

DRAFT

Report on Count of Silver Gulls on Carnac and Penguin Islands on 18 May 1994

Introduction

At the request of Gordon Wyre, Manager Wildlife Branch, an aerial census of Silver Gulls (*Larus novaehollandiae*) on Carnac and Penguin Islands near Perth was made on Wednesday 18 May 1994.

The purpose of this census was to provide an index of the number of breeding pairs utilising each island at this time of the year. It is proposed that the census be repeated each year so that medium to long term trends in the size of the gull populations on these islands may be determined. Other requirements were that the methods used be uncomplicated, inexpensive (including staff time) and not require substantial, ongoing involvement of scientific staff.

The methodologies used are described here in detail in order that they may be critically reviewed and repeated or compared in future years. Costs have also been detailed. Recommendations are made for 1995 and subsequent surveys.

Timing

The census period and time of day were chosen on the basis of verbal advice from Associate Professor Ron Wooller of Murdoch University (Prof Wooller subsequently provided written advice; see attached letter of 20 May 1994).

According to Prof Wooller, the number of nesting birds on Carnac and Penguin Islands would normally be at or near an annual peak in mid-May and most birds would have late-incubation stage eggs or early young.

Prof Wooller also suggested that the optimal time of day to obtain an estimate of the number of breeding pairs (active nests) by aerial census would be early morning as most nests would be attended by only one adult at this time of day (hourly counts had shown that gull numbers at Rockingham rubbish tip consistently peaked around 0700-0900 hrs).

The actual day of the census was decided on the basis of staff availability and most-suitable weather conditions (as advised by the Bureau of Meteorology's duty forecaster).

Methodology

A Cessna 172 was used, with the right hand door removed for photography. This aircraft was chartered from the Royal Aero Club based at Jandakot. The pilot was Murray Bow. Two officers from the Department of Conservation and Land Management, Principal Research Scientist Jim Lane (JL) and Supervising Wildlife Office Doug Coughran (DC), undertook the photography.

The plane (pilot, JL, DC) took off from Jandakot Airport at 0810 hrs on 18 May and flew direct to Carnac Island.

• Carnac Island

Carnac Island was reached at approx 0825 hrs. Four "passes" were made, from north to south on the eastern side of the island. This positioning of the aircraft was necessary to ensure that the early morning sun was behind the aircraft and that JL and DC, on the right hand side of the aircraft, had the best view possible for taking photographs.

No photographs were taken on the first pass which was to ascertain an appropriate altitude and distance from the island for subsequent, photographic passes and to enable JL to determine (by means of Lunasix 3 light meter) an appropriate lens aperture for the Hasselblad camera. On the second, third and fourth passes (at an altitude of 500 ft), several series of overlapping, oblique photographs were taken by both JL (from front seat) and DC (rear seat).

JL used a Hasselblad 500EL/M (70 mm format) camera with 120 mm lens, 150/250 frame viewfinder, motor drive and a 12 exposure magazine loaded with Ilford FP4 panchromatic (B&W) film set at 125 ASA. The lens focus was pre-set at infinity, the shutter speed at 1/500th sec and lens aperture at f5.6. JL took a series of 6 overlapping photos on the second pass, 5 on the third pass and none on the fourth pass.

DC used a Ricoh KR10 SLR (35 mm format) camera with standard 50 mm lens and motor drive, loaded with Kodachrome 64 ASA, 36 exposure colour diapositive (transparency) film. The lens focus was pre-set at infinity, the shutter speed at 1/250th sec and lens aperture at f4 (manual override). DC took a series of 16 overlapping photographs on the second pass, 5 on the third and 15 on the fourth.

Following completion of the four passes at Carnac Island, the plane flew south to Penguin Island in Shoalwater Bay.

• Penguin Island

Three passes were made at Penguin Island, again from north to south and on the eastern side of the island. Again the first pass was to ascertain a suitable altitude and

distance from the island and for JL to take a light meter reading. On the second pass (at 500 ft) JL took 2 overlapping photographs (same settings except lens aperture at f11). Unfortunately, jamming of the film magazine prevented any more being taken.

DC took a series of 11 overlapping photos on the second pass, 17 on the third and 7 on the fourth. Between the second and third passes DC also took a single photograph of Seal Island, to the north of Penguin. All photographs were again at f4 and 1/250th sec (manual override).

The aircraft then flew back to Jandakot Airport and landed at 0905 hrs.

Flying and viewing conditions were very suitable for the task. The islands were in full sun at the time of photographing (sunrise was at 0659 hrs) and there was no turbulence (winds were very light and air temperature low). Removal of the front right hand door worked well; view was only marginally restricted by the wing strut and wheel housing and provided the cameras were held inside the cabin (i.e. not in the slipstream), camera shake was not excessive.

Counting from Photographs

- Panchromatic (B&W) 70mm Film**

The original intention had been to count gulls from both JL's 70mm B&W photographs and DC's 35mm colour transparencies (diapositives) and compare their suitability for the task. However, contact prints from the 70 mm negatives did not provide the resolution required and suitable-size enlargements would have been expensive (at least \$15 each). As an alternative, the negatives were mounted in glass slides (\$2 each) for projection. Although this provided a better product to work with, the resultant (negative) image proved more difficult to count from than DC's projected colour slides and so this method was not pursued any further.

- Diapositive (colour transparency) 35mm Film**

DC's mounted and numbered "slides" were laid out in sequence on a light table and the series (there were three, one from each pass) giving the most complete and closest coverage of the island and the best quality image was selected. The minimum number of slides needed to give complete coverage of the island were then selected from this series. Two Kodak slide projectors were set up side-by-side to project on to sheets of white paper approx 83 cm by 57 cm in size and pinned onto a wall in a darkened room. The selected slides were loaded alternately (1,3,5 etc and 2,4,6, etc) into the two magazines. Slides 1 & 2 were then projected and gulls in areas appearing on slide 1 but not slide 2 were individually marked onto the sheet of paper onto which slide 1 was projected. This procedure was then repeated in similar fashion with slides 2 & 3, then 3 & 4, etc until all gulls had been marked on a series of sheets.

A similar procedure was followed for both Carnac and Penguin Island counts. The series used for Carnac Island had 11 photographs. The series for Penguin Island had 10.

The next step in the methodology was for one of us (DC) to count all the gulls from the paper sheets. This was a straightforward, though time-consuming, task of dividing the many hundreds of marks on each sheet into manageable groups, counting the number in each and then summing these.

Numbers of Gulls

The number of gulls counted was as follows.

	Suitable nesting habitat	Beaches	Sand drift	Flying	Ocean
Carnac Island	4 183	248	59	40	53
Penguin Island	2 966	349	-	52	22
Totals	7 149	597	59	92	75

Most (Carnac 91 %, Penguin 87 %) gulls were standing (or sitting, it was not possible to tell in most cases) on what was judged to be suitable breeding habitat (mainly vegetated areas). The great majority of these gulls were metres to tens of metres apart, suggesting that, as anticipated, most nests (we would estimate $>95\%$) were attended by only one adult at the time of the survey. It was not possible to confidently identify pairs of birds as distances apart varied on a continuum.

A small proportion of gulls were either on "habitat" (landscape components) that appeared unsuitable for nesting (e.g. beach and sand-drift areas other than at the very edge of vegetation), or were sitting on the ocean near the islands, or were flying over the ocean or islands.

The only areas which were not visible on the photographs and may have had small numbers of nesting gulls were the western slope of a vegetated ridge in the NW sector of Carnac Island and the dune face along the western edge of Penguin Island. Provided these areas are consistently excluded from future counts, this is not considered a problem.

The total number of gulls on what was judged to be "suitable nesting habitat" is considered the best index of the total number of breeding pairs nesting on the islands on the day of survey. Adopting this approach, the baseline index for Carnac is 4 183 and for Penguin Island is 3 389.

Costs

i) Expenditure

	\$
Aircraft hire (\$145/hr).....	128
35mm colour slide film, process & mount (3 rolls).....	45
70mm panchromatic film, process, contact prints & glass mounts (2 rolls).....	76
Vehicle use (...km).....	30
 Total.....	 \$279

ii) Staff Time

DC (flight/travel 2hr, photo plot 7.5 hr, count 7.5 hr).....	17 hrs
JL (prep'tion 4hrs, flight/travel 2hr, photos 7.5 hr, report 7.5 hr).....	21 hrs

Recommendations for Future Censuses

The following recommendations assume that the basic methodology and outcomes of this census are considered satisfactory in terms of CALM Wildlife Branch's monitoring objectives. More sophisticated and/or quite different methodologies could be used to obtain more precise indications or estimates of the size of the Carnac and Penguin Island silver gull breeding populations. Costs, however, increase exponentially with precision.

If the 1994 methodology is considered acceptable, future censuses (annual) should be conducted at the same time each year (18th May + or - 3 days) and at the same time of day (0800-0900hrs). In 1995, all procedures and equipment should be as performed or used in 1994 with the following exceptions.

- 70 mm *colour slide* film should be used in the Hasselblad on an experimental basis.
- The first photographic run past each island should be at 500 ft as in 1994. However, the second and third photographic runs should be at slightly lower altitudes (say 400 and 350 ft) and the results compared. These lower altitudes may yield slightly improved results in terms of photographic resolution.
- Unadjusted aperture settings should be used on the first photographic run past each island. Apertures should be one and two stops higher ("darker") on the second and third photographic runs respectively. This will facilitate counting of gulls on bright backgrounds.

It would be preferable to use the same pilot each year and in 1995 it would be preferable to have JL and DC do the photography again. In subsequent years other staff could do the task, however there should always be continuity (i.e. at least one of the 2 CALM staff on the flight in any year should be on the flight in the following year).

Prof Wooller has been most helpful in his advice regarding this gull census. CALM should maintain a close liaison with him in relation to future censuses.

J. Lane

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