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PRESENCE AND DISTRIBUTION OF AUSTRALIAN BRUSH-TURKEYS IN THE GREATER BRISBANE REGION

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ABSTRACT

Between February 2002 and March 2003 Birds Queensland (BQ) initiated a survey of the presence and distribution of the Australian Brush-turkey *Alectura lathami* within the Greater Brisbane Region. Members and the public were invited to participate in the survey. One hundred and twenty six correspondents made a total of 242 reports. Brush-turkeys were reported from 73 Brisbane suburbs and nest mounds were commonly mentioned. Compared to a survey conducted in 1980-1981, the general range of the species has not changed greatly within the region but it is now present in many more suburbs, including some far from well-established breeding populations. Given the high rates of chick predation, the apparent expansion of this species within the suburbs of Brisbane is remarkable and would repay further investigation.

INTRODUCTION

Although currently widespread and abundant in Brisbane and environs (Woodall 2002), the Australian Brush-turkey *Alectura lathami* population has been markedly variable within this area over the last 50 years. During the 1950-60s, the species was regarded as shy and elusive and was known primarily from the D'Aguilar Range NW of the city (Vernon 1968). Vernon (1968: 29) also noted that it had formerly been "common close to the city years ago" but that by the mid-1960s was seen only occasionally in the outer western suburbs. Tellingly, Jack's (1938) earlier comprehensive account of the birds of the Mt Coot-tha

reserve does not even mention the species. This absence of Brush-turkeys from locations close to human habitation has been attributed primarily to hunting pressure, with the species being a favoured "game bird" during the first half of the twentieth century and before (Jones & Everding 1991).

Having been locally rare and unapproachable in the Brisbane region, the Brush-turkey made a rapid and dramatic recovery, apparently around the mid-to-late 1970s. Whether or not this was related to the enactment of legislation in the early 1970s providing protection to all native bird species (Jones & Everding 1991) is unclear. Nonetheless, the appearance of significant numbers of Brush-turkeys in numerous Brisbane suburbs, mainly adjacent to the forests of Mt Coot-tha, was sufficient to interest the then Queensland National Parks and Wildlife Service (Harris 1979). Peter Ogilvie's unpublished report of 1979 provides a valuable insight into the timing of the bird's arrival in these areas. For example, he reports individuals first being noted in Corinda in 1972, Indooroopilly in 1974, and Chapel Hill around 1979, with mounds and damage to gardens being recorded soon after (P. Ogilvie, unpublished data). The largest numbers of mounds reported at the time were from The Gap. Residents of this suburb indicated that they had been aware of relatively shy birds frequenting *Lantana* thickets in 1963 but that by 1979 the birds were noticeably tamer, some even drinking from milk bottles (P. Ogilvie, unpublished data).

About a decade later (1980-1981), the Wildlife Preservation Society of Queensland (WPSQ) conducted the Brisbane Wildlife Survey, an atlas-style survey of all species in the Greater Brisbane area (see Davies 1983). This survey found Brush-turkeys to be present in 27 Brisbane suburbs, and noted "It has clearly returned to much of its former range with the establishment and growth of gardens" (WPSQ 1983)

Earlier surveys by BQ (then Queensland Ornithological Society (QOS)) also provide useful background to the changing abundance of the species. The QOS 1973 annual bird count of the Brisbane area recorded only four individuals, all but one being from areas W of Ipswich (QOS 1974). In the 1979-80 Garden Bird Survey (Woodall 1995), Brush-turkeys are not mentioned specifically in the text, although small numbers were included in the tabulated data. By the 1999-2000 survey, sightings had increased by 22% by site and 12% by week, the species having the eighth largest increase during the previous 20-year period (Woodall 2002).

Jones & Everding's (1991) investigation of the ecology of suburban Brush-turkeys in the Brisbane area during 1989-90 also included information on their distribution. This was based largely on reports made by the public to the Queensland Parks and Wildlife Service. It provided a snapshot of the presence of the species at the time, as well as an assessment of the potential positive and negative influences affecting Brush-turkeys living within this human-dominated environment. They were reported from 39 suburbs, including several from locations or habitats unlikely to have traditionally supported the species (see Jones *et al.* 1995). It was speculated that at least some of these had resulted from intentional relocations by people (Jones & Everding 1991). Although this study found the species to be widespread and abundant in the area, a comparison of reproductive success of bushland versus suburban birds found the latter to be far less productive. Given the apparently poor survival of hatchlings in the wild (recently confirmed by Göth & Vogel 2002, 2003), it was suggested that the long -term survival of the Brush-turkey in suburban Brisbane should not be assumed (Jones & Everding 1991).

Birds Queensland initiated the present study to reassess the presence and distribution of the Brush-turkey in the Greater Brisbane Region. It was motivated in part, by the perception that, far from declining, the species' population was growing and spreading (Woodall 2002). The aims of the study were to obtain a detailed picture of the presence and abundance of the Australian Brush-turkey throughout the Greater Brisbane region during 2002-3, to compare these findings to earlier surveys and to assess whether its numbers and distribution had increased during the previous decade.

METHODS

Sightings of Brush-turkeys were invited from members of Birds Queensland and the public via announcements at the monthly meetings of BQ, notices in newsletters and over the media. R Sonneberg established an automated telephone hot-line and email address dedicated specifically to receiving reports of the sightings. People making reports were encouraged to record an exact location (preferably with GPS or longitude and latitude co-ordinates), the number and sex of birds, whether chicks or mounds were present, and any other relevant information.

The survey ran for 14 months from February 2002 to March 2003. All data was sent to the Suburban Wildlife Research Group at Griffith University for analysis. K. Sinden checked the locations and GPS information against a Brisbane geographical database using ArcView software.

RESULTS

A total of 126 correspondents provided 242 separate reports during the survey. Most (74 or 59%) correspondents made a single report while 24 made 2-7 reports. Three people contributed 11 (R. Sonnenburg), 13 (D. Muir) and 52 (I. Venables) reports from throughout the region. (A full list of correspondents and a detailed map of reports, including all grid and GPS data, has been included in the report provided separately for QOS (Jones *et al.* 2004).

Small groups of birds (between two and four, or 'several') were most often reported (147 or 61%) although 63 (26%) reports were of single birds. Birds 'sexed' by correspondents were most commonly male (20%), of unknown sex (13%) or female (7%) respectively. Group sizes ranged from 1 to '20+'. Only six reports (2.5%) mentioned the presence of chicks, although 62 (25%) reported a nest mound.

Reports were from a total of 49 postcode districts (4000 to 4503) and 73 specific suburbs (Table 1) ranging from the Brisbane CBD (Spring Hill, Petrie Terrace and Brisbane Botanic Gardens), to Ironbark (51 km W of the Brisbane GPO), Carindale (12 km E), Petrie (27 km N) and Cornubia (32 km S).

The greatest frequencies of reports were from locations known to support large breeding populations (suburbs adjacent to Brisbane Forest Park such as The Gap, Toowong, Indooroopilly, Chapel Hill and Brookfield). Those populations identified as 'recently established' during 1989-90 (Jones & Everding 1991) in or adjacent to Toohey Forest Park such as Tarragindi and Upper Mount Gravatt, and those in Cornubia had prospered, with birds apparently expanding into neighbouring suburbs.

The most significant finding was the presence of Brush-turkeys in suburbs far from any previously known breeding population. Brush-turkeys were reported from the N and SE of the region, as well as from inner suburbs not previously known to support the species. The largest areas where the birds have not established populations are rural districts to the east of the city in the Redlands Shire.

DISCUSSION

This survey shows that the Australian Brush-turkey now occurs in most areas of Brisbane, including the CBD with minimal habitat such as the Brisbane Botanic Gardens and the Queensland University of Technology Gardens Point Campus.

Table 1: Suburbs (listed by postcode) in the Greater Brisbane Area where the Australian Brush-turkey was reported between August 2002 and March 2003.

Northern Suburbs			Southern Suburbs		
Suburb	**Postcode**	**Reports**	**Suburb**	**Postcode**	**Reports**
Spring Hill	4000	6	Seventeen Mile Rocks	4073	3
Herston	4006	4	Jindalee	4074	3
Hamilton	4007	1	Chelmer	4074	1
Nundah	4012	12	Graceville	4075	1
Wavell Heights	4012	1	Sherwood	4075	3
Taigum	4018	1	Oxley	4075	2
Windsor	4030	1	Highgate Hill	4101	10
Kedron	4031	1	West End	4101	1
Chermside	4032	1	Tennyson	4105	1
Aspley	4034	3	Moorooka	4105	4
Carsledine	4034	1	Sunnybank	4109	4
Zillmere	4034	1	Pallara	4110	1
Albany Creek	4035	4	Nathan	4111	1
Alderley	4051	2	Algester	4115	1
Stafford	4053	4	Holland Park	4121	1
Everton Hills	4053	3	Tarragindi	4121	5
Ferny Grove	4055	5	Upper Mt. Gravatt	4122	2
Ferny Hills	4055	1	Springwood	4127	1
Red Hill	4059	3	Shailer Park	4128	1
Kelvin Grove	4059	1	Cornubia	4130	1
Newmarket	4060	1			
Ashgrove	4060	2	**Eastern Suburbs**		
The Gap	4061	8	Carina	4152	2
Paddington	4064	5	Carindale	4152	2
Bardon	4065	5	Belmont Hills	4153	1
			Burbank	4156	1
Western Suburbs			East Brisbane	4169	1
Toowong	4066	17	Norman Park	4170	1
Auchenflower	4066	4	Balmoral	4171	3
St. Lucia	4067	9	Hawthorne	4171	1
Kenmore	4067	16			
Indooroopilly	4068	22	**Other Suburbs - West**		
Chelmer	4068	2	Goodna	4300	1
Taringa	4068	7	Carole Park	4300	1
Pinjarra Hills	4069	1	Ironbark	4306	2
Chappel Hill	4069	8			
Fig Tree Pocket	4069	1	**Other Suburbs - North**		
Brookfield	4069	5	Bray Park	4500	1
			Cashmere	4500	2
			Lawnton	4501	1
			Petrie	4502	1
			Whiteside	4503	2

Although the differing methods used in early surveys make comparisons with the present study problematic, it appears certain that the species has spread dramatically across Brisbane. It has successfully moved from former strongholds, such as the suburbs adjacent to Brisbane Forest Park, into others some distance from bushland refuges. For example, reports of Brush-turkeys from Taigum, Algester, Springwood and Carole Park suggest that the birds are capable of travelling considerable distances through apparently inhospitable environments and breeding with a minimum amount of bushland.

The information from the 1980-1 Brisbane Wildlife Survey (WPSQ 1983) provides the most reliable data for comparison. Although Brush-turkeys were reported from almost twice as many suburbs during the present survey (73 versus 37) the range of the species appears not to have changed markedly. In 1980-1 birds were reported from Chermside and Nudgee in the N, Rochedale and Springwood to the S, and several sites W along the Brisbane River near Ipswich, as in the present study, and also Gumdale and Mt Cotton where no birds were reported in the present study. The Brisbane Wildlife Survey was an atlas-style study, with the Brisbane region being divided into grid-squares, all of which were visited (Davies 1983). In contrast, all or most reports made during the present survey were based on opportunistic sightings rather than any systematic coverage of the region.

The comprehensiveness of the survey and the conspicuousness of the Brush-turkey, suggest that an absence of the species from a location may be reliably interpreted as the species not being present, rather than simply being overlooked. If so, the main phenomenon to occur in the previous 20 years has been the movement of Brush-turkeys into previously unoccupied suburbs. The reporting of mounds from these new locations also indicates that breeding populations are present and not isolated individuals.

The causes of this expansion by the Brush-turkey into the Greater Brisbane Region have not been investigated but previous research suggests two likely influences. First, reproduction in this species depends upon the construction, maintenance and defence of large incubation mounds by an adult male (Jones 1988a, 1990). Although Brush-turkeys in the suburban environment are flexible in their choice of mound sites (Jones & Everding 1991) many locations are unsuitable or sub-optimal (Jones 1988b). Poorly sited nest mounds may be less attractive to females (Jones 1997), or increase egg and hatchling mortality (Jones 1988c, Göth & Vogel 2002). The vigorous defence of preferred mound sites by dominant male Brush-turkeys ensures that young males move well away from their natal mound in search of suitable sites for their own mounds (Jones 1990).

Recent years of drought in Brisbane have prevented successful reproduction (D. Jones unpublished data) by reducing food for females and preventing incubation mounds from generating sufficient heat (see Jones 1988a, b, 1995). The effect of these conditions has caused young males to move away from established high-density populations into the surrounding suburbs. The dense vegetation along the Brisbane River and its many tributaries appears also to have assisted the spread of the species.

Translocation by humans, mentioned explicitly by Jones & Everding (1991), is the second explanation for the expansion of the Brush-turkey. Although illegal, it is often done (see Craven *et al.* 1998). Survey respondents confirmed this suspicion in the case of Brush-turkeys, witnessing directly the release of birds. Their destruction of gardens is a typical reason given for translocation (Jones *et al.* 1993) and their removal is deemed more acceptable than euthanasia. Licenced pest control operators who capture and relocate specific animals for paying members of the public may also have contributed. Although they are required to release birds only in locations specified by the relevant wildlife agency, it is possible that at least some releases occur elsewhere.

The origin of particular populations is uncertain but the population in Toohey Forest Park, for example, almost certainly started through translocation. Before 1980 Brush-turkeys were unknown from this large suburban reserve. It consists of dry *Eucalyptus* forest and woodland without permanent water, and is incapable of supporting a wild Brush-turkey population because the leaf-litter would not support incubation (Jones 1988b). Since the arrival of Brush-turkeys in the 1980s (Catterall 1988) the population has grown and spread by establishing mounds in adjacent well-vegetated gardens. New mound sites were then located in the surrounding suburbs, with the result that Brush-turkeys are a common sight in the neighbouring suburbs of Tarragindi, Moorooka and Sunnybank.

Jones & Everding (1991) speculated that breeding in the suburbs risked an extraordinarily high rate of juvenile mortality due to predation (Jones 1988c). Göth & Vogel (2002) found that predation, especially by feral cats, was likely to remove almost all hatchlings. Only in areas where chicks can find refuge in dense thickets are survival rates above zero.

Given a high density of cats, a lack of protective thickets, the ubiquity of roads and traffic, and a variety of other negative features in Brisbane's suburbs, the continuing survival of the Brush-turkey appears noteworthy. That the population is growing and expanding its range locally is remarkable, especially as many other

species of native wildlife appear unable to cope with greater urbanisation (Sewell & Catterall 1998) and most other species of megapode are declining alarmingly (Jones *et al.* 1995). Detailed investigation of reasons for the success of the Australian Brush-turkey would be particularly valuable.

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THE ECOLOGY OF THE CRITICALLY ENDANGERED YELLOW CHAT *EPTHIANURA CROCEA MACGREGORI* ON CURTIS ISLAND

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ABSTRACT

Surveys undertaken on Curtis Island from 2000 to 2002 have increased understanding of the ecology and management needs of the recently re-discovered subspecies of the Yellow Chat *Epthianura crocea macgregori*. A population of approximately 30 - 40 adult birds was found living in *Schoenoplectus litoralis* rush-beds and nearby vegetation that appeared to provide them with shelter and food. The birds bred during the spring and summer. Two nests were found in October and fledglings were seen being fed by adults in *S. litoralis* rush-beds. Adult birds mostly fed on invertebrates on the ground, low vegetation or in shallow water.

Their preferred habitat at Curtis Island is dense tall rush-beds combined with bare or, sparsely vegetated, moist substrate in a saline-influenced wetland that varies spatially and temporally. Yellow Chats persisted on the marine plain despite a recent drought and the hyper-salinity of their habitat. They used different parts of the wetland mosaic for different purposes. Dense rush-beds (mostly > 1.2 m high) provided shelter. Most foraging occurred in the more open vegetation such as patchy tussocks of rush, areas where grasslands were less dense (either *Sporobolus virginicus, Paspalum distichum* or a mixture of both) or chenopod salt flats. Parents feeding fledglings foraged in patchy rush-beds where dense tall rushes juxtaposed open areas with mixtures of mud, shallow water or sparse grass.

Feral pigs are present and responsible for damaging some rush-beds. Despite a long recent drought the population has survived under present cattle stocking densities and grazing practices. Fencing trials to protect the rush-bed habitat are recommended. The marine plain has been declared a Conservation Park and monitoring of the vegetation is recommended.

INTRODUCTION

The endemic Yellow Chat *Epthianura crocea* is a small (approximately 11 cm and 9 g) predominantly insectivorous bird of well-vegetated wetlands (Higgins et al. 2001). The known coastal population of Yellow Chat in Queensland is represented by the Capricorn (Dawson) subspecies *Epthianura crocea macgregori* (Keast 1958) and is critically endangered (Garnett and Crowley 2000). Another subspecies *(E. c. crocea)* is centred in the Kimberley, Barkly Tableland, Gulf of Carpentaria and Lake Eyre Basin areas and a third (*E. c. tunneyi)* is found in the Alligator Rivers region of the Northern Territory (Higgins et al. 2001; Garnett and Crowley 2000).

The Capricorn subspecies was first known from the Fitzroy River near Rockhampton (Keast 1958, Mack 1930) and Torilla Plain N of Rockhampton (Campbell 1917) but not seen for over 70 years (Blakers et al. 1984) until it was re-discovered in 1992 on a marine plain on Curtis Island (23^0 34.20' S, 151^0 10.98') (Arnold et al. 1993). Since then, repeated surveys over several years (QDEH 1993, G.P.) have found the birds to live only on the marine plain. Searching (by R.E.) has found no evidence of Yellow Chats on the NW coast of Curtis Island ('Spadleigh'). In 2003 the marine plain was gazetted as a Conservation Park. Recent surveys have re-discovered the Yellow Chat on the Torilla Plain and Fitzroy River delta as reported in this issue (Jaensch et. al. 2004, Houston et al. 2004)

Little is known of the ecology of this subspecies (Arnold et al. 1993, Higgins et al. 2001). We aimed to determine the abundance, distribution and critical habitat requirements of the Curtis Island population to identify threats to its survival and to advise the management of the area for the bird. A reconnaissance of the study area was undertaken in winter 2000 (14 to 16 June). The three subsequent surveys were completed during the spring/summer of 2001 and 2002 (28 October to 2 November 2001, 9 to 12 December 2001 and 30 September to 4 October 2002) when it was suspected the birds might be breeding.

STUDY AREA

Curtis Island is large (ca. 40 x 15 km) and adjacent to the coast near Gladstone, just S of the Fitzroy River mouth in central Queensland. The NE side of the island (approximately 5 x 6 km) is a plain with a very shallow gradient and subtle changes in elevation formed by marine deposition (Speight 1990). There is a gradation from a highly saline marine environment in the N, to a variable

hypersaline middle area and a freshwater system in the S. Parts of the southern and middle portions experience regular flooding by shallow freshwater and soil salinity can be locally high reflecting the prior marine history.

There is a mosaic of vegetation communities on the plain whose local structures are controlled by the small variations in topography and soil salinity. Broadly, freshwater *Melaleuca* swamps exist in the SE and extensive chenopod or bare salt flats border mangroves along tidal creeks in the N. *Eleocharis* sedgelands occupy the southern margins of the plain. In intermediate locations between freshwater and tidal areas are salt tolerant *Schoenoplectus litoralis* rush-beds. Pools of water (< 1 m depth) are lined by *S. litoralis* rush-beds bordered by Water Couch *Paspalum distichum* and/or Marine Couch *Sporobolus virginicus* grasslands with occasional patches of chenopods (*Halosarcia* spp.), or bare salt flats. *S. litoralis* rushes range in height (0.6 - 1.8 m) depending on drainage.

Monthly rainfall measurements at "Monte Christo" (George and Joy Wilson, pers. comm.) < 5 km from the plain show that local rainfall (Figure 1) was well below the average for the past 9 years. Only June 2001, December 2001, June 2002 and August 2002 produced rain above the average. Consequently in 2001 there was 589 mm of rain (ca. 2/3 of the average, 871 mm) and in 2002 from January to October 498 mm of rain fell which was also below the average (690 mm). The high rainfall in December 2001 fell after the December survey (see methods). Rainfall can be very localised and on 17 October 2001 approximately 100 mm fell on the plain but not at "Monte Christo" homestead (G. Wilson pers. comm.).

METHODS

A reconnaissance of the island was undertaken in 2000 (14 to 16 June). Three subsequent surveys were completed during 2001 and 2002 (28 October to 2 November 2001, 9 to 12 December 2001 and 30 September to 4 October 2002) when it was suspected the birds might be breeding.

Vegetation was described using standard techniques (Walker and Hopkins 1990). Water salinities were measured using a field refractometer (BS Ellipse). Aerial photographs (1:25,000, Sunmap Centre, 1989) were used to guide the search effort. All vegetation types were searched during transects either on foot or on quad all-terrain vehicles. Three traverses were made from S (at the terrestrial edge) to N (at the influence of regular tides and with extensive bare salt flats) at intervals across the marine plain searching for Yellow Chats.

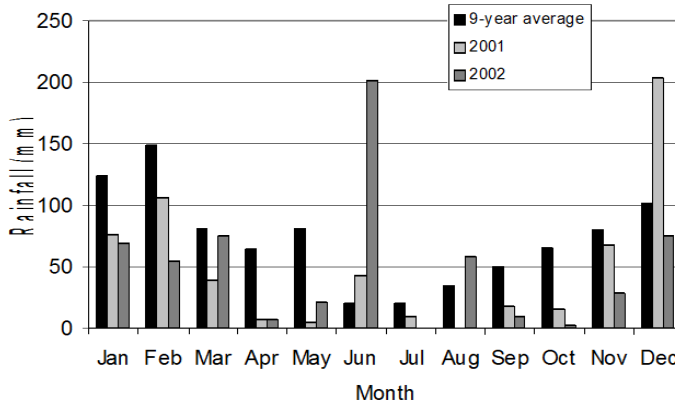

Figure 1 Rainfall at "Monte Christo" for 2001, 2002 and the 1992-2000 mean .

When the birds were located, thorough searches were made to count them. Censuses started at 7 am and ended at noon. Quad-motorbikes were used to circumnavigate sites, and birds were counted whilst driving slowly around rush-beds and by stopping occasionally to listen. The vehicles provided ideal elevated platforms from which to observe the birds and their sound appeared to stimulate them to call and fly to perch at the tops of rushes. Transects carried out on foot rarely elicited this response and were less successful than the quad-borne surveys. Playback tapes of calls also elicited responses but were not efficient for censusing the birds over large areas. Wind reduced the effectiveness of all census methods and, if strong (> ca. 20 knots), forced them to be abandoned. Where possible, the census for each trip was completed over a single morning.

The behaviour of birds was also observed on foot for 2-3 hours, usually of a morning, using sit-and-watch techniques (Bibby et al. 1992). Counts of birds were similar to those obtained by vehicle census. Intensive searches of tall dense *S. litoralis* rush-beds to locate nests were unsuccessful. Observing foraging birds, tracking them to the vicinity of the nest, and then undertaking intensive searches located nests.

RESULTS

In October 2001, *S. litoralis* rush-beds were brown except for those closest to freshwater that had some new 'green' growth at the base of the rushes. In the same ponds *S. litoralis* rushes were green and flowering by December 2001. In October 2002,

where the surrounding *P. distichum* dominated pastures had been inundated from the ponds and lakes, most *P. distichum* was dead.

The salinity of pools was lowest in the S nearest to the influence of freshwater and highest in the N, nearest the sea. Rush-bed ponds fluctuated greatly in salinity and some sites changed from fresh in October 2001 to hypersaline by early December 2001 (e.g. from 1 -78 parts /1000). Salinity at four ponds measured during each of the three field trips reflected changes in accordance with preceding rainfall and evaporation rates. Mean salinity of the four ponds differed between the three sampling times. In late October 2001 (10 parts /1000) ponds were full and water inundated bordering rushes and pastures to a depth of approximately 20 cm. In early December 2001 (106 parts /1000) many surrounding ponds were dry and in late October 2002 (42.5 parts /1000) most ponds extended only into their surrounding rushes. Four wetlands monitored immediately before a storm during December 2001 and then the day after the storm showed a decline in average salinity from 106 to 66 parts /1000. This 38% fall in salinity was in response to a localised storm event of approximately 25 mm (George and Joy Wilson, pers. comm.).

The census located Yellow Chats only in the central portion of the marine plain S of regular tidal influence and N of the *Eleocharis* swamps along the southern margin. The adult population was estimated to contain approximately 40 Yellow Chats. The maximum number of pairs observed on any of the surveys was approximately 15 and the estimate of 40 adult birds includes birds that were not breeding.

During 2001 and 2002 up to 10 individuals resembling juvenile birds were seen but their breeding status could not be confirmed because non-breeding plumage of the female varies considerably and is similar to juvenile plumage. The three confirmed juvenile birds were observed in December 2001. The throat and breast were light brown, duller than the female that has a yellow throat. They were an even brown on the back and wings without obvious white edges to the wings. Belly, sides and rump were yellow but paler than the female.

The total area of Yellow Chat habitat (< 1000 ha) on the marine plain extended over approximately 2 km by 3 km of grassland dominated by *S. virginicus* or *P. distichum* with small areas of rush-beds, chenopods and salt flats. The importance of *Eleocharis* swamps could not be assessed adequately as these were dry during all field trips. Yellow Chats were only observed within vegetated habitat and not on the salt flats although they foraged in the chenopod saltmarsh bordering the rush-beds.

The most northerly sighting was a pair in *S. litoralis*, *S. virginicus* and chenopods (*Halosarcia* sp.), approximately a kilometre from the nearest mangroves.

Out of 21 pools/rush-beds surveyed on the marine plain, Yellow Chats were found at only 12 and these comprised an area of less than 50 ha. Of the 12 occupied sites, nine accounted for over 95% of the observations of Yellow Chats. With the exception of two Yellow Chats observed feeding at an open body of water in November 2001, all birds were associated with rush-lined pools or rush-beds dominated by *S. litoralis*. Pooling census data from the three surveys showed that 74% were associated with *S. litoralis* rush-lined pools and 24% with *S. litoralis* rush-beds.

Males and females were observed in full breeding plumage in late October 2001 and mating was observed once after which the female was seen gathering grass stalks. In December 2001 three fledglings were observed being fed by adults, which suggests that breeding was initiated in late spring. Breeding males were a burnt yellow colour with obvious black breast bands and females had lemon yellow plumage.

Two nests were found to contain nestlings in October 2002 indicating that breeding began during early spring. Nests appeared to be attended by single pairs of adults. Three nestlings (one of which was dead) were found in one nest and two in the other. Three groups of unfledged young out of the nest (one or two in each group) were observed being fed by pairs of adults in the spring of 2002.

Figure 2: An author (GP) pointing at a Yellow Chat nest in dry *S. litoralis* rushes (Sept. 2002).

Table 1: Nest location and description.

	NEST 1	NEST 2
Description	An oblong 8 x 7 cm cup, 37 cm above ground.	A cup 7 x 7 cm, 30 cm above ground.
Location	In a clump of rushes 2 x 3 m, 10m from a dense *S. litoralis rush-bed*.	In rushes and grass 30 m from a rush -bed.
Situation	In 1.2 m tall *S. litoralis* sedgeland.	In 0.8 m high, mid-dense *S. litoralis* sedgeland / *S. virginicus, P. distichum* grassland.
Vegetation < 10 m	Total cover 30% of *S. litoralis* rushes, dead *P. distichum* and stems of young rushes.	Total cover 65%; 10% withered *S. litoralis* rushes, 40% *S. virginicus*, and 15% *P. distichum* .
Vegetation < 50 m	*S. litoralis* rush-bed, *P. distichum* and *S. virginicus* grassland.	*S. litoralis* rush-bed, *P. distichum* and *S. virginicus* grassland, chenopod shrubland, and salt flat.

Nests and nest locations are described in Table 1. One nest was in a mosaic of small patches of *S. litoralis* rushes surrounded by bare substrate and the other in a mid-dense mixture of *S. litoralis* rushes and *S. virginicus* dominated grassland. Although the soils were moist, neither nest was near a pond or within a dense 'closed canopy' *S. litoralis* rush-bed.

In spring and summer 2001 male and female pairs were frequently seen together feeding, perching on *S. litoralis* rushes or moving from one site to another. Some pairs seemed to favour one location suggesting a territory was being held and males were spaced at approximately 100 m intervals around the edges of wetlands.

Some males were heard calling during aerial display flights near females. Solo display flights by males were at a steep angle of approximately 80^0 to 20 m high, over a horizontal distance of 15 - 20 m. Several males were observed perching conspicuously at the top of tall vegetation and making a 'whit-ney' call – possibly a display call advertising their presence to a female. A four-noted 'pink-pink-pink -pink' call was also used and appeared to be a territorial call directed at other males. Calling birds used a variety of prominent perches including the edge of *S. litoralis* rush-beds, the middle of rush-beds and grass tussocks surrounding a rush-bed. A male chased another for approximately 70 m then returned to its original location, calling stridently using the 'pink-pink-pink-pink' call. Males usually returned to their original perch after such chases.

Yellow Chats were mainly observed in, or near, *S. litoralis* dominated rush-beds. While other vegetation types were used for feeding or perching, birds always returned to the rush-beds. For example, in October 2002, Yellow Chats sheltered from strong easterly winds by using the western face of rush-beds along the eastern margins of pools, which also exposed them to the warmth of the afternoon sun. Most adult birds were observed within approximately 10 m of rushes but occasionally moved up to 50 m into grassland.

Some pairs of Yellow Chats were observed to move between two *S. litoralis* rush-beds. When moving short distances between rush clumps (< 10 m) the birds stayed close to the ground. Groups of two or three birds flew between 2 - 3 m high when moving longer distances between rush-beds. Birds often perched for up to 10 minutes on rushes, and sometimes on adjacent *P. distichum* tussocks near rush-beds.

Parents with unfledged and fledged young used rush-beds consistently. Unfledged young hid from observers in rushes. On one occasion when escaping a disturbance an unfledged chick briefly moved into adjacent *P. distichum* grasslands. Fledglings were left unattended for periods of up to 10 minutes and usually remained unconcealed on the ground, or perched on the base of *S. litoralis* rushes.

Adult birds fed on invertebrates from the ground, or the bases of rushes, on bare mud, on mud covered by flattened or sparse grass and from grass tussocks fringing the rush-beds. Flying insects were hawked from higher rush perches. In late October 2001, Yellow Chats appeared to be gathering the abundant mosquito larvae in shallow water (2 cm deep) at the base of flattened grass tussocks. In June 2000, flocks of birds fed in chenopod vegetation some distance from rush-beds.

Most foraging was observed in open vegetation types but foraging in dense vegetation could not be observed easily. Adults tending nestlings foraged mainly around pools and muddy substrates. One male flew over 100 m, from a nest in dry rushes to a nearby pool, before returning to feed the nestlings. It also foraged in a *P. distichum* patch with moist substrate approximately 20 m from the nest. Parents attending the other nest, also located in dry rushes, flew 200 m to a green rush-bed with wet substrate. The frequency of feeding of the nestlings was recorded for over an hour. Nestlings were fed once every 3 - 4 minutes (mean 3.5 min.) but this ranged from once every 1 minute to once every 10 minutes. At one nest the male delivered 80% of the food. Fledglings in December 2001 were fed at similar rates.

Prey items for nestlings and fledglings were mostly small and easily swallowed (e.g. spiders gleaned from webs in the grass) but included some larger flying insects such as moths and damselflies.

Pig tracks were found at freshwater ponds on the inland edge of the plain and some pig-damaged *S. litoralis* rush-beds were found. On the marine plain, cattle tracks were concentrated on the driest ridges that supported *S. virginicus* grasslands. *P. distichum* dominated wetter pastures, and rush-beds surrounded by wet pastures showed little evidence of cattle damage. Only one stand of *S. litoralis* appeared to have been trampled by cattle. Heavy grazing of *S. litoralis* rushes has been observed at other wetlands in central Queensland (W.H., pers. obs.). Wildfire poses a low-level of threat and no predation of Yellow Chats was observed.

Predators on the marine plain included Keelback snakes (*Tropidonophis mairii*), unidentified elapid snakes, Swamp Harriers (*Circus approximans*), Brahminy Kites (*Haliastur indus*), Whistling Kites (*Haliastur sphenurus*), White-bellied Sea-eagles (*Haliaeetus leucogaster*) and Dingoes (*Canis lupus dingo*). The snakes were seen at *S. litoralis* rush-beds.

DISCUSSION

As elsewhere, Yellow Chats on Curtis Island live in wetland vegetation (Higgins et al. 2001, Reynolds et.al.1982). Wetland vegetation at Curtis Island is an ecotonal habitat. It exists in a dynamic ecotone that experiences continuous seasonal change due to a complex interplay between freshwater flooding, evaporation, saltwater intrusions and relict soil salinity. Locally, minor differences in elevation produce a mosaic of different successional phases of drying and wetting across the wetland. For instance, in October 2002 Yellow Chats used several kinds of *S. litoralis* rush-beds, senescent for breeding, and new growth of rushes and other associated vegetation on moist substrates for foraging. The availability of these habitat types also varied across the marine plain with different areas producing a favourable mixture of conditions (dense rushes, moist substrates and more open areas for feeding) at different times. This vegetation complexity and successional mosaic may be critical in determining the persistence and distribution of Yellow Chats on the plain, particularly during drought.

Typical feeding habitat of Yellow Chats at Curtis Island is patchy rush-beds, grasslands (both *S. virginicus* and *P. distichum*), where less dense, and chenopods. Foraging birds were most often observed feeding in more open vegetation rather

than continuous dense rush-beds. Inland populations of Yellow Chats also feed on mud and shallow water among sedges and in open chenopod vegetation (Black et al. 1983).

At Curtis Island *S. litoralis* rush-beds are important for shelter, breeding, providing protection from predation and the elements, as well as food. Most sightings were associated with tall rush-beds (> 1.2 m). Yellow Chats elsewhere use various species of rushes and sedges (Ford and Parker 1972; Williams and Main 1976; Waugh 1978; Horton 1982; Reynolds et al. 1982; Woodall 1982; Black et al. 1983) or rank grasses (Keast 1958; Williams and Main 1976) indicating that it is the structure - tall groundcover vegetation – not the floristic composition that is important for their survival.

Areas of dense rush-beds appeared to be used as refuges for parents and fledglings to retreat into when disturbed, but adults spent much time feeding and rearing their young in more open rush-beds with clumps of dense tall rushes interspersed with mud. Foraging adults rearing young (both nestlings and fledglings) mainly used the margins of drying ponds or dense continuous rush-beds with small pockets of open vegetation on moist substrates. Foraging adults seldom used rush -beds without these open areas. A combination of both dense vegetation and bare or sparsely vegetated moist substrate appears to be optimum habitat.

Figure 3: Dense rush-bed in wet substrate where fledglingYellow Chats were fed (Sept. 2002).

Yellow Chats persisted on the marine plain despite below average rainfall over the survey period and salinities greatly in excess of seawater in their habitat. Williams (1979) and Reynolds et al. (1982) differ over regarding the Yellow Chat as the most xeric of the four species of chats. The wetlands where Yellow Chats live at Curtis Island range from freshwater to hyper saline and all sites were hyper saline in December 2001. Birds were not observed using freshwater in the S of the marine plain and appeared to obtain water from their food and the local area surrounding the rush-beds. They appear to be able to survive without access to hypo saline water and may gain all the water they require from food, dew, or succulent chenopods.

Dates of egg-laying were estimated using Williams (1979) standard phenology. Presence of late fledged young between 9 and 12 December 2001 indicates that eggs were laid in early November 2001. This estimated date agrees with field observations in late October 2001 that indicated a readiness to breed. Presence of unfledged young and late nestlings on 1 October 2002 suggests a date for the commencement of breeding in early September and confirms a spring - summer breeding pattern for Yellow Chats at Curtis Island.

It is not known if breeding is timed to coincide with rainfall and maximum food availability like other wetland species (Frith 1967; Morton and Brennan 1991), or if, as in other subtropical passerines, the onset of breeding is produced by increasing day length, warmer temperatures and the seasonal availability of food following the new growth of plants. Both observed breeding events at Curtis Island coincided with above average monthly rainfall in the month preceding the estimated breeding date (> 100 mm in October 2001 and > 50 mm in August 2002). However, further evidence would be required to distinguish between either hypothesis.

The rush-beds are key habitat and appear to be adapted to survive inundation and high salinities, having persisted during the recent decade of reduced rainfall. So, unless a drought is very severe they should survive indefinitely. Reduced water flow following construction of levees would reduce the area of the wetland. Ponded-pasture banks could also restrict drainage and limit successful reproduction of Yellow Chats. Levees upstream of the marine plain are unlikely to be used, as it is a natural 'ponded' pasture providing a dry season source of food for cattle. The marine plain is currently managed as a source of dry season fodder. Floods have destroyed the levees downstream of the marine plain constructed in the 1970's and further construction is now illegal.

A potential threat to the habitat is the invasion of the marine plain by exotic wet pasture grasses (e.g. Para Grass *Brachiaria mutica* or Olive Hymenachne *Hymenachne amplexicaulis*) and replacement of the native wet pasture species *P. distichum* (Houston and McCabe 1996). However, high salinity levels reduce the likelihood of invasion by ponded-pasture grasses into the habitat of Yellow Chats.

A reduction in pig numbers would protect and improve the available *S. litoralis* habitat. Cattle grazing at current levels may enhance the structure of the habitat by opening up dense grasslands and improving the access for Yellow Chats to food. However, increased grazing levels could damage *S. litoralis* rush-beds. Under current management, cattle are allowed to use the marine plain as a drought refuge (G. Wilson, pers. comm.) and have done so for the past decade without apparent over-grazing. Limited grazing by cattle has not damaged the habitat of Yellow Chats in the Barkly region of northern Australia (Strong and Fleming 1987). Nevertheless it is not known at what density of Yellow Chats can survive in the area. The population may have been larger and more widespread in earlier times.

The declaration of the marine plain as a Conservation Park allows monitoring of vegetation aimed at maintaining vegetation cover, height and complexity for Yellow Chats to begin. Measures that increase the area of rush-bed for Yellow Chat habitat (with the possibility of increasing numbers of Yellow Chats) should be considered. Fencing of rush-beds (i.e. those currently under-utilised by Yellow Chats) should be trialed to protect habitat if this can increase the size of the local Yellow Chat population.

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REDISCOVERY OF THE CAPRICORN SUBSPECIES OF YELLOW CHAT *EPTHIANURA CROCEA MACGREGORI* AT TORILLA PLAIN, ON THE MAINLAND COAST OF CENTRAL QUEENSLAND

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ABSTRACT

The critically endangered Capricorn (Dawson) subspecies of the Yellow Chat *Epthianura crocea macgregori* is reported for the first time in more than 80 years from the mainland coast of central Queensland. We describe the rediscovery, in the period July 2003 to May 2004, of a breeding population on the Torilla Plain, adjacent to Broad Sound, NNW of Rockhampton. A two-stage census of the population in three localities produced a total of 160 birds (including juveniles). Habitats occupied were saline swamp dominated by tall rush *Schoenoplectus litoralis*, and samphire *Halosarcia* spp. and freshwater channels lined with tall sedge *Cyperus alopecuroides*, and grass. The subspecies is now known from Curtis Island and several mainland localities. We identify some of the conservation needs of the Torilla Plain population.

INTRODUCTION

The Yellow Chat *Epthianura crocea* is a small passerine that is commonly associated with wetlands (Higgins *et al.* 2001, Houston *et al.* 2004a, R.J. pers. obs.). Three subspecies are recognised. *Epthianura c. crocea* occurs from the Kimberley to the Gulf of Carpentaria and the Lake Eyre Basin, *E. c. tunneyi* occurs in the Alligator Rivers region and *E. c. macgregori* occurs in the coastal region of central Queensland (Higgins *et al.* 2001, Garnett & Crowley 2000). The latter is critically endangered under the *Environment Protection and Biodiversity Conservation Act 1999*.

In central Queensland early last century it was known from only a handful of localities. Specimens had been collected near Torilla, in the Broad Sound area ca. 115 km NNW of Rockhampton (March 1917, an adult male), and earlier from Fitzroy Vale in the delta of the Fitzroy River (1859, 3 adult males and an adult female) (Campbell 1917, Keast 1958, Higgins *et al.* 2001). There was a long absence of published records (Blakers *et al.* 1984, Higgins *et al.* 2001) until 1992 when a population of approximately 40 birds was found on marine plain in the NE of Curtis Island (23^0 34.20' S,

151^0 10.98' E), SE of the Fitzroy River mouth (Arnold *et al.* 1993, Houston *et al.* 2004a).

Searching for Yellow Chats was included in waterbird surveys conducted near Torilla by Wetlands International (R.J.) in March to July of 2003 and in March 2004 and was the focus of concurrent research by Central Queensland University (W.H.) in November 2003 and March to May of 2004. As locality details for the 1917 specimen were sparse (Campbell 1917), surveys were undertaken broadly across Torilla Plain, an extensive (25,000 ha) marine plain near the homestead and low hill that bear the name 'Toorilla'. Torilla Plain is managed for cattle grazing, mostly under freehold tenure, by four private properties.

METHODS

Inundated sedgelands were specifically targeted when searching for Yellow Chats in 2003. Based on the species' Curtis Island habitat (Houston *et al.* 2004a), search effort was concentrated on beds of the rush *Schoenoplectus litoralis*. This wetland plant is tolerant of brackish water (Sainty & Jacobs 1994) and typically occurs in the ecotone where freshwater and saline inundation both occur (R.J. pers. obs.).

An aerial survey of waterbirds on Torilla Plain on 28 March 2003 enabled one of us (R.J.) to also search for sedgelands of *Schoenoplectus litoralis*. An extensive and complex stand was discovered in the south of the Plain, in channels and basins landward of a low sea wall. Smaller beds were detected in the far west of the Plain, in smaller channels and basins both up and down stream of block banks across tidal channels.

The emphasis in searching was to find and count chats at as many sites as possible and to document their habitats and any evidence of breeding. Due to the limited available time, only seven wetland sites were surveyed (R.J.) on the ground in March 2003. These were on the eastern side of the Plain where freshwater inflows were dominant. Though rainfall had been infrequent in the 2002-3 wet season, intense falls in February totalling about 500 mm (Bureau of Meteorology rainfall maps) had caused major inundation of the Plain. Much of the Plain remained wet through March, preventing ground access to the saline southern and western sectors.

Torilla Plain received no substantial rainfall (< 50 mm per month: Bureau of Meteorology rainfall maps) during the period April-November of 2003. From 30 April to 2 May 2003, R.J. and J. Wahl surveyed 19 wetland sites including several in the saline western sector. Two of these included inundated beds of *S. litoralis*. One observer waded through the rush beds while the other watched for flushed birds. Conditions were windy.

During 1-3 July 2003, 17 sites were surveyed. These included one of the western wetlands visited in May, a newly accessible wetland in the centre of the Plain and (for the first time) the extensive southern stand of *S. litoralis*. The latter was searched by five or six of the authors (R.J., W.H., R.B., L.C., J.M. and R.E.) from early morning to midday on 2 July and in the morning of 3 July. Some observers waded slowly through inundated or dry fringing *S. litoralis* while others on dry land watched for flushed birds. Binoculars and tripod-mounted telescopes were used. On both occasions there were breezy periods alternating with calm.

The southern and western areas were revisited on 10-12 and 24-26 November 2003 by five of the authors (W.H., R.B, L.C., R.E. and G.P.) to look for chats under the harshest conditions of the annual cycle.

Light to moderate rainfall occurred over Torilla Plain and/or its catchments through the 2004 wet season, with monthly totals over 100 mm from December 2003 to February 2004 (Bureau of Meteorology rainfall maps). Some creeks provided substantial freshwater inflow to the Plain but others provided only minor floods. Inundation of wetlands varied accordingly across the Plain and many areas were drying out in March. Aware of the favourable conditions for waterbirds and for access to sites, four of the authors (W.H., R.J., R.B. and L.C.) surveyed Torilla Plain from 30 March to 1 April 2004. We hoped that Yellow Chats would be more conspicuous if breeding late in the wet season. Adult Yellow Chats tend to call frequently and perch higher in vegetation whilst breeding (R.J. pers. obs., W.H. pers. obs.). Fourteen wetland sites were visited but most effort was invested in sedgelands of *S. litoralis* in the south (30-31 March) and west (31 March).

Four observers (W.H., R.B., R.E. and G.P.) re-surveyed the central and western areas on 18-19 May 2004. Further surveys on Torilla Plain are proposed.

RESULTS

No Yellow Chats were seen at Torilla Plain during the March-May 2003 surveys but chats were found during the July 2003, November 2003, March 2004 and May 2004 surveys described above, at three localities. Summary accounts of sightings to March 2004 are presented below, arranged by locality. Results from the May 2004 survey came to hand while this paper was going to press and thus are presented separately.

Southern locality

The first sightings were made, by all of the participating observers, in the southern stand of *S. litoralis* on 2-3 July 2003. Yellow Chats were seen at

numerous points, on both days, up to 1.5 km apart (from 22^0 30.06' S, 150^0 00.67' E east to 22^0 29.94' S, 150^0 01.48' E and a shorter distance to the south; datum WGS84) but in semi-continuous habitat. Chats were subsequently seen in the southern part of this locality on 10-11 November 2003 and on 30 March 2004, and in the original area (especially a 'core area' near 22^0 30.00' S, 150^0 01.00' E) on 30-31 March 2004.

Up to nine chats were counted during a 1.5 hour period on 2 July 2003 and likewise the next day, but only three were found over 10 hours in November 2003. Searching was easier in November due to the dry conditions so this result implied that fewer birds were present. However, at least 45 birds were found in 12 hours in March 2004. Despite extensive searching, complete coverage was not achieved in the July or March surveys and some substantial rush beds yielded no chats. Hence, some birds may have been overlooked and the totals should be regarded as minima.

Several of the nine chats seen in July were adult males and the other birds ranged from partly yellow to mostly plain (see notes on identification below). The three chats found in November were a male, a female and a bird that was heard but not seen, 1-2 km south of the core area near a long central channel. In March 2004, ten family groups were detected, each including adult parents and up to three mobile juveniles. Most of the juveniles seemed to be of the same age. We concluded that because many mobile juveniles were being fed periodically by adults a major breeding effort had occurred at this site in 2004. Allowing about two weeks for incubation and a slightly longer period for feeding nestlings and fledglings (Higgins *et al.* 2001, Houston *et al*. 2004a), eggs were laid probably in late February or early March.

The dominant component of the chat habitat at this locality was inundated *S. litoralis*. A semi-continuous stand covered at least several hectares in the core area and clumps and strips continued widely beyond. In July 2003, rush beds in the core area were partly green and were dense and erect (stem tips to 1.5 m) though drooping stems and dead stubs also were common. Some narrow stands fringing a saline lake on the seaward side of the locality were partly collapsed and desiccated, as were the rushes in outer basins and channels that had dried out. Moderately saline water (30 ppt) was up to 0.5 m deep in the main channel through the core area but much shallower in most beds and soft wet mud was abundant. By November only patches of damp mud remained and *S. litoralis* plants were brown and some had been reduced to stubs or collapsed/broken stems. Regardless, in November the chats were all associated with *S. litoralis*, in small patches adjacent to bare claypans and samphire.

In March 2004 the rush beds had been rejuvenated and all stands were green and erect. Water was less saline (9 ppt) and a little more extensive than in July 2003, with a veneer of receding water in surrounding marshes and secondary channels. Low samphire *Halosarcia* spp. was common in these marshes and samphire, other succulent halophytes (eg. *Sesuvium* sp.), salt-water couch *Sporobolus virginicus* and tussock grass *Leptochloa fusca* were common in drier parts of the site. The sedge *Bolboschoenus fluviatilus* and sometimes nardoo *Marsilea* sp. occurred patchily in the swamp margins. A feature of the habitat (only) in March 2004 was stands of pea bush *Sesbania cannabina* over 2.0 m tall on recently dried ground, often in dense strips but also in isolated clumps. As in July 2003, chats were found at many points through the locality, including strips of *S. litoralis* fringing islands in the lake and peripheral channels. However, the largest numbers were consistently in the core area especially where the rush was in clumps with intervening mud or shallow water (Fig.1).

Despite frequent windy periods, chats were located by their contact calls (see below) in both the July and March surveys, though more so in March. In all three surveys the chats tended to be furtive and sometimes were flushed close to the unsuspecting observer. Birds were inconspicuous as they fed on insects gleaned from the water surface, wet mud and/or stems at the bases of *S. litoralis* clumps and when they flew below the tops of

Figure 1: Yellow Chat habitat, Torilla Plain: *Schoenoplectus litoralis*

adjacent clumps. Occasionally, birds were observed feeding in other vegetation (*Sesbania*). Many sightings were of yellow birds that had eventually moved high up the rush stems, at the water side edge of inundated beds. In March 2004, chats perched in *Sesbania* clumps and family groups feeding (and calling) in wet or muddy marshes with scattered rush clumps, were relatively conspicuous. Pairs or individuals sometimes flew between isolated rush beds, for up to 50 m, close to the water surface. Groups of up to six occasionally flew about 5.0 m above ground for similar distances. Chats were rarely found in dry areas. Two sightings were made in the same clumps of *S. litoralis* in two surveys.

Western locality

Yellow Chats were found, by all four observers, in the more northerly (22^0 22.15' S, 150^0 00.24' E) of the two western patches of *S. litoralis* in the late afternoon of 31 March 2004. None were found there in three visits in 2003, despite wider searching in November.

This western sub-population comprised at least 10 chats. Much of the area of *S. litoralis* was explored but searching lasted little more than an hour and it is possible that some chats were overlooked. Four sightings were made, at points up to 300 m apart, comprising a group of five, two singles and a group of three birds. The five were a family of two adults closely associated with three mobile juveniles, indicating that breeding had occurred earlier in the 2004 wet season at this site or nearby. One of the other chats was an adult female.

At this locality water up to 1.0 m deep was present in networks of channels that were 1-3 m wide and ran for many tens of metres, also in connected basins that were tens of metres wide. Channel and basin edges were muddy. Many of the shorter channels were roughly parallel and branched off a broader open channel that extended more than a kilometre from the Plain toward the distant mangroves. Constructed block banks lay across the several, larger arterial channels and all chats were found upstream of these banks. The chats were in partly inundated beds of dense green *S. litoralis* (1.5 m tall) that grew narrowly and discontinuously along the edges of the channels and in broader beds fringing or in the middle of some of the basins. Partly desiccated stands of pea bush over 2.0 m tall commonly occurred next to the rush-lined channels; these stands were not present in 2003. Surrounding areas supported samphire, other halophytes, salt-water couch and/or tussock grass or were bare. The more southerly western patch (22^0 23.39' S, 149^0 59.83' E) and others nearby, in which no chats were found, generally exhibited shorter vegetation with less extensive tall cover.

The chats were first detected by far carrying "pee-pee-pee" calls emanating from the family group; calls from this group were heard after sunset. The other birds were seen perched high in the rush beds or were flushed from damp ground beside beds. Some flew more than 30 m between beds.

Central locality

A third sub-population of Yellow Chats was found by two observers (R.J., R.B.) near an earthen stock tank in the central part of the Plain (22^0 deg 22.08' S, 150^0 02.49' E) at 1315 on 1 April 2004. No chats were found there in two visits in 2003.

This central sub-population contained at least 13 chats. In one hour only a small portion of the occupied habitat was surveyed, hence a much larger number of chats may have been present. Four sightings were made, at points up to 700 m apart, comprising a group of six, one bird, a pair and a group of four. The first group was a family of two adults and 3-4 mobile but closely associated juveniles, some of which were being fed. The lone bird was an adult and the last group was a family of two adults and at least two juveniles. Clearly, breeding had occurred earlier in the 2004 wet season in this area or nearby.

Habitat occupied by the central sub-population was similar to that occupied by the southern and western sub-populations in terms of wetland geomorphology but was substantially different in terms of dominant plants and salinity. A major channel up to 20 m wide and of unknown depth meandered through the site; this originated well to the SE and continued westward to Broad Sound (but lay north of the major channel near the western population). Like chat habitat elsewhere on the Plain, there were networks of branching minor channels throughout the site. Robust stands of the perennial sedge *Cyperus alopecuroides* to 1.5 m tall grew in variable densities along the channel edges (Fig. 2) and across associated minor basins, often continuously. Lush thick swards of freshwater couch *Paspalum distichum* or tall dense Para grass *Brachiaria mutica* covered the intervening areas. Though most of the *Cyperus* was still shallowly inundated, small areas of grassy and bare mud were exposed along the gently sloped channel edges. Water salinity was not tested, but the vegetation was indicative of a freshwater regime that was probably enhanced by the existence of low block banks constructed on the arterial channels west (downstream) of the site.

This sub-population was situated only 3.0 km east of the western sub-population. Nevertheless, we consider that it was a distinct sub-population because the habitat occupied was markedly different and was located

Figure 2: Yellow Chat habitat, Torilla Plain: *Cyperus* channel

principally in the centre of the Plain, extending for at least 2.0 km to the S, E and N of the survey site (covering > 800 ha).

Despite wind persistently sweeping the area, the first chat (the adult male of the largest family) found at this site was detected by its "pee-pee-pee" calls. A separate pair of undetermined age was recorded as it flew to the north, calling spasmodically. Adults of the family groups were typically seen at the channel water line, often at the sheltered bases of *Cyperus* clumps, presumably searching for food. Now and then they perched high in the *Cyperus*, sometimes calling, or on barbed wire fences traversing the site.

May 2004 results

Wider searching at the central locality in May 2004 yielded 94 Yellow Chats. Many were in areas previously surveyed but others were several kilometres to the SE or N. The birds were feeding or sheltering in the *C. alopecuroides* and *B. mutica* community associated with freshwater channels. Much of this vegetation had been shortened by grazing and most channels had dried since March. An aggregation of about 40 birds was observed on damp mud adjacent to a pool. A few family groups with juveniles were seen, indicating that some eggs were laid probably in early-mid April.

Systematic searching of the western locality in May 2004 yielded 21 chats. Habitat was similar to that recorded seven weeks earlier, but drier. The southern locality was not searched in May but probably was in similar condition to the western locality and therefore also supporting a substantial number of chats.

Identification

In all seasons, adult male Yellow Chats were distinguished from females and juveniles (and Orange Chats *E. aurifrons*) by the presence of a short black crescent, or smaller but distinct dark mark, on the upper chest (Higgins *et al.* 2001). In the breeding season, both adult males and adult females showed extensive bright yellow colour on the underparts and to varying extent on the rump and head. Juveniles were recognised by extensive brown streaks and/or wash on the sides of their chests and by their close association with parents. In other seasons, recognition of females and immatures was more problematic because they tended to be plain, some with yellow only on the vent and/or rump. Adults were also separated from Orange Chats by having white rather than brown irides (Higgins *et al.* 2001). In addition to uttering the high-pitched "pee-pee-pee" call, the Yellow Chats spasmodically emitted a short nasal call when flying.

DISCUSSION

Our work has led to the rediscovery of a mainland population of the critically endangered Capricorn (Dawson) subspecies *macgregori* after more than 80 years. We suspect there may have been little, if any searching for Yellow Chats in the Torilla area since early last century, so, strictly speaking, the local population was not 'lost'. However, given the long time lapse and lack of other mainland records, we consider 'rediscovery' an appropriate term. We did not collect any of the birds for closer examination and we assume they belong to the subspecies *macgregori* on geographical and historical grounds.

Because Campbell (1917) gave insufficient details about the locality of the Torilla population, it is uncertain if any of the rediscovered birds are in the same locality or are direct descendants of the population sampled early last century. Regardless, Yellow Chats are now known from three localities on Torilla Plain and probably occur elsewhere on the Plain. Repeat visits to some sites have shown that chats may escape detection, or use certain localities seasonally/irregularly, or both.

Based on the 2004 surveys and experience on Curtis Island (Houston *et al.* 2004a), we conclude that searching for birds in order to census numbers

may be most effective in the late stages of the breeding season. At that stage, family groups may be relatively conspicuous as they actively search for food and call to maintain contact. However, the February-April (wet season) breeding period at Torilla Plain in 2004, associated with abundant concealing vegetation and inaccessibility of some sites, made censusing difficult at that time.

The census of three sub-populations surveyed on Torilla Plain in March 2004 realised a minimum population size of 68 Yellow Chats (including mobile juveniles). The census of two sub-populations in May 2004 realised 115 birds but, allowing for the southern sub-population, an estimated total of at least 160 birds may have been present. This is the largest aggregation of the Capricorn subspecies of Yellow Chat known at present.

It is conceivable that the Torilla Plain population may have suffered a crash in 2003 or earlier, because drought conditions had affected the Plain for several years. Perennial vegetation such as *S. litoralis* and *C. alopecuroides* recovered from subterranean stock and/or seed in the 2004 wet season and, especially the latter, was far more abundant in March 2004 than in previous surveys. This may partly explain the apparent increase in population size in 2004 but immigration of birds from another part of central Queensland cannot be ruled out. Yellow Chats are known to occur spasmodically at remote areas of inland Australia such as the Channel Country (Jaensch in prep.) when conditions are favourable and have colonised artificial habitats in the arid zone (Higgins *et al.* 2001, G.P. pers. obs.).

Recent surveys of other parts of Capricornia have led to discovery (Houston *et al.* 2004b) of another mainland population of Yellow Chat, in the greater Fitzroy Delta region.

While prospects for survival of the subspecies are considered to be better now than a few years ago, some conservation issues remain unresolved. Given that areas of *S. litoralis* and *C. alopecuroides* are both extensive on Torilla Plain and that chats appear to have bred in both, it is unclear as to which is the more important (perhaps core) habitat for Yellow Chats. Importance of habitat may vary with season; hence further surveys are needed in the late dry season to search for chats across the Plain in order to identify the main refugia.

The three localities occupied at Torilla Plain each had substantial cover of low vegetation in surrounding areas. High intensity grazing of cattle over an extended period may reduce ground cover on marine plains and cattle sometimes trample *S. litoralis*. However, due to lack of baseline surveys of chat habitat or populations over past decades, the long-term impact of

grazing on current or past chat habitat on the Plain is unknown. The introduced Para grass is extensive in the centre of the Plain and controlled grazing may usefully limit it from spreading into the native vegetation (Houston & McCabe 1996).

The impact of existing sea walls and channel block banks on chat habitats is unclear. There is some evidence that marine plain seaward of these structures has received less fresh water and consequently supports less perennial vegetation. However, areas landward of the structures seem to support vigorous vegetation communities that are occupied by chats.

There is currently no evidence to suggest that major changes to land use practice on Torilla Plain may be required in order to sustain a Yellow Chat population. As at Curtis Island (Houston *et al.* 2004a), a population exists despite recent severe drought. The landowners control access to the chat localities, which are far from formed roads and may be seasonally inaccessible due to widespread flooding. The present owners seem well placed to maintain and manage the chat habitat in recognition of its considerable importance for persistence of this subspecies that is endemic to coastal central Queensland.

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REDISCOVERY OF YELLOW CHATS (CAPRICORN SUBSPECIES) ON THE FITZROY RIVER DELTA CENTRAL QUEENSLAND

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ABSTRACT

A third extant population of the Yellow Chat (*Epthianura crocea macgregori*) is reported from the delta of the Fitzroy River near Rockhampton. This raises the estimated total for the current abundance of this Capricorn subspecies to approximately 300 birds. Surveys conducted in the delta at Twelve Mile Creek and Raglan Creek during February and March 2004 produced sightings of approximately 40 birds (adults and fledgling juveniles) from two sites 6km apart. Nests were located in low grass adjacent to samphire habitat surrounded by shallow freshwater and tidal wetlands. The subspecies has not been reported from the delta of the Fitzroy River since the late 1800's. These sightings help to re-establish (see also this issue Jaensch et al 2004 and Houston et al 2004a) the former known range of the subspecies over approximately 200 km of coastline.

INTRODUCTION

After the discovery of extant populations of the Yellow Chat (*Epthianura crocea macgregori*) at Curtis Island in 1992 (Arnold et al. 1993) and Torilla Plain in 2003 (Jaensch et al. 2004) we began surveying the marine plain in the Fitzroy River delta, near Rockhampton. The earliest report of Yellow Chats by MacGregor was from the delta at Fitzroy Vale in 1859 (Mack 1930). The collection of specimens from Fitzroy Vale enabled Keast (1959) to describe the subspecies and pre-dated the description of the type specimens from northern Queensland by Castelnau and Ramsay (1877) and also its discovery at Torilla Plain in the early 1900's (Campbell 1917). Here we report on a third population of the Yellow Chat (*Epthianura crocea macgregori*) adding to the growing knowledge of the distribution, abundance and ecology of this critically endangered Capricorn (Dawson) subspecies. This knowledge has been limited by its small range, secretive habits and access to its wetland habitat in the past. No recent regional waterbird surveys had detected Yellow Chats in the Fitzroy River delta, (Houston and McCabe 1996, Jaensch, 2004). Figure 1 shows the locations of the three extant Yellow Chat populations.

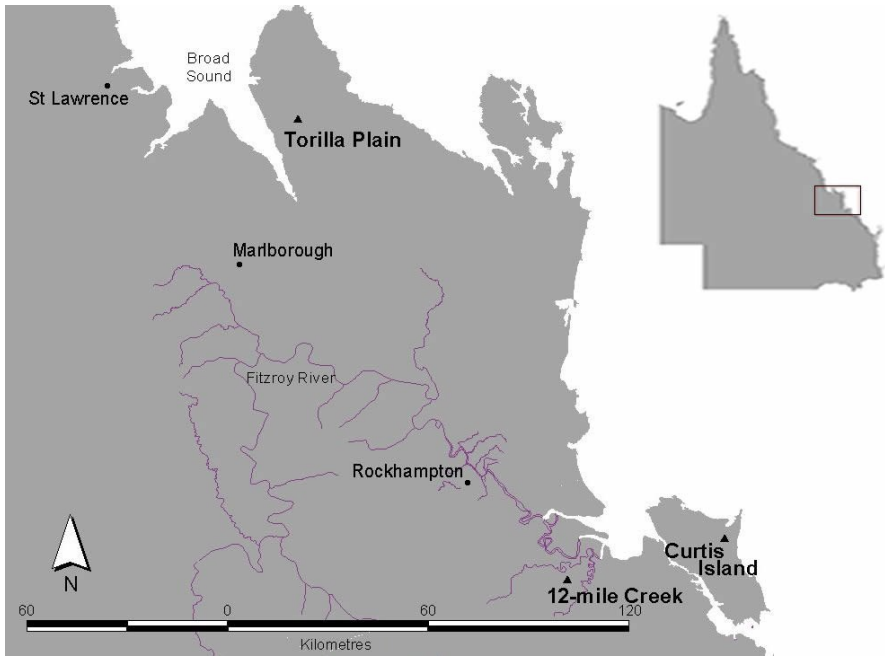

Figure 1: Locations of Yellow Chat populations in Central Queensland

METHODS

Searches in the Fitzroy River delta commenced in July 2003 and continued through summer 2003 until May 2004. In all, over twenty sites within the greater Fitzroy River delta area both north and south of the estuary were searched. Searches during August, November 2003 and March 2004, totalling 60 person-hours of search effort, were conducted at Fitzroy Vale. *Schoenoplectus litoralis* dominated wetlands were searched based on knowledge of the habitat on Curtis Island (Houston et al. 2004) and all other wetlands (fresh and saline) containing rank vegetation (Houston et al. 2004, Jaensch et al. 2004). Low sparse vegetation in or around deep wetlands was not searched. Most observations were made daily before 1 pm when conditions were most favourable (Houston et al. 2004). Previous searches during cooler months (Aug.-Nov.) were repeated in the warmer months when breeding makes Yellow Chats less secretive (Jaensch et al. 2004) and more vocal (Houston et al. 2004).

A systematic survey of vegetation (< 1 m) at Twelve Mile Creek on 3 March 2004 was conducted from 8 am until noon. Five observers transected the vegetation by walking separately along lines approximately

200 m apart from south to north until they reached bare saline flats at the northern end of the site. At intervals of 100 m along the transect they stopped in unison for 10 to 15 minutes, each searching the vegetation around them with binoculars and recording the locations and types of birds they saw. This helped to prevent the duplication of sightings by different observers.

RESULTS

Yellow Chats were not located at Fitzroy Vale but they were located at Twelve Mile and Raglan Creeks.

Twelve Mile Creek

After a report of an unidentified bird (M.S.), two Yellow Chats were seen feeding along the creek edge (23^0 40.65' S, 150^0 45.12' E, datum AGD 84) on the 10 February 2004. They were in a sparse (10-30% cover) narrow band (1 - 2 m) of *S.litoralis* or *Sporobolus virginicus* (Marine Couch) bordering the creek at the saline / freshwater interface. This site includes a small piece of crown land being rehabilitated as fish habitat (Bill Sawynok, pers. comm.).

Surveys during February and early March 2004 produced most subsequent sightings downstream from this location in an extensive saltmarsh where the creek empties into the upper marine plain, losing definition because of the limited gradient (230 40.17' S 1500 45.33' E). Nests, fledged dependent juveniles and several pairs of adults holding territories were observed at this site. A census at Twelve Mile Creek indicated a population of 41 individuals (including fledged dependent juveniles) containing at least 15 pairs in an area of approximately 150 ha.

At this site the upper marine plain supported a mosaic of grassland (< 60 cm) and chenopod (samphire) shrubland (<50 cm), enclosed by large brackish shallow pools (0 to 6 ppt) and occasional mangroves (*Avicennia marina, Ceriops tagal*) bordering tidal channels. Dense *S. virginicus* grassland formed tussocks in places and upright herbs (*Halosarcia sp., H. indica, Sueda australis, Sesuvium portulacastrum*) gave way to bare saltflats in the northern part of the plain. The southern and eastern margins supported a mixture of terrestrial grasses and isolated shrubs and the chenopod shrubland in the west gradually attenuated into bare saltflats. Substrates were moist and some mud was present.

Two nests were found, each containing two young. Both nests were on small islands (1 x 4 m) in large shallow pools at the upper end of the marine plain. A nest found on 19 February contained newly hatched chicks (< 2 days old, unfeathered) that were near fully fledged when

Figure 2: Channel lined with mangroves, tall chenopods and marine couch grass where fledglings were fed

re-examined on the 26 February. They had left the nest by 3 March indicating a 10-14 day nestling period. Nests were built in dense grass (*S. virginicus,* >90% cover) 40 cm above the ground and lined with grass. They were located at the bases of cylindrical cavities (ca. 6 x 20 cm) that extended down into the dense sward. All types of the locally dominant ground cover, grassland, chenopod shrubland and bare saltflat occurred within a 100 m radius of the nests.

On 19 February a group of fledged young were observed being fed by adults. Both nestlings and fledged young were fed on caterpillars gathered from the new growth of the surrounding samphire plants. Fledglings were seen being fed by adults in a chenopod herbfield mixed with sparse grass (*S. virginicus*) and emergent mangrove shrubs (mainly *A. marina*) along a tidal channel. They frequently perched on living mangroves and the stumps of dead mangroves in the moist and muddy substrate. Their parents, apparently unconfined by a territory, ranged widely looking for food. One adult bird was observed perching in low shrubs along the terrestrial margin of the marine plain and two males were observed chasing each other near a nest. All adults had bright plumage. Males had burnt-yellow heads with obvious dark crescents on the breast and females were more lemon-yellow. The breeding location was re-surveyed on the 14 April, 29 April and the 17 May and few birds were seen.

Raglan Creek

Two male Yellow Chats were located at this site on a freehold grazing property 6 km SE of Twelve Mile Creek on the 12 March. The first male was seen calling 'pink-pink-pink' from a perch on *Eleocharis* sp. reeds forming a narrow band (< 3 m wide) along a freshwater lagoon. It flew approximately 200m to *S. virginicus* grassland (< 40 cm) and perched on tall (0.8 m) *S. litoralis* tussocks along a drain (salinity 12 ppt) near Raglan Creek. Small patches of chenopods (mainly *S. portulacastrum*), semiaquatic grasses (*Paspalum distichum*) and unidentified terrestrial grasses bordered the tidal drain. Another male was also seen in this area. Searches of the nearby mangroves and wetlands up to 500m from this sighting locality failed to locate any further Yellow Chats.

DISCUSSION

The Twelve Mile Creek population combined with the Torilla Plain and Curtis Island populations provides a new estimate of 240-300 Yellow Chats for the total abundance of this subspecies. The locations of the mainland populations are approximately 40 km SW (Twelve Mile Creek) and 160 km NW (Torilla Plain) of the Curtis Island population (Figure 1) and restore the current range of the subspecies to its approximate historic range in the early part of last century. As three widely spaced extant populations, the subspecies is now considered to be less prone to local threatening processes than before. It has persisted in the region in association with both grazing and drought. Dry season habitat for both the Twelve Mile Creek and Torilla Plain populations remains to be identified and this information is likely to be a key component of the conservation strategy for the subspecies.

Breeding habitat is now know to vary from saltmarsh vegetation (Twelve Mile Creek) to freshwater vegetation (Torilla Plain, Jaensch et al. 2004) and vegetation of intermediate salinity at Curtis Island (Houston et al. 2004) and Torilla Plain. However, all have in common an association with drainage lines, saline soils, the presence of extensive moist and / or muddy substrates and a location on marine plains with a connection to tidally influenced wetlands. Typical habitat at Curtis Island, Twelve Mile Creek and two of the three Torilla Plain localities is a network of braided drains flanked by rank vegetation (rushes, sedges or grass) that provide shelter adjacent to muddy substrates.

Breeding dates in the three localities conform to the spring-summer breeding observed at Curtis Island (Houston et al. 2004) but the Torilla Plain population also breeds in autumn (Jaensch et al. 2004). At Twelve

Mile Creek breeding followed substantial local rainfall. The timing of breeding observed in the Twelve Mile Creek and Torilla Plain populations (Jaensch et al. 2004) also suggests that Yellow Chats bred after significant local rainfall (Houston et al. 2004). Thus any excessive drainage or damming of runoff could compromise their breeding.

Breeding Yellow Chats exploit several locally abundant food sources when feeding juveniles. Their diet includes arthropods associated with damp substrates, low vegetation (Curtis Island, Twelve Mile Creek) or shallow water (e.g. mosquito larvae at Curtis Island) (Houston et al. 2004). This dependence on abundant food resources associated with low vegetation or damp substrates may be an important requirement limiting their distribution and breeding range if such foods are readily available only in the restricted environments described.

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A LITTLE RINGED PLOVER IN THE LOWER FITZROY WETLANDS, CENTRAL QUEENSLAND

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ABSTRACT

A sighting of a Little Ringed Plover *Charadrius dubius* at a drying freshwater lake on the Fitzroy River floodplain near Rockhampton, central Queensland, in October 2003 is described. There are few published reports of the species from Queensland.

INTRODUCTION

The Little Ringed Plover *Charadrius dubius* occurs widely in Eurasia and the subspecies *C. d. curonicus* is a non-breeding migrant that reaches the southern hemisphere, including Australia, in small numbers. The non-migratory subspecies *jerdoni* and *dubius* occur from India to Thailand, and the Philippines to New Guinea and New Ireland, respectively (Marchant & Higgins 1993).

During 11-19 October 2003 the authors were involved in a census of waterbirds in wetlands of the lower Fitzroy River floodplain, central Queensland. One of the waterbird habitats surveyed was Lower Gracemere Lagoon (ca. 500 ha). This open wetland is a complex of channels and narrow shallow basins separated by natural levees. It is seasonally inundated by Lion Creek arising in nearby ranges and less frequently inundated by the Fitzroy River during major floods.

THE SIGHTING

At approximately 0930 on 16 October 2003 we saw a small plover on the muddy shore of a narrow water body within Lower Gracemere Lagoon (23^0 23.38' S, 150^0 24.54' E). The plover was different from Australian-breeding plovers because it had a complete white collar around its neck and a complete breast band. It was studied using binoculars and tripod-mounted telescopes (20-40 x) from as close as 30 m. The weather was fine, with clear skies and a light wind.

Deep water kept us from viewing the bird at closer range and after observing it for about 20 minutes we resumed our count of waterbirds elsewhere on the Lagoon.

The plover was observed on the gently sloping margin of a long open arm of the Lagoon, which was slowly drying, exposing muddy margins up to a metre wide along its shoreline. The margin supported only the small dead stubs of grass tussocks; lush, short green meadows had established on drier ground. The Lagoon had been inundated early in 2003 following heavy rain in the Lion Creek catchment but by October the remaining water formed a complex series of narrow reaches separated by natural levees. Muddy margins were widespread throughout the Lagoon on 16 October.

Many of the wetlands on the Fitzroy River floodplain around Rockhampton have open edges that become bare and muddy late in the dry season. Habitat for migratory shorebirds therefore may be plentiful during the southward migration period, but may be scarce during northward migration due to summer flooding and heavily vegetated margins. Grazing of cattle on the floodplain, most of which is in freehold tenure, possibly contributes to seasonal development of the open habitat favoured by migratory shorebirds in freshwater wetlands but the long-term impacts of grazing are unknown.

DESCRIPTION

Our description of the bird, derived from field notes taken during the sighting and before consulting references follows.

A small plover with a consistently horizontal, rather than upright, stance. Its size is slightly (but noticeably) smaller than the nearby Sharp-tailed Sandpipers *Calidris acuminata*. The head is small, neck is slender and the posterior of the bird is markedly attenuated. At rest, the wing tips reach or project slightly beyond the tail tip. The bill is short, black (no pale sections evident) and finely proportioned for a plover. Legs are of medium length and bright orange or pale red-orange. The crown, back and wing coverts are uniform brown-grey; the primaries are darker. White collar extends around the nape to the white throat. A complete dark (blackish-brown) band around the upper-chest is widest at the sides of the chest on the lower side of the band but narrows slightly at the centre of chest. The remaining underparts are white. Dark (blackish-brown) patch extending from the bill through the lores, widening around and behind the eye;

inconspicuous thin white line above eye patch, connecting to white frons; a thin, weak dark bar on the forehead immediately above the frons; no conspicuous eye ring. In flight (brief views on two occasions), an inconspicuous, faint white line is displayed across the upper-wings. Bobbed several times when alarmed. No calls heard.

CONCLUSIONS

Based on the size, proportions, stance and wing-pattern of the bird we concluded during the sighting that it was a Little Ringed Plover *C. dubius*.

Only two other white-collared, small brown plovers, Ringed Plover *C. hiaticula* and Kentish Plover *C. alexandrinus,* are known to migrate to Australia (Marchant & Higgins 1993, McCrie 1995). Both can be ruled out because they display prominent white wing bars and have a more upright stance similar to that of Red-capped Plover *C. ruficapillus*. Kentish Plover lacks a complete breast band. Ringed Plover may have similar plumage to Little Ringed Plover but is of stockier build. Ringed Plover has a stouter bill than the Little Ringed Plover and its length and weight are closer to those of the Sharp-tailed Sandpiper. The Little Ringed Plover is shorter and weighs about 20 g less (Marchant & Higgins 1993, McCrie 1995, Higgins & Davies 1996, Carter & Rogers 1998, R.J. pers. obs.).

One of us (R.J.) is familiar with these four species, especially *C. dubius*, from field work elsewhere in Australia, Asia-Pacific and/or Europe.

Although the upperparts of this bird were not observed closely enough to determine the presence or absence of scalloping (a feature of juvenile plumage), the presence of blackish-brown marks on the chest, face and forehead suggest that it was probably an adult progressing from breeding to non-breeding plumage (Marchant & Higgins 1993).

Only the migratory subspecies *C. d. curonicus* has been confirmed as occurring in Australia. Unlike the Rockhampton bird, the other subspecies do not have non-breeding plumages. Furthermore, Carter & Rogers (1998) advised that bright yellow had not been included in descriptions of leg colour of subspecies *C. d. dubius* from neighbouring New Guinea and South-east Asia. Thus we conclude that the Rockhampton bird was *curonicus*. Birds with bright yellow or orange-yellow legs may be characteristic of *curonicus* in eastern parts of its range (Jaensch 1982; Marchant & Higgins 1993, p. 835; Carter & Rogers 1998).

There are few published records of Little Ringed Plover in Queensland. It was recorded near Townsville in February 1985 (Marchant & Higgins 1993). During 1995-7 there were several reports from North Queensland, at Tinaroo Dam and near Georgetown, one of which has been accepted by the Birds Australia Rarities Committee (BARC 2004). Reports and atlases covering the Rockhampton area give no previous records (Longmore 1978, Blakers *et al.* 1984, Houston & McCabe 1996, Barrett *et al.* 2003). The species occurs regularly but in small numbers in northern and western Australia and as a vagrant in at least six Australian States/Territories (Marchant & Higgins 1993, Carter & Rogers 1998, N. McCrie pers. comm.).

Our record was presented as Submission Number 413 to the Birds Australia Rarities Committee and was declared Accepted on 30 April 2004.

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