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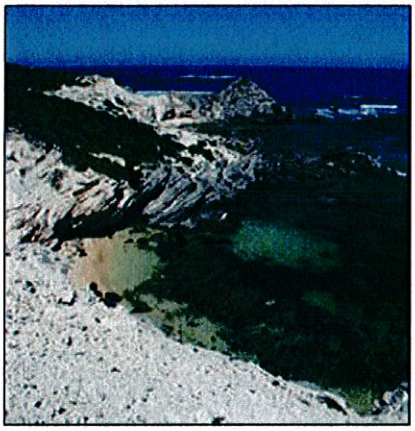
South West Islands Survey Report

2009

Department of Environment and Conservation, South West Region



Prepared by Kimberly Onton and Andrew Webb, October 2009

Department of Environment and Conservation

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SOUTH WEST CATCHMENTS COUNCIL

Acknowledgements

3.02 Project Manager: Kim Williams
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Field team: Kim Williams, Kim Onton, Andrew Webb, Melissa Manns, John Edwards, Holly Smith
Transport: Augusta Sea Search and Rescue, Department of Environment and Conservation's Swan Coastal District, Murdoch University.
Litter analysis: Wally Smith (Tangaroa Blue Ocean Care Society)
Photo credits: Department of Environment and Conservation

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Cover images: Fairy Tern chick (*Sterna nereis*) on Seal Island Nature Reserve; Hamelin Island Nature Reserve; Signage at Saint Alouarn Island Nature Reserve; DEC staff undertaking vegetation surveys on Seal Island Nature Reserve.

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AUGUSTA ISLANDS

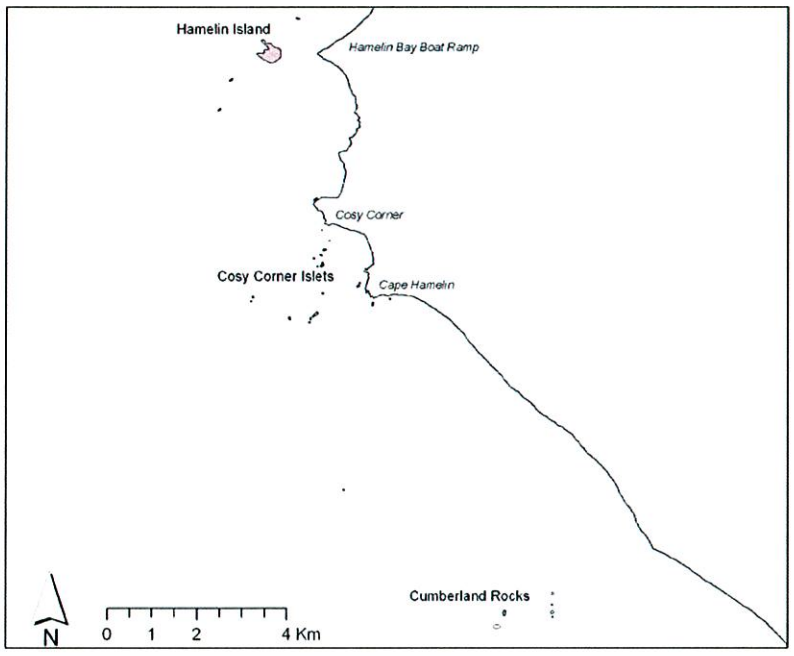
Introduction

A brief survey and inspection of the nature reserve islands and rocky islets off the south west coast was undertaken on 23rd and 24th February 2009. The aims of the survey were to:

1) Quantify the number of New Zealand Fur Seals (*Arctocephalus forsteri*) utilising the islands and rocks;
2) Determine the diversity and density of seabirds breeding on and utilizing the islands, particularly monitoring observations of tropical seabirds that have been observed extending their range south (Dunlop, 2008);
3) Determine the flora species diversity of the larger islands (St Alouarn, Seal and Hamelin Islands);
4) Conduct a general inspection of the nature reserves; and
5) Quantify the amount and types of litter on the islands.

Methods

Staff from the Department of Environment and Conservation's (DEC) South West Region and Blackwood District undertook the surveys of Hamelin, Flinders, Saint Alouarn and Seal Island Nature Reserves (Figure 1).



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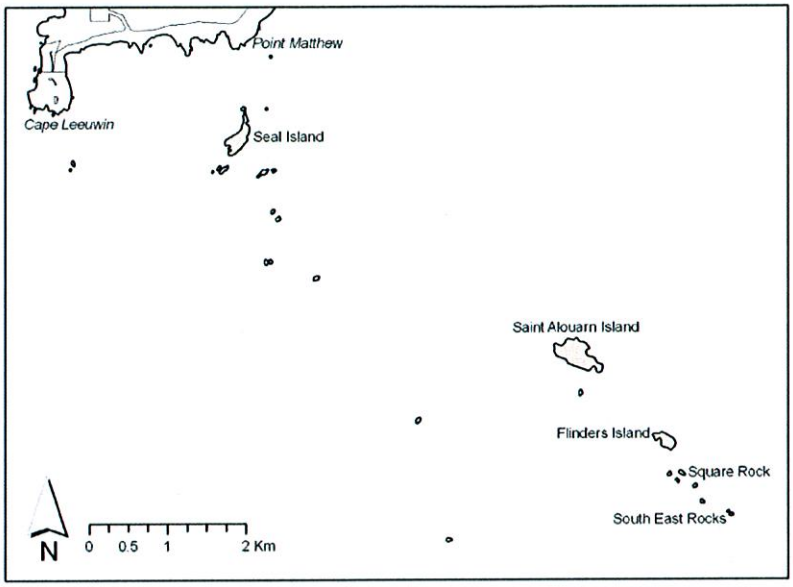

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Figure 1: Islands off the south west coast surveyed by DEC staff in February 2009. A. Hamelin Island Nature Reserve and Cosy Corner Islets. B. Seal, Saint Alourn and Flinders Island Nature Reserves and Square and South East Rocks.

Transport to and from Hamelin Island was provided by a DEC Swan Coastal District Marine Park inflatable vessel skippered by John Edwards (Marine Nature Conservation Officer) and launched at Hamelin Bay. Transport to the islands off Augusta was provided by the Augusta Sea Search and Rescue vessel skippered by local volunteers and launched at Flinders Bay. The vessels circled the rocky islets and approached close to the islands allowing DEC staff to be dropped into the water to swim or wade a short distance to the larger islands.

The larger islands (Hamelin, Flinders, Saint Alouarn and Seal) were traversed on foot and the smaller islands and rocks were inspected from the vessel. All seabirds, shorebirds and seals were counted, their breeding status noted and habitat was mapped. All plant species seen on the island were recorded and the dominant plant communities were mapped. Litter was collected and a general inspection of the islands, including signage, was undertaken.

Results and Discussion

Staff traversed Hamelin Island and counted birds, however there was no evidence of seabirds breeding on the island (Table 1). Similarly, in March 2008 a survey of Hamelin Island found no seabirds breeding on the island. Historically Hamelin Island has supported breeding Bridled Terns, Pacific Gulls, Flesh-footed Shearwaters, Silver Gulls, and Crested Terns. It is unknown whether disturbance, change in the parameters of breeding season, such as earlier commencement or some other factor has led to the abandonment of this previous seabird breeding colony (Kim Williams, pers. comm.) Many Bridled Terns (*Sterna anaethetus*) were observed from the vessel breeding on the islets off Cosy Corner.

Vegetation plots established in 2008 were rescored (Table 2, Figure 2). Attachment 1 describes the vegetation communities of Hamelin Island and draws comparisons

between recent and historical vegetation composition. Little rubbish was observed on Hamelin Island.

Staff landed on Flinders Island and counted New Zealand Fur Seals, with no seals observed on any of the other islands or rocks (Table 1). Birds were counted on Flinders Island from the vessel. Saint Alouarn and Seal Island birds were counted from the islands and seabird breeding habitats were mapped (Table 1, Figures 3 & 5). Many Bridled Terns were observed on both Saint Alouarn and Seal Islands however there was no evidence of recent breeding activity (i.e. no active nests or chicks). Bridled Terns were however observed flying or gliding very short distances from the island, suggesting that they may have been recently fledged birds practicing flying (Figure 7). Two pairs of Caspian Terns (*Sterna caspia*) were observed with chicks and a colony of Fairy Terns (*Sterna nereis*) were observed incubating eggs and brooding chicks on Seal Island (Table 1, Figure 7). The Bridled Terns inhabited most of the vegetated areas on both Saint Alouarn and Seal Islands and the Fairy Terns inhabited a specific rocky and sparsely vegetated area on Seal Island (Figure 3 & 5). Shearwater (likely Flesh-footed Shearwater *Puffinus carneipes* or Little Shearwater *Puffinus assimilis*) burrows were also present and densities were calculated around Saint Alouarn and Seal islands (Table 1, Figure 3 & 5). Burrow densities averaged 0.25 burrows per square metre across islands, with only one burrow occupied on Seal Island (3% occupancy across the islands).

A survey by Gillham in the first week of November 1959 identified that the majority of burrows on Saint Alouarn Island appeared to belong to the Little Shearwater (*P. assimilis*). Gillham also identified White-faced Storm-Petrel (*Pelagodroma marina*) burrows and the species was observed on the island in December 1842 by John Gilbert (Gillham, 1963). Insufficient time was available on the islands in 2009 to determine the proportion of species in burrows, however this work is recommended to be undertaken in future when time and resources permit.

Bridled Tern numbers were similar on Seal Island to that reported in 2007 and by Gillham in 1959 (Onton, 2008; Gillham, 1963). Gillham did note that the species was not observed this far south in 1842 by Gilbert, consistent with an observed expansion of this and other tropical seabird species south (Dunlop, 2007). No Crested Tern were observed on Seal Island in 2009, unlike the approximately 40 birds observed breeding in January 2008 and the 500-1000 estimated in November 1959 (Onton, 2008; Gillham, 1963). Another notable variation is that of Caspian Terns – 36 nests were observed by Gillham on Seal Island, compared with two in 2009 and none in 2008. It is recommended that a survey be undertaken in November or December to determine if peak seabird breeding is occurring earlier (November/December), or whether true declines in breeding terns is evident on the islands.

Vegetation plots were established on Saint Alouarn and Seal Islands and photo reference points established in 2008 were re-photographed to record change over time (Tables 3 & 4, Figures 4 & 6). Attachment 2 describes the vegetation communities of Saint Alouarn and Seal islands and draws comparisons between recent and historical vegetation composition.

Recently installed signage was inspected on the islands (Figure 8). Rubbish was collected on Saint Alouarn Island and its contents analysed by the Tangaroa Blue Ocean Care Society (Table 5).

Table 1: Wildlife observations from the South West Islands Survey, 23rd and 24th February 2009.

South West Islands Survey 2009									
Site	**Date**	**Time Start**	**Time Finish**	**Species Observed**			**Number**	**Notes**	
Hamelin Island	23/02/2009	1130	1430	Pied Cormorant	*Phalacrocorax varius*		2		**Staff:** Kim Williams, Kim Onton, Andrew Webb, John Edwards
				Pacific Gull	*Larus pacificus*		5		**Weather conditions:** 1-2m swell, SE winds in morning turning SSW in afternoon, up to 15-20 knots
				Osprey	*Pandion haliaetus*		1		**Transport:** Provided by John Edwards on Marine Park inflatible vessel launched at Hamelin Bay Boast Ramp.
				Sooty Oystercatcher	*Haematopus fuliginosus*		1		**Signage:** New aluminium processed graphics signage installed in November appears in good condition. Concern that second sign ('No Public Access') has been incorrectly positioned therefore required moving.
				Little Pied Cormorant	*Phalacrocorax melanoleucos*		1		**Litter:** Several pieces of fresh litter on beach likely from day visitors picnicing.
				Silver Gull	*Larus novaehollandiae*		40	Granite rocks offshore of Hamelin Island	**Vegetation:** Plots established in 2008 rescored and additional specimens collected.
				Bridled Tern	*Sterna anaethetus*		9	Arrived at island after 1300	
				Tree Martin	*Hirundo nigricans*		>1		
				White-breasted Robin	*Eopsaltria georgiana*		>1		
				Welcome Swallow	*Hirundo neoxena*		>1		
				Rock Parrot	*Neophema petrophila*		>1		
				Silvereye	*Zosterops lateralis*		>1		
				Southern Boobook	*Ninox novaeseelandiae*		1		
Cosy Corner Islets	23/02/2009	1400	1415	Bridled Tern	*Sterna anaethetus*		>500	Some large chicks observed	**Staff:** Kim Onton, John Edwards Vessel circled islands and birds counted from s distance. Windy weather made getting close to islets and accurate counts difficult.
Flinders Island	24/02/2009	1030	1130	New Zealand Fur Seal	*Arctocepahalus forsteri*	Bulls	8		**Staff:** Kim Onton, Andrew Webb, John Edwards, Melissa Manns
						Cows	41		**Weather conditions:** 1-2m swell, SSW winds up to knots
						Juveniles	12		**Transport:** Augusta Sea Search and Rescue Niaid.
						Black pups	3		John landed on the island and counted seals, birds were counted from the vessel.
						Moult pups	33		
				Bridled Tern	*Sterna anaethetus*		40		
				Silver Gull	*Larus novaehollandiae*		7		
				Caspian Tern	*Sterna caspia*		31		
				Pied Cormorant	*Phalacrocorax varius*		14		
				Sooty Oystercatcher	*Haematopus fuliginosus*		2		
				Pacific Gull	*Larus pacificus*	Adult	1		
						Juvenile	1		
				Ruddy Turnstone	*Arenaria interpres*		1		
				Rock Parrot	*Neophema petrophila*		1		
				Egernia sp. present					
South East Rocks	24/02/2009	1015	1030	New Zealand Fur Seal	*Arctocepahalus forsteri*		28	All seal ages collectively	Sea Search and Rescue vessel circled rocks and seals were counted from the vessel.
St Alouarn Island	24/02/2009	1100	1300	Bridled Tern	*Sterna anaethetus*		440	Occupied most of the island. Mostly NW side of island	**Staff:** Kim Onton, Andrew Webb, John Edwards, Melissa Manns
				Pacific Gull	*Larus pacificus*		5		**Weather conditions:** 1-2m swell, SSW winds up to 20 knots
				Sooty Oystercatcher	*Haematopus fuliginosus*		4		**Transport:** Augusta Sea Search and Rescue Niaid.
				Pied Cormorant	*Phalacrocorax varius*		6		**Signage:** New aluminium processed graphics signage installed in November appears in good condition. Location: -34.40486, 115.19572. Old wooden signage still in original location in poor condition.
				Rock Parrot	*Neophema petrophila*		>1		**Litter:** One large bag of rubbish containing mostly plastic bottles and floats was collected, plus one milk crate. Contents will be analysed by Tangaroa Blue Ocean Care Society.
				Egernia sp. present					**Vegetation:** Three vegetation monitoring plots were established. Photographs were taken at two photopoints established in 2008 (Veg photopoint 1: -34.40390, 115.19672; Veg photopoint 2: -34.40477, 115.19716).
									Shearwater burrows: Burrow density counts were undertaken in 5 x 5m quadrats at 3 sites. Q1= (9) 0.36 per m^2, Q2= (0) 0 per m^2, Q3= (9) 0.36 per m^2. Average = 0.24 burrows per m^2, 0% occupancy.
Seal Island	24/02/2009	1300	1430	Sooty Oystercatcher	*Haematopus fuliginosus*		2		**Staff:** Kim Onton, Andrew Webb, John Edwards, Melissa Manns
				Pacific Gull	*Larus pacificus*		3		**Weather conditions:** 1-2m swell, SSW winds up to 20 knots
				Rock Parrot	*Neophema petrophila*		>1		**Transport:** Augusta Sea Search and Rescue Niaid.
				Ruddy Turnstone	*Arenaria interpres*		6		**Signage:** New aluminium processed graphics signage installed in November appears in good condition. Location: -34.37927, 115.15771. Old wooden signage has been removed.
				Silver Gull	*Larus novaehollandiae*		1		**Litter:** Some litter, such as bottles and foam was observed on the island.
				Grey-tailed Tattler	*Heteroscelus brevipes*		2		**Vegetation:** Two vegetation monitoring plots were established and photographs taken (Veg plot 1: -34.38005, 115.15714; Veg plot 2: -34.37981, 115.15745).
				Bridled Tern	*Sterna anaethetus*		200	Occupied most of the island	**Shearwater burrows:** Burrow density counts were undertaken in 5 x 5m quadrats at 2 sites. Q1=(4) 0.16 per m^2 (all occured under a *Rhagodia* bush, 1 active), Q2= (9) 0.36 per m^2. Average = 0.26 burrows per m^2, 8% occupancy.
				Fairy Tern	*Sterna nereis*	Adult	33	Breeding habitat of Fairy Terns has been mapped. Location: -34.37947, 115.15720.	
						Chick	3		
						Egg	11		
				Caspian Tern	*Sterna caspia*	Adult	2	Two separate pairs	
						Runner	2		

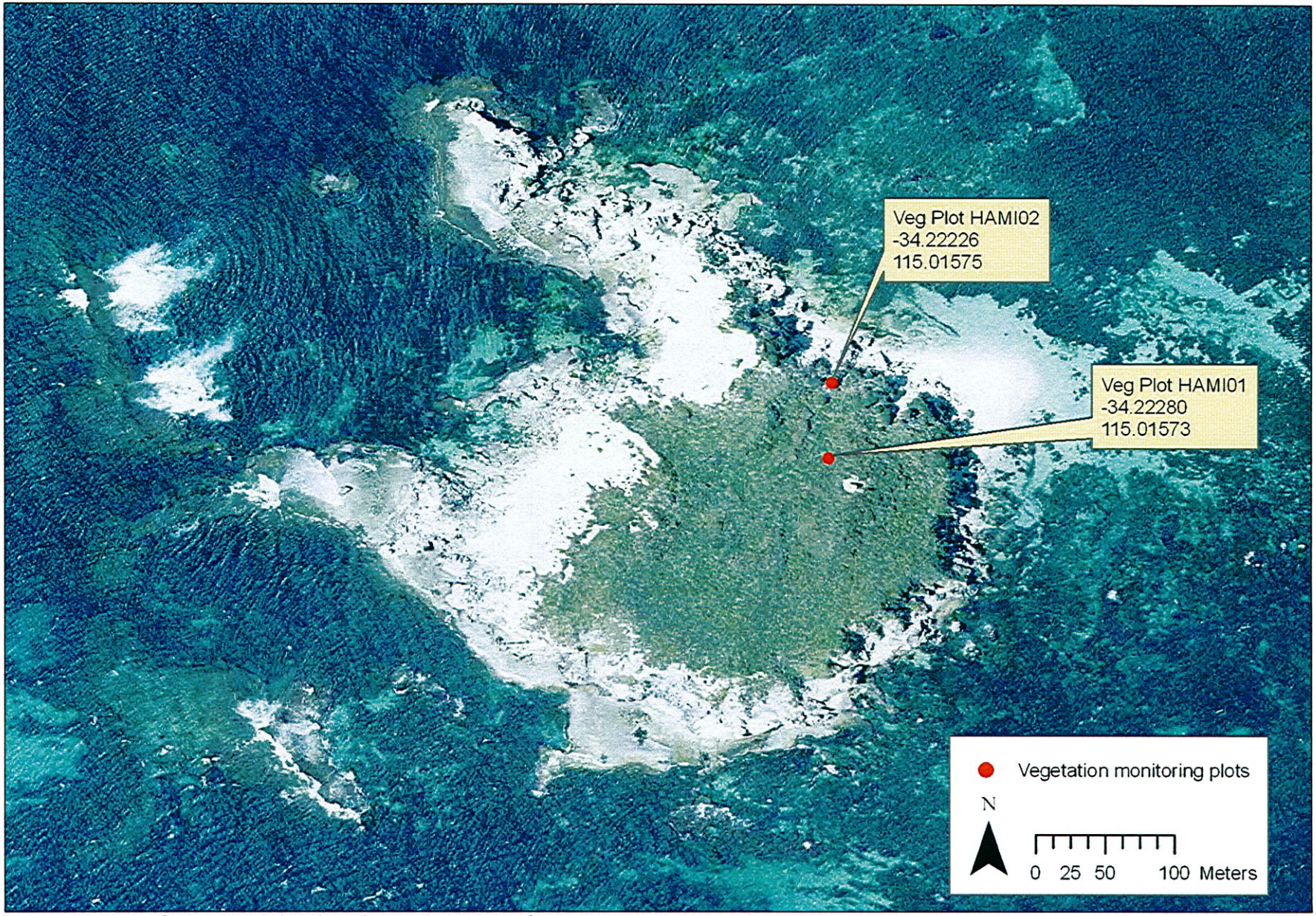

Figure 2: Map of Hamelin Island outlining location of vegetation monitoring plots.

Table 2: Flora species of Hamelin Island with comparisons between recent and historical observations.

Table 2 continued

Euphorbiaceae				
	Beyeria viscosa		X	only recorded in DEC 1997 survey
	Phyllanthus calycinus	X		
	Poranthera microphylla	X		
Sapindaceae				
	Dodonaea aptera	X	X	
Rhamnaceae				
	Spyridium globulosum	X	X	
	Trymalium spathulatum	X		? noted in 1959 survey
Sterculiaceae				
	Thomasia triphylla	X		
Dilleniaceae				
	Hibbertia cuneiformis	X	X	
Thymelaeaceae				
	Pimelea ferruginea	X	X	
Myrtaceae				
	Agonis flexuosa	X	X	
	Melaleuca huegelii	X	X	
	Melaleuca lanceolata	X	X	
Apiaceae				
	Daucus glochidiatus		X	
Epacridaceae				
	Acrotriche cordata	X	X	
	Leucopogon parviflorus	X	X	
Primulaceae				
	*Anagallis arvensis var. arvensis	X	X	
	*Anagallis arvensis var. caerulea	X	X	
	Samolus repens	X	X	
Apocynaceae				
	Alyxia buxifolia	X		
Convolvulaceae				
	Dichondra repens	X		
Orobanchaceae				
	*Orobanche minor		X	
Myoporaceae				
	Myoporum insulare	X	X	
Lobeliaceae				
	Isotoma scapigera	X		
Goodeniaceae				
	Scaevola crassifolia	X	X	
	Scaevola nitida		X	
Stylidiaceae				
	Stylidium adnatum	X		
	Stylidium breviscapum		X	
Asteraceae				
	Actites megalocarpus	X	X	
	Leucophyta brownii	X	X	
	Olearia axillaris	X	X	
	*Senecio elegans		X	
	Senecio pinnatifolius	X	X	
	*Sonchus oleraceus	X	X	
Dasypogonaceae				
	Acanthocarpus preissii	X	X	

* = introduced species

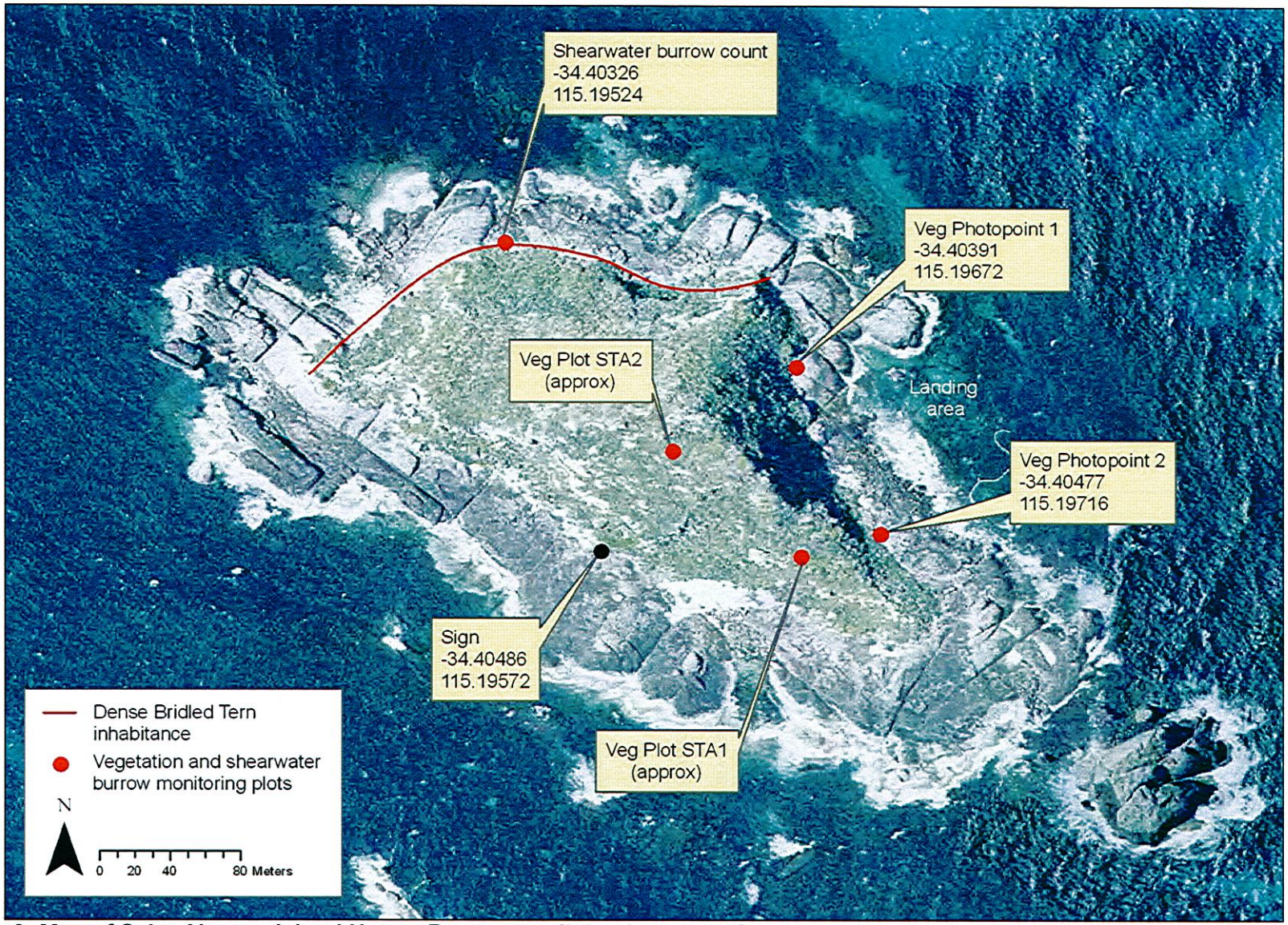

Figure 3: Map of Saint Alouarn Island Nature Reserve outlining location of vegetation monitoring and shearwater burrow density plots. Bridled Terns (*Sterna anaethetus*) inhabited the vegetated cliffs of the northwest side of the island in the greatest densities, however were observed in abundance throughout all vegetated areas of the island. No evidence of recent nesting activity was observed.

Table 3: Flora species of Saint Alouarn Island with comparisons between recent and historical observations.

Name	1959 species	2008/09 species	Notes	Weed species
Apium prostratum	X	X	ssp. filiforme	
Atriplex hypoleuca		X		
Bromus arenarius	X			*
Calandrinia calyptrata	X			
Calandrinia polypetala	?			
Carpobrotus virescens	X	X?	id'd as C.rossii in 1959 need more flwing material to confirm id	
Chenopodium anthelminticum	X		unknown spp maybe Dysphania anthelminticum although still no info on sp.	
Cotula coronopifolia	X	X		*
Cotula cotuloides	X			
Crassula colorata	X			
Crassula decumbens	X			
Hordeum leporinum	X			*
Hornungia procumbens	X			*
Lepidium foliosum	X	X		
Leucophyta brownii	X			
Lolium rigidum		X		*
Malva preissiana	X	X		
Mesembryanthemum crystallinum		X		*
Nitraria billardierei	X	X		
Olearia axillaris	X	X		
Parietaria debilis	X			
Poa poiformis		X		
Poaceae sp.		X	dead annual material collected	
Polycarpon tetraphyllum	X			*
Rhagodia baccata	X	X		
Sagina maritima	X	X	this species was identified as S.apetala in 1959	*
Senecio elegans		X		*
Sonchus oleraceus	X	X		*
Stellaria media	X			*
Tetragonia decumbens		X	was recorded as T.implexicoma in 1959	
Threlkeldia diffusa	X	X		

Figure 4: Plant community photo points from coastal rocks to island crest on Saint Alouarn Island, 23 February 2009. A) Vegetation photo point 1. B) Vegetation photo point 2.

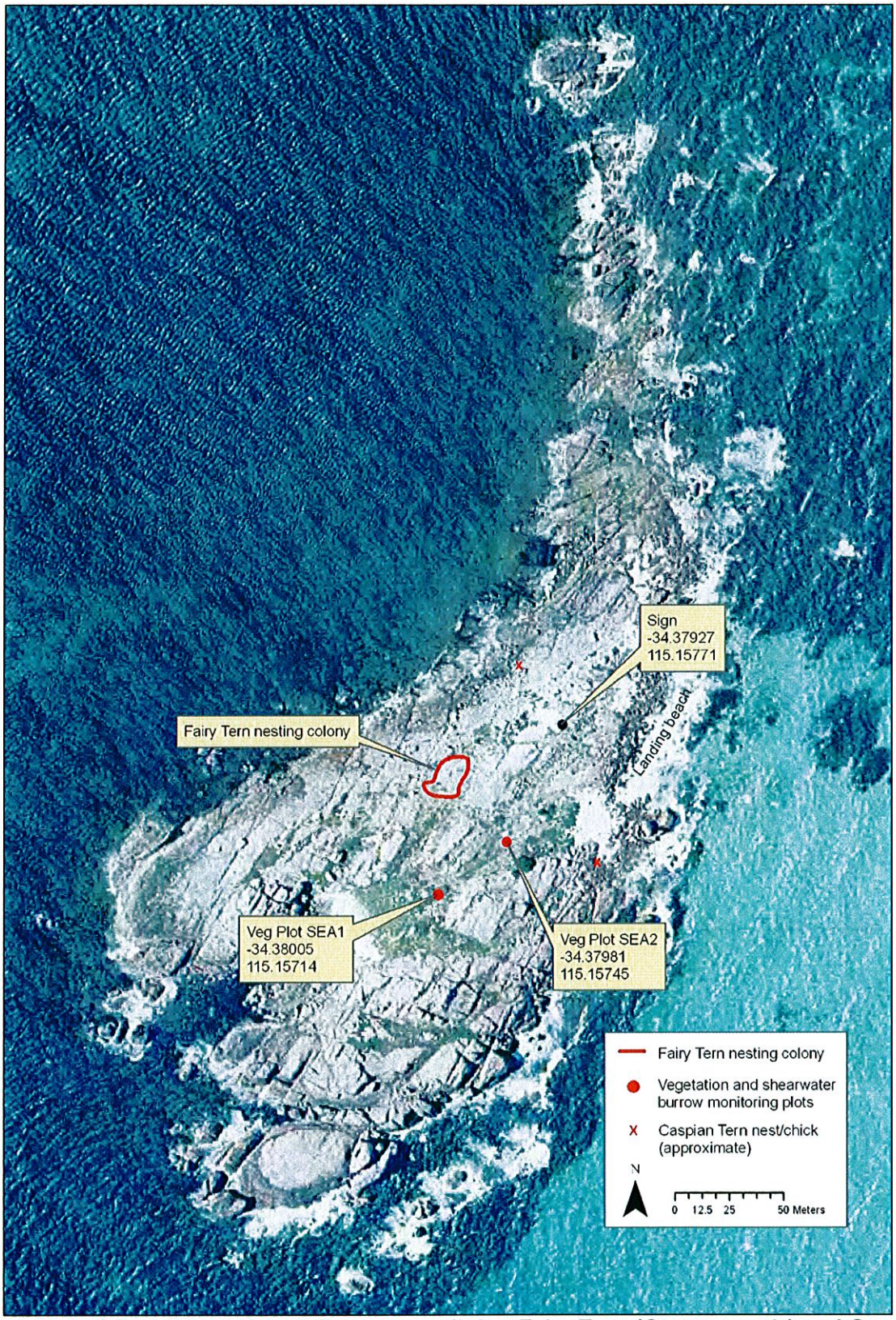

Figure 5: Map of Seal Island Nature Reserve outlining Fairy Tern (*Sterna nereis*) and Caspian Tern (*Sterna caspia*) breeding habitat and location of vegetation monitoring plots. Bridled Terns (*Sterna anaethetus*) were observed throughout the island though no evidence of breeding was observed.

Table 4: Flora species of Seal Island with comparisons between recent and historical observations.

Species Name	1959 species	2008/09 species	Notes	Weed species
Actites megalocarpus	X	X		
Anagallis arvensis var. arvensis		X		*
Apium prostratum	X	X	ssp. filiforme	
Arctotheca calendula	X			*
Arctotheca populifolia	X	X		*
Atriplex hypoleuca		X		
Atriplex prostrata		X		
Calandrinia calyptrata	X			
Calandrinia polypetala	?			
Carpobrotus virescens	X	X	id'd as C.rossii in 1959 need more flwing material to confirm id	
Chenopodium glaucum		X		
Comprosma repens		X		*
Cotula coronopifolia	X	X		*
Cotula cotuloides	X			
Crassula colorata	X	X		
Crassula decumbens	X			
Cynodon dactylon	X			*
Euphorbia paralias		X		*
Hordeum leporinum	X	X		*
Hornungia procumbens	X			*
Isolepis sp.		X	annual	
Lagunaria patersonii		X		*
Lepidium foliosum	X	X		
Lolium rigidum	X	X		*
Malva preissiana	X	X		
Mesembryanthemum crystallinum	X	X		*
Olearia axillaris		X		
Parietaria debilis	X			
Pennisetum clandestinum		X		*
Polycarpon tetraphyllum	X			*
Rhagodia baccata		X		
Sagina maritima	X	X	this species was identified as S.apetala in 1959	*
Senecio elegans		X		*
Sonchus oleraceus	X	X		*
Stellaria media	X			*
Tetragonia decumbens		X		
Threlkeldia diffusa	X			

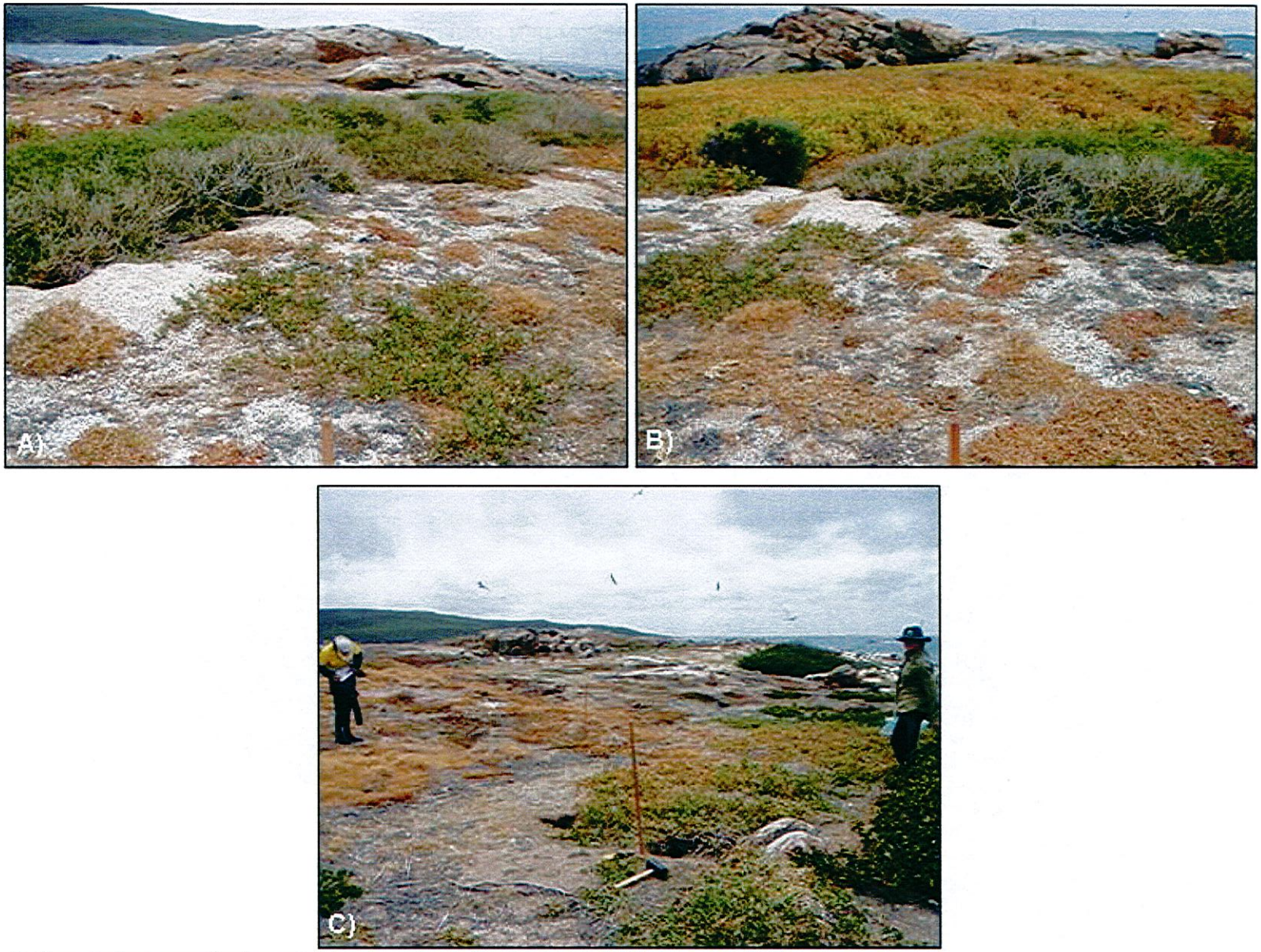

Figure 6: Vegetation monitoring plot images from Seal Island, 24 February 2009.
A) & B) Vegetation plot SEA1. C) Vegetation plots SEA2.

Figure 7: Images of seabirds on south west islands 24 February 2009. A. Bridled Terns (*Sterna anaethetus*) flying close to vegetation on Saint Alouarn Island Nature Reserve. B. Fairy Tern (*Sterna nereis*) colony on Seal Island Nature Reserve. C. Fairy Tern chick camouflaged in vegetation on Seal Island Nature Reserve.

Figure 8: Images of south west islands 23-24 February 2009. A – C: Hamelin Island Nature Reserve. D: Signage on Seal Island Nature Reserve. E. Signage on Saint Alouarn Island Nature Reserve. F: Bridled Terns (*Sterna anaethetus*) on Seal Island Nature Reserve.

Table 5: Litter collected on Saint Alouarn Island Nature Reserve 24 February 2009. (Data courtesy Wally Smith, Tangaroa Blue Ocean Care Society)

TYPE OF LITTER	AMOUNT
Plastic Drink Bottles	7
Aluminium Cans	1
Polystyrene Foam	2
Pieces of Plastic	1
Buoys/Floats	4
Rope	20 metres
Rubber	1

BARR ISLAND

A report of nesting Fairy Terns on Barr Island, at the mouth of the Collie River under the responsibility of the Shire of Harvey, was investigated on 29th December 2008. A breeding colony of approximately 200 birds was observed (Table 6). It is estimated that approximately one third of the colony were incubating eggs and another third were brooding and feeding chicks (Figures 9 & 10). Other birds observed on the island included Caspian and Crested Terns, Common Sandpiper (*Actitis hypoleucos*) and Lesser Sand Plover (*Charadrius mongolus*) (Table 6). Another trip was made to Barr Island on 29th January 2009. The colony appeared to be abandoned, with over 30 dead chicks and numerous abandoned eggs remaining at the nest site. One chick was observed camouflaged in vegetation and an adult bird was observed flying in with fish possibly to feed that chick. Upon further inspection of the island, six juvenile Fairy Terns were observed in the west side of the island. Seven adult birds later flew in with fish to feed juveniles. Several dead chicks and abandoned eggs were collected as voucher specimens. Crested and Caspian Terns were again observed on the island (Table 6).

Transport to Barr Island was kindly provided by Holly Smith, PhD candidate, in a Murdoch University research vessel.

Figure 9: Map of Barr Island outlining Fairy Tern (*Sterna nereis*) breeding colony and locations where other coastal birds were observed.

Table 6: Bird observations on Barr Island, 29th December 2008 and 29th January 2009.

Date	Time	Species			Number
29/12/2008	0945	Fairy tern	*Sterna nereis*		>200*
		Common sandpiper	*Actitis hypoleucos*		1
		Caspian tern	*Sterna caspia*		6
		Crested tern	*Sterna bergii*		2
		Silver gull	*Larus novaehollandiae*		10
		Pied oystercatcher	*Haematopus longirostris*		2
		Pied cormorant	*Phalocrocorax varius*		6
		Lesser sand plover	*Charadrius mongolus*		1
29/01/2009	1000	Common Sandpiper	*Actitis hypoleucos*		1
		Common Greenshank	*Tringa nebularia*		1
		Buff-banded Rail	*Gallirallus philippensis*		1
29/01/2009	1300	Fairy Tern	*Sterna nereis*	Juvenile	6
				Adult	7
				Runner	1
				Dead chicks	30
		Caspian Tern	*Sterna caspia*	Adult	19
				Juvenile	4
		Crested Tern	*Sterna bergii*	Adult	6
				Juvenile	4
		Australian Pelican	*Pelecanus conspicillatus*	Adult	8
		Pied Cormorant	*Phalocrocorax varius*	Adult	1
		Red-capped Plover	*Charadrius ruficapillus*	Adult	2

*Possibly 50 or more chicks in addition and 20+ nests with eggs

Figure 10: Images of Barr Island Fairy Tern colony. A. Fairy Tern colony in December 2009. B. Fairy Tern adults and chicks in December 2008. C. Juvenile Fairy Tern observed in January 2009. D. Juvenile and adult Fairy Terns in January 2009. Abandoned Fairy Tern nest in January 2009. Pelican and large tern roost on Barr Island, January 2009.

SUGARLOAF ROCK

Annual monitoring of the Red-tailed Tropicbird (*Phaethon rubricauda*) was undertaken over the 2008/09 breeding season. This involved regular visits to Sugarloaf Rock, off Cape Naturaliste, to search nest sites for breeding pairs over the summer months. Two pairs of birds were observed on nests each incubating one and two eggs respectively. However the breeding attempts were unsuccessful with no chicks emerging from the nests. This marks an improvement on the previous two seasons pair counts however is consistent with a decreasing trend in Red-tailed Tropicbird numbers (Figure 11).

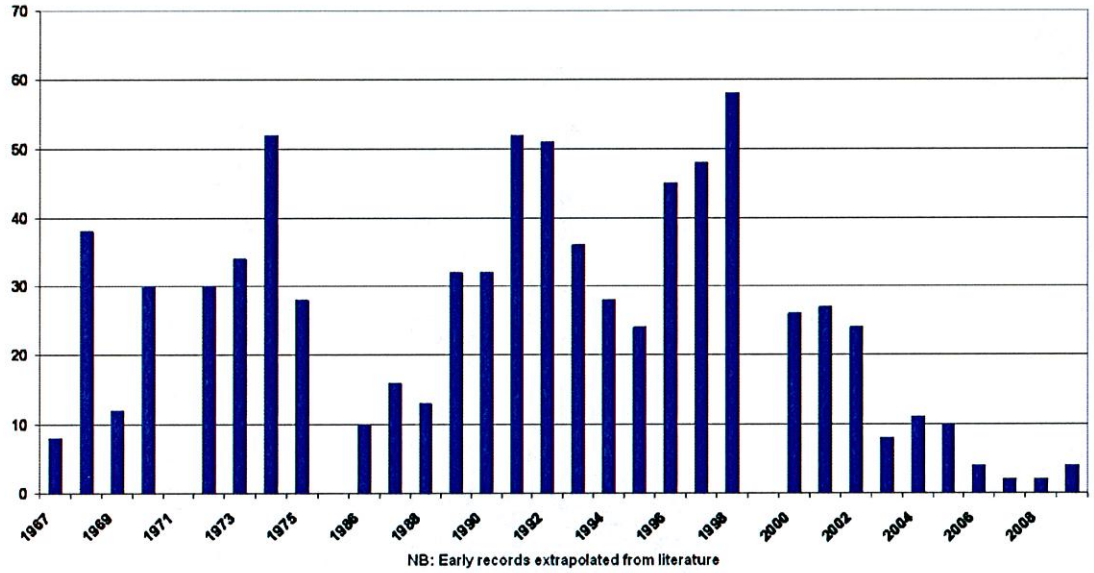

Figure 11: Red-tailed Tropicbird annual counts at Sugarloaf Rock 1967 - 2009.

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Attachment 1: Vegetation Communities of Hamelin Island. Prepared by Andrew Webb, July 2009.

A survey of Hamelin Island was undertaken on the 23rd February 2009, all plant species seen on the island were recorded and the dominant plant communities were mapped. The island has been subject to partial flora surveys in 2008 and 1997 by staff from the DEC Blackwood District and subject to a detailed survey by seabird researchers in 1959 (Gillham 1963). The following information is based on the results of the 2009 survey with reference to the other surveys undertaken.

A species list for the island is presented in Table 2.

The plant communities of Hamelin Island

The dominant plant communities of the island are detailed below.

1. On the western coastal fringing side of the island, vegetation predominantly occurs as scattered clumps on exposed white sand and limestone. The dominant plant community of this area is an open low heath of *Pimelea ferruginea, Acacia cyclops, A.littorea, Olearia axillaris, Scaveola crassifolia* and *Leucophyta brownii* with *Ficinia nodosa* and emergent *Lepidosperma gladiatum* sedges and *Carpobrotus sp, Samolus repens* herbs. In some areas *Sarcocornia blackiana* forms a dominant herbaceous layer.

2. On the southern extent of the island a exposed closed low heath shrub community is dominant. Dominant species include *Acacia littorea, Acrotriche cordata, Olearia axillaris, Spyridium globulosum, Scaveola crassifolia, Pimelea ferruginea* and emergent *Melaleuca huegelii* with *Ficinia nodosa, Lepidosperma gladiatum* sedges and *Poa poiformis, Acanthocarpos preissii* grass and herbs.

3. The lower relatively sheltered centre of the island supports a closed heath of species including *Spyridium globulosum, Leucopogon parviflorus, Templetonia retusa, Dodonaea aptera, Olearia axillaris, Boronia alata* and emergent *Agonis flexuosa* and *Scaveola nitida*, over *Lepidosperma squamata* (coastal) sedges and *Poa poiformis* and *Acanthocarpos preissii* grass and herbs.

4. On the northern extent of the island is a *Melaleuca lanceolata* low closed forest, over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia baccata* open low heath with *Samolus repens* herbs.

5. Dominant vegetation of the sandy beach at the north-eastern extent of the island is the weed species *Cakile maritima,* the beach also supports a solitary population of *Atriplex isatidea.*

Observations on the flora of Hamelin Island

The island supports flora and plant communities comparable to those on the adjoining mainland. It is interesting to note is that *Myoporum insulare* which is relatively common in the island plant community is very poorly recorded in the comparable plant communities of the mainland. The nearest recorded populations of the species on the mainland are from Geographe Bay, Redgate and Gracetown. The nearest other populations are from the

Yalgorup National Park and the Albany areas. It is possible that the species is under-collected on the mainland.

Hamelin Island was last subject to a documented flora survey in 1959 (Gillham 1963). A comparison of the findings of that survey in relation to the 2009 survey notes the following significant changes that may have occurred in the island flora over that period.

It needs to be noted that the comparison of species list and inferences of changes within the plant community based on those lists can be risky without knowing the level of survey work undertaken to generate the relevant species lists. For the sake of this comparison annual species have been excluded as the 2009 survey work was undertaken in late summer.

- *Thomasia triphylla* was collected and noted to be abundant in the island vegetation in 1959; this species was not recorded in the 2009 survey or recorded in any preceding partial surveys in 1997 and 2008.

  Also recorded in 1959 but not recorded by any of the subsequent DEC surveys were the woody shrub species *Alyxia buxifolia, Phyllanthus calycinus* and *Sollya fusiformis.* Given that *Alyxia buxifolia* has not previously been recorded on the Leeuwin Naturaliste ridge it is possible that the 1959 record was an incorrect identification. The low shrub species *Phyllanthus calycinus* could easily be overlooked in the dense vegetation of the island by subsequent surveys. It is possible that together with *Thomasia triphylla* that *Sollya fusiformis* may have been lost from the island vegetation.

  The island vegetation has not been subject to any apparent disturbance activities to cause species loss, except the exclusion of fire. It is possible that these species have become senescent in the plant community due to a lack of recruitment opportunities such as fire. Surveys of the island vegetation are recommended following any future fire events to see if these species respond from soil stored seed banks.

- The 2009 survey noted the dominance of the weed species *Cakile maritima* on the sandy beach at the northern extent of the island. This species wasn't recorded on the island in 1959 and it appears as though the species has colonized the island since that survey. It is also of interest to note the appearance of the native coastal colonizing species *Atriplex isatidea* and *Nitraria billardierei* on the island since 1959.

- The 2009 survey also recorded the presence of the woody shrub species *Diplolaena dampieri* and *Hardenbergia comptoniana* within the island vegetation, these species were not recorded in 1959. It appears unlikely that these species would have colonized the island since 1959 and it is likely that these species where overlooked in the 1959 survey.

- The DEC floristic survey in 1997 recorded the additional perennial species of *Muehlenbeckia adpressa* and *Beyeria viscosa*; neither of these species were noted in the 2009 survey. A review of herbarium collections has shown the identification of the *Muehlenbeckia* to be correct; it is likely that this species was missed in the 2009 survey. It is unlikely that any plants of the tall shrub *Beyeria viscosa* on the island would have been missed by the 2009 survey, unfortunately the 1997 herbarium collection is missing so its identification is unable to be confirmed.

Attachment 2: Vegetation Communities of Saint Alouarn and Seal Islands. Prepared by Andrew Webb, July 2009.

Floristic surveys of the two vegetated islands, Seal Island and St.Alouarn Island, off the coast of Western Australia south of Augusta were undertaken on the 11th January 2008 and the 24th February 2009. Unfortunately the surveys were undertaken in summer months and were not ideal for recording the presence of spring annuals or collecting flowering specimens for identification purposes, as such a follow-up spring survey is required to fully document the islands flora.

While other floristic surveys of these islands have occurred over recent times, the last documented floristic survey was undertaken in November 1959 and the results of that survey are provided together with sea-bird information in the report "Association of Nesting Sea-Birds and Vegetation Types on Islands off Cape Leeuwin, South-Western Australia" by M.E. Gillham in the journal Western Australian Naturalist (1963).

Tables 3 and 4 compare plant species for both islands as recorded in the 1959 survey and 2008/09 surveys. The information below highlights some of the key differences in the islands flora that can be noted between the two surveys.

Seal Island

Seal Island has three dominant plant communities being,

- A *Malva preissiana, Tetragonia decumbens, Rhagodia baccata, Carpobrotus virescens* open low heath on gritty sandy soils over granite rock that dominates a majority of the island.
- The central area of the island has an open version of the same community as above, with the addition of *Pennisetum clandestinum* closed grasses and emergent plants of *Comprosma repens*.
- The western extent of the island is dominated by a *Euphorbia paralias* closed low heath.

Detail on the dominant plant communities on the island in 1959 are found throughout the 1963 publication.

Seal Island in 1959 supported 23 plant species and in 2008/09 it supports 26.

A comparison of the flora and communities as noted in the 2008 inspection and documented from the 1959 inspection indicates that in 1959 the island only supported annual and herbaceous succulent species, when in 2008 the island supports up to 7 species that could be considered woody perennials.

Since 1959 some significant changes that have occurred in the islands flora would be the introduction of *Euphorbia paralias, Comprosma repens* and *Pennisetum clandestinum*. As indicated below these species are becoming or have the potential to become significant species of the islands flora.

- *Euphorbia paralias* has become a dominant species (practically a monoculture) on the western side of the island.
- *Comprosma repens* (mirror bush) is a garden plant that has become naturalized on the island and has established large plants together with several young plants in the centre of the island; this woody perennial has the potential to change the islands vegetation structure from a low herbaceous community to an elevated scrub community.

- *Pennisetum clandestinum* (kikuyu) is also becoming a dominant species in the centre area of the island; it is possible this species was present in 1959 but was mistaken for *Cynodon dactylon* (couch grass) which was not seen in the 2008.

Another notable change in the flora of Seal Island is that dominant vegetation descriptions in 2008 recorded the weed species *Mesembryanthemum crystallinum* as a dominant species, when it wasn't regarded as a dominant species in 1959.

St.Alouarn Island

The dominant vegetation of St.Alouarn Island is,

- The lower slopes/coastal fringe of the island which has gritty sandy soils over granite and gritty sandy soils over shallow limestone over granite is dominated by *Nitraria billardierei, Rhagodia baccata, Mesembryanthemum crystallinum, Threlkeldia diffusa* closed low heath with emergent *Olearia axillaris.* In the elevated areas of the island which has gritty sandy soils over limestone rock *Mesembryanthemum crystallinum* falls out of the vegetation community and is replaced as a dominant by *Olearia axillaris.*

Detail on the dominant vegetation on the island in 1959 is found throughout the 1963 publication.

St.Alouarn Island in 1959 supported 23 species as compared to a total of 18 species in 2008/09. Although it needs to be noted that the structurally diverse plant communities as found on St.Alouarn Island is likely to support spring annual species that would have been missed by the 2008 survey.

A comparison of the flora and vegetation as noted in the 2008 inspection and documented from the 1959 inspection indicates that one of the most significant changes is the loss of the native species *Leucophyta brownii* from the island. This species in 1959 was recorded as rare and coastal, growing at the lowest points of the island at the interface between the ocean and the vegetation. This same area is now dominated by the species *Mesembryanthemum crystallinum, Senecio elegans* and *Tetragonia decumbens.* Two of these species particularly the weed species *Mesembryanthemum* are prostrate spreading species that form large monocultures. Interestingly the *Mesembryanthemum* was not recorded as being present on the island in 1959, it is likely that the colonization and domination of this species within the island fringing zone has been a contributing factor in the loss of *Leucophyta* from the island.