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Health/Disease Study of White-Tailed Deer in Southern Florida

July 1, 1988 through June 30, 1989

Abstract- Reproductive and health/disease information was collected from 51 white-tailed deer (Odocoileus virginianus) from five distinct areas in the Big Cypress National Preserve (BCNP), the Fakahatchee Strand, and private land to the north of BCNP. Of these deer, 32 were collected by shooting at night by personnel of the Florida Game and Fresh Water Fish Commission, 18 were hunter-killed animals, and one was a radio-collared deer which was found dead of unknown causes. The deer were evaluated via examinations for external and internal parasites, lesions, serologic tests for a number of infectious disease agents, determination of physical condition (weights, measurements, fat indices, etc.) and reproductive status. Deer from Bear Island (BI) were larger and in the best overall condition, followed closely by deer from the Fakahatchee Conservation Club (FCC) area and Collier land to the north of BCNP. APCs were lowest (531) for Bear Island deer and highest (2164) for Raccoon Point animals. Compared to previous years, APCs remained stable for Bear Island and FCC, decreased for Collier land, and increased for Fakahatchee Strand State Preserve (FSSP) and Raccoon Point. The highest APC (9912) was found in a 30-month-old doe from Raccoon Point. This animal had a Haemonchus Pathogenic Factor (HPF) of 196. Twinning rates were highest at Bear Island (60%) and lowest at raccoon Point (0%). Fecundity was above 80% for all areas except FSSP where only 67% of the does were pregnant in October. Deer from areas where the habitat was shared with range cattle had higher prevalences of hemorrhagic disease virus and Leptospira interrogans then did deer in areas where no range cattle occurred. Compared to previous years, prevalences of some parasites (i.e. nasal bots) have increased markedly, while others (such as ticks and lice) have decreased. Prevalences and intensities of most other parasites have remained constant.

White-tailed deer (Odocoileus virginianus) are an important food item for the Florida panther (Felis concolor coryi) in southern Florida. Because of this, the health status of deer in such areas as Big Cypress National Preserve (BCNP), the Fakahatchee Strand, and nearby private lands is of much concern. In 1984, a study was initiated to obtain information on the diseases, parasites, and general physical and reproductive condition of deer in several areas inhabited by Florida panthers. These areas include Bear Island and Raccoon Point in BCNP, Fakahatchee Strand State Preserve (FSSP), land-holdings

of the Fakahatchee Conservation Club (FCC), and private lands owned by Collier Enterprises (CE) to the north of BCNP. This is a report of the 1988-89 research activities during the fifth year of that study.

METHODS

Since the beginning of this study in 1984, the methods used have changed very little. This was deemed to be important so that the data collected could be compared from year to year and also would be comparable to similar information obtained from deer in other parts of Florida and the Southeast by the Southeastern Cooperative Wildlife Disease Study (SCWDS). Some minor modifications were implemented and from time to time additional tests were run, but the testing format essentially has remained the same.

Information was obtained from a total of 51 deer (Table 1). Of these, 32 were collected by shooting at night by Game Commision personnel and 18 were hunter-killed animals. One additional radio-collared deer was found dead of unknown causes and subsequently examined at necropsy.

For the deer collected at night by Game Commission personnel, blood samples were obtained by cardiac puncture soon after death and chilled with the carcass. Blood work-ups were completed within 6 to 8 hours and complete necropsies were performed, usually within 10 hours of death of the animal. Necropsies included weights, measurements, and evaluations of condition using fat and organ indices. Ages were determined by analysis of tooth development and wear by Game Commission personnel. Selected tissues for numerous analyses were either frozen or fixed and preserved in formalin for further processing and study. Parasitism by arthropods, helminths, and protozoans was evaluated by a number of standard methods. Total counts of some parasites were made; for others estimates were determined. Abomasal parasite counts (APCs) were

made by procedures as determined by SCWDS. Blood samples were tested for antibodies to a number of viral and bacterial disease agents and 19 different tests relating to serum chemistry and hematology were conducted.

The 18 deer obtained as hunter-kills and the one radio-collared deer were processed as above where possible. In some cases, however, the procedures were less complete because only certain organs or samples were available.

RESULTS AND DISCUSSION

Physical Conditon

The weights and measurements of 47 deer collected from Bear Island (n=9), Raccoon Point (n=7), Fakahatchee Strand State Preserve (n=10), Fakahatchee Conservation Club area (n=12), and Collier land (n=9) are presented in Tables 2-4. In general, deer from Bear Island were larger than those from other areas. In Table 5 the values for 24 to 48-month-old does are compared. Does from Bear Island averaged 19lbs. heavier and were 12cm. longer than does from Raccoon Point. In Table 6 similar values are compared for deer collected each October from 1984 through 1988. The trends for the 5-year-period were similar to those for 1988, i.e. Bear Island does were larger than those from Raccoon Point. Data on fat indices and overall condition values are presented in Tables 7-9. Fat indices and condition values were converted to numbers (i.e. P=1, P+=2, F-=3, F=4, F+=5, etc. and L=1, L+=2, M-=3, M=4, M+=5, etc.) and mean values were detemined as shown in Table 10. By this method deer from Bear Island graded out at an overall condition index of 9.0 (E-), whereas deer from Raccoon Point were 4.4 (F). Deer from other areas were between these extremes.

Data on heart weights (with and without the pericardium) and kidney weights (with and without the capsule) were collected for each deer and are

presented in Tables 11-13. In Table 14 the values for 24 to 48-month-old does are compared. The heaviest hearts and kidneys were in deer from Bear Island and Collier land, whereas the smallest hearts and kidneys were in deer from Raccoon Point and perhaps Fakahatchee Strand State Preserve. When data on weights of hearts and kidneys of deer collected in other years were compared (Table 15), similar trends were seen.

A number of tests were conducted on serum and whole blood samples from adult female deer. These included the following serum chemistry analyses: alkaline phosphatase, AST/SGOT, gamma GT, creatinine kinase, sodium, potassium, chloride, total CO_2, anion gap, blood urea nitrogen, creatinine, BUN/creatinine ratio, total proteins, albumin, total globulin, and albumin/total globulin ratio. Hematocrits (PCVs) and total white blood cell counts were determined also. The results of these tests are currently being studied and statistically evaluated so that baseline data can be established for deer in southern Florida.

Reproductive Status

Reproductive data on 36 does are presented in Table 16. Of these 36 does, four were eliminated from further consideration since they were 7 to 8-months-of-age. They would have been 5-6 months old during the rut, and although white-tailed deer can breed as young as 6-7 months, this is not common. Of 32 does which were 18 months or older, 88% were pregnant when examined in October (Table 17). Seven (25%) of these were carrying twins. No twinning occurred in deer from Raccoon Point; 3 of 5 (60%) does from Bear Island had twins. Ages of fetuses varied from 4-18 weeks (mean = 11). Conception dates were latest for deer at Raccoon Point as was seen in previous years as well. The sex ratio of the fetuses was close to 1:1 (16 males versus 14 females). In Table 18 reproductive data are presented for 18-month-old or

older does during the entire 5-year-period of the study. Similar trends were seen as for 1988 with 90% fecundity and a twinning rate of 18%.

Parasitism

A number of parasites were identified including helminths, protozoans, and arthropods. Each was evaluated to determine its significance to the health of deer in southern Florida.

Numbers of abomasal nematodes (abomasal parasite counts or APCs) were determined for each deer (Tables 19-21). Most of the nematodes were *Spiculopteragia odocoilei* and *Haemonchus contortus*. A few *Haemonchus placei*, *Trichostrongylus axei*, and *T. dosteri* were also present in several deer, but the bulk of the APC was made up of *S. odocoilei* and secondarily *H. contortus*. Only two deer, a 30-month-old doe from Raccoon Point and a 7-month-old male fawn from Collier land, had HPFs higher than 75. These values would indicate that haemonchosis may have been a serious pathogenic factor in these two deer. The haemonchosis/malnutrition syndrome may be a disease of significance in southern Florida, especially among fawns.

APCs in 1988 were similar to those for 1987 in deer from Bear Island and the Fakahatchee Conservation Club area, but were higher at Raccoon Point and Fakahatchee Strand State Preserve. In contrast the APCs for deer from Collier land were considerably lower. In Table 22 APCs along with condition values are compared for the 5-year-period from 1984 through 1988. Values have consistently been low for deer from Bear Island and fairly high for Raccoon Point deer.

Data on other helminths and on arthropods and protozoans are given in Tables 23-26. As in previous years infections of the following pathogenic nematodes were not found: threadworms (*Strongyloides papillosus*), meningeal worms (*Parelaphostrongylus tenuis*), and arterial worms (*Elaeophora*

schneideri). Cysticerci of the tapeworm Taenia omissa (adults of which occur in Florida panthers) were not found this year. These had been seen in low prevalences and intensities in previous years. The abdominal worm (Setaria yehi) was found in one deer, a doe from Raccoon Point. With a few exceptions, the prevalences and intensities of parasites were similar to those of previous years. The exceptions include increased prevalences of bots and decreased prevalences of lice and ticks. The reasons for these changes are not readily apparent. Further detailed study of these data may provide some helpful insights into long-term changes in prevalences and intensities of parasitism.

Viruses

Deer were tested serologically for seven viruses. All samples were negative for antibodies to infectious bovine rhinotracheitis virus, bovine virus diarrhea virus, parainfluenza-3 virus, bovine respiratory syncytial virus, and the Indiana and New Jersey strains of vesicular stomatitis virus. Fifty-five percent of the 47 deer tested were seropositive for hemorrhagic disease virus (HDV) (Table 27). The highest prevalence (89%) was in deer from Bear Island. All samples from Raccoon Point deer were seronegative. These results are similar to those obtained in 1987. Lesions attributable to chronic hemorrhagic disease were seen in four deer, two from Bear Island (one with atrophy of rumen villi and one with hoof sloughing), one from the Fakahatchee Conservation Club area (atrophy of rumen villi and hoof sloughing), and one from Collier land (hoof sloughing). During 1987 and 1988 an attempt was made to determine which species of Culicoides were present in deer habitat in southern Florida. Culicoides variipennis is the vector of HDV in the southeastern U.S. However, this species does not occur in southern Florida where there is a fairly high prevalence of HD in deer. Accordingly insect

light-traps were used at Bear Island, Raccoon Point, and the Fakahatchee Conservation Club area during the spring and fall in order to determine the composition of the Culicoides fauna. No specimens of C. variipennis were captured, but six other species were. The most common was C. insignis, which was especially abundant during April and May (Table 28). Other species included C. stellifer, C. edeni, C. knowltoni, C. aboricola, and C. pusillus. Other studies on bluetongue virus and EHD virus in cattle in Florida have shown that C. insignis is the probable vector of these viruses. It is likely, therefore, that C. insignis might be serving as the vector of HD viruses in white-tailed deer in southern Florida, but this remains to be determined.

Bacteria

Serologic tests were conducted in order to detect antibodies to Brucella abortus and five serogroups of Leptospira interrogans. All deer were negative for antibodies to B. abortus. Four serogroups were identified in samples positive for L. interrogans and included pomona, hardjo, grippotyphosa, and canicola (Table 29). Canicola was the most prevalent serogroup which was a similar finding in past years. A serovar of the serogroup pomona (serovar Portland-Vere) was isolated from one deer, a hunter-killed buck from Bear Island. The significance of these findings is unknown.

Neoplasia

One deer, an 18-month-old female from Raccoon Point, had nine infectious cutaneous fibromas on its rear legs. These benign neoplasms are caused by viruses and are believed to be transmitted by insect vectors such as mosquitoes. Although these tumers are unsightly in appearance, they are self-limiting and of little consequence unless they occur on the eyelids or

lips and interfere with vision or feeding. This is the first case of fibroma seen in this study in which over 300 deer have been examined from southern Florida.

CONCLUSIONS

Overall, the deer from Bear Island were in the best health, followed closely by deer from the Fakahatchee Conservation Club area and Collier's land. In contrast, the deer from Raccoon Point and Fakahatchee Strand State Preserve were not as healthy. These conclusions were supported by fat indices, condition values, carcass and organ weights, measurements, APCs, and reproductive observations. As in past years, Bear Island and Raccoon Point were at opposite extremes for many of the components which were measured. A continuing trend has been the observation that several infectious disease agents (hemorrhagic disease virus and *Leptospira interrogans*) were quite prevalent in the three areas where range cattle occur (i.e. Bear Island, Fakahatchee Conservation Club area, and Collier land), but were practically absent from the other two areas (Raccoon Point and Fakahatchee Strand State Preserve) where there are no range cattle.

Many of the parasites and diseases have remained the same as far as prevalences are concerned, or have fluctuated without any apparent pattern. Others such as nasal bots have increased over the years, while some (such as lice and ticks) have decreased in prevalence. Considerably more analysis of the large volume of data that has been collected since 1984 is necessary before the health and disease status of deer in southern Florida can be more completely understood.

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Prepared by Donald J. Forrester and Scott D. Wright

Table 1. Total numbers of white-tailed deer from southern Florida examined during 1988-89.

Area	Does		Bucks		Totals
	Collected	Hunter-killed	Collected	Hunter-killed	
Bear Island	6	0	0	6	12
Raccoon Point	7	0	0	0	7
FSSP[a]	6	0	4	0	10
FCC[b]	0	9	0	3	12
Collier's land	7	0	2	0	9
Totals	26	9	6	9	50[c]

[a]FSSP = Fakahatchee Strand State Preserve

[b]FCC = Fakahatchee Conservation Club Area

[c]In addition to these 50 deer, a radio-collared doe which was found dead of unknown causes was examined at necropsy.

Table 2. Physical characteristics of white-tailed deer collected from Bear Island and Raccoon Point during October of 1988.

Deer number	Sex	Age (mo)	Weight (lbs)	Total length (cm)	Tail length (cm)	Girth (cm)
Bear Island						
244	F	30	75	150	25	74
245	F	30	95	150	25	70
246	F	18	85	138	21	70
247	F	30	105	151	24	83
248	F	42	105	153	24	82
249	F	42	100	147	23	81
263[b]	M	ND[a]	ND	ND	ND	ND
289[b]	M	30	86	ND	ND	75
293[b]	M	54	135	ND	ND	88
Raccoon Point						
250	F	18	55	133	23	66
251	F	18	57	128	24	67
252	F	30	75	138	23	73
253	F	18	55	132	24	61
254	F	18	62	137	22	66
255	F	30	75	140	24	70
256	F	30	81	136	21	70

[a]ND = not determined

[b]Hunter-killed deer (complete carcasses not available)

Table 3. Physical characteristics of white-tailed deer collected from Fakahatchee Strand State Preserve and Fakahatchee Conservation Club Area during October and November of 1988.

Deer number	Sex	Age (mo)	Weight (lbs)	Total length (cm)	Tail length (cm)	Girth (cm)
Fakahatchee Strand State Preserve						
257	M	18	95	152	25	79
258	F	18	75	126	25	76
259	M	30	100	156	27	78
260	F	54	105	146	25	84
261	M	7	51	122	24	62
262	F	18	70	138	25	70
264	F	18	85	148	25	74
265	M	30	126	170	31	87
266	F	7	51	128	26	64
267	F	30	75	135	24	69
Fakahatchee Conservation Club Area						
296	F	8	54	128	22	67
297	M	30	75	142	22	69
298	F	30	91	151	28	77
300	F	7	48	108	22	ND[a]
301	F	30	82	125	14	75
302	M	7	54	103	20	58
303	M	30	100	122	25	84
305	F	18	68	136	22	77
306	F	30	78	136	25	74
307	F	36	84	132	25	70
308	F	66	100	152	27	77
309	F	48	105	128	25	86

[a]ND= not determined

Table 4. Physical characteristics of white-tailed deer collected from Collier Enterprises land during October of 1988.

Deer number	Sex	Age (mo)	Weight (lbs)	Total length (cm)	Tail length (cm)	Girth (cm)
271	F	30	105	148	27	85
272	F	36	94	144	27	78
273	F	24	94	142	24	79
274	M	7	55	136	25	69
275	M	18	65	134	24	67
276	F	36	84	132	18	76
277	F	42	104	137	7	68
278	F	24	75	135	22	75
279	F	8	58	128	27	67

Table 5. Mean weights and measurements of white-tailed deer from southern Florida in October of 1988. All deer are does between 24 and 48 months of age.

Area	No. deer	Weight (lbs)	Total length (cm)	Tail length (cm)	Girth (cm)
Bear Island	5	96	150	24	78
Collier land	6	93	140	21	77
FCC[a]	5	88	134	23	76
Raccoon Point	3	77	138	23	71
FSSP[b]	1	75	135	24	69

[a]FCC = Fakahatchee Conservation Club area (collected during November)

[b]FSSP = Fakahatchee Strand State Preserve

Table 6. Mean weights and measurements of white-tailed deer from southern Florida in October of the years 1984 through 1988. All deer are does between 24 and 48 months of age.

Area	No. deer	Weight (lbs)	Total length (cm)	Tail length (cm)	Girth (cm)
Bear Island	15	93	151	23	78
Collier land	11	88	144	22	77
FCC[a]	11	88	139[b]	23[b]	75[b]
FSSP[c]	5	84	141	24	76
Raccoon Point	9	77	139	23	71

[a]FCC = Fakahatchee Conservation Club area (collected during November)

[b]These values are based on 9 deer, rather than 11.

[c]FSSP = Fakahatchee Strand State Preserve

Table 7. Fat indices and overall condition values of white-tailed deer collected from Bear Island and Raccoon Point during October 1988.

Deer number	Tail fat[a]	Heart fat[a]	Pericardial fat[a]	Kidney fat[a]	Condition value[b]
Bear Island					
244	M	M	M	L	G
245	H	H	H	H	E
246	M	L	H	L	G
247	H	M	H	H	E
248	H	H	H	H	E
249	M	H	H	H	E
263	ND[c]	L	ND	H	ND
289	ND	L	L	L	ND
293	ND	H	L	M	ND
Raccoon Point					
250	L	L	ND	L	F
251	L	L	L	L	F
252	H	M	M	H	G
253	L	L	L	L	F
254	L	M	H	M	F
255	L	M	L	L	F
256	L	M	L	L	F

[a]L = light, M = moderate, H = heavy

[b]F = fair, G = good, E = excellent

[c]ND = not determined (tails were not available for examination, hearts were damaged by gunshot)

Table 8. Fat indices and overall condition values of white-tailed deer from Fakahatchee Strand State Preserve and Fakahatchee Conservation Club area during October and November of 1988.

Deer number	Tail fat	Heart fat	Pericardial fat	Kidney fat	Condition value
Fakahatchee Strand State Preserve					
257	L	L	L	L	F
258	L	L	L	L	F
259	L	L	L	M	F
260	H	M	M	H	G
261	L	L	L	L	F
262	L	L	L	L	F
264	M	M	L	M	G
265	L	L	L	L	G
266	L	L	L	L	G
267	L	M	M	H	G
Fakahatchee Conservation Club Area					
296	L	L	ND	L	F
297	L	L	L	L	F
298	L	H	M	M	F
300	L	L	L	L	F
301	M	L	ND	L	F
302	L	L	L	L	F
303	M	L	L	L	F
305	L	L	ND	L	F
306	L	L	L	L	F
307	L	M	L	L	F
308	M	M	L	M	F
309	M	L	M	M	G

[a]L = light, M = moderate, H = heavy

[b]F = fair, G = good, E = excellent

[c]ND = not determined (hearts were damaged by gunshot)

Table 9. Fat indices and overall condition values of white-tailed deer collected from Collier land during October of 1988.

Deer number	Tail fat[a]	Heart fat[a]	Pericardial fat[a]	Kidney fat[a]	Condition value[b]
271	H	M	H	H	G
272	M	H	H	H	E
273	H	H	H	H	E
274	L	L	L	L	F
275	L	L	L	L	F
276	M	M	H	H	G
277	L	H	H	H	E
278	H	M	H	H	G
279	L	M	L	L	G

[a]L = light, M = moderate, H = heavy

[b]F = fair, G = good, E = excellent

Table 10. Mean fat indices and overall condition values of white-tailed deer collected in southern Florida during October of 1988.

Area	Tail fat[a]	Heart fat[a]	Pericardial fat[a]	Kidney fat[a]	Condition value[b]
Bear Island	H-	M	M+	M+	E-
Collier land	M	M	M+	M+	G
FSSP[c]	L+	L+	L+	M-	G-
FCC[d]	L+	L+	L+	L+	F+
Raccoon Point	L+	M-	M-	L+	F

[a]L = light, M = moderate, H = heavy

[b]F = fair, G =good, E = excellent

[c]FSSP = Fakahatchee Strand State Preserve

[d]FCC = Fakahatchee Conservation Club area (collected during November)

Table 11. Weights of hearts and kidneys of white-tailed deer from Bear Island and Raccoon Point during October of 1988.

Deer number	Heart with pericardium (gm)	Heart without pericardium (gm)	Kidney with capsule (gm)	Kidney without capsule (gm)
Bear Island				
244	440	419	53	44
245	409	367	95	39
246	478	420	51	40
247	464	411	82	44
248	509	395	125	44
249	415	343	80	47
289	372	344	65	55
293	553	499	82	55
Raccoon Point				
250	ND[a]	ND	35	31
251	253	221	28	26
252	346	299	58	31
253	232	211	34	32
254	303	245	42	29
255	361	322	52	45
256	302	260	49	42

[a]ND = not determined (heart damaged by gunshot)

Table 12. Weights of hearts and kidneys of white-tailed deer from Fakahatchee Strand State Preserve and Fakahatchee Conservation Club Area during October of 1988.

Deer number	Heart with pericardium (gm)	Heart without pericardium (gm)	Kidney with capsule (gm)	Kidney without capsule (gm)
Fakahatchee Strand State Preserve[a]				
257	337	310	72	68
258	371	358	43	43
259	417	370	57	42
260	397	339	89	54
261	240	228	34	30
262	345	314	49	40
264	348	303	53	40
265	463	440	71	65
266	193	105	32	30
267	292	266	54	46
Fakahatchee Conservation Club Area[a]				
296	ND[b]	ND	38	26
297	340	312	57	48
298	448	370	76	53
300	209	201	38	36
301	ND	ND	52	48
302	154	152	41	39
303	329	289	65	61
305	ND	ND	41	38
306	360	313	69	43
307	336	311	57	52
308	412	386	91	69
309	427	378	74	64

[a]Collected in November

[b]ND = not determined (hearts damaged by gunshot)

Table 13. Weights of hearts and kidneys of white-tailed deer from Collier land during October of 1988.

Deer number	Heart with pericardium (gm)	Heart without pericardium (gm)	Kidney with capsule (gm)	Kidney without capsule (gm)
271	568	497	163	75
272	491	422	90	62
273	434	373	81	59
274	237	219	51	48
275	244	234	55	51
276	435	330	96	41
277	498	406	111	67
278	347	268	64	38
279	254	237	33	30

Table 14. Mean weights of hearts and kidneys of white-tailed deer from southern Florida in October of 1988. All deer are does between 24 and 48 months of age.

Area	Heart wt. (gm)			Kidney wt. (gm)		
	No. deer	With pericar-dium	Without pericar-dium	No. deer	With capsule	Without capsule
Bear Island	5	447	387	5	87	44
Collier land	6	462	386	6	101	57
FCC[a]	4	393	327	5	66	52
Raccoon Point	3	336	294	3	53	39
FSSP[b]	1	292	266	1	54	46

[a]FCC = Fakahatchee Conservation Club area (collected during November)

[b]FSSP = Fakahatchee Strand State Preserve

Table 15. Mean weights of hearts and kidneys of white-tailed deer from southern Florida in October of the years 1985 through 1988. All deer are does between 24 and 48 months of age.

Area	Heart wt. (gm)			Kidney wt. (gm)		
	No. deer	With pericardium	Without pericardium	No. deer	With capsule	Without capsule
Collier land	11	467[a]	396	11	96	59
Bear Island	6	439	382	14	75	46
FCC[b]	4	393	327	9	70	57
FSSP[c]	2	338	309	5	63	50
Raccoon Point	5	320	304	8	52	41

[a]This value is based on 10 deer rather than 11. The pericardium of this one deer was damaged (trauma), whereas the heart was suitable for weighing.

[b]FCC = Fakahatchee Conservation Club area (collected during November)

[c]FSSP = Fakahatchee Strand State Preserve

Table 16. Reproductive data of does collected from Bear Island, Raccoon Point, Fakahatchee Strand State Preserve, Fakahatchee Conservation Club area, and Collier land during October of 1988.

Deer number	Age (mo)	Fetuses			
		No.	Sex	Age (wks)	Weight (gms)
Bear Island					
244	30	1	ND[a]	6	6.0
245	30	2	M,F	12	79.9, 85.6
246	18	1	M	9	12.7
247	30	2	M,M	13	120.6, 108.6
248	42	0	Not Pregnant		
249	42	2	M,F	10	37.6, 36.3
Raccoon Point					
250	18	1	ND	5	1.8
251	18	1	M	10	36.6
252	30	1	F	9	18.9
253	18	0	Not Pregnant		
254	18	1	ND	4	0.6
255	30	1	ND	7	6.4
256	30	1	F	13	18.2
Fakahatchee Strand State Preserve					
257	18	0	Not Pregnant		
258	18	0	Not Pregnant		
260	54	2	M,F	15	395.0, 361.2
262	18	1	M	9	13.0
264	18	1	F	17	500.0
266	7	0	Not Pregnant		
267	30	1	F	12	92.8
Fakahatchee Conservation Club Area[b]					
296	7	0	Not Pregnant		
298	30	1	M	10	29.8
300	7	0	Not Pregnant		

Table 16. (continued)

Deer number	Age (mo)	Fetuses			
		No.	Sex	Age (wks)	Weight (gms)
301	30	1	F	18	500.0
305	18	1	F	12	50.8
306	30	1	F	11	58.8
307	36	2	M,F	14	312.0, 291.0
308	66	2	M,F	13	160.0, 157.0
309	48	1	M	15	397.0
Collier land					
271	30	2	M,M	9	18.8, 17.8
272	36	1	F	11	44.7
273	24	1	M	10	28.4
276	36	1	M	7	5.0
277	42	1	F	12	98.6
278	24	1	ND	8	8.3
279	8	0	Not Pregnant		

[a]ND = not determined; the fetus was so small that the sex could not be determined.

[b]Collected during the first week in November

Table 17. Reproductive data on does 18 months of age or older from southern Florida, October, 1988.

Area	Number of deer					Ages of fetuses	
	Exam.	Preg.	(%)	with twins	(%)	Mean	Range
Bear Island	6	5	(83)	3	(60)	10	6-13
Collier land	6	6	(100)	1	(17)	10	7-12
FCC[a]	7	7	(100)	2	(29)	13	10-18
FSSP[b]	6	4	(67)	1	(25)	13	9-17
Raccoon Point	7	6	(86)	0	(0)	8	4-13
Totals	32	28	(88)	7	(25)	11	4-18

[a]FCC = Fakahatchee Conservation Club area (Collected during November)

[b]FSSP = Fakahatchee Strand State Preserve

Table 18. Reproductive data on does 18 months of age or older from southern Florida during October, 1984-1988.

Area	Number of deer					Ages of fetuses	
	Exam.	Preg.	(%)	with twins	(%)	Mean	Range
Bear Island	24	22	(92)	5	(23)	11.5	5.5-20
Collier land	12	12	(100)	2	(17)	10.4	4-15
FCC[a]	15	13	(87)	3	(23)	14.4	11-21
FSSP[b]	10	7	(70)	2	(29)	12.5	8-17
Raccoon Point	18	17	(94)	1	(6)	8.9	4-13
Totals	79	71	(90)	13	(18)	11.5	4-21

[a]FCC = Fakahatchee Conservation Club area; these deer were collected during the first part of November each year, rather than during October and therefore the ages of their fetuses will be somewhat older than the others.

[b]FSSP = Fakahatchee Strand State Preserve

Table 19. Abomasal parasite counts (APCs), numbers of larval nematodes, and Haemonchus Pathogenic Factors (HPFs) of white-tailed deer collected from Bear Island and Raccoon Point areas during October of 1988.

Deer number	Sex	Age (mo)	Weight (kg)	APC	No. of Larvae[a]	No. of adult Haemonchus	HPF[b]
Bear Island							
244	F	30	34	360	20	0	0
245	F	30	43	1060	126	67	2
246	F	18	39	440	66	66	2
247	F	30	48	320	47	20	<1
248	F	42	48	30	0	20	<1
249	F	42	45	766	172	100	2
263	M	ND[d]	ND	3690[e]	40	1420	ND
289	M	30	39	740	40	20	<1
Means	-	-	-	531[c]	67	42	-
Raccoon Point							
250	F	18	25	340	13	93	4
251	F	18	26	766	1212	253	10
252	F	30	34	1572	46	640	19
253	F	18	25	1932	180	633	25
254	F	18	28	310	80	93	3
255	F	30	34	9912	52	6652	196[f]
256	F	30	37	320	440	100	3
Means	-	-	-	2164[c]	289	1209	-

[a]Larvae are not included in the APC.

[b]The HPF is calculated by dividing the number of adult Haemonchus by the weight (kg) of the deer. Values of 75 or greater indicate pathogenicity.

[c]Mean APC values do not include animals less than 12 months of age.

[d]ND = not determined

[e]Not included in the calculation of the mean APC because the age of this deer was not determined.

[f]Above the pathogenic level for Haemonchus

Table 20. Abomasal parasite counts (APCs), numbers of larval nematodes, and Haemonchus Pathogenic Factors (HPFs) of white-tailed deer collected from Fakahatchee Strand State Preserve and the Fakahatchee Conservation Club area during October and November of 1988.

Deer number	Sex	Age (mo)	Weight (kg)	APC	No. of Larvae[a]	No. of adult Haemonchus	HPF[b]
Fakahatchee Strand State Preserve							
257	M	18	43	432	140	20	<1
258	F	18	34	900	220	20	<1
259	M	30	45	800	0	53	1
260	F	54	48	320	170	20	<1
261	M	7	23	340	0	20	<1
262	F	18	32	90	60	10	<1
264	F	18	37	640	306	10	<1
265	M	30	57	2910	30	413	7
266	F	7	23	1760	13	620	27
267	F	30	34	1800	166	487	14
Means	-	-	-	987[c]	111	167	-
Fakahatchee Conservation Club Area							
296	F	8	25	1190	10	400	16
297	M	30	34	2400	150	0	0
298	F	30	41	300	10	70	2
300	F	7	22	1950	100	0	0
301	F	30	37	420	1620	140	4
302	M	7	25	3860	170	750	30
305	F	18	31	2900	0	460	15
306	F	30	35	440	510	80	2
307	F	36	38	1720	1680	47	1
308	F	66	45	1460	240	27	<1
309	F	48	48	690	80	40	<1
Means	-	-	-	1148[c]	381	168	-

[a]Larvae are not included in the APC.

[b]The HPF is calculated by dividing the number of adult Haemonchus by the weight (kg) of the deer. Values of 75 or greater indicate pathogenicity.
[c]Mean APC values do not include deer less than 12 months of age.

Table 21. Abomasal parasite counts (APCs), numbers of larval nematodes, and Haemonchus Pathogenic Factors (HPFs) of white-tailed deer collected from Collier land area during October of 1988.

Deer number	Sex	Age (mo)	Weight (kg)	APC	No. of Larvae[a]	No. of adult Haemonchus	HPF[b]
271	F	30	48	620	240	7	<1
272	F	36	43	640	140	0	0
273	F	24	43	360	350	0	0
274	M	7	25	5150	670	2500	100[d]
275	M	18	29	2000	520	1187	41
276	F	36	38	466	1626	33	<1
277	F	42	52	576	66	100	2
278	F	24	34	1030	620	0	0
279	F	8	26	1792	320	480	19
Means	-	-	-	813[c]	506	479	-

[a]Larvae are not included in the APC.

[b]The HPF is calculated by dividing the number of adult Haemonchus by the weight (kg) of the deer. Values of 75 or greater indicate pathogenicity.

[c]Mean APC values do not include deer less than 12 months of age.

[d]Above the pathogenic level for Haemonchus.

Table 22. Mean Abomasal parasite counts (APCs) and condition values (CV) for white-tailed deer collected from Bear Island, Raccoon Point, Fakahatchee Strand State Preserve, Fakahatchee Conservation Club area, and Collier land during October of 1984-1988.

Area	1984		1985		1986		1987		1988	
	APC	CV[a]	APC	CV[a]	APC	CV[a]	APC	CV[a]	APC	CV[a]
Bear Island	362	F+	392	G-	847	G+	628	G+	531	G+
Raccoon Point	938	F	1008	G-	-	-	1060	F+	2164	F
FSSP[b]	-	-	-	-	1562	F+	495	G-	987	F+
FCC[c]	997	F-	1164	F	1730	F	1058	G-	1148	F
Collier land	-	-	-	-	-	-	2422	G-	843	G

[a]CV = Condition value; F = fair, G = good, +, - = intermediate values

[b]FSSP = Fakahatchee Strand State Preserve

[c]FCC = Fakahatchee Conservation Club area (collected during November)

Table 23. Helminths and arthropods of white-tailed deer from Bear Island and Raccoon Point during the fall of 1988.

Deer no.	Sex	Age (mo)	Lung-worms	Muscle worms	Liver flukes	Rumen flukes[a]	Bots	Ticks[a]	Lice[a]	Keds[a]
Bear Island										
244	F	30	0	+	10	L	3	0	0	L
245	F	30	0	+	2	L	0	0	0	L
246	F	18	2	-	4	L	4	0	0	0
247	F	30	1	+	10	0	7	0	0	L
248	F	42	2	-	2	L	2	0	0	L
249	F	42	2	+	2	0	4	0	0	0
263	M	ND[b]	5	+	8	L	ND	ND	ND	ND
289	M	30	0	+	2	0	2	ND	ND	ND
293	M	54	5	+	13	M	13	ND	ND	ND
Raccoon Point										
250	F	18	0	-	5	L	7	L	0	L
251	F	18	0	-	0	L	1	0	0	L
252	F	30	4	+	3	L	8	0	0	L
253	F	18	49	+	8	M	4	0	0	L
254	F	18	1	+	3	L	6	0	0	L
255	F	30	0	+	3	0	0	0	0	L
256	F	30	62	+	9	L	6	0	0	L

[a]Estimates according to: 0 = none, L = light, M = moderate numbers of parasites.

[b]ND = not determined (these were hunter-killed deer and the complete carcasses were not available for examination)

Table 24. Helminths and arthropods of white-tailed deer from the Fakahatchee Strand State Preserve and the Fakahatchee Conservation Club area during the fall of 1988.

Deer no.	Sex	Age (mo)	Lung-worms	Muscle worms	Liver flukes	Rumen flukes[a]	Bots	Ticks[a]	Lice[a]	Keds[a]
Fakahatchee Strand State Preserve										
257	M	18	0	-	0	L	0	0	0	L
258	F	18	2	-	21	L	23	0	0	0
259	M	30	10	+	0	0	7	0	0	L
260	F	54	3	+	8	L	0	L	0	L
261	M	7	0	-	0	0	0	0	0	0
262	F	18	5	+	4	0	18	L	0	L
264	F	18	7	-	3	L	0	0	0	L
265	M	30	5	+	20	M	0	L	0	M
266	F	7	1	-	0	0	2	L	0	L
267	F	30	0	+	2	L	6	L	0	L
Fakahatchee Conservation Club										
296	F	7	2	-	0	0	1	ND[b]	ND	ND
297	M	30	10	+	20	H	10	0	0	M
298	F	30	1	-	7	0	0	L	0	L
300	F	7	2	-	6	L	ND	ND	ND	ND
301	F	30	7	+	8	0	2	ND	ND	ND
302	M	7	2	-	0	L	ND	0	0	0
303	M	30	2	+	10	0	1	ND	ND	ND
305	F	18	2	-	4	L	4	0	0	L
306	F	30	1	+	0	0	1	0	0	L
307	F	36	4	+	10	M	2	0	0	L
308	F	66	0	-	13	L	0	0	0	L
309	F	48	3	-	8	0	18	0	0	L

[a]Estimates according to: 0 = none, L = light, M = moderate numbers of parasites.

[b]ND = not determined (these were hunter-killed deer and the complete carcasses were not available for examination)

Table 25. Helminths and arthropods of white-tailed deer from Collier land during the fall of 1988.

Deer no.	Sex	Age (mo)	Lung-worms	Muscle worms	Liver flukes	Rumen flukes[a]	Bots	Ticks[a]	Lice[a]	Keds[a]
271	F	30	12	+	4	0	7	0	0	L
272	F	36	0	+	0	L	0	0	0	0
273	F	24	3	+	14	M	13	0	0	L
274	M	7	1	-	0	0	0	0	0	L
275	M	18	7	-	3	0	0	0	0	L
276	F	36	1	+	19	L	1	0	0	L
277	F	42	3	+	15	L	37	0	0	L
278	F	24	3	+	4	L	3	0	0	L
279	F	8	0	-	0	L	1	0	0	L

[a]Estimates according to: 0 = none, L = light, M = moderate numbers of parasites.

Table 26. Prevalence of protozoan parasites in white-tailed deer in southern Florida during the fall of 1988.

Area	Intestinal coccidia[a]		*Sarcocystis*[b]		*Trypanosoma*[c]	
	No. deer exam.	% prev.	No. deer exam.	% prev.	No. deer exam.	% prev.
Bear Island	9	0	6	50	6	100
Raccoon Point	7	0	7	43	7	100
FSSP[d]	10	20	10	60	9	67
FCC[e]	12	8	10	60	ND	-
Collier land	9	22	9	22	8	63
Totals	44	11	42	48	30	83

[a]*Eimeria odocoilei* and *E. mccordocki*

[b]*Sarcocystis odocoileocanis* and two undescribed species

[c]*Trypanosoma cervi*

[d]FSSP = Fakahatchee Strand State Preserve

[e]FCC = Fakahatchee Conservation Club area

Table 27. Seroprevalence of hemorrhagic disease virus in white-tailed deer from southern Florida during October, 1988.

Area	Number of deer		
	Examined	Positive	%
Bear Island	9	8	89
Raccoon Point	7	0	0
FSSP[a]	10	2	20
FCC[b]	12	9	75
Collier land	9	7	78
Totals	47	26	55

[a]FSSP = Fakahatchee Strand State Preserve

[b]FCC = Fakahatchee Conservation Club area; samples were taken during the first week in November rather than in October.

Table 28. Number of *Culicoides insignis* captured in insect light-traps in southern Florida during 1987 and 1988.

Area	Season[a]	Year	Number of trap-nights[b]	No. *Culicoides insignis* captured per trap-night	
				Mean	Range
Bear Island	Spring	1987	1	298	-
		1988	5	1,192	13-2,674
	Fall	1987	3	23	18-26
		1988	3	484	94-783
FCC[b]	Fall	1988	2	90	2-177
Raccoon Point	Fall	1987	3	<1	0-2

[a]Spring = April and May; Fall = September, October, and November.

[b]A trap-night is one light-trap operating continuously from dusk to dawn during one 24-hour period.

[c]FCC = Fakahatchee Conservation Club area

Table 29. Prevalence of serogroups of *Leptospira interrogans* in white-tailed deer in southern Florida during October, 1988.

Area[b]	No. deer tested	Prevalence (%) of *Leptospira* serogroups[a]			
		pomona	*hardjo*	*grippo-typhosa*	*canicola*
Bear Island	8	0	12	12	25[c]
Raccoon Point	7	0	0	0	14
FSSP[d]	8	0	0	0	25
Collier land	9	11	33	33	11
All deer	32	<1	13	13	19

[a]All 32 deer were seronegative for serogroup *icterohemorrhagica*

[b]Twelve deer from the Fakahatchee Conservation Club area could not be tested because their sera were toxic to the serologic test.

[c]Leptospires were isolated from one deer from Bear Island and were determined to be *Leptospira interrogans*, serogroup *canicola*, serovar Portland-Vere.

[d]FSSP = Fakahatchee Strand State Preserve.