



Management Plan

Antarctic Specially Protected Area No. 142 SVARTHAMAREN

Introduction

The Svarthamaren nunatak (71°53'16"S - 5°9'24"E to 71°56'10"S - 5°15'37"), part of the Mühlig-Hoffmanfjella in Dronning Maud Land, Antarctica, is protected as an Antarctic Special Protected Area (ASPA). The Area is approximately 7.5 km².

The nunatak holds one of the largest known seabird colony in the Antarctica. Between approx. 100,000 and 250,000 pairs of Antarctic petrels (*Thalassoica antarctica*) breed here annually and many non-breeders are present during breeding season. Svarthamaren is the largest petrel colony in Dronning Maud Land, where more than 60% of the entire Antarctic petrel population breed. In addition, between 1000 and 2000 pairs of snow petrel (*Pagodroma nivea*) and between 100 and 150 pairs of south polar skua (*Catharacta maccormicki*) are found here. This is one of the largest concentrations of South polar skuas in Antarctica.

Primary purpose: To avoid human induced changes to the population structure, composition and size of the seabird colonies present at the site, to allow for undisturbed research on the adaptations of the Antarctic petrel, snow petrel and south polar skua to the inland conditions in Antarctica.

1. Description of values to be protected

The Area was originally designated in Recommendation XIV-5 (1987, SSSI No. 23) after a proposal by Norway based on the following factors, which still give relevant grounds for designation:

- the fact that the colony of Antarctic petrel (*Thalassoica antarctica*) is one of the largest known inland seabird colony on the Antarctic continent
- the fact that the colony constitutes a large proportion of the known world population of Antarctic petrel
- the fact that the colony is an exceptional "natural research laboratory" providing for research on the Antarctic petrel, snow petrel (*Pagodroma nivea*) and south polar skua (*Catharacta maccormicki*), and their adaptation to breeding in the inland/interior of Antarctica

2. Aim and objectives

The aim of managing Svarthamaren is to:

- avoid human induced changes to the population structure, composition and size of the seabird colonies present at the site prevent unnecessary disturbance to the seabird colonies, as well as to the surrounding environment
- allow for undisturbed research on the adaptations of the Antarctic petrel, snow petrel and south polar skua to the inland conditions in Antarctica (Primary Research)
- allow access for other scientific reasons where the investigations will not damage the objectives of the bird research

The focus of the *Primary Research* in Svarthamaren ASPA is as follows:

- Improve the understanding of how natural as well as anthropogenic changes in the environment affect the spatial and temporal distribution of animal populations, and, furthermore, how such changes affect the interaction between key species in the Antarctic ecosystem.

3. Management activities

Management activities at Svarthamaren shall:

- ensure that the seabird colonies are adequately monitored, to the maximum extent possible by non-invasive methods
- allow erection of signs/posters, border markers, etc. in connection to the site, and ensure that these are serviced and maintained in good condition
- include visits as necessary to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate
- allow posting of warning signs informing about danger of rock avalanches to ensure safety of visitors in some areas within the Area

Any direct intervention management activity in the area must be subject to an environmental impact assessment before any decision to proceed is taken.



4. Period of Designation

Designated for an indefinite period.

5. Maps and Illustrations

Map A: Map of ASPA 142 Svarthamaren in Dronning Maud Land (showing location of Map B 71°53'16"S - 5°9'24"E to 71°56'10"S - 5°15'37"E). Map specifications:

Projection: Transverse Mercator, UTM zone 31S

Spheroid: WGS 1984
(EPSG code: 32731)

Additionally, the map is rotated 2,5 degrees to the left

Map B: Svarthamaren – ASPA 142. Boundaries and Main Seabird Concentrations (2014). Map specifications:

Projection: Transverse Mercator, UTM zone 31S

Spheroid: WGS 1984
(EPSG code: 32731)

Additionally, the map is rotated 2,1 degrees to the left

Map C: Aerial photo of Svarthamaren (1996, Norwegian Polar Institute)

6. Description of Area

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

The Svarthamaren ASPA is situated in Mühlig-Hoffmannfjella, Dronning Maud Land, stretching from approx. 71°53'16"S - 5°9'24"E to the north-east to approx. 71°56'10"S - 5°15'37"E in the south-east. The distance from the ice front is about 200 km. The Area covers approximately 7.5 km², and consists of the ice-free areas of the Svarthamaren nunatak, including the areas in the immediate vicinity of the ice-free areas naturally belonging to the nunatak (i.e. rocks). The Area is shown in Map B and C.

The Norwegian field station Tor is located in the Svarthamaren nunatak at lat. 71°53'22"S, 5°9'34"E, immediately outside the Area.

The main rock types in the Area are coarse and medium grained charnockites with small amounts of xenoliths. Included in the charnockitoids are banded gneisses, amphibolites and granites of the amphibolite facies mineralogy. The slopes are covered by decomposed feldspathic sand. The north-eastern side of the Svarthamaren nunatak is dominated by scree slopes (slope 31°-34°), extending 240 metres upwards from the base of the mountain at about 1600 metres above sea level. The major features of this area are two rock amphitheatres inhabited by breeding Antarctic petrels. It is this area which makes up the core of the protected site.

No continuous weather observations have been carried through in the Area, but prevalent air temperature has been observed to range between -5° and -15°C in January, with somewhat lower minimum temperatures in February.

The flora and vegetation at Svarthamaren are sparse compared with other areas in Mühlig-Hoffmannfjella and Gjelsvikfjella to the west of the site. The only plant species occurring in abundance, but peripherally to the most manured areas, is the foliose green alga, *Prasiola crista*. There are a few lichen species on glacier-borne erratics 1-2 km away from the bird colonies: *Candelariella hallettensis* (= *C. antarctica*), *Rhizoplaca* (= *Lecanora*) *melanophthalma*, *Umbilicaria* spp. and *Xanthoria* spp. Areas covered with *Prasiola* are inhabited by collembola ASPA No. 142: Svarthamaren *Cryptopygus sverdrupi*) and a rich fauna of mites (*Eupodes anghardi*, *Tydeus erebus*) protozoan, nematodes and rotifers. A shallow pond measuring about 20 x 30 m, lying below the middle and largest bird sub-colony at Svarthamaren, is heavily polluted by petrel carcasses, and supports a strong growth of a yellowish-green unicellular algae, *Chlamydomonas*, sp. No aquatic invertebrates have yet been recorded.

The colonies of breeding seabirds are the most conspicuous biological element in the Area. The north-eastern slopes of Svarthamaren are occupied by a densely populated colony of Antarctic petrels (*Thalassoica antarctica*) divided into three separate sub-colonies.

The total number of breeding pairs is estimated to be between 100,000 and 250,000 pairs, with large inter-annual fluctuations. In addition, approximately 1000-2000 pairs of snow petrels (*Pagodroma nivea*) and 100-150 pairs of south polar skuas (*Catharacta maccormicki*) breed in the area. The two main colonies of Antarctic petrels are situated in the two rocky amphitheatres. The main colonies of snow petrels are located in separate parts of the scree-slope that are characterised by larger rocks. The south polar skuas nest on the narrow strip of flat, snow-free ground below the scree-slopes.

The main concentrations of seabirds are indicated on Map B. Readers should, however, be aware that birds are also found in other areas than these densely populated areas.

Based on the Environmental Domains Analysis for Antarctica (2007, Morgan et al.) both Environments T-Inland continental geologic - and U-North Victoria Land geologic - are found to be represented at Svarthamaren (2009, Harry Keys, pers. comm.). Svarthamaren belongs to Antarctic Conservation Biogeographic Region 6 – Dronning Maud Land (ACBR 6) (2012, Aleks Terauds et al.). Antarctic Important Bird Area No. 112 Svarthamaren is identified within the Area.

6 (ii) Restricted zones within the Area

None

6 (iii) Location of structures within the Area

A weather station is located at the edge of the main petrel colony. During the austral winter only the mast (2 meters high) remains, while the station proper is installed during the summer season. The mast has not been permanently fixed into the ground and can easily be removed. With this exception there are no structures within the Area.

6 (iv) Location of other Protected Areas within close proximity

None



7. Permit Conditions

Permits may be issued only by appropriate national authorities as designated under Annex V, Article 7 of the Protocol on Environmental Protection to the Antarctic Treaty. Conditions for issuing a permit to enter the Area are that:

- the actions permitted are in accordance with this Management Plan
- the permit, or a copy, shall be carried within the area
- any permit issued shall be valid for a stated period
- a visit report is supplied to the authority named in the permit

7 (i) Access to and movement within the Area

Access to the area is restricted by the following conditions:

- no pedestrian routes are designated, but persons on foot shall at all times avoid disturbances to birds, and as far as possible also to the sparse vegetation cover in the Area
- vehicles are prohibited in the Area
- no flying of helicopters or other aircraft over the Area is allowed
- helicopter landings are not allowed within the boundaries of the ASPA. Landings associated with activities at the field station Tor should preferably take place at the north-eastern tip of the Svarthamaren nunatak
- the use of Remotely Piloted Aircraft Systems (RPAS) within the Area is not allowed. Exemptions can be granted for research and management activities provided these are not in conflict with the aim and objectives of this management plan. Such use of RPAS should be in accordance with the Environmental Guidelines for operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (ATCM Resolution 4 (2018)).

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

The following activities may be conducted within the Area in accordance with permit:

- primary biological research programs for which the area was designated
- essential management activities, including monitoring and inspection
- other research programs of a compelling scientific nature that will not interfere with the bird research in the Area

7 (iii) Installation, modification or removal of structures

No structures are to be erected in the Area, or scientific equipment installed, except for equipment essential for scientific or management activities, including Automatic Weather Stations (AWS) for scientific purposes. Such structures can only be installed as specified in a permit.

7 (iv) Location of field camps

No field camps should be established within the Area.

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

- no living animals or plant material shall be deliberately introduced into the Area
- no poultry products, including food products containing uncooked dried eggs, shall be taken into the Area
- no herbicides or pesticides shall be brought into the Area. Any other chemicals (including fuel), which may be introduced for a compelling scientific purpose specified in the permit, shall be removed from the Area before or at the conclusion of the activity for which the permit was granted
- all materials introduced shall be for a stated period, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction into the environment is minimized

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

Taking or harmful interference with native flora and fauna is prohibited, except in accordance with a permit issued in accordance with Annex II to the Protocol of Environmental Protection to the Antarctic Treaty. Where taking or harmful interference with animals is involved, *SCAR Code of Conduct for Use of Animals for Scientific Purposes in Antarctica* should be used as a minimum standard.

It is recommended that those responsible for the primary research in the Area should be consulted before a permit is granted for taking of birds for purposes not associated with the primary research. Studies requiring taking of birds for other purposes should be planned and carried through in such a manner that it will not interfere with the objectives of the bird research in the Area.

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

Material may be collected or removed from the Area only in accordance with a permit, except that debris of man-made origin should be removed and that dead specimens of fauna may be removed for laboratory examination.

7 (viii) Disposal of waste

All wastes, including human wastes, are to be removed from the Area.

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

Permits may be granted to enter the Area to carry out biological monitoring and site inspection activities which may involve the collection of small amounts of plant material or small numbers of animals for analysis or audit, to erect or maintain notice boards or to undertake protective measures.



7 (x) Requirements for reports

Parties should ensure that the principal holder of each permit issued submit to the appropriate authority a report describing the activities undertaken. Such reports should include, as appropriate, the information identified in the Visit Report form suggested by SCAR. Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary

descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of the Management Plan. Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, to be used both in any review of the management plan and in organizing the scientific use of the Area.

Bibliography

- Amundsen, T. 1995. Egg size and early nestling growth in the snow petrel. *Condor* 97: 345-351.
- Amundsen, T., Lorentsen, S.H. & Tveraa, T. 1996. Effects of egg size and parental quality on early nestling growth: An experiment with the Antarctic petrel. *Journal of Animal Ecology* 65: 545-555.
- Andersen, R., Sæther, B.E. & Pedersen, H.C. 1995. Regulation of parental investment in the Antarctic petrel *Thalassoica antarctica*: An experiment. *Polar Biology* 15:65-68
- Andersen, R., Sæther, B.-E. & Pedersen, H.C. 1993. Resource limitation in a long-lived seabird, the Antarctic petrel *Thalassoica antarctica*: a twinning experiment. *Fauna Norwegica, Serie C* 16:15-18
- Bech, C., Mehlum, F. & Haftorn, S. 1988. Development of chicks during extreme cold conditions: the Antarctic petrel *Thalassioica antarctica*. *Proceedings of the 19th International Ornithological Congress*:1447-1456
- Brooke, M.D., Keith, D. & Røv, N. 1999. Exploitation of inland-breeding Antarctic petrels by south polar skuas. *OECOLOGIA* 121: 25-31
- Carravieri A et al. (2018) Mercury exposure and short-term consequences on physiology and reproduction in Antarctic petrels *Environmental Pollution* 237:824-831
- Descamps S, Tarroux A, Lorentsen SH, Love OP, Varpe O, Yoccoz NG (2016) Large-scale oceanographic fluctuations drive Antarctic petrel survival and reproduction *Ecography* 39:496-505 doi:10.1111/ecog.01659
- Descamps S et al. (2016) At-Sea Distribution and Prey Selection of Antarctic Petrels and Commercial Krill Fisheries *PLoS One* 11:e0156968
- Descamps S, Tarroux A, Varpe Ø, Yoccoz NG, Tveraa T, Lorentsen SH (2015) Demographic effects of extreme weather events: snow storms, breeding success, and population growth rate in a long-lived Antarctic seabird *Ecol and Evol* 5:314-325
- Fauchald P et al. (2017) Spring phenology shapes the spatial foraging behavior of Antarctic petrels *Mar Ecol Prog Ser* 568:203-215
- Fauchald, P. & Tveraa, T. 2003. Using first-passage time in the analysis of area restricted search and habitat selection. *Ecology* 84:282-288
- Fauchald P. & Tveraa T. 2006. Hierarchical patch dynamics and animal movement pattern. *Oecologia*, 149, 383-395
- Haftorn, S., Beck, C. & Mehlum, F. 1991. Aspects of the breeding biology of the Antarctic petrel (*Thalassoica antarctica*) and krill requirements of the chicks, at Svarthamaren in Mühlig-Hofmannfjella, Dronning Maud Land. *Fauna Norwegica, Serie C. Sinclus* 14:7-22
- Haftorn, S., Mehlum, F. & Bech, C. 1988. Navigation to nest site in the snow petrel (*Pagodrom nivea*). *Condor* 90:484-486
- Lorentsen, S.H. & Røv, N. 1994. Sex determination of Antarctic petrels *Thalassoica antarctica* by discriminant analysis of morphometric characters. *Polar Biology* 14:143-145
- Lorentsen, S.H. & Røv, N. 1995. Incubation and brooding performance of the Antarctic petrel (*Thalassoica antarctica*) at Svarthamaren, Dronning Maud Land. *Ibis* 137: 345-351.
- Lorentsen, S.H., Klages, N. & Røv, N. 1998. Diet and prey consumption of Antarctic petrels *Thalassoica antarctica* at Svarthamaren, Dronning Maud Land, and at sea outside the colony. *Polar Biology* 19: 414-420.
- Lorentsen, S.H. 2000. Molecular evidence for extra-pair paternity and female-female pairs in Antarctic petrels. *Auk* 117:1042-1047
- Morgan, F., Barker, G., Briggs, C. Price, R., Keys, H. 2007. *Environmental Domains of Antarctica*, Landcare Research New Zealand Ltd
- Nygård, T., Lie, E., Røv, N., et al. 2001. Metal dynamics in an Antarctic food chain. *Mar. Pollut. Bull.* 42: 598-602
- Ohta, Y., Torudbakken, B.O. & Shiraishi, K. 1990. Geology of Gjelsvikfjella and Western Mühlig-Hofmannfjella, Dronning Maud Land, East Antarctica. *Polar Research* 8: 99-126.
- Steele, W.K., Pilgrim, R.L.C. & Palma, R.L. 1997. Occurrence of the flea *Glaciopsyllus antarcticus* and avian lice in central Dronning Maud Land. *Polar Biology* 18: 292-294.
- Schwaller MR, Lynch HJ, Tarroux A, Prehn B (2018) A continent-wide search for Antarctic petrel breeding sites with satellite remote sensing *Remote Sensing of Environment* 210:444-451
- Sæther, B.E., Lorentsen, S.H., Tveraa, T. et al. 1997. Size-dependent variation in reproductive success of a long-lived seabird, the Antarctic petrel (*Thalassoica antarctica*). *AUK* 114 (3): 333-340.
- Sæther, B.-E., Andersen, R. & Pedersen, H.C. 1993. Regulation of parental effort in a long-lived seabird: An experimental study of the costs of reproduction in the Antarctic petrel (*Thalassoica Antarctica*). *Behavioral Ecology and Sociobiology* 33:147-150
- Tarroux A et al. (2016) Flexible flight response to challenging wind conditions in a commuting Antarctic seabird: do you catch the drift? *Animal Behaviour* 113:99-112



Terauds, A., Chown, S. L., Morgan, F, Peat, H.J., Watts, D. J., Keys, H, Convey, P. , Bergstrom, D.M. 2012.

Conservation biogeography of the Antarctic. Diversity and Distributions: 1–16.

Tveraa, T., Lorentsen, S.H. & Saether, B.E. 1997. Regulation of foraging trips and costs of incubation shifts in the Antarctic petrel (*Thalassoica antarctica*). *Behavioral Ecology* 8: 465-469.

Tveraa, T. & Christensen, G.N. 2002. Body condition and parental decisions in the Snow Petrel (*Pagodroma nivea*). *AUK* 119: 266-270.

Tveraa, T., Sæther, B.E., Aanes, R. & Erikstad, K.E. 1998. Regulation of food provisioning in the Antarctic petrel; the importance of parental body condition and chick body mass. *Journal of Animal Ecology* 67: 699-704.

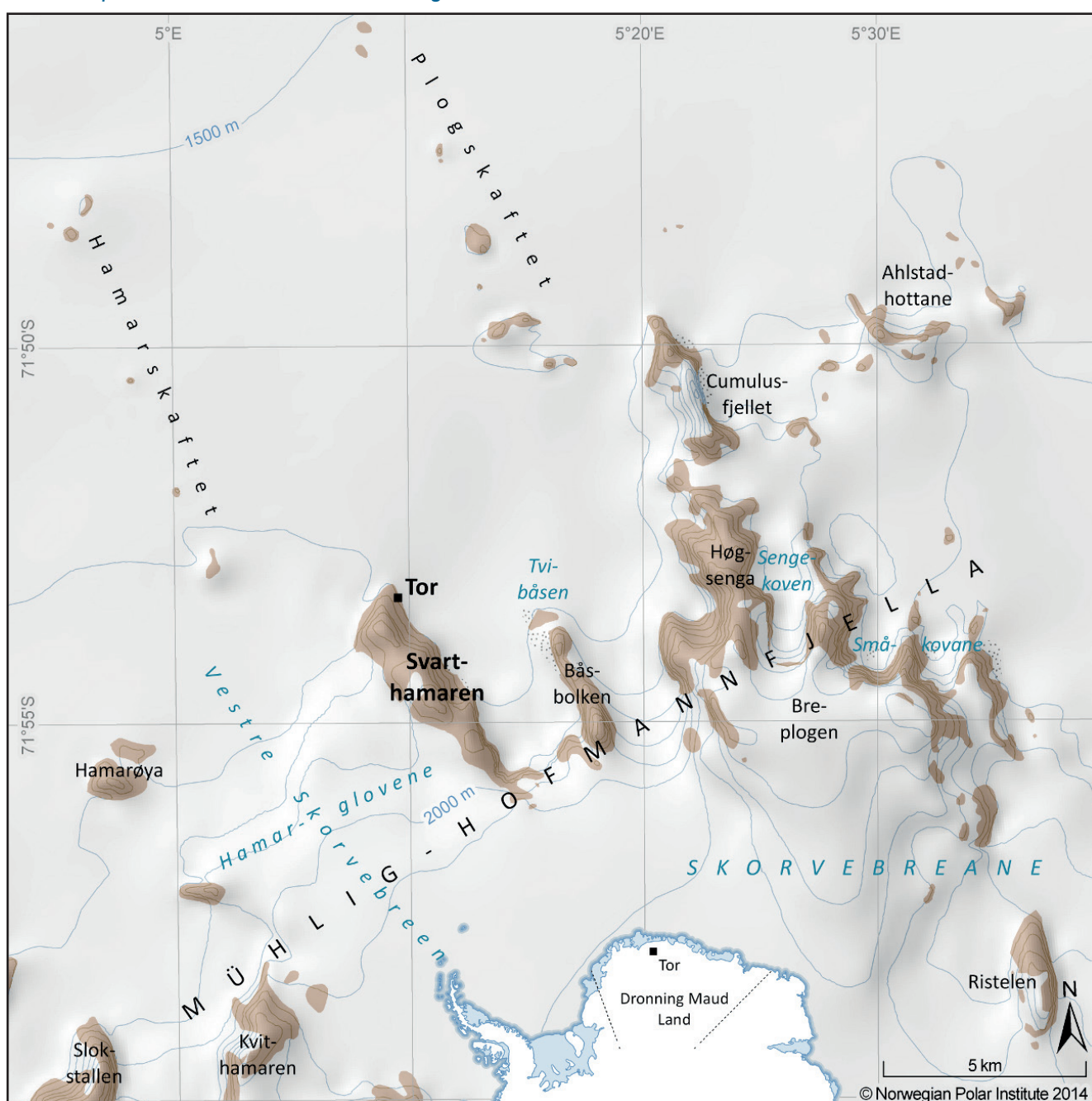
Tveraa, T., Sæther, B.-E., Aanes, R. & Erikstad, K.E. 1998. Body mass and parental decisions in the Antarctic petrel *Thalassoica antarctica*: how long should the parents guard the chick? *Behavioral Ecology and Sociobiology* 43:73-79

van Franeker JA, Gavrilov M, Mehlum F, Veit RR, Woehler EJ (1999) Distribution and abundance of the Antarctic Petrel *Waterbirds* 22:14-28 doi:10.2307/1521989

Varpe, Ø., Tveraa, T. & Folstad, I. 2004. State-dependent parental care in the Antarctic petrel: responses to manipulated chick age during early chick rearing. *Oikos*, in press ASPA No. 142: Svarthamaren

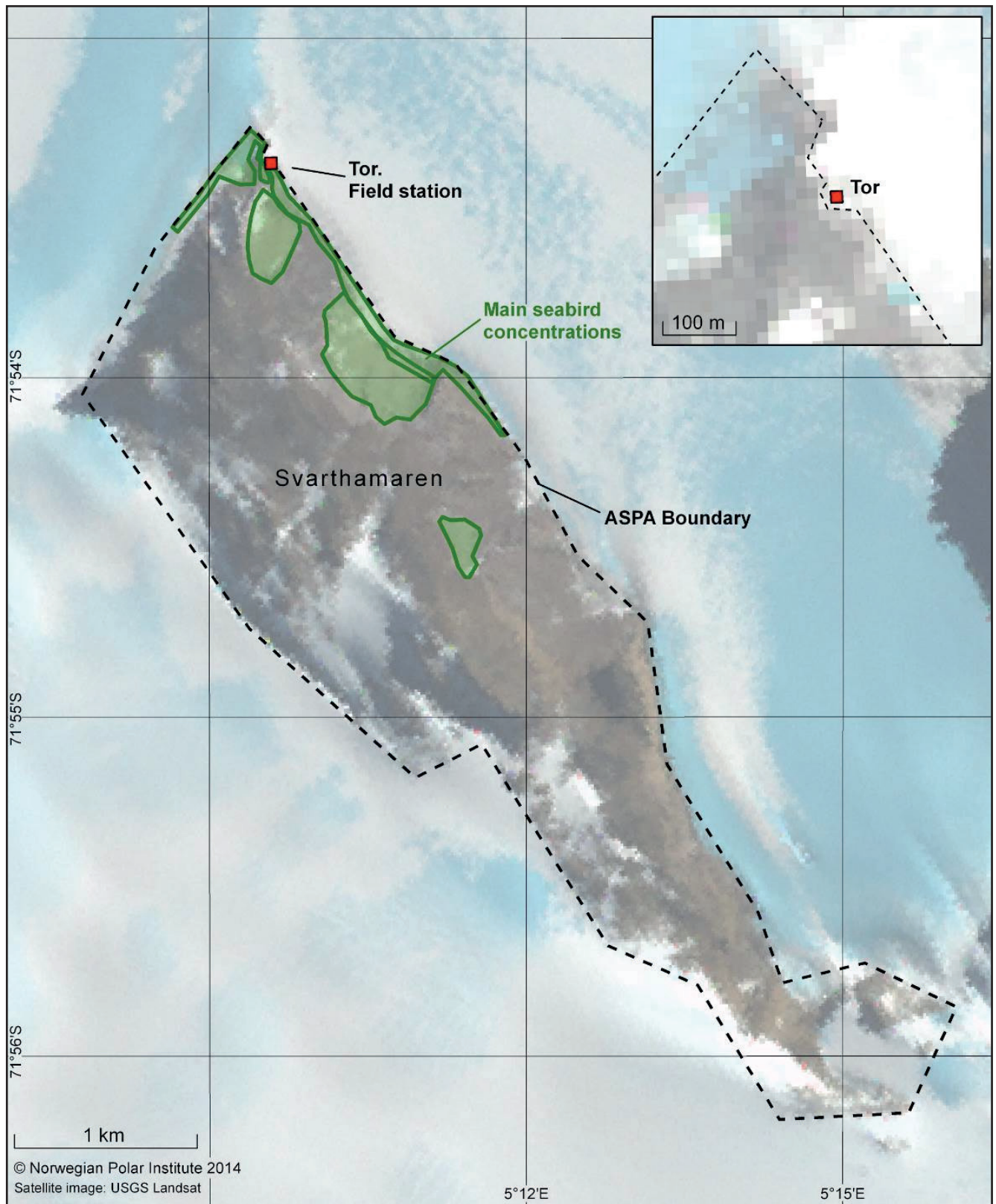
Weimerskirch H, Tarroux A, Chastel O, Delord K, Cherel Y, Descamps S (2015) Population-specific wintering distributions of adult south polar skuas over three oceans *Mar Ecol Prog Ser* 538:229-237

MAP A: Map of ASPA 142 Svarthamaren in Dronning Maud Land





Map B: Svarthamaren – ASPA No. 142. Boundaries and Main Seabird Concentrations (2014).





Map C: Aerial Photograph of Svarthamaren ASPA 142 (1996, Norwegian Polar Institute)

