JMO 1988

ROTTNEST ISLAND FIELD TRIP

OBSERVATION OF CRESTED TERN COLONIES:

YOU MUST NEVER VENTURE NEAR OR INTO A BREEDING COLONY

The object of this exercise is to learn techniques of observing seabird colonies and methods of recording behavioural displays. We will be observing the birds in one of three areas on Rottnest Island (see Figures 1 & 2 for localities):

1. The beach of Salmon Bay and on Salmon Point.

2. The spits and islets at Lake Baghdad (on the eastern side of the lake).

3. The beach at Phillip Point and Natural Jetty.

While en route to one of these sites, students should observe and record all other birds seen. A list can be compiled on the back of these notes, or in your field notebook.

Your assignment for this observational exercise is as follows:

> Observe and describe the aerial and ground, group and paired displays of pre-breeding and/or breeding Crested Terns.

The observed patterns will be divided into "behavioural units" i.e. replicated postures, displays or interactions. These are outlined in detail on the following pages.

It would be ideal to record about 2 hours of observations, if possible. Recording sheets are supplied (orange sheets attached), as well as information on the Crested Tern and other Terns found on Rottnest Island. It is important to fill out the record sheets as **ACCURATELY** as possible, in every detail. For example, windy conditions reduce fishing success and warm conditions always cause a considerable increase in activity; this must all be recorded. Naturally, the time of day also corresponds to very different behavioural patterns.

Your data will be summarised and interpreted and you must be prepared to comment on your group's activities and results.

CRESTED TERN **Sterna bergii**

Identification: Length 43-53 cm; weight 350-400 g. The Crested Tern, which is slightly larger than the Silver Gull, has a black crown and some of the feathers on the crown may be erected to form a crest. The upper surfaces are grey, the forehead, neck, chest and under surfaces are white. The eyes are brown, the long bill yellow and the legs black. In flight the wings appear long, narrow and raked back while the tail is deeply forked.

Status: The Crested Tern is the most common tern on the island and for many people, particularly those who stay at Geordie Bay, the calls of this bird may be one of the "sounds of Rottnest Island". The Crested Tern utters a harsh guttural cry as it flies and the nesting colonies on Baghdad and Herschell Lakes emit a constant racket at all hours of the day and night. The birds may be seen as they fly over heading to and from the coast. The breeding colonies produce so much noise that they may be heard outside the cottages at Geordie Bay (2 km away) or the lighthouse on Wadgemup Hill (over 3 km away).

The nesting season of the Crested Tern extends through April and May or from September to December. This Tern tends to form tight concentric nesting colonies with the nests spaced from 1/2 - 1 metre apart. The nest is a simple un lined scrape and the clutch is invariably composed

of a single egg. The first Terns to arrive and commence laying form the nucleus of the colony. It is to this nucleus that other breeding pairs are subsequently attracted, and these in turn nest on the periphery of the established congregation. Gradually, over a period of one or two months, the colony grows out from its centre. This is why the use of decoys has been quite successful.

The actual time at which laying is initiated can vary somewhat from year to year and it should be noted there are two laying periods, Autumn and Spring. It is usual for egg-laying to commence during April, early May or between the middle of September and the end of the first week in October. Incubation of the egg takes about 4 weeks.

The Crested Tern has altered the site of its breeding colonies over the last 30 years, but the population on the island is a subgroup of the much larger population which occurs on the is lands of Cockburn Sound. There is an interchange between the various breeding colonies and a bird banded on Dyer Island was recovered at City Beach. During the 1950's this species nested on Dyer Island, Green Island and the stack in Eagle Bay (see Figures 1 & 2) but did not use each site every year. At this time the population was estimated at 300-400 breeding pairs and there were no records of any nesting on the main island. By the early 1980's the Crested Tern had moved its breeding colonies onto the salt-lake system. The two major breeding concentrations are now on the islet in West Baghdad Lake and the islet at the east end of Herschell Lake. The birds appear to have abandoned Dyer Island as a nest site but there was a small colony on Green Island early in 1982. It did not contain anywhere near the 300 nests recorded there in 1960.

The Crested Tern usually reaches sexual maturity when 2 years old but there are records of them having bred at 1 year. Once they attain maturity, they form lasting pair bonds but these occasionally break down and the birds remate. With the start of the breeding season the birds engage in courtship displays. During this period the members of the pair may be seen performing elaborate aerial displays as they dive, climb, circle and zig-zag in perfect close formation, calling loudly. On the ground during the prelude to copulation, the members of the pair engage in an elegant display as they circle each other with their wings held out from the body, drooped towards the ground and the crest raised.

A common bird roosting on sand spits and shell beaches around the salt-lakes, the Crested Tern is also common on the beaches and rocky platforms around the coast. The sandy point between Stark and Rocky Bays is a favourite roosting point as is the east end of Salmon Bay. This is a particularly good vantage point to watch the birds as the road runs almost to the cliff and the birds may be observed from above without disturbance. At this spot the birds often roost in groups of several hundred; preening, sleeping, walking into the water and bathing, fishing just off the shore or involved in mating displays. The birds often roost on the rocky platforms at Cape Vlamingh and Cathedral Rocks where there are a series of rocky protrusions on which the birds perch, the area being well coated with their white droppings.

Population counts of the Crested Tern on Rottnest Island carried out between March 1982 and October 1984 showed that there was a marked seasonal pattern in the number of birds present; being highest between April and June, depending on season (peak nearly 2200 in June 1983) and lowest in late winter and spring (about 620 in August and September 1983).

Banding studies have shown that the Crested Tern may live for more than 20 years.

FROM: Saunders et al (1985); Veen (1977).

References and Additional Reading

Blakers, M., Davies, S.J.J.F. & Reilly, P.N. (1984). **The atlas of Australian birds.** Melbourne University Press, Victoria. pp. 200-209.

Dunlop, J.N. (1985). Seasonal variation in prey selection, prey availability and egg size in a population of Crested Terns, **Sterna bergii**. **Aust. Wildl. Res.**

Dunlop, J.N. (1985). The relationship between moult and the reproductive cycle in a population of Crested Terns, **Sterna bergii**, Lichtenstein. **Aust. Wildl. Res.** 12, 487-494.

Dunlop, J.N. & Wooller, R.D. (1985). Range extensions and the breeding seasons of seabirds in south-western Australia. **Rec. West. Aust. Mus.**

Langham, N.P. & Hulsman, K. (1985). The breeding biology of the Crested Tern, **Sterna bergii**. **Emu** 86, 23-32.

Saunders, D. & de Rebeira, P. (1985). **The bird life of Rottnest Island.** Guildford, W.A. 101 pp.

Veen, J. (1977). **The Sandwich Tern - functional and casual aspects of nest distribution.** E.J. Brill, Leiden, Netherlands. 193 pp.

DESCRIPTION OF BEHAVIOURAL UNITS

. **AERIAL DISPLAYS**

1. Panic Flights: Social flights (often called panics) are a fairly common event. All birds suddenly fly up and away making synchronized swerving movements. The whole exercise may take a few seconds or a few minutes and the birds usually return to their original position. Panic flights occur less frequently as the season progresses.

2. Paired Flights: These are zig-zagging flights of two birds across the sky. They often originate with the two birds spiralling up from the ground amidst loud calling.

3. Diving: This will only be seen on the coast and is associated with feeding on small fish.

4. Food Display: A bird returns calling and carrying a fish crosswise in the bill.

5. General Flights: Unpaired and ungrouped flights, not associated with pre-breeding behaviour.

. **GROUND DISPLAYS** (see also attached diagrams)

6. Neutral Activities: Walking, standing, sitting, preening, bathing.

7. Courtship Activities: Stretch posture, circling, erect posture, advertisement calling, begging, copulation.

8. Nesting Activities: Stooping, fixating, scraping.

9. Overt Aggression: Threatening, fighting.

Stretch posture (Fig. a) - The neck is vertically stretched and the carpal joints are raised. During a 'high intensity stretch' body axis points upwards at an angle up to 45° to the horizontal; the tail may be raised at the same angle to the horizontal. In general the head is held horizontally, but in certain situations - e.g. when a bird offers a fish in a stretch - head and bill are bent downwards (Fig. b).

Circling (Fig. c) - Two birds walk around each other in the stretch posture. The body axes roughly parallel each other and the birds are in a head to tail position with respect to one another. The carpal joints are conspicuously raised and sometimes hook each other. As a consequence both birds may walk 'arm in arm'. The whole procedure may last from a few seconds up to several minutes.

Erect posture (Fig. d) - The erect posture includes all characteristics of a 'high intensity stretch posture' with the only exception that the body axis points more upwards (up to 60° with the horizontal) while the head is in line with the neck.

Stooping (Fig. e) - The body axis points downwards up to 40° with the horizontal. The neck is held at an angle of roughly 90° with the body axis. The head is turned downwards and the bill usually points to the ground. In general the carpal joints are raised.

Fixating (Fig. f) - The body axis is horizontal. The neck is held in line with the body axis, head and bill point vertically downwards. The bird stands motionless fixing the bottom.

Scraping (Fig. g) - The bird lies with its breast on the ground. With a backward scraping movement of the legs sand is thrown away from under the belly.

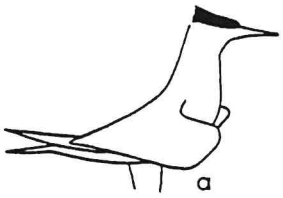
Advertisement calling (Fig. h) - The body axis points slightly upwards (up to 30° with the horizontal). The neck is withdrawn, carpal joints, crest and body feathers are conspicuously raised. Head and bill point into the direction of a fish-carrying con specific flying around. The bird calls loudly and maintains its position with respect to the fish-carrying individual by turning around.

Begging (Fig. i) - The bird rhythmically calls in a hunched position. The body axis is horizontal, head and neck are withdrawn between the shoulders. At every call head and bill rhythmically move up and down between 0° and 30° with the horizontal.

Threatening (Fig. j) - Head and neck are stretched into the direction of another bird. The carpal joints, crest, neck and body feathers are raised. In 'high intensity threat' head and neck rhythmically move up and down. Threatening occurs in sitting as well as in standing position.

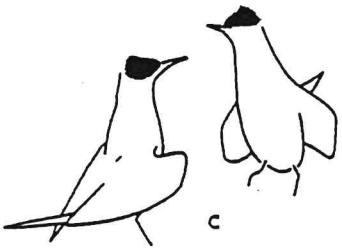
Fighting - In threat position both opponents seize each others bill and thereupon bite, twist and pull. When fighting in stand ing position, the wings are often raised. The wings, however, are never used to beat the opponent.

Copulation (Fig. k) - The body of the female is between horizontal and sloping slightly downwards. The neck is withdrawn; head and neck point upwards at an angle between 30° and 80° with the horizontal. During copulation the female may peck at the breast of the male. The body axis of the male makes an angle of roughly 45° with the horizontal. The legs are bent an the wings spread. The neck is stretched in an upward direction; head and bill point downward. During cloacal contact the male beats his wings.

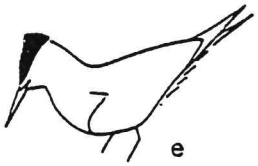


stretch posture

erect posture



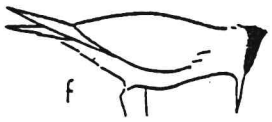
circling



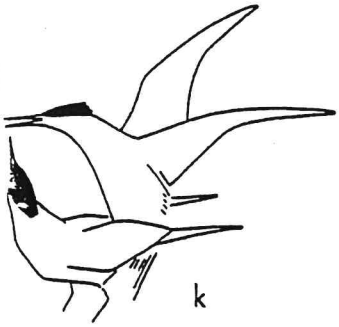
stooping

advertisement calling

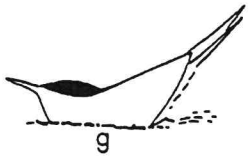
begging



fixating



copulation



scraping

threatening

FROM: Veen, 1977.

RECORDER: _____

SITE: _____ **NESTING/ROOSTING**

DATE: _____ **TIME** (use 24 hour clock): _____

WEATHER CONDITIONS - APPROX. TEMP (oC): _____

- WIND DIRECTION & SPEED: _____

- LIGHT CONDITIONS: _____

- DESCRIPTION: _____

START TIME: _____ **FINISH TIME:** _____

ESTIMATED NUMBER OF BIRDS IN COLONY/ROOST: _____

(a) **WHOLE COLONY/ROOST OBSERVATIONS:** At any given point in time, record what <u>percentage</u> of the colony is occupied in each behavioural unit. Don't forget to record the exact (24 HOUR CLOCK) time of each observation. Repeat this at random times throughout the exercise, as instructed.

POINT IN TIME	BEHAVIOURAL UNIT										
	1	2	3	4	5	6	7	8	9	10	TOTAL
1											100
2											100
3											100
4											100
5											100
TOTAL											500

b) **WHOLE COLONY/ROOST AERIAL DISPLAY OBSERVATIONS**

Over a recorded time interval (e.g. 5 minutes), tally (and total) the number of observed aerial behavioural units. Work in pairs: one observing and one recording.

		AERIAL BEHAVIOURAL UNIT				
TIME INTERVAL	TIME (MINS.)	1	2	3	4	5
1						
2						
3						
4						
5						
TOTAL						

c) **FOCAL OBSERVATIONS:**

Count the number of behavioural units while observing one bird only. Work in pairs with one observing and describing the bird's behaviour and one tallying the results in the appropriate columns. Swap after a given time. Keep results separate for each time period (e.g. 1. 1257, 2. 1258, 3. 1259, etc. or 1. 0931-0936, 2. 0936-0941, 3. 0941-0946, etc.).

TIMES	BEHAVIOURAL UNITS									
	1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
TOTAL										

c) **FOCAL OBSERVATIONS** (Cont.):

Count the number of behavioural units while observing one bird only. Work in pairs with one observing and describing the bird's behaviour and one tallying the results in the appropriate columns. Swap after a given time. Keep results separate for each time period (e.g. 1. 1257, 2. 1258, 3. 1259, etc. or 1. 0931-0936, 2. 0936-0941, 3. 0941-0946, etc.).

TIMES	BEHAVIOURAL UNITS									
	1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
TOTAL										

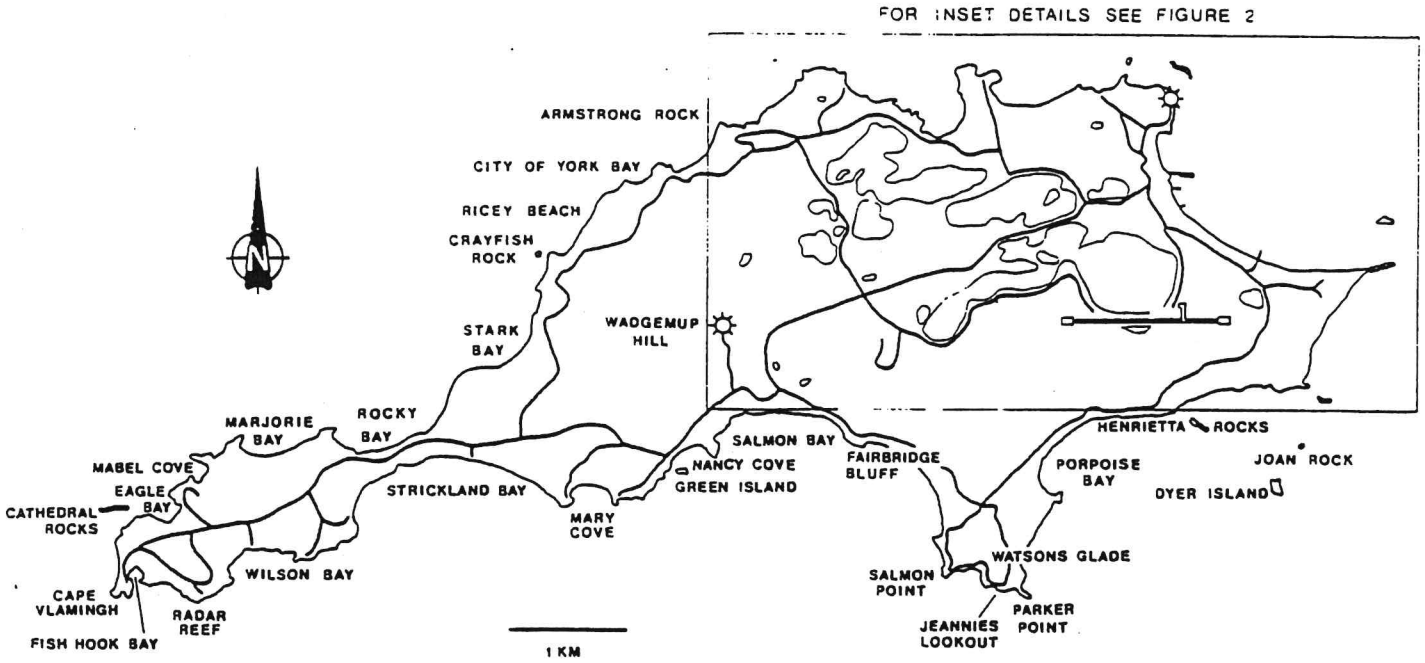


Figure 1. Map of Rottnest Island showing salient features and places mentioned in the text.

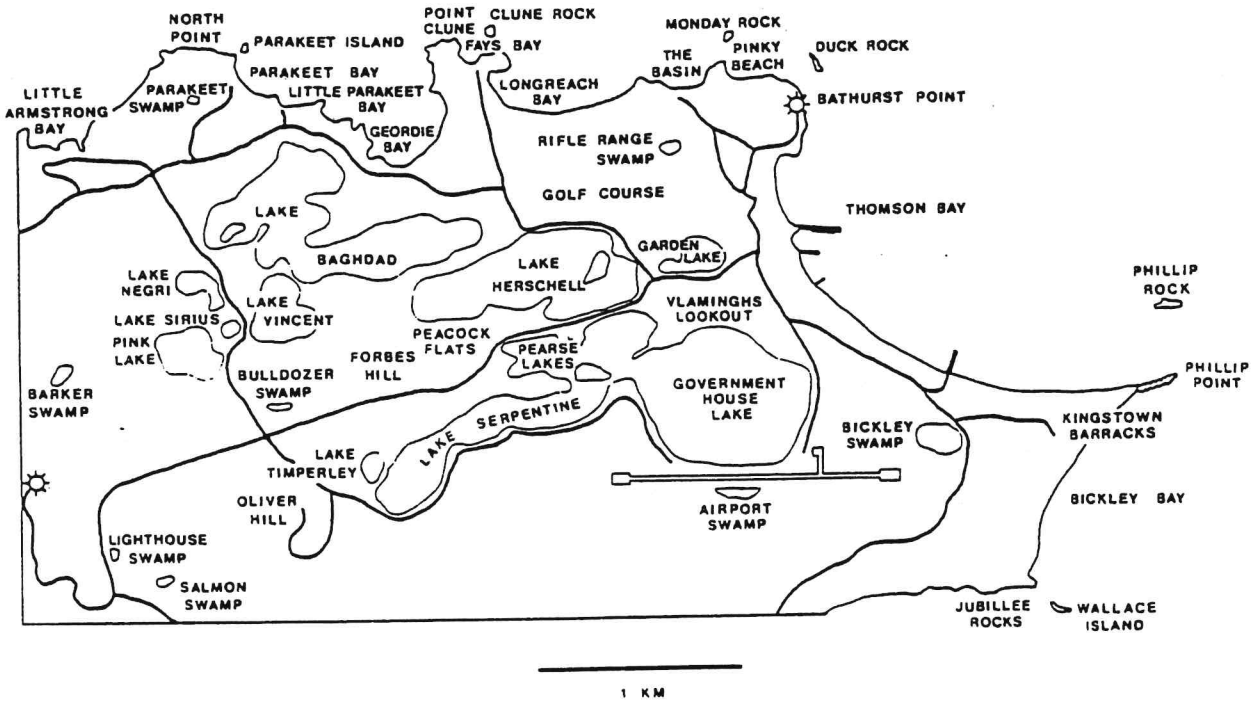
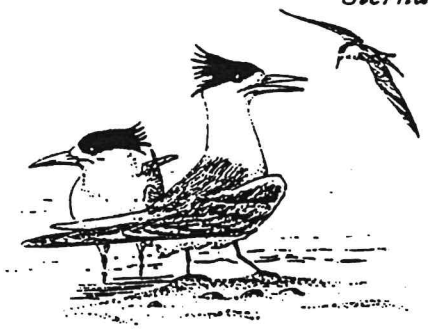


Figure 2. Map of salt-lakes and brackish swamps.

Crested Tern

Sterna bergii



The Crested Tern lives in south-eastern Asia, some Pacific islands, New Guinea and countries bordering the Indian Ocean including Australia. Opinions differ about the subspecific status of birds in Australia.[108,149] Though the species breeds round the Top End coast, breeding was not reported there in the Field Atlas because few observers visited at the right time.

There is a seasonal fluctuation in the number of Crested Terns present in Darwin (12/130) with few recorded Apr.-July. The pattern may result from a local movement to breeding grounds or it may represent movement in and out of Australia. Some south-eastern Asian populations are known to undertake regular migrations.[427,1169] Banding studies have shown long movements for adults and young of the Crested Tern, the longest recorded being that of an immature from Beachport (37/140) to Hervey Bay (25/152), 1850 km.[55] Eastward movement from colonies in SA has been determined but so far none to the west.[1649]

The Crested Tern may be seen on any coast and even far out to sea. It fishes by plunge-diving. Nesting is colonial. Sites of colonies change and numbers vary year by year, e.g. on West I. (35/138) no terns nested 1964–69; about 1000 in 1970–71, 2800 in 1972–73 and 2000 in 1975–76.[1648] Small scattered colonies suffer predation from Silver Gulls, which not only take eggs but rob parents bringing fish to the chicks.[881] It is thought that the predatory activities of gulls caused a colony on One Tree I. (23/152) to decline from 181 nests on 8 Dec. 1973 to none on 25 Dec.[882]

Major breeding islands are: Lizard I. (14/145) 2000 birds in 1974;[494] Michaelmas Cay (16/145) 2500–4000 birds in 1982;[1826] Swain Reefs (21/151) 1960 birds in 1976;[1071] One Tree I. 1600 birds in 1980;[886a] on nine NSW islands 26 000 birds (summary of the 1970s);[1039] Mud I. (38/144) 2000 birds in 1978;[768] Georges I. (40/148) 4000 birds in 1977;[1939] Penguin I. (37/140) 1100 birds in 1976;[1552] Fifth I. (36/139) 2000 birds in 1964;[1552] Lipson Cove I. (34/136) 2000 birds in 1980;[1552] Gull Rock (35/117) 2000 birds in 1977.[1039]

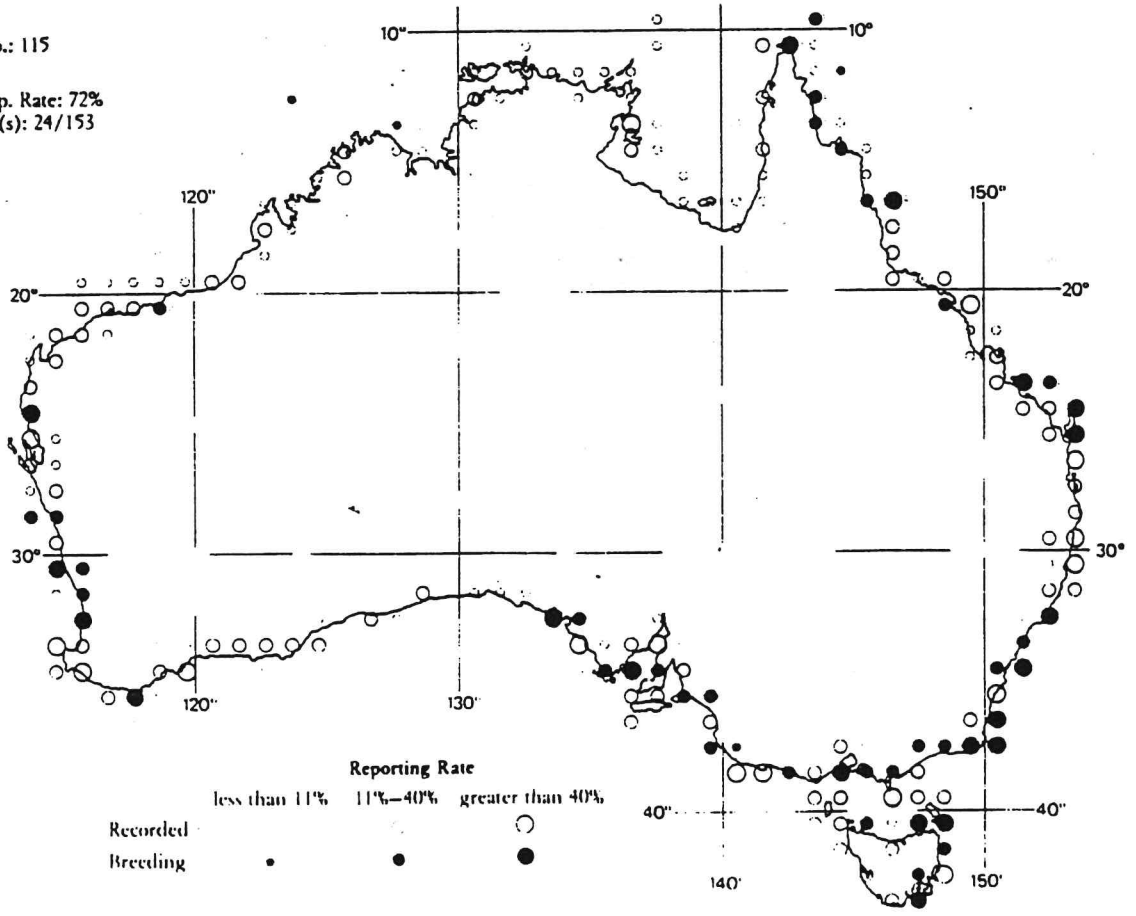
Field Atlas Records: 7253

1° blocks–with records: 219 (27%)

–with breeding records: 52 (24%)

Atlas No.: 115

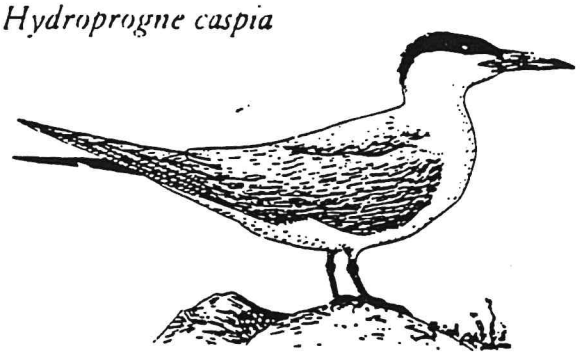
Max. Rep. Rate: 72%
In block(s): 24/153



FROM: Blakers et. al. (1984)

Caspian Tern

Hydroprogne caspia



The Caspian Tern lives in North America, Europe, Asia, Africa, New Zealand, New Guinea and Australia. In the Top End it is reported to breed in the Sir Edward Pellew Group (15/136) and perhaps on other islands.[1169] On the coast of the South-East Region there are no breeding reports between 29°S and 37°S. Inland breeding is rare, sites reported in the Atlases being L. Moondarra (20/139), L. Dynevor (28/144), Menindee Lakes (32/142), L. Eyre (29/137) and L. Watherston (30/138).

The Caspian Tern was previously considered to move only locally.[1646] Though it is present all year in some places, there is evidence of seasonal movement in others. In Torres Strait it is seen throughout the year.[591] Round Darwin (12/130) small numbers are always present[1169] but in some years the species may be more abundant in the dry winter season.[421] At L. Moondarra, where up to 400 birds breed May-Sept., few are present in the wet summer season, Dec.-Mar.[502] In the southern Murray-Darling the bird is most numerous Jan.-Aug. though some may be seen in all months; presumably it leaves the area to breed.[516] In the Tas. Region the Reporting Rate was 1% in winter compared with 10% in summer, which suggests that there may be movement out of the region in winter. The longest movement recorded is from Mt Isa (20/139) to Murray Bridge (35/139), 1633 km.[47]

The Caspian Tern lives on the seashore and round some inland waters. Many breeding colonies are small and sometimes the bird nests singly among other species of seabirds. In the Tas. Region breeding is not usually colonial.[1511] The Caspian Tern feeds on fish up to about 18 cm in length, which it catches by diving, sometimes submerging completely.[1646]

There are colonies of up to 400 birds on West I. (35/138)[1646] and 200 at Houtman Abrolhos (28/113).[1646]

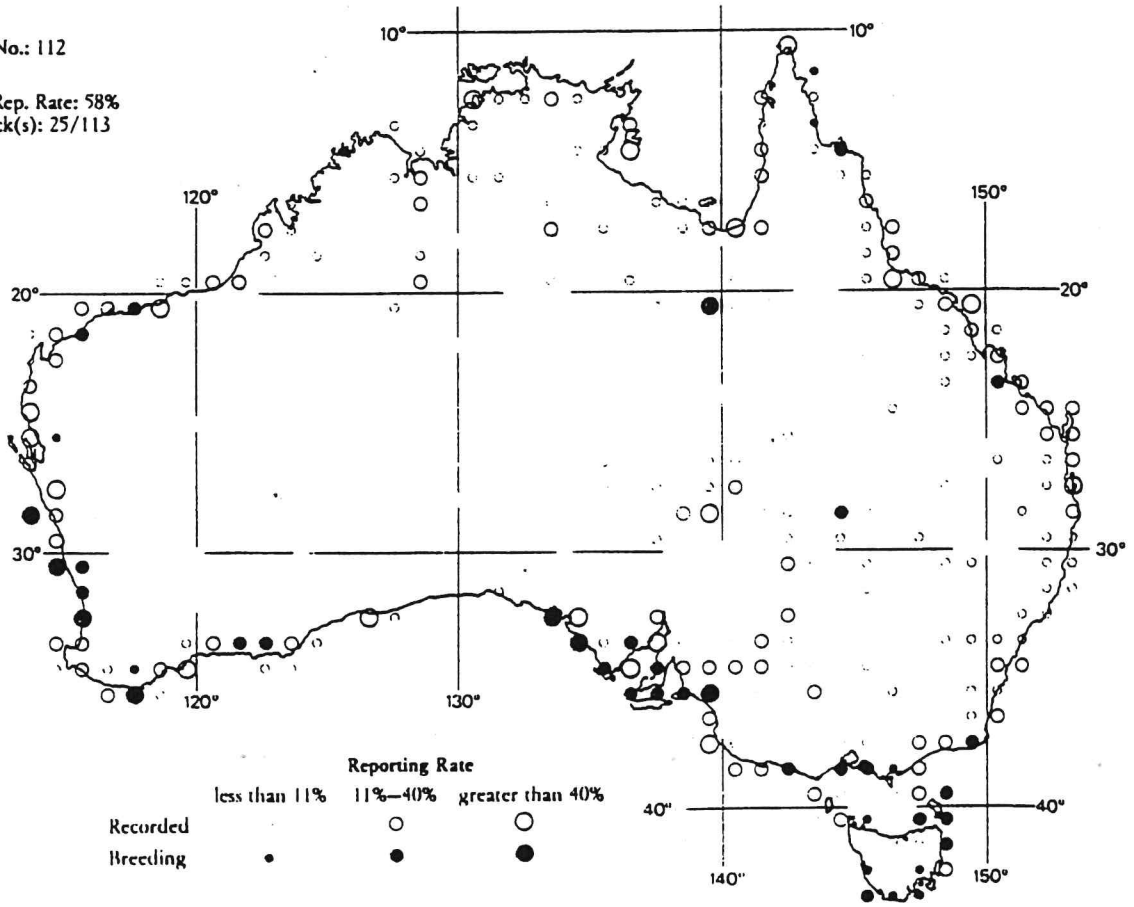
Field Atlas Records: 4860

1° blocks–with records: 271 (33%)

–with breeding records: 43 (16%)

Atlas No.: 112

Max. Rep. Rate: 58%
In block(s): 25/113

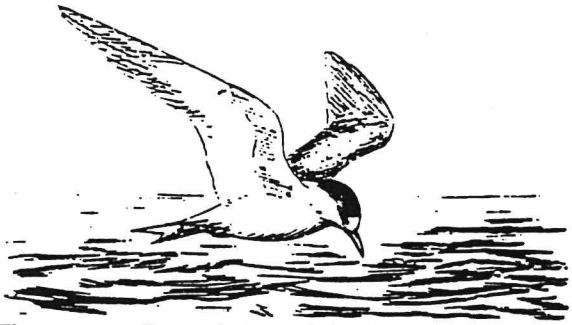


FROM: Blakers et. al. (1984)

Endangered

Fairy Tern

Sterna nereis



There are small populations of the Fairy Tern breeding on the coasts of New Zealand and New Caledonia but the largest are in Australia where there is one breeding subspecies *nereis*. Three specimens from Heron I. (23/151) in Dec.-Jan. are apparently of the New Caledonian subspecies *exsul*.[401] The northernmost records of *nereis* are from Botany Bay (34/151) in the east in Dec. 1962[864] and Admiralty Gulf (14/126) in the west in July 1973.

On the mainland the Fairy Tern rarely breeds east of Corner Inlet (38/146); small numbers, usually one or two pairs, have occasionally bred at the Gippsland Lakes (38/147) and Marlo (37/148).[1795] In WA colonies are reported north to the Lacepede Is (16/122).[1636] Fairy and Little Terns overlap in distribution, sometimes breed in loose mixed colonies, may hybridize[430] and are difficult to differentiate in the field. Mixed breeding colonies have been recorded at St Helens (41/148), Marion Bay (42/147), on The Coorong (36/139) and at Price Saltfields (34/138).

The Field Atlas suggests movement out of the Tas. and South-West Regions in winter (Reporting Rates: summer 5.5% and 4.3% respectively, winter 1.1% and 0.6%). It does not reflect suggested gatherings in winter on The Coorong nor in Spencer Gulf (34/136) and Gulf St Vincent (34/138).[1794] The longest movement reported is that of an immature from Beachport (37/140) to 38/144 near Werribee, 410 km.[1449]

The Fairy Tern lives along the coast, rarely out of sight of land and seldom inland. Fish, the main food, are taken by plunge- living in shallow water. Most nesting colonies are on islands, the shores of lagoons or coastal beaches.[1636] Breeding colonies suffer from encroachment of vegetation, storm damage, human disturbance and expansion of Silver Gull colonies.[565,1018,1518,1497,1897]

The average size of ten colonies examined 1974–80 in Vic. was 53 birds[1018] and of 29 colonies examined 1955–82 in Tas. was 40 birds.[1533] The largest reported is of 800 birds on Flinders I. (40/148) in 1971.[1260] Probably fewer than 500 birds were present in Vic. in 1981–82.[1897]

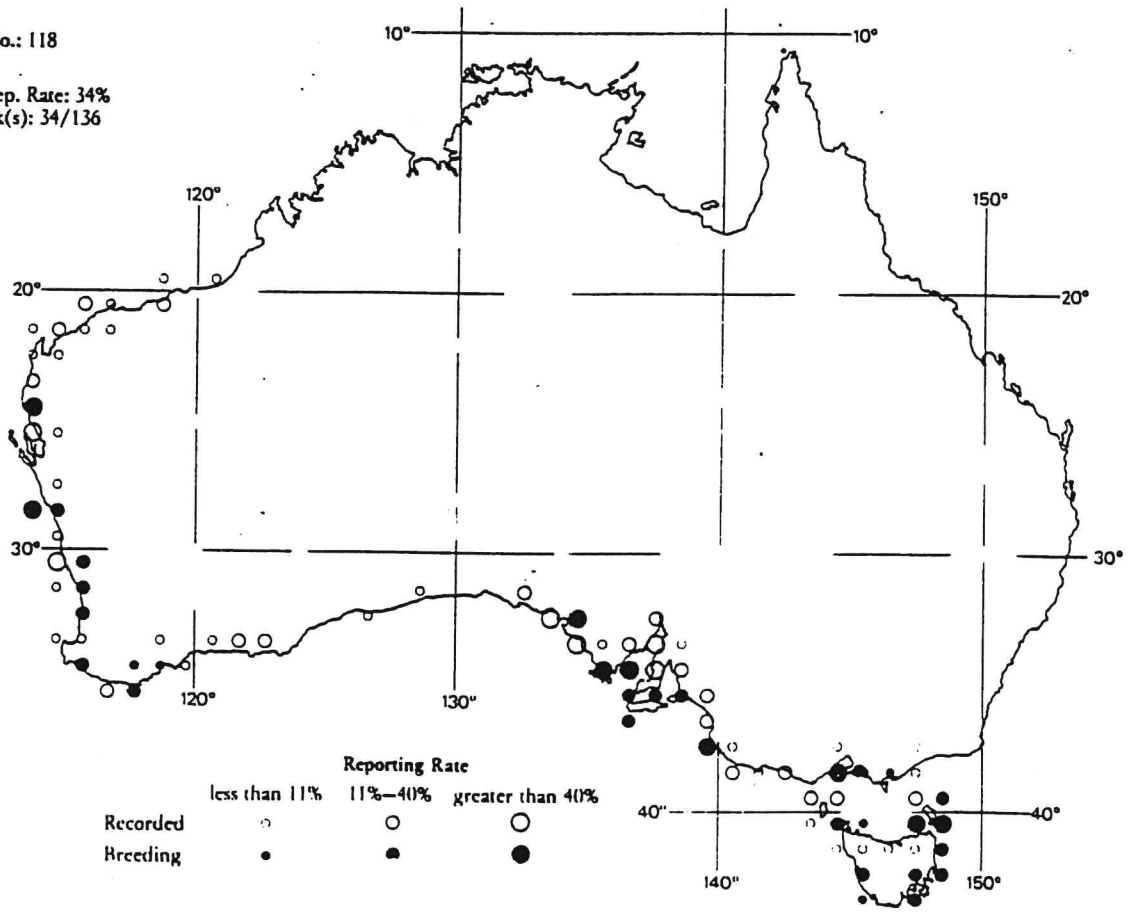
Field Atlas Records: 1314

1° blocks–with records: 88 (11%)

–with breeding records: 32 (36%)

Atlas No.: 118

Max. Rep. Rate: 34%
In block(s): 34/136



FROM: Blakers et. al. (1984)

Penguin Island

Bridled Tern

Sterna anaethetus

The Bridled Tern lives in the Indian, Pacific and western Atlantic Oceans, with the subspecies ***anaethetus*** breeding in Australia. As well as the breeding sites mapped during the Field Atlas, there are others on islands off the Qld coast; in the Top End on Haul Round I. (11/134) and an island in the Sir Edward Pellew Group (15/136); and on islands round the Kimberley coast.[16][16] In WA the Bridled Tern has extended its range southward. In 1839–43 it was present no farther south than the Houtman Abrolhos (28/113). In 1920, 32°S was given as the southern limit. In 1957 it was discovered nesting on Seal I. (34/115) and continues to do so.[16][6] The broken shell of a hatched egg was collected from Baudin Rocks (37/139) in SA in 1969 and the species was reported again in SA in 1973.[7][11]

The Bridled Tern migrates to islands in Torres Strait Aug.-Jan. to breed[5][1] and is also a spring-summer breeding migrant on the Qld coast and in the South-West Region. In the Top End it has been recorded breeding June-July and Oct. In the Kimberley the breeding season is given as spring-summer only[7][15] or autumn as well.[5][6]

The Field Atlas suggests that most of the spring-summer breeding birds leave coastal waters in autumn and winter. In the regions where the bird was most often seen (Atherton, Eastern Qld, Top End and South-West) the combined Reporting Rates were: spring 1.1%, summer 3.5%, autumn 0.2%, winter 0.1%. One bird banded at N. Fisherman I. (30/114) was recovered north of the equator in Borneo (3N/117E).[9][42]

The Bridled Tern is a bird of the open sea, rarely fishing inshore, even near breeding colonies. It hunts in daylight taking fish rather than cephalopods.

The main breeding islands are: Channel I. (10/142) 160 birds in 1979;[15][52] Swain Reefs (21/151) 1100 birds in 1976;[15][73] Tryon I. (23/151) 762 birds;[8][80] One Tree I. (23/152) 652 birds in 1974;[8][80] N. Fisherman I. 4000 birds in 1976;[9][42] S. Fisherman I. (30/114) 1000 birds in 1976;[9][41] Lancelin I. (31/115) 400–1000 birds in 1976;[5] Carnac I. (32/115) 100–200 birds in 1980;[9][5] Hamelin I. (34/115) 1000 birds in 1977.[4]

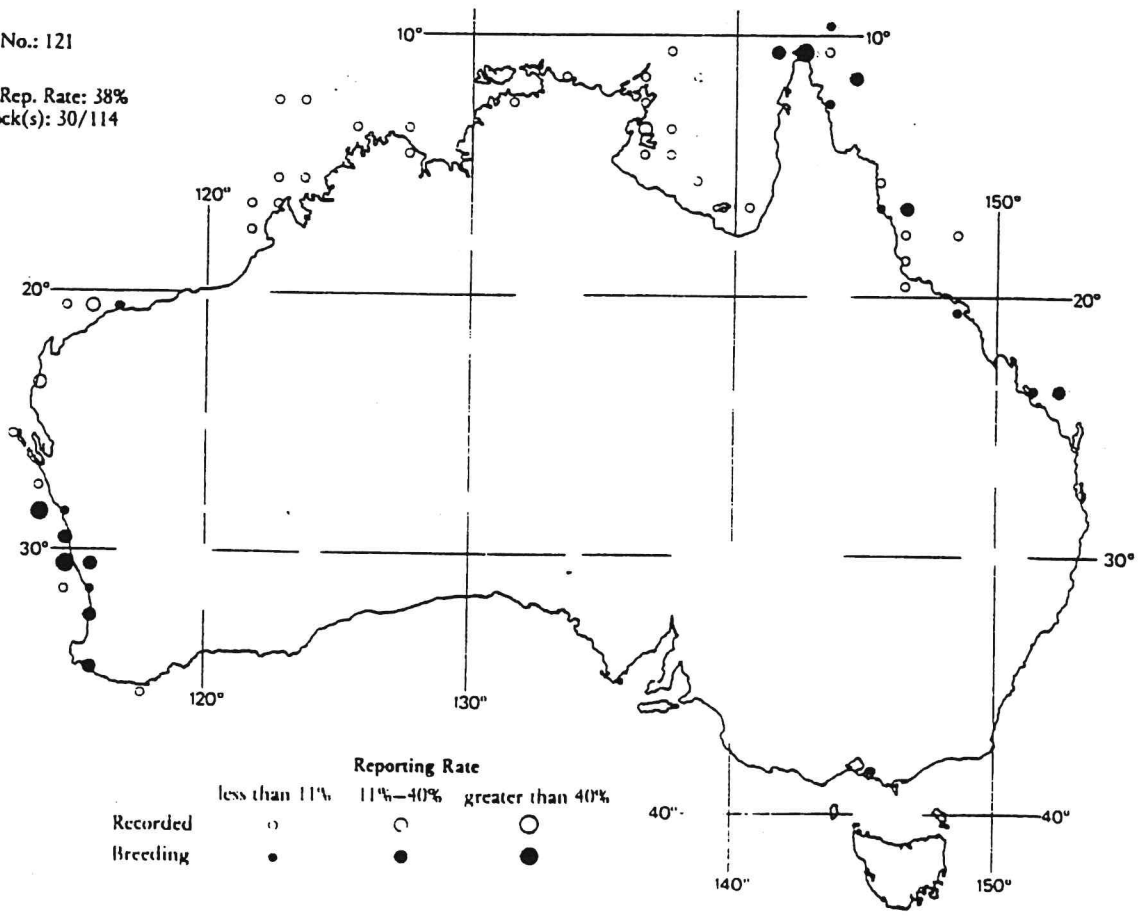
Field Atlas Records: 259

1° blocks–with records: 57 (7%)

–with breeding records: 19 (33%)

Atlas No.: 121

Max. Rep. Rate: 38%
In block(s): 30/114



FROM: Blakers et. al. (1984)