

Contents

<i>List of Contributors</i>	<i>page</i> xiii
<i>Preface</i>	xix
<i>Acknowledgements</i>	xxii
1 Mountain Birds and Their Habitats	1
Dan Chamberlain, Aleksi Lehikoinen, Davide Scridel and Kathy Martin	
1.1 Defining a Mountain	2
1.2 Mountain Biodiversity	4
1.3 Mountain Birds	10
1.4 Environmental Challenges for Mountain Birds	15
1.5 Anthropogenic Impacts	25
Acknowledgements	27
References	27
2 Avian Adaptations to High Mountain Habitats: Solving the Challenges of Living in Alpine Ecosystems	35
Kathy Martin, Devin R. de Zwaan, Davide Scridel and Tomás A. Altamirano	
2.1 Defining 'High' in High Mountain Birds	38
2.2 Abiotic Challenges for Alpine Birds	42
2.3 Biological Adaptations for High Mountain Birds	47
2.4 Seasonality, Migration and Connectivity	62
2.5 Ecological Consequences	66
2.6 Life Is Slow on the High Mountains	71
2.7 Advantages to Living and Breeding at High Elevation	74
2.8 Conclusions	76
Acknowledgements	77
References	77

3	Global Bird Communities of Alpine and Nival Habitats	90
	Devin R. de Zwaan, Arnaud G. Barras, Tomás A. Altamirano, Addisu Asefa, Pranav Gokhale, R. Suresh Kumar, Shaobin Li, Ruey-shing Lin, C. Steven Sevillano-Ríos, Kerry A. Weston and Davide Scridel	
3.1	What Defines 'Alpine' Habitat?	91
3.2	A Global Overview of Alpine Habitats and Their Avian Communities	93
3.3	A Global Comparison of Alpine Breeding Bird Communities	108
3.4	Ecology of Alpine Habitats	118
3.5	Snow Dynamics and the Changing Alpine Environment	124
3.6	Conclusions	127
	Acknowledgements	127
	References	128
4	Birds of Treeline Ecotones	137
	Dan Chamberlain, Evgeniya Melikhova, Susanne Jähnig and C. Steven Sevillano-Ríos	
4.1	Introduction	137
4.2	Defining the Treeline Ecotone	138
4.3	Treeline Ecotone Bird Communities	145
4.4	Vegetation Structure	158
4.5	Drivers of Reproductive Success and Survival	159
4.6	Anthropogenic Influences on the Treeline Ecotone Bird Community	162
4.7	Conclusions	165
	Acknowledgements	166
	Appendix 4.1	167
	References	169
5	Population Trends of Mountain Birds in Europe and North America	176
	Aleksi Lehikoinen, Åke Lindström, John Calladine, Tommaso Campedelli, William V. DeLuca, Virginia Escandell, Jirí Flousek [†] , Sergi Herrando, Frédéric Jiguet, John Atle Kålås, Romain Lorrilliere, Timothy D. Meehan, Ingar Jostein Øien, Clara Pladevall, Brett K. Sandercock, Thomas Sattler, Benjamin Seaman, Laura Silva, Hans Schmid, Norbert Teufelbauer and Sven Trautmann	
5.1	Introduction	176
5.2	Methods	179

5.3	Results	189
5.4	Discussion	200
5.5	Future Directions	203
	Acknowledgements	205
	Appendix 5.1	206
	Appendix 5.2	207
	References	209
6	Climate Change Impacts on Mountain Birds	215
	James W. Pearce-Higgins and Kathy Martin	
6.1	A Changing Mountain Climate	216
6.2	Climate Change Impacts Observed on Birds in High Mountain Habitats	219
6.3	Impacts at Larger Spatial Scales	229
6.4	Future Vulnerability	235
6.5	Conservation Strategies to Adapt to Climate Change	243
6.6	Conclusions	245
	Acknowledgements	247
	References	247
7	Anthropogenic Activities and Mountain Birds	260
	Enrico Caprio, Antonio Rolando, Raphaël Arlettaz and Dan Chamberlain	
7.1	Introduction	260
7.2	The Impact of Skiing on Birds	264
7.3	The Impact of Other Recreational Activities	272
7.4	Hunting and Persecution	276
7.5	Renewable Energy Development	279
7.6	Research and Conservation Perspectives	283
	Acknowledgements	285
	References	285
8	Modelling Large-Scale Patterns in Mountain Bird Diversity and Distributions	296
	Mattia Brambilla, Matthew G. Betts, Ute Bradter, Hankyu Kim, Paola Laiolo and Thomas Sattler	
8.1	Introduction	296
8.2	Modelling Distributions of Mountain Birds	298
8.3	Modelling Bird Diversity in Mountains	306
8.4	Assessing and Predicting Impacts of Environmental Changes and Implications for Conservation	310
	Acknowledgements	322
	References	322

9	The Alpine Avifauna of Tropical Mountains	336
	Jon Fjeldså, Jesper Sonne and Carsten Rahbek	
9.1	Introduction	336
9.2	Outlining Tropical Alpine Regions	339
9.3	The Physical Environment of Tropical Mountains	341
9.4	The Birds of High Tropical Mountains	345
9.5	Adaptations and Life History Strategies	356
9.6	Origin and Diversification of Tropical Alpine Avifaunas	359
9.7	Climate Change and the Future of Tropical Alpine Birds	362
9.8	Concluding Remarks	363
	Acknowledgements	364
	References	364
10	Priorities for Information, Research and Conservation of Birds in High Mountains	372
	Kathy Martin, Dan Chamberlain and Aleksi Lehikoinen	
10.1	High Mountain Birds, Avian Adaptations and Key Habitats	372
10.2	Monitoring and Modelling	377
10.3	Climate Change Impacts and Other Anthropogenic Influences	378
10.4	Impacts, Adaptations and Vulnerabilities to Climate Change and Interactions with Other Stressors: Modelling, Predicting and Mitigating	380
10.5	Key Knowledge Gaps and Research Priorities for High Mountain Bird Ecology and Conservation Problems	384
10.6	Conservation and Management Research Priorities for Birds Living in High Mountains	391
10.7	Concluding Summary	399
	Acknowledgements	399
	References	399
	<i>Bird Species Index</i>	407
	<i>Subject Index</i>	414

Colour plates can be found between pages 202 and 203.