

Contents

Contributors to Volume 35	v
Preface	vii
Acknowledgements	ix

Arrival and Departure Dates

ESA LEHIKONEN, TIM H. SPARKS and MECISLOVAS ZALAKEVICIUS

I. Summary	1
II. A Brief History	2
III. Variation of Arrival Dates During the Last 250 Years	4
IV. Current Data and Approaches	4
A. Types and Quality of Data	4
V. How Is Earlier Arrival Achieved?	9
VI. Statistics	11
VII. Confounding Factors	12
VIII. Overview of Changes of Timing in the Latter Part of the 20th Century	13
A. Arrival—Trend of Timing	14
B. Arrival—Relationship to Temperature and Weather Systems	20
C. Departure	23
D. Length of Stay	26
IX. Consequence of Changing Timing	27
X. Future Work	28
References	28

Migratory Fuelling and Global Climate Change

FRANZ BAIRLEIN and OMMO HÜPPOP

I. Summary	33
II. Introduction	33

III. Changing Stopover Habitats	35
IV. Migratory Fuelling and Successful Migration	36
V. Plasticity in Migratory Performance: Does It Matter?	37
VI. Energy Stores and Migration Performance	38
VII. Outlook	42
References	44

Using Large-Scale Data from Ringed Birds for the Investigation of Effects of Climate Change on Migrating Birds: Pitfalls and Prospects

WOLFGANG FIEDLER, FRANZ BAIRLEIN and ULRICH KÖPPEN

I. Summary	49
II. Introduction	50
III. Changes in Migration Behaviour	51
A. Types of Changes	51
B. Changes in the Presence of Individuals at Distinct Times	52
C. Changes in Recovery Distances	57
D. Changes in Recovery Latitude	61
E. Changes in Recovery Directions	61
F. Comparison of Results and Methods	61
IV. Identification of Underlying Factors and the Role of Climate Change	64
References	66

Breeding Dates and Reproductive Performance

PETER DUNN

I. Summary	69
II. Introduction	70
III. Changes in Temperature	70
IV. How Does Temperature Affect the Timing of Reproduction?	71
V. Changes in Laying Date and Reproductive Performance	75
VI. The Effect of Climate Change on Particular Species and Locations	80
VII. What Causes Changes in Timing of Breeding?	83
VIII. Conclusions	84
Acknowledgements	85
References	85

Global Climate Change Leads to Mistimed Avian Reproduction

MARCEL E. VISSER, CHRISTIAAN BOTH and
MARCEL M. LAMBRECHTS

I. Summary	89
II. Introduction	90
III. Why Global Climate Change Will Lead to Reproductive Mistiming	92
A. Changes in the Environment of Decision-Making	93
B. Changes in the Environment of Selection	95
C. Changes in Synchronisation	97
IV. Consequences of Reproductive Mistiming	98
V. Adaptations to Reproductive Mistiming	101
A. Responses of Individuals	101
B. Population Responses	102
VI. Discussion and Conclusions	104
Acknowledgements	108
References	108

Analysis and Interpretation of Long-Term Studies Investigating Responses to Climate Change

ANDERS P. MØLLER and JUHA MERILÄ

I. Summary	111
II. Introduction	112
III. Methodological Considerations	113
A. Choice of Phenological Variables	113
B. Choice of Climate Variables	115
C. Choice of Statistical Models	118
D. Accounting for Variation in Recapture Probabilities	119
E. Representativeness of the Data	119
IV. Interpretational Considerations	120
A. Phenotypic Plasticity	121
B. Genetic Change	121
C. Migration	125
V. Conclusions and Further Directions	126
Acknowledgements	127
References	128

Photoperiodic Response and the Adaptability of Avian Life Cycles to Environmental Change

TIMOTHY COPPACK and FRANCISCO PULIDO

I.	Summary	131
II.	Introduction	132
	A. General Introduction	132
	B. Photoperiodic Control of Avian Seasonality	133
	C. Photoperiodic Response and Environmental Change	135
III.	Responses to Temporal and Spatial Variation in Photoperiodic Conditions	138
	A. Photoperiodic Response of Migrants to Changes in Hatching Date	138
	B. Photoperiodic Response of Migrants to Novel Wintering Ranges	143
	C. Tropical Birds and Their Potential for Poleward Range Extension	145
	D. Birds in Urban Habitats and the Effect of Artificial Light	146
IV.	Conclusion	147
	References	147

Microevolutionary Response to Climatic Change

FRANCISCO PULIDO and PETER BERTHOLD

I.	Summary	151
II.	Introduction	152
III.	Microevolutionary Change—Mechanisms and Approaches	155
IV.	The Prospective Importance of Different Evolutionary Processes to Adaptive Evolutionary Change	159
	A. The Response of Bird Populations to Natural Selection	159
	B. The Effects of Gene Flow	161
	C. The Effects of Inbreeding	162
V.	Changes in the Level of Genetic Variation	163
VI.	Adaptive Changes in Laying Date in Response to Climate Change	165
VII.	Microevolutionary Response of Migratory Behaviour	166
	A. The Adaptability of Migratory Behaviour: The Role of Genetic Variances and Covariances	166
	B. Constraints on Adaptive Evolution of Migration	168
	C. The Study of Adaptive Change in Migratory Birds	169
	D. Phenotypic Changes in Migratory Behaviour and Their Potential Causes	170
	E. Microevolutionary Change in Migratory Behaviour	172
VIII.	Conclusions and Outlook	175

Acknowledgements	176
References	176

Climate Influences on Avian Population Dynamics

BERNT-ERIK SÆTHER, WILLIAM J. SUTHERLAND and
STEINAR ENGEN

I. Summary	185
II. Introduction	186
III. Impact of Weather on Avian Population Dynamics	187
IV. Modelling Population Dynamical Consequences of Changes in Climate	197
A. Changes in Mean Demographic Variables	197
B. Changes in the Environmental Stochasticity	198
C. Trends in Climate	200
V. Discussion	203
Acknowledgements	205
References	205

Importance of Climate Change for the Ranges, Communities and Conservation of Birds

KATRIN BÖHNING-GAESE and NICOLE LEMOINE

I. Summary	211
II. Introduction	212
III. Changes in Climate	213
IV. How to Analyse the Effect of Climate Change	214
V. Influence of Climate Change on the Ranges of Birds	216
A. Correlations of Climatic Factors and Range Boundaries	216
B. Modelled Consequences of Climate Change for Range Boundaries	217
C. Observed Consequences of Climate Change for Range Boundaries	220
VI. Influence of Climate Change on Avian Communities	224
A. Correlations of Climatic Factors and Avian Communities	224
B. Modelled Consequences of Climate Change for Avian Communities	225
C. Observed Consequences of Climate Change for Avian Communities	229
VII. Conservation Consequences of Climate Change	230

VIII. Conclusions and Future Directions	231
References	233

The Challenge of Future Research on Climate Change and Avian Biology

ANDERS P. MØLLER, PETER BERTHOLD and
WOLFGANG FIEDLER

I. Summary	237
II. Introduction	238
III. The Effects of Climate on Avian Biology	238
IV. Phenotypic Plasticity or Micro-Evolutionary Change	241
V. Complex Annual Cycles	242
VI. Latitudinal Gradients as Model Systems	242
VII. Conclusions	243
References	244
Subject Index	247
Cumulative List of Titles	253