

# TABLE OF CONTENTS

ABSTRACT .....	iii
ABBREVIATIONS .....	iv
TABLE OF CONTENTS .....	vii
LIST OF TABLES .....	x
LIST OF FIGURES .....	xi
CHAPTER ONE .....	1
<b>INTRODUCTION AND STUDY AIMS.</b> .....	1
1.1 <i>Introduction.</i> .....	1
1.2 <i>Aims of the study.</i> .....	15
1.3 <i>References.</i> .....	16
CHAPTER TWO .....	24
<b>MATERIALS AND METHODS.</b> .....	24
2.1 <i>Study sites.</i> .....	24
2.2 <i>Sampling procedure.</i> .....	25
2.2.1 Physico-chemical analysis (adapted from Bird, 2009). .....	26
2.2.2 Collection of diatom samples. ....	27
2.2.2.1 Sediment sampling. ....	27
2.2.2.2 Sampling in shallow water. ....	27
2.2.2.3 Sampling from aquatic macrophytes. ....	27
2.2.3 Preservation of diatom samples. ....	28
2.3 <i>Processing of diatom samples.</i> .....	28
2.3.1 Cleaning of samples. ....	28
2.3.2 Preparation of slides. ....	29
2.3.3 Preparation for Scanning Electron Microscopy. ....	30
2.3.4 Archiving. ....	30
2.3.5 Diatom identification, enumeration and data analysis. ....	30
a. Identification .....	30
b. Enumeration .....	31
c. Data analysis .....	31
2.4 <i>References.</i> .....	33
CHAPTER THREE .....	35
<b>RESULTS AND DISCUSSION – PHYSICO-CHEMICAL VARIABLES.</b> .....	35
3.1 <i>Introduction.</i> .....	35
3.2 <i>Water quality analysis in South Africa.</i> .....	35
3.3 <i>Physico-chemical variables.</i> .....	36
3.3.1 System variables .....	36
a. Temperature .....	37
b. Dissolved oxygen .....	38
c. pH .....	40
3.3.2 Inorganic constituents .....	42
a. Electrical conductivity .....	42
b. Turbidity .....	44
3.3.3 Nutrients .....	45
a. Nitrogen .....	46
b. Phosphorus .....	49
3.4 <i>Discussion.</i> .....	51
3.5 <i>Conclusion</i> .....	55

3.6 <i>References.</i> .....	56
<b>CHAPTER FOUR</b> .....	57
<b>RESULTS AND DISCUSSION – APPLICATION AND TESTING OF DIATOM INDICES</b> .....	57
4.1 <i>Introduction.</i> .....	57
4.2 <i>Species composition</i> .....	57
4.3 <i>Water quality variables and dominant species.</i> .....	62
4.3.1 Canonical correspondence analysis (CCA). .....	63
4.4 <i>Application of diatom Indices.</i> .....	68
4.5 <i>Correlation of diatom indices to environmental variables.</i> .....	75
4.5.1 Diatoms collected concurrently from wetlands whose environmental variables were measured once-off. ....	76
4.5.2 Diatoms collected from wetlands whose environmental variables were measured over a period of three years. ....	76
4.6 <i>Discussion.</i> .....	78
4.7 <i>Conclusion</i> .....	80
4.8 <i>References.</i> .....	81
<b>CHAPTER FIVE</b> .....	83
<b>CONCLUSION AND RECOMMENDATIONS</b> .....	83
5.1 <i>References.</i> .....	86