

Antarctic Specially Protected Area No. 136 (Site of Special Scientific Interest No. 17)

Clark Peninsula, Budd Coast, Wilkes Land

Clark Peninsula was designated as a Site of Special Scientific Interest in 1985 (ATCM Recommendation XIII-8): put forward by Australia. The Area is approximately 9.75 square kilometres in area and is adjacent to the Windmill Islands Group on the Budd Coast, Wilkes Land, Eastern Antarctica. (Maps A and B.) Scientific research within the Area has focused on the plant communities but has also included studies of the Area's penguin colonies. The Area has served as a valuable comparative site for similar plant communities and penguin colonies closer to Casey Station which are subject to greater disturbance.

1. Description of Values to be Protected

Excluding the Antarctic Peninsula, the largely undisturbed terrestrial ecosystem of Clark Peninsula supports one of the most extensive and best-developed plant communities on continental Antarctica. The Area has rich associations of macrolichens and bryophytes that occupy very specific ecological niches. Within the relatively complex plant communities, 33 species of bryophytes and macrolichens have been found with 11 cryptogamic sociations being identified. This vegetation forms a continuum of ecological variation along environmental gradients of soil moisture, soil chemistry, and microclimate. As such, the Area has intrinsic ecological value and scientific importance, particularly to botanists, microbiologists, soil scientists and glacial geomorphologists.

Within the Area, moss and lichen communities are used as control plots to monitor the environmental impacts of nearby Casey Station. The Area provides baseline data with which to compare changes in similar plant communities in the immediate surroundings of Casey Station. The cryptogamic plant communities are also being monitored in relation to short-term microclimate fluctuation and long-term climate change in the region since deglaciation 8000-5000 years BP.

Significant and relatively undisturbed breeding populations of Adélie penguin (*Pygoscelis adeliae*), South polar skuas (*Catharacta maccormicki*), Wilson's storm petrels (*Oceanites oceanicus*), and Snow petrels (*Pagodroma nivea*), are established at Whitney and Blakeney Points within the Area. These populations provide valuable comparative data for assessing and measuring human impacts and disturbance of penguin colonies on nearby Shirley Island close to Casey Station.

The Area supports an exceptional vegetation cover for continental Antarctic ice free localities, with a wide range of vegetation communities. The Area requires protection because of its ecological importance, its significant scientific value, and the limited geographical extent of the ecosystem. The Area is vulnerable to disturbance through trampling, sampling, pollution or alien introductions, while being sufficiently distant from Casey Station to avoid immediate impacts and disturbances from activities carried out there. It is because of the scientific and ecological values, and the values of the Area for long term monitoring, that it should continue to be protected.

2. *Aims and Objectives*

Management at Clark Peninsula aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing undue human disturbance;
- conserve a part of the natural ecosystem as a reference area for the purpose of comparative studies and to assess direct and indirect effects of Casey Station;
- allow scientific research on the ecosystem and elements of the ecosystem, both geological and biological, while ensuring protection from over-sampling and disturbances;
- minimise the possibility of introduction of alien plants, animals and microbes to the Area;
- allow visits for management purposes in support of the aims of the Management Plan.

3. *Management Activities*

The following management activities will be undertaken to protect the values of the Area:

- signs illustrating the location and boundaries, with clear statements of entry restrictions, shall be placed at appropriate locations at the boundaries of the Area to help avoid inadvertent entry;
- information on the location of the Area (stating special restrictions that apply) shall be displayed prominently, and a copy of this Management Plan shall be kept available, at the adjacent abandoned Wilkes Station, the “Wilkes Hilton” (unofficial name) Refuge Hut on Stonehocker Point, “Jack’s Donga” (unofficial name) Refuge Hut, and at Casey Station and will be provided to all visiting ships;
- markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required;
- the Management Plan shall be reviewed at least every five years and updated as required.

4. *Period of Designation*

Designated for an indefinite period.

5. *Maps*

Map A: East Antarctica, showing location of Clark Peninsula.

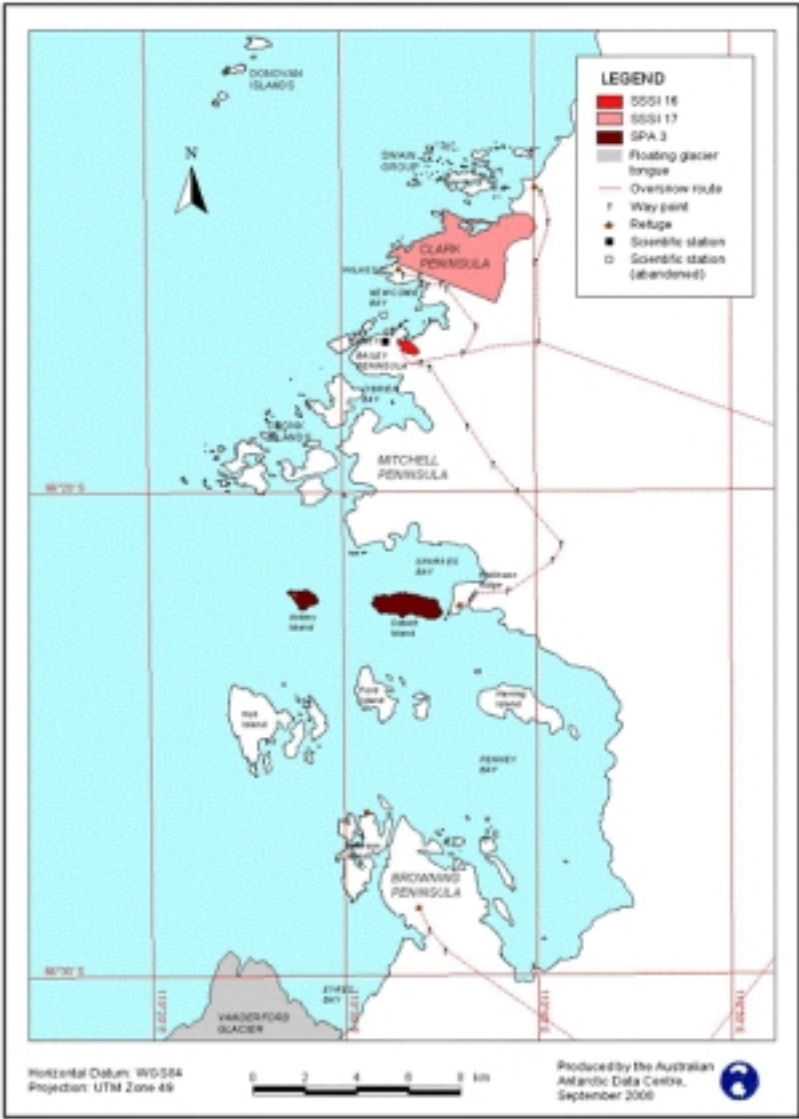
Projection: Polar Stereographic

Horizontal Datum: WGS84. True scale of latitude 71°.



ASPA 136
Map A*

Map B: Windmill Islands, showing location of Clark Peninsula.
 Projection: UTM Zone 49
 Horizontal Datum: WGS84.



ASPA 136
 Map B*

Map C: Topographic map of the Area.
 Projection: UTM Zone 49 Horizontal Datum: WGS84.
 Contour Interval: 10 m.



ASPA 136
 Map C*

6 Description of the Area

6(i) Geographical co-ordinates, boundary markers and natural features

Clark Peninsula, an area of rock exposures and permanent ice and snow fields, is situated on the north side of Newcomb Bay at the east end of Vincennes Bay, opposite Windmill Islands region, on Budd Coast, Wilkes Land, in latitude 66°15'S and longitude 110°36'E. The Area is approximately 9.75 square kilometres in area. (Map C.)

The Area comprises all the land on Clark Peninsula within the southern boundary line connecting the east side of Powell Cove at a point which originates at latitude 66.254424° South, longitude 110.53330° East, to trigonometrical station G7 at latitude 66.25809° South, longitude 110.55664° East thence to a point to the east-south-east on Løken Moraine. The eastern boundary is the westernmost limit of Løken Moraines as far north as a point due east of Blakeney Point, and thence to the coast, returning along the coast to the point of origin. The boundary of the Area will be indicated by prominent markers, and is shown on Map C.

Topographically, the Clark Peninsula comprises low lying, rounded ice-free rocky outcrops (maximum altitude approximately 40 metres), rising in the east to the Løken Moraines (altitude approximately 130 metres). Intervening valleys are filled with permanent snow or ice, or glacial moraine and exfoliated debris and contain water catchment areas.

The Windmill Islands represent one of the easternmost outcrops of a Mesoproterozoic low-pressure granulite facies terrain that extends west to the Bunger Hills and further to the Archaean complexes in Princess Elizabeth Land, to minor exposures in the east in the Dumont D'Urville area and in Commonwealth Bay. The total outcrop areas do not exceed more than a few square kilometres.

The rocks of the Windmill Islands area comprise a series of migmatitic metapelites and metapsammites interlayered with mafic to ultramafic and felsic sequences with rare calc-silicates, large partial melt bodies (Windmill Island supacrustals), undeformed granite, charnockite, gabbro, pegmatite, aplites and late dolerite dykes. Clark Peninsula distinguishes the northern transition of a metamorphic grade transition which separates the northern part of the Windmill Islands area from the southern part.

On Clark Peninsula outcrops of metapelitic rock and leucocratic granite gneiss are dominant. The metapelitic rock is generally foliated, migmatized and fine to medium grained. Mineralogy of the metapelitic rock involves biotite-sillimanite and biotite-sillimanite±cordierite. The sillimanite is strongly lineated in the foliation and the cordierite is generally pinnitized. The early granite gneiss is white, medium grained and foliated, it comprises two felsic to intermediate intrusions which predate and/or are synchronous with the deformation in the Windmill Islands. The larger intrusion, which occupies most of central Clark Peninsula is a quartz, K-feldspar, biotite, white mica and opaque-bearing granitic augen gneiss. Small outcrops of mafics and metapsammite occur. The rock beds lie in a south-west north-east orientation. The geology of Clark Peninsula is shown at Map F.

Gravels and soils appear to be derived from marine sediments deposited in the Pleistocene with a thin cover of weathered rock. Subfossil penguin colonies are common along the central ridge running south-west to north-east on Clark Peninsula and at Whitney Point and Blakeney Point. In the vicinity of abandoned penguin colonies, the soils, derived from penguin guano, are fine and silty with relatively high percentage of organic matter. Melt streams and pools and small lakes are prevalent in summer. The distribution of pools and lakes on Clark Peninsula is shown at Map E.

Conditions on Clark Peninsula, in comparison with many other continental Antarctic areas, are favourable enough to have induced relatively stable, complex, well developed, and species rich vegetation. The ice-free rocks support an extensive cover of lichen and in lower lying areas mosses predominate. Principal factors responsible for the distribution of vegetation on Clark Peninsula are exposure to wind, availability of water and the presence of abandoned penguin colonies which have a marked influence on the distribution and abundance of species.

To the north-east of the Peninsula, well-developed *Umbilicaria decussata*, *Pseudephebe minuscula*, *Usnea sphacelata* communities dominate. Further from the coast, *U. sphacelata* is dominant and forms extensive carpets over the metamorphic rocks and gravel beds in association with *P. minuscula* and *U. decussata*, together with scattered bryophytes. The bryophytes comprise, *Bryum pseudotriquetrum*, *Grimmia antarctici* and *Ceratodon purpureus*. Within these communities, well-

developed bryophyte patches dominate in moist, sheltered sites and locally form closed stands comprising a moss turf up to almost 30 cm depth.

In the north-western and western coastal areas where penguin colonies are present, *Xanthoria mawsonii*, *Candelariella flava* and *Buellia frigida* are more common. On the abandoned penguin colonies in the southern coastal areas, this community type contains a higher proportion of *U. decussata* and *U. sphacelata*.

In the centre of Clark Peninsula the vegetation is dominated by *U. decussata*, *P. minuscula*, *B. soredians* and *B. frigida*, with scattered occurrences of *Pleopsidium chlorophanum*.

The vegetation distribution of Clark Peninsula is shown at Map D.

The microflora comprises algae, with *Botrydiopsis constricta* and *Chlorella conglomerata* dominating, together with bacteria, yeasts and filamentous fungi.

Adélie penguins (*Pygoscelis adeliae*) are abundant within the Area, with colonies present at Whitney and Blakeney Points. Approximately 5,500 breeding pairs were counted in 1999 at Whitney Point, and 4,600 breeding pairs were present at Blakeney Point in 1991. The penguin population has shown a long-term increase since studies commenced in 1959/60. This is in contrast to nearby Shirley Island, opposite Casey Station, where the breeding population of Adélie penguins has remained stable since 1968.

Wilson's storm petrels (*Oceanites oceanicus*), South polar skuas (*Catharacta maccormicki*) and Snow petrels (*Pagodroma nivea*) breed within the Area.

Terrestrial invertebrate microfauna consists of protozoa, nematodes, mites, rotifers and tardigrades. The invertebrates are mainly confined to the moss beds, lichen stands and moist soils.

The climate of the Windmill Islands area is frigid-Antarctic. Meteorological data from Casey Station on nearby Bailey Peninsula show mean temperatures for the warmest and coldest months of 0.3 and -14.9°C , respectively, with extreme temperatures ranging from 9.2 to -41°C . The climate is dry with a mean annual snowfall of 195 mm year⁻¹ (rainfall equivalent). There is an annual average of 96 days with gale-force winds, which are predominantly easterly in direction, off the polar ice cap. Snowfall is common during the winter, but the extremely strong winds scour the exposed areas of the Peninsula of snow. On most hill crests on Clark Peninsula snow gathers in the lee of rock outcrops and in depressions in the substratum. Further down the slopes snow forms deeper drifts.

6(ii) Special Zones within the Area

There are no special zones within the Area.

6(iii) Location of Structures within and adjacent to the Area

The only structures known to exist in the Area are a severely deteriorated wood and canvas hide, known as "Wannigan," located on "Lower Snow Slope" (unofficial name) on the eastern portion of Whitney Point. This hide was constructed in 1959 for behavioural studies of penguins. There are a number of boundary markers along the southern boundary, and survey markers within the Area.

The “Wilkes Hilton” Refuge Hut is located approximately 200 metres south of the southern boundary. Approximately one kilometre to the south-west is the abandoned Wilkes Station on Stonehocker Point. Another Refuge Hut, “Jack’s Donga” is located approximately 1.5 kilometres north of the northern boundary of the Area.

6(iv) Location of other Protected Areas in the vicinity

Nearby protected areas to Clark Peninsula are: North-east Bailey Peninsula, Site of Special Scientific Interest No. 16, 66°17’S, 110°33’E, 2.5 km, south-west of Clark Peninsula, across Newcomb Bay, adjacent to Casey Station; and Specially Protected Area, No. 3, Ardery Island, 66°22’S, 110°27’E, and Odbert Island, 66°22’S, 110°33’E, Budd Coast lying in Vincennes Bay, 13 km south of the former Wilkes Station.

7. Permit Conditions

Entry into the Area is prohibited except in accordance with a permit issued by an appropriate National Authority.

A permit to enter the Area may only be issued for scientific research, or for essential management purposes consistent with the Management Plan’s objectives and provisions, and providing that the actions permitted will not jeopardise the ecological or scientific values of the Area or interfere with existing scientific studies.

Conditions that must be included in the permit are provisos that the permit or an authorised copy shall be carried within the Area, and that the permit specify the period for specific activities. Additional conditions, consistent with the Management Plan’s objectives and provisions, may be included by the issuing Authority.

7(i) Access to and Movement within or over the Area

Access into the Area should, except in emergency/exceptional circumstances be from “Wilkes Hilton” Refuge Hut in the south-west, “Jack’s Donga” Refuge Hut in the north-east, or from the over snow route between Casey Station and “Jack’s Donga” by descending the western slope of Løken Moraines in the vicinity east of Stevenson Cove, see Map C.

Access from Casey to abandoned Wilkes Station is via a well-defined marked cane route outside the southern boundary of the Area. As the Casey-Wilkes route is very close to the boundary, pedestrian and vehicular traffic should take care not to stray northward of it. See Map C.

Vehicles are not allowed within the Area (except for emergency) and access should be by foot. Helicopters (except in emergencies or for essential management activities) are not allowed to land within the Area. Persons authorised to enter the Area should, to the maximum extent possible, avoid walking on visible vegetation. Care should be exercised walking in areas of moist ground, where foot traffic can easily damage sensitive soils, plant or algae communities, and degrade water quality. Persons should walk around such features, on ice or rocky ground. Pedestrian traffic should be kept to the minimum necessary consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise effects.

Persons should avoid disturbance of penguin populations and individuals, and not approach penguins within 40 metres during the breeding season, October to April, unless this is an integral part of the permitted research activity.

7(ii) Activities which are or may be conducted within the Area, including restrictions on time and place

The following may be conducted within the Area:

- scientific research programs consistent with the Management Plan for the Area, including the values for which the Area has been designated, and which will not jeopardise the ecosystem of the Area;
- essential management activities, including monitoring;
- sampling, which should be the minimum required for the approved research programs.

7(iii) Installation, modification or removal of structures

No structures are to be erected within the Area, or scientific equipment installed, except for essential scientific or management activities, and as authorised in a permit. All scientific equipment installed in the Area must be clearly identified by country, name of principal investigator, year of installation and expected date of completion of the study. Details are to be included in the visit report. All such items should be made of materials that pose minimum risk of contamination of the Area and must be removed at the completion of the study.

7(iv) Location of field camps

Camping is not allowed within the Area and field parties should camp at either “Wilkes Hilton” Refuge Hut or “Jack’s Donga” Refuge Hut (see Map C).

7(v) Restrictions on materials and organisms that may be brought into the Area

No living animals, plant material or microorganisms shall be deliberately introduced into the Area and precautions shall be taken against accidental introductions.

No poultry or poultry products shall be taken into the Area.

No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes and which have been authorised, shall be removed from the Area at or before the conclusion of the activity.

Fuel is not to be stored in the Area unless required for essential purposes connected with the authorised activity. Permanent depots are not permitted.

All material introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction to the environment is minimised.

7(vi) Taking of or harmful interference with native flora and fauna

Taking of, or harmful interference with native flora and fauna is prohibited, except in accordance with a permit. Where authorised, the activity shall, as a minimum standard, be in accordance with the requirements of the Protocol on Environmental Protection to the Antarctic Treaty, 1991, Annex II, Article 3.

7(vii) Collection and removal of anything not brought into the Area by the permit holder

Material may only be collected or removed from the Area as authorised and should be limited to the minimum necessary to meet scientific or management needs.

Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or otherwise authorised, may be removed unless the impact of the removal is likely to be greater than leaving the material *in situ*. If material is to be removed the appropriate Authority must be notified and approval obtained.

7(viii) Disposal of waste

All wastes generated by persons in the Area, including human faeces and urine, shall be removed from the Area, and none deposited within the Area.

7(ix) Measures that may be necessary to ensure that the aims and objectives of the Management Plan can continue to be met

The following may be necessary to ensure the objectives of the Management Plan are met:

- permits may be granted to enter the Area to carry out biological monitoring and Area inspection activities, which may involve the collection of samples for analysis or review; the erection or maintenance of scientific equipment and structures, and signposts; or for other protective measures.
- any specific sites of long-term monitoring shall be appropriately marked and a GPS position obtained for lodgement with the Antarctic Data Directory System through the appropriate National Authority.
- to help maintain the ecological and scientific values of the plant communities found in the Area, visitors shall take special precautions against introductions. Of particular concern are microbial or vegetation introductions sourced from soils at other Antarctic sites, including Stations, or from regions outside Antarctica. To minimise the risk of introductions, before entering the Area, visitors shall thoroughly clean footwear and any equipment, particularly sampling equipment and markers to be used in the Area.

7(x) Requirements for reports

The principal permit holder for each permit issued should submit to the appropriate National Authority a visit report describing the activities undertaken. Such reports should be submitted as soon as possible and include the types of information contained in the SCAR Visit Report form or as required by national laws. The Authority should maintain a record of such activities and make this accessible to interested Parties.

Bibliography

Adamson, E., and Seppelt, R. D., 1990. *A Comparison of Airborne Alkaline Pollution Damage in Selected Lichens and Mosses at Casey Station, Wilkes Land, Antarctica*. In: Kerry, K. R., and Hempel, G. (Eds.), *Antarctic Ecosystems: Ecological Change and Conservation*, Springer-Verlag, Berlin, pp. 347-353.

- Azmi, O. R., and Seppelt, R. D., 1997. *Fungi in the Windmill Islands, continental Antarctica. Effect of temperature, pH and culture media on the growth of selected microfungi*. Polar Biology 18: 128-134.
- Azmi, O. R., and Seppelt, R. D., 1998. *The broad scale distribution of microfungi in the Windmill islands region, continental Antarctica*. Polar Biology 19: 92-100.
- Beyer, L., Pingpank, K., Bolter, M. and Seppelt, R. D., 1998. *Small-distance variation of carbon and nitrogen storage in mineral Antarctic Cryosols near Casey Station (Wilkes Land)*. Zeitschrift fur Pflanzenahrung Bodendunde 161: 211-220.
- Blight, D. F., 1975. *The Metamorphic Geology of the Windmill Islands Antarctica, Volume 1 and 2*, PhD thesis, University of Adelaide.
- Blight, D. F. and Oliver, R. L., 1997. *The metamorphic geology of the Windmill Islands Antarctica: a preliminary account*. Journal of the Geological Society of Australia, 24 (5): 239-262.
- Blight, D. F. and Oliver, R. L., 1982. *Aspects of the Geological history of the Windmill Islands, Antarctica*. In: Craddock, C. (Ed.), Antarctic Geoscience, University of Wisconsin Press, Madison, WI, pp. 445-454.
- Cowan, A. N., 1979. *Giant Petrels at Casey, Antarctica*. Australian Bird Watcher 8 (2): 66-67.
- Cowan, A. N., 1981. *Size variation in the Snow petrel (Pagodroma nivea)*. Notornis 28: 169-188.
- Giese, M., 1998. *Guidelines for people approaching breeding groups of Adélie penguins (Pygoscelis adeliae)*, Polar Record 34 (191): 287-292.
- Goodwin, I. D., 19893, *Holocene deglaciation, sea-level change, and the emergence of the Windmill Islands, Budd Coast, Antarctica*, Quaternary Research, 40: 70-80.
- Heatwole, H., Saenger, P., Spain, A., Kerry, E. and Donelan, J., 1989. *Biotic and chemical characteristics of some soils from Wilkes Land Antarctica*, Antarctic Science 1(3): 225-234.
- Hovenden, M. J., and Seppelt, R. D., 1995. *Exposure and nutrients as delimiters of lichen communities in continental Antarctica*, Lichenologist 27(6): 505-516.
- Melick, D. R., Hovenden, M. J., & Seppelt, R. D., 1994. *Phytogeography of bryophyte and lichen vegetation in the Windmill Islands, Wilkes land, Continental Antarctica*, Vegetatio 111: 71-87.
- Melick, D. R., and Seppelt, R. D., 1990. *Vegetation patterns in Relation to climatic and endogenous changes in Wilkes Land, continental Antarctica*, Journal of Ecology, 85: 43-56.
- Murray, M. D., and Luders, D. J., 1990. *Faunistic studies at the Windmill Islands, Wilkes Land, east Antarctica, 1959-80*. ANARE Research Notes 73, Antarctic Division, Kingston.

- Orton, M. N., 1963. *A Brief Survey of the fauna of the Windmill Islands, Wilkes Land, Antarctica*. The Emu 63 (1): 14-22.
- Paul, E., Stüwe, K., Teasdale, J., and Worley, B., 1995. *Structural and metamorphic geology of the Windmill Islands, east Antarctica: field evidence for repeated tectonothermal activity*. Australian Journal of Earth Sciences 42: 453-469.
- Roser, D. J., Melick, D. R. and Seppelt, R. D., 1992. *Reductions in the polyhydric alcohol content of lichens as an indicator of environmental pollution*. Antarctic Science 4 (4): 185-189.
- Roser, D. J., Melick, D. R., Ling, H. U. and Seppelt, R. D. 1992. *Polyol and sugar content of terrestrial plants from continental Antarctica*. Antarctic Science 4 (4): 413-420.
- Roser, D. J., Seppelt, R. D. and Nordstrom, 1994. *Soluble carbohydrate and organic content of soils and associated microbiota from the Windmill Islands, Budd Coast, Antarctica*. Antarctic Science 6 (1): 53-59.
- Smith, R. I. L., 1980. *Plant community dynamics in Wilkes Land, Antarctica*, Proceedings NIPR Symposium of polar biology, 3: 229-224.
- Smith, R. I. L., 1986. *Plant ecological studies in the fellfield ecosystem near Casey Station, Australian Antarctic Territory, 1985-86*. British Antarctic Survey Bulletin, 72: 81-91.
- Woehler, E. J., Slip, D. J., Robertson, L. M., Fullagar, P. J. and Burton, H. R., 1991. *The distribution, abundance and status of Adelie penguins *Pygoscelis adeliae* at the Windmill Islands, Wilkes Land, Antarctica*, Marine Ornithology 19(1): 1-18.
- Woehler, E. J., Penney, S. M., Creet, S. M. and Burton, H. R., 1994. *Impacts of human visitors on breeding success and long-term population trends in Adelie Penguins at Casey, Antarctica*, Polar Biology 14: 269-274.