

Documentation of the South African Antarctic Pack Ice Seals Census (APIS) Programme 1998 during PS48

Labelling of events and parameters

Parameter&Method	Short Name	UNIT	Comment
Event label	SA_APIS		South African Antarctic Pack Ice Seals Census Survey
Identification	Identification		Census_Leg_Frame
Census	Census		Each day is considered a new census
Leg	Leg		Within each census legs denote start and end of the strip installation
Frame	Frame		Within each leg species specific counts are accumulated within frames of three-minutes (denoted as blocks in Gurarie et al.).
Latitude Leg start	Lat leg start		
Longitude Leg start	Lon leg start		
Latitude Leg end	Lat leg end		
Longitude Leg end	Lon leg end		
Date	Date		
Time Leg start [interpolated]	TIME Leg start [interpolated]		Interpolation equidistantly between 2:30 and 4:30 min
Time Leg end [interpolated]	TIME Leg end [interpolated]		Interpolation equidistantly between 2:30 and 4:30 min
Time Leg start	TIME Leg start		UTC
Time Leg end	TIME Leg end		UTC
Distance	Dist		Estimated first by dividing the straight line distance travelled in a LEG by the corresponding number of FRAMESD then calculated along the given lat lon geocodes of that cell according to $\text{ARCCOS}(\text{SIN}(\text{H}2 \cdot \text{PI}()/180) \cdot \text{SIN}(\text{J}2 \cdot \text{PI}()/180) + \text{COS}(\text{H}2 \cdot \text{PI}()/180) \cdot \text{COS}(\text{J}2 \cdot \text{PI}()/180) \cdot \text{COS}(\text{I}2 \cdot \text{PI}()/180 - \text{K}2 \cdot \text{PI}()/180)) \cdot 6366.707$ with H = Lat leg start, I = Lon leg start, J = Lat leg end, K = Lon leg end

Altitude	Alt	m	Flight altitude of helicopter. The bin angles were constant (every 10 degrees from 30 to horizon) but width depended upon altitude
Velocity	Vel	km/h	velocity of helicopter
Width Bin 1-5	Width bin 1-5	km	Cumulative width of bins 1-5
Lenght Bin 1-5	Lenght bin 1-5	km	Cumulative length of bins 1-5 along the strip. As a general rule the average length of a FRAME was estimated by dividing the straight line distance travelled in a LEG by the number of FRAMES in the LEG. This was not always true however (nor was it recorded). The area covered in a frame was estimated by multiplying the 1-5bin width by the length of ground surveyed in that LEG.
Observation side	Obs. Side		Observation from left or right seat resp. side of the helicopter
No of crabeater seals bin 1-5	Crab1-5		Cumulative counts of crabeater seals (<i>Lobodon carcinophaga</i>) within bin 1 to 5
Sum of Ross seals bin 1-5	Ross1-5		Cumulative counts of Ross seals (<i>Ommatophoca rossii</i>) within bin 1 to 5
Sum of Weddell seals bin 1-5	Wedd1-5		Cumulative counts of Weddell seals (<i>Leptonychotes weddellii</i>) within bin 1 to 5
Sum of leopard seals bin 1-5	Leop1-5		Cumulative counts of leopard seals (<i>Hydrurga leptonyx</i>) within bin 1 to 5
Sum of unidentified seal species bin 1-5	Unid1-5		Cumulative counts of unidentified seal species within bin 1 to 5
No of crabeater seals bin 1	Crab1		Number of crabeater seals (<i>Lobodon carcinophaga</i>) in bin 1
No of Ross seals bin 1	Ross1		Number of Ross seals (<i>Ommatophoca rossii</i>) in bin 1
No of Weddell seals bin 1	Wedd1		Number of Weddell seals (<i>Leptonychotes weddellii</i>) in bin 1
No of leopard seals bin 1	Leop1		Number of leopard seals (<i>Hydrurga leptonyx</i>) in bin 1
No of unidentified seal species bin 1	Unid1		Number of unidentified seal species in bin 1
No of crabeater seals bin 2	Crab2		Number of crabeater seals (<i>Lobodon carcinophaga</i>) in bin 2
No of Ross seals bin 2	Ross2		Number of Ross seals (<i>Ommatophoca rossii</i>) in bin 2
No of Weddell seals bin 2	Wedd2		Number of Weddell seals (<i>Leptonychotes weddellii</i>) in bin 2
No of leopard seals bin 2	Leop2		Number of leopard seals (<i>Hydrurga leptonyx</i>) in bin 2
No of unidentified seal species bin 2	Unid2		Number of unidentified seal species in bin 2
No of crabeater seals bin 3	Crab3		Number of crabeater seals (<i>Lobodon carcinophaga</i>) in bin 3

No of Ross seals bin 3	Ross3		Number of Ross seals (<i>Ommatophoca rossii</i>) in bin 3
No of Weddell seals bin 3	Wedd3		Number of Weddell seals (<i>Leptonychotes weddellii</i>) in bin 3
No of leopard seals bin 3	Leop3		Number of leopard seals (<i>Hydrurga leptonyx</i>) in bin 3
No of unidentified seal species bin 3	Unid3		Number of unidentified seal species in bin 3
No of crabeater seals bin 4	Crab4		Number of crabeater seals (<i>Lobodon carcinophaga</i>) in bin 4
No of Ross seals bin 4	Ross4		Number of Ross seals (<i>Ommatophoca rossii</i>) in bin 4
No of Weddell seals bin 4	Wedd4		Number of Weddell seals (<i>Leptonychotes weddellii</i>) in bin 4
No of leopard seals bin 4	Leop4		Number of leopard seals (<i>Hydrurga leptonyx</i>) in bin 4
No of unidentified seal species bin 4	Unid4		Number of unidentified seal species in bin 4
No of crabeater seals bin 5	Crab5		Number of crabeater seals (<i>Lobodon carcinophaga</i>) in bin 5
No of Ross seals bin 5	Ross5		Number of Ross seals (<i>Ommatophoca rossii</i>) in bin 5
No of Weddell seals bin 5	Wedd5		Number of Weddell seals (<i>Leptonychotes weddellii</i>) in bin 5
No of leopard seals bin 5	Leop5		Number of leopard seals (<i>Hydrurga leptonyx</i>) in bin 5
No of unidentified seal species bin 5	Unid5		Number of unidentified seal species in bin 5
No of crabeater seals bin 6	Crab6		Number of crabeater seals (<i>Lobodon carcinophaga</i>) in bin 6 (disregarded in the analysis)
No of Ross seals bin 6	Ross6		Number of Ross seals (<i>Ommatophoca rossii</i>) in bin 6 (disregarded in the analysis)
No of Weddell seals bin 6	Wedd6		Number of Weddell seals (<i>Leptonychotes weddellii</i>) in bin 6 (disregarded in the analysis)
No of leopard seals bin 6	Leop6		Number of leopard seals (<i>Hydrurga leptonyx</i>) in bin 6 (disregarded in the analysis)
No of unidentified seal species bin 6	Unid6		Number of unidentified seal species in bin 6 (disregarded in the analysis)
Ice cover	Cover	%	Percentage of coverage of sea ice
Floes	Floes	%	Percentage of coverage by ice floes
Brash	Brash	%	Percentage of coverage by brash ice
Cake	Cake	%	Percentage of coverage by cake ice
Small	Small	%	Percentage of coverage by small ice floes (ice floes measuring 10-100 m across)
Medium	Medium	%	Percentage of coverage by medium ice floes (ice floes measuring 100-500 m across)

Large	Large	%	Percentage of coverage by large ice floes (ice floes greater than 500 m across)
Temperature	Temperature	°C	Air temperature
Wind velocity	Wind vel	m/s	Velocity of wind
Visibility	Visibility		Visibility classified as excellent, fair, poor
Glare	Glare		Glare present (yes) or not (no)
Contrast	Contrast		Quality of contrast vision classified as high, good, or no
Type of aircraft	Type of aircraft		Bell Long Ranger II, Bölkow Blohm 105
Comment			

Seal densities in Bester and Odendaal (2000)

Densities were calculated by dividing (1) the area surveyed during each census = width of trip delineated by sighting bars (1-5 on both sides combined = 1023 ft or 0.1682 nm) multiplied by the total length of census line for each census, by (2) numbers of each species encountered in during each census. Furthermore, at some points densities for individual frames were calculated to illustrate some points, but not for overall densities per census (i.e. Bester and Odendaal did not calculate densities for each frame, but then the mean +/- SD(SE for all the frames of a single species).

Further details on methods are available in:

Ackley, Stephen F; Bengtson, J L; Bester, Marthán N; Blix, A S; Bornemann, Horst; Boveng, P; Boyd, I; Cameron, M; Nordøy, E; Plötz, Joachim; Siniff, D; Southwell, C; Steinhage, Daniel; Stewart, Brent S; Stirling, J; Torres, J; Yochem, PK (2006): The International Antarctic Pack Ice Seals (APIS) Program. Multi-disciplinary Research into the Ecology and Behavior of Antarctic Pack Ice Seals. Summary Update. The Expert Group on Seals (EGS); Scientific Committee on Antarctic Research (SCAR). Marthán N. Bester, D.Sc., Chief Officer, Brent S. Stewart, Ph.D., J.D., Secretary (eds.), 25 pp, [hdl:10013/epic.37461.d001](http://hdl.handle.net/10013/epic.37461.d001)

Bester MN & Odendaal PN (2000) Abundance and distribution of Antarctic pack ice seals in the Weddell Sea. In: Antarctic Ecosystems: Models for Wider Ecological Understanding. W. Davison, C. Howard-Williams & P. Broady (eds), Caxton Press, Christchurch, New Zealand. Pp. 51-55

Bester MN & Odendaal PN (1999) Abundance and distribution of Antarctic pack ice seals in the Weddell Sea. In: W.E. Arntz & J. Gutt (eds) The Expedition ANTARKTIS XV/3 (EASIZ II) of "Polarstern" in 1998. Alfred-Wegener-Institut für Polar- und Meeresforschung. Berichte zur Polarforschung 301:102-107, <http://hdl.handle.net/10013/epic.10304>

Southwell, C; Bengtson, J L; Bester, Marthán N; Schytte Blix, A; Bornemann, Horst; Boveng, P; Cameron, M; Forcada, J; Laake, J; Nordøy, E; Plötz, Joachim; Rogers, Tracey; Southwell, D; Steinhage, Daniel; Stewart, Brent S; Trathan, P (2012): A review of data on abundance, trends in abundance, habitat use and diet of ice-breeding seals in the Southern Ocean. CCAMLR Science, 19(49), <http://hdl.handle.net/10013/epic.40419>