

Australian sea lions *Neophoca cinerea* at colonies in South Australia: distribution and abundance, 2004 to 2008

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Endangered Species Research 13: 87–98 (2011)

Supplement. Information on 26 *Neophoca cinerea* breeding colonies in South Australia

The Australian sea lion *Neophoca cinerea* is restricted to South Australia and Western Australia. This supplementary material provides information on 26 breeding colonies in South Australia that were visited during this study between 2004 and 2008, with details on pup population estimates from which best estimates are summarized in Table 1 of the main paper. It also summarises data on pup counts available before 2004. Mark-recapture estimates are presented with their 95% confidence limits (CL). Detailed counts of all animals in these colonies have been presented in consultancy reports. Data for the other 13 breeding colonies and 9 haulout sites with occasional pupping (which were not visited in this study) were taken from published literature.

In addition, 24 haulout sites of the Australian sea lion visited during the study are listed in Table S1 of this supplementary material, together with their geographical positions and counts of sea lions seen on the dates visited.

BREEDING COLONIES

The Pages Islands (35.76° S, 138.30° E)

The Pages are 2 rocky islands separated by 3.5 km and situated 15 km from the eastern end of Kangaroo Island. They are treated here as separate colonies because of the strong philopatry evident in Australian sea lions (Campbell et al. 2008). Pup numbers were estimated by direct counting of live and dead pups for 12 of the 15 pupping seasons between 1989-90 and 2006-07, with 1 to 8 counts per season. In addition, only live pups were counted in 1986-87. Data were summarized by Shaughnessy & Goldsworthy (2007) for the 2 islands (North Page and South Page) combined; the mean count of live and dead pups was 474 (SD 67). The maximum count in this period was 313 on North Page and 296 on South Page in the 2002-03 season (Shaughnessy & Dennis 2003).

In the 2005 pupping season, numbers of live pups on both islands were estimated by mark-recapture on 11 and 13 October (Shaughnessy 2005b). On North Page Island, the Petersen estimate was 177 live pups (95% CL 162-191); with the addition of dead pups (81), the estimate becomes 258 (95% CL 243-272). On South Page Island, the Petersen estimate was 219 live pups (95% CL 206-233); with the addition of dead pups (112), the estimate becomes 331 (95% CL 318-345). These are taken as the best estimates because they based on mark-recapture procedures.

Seal Slide, Kangaroo Island (36.03°S, 137.54°E)

At the Seal Slide, pup numbers were estimated in 11 pupping seasons between 1988 and 2007, with data from the last 4 seasons collected more rigorously than previously. In the 2002-03 and 2004 seasons, 11 and 9 pups were recorded at the Seal Slide. Visits were made to the colony at monthly intervals and the cumulative total of the monthly counts of pups aged less than 4 months (which were assumed not to have been born at other colonies) was taken as the estimate of pup numbers for the season (Shaughnessy et al. 2009b).

In the 2005-06 pupping season, pup abundance was estimated as 10 using the cumulative mark and count method based on 4 visits between February and May 2006 (Goldsworthy et al. 2007a). In the 2007 pupping season the colony was visited 5 times in September and October, and 8 pups were marked. With the inclusion of dead pups, the cumulative mark and count method led to an estimate of 15 pups, and the Petersen estimate was 16 pups (95% CL 14-18) (Goldsworthy et al. 2008a).

Seal Bay, Kangaroo Island (36.00°S, 137.33°E)

Direct counts of live pups at Seal Bay for 13 consecutive seasons from 1985 to 2002-03 averaged 144 (SD = 14, range 122-166) (Shaughnessy et al. 2006). Since 2002-03, several methods were used to estimate pup abundance in the colony (summarised in the main paper), resulting in the following estimates: 227 in 2002-03 (95% CL 221-239), 288 in 2004 (95% CL 237-302), 219 in 2005-06 (95% CL 199-207) and 260 in 2007 (95% CL 254-272) (Goldsworthy et al. 2008b). The last of these (260 pups) is used in Table 1.

North Islet (35.12°S, 136.48°E)

At North Islet on 27 July 2005, 28 live pups were seen (Shaughnessy et al. 2009a). Previously, small numbers of pups were reported there: 8 in November 1975 (Ling & Walker 1976; Gales et al. 1994) and 1 in February 1977 (G. Walker, in Dennis 2005).

Dangerous Reef (34.82°S, 136.22°E)

At Dangerous Reef in southern Spencer Gulf, pup numbers were estimated by direct counting of live and dead pups for 11 pupping seasons between 1975 and 2006-07. For 8 seasons from 1994-95 to 2006-07, when pups were counted monthly for at least 5 months of the pupping season (i.e. until the maximum numbers of pups were expected), the maximum estimate of pup numbers for each season increased at 6.9% per pupping season (Goldsworthy et al. 2007b). The mean count for those 8 seasons was 447 pups (SD 94), and the maximum was 585 in the 2005 season.

Pup numbers have been estimated by mark-recapture using the Petersen estimate in 4 pupping seasons since 1999. For the 2006-07 season, the largest mark-recapture estimate of live pup numbers was 629 (95% CL 556-703), making it 1.27 times larger than the direct count of live pups made at the same time (Goldsworthy et al. 2007b). With the addition of the accumulated number of dead pups counted to that date (80), the estimate for the 2006-07 season becomes 709 pups (95% CL 636-783).

English Island (34.64°S, 136.20°E)

English Island was visited on 3 occasions in 2005. On 7 June, 21 live pups and 3 dead pups were seen. On 24 June, there were 18 live pups and 1 dead pup; 3 of the live pups were small and were judged to be less than a week old. On 20 July there were 31 live pups (25 moulted and 6 brown) and 1 dead pup. The moulted pups included 3 that had been marked by clipping hair on the head a week earlier at Dangerous Reef. Pup production at English Island for the 2005 season is estimated at 27, from information from the first 2 visits: namely, 24 pups in early June plus the 3 small pups seen on the second visit (Shaughnessy et al. 2009a).

Previously, in 4 pupping seasons from 1998 to 2002, between 4 and 15 pups were recorded (Shaughnessy et al. 2005) and 18 pups were seen in February 1991 (Gales et al. 1994).

Albatross Island (35.07°S, 136.18°E)

Albatross Island at the southern end of Spencer Gulf is exposed to the prevailing swells which makes landings on it difficult. On 27 July 2005 it was circumnavigated by boat and at least 15 sea lion pups were

seen (Shaughnessy et al. 2009a). Previously, 12 pups were reported there in November 1982 (Gales et al. 1994, Robinson et al. 1996) and large pups were seen during an aerial survey in July 1996 (Shaughnessy et al. 2005).

South Neptune Islands (35.33°S, 136.11°E)

There are 3 islands in this group: the largest (Main Island) is used mainly by New Zealand fur seals *Arctocephalus forsteri*. Australian sea lions also breed on Main Island and haulout on the other 2 islands. On 7 February 2005, 35 sea lions were counted on the South Neptune Islands, but no pups. That was surprising because the visit was at the end of a predicted pupping season, based on extrapolations from timing of pupping seasons during the 1990s (Shaughnessy et al. 2005). On 4 February 2008, 6 pups were seen on Main Island by S. Goldsworthy.

Stirling (1972) recorded Australian sea lions at the South Neptune Islands, including “thirty-two pups and subadults” (p. 271), not “32 pups” as recorded by Gales et al. (1994, p. 365). Scrutiny of Stirling's field notes indicates that at least 10 small pups were seen on Main Island at the beginning and end of the 1969-70 pupping season; this is likely to have been an underestimate of pup production that season because observations were not possible in the middle of the pupping season. Small numbers of pups were seen there during the 1990s: 4 in October 1991 (Gales et al. 1994), 6 in March and April of 1993, and 5 in October and November of 1994 (Shaughnessy et al. 2005). Sea lions, but no pups, were recorded on adjacent Middle Island and Lighthouse Island in February of 2005 and 2008 (Table S1).

East Island, North Neptune group (35.23°S, 136.07°E)

There are 2 islands in this group separated by 300 m: the larger, West Island is used by many New Zealand fur seals and both species breed on the smaller East Island. On 10 February 2005, 6 brown sea lion pups were seen on East Island. On a later visit that season (12 May 2005), there were 13 brown pups and a dead pup (Shaughnessy et al. 2009a). These observations form the first record of pupping on the East Island of the North Neptune group and the estimate of pup numbers for the season is 14. Two pupping seasons later, on 1 February 2008, 10 brown pups were seen on East Island, 1 of which was dead, and a single pup was seen on West Island. Thus the direct count for the North Neptunes group for the 2007-08 pupping season was 11 pups. The count for the 2004-05 season of 14 pups is taken as the estimate for this colony.

On 3 previous visits to East Island, 20 to 35 sea lions were counted, but pups were not seen; in February of 1990, 1993 (when a bull was mate-guarding a cow, indicating that a breeding season was imminent) and 2000 (Shaughnessy et al. 2005).

Lewis Island (34.96°S, 136.03°E)

In the 2004-05 pupping season, Lewis Island in southern Spencer Gulf was visited 4 times between June and November 2005 and pups were seen on each occasion. On 29 June 2005, 6 small pups were seen and the pupping season must have just begun. By 30 November 2005, a total of 78 pups had been recorded there, which includes 3 dead pups seen on 23 September 2005 (Shaughnessy et al. 2009a).

In the 2007 pupping season the island was visited 4 times between January and July and 77 pups were marked. Mark-recapture calculations were complicated by the observation on Lewis Island of 10 pups that had been marked at Dangerous Reef. The Petersen estimate on 1 July 2007 was 134 (95% CL 123-146); with the inclusion of the cumulative count of dead pups (17) and allowing for an estimated 19 pups that immigrated from Dangerous Reef, the estimate was 131 pups (95% CL 116-146) (Goldsworthy et al. 2008a).

During an aerial survey in September 1975, 7 moulted pups were seen on Lewis Island (Ling & Walker 1976, D. Needham in Dennis 2005) and 9 moulted pups were seen during a boat survey in September 1976 (D. Needham in Dennis 2005). The island was not included in the enumeration of pup numbers in lists of breeding colonies by Robinson & Dennis (1988) or Gales et al. (1994), presumably because the sightings were considered unreliable because moulted pups are difficult to distinguish from juveniles from a fixed-wing aircraft or a boat, or because the pups may have moved to Lewis from nearby Dangerous Reef. The observations in 2005 and 2007 confirm Lewis Island as a breeding colony.

Liguanea Island (35.00°S, 135.62°E)

In the 2004-05 pupping season, Liguanea Island was visited twice (Shaughnessy et al. 2009a). On 11 November 2004, pup numbers were estimated as 41 by direct counting, which included 4 dead pups. On 10 February 2005, 2 small pups judged to be younger than 2 months were seen; they were assumed to have been born since the visit in November. Therefore the estimate of pup numbers for the 2004-05 pupping season is 43.

This estimate exceeds the direct count of 23 pups made in January 1990, based on a single visit when the colony was first reported (Gales et al. 1994) and timing of the breeding cycle was unknown. It also exceeds the count in November 1995, when only 1 pup was seen (Shaughnessy et al. 2005).

West Waldegrave Island (33.60°S, 134.76°E)

There are 2 islands in the Waldegrave group; most sea lions are on West Waldegrave Island. In the 2004-05 pupping season, sea lions were counted twice. On 9 November 2004, there were 98 live pups and 6 dead pups, and on 9 March 2005, 88 live pups and 4 dead pups. It was apparent during the March 2005 visit that the pupping season was over because the youngest pups were older than 1 month and adult males were showing little interest in adult females. Thus the maximum count for this season was 104 pups (Shaughnessy 2005a).

At West Waldegrave Island, estimates of pup numbers are available for 4 successive pupping seasons: 79 in 2001-02 from a single count on 6 February 2002, 157 pups in 2003, primarily from the count on 4 July 2003 (Shaughnessy et al. 2005), 104 in the 2004-05 pupping season (see above) and 86 from a single count on 15 May 2006 when the pupping season was still underway (Robinson et al. 2008). The largest of these (157 pups) is assumed to be the best estimate of pup production at the colony because it is suspected that timing for the other counts was inappropriate.

On nearby East Waldegrave Island, no brown pups or signs of breeding activity were found in ground surveys on 9 September 2004, and on 11 and 12 May 2006 (Table S1), and from several boat inspections since February 2001 (Shaughnessy 2005a, Robinson et al. 2008).

Jones Island (33.19°S, 134.37°E)

In the 2004-05 pupping season at Jones Island, the first pup was seen on 15 September 2004 (A. Payne pers. comm.). It was estimated to be 2 weeks of age and the maximum number of pups was expected in January 2005; 15 brown pups were counted on 13 January 2005 (Shaughnessy 2005a). In the 2007 pupping season, the number of pups was estimated as 15 using the cumulative mark and count method on 2 visits in September and November, and the same number was obtained by direct counting in November (Goldsworthy et al. 2008a).

Sea lion pups were first recorded at Jones Island in 1977 (Dennis 2005) when 2 pups were seen on a ground survey. Five pups were seen in December 1990 (Gales et al. 1994). More complete ground count data are available for pupping seasons of 1998-99 (9 pups), 2000 (6 pups), 2001-02 (12 pups), 2003 (7 pups) and 2004-05 (15 pups) (Shaughnessy et al. 2005).

Pearson Island (33.95°S, 134.26°E)

In the 2003 pupping season, Pearson Island was visited on 12 September 2003 when 29 pups were seen, including 2 that had moulted (S. Goldsworthy and B. Page in Dennis 2005). In the 2004-05 pupping season, the island was visited 3 times. On the first visit (11 September 2004), 1 pup was recorded. There were 13 pups during mid-November 2004 and 35 in July 2005; no dead pups were seen (K. Peters and B. Page, in Dennis 2005). Although 35 is the largest estimate available, it is likely to be an underestimate for the 2004-05 season because the visits were over a period of 9 months, the last count was after the pupping season had ended and some pups may have dispersed. In the 2006 season, 15 live and 2 dead pups were seen on 18 and 19 May 2006, and the pupping season was still underway (Robinson et al. 2008).

Earlier estimates of pup numbers at Pearson Island in 4 seasons in the 1990s were between 1 and 29 (Gales et al. 1994, Shaughnessy et al. 2005).

Point Labatt (33.15°S, 134.26°E)

The sea lion colony at Point Labatt is on the mainland at the base of 50 m high cliffs. In 1994 a viewing platform was built on the cliff and access to the colony was prevented by construction of a concrete wall across the narrow path on the cliff face (A. Zepf, pers. comm.). It is likely that the site became a pupping colony after visitor access to the beach was prevented.

During the 2004-05 pupping season, sea lions were counted on 3 occasions. In September 2004, 1 brown pup was seen. In January 2005, 3 brown pups were seen that were likely to have been born there because they were too small to have swum from another colony. In March 2005, 10 moulted pups and 6 brown pups were seen. The 6 brown pups were small and unlikely to have swum from another colony and 6 should be taken as the pup production for the site in the 2004-05 pupping season (Shaughnessy 2005a).

In the 2007-08 pupping season, the colony was visited twice, in September and November 2007, and 2 brown pups were seen.

Small numbers of brown sea lion pups have been reported sporadically from Point Labatt previously and it has been suggested that some of them may have moved there from nearby Jones and Nicolas Baudin Islands (Shaughnessy et al. 2005). Small numbers of pups may have been born at this site more frequently than has been recorded, because it has not been examined carefully when peak numbers of pups were there.

Nicolas Baudin Island (33.02°S, 134.13°E)

Pup counts are available for 3 seasons at Nicolas Baudin Island, beginning with the 2004-05 pupping season. On 12 September 2004, the estimate was 49, which included 6 dead pups. The second count was on 11 February 2005, when the estimated number of pups was 39, including 6 pups recorded dead earlier. The peak number of pups for the pupping season had passed and the best estimate for that pupping season is 49 pups (Shaughnessy 2005a).

In the 2005-06 pupping season, pups were counted on 13 May 2006, when their numbers were estimated to be at their maximum; there were 98 pups, including a dead pup (Shaughnessy 2008).

In 2007 there were 2 visits to the island. On 18 June 2007, 12 pups were seen and the pupping season was considered to have begun about 2 weeks previously, i.e., in the first week of June (Shaughnessy & Goldsworthy 2007). The second visit, on 8 November 2007, was timed to be 5 months after the commencement of its pupping season and 5 moulted pups and 75 brown pups were seen. The youngest pup was at least a month old, indicating that the breeding season had ended. No dead pups were seen ashore, but 8 were recorded earlier on the mainland. Thus the estimate for pup numbers for the 2007 pupping season is 92 (Shaughnessy 2008).

Estimates for the last 2 seasons of 98 pups in 2005-06 and 92 pups in 2007 are considerably higher than previous counts of 72 and 70 pups in the 2001-02 and 2003 pupping seasons, respectively (Shaughnessy et al. 2005). It is not clear whether the higher counts result from better timing of visits or from a real increase on the island.

Olive Island (32.72°S, 133.97°E)

In the 2004-05 pupping season, Olive Island was visited twice. In September 2004, there were 62 brown pups and 2 dead pups. In January 2005, 129 pups were seen, all of which were alive. The smallest pup was estimated to be at least 6 weeks of age, indicating that the pupping season had finished. The estimate of pup numbers for the 2004-05 season is therefore 131, comprising the 129 seen in January and the 2 dead pups seen on the September visit (Shaughnessy 2005a).

In the 2005-06 pupping season, the island was visited 6 times between March and July of 2006, and 142 pups were tagged in order to use mark-recapture procedures to estimate pup numbers (Goldsworthy et al. 2007a). Based on the size of pups seen during the first visit, it is possible that pupping began as early as December 2005. Pup numbers were estimated as 150 (live and dead) by direct counting in April 2006. In June 2006, the estimate from mark-recapture using the Petersen method was 197 (95% CL 191-203); with the inclusion of dead pups the estimate was 206 (95% CL 191-223), which is taken as the best available estimate for the colony for the period of this study.

In the 2007 pupping season, the island was visited 5 times between August and November 2007, and 78 pups were tagged to use mark-recapture procedures (Goldsworthy et al. 2008a). Pup numbers were estimated as 144 (live and dead) by direct counting in November 2007, and in September 2007 as 161 (95% CL 151-172) from the Petersen method with the addition of dead pups.

At Olive Island between 1977 and 1996, direct counts of pups ranged from 12 to 52 based on single visits in each of 4 seasons (Shaughnessy et al. 2005). Pup counts were higher when at least 2 visits were made per season with 1 of them timed to coincide with the expectation of maximum pup numbers; in 4 consecutive seasons from 2003 to 2007 direct counts varied from 121 pups (Shaughnessy et al. 2005) to 150. In the 2 most recent seasons, mark-recapture procedures resulted in estimates of 206 pups in 2005-06 and 161 pups in 2007 (Goldsworthy et al. 2007a, 2008a).

Lilliput (32.45° S, 133.67° E) & Blefuscu (32.46° S, 133.64° E) Islands

These islands were referred to as 'Small N/E Franklin' and 'Small Sth Franklin' by Gales et al. (1994, their Table 1) because of their proximity (a few hundred metres) to Franklin Island and their relative size.

During the 2004-05 pupping season, these islands were visited on the same days on 4 occasions between November 2004 and April 2005 (Shaughnessy et al. 2009a). At the initial visit, small numbers of pups were present: 10 on Lilliput and 16 on Blefuscu. The highest pup counts were obtained on the third visit to both islands, in March 2005. Pup numbers were slightly lower on the final visit, in April 2005, indicating that the pupping season had ended. The estimate of pup production for Lilliput Island was 67, comprising 61 live pups in March 2005 and a total of 6 dead pups. For Blefuscu Island, the estimate of pup production was 84, comprising 81 live pups in March 2005 and 3 dead pups.

In the 2007-08 pupping season, these islands were visited 4 times between November 2007 and April 2008. Direct counting resulted in estimates of 53 pups on Lilliput in February 2008 and 68 pups on Blefuscu in January 2008 (Goldsworthy et al. 2009a). Pup numbers were also estimated by mark-recapture. The largest Petersen estimates were 64 pups (95% CL 62-69) on Lilliput in February 2008 and 96 pups (95% CL 89-103) on Blefuscu in January 2008. At Blefuscu, 3 small pups were seen in March 2008 that must have been born after the previous visit. Addition of these to the Petersen estimate results in an estimate of 99 pups (95% CL 92-106) for Blefuscu in the 2007-08 season. The best estimates for these colonies are considered to be 64 for Lilliput and 99 for Blefuscu.

The only other estimates of pup numbers for these islands are from a single visit to each in October 1990 when 46 and 75 pups were counted on Lilliput and Blefuscu, respectively (Gales et al. 1994). The estimates for the 2004-05 and 2006-07 pupping seasons exceed those for 1990, presumably because the recent ones were made closer to when peak numbers were in each colony than were the estimates in 1990.

Gliddon Reef (32.32° S, 133.56° E)

Gliddon Reef was first visited on 4 June 2005, when 7 brown pups were seen that were so small that they must have been born there (Shaughnessy et al. 2009a). Two pupping seasons later, on 5 March 2008, 7 pups were seen, 3 of which were moulted (Goldsworthy et al. 2009a). Because all 7 pups seen in June 2005 were small, that is taken as the better estimate for Gliddon Reef.

Breakwater Island (32.32° S, 133.56° E)

Sea lions, including pups, were first reported on Breakwater Island by P. Will in February 2003 (pers. comm.). In February 2003, 23 sea lions were ashore, including 6 moulted pups (Shaughnessy & Dennis 2003). Because moulted pups can move between islands and there was no evidence of breeding activity, the site was not recorded as a breeding colony then. It was visited again in February 2004 with similar results: 27 sea lions with 7 moulted pups that were large enough to have swum there from nearby colonies (Shaughnessy 2004).

In the 2004-05 breeding season, Breakwater Island was visited 4 times between November 2004 and June 2005. No pups were seen in November 2004. During visits in January and April 2005, 2 and 15 brown pups were seen, respectively. They were so small that they must have been born there. Sixteen live pups and a dead pup were seen on the island in June 2005. This is the first documented record of breeding by sea lions on Breakwater Island and the estimate of pup numbers for the 2004-05 season is 17, based on the final visit (Shaughnessy et al. 2009a).

In the 2007-08 breeding season, Breakwater Island was visited in March 2008 when 15 brown pups and 2 moulted pups were seen (Goldsworthy et al. 2009a). Because the 2005 estimate of 17 pups was based on several visits, it should be taken as the best available for Breakwater Island.

Lounds Island (32.27° S, 133.37° E)

In April 2008, 34 pups were counted at Lounds Island during a ground survey. Most were in rock pools at the north-east end of the island (Goldsworthy et al. 2009a).

Four counts at Lounds Island between 1977 and 1995 resulted in counts of between 4 and 26 pups (summarised in Shaughnessy et al. 2005).

Fenelon Island (32.58° S, 133.28° E)

At Fenelon Island, 10 sea lion pups were counted from a boat and while walking on shore in March 2005 (Shaughnessy et al. 2009a). Because the oldest was aged about 3 months, it is likely that pupping continued for 1 or 2 months and that this is an underestimate.

In April 2008, 40 pups were counted during a ground survey (Goldsworthy et al. 2009a). Most were on the north-east and north-west coasts.

Previously, between 8 and 21 pups were counted on the island on visits in 3 pupping seasons between April 1982 and August 1995 (summarised in Shaughnessy et al. 2005) and 19 were seen in September 2002 (Robinson et al. 2003).

Masillon Island (32.56° S, 133.28° E)

Masillon Island is described as a potential breeding colony in the main paper. Pups were reported there in September 2002 by Robinson et al. (2003), but none was seen in March and May 2005 or in April 2008 and the habitat was considered unsuitable for survival of pups (Shaughnessy et al. 2009a, Goldsworthy et al. 2009a).

West Island (32.51° S, 133.25° E)

In 2005 West Island was visited 3 times between March and July 2005 (Shaughnessy et al. 2009a). On 13 March it was circled on foot and 38 sea lion pups were recorded including 2 dead pups. Five bulls ashore were mate-guarding adult females and pups, indicating that pupping was still underway. On 29 May 2005, 52 live pups and 1 dead pup were counted. On 5 July 2005, 1 sea lion pup was seen that was estimated to have been less than a month old and hence had been born since the previous visit. Therefore in the 2005 pupping season, at least 56 sea lion pups were born on West Island; this includes the 3 dead pups seen in March and May, and the small pup seen in July. This exceeds numbers recorded in 2 previous surveys, of 14 in September 1990 (Gales et al. 1994) and 18 in August 1995 (Shaughnessy et al. 2005).

Purdie Island (32.27° S, 133.23° E)

At Purdie Island on 31 May 2005, 132 sea lions pups were counted, including 3 that were dead (Shaughnessy et al. 2009a). Eight pups had completed their moult, indicating that pupping had nearly finished. Two pupping seasons later, 95 pups were counted on 7 April 2008 (Goldsworthy et al. 2009a).

The direct count in May 2005 of 132 exceeds 3 previous counts at the site of 34 to 112 pups between November 1990 and August 1995 (Gales et al. 1994, Shaughnessy et al. 2005), and that of April 2008.

Acknowledgements. We thank many colleagues who have assisted counting sea lions on the islands and Dr I Stirling of the Canadian Wildlife Service, Edmonton, Canada for providing his data sheets with counts of sea lions on South Neptune Island in 1969/1970.

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Table S1. Haulout sites of the Australian sea lion visited during this study between 2004 and 2008. Further details are provided by Shaughnessy et al. (2009a) unless otherwise indicated. Pups seen at some sites were too large to suggest that the sites were breeding colonies. Counts that refer to pups are denoted as brown pups ('bp') and moulted pups ('mp'); otherwise counts refer to other age classes. Positions of the sites are provided by Goldsworthy et al. (2009b).

Site	Latitude, longitude	Date visited	Count of sea lions
Baudin Rocks	37.09° S, 139.72° E	13 May 08	12
Blyth Is.	34.57° S, 136.29° E	25 Jul. 05	78
Langton Is.	34.60° S, 136.25° E	25 Jul. 05	127 + 2 bp
Sibsey Is.	34.65° S, 136.18° E	7 Jun. 05	7
South Neptunes, Lighthouse Is.	35.34° S, 136.11° E	7 Feb. 08	ca 15
South Neptunes, Middle Is.	35.34° S, 136.11° E	7 Feb. 05	10
Hopkins Is.	34.97° S, 136.06° E	29 Jun. 05	ca 60
Smith Is.	34.99° S, 136.03° E	11 Nov. 04	34
Little Is.	34.95° S, 136.03° E	29 Jun. 05	29 + 4 mp
Donington Is.	34.72° S, 136.00° E	29 Sep. 05	12
Rabbit Is., Louth Bay	34.60° S, 135.99° E	7 Jun. 05	2
East Waldegrave Is.	33.60° S, 134.77° E	11-12 May 06	ca 20
Topgallant Is. ^a	33.72° S, 134.61° E	17 May 06	5
Flinders Is. ^a	33.73° S, 134.48° E	20-24 May 06	13
Flinders Reef	32.39° S, 133.55° E	10 Jan. 05	6 ^b
Lacy Is.	32.40° S, 133.37° E	7 Apr. 08	19 ^b
Rocks NW of Lacy Island	32.37° S, 133.35° E	7 Apr. 08	4 ^b
Freeling Is.	32.48° S, 133.34° E	7 Apr. 08	6 ^b
Dog Is.	32.49° S, 133.33° E	7 Apr. 08	17 ^b
Egg Is.	32.47° S, 133.32° E	7 Apr. 08	1 ^b
Smooth Is.	32.49° S, 133.31° E	7 Apr. 08	1 ^b
Un-named islet east of St Francis Is.	32.52° S, 133.31° E	7 Apr. 08	4 ^b
Masillon Is.	32.56° S, 133.28° E	13 Mar. 05	27 ^b
Sinclair Is.	32.14° S, 132.99° E	7 Apr. 08	44 ^b

^aFrom Robinson et al. (2008).

^bCounted from a boat or helicopter close to an island.