

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

## BIONOMICS OF THE PIED STILT (<u>HIMANTOPUS</u> <u>LEUCOCEPHALUS</u>) IN NEW ZEALAND : WITH SPECIAL REFERENCE TO BREEDING BEHAVIOUR.

A thesis presented in partial fulfilment of the requirements for the degree of Master of Science in Zoology at Massey University

> BRIAN F.McCONKEY 1971



THE PIED STILT

(<u>HIMANTOPUS</u> <u>LEUCOCEPHALUS</u>,Gould,1837)

CONTRACTO
CONTENTS

			CONTENTS		
CHAPTER				PAGE	
I	INTI	RODUC	RODUCTTON		
	Α.	Intro	oduction	1	
		i) ii)	Aims of the Study Previous Work	1 2	
		iii)	Affinities	3	
	Β.	Habit	tat Description	3	
	C.	Clima	atic Conditions	9	
		i)	Rainfall	9	
		ii)	Temperature	9	
		iii)	Wind	11	
e e	D.	Metho	ods	12	
		i)	Observation	12	
		ii)	Measurements	13	
		iii)	Trapping and Banding	14	
		iv)	Automatic recording	19	
II	GENI	ERAL I	BIOLOGY	21	
	Α.	Bodil	Ly Characters	21	
		i)	Measurements of Adult birds	21	
		ii)	Seasonal Changes in Body Weights	27	
		iii)	Seasonal Changes in Gonad Weights	29	
		iv)	Plumage and Plumage Cycles	33	
		v)	Status	38	
	Β.	Food	Analysis	42	
	C.	Paras	sites	45	

i. 

CHAPTER				PAGE
III	NON	-BREE	DING BEHAVIOUR	48
	Α.	Disp	ersion	48
	Β.	Main	tenance Behaviour	52
		i)	Feeding	52
		ii)	Bathing	54
		iii)	Preening	55
		iv)	Sleeping	57
		v)	Pseudo-sleeping	58
	С.	Aggr	essive Behaviour	59
		i)	General	59
		ii)	Intraspecific Reactions	60
			(a) Hunch Pursuit	60
			(b) Aggressive Upright	62
			(c) Parachuting	63
		iii)	Interspecific Reactions	65
IV	BRE	EDING	BEHAVIOUR	67
	Α.	Pair	Formation	67
	B.	Terr	itorial Behaviour	68
		i)	Size of Territory	68
		ii)	Aggressive Upright	70
		iii)	Parachuting	70
		iv)	Choking	71
		v)	Grass-pulling and Sideways- throwing	73
	C.	Copu	lation	75
	$\mathbb{D}_{\bullet}$	Nest	Building	83
		i)	Nest site	83
		ii)	Nest materials	87
		iii)	Nest raising	87

## CHAPTER

V

			PAGE
	iv)	Behavioural Elements	89
		(a) Nest-showing	89
		(b) Sideways-throwing	93
		(c) Sideways-building	93
		(d) Scraping	94
		(e) Settling	96
E.	Defe	nce of Nest or Young	97
	i)	Reactions to species other than man.	97
		(a) Swooping	97
		(b) Chasing	98
	ii)	Reactions to Man	99
		(a) Aggressive flight	99
		(b) Furtive Run	100
		(c) Butterfly-flight	100
		(d) Lure display	102
		(e) False brooding	105
INCU	BATIO	N	109
Α.	Egg :	laying	109
	i)	Dates of Laying	109
	ii)	Time of Laying	110
	iii)	Clutch size	113
	iv)	Egg measurements	117
	v)	Relaying	119
Β.	Leng	th of Incubation	121
С.	Atte	ntiveness	125
	i)	Mechanical Records	125
	ii)	Nest Relief	132
D.	Temp	erature of Incubation	138

CHAPTER						PI	AGE
.VI	BREF	DING S	SUCCESS	AND CHIC	K BEHAVIOUR	-	141
	A.	Egg 1	Losses			,	141
	Β.	Chic	k Losse	3		1	146
	С.	Infl Breed	uence o: ling Su	f Laying ccess.	Date on		147
	D.	Chic	k Behav:	iour		,	149
		i)	Anti-p	redator		,	149
		ii)	Aggres	siveness		-	151
		iii)	Feeding	5		-	151
	SUMM	IARY				-	152
	ACKN	OWLED	GEMENTS				155
	APPE	NDICES	5			157	7 <b>-</b> 158
	REFF	RENCE	5			16	1-169

## LIST OF TABLES

TABLE		PAGE
1.1	Major plant species found on Colony I.	7
1.2	Mean monthly measurements of Climatic factors over the Breeding Season.	20
2.1	Measurements of Adults.	22
2.2	Seasonal Bodyweight of Adults.	28
2.3	Seasonal Gonadweights.	30
2.4	Percentage Distribution of Adult Neck and Mantle Plumage Colouration.	34
2.5	Comparison of Adult Measurements with those of Oliver (1955) for Black and Pied Stilts.	41
2.6	Monthly and Yearly Percentage of Birds taking each species as prey.	43
4.1	Nesting habitat of the Pied Stilt.	85
5.1	Distribution of Clutch Size.	114
5.2	Size of smallest and largest eggs and position in the clutch.	118
5.3	Incubation and Body Temperature of the Stilt compared with Penguin and Skua.	120
6.1	Fate of Eggs lost from Hatching Clutches	.141
6.2	Fate of Eggs lost from All Nests.	142
6.3	Hatching Success on Each Colony.	143
64	Fate of Forg in Fach Colony	1/1/1

v.

LIST OF FIGURES

FIGURE		PAGE
1.1	Map of Area of Colony I.	4
1.2	Total weekly rainfall and mean wind force from beginning of laying.	8
1.3	Mean weekly temperatures throughout laying period.	10
1.4	Clap trap plan.	15
2.1	Length of Wing at First Primary.	23
2.2	Length of Tarsus.	24
2.3	Relation between Wing Length and Tarsal Length.	25
2.4	Seasonal Variation in Body Weight.	26
2.5	Seasonal Variation in Gonad Weight.	31
3.1	Arbitrary areas used in Analysing Stilt Dispersion.	49
3.2	Fluctuation in Stilt Population in New Zealand.	50
3.3	Fluctuation of Stilt Numbers in Each Area.	51
4.1	Number of Copulations per hour of observation in relation to number of eggs laid.	76
4.2	Occurrence of Copulation in Relation to Time of Day.	78
4.3	Mean Number of Nest Showing bouts in relation to Number of New Tests.	90
5.1	Spread of laying.	111
5.2	Number of Eggs Laid.	112
5.3	Records of spells of Incubation for typical day and night periods.	126
5.4	Mean length of sessions per day throughout the incubation period for three nests.	128
5.5	Percentage time on the nest per day throughout the incubation period for three nests.	130

vi.

FIGURE		PAGE
5.6	Patterns of Egg Arrangement within the Nest.	136
5.7	Two periods of temperature recording 12 hours apart.	139
6.1	Percentage of those eggs laid each week which hatched successfully.	148

LIST OF PLATES

PLATE		PAGE
Frontispiece	The Pied Stilt.	
1	Area of Colony I.	6
2	Mounds of Coarse Grass and Weeds.	6
3	Clap trap in set position.	16
4	Tambour chart recorder.	16
5	Radio Receiver for Temperature Impulses.	18
6	Temperature chart recorder.	18
7	Pair of stilts showing Individual Markings.	36
8	Preening stilt.	56
9	Sleeping stilts.	56
10	Hunch pursuit posture.	61
11	Aggressive Upright posture.	61
12	Parachuting display.	64.
13	Anxious or Alert Upright posture.	64
14	Neighbouring pairs choking.	72
15	One of each pair choking.	72
16	Female assumes Invitation posture.	80
17	Male flicking and dipping beak.	80
18	Male mounts and copulates.	82
19	Walking with Crossed Beaks.	82
20	Nest on Built up Mound of Mud.	86
21	Nest on River Shingle Bed.	86
22	Nest on Swamp.	88
23	Built up Nest on Swamp.	88
24	Male and Female Nest showing.	92

PLATE		$\underline{PAGE}$
25	Sideways Building.	92
26	Scraping in Nest Cup.	95
27	Furtive Run posture.	101
28	Butterfly Flight.	101
29	Lure Distraction.	
	(a) Running from predator.	103
	(b) Facing predator.	103
	(c) Lying down.	104
	(d) Springing in the air.	104
30	Conflict Behaviour.	
	(a) Standing in Conflict.	106
	(b) Sitting down in Conflict.	106
31	False Brooding amongst Rocks.	107
32	False Brooding in Shallow Water.	107
33	Stilt Settling on Eggs.	134
34	Stilt beginning Sideways Building.	134
35	Stilt turning Eggs.	137
36	Chick showing Cryptic Colouration.	150