

CONSERVATION MEASURE 91-02 (2004)
Protection of the Cape Shirreff CEMP site

Species	all
Area	48.1

1. The Commission noted that a program of long-term studies is being undertaken at Cape Shirreff and the San Telmo Islands, Livingston Island, South Shetland Islands, as part of the CCAMLR Ecosystem Monitoring Program (CEMP). Recognising that these studies may be vulnerable to accidental or wilful interference, the Commission expressed its concern that this CEMP site, the scientific investigations, and the Antarctic marine living resources therein be protected.
2. Therefore, the Commission considers it appropriate to accord protection to the Cape Shirreff CEMP site, as defined in the Cape Shirreff management plan.
3. Members shall comply with the provisions of the Cape Shirreff CEMP site management plan, which is recorded in Annex 91-02/A.
4. In accordance with Article X, the Commission shall draw this conservation measure to the attention of any State that is not a Party to the Convention and whose nationals or vessels are present in the Convention Area.

ANNEX 91-02/A

**MANAGEMENT PLAN FOR THE PROTECTION OF
CAPE SHIRREFF AND THE SAN TELMO ISLANDS,
SOUTH SHETLAND ISLANDS, AS A SITE INCLUDED
IN THE CCAMLR ECOSYSTEM MONITORING PROGRAM¹**

A. GEOGRAPHICAL INFORMATION

1. Description of the site:

- (a) Geographical coordinates: Cape Shirreff is a low, ice-free peninsula towards the western end of the north coast of Livingston Island, South Shetland Islands, situated at latitude 62°27'S, longitude 60°47'W, between Barclay Bay and Hero Bay. San Telmo Islands are the largest of a small group of ice-free rock islets, approximately 2 km west of Cape Shirreff.
- (b) Natural features: Cape Shirreff is approximately 3 km from north to south and 0.5 to 1.2 km from east to west. The site is characterised by many inlets, coves and cliffs. Its southern boundary is bordered by a permanent glacial ice barrier, which is located at the narrowest part of the cape. The cape is mainly an extensive rock platform, 46 to 83 m above sea level, the bedrock being largely covered by weathered rock and glacial deposits. The eastern side of the base of the cape has two beaches with a total length of about 600 m. The first is a boulder beach, the second of sand. Above this is a raised beach with mosses and lichens, crossed by melt-streams from the snow above. The extremity of the cape has a rocky barrier about 150 m long. The western side is formed by almost continuous

¹ As adopted at CCAMLR-XVIII (paragraphs 9.5 and 9.6), and revised at CCAMLR-XIX (paragraph 9.9).

cliffs 10 to 15 m high above an exposed coast with a few protected beaches. At the southwestern base of the cape is a small sandy and pebble beach approximately 50 m long.

The San Telmo Islands are located approximately 2 km west of Cape Shirreff, and are a group of ice-free, rocky islets. The east coast of San Telmo Island (the largest of the group) has a sandy and pebble beach (60 m) at the south end, separated from the northern sandy beach (120 m) by two irregular cliffs (45 m) and narrow pebble beaches.

- (c) Boundary markers: The boundaries of the Cape Shirreff CEMP Protected Area are identical to the boundaries of the Site of Special Scientific Interest No. 32, as specified by ATCM Recommendation XV-7. At present, there are no man-made boundary markers indicating the limits of the SSSI or established protected areas. The boundaries of the site are defined by natural features (i.e. coastlines, glacial margins) described in Section A.1(d).
- (d) Natural features that define the site: The Cape Shirreff CEMP Protected Area includes the entire area of the Cape Shirreff peninsula north of the glacier ice tongue margin, and most of the San Telmo Islands group. For the purposes of the CEMP protected area, 'the entire area' of Cape Shirreff and the San Telmo Islands group is defined as any land or rocks exposed at mean low tide within the area delimited by the map (Figure 3).
- (e) Access points: The Cape Shirreff part of the CEMP site may be entered at any point where pinniped or seabird rookeries are not present on or near the beach. Access to the island in the San Telmo group is unrestricted but should be at the least densely populated areas and cause minimal disturbance to the fauna. Access for other than CEMP research should avoid disturbing pinnipeds and seabirds (see Sections D.1 and D.2). Access by small boat or helicopter is recommended in most circumstances. Four helicopter landing areas are recommended including: (i) the south plain of Playa Yámana, which is situated on the Southwest coast of the cape; (ii) on the west coast of the cape, on the top plain of Gaviota Hill (10 x 20 m), near the monument erected to commemorate the officers and crew of the Spanish ship *San Telmo*; (iii) the wide plain, Paso Ancho, situated to the east of Cóndor Hill; and (iv) the top plain of Cóndor Hill. Recommended sites for landing small boats include: (i) the northern end of Half Moon beach, on the east coast of the cape; (ii) on the east coast, 300 m north of El Mirador, there is a deep channel which permits easy disembarkation, and (iii) the northern end of Playa Yámana on the west coast of the cape (during high tide conditions). There are no landing sites for fixed-wing aircraft.
- (f) Pedestrian and vehicular routes: Boats, helicopters, fixed-wing aircraft and land vehicles should avoid the site except for operations directly supporting authorised scientific activities. During these operations, boats and aircraft should travel routes that avoid or minimise disturbance of pinnipeds and seabirds. Land vehicles should not be used except to transport needed equipment and supplies to and from the field camps. Pedestrians should not walk through wildlife population areas, especially during the breeding season, or disturb other fauna or flora except as necessary to conduct authorised research.

- (g) Preferred anchorages: Numerous shoals and pinnacles are known to exist in the vicinity of Cape Shirreff and the San Telmo Islands. The detailed bathymetric chart No. 14301 produced by the Servicio Hidrográfico y Oceanográfico de la Armada de Chile (SHOA, 1994) provides guidance but those unfamiliar with local conditions at Cape Shirreff are advised to approach the area with caution. Three anchorages that have been used in the past are: (i) northwest coast – situated between Rapa-Nui Point on Cape Shirreff and the northern extremity of the San Telmo Islands; (ii) east coast – 2.5 km to the east of El Mirador, being alert for icebergs drifting in the area; and (iii) south coast – located about 4 km off the southern coast of Byers Peninsula to support ship-based helicopter operations. Organisation(s) conducting CEMP studies at the site can provide further details about sailing instructions pertaining to recommended anchorages (see Section E.2).
- (h) Location of structures within the site: During the 1991/92 austral summer, a fibreglass cabin for four people was installed by the Instituto Antártico Chileno (INACH) (Anonymous, 1992) in the El Mirador area. This area is on the cape's east coast, at the base of Condor Hill (near the site of the previous installation of the former Soviet Union). This site was chosen because of its accessibility by helicopter and boat, shelter from winds, good water supply and absence of seal or bird colonies. During the 1996/97 austral summer a US AMLR field camp was established approximately 50 m to the south of the INACH camp. The US camp is comprised of four small wood-constructed buildings (including an outhouse); all within 3 m of each other and jointed by wooden walkways. In February 1999 an emergency shelter/bird observation blind was constructed by the US program at the northern end of the Cape. Minor remains of a hut used in the past by the former Soviet Union as well as sparse evidence of a 19th century sealers' camp can be found near the camp site.
- (i) Areas within the site where activities are constrained: The protection measures specified in Section D apply to all areas within the Cape Shirreff CEMP Protected Area, as defined in Section A.1(d).
- (j) Location of nearby scientific, research, or refuge facilities: The nearest research facility to the site is Juan Carlos I Station (summer only) maintained by the Spanish government at South Bay, Livingston Island, (62°40'S, 60°22'W), approximately 30 km southeast of Cape Shirreff. The Chilean Station Arturo Prat is located on Greenwich Island (62°30'S, 59°41'W) approximately 56 km northeast of Cape Shirreff. Numerous scientific stations and research facilities (e.g. Argentina, Brazil, Chile, China, Korea, Poland, Russia, Uruguay) are located on King George Island, approximately 100 km northeast of Cape Shirreff. The largest of these facilities is Base Presidente Eduardo Frei Montalva (also formerly referred to as Base Teniente Rodolfo Marsh Martin), maintained by the Chilean government on the western end of King George Island (62°12'S, 58°55'W).
- (k) Areas or sites protected under the Antarctic Treaty System: Cape Shirreff and the San Telmo Islands are protected as a Site of Special Scientific Interest (No. 32) under the Antarctic Treaty System (see Section A.1(c)). Several other sites or areas within 100 km of Cape Shirreff are also protected under the Antarctic Treaty System: SSSI No. 5, Fildes Peninsula (62°12'S, 58°59'W); SSSI

No. 6, Byers Peninsula (62°38'S, 61°05'W); SSSI No. 35, Ardley Island, Maxwell Bay, King George Island (62°13'S, 58°56'W); Marine SSSI No. 35, Western Bransfield Strait (63°20'S to 63°35'S, 61°45'W to 62°30'W); and SPA No. 16, Coppermine Peninsula, Robert Island (62°23'S, 59°44'W). The Seal Islands CEMP Protected Area (60°59'14"S, 55°23'04"W) is located approximately 325 km northeast of Cape Shirreff.

2. Maps of the site:

- (a) Figures 1 and 2 show the geographical position of Cape Shirreff and the San Telmo Islands in relation to major surrounding features, including the South Shetland Islands and adjacent bodies of water.
- (b) Figure 3 identifies the boundaries of the site and provides details of specific locations within the vicinity of Cape Shirreff and the San Telmo Islands, including preferred vessel anchorages.

B. **BIOLOGICAL FEATURES**

1. Terrestrial: There is no information on soil biology of Cape Shirreff but it is likely that similar types of plants and invertebrates are found as at other sites in the South Shetland Islands (e.g. see Lindsey, 1971; Allison and Smith, 1973; Smith, 1984; Sömme, 1985). A moderate lichen cover (e.g. *Polytrichum alpestre*, *Usnea fasciata*) is present on rocks located in the higher geological platforms. In some valleys there are patches of moss and grass (e.g. *Deschampsia antarctica*).
2. Inland waters: There are several ephemeral ponds and streams located at Cape Shirreff. These form from melting snow, especially in January and February. Hidden Lake is the only permanent body of water on the cape, and it is located in the confluence of the slope of three hills: El Toqui, Pehuenche and Aymara. The lake's drainage supports the growth of moss banks along its northeast and southwest slopes. From the southwest slope a stream flows to the western coast at Playa Yámana. The lake's depth is estimated at two to 3 m and it is approximately 12 m long when fullest; the lake diminishes considerably in size after February (Torres, 1995). There are no known lakes or ephemeral ponds of significance on the San Telmo Islands.
3. Marine: No studies on littoral communities have been carried out. There is abundant macroalgae present in the intertidal zone. The limpet *Nacella concinna* is common, as elsewhere in the South Shetland Islands.
4. Seabirds: In January 1958, 2 000 pairs of chinstrap penguins (*Pygoscelis antarctica*) and 200 to 500 pairs of gentoo penguins (*P. papua*) were reported (Croxford and Kirkwood, 1979). In 1981 two unspecified penguin colonies had 4 328 and 1 686 individuals respectively (Sallaberry and Schlatter, 1983). A census in January 1987, produced estimates of 20 800 adult chinstrap penguins and 750 adult gentoo penguins (Shuford and Spear, 1987). Hucke-Gaete et al. (1997a) identified the presence of 31 breeding colonies for both species during 1996/97 and reported estimates of 6 907 breeding pairs of chinstrap penguins and 682 of gentoo penguins. A chick census developed in early February that same year gave a total of 8 802 chinstrap penguins and 825 gentoo penguins. The first of a continuing CCAMLR census of the colonies at

Cape Shirreff conducted on 3 December, 1997 recorded 7 617 and 810 breeding pairs of chinstrap and gentoo penguins, respectively (Martin 1998). Dominican gulls (*Larus dominicanus*), brown skuas (*Catharacta lönnerbergi*), Antarctic terns (*Sterna vittata*), blue-eyed shags (*Phalacrocorax atriceps*), cape petrels (*Daption capense*), Wilson's storm petrels (*Oceanites oceanicus*) and black-bellied storm petrel (*Fregetta tropica*) also nest on the cape. Giant petrels (*Macronectes giganteus*) are regular visitors during the austral summer (Torres, 1995).

5. Pinnipeds: Cape Shirreff is presently the site of the largest known breeding colony of the Antarctic fur seal (*Arctocephalus gazella*) in the South Shetland Islands. The first post-exploitation record of fur seals at Cape Shirreff was reported by O'Gorman (1961) in mid-February 1958 when 27 non-breeding adults were seen. Over the past 30 years, the colony has continued to increase in size (Aguayo and Torres, 1968, 1993; Bengtson et al., 1990, Torres, 1995; Huccke-Gaete et al., 1999). Annual censuses begun in 1991/92 by INACH scientists showed that pup production has increased every year except for 1997/98 when there was an apparent 14% decrease in the entire SSSI. From 1965/66 to 1998/99 the population increased at a rate of 19.8%. However, from 1992/93 to 1998/99 the growth rate has decreased to ca. 7% per year, with the last census in 1998/99 reporting 5 497 pups born on Cape Shirreff and 3 027 pups born on San Telmo Islands (Huccke-Gaete et al., 1999). Groups of non-breeding southern elephant seals (*Mirounga leonina*), Weddell seals (*Leptonychotes weddelli*), leopard seals (*Hydrurga leptonyx*) and crabeater seals (*Lobodon carcinophagus*) have been observed on the cape (O'Gorman, 1961; Aguayo and Torres, 1967; Bengtson et al., 1990; Torres et al., 1998). Additionally, observations of pup carcasses suggest breeding sites of southern elephant seals (Torres, 1995).

C. CEMP STUDIES

1. The presence at Cape Shirreff of both Antarctic fur seal and penguin breeding colonies, and of krill fisheries within the foraging range of these species, make this a critical site for inclusion in the ecosystem monitoring network established to help meet the objectives of the Convention on the Conservation of Antarctic Marine Living Resources. The purpose of the designation is to allow planned research and monitoring to proceed, while avoiding or reducing, to the greatest extent possible, other activities which could interfere with or affect the results of the research and monitoring program or alter the natural features of the site.
2. The following species are of particular interest for CEMP routine monitoring and directed research at this site: Antarctic fur seals, chinstrap penguins and gentoo penguins.
3. Long-term studies are under way to assess and monitor the feeding ecology, growth and condition, reproductive success, behaviour, and population dynamics of pinnipeds and seabirds that breed in the area. The results of these studies will be compared with environmental data, wildlife diseases, offshore sampling data, and fishery statistics to identify possible cause-effect relationships.
4. Chilean scientists have been conducting studies at the site for many years and in recent seasons they have developed studies specifically designed to contribute to CEMP. These studies have mainly focused on Antarctic fur seals, wildlife diseases and survey

of marine debris. Annual marine debris surveys began in 1985, with a baseline established in 1994 (e.g. Torres and Jorquera 1995, 1999). In 1996/97 US scientists began CEMP monitoring studies of Antarctic fur seals, chinstrap and gentoo penguins in conjunction with studies of offshore prey distribution and general oceanography (e.g. Martin, 1999).

5. Penguin parameters routinely monitored include trends in population size (A3), demography (A4), duration of foraging trips (A5), breeding success (A6), chick fledging weight (A7), chick diet (A8) and breeding chronology (A9). Studies of fur seals include foraging energetics, at-sea foraging locations using satellite-linked telemetry, diving behaviour, diet studies, duration of foraging trips (C1), reproductive success, and pup growth rates (C2).

D. PROTECTION MEASURES

1. Prohibited activities and temporal constraints:

- (a) Throughout the site at all times of the year: Any activities which damage, interfere with, or adversely affect the planned CEMP monitoring and directed research at this site are not permitted.
- (b) Throughout the site at all times of the year: Any non-CEMP activities are not permitted which result in:
 - (i) killing, injuring, or disturbing pinnipeds or seabirds;
 - (ii) damaging or destroying pinniped or seabird breeding areas; or
 - (iii) damaging or destroying the access of pinnipeds or seabirds to their breeding areas.
- (c) Throughout the site at defined parts of the year: Human occupation of the site during the period 1 June to 31 August is not permitted except under emergency circumstances.
- (d) In parts of the site at all times of the year: Building structures within boundaries of any pinniped or seabird colony is not permitted. For this purpose, colonies are defined as the specific locations where pinniped pups are born or where seabird nests are built. This prohibition does not pertain to placing markers (e.g. numbered stakes, posts, etc.) or situating research equipment in colonies as may be required to facilitate scientific research.
- (e) In parts of the site at defined parts of the year: Entry into any pinniped or seabird colonies during the period 1 September to 31 May is not permitted except in association with CEMP activities.

2. Prohibitions regarding access to and movement within the site:

- (a) Entry to the site at locations where pinniped or seabird colonies are present in densely populated areas is not permitted.

- (b) Aircraft overflight of the site is not permitted at altitudes less than 1 000 m unless the proposed flight plan has been reviewed in advance by the organisation(s) conducting CEMP activities at the site (see Section E.2). Aircraft overflight at altitudes below 200 m is not permitted.
 - (c) The use of land vehicles is not permitted except to transport needed equipment and supplies to and from the field camps.
 - (d) Pedestrians are not permitted to walk through wildlife population areas (e.g. colonies, resting areas, pathways), or to disturb other fauna or flora, except as necessary to conduct authorised research.
3. Prohibitions regarding structures:
- (a) Building structures other than those directly supporting authorised scientific research and monitoring programs or to house research personnel and their equipment is not permitted.
 - (b) Human occupation of these structures is not permitted during the period 1 June to 31 August (see Section D.1(c)).
 - (c) New structures are not permitted to be built within the site unless the proposed plans have been reviewed in advance by the organisation(s) conducting CEMP activities at the site (see Section E.2).
4. Prohibitions regarding waste disposal:
- (a) Landfill disposal of any materials is not permitted; all materials brought to the site are to be removed when no longer in use.
 - (b) Disposal of waste fuels, volatile liquids and scientific chemicals within the site is not permitted; these materials are to be removed from the site for proper disposal elsewhere.
 - (c) The open burning of any materials is not permitted (except for properly used fuels for heating, lighting or cooking).
5. Prohibitions regarding the Antarctic Treaty System:
- It is not permitted to undertake any activities in the Cape Shirreff CEMP Protected Area which are not in compliance with the provisions of: (i) the Antarctic Treaty, including the Agreed Measures for the Conservation of Antarctic Fauna and Flora and the Protocol on Environmental Protection, (ii) the Convention for the Conservation of Antarctic Seals, and (iii) the Convention for the Conservation of Antarctic Marine Living Resources.

E. COMMUNICATIONS INFORMATION

1. Organisation(s) appointing national representatives to the Commission.

- (a) Ministerio de Relaciones Exteriores
Direccion de Medio Ambiente (DIMA)
Catedral 1143, 2° Piso
Santiago
Chile

Telephone: +56 (2) 679 4720
Facsimile: +56 (2) 673 2152
Email: mlcarvallo@minrel.gov.cl

- (b) Bureau of Oceans and International Environmental and Scientific Affairs
US Department of State
Washington DC 20520
USA

Telephone: +1 (202) 647 3262
Facsimile: +1 (202) 647 1106

2. Organisation(s) conducting CEMP studies at the site.

- (a) Ministerio de Relaciones Exteriores
Instituto Antártico Chileno
Plaza Muñoz Gamero 1055
Punta Arenas
Chile

Telephone: +56 (61) 29 8100
Facsimile: +56 (61) 29 8149
Email: dtorres@inach.cl

- (b) US Antarctic Marine Living Resources Program
National Marine Fisheries Service, NOAA
Southwest Fisheries Science Center
PO Box 271
La Jolla CA 92038
USA

Telephone: +1 (858) 546 5601
Facsimile: +1 (858) 546 5608
Email: rennie.holt@noaa.gov

**CODE OF CONDUCT FOR THE CAPE SHIRREFF
CEMP PROTECTED AREA**

Investigators should take all reasonable steps to ensure that their activities, both in implementing their scientific protocols as well as in maintaining a field camp, do not unduly harm or alter the natural behaviour and ecology of wildlife. Wherever possible, actions should be taken to minimise disturbance of the natural environment.

Killing, capturing, handling and taking eggs, blood, or other biological samples from pinniped and seabirds should be limited to that necessary to characterise and monitor individual and population parameters that may change in detectable ways in response to changes in food availability or other environmental factors. Sampling should be done and reported in accordance with: (i) the Agreed Measures for the Conservation of Antarctic Fauna and Flora and the Protocol on Environmental Protection, (ii) the Convention for the Conservation of Antarctic Seals, and (iii) the Convention for the Conservation of Antarctic Marine Living Resources.

Geological, glaciological and other studies which can be done outside of the pinniped and seabird breeding season, and which will not damage or destroy pinniped or seabird breeding areas, or access to those areas, would not adversely affect the planned assessment and monitoring studies. Likewise, the planned assessment and monitoring studies would not be affected adversely by periodic biological surveys or studies of other species which do not result in killing, injuring, or disturbing pinnipeds or seabirds, or damage or destroy pinnipeds or seabird breeding areas or access to those areas.

BACKGROUND INFORMATION CONCERNING CAPE SHIRREFF

Prior to 1819, there were substantial colonies of fur seals, and possibly elephant seals, throughout the South Shetland Islands archipelago. Thereafter, Cape Shirreff was the scene of more intensive sealing activities until about 1825. Sealers' refuges were erected all around the western shores of Livingston Island, with those on the south coast being occupied mainly by American sealers and those on the north coast by British sealers. There were about 60 to 75 men living ashore at Cape Shirreff in January 1821 (Stackpole, 1955) and 95 000 skins were taken during the 1821/22 season (O'Gorman, 1963). There are ruins of at least 12 sealers' huts on the cape and the shoreline in several bays is littered with timbers and sections of wrecked sealers' vessels (Torres, 1995). The outcome of the sealing of the early 1820s was the extermination of fur seals from the entire region. Antarctic fur seals were not observed again in the South Shetland Islands until 1958, when a small colony was discovered at Cape Shirreff, Livingston Island (O'Gorman, 1961). The original colonisers probably came from South Georgia, where surviving fur seal colonies had substantially recovered by the early 1950s. Chilean studies at the site began in 1965 (e.g. Aguayo and Torres, 1967, 1968) and US studies began in 1996 (e.g. Martin, 1998). At present, the fur seal rookeries at Cape Shirreff and the San Telmo Islands are the largest in the South Shetland Islands.

HISTORY OF PROTECTION AT CAPE SHIRREFF

Cape Shirreff was designated in 1966 as Specially Protected Area (SPA) No. 11 by ATCM Recommendation IV-11 'on the grounds that the cape supports a considerable diversity of plant and animal life, including many invertebrates, that a substantial population of elephant seals (*Mirounga leonina*) and small colonies of Antarctic fur seals are found on the beaches and that the area is of outstanding interest'. The protection conferred on this site was successful in ensuring that Antarctic fur seals were not disturbed during the important early phases of their recolonisation. Subsequent to the site's designation as a SPA, the locally breeding population of Antarctic fur seals increased to a level at which biological research activities could be undertaken without threatening the continued recolonisation and population increase of this species.

Surveys during the mid-1980s to locate study sites for long-term monitoring of fur seal and penguin populations as part of the CCAMLR Ecosystem Monitoring Program (CEMP) indicated that Cape Shirreff would be an excellent site within the Antarctic Peninsula Integrated Study Region. To carry out such a monitoring program safely and effectively, a multi-year field camp for four to six researchers was needed within the area previously designated as SPA No. 11. This might have been considered inappropriate within a SPA and hence a proposal was made in 1988 to redesignate Cape Shirreff as a Site of Special Scientific Interest (SSSI). Additionally, it was proposed substantially to enlarge the site by the inclusion of the San Telmo Islands group, presently the location of the largest fur seal colony in the Antarctic Peninsula region.

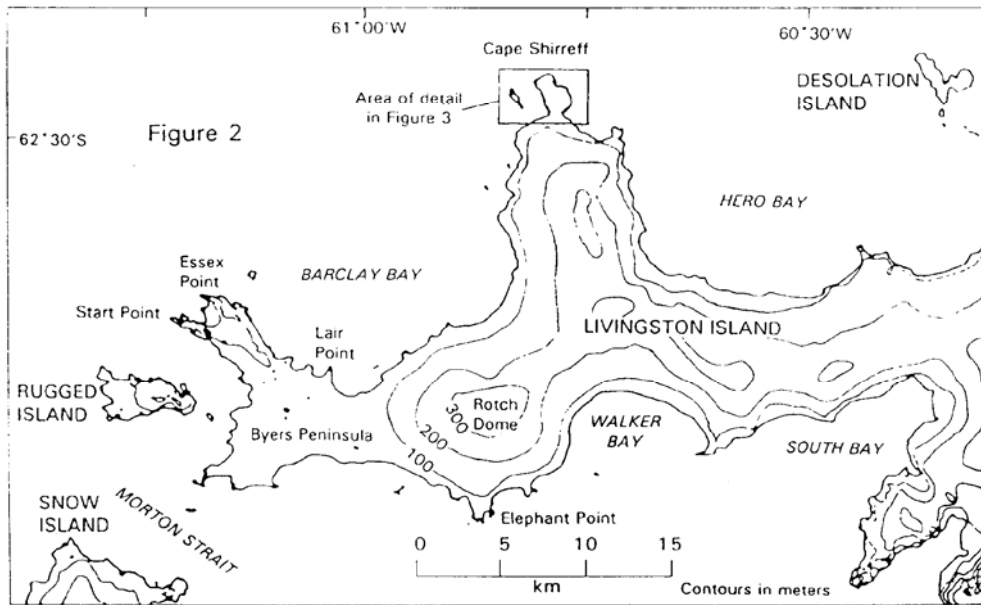
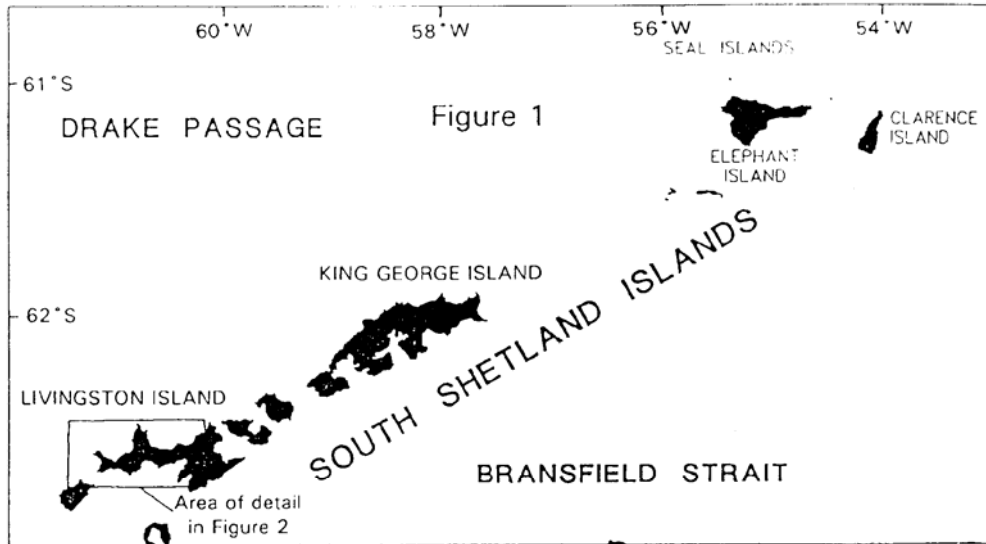
Cape Shirreff was redesignated in 1990 as SSSI No. 32 by Recommendation XV-7, which was adopted by the XVth Consultative Meeting of the Antarctic Treaty. It was understood that SSSI No. 32, Cape Shirreff, should be redesignated an SPA (in its enlarged form) if and when the long-term monitoring of fur seals and seabirds at the site should be ended.

Chilean and US scientists initiated CEMP studies at Cape Shirreff during the late 1980s, and have collaborated on predator studies at Cape Shirreff since 1996/97. To further protect the site from damage or disturbance that could adversely affect the long-term CEMP monitoring and directed research, in 1991 Cape Shirreff was proposed as a CEMP Protected Area.

BIBLIOGRAPHY

- Aguayo, A. and D. Torres. 1967. Observaciones sobre mamíferos marinos durante la Vigésima Comisión Antártica Chilena. Primer censo de pinípedos en las Islas Shetland del Sur. *Rev. Biol. Mar.*, 13 (1): 1–57.
- Aguayo, A. and D. Torres. 1968. A first census of Pinnipedia in the South Shetland Islands and other observations on marine mammals. In: *Symposium on Antarctic Oceanography, Santiago, Chile*. Scott Polar Research Institute, Cambridge: 166–168.
- Aguayo, A. and D. Torres. 1993. Análisis de los censos de *Arctocephalus gazella* efectuados en el Sitio de Especial Interés Científico N° 32, isla Livingston, Antártica. *Ser. Cient. INACH*, 43: 89–93.
- Allison, J.S. and R.I.L.-Smith. 1973. The vegetation of Elephant Island, South Shetland Islands. *Br. Antarct. Surv. Bull.*, 33 and 34: 185–212.
- Anonymous. 1992. Instalaciones del INACH en la Antártica. *Bol. Antart. Chileno*, 11 (1): 16.
- Bengtson, J.L., L.M. Ferm, T.J. Härkönen and B.S. Stewart. 1990. Abundance of Antarctic fur seals in the South Shetland Islands, Antarctica, during the 1986/87 austral summer. In: Kerry, K. and G. Hempel (Eds). *Antarctic Ecosystems, Proceedings of the Fifth SCAR Symposium on Antarctic Biology*. Springer-Verlag, Berlin: 265–270.
- Croxall, J.P. and E.D. Kirkwood. 1979. *The Distribution of Penguins on the Antarctic Peninsula and Islands of the Scotia Sea*. British Antarctic Survey, Cambridge: 186 pp.
- Hucke-Gaete, R., D. Torres and V. Vallejos. 1997. Entanglement of Antarctic fur seals *Arctocephalus gazella* in marine debris at Cape Shirreff and San Telmo Islets, Livingston Island, Antarctica: 1988–1977. *Ser. Cient. INACH*, 47: 123–135.
- Hucke-Gaete, R., D. Torres, A. Aguayo, J. Acevedo, and V. Vallejos. 1999. Trends of Antarctic fur seal populations at SSSI No. 32, Livingston Island, South Shetlands, Antarctica. Document *WG-EMM-99/16*. CCAMLR, Hobart, Australia.
- Laws, R.M. 1973. Population increase of fur seals at South Georgia. *Polar Record*, 16 (105): 856–858.
- Lindsay, D.C. 1971. Vegetation of the South Shetland Islands. *Br. Antarct. Surv. Bull.*, 25: 59–83.
- Martin, J. (Ed.). 1998. AMLR 1997/98 Field Season Report. Southwest Fisheries Science Center Administrative Report LJ-98-07: 161 pp.
- Martin, J. (Ed.). 1999. AMLR 1998/99 Field Season Report. Southwest Fisheries Science Center Administrative Report LJ-99-10: 158 pp.
- O’Gorman, F.A. 1961. Fur seals breeding in the Falkland Islands Dependencies. *Nature, Lond.*, 192: 914–916.

- O’Gorman, F.A. 1963. The return of the Antarctic fur seal. *New Scientist*, 20: 374–376.
- Sallaberry, M. and R. Schlatter. 1983. Estimación del número de pingüinos en el Archipiélago de las Shetland del Sur. *Ser. Cient. INACH*, 30: 87–91.
- SHOA, 1994. Carta N°14301, Escala 1: 15.000, cabo Shirreff, isla Livingston (Territorio Chileno Antártico). Servicio Hidrográfico y Oceanográfico de la Armada de Chile.
- Shuford, W.D. and L.B. Spear. 1987. Surveys of breeding penguins and other seabirds in the South Shetland Islands, Antarctica, January–February 1987. Report to the US National Marine Fisheries Service.
- Smith, R.I.L. 1984. Terrestrial plant biology. In: Laws, R.M. (Ed.). *Antarctic Ecology*. Academic Press.
- Sömme, L. 1985. Terrestrial habitats – invertebrates. In: Bonner, W.N. and D.W.H. Walton (Eds). *Antarctica*. Pergamon Press.
- Stackpole, E.A. 1955. The voyage of the Huron and the Huntress: the American sealers and the discovery of the continent of Antarctica. *The Marine Historical Association, Inc., Mystic, Conn.*, 29: 1–86.
- Torres, D. 1995. Antecedentes y proyecciones científicas de los estudios en el SEIC N° 32 y sitio CEMP ‘cabo Shirreff e islotes San Telmo’, isla Livingston, Antártica. *Ser. Cient. INACH*, 45: 143–169.
- Torres, D. and D. Jorquera. 1995. Línea base para el seguimiento de los desechos marinos en cabo Shirreff, isla Livingston, Antártica. *Ser. Cient. INACH*, 45: 131–141.
- Torres, D. and D. Jorquera. 1999. Synthesis of marine debris survey at Cape Shirreff, Livingston Island, during the Antarctic season 1998/99. Document *CCAMLR-XVIII/BG/39*. CCAMLR, Hobart, Australia.
- Torres, D., V. Vallejos, J. Acevedo, R. Hucke-Gaete and S. Zárate. 1998. Registros biológicos atípicos en cabo Shirreff, isla Livingston, Antártica. *Bol. Antárt. Chileno*, 17 (1): 17–19.



Figures 1 and 2: These maps show the general position of Cape Shirreff and the San Telmo Islands CEMP Protected Area (Figure 1) and the location of the CEMP Protected Area in relation to the northwestern portion of Livingston Island.

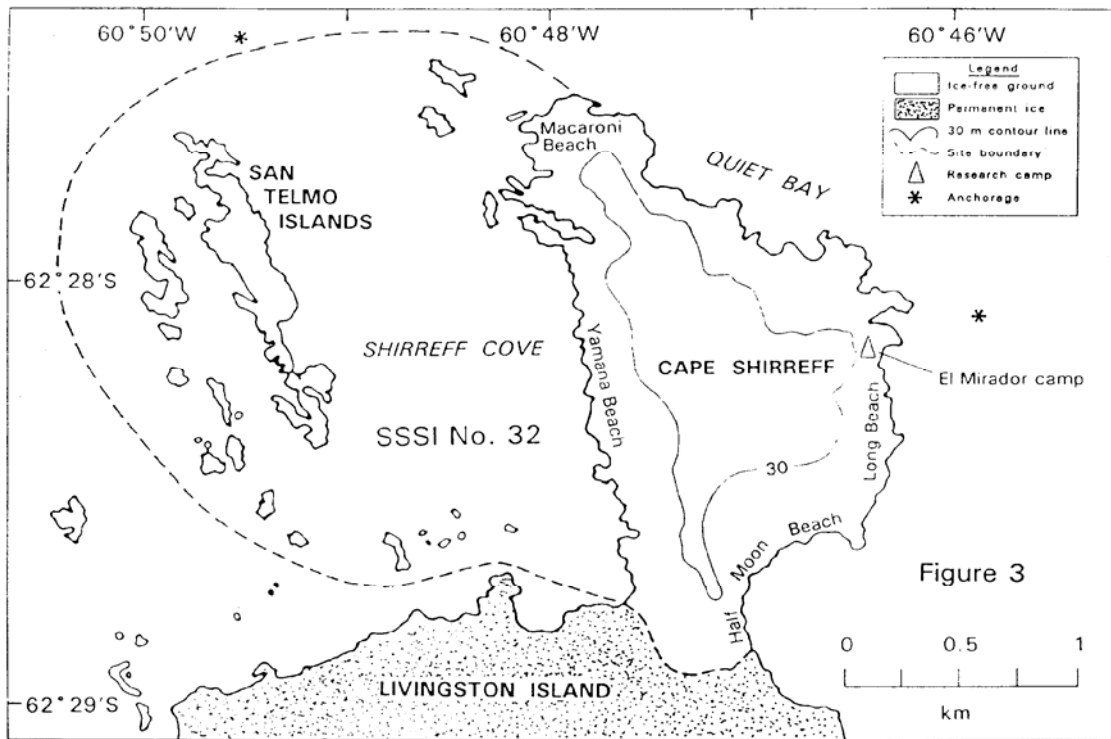


Figure 3: This map shows a detailed view of the Cape Shirreff and the San Telmo Islands CEMP Protected Area. Note that the boundaries of the CEMP Protected Area are identical to the boundaries of Site of Special Scientific Interest No. 32, which is protected under the Antarctic Treaty.