

The birds of Satawan Atoll and the Mortlock Islands, Chuuk, including the first record of Tree Martin *Hirundo nigricans* in Micronesia

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The Mortlock Islands, a subgroup of the Caroline Islands and a part of the Federated States of Micronesia (FSM), are among the many small, remote, far-flung and seldom-visited islands of Oceania whose faunas are incompletely surveyed; ornithological records for the Mortlocks are especially scanty. The present study is based largely on observations by the author throughout the Mortlock Islands, but mainly on Satawan Atoll, during five separate visits between December 2002 and August 2004.

Previous studies

Kittlitz (1836) commented briefly on 11 species of birds observed on Lukunor Atoll in February 1828, during an expedition of the Russian research vessel *Senyavin*. Specimens from this expedition were deposited in the Russian Academy of Sciences in St Petersburg (Baker 1951, Hume 2001). Of landbirds recorded on the Mortlocks, the St Petersburg collection has only two specimens of Caroline Reed-warbler *Acrocephalus syrinx* that Kittlitz collected on Lukunor (V. Loskot *in litt.* 2005); whether seabirds were included in the collection was not determined at this time.

Johann Kubary, a naturalist and ethnographer employed at the Godeffroy Museum, Hamburg, Germany, visited the southern Mortlocks briefly in 1873 (Hezel 1979, Paszkowski 1971), and again in March to late May 1877 (Kubary 1880, Schmeltz & Krause 1881). No ornithological reports stem from the 1873 visit, which may have been only a brief stop en route from Palau to Pohnpei, but Schmeltz & Krause (1881) commented on 19 species seen by Kubary in 1877. Baker (1951) included these early records from the Mortlocks in his review of the avifauna of Micronesia, but no additional species were added to the group's avifauna by Baker.

Marshall (1971, 1975) recorded 23 species on Namoluk Atoll based largely on observations ancillary to his anthropological studies in 1969–71, which included records mentioned by Girschner (1912, 1913), a German physician who conducted anthropological research on Namoluk in *c.*1910 (Marshall 2004). Girschner used mainly local vernacular names that Marshall transposed into scientific nomenclature. Korte & Meltofte (1997) commented briefly on the status of some breeding seabirds in the Mortlocks, but provided no new records.

Remarks on place names

A confusing array of alternative place names for the Mortlock Islands, some obsolete, contributes to the difficulty in determining precise locations for some of the earlier records. The Mortlock Islands now refers to five atolls and one low coralline island south-east of Chuuk (=Truk) Lagoon (Fig. 1), but at the time of Kubary's visit, in 1877, it referred only to the three southernmost atolls—Ettal, Lukunor and Satawan (e.g. Rosser 1870, US Navy Hydrographic Office 1920). The name Lukunor is used for one of the islands on the atoll of the same name, and Satawan is the name of one of those within Satawan Atoll. Augmenting the confusion, Schmeltz & Krause (1881) reported Kubary's records under the heading 'Die Lukunorgruppe (Mortlock-Inseln)' referring, in this case, to all three closely juxtaposed southernmost atolls, and not solely to Lukunor Atoll. Baker (1951), however, reported these records as being from Lukunor or Mortlock. But the only

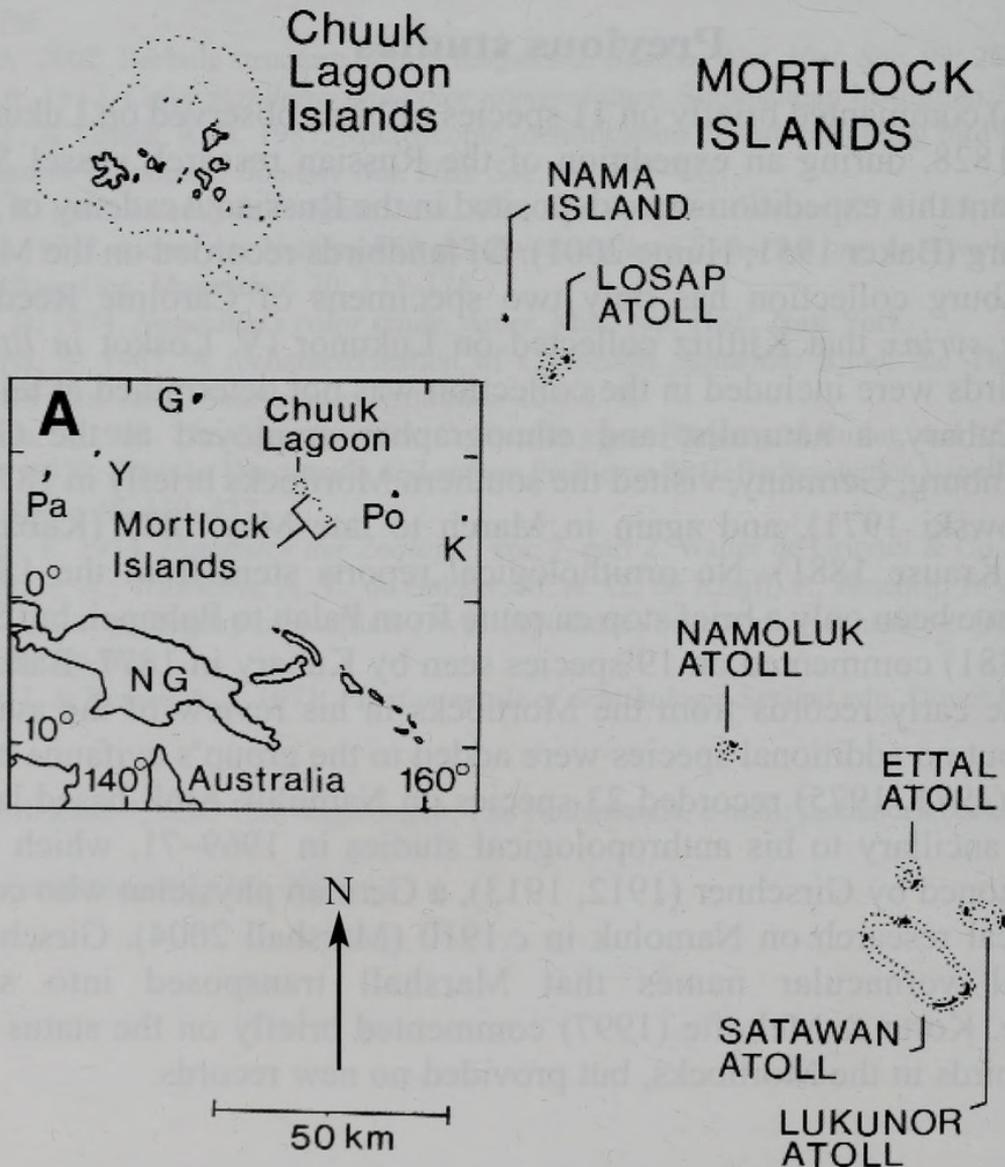


Figure 1. Location map for the Mortlock Islands. Inset: G = Guam, K = Kosrae, NG = New Guinea, Pa = Palau, Po = Pohnpei, Y = Yap.

islands specifically mentioned by Schmeltz & Krause (1881) with reference to Kubary in the Mortlocks are Ta and Uojta (=Weito), both on Satawan Atoll, and Westwood (1905: 81, 112) saw Kubary on Satawan Island in 1877. Also, in an anonymously written introduction to Kubary's (1880) ethnographic report on the inhabitants of the Mortlock Islands, the following statement appears: 'Kubary verweilte auf den Mortlock-Inseln während der Monate März bis Ende Mai 1877 und zwar speciell auf der Inseln Tä, Uoytä und Aliar' [Kubary visited the Mortlock Islands, particularly the islands Ta, Weito, and Aliar during the months of March through the end of May 1877.]. Additionally, Nason (1970) indicated that Kubary spent most of his time on Ta Island during his three months in the Mortlocks. In light of these reports, most if not all of Kubary's Mortlock records are likely to have been made on Satawan Atoll.

Study area

The Mortlocks (05°17'–07°N, 152°35'–153°50'E) comprise a chain of five atolls and one low, coral island spanning *c.* 220 km in the west-central Pacific, from Nama Island, just south of Chuuk Lagoon, south-east to Satawan Atoll (Figs. 1–2). Total land area is *c.* 12 km² distributed among more than 100 islands; Ta, the largest island, is 1.6 km². Maximum elevations are just *c.* 3–5 m. The Mortlocks lie within the equatorial rainbelt and are sufficiently wet to support mesophytic vegetation (Mueller-Dombois & Fosberg 1998); the smaller islands lack a freshwater lens and are more xeric. Warm humid conditions persist throughout the year. On Namoluk, the mean monthly low temperature is 24–27°C, and the mean monthly high 30–36°C (Marshall 1975).

Coconut (*Cocos nucifera*) forest is the dominant vegetation type and breadfruit (*Artocarpus* spp.) is co-dominant in the interior of the larger islands. Other large, common forest trees include *Barringtonia asiatica*, *Ficus* spp., *Guettarda speciosa*, *Hernandia sonora*, *Neisosperma oppositifolia*, *Pandanus* spp. and *Terminalia samoensis*. The forest abuts the beach or merges abruptly with a narrow zone of coastal scrub or thicket dominated by *Tournefortia argentea* and *Scaevola taccada*. *Pemphis acidula* scrub is locally common in patches along the shore and mangroves are scarce throughout. There is no standing fresh water with the exception of excavated wells, some of which are simply crude holes dug to below the level of the freshwater lens. Some natural depressions, along with pits excavated for taro cultivation, hold water semi-permanently. Large, community-maintained taro patches occupy much of the interior on Nama, Namoluk, Kuttu, Moch and Lekinioch Islands.

Methods

Field work was conducted on Satawan Atoll on 17–26 December 2002, 7 July–1 August 2003, 30 March–9 April 2004, 22 June–6 July 2004 and 1–5 August 2004. The five other groups of islands were visited during summer 2004: Nama Island,

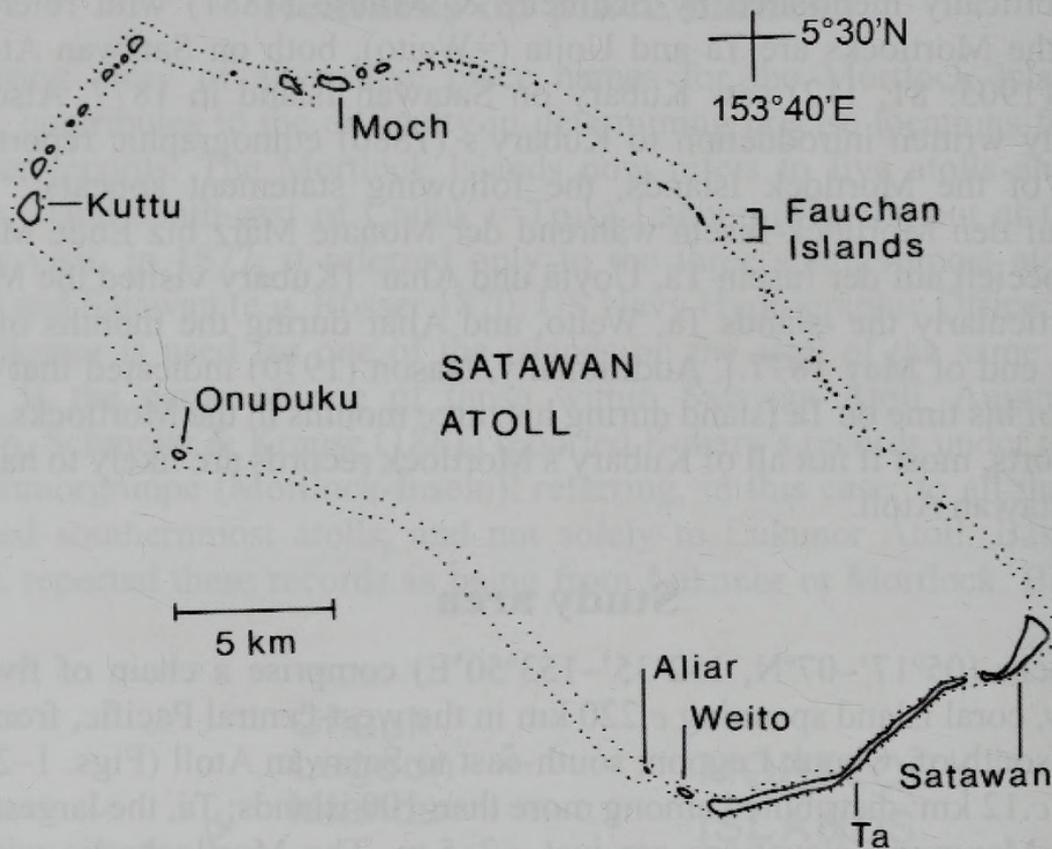


Figure 2. Location map for islands on Satawan Atoll, adapted from Bryan (1971).

7–14 July; Losap Atoll, 10 July; Namoluk Atoll, 19–29 July; Ettal Atoll 30 July–1 August; and Lukunor Atoll (Lekinioch Island only), 2–3 August. Landbirds were counted on 25 islands on Satawan Atoll between December 2002 and August 2004. The number of birds seen and heard calling were recorded during timed walks along pre-existing trails or by roughly following a compass bearing through the centre of the less frequently visited islands, usually along the long axis of the island, but occasionally at right angles to it. A single three-minute point count was applied on the smallest islands where complete coverage of the island was possible from one site. Each transect line or observation point was surveyed only once. An index of relative abundance for each species was calculated as the number of individuals encountered per hour. Shorebirds and seabirds were counted during walks along the beaches at or near low tide. On islands other than Satawan Atoll, birds were recorded irregularly and ancillary to reptile and fruit bat surveys; no transect or point counts were made, and the species lists, at least of migrants, are incomplete for these islands.

Terms of status and abundance are: common (more than 15 sightings per day), fairly common (approximately 5–15 sightings on most days), uncommon (usually fewer than five sightings per day and unrecorded on some days), scarce (observed occasionally and known only from few records, but not unexpected), resident (present year-round and breeding confirmed or very probable), migrant (present temporarily or sometimes throughout the year, breeding does not occur or is very

unlikely), occasional visitor (non-breeder of irregular and seldom occurrence, but not unexpected), vagrant (unexpected visitor and recorded only once or twice), and hypothetical (a record in need of corroboration or verification).

Scientific and English names and sequence of species follow Wiles (2005) where applicable. Some authorities include Tree Martin *Hirundo nigricans* in either the genus *Petrochelidon* or *Cecropis*. Hypothetical records are in square brackets.

Species accounts

[PACIFIC BLACK DUCK *Anas superciliosa*

Hypothetical. Girschner (1912, 1913) recorded a kind of wild duck [translation from German] on Namoluk Atoll. Marshall (1975: 11) stated 'ducks come singly or in pairs to the main taro swamp on Namoluk Islet, and that several different people reported having seen them at various times during the late 1960's [*sic*]' C. Severance (*in litt.* 2004) also recorded 'ducks' on Losap Atoll during the late 1960s and early 1970s. In none of these accounts is the species positively identified. Marshall (1971, 1975) included the Namoluk records under *A. poecilorhyncha* (= *superciliosa*) probably because of the proximity of Namoluk to the Chuuk Lagoon islands, where Pacific Black Duck is resident. However, inasmuch as five other species of ducks have been recorded as migrants on Chuuk and the high islands of Yap and Pohnpei that bracket Chuuk and the Mortlocks (Wiles 2005), the records of *A. superciliosa* in the Mortlocks require confirmation.]

RED JUNGLEFOWL (CHICKEN) *Gallus gallus*

Introduced. Free-ranging chickens occur on all the inhabited islands throughout the Mortlocks, usually around settlements, but occasionally in more remote areas. Less common on some of the uninhabited outlying islands. They were present during the earliest surveys. Kittlitz (1836) recorded chickens on Lukunor in 1828 and Kubary (*in Schmeltz & Krause* 1881) noted that *Gallus bankiva* (= *gallus*) inhabited the interior [probably on Ta or Satawan Islands], where it was rarely disturbed by the islanders who used the tail-feathers of roosters as a decoration for combs, but did not hunt it for food. In the Mortlocks, chickens are eaten only on special occasions and the eggs are very seldom eaten (Tolerton & Rauche 1949?, Marshall 1975, Severance 1976). The original sources of introduction are unknown, although Tolerton & Rauche (1949?) stated that chickens 'are said to have been brought [to Lukunor] from Truk in very early times,' and Marshall (1975) alluded to the introduction of Rhode Island Red stock to Namoluk by the Department of Agriculture on Truk.

WEDGE-TAILED SHEARWATER *Puffinus pacificus*

Occasional visitor? Encountered widely throughout Micronesia (Wiles 2005) and has apparently bred at unspecified localities in the Caroline Islands (Murphy & King *vide* Wiles 2005). Kubary (*in Schmeltz & Krause* 1881) recorded it in the southern

Mortlocks (probably at Satawan Atoll), and Marshall (1971, 1975) remarked on ten that arrived at Namoluk Atoll on 17 May 1971 at the same time as a ship from Chuuk. Marshall (1971, 1975) used the local name 'machukou' for this species, but Goodenough & Sugita (1980) indicate the name 'mechikow' (an orthographic variant?) may refer to Sooty Tern *Sterna fuscata*. On the other hand, the name 'sapal' that Marshall (1975) said referred to an unidentified species of seabird is similar to the Chuukese vernacular names 'sepal' (Nomwin Atoll) and 'hepal' (Pullap and Puluwat Atolls), which Davis (1999) indicated as possibly referable to *P. pacificus*.

WHITE-TAILED TROPICBIRD *Phaethon lepturus*

Scarce to uncommon resident. Recorded by Kubary (*in* Schmeltz & Krause 1881), presumably on Satawan Atoll, and by Girschner (1912) on Namoluk Atoll. Marshall (1975) estimated a population of no more than 50 individuals on Namoluk Atoll and recorded them nesting in breadfruit trees ('frequently in clumps of *Asplenium nidus*') on Amwes and Toinom islets. He added that tropicbirds are caught and eaten whenever possible. I saw none during this study.

BROWN BOOBY *Sula leucogaster*

Scarce to uncommon, probably breeding in small numbers. Resident breeder and widespread in Micronesia (Wiles 2005), but the only one I saw was on Onupuku on 9 July 2003. Marshall (1975) recorded *S. leucogaster* as an occasional visitor to Namoluk. He used the local vernacular name 'apwang' (= 'apwan' in Girschner 1913), but Davis (1999) indicated this is the name for Red-footed Booby *Sula sula*, whereas the name 'aamoo' or 'amo' refers to *S. leucogaster*.

RED-FOOTED BOOBY *Sula sula*

Locally common resident. I saw Red-footed Boobies frequently among feeding flocks of seabirds around Ettal, Satawan and Lukunor Atolls, and estimated 75–100 breeding pairs (some with eggs and young) on Onupuku Island, Satawan Atoll, on 9 July 2003. I observed a similar number breeding there on 31 March 2004 when I counted 60 active nests, including 29 with downy young, seven with nearly fledged young and three occupied by adults. Three immatures kept as pets in the settlement on Satawan Island in December 2002 were collected as nestlings on Onupuku. Unconfirmed reports of *S. sula* possibly breeding on Aliar Island, Satawan Atoll (Brandt 1962, Nelson 1978, Korte & Meltofte 1997), possibly are referable to Onukupu, which is not mentioned in these accounts. The only indications of seabirds breeding on Aliar (0.2 ha) that I saw in July 2004 were several disused nests of Black Noddies *Anous minutus* in a large *Pisonia* tree in the centre of the island.

GREAT FRIGATEBIRD *Fregata minor*

Uncommon to locally common resident. I observed *F. minor* occasionally throughout the year on Satawan Atoll, usually during periods of strong winds and

inclement weather, when small flocks of up to 15 soared on obstruction currents over the islands. I estimated 25–30 breeding pairs on Onupuku Island on 9 July 2003: three nests each containing single young ranging in age from a flightless downy nestling to fledged or nearly fledged birds with only tufts of down on the head and breast, with other (unexamined) nests higher in the canopy beyond reach, and some adults flushed from the crowns of coconut trees where additional nests may have been hidden from view. I observed a similar number breeding there on 31 March 2004 and recorded a nest with one egg, another with a downy young and five others each occupied by an adult. The nests were *c.* 3–6 m above ground in *Tournefortia* trees. Other nests appeared to be in the tops of coconut trees but could not be seen clearly and verified.

INTERMEDIATE EGRET *Egretta intermedia*

Occasional visitor? Recorded as a migrant in Micronesia from Palau east to Chuuk (Wiles 2005). One I saw on Weito, Satawan Atoll, on 28 July 2003 is the first record for the Mortlock Islands. It was flushed several times from the marsh (an abandoned storm-damaged taro patch) that covers most of the interior of the island. Its larger size and slower, more forceful wingbeats distinguished it from the more common reef-egret.

PACIFIC REEF-EGRET *Egretta sacra*

Uncommon to fairly common resident. I encountered this species in small numbers, of 1–3 birds, regularly on beaches and reef flats throughout the Mortlocks. Of 27 on Satawan Atoll for which I recorded coloration, 13 were white, six were dark blue and eight were piebald. Marshall (1975) estimated no more than 25–30 on Namoluk Atoll, and mentioned only the white morph.

CATTLE EGRET *Bubulcus ibis*

Scarce migrant. A migrant to all major island groups of Micronesia (Wiles 2005). The two I observed on the Satawan Island school grounds on 17 December 2002 is the only record for the Mortlock Islands.

PACIFIC GOLDEN PLOVER *Pluvialis fulva*

Common migrant. I encountered *P. fulva* regularly on beaches and reef flats throughout the Mortlocks, usually in small numbers of up to 5–6 together. They were observed throughout the year, but less frequently in summer.

WANDERING TATTLER *Heteroscelus incanus* /

GREY-TAILED TATTLER *H. brevipes*

Uncommon to common migrants. Both species are recorded widely in Micronesia (Wiles 2005), and because they are difficult to distinguish in the field I treat them together. I observed tattlers on beaches throughout the Mortlocks, and usually no more than 2–3 together. Two were identified as *H. brevipes* by their bisyllabic calls;

many others had polysyllabic calls more characteristic of *H. incanus*. Kittlitz (1836) recorded *H. brevipes* on Lukunor Atoll. Kubary (*in* Schmeltz & Krause 1881) recorded *H. incanus*, probably on Satawan Atoll, and Marshall (1971, 1975) recorded it on Namoluk Atoll.

COMMON SANDPIPER *Actitis hypoleucos*

Uncommon migrant? Kubary (*in* Schmeltz & Krause 1881) recorded this species in the southern Mortlocks, presumably on Satawan Atoll, and Marshall (1971, 1975) observed it once on Namoluk Atoll; there are no other records for the Mortlocks. It has been recorded widely as a migrant in Micronesia, although Wiles (2005) considers records from Pohnpei and Kosrae, in the easternmost Carolines, to require confirmation because of the possible occurrence and confusion with the very similar Spotted Sandpiper *A. macularius* (Pyle & Engbring 1985, Wiles 2005).

WHIMBREL *Numenius phaeopus*

Uncommon to fairly common migrant. I observed Whimbrels occasionally on Satawan Atoll in April, June, July, August and December, with a max. 5 together at Ta airstrip on 4 August 2004. All those flushed at close range clearly had white on the rump characteristic of the north-east Asian subspecies *N. p. variegatus*. Marshall (1971, 1975) recorded this species on Namoluk Atoll.

BAR-TAILED GODWIT *Limosa lapponica*

Uncommon migrant. Kubary (*in* Schmeltz & Krause 1881) recorded *L. lapponica* (as *L. uropygialis*) in the southern Mortlocks, presumably on Satawan Atoll, and I saw singles on Ta Island, Satawan, on 7 April and 23 June 2004. There are no other records.

RUDDY TURNSTONE *Arenaria interpres*

Common migrant. I frequently encountered Ruddy Turnstones along rocky beaches, usually in small flocks of 2–5 (max. 20). It is one of the commonest shorebirds during migration and the absence of records from some islands is almost certainly an artefact of sampling; recorded previously in the Mortlocks on Namoluk Atoll (Marshall 1971) and Lukunor Atoll (Kittlitz 1836).

BUFF-BREASTED SANDPIPER *Tryngites subruficollis*

Vagrant or possibly scarce but regularly occurring migrant. A vagrant in Micronesia on Pohnpei and in the Marshall Islands (Wiles 2005). One that I observed foraging on the grass airstrip at Ta, Satawan Atoll over several days during the first week of April 2004 is the first record for Chuuk state. The distinctly buff-coloured plumage, yellowish legs and slightly smaller size readily distinguished it from several *Pluvialis* golden plovers foraging in the same area. Its small size and more uniformly buffy face and ventral region further distinguished it from Ruff

Philomachus pugnax, which is widespread during migration in Micronesia (Wiles 2005).

GREAT CRESTED TERN *Sterna bergii*

Uncommon to locally common resident. I observed *S. bergii* on Satawan Atoll occasionally, mainly in June and July. One young of the year (with a piece of orange yarn tied around one leg) on Manimwek Island on 20 July 2003 had a damaged wing and was unable to fly. I was told it was captured in the Fauchan Islands group (eastern side of the atoll) in March, when there were many flightless young on the beach. Kubary (*in* Schmeltz & Krause 1881) recorded this species, presumably on Satawan Atoll, in March–May 1877. Marshall (1975) estimated a population of no more than 50 birds on Namoluk Atoll and recorded some of them nesting on uninhabited islets.

BLACK-NAPED TERN *Sterna sumatrana*

Uncommon to fairly common resident. I encountered *S. sumatrana* regularly in small numbers throughout Satawan Atoll, mainly on sandy beaches and sandbars. Marshall (1975) estimated 50–100 on Namoluk Atoll, where they nested on sandbars and exposed reef outcroppings.

GREY-BACKED TERN *Sterna lunata*

Vagrant or occasional visitor. Breeds in Micronesia only in the Mariana Islands, but the species has been recorded in Palau, Yap and the Marshall Islands (Wiles 2005). One that I photographed (Fig. 3) on a sand and gravel bank on the east side of Satawan Atoll on 28 June 2004 is the first record for any of the eastern Caroline Islands (i.e. Chuuk, Pohnpei and Kosrae states), although Baker (1951) reported that W. Coultas obtained an immature male at sea south-east of Pohnpei in October 1930. The pale grey mantle of the Satawan bird distinguished it from the darker plumaged Bridled Tern *Sterna anaethetus*, which may also occur as a vagrant.



Figure 3. Grey-backed Tern *Sterna lunata*, Satawan Atoll, 28 June 2004 (D. W. Buden)

BROWN NODDY *Anous stolidus*

Common resident. I encountered *A. stolidus* frequently throughout the Mortlocks. Marshall (1975) considered it the most abundant bird on Namoluk Atoll, though I found it less numerous than *A. minutus*. The number of breeders is difficult to assess as the nests are usually hidden from view in the tops of coconut and *Pandanus* trees.

BLACK NODDY *Anous minutus*

Common resident and probably the most abundant bird in the Mortlocks. I frequently observed feeding flocks ranging in size from a few individuals to several hundred birds, usually just outside the reef-enclosed lagoons. On Satawan Atoll, in July 2003, I estimated *c.*100 breeding pairs on Onukupu Island, 200 pairs on Foui Island (north-east section of the atoll) and 40 pairs in each of two colonies on Ta Island. Smaller colonies of up to *c.*10 pairs were frequently encountered throughout the atoll. Nests usually were placed on the limbs of large broadleaf trees, mainly breadfruit and *Pisonia grandis*. I also frequently observed long, diffuse skeins of Black Noddies over Ta airstrip at sunrise, apparently departing their nocturnal roosts to feed at sea. I counted roughly 2,115, 2,365 and 2,245 during 05.20–06.40, 04.45–06.30 and 05.15–06.20 on 24, 25 and 26 June 2004, respectively; sunrise was at 05.35.

WHITE TERN *Gygis alba*

Uncommon to locally common resident. I frequently observed White Terns in small groups of 2–6 throughout the Mortlocks, usually as they flushed from roosting or presumed nesting sites in trees on many of the uninhabited islands and away from the villages on the inhabited ones. Marshall (1975) estimated 'well over 700' on Namoluk Atoll, and recorded *G. alba* nesting in breadfruit trees on the three largest islets.

MICRONESIAN PIGEON *Ducula oceanica*

Scarce resident, more numerous in the past. The only recent records are from Satawan Atoll, where I heard one calling at the eastern end of Ta on 24 December 2002, and another on Mariong Island on 11 July 2003. Kittlitz (1836) considered *D. oceanica* abundant on Lukunor Atoll, and Kubary (*in* Schmeltz & Krause, 1881) recorded it in the southern Mortlocks, presumably on Satawan Atoll, but gave no indication of abundance. Westwood (1905) remarked on shooting at least a dozen wild pigeons on an uninhabited island on Lukunor Atoll. Micronesian Pigeon probably was extirpated on Lukunor by about the 1940s. Tolerton & Rauche (1949?) stated 'some wild pigeons formerly existed but were killed off after acquisition of guns by the natives.' Girschner (1912, 1913) indicated *D. oceanica* was formerly present on Namoluk Atoll but extirpated by overhunting. The absence of records from Ettal Atoll and of any recent records from Lukunor possibly is an artefact of sampling. In view of the widespread distribution of *D. oceanica* in Micronesia (Kosrae, Pohnpei, Chuuk, Yap, Palau, Nauru, the Gilbert Islands [= Kiribati] and

Marshall Islands; Engbring *et al.* 1990), indicating an ability to cross long distances over water, it seems unlikely that the species would not disperse to Ettal and Lukunor from Satawan Atoll across water gaps of less than 10 km.

POHNPEI LORIKEET *Trichoglossus rubiginosus*

Probably introduced but never established; known only from an old record from Namoluk Atoll. Girschner (*in* Marshall 1971) claimed Pohnpei Lorikeet arrived on Namoluk during a typhoon in 1905. Marshall (1975) considered it an extinct breeder, presumably based on Girschner's report, but none of the islanders he interviewed in 1971 recalled ever seeing this species and there is no evidence it was ever established. Pyle & Engbring (1985) suggested the record is more likely based on the escape or release of caged birds brought from Pohnpei, where this species is endemic and occasionally kept as a pet.

LONG-TAILED CUCKOO *Urodynamys taitensis*

Scarce migrant. Marshall (1975) twice heard this species calling on Namoluk Atoll, and Kubary (*in* Schmeltz & Krause, 1881) recorded it, presumably on Satawan Atoll. Long-tailed Cuckoo breeds in New Zealand in the austral summer. It has been recorded as a vagrant or migrant in all of the major groups of islands in Micronesia (Wiles 2005).

MICRONESIAN HONEYEATER *Myzomela rubrata*

Common resident; the second-most numerous landbird species in the Mortlocks after Micronesian Starling *Aplonis opaca*. Encountered in all terrestrial habitats.

BARN SWALLOW *Hirundo rustica*

Uncommon migrant. Reported during migration on all the major island groups in Micronesia (Wiles 2005). I observed *H. rustica* in small numbers (several groups of c.4–6 birds) on Satawan Atoll in December 2000 and April 2004.

TREE MARTIN *Hirundo nigricans nigricans*

Vagrant. A female with small follicles collected at the south-west tip of Satawan Island on Satawan Atoll on 19 December 2002 is the first record for Micronesia. The bird was first observed the previous day hawking back and forth along the beach. It was captured in a mist-net set at right angles to the beach. The study skin is deposited at the Louisiana State University Museum of Natural Science, Baton Rouge (LSUMZ 172489). I saw no other swallows in the vicinity on either day. Tree Martin breeds in Australia, Tasmania and two of the Lesser Sundas, and possibly southern New Guinea (Coates & Bishop 1997). Migrants (including extralimitals) have been recorded as far north as Halmahera in the Moluccas (Buck *et al.* 1990) and east to New Guinea, the Bismarck Archipelago and the Solomons (Peckover & Filewood 1976), and New Caledonia (Barre & Bachy 2003). The wing-chord (unflattened, left 109.8 mm, right 109.1 mm) of the Satawan specimen falls well

within the range of the nominate (eastern Australian) subspecies (105–111 mm—Schodde & Mason 1999), but outside those of the western Australian subspecies *H. n. neglecta* (100–107 mm—Schodde & Mason 1999), and the Lesser Sunda Islands race *H. n. timoriensis* (90–94 mm—Turner & Rose 1989). The December date of the Satawan record is unusual for an austral migrant as it falls within the austral summer breeding season.

[UNIDENTIFIED HIRUNDINIDAE

Small groups of 5–10 swallows that I observed in flight on Ta and Satawan Islands in December 2002 and April 2004 were unidentified to species. They lacked white on the rump, thus eliminating Tree Martin. In having a slightly forked tail and seemingly no dark pigmentation on the upper breast they appeared less similar to Barn Swallow than to Pacific Swallow *H. tahitica*, which occurs in south-east Asia south to Australia, New Zealand and Melanesia, and east to the Society Islands in Polynesia (Howard & Moore 1994), but is unrecorded in Micronesia.]

CAROLINE REED-WARBLER *Acrocephalus syrinx*

Common resident. Recorded throughout the Mortlocks and frequently encountered in dense understorey and thickets. Marshall (1975) estimated 400–500 on Namoluk Atoll. Kubary (*in* Schmeltz & Krause 1881) recorded it nesting in March–May 1877, presumably on Satawan Atoll. I saw two nearly fledged young that a boy had removed from a nest on Ta Island, Satawan Atoll, on 7 July 2003.

MICRONESIAN STARLING *Aplonis opaca*

Common resident; the most common landbird on Satawan Atoll (Table 1), Namoluk Atoll (Marshall 1975), and elsewhere throughout the Mortlocks (pers. obs.). Marshall (1975) recorded it nesting on Namoluk Atoll, usually in *Pandanus* and coconut trees. On Satawan Atoll, I saw at least six different immatures in striped plumage soliciting food from adults in June 2004, and an islander informed me of the discovery of two unfledged young in a nest in the crown of a coconut tree on Manimwek Island on 18 July 2003.

[BLUE-FACED PARROTFINCH *Erythrura trichroa*

Hypothetical. Baker (1951) questionably recorded this species from Lukunor probably based on a statement by Schmeltz & Krause (1881) relating to Kubary's work in the Mortlocks: 'Ein versch lagenes Exemplar der *Erythrura trichroa* schuss K. einmal hier [Kubary once shot a specimen of *Erythrura trichroa* here].' But the location of any such specimen is unknown. *E. trichroa* occurs on the high Caroline Islands, including Palau, Chuuk, Pohnpei and Kosrae, but it is otherwise unknown from the atolls. The record from the Mortlocks (stated as Lukunor but probably Satawan) seems unlikely and requires confirmation.]

TABLE 1
Distribution of birds in the Mortlock Islands^a

Species	Nama Island	Losap Atoll	Namoluk Atoll	Ettal Atoll	Lukunor Atoll	Satawan Atoll
[<i>Anas superciliosa</i>]			G/M			
<i>Gallus gallus</i> ¹	+	+	+/G/M	+	+/K	+/SK
<i>Puffinus pacificus</i> *			M			SK
<i>Phaethon lepturus</i> *			G/M			SK
<i>Sula leucogaster</i> *			G(?) / M		K(?)	+
<i>Sula sula</i> *			G(?)			+
<i>Fregata minor</i> *			G/M			+ / SK
<i>Egretta intermedia</i>						+
<i>Egretta sacra</i> *		+	+ / G / M	+	+ / K	+ / SK
<i>Bubulcus ibis</i>						+
<i>Pluvialis fulva</i>	+	+	+ / G / M	+	+ / K	+
<i>Heteroscelus incanus</i>	+ (?)	+ (?)	G (?) / M (?)			+ / SK
<i>Heteroscelus brevipes</i>	+ (?)	+ (?)	G (?) / M (?)		K	+
<i>Actitis hypoleucos</i>			M			SK
<i>Numenius phaeopus</i>			G / M			+ / SK
<i>Limosa lapponica</i>						+ / SK
<i>Arenaria interpres</i>	+	+	+ / G / M	+	K	+
<i>Tryngites subruficollis</i>						+
<i>Sterna bergii</i> *			G / M			+ / SK
<i>Sterna sumatrana</i> *			G / M			+ / SK
<i>Sterna lunata</i>						+
<i>Anous stolidus</i> *	+	+	+ / G / M	+	+ / K	+ / SK
<i>Anous minutus</i> *	+	+	+ / G / M	+	+	+ / SK
<i>Gygis alba</i> *			G / M		K	+ / SK
<i>Ducula oceanica</i> *			G		K	+ / SK
<i>Trichoglossus rubiginosus</i> ^{1?}			G			
<i>Urodynamys taitensis</i>			M			SK
<i>Myzomela rubrata</i> *	+	+	+ / G / M	+	+	+
<i>Hirundo rustica</i>						+
<i>Hirundo nigricans</i>						+
<i>Acrocephalus syrinx</i> *	+	+	+ / G / M	+	+ / K	+ / SK
<i>Aplonis opaca</i> *	+	+	+ / G / M	+	+ / K	+ / SK
[<i>Erythrura trichroa</i>]						SK

^a Sources: + = this study, G = Girschner (in Marshall 1975), K = Kittlitz (1836), M = Marshall (1975), SK = Kubary (in Schmeltz & Krause, 1881).

Symbols and abbreviations: [] = hypothetical record; * = indigenous species recorded breeding in the Mortlocks or on one or more islands elsewhere in the Carolines; ¹ = introduced.

Discussion

Of the 33 species of birds recorded from the Mortlock Islands (Table 1), and excluding the two introduced species and two hypothetical records, 15 breed locally

TABLE 2
Relative abundance of landbird species on Satawan Atoll based on surveys on 25 islands.

Species	Incidence ^a	Encounter rate (birds/h) ^b			
		Inhabited islands ^c	Uninhabited islands ^d	X^{2e}	All islands
<i>Ducula oceanica</i>	1/25 (4%)	0	0.2 (1)	NA	0.1
<i>Myzomela rubratra</i>	25/25 (100%)	14.1 (49)	17.2 (75)	ns	15.8
<i>Acrocephalus syrinx</i>	24/25 (96%)	9.5 (33)	14.6 (64)	ns	12.4
<i>Aplonis opaca</i>	24/25 (96%)	22.4 (78)	26.1 (114)	ns	24.5

^a The number of islands on which the species was recorded, divided by the total number of islands surveyed.

^b The number of birds seen or heard per hour; total number in parentheses—see Methods.

^c Four: Moch, 0.28 km², 50 minutes; Satawan, 1.1 km², 60 minutes; Ta, 1.6 km², 40 minutes; Kuttu, 0.28 km², 60 minutes.

^d Twenty-one: total area c.1.1 km² (largest island 0.13 km²), total survey time 262 minutes (4.37 hours).

^e Comparisons between inhabited and uninhabited islands: NA = not available, insufficient data, ns = no significant difference ($P > 0.05$).

or have been recorded breeding elsewhere in the Caroline Islands; none is endemic. The 14 others are regularly occurring migrants or occasional visitors and vagrants. The indigenous avifauna includes 11 seabirds in the following orders: Procellariiformes (one shearwater), Pelecaniformes (two boobies, a frigatebird and a tropicbird), and Charadriiformes (six terns). All but one of the terns (*Sterna lunata*) breeds on one or more islands in the Carolines. The eight species of shorebirds recorded in the Mortlocks are all boreal migrants, and, with three egrets and a duck, complete the list of water or marsh birds. In view of the relatively large number of migrant shorebirds recorded on the major island groups elsewhere in the FSM (29 species—Wiles 2005), the number recorded in the Mortlocks is likely to increase markedly with additional surveys.

Onupuku, a small (0.05 km²) island isolated on the west side of Satawan Atoll (Fig. 2), is an important seabird rookery in the Mortlocks. Satawan islanders consider it the principal bird island on the atoll. Onupuku is the chief breeding site for Red-footed Boobies in the Mortlocks (75–100 pairs); Great Frigatebirds, Brown Noddies, Black Noddies and White Terns also nest there. Onupuku is part of the Kuttu Island district and permission to visit must be obtained from a family on Kuttu. Some poaching of birds and coconut crabs occurs, but for the most part islanders are respectful of the restrictions, which are based on cultural tradition rather than formal Western legislation.

The four resident landbirds represent three feeding guilds, including a nearly extirpated frugivore, Micronesian Pigeon, apparently now confined to a small population on Satawan Atoll, another frugivore (Micronesian Starling), an insectivore (Caroline Reed-warbler) and a nectarivore (Micronesian Honeyeater). The honeyeater, reed-warbler and starling are abundant and widespread throughout the Mortlocks, and their encounter rates on Satawan Atoll showed no significant

differences between the larger, inhabited islands and the smaller, uninhabited ones (Table 2). The six other landbirds include introduced chickens, a probably introduced but apparently never established lorikeet, two migrants (Long-tailed Cuckoo and Barn Swallow), a vagrant (Tree Martin) and one hypothetical (Blue-faced Parrotfinch). Additional surveys will doubtless increase the number of migrants and occasional visitors, but the four resident landbirds undoubtedly are all that occur. This same resident species complex, or subsets thereof, is typically present on atolls throughout the eastern Caroline Islands (Baker 1951, Buden 1995, 1996a,b, 1998, 1999a,b), the one exception being Micronesian Kingfisher *Todiramphus cinnamominus* on Ant Atoll, off Pohnpei (Engbring *et al.* 1990, Buden 1996a).

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