

Birds of the Southgate Coastal Reserve:



*The effects of season and pond water levels
as controlling factors in community structure*

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**BIRDS OF THE
SOUTHGATE COASTAL RESERVE:**

**The Effects of Season and Pond Water Levels
as Controlling Factors in Community Structure**

by

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Cover photograph: A Great Egret, Snowy Egrets, and Brown Pelicans at Southgate Pond in May 1985
(photo by W. B. Gladfelter).

Abstract

Southgate Pond continues to be one of the premier birding sites on the island of St. Croix, a distinction it has held for more than a century. Its recorded bird life includes 113 species of which 34 have been observed nesting there in recent times, and an additional 3 species nest at nearby Green Cay Island. Thirty-nine species on this list can be characterized as “species of special interest”, meaning that they have a restricted distribution in the US, so their presence could attract international birdwatchers to Southgate. With a few notable exceptions, nearly the entire regular avifauna that has been observed in St. Croix has been observed at Southgate. Two species at Southgate are on the Federal Endangered Species list and an additional 11 species are listed on the VI Endangered list.

About 60% of the 113 species are “water” birds, dependent in some way on the Pond or ocean, and the remaining 40% are the “land” birds that can be observed in adjacent wooded areas. About 40% of the 113 species are resident breeders; about 40% are winter residents (meaning they migrate to St. Croix to spend the winter months, but they do not breed there), about 5% are summer residents (meaning they migrate to the Virgin Islands in the summertime and breed there, although of this group only the Least Tern nests at Southgate). The remaining species are migrants, visiting St. Croix in the spring and/or the fall (depending on their migratory route), stopping for only a short visit to refuel before resuming their journey.

The abundance of birds using Southgate Pond remains high when there is sufficient water in the yearly cycle of this arid setting. It is the complexity of habitats that the Southgate coastal complex offers in time and space, primarily dependent on periodically changing water levels, that is so critical in maintaining high diversity and abundance. For instance, the White-cheeked Pintail, the only native duck breeding in the Virgin Islands, is found in the pond when water depth exceeds 6 inches, but is absent when level falls below that. Migrant ducks, winter residents, are found in the winter months when the water level exceeds 8 inches.

Brown Pelicans, the 9 species of herons found at Southgate, and large migrant shorebirds use the pond if the water level is greater than 3 inches, as do Black-necked Stilts, although the latter are absent if the level exceeds 19 inches. Small migrant shorebirds, however, with much shorter legs than the shorebirds mentioned above, are often seen when pond level falls below 3 inches. All of the above mentioned species (with the exception of White-cheeked Pintail) have a seasonal component to their occurrence as well as the water-dependence described above. Wilson’s Plover uses the pond primarily in the summer months, and is tolerant of dry conditions as it feeds upon the fiddler crabs present in moist areas around the dry pond. The presence of the Least Tern, a summer migrant which breeds at Southgate (the most important site on St. Croix for Least Tern nesting in 2003), shows no correlation to water level.

Comparisons of the bird communities of Southgate Pond with those of Coakley Pond and Great Pond (and others) over 15 years of observations demonstrate Southgate Pond is an important component of a network of wetlands in St. Croix, including the

nearby farm ponds found inland from Southgate. Given the vagaries of the water cycle on St. Croix, it is this complex network of wetland habitats that collectively provides shelter, feeding and/or nesting habitat to the “water” birds that reside either permanently, or for some part of their lives on St. Croix.

This paper documents the importance of the water cycle to the presence and abundance of birds at Southgate, and suggests management of water could be crucial to management of bird habitat. The use of mangrove habitat for nesting by Coot, Moorhens, Green Herons, and White-cheeked Pintails at Southgate during the wet season of 2003-2004 underlines the importance of this habitat for certain birds, and suggests protection and enhancement of mangrove habitat should be a management objective for the Southgate Coastal Reserve.

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Introduction

The native avifauna of St. Croix includes slightly over one hundred species of regularly occurring wild birds. About half of these species breed on island and about half are non-breeding migrants. About one-third of the species are "land" birds, and about two-thirds are "water" birds (and raptors). In addition to these regularly occurring species there are several species that used to occur on St. Croix, some which even bred at Southgate, that no longer do. Other species are occasional wanderers and would only be sighted once in a number of years. To avid "birders" this latter group is particularly interesting because of the rarity of the species. However, these contribute only a tiny fraction of the birds observed by the overwhelming number of viewers.

Southgate Pond has long been recognized as a premier birding site on St. Croix. In the early days, of special interest was its function as good hunting grounds, particularly for ducks and pigeons. It provided excellent habitat for nesting, feeding and shelter for resident (West Indian Whistling Duck and White-cheeked Pintail) ducks and feeding and shelter habitat for migratory ducks (e.g., Blue-winged Teal, Lesser Scaup, Widgeon, etc.) that were regular winter residents (Newton and Newton, 1859; Seaman, 1957, 1973). Pigeons (e.g., White-crowned Pigeon and Zenaida Dove) nested on nearby Green Cay, but crossed the narrows to the mainland to feed around Southgate Pond and its environs (Seaman, 1973). Both ducks and pigeons were sought by hunters who would bring little boys, at one time including George Seaman, to be "bird dogs" and collect the fallen prey. Seaman (1973) describes the Southgate Pond of his childhood (around 1920) as:

"... a biotic gem sparkling with vibrant life. In its clear sweet waters were "pan crabs" (soft shell crabs), little red and white mangrove crabs, gesticulating fiddler crabs and those beautiful, big "kalaloo" crabs. "Sand diggers" (gobies), "Bonnies" (tarpon, a delicious fish if you knew how to "stretch them"), Crameaux, mullet and eels....Ducks, gallinules, coots, grebes and several herons lived and nested here. In the fall of the year migrating waterfowl settled on this food-rich body of water by the hundreds."

Seaman, who grew up to become a renowned naturalist and protector of wildlife, recounts the destruction of the eastern third of Southgate Pond in 1956 (Seaman, 1957), when the mangroves were destroyed and much of that portion of the wetland filled in, in anticipation of development. Fortunately, the planned construction did not occur. In the 1950s the western one-third of the pond was dredged (a marina was built in 1981). By the 1960s a dike was constructed across the narrowest part of the pond (partially using dredge spoils), leaving the middle third of the original pond relatively undisturbed from direct human impact. Sladen (1988) points out that "because of lack of disturbance and development in the immediate vicinity of the present Pond over the past 20 years [e.g., 1968-1988], the Pond ecosystem has recovered remarkably well."

Birds of Southgate Pond

Table I is a compilation of 113 species of birds recorded at Southgate Pond and its surrounding vegetation (adapted from Sladen, 1988) with information on their breeding status, season of occurrence, and pond use (Sladen, 1988, 1992, 1994; Knowles, 1996; Johnsgard, 1981; Bond, 1974; Robbins *et al.*, 1983; W. Gladfelter, personal observations). The species are arranged by major taxonomic group (i.e. either Order or Suborder) in standard AOU (American Ornithological Union) fashion. We have used common names, which have been standardized by the AOU and are considerably easier to use (and for the layman to recognize) than the latinized scientific names.

The first approximately 60% of the bird species listed in Table I, the “water” birds and raptors, can generally be observed from afar with the aid of a telescope (a “spotting” scope) or with powerful binoculars. These species are generally seen in and immediately around the pond itself (e.g. ducks, herons, shorebirds), overhead (e.g. frigatebirds, terns, etc.) or on the beach or nearby sea. The remaining species, the “land” birds, typically inhabit the wooded areas or edges and generally require closer observation and often some degree of stealth to observe (e.g., hummingbirds, warblers, cuckoos, etc.).

Some birds reside on St. Croix full time, while others spend only part of the year on island. Some researchers define a “resident” species as a species that breeds in a given locale as opposed to a “migrant” species (which breeds elsewhere and only visits a given locale), but the situation in St. Croix is much more complicated than that. Resident species (**r**) live on island throughout the year and breed on the island. The populations of some resident species, however, are enhanced by individuals migrating seasonally as well (e.g., Great Blue Heron, Great Egret, and others). Some species, such as the Least Tern and Laughing Gull, breed in the Virgin Islands and are called “summer residents” (**sr**) in Table I, but these are migratory species. Some migrating birds reside on the island for the winter season (the migratory ducks, for example) and are labeled as “winter residents” (**wr**). Lastly, some birds are migrants (**m**) and only visit the island for brief periods (in the fall, or in the spring, or in the fall and in the spring); some of the shorebirds fit into this category.

Sixteen birds are listed in Table I as rare or extirpated (**ext**; meaning that they used to occur, but have not been seen in the recent past, for at least 35 years). The remaining 97 species include the great majority of birds in the St. Croix avifauna. Obvious and important omissions include habitat specialists such as the Bridled Quail Dove and the White-tailed Tropicbird, which breed elsewhere on St. Croix (but whose habitat requirements are not met at Southgate Pond). However, with these noted exceptions, nearly the entire regular avifauna that has been observed on St. Croix, has been observed at Southgate! About one-third of these (34 species) have been recorded as nesting at Southgate in recent times (cf. Table I). The abundance figures in Table 1 are derived from monthly census data gathered by William C. Knowles (1996; WCK) from February 1989 through June 1996, analyzed by the senior author of this report. The list of birds seen at Southgate (with notes on residency and breeding) was compiled by Fred Sladen (1988; there is one addition noted below), with updates and information on Pond Use, status and species of special interest added by William B. Gladfelter.

Table I. Birds of Southgate Coastal Reserve (adapted from Sladen, 1988).

Group	Bird Species	Residency	Status	Breeds		Species Special Interest	Pond Use		Endan/Threat.	Abundance	
				STX (VI)	SG(GC)		Location	Food		Total	Max/census
Grebes	Pied-billed Grebe	r		Yes	Yes		S	Fish		16	4
Pelicans, etc.	Brown Pelican	r		Yes	(GC)	X	S	Fish	F Endan	668	99
	Magnificent Frigatebird	r				X	OH	Fish		21	5
Herons, etc.	American Bittern	m	rare								
	Least Bittern	m	rare								
	Great Blue Heron	r		Yes	Yes		W	Fish, Crus	VI Endan	33	4
	Great Egret	r		Yes	Yes		W	Fish	VI Endan	468	86
	Snowy Egret	r		Yes	Yes		W	Fish	VI Endan	381	54
	Little Blue Heron	r		Yes	Yes		W	Fish, Crus		294	28
	Tricolored Heron	r		Yes	Yes		W	Fish		15	2
	Reddish Egret	m	rare			X	W	Fish		3	2
	Cattle Egret	r		Yes	Yes			Inv			
	Green-backed Heron	r		Yes	Yes		W	Fish		27	3
	Black-crowned Night Heron	r	uncommon	Yes	Yes	X	W	Fish, Crus	VI Endan	24	4
	Yellow-crowned Night Heron	r		Yes	Yes	X	W	Fish, Crus		50	12
Ducks	Fulvous Whistling Duck	m	rare			X					
	West Indian Whistling Duck		extirpated	formerly	formerly						
	Black-bellied Whistling Duck		extirpated								
	Green-winged Teal	wr	uncommon				S	Veg		32	13
	Mallard	r	uncommon	Yes			S	Veg		1	1
	White-cheeked Pintail	r		Yes	Yes	X	S	Veg	VI Endan	1084	97
	Northern Pintail	wr	uncommon			X	S	Veg		18	8
	Blue-winged Teal	wr					S	Veg		746	97
	Cinnamon Teal		uncommon	unk	unk						
	Northern Shoveler	wr	uncommon				S	Veg		10	4
	American Widgeon	wr	uncommon				S	Veg		22	8
	Ring-necked Duck	wr	uncommon			X					
	Greater Scaup	wr	uncommon			X					
	Lesser Scaup	wr					S	Fish, Crus		32	10
Ruddy Duck	unk	uncommon	unk	unk	X	S	Veg	VI Endan	1	1	
Raptors	Osprey	wr				X	OH	Fish		9	1
	Northern Harrier	m									
	Red-tailed Hawk	r		Yes							
	American Kestrel	r		Yes	Yes						
	Merlin	wr				X					
Peregrine Falcon	wr				X	OH	Birds		1	1	
Rails, etc	Clapper Rail		rare	unk	unk	X			VI Endan		
	Sora	wr	uncommon			X					
	Common Moorhen	r		Yes	Yes		S	Veg		24	4
	American Coot	m					S	Veg		116	44
Caribbean Coot	r	rare	Yes	Yes	X	S	Veg	VI Endan	2	1	
Shorebirds	Black-bellied Plover	wr					W	Inv		200	31
	Lesser Golden Plover	m	uncommon								
	Snowy Plover		extirpated	formerly	formerly						
	Wilson's Plover	r		Yes	Yes	X	W(dry)	iddler Crabs		367	42
	Semipalmated Plover						W(dry)	Inv		46	13
	Killdeer	r		Yes	Yes		W(dry)	Inv		8	2
	American Oystercatcher	r		Yes	(GC)	X	W	Inv		1	1
	Black-necked Stilt	r		Yes	Yes	X	W	Inv		942	128
	Greater Yellowlegs	wr					W	Inv		213	42
	Lesser Yellowlegs	wr					W	Inv		437	36
	Solitary Sandpiper	wr	uncommon								
	Willet	r	uncommon	Yes			W	Inv	VI Endan	2	1
	Spotted Sandpiper	wr					W(dry)	Inv		183	11
	Upland Sandpiper	m	uncommon								
	Whimbrel	wr					W	Inv		37	10
	Ruddy Turnstone	wr					W(dry)	Inv		318	35
Red Knot	m	uncommon				W	Inv		1	1	
Sanderling	wr					W	Inv		1	1	

Table I (cont.). Birds of Southgate (adapted from Sladen, 1988)

Group	Bird Species	Status	Breeds		Species Special Interest	Pond Use		Endan/ Threat.	Abundance WCK; 89-96	
			STX (VI)	SG(GC)		Location	Food		Total	Max/ census
Shorebirds, cont.	peeps* (lumped by WCK)					W	Inv		932	155
	*Semipalmated Sandpiper	wr								
	*Western Sandpiper	wr								
	*Least Sandpiper	wr								
	White-rumped Sandpiper	m	uncommon			X	W	Inv	5	3
	*Baird's Sandpiper	m	rare							
	Pectoral Sandpiper	m								
	Stilt Sandpiper	wr				X	W	Inv	421	90
	Buff-breasted Sandpiper	m	rare							
	Short-billed Dowitcher	wr					W	Inv	104	24
	Long-billed Dowitcher	m	uncommon							
	Common snipe	wr								
Wilson's Phalarope	m	rare			X	S	Inv	1	1	
Terns and gulls	Laughing Gull	sr		(VI)		OH	Inv		32	4
	Gull-billed Tern	sr	uncommon		X	OH	Fish		1	1
	Royal Tern	r		(VI)		OH	Fish		32	6
	Common? Tern	sr		(VI)		OH	Fish		1	1
	Least Tern	sr		Yes	Yes	X	OH	Fish	red Endan	942
Pigeons	Rock Dove	r		Yes						
	Scaly-naped Pigeon	r		Yes	Yes	X				
	White-crowned Pigeon	r		Yes	(GC)	X		VI Endan		
	Zenaida Dove	r		Yes	Yes	X				
	White-winged Dove	r		Yes	probably	X				
	Common Ground Dove	r		Yes	Yes	X				
Cuckoos	Yellow-billed Cuckoo	m								
	Mangrove Cuckoo	r		Yes	Yes	X				
	Smooth-billed Ani	r		Yes	Yes	X				
Hummingbirds	Green-throated Carib	r		Yes	Yes	X				
	Antillean Crested Hummingbird	r		Yes	Yes	X				
Kingfishers	Belted Kingfisher	wr				OH	Fish		31	3
Woodpeckers	Yellow-bellied Sapsucker	wr	rare							
Perching birds, primitive	Caribbean Elaenia	r		Yes	Yes	X				
	Grey Kingbird	r		Yes	Yes	X				
	Caribbean Martin	sr	uncommon	Yes		X				
	Bank Swallow	wr	uncommon							
	Cliff Swallow	wr	uncommon							
	Barn Swallow	wr								
Songbirds	Northern Mockingbird	r		Yes	Yes					
	Pearly-eyed Thrasher	r		Yes	Yes	X				
	Black-whiskered Vireo	r		Yes	Yes					
	Northern Parula	wr								
	Yellow Warbler	r		Yes	Yes					
	Magnolia Warbler	wr								
	Cape May Warbler	wr								
	Prairie Warbler	wr								
	Palm Warbler	wr								
	Blackpoll Warbler	m								
	Black-and-white Warbler	wr								
	American Redstart	wr								
	Northern Waterthrush	wr								
	Common Yellowthroat	wr								
	Bananaquit	r		Yes	Yes	X				
	Black-faced Grassquit	r		Yes	Yes	X				
	Red Bishop	r		Yes	Yes					
Bronze Manikin		exotic								

TOTAL SPECIES = 113
Species nesting at Southgate = 34

Table I contains a variety of information on the birds observed at Southgate. Species currently known to breed on St. Croix (STX; or if not on STX, elsewhere in the US Virgin Islands, VI) are indicated, as well as whether the species has bred at Southgate (SG; or, if not, on nearby Green Cay, GC). Not all the species listed as breeding at

Southgate Pond will breed there every year. All recorded heron species except the rare Reddish Egret have been recorded as breeding at Southgate in recent times (within the past two decades). The White-cheeked Pintail is the only duck species presently breeding at Southgate (as well as on St. Croix), although the West Indian Whistling Duck bred there formerly (Seaman, 1973). Of the remaining species, the Black-necked Stilt and Wilson's Plover both use the areas at the edge of the pond and must be considered, along with the White-cheeked Pintail, as among the most important users of Southgate. Other important resident species are the Black-crowned Night Heron, and the Willet (which has not been recorded as actually breeding at Southgate, but potentially could breed there as well).

Species that have restricted distribution within the continental U.S. are noted because they are generally of great interest to visiting birdwatchers. The presence of these species could attract international birdwatchers to St. Croix and to the Southgate Coastal Reserve.

The general mode of pond use by the water bird species is indicated as follows:

- **S** = swimmers: including all ducks, pelicans, grebes, coots and the rare phalarope;
- **W** = waders: including herons, sandpipers, stilts and plovers;
- **W(dry)** = walkers on the dry flats surrounding the pond, even when water is available: includes mainly plovers; and,
- **OH** = overhead: includes birds that soar, fly, or hover above the pond (and may dive for food) including terns, frigatebirds, swallows, kingfishers and raptors (Peregrine Falcon and Osprey).

The general category of food utilized by these bird species include:

- **F** = fish (in times of heavy rains *Tilapia* spp. and perhaps mollies, are washed into the pond from small farm ponds upstream and fed upon by all heron species, pelicans, frigatebirds, ospreys and other birds). The length of time that these fish remain is unknown. Small fishes are consumed by stilts, small terns, and others (we do not know if other types of fishes occur in the pond during prolonged wet periods);
- **Cr** = Crustacea (crabs and shrimps). We do not know of the presence of shrimps in the pond, but fiddler crabs (*Uca* spp.) are abundant around the margins of the pond and are known to be consumed (W.B. Gladfelter, personal observations) by the plover species (e.g., Wilson's Plover, Black-bellied Plover, etc.). Blue crabs are known to occur in the pond at times and could be the prey of night herons and other species;
- **Veg** = vegetable matter or detritus; *Ruppia* sp. (widgeon grass) grows in the pond and it and other vegetable matter and detritus (e.g., often formed from decaying mangrove leaves) are consumed by ducks and coots;
- **Inv** = invertebrates (a variety of species of small crustaceans, worms, insects, and mollusks). Most of the shorebirds prey on such items, particularly by probing the sediment with their sensitive bills. Although we have made observations on such

probing behavior we have no data on actual food items present or ingested. A sediment sample taken at nearby Coakley Pond in March 2003 when it had a few cm of water revealed no food items, but this pond was highly saline when water levels were low (salinity was in excess of 100 o/oo; water was "thick" with brine; the sediment sample was itself full of salt crystals). Birds were present at the pond, however, including Wilson's Plovers and Whimbrels, which appeared to be "working" the edges of the pond and then crossing the deepest portion despite the large accumulation of salt crystals in all these zones. Unless the pond is nearly dry, the water in Southgate Pond does not become much more saline than normal seawater (about 35 o/oo), and usually is much less saline, indicating a less stressful environment for potential food items. In March 2003, we observed Wilson's Plovers and Black-bellied Plovers running at the edge of the wet area (from the R/O plant run-off; salinity of 25 o/oo) to the south of the pond, although we did not observe any feeding behavior; and,

- **Birds** = birds; the Peregrine Falcon is present throughout the fall and winter and is known to prey on egrets and other water birds on St. Croix.

Table I also indicates whether a species is listed on the Virgin Islands or Federal Endangered Species Lists (VI Legislature 1990; www.fws.gov). Only the Brown Pelican and the Least Tern are currently listed on the Federal "endangered list" (the Peregrine Falcon has recently been taken off the list). Eleven species are listed on the Virgin Islands "endangered list". Three other species (West Indian Whistling Duck, Black-bellied Whistling Duck and the Snowy Plover) occurred in the recent past in the Virgin Islands (and at Southgate Pond) but are now listed as "extirpated"-- no longer occurring in the Virgin Islands. In contrast, in very recent years (since Hurricane Hugo in 1989) we have observed the White-winged Dove on St. Croix (and at Southgate) in ever increasing numbers.

Most Frequently Censused Water bird Species

The analyses in the remainder of this report deal with water birds that utilize the wetland itself in some capacity. For these analyses, we have relied most heavily on the monthly censuses made by William C. Knowles (Wildlife Biologist, Virgin Islands Division of Fish and Wildlife) from February 1989 through June 1996. His 1996 report with the raw bird census data (and pond water level) was kindly provided to us by Douglas McNair, current Wildlife Biologist with the V.I. Division of Fish and Wildlife. These data were compiled and then analyzed and presented in graphic form by the authors of this report. The number of water birds censused at Southgate Pond by W. C. Knowles (Knowles, 1996) are presented in the final columns of Table I. Note that the three largest groups are herons, ducks, and shorebirds (sandpipers, plovers and allied forms). Numerous censuses of the water birds at Southgate were also made in the 1980s by Fred W. Sladen (Wildlife Biologist, Virgin Islands Division of Fish and Wildlife) and we have incorporated his published results (Sladen, 1992) below for comparison.

The values for abundance given in Table I (right-most two columns) provide an indication of the importance of Southgate Pond for those species. Those with particularly high abundance (given below in taxonomic order) include:

Pelicans
 Little Blue Herons
 Great Egret
 Snowy Egret
 Blue-winged Teal
 White-checked Pintail
 Least Terns
 Many shorebird species, such as "peeps"
 Black-necked Stilts
 Wilson's Plovers

The most abundant species of water birds censused by W.C. Knowles (wck) over his eight years of observation are ranked in Table II, along with annual abundance for each year. The right-most two columns give the average abundance per census, for a total of 88 monthly censuses by W. Knowles, and 99 censuses by F.W. Sladen (fws) where available (Sladen's observations were scattered irregularly throughout the years 1982-1985). Eight of the species were significantly more abundant in Sladen's censuses, four species of which were dramatically more abundant. These differences are discussed below in section "A Comparison of Bird Abundances in the 1980s vs. the 1990s."

Table II. Major Bird Species Use at Southgate Pond

Species	Rank	1989	1990	1991	1992	1993	1994	1995*	1996*	SUM	Avg Cnt/Census	
											wck=88	fws=99
White-checked Pintail	1	285	337	129	75	88	0	60	74	1,084	12.3	19.43
Least Tern	2	154	69	74	85	43	295	176	46	942	10.7	NA
Black-necked Stilt	2	107	163	90	79	403	0	35	62	942	10.7	Common
"peeps"	4	184	151	33	251	109	51	91	82	932	10.6	66.37
Blue-winged Teal	5	87	310	62	0	3	0	122	162	746	8.5	27.16
Brown Pelican	6	76	240	162	3	6	1	1	179	668	7.6	Common
Great Egret	7	38	117	90	33	40	5	19	126	468	5.3	3.74
Lesser Yellowlegs	8	26	111	87	61	98	0	11	43	437	5	14.25
Stilt Sandpiper	9	25	58	75	80	72	0	19	92	421	4.8	25.25
Snowy Egret	10	56	125	73	5	31	0	1	90	381	4.3	4.71
Wilson's Plover	11	82	9	76	57	23	46	56	18	367	4.2	3.87
Ruddy Turnstone	12	10	31	31	39	131	31	17	28	318	3.6	Common
Little Blue Heron	13	29	74	44	31	39	0	25	52	294	3.3	3.39
Greater Yellowlegs	14	11	42	25	55	53	0	6	22	213	2.4	1.48
Spotted Sandpiper	15	22	32	30	28	59	16	6	3	196	2.2	Common
Black-bellied Plover	15	30	47	23	25	35	7	8	21	196	2.2	3.06
Spotted Sandpiper	15	22	33	30	28	59	15	6	3	196	2.2	Common
Short-billed Dowitcher	18	20	20	15	9	24	0	0	16	104	1.2	5.25
Barn Swallow	19	2	35	29	3	1	0	9	4	83	0.9	NA
Yellow-crowned Night Heron	20	12	6	9	5	5	0	2	10	49	0.5	0.02
Semi-palmated Plover	21	1	3	2	23	0	3	12	2	46	0.5	3.87
Black-crowned Night Heron	-	-	-	-	-	-	-	-	-	24		2.91
Total Number of Birds (n=12 censuses/yr)		1,236	2,062	1,271	961	1,326	482	766*	1,165			
Mean water depth (cm) (n=12 measurements/yr)		40	45	12	16	18	1	40*	43			
# mo. > 1 cm		10	12	10	10	12	3	8	5			
# mo. >10 cm		9	11	5	7	7	0	6	4			
# mo. >20 cm		6	9	2	4	4	0	6	4			

Water bird Abundance as affected by Season and Pond Water Level

Bird abundance at Southgate has a seasonal component and is also dependent on the presence of water in the pond; during prolonged dry periods bird abundance plummets to almost zero. Figure 1 shows overall census counts and pond level for each of the months between February 1989 and June 1996. When pond levels were close to zero (e.g. 1991, 1994 and 1995) bird counts were very low, except in summer 1994 and summer 1995 when the high census counts were due primarily to Least Terns flocking above the dried pond bed.

Figure 1. No. of birds vs. pond depth (data from Knowles, 1996)

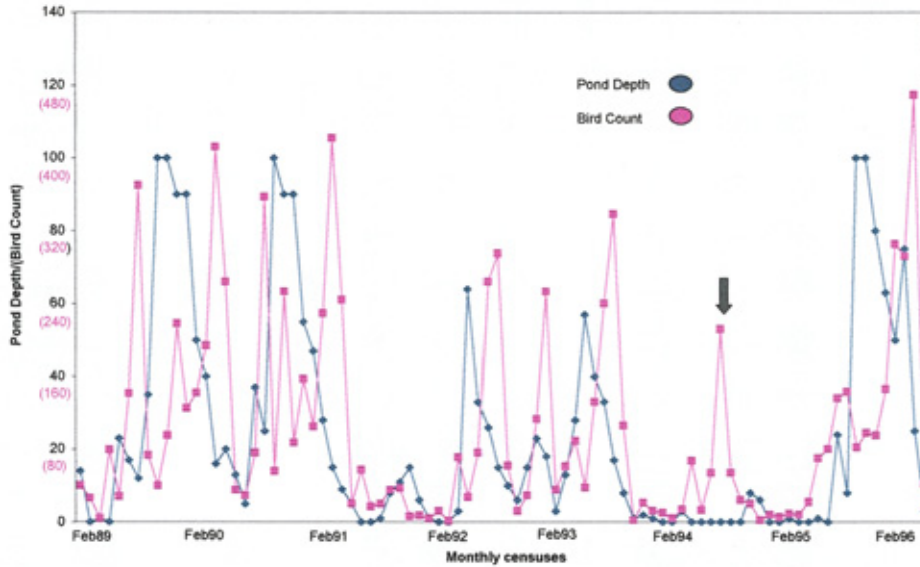


Figure 2. Monthly use of Southgate Pond by groups of waders (data from Knowles, 1996)

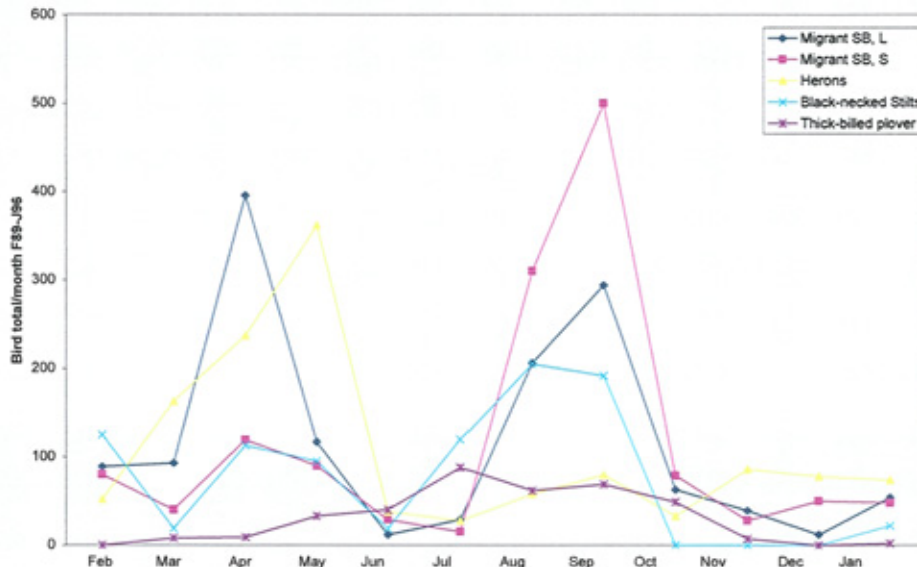


Figure 2 shows utilization of the Southgate Pond by groups of waders; it illustrates that pond use also has a seasonal component. Herons have a peak in spring (nesting season), while migrant shorebirds have peaks in spring and fall. The Thick-billed plover is the only species among this group to be common in mid-summer while the Black-necked Stilts are more abundant in late summer- early fall than at other times of the year. Mid-summer and winter have the lowest abundance of waders (but other species are most abundant then, as we shall see below).

We will now consider abundance of important species and groups of species, and relate this to both season and the level of water in the pond (Figs. 3A-J). In each entry of Figure 3 we have provided monthly abundance and, in some entries, range of water depth is indicated by color.

The White-cheeked Pintail (Fig. 3A; Fig. 4) is the single most important species utilizing Southgate Pond:

- a. It is the most abundantly censused species;
- b. It is the only native duck breeding in the Virgin Islands;
- c. It does not occur in the U.S. and is thus a species sought by visiting birdwatchers; and as important as all of the above
- d. It is a lovely and graceful wild animal.

In Figure 3A, months when water depths were greater than 15 cm are colored blue; all months when depths were less than 9 cm are red; months with intervening depths, between 9 and 15 cm are orange. With the single exception of April 1991, there is an extremely high correspondence between months with lots of pintails and water depths of greater than 15 cm (6 inches). Conversely, there were almost no pintails present when water depths were less than 9 cm (3.5 inches). At intermediate depths, only one month, April 1991, had a large number of pintails. A chi-square test to determine if the presence and absence of ducks in dry (< 8 cm), intermediate ($8 \text{ cm} < X < 15 \text{ cm}$), and wet (> 15 cm) conditions is different from random, results in a $D^2 = 68$. The probability $\{\text{chi-square} > 10.6; 2 \text{ degrees of freedom}\} = 0.005$, which demonstrates a highly significant correlation between water depth of greater than 15 cm and the presence of the White-cheeked Pintails. Thus, we conclude that regardless of season, when greater than 15 cm of water was present in the pond, many pintails were present; when pond level was less than 15 cm pintails hardly used it at all.

An important alternative habitat for these resident ducks is found upstream of Southgate Pond, in the farm ponds along the guts draining the Southgate watershed (Gaines, 2004). White-cheeked Pintail are frequently found in these farm ponds, such as when Southgate Pond is dry, and use them (and other freshwater ponds) for nesting (McNair, personal communication; W. and E. Gladfelter, personal observations).

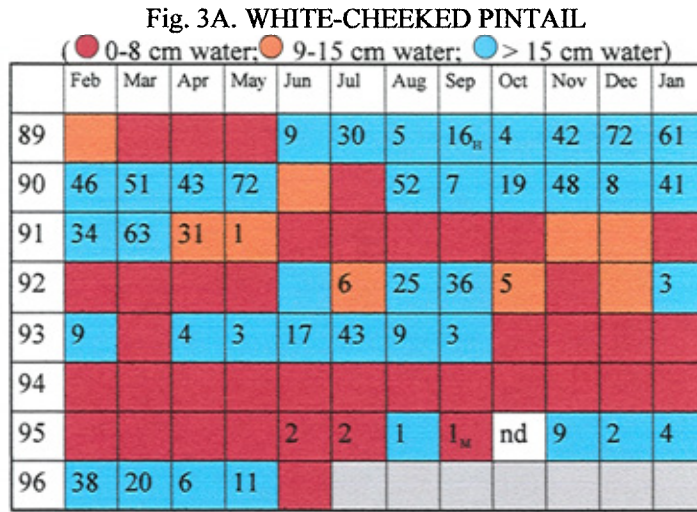


Figure 3A. Monthly abundance of White-cheeked Pintail and monthly water depth between Jan 1989 and Jun 1996 (data from Knowles, 1996).



Figure 4. White-cheeked Pintail mother and brood in Southgate Pond (photo by C. Cramer-Burke, Jan 2004).

Six species of migrant ducks were censused at Southgate Pond by Knowles (1996): American Widgeon, Blue-winged Teal, Green-winged Teal, Lesser Scaup, Northern Pintail, Northern Shoveller (treated collectively in Fig. 3B).

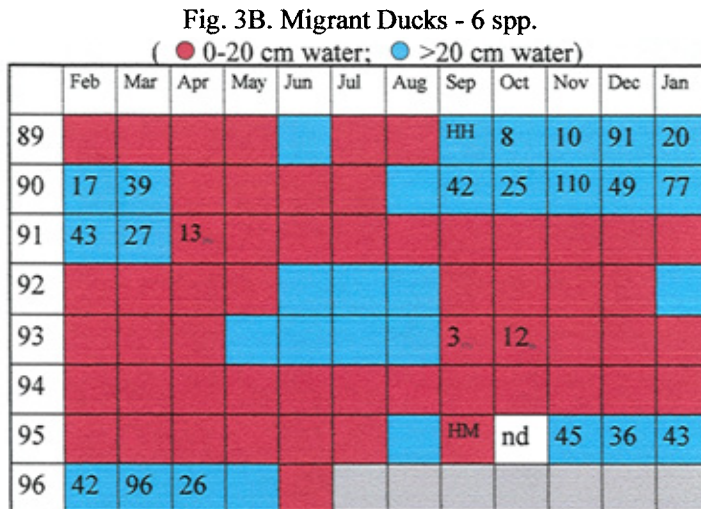


Figure 3B. Monthly abundance of migrant ducks and of water depth from Feb 1980 to Jun 1996 (data from Knowles, 1996)

A chi-square test to determine if the presence and absence of migrant ducks, in dry (<20 cm) and wet (>20 cm) conditions (excluding May through August when these migrant species breed in North America), is different from random, results in a $D^2 = 38$. The probability {chi-square > 7.88; 1 degree of freedom} = 0.005, which demonstrates that there is a highly significant correlation between water depth (>20 cm) and the presence of migrant ducks. In fact, we see a pattern similar to that of the White-cheeked Pintail with two differences:

- The critical pond depth for heavy use was 20 cm rather than 15 cm;
- There was a seasonal component superimposed on that of water depth: migrant ducks are present on the island only from September until April (and are referred to as “winter residents” in Table I).

The other numerically important “swimmer” using the pond (Fig. 3C) was the Brown Pelican, which breeds on nearby Green Cay and on Buck Island. Both breeding populations are known to feed (when food is available) in Southgate Pond (Sladen, 1988).

Fig. 3C. BROWN PELICANS
 (● 0-8 cm water; ● >8 cm water)

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
89	10							HH		2	5	13
90	46	48	44	63	9	3		3			3	21
91	17	21	46	71	4						2	
92		2					1	1	1			
93	1	1				1		2				
94							1					
95								1 _{BM}	nd			
96	2	60	50	65	2							

Figure 3C. Presence of Brown Pelicans related to season and water presence in Southgate Pond (data from Knowles, 1996).

There was heavy seasonal use of the pond by pelicans in the months of January through May in the three years that those months had water depths greater than 8 cm for the whole period, probably reflecting use by the pelicans from both offshore nesting colonies. At other times pelican use was very slight. A chi-square test to determine if the presence and absence of pelicans in dry (< 8 cm) and wet (> 8 cm) conditions is different from random, results in a $D^2 = 13.9$. The probability {chi-square > 7.88; 1 degree of freedom} = 0.005, which demonstrates a highly significant correlation between water depth (> 8 cm) and the presence of the Brown Pelicans. Figure 5 and the cover photo, taken in May 1985 (W.B. Gladfelter), show pelicans swimming and feeding in the pond, presumably on *Tilapia spp.* washed into Southgate Pond from the farm ponds upstream during periods of heavy rain (Sladen, 1992; Schuster, personal communication).



Figure 5. Brown Pelicans and egrets feeding at Southgate Pond in May 1985 (photo by W. Gladfelter).

We have subdivided the wading birds that use Southgate Pond into five groups (Fig. 2):

1. Black-necked Stilts
2. Herons (egrets are simply herons with white feathers)
3. Large shorebirds
4. Small shorebirds
5. Wilson's Plover

It should be remembered that waders utilize water depths that more or less correspond to the length of their exposed shank and foot (remember also that the “backward knee” of birds is really the ankle).

Black-necked Stilts (Fig. 3D; Figs. 2 and 6) are present on St. Croix year round. They were numerous at the pond when maximum water depth was greater than 8 cm but less than 47 cm.

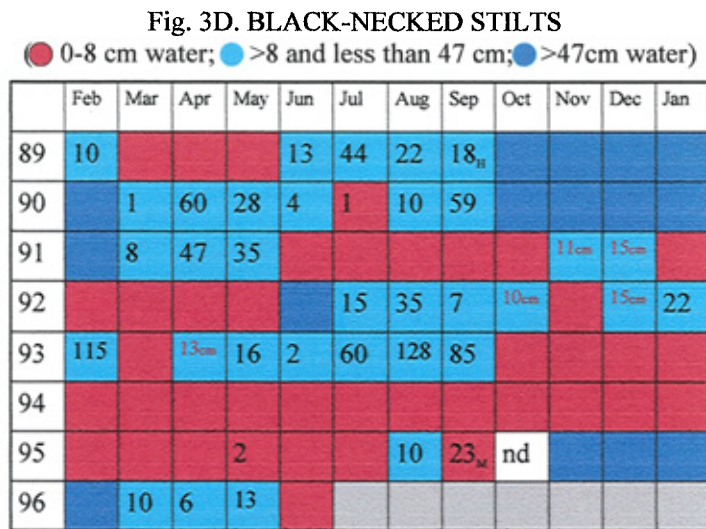


Figure 3D. Use of Southgate Pond by Black-necked Stilts as related to season and water depth (data from Knowles, 1996).

A chi-square test to determine if the presence and absence of stilts in conditions where water levels are > 8 cm but < 47 cm is different from random, results in a $D^2 = 57.1$. The probability {chi-square > 7.88; 1 degrees of freedom} = 0.005, which demonstrates a highly significant correlation between water depth greater than 8 cm but less than 47 cm and the presence of the Black-necked Stilts. However, we note that despite adequate water depths, Black-necked Stilts were totally absent in the fall (October – December) presumably spending that period at some other location on the island of St. Croix.

Figure 6. Black-necked Stilts on a Caribbean salt pond in Anegada, BVI (photo by W. B. Gladfelter.)



Nine species of herons are assessed as a group in Figure 3E and Figure 2. Clearly, there are numerous herons present throughout the year, whenever maximum pond depth exceeds 8 cm (Fig 3E), and though they may occur when pond depths are less, they are not abundant. The most commonly occurring egrets (see Table II) are the Great Egret (Figure 5, 9 and 11) and Snowy Egrets (Figures 5, 10 and 11).

Fig. 3E. Herons – 9 spp.
(● 0-8 cm water; ● >8 cm water)

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
89	●	1	●	●	●	2	23	HH	17	39	41	24
90	16	35	120	102	5	2	2	4	4	23	18	16
91	7	76	54	81	4	●	●	●	1	2	●	1
92	●	9	●	4	13	14	8	16	6	5	2	9
93	4	4	3	10	9	10	25	55	5	●	1	●
94	1	●	2	●	●	●	●	1	●	1	●	2
95	1	●	●	●	1	●	●	4 _{nd}	nd	16	16	22
96	23	38	58	165	6	●	●	●	●	●	●	●

Figure 3E. Presence of herons in Southgate Pond as related to water level and season (data from Knowles, 1996).

A chi-square test to determine if the presence and absence of herons in conditions where water conditions are dry (< 8 cm) or wet (>8 cm) is different from random, results in a $D^2 = 18.8$. The probability {chi-square > 7.88; 1 degrees of freedom} = 0.005, which demonstrates a highly significant correlation between water depth greater than 8 cm and the presence of herons. All but one of the heron species are known to breed on St. Croix (in fact, at Southgate itself; Figs. 7 and 8). It is also suspected that the local breeding populations of at least some heron species (Great Blue Heron, Great Egret, etc.) are

augmented by migrant individuals in the winter (late fall to early spring). The rare Reddish Egret (the only heron species that doesn't breed in St. Croix) is strictly an accidental and turns up about one to a few times in a decade.



Figure 7 (left). Green Heron chicks in nest at Southgate Pond, Jan 2004 (photo by C. Cramer-Burke)

Figure 8 (right). Green Heron chicks in nest (above) a few days later (photo by C. Cramer-Burke.)



Figure 9. Great Egrets feeding at Southgate Pond, July 1985 (photo by W.B. Gladfelter).



Figure 10. Snowy Egrets feeding in Southgate Pond, May 1985 (photo by W.B. Gladfelter.)



Figure 11. Egrets and Pelicans feeding in Southgate Pond, May 1985 (photo by W.B. Gladfelter.)

Migrant shorebirds, both large (e.g., Whimbrel, Stilt Sandpiper, Black-bellied Plover, Dowitcher, Greater Yellowlegs, Lesser Yellowlegs; Fig. 3F) and small (e.g., Spotted Sandpiper, Least Sandpiper, Semi-palmated Sandpiper, Western Sandpiper, White-rumped Sandpiper, Semi-palmated Plover, Ruddy Turnstone; Fig. 3G, Figure 13),

occur year round at Southgate Pond, but these birds are largely absent from the island during the summer (especially June and July; Fig 2) when these species are breeding in northern North America and numbers are reduced in the winter (as many of the species migrate beyond St. Croix to winter in South America). As seen in Figure 2 (dark blue line and pink line) shorebird abundance is highly seasonal due to their migration patterns.

Fig 3F. Migrant Shorebirds, Large (6 spp.)
(● 0-8 cm water; ● >8 cm water)

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
89		17		3	2	20	59	18 _w	4			2
90		10	109	21	5	5	1	89		29	3	
91	1	28	169	19			6		1	3		
92	2		1	3	1	4	91	68	23	1	4	50
93	80	1	27	9			39	92	34		5	
94					2			2	1	4		
95		3					10	25 _w	nd	2		2
96	6	34	90	62	2							

Figure 3F. Presence of six species of large migrant shorebirds at Southgate Pond as related to season and pond water level (data from Knowles, 1996).

Fig. 3G. Migrant Shorebirds, Small (7 spp.)
(● 0-8 cm water; ● >8 cm water)

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
89	20		3		8	8	156	17 _w	2	1	4	2
90	1	1	8	2	2		5	147	6	7	5	
91	2	3	59	1			1	9	5	3	3	1
92	2			8		1	72	152	13	5	21	27
93	42	29	24	31			23	85	36	1	14	11
94	8	3	6	14	1		8	39	17	10	2	6
95	4	3	4	4	6	6	45	51 _w	nd	1	1	1
96	1	1	15	30	12							

Figure 3G. Presence of seven species of small migrant shorebirds at Southgate Pond as related to season and pond water level (data from Knowles, 1996)

Peak abundance of migrant shorebirds at Southgate Pond, as well as elsewhere on St. Croix, is in April and August/ September. A chi-square test to determine if the presence and absence of large and small shorebirds in conditions where water conditions are dry (< 8 cm) or wet (> 8 cm) is different from random, results in a $D^2 = 11.66$ for large shorebirds, but a $D^2 = 2.9$ for small shorebirds. The probability {chi-square > 3,84; 1 degree of freedom} = 0.05, which demonstrates a significant correlation between water

depth greater than 8 cm and the presence of the large shorebirds, but a less strong correlation ($0.1 > P > 0.05$) with wet conditions and the presence of small shorebirds.



Figure 12. Whimbrels, an example of a large shorebird, wade among the mangroves of Great Pond, St. Croix (photo by W.B. Gladfelter).

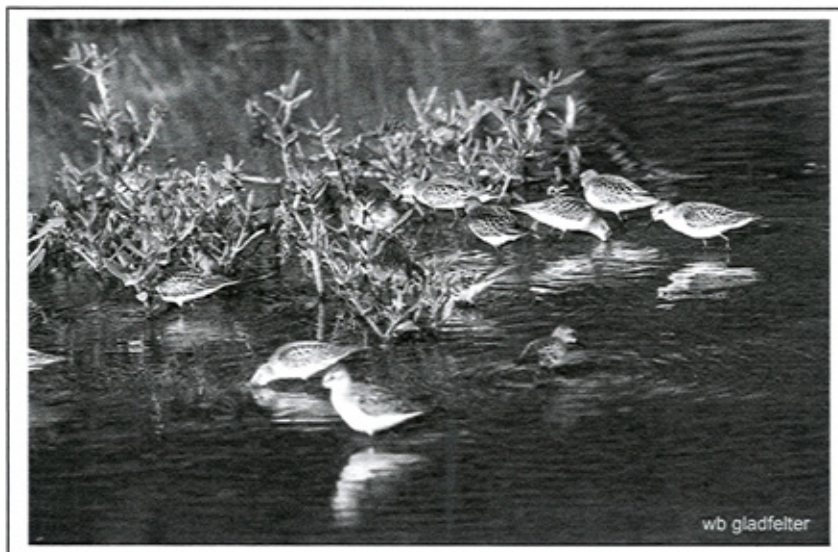


Figure 13. "Peeps", an example of small migrant shorebirds, feed by succulent plants at the pond's edge (photo by W.B. Gladfelter).

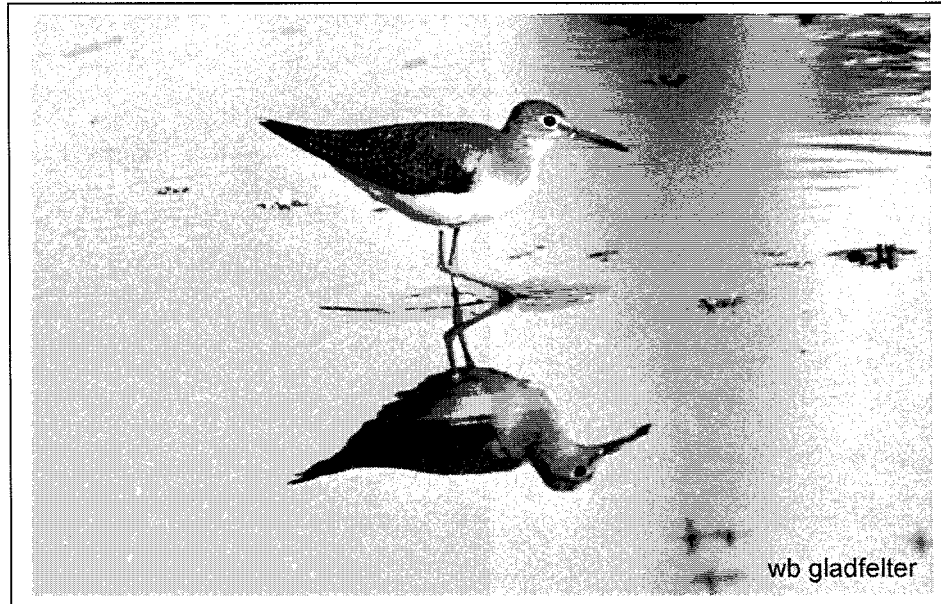


Figure 14. A Solitary Sandpiper, an uncommon visitor to Southgate Pond, preferring freshwater habitats (photo by W.B. Gladfelter).

The remaining important wader utilizing the pond is Wilson's Plover, a resident species on St. Croix. Its occurrence at Southgate is somewhat seasonal (Fig. 3H; Fig. 2), being found mainly from May through October, despite its year-round presence on the island. A chi-square test to determine if the presence and absence of Wilson's Plover in conditions where water conditions are dry (< 8 cm) or wet (> 8 cm) is different from random, results in a $D^2 = 4.0$. The probability {chi-square > 3.84; 1 degree of freedom} = 0.05, revealing a significant correlation between dry conditions (< 8 cm) and the

Fig. 3H. WILSON'S PLOVER
 (● 0-8 cm water; ● >8 cm water)

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
89		8		6	2	42	22	HH				
90					1	2		6				
91					6	24	8	8	24	4		2
92				8		6	10	17	16			
93			2	8				8	5			
94			5	6	6	6	6	10	4	3		
95			2	2	10	6	16	20	nd			
96				3	15							

Figure 3H. Presence of Wilson's Plover at Southgate Pond as related to season and pond water level (data from Knowles, 1996).

presence of Wilson's Plovers. In fact, this bird seems to feed heavily upon fiddler crabs, which are present around moist areas at pond margins even when the pond is dry. These birds also presently nest at Southgate (McNair, personal communication), and, in fact, this site might be one of their important nesting sites on St. Croix.

Least Terns (Fig. 3I) are present on St. Croix only during the summer (“summer residents” in Table I; late spring to late summer), at which time they nest on sandy beaches and similar habitats. A chi-square test to determine if the presence and absence of Least Terns in conditions where water conditions are dry (< 8 cm) or wet (> 8 cm) in the months that they are present (April through September) is different from random, results in a $D^2 = 0.496$. The probability {chi-square > 3.84; 1 degrees of freedom} = 0.05, revealing no correlation between water levels and the presence of Least Terns. At Southgate they were observed overhead in flocks in particularly large numbers in May and August, that is, at the beginning and the end of their nesting season. According to Lombard (personal communication), Southgate Pond was the most important nesting site for this species on St. Croix in 2003, when the pond was in a dry condition. She reported approximately 350 active nests, most of which were lost to predation by feral dogs.

Fig. 3I LEAST TERN

(● 0-8 cm water; ● >8 cm water)

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
89	●	●	●	68	2	●	83	1 _{obs}	●	●	●	●
90	●	●	17	26	4	16	6	●	●	●	●	●
91	●	●	17	16	6	33	2	●	●	●	●	●
92	●	●	●	48	4	6	5	22	●	●	●	●
93	●	●	●	12	5	13	11	2	●	●	●	●
94	●	●	●	46	4	48	197	●	●	●	●	●
95	●	●	●	10	49	65	50	2 _{obs}	nd	●	●	●
96	●	●	●	42	4	●	●	●	●	●	●	●

Figure 3I. Presence of Least Terns at Southgate Pond as related to season and water level (data from Knowles, 1996)

Comparisons to Nearby Coastal Ponds

Figure 1 presents the monthly overall water bird abundance and water depths at Southgate Pond from February 1989 to June 1996 (Knowles, 1996). The patterns of maximum water depths occurred as follows:

- 1989 Fall/winter
- 1990 Fall/winter
- 1991 None
- 1992 May
- 1993 June

1994 None
 1995 Fall/winter
 1996 (no census after June)

Maximum bird censuses did not coincide with any of the periods of maximum pond water depth. They seemed to have a higher seasonal component occurring either late summer (Aug/Sep) or spring (Apr/May) when pond depths were about 20 cm. An exception is August 1994 when the peak was due to hovering Least Terns at the end of their nesting season and the pond was dry.

We compared the overall water bird pattern at Southgate Pond with that of two other important and nearby ponds, Coakley Pond (the closest landlocked pond, 2 km east on the north shore) and Great Pond (4 km south; a larger pond with a permanent opening to the sea). In Figure 15, the monthly pond depths of Southgate and Coakley Ponds are compared.

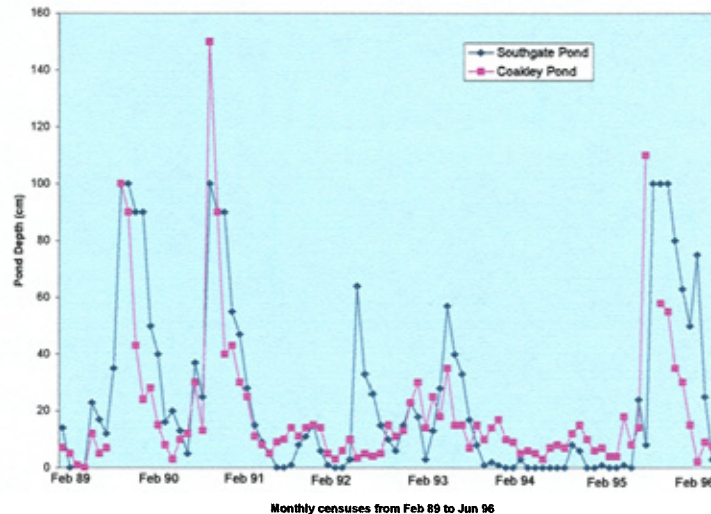


Figure 15. Pond depths (cm) of Southgate and Coakley Ponds from Feb 89 to Jun 96 (data from Knowles, 1996).

The patterns are generally very similar with the following exceptions:

- In late 1990 when Southgate Pond was at its maximum depth of 100 cm, Coakley reached a depth of over 1.5 m;
- A late spring peak occurred at Southgate in 1992 and 1993, but there was none at Coakley in 1992 and only a minor one in 1993;
- Water depths generally lingered some months longer after filling at Southgate than at Coakley;
- While Southgate became completely dry for a few months in each of 1989, 1991 and 1992, and for a prolonged period in 1994 and 1995, Coakley Pond never totally dried up.

Figure 16 shows a comparison between the monthly censuses (Knowles, 1996) at Southgate and Coakley Ponds. Peak abundances were nearly always greater at Southgate except during a prolonged period from early 1991 to early 1992, and a period of a few months in early 1994 when Southgate Pond was dry and the depths at Coakley were greater than 10 cm.

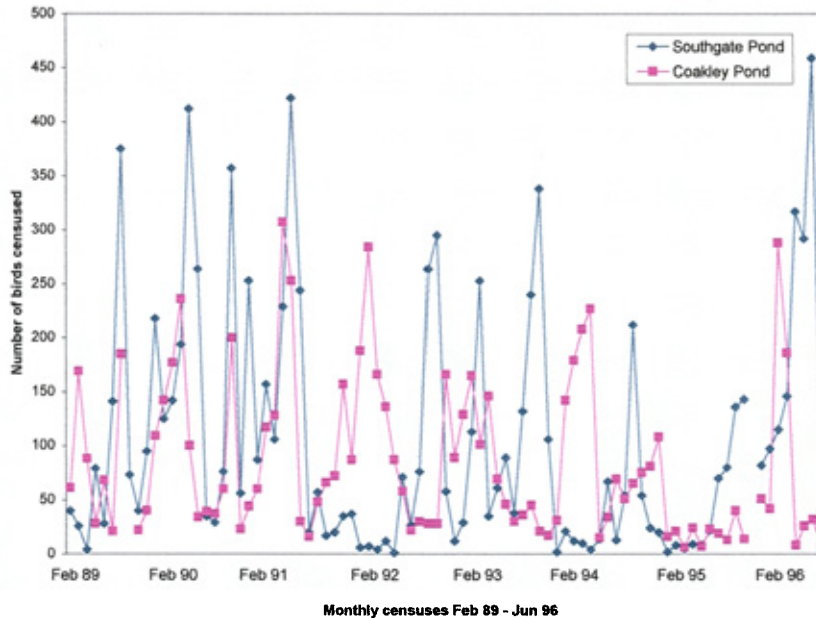


Figure 16. Total number of birds censused at Southgate and Coakley Ponds in the months from Feb 89 through Jun 96 (data from Knowles, 1996)

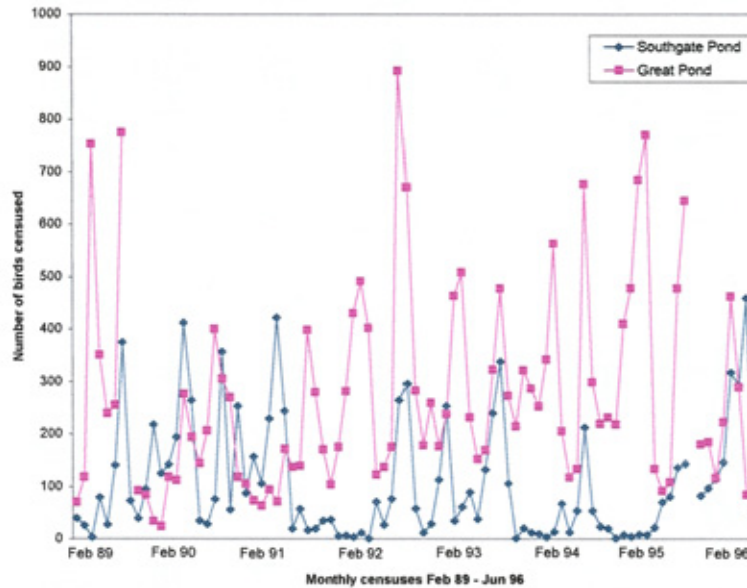
In addition to the greater number of individual water birds at Southgate compared to Coakley, more species were regularly counted at Southgate, especially ducks. What accounts for these differences between the nearby ponds, even though Coakley Pond did not dry up during the entire period of Knowles's censuses? The environmental differences between Southgate and Coakley Ponds that might explain the great number (and greater variety) of birds utilizing the former include:

- a. Southgate pond is larger;
- b. Southgate Pond has an extensive border of grass and succulent vegetation, especially on the southern side; Coakley Pond is totally surrounded by a forest fringe (primarily mangroves);
- c. Southgate has a series of mangrove "islets" at the eastern edge of the pond that provide shelter and complexity of habitat. This end is, in fact, where the ducks mostly occurred in Fred Sladen's visits. Sladen, in fact, considered Southgate Pond to be the most important pond on St. Croix for duck diversity (see his Table 2; Sladen, 1992).

In Figure 17 the comparison between Southgate Pond and Great Pond monthly censuses is shown (Knowles, 1996). In contrast to Southgate and Coakley Ponds, Great

Pond has a mostly permanent opening to the sea. Water level in the pond fluctuates during tidal cycles, but much of the pond, most years, has plenty of water.

Figure 17. Total numbers of birds censused in Southgate Pond and Great Pond in the months from Feb 89 through Jun 96 (data from Knowles, 1996).



With a few exceptions, census totals were always much greater at Great Pond than at Southgate in the early 1990s. Census totals rarely dropped much below 100 individuals at Great Pond, while the values at Southgate hovered close to zero during prolonged dry periods. In fact, a number of census peaks at Great Pond coincide with these periods of negligible bird activity at Southgate and it is likely that a number of individuals that might have normally utilized Southgate in wetter years had shifted to Great Pond. This suggests the great importance of a consideration of Southgate Pond as a part of a network of wetlands within St. Croix, each of which plays an important role depending on yearly fluctuating (but in an unpredictable manner) climatic conditions.

A Comparison of Bird Abundances in the 1980s vs. the 1990s

Fred Sladen had also compared censuses at the latter two sites (e.g., Southgate and Great Pond) a decade previously (Sladen, 1992). He found a considerably greater number of species of water birds at Southgate Pond as compared to Great Pond and generally similar or higher counts of many species of water birds at Southgate (despite the fact that it is a smaller pond). A notable exception was the Semi-palmated Sandpiper which was far more prevalent at Great Pond. Eight of the abundant water bird species censused at Southgate (Table II) by Knowles (1996) in the 1990s were considerably more abundant in the 1980 censuses by Sladen (1992). These include:

- “peeps” : (small, *Eriola* sandpipers are sometimes lumped as “peeps” because of the difficulty in identification when censusing large numbers. Sladen’s counts were 6.5 times greater than Knowles’s (55 individuals/census greater; 66.4 vs. 10.6);
- Blue-winged teal: Sladen’s counts were more than 3 times as great as Knowles’s (nearly 20 birds/census greater; 27.2 vs. 8.5);
- Lesser yellowlegs: Sladen’s counts were nearly 3 times as great as Knowles’s (10 birds/census more; 14.3 vs. 5); and
- Stilt sandpipers: Sladen’s counts were 5 times greater than Knowles’s (20 birds/census; 25.3 vs. 4.8).

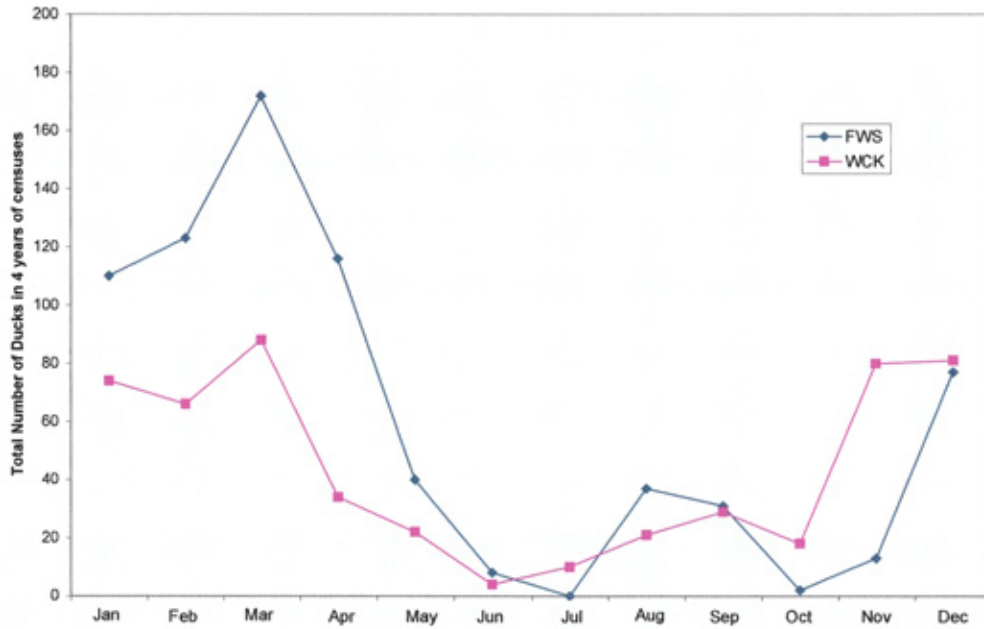
The other four species which were greater in Sladen’s censuses than in Knowles’s are the White-cheeked Pintail, Dowitcher, Semi-palmated plover and the Black-crowned Night Heron.

The reason for the higher counts in Sladen’s versus Knowles’s census data is uncertain. It may reflect higher abundance in the early 1980s as opposed to a decade later (and weather patterns may play a role, as half of the years during the Knowles’s censuses can be characterized as dry or very dry), or it may partially be an artifact of the biologists’ techniques. The greatest number of individuals censused by Knowles was in 1990. If the average number/census for that year is calculated, two species still fall woefully short in Knowles’s counts: “peeps” and Stilt Sandpipers. However, Knowles’s censuses were taken on a regular monthly basis, while Sladen made more frequent censuses during the periods when migrating shorebirds and ducks were more likely to be found, and fewer (or no) censuses in the period of the year when the fewest birds were likely to be found. Both approaches have yielded valuable information for our analyses. We will discuss more about the comparison between the two census periods below.

For three main groups of birds using Southgate Pond: ducks, herons and shorebirds, we will compare some of the highlights of Knowles's data set (1996) with data taken a decade earlier by Sladen (1992). Sladen’s censuses covered four years, while Knowles censused for 7.5 years. However, all of the four earlier years of censuses (the early 1980s) were relatively “wet” years and only four of the 7.5 years of Knowles’s censuses (the 1990s) were relatively “wet” years. Thus we have compared just the two sets of four “wet” year censuses to evaluate possible trends in the avifauna.

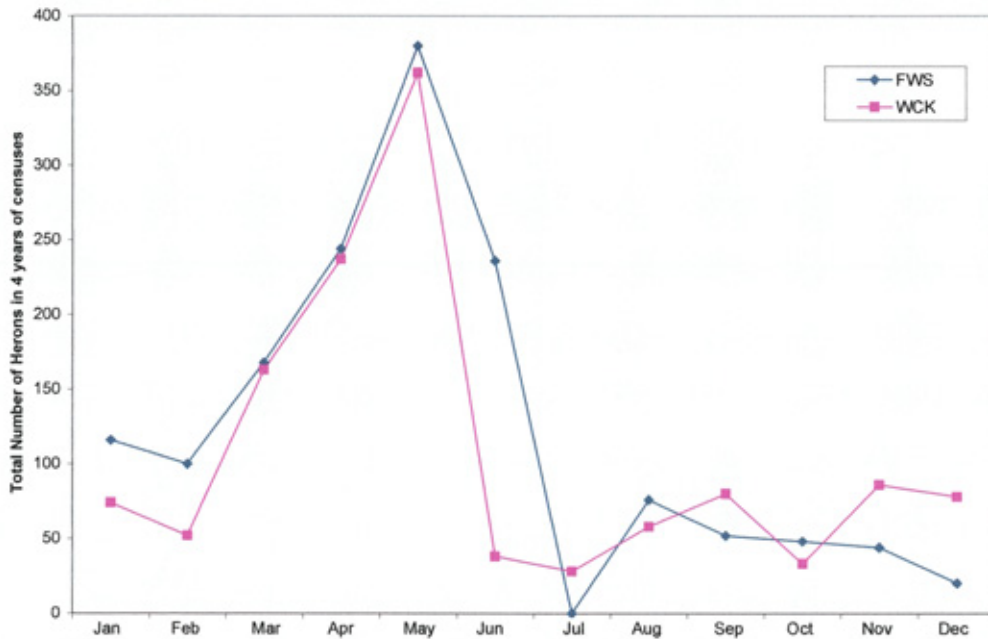
The census data for ducks (Fig. 18) includes both the White-cheeked Pintail and migrant species. Sladen’s much greater numbers in early spring (Jan-Apr) are primarily due to larger numbers of Blue-winged Teals at that time (Sladen, 1992). Otherwise the data were comparable in the two decades.

Figure 18. Monthly occurrence of ducks at Southgate Pond (4 years of census data). See text for discussion.



The patterns for all heron species (Fig. 19) are remarkably similar.

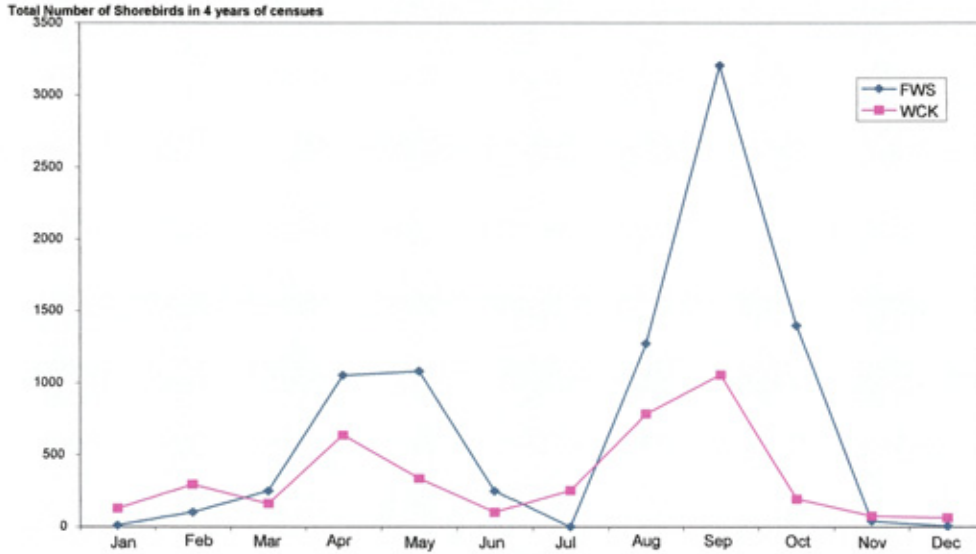
Figure 19. Monthly occurrence of herons at Southgate Pond (4 years of census data). See text for discussion.



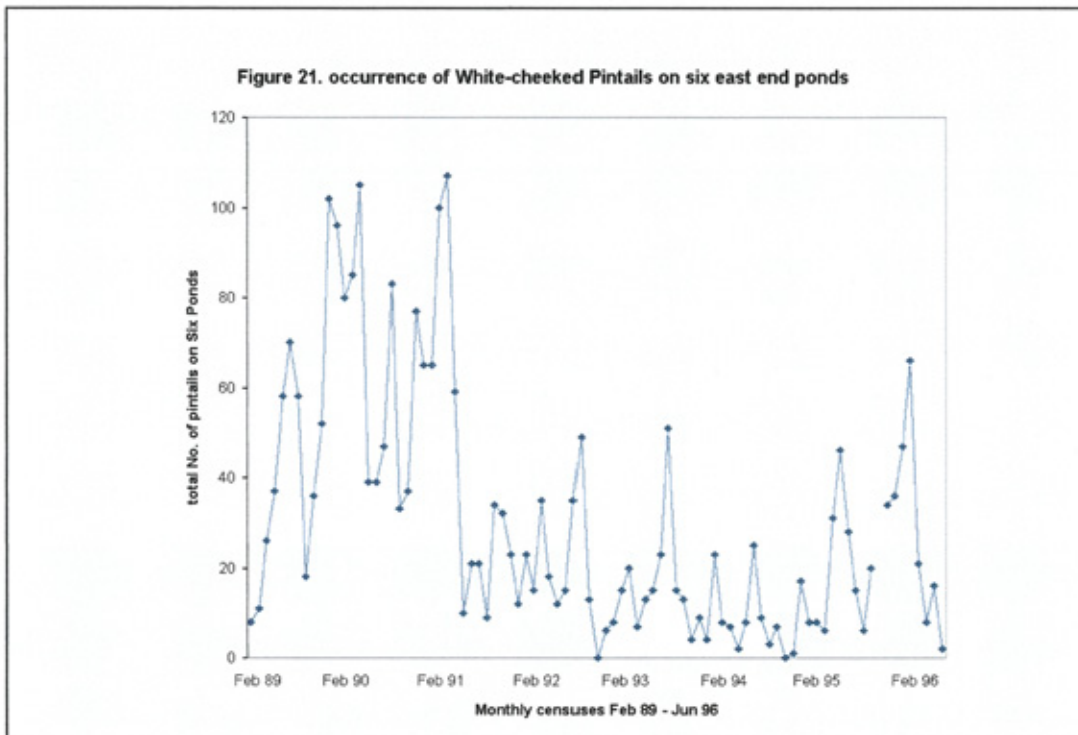
Though the patterns of reported abundance of shorebirds over the annual cycle were similar (Fig. 20), the spring and especially the fall maxima were much greater in the

early 1980s than the following decade. Though there may be several factors responsible for this difference, we feel that one of them may be due to the global decline in some migrant bird populations during the past several decades.

Figure 20. Monthly occurrence of Shorebirds at Southgate Pond (4 years of census data) See text for details.



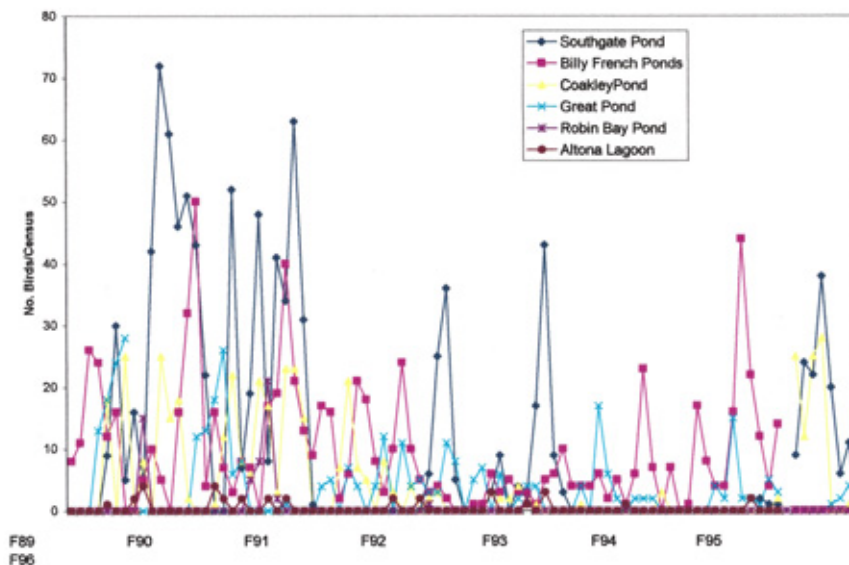
Finally, we consider the two most common duck species on St. Croix, the resident



White-cheeked Pintail and the migratory, winter resident, Blue-winged Teal. The average number of White-cheeked Pintail in the censuses made in 1980s (Sladen, 1992) was 19.4 while in the 1990s (Knowles, 1996) was 12.3. As Knowles's data included four "dry years" these numbers may be considered comparable. The abundance of the White-cheeked Pintail from February 1989 to June 1996 (Knowles, 1996) on six East End St. Croix coastal ponds, is presented collectively in Figure 21 and separately in Figure 22.

The two most important coastal ponds for this species (see Fig. 22) during the 7.5 years of Knowles's censuses (Knowles, 1996) were Southgate Pond (number 1) and Billy French Ponds (number 2; now protected as the UVI Wetland Reserve); Coakley Pond was third rank in the wet years, but Great Pond was third in the dry years. White-cheeked Pintail breed also in the numerous freshwater ponds on St. Croix (McNair, personal communication; W.B. and E.H. Gladfelter, personal observations). In addition these sites play another critical role in the ecology of this species on St. Croix, especially in years of prolonged drought, as the ducks (which might have used Southgate Pond, if it had water) utilize the farm ponds in the watershed instead (McNair, personal communication; Schuster, personal communication).

Figure 22. Occurrence of White-cheeked Pintail on each of the East End ponds from Feb 1989 through June 1996 (data from Knowles, 1996).



Figures 23 and 24 present the monthly abundance of the Blue-winged Teal, the most abundant migratory duck species, on five east end ponds from February 1989 until June 1996 (Knowles, 1996); the sixth pond in the example above, Robin Bay, had too few sightings (9 in a total of 88 censuses) to consider in this analysis. Figure 23 shows the total number of ducks collectively on the five ponds, while Figure 24 shows the distribution of this duck on the individual ponds.

Figure 23. Cumulative abundance of Blue-winged Teal on five East End ponds (data from Knowles, 1996).

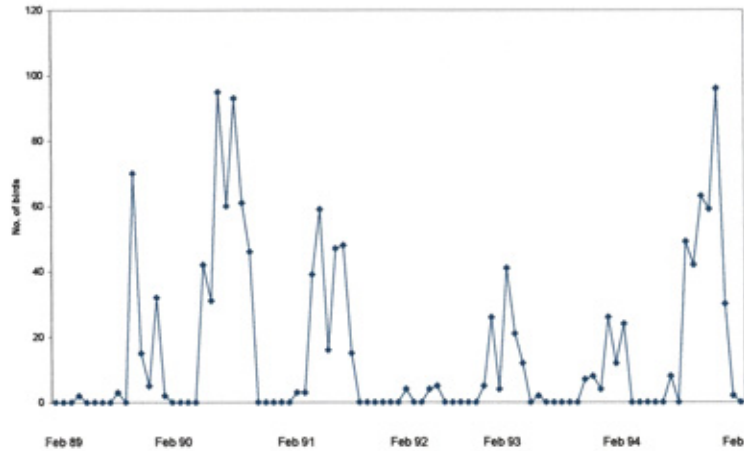
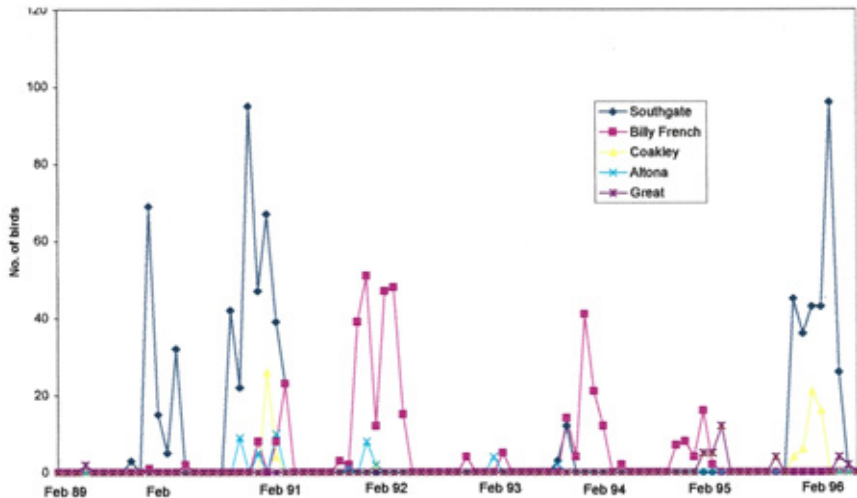


Figure 24. Abundance of Blue-winged Teal on each of five East End ponds (data from Knowles, 1996).



For the Blue-winged Teal, Southgate Pond is again the most important habitat, followed by Billy French Ponds (748 sightings vs. 398). Coakley Pond was ranked number three (80), while Altona (41) and Great Pond (38) had many fewer sightings. It is of some concern, however, that the average number of Blue-winged Teal observed by Sladen per census, 27.16, was almost three times greater than that observed on the average by Knowles, 8.5, suggesting that this species may be declining. This species was

noted as extremely abundant in the 1920s (Seaman, 1973), who recounted "hundreds of ducks" primarily of this species as wintering at Southgate. Whether this decline is due to habitat conditions on St. Croix (for instance, Southgate Pond is now one-third its former size, and it was almost dry during half the time of Knowles's censuses) or factors elsewhere in its yearly cycle is not known to us at present.

The discrepancy in evaluating which pond, Southgate or Great Pond, has a greater number of water birds may possibly be accounted for partially by drier climatic conditions during Knowles's study, but also the fact that noticeable habitat shifts occurred in both ponds, between the early 1980s and the present. In the 1970s and the early 1980s, Great Pond was largely an open body of water with a mangrove fringe along the south (between it and Great Pond Bay). Dense mangroves formed a forest in the southeast, but in other parts of Great Pond there were only a patch of mangroves in the northern portion of the pond and scattered small plants elsewhere. By the 1990s the pond had begun to be filled in by expanding mangrove forest, thus providing increased habitat complexity and shelter. A complex habitat providing good shelter was present at Southgate Pond prior to Hurricane Hugo, but this had been severely damaged by that hurricane (and subsequent ones), which destroyed much of the mangrove zone. The storms also severely impacted woodland tree species on the berm between the pond and the sea (Gladfelter and Gladfelter, 2004) and on nearby Green Cay (Lombard, personal communication). The mangrove fringe on the north of the Southgate Pond and particularly those on the south side by the R/O effluent are showing growth and recovery including numerous seedlings, suggesting that habitat complexity may be increasing at the present time.

It is the diversity of habitats (provided by the spatial complexity of vegetation and the temporal complexity provided by varying water levels throughout the year) that Sladen suggested accounted for the greater species diversity and abundance seen at Southgate as opposed to Great Pond in his study conducted in the early 1980s (Sladen 1992). Both the complexity conferred by the vegetation and that due to changing water levels (because several years were very dry) were compromised in the 1990s at the Southgate site when Knowles (1996) made his observations. This is an extremely important point as it should serve as a guide to habitat restorative work at Southgate Pond and, perhaps in the future, at other salt ponds as well. Further discussion of changes in wildlife habitat, primarily due to man's activities are found in the Southgate Heritage report (Gladfelter and Gaines, 2004) and the report on Southgate Pond (Gaines and Crawford, 2004).

Conclusion

Southgate Pond continues to be a premier birding site on St. Croix, despite great perturbations, both man-made and natural (e.g., hurricanes), that have interfered with much of its functional role as wildlife habitat in the latter half of the twentieth century (Seaman, 1957, 1973; Sladen, 1988; Gladfelter and Gaines, 2004; Gaines and Crawford, 2004). In recent years, more species of birds have been recorded as utilizing Southgate Pond than any other site on St. Croix, with the exception of the much larger Salt River

complex (which only had one additional species in over 100 listed; Sladen, 1988). The abundance of birds utilizing Southgate remains high when there is sufficient water during the yearly cycle. It is very important to note the recovery in Knowles's bird count in 1995-1996 following refilling of the pond after two years of drought (Fig. 1). Southgate Pond continues to be an important duck habitat and is, in fact, the most important habitat among coastal ponds for both the resident White-cheeked Pintail (Figs. 21 and 22) and the migratory winter resident Blue-winged Teal. During a dry spell in 2003, Southgate provided the best nesting area on St. Croix for the Least Tern, an endangered species.

It is the complexity of habitats that the Southgate coastal complex offers in time and space that is so critical in maintaining this high bird diversity and abundance. Complexity in time depends on aquatic periods followed by prolonged periods of drying, when new "habitats" are gradually formed, as mudflats are exposed. Complexity in space is created by the mixture of habitats associated with the pond itself, including pond, mangrove "islets", mangrove fringes, grasslands, mudflats, as well as terrestrial vegetative zones, such as littoral forest, and mangrove forest. The offshore island refuge of Green Cay represents yet another facet of this diversity (Gladfelter and Gladfelter, 2004).

Finally, it must be noted that Southgate Pond, beyond the special role it plays in the avifauna of St. Croix, is not an "island unto itself." For instance, while the Cattle Egret does not feed at Southgate Pond, it often roosts there in high numbers, leaving early each morning to feed on far flung pastures, and returning only at dusk to its perches among mangrove branches. In very dry years, ducks (e.g., Blue-winged Teal) preferring Southgate Pond when it has enough water to support them, will instead be found at Billy French Ponds, which have some water throughout the year. White-cheeked Pintail will move upstream in the watershed during dry periods at Southgate and live and breed in the farm ponds located there (McNair, personal communication). Some St. Croix resident species, such as the Black-necked Stilts and the Wilson's Plover, appear to be absent from Southgate Pond at certain specific periods of the year (despite conditions seemingly favorable for their presence). Lastly, many bird species that nest on Green Cay (and even on Buck Island; e.g., Brown Pelican) will visit Southgate Pond for food (if there is enough water in the pond to support fish).

Southgate Pond is an important component of the network of wetlands, beginning with those within its own watershed, but also extending to include other saltponds, freshwater ponds, and seacoast habitat. These sites provide shelter, feeding and/or nesting habitat to the vast majority of water birds that reside either permanently, or for some part of their lives, on St. Croix. Each site within this network plays a vital role in maintaining the populations of our resident birds species, as well as those species whose future is threatened by habitat destruction (and other factors) in St. Croix as well as elsewhere. Two groups of migratory species that appear to have declined in very recent years on St. Croix are the migratory shorebirds and the Blue-winged Teal. It is important to preserve (and restore) the wetland habitat that remains on St. Croix to ensure survival of these and other wild and special species.

Addendum:

Since this manuscript was finished in spring 2003, some additional bird research has been conducted at Southgate Pond. Below, the junior author of this report (EHG) briefly discusses a few aspects of the recent findings about the bird life at Southgate Pond based on information provided by Carol Cramer-Burke (SEA), Doug McNair (VI Division of Fish and Wildlife) and Claudia Lombard (U.S. F&W).

In November 2003, St. Croix and the Virgin Islands received a heavy rainfall resulting in a dramatic refilling of the Pond, after years of arid conditions. Working with us, Ms. Cramer-Burke of SEA immediately began an intense field effort to document changes in pond level and general observations of the biota of the Pond, capturing salient features in a collection of excellent photographs. The photographs have been organized and archived by Cramer-Burke; field data on pond level are reported in Gaines and Crawford, 2004. Bird observations coordinated by Dr. McNair, especially his continuing observations on nesting, will be reported elsewhere.

Lisa Yntema made several trips to Southgate Pond to census birds (Table III), and graciously shared the information with SEA. The first trip (Oct 28 2003) was made before the big rains, and only a few "water" birds were observed (Great Egret, Green Heron; one each) and a few migrants (e.g. three Pectoral Sandpipers), and eight Wilson's Plover (which can tolerate dry conditions).

The next trip (17 Nov 2003) found the pond full, and in it were herons, shorebirds (e.g. Greater and Lesser Yellowlegs and Snipe) and resident (White-cheeked Pintail) and winter resident (Lesser Scaup) ducks. By December 18, there were Coots and Moorhens, as well as ducks, e.g. White-cheeked Pintails (and a lone Northern Pintail) and assorted shorebirds. Over 40% of the birds observed by Ms. Yntema are listed as "species that are generally of interest to visiting birdwatchers, because of their restricted distribution within the continental U.S." (Table I). As noted earlier, the presence of these species could attract international birdwatchers to the Southgate Reserve

Carol Cramer-Burke and Doug McNair were fortunate to be able to observe the successful breeding of not only White-cheeked Pintails (Fig. 4), but also Green Herons (Figs. 7 and 8), Coots (Fig. 25), and Moorhens.

Table III. Birds observed at Southgate Coastal Reserve in October-December 2003 (data from Yntema, unpublished).

Species	Census Date		
	28-Oct-03	17-Nov-03	18-Dec-03
Pond water level	11 cm	130 cm	108 cm
Magnificent Frigate		1	
Great Blue Heron		2	
Little Blue Heron		1	3
Snowy Egret		2	
Great Egret	1		2
Green Heron	1		
Northern Pintal			1
White-cheeked Pintail		19	21
Lesser Scaup		4	
Osprey	1		1
Merlin	1	1	
Sora			1
Common Moorhen			2
American Coot			1
Caribbean Coot		1	6
American Golden-Plover	2		
Wilson's Plover	8		
Common Snipe		10	7
Greater Yellowlegs		2	1
Lesser Yellowlegs	1	12	1
Spotted Sandpiper	1	1	3
Pectoral Sandpiper	3		
Wilson's Phalarope	1 ^{a/}		
White-crowned Pigeon	5		
Scaly-naped Pigeon	3	1	
Zenaida Dove		15	3
Common Ground-Dove	2	3	
Smooth-billed Ani		7	1
Green-throated Carib		3	
Belted Kingfisher	1	1	2
Gray Kingbird	2	6	1
Barn Swallow	21		6
Northern Mockingbird	2		2
Northern Parula Warbler	3		
Yellow Warbler	3	1	3
Blackpoll Warbler	16		
Northern Waterthrush	1		
Bananaquit	2	2	1
Black-faced Grassquit	3	2	

a/ I.D. from photo

Final thoughts

In winter 2002-2003, dry conditions at Southgate Pond resulted in a depauperate bird fauna for that year (as it had been for the previous several years). It is tempting for people to consider only the short-term and conclude that Southgate Pond as a bird habit was finished. However, the arrival of sufficient rains in November 2003 restored the pond to a highly successful habitat for resident and migrant birds alike. It didn't take a long period for the birds to "rediscover" the good feeding, nesting, and roosting habitat provided by Southgate Pond and its surrounding mangroves. St. Croix is indeed fortunate that the St. Croix Environmental Association is committed to maintaining this productive and important habitat in the Southgate Coastal Reserve for future generations to discover the lessons of nature: not only what observations one may be fortunate enough to make, but also the joy and sometimes inspiration that arrives with them.



Photo 25. A coot chick in its nest at Southgate Pond in January 2004 (photo by C. Cramer-Burke).

Acknowledgements

The core of this report is dependent on systematic data sets spanning almost 15 years assembled by Fred Sladen and Bill Knowles; we are very appreciative of their dedication to field work. Fred also provided us with a number of published and unpublished reports and other materials, giving us his enthusiastic endorsement of our work at Southgate Pond. Doug McNair provided us with Bill Knowles's wetland report

and other relevant materials, as well as more recent observations and other crucial information. Over the years the VI Division of Fish and Wildlife has supported some of the work of these investigators.

Claudia Lombard (US Fish and Wildlife) and Lisa Yntema have provided us with information on recent bird observations at Southgate and at Green Cay. We thank Bobby Schuster for a myriad of information about the Southgate watershed. Finally, we are appreciative of the enthusiastic response of Carol Cramer-Burke of SEA, who admittedly knew little about the birds of Southgate just a year ago, but stepped in late in our project when the rains fell, and provided a reliable and ongoing stream of observations and photographs of the Pond and its bird life.

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