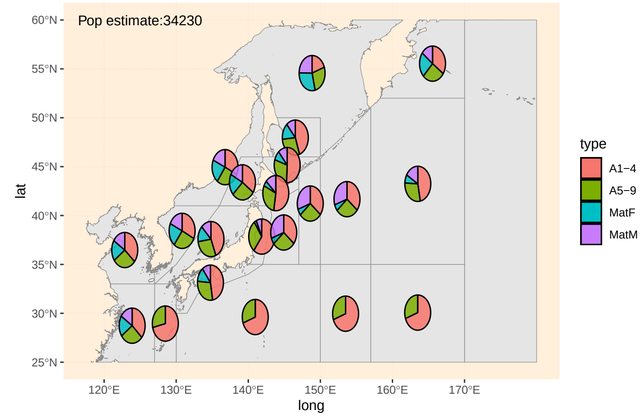
B01−1 Jun−2020



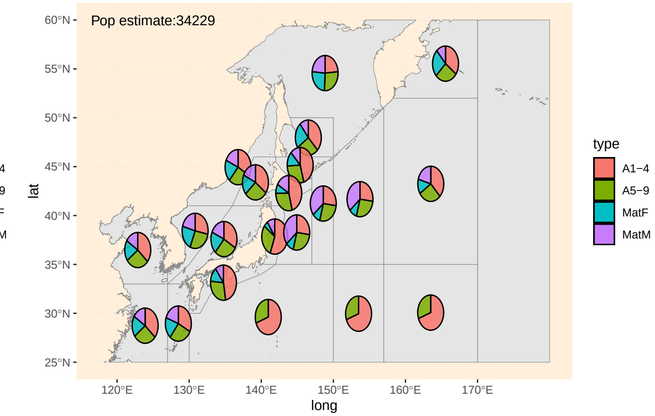
B01−1 Jul−2020



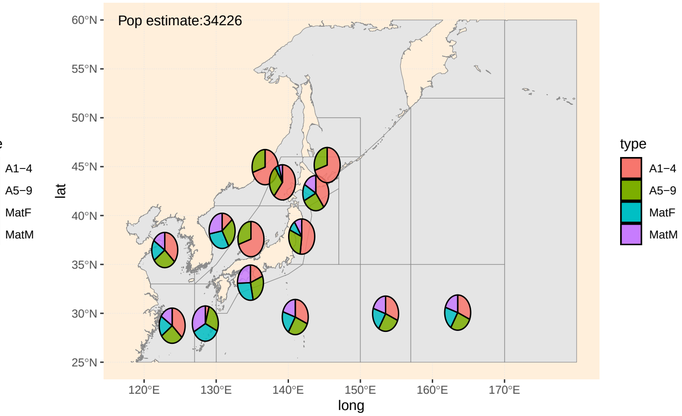
B01−1 Aug−2020



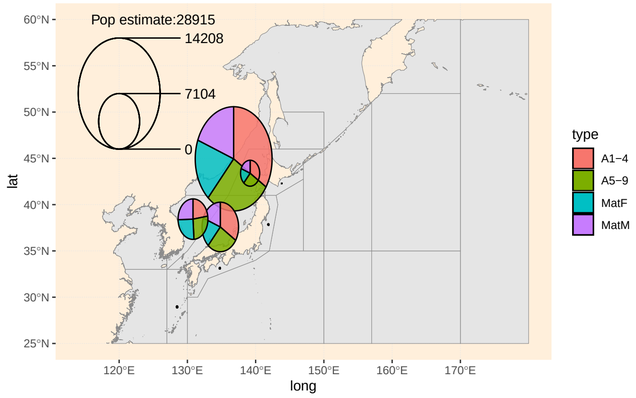
B01−1 Sep−2020



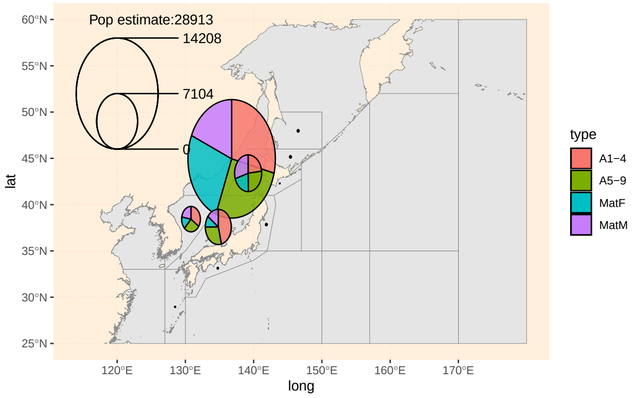
B01−1 Oct−2020



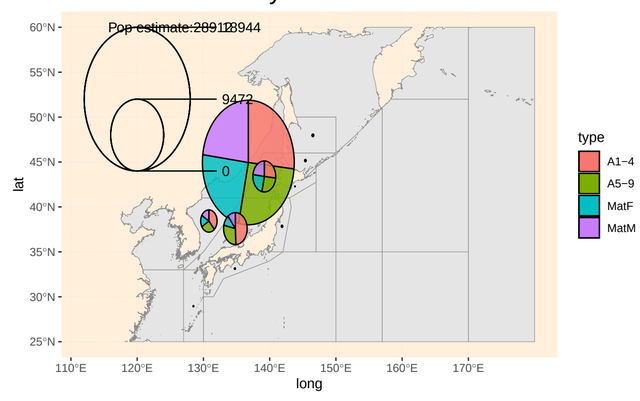
B01−1 Stock:J Mar−1930



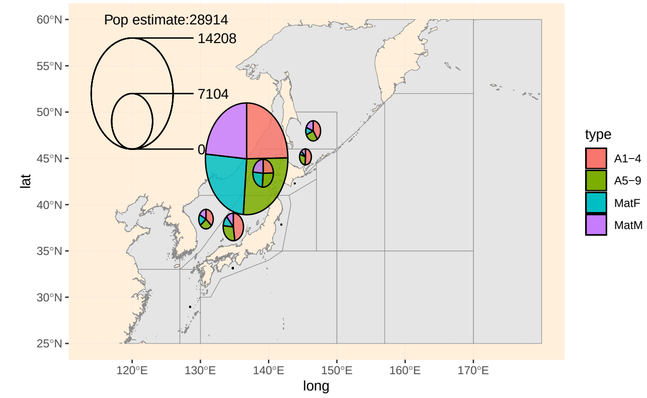
B01−1 Stock:J Apr−1930



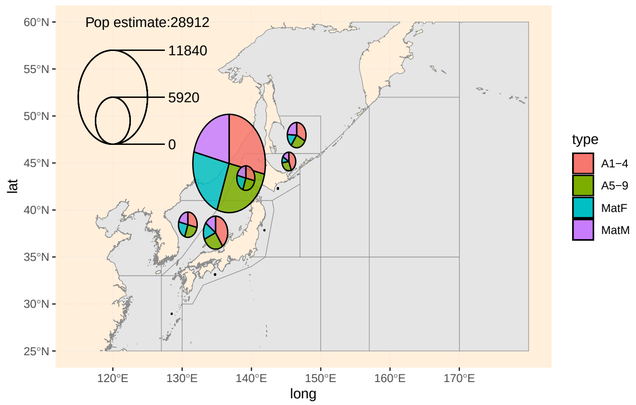
B01−1 Stock:J May−1930



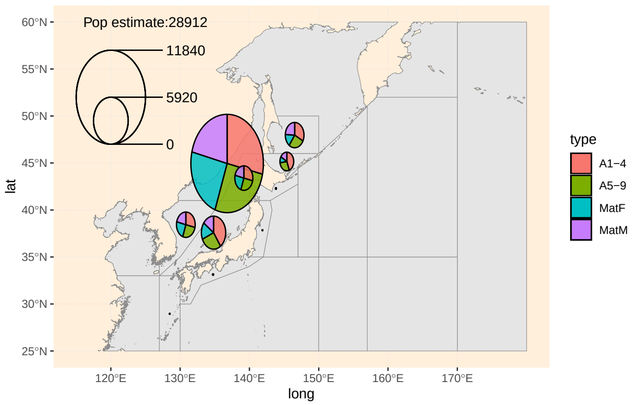
B01−1 Stock:J Jun−1930



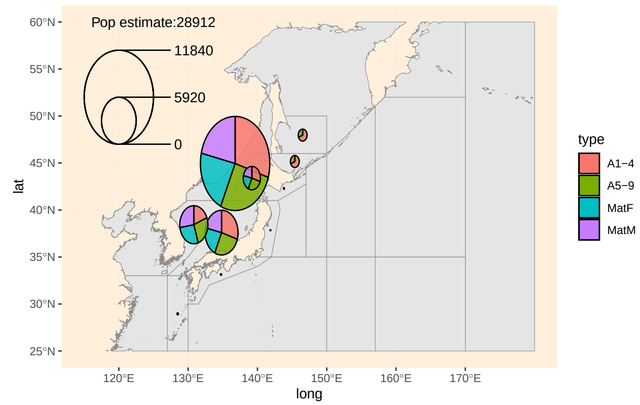
B01−1 Stock:J Jul−1930



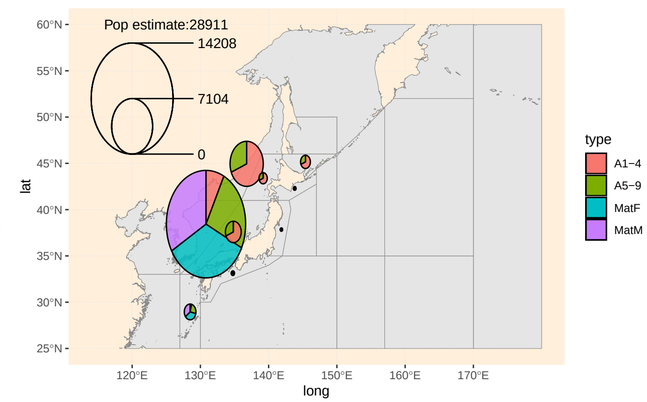
B01−1 Stock:J Aug−1930



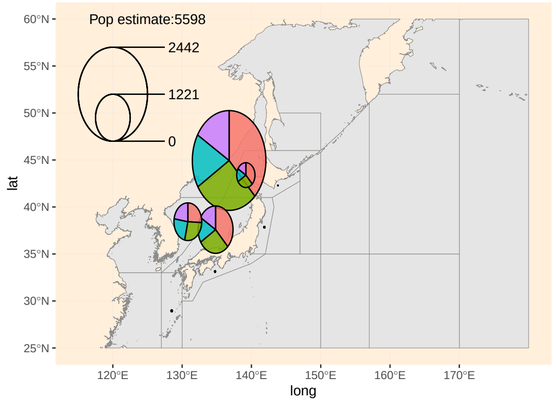
B01−1 Stock:J Sep−1930



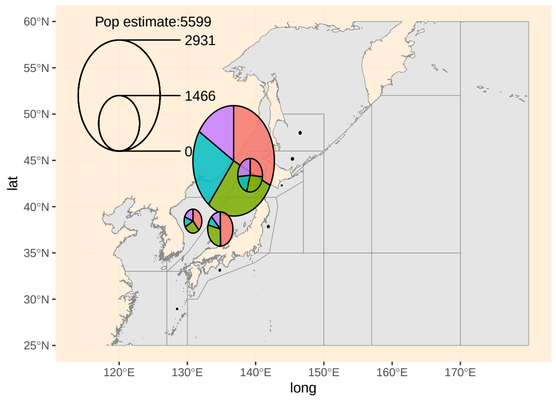
B01−1 Stock:J Oct−1930



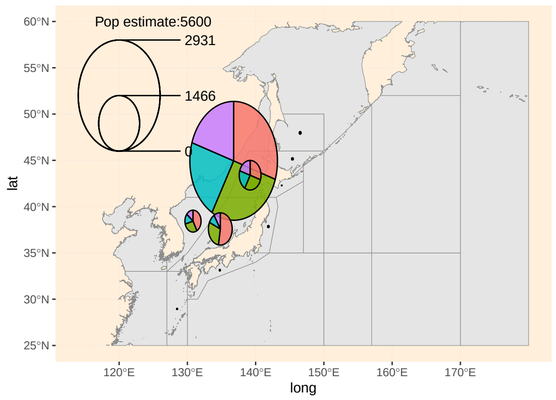
B01−1 Stock:J Mar−2020



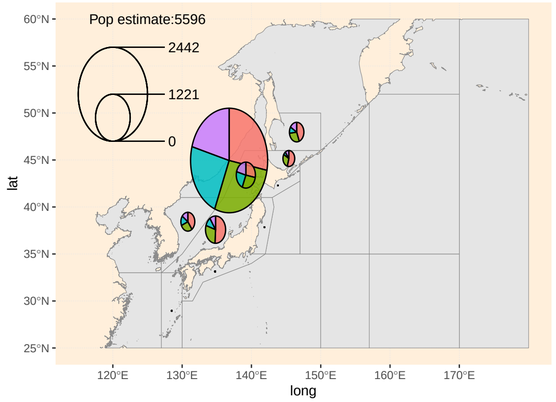
B01−1 Stock:J Apr−2020



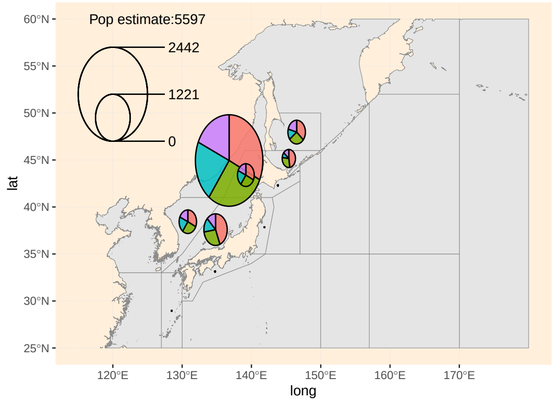
B01−1 Stock:J May−2020



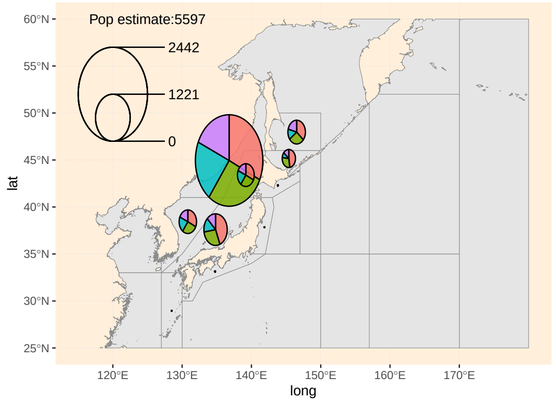
B01−1 Stock:J Jun−2020



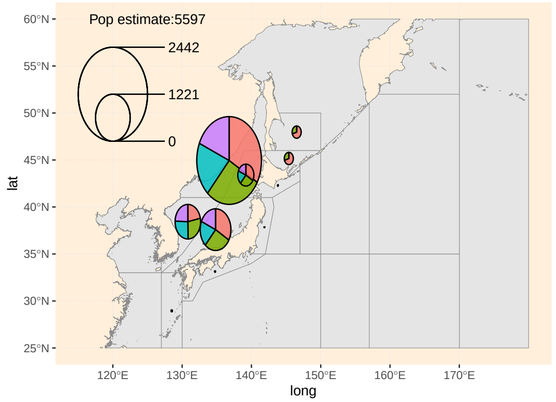
B01−1 Stock:J Jul−2020



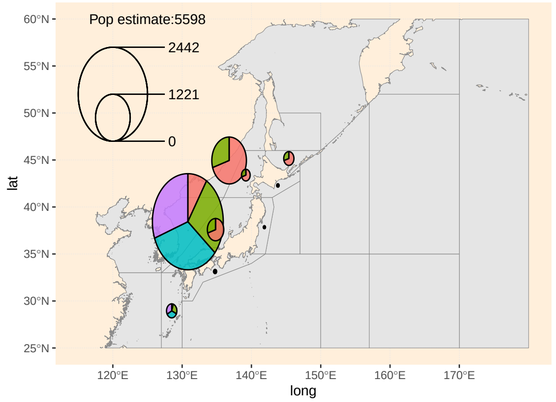
B01−1 Stock:J Aug−2020



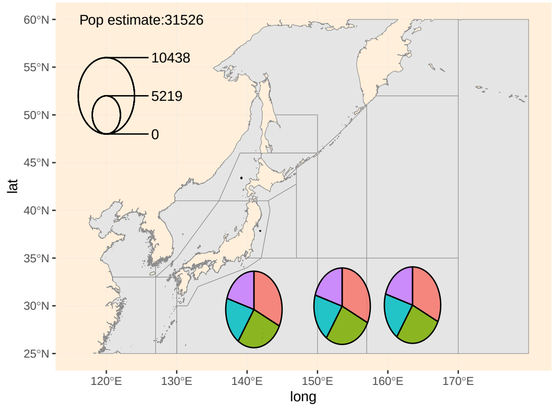
B01−1 Stock:J Sep−2020



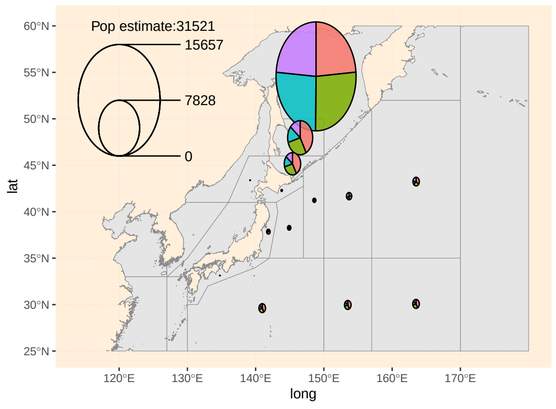
B01−1 Stock:J Oct−2020



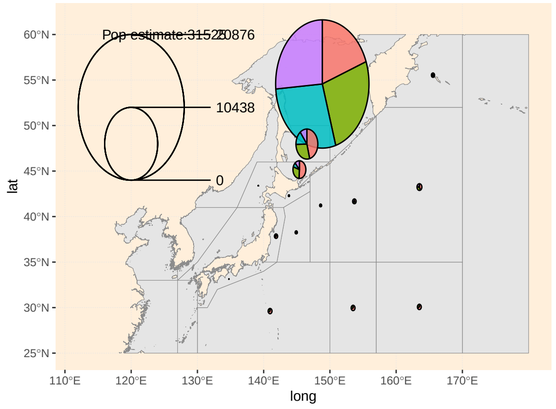
B01−1 Stock:O Mar−1930



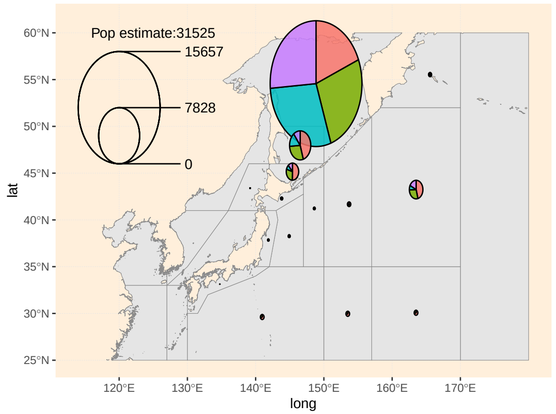
B01−1 Stock:O Apr−1930



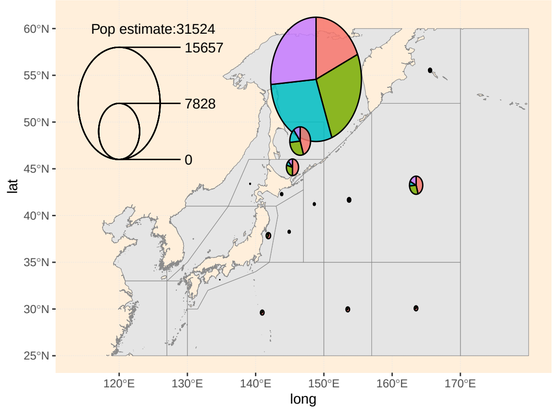
B01−1 Stock:O May−1930



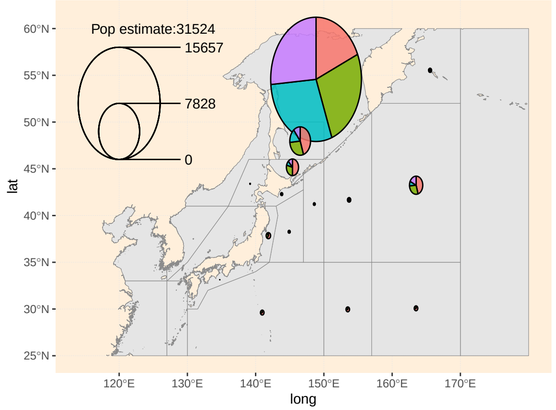
B01−1 Stock:O Jun−1930



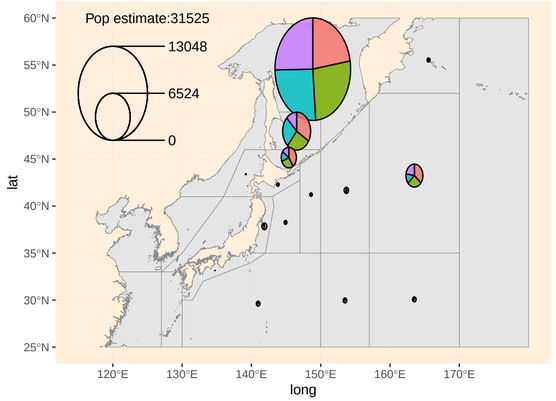
B01−1 Stock:O Jul−1930



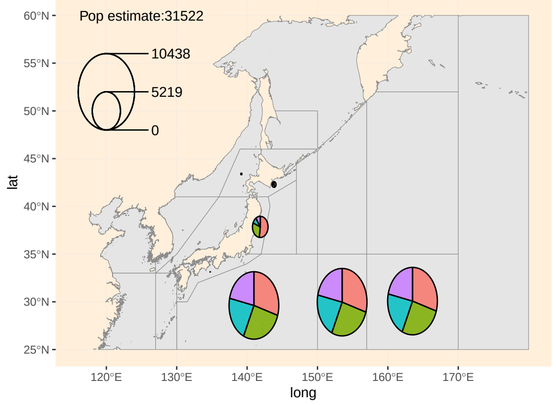
B01−1 Stock:O Aug−1930



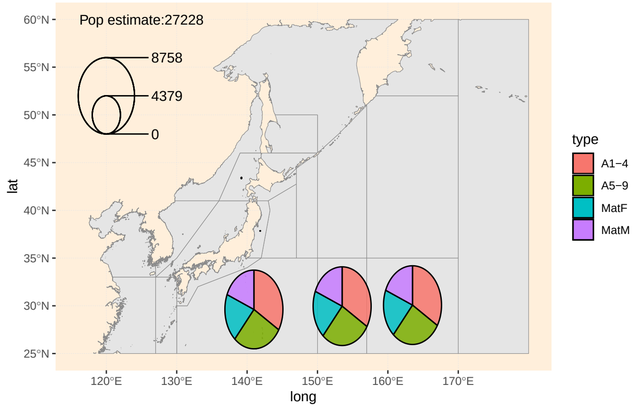
B01−1 Stock:O Sep−1930



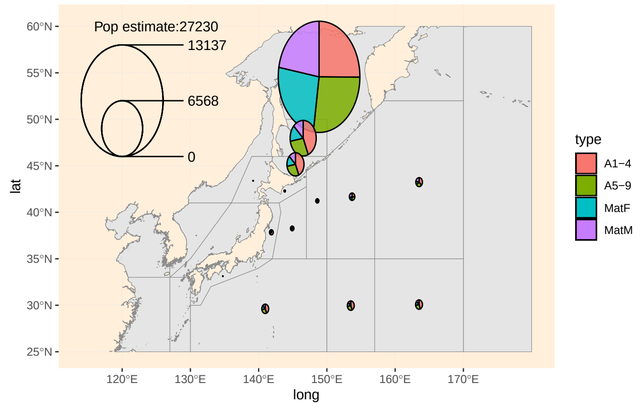
B01−1 Stock:O Oct−1930



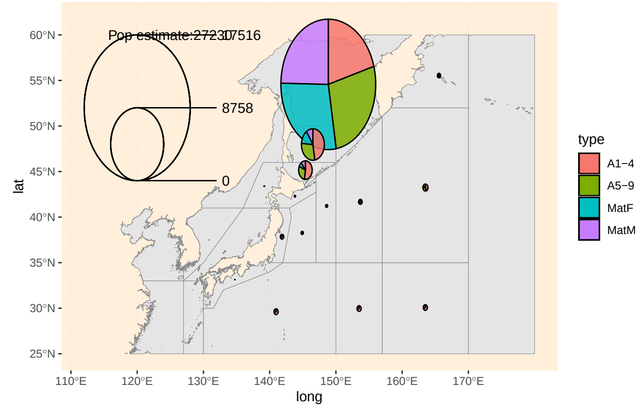
B01−1 Stock:O Mar−2020



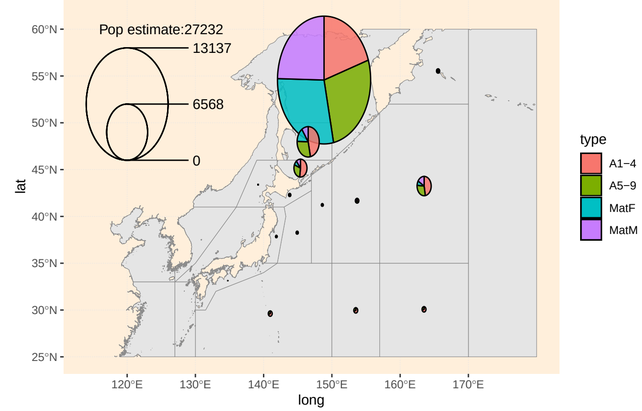
B01−1 Stock:O Apr−2020



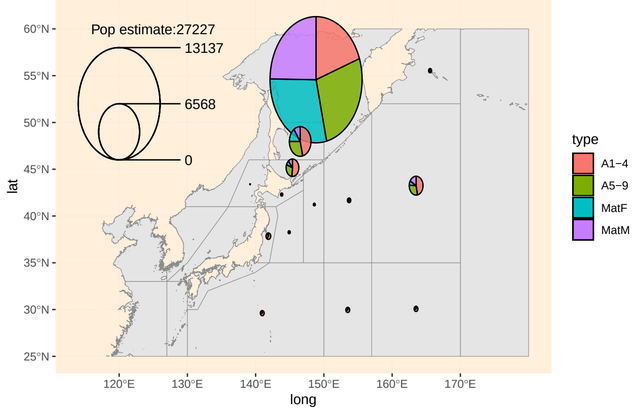
B01−1 Stock:O May−2020



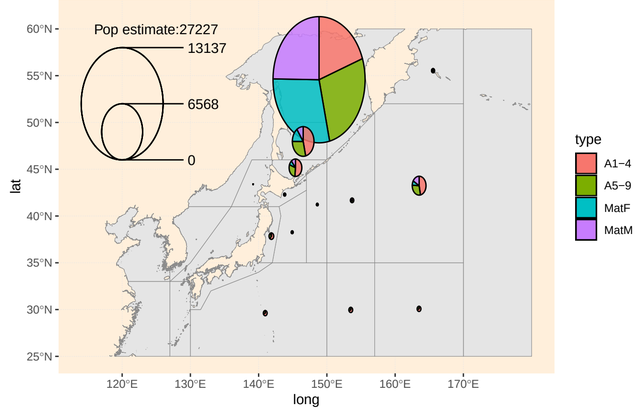
B01−1 Stock:O Jun−2020



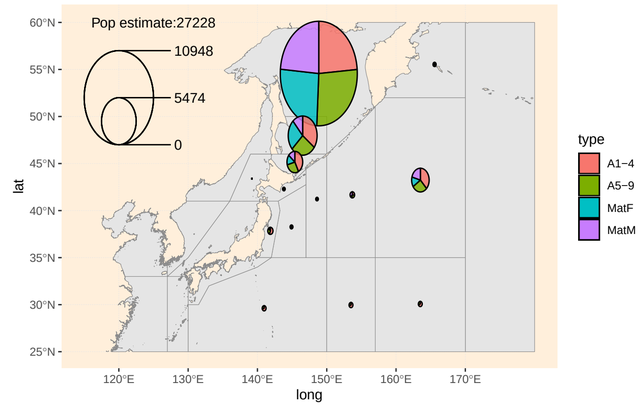
B01−1 Stock:O Jul−2020



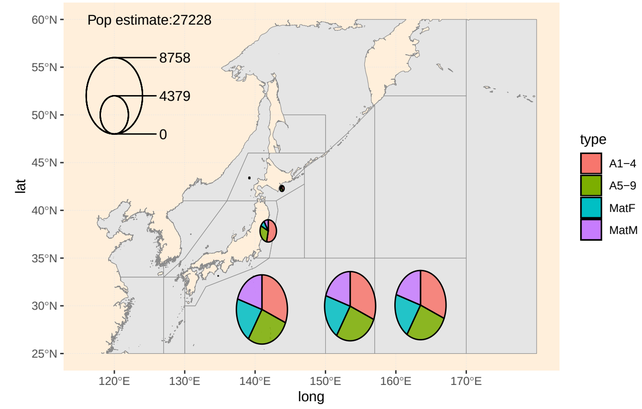
B01−1 Stock:O Aug−2020



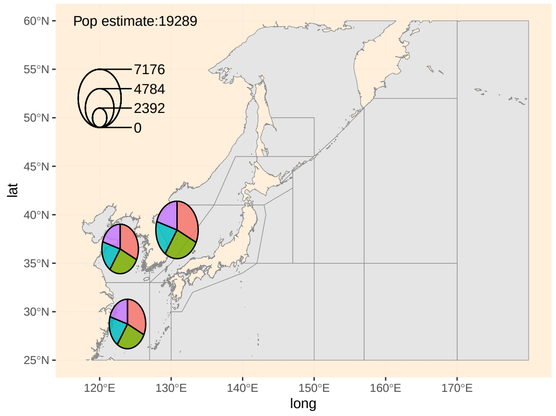
B01−1 Stock:O Sep−2020



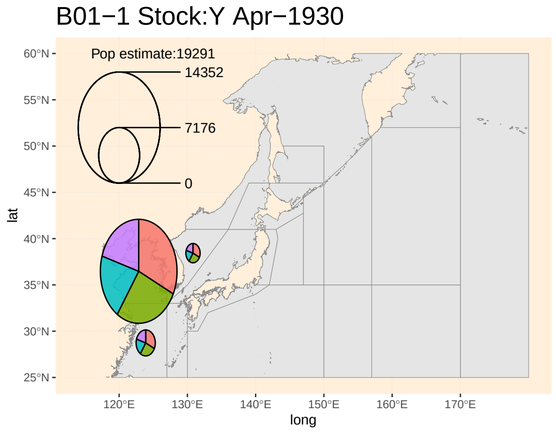
B01−1 Stock:O Oct−2020



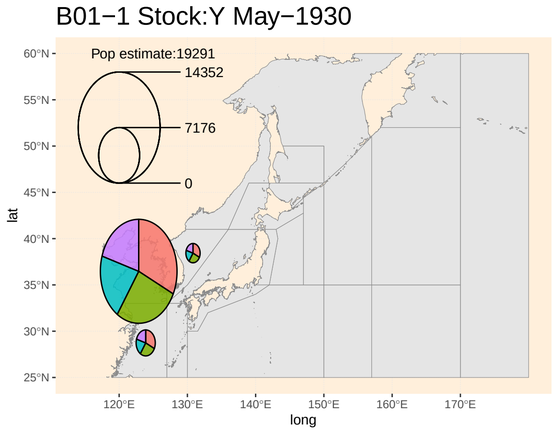
B01−1 Stock:Y Mar−1930



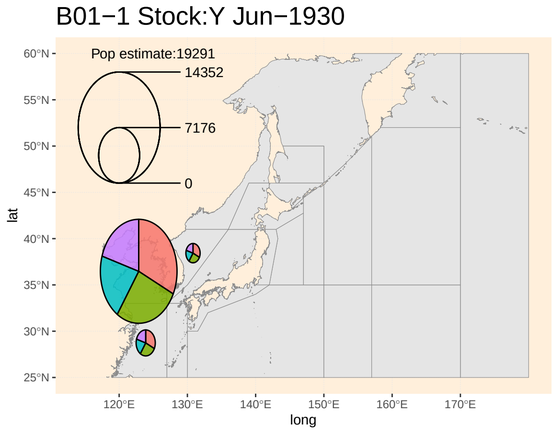
B01−1 Stock:Y Apr−1930



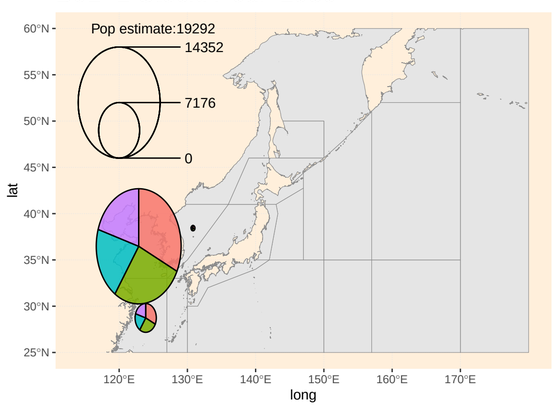
B01−1 Stock:Y May−1930



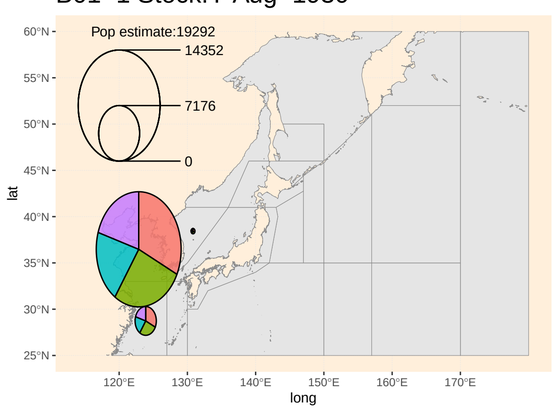
B01−1 Stock:Y Jun−1930



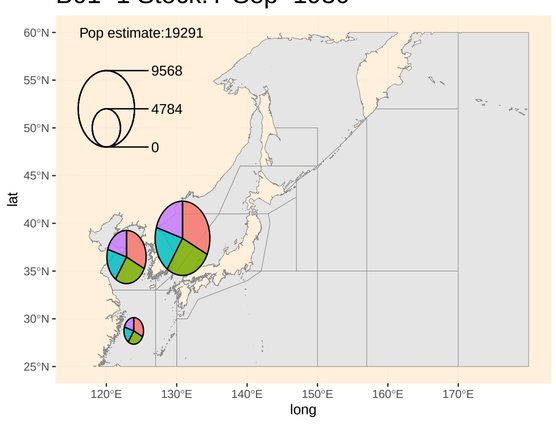
B01−1 Stock:Y Jul−1930



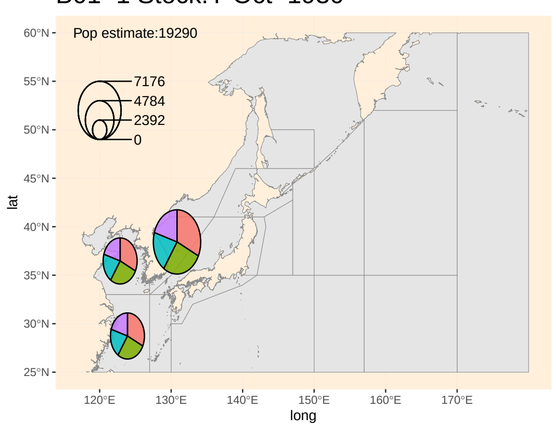
B01−1 Stock:Y Aug−1930



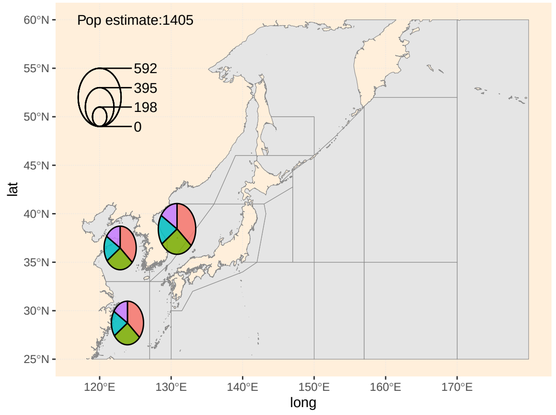
B01−1 Stock:Y Sep−1930



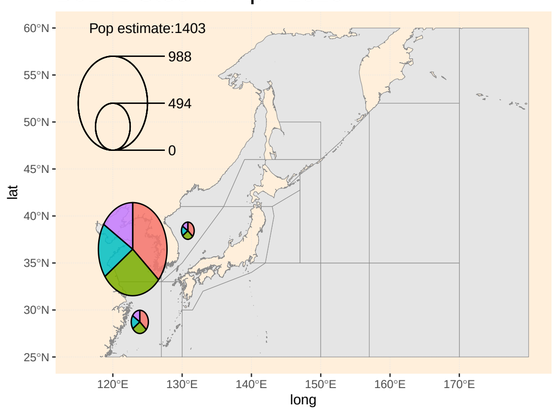
B01−1 Stock:Y Oct−1930



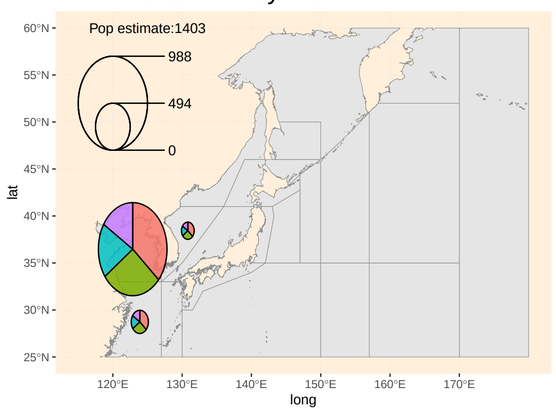
B01−1 Stock:Y Mar−2020



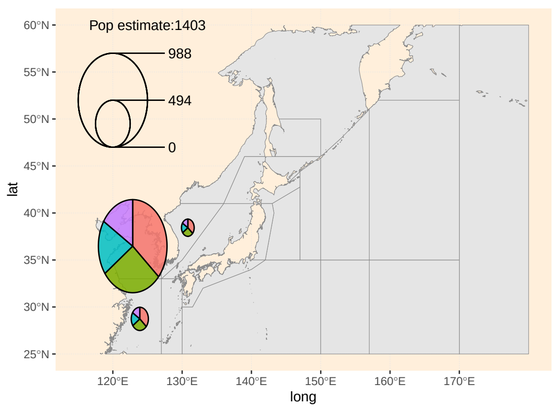
B01−1 Stock:Y Apr−2020



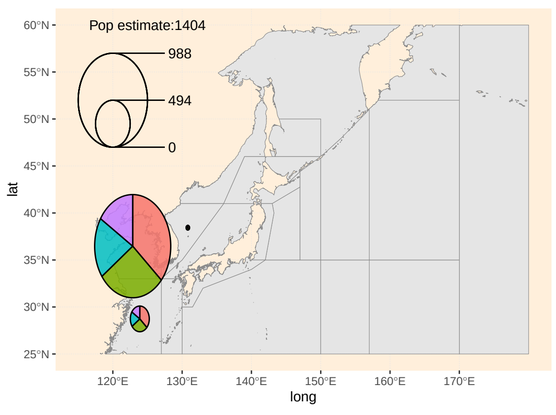
B01−1 Stock:Y May−2020



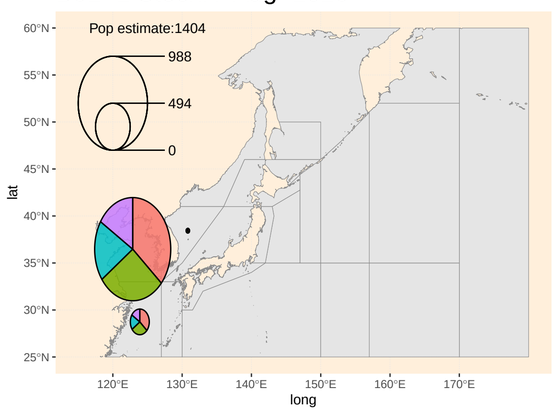
B01−1 Stock:Y Jun−2020



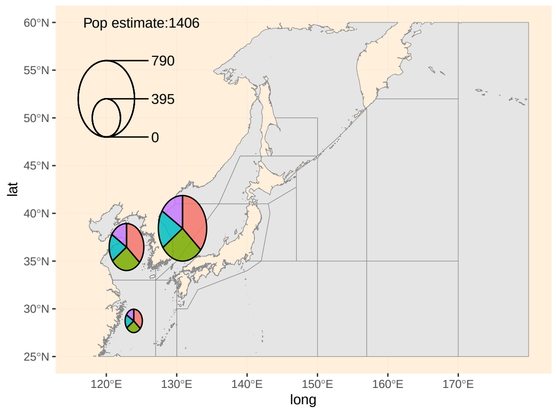
B01−1 Stock:Y Jul−2020



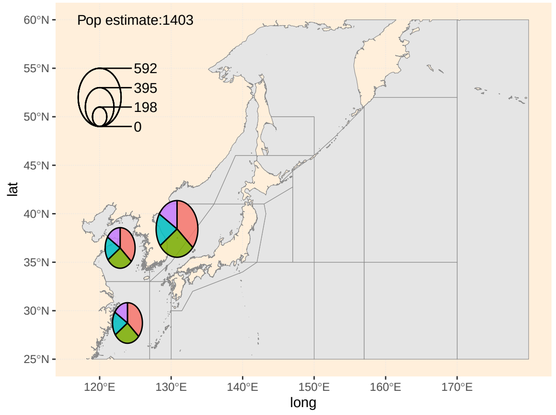
B01−1 Stock:Y Aug−2020

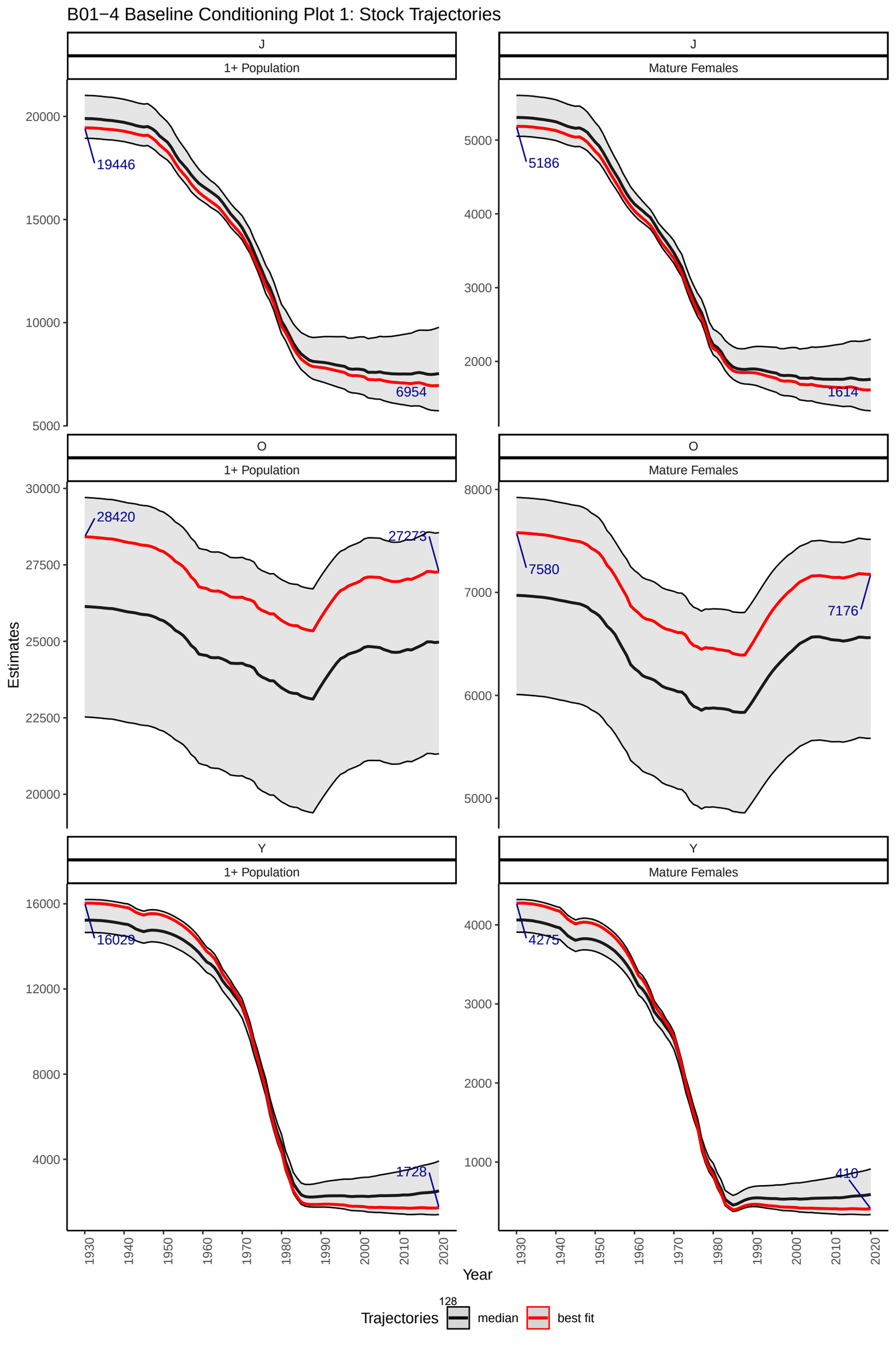


B01−1 Stock:Y Sep−2020

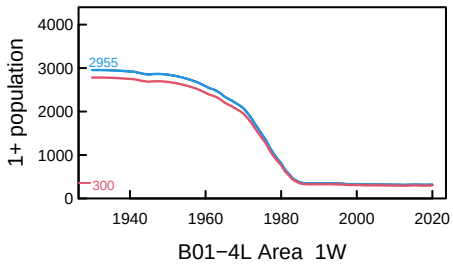


B01−1 Stock:Y Oct−2020

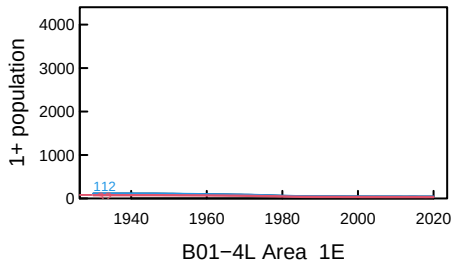



B01−4 Baseline Conditioning Plot 1: Stock Trajectories
J
1+ Population
Mature Females
O
Y
19446
6954
5186
1614
28420
27273
7580
7176
16029
1728
4275
410
Estimates
Year
Trajectories
128
median
best fit

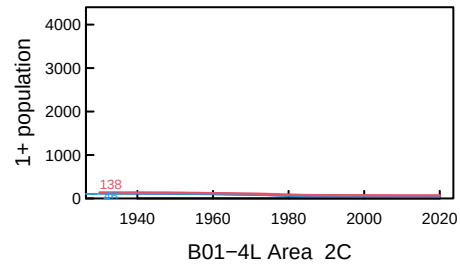
B01−4L Hyp. B 4% Baseline Conditioning Plot 2a: May/Jun (red) & Aug/Sep (blue)



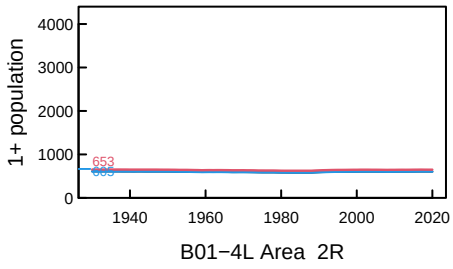
B01−4L Area 1W



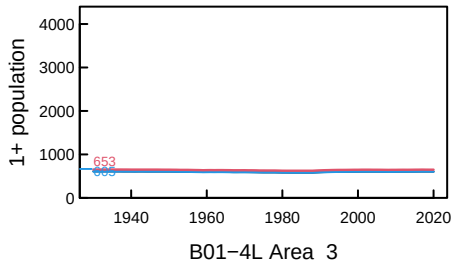
B01−4L Area 1E



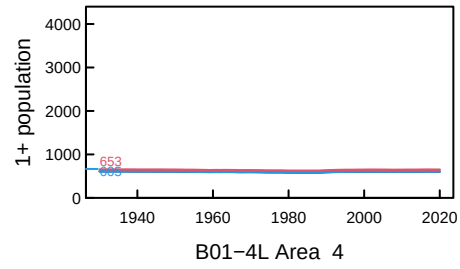
B01−4L Area 2C



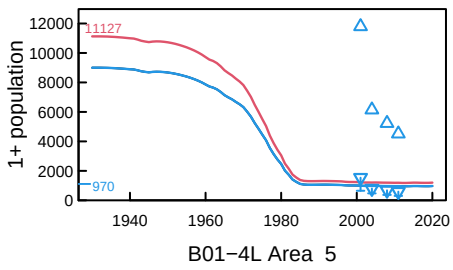
B01−4L Area 2R



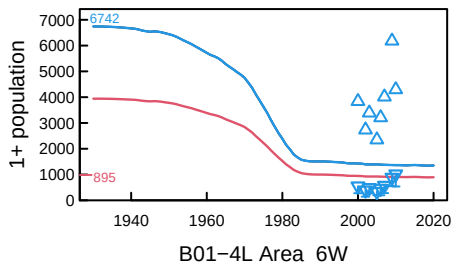
B01−4L Area 3



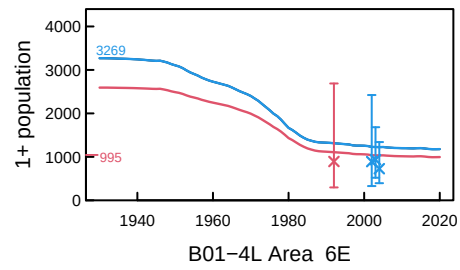
B01−4L Area 4



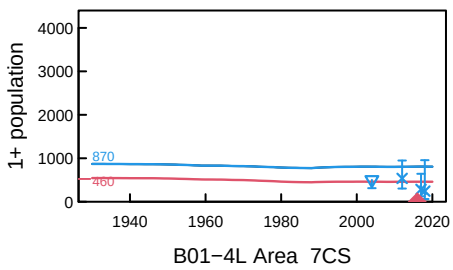
B01−4L Area 5



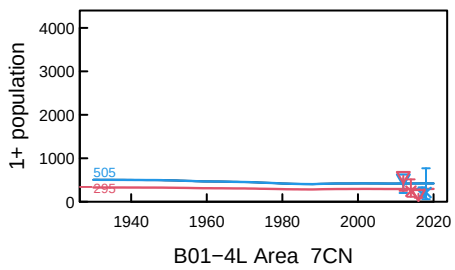
B01−4L Area 6W



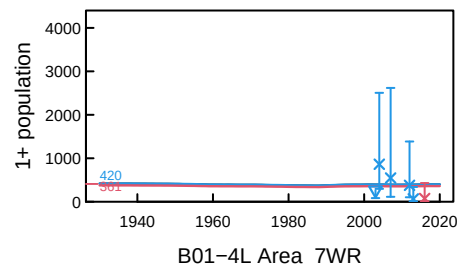
B01−4L Area 6E



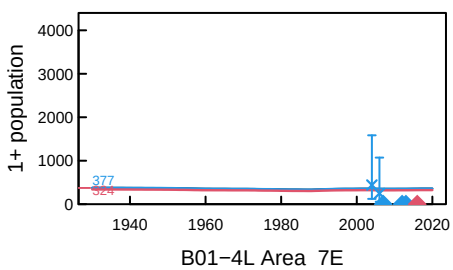
B01−4L Area 7CS



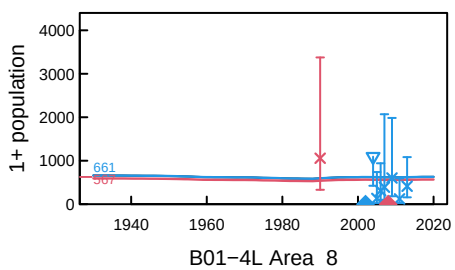
B01−4L Area 7CN



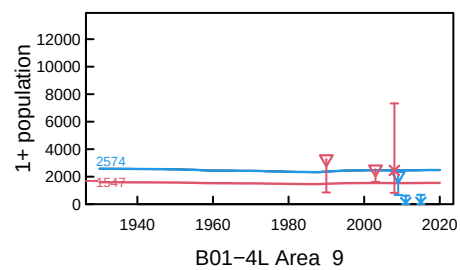
B01−4L Area 7WR



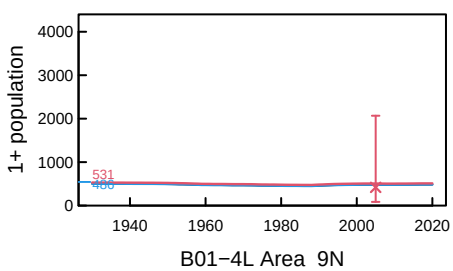
B01−4L Area 7E



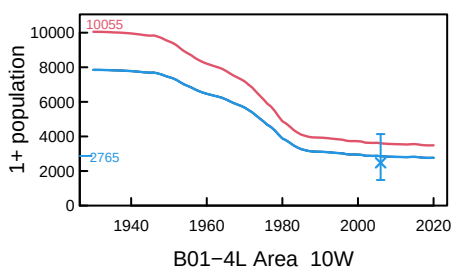
B01−4L Area 8



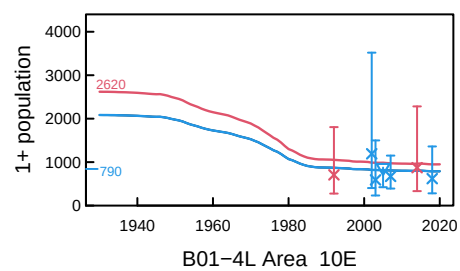
B01−4L Area 9



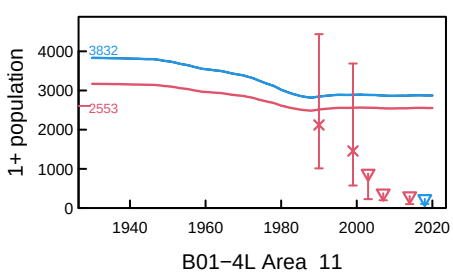
B01−4L Area 9N



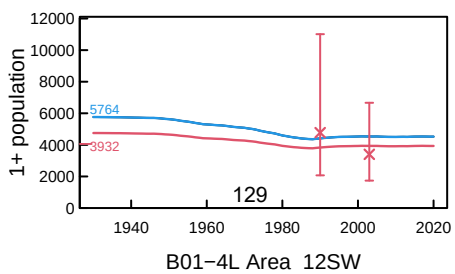
B01−4L Area 10W



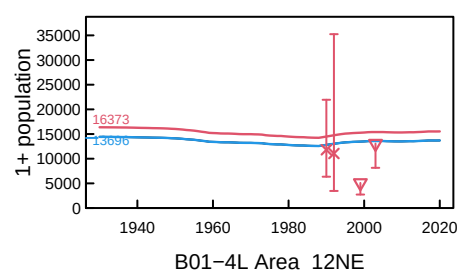
B01−4L Area 10E



B01−4L Area 11

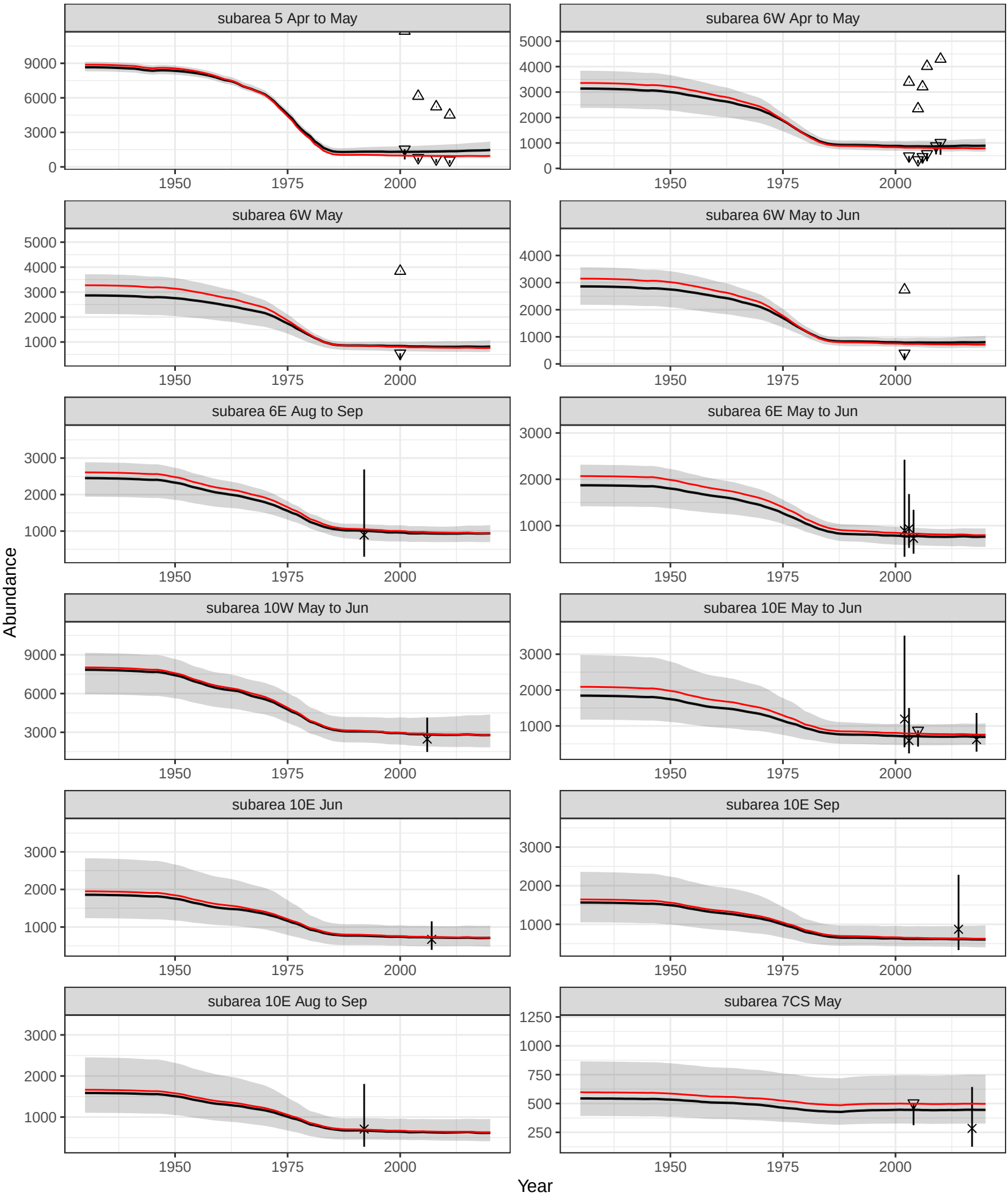


B01−4L Area 12SW



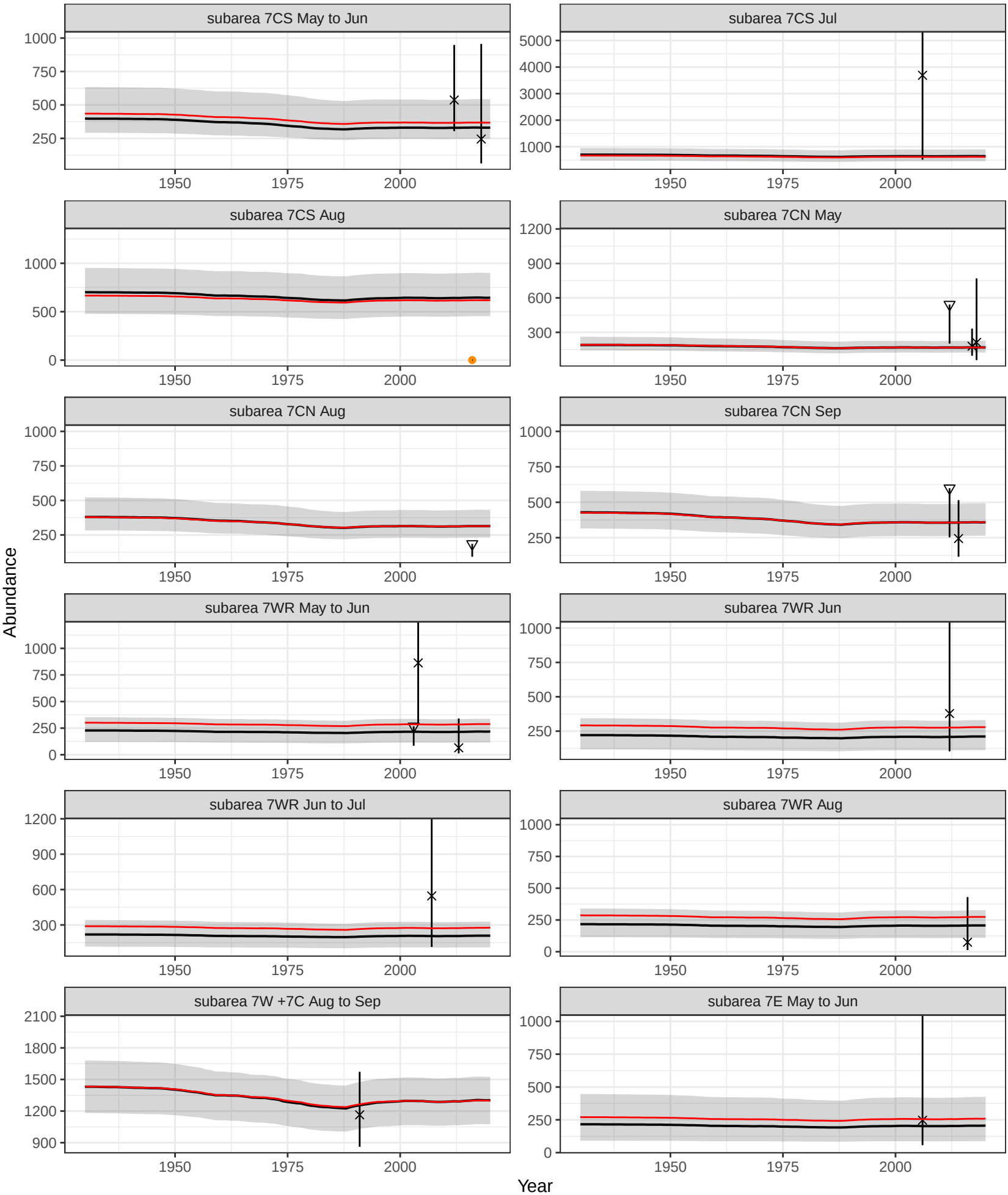
B01−4L Area 12NE

B01−4 Baseline Conditioning Plot 2b: Fits to Data



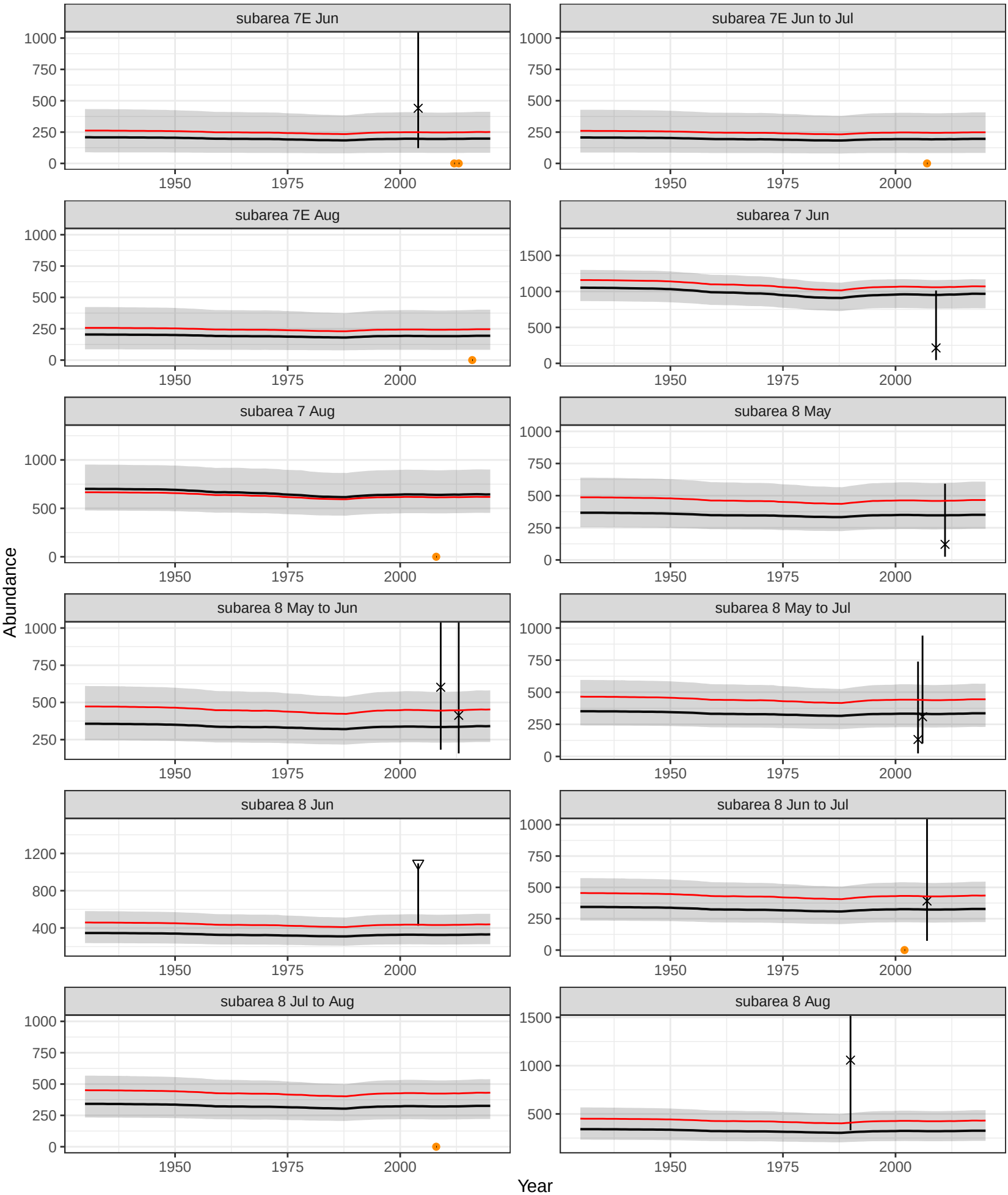
best fit = red, median = black

B01−4 Baseline Conditioning Plot 2b: Fits to Data



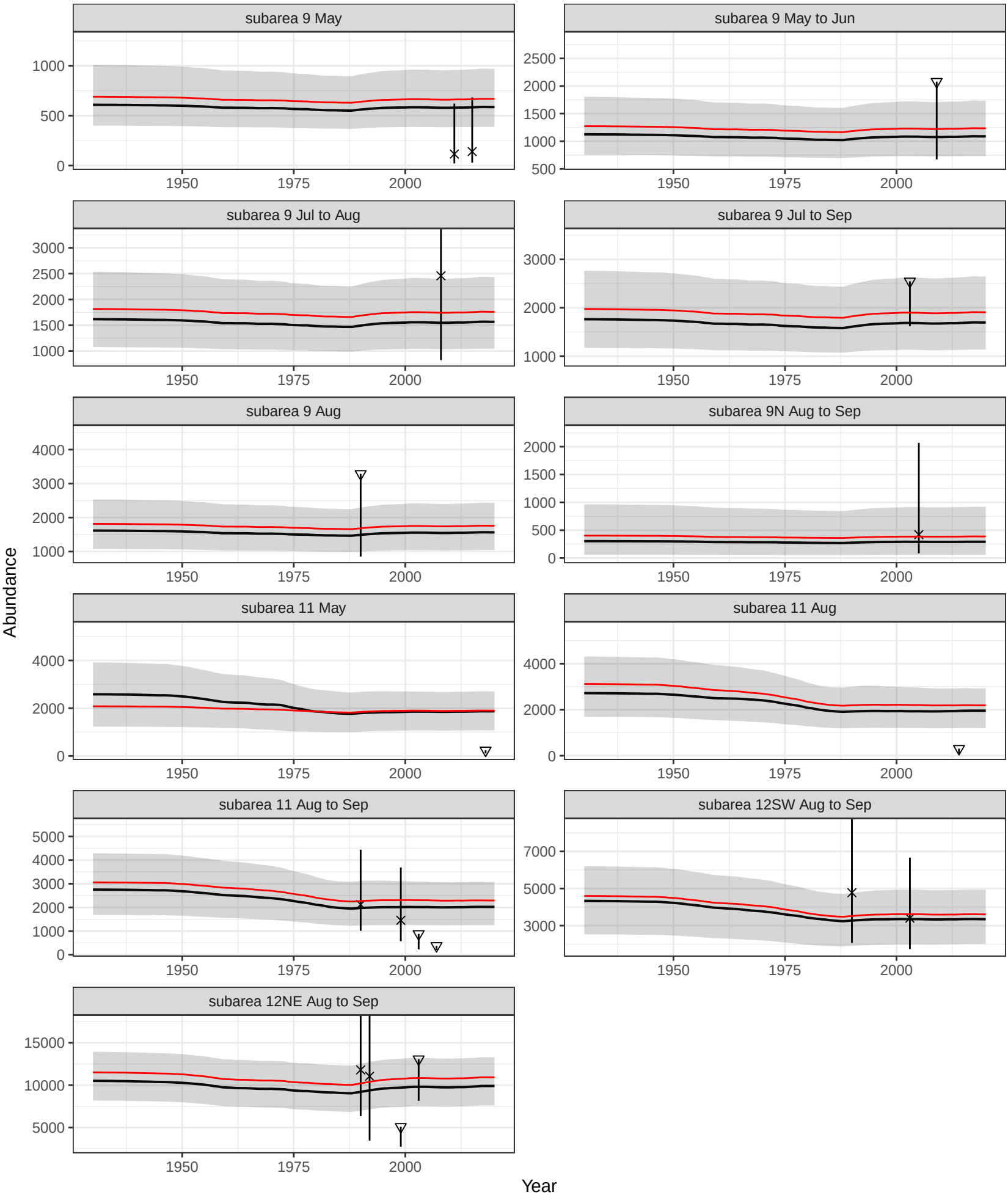
best fit = red, median = black

B01−4 Baseline Conditioning Plot 2b: Fits to Data

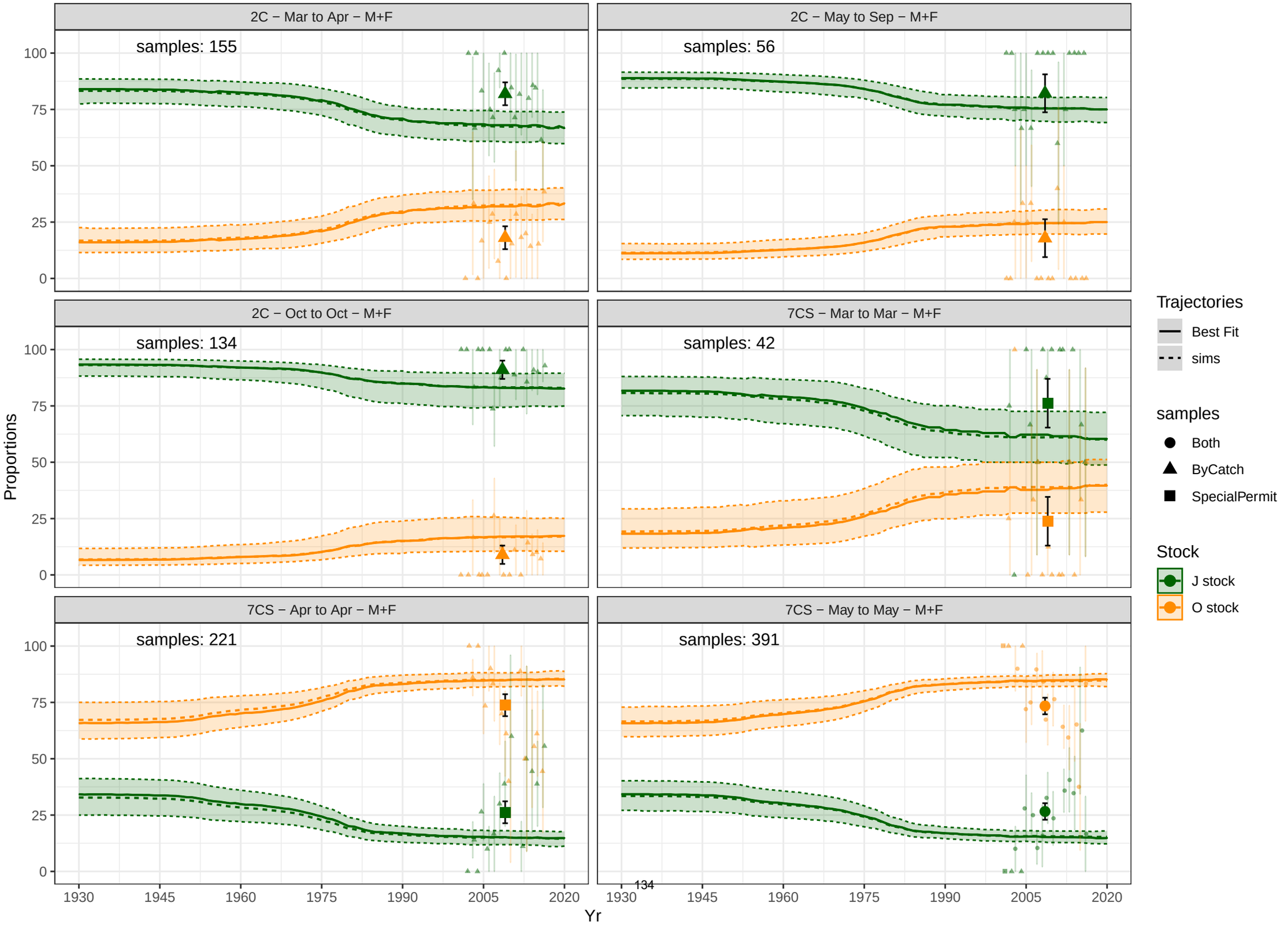


best fit = red, median = black

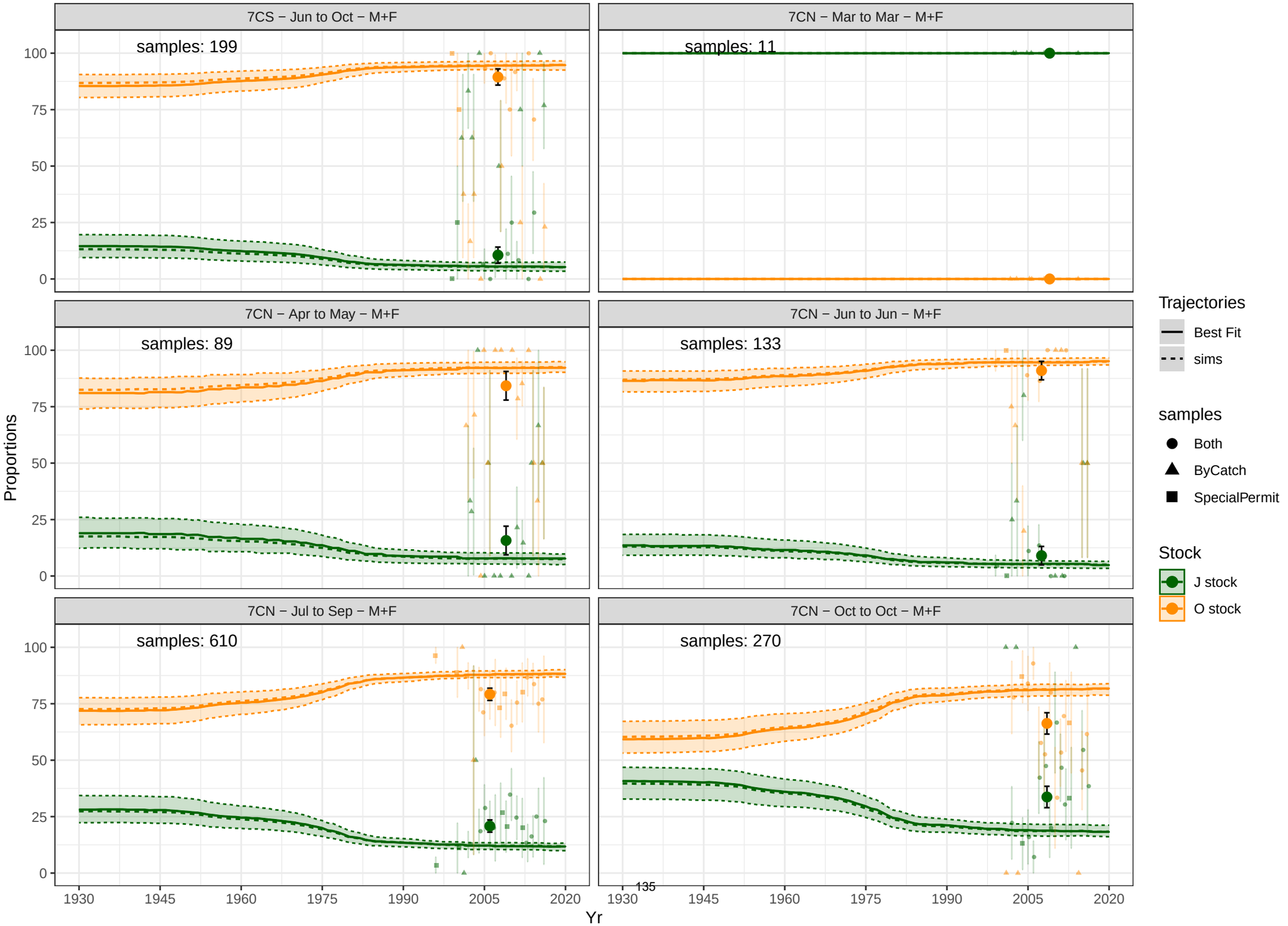
B01−4 Baseline Conditioning Plot 2b: Fits to Data



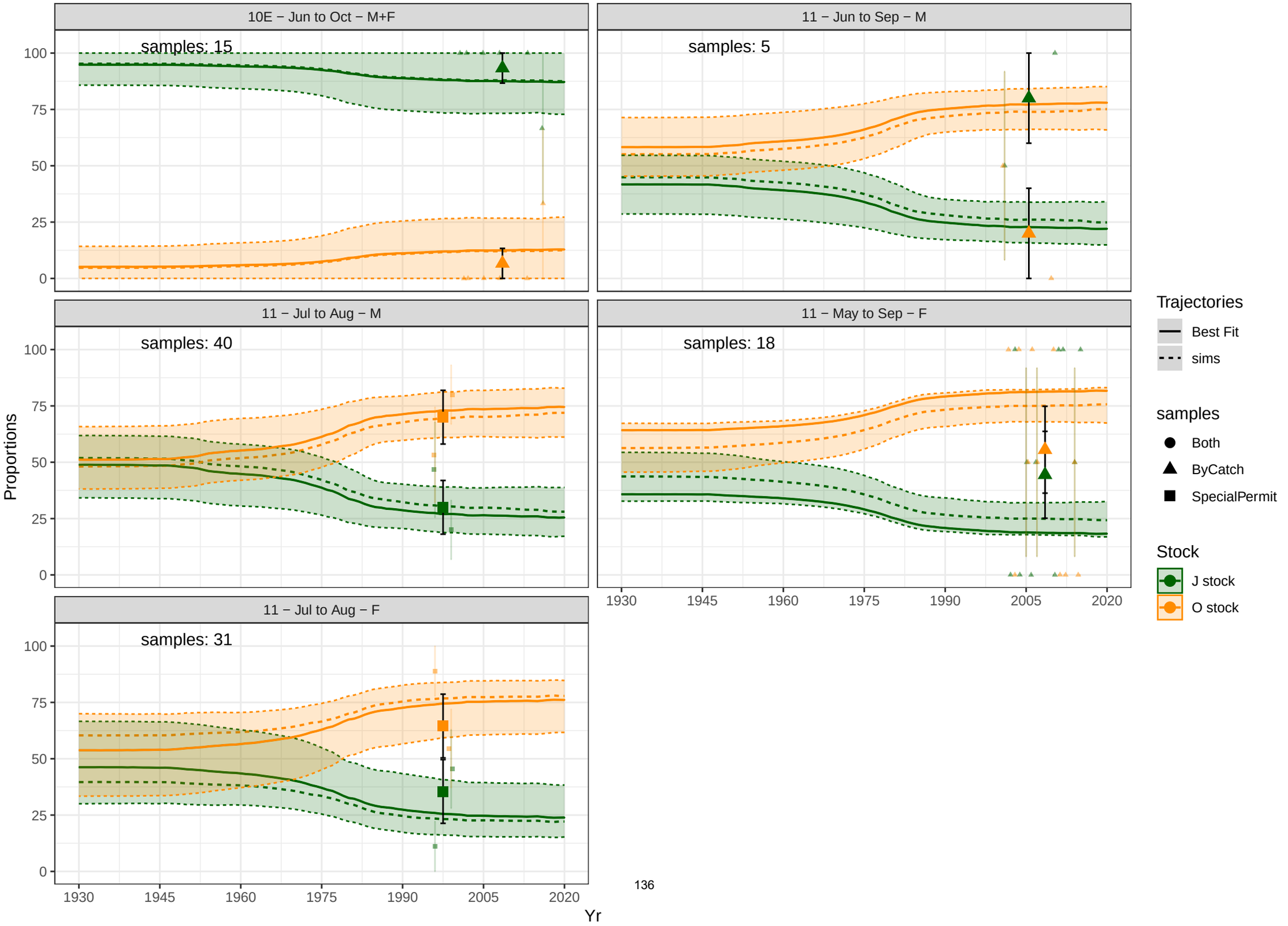
B01−4 Baseline Conditioning Plot 3: Fits to Data

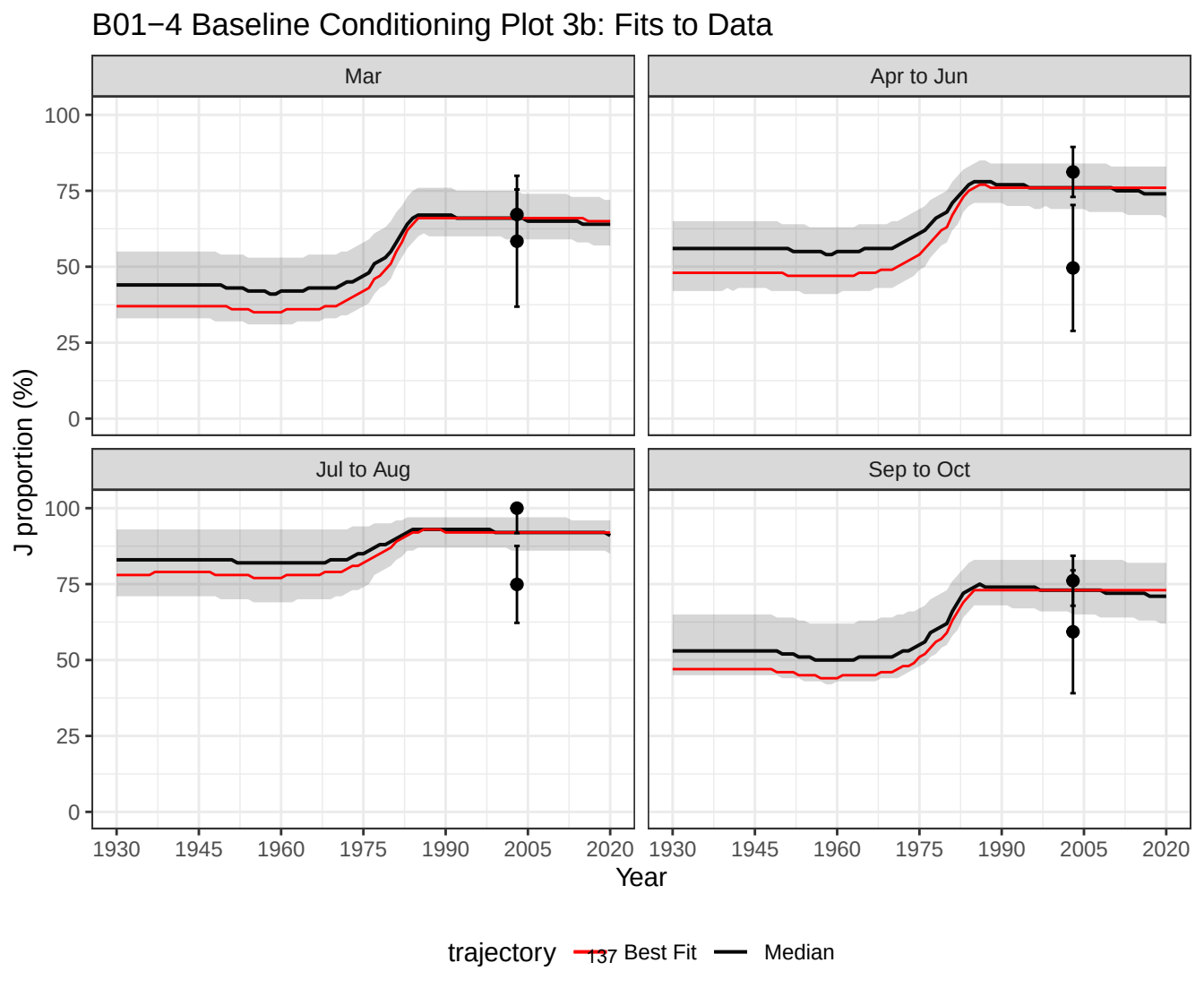


B01−4 Baseline Conditioning Plot 3: Fits to Data

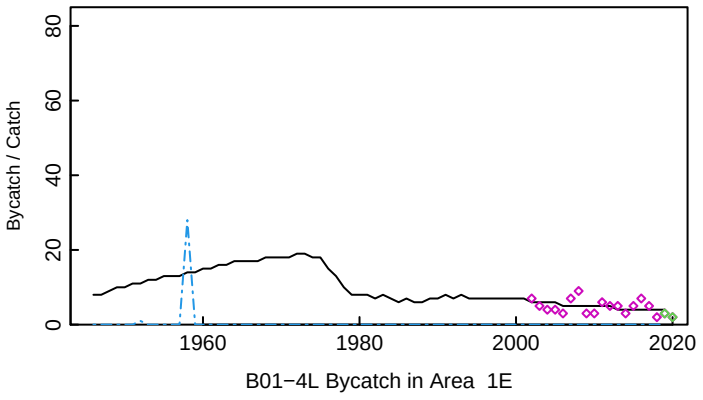


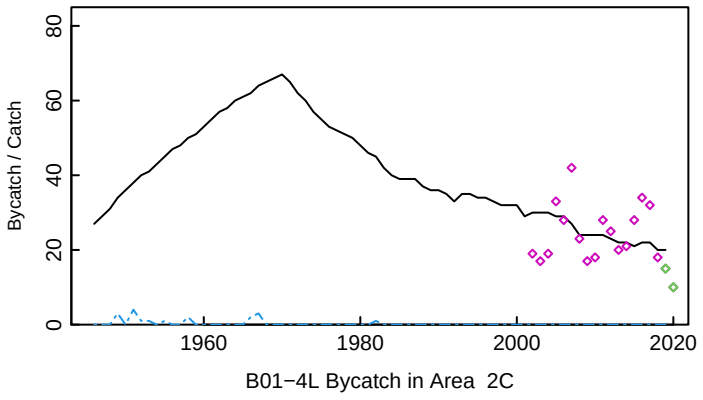
B01−4 Baseline Conditioning Plot 3: Fits to Data

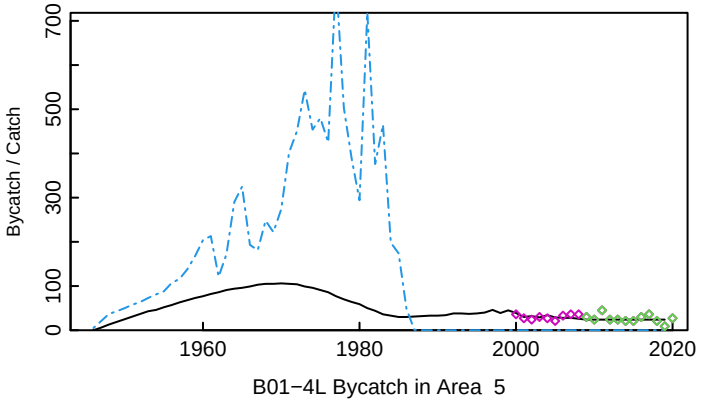


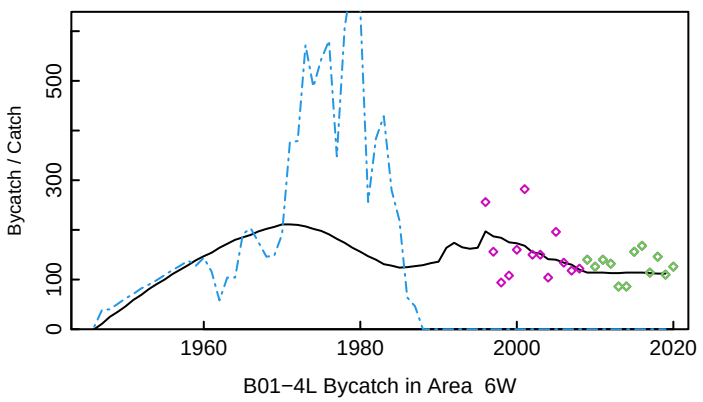

B01−4 Baseline Conditioning Plot 3b: Fits to Data
Mar
Apr to Jun
Jul to Aug
Sep to Oct
J proportion (%)
100
75
50
25
0
1930
1945
1960
1975
1990
2005
2020
Year
trajectory
Best Fit
Median
137
Subarea 6W

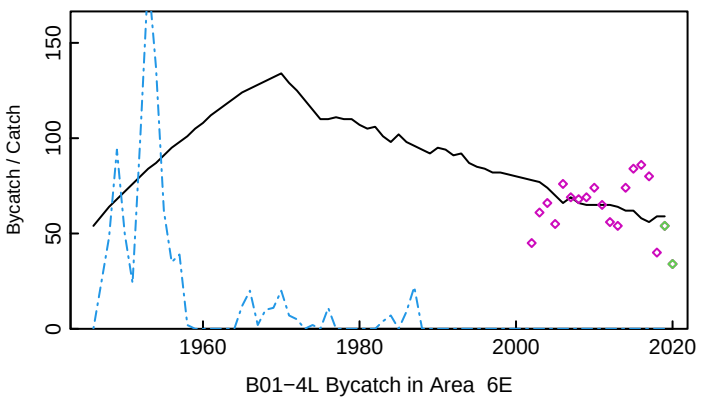
B01−4L Hyp. B 4% Baseline Conditioning Plot 4a: 'Best Fit' Bycatches

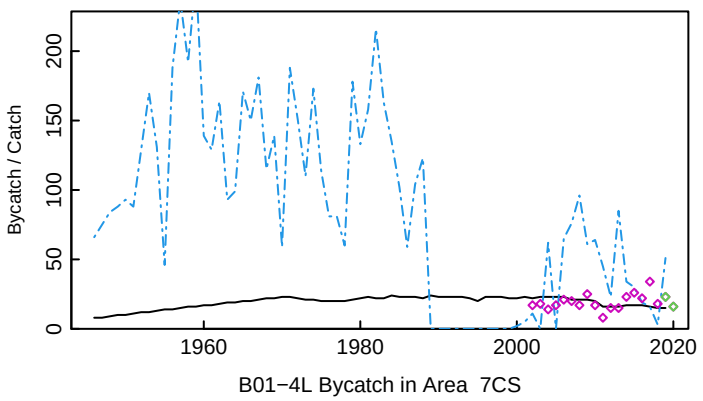


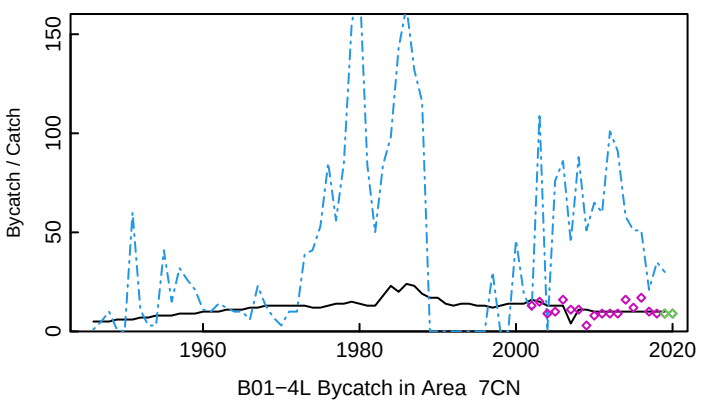


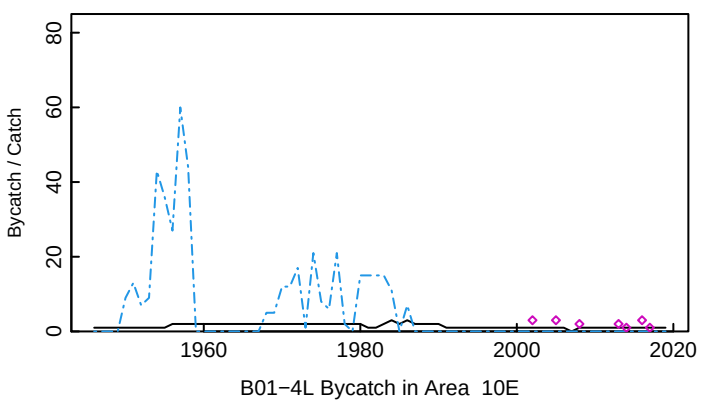


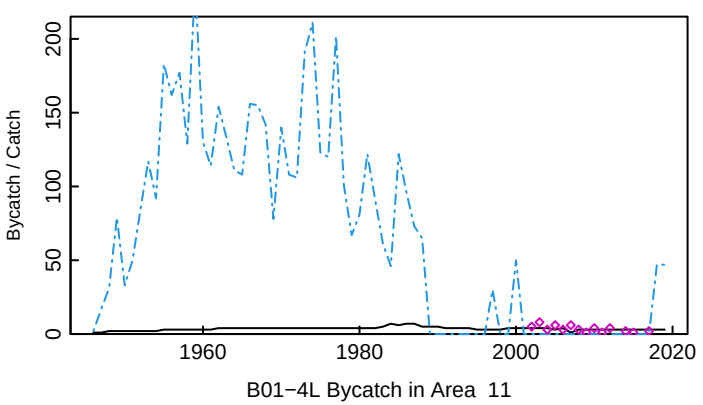


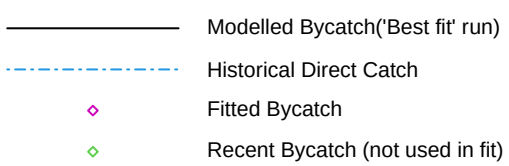




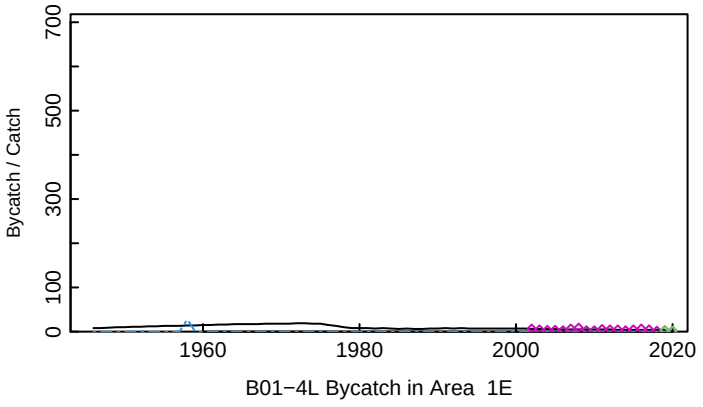


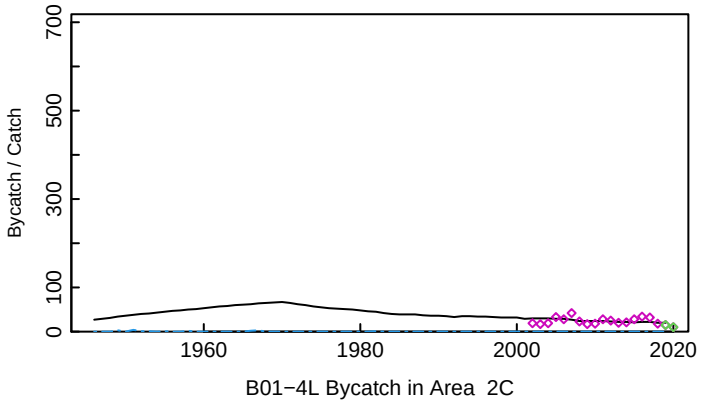


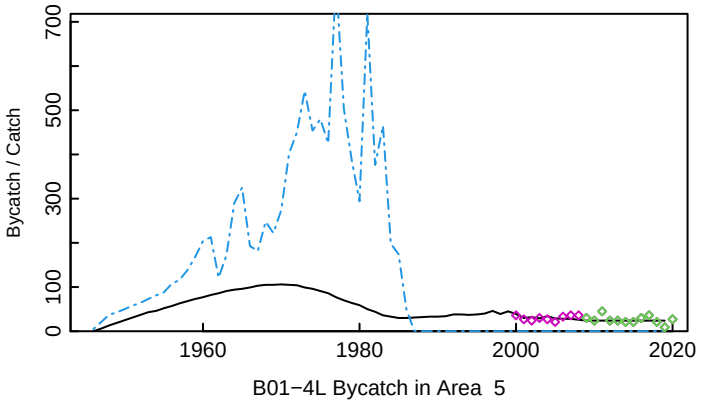


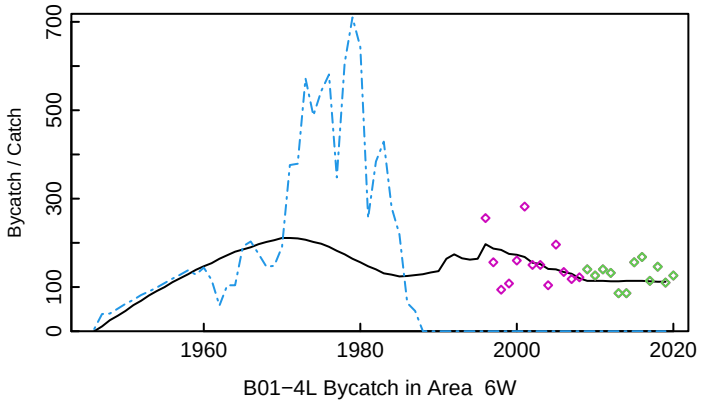


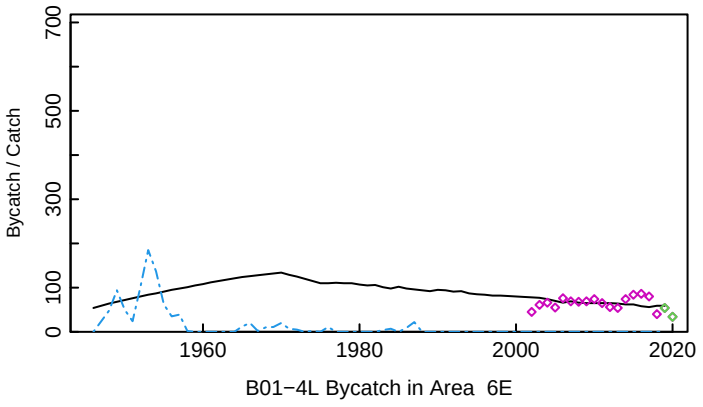
B01−4L Hyp. B 4% Baseline Conditioning Plot 4b: 'Best Fit' Bycatches On Same Scale

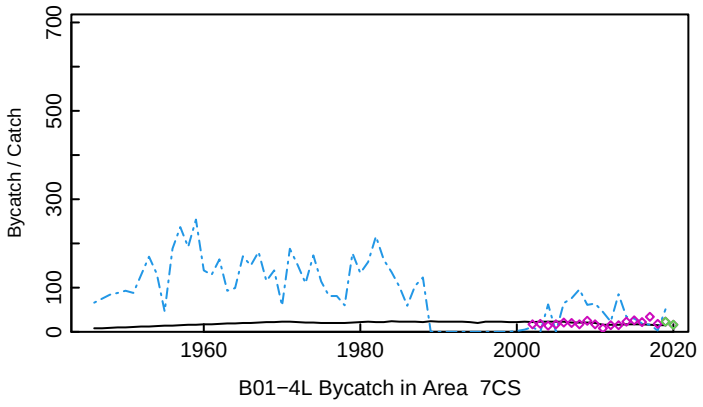


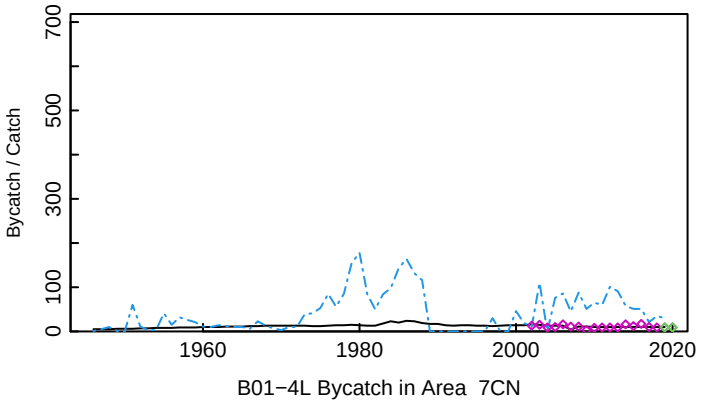


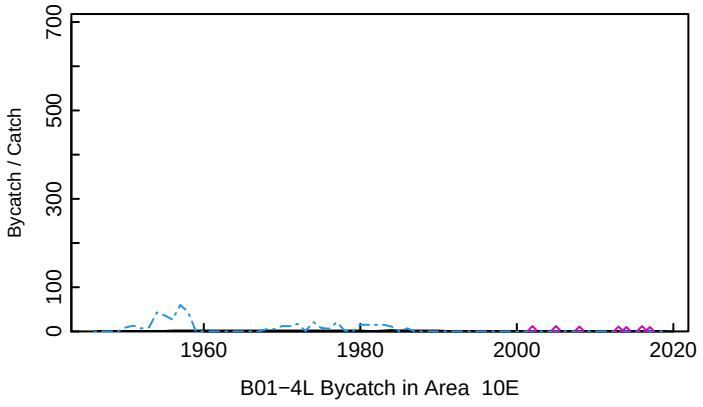


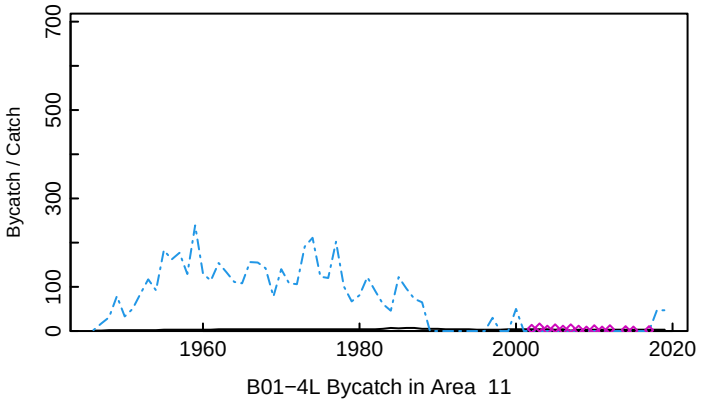


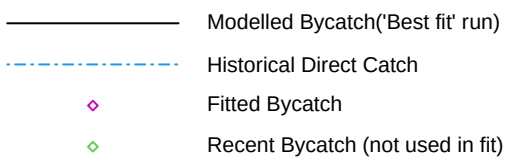




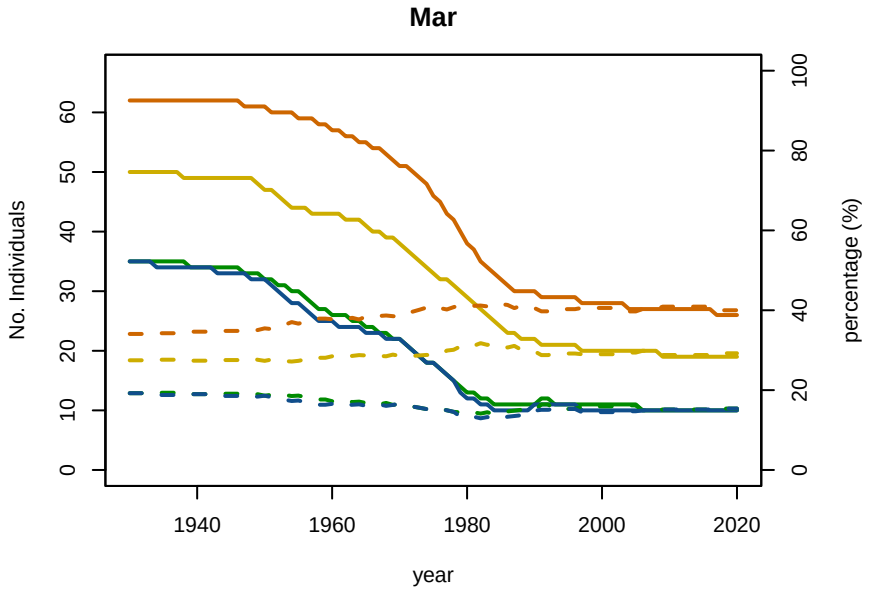


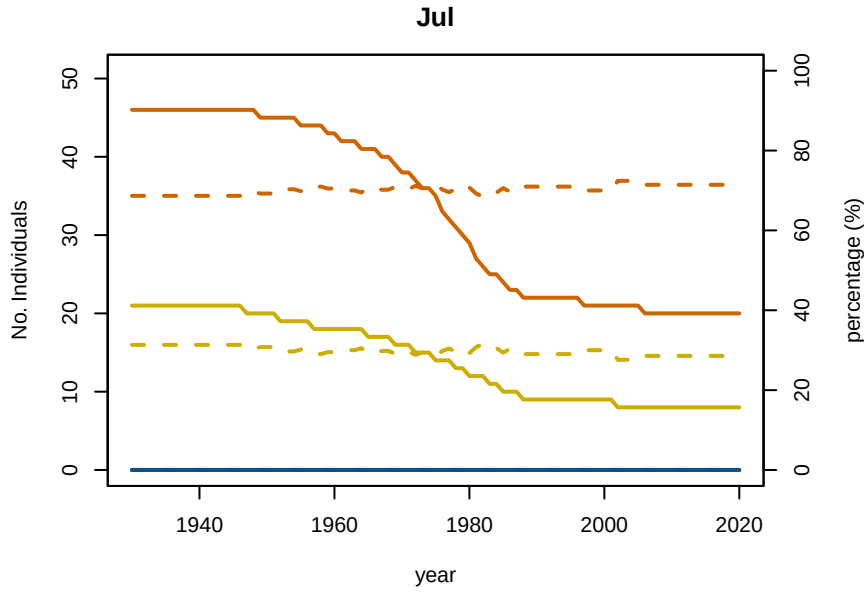


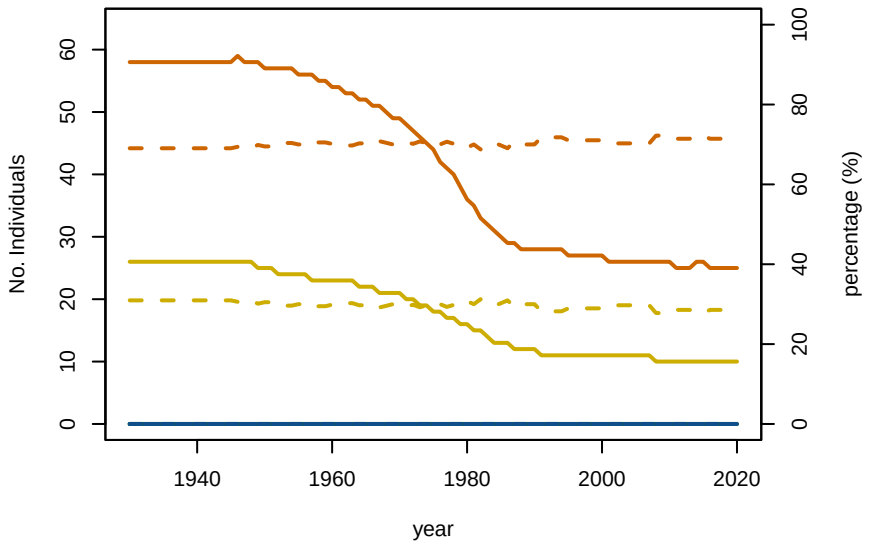


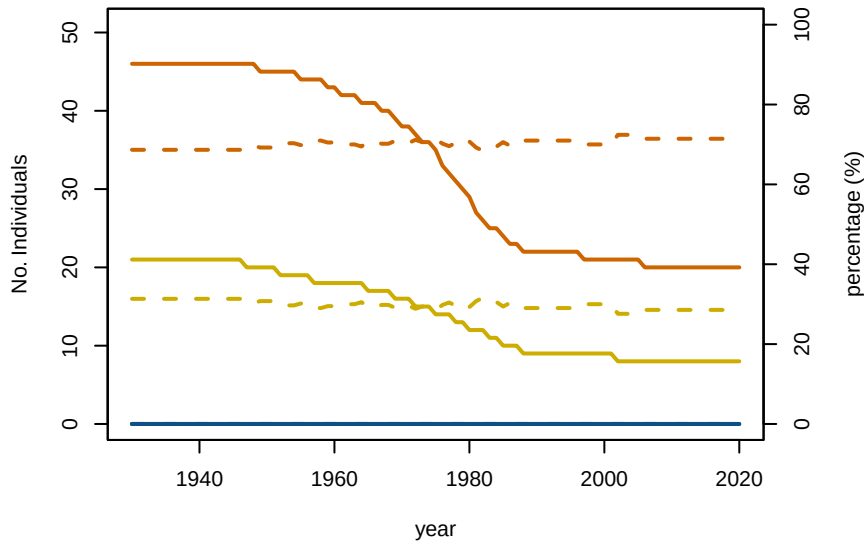


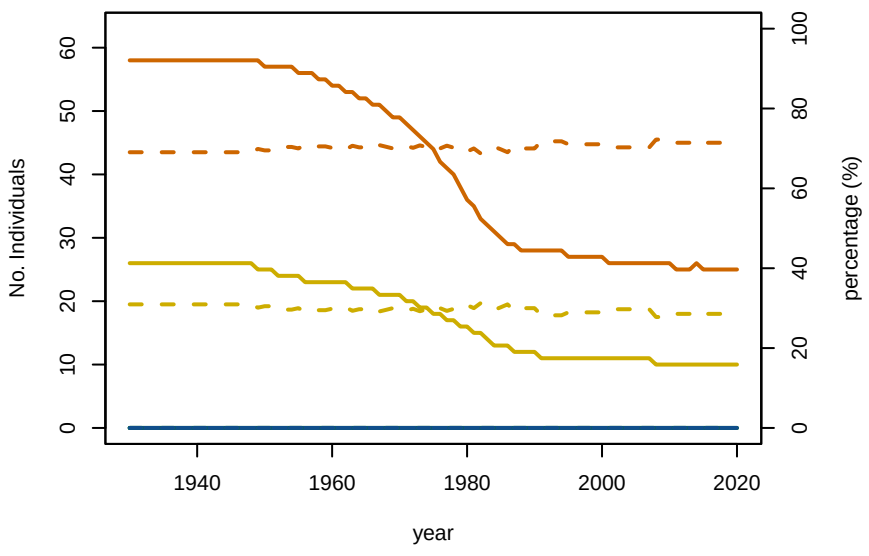
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 1E

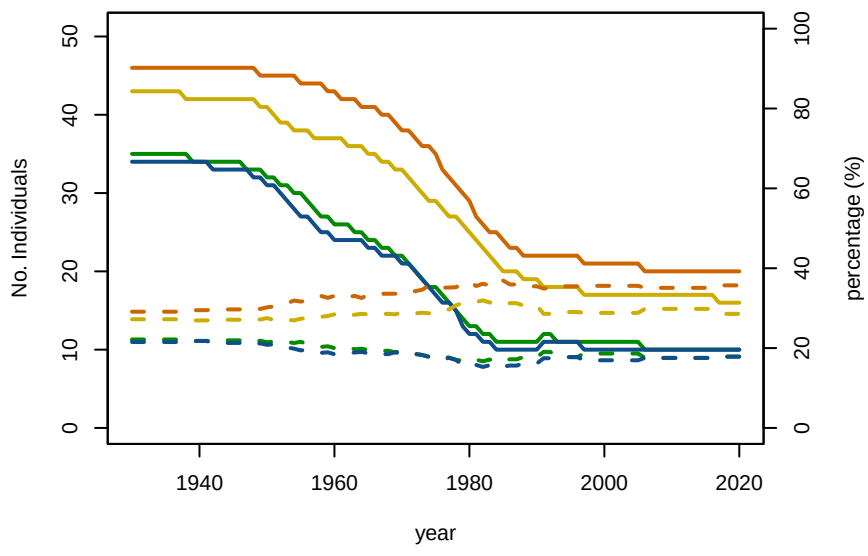


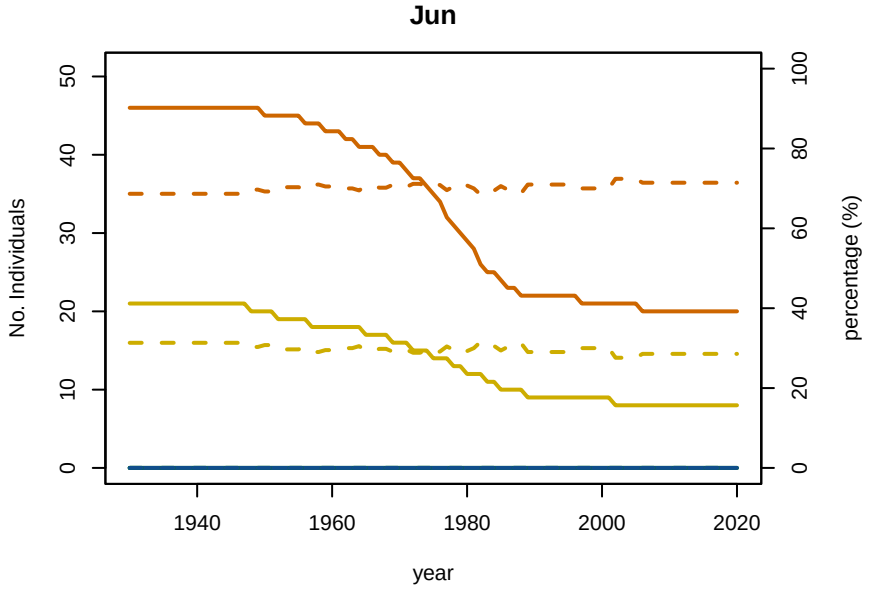


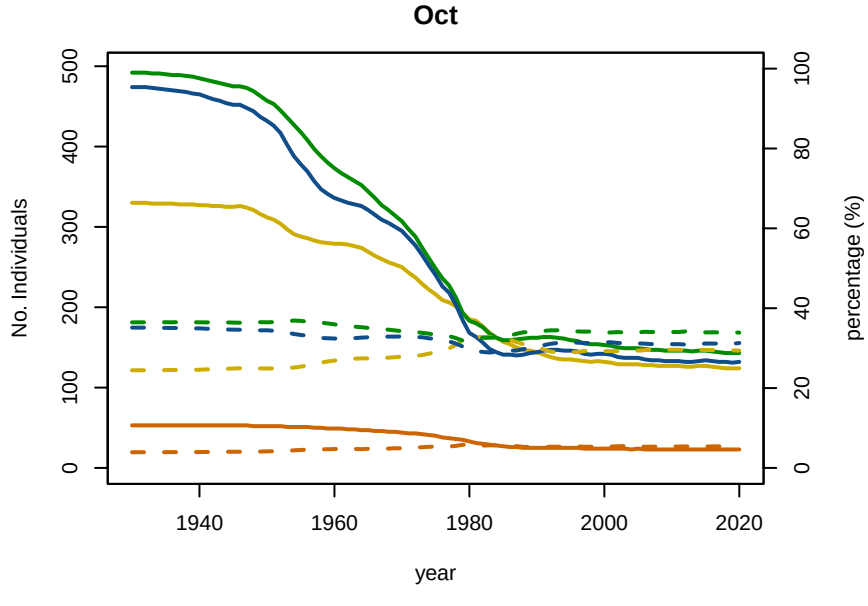






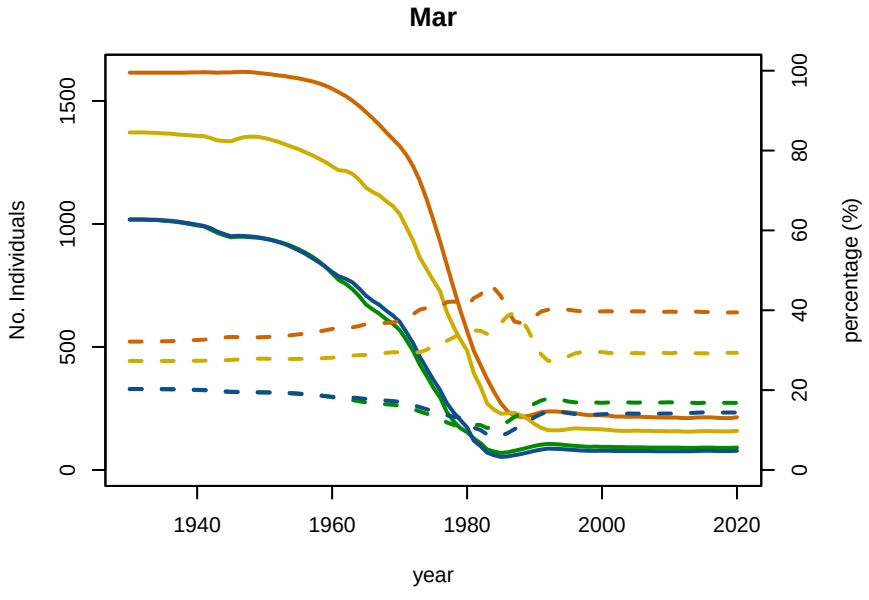


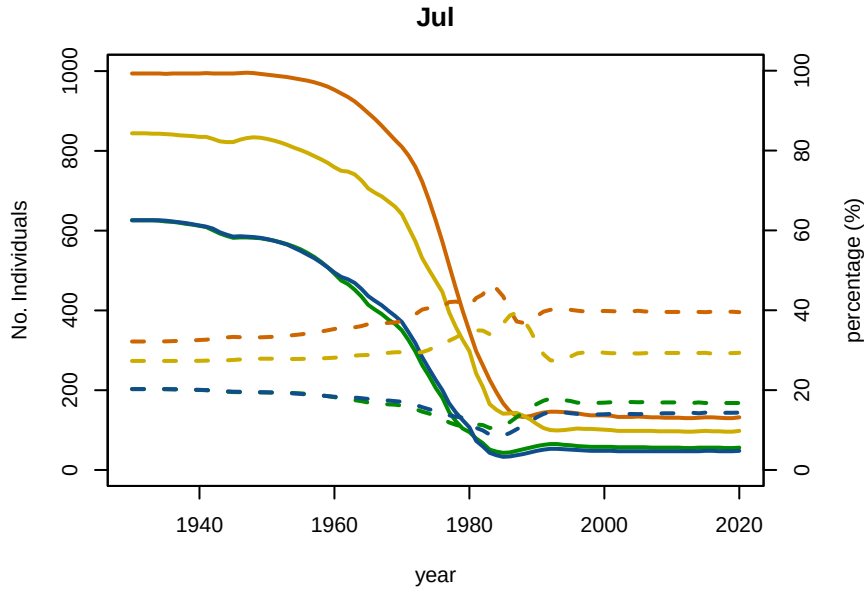


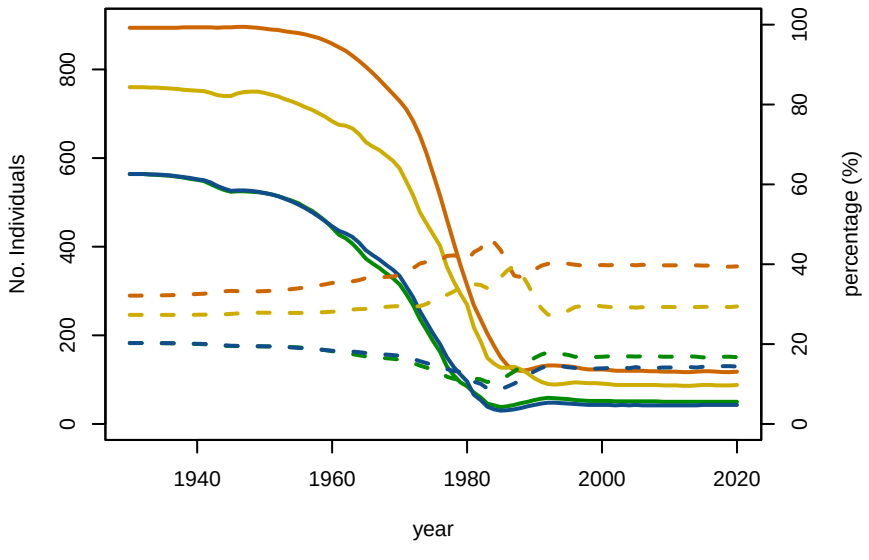


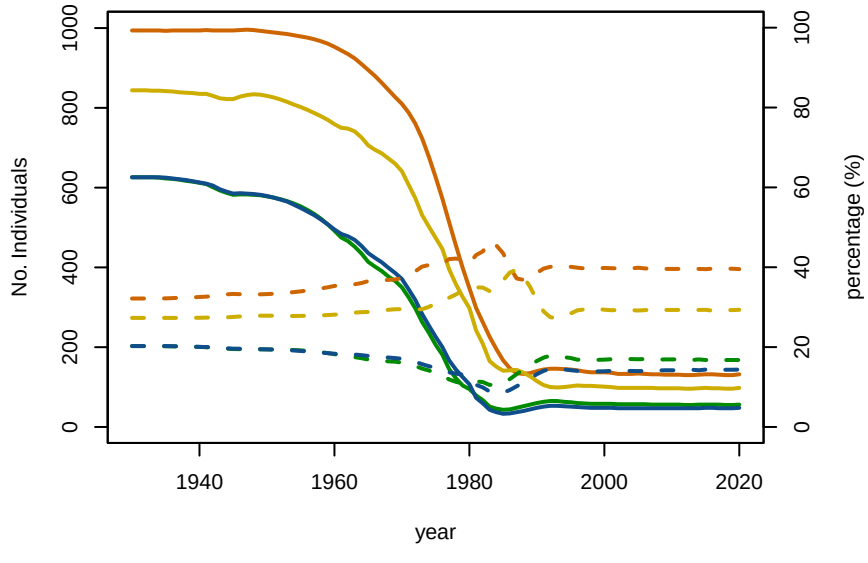
A1−4 A5−9 MatF MatM No Individuals percentage

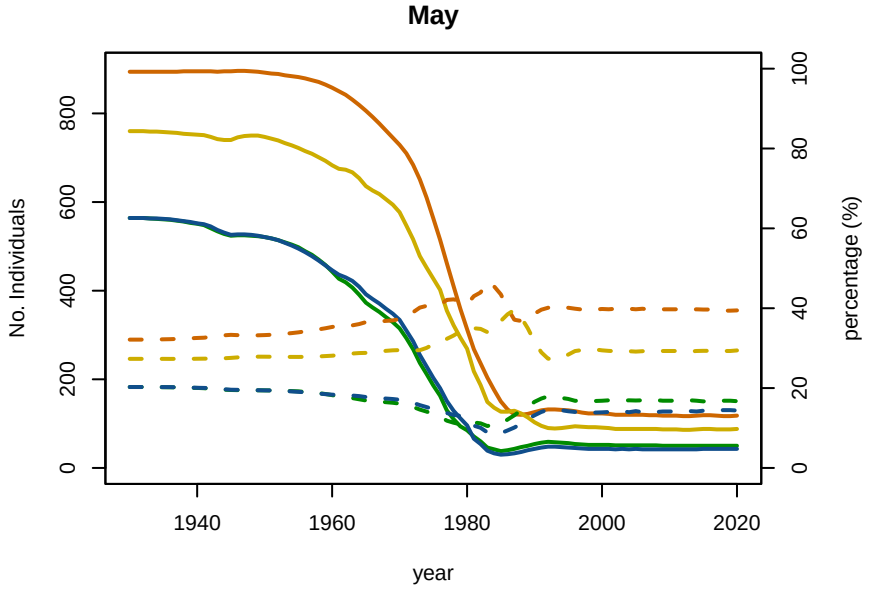
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 1W

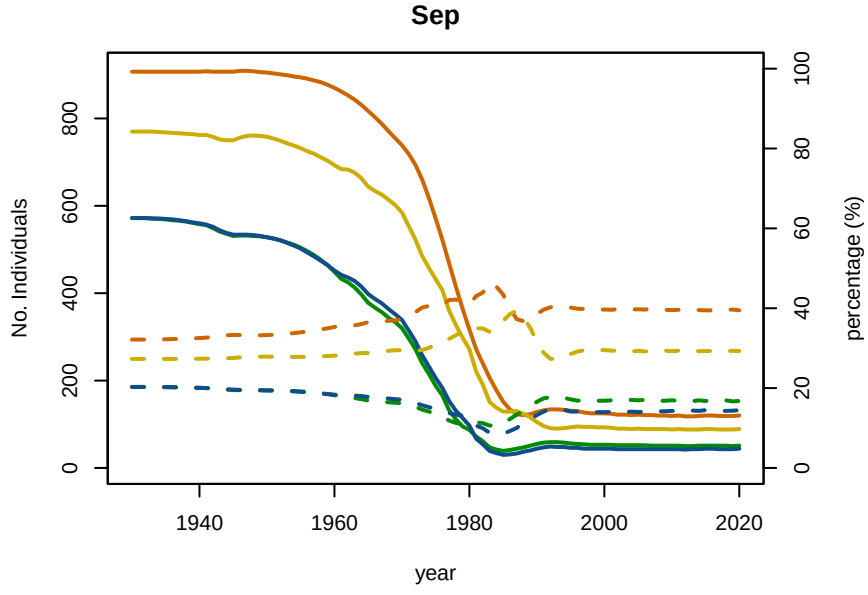


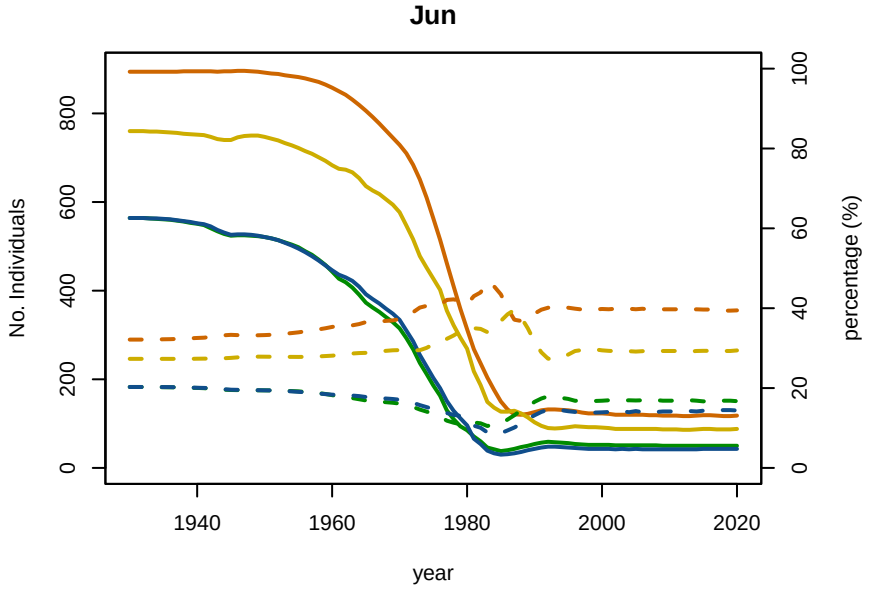


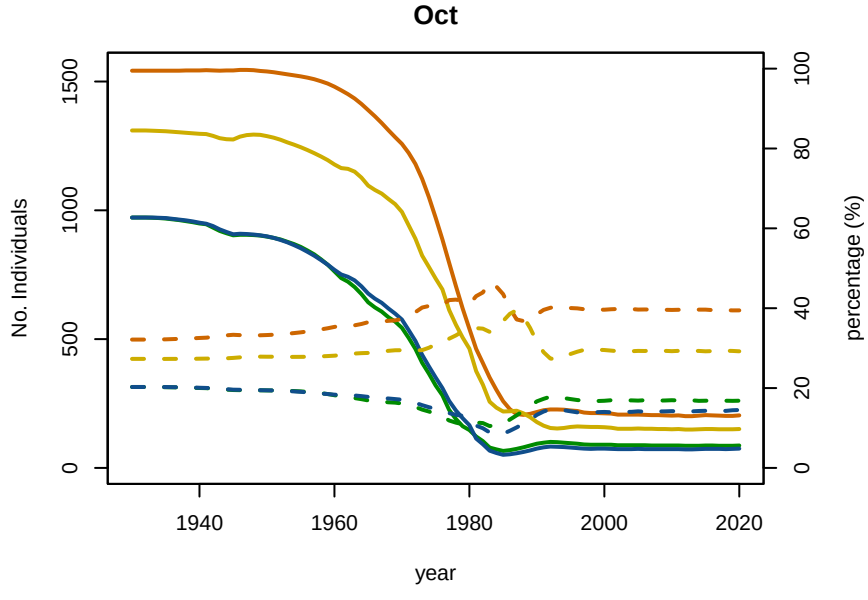






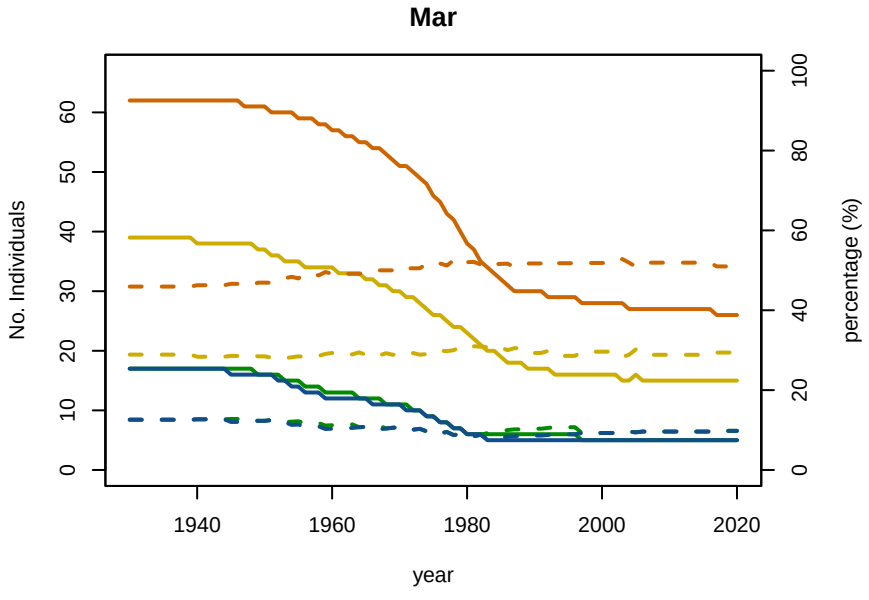


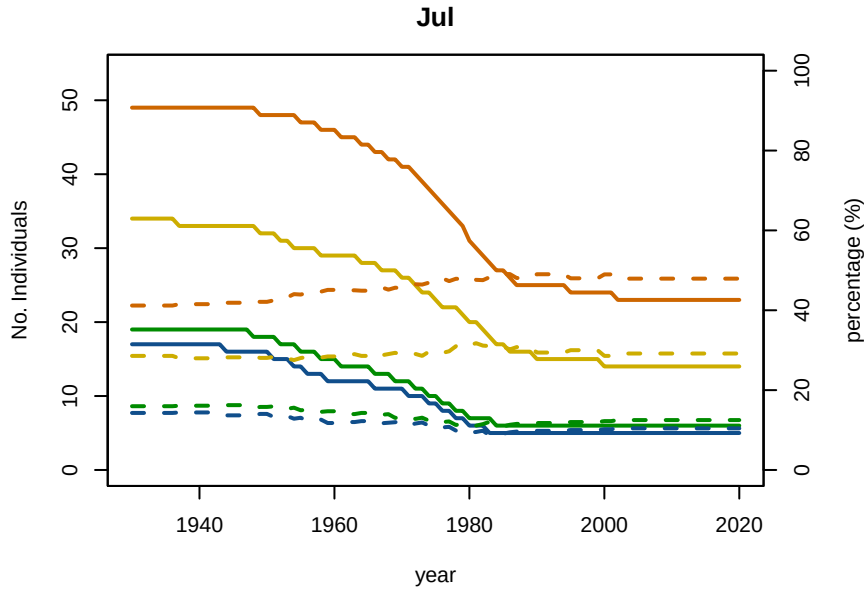


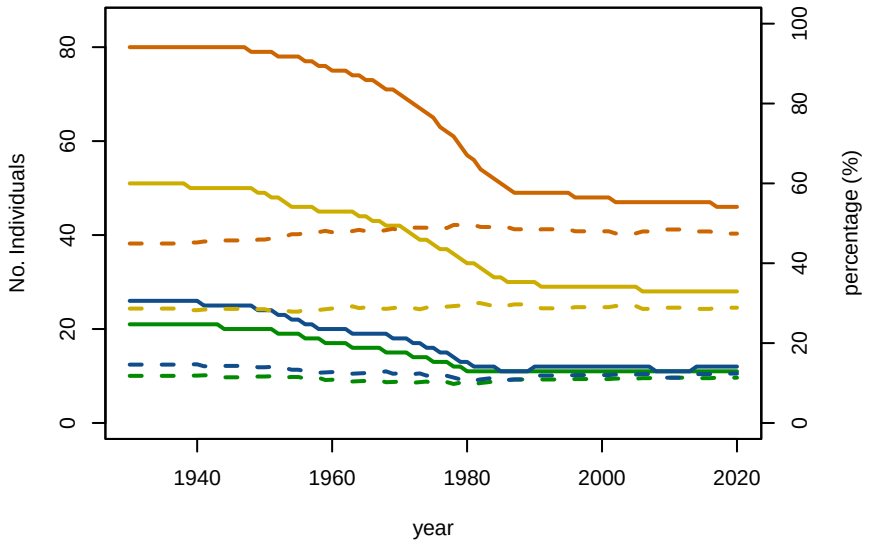


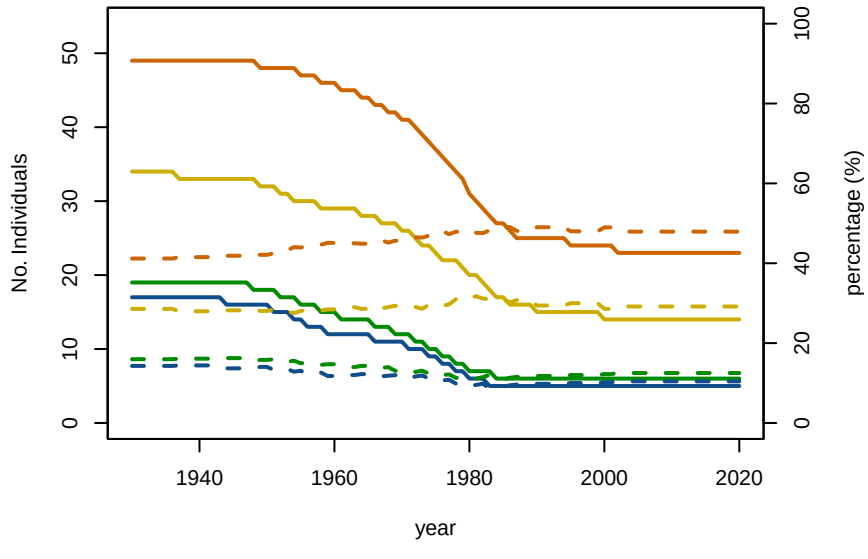
A1−4 A5−9 MatF MatM No Individuals percentage

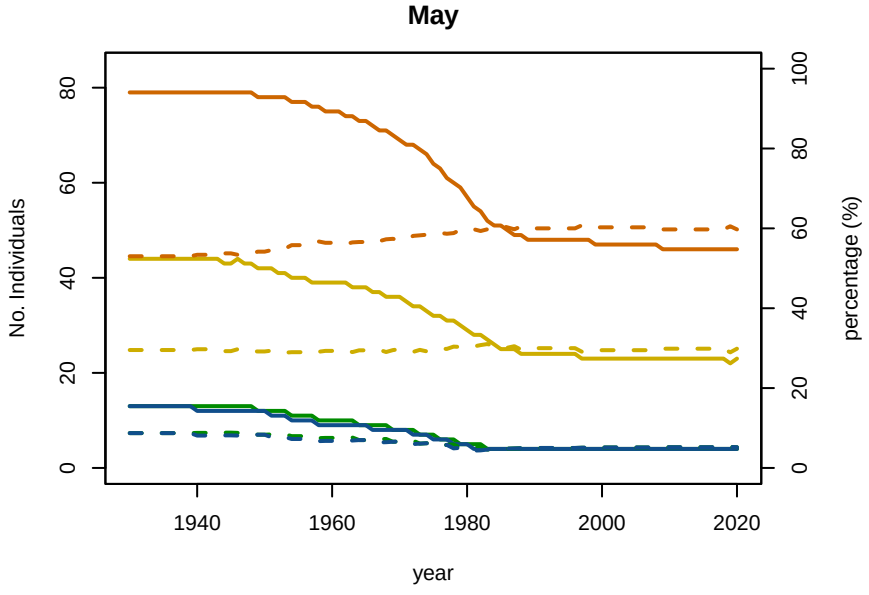
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 2C

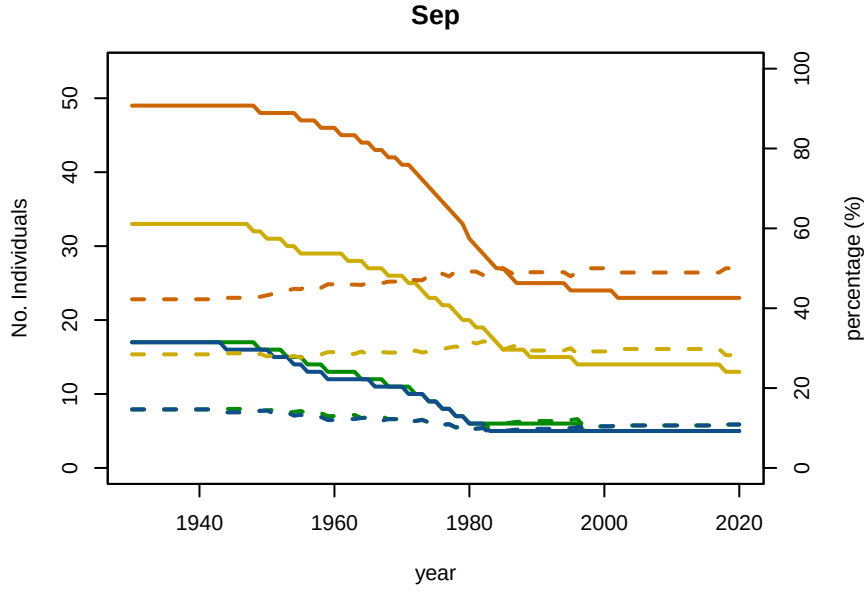


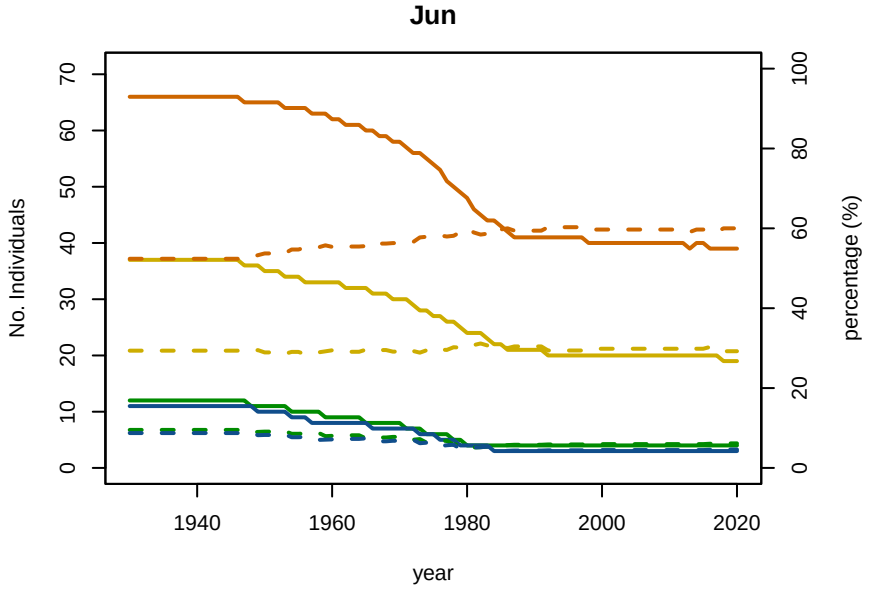


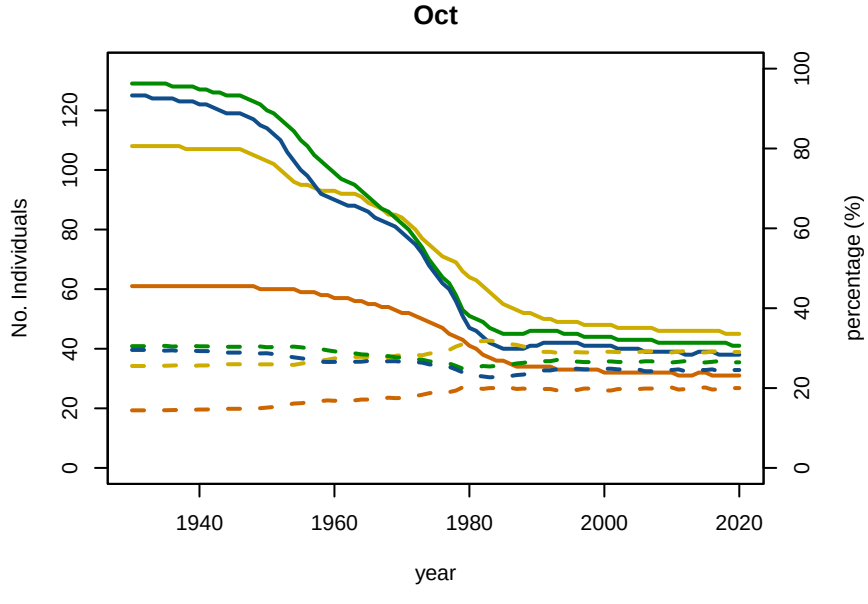






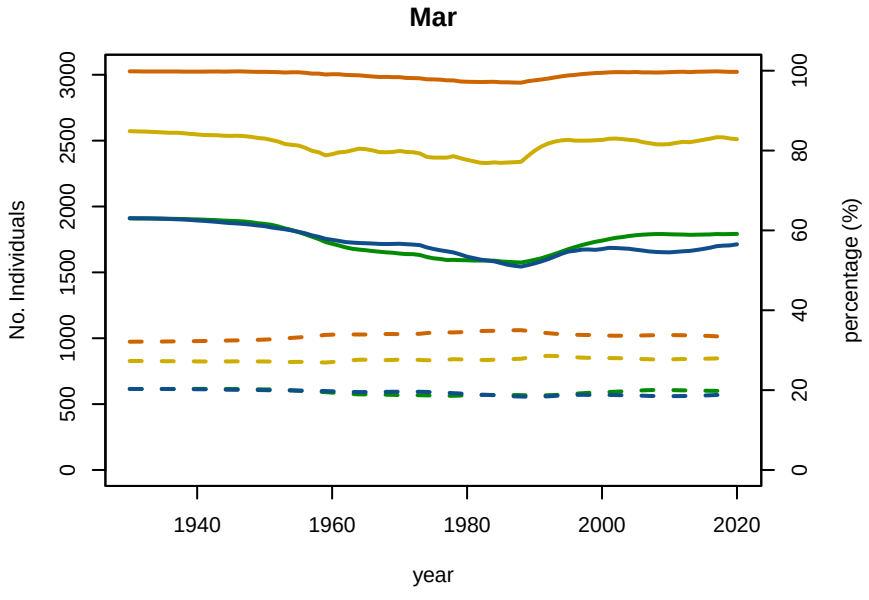


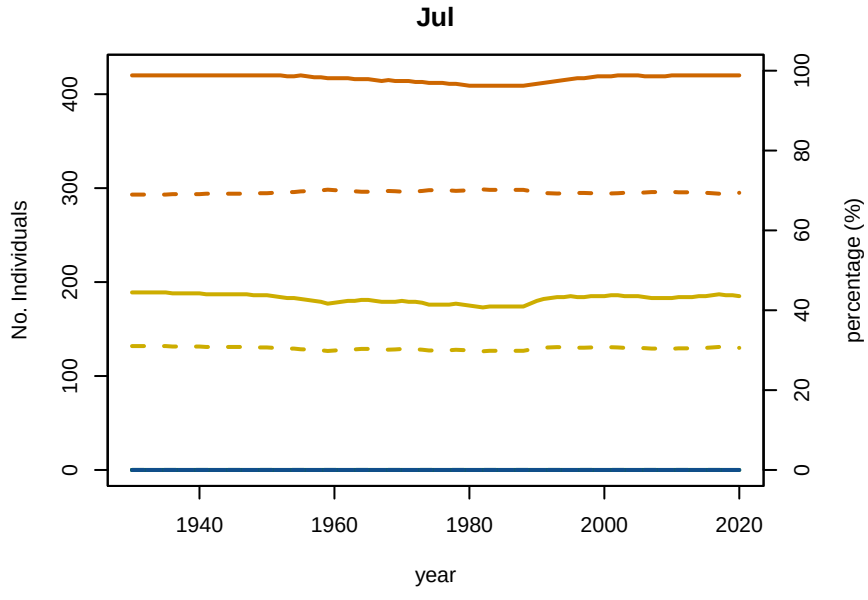


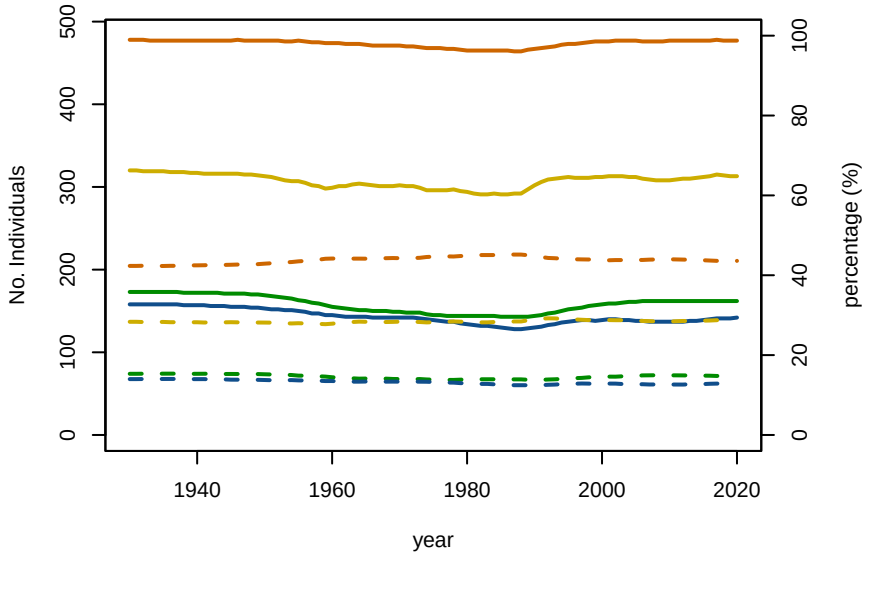


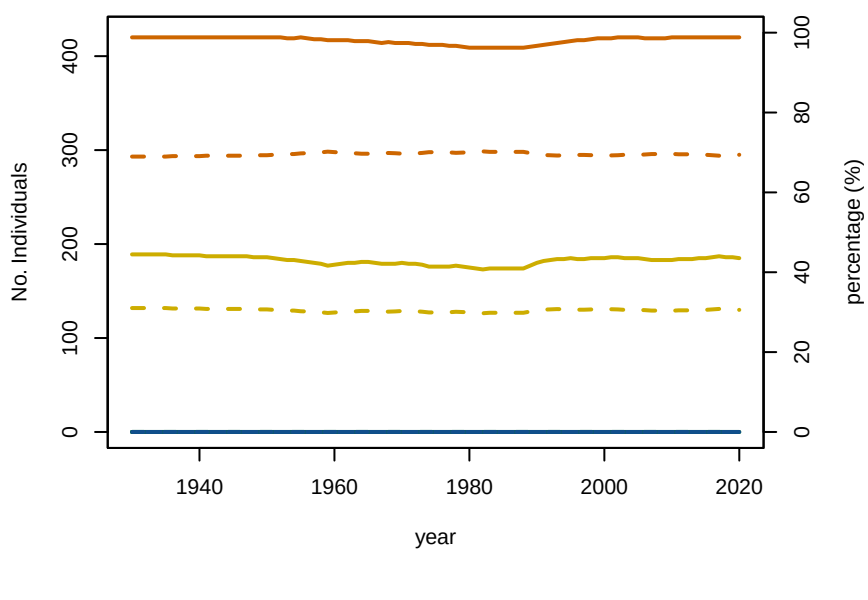
A1−4 A5−9 MatF MatM No Individuals percentage

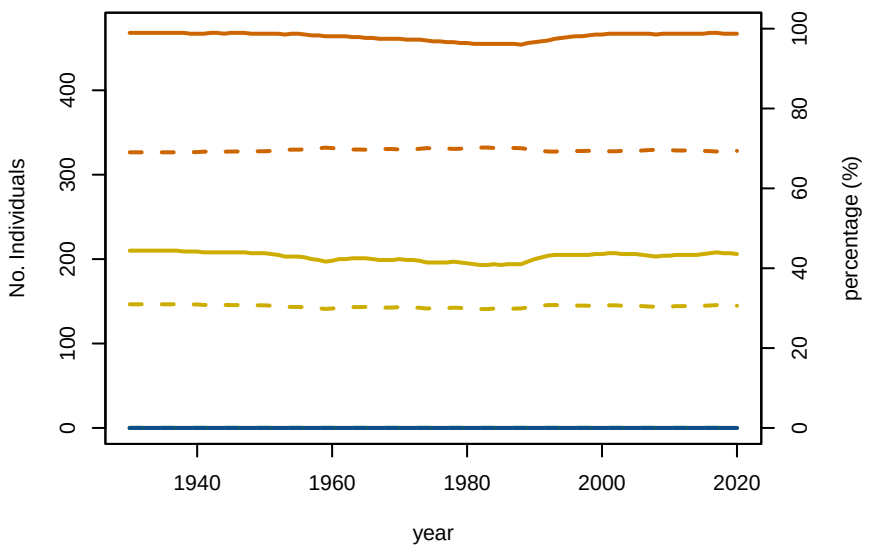
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 2R

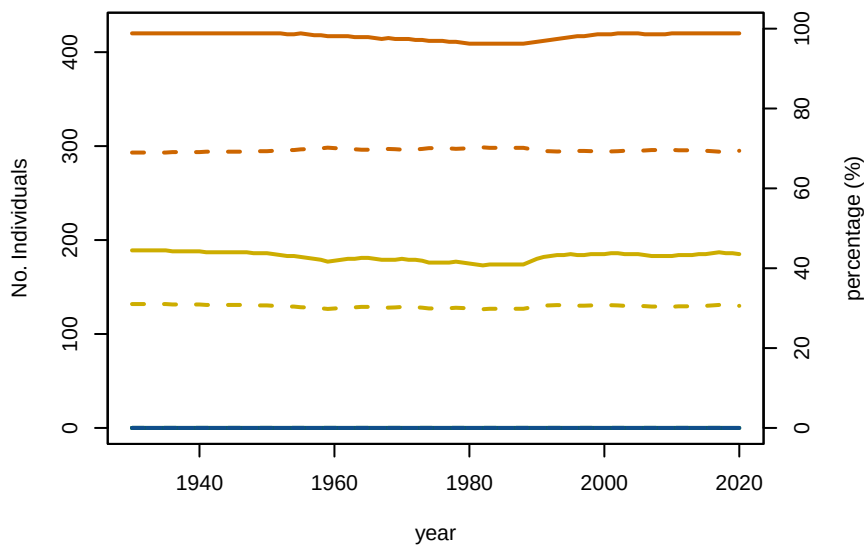


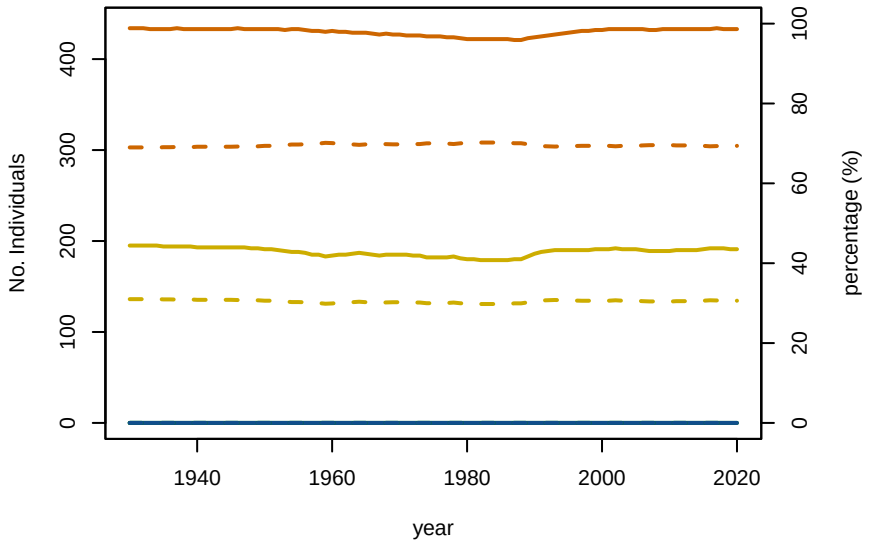


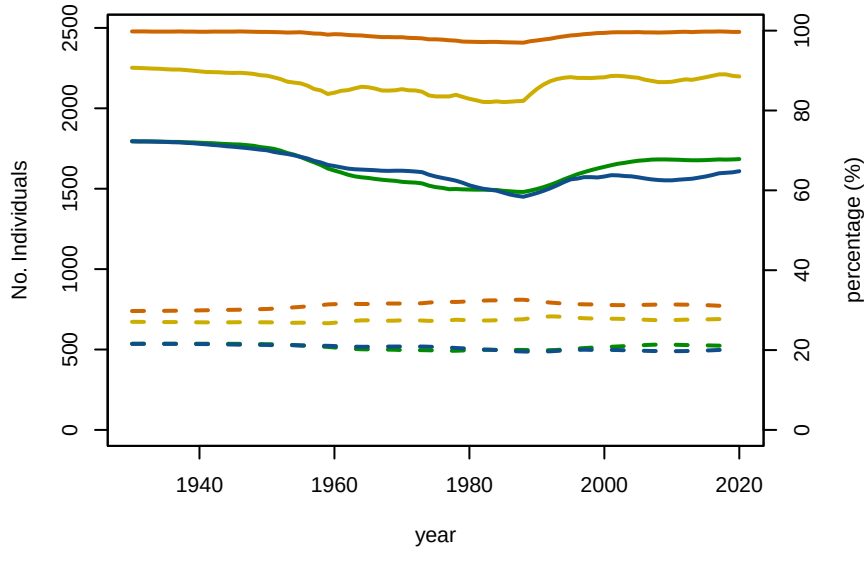






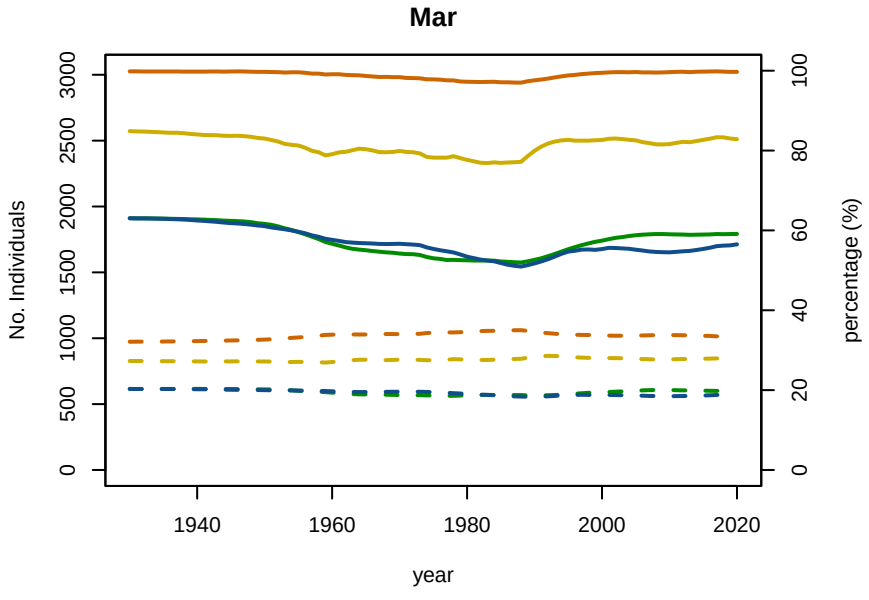


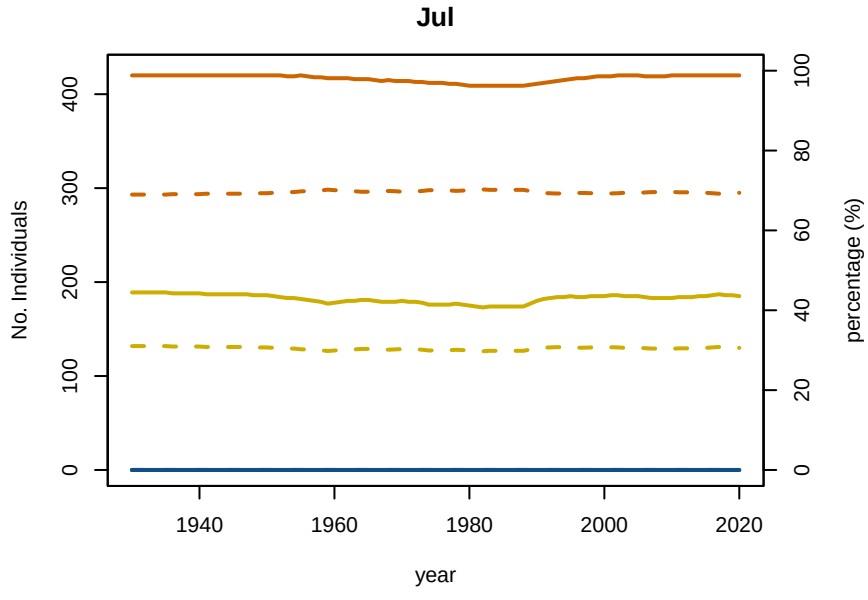


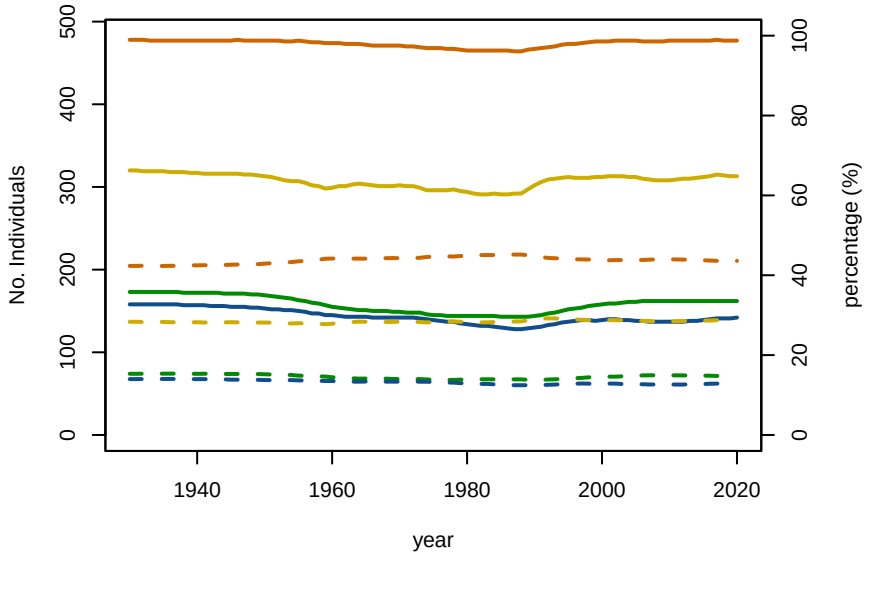


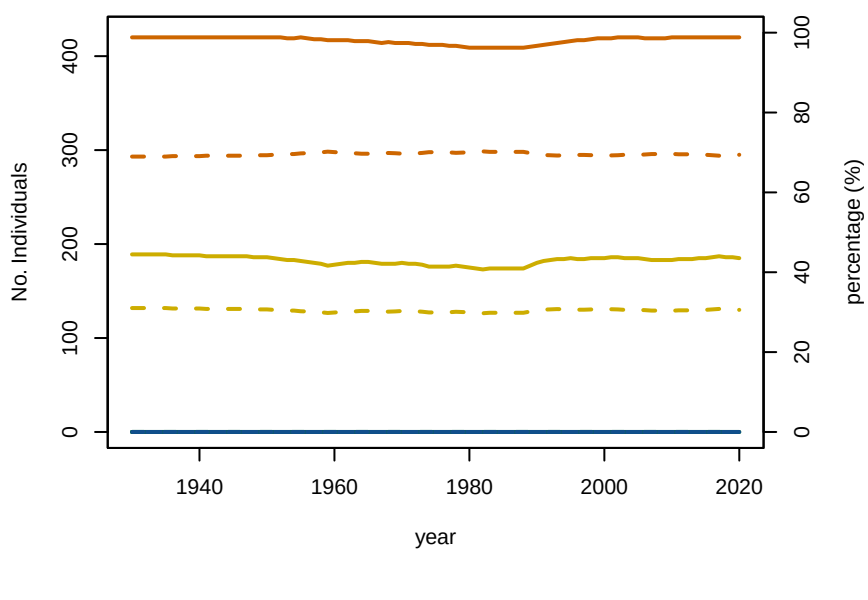
A1−4 A5−9 MatF MatM No Individuals percentage

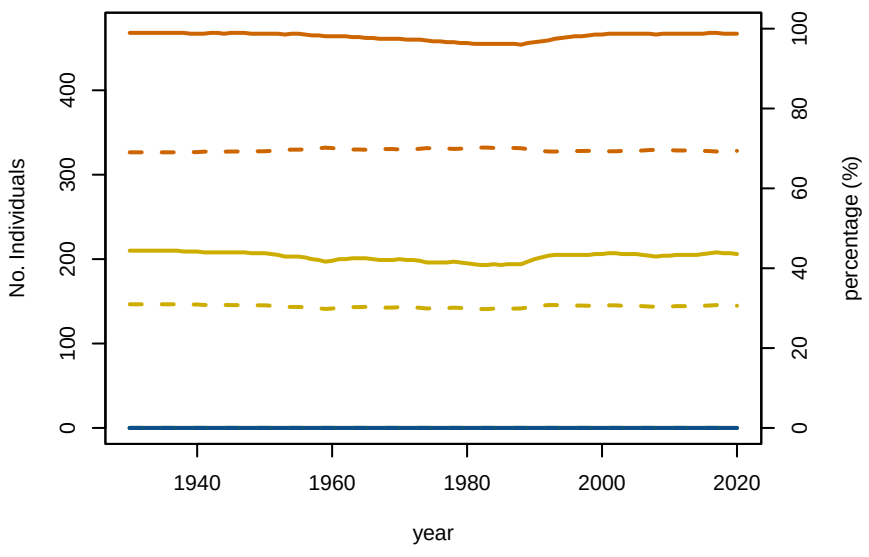
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 3

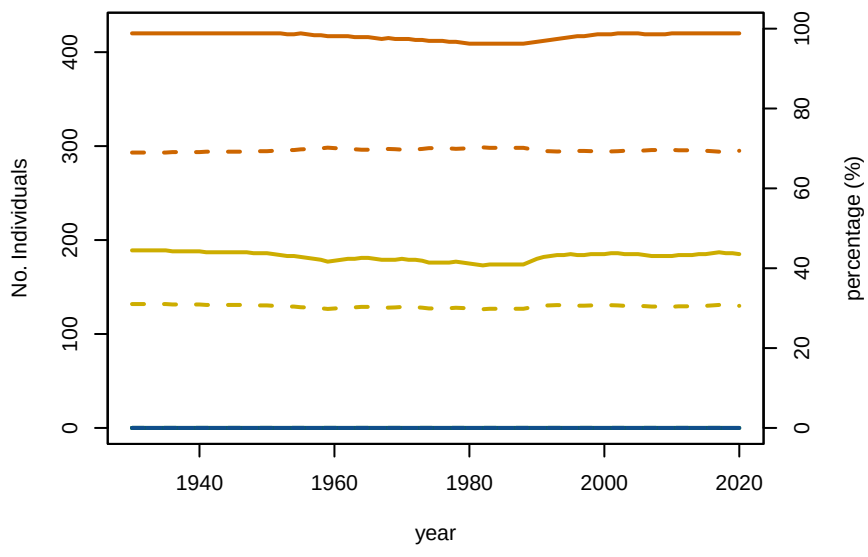


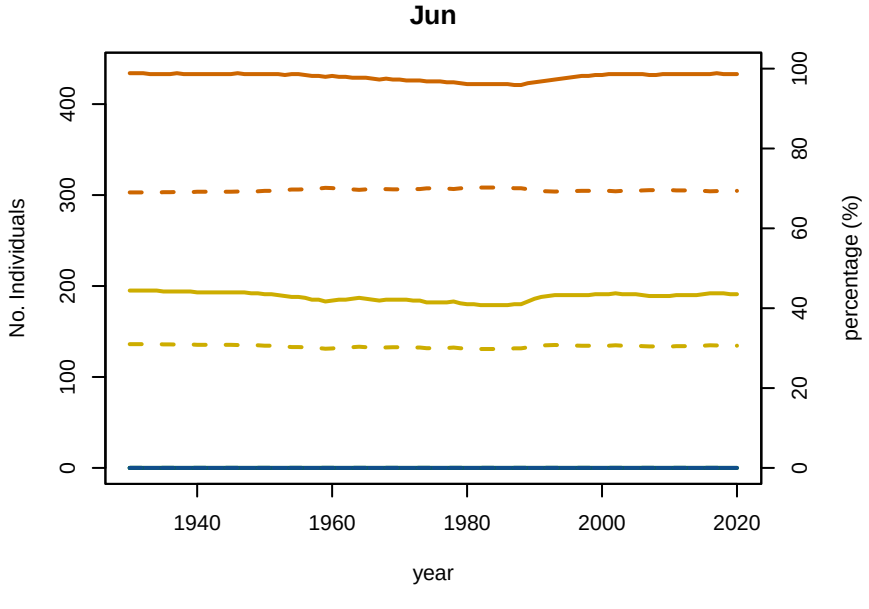


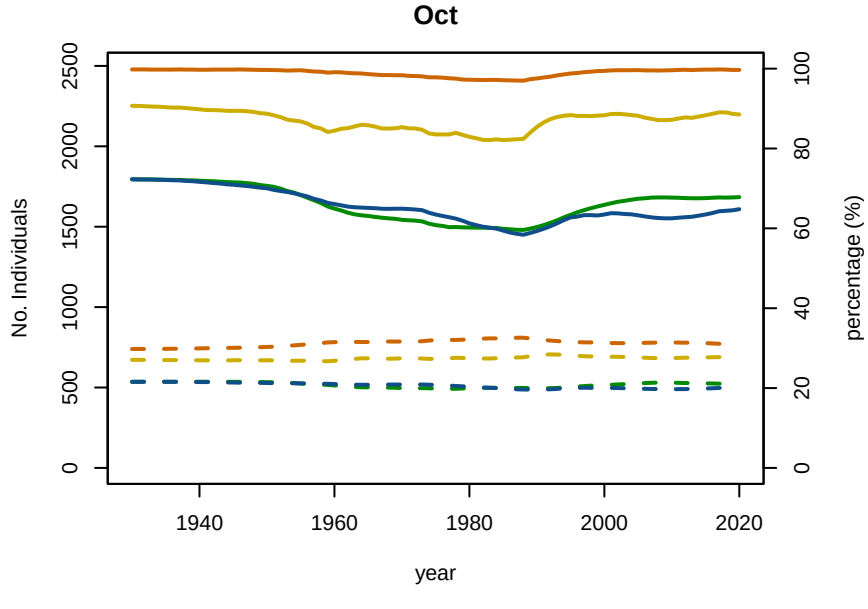






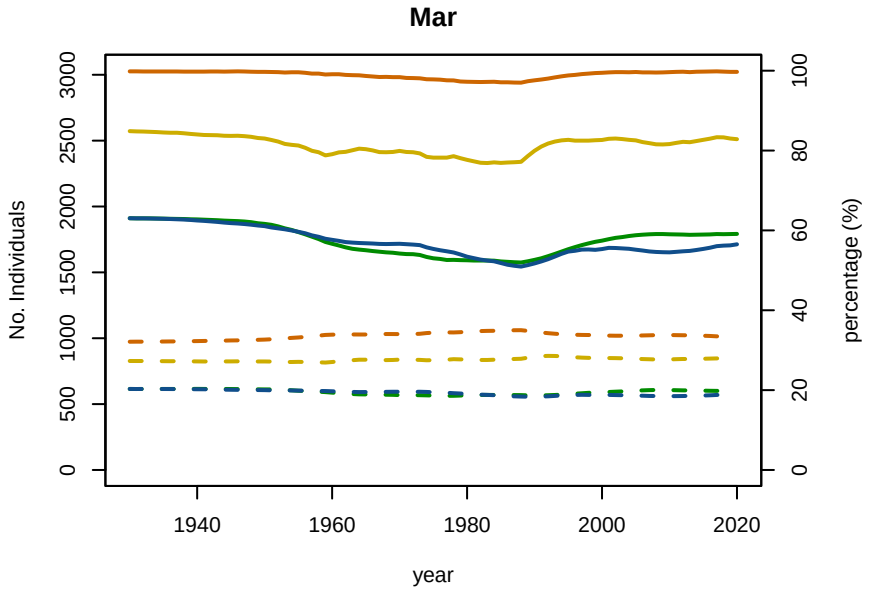


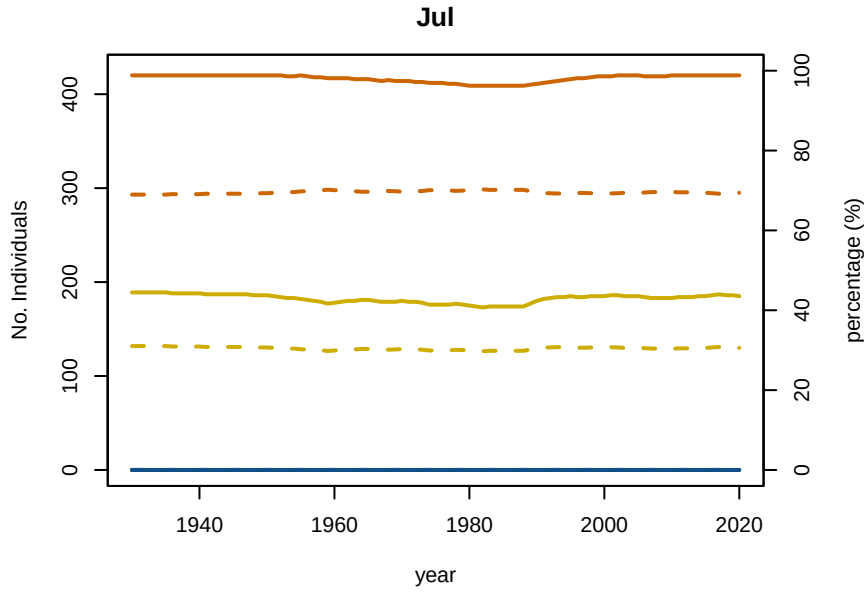


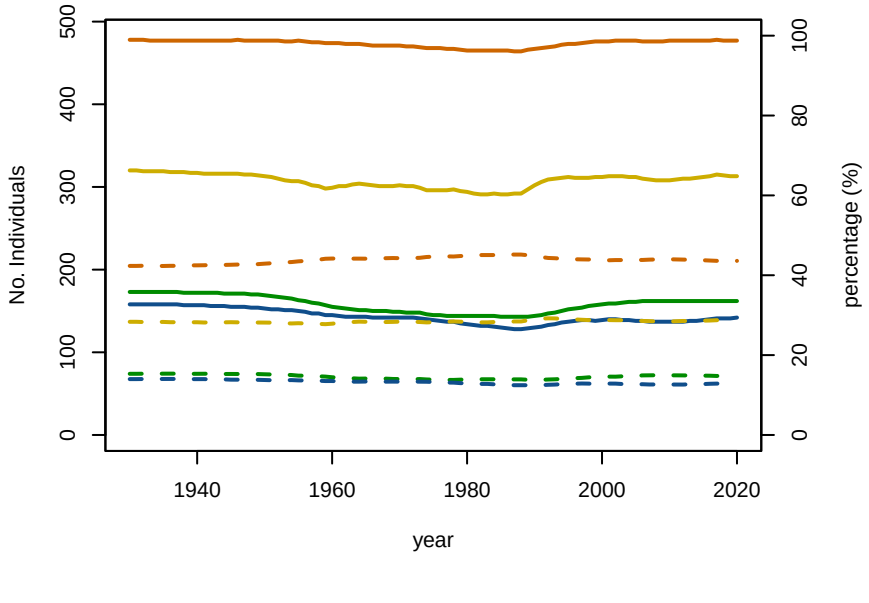


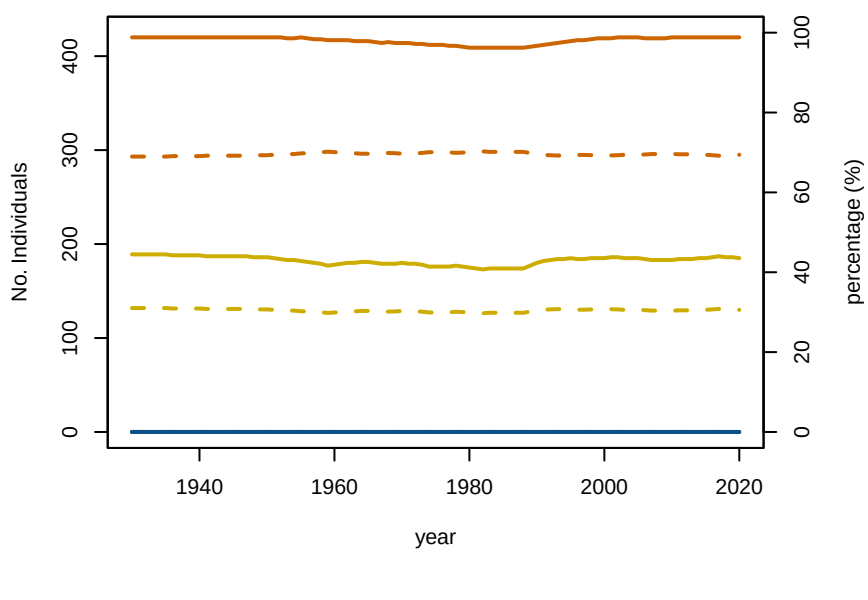
A1−4 A5−9 MatF MatM No Individuals percentage

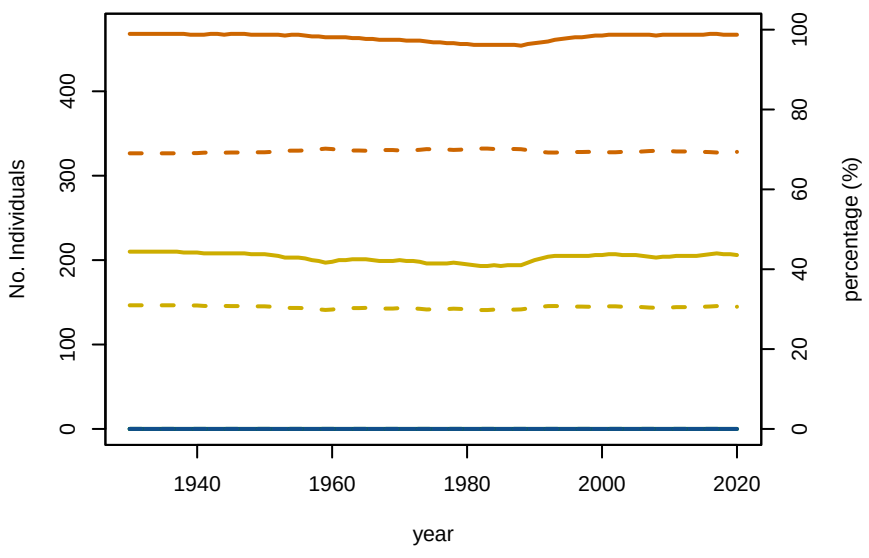
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 4

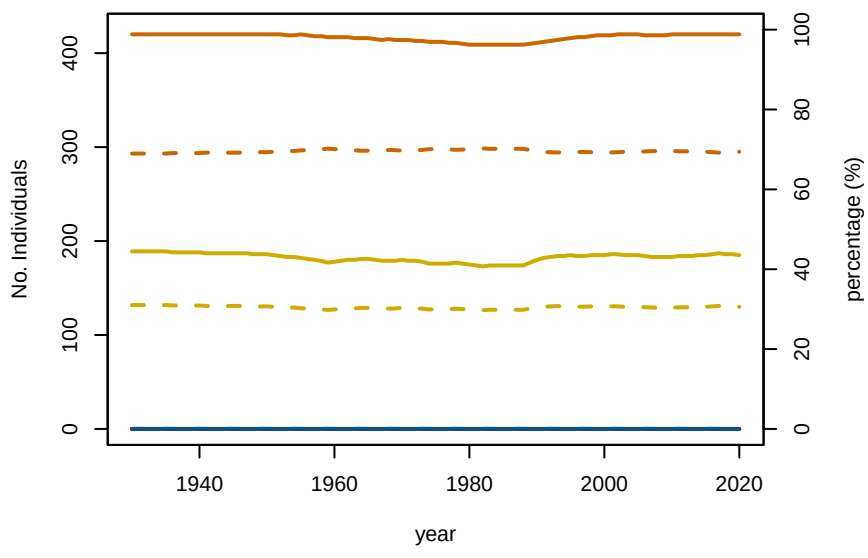


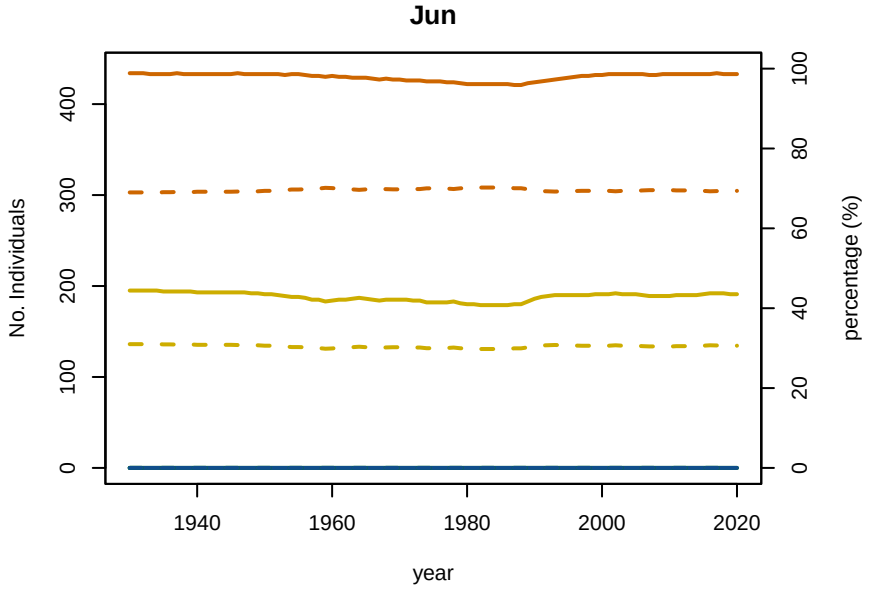


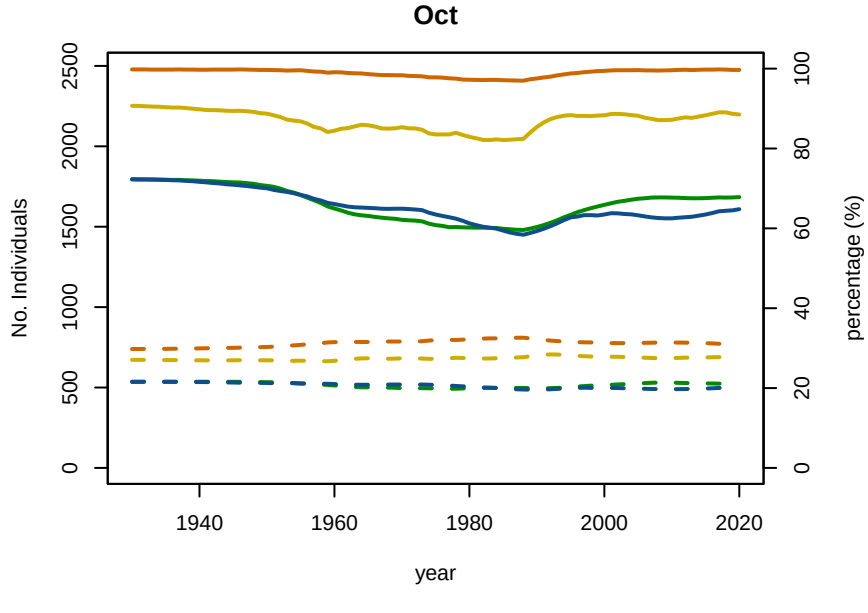






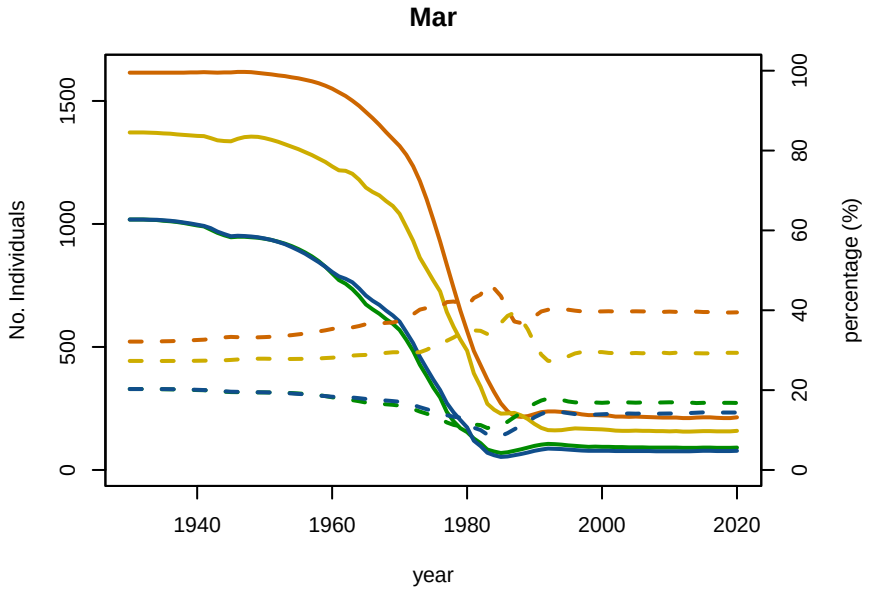


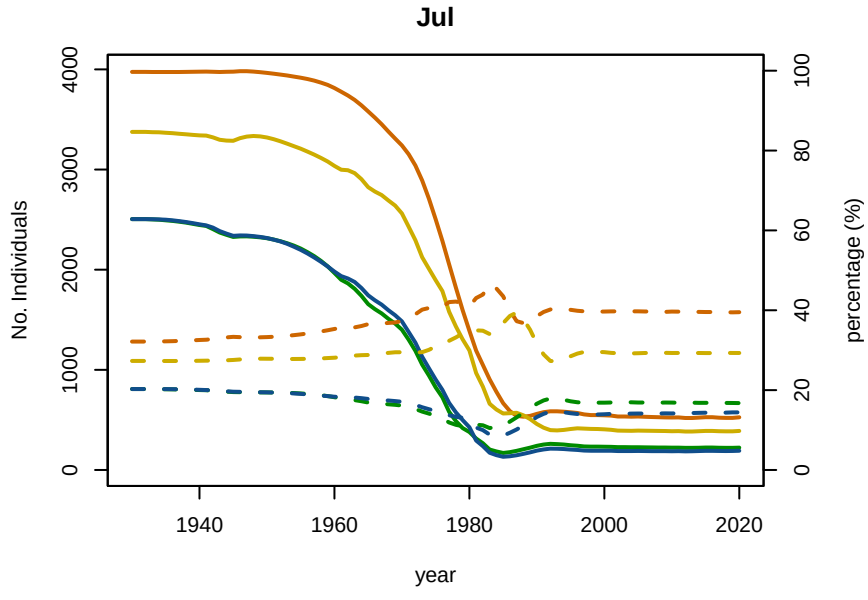


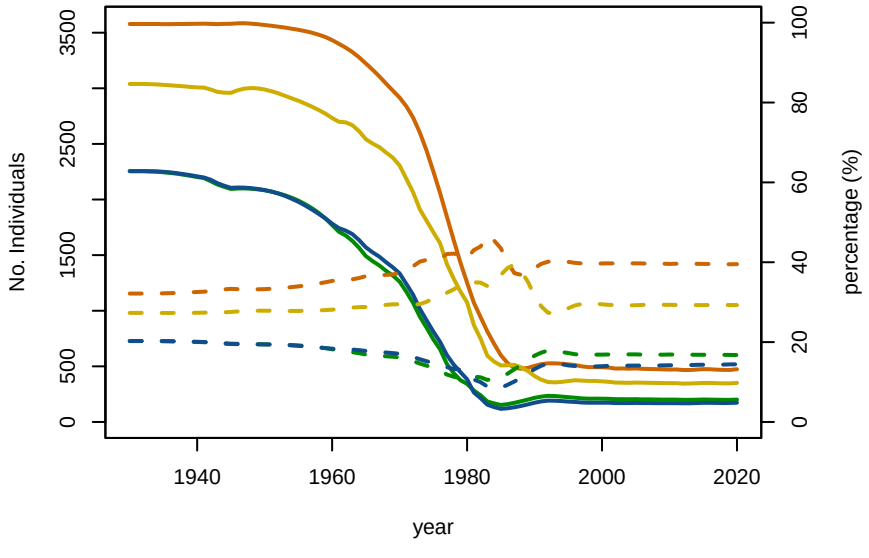


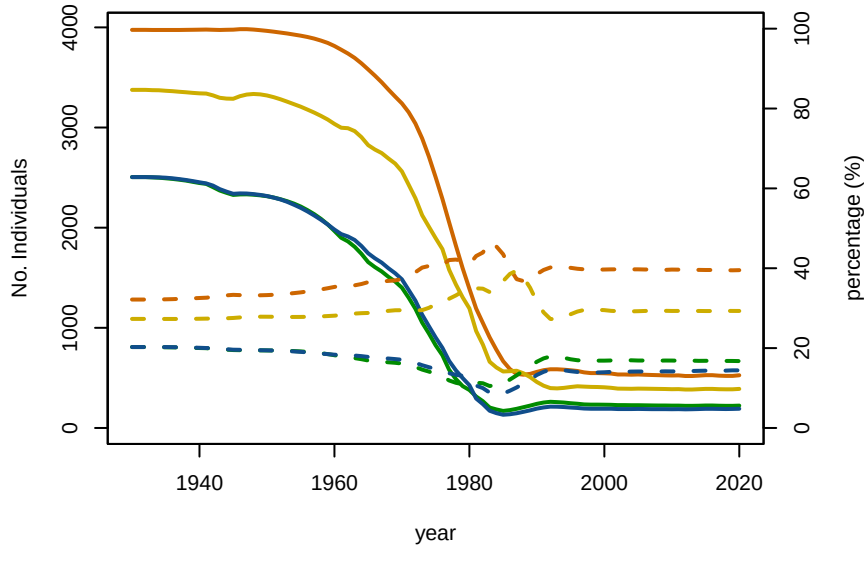
A1−4 A5−9 MatF MatM No Individuals percentage

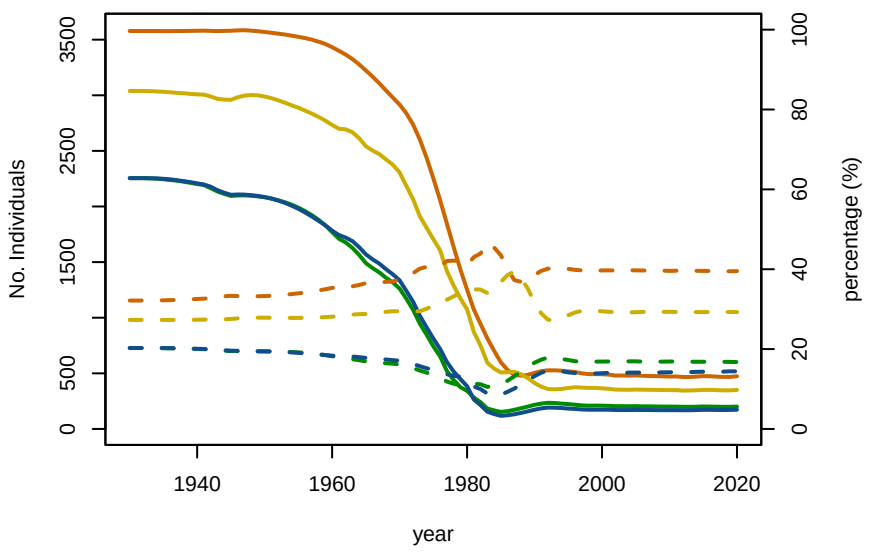
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 5

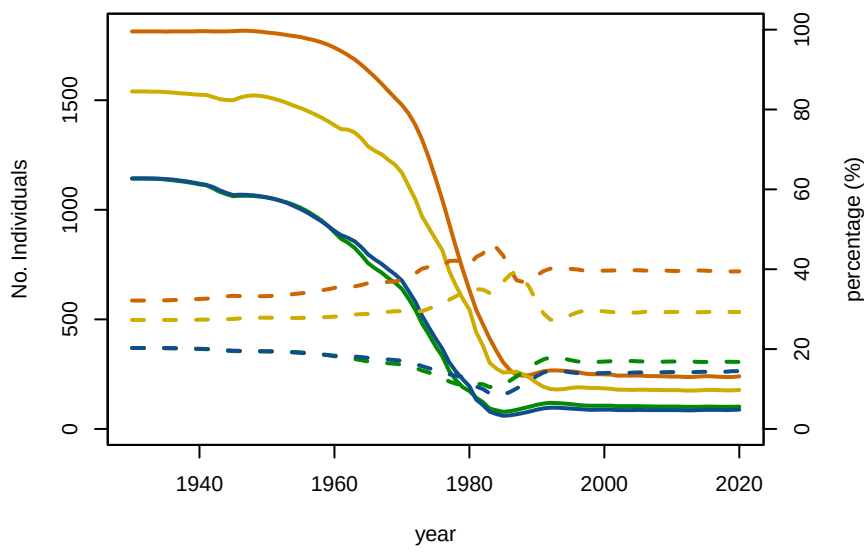


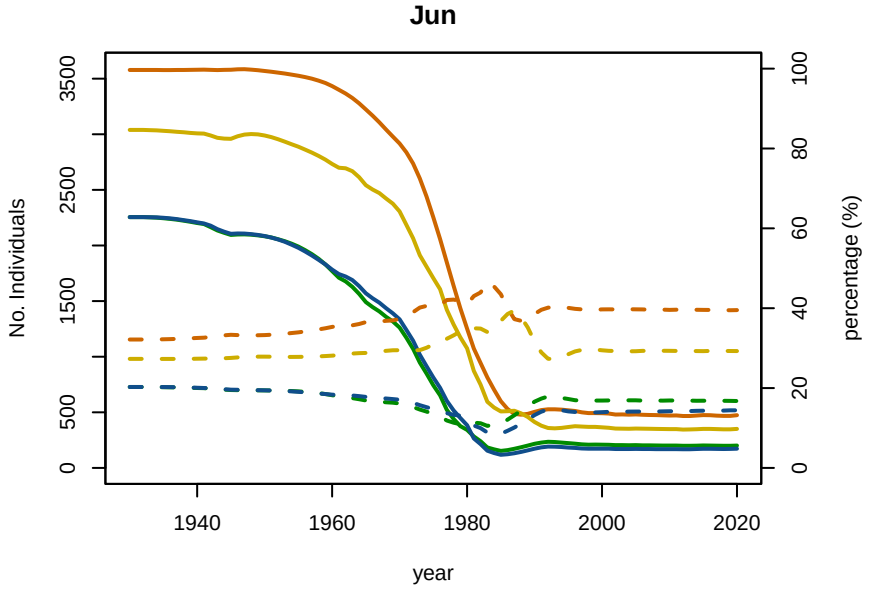


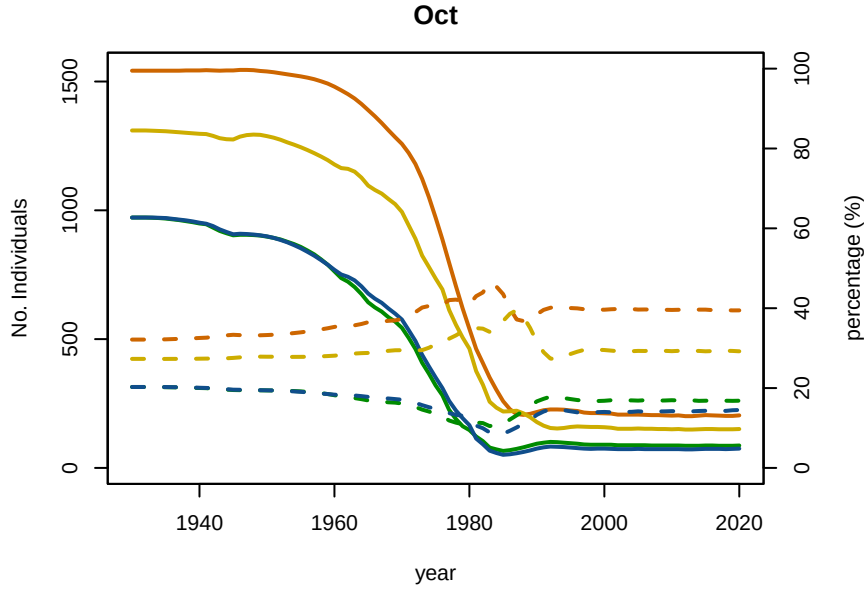






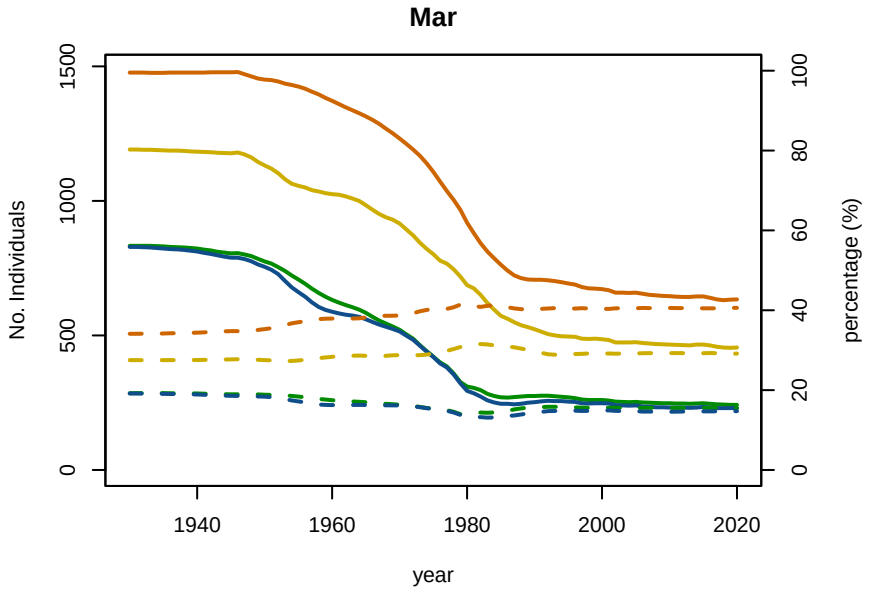


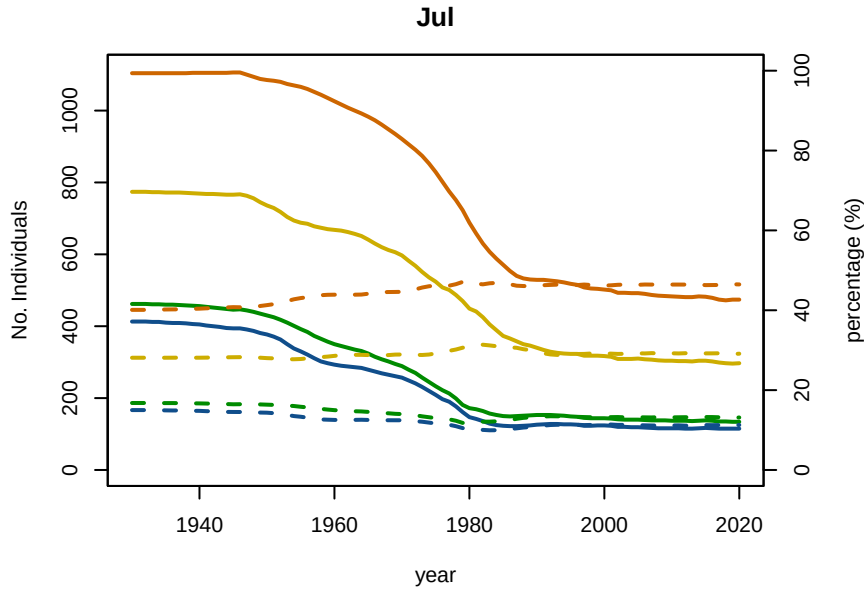


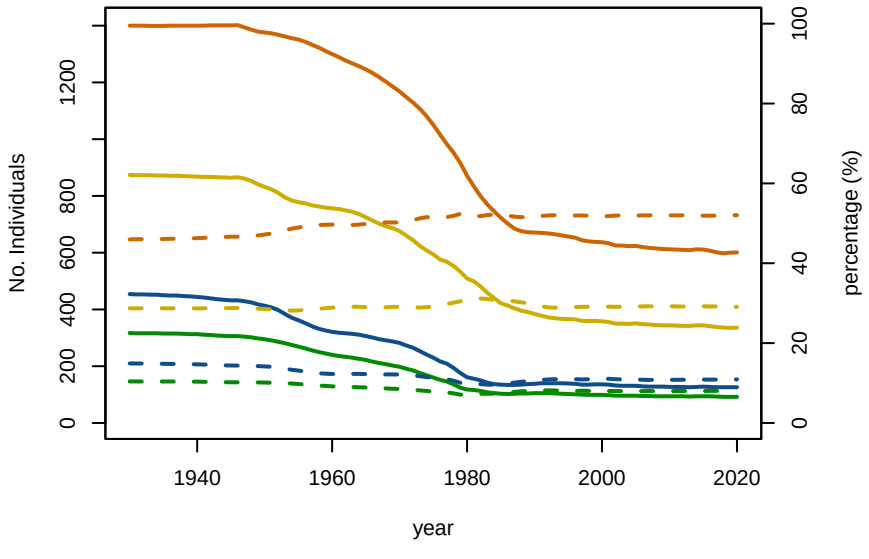


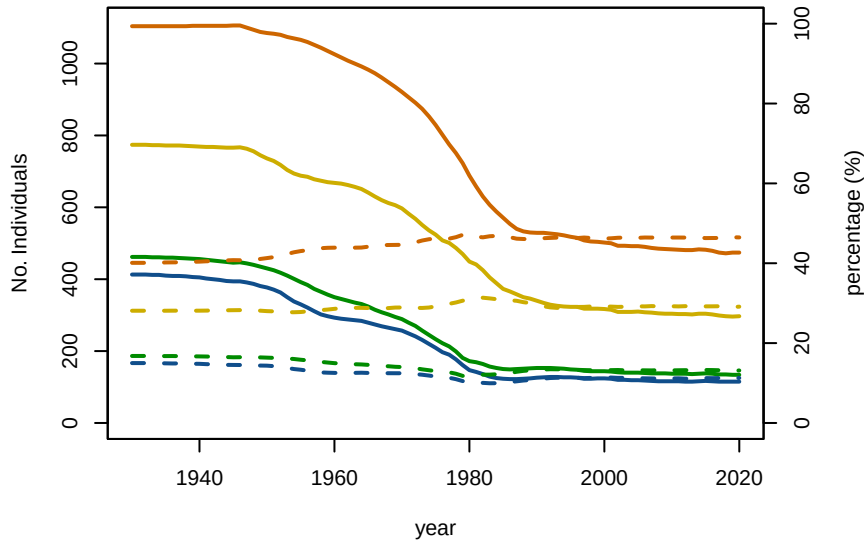
A1−4 A5−9 MatF MatM No Individuals percentage

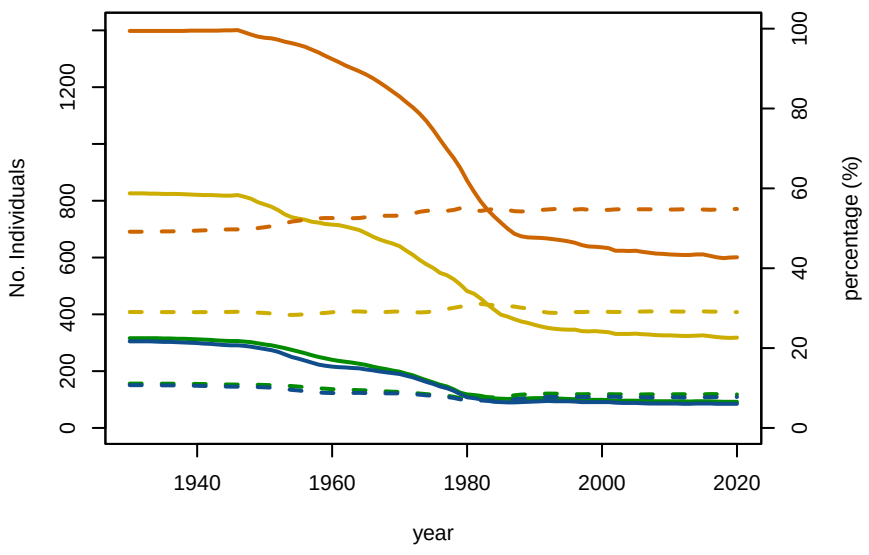
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 6E

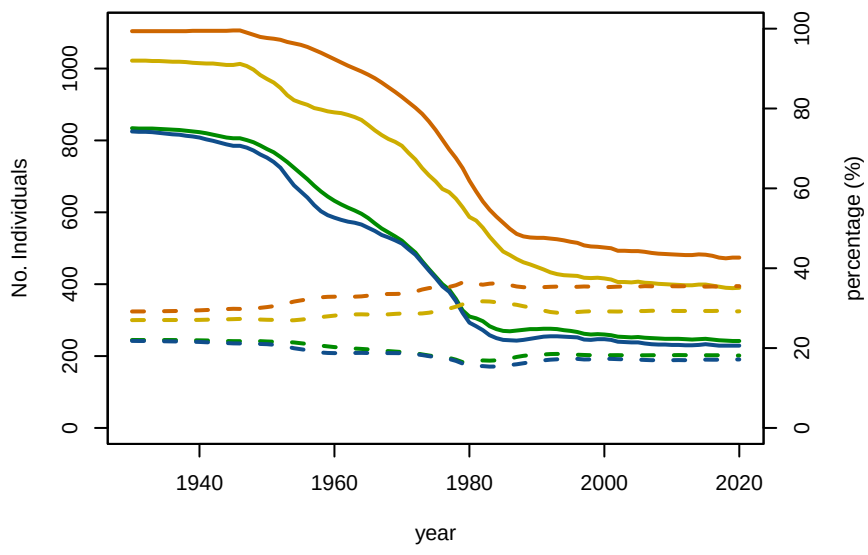


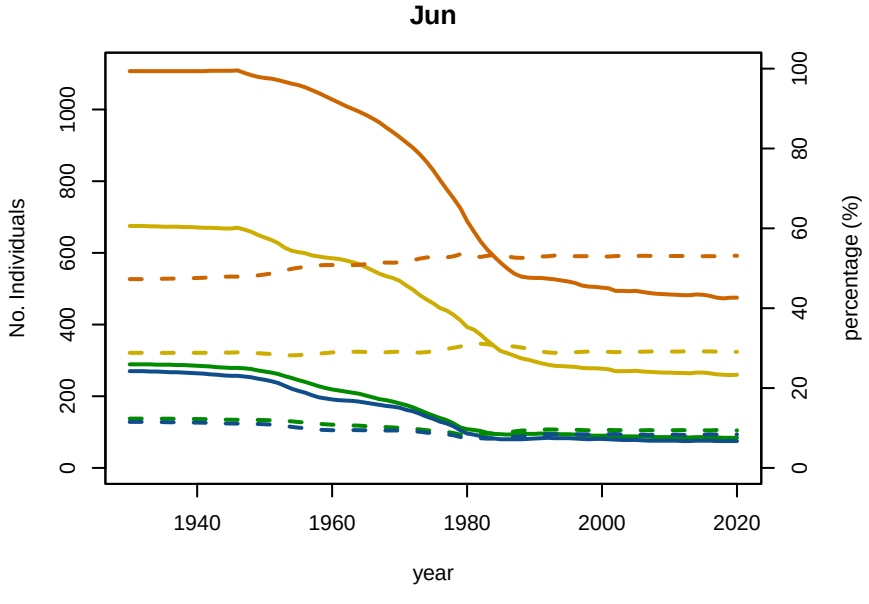


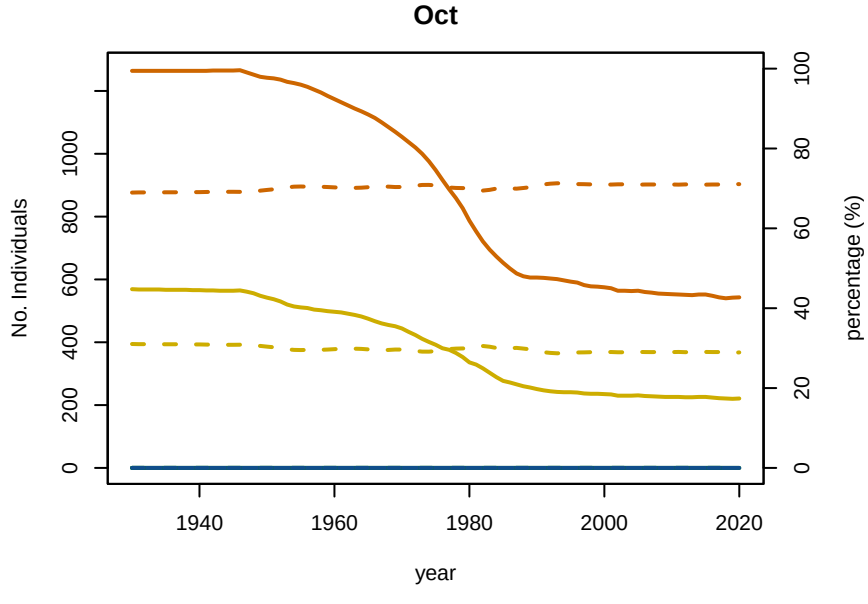






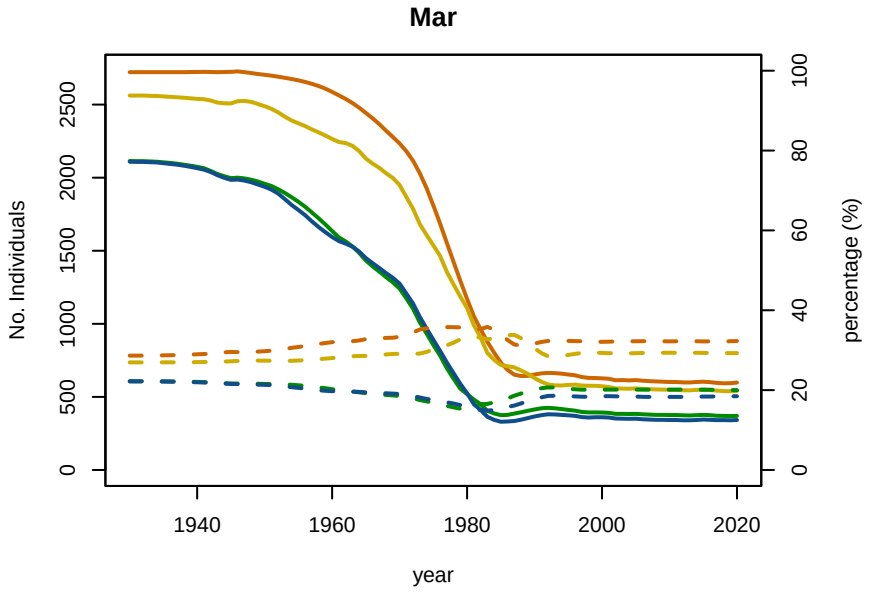


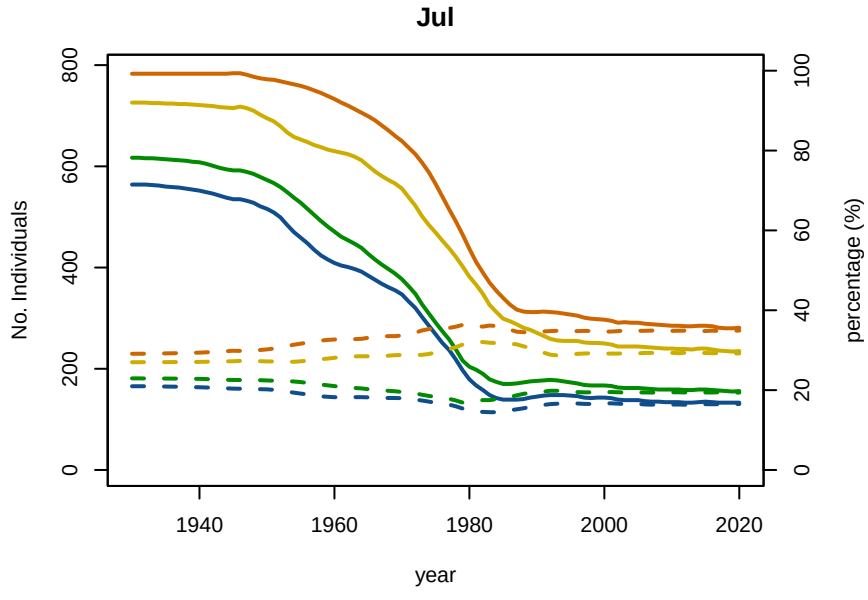


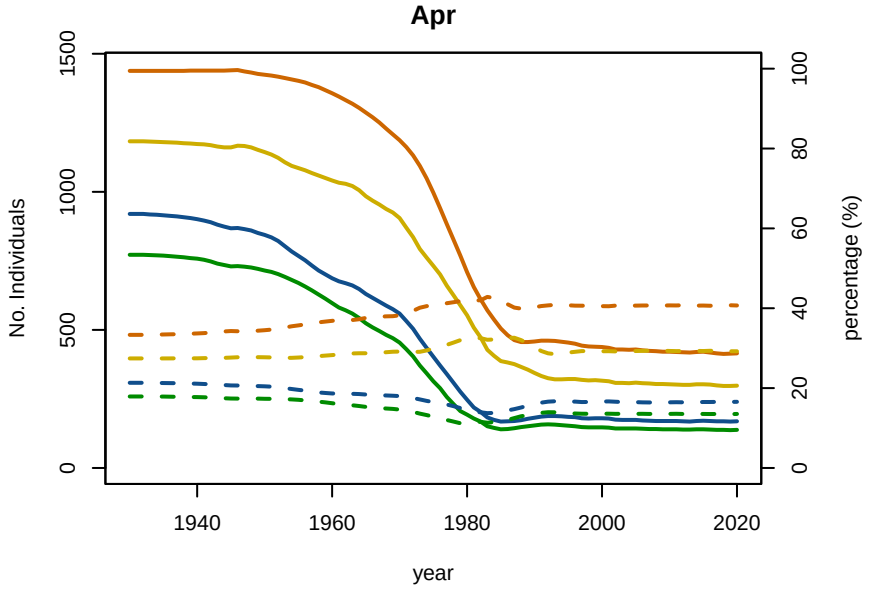


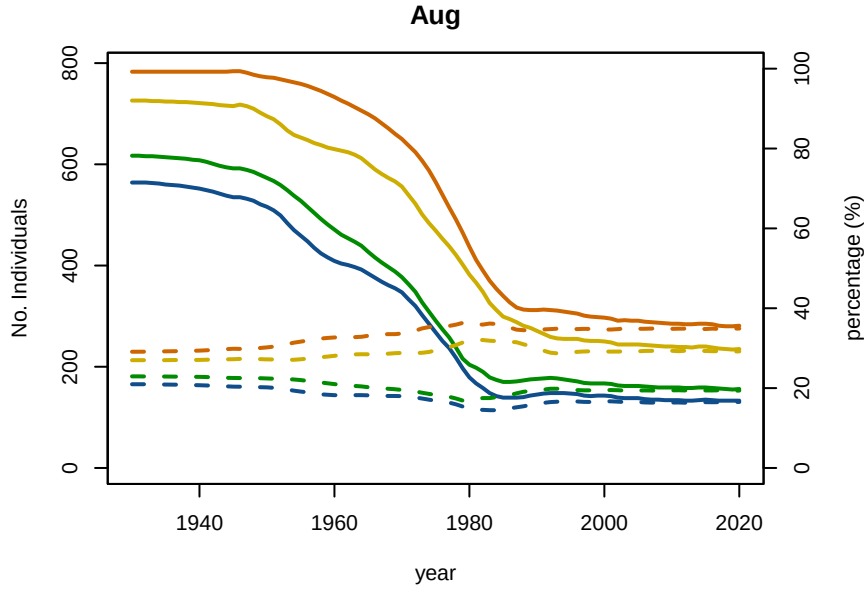
A1−4 A5−9 MatF MatM No Individuals percentage

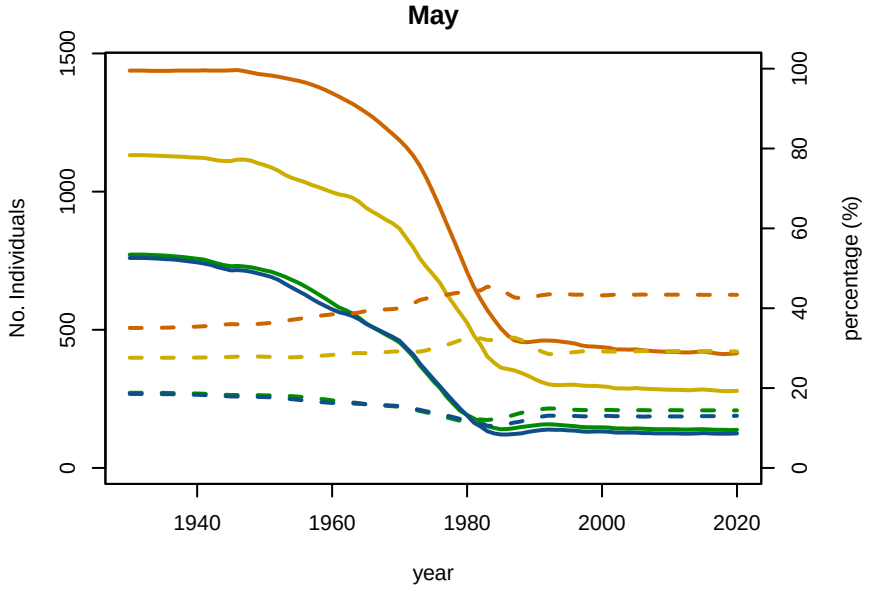
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 6W

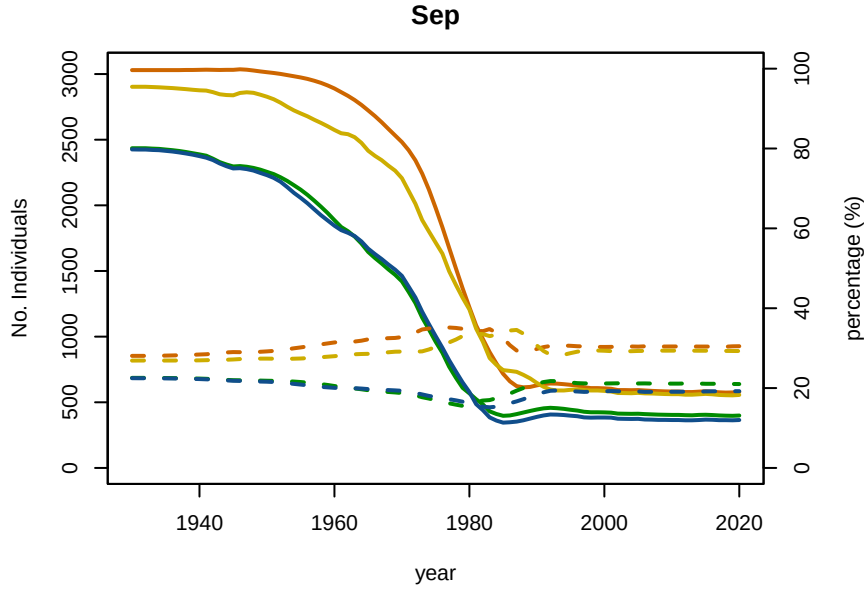


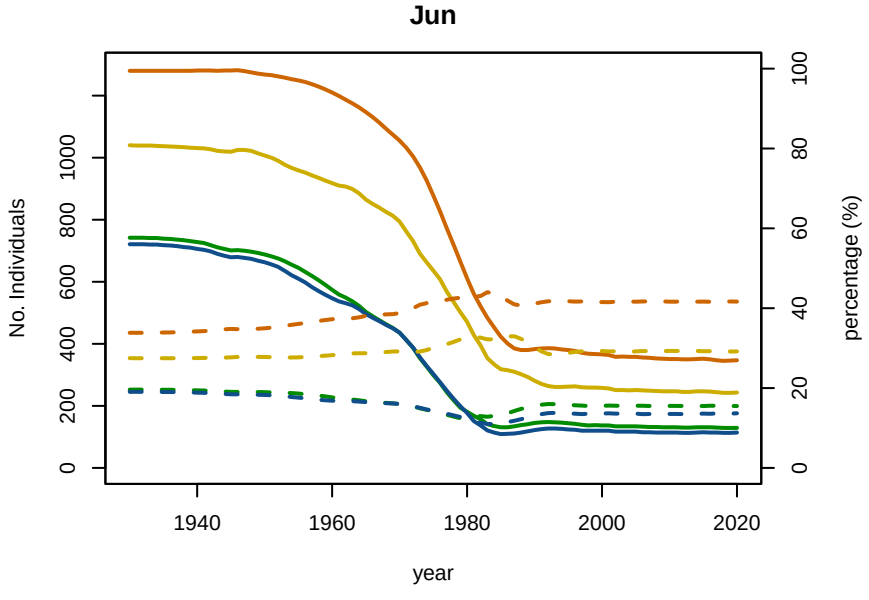


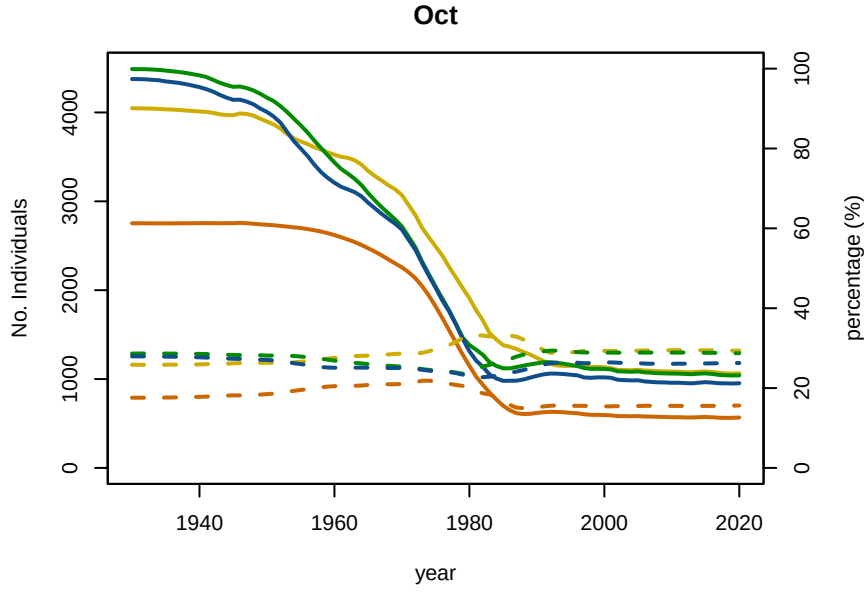






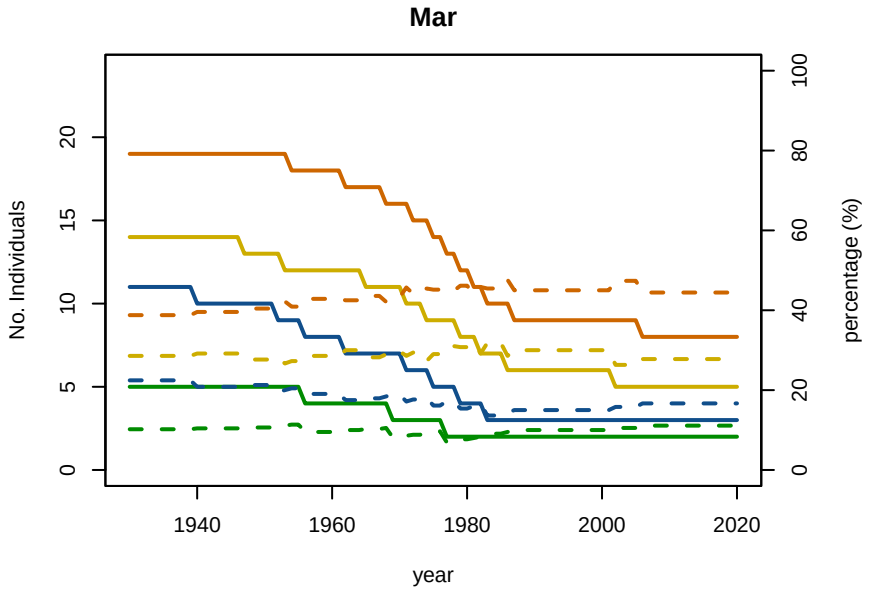


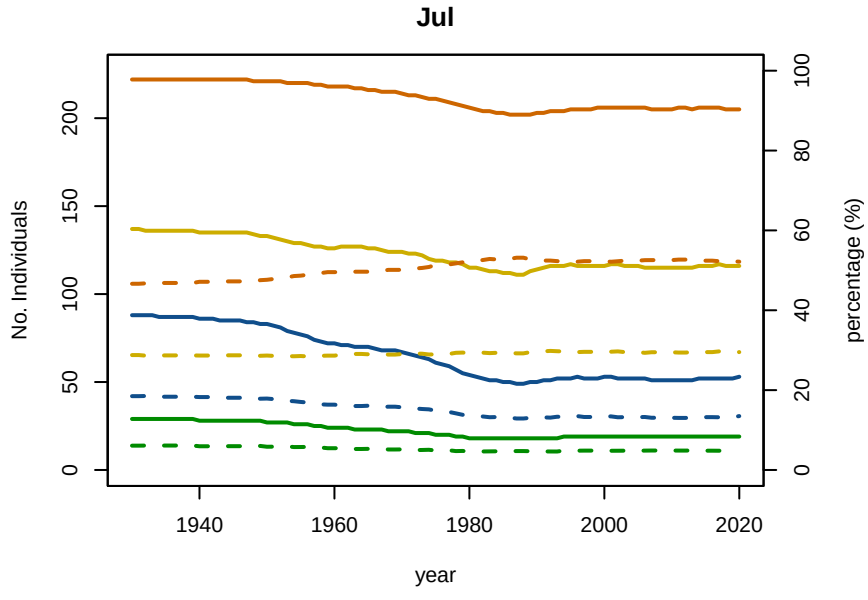


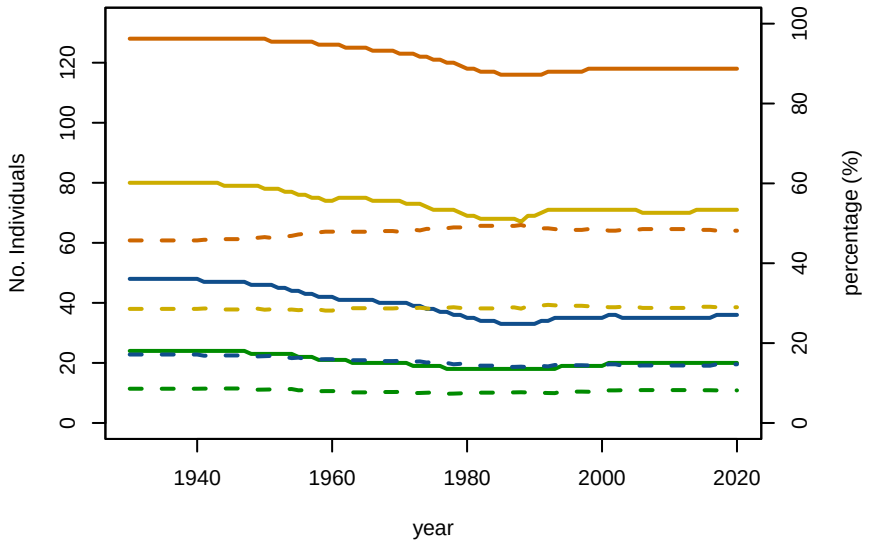


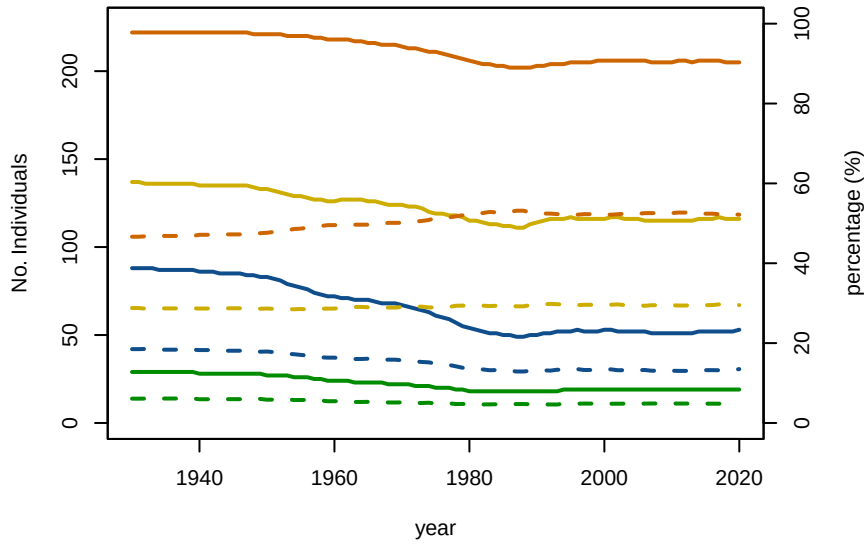
A1−4 A5−9 MatF MatM No Individuals percentage

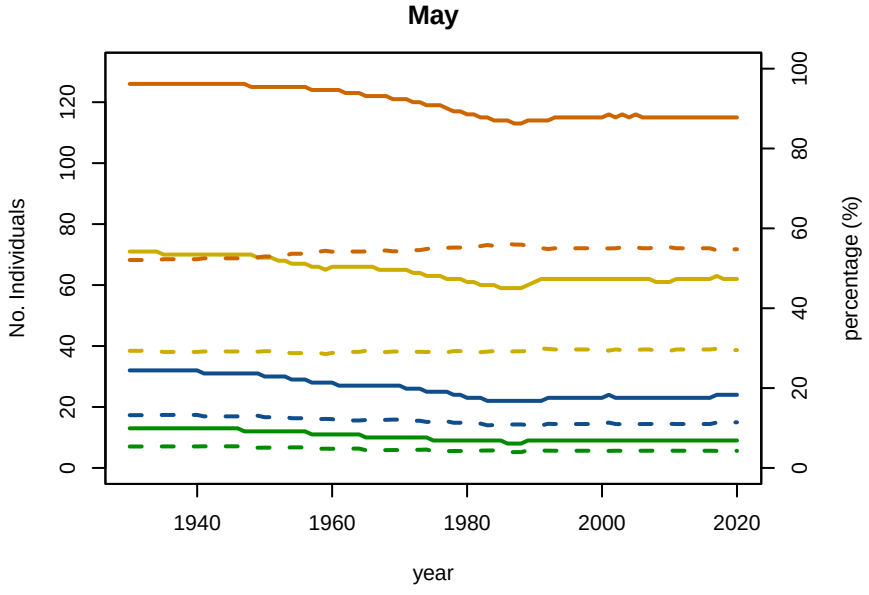
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7CN

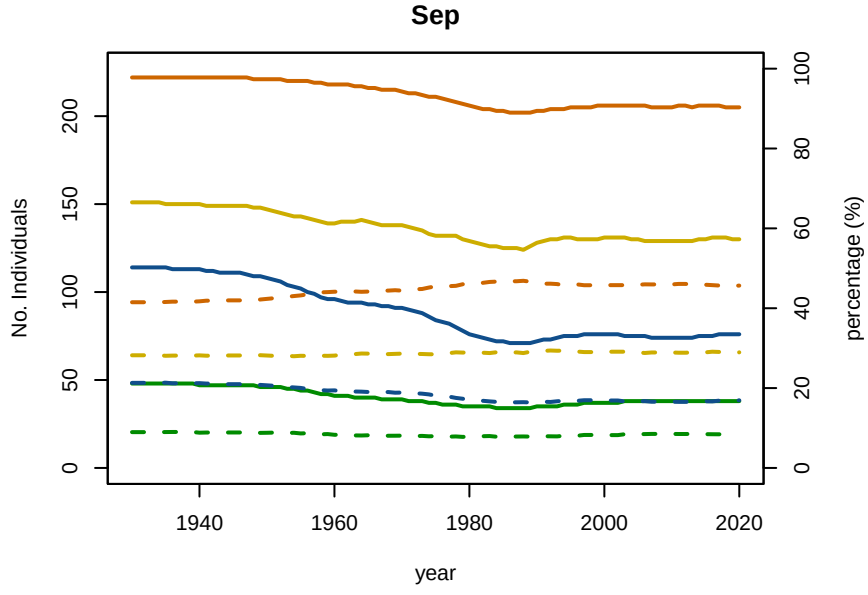


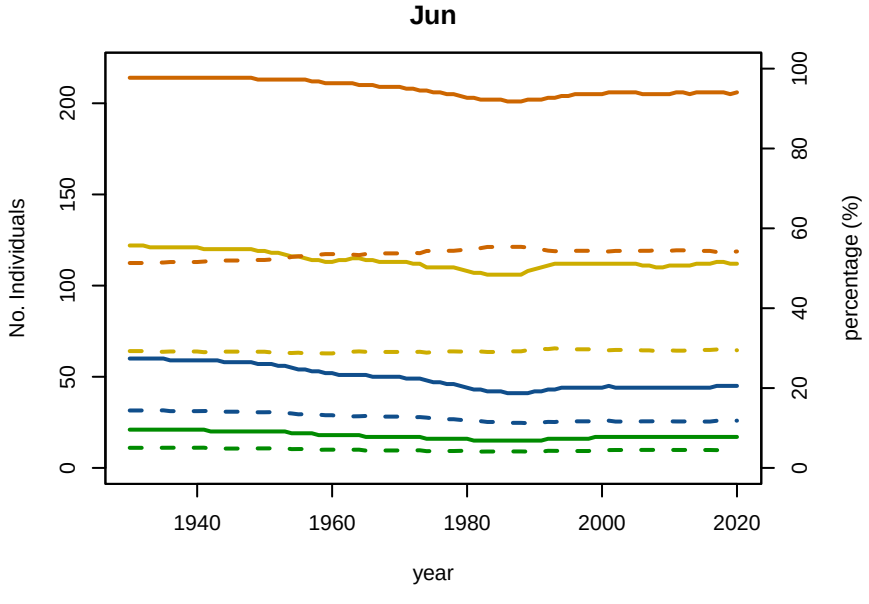


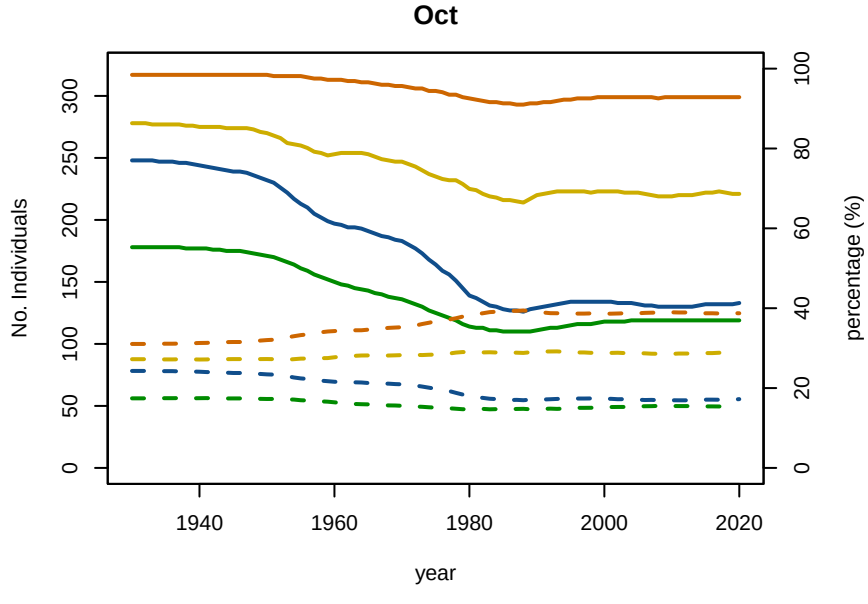






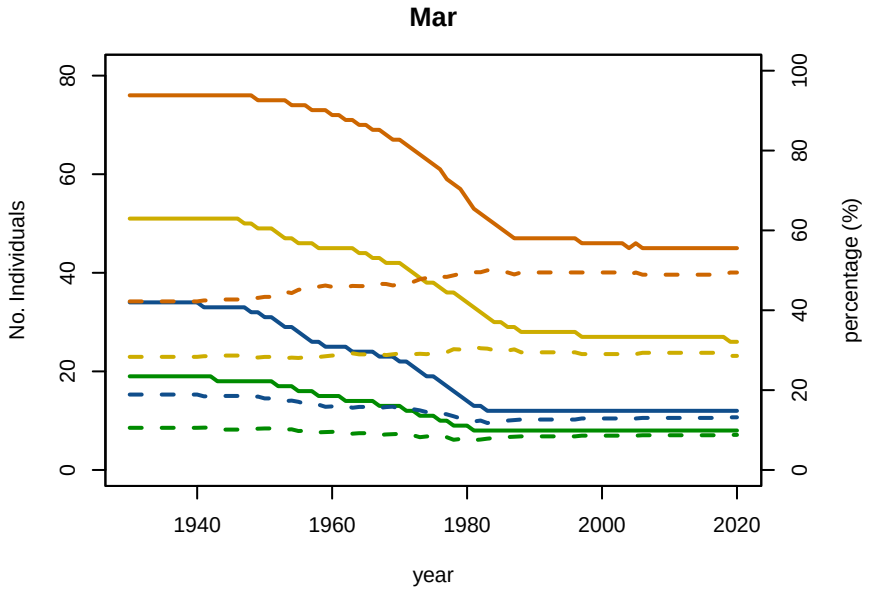


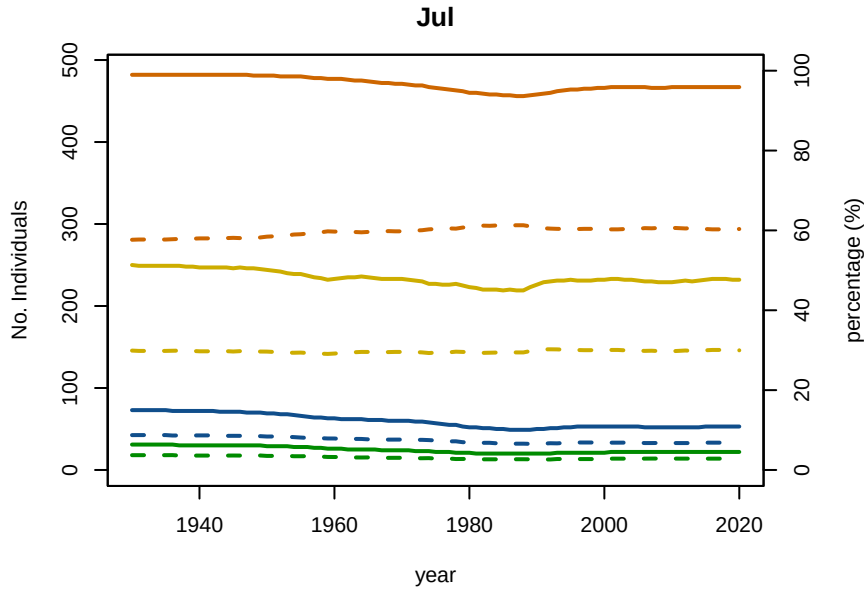


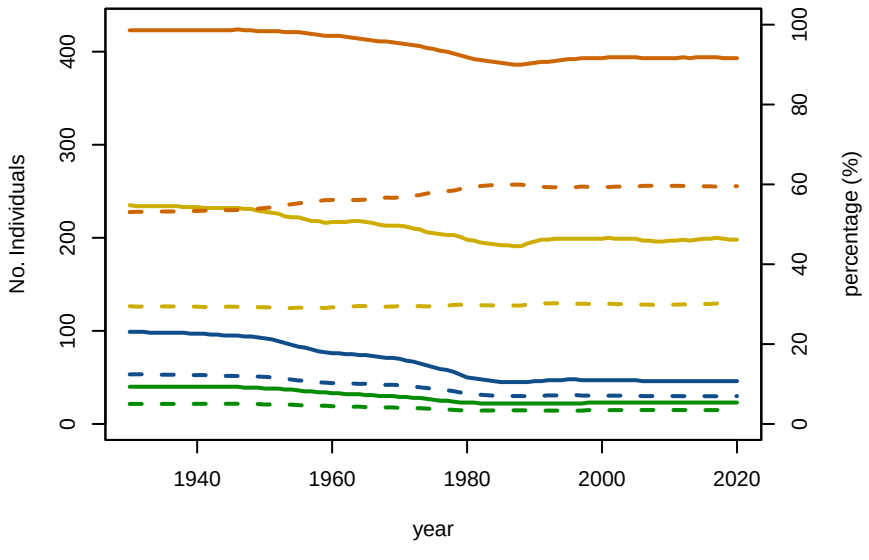


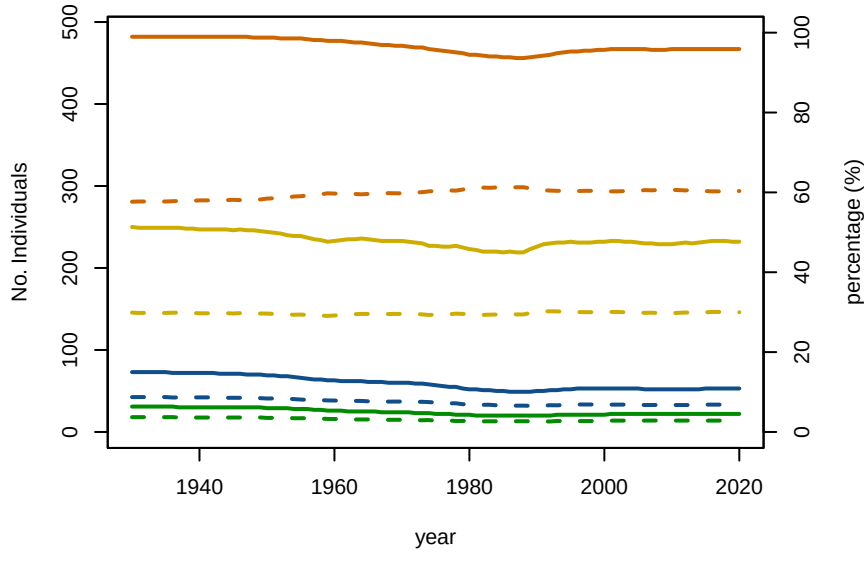
A1−4 A5−9 MatF MatM No Individuals percentage

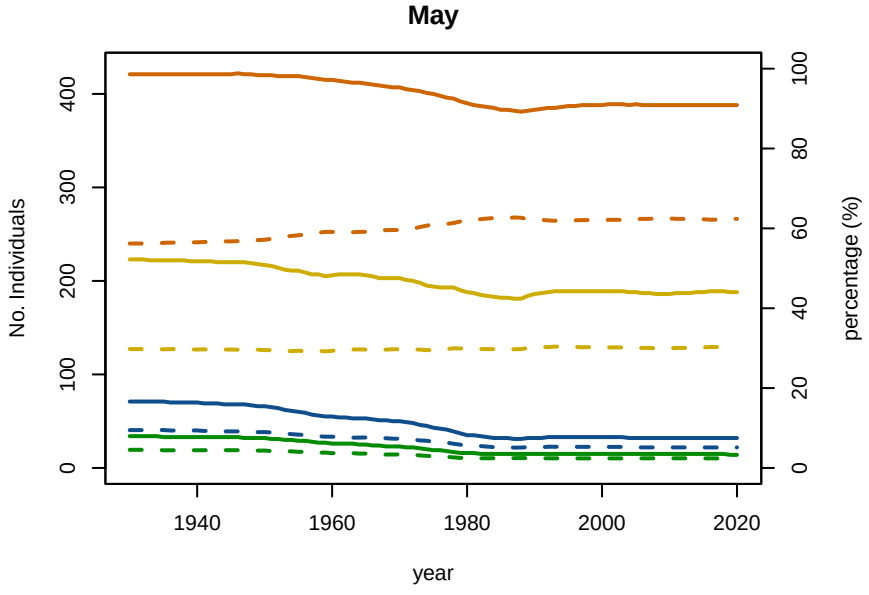
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7CS

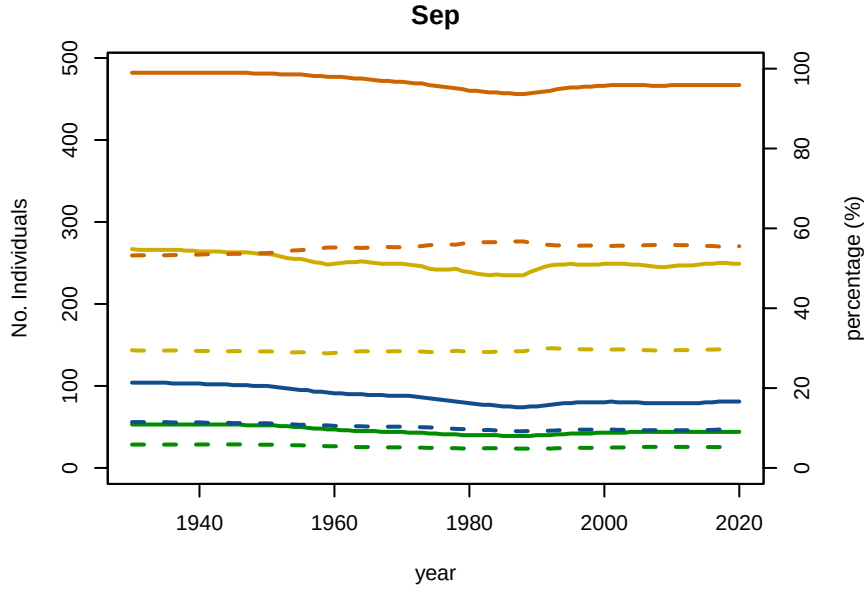


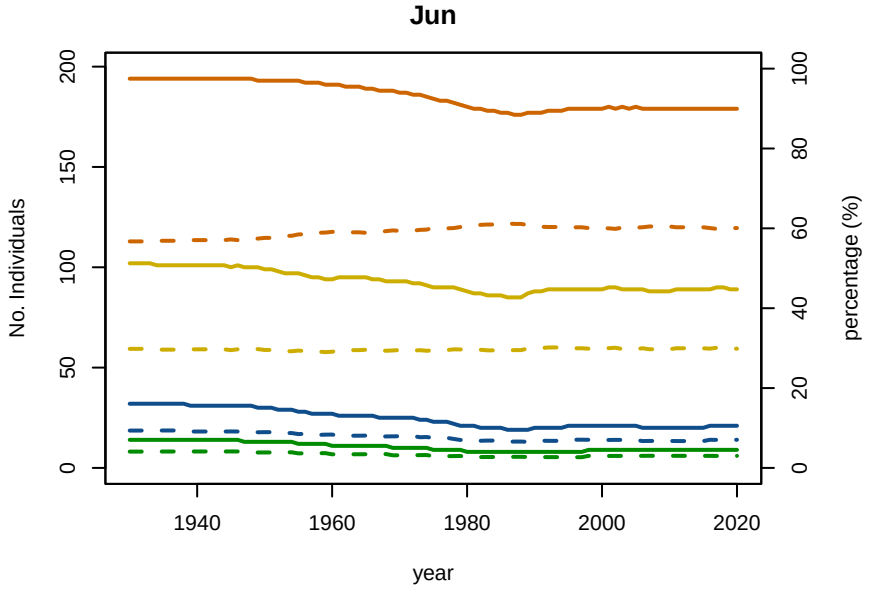


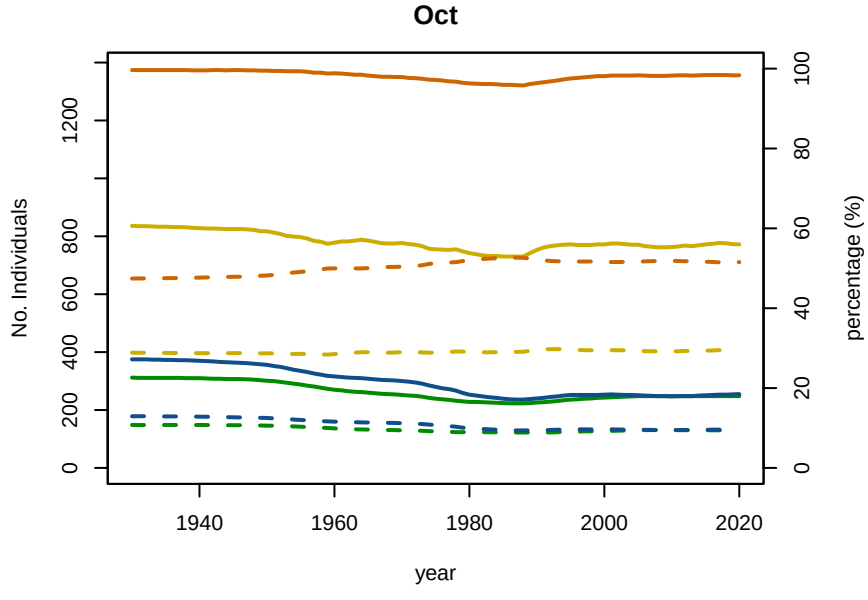






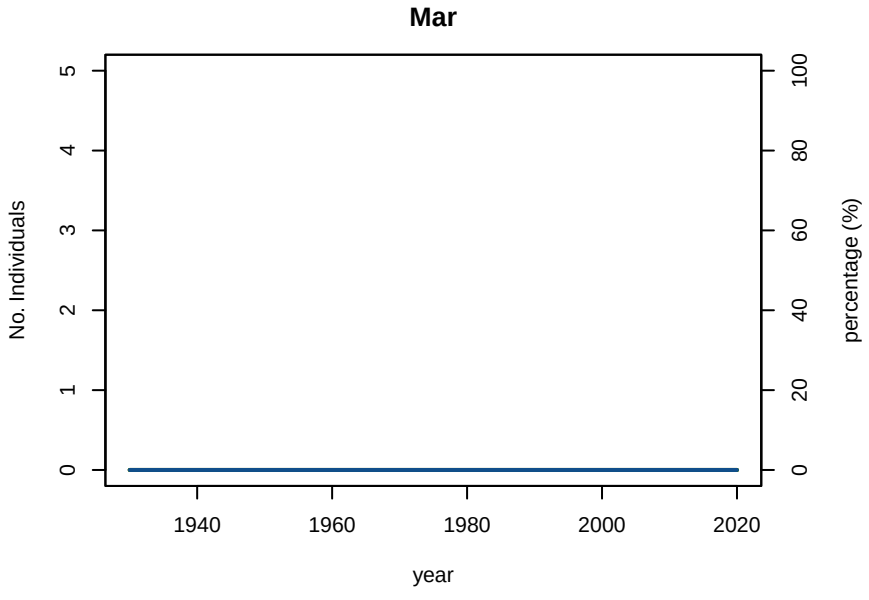


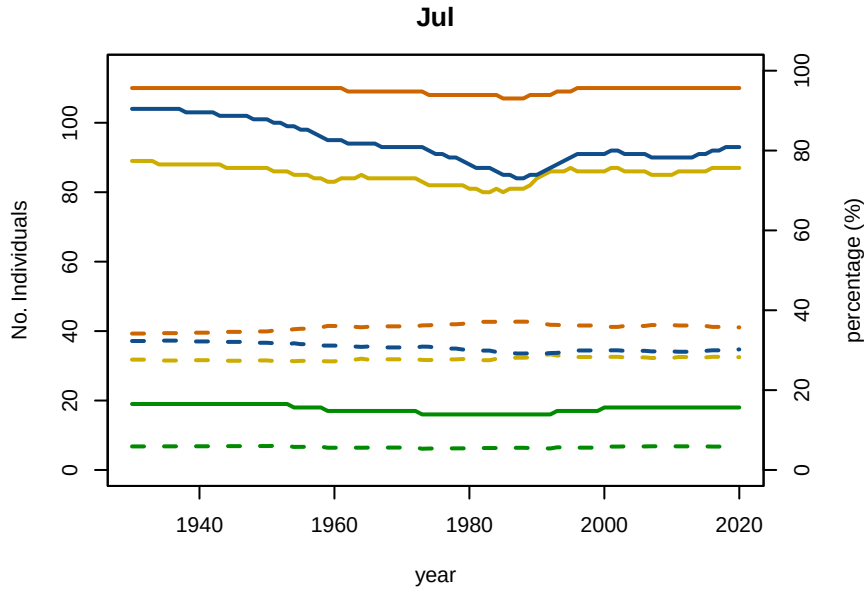


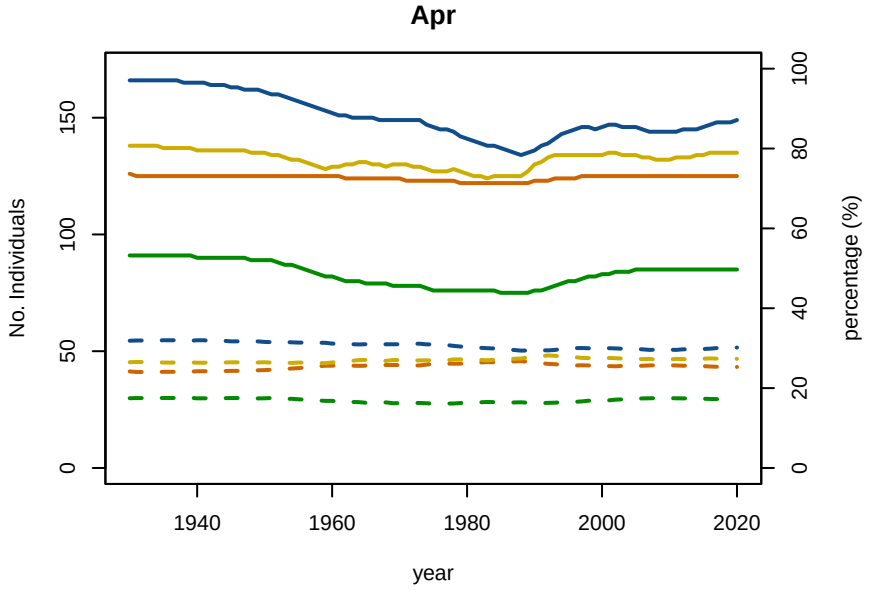


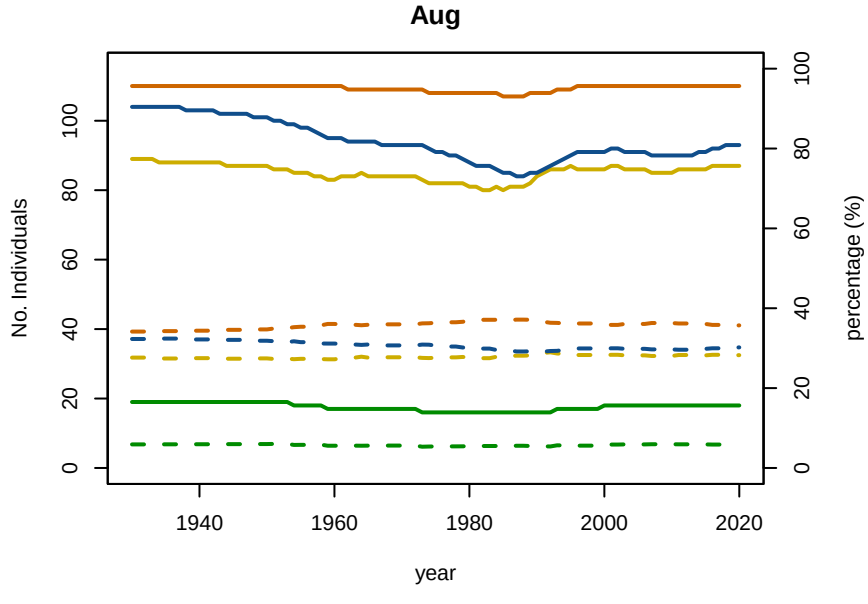
A1−4 A5−9 MatF MatM No Individuals percentage

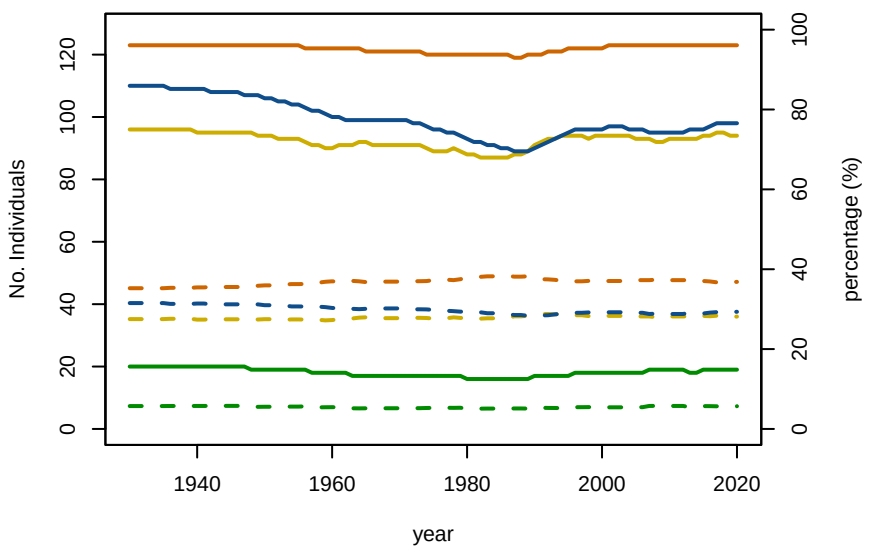
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7E

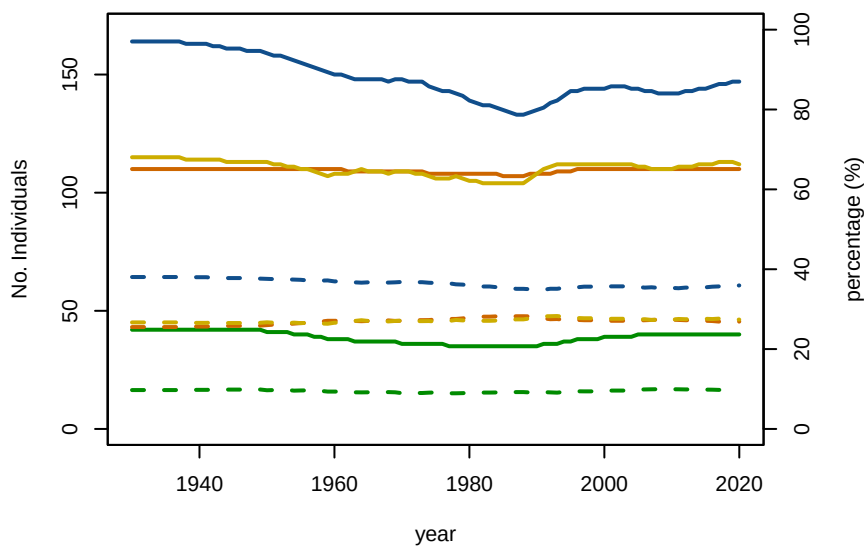


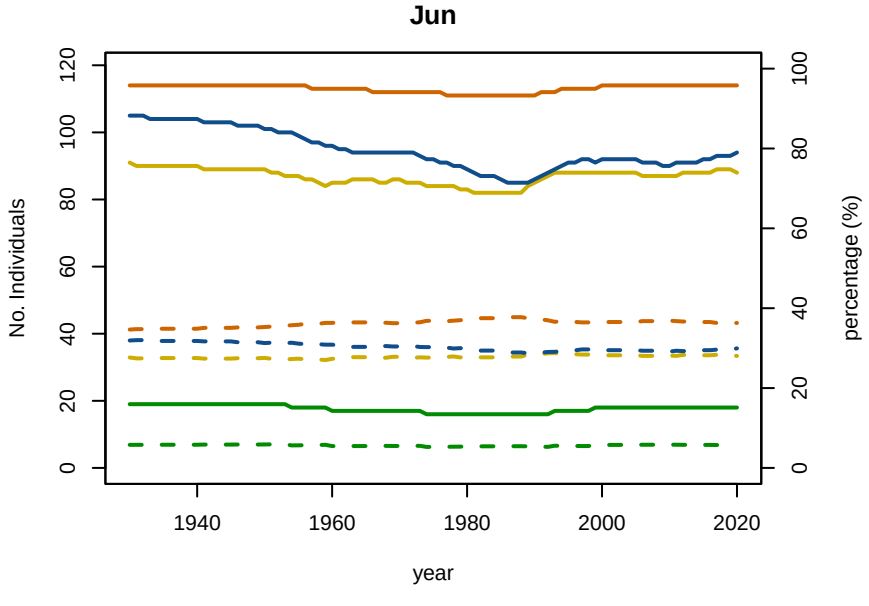


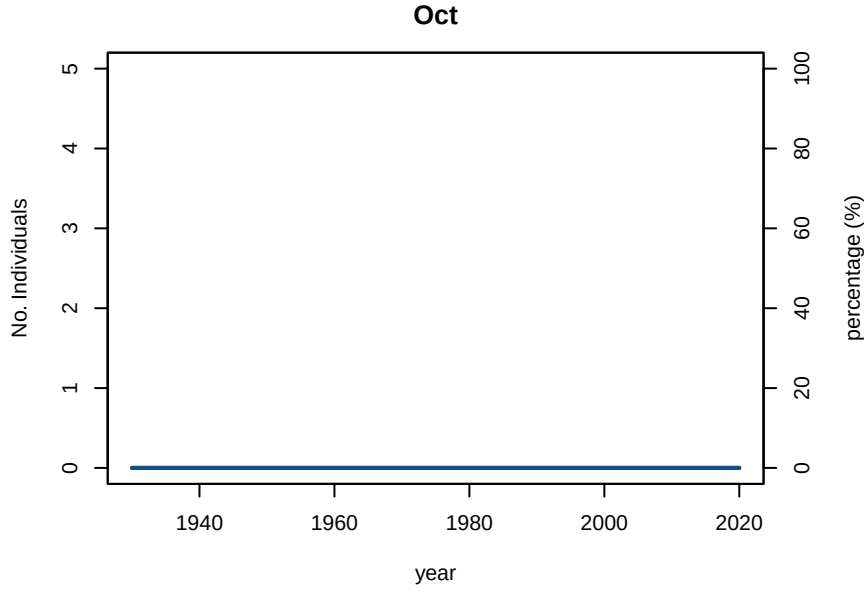






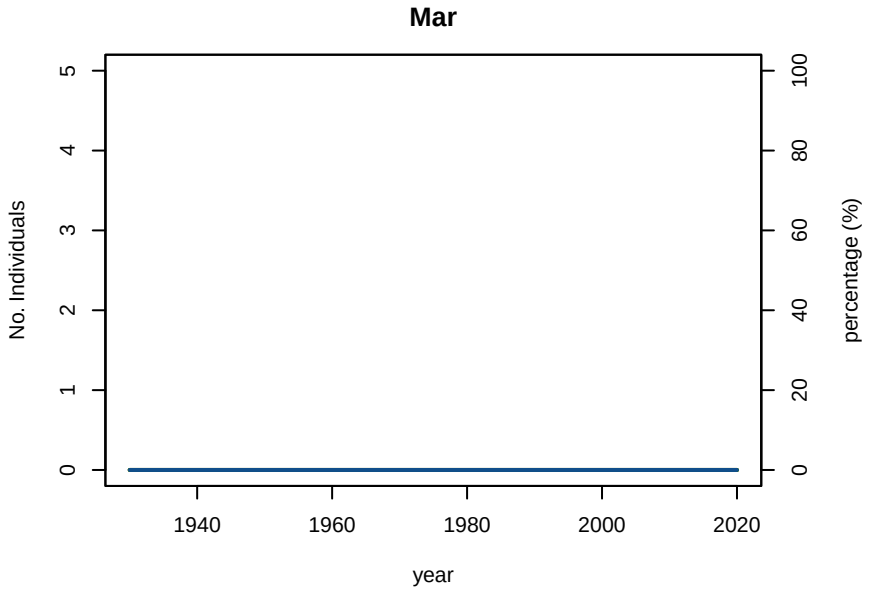


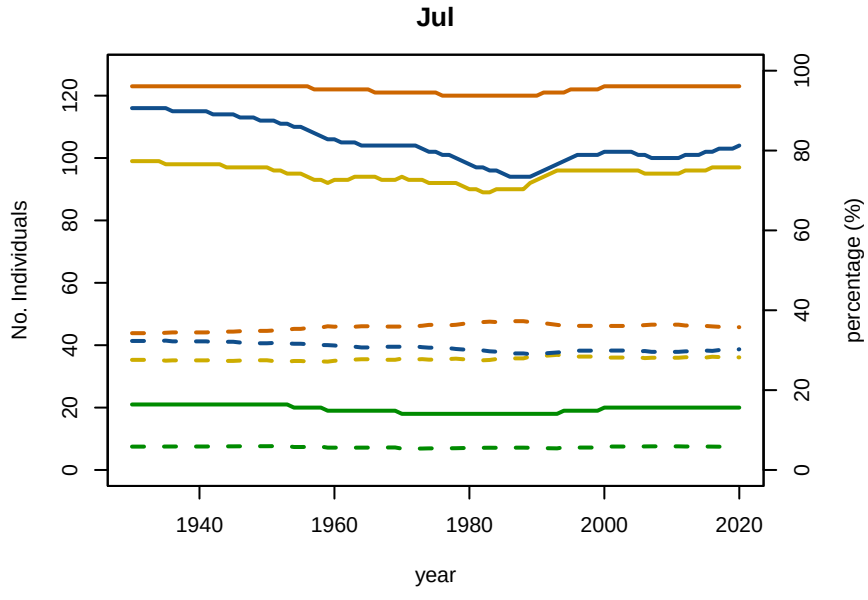


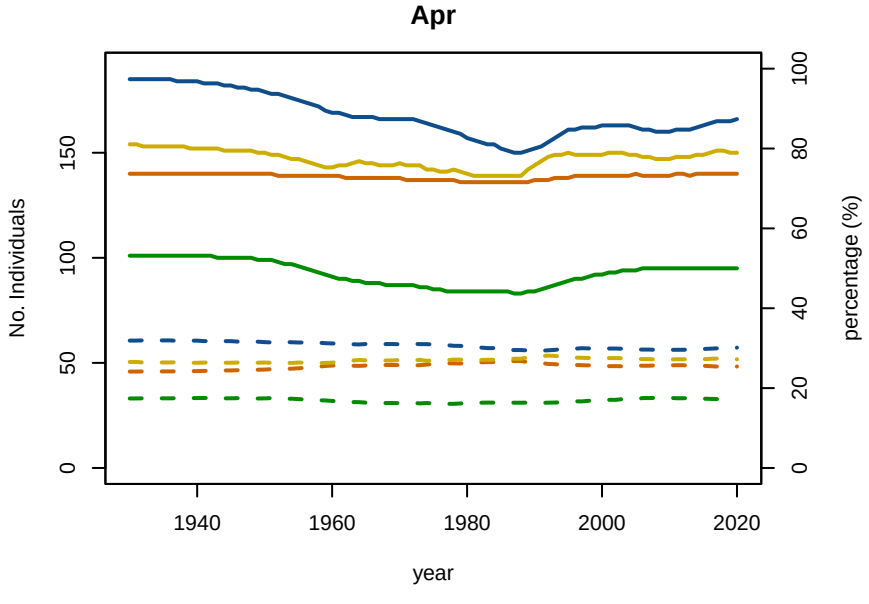


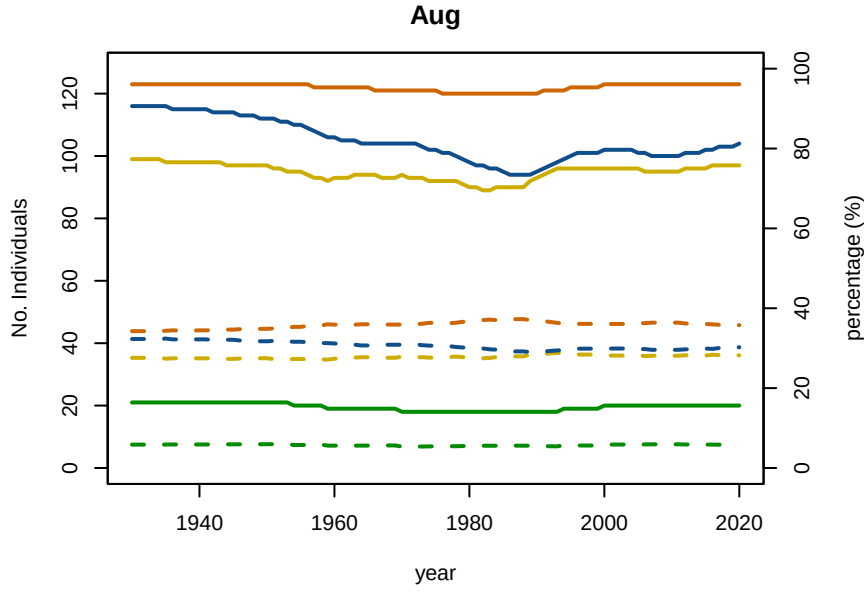
A1−4 A5−9 MatF MatM No Individuals percentage

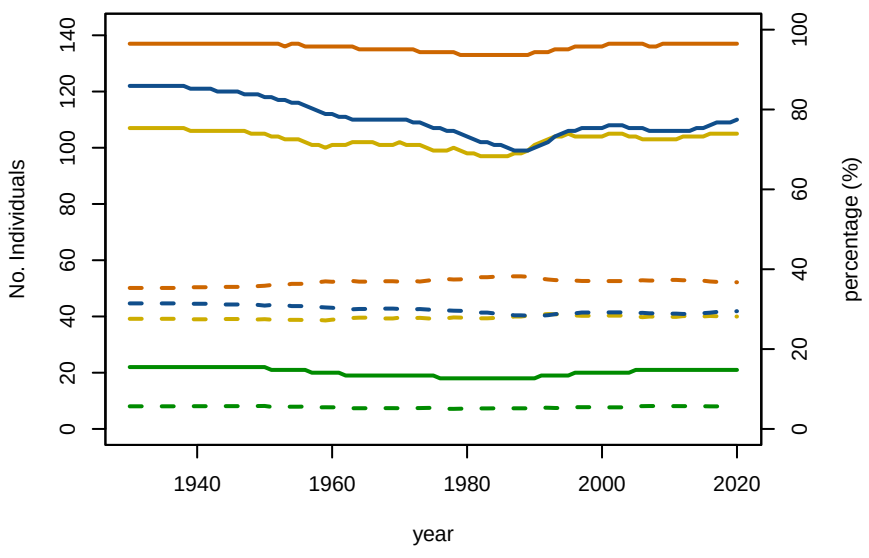
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 7WR

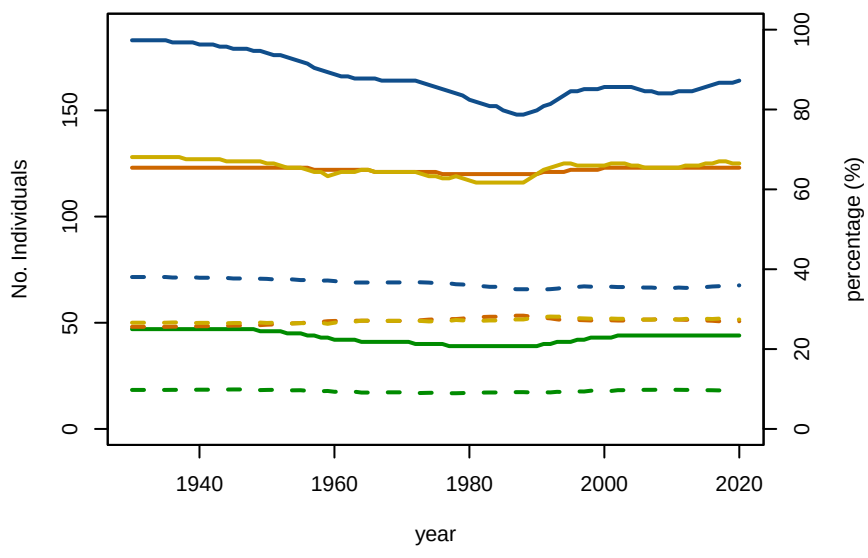


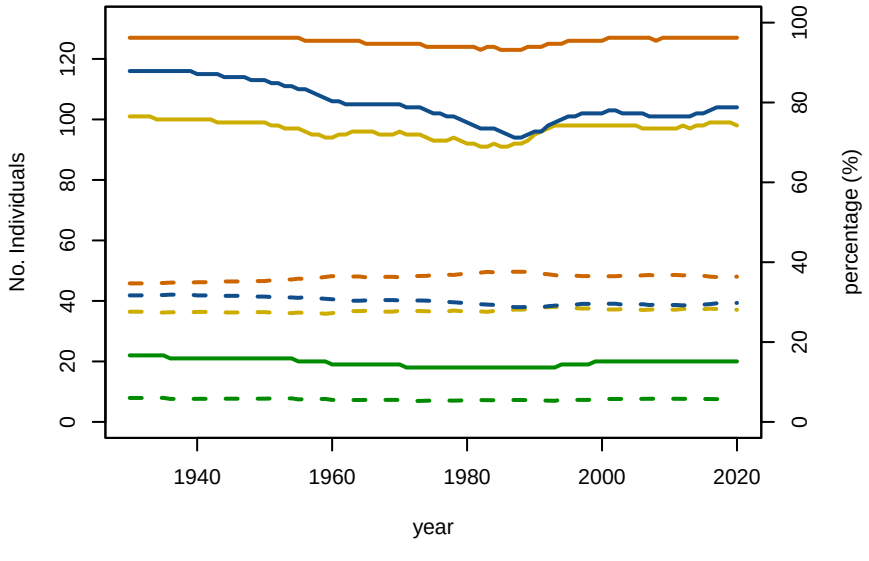


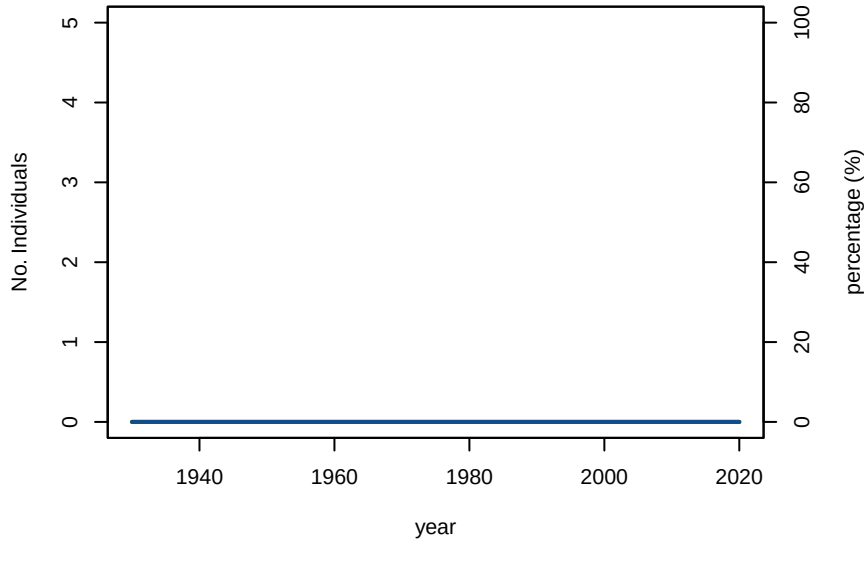






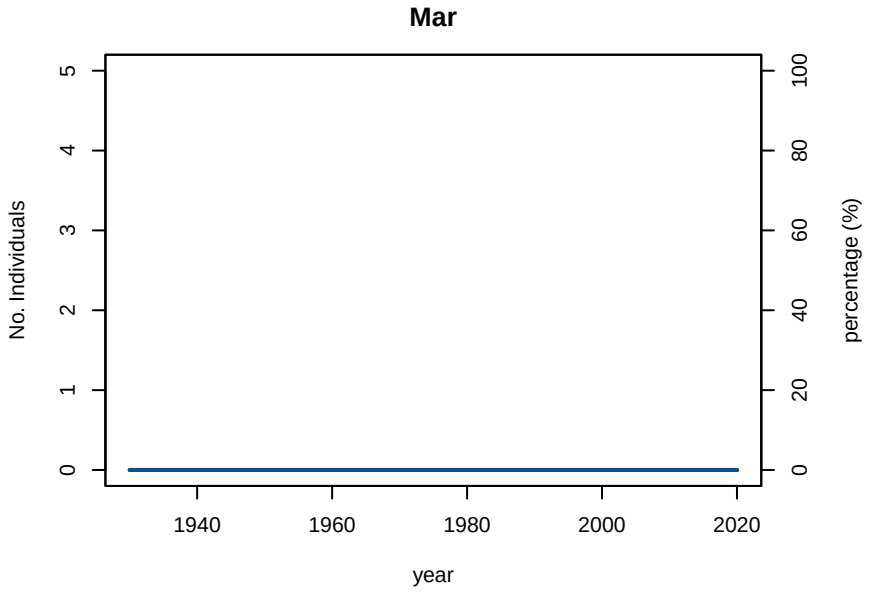


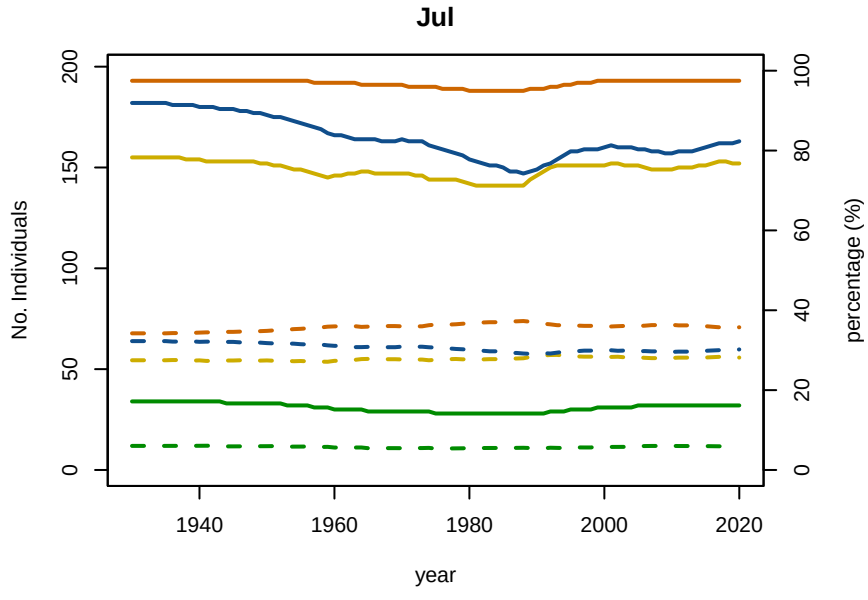


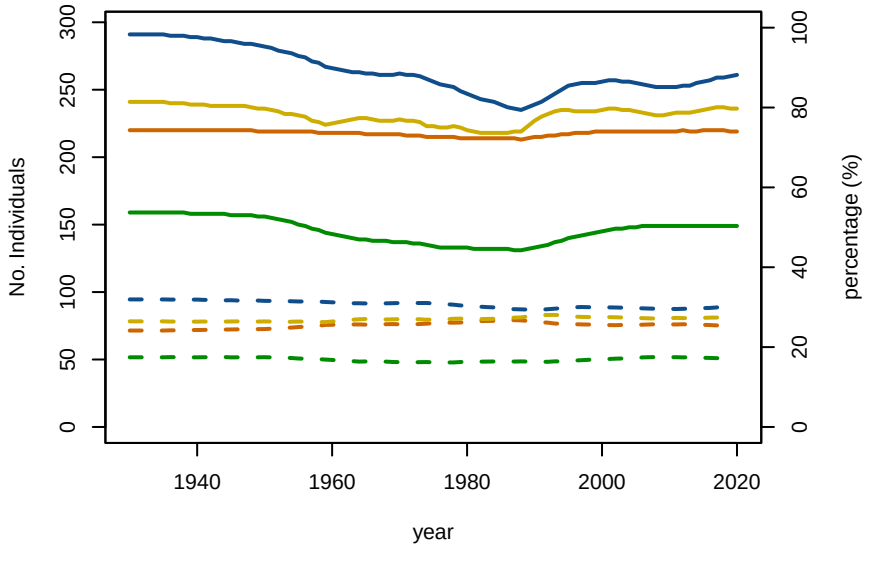


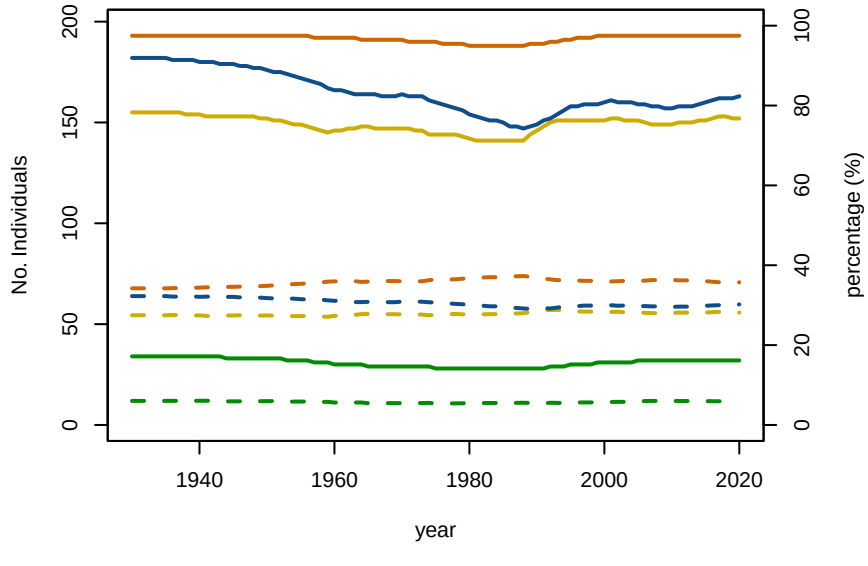
A1−4 A5−9 MatF MatM No Individuals percentage

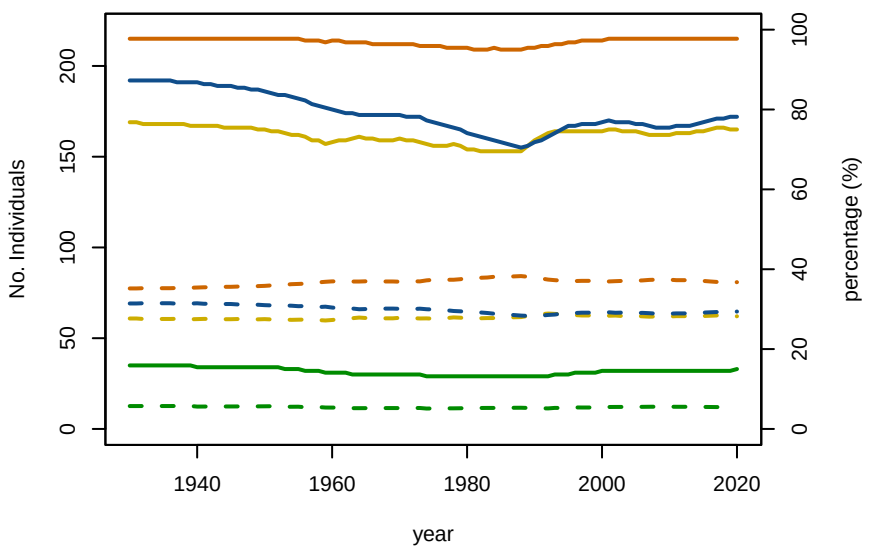
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 8

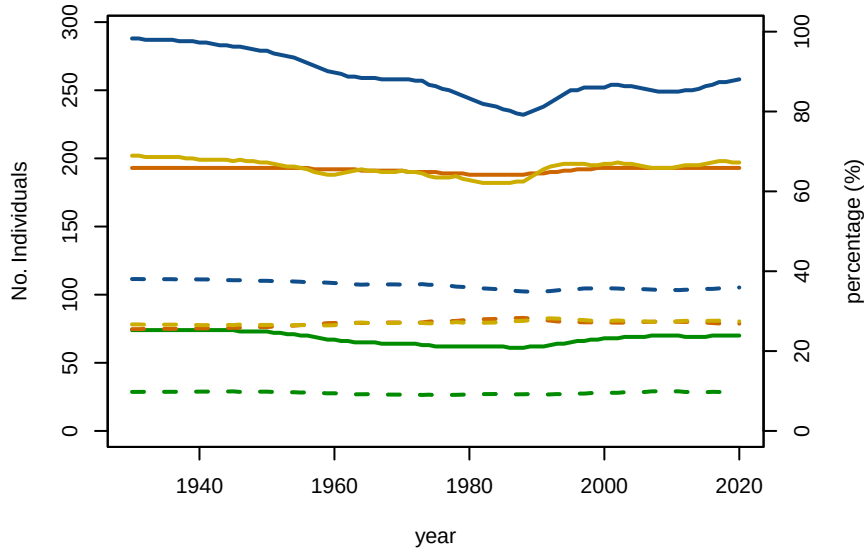


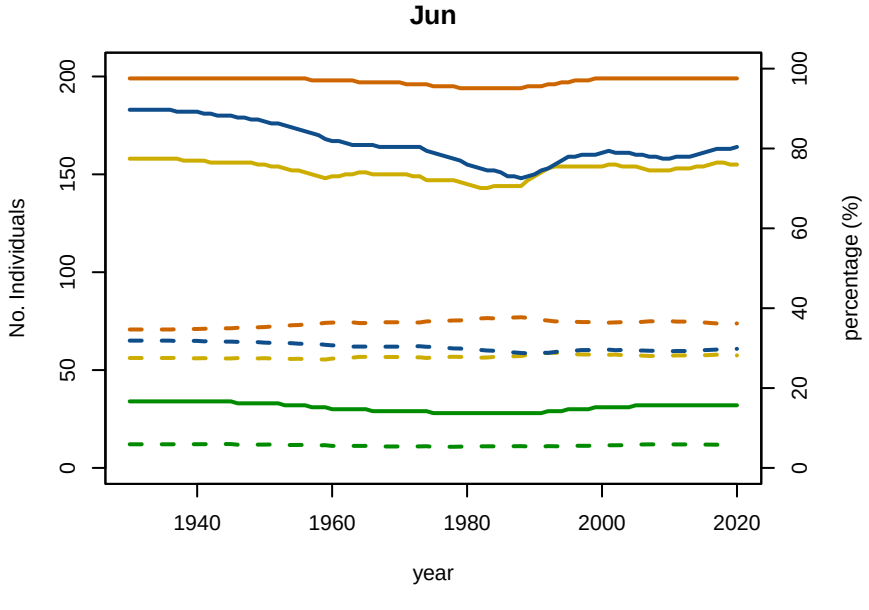


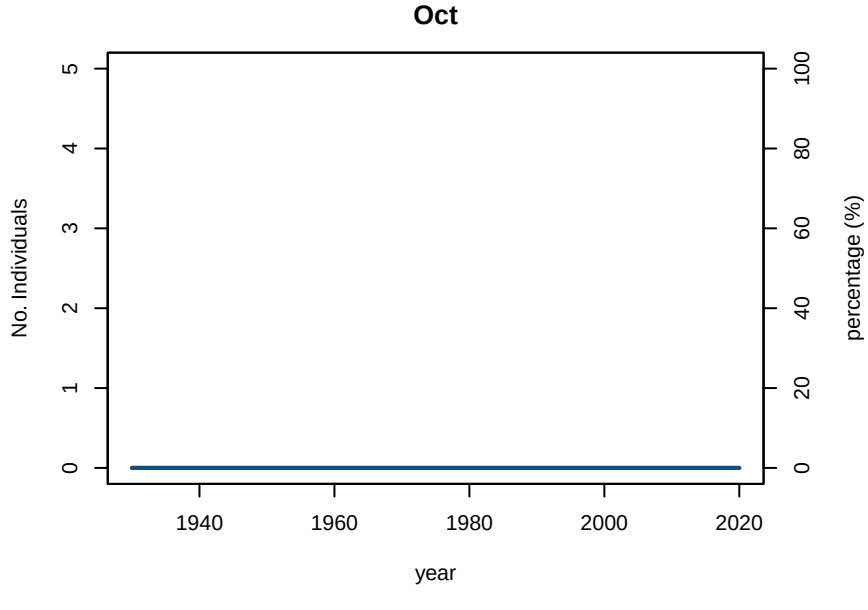






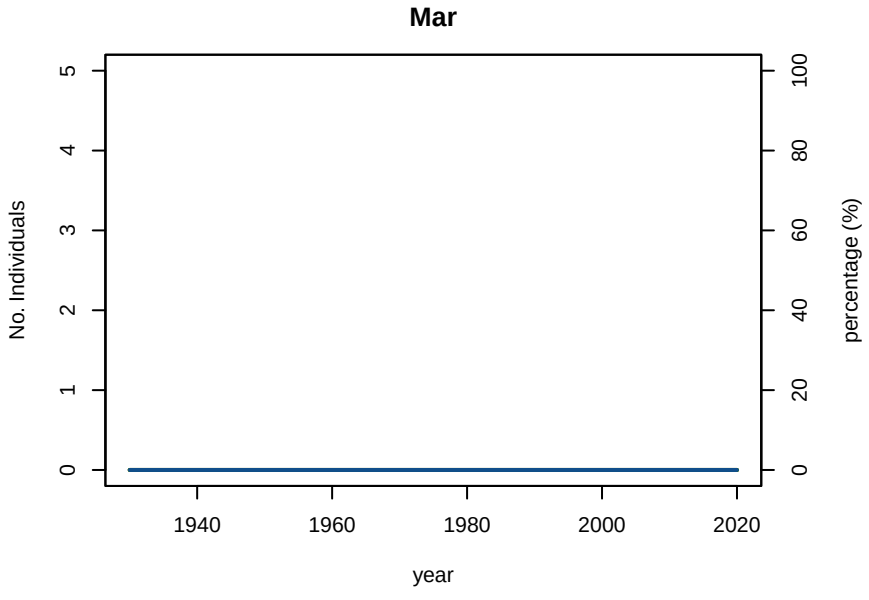


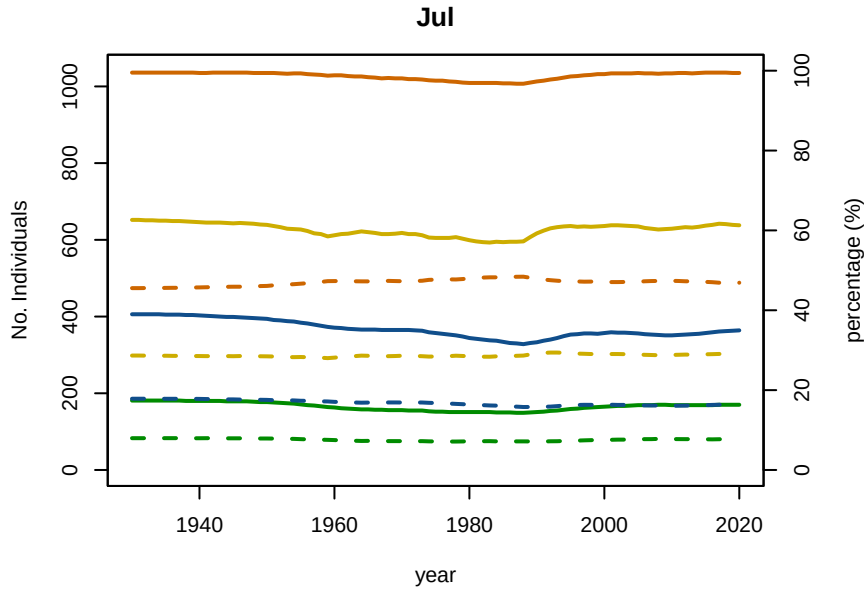


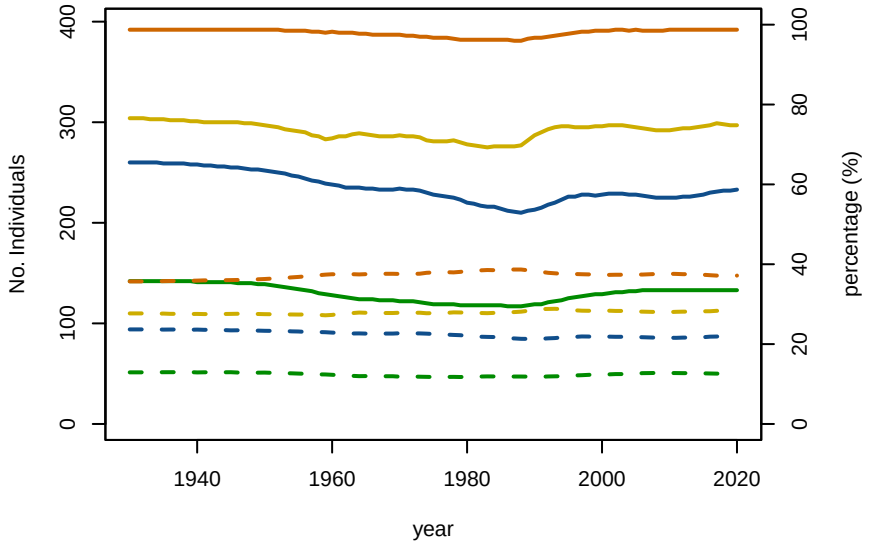


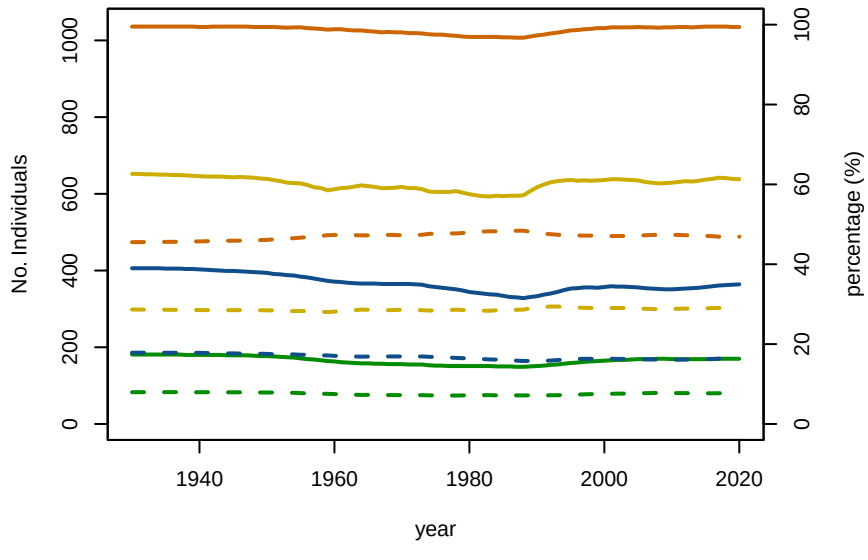
A1−4 A5−9 MatF MatM No Individuals percentage

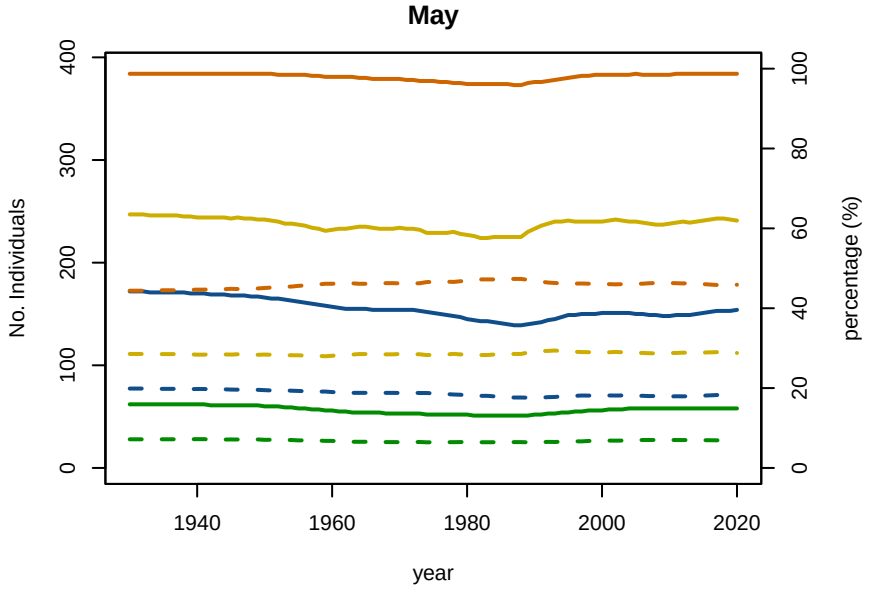
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 9

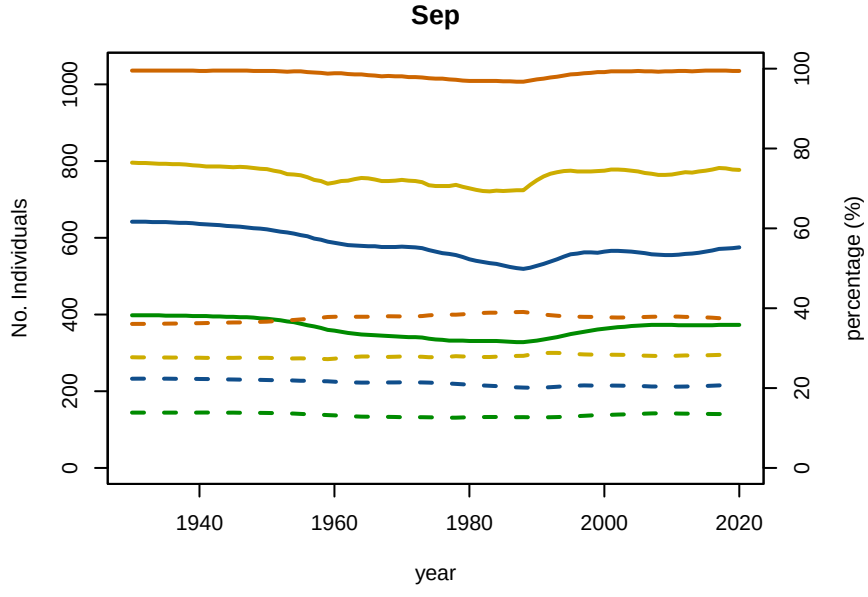


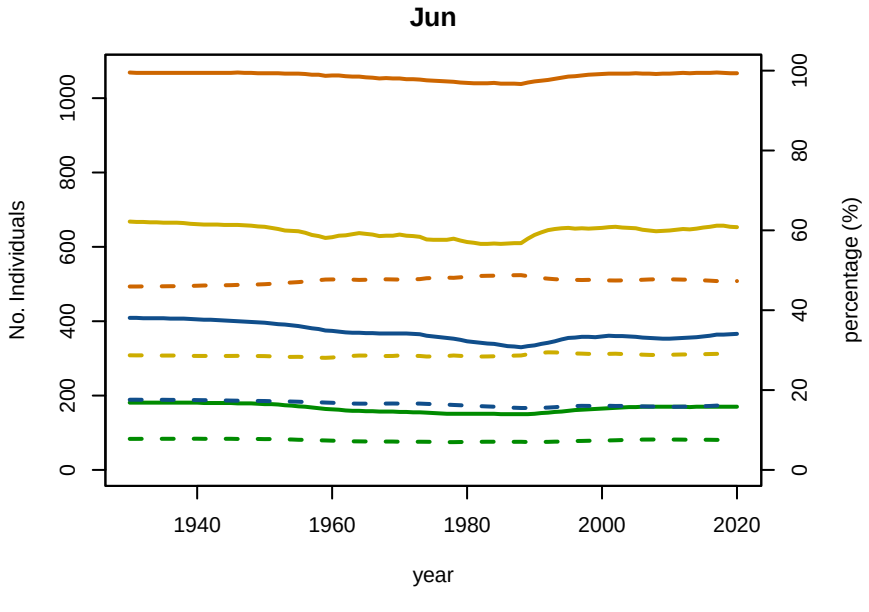


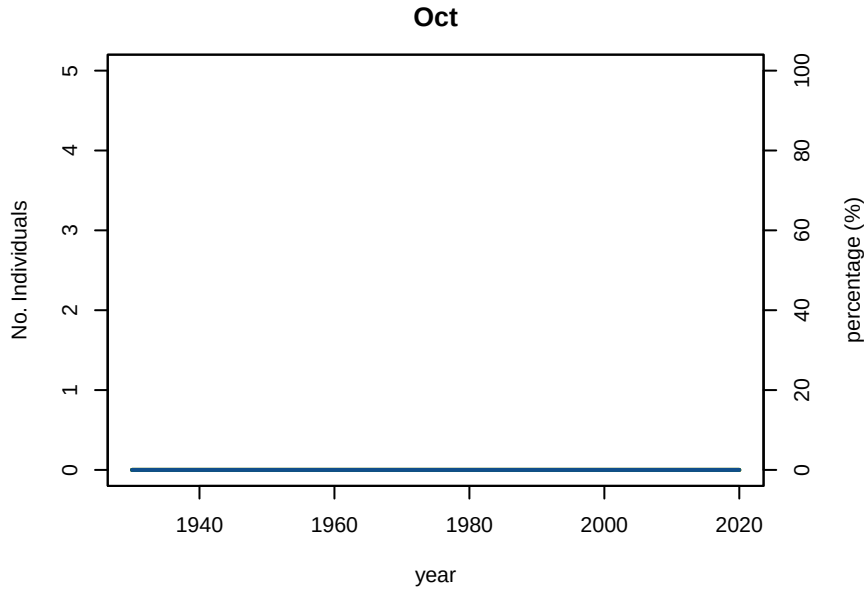






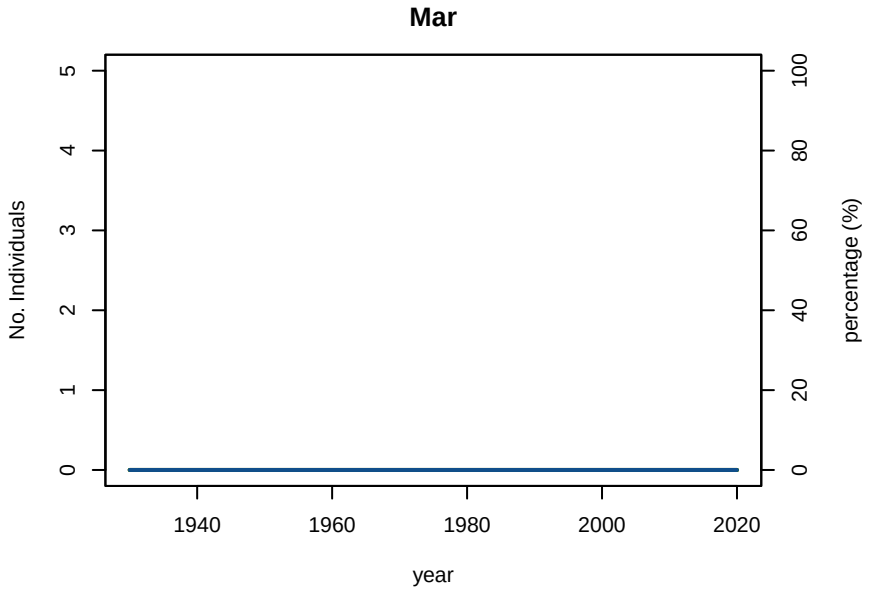


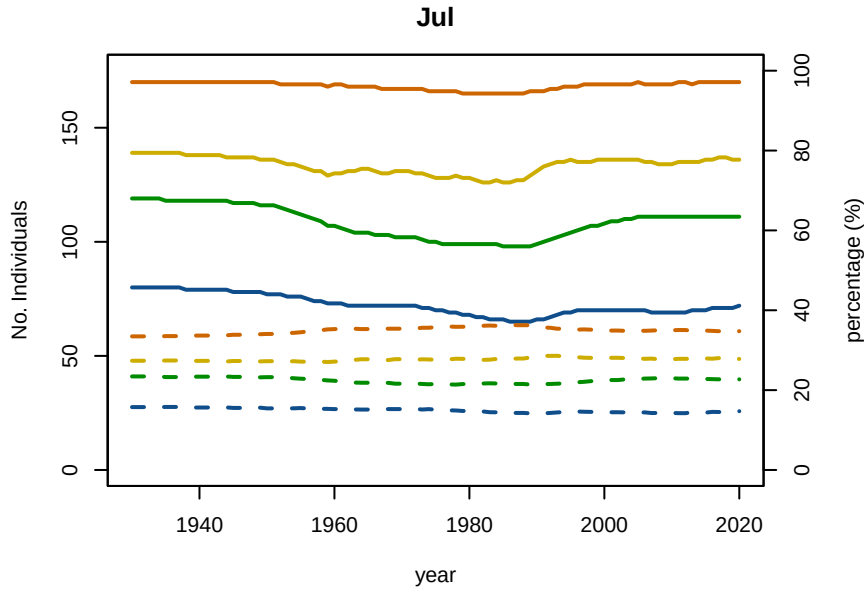


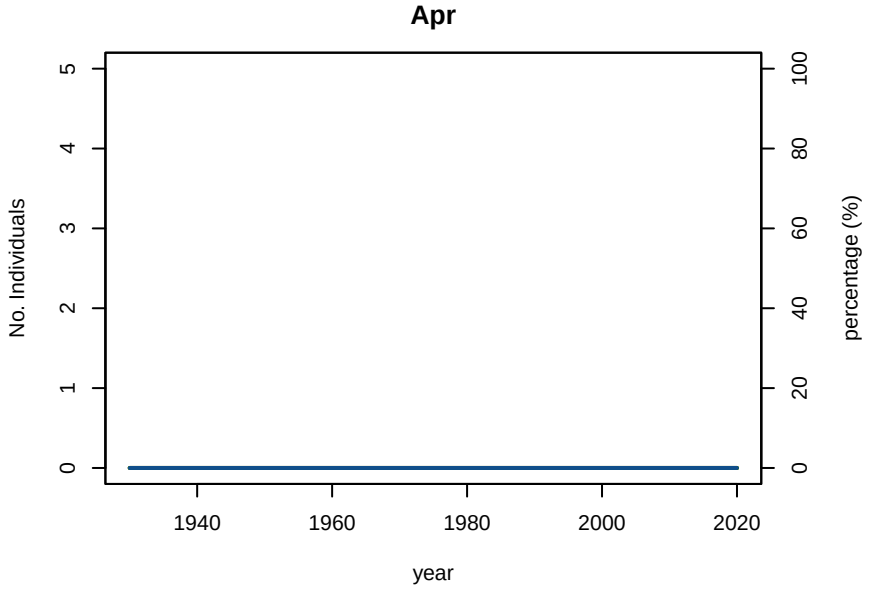


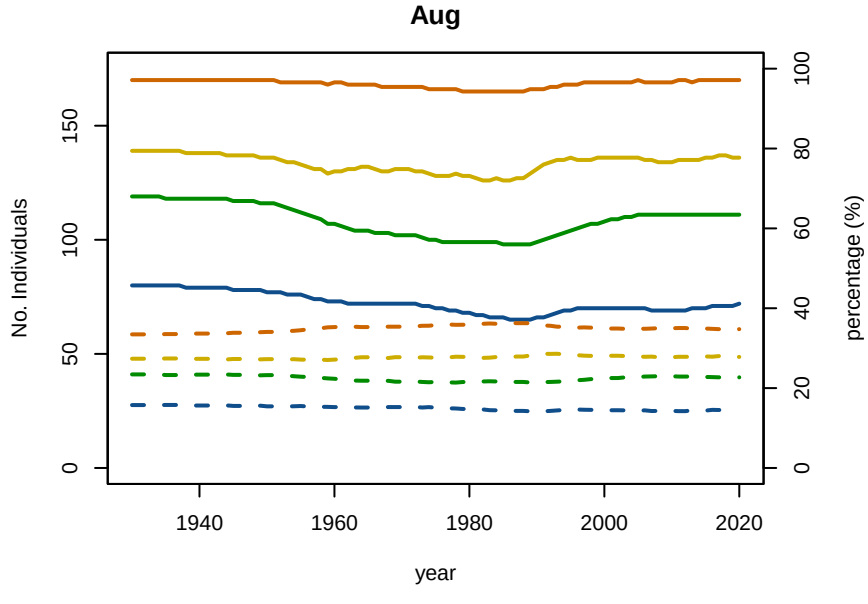
A1−4 A5−9 MatF MatM No Individuals percentage

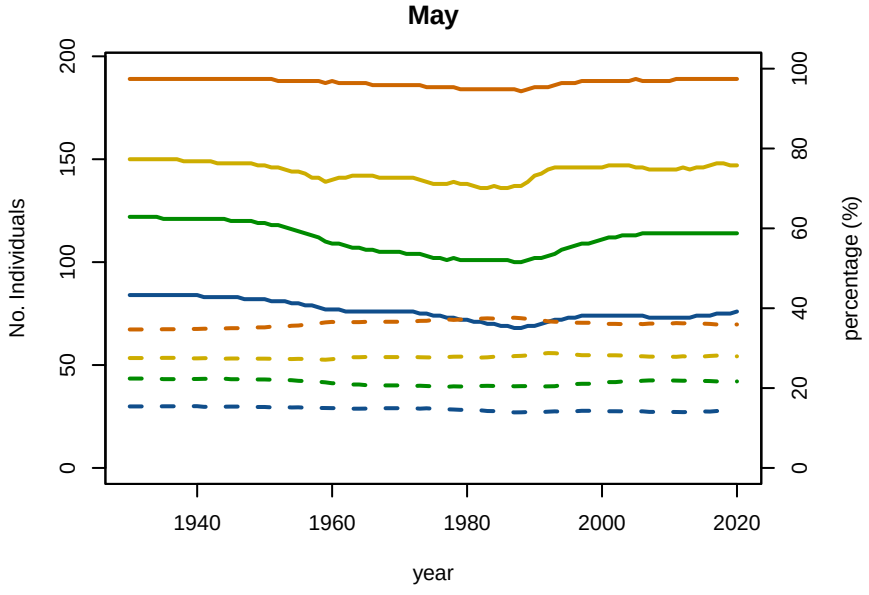
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 9N

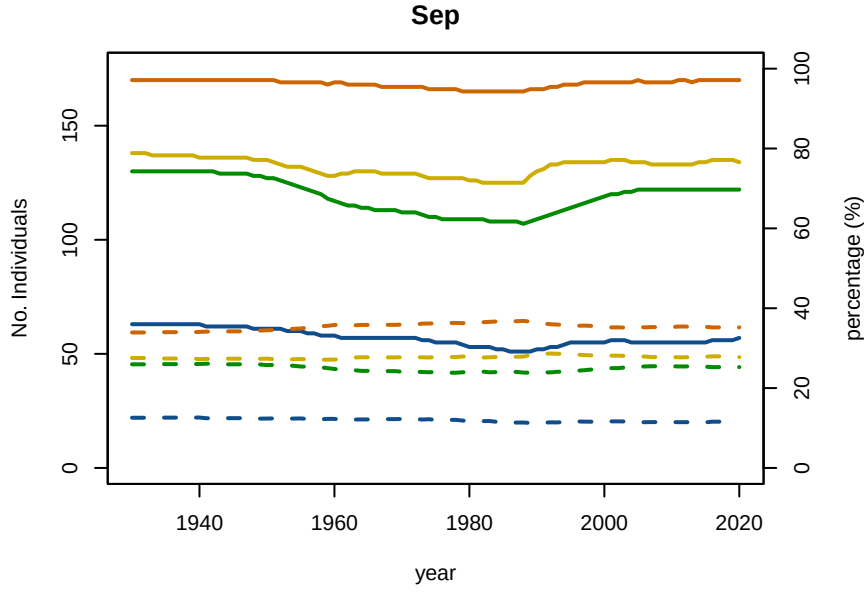


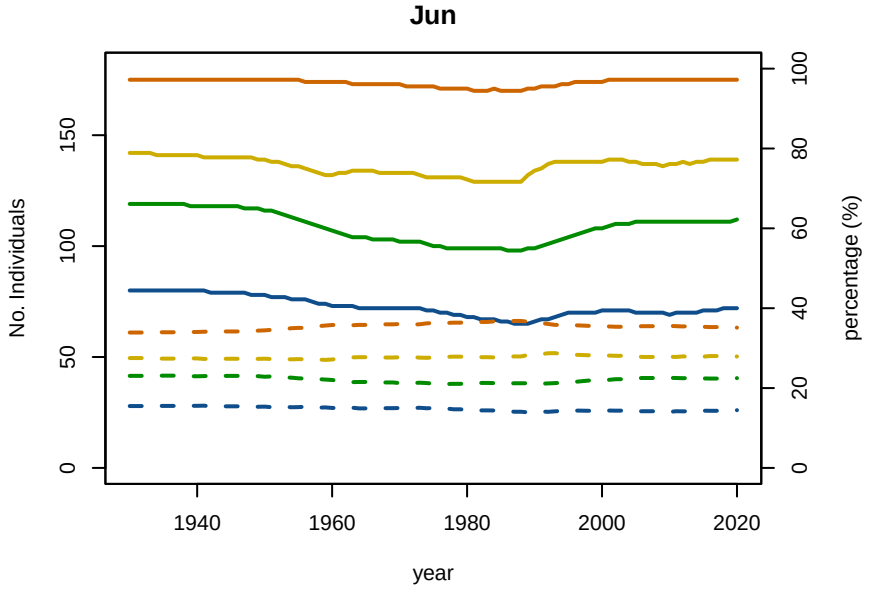


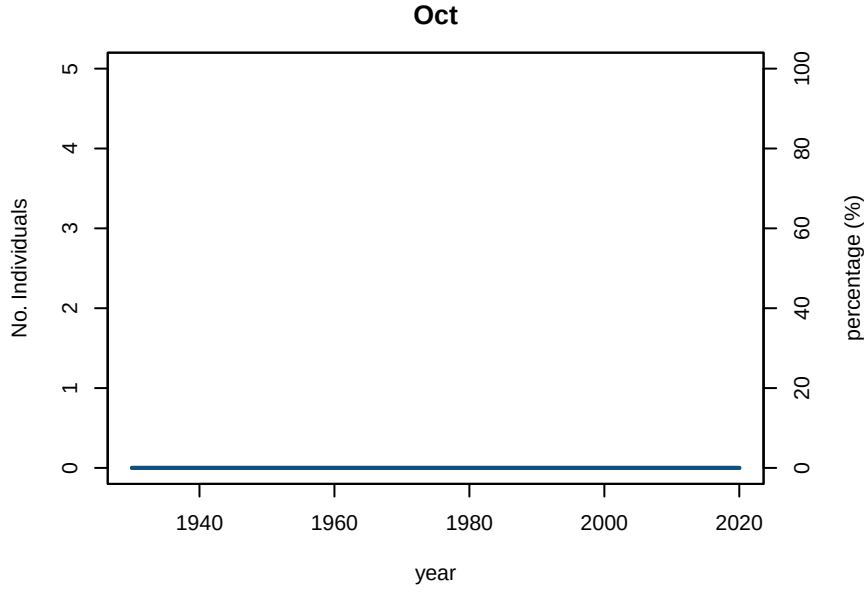






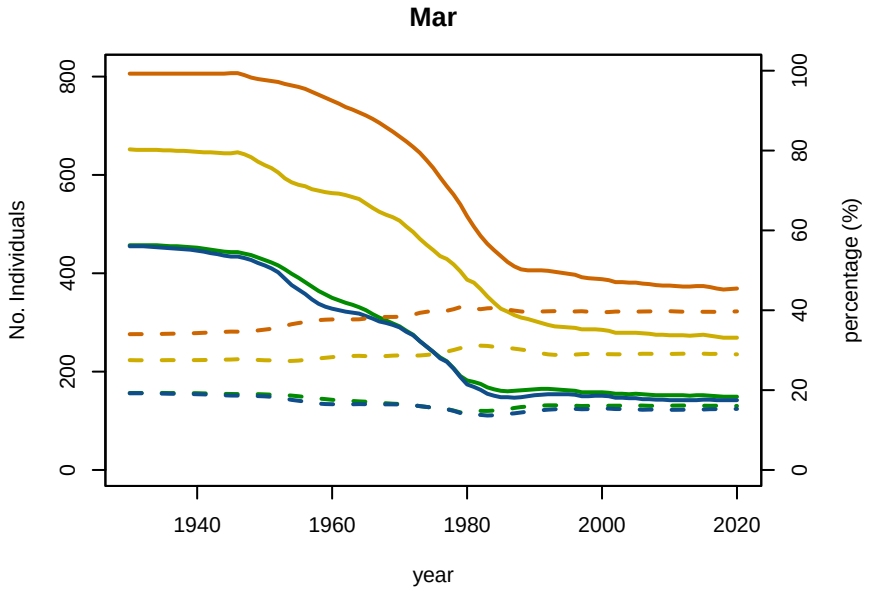


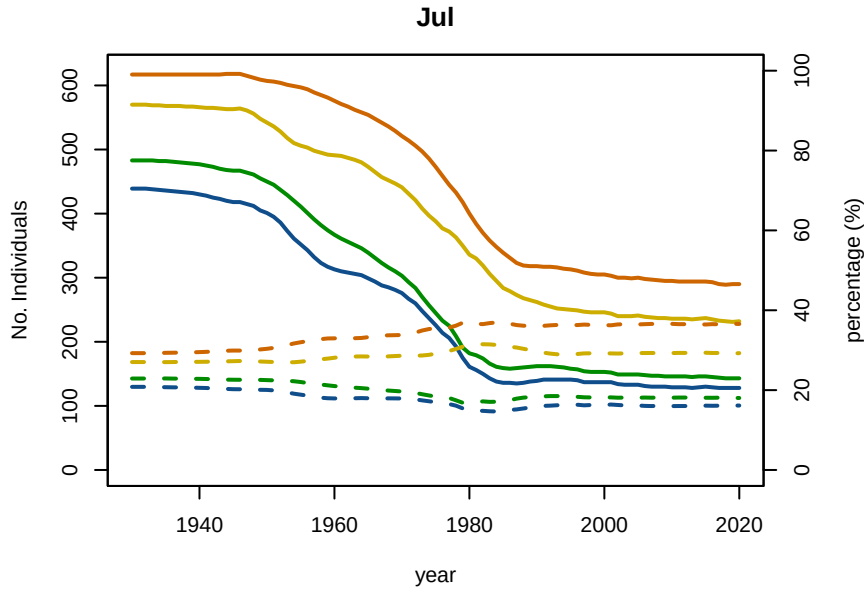


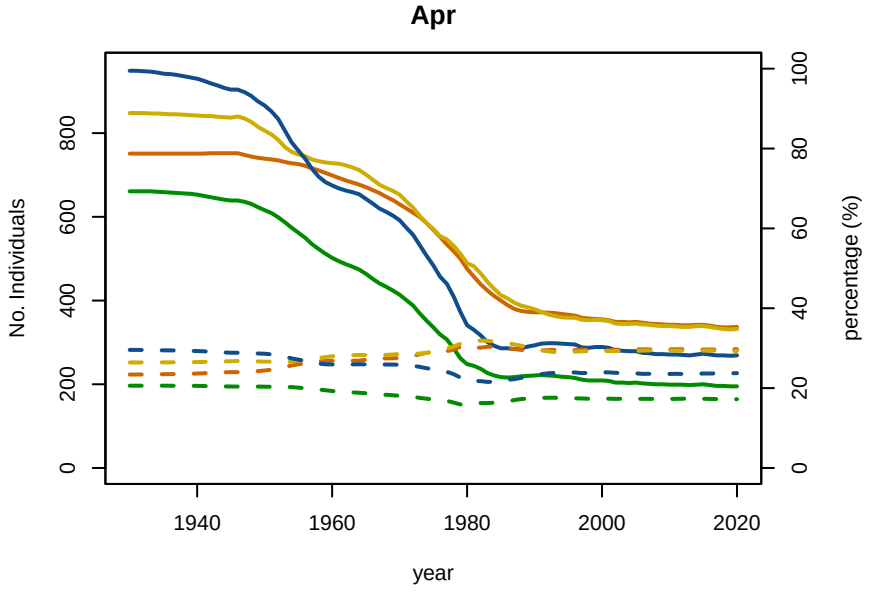


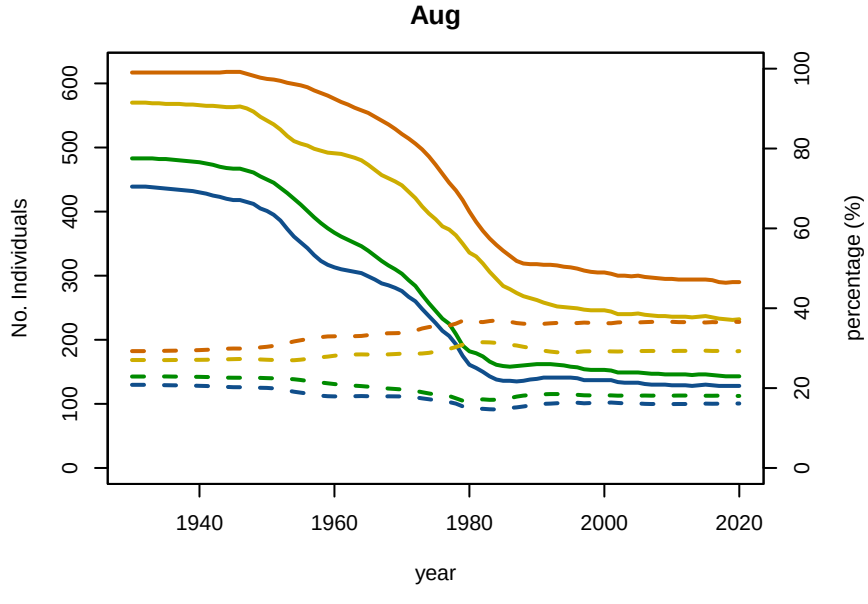
A1−4 A5−9 MatF MatM No Individuals percentage

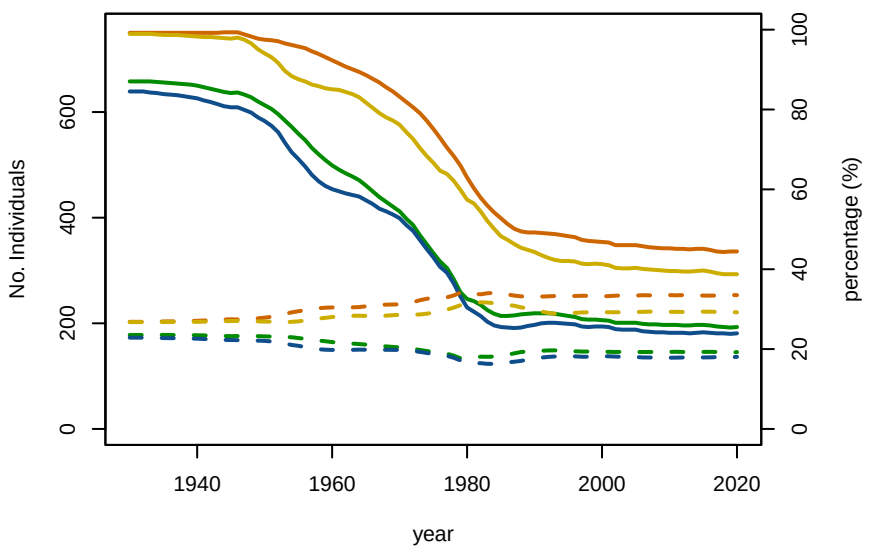
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 10E

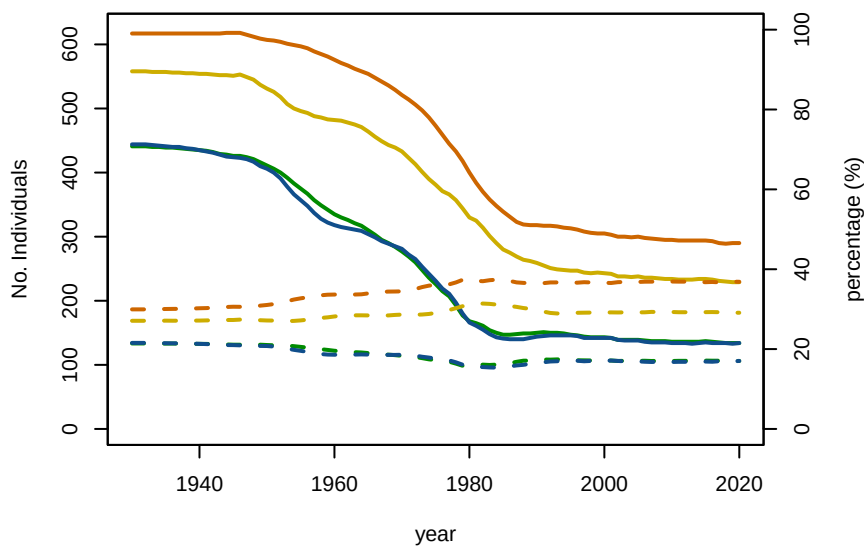


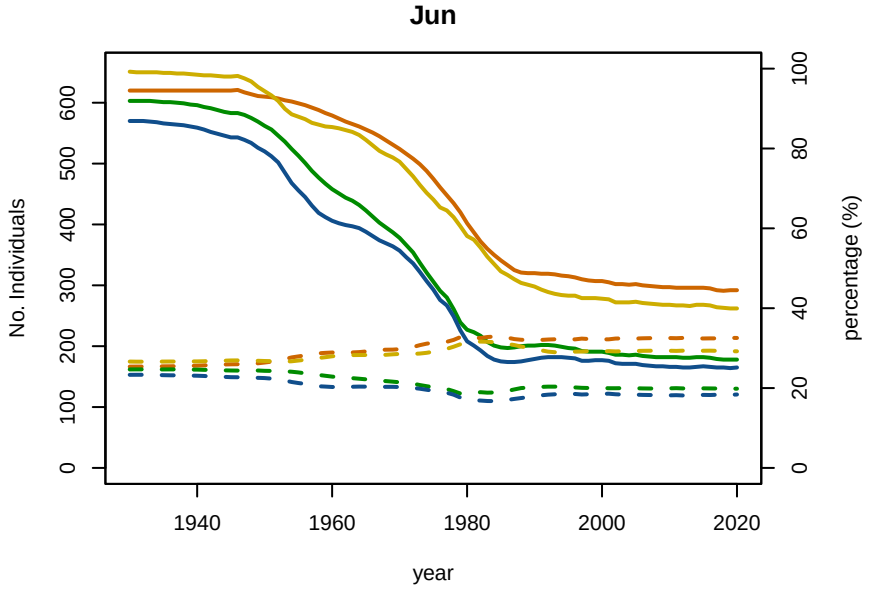


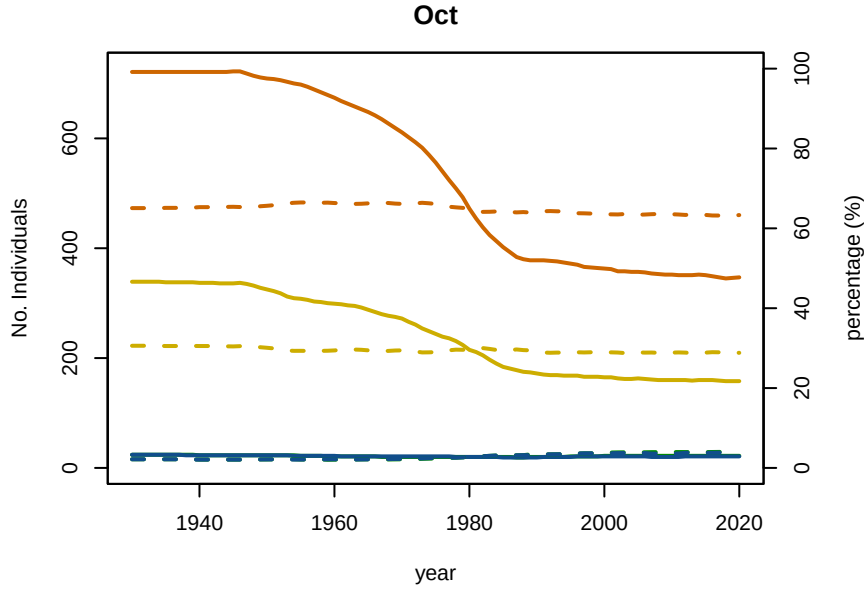






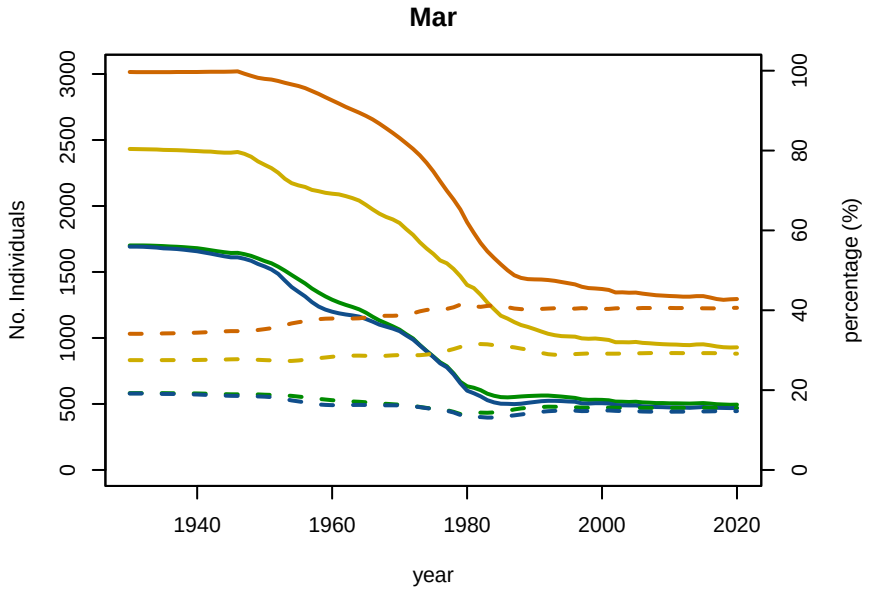


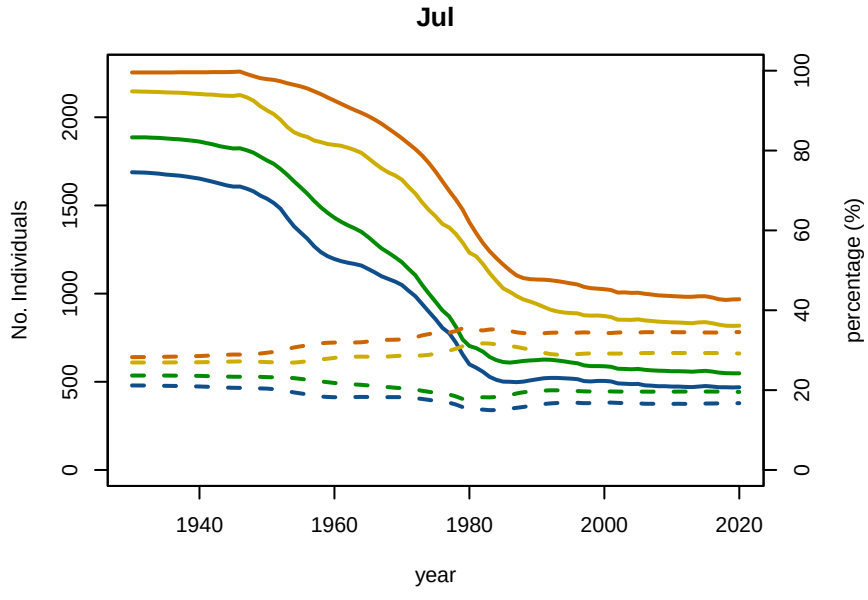


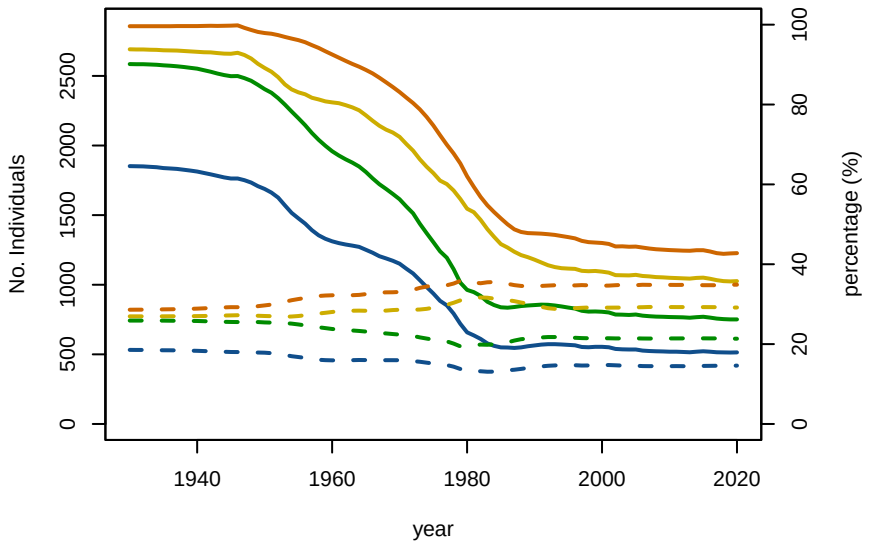


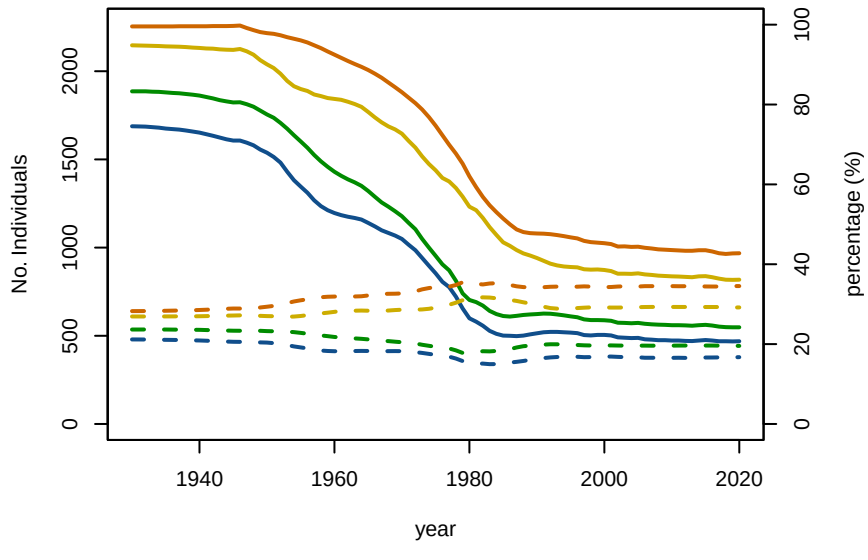
A1−4 A5−9 MatF MatM No Individuals percentage

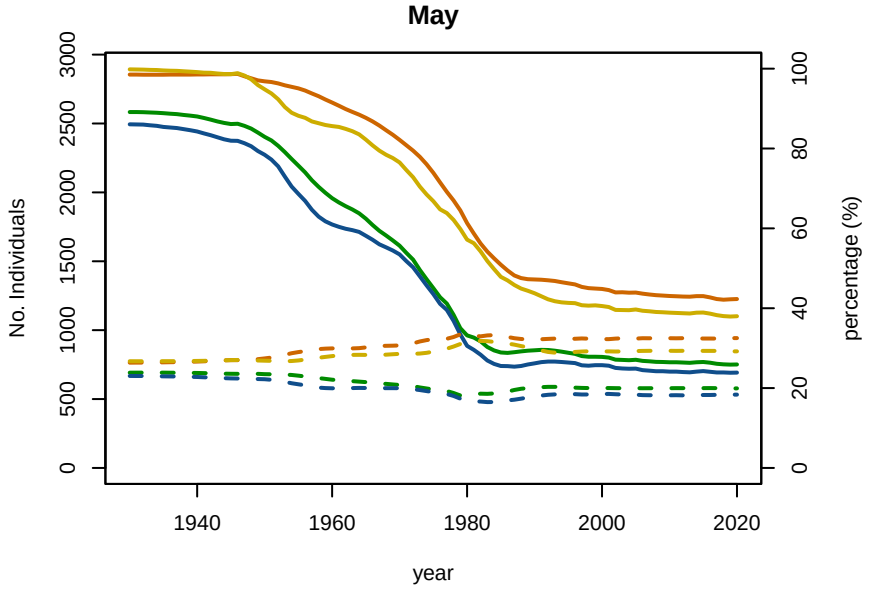
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 10W

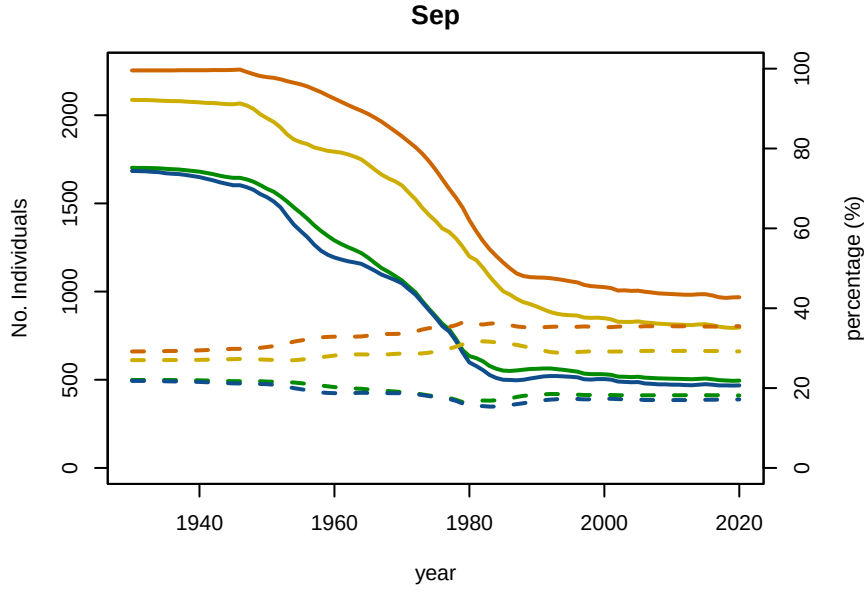


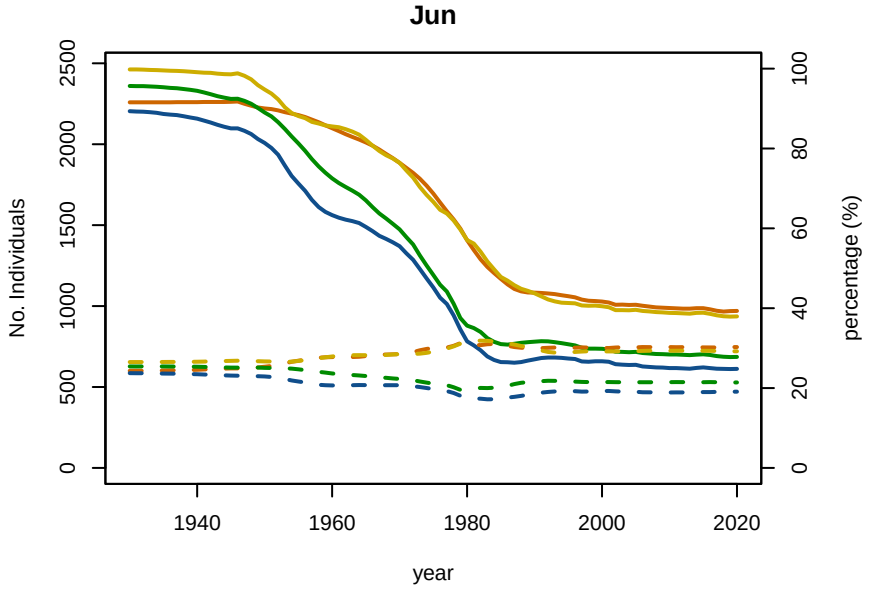


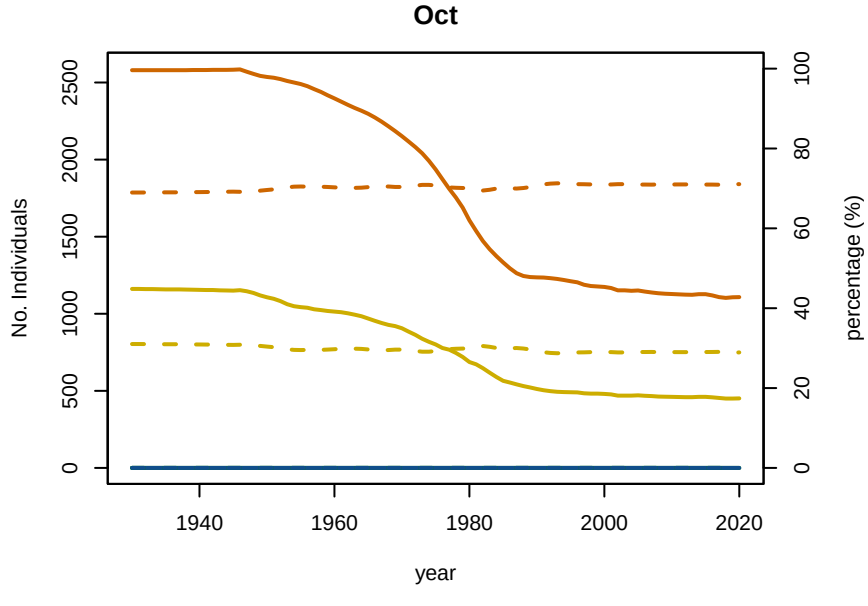






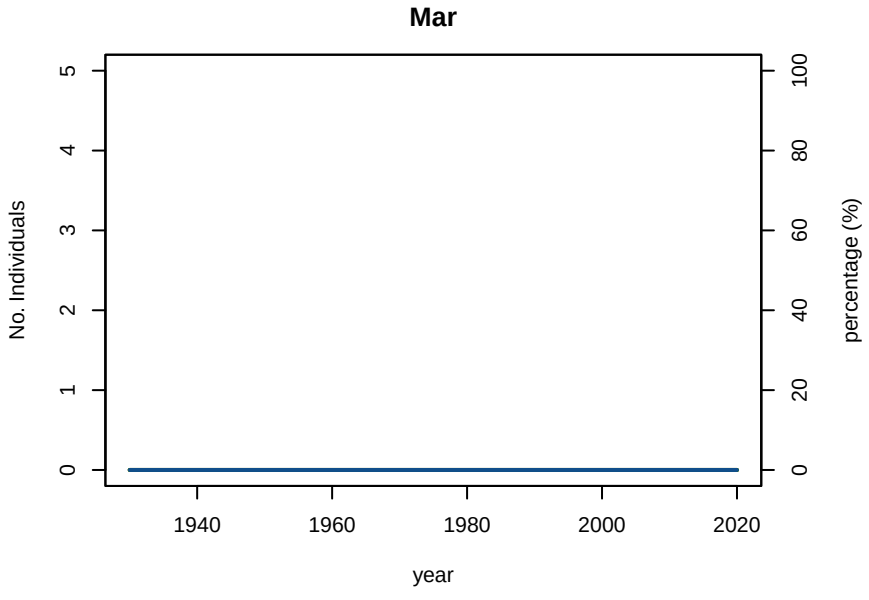


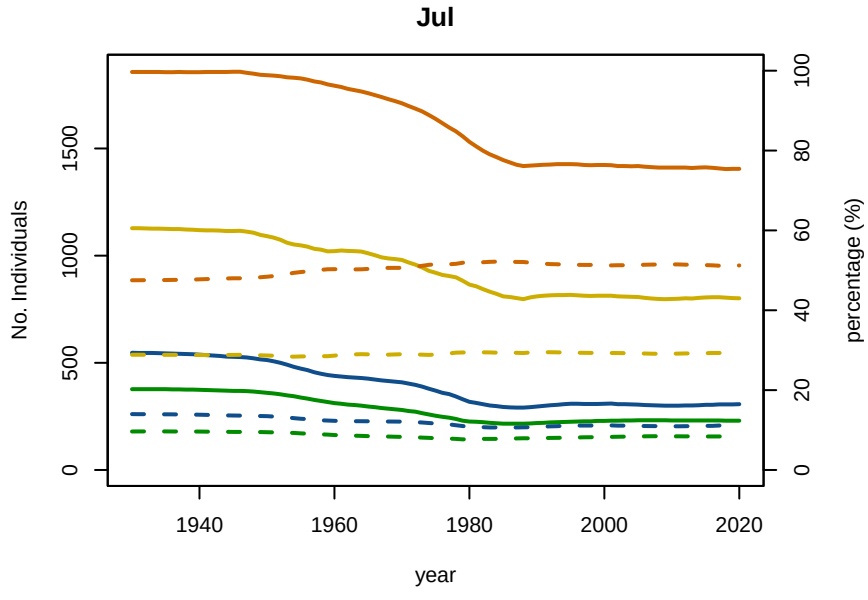


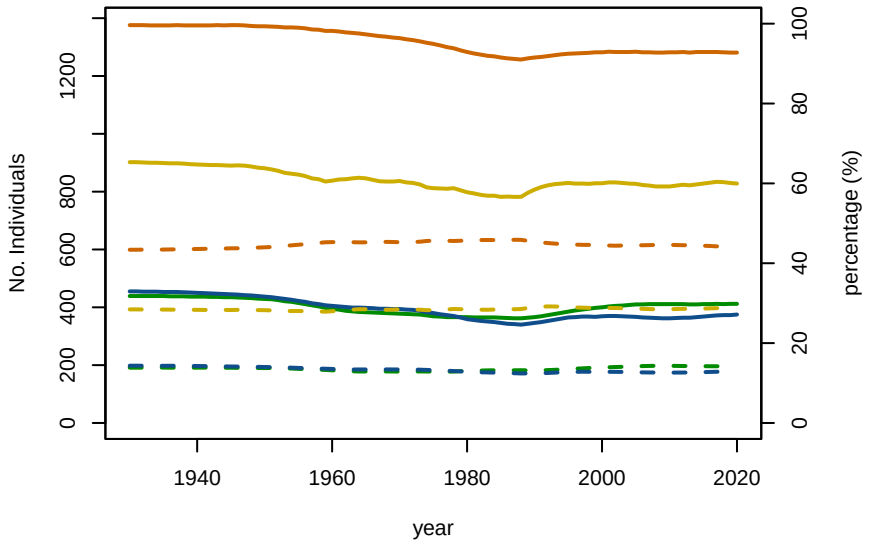


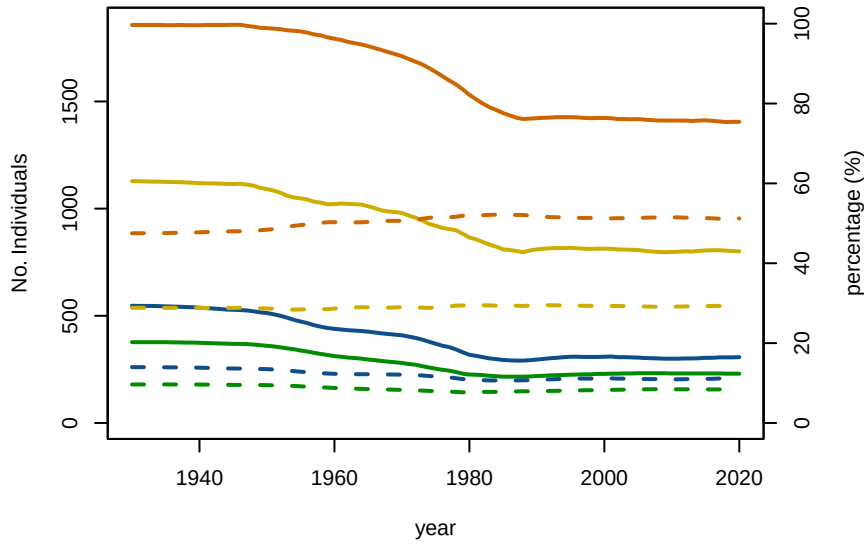
A1−4 A5−9 MatF MatM No Individuals percentage

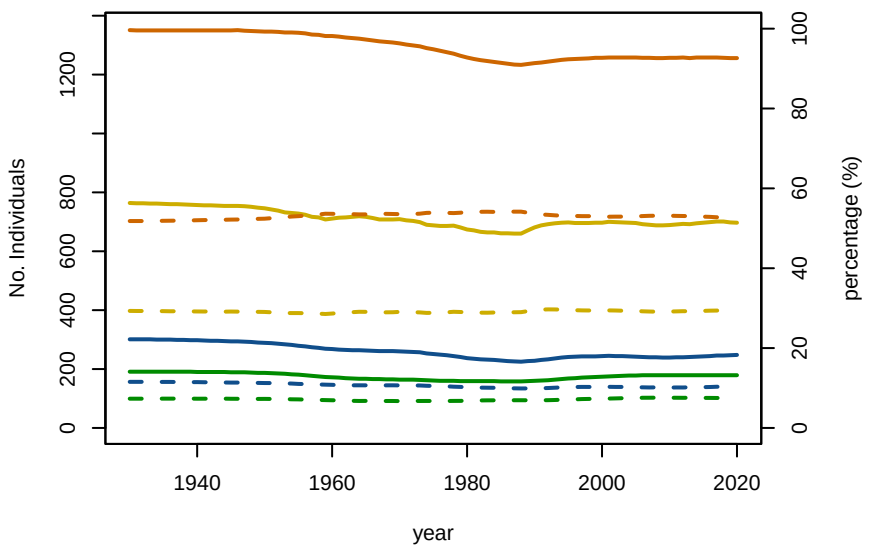
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 11

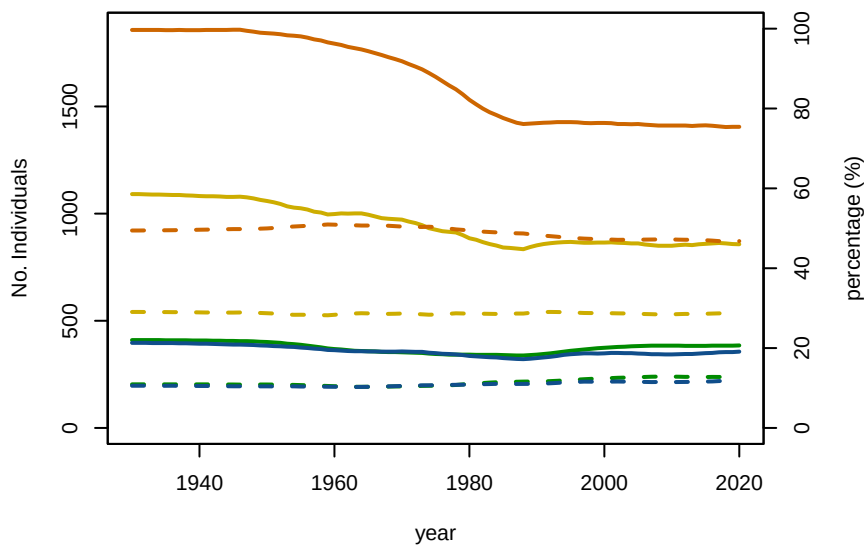


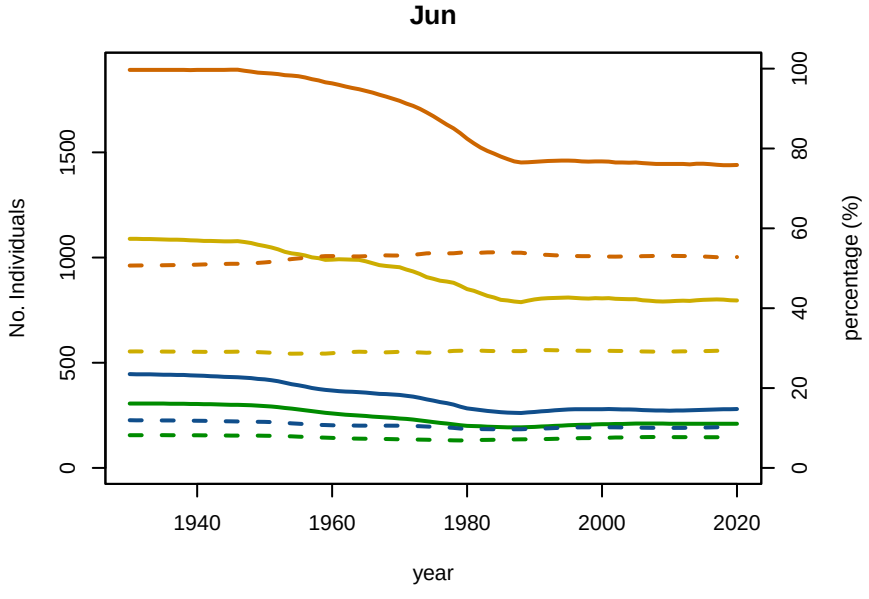


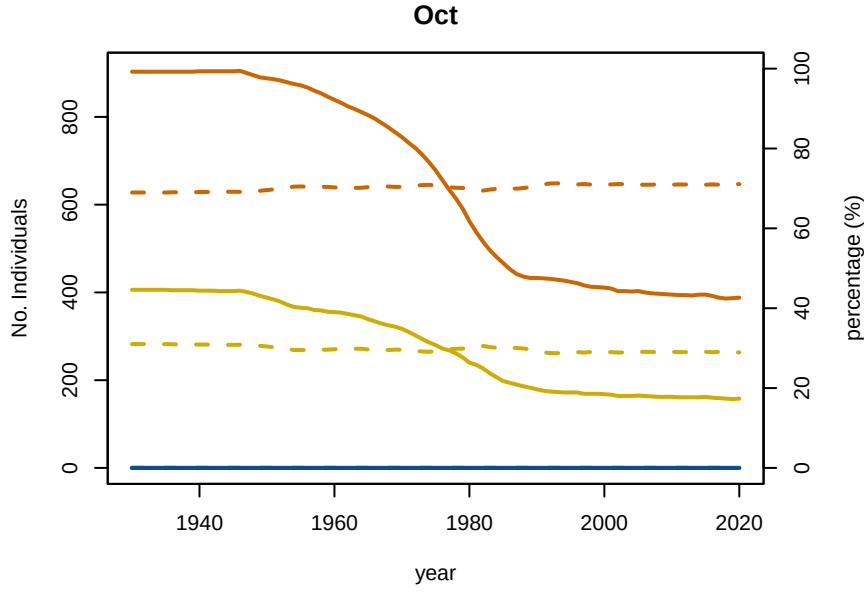






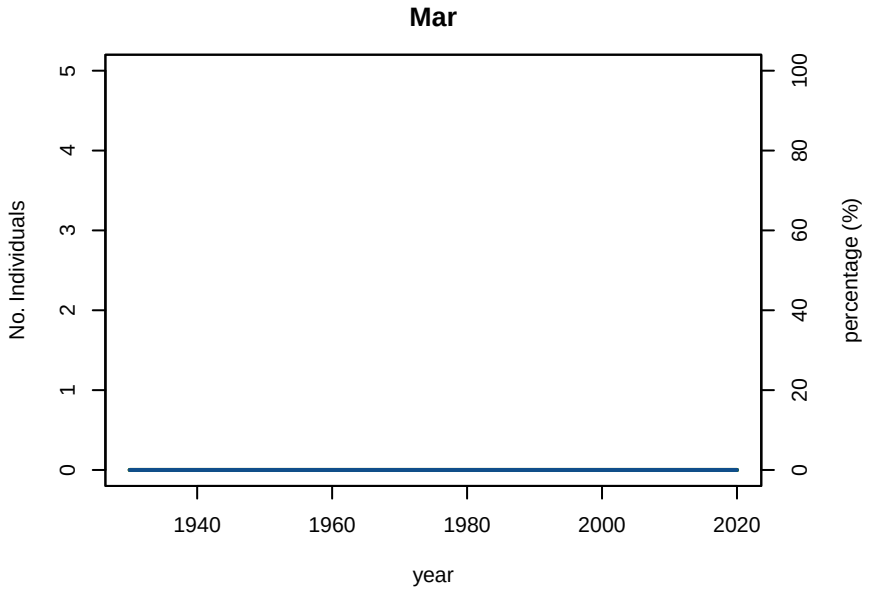


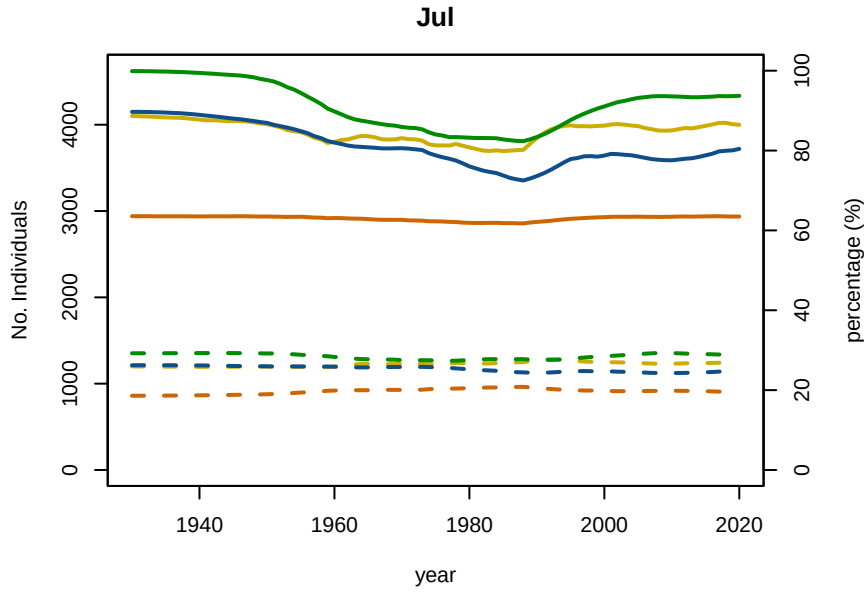


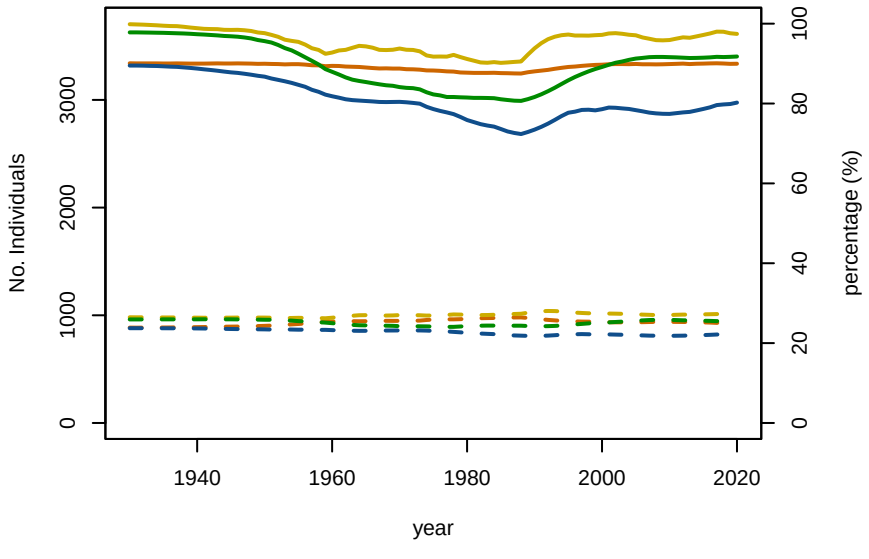


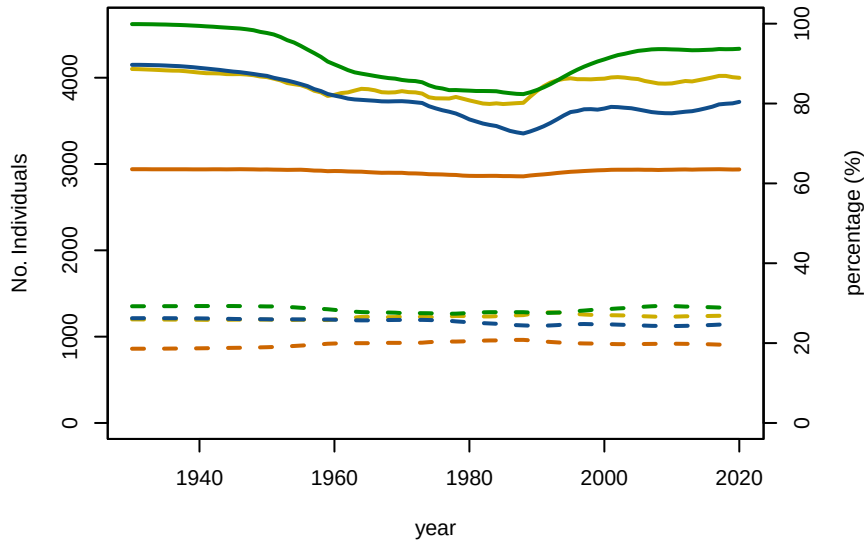
A1−4 A5−9 MatF MatM No Individuals percentage

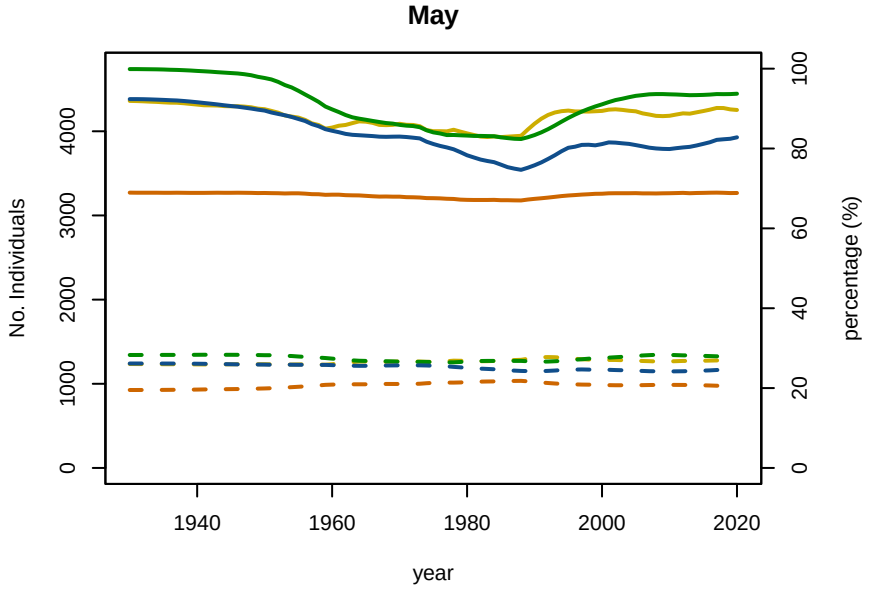
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 12N

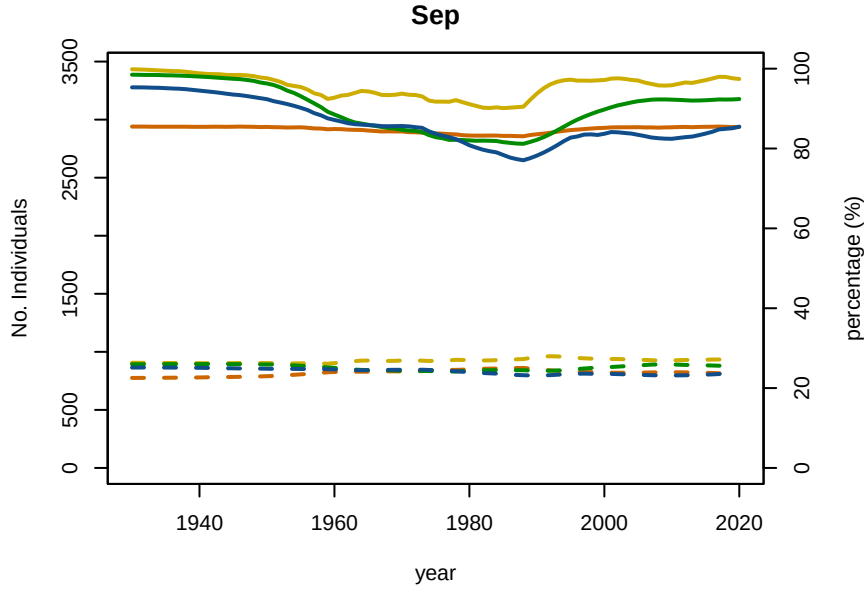


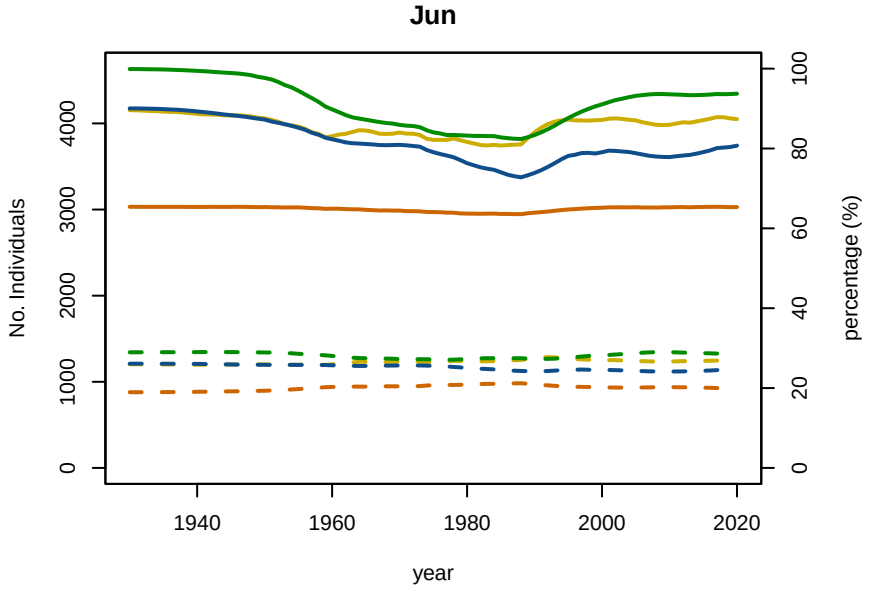


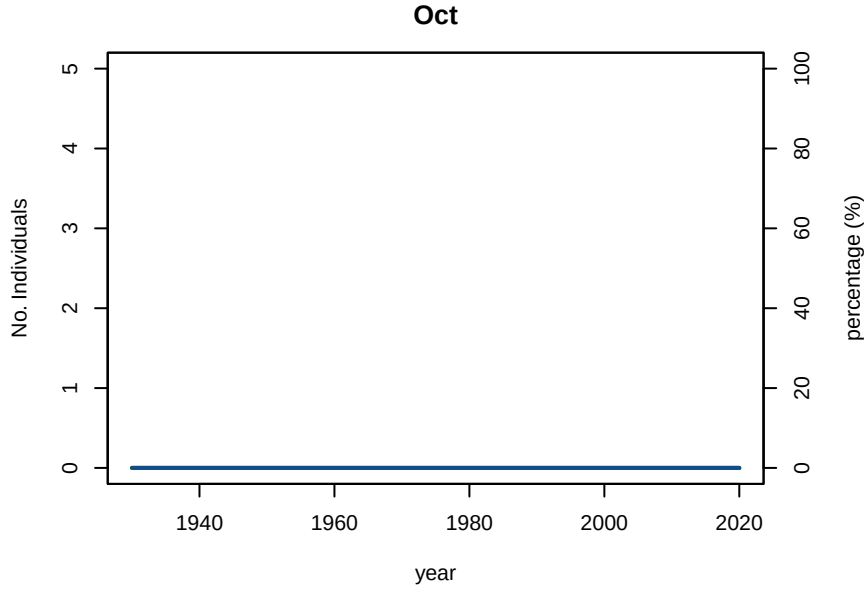






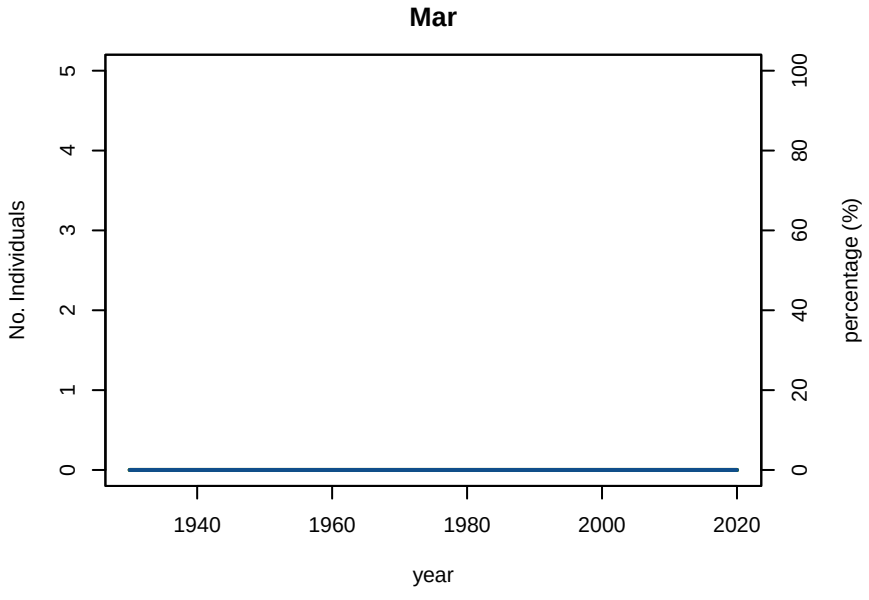


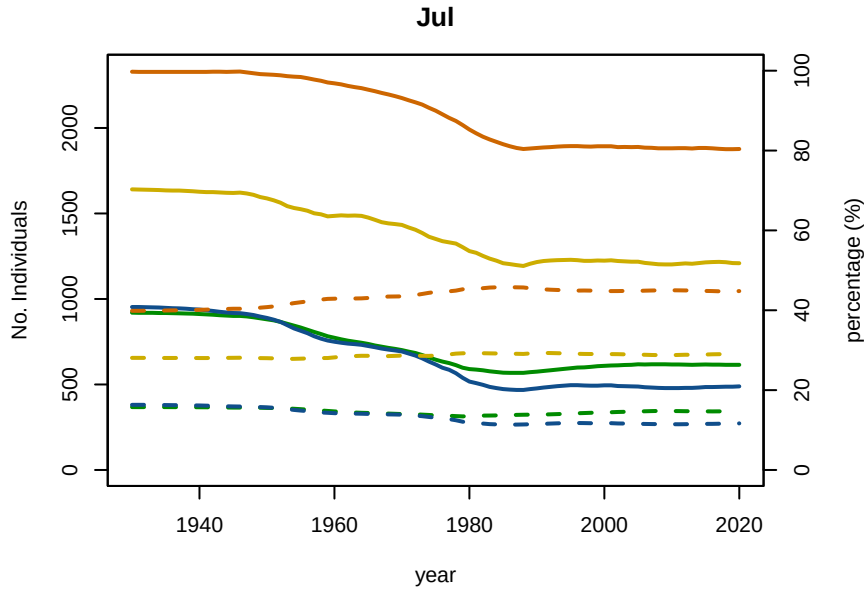


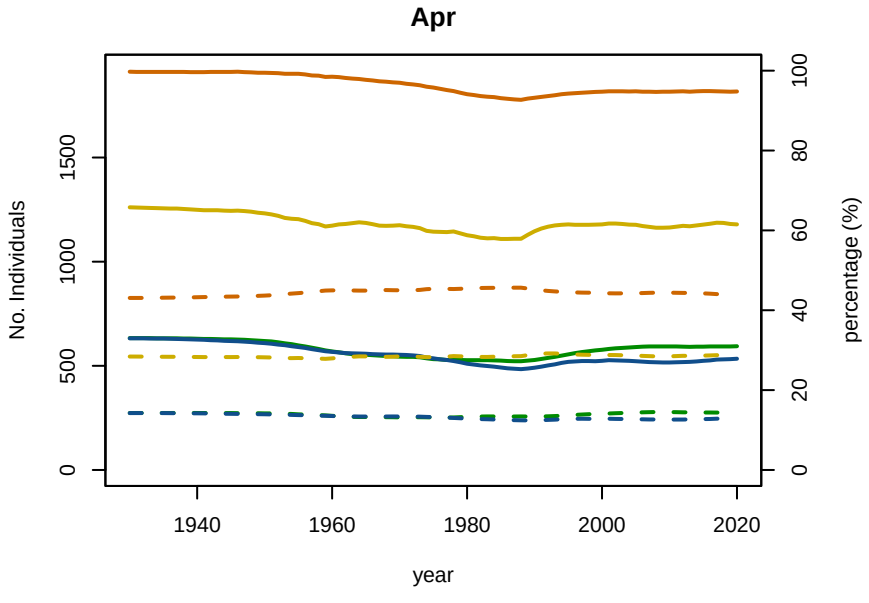


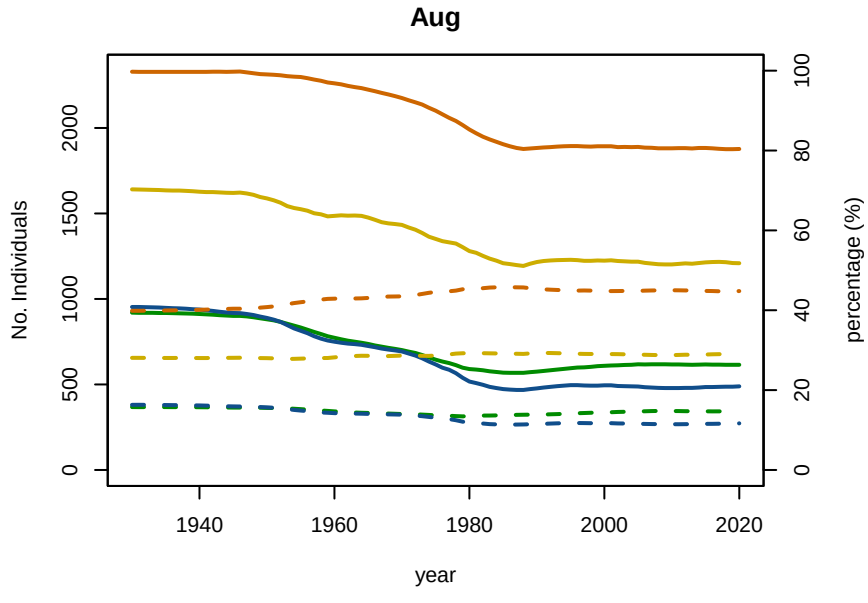
A1−4 A5−9 MatF MatM No Individuals percentage

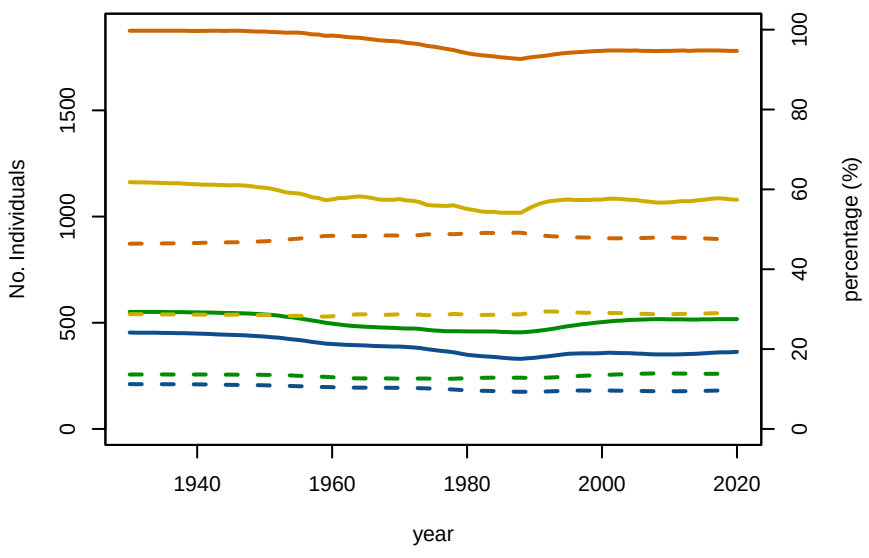
B01−4 Baseline Conditioning Plot 5: Abundance/Proportion by age Subarea 12S

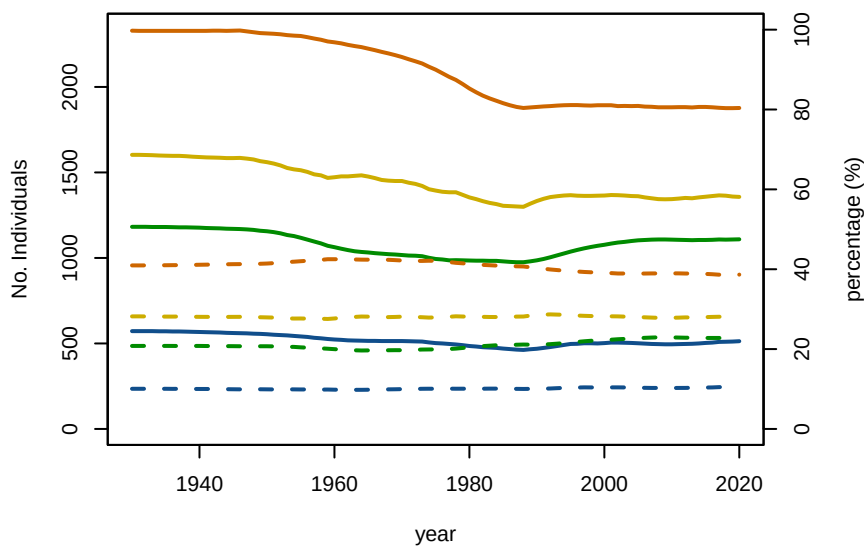


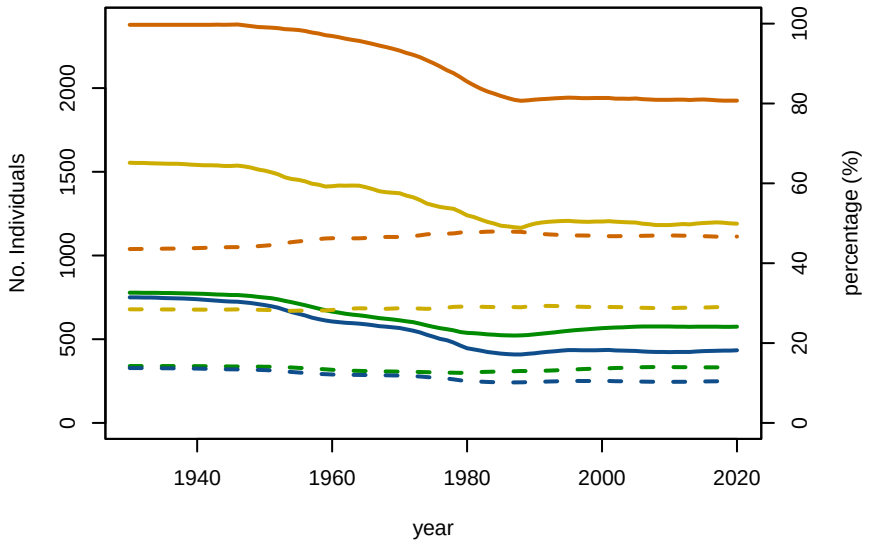


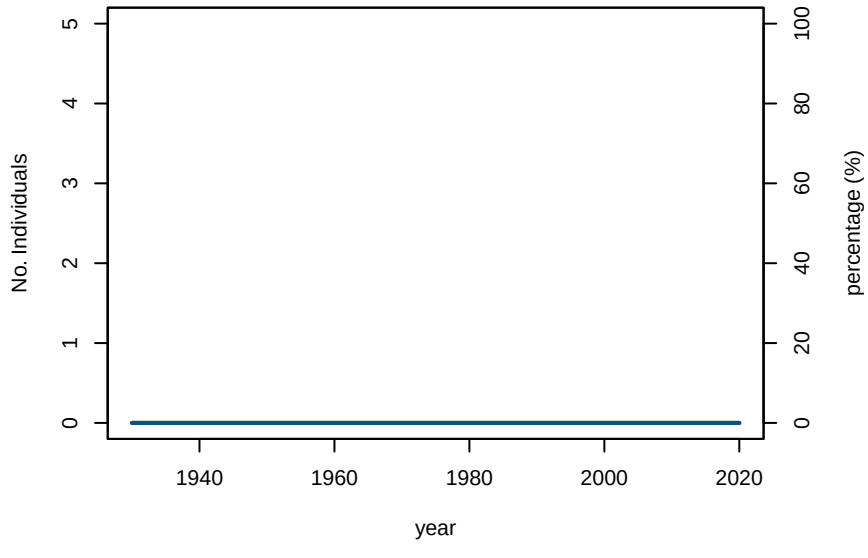






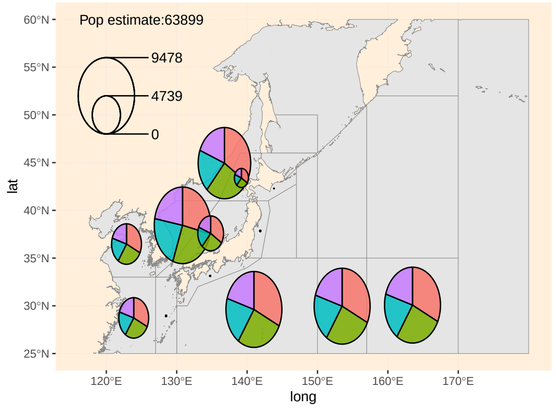




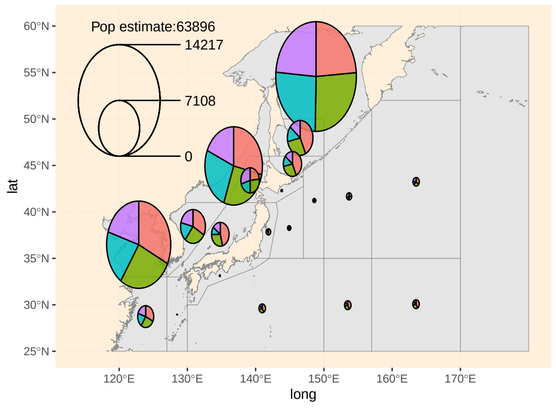


A1−4 A5−9 MatF MatM No Individuals percentage

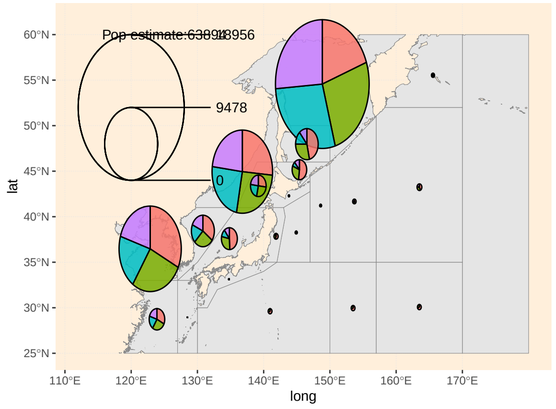
B01−4 Mar−1930



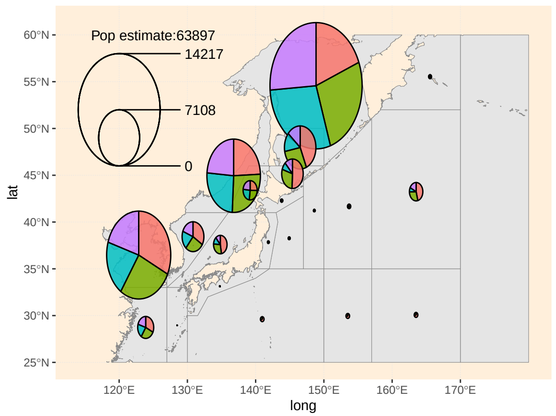
B01−4 Apr−1930



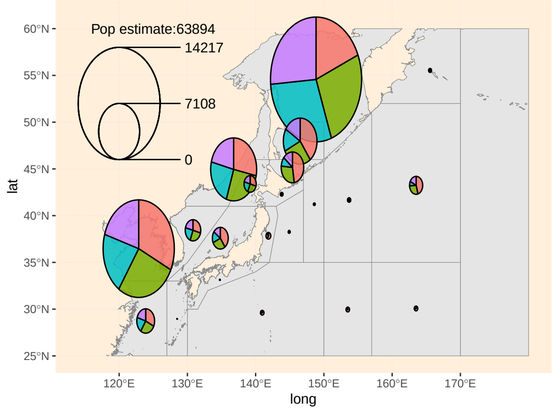
B01−4 May−1930



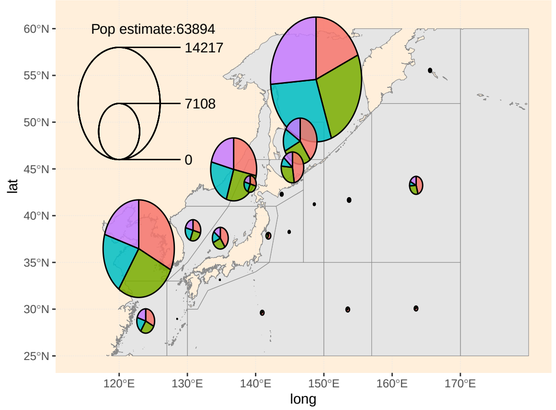
B01−4 Jun−1930



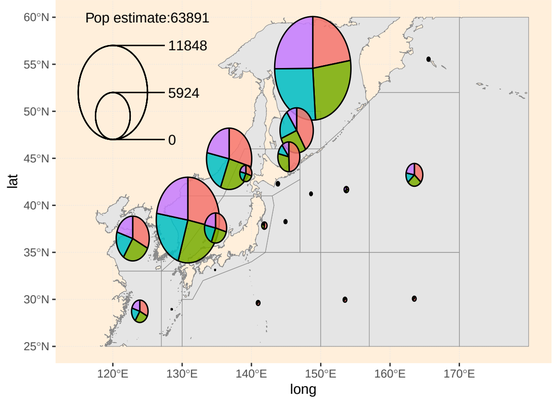
B01−4 Jul−1930



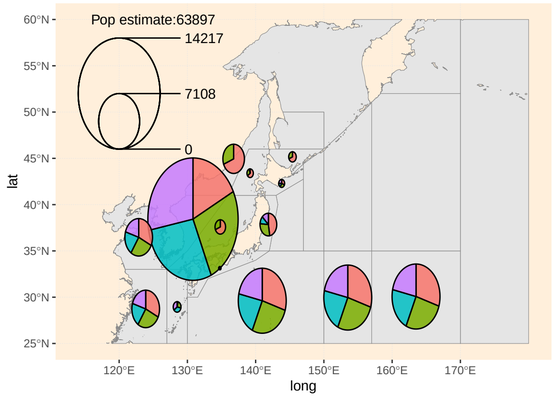
B01−4 Aug−1930



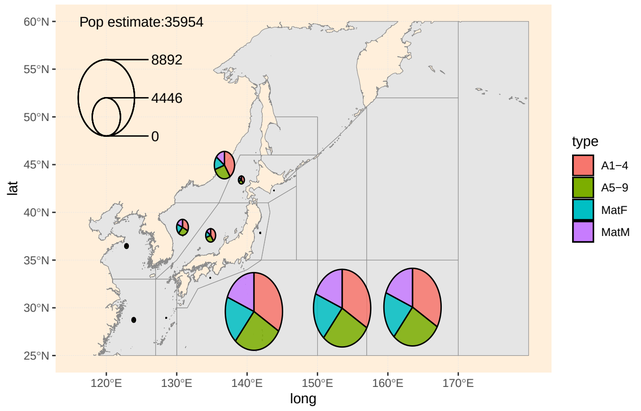
B01−4 Sep−1930



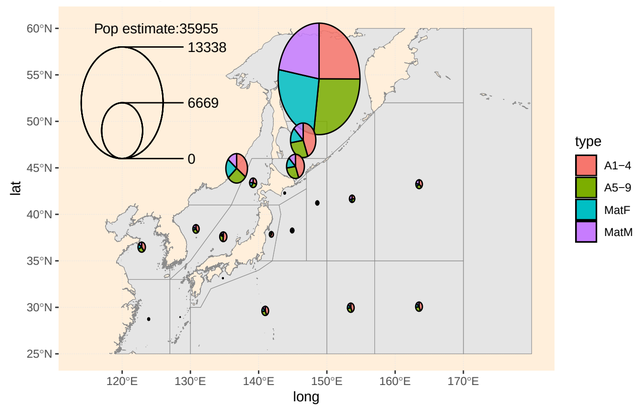
B01−4 Oct−1930



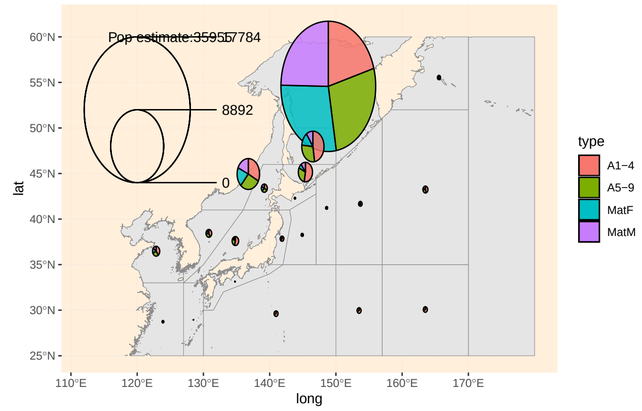
B01−4 Mar−2020



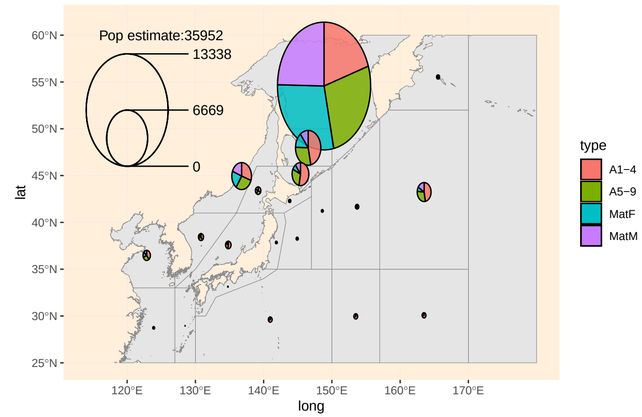
B01−4 Apr−2020



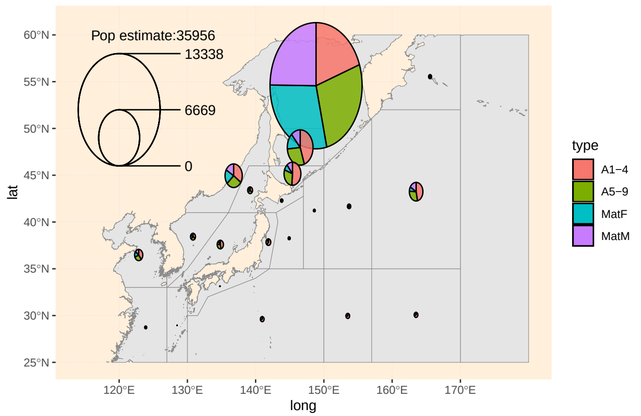
B01−4 May−2020



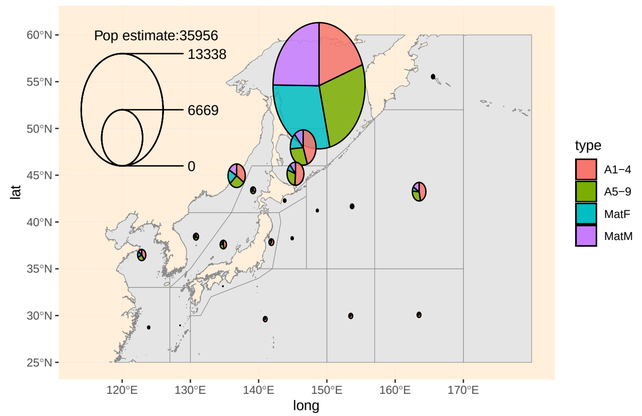
B01−4 Jun−2020



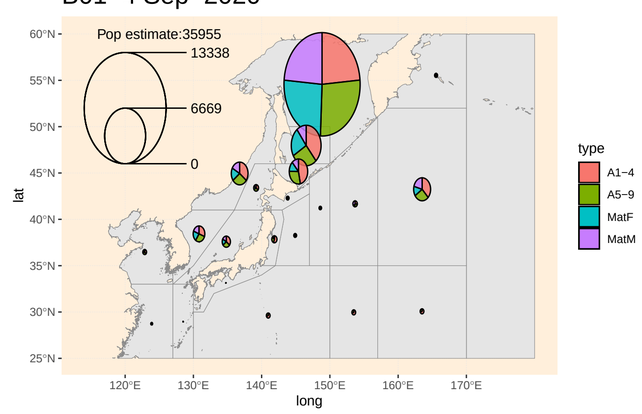
B01−4 Jul−2020



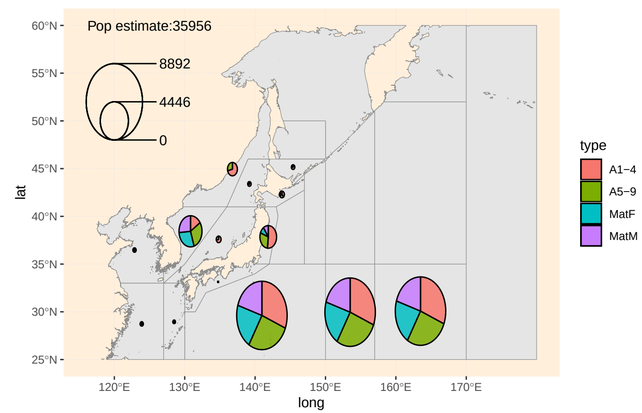
B01−4 Aug−2020



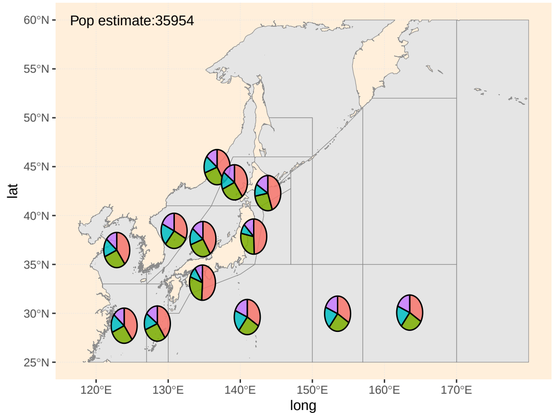
B01−4 Sep−2020



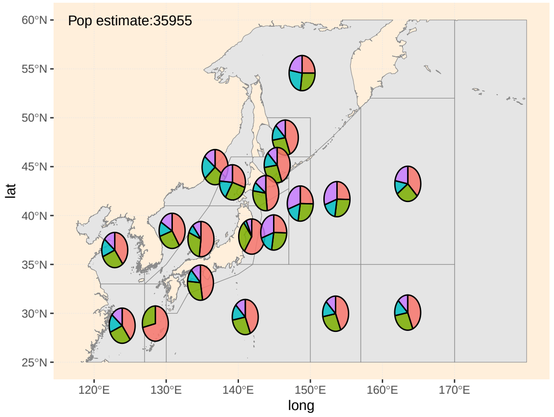
B01−4 Oct−2020



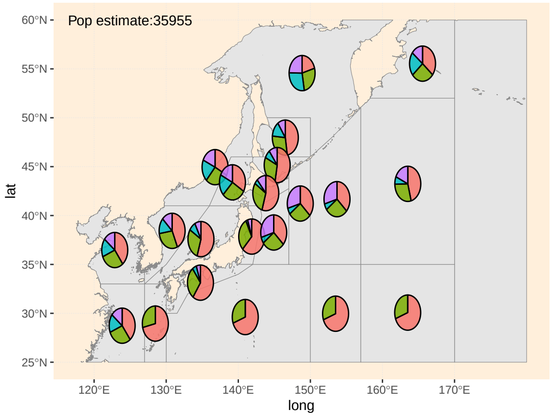
B01−4 Mar−2020



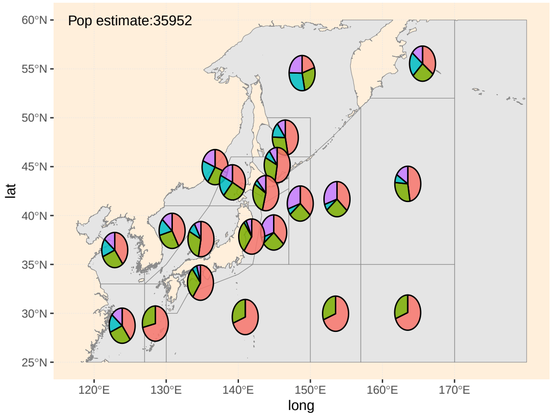
B01−4 Apr−2020



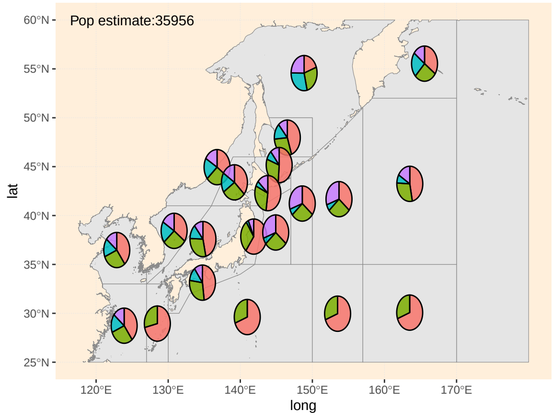
B01−4 May−2020



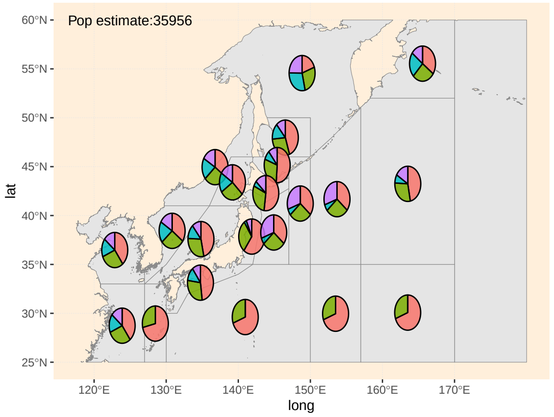
B01−4 Jun−2020



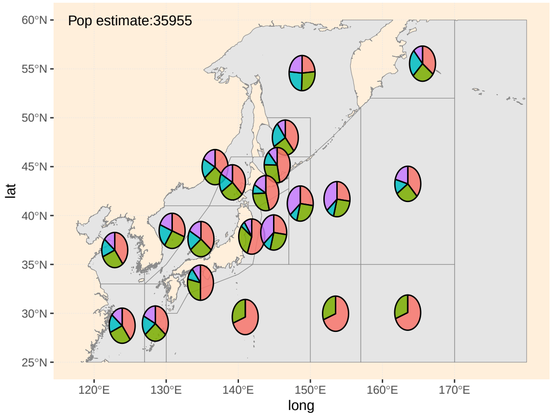
B01−4 Jul−2020



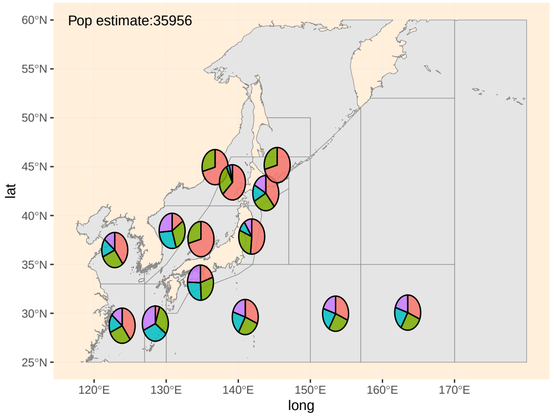
B01−4 Aug−2020



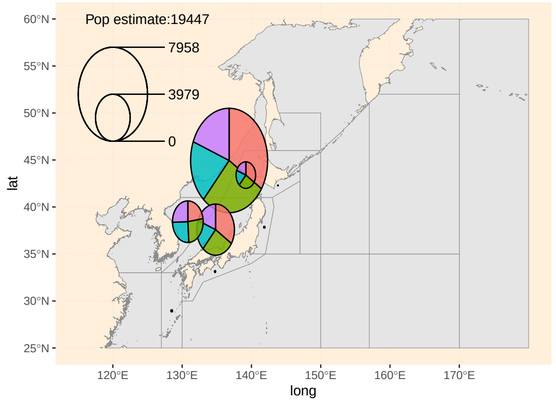
B01−4 Sep−2020



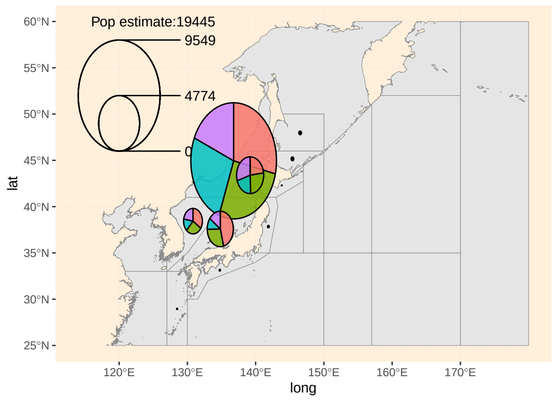
B01−4 Oct−2020



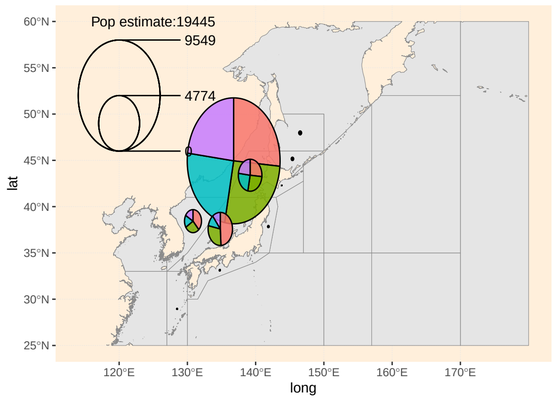
B01−4 Stock:J Mar−1930



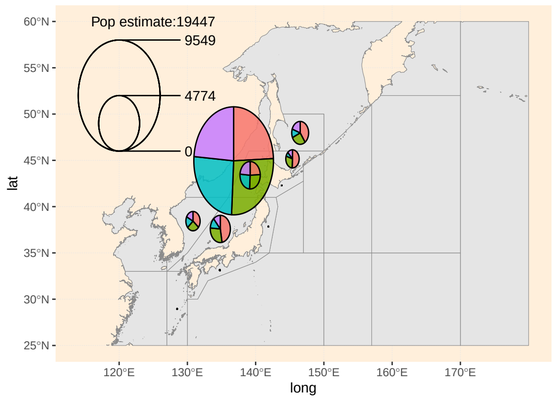
B01−4 Stock:J Apr−1930



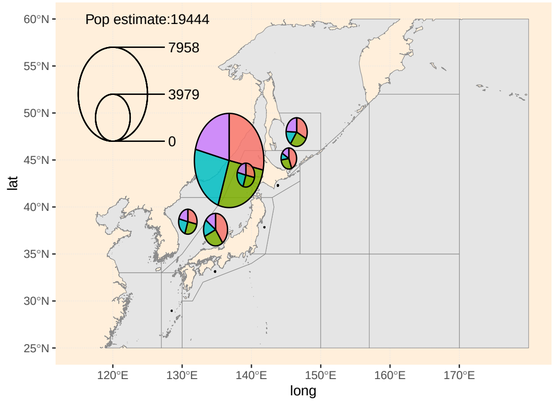
B01−4 Stock:J May−1930



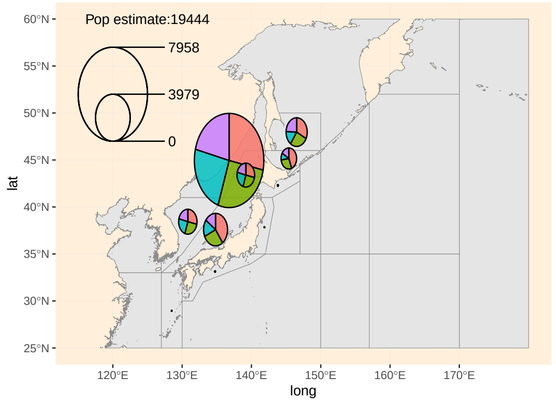
B01−4 Stock:J Jun−1930



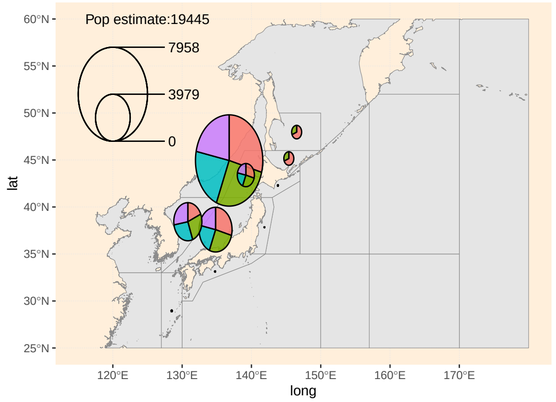
B01−4 Stock:J Jul−1930



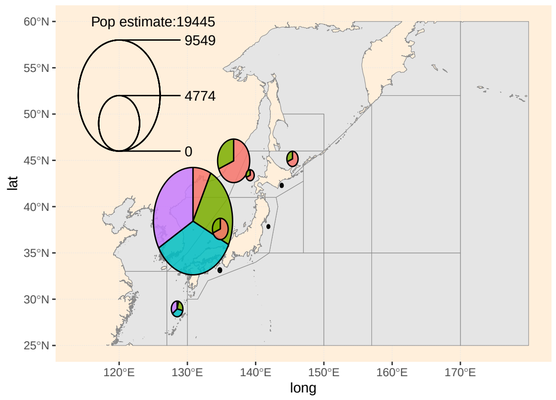
B01−4 Stock:J Aug−1930



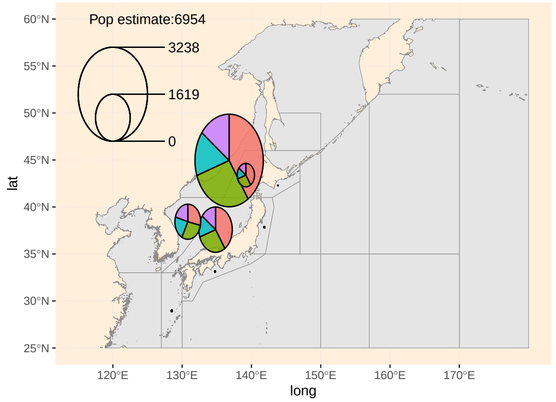
B01−4 Stock:J Sep−1930



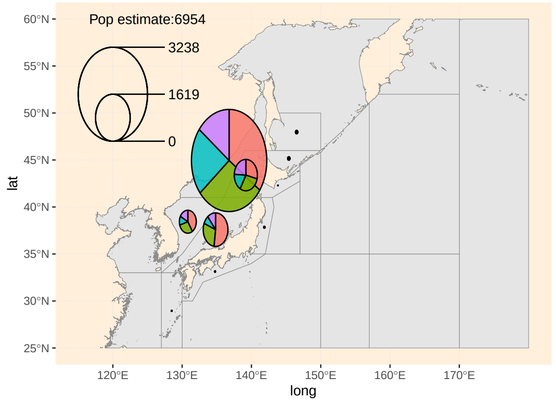
B01−4 Stock:J Oct−1930



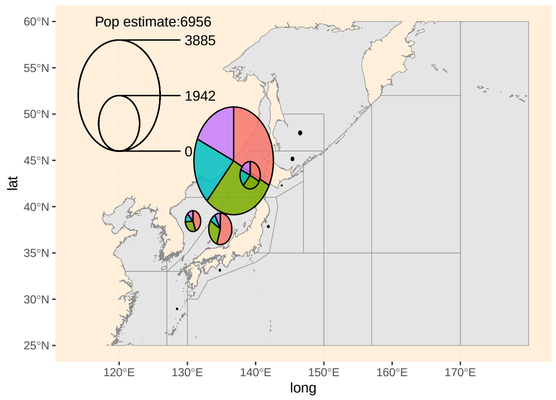
B01−4 Stock:J Mar−2020



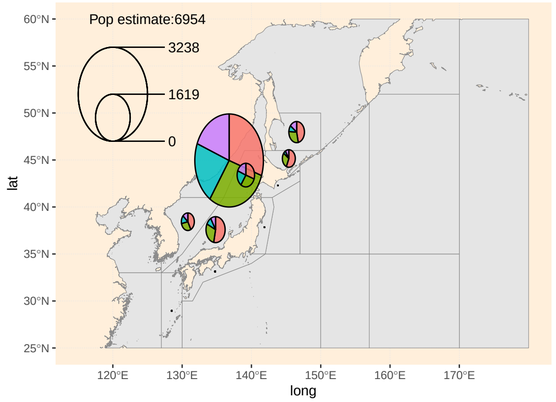
B01−4 Stock:J Apr−2020



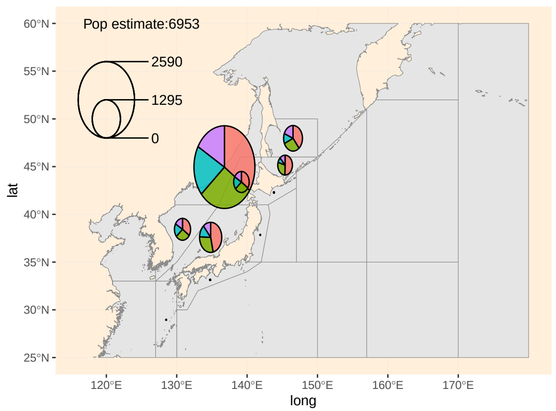
B01−4 Stock:J May−2020



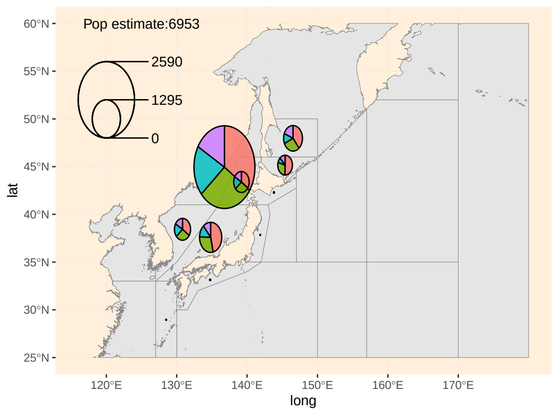
B01−4 Stock:J Jun−2020



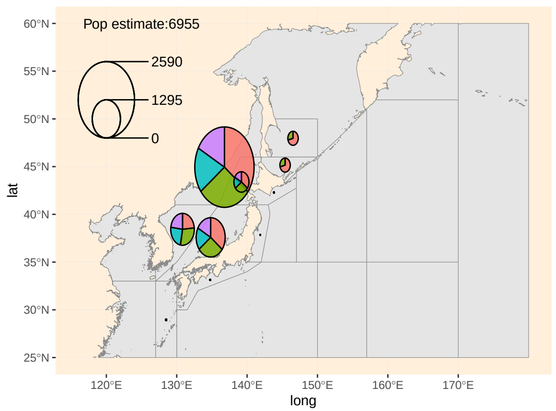
B01−4 Stock:J Jul−2020



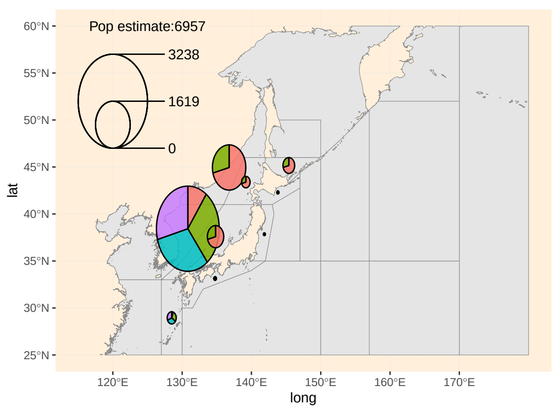
B01−4 Stock:J Aug−2020



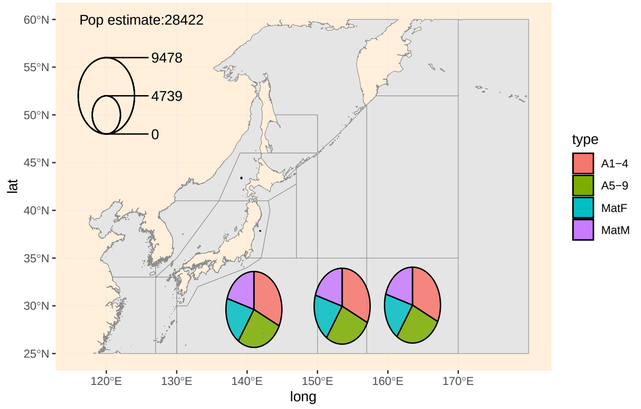
B01−4 Stock:J Sep−2020



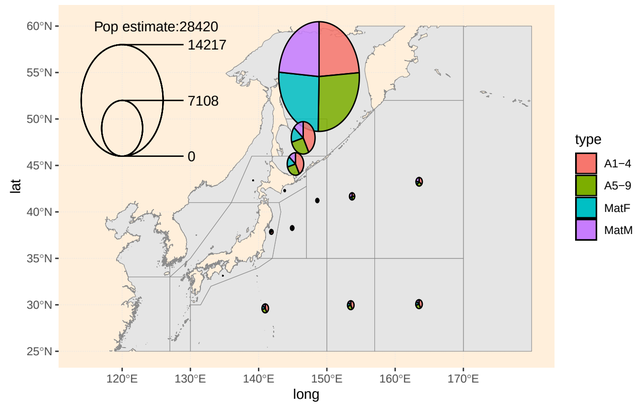
B01−4 Stock:J Oct−2020



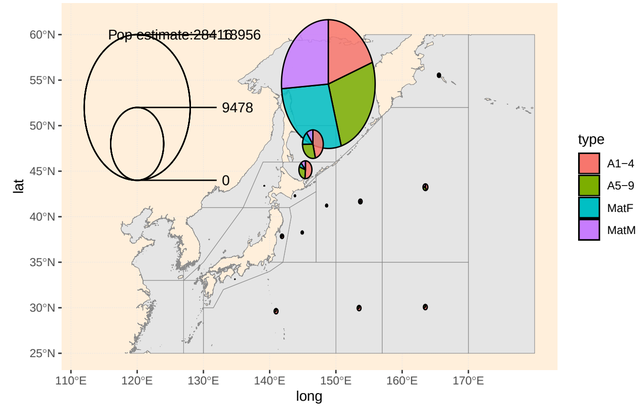
B01−4 Stock:O Mar−1930



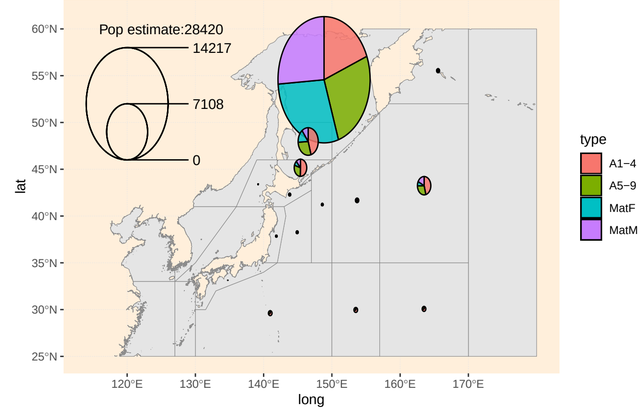
B01−4 Stock:O Apr−1930



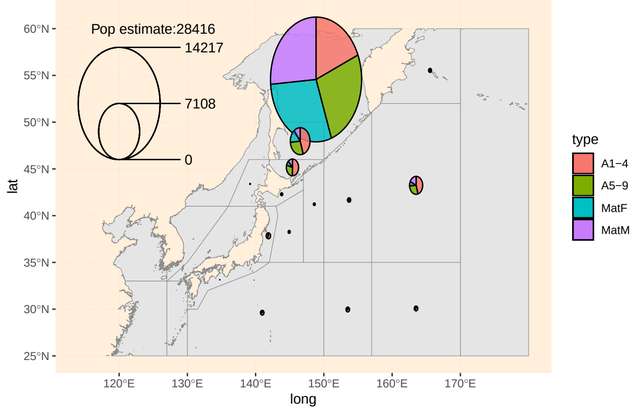
B01−4 Stock:O May−1930



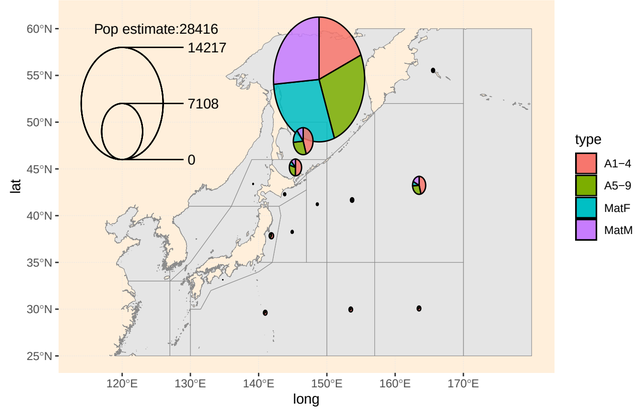
B01−4 Stock:O Jun−1930



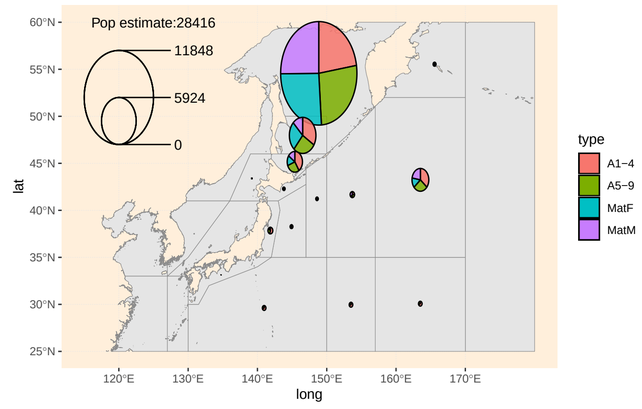
B01−4 Stock:O Jul−1930



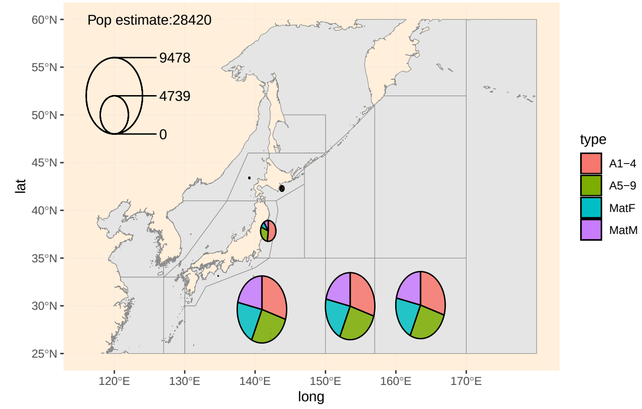
B01−4 Stock:O Aug−1930



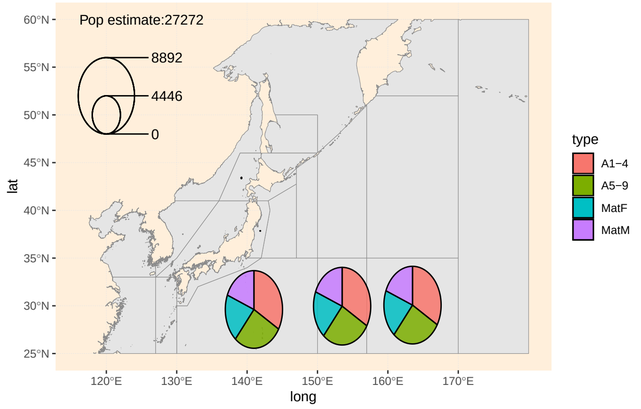
B01−4 Stock:O Sep−1930



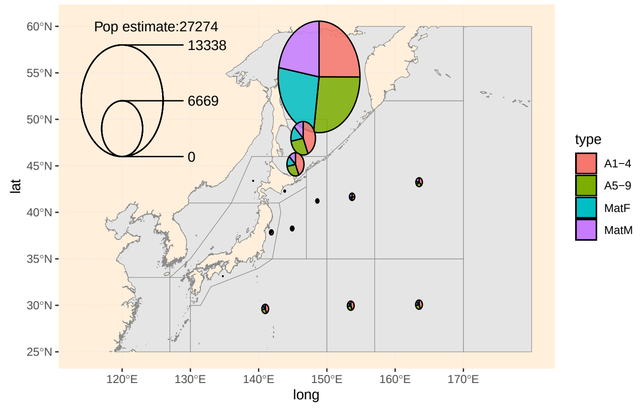
B01−4 Stock:O Oct−1930



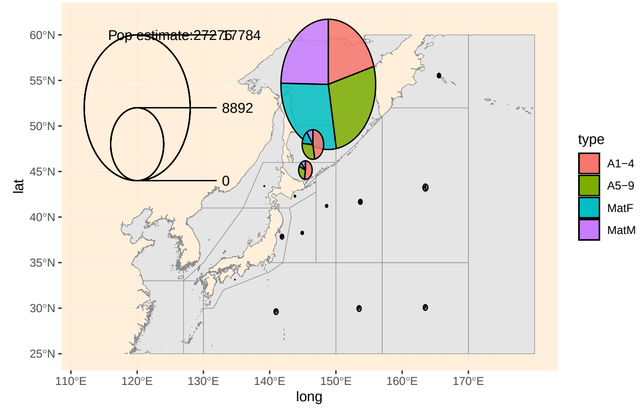
B01−4 Stock:O Mar−2020



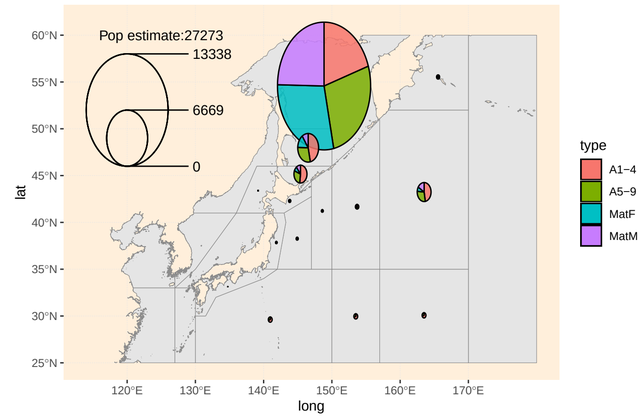
B01−4 Stock:O Apr−2020



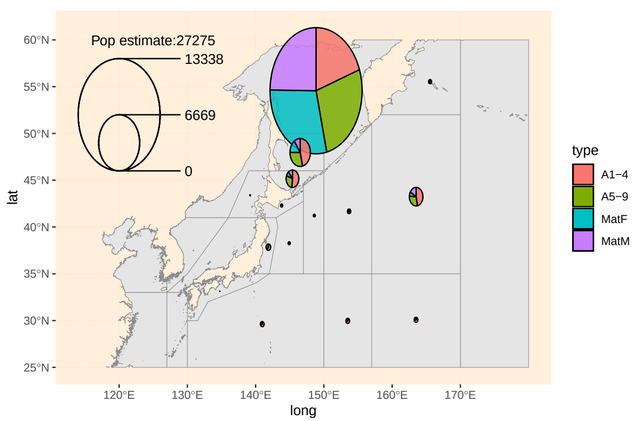
B01−4 Stock:O May−2020



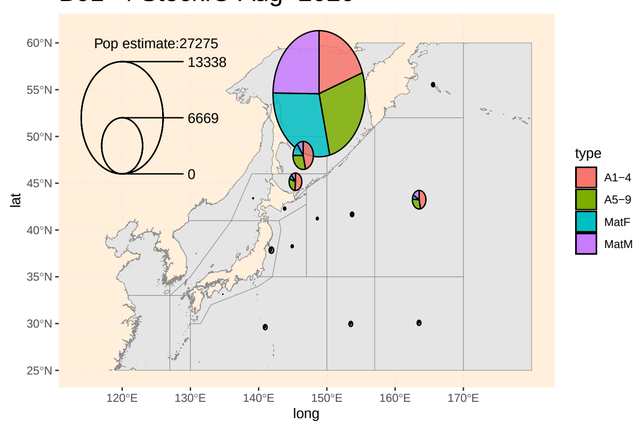
B01−4 Stock:O Jun−2020



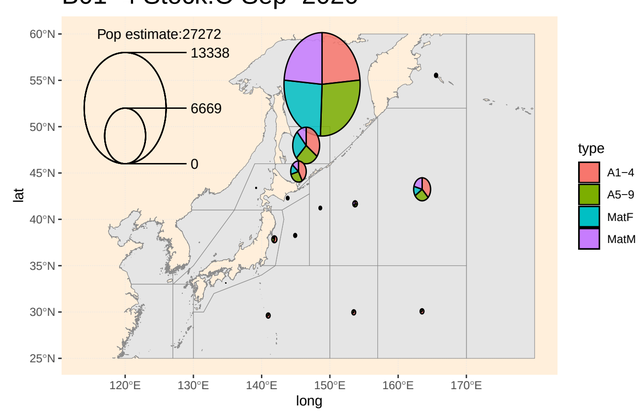
B01−4 Stock:O Jul−2020



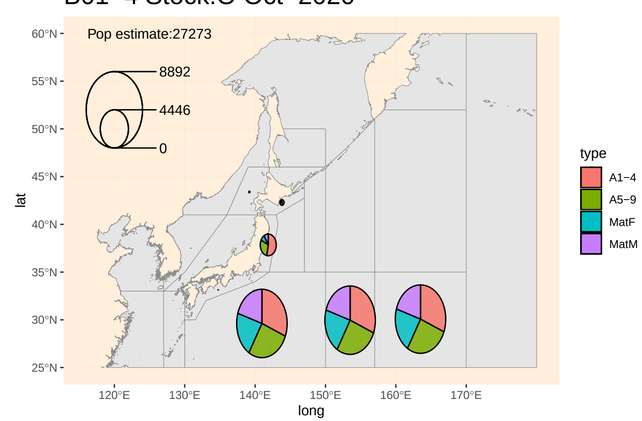
B01−4 Stock:O Aug−2020



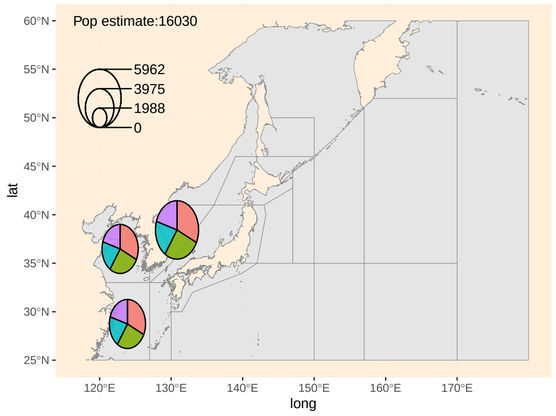
B01−4 Stock:O Sep−2020



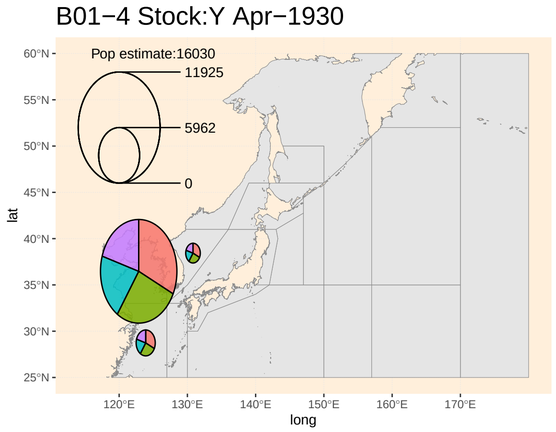
B01−4 Stock:O Oct−2020



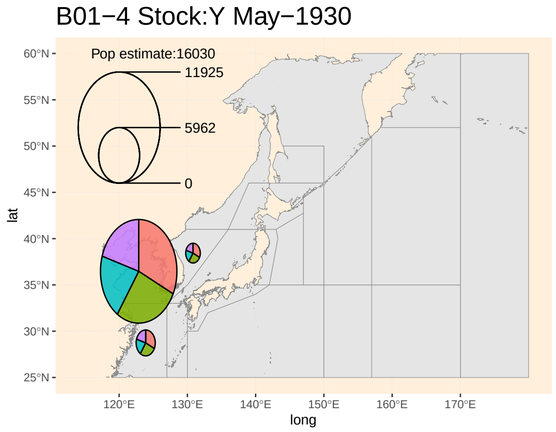
B01−4 Stock:Y Mar−1930



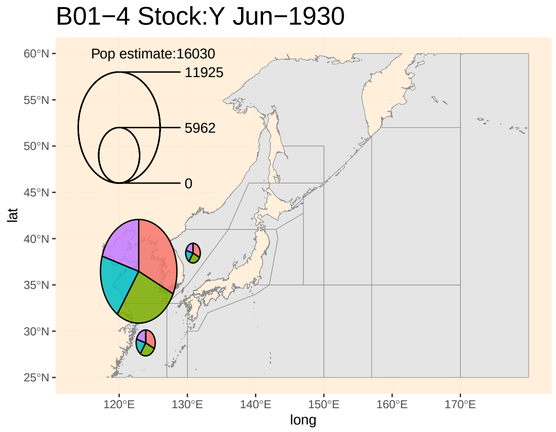
B01−4 Stock:Y Apr−1930



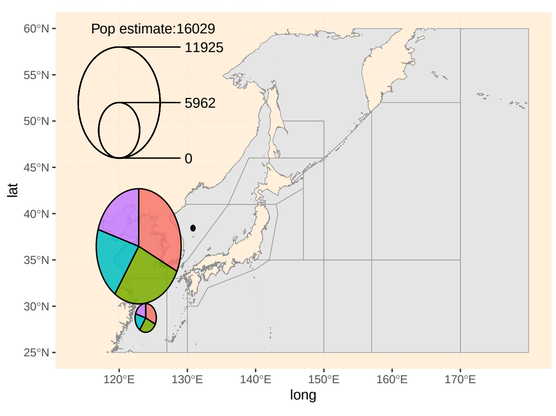
B01−4 Stock:Y May−1930



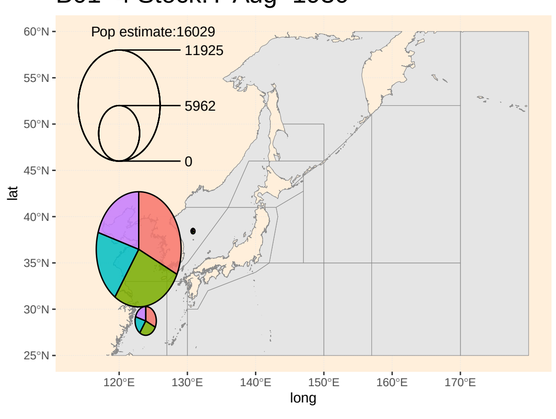
B01−4 Stock:Y Jun−1930



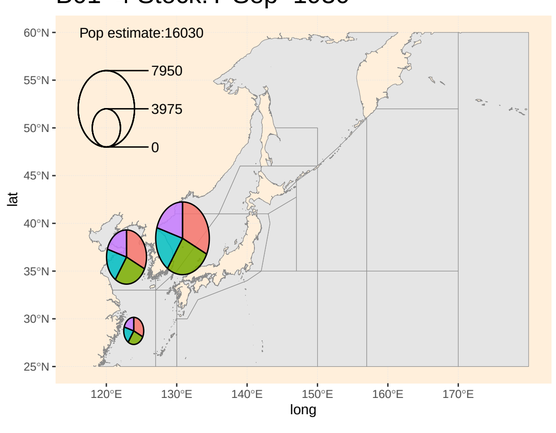
B01−4 Stock:Y Jul−1930



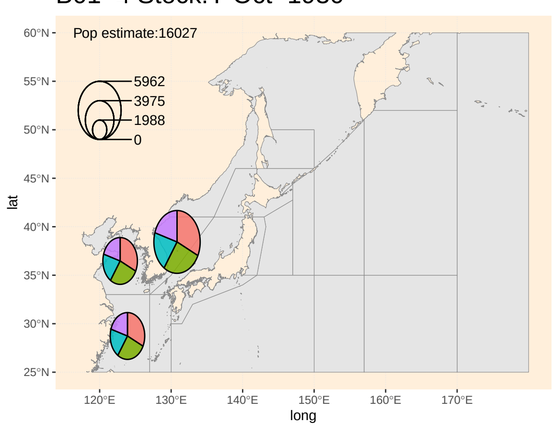
B01−4 Stock:Y Aug−1930



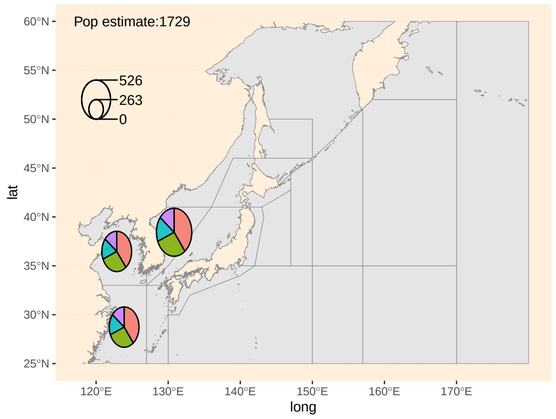
B01−4 Stock:Y Sep−1930



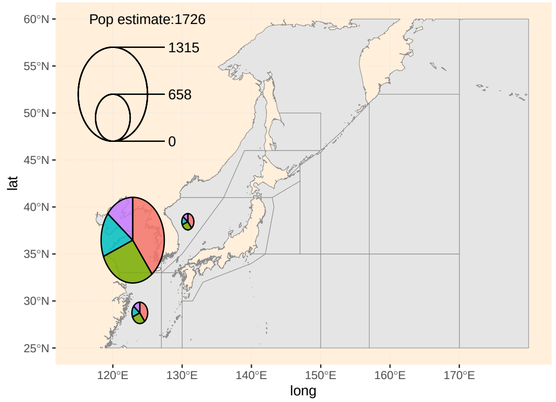
B01−4 Stock:Y Oct−1930



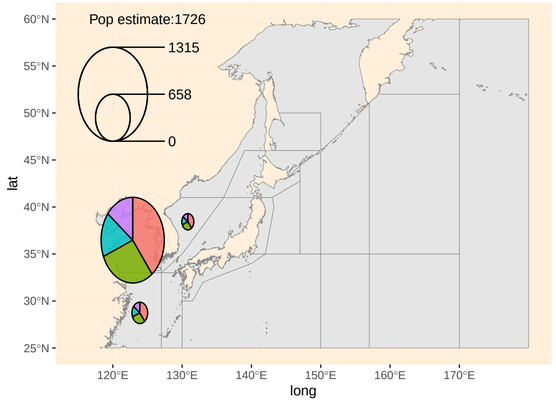
B01−4 Stock:Y Mar−2020



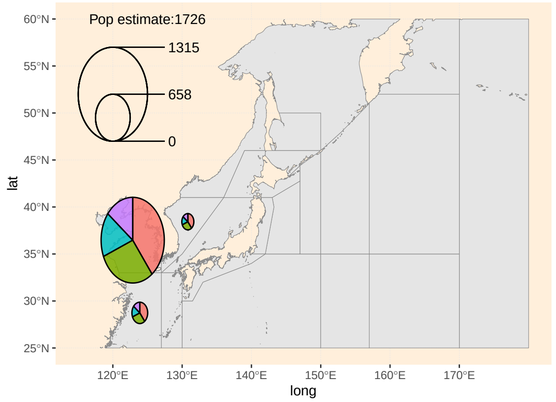
B01−4 Stock:Y Apr−2020



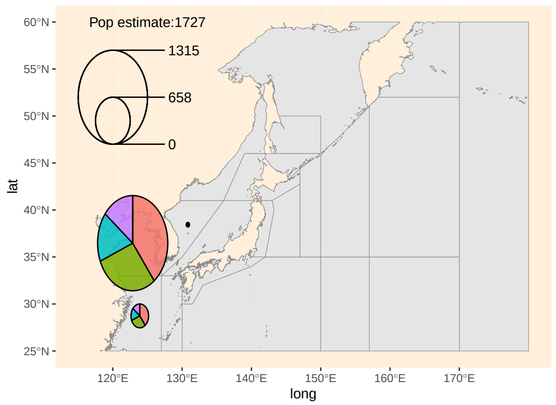
B01−4 Stock:Y May−2020



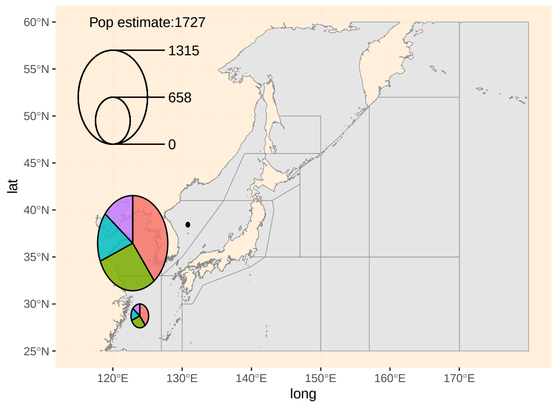
B01−4 Stock:Y Jun−2020



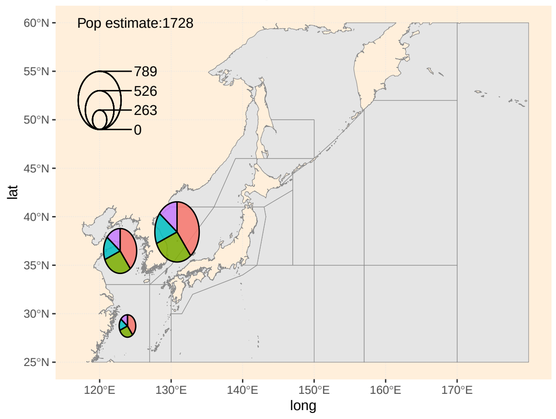
B01−4 Stock:Y Jul−2020



B01−4 Stock:Y Aug−2020



B01−4 Stock:Y Sep−2020



B01−4 Stock:Y Oct−2020

