CONTENTS

Preface	ix
Acknowledgments	x
Explanatory Notes	xi
Authors	xiii
PERSPECTIVES	1
An Overview of Problems with Introduced Plant Species in National Parks and Biosphere Reserves of the United States Lloyd L. Loope	3
Effects of Alien Plants on Native Ecosystems Peter M. Vitousek	29
Characteristics of Invading Plant Species Richard N. Mack	42
Alien Plant Management in Everglades National Park: An Historical Perspective Anne Marie LaRosa, Robert F. Doren, and Lance Gunderson	47
Alien Plants at Channel Islands National Park William L. Halvorson	64
STATUS AND DISTRIBUTION OF SOME IMPORTANT ALIEN PLANTS IN HAWAI1	97
Origin and Distribution of Adventive Alien Flowering Plants in Hawai'i Lyndon Wester	99
Distribution of Six Alien Plant Species in Upland Habitats on the Island of Hawai'i James D. Jacobi and Fredrick R. Warshauer	155
Alien Plants on the Northwestern Hawaiian Islands Derral R. Herbst and Warren L. Wagner	189
Firetree (Myrica faya) Distribution in Hawaiʻi Louis D. Whiteaker and Donald E. Gardner	225
Distribution, Status, Phenology, Rate of Spread, and Management of Clidemia in Hawai'i Clifford W. Smith	241

Contents	

Mullein (Verbascum thapsus): the Spread and Adaptation of a Temperate Weed in the Montane Tropics James O. Juvik and Sonia P. Juvik	25
The Status of Banana Poka in Hawai'i Anne Marie LaRosa	27
Distribution and Spread of Alien Plants in Kīpahulu Valley, Haleakala National Park, above 2,300 ft Elevation Stephen J. Anderson, Charles P. Stone, and Paul K. Higashino	300
PHYSICAL AND CHEMICAL CONTROL	339
Herbicidal Control of Selected Alien Plant Species in Hawaii Volcanoes National Park Gregory L. Santos, Dina Kageler, Donald E. Gardner, Linda W. Cuddihy, and Charles P. Stone	34:
Fountain Grass Control in Hawaii Volcanoes National Park: Management Considerations and Strategies J. Timothy Tunison	376
Fire and Alien Plants in Hawai'i: Research and ManagementImplications for Native Ecosystems Clifford W. Smith and J. Timothy Tunison	394
BIOLOGICAL CONTROL	409
Biological Control of Lantana, Prickly Pear, and Hāmākua Pāmakani in Hawai'i: a Review and Update Clifton J. Davis, Ernest Yoshioka, and Dina Kageler	411
Plant Pathogens as Biocontrol Agents in Native Hawaiian Ecosystems Donald E. Gardner	432
Review and Status of Biological Control of Clidemia in Hawai'i Larry M. Nakahara, Robert M. Burkhart, and George Y. Funasaki	452
Status of Biological Control of Weeds in Hawai'i and Implications for Managing Native Ecosystems George P. Markin, Po-Yung Lai, and George Y. Funasaki	466
AGENCY, ORGANIZATION, AND LANDOWNER APPROACHES	483
Alien Plant Control Strategies in Hawaii Volcanoes National Park J. Timothy Tunison	485

Contents	vii
Success in Controlling Localized Alien Plants in Hawaii Volcanoes National Park J. Timothy Tunison and Nicholas G. Zimmer	506
Control of Alien Plants on Nature Conservancy Preserves R. Alan Holt	525
Alien Plant Control on State Lands Including Natural Areas Victor M. Tanimoto and Winona P. Char	536
Alien Plants in Haleakala National Park Lloyd L. Loope, Ronald J. Nagata, and Arthur C. Medeiros	551
The U.S. Department of Agriculture's Rural Development Approach to Alien Plant Control in Hawai'i: a Case Study Mike Tulang	577
Introduced Plant Control on Private Lands in Hawai'i Carl "Soot" Bredhoff	584
Public/Private Sector Partnerships to Preserve Native Ecosystems: The Department of Hawaiian Home Lands Experience Hardy Spoehr	589
INTRODUCED PLANTS IN THE ABSENCE OF UNGULATES	595
Relationships among Native and Alien Plants on Pacific Islands with and without Significant Human Disturbance and Feral Ungulates Mark D. Merlin and James O. Juvik	597
Alien and Native Plant Response to Release from Feral Sheep Browsing on Mauna Kea Paul G. Scowcroft and C. Eugene Conrad	625
Responses of Hawaiian Ecosystems to Removal of Feral Pigs and Goats Charles P. Stone, Linda W. Cuddihy, and J. Timothy Tunison	666
CHOOSING WHICH PLANTS TO INTRODUCE	705
Plant Importation Rules and Regulations Stan Higa	707
Activities and Needs of the Horticulture Industry in Relation to Alien Plant Problems in Hawai'i Rylan S.N. Yee and Wayne C. Gagné	712
Plant Introduction Needs of the Hawaiian Sugar Industry Robert V. Osgood and Robert D. Wiemer	726

Contents	vii
Choosing Plant Introductions: Needs of Graziers Gordon Cran and Ken Dillingham	732
CHOOSING WHICH PLANTS TO CONTROL IN NATIVE ECOSYSTEMS	737
Modelling to Predict the Fate of Invading Plants Richard N. Mack and Michael E. Moody	739
Rule-Based Decision Making: a Way to Determine which Alien Species to Control Kent W. Bridges	743
Controlling Weeds in Natural Areas in Hawai'i: a Manager's Perspective Dan Taylor	752
Evaluating Proposed Biological Control Programs for Introduced Plants George P. Markin and Ernest Yoshioka	757
ECOSYSTEM APPROACHES, EDUCATION, AND COMMUNITY INVOLVEMENT	779
Special Ecological Areas: An Approach to Alien Plant Control in Hawaii Volcanoes National Park J. Timothy Tunison and Charles P. Stone	781
Environmental Education in Hawai'i: History and Overview Charles P. Stone	799
Environmental Education in the Schools John W. Hawkins	807
The Use of Volunteers for Alien Plant Control at Hawaii Volcanoes National Park and The Nature Conservancy's Kamakou Preserve J. Timothy Tunison and Edwin T. Misaki	813
IN CONCLUSION	819
ALIEN PLANT MANAGEMENT IN HAWAI'I:	821
CONCLUSIONS J. Timothy Tunison, Clifford W. Smith, and Charles P. Stone	
INDEX	835