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Birds of a Railway Yard at Corinda, Queensland

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Summary

Birds encountered at an industrial-residential site were examined to see if patterns of species abundance would provide an indication of environmental disturbance. Observations from 1972 to 1979 revealed that the site was impoverished in native species. Feral species dominated. It is concluded that such small-area studies may be useful in the context of urban planning.

Introduction

Krebs (1972) reported that roughly 10 to 30% of bird species introduced to other countries successfully established themselves, and that the introduced species comprise a small percentage of the bird species present. This relative unimportance of introduced species on a continental scale is not necessarily reflected in small study areas where species composition may change rapidly over very short distances. Human settlement patterns and environmental management set up localised features which may affect small-scale distributions of native and introduced species: successful introduced species usually occupy a man-made environment similar to their native environment (Goodwin 1978).

The degree of settlement and intrusion also affects the 'quality' of the landscape perceived by human residents (cf. Crofts 1975, Unwin 1975), so it may be possible to look for a relation between the distribution of bird species and the way in which human residents judge the value of the local landscape.

This paper investigates the birds encountered at a small industrial-residential site, and examines the quality of this landscape as it relates to native and introduced bird species.

Study area and methods

The 4.2 ha study site (Figure 1) comprised the railway shunting yard and surrounding residences and streets in the Brisbane suburb of Corinda, Queensland. Man-made structures included track area, covered loading bay, access road and electric light poles (c. 10 m high), and 25 houses on blocks of 1000 sq. m or less in area. The floristic component of the site comprised four elements: lawns; flower and vegetable gardens, long grass and weeds to 2 m in height; low trees and shrubs to 5 m in height; and shrubs and trees taller than 5 m. The landscape was entirely anthropogenic, and the only large trees present were Silky Oak *Grevillea robusta* (two individuals), Pride of India *Lagerstroemia indica* (three), Mango *Mangifera indica* (ten), and She Oak *Casuarina* sp. (two). There were also several patches of banana plants more than 5 m high. Using 50 sample points and the method of Karr (1971), it was determined that man-made structures covered a greater area than did foliage in this reasonably uniform site (Figures 1 and 2).

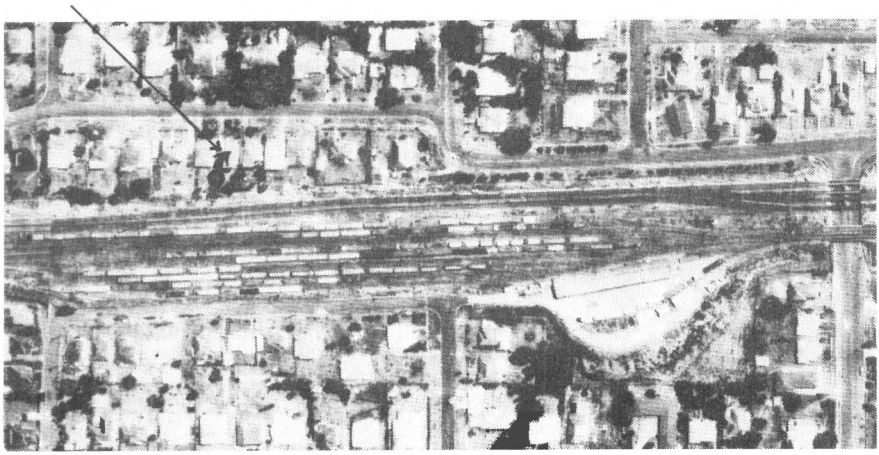

Figure 1. The study area. My residence is indicated.

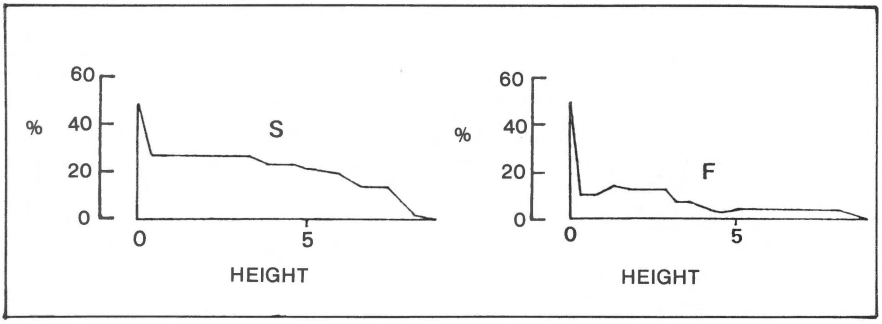

Figure 2. Structure (S) and foliage (F) profiles for 50 samples. Frequency (%) of occurrence shown for various heights in metres.

From 1972 to 1979 I lived on the site in the residence indicated (Figure 1), and made irregular but frequent walks about the site and in adjacent areas. Most observations were made from an elevated patio of my residence, using 8 x 30 binoculars. I recorded all bird species encountered, plus data on them. From September 1977 to December 1978 I was present on the site during daylight on 406 days, and kept daily records of all birds seen and heard on or over the site and adjacent areas. Most data were collected during the day; some records were also obtained at night. To test for bias caused by differences in species detectability, an index of encounterability (Williamson 1964) was calculated (Table 1). This index is (no. days on which a species is observed/no. observation days between extreme dates on which that species was observed) x 100. To determine site occupancy, throughout the day, continuous watches were conducted on six days in winter 1977: 28 and 30 June; 22, 23, 26 and 27 August. Following the method of Davies (1972), species were recorded as present or absent during 30-minute time units. To aid effectiveness of observation, recording was done in two-hour blocks separated

by two-hour rest periods. On successive days of observation I alternated rest and watch times, so that the six days yielded three composite days of complete daylight records.

Results

The number of days on which particular species were encountered are presented in Table 1. The only species confirmed as breeding on the site were House Sparrow *Passer domesticus* and Silvereye *Zosterops lateralis*. Using Rix's (1976) criterion that species encountered on c.90% of observation days were residents, the following were considered residents in the study area because they were encountered approximately daily: Feral Pigeon *Columba livia,* House Sparrow, Silvereye and Spotted Turtle-Dove *Streptopelia chinensis* (Table 1). The residents at the Corinda site comprised c.10% of all species recorded. The data confirmed the subjective impression that few species were continually present, and that feral species dominated. House Sparrow and Feral Pigeon were the most abundant species (more than 50 individuals of each regularly counted at any one time), while Silvereye, Australian Magpie-lark *Grallina cyanoleuca,* Figbird *Sphecotheres viridis,* Nutmeg Mannikin *Lonchura punctulata* and Common Starling *Sturnus vulgaris* were sometimes recorded in flocks of 10-30 birds. All other species in Table 1 occurred in small numbers (fewer than 10 individuals). Though probably related to the small area of the site, these results reinforced the impression of site dominance by the introduced species.

Table 2 shows the number of days on which birds from Table 1 were recorded adjacent to the site while not recorded on the site. Species such as Pied Butcherbird *Cracticus nigrogularis,* Figbird, Common Koel *Eudynamys scolopacea*, Blue-faced Honeyeater *Entomyzon cyanotis*, Grey Butcherbird *C. torquatus* and Striated Pardalote *Pardalotus striatus* seemed to prefer the surrounding area rather than the railway environs.

Data on site use throughout the day are presented in Figure 3. The four resident species were easily encountered at virtually all times of day, the Common Starling for most of the day, while Black-faced Cuckoo-shrike *Coracina novaehollandiae*, Willie Wagtail *Rhipidura leucophrys,* Australian Magpie-lark and Torresian Crow *Corvus orru* could be seen at most times of day but not on all days. Black-shouldered Kite *Elanus notatus*, Laughing Kookaburra *Dacelo novaeguineae*, Golden-headed Cisticola *Cisticola exilis* and Australian Magpie *Gymnorhina tibicen* were encountered at more specific times of day, while the remaining species appeared to be occasional day-long visitors which were not observed on the site for lengthy periods on any day. Figure 3 supports the subjective impression of day-long domination by the resident species, partial day-long occupation by others, and occasional visits to the site by still others. Figure 3 also shows a group of species most common at 0600-0800 h, but it was not clear whether this reflected bird inactivity in the middle of the day, or if species only moved to the site during morning and evening activity periods. As Figure 3 shows, many species were easily located throughout the day, and species such as Kookaburra and Pied Butcherbird would hardly go unnoticed. I suggest that Figure 3 reflects site use. It should also be noted that some species were usually recorded as using the site for feeding, roosting etc. and then moving on: Australian Magpies used the

Table 1

Days encountered, interval between encounters, index of encounterability (I.E.) and maximum numbers for species recorded during September 1977 – December 1978

*Ranked species**	*Days observed*	*%*	*Interval between encounters (days)*	*I.E.*	*Max nos*
House Sparrow *Passer domesticus*	405	99.75	1.00	99.75	52
Feral Pigeon *Columba livia*	398	98.03	1.02	98.27	64
Silvereye *Zosterops lateralis*	380	93.60	1.07	93.60	22
Spotted Turtle-Dove *Streptopelia chinensis*	341	83.99	1.19	83.99	7
Australian Magpie-lark *Grallina cyanoleuca*	241	59.36	1.68	59.36	12
Torresian Crow *Corvus orru*	192	47.29	2.11	48.36	7
Common Starling *Sturnus vulgaris*	138	33.99	2.94	34.07	26
Brown Honeyeater *Lichmera indistincta*	135	33.25	3.00	33.50	3
Pied Butcherbird *Cracticus nigrogularis*	131	32.27	3.10	34.20	5
Black-faced Cuckoo-shrike *Coracina novaehollandiae*	126	31.03	3.22	32.81	6
Golden-headed Cisticola *Cisticola exilis*	98	24.14	4.14	24.32	2
Willie Wagtail *Rhipidura leucophrys*	74	18.23	5.49	18.27	2
Australian Kestrel *Falco cenchroides*	72	17.73	5.64	19.05	2
Black-shouldered Kite *Elanus notatus*	58	14.29	7.00	15.26	3
Laughing Kookaburra *Dacelo novaeguineae*	49	12.07	8.29	12.86	14
Nutmeg Mannikin *Lonchura punctulata*	45	11.08	9.02	11.34	14
Little Friarbird *Philemon citreogularis*	45	11.08	9.02	14.02	2
Australian Magpie *Gymnorhina tibicen*	44	10.84	9.23	10.92	5
Figbird *Sphecotheres viridis*	34	8.37	11.94	9.71	12
Lorikeets *Trichoglossus* spp.	34	8.37	11.94	9.94	6
Blue-faced Honeyeater *Entomyzon cyanotis*	27	6.65	15.04	7.54	4
Pale-headed Rosella *Platycercus adscitus*	17	4.19	23.88	5.04	2
Scarlet Honeyeater *Myzomela sanguinolenta*	15	3.69	27.07	6.33	1
Collared Sparrowhawk *Accipiter cirrhocephalus*	14	3.45	29.00	5.71	1

Table 1 continued

Striated Pardalote *Pardalotus striatus*	11	2.71	36.90	8.56	1
Sacred Kingfisher *Halcyon sancta*	10	2.46	40.60	2.79	1
Olive-backed Oriole *Oriolus sagittatus*	8	1.97	50.75	3.42	1
Spangled Drongo *Dicrurus hottentottus*	5	1.23	81.20	2.02	1
Red-backed Fairy-wren *Malurus melanocephalus*	5	1.23	81.20	7.35	1
Crested Pigeon *Ocyphaps lophotes*	3	0.74	135.33	1.26	4
Fan-tailed Cuckoo *Cuculus pyrrhophanus*	3	0.74	135.33	3.80	1
Grey Butcherbird *Cracticus torquatus*	3	0.74	135.33	1.92	1
Common Koel *Eudynamys scolopacea*	2	0.49	203.00	6.25	1
Noisy Friarbird *Philemon corniculatus*	1	0.25	406.00	-	1
Whistler *Pachycephala* sp.	1	0.25	406.00	-	1
Horsfield's Bronze-Cuckoo *Chrysococcyx basalis*	1	0.25	406.00	-	1
Forest Kingfisher *Halcyon macleayi*	1	0.25	406.00	-	1
Southern Boobook *Ninox novaeseelandiae*	1	0.25	406.00	-	1
Mistletoebird *Dicaeum hirundinaceum*	1	0.25	406.00	-	2

*ranked according to no. days observed

Table 2

Days on which birds from Table 1 were recorded adjacent to the site when not recorded on site September 1977 - December 1978 (ranking as in Table 1)

Species	*No. Days*	*Species*	*No. Days*
Silvereye	2	Australian Magpie	75
Spotted Turtle-Dove	6	Figbird	112
Australian Magpie-lark	87	Lorikeets	22
Torresian Crow	97	Blue-faced Honeyeater	46
Common Starling	34	Pale-headed Rosella	2
Brown Honeyeater	93	Scarlet Honeyeater	10
Pied Butcherbird	127	Striated Pardalote	14
Black-faced Cuckoo-shrike	40	Olive-backed Oriole	8
Golden-headed Cisticola	3	Spangled Drongo	18
Willie Wagtail	34	Grey Butcherbird	16
Australian Kestrel	4	Common Koel	53
Laughing Kookaburra	29	Noisy Friarbird	1
Nutmeg Mannikin	1	Southern Boobook	9
Little Friarbird	29		

Table 3

Other species recorded 1972-1979

Species	*Comments*
Australian Pelican *Pelecanus conspicillatus*	Small and large parties occasionally in transit over the site.
White-faced Heron *Ardea novaehollandiae*	One on site once June 1974; occasionally seen in transit.
Cattle Egret *Ardeola ibis*	In transit on many days; numbers often hundreds.
Egret *Egretta* sp.	One once in October 1976.
Sacred Ibis *Threskiornis aethiopica*	In transit and adjacent areas occasionally; numbers variable.
Straw-necked Ibis *Threskiornis spinicollis*	In transit occasionally; numbers variable.
Royal Spoonbill *Platalea regia*	In transit occasionally; numbers less than ten.
Pacific Black Duck *Anas superciliosa*	In transit occasionally; small numbers.
Pacific Baza *Aviceda subcristata*	One pair adjacent to site September 1972.
Spotted Harrier *Circus assimilis*	One occasionally in transit.
Masked Lapwing *Vanellus miles*	Usually singly or in pairs in transit or in local parks and grass flats near site.
Galah *Cacatua roseicapilla*	Occasionally in transit; mostly two or four birds.
Sulphur-crested Cockatoo *Cacatua galerita*	Occasionally in transit; small numbers.
Cockatiel *Nymphicus hollandicus*	One on site August 1974.
Budgerigar *Melopsittacus undulatus*	One on one day June 1976; possibly a domestic escapee.
Crimson Rosella *Platycercus elegans*	An immature once in June 1975.
Channel-billed Cuckoo *Scythrops novaehollandiae*	Occasionally in adjacent areas.
Owl *Tyto* sp.	Individuals of this genus occasionally at night.
White-throated Needletail *Hirundapus caudacutus*	In varying numbers occasionally; flocks over site less than 50.
Rainbow Bee-eater *Merops ornatus*	Six on site May 1974, seven in July 1974; at other times fairly common in transit in parties of less than ten.
Dollarbird *Eurystomus orientalis*	Occasionally in transit; small numbers.
Welcome Swallow *Hirundo neoxena*	Reported by residents as a common nester on site 20 years ago; commonly in transit (less than ten) and in adjacent areas.
Tree Martin *Cecropis nigricans*	Martins almost daily over site; this species on site around eaves of houses during apparent nesting attempts (cf. Bell 1979).

Table 3 continued

White-bellied Cuckoo-shrike *Coracina papuensis*	One on one day June 1977.
Rufous Whistler *Pachycephala rufiventris*	One in August 1977.
Flycatcher *Myiagra* sp. (?)	Possibly Restless Flycatcher *M. inquieta;* one in April 1977 and January 1979.
Grey Fantail *Rhipidura fuliginosa*	One adjacent to site May 1979.
Clamorous Reed-Warbler *Acrocephalus stentoreus*	One in October 1979.
Thornbill *Acanthiza* sp.	One of this genus August 1977.
Noisy Miner *Manorina melanocephala*	This species, 'one of Brisbane's commonest honeyeaters' (Vernon 1968) never on site; frequently adjacent to site.
Yellow-faced Honeyeater *Lichenostomus chrysops*	Occasionally; six in August 1977.
Double-barred Finch *Poephila bichenovii*	Three in March 1977.
Pied Currawong *Strepera graculina*	Occasionally in areas adjacent to site.

railway-yard posts at dusk when they flew in from the east, called, then flew west; Torresian Crows, Brown Honeyeaters *Lichmera indistincta* and others used the site as one feeding area in their home ranges; and even Feral Pigeons left the site at dusk to roost in other places such as the local railway station.

All other species recorded at the site from 1972 to 1979 and relevant comparisons 1977-1978 from areas adjacent to the site are presented as an annotated list in Table 3.

Discussion

The study site was small and the boundaries artificially sharp in terms of bird mobility and home range size, but the area had to be visible during continuous watches; as the study was intended to reflect human landscape perceptions, the bird distributions had to show what the resident observer experienced in the small area of his daily round. Some biases and limitations are inherent in the study because of the methods used, e.g. habitat sample sites and days of continuous watches were chosen for convenience.

Encounters may reflect no more than the ease or difficulty of detecting species. Indices of encounterability (Table 1) show that the species with the highest value for site occupation were also those showing greatest ease of encounter, so an apparent bias in data collection seems evident. However, many of these records were spread across the entire 406 days even though some species may have visited the site sporadically or seasonally (cf. Walters 1979). When such effects were considered and initial and final records adjusted to span, say, one 'season', rather difficult values were noted. For example, lorikeets *Trichoglossus* spp. were present for a short time in October-November 1977 then fairly constantly during January-April 1978, and

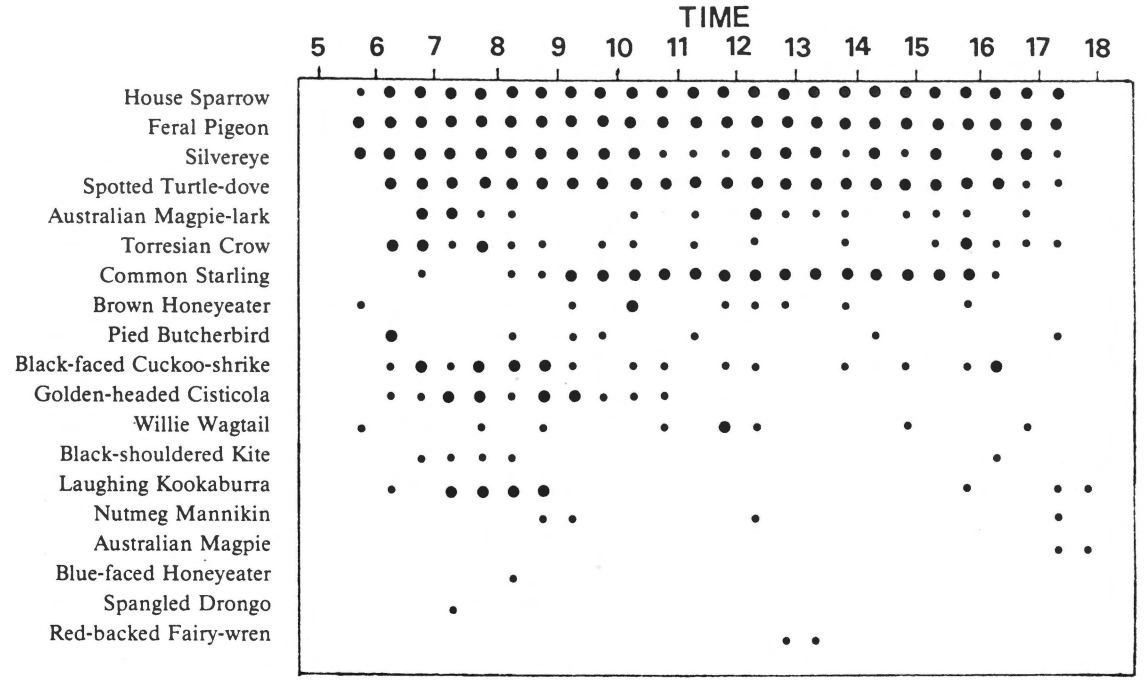

Figure 3. Birds recorded in half-hour periods on three composite days during winter 1977. ● = species recorded on at least two composite days in a particular half-hour period; • = recorded once in a particular half-hour period. Species ranked according to Table 1.

intermittent records were made at other times. When the index was applied only to the period of greatest concentration of observations, its value changed from 9.94 (Table 1) to 22.73. Similarly, the presence of the Pied Butcherbird was concentrated in the period March-November 1978, which changes the index from 34.20 to 54.81. When Table 2 records are combined with Table 1 numbers, encounterability values for many species approach the upper limit of 100, so perhaps the data in Table 1 are not as biased as they may appear. Some species were easily detected and should have been encountered often had they been on the site regularly or continuously; paucity of on-site records for such species may reflect a valid distributional situation. Problems remain for smaller, less obvious species, which is a difficulty with such studies (cf. Jarvinen 1978).

Birds could be used as indicators of landscape quality, i.e. the degree of environmental disturbance from what would be expected in a natural community. Patterns of species abundance have been used by Nagasawa & Nuorteva (1974) to demonstrate environmental disturbance. They looked to the failure of survey data to conform to patterns known respectively as Fisher's and Preston's distributions (mathematical estimates of how numbers

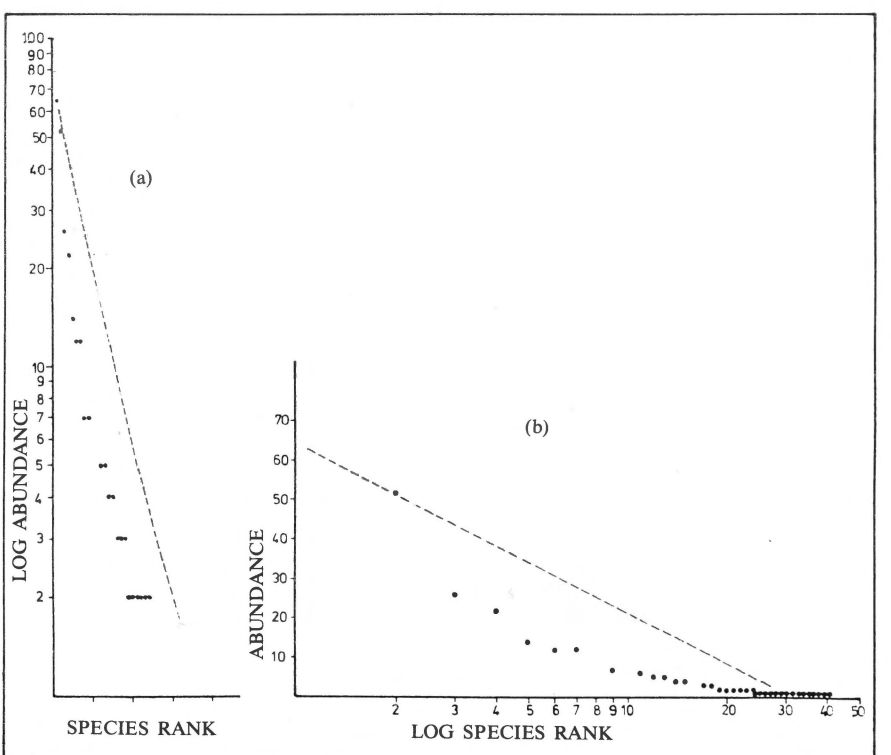

Figure 4. Showing how Corinda birds do not conform to (a) Fisher's or (b) MacArthur's broken stick distributions. Lines show predicted distributions, dots represent actual values.

of individuals are expected to spread across the species found in natural communities). Preston's distribution applies to species totals greater than c.100; we may thus expect the present pattern to approximate either Fisher's or the so-called MacArthur broken-stick distribution (May 1975). According to May, a broken-stick distribution should show up as 'nearly linear' when abundance is plotted against the logarithm of species rank, where ranking is by numbers of individuals; Fisher-type distributions are linear when log abundance is plotted against species rank. These linear models do not fit the data (Figure 4), so the pattern of species abundance does not conform to what would be expected in a natural, i.e. undisturbed, bird community of this size.

Conclusions

Daily records, day-long occupation patterns and comparisons with adjacent areas indicate that a small number of introduced species dominated the site, which seems impoverished in native birds not only relative to adjacent areas, but also relative to the species that could be expected for such an area of suburban Brisbane (cf. Vernon 1968). The site could be considered as a feature (Dwyer 1972) concentrating feeding, roosting and breeding resources for feral species. It is certainly an area of lesser interest to many native species, and presumably has insufficient resources to ever attract some native species that are easily and frequently encountered in the Brisbane area.

Three factors provide evidence of a diminution of landscape 'quality' at the Corinda site: the area of man-made structures dominated over that of vegetation; the pattern of bird species abundance differs from that expected in a natural community (i.e. one into which human settlement had intruded with minimum disturbance); the dominance of introduced species suggests environmental disturbance such that the site is virtually only 'useful' to birds previously adapted to such disturbance on other continents.

Those introduced species that have achieved continental success appear to have done so via small areas such as these railway yard environs (Krebs 1972, Goodwin 1978), which provide conditions to which these species are adapted. From these bases their superior adaptiveness allows them to expand at the expense of native species (Goodwin 1978). On such small areas introduced species appear to be more conspicuous and show greater ubiquity than Krebs (1972) attributed to them on a continental scale.

Environmental quality is probably an individual and subjective judgement based upon each person's values, but if environmental planners desired some measure of this concept it could be easily done: the number of multi-storey buildings may be used as an index for those who greatly value concrete and 'progress'; the number of hectares of lakes and waterways for those who value boating; or the number of native species and individuals for the nature conservationist. For the last-named, the distribution of urban birds in studies such as this one may have implications for urban planning.

Given that value judgements relating to living standards are important to people residing in urban areas, industrial-residential sites may need to be planned with considerations of floral and faunal distributions in mind: maintenance of diversity, minimal destruction of native habitat, incentives to owners for restoration and protection of native vegetation and minimisation of pollution. This study suggests that the composition of the bird fauna may

serve as an environmental quality 'component' (Crofts 1975) within such a planning scheme.

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