

Contents

Acknowledgments

page viii

1 Introduction	1
1.1 Conservation-area networks	2
1.2 What do we mean by biodiversity?	5
1.3 Systematic conservation planning	8
1.4 Summary	16
2 Biodiversity surrogates	19
2.1 True and estimator surrogates	20
2.2 Establishing the adequacy of an estimator-surrogate set	22
2.3 Traditional species-based surrogates	27
2.4 Systematic surrogate sets	30
2.5 Surrogacy and spatial scale	42
2.6 A protocol for the identification of an adequate surrogate set	43
2.7 Diversity of ecological processes	44
2.8 Summary	45
3 Data collection	47
3.1 Areas and features	47
3.2 Sources of data	51
3.3 Collecting new data with field surveys	56
3.4 Summary	76
4 Data treatments	79
4.1 Conceptual framework	79
4.2 Multi-variate pattern analysis	83
4.3 Heuristic models	90
4.4 Regression models	93

4.5	Machine-learning methods	100
4.6	Summary	103
5	Conservation-area networks	105
5.1	The role of conservation-area networks	105
5.2	The goals of networks: representativeness, persistence and economy	108
5.3	Selecting networks: complementarity	112
5.4	Selecting networks: rarity and adjacency	120
5.5	Subsidiary goals: flexibility, transparency, modularity, genericity and irreplaceability	121
5.6	Algorithms for the selection of networks	124
5.7	The trouble with scoring and ranking procedures	127
5.8	Summary	129
6	Persistence and vulnerability	131
6.1	Incorporating biological processes	132
6.2	Viability analysis	135
6.3	Targets for representation	151
6.4	Formal decision analysis	162
6.5	Summary	166
7	Satisfying multiple criteria	169
7.1	Iterative- and terminal-stage procedures	171
7.2	The valuation framework	172
7.3	Non-dominated alternatives	176
7.4	Refining non-dominated sets	180
7.5	Sensitivity analysis	188
7.6	Summary	194
8	Systematic conservation plans	197
8.1	Complementarity by inspection in the Nullarbor region, Australia	197
8.2	Complementarity using species records in Québec	205
8.3	A marine conservation plan for the California Channel Islands, United States	209
8.4	A conservation plan for the Cape Floristic Region of South Africa	214
8.5	A conservation plan for Papua New Guinea	219
8.6	Summary	225

9 Conclusions	227
9.1 Coping with uncertainty	228
9.2 Practicing conservation science in a complex world	231
9.3 Future directions	233
9.4 Summary	238
<i>References</i>	239
<i>Index</i>	265

The colour plates are situated between pages 130 and 131.