

ACKNOWLEDGEMENTS

I would like to express my gratitude to my idolized guide Dr. N.C.Ujjania, Department of Aquatic Biology, Veer Narmad South Gujarat University, Surat for invaluable guidance, co-operation, support and constant encouragement in accomplishing the thesis. His vitality, incredible fortitude and incessant monitoring helped me to carry out the research work towards final phase.

I wish to acknowledge Dr. Kapila Manoj, Professor and Head, Department of Aquatic Biology, Veer Narmad South Gujarat University, Surat for continuous support and suggestions during the research work.

I am thankful to the teaching and non-teaching members of the Department of Aquatic Biology, Veer Narmad South Gujarat University, Surat for their timely help. I extend my special thanks to Dr. Ekhalak Ansari for his friendly help.

Further, I express my wholehearted thanks to my husband Dr. Pinak Deshpande, my Father in-law Mr. Sadanand Deshpande and my Mother in-law Mrs. Mrudula S Deshpande for their co-operation, endless support and encouragement. I am highly thankful to my lovely sisters Mrs. Damyanti Soni Rai, Mrs. Tarkeshwari Soni Patel and my best friend Suhas Savant for their unconditional support during sampling.

I render my sincere gratefulness to my beloved parents, Mr. Jageshwar Prasad Soni and Mrs. Mini Devi Soni for being my source of inspiration and providing constant support.

Last but not the least, I am rendering my gratitude to UGC, New Delhi, Government of India for awarding me Research Fellowship to conduct this research work.

Date:

Soni Nandita J.P.

Place:

Research Scholar

Contents

Chapter No.	Title	Page No.
	List of tables	<i>i-iii</i>
	List of plates and figures	<i>vi-viii</i>
	Abstract	<i>ix</i>
1.	Introduction	1-13
1.1	Climatic condition and physicochemical study of the water body	5
1.2	Age and growth	6-8
1.3	Condition and relative condition factor	9
1.4	Food component, feeding habit and gastro-somatic Index	10-11
1.5	Vallabhsagar reservoir	12-13
2.	Review of literature	14-40
3.	Materials and methods	41-69
1.0	Vallabhsagar reservoir	41
1.1	Sampling stations	42
2.0	Sampling duration	42
3.0	Sample collection and preservation	42
3.1	Water sample	42
3.2	Plankton sample	43
3.3	Chlorophyll-a sampling	44
3.4	Fish sampling	44
3.4.1	Catla (<i>Catla catla</i> , Ham. 1822)	45
3.4.2	Rohu (<i>Labeo rohita</i> , Ham. 1822)	45
3.4.3	Mrigal (<i>Cirrhinus mrigala</i> , Ham. 1822)	46
3.5	Morphometric data	47
3.6	Scale sample	47
3.7	Gut Sample	48

3.8	Data collection	48
4.0	Analysis of Sample	48
4.1	Water parameters analysis	48
4.1.1	Temperature	49
4.1.2	Turbidity	49
4.1.3	Dissolve Oxygen	50
4.1.4	Total Solid	51
4.1.5	Total dissolve solids	52
4.1.6	Total suspended solids	52
4.1.7	Total Hardness	52-53
4.1.8	Nitrate-Nitrogen	53-54
4.1.9	Nitrite-Nitrogen	55-56
4.1.10	Ammonical-Nitrogen	57-57
4.1.11	Total Kjeldahl Nitrogen	58
4.1.12	Organic Nitrogen	58
4.1.13	Phosphate	58-60
4.1.14	Silicate	60-61
4.2	Plankton analysis	61-62
4.3	Chlorophyll (a) analysis	62-63
4.4	Scale analysis	63-64
4.5	Length weight relationship analysis	65-66
4.6	Growth parameters based on scale study	66-67
4.7	Condition and relative condition factor	67-68
4.8	Gut analysis	68-69
4.8.1	Gut contents	68
4.8.2	Gastrosoomatic index	69
4.	Results	73-111
1	Water quality parameters	73-74
4.1.1	Introduction	75-76
4.1.2	Temperature	76-77
4.1.3	Turbidity	76-77

4.1.4	Total solids	78
4.1.5	Total dissolved solids	78
4.1.6	Total suspended solids	78-79
4.1.7	Dissolved oxygen	79
4.1.8	Hardness	80
4.1.9	Nitrate	80-81
4.1.10	Nitrite	81
4.1.11	Total Kjeldahl-Nitrogen	81-82
4.1.12	Organic Nitrogen	82-83
4.1.13	Ammonia	83
4.1.14	Phosphate	84
4.1.15	Silica	84-85
4.1.16	Chlorophyll-a	85
4.1.17	Plankton	85-86
2	Fish biological study	87
4.2.1	Catla (<i>Catla catla</i> , Ham 1822)	88-95
4.2.2	Rohu (<i>Labeo rohita</i> , Ham 1822)	96-103
4.2.3	Mrigal (<i>Cirrhinus mrigala</i> , Ham 1822)	104-111
<hr/>		
5.	Discussion	187-219
<hr/>		
6.	Summary	220-224
<hr/>		
7.	Bibliography	225-271
<hr/>		
List of Publication		
<hr/>		

List of Tables

Table No.	Title	Page No.
Table 3.1	Morphometric features of Vallabhsagar reservoir	70
Table 4.1	Fish production in Vallabhsagar reservoir (kg.)	112
Table 4.2	Rain fall in study area (2010-2015)	113
Table 4.3	Water quality parameter of Vallabhsagar reservoir (2013-14)	114
Table 4.4	Water quality parameter of Vallabhsagar Reservoir (2014-15)	115
Table 4.5	Water quality parameters of Vallabhsagar during breeding season	116
Table 4.6	Water quality parameters of Vallabhsagar during post breeding season	117
Table 4.7	Water quality parameters of Vallabhsagar during pre-breeding season	118
Table 4.8	Length-weight relationship of <i>Catla catla</i> at different length groups	119
Table 4.9	Length weight relationship of <i>Catla catla</i> at different seasons	120
Table 4.10	Back calculated mean total length (cm) and weight (gm) of <i>Catla catla</i> from Vallabhsagar reservoir	121
Table 4.11	Growth Parameter of <i>Catla catla</i> (2013-14)	122
Table 4.12	Growth Parameter of <i>Catla catla</i> (2014-15)	123
Table 4.13	Condition (K) and relative condition factor (Kn) of <i>Catla catla</i> at different length groups	124
Table 4.14	Condition (K) and relative condition factor (Kn) of <i>Catla catla</i> at different seasons	125
Table 4.15	Observations on gut contents analysis of <i>Catla catla</i>	126
Table 4.16	Gastroscopic index of <i>Catla catla</i>	127
Table 4.17	Length-weight relationship of <i>Labeo rohita</i> at different length groups	128

Table 4.18	Length weight relationship of <i>Labeo rohita</i> at different seasons	129
Table 4.19	Back calculated mean total length (cm) and weight (gm) of <i>Labeo rohita</i>	130
Table 4.20	Growth Parameter of <i>Labeo rohita</i> (2013-14)	131
Table 4.21	Growth Parameter of <i>Labeo rohita</i> (2014-15)	132
Table 4.22	Condition (K) and relative condition factor (Kn) of <i>Labeo rohita</i> at different length groups	133
Table 4.23	Condition (K) and relative condition factor (Kn) of <i>Labeo rohita</i> at different seasons	134
Table 4.24	Observations on gut contents analysis of <i>Labeo rohita</i>	135
Table 4.25	Gastrosomatic index of <i>Labeo rohita</i>	136
Table 4.26	Length-weight relationship of <i>Cirrhinus mrigala</i> at different length groups	137
Table 4.27	Length weight relationship Seasonal of <i>Cirrhinus mrigala</i>	138
Table 4.28	Back calculated mean length (cm) and weight (gm) of <i>Cirrhinus mrigala</i>	139
Table 4.29	Growth Parameter <i>Cirrhinus mrigala</i> during (2013-14)	140
Table 4.30	Growth Parameter of <i>Cirrhinus mrigala</i> during (2014-15)	141
Table 4.31	Condition (K) and relative condition factor (Kn) of <i>Cirrhinus mrigala</i> at different length groups	142
Table 4.32	Condition factor (K) and relative condition factor (Kn) of <i>Cirrhinus mrigala</i> at different seasons	143
Table 4.33	Observation on gut contents analysis of <i>Cirrhinus mrigala</i>	144
Table 4.34	Gastrosomatic index of <i>Cirrhinus mrigala</i>	145

List of Plates and Figures

Figure / Plate Number and title		Page No.
A. Plates		
	3.1 Location of study area	71
3.2	3.2 Indian major carps from Vallabhsagar reservoir	72
4.1	Typical scale of catla (2013-14)	146
4.2	Typical scale of catla (2014-15)	147
4.3	Typical scale of rohu (2013-14)	148
4.4	Typical scale of rohu (2014-15)	149
4.5	Typical scale of mrigal (2013-14)	150
4.6	Typical scale of mrigal (2014-15)	151
B Figures		
4.1	Fish production of Vallabhsagar reservoir (2008-2015)	152
4.2	(A) Monthly variation and (B) seasonal variation in water quality parameter (Temperature) of Vallabhsagar reservoir	153
4.3	(A) Monthly variation and (B) seasonal variation in water quality parameter (Turbidity) of Vallabhsagar reservoir	154
4.4	(A) Monthly variation and (B) seasonal variation in water quality parameter (Total solid) of Vallabhsagar reservoir	155
4.5	(A) Monthly variation and (B) seasonal variation in water quality parameter (Total dissolve solid) of Vallabhsagar reservoir	156

4.6	(A) Monthly variation and (B) seasonal variation in water quality parameter (Total suspended solid) of Vallabhsagar reservoir	157
4.7	(A) Monthly variation and (B) seasonal variation in water quality parameter (Dissolve oxygen) of Vallabhsagar reservoir	158
4.8	(A) Monthly variation and (B) seasonal variation in water quality parameter (Hardness) of Vallabhsagar reservoir	159
4.9	(A) Monthly variation and (B) seasonal variation in water quality parameter (Nitrate-N) of Vallabhsagar reservoir	160
4.10	(A) Monthly variation and (B) seasonal variation in water quality parameter (Nitrite-N) of Vallabhsagar reservoir	161
4.11	(A) Monthly variation and (B) seasonal variation in water quality parameter (Total Kjeldahl nitrogen) of Vallabhsagar reservoir	162
4.12	(A) Monthly variation and (B) seasonal variation in water quality parameter (Organic nitrogen) of Vallabhsagar reservoir	163
4.13	(A) Monthly variation and (B) seasonal variation in water quality parameter (Ammonia) of Vallabhsagar reservoir	164
4.14	(A) Monthly variation and (B) seasonal variation in water quality parameter (Phosphate) of Vallabhsagar reservoir	165
4.15	(A) Monthly variation and (B) seasonal variation in water quality parameter (Silicate) of Vallabhsagar reservoir	166
4.16	(A) Monthly variation and (B) seasonal variation in water quality parameter (Chlorophyll-a) of Vallabhsagar reservoir	167
4.17	(A) Monthly variation and (B) seasonal variation in water quality parameter (Plankton) of Vallabhsagar reservoir	168
4.18	Length weight relationship of Catla (A) pooled data of 2013-14 and (B) pooled data of 2014-15	169

4.19	Length weight relationship of Catla for different length groups during 2013-14 (A) 30-40 (B) 40-50 (C) 50-60 (D) 60-70 (E) 70-80 and (F) 80-90 cm	170
4.20	Length weight relationship of Catla for different length groups during 2013-14 (G) 90-100 cm	171
4.21	Length weight relationship of Catla for different length groups during 2014-15 (A) 40-50 (B) 50-60 (C) 60-70 (D) 70-80 (E) 80-90 and (F) 80-90	172
4.22	Length weight relationship of Catla for different length groups during 2014-15 (G) 90-100 and (H) 110-120	173
4.23	Length weight relationship of Catla during different seasons (A) Breeding (B) post breeding and (C) pre-breeding season of 2013-14 (D) Breeding (E) post breeding and (F) pre-breeding season of 2014-15	174
4.24	Total length and scale radius relationship of Catla (A) 2013-14 and (B) 2014-15	175
4.25	Length weight relationship of Rohu (A) pooled data of 2013-14 and (B) pooled data of 2014-15	176
4.26	Length weight relationship of Rohu for different length groups during 2013-14 (A) 30-40, (B) 40-50, (C) 50-60, (D) 60-70 and (E) 70-80 cm	177
4.27	Length weight relationship of Catla for different length groups during 2013-14 (A) 30-40 (B) 40-50 (C) 50-60 (D) 60-70 (E) 70-80 and (F) 80-90 cm	178
4.28	Length weight relationship of Rohu for different length groups during 2014-15 (G) 110-120 cm	179
4.29	Length weight relationship of Rohu during different seasons (A) Breeding (B) post breeding and (C) pre-breeding season of 2013-14 (D) Breeding (E) post breeding and (F) pre-breeding season of 2014-15	180

4.30	Total length and scale radius relationship of Rohu (A) 2013-14 and (B) 2014-15	181
4.31	Length weight relationship of Mrigal (A) pooled data of 2013-14 and (B) pooled data of 2014-15	182
4.32	Length weight relationship of Mrigal for different length groups during 2013-14 (A) 30-40 (B) 40-50 (C) 50-60 (D) 60-70 (E) 70-80 and (F) 80-90 cm	183
4.33	Length weight relationship of Mrigal for different length groups during 2014-15 (A) 40-50, (B) 50-60, (C) 60-70, (D) 70-80 and (E) 80-90 cm	184
4.34	Length weight relationship of Mrigal during different seasons (A) Breeding (B) post breeding and (C) pre-breeding season of 2013-14 (D) Breeding (E) post breeding and (F) pre-breeding season of 2014-15	185
4.35	Total length and scale radius relationship of Mrigal (A) 2013-14 and (B) 2014-15	186