

Abundance and Seasonal Migration of Birds at the Port of Spain Sewage Ponds

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ABSTRACT

The Port of Spain sewage ponds offer an opportunity to study wetland birds in a relatively constant habitat. Twenty-five visits were made between 1985 and 1986, and all species or seen or heard along a standard route were recorded. Of 107 species recorded, 55 were associated with the sewage facility and 34 with the surrounding mangrove. The remaining species utilized both habitats. The species list included 58 residents, 40 non-residents and nine species with both migrant and resident populations. The presence of Black-necked Stilts throughout the year with nesting in June and July was confirmed. Late or early dates are recorded for Least Sandpiper, Spotted Sandpiper, Red Knot, White-rumped Sandpiper, Black Tern, Prothonotary Warbler, American Redstart and Barn Swallow. Local movement is suspected for the Yellow-breasted Crake.

INTRODUCTION

Wastewater treatment ponds are often areas with rich avian diversity as they provide a man-made wetland with a continuous supply of nutrients. As wastewater is generated in areas of high population density, treatment facilities may serve as small sanctuaries with abundant food and no hunting. In Trinidad and Tobago there are three sewage treatment facilities which support high populations of wetland birds: Port of Spain and Trincity sewage ponds in Trinidad and the Bon Accord sewage facility in Tobago.

The composition of the bird communities in Trinidad's wetlands is well documented. Checklists have been published for Caroni swamp (Bacon 1970, ffrench 1977) and Nariva swamp (Worth 1973) and species from all major wetlands considered by Ramcharan and ffrench (1988). A small wetland at Galeota Point was described by (Morgan 1984). There is, however, a lack of baseline data on the abundance of species other than a subjective assessment given by ffrench (1980,1991). An objective assessment was attempted by Ramcharan and ffrench (1988) but the methods and criteria used offer little improvement over ffrench (1980,1991) and they omitted a large number of species which would usually be associated with wetlands. James *et al.* (1984) describe all the wetlands areas of Trinidad but their treatment of the status and distribution of the birds is based on few

observations and for many species is contrary to ffrench (1980,1991). No studies have focused on the seasonal composition of wetland birds. However, ffrench (1980, 1991) compiles sightings from a great range of sources, including his own, to present the seasonality of each species.

This study was conducted to document the abundance and seasonality of birds at the Port of Spain sewage ponds and to compare the observed seasonality of migrant species to that described by ffrench (1980, 1991). The Port of Spain sewage ponds pro-

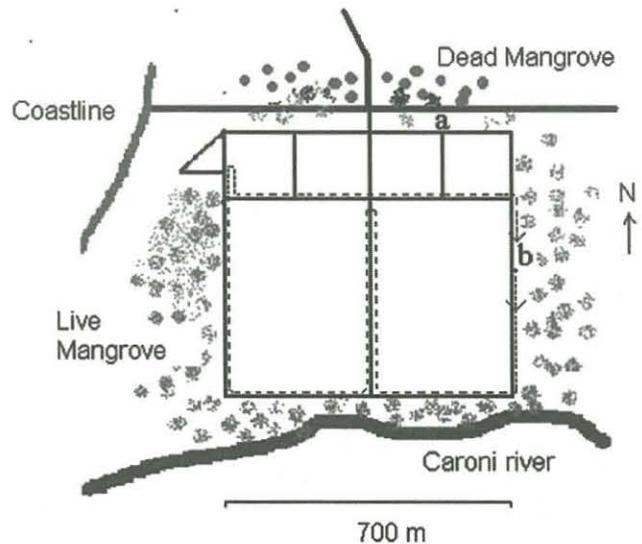


Figure 1. Diagrammatic representation of the Port of Spain Sewage ponds.

vide an excellent site for monitoring migrant waders, being more stable and predictable than the natural habitats that it approximates. There are no tidal effects and seasonal differences are minimal. Visibility and accessibility are relatively constant.

Description of study site

The Port of Spain sewage processing facility comprises 50 ha, divided into four small and two large

ponds, (Figure 1). It was constructed in 1962-1963 and is located just north of the Caroni River mouth and south of Port of Spain (Gerald 1985). The site is surrounded by live mangroves on three sides with dead mangroves to the north. The sea is visible from the northwestern corner. Sewage enters the system into small anaerobic ponds at the north and works its way by gravity to the larger facultative ponds, from which it enters the mangroves and the Caroni River.

Table 1. Resident birds of Trinidad recorded at the Port of Spain Sewage Ponds, October 1985 - October 1986

Species		Frequency of occurrence	Greatest Number	Predominant Habitat
<i>Tachybaptus dominicus</i>	Least Grebe	0.32	8	Pond open water
<i>Bubulcus ibis</i>	Cattle Egret	1.00	>200	Pond and roadside vegetation, pond mudbanks
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	0.04	2	Mangrove edges
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	0.08	4	Mangrove edges
<i>Ixobrychus exilis</i>	Least Bittern	0.04	1	Pond vegetation
<i>Coragyps atratus</i>	Black Vulture	0.88	>30	Dead mangrove
<i>Cathartes aura</i>	Turkey Vulture	0.04	1	Airspace
<i>Buteogallus anthracinus</i>	Common black Hawk	0.32	2	Dead Mangrove
<i>Milvago chimachima</i>	Yellow-headed Caracara	0.24	3	Dead mangrove
<i>Rallus longirostris</i>	Clapper Rail	0.52	7	Mangrove roots
<i>Aramides</i> sp.	Wood-Rail	0.04	1	Mangrove roots
<i>Porzana flaviventer</i>	Yellow-breasted Crane	0.36	10	Pond vegetation
<i>Porphyryla martinica</i>	Purple Gallinule	0.76	18	Pond vegetation and open water
<i>Jacana jacana</i>	Wattled Jacana	0.96	>200	Pond vegetation
<i>Zenaidura macroura</i>	Eared Dove	0.08	>200	All vegetation
<i>Columbina talpacoti</i>	Ruddy Ground-dove	0.96	>20	Roadside vegetation
<i>Leptotila verreauxi</i>	White-tipped Dove	0.64	2	Roadside vegetation
<i>Forpus passerinus</i>	Green-rumped Parrotlet	0.76	10	Mangrove branches
<i>Amazona amazonica</i>	Orange-winged Parrot	0.04	2	Mangrove branches
<i>Coccyzus minor</i>	Mangrove Cuckoo	0.08	1	Mangrove branches
<i>Piaya minuta</i>	Little Cuckoo	0.16	1	Mangrove branches
<i>Crotophaga major</i>	Greater Ani	0.68	5	Mangrove branches
<i>Crotophaga ani</i>	Smooth-billed Ani	0.80		Mangrove, roadside and pond vegetation
<i>Tapera naevia</i>	Striped Cuckoo	0.44	1	Mangrove, roadside and pond vegetation
<i>Chaetura brachyura</i>	Short-tailed Swift	0.08		Pond airspace
<i>Reinarda squamata</i>	Fork-tailed Palm-Swift	0.16		Pond airspace
<i>Anthracoceros viridigula</i>	Green-throated Mango	0.16	1	Mangrove branches
<i>Amazilia tobaci</i>	Copper-rumped Hummingbird	0.44	2	Mangrove, roadside and pond vegetation
<i>Chloroceryle aenea</i>	Pygmy Kingfisher	0.04	1	Mangrove edges
<i>Xiphorhynchus picus</i>	Straight-billed Woodcreeper	0.08	1	Mangrove branches
<i>Synallaxis cinnamomea</i>	Stripe-breasted Spinetail	0.04	1	Pond and roadside vegetation
<i>Certhia cinnamomea</i>	Yellow-throated Spinetail	0.92	6	Pond and roadside vegetation
<i>Sakesphorus canadensis</i>	Black-crested Antshrike	0.36	2	Mangrove branches
<i>Fluvicola pica</i>	Pied Water-tyrant	1.00	5	All vegetation
<i>Arundinicola leucocephala</i>	White-headed Marsh-tyrant	0.88	6	All vegetation
<i>Tyrannus melancholicus</i>	Tropical Kingbird	0.88		Pond and roadside vegetation
<i>Pitangus sulphuratus</i>	Great Kiskadee	0.16		All vegetation
<i>Tolmomyias flaviventris</i>	Yellow-breasted Flycatcher	0.32	1	Mangrove branches
<i>Elaenia flavogaster</i>	Yellow-bellied Elaenia	0.28	2	Mangrove branches
<i>Sublegatus modestus</i>	Scrub Flycatcher	0.20	1	Pond and roadside vegetation
<i>Tachycineta albiventer</i>	White-winged Swallow	0.48	10	Mangrove branches
<i>Progne chalybea</i>	Grey-breasted Martin	0.36		Pond vegetation and airspace
<i>Stelgidopteryx ruficollis</i>	Southern rough-winged Swallow	0.04		Pond airspace
<i>Mimus gilvus</i>	Tropical Mockingbird	0.76		All vegetation
<i>Cyclarhis gujanensis</i>	Rufous-browed Peppershrike	0.52		All vegetation
<i>Molothrus bonariensis</i>	Shiny Cowbird	0.76		Mangrove branches
<i>Quiscalus lugubris</i>	Carib Grackle	0.96	>50	All vegetation and roads
<i>Agelaius icterocephalus</i>	Yellow-hooded Blackbird	0.88	>50	All vegetation and roads
<i>Icterus nigrogularis</i>	Yellow Oriole	0.76	2	Pond and roadside vegetation
<i>Sturnella militaris</i>	Red-breasted Blackbird	0.04	2	Mangrove branches
<i>Geothlypis aequinoctialis</i>	Masked Yellowthroat	0.04	1	Pond and roadside vegetation
<i>Coereba flaveola</i>	Bananaquit	0.12		Mangrove branches
<i>Conirostrum bicolor</i>	Bicoloured Conebill	0.60	6	Mangrove branches
<i>Thraupis episcopus</i>	Blue-grey Tanager	0.48		Mangrove branches
<i>Thraupis palmarum</i>	Palm Tanager	0.08		Mangrove branches
<i>Saltator coerulescens</i>	Greyish Saltator	0.04		Mangrove branches
<i>Paroaria gularis</i>	Red-capped Cardinal	0.04	1	Mangrove branches
<i>Volatinia jacarina</i>	Blue-black Grassquit	0.72	8	Roadside vegetation

Table 4. Non-resident birds of Trinidad recorded at the Port of Spain Sewage Ponds, October 1985 - October 1986

Species		Frequency of occurrence	Greatest number	Predominant habitat
<i>Ardea herodias</i>	Great blue Heron	0.04	1	Mangrove edges
<i>Eudocimus ruber</i>	Scarlet Ibis	0.68	>100	Mangrove roots
<i>Dendrocygna bicolor</i>	Fulvous Whistling-duck	0.52	37	Pond vegetation
<i>Anas discors</i>	Blue-winged Teal	0.16	6	Mangrove edges
<i>Pandion haliaetus</i>	Osprey	0.96	6	Dead Mangrove, Pond airspace
<i>Falco peregrinus</i>	Peregrine Falcon	0.16	1	Dead mangrove, pond airspace
<i>Falco columbarius</i>	Merlin	0.20	1	Dead mangrove, Pond airspace
<i>Porzana carolina</i>	Sora	0.28	2	Pond vegetation
<i>Pluvialis squatarola</i>	Black-bellied Plover	0.16	2	Pond mudbanks
<i>Charadrius semipalmatus</i>	Semipalmated Plover	0.40	10	Pond mudbanks
<i>Arenaria interpres</i>	Ruddy Turnstone	0.16	4	Pond mudbanks and roadways
<i>Tringa solitaria</i>	Solitary Sandpiper	0.40	12	Pond vegetation
<i>Tringa flavipes</i>	Lesser Yellowlegs	0.92	>50	Pond mudbanks
<i>Tringa melanoleuca</i>	Greater Yellowlegs	0.80	4	Pond mudbanks
<i>Actitis macularia</i>	Spotted Sandpiper	0.92	12	Pond mudbanks, Mangrove roots
<i>Catoptrophorus semipalmatus</i>	Willet	0.76	26	Canal edges
<i>Calidris canutus</i>	Red Knot	0.48	70	Pond mudbanks
<i>Calidris minutilla</i>	Least Sandpiper	0.56	>20	Pond mudbanks
<i>Calidris fuscicollis</i>	White-rumped Sandpiper	0.32	5	Pond mudbanks
<i>Calidris melanotos</i>	Pectoral Sandpiper	0.32	15	Pond mudbanks
<i>Calidris pusilla</i>	Semipalmated Sandpiper	0.72	>20	Pond mudbanks
<i>Calidris mauri</i>	Western Sandpiper	0.84	>60	Pond mudbanks
<i>Numenius phaeopus</i>	Whimbrel	0.84	20	Canal edges
<i>Limosa fedoa</i>	Marbled Gotwit	0.04	1	Pond mudbanks
<i>Limnodromus griseus</i>	Short-billed Dowitcher	0.44	100	Pond mudbanks
<i>Gallinago gallinago</i>	Common Snipe	0.12	1	Roadways
<i>Larus fuscus</i>	Lesser black-backed Gull	0.04	1	Pond mudbanks
<i>Larus atricilla</i>	Laughing Gull	0.80	>30	Pond mudbanks
<i>Chlidonias niger</i>	Black Tern	0.60	5	Pond airspace
<i>Phaetusa simplex</i>	Large-billed Tern	0.28	3	Pond airspace
<i>Sterna nilotica</i>	Gull-billed Tern	0.12	2	Pond airspace
<i>Sterna superciliaris</i>	Yellow-billed Tern	0.12	8	Pond airspace
<i>Rynchops niger</i>	Black Skimmer	0.52	3	Pond surface,
<i>Tyrannus savana</i>	Fork-tailed Flycatcher	0.44	10	Pond and roadside vegetation
<i>Riparia riparia</i>	Bank Swallow	0.12	4	Pond airspace
<i>Hirundo rustica</i>	Barn Swallow	0.72	20	Pond airspace and vegetation
<i>Protonotaria citrea</i>	Prothonatory Warbler	0.12	1	Mangrove trees
<i>Dendroica petechia</i>	Yellow Warbler	0.44	6	Mangrove trees
<i>Seiurus noveboracensis</i>	Northern Waterthrush	0.64		Mangrove roots
<i>Setophaga ruticilla</i>	American Redstart	0.28		Mangrove trees

individuals, however, may remain in the wintering grounds for the entire year. Most of the resident species with seasonal influxes arrived from South America.

RESULTS

During the one-year period, 107 species were recorded, seventy-one of which were noted on five or more occasions. Of the 107 species, 55 were associated with the sewage ponds and 34 were characteristic of mangrove forest. The remaining species utilized both habitats. There were 58 resident species recorded at the sewage facility. Their abundance and habitat use is presented in Table 1. Nine species with resident

and migrant populations were recorded. Their abundance and habitat is presented in Table 2, and their seasonal occurrence is shown in Table 3. There were 40 non-resident species recorded at the sewage ponds. Their abundance and habitat is presented in Table 4 and their seasonal occurrence, compared with that presented by ffrench (1991), is shown in Table 5. The expected period of occurrence, extracted from ffrench (1991), spans the earliest and latest recorded dates, with individual records in between indicated by an "o".

Three species of interest stand out; the Black-necked Stilt, the Black-bellied Whistling-duck and the Yellow-breasted Crake. Black-necked Stilts were

Table 4. Seasonal occurrence of non-resident birds at the Port of Spain Sewage Ponds, October 1985 - October 1986.
Light Shading denotes expected period of occurrence, "o" denotes individual site records.

Species	Date of visit	85.10.06	85.10.13	85.11.03	85.11.12	85.11.17	85.12.06	86.01.19	86.02.02	86.02.16	86.03.15	86.03.29	86.04.06	86.04.27	86.05.04	86.05.18	86.06.01	86.06.07	86.06.22	86.07.13	86.07.24	86.08.09	86.08.30	86.09.14	86.09.21	86.10.05
<i>Ardea herodias</i>	Great blue Heron							x																		
<i>Eudocimus ruber</i>	Scarlet Ibis	x	x	x	x	x	x	x	x	x	x	x	x						x	x			x	x	x	
<i>Dendrocygna bicolor</i>	Fulvous Whistling-duck	x	x	x							x															
<i>Anas discors</i>	Blue-winged Teal				x		x																			
<i>Pandion haliaetus</i>	Osprey	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Falco peregrinus</i>	Peregrine Falcon	x		x	x				x																	
<i>Falco columbarius</i>	Merlin		x	x	x	x		x																		
<i>Porzana carolina</i>	Sora			x				x	x		x	x	x	x												
<i>Pluvialis squatarola</i>	Black-bellied Plover		x	x																				x	x	
<i>Charadrius semipalmatus</i>	Semipalmated Plover	x		x										x	x	x	x	x	x						x	x
<i>Arenaria interpres</i>	Ruddy Turnstone													x	x							x				x
<i>Tringa solitaria</i>	Solitary Sandpiper	x						x		x	x	x	x	x	x							x		x		x
<i>Tringa flavipes</i>	Lesser Yellowlegs	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Tringa melanoleuca</i>	Greater Yellowlegs	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Actitis macularia</i>	Spotted Sandpiper	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Catoptrophorus semipalmatus</i>	Willet	x	x	x	x	x	x	x	x	x	x	x	x							x		x		x	x	x
<i>Calidris canutus</i>	Red Knot	x					x	x						x	x	x	x				x		x	x	x	x
<i>Calidris minutilla</i>	Least Sandpiper	x	x	x			possible			x			x	x	x	x	x	possible			x	x		x	x	x
<i>Calidris fuscicollis</i>	White-rumped Sandpiper	x	x					- -	probable	- -						x	x			- x -	probable	- -	- -	x	x	- x
<i>Calidris melanotos</i>	Pectoral Sandpiper	x	x	x	x	x				o				o								x	x		x	x
<i>Calidris pusilla</i>	Semipalmated Sandpiper	x	x	x	x									x	x		x	x	x	x	x	x	x	x	x	x
<i>Calidris mauri</i>	Western Sandpiper	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Numenius phaeopus</i>	Whimbrel	x	x	x	x				x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x
<i>Limosa fedoa</i>	Marbled Gotwit																									x
<i>Limnodromus griseus</i>	Short-billed Dowitcher	x	x	x	x	x																x	x	x	x	x
<i>Gallinago gallinago</i>	Common Snipe		x	x	x																					
<i>Larus fuscus</i>	Lesser black-backed Gull	x																								
<i>Larus atricilla</i>	Laughing Gull	x	x	x	x			x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Chlidonias niger</i>	Black Tern	x	x	x	x					o	?	o	?	o	x	x	x	x			x	x	x	x	x	x
<i>Phaetusa simplex</i>	Large-billed Tern													x	x		x	x	x	x	x	x			x	
<i>Sterna nitotica</i>	Gull-billed Tern													o											x	x
<i>Sterna superciliaris</i>	Yellow-billed Tern	x																			x		x			
<i>Rynchops niger</i>	Black Skimmer	x		x										x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Tyrannus savana</i>	Fork-tailed Flycatcher	x		ox									o	o				x	x	x	x	x	x	x	x	x
<i>Riparia riparia</i>	Bank Swallow						o	o	x		o	x		o				x								
<i>Hirundo rustica</i>	Barn Swallow	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x	x
<i>Protonotaria citrea</i>	Prothonatory Warbler							x		x			o	x												
<i>Dendroica petechia</i>	Yellow Warbler	x	x	x	x			x	x	x		x													x	x
<i>Seiurus noveboracensis</i>	Northern Waterthrush	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x									x
<i>Setophaga ruticilla</i>	American Redstart		x	x				x		x															x	x

recorded all months of the year. High numbers (>50) were observed in the months September to December, with numbers gradually diminishing until March 29 and April 6 when no Stilts were seen. In May, there appeared to be an influx of migrants when a flock of 20 apparently exhausted birds (which seemed reluctant to fly off when approached) was recorded, with numbers increasing thereafter. Nesting was observed during June and July. Black-bellied Whistling-ducks were observed on 15 occasions, with twelve records from July to November and three records between December and June. The Yellow-breasted Crake was recorded on nine occasions. Six records were of single birds but between May 18 and June 22, ten, seven and five individuals were recorded.

DISCUSSION

The presence of non-resident migrants closely reflects the previously observed status (ffrench 1991) although this study was for just one year at one location. This demonstrates the value of the sewage ponds as a location for monitoring such species.

The data on the Black-necked Stilt shows the species to be present throughout the year but with highest numbers between May to December. This supports the suggestion in ffrench (1991) that the Stilts "probably migrate to the continent outside of the breeding season." Prior to the development of the Caroni Rice Project, the Port of Spain sewage ponds probably represented a major breeding site for the Black-necked Stilt in Trinidad.

Some local movement is suspected for the Yellow-breasted Crake. All records were of birds seen and there was no apparent change in the vegetation, which could make the birds more visible. It is possible that by the end of the dry season, Crakes were attracted to the ponds as alternative habitat dried out. Crakes are generally difficult to observe and the sewage ponds present an opportunity for more work.

The Black-bellied Whistling duck is described by ffrench (1991) as "resident with some local migration evident, commonest during the wet season". This is confirmed with twelve records from July to November and only three from December to June. However, records of the Black-bellied Whistling-duck are similar to those for the Fulvous Whistling duck. Since they often associate it is possible that they may migrate together. The Fulvous Whistling-duck is

described by ffrench (1991) as an occasional visitor. Data from this study suggest that visits of the latter may be increasing in frequency.

Most of the Sandpipers recorded at the sewage ponds regularly overwinter in Trinidad, and it is not surprising that a few non-breeding birds remain throughout the year. Records of the Least Sandpiper extend into June; while this was deemed "possible" (ffrench 1991) there were no previous records for this month. The record of a Spotted Sandpiper on June 22 falls in between the previous extreme dates.

Passage migrants like the Red Knot, White-rumped Sandpiper and Pectoral Sandpiper, are less likely to be recorded throughout the year. The records of each of these migrants reflects their status as passage migrants but with early and late dates for the Red Knot and early dates for the White-rumped Sandpiper. The records of the White-rumped Sandpiper in July, September and October are the first for these months. The White-rumped Sandpipers southward passage through the USA spans July to early December with return passage from April to mid June (Hayman *et. al.* 1986). The records of Red Knots in December and January may represent over-wintering birds. While the Red Knot is considered to be a passage migrant there are populations which over-winter in the southern USA (Hayman *et. al.* 1986).

Four records of Black Terns from April 27 to June 1 are all earlier than previously recorded, although a "few spring records" have been made (ffrench 1991).

Sightings of the Prothonotary Warbler and American Redstart are later than previously recorded. The Barn Swallow on June 22 is the latest.

Future studies at the Port of Spain sewage ponds should include census counts on migrant birds, and birds of uncertain status. The few individuals recorded during summer months are not as important ecologically as the major influxes each winter. It would be useful to establish the nesting periods of common residents, but the nature of the habitat makes investigation of nests difficult.

As further studies become available it would be interesting to compare the wader community at the sewage ponds with that from freshwater (e.g. Caroni rice project) and estuarine mudflats (e.g. Brickfield).

Future studies would benefit from concentrating on fewer species and the inclusion of census counts, as it is the overall seasonal pattern that should be high-

lighted rather than individual out-of-season sightings. A description of the seasonal changes in the environment will also assist in determining whether a species's absence is due to a lack of appropriate environment rather than a migration pattern.

ACKNOWLEDGMENTS

I thank the following persons who assisted in the recording of birds on one or more occasions: D. Buch, C. Chaboo, A. Kacal, S. Kacal, R. Tewari, A. White, and P. Christopher. Also I would like to thank R. ffrench and F. Hayes for reviewing the final manuscript.

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