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SEASONAL ABUNDANCE, MARINE HABITATS AND BEHAVIOUR OF SKUAS OFF CENTRAL NEW SOUTH WALES

K. A. WOOD

7 Eastern Avenue, Mangerton, NSW 2500

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Between April 1985 and March 1987, monthly cruises were made from Wollongong to approximately 66 km east. Using 20-minute censuses, the abundance of skuas was determined seasonally and in marine zones classified as inshore, offshore, neritic and pelagic. Regularly occurring species, listed in descending order of abundance, had the following zonal and seasonal distributions: Pomarine Jaeger *Stercorarius pomarinus*, most abundant, mainly offshore, November to May; Arctic Jaeger *S. parasiticus*, inshore, October to May; Long-tailed Jaeger *S. longicaudus*, offshore and pelagic, October to March; Great Skua *S. skua* (least abundant), offshore, May to September. South Polar Skuas *S. maccormicki* were not seen. Arctic Jaegers repeatedly parasitised Silver Gulls *Larus novaehollandiae*. Characteristics of behaviour are compared.

INTRODUCTION

Skuas (Stercorariidae) visit the seas off south-eastern Australia. Both Milledge (1977) and Barton (1982) have previously estimated their seasonal abundance, mainly from shallower waters over the continental shelf (maximum depth of water c. 200 m), but the relationship between abundance and distance from shore has not yet been reported.

This paper describes a quantative analysis of relative abundance in marine habitat zones east of Wollongong (34°25′S., 150°54′E.). Behavioural notes are included where appropriate. Data were obtained between April 1985 and March 1987 during 25 return ocean cruises from shore to well beyond the edge of the continental shelf. The average cruise distance was 66 km eastwards (depth > 2 500 m) whereas the shelf edge (depth 200 m) is about 34 km east. The maximum depth encountered was 4 200 m. Observations totalled 218 hours over a cumulative cruise distance of 1 540 km.

STUDY AREA AND METHODS

The study area and methods will be described in detail elsewhere. Briefly, the area surveyed was about 2 000 sq km, in a subtropical region (Ashmole 1971, Shuntov 1974) which is generally rich in avifauna (Serventy *et al.* 1971). Watches were made continuously from the stern of a 14-metre vessel, as fish remains and animal fats were cut into pieces and tossed overboard to attract birds. At about eight-minute intervals, and whenever a change in abundance was noticed, scans covering 360 degrees were conducted. All skuas within a radius of about 250 m were counted after identification using 8×40 binoculars. Data were obtained from the observations of successive periods of approximately 20 minutes. Within each period were assessed the highest number of individuals of each species seen together while following the boat or sitting on the water, and the cumulative number of discrete individuals of each species seen passing by or sitting on the water. These numbers were added to give the 20-minute census data. This method has unavoidable biases which have been recently reviewed by Tasker *et al.* (1984) but the results presented should be comparable with other shipboard surveys if a similar method is adopted.

The marine habitats recognized were: the inshore zone, the area within 8 km of the mainland; the offshore zone, from 8 km to the edge of the continental shelf (c.34 km east); the neritic zone where depths are <200 m and includes inshore and offshore; the pelagic zone where depths are >200 m. This convention follows Tuck (1960), Ashmole (1971) and Bartle (1974).

Foraging terms are fully explained in Harper *et al.* (1985). Seasons are defined in Blakers *et al.* (1984). Vertical strata in air are classified as low (<20 m), middle (20–60 m) and high (60–180 m).

The plumage characteristics described by Devillers (1977), Harrison (1983) and Roselaar (1983) were used to identify skuas, their morphs and plumage phases.

TABLE 1

Relative abundance of 982 skuas during 25 oceanic cruises off Wollongong between April 1985 and March 1987.

Species	Number of individuals	Per cent
Great Skua	27	3
Arctic Jaeger	126	13
Pomarine Jaeger	762	77
Long-tailed Jaeger	67	7

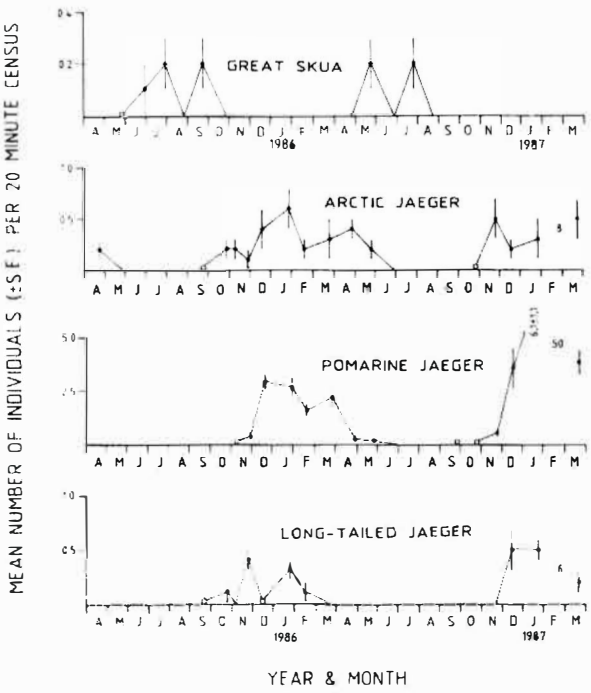

Figure 1. *Relative abundance of skuas off Wollongong, New South Wales between April 1985 and March 1987. Open circles represent a total of one or two birds. Cruise data for 27 September 1986 and February 1987 presented as total number of individuals observed.*

RESULTS AND DISCUSSION

During the two year period I was unable to attend the regular monthly cruises on 27 September 1986 and 28 February 1987. Estimates of the total numbers of individuals observed during these two cruises were kindly supplied by D. H. Fischer. After combining my 20-minute census data with the cruise estimates for September 1986 and February 1987, a total of four species and 982 individuals was recorded. The relative abundance of each species is shown in Table 1.

In statistical analyses, only my 20-minute census data were used. Abundance by month (Fig. 1) was calculated from data for 23 cruises but abundance by marine habitat (Fig. 2) was calculated from census results for cruises in which the particular species was observed. The abundance statistic for the 60–90 km region should be used with caution when making comparisons with other regions because the number of 20-minute censuses conducted there varied markedly for each cruise (range: 0–30). Table 2 indicates the distribution of species across neritic and pelagic habitats. The pattern of occurrence of each species may be gauged from Table 3 which displays the number of discrete individuals observed within 20-minute intervals (double-counting eliminated). Oceanographic and meteorological conditions were not abnormal during the study period, and therefore the results obtained are considered typical for the study area.

Great Skua *Stercorarius skua*

The Great Skua (presumably race *lonnbergi*) was present mainly in winter and absent in summer. All sightings were of single birds except on 26 July 1986 when two were seen together (depth 160 m). Off south-eastern Australia between 1977 and 1981 most observers also sighted Great Skuas either 'singly or in pairs' (Blakers *et al.* 1984). Lindsey (1986), however, has reported a flock of seven birds slightly north of the study area in July 1984. One of these birds followed the ship southwards for about 150 km.

Sixty-five per cent of sightings were made in the offshore zone. Most individuals scavenged on fat scraps by contact dipping. They tended to follow and forage in the distant wake (c. 100 m), rarely approaching less than 30 m. Serventy *et al.* (1971) have noted that Great Skuas 'often settle on the water' in Australian seas, but this behaviour was not observed. Neither was shallow plunging nor underwater swimming, mentioned by Barton (1982). Furthermore, despite the presence of many foraging gulls and albatrosses, unlike the reports of Barton (1982) off Eden or Milledge (1977) off Sydney, harassment by Great Skuas was not seen off Wollongong. While deep-sea trawling off southern Africa, Sinclair (1978) also reported that Great Skuas (sometimes 400+) did not pursue or harry gulls or terns.

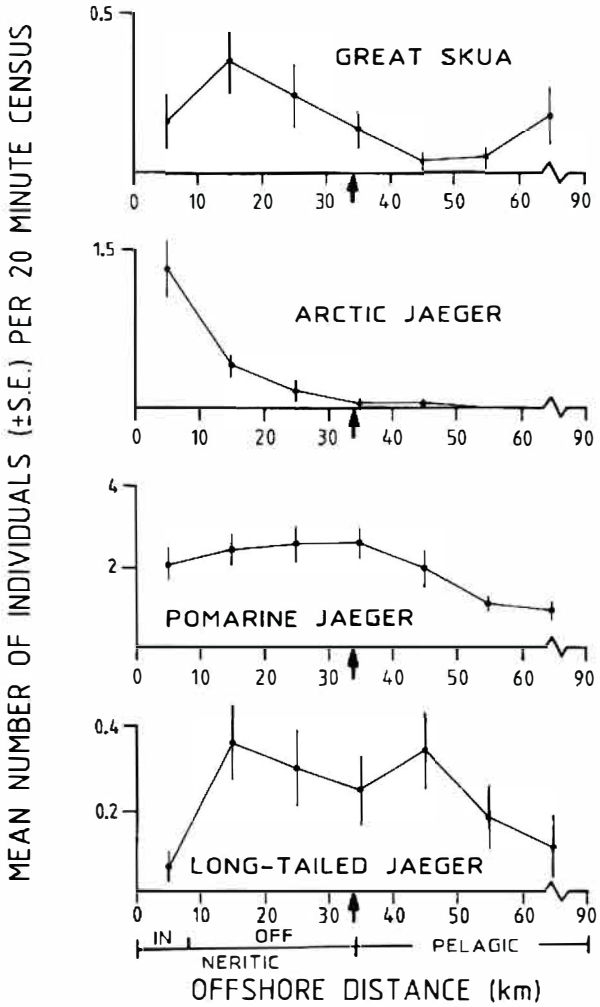

Figure 2. *Zonation of skuas off Wollongong, New South Wales between April 1985 and March 1987. Arrows indicate approximate position of 200 m isobath.*

TABLE 2

Distribution of skuas in neritic and pelagic zones during 23 monthly oceanic cruises between April 1985 and March 1987.

	Neritic			Pelagic			
Species	n	c	n/c	n	c	n/c	R
Great	20	85	0.24	7	86	0.08	3:1
Arctic	113	220	0.51	5	216	0.02	25:1
Pomarine	419	176	2.4	292	186	1.6	1.5:1
Long-tailed	33	128	0.26	28	122	0.23	1.1:1

n=No. of individuals
c=No. of 20-minute census periods
R=Ratio of No. of individuals per census period in neritic to pelagic zones.

TABLE 3

Number of 20-minute censuses in which skuas were recorded, grouped by the numbers seen.

	Number of individuals					
Species	1	2	3–5	6–10	11–20	>20
Great Skua	25	1				
Arctic Jaeger	31	16	13	1		
Pomarine Jaeger	57	58	55	21	9	1
Long-tailed Jaeger	28	13	2			

South Polar Skua *Stercorarius maccormicki*

Vagrants occur in the western Tasman Sea (Serventy *et al.* 1971, Morris *et al.* 1981, Barton 1982, van Tets and Fullager 1984, Pringle 1987) but none was observed during the present study.

Arctic Jaeger *Stercorarius parasiticus*

Arctic Jaegers were absent in winter, arriving in significant numbers in October–November. Individuals were not categorized by age or plumage but the presence of adults and immatures; light, intermediate and dark morphs was noted. A slight overall minority of dark phase individuals was present; an assessment which concurs with previous estimates of almost equal numbers of light and dark morphs in Australian seas (Serventy *et al.* 1971). In contrast, off southern New South Wales between 1976 and 1979, Barton (1982) considered that dark morphs outnumbered light by about 2:1.

Arctic Jaegers clearly showed a preference for inshore waters (Fig. 2, Table 2). Indeed 64 per cent were observed within 10 km of the mainland. None was seen more than 47 km seawards. These jaegers were mainly present in ones and twos, not in small cohesive flocks as were Pomarine Jaegers (Table 3). Within the census radius the highest count was six birds in January 1987. The highest count reported to date in New South Wales waters is 10+ birds off Sydney in March 1983 (Lindsey 1985).

Over 90 per cent of individuals obtained their food by chasing Silver Gulls *Larus novaehollandiae* and forcing them to disgorge or drop offal which had been previously scavenged behind the boat. Approximately 100 000 Silver Gulls breed each spring and summer on The Five Islands (34°30′S., 150°56′E.) (Gibson 1979). Many gulls from this nearby colony scavenged for fish and fat tossed overboard on both outgoing and incoming voyages, thereby providing a substantial number of potential prey victims. The aerial pursuit of Silver Gulls was impressive. Using a combination of speed and manoeuvrability, Arctic Jaegers were quickly able to choose a victim and maintain close contact with it until the food was dropped. No other stercorariid exhibited such regular kleptoparasitism. Piratical chases were made most often by single birds which caught the disgorged offal before it reached the surface. In the Mediterranean Sea, Paterson (1986) recently reported that migrating Arctic Jaegers also selected the similarly-sized Black-headed Gull *Larus ridibundus* as their main victim in preference to other larids.

Sometimes distant gulls in tight flocks (20–40 birds) in the high air space were shadowed by an Arctic Jaeger. Invariably a successful chase resulted. This activity was interpreted as either 'herding' by the jaeger, a consequence of searching for a suitable victim or an evasion tactic used by gulls with food to screen themselves from detection and/or piracy. It is unlikely to be purposeful clustering by gulls without food to protect potential peer victims from attack. Herded-flocks probably contained breeders and nonbreeders but their flight directions were variable and lacking obvious purpose; they were certainly not flying towards The Five Islands nor following the boat. How Arctic Jaegers selected victims with food in the proventriculus was not apparent. They successfully pursue some hosts which carry food hidden from view internally (Furness 1978, 1986) but herding does not appear to have been reported previously (Andersson 1976, Roselaar 1983, Furness 1987). Brockman and Barnard (1979) have stated that 'only individuals with visible food in the bill are attacked or pursued by a kleptoparasite'.

The piratical association between Arctic Jaegers and Silver Gulls was not only conspicuous but was also reflected in their zonal distributions. Twenty-minute census data obtained for the Silver Gull during the present study showed that many more gulls were inshore than beyond the shelf-break (Wood, unpublished data) and also that a statistically significant correlation existed between the relative abundances of these two species in all seven incremental offshore regions (Fig. 2) (r_s=0.81, p=0.05, Spearman Rank Correlation Test).

Pomarine Jaeger *Stercorarius pomarinus*

Pomarine Jaegers were last to arrive in the study area. They were by far the most abundant species, outnumbering Arctic Jaegers by six to one (Table 1). Barton (1982) off Eden and Milledge (1977) off Sydney found a similar relative abundance. Light and intermediate phase Pomarine Jaegers outnumbered dark morphs by almost six to one. This ratio differs from previous assessments off Eden and Sydney where Barton (1982) and Milledge (1977) found the light to dark phase ratios to be 2:3 and about 1:1 respectively. However, it is consistent with estimates at Holarctic breeding grounds where dark phase birds comprise 'between 5–20 per cent of populations in all parts of the range' (Furness 1987). The proportion of dark morphs in the 'wintering' population off Wollongong appears similar to that at the breeding grounds.

These skuas followed the boat regularly in small flocks and scavenged for scraps by contact dipping or surface seizing but surface diving, shallow plunging or underwater swimming (Barton 1982) was not observed. Staccato notes were sometimes uttered while foraging. Rafts of five to seven birds were occasionally seen on the water.

Pomarine Jaegers were the most intrepid. Individuals often sailed only 4–5 m above the stern inspecting offal-chopping operations. They rarely engaged in aerial piracy presumably because potential victims such as Silver Gulls and Wedge-tailed Shearwaters *Puffinus pacificus* were able to outmanoeuvre them in flight. In the central and eastern Pacific Ocean, King (1974) also considered that Wedge-tailed Shearwaters were free of regular kleptoparasitic attack by stercorariids. Off Central America, however, Jehl (1974) noted that Pomarine Jaegers successfully chased Audubon's Shearwaters *Puffinus lherminieri,* forcing them to eventually disgorge prey after attempting evasion by plunge-diving and underwater swimming. In the study area these jaegers were most successful at food-piracy on the surface where they landed and bullied other species to drop the offal or abandon it. Certainly when hunting was attempted they were far less agile in pursuit than Arctic Jaegers. Similar parasitic behaviour was noted by Milledge (1977) and Barton (1982).

The species was most common in the offshore zone, tapering slightly in abundance both inshore and beyond the shelf-break (Fig. 2). The neritic to pelagic ratio was 3:2 (Table 2). These data accord with findings of Wahl (1975) and Blakers *et al.* (1984) but do not concur with Watson's (1975) statement that 'the Pomarine Jaeger is almost exclusively pelagic except when it is breeding'.

Long-tailed Jaeger *Stercorarius longicaudus*

The present data suggest that the Long-tailed Jaeger is a regular visitor off Wollongong between October and March. The census method resulted in an overall total of 67 birds (Table 1) but after allowing for the possibility of recounting, at least 28 and 20 individuals were observed in the 1985–86 and 1986–87 seasons respectively. This skua is considered a vagrant or rare visitor in Australasian seas (Serventy *et al.* 1971, van Tets and Fullagar 1984, Blakers *et al.* 1984, Young 1985) and its 'wintering' areas are poorly known (Roselaar 1983, Furness 1987). Published records for Australia and New Zealand are few. Barton (1982) reported a sighting of two birds off southern New South Wales in January 1977. An unprecedented total of 38 birds was reported off Sydney in 1983 when 27 birds were seen in one flock in December (Lindsey 1985). About 41 records are available from New Zealand of which 16 (probably 35) specimens were found beach-washed in January–February 1983 (Melville 1985). Pringle (1987), however, considers *S. longicaudus* a regular visitor in Australia mainly in March and April. These jaegers were present in the study area between October and March (probably May). During eight other seabird excursions off Sydney or Wollongong in spring or summer of 1983, 1984 and 1985, about 70 individuals (range: 0–20) were observed during the same months (M. J. Carter, unpublished data).

Long-tailed Jaegers were not markedly pelagic as reported by Roselaar (1983), Viet (1985) and Pringle (1987). Apart from two individuals seen inshore, sightings were almost equally divided

between offshore and pelagic zones (Fig. 2, Table 2). All sightings reported by Lindsey (1985) were from cruises limited to neritic waters. Only two of Carter's cruises traversed neritic and pelagic waters (maximum depths 2 500 and 3 000 m). During these two cruises 28 Long-tailed Jaegers were almost equally distributed in offshore and pelagic zones. Lindsey's and Carter's records both support the observations in this study which indicate that Long-tailed Jaegers regularly occur in neritic and pelagic waters off the New South Wales coast.

Using the diagnostic features described by Roselaar (1983) and Harrison (1983), most birds in flight could be readily identified with experience. Slate-grey upperparts and only two white shafts in the outer primaries were usually obvious but elongated central rectrices (>50 mm projection) were not seen despite ideal viewing of the tail on a majority of birds*. Immatures and adults were seen but not counted separately. All were light or intermediate morphs (Harrison 1983) except for a single dark phase bird on 25 January 1987. Dark morphs, race *S. l. pallescens*, are apparently known only as adults from breeding populations in Greenland (Roselaar 1983, Furness 1987).

Long-tailed Jaegers differed from their congeners in behaviour. They were mainly solitary, flying haphazardly in the middle air space somewhat distant from the boat (>30 m). Rarely did they follow and scavange in the wake, although they were probably attracted to the immediate area by the foraging of other attendant seabirds. On three occasions they harassed Silver Gulls for food but in general they were much less piratical than *S. parasiticus*. Roselaar (1983) also considered that *S. longicaudus* was the least piratical of the palearctic jaegers but Lambert (1980) reported that birds 'wintering' off southern Africa regularly kleptoparasitised fish from larids and procellariids. Long-tailed Jaegers sometimes group into small flocks and settle on the sea (Roselaar 1983, Viet 1985) but these behaviours were not observed.

CONCLUSIONS

The data presented complement the work of previous researches in Australia: Storr (1964), Marchant (1977), Milledge (1977), Morris *et al.* (1981), Barton (1982), van Tets and Fullagar (1984) and Blakers *et al.* (1984). Pomarine Jaegers and Great Skuas were clearly more avid boat-followers than the other Stercocariids and consequently some individuals were probably recounted. However, because Arctic and Long-tailed Jaegers were also attracted to the vessel, where food was available and potential victims were foraging in the wake, they too were probably over-estimated. After making allowances for these respective biases, Pomarine Jaegers were clearly the most abundant species. They obtained most of their food by scavenging in all marine habitats but showed a slight preference for the offshore zone. Arctic Jaegers occurred predominantly inshore where they often parasitised Silver Gulls. The regular presence of Long-tailed Jaegers off New South Wales was confirmed. They were the least abundant jaeger, occurring almost equally in offshore and pelagic zones but rarely inshore. Great Skuas were least numerous, preferring to forage offshore. South Pole Skuas were not encountered. These findings and other behavioural characteristics are summarized in Table 4.

*Carter's field notes on 70 Sydney and Wollongong jaegers mention that central rectrices were 'well projecting' on one bird, 'short but spiked' on 20 and 'not fully developed' on another 20. Jehl (1974) noticed in April that none of 14 adults off Central America had 'yet developed long central rectrices'. He postulated that replacement of the central pair may be deferred until arrival at the breeding grounds. Viet (1985) observed over 500 birds off Argentina mostly in March 1983, 1984 and 1985. The majority were non-adult and their plumage descriptions make no mention of long central streamers. Seven adults also lacked elongated centre-tails. Conversely, Melville (1985) tabulated measurements of 12 museum skins collected from the January–February 1983 'wreck'; all had streamers with projections >135 mm (max. 190 mm). Lindsey (1984) has reported an adult with 'long tail streamers' off Sydney on 27 March 1982. I am unable to explain why elongated central rectrices were apparently absent from *S. longicaudus* in the study area. They were often present in *S. pomarinus* and both congeners are reported to have the same moult sequence, loosing these feathers twice each year in pre- and postbreeding periods (Roselaar 1983). In the palaearctic region, new central ribbons take 30–40 days to grow. Their projection increases with age from about 56 mm at two years to an average of 179 mm at six years. They are, however, invisible beyond c. 350 m (Roselaar 1983). More information is required in the non-breeding season.

TABLE 4

Summary of characteristics of skuas observed off Wollongong between April 1985 and March 1987.

Characteristic	Great Skua	Arctic Jaeger	Pomarine Jaeger	Long-tailed Jaeger
Relative abundance ratio	1	4	24	2
Seasonality	May–September	October–May	November–May	October–March (probably May)
Zonation	Offshore	Inshore	Mainly offshore but also inshore	Offshore and pelagic
Morph ratio	All dark phase	Slight majority of light and intermediate	Light and intermediate to dark, 6:1	Only a single dark phase individual
Elongated central retrices visible	None	In half of birds observed, temporal pattern unclear	In half of birds observed, temporal pattern unclear	None
Frequency of kleptoparasitic interactions	None	High	Low	Lowest
Victims	None	Mainly *Larus novaehollandiae*, also *Sterna bergii*	*Puffinus pacificus*, *Pterodroma macroptera*, *Larus novaehollandiae*	*Larus novaehollandiae*
Aerodynamic agility	Very poor	Exceptional	Poor	Insufficient data
Tendency to follow and forage in the wake	High	Low	High, sometimes closely	Low
Dived for offal	No	No	No	No
Air-stratum used	Low	High when herding gulls, otherwise middle	Low	Middle
Formed conspecific flocks	No	No	Regularly	No
Settled on surface	No	No	Occasionally	No
Number of vocalizations uttered	None	None	Many while scavenging	None

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REFERENCES

Andersson, M. (1976). *Ibis* **118**: 208–217.
Ashmole, N. P. (1971). *In* Avian Biology. Ed. by Farner, D. S. and King J. R. Academic Press, New York. pp. 224–286.
Bartle, J. A. (1974). *Notornis* **21**: 135–166.
Barton, D. (1982). *Emu* **82**: 56–59.
Blakers, M., Davies, S. J. J. F. and Reilly, P. N. (1984). The Atlas of Australian Birds. RAOU, Melbourne University Press, Carlton.
Brockman, H. J. and Barnard, C. J. (1979). *Anim Behav.* **27**: 487–514.
Devillers, P. (1977). *Auk* **94**: 417–429.
Furness, R. W. (1978). *Anim. Behav.* **26**: 1167–1177.
Furness, R. W. (1986). *In* Seabirds feeding ecology and role in marine ecosystems. Ed. by Croxall, J. P. Cambridge University Press. pp. 77–100.

Furness, R. W. (1987). The skuas. T. and A. D. Poyser, Calton.

Gibson, J. D. (1979). *Corella* 3: 103-104.

Harper, P. C., Croxall, J. P. and Cooper, J. (1985). A Guide to foraging methods used by marine birds in Antarctic and Subantarctic seas. Biomass Handbook No. 24, 22pp.

Harrison, P. (1983). Seabirds, an Identification Guide. Croom Helm Ltd, Beckenham.

Jehl, J. B. (1974). *Auk* 91: 681-699.

King, W. B. (1974). *Smithson. Contrib. Zool.* 158: 53-55.

Lambert, K. (1980). *Beitr. Voegelkd.* 26: 199-212.

Lindsey, T. R. (1984). *Aust. Birds* 19: 37-68.

Lindsey, T. R. (1985). *Aust. Birds* 19: 65-100.

Lindsey, T. R. (1986). *Aust. Birds* 20: 97-132.

Marchant, S. (1977). *Emu* 77: 9-18.

Melville, D. S. (1985). *Notornis* 32: 51-73.

Milledge, D. R. (1977). *Corella* 1: 1-11.

Morris, A. K., McGill, A. R. and Holmes, G. (1981). Handlist of Birds of New South Wales. NSW Field Ornithologist's Club, Sydney.

Paterson, A. M. (1986). *Ringing and Migr.* 7: 51-55.

Pringle, J. D. (1987). The Shorebirds of Australia. The National Photographic Index of Australian Wildlife, Angus and Robertson, Sydney.

Roselaar, C. S. (1983). *In* Handbook of the Birds of Europe, the Middle East and North Africa, Vol. III. Ed. by Cramp, S. and Simmons, K. E. L. Oxford University Press, Oxford, pp. 652-697.

Serventy, D. L., Serventy, V. and Warham, J. (1971). The Handbook of Australian Sea-birds. Reed, Sydney.

Shuntov, V. P. (1974). Seabirds and the Biological Structure of the Ocean. English translation for the Bureau of Sport, Fisheries and Wildlife, U.S. Dept. of the Interior and National Research Foundation, Washington, DC.

Sinclair, J. C. (1978). *Bokmakierie* 30: 12-16.

Storr, G. M. (1964). *Emu* 63: 297 303.

Tasker, M. L., Hope-Jones, P., Dixon, T. and Blake, B. F. (1984). *Auk* 101: 567-577.

Tuck, L. M. (1960). The Murres. The Canadian Wildlife Series No. 1 103-104.

van Tets, G. F. and Fullagar, P. L. (1984). Australasian Seabird Group Newsletter No. 20. p. 6

Viet, R. R. (1985). *Am. Birds* 39: 873-878.

Wahl, T. R. (1975). *West. Birds* 39: 873-878.

Watson, G. E. (1975). Birds of the Antarctic and Subantarctic. American Geophysical Union, Washington.

Young, E. C. (1985). *In* Complete Book of New Zealand Birds. Reader's Digest, Sydney, p. 220.

THE GIBSON CODE

One of the first co-operative studies in New South Wales was that of the Wandering Albatross *Diomedea exulans* off the coast at Bellambi and Malabar. Once started, it soon became clear that a standard method for recording plumage characteristics was necessary, and a scheme was developed by Doug Gibson. This was designed to enable a numerical score to be given based on the similarity of the plumage to a series of numbered drawings depicting the plumage changes suspected to occur with age. It was also apparent that such a scheme must give similar data when used by different observers. Fortunately, at this critical moment a sick Wandering Albatross appeared in Sydney harbour. A meeting was arranged at short notice and held in the evening in Arthur Gwynn's home, attended by Doug Gibson, Allen Sefton, Clive Champion, Bill Lane, myself and the albatross. Doug explained his plan and at intervals we retired individually to the verandah to make our plumage scores, after which we compared notes and discussed our disagreements. From these Doug developed his scheme which became known as the "Gibson Code". The albatross recovered within two days from its unique experience and was last seen flying through Sydney Heads to the Tasman Sea.

P. Jouventin, J. Martinez and J. P. Roux have just published the latest modification to the "Gibson Code" in *Ibis* 131: 171-182. This accommodates the plumage changes of the newest of the great albatrosses, the Amsterdam Island Albatross *Diomedea amsterdamensis*. This species breeds on Amsterdam Island (37°50'S., 77°35'E.) mid-way between southern Africa and Australia. It commences to breed in a dark plumage with a dark cap on the head, a plumage similar to the immature stages of the Wandering Albatross from which it can be readily distinguished. The Amsterdam Island Albatross has a distinct dark line on the cutting edge of the upper mandible. Its breeding biology is similar to those of the other great albatrosses but whereas the Wandering and Royal Albatrosses breed during December and January, the Amsterdam Island Albatross breeds in February and March. The breeding population is estimated at only 65 birds including 21 breeding pairs which, as the authors comment, makes this albatross probably one of the rarest of seabirds.

Durno Murray