

Masters Degree Thesis

An Ecological Study of Bush Stonecurlews, *Burhinus grallarius*, on Kangaroo Island, South Australia

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Bush Stonecurlews, *Burhinus grallarius*, forage, roost and nest on the ground, making them particularly vulnerable to decline. Although once common and widespread throughout southern, eastern and northern Australia, only sporadic records occur across much of their former range in southern and eastern Australia following a major contraction in range (Marchant and Higgins 1993). Two main factors have been implicated in the decline of this species in southern and eastern Australia – predation by foxes and habitat clearance and modification (Marchant and Higgins 1993, Johnson and Baker-Gabb 1994, Saunders and Ingram 1995, Robinson and Traill 1996). Bush Stonecurlews have recently been listed as near threatened at the national level (Garnett and Crowley 2000) but have been down-graded from endangered to vulnerable in South Australia, primarily as a result of the findings in this study.

In contrast to the mainland, Bush Stonecurlews were apparently common on Kangaroo Island, providing an opportunity to study their ecology in a temperate environment. The studies were undertaken at two major study sites in the south west of the island: Flinders Chase National Park Headquarters (FCHQ) and an agricultural

property, 'KB Downs'. The objectives of the study were:

- To document the historical distribution, and subsequent decline, of Bush Stonecurlews in South Australia.
- To determine the current distribution and status of Bush Stonecurlews on Kangaroo Island.
- To determine the home range sizes and movements of Bush Stonecurlews on Kangaroo Island.
- To determine the characteristics of foraging habitat, day roost areas and nest sites, and the availability of this habitat across Kangaroo Island.
- To determine the diet and food resources of the Bush Stonecurlews on Kangaroo Island.
- To determine potential threats to the population and to make management recommendations aimed at ameliorating these threats.

A total of 414 records of Bush Stonecurlews were obtained for South Australia from the late 1880s through to 1995. Early records were widespread across the State. However, by 1940 a major decline was evident. By 1980 most records came from Kangaroo Island, with relatively few from the Riverland, South East, Lower Lakes and Southern Eyre Peninsula.

Call-playback surveys were undertaken across Kangaroo Island in 1995/96 to determine the current distribution of the birds. Surveys and questionnaires were undertaken by landholders to complement the call-playback surveys. The birds were recorded at 109 of 147 (74%) call playback survey sites. Of the 38 sites where the birds were absent only seven sites (5% of the total)

were within agricultural areas, and the remaining 31 sites (21% of the total) occurred within large continuous areas of vegetation, such as Flinders Chase National Park. Combined with the results of questionnaires and landholder surveys the call-playback surveys showed that the birds were widespread and common across Kangaroo Island, and showed a strong preference for the agricultural areas. This confirmed that Kangaroo Island was the major stronghold for these birds in southern and eastern Australia.

Fifteen Bush Stonecurlews were fitted with radio-transmitters between July 1996 and June 1998. Adult birds were preferentially selected, although one juvenile was also radio-tagged. Based on home range sizes and use, three groups of birds were identified: (1) resident breeding birds; (2) mobile breeding and non-breeding birds and (3) first year juveniles. Six birds belonged to group (1) and home range estimates for four of these ranged between 26 ha and 64 ha. These birds regularly used the same sites for roosting, were always observed roosting with another bird, and were recorded breeding within the vicinity of their regular roost sites. Nine birds belonged to the second group, and these birds ranged widely and regularly made long distance movements, which accounted for larger home range sizes of between 120 ha and 877 ha. Five of these birds were recorded using a communal roost with up to 15+ other birds during the non-breeding season, and four of these birds subsequently disappeared from the study site. Fortunately one of these birds was subsequently rediscovered eight kilometres away from the study site, suggesting that the birds may have dispersed. The radio-tagged juvenile was placed within a separate group of birds. This bird remained within the home range of its parents until at least the beginning of the following breeding season. Unfortunately the transmitter either failed or the bird dispersed at this time.

Characteristics of roost, nest and foraging locations were investigated. Roost and nest sites were located through radio-tracking and

intensive searching, and foraging locations were obtained from radio-tracking alone. Within three broad habitat types (A- natural vegetation; B- semi-cleared / regrowth vegetation; and C- cleared areas) roost sites (n=47) were predominantly located within vegetation (60% in A, 30% in B, 10% in C). Nest sites (n=27) however, were found in cleared land more often (41% in A, 15% in B, 44% in C), and foraging locations (n=819) were primarily in cleared areas (21% in A, 12% in B, 67% in C). The small percentage of records of foraging in natural vegetation, and roosting in cleared areas, were primarily related to nest or chick attendance by the birds. Specific data on vegetation and other habitat variables were collected for all roost and nest sites and associated random sites. Multi-dimensional scaling and ordination plots showed that there were no differences between the sites used by the birds and the random sites. These results suggest that suitable habitat was abundant on Kangaroo Island, and that land clearance has benefited these birds by opening up otherwise unsuitable habitat.

Faecal analysis and micro-pitfall traps were used to investigate diet and food resources. Faeces (n=416) were collected opportunistically from roost sites at the two major study sites (FCHQ and 'KB Downs') and one other property ('Brookland Park') between 1995 and 1998. A total of eight micro-pitfall trap sites (each with nine pitfalls) was established at the major study sites. Beetles were the most commonly recorded food item (in 90% of all faeces) followed by spiders, larvae / caterpillars and ants. Earwigs, centipedes / millipedes, moths, snails and vertebrates were also important food items, but occurred in less than 25% of faeces. Over 20,000 macro-invertebrates were captured in the micro-pitfall traps, and remains of all major groups captured were present in faeces, except for worms. At both of the major study sites beetles and ants accounted for the majority of the captures in the pitfall traps. Seasonal variation in diet was evident, and based on the captures in pitfall traps, primarily reflected changes in the

abundance/activity of prey groups. The results demonstrated that the birds were opportunistic foragers with a generalist diet, consuming what was most readily available, with no major preferences observed. All food items had been recorded in other studies. This study suggests that food resources were not likely to be limiting. However, potential changes to the agricultural landscape may have both long and short-term impacts on prey resources, either directly or as a result of changes to foraging habitat.

This study has provided a basis for management and research recommendations for Bush Stonecurlews to ensure that Kangaroo Island remains a stronghold for the species. The major threats to the birds, habitat clearance and modification, and predation by foxes, are both

absent on Kangaroo Island. The initial clearance of native vegetation for agriculture on the Island has actually provided more suitable habitat, as large areas of natural vegetation of minimal value to the birds were cleared and replaced with pasture. However, ongoing changes across the agricultural landscape may be detrimental to the birds, particularly as large areas of potential foraging habitat are being converted to agro-forestry.

REFERENCE

Gates, J.A. 2001. *An ecological study of Bush Stonecurlews* *Burhinus grallarius* *on Kangaroo Island, South Australia*. Master of Science Degree thesis. University of Adelaide (abstract)