CONTENTS

| Introduction 1 | | |
|---|--|--|
| Chapter | 1. Elementary Dynamics of Exploited Populations 9 | |
| 1.1 1.2 1.3 | 2 de la constantion de la cons | |
| Chapter | 2. Economic Models of Renewable-Resource Harvesting 24 | |
| 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 | Biological Overfishing 32 Optimal Fishery Management 35 The Optimal Harvest Policy 39 Examples Based on the Schaefer Model 45 Linear Variational Problems 51 | |
| Chapter | 3. Capital-theoretic Aspects of Resource Management 68 | |
| 3.1 3.2 3.3 3.4 | Nonautonomous Models 75 | |
| Chapter | 4. Optimal Control Theory 88 | |
| 4.1 4.2 4.3 4.4 4.5 | One-dimensional Control Problems 89 A Nonlinear Fishery Model 95 Economic Interpretation of the Maximum Principle 100 Multidimensional Optimal Control Problems 105 Optimal Investment Policies 108 | |
| | Optimal Investment Policies 108 Regulation of Fisheries: Taxation 116 | |

ENTS

| x | CONTE |
|---------|---|
| Chapter | 5. Supply and Demand: Nonlinear Models 126 |
| 5.1 | The Elementary Theory of Supply and Demand 127 |
| 5.2 | The Economics of Exhaustible Resources 135 |
| 5.3 | Supply and Demand in Fisheries 153 |
| 5.4 | Nonlinear Cost Effects: Pulse Fishing 166 |
| 5.5 | Summary and Critique 175 |
| Chapter | 6. Dynamical Systems 179 |
| 6.1 | Basic Theory 179 |
| 6.2 | Dynamical Systems in the Plane: Linear Theory 183 |
| 6.3 | Isoclines 191 |
| 6.4 | |
| 6.5 | • |
| 6.6 | Gause's Model of Interspecific Competition 205 |
| Chapter | 7. Discrete-time or Metered Models 210 |
| 7.1 | A General Metered Stock-Recruitment Model 211 |
| 7.2 | The Beverton-Holt Stock-Recruitment Model 217 |
| 7.3 | Depensation Models 224 |
| 7.4 | Overcompensation 228 |
| 7.5 | A Single-Cohort Model 230 |
| 7.6 | The Production Function of a Fishery 235 |
| 7.7 | Optimal Harvest Policies 243 |
| 7.8 | The Discrete Maximum principle 250 |
| Chapter | 8. Growth and Aging 256 |
| 8.1 | Forestry Management: The Faustmann Model 257 |
| 8.2 | A Model of Optimal Forest Thinning 263 |
| 8.3 | The Beverton-Holt Fisheries Model 269 |
| 8.4 | Dynamic Optimization in the Beverton-Holt Model 276 |
| 8.5 | The Case $F_{\text{max}} < \infty$ 282 |
| 8.6 | Multiple Cohorts: Nonselective Gear 285 |
| 8.7 | Pulse Fishing 293 |
| 8.8 | Multiple Cohorts: Selective Gear 295 |
| 8.9 | Summary and Critique 297 |
| Chapter | 9. Multispecies Problems 302 |

9.1 Differential Productivity 3039.2 Harvesting Competing Populations 311

CONTENTS хi

- 9.3 Selective Harvesting 317
 9.4 A Diffusion Model: The Inshore-Offshore Fishery 325

9.5 Summary and Critique 333

Index 347