Field Survey of Avifauna at Long Island, Wallabi Group, Houtman Abrolhos.

September and December 2005

Houtman Abrolhos Islands Tourism Development - Long Island.

> Dr C. A. Surman Halfmoon Biosciences January 2006



Citation.

This report may be quoted as: Surman, C.A. (2006). Field Survey of Avifauna at Long Island, Wallabi Group, Houtman Abrolhos, September and December 2005. Unpublished report prepared for MBS by Halfmoon Biosciences. 33 pp.

Submitted on: 30 January 2006

Prepared by: Dr Chris Surman Halfmoon Biosciences 14 Snook Crescent Hilton, W.A. 6163

halfmoon@webace.com.au

©Copyright 2006

Halfmoon Biosciences

This document and information contained in it has been prepared by Halfmoon Biosciences under the terms and conditions of his contract with his client. The report is for the client's use only and may not be used, exploited, copied, duplicated or reproduced in any form or medium whatsoever without the prior written permission of Halfmoon Biosciences or their client.

Table of Contents

1	Intro	oduction1				
	1.1	Nomenclature				
2	Nesting Habitat					
	2.1	Low Sand Dunes (plates 1-4)				
	2.2	Coral Ridges				
	2.3	Tidal Ponds				
	2.4	Vegetation (plates 2,3 and 7)				
	2.5	Shoreline (plate 8)				
3	Met	hods5				
	3.1	Habitat Proofing				
	3.2	Colony Size Estimates				
	3.3	Monitoring Sites				
	3.4	West Wallabi Island7				
4	Resi	ılts				
	4.1	Notes on species recorded				
	4.1.	Wedge-tailed Shearwater 11				
	4.1.2	2 Little Shearwater (Plate 6) 11				
	4.1.3	3 White-faced Storm-petrel				
	4.1.4	Eastern Reef Egret (Plate 12) 11				
	4.1.5	5 Pied Oystercatcher				
	4.1.6	5 Red-capped Plover				
	4.1.7	7 White-breasted Sea-eagle				
	4.1.8	8 Osprey				
	4.1.9	Pacific Gull (Plate 11) 12				
	4.1.	10 Silver Gull				
	4.1.	11 Caspian Tern				
	4.1.	12 Crested Tern				
	4.1.	13 Bridled Tern				
	4.1.	14 Roseate Tern				
	4.1.1	15 Fairy Tern				
	4.1.1	16 Lesser Noddy 15				
	4.1.	17 Sooty Tern				
5	Disc	cussion 17				
6	Pote	ntial Impacts of the Development				
7	References					
8	List	of Figures				

1 Introduction

This report was commissioned by Martinick Bosch Sell Pty Ltd (MBS) on behalf of Humfrey Land Developments. Humfrey Land Developments was selected by the State Government as the preferred candidate to develop a nature-based tourism operation on Long Island, Wallabi Group, Houtman Abrolhos (MBS 2005). As part of their preliminary commitments for the project MBS engaged Halfmoon Biosciences to undertake two field surveys of the avifauna of Long Island. This report is a summary of the findings of those surveys.

Long Island is a medium sized island situated in the eastern half of the Wallabi Group, 1km west of Beacon Island, the closest island inhabited by Rock-lobster Fishermen. It is chiefly composed of beach-cast coral shingle on a base of consolidated limestone reef, with some patches of sand in hollows in the central portions of the island. The development is to be situated in the central portion of the island over an area of 2 hectares, covering the highest ground on the island (~ 3m AMHW).

The most recent published account of the avifauna of Long Island was included in Burbidge and Fuller's (2004) survey of the entire Houtman Abrolhos. In an earlier account, Fuller *et al.* (1994) recorded six species breeding on Long Island; Little Shearwater *Puffinus assimilis* (700 pairs), Bridled Tern *Sterna anaethetus* (700 pairs), Crested Tern *Sterna bergii* (60 pairs), and a single pair for White-breasted Sea Eagle *Haliaeetus leucogaster*, Eastern Reef Egret *Egretta sacra* and Pacific Gull *Larus pacificus*. In addition, a single pair of Osprey *Pandion haliaetus* were recorded nesting on the islet to the north east of Long Island.

A previous review of the birds of the Houtman Abrolhos by Storr *et al.* (1986) provided a fuller list of breeding species for Long Island based on a summary of previous literature and unpublished observations. In addition to the six species above, Storr *et al.* (1986) included as breeders the Roseate Tern *Sterna dougalli*, Caspian Tern *Sterna caspia*,

Silver Gull *Larus novaehollandiae* as well as the Grey-breasted White eye *Zosterops lateralis gouldi*. However, no indication of the size of these populations was reported.

The field surveys conducted were designed to assess accurately the population sizes and status of avifauna at Long Island, and to identify nesting habitat. In addition, semipermanent long-term monitoring sites were selected should the development proceed (Surman 2005).

1.1 Nomenclature

There has been considerable confusion over the names of Long Island (Wallabi Group) and Pelsaert Island (Pelsaert or Southern Group). In several articles the latter has been referred to as Long Island, and contemporary fishermen continue to call Pelsaert Island by the name Long Island based on its incredible length (12km). Throughout this report, nomenclature of island names will follow that of the latest registered with the DOLA.

Throughout this report I will use the term avifauna to refer to the entire bird fauna of Long Island. Although seabirds are the dominant group of birds that utilise the islands, there are important passerine and non-passerine components of the avifauna, notably migratory waders and shorebirds, most of which are protected under international migratory species agreements such as the JAMBA (Japan Australia Migratory Bird Agreement) and CAMBA (China Australia Migratory Bird Agreement).

Names for bird species follows that presented in Christidis and Boles (1994), for plant communities Harvey *et al.* (2001) and Rippey and Rowland (1995).

2 Nesting Habitat

Long Island is best described geologically as a composite island, typical of the leeward islands found in the eastern portions of the archipelago (Collins *et al.* 1997). It is composed of a core of emergent coral reef, overlain by storm cast coral shingle ridges. The shores of Long Island are lined on the western shore by late-Holocene bedded coral rudstone, forming low, undercut cliffs, and on the eastern shore by storm ridges of unconsolidated coral rudstone. Nestled between storm ridges within the mid-portions of the island are low sand dunes.

2.1 Low Sand Dunes (plates 1-4)

Several areas of sand dunes are found on Long Island. Relatively fine sands deposited in between storm ridges in central portions of the island, as well as low primary dunes on coral ridges in northern portion of the island situated along the eastern shore. Little Shearwaters and White-faced Storm-petrels nest in deep burrows in all sandy areas of the island. Burrows are excavated in open sandy areas as well as below dense woody shrubs of *Myoporum insulare* and *Nitraria billardierei*.

2.2 Coral Ridges

Storm cast coral shingle form north-south orientated coral ridges, with older coral ridges higher and more centrally located on the island. The ridges are generally devoid of vegetation except where they form shallow gullies. Several seabird species may potentially nest amongst the coral ridges. Crested Terns, Roseate Terns and Fairy Terns at the Houtman Abrolhos typically nest on coral ridges, the latter two species preferring the peak of older coral ridges where finer coral rubble is located. Crested Terns prefer expanses of flat areas with finer coral rubbles and sand, typical of those areas found to the north of Tidal Pond 504, and to the south west of Tidal Pond 507. The single pair of Caspian Tern nest on shell grit and finer coral sand adjacent the extensive Samphire *Sarcocornia quinqueflora* just north of Pond 503.

2.3 Tidal Ponds

There are seven tidal ponds on Long Island (MBS 2005). They provide feeding habitat and shelter for the small numbers of migratory waders that visit Long Island. The larger ponds, Pond 504 and Pond 507, typically have higher aggregations of waders than other ponds on the island, but wader numbers are very low compared with other areas of the Houtman Abrolhos (Storr *et al.* 1986, Surman *pers. obs.*).

2.4 Vegetation (plates 2,3 and 7)

The vegetation of Long island is dominated by low coastal shrubs. The largest plants are the woody *Myoporum insulare* and *Nitraria billardierei*. Throughout the island, *Atriplex cinerea* and *Rhagodia sp*. dominate sandier areas and swales between coral ridges. Bridled Terns nest under any object that provides some shading and camouflage, particularly favouring the dense cover afforded by *M. insulare* and *N. billardierei*. Silver Gulls also nest amongst these species, as well as favouring clumps of *Spinifex longifolius* (Plate 7).

2.5 Shoreline (plate 8)

Several seabirds construct their nests along the shoreline, typically just above the high water mark. Pacific Gulls construct nests of brown algae usually overlooking the sheltered western shore. Pied Oystercatchers construct a nest consisting of a cryptic nest scrape located a few meters from the waters edge.

3 Methods

Long Island was visited on two occasions between 29 September- 1 October 2005, and 1 - 4 December 2005. The island was surveyed on foot during daylight hours (0600 – 1800). No overnight observations were undertaken.

3.1 Habitat Proofing

Aerial photographs at a scale of 1:2300 were used to cross-check vegetation and habitat zones throughout the entire island. Long Island was systematically walked in its entirety and seabird habitat as well as nest sites were plotted onto aerial photographs of the island. Where defined colony areas, such as shearwater rookeries in sandy areas were located, the perimeter of each was traversed to estimate total colony area in m². Where potential seabird nesting habitat was observed, this was plotted onto the aerial photographs. Nests of Silver Gulls, and Bridled Terns were plotted when located, although it was not possible to locate all nests in all parts of the island due to time constraints.

3.2 Colony Size Estimates

Colony sizes for each species was estimated using a combination of the following;

- Complete counts of all nests of individual nesting species (eg. Pacific Gull, Osprey)
- Estimated colony size based on line-transect methods to assess nesting density (eg. Little Shearwater, White-faced Storm-petrel).
- Estimated colony size based on random density quadrats for ground nesting species in each habitat and extrapolated to the rest of occupied territories (Bridled Terns).
- Complete counts of open-nesting terns using head counts of incubating adults remotely using binoculars (eg. Roseate Terns, Crested Terns and Fairy Terns)
- Sand spit and beach counts for roosting birds
- Overhead counts taken during dreads (i.e. Bridled Terns) to compare with density and nest estimates.

3.3 Monitoring Sites

During the September and December 2005 Field Surveys, three semi-permanent monitoring transects were established to assess long-term changes in the distribution, size and breeding performance of burrow-nesting species on Long Island. Sites for monitoring transects were selected on their relative location to the development zone, and for being representative of the habitat in the area. The position of monitoring transects is shown in Figure 2. Characteristics of each monitoring transect are presented in Table 1.

A 50m long tape was placed between two jarrah stakes to establish the transect baseline. Ten, continuous 5 m x 5 m (25 m^2) quadrats were inspected directly adjacent one side of the transect line. The number, species and burrow contents of each burrow was determined either by manual inspection or with the aid of a burrowscope, (an electronic video monitor attached to a length of flexible tubing that can remotely detect nest contents using an infra red light source).

The total number of burrows for each area was calculated using the mean density of burrows per m2 calculated from strip transects. The total supposed breeding population for 2005 was estimated based on the proportion of burrows that were occupied.

	Seabird 1	Seabird 2	Seabird 3
Location	Development zone	100m south of	500m north of
		development	development
Treatment	Disturbed	Control	Control
Length	50 m	50 m	50 m
Habitat	Low dunes	Low dunes	Low dunes
Species	LSW, WFSP	LSW, WFSP	LSW, WFSP
Plate	1	2	3,4

Table 1: The location and characteristics of monitoring transects established on LongIsland.

Further potential monitoring sites were assessed on islands adjacent to Long Island for their suitability as control sites for comparison to the sites established on Long Island. Based on species composition reported by Fuller *et al.* (1994) Eastern Island, Dakin

Island, Seal Island, First Sister Island, Dick Island as well as West Wallabi Island were visited. Estimates of the density of and reproductive stage of burrow nesting seabirds were obtained from most islands for comparison to Long Island. Results are presented in Table 5.

3.4 West Wallabi Island

West Wallabi Island was originally earmarked as a likely location for visitors to access to view the heritage trail. This island was visited on two occasions, October 1 and December 3 to measure the proximity of marine raptor nesting and feeding roosts to the Wiebbe Hayes forts and heritage trail. Sensitive marine raptor sites were plotted onto aerial photographs using GPS. In addition, a mixed colony of Wedge-tailed Shearwaters and Little Shearwaters was inspected to assess the stage of breeding and occupancy of burrows compared to that of Long Island.

4 Results

A total of 20 species of birds were recorded on Long Island during the September and December 2005 field surveys (Table 2). Of these, 12 species (7seabirds, 2 marine raptors, 2 shorebirds and 1 passerine) were recorded as breeding or had recently bred (Table 3). Breeding species in order of descending population size were: Bridled Tern, White-faced Storm-petrel, Little Shearwater, Silver Gull, Pacific Gull, Pied Oystercatcher, Caspian Tern, Crested Tern, Osprey, White-breasted Sea Eagle, Greybreasted White-eye and Eastern Reef Egret. Observed (or estimated) breeding populations for the 2005 breeding season are presented in Table 3. The timing of breeding of nesting birds is presented in Figure 5.

Significantly, this report confirms unpublished data indicating that a medium-sized population of White-faced Storm-petrels breed on Long Island. This report also confirms the breeding records reported by Storr *et al.* (1986), Fuller *et al.* (1994) and Burbidge and Fuller (2004), as well as significantly adding to the sizes of these populations.

Previously, White-faced Storm-petrels had not been formerly recorded breeding on Long Island. Asmussen (*pers. comm.*) reported the presence of this species on Long Island to Fisheries Western Australia in 2001. After inspection of burrows on Long Island and other islands in the group, it is suggested that this species is far more prevalent than once thought at the Houtman Abrolhos, and occupies burrows amongst Little Shearwater colonies. White-faced Storm-petrels may also utilise Little Shearwater burrows abandoned during a previous breeding attempt, although this would be unusual for a species that is site faithful.

Approximately 612 burrows of the White-faced Storm-petrels were estimated to occur on Long Island, the majority of which were located in low sandy dunes along the eastern shore north of the proposed development (Figure 2). Approximately 376 Little Shearwater burrows were estimated to occur throughout all sandy areas of the island (Figure 3). The Houtman Abrolhos is the northern most breeding range of the Whitefaced Storm-petrels, and the populations amongst the leeward islands of the Wallabi Group represent the extension of this species range in Western Australia. This discovery increases the known White-faced Storm-petrels population of the Houtman Abrolhos by 15 % based on a total population estimate by Fuller *et al.* (1994) of 4227 pairs.

Table 2: Numbers of birds (breeding pairs or burrows) reported for Long Island and surroundsbased on previous observations compared with those recorded during the September andDecember 2005 surveys. Figures in bold represent total nest sites located. Crosses indicatespecies previously recorded, a bold cross indicates previous breeding reported (no estimate).

Species			Long Is.			
		Previous	Sep	Dec		
Wedge-tailed Shearwater	Puffinus pacificus	250	0	0	4	
Little Shearwater	Puffinus assimilis	550	376	376	4	
White-faced Storm-petrel	Pterodroma marina	-	612	612	8	
Pacific Gull	Larus pacificus	2	6 (3)	21	3	
Silver Gull	L. novaehollandiae	1	1 62 (47)		6	
Crested Tern	Sterna bergii	11-100	11-100 52 (1)		2	
Caspian Tern	Sterna caspia	1	2 (1)	4	4, 3, 6	
Bridled Tern	S. anaethetus	350-700	2	368 (106)	3	
Roseate Tern	S. dougalli	171	22	65	4, 6	
Fairy Tern	S. nereis	-	20	4	6	
Lesser Noddy	A. tenuirostris	-	6	-	8	
Sooty Tern	S. fuscata	-	0	2	8	
Pied Cormorant	Phalacrocorax varius	X	0	5	1	
Osprey	Pandion haliaetus	X	3	1	2, 8	
White-breasted Sea Eagle	Haliaeetus leucogaster	1	2 (1)	1	2, 3	
Eastern Reef EgretEgreta sacra		1	3 (1)	0	2	
Pied Oystercacher	Haematopus longirostris	1	4 (3)	5	5	
Ruddy Turnstone	Arenaria interpres	X	18	36	1	
Grey-tailed Tattler	Tringa brevipes	X	0	11	1	
Bar-tailed Godwit	Limosa lapponica	X	0	0	1	
Red-capped Plover	Charadrius ruficapillus	-	11 (?)	12	1	
Red-necked Stint	C. ruficollis	-	18	7	8	
Brush Bronzewing	Phaps elegans	1	0	0	1	
White Eye	Zosterops lateralis	X	6 (1)	5	1	
Welcome Swallow	Hirundo neoxena	X	0	3	1	

Sources: 1. Storr *et al.* (1986), 2. Fuller *et al.* (1994), 3. Burbidge and Fuller (2004), 4. CALM SBID, 5. O'Loughlin (1966).. 6 Johnstone and Storr (1994), 7 Surman (1994), 8 Surman *pers. obs.*

4.1 Notes on species recorded

4.1.1 Wedge-tailed Shearwater

No burrows of this species were located during the September or December visit. The CALM Seabird Breeding Island Database (SBIDB) lists Long Island with a population of 250 pairs. It is possible that this species does breed on Long Island, although in very small numbers amongst the larger colonies of the Little Shearwater.

4.1.2 Little Shearwater (Plate 6)

A total of 176 burrows were inspected during the September survey, whilst most were empty (97 – 56%) 10 were confirmed as containing Little Shearwaters (Table 4). Of these burrows, nine contained young chicks and one contained an unattended egg. This corresponds well with other reports of the timing of breeding at the Houtman Abrolhos, however the participation rate appears particularly low. Based on burrow densities, there are approximately 376 burrows of this species on Long Island.

4.1.3 White-faced Storm-petrel

Of the 176 burrows inspected during the September survey, 14 were found to be occupied by this species, all of which contained adults incubating fresh eggs. During the December visit, 11 (of a total 74 burrows) were found to be occupied by White-faced Storm Petrels, the majority with young chicks (Table 5). Burrows were confined to deep, fine, white sand dunes approximately 250m north of the proposed lease area, and were located together with Little Shearwater burrows amongst low Atriplex/Rhagodia and Nitraria bushes. Based on burrow densities, and total area of the colony, approximately 612 burrows occur on Long Island.

4.1.4 Eastern Reef Egret (Plate 12)

A single nest of this species was located under an overhanging conglomerated limestone notch in the middle of the island (plate 8). Whilst the nest was empty at the time of the September visit, guano and the defensive behaviour of adults suggested that young were in the vicinity.

4.1.5 Pied Oystercatcher

Three pairs of this species breed on Long Island. During the September visit, one nest contained two eggs, and elsewhere a 4 day old and a large runner were located. Nests were located just above the maximal high water mark and are very cryptic.

4.1.6 Red-capped Plover

Eleven adults in breeding plumage were observed on Long Island. Whilst one adult displayed defensive behaviour, no eggs or chicks were reported, although it is highly likely that this species does breed on the island as there is ample suitable habitat.

4.1.7 White-breasted Sea-eagle

A single nest of this species was observed in the southern portion of the island (Figure 3). The nest contained a single egg. This pair utilise a feeding roost situated at the southern end of the island.

4.1.8 Osprey

None were observed breeding at the time of the September visit, although a family group was observed overflying the island. A single recently attended nest was located, and four disused nest sites (including one on Short Island to the north). There was no evidence of breeding such as food scraps or guano. A pair was observed nesting on nearby Wann Island.

4.1.9 Pacific Gull (Plate 11)

Three active nests and two old, unused nests of the Pacific Gull were located (Table 3). All occupied nests contained chicks at various ages, ranging from newly hatched to 7 days old. All nests were located above high water along the shoreline regions of the western shore. All were located outside the proposed footprint of the development. Up to 13 adult Pacific Gulls were recorded on the island during the December visit. Two of the three active nests observed in September had juvenile birds in the December visit.

4.1.10 Silver Gull

Silver Gulls were relatively common on Long Island. A total of 62 Silver Gulls were observed roosting or attending nest sites on Long Island. Forty seven nests were located, of which 25 were currently active (Table 3). Of the active nests, most were empty, but

five had eggs, and four contained young chicks (< 7 days). A single half grown runner was also observed. A previous estimate of the autumn population suggests up to 300 Silver Gulls may nest on Long Island (Kirsten 2001).

4.1.11 Caspian Tern

A single pair of Caspian Terns was breeding at the time of the September survey. The nest contained 2 eggs. During the December visit two juvenile birds were being fed by adults.

4.1.12 Crested Tern

A single nest was located just north of Pond 504, situated upon a high coral shingle ridge. Other adult birds were observed roosting adjacent to the nesting pair. This pair appeared to be pioneering the breeding season, however, during the December visit there was no evidence of any expansion of the colony.

4.1.13 Bridled Tern

Few Bridled Terns were present during the September survey, only two were observed roosting on the rocky spit that joins Long Island to Short Island. However, breeding was in full swing during the December survey. A total of 106 nests were inspected and plotted using GPS. Of these, most contained freshly laid eggs (Table 3). Of the 61 nests found containing eggs, seven were recently predated, most likely from Silver Gulls or Ruddy Turnstones. Inspection of two yolks revealed no embryonic development, suggesting that the eggs had been recently laid.

Table 3: The numbers of nests located on Long Island during the September and

 December 2005 field surveys. Unused nests were those not in recent (< 1 month) use</td>

 based on the aging of the nesting material. New empty nests are those deemed to have

 been recently attended to and contained fresh nesting material.

Species					
	No. nests	Unused	New	Eggs	Chicks
	located	Empty	Empty		
Pacific Gull	5	2	0	0	3
Silver Gull	47	22	16	5	4
Pied Oystercatcher	3	0	0	1	2
Eastern Reef Egret	1	0	1	0	0
Caspian Tern	1	0	0	1	0
Crested Tern	1	0	0	1	0
White-bellied Sea Eagle	1	0	0	1	0
Osprey	4	4	0	0	0
Grey White-eye	1	0	0	1	0
Bridled Tern	106	0	45	61	0

4.1.14 Roseate Tern

Roseate Terns roosted regularly on the rocky spit that adjoins Long Island to Short Island. Similarly, many were observed foraging close to the eastern shore of Long Island in Goss Passage on dense schools of baitfish. No breeding pairs were observed on Long Island although there is suitable habitat available, particularly towards the southern extremity of the island. During the December survey, Roseate Terns were nesting in moderate numbers on two islets directly north of First Sister Island.

4.1.15 Fairy Tern

Several individuals of this species were observed roosting along the shoreline of Long Island, particularly the south western tip of the island. Courtship feeding was observed during the December visit, but no current breeding attempts were observed. Breeding was currently underway on West Wallabi at the time of the December visit. A small area was identified as having 16 scrapes likely to have been made by Fairy Terns on a low coral ridge, however no adults were in attendance and the scrapes did not appear to be recent.

4.1.16 Lesser Noddy

A flock of 6 birds was observed flying past adjacent to Wann Island, approximately 700m to the west of Long Island. The birds were heading SSE, on a bearing for colonies situated on Morely and Wooded Islands in the Easter Group.

4.1.17 Sooty Tern

Two adults were observed prospecting over the northern portion of Long Island on December 2, 2005 for approximately two hours. Other small flocks of Sooty Terns were observed heading south through Goss Passage, most likely en route to colonies located in the Easter and Pelsaert Groups.



Figure 5: Breeding chronology of the Long Island, Houtman Abrolhos avifauna. Data based on Storr et al. 1986, Surman 1994, Surman 1998, Surman 2006, Kirsten 2001. The presence of each species is represented by the open bar, the period of breeding activity is indicated by the solid bar.

5 Discussion

Twenty species of birds were recorded during the two field surveys conducted during September and December 2005. Of these, eleven species were observed breeding, and one species (Osprey) is likely to breed. The timing of breeding for each species was estimated based on the field surveys and Surman (1998).

Based on revised population estimates, Long Island contains the third largest population (of 15 breeding islands) of White-faced Storm-petrels at the Houtman Abrolhos, and the 13th largest (of 26 breeding islands) Little Shearwater population. Whilst estimates of both these burrow-nesting species may vary from those reported in the most recent account (Fuller *et al.* 1994), based on their estimates, the Long Island population of White-faced Storm-petrels and Little Shearwaters represent 14.5 % and 1.2 % of the total Houtman Abrolhos population respectively.

Similarly, it contains one of the largest populations of spring-breeding Silver Gulls, second only to Pelsaert Island. Significantly, there are reports of several hundred Silver Gulls breeding during the Rock-lobster fishing season (Asmussen *pers. comm.*).

Approximately 250 Bridled Terns breed on Long Island, slightly fewer than that reported by Burbidge and Fuller (2004). Long Island is thus ranked as the 13th largest colony (of 66 breeding islands), with approximately 4 % of the total Houtman Abrolhos breeding population.

The most sensitive areas of Long Island with respect to avifauna, and particularly to seabirds are the low dune areas, that are located in swales between coral ridges towards the eastern shore of Long Island. These areas are dominated by larger *N. billarbiardi* and *Myoporum insulare*, with expanses of bare soil and covered in introduced weeds. The areas contain burrows, predominately White-faced Storm Petrels and Little Shearwaters.

Burrows in these areas are easily disturbed and collapsed, as the sand is highly friable and held together by the shallow root mats of the surrounding vegetation.

There are two main areas of sand dune on Long Island; the area east of the main development site and running south, from Pond 502 to just north of the navigation markers situated at the narrow neck (Figure 4); and another is located just north of the survey mark and extending northwards for approximately 130m past a small rocky point on the mid-north east coast of Long Island.

Burrow density and occupancy varies considerably between sites. Burrow density throughout the northern dune system is high, averaging 0.24 burrows/m² (range 0.12-0.92). This is largely reflected by higher density of White-faced Storm Petrel burrows compared to Little Shearwater burrows. The area of the main dune system in the central portion of Long Island and within the development zone appears to be of sub-optimal quality. Burrow density is very low and averaged 0.11 burrows/m² (range 0.04-0.4). There is little humping of sand indicative of repeated diggings of shearwaters over the years, and clear areas of sand are dominated by exotic weeds. However, in the area bounded by the Seabird Transect 2 (Figure 4), just south of the main development zone, burrow density was higher again, and averaged 6.0 burrows/m² (range 0.08-0.32). This area will have the main service boardwalk pass through it.

Burrow density was less than half of that observed in other areas of Long Island (Table 4) and less than a third of that observed on West Wallabi and Beacon Island at the same time of year. Further investigation of other islands adjacent to the development site also confirmed this trend (Table 5). In fact, of the five other islands checked during the December survey, none had any Little Shearwater chicks (likely that most had fledged), but all had evidence of White-faced Storm-petrel breeding.

At the time of the field surveys there was a single White-breasted Sea Eagle nesting on a low stick nest immediately adjacent to the south eastern shore of Pond 506. The nest was

located approximately 130 m from the proposed helipad and shielded completely from the proposed deck and access boardwalk by a storm ridge of coral shingle. Previously, Kirsten (2001) reported this pair breeding in a similar location between the tidal ponds 506 and 507.

Ospreys have been recorded breeding on Long Island in the past (Fuller *et al* 1994). Similarly, Kirsten (2001) reported nesting at two locations, presumably the same pair rotating between nest sites. In 2000, Osprey nested on the promitory called Short Island, and in 2001, at the nest site located 100m south of the northern point of the island along the west coast. No obvious signs of nesting were observed during this survey.

6 Potential Impacts of the Development

It is beyond the scope of this report to comment in detail on the impacts of this development of the avifauna as this will be addressed elsewhere. However, a number of points should be considered.

Avifauna will be potentially impacted through construction activities as well as activities undertaken by visitors to the facility during operations. Construction or visitor based activities that increase the exposure of nesting birds on Long Island to human presence may result in;

- Changes to nesting habitat through construction activities
- Disturbance to nesting birds during construction or operations potentially resulting in decreased reproductive performance and increased stress.
- Displacement or desertion of nesting sites by breeding adults.
- Potential increase in the mortality of eggs and nestlings due to exposure, trampling, disorientation or predation.
- Changes to the size and location of breeding populations

The above impacts upon avifauna on Long Island and measures to reduce these potential impacts is presented in Surman (2006).

January	2000

		L	Beacon Island	West Wallabi Island			
	Seabird 1	Seabird 2	Seabird 3	Others	Total		
Treatment	Development	Control south	Control north			Control	Control
Burrow Contents							
Empty	22	47	42*	5	97	13	22
Collapsed	1	8	7	-	16	-	4
Egg	-	-	2*	-	2	1	1
Adult + egg	-	-	11*	-	11	1*	1
Adult	-	-	1	1	2	-	-
Chick	4	3	-	2	9	2	5
Too Deep	1	2	16	-	19	6	3
Total Checked	28	60	80	8	176	23	36
Occupancy	15.4	6.0	23.0	25.0	10.0	23.5	24.1
Adj. for LSW	15.4	6.0	2.0 (4.0**)	25.0	10.0	17.6	24.1
Mean density	2.8 (0.9)	6.0 (0.6)	6.0 (1.3)	4 (1.7)	4.8 (0.6)	11.7 (1.2)	7.6 (0.9)

Table 4: The status of White-faced Storm-petrel and Little Shearwater burrows examined during the September 2005 field survey

Occupancy = excluding too deep and collapsed burrows

*Most of attempts in this colony were White-faced Storm Petrel, i.e. all adults incubating eggs were this species.

** Little Shearwater percentage based on 23 Little Shearwater burrows and 22 White-faced Storm Petrel burrows

January 2006

Table 5: The status of White-faced Storm Petrel and Little Shearwater burrows examined during the December 2005 field survey. The total breeding estimate is based on the proportion of occupied burrows and extrapolated from the total number of burrows. WFSP = White-faced Storm Petrel, LSW = Little Shearwater.

	Long Island			Dakin	Dick	Eastern	First	Seal	
	Cookind 1	Sechind 2	Cashind 2	Others				Sister	
	Seabird I	Seabird 2	Seabird 5	Others					
Treatment	Development	Control	Control						
		south	north						
Empty WFSP	4	8	7	0	10	19	8	12	4
Empty LSW	9	0	3	16					
Collapsed	4	0	0	1		7	2	6	
Eggs	0	0	0	0	2				
WFSP adult + egg	1	2	1	0		2	2	2	
WFSP adult alone	0	0	0	0			1		
WFSP Chick	1	0	6	0	1	14	5	5	4
LSW Chick	1	0	0	1					
Too Deep	0	0	6	0		7	2		1
Total Checked	20	10	23	18	13	49	20	25	10
Occupancy	18.8	20	41	6					
Mean density	2.8	6	6 (13)	-	9	14.3	12.5	-	-
(burrow/quadrat)									
Density (burrow/ m ²)	0.112	0.24	0.24 (0.52)	0.24					
Colony Area (m ²)	2870	1100	1550	140					
Total Burrow Estimate	321	264	372	33					
Breeding No. 2005/06	60	53	152	2					
TOTAL Breeding	267								

7 References

Burbidge, A.A. and P.J. Fuller. (2004). Numbers of non-burrowing breeding seabirds of the Houtman Abrolhos: 1991-1993 and 1999. *Corella* **28**: 96-103.

Christidis, L. and Boles, W.E. 1994. *The taxonomy and species of birds if Australia and its territories*. Royal Australian Ornithologists Union Monograph 2. 112pp.

Coate, K. (2005). Houtman Abrolhos Islands: Bird Sightings. 12pp.

Collins, L.B., Zhu, Z.R. and Wyrwoll, K.H. (1997). Geology of the Houtman Abrolhos islands. *Geology and hydrogeology of carbonate islands* **54**: 811-833.

Fuller, P.J., Burbidge, A.A. and Owens, R. (1994). Breeding seabirds of the Houtman Abrolhos, Western Australia: 1991-1993. *Corella* **18**:97-113.

Harvey, J.M., Alford, J.J., Longman, V.M. and G.J. Keighery. (2001). A flora and vegetation survey of the islands of the Houtman Abrolhos, Western Australia. *CALM Science* 3(4): 521-623.

Johnstone, R.E. and Storr, G.M. (1994). Seabird Islands No. 224: West Wallabi Island, Houtman Abrolhos, Western Australia. Corella 18(2): 56-60.

Kirsten, I. (2001). Birds and mammals of Long Island, wallaby Group of the Houtman Abrolhos Islands 2001-2001. Unpublished report to FWA.6pp.

Martinick, Bosch and Sell (2005). Houtman Abrolhos Islands Tourism Development – Long Island. Draft Environmental scoping document, Public Environmental Review. August 2005. 51pp.

Halfmoon Biosciences

O'Loughlin, P.M. (1966). Aquinas College second expedition to Wallabi Islands of Houtman's Abrolhos. August 23rd – August 31st.

Rippey, E., and Rowland, B. (1995). Plants of the Perth coast and islands. UWA Press, Perth. 292pp.

Storr, G.M, Johnstone, R.E. and Griffin, P. (1986). Birds of the Houtman Abrolhos, Western Australia. Records of the Western Australian Museum 24: 1-42.

Surman, C.A. (1994). New breeding record for White-faced Storm-petrel Pelagodroma marina at the Houtman Abrolhos, Western Australia. Corella 18(4): 114.

Surman, C.A. (1998). Seabird breeding schedules at the Pelsaert Group of islands,
Houtman Abrolhos, Western Australia between 1993 and 1998. *Rec. W.A. Museum* 19
(2): 209-216.

Surman, C.A. 2005. Proposed Field Methodology for Establishing Baseline Information on the Status of Seabirds at Long Island, Wallabi Group, Houtman Abrolhos. 11 pp.

Surman, C.A. 2006. Avifauna Management Plan for the Long Island Tourism Development. Unpublished report.

8 List of Figures

Figure 1: Aerial photograph of the Wallabi Group of Islands, Houtman Abrolhos showing the islands visited during the September and December avifauna surveys.

Figure 2: Aerial photograph of Long Island, Wallabi Group, Houtman Abrolhos showing colony areas and individual nests located. Note, not all burrows or nests of some species were plotted.

Figure 3: Aerial photograph of the eastern-most portion of West Wallabi Island, Houtman Abrolhos. Nest sites and feeding roosts of the closest marine raptor sites to the Weibbe Hayes forts are plotted.

Figure 4: Aerial photograph of Long Island, Wallabi Group, Houtman Abrolhos showing locations of places mentioned in the text.

Humfrey Land Developments

Avifauna Field Survey

January 2006









Halfmoon Biosciences



Halfmoon Biosciences



Halfmoon Biosciences

Plates

Plate 1: Seabird 1 Transect looking north across sandy area in main development zone.



Plate 3: Seabird 3 transect looking south, towards development in far background.



Plate 5: Low density Little Shearwater habitat in main development area.

Plate 2: Seabird 2 transect looking north. Development on ridge in background.



Plate 4: White-faced Storm-petrel burrows in fine sand at Seabird 3.



Plate 6: Adult Little Shearwater



Halfmoon Biosciences



Plate 7: Silver Gull habitat, Long Island. View looking south from Navigation markers



Plate 9: Osprey nest adjacent Pond 504.



Plate 11: Pacific Gull chick and nest



Halfmoon Biosciences

Plate 8: Eastern Reef Egret nests under collapsed shore cliff in foreground.



Plate 10: White-breasted Grey Eye nest.



Plate 12: Eastern Reef Egret

