

CONTENTS

FOREWORD	iv
CONTENTS	v
SUMMARY	1
ACKNOWLEDGMENTS	2
1. INTRODUCTION	3
1.1 Geographical and Biological Setting.....	5
1.2 Dugong Habitats.....	5
2. CATCHMENT ACTIVITIES POTENTIALLY AFFECTING DUGONG PROTECTION AREAS	7
2.1 Changes in Land Use.....	7
2.2 Terrestrial Runoff.....	8
2.2.1 Point Sources	9
2.2.2 River Discharge.....	10
2.2.3 Cyclonic Flood Plumes.....	12
2.2.4 Other Sources - Water Dynamics and Sediment Resuspension.....	12
2.3 Constituents of Terrestrial Runoff	13
2.3.1 Nutrients and Sediment.....	15
2.3.2 Heavy Metals.....	16
2.3.3 Other Contaminants	16
2.3.4 Freshwater	17
2.3.5 Acid Sulfate Soils	17
2.3.6 Litter.....	17
3. POTENTIAL IMPACTS OF DEGRADED WATER QUALITY ON DUGONG	18
3.1 Potential Direct Impacts of Water Quality on Dugong Health.....	18
3.2 Potential Impacts of Terrestrial Runoff on Dugong Habitats.....	18
3.2.1 Increased Nutrients	19
3.2.2 Increased Sedimentation	20
3.2.3 Contaminants.....	20
3.2.4 Other Considerations.....	21
3.3 Other Pressures to Water Quality and Dugong Habitat Quality	21
3.3.1 Shipping.....	22
3.3.2 Oil Spills.....	22
3.3.3 Trawling.....	22
4. CONDITION OF CATCHMENTS ADJACENT TO DUGONG PROTECTION AREAS	23
4.1 Hinchinbrook and Taylors Beach DPAs.....	23
4.2 Cleveland Bay, Cape Bowling Green Bay and Upstart Bay DPAs.....	26
4.3 Edgecumbe Bay, Repulse Bay, Newry Region and Sand Bay DPAs.....	30
4.4 Llewellyn Bay, Ince Bay, Clairview Region, Shoalwater Bay, Port Clinton DPAs.....	33
4.5 Rodds Bay and Hervey Bay–Great Sandy Strait DPAs.....	34

5. QUALITATIVE RISK ASSESSMENT FOR HABITAT QUALITY IN DUGONG PROTECTION AREAS	40
6. ASSESSMENT AND MONITORING OF POLLUTANTS IN DUGONG PROTECTION AREAS	44
6.1 Monitoring of Pollutant Levels in Marine Mammals	44
6.2 Monitoring of Pollutant Levels in Dugong Habitats	44
6.3 Long-term Water Quality Monitoring.....	44
6.3.1 Chlorophyll Monitoring.....	44
6.3.2 Flood Plume Monitoring.....	44
7. JURISDICTIONAL LIMITATIONS	45
8. DISCUSSION.....	46
9. CONCLUSION.....	47
REFERENCES	48
APPENDICES.....	64
Appendix 1 (Tables A1 to A3).	65
Appendix 2 (Figures A1 to A6).....	68
FIGURES	
1. Location of Dugong Protection Areas and the adjacent river catchment areas of the Great Barrier Reef World Heritage Area	4
2. Increase in land area used for sugar cultivation from 1930 to 1996	8
3. Sources of new nitrogen and phosphorus to Great Barrier Reef shelf waters	9
4. Extent of cyclonic flood plumes in the inner lagoon of the GBRWHA	11
5. Contribution of different land uses to nitrogen and phosphorus runoff	15
6. Land use in catchments adjacent to the Hinchinbrook Island Region and Taylors Beach Dugong Protection Areas.....	24
7. Change of land use in the Herbert River catchment over the past 140 years.....	25
8. Land use in catchments adjacent to the Cleveland Bay, Bowling Green Bay and Upstart Bay Dugong Protection Areas.....	27
9. Land use in the Burdekin River Catchment Area.....	28
10. Land use in catchments adjacent to the Edgecumbe Bay, Repulse Bay, Newry Region and Sand Bay Dugong Protection Area.....	32
11. Land use in catchments adjacent to the Llewellyn Bay, Ince Bay, Clairview Region, Shoalwater Bay and Port Clinton Dugong Protection Areas.....	35
12. Land use in the Fitzroy River catchment Area	36
13. Land use in catchments adjacent to the Rodds Bay Dugong Protection Area	38
14. Land use in catchments adjacent to the Hervey Bay–Great Sandy Strait Dugong Protection Area	39
TABLES	
1. Nutrient concentrations in the Herbert River and the Hinchinbrook Channel.....	25
2. Nutrient concentrations in the Burdekin River	29
3. Nutrient concentrations in the Fitzroy River.....	34
4. Qualitative risk assessment of impacts by catchment activities on water and habitat quality in Dugong Protection Areas.....	43