

THE STATUS OF THE WHITE-BELLIED SEA-EAGLE AND OSPREY ON KANGAROO ISLAND IN 2005

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ABSTRACT

During the spring breeding season of 2005 the coastline of Kangaroo Island was systematically surveyed by ground and sea search to locate occupied White-bellied Sea-Eagle *Haliaeetus leucogaster* and Osprey *Pandion haliaetus* territories and determine breeding activity where possible. Precise nest-site location data and potential habitat disturbance factors were recorded. However, nest locations are not reported here and remain confidential to the South Australian Department for Environment and Heritage and Kangaroo Island Natural Resources Management Board.

Seventeen occupied White-bellied Sea-Eagle territories were located, of which seven were confirmed as active (breeding) and three, from observed behaviours, were considered likely to be active. Nine territories (53%) were assessed as subject to disturbance by human activities during the breeding season, with four of these potentially highly disturbed. Although some territories/nest-sites known to be active in the mid-1990s were found to be vacant, overall the number of occupied sea-eagle territories (or pairs) was similar to earlier surveys, when an average of 17.5 territories was found each year from 1985 to 1995.

Significantly, the number of occupied Osprey territories was greater than recorded previously, most likely reflecting the completeness of the survey effort in 2005. Twelve occupied Osprey territories were identified, eight of which were recorded as active, while egg-laying was possible at others. Earlier surveys (from 1985 to 2004) recorded an average of 9.5 occupied territories per year. Four territories were assessed as being potentially highly disturbed and one as recently abandoned due to disturbance.

INTRODUCTION

Because of their isolation from other populations of conspecific birds and evident regional population declines in recent times, the White-bellied Sea-Eagle *Haliaeetus leucogaster* and Osprey *Pandion haliaetus* have been recognised as being of conservation significance in South Australia (Dennis and Lashmar 1996; Dennis in press). South Australia's *National Parks and Wildlife Act, 1972* lists both as Threatened (White-bellied Sea-Eagle Vulnerable and Osprey Rare). Their decline has been linked to shrinking refuge habitat coincident with coastal development and, in the case of the sea-eagle, inherent sensitivity to human disturbance (Olsen 1998; Dennis 2004). Both species are recognised as indicators of wilderness quality in undeveloped coastlines. Their presence (or absence), and more particularly breeding status in an area, can be a useful biodiversity marker against which to measure the impacts of human presence and

activity over time (Newton 1979; Poole 1989).

Both the White-bellied Sea-Eagle and Osprey populations on Kangaroo Island have been monitored in the recent past, providing baseline data on the number of territories and expected location of primary nest sites. Therefore the aim of the 2005 survey was to:

- determine the number and location of occupied White-bellied Sea-Eagle and Osprey territories on Kangaroo Island; and
- compare these data with previous surveys.

METHODS

Survey area and methods

The search and survey effort was concentrated on likely habitat around the coastline of Kangaroo Island, and in particular, revisiting sites where breeding had been recorded previously (T. Dennis unpubl. data). Known territories and potential nest sites on the southern and eastern coastlines were approached by cautious ground survey and data gathered without disruption to normal behaviours using a high resolution spotting scope (25x or 40x magnification) and binoculars. All known and potential nesting terrain on the northern coastline between American River and Snug Cove (c. 80 km), was surveyed from the sea using a 6.5 m inflatable boat with a crew of four (vessel skipper, two ornithologists and a technical support person).

Survey timing and strategies to minimise disturbance

The main survey fieldwork was conducted from 24 September to 5 October 2005, being deliberately timed to coincide with late incubation or early brooding at White-bellied Sea-Eagle nests and egg-laying or early incubation in Osprey territories. However, for some Osprey pairs commencement of egg-laying can occur as late as mid-October (Dennis in press). This strategy was to ensure that territorial behaviours and nest site attachment would be strongly evident for both species. Ground survey observations

were made from vantage points overlooking likely habitat and, when nest sites were located, data-gathering time was kept to a minimum and the area vacated promptly to allow the adults to resume normal behaviours if disturbed.

Survey data

The precise location of nest sites was determined by compass bearing and estimate of distance from a fixed point determined by a hand-held Global Positioning System unit. These data, plus the physical characteristics of the site, existing and potential habitat disturbance factors, and breeding activity (determined by interpreting observed behaviours), were recorded onto a standard data sheet developed for the project in consultation with the South Australian Department for Environment and Heritage (DEH). Also a high-resolution digital image was taken at all sites showing the position of the nest site relative to surrounding terrain, and a territory occupation history was provided where available (T. Dennis unpubl. data). However, these data are not reported here and remain confidential to DEH and the Kangaroo Island Natural Resources Management Board.

Habitat disturbance

Each territory was arbitrarily assessed from observations made during the survey and examination of current aerial photographs and maps for likely disturbance factors and proximity to human activities. These included: assessment of land-use factors, e.g. the intensity of agricultural and/or horticultural activities nearby; vulnerability to vandalism or bushfire; proximity to roads, tracks and walking trails; recreational activities; presence of overhead power transmission lines; and proximity to (proposed) tourism developments, residences or other occupied infrastructure.

Territories were classified as:

Low disturbance—when the nest site was in a relatively remote setting, e.g. no roads, tracks, walking trails or dwellings within 500 m; nest not visible from roads, tracks, walking trails or dwellings; few people approach the nest site location during breeding season.

Moderate disturbance—when the nest site was in a relatively semi-remote setting; people may gain access with difficulty to within photography or missile range; roads, tracks, walking trails or dwellings occur within 500 m of nest; nest visible

from roads, tracks, walking trails or dwellings; some people, vehicle or machinery movements within 500 m of nest site during breeding season. *High disturbance*—when the nest site was in a relatively disturbed or developed setting; nest clearly visible from roads, tracks, walking trails or dwellings; people may easily gain access within photography or missile range; nest vulnerable to damage from bushfire; frequent people, vehicle or machinery movements within 500 m and in full view from nest during breeding season.

Definitions

For this study the following definitions were used:

Territory—the space around a nest site (or sites) that is defended against conspecific birds and other species during the breeding season.

Home range—the extended area around the core territory to include favoured hunting and loafing areas sometimes shared with neighbouring conspecific birds.

Occupied territory—where a pair of adult birds appear together in the vicinity of the nest(s) in the breeding season with, or without, observation of courtship behaviour or copulation and where territory defence behaviours are observed.

Active nest or territory status was assigned to a locality when either:

- incubation was observed or young were in the nest; or
- a recently vacated nest site was located with egg shell or typical accumulated faecal spray present.

Successful nest or territory—where young were fledged.

Failed nest or territory—where eggs failed to hatch or young were lost.

Abandoned nest or territory—one not used or not occupied in previous five years.

Alternative nest—one of sometimes several nest structures within the home range of one pair of birds.

RESULTS AND DISCUSSION

Survey method

The boat-based survey of the northern coastline was a particularly successful method for sighting the target species and locating nest structures, which were typically high on the cliff-face in the case of the White-bellied Sea-Eagle and on rock-

stacks for the Osprey. Consistent with our experience during similar earlier surveys, both species were considered well habituated to boat movements, enabling nest sites to be approached with minimal disturbance and without discernible change to natural behaviours. Consequently, observers could confidently interpret the stage of breeding activity at most sites.

White-bellied Sea-Eagle

Seventeen occupied White-bellied Sea-Eagle territories were located, of which seven were confirmed as active and three, from the behaviours observed, were considered likely to be active. This is a similar result to previous surveys when an average of 17.5 territories was found each year on Kangaroo Island from 1985 to 1995 (Figure) and represents *c.* 30% of the known breeding population in South Australia (Dennis and Lashmar 1996). Among these only two nests were found constructed in trees.

In addition to the number of territorial pairs recorded, two single adults and six juvenile or sub-adult sea-eagles were observed at various locations during the survey. Two of the latter were first-year juveniles in apparent company with the parent pair and likely still within their natal territory, which was not active.

Territory size—Thirteen of the occupied territories (including one in Backstairs Passage) were found along the north coast, where the distance between active nests of neighbouring pairs averaged 12.6 km (range 4.5–25.2 km). To estimate a probable home-range along this coastline,

the locations of nest sites were plotted onto 1:100,000 maps and the averaged mid-point distances between two 'nearest neighbour' occupied nests determined. To arrive at a theoretical semicircular territory around each nest, these distances were halved to give a radius (*r*) of likely spatial 'ownership' along the coast and out to sea and the area calculated ($\pi r^2 \div 2$), providing an estimate of the home-range for each, averaging *c.* 62 km² (range 34.2–237.6 km²). While it is not known how far sea-eagles range inland (or offshore) during the breeding season, this estimate is comparable with studies elsewhere in Australia (summarised in Marchant and Higgins 1993).

Habitat disturbance—Nine of the 17 occupied territories were considered to be subject to varying levels of human disturbance. Four of these on the north coast were assessed as highly disturbed due to factors such as recent land subdivision and residential developments.

In addition to the currently occupied territories 15 abandoned nest sites were identified, several of which were in apparently suitable habitat and remote from currently used nest sites. At three sites abandonment had followed known disturbance events during a breeding season: at one, a walking trail had been cut through bushland directly under the nest tree (Dennis and Lashmar 1996); at another, a residence was built *c.* 650 m from a nest in a new land sub-division; at the other, a temporary residence (a tent) was erected and occupied for more than a year <400 m from a nest (T. Dennis unpubl. data). It is

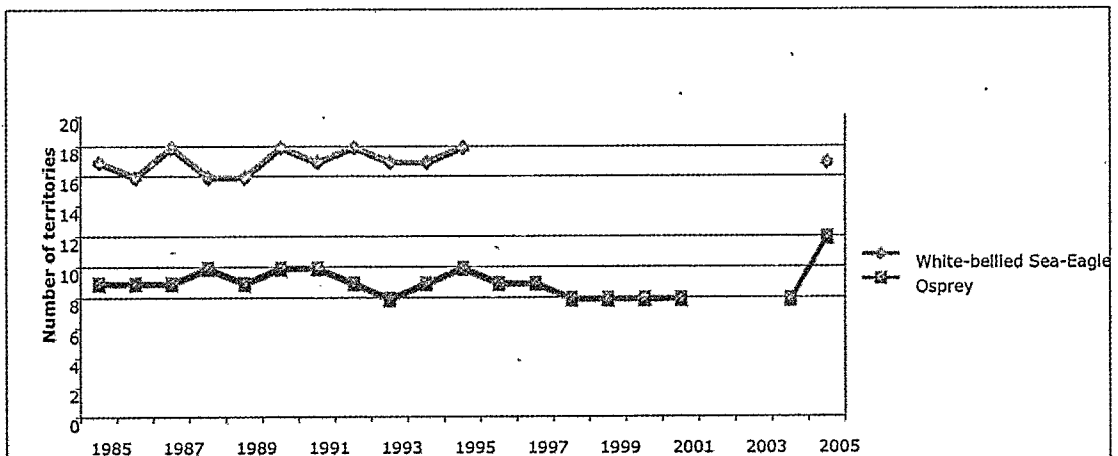


Figure. The number of occupied White-bellied Sea-Eagle and Osprey territories found on Kangaroo Island from 1985 to 2005.

probable that at least some of these abandoned nest sites may represent a decline in the number of White-bellied Sea-Eagle pairs on Kangaroo Island and therefore in the overall population in South Australia.

Osprey

Twelve occupied Osprey territories were found, eight (67%) of which were active. Nine were found during the initial survey period and three additional remote occupied territories were confirmed subsequently. The number of occupied Osprey territories located was greater than recorded previously, most likely reflecting the completeness of the survey effort in 2005. Earlier surveys, conducted each year from 1985 to 2004, record an average of 9.5 occupied territories per year (Figure 1; Dennis in press). However, these earlier surveys concentrated on monitoring known sites rather than surveying remote areas for 'new' sites.

In these territories five nests were constructed on protruding rocky headlands in exposed and accessible settings, five were on disjointed rock stacks surrounded by water, one was in a small dead tree and one pair continued to use an artificial nest platform. In two of the 'new' territories, pairs had re-built over old nests in locations that had been vacant for 17 and >20 years (T. Dennis unpubl. data).

Population density—Overall, nest sites within active or occupied territories were found to average 33.7 km apart (range 8–72 km), with the density of nest sites differing significantly between the exposed southern coastline of the island ($n = 8$, average 16.5 km apart, range 8–45 km) and the comparatively sheltered north coast ($n = 4$, average 33.5 km apart, range 23–72 km). This sparseness of territory distribution, while typical for southern Australia, differs markedly from warm-temperate and tropical regions where the majority of the Australasian Osprey population occurs (summarised in Marchant and Higgins 1993; Dennis in press).

In addition to the number of territorial pairs recorded, single adults were seen at two widely-spaced locations, >20 km from known occupied territories.

Habitat disturbance—Eight of the occupied Osprey territories were considered to be subject to human disturbance during the breeding season. Four of these were assessed as potentially highly disturbed, one of which, last active in 2004, was

found abandoned. Seven other abandoned nest sites were identified in apparently suitable habitat and remote from currently used nest sites.

Expanding residential development and recreational activity is concentrated along the sheltered north coast of the island where only two occupied territories were found over >75 km of what appears to be ideal Osprey habitat. The number of abandoned sites there may indicate a population decline for this area. Elsewhere, abandoned sites most likely represent the normal dynamics within the population as the composition of pairs and the extent of foraging territories change over time.

Sea-eagle and Osprey interaction

While the nest site characteristics of the two species differ, spatial conflicts occur during the breeding season when nest sites are in close proximity and both are foraging for similar prey (fish). Territorial aggression is common (Osprey) and instances of kleptoparasitism (sea-eagle) are often recorded (summarised in Marchant and Higgins 1993; Dennis and Brittain 2006, this issue). In this survey, active nest sites of both species were found relatively close together, with the average distance from each Osprey nest to the nearest sea-eagle nest being 6.8 km (range 2.0–16.2 km). On the north coast of the island where there are fewer Osprey territories ($n = 4$) it was less, with nests averaging just 3.4 km apart (range 2.0–5.7 km), while on the southern coastline nests averaged 8.5 km apart ($n = 8$, range 3.6–16.2 km).

Management

Although it was beyond the scope of the survey to address management issues, it is clear that on the local level much could be done to protect some sites from deliberate or unwitting human disturbance. Instances of disturbance were observed during the course of this survey, e.g. at the well-known Osprey nest site at D'Estrees Bay, within Cape Gantheaume Conservation Park, people were climbing on the rock stack <5 m from the nest. Although obvious provision has been made for visitors to view this nest from two nearby lookouts, there is no interpretive signage to convey a message about the likely negative impacts of disturbance caused by closer approach.

Both the White-bellied Sea-Eagle and Osprey re-use the same nest sites over long periods of time and the sea-eagle in particular is renowned

as being sensitive to disturbance during the breeding season (Poole 1989; Clunie 1994; Olsen 1998). Nests where some form of disturbance occurs during the breeding season produce significantly fewer young than those remote from human activities (Van Daele and Van Daele 1982; Bischoff 2001; T. Dennis in prep.). To counter these impacts, land-use regulations in Scandinavia and parts of North America, where the birds are threatened, give special protection to significant raptor breeding sites: zones of undisturbed habitat are set aside around nesting habitat to buffer from any form of modification, including increased human presence (Newton 1979). In parts of North America these are 1,500–3,000 m in diameter around eagle, falcon and Osprey nest sites, depending on direct line of sight parameters (Richardson and Miller 1997). Considering the conservation status of the White-bellied Sea-Eagle and Osprey in South Australia and the obvious significance of their habitats on Kangaroo Island, similar habitat protection provisions are needed to ensure that breeding refuges and foraging habitats are fully considered by land-use planners and government agencies with responsibility for the management of coastal lands. Without such provisions, these threatened species may continue to be displaced to sub-optimal habitats, resulting in further population declines.

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REFERENCES

- Bischoff, T. 2001. Aspects of breeding of the Osprey *Pandion haliaetus* on the mid-north coast of New South Wales. *Australian Bird Watcher*, 19: 88-93.
- Clunie, P. 1994. *White-bellied Sea-Eagle Haliaeetus leucogaster*. Action Statement No. 60, Flora and Fauna Guarantee Act, 1988. Department of Conservation and Natural Resources, Victoria.
- Dennis, T.E. 2004. Conservation status of the White-bellied Sea-Eagle, Osprey and Peregrine Falcon on western Eyre Peninsula and adjacent offshore islands in South Australia. *South Australian Ornithologist*, 34 (6): 222-228.
- Dennis, T. E. in press. Distribution of the Osprey *Pandion haliaetus* in South Australia. *Emu* (submitted January 2006).
- Dennis, T.E. and Brittain, R. 2006. Attempted kleptoparasitism by White-bellied Sea-eagles on fur-seal. *South Australian Ornithologist*, 35 (1 & 2): 68. [This issue].
- Dennis, T.E. and Lashmar, A.F.C. 1996. Distribution and abundance of White-bellied Sea-Eagles in South Australia. *Corella*, 20 (3): 93-102.
- Marchant, S. and Higgins, P.J. (eds). 1993. *Handbook of Australian, New Zealand and Antarctic birds. Volume 2, raptors to lapwings*. Oxford University Press, Melbourne.
- Newton, I. 1979. *Population ecology of raptors*. Poyser, Berkhamsted, England.
- Olsen, P.D. 1998. Australia's raptors: diurnal birds of prey and owls. *Wingspan*, 8 (3) supplement (Birds Australia Conservation Statement no. 2).
- Poole, A.F. 1989. *Ospreys - a natural and unnatural history*. Cambridge University Press, Cambridge.
- Richardson, C.T. and Miller, C.K. 1997. Recommendation for protecting raptors from human disturbance: a review. *Wildlife Society Bulletin*, 25: 634-638.
- Van Daele, L.J., and Van Daele, H.A. 1982. Factors affecting the productivity of Ospreys nesting in west-central Idaho. *Condor*, 84: 292-299.
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