COMPENDIUM OF ANTARCTIC PENINSULA VISITOR SITES

2nd Edition

A Report to the United States ENVIRONMENTAL PROTECTION AGENCY

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Oceanites, Inc. greatly appreciates the assistance of the US Environmental Protection Agency in updating the *Compendium of Antarctic Peninsula Visitor Sites*, and the encouragement of Ms. Katherine Biggs, Mr. Joseph Montgomery, and Ms. Summer Allen of EPA's Office of Federal Activities, who helped facilitate this second edition. In addition, many thanks to the US Department of State, Oceans and Environment Section, and the UK Foreign and Commonwealth Office and Government of the British Antarctic Territory, for long-standing support and assistance provided to Oceanites' Antarctic Site Inventory. Oceanites extends additional thanks to the UK Royal Navy and the officers and personnel of *HMS Endurance*, and the International Association of Antarctic Tour Operators (IAATO) and its member companies, for their assistance with Antarctic Site Inventory logistics and data collection.

Also, Oceanites, Inc. gratefully acknowledges grant awards and funding for the Antarctic Site Inventory from the Tinker Foundation, Inc., Environmental Defense, Inc., the US National Science Foundation Office of Polar Programs, the US Environmental Protection Agency, the US Marine Mammal Commission, the UK Foreign and Commonwealth Office, South Atlantic and Antarctic Department, the Cincinnati Zoo and Biological Garden, and many private contributors.

There is special appreciation to an expert cohort whose advice and cooperation, since 1994, has greatly assisted the Antarctic Site Inventory: J. Jatko, P. Penhale, W. Trivelpiece, S. Trivelpiece, N. Gilbert, J. Croxall, R. Holt, R. Lewis-Smith, D. Elliot, J. Bengston, D.W.H. Walton, J. Shears, R. Downie, P. Prince, J. Thompson, J. M. Acero, C. A. Aguirre, J. Valencia, P. Clarkson, E. Woehler, J. Cooper, J. Heap, R. Headland, K. Crosbie, A. Nimon, and B. Stonehouse. Particular thanks are extended to N. Kennedy, US National Science Foundation Office of Polar Programs, for assistance in utilizing data regarding expedition ship visits in the Antarctic Peninsula.

Oceanites is grateful to Scott Polar Research Institute and Cambridge University Press for permission to reprint Inventory-related articles that have appeared in *Polar Record*.

At the end of the day, the basic raw materials for the *Site Compendium* are data sheets, field notes, and maps generated by field staff of the Antarctic Site Inventory, and the effort of these gritty, determined investigators is very deeply appreciated and valued: R. Dagit, S. Forrest, R. Polatty, L. Blight, W. Trivelpiece, S. Trivelpiece, B. Houston, L. Forrest, M. McOsker, J. Carlson, L. Gittings-Carlson, C. Edelen, M. Becker, and L. Shill.

DISCLAIMER

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* = Sites visited by Antarctic Site Inventory researchers, but not specifically listed in compilations of site visit data for 1989-2003, prepared by the U.S. National Science Foundation Office Of Polar Programs (NSF/OPP), based on site visit data submitted by tour operators.

** = Another site not listed in the NSF/OPP compilations for the 1995-96 season, but visited in January 1996 by Antarctic Site Inventory researchers. More recently, expedition tour ships have made zodiac landings at Bongrain Point (67˚43'S, 67˚48'W), which forms the S side of the entrance to Dalgliesh Bay on the W side of the Pourquoi-pas Island, and in Dalgleish Bay (67˚42'S, 67˚45'W) itself, both of which are close to where Inventory researchers visited in January 1996.

QUICK REFERENCE: PART II MAPS AND POSTERS

Introduction to the 2nd Edition

This revision updates the *Compendium of Antarctic Peninsula Visitor Sites* to cover all 82 sites visited/censused by the Antarctic Site Inventory in nine field seasons, November 1994 through February 2003. In total, through February 2003, Inventory researchers have made 503 visits to these 82 sites. This second edition describes 31 new sites, revises subarea maps and orientation maps, adds a large number of site-specific photodocumentation, updates analyses of visitor frequency and distribution, and adds analyses and discussion of each site's species diversity and sensitivity to potential environmental disruptions. Previous site descriptions have been updated and all site descriptions have been reformatted for consistency and, hopefully, easier use.

In essence, the *Compendium* summarizes achievements of the Antarctic Site Inventory since it began collecting data in November 1994. The Inventory was intended to assist the implementation of the 1991 Protocol on Environmental Protection to the Antarctic Treaty, which, among other things, requires *a priori* environmental impact assessments for all human activities. In addition, the Protocol calls for monitoring, as and when necessary, to ensure that activities do not have unacceptable environmental impacts. Reflecting the Protocol's focus on the "initial environmental reference state" of particular locations, the *Compendium* sets forth baseline descriptive information and biological data regarding Antarctic Peninsula visitor sites the Antarctic Site Inventory has censused and surveyed.

Ultimately, in terms of monitoring and potential environmental impacts, the challenge will be identifying changes to a site's baseline reference state and, if possible, determining whether any detected changes are naturally occurring or anthropogenic, perhaps caused by tourism or other human activities. Potential impacts may be short-term or long-term, immediate or cumulative. (Benninghoff and Bonner, 1985; Abbott and Benninghoff, 1990; Woehler & Croxall, 1996; Emslie, 1997; Hofman and Jatko, 2002).

For the first edition of the *Compendium*, Oceanites was tasked by the UK and US governments with examining future assessment and monitoring needs under the Protocol, correlation studies that would improve the utility of Antarctic Site Inventory-like censuses, and prospects for improved site-visit reporting and analyses by tour operators and governments. It was found that the Antarctic Site Inventory had succeeded in efforts to:

- begin characterizing these sites in a meaningful manner, utilizing opportunistic shipboard visits;
- examine the numbers of visitors to these sites, and their distribution;
- choose indicator species (penguins, flying birds, seals, moss communities) that provide some indication of environmental changes at visitor sites;
- examine parameters and key variables related to the status or long-term reproductive viability of these indicator species (nest counts, chick counts);
- collect these data in a repetitive, consistent, and rigorous fashion from visit-to-visit and season-to-season;
- establish prospective "control" colonies whose productivity may be compared to the productivity of colonies visited by tourists;
- use statistically rigorous census methods; and
- use expedition ships and other shipboard platforms to reach heavily visited sites repetitively and, especially, at key times within a season for collecting relevant biological data.

Flowing from these results and findings, Oceanites recommended that:

- Treaty Parties should address a "macro" approach insuring that a range of visitor sites are censused at 3-5 year intervals;
- Treaty Parties should address a "micro" approach insuring that key biological and other parameters at vulnerable sites are assessed and monitored annually;
- The Antarctic Site Inventory and related projects should conduct correlation studies to insure that key biological data are collected at appropriate times, in accordance with CCAMLR protocols;
- Tour operators and organizers should insure that accurate names of Antarctic

Peninsula visitor sites are used in their site visit reports; and

- To enhance the usefulness of breeding chronology data generated by the Antarctic Site Inventory and related projects, Treaty Parties should insure that annual compilations (and any subsequent analyses) of site visit reports delineate, in greater detail, the exact timing of all visits and, concomitantly, the precise intervals between all visits.

The recommendations were supported by four appendices:

- Appendix A presented site descriptions, census data, and in many cases orientation maps and photographs of the 51 sites examined by the Antarctic Site Inventory project between 1994-97;
- Appendix B assessed the Antarctic shipboard tourism industry in depth; particularly, which Peninsula sites are visited most frequently, how visits are distributed, and which sites have the most species diversity, are most diverse attractive to visitors, and are most sensitive to potentially adverse environmental consequences;
- Appendix C examined the project's methodology; particularly, the project's ability to reach heavily visited sites at key times for data collection during each field season and whether the project's census methods can be improved. The methodology for the project is delineated in full; and
- Appendix D presented a bibliography of authorities utilized in preparing this report. analyze visitor frequency and distribution.

The site descriptive information in Appendix A proved especially useful to various interests concerned with potential, direct and cumulative impacts in the Peninsula, and how such potential impacts might be minimized, if not avoided altogether. This broad cohort of interests includes diplomats, scientists, environmentalists, expedition tour operators, and expedition leaders and staff.

As a result of this broad, international interest, the US Environmental Protection Agency, in commissioning a second edition of the *Compendium*, tasked Oceanites with updating such site descriptive data and information as thoroughly as possible.

PART I of this second edition describes various aspects of the Antarctic Site Inventory project, including:

- Design, purpose, and goals
- Overall results
- Methodology and rationale

  Subareas

  Overview map of the Antarctic Peninsula

  Data categories

  Indicator species

  Census strategies

  Regular Inventory censuses

  Control and experimental colonies

  Logistics

  Long-term monitoring at key sites
- Recent publications
- Details regarding the nongovernmental education and science organization Oceanites, Inc. and the Antarctic Site Inventory

PART II contains descriptions of the 82 sites Inventory researchers have censused or surveyed from November 1994 through February 2003, arranged by subareas — the South Orkney Islands (SO), Elephant Island (EI),

Northeast Antarctic Peninsula (NE), South Shetland Islands (SH), Northwest Antarctic Peninsula (NW), and Southwest Antarctic Peninsula (SW).

For each site, the following aspects are noted:

- Location, history, prominent features (physical or topographical);
- Landing characteristics (if the site has been visited regularly);
- Antarctic Site Inventory effort, including a chronological listing of visits by Antarctic Site Inventory researchers, 1994-2003, and a summary of Inventory assessment and monitoring activity to date;
- Fauna (penguins, flying birds, wallowing seals) and flora (mosses, lichens, grass);
- Census data, if available;
- Conservation aspects, including sensitivity to potential environmental disruptions and suggestions ("pointers") for avoiding potential disruptions; and
- Visitation aspects, noting the numbers of zodiac landings and visitors participating in such landings, over 14 seasons, from the 1989 to 2003, and other, proximate visitor sites.

There are orientation maps of 19 sites the Inventory regularly censuses. For 12 sites, there is a supplementary, one-page poster with photodocumentation and noting suggested "pointers" for avoiding potential disruptions.

PART III describes the distribution and frequency in the Antarctic Peninsula of zodiac landings and visitors participating in such zodiac landings. The most frequently visited sites, in terms of numbers of zodiac landings and participating visitors, are identified.

Appendix 4 presents distribution and frequency data for all sites that have experienced zodiac landings in the 1989-2003 period, and notes which activities other than zodiac landings have occurred at each site. This appendix also lists data regarding number of sites visited for the first time each season, and sites experiencing only one zodiac visit per season.

PART IV describes the effort of the Antarctic Site Inventory to assess the species diversity of all sites that are visited, as well as each site's sensitivity to potential environmental disruptions. Appendix 7 presents the results of this assessment for all 82 sites the Antarctic Site Inventory has visited.

PART V discusses Oceanites' previous recommendations (in the first edition of the *Compendium*), and whether, five years later, these concerns regarding future assessment and monitoring needs, fine-tuning the Inventory's database, and improving site-visit reporting have been addressed.

A complete Bibliography of references is provided.

PART I

ANTARCTIC
SITE
INVENTORY

DESIGN, PURPOSE AND GOALS

The major impetus for the Antarctic Site Inventory project is the 1991 Environmental Protocol to the Antarctic Treaty, which entered into force, as a matter of international law, in 1994. There had been no previous effort to catalogue the biological and physical resources of Antarctic Peninsula zodiac landing sites. Thus, an overarching goal is to establish baselines of site-descriptive information and biological data, which will enable environmental changes to be detected and potential causes for such changes to be examined.

Following a year of examining methodologies and logistics, the Antarctic Site Inventory began fieldwork in November 1994; specifically, the project intended to:

- determine whether opportunistic visits can be used to effectively and economically detect possible visitor-caused changes in the physical features, flora, and fauna of sites in the Antarctic Peninsula being visited repeatedly by ship-based tourists;
- begin collecting baseline information necessary to detect possible changes in the physical and biological variables being monitored; and
- determine how best to minimize or avoid possible environmental impacts of tourism and non-governmental activities in the Antarctic Peninsula area.

Theoretically, these data and information will: allow direct and cumulative impacts to be detected; ensure that the best scientific data and descriptive information are available should Antarctic Treaty Parties determine that site management is necessary and appropriate; contribute to a better understanding of biological processes in the entire Antarctic Peninsula region; and suggest additional biological research that might be accomplished with respect to penguins and shags.

From the Inventory's inception, it was intended that collected data and information be made publicly and routinely available, thus assisting visitors in determining how best to minimize, or potentially avoid, environmental impacts.

Any potential, management efforts by Antarctic Treaty countries inevitably require a consideration of whether or not any detected impacts, direct or cumulative, are naturally occurring, perhaps caused by tourism or other human activities, or result from other causes (Benninghoff and Bonner, 1985; Abbott and Benninghoff, 1990).

RESULTS

Through February 2003, the Inventory has made 503 visits/surveys throughout the Antarctic Peninsula, involving 82 different locations (see Table 1). There have been repetitive visits to all of the visitor sites that are most heavily visited by expedition tourists, and to all sites which exhibit the most species diversity and which are most prone to potential environmental disturbance from human visitors (Naveen, 1997a; Naveen, et. al: 2000, 2001).

Table 1: Cumulative list of visited by Antarctic Site Inventory researchers, by Antarctic Site Inventory subarea, 1994-2003

		Acronym	Latitude / Longitude
	SOUTH ORKNEY ISLANDS SUBAREA (SO)		
1	Amphibolite Point	AMPH	60˚ 41' S 45˚ 21' W
2	Gibbon Bay	GIBB	60˚ 39' S 45˚ 11' W
3	Orcadas Station Vicinity	ORCA	60˚ 46' S 44˚ 40' W
	ELEPHANT ISLAND SUBAREA (EI)		
4	Point Lookout	LOOK	61˚ 17' S 55˚ 13' W
5	Point Wild	WILD	61˚ 06' S 54˚ 52' W
	NORTHEAST PENINSULA SUBAREA (NE)		
6	Bald Head	BALD	63˚ 38'S 57˚ 36' W
7	Brown Bluff	BROW	63˚ 32' S 56˚ 55' W
8	Camp Hill *	HILL	63˚ 41' S 57˚ 52' W

		Acronym	Latitude / Longitude
9	Cape Burd	BURD	63˚ 39’ S 57˚ 09’ W
10	Crystal Hill	CRYS	63˚ 39’ S 57˚ 54’ W
11	d’Urville Monument	DURV	63˚ 31’ S 58˚ 11’ W
12	Devil Island	DEVI	63˚ 48’ S 57˚ 17’ W
13	Eagle Island	EAGL	63˚ 40’ S 57˚ 29’ W
14	Eden Rocks *	EDEN	63˚ 29’ S 55˚ 40’ W
15	False Head Point, Vega Island	FALS	63˚ 55’ S 57˚ 20’ W
16	Heroína Island	HERO	63˚ 24’ S 54˚ 36’ W
17	Hope Bay	HOPE	63˚ 23’ S 57˚ 00’ W
18	Jade Point *	JADE	63˚ 36’ S 57˚ 35’ W
19	Jonassen Island *	JONA	63˚ 33’ S 56˚ 40’ W
20	Madder Cliffs, Joinville Is.	MADD	63˚ 18’ S 56˚ 29’ W
21	Marambio Station Vicinity	MARA	64˚ 13’ S 56˚ 38’ W
22	Paulet Island	PAUL	63˚ 35’ S 55˚ 27’ W
23	Penguin Point, Seymour Island	PEPO	64˚ 19’ S 56˚ 43’ W
24	Persson Island	PERS	64˚ 13’ S 58˚ 24’ W
25	Point Obelisk, James Ross Island	OBEL	64˚ 08’ S 58˚ 27’ W
26	Rum Cove, James Ross Island	RUMC	64˚ 06’ S 58˚ 25’ W
27	Snow Hill Island	SNOW	64˚ 28’ S 57˚ 12’ W
28	Tay Head, Joinville Island	TAYH	63˚ 21’ S 55˚ 34’ W
29	View Point	VIEW	63˚ 33’ S 57˚ 22’ W
	SOUTH SHETLAND ISLANDS SUBAREA (SH)		
30	Aitcho Islands	AITC	62˚ 24’ S 59˚ 47’ W
31	Arctowski Station Vicinity, King George Island	ARCT	62˚ 15’ S 58˚ 51’ W
32	Baily Head/Rancho Point, Deception Island	BAIL	62˚ 58’ S 60˚ 30’ W
33	Ferraz Station Vicinity, King George Island	FERR	62˚ 10’ S 58˚ 48’ W
34	Fort Point, Greenwich Is.	FORT	62˚ 43’ S 59˚ 34’ W
35	Half Moon Island	HALF	62˚ 36’ S 59˚ 55’ W
36	Hannah Point, Livingston Island	HANN	62˚ 39’ S 60˚ 37’ W
37	Jubany Station, King George Island	JUBA	62˚ 14’ S 58˚ 38’ W
38	Mitchell Cove, Robert Island	MITC	62˚ 24’ S 59˚ 40’ W
39	Pendulum Cove, Deception Island	PEND	62˚ 56’ S 60˚ 36’ W
40	Penguin Island	PENG	62˚ 06’ S 57˚ 54’ W
41	Robert Point, Robert Island	ROBE	62˚ 28’ S 59˚ 23’ W
42	Telefon Bay, Deception Island	TELE	62˚ 56’ S 60˚ 40’ W
43	Turret Point, King George Island	TURR	62˚ 05’ S 57˚ 55’ W
44	Vapour Col, Deception Island	VAPO	62˚ 59’ S 60˚ 44’ W
45	Whaler’s Bay, King George Island	WHAL	62˚ 59’ S 60˚ 34’ W
46	Yankee Harbor, Livingston Island	YANK	62˚ 32’ S 59˚ 47’ W
	NORTHWEST PENINSULA SUBAREA (NW)		
47	Almirante Brown Station Vicinity, Paradise Bay	ALMI	64˚ 53’ S 62˚ 52’ W
48	Astrolabe Island	ASTR	63˚ 17’ S 58˚ 40’ W
49	Bernardo O’Higgins Station	BERN	63˚ 19’ S 57˚ 54’ W
50	Cuverville Island	CUVE	64˚ 41’ S 62˚ 38’ W
51	Danco Island	DANC	64˚ 44’ S 62˚ 37’ W
52	Dorian Bay/Damoy Point	DORI	64˚ 49’ S 63˚ 30’ W
53	Foyn Harbor, Enterprise Is.	FOYN	64˚ 33’ S 62˚ 01’ W
54	Georges Point, Rongé Island	RONG	64˚ 40’ S 62˚ 40’ W
55	Gourdin Is.	GOUR	63˚ 12’ S 57˚ 18’ W
56	Gouvernøren Harbor	GOUV	64˚ 32’ S 62˚ 00’ W
57	Hydrurga Rocks	HYDR	64˚ 08’ S 61˚ 37’ W
58	Jougla Point, Port Lockroy, Wiencke Island	LOCK	64˚ 49’ S 63˚ 30’ W
59	Lecointe Island *	LECO	64˚ 16’ S 62˚ 03’ W
60	Melchior Islands	MELC	64˚ 19’ S 62˚ 57’ W
61	Mikklesen Harbor, Trinity Island	MIKK	63˚ 54’ S 60˚ 47’ W

		Acronym	Latitude / Longitude
62	Neko Harbor, Andvord Bay	NEKO	64˚ 50’ S 62˚ 33’ W
63	Orne Islands	ORNE	64˚ 40’ S 62˚ 40’ W
64	Portal Point	POPT	64˚ 30’ S 61˚ 46’ W
65	Priest Island (Goetschy Island), Peltier Channel *	PRIE	64˚ 52’ S 63˚ 31’ W
66	Py Point	PYPT	64˚ 53’ S 63˚ 37’ W
67	Siffrey Point	SIFF	63˚ 13’ S 57˚ 13’ W
68	Sprightly Islands Vicinity	SPRI	64˚ 18’ S 61˚ 03’ W
69	Waterboat Point, Paradise Bay	WATE	64˚ 49’ S 62˚ 51’ W
	SOUTHWEST PENINSULA SUBAREA (SW)		
70	Blaicklock Island	BLAI	67˚ 33’ S 67˚ 04’ W
71	Booth Island	BOOT	65˚ 05’ S 64˚ 00’ W
72	Detaille Island	DETA	66˚ 52’ S 66˚ 48’ W
73	Fish Islands	FISH	66˚ 02’ S 65˚ 25’ W
74	McCall Point	MCAL	67˚ 02’ S 66˚ 38’ W
75	Petermann Island	PETE	65˚ 10’ S 64˚ 10’ W
76	Pléneau Island	PLEN	65˚ 06’ S 64˚ 04’ W
77	Pourquoi-pas Island *	POUR	67˚ 43’ S 67˚ 44’ W
78	Prospect Point	PROS	66˚ 0’1 S 65˚ 21’ W
79	Shumskiy Cove	SHUM	67˚ 04’ S 67˚ 21’ W
80	Stonington Island	STON	68˚ 11’ S 67˚ 00’ W
81	Vernadsky Station	VERN	65˚ 15’ S 64˚ 16’ W
82	Yalour Islands	YALO	65˚ 14’ S 64˚ 10’ W

* = Site visited by Antarctic Site Inventory researchers, but not specifically listed in compilations of site visit data for 1989-2003, prepared by the U. S. National Science Foundation Office Of Polar Programs (NSF/OPP), based on site visit data submitted by tour operators.

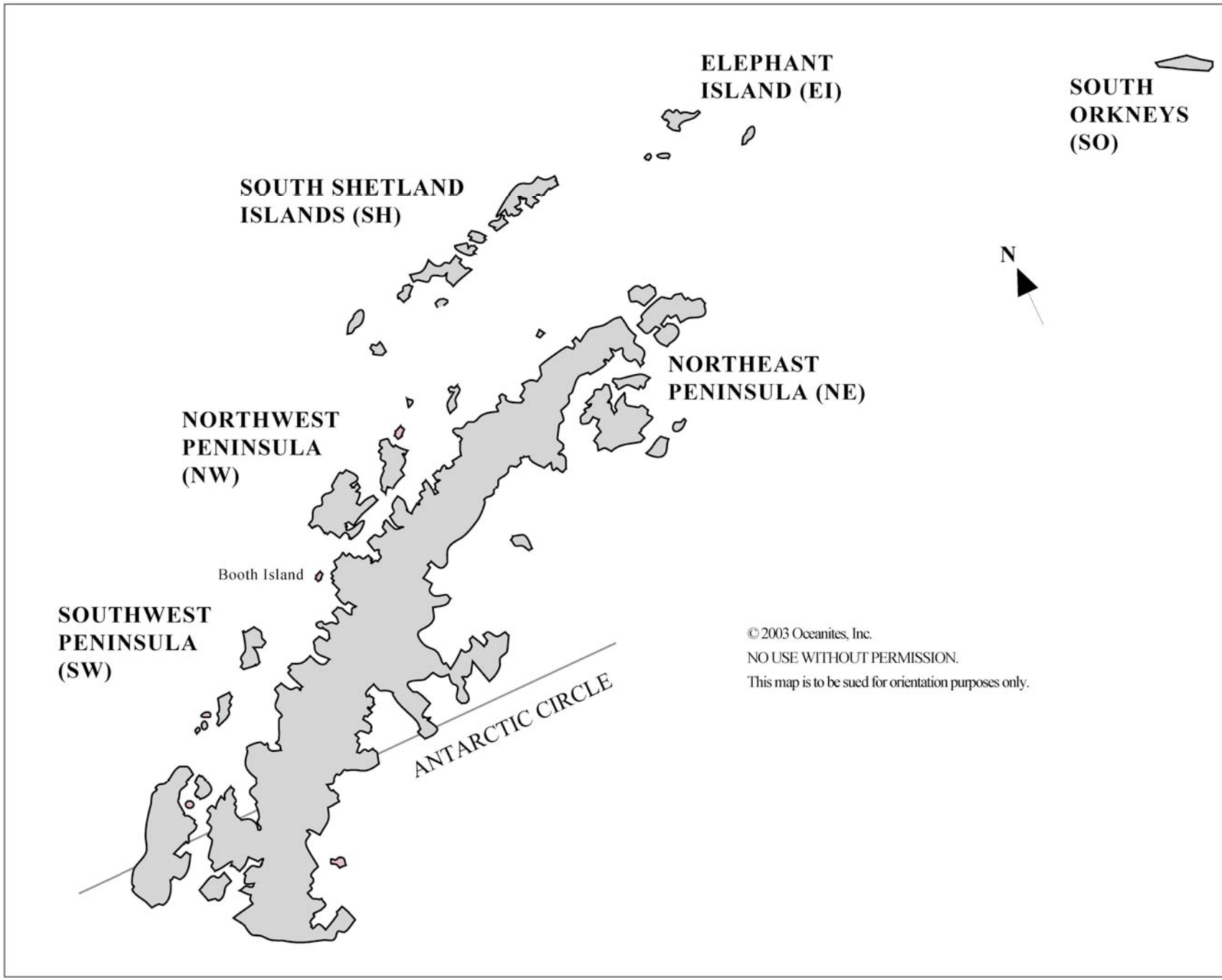
The Inventory has demonstrated that opportunistic, well-timed visits by trained researchers have proved an resourceful, cost-effective means of characterizing sites and for collecting relevant biological data (Naveen, 1997a; Naveen, et. al: 2000, 2001). This has been accomplished by relying upon expedition tour vessels and the United Kingdom ice patrol vessel *HMS Endurance* for logistics support.

SUBAREAS

The Inventory divides the Antarctic Peninsula into six subareas:

- South Orkney Islands, including Laurie, Coronation, and Signy Islands (SO);
- Elephant Island and nearby islands (EI);
- Northeast Antarctic Peninsula/northwestern Weddell Sea (NE), from Cape Dubouzet (63˚16’S 64˚00’W) to James Ross Island;
- South Shetland Islands, including Deception, Low, and Smith Islands (SH);
- Northwest Antarctic Peninsula (NW), from Cape Dubouzet (63˚16’S 64˚00’W) to north end of the Lemaire Channel; and
- Southwest Antarctic Peninsula (SW), from the north end of the Lemaire Channel to the northern part of Marguerite Bay (68˚18’S 67˚11’W).

The following seven maps depict the Antarctic Site Inventory study area and these six subareas:


ELEPHANT
ISLAND (EI)
SOUTH
ORKNEYS
(SO)
SOUTH SHETLAND
ISLANDS (SH)
N
NORTHEAST
PENINSULA (NE)
NORTHWEST
PENINSULA
(NW)
Booth Island
SOUTHWEST
PENINSULA
(SW)
ANTARCTIC CIRCLE
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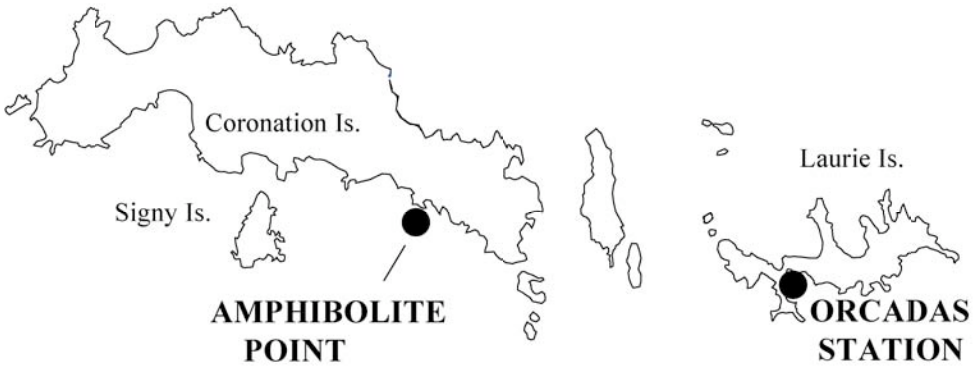
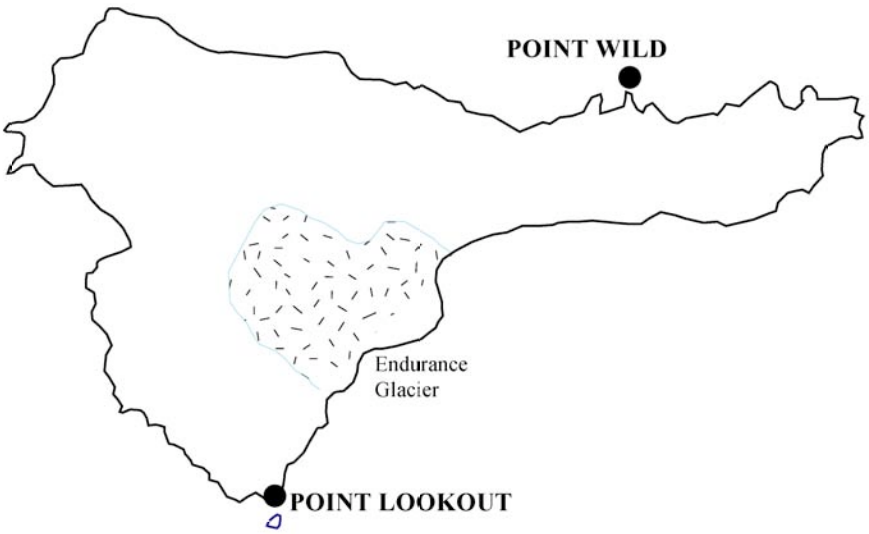
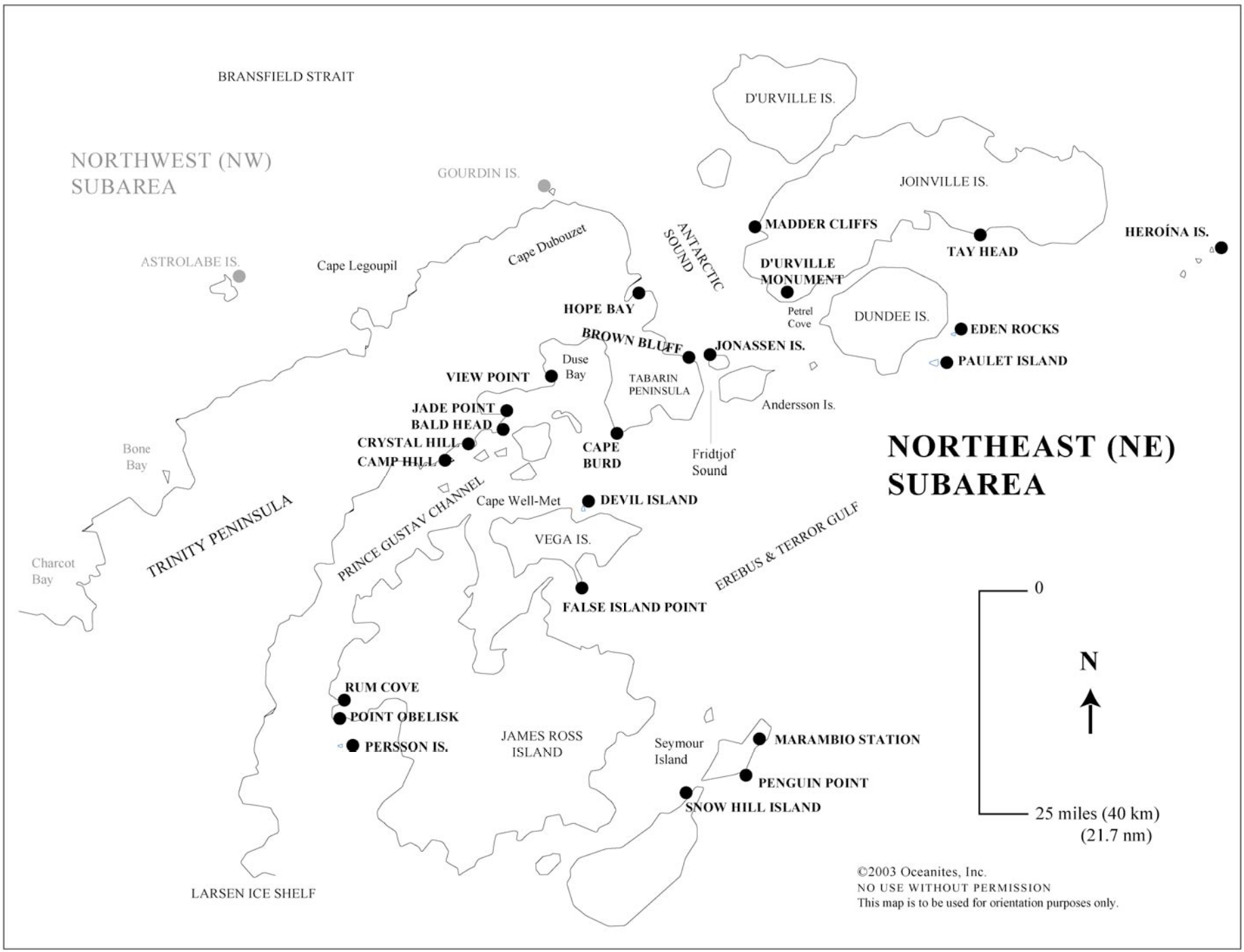
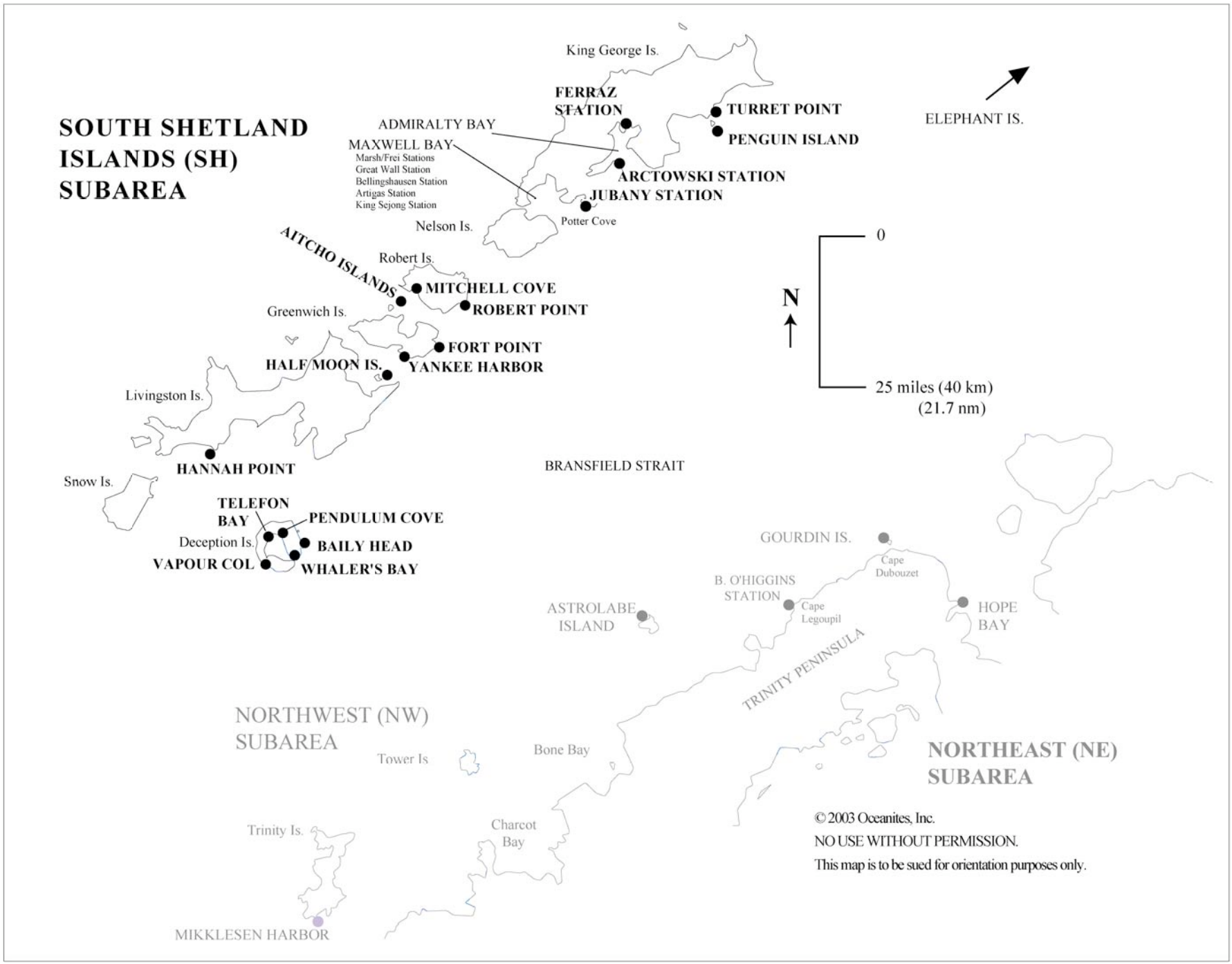
SOUTH ORKNEY ISLANDS



ELEPHANT ISLAND






SOUTH SHETLAND ISLANDS (SH) SUBAREA
King George Is.
FERRAZ STATION
TURRET POINT
PENGUIN ISLAND
ELEPHANT IS.
ADMIRALTY BAY
MAXWELL BAY
Marsh/Frei Stations
Great Wall Station
Bellingshausen Station
Artigas Station
King Sejong Station
ARCTOWSKI STATION
JUBANY STATION
Potter Cove
Nelson Is.
AITCHO ISLANDS
Robert Is.
MITCHELL COVE
ROBERT POINT
Greenwich Is.
FORT POINT
YANKEE HARBOR
HALF MOON IS.
Livingston Is.
HANNAH POINT
Snow Is.
BRANSFIELD STRAIT
TELEFON BAY
PENDULUM COVE
Deception Is.
BAILY HEAD
VAPOUR COL
WHALER'S BAY
0
N
25 miles (40 km)
(21.7 nm)
GOURDIN IS.
Cape Dubouzet
B. O'HIGGINS STATION
Cape Legoupil
HOPE BAY
ASTROLABE ISLAND
TRINITY PENINSULA
NORTHWEST (NW) SUBAREA
Tower Is
Bone Bay
NORTHEAST (NE) SUBAREA
Trinity Is.
Charcot Bay
MIKKLESEN HARBOR
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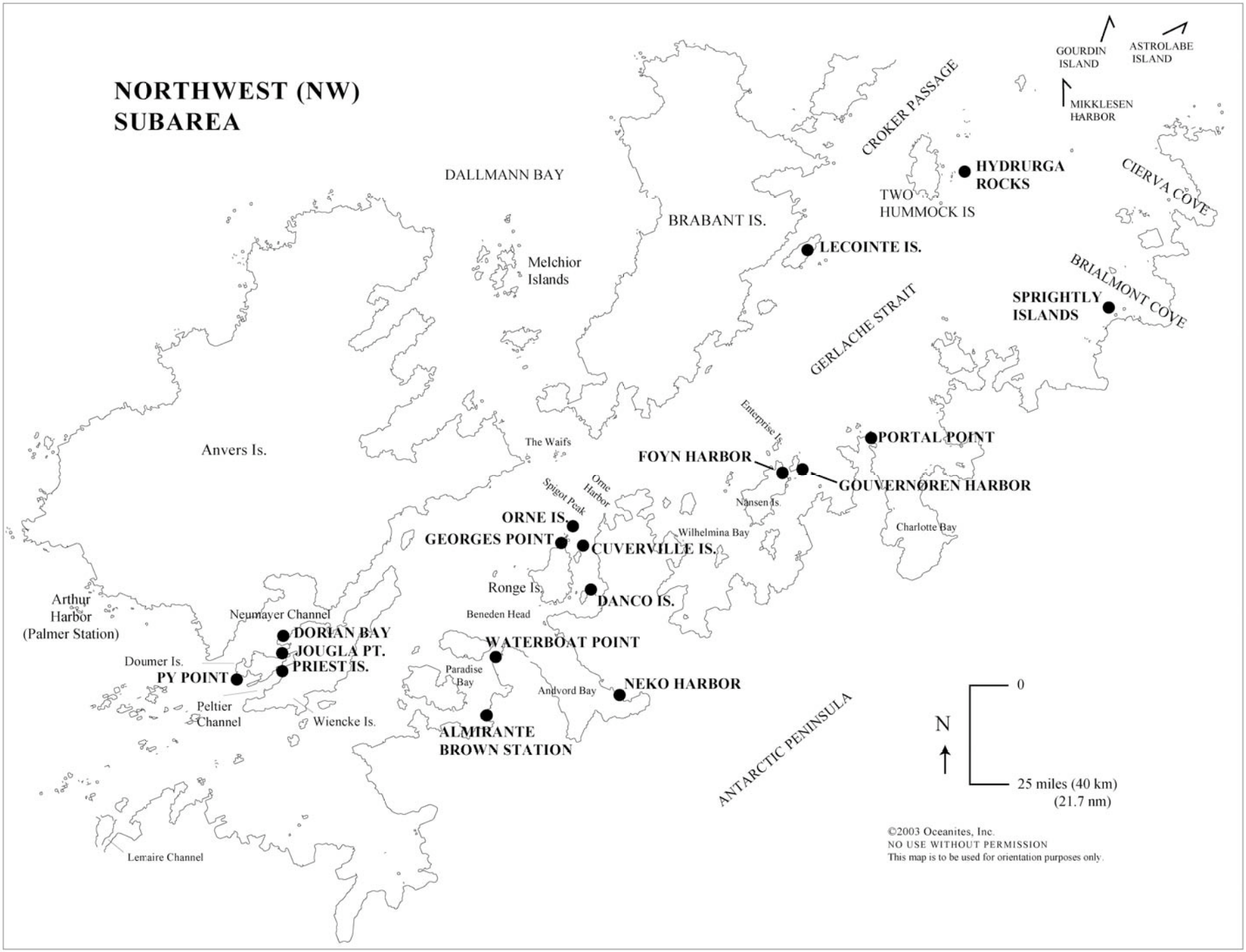

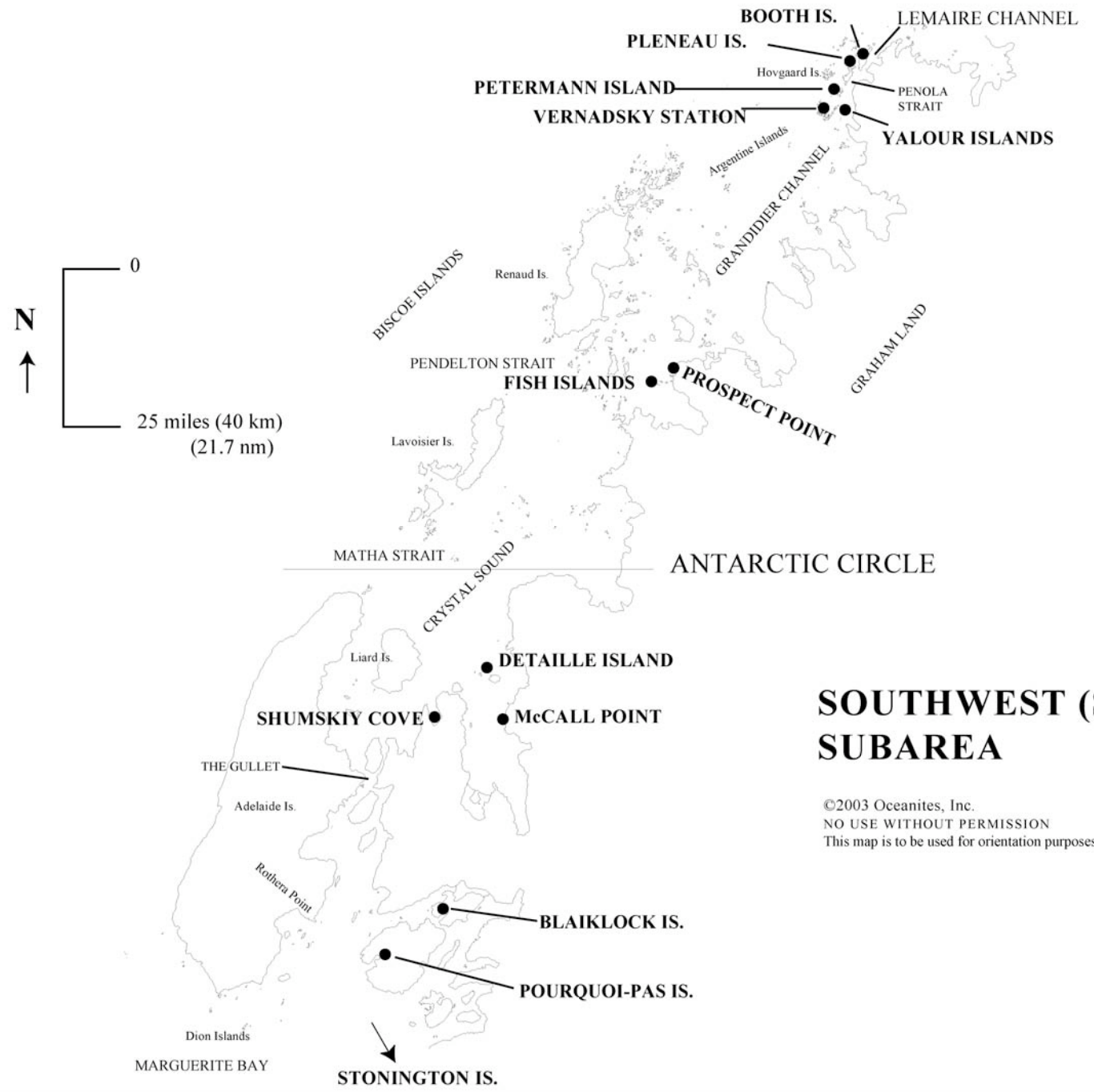

SOUTHWEST (SW) SUBAREA

DATA CATEGORIES

The Inventory's methodology (described in Naveen: 1996, 1997a) involves the collection of three categories of data and information.

The first category, *Basic Site Information*, includes descriptions of key physical and topographical characteristics; latitude and longitude; distribution of flora, seal haul-out and wallow locations, and discrete groups of breeding penguins and flying birds.

At each site, to evaluate species diversity and site sensitivities, the Inventory collects data regarding the presence or absence of nesting species of penguins and flying birds, wallows of southern elephant seals, and large patches or beds of lichens and mosses at all sites visited. These data are used to rank sites as to their species diversity, based on the number of faunal species and major floral groups recorded. Using these presence/absence data as a base, sites also are ranked as to their potential sensitivity to disruption by visitors, depending on: the number of penguin and seabird species whose nests visitors may access easily, whether or not visitors may access southern elephant seal wallows easily, and whether or not visitors may access easily and possibly trample large patches or beds of lichens and mosses.

Census data collection proceeds according to Standard Methods used in the CCAMLR Ecosystem Monitoring Program, particularly Standard Method A3A (v4), which relates to *breeding population size* and Standard Method A6 (v5), Procedure A, which relates to *breeding success*. With respect to blue-eyed shags, data collection follows similar methodologies because, at present, there are no applicable CEMP methods specifically pertaining to blue-eyed shags. The aim is to determine interannual trends in the size of breeding populations. A decline in a breeding population would be one indication that a penguin population at a particular site is being impacted.

This data collection method specifically pertains only to ground counts of nests in entire colonies. The mandated procedure is to select one or more colonies that are discrete, which separately can be counted as a whole unit, and which will not be affected by other studies or on-site human activities. The census colonies must be well defined and distributed in various parts of the study area. It is important that the same colonies be counted annually and that the counts are made one week after peak egg-laying. The colonies must be clearly marked and mapped. Once established, the same colonies will be used to assess chick numbers under CCAMLR Standard Method A6 (v5), Procedure A, described below. Instructions given to Antarctic site Inventory researchers may be found in Appendix 2.

The nest census procedure requires that three separate counts should be made of each of the selected colonies on the same day; if one of the three counts differs more than 10% from the others, a fourth count should be made on the same day as the other three counts.[1] The total number of birds engaged in breeding activity can be influenced by: cohort size at fledging and rate of recruitment of each cohort to the breeding population; food supply during pre-laying and incubation periods; ages of individual birds (and consequently the age structure of colony); previous breeding experience of the individuals; the length of mate-bond; presence of mate; size and location of colony; and ice conditions prior to colony occupation.

CCAMLR Standard Method A6 (v5), Procedure A will be utilized to estimate *breeding success*. The aim is to assess productivity by providing an index of relative change in the number of chicks produced one year to the next. A decline in the number of chicks produced per occupied nest would be one indication that a penguin population at a particular site is being impacted.

As with the censusing of occupied nests, Standard Method A6 (v5), Procedure A requires the selection of one or more colonies that are discrete, which separately can be counted as a whole unit, and which will not be affected by other studies or on-site human activities. The census colonies must be well defined, distributed in various parts of the study area, and clearly marked and mapped. It is important that the same colonies be counted annually. The colonies should be the same as those used to assess breeding population size CCAMLR Standard Method A3A (v4), described above.

The chick census procedure requires that three separate counts should be made of each of the selected colonies on the same day, during the peak of chick-créching. The CCAMLR chick censusing methodology states that if one

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[1] In practice, the Antarctic Site Inventory has tightened the CCAMLR nest censusing procedure by requiring three counts within 8%, to ensure that Type I and Type II statistical errors are completely avoided. The justification for this change is explained in Appendix 2.

of the three counts differs more than 10% from the others, a fourth count should be made on the same day as the other three counts.[2]

The methodology cautions researchers to walk slowly in performing their work to avoid disruptions that might cause the breakage of eggs or predation by skuas. The methodology provides that results should be analyzed to produce mean numbers of chicks at each colony or breeding area for the number of counts employed (minimum three). These data can be used as an index of breeding success directly by comparing counts for specific colonies or groups of colonies, or indirectly by expressing the results as the mean number of chicks per adult over a group of colonies, yielding an attendant variance. It is important that the colonies or breeding areas, and dates of counts are standardized.

Breeding success will be indicative of many factors, notably adult condition and colony size, food availability, predator pressure, ice conditions and other environmental features. The success of breeding expressed both as total number of chicks raised and number of chicks raised per adult will have important implications for future population size. Season-to-season variation in breeding success can be considerable.

The second category of data and information, *Variable Site Information and Data*, includes weather and other environmental conditions (sea ice extent, cloud cover, snow cover, temperature, wind direction and speed), biological variables (number of occupied nests, number of chicks per occupied nest, ages of chicks), and the nature and extent of any observed visitor impacts (footprints or paths, cigarette butts, film canisters, and litter). With respect to penguins and flying birds, the focus is collecting data on breeding population size (nest counts) and breeding productivity (number of chicks per active nest), which are the appropriate biological parameters for detecting direct and cumulative impacts on these populations (Scientific Committee for the Conservation of Antarctic Marine Living Resources, 2001).

The third category of data and information, *Maps and Photodocumentation*, is an effort to portray major features of each site, particularly the locations of colonies and assemblages of resident fauna and flora. Orientation maps are crafted to assist Inventory researchers in their regular, season-to-season censusing. Oblique aerial photodocumentation has transpired via a cooperative arrangement among Oceanites, the UK Foreign and Commonwealth Office, and the Royal Navy ice patrol ship *HMS Endurance*. The oblique aerial photodocumentation from HMS Endurance, conducted by helicopter, conforms fully to guidelines established by the UK Foreign and Commonwealth Office to avoid harmful interference with concentrations of Antarctic wildlife.

Inventory researchers use 35mm and digital cameras to photodocument — within a season from season-to-season, and from the same vantage points — flora (lichen, mosses, and grass), penguin and seabird colonies, seal haul-out sites, and other features. Over time, repetitive photodocumentation from the same vantage point potentially may record on-site changes. In the 2001-02 field season, the Inventory experimented with a kite-flown digital camera in order to obtain images of inaccessible penguin nesting groups.

Original site sketches and maps are digitized and archived for safe-keeping. Oblique aerial photodocumentation is used to upgrade site sketches and maps. Photographic slides are similarly stored. All film canisters are marked in the field according to a designation system that enables original slides to be catalogued by field season, roll number, and frame-number, and which insures the correct identification of all photographs of a particular site. Digital photographs, catalogued in a similar fashion, are stored on CD-R disks.

INDICATOR SPECIES

The Inventory considers the following fauna and flora, found variously throughout the Peninsula, to be potential indicators of environmental change:

[2] As noted in footnote 1, the Antarctic Site Inventory has tightened the CCAMLR censusing procedure by requiring three counts within 8%, to ensure that Type I and Type II statistical errors are completely avoided. See Appendix 2.

Table 2: Indicator species

Seals	
Southern elephant seal	*Mirounga leonina*
Penguins	
Adélie penguin	*Pygoscelis adeliae*
Chinstrap penguin	*Pygoscelis antarctica*
Gentoo penguin	*Pygoscelis papua*
Macaroni penguin	*Eudyptes chrysolophus*
Flying birds	
Southern giant petrel	*Macronectes giganteus*
Antarctic fulmar	*Fulmarus glaciodes*
Pintado petrel	*Daption capense*
Snow petrel	*Pagodroma nivea*
Blue-eyed shag	*Phalacrocorax atriceps*
Snowy sheathbill	*Chionis alba*
Skua, spp.	*Catharacta lonnbergi* *Catharacta maccormicki*
Kelp gull	*Larus dominicanus*
Antarctic tern	*Sterna vittata*
Flora	
Antarctic hair grass	*Deschampsia antarctica*
Antarctic pearlwort	*Colobanthus quitensis*
Moss, spp.	*Bryum*, spp. *Brachythecium*, spp. *Drepanocladus*, spp. *Polytrichum*, spp.
Crustose lichens, spp., fruticose and foliose lichens, spp.,	*Xanthoria*, spp. *Caloplaca*, spp. *Verrucaria*, spp. *Haematomma*, spp. *Usnea*, spp. *Umbilicaria*, spp. *Ramalina*, spp. *Physcia*, spp. *Prasiola crispa* (and its lichenized form, *Mastodia tesselata*)
Snow Algae	

CENSUS STRATEGIES

Taking cues from the literature (Trivelpiece, 1991; Emslie, 1997; Croxall & Kirkwood, 1979; Woehler, 1993; Woehler & Croxall, 1996), the Inventory has focused on censusing four penguin species (gentoo, Adélie, chinstrap, and macaroni) and four species of flying birds (blue-eyed shags, southern giant petrels, kelp gulls, and skuas, spp.). Scree-nesting seabirds (storm-petrels, spp.; Antarctic fulmars; Antarctic petrels; snow petrels) were too difficult to census regularly in the short times expected for Inventory visits because these species' nests are generally inaccessible and, at times, difficult to discover. Antarctic terns presented a different problem: nesting territories were readily ascertained, but censusing is difficult because of this species' extraordinary skittishness, and the camouflage of its eggs and young. As a consequence, Inventory researchers note Antarctic tern breeding grounds in field data and orientation maps, but do not expend time trying to achieve censuses.

Regarding penguins, differences in breeding biology led to different Inventory census strategies (Trivelpiece, 1991; Williams, 1995; Emslie, 1997). Chinstraps and Adélies are site-specific animals, which do not tend to abandon regular nest sites and rookeries if there is a breeding failure in a single season. Gentoos, by contrast, are not as site-tenacious and gentoo-pairs regularly change nesting locations if there are disturbances. The implications for Inventory-like projects are that: gentoo censuses only may have long-term relevance if all gentoos at a particular visitor sites are counted, including all subgroups and small colonies of gentoos found at that site; and censuses of chinstraps and Adélies may have long-term relevance even if all chinstraps or Adélies at a particular location cannot be counted.

With respect to chinstraps and Adélies, Inventory personnel generally selected census colonies of fewer than 300 active nests. Colonies with greater than 300 active nests (e.g. at Baily Head and Hannah Point) consistently proved to be more difficult to census. With respect to macaroni penguins, Hannah Point is the only Peninsula visitor site where this species is regularly encountered, and the small numbers of nests, adults, and chicks are readily tracked. Emslie (1997) notes that while some studies have shown that the cumulative effect of repeated visits to penguin colonies over many years has caused no significant decline in colony size or reproductive performance, and that penguins tend to become habituated to the presence of humans and human disturbances near their nest sites, other studies indicate potential effects on recruitment by new breeding pairs to heavily-visited colonies, which may cause a population decline over time, especially to small colonies. At this stage, it is unclear whether the Hannah Point macaroni population is growing, declining, or remaining steady.

In the first edition of the *Compendium*, regarding the relevance of Inventory census data for reproductive comparisons, Oceanites recommended a need for correlation studies to determine how close opportunistic Inventory nest and chick counts are to the peaks of egg-laying and chick-créching, respectively (Scientific Committee for the Conservation of Antarctic Marine Living Resources, 1992). Alternatively, in this second edition, Oceanites recommends long-term monitoring of a few select sites that are heavily visited, diverse in species composition, and sensitive to potential environmental impacts; at select sites where this long-term monitoring is realized, data will be collected according to CCAMLR Standard Methods and, thus, be fully comparable with data collected elsewhere in the Antarctic.

Preaching extreme care in the use of Inventory-collected data does not and should not suggest a lack of usefulness. For example, note that historical compilations of minimum penguin breeding populations (Croxall & Kirkwood, 1979; Woehler, 1993; Woehler & Croxall, 1996) reflect nest counts obtained at various times and in varying fashions. No filter insures that these data reflect nest counts achieved at the peak of egg-laying. The only filter applied to these data relates to the exactitude of the counts themselves (i.e. whether they represent actual nest counts or estimates with varying degrees of accuracy). These compilations are valuable sources of information about penguin distribution, often reflect more detailed work being done at various locations, and if repeated may suggest trends. In other words, “one-off” counts that are carefully accomplished during each breeding season are useful and should be repeated as often as possible.

The Inventory has achieved flying bird censuses (blue-eyed shags, southern giant petrels, kelp gulls, and skuas, spp.), but not in as much detail as with similar censuses of penguin colonies. Shag nests, adults, and chicks are regularly censused at eight sites. Kelp gull and skua nests at various locations were readily noted and marked both in Inventory data sheets and on Inventory orientation maps. Both species readily take flight on close approaches and, thus, Inventory personnel give them a wide berth, confining notes and data to the location of nests, numbers of adults tending nests, and numbers of chicks observed at a distance. Censuses of the southern giant petrels were consistently difficult to accomplish, being perhaps the most skittish of these flying birds, nesting in scrapes on the ground and easily agitated. The standard Inventory *modus operandii* is to walk the far perimeter of giant petrel nesting areas to reduce potential disturbances to an absolute minimum.

With respect to non-avian fauna, Inventory personnel regularly census seals on the landing beaches of Peninsula visitor sites, and track numbers of southern elephant seals in easily accessed wallows.

With respect to Antarctic Peninsula flora communities, Inventory researchers record the presence of lichens, mosses, *Deschampsia*, and *Colobanthus*, and there is an effort to photodocument as much of this vegetation as possible. Specific identifications are coordinated with British Antarctic Survey personnel. Some locations have readily accessed and often extensive moss beds (the Aitcho Islands, Penguin Island, the upper slopes of Cuverville Island, the vicinity of the Ferraz Station, Pléneau Island). Other sites present easily accessed *Usnea* lichens and *Deschampsia* (inland of the beach walk at Arctowski Station, Whalers Bay).

To avoid duplication of effort, the principal investigator of the Inventory coordinates with other national Antarctic programs and their scientists, and with representatives of the Scientific Committee on Antarctic Research (SCAR) and its specialist groups, regarding ongoing and previous scientific effort that relates directly to sites being

surveyed. At sites where on-site flora have been photographed, identification of such flora is made in coordination with the British Antarctic Survey.

No Inventory effort takes place at sites where national Antarctic programs are operating research stations. However, five of these sites — Ferraz Station (SH), Arctowski Station (SH), Half Moon Island (SH), Bernardo O'Higgins Station (NW), and Vernadsky Station (SW) — are included in the compendium for reference, because they are relatively, frequently visited by tourists. The recently restored (and frequently visited) hut at Goudier Island is referenced in the site description of Jougla Point, Port Lockroy (NW).

REGULAR INVENTORY CENSUSES

As of the close of the 2002-03 field season, the Antarctic Site Inventory regularly censuses 17 Antarctic Peninsula sites:

BROW	Brown Bluff	NE
PAUL	Paulet Is.	NE
ALMI	Almirante Brown STN vicinity	NW
HYDR	Hydrurga Rocks	NW
LOCK	Jougla Point, Port Lockroy	NW
NEKO	Neko Harbor	NW
ORNE	Orne Is.	NW
RONG	Georges Pt., Rongé Is.	NW
WATE	Waterboat Point	NW
AITC	Aitcho Is.	SH
BAIL	Baily Head, Deception Is.	SH
HANN	Hannah Point	SH
WHAL	Whaler's Bay	SH
PENG	Penguin Is.	SH
YANK	Yankee Harbor	SH
PETE	Petermann Is.	SW
PLEN	Pléneau Is.	SW

Specific chinstrap penguin groups are regularly censused at eight sites:

HYDR	Hydrurga Rocks	NW
ORNE	Orne Is.	NW
RONG	Georges Pt., Rongé Is.	NW
WATE	Waterboat Point	NW
AITC	Aitcho Is.	SH
BAIL	Baily Head, Deception Is.	SH
HANN	Hannah Point	SH
PENG	Penguin Is.	SH

Specific Adélie penguin groups are regularly censused at three sites:

PAUL	Paulet Is.	NE
PENG	Penguin Is.	SH
PETE	Petermann Is.	SW

Regular, site-wide gentoo penguin censuses take place at nine sites:

BROW	Brown Bluff	NE
LOCK	Jougla Point, Port Lockroy	NW
NEKO	Neko Harbor	NW
RONG	Georges Pt., Rongé Is.	NW
WATE	Waterboat Point	NW
HANN	Hannah Point	SH
YANK	Yankee Harbor	SH
PETE	Petermann Is.	SW
PLEN	Pléneau Is.	SW

Macaroni penguins are regularly censused at one site:

HANN	Hannah Point	SH

Blue-eyed shags are regularly censused at eight sites:

PAUL	Paulet Is.	NE
ALMI	Almirante Brown STN Vic.	NW
HYDR	Hydrurga Rocks	NW
LOCK	Jougla Point, Port Lockroy	NW
ORNE	Orne Is.	NW
HANN	Hannah Point	SH
PETE	Petermann Is.	SW
PLEN	Pléneau Is.	SW

Southern giant petrels are regularly censused at three sites:

AITC	Aitcho Is.	SH
HANN	Hannah Point	SH
PENG	Penguin Is.	SH

Kelp gulls are regularly censused at one site:

WHAL	Whaler's Bay	SH

Nest and chick census data are collected according to the methods described in the CEMP Standard Methods for Monitoring Studies (Scientific Committee for the Conservation of Antarctic Marine Living Resources, 1992) and other pertinent authorities, in particular, Croxall & Kirkwood (1979, and Woehler (1993).

CONTROL AND EXPERIMENTAL COLONIES

At each site, Inventory researchers attempt to select and establish prospective control (seldom disturbed) colonies and experimental (frequently disturbed) colonies of penguins and flying birds to census. The intent is to regularly repeat censuses both near and far from landing beaches where visitors access a particular location, to allow comparisons, over time, between areas where there is comparatively much and little human activity.

In some instances, these discrete groups of penguins and flying birds are marked by wooden stakes to insure that they can be relocated and censused from the same perspective during future visits. The stakes bear numbered tags that are referenced on the project's orientation maps.

To date, the inventory has established control colonies at these seven visitor sites:

PAUL	Paulet Is.	NE
ORNE	Orne Is.	NW
AITC	Aitcho Is.	SH
BAIL	Baily Head, Deception Is.	SH
HANN	Hannah Point	SH
PENG	Penguin Is.	SH
PETE	Petermann Is.	SW

LOGISTICS

In terms of logistics, the Inventory attempts to reach as many visitor sites as possible each austral spring and summer season, especially within the appropriate time frames for collecting nest and chick census data.

Expedition ships are selected carefully, particularly those with: the longest Peninsula itineraries whose Initial Environmental Evaluations have been reviewed by national authorities; and whose operations and expedition personnel enable Inventory researchers to reach the most heavily visited sites and to collect data at key census times (the peak of egg-laying for nest counts and the peak of chick-crèching for chick counts). Site visits and aerial photodocumentation also have been undertaken in cooperation with the British Royal Navy ice patrol vessel *HMS Endurance*. (Naveen: 1996, 1997a, 1999)

The ships utilized as platforms are noted both in site descriptions and the chronological list of Inventory site

visits/censuses in Appendix 1.

LONG-TERM MONITORING AT KEY SITES

Beginning in November 2003, the Antarctic Site Inventory will begin a long-term monitoring and assessment study at Petermann Island. This effort involves a three-person team of researchers being on-site during the respective peaks of penguin egg-laying (for nest counts) and penguin chick-créching (for chick counts), and will not depend on opportunistic logistics from carefully selected expedition ships. As a result, these long-term data sets will enable more accurate estimates of breeding population size and breeding success of Adélie penguin (*Pygoscelis adeliae*), gentoo penguin (*Pygoscelis papua*), and blue-eyed shag (*Phalacrocorax atriceps*), and allow direct and cumulative impacts at these sites to be detected precisely. Further, such data, will ensure that the best scientific data and descriptive information are available should Antarctic Treaty Parties determine that site management is necessary and appropriate in the future and contribute to a better understanding of biological processes in the entire Antarctic Peninsula region,

PUBLICATIONS, REPORTS, AND PAPERS

Biological data and site descriptions collected by the Inventory have been published and routinely made available in peer-reviewed papers, government reports, and popular publications (Naveen: 1996, 1997a, 1997b; Naveen, et. al, 2000, 2001). The most recent of these peer-reviewed papers are:

- *Prevalence of Leucism in Pygoscelid Penguins of the Antarctic Peninsula*, *Waterbirds* 23 (2): 283-285 (Forrest, S. and Naveen, R., 2000).
- *Censuses of penguin, blue-eyed shag, and southern giant petrel populations in the Antarctic Peninsula region*, 1994-2000, *Polar Record* 36 (199): 323-334 (Naveen, R., Forrest, S.C., Dagit, R.G., Blight, L.K., Trivelpiece, W.Z., and Trivelpiece, S.G., 2000).
- *Zodiac landings by tourist ships in the Antarctic Peninsula region*, 1989-99, *Polar Record* 37 (201): 121-132 (Naveen, R., Forrest, S.C., Dagit, R.G., Blight, L.K., Trivelpiece, W.Z., and Trivelpiece, S.G., 2001).

Summaries of Inventory data and results have been submitted routinely as information papers to annual consultative meetings of the Antarctic Treaty parties:

- Naveen, R., 1995a. Pilot Study To Assess The Potential Utility Of An Antarctic Site Inventory, Information Paper (IP 47) submitted by the United States to the XIXth Antarctic Treaty Consultative Meeting in Seoul, Republic of Korea.
- Naveen, R., 1995b. Implementation of Recommendation XVIII-1. United States Information Paper for the XIXth Antarctic Treaty Consultative Meeting in Seoul, Republic of Korea.
- Naveen, R., 1996a. Antarctic Site Inventory: Summary During Two Seasons Of Field Work — 1994 to 1996, Information Paper (IP 102) submitted by the United States to the XXth Antarctic Treaty Consultative Meeting in Utrecht, The Netherlands.
- Naveen, R., 1996b. Photodocumentation Of Survey Sites: Report Of A Cooperative International Program During the 1995-96 Austral Summer, Information Paper (IP 100) submitted by the United States and the United Kingdom to the XXth Antarctic Treaty Consultative Meeting in Utrecht, The Netherlands.
- Naveen, R., 1997c. Antarctic Site Inventory: Summary Of Progress — 1994 to 1996, Information Paper (IP 114) submitted by the United States and the United Kingdom to the XXIst Antarctic Treaty Consultative Meeting in Christchurch, New Zealand.
- Naveen, R., 1998. Antarctic Site Inventory: Update On Results Through Completion of the 1997-98 Field Season, Information Paper (IP 27) submitted by the United States, the United Kingdom, and Germany to the XXIInd Antarctic Treaty Consultative Meeting in Tromsø, Norway.

- Naveen, R., 1999a. Antarctic Site Inventory: Update On Results Following Completion of the 1998-99 Field Season, Information Paper (IP 32) submitted by the United States, the United Kingdom, and Germany to the XXIIIrd Antarctic Treaty Consultative Meeting in Lima, Peru.
- Naveen, R., 2002. Antarctic Site Inventory: 1994-2002, Information Paper (IP 25) submitted by the United Kingdom and the United States to the XXVth Antarctic Treaty Consultative Meeting in Warsaw, Poland.
- Naveen, R., 2003. Antarctic Site Inventory: 1994-2003, Information Paper (IP 53) submitted by the United Kingdom and the United States to the XXVIth Antarctic Treaty Consultative Meeting in Madrid, Spain.

DETAILS REGARDING OCEANITES AND THE ANTARCTIC SITE INVENTORY

The Antarctic Site Inventory project is managed and operated by Oceanites, Inc., a non-profit science and education foundation based in Chevy Chase, Maryland USA. Ron Naveen is the founder and chief executive officer of Oceanites, Inc., and the principal investigator of the Antarctic Site Inventory project. At present, Inventory field work is permitted under U.S. Antarctic Conservation Act Permit No. 2000-12, issued to Oceanites, Inc. for the period September 1, 1999 to August 31, 2004. In addition, the US Environmental Protection Agency has determined that Oceanites has met the criteria in 40 US Code of Federal Regulations §8.4(e) for a multi-year Initial Environmental Evaluation, through the 2006-2007 Antarctic field season.

Further information about Oceanites and the Antarctic Site Inventory may be obtained via email (oceanites.mail@verizon.net) and regular mail (P.O. Box 15259, Chevy Chase, MD 20825 USA).

The raw materials for this second edition of the *Compendium* are the data sheets, slide photographs, and sketch maps compiled by Antarctic Site Inventory researchers from November 1994 to February 2003. As noted, these data, documentary photographs, and maps are stored by Oceanites.

Appendix 1: Chronological list of site visits by Antarctic Site Inventory researchers, 1994-2003

	Site	Subarea	Date	Researcher(s)	Platform
1994-1995 Field Season					
1	ARCT	SH	November 26, 1994	RN ST	from COPA
2	ARCT	SH	November 27, 1994	RN	from COPA
3	ARCT	SH	December 4, 1994	RN	from COPA
4	HALF	SH	December 6, 1994	RN BH	Alla Tarasova
5	PETE	SW	December 7, 1994	RN	Alla Tarasova
6	WATE	NW	December 7, 1994	RN RD RP BH	Alla Tarasova
7	CUVE	NW	December 8, 1994	RN	Alla Tarasova
8	LOCK	NW	December 8, 1994	RN BH	Alla Tarasova
9	BAIL	SH	December 9, 1994	RN BH	Alla Tarasova
10	HANN	SH	December 9, 1994	RN BH	Alla Tarasova
11	WHAL	SH	December 9, 1994	RN BH	Alla Tarasova
12	ALMI	NW	December 10, 1994	RN BH	Livonia
13	CUVE	NW	December 10, 1994	RN	Livonia
14	LOCK	NW	December 11, 1994	RN BH	Livonia
15	PETE	SW	December 11, 1994	RN BH	Livonia
16	PLEN	SW	December 11, 1994	RN	Livonia
17	WHAL	SH	December 12, 1994	RN BH	Livonia
18	YANK	SH	December 12, 1994	RN	Livonia
19	BAIL	SH	December 14, 1994	RN BH	Livonia
20	YANK	SH	December 14, 1994	RN BH ST	Explorer
21	ALMI	NW	December 15, 1994	RN	Explorer
22	DORI	NW	December 15, 1994	RN BH ST	Explorer
23	LOCK	NW	December 15, 1994	RN BH ST	Explorer
24	PETE	SW	December 15, 1994	RN BH ST	Explorer
25	ORNE	NW	December 16, 1994	RN BH	Explorer
26	POPT	NW	December 16, 1994	RN SF	Explorer
27	ARCT	SH	January 12, 1995	RN RD	Livonia
28	PENG	SH	January 12, 1995	RN RD	Livonia
29	YANK	SH	January 12, 1995	RN RD	Livonia
30	ORNE	NW	January 13, 1995	RN RD	Livonia
31	BAIL	SH	January 14, 1995	RN RD	Livonia
32	PAUL	NE	January 22, 1995	RN	Explorer
33	SNOW	NE	January 22, 1995	RN	Explorer
34	HANN	SH	January 23, 1995	RN RD	Explorer
35	WHAL	SH	January 23, 1995	RN	Explorer
36	ALMI	NW	January 24, 1995	RN	Explorer
37	CUVE	NW	January 24, 1995	RN	Explorer
38	ORNE	NW	January 24, 1995	RN RD	Explorer
39	FISH	SW	January 25, 1995	RN RD	Explorer
40	PROS	SW	January 25, 1995	RN RD	Explorer
41	DORI	NW	January 26, 1995	RN	Explorer
42	LOCK	NW	January 26, 1995	RN	Explorer
43	PETE	SW	January 26, 1995	RN	Explorer
1995-1996 Field Season					
44	AITC	SH	November 17, 1995	BH	W. Discoverer
45	ARCT	SH	November 17, 1995	RN LB	Explorer
46	PENG	SH	November 17, 1995	RN LB	Explorer
47	BAIL	SH	November 18, 1995	BH	W. Discoverer
48	HANN	SH	November 18, 1995	RN LB	Explorer
49	HYDR	NW	November 18, 1995	BH	W. Discoverer
50	WHAL	SH	November 18, 1995	RN LB	Explorer
51	ALMI	NW	November 19, 1995	BH	W. Discoverer
52	ALMI	NW	November 19, 1995	RN LB	Explorer
53	CUVE	NW	November 19, 1995	RN LB	Explorer
54	CUVE	NW	November 19, 1995	BH	W. Discoverer

	Site	Subarea	Date	Researcher(s)	Platform
55	JUBA	SH	November 20, 1995	BH SF	W. Discoverer
56	LOCK	NW	November 20, 1995	RN LB	Explorer
57	PETE	SW	November 20, 1995	RN LB	Explorer
58	TURR	SH	November 20, 1995	BH	W. Discoverer
59	LOOK	EI	November 21, 1995	BH SF	W. Discoverer
60	POPT	NW	November 21, 1995	RN LB	Explorer
61	CUVE	NW	November 27, 1995	RN LB	Explorer
62	LOCK	NW	November 27, 1995	RN LB	Explorer
63	LOOK	EI	November 27, 1995	BH SF	W. Discoverer
64	ORNE	NW	November 27, 1995	RN LB	Explorer
65	ALMI	NW	November 28, 1995	RN LB	Explorer
66	FERR	SH	November 28, 1995	BH SF	W. Discoverer
67	PENG	SH	November 28, 1995	BH SF	W. Discoverer
68	PETE	SW	November 28, 1995	RN LB	Explorer
69	TURR	SH	November 28, 1995	BH	W. Discoverer
70	AITC	SH	November 29, 1995	BH	W. Discoverer
71	BAIL	SH	November 29, 1995	RN LB	Explorer
72	HALF	SH	November 29, 1995	BH	W. Discoverer
73	ROBE	SH	November 29, 1995	BH	W. Discoverer
74	TELE	SH	November 29, 1995	RN LB	Explorer
75	BAIL	SH	November 30, 1995	SF	W. Discoverer
76	HANN	SH	November 30, 1995	BH	W. Discoverer
77	PAUL	NE	November 30, 1995	RN LB	Explorer
78	WHAL	SH	November 30, 1995	BH SF	W. Discoverer
79	AITC	SH	December 1, 1995	RN LB	Explorer
80	ARCT	SH	December 1, 1995	RN LB	Explorer
81	HYDR	NW	December 1, 1995	BH SF	W. Discoverer
82	MIKK	NW	December 1, 1995	BH SF	W. Discoverer
83	POPT	NW	December 1, 1995	BH SF	W. Discoverer
84	ALMI	NW	December 2, 1995	SF	W. Discoverer
85	CUVE	NW	December 2, 1995	BH	W. Discoverer
86	RONG	NW	December 2, 1995	BH	W. Discoverer
87	WILD	EI	December 2, 1995	RN LB	Explorer
88	PETE	SW	December 3, 1995	BH	W. Discoverer
89	PAUL	NE	December 9, 1995	BH	W. Discoverer
90	HOPE	NE	December 10, 1995	BH	W. Discoverer
91	JONA	NE	December 10, 1995	BH SF	W. Discoverer
92	AITC	SH	December 11, 1995	BH SF	W. Discoverer
93	PENG	SH	December 11, 1995	BH	W. Discoverer
94	ROBE	SH	December 11, 1995	BH	W. Discoverer
95	TURR	SH	December 11, 1995	BH	W. Discoverer
96	BAIL	SH	December 12, 1995	BH	W. Discoverer
97	HANN	SH	December 12, 1995	BH	W. Discoverer
98	PEND	SH	December 12, 1995	BH SF	W. Discoverer
99	ALMI	NW	December 13, 1995	BH	W. Discoverer
100	DORI	NW	December 13, 1995	BH	W. Discoverer
101	ORCA	SO	December 13, 1995	LB	Explorer
102	RONG	NW	December 13, 1995	BH	W. Discoverer
103	PETE	SW	December 14, 1995	BH	W. Discoverer
104	WILD	EI	December 14, 1995	LB	Explorer
105	HALF	SH	December 15, 1995	LB	Explorer
106	YANK	SH	December 15, 1995	LB	Explorer
107	ALMI	NW	December 16, 1995	LB	Explorer
108	PETE	SW	December 16, 1995	LB	Explorer
109	DORI	NW	December 17, 1995	LB	Explorer
110	TURR	SH	December 20, 1995	BH	W. Discoverer
111	PEND	SH	December 29, 1995	RN LB	Explorer
112	PENG	SH	January 12, 1996	RN BH	Endurance
113	WHAL	SH	January 12, 1996	RN BH	Endurance
114	BAIL	SH	January 13, 1996	RN BH	Endurance

	Site	Subarea	Date	Researcher(s)	Platform
115	DORI	NW	January 14, 1996	RN BH	Endurance
116	LOCK	NW	January 14, 1996	RN BH	Endurance
117	ASTR	NW	January 15, 1996	RN BH	Endurance
118	HOPE	NE	January 15, 1996	RN BH	Endurance
119	PAUL	NE	January 16, 1996	RN BH	Endurance
120	CUVE	NW	January 19, 1996	RD RP	Livonia
121	MIKK	NW	January 19, 1996	RD RP	Livonia
122	MIKK	NW	January 19, 1996	RD RP	Livonia
123	DEVI	NE	January 20, 1996	RN BH	Endurance
124	LAGO	SW	January 21, 1996	RD RP	Livonia
125	POUR	SW	January 21, 1996	RD RP	Livonia
126	BROW	NE	January 22, 1996	RN BH	Endurance
127	PETE	SW	January 23, 1996	RD RP	Livonia
128	PLEN	SW	January 23, 1996	RD RP	Livonia
129	YALO	SW	January 23, 1996	RD RP	Livonia
130	DORI	NW	January 24, 1996	RD RP	Livonia
131	LOCK	NW	January 24, 1996	RD RP	Livonia
132	MARA	NE	January 25, 1996	RN BH	Endurance
133	NEKO	NW	January 25, 1996	RD RP	Livonia
134	ORNE	NW	January 25, 1996	RD RP	Livonia
135	RONG	NW	January 25, 1996	BH	W. Discoverer
136	MELC	NW	January 26, 1996	RD RP	Livonia
137	POPT	NW	January 26, 1996	RD RP	Livonia
138	SPRI	NW	January 26, 1996	RD RP	Livonia
139	BAIL	SH	January 27, 1996	RD RP	Livonia
140	HANN	SH	January 27, 1996	RD RP	Livonia
141	JONA	NE	January 30, 1996	RN BH	Endurance
142	PAUL	NE	January 31, 1996	RN BH	Endurance
143	AITC	SH	February 2, 1996	RD RP	Livonia
144	ARCT	SH	February 2, 1996	RD RP	Livonia
145	WHAL	SH	February 2, 1996	RN	Livonia
146	NEKO	NW	February 3, 1996	RN RD RP BH	Livonia
147	WATE	NW	February 3, 1996	RN RD RP BH	Livonia
148	CUVE	NW	February 4, 1996	RN RD RP BH	Livonia
149	PETE	SW	February 4, 1996	RN RD RP BH	Livonia
150	AITC	SH	February 9, 1996	RD RP	Livonia
151	ROBE	SH	February 9, 1996	BH RP	Livonia
152	BROW	NE	February 10, 1996	BH RP	Livonia
153	DURV	NE	February 10, 1996	RP BH	Livonia
154	ASTR	NW	February 11, 1996	BH RP	Livonia
155	MIKK	NW	February 11, 1996	RP BH	Livonia
156	RONG	NW	February 11, 1996	BH RP	Livonia
157	CUVE	NW	February 12, 1996	BH RP	Livonia
158	NEKO	NW	February 12, 1996	BH RP	Livonia
159	LOCK	NW	February 13, 1996	BH RP	Livonia
160	PLEN	SW	February 13, 1996	BH RP	Livonia
1996-1997 Field Season					
161	YANK	SH	November 23, 1996	RN WT SF	Explorer
162	LOCK	NW	November 24, 1996	RN SF WT	Explorer
163	ALMI	NW	November 25, 1996	RN SF	Explorer
164	HYDR	NW	November 25, 1996	SF WT RN	Explorer
165	TELE	SH	November 26, 1996	RN	Explorer
166	WHAL	SH	November 26, 1996	RN	Explorer
167	PAUL	NE	November 27, 1996	RN WT	Explorer
168	PENG	SH	November 30, 1996	RN SF	W. Discoverer
169	EDEN	NE	December 1, 1996	RN SF	W. Discoverer
170	HERO	NE	December 1, 1996	RN SF	W. Discoverer
171	PAUL	NE	December 1, 1996	RN	W. Discoverer
172	BERN	NW	December 2, 1996	RN	W. Discoverer

	Site	Subarea	Date	Researcher(s)	Platform
173	HALF	SH	December 2, 1996	RN SF	W. Discoverer
174	BAIL	SH	December 3, 1996	RN	W. Discoverer
175	HANN	SH	December 3, 1996	RN SF	W. Discoverer
176	ALMI	NW	December 4, 1996	RN SF	W. Discoverer
177	CUVE	NW	December 4, 1996	RN SF	W. Discoverer
178	ORNE	NW	December 4, 1996	RN SF	W. Discoverer
179	RONG	NW	December 4, 1996	RN SF	W. Discoverer
180	PETE	SW	December 5, 1996	RN SF	W. Discoverer
181	LOOK	EI	December 30, 1996	LB	Hanseatic
182	PAUL	NE	December 31, 1996	LB	Hanseatic
183	PETE	SW	January 9, 1997	LB	Hanseatic
184	PETE	SW	January 29, 1997	LB	Hanseatic
185	HANN	SH	January 30, 1997	LB	Hanseatic
186	PETE	SW	February 8, 1997	LB	Hanseatic
187	PETE	SW	February 16, 1997	LB	Hanseatic
188	AITC	SH	February 17, 1997	RN	Explorer
189	ALMI	NW	February 18, 1997	RN	Explorer
190	CUVE	NW	February 18, 1997	RN	Explorer
191	PLEN	SW	February 19, 1997	RN	Explorer
192	BAIL	SH	February 21, 1997	RN	Explorer
193	DEVI	NE	February 23, 1997	RN ST	Explorer
194	RUMC	NE	February 23, 1997	RN	Explorer
1997-1998 Field Season					
195	PETE	SW	November 23, 1997	RN SF	W. Discoverer
196	WATE	NW	November 23, 1997	RN SF	W. Discoverer
197	LOCK	NW	November 24, 1997	RN SF	W. Discoverer
198	AITC	SH	November 25, 1997	RN SF	W. Discoverer
199	PENG	SH	November 26, 1997	RN SF	W. Discoverer
200	TURR	SH	November 26, 1997	RN SF	W. Discoverer
201	ALMI	NW	November 27, 1997	RN SF	W. Discoverer
202	ARCT	SH	November 29, 1997	RN	W. Discoverer
203	PENG	SH	December 1, 1997	RN SF LS MB	Explorer
204	GOUR	NW	December 2, 1997	RN SF	Explorer
205	BAIL	SH	December 3, 1997	RN SF	Explorer
206	HANN	SH	December 3, 1997	RN SF	Explorer
207	ALMI	NW	December 4, 1997	RN SF	Explorer
208	CUVE	NW	December 4, 1997	RN	Explorer
209	ORNE	NW	December 4, 1997	RN	Explorer
210	RONG	NW	December 4, 1997	SF	Explorer
211	LOCK	NW	December 5, 1997	RN SF	Explorer
1998-1999 Field Season					
212	ARCT	SH	November 26, 1998	RN SF	Explorer
213	HALF	SH	November 26, 1998	RN SF	Explorer
214	ORNE	NW	November 27, 1998	RN SF	Explorer
215	RONG	NW	November 27, 1998	RN SF	Explorer
216	WATE	NW	November 27, 1998	RN SF	Explorer
217	LOCK	NW	November 28, 1998	RN SF	Explorer
218	CUVE	NW	December 5, 1998	RN SF	Explorer
219	ORNE	NW	December 6, 1998	RN SF	Explorer
220	POPT	NW	December 6, 1998	RN SF	Explorer
221	BAIL	SH	December 7, 1998	RN SF	Explorer
222	HANN	SH	December 7, 1998	RN SF	Explorer
223	HOPE	NE	December 8, 1998	RN SF	Explorer
224	PENG	SH	December 9, 1998	RN SF	Explorer
225	BAIL	SH	January 12, 1999	RN SF	Endurance
226	PENG	SH	January 12, 1999	RN SF	Endurance
227	BROW	NE	January 13, 1999	RN SF	Endurance
228	LOCK	NW	January 14, 1999	RN SF	Endurance

	Site	Subarea	Date	Researcher(s)	Platform
229	VAPO	SH	January 16, 1999	RN SF	Endurance
230	WILD	EI	January 17, 1999	RN	Endurance
231	AITC	SH	January 18, 1999	RN	Endurance
232	PENG	SH	January 19, 1999	RD ST	Vavilov
233	BAIL	SH	January 20, 1999	RD ST	Vavilov
234	GOUR	NW	January 20, 1999	RN	Endurance
235	YANK	SH	January 20, 1999	RD ST	Vavilov
236	PAUL	NE	January 21, 1999	RN RD ST	Vavilov
237	PETE	SW	January 22, 1999	RN RD ST	Vavilov
238	NEKO	NW	January 23, 1999	RD ST	Vavilov
239	AITC	SH	January 24, 1999	RN RD ST	Vavilov
1999-2000 Field Season					
240	BROW	NE	November 25, 1999	LB BP	Cal Star
241	PAUL	NE	November 25, 1999	LB BP	Cal Star
242	WHAL	SH	November 26, 1999	LB BP	Cal Star
243	YANK	SH	November 26, 1999	LB BP	Cal Star
244	LOCK	NW	November 27, 1999	LB BP	Cal Star
245	ORNE	NW	November 27, 1999	LB BP	Cal Star
246	LEMA	SW	November 28, 1999	LB BP	Cal Star
247	PLEN	SW	November 28, 1999	LB BP	Cal Star
248	DANC	NW	November 29, 1999	LB BP	Cal Star
249	AITC	SH	December 13, 1999	RN	Cal Star
250	FORT	SH	December 13, 1999	RN	Cal Star
251	YANK	SH	December 13, 1999	RN	Cal Star
252	PAUL	NE	December 14, 1999	RN	Cal Star
253	ASTR	NW	December 15, 1999	SF	Shuleykin
254	BROW	NE	December 15, 1999	RN	Cal Star
255	CRYS	NE	December 15, 1999	RN	Cal Star
256	PENG	SH	December 15, 1999	SF	Shuleykin
257	NEKO	NW	December 16, 1999	SF	Shuleykin
258	ORNE	NW	December 16, 1999	RN	Cal Star
259	PETE	SW	December 16, 1999	RN	Cal Star
260	RONG	NW	December 16, 1999	SF	Shuleykin
261	HYDR	NW	December 17, 1999	RN	Cal Star
262	LOCK	NW	December 17, 1999	RN	Cal Star
263	FOYN	NW	December 18, 1999	SF	Shuleykin
264	HANN	SH	December 18, 1999	RN	Cal Star
265	PEND	SH	December 18, 1999	RN	Cal Star
266	TELE	SH	December 18, 1999	RN	Cal Star
267	WHAL	SH	December 18, 1999	RN	Cal Star
268	BAIL	SH	December 19, 1999	SF	Shuleykin
269	AITC	SH	January 9, 2000	SF	Cal Star
270	BALD	NE	January 11, 2000	SF	Cal Star
271	DEVI	NE	January 11, 2000	SF	Cal Star
272	ALMI	NW	January 13, 2000	SF	Cal Star
273	LOCK	NW	January 13, 2000	SF	Cal Star
274	HANN	SH	January 14, 2000	SF	Cal Star
275	WILD	EI	January 15, 2000	SF	Cal Star
276	DEVI	NE	January 17, 2000	RD	Explorer
277	VIEW	NE	January 17, 2000	RD	Explorer
278	HANN	SH	January 18, 2000	RD	Explorer
279	LOCK	NW	January 19, 2000	RD	Explorer
280	PETE	SW	January 20, 2000	RD	Explorer
281	HERO	NE	January 21, 2000	RN	Shuleykin
282	ORNE	NW	January 21, 2000	RD	Explorer
283	PAUL	NE	January 21, 2000	RN	Shuleykin
284	HALF	SH	January 22, 2000	RN	Shuleykin
285	CUVE	NW	January 23, 2000	RN	Shuleykin
286	LOCK	NW	January 23, 2000	RN	Shuleykin

	Site	Subarea	Date	Researcher(s)	Platform
287	ORNE	NW	January 23, 2000	RN	Shuleykin
288	NEKO	NW	January 24, 2000	RN	Shuleykin
289	PETE	SW	January 24, 2000	RN	Shuleykin
290	VERN	SW	January 24, 2000	RN	Shuleykin
291	HANN	SH	January 25, 2000	RN	Shuleykin
292	WHAL	SH	January 25, 2000	RN	Shuleykin
2000-2001 Field Season					
293	WILD	EI	December 10, 2000	RN	Cal Star
294	BROW	NE	December 11, 2000	RN	Cal Star
295	PAUL	NE	December 11, 2000	RN	Cal Star
296	WHAL	SH	December 12, 2000	RN	Cal Star
297	LOCK	NW	December 13, 2000	RN	Cal Star
298	PETE	SW	December 13, 2000	RN	Cal Star
299	PLEN	SW	December 13, 2000	RN	Cal Star
300	ALMI	NW	December 14, 2000	RN	Cal Star
301	ORNE	NW	December 14, 2000	RN	Cal Star
302	AITC	SH	December 15, 2000	RN	Cal Star
303	HANN	SH	December 15, 2000	RN	Cal Star
304	AITC	SH	December 24, 2000	SF	Cal Star
305	YANK	SH	December 24, 2000	SF LF	Cal Star
306	BROW	NE	December 25, 2000	SF	Cal Star
307	PAUL	NE	December 25, 2000	SF LF	Cal Star
308	HYDR	NW	December 26, 2000	SF LF	Cal Star
309	LOCK	NW	December 27, 2000	SF	Cal Star
310	PLEN	SW	December 27, 2000	SF LF	Cal Star
311	STON	SW	December 28, 2000	SF LF	Cal Star
312	HANN	SH	December 30, 2000	SF LF	Cal Star
313	BROW	NE	January 9, 2001	SF	Cal Star
314	PAUL	NE	January 9, 2001	SF	Cal Star
315	BALD	NE	January 10, 2001	SF	Cal Star
316	DEVI	NE	January 10, 2001	SF	Cal Star
317	BAIL	SH	January 11, 2001	SF	Cal Star
318	DEVI	NE	January 11, 2001	SF	Cal Star
319	WHAL	SH	January 11, 2001	SF	Cal Star
320	LOCK	NW	January 12, 2001	SF	Cal Star
321	RONG	NW	January 12, 2001	SF	Cal Star
322	BLAI	SW	January 13, 2001	SF	Cal Star
323	BOOT	SW	January 13, 2001	SF	Cal Star
324	LOCK	NW	January 13, 2001	RN RD	Cal Star
325	PETE	SW	January 13, 2001	SF	Cal Star
326	PETE	SW	January 14, 2001	SF	Cal Star
327	AITC	SH	January 22, 2001	RN	Cal Star
328	CUVE	NW	January 23, 2001	RN RD	Cal Star
329	ORNE	NW	January 23, 2001	RN RD	Cal Star
330	BAIL	SH	January 24, 2001	RN RD	Cal Star
331	BOOT	SW	January 24, 2001	RN RD	Cal Star
332	PLEN	SW	January 24, 2001	RN RD	Cal Star
333	PLEN	SW	January 25, 2001	RD	Cal Star
334	BAIL	SH	January 26, 2001	RN RD	Cal Star
335	PAUL	NE	January 26, 2001	RD	Cal Star
336	BURD	NE	January 27, 2001	RD	Cal Star
337	FORT	SH	February 1, 2001	RN	Cal Star
338	BROW	NE	February 2, 2001	RN	Cal Star
339	PAUL	NE	February 2, 2001	RN	Cal Star
340	MIKK	NW	February 3, 2001	RN	Cal Star
341	BOOT	NW	February 4, 2001	RN	Cal Star
342	LOCK	NW	February 4, 2001	RN	Cal Star
343	PYPT	NW	February 5, 2001	RN	Cal Star
344	VAPO	SH	February 6, 2001	RN	Cal Star

	Site	Subarea	Date	Researcher(s)	Platform
2001-2002 Field Season					
345	WILD	EI	December 9, 2001	RN SF CE	Endeavour
346	FALS	NE	December 10, 2001	RN SF CE	Endeavour
347	SNOW	NE	December 10, 2001	RN SF CE	Endeavour
348	BROW	NE	December 11, 2001	RN SF CE	Endeavour
349	PAUL	NE	December 11, 2001	RN SF CE	Endeavour
350	AITC	SH	December 12, 2001	RN SF CE	Endeavour
351	WHAL	SH	December 12, 2001	RN SF CE	Endeavour
352	ALMI	NW	December 13, 2001	RN SF CE	Endeavour
353	CUVE	NW	December 13, 2001	RN SF CE	Endeavour
354	DANC	NW	December 14, 2001	RN SF CE	Endeavour
355	PRIE	NW	December 14, 2001	RN SF CE	Endeavour
356	LOCK	NW	December 15, 2001	RN SF CE	Endeavour
357	AITC	SH	December 20, 2001	JC LGC	Endeavour
358	PAUL	NE	December 21, 2001	JC LC	Endeavour
359	SNOW	NE	December 21, 2001	JC LC	Endeavour
360	BROW	NE	December 22, 2001	JC LC	Endeavour
361	JADE	NE	December 22, 2001	JC LC	Endeavour
362	JONA	NE	December 22, 2001	JC LC	Endeavour
363	HYDR	NW	December 23, 2001	JC LC	Endeavour
364	LECO	NW	December 23, 2001	JC LC	Endeavour
365	ALMI	NW	December 24, 2001	JC LC	Endeavour
366	BOOT	NW	December 24, 2001	JC LC	Endeavour
367	ORNE	NW	December 24, 2001	JC LC	Endeavour
368	LOCK	NW	December 25, 2001	JC LC	Endeavour
369	MITC	SH	December 26, 2001	JC LC	Endeavour
370	AITC	SH	December 30, 2001	RP	Endeavour
371	OBEL	NE	January 1, 2002	RP	Endeavour
372	BROW	NE	January 2, 2002	RP	Endeavour
373	JADE	NE	January 2, 2002	RP	Endeavour
374	SNOW	NE	January 2, 2002	RP	Endeavour
375	HYDR	NW	January 3, 2002	RP	Endeavour
376	CUVE	NW	January 4, 2002	RP	Endeavour
377	PLEN	SW	January 4, 2002	RP	Endeavour
378	LOCK	NW	January 5, 2002	RP	Endeavour
379	MITC	SH	January 6, 2002	RP	Endeavour
380	WHAL	SH	January 6, 2002	RP	Endeavour
381	WILD	EI	January 8, 2002	SF	Endeavour
382	AITC	SH	January 11, 2002	RP WT	Endeavour
383	DEVI	NE	January 12, 2002	RP WT	Endeavour
384	PERS	NE	January 12, 2002	RP WT	Endeavour
385	BROW	NE	January 13, 2002	RP WT	Endeavour
386	SNOW	NE	January 13, 2002	RP WT	Endeavour
387	CUVE	NW	January 14, 2002	RP WT	Endeavour
388	ALMI	NW	January 15, 2002	RP WT	Endeavour
389	BOOT	SW	January 15, 2002	RP WT	Endeavour
390	PLEN	SW	January 15, 2002	RP WT	Endeavour
391	LOCK	NW	January 16, 2002	RP WT	Endeavour
392	BAIL	NE	January 17, 2002	RP WT	Endeavour
393	AITC	SH	January 22, 2002	RD LS	Endeavour
394	BROW	NE	January 24, 2002	RD LS	Endeavour
395	DEVI	NE	January 24, 2002	RD LS	Endeavour
396	PAUL	NE	January 25, 2002	RD LS	Endeavour
397	TAYH	NE	January 25, 2002	RD LS	Endeavour
398	ALMI	NW	January 27, 2002	RD LS	Endeavour
399	ORNE	NW	January 27, 2002	RD LS	Endeavour
400	LOCK	NW	January 28, 2002	RD LS	Endeavour
401	AITC	SH	February 2, 2002	MM	Endeavour
402	PAUL	NE	February 3, 2002	MM	Endeavour

	Site	Subarea	Date	Researcher(s)	Platform
403	BROW	NE	February 4, 2002	MM	Endeavour
404	TAYH	NE	February 4, 2002	MM	Endeavour
405	WHAL	NE	February 5, 2002	MM	Endeavour
406	LOCK	NW	February 6, 2002	MM	Endeavour
407	ALMI	NW	February 7, 2002	MM	Endeavour
408	CUVE	NW	February 7, 2002	MM	Endeavour
409	ORNE	NW	February 7, 2002	MM	Endeavour
410	PLEN	SW	February 8, 2002	MM	Endeavour
411	CUVE	NW	February 15, 2002	RN	Endeavour
412	LOCK	NW	February 15, 2002	RN	Endeavour
413	ORNE	NW	February 15, 2002	RN	Endeavour
414	PETE	SW	February 16, 2002	RN	Endeavour
415	ALMI	NW	February 17, 2002	RN	Endeavour
416	GOUV	NW	February 17, 2002	RN	Endeavour
417	BAIL	SH	February 18, 2002	RN	Endeavour
418	TELE	SH	February 18, 2002	RN	Endeavour
419	WHAL	SH	February 18, 2002	RN	Endeavour
420	PEPO	NE	February 19, 2002	RN	Endeavour
421	SNOW	NE	February 19, 2002	RN	Endeavour
422	HILL	NE	February 20, 2002	RN	Endeavour
423	PAUL	NE	February 20, 2002	RN	Endeavour
424	TAYH	NE	February 20, 2002	RN	Endeavour
425	WILD	EI	February 21, 2002	RN	Endeavour
426	AMPH	SO	February 22, 2002	RN	Endeavour
2002-2003 Field Season					
427	WILD	EI	December 6, 2002	RN	Endeavour
428	GOUR	NW	December 7, 2002	RN	Endeavour
429	BAIL	SH	December 8, 2002	RN	Endeavour
430	AITC	SH	December 8, 2002	RN	Endeavour
431	ORNE	NW	December 9, 2002	RN	Endeavour
432	LOCK	NW	December 9, 2002	RN	Endeavour
433	PETE	SW	December 10, 2002	RN	Endeavour
434	NEKO	NW	December 11, 2002	RN	Endeavour
435	ALMI	NW	December 11, 2002	RN	Endeavour
436	LECO	NW	December 12, 2002	RN	Endeavour
437	DORI	NW	December 12, 2002	RN	Endeavour
438	WILD	EI	December 28, 2002	RP	Endeavour
439	LOOK	EI	December 28, 2002	RP	Endeavour
440	AITC	SH	December 29, 2002	RP	Endeavour
441	MITC	SH	December 29, 2002	RP	Endeavour
442	YANK	SH	December 29, 2002	RP	Endeavour
443	BAIL	SH	December 30, 2002	RP	Endeavour
444	WHAL	SH	December 30, 2002	RP	Endeavour
445	TELE	SH	December 30, 2002	RP	Endeavour
446	EAGL	NE	December 31, 2002	RP	Endeavour
447	BROW	NE	January 1, 2003	RP	Endeavour
448	HYDR	NW	January 1, 2003	RP	Endeavour
449	CUVE	NW	January 2, 2003	RP	Endeavour
450	LOCK	NW	January 2, 2003	RP	Endeavour
451	PLEN	SW	January 3, 2003	RP	Endeavour
452	ALMI	NW	January 3, 2003	RP	Endeavour
453	AITC	SH	January 8, 2003	SF	Endeavour
454	MITC	SH	January 8, 2003	SF	Endeavour
455	BAIL	SH	January 9, 2003	SF	Endeavour
456	WHAL	SH	January 9, 2003	SF	Endeavour
457	TELE	SH	January 9, 2003	SF	Endeavour
458	PAUL	NE	January 10, 2003	SF	Endeavour
459	BROW	NE	January 10, 2003	SF	Endeavour
460	HYDR	NW	January 11, 2003	SF	Endeavour

	Site	Subarea	Date	Researcher(s)	Platform
461	NEKO	NW	January 11, 2003	SF	Endeavour
462	ALMI	NW	January 12, 2003	SF	Endeavour
463	LOCK	NW	January 12, 2003	SF	Endeavour
464	DETA	SW	January 13, 2003	SF	Endeavour
465	FISH	SW	January 13, 2003	SF	Endeavour
466	PLEN	SW	January 14, 2003	SF	Endeavour
467	AITC	SH	January 19, 2003	RD	Endeavour
468	DEVI	NE	January 20, 2003	RD	Endeavour
469	PAUL	NE	January 20, 2003	RD	Endeavour
470	MADD	NE	January 21, 2003	RD	Endeavour
471	SIFF	NW	January 21, 2003	RD	Endeavour
472	BAIL	SH	January 22, 2003	RD	Endeavour
473	PETE	SW	January 23, 2003	RD	Endeavour
474	LOCK	NW	January 25, 2003	RD	Endeavour
475	ALMI	NW	January 25, 2003	RD	Endeavour
476	NEKO	NW	January 25, 2003	RD	Endeavour
477	AITC	SH	January 30, 2003	MM	Endeavour
478	SNOW	NE	January 31, 2003	MM	Endeavour
479	FALS	NE	January 31, 2003	MM	Endeavour
480	BROW	NE	February 1, 2003	MM	Endeavour
481	PAUL	NE	February 1, 2003	MM	Endeavour
482	BAIL	SH	February 2, 2003	MM	Endeavour
483	WHAL	SH	February 2, 2003	MM	Endeavour
484	PETE	SW	February 3, 2003	MM	Endeavour
485	SHUM	SW	February 4, 2003	MM	Endeavour
486	LOCK	NW	February 6, 2003	MM	Endeavour
487	ALMI	NW	February 6, 2003	MM	Endeavour
488	MCAL	SW	February 12, 2003	MB	Endeavour
489	LOCK	NW	February 13, 2003	MB	Endeavour
490	PETE	SW	February 13, 2003	MB	Endeavour
491	ALMI	NW	February 14, 2003	MB	Endeavour
492	NEKO	NW	February 14, 2003	MB	Endeavour
493	ORNE	NW	February 14, 2003	MB	Endeavour
494	CUVE	NW	February 14, 2003	MB	Endeavour
495	BAIL	SH	February 15, 2003	MB	Endeavour
496	WHAL	SH	February 15, 2003	MB	Endeavour
497	TELE	SH	February 15, 2003	MB	Endeavour
498	PAUL	NE	February 16, 2003	MB	Endeavour
499	SNOW	NE	February 16, 2003	MB	Endeavour
500	CAMP	NE	February 17, 2003	MB	Endeavour
501	DEVI	NE	February 17, 2003	MB	Endeavour
502	WILD	EI	February 18, 2003	MB	Endeavour
503	GIBB	SO	February 19, 2003	MB	Endeavour

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LB	Louise Blight
JC	John Carlson
LC	Laura Gittings Carlson
CE	Chris Edelen
LF	Louise Forrest
BH	Brent Houston
MM	Megan McOsker
RP	Richard Polatty
LS	Laina Shill
WT	Wayne Z. Trivelpiece
ST	Susan G. Trivelpiece

Appendix 2: Specific instructions for Antarctic Site Inventory researchers.

Inventory researchers and the project's principal investigator follow particular and standard operating procedures with respect to data collection, data evaluation, and record keeping. These procedures are described below.

Prior to the start of each site survey, the investigators:

- Record the ship's GPS reading, and compare it to that obtained from the team's hand-held GPS receivers;
- Record Beaufort wind force, air and water temperatures in ˚C., and the amount of ice and cloud cover; and
- Photograph the landing site, from port to starboard, and record bearings and distances from the ship to prominent features and landmarks on shore.

Immediately upon reaching the landing site, the investigators:

- Record the GPS reading and, if necessary, find a safe location for placing the GPS base unit;
- Take additional photographs if necessary, and estimate the dimensions of the landing beach and record any other prominent features or landmarks; and
- Take and record compass bearings and measure/estimate/record distances from the landing beach to prominent features and to discrete groups or assemblages of fauna and flora.

While ashore, the investigators:

- Use hand-held GPS receivers to document waypoints as necessary for general surveying and mapping purposes, and to specifically record the positions of prominent features and discrete groups or assemblages of fauna and flora;
- Determine/identify other access and exit points to the landing site, and describe groups or assemblages of fauna and flora in close proximity to all access and exit points;
- Establish a route for censusing seals that may be present;
- Locate vantage points from which serial, visit-to-visit and season-to-season photodocumentation and observation of prominent features and discrete groups or assemblages of fauna and flora can be accomplished;
- Maintain a running log of the date and the location where each photograph is taken, and as appropriate photograph discrete groups of penguins, flying birds, seals (wallows or haul-out sites), and floral assemblages that are easily reached by visitors from the landing sites, and those which are difficult or impossible to reach in the normal course of a visitor landing and which, therefore, may serve as "control groups";
- With respect to selected control and experimental groups of penguins and flying birds (and according to the stage of the breeding cycle), record and estimate: the number of active nests; the number of adults present (whether incubating or not); the number of eggs and eggs per nest (as possible); the number of chicks (and chicks per nest, as possible); the age of chicks (in weeks); and with respect to penguins, the percentage of chicks that are creched; counts of adults, active nests, and chicks should be repeated until three counts are obtained, with the highest count being no more than 8% higher than the lowest count; and
- With respect to seals, record the number, age, condition, and location of seals in wallows and hauled-out on beaches.

Following each site survey, the investigators:

- Log field data onto standard data sheets, and update the master film log; data sheets are duplicated and the originals are stored for safe-keeping;
- Review data to insure that each team member is cognizant of the other's effort and coverage, and compare maps and sketches to insure accuracy and agreement; and
- Determine data collection priorities for the next visit to the site.

At the end of each field season, the principal investigator reviews the data to ascertain which sites were visited and how often they were visited, and whether sites were visited in both the 1st and 2nd deployments (i.e. in the austral spring, November/December, and the austral summer, January/February). These summary data are reviewed in turn to evaluate whether the selection of vessels and expedition leaders produced the desired coverage of sites for the season, and to make

necessary scheduling adjustments for the next field season.

The principal investigator also reviews and analyzes the data sheets from every site visit to insure that data have been collected consistently and recorded accurately. These data then are logged into compute files maintained by the principal investigator.

Appendix 3: Improving Antarctic Site Inventory Census Methods

> In the 1st edition of the *Site Compendium*, Oceanites reported on a power analysis study regarding census methods of the Conservation Of Antarctic Living Marine Resources (CCAMLR) Ecosystem Monitoring Program (CEMP) published by the Scientific Committee for the Conservation of Antarctic Marine Living Resources, and used throughout the Antarctic.
>
> These census methods require, for penguin nest and chick counts, three counts that are "within 5-10% range of each other." The power analysis suggested a tightening so that the highest count is "no more than 8% higher than the lowest count," to ensure that Type I and Type II statistical errors are avoided.
>
> The power analysis from the 1st edition of the *Site Compendium* is reprinted below.

A power analysis was undertaken to examines possibilities for improving the census methods for the Antarctic Site Inventory (ASI), particularly when large colonies of penguins are involved. These large assemblages, given the vagaries of often difficult terrain and time pressures facing ASI researchers, present difficult census situations.

In its original iteration, the methodology for the Inventory required that

> . . . counts of adults, active nests, and chicks should be repeated until three counts are obtained that are within 5-10% range of each other.

This derives from the CEMP Standard Methods 1992, which, for collecting data on parameters that are relevant to ascertaining penguin breeding population size and penguin breeding success (e.g. numbers of nests, numbers of chicks), states that:

> Three separate counts should be made of each of the selected colonies on the same day. if one of the three counts [of the relevant parameter] differs more than 10% from the others, a fourth count should be made on the same day as the other three counts. (CCAMLR, 1992)

This three-count standard is followed in other Antarctic penguin studies, for example the long-term study of *Pygoscelid* penguins in Admiralty Bay (W. Trivelpiece, pers. comm.), and is incorporated into the data forms utilized in the CCAMLR Ecosystem Monitoring (CEMP) program (CCAMLR, 1992).

The three-count technique had its genesis in the CEMP Working Group (SC-CAMLR, 1989), which suggested sampling strategies that should be able to detect a 10% or 20% change in a parameter with a significance level $\alpha = .01$ and a statistical power P (=1-β) $\geq$ 0.8 (Agnew, 1989). Following Sokal and Rohlf (1981), Whitehead (1990) notes the following formula for calculating the necessary sample size for detecting a given, "true" difference between means:

$$n \geq 2\,(sd/\Pi)2\,(t_{a,v} + t_{2(1-P),v})2$$

where

n = the required sample size (samples per year per site);
sd = true standard deviation;
Π = the smallest true difference that is desired to detect;
a = the significance level (i.e. the probability of rejecting a true null hypothesis of no difference among years);
P = the desired probability that a difference will be found if it is large as Π (P = the statistical power);
$t_{a,v}$ = value from a two-tailed t-table with v degrees of freedom and corresponding to probability a; and
$t_{2(1-P),v}$ = value from a two-tailed Student's t-table with v degrees of freedom and corresponding to probability 2(1-P)

The degrees of freedom, v, would = r(n-1), where r = the number of years over which the effect is detected, and n = the sample size.

Solving for Π, then

$$\sqrt{\frac{n}{2}} \geq (sd/\Pi)\ (ta,v + t2(1-P),v)$$

and $\Pi \geq \sqrt{\frac{2}{n}}\ (sd)\ (ta,v + t2(1-P),v)$

The formula is solved iteratively to determine which levels of change may be detected with the required degree of confidence. The CEMP Working Group standard suggests there should a 99% confidence ($\alpha = .01$) that when a change has been detected, it has actually occurred (which, in statistical parlance, avoids what is deemed a Type I error, where a significant change is detected but does not actually exist) and only a 20% chance ($P \geq 0.8$) of missing a significant change (which, in statistical parlance, avoids what is deemed a Type II error, where no significant change is detected but one actually exists). Translating this mandate to the context of the Antarctic Site Inventory, there should be a 99% confidence of detecting a change from one season to the next in one of the relevant biological parameters being examined (i.e. numbers of nests, numbers of adults, numbers of chicks) and only a 20% chance of missing a significant change in one of these parameters.

The Inventory's methodology requires three counts of each parameter; thus, n = 3. In terms of the Sokal and Rohlf formula, then, the degrees of freedom would be v = r(n-1) = 4 (where r, the number of years over which the effect is detected, = 2). Then, from the appropriate t-tables, the ta,v corresponding to $\alpha = .01$ is 4.60 and the t2(1-P),v corresponding to $P \geq 0.8$ is 0.93. The three-count, 5-10% mandate of the methodology may be examined in two ways:

• **Symmetrical counts**. First, it might be assumed that the minimum and the maximum of the three counts are an equal percentage away from the mean of the three counts. So, if there were three specific counts of 95, 100, and 105, the standard deviation (sd) would be 5.0; if there were three counts of x, x + k, and x - k, the standard deviation would be k; or, if there were three counts of x, x + k% of x, x - k% of x, the standard deviation would be k% of x (where x = mean).

Thus, if project investigators accept three counts within 5% of the mean (x) of the three counts, according to the Sokal and Rohlf formula, they would be able to detect changes greater than or equal to 23% of the mean with a power of P = .8; from the formula above:

$\Pi \geq \sqrt{\frac{2}{n}}\ (sd)\ (ta,v + t2(1-P),v)$

$\Pi \geq$ (.8165, the square root of 2/3)(.05x, the sd) (5.54, the sum of ta,v + t2(1-P),v)); and

$\Pi \geq .23x$

But if project investigators accept three counts within 4% of the mean (x) of the three counts, the investigators will be able to detect changes no less than 18% of the mean with a power of P = .8:

$\Pi \geq (.8165)(.04x)(5.54)$

$\Pi \geq .18x$

The ability to detect an 18% level of change with a statistical power of 0.8 complies within the mandate of the CEMP Working Group ("sampling strategies that should be able to detect a 10% or 20% change in a parameter with a significance level $\alpha = .01$ and a statistical power P (=1-β) $\geq$ 0.8"). In practical terms, if the count in question is of nests in a particular penguin colony, where the mean number of nests is 100, the CEMP Working Group standard is met if investigators' counts vary no more than 4% from the mean (the counts would have to be no lower than 96 and no greater than 104). If the mean number of nests is 500, the highest acceptable count meeting the $\alpha = .01/P \geq .8$ mandate would be 520 and the lowest, 480.1

---

[1] The Sokal and Rohlf equation also may be examined to determine the percentage of difference (k) that counts should maintain from their mean to permit an exact level of change (e.g. 20% of x) to be detected at the requisite power (e.g. P = .08); thus:

$\Pi \geq \sqrt{\frac{2}{n}}\ (kx)\ (t_{a,v} = t_{2(1-P),v})$

$.20x \geq (.8165)(kx)(5.54)$

If it is desired to detect a 10% change with the same statistical power, the Sohal and Rohlf formula may be examined to determine by how much investigators would have to tighten their counts:

$$.10x \geq (.8165)(kx)(5.54),$$

where k = the percentage limit by which counts may vary from their mean, and

$$k \prod .10/(.8165)(5.54)$$

$$\prod .022\ x,$$

which means that counts would have to be tightened to within 2.2% of the mean. So where the mean number of nests is 100, detecting a smaller change with the same statistical power would require counts to be no lower than 97.8 and no greater than 102.2; if the mean number of nests is 500, the highest acceptable count in this example would be 511 and the lowest, 489

Similarly, the formula may be examined to determine how much counts would need to tighten if the power is increased. Increasing the power to P = .9 increases the corresponding value of t2(1-P),v to 1.53 (ta,v remains = 4.60); then, to detect a 20% change:

$$.20x \geq (.8165)(kx)(6.13)$$

$$k \prod .20/(.8165)(6.13)$$

$$\prod .039\ x,$$

which means that counts could vary no more than 3.9% from the mean. If it is desired to detect a 10% change with a power P = .9, then:

$$.10x \geq (.8165)(kx)(6.13)$$

$$k \prod .10/(.8165)(6.13)$$

$$\prod .019\ x,$$

which means that counts could vary no more than 1.9% from the mean. So in this case, if the mean number of nests is 100, counts have to range between 98.1 and 101.9.

• **Unsymmetrical counts**. In a practical sense, the most difficult aspect of the first scenario is the apparent need to keep a running tab of means while counts are proceeding in the field. This would be particularly burdensome where large colonies are being counted and time is of the essence. A second scenario addresses this concern by focusing on the lowest count, and assumes that the highest count will not be greater that a certain percentage above the lowest.

The maximum standard deviation occurs when the two lowest numbers are the same and the third is 10% higher (e.g. 100, 100, 110, in three counts of the number of nests in a particular penguin colony). In this specific, numerical example, the standard deviation is 5.77, which is higher than that noted in (a) above where the three counts varied only by a certain percentage from the mean of all three counts. The general pattern of counts in the second scenario, therefore, would be y, y, ky, where k represents a certain percentage above the lowest count, y. This leads to the standard deviation

$$sd = \left[\frac{k - 1}{\sqrt{3}}\right](y)$$

which, inserted into the Sokal and Rohlf formula (and assuming the desired statistical power P = .8), gives

$$\prod \geq \sqrt{\frac{2}{n}}\ (sd)\ (ta,v + t2(1-P),v)$$

$$k \prod .20/(.8165)(5.54)$$

$$\prod .044$$

Again, if the mean number of nests is 100, the CEMP Working Group Standard is met if counts vary no more than 4.4% from the mean (i.e. they are not less than 95.6 (rounded to 96) or higher than 104.4 (rounded to 104).

$\Pi \geq$ (.8165, the square root of 2/3) $\left[\frac{(k-1)}{\sqrt{3}}(y)\right]$ (5.54, the sum of $t_{a,v} + t_{2(1-P),v}$)

If it is desired to detect a change of 20% of the smallest observation (Π = .20y), then

$$.20y \geq 4.52\left[\frac{(k-1)}{\sqrt{3}}(y)\right],$$

$$.20y \geq 2.61\,(k-1)\,(y), \text{ and}$$

$$k \geq 1.08$$

This would require investigators in applying the $\Pi \geq .01/P \geq .8$ CEMP Working Group mandate to insure that the largest count is no more than 108% of the smallest. So, in the example where the lowest nest count is 100, the highest count should not exceed 108.

In scenario (a), where a range of 95, 100, and 105 was examined, and the issue was keeping counts within a certain percentage of the mean, it was determined that a maximum count of 104 was necessary to satisfy the $\Pi \geq .01/P \geq .8$ mandate. In scenario (b), where a certain percentage above the lowest count is used as the measuring stick for satisfying the $\Pi \geq .01/P \geq .8$ mandate, 108% of the lowest count, 95, would yield a maximum count of 102.6 (or 103, rounded off).

As a practical matter, the second counting scenario appears much easier to use in the field. Instead of constantly recalculating means, investigators would be guided by a relatively simple calculation based on the lowest count, to insure that the requisite statistical power is attained. Thus it is recommended that for future work on the Inventory, the project's methodology be adjusted to reflect that

> . . . counts of adults, active nests, and chicks should be repeated until three counts are obtained, with the highest count being no more than 8% higher than the lowest count.

PART II

ANTARCTIC PENINSULA SITE DESCRIPTIONS

INCLUSIVITY

From the inception of the Inventory, there has been an effort to survey and census as many sites as possible, and the *Site Compendium* includes information for 82 sites where Inventory researchers have collected data and information from November 1994 through February 2003. One site not included in the *Site Compendium* is Lagotellerie Island (67˚53'S, 67˚24'W), an Antarctic Specially Protected Area visited in January 1996, presumably inadvertently, by an expedition tour ship on which Inventory researchers were working.

An excellent and much appreciated rapport with expedition ship captains and expedition leaders has enabled Inventory researchers to survey and census additional sites near to where visitors are making zodiac landings, and to census shag and penguin colonies ships pass en route from one location to the next. Also, the Oceanites' collaboration with *HMS Endurance* has enabled Inventory researchers to survey, census, and photodocument even more locations "off" the regular rotation of expedition tourism visits.

These non-"regular" sites include:

Eden Rocks (NE)
Jonassen Island (NE)
Point Obelisk, James Ross Island (NE)
Vapour Col, Deception Island (SH)
Foyn Harbor (NW)
Gouvernøren Harbor (NW)
Lecointe Island (NW)
Priest (Goetschy) Island, Peltier Channel (NW)

All locations, whether "regular" visitor sites or sites where visitors are infrequent or totally absent are included in the *Site Compendium* and noted in the subarea maps. It is hoped that all of these data and site-descriptions ultimately assist further investigation and a better understanding of the Antarctic Peninsula ecosystem.

FORMAT

Site descriptions are grouped according to Inventory subarea and each site description presents the following information:

- Official geographical name, four-letter abbreviation used on Inventory data sheets and throughout the *Compendium*, geographical coordinates, appropriate magnetic declination for surveying, charting, and GPS work), Inventory subarea, level of species diversity and sensitivity to potential environmental impacts (as per Inventory analyses described in Part IV of the *Compendium*); and whether there is restricted visitor space on the regular zodiac landing beach;
- Location, history, prominent onshore, offshore, geological, glaciological, or topographical features, historical artifacts, or officially designation as an Antarctic Historic Sites and Monument;
- Landing characteristics (if the site has been visited regularly);
- Antarctic Site Inventory effort, including a chronological listing of visits by Antarctic Site Inventory researchers, 1994-2003, and a summary of Inventory assessment and monitoring activity to date;
- Fauna (penguins, flying birds, wallowing seals) and flora (mosses, lichens, grass, flowering plants) observed;
- Census data from the scientific literature, if available, particularly Woehler (1993) and Woehler & Croxall (1996);
- Antarctic Site Inventory censuses;
- Conservation aspects, including sensitivity to potential environmental disruptions and suggestions ("pointers") for avoiding potential disruptions:
- Visitation aspects, noting the numbers of zodiac landings and visitors participating in such landings, over 13 seasons, from the 1989 to 2002, and other, proximate visitor sites.

The primary sources for site names and coordinates are the *Geographical Names of the Antarctic* (1995) and the *Gazetteer of the Antarctic* (1989).

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SPECIES IDENTIFICATION

Fauna and flora are identified specifically whenever possible; otherwise, the genus is noted and the lack of a specific identification noted (e.g. “skua, spp.” or “Usnea, spp.”).

CENSUS NUMBERS

The site descriptions present penguin and seabird census data collected by the Inventory and previously published (Naveen, et al., 2000), as well as recently collected data and historic censuses reported in Woehler (1993) and Woehler & Croxall (1996). Inventory census data are presented as mean values of all counts achieved during a particular calendar month.

All nest and chick data are presented in the same format suggested in Woehler (1993) and Woehler & Croxall (1996).

Table 3: Format for census data

N1 Nests individually counted, accurate to better than ± 5%
N2 Nests counted in known area then extrapolated over total colony area, accurate to 5-10%
N3 Accurate estimate, accurate to 10-15%
N4 Rough estimate, accurate to 25-50%

C1 Chicks individually counted, accurate to better than +/- 5%
C2 Chicks counted in known area then extrapolated over total area, accurate to 5-10%
C3 Accurate estimate, accurate to 10-15%
C4 Rough estimate, accurate to 25-50%

A1 Estimates based on counts of total birds or adults individually counted, accurate to better than +/- 5%
A2 Estimates based on counts of total birds or adults individually counted, accurate to 5-10%
A3 Estimates based on counts of total birds or adults individually counted, accurate to 10-15%
A4 Estimates based on counts of total birds or adults individually counted, accurate to 25-50%

Extra large (EL)	>100,000 breeding pairs
Very large (VL)	20,000-99,999 breeding pairs
Large (L)	7,500-19,999 breeding pairs
Medium (M)	1,000-7,499 breeding pairs
Small (S)	100-999 breeding pairs
Very small (VS)	1-99 breeding pairs

Source: Woehler (1993) and Woehler & Croxall (1996)

Conditions and circumstances often prevent Inventory researchers from achieving intended censuses. Also, censuses are not attempted when a visit clearly does not occur within the peak of egg-laying (for nest censuses) or the peak of chick-créching (for penguin chick censuses) or after seabird chicks have fledged (in the case of blue-eyed shags).

Inventory census data, as well as the data reported in Woehler (1993) and Woehler & Croxall (1996), need to be used carefully. Until correlations are completed, there is no way to confirm whether Inventory counts were obtained at the absolute peak of egg-laying or chick-counts at the absolute peak of chick-crèching, as required by CEMP Standard Methods (Scientific Committee for CCAMLR, 1997). As a result, Inventory nest counts may be useful for general discussions of population size, according to the accuracy of the counting method used; however, until correlations are completed, these data are not sufficiently rigorous for use in productivity determinations under the CEMP Standard Methods.

Based on Woehler (1993), Appendix 7 presents summary data on World and Antarctic Peninsula populations of the four penguin species regularly censused by the Inventory — Adélie, gentoo, chinstrap, and macaroni.

The site descriptions occasionally refer to “large” numbers of fur seals hauling-out on beaches of various landing sites. In this instance, the reference is >50 individual animals.

MAPS AND PHOTODOCUMENTATION

Many of the descriptions are supplemented by site-specific photo-documentation. There are orientation maps of sites the Inventory regularly censuses, and a few others where site sensitivities have been identified.

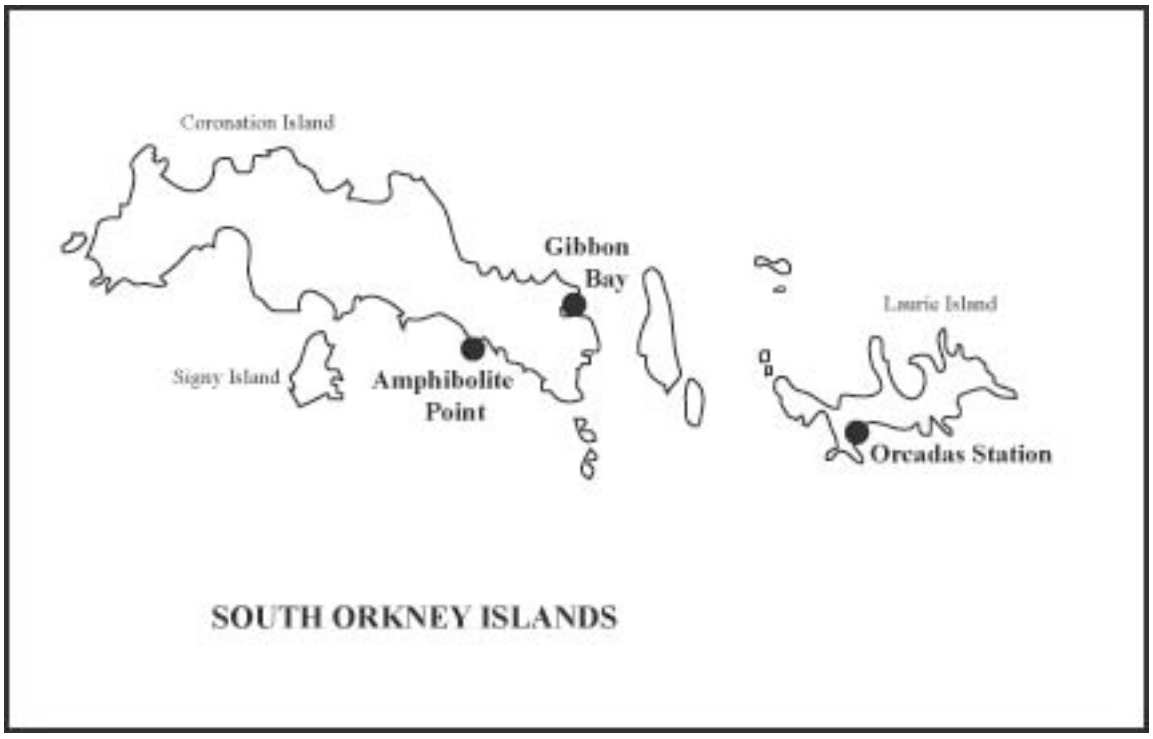
SOUTH ORKNEY ISLANDS (SO) Subarea

Subarea Map

Site Descriptions (3)

- Amphibolite Point (AMPH)
- Gibbon Bay (GIBB)
- Orcadas Station Vicinity (ORCA)

The South Orkneys are the least visited subarea in the Antarctic Peninsula. On departures proceeding south from gateways like Punta Arenas, Chile, or Ushuaia, Argentina, the South Orkneys are decidedly inconvenient, with ships more regularly choosing direct routes across the Drake Passage to the South Shetland Islands. The South Orkneys are a more realistic option on Antarctic Peninsula itineraries that add visits to South Georgia or the Falkland Islands.



Keys:

For acronymns of Antarctic Site Inventory researchers, see Appendix 1 p. 39.

For codes relating to penguin/seabird census/population data, see Table 3, p. 49.

Amphibolite Point (AMPH)

60˚41'S, 45˚21'W
Magnetic Declination: 2.4˚ E
Inventory subarea: SO
Inventory acronym: AMPH
Species Diversity: LOW
Site Sensitivity: LOW

Note: Restricted visitor space

Location — History — Features

Conspicuous, pyramidal point located 1.5 mile NW of Saunders Point on the S coast of Coronation island. Named by Falkland island Dependencies Survey after 1948-49 surveys. Named for considerable amount of the metamorphic rock, amphibolite, found on site.

Landing Characteristics

Small cove at base of penguin colony provides narrow, rocky, uphill access to the site.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. February 22, 2002 RN Endeavour

Assessment and monitoring. Preliminary surveying and population estimates. Regular chinstrap penguin census colonies not identified. Preliminary ground level digital photography achieved. No aerial photodocumentation.

Fauna — Flora — Censuses

Penguins & flying birds. Chinstrap penguins and snowy sheathbills confirmed breeding at time of Inventory visit. One gentoo penguin, dead Adélie penguin chicks also noted. Large area cleared, where Adélie penguins likely breed and which, at time of Inventory visit, had concluded their breeding season and departed.

Recent census data reported in Woehler (1993): chinstrap penguin, 4,000 N4, 1984; and Adélie penguin, 4,000 N4, 1984.

Seals. Southern elephant seals and Antarctic fur seals hauled-out on shore.

Flora. Crustose lichens (spp.) commonly observed.

Conservation Aspects

Site sensitivities. Restricted visitor space among large colony of breeding chinstrap penguins. Fur seals on the rocky landing beach, and in coves along the shoreline.

Pointers for avoiding disruptions:

- Do not impede penguins' access to and from the water.
- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-2001:	0	0
2001-02:	1	109
2002-03:	0	0
14-Season Total	1	109

Proximate visitor sites. Laurie Island (Cape Dundas), Gosling Islands, Signy Island, Coronation Island (Gibbon Bay, Shingle Cove, Iceberg Bay).

Gibbon Bay (GIBB)

60˚39'S, 45˚11'W
Magnetic Declination: 2.3˚ E
Inventory subarea: SO
Inventory acronym: GIBB
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A one-mile-long and wide bay along the E coast of Coronation Island. It was first observed in 1821 by Capt. George Powell and Capt. Nathaniel Palmer, recharted in 1933 on *Discovery II* and named for that ship's surgeon.

Landing Characteristics

Very few landings have been reported and no regular locations for zodiac landings are known. Preliminary Inventory data and information were collected via zodiac, which was the most efficient means for surveying this long, wide bay.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. February 19, 2003 MB Endeavour

Assessment and monitoring. Very preliminary surveying. No aerial photodocumentation.

Fauna — Flora — Censuses

Penguins & flying birds. Chinstrap penguins are confirmed breeders, and Snowy Sheathbill and Wilson's storm-petrel likely breeders. Kelp gull, southern giant petrel, skua spp., blue-eyed shag, and pintado petrel also observed.

Seals. Leopard seals obsewrved offshore.

Flora. None noted

Conservation Aspects

Site sensitivities. None noted

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-1995:	0	0
1995-96:	1	115
1996-97:	0	0
1997-98:	0	0
1998-99:	0	0
1999-2000:	0	0
2000-01:	0	0
2001-02:	0	0
2002-03:	1	108
14-Season Total	2	223

Proximate visitor sites. Laurie Island (Cape Dundas), Gosling Islands, Signy Island, Coronation Island (Gibbon Bay, Shingle Cove, Iceberg Bay).

Orcadas Station Vicinity (ORCA)

60˚45'S, 44˚43'W
Magnetic declination: 2.1˚E
Inventory subarea: SO
Inventory acronym: ORCA
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

The South Orkneys are a group of two larger and several smaller mountainous, barren islands lying NE of the Antarctic Peninsula between 60˚20'S and 60˚50'S, and 44˚20'W and 46˚45'W. They were discovered in 1821 on a joint sealing expedition by British Captain George Powell and American Captain Nathaniel Palmer. Orcadas Station is the Argentine Research Station in the South Orkneys. The station is located on a gravel bar of cobbles and pebbles that connects the high peaks on the E end of Laurie Island. Uruguay Bay is to the N, Scotia Bay to the S. Scree slopes are developed along the base of the cliffs around Scotia Bay and at both ends of the gravel bar where the station is located. E of the station a large glacier comes down to the shore and calves into Scotia Bay. Another large glacier comes to the shore of Uruguay Bay W of the station.

Landing Characteristics

Visitors may reach Orcadas by zodiac, with advance permission required, as with all station visits, under the terms of the Antarctic Treaty. Visitors are prohibited from landing at Port Martin, where large Adélie and chinstrap penguin colonies are being studied. Punta Cormorán, located between the base and Port Martin has an Adélie penguin colony and visitors may land here with advance permission from base personnel.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. December 13, 1995 LB Explorer

Assessment and monitoring. Preliminary surveying and censusing have been completed, but this site has not been regularly visited by Inventory researchers. Additional characterization needs include: designation of regular censuses colonies and photodocumentation. Argentine researchers stationed year-round at Orcadas are involved in censusing penguin and flying bird populations in the vicinity, especially at Port Martin (Puerto Martín), located at 60˚46'S 44˚42'W, where visitor landings are prohibited.

Fauna — Flora — Censuses

Penguins & flying birds. Pintado petrels observed nesting on cliffs W of the base; station personnel indicate that southern giant petrels, snow petrels, black-bellied and Wilson's storm-petrels, kelp gulls, Antarctic terns, and snowy sheathbills also breed in the vicinity. Station personnel are completing an outline map indicating sites of breeding colonies. Macaroni penguins also have been seen in the area, and a few gentoo penguin pairs have breed at Port Martin.

Census data from Port Martin reported in Woehler & Croxall (1996): gentoo penguin, a "large" colony; and Adélie penguin, 26,038 N1/2, 1994, approximately a 10% increase from a 1983 census; and chinstrap penguin, 13,394 N1/2, 1994, an approximate 13% increase from 1983 (biologists on site also have commented on an apparent 40% displacement rate of Adélie penguin by chinstrap penguins during the 1995-96 season at Port Martin study plots).

Seals. A single southern elephant seal was observed.

Flora. Ground-survey of the flora in the vicinity of the base has not been conducted.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	1	36

	Zodiac Landings	Participating Visitors
1991-92:	2	148
1992-93:	1	127
1993-94:	2	152
1994-95:	3	198
1995-96:	3	203
1996-97:	4	491
1997-98:	0	0
1998-99:	4	462
1999-2000:	12	1,388
2000-01:	1	43
2001-02:	7	753
2002-03:	4	389
14-Season Total	44	4,390

Proximate visitor sites. Laurie Island (Cape Dundas), Gosling Islands, Signy Island, Coronation Island (Gibbon Bay, Shingle Cove, Iceberg Bay).

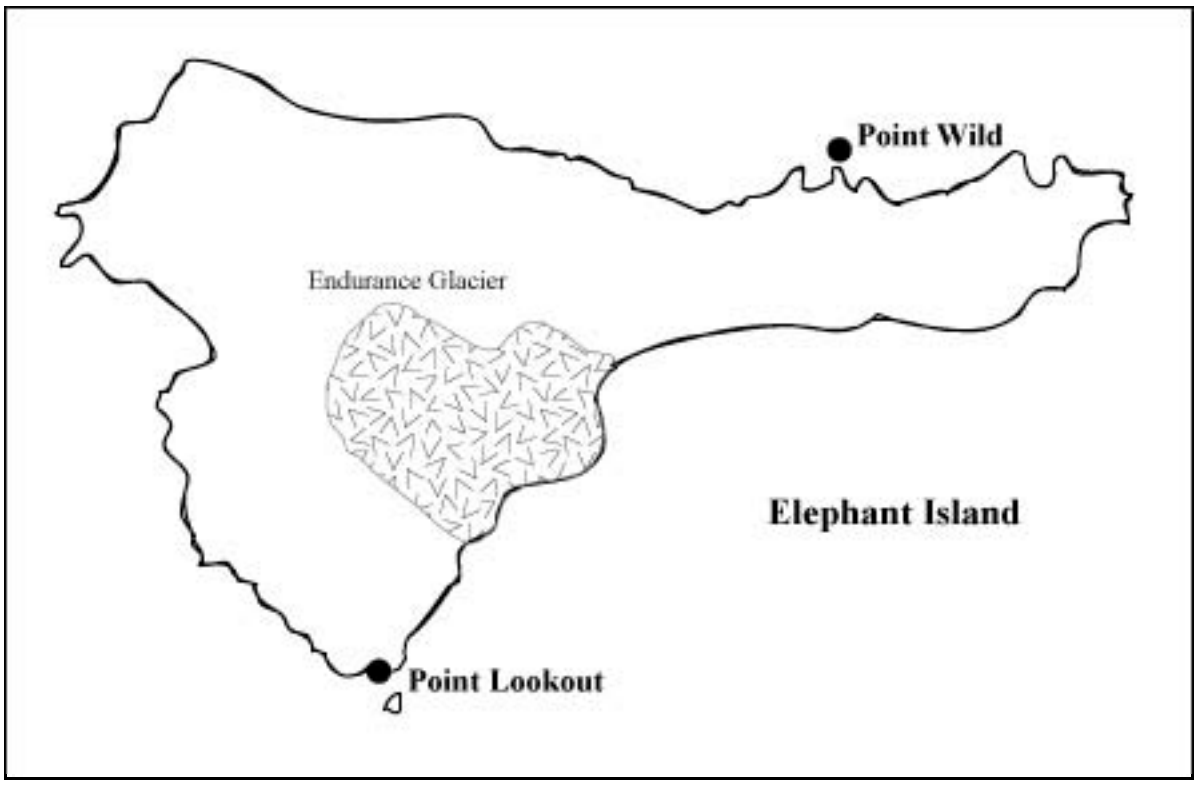
ELEPHANT ISLAND (EI) Subarea

Subarea Map

Site Descriptions (2)

- Point Lookout (LOOK)
- Point Wild (WILD)

Elephant Island is indelibly linked with Sir Ernest Shackleton's famous expedition of 1914-17. Leaving 22 of his men on the island's northern coast under Frank Wild's command, Shackleton, Frank Worsley, Tom Crean, Harry McNeish, John Vincent, Tim McCarthy departed from Point Wild on the lifeboat *James Caird*, heading for South Georgia, an unprecedented, 800-mile — and successful — open boat voyage. Ultimately, Shackelton's men were rescued from Point Wild. This rugged island teems with breeding chinstrap penguins and increasing numbers of Antarctic fur seals.



Keys:

For acronymns of Antarctic Site Inventory researchers, see Appendix 1 p. 39.

For codes relating to penguin/seabird census/population data, see Table 3, p. 49.

Point Lookout, Elephant Island (LOOK)

61˚17'S, 55˚13'W
Magnetic declination: 8.7˚E
Inventory subarea: EI
Inventory acronym: LOOK
Species Diversity: MEDIUM
Site Sensitivity: LOW

NOTE: Restricted visitor space

Location — History — Features

This steep, 240-meter-high bluff marks the S end of Elephant Island. The site name first appears on an 1822 map of the British sealer, Captain George Powell. The narrow spit W of the bluff may be used for zodiac landings, but only in the best of sea state and weather conditions, and when the rocky beach is not overrun by fur seals. Zodiac operations are likely to encounter high swell and spray. Nesting macaroni penguins may be observed more readily than in the Antarctic Peninsula, where they are much rarer.

Landing Characteristics

Uncharted water near shore. Hazardous rocks along the shoreline may be exposed, depending on the tide. Landing on exposed, rocky beach, surrounded by water on three sides, and often subjected to high swell and wind; beyond the beach, difficult hiking and walking because of the very rocky terrain and steep scree slopes. Very restricted visitor space because of topography, tide, swell, density of nesting penguins, and hauled-out seals.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	November 21, 1995	BH SF	W. Discoverer
2.	November 27, 1995	BH SF	W. Discoverer
3.	December 30, 1996	LB	Hanseatic
4.	December 28, 2002	RP	Endeavour

Assessment and monitoring. Prospective chinstrap penguin control colonies have been identified and preliminary censuses achieved, but this site has not been visited regularly by Inventory researchers. Additional characterization needs include: photodocumentation of ground features; photodocumentation and survey of floral communities; and a more complete description of geological features.

Fauna — Flora — Censuses

Penguins & flying birds. Chinstrap, gentoo, and macaroni penguins are confirmed nesters. No site-specific censuses of penguin breeding populations are reported in Woehler (1993) and Woehler & Croxall (1996). Pintado petrels may be found in large, offshore feeding flocks, and nest in the cliffs to the S of the landing beach. Wilson's storm-petrels also are confirmed nesters in the talus at the base of these cliffs. Snowy sheathbill nesting also confirmed.

Seals. Antarctic fur seals and southern elephant seals haul-out regularly. Weddell seals have been observed on the landing beach.

Flora. Crustose lichens observed on exposed rocks.

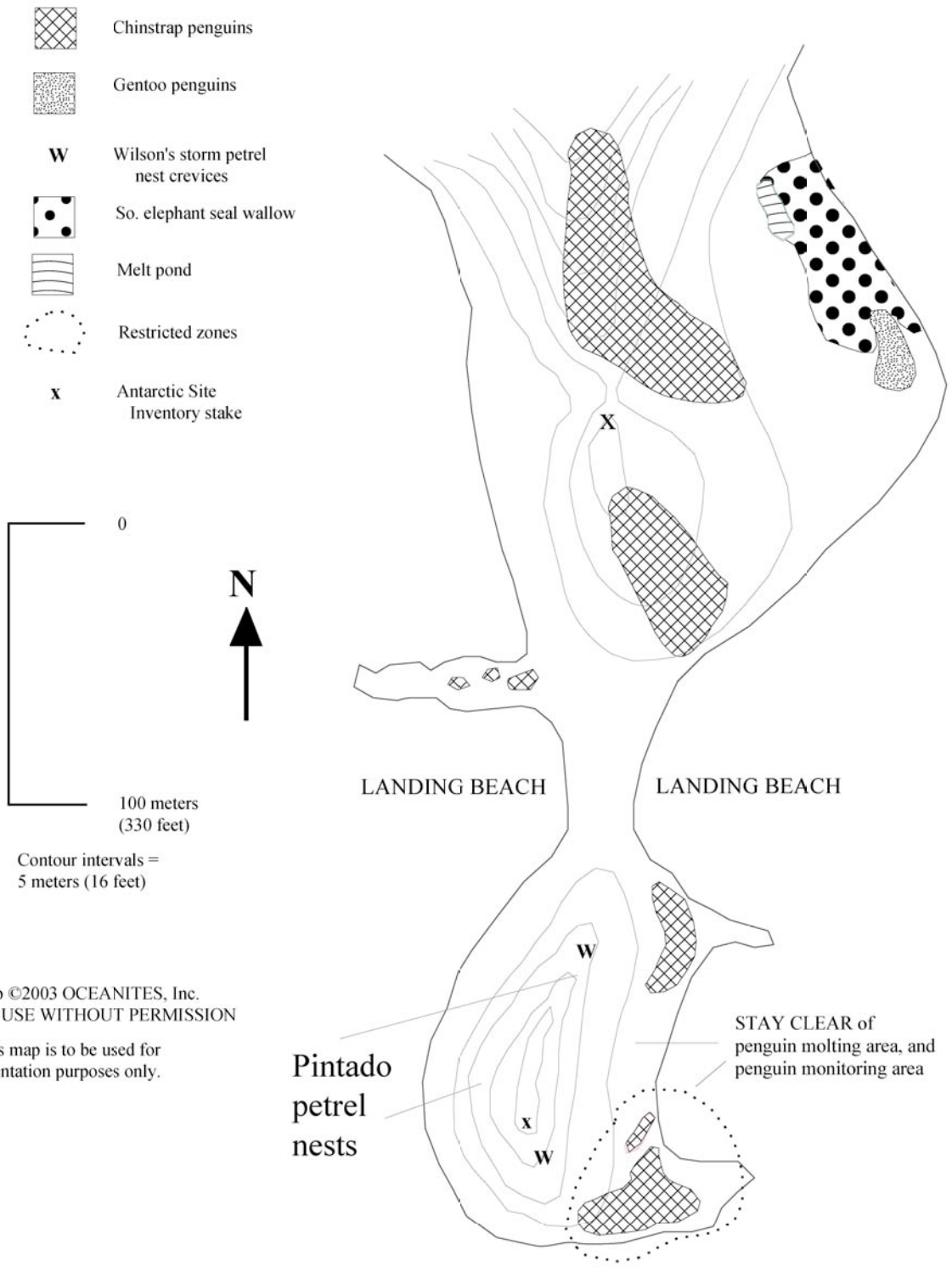
Conservation Aspects

Site sensitivities. Large numbers of chinstrap penguins in densely packed colonies, and smaller numbers of gentoo and macaroni penguins; all are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Wallowing southern elephant seals are easily approached and disturbed. Favored haul-out site for Antarctic fur seals.

Pointers for avoiding disruptions:

- Avoid congestion by alternating zodiac tours with brief landings, at staggered intervals, ashore.
- Do not impede penguins' access to and from the water.
- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Avoid and stay clear of wallowing elephant seals.

POINT LOOKOUT



This map is to be used for orientation purposes only.

- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.
- Strictly control landings on the narrow, exposed beach by organizing small, guided groups, which are well spaced, all following the same path, and not allowing any free wandering over the very rocky terrain and slopes.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	5	541
1990-91:	2	124
1991-92:	5	579
1992-93:	4	271
1993-94:	6	1,131
1994-95:	9	951
1995-96:	4	442
1996-97:	8	818
1997-98:	7	749
1998-99:	9	983
1999-2000:	11	1,095
2000-01:	11	1,083
2001-02:	4	300
2002-03:	10	958
14-Season Total	95	10,025

Proximate visitor sites. Point Lookout and Point Wild are the Elephant Island sites most frequently visited by expedition ships. Point Lookout has more visitors, in great part because it lies closer to the South Shetland Islands in the Antarctic Peninsula. The landing beach at Point Wild (where Shackleton's men camped) lies at a greater distance from the Peninsula, on the N side of Elephant Island, is frequently awash in surf, and may be overrun with fur seals.

Point Wild, Elephant Island (WILD)

61˚06'S, 54˚52'W
Magnetic declination: 8.3˚E
Inventory subarea: EI
Inventory acronym: WILD
Species Diversity: LOW
Site Sensitivity: LOW

Note: Restricted visitor space

Location — History — Features

A point six miles W of Cape Valentine on the N coast of Elephant Island. This site was made famous during Shackleton's *Endurance* expedition (1914-17). It was the jumping-off spot for Shackleton and five of his men in the lifeboat *James Caird*. They successfully negotiated the 800-mile passage to South Georgia, and Shackleton ultimately returned to rescue the 22 men stranded at this rugged location. The site is named for Frank Wild, who was leader of the stranded party that camped here for four months until they were rescued in August 1916. The Chileans have erected a monument on site with a bust of Capt. Pardo, the master of the vessel *Yelcho* who successfully rescued these men. In the early 1980s, it was much easier to make shore landings at the Point, and to stand at the exact spot from which Hurley's classic photographs of the *James Caird* launch were taken; now however, the beach is overrun by nesting penguins and fur seals.

Elephant Island supports an active ice dome and several glaciers. Ice cliffs fringe much of the coastline. Nunataks project through the ice in the interior, but the only main ice-free areas are lowland peninsulas, headlands, coastal cliffs, scree, and boulder beaches. Point Wild is a low, narrow ridge of boulders and gravel between rocky, high, nearly vertical cliffs on the island side and steep, rocky masses of bedrock on the seaward side. To the W is the arc of a deeply indented bay whose N shore is formed by a massive glacier, which in comparison to historical photographs from the Shackleton expedition, appears to have receded. Many crevasses are exposed in the ice face. Vertical cliffs extend around the shore on the W side of this bay. On the E side of Point Wild, steep mountainsides rise almost directly from the sea. The ridge of Point Wild appears to be mainly rock with abundant guano and mud. There is a narrow, rocky beach of coarse, dark pebbles and cobbles, with occasionally exposed bedrock. The cliffs at Point Wild also expose well-foliated, layered metamorphic rocks. Outcrops at sea level contain many streaks of quartz.

On site is an Antarctic Historic Site and Monument, a monolith and commemorative plaque celebrating the rescue of Shackleton's *Endurance* expedition on August 30, 1916 by the Chilean Navy cutter *Yelcho*, under the command of Captain Luis Pardo Villalon. A bronze bust of Captain Pardo was placed on the monolith by the XXIVth Chilean Antarctic scientific Expedition in 1987-88.

Landing Characteristics

Point Wild presents a difficult zodiac tour, even in the best of weather. Landings are few because of the increase in numbers of hauled-out fur seals. If landings are negotiated, there is limited visitor space because of the high concentration of on-shore animal life. Zodiac tours are the more regular routine, which enable excellent looks at the site's penguin-packed shoreline and active glaciers. Frequent glacier-calving and avalanches often fill the bay with brash ice and growlers, and potentially render zodiac travel more difficult.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 2, 1995	RN LB	Explorer
2.	December 14, 1995	LB	Explorer
3.	January 17, 1999	RN	Endurance
4.	January 15, 2000	SF	Cal Star
5.	December 10, 2000	RN	Cal Star
6.	December 9, 2001	RN SF CE	Endeavour
7.	January 8, 2002 `	SF	Endeavour
8.	February 21, 2002	RN	Endeavour
9.	December 6, 2002	RN	Endeavour
10.	December 28, 2002	RP	Endeavour

Assessment and monitoring. The glacial recession between Point Wild and Cape Belsham suggests the utility of season-to-season photodocumentation. Preliminary surveying and population estimates only. Regular chinstrap penguin census colonies not identified. Preliminary ground level and aerial photography achieved.

Fauna — Flora — Censuses

Penguins & flying birds. Chinstrap penguins are abundant breeders, and macaroni penguins occasionally are noted. Pintado petrels are numerous and may be seen flying onto cliffside nests.

No site-specific counts of chinstrap, gentoo, or macaroni penguin breeding populations are reported in Woehler (1993) and Woehler & Croxall (1996).

Seals. Antarctic fur seals and southern elephant seals regularly haul-out on the site's rocky beaches.

Flora. None noted.

Conservation Aspects

Site sensitivities. Restricted visitor space. The receding glacier W of Point Wild, between Point Wild and Cape Belsham, has enabled seawater to reach the landing beach more readily, and considerably decreased available landing space. Chinstrap penguins crowd the available space, along with elephant seals and increasing numbers of fur seals.

Pointers for avoiding disruptions:

- Restricted landing space suggests a reliance on zodiac tours to explore the vicinity.
- If landings are achieved, do not impede penguins' access to and from the water.
- If landings are achieved, walk slowly and carefully around nesting, crèching, or molting penguins.
- If landings are achieved, avoid and stay clear of wallowing elephant seals.
- If landings are achieved, avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.
- Strictly control any landings on the small, and do not allow any free wandering over the very rocky terrain and slopes.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	**Participating Visitors**
1989-90:	2	265
1990-91:	2	151
1991-92:	2	268
1992-93:	1	95
1993-94:	1	108
1994-95:	3	185
1995-96:	1	26
1996-97:	0	0
1997-98:	2	267
1998-99:	1	59
1999-2000:	0	0
2000-01:	5	638
2001-02:	1	92
2002-03:	20	1,992
14-Season Total	41	4,146

Proximate visitor sites. Tourist visits to Elephant Island generally make only one landing, either here or at Point Lookout on the S end of the island. Because of Point Wild's farther distance from the South Shetlands, there have been fewer tourist visits.

NORTHEAST (NE) Subarea

Subarea Map

Site Descriptions (24)

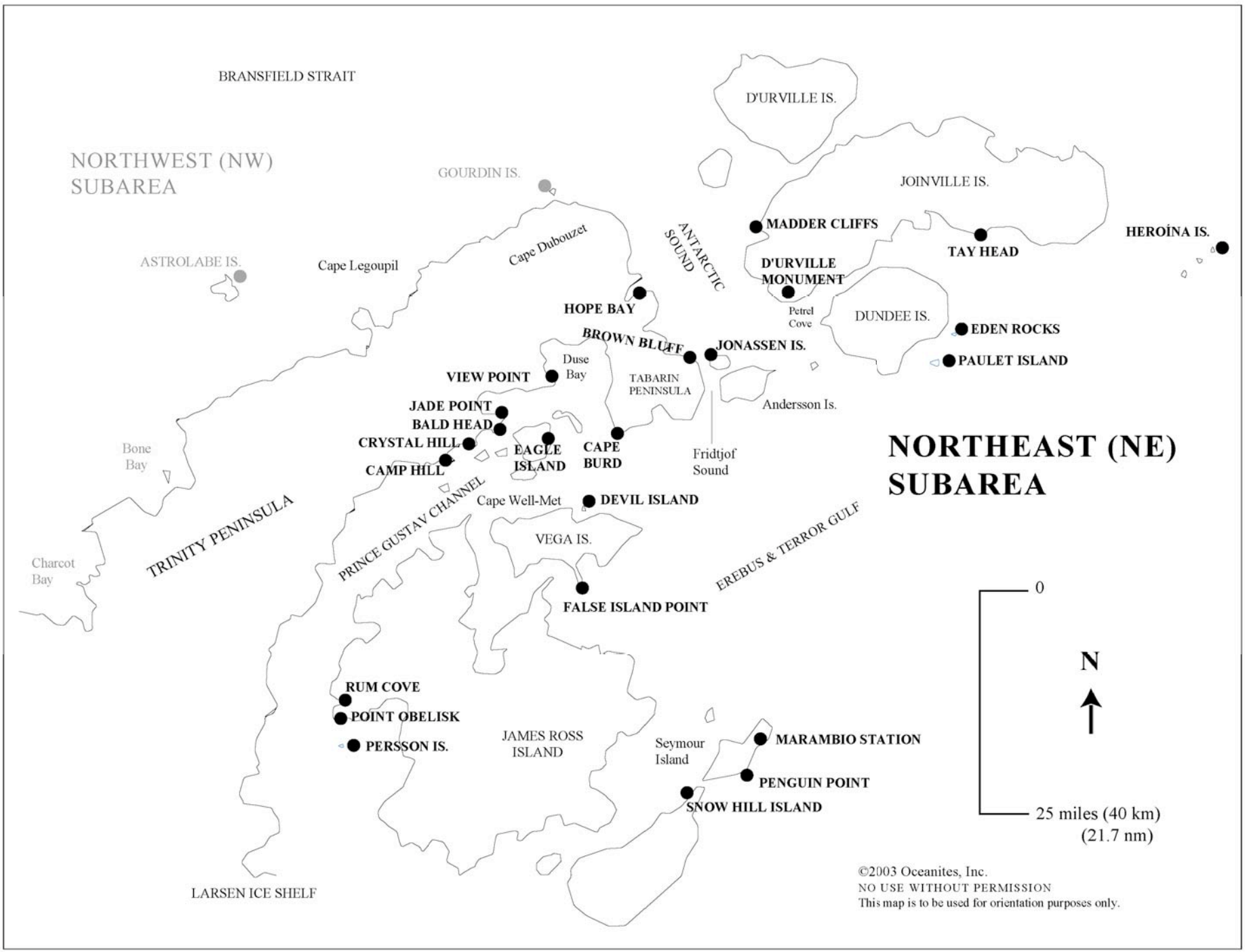
- Bald Head (BALD)
- Brown Bluff (BROW)
- Camp Hill (HILL)
- Cape Burd (BURD)
- Crystal Hill (CRYS)
- Devil Island (DEVI)
- d'Urville Monument (DURV)
- Eagle Island (EAGL)
- Eden Rocks (EDEN)
- False Head Point, Vega Island (FALS)
- Heroína Island (HERO)
- Hope Bay (HOPE)
- Jade Point (JADE)
- Jonassen Island (JONA)
- Madder Cliffs, Joinville Is. (MADD)
- Marambio Station Vicinity (MARA)
- Cape Obelisk, James Ross Island (OBEL)
- Paulet Island (PAUL)
- Penguin Point, Seymour Island (PEPO)
- Persson Island (PERS)
- Rum Cove, James Ross Island (RUMC)
- Snow Hill Island (SNOW)
- Tay Head, Joinville Island (TAYH)
- View Point (VIEW)

This subarea was less visited in the early 1990s, with heavy ice typical in the early austral spring. In the latter 1990s, continuing through the 2001-02 season, lighter ice conditions have allowed more November and December visits. Lighter ice conditions in Prince Gustav Channel and the collapse of the Larsen Ice Shelf, which formerly connected James Ross Island to the Trinity Peninsula, have enabled visits to many new landing sites.

Keys:

For acronymns of Antarctic Site Inventory researchers, see Appendix 1 p. 39.

For codes relating to penguin/seabird census/population data, see Table 3, p. 49.



Bald Head (BALD)

63˚38’S, 57˚36’W
Magnetic declination: 11.7˚E
Inventory subarea: NE
Inventory acronym: BALD
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Bare, ice-free headland located 8 miles SW of View Point on S side of the Trinity Peninsula. Probably first seen in 1902-3 by J. Gunnar Andersson’s party from Nordenskjøld’s Swedish Antarctic Expedition. Charted and named by Falklands Islands Dependencies Survey in 1945.

Landing Characteristics

Easily facilitated beach with volcanic rock and shale. Chilean *refugio* nearby. Offers a continental landing and elevated views of Prince Gustav Channel.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	January 11, 2000	SF	Cal Star
2.	January 10, 2001	SF	Cal Star

Assessment and monitoring. Preliminary surveying.

Fauna — Flora — Censuses

Penguins & flying birds. South polar skuas, kelp gulls observed; breeding not confirmed.

Seals. Crabeater seals present offshore in January 2000; Weddell seals on ice floes in January 2001.

Flora. Not surveyed.

Conservation Aspects

Site sensitivities. None observed

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-99:	0	0
1999-2000:	3	326
2000-01:	1	98
2001-02:	2	264
2002-03:	0	0
14-Season Total	6	688

Proximate visitor sites. On the Trinity Peninsula: Jade Point, Crystal Hill, Camp Hill, and View Point; Cape Burd on the Tabarin Peninsula; Devil Island; and False Island Point on Vega Island.

Brown Bluff, Tabarin Peninsula (BROW)

63˚32'S, 56˚55'W
Magnetic declination: 11.2˚E
Inventory subarea: NE
Inventory acronym: BROW
Species Diversity: MEDIUM
Site Sensitivity: MODERATE

Note: Restricted visitor space on landing beach with high tide, heavy snow or ice

Location — History — Features

An ice-capped, 745-meter-high, flat-topped mountain with a prominent cliff of reddish-brown volcanic rock on its N face, located 9 miles S of Hope Bay, and W of Jonassen Island, on the E side of the Tabarin Peninsula. On sunlit days, the towering bluff and blue sky are reminiscent of the "badlands" region of W North America, but with hordes of penguins dominating the scene. There is considerable erosion from upper slopes onto the almost 2-mile-long, rock and ash beach.

It appears that some discrete groups/colonies of Adélie penguins may have been obliterated by these rock falls and slides. Brown Bluff appears to be the exposure of an englacial volcano. The tuff cliffs are embedded with many lava "bombs," which appear to be basaltic with olivine minerals present. The towering rust-colored bluff dominates this landscape.

Landing Characteristics

Uncharted water near shore. Hazardous rocks along the shoreline may be exposed, depending on the tide. Zodiac landings along broad, long, cobble and ash beach, which has a N exposure and is prone to swells in N-NE wind. Very restricted visitor space with high tide or when shoreline caked with ice, crowding penguins into long lines marching to and from the water. More visitor space on a low or falling tide.

The narrow, E end of the landing beach is a major access route for penguins, strewn with rocks and rubble, and too congested to accommodate marching penguins, nesting gulls, and visitors; it should not be visited.

Higher slopes are eroding severely, with much loose scree and rubble. Rock falls have been frequent and, in places, penguin colonies straddle enormous lava bombs and boulders.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	January 22, 1996	RN BH	Endurance
2.	February 10, 1996	BH RP	Livonia
3.	January 13, 1999	RN SF	Endurance
4.	November 25, 1999	LB BP	Cal Star
5.	December 15, 1999	RN	Cal Star
6.	December 11, 2000	RN	Cal Star
7.	December 25, 2000	SF	Cal Star
8.	January 9, 2001	SF	Cal Star
9.	February 2, 2001	RN	Cal Star
10.	December 11, 2001	RN SF CE	Endeavour
11.	December 22, 2001	JC LGC	Endeavour
12.	January 2, 2002	RP	Endeavour
13.	January 13, 2002	RP WT	Endeavour
14.	January 24, 2002	RD LS	Endeavour
15.	February 4, 2002	MM	Endeavour
16.	January 1, 2003	RP	Endeavour
17.	January 10, 2003	SF	Endeavour
18.	February 1, 2003	MM	Endeavour

Assessment and monitoring. Regular, site-wide censusing of gentoo penguins. Preliminary surveying. Aerial and ground photodocumentation achieved. Only preliminary estimates of Adélie penguin population; regular Adélie penguin census colonies not identified. Site-wide ground-survey of floral communities not achieved.

Fauna — Flora — Censuses

Penguins & flying birds. Adélie and gentoo penguins, kelp gulls, pintado petrels are confirmed breeders. Snow petrels seen flying about the higher slopes and they may nest, but breeding not confirmed. A few skuas, spp. were observed, but breeding not confirmed.

No site-specific population data are reported in Woehler (1993).

Antarctic site Inventory censuses:

Adélie penguin (site-wide)

20,000	C3	1996 Jan

Gentoo penguin (site-wide)

617	N1	1999 Nov
567	N1	1999 Dec
668	C1	1999 Jan
756	N1	2000 Dec
511	C1	2001 Jan
450	N1	2001 Dec
409	C1	2002 Jan
764	C1	2003 Jan
483	N1	2003 Jan

In January 1996, the Adélie chicks were more than 95% in crèche, and the estimated, 200-250 gentoo chicks spanned a wide range of ages, from just out of brood to past 6 weeks and substantially molted.

Seals. Weddell seals observed hauled-out on the main beach below Brown Bluff.

Flora. Xanthoria, spp. and *Caloplaca*, spp. observed on exposed boulders from shoreline to an elevation of 606 feet. Some moss, spp. exposed at higher elevations near glacial drainage.

Conservation Aspects

Site sensitivities. Adélie penguins nest in large numbers and tightly packed colonies above and uphill of the landing beach, and on terraces and ridges extending to the W end; they are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Gentoo penguins nest on flat terraces and lower slopes above and toward the E end; they are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Kelp gulls nest in widely scattered locations and are easily approached and disturbed; in November and early December adults will be incubating eggs and, subsequently, guarding and provisioning chicks. Snow petrels and Wilson's storm-petrels nest in rock crevices and loose scree at higher elevations.

Pointers for avoiding disruptions.

- Do not impede penguins' access to and from the water.
- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Walk slowly and carefully around nesting gulls.
- Strictly control hikes to higher elevations by organizing guided groups, all following the same path, and not allowing any free wandering.
- Stay clear of — and do not visit — the narrow, E end of the landing beach, which provides a major access route for penguins, is strewn with rocks and rubble, and is very congested.
- Stay clear of — and do not hike upon or wander over — the eroding, higher slopes.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-1994:	0	0
1994-95:	2	77
1995-96:	4	223
1996-97:	9	553
1997-98:	17	1,293
1998-99:	14	996
1999-2000:	29	1,959
2000-01:	29	2,507
2001-02:	28	2,386
2002-03:	31	2,534
14-Season Total	163	12,528

Proximate visitor sites. Hope Bay lies due N, Jonassen Island lies almost due E.

BROWN BLUFF

POINTERS FOR AVOIDING DISRUPTIONS

- DO NOT IMPEDE PENGUINS' ACCESS TO AND FROM THE WATER
- WALK SLOWLY AND CAREFULLY AROUND NESTING, CRÈCHING, OR MOLTING PENGUINS
- WALK SLOWLY AND CAREFULLY AROUND NESTING GULLS
- STRICTLY CONTROL HIKES TO HIGHER ELEVATIONS BY ORGANIZING GUIDED GROUPS, ALL FOLLOWING THE SAME PATH, AND NOT ALLOWING ANY FREE WANDERING
- STAY CLEAR OF — AND DO NOT VISIT — THE NARROW, E END OF THE LANDING BEACH, WHICH PROVIDES A MAJOR ACCESS ROUTE FOR PENGUINS, IS STREWN WITH ROCKS AND RUBBLE, AND IS VERY CONGESTED
- STAY CLEAR OF — AND DO NOT HIKE UPON OR WANDER OVER — THE ERODING, HIGHER SLOPES

Camp Hill (HILL)

63˚41'S, 57˚52'W
Magnetic declination: 11.9˚E
Inventory subarea: NE
Inventory acronym: HILL
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Small, ice-free hill, 120 meters in elevation, located 2 miles E of Church Point on S side of the Trinity Peninsula. Charted in 1946 by the Falklands Islands Dependencies Survey and named for geological camp established at base of this hill.

Landing Characteristics

Broad landing beach below this ice-free hill. All access inland is uphill, and often steep.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	February 20, 2002	RN	Endeavour
2.	February 17, 2003	MB	Endeavour

Assessment and monitoring. Preliminary surveying.

Fauna — Flora — Censuses

Penguins & flying birds. Antarctic terns observed feeding a chick on the landing beach; no nests observed. Kelp gulls and south polar skuas also observed, but breeding not confirmed.

Seals. Weddell seal observed on the landing beach.

Flora. Scattered large patches of *Usnea* lichens at higher elevations and inland, and many crustose lichens (*Caloplaca*, *Xanthoria, Verrucaria*, spp.) on jagged, seaward-facing rocks.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-2002:	0	0
2002-03:	1	100
14-Season Total	1	100

Note: Inventory researchers visited this site from a tour ship during the 2001-02 season; however, this landing is, inexplicably, not listed in the NSF compilations.

Proximate visitor sites. On the Trinity Peninsula: Jade Point, Crystal Hill, Bald Head, and View Point; Cape Burd on the Tabarin Peninsula; Devil Island; and False Island Point on Vega Island.

Cape Burd (BURD)

63˚39'S, 57˚09'W
Magnetic declination: 11.4˚E
Inventory subarea: NE
Inventory acronym: BURD
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Low rock cliff forming the SW extremity of the Tabarin Peninsula at the NE end of the Antarctic Peninsula. Charted by Falklands Islands Dependencies Survey and named for Falklands Islands Dependencies Survey meteorologist who perished when the base hut at Hope Bay burned in 1948.

Landing Characteristics

Landing onto barren, rocky shore of volcanic ash mixed with pyroclasts of many sizes. Continental landing on the Tabarin Peninsula.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. January 27, 2001 RD Cal Star

Assessment and monitoring. Preliminary surveying.

Fauna — Flora — Censuses

Penguins & flying birds. One gentoo penguin noted during the Inventory visit. Skuas (spp.) and southern giant petrels also observed, but no confirmed breeding of any penguin or flying bird species.

Seals. Weddell seal hauled-out on the landing beach.

Flora. Scattered moss patches observed. No lichens noted.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-2001:	0	0
2000-01:	0	0
2001-02:	1	107
2002-03:	0	0
14-Season Total	1	107

Proximate visitor sites. On the Trinity Peninsula: Jade Point, Crystal Hill, Bald Head, Camp Hill, and View Point; Devil Island; and False Island Point on Vega Island.

Crystal Hill (CRYS)

63˚39'S, 57˚54'W
Magnetic declination: 11.8˚E
Inventory subarea: NE
Inventory acronym: CRYS
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Ice-free hill, 150 meters in elevation, forming the summit of a headland between Bald Head and Camp Hill on the S side of the Trinity Peninsula. Named because crystals were collected at the foot of the hill by Falklands Island Dependencies Survey researchers.

Landing Characteristics

Broad landing beach below this ice-free hill. All access inland is uphill, and often steep.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. December 15, 1999 RN Cal Star

Assessment and monitoring. Preliminary surveying.

Fauna — Flora — Censuses

Penguins & flying birds. None observed.

Seals. Large numbers of crabeater seals swimming near shore.

Flora. None observed.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-1995:	0	0
1995-96:	4	352
1996-97:	2	165
1997-98:	0	0
1998-99:	1	94
1999-2000:	6	526
2000-01:	0	0
2001-02:	0	0
2002-03:	1	53
14-Season Total	14	1190

Proximate visitor sites. On the Trinity Peninsula: Jade Point, Camp Hill, Bald Head, and View Point; Cape Burd on the Tabarin Peninsula; Devil Island; and False Island Point on Vega Island.

Devil Island (DEVI)

63˚48’S, 57˚17’W
Magnetic declination: 11.6˚E
Inventory subarea: NE
Inventory acronym: DEVI
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A narrow, 1-mile-long island with a low summit on each end, lying in the middle of a small bay one mile SE of Cape Well-Met, Vega Island, S of the NE end of the Antarctic Peninsula. The island was discovered and named by Nordenskjøld’s 1901-4 Swedish Antarctic Expedition. Access to this site depends on the extent of ice in Erebus & Terror Gulf.

Landing Characteristics

Cobble beach on N side of the island. Narrow cut passes to S side, yielding excellent views of Vega Island. There are many low-lying rocks just offshore, and substantial tidal action. The rocks necessitate careful approaches and the site may be inaccessible because of ice conditions. Adélie penguins nest on the N side.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	January 20, 1996	RN BH	Endurance
2.	February 23, 1997	RN ST	Explorer
3.	January 11, 2000	SF	Cal Star
4.	January 17, 2000	RD	Explorer
5.	January 10, 2001	SF	Cal Star
6.	January 11, 2001	SF	Cal Star
7.	January 12, 2002	RP WT	Endeavour
8.	January 24, 2002	RD LS	Endeavour
9.	January 20, 2003	RD	Endeavour
10.	February 17, 2003	MB	Endeavour

Assessment and monitoring. Preliminary surveying, mapping, censusing, and photodocumentation (aerial and tyerrestrial). Regular Adélie penguin census groups not yet identified.

Fauna — Flora — Censuses

Penguins & flying birds. Adélie penguins and Antarctic brown skuas are confirmed breeders. One nesting skua pair appeared to be of hybrid lineage. Kelp gulls and Wilson’s storm-petrels also flying about, but nesting was not confirmed.

No site-specific population counts are reported in Woehler (1993).

Antarctic Site Inventory censuses:

Adélie penguin

10,320	C2	1996 Jan
8,501	C1	2000 Jan

Seals. None observed.

Flora. Primarily *Xanthoria*, spp., with some *Caloplaca*, spp. mixed-in, on seaward-facing slopes. *Prasiola* and occasional moss, spp. patches also noted. Skuas utilized the moss patches for breeding.

Conservation Aspects

Site sensitivities. Adélie penguins may be approached readily, and landing beach may be crowded with penguins if ice packs the shoreline.

Pointers for avoiding disruptions:

- Do not impede penguins’ access to and from the water.
- Walk slowly and carefully around nesting, crèching, or molting penguins.

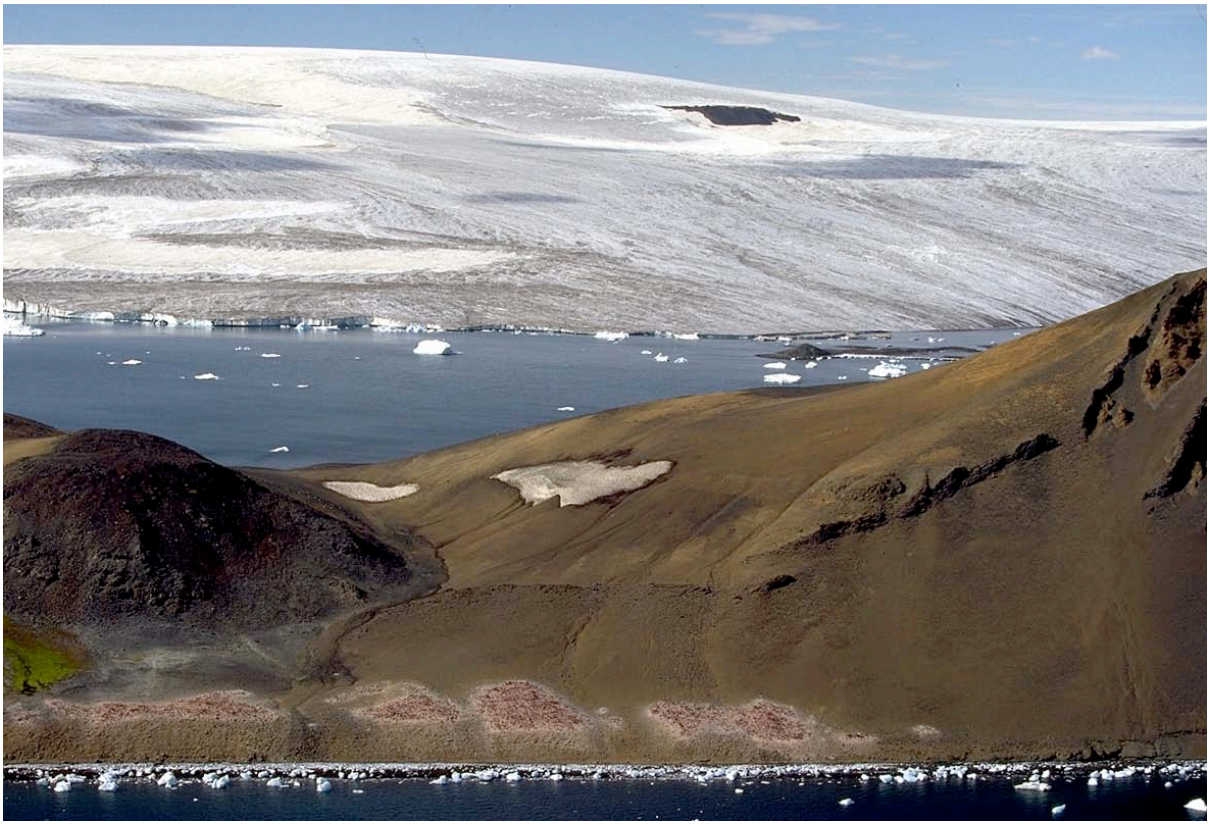
Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-1995:	0	0
1995-96:	4	352
1996-97:	9	657
1997-98:	1	2
1998-99:	3	285
1999-2000:	14	1,270
2000-01:	2	195
2001-02:	12	1,249
2202-03:	12	954
14-Season Total	57	4,964

Proximate visitor sites. On the Trinity Peninsula: Jade Point, Crystal Hill, Bald Head, Camp Hill, and View Point; Cape Burd on the Tabarin Peninsula; and False Island Point on Vega Island.

DEVIL ISLAND



WEST End, facing S — Vega Is. in the background

POINTERS FOR AVOIDING DISRUPTIONS

- DO NOT IMPEDE PENGUINS' ACCESS TO AND FROM THE WATER
- WALK SLOWLY AND CAREFULLY AROUND NESTING, CRÈCHING, OR MOLTING PENGUINS

d'Urville Monument, Joinville Island (DURV)

63˚31'S, 58˚11'W
Magnetic declination: 12.0˚E
Inventory subarea: NE
Inventory acronym: DURV
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A conspicuous conical summit of 575 meters, at the SW end of Joinville Island, off the NE end of the Antarctic Peninsula. It was discovered by the British expedition led by Ross, 1839-43, and named by Ross for Capt. Jacques Dumont D'Urville, the French explorer who led his own Antarctic expedition (1837-40), and who first discovered land in the Joinville Island group.

Landing Characteristics

An alternative and very rarely visited site in the NE Peninsula subarea. The monument faces toward Petrel Cove on Dundee Island. The site involves steep hiking. Offshore rocks and islets also appear to have breeding penguins.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. February 10, 1996 RP BH Livonia

Assessment and monitoring. Preliminary surveying and censusing. Lacking a complete ground survey of penguin colonies and floral communities. No photodocumentation.

Fauna — Flora — Censuses

Penguins & flying birds. Adélie and gentoo penguins are confirmed breeders.

No site-specific penguin populations are reported in Woehler (1993) and Woehler & Croxall (1996); however, the overall Adélie penguin population estimated for Joinville Island: 35,000 nests A3, 1953.

On Feb 10, 1996 at least 300-400 gentoo chicks were observed near the landing beach. Adélies are relatively common, but a more detailed census is needed.

Seals. A single Weddell seal observed on the landing beach.

Flora. None noted.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-1994:	0	0
1994-95:	1	33
1995-96:	0	0
1996-97:	0	0
1997-98:	1	74
1998-99:	0	0
1999-2000:	0	0
2000-01:	0	0
2001-02:	0	0
2002-03:	0	0
14-Season Total	2	107

Proximate visitor sites. Paulet Island is located on the SE side of Dundee Island.

Eagle Island (EAGL)

63˚40’S, 57˚29’W
Magnetic Declination: 11.6˚ E
Inventory subarea: SO
Inventory acronym: EAGL
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

An island that is 5 miles long and 4 miles wide, rising to 560 meters on the NE side. It is the largest island in an archipelago that lies between Trinity Peninsula and Vega Island, and was probably seen for the first time by J. Gunnar andersson of the 1901-04 Swedish Antarctic Expedition. It is named after a ship used by the Falkland Islands Dependency Survey.

Landing Characteristics

The landing beach on the E side is a cobble and shingle beach intermixed with sand. Many granitic boulders lie on site. The first shelf above the beach is covered with *Caloplaca* spp., with *Usnea* spp. at higher elevations. Above ther beach are mesa formations of tuff, similar to the geology at Brown Bluff. Volcanic bombs are present in the tuff. The beach has many mummified seals and this appears to be a major tidal feeding area for kelp gulls, skuas, and Antarctic terns. The birds were observed feeding on krill, sea stars, urchins, amphipods, and limpets.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. December 31, 2002 RP Endeavour

Assessment and monitoring. Preliminary surveying. No aerial photodocumentation.

Fauna — Flora — Censuses

Penguins & flying birds. No breeding observed. Gentoo penguin, kelp gulls, skua spp., and Antarctic terns observed.

Seals. None noted.

Flora. *Prasiola crispa*, *Xanthoria* spp., *Caloplaca* spp., and *Usnea* spp. observed.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-2002:	0	0
2002-03:	1	104
14-Season Total	1	104

Proximate visitor sites. Camp Hill, Crystal Hill, Bald Head, Jade Point, Devil Island, and False Island Point on Vega Island.

Eden Rocks (EDEN)

63˚29'S, 55˚40'W
Magnetic declination: 10.4˚E
Inventory subarea: NE
Inventory acronym: EDEN
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Two rocks located off the E end of Dundee Island, and N of Paulet Island. Ross reported a small island here in 1842, and he named it for a captain in the Royal Navy.

Landing Characteristics

Visitor landings are unlikely because of ice conditions and uncharted waters. Zodiac tours may be possible.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. December 1, 1996 RN SF W. Discoverer

Assessment and monitoring. Preliminary surveying and population estimates. Regular Adélie penguin census colonies not identified. Preliminary ground and aerial photodocumentation achieved. Lacking a complete ground survey of penguin colonies and floral communities.

Fauna — Flora — Censuses

Penguins & flying birds. Adélie penguins are confirmed breeders.

Antarctic Site Inventory censuses:

Adélie penguin (W colony)
19,649 – 20,785 N3 1996 Dec

Adélie penguin (E colony)
24,600 – 28,905 N3 1996 Dec

Adélie penguin (site-wide)
44,249 - 49,460 N3 1996 Dec

These represent the first-reported penguin population estimates for this site.

Seals. None observed.

Flora. None noted.

Conservation Aspects

Site sensitivities. Adélie penguins are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche.

Pointers for avoiding disruptions.

- Do not impede penguins' access to and from the water.
- Walk slowly and carefully around nesting, crèching, or molting penguins.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
14-Season Total	0	0

Proximate visitor sites. Paulet Island is located five miles to the S.

False Island Point, Vega Island (FALS)

63˚55'S, 57˚20'W
Magnetic declination: 11.7˚E
Inventory subarea: NE
Inventory acronym: FALS
Species Diversity: MEDIUM
Site Sensitivity: LOW

Location — History — Features

Headland one mile long and 0.5 miles wide, connected by a low, almost unnoticeable isthmus to the S side of Vega Island. First sighted in 1902 and charted as an island by Nordenskjøld's Swedish Antarctic Expedition. Determined to be part of Vega Island by the Falklands Islands Dependencies Survey in 1945.

Landing Characteristics

Rocky beach with large cobble. Access inland is uphill.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 10, 2001	RN SF CE	Endeavour
2.	January 31, 2003	MM	Endeavour

Assessment and monitoring. Preliminary censusing and ground photodocumentation. Lacking a complete ground survey of nesting birds and floral communities.

Fauna — Flora — Censuses

Penguins & flying birds. South polar skua confirmed breeding. Wilson's storm-petrel and snow petrel confirmed breeding in high scree at SE end of the Point, overlooking Pastorizo Bay. Kelp gulls and Antarctic terns also observed, but breeding not confirmed.

Seals. Weddell seals observed on nearby ice floes.

Flora. Scattered, occasionally dense moss patches in snow melt gullies. *Usnea*, spp. and *Xanthoria*, spp. Also noted.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-2002:	0	0
2002-03:	1	98
14-Season Total	1	98

Note: Inventory researchers visited this site from a tour ship during the 2001-02 season; however, this landing is, inexplicably, not listed specifically in the NSF compilations for that season; however, 1 zodiac landing and 72 participating visitors are listed for Vega Island)

Proximate visitor sites. On the Trinity Peninsula: Jade Point, Crystal Hill, Bald Head, Camp Hill, and View Point; Cape Burd on the Tabarin Peninsula; and Devil Island.

Heroína Island

63˚24'S, 54˚36'W
Magnetic declination: 9.7˚E
Inventory subarea: NE
Inventory acronym: HERO
Species Diversity: MEDIUM
Site Sensitivity: LOW

Note: Restricted visitor space

Location — History — Features

This small island marks the NE end of the Danger Islands group. It is named by the Argentine Antarctic expedition of 1948-49 for the expedition ship Heroína.

Landing Characteristics

Uncharted water offshore and near shore. Passage may be totally blocked by ice. Hazardous rocks along the shoreline may be exposed, depending on tide. Landing on rocks along W side of the island; coast may be packed with ice, depending on wind and swell, and snow cover may be extensive. Very restricted visitor space because of difficult terrain, slippery conditions, and extremely high density of penguins.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 1, 1996	RN SF	W. Discoverer
2.	January 21, 2000	RN	Shuleykin

Assessment and monitoring. Preliminary surveying and population estimates. Regular Adélie penguin census colonies not identified. Preliminary ground level and aerial photodocumentation. More complete ground survey of floral communities is needed.

Fauna — Flora — Censuses

Penguins & flying birds. Adélie and gentoo penguins are confirmed breeders. Large numbers of snowy sheathbills suggest breeding, but no nests observed. Kelp gulls, skuas (spp.), and blue-eyed shags observed, but no nests discovered. The gentoo penguins breed on the "tabletop" of this island, representing the first recorded gentoo breeding site in the Weddell Sea, and the easternmost gentoo nesting site in the Antarctic Peninsula. All of the gentoos were on eggs, with only 2-egg clutches noted. On the January 2000 visit, Inventory researchers found Adélie penguin chicks were at 3-4 weeks of age and beginning to crèche, and that gentoo penguin chicks were tightly crèched; however, time constraints prevented a site-wide census on this occasion.

Woehler (1993) reports ≥5 Adélie colonies in the Danger Island group, but without a specific estimate or census listed for Heroína Island. From aerial photodocumentation of the Danger Island group in January 1999, very large (20,000 to 99,999 breeding pairs) to extra large (>100,000 breeding pairs) numbers of Adélie penguins appear to be present on Beagle Island and Darwin Island in the Danger Islands group. With respect to other islands in this group, large (7,500 to 19,999 breeding pairs) numbers of Adélie penguins appear to be present on Platter Island, while Comb Island appears to have small (100 to 999 breeding pairs) to medium (1,000 to 7,499 breeding pairs) numbers of Adélie penguins breeding on its eroding slopes.

Antarctic Site Inventory censuses:

Gentoo penguin (site-wide)
215 N1 1996 Dec

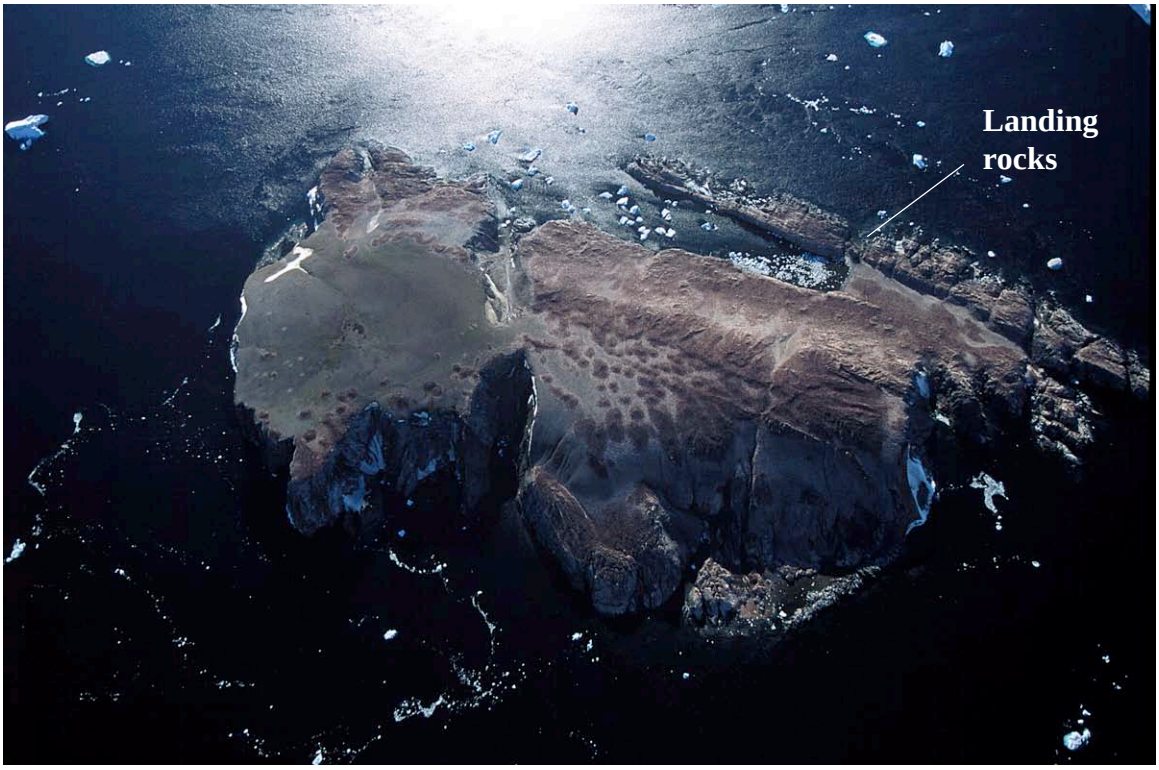
Adélie penguin (site-wide)
285,115 –305,165 N2 1996 Dec

These represent the first-reported penguin population data for this site.

Seals. A single Weddell seal observed on the landing beach.

Flora. None noted.

HEROÍNA ISLAND



POINTERS FOR AVOIDING DISRUPTIONS

- AVOID CONGESTION BY ALTERNATING ZODIAC TOURS WITH BRIEF LANDINGS, AT STAGGERED INTERVALS, ASHORE
- WALK SLOWLY AROUND ALL NESTING PENGUINS, ENSURING AT ALL TIMES THAT PENGUINS' ACCESS UP AND DOWN THE SLOPES IS NOT IMPEDED
- DO NOT IMPEDE PENGUINS' ACCESS TO AND FROM THE WATER
- STRICTLY CONTROL ANY HIKES UPHILL BY ORGANIZING GUIDED, WELL SPACED GROUPS, ALL FOLLOWING THE SAME PATH, AND NOT ALLOWING ANY FREE WANDERING
- AVOID AND STAY CLEAR OF ANTARCTIC FUR SEALS, WHICH SHOULD BE GIVEN A WIDE BERTH AND SHOULD NOT BE APPROACHED

Conservation Aspects

Site sensitivities. Adélie penguins nest in enormous numbers, occupying much of the available space on slopes and ridges leading to the flat top of the island; they are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Gentoo penguins nest on the flat top of the island; they are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks. Antarctic fur seals may be present.

Pointers for avoiding disruptions.

- Avoid congestion by alternating zodiac tours with brief landings, at staggered intervals, ashore.
- Walk slowly around all nesting penguins, ensuring at all times that penguins' access up and down the slopes is not impeded.
- Do not impede penguins' access to and from the water.
- Strictly control any hikes uphill by organizing guided, well spaced groups, all following the same path, and not allowing any free wandering.
- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	**Participating Visitors**
1989-1996:	0	0
1996-97:	1	90
1997-98:	1	37
1998-99:	2	85
1999-2000:	0	0
2000-01:	0	0
2001-02:	0	0
2002-03:	0	0
14-Season Total	4	212

Note: These numbers do not include 7 visits and 240 visitors to the "Danger Islands" that are listed in the NSF compilations for the 1996-97 season, because it is unclear whether Heroína Island or another island in this group was visited.

Proximate visitor sites. Heroína Island is located approximately 35 miles E-NE of Eden Rocks.

Hope Bay/Esperanza Station Vicinity (HOPE)

63˚23'S, 57˚00'W
Magnetic declination: 12.0˚E
Inventory subarea: NE
Inventory acronym: HOPE
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

This is a 3-mile-long, 2-mile-wide bay indenting the NE tip of the Antarctic Peninsula, and opening onto Antarctic Sound. It was discovered by Nordenskjøld and the Swedish Antarctic expedition in 1902, and named in honor of the winter spent there by expedition members Andersson, Duse, and Grunden. The remains of their hut are found near the boat jetty that is often used by visitors. The ground surface leading to the hut consists of fragmented slate. The Argentine Esperanza Station occupies a gently sloping area beyond the hut, and near to the end of Hope Bay. Behind the station the ground surface rises to an extensive plateau and lake. The peak above and behind the Argentine station exhibits a well-developed cirque in its center with a small glacier extending down the slope toward the station.

Just beyond the boat jetty is the stone hut built by the Swedish Expedition in January 1903, which has been designated as an Antarctic Historic Site and Monument. Nearby is another Historic Site and Monument — a bust of General San Martin, a grotto with a statue of the Virgin of Lujan, and a flag mast — erected by the Argentines in 1955. There is a graveyard memorializing members of Argentine expeditions who have died in the area.

Landing Characteristics

A fairly regularly visited scientific station, with a very large, resident population of Adélie penguins. The remains of the hut from the Nordenskjøld expedition lends historical significance to this site. In recent years, the Adélie colonies close to the boat jetty utilized by tourists have been cordoned off to minimize disruptions; these same colonies abut the station's helicopter landing pad.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 10, 1995	BH	W. Discoverer
2.	January 15, 1996	RN BH	Endurance
3.	December 8, 1998	RN SF	Explorer

Assessment and monitoring. None.

Fauna — Flora — Censuses

Penguins & flying birds. Adélie penguins are confirmed breeders. Snowy sheathbills commonly observed among the Adélies and may breed.

Recent Hope Bay Adélie penguin census data reported in Woehler (1993): 123,850 N2, 1985.

Seals. None observed.

Flora. None noted.

Conservation Aspects

Site sensitivities. None noted.

Pointers for avoiding disruptions. Restricted visitor space (Adélie penguins near to the landing jetty are now cordoned off to protect these nearby rookeries from visitor intrusions)

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	1	145
1990-91:	3	1,130
1991-92:	9	1,278
1992-93:	3	209

	Zodiac Landings	Participating Visitors
1993-94:	17	1,801
1994-95:	11	907
1995-96:	17	1,476
1996-97:	7	710
1997-98:	10	1,210
1998-99:	9	1,031
1999-2000:	12	1,138
2000-01:	14	1,404
2001-02:	12	1,323
2002-03:	12	1,508
14-Season Total	137	15,270

Proximate visitor sites. Brown Bluff is due S on the N edge of the Tabarin Peninsula.

Jade Point (JADE)

63˚36'S, 57˚35'W
Magnetic declination: 11.7˚E
Inventory subarea: NE
Inventory acronym: JADE
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Gently sloping, rocky point forming the S limit of Eyrie Bay in the Trinity Peninsula. Named because of its lower, green-tinged, ice slopes.

Landing Characteristics

Rocky, morainal landing beach. Continental landing on the Trinity Peninsula.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 22, 2001	JC LC	Endeavour
2.	January 2, 2002	RP	Endeavour

Assessment and monitoring. Preliminary surveying.

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo and Adélie penguin, Wilson's storm-petrel, kelp gull, south polar skua, and Antarctic tern observed, but none observed breeding.

Seals. Weddell and leopard seals on nearby ice floes and offshore.

Flora. None noted.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
14-Season Total, 1989-2003	0	0

Note: Inventory researchers visited this site twice from a tour ship during the 2001-02 season; however, these landings are, inexplicably, not listed in the NSF compilations.

Proximate visitor sites. On the Trinity Peninsula: Crystal Hill, Bald Head, Camp Hill, Crystal Hill, and View Point; Cape Burd on the Tabarin Peninsula; Eagle Island; Dcvil Island; and False Island Point on Vega Island.

Jonassen Island (JONA)

63˚33'S, 56˚40'W
Magnetic declination: 12.0˚E
Inventory subarea: NE
Inventory acronym: JONA
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A 2.5-mile-long island, lying N of Andersson Island in the S entrance to Antarctic Sound, off the NE tip of the Antarctic Peninsula. Originally called Irizar Island by Nordenskjøld, who named it for the Argentine captain whose ship, the *Uruguay*, rescued the shipwrecked Swedish Antarctic expedition in 1903. However, in 1904, Charcot gave the name Irizar to an island of the W coast of the Antarctic Peninsula, being totally unaware of the Swedish naming. Because the name of the latter island received wider use, the small island at the entrance to Antarctic Sound was renamed in honor of Ole Jonassen, who accompanied Nordenskjøld on his two major sledge journeys in 1902-3.

At higher elevations, an excellent view of the strait between Jonassen Island and the Tabarin Peninsula.

Landing Characteristics

More suitable for zodiac touring than for shore landings. The cobble shoreline is slippery and there are few access points that avoid the gentoos nesting on this steep hillside.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 10, 1995	BH SF	W. Discoverer
2.	January 30, 1996	RN BH	Endurance
3.	December 22, 2001	JC LGC	Endeavour

Assessment and monitoring. Preliminary surveying. Unclear whether Adélie penguin colony reported in 1901 is still extant.

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo penguins and kelp gulls are confirmed breeders. Adélie penguins also observed on shore and chinstrap penguins observed cruising offshore, but nests of neither species found. Many pintado and snow petrels flying about, and these species may breed in the island's higher reaches.

Woehler (1993) reports "large" Adélie penguin colony observed in 1901, but it was not relocated by Inventory researchers during 1995-96 visits. The 1901 reference also notes 20 breeding pairs of gentoo penguins.

Antarctic Site Inventory censuses:

Gentoo penguin
233 C1 1996 Jan

Seals. None observed.

Flora. Xanthoria, spp., *Caloplaca*, spp., and *Usnea*, spp. noted.

Conservation Aspects

Site sensitivities. Difficult walking over cobble, and many of the penguins located upslope and in hard-to-reach places.

Pointers for avoiding disruptions.

- Walk slowly around all nesting penguins, and do not impede their access to the sea.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
14-Season Total	0	0

Proximate visitor sites. Brown Bluff is located to the E.

Madder Cliffs, Joinville Island (MADD)

63˚18'S, 56˚29'W
Magnetic Declination: 10.8˚ E
Inventory subarea: SO
Inventory acronym: MADD
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Reddish rock cliffs rising steeply from the sea to >300 meters and forming the N side of the entrance to Suspiros Bay, at the W edge of Kinnes Cove and the W end of Joinville Island. The name reflects the red color of the rocks, madder being a red vegetable dye. Adelie penguin colony along exposed, scree and tuff ridges above the rocky beach.

Landing Characteristics

Near the glacier, on the W edge of a very slick boulder beach, strewn with limpet shells, which rises steeply to a high ridge and peak. During the Inventory visit, there were snowfields above the beach, which penguins use to reach the sea.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. January 21, 2003 RD Endeavour

Assessment and monitoring. Preliminary surveying. No aerial photodocumentation.

Fauna — Flora — Censuses

Penguins & flying birds. Adelie penguin, gentoo penguin, kelp gull, and snowy sheathbill are confirmed breeders.

Seals. None noted

Flora. *Prasiola crispa* and snow algae noted.

Conservation Aspects

Site sensitivities. Difficult walking on the beach and uphill, and many of the penguins located upslope on exposed ridges ande knolls.

Pointers for avoiding disruptions.

- Walk slowly around all nesting penguins, and do not impede their access to the sea.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-2000:	0	0
2000-01:	1	92
2001-02:	0	0
2002-03:	1	93
14-Season Total	2	185

Proximate visitor sites. D'Urville Monument.

Marambio Station Vicinity, Seymour Island (SEYM)

64˚13'S, 56˚38'W
Magnetic declination: 12.0˚E
Inventory subarea: NE
Inventory acronym: SEYM
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

This is the Argentine research station found on the NE end of Seymour Island, a barren, 10-mile long and 5-mile-wide island lying one mile NE of Snow Hill Island, at the S margin of Erebus & Terror Gulf. Seymour's NE end was first seen by Ross in January 1843. The barren area to the N of the station is where many important fossil discoveries have been made. A remarkably barren clay and mud landscape, laden with snail and shell fossils, where fossil penguin bones have been found.

Landing Characteristics

Inventory researchers visited the muddy, barren landscape of the N end of Seymour Island, in the course of helicopter reconnaissance. Zodiac landings appear possible. While devoid of life, the unusual landscape provides a glimpse into Antarctica's much warmer past.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. January 25, 1996 RN BH Endurance

Assessment and monitoring. Only preliminary censusing and ground photodocumentation has been accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. No confirmed nesting. Antarctic terns were observed and may nest in the vicinity.

No site-specific penguin populations are reported in Woehler (1993); the Adélie penguin count of 21,954 N2, 1985, reported for Seymour Island presumably pertains to the colony at Penguin Point on the SE side of the island.

Seals and flora. None noted.

Conservation Aspects

Site sensitivities. Area where rare fossils have been discovered is easily trampled and eroded.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-2000:	0	0
2000-01:	4	128
2001-02:	0	0
2002-03:	0	0
14-Season Total	4	128

Proximate visitor sites. Penguin Point, Seymour Island, lies to the SE. Snow Hill Island lies to the W.

Paulet Island (PAUL)

63˚35'S, 55˚47'W
Magnetic declination: 11.0˚E
Inventory subarea: NE
Inventory acronym: PAUL
Species Diversity: MEDIUM
Site Sensitivity: MODERATE Note: Restricted visitor space if high tide, creching penguins, heavy snow, or ice

Location — History — Features

A circular island, about 1.0 mile in diameter, lying 3 miles SE of Dundee Island, off the NE end of the Antarctic Peninsula. Paulet is the site of an enormous Adélie penguin colony. The island was discovered by Ross's British expedition (1839-43), and named by Ross for a captain in the Royal Navy. Paulet consists of a distinct volcanic cone, 1,158 feet high. The landing beach on the N side of the island contains rounded, mainly spherical boulders and pebbles of basalt and scoriae. Well to the E of the landing beach is a memorial cross marking the grave of one of the members of the Nordenskjøld expedition who died here, and the remains of the hut in which these explorers overwintered may be found above the landing beach. Beyond and above the hut is a substantial ovoid-shaped lake, several hundred feet long and about half that width, which appears to be in the crater of the old volcano. The ridge above the landing (upon which the remains of the hut are located) is made up entirely of rounded boulders, pebbles, and even bomb-shaped fragments. This ridge slopes up gently to a steeper hillside leading around the lake.

There are many Adélies around the lake and on the elevated ridge between the lake and a basaltic stack NE of the landing beach. This stack contains sheathbill and shag nests, and sits opposite a large shag colony that covers a steep ridge on an interior hillside. Beyond this rock stack is a flat terrace that forms an apron around the N and NE side of the island. Enormous numbers of Adélies nest on this apron and on the ridges above. The ground surface consists of cinders and pebbles in a muddy, guano-rich soil. The steep ridge that houses the large shag colony is underlain by solid basalt. Angular slabs of thin cryoturbated (broken and churned by freezing and thawing) basalt are common, and were used by the Nordenskjøld expedition members to build their emergency hut.

On site is an Antarctic Historic Site and Monument, the stone hut built in February 1903 by C. A. Larsen, Norwegian captain of the wrecked vessel *Antarctic* of the Swedish Antarctic Expedition, led by Otto Nordenskjøld, and the grave of a member of that expedition.

This small island in the W Weddell Sea is normally the home to at least 60,000 breeding pairs of Adélie penguins. It is also the site of an historical hut and burial marker from the ill-fated Nordenskjøld expedition. The landing site is on the N central side of the island, and access is often impeded by ice. Anchoring is generally impossible because of the fast flowing ice and currents. Leopard seals often may be found offshore of the landing site. In normal circumstances, Paulet presents a very major challenge: the Adélies are tightly grouped and often difficult to access, especially when the beach is caked with ice, or later in the breeding season, when penguin chicks break crèche and move to the beach. In the 1994-95 austral summer, Paulet experienced a site-wide Adélie breeding crash, with many dead chicks strewn about and relatively small numbers of undersized chicks gasping for food. Normally, in mid-summer, this site is awash in chicks, guano, and mud. In the 1994-95 season, blue-eyed shags also failed. The causes for the abject breeding failures are unclear, although suspicions suggest krill stock fluctuations in the penguins' and shags' normal foraging areas or, because of a "high ice" winter, the penguins and shags found Paulet difficult to reach and were much delayed in starting their breeding cycle.

Landing Characteristics

Uncharted water near shore. Cobble landing beach on N coast may be packed with ice, depending on wind and swell. More visitor space on a low or falling tide; otherwise, space is very restricted. Landing beach difficult to negotiate when snow- or ice-covered or wet, and especially in January after Adélie penguin chicks break crèche and move seaward. Access inland is uphill and immediately places visitors in close proximity to nesting penguins. Late in the season, Antarctic fur seals may be present, and in large numbers. Historic Nordenskjøld expedition hut located inland above the landing beach, with an ovoid-shaped melt lake beyond and S of the hut.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	January 22, 1995	RN	Explorer
2.	November 30, 1995	RN LB	Explorer
3.	December 9, 1995	BH	W. Discoverer

4.	January 16, 1996	RN BH	Endurance
5.	January 31, 1996	RN BH	Endurance
6.	November 27, 1996	RN WT	Explorer
7.	December 1, 1996	RN	W. Discoverer
8.	December 31, 1996	LB	Hanseatic
9.	January 21, 1999	RN RD ST	Vavilov
10.	November 25, 1999	LB BP	Cal Star
11.	December 14, 1999	RN	Cal Star
12.	January 21, 2000	RN	Shuleykin
13.	December 11, 2000	RN	Cal Star
14.	December 25, 2000	SF LF	Cal Star
15.	January 9, 2001	SF	Cal Star
16.	January 26, 2001	RD	Cal Star
17.	February 2, 2001	RN	Cal Star
18.	December 11, 2001	RN SF CE	Endeavour
19.	December 21, 2001	JC LGC	Endeavour
20.	January 25, 2002	RD LS	Endeavour
21.	February 3, 2002	MM	Endeavour
22.	February 20, 2002	RN	Endeavour
23.	January 10, 2003	SF	Endeavour
24.	January 20, 2003	RD	Endeavour
25.	February 1, 2003	MM	Endeavour
26.	February 16, 2003	MB	Endeavour

Assessment and monitoring. The Inventory undertakes regular censusing of blue-eyed shags and specific Adélie penguin groups.

Fauna — Flora — Censuses

Penguins & flying birds. Adélie penguins, blue-eyed shags, kelp gulls, and snowy sheathbills are confirmed breeders. Both snow and Wilson's storm-petrels commonly course the higher scree and are strongly suspected to be breeding. There is a noticeable paucity of skuas, spp.; none were found nesting and very few were observed harassing penguins. Kelp gulls also observed but it is unclear whether they actually nest on site.

Recent Adélie penguin census data reported in Woehler (1993): 60,000 A3, 1984.

Antarctic Site Inventory censuses:

Adélie penguin ("hut" colony)

216	C1	1995 Jan
502	N1	1995 Nov
447	N1	1995 Dec
559	N1	1996 Nov
609	N1	1999 Nov
458	C1	2000 Jan
522	N1	2000 Dec
472	C1	2001 Jan
373	N1	2001 Dec
252	C1	2002 Jan
238	C1	2002 Feb
573	C1	2003 Jan

Adélie penguin (large colony contiguous to landing site, Nordenskjøld hut)

75,000	N2	1999 Jan

Adélie penguin (NE canyons, far removed from landing site area)

20,000-30,000	N3	1999 Jan

Adélie penguin (site-wide estimate)

95,000-105,000	N2/3	1999 Jan

Blue-eyed shag		
432	N1	1995 Nov
326	N1	1996 Nov
360	N1	1996 Dec
377	N2	1999 Nov
291	N1	2000 Dec
265	C1	2001 Jan
297	N1	2001 Dec
273	N1	2003 Jan
524	C1	2003 Jan

Seals. Weddell seals and Antarctic fur seals have hauled-out on the landing beach, and leopard seals often may be found hunting offshore.

Flora. Xanthoria, spp. may be found on exposed slopes.

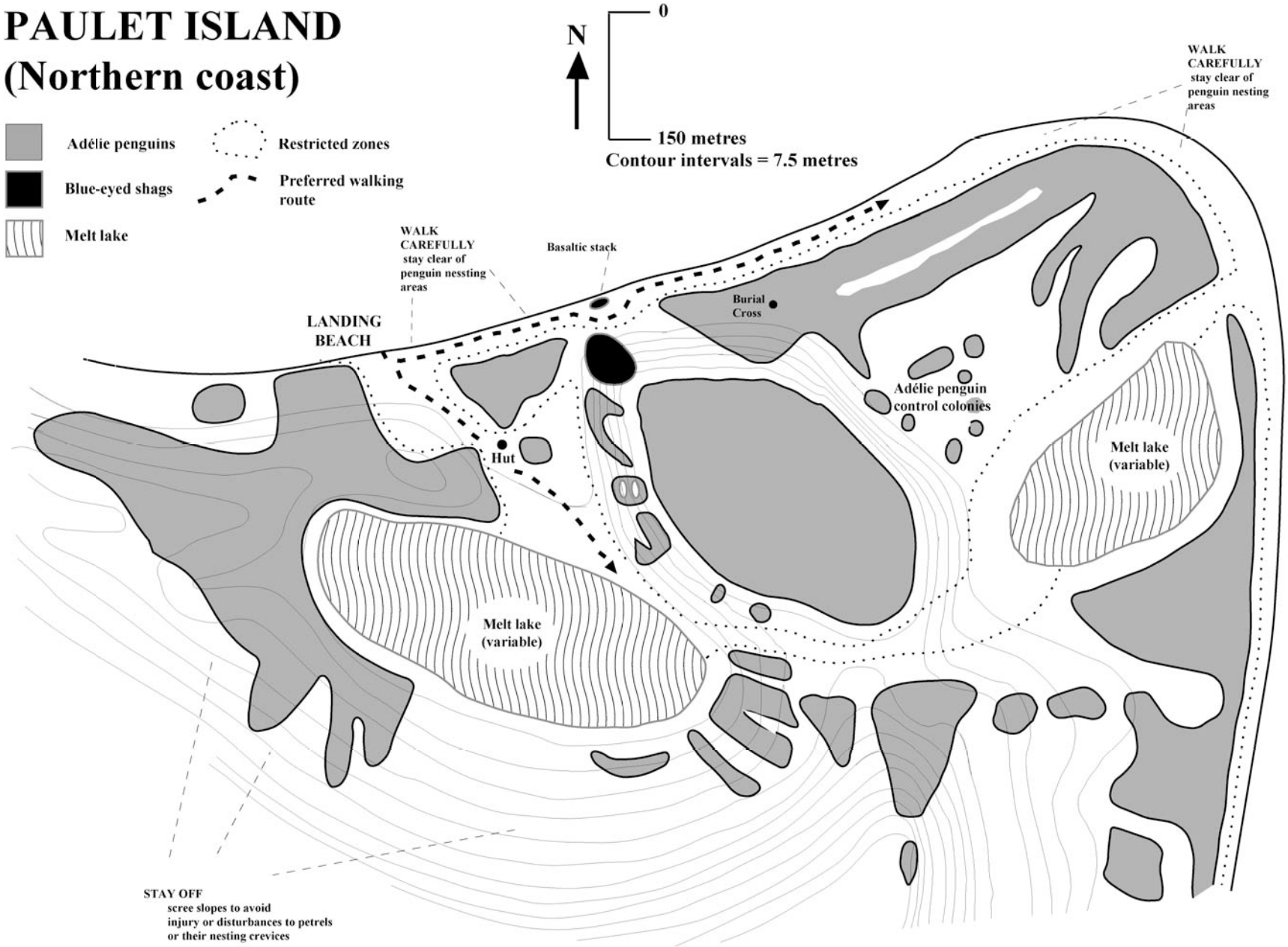
Conservation Aspects

Site sensitivities. Adélie penguins nest in large numbers and large, tightly packed colonies immediately above and uphill of the landing beach, on slightly elevated terraces surrounding the entire N coast, and on inland slopes and ridges; they are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Adélie penguins also nest in steep, rubble-strewn canyons on far NE end of the island; they are not readily accessed, but are easily disturbed. Blue-eyed shags nesting on a basaltic, shoreline stack E of the landing beach and in a large, cliffside colony opposite this stack are easily approached and disturbed; in November and early December adults will be incubating eggs and, subsequently, guarding and provisioning chicks. Snowy sheathbills also nest on this basaltic, shoreline stack, and are easily approached and disturbed. Snow petrels and Wilson's storm-petrels nest in loose scree on steep slopes inland and W of the landing beach. As the penguin breeding season winds down, Antarctic fur seals begin to arrive, crowding onto beaches and elevated terraces.

Pointers for avoiding disruptions.

- Do not impede penguins' access to and from the water.
- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Walk slowly and carefully around nesting shags.
- Avoid and stay clear of penguins nesting in canyons on the NE end.
- Walk slowly and carefully around nesting sheathbills.
- Stay clear of — and do not hike upon or wander over — scree slopes and high ridges.
- When visitor space on the landing beach is restricted by high tide, ice, or swarms of penguins, strictly control landings by organizing guided, well spaced groups, all following the same path, and not allowing any free wandering.
- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.

PAULET ISLAND
(Northern coast)



PAULET ISLAND

POINTERS FOR AVOIDING DISRUPTIONS

- DO NOT IMPEDE PENGUINS' ACCESS TO AND FROM THE WATER
- WALK SLOWLY AND CAREFULLY AROUND NESTING, CRÈCHING, OR MOLTING PENGUINS
- WALK SLOWLY AND CAREFULLY AROUND NESTING SHAGS.
- AVOID AND STAY CLEAR OF PENGUINS NESTING IN CANYONS ON THE NE END
- WALK SLOWLY AND CAREFULLY AROUND NESTING SHEATHBILLS
- STAY CLEAR OF — AND DO NOT HIKE UPON OR WANDER OVER — SCREE SLOPES AND HIGH RIDGES
- WHEN VISITOR SPACE ON THE LANDING BEACH IS RESTRICTED BY HIGH TIDE, ICE, OR SWARMS OF PENGUINS, STRICTLY CONTROL LANDINGS BY ORGANIZING GUIDED, WELL SPACED GROUPS, ALL FOLLOWING THE SAME PATH, AND NOT ALLOWING ANY FREE WANDERING
- AVOID AND STAY CLEAR OF ANTARCTIC FUR SEALS, WHICH SHOULD BE GIVEN A WIDE BERTH AND SHOULD NOT BE APPROACHED

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	7	772
1990-91:	4	240
1991-92:	14	2,239
1992-93:	16	1,498
1993-94:	18	1,664
1994-95:	30	2,819
1995-96:	31	2,315
1996-97:	31	2,808
1997-98:	8	732
1998-99:	37	3,722
1999-2000:	49	4,230
2000-01:	19	1,905
2001-02:	38	3,357
2002-03:	21	1,916
14-Season Total	323	30,217

*Proximate visitor sites***.** D'Urville Monument may be found to the NW at Joinville Island. Jonassen Island and Brown Bluff lie to the W, Seymour and Snow Hill Islands to the SW.

Point Obelisk, James Ross Island (OBEL)

64˚08'S, 58˚27'W
Magnetic declination: 12.5˚E
Inventory subarea: NE
Inventory acronym: OBEL
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Located at the N end of the entrance to Röhss Bay on the W side of James Ross Island. Discovered by Nordenskjøld's Swedish Antarctic Expedition and named for a conspicuous rock pinnacle two miles within the headland, visible from the NW and S.

Landing Characteristics

Barren landing beach.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. January 1, 2002 RP Endeavour

Assessment and monitoring. Only preliminary censusing and ground photodocumentation has been accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. Pairs of kelp gull and south polar skua acting defensively, but no nests discovered.

Seals. None observed.

Flora. Scattered moss beds. *Xanthoria*, spp., *Usnea*, spp., *Mastodia*, spp., and *Caloplaca*, spp. noted.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
14-Season Total, 1989-2003	0	0

Note: Inventory researchers visited this site from a tour ship during the 2001-02 season; however, this landings is, inexplicably, not listed in the NSF compilations.

Proximate visitor sites. On James Ross Island: Rum Cove, Brandy Bay, Cape Gage, Cape Lachman, Comb Ridge, Gin Cove, and Holluschickie Bay; and Persson Island.

Penguin Point, Seymour Island (PEPO)

64˚19'S, 56˚43'W
Magnetic declination: 12.0˚E
Inventory subarea: NE
Inventory acronym: PEPO
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Located SE of the Argentine Marambio station, this site has remarkably barren clay and mud landscape and a large colony of Adélie penguins sprawled along mud slopes rising from the site's landing beach.

Landing Characteristics

The muddy, barren landscape is similar to that on the N part of the island. The landing site is regularly impeded by ice.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. February 19, 2002 RN Endeavour

Assessment and monitoring. Preliminary censusing and ground photodocumentation accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. Adélie penguins are confirmed breeders.

Woehler (1993) reports Adélie penguin census data for Seymour Island: 21,954 N2, 1985, which, presumably, pertains to the colony at Penguin Point.

Seals. Weddell seal and Antarctic fur seal hauled-out on cobble beach.

Flora. Need to be surveyed.

Conservation Aspects

Site sensitivities. Adélie penguins are easily approached and disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins, and do not impede their access to the sea.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	1	86
1992-93:	1	85
1993-94:	2	129
1994-95:	1	41
1995-96:	0	0
1996-97:	0	0
1997-98:	0	0
1998-99:	0	0
1999-2000:	0	0
2000-01:	0	0
2001-02:	4	413
2002-03:	1	56
14-Season Total	9	810

Proximate visitor sites. Marambio Station. Snow Hill Island.

Persson Island (PERS)

64˚13'S, 58˚24'W
Magnetic declination: 12.6˚E
Inventory subarea: NE
Inventory acronym: PERS
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A 1.5 mile long island in the entrance to Röhss Bay on the SW side of James Ross Island. Discovered by Nordenskjøld's Swedish Antarctic Expedition, 1901-04, and named for Nils Persson, one of the patrons of the expedition.

Landing Characteristics

Rocky landing beach. Much frost heaving in the rocks, some fossils observed, and evidence of previous volcanic activity. Until recently, the SW end of James Ross Island and Persson Island were covered by the Larsen Ice Shelf.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. January 12, 2002 RP WT Endeavour

Assessment and monitoring. Only preliminary censusing and ground photodocumentation has been accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. No evidence of any breeding activity.

Seals. None observed.

Flora. Moss, spp. in meltwater channels. *Usnea*, spp., *Mastodia*, spp., *Caloplaca*, spp., and *Xanthoria*, spp. observed.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	0	0
1994-95:	0	0
1995-96:	0	0
1996-97:	0	0
1997-98:	0	0
1998-99:	0	0
1999-2000:	0	0
2000-01:	0	0
2001-02:	1	104
2002-03:	0	0
14-Season Total	1	104

Proximate visitor sites. On James Ross Island: Rum Cove, Cape Obelisk, Brandy Bay, Cape Gage, Cape Lachman, Comb Ridge, Gin Cove, and Holluschickie Bay.

Rum Cove, James Ross Island (RUMC)

64˚06'S, 58˚25'W
Magnetic declination: 12.5˚E
Inventory subarea: NE
Inventory acronym: RUMC
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A cove indenting the NW coast of James Ross Island between Tumbledown Cliffs and Cape Obelisk. Named in 1983 to associate with other sites along this coast named for alcoholic spirits.

Landing Characteristics

This site was first visited in 1996-97, as the Larsen Ice Shelf on the SW side of James Ross Island to such an extent, that the island could be circumnavigated. Lichens appeared to be the only living organisms on site. Uncharted waters and drifting ice offshore required the expedition ship to drift, and required long zodiac rides to reach the shore.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. February 23, 1997 RN Explorer

Assessment and monitoring. Only preliminary censusing and ground photodocumentation has been accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. Skuas, spp. observed, but no nests observed.

Seals. None observed.

Flora. Crustose lichens, spp. noted.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-1996:	0	0
1996-97:	1	80
1997-98:	0	0
1998-99:	0	0
1999-2000:	2	183
2000-01:	0	0
2001-02:	0	0
2002-03:	0	0
14-Season Total	3	263

Proximate visitor sites. On James Ross Island: Cape Obelisk, Brandy Bay, Cape Gage, Cape Lachman, Comb Ridge, Gin Cove, and Holluschickie Bay; and Persson Island.

Snow Hill Island (SNOW)

64˚28'S, 57˚12'W
Magnetic declination: 12.0˚E
Inventory subarea: NE
Inventory acronym: SNOW
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A 20 mile-long, 6 mile-wide, island lying SE of James Ross Island, and separated from it by Admiralty Sound. It was discovered by Ross in 1843, but he was uncertain of its connection to the mainland, and named it simply Snow Hill because its snowy appearance contrasted so markedly with the barren ground of nearby Seymour Island. Many fossils may be found on site. The refuge built in 1902 and utilized by the main party of the Nordenskjøld expedition is still intact, is maintained by the Argentines, and is designated as an Antarctic Historic Site and Monument.

Landing Characteristics

The Nordenskjøld refuge is maintained for visitors, and is reached by an easy uphill climb from the landing beach. Snow Hill and Seymour are in close proximity of the Argentine Marambio Station. There appears to be no breeding wildlife. A seal census is easily accomplished along the shoreline.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	January 22, 1995	RN	Explorer
2.	December 10, 2001	RN SF CE	Endeavour
3.	December 21, 2001	JC LGC	Endeavour
4.	January 2, 2002	RP	Endeavour
5.	January 13, 2002	RP WT	Endeavour
6.	February 19, 2002	RN	Endeavour
7.	January 31, 2003	MM	Endeavour
8.	February 16, 2003	MB	Endeavour

Assessment and Monitoring. The landing site has been surveyed and is regularly censused.

Fauna — Flora — Censuses

Penguins & flying birds. No confirmed nesting species, though kelp gulls, south polar skuas, and Antarctic terns observed on site.

Woehler (1993) and Woehler & Croxall (1996) report no site-specific penguin populations.

Seals. None observed.

Flora. Crustose lichens (spp.) noted.

Conservation Aspects

Site sensitivities.

Pointers for avoiding disruptions.

- Fossils easily found and trampled

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	2	125
1990-91:	0	0
1991-92:	1	90
1992-93:	0	0
1993-94:	0	0
1994-95:	4	304

	Zodiac Landings	Participating Visitors
1995-96:	2	187
1996-97:	1	35
1997-98:	0	0
1998-99:	5	482
1999-2000:	5	442
2000-01:	0	0
2001-02:	16	1,589
2002-03:	7	516
14-Season Total	43	3,770

Proximate visitor sites. Penguin Point and the fossil area N of the Marambio Station on Seymour Island.

Tay Head, Joinville Island (TAYH)

63˚21'S, 55˚34'W
Magnetic declination: 10.3˚E
Inventory subarea: NE
Inventory acronym: TAYH
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A rocky headland located 6 miles E of Mt. Alexander and extending into the Firth of Tay, on the S coast of Joinville Island. Named derives from the Firth of Tay.

Landing Characteristics

Broad cobble landing beach, which, during Inventory visits in 2002, was overrun with fur seals. Once above the cobble beach, a broad, flat stretch of terrain extends inland and N to a large glacier. Adélie penguin colony located W of the landing beach.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	January 25, 2002	RD LS	Endeavour
2.	February 4, 2002	MM	Endeavour
3.	February 20, 2002	RN	Endeavour

Assessment and monitoring. Only preliminary censusing and ground photodocumentation has been accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. Adélie penguins, skua, spp., and Antarctic terns are confirmed breeders. Southern giant petrels observed on the landing beach, but nests not observed. Molting, likely 2-year-old, emperor penguin observed in January and February 2002 on the glacier, one mile inland from the landing beach.

Antarctic Site Inventory censuses:

Adélie penguin
15-20,000 N3 2002 Jan/Feb

Seals. Weddell seals hauled-out on landing beach and on ice floes offshore. Leopard seal observed on the landing beach during the January 2002 visit; leopard and crabeater seals observed offshore on January 25, 2002 and February 4, 2002 visits. Fur seals hauled-out on landing beach during all 2002 visits, with an estimated 1,500+ observed on February 20, 2002.

Flora. *Xanthoria*, spp., *Caloplaca*, spp., *Usnea*, spp., and snow algae noted.

Conservation Aspects

Site sensitivities. If large numbers of fur seals, access inland may be impeded. Breeding Adélie penguins are easily approached. Antarctic terns nesting opportunistically between the landing beach and N toward the glacier, on available, open ground, are skittish, defensive, and very easily disturbed, even from a distance.

Pointers for avoiding disruptions:

- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Avoid and stay clear of wallowing elephant seals.
- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.
- Stay clear — and do not approach — nesting terns.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-2001:	0	0

	Zodiac Landings	Participating Visitors
2001-02:	3	301
2002-03:	0	0
14-Season Total	3	301

Proximate visitor sites. Heroína Island.

View Point (VIEW)

63˚33'S, 57˚22'W
Magnetic declination: 11.5˚E
Inventory subarea: NE
Inventory acronym: VIEW
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

E tip of a promontory, 150 meters in elevation, forming the W side of the entrance to Duse Bay on the S coast of the Trinity Peninsula. Discovered by Gunnar Andersson's party from Nordenskjøld's Swedish Antarctic Expedition, 1901-4, and named by the Falklands Islands Dependencies Survey, after a 1945 survey, because good panoramic views and photographs were obtained from this promontory.

Landing Characteristics

Continental landing site on the Trinity Peninsula. British hut was erected in 1953 and later transferred to Chile. Mummified seal carcasses near the hut.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. January 17, 2000 RD Explorer

Assessment and monitoring. Only preliminary censusing and ground photodocumentation has been accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. Kelp gull confirmed breeding. Adélie and gentoo penguin, and skua, spp. noted, but no breeding activity observed.

Seals. Weddell seals hauled-out on landing beach. Juvenile southern elephant seal also observed on the beach.

Flora. *Xanthoria*, spp. and snow algae noted.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-1995:	0	0
1995-96:	1	99
1996-97:	3	207
1997-98:	0	0
1998-99:	1	88
1999-2000:	2	138
2000-01:	0	0
2001-02:	2	139
2002-03:	4	212
14-Season Total	13	883

Proximate visitor sites. On the Trinity Peninsula: Jade Point, Crystal Hill, Bald Head, and Camp Hill; Cape Burd on the Tabarin Peninsula; and False Island Point on Vega Island.

SOUTH SHETLAND ISLANDS (SH) Subarea

Subarea Map

Site Descriptions (17)

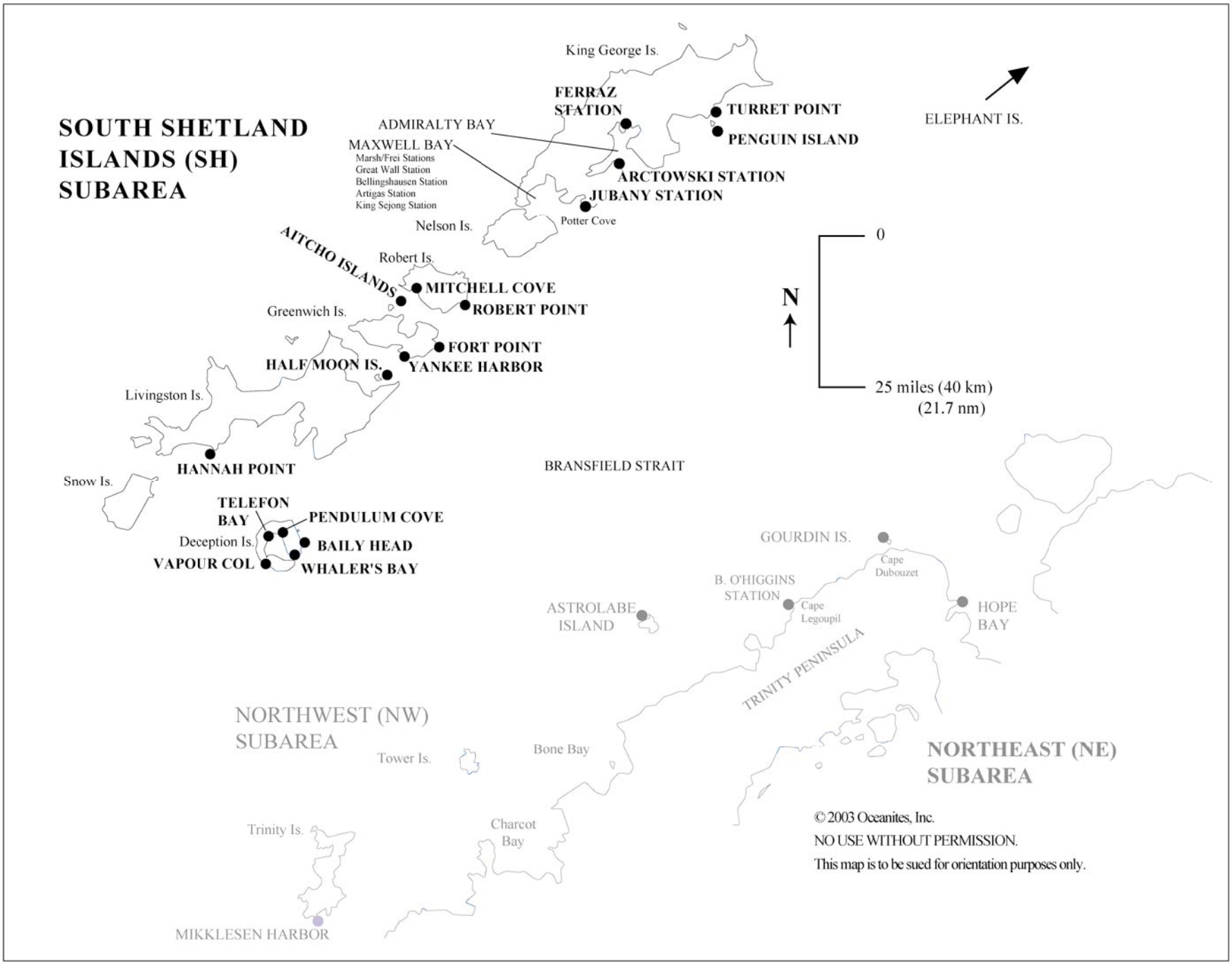
- Aitcho Islands (AITC)
- Arctowski Station Vicinity, King George Island (ARCT)
- Baily Head/Rancho Point, Deception Island (BAIL)
- Ferraz Station Vicinity, King George Island (FERR)
- Fort Point, Greenwich Is. (FORT)
- Half Moon Island (HALF)
- Hannah Point, Livingston Island (HANN)
- Jubany Station, King George Island (JUBA)
- Mitchell Cove, Robert Island (MITC)
- Pendulum Cove, Deception Island (PEND)
- Penguin Island (PENG)
- Robert Point, Robert Island (ROBE)
- Telefon Bay, Deception Island (TELE)
- Turret Point, King George Island (TURR)
- Vapour Col, Deception Island (VAPO)
- Whaler's Bay, King George Island (WHAL)
- Yankee Harbor, Livingston Island (YANK)

Because of its close proximity to South America, the South Shetland Islands is the most heavily visited Antarctic Site Inventory subarea. Chinstrap penguins are more easily and regularly observed than in other parts of the Peninsula.

Keys:

For acronyms of Antarctic Site Inventory researchers, see Appendix 1 p. 39.

For codes relating to penguin/seabird census/population data, see Table 3, p. 49.


SOUTH SHETLAND ISLANDS (SH) SUBAREA
King George Is.
FERRAZ STATION
TURRET POINT
PENGUIN ISLAND
ELEPHANT IS.
ADMIRALTY BAY
MAXWELL BAY
Marsh/Frei Stations
Great Wall Station
Bellingshausen Station
Artigas Station
King Sejong Station
ARCTOWSKI STATION
JUBANY STATION
Potter Cove
Nelson Is.
AITCHO ISLANDS
Robert Is.
MITCHELL COVE
ROBERT POINT
Greenwich Is.
FORT POINT
YANKEE HARBOR
HALF MOON IS.
Livingston Is.
HANNAH POINT
Snow Is.
BRANSFIELD STRAIT
TELEFON BAY
PENDULUM COVE
Deception Is.
BAILY HEAD
VAPOUR COL
WHALER'S BAY
0
N
25 miles (40 km)
(21.7 nm)
GOURDIN IS.
Cape Dubouzet
B. O'HIGGINS STATION
Cape Legoupil
HOPE BAY
ASTROLABE ISLAND
TRINITY PENINSULA
NORTHWEST (NW) SUBAREA
Tower Is.
Bone Bay
NORTHEAST (NE) SUBAREA
Trinity Is.
Charcot Bay
MIKKLESEN HARBOR
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This map is to be sued for orientation purposes only.

Aitcho Islands (AITC)

62˚24’S, 59˚47’W
Magnetic declination: 13.5˚E
Inventory subarea: SH
Inventory acronym: AITC
Species Diversity: HIGH
Site Sensitivity: HIGH

Location — History — Features

This group of small islands lies in the N entrance to English Strait, South Shetland Islands. Robert Island is to the E, Dee Island to the SW, and Greenwich Island beyond Dee to the S. Visitor activity has concentrated on the unnamed island (on British Admiralty and US charts) found NW of Cecilia Island. See accompanying nautical chart excerpt. The islands were charted and named in 1936 by the Discovery Investigations (1925-39) for the Admiralty Hydrographic Office (the “H.O.”). Shallow, offshore rocks impede zodiac maneuverability at low tide. The islands are windswept and do not afford a convenient leeward anchorage to visiting tour ships. Annual snow, which covers moss beds to the W of the landing site, may linger through January.

Landing Characteristics

Windswept location at the N entrance to English Strait, between Robert and Greenwich Islands, often shrouded in fog and mist, without a convenient leeward anchorage. Uncharted water near shore. Hazardous rocks along the shoreline may be exposed, depending on the tide. Visitor activity is on the unnamed island NW of Cecilia Island; reasonably protected visitor ingress and egress on the cobble and sand beach at the NE side of this unnamed island. Annual snow, which covers moss beds to the W of the landing site, may linger through January. “Whalebone Beach,” a favored haul-out area for seals, is reached by hiking SW of the landing beach.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	November 17, 1995	BH	W. Discoverer
2.	November 29, 1995	BH	W. Discoverer
3.	December 1, 1995	RN LB	Explorer
4.	December 11, 1995	BH SF	W. Discoverer
5.	February 2, 1996	RD RP	Livonia
6.	February 9, 1996	RD RP	Livonia
7.	February 17, 1997	RN	Explorer
8.	November 25, 1997	RN SF	W. Discoverer
9.	January 18, 1999	RN	Endurance
10.	January 24, 1999	RN RD ST	Vavilov
11.	December 13, 1999	RN	Cal Star
12.	January 9, 2000	SF	Cal Star
13.	December 15, 2000	RN	Cal Star
14.	December 24, 2000	SF	Cal Star
15.	January 22, 2001	RN	Cal Star
16.	December 12, 2001	RN SF CE	Endeavour
17.	December 20, 2001	JC LGC	Endeavour
18.	December 30, 2001	RP	Endeavour
19.	January 11, 2002	RP WT	Endeavour
20.	January 22, 2002	RD LS	Endeavour
21.	February 2, 2002	MM	Endeavour
22.	December 8, 2002	RN	Endeavour
23.	December 29, 2002	RP	Endeavour
24.	January 8, 2003	SF	Endeavour
25.	January 19, 2003	RD	Endeavour
26.	January 30, 2003	MM	Endeavour

Assessment and monitoring. Surveyed, mapped, and photodocumented (aerial and terrestrial). Regular censusing of staked gentoo and chinstrap penguin groups near the regular landing beach, and of southern giant petrels, site-wide. Staked chinstrap penguin control groups located high above the regular landing beach appear to

have considerable integrity in terms of visitor absence. Abandoned southern giant petrel nests on the island's N ridge suggest an opportunity for paleoecological research. More thorough censusing of nesting kelp gulls and skuas needed. More thorough ground survey of floral communities needed. Censusing of chinstrap penguin groups at SE end of the island needed. Because of extensive, easily accessed moss beds, a degradation study seems appropriate and necessary.

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo penguins, chinstrap penguins, and southern giant petrels are confirmed breeders. Blue-eyed shags, skuas, spp., and Wilson's storm-petrel also have been noted on site, but breeding was not confirmed during Inventory visits.

Recent historic gentoo census reported in Woehler (1993): 314 N3, Jan 1966). With respect to chinstrap penguins, Woehler (1993) lists four colonies at the Aitcho Islands, including Jorge Island, which comprise a "medium" sized breeding population (1,000-7,499 pairs). There is a listing of 3,500 nesting pairs (N4, from Jan 1966) at nearby Cecilia Island. However, this Cecilia Island count should be ascribed to the island located NW of Cecilia Island, which is officially unnamed on US and British Admiralty nautical charts. This unnamed island is where visitor zodiac landings occur in the Aitcho Islands group, and where Inventory censuses have been conducted. The Cecilia Island data derive from 1966 British Antarctic Survey data referenced in Croxall & Kirkwood (1979), which, based on site maps in Croxall & Kirkwood (1979), should be ascribed to the unnamed island where landings takes place, not Cecilia Island. While the total chinstrap population is listed as 3,500 nests, a note to this specific entry indicates there were two distinct chinstrap colonies, of 1,500 and 2,500 nests.

Antarctic Site Inventory censuses:

Chinstrap penguin (southern end of the island only, near the regular landing beach; but not including nesting groups on rocky, N coast, which have not been censused)

4,608	N2	1997 Nov
1,764	N1	2001 Dec

Gentoo penguins (S and SE end of the island)

1,177	N1	1999 Dec
787	C1	2002 Feb

Seals. Weddell and southern elephant seals regularly haul-out on WHALEBONE beach, and there are southern elephant seal wallows at the W end of the island on which landings occur.

Flora. *Prasiola crispa* is widespread. Extensive cushion moss, spp. beds are found W and N of WHALEBONE beach, and cover extensive areas toward the W part of the island. On N ridge, where active and abandoned southern giant petrel nests may be found, boot prints in the moss have been colonized by *Prasiola*. Snow algae noted in the early season snow cover. *Xanthoria*, spp., *Caloplaca*, spp. and other crustose lichens observed and photodocumented.

Conservation Aspects

Site sensitivities. Chinstrap and gentoo penguins nesting in widely spaced colonies above, S, and W of the landing beach are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Scientific control groups of chinstrap penguins on high bluff S-SW of the landing beach. Hauled-out seals, including wallowing southern elephant seals on the far W end, are easily approached and disturbed. Southern giant petrels nesting on ridges and along the N coast are easily approached and disturbed; many unoccupied nests are evident; in November and early December they will be incubating eggs. Skuas nesting on widely scattered territories are easily approached and disturbed, particularly, later in the season (from mid-January) when adults are fiercely protecting young. Between the landing beach and the western end of the island, there are wide and extensive swards of lichens and mosses, which may be easily trampled.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Avoid and stay clear of chinstrap penguin control colonies on high bluff S-SW of the landing beach.
- Do not impede penguins' access to and from the water.
- Avoid and stay clear of skua territories.

- Walk around hauled-out seals on Whalebone Beach and wallowing southern elephant seals on the far W end.
- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.
- Avoid and stay clear of southern giant petrels nesting on ridges and along the N coast.
- Watch footsteps carefully, especially when snow cover is absent, to avoid trampling moss.
- Strictly control hikes to the far W end by organizing guided groups, all following the same path, and not allowing any free wandering.

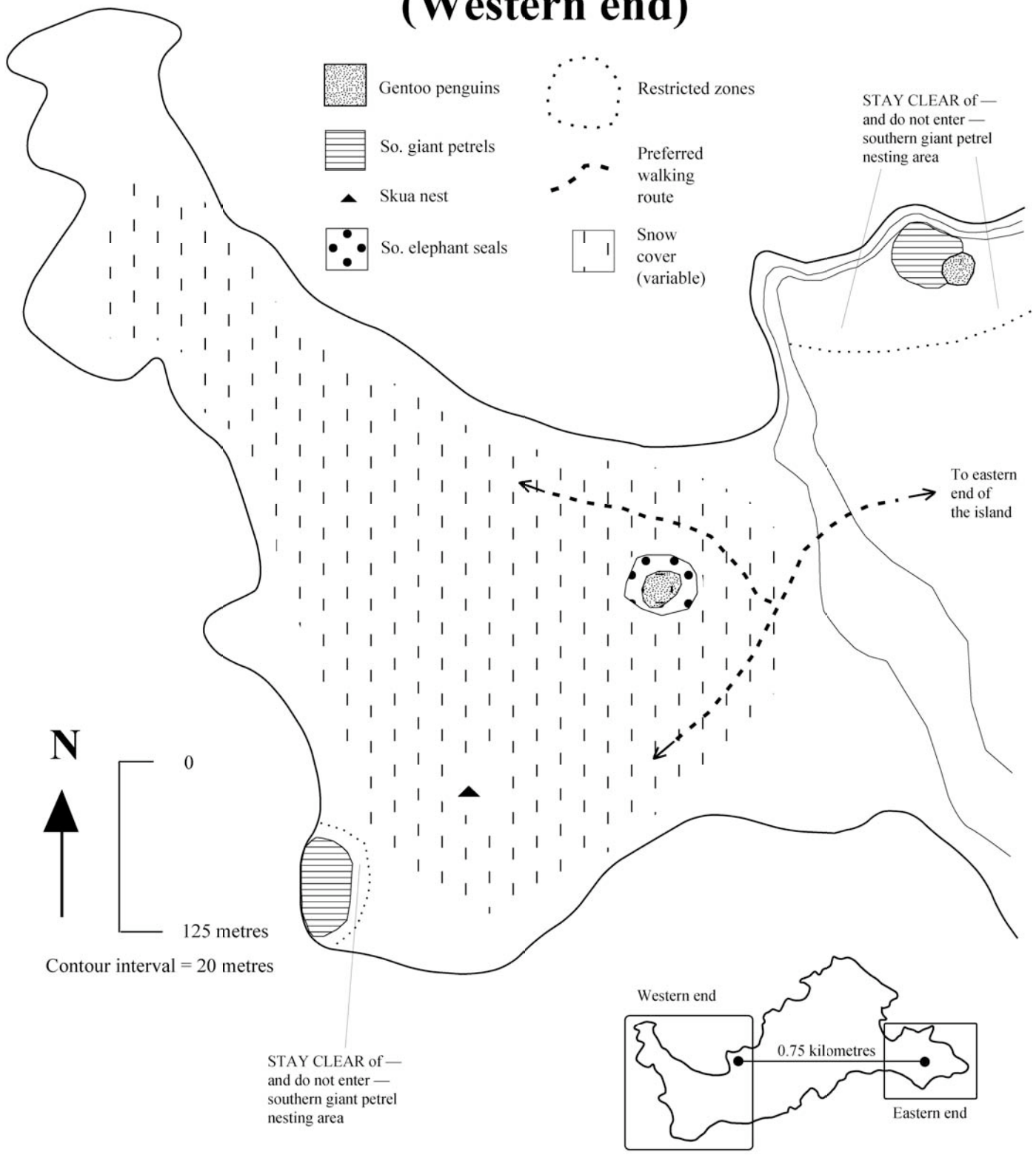
Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

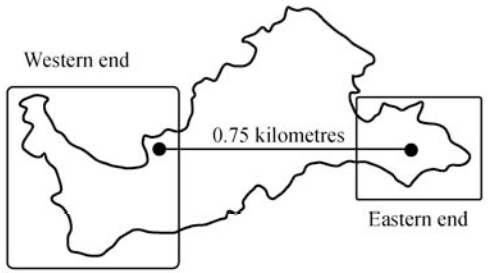
	Zodiac Landings	**Participating Visitors**
1989-90:	2	271
1990-91:	0	0
1991-92:	3	285
1992-93:	7	601
1993-94:	3	271
1994-95:	10	667
1995-96:	23	1,759
1996-97:	37	2,341
1997-98:	31	2,499
1998-99:	31	2,525
1999-2000:	42	3,454
2000-01:	38	3,285
2001-02:	27	2,396
2002-03:	44	3,566
14-Season Total	298	23,920

Proximate visitor sites. Robert Point and Mitchell Cove, Robert Island, and Yankee Harbor on Greenwich Island.

Visitor Site in the AITCHO ISLANDS (Western end)



Visitor Site in the AITCHO ISLANDS (Eastern end)



Gentoo penguins

Chinstrap penguins

Restricted zones

Antarctic Site Inventory stake

Preferred walking route

N

0

40 metres

Contour intervals = 5 metres

LANDING BEACH

To western end of the island

STAY CLEAR of — and do not enter — this area, where there are penguin monitoring groups

Seal haul-out beach

AITCHO ISLANDS

POINTERS FOR AVOIDING DISRUPTIONS

- WALK SLOWLY AND CAREFULLY AROUND NESTING, CRÈCHING, OR MOLTING PENGUINS
- AVOID AND STAY CLEAR OF CHINSTRAP PENGUIN CONTROL COLONIES ON HIGH BLUFF S-SW OF THE LANDING BEACH
- DO NOT IMPEDE PENGUINS' ACCESS TO AND FROM THE WATER
- AVOID AND STAY CLEAR OF SKUA TERRITORIES
- WALK AROUND HAULED-OUT SEALS AND WALLOWING SOUTHERN ELEPHANT SEALS ON THE FAR W END OF THE ISLAND
- AVOID AND STAY CLEAR OF ANTARCTIC FUR SEALS, WHICH SHOULD BE GIVEN A WIDE BERTH AND SHOULD NOT BE APPROACHED
- AVOID AND STAY CLEAR OF SOUTHERN GIANT PETRELS NESTING ON RIDGES AND ALONG THE N COAST
- WATCH FOOTSTEPS CAREFULLY, ESPECIALLY WHEN SNOW COVER IS ABSENT, TO AVOID TRAMPLING MOSS
- STRICTLY CONTROL HIKES TO THE FAR W END WITH GUIDED GROUPS, ALL FOLLOWING THE SAME PATH, AND NOT ALLOWING ANY FREE WANDERING

Arctowski Station Vicinity, King George Island (ARCT)

62˚15'S, 58˚51'W
Magnetic declination: 13.0˚E
Inventory subarea: SH
Inventory acronym: ARCT
Species Diversity: MEDIUM
Site Sensitivity: LOW

Location — History — Features

The station is named for Henryk Arctowski, the Polish geologist, oceanographer, and meteorologist of the Belgian Antarctic expedition (1897-99). The research station lies on a flat, shingle peninsula flanked to the S by a bay-mouth bar enclosing a small lagoon. The beach is largely cobble and the bay-mouth bar is mainly rounded cobbles, but there is a black sand beach at lower water levels.

From the head of the peninsula, marked by a towering rock of brown-weathering, basalt material, visitors may traverse this cobble beach, which is known as Half Moon Beach, for almost 0.5 mile, to an elephant seal wallow at the boundary of the Point Thomas Antarctic Specially Protected Area. The beach is littered with whale bones.

The ground around the station area is spongy and muddy, made up of rounded sand and pebbly material. Directly behind the station is a large morainal ridge. This moraine has fragments of fossil woody-plant material, which appears to be *Nothofagus*, the genus of beech trees from Tierra del Fuego.

In the moss-strewn hills above and to the S of the station is an Historic Site and Monument, the grave of Wladzimierz Puchalski. He was an artist and producer of documentary films, and died in January 1979 while working at the station. The grave is marked by a tall iron cross.

Arctowski Station is the Polish research base located in Admiralty Bay, South Shetland Islands. The short, easily walked beach in "front" of the station is called Half Moon Beach, and it extends for 0.5 mile to the N boundary of the Point Thomas Antarctic Specially Protected Area (ASPA). As a matter of geography, Point Thomas is located NW of Arctowski Station and outside of the ASPA, at the opening to Ezcurra Inlet. The high cliffs extending toward Ezcurra Inlet contain many nesting skuas and storm-petrels and would be easily disturbed by visitor encroachment. Half Moon Beach is frequently visited by expedition vessel passengers (usually in conjunction with Station visits), and ends at an elephant seal wallow that abuts the boundary of the ASPA.

Late in each season, fur seals often are found on the *Deschampsia* and moss inland from the beach. Skuas also breed here and the wet areas are totally off-limits to visitors. There are no colonies of penguins or seabirds along this stretch of Half Moon Beach. Skuas occasionally nest on the grassy plain inward of the landing site. As the summer progresses, a snow melt lake develops on this plain, which becomes a skua bathing spot. There is very little room for tourists between the ASPA boundary and the Station.

Landing Characteristics

Henryk Arctowski Station is the Polish research base located in Admiralty Bay. Landings near the "Lighthouse" on short cobble beach fronting the station. Visitors are confined to the cobble beach and prohibited from hiking uphill into the Antarctic Specially Protected Area, which is totally off-limits. A visitor trail, marked by stones, extends from the vicinity of the seal wallow to the station.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	November 26, 1994	RN ST	from COPA
2.	November 27, 1994	RN	from COPA
3.	December 4, 1994	RN	from COPA
4.	January 12, 1995	RN RD	Livonia
5.	November 17, 1995	RN LB	Explorer
6.	December 1, 1995	RN LB	Explorer
7.	February 2, 1996	RD RP	Livonia
8.	November 29, 1997	RN	W. Discoverer
9.	November 26, 1998	RN SF	Explorer

Assessment and monitoring. None by the Inventory. These tasks presumably accomplished by base personnel.

Fauna — Flora — Censuses

Penguins & flying birds. Confirmed breeders in the immediate station vicinity (but not within the confines of the ASPA) include Antarctic brown skuas (and hybrid skua pairs), Wilson's and black-bellied storm petrels. Adélie, gentoo, and chinstrap penguins, and kelp gulls nest within the ASPA. Blue-eyed shags nest at various locations in Admiralty Bay. All penguins breeding at this site are within the boundary of the ASPA.

Woehler & Croxall (1996) list a minimum breeding population of 8,645 pairs of Adélie penguins, 136 pairs of gentoo penguins, and 18 pairs of chinstrap penguins at Point Thomas. These counts are from the 1989-90 season and reflect decreases in all three species since 1980. The researchers within the ASPA have noted recent, significant declines in chinstrap penguins (W. Trivelpiece, *pers. comm.*).

On King George Island as a whole, Woehler & Croxall (1996) note recent data suggesting a decrease in the Adélie penguin breeding population from approximately 33,000 pairs in 1980-91, to approximately 14,000 pairs in 1989-90. Since 1976 in Admiralty Bay, Adélie populations have been highly variable, but declined sharply after the late 1980s, and are 30% lower on average since 1990 than between 1976-88; recruitment rates have decreased at the same time (SCAR, 1996).

Seals. Weddell and southern elephant seals frequently haul-out on Half Moon Beach, and the elephant seal wallow at the end of Half Moon Beach builds in numbers as the summer progresses. In many seasons, Antarctic fur seals will haul-out on the moss and *Deschampsia* between the beach and the station.

Flora. *Deschampsia* and cushion moss beds are found between Half Moon Beach and the station. There are many crustose lichens spp. along the shore and extensive swards of *Usnea*, spp.

Conservation Aspects

Site sensitivities. All nesting penguins are within the boundary of the Antarctic Specially Protected Area, which is totally off limits. Patches of moss and grass near the beach are readily accessed and easily disturbed, but also, are totally off limits. No penguins nest along the visitor beach. Southern elephant seals frequent a wallow at the end of the visitor beach, and are easily approached and disturbed.

Pointers for avoiding disruptions.

- Stay on the visitor trail and do not enter the Antarctic Specially Protected Area.
- Avoid, stay clear of, and do not trample moss and grass patches near the visitor beach.
- Observe southern elephant seals and penguins within the boundary of the Antarctic Specially Protected Area from a distance.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	8	930
1990-91:	6	601
1991-92:	14	1,509
1992-93:	10	598
1993-94:	30	3,031
1994-95:	31	2,445
1995-96:	21	1,724
1996-97:	22	1,789
1997-98:	11	1,014
1998-99:	13	1,109
1999-2000:	22	1,901
2000-01:	7	688
2001-02:	9	655
2002-03:	12	1,766
14-Season Total	216	19,760

Proximate visitor sites. The Brazilian Ferraz Station is located across Admiralty Bay in Martel Inlet.

Baily Head (Rancho Point), Deception Island (BAIL)

62˚58'S, 60˚30'W
Magnetic declination: 13.0˚E
Inventory subarea: SH
Inventory acronym: BAIL
Species Diversity: MEDIUM
Site Sensitivity: LOW

Location — History — Features

The derivation of the name "Baily" is unclear. Rancho Point is a conspicuous rock headland of 170 meters, marking the E extremity of Deception Island. The landing beach is an extraordinarily long, straight black-sand beach that extends nearly 7 kilometers along the E side of the island. Directly up against this beach is the ice cliff of Deception's E-side ice cap, which controls the shape of this beach. A stream with a substantial flow of water flows through a narrow gap between Baily Head and the ice cliffs. This stream drains a large, elongated, bowl-shaped valley ("amphitheater") with hummocky topography. This valley, entirely on the outer slope of the Deception caldera, provides nesting territory for an estimated 100,000 pairs of chinstrap penguins. Within the penguin rookery, a soil up to several inches thick has formed on volcanic material, the thick guano, and other organic debris.

In early November the entire area may be covered with snow, which is deep in the lower parts of the valley, but relatively thin on the upper slopes. By December, all the snow may be gone, and the amphitheater of penguins becomes flush with a green swatch of *Prasiola crispa.* On these upper slopes, there is relatively little black, red, and gray pyroclastic debris from recent eruptions. The ice wall behind the 7-kilometer-long beach forms a substantial ridge along the E side of the island. The beach itself has a very steep face against the Bransfield Strait, which produces a heavy swell and surf and makes zodiac landings dangerous. The beach is made up of black and red pyroclastic material, mainly coarse ash and lapilli in size, and basaltic in composition. Along the nearby coast, there are several sea stacks, which appear to be erosional remnants of an offshore, eruptive center and cone. The primary rock is well-layered tuff. Back from the shore are more recent deposits of black ash, probably from Deception's recent eruptions. The penguin amphitheater appears to consist of lateral morainal material and ice. The ice at the lower end of the glacier is covered with substantial volcanic ash.

Also known as Rancho Point, the Baily Head colony of chinstrap penguins is located on the SE side of Deception Island. From the black sand landing beach that faces Livingston Island to the N, the chinstrap colony rises in an amphitheater toward a ridge line that is 150 feet or more above the surf below. A melt stream runs down through the amphitheater. There is a constant flow of many hundred penguins up and down along this route. The black, white, and brown geologic scenery is spectacular, and contrasts strikingly with the green *Prasiola* and the pink, guano-laden chinstrap colonies. An alternative landing beach lies below this high ridge, but should only be used by researchers who are properly permitted and skilled in moving without interference past hordes of chinstraps moving between the rim and the bay. This bay offers excellent zodiac cruising, and the chance to see leopard seals patrolling for chinstraps entering the sea.

Landing Characteristics

Zodiac landings at S end of long, black-sand beach forming SE side of Deception Island, crowded with chinstrap penguins moving back and forth, and prone to heavy swell and surf because the beach drops steeply into the sea. Large numbers of chinstrap penguins nest inland and uphill to the SW, within an impressive, bowl-shaped, volcanic valley rising to a high ridge line and drained by a substantial, often vigorously flowing, melt stream. May be extensive snow cover early (perhaps, into January); extensive guano, mud, and snow melt later; and at all times slippery.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 9, 1994	RN BH	Alla Tarasova
2.	December 14, 1994	RN BH	Livonia
3.	January 14, 1995	RN RD	Livonia
4.	November 18, 1995	BH	W. Discoverer
5.	November 29, 1995	RN LB	Explorer
6.	November 30, 1995	SF	W. Discoverer
7.	December 12, 1995	BH	W. Discoverer

8.	January 13, 1996	RN BH	Endurance
9.	January 27, 1996	RD RP	Livonia
10.	December 3, 1996	RN	W. Discoverer
11.	February 21, 1997	RN	Explorer
12.	December 3, 1997	RN SF	Explorer
13.	December 7, 1998	RN SF	Explorer
14.	January 12, 1999	RN SF	Endurance
15.	January 20, 1999	RD ST	Vavilov
16.	December 19, 1999	SF	Shuleykin
17.	January 11, 2001	SF	Cal Star
18.	January 24, 2001	RN RD	Cal Star
19.	January 26, 2001	RN RD	Cal Star
20.	January 17, 2002	RP WT	Endeavour
21.	February 18, 2002	RN	Endeavour
22.	December 8, 2002	RN	Endeavour
23.	December 30, 2002	RP	Endeavour
24.	January 9, 2003	SF	Endeavour
25.	January 22, 2003	RD	Endeavour
26.	February 2, 2003	MM	Endeavour
27.	February 15, 2003	MB	Endeavour

Assessment and monitoring. Surveyed and mapped. Terrestrial photodocumentation accomplished, more thorough aerial photodocumentation needed. Regular censusing of four staked chinstrap penguin groups at higher reaches of the site, which were originally staked by Dr. Wayne Trivelpiece and other researchers in 1992. More thorough ground survey of floral communities needed.

Fauna — Flora — Censuses

Penguins & flying birds. Chinstrap penguins, Antarctic brown skuas, and pintado petrels are confirmed breeders.

Recent census data reported in Woehler (1993) and Woehler & Croxall (1996): 100,000 N4/5, 1989, and a decrease in the overall chinstrap population at Deception Island between 1992-96.

Antarctic Site Inventory censuses:

Chinstrap penguin (group #7)

63	N1	1992 Dec
80	N1	1993 Dec
93	N1	1994 Dec
130	C1	1995 Jan
126	N1	1995 Nov
120	N1	1995 Dec
153	C1	1996 Jan
186	N1	1996 Dec
143	N1	1997 Dec
171	N1	1998 Dec
268	C1	1999 Jan
187	N1	1999 Dec
205	N1	2001 Jan
307	C1	2001 Jan
267	C1	2002 Jan
214	N1	2002 Dec
228	C1	2003 Jan
242	C1	2003 Feb

Chinstrap penguin (group #8)

205	N1	1992 Dec
200	N1	1993 Dec
189	N1	1994 Dec

173	C1	1995 Jan
257	C1	1995 Jan
233	N1	1995 Nov
219	N1	1995 Dec
245	C1	1996 Jan
230	N1	1996 Nov
220	N1	1997 Dec
229	N1	1998 Dec
326	C1	1999 Jan
223	N1	2001 Jan
361	C1	2001 Jan
252	C1	2002 Jan
252	N1	2002 Dec
269	C1	2002 Jan
289	C1	2003 Feb

Chinstrap penguin (group #9)

355	N1	1992 Dec
436	N1	1993 Dec
398	N1	1994 Dec
444	C1	1995 Jan
418	N1	1995 Nov
400	N1	1995 Dec
496	C1	1996 Jan
397	N1	1996 Dec
360	N1	1997 Dec
412	N1	1998 Dec
548	C1	1999 Jan
346	N1	1999 Dec
397	N1	2001 Jan
537	C1	2001 Jan
429	C1	2002 Jan
382	N1	2002 Dec
476	C1	2002 Jan
355	C1	2003 Feb

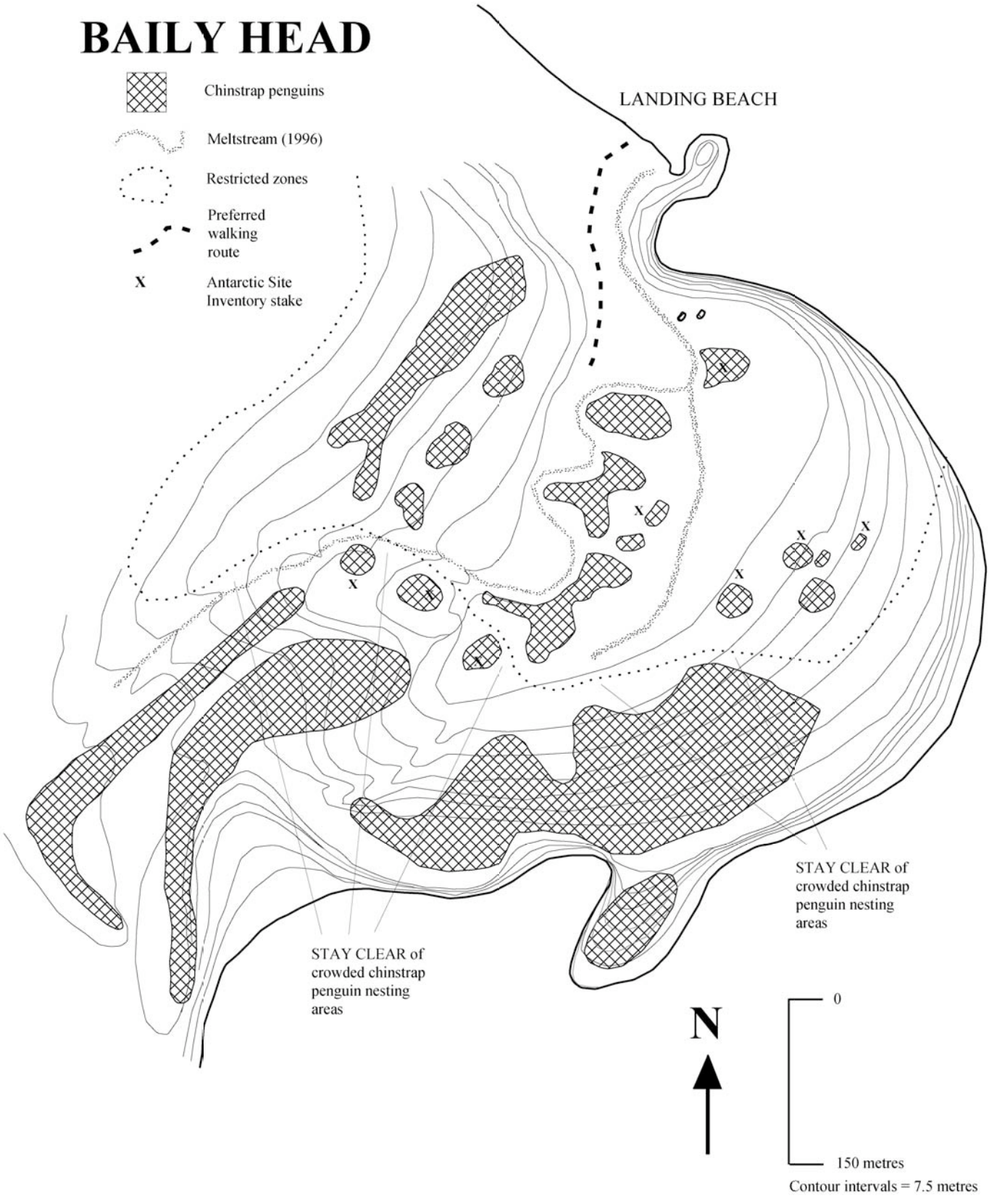
Chinstrap penguin (group #10)

560	N1	1992 Dec
572	N1	1993 Dec
458	N1	1994 Dec
571	C1	1995 Jan
552	N1	1995 Nov
519	N1	1996 Dec
556	N1	1997 Dec
492	N1	1998 Dec
881	C1	1999 Jan
541	N1	1999 Dec
524	C1	2002 Jan
684	C1	2003 Feb

Seals. Antarctic fur seals often haul-out along Baily Head's black beach in late spring and summer. Weddell, southern elephant, and crabeater seals also may haul-out on this beach.

Flora. Snow algae noted on the annual snow cover, which reveals extensive *Prasiola* once it begins to melt. Colorful crustose lichens may be found on the rocks along the upper reaches of the penguin amphitheater. Occasional moss, spp. patches also noted.

BAILY HEAD


Chinstrap penguins
Meltstream (1996)
Restricted zones
Preferred walking route
X Antarctic Site Inventory stake
LANDING BEACH
STAY CLEAR of crowded chinstrap penguin nesting areas
STAY CLEAR of crowded chinstrap penguin nesting areas
N
0
150 metres
Contour intervals = 7.5 metres

BAILY HEAD

POINTERS FOR AVOIDING DISRUPTIONS

- WALK SLOWLY AND CAREFULLY AROUND — AND DO NOT INTERFERE WITH OR BLOCK — PENGUINS MOVING BACK AND FORTH ALONG THE MELT STREAM
- WALK SLOWLY AND CAREFULLY AROUND NESTING, CRÈCHING, OR MOLTING CHINSTRAP PENGUINS
- AVOID AND STAY CLEAR OF ANTARCTIC FUR SEALS, WHICH SHOULD BE GIVEN A WIDE BERTH AND SHOULD NOT BE APPROACHED
- STRICTLY CONTROL HIKES UPHILL INTO AND THROUGH THE AMPHITHEATER BY ORGANIZING SMALL GROUPS OF NO MORE THAN 20 VISITORS, WHICH ARE WELL SPACED, WITH ONE GUIDE PER GROUP, ALL FOLLOWING THE SAME PATH, AND NOT ALLOWING ANY FREE WANDERING

Conservation Aspects

Site sensitivities. Chinstrap penguins nest in large, tightly packed colonies scattered throughout this natural, volcanic amphitheater; they are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Heavy congestion along the melt stream, with large numbers of penguins moving back and forth. The landing beach is favored by Antarctic fur seals, which increase in numbers through the season. Highest ridges are eroding and are heavily crevassed, in some cases, severely. Cliff edges are eroding and crumbling. Rock falls are evident.

Pointers for avoiding disruptions.

- Walk slowly and carefully around — and do not interfere with or block — penguins moving back and forth along the melt stream.
- Walk slowly and carefully around nesting, crèching, or molting chinstrap penguins.
- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.
- Strictly control hikes uphill into and through the amphitheater by organizing small groups of no more than 20 visitors, which are well spaced, with one guide per group, all following the same path, and not allowing any free wandering.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	5	455
1990-91:	6	584
1991-92:	14	1,182
1992-93:	10	657
1993-94:	9	990
1994-95:	32	2,576
1995-96:	19	1,094
1996-97:	14	1,133
1997-98:	20	1,493
1998-99:	20	2,012
1999-2000:	31	2,595
2000-01:	21	1,091
2001-02:	19	1,510
2002-03:	27	2,319
14-Season Total	247	19,691

Proximate visitor sites. The interior of Deception Island affords three other visitor landing sites: Whaler’s Bay, Pendulum Cove, and Telefon Bay. Vapour Col is located on W, seaward side of the island.

Ferraz Station Vicinity, King George Island (FERR)

62˚10'S, 58˚48'W
Magnetic declination: 12.0˚E
Inventory subarea: SH
Inventory acronym: FERR
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

This site is located in Martel Inlet, Admiralty Bay, and is the locus of the Brazilian research station, Commandante Ferraz. Martel Inlet was first charted by Charcot in 1909 and named for a French politician. The site is on morainal materials with a gently-sloping surface up onto the edge of a moraine, the top of which is perhaps 25-30 meters above sea level. The base itself is built upon a large lateral moraine, and there is a cemetery on the morainal hillside. Rock fragments in the moraine comprise several kinds of basaltic rocks with differing textures, likely reflecting the composition of volcanic rocks in higher reaches of the island. Near the shore and just beyond the main base buildings, there is a large outcrop of layered basalt. At the far end of the bay beyond the station, a rugged ice-fall at the base of a glacier reaches the sea. Across the bay, there is a massive lateral moraine rising as a ridge perhaps 150 meters above sea level, which suggests a considerable retreat by this glacier front in the recent geologic past. The volcanic origin of the South Shetland Islands and King George Island is evidenced by well-developed layering in the brown, gray, and black rocks around the bay. The surface may remain covered in snow well into the austral spring, though exposed morainal material may be muddy and soft. The rocky, pebbly beach is covered with whale bones from former whaling activities in this area. A whale skeleton (with bones from at least nine species of whales) has been "reassembled" on a moss bed a short distance from the station.

Landing Characteristics

Easy landings by zodiac on the cobble beach in front of the station. At this site, there are relatively few faunal attractions, though the tidepools on site often provide excellent views of invertebrates. The whale skeleton is a bit of a tourist attraction, though the bones derive from many species. Many tour ships conduct zodiac tours in Martel Inlet to view humpback whales that often summer in Admiralty Bay, when krill is abundant. Krill often washes up on the station's beaches.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. November 28, 1995 BH SF W. Discoverer

Assessment and monitoring. None by the Inventory. These tasks presumably accomplished by base personnel.

Fauna — Flora — Censuses

Penguins & flying birds. Antarctic terns nest in the vicinity of the reassembled whale skeleton. No site-specific penguin breeding populations are listed in Woehler (1993) or Woehler & Croxall (1996).

Seals. None noted.

Flora. There are extensive moss beds, spp. above and behind the station and the inlet.

Conservation Aspects

Site sensitivities. Moss beds behind and near the station are easily accessed. Antarctic terns nest near the station and are easily disturbed.

Pointers for avoiding disruptions.

- Stay clear of — and do not hike or wander — where terns are nesting.
- Watch footsteps carefully, especially when snow cover is absent, to avoid trampling moss.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	3	305
1990-91:	1	95

	Zodiac Landings	Participating Visitors
1991-92:	6	660
1992-93:	2	187
1993-94:	12	1,135
1994-95:	10	930
1995-96:	4	321
1996-97:	3	183
1997-98:	5	693
1998-99:	4	381
1999-2000:	5	387
2000-01:	1	27
2001-02:	1	102
2002-03:	3	228
14-Season Total	60	5,634

Proximate visitor sites. The Polish Arctowski Base is located to the S across Admiralty Bay from Martel Inlet.

Fort Point, Greenwich Island (FORT)

62˚34'S, 59˚34'W
Magnetic declination: 12.2˚E
Inventory subarea: SH
Inventory acronym: FORT
Species Diversity: HIGH
Site Sensitivity: MODERATE

Note: Restricted visitor space

Location — History — Features

Rocky point, 85 meters high, forming the SE extremity of Greenwich Island. The highest rock on the seaward end of the point was initially named Castle Rock; Fort Rock was recommended in 1954 to avoid confusion with a Castle Rock at nearby Snow Island

Landing Characteristics

Uncharted water near shore. Hazardous rocks along the shoreline may be exposed, depending on the tide. Landing on narrow, elevated, rocky beach that forms SE extremity of Greenwich Island and is totally exposed to the elements. Extensive glacier inland. Loose scree slopes above the penguin colonies. Many kelp gulls, Antarctic terns, blue-eyed shags, Antarctic fulmars, snowy sheathbills, and Wilson's storm-petrels swirling above and around the high, seaward stacks and cliffs, which cannot be accessed safely. Large numbers of fur seals, high swell, or both, may prevent landings, in which case the site is best viewed by zodiac.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 13, 1999	RN	Cal Star
2.	February 1, 2001	RN	Cal Star

Assessment and monitoring. This site has not been regularly visited by the Inventory, and only preliminary surveying, mapping, censusing, and terrestrial photodocumentation have been accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. Chinstrap, gentoo, and macaroni penguins are confirmed breeders. Kelp gull, Antarctic tern, Antarctic fulmar, blue-eyed shag, snowy sheathbill, and Wilson's storm-petrel have been observed and are likely breeding.

Antarctic Site Inventory censuses:

Chinstrap penguin
853 N1 1999 Dec

Gentoo penguin
282 N1 1999 Dec

Macaroni penguin
1 N1 1999 Dec

The Inventory census in December 1999 totaled 1,136 nests of three penguin species. Recent historic chinstrap penguin census reported in Woehler (1993): 1,200 N4, 1987.

Seals. Southern elephant, Weddell, and Antarctic fur seals hauled-out on rocky beach.

Flora. *Xanthoria*, spp., *Haematomma*, spp., *Caloplaca*, spp., and patches of moss, spp., noted.

Conservation Aspects

Site sensitivities. Chinstrap, gentoo, and a few macaroni penguins nesting on the point (many on uphill slopes) are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.

- If seals are numerous, or with high swell or surf, zodiac tours are the best way to view the site.
- Stay clear of — and do not allow any hiking or free wandering over — scree slopes and seaward stacks and cliffs.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-98:	0	0
1998-99:	2	185
1999-2000:	2	131
2000-01:	0	0
2001-02:	0	0
2002-03:	0	0
14-Season Total	4	316

Proximate visitor sites. Yankee Harbor, also on Greenwich Island; Robert Point and Mitchell Cove on Robert Island; the Aitcho Islands; and Half Moon Island.

Half Moon Island (HALF)

62˚36'S, 59˚55'W
Magnetic declination: 12.5˚E
Inventory subarea: SH
Inventory acronym: HALF
Species Diversity: MEDIUM
Site Sensitivity: LOW

Note: Restricted visitor space

Location — History — Features

A 1.25-mile-long, crescent-shaped island lying in the entrance to Moon Bay on the E side of Livingston Island. The island was known by sealers as early as 1821. The Argentine Camara Station is located on the island's SW side.

Half Moon is the site of the Argentine Camara Station, and at one point was the locus for a joint tourism impact study run by U.K., Argentine, and Chilean interests. Station personnel and biologists from the Argentine Antarctic Institute continue to monitor the island's penguin and flying bird populations. From the regular landing beach on the NE shore, marked by a rotting old dory, it is necessary to climb toward a navigation tower on the ridge above in order to reach the pathway leading to the major chinstrap colonies on the E extremity of the island. There may be heavy snow cover, which makes hiking difficult. On the pathway to the E spit, Wilson's storm-petrels, Antarctic terns, sheathbills, and kelp gulls may be encountered.

Landing Characteristics

Landing beach on NE side strewn with cobble, algae, and a derelict dory. Access is uphill and slippery. Visitor space restricted by difficult terrain, snow cover (which may be extensive), and numbers of penguins tramping well-worn paths, moving to and from the water. The Argentine Camara Station lies W-SW of the landing beach. The beach on the far NE side may be accessed by hiking E from the dory beach, winding uphill and over ridges; in heavy snow, hiking is difficult.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 6, 1994	RN BH	Alla Tarasova
2.	November 29, 1995	BH	W. Discoverer
3.	December 15, 1995	LB	Explorer
4.	December 2, 1996	RN SF	W. Discoverer
5.	November 26, 1998	RN SF	Explorer
6.	January 22, 2000	RN	Shuleykin

Assessment and monitoring. This site has not been frequently visited by the Inventory. Preliminary surveying, mapping, censusing, and photodocumentation have been accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. Confirmed nesting species include chinstrap penguins, blue-eyed shags, Wilson's storm-petrels, kelp gulls, snowy sheathbills, Antarctic tern, and Antarctic brown skua.

Recent (1995) surveys indicate a minimum breeding population of 3,342 pairs of chinstrap penguins, an increase from 2,500 pairs counted in 1987 (Woehler & Croxall, 1996).

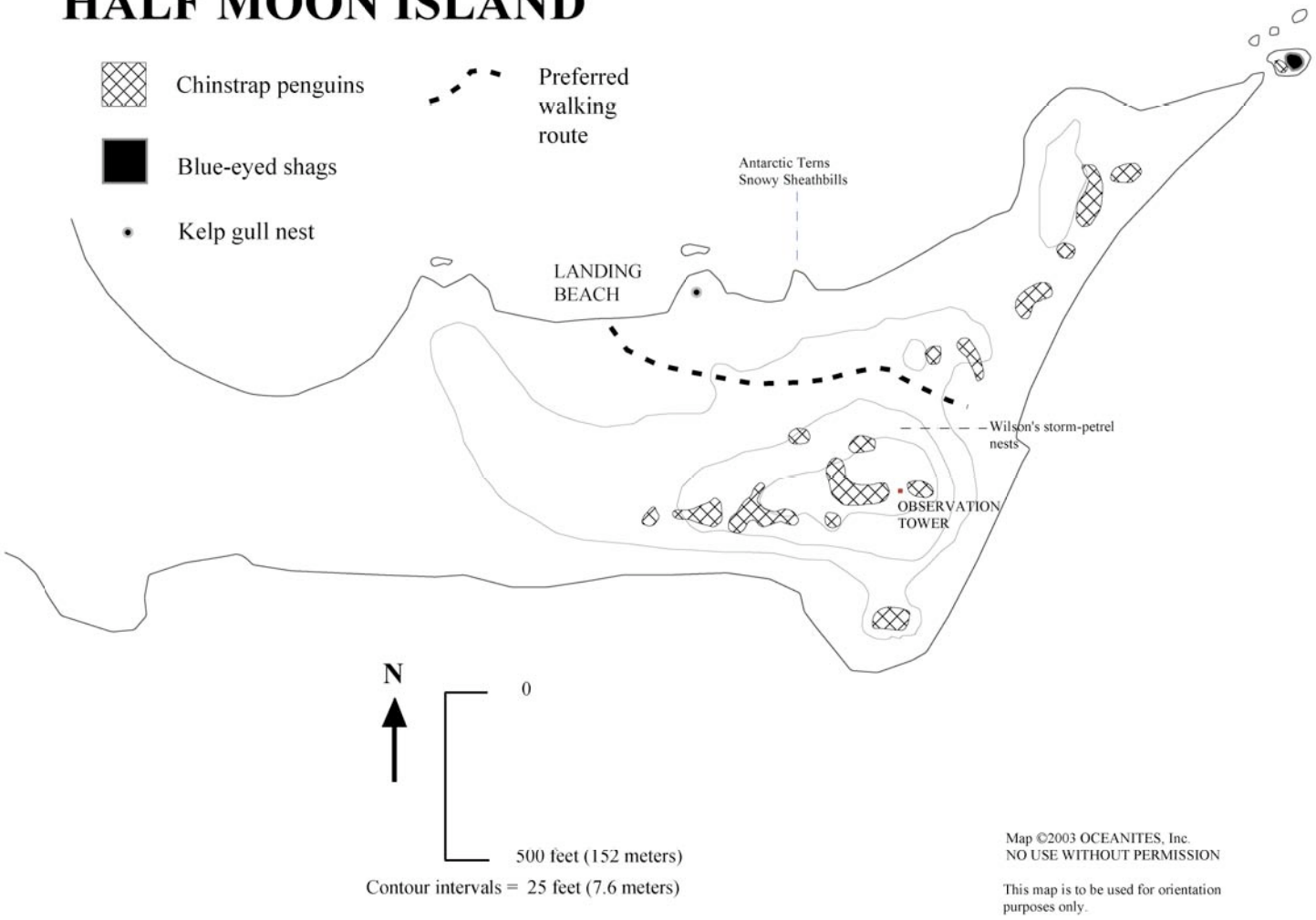
Seals. Southern elephant, Weddell, and Antarctic fur seals regularly haul-out on Half Moon's beaches.

Flora. Crustose lichens, spp. noted.

Conservation Aspects

Site sensitivities. Chinstrap penguins nesting above the landing beach and to the E are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. If snow cover is heavy, visitor space is restricted further. Kelp gulls nesting immediately E of the landing beach, and at other scattered locations, are easily approached and disturbed; in November and early December adults will be incubating eggs and, subsequently, guarding and provisioning chicks.

HALF MOON ISLAND



This map is to be used for orientation purposes only.

Antarctic terns nesting opportunistically on available, open ground are skittish, defensive, and very easily disturbed, even from a distance. Blue-eyed shags nesting on the far E tip are easily approached and disturbed; in November and December adults will be incubating eggs and, subsequently, guarding and provisioning chicks. Wilson's storm-petrels nest in loose scree. Antarctic fur seals frequently haul-out on the far NE beach.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting chinstrap penguins.
- If extensive snow cover, avoid — and do not walk in or block — trails that penguins have made through the snow.
- Avoid and stay clear of kelp gull nests.
- Walk slowly and carefully — and stay well clear — of nesting terns.
- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.
- Stay clear of — and do not hike upon or wander over — scree slopes.
- Strictly control hikes to the NE end by organizing guided groups, all following the same path, and not allowing any free wandering.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	10	1,191
1990-91:	9	1,011
1991-92:	25	2,984
1992-93:	14	1,585
1993-94:	17	2,961
1994-95:	38	3,017
1995-96:	49	5,221
1996-97:	35	2,258
1997-98:	33	4,382
1998-99:	33	3,931
1999-2000:	46	1,454
2000-01:	33	5,711
2001-02:	41	5,317
2002-03:	38	5,413
14-Season Total	421	46,436

Proximate visitor sites. Yankee Harbor and Fort Point on Greenwich Island; Robert Point and Mitchell Cove on Robert Island; and the Aitcho Islands.

Hannah Point, Livingston Island (HANN)

62˚39'S, 60˚37'W
Magnetic declination: 13.0˚E
Inventory subarea: SH
Inventory acronym: HANN
Species Diversity: HIGH
Site Sensitivity: HIGH

Note: Restricted visitor space.

Location — History — Features

This point forms the E side of the entrance to Walker Bay on the S coast of Livingston Island. It is named after the sealing vessel *Hannah* of Liverpool, which visited the South Shetland Islands and wrecked on this site in 1820. The regular landing site is a small, steep-faced, pocket beach about 50 meters wide. The beach rises to the ridge of a narrow isthmus between very steep, pointed peaks. W of this beach, the land surface slopes upward along a more-or-less planar surface to a knife-edged ridge on the N edge of this peninsula, from which nearly vertical sea cliffs plunge to the sea, 30-50 meters below. A narrow beach stretches along the base of these cliffs. The shingle beach at the landing site and the N beach below the southern giant petrel ridge are composed of dark, rounded, fine-grained basaltic cobbles and pebbles. The ground to the W is basaltic, and covered extensively with *Prasiola crispa*, which yields a green background to the extensive gentoo penguin colony found between the landing beach and inner Walker Bay. There are several round-bottomed gullies, deep in sandy and muddy material, along these upward slopes. The slopes appear to be eroding. Above the landing beach is an obvious jaspar spur. The upper slopes are littered with limpet shells, presumably dropped by the resident, nesting kelp gulls.

Easily observed, nesting macaroni penguins, which are rare in the Antarctic Peninsula, but relatively common at Elephant Island and extraordinarily abundant at South Georgia.

Landing Characteristics

Uncharted water near shore. Hazardous rocks along the shoreline toward inner Walker Bay may be exposed, depending on the tide. Narrow and exposed landing beach crowded with wildlife, prone to swells in moderate to high W-NW wind. Very restricted visitor space on the beach and at higher elevations because of topography and high biological density. Much erosion and loose scree on higher slopes, ridges. Cliff edges eroding and crumbling.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 9, 1994	RN BH	Alla Tarasova
2.	January 23, 1995	RN RD	Explorer
3.	November 18, 1995	RN LB	Explorer
4.	November 30, 1995	BH	W. Discoverer
5.	December 12, 1995	BH	W. Discoverer
6.	January 27, 1996	RD RP	Livonia
7.	December 3, 1996	RN SF	W. Discoverer
8.	January 30, 1997	LB	Hanseatic
9.	December 3, 1997	RN SF	Explorer
10.	December 7, 1998	RN SF	Explorer
11.	December 18, 1999	RN	Cal Star
12.	January 14, 2000	SF	Cal Star
13.	January 18, 2000	RD	Explorer
14.	January 25, 2000	RN	Shuleykin
15.	December 15, 2000	RN	Cal Star
16.	December 30, 2000	SF LF	Cal Star

Assessment and monitoring. Surveyed, mapped, and photodocumented (aerial and terrestrial). Regular, site-wide censusing of gentoo, chinstrap (in 12 groups), and macaroni penguins, southern giant petrels, and blue-eyed shags. More thorough ground-survey of floral communities needed.

Fauna — Flora — Censuses

Penguins & flying birds. Confirmed nesting species include chinstrap, gentoo, and macaroni penguins, blue-eyed shag, snowy sheathbill, kelp gull, pintado petrel, skuas, spp., and southern giant petrel. Antarctic terns nest elsewhere in Walker Bay. Wilson's storm-petrels have been observed on the higher slopes and presumably breed.

Historic censuses reported in Woehler (1993) include: gentoo penguin, 1,016 N1, 1987; chinstrap penguin, 1,500 N3, 1987; and macaroni penguin, 8 N1, 1987.

Antarctic Site Inventory censuses:

Chinstrap penguin (total, 12 groups, site-wide)

1,158	N1	1996 Dec
1,137	N1	1997 Dec
1,061	N1	1999 Dec
1,341	C1	2000 Jan
1,045	N1	2000 Dec

Gentoo penguin (site-wide)

1.123	N1	1996 Dec
1,350	N1	1997 Dec

Macaroni penguin (site-wide, found nesting in chinstrap penguin groups)

8	N1	1995 Nov
6	N1	1995 Dec
6	N1	1996 Dec
6	N1	1997 Dec
5	N1	1999 Dec
3	C1	1995 Jan
4	C1	1996 Jan
3	C1	2000 Jan
4	N1	2000 Dec

Southern giant petrel (site-wide)

117	N1	1997 Dec
110	N1	1999 Jan
126	N1	1999 Dec
111	N1	2000 Jan
123	N1	2000 Dec

Blue-eyed shag (small colony at W end)

10	N1	1994 Dec
7	N1	1995 Nov
5	N1	1995 Dec
5	N1	1996 Dec
7	N1	1997 Dec
5	N1	1998 Dec
7	N1	1999 Dec
5	N1	2000 Jan
2	C1	1999 Dec
8	C1	2000 Jan
9	C1	2000 Jan
3	N1	2000 Dec

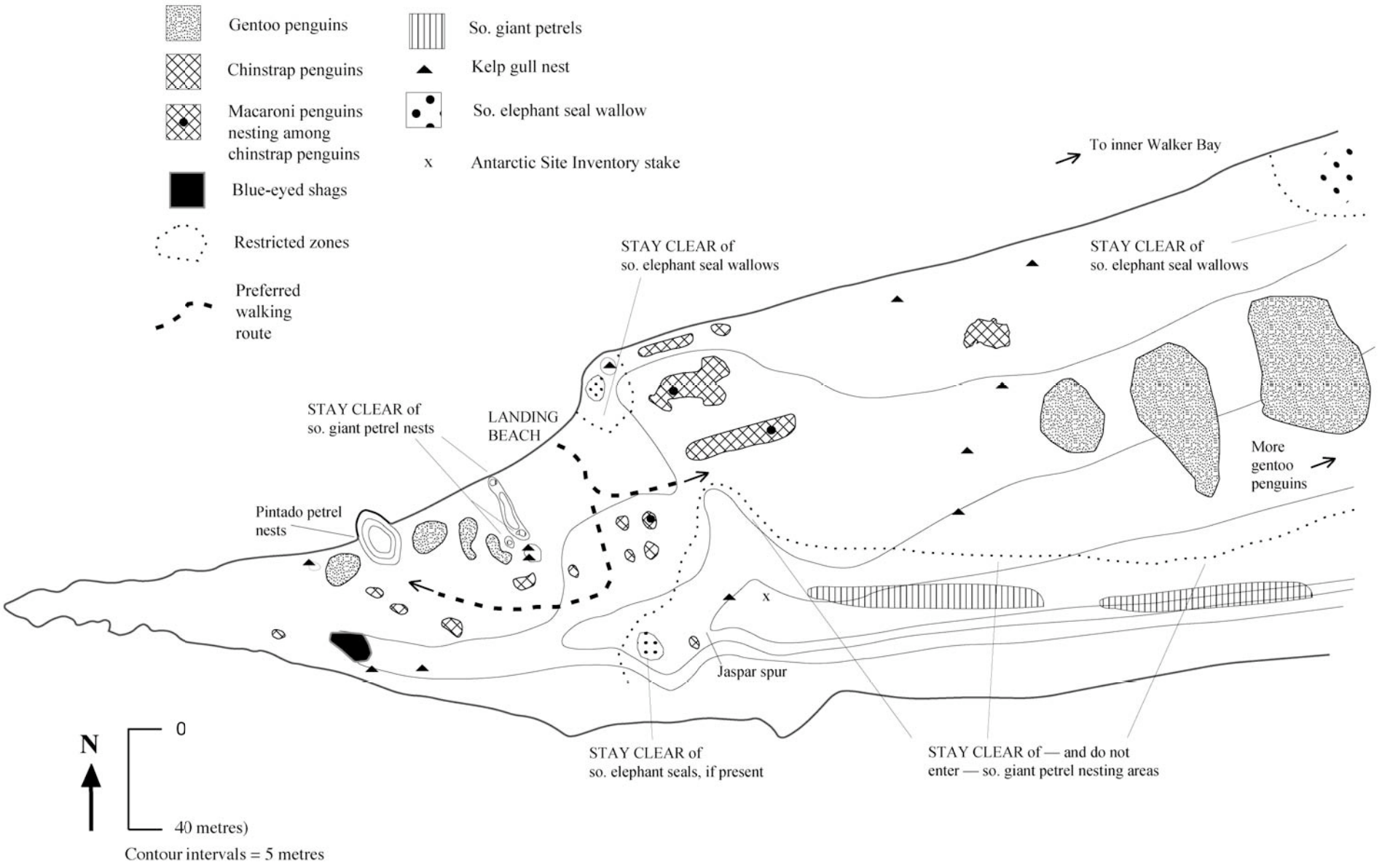
Seals. The site presents a few, regularly occupied southern elephant seal wallows, and its beaches occasionally have hauled-out Weddell and Antarctic fur seals.

Flora. *Prasiola* is extensive. *Xanthoria,* spp. and other crustose lichens adorn many rocks and outcrops, and there are patches of *Colobanthus* and *Deschampsia*.

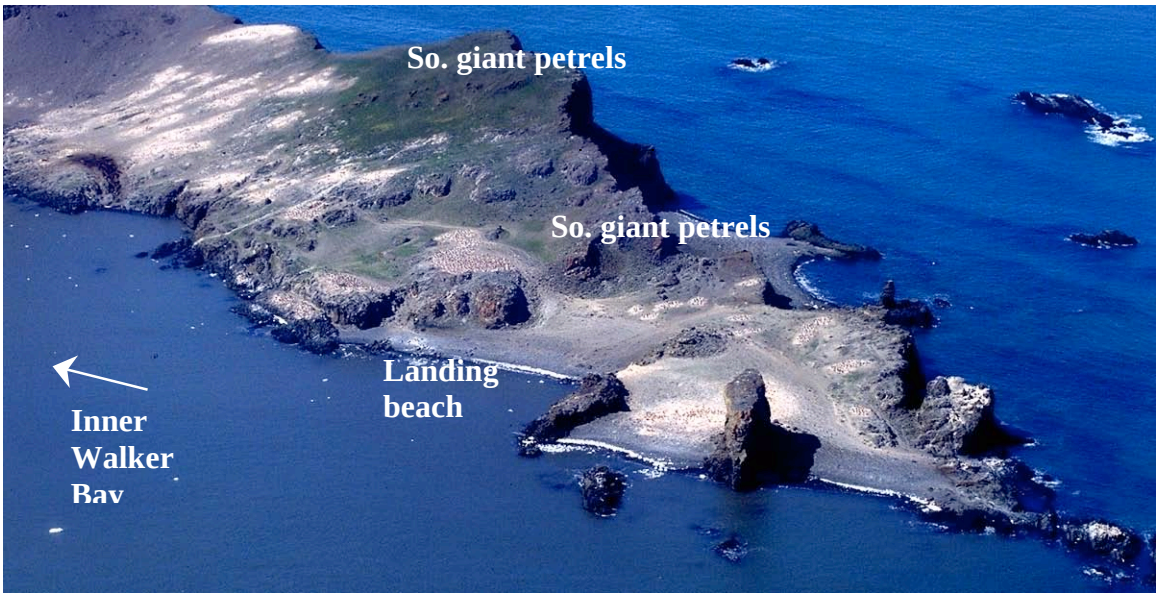
Conservation Aspects

Site sensitivities. Very restricted visitor space on the landing beach, where numbers of penguins are moving back and forth, and on higher ground above and immediately E and W of the beach, where penguins nest in densely packed colonies. Nesting chinstrap, gentoo, and macaroni penguins are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche.

HANNAH POINT



HANNAH POINT



POINTERS FOR AVOIDING DISRUPTIONS

- STRICTLY CONTROL LANDINGS WITH SMALL GROUPS OF NO MORE 20 VISITORS, WHICH ARE WELL SPACED, WITH ONE GUIDE PER GROUP, FOLLOWING THE SAME PATH, AND NOT ALLOWING ANY FREE WANDERING
- ALTERNATIVELY, MAKE ZODIAC LANDINGS FURTHER E, BEYOND THE MAIN ELEPHANT SEAL WALLOW, TOWARD INNER WALKER BAY
- DO NOT IMPEDE PENGUINS' ACCESS TO AND FROM THE WATER
- WALK SLOWLY AND CAREFULLY AROUND NESTING, CRÈCHING, OR MOLTING PENGUINS
- AVOID AND STAY CLEAR OF NESTING SOUTHERN GIANT PETRELS
- STAY CLEAR OF — AND DO NOT HIKE UPON OR WANDER OVER — RIDGES, SCREE SLOPES, AND CLIFF EDGES
- WALK SLOWLY AND CAREFULLY AROUND NESTING SHEATHBILLS
- AVOID AND STAY CLEAR OF WALLOWING SOUTHERN ELEPHANT SEALS
- AVOID AND STAY CLEAR OF ANTARCTIC FUR SEALS, WHICH SHOULD BE GIVEN A WIDE BERTH AND SHOULD NOT BE APPROACHED

Southern giant petrels within 100 meters of the landing beach and on slopes and ridges above and E of the landing beach are easily approached and disturbed; in November and December they will be incubating eggs. Kelp gulls on widely scattered nests are easily approached and disturbed; in November and early December adults will be incubating eggs and, subsequently, guarding and provisioning chicks.

Blue-eyed shags on the far W point are easily approached and disturbed; in November and early December adults will be incubating eggs and, subsequently, guarding and provisioning chicks. Skuas nesting on widely scattered territories at higher elevations are easily approached and disturbed, particularly, later in the season (from mid-January) when adults are fiercely protecting young. Snowy sheathbills nesting in rock caves and crevices are easily approached and disturbed. Wallowing southern elephant seals E of the narrow landing beach (occasionally, among the penguins) are easily approached and disturbed. Antarctic fur seals may be found on the beach and among the penguins.

Pointers for avoiding disruptions.

- Strictly control landings on the narrow, exposed beach by organizing small groups of no more than 20 visitors, which are well spaced, with one guide per group, all following the same path, and not allowing any free wandering.
- Alternatively, make zodiac landings further E, beyond the main elephant seal wallow, toward inner Walker Bay.
- Do not impede penguins' access to and from the water.
- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Avoid and stay clear of nesting southern giant petrels.
- Stay clear of — and do not hike upon or wander over — ridges, scree slopes, and cliff edges.
- Walk slowly and carefully around nesting sheathbills.
- Avoid and stay clear of wallowing southern elephant seals.
- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	3	419
1990-91:	2	192
1991-92:	17	1,632
1992-93:	23	1,542
1993-94:	29	2,740
1994-95:	46	4,010
1995-96:	37	3,048
1996-97:	46	3,480
1997-98:	39	3,399
1998-99:	48	3,982
1999-2000:	54	1,691
2000-01:	53	4,752
2001-02:	37	2,927
2002-03:	46	4,096
14-Season Total	480	37,910

Proximate visitor sites. Half Moon Island is located to the N, between Livingston Island and Greenwich Island.

Jubany Station Vicinity, King George Island (JUBA)

62˚14'S, 58˚38'W
Magnetic declination: 12.0˚E
Inventory subarea: SH
Inventory acronym: JUBA
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

This Argentine Research Station is located in Potter Cove, which indents the NW side of King George island to the E of Barton Peninsula. The cove was known to sealers as early as 1821. A prominent geological feature in the vicinity is Three Brothers Hill, 210 meters tall, which is very conspicuous and is the remaining portion of an extinct volcano that once existed on the E side of Potter Cove. On site is an Historic Site and Monument, a metal plaque erected by Eduard Dallman to commemorate the visit of his German expedition on March 1, 1874.

Landing Characteristics

Mostly a station visit, though some wildlife, and particularly southern elephant seals, may be readily observed.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. November 20, 1995 BH SF W. Discoverer

Assessment and monitoring. None by the Inventory. These tasks presumably accomplished by base personnel.

Fauna — Flora — Censuses

Penguins & flying birds. Kelp gulls and Wilson's storm-petrels are confirmed breeders. No site-specific penguin breeding populations are listed in Woehler (1993) or Woehler & Croxall (1996).

Seals. Southern elephant seals are regularly hauled-out in Potter Cove.

Flora. Not surveyed during brief Inventory visit.

Conservation Aspects

Site sensitivities. Close proximity to nearby, Potter Cove Antarctic Specially Protected Area. (ASPA).

Pointers for avoiding disruptions.

- Do not enter the Antarctic Specially Protected Area.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	1	120
1990-91:	1	107
1991-92:	3	307
1992-93:	4	305
1993-94:	6	869
1994-95:	3	403
1995-96:	0	0
1996-97:	0	0
1997-98:	3	333
1998-99:	6	232
1999-2000:	3	268
2000-01:	1	132
2001-02:	1	96
2002-03:	6	363
14-Season Total	38	3,535

Proximate visitor sites. Jubany is close to Maxwell Bay, where many other science stations are located.

Mitchell Cove, Robert Island (MITC)

62˚24’S, 59˚40’W
Magnetic declination: 13.5˚E
Inventory subarea: SH
Inventory acronym: MITC
Species Diversity: MEDIUM
Site Sensitivity: LOW

Location — History — Features

Cove on NW end of Robert Island.

Landing Characteristics

Cobble landing beach, with fragile substrate and glacial silt moraine.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 26, 2001	JC LGC	Endeavour
2.	January 6, 2002	RP	Endeavour
3.	December 29, 2002	RP	Endeavour
4.	January 8, 2003	SF	Endeavour

Assessment and monitoring. Only preliminary surveying and censusing have been accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. South polar and Antarctic brown skua, Wilson’s storm-petrel, and Antarctic terns are confirmed breeders. Kelp gulls observed, but nests not observed. Chinstrap, gentoo, and Adélie penguins observed wandering on the beach, but not observed nesting.

Seals. None observed.

Flora. Dense beds of moss, spp. both on lower slopes and higher elevations. Dense patches of *Usnea*, spp. at higher elevations.

Conservation Aspects

Site sensitivities. Substrate is fragile, requiring walking and hiking in melt streams. Dense moss beds and lichens patches. Antarctic terns

Pointers for avoiding disruptions.

- Watch footsteps carefully, especially when snow cover is absent, to avoid trampling moss and lichens.
- Stay clear of — and do not hike near — areas where terns are nesting.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
14-Season Total, 1989-2003	0	0

Note: Inventory researchers visited this site twice from a tour ship during the 2001-02 season; however, these landings are, inexplicably, not listed in the NSF compilations.

Proximate visitor sites. Yankee Harbor and Fort Point on Greenwich Island; Robert Point and Mitchell Cove on Robert Island; and the Aitcho Islands.

Pendulum Cove, Deception Island (PEND)

62˚56'S, 60˚36'W
Magnetic declination: 13.2˚E
Inventory subarea: SH
Inventory acronym: PEND
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

The cove is located on the NE side of Port Foster, Deception Island, and its name relates to pendulum and magnetic observations made by a British expedition in 1829. The flat, black sand beach slopes gently offshore and forms a distinct beach ridge. From the beach the ground slopes gently up to the Chilean research station that was destroyed during the 1967 eruption. The ground behind the ruins of the old station rises abruptly to the inner caldera wall, which at this point is mostly covered with glacial ice from the E rim ice cap. A substantial hill to the E is covered with ash and cinders that are deeply gullied. An Antarctic Specially Protected Area (ASPA) is located here, and is intended to protect rare bryophytes (mosses), but its boundary is not clearly marked and is merely described as beginning at the high tide line. The beach is entirely composed of loose cinders, with no soil, and is used by visiting ships to conduct brief, Antarctic swims. There may be yellow algae and boiled krill floating on the surface, and the steam rising from the beach often is laced with sulfurous odor. The beach is deeply gullied by melt-water streams, and erosion appears to be progressing at a rapid rate.

Landing Characteristics

Expedition companies often bring visitors to this site to swim where cold bay water mixes with volcanically heated water at the shoreline.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 12, 1995	BH SF	W. Discoverer
2.	December 29, 1995	RN LB	Explorer
3.	December 18, 1999	RN	Cal Star

Assessment and monitoring. Preliminary surveying, censusing, and photodocumentation have been accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. No species recorded as nesting. Antarctic terns may visit, however, to pluck boiled krill and other invertebrates from the shore edge. No site-specific penguin counts are listed in Woehler (1993).

Seals. None.

Flora. None observed. Access to the ASPA, where rare bryophytes are located, is prohibited.

Conservation Aspects

Site sensitivities. Close proximity to nearby Antarctic Specially Protected Area (ASPA) where rare bryophytes are located. Entry is prohibited, but the ASPA boundary is ill defined.

Pointers for avoiding disruptions.

- Do not enter the ASPA.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	7	587
1990-91:	10	1,215
1991-92:	19	2,011
1992-93:	23	1,936
1993-94:	33	3,159
1994-95:	41	2,803
1995-96:	42	3,492

	Zodiac Landings	Participating Visitors
1996-97:	44	2,725
1997-98:	31	3,426
1998-99:	50	4,676
1999-2000:	57	5,300
2000-01:	45	4,211
2001-02:	47	4,994
2002-03:	42	2,447
14-Season Total	491	42,982

Proximate visitor sites. Two other, regular visitor sites may be found within Port Foster: Whaler's Bay and Telefon Bay. Vapour Col is located on W, seaward side of the island, Baily Head on the SE, seaward side.

Penguin Island (PENG)

62˚06'S, 57˚54'W
Magnetic declination: 11.0˚E
Inventory subarea: SH
Inventory acronym: PENG
Species Diversity: HIGH
Site Sensitivity: HIGH

Location — History — Features

This is a 1.0-mile-long island lying close to the S coast of King George Island, which marks the E side of the entrance to King George Bay. It was first sighted in 1820 by the British expedition under Bransfield's command, and named by him for the penguins observed on shore.

Looming tall is the dormant caldera of Deacon Peak, the 170-meter high summit of the island. Many visitors hike to this summit, and to do so will traverse through areas where Antarctic terns breed. On the high knolls S of the landing beach, there are extensive moss beds, many *Usnea* patches, and some abandoned giant petrel nests.

Landing Characteristics

Uncharted water near shore. Hazardous rocks along the shoreline may be exposed, depending on the tide. Broad cobble landing beach on the N coast, which may be packed with ice depending on wind and swell; difficult to negotiate when snow-covered or wet, and especially if Antarctic fur seals are present. Easiest inland access is toward the E and uphill, but immediately places visitors in close proximity of nesting southern giant petrels.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	January 12, 1995	RN RD	Livonia
2.	November 17, 1995	RN LB	Explorer
3.	November 28, 1995	BH SF	W. Discoverer
4.	December 11, 1995	BH	W. Discoverer
5.	January 12, 1996	RN BH	Endurance
6.	November 30, 1996	RN SF	W. Discoverer
7.	November 26, 1997	RN SF	W. Discoverer
8.	December 1, 1997	RN SF LS MB	Explorer
9.	December 9, 1998	RN SF	Explorer
10.	January 12, 1999	RN SF	Endurance
11.	January 19, 1999	RD ST	Vavilov
12.	December 15, 1999	SF	Shuleykin

Assessment and monitoring. Surveyed, mapped, and photodocumented (aerial and terrestrial). Regular censusing of Adélie and chinstrap penguin groups on the southern end of the island, and of southern giant petrels, site-wide. Adélie and chinstrap penguins on the southern end appear to have considerable integrity as control groups because of their far proximity from the regular landing beach and, likely, visitor absence. Abandoned southern giant petrel nests on the N end suggest an opportunity for paleontological research. More thorough censusing of nesting kelp gulls and skuas needed. More thorough ground survey of floral communities needed. Because of extensive, easily accessed moss beds, a degradation study seems appropriate and necessary.

Fauna — Flora — Censuses

Penguins & flying birds. Chinstrap penguins, southern giant petrels, Antarctic terns, skuas, spp., and kelp gulls are confirmed breeders. Snowy sheathbills have been noted, but no nests were discovered. Blue-eyed shags may be found roosting on offshore rocks. Adélie penguins nest on the southern side of the island, away from the visitor traffic. Storm-petrels, spp. observed at higher reaches and presumably breed.

Recent historic censuses reported in Woehler (1993): chinstrap penguin, 7,581 N1/3, 1980 and Adélie penguin 3,114 N1/3, 1980.

Antarctic Site Inventory censuses:

Adélie penguin (site-wide)

1,966	N1	1996 Nov
2,441	N1	1997 Dec

Southern giant petrel (site-wide)

507	N1	1997 Dec
578	N1	1998 Dec
439	N1	1999 Jan
634	N1	1999 Dec

Seals. Southern elephant, Weddell, and Antarctic fur seals regularly haul-out on the landing beach.

Flora. *Deschampsia*; *Colobanthus*; *Xanthoria elegans, Caloplaca*, spp., and other crustose lichens; patches of fruticose lichens, *Usnea antarctica*; and extensive beds of cushion moss, spp. are present.

Conservation Aspects

Site sensitivities. Southern giant petrels nesting along the entire N coast and around and near the eroding crater to the E are easily approached and disturbed; many unoccupied nests are evident; in November and early December adults will be incubating eggs. Chinstrap penguins nesting along this eroding crater are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche.

Scientific control groups of chinstrap and Adélie penguin colonies on the SE end of the island. Skuas nesting on widely scattered territories are easily approached and disturbed, particularly later in the season (from mid-January) when adults are fiercely protecting young. Kelp gulls nesting at widely scattered locations are easily approached and disturbed; in November and early December adults will be incubating eggs and, subsequently, guarding and provisioning chicks. Antarctic terns nesting opportunistically to the W and inland on available, open ground are skittish, defensive, and very easily disturbed, even from a distance.

Toward the interior, extensive patches of moss and *Usnea* lichens are readily accessed and easily may be trampled. Antarctic fur seals may be found on the cobble beach, among the penguins and giant petrels, and inland — and in large numbers. Higher slopes, including the route to Deacon Peak, are eroding, and storm-petrel nests in the high scree may be trampled.

Pointers for avoiding disruptions.

- Avoid and stay clear of southern giant petrels nesting along the N coast and NE crater.
- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Avoid and stay clear of skua territories and nesting kelp gulls.
- Stay clear of — and do not hike or wander to — the W side, where terns are nesting.
- Watch footsteps carefully, especially when snow cover is absent, to avoid trampling moss and lichens.
- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.
- Stay clear of — and do not hike upon or wander over — scree slopes.
- Strictly control hikes to Deacon Peak by organizing guided groups, all following the same path, and not allowing any free wandering.
- Avoid chinstrap and Adélie penguin control colonies on the SE end.

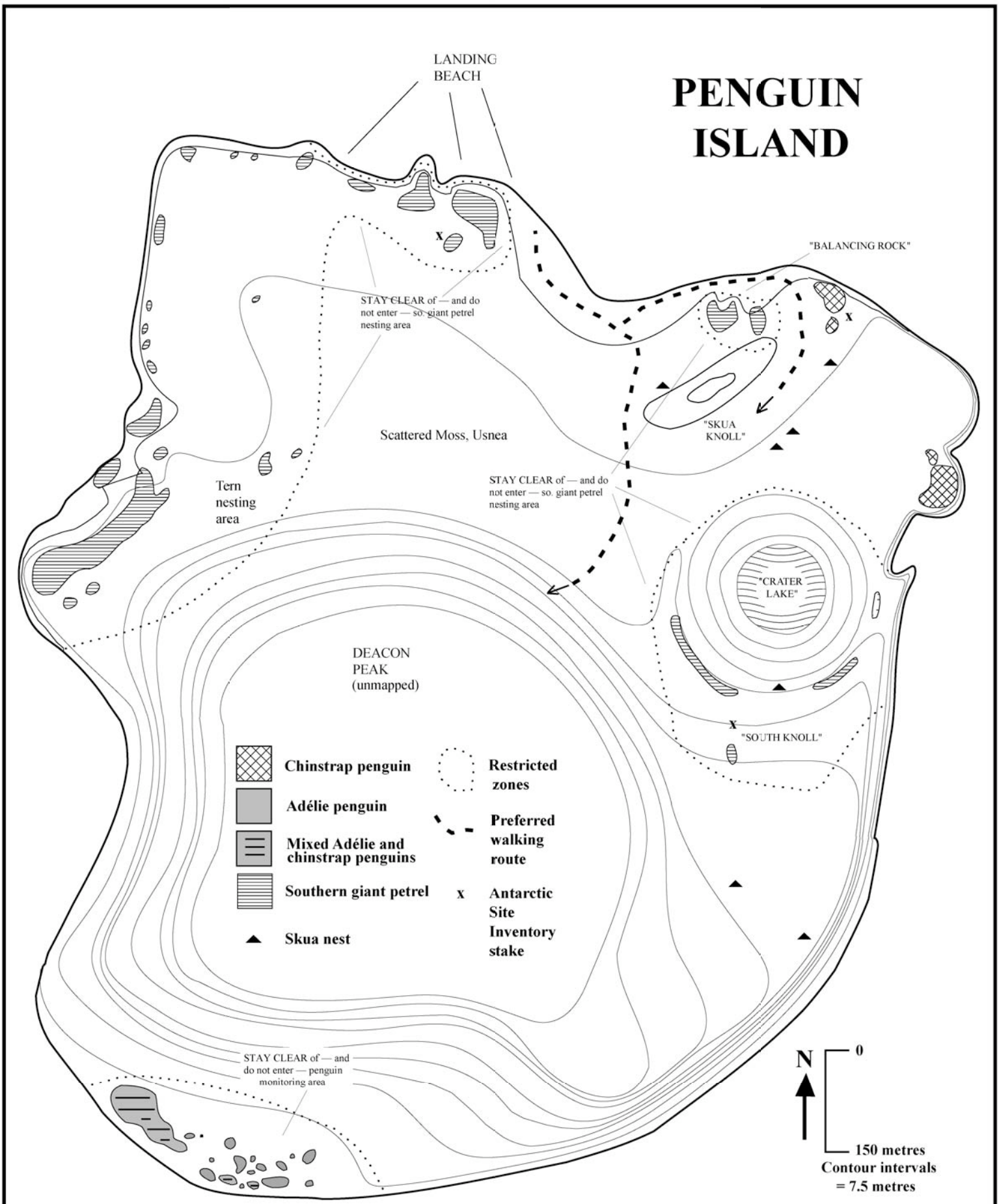
Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	**Participating Visitors**
1989-90:	3	256
1990-91:	0	0
1991-92:	1	65
1992-93:	7	506
1993-94:	13	1.166
1994-95:	24	1,692

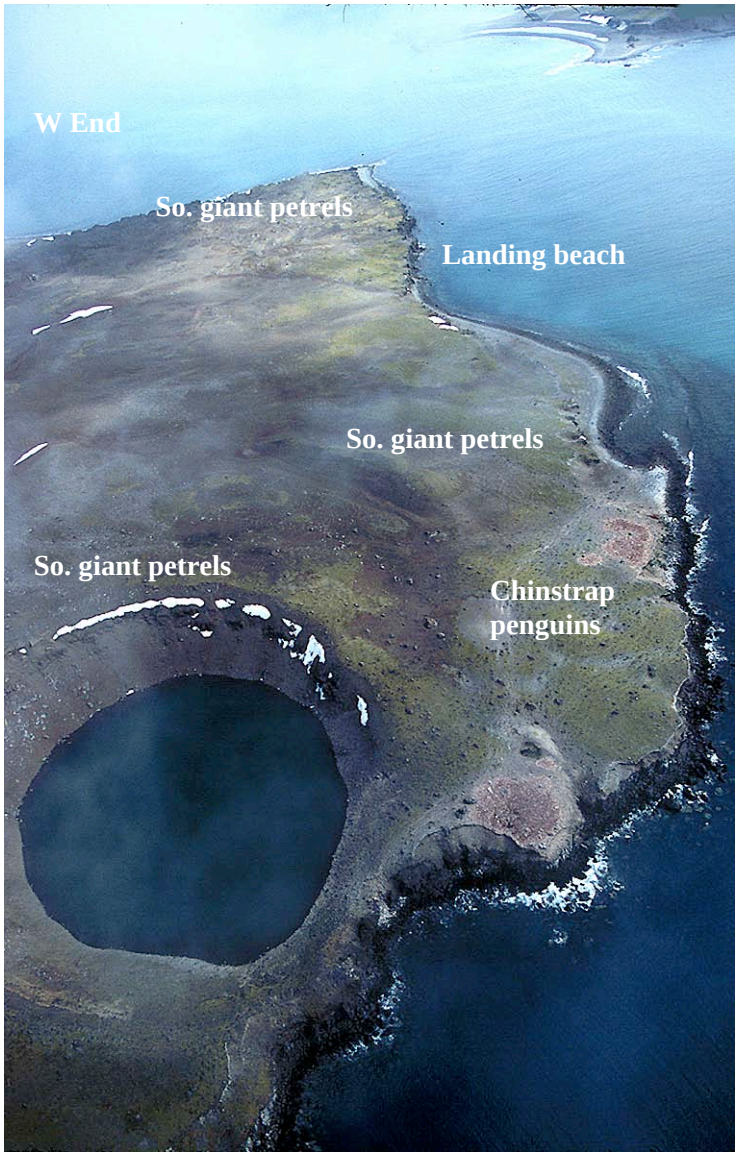
	Zodiac Landings	Participating Visitors
1995-96:	23	1,449
1996-97:	12	1,090
1997-98:	15	1,394
1998-99:	20	1,744
1999-2000:	17	1,515
2000-01:	9	740
2001-02:	11	1,009
2002-03:	14	1,262
14-Season Total	169	13,888

Proximate visitor sites. Turret Point on King George Island to the N, Admiralty Bay and the Ferraz and Arctowski Research stations to the W.


PENGUIN ISLAND
LANDING BEACH
"BALANCING ROCK"
STAY CLEAR of — and do not enter — so. giant petrel nesting area
Scattered Moss, Usnea
"SKUA KNOLL"
Tern nesting area
STAY CLEAR of — and do not enter — so. giant petrel nesting area
"CRATER LAKE"
DEACON PEAK (unmapped)
"SOUTH KNOLL"
Chinstrap penguin
Adélie penguin
Mixed Adélie and chinstrap penguins
Southern giant petrel
Skua nest
Restricted zones
Preferred walking route
Antarctic Site Inventory stake
STAY CLEAR of — and do not enter — penguin monitoring area
N
0
150 metres
Contour intervals = 7.5 metres

PENGUIN ISLAND

POINTERS FOR AVOIDING DISRUPTIONS



- AVOID AND STAY CLEAR OF SOUTHERN GIANT PETRELS NESTING ALONG THE N COAST AND NE CRATER
- WALK SLOWLY AND CAREFULLY AROUND NESTING, CRÈCHING, OR MOLTING PENGUINS
- AVOID AND STAY CLEAR OF SKUA TERRITORIES AND NESTING KELP GULLS
- STAY CLEAR OF — AND DO NOT HIKE OR WANDER TO — THE W END, WHERE TERNS ARE NESTING
- WATCH FOOTSTEPS CAREFULLY, ESPECIALLY WHEN SNOW COVER IS ABSENT, TO AVOID TRAMPLING MOSS AND LICHENS
- AVOID AND STAY CLEAR OF ANTARCTIC FUR SEALS, WHICH SHOULD BE GIVEN A WIDE BERTH AND SHOULD NOT BE APPROACHED
- STAY CLEAR OF — AND DO NOT HIKE UPON OR WANDER OVER — SCREE SLOPES
- STRICTLY CONTROL HIKES TO DEACON PEAK BY ORGANIZING GUIDED GROUPS, ALL FOLLOWING THE SAME PATH, AND NOT ALLOWING ANY FREE WANDERING
- AVOID CHINSTRAP AND ADÉLIE PENGUIN CONTROL COLONIES ON THE SE END

Robert Point, Robert Island (ROBE)

62˚28'S, 59˚23'W
Magnetic declination: 13.5˚E
Inventory subarea: SH
Inventory acronym: ROBE
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

This is the SE tip of Robert Island, in the South Shetlands. The point has been known to sealers for more than a century, but it is not known for whom the point or the island is named.

Landing Characteristics

A new visitor site, which offers breeding chinstrap penguins, many elephant seals, and rugged scenery.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	November 29, 1995	BH	W. Discoverer
2.	December 11, 1995	BH	W. Discoverer
3.	February 9, 1996	BH RP	Livonia

Assessment and monitoring. Only preliminary surveying, censusing, mapping, and photodocumentation have been accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. Confirmed breeding species include chinstrap penguin, kelp gull, and pintado petrel. Recent chinstrap penguin census data reported in Woehler (1993): 2,500 A3, 1987.

Seals. Southern elephant seals haul-out in substantial numbers. Weddell and Antarctic fur seals also may be found.

Flora. Crustose lichens observed near the pintado breeding cliffs.

Conservation Aspects

Site sensitivities. Chinstrap penguins are easily approached and disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-95:	0	0
1995-96:	2	118
1996-97:	1	45
1997-98:	6	383
1998-99:	0	0
1999-2000:	1	56
2000-01:	0	0
2001-02:	6	532
2002-03:	4	224
14-Season Total	20	1,358

Proximate visitor sites. Mitchell Cove, Robert Island; Half Moon Island; the Aitcho Islands; and Fort point and Yankee Harbor on Greenwich Island.

Telefon Bay, Deception Island (TELE)

62˚56'S, 60˚40'W
Magnetic declination: 13.0˚E
Inventory subarea: SH
Inventory acronym: TELE
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A small bay on the NW side of Port Foster, Deception Island, named for a salvage vessel that moored in the bay in 1909, awaiting repairs. From a wide, flat, black-sand beach, an apron of this same material slopes gently upward to the steep face of the cinder-covered glacier, about 300 meters inland, which extends over an inner caldera rim. The rising slope extends to a ridge of black, cinder-covered volcanic material, which forms the E edge of one of the recent eruption craters. The crater has a flat floor with a small, shallow lake at its E end. The W end of the crater is being filled by a melt-water stream that enters the crater on the NE side. The upper edges of the principal crater walls show concentric cracking and are likely to slip and collapse. The ground is completely covered with a thick layer of recent coarse volcanic ash and small lapilli. There is no soil. The axis of the valley, when covered with snow, has a deep layer of water and mud underneath the snow and is nearly impassable. The ridge line, although also muddy, has a thinner cover of snow and is more easily passable. The beach has a flat profile both under water and up into the valley between the explosion craters to the W and the volcanic hills to the E within the caldera. At the E end of the beach is a wave-cut terrace at sea-level, which contains hot pools. Round piles of harder basaltic material are disposed along the crater rim, and there is debris remaining from volcanic bombs up to 20-30 centimeters in diameter, which were ejected from the crater during recent eruptions. These bomb fragments easily break apart. The main eruption crater is directly against the E-rim glacier (Goddard Hill-Mt. Pond Ice Cap), and its NE wall is actually formed by the glacier itself. The recent eruptions may have been partially through the ice. The glacier face is completely covered by black ash and cinders, which insulate it and retard melting.

Landing Characteristics

This is the site of the most recent volcanic eruption at Deception Island, and wildlife are generally absent. The pathway to the caldera becomes a potpourri of footprints in the ash.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	November 29, 1995	RN LB	Explorer
2.	November 26, 1996	RN	Explorer
3.	December 18, 1999	RN	Cal Star
4.	February 18, 2002	RN	Endeavour
5.	December 30, 2002	RP	Endeavour
6.	January 9, 2003	SF	Endeavour
7.	February 15, 2003	MB	Endeavour

Assessment and monitoring. Only preliminary surveying, censusing, and photodocumentation has been accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. No site-specific penguin breeding populations are listed in Woehler (1993) and Woehler & Croxall (1996).

Seals. None.

Flora. None observed. Melt pools near the landing beach may contain algae.

Conservation Aspects

Site sensitivities. Caldera rim is eroding and unstable.

Pointers for avoiding disruptions.

- Stay clear of — and do not hike upon or wander too close to — edges of the caldera.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	6	492
1990-91:	4	452
1991-92:	6	606
1992-93:	1	72
1993-94:	12	819
1994-95:	5	403
1995-96:	7	543
1996-97:	4	282
1997-98:	7	566
1998-99:	13	1,039
1999-2000:	9	634
2000-01:	13	937
2001-02:	15	1,137
2002-03:	13	995
14-Season Total	115	8,977

Proximate visitor sites. There are two other visitor sites "inside" Port Foster: Whaler's Bay and Pendulum Cove. Baily Head lies on the SE, seaward side of the island, Vapour Col on the E, seaward side.

Turret Point, King George Island (TURR)

62˚05'S, 57˚55'W
Magnetic declination: 11.0˚E
Inventory subarea: SH
Inventory acronym: TURR
Species Diversity: MEDIUM
Site Sensitivity: HIGH

Location — History — Features

A point marked by conspicuous high rock stacks that form the E limit of King George Bay on the S coast of King George Island. The point was first charted by personnel of the *Discovery II* expedition in 1937. To the E lies Three Sisters Point, which is marked by three conspicuous boulders and form the W side of the entrance to Sherratt Bay.

Landing Characteristics

Uncharted water near shore. Hazardous rocks along the shoreline may be exposed, depending on the tide. Landings on broad cobble beach on S coast, which may be packed with ice depending on wind and swell; difficult to negotiate when snow-covered or wet, and especially if Antarctic fur seals are present. Melt pools inland. Extensive, heavily crevassed glacier above and behind the landing beach.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	November 20, 1995	BH	W. Discoverer
2.	November 28, 1995	BH	W. Discoverer
3.	December 11, 1995	BH	W. Discoverer
4.	December 20, 1995	BH	W. Discoverer
5.	November 26, 1997	RN SF	W. Discoverer

Assessment and monitoring. Only preliminary surveying, mapping, and photodocumentation has been accomplished. Documentation needs include: more thorough censusing of nesting kelp gulls and skuas, and ground survey of floral communities.

Fauna — Flora — Censuses

Penguins & flying birds. Confirmed breeding species include chinstrap and Adélie penguins, southern giant petrels, kelp gulls, blue-eyed shags, and Antarctic terns. Skuas, spp. and snowy sheathbills also noted, but no nests discovered.

Antarctic Site Inventory censuses:

Adélie penguins

1,077	N1	1997 Nov

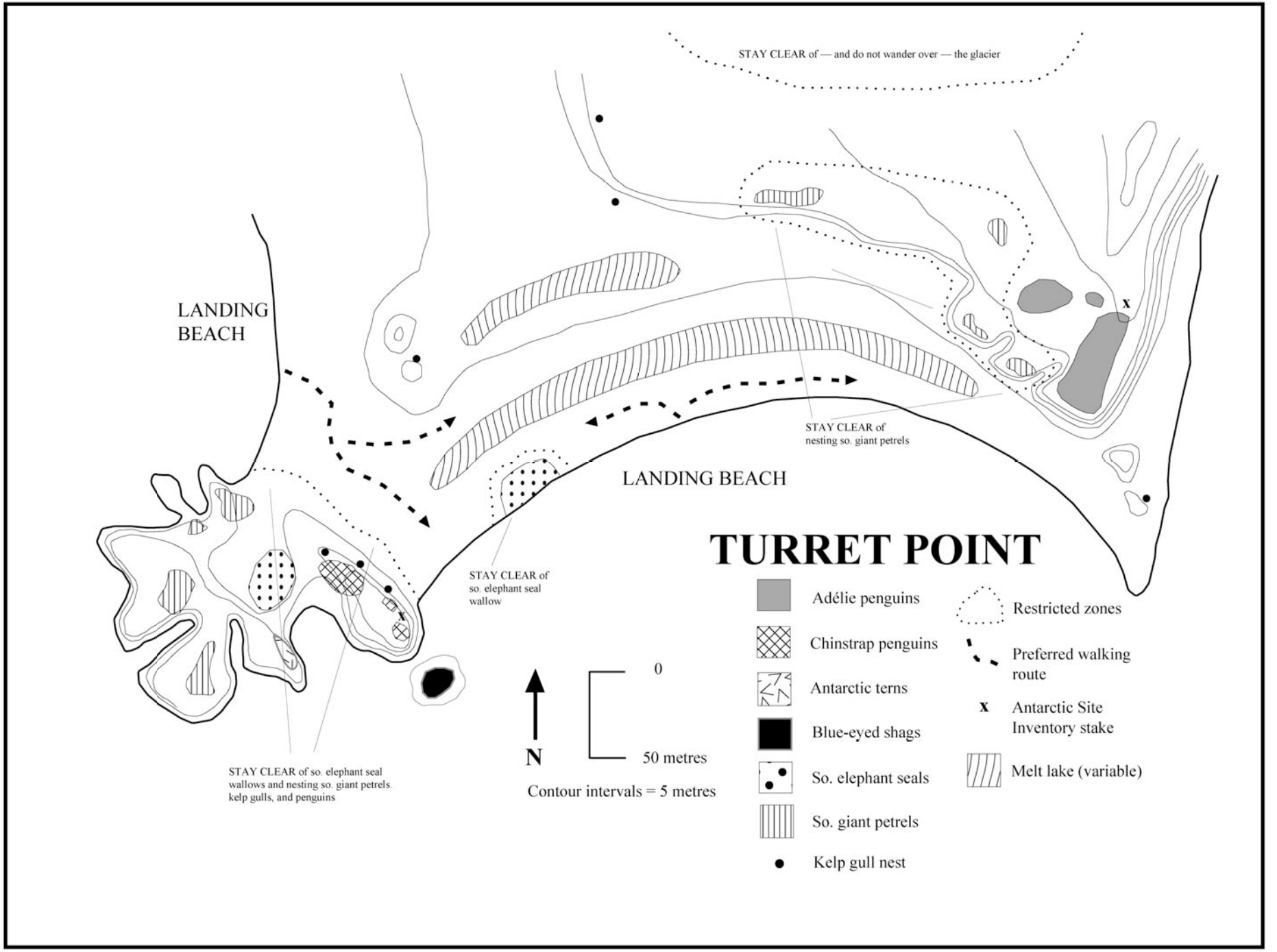
Recent historic Adélie penguin census reported in Woehler (1993): 1,918 N1, 1980. Woehler (1993) also lists 6,202 pairs of Adélie penguins at nearby Three Sisters Point (62˚05'S 57˚55'W); no site-specific chinstrap penguin breeding population is listed.

Seals. Southern elephant seals frequently haul-out in large numbers. Weddell seals also hauled-out during Inventory visits.

Flora. Cushion moss, spp., and crustose lichens *Xanthoria*, spp. and *Caloplaca*, spp. noted. Moss appears to be heavily damaged by the elephant seals.

Conservation Aspects

Site sensitivities. Wallowing southern elephant seals on the W and E ends are easily approached and disturbed. Southern giant petrels nesting on the W and E ends of the cobble beach are easily approached and disturbed; in November and December they will be incubating eggs. Adélie penguins nesting on slopes and ridges inland and to the E are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Kelp gulls on widely scattered nests are easily approached and disturbed; in November and early December adults will be incubating eggs and, subsequently, guarding and provisioning chicks. Antarctic fur seals may be found on the beach and inland, often in large numbers. Glacier is unstable.


STAY CLEAR of — and do not wander over — the glacier
LANDING BEACH
LANDING BEACH
STAY CLEAR of nesting so. giant petrels
STAY CLEAR of so. elephant seal wallow
STAY CLEAR of so. elephant seal wallows and nesting so. giant petrels. kelp gulls, and penguins
TURRET POINT
N
0
50 metres
Contour intervals = 5 metres
Adélie penguins
Chinstrap penguins
Antarctic terns
Blue-eyed shags
So. elephant seals
So. giant petrels
Kelp gull nest
Restricted zones
Preferred walking route
Antarctic Site Inventory stake
Melt lake (variable)

TURRET POINT

POINTERS FOR AVOIDING DISRUPTIONS

- AVOID AND STAY CLEAR OF SOUTHERN GIANT PETRELS NESTING ON THE SW END AND ON SLOPES AND RIDGES INLAND AND TO THE E
- AVOID AND STAY CLEAR OF WALLOWING SOUTHERN ELEPHANT SEALS
- WALK SLOWLY AND CAREFULLY AROUND NESTING, CRÈCHING, OR MOLTING ADÉLIE PENGUINS
- AVOID AND STAY CLEAR OF ANTARCTIC FUR SEALS, WHICH SHOULD BE GIVEN A WIDE BERTH AND SHOULD NOT BE APPROACHED
- STAY CLEAR OF — AND DO NOT HIKE UPON OR WANDER OVER — THE GLACIER

Pointers for avoiding disruptions.

- Avoid and stay clear of southern giant petrels nesting on the SW end and on slopes and ridges inland and to the E.
- Avoid and stay clear of wallowing southern elephant seals.
- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.
- Stay clear of — and do not hike upon or wander over — the glacier.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	**Participating Visitors**
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	1	99
1994-95:	1	146
1995-96:	4	180
1996-97:	3	185
1997-98:	9	858
1998-99:	2	138
1999-2000:	1	89
2000-01:	2	181
2001-02:	1	61
2002-03:	1	66
14-Season Total	25	2,003

Proximate visitor sites. Penguin Island lies S.

Vapour Col, Deception Island (VAPO)

62˚59'S, 60˚44'W
Magnetic declination: 13.2˚E
Inventory subarea: SH
Inventory acronym: VAPO
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Col S of Stone Throw Ridge on W side of Deception Island. Name originates from fumaroles observed in the col. This is the only location on Deception Island where there is a complete cross-section through the volcanic succession.

Landing Characteristics

Inventory researchers have visited this site twice, once via a helicopter drop, the second time via a zodiac tour. Coastline subject to heavy swell and zodiac landings would be difficult.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	January 16, 1999	RN SF	Endurance
2.	February 5, 2001	RN	Cal Star

Assessment and monitoring. Preliminary surveying, censusing, mapping, and photodocumentation accomplished.

Fauna — Flora — Censuses

Penguins & flying birds. Chinstrap penguins are confirmed breeders. Recent chinstrap penguin census data reported in Woehler (1993): 75,000 A4, 1987.

Seals. Leopard seals regularly observed offshore during the penguin breeding season.

Flora. Extensive *Prasiola crispa* noted.

Conservation Aspects

Site sensitivities. If visitors reach the shore, penguins are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Heavy congestion along the shore, with many penguins diving into the sea. Spanish researchers are conducting long-term studies at this site, and their staked and roped penguin group should be totally avoided and not disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around — and do not interfere with or block — penguins moving back and forth along the melt stream.
- Walk slowly and carefully around nesting, crèching, or molting chinstrap penguins.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
14-Season Total	0	0

Proximate visitor sites. Baily Head on the SE, seaward end of Deception Island; Whaler's Bay, Pendulum Cove, and Telefon Bay located within Port Foster.

Whalers Bay, Deception Island (WHAL)

62˚59’S, 60˚34’W
Magnetic declination: 13.4˚E
Inventory subarea: SH
Inventory acronym: WHAL
Species Diversity: MEDIUM
Site Sensitivity: LOW

Location — History — Features

This is the small bay first encountered after passing through Neptune’s Bellow’s, into the Port Foster, Deception Island. The French explorer, Jean-Baptiste Charcot, named the bay because of its heavy use by whalers at the turn of the 20th century. Deception Island is ring shaped and 8 nautical miles in diameter, enclosing a large harbor called Port Foster. This bay inside Deception Volcano's caldera is a landlocked basin 5 nautical miles long from NW to SE and 3.5 nautical miles wide.

Deception is the largest of three recent volcanic centers in the South Shetlands, Penguin and Bridgeman Islands being the other two. The rim has an average elevation of 300 meters, with highest points at Mt. Pond (542 meters) to the E and Mt. Kirkwood (467 meters) to the S; it is composed of lava and cinders, but above 100 meters it is dominated by glaciers and ash-covered ice that reaches the sea at many places along the coast and on the E side of Port Foster.

The water in Port Foster is warmer than the surrounding sea because of numerous active fumaroles. A long black sand beach stretches along the E shore N of Baily Head. There were eruptions in 1800, 1812, 1842, 1871, 1912, 1956, 1967, 1969, 1970, and 1972.

On site is an Historic Site and Monument, a memorial plaque marking the position of a cemetery where approximately 40 Norwegian whalers were buried in the first half of the 20th century; the cemetery was swept away by the February 1969 volcanic eruption. Another Historic Site and Monument is a cairn with memorial plaque, honoring Captain Adolphus Amandus Andresen who established the first whaling operation at Deception Island in 1906.

Whaler's Bay has a SW-facing beach just inside and to the N of the caldera indentation known as Neptune's Bellows. A broad cinder beach extends over 100 m from the water's edge to the steeply-rising inner wall of the caldera. Behind the abandoned whale-processing plant, the glacier meets the apron of cinders. To the SE, the caldera rim is partially breached at Neptune's Window, and the bedrock of the rim is exposed along a steep, 2-kilometer-long section of cliff extending from E of Neptune's Window to Neptune's Bellows.

The onshore boilers are remnants from previous shore-based whaling activities. The Kroner Lake Antarctic Specially Protected Area (ASPA) is at the southern end of the long shoreline. The remains of the abandoned British Antarctic Survey base are located between Kroner Lake and the boilers. Petrel nests are scattered rather widely over a vast area between the shoreline and a feature in the caldera wall known as Neptune's Window. Whalers Bay is located “inside” the caldera of Deception Island, and is the first landing site reached after passing inside Deception through the narrow passage known as Neptune’s Bellows.

Little wildlife is present, though Antarctic terns frequent the *Deschampsia*-laden hillsides behind the ruined station, an assortment of skuas often collects in the melt pools just off of the landing beach, and fur seals often straggle in to roam the long, warm, black sand beach, typically collecting at the far end toward Neptune’s Window. The water is volcanically heated, often leaving roasted, boiled krill along the shoreline.

Pyroclastic debris ranging in size from coarse ash to small lapilli covers the entire broad area of the beach and back shore clear to the inner wall of the caldera. These cinders are mostly black, and cover many of the old barrels, whale bones, and other debris from the whaling and research groups that occupied the area until recently. Several melt-water streams from the snow and glacier above form channels cutting through the beach. The beach is flat and has a very shallow slope both onshore and offshore. Steam may rise from hot springs along the shoreline, and gas rising from the springs has a strong, sulfurous smell.

Landing Characteristics

Protected anchorage located immediately E-NE after passing through Neptune's Bellows and entering Port Foster. Zodiac landings on broad, black sand beach fronting the derelict Norwegian whaling and British Antarctic Survey stations.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 9, 1994	RN BH	Alla Tarasova
2.	December 12, 1994	RN BH	Livonia
3.	January 23, 1995	RN	Explorer
4.	November 18, 1995	RN LB	Explorer
5.	November 30, 1995	BH SF	W. Discoverer
6.	January 12, 1996	RN	Endurance
7.	February 2, 1996	RN	Livonia
8.	November 26, 1996	RN	Explorer
9.	November 26, 1999	LB BP	Cal Star
10.	December 18, 1999	RN	Cal Star
11.	January 25, 2000	RN	Shuleykin
12.	December 12, 2000	RN	Cal Star
13.	January 11, 2001	SF	Cal Star
14.	December 12, 2001	RN SF CE	Endeavour
15.	January 6, 2002	RP	Endeavour
16.	February 5, 2002	MM	Endeavour
17.	February 18, 2002	RN	Endeavour
18.	December 30, 2002	RP	Endeavour
19.	January 9, 2003	SF	Endeavour
20.	February 2, 2003	MM	Endeavour
21.	February 15, 2003	MB	Endeavour

Assessment and monitoring. Surveyed, mapped, censused, and photodocumented (aerial and terrestrial). Regular censusing of nesting kelp gulls near the abandoned station, and the "club" of non-nesting skuas at the melt pond near the landing beach. More thorough surveying of floral communities and tern nesting area needed.

Fauna — Flora — Censuses

Penguins & flying birds. Kelp gulls nest on some of the abandoned onshore buildings. Pintado petrels and Wilson's storm-petrels nest in the cliffs and scree between Neptune's Window and Neptune's Bellow. Antarctic terns are regularly seen, and suspected of breeding inland, behind the abandoned British Station. No site-specific penguin breeding populations are listed in Woehler (1993) and Woehler & Croxall (1996).

Seals. Weddell, crabeater, and Antarctic fur seals regularly haul-out on this beach.

Flora. There are extensive *Usnea*, spp. patches between Neptune's Window and Neptune's Bellow. Crustose lichens *Xanthoria*, spp. and *Caloplaca*, spp. also noted on cliffsides. *Deschampsia* noted behind the abandoned British station.

Conservation Aspects

Site sensitivities. Much erosion on the heavily visited scree slopes and cliff edges near Neptune's Window, located on the high, outer rim above the Bay; to the SW, between Neptune's Window and the Bay, the erosion is severe and this undermined slope has produced significant rock falls. Patches of *Usnea* lichens and hair grass (*Deschampsia Antarctica*) on uphill slopes leading to, and in the vicinity of, Neptune's Window, are readily accessed and easily may be trampled. Pintado petrels on scree slopes above the Bay are easily approached and disturbed.

Wilson's storm-petrels nest on scree slopes above the Bay, and their hidden nesting cavities may be trampled.

Beginning stands of moss around the derelict stations, in the vicinity of the abandoned boilers and tanks, and near the melt pool (located above the beach and frequented by skuas) are readily accessed and easily may be trampled.

Kelp gulls nesting at the base and on top of abandoned boilers at the derelict whaling station are easily approached and disturbed; in November and early December adults will be incubating eggs and, subsequently, guarding and provisioning chicks.

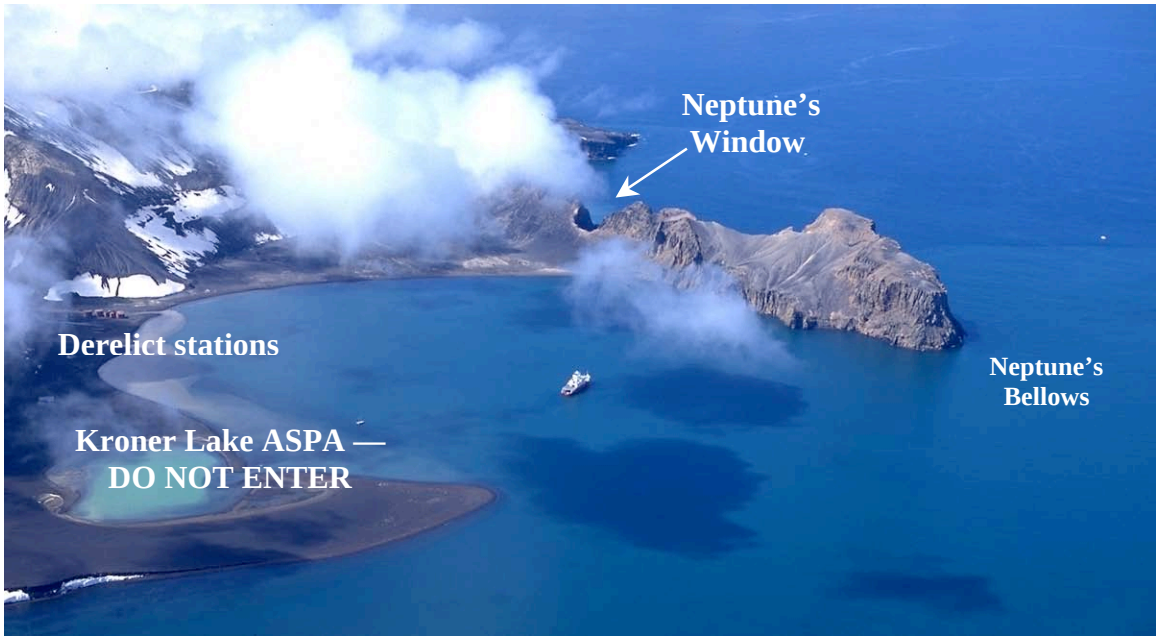
Antarctic terns nesting opportunistically on available, open ground between the derelict stations and higher slopes are skittish, defensive, and very easily disturbed, even from a distance.

Kroner Lake, beyond the derelict hanger, toward Port Foster, is completely off limits under the Antarctic Treaty. Late season, Antarctic fur seals arrive, perhaps in large numbers.

Pointers for avoiding disruptions.

- Use existing trails to hike to Neptune's Window.
- Strictly control hikes to Neptune's Window and the high, outer rim by organizing guided groups, all following the same path, avoiding trampling of lichens, and not allowing any access to, or wandering on, severely eroded slopes between Neptune's Window and the Bay.
- Stay clear of — and do not hike upon or wander over — scree slopes.
- Walk carefully around abandoned boilers and tanks, staying clear of nesting kelp gulls and avoiding any trampling of emergent moss stands.
- Strictly control hikes behind the derelict stations and inland toward the higher slopes by organizing guided groups, which are well spaced, all following the same path, and carefully avoiding any disturbance of nesting terns.
- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.

WHALER'S BAY



POINTERS FOR AVOIDING DISRUPTIONS

- USE EXISTING TRAILS TO HIKE TO NEPTUNE'S WINDOW
- STRICTLY CONTROL HIKES TO NEPTUNE'S WINDOW AND THE HIGH, OUTER RIM BY ORGANIZING GUIDED GROUPS, ALL FOLLOWING THE SAME PATH, AVOIDING TRAMPLING OF LICHENS, AND NOT ALLOWING ANY ACCESS TO, OR WANDERING ON, SEVERELY ERODED SLOPES BETWEEN NEPTUNE'S WINDOW AND THE BAY
- STAY CLEAR OF — AND DO NOT HIKE UPON OR WANDER OVER — SCREE SLOPES
- WALK CAREFULLY AROUND ABANDONED BOILERS AND TANKS, STAYING CLEAR OF NESTING KELP GULLS AND AVOIDING ANY TRAMPLING OF EMERGENT MOSS STANDS
- STRICTLY CONTROL HIKES BEHIND THE DERELICT STATIONS AND INLAND TOWARD THE HIGHER SLOPES BY ORGANIZING GUIDED GROUPS, WHICH ARE WELL SPACED, ALL FOLLOWING THE SAME PATH, AND CAREFULLY AVOIDING ANY DISTURBANCE OF NESTING TERNS.
- AVOID AND STAY CLEAR OF ANTARCTIC FUR SEALS, WHICH SHOULD BE GIVEN A WIDE BERTH AND SHOULD NOT BE APPROACHED

Photo: B. Houston

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	17	1,682
1990-91:	13	1,496
1991-92:	23	2,899
1992-93:	22	1,711
1993-94:	37	3,480
1994-95:	66	5,241
1995-96:	67	5,033
1996-97:	51	3,012
1997-98:	60	5,344
1998-99:	69	5,427
1999-2000:	86	7,333
2000-01:	79	7,065
2001-02:	76	6,972
2002-03:	95	8,934
14-Season Total	761	65,629

Proximate visitor sites. Telefon Bay and Pendulum Cove are located within Port Foster, Baily Head on the E, outside end of Deception.

Yankee Harbor, Greenwich Island (YANK)

62˚32'S, 59˚47'W
Magnetic declination: 11.25˚E
Inventory subarea: SH
Inventory acronym: YANK
Species Diversity: MEDIUM
Site Sensitivity: LOW

Location — History — Features

This small harbor on the SW side of Greenwich Island is entered between Glacier Bluff and Spit Point. The harbor was well known to American and British sealers as early as 1820. The harbor is enclosed by a recurved bay-mouth bar made up of coarse gravel and cobbles. The entry to the harbor around the end of this bar is very narrow. Well-developed, raised-beach terraces are located at about 3 meters and at 10 meters above the currently active beach, and provide territories for nesting gentoo penguins. Landings are typically made on a coarse gravel beach below the first terrace, in the vicinity of a navigational marker that looks like a railroad tie. Midway between the lower and upper ridges is a distinct, partially consolidated layer of cobbles, sand, and soil, which may represent another former beach level. The land rises gently from the shingle beach along the SE side of the harbor to a hut at about 15-20 meters above water level, then it rises steeply up a slope of coarse, angular talus and some finer scree. Above, cliffs rise 100 or more meters to a rugged, knife-edge summit. The principal bedrock exposed in the cliffs is well-layered, reddish brown basalt. Rock fragments in the talus slope below the cliffs are mainly basaltic. Some mosses are well developed on some areas of the talus slope, and on flatter areas at the bottom and around the hut. A large glacier rims the E and N sides of the bay.

There are trypots from early sealing activities. Also on site is an Historic Site and Monument, a commemorative plaque erected to the memory of Captain Robert McFarlane, who in 1820 explored the Antarctic Peninsula in the brigantine *Dragón*.

Zodiac landings are typically made on the gravel beach below the first raised-beach terrace, near a navigational marker that looks like a railroad tie. Gentoo penguins nest on the terraces above the landing beach, as well as in the vicinity of the abandoned *refugio* and nearby hillside. The shoreline of Yankee Harbor is littered with trypots and other artifacts from long defunct sealing activities. The long spit guarding the harbor provides an excellent haul-out location for seals, and is home to a number of nesting skua pairs during the austral spring and summer.

Landing Characteristics

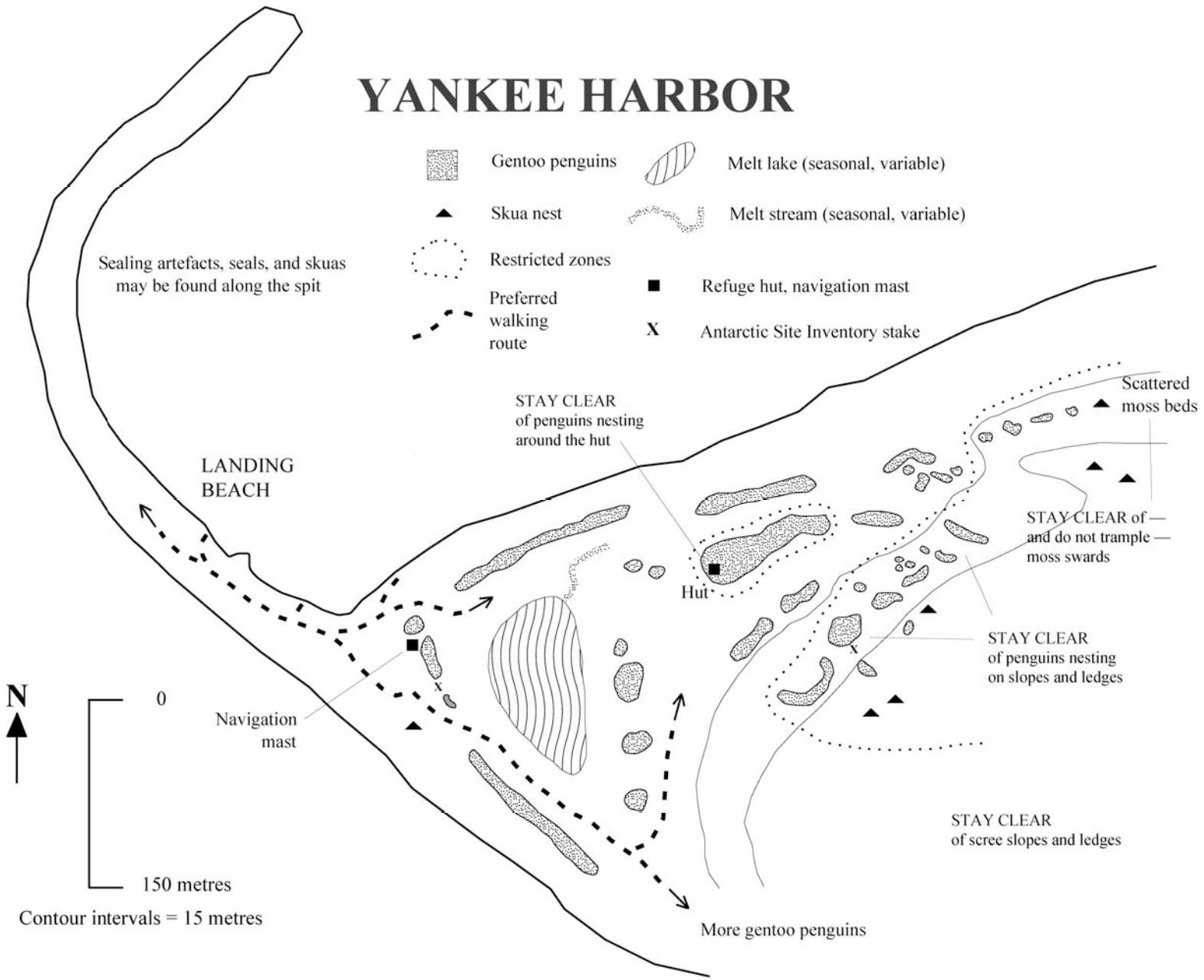
Small harbor on SW side of Greenwich Island, entered between Glacier Bluff and Spit Point. Landings on recurved, gravel and cobble bar enclosing this small harbor, or gravel beach at inland end of this recurved bar. Raised terraces above the bar and gravel beach. Artifacts from 19th century sealing operations — trypots and other relics — may be found on the cobble bar. There is a melt pool of variable extent located inland and E past the first terrace of nesting penguins, and an abandoned *refugio* on one of the higher ridges. Large, crevassed glacier and snowfields rim the bay.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 12, 1994	RN	Livonia
2.	December 14, 1994	RN BH ST	Explorer
3.	January 12, 1995	RN RD	Livonia
4.	December 15, 1995	LB	Explorer
5.	November 23, 1996	RN WT SF	Explorer
6.	January 20, 1999	RD ST	Vavilov
7.	November 26, 1999	LB BP	Cal Star
8.	December 13, 1999	RN	Cal Star
9.	December 24, 2000	SF LF	Cal Star
10.	December 29, 2002	RP	Endeavour

Assessment and monitoring. Surveyed, mapped, and photodocumented (aerial and terrestrial). Regular, site-wide censusing of gentoo penguins. More thorough ground-survey of floral communities needed.


YANKEE HARBOR
Gentoo penguins
Skua nest
Restricted zones
Preferred walking route
Melt lake (seasonal, variable)
Melt stream (seasonal, variable)
Refuge hut, navigation mast
X
Antarctic Site Inventory stake
Sealing artefacts, seals, and skuas may be found along the spit
STAY CLEAR of penguins nesting around the hut
Scattered moss beds
LANDING BEACH
STAY CLEAR of — and do not trample — moss swards
Hut
STAY CLEAR of penguins nesting on slopes and ledges
N
0
Navigation mast
150 metres
Contour intervals = 15 metres
STAY CLEAR of scree slopes and ledges
More gentoo penguins

YANKEE HARBOR

POINTERS FOR AVOIDING DISRUPTIONS

- WALK SLOWLY AND CAREFULLY AROUND NESTING, CRÈCHING, OR MOLTING GENTOO PENGUINS
- DO NOT DISTURB SEALING ARTIFACTS
- AVOID AND STAY CLEAR OF ANTARCTIC FUR SEALS, WHICH SHOULD BE GIVEN A WIDE BERTH AND SHOULD NOT BE APPROACHED
- AVOID AND STAY CLEAR OF SKUA TERRITORIES
- STAY CLEAR OF — AND DO NOT HIKE UPON OR WANDER OVER — THE GLACIER, SNOWFIELDS OR SCREE SLOPES

Fauna — Flora — Censuses

Penguins & flying birds. Confirmed breeding species include gentoo penguin and skuas, spp. Snowy sheathbills have been observed among the gentoos, but breeding is not confirmed. Storm-petrels, spp. have been observed at higher elevations and presumably breed.

Antarctic Site Inventory censuses:

Gentoo penguin		
4,751	N1	1999 Nov
3,974	N1	2000 Dec
3,804	N2	2002 Dec

Recent historic gentoo penguin census reported in Woehler (1993): 4,000 N3/4, 1990.

Seals. Southern elephant seals, Weddell, and crabeater seals haul-out either on the long spit into the harbor, the landing beach, or on the raised beach terrace above the landing beach.

Flora. *Xanthoria*, spp. and other crustose lichens, cushion moss, spp., *Deschampsia*, and *Colobanthus* and *Prasiola* have been noted.

Conservation Aspects

Site sensitivities. Gentoo penguins nesting in scattered colonies on the raised terraces and on higher, inland slopes and ridges are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Skuas nest on widely scattered territories and are easily accessed and disturbed, particularly, later in the season (from mid-January) when adults are fiercely protecting young. Wilson's storm-petrel nest in loose scree at higher elevations. Antarctic fur seals frequent the gravel bar, and in larger numbers as the season progresses.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting gentoo penguins.
- Do not disturb sealing artifacts.
- Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.
- Avoid and stay clear of skua territories.
- Stay clear of — and do not hike upon or wander over — the glacier, snowfields or scree slopes.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	2	763
1992-93:	2	474
1993-94:	3	233
1994-95:	8	544
1995-96:	19	1,893
1996-97:	7	473
1997-98:	7	589
1998-99:	12	1,045
1999-2000:	12	1,040
2000-01:	9	778
2001-02:	6	655
2002-03:	25	2,175
14-Season Total	112	10,662

Proximate visitor sites. Half Moon Island; Fort Point on Greenwich Island; Robert Point and Mitchell Cove on Robert Island; and the Aitcho Islands.

NORTHWEST (NW) Subarea

SUBAREA MAP

SITE DESCRIPTIONS (23)

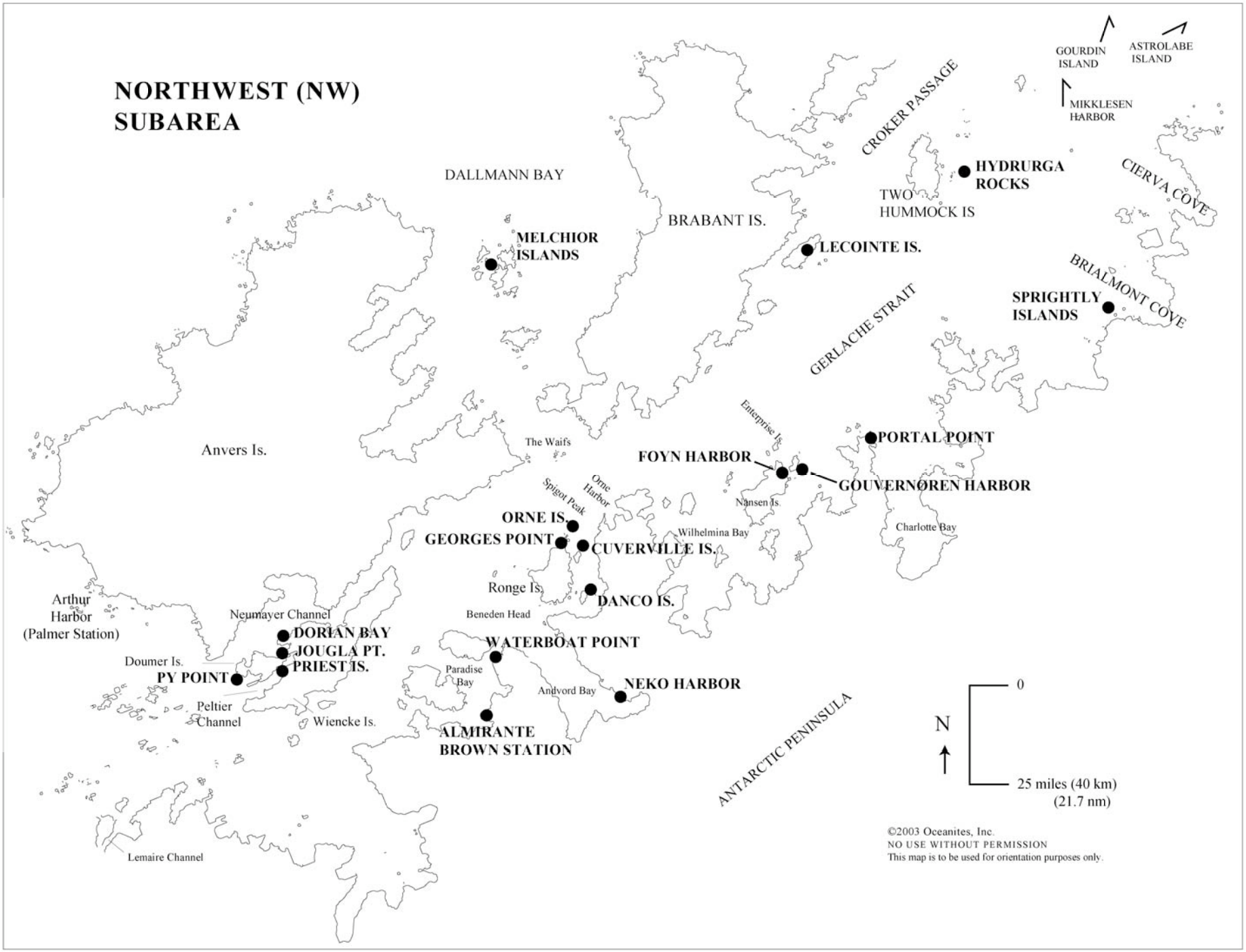
- Almirante Brown Station Vicinity, Paradise Bay (ALMI)
- Astrolabe Island (ASTR)
- Bernardo O'Higgins Station (BERN)
- Cuverville Island (CUVE)
- Danco Island (DANC)
- Dorian Bay/Damoy Point (DORI)
- Foyn Harbor, Enterprise Is. (FOYN)
- Georges Point, Rongé Island (RONG)
- Gourdin Is. (GOUR)
- Gouvernøren Harbor (GOUV)
- Hydrurga Rocks (HYDR)
- Lecointe Island (LECO)
- Port Lockroy, Wiencke Island (LOCK)
- Melchior Islands (MELC)
- Mikklesen Harbor, Trinity Island (MIKK)
- Neko Harbor, Andvord Bay (NEKO)
- Orne Islands (ORNE)
- Portal Point (POPT)
- Priest Island (Goetschy Island), Peltier Channel (PRIE)
- Py Point (PYPT)
- Siffrey Point (SIFF)
- Sprightly Islands Vicinity (SPRI)
- Waterboat Point, Paradise Bay (WATE)

This Antarctic Site Inventory subarea extends from the Bransfield Strait to the Lemaire Channel. The southern portion is a stronghold for gentoo penguins — Cuverville Island (the largest known colony in the Peninsula), Danco Island, Neko Harbor, Jougla Point and Goudier Island in Port Lockroy, Damoy Point/Dorian Bay at the southern end of the Neumayer Channel, and Waterboat Point in Paradise Bay.

Keys:

For acronyms of Antarctic Site Inventory researchers, see Appendix 1 p. 39.

For codes relating to penguin/seabird census/population data, see Table 3, p. 49.



Almirante Brown Station Vicinity, Paradise Bay (ALMI)

64˚53'S, 62˚52'W
Magnetic declination: 15.8˚E
Inventory subarea: NW
Inventory acronym: ALMI
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Almirante Brown is the small Argentine station located in Paradise Bay. The old research station is located on a point of land with steep sea-cliffs at least 100 meters high on one side (adjacent to Paradise Bay), and the sheer face of a tide-water glacier on the other side, to the E. Several of the principal buildings are 10-30 meters above a small concrete pier, and damage from an extensive fire, more than a decade ago, is still evident.

There are a few gentoo penguin nests on the bedrock below the ruins of the main, derelict station building. The rock around the station, along the coast, and near the buildings is massive porphyritic andesite, which is extensively mineralized with green epidote along cracks and in inclusions. Nunataks rise through the surrounding glaciers. The bay is well protected and deep. Glaciers on the S end of the bay calve regularly. The burnt remains of the old station have not been fully removed, but much trash and garbage has been removed in recent years.

Landing Characteristics

This is a favored location for zodiac tours into Paradise Bay, which is regularly full of ice and a prime locus for resting crabeater, Weddell, and occasional leopard seas. On the nearby cliffs overlooking the bay to the S of the station, two blue-eyed shags colonies can be easily viewed by zodiac; late in the summer, juvenile shags often follow and swim with the zodiacs. The only possible shore landing is at the station itself.

The base is located on the Antarctic mainland and gives tourists an opportunity to set foot on the continent itself. The 30-50 meter slope behind the station is snow-covered for most of the spring and summer, and affords visitors a chance to hike upward for spectacular views of Paradise Bay, and then, to do some downhill snow sliding.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 10, 1994	RN BH	Livonia
2.	December 15, 1994	RN	Explorer
3.	January 24, 1995	RN	Explorer
4.	November 19, 1995	BH	W. Discoverer
5.	November 19, 1995	RN LB	Explorer
6.	November 28, 1995	RN LB	Explorer
7.	December 2, 1995	SF	W. Discoverer
8.	December 13, 1995	BH	W. Discoverer
9.	December 16, 1995	LB	Explorer
10.	November 25, 1996	RN SF	Explorer
11.	December 4, 1996	RN SF	W. Discoverer
12.	February 18, 1997	RN	Explorer
13.	November 27, 1997	RN SF	W. Discoverer
14.	December 4, 1997	RN SF	Explorer
15.	January 13, 2000	SF	Cal Star
16.	December 14, 2000	RN	Cal Star
17.	December 13, 2001	RN SF CE	Endeavour
18.	December 24, 2001	JC LGC	Endeavour
19.	January 15, 2002	RP WT	Endeavour
20.	January 27, 2002	RD LS	Endeavour
21.	February 7, 2002	MM	Endeavour
22.	February 17, 2002	RN	Endeavour
23.	December 11, 2002	RN	Endeavour
24.	January 3, 2003	RP	Endeavour
25.	January 12, 2003	SF	Endeavour

26.	January 25, 2003	RD	Endeavour
27.	February 6, 2003	MM	Endeavour
28.	February 14, 2003	MB	Endeavour

Assessment and monitoring. Surveyed, censused, mapped, and photodocumented (terrestrial). Regular censusing of blue eyed shag colonies near the abandoned Almirante Brown station.

Fauna — Flora — Censuses

Penguins & flying birds. A few pairs of gentoo penguins nest underneath remnants of the burnt-out station, with snowy sheathbills often parading about, looking for spills of regurgitated food. The sheathbills also are seen commonly on the shag cliffs S of the station, and are presumed to be breeding. Blue-eyed shags, Antarctic terns, skuas, spp., and kelp gulls nest on the cliffs overlooking Paradise Bay, to the S of the station. The two large shag colonies S of the station are easily censused from a zodiac.

Antarctic Site Inventory censuses:

Blue-eyed shags (colony #1, near A. Brown Station)

72	N1	1994 Jan
76	N1	1994 Dec
60	N1	1995 Nov
57	N1	1995 Dec
56	N1	1996 Nov
53	N1	1996 Dec
46	N1	1997 Nov
46	N1	1997 Dec
43	N1	2000 Jan
81	C1	2000 Jan
37	N1	2001 Dec
41	N1	2000 Dec
45	N1	2002 Dec
86	C1	2003 Feb

Blue-eyed shags (colony #2, near A. Brown Station)

18	N1	1994 Jan
24	N1	1994 Dec
16	N1	1995 Nov
14	N1	1995 Dec
10	N1	1996 Nov
6	N1	1997 Nov
8	N1	1997 Dec
6	N1	2000 Jan
11	C1	2000 Jan
7	N1	2000 Dec
7	N1	2001 Dec
18	N1	2002 Dec
40	C1	2003 Feb

Blue-eyed shags (colony #1 + #2, near A. Brown Station)

90	N1	1994 Jan
100	N1	1994 Dec
76	N1	1995 Nov
71	N1	1995 Dec
66	N1	1996 Nov
52	N1	1997 Nov
54	N1	1997 Dec
49	N1	2000 Jan
92	C1	2000 Jan
48	N1	2000 Dec
44	N1	2001 Dec

63	N1	2002 Dec
114	C1	2003 Jan
126	C1	2003 Feb

Seals. The station does not afford a good haul-out beach, but crabeater, Weddell, and occasionally leopard seals often are found resting on ice floes in the bay, or on ice ledges along the shoreline.

Flora. Moss becomes exposed on the slopes and cliffs above the station as the summer progresses, as well as on the cliffs within and above the shag colonies S of the station. Crustose lichens *Xanthoria,* spp. and *Caloplaca*, spp. have been noted on the shag cliffs.

Conservation Aspects

Site sensitivities. None.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	**Participating Visitors**
1989-90:	10	1,191
1990-91:	16	1,471
1991-92:	26	2,889
1992-93:	19	1,659
1993-94:	31	3,513
1994-95:	43	1,307
1995-96:	25	2,244
1996-97:	38	2,504
1997-98:	34	3,991
1998-99:	17	1,612
1999-2000:	35	3,369
2000-01:	41	4,445
2001-02	14	1,429
2002-03:	62	6,556
14-Season Total	411	38,000

Proximate visitor sites. Waterboat Point and the Chilean Station, Gonzalez Videla.

Astrolabe Island (ASTR)

63˚17'S, 58˚40'W
Magnetic declination: 12.2˚E
Inventory subarea: NW
Inventory acronym: ASTR
Species Diversity: MEDIUM
Site Sensitivity: LOW

Note: Restricted visitor space

Location — History — Features

A 3-mile-long island lying in the Bransfield Strait, 14 miles NW of Cape Ducorps, Trinity Peninsula. It was discovered the French Expedition of 1837-40, under Capt. Jules Dumont d'Urville, and named for his chief expedition ship. A rarely visited site near the N tip of the Antarctic Peninsula, which offers excellent zodiac cruising and — if the tides are right and the hauled-out seals few — a chance for some walking on Astrolabe's rocky shores. The chinstraps occupy steep, uphill nesting locations. At 140 meters elevation, many Antarctic fulmars breed. There are a number of points from which chinstraps may be observed leaping in or out of the sea.

Landing Characteristics

Uncharted water near shore. Hazardous rocks along the shoreline may be exposed, depending on the tide. Restricted visitor space on the cobble landing beach, which is strewn with boulders and slippery. Antarctic fur seals may be present. Steep slopes inland and considerable loose scree at higher elevations.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	January 15, 1996	RN BH	Endurance
2.	February 11, 1996	BH RP	Livonia
3.	December 15, 1999	SF	Shuleykin

Assessment and monitoring. Preliminary surveying, mapping, censusing, and photodocumentation (aerial and terrestrial).

Fauna — Flora — Censuses

Penguins & flying birds. Chinstrap penguins, Antarctic fulmars, and Antarctic brown skuas are confirmed breeders. Blue-eyed shags nest on offshore islands. Wilson's storm-petrels flying about, suggesting nests in the higher scree.

Recent chinstrap penguin census reported in Woehler, 1993: 3,400 N3/4, 1987.

Seals. Weddell and Antarctic fur seals were hauled-out during Inventory visits.

Flora. Caloplaca, spp., *Xanthoria candelaria, Buellia*, spp. And other crustose lichens, spp., and moss, spp. observed above 73 meters elevation, and *Usnea antarctica* at 75-90 meters elevation.

Conservation Aspects

Site sensitivities. Chinstrap penguins nesting on steep, uphill slopes are not easily accessed, but are easily disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Antarctic fulmars breed on ledges at highest elevations and are easily disturbed. Skuas nest in scattered locations and are easily approached and disturbed. Avoid and stay clear of Antarctic fur seals, which should be given a wide berth and should not be approached.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Avoid and stay clear of skua territories, and do not approach fulmar nesting ledges.
- Stay clear of — and do not hike upon or wander over — scree slopes
- If beach cannot be accessed because of tide, ice, seals, or numbers of penguins, zodiac tours are the best way to view the site.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	1	34
1993-94:	3	93
1994-95:	4	211
1995-96:	2	69
1996-97:	2	105
1997-98:	1	53
1998-99:	0	0
1999-2000:	5	288
2000-01:	2	54
2001-02:	1	55
2002-03:	1	62
14-Season Total	22	1,024

Proximity to other nearby visitor sites. Mikklesen Harbor, Trinity Island, lies SW, Gourdin Island to the NE.

Bernardo O'Higgins Station (BERN)

63˚19'S, 57˚54'W
Magnetic declination: 11.7˚E
Inventory subarea: NW
Inventory acronym: BERN
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Site of Chilean research station near Cape Legoupil.

Landing Characteristics

Easy landing on the station jetty.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. December 2, 1996 RN W. Discoverer

Assessment and monitoring. None.

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo penguins are confirmed breeders. Skuas, spp. and kelp gulls noted during Inventory visit. Immature-plumaged Kelp Gulls suggest breeding in the vicinity.

Seals. None noted.

Flora. None noted.

Conservation Aspects

Site sensitivities. None.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-96:	0	0
1996-97:	1	95
1997-98:	0	0
1998-99:	0	0
1999-2000:	0	0
2000-01:	0	0
2001-02:	0	0
2002-03:	0	0
14-Season Total	1	95

Proximate visitor sites. Astrolabe and Gourdin Islands.

Cuverville Island (CUVE)

64˚41'S, 62˚38'W
Magnetic declination: 15.5˚E
Inventory subarea: NW
Inventory acronym: CUVE
Species Diversity: HIGH
Site Sensitivity: LOW

Note: Restricted visitor space if high tide, heavy snow or ice

Location — History — Features

A rocky island with extensive moss cover at higher elevations, lying in the Errera Channel between Arctowski Peninsula and the N part of Rongé Island, off the W coast of the Antarctic Peninsula. It was discovered by Gerlache's Belgian Antarctic expedition (1897-99), and named by Charcot for a vice-admiral in the French Navy. Nearly vertical cliffs surround the island except on the NE coast, where a gently sloping apron of bedrock extends 200 meters from the shore to the base of the cliffs. Much of the apron on the NE side of the island may remain snow-covered through much of December. Large, bare rock areas of this platform provide nesting sites for gentoo penguins. The surface occupied by the penguins, although largely on bedrock or raised beach deposits, is covered with guano, mud, and other organic debris. The water level rises to a narrow beach (often with overhanging snow/ice), which comprises a wide range of rounded boulders and cobbles of several types. Outcrops occupied by the penguins are highly cryoturbated (i.e. broken and churned by freezing and thawing), creating many small, flat, angular blocks. The whole lower section at base of the cliffs has rounded outcrop surfaces that are glacially polished and grooved. A well-defined raised beach, S of the usual landing area and forming the nesting site for many gentoos, is located 8-10 meters above present sea-level. This raised area is defined by a roughly flat terrace (hummocky from glaciated outcrops) with lots of small, partially rounded pebbles in hollows and on flat places, and suggests uplift of the land, lowering of sea level, or both during deglaciation. In all likelihood a more careful examination would reveal several different levels of raised beaches that penguins have been occupied during various stages of deglaciation.

Landing Characteristics

Uncharted water near shore. Hazardous rocks along the shoreline may be exposed, depending on the tide. Nearly vertical cliffs surround the island except on the NW coast, where zodiac landings occur on a long and exposed, cobble beach often packed with ice and snow covered, adjacent to elevated bedrock terraces extending to the W. Landing beach difficult to negotiate when snow- or ice-covered or wet. Very restricted visitor space with high tide and heavy snow cover, or when shoreline caked with ice, which crowds penguins into lines marching to and from the water. More visitor space on a low or falling tide. A very small beach at the N end provides a major access route for penguins, but is too small to accommodate both penguins and visitors, and should not be used. Snow cornices on the shoreline are unstable and treacherous.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 8, 1994	RN	Alla Tarasova
2.	December 10, 1994	RN	Livonia
3.	January 24, 1995	RN	Explorer
4.	November 19, 1995	RN LB	Explorer
5.	November 19, 1995	BH	W. Discoverer
6.	November 27, 1995	RN LB	Explorer
7.	December 2, 1995	BH	W. Discoverer
8.	January 19, 1996	RD RP	Livonia
9.	February 4, 1996	RN RD RP BH	Livonia
10.	February 12, 1996	BH RP	Livonia
11.	December 4, 1996	RN SF	W. Discoverer
12.	February 18, 1997	RN	Explorer
13.	December 4, 1997	RN	Explorer
14.	December 5, 1998	RN SF	Explorer
15.	January 23, 2000	RN	Shuleykin
16.	January 23, 2001	RN RD	Cal Star
17.	December 13, 2001	RN SF CE	Endeavour

18.	January 4, 2002	RP	Endeavour
19.	January 14, 2002	RP WT	Endeavour
20.	February 7, 2002	MM	Endeavour
21.	February 15, 2002	RN	Endeavour
22.	January 2, 2003	RP	Endeavour
23.	February 14, 2003	MB	Endeavour

Assessment and monitoring. Preliminary surveying, mapping, censusing, and photodocumentation (terrestrial). Regular, site-wide censusing of gentoo penguins difficult to accomplish in short, 2-3 hour visits. This is the largest gentoo penguin colony in the Peninsula, with many scattered nesting groups, and many at high elevations. Inventory researchers have begun to census the shag colony on the NE side of the island.

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo penguins, southern giant petrels, kelp gulls, Antarctic terns, snowy sheathbills, and skuas, spp. are confirmed breeders. Blue-eyed shags nest on the NE coast of the island, and Wilson's storm-petrels nest in the higher scree. Snow and pintado petrels also may nest in the highest part of the island.

Recent gentoo penguin census data reported in Woehler (1993) and Woehler & Croxall (1996): 4,818 N1, 1994, an increase of approximately 400 pairs above 1993 nest counts, and an increase of approximately 1,600 pairs above 1988 nest counts.

Antarctic Site Inventory censuses:

Blue-eyed shag

33	C1	2001 Jan
28	N1	2003 Jan
40	C1	2003 Feb

Seals. Weddell and Antarctic fur seals were hauled-out during Inventory visits.

Flora. Xanthoria, spp., *Buellia,* spp., *Caloplaca,* spp., *Usnea*, spp. *Deschampsia Antarctica,* and numerous patches of moss, spp. noted.

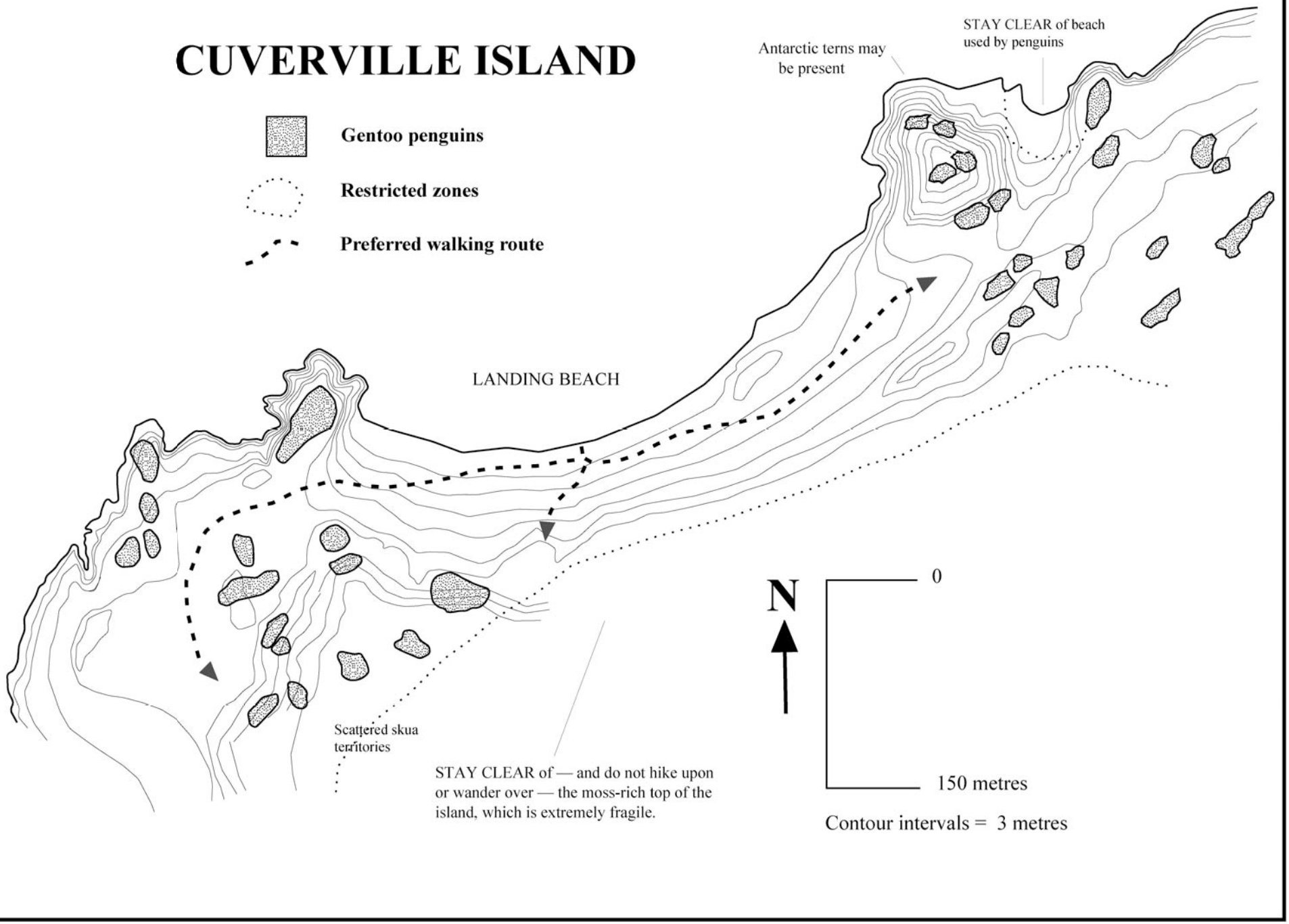
Conservation Aspects

Site sensitivities. Gentoo penguins nesting on bedrock terraces W and N of the landing beach and on higher ridges and slopes are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Patches of hair grass, *Deschampsia Antarctica*, are readily accessed and easily may be trampled. If snow has melted, moss beds on ridges and slopes above the main beach, especially on top of the island, are readily accessed and easily may be trampled. Skuas nesting on ridges and slopes above and W of the main beach are easily accessed and disturbed, particularly, later in the season (from mid-January) when adults are fiercely protecting young. Steep, uphill slopes and ridges may be snow- or ice-covered, crevassed, wet, and slippery.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting gentoo penguins, and do not impede penguins' access to and from the water.
- If extensive snow cover, avoid — and do not walk in or block — trails that penguins have made through the snow.
- Strictly control hiking and walking in deep snow, ensuring that all visitors use the same path.
- Stay clear of the small beach at the N end, which provides a major access route for penguins.
- Watch footsteps carefully, especially when snow cover is absent, to avoid trampling moss and grass.
- Strictly control hikes to high ridges and slopes by organizing small groups of no more than 15 visitors, which are well spaced, with one guide per group, all following the same path, and not allowing any free wandering.
- If snow has melted, stay clear of — and do not hike upon or wander over — the moss-rich top of the island, which is extremely fragile.
- Stay clear of — and do not hike upon or wander over — snow cornices.

CUVERVILLE ISLAND



Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	8	883
1990-91:	8	936
1991-92:	21	2,565
1992-93:	25	1,589
1993-94:	27	2,174
1994-95:	47	3,367
1995-96:	59	4,343
1996-97:	56	3,714
1997-98:	53	4,143
1998-99:	55	4,087
1999-2000:	63	4,908
2000-01:	56	5,615
2001-02:	53	4,115
2002-03:	54	4,749
14-Season Total	585	47,188

Proximate visitor sites. Georges Point, Rongé Island, the Orne Island, Danco Island, and Neko Harbor.

Danco Island (DANC)

64˚44'S, 62˚37'W
Magnetic declination: 15.5˚E
Inventory subarea: NW
Inventory acronym: DANC
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A 1-mile-long island lying in the S part of the Errera Channel, off the W coast of the Antarctic Peninsula. It was first charted by Gerlache's Belgian Antarctic Expedition (1897-9), and named for the Belgian geophysicist who died on board the *Belgica* in the Antarctic. Site of abandoned British Antarctic Survey hut.

Landing Characteristics

Substantial cobble beach. Zodiacs must closely observe rocks offshore. The hike from the beach to the gentoos is not steep. The hut is off limits to visitors. Snow cover may be extensive.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	November 29, 1999	LB BP	Cal Star
2.	December 14, 2001	RN SF CE	Endeavour

Assessment and monitoring. Preliminary surveying, censusing, and photodocumentation (terrestrial).

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo penguins are confirmed breeders. Snowy sheathbills, kelp gulls, blue-eyed shags also noted in the vicinity, but breeding on site not confirmed.

Antarctic Site Inventory censuses:

Gentoo penguin
2,300 N2 1999 Nov

Recent gentoo penguin census data reported in Woehler & Croxall (1996): 1,637 N1, 1994, an increase of more than 800 pairs from 1986 nest counts.

Seals. None observed.

Flora. Snow algae observed.

Conservation Aspects

Site sensitivities. None.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	3	73
1994-95:	4	276
1995-96:	13	560
1996-97:	5	314
1997-98:	6	380
1998-99:	6	343
1999-2000:	14	993
2000-01:	4	120
2001-02:	13	996
2002-03:	13	806

	Zodiac Landings	Participating Visitors
14-Season Total	81	4,861

Proximate visitor sites. Cuverville Island, the Orne Islands, Georges Point (Rongé Island), and Neko Harbor.

Dorian Bay (Damoy Point), Wiencke Island (DORI)

64˚49'S, 63˚30'W
Magnetic declination: 16.2˚E
Inventory subarea: NW
Inventory acronym: DORI
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Dorian Bay is a cove on the NW side of Wiencke Island, located 0.5 mile E-NE of Damoy Point, in the Palmer Archipelago. British and Argentine huts may be found on-site. Damoy Point (64˚49'S 63˚32'W) is the N entrance point to Port Lockroy harbor, on the W side of Wiencke Island in the Palmer Archipelago. The point was discovered and named by Charcot's French Antarctic expedition (1903-05). From inner Dorian Bay, the land rises gently from a bare, rocky landing to two huts, one a well-maintained and stocked British refuge hut, the second a small Argentinian hut. The landing area below the huts is a minor sand beach, interspersed with many glaciated, polished rocks. Behind them the land rises gently on one side to a rounded, bare hilltop 30-40 meters above sea level. On the other side a steep snowy slope leads up onto the end of a glacier. The site's outcrops are mainly low, smooth and polished. At an elevation of 6-7 meters above sea level, there are outcrops nearly covered with many small (1-4 centimeter), and well-rounded fragments of granitic, gneiss/schist, and other materials. British and Argentine huts located on site.

Landing Characteristics

Also known as Damoy Hut area, where an Argentine refuge and a very well preserved British hut are located. British researchers continue to use the hut, which offers access either by sea - a very nicely protected anchorage - or air - a long ice runway that twin otters may utilize. In comparison to nearby Port Lockroy, the site is more exposed to wind from the Neumayer Channel, which in high gusts makes the site less accessible to visits. Visitors may disembark relatively easily on the site's cobble beach. The gentoo penguin colonies are spaced more widely than at Port Lockroy. There is a "road sign" marker approximately 0.5km from the huts, accompanied by a stone marked on which site coordinates are painted. The landscape changes dramatically, from a site that may be substantially snow-covered in spring, to one having little snow surrounding the penguin colonies in high summer.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 15, 1994	RN BH ST	Explorer
2.	January 26, 1995	RN	Explorer
3.	December 13, 1995	BH	W. Discoverer
4.	December 17, 1995	LB	Explorer
5.	January 14, 1996	RN BH	Endurance
6.	January 24, 1996	RD RP	Livonia
7.	December 12, 2002	RN	Endeavour

Assessment and monitoring. Preliminary surveying, mapping, censusing, and photodocumentation (terrestrial).

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo penguins and south polar skuas are confirmed breeders.

Recent gentoo penguin census data in Woehler (1993): 1,658 N1, 1990, at Damoy Point (64˚49'S 63˚31'W); Croxall and Kirkwood (1979), map 24.4, indicates that the Damoy Point colony refers to the gentoos nesting between Damoy Point and inner Dorian Bay.

Antarctic Site Inventory censuses:

Gentoo penguins

1,928	N2	2002 Dec

Seals. Weddell seals have hauled-out along the inner bay.

Flora. Prasiola crispa observed in flat melt areas. Snow algae present in early season snow cover. Small patches of moss, spp. noted, as well as a few crustose lichens on exposed rocks.

Conservation Aspects

Site sensitivities. Penguins are easily approached and disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting gentoo penguins.
- Do not impede penguins' access to and from the water.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	0	0
1994-95:	3	321
1995-96:	6	597
1996-97:	1	92
1997-98:	7	477
1998-99:	8	553
1999-2000:	13	1,247
2000-01:	16	805
2001-02:	10	737
2002-03:	19	1,884
14-Season Total	83	6,713

NOTE: In this instance, tour operators apparently have been reporting visits to a single site, but reporting under the names of two on-site, geographical features. The foregoing table reflects separate figures in the NSF/OPP database for landings/visits to Dorian Bay and Damoy Point, respectively; and, in parentheses, the combined, total number of landings and visitors, and the overall ranking of the site in terms of numbers of visitors (32nd in 1994-95, 22nd in 1995-96, and 36th for 1989-96).

Proximate visitor sites. Port Lockroy is located nearby on the S side of Damoy Point.

Foyn Harbor (FOYN)

64˚33'S, 62˚01'W
Magnetic declination: 15.0˚E
Inventory subarea: NW
Inventory acronym: FOYN
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

An anchorage between Nansen and enterprise Islands off the W coast of the Antarctic Peninsula. Surveyed by T. W. Bagshawe and M. C. Lester in 1921-22. Named by whalers after the whaling factory ship Svend Foyn, which was moored here during 1921-22.

Landing Characteristics

Scattered rocky areas where zodiacs may land, but mostly, a site for zodiac touring.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. December 18, 1999 SF Shuleykin

Assessment and monitoring. None.

Fauna — Flora — Censuses

Penguins & flying birds. Passing blue-eyed shags, no nesting observed.

Seals. Weddell seals hauled-out.

Flora. None noted.

Conservation Aspects

Site sensitivities. None.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	1	66
1993-94:	3	133
1994-95:	0	0
1995-96:	0	0
1996-97:	0	0
1997-98:	0	0
1998-99:	0	0
1999-2000:	0	0
2000-01:	3	80
2001-02:	3	159
2002-03:	1	46
14-Season Total	11	484

Proximate visitor sites. Gouvernøren Harbor, Portal Point.

Georges Point, Rongé Island (RONG)

64˚40’S, 62˚40’W
Magnetic declination: 15.5˚E
Inventory subarea: NW
Inventory acronym: RONG
Species Diversity: LOW
Site Sensitivity: MODERATE

Location — History — Features

The N tip of Rongé Island, lying W of Arctowski Peninsula off the W coast of the Antarctic Peninsula. It was discovered and named by Gerlache’s Belgian Antarctic expedition, 1897-9. As with the Orne Islands site, a chance to view chinstrap penguins. The rocky shoreline requires careful zodiacs maneuvering. There are some chinstraps to the W of the N-facing landing site, with gentoos and more chinstraps accessible via a moderate uphill climb toward the glacier that backs this site.

Landing Characteristics

Uncharted water near shore. Hazardous rocks along the shoreline may be exposed, depending on the tide. Landing on slippery, cobble shoreline. Snow cover may be extensive, making uphill hiking difficult. Nesting penguins are found upslope and inland. Snow cornices on the shoreline are unstable and treacherous.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 2, 1995	BH	W. Discoverer
2.	December 13, 1995	BH	W. Discoverer
3.	January 25, 1996	BH	W. Discoverer
4.	February 11, 1996	BH RP	Livonia
5.	December 4, 1996	RN SF	W. Discoverer
6.	December 4, 1997	SF	Explorer
7.	November 27, 1998	RN SF	Explorer
8.	December 16, 1999	SF	Shuleykin
9.	January 12, 2001	SF	Cal Star

Assessment and monitoring. Surveyed, mapped, and photodocumented (terrestrial). Regular censusing of gentoo and chinstrap penguins. More thorough ground-survey of floral communities needed.

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo penguins, chinstrap penguins, and snowy sheathbills are confirmed breeders.

Antarctic Site Inventory censuses:

Chinstrap penguin

383	N1	1996 Dec
327	N1	1998 Nov
356	N1	2001 Jan

Recent penguin census data reported in Woehler (1993): gentoo penguin, 1,752 N1, 1994, an increase of more than 800 pairs from 1986 nest counts; and chinstrap penguin, 414 N1, 1994, a decrease from the estimated 600 pairs in 1988, and slightly higher than the estimated 300 pairs in 1984.

Seals. A dead Antarctic fur seal observed on Inventory visit.

Flora. Snow algae noted.

Conservation Aspects

Site sensitivities. Nesting gentoo penguins and chinstrap penguins are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Snowy sheathbills nest in rock caves and crevices, and are easily approached and disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins.

GEORGES POINT

This map is to be used for orientation purposes only.

- Do not impede penguins' access to and from the water.
- Walk slowly and carefully around nesting sheathbills.
- Stay clear of — and do not hike upon or wander over — snow cornices.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	5	186
1993-94:	6	267
1994-95:	10	711
1995-96:	9	546
1996-97:	12	673
1997-98:	6	655
1998-99:	2	135
1999-2000:	3	149
2000-01:	4	170
2001-02:	1	15
2002-03:	2	273
14-season total	60	3,780

NOTE: It appears that tour operators have only rarely used the specific geographical name of this site in reporting visits. Georges Point is the landing site normally used on Rongé Island. The foregoing table reflects separate figures in the NSF/OPP database for landings/visits to Georges Point and Rongé Island, respectively.

Proximate visitor sites. Orne Islands, Danco Island, Cuverville Island, and Neko Harbor.

Gourdin Island (GOUR)

64˚32’S, 62˚00’W
Magnetic declination: 11.2˚E
Inventory subarea: NW
Inventory acronym: GOUR
Species Diversity: LOW
Site Sensitivity: MODERATE Note: Restricted visitor space if high tide, heavy snow or ice

Location — History — Features

Largest of group of islands and rocks one mile N of Prime Head, the N tip of the Antarctic peninsula. Discovered by Jules Dumont d’Urville’s French Expedition of 1837-40, and named for an ensign of the exp[edition ship *Astrolabe*.

Landing Characteristics

Substantial ice may rim the island in spring, impeding access to the rocky landing beach on the NW end. Access is all uphill, and may be difficult because of heavy early spring snowfall or, later in the season, slippery guano and mud.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 2, 1997	RN SF	Explorer
2.	January 20, 1999	RN	Endurance
3.	December 7, 2002	RN	Endeavour

Assessment and monitoring. Preliminary surveying, censusing, mapping, and photodocumentation (aerial and terrestrial). Floral survey is needed.

Fauna — Flora — Censuses

Penguins & flying birds. Chinstrap, gentoo, and Adélie penguins, and skuas, spp. are confirmed breeders.

Antarctic Site Inventory censuses:

Chinstrap penguin (NW and E end of island, only)
3,282 N2 1997 Dec

Gentoo penguin (NW end of island, only)
568 N2 1997 Dec

Adélie penguin (NW end of island, only)
14,334 N2 1997 Dec

Recent census data reported in Woehler include: chinstrap penguin, a “large” colony, 1969; Adélie penguin 300 N4, 1969; and gentoo penguin, 50 N3, 1969. Other Peninsula sites where all three pygoscelid penguins nest contiguously are: Stranger Point, King George Island, the Point Thomas Antarctic Specially Protected Area in Admiralty Bay, and Ardley Island, all of which are off-limits to visitors under the Antarctic Treaty; and Booth Island.

Seals. None observed.

Flora. None observed.

Conservation Aspects

Site sensitivities. All three penguin species are very easily approached and readily disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Do not impede penguins’ access to and from the water.

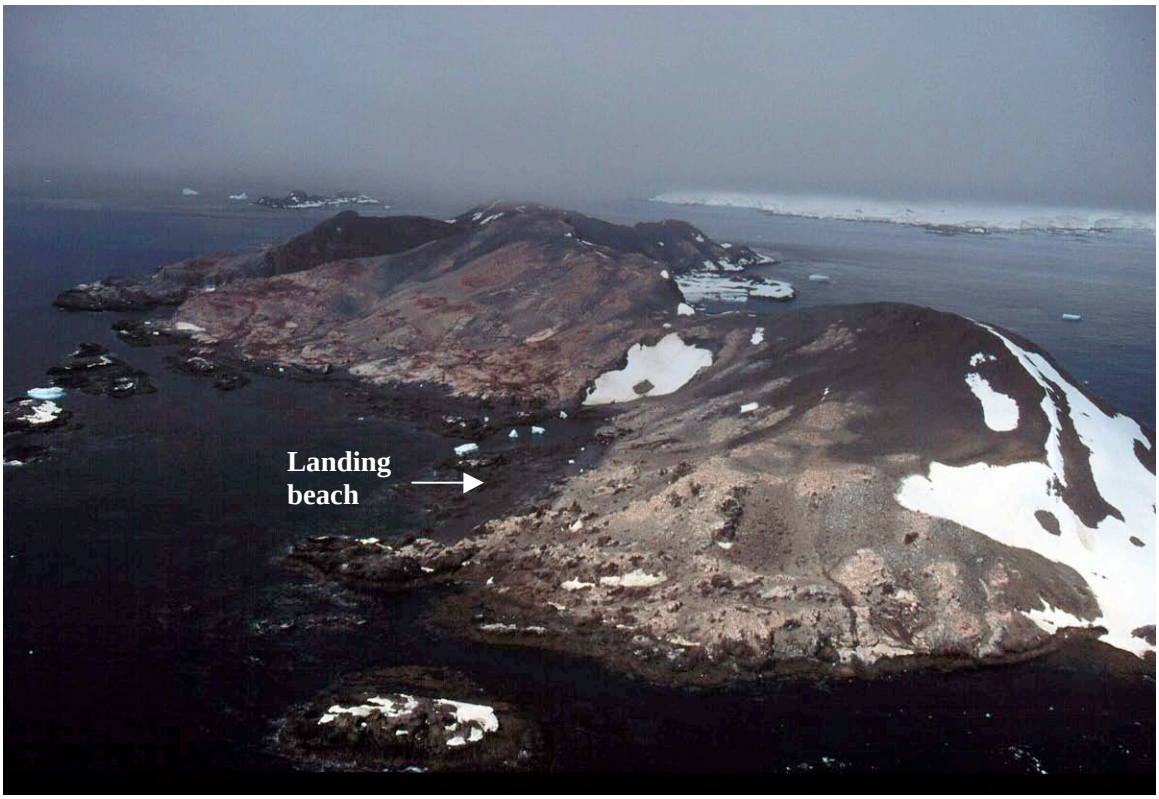
Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	0	0
1994-95:	0	0
1995-96:	0	0
1996-97:	0	0
1997-98:	2	207
1998-99:	4	321
1999-2000:	4	252
2000-01:	4	197
2001-02:	2	58
2002-03:	7	638
14-season total	23	1,673

Proximate visitor sites. Astrolabe Island, Bernardo O'Higgins Station.

GOURDIN ISLAND



POINTERS FOR AVOIDING DISRUPTIONS

- WALK SLOWLY AND CAREFULLY AROUND NESTING, CRÉCHING, OR MOLTING ADÉLIE, CHINSTRAP, AND GENTOO PENGUINS
- DO NOT IMPEDE PENGUINS' ACCESS TO AND FROM THE WATER

Gouvernøren Harbor (GOUV)

64˚32’S, 62˚00’W
Magnetic declination: 15.0˚E
Inventory subarea: NW
Inventory acronym: GOUV
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Small harbor indenting the E side of Enterprise Island W of Pythia Island in Wilhelmina Bay, off the W coast of the Antarctic Peninsula. Named by whalers after the vessel that sank here in 1916, the remains of which (including harpoons and other gear) are still visible, above and below the water.

Landing Characteristics

Scattered rocky areas where zodiacs may land, but mostly, a site for zodiac touring.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. February 17, 2002 RN Endeavour

Assessment and monitoring. None.

Fauna — Flora — Censuses

Penguins & flying birds. Blue-eyed shags and kelp gulls noted, but no breeding observed.

Seals. None noted.

Flora. None noted.

Conservation Aspects

Site sensitivities. None.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
14-Season Total	0	0

Note: The NSF visitor compilations nonspecifically list visits to the “Enterprise Islands,” which may or may not reflect visits to this site. There are no listings for Gouvernøren Harbor.

Proximate visitor sites. Foyn Harbor, Portal Point.

Hydrurga Rocks (HYDR)

64˚08'S, 61˚37'W
Magnetic declination: 14.5˚E
Inventory subarea: NW
Inventory acronym: HYDR
Species Diversity: LOW
Site Sensitivity: LOW

Note: Restricted visitor space

Location — History — Features

A group of rocks lying E of Two Hummock Island in the Palmer Archipelago, and named after the leopard seal, *Hydrurga leptonyx*. These low, rocky islands rise to approximately 25 meters above sea level and have a bare-rock summit. Snow cover may totally cover the area in November. The narrow shingle beach is made up largely of pebbles and cobbles of angular to subrounded blocks, with some minor sand and granules. Several of the smaller rocks surrounding the main island are connected by causeways of this shingle material. Glacially polished rock surfaces are extensive.

Landing Characteristics

Rock-strewn island, which approaching zodiacs must negotiate carefully to avoid shallow rocks. Visitors must climb uphill from the regular landing rocks, sometimes through deep early-season snow, to reach numerous, discrete groups of chinstrap penguins. An additional set of chinstrap colonies to the N are more difficult to access. Shag nests are relatively inaccessible in heavy snow cover, but may be more accessible in mid- to late-summer. There appear to be few vantage points for photo-documentation.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	November 18, 1995	BH	W. Discoverer
2.	December 1, 1995	BH SF	W. Discoverer
3.	November 25, 1996	SF WT RN	Explorer
4.	December 17, 1999	RN	Cal Star
5.	December 26, 2000	SF LF	Cal Star
6.	December 23, 2001	JC LGC	Endeavour
7.	January 3, 2002	RP	Endeavour
8.	January 1, 2003	RP	Endeavour
9.	January 11, 2003	SF	Endeavour

Assessment and monitoring. Preliminary surveying, mapping, and photodocumentation (terrestrial). Regular censusing of chinstrap penguin groups (##1-20) and blue-eyed shags. More thorough ground survey of floral communities, after snow cover recedes, is needed.

Fauna — Flora — Censuses

Penguins & flying birds. Chinstrap penguins, blue-eyed shags, and kelp gulls are confirmed breeders. Antarctic brown skuas noted, and also may breed.

Antarctic Site Inventory censuses:

Chinstrap penguin (site-wide)

526	N1	1996 Nov
420	N1	2000 Dec
398	N1	2003 Jan

Blue-eyed shag (site-wide)

21	N1	1996 Nov
13	N1	2000 Dec
12	N1	2003 Jan

Recent chinstrap penguin census data reported in Woehler (1993): 1,000 N4/5, 1986.

Seals. Leopard seals observed patrolling the site. Weddell seals hauled-out on cobble shoreline and on snow-covered areas above the shoreline.

Flora. Virtually total snow cover during Inventory visits.

Conservation Aspects

Site sensitivities. Restricted visitor space and upward climb (often, through snow) to reach the penguins, whose nests are readily approached. Steep cliff edges.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting chinstrap penguins.
- Do not impede penguins' access to and from the water.
- If extensive snow cover, avoid — and do not walk in or block — trails that penguins have made through the snow.
- Stay clear of — and do not hike upon or wander over — cliff edges.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

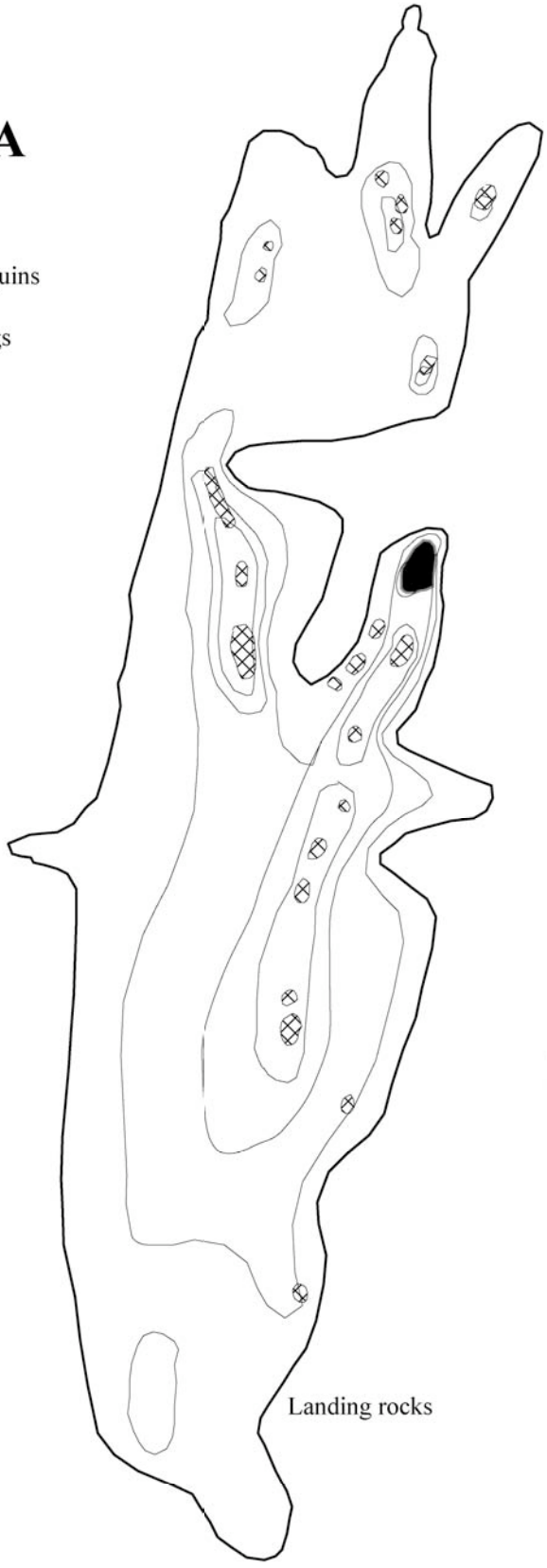
	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	3	165
1994-95:	2	72
1995-96:	1	83
1996-97:	7	461
1997-98:	4	199
1998-99:	8	553
1999-2000:	9	501
2000-01:	0	0
2001-02:	8	451
2002-03:	5	381
14-Season Total	47	2,866

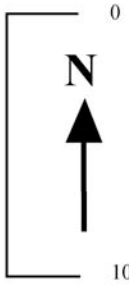
Proximate visitor sites. Sprightly Islands lie to the SE; Portal Point (Charlotte Bay) to the S; Mikklesen Harbor and Astrolabe Island to the NE.

HYDRURGA ROCKS

Chinstrap penguins

Blue-eyed shags





Contour intervals =
5 meters (16 feet)

This map is to be used for
orientation purposes only.

Jougla Point, Port Lockroy, Wiencke Island (LOCK)

64˚49'S, 63˚30'W
Magnetic declination: 16.2˚E
Inventory subarea: NW
Inventory acronym: LOCK
Species Diversity: MEDIUM
Site Sensitivity: LOW

Note: Restricted visitor space at shoreline and lower elevations

Location — History — Features

A harbor, 0.5 mile long and wide, entered between Flag Point and Lécuyer Point on the W side of Wiencke Island, in the Palmer Archipelago. It was discovered by Charcot's French Antarctic expedition (1903-05) and named for Édouard Lockroy, the French politician who assisted Charcot in obtaining government backing for his expedition. Most visitor landings have taken place at Jougla Point, which slopes gently upward to a flat area about 10 meters above sea level, and then further to a minor summit about 100 meters above sea level. Inland, there are steep and rugged mountain slopes. Snow cover may be considerable through mid-December, when extensive areas of outcrop on the ridges and summit of this area become snow-free. Many of the outcrops are occupied by the nests of gentoo penguins and are partially covered with guano, which creates a layer of organic soil. At Jougla Point, the water comes directly over bare, rocky outcrops of diorite and quartz diorite composition. Just above, on what may be a raised beach, there are numerous gentoo penguin nests among the rounded cobbles, boulders, and pebbles. In mid- to late-summer, this area is awash in guano and mud. Several large, tidewater glaciers flow down into Alice Creek to the E of, and behind, Jougla Point. This small bay is often covered with fast ice. The Port Lockroy harbor is substantially protected, and provides an excellent lee from the often windblown Neumayer Channel and Gerlache Strait.

This site is *not* Goudier Is., where restored UK hut is located. The Operation Tabarin hut on Goudier Island has been restored and will be manned, beginning in the 1996-97 summer, to accommodate inquiring visitors.

Landing Characteristics

Jougla Point lies at the SW end of Wiencke Island and juts into the small harbor of Port Lockroy, an excellent, protected anchorage entered between Flag Point and Lécuyer Point. Goudier Island, with a restored UK hut, is located in the harbor, immediately N of Jougla Point. Several large glaciers flow into the harbor, which in November and December may be covered with fast ice. Zodiac landings on boulders and rocks at far NW end of Jougla Point, or slightly E-SE, toward a part of the inner harbor called Alice Creek. Very restricted visitor space in vicinity of nesting penguins and shags, especially at the NW end. May be extensive snow cover early (perhaps, into January); extensive guano, mud, and snow melt later; and at all times slippery. Snow cornices on the shoreline are unstable and treacherous. Extensive, steep, and potentially crevassed snowfields above the harbor. Glaciers at higher elevations inland.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 8, 1994	RN BH	Alla Tarasova
2.	December 11, 1994	RN BH	Livonia
3.	December 15, 1994	RN BH ST	Explorer
4.	January 26, 1995	RN	Explorer
5.	November 20, 1995	RN LB	Explorer
6.	November 27, 1995	RN LB	Explorer
7.	January 14, 1996	RN BH	Endurance
8.	January 24, 1996	RD RP	Livonia
9.	February 13, 1996	BH RP	Livonia
10.	November 24, 1996	RN SF WT	Explorer
11.	November 24, 1997	RN SF	W. Discoverer
12.	December 5, 1997	RN SF	Explorer
13.	November 28, 1998	RN SF	Explorer
14.	January 14, 1999	RN SF	Endurance
15.	November 27, 1999	LB BP	Cal Star
16.	December 17, 1999	RN	Cal Star
17.	January 13, 2000	SF	Cal Star

18.	January 19, 2000	RD	Explorer
19.	January 23, 2000	RN	Shuleykin
20.	December 13, 2000	RN	Cal Star
21.	December 27, 2000	SF	Cal Star
22.	January 12, 2001	SF	Cal Star
23.	January 13, 2001	RN RD	Cal Star
24.	February 4, 2001	RN	Cal Star
25.	December 15, 2001	RN SF CE	Endeavour
26.	December 25, 2001	JC LGC	Endeavour
27.	January 5, 2002	RP	Endeavour
28.	January 16, 2002	RP WT	Endeavour
29.	January 28, 2002	RD LS	Endeavour
30.	February 6, 2002	MM	Endeavour
31.	February 15, 2002	RN	Endeavour
32.	December 9, 2002	RN	Endeavour
33.	January 2, 2003	RP	Endeavour
34.	January 12, 2003	SF	Endeavour
35.	January 25, 2003	RD	Endeavour
36.	February 6, 2003	MM	Endeavour
37.	February 13, 2003	MB	Endeavour

Assessment and monitoring. Surveyed and photodocumented (aerial and terrestrial). Regular, site-wide censusing of gentoo penguins and blue-eyed shags. More thorough ground-survey of floral communities needed.

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo penguins, kelp gulls, blue-eyed shags and skuas, spp. are confirmed breeders.

Recent Jougla Point gentoo penguin census data reported in Woehler (1993): 1,616 N1, 1988.

At nearby Goudier Island, Cobley & Shears (1999) examined effects of visitor disturbance on the breeding performance of gentoo penguins during the austral summer of 1996-97 by comparing pairs in experimental areas (visited by 35-55 tourists every 1-2 days) and control colonies (not visited by tourists). They found no differences between the two groups in the proportion of birds that laid, in hatching success, or the proportion of single-chick broods, and that the overall breeding success, based on counts of crèched birds, was similar to other southern populations of gentoo penguins after correcting for mortality between crèching and fledging. Historical data from Goudier Island indicate that this colony established itself in 1985 and has rapidly increased in size since.

Cobley & Shears (1999) also note that the Jougla Point/Alice Creek colony, which the Inventory censuses regularly and which has been visited regularly by tourists, also has shown a population increase, but at a slower rate. They conclude that it is unlikely that disturbance from tourist visits has been a major determinant of gentoo population change at Port Lockroy.

Antarctic Site Inventory censuses:

Gentoo penguin

1,595	N1	1996 Nov
1,405	N1	1997 Nov
1,545	N1	1997 Dec
1,437	N1	1998 Nov
1,681	N1	1999 Nov
1,501	N1	1999 Dec
837	N1	2001 Dec
1,556	N1	2002 Dec

Blue-eyed shag

31	N1	1994 Dec
58	C1	1995 Jan
22	N1	1995 Nov
25	N1	1996 Jan
50	C1	1996 Jan

20	N1	1997 Nov
20	N1	1997 Dec
33	C1	1998 Feb
22	N1	1998 Nov
25	N1	1999 Dec
26	N1	2000 Jan
44	C1	2000 Jan
25	N1	2000 Dec
25	N1	2001 Jan
20	N1	2001 Dec
43	C1	2001 Feb
24	N1	2002 Jan
23	C2	2002 Feb
24	N1	2002 Dec

Seals. Weddell seals occasionally haul-out along Alice Creek shoreline.

Flora. *Xanthoria,* spp., *Caloplaca* spp., *Buellia*, spp., and other crustose lichens, spp. noted on exposed rocks near highest gentoo groups. Scattered *Prasiola crispa* also noted.

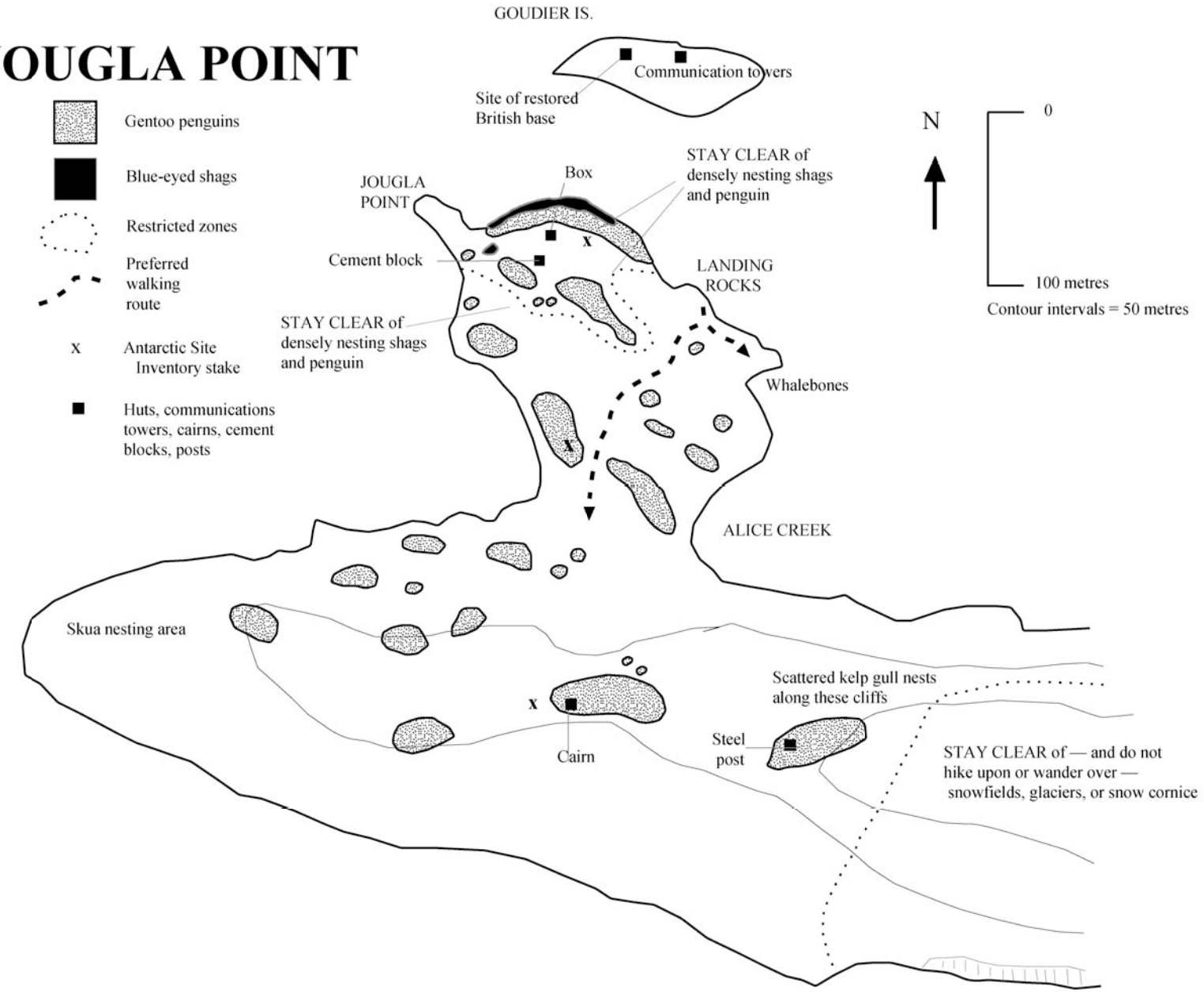
Conservation Aspects

Site sensitivities. Very restricted and cramped visitor space among the gentoo penguins and blue-eyed shags nesting at the NW end of Jougla Point. The penguins are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Blue-eyed shags nesting on the outer edges of the Point cannot be approached easily, but are skittish and defensive, and easily disturbed; in November and early December adults will be incubating eggs and, subsequently, guarding and provisioning chicks. Gentoo penguins also nest on elevated outcrops inland toward Alice Creek, and on high ridges above the harbor; in these areas, visitor space improves, but still, the penguins are easily approached and disturbed.

Pointers for avoiding disruptions.

- Avoid and stay clear of blue-eyed shags nesting on the outer edge of the Point.
- Walk slowly and carefully around nesting, crèching, or molting gentoo penguins.
- Do not impede penguins' access to and from the water.
- If extensive snow cover, avoid — and do not walk in or block — trails that penguins have made through the snow.
- Strictly control hikes to penguins nesting on high ridges above the harbor by organizing guided groups, which are well spaced, all following the same path, and not allowing any free wandering.
- Stay clear of — and do not hike upon or wander over — snowfields, glaciers, or snow cornices.

JOUGLA POINT



Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	7	796
1990-91:	7	1,067
1991-92:	19	2,615
1992-93:	22	2,139
1993-94:	30	4,274
1994-95:	27	1,769
1995-96:	42	3,851
1996-97:	58	3,212
1997-98:	63	6,879
1998-99:	75	7,587
1999-2000:	93	9,323
2000-01:	94	8,675
2001-02:	43	4,238
2002-03:	63	6,575
14-Season Total	643	63,000

NOTE: This table combines landings data from Jougla Point and Port Lockroy, but does not include data regarding the newly restored hut and visitor site at nearby Goudier Island.

Proximate visitor sites. Dorian Bay is the closest, alternative visitor site, located on the N side of Damoy Point, at the lower end of the Neumayer Channel.

Lecointe Island, Pampas Channel (LECO)

64˚16’’S, 62˚03’W
Magnetic declination: 14.9˚E
Inventory subarea: NW
Inventory acronym: LECO
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

N elongated 4-mile-long island, 700 meters in elevation, separated from the E coast of Brabant Island by Pampa Passage. Preliminarily surveyed by the Belgian Antarctic expedition of 1987-99, and surveyed and photographed by British expedition in 1955-58, which named the site for the second-in-command, and surveyor, of the Belgian expedition that first surveyed the Gerlache Strait.

Landing Characteristics

Rocky coast with no known locations for zodiac landings; preliminary Inventory censuses achieved from ship.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 23, 2001	JC LGC	Endeavour
2.	December 12, 2002	RN	Endeavour

Assessment and monitoring. Preliminary censusing of nesting shags.

Fauna — Flora — Censuses

Penguins & flying birds. Blue-eyed shags are confirmed breeders, 7 N1 noted during December 2001 pass-by.

Seals. None noted.

Flora. None noted.

Conservation Aspects

Site sensitivities. None.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
14-Season Total	0	0

Proximate visitor sites. Hydrurga Rocks.

Melchior Islands (MELC)

64˚19'S, 62˚57'W
Magnetic declination: 15.5˚E
Inventory subarea: NW
Inventory acronym: MELC
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A group of many low, ice-covered islands lying near the center of Dallman Bay in the Palmer Archipelago. They were first seen but not named by Dallman's German expedition in 1873-4. The islands were resighted and roughly charted by Charcot during the French Antarctic expedition, 1903-5, and he originally gave this name, that of a French Navy admiral, to the large, easternmost island. Later surveys proved that these were really two islands, now called Eta and Omega Islands, and Melchior has become established as the name for the entire group.

Landing Characteristics

A paucity of wildlife. There is an Argentine research facility. Deeper offshore waters of Dallman Bay attract humpback whales, and there may be spectacular, grounded icebergs.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. January 26, 1996 RD RP Livonia

Assessment and monitoring. Preliminary surveying and censusing.

Fauna — Flora — Censuses

Penguins & flying birds. None noted. Kelp gulls observed, but nests not discovered.

No site-specific penguin populations are listed in Woehler (1993, 1996).

Seals. Antarctic fur seals may haul-out on exposed rocks.

Flora. None noted.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	1	100
1990-91:	0	0
1991-92:	3	249
1992-93:	1	17
1993-94:	2	203
1994-95:	1	14
1995-96:	0	0
1996-97:	3	118
1997-98:	1	257
1998-99:	3	30
1999-2000:	0	0
2000-01:	2	496
2001-02:	1	53
2002-03:	3	137
14-Season Total	21	1,674

Proximate visitor sites. There are no immediately proximate, alternative visitor sites. Cuverville, Orne, and Danco Islands lie well S.

Mikklesen Harbor (MIKK)

63˚54’S, 60˚47’W
Magnetic declination: 13.9˚E
Inventory subarea: NW
Inventory acronym: MIKK
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A small bay indenting the S side of Trinity Island between Skottsberg and Borge points, in the Palmer Archipelago. It was discovered by the Swedish Antarctic Expedition, 1901-4. The landing site is a small islet in the harbor, which is marked by a navigation tower and some unmanned huts.

Landing Characteristics

Rocky islet that may be snow-covered well into the austral summer. Approaching zodiacs must beware of rocks in shallow waters surrounding the islet. Landings have taken place at both the N and SE ends of the islet.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 1, 1995	BH SF	W. Discoverer
2.	January 19, 1996	RD RP	Livonia
3.	January 19, 1996	RD RP	Livonia
4.	February 11, 1996	RP BH	Livonia
5.	February 3, 2001	RN	Cal Star

Assessment and monitoring. Preliminary surveying, censusing, mapping, and photodocumentation. More thorough ground-survey of floral communities needed.

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo penguins are confirmed breeders. Recent gentoo penguin census data reported in Woehler (1993): 300 N3/4, 1984. Snowy sheathbills, kelp gulls, skuas, spp., and southern giant petrel noted, but breeding not confirmed.

Seals. Weddell and Antarctic fur seals were hauled-out during Inventory visits.

Flora. Small patch of moss, spp. noted, but island mostly snow-covered during Inventory visits.

Conservation Aspects

Site sensitivities. Gentoo penguins are easily approached and disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting gentoo penguins.
- Do not impede penguins’ access to and from the water.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	1	85
1990-91:	0	0
1991-92:	1	72
1992-93:	7	258
1993-94:	0	0
1994-95:	3	160
1995-96:	2	76
1996-97:	1	72
1997-98:	5	341
1998-99:	3	152

	Zodiac Landings	Participating Visitors
1999-2000:	9	548
2000-01:	11	956
2001-02:	12	1,025
2002-03:	5	330
14-Season Total	60	4,075

Proximate visitor sites. Astrolabe Islands lies to the NE.

Neko Harbor, Andvord Bay (NEKO)

64˚50'S, 62˚33'W
Magnetic declination: 15.5˚E
Inventory subarea: NW
Inventory acronym: NEKO
Species Diversity: LOW
Site Sensitivity: MODERATE Note: Restricted space at elevation, in vicinity of nesting gentoo penguins

Location — History — Features

A small bay indenting the E shore of Andvord Bay, 6 miles SE of Beneden Head, along the W coast of the Antarctic Peninsula. First seen and roughly charted by Gerlache's Belgian Antarctic expedition, 1897-9, and named for Messrs. Chr. Salvesen's floating factory ship, *Neko*, which operated in the South Shetlands and Antarctic Peninsula in 1911-2 and 1923-4, and often used this bay. Unmanned Argentine hut on site.

Landing Characteristics

A small beach leads to an elevated hillside with nesting gentoos, skuas, and kelp gulls. The skuas offer a strong defense of their nests and visitors are advised to keep clear. From the elevation of gentoo colonies 2 and 4, there are excellent, scenic views of Andvord Bay and the Gerlache Strait. The area seems prone to relatively frequent glacier calving.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	January 25, 1996	RD RP	Livonia
2.	February 3, 1996	RN RD RP BH	Livonia
3.	February 12, 1996	BH RP	Livonia
4.	January 23, 1999	RD ST	Vavilov
5.	December 16, 1999	SF	Shuleykin
6.	January 24, 2000	RN	Shuleykin
7.	December 11, 2002	RN	Endeavour
8.	January 11, 2003	SF	Endeavour
9.	January 25, 2003	RD	Endeavour
10.	February 14, 2003	MB	Endeavour

Assessment and monitoring. Preliminary surveying, censusing, mapping, and photodocumentation. More thorough ground-survey of floral communities needed.

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo penguins, kelp gulls, and skuas, spp. are confirmed breeders.

Antarctic Site Inventory censuses:

Gentoo penguin		
934	C1	1996 Feb
625	C1	1999 Jan
844	N1	1999 Dec
1,072	N1	2002 Dec
1,042	N1	2003 Jan

Recent gentoo penguin census data reported in Woehler (1993): 250 C1, 1987.

Seals. Weddell and crabeater seals have hauled-out on the site during Inventory visits.

Flora. Snow algae and *Prasiola crispa* noted, with some patches of moss, spp. exposed after late summer snow melt.

Conservation Aspects

Site sensitivities. Nesting gentoo penguins, skuas, spp., and kelp gulls are easily approached and disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting gentoo penguins.

- Do not impede penguins' access to and from the water.
- Stay clear of skua and gull nesting territories.

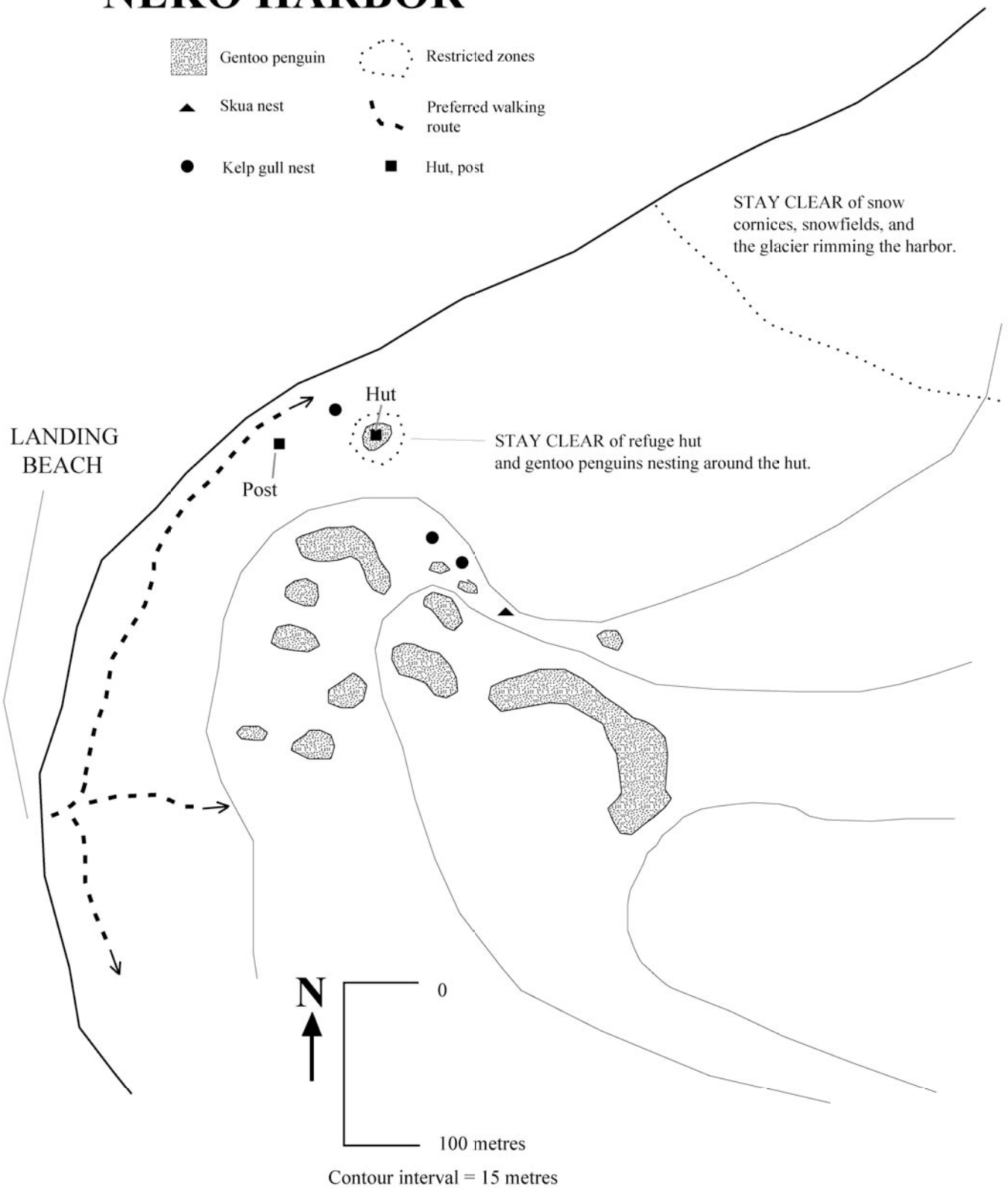
Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	8	357
1993-94:	6	275
1994-95:	12	560
1995-96:	21	963
1996-97:	36	2,348
1997-98:	27	1,737
1998-99:	42	3,613
1999-2000:	58	4,794
2000-01:	51	4,383
2001-02:	51	4,233
2002-03:	70	5,827
14-Season Total	382	29,090

Proximate visitor sites. Danco Island, Cuverville Island, Orne Islands, and Georges Point, Rongé Island are the closest alternative visitor sites.

NEKO HARBOR



Contour interval = 15 metres

Orne Islands (ORNE)

64˚40’S, 62˚40’W
Magnetic declination: 15.5˚E
Inventory subarea: NW
Inventory acronym: ORNE
Species Diversity: MEDIUM
Site Sensitivity: MODERATE

Location — History — Features

A group of small islands lying close to Rongé Island, off the W coast of the Antarctic Peninsula. They were roughly surveyed in 1898 by Gerlache’s Belgian Antarctic expedition. The name Orne apparently was used by Norwegian whalers, and then subsequently by the Scottish geologist David Ferguson, who worked this area in 1913. The largest island is where visits take place. It forms a rocky dome up to 75 meters high at its summit, with moderate slopes from the shoreline to a long summit ridge of mainly bare rock. The NW side of the island has a steep snow face. The surface may be largely covered with deep snow through late December. The rocky surface on the NE tip of the island slopes moderately steeply upward to one of many colonies of nesting chinstrap penguins. The areas occupied by chinstrap penguins consist of a cryoturbated (i.e. broken and churned by freezing and thawing) rock covered with thin, angular plates of rock and some pebbly material. These areas are coated with abundant guano. This landing site had no beach, with bare rock extending directly down into the water. Rocks exposed along the S end of the island are glacially smoothed and polished, but the upper slopes, where the chinstraps and shags nest are cryoturbated, with thin, angular fragments littering the ground. Some zones of flat-pebbly-looking materials in upper zones look almost like beach materials. They could represent a high-level raised beach.

Landing Characteristics

Uncharted water near shore. Hazardous rocks along the shoreline may be exposed, depending on the tide. Landings on slippery cobble at N end of the largest in a small group of islands, which extends for one mile N to S, with slopes rising moderately to a domed summit. Snow cover may be extensive and hiking difficult. Crevassed snowfields and cliff edges on NW and S ends. Snow cornices on the shoreline are unstable and treacherous.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 16, 1994	RN BH	Explorer
2.	January 13, 1995	RN RD	Livonia
3.	January 24, 1995	RN RD	Explorer
4.	November 27, 1995	RN LB	Explorer
5.	January 25, 1996	RD RP	Livonia
6.	December 4, 1996	RN SF	W. Discoverer
7.	December 4, 1997	RN	Explorer
8.	November 27, 1998	RN SF	Explorer
9.	December 6, 1998	RN SF	Explorer
10.	November 27, 1999	LB BP	Cal Star
11.	December 16, 1999	RN	Cal Star
12.	January 21, 2000	RD	Explorer
13.	January 23, 2000	RN	Shuleykin
14.	December 14, 2000	RN	Cal Star
15.	January 23, 2001	RN RD	Cal Star
16.	December 24, 2001	JC LGC	Endeavour
17.	January 27, 2002	RD LS	Endeavour
18.	February 7, 2002	MM	Endeavour
19.	February 15, 2002	RN	Endeavour
20.	December 9, 2002	RN	Endeavour
21.	February 14, 2003	MB	Endeavour

Assessment and monitoring. Surveyed, mapped, and photodocumented (terrestrial).Regular, site-wide censusing of chinstrap penguins and, on the S end, the cliff edges where blue-eyed shags formerly bred. More thorough ground-survey of floral communities needed.

Fauna — Flora — Censuses

Penguins & flying birds. Chinstrap penguins, and south polar and hybrid skuas are confirmed breeders. Blue-eyed shags last bred in December 1998. Snowy sheathbills have been found in a sea cave on this site, and are strongly suspected of breeding. Southern giant petrels have been observed resting on site, but no nests have been discovered.

Recent chinstrap penguin census data reported in Woehler (1993) and Woehler & Croxall (1996): 420 N1, 1994, a decrease from the 1987 estimate of 860 pairs, but slightly greater the 1985 estimate of 340 pairs.

Antarctic Site Inventory censuses:

Chinstrap penguin

342	N1	1996 Dec
370	N1	1998 Nov
361	N1	1998 Dec
421	N1	1999 Nov
332	N1	1999 Dec
484	C1	2000 Jan
396	N1	2000 Dec
631	C1	2001 Jan
338	N1	2002 Dec
471	C1	2003 Feb

Blue-eyed shag

15	N1	1994 Dec
9	N1	1995 Nov
5	N1	1996 Dec
3	N1	1997 Dec
1	N1	1998 Nov
1	N1	1998 Dec
0	N1	1999 Dec
0	N1	2000 Dec
0	N1	2000 Jan
0	N1	2002 Dec

Seals. Weddell and crabeater seals have hauled-out on either the island where visits occur or on edges of the smaller islets W of LANDSEND. Antarctic fur seals have been found in snow fields below and S of chinstrap penguin colonies 8a-d.

Flora. Extensive snow covers the island, often into late summer, and snow algae is evident. *Xanthoria*, spp. and other crustose lichens noted on exposed rocks at higher reaches, with some patches of moss, spp. and *Prasiola crispa*.

Conservation Aspects

Site sensitivities. Chinstrap penguins nest in widely scattered, small colonies on W side, the first located just uphill from the N landing beach; they are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Blue-eyed shags formerly nested on ridges at the S end, which are not easy to access; last recorded nesting in 1998. Skuas nest on widely scattered territories at the highest elevations and are easily approached and disturbed, particularly, later in the season (from mid-January) when adults are fiercely protecting young.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Avoid and stay clear of any prospecting shags in vicinity of S end cliffs.
- Avoid and stay clear of skua territories.
- Stay clear of — and do not hike upon or wander over — crevassed snowfields, cliff edges, or snow cornices.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	2	201
1993-94:	1	54
1994-95:	7	368
1995-96:	1	42
1996-97:	0	0
1997-98:	0	0
1998-99:	0	0
1999-2000:	1	1
2000-01:	1	6
2001-02:	0	0
2002-03:	5	257
14-Season Total	18	929

Proximate visitor sites. Cuverville Island lies due E, and Georges Point, Rongé Island, a very short distance S.

ORNE ISLAND

Chinstrap penguins

Blue-eyed shags

Skua nest

X Antarctic Site Inventory stake

0 N

100 meters (330 feet)

Contour intervals =
7 meters (23 feet)

This map is to be used for orientation purposes only.

Portal Point (POPT)

64˚30’S, 61˚46’W
Magnetic declination: 14.8˚E
Inventory subarea: NW
Inventory acronym: POPT
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

This narrow point in the NE part of the Reclus Peninsula, on the W coast of the Antarctic Peninsula, extending from the Antarctic Peninsula into Charlotte Bay. It is where a Falkland Islands dependency Survey hut was established in 1956. The hut has now been removed to the Falklands Islands Museum in Stanley. Portal Point served as the gateway for a route to the polar plateau. Immediately behind the low point on which the hut was located the (usually snow-covered) land rises steeply upslope toward the plateau. The topography of the surrounding area is mountainous, with nunataks rising through the ice. Coastal outcrops and those beneath the hut are glacially polished and striated. On both sides of this site there are large glacial tongues extending down to sea level from the plateau's ice cap. These terminate against the sea in high ice cliffs, which expose crevasses showing blue ice inside. The steep glacial trough produces rugged-looking ice falls in the lower zones of these glaciers. Bare rock is exposed only along the shore, beneath an overhanging cover of snow and ice. The sea washes directly onto bare bedrock. There are many rounded boulders above and beneath the waterline. Charlotte Bay is often filled with icebergs.

Landing Characteristics

There is a paucity of wildlife in the vicinity, save for seals on floes in Charlotte Bay, and occasional, straggler kelp gulls, skuas, shags, or penguins. The main attraction was the British Antarctic Survey hut, which now has been removed to the Falklands Islands Museum. The slope above the point has been used by visitors for snow-sliding, and at its highest point, there are excellent views of Charlotte Bay.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 16, 1994	RN SF	Explorer
2.	November 21, 1995	RN LB	Explorer
3.	December 1, 1995	BH SF	W. Discoverer
4.	January 26, 1996	RD RP	Livonia
5.	December 6, 1998	RN SF	Explorer

Assessment and monitoring. Preliminary surveying, censusing, and photodocumentation (terrestrial).

Fauna — Flora — Censuses

Penguins & flying birds. No breeding species confirmed directly on site. Antarctic brown skuas, southern giant petrels, and gentoo penguins noted in the vicinity. Kelp gulls and blue-eyed shags breed elsewhere in Charlotte Bay. No site-specific penguin populations are listed in Woehler (1993) or Woehler & Croxall (1996).

Seals. Weddell and crabeater seals may haul-out on the rocky edges of this site.

Flora. Snow covered during Inventory visits; no flora visible.

Conservation Aspects

Site sensitivities. None.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	1	93
1991-92:	0	0
1992-93:	8	592
1993-94:	10	781
1994-95:	8	641
1995-96:	14	890

	Zodiac Landings	Participating Visitors
1996-97:	5	370
1997-98:	4	118
1998-99:	6	328
1999-2000:	10	487
2000-01:	10	590
2001-02:	10	715
2002-03:	4	284
14-Season Total	90	5,889

Proximate visitor sites. Hydrurga Rocks is to the N. The Errera Channel and the Cuverville, Danco, Orne, and Rongé (Georges Point) Island visitor sites lie to the W.

Priest Island (Goetschy Island), Peltier Channel (PRIE)

64˚52’’S, 63˚31’W
Magnetic declination: 16.2˚E
Inventory subarea: NW
Inventory acronym: PRIE
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Low rocky island lying near the middle of Peltier Channel in the Palmer archipelago. First charted and named as Goetschy Island by Charcot’s French Antarctic expedition, 1903-5.

Landing Characteristics

Rocky coast with no known locations for zodiac landings; preliminary Inventory censuses achieved from ship.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. December 14, 2001 RN SF CE Endeavour

Assessment and monitoring. Preliminary censusing of nesting shags.

Fauna — Flora — Censuses

Penguins & flying birds. Blue-eyed shags are confirmed breeders, 8 N1 noted during December 2001 pass-by.

Seals. None noted.

Flora. None noted.

Conservation Aspects

Site sensitivities. None

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
14-Season Total	0	0

Proximate visitor sites. Jougla Point, Goudier Island, Dorian Bay.

Py Point (PYPT)

64˚53'S, 63˚37'W
Magnetic declination: 16.2˚E
Inventory subarea: NW
Inventory acronym: PYPT
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Point forming the S extremity of Doumer Island. Discovered by Charcot's French Antarctic expedition of 1903-05, and named for the president of the French Chamber of Commerce in Buenos Aires at that time.

Landing Characteristics

Onto slippery cobble and rock outcrops in vicinity of Chilean *refugio*. Bulk of nesting gentoos located inland and N, more than 0.5 kilometers beyond the *refugio*.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. February 5, 2001 RN Cal Star

Assessment and monitoring. Preliminary surveying, censusing, and photodocumentation (terrestrial). More thorough ground-survey of floral communities needed.

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo penguins and south polar skuas are confirmed breeders. Recent Doumer Island gentoo penguin census data reported in Woehler (1993): 1,500 N1, 1983.

Seals. None noted.

Flora. Extensive snow algae noted.

Conservation Aspects

Site sensitivities. Gentoo penguins are easily approached and disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	0	0
1994-95:	0	0
1995-96:	0	0
1996-97:	0	0
1997-98:	0	0
1998-99:	0	0
1999-2000:	0	0
2000-01:	2	93
2001-02:	0	0
2002-03	0	0
14-Season Total	2	93

Proximate visitor sites. US Palmer Station (Arthur Harbor), Dorian Bay, Goudier Island, Jougla Point; and Almirante Brown Station and Waterboat Point in Paradise Bay.

Siffrey Point (SIFF)

63˚13'S, 57˚13'W
Magnetic Declination: 11.2˚ E
Inventory subarea: SO
Inventory acronym: SIFF
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A low, rocky point projecting from the N coast of Trinity Peninsula, 6 miles WNW of Cape Dubouzet. "Cap Siffrey" was named by Capt. Jules Dumont d'Urville in 1838. Shore covered by snow during Antarctic site Inventory visit.

Landing Characteristics

On slick boulders in a small cove, which were snow covered during the Inventory visit. .

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. January 21, 2003 RD Endeavour

Assessment and monitoring. Preliminary surveying. No photodocumentation.

Fauna — Flora — Censuses

Penguins & flying birds. No confirming breeding. Many snow petrels observed flying over high ridges.

Seals. None noted.

Flora. Moss, spp., *Prasiola crispa*, and crustose and fruticose lichens, spp. noted.

Conservation Aspects

Site sensitivities. None noted

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-2002:	0	0
2002-03	1	124
14-Season Total	1	124

Proximate visitor sites. Gourdin Island.

Sprightly Islands Vicinity (SPRI)

64˚17’S, 61˚04’W
Magnetic declination: 14.3˚E
Inventory subarea: NW
Inventory acronym: SPRI
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Sprightly Island lies one mile NW of Spring Point in Hughes Bay, on the W coast of the Antarctic Peninsula. It was first surveyed by Gerlache in 1897-9, and is named for a British sealing vessel that visited this area in 1824-5. Inventory researchers visited the small islet just N of Sprightly Island.

Landing Characteristics

A small island with fractured, metamorphic rocks that are easy to climb.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. January 26, 1996 RD RP Livonia

Assessment and monitoring. Preliminary surveying and censusing. More thorough ground-survey of floral communities needed.

Fauna — Flora — Censuses

Penguins & flying birds. Chinstrap penguins are confirmed breeders. Recent chinstrap penguin census data reported in Woehler, 1993: 60 N4, 1990.

Seals. No seals observed during brief Inventory visit.

Flora. *Xanthoria*, spp., *Prasiola crispa,* and two small clumps of *Deschampsia antarctica* noted.

Conservation Aspects

Site sensitivities. None.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	0	0
1994-95:	0	0
1995-96:	1	48
1996-97:	0	0
1997-98:	0	0
1998-99:	0	0
1999-2000:	0	0
2000-01:	0	0
2001-02:	0	0
2002-03:	0	0
14-Season Total	1	48

Proximate visitor sites. Hydrurga Rocks lie NW.

Waterboat Point, Paradise Bay (WATE)

64˚49'S, 62˚51'W
Magnetic declination: 15.0˚E
Inventory subarea: NW
Inventory acronym: WATE
Species Diversity: LOW
Site Sensitivity: MODERATE

Note: Restricted visitor space.

Location — History — Features

This is the low, westernmost termination of the peninsula between Paradise Harbor and Andvord Bay on the W coast of the Antarctic Peninsula. It is the site of the Chilean Station González Videla. Waterboat Point is separated from the mainland at high water. The Belgian Antarctic Expedition of 1898 first surveyed the coast in this vicinity. This particular point was surveyed and named by T. W. Bagshawe and M. C. Lester who lived here in a waterboat from 1921-22, while conducting studies of the on-site penguins. The area where they worked is roped off and noted by historical markers. The Station area is about 10-15 meters above sea level. The exposed face of a crevassed glacier lies just beyond the tombola — the causeway that connects the Station area to the mainland at low tide. The area around the edges of Paradise Bay is ruggedly mountainous and mainly covered with glaciers and snow, leaving a few nunataks and cliffs exposed. There are coast-line exposures of bedrock at the edge of the snow cover. There is no well-developed beach visible along the present shoreline, where bare bedrock is exposed at sea level below the snow and ice.

On site is an Historic Site and Monument, the hut in which the pioneering penguin biologists Bagshawe and Lester overwintered in 1921-22. The remains include the base of their waterboat, the roots of door posts, and an outline of the hut and extension; this two-man expedition was the smallest expedition to ever overwinter in Antarctica. Another Historic Site and Monument is a shelter erected in 1950 to honor Gabriel González Videla, the first Head of State to visit the Antarctic.

Landing Characteristics

The low, westernmost termination of the peninsula between Paradise Harbor and Andvord Bay, and site of the Chilean station *Gabriel Gonzalez Videla*, which is off limits to visitors. Separated from the mainland at high water. Landings on rocks or station jetty at N tip, or on rocks at far end of inner bay ("Coal Point"), on the mainland, in the vicinity of breeding penguins and a derelict station building. Restricted visitor space. Hazardous rocks in the inner bay may be exposed, depending on the tide. May be extensive snow cover early (perhaps, into January); extensive guano, mud, and snow melt later; and at all times slippery. Extensive glacier and snow fields (potentially crevassed) on mainland side of the inner bay. Snow cornices on the shoreline are unstable and treacherous.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 7, 1994	RN RD RP BH	Alla Tarasova
2.	February 3, 1996	RN RD RP BH	Livonia
3.	November 23, 1997	RN SF	W. Discoverer
4.	November 27, 1998	RN SF	Explorer

Assessment and monitoring. Surveyed, mapped, and photodocumented (aerial and terrestrial). Regular site-wide censusing of gentoo and chinstrap penguins.

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo penguins, chinstrap penguins, and snowy sheathbills are confirmed breeders. Kelp gulls, skuas, spp., and blue-eyed shags also noted, but do not appear to nest immediately on site.

Antarctic Site Inventory censuses:

Chinstrap penguin (site-wide)

8	N1	1994 Dec
2	C1	1996 Feb
8	N1	1997 Nov
4	N1	1998 Nov

Gentoo penguin (site-wide)

1,455 N1 1997 Nov

Recent penguin census data reported in Woehler (1993): gentoo penguin, 700 C1, 1986; and chinstrap penguin, 28 N1, 1989. The number of chinstrap penguins has declined steadily since Bagshawe & Lester's surveys in 1921-22 (350 A1, 1922, where the research station is now situated, and 225 A1, 1922, at Cola Point).

Seals. No seals observed.

Flora. Snow algae common on glacier front.

Conservation Aspects

Site sensitivities. Restricted visitor space among the gentoo penguins nesting in the vicinity of the station, around the inner bay, and on the mainland; they are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Very restricted and cramped visitor space among the few chinstrap penguins still nesting at the N tip of the inner bay; they cannot be approached easily, but are easily disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks. Snowy sheathbills nesting in vicinity of the station and at the derelict station building on the far side of the bay are easily approached and disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Do not impede penguins' access to and from the water.
- If extensive snow cover, avoid — and do not walk in or block — trails that penguins have made through the snow.
- Avoid and stay clear of chinstrap penguins nesting at the N tip of the inner bay.
- Walk slowly and carefully around nesting sheathbills.
- If snow-, ice-, or mud-cover is extensive, strictly control visitors by organizing guided groups, all following the same path, avoiding any penguin trails, and not allowing any free wandering.
- Stay clear of — and do not hike upon or wander over — the glacier, snowfields, or snow cornices.

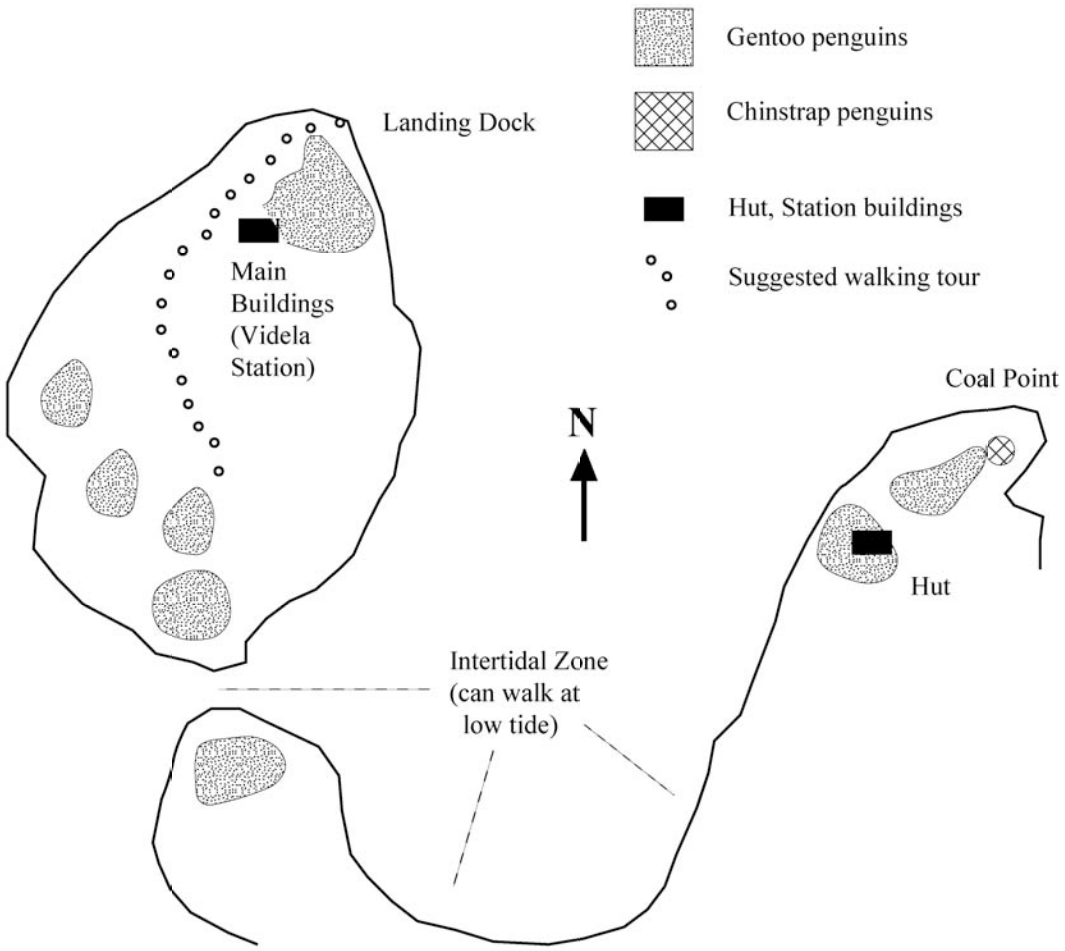
Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	9	1,038
1990-91:	10	1,965
1991-92:	15	2,398
1992-93:	19	1,671
1993-94:	17	3,248
1994-95:	20	1,559
1995-96:	14	2,384
1996-97:	12	1,095
1997-98:	12	2,998
1998-99:	20	3,379
1999-2000:	15	2,871
2000-01:	17	3,299
2001-02:	15	4,082
2002-03:	13	2,961
14-Season Total	208	39,948

Proximate visitor sites. The Almirante Brown Station is to the S, further into Paradise Bay.

WATERBOAT POINT



SOUTHWEST (SW) Subarea

SUBAREA MAP

SITE DESCRIPTIONS (13)

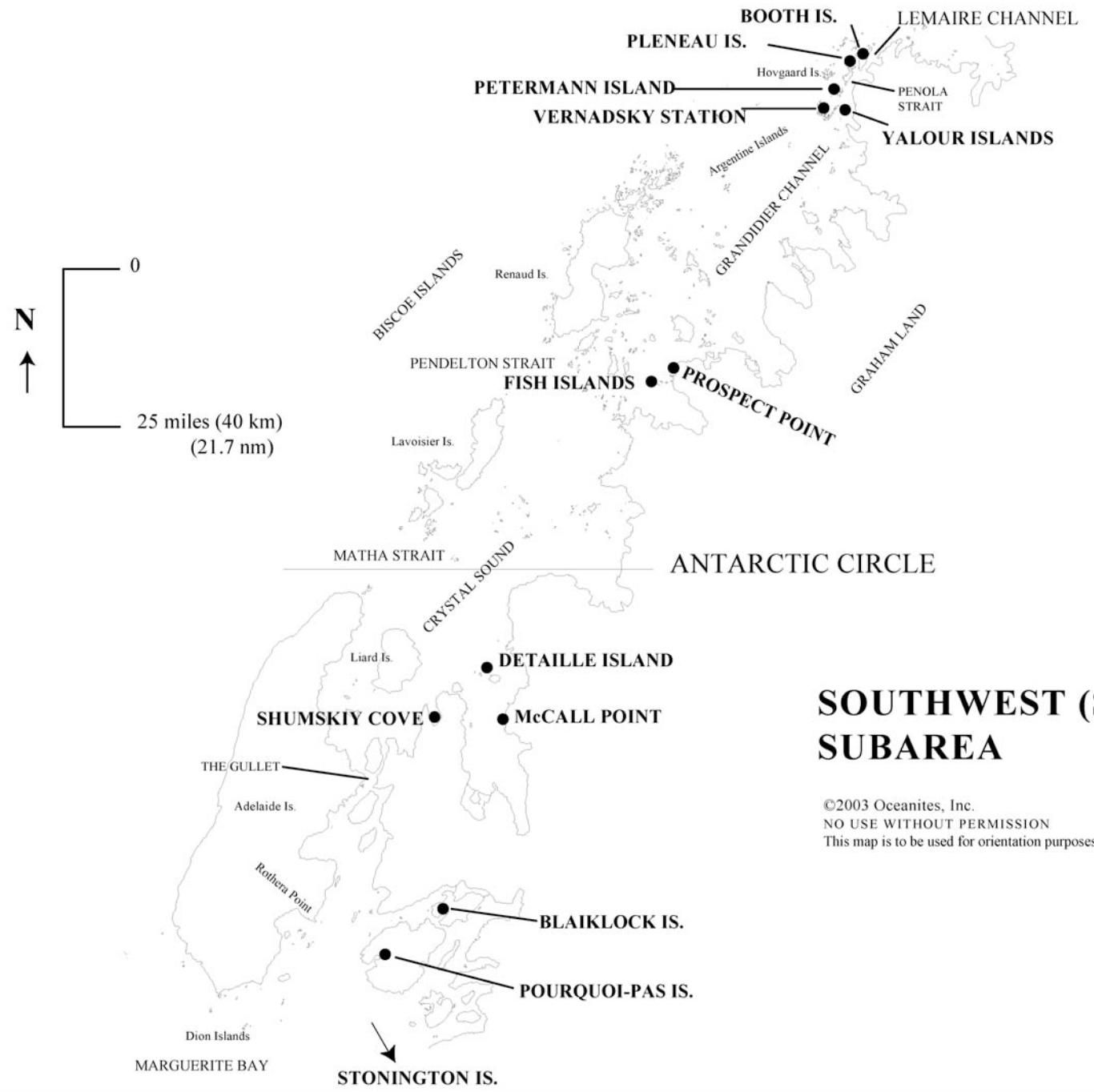
- Blaicklock Island (BLAI)
- Booth Island (BOOT)
- Detaille Island (DETA)
- Fish Islands (FISH)
- McCall Point (MCAL)
- Petermann Island (PETE)
- Pléneau Island (PLEN)
- Pourquoi-pas Island (POUR)
- Prospect Point (PROS)
- Shumskiy Cove (SHUM)
- Stonington Island (STON)
- Vernadsky Station (VERN)
- Yalour Islands (YALO)

The Antarctic Site Inventory subarea that is furthest south, which has the world's southernmost breeding gentoo penguins. Extensive, beautiful ice scenery and often caked with brash, perhaps multi-year ice. In the Antarctic peninsula, few shipboard expeditions proceed further south than the Lemaire Channel, Petermann Island, Vernadsky Station, and the Yalour Islands.

Keys:

For acronymns of Antarctic Site Inventory researchers, see Appendix 1 p. 39.

For codes relating to penguin/seabird census/population data, see Table 3, p. 49.



SOUTHWEST (SW) SUBAREA

Blaicklock Island (BLAI)

67˚33'S, 67˚04'W
Magnetic declination: 20.1˚E
Inventory subarea: SW
Inventory acronym: BLAI
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

High and irregularly shaped, 9-mile-long island, lying between Bigourdan and Bourgeois Flords. Separated from Pourquoi-pas Island by The Narrows and from Graham Land by Jones Channel. Named for Kenneth Blaicklock, the Falklands Islands Dependencies Survey surveyor who determined the site to be an island in 1949.

Landing Characteristics

Fine and very long shingle beach on W side of island. Old British hut on N end.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. January 13, 2001 SF Cal Star

Assessment and monitoring. Preliminary surveying.

Fauna — Flora — Censuses

Penguins & flying birds. South polar skuas are confirmed breeders and common. Many blue-eyed shags roosting on small, offshore island, but breeding not observed.

Seals. None noted.

Flora. Well developed moss, spp. and *Deschampsia antarctica* beds.

Conservation Aspects

Site sensitivities. South polar skuas defend territories fiercely. Extensive moss and *Deschampsia* beds are easily trampled.

Pointers for avoiding disruptions.

- Avoid and stay clear of skua territories.
- Watch footsteps carefully, to avoid trampling moss and *Deschampsia antarctica*.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	0	0
1994-95:	1	9
1995-96:	0	0
1996-97:	0	0
1997-98:	0	0
1998-99:	0	0
1999-2000:	0	0
2000-01:	1	89
2001-02:	0	0
2002-03:	0	0
14-Season Total	2	98

Proximate visitor sites. Pourquoi-pas Island.

Booth Island (Port Charcot) (BOOT)

65˚05'S, 64˚00'W
Magnetic declination: 16.6˚E
Inventory subarea: SW
Inventory acronym: BOOT
Species Diversity: MEDIUM
Site Sensitivity: MODERATE

Location — History — Features

Y-shaped, 5-mile-long island rising to an elevation of 980 meters. Discovered by Dallman's German Expedition of 1873-74, and named for Oskar Booth or Stanley Booth, or both, who were members of the Hamburg Geographical Society. Jean-Baptiste Charcot and the French Antarctic Expedition, aboard the schooner *Français*, spent the winter of 1904 in an inlet of Booth Island. A well constructed stone magnetic hut and other artifacts (wrecked tender, stove) may be observed. Port Charcot is the bay indenting the N shore of the island.

The Lemaire Channel (65˚04'S, 63˚57'W) lies on the eastern side of Booth Island. The seven-mile-long channel averages a mile in width, extending NE-SW from Spilwind Island and False Cape Rena to Roullin Point and Cape Cloos, separating Booth Island from the W coast of Graham Land. Glandaz Point (65˚05'S, 63˚59'W) forms the S entrance, and Loubat Point (65˚04'S, 63˚56'W) the N entrance, to Deloncle Bay, which indents Graham Land on the E side of Lemaire Channel. Gentoo penguins are confirmed breeders at both Glandaz Point (100 N1, 1982, reported in Woehler, 1993), and Loubat Point (100 N1, 1982, reported in Woehler, 1993).

Landing Characteristics

Ice-free conditions N of Pléneau Island enable landings on the rocky beach along the S-SW end of the island, The nesting penguins are found uphill and to the NE, toward the Lemaire Channel.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	January 14, 2001	SF	Cal Star
2.	January 24, 2001	RN RD	Cal Star
3.	February 4, 2001	RN	Cal Star
4.	December 24, 2001	JC LC	Endeavour
5.	January 15, 2002	RP WT	Endeavour

Assessment and monitoring. Preliminary surveying, mapping, censusing, and photodocumentation (terrestrial).

Fauna — Flora — Censuses

Penguins & flying birds. Adélie, chinstrap, and gentoo penguins, kelp gulls, south polar skuas, and blue-eyed shags are confirmed breeders.

Recent census data for Port Charcot, Booth Island, reported in Woehler (1993): Adélie penguin, 100 C1, 1983, and 61 N1, 1990; chinstrap penguin, 3 C1, 1983, and 3 N1, 1990; gentoo penguin, 400 N1, 1983.

Historic census data for Booth Island, also reported in Woehler (1993): Adélie penguin, >1,208 (A5, C1, C3, B), 1903-09; 1,500-2,000 A4, 1909.

Other Peninsula sites where all three pygoscelid penguins nest contiguously are: Stranger Point, King George Island, the Point Thomas Antarctic Specially Protected Area in Admiralty Bay, and Ardley Island, all of which are off-limits to visitors under the Antarctic Treaty; and Gourdin Island.

Antarctic Site Inventory censuses:

Adélie penguin (3 groups)
34 N1 2001 Dec

Gentoo penguin (15 groups)
377 N1 2001 Dec

Chinstrap penguin (2 groups)
24 N1 2001 Dec

Blue-eyed shag
19 N1 2001 Dec

Seals. None noted.

Flora. Moss, spp., *Prasiola crispa*, *Xanthoria*, spp., *Caloplaca*, spp., and *Verrucaria*, spp. noted.

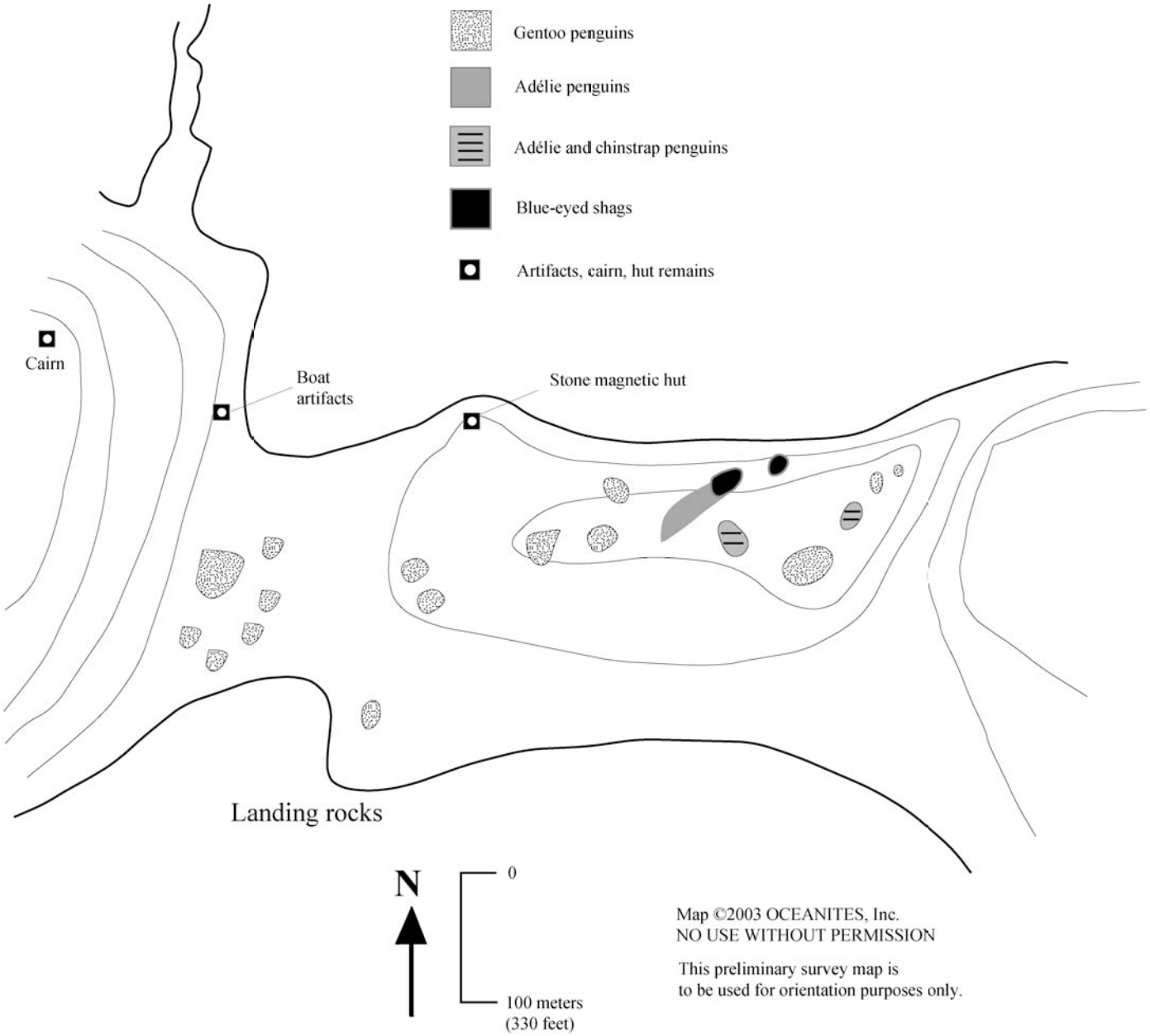
Conservation Aspects

Site sensitivities. Penguins, skuas, and shags are easily approached and disturbed. Historic remains should not be disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Avoid and stay clear of south polar skua territories.
- Approach blue-eyed shags carefully, and view them at a distance.
- Do not disturb or remove any artifacts.

BOOTH ISLAND
(PORT CHARCOT)



This preliminary survey map is
to be used for orientation purposes only.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

For Booth Island, in the NSF/OPP compilations:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	0	0
1994-95:	0	0
1995-96:	0	0
1996-97:	0	0
1997-98:	0	0
1998-99:	0	0
1999-2000:	1	50
2000-01:	5	333
2001-02:	2	176
2002-03:		
14-Season Total	8	559

For Port Charcot, Booth Island, in the NSF/OPP compilations:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	0	0
1994-95:	0	0
1995-96:	1	74
1996-97:	0	0
1997-98:	0	0
1998-99:	2	20
1999-2000:	0	0
2000-01:	3	16
2001-02:	1	8
2002-03:	3	29
14-Season Total	10	147

Proximate visitor sites. Pléneau Island, Petermann Island.

Detaille Island (DETA)

66˚52'S, 66˚48'W
Magnetic Declination: 19.5˚ E
Inventory subarea: SO
Inventory acronym: DETA
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Small island lying 2 miles NW off Andersen Island in the entrance of Lallemand Flord. Discovered by the 1908-10 Charcot expedition and named for a shareholder in the Magellan Whaling Company. There is a British Antarctic Survey hut and associated building remains on site, and 360˚ views of Crystal Sound.

Landing Characteristics

On N end of the island, in the vicinity of the hut and outlying buildings.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. January 13, 2003 SF Endeavour

Assessment and monitoring. Preliminary surveying. No photodocumentation.

Fauna — Flora — Censuses

Penguins & flying birds. Adelie penguin, kelp gull, south polar skua, and blue-eyed shag are confirmed breeders.

Antarctic Site Inventory censuses:

Adelie penguin
928 C1 2003 Jan

Seals and Flora. None noted.

Conservation Aspects

Site sensitivities. Adelie penguins on the S end of the island are easily approached and disturbed. The hut, outlying buildings, antennae, and other artifacts should not be disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Do not disturb or remove any artifacts.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	1	94
1990-91:	2	195
1991-92:	0	0
1992-93:	3	278
1993-94:	0	0
1994-95:	2	236
1995-96:	0	0
1996-97:	1	108
1997-98:	4	413
1998-99:	3	244
1999-2000:	1	5
2000-01:	5	478
2001-02:	0	0
2002-03:	7	858
14-Season Total	29	2,909

Proximate visitor sites. McCall Point, Shumskiy Cove.

Fish Islands (FISH)

66˚02’S, 65˚25’W
Magnetic declination: 18.1˚E
Inventory subarea: SW
Inventory acronym: FISH
Species Diversity:
Site Sensitivity:

Location — History — Features

This low-lying island group is located off the W coast of Graham Land. The small islands and rocks lying E of Flounder Island are called The Minnows and were first charted by John Rymill’s British Graham Land Expedition (1934-37).

Landing Characteristics

A location for zodiac touring and possible landings at one of the small islets in The Minnows. The very slippery rocks and the numerous Adélie penguins and blue-eyed shags present less than ideal conditions for visitors. There is little visitor space, and only small numbers of visitors are easily accommodated. Glacial scenery in the vicinity is spectacular.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	January 25, 1995	RN RD	Explorer
2.	January 13, 2003	SF	Endeavour

Assessment and monitoring. Preliminary surveying, mapping, censusing, and photodocumentation (terrestrial).

Fauna — Flora — Censuses

Penguins & flying birds. Adélie penguins and blue-eyed shags are confirmed breeders.

Recent Adélie penguin census data reported in Woehler (1993): 4,000 N3/4, 1984, spread among 12 colonies.

Antarctic Site Inventory censuses:

Adelie penguin
1,650 C2 2003 Jan

Seals and Flora. None noted.

Conservation Aspects

Site sensitivities. Restricted space between visitors and nesting penguins and shags.

Pointers for avoiding disruptions.

- If a landing is achieved, walk carefully around nesting, crèching, or molting penguins.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	2	229
1994-95:	0	0
1995-96:	1	113
1996-97:	0	0
1997-98:	0	0
1998-99:	1	95
1999-2000:	0	0
2000-01:	2	86
2001-02:	0	0

	Zodiac Landings	Participating Visitors
2002-03:	1	7
14-Season Total	7	530

Proximate visitor sites. Prospect Point.

McCall Point (MCAL)

67˚02’S, 66˚38 ’W
Magnetic declination: 19.5˚E
Inventory subarea: SW
Inventory acronym: MCAL
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A point on the E side of the Lallemand Fjord, 4 miles NW of Salmon Cove, in Graham Land. Named after an American engineer who first measured the detailed internal movement of a cirque glacier in 1951-52.

Landing Characteristics

Continental landing site that is barren, rocky, and with minimal vegetation.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. February 12, 2003 MB Endeavour

Assessment and monitoring. Preliminary censusing only.

Fauna — Flora — Censuses

Penguins & flying birds. Adelie penguin, Antarctic tern, south polar skua observed during Inventory visit, which occurred late in the breeding season. South polar skuas may breed. Some of the Adelie penguins were molting.

Seals. None noted.

Flora. Moss, sp., crustose lichens, sp., and snow algae noted.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-2002:	0	0
2002-03:	1	50
14-Season Total	1	50

Proximate visitor sites. Shumskiy Cove, Detaille Island.

Petermann Island (PETE)

65˚10'S, 64˚10'W
Magnetic declination: 17.0˚E
Inventory subarea: SW
Inventory acronym: PETE
Species Diversity: MEDIUM
Site Sensitivity: MODERATE **Note**: Restricted visitor space at the *refugio* and far NE tip.

Location — History — Features

A one-mile long island lying one mile SW of Hovgaard Island in the Wilhelm Archipelago, S of Lemaire Channel. The island is named for the German geographer August Petermann, and was first discovered by a German expedition in 1873-74. It was at a cove on the SW side of the island where the French explorer, Jean-Baptiste Charcot, and his vessel, *Pourquoi Pas?,* overwintered in 1909. Charcot named this cove Port Circumcision, for the holy day on which it was discovered. Petermann is a snow-covered, domed island that rises moderately steeply to a rocky summit, 150-200 meters above sea level. It has a rocky coastline indented by many small bays. There are abundant and nearly continuous rocky outcrops along the shore, near the abandoned Argentine research hut at Port Circumcision, on several ridges, and on the summit. Rookeries of Adélie penguins, gentoo penguins, and blue-eyed shags are on nearly soil-free bedrock, but a substantial layer of guano and other organic material is accumulating. Early season snow cover, through mid-December, may be extensive. The water level is directly against bedrock along the coast, without any significant beach deposits. Some of the penguin-colony areas with substantial numbers of pebbles may represent older raised beaches. These are many basaltic dikes along the shoreline. Above the Point Circumcision hut, and on the small summit with the Charcot monument/cairn, the rock is more granitic in composition. Rock surfaces show glacial polish and some glacial grooving. There are many protected bays and inlets in the vicinity, and visiting yachts are often encountered.

On Megalestris Hill there is a cairn with a plaque erected in 1909 by the second French Antarctic Expedition, led by Capt. Jean-Baptiste Charcot. The British Antarctic Survey restored the plaque in 1958. The plaque is officially designated as an Antarctic Historic Site and Monument. There is an abandoned Argentine hut at Point Circumcision and memorial crosses on surrounding hills for British Antarctic Survey personnel who have perished on or near this site.

Landing Characteristics

No anchorage possible in Penola Strait and a strong offshore current. Landing along cobble shoreline near Port Circumcision, on the SE side facing Penola Strait, in the vicinity of a *refugio* surrounded by nesting gentoo penguins. Visitor space around the *refugio* is restricted because of snow cover early (perhaps, into January), mud and snow melt later. Rocky coastline indented by many small bays and basaltic dikes, with sea water flowing directly over the bedrock, often packed with ice and snow covered. Adélie penguins and blue-eyed shags nest on ridges and dikes at the far NE end, where visitor space is restricted by topography, snow cover early (perhaps, into January), mud and snow melt later. Snow cover between the *refugio* and the NE end, and further inland and uphill, may be extensive; in deep snow, hiking is very difficult. Glacier and crevassed snow slopes inland, W-NW of Port Circumcision. Snow cornices on the shoreline are unstable and treacherous.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 7, 1994	RN	Alla Tarasova
2.	December 11, 1994	RN BH	Livonia
3.	December 15, 1994	RN BH ST	Explorer
4.	January 26, 1995	RN	Explorer
5.	November 20, 1995	RN LB	Explorer
6.	November 28, 1995	RN LB	Explorer
7.	December 3, 1995	BH	W. Discoverer
8.	December 14, 1995	BH	W. Discoverer
9.	December 16, 1995	LB	Explorer
10.	January 23, 1996	RD RP	Livonia
11.	February 4, 1996	RN RD RP BH	Livonia
12.	December 5, 1996	RN SF	W. Discoverer

13.	January 9, 1997	LB	Hanseatic
14.	January 29, 1997	LB	Hanseatic
15.	February 8, 1997	LB	Hanseatic
16.	February 16, 1997	LB	Hanseatic
17.	November 23, 1997	RN SF	W. Discoverer
18.	January 22, 1999	RN RD ST	Vavilov
19.	December 16, 1999	RN	Cal Star
20.	January 20, 2000	RD	Explorer
21.	January 24, 2000	RN	Shuleykin
22.	December 13, 2000	RN	Cal Star
23.	January 13, 2001	SF	Cal Star
24.	January 14, 2001	SF	Cal Star
25.	February 16, 2002	RN	Endeavour
26.	December 10, 2002	RN	Endeavour
27.	January 23, 2003	RD	Endeavour
28.	February 3, 2003	MM	Endeavour
29.	February 13, 2003	MB	Endeavour

Assessment and monitoring Surveyed, mapped, censused, and photodocumented (terrestrial). Aerial phodocumentation needs to be repeated. More thorough ground-survey of floral communities needed. Regular, site-wide censusing of gentoo penguins, Adélie penguins, and blue-eyed shags. Prospective Adélie penguin control colonies are in different locations and appear to have much integrity in terms of visitor absence.

Fauna — Flora — Censuses

Penguins & flying birds. Adélie and gentoo penguins, blue-eyed shags, Wilson's storm-petrel, and south polar skuas are confirmed breeders. Apparently hybrid south polar-Antarctic brown skuas have been observed, but hybrid, nesting pairs have not been noted.

Census data reported in Woehler (1993) and Croxall & Kirkwood (1979): Adélie penguin, 1,080 N3, 1988 penguin, 1,540 N1, 1971; and gentoo penguin, 755 N2, 1988. Petermann Island appears to represent the southernmost breeding population of gentoo penguin.

Antarctic Site Inventory censuses:

Gentoo penguin

1,224	N1	1997 Dec

Adélie penguin

862	N1	1997 Nov
1,135	C1	1999 Jan
926	N1	2001 Jan
485	N1	2002 Dec
661	C1	2003 Jan

Blue-eyed shag

34	N1	1994 Dec
27	N1	1995 Nov
33	N1	1995 Dec
29	N1	1996 Dec
29	N1	1997 Jan
29	N1	1997 Nov
30	N1	1997 Dec
67	C1	1995 Jan
50	C1	1996 Jan
57	C1	1999 Jan
46	C1	2000 Jan
23	N1	2000 Dec
21	C1	2001 Jan
28	N1	2002 Dec
49	C1	2003 Jan

Seals. None noted.

Flora. Snow algae is extensive. As the snow cover erodes, patches of *Deschampsia*, *Prasiola crispa*, *Xanthoria*, spp., *Caloplaca*, spp., other crustose lichens, spp., and cushion moss, spp. may be found.

Conservation Aspects

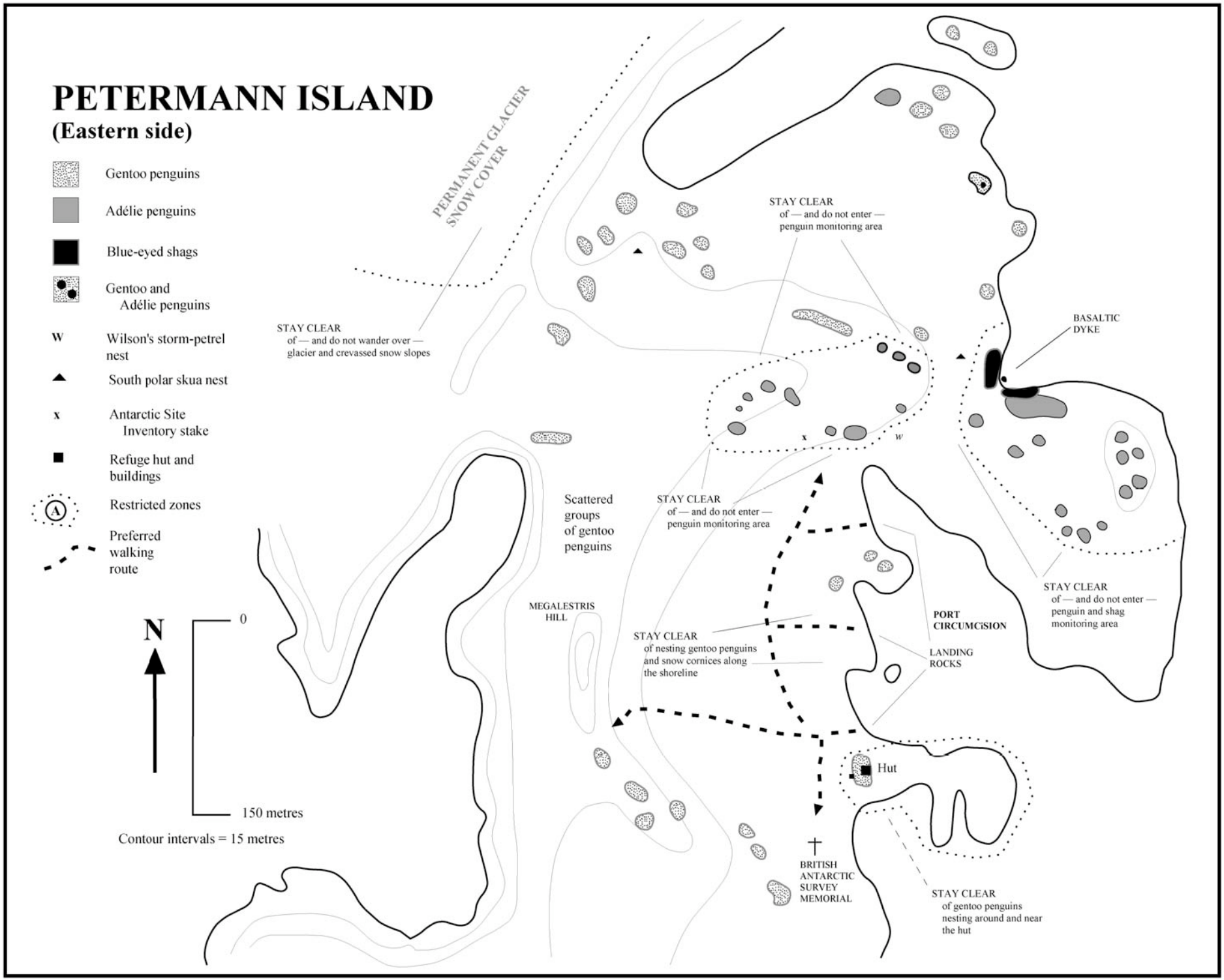
Site sensitivities. Gentoo penguins nesting around the *refugio* and in scattered colonies on inland slopes and ridges are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Visitor space around the *refugio* is restricted because of snow cover early (perhaps, into January), mud and snow melt later.

Adélie penguins nesting on edges of the far NE tip are not easily approached, but are easily disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Blue-eyed shags nesting on edges of the far NE tip are not easily approached, but are easily disturbed; in November and early December adults will be incubating eggs and, subsequently, guarding and provisioning chicks. Visitor space at the far NE tip is restricted by topography, snow cover early (perhaps, into January), mud and snow melt later. Adélie penguins nesting on high ground at the N end are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche.

South polar skuas nesting on scattered territories on high ground at the N end are easily approached and disturbed, particularly, later in the season (from mid-January) when adults are fiercely protecting young. If snow cover recedes, moss and lichen are exposed and readily accessed, and easily may be trampled.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting gentoo penguins at the *refugio* and along inland slopes and ridges, and around Adélie penguins on high ground at the N end.
- Avoid and stay clear of Adélie penguins on edges of the far NE tip.
- Approach blue-eyed shags nesting on the far NE tip carefully, and view them at a distance from elevated rock and snow perches.
- Avoid and stay clear of south polar skua territories.
- Avoid trampling exposed moss and lichens.
- Strictly control hikes to the NE end by organizing guided groups, all following the same path, and not allowing any free wandering.
- Stay clear of — and do not hike upon or wander over — the glacier, crevassed snow slopes, or snow cornices.


PETERMANN ISLAND
(Eastern side)
Gentoo penguins
Adélie penguins
Blue-eyed shags
Gentoo and Adélie penguins
W Wilson's storm-petrel nest
South polar skua nest
x Antarctic Site Inventory stake
Refuge hut and buildings
A Restricted zones
Preferred walking route
N
0
150 metres
Contour intervals = 15 metres
PERMANENT GLACIER SNOW COVER
STAY CLEAR of — and do not wander over — glacier and crevassed snow slopes
STAY CLEAR of — and do not enter — penguin monitoring area
BASALTIC DYKE
Scattered groups of gentoo penguins
STAY CLEAR of — and do not enter — penguin monitoring area
MEGALESTRIS HILL
STAY CLEAR of nesting gentoo penguins and snow cornices along the shoreline
PORT CIRCUMCISION
LANDING ROCKS
STAY CLEAR of — and do not enter — penguin and shag monitoring area
Hut
BRITISH ANTARCTIC SURVEY MEMORIAL
STAY CLEAR of gentoo penguins nesting around and near the hut

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	6	761
1990-91:	11	1,084
1991-92:	14	1,376
1992-93:	14	1,376
1993-94:	30	2,828
1994-95:	42	3,406
1995-96:	47	3,504
1996-97:	34	2,576
1997-98:	42	3,866
1998-99:	38	3,305
1999-2000:	48	4,159
2000-01:	57	4,813
2001-02:	10	721
2002-03:	66	6,311
14-Season Total	459	40,086

Proximate visitor sites. Pléneau Island, Booth Island, and Yalour Islands.

Pléneau Island (PLEN)

65˚06'S, 64˚04'W
Magnetic declination: 17.0˚E
Inventory subarea: SW
Inventory acronym: PLEN
Species Diversity: MEDIUM
Site Sensitivity: MODERATE

Location — History — Features

This 0.8-mile-long island lies NE of Hovgaard island in the Wilhelm Archipelago, and is very near to Booth Island and the S end of the Lemaire Channel. It was first charted (albeit, incorrectly) as a peninsula of Hovgaard Island during Charcot's 1903-05 French Antarctic Expedition. The island was named by Charcot for the expedition's photographer, Paul Pléneau. It was first shown as an island on the Argentine government chart of 1957.

Landing Characteristics

Uncharted water near shore. Hazardous rocks along the shoreline may be exposed, depending on the tide. Landings onto rocks and boulders on the E-NE side, facing Booth Island. May be considerable snow cover, with hidden crevasses. Snow cornices on the shoreline are unstable and treacherous. Pléneau Island is very close to Booth Island at the S end of the Lemaire Passage, and is a site that occasionally has attracted straggler emperor penguins. There are two potential landing sites; one to the N with easy upslope access to gentoo penguins, moss, and scenic views; the other to the S (noted on the appended map), which likely will be closer both to the ship's anchorage or drifting position, and to nearby Booth Island. Southern elephant seals often haul-out or collect in wallows. The gentoo penguin colonies are scattered and at higher reaches, and care must be taken to avoid trampling the site's moss beds, which may be hidden by snow cover. On clear days, the top of the island provides excellent views of the glacial and ice scenery to the W.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1.	December 11, 1994	RN	Livonia
2.	January 23, 1996	RD RP	Livonia
3.	February 13, 1996	BH RP	Livonia
4.	February 19, 1997	RN	Explorer
5.	November 28, 1999	LB BP	Cal Star
6.	December 13, 2000	RN	Cal Star
7.	December 27, 2000	SF LF	Cal Star
8.	January 24, 2001	RN RD	Cal Star
9.	January 25, 2001	RD	Cal Star
10.	January 4, 2002	RP	Endeavour
11.	January 15, 2002	RP WT	Endeavour
12.	February 8, 2002	MM	Endeavour
13.	January 3, 2003	RP	Endeavour
14.	January 14, 2003	SF	Endeavour

Assessment and monitoring. Surveyed, mapped, and photodocumented (terrestrial). Aerial photodocumentation needed. Regular, site-wide censusing of gentoo penguins.

Fauna — Flora — Censuses

Penguins & flying birds. Gentoo penguins, kelp gulls, and south polar skuas are confirmed breeders. Gentoo penguin census data reported in Woehler (1993): 500 N1, 1982.

Antarctic Site Inventory censuses:

Gentoo penguin

1,577	N1	1999 Nov
1,579	N1	2000 Dec
1,639	N1	2003 Jan

Blue-eyed shag

28	N1	2000 Dec

25	N1	2001 Jan
53	C1	2001 Jan
28	N1	2003 Jan

Seals. Southern elephant seals haul-out regularly.

Flora. As the snow cover erodes, patches of *Prasiola crispa*, crustose lichens *Caloplaca*, spp., and cushion moss, spp. may be found. At higher reaches, the moss beds appear to be more extensive, but are often snow covered. Snow algae also present.

Conservation Aspects

Site sensitivities. Gentoo penguins in widely scattered colonies are easily approached and disturbed, especially in November and early December when adults will be incubating eggs; subsequently, adults will be guarding and provisioning chicks at the nest, then in crèche. Blue-eyed shags nesting at the NE end are easily approached and disturbed; in November and early December adults will be incubating eggs and, subsequently, guarding and provisioning chicks. As the snow cover recedes, patches of moss and lichens are exposed and readily accessed, and easily may be trampled. Scattered south polar skua territories are easily accessed and disturbed, particularly, later in the season (from mid-January) when adults are fiercely protecting young. Southern elephant seals often haul-out or collect in wallows, and are easily approached and disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins.
- Walk slowly and carefully around nesting shags.
- Watch for, and avoid, exposed moss patches.
- Avoid and stay clear of skua territories.
- Avoid and stay clear of wallowing southern elephant seals.
- In deep snow, walk carefully and slowly and beware of crevasses.
- Stay clear of — and do not hike upon or wander over — snow cornices.

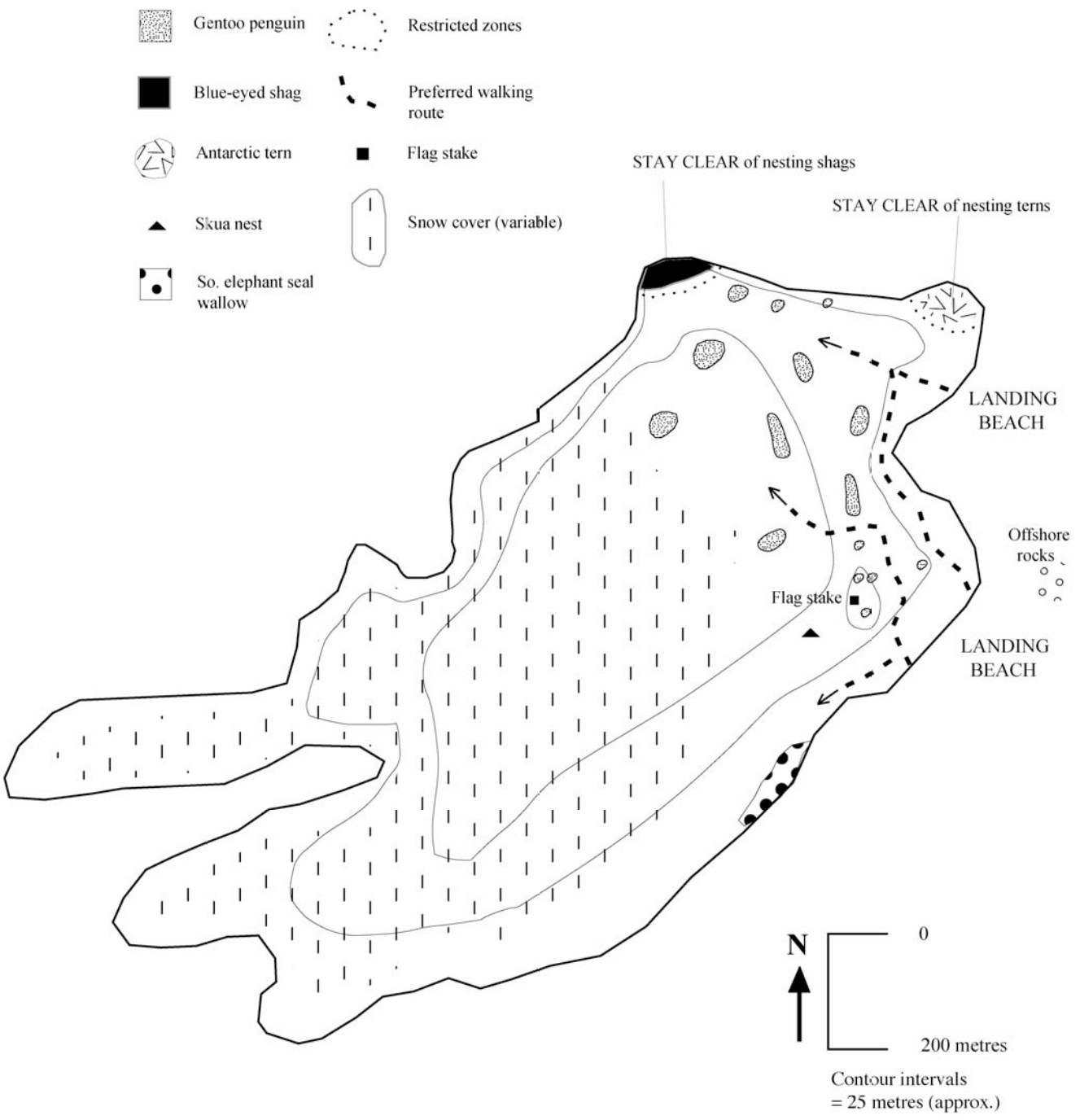
Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	**Participating Visitors**
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	10	447
1993-94:	6	370
1994-95:	6	374
1995-96:	20	1,333
1996-97:	24	1,803
1997-98:	8	548
1998-99:	15	682
1999-2000:	14	730
2000-01:	26	1,680
2001-02:	11	917
2002-03:	16	1,017
14-Season Total	156	9,901

Proximate visitor sites. Petermann Island and Booth Island.

PLÈNEAU ISLAND



Pourquoi-pas Island (POUR)

67˚43’S, 67˚44’W
Magnetic declination: 20.5˚E
Inventory subarea: SW
Inventory acronym: POUR
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A 17-mile-long, 5-to-11-mile-wide, mountainous island lying between Bigourdan and Bourgeois Fjords off the W coast of Graham land. The island was discovered by Charcot’s French Antarctic Expedition of 1908-10. The island was charted more accurately by John Rymill’s British Graham land Expedition, 1934-7, and Rymill named the island for Charcot’s expedition ship.

Landing Characteristics

The landing beach for this visit is located on the W side of the island, NW of an extensive moraine (67˚43’S 67˚44’W).

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. January 21, 1996 RD RP Livonia

Assessment and monitoring. Preliminary surveying. More complete censusing of penguin colonies and surveying of floral communities needed.

Fauna — Flora — Censuses

Penguins & flying birds. Adélie penguins are confirmed breeders. Recent Adélie penguin census data reported in Woehler (1993): 700 N3/4, 1984. One south polar skua nest also noted and, given the extensive skua “club” near the landing beach, there are likely to be other nests in the vicinity.

Seals. Single Weddell and crabeater seals hauled-out.

Flora. *Usnea*, spp., *Xanthoria*, spp., and cushion moss, spp., noted.

Conservation Aspects

Site sensitivities. Breeding penguins are easily approached and disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting penguins.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	0	0
1994-95:	0	0
1995-96:	0	0
1996-97:	0	0
1997-98:	1	80
1998-99:	0	0
1999-2000:	0	0
2000-01:	2	149
2001-02:	0	0
2002-03:	0	0
14-Season Total	3	229

NOTE: The January 1996 visit that brought Inventory researchers to Pourquoi-pas Island never entered the annual database compiled by NSF. Nor did the same visit made by that ship, presumably inadvertently, to off-limits Lagotellerie Island. More recently, expedition ships have recorded landings at Bongrain Point (67˚43'S, 67˚48'W), which forms the S side of the entrance to Dalgliesh Bay on the W side of the Pourquoi-pas Island, and in Dalgliesh Bay (67˚42'S, 67˚45'W) itself, both of which are close to where Inventory researchers visited in January 1996. Landings and participating visitor data for these recent visits are combined in the above table.

Proximate visitor sites. Stonington Island.

Prospect Point (PROS)

66˚01'S, 65˚21'W
Magnetic declination: 18.01˚E
Inventory subarea: SW
Inventory acronym: PROS
Species Diversity:
Site Sensitivity:

Location — History — Features

Located on the W coast of Graham Land, nearly two miles S of Fern Head and immediately E of the Fish Islands. It was roughly charted by John Rymill's British Graham Land Expedition (1934-37), and photographed by Hunting Aerosurveys Ltd. in 1956-57. An abandoned British Antarctic Survey hut may be found on site.

Landing Characteristics

Landings easily accomplished on the rocky shoreline to the W of the hut. South polar skuas and a year old Adélie penguin near the hut, but otherwise the site was devoid of wildlife. Mummified seal remains in front of the hut.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. January 25, 1995 RN RD Explorer

Assessment and monitoring. Preliminary surveying.

Fauna — Flora — Censuses

Penguins & flying birds. No confirmed nesting activity. No site-specific penguin breeding populations are reported in Woehler (1993) or Woehler & Croxall (1996).

Seals. None noted.

Flora. None noted.

Conservation Aspects

Site sensitivities.

Pointers for avoiding disruptions.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	0	0
1991-92:	0	0
1992-93:	3	305
1993-94:	0	0
1994-95:	4	291
1995-96:	2	122
1996-97:	0	0
1997-98:	1	91
1998-99:	4	294
1999-2000:	0	0
2000-01:	5	265
2001-02:	0	0
2002-03:	5	337
14-Season Total	24	1,745

Proximate visitor sites. Fish Islands.

Shumskiy Cove (SHUM)

67˚04'S, 67˚21'W
Magnetic Declination: 20.0˚ E
Inventory subarea: SO
Inventory acronym: SHUM
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A cove in southern Hanusse Bay indenting the NW side of Arrowsmith Peninsula in Graham Land. Named after a Russian glaciologist who authored a 1955 publication on the petrology of ice.

Landing Characteristics

Shore difficult to access because of ice.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. February 4, 2003 MM Endeavour

Assessment and monitoring. Preliminary surveying. No aerial photodocumentation.

Fauna — Flora — Censuses

Penguins & flying birds. South polar skuas and Adelie penguins observed.

Seals. Antarctic fur seals and crabeater seals observed on ice floes only.

Flora. None noted.

Conservation Aspects

Site sensitivities. None noted.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-2002:	0	0
2002-03:	1	127
14-Season Total	1	127

Proximate visitor sites. McCall Point, Detaille Island.

Stonington Island (STON)

68˚11'S, 67˚00'W
Inventory subarea: SW
Inventory acronym: STON
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Rocky island, one mile E of Neny Island in E Marguerite Bay, off the W coast of Graham Land. The site of the US East Base in 1939-41 and named for Stonington, Connecticut, home port of the sloop *Hero* in which Capt. Nathaniel Palmer signed the Antarctic Continent in 1820.

Landing Characteristics

Landing beach on S side of the island.

Fauna — Flora — Censuses

Penguins & flying birds. A single Antarctic tern nest observed. South polar skua also confirmed breeding.

Seals. None noted.

Flora. None noted.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. December 28, 2000 SF LF Cal Star

Assessment and monitoring. Preliminary surveying.

Conservation Aspects

Site sensitivities. None.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	1	97
1990-91:	0	0
1991-92:	0	0
1992-93:	0	0
1993-94:	0	0
1994-95:	2	197
1995-96:	0	0
1996-97:	0	0
1997-98:	0	0
1998-99:	0	0
1999-2000:	0	0
2000-01:	4	346
2001-02:	0	0
2002-03:	0	0
14-Season Total	7	640

Proximate visitor sites. Pourquoi-pas Island, Blaicklock Island.

Vernadsky Station (VERN)

65˚15'S, 64˚16'W
Inventory subarea: SW
Inventory acronym: VERN
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

Site of the Ukrainian Research Station (formerly, the UK Faraday Station).

Landing Characteristics

Station jetty.

Fauna — Flora — Censuses

Penguins & flying birds. South polar skua routinely observed, likely nesting in the vicinity.

Seals. None noted.

Flora. None noted.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2003:

1. December 28, 2000 SF LF Cal Star

Assessment and monitoring. Preliminary surveying.

Conservation Aspects

Site sensitivities. None.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2003:

	Zodiac Landings	Participating Visitors
1989-90:	2	252
1990-91:	5	432
1991-92:	4	422
1992-93:	3	274
1993-94:	2	178
1994-95:	4	267
1995-96:	5	209
1996-97:	6	369
1997-98:	19	1,094
1998-99:	22	1,626
1999-2000:	23	1,585
2000-01:	37	2,811
2001-02:	3	219
2002-03:	8	457
14-Season Total	143	10.195

NOTE: Table includes visits to the former UK Faraday Station, prior to the station being given to the Ukraine.

Proximate visitor sites. Pourquoi-pas Island, Blaicklock Island.

Yalour Islands (YALO)

65˚14’S, 64˚09’W
Magnetic declination: 17.0˚E
Inventory subarea: SW
Inventory acronym: YALO
Species Diversity: LOW
Site Sensitivity: LOW

Location — History — Features

A 1.5-mile-long group of scattered, low lying islands and rocks in the S part of the Wilhelm Archipelago, found one mile NW of Cape Tuxen. The islands were discovered and named by Charcot’s French Antarctic expedition, 1903-5. Lt. Yalour was an officer of the Argentine ship *Uruguay*, which rescued members of the Swedish Antarctic Expedition in November 1903.

Landing Characteristics

Landing on a rocky islet at 65˚14’S, 64˚09’W, with a BAS ration box to the SW and in close proximity. These very low-lying islets offer a chance for Adélie penguins, which are scattered in small groups and, it seems, in almost every direction.

Antarctic Site Inventory Effort

Visits by Antarctic Site Inventory researchers, 1994-2002:

1. January 23, 1996 RD RP Livonia

Assessment and monitoring. Preliminary surveying.

Fauna — Flora — Censuses

Penguins & flying birds. Adélie penguins and south polar skuas are confirmed breeders. Recent Adélie penguin census data reported in Woehler (1993): 8,000 N1, 1982, spread among 13 colonies.

Seals. None hauled-out.

Flora. *Deschampsia*, cushion moss, spp., *Xanthoria*, spp. and other crustose lichens noted.

Conservation Aspects

Site sensitivities. Penguins are easily approached and disturbed.

Pointers for avoiding disruptions.

- Walk slowly and carefully around nesting, crèching, or molting Adélie penguins.

Visitation Aspects

Numbers of tourist zodiac landings and participating visitors, 1989-2002:

	Zodiac Landings	Participating Visitors
1989-90:	0	0
1990-91:	1	87
1991-92:	2	177
1992-93:	0	0
1993-94:	5	378
1994-95:	2	117
1995-96:	3	104
1996-97:	3	118
1997-98:	3	167
1998-99:	3	158
1999-2000:	9	496
2000-01:	6	551
2001-02:	0	0
2002-03:	15	976
14-Season Total	52	3,329

Proximate visitor sites. Petermann Island.

PART III

NUMBERS AND DISTRIBUTION OF ZODIAC LANDINGS AND VISITORS

DATA SOURCES

The visitation statistics presented in Part II of the *Site Compendium* are a filtered version of the annual compilations that the US National Science Foundation Office of Polar Programs (NSF/OPP) has produced since the 1989-90 season. The NSF/OPP compilations are based on site visit reports submitted by Antarctic tour operators.

As noted, for purposes of the *Site Compendium*, the NSF/OPP compilations have been filtered to reflect zodiac landings *only*. While many other visitor activities occur — zodiac tours, snorkeling, helicopter landings and overflights, camping, ice-walking, and mountain climbing, none of these other activities, separately or combined, approach the frequency and magnitude of visitation generated by expedition tour ship passengers in zodiacs (Naveen, 1997a; Rubin, 2000; NSF/OPP. 1990-2002).

A full presentation of the filtered data may be found in Appendix 4, pp. 247-295. For each site, Appendix 4 notes:

- Antarctic Site Inventory subarea;
- Coordinates (latitude/longitude);
- Whether the site is one of the 82 locations visited by Antarctic Site Inventory researchers between 1994-2003;
- Whether a national research station is found on site; and
- Tourist activities that have taken place on site, other than zodiac landings.

Appendix 4 presents numbers of zodiac landings and visitors participating in such landings for each of the 14 seasons, 1989-2003. To enable comparisons through these 14 seasons, Appendix 4 also presents numbers of zodiac landings and visitors participating in such zodiac landings for:

- 1989-94 (the first five seasons that visitor statistics were compiled by NSF/OPP);
- 1994-99 (the second five seasons that visitor statistics were compiled by NSF/OPP);
- 1989-99 (the first ten seasons that visitor statistics were compiled);
- 1999-2003 (the four, most recent seasons); and
- 1989-2003 (the entire 14-year period).

The latter part of Appendix 4 presents summary statistics regarding:

- Number of sites experiencing zodiac landings, by season and by Antarctic Site Inventory subarea;
- Sites experiencing zodiac landings for the first time, by season and by Antarctic Site Inventory subarea;
- Cumulative number of “known” visitor sites in the Antarctic Peninsula;
- Number of sites experiencing only one zodiac landing per season, by Antarctic Site Inventory subarea;
- Number of zodiac landings, by season and by Antarctic Site Inventory subarea;
- Number of visitors participating in zodiac landings, by season and by Antarctic Site Inventory subarea;

All tables presented in Part III are based on Appendix 4.

DISCLAIMER REGARDING COMPILED VISITOR DATA

To generate these annual compilations, NSF/OPP collates visitor data assembled by the International Association of Antarctic Tour Operators (IAATO), based on site visit reports of tour operators and their expedition staff. This is and will continue to be a useful database, and may be particularly important for analyses attempting to correlate visitation trends with observed on-site changes.

However, repeating a major caveat noted in the first edition of the *Site Compendium* (1997), these compilations suffer because inaccurate or nonspecific site names are reported and listed. The first edition recommended improvements, but imprecise site names continue to be reported. See Part V of this edition for more discussion about this lack of specificity.

VISITATION TRENDS

Over 14 seasons, 1989-2003, 245 Antarctic Peninsula sites have experienced zodiac landings. There have been 9,443 zodiac landings at these sites, an average of 675 landings per season.

The number of zodiac landings per season rose steadily since 1989-90 to 1,101 landings in the 1999-2000 season, then declined to 866 in the 2000-01 season, and increased to 1,161 in the 2002-03 season:

Table 4: ZODIAC LANDINGS IN ASI STUDY AREA

	Number of zodiac landings, all sites	Number of visitors participating in such landings	Average number of participating visitors per zodiac landing
1989-90	164	17,759	108
1990-91	161	19,001	118
1991-92	327	38,828	119
1992-93	348	27,789	80
1993-94	488	50,035	103
1994-95	704	52,610	75
1995-96	784	61,345	78
1996-97	775	54,286	70
1997-98	714	66,387	93
1998-99	858	74,772	87
1999-2000	1,101	87,977	80
2000-01	1,055	91,829	87
2001-02	866	78,875	91
2002-03	1,161	104,084	90
1989-94	1,488	153,412	103
1994-99	3,835	309,400	81
1989-99	5,323	462,812	87
1999-2003	4,183	362,765	87
1989-2003	9,506	823,926	87

The average number of visitors participating in a zodiac landing reached a high of 119 in the 1991-92 season. The lowest average number of participating visitors was 70 in the 1996-97 season, and the average has ranged from 81-87 in the four most recent seasons.

Zodiac landings concentrate in the Northwest Peninsula (NW) and South Shetland Islands (SH) subareas:

Table 5: SITES EXPERIENCING ZODIAC LANDINGS, BY ASI SUBAREA

	SO	EI	SH	NE	NW	SW	Total
1989-90	2	2	15	3	7	6	35
1990-91	3	2	12	3	7	5	32
1991-92	3	2	20	5	10	4	44
1992-93	2	3	18	3	18	6	50
1993-94	4	3	21	6	22	8	64
1994-95	6	3	23	6	22	15	75
1995-96	3	2	22	9	25	10	71
1996-97	6	2	21	16	27	9	81
1997-98	1	4	20	6	29	11	71
1998-99	4	3	20	11	32	15	85
1999-2000	4	1	22	13	36	15	91
2000-01	3	2	25	12	46	30	118
2001-02	3	4	24	13	35	8	87
2002-03	9	2	30	15	31	22	109

	SO	EI	SH	NE	NW	SW	
1989-94	5	3	28	7	27	14	84
	6.0%	3.6%	33.3%	8.3%	32.1%	16.7%	
1994-99	10	4	32	24	49	29	148
	6.8%	2.7%	21.6%	16.9%	32.4%	19.6%	
1989-99	10	5	40	25	54	31	165
	6.1%	3.0%	24.2%	15.8%	32.1%	18.8%	
1999-2003	13	4	42	29	65	44	197
	6.6%	2.0%	21.3%	14.7%	33.0%	22.3%	
1989-2003	15	5	54	39	82	50	245
	6.1%	2.0%	22.0%	15.9%	33.5%	20.4%	

Over the entire, 1989-2003 period, the NW subarea has experienced one-third of all zodiac landings.

In the first five seasons that visitation data were compiled, 1989-94, the SH subarea also experienced one-third of all zodiac landings, but that share has declined subsequently, with an increasing shift of visits to the Northeast Peninsula (NE) and Southwest Peninsula (SW) subareas.

MOST HEAVILY VISITED SITES

A recently published paper regarding zodiac landings in the Antarctic Peninsula (Naveen, et al., 2001; reproduced below as Appendix 5) examines the location, intensity, and frequency of zodiac landings by expedition tour ship passengers in the Antarctic Peninsula over ten seasons, 1989-90 through 1998-99.

In this period, the 25 most heavily visited Peninsula sites, by number of landings, were:

Table 6: MOST HEAVILY VISITED SITES, 1989-99

Site		1989-99 Landings	89-99 Rank
Whalers Bay, Deception Island	SH	425	1
Cuverville Island	NW	359	2
Jougla Point, Port Lockroy, Wiencke Island (includes landings listed for "Port Lockroy" and "Jougla Point," but NOT for Goudier Is.)	NW	350	3
Pendulum Cove, Deception Island	SH	300	4
Hannah Point, Livingston Island	SH	290	5
Petermann Island	SW	278	6
Half Moon Island	SH	263	7
Almirante Brown Station, Paradise Bay	NW	259	8
Paulet Island	NE	196	9
Arctowski Station, King George Island	SH	166	10
Neko Harbor, Andvord Bay	NW	152	11
Baily Head (incl. Rancho Point), Deception Is.	SH	149	12
Waterboat Pt. (G. Videla Station), Paradise Bay	NW	148	13
Aitcho Islands	SH	147	14
Penguin Island	SH	118	15
Palmer Station, Arthur Harbor, Anvers Is.	NW	104	16
Pléneau Islands	SW	89	17
Paradise Bay (nonspecifically described as to site)	NW	88	18
Hope Bay (Esperanza Station)	NE	87	19
Ak. Vernadsky (ex-Faraday) Station, Argentine Is.	SW	72	20
Telefon Bay, Deception Island	SH	65	21
Yankee Harbor, Greenwich Island	SH	60	22
Point Lookout, Elephant Island	EI	59	23
Torgersen Is., Arthur Harbor	NW	57	24
Portal Point, Charlotte Bay	NW	56	25

For the most recent four-year period, 1999-2003, the 25 most heavily visited Peninsula sites, by number of landings — and a comparison of rankings from the previous 1989-99 period — are:

Table 7: MOST HEAVILY VISITED SITES, 1999-2003

Site		1999-2003 Landings	99-03 Rank	89-99 Rank
Whalers Bay, Deception Island	SH	336	1	1
Jougla Point, Port Lockroy, Wiencke Island (includes ldgs listed for "Port Lockroy" and "Jougla Point")	NW	293	2	3
Neko Harbor, Andvord Bay	NW	230	3	11
Cuverville Island	NW	226	4	2
Pendulum Cove, Deception Island	SH	191	5	4
Goudier Island (restored UK Hut), off Jougla Pt., Port Lockroy (does NOT include LDGs listed for "Port Lockroy" and "Jougla Point")	NW	191	6	-
Hannah Point, Livingston Island	SH	190	7	5
Petermann Island	SW	181	8	6
Half Moon Island	SH	158	9	7
Almirante Brown STATION, Paradise Bay	NW	152	10	8
Aitcho Islands	SH	151	11	14
Paulet Island	NE	127	12	9
Brown Bluff, Tabarin Peninsula	NE	117	13	-
Baily Head (incl. Rancho Point), Deception Island	SH	98	14	12
Akademic Vernadsky (ex-Faraday) STATION, Argentine Islands	SW	71	15	20
Pléneau Island	SW	67	16	17
Waterboat Point (Gonzales Videla STATION), Paradise Bay	NW	60	17	13
Paradise Bay (nonspecific)	NW	59	18	18
Damoy Point (incl. Dorian Bay), Wiencke Island	NW	58	19	-
Yankee Harbor, Greenwich Island	SH	52	20	22
Penguin Island	SH	51	21	15
Arctowski STATION, King George Island	SH	50	22	10
Hope Bay (Esperanza STATION)	NE	50	23	19
Telefon Bay, Deception Island	SH	50	24	21
Danco Island, w. coast Graham Land	NW	44	25	-

In the last four seasons, four sites — Goudier Island, Brown Bluff, Damoy Point, and Danco Island have entered the “Top 25” rankings for most Antarctic Peninsula zodiac landings; and six sites — Jougla Point, Neko Harbor, the Aitcho Islands, Akademic Vernadsky (ex-Faraday) Station, Pléneau Island, and Yankee Harbor have improved their position within in the “Top 25” rankings for the most zodiac landings.

NEW VISITOR SITES

In each season, there are zodiac landings at previously unvisited sites in the Antarctic Peninsula.

Assuming the 35 sites visited in the 1989-90 season as a baseline, 210 “new” sites have been added as zodiac landing sites from the 1990-91 season through the 2002-03 season, for a cumulative total of 245 sites visited during these 14 seasons

After the baseline season of 1989-90, recruitment of new sites generally exceeded 20% through the 1996-97 season, then began to trend download, reaching a low of 12.1% in the 1999-2000 season. The next season, 2000-01, exhibited a spike to peak recruitment of 29.7% in 2000-01, when 35 new sites were visited.

After the baseline 1989-90 season, zodiac landings to new sites generally has been less than 10% of the total number of zodiac landings per season. The exception was 1992-93, when visits to new sites comprised 14.7% of all zodiac landings.

Table 8: NEW VISITOR SITES

Season	Zodiac landing sites visited for the 1st time	Percentage of sites visited that are “new” sites	Percentage of seasonal zodiac landings to “new” sites
89-90	35	100.0 %	100.0 %
90-91	7	21.9 %	9.9 %
91-92	12	27.3 %	7.0 %
92-93	14	28.0 %	14.7 %
93-94	16	25.0 %	4.5 %
94-95	21	28.0 %	4.1 %
95-96	19	26.8 %	9.6 %
96-97	18	22.2 %	3.5 %
97-98	11	15.5 %	1.7 %
98-99	12	14.1 %	1.7 %
99-00	11	12.1 %	1.5 %
00-01	35	29.7 %	5.1 %
01-02	11	12.6 %	1.6 %
02-03	23	21.3 %	2.6 %

SITES VISITED EACH SEASON; SITES VISITED ONLY ONCE

Over the 1989-2003 period, the cumulative number of "known" sites has grown to 245, while the percentage of sites visited each season generally has declined.

Since the 1994-95 season, the percentage of known sites visited *only once* per season generally has been less than 20%. The exception was 2000-01, when almost 25% of all known sites were visited only once, a peak which correlates to the high number of new sites (35) added that season.

Table 9: SITES VISITED EACH SEASON; SITES VISITED ONLY ONCE

Season	Cumulative total of "known" zodiac landing sites	Sites with zodiac landings during the season	% of "known" sites visited during the season	Sites visited only once during the season	% of sites visited only once
89-90	35	35	100.0 %	9	25.7 %
90-91	42	32	76.2 %	7	16.7 %
91-92	54	44	81.5 %	11	20.4 %
92-93	68	50	73.5 %	14	20.6 %
93-94	84	64	76.2 %	22	26.2 %
94-95	105	75	71.4 %	24	22.9 %
95-96	124	71	57.3 %	19	15.3 %
96-97	142	81	57.0 %	28	19.7 %
97-98	153	71	46.4 %	25	16.3 %
98-99	165	85	51.5 %	30	18.2 %
99-00	176	91	51.7 %	28	15.9 %
00-01	211	118	55.9 %	51	24.2 %
01-02	222	87	39.2 %	32	14.4 %
02-03	245	109	44.5 %	43	17.6 %

CONCENTRATION OF VISITS

Irrespective of the rising, cumulative number of “known” sites (245 at the end of the 2002-03 season), zodiac landings consistently concentrate at the 10-20 most frequently visited sites (in terms of numbers of zodiac landings).

For each season in the 14-year period, 1989-2003, the 10 sites experiencing the most number of zodiac landings account for >50% of each season’s zodiac landings and visitors participating in such zodiac landings. The “Top 15” sites account for 65-80% of seasonal zodiac landings and participating visitors, and the “Top 20” sites for 73-93% of seasonal zodiac landings and visitors.

Table 10: CONCENTRATION OF VISITS AT TOP 10-20 SITES

Season	Total ZODIAC LANDINGS @ "Top 10" sites	% ZODIAC LANDINGS @ "Top 10" sites	Total PARTICIPATING VISITORS @ "Top 10" sites	% PARTICIPATING VISITORS @ "Top 10" sites
89-90	94	57.3 %	10,322	58.1 %
90-91	101	62.7 %	11,596	62.9 %
91-92	193	59.0 %	23,741	61.1 %
92-93	197	56.6 %	16,706	60.1 %
93-94	282	57.8 %	30,111	60.2 %
94-95	416	59.1 %	30,991	58.9 %
95-96	435	55.5 %	35,823	58.4 %
96-97	435	56.1 %	28,170	51.9 %
97-98	413	57.8 %	39,666	59.7 %
98-99	478	55.7 %	42,855	57.3 %
99-00	596	54.1 %	46,646	53.0 %
00-01	551	52.2 %	50,055	54.5 %
01-02	470	54.3 %	42,951	54.5 %
02-03	621	53.5 %	55,989	53.8 %
1989-99	2,886	54.2 %	256,352	55.4 %
1999-2003	2,148	51.4 %	193,836	53.4 %
1989-2003	4,956	52.1 %	440,538	53.5 %

Season	Total ZODIAC LANDINGS @ "Top 15" sites	% ZODIAC LANDINGS @ "Top 15" sites	Total PARTICIPATING VISITORS @ "Top 15" sites	% PARTICIPATING VISITORS @ "Top 15" sites
89-90	123	75.0 %	13,362	75.2 %
90-91	129	80.1 %	14,941	78.6 %
91-92	250	76.5 %	29.809	76.8 %
92-93	244	70.1 %	20,312	73.1 %
93-94	353	72.3 %	27,993	75.9 %
94-95	510	72.4 %	37,478	71.2 %
95-96	543	69.3 %	43,051	70.2 %
96-97	548	70.7 %	37,442	69.0 %
97-98	499	69.8 %	45,881	69.1 %
98-99	577	67.2 %	53,228	71.2 %
99-00	741	67.3 %	58,400	66.4 %
00-01	689	65.3 %	63,619	69.3 %
01-02	564	65.1 %	53,914	68.4 %
02-03	773	66.6 %	70,757	68.0 %
1989-99	3,600	67.6 %	320,697	69.3 %
1999-2003	2,712	64.8 %	239,918	66.1 %
1989-2003	6,141	64.6 %	557,093	67.6 %

Season	Total ZODIAC LANDINGS @ "Top 20" sites	% ZODIAC LANDINGS @ "Top 20" sites	Total PARTICIPATING VISITORS @ "Top 20" sites	% PARTICIPATING VISITORS @ "Top 20" sites
89-90	142	86.6 %	15,395	86.7 %
90-91	144	89.4 %	17,663	93.0 %
91-92	283	86.5 %	33,687	86.8 %
92-93	281	80.7 %	22,626	81.4 %
93-94	394	80.7 %	42,949	85.8 %
94-95	558	79.3 %	41,767	79.4 %
95-96	626	79.8 %	50,788	82.8 %
96-97	604	77.9 %	41,832	77.1 %
97-98	557	77.9 %	52,666	79.3 %
98-99	649	75.6 %	58,846	78.7 %
99-00	831	75.5 %	67,446	76.7 %
00-01	770	73.0 %	72,090	78.5 %
01-02	631	72,9 %	59,480	75.4 %
02-03	864	74.4 %	73,229	70.4 %
1989-99	4,040	75.9 %	359,045	77.6 %
1999-2003	3,008	71.9 %	271,267	74.8 %
1989-2003	6,919	72.8 %	615,057	74.6 %

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

KEY:	ASI	Antarctic Site Inventory survey site
	ZOD	Zodiac rides also take place at this landing site
	ICE	Ice walking also takes place at this site
	HEL	Helicopter landings/overflights also take place at this site
	CAM	Camping also take splace at this site
	CLI	Climbing
	SNO	Snorkeling activity also takes place at this site
	ASPA	Antarctic Specially Protected Area
	ST	Research station on site
	1st LDG	Season when landing site was first visited in 1989-99 time period
	RANK (1-25)	Rank if among 25 sites with most numbers of zodiac landings or visitors participating in zodiac landings
	NS	Landing site not specifically described in NSF/OPP compilations
	NSF/OPP	U.S. National Science Foundation, Office of Polar Programs
	?	Reported as Antarctic Peninsula visitor site in NSF/OPP compilations, but precise location/identity unknown
	SO	South Orkneys subarea of the Antarctic Site Inventory project
	SH	So. Shetland Islands subarea of the Antarctic Site Inventory project
	NE	Northeast subarea of the Antarctic Site Inventory project, from Cape Dubouzet (63˚16' S 64˚00' W) to James Ross Island
	SW	Southwest subarea of the Antarctic Site Inventory project, from northern end of Lemaire Channel to northern end of Marguerite Bay (68˚18' S 67˚11' W)
	NW	Northwest subarea of the Antarctic Site Inventory project, from Cape Dubouzet (63˚16' S 64˚00' W) to the northern end of the Lemaire Channel

NOTE: This table only reflects the Antarctic Site Inventory study area in the Antarctic Peninsula

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE				1st Landing	89-90 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Adelaide Island	SW		ZOD	89-90	2	25	183	25
Admiralty Bay, KGI	SH		ZOD	01-02				
Admiralty Sound (between Seymour & Snow Hill Island)	NE		ZOD	96-97				
Aitcho Islands	SH	ASI	ZOD	89-90	2	22	271	21
Akademic Vernadsky (ex-Faraday) STATION, Argentine Islands	SW	ASI ST	CAM HEL CLI	89-90	2	24	252	24
Alamode Is., Terra Firma Islands	SW		ZOD	00-01				
Alcock Island	NW		ZOD	91-92				
Almirante Brown STATION, Paradise Bay	NW	ST ASI	ZOD SNO	89-90	10	3	1,191	3
Alpha Is., Melchior Islands	NW		ZOD	01-02				
Amphibolite Point, Coronation Islands	SO	ASI	ZOD	01-02				
Andvord Bay	NW		ZOD HEL CAM	00-01				
Anvers Island (nonspecific)	NW	NS	ZOD	00-01				
Apendice Is. (not Stemeck Is.)	SW		ZOD	02-03				
Arago Glacier, Andvord Bay	NW		ZOD	92-93				
Arctowski STATION, King George Island	SH	ST ASI	ZOD	89-90	8	6	930	6
Ardley Island	SH	ASPA	ZOD	89-90	4	18	418	19
Argentine Islands (nonspecific)	SW	NS	ZOD HEL	96-97				
Armstrong Reef, Renaud Is.	SW		ZOD	00-01				
Artigas STATION, King George Island	SH	ST	ZOD	94-95				
Arturo Prat STATION, Greenwich Island	SH	ST	ZOD	91-92				
Astrolabe Island	NW	ASI	ZOD HEL SNO	92-93				
Auguste Island, Gerlache Str.	NW		ZOD	97-98				
Auster Point, Trinity Peninsula	NW		ZOD HEL	00-01				
Baily Head (incl. Rancho Point), Deception Island	SH	ASI	ZOD SNO	89-90	5	16	455	16
Bald Head, Trinity Peninsula	NE	ASI	ZOD	99-00				
Barcroft Islands (so. of Watkins and Biscoe Island)	SW		ZOD	94-95				
Bayard Islands (off west coast, Graham Land)	NW		ZOD	98-99				
Beak Island, Pr. Gustav Channel	NE		ZOD	98-99				
Bellingshausen STATION, King George Island	SH	ST	ZOD	91-92				
Bennett Islands, Hanusse Bay	SW		ZOD	97-98				
Bernardo O'Higgins STATION	NW	ST ASI	ZOD	96-97				
Biscoe Point, Anvers Is. (ASPA)	NW		ZOD	99-00				
Blaicklock Island (off w. coast Graham Land)	SW	ASI	ZOD	94-95				
Bongrain Pt., Pourquoi Pas Island	SW		ZOD	97-98				
Booth Is.	SW	ASI	ZOD SNO	99-00				
Bradbrooke Island, Aitcho Islands	SH	?	ZOD	94-95				
Brandy Bay, James Ross Is.	NE		ZOD	01-02				
Brown Bluff, Tabarin Peninsula	NE	ASI	ZOD	94-95				
Bryde Island (west coast Graham land)	NW		SNO CLI	98-99				
Buls Bay, Brabant Is.	NW		ZOD	97-98				
Camara STATION, Half Moon Island,	SH	ST	ZOD	94-95				
Camp Hill	NE	ASI	ZOD	02-03				
Camp Point (w. side, Graham Land)	SW		ZOD	96-97				
Cape Burd, Tabarin Peninsula	NE	ASI	ZOD	00-01				

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		90-91 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	91-92 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Adelaide Island	SW								
Admiralty Bay, KGI	SH								
Admiralty Sound (between Seymour & Snow Hill Island)	NE								
Aitcho Islands	SH					3	24	285	
Akademic Vernadsky (ex-Faraday) STATION, Argentine Islands	SW	5	14	432	18	4	21	422	22
Alamode Is., Terra Firma Islands	SW								
Alcock Island	NW					1		78	
Almirante Brown STATION, Paradise Bay	NW	16	1	1,471	3	26	1	2,889	3
Alpha Is., Melchior Islands	NW								
Amphibolite Point, Coronation Islands	SO								
Andvord Bay	NW								
Anvers Island (nonspecific)	NW								
Apendice Is. (not Stemeck Is.)	SW								
Arago Glacier, Andvord Bay	NW								
Arctowski STATION, King George Island	SH	6	12	601	14	14	10	1,509	10
Ardley Island	SH	2	19	705	13				
Argentine Islands (nonspecific)	SW								
Armstrong Reef, Renaud Is.	SW								
Artigas STATION, King George Island	SH								
Arturo Prat STATION, Greenwich Island	SH					2		181	
Astrolabe Island	NW								
Auguste Island, Gerlache Str.	NW								
Auster Point, Trinity Peninsula	NW								
Baily Head (incl. Rancho Point), Deception Island	SH	6	13	584	16	14	12	1,182	14
Bald Head, Trinity Peninsula	NE								
Barcroft Islands (so. of Watkins and Biscoe Island)	SW								
Bayard Islands (off west coast, Graham Land)	NW								
Beak Island, Pr. Gustav Channel	NE								
Bellingshausen STATION, King George Island	SH					9	15	966	16
Bennett Islands, Hanusse Bay	SW								
Bernardo O'Higgins STATION	NW								
Biscoe Point, Anvers Is. (ASPA)	NW								
Blaicklock Island (off w. coast Graham Land)	SW								
Bongrain Pt., Pourquoi Pas Island	SW								
Booth Is.	SW								
Bradbrooke Island, Aitcho Islands	SH								
Brandy Bay, James Ross Is.	NE								
Brown Bluff, Tabarin Peninsula	NE								
Bryde Island (west coast Graham land)	NW								
Buls Bay, Brabant Is.	NW								
Camara STATION, Half Moon Island,	SH								
Camp Hill	NE								
Camp Point (w. side, Graham Land)	SW								
Cape Burd, Tabarin Peninsula	NE								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		92-93 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	93-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Adelaide Island	SW								
Admiralty Bay, KGI	SH								
Admiralty Sound (between Seymour & Snow Hill Island)	NE								
Aitcho Islands	SH	7	18	601	14	3		271	
Akademic Vernadsky (ex-Faraday) STATION, Argentine Islands	SW	3		274		2		178	
Alamode Is., Terra Firma Islands	SW								
Alcock Island	NW					1		14	
Almirante Brown STATION, Paradise Bay	NW	19	7	1,659	5	31	3	3,513	2
Alpha Is., Melchior Islands	NW								
Amphibolite Point, Coronation Islands	SO								
Andvord Bay	NW								
Anvers Island (nonspecific)	NW								
Apendice Is. (not Stemeck Is.)	SW								
Arago Glacier, Andvord Bay	NW	6	22	251					
Arctowski STATION, King George Island	SH	10	12	598	15	30	5	3,031	6
Ardley Island	SH	1		113		1		175	
Argentine Islands (nonspecific)	SW								
Armstrong Reef, Renaud Is.	SW								
Artigas STATION, King George Island	SH								
Arturo Prat STATION, Greenwich Island	SH								
Astrolabe Island	NW	1		34		3		93	
Auguste Island, Gerlache Str.	NW								
Auster Point, Trinity Peninsula	NW								
Baily Head (incl. Rancho Point), Deception Island	SH	10	11	657	13	9	18	990	18
Bald Head, Trinity Peninsula	NE								
Barcroft Islands (so. of Watkins and Biscoe Island)	SW								
Bayard Islands (off west coast, Graham Land)	NW								
Beak Island, Pr. Gustav Channel	NE								
Bellingshausen STATION, King George Island	SH	1		62		1		88	
Bennett Islands, Hanusse Bay	SW								
Bernardo O'Higgins STATION	NW								
Biscoe Point, Anvers Is. (ASPA)	NW								
Blaicklock Island (off w. coast Graham Land)	SW								
Bongrain Pt., Pourquoi Pas Island	SW								
Booth Is.	SW								
Bradbrooke Island, Aitcho Islands	SH								
Brandy Bay, James Ross Is.	NE								
Brown Bluff, Tabarin Peninsula	NE								
Bryde Island (west coast Graham land)	NW								
Buls Bay, Brabant Is.	NW								
Camara STATION, Half Moon Island,	SH								
Camp Hill	NE								
Camp Point (w. side, Graham Land)	SW								
Cape Burd, Tabarin Peninsula	NE								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		94-95 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	95-96 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Adelaide Island	SW								
Admiralty Bay, KGI	SH								
Admiralty Sound (between Seymour & Snow Hill Island)	NE								
Aitcho Islands	SH	10	18	667	20	23	11	1,759	13
Akademic Vernadsky (ex-Faraday) STATION, Argentine Islands	SW	4		267		5		209	
Alamode Is., Terra Firma Islands	SW								
Alcock Island	NW								
Almirante Brown STATION, Paradise Bay	NW	43	4	1,307	13	25	10	2,244	11
Alpha Is., Melchior Islands	NW								
Amphibolite Point, Coronation Islands	SO								
Andvord Bay	NW								
Anvers Island (nonspecific)	NW								
Apendice Is. (not Stemeck Is.)	SW								
Arago Glacier, Andvord Bay	NW								
Arctowski STATION, King George Island	SH	31	9	2,445	9	21	14	1,724	14
Ardley Island	SH	2		149					
Argentine Islands (nonspecific)	SW								
Armstrong Reef, Renaud Is.	SW								
Artigas STATION, King George Island	SH	3		212					
Arturo Prat STATION, Greenwich Island	SH	1		112		1		66	
Astrolabe Island	NW	4		211		2		69	
Auguste Island, Gerlache Str.	NW								
Auster Point, Trinity Peninsula	NW								
Baily Head (incl. Rancho Point), Deception Island	SH	32	8	2,576	8	19	16	1,094	18
Bald Head, Trinity Peninsula	NE								
Barcroft Islands (so. of Watkins and Biscoe Island)	SW	1		83					
Bayard Islands (off west coast, Graham Land)	NW								
Beak Island, Pr. Gustav Channel	NE								
Bellingshausen STATION, King George Island	SH	8	23	573	22	10	22	530	
Bennett Islands, Hanusse Bay	SW								
Bernardo O'Higgins STATION	NW								
Biscoe Point, Anvers Is. (ASPA)	NW								
Blaicklock Island (off w. coast Graham Land)	SW	1		9					
Bongrain Pt., Pourquoi Pas Island	SW								
Booth Is.	SW								
Bradbrooke Island, Aitcho Islands	SH	1		136					
Brandy Bay, James Ross Is.	NE								
Brown Bluff, Tabarin Peninsula	NE	2		77		4		223	
Bryde Island (west coast Graham land)	NW								
Buls Bay, Brabant Is.	NW								
Camara STATION, Half Moon Island,	SH	1		96					
Camp Hill	NE								
Camp Point (w. side, Graham Land)	SW								
Cape Burd, Tabarin Peninsula	NE								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		96-97 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	97-98 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Adelaide Island	SW					1		57	
Admiralty Bay, KGI	SH								
Admiralty Sound (between Seymour & Snow Hill Island)	NE	3		185					
Aitcho Islands	SH	37	7	2,341	10	31	9	2,499	10
Akademic Vernadsky (ex-Faraday) STATION, Argentine Islands	SW	6		369		19	12	1,094	17
Alamode Is., Terra Firma Islands	SW								
Alcock Island	NW								
Almirante Brown STATION, Paradise Bay	NW	38	6	2,504	8	34	6	3,991	5
Alpha Is., Melchior Islands	NW								
Amphibolite Point, Coronation Islands	SO								
Andvord Bay	NW								
Anvers Island (nonspecific)	NW								
Apendice Is. (not Stemeck Is.)	SW								
Arago Glacier, Andvord Bay	NW								
Arctowski STATION, King George Island	SH	22	13	1,789	13	11	18	1,014	18
Ardley Island	SH	1		55					
Argentine Islands (nonspecific)	SW	1		112					
Armstrong Reef, Renaud Is.	SW								
Artigas STATION, King George Island	SH					1		7	
Arturo Prat STATION, Greenwich Island	SH	3		224		3		267	
Astrolabe Island	NW	2		105		1		53	
Auguste Island, Gerlache Str.	NW					1		55	
Auster Point, Trinity Peninsula	NW								
Baily Head (incl. Rancho Point), Deception Island	SH	14	15	1,133	15	20	11	1,493	12
Bald Head, Trinity Peninsula	NE								
Barcroft Islands (so. of Watkins and Biscoe Island)	SW								
Bayard Islands (off west coast, Graham Land)	NW								
Beak Island, Pr. Gustav Channel	NE								
Bellingshausen STATION, King George Island	SH	6		138		11	19	146	
Bennett Islands, Hanusse Bay	SW					1		56	
Bernardo O'Higgins STATION	NW	1		95					
Biscoe Point, Anvers Is. (ASPA)	NW								
Blaicklock Island (off w. coast Graham Land)	SW								
Bongrain Pt., Pourquoi Pas Island	SW					1		80	
Booth Is.	SW								
Bradbrooke Island, Aitcho Islands	SH								
Brandy Bay, James Ross Is.	NE								
Brown Bluff, Tabarin Peninsula	NE	9	20	553	25	17	13	1,293	15
Bryde Island (west coast Graham land)	NW								
Buls Bay, Brabant Is.	NW					1		56	
Camara STATION, Half Moon Island,	SH	5		672	22	2		395	
Camp Hill	NE								
Camp Point (w. side, Graham Land)	SW	1		78					
Cape Burd, Tabarin Peninsula	NE								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		98-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Adelaide Island	SW					3		240	
Admiralty Bay, KGI	SH								
Admiralty Sound (between Seymour & Snow Hill Island)	NE					3		185	
Aitcho Islands	SH	31	10	2,525	11	147	14	11,219	13
Akademic Vernadsky (ex-Faraday) STATION, Argentine Islands	SW	22	11	1,626	14	72	20	5,123	24
Alamode Is., Terra Firma Islands	SW								
Alcock Island	NW					2		92	
Almirante Brown STATION, Paradise Bay	NW	17	15	1,612	15	259	8	22,381	8
Alpha Is., Melchior Islands	NW								
Amphibolite Point, Coronation Islands	SO								
Andvord Bay	NW								
Anvers Island (nonspecific)	NW								
Apendice Is. (not Stemeck Is.)	SW								
Arago Glacier, Andvord Bay	NW					6		251	
Arctowski STATION, King George Island	SH	13	20	1,109	18	166	10	14,750	11
Ardley Island	SH	1		8		12		1,623	
Argentine Islands (nonspecific)	SW	1		59		2		171	
Armstrong Reef, Renaud Is.	SW								
Artigas STATION, King George Island	SH	2		181		6		400	
Arturo Prat STATION, Greenwich Island	SH					10		850	
Astrolabe Island	NW					13		565	
Auguste Island, Gerlache Str.	NW					1		55	
Auster Point, Trinity Peninsula	NW								
Baily Head (incl. Rancho Point), Deception Island	SH	20	13	2,012	12	149	12	12,176	12
Bald Head, Trinity Peninsula	NE								
Barcroft Islands (so. of Watkins and Biscoe Island)	SW	1		95		2		178	
Bayard Islands (off west coast, Graham Land)	NW	1		57		1		57	
Beak Island, Pr. Gustav Channel	NE	1		51		1		51	
Bellingshausen STATION, King George Island	SH	5		305		51		2,808	
Bennett Islands, Hanusse Bay	SW					1		56	
Bernardo O'Higgins STATION	NW					1		95	
Biscoe Point, Anvers Is. (ASPA)	NW								
Blaicklock Island (off w. coast Graham Land)	SW					1		9	
Bongrain Pt., Pourquoi Pas Island	SW					1		80	
Booth Is.	SW								
Bradbrooke Island, Aitcho Islands	SH					1		136	
Brandy Bay, James Ross Is.	NE								
Brown Bluff, Tabarin Peninsula	NE	14	19	996	23	46		3,142	
Bryde Island (west coast Graham land)	NW	1		17		1		17	
Buls Bay, Brabant Is.	NW					1		56	
Camara STATION, Half Moon Island,	SH					8		1,163	
Camp Hill	NE								
Camp Point (w. side, Graham Land)	SW					1		78	
Cape Burd, Tabarin Peninsula	NE								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		89-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	94-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Adelaide Island	SW	2		183		1		57	
Admiralty Bay, KGI	SH								
Admiralty Sound (between Seymour & Snow Hill Island)	NE					3		185	
Aitcho Islands	SH	15	26	1,428		132	11	9,791	11
Akademic Vernadsky (ex-Faraday) STATION, Argentine Islands	SW	16	23	1,558	24	56	18	3,565	22
Alamode Is., Terra Firma Islands	SW								
Alcock Island	NW	2		92					
Almirante Brown STATION, Paradise Bay	NW	102	2	10,723	3	157	8	11,658	9
Alpha Is., Melchior Islands	NW								
Amphibolite Point, Coronation Islands	SO								
Andvord Bay	NW								
Anvers Island (nonspecific)	NW								
Apendice Is. (not Stemeck Is.)	SW								
Arago Glacier, Andvord Bay	NW	6		251					
Arctowski STATION, King George Island	SH	68	10	6,669	9	98	13	8,081	14
Ardley Island	SH	8		1,411		4		212	
Argentine Islands (nonspecific)	SW					2		171	
Armstrong Reef, Renaud Is.	SW								
Artigas STATION, King George Island	SH					6		400	
Arturo Prat STATION, Greenwich Island	SH	2		181		8		669	
Astrolabe Island	NW	4		127		9		438	
Auguste Island, Gerlache Str.	NW					1		55	
Auster Point, Trinity Peninsula	NW								
Baily Head (incl. Rancho Point), Deception Island	SH	44	13	3,868	14	105	12	8,308	13
Bald Head, Trinity Peninsula	NE								
Barcroft Islands (so. of Watkins and Biscoe Island)	SW					2		178	
Bayard Islands (off west coast, Graham Land)	NW					1		57	
Beak Island, Pr. Gustav Channel	NE					1		51	
Bellingshausen STATION, King George Island	SH	11		1,116		40	23	1,692	
Bennett Islands, Hanusse Bay	SW					1		56	
Bernardo O'Higgins STATION	NW					1		95	
Biscoe Point, Anvers Is. (ASPA)	NW								
Blaicklock Island (off w. coast Graham Land)	SW					1		9	
Bongrain Pt., Pourquoi Pas Island	SW					1		80	
Booth Is.	SW								
Bradbrooke Island, Aitcho Islands	SH					1		136	
Brandy Bay, James Ross Is.	NE								
Brown Bluff, Tabarin Peninsula	NE					46	22	3,142	23
Bryde Island (west coast Graham land)	NW					1		17	
Buls Bay, Brabant Is.	NW					1		56	
Camara STATION, Half Moon Island,	SH					8		1,163	
Camp Hill	NE								
Camp Point (w. side, Graham Land)	SW					1		78	
Cape Burd, Tabarin Peninsula	NE								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		99-00 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	00-01 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	
Adelaide Island	SW	1				1		107	
Admiralty Bay, KGI	SH								
Admiralty Sound (between Seymour & Snow Hill Island)	NE								
Aitcho Islands	SH	42	10	3,454	8	38	9	3,285	11
Akademic Vernadsky (ex-Faraday) STATION, Argentine Islands	SW	23	15	1,585	17	37	10	2,811	12
Alamode Is., Terra Firma Islands	SW					1		6	
Alcock Island	NW	2		86		1		64	
Almirante Brown STATION, Paradise Bay	NW	35	11	3,369	9	41	8	4,445	7
Alpha Is., Melchior Islands	NW								
Amphibolite Point, Coronation Islands	SO								
Andvord Bay	NW					1		20	
Anvers Island (nonspecific)	NW					1		6	
Apendice Is. (not Stemeck Is.)	SW								
Arago Glacier, Andvord Bay	NW								
Arctowski STATION, King George Island	SH	22	16	1,901	14	7		688	
Ardley Island	SH								
Argentine Islands (nonspecific)	SW					1		63	
Armstrong Reef, Renaud Is.	SW					1		6	
Artigas STATION, King George Island	SH	2		147					
Arturo Prat STATION, Greenwich Island	SH	4		358		1		107	
Astrolabe Island	NW	5		288		2		54	
Auguste Island, Gerlache Str.	NW								
Auster Point, Trinity Peninsula	NW					1		413	
Baily Head (incl. Rancho Point), Deception Island	SH	31	12	2,595	11	21	15	1,091	19
Bald Head, Trinity Peninsula	NE	3		326		1		98	
Barcroft Islands (so. of Watkins and Biscoe Island)	SW								
Bayard Islands (off west coast, Graham Land)	NW								
Beak Island, Pr. Gustav Channel	NE	2		107		1		57	
Bellingshausen STATION, King George Island	SH	5		256					
Bennett Islands, Hanusse Bay	SW					4		317	
Bernardo O'Higgins STATION	NW								
Biscoe Point, Anvers Is. (ASPA)	NW	1		64					
Blaicklock Island (off w. coast Graham Land)	SW					1		89	
Bongrain Pt., Pourquoi Pas Island	SW								
Booth Is.	SW	1		50		5		333	
Bradbrooke Island, Aitcho Islands	SH								
Brandy Bay, James Ross Is.	NE								
Brown Bluff, Tabarin Peninsula	NE	29	13	1,959	13	29	13	2,507	14
Bryde Island (west coast Graham land)	NW								
Buls Bay, Brabant Is.	NW								
Camara STATION, Half Moon Island,	SH								
Camp Hill	NE								
Camp Point (w. side, Graham Land)	SW								
Cape Burd, Tabarin Peninsula	NE					1		107	

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		01-02 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	02-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Adelaide Island	SW								
Admiralty Bay, KGI	SH	1		97		1		46	
Admiralty Sound (between Seymour & Snow Hill Island)	NE								
Aitcho Islands	SH	27	11	2,396	11	44	9	3,566	10
Akademic Vernadsky (ex-Faraday) STATION, Argentine Islands	SW	3		219		8		457	
Alamode Is., Terra Firma Islands	SW								
Alcock Island	NW	1		54		1		113	
Almirante Brown STATION, Paradise Bay	NW	14	17	1,249	17	62	6	6,556	4
Alpha Is., Melchior Islands	NW	1		8					
Amphibolite Point, Coronation Islands	SO	1		109					
Andvord Bay	NW								
Anvers Island (nonspecific)	NW								
Apendice Is. (not Stemeck Is.)	SW					1		4	
Arago Glacier, Andvord Bay	NW								
Arctowski STATION, King George Island	SH	9		655		12	25	1,766	20
Ardley Island	SH	1		173					
Argentine Islands (nonspecific)	SW					31	13	2,327	14
Armstrong Reef, Renaud Is.	SW								
Artigas STATION, King George Island	SH								
Arturo Prat STATION, Greenwich Island	SH					3		204	
Astrolabe Island	NW	1		55		1		62	
Auguste Island, Gerlache Str.	NW								
Auster Point, Trinity Peninsula	NW								
Baily Head (incl. Rancho Point), Deception Island	SH	19	12	1,510	14	27	14	2,319	15
Bald Head, Trinity Peninsula	NE	2		264					
Barcroft Islands (so. of Watkins and Biscoe Island)	SW								
Bayard Islands (off west coast, Graham Land)	NW								
Beak Island, Pr. Gustav Channel	NE					1		44	
Bellingshausen STATION, King George Island	SH	7		640		2		63	
Bennett Islands, Hanusse Bay	SW								
Bernardo O'Higgins STATION	NW								
Biscoe Point, Anvers Is. (ASPA)	NW								
Blaicklock Island (off w. coast Graham Land)	SW								
Bongrain Pt., Pourquoi Pas Island	SW								
Booth Is.	SW	2		176					
Bradbrooke Island, Aitcho Islands	SH								
Brandy Bay, James Ross Is.	NE	1		59					
Brown Bluff, Tabarin Peninsula	NE	28	10	2,386	12	31	12	2,534	12
Bryde Island (west coast Graham land)	NW								
Buls Bay, Brabant Is.	NW								
Camara STATION, Half Moon Island,	SH								
Camp Hill	NE					1		100	
Camp Point (w. side, Graham Land)	SW								
Cape Burd, Tabarin Peninsula	NE								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		99-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Adelaide Island	SW	2		107		5		347	
Admiralty Bay, KGI	SH	2		143		2		143	
Admiralty Sound (between Seymour & Snow Hill Island)	NE					3		185	
Aitcho Islands	SH	151	11	12,701	12	298	11	23,920	12
Akademic Vernadsky (ex-Faraday) STATION, Argentine Islands	SW	71	15	5,072	17	143	20	10,195	22
Alamode Is., Terra Firma Islands	SW	1		6		1		6	
Alcock Island	NW	5		317		7		409	
Almirante Brown STATION, Paradise Bay	NW	152	10	15,619	9	411	8	38,000	7
Alpha Is., Melchior Islands	NW	1		8		1		8	
Amphibolite Point, Coronation Islands	SO	1		109		1		109	
Andvord Bay	NW	1		20		1		20	
Anvers Island (nonspecific)	NW	1		6		1		6	
Apendice Is. (not Stemeck Is.)	SW	1		4		1		4	
Arago Glacier, Andvord Bay	NW					6		251	
Arctowski STATION, King George Island	SH	50	22	5,010	18	216	13	19,760	13
Ardley Island	SH	1		173		13		1,796	
Argentine Islands (nonspecific)	SW	32		2,390		34		2,561	
Armstrong Reef, Renaud Is.	SW	1		6		1		6	
Artigas STATION, King George Island	SH	2		147		8		547	
Arturo Prat STATION, Greenwich Island	SH	8		669		18		1,519	
Astrolabe Island	NW	9		459		22		1,024	
Auguste Island, Gerlache Str.	NW					1		55	
Auster Point, Trinity Peninsula	NW	1		413		1		413	
Baily Head (incl. Rancho Point), Deception Island	SH	98	14	7,515	15	247	12	19,691	14
Bald Head, Trinity Peninsula	NE	6		688		6		688	
Barcroft Islands (so. of Watkins and Biscoe Island)	SW					2		178	
Bayard Islands (off west coast, Graham Land)	NW					1		57	
Beak Island, Pr. Gustav Channel	NE	4		208		5		259	
Bellingshausen STATION, King George Island	SH	14		959		65		3,767	
Bennett Islands, Hanusse Bay	SW	4		317		5		373	
Bernardo O'Higgins STATION	NW					1		95	
Biscoe Point, Anvers Is. (ASPA)	NW	1		64		1		64	
Blaicklock Island (off w. coast Graham Land)	SW	1		89		2		98	
Bongrain Pt., Pourquoi Pas Island	SW					1		80	
Booth Is.	SW	8		559		8		559	
Bradbrooke Island, Aitcho Islands	SH					1		136	
Brandy Bay, James Ross Is.	NE	1		59		1		59	
Brown Bluff, Tabarin Peninsula	NE	117	13	9,386	14	163	17	12,528	19
Bryde Island (west coast Graham land)	NW					1		17	
Buls Bay, Brabant Is.	NW					1		56	
Camara STATION, Half Moon Island,	SH					8		1,163	
Camp Hill	NE	1		100		1		100	
Camp Point (w. side, Graham Land)	SW					1		78	
Cape Burd, Tabarin Peninsula	NE	1		107		1		107	

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE				1st Landing	89-90 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Cape Dundas, Laurie Island, So. Orkneys	SO		ZOD	94-95				
Cape Gage, James Ross Island	NE		ZOD	94-95				
Cape Lachman, James Ross Island	NE		ZOD	98-99				
Cape Melville, King George Island	SH		ZOD	92-93				
Cape Renard, Flandres Bay	SW		ZOD	98-99				
Cape Shirreff, Livingston Is. (CEMP site)	SH		ZOD	00-01				
Cape Tuxen (w. coast Graham Land)	SW		ZOD	93-94				
Cape Valentine, Elephant Island	EI		ZOD	92-93				
Cecilia Is., Aitcho Islands	SH		ZOD	00-01				
Challenger Island (off w. coast Graham Land)	NW		ZOD	93-94				
Chang Chen (Great Wall) STATION, King George Island	SH	ST	ZOD	91-92				
Charlotte Bay (nonspecific)	NW	NS	ZOD ICE	95-96				
Christiana Islands	NW		ZOD	97-98				
Cierva Cove	NW		ZOD	92-93				
Clothier Harbor, Robert Is.	SH		ZOD	02-03				
Comb Ridge, James Ross Island	NE		ZOD	96-97				
Conception Point, Coronation Is.	SO		ZOD	02-03				
Cormorant Island (vic. Anvers Island)	NW		ZOD	91-92				
Coronation Island, So. Orkneys (nonspecific)	SO	NS	ZOD	90-91				
Crystal Hill, Trinity Peninsula	NE	ASI	ZOD	95-96				
Crystal Sound, Pendelton Strait	SW		ZOD	96-97				
Curtiss Bay, (west coast Graham Land)	NW		ZOD	95-96				
Cuverville Island	NW	ASI	ZOD SNO CAM	89-90	8	7	883	7
Dalgleish Bay, Pourquoi Pas Is.	SW		ZOD	00-01				
Damoy Point (incl. Dorian Bay), Wiencke Island	NW	ASI	ZOD CAM CLI	94-95				
Danco Island, w. coast Graham Land	NW	ASI	ZOD SNO CAM	93-94				
Danger Islands (nonspecific)	NE	NS	ZOD	96-97				
Deception Island (nonspecific)	SH	NS	ZOD	95-96				
Desolation Is.	SH		ZOD	00-01				
Detaille Island	SW	ASI	ZOD CAM	89-90	1		94	
Devil Island	NE	ASI	ZOD	95-96				
Doumer Is. (nonspecific)	NW	NS	ZOD	02-03				
Dream Is. (SSSI Arthur Harbor	NW		ZOD	00-01				
Dundee Is. (nonspecific)	NE	NS	ZOD	99-00				
D'Urville Monument, Joinville Island	NE	ASI	ZOD	93-94				
Duthiers Pt., Graham Land	NW		ZOD	02-03				
Duthoit Point, Nelson Island	SH		ZOD	94-95				
Eagle Is.	NE	ASI	ZOD	02-03				
Elephant Island (nonspecific)	EI	NS	ZOD	94-95				
Enterprise Is. (nonspecific)	NW	NS	ZOD CAM	99-00				
Errera Channel, small peak (nonspecific)	NW	NS	ZOD HEL	95-96				
Ezcurra Inlet, Admiralty Bay, King George Island	SH		ZOD	93-94				
False Bay, Livingston Island	SH		ZOD	89-90	1		127	
False Island Pt., Vega Is.	NE	ASI	ZOD	02-03				
Ferraz STATION, King George Island	SH	ST ASI	ZOD	89-90	3	20	305	20
Fildes Peninsula (nonspecific)	SH	NS	ZOD	96-97				
Fish Islands (Perch Is.)	SW		ZOD	99-00				

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		90-91 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	91-92 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Cape Dundas, Laurie Island, So. Orkneys	SO								
Cape Gage, James Ross Island	NE								
Cape Lachman, James Ross Island	NE								
Cape Melville, King George Island	SH								
Cape Renard, Flandres Bay	SW								
Cape Shirreff, Livingston Is. (CEMP site)	SH								
Cape Tuxen (w. coast Graham Land)	SW								
Cape Valentine, Elephant Island	EI								
Cecilia Is., Aitcho Islands	SH								
Challenger Island (off w. coast Graham Land)	NW								
Chang Chen (Great Wall) STATION, King George Island	SH					1		84	
Charlotte Bay (nonspecific)	NW								
Christiana Islands	NW								
Cierva Cove	NW								
Clothier Harbor, Robert Is.	SH								
Comb Ridge, James Ross Island	NE								
Conception Point, Coronation Is.	SO								
Cormorant Island (vic. Anvers Island)	NW					1		125	
Coronation Island, So. Orkneys (nonspecific)	SO	2	22	185	22	2		370	24
Crystal Hill, Trinity Peninsula	NE								
Crystal Sound, Pendelton Strait	SW								
Curtiss Bay, (west coast Graham Land)	NW								
Cuverville Island	NW	8	8	936	9	21	4	2,565	5
Dalgleish Bay, Pourquoi Pas Is.	SW								
Damoy Point (incl. Dorian Bay), Wiencke Island	NW								
Danco Island, w. coast Graham Land	NW								
Danger Islands (nonspecific)	NE								
Deception Island (nonspecific)	SH								
Desolation Is.	SH								
Detaille Island	SW	2	20	195	20				
Devil Island	NE								
Doumer Is. (nonspecific)	NW								
Dream Is. (SSSI Arthur Harbor	NW								
Dundee Is. (nonspecific)	NE								
D'Urville Monument, Joinville Island	NE								
Duthiers Pt., Graham Land	NW								
Duthoit Point, Nelson Island	SH								
Eagle Is.	NE								
Elephant Island (nonspecific)	EI								
Enterprise Is. (nonspecific)	NW								
Errera Channel, small peak (nonspecific)	NW								
Ezcurra Inlet, Admiralty Bay, King George Island	SH								
False Bay, Livingston Island	SH								
False Island Pt., Vega Is.	NE								
Ferraz STATION, King George Island	SH	1		95		6	18	660	19
Fildes Peninsula (nonspecific)	SH								
Fish Islands (Perch Is.)	SW								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		92-93 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	93-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Cape Dundas, Laurie Island, So. Orkneys	SO								
Cape Gage, James Ross Island	NE								
Cape Lachman, James Ross Island	NE								
Cape Melville, King George Island	SH	1		58					
Cape Renard, Flandres Bay	SW								
Cape Shirreff, Livingston Is. (CEMP site)	SH								
Cape Tuxen (w. coast Graham Land)	SW					1		16	
Cape Valentine, Elephant Island	EI	1		28		1		118	
Cecilia Is., Aitcho Islands	SH								
Challenger Island (off w. coast Graham Land)	NW					1		27	
Chang Chen (Great Wall) STATION, King George Island	SH	1		62					
Charlotte Bay (nonspecific)	NW								
Christiana Islands	NW								
Cierva Cove	NW	1		38					
Clothier Harbor, Robert Is.	SH								
Comb Ridge, James Ross Island	NE								
Conception Point, Coronation Is.	SO								
Cormorant Island (vic. Anvers Island)	NW								
Coronation Island, So. Orkneys (nonspecific)	SO					1		176	
Crystal Hill, Trinity Peninsula	NE								
Crystal Sound, Pendelton Strait	SW								
Curtiss Bay, (west coast Graham Land)	NW								
Cuverville Island	NW	25	1	1,589	6	27	8	2,174	10
Dalgleish Bay, Pourquoi Pas Is.	SW								
Damoy Point (incl. Dorian Bay), Wiencke Island	NW								
Danco Island, w. coast Graham Land	NW					3		73	
Danger Islands (nonspecific)	NE								
Deception Island (nonspecific)	SH								
Desolation Is.	SH								
Detaille Island	SW	3		278	25				
Devil Island	NE								
Doumer Is. (nonspecific)	NW								
Dream Is. (SSSI Arthur Harbor	NW								
Dundee Is. (nonspecific)	NE								
D'Urville Monument, Joinville Island	NE					1		33	
Duthiers Pt., Graham Land	NW								
Duthoit Point, Nelson Island	SH								
Eagle Is.	NE								
Elephant Island (nonspecific)	EI								
Enterprise Is. (nonspecific)	NW								
Errera Channel, small peak (nonspecific)	NW								
Ezcurra Inlet, Admiralty Bay, King George Island	SH					1		36	
False Bay, Livingston Island	SH								
False Island Pt., Vega Is.	NE								
Ferraz STATION, King George Island	SH	2		187		12	14	1,135	15
Fildes Peninsula (nonspecific)	SH								
Fish Islands (Perch Is.)	SW								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		94-95 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	95-96 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Cape Dundas, Laurie Island, So. Orkneys	SO	1		138					
Cape Gage, James Ross Island	NE	1		86		1		72	
Cape Lachman, James Ross Island	NE								
Cape Melville, King George Island	SH								
Cape Renard, Flandres Bay	SW								
Cape Shirreff, Livingston Is. (CEMP site)	SH								
Cape Tuxen (w. coast Graham Land)	SW	1		30					
Cape Valentine, Elephant Island	EI								
Cecilia Is., Aitcho Islands	SH								
Challenger Island (off w. coast Graham Land)	NW								
Chang Chen (Great Wall) STATION, King George Island	SH					1		60	
Charlotte Bay (nonspecific)	NW					4		349	
Christiana Islands	NW								
Cierva Cove	NW								
Clothier Harbor, Robert Is.	SH								
Comb Ridge, James Ross Island	NE								
Conception Point, Coronation Is.	SO								
Cormorant Island (vic. Anvers Island)	NW								
Coronation Island, So. Orkneys (nonspecific)	SO	1		108					
Crystal Hill, Trinity Peninsula	NE					4		352	
Crystal Sound, Pendelton Strait	SW								
Curtiss Bay, (west coast Graham Land)	NW					2		72	
Cuverville Island	NW	47	2	3,367	4	59	2	4,343	3
Dalgleish Bay, Pourquoi Pas Is.	SW								
Damoy Point (incl. Dorian Bay), Wiencke Island	NW	3		321		6		597	22
Danco Island, w. coast Graham Land	NW	4		276		13	21	560	23
Danger Islands (nonspecific)	NE								
Deception Island (nonspecific)	SH					9	24	557	24
Desolation Is.	SH								
Detaille Island	SW	2		236					
Devil Island	NE					4		352	
Doumer Is. (nonspecific)	NW								
Dream Is. (SSSI Arthur Harbor	NW								
Dundee Is. (nonspecific)	NE								
D'Urville Monument, Joinville Island	NE								
Duthiers Pt., Graham Land	NW								
Duthoit Point, Nelson Island	SH	1		135		1		109	
Eagle Is.	NE								
Elephant Island (nonspecific)	EI	3		259					
Enterprise Is. (nonspecific)	NW								
Errera Channel, small peak (nonspecific)	NW					1		15	
Ezcurra Inlet, Admiralty Bay, King George Island	SH								
False Bay, Livingston Island	SH								
False Island Pt., Vega Is.	NE								
Ferraz STATION, King George Island	SH	10	16	930	16	4		321	
Fildes Peninsula (nonspecific)	SH								
Fish Islands (Perch Is.)	SW								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		96-97 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	97-98 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Cape Dundas, Laurie Island, So. Orkneys	SO								
Cape Gage, James Ross Island	NE								
Cape Lachman, James Ross Island	NE								
Cape Melville, King George Island	SH								
Cape Renard, Flandres Bay	SW								
Cape Shirreff, Livingston Is. (CEMP site)	SH								
Cape Tuxen (w. coast Graham Land)	SW								
Cape Valentine, Elephant Island	EI								
Cecilia Is., Aitcho Islands	SH								
Challenger Island (off w. coast Graham Land)	NW								
Chang Chen (Great Wall) STATION, King George Island	SH								
Charlotte Bay (nonspecific)	NW	1		92					
Christiana Islands	NW					1		54	
Cierva Cove	NW	3		272		2		176	
Clothier Harbor, Robert Is.	SH								
Comb Ridge, James Ross Island	NE	1		31					
Conception Point, Coronation Is.	SO								
Cormorant Island (vic. Anvers Island)	NW								
Coronation Island, So. Orkneys (nonspecific)	SO								
Crystal Hill, Trinity Peninsula	NE	2		165					
Crystal Sound, Pendelton Strait	SW	2		290					
Curtiss Bay, (west coast Graham Land)	NW	2		65		1		57	
Cuverville Island	NW	56	2	3,714	1	53	3	4,143	4
Dalgleish Bay, Pourquoi Pas Is.	SW								
Damoy Point (incl. Dorian Bay), Wiencke Island	NW	1		92		7	28	477	
Danco Island, w. coast Graham Land	NW	5		314		6		380	
Danger Islands (nonspecific)	NE	7	27	240					
Deception Island (nonspecific)	SH	9	21	634	24	4		236	
Desolation Is.	SH								
Detaille Island	SW	1		108		4		413	
Devil Island	NE	9	22	657	23	1		2	
Doumer Is. (nonspecific)	NW								
Dream Is. (SSSI Arthur Harbor	NW								
Dundee Is. (nonspecific)	NE								
D'Urville Monument, Joinville Island	NE					1		74	
Duthiers Pt., Graham Land	NW								
Duthoit Point, Nelson Island	SH								
Eagle Is.	NE								
Elephant Island (nonspecific)	EI	1		50		1		81	
Enterprise Is. (nonspecific)	NW								
Errera Channel, small peak (nonspecific)	NW								
Ezcurra Inlet, Admiralty Bay, King George Island	SH								
False Bay, Livingston Island	SH								
False Island Pt., Vega Is.	NE								
Ferraz STATION, King George Island	SH	3		183		5		693	24
Fildes Peninsula (nonspecific)	SH	1		85					
Fish Islands (Perch Is.)	SW								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		98-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Cape Dundas, Laurie Island, So. Orkneys	SO					1		138	
Cape Gage, James Ross Island	NE					2		158	
Cape Lachman, James Ross Island	NE	1		95		1		95	
Cape Melville, King George Island	SH					1		58	
Cape Renard, Flandres Bay	SW	1		70		1		70	
Cape Shirreff, Livingston Is. (CEMP site)	SH								
Cape Tuxen (w. coast Graham Land)	SW					2		46	
Cape Valentine, Elephant Island	EI					2		146	
Cecilia Is., Aitcho Islands	SH								
Challenger Island (off w. coast Graham Land)	NW					1		27	
Chang Chen (Great Wall) STATION, King George Island	SH					3		206	
Charlotte Bay (nonspecific)	NW	1		164		6		605	
Christiana Islands	NW	1		51		2		105	
Cierva Cove	NW	2		124		8		610	
Clothier Harbor, Robert Is.	SH								
Comb Ridge, James Ross Island	NE					1		31	
Conception Point, Coronation Is.	SO								
Cormorant Island (vic. Anvers Island)	NW					1		125	
Coronation Island, So. Orkneys (nonspecific)	SO	3		199		9		1,038	
Crystal Hill, Trinity Peninsula	NE	1		94		7		611	
Crystal Sound, Pendelton Strait	SW					2		290	
Curtiss Bay, (west coast Graham Land)	NW	1		56		6		250	
Cuverville Island	NW	55	3	4,087	4	359	2	27,801	4
Dalgleish Bay, Pourquoi Pas Is.	SW								
Damoy Point (incl. Dorian Bay), Wiencke Island	NW	8		553		25		2,040	
Danco Island, w. coast Graham Land	NW	6		343		37		1,946	
Danger Islands (nonspecific)	NE					7		240	
Deception Island (nonspecific)	SH	11	24	801	25	33		2,228	
Desolation Is.	SH								
Detaille Island	SW	3		244		16		1,568	
Devil Island	NE	3		285		17		1,296	
Doumer Is. (nonspecific)	NW								
Dream Is. (SSSI Arthur Harbor	NW								
Dundee Is. (nonspecific)	NE								
D'Urville Monument, Joinville Island	NE					2		107	
Duthiers Pt., Graham Land	NW								
Duthoit Point, Nelson Island	SH					2		244	
Eagle Is.	NE								
Elephant Island (nonspecific)	EI					5		390	
Enterprise Is. (nonspecific)	NW								
Errera Channel, small peak (nonspecific)	NW					1		15	
Ezcurra Inlet, Admiralty Bay, King George Island	SH					1		36	
False Bay, Livingston Island	SH					1		127	
False Island Pt., Vega Is.	NE								
Ferraz STATION, King George Island	SH	4		381		50		4,890	25
Fildes Peninsula (nonspecific)	SH					1		85	
Fish Islands (Perch Is.)	SW								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		89-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	94-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Cape Dundas, Laurie Island, So. Orkneys	SO					1		138	
Cape Gage, James Ross Island	NE					2		158	
Cape Lachman, James Ross Island	NE					1		95	
Cape Melville, King George Island	SH	1		58					
Cape Renard, Flandres Bay	SW					1		70	
Cape Shirreff, Livingston Is. (CEMP site)	SH								
Cape Tuxen (w. coast Graham Land)	SW	1		16		1		30	
Cape Valentine, Elephant Island	EI	2		146					
Cecilia Is., Aitcho Islands	SH								
Challenger Island (off w. coast Graham Land)	NW	1		27					
Chang Chen (Great Wall) STATION, King George Island	SH	2		146		1		60	
Charlotte Bay (nonspecific)	NW					6		605	
Christiana Islands	NW					2		105	
Cierva Cove	NW	1		38		7		572	
Clothier Harbor, Robert Is.	SH								
Comb Ridge, James Ross Island	NE					1		31	
Conception Point, Coronation Is.	SO								
Cormorant Island (vic. Anvers Island)	NW	1		125					
Coronation Island, So. Orkneys (nonspecific)	SO	5		731		4		307	
Crystal Hill, Trinity Peninsula	NE					7		611	
Crystal Sound, Pendelton Strait	SW					2		290	
Curtiss Bay, (west coast Graham Land)	NW					6		250	
Cuverville Island	NW	89	4	8,147	7	270	2	19,654	3
Dalgleish Bay, Pourquoi Pas Is.	SW								
Damoy Point (incl. Dorian Bay), Wiencke Island	NW					25		2,040	
Danco Island, w. coast Graham Land	NW	3		73		34		1,873	
Danger Islands (nonspecific)	NE					7		240	
Deception Island (nonspecific)	SH					33		2,228	
Desolation Is.	SH								
Detaille Island	SW	6		567		10		1,001	
Devil Island	NE					17		1,296	
Doumer Is. (nonspecific)	NW								
Dream Is. (SSSI Arthur Harbor	NW								
Dundee Is. (nonspecific)	NE								
D'Urville Monument, Joinville Island	NE	1		33		1		74	
Duthiers Pt., Graham Land	NW								
Duthoit Point, Nelson Island	SH					2		244	
Eagle Is.	NE								
Elephant Island (nonspecific)	EI					5		390	
Enterprise Is. (nonspecific)	NW								
Errera Channel, small peak (nonspecific)	NW					1		15	
Ezcurra Inlet, Admiralty Bay, King George Island	SH	1		36					
False Bay, Livingston Island	SH	1		127					
False Island Pt., Vega Is.	NE								
Ferraz STATION, King George Island	SH	24	17	2,382	19	26		2,508	
Fildes Peninsula (nonspecific)	SH					1		85	
Fish Islands (Perch Is.)	SW								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		99-00 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	00-01 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	
Cape Dundas, Laurie Island, So. Orkneys	SO	1		104					
Cape Gage, James Ross Island	NE								
Cape Lachman, James Ross Island	NE								
Cape Melville, King George Island	SH								
Cape Renard, Flandres Bay	SW	1		28					
Cape Shirreff, Livingston Is. (CEMP site)	SH					1		2	
Cape Tuxen (w. coast Graham Land)	SW					1		51	
Cape Valentine, Elephant Island	EI								
Cecilia Is., Aitcho Islands	SH					1		2	
Challenger Island (off w. coast Graham Land)	NW								
Chang Chen (Great Wall) STATION, King George Island	SH	1		90					
Charlotte Bay (nonspecific)	NW	1		41					
Christiana Islands	NW								
Cierva Cove	NW	2		183		1		125	
Clothier Harbor, Robert Is.	SH								
Comb Ridge, James Ross Island	NE								
Conception Point, Coronation Is.	SO								
Cormorant Island (vic. Anvers Island)	NW								
Coronation Island, So. Orkneys (nonspecific)	SO								
Crystal Hill, Trinity Peninsula	NE	6		526					
Crystal Sound, Pendelton Strait	SW	1		128					
Curtiss Bay, (west coast Graham Land)	NW	2		109					
Cuverville Island	NW	63	3	4,908	4	56	4	5,615	4
Dalgleish Bay, Pourquoi Pas Is.	SW					2		149	
Damoy Point (incl. Dorian Bay), Wiencke Island	NW	13	23	1,247	22	16	18	805	25
Danco Island, w. coast Graham Land	NW	14	20	993		4		120	
Danger Islands (nonspecific)	NE								
Deception Island (nonspecific)	SH	1		117		6		613	
Desolation Is.	SH					1		55	
Detaille Island	SW	1		5		5		478	
Devil Island	NE	14	21	1,270	21	2		195	
Doumer Is. (nonspecific)	NW								
Dream Is. (SSSI Arthur Harbor	NW					1		56	
Dundee Is. (nonspecific)	NE	1		42					
D'Urville Monument, Joinville Island	NE								
Duthiers Pt., Graham Land	NW								
Duthoit Point, Nelson Island	SH								
Eagle Is.	NE								
Elephant Island (nonspecific)	EI								
Enterprise Is. (nonspecific)	NW	4		186		1		5	
Errera Channel, small peak (nonspecific)	NW								
Ezcurra Inlet, Admiralty Bay, King George Island	SH	1		39					
False Bay, Livingston Island	SH								
False Island Pt., Vega Is.	NE								
Ferraz STATION, King George Island	SH	5		387		1		27	
Fildes Peninsula (nonspecific)	SH								
Fish Islands (Perch Is.)	SW	1		34					

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		01-02 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	02-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Cape Dundas, Laurie Island, So. Orkneys	SO								
Cape Gage, James Ross Island	NE								
Cape Lachman, James Ross Island	NE								
Cape Melville, King George Island	SH								
Cape Renard, Flandres Bay	SW								
Cape Shirreff, Livingston Is. (CEMP site)	SH								
Cape Tuxen (w. coast Graham Land)	SW								
Cape Valentine, Elephant Island	EI								
Cecilia Is., Aitcho Islands	SH								
Challenger Island (off w. coast Graham Land)	NW								
Chang Chen (Great Wall) STATION, King George Island	SH	1		162					
Charlotte Bay (nonspecific)	NW	1		123					
Christiana Islands	NW								
Cierva Cove	NW	2		202					
Clothier Harbor, Robert Is.	SH					1		6	
Comb Ridge, James Ross Island	NE								
Conception Point, Coronation Is.	SO					1		111	
Cormorant Island (vic. Anvers Island)	NW								
Coronation Island, So. Orkneys (nonspecific)	SO					1		146	
Crystal Hill, Trinity Peninsula	NE					1		53	
Crystal Sound, Pendelton Strait	SW								
Curtiss Bay, (west coast Graham Land)	NW					2		177	
Cuverville Island	NW	53	3	4,115	7	54	7	4,749	8
Dalgleish Bay, Pourquoi Pas Is.	SW								
Damoy Point (incl. Dorian Bay), Wiencke Island	NW	10	27	737		19	18	1,884	19
Danco Island, w. coast Graham Land	NW	13	18	996	22	13	24	806	
Danger Islands (nonspecific)	NE					1		54	
Deception Island (nonspecific)	SH					1		41	
Desolation Is.	SH								
Detaille Island	SW					7		858	
Devil Island	NE	12	22	1,249	18	12	27	954	
Doumer Is. (nonspecific)	NW					2		9	
Dream Is. (SSSI Arthur Harbor	NW								
Dundee Is. (nonspecific)	NE								
D'Urville Monument, Joinville Island	NE								
Duthiers Pt., Graham Land	NW					1		46	
Duthoit Point, Nelson Island	SH								
Eagle Is.	NE					1		104	
Elephant Island (nonspecific)	EI	1		39					
Enterprise Is. (nonspecific)	NW	5		282		6		251	
Errera Channel, small peak (nonspecific)	NW								
Ezcurra Inlet, Admiralty Bay, King George Island	SH								
False Bay, Livingston Island	SH								
False Island Pt., Vega Is.	NE					1		98	
Ferraz STATION, King George Island	SH	1		102		3		228	
Fildes Peninsula (nonspecific)	SH	1		276		3		193	
Fish Islands (Perch Is.)	SW								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		99-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Cape Dundas, Laurie Island, So. Orkneys	SO	1		104		2		242	
Cape Gage, James Ross Island	NE					2		158	
Cape Lachman, James Ross Island	NE					1		95	
Cape Melville, King George Island	SH					1		58	
Cape Renard, Flandres Bay	SW	1		28		2		98	
Cape Shirreff, Livingston Is. (CEMP site)	SH	1		2		1		2	
Cape Tuxen (w. coast Graham Land)	SW	1		51		3		97	
Cape Valentine, Elephant Island	EI					2		146	
Cecilia Is., Aitcho Islands	SH	1		2		1		2	
Challenger Island (off w. coast Graham Land)	NW					1		27	
Chang Chen (Great Wall) STATION, King George Island	SH	2		252		5		458	
Charlotte Bay (nonspecific)	NW	2		164		8		769	
Christiana Islands	NW					2		105	
Cierva Cove	NW	5		510		13		1,120	
Clothier Harbor, Robert Is.	SH	1		6		1		6	
Comb Ridge, James Ross Island	NE					1		31	
Conception Point, Coronation Is.	SO	1		111		1		111	
Cormorant Island (vic. Anvers Island)	NW					1		125	
Coronation Island, So. Orkneys (nonspecific)	SO	1		146		10		1,184	
Crystal Hill, Trinity Peninsula	NE	7		579		14		1,190	
Crystal Sound, Pendelton Strait	SW	1		128		3		418	
Curtiss Bay, (west coast Graham Land)	NW	4		286		10		536	
Cuverville Island	NW	226	4	19,387	3	585	3	47,188	3
Dalgleish Bay, Pourquoi Pas Is.	SW	2		149		2		149	
Damoy Point (incl. Dorian Bay), Wiencke Island	NW	58	19	4,673	19	83		6,713	
Danco Island, w. coast Graham Land	NW	44	25	2,915		81		4,861	
Danger Islands (nonspecific)	NE	1		54		8		294	
Deception Island (nonspecific)	SH	8		771		41		2,999	
Desolation Is.	SH	1		55		1		55	
Detaille Island	SW	13		1,341		29		2,909	
Devil Island	NE	40		3,668	25	57		4,964	
Doumer Is. (nonspecific)	NW	2		9		2		9	
Dream Is. (SSSI Arthur Harbor	NW	1		56		1		56	
Dundee Is. (nonspecific)	NE	1		42		1		42	
D'Urville Monument, Joinville Island	NE					2		107	
Duthiers Pt., Graham Land	NW	1		46		1		46	
Duthoit Point, Nelson Island	SH					2		244	
Eagle Is.	NE	1		104		1		104	
Elephant Island (nonspecific)	EI	1		39		6		429	
Enterprise Is. (nonspecific)	NW	16		724		16		724	
Errera Channel, small peak (nonspecific)	NW					1		15	
Ezcurra Inlet, Admiralty Bay, King George Island	SH	1		39		2		75	
False Bay, Livingston Island	SH					1		127	
False Island Pt., Vega Is.	NE	1		98		1		98	
Ferraz STATION, King George Island	SH	10		744		60		5,634	
Fildes Peninsula (nonspecific)	SH	4		469		5		554	
Fish Islands (Perch Is.)	SW	1		34		1		34	

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE				1st Landing	89-90 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Fish Islands, west coast Graham Land (nonspecific)	SW	ASI NS	ZOD	93-94				
Fort Point, Greenwich Is	SH	ASI	ZOD	98-99				
Foyn Harbor	NW	ASI	ZOD	92-93				
Frei STATION/Marsh Base, King George Island	SH	ST	ZOD	89-90	6	13	621	12
Fridtjof Sound, Tabarin Peninsula	NE		HEL	00-01				
Fumarole Bay (Primero de Mayo Bay), Deception Island	SH		ZOD	91-92				
Gabriel de Dastilla STATION, Deception Island	SH	ST	ZOD	95-96				
Galindez Is., Argentine Islands	SW		ZOD	00-01				
Gallows Pt., Gamma Is., Melchior Islands	NW		ZOD	00-01				
Gaston Island (near tip, Reclus peninsula)	NW		ZOD	96-97				
Georges Point, Rongé Island (incl. landings listed for Rongé Island only)	NW	ASI	CAM	92-93				
Gibbon Bay, Coronation Is.	SO	ASI	ZOD	97-98				
Gibbs Island (nonspecific)	EI	NS	ZOD	97-98				
Gin Cove, James Ross Island	NE		ZOD	95-96				
Gosling Islands, So. Orkneys	SO		ZOD	93-94				
Goudier Island (restored UK Hut), off Jougla Pt., Port Lockroy (does NOT include LDGs listed for "Port Lockroy" and "Jougla Point")	NW		ZOD	95-96				
Gourdin Island	NW	ASI	ZOD	97-98				
Grandidier Channel (nonspecific)	SW	NS	ZOD	01-02				
Greenwich Is. (nonspecific)	SH	NS	ZOD	02-03				
Half Moon Island	SH	ST ASI	ZOD SNO	89-90	10	4	1,191	4
Hannah Point, Livingston Island	SH	ASI	ZOD	89-90	3	19	419	18
Hannah Pt. Vicinity — "Walker Bay" (nonspecific)	SH	NS	ZOD	00-01				
Hanusse Bay	SW		ZOD	90-91				
Heim Glacier, s.e. Arrowsmith Pen. (w. coast Graham Land)	SW		ZOD	94-95				
Heroína Island	NE	ASI	ZOD	96-97				
Heywood Island (vic. Robert Island)	SH		ZOD	92-93				
Holluschickie Bay, James Ross Island	NE		ZOD	96-97				
Hope Bay (Esperanza STATION)	NE	ST ASI	ZOD	89-90	1		145	
Hope Bay (Uruguayan Hut/STATION)	NE	ST	ZOD	97-98				
Horseshoe Island	SW		ZOD	97-98				
Hovgaard Island	SW		ZOD CAM	91-92				
Huemul Is.	NW		ZOD	00-01				
Hydrurga Rocks	NW	ASI	ZOD SNO	93-94				
Intercurrence Island (Gennady Cove), Christiana Islands	NW		ZOD	94-95				
Inverleith Harbor, Anvers Is.	NW		ZOD	99-00				
Jabet Peak, Wiencke Is.	NW		CLI	00-01				
James Ross Island (nonspecific)	NE	NS	ZOD	98-99				
Jansenn Peak, Wiencke Is.	NW		ZOD	02-03				
Jones Ice Shelf, Graham Land	SW		ZOD	02-03				
Joubin Islands	NW		ZOD	00-01				
Jougla Point, Port Lockroy, Wiencke Island (includes ldgs listed for "Port Lockroy" and "Jougla Point")	NW	ASI	ZOD SNO CAM	89-90	7	8	796	8
Jubany STATION, King George Island	SH	ST ASI	SNO	89-90	1		120	
Killermet Cove, Bryde Is.	NW		ZOD	02-03				
King George Island (nonspecific)	SH	NS	ZOD	95-96				

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		90-91 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	91-92 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Fish Islands, west coast Graham Land (nonspecific)	SW								
Fort Point, Greenwich Is	SH								
Foyn Harbor	NW								
Frei STATION/Marsh Base, King George Island	SH	4	15	596	15	8	16	1,162	15
Fridtjof Sound, Tabarin Peninsula	NE								
Fumarole Bay (Primero de Mayo Bay), Deception Island	SH					1		8	
Gabriel de Dastilla STATION, Deception Island	SH								
Galindez Is., Argentine Islands	SW								
Gallows Pt., Gamma Is., Melchior Islands	NW								
Gaston Island (near tip, Reclus peninsula)	NW								
Georges Point, Rongé Island (incl. landings listed for Rongé Island only)	NW								
Gibbon Bay, Coronation Is.	SO								
Gibbs Island (nonspecific)	EI								
Gin Cove, James Ross Island	NE								
Gosling Islands, So. Orkneys	SO								
Goudier Island (restored UK Hut), off Jougla Pt., Port Lockroy (does NOT include LDGs listed for "Port Lockroy" and "Jougla Point")	NW								
Gourdin Island	NW								
Grandidier Channel (nonspecific)	SW								
Greenwich Is. (nonspecific)	SH								
Half Moon Island	SH	9	6	1,011	8	25	2	2,984	1
Hannah Point, Livingston Island	SH	2	21	192	21	17	7	1,632	9
Hannah Pt. Vicinity — "Walker Bay" (nonspecific)	SH								
Hanusse Bay	SW	2	24	148	24				
Heim Glacier, s.e. Arrowsmith Pen. (w. coast Graham Land)	SW								
Heroína Island	NE								
Heywood Island (vic. Robert Island)	SH								
Holluschickie Bay, James Ross Island	NE								
Hope Bay (Esperanza STATION)	NE	3	18	1,130	5	9	14	1,278	12
Hope Bay (Uruguayan Hut/STATION)	NE								
Horseshoe Island	SW								
Hovgaard Island	SW					1		328	25
Huemul Is.	NW								
Hydrurga Rocks	NW								
Intercurrence Island (Gennady Cove), Christiana Islands	NW								
Inverleith Harbor, Anvers Is.	NW								
Jabet Peak, Wiencke Is.	NW								
James Ross Island (nonspecific)	NE								
Jansenn Peak, Wiencke Is.	NW								
Jones Ice Shelf, Graham Land	SW								
Joubin Islands	NW								
Jougla Point, Port Lockroy, Wiencke Island (includes ldgs listed for "Port Lockroy" and "Jougla Point")	NW	7	10	1,067	7	19	5	2,615	4
Jubany STATION, King George Island	SH	1		107		3	23	307	
Killermet Cove, Bryde Is.	NW								
King George Island (nonspecific)	SH								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		92-93 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	93-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Fish Islands, west coast Graham Land (nonspecific)	SW					2		229	
Fort Point, Greenwich Is	SH								
Foyn Harbor	NW	1		66		3		133	
Frei STATION/Marsh Base, King George Island	SH	2		333	22	1		90	
Fridtjof Sound, Tabarin Peninsula	NE								
Fumarole Bay (Primero de Mayo Bay), Deception Island	SH								
Gabriel de Dastilla STATION, Deception Island	SH								
Galindez Is., Argentine Islands	SW								
Gallows Pt., Gamma Is., Melchior Islands	NW								
Gaston Island (near tip, Reclus peninsula)	NW								
Georges Point, Rongé Island (incl. landings listed for Rongé Island only)	NW	5	23	186		6	23	267	
Gibbon Bay, Coronation Is.	SO								
Gibbs Island (nonspecific)	EI								
Gin Cove, James Ross Island	NE								
Gosling Islands, So. Orkneys	SO					1		139	
Goudier Island (restored UK Hut), off Jougla Pt., Port Lockroy (does NOT include LDGs listed for "Port Lockroy" and "Jougla Point")	NW								
Gourdin Island	NW								
Grandidier Channel (nonspecific)	SW								
Greenwich Is. (nonspecific)	SH								
Half Moon Island	SH	14	9	1,585	7	17	11	2,961	7
Hannah Point, Livingston Island	SH	23	3	1,542	8	29	7	2,740	9
Hannah Pt. Vicinity — "Walker Bay" (nonspecific)	SH								
Hanusse Bay	SW								
Heim Glacier, s.e. Arrowsmith Pen. (w. coast Graham Land)	SW								
Heroína Island	NE								
Heywood Island (vic. Robert Island)	SH	1		102					
Holluschickie Bay, James Ross Island	NE								
Hope Bay (Esperanza STATION)	NE	3		209		17	12	1,801	11
Hope Bay (Uruguayan Hut/STATION)	NE								
Horseshoe Island	SW								
Hovgaard Island	SW	1		391	20	1		475	22
Huemul Is.	NW								
Hydrurga Rocks	NW					3		165	
Intercurrence Island (Gennady Cove), Christiana Islands	NW								
Inverleith Harbor, Anvers Is.	NW								
Jabet Peak, Wiencke Is.	NW								
James Ross Island (nonspecific)	NE								
Jansenn Peak, Wiencke Is.	NW								
Jones Ice Shelf, Graham Land	SW								
Joubin Islands	NW								
Jougla Point, Port Lockroy, Wiencke Island (includes ldgs listed for "Port Lockroy" and "Jougla Point")	NW	22	4	2,139	1	30	4	4,274	1
Jubany STATION, King George Island	SH	4	24	305	23	6	20	869	19
Killermet Cove, Bryde Is.	NW								
King George Island (nonspecific)	SH								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		94-95 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	95-96 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Fish Islands, west coast Graham Land (nonspecific)	SW					1		113	
Fort Point, Greenwich Is	SH								
Foyn Harbor	NW								
Frei STATION/Marsh Base, King George Island	SH	9	21	766	18	6		542	
Fridtjof Sound, Tabarin Peninsula	NE								
Fumarole Bay (Primero de Mayo Bay), Deception Island	SH								
Gabriel de Dastilla STATION, Deception Island	SH					1		42	
Galindez Is., Argentine Islands	SW								
Gallows Pt., Gamma Is., Melchior Islands	NW								
Gaston Island (near tip, Reclus peninsula)	NW								
Georges Point, Rongé Island (incl. landings listed for Rongé Island only)	NW	10	17	711	19	9	23	546	25
Gibbon Bay, Coronation Is.	SO								
Gibbs Island (nonspecific)	EI								
Gin Cove, James Ross Island	NE					1		67	
Gosling Islands, So. Orkneys	SO								
Goudier Island (restored UK Hut), off Jougla Pt., Port Lockroy (does NOT include LDGs listed for "Port Lockroy" and "Jougla Point")	NW					1		44	
Gourdin Island	NW								
Grandidier Channel (nonspecific)	SW								
Greenwich Is. (nonspecific)	SH								
Half Moon Island	SH	38	7	3,017	5	49	3	5,221	1
Hannah Point, Livingston Island	SH	46	3	4,010	2	37	7	3,048	7
Hannah Pt. Vicinity — "Walker Bay" (nonspecific)	SH								
Hanusse Bay	SW								
Heim Glacier, s.e. Arrowsmith Pen. (w. coast Graham Land)	SW	1		19					
Heroína Island	NE								
Heywood Island (vic. Robert Island)	SH								
Holluschickie Bay, James Ross Island	NE								
Hope Bay (Esperanza STATION)	NE	11	15	907	17	17	18	1,476	15
Hope Bay (Uruguayan Hut/STATION)	NE								
Horseshoe Island	SW								
Hovgaard Island	SW	2		172		2		138	
Huemul Is.	NW								
Hydrurga Rocks	NW	2		72		1		83	
Intercurrence Island (Gennady Cove), Christiana Islands	NW	1		34					
Inverleith Harbor, Anvers Is.	NW								
Jabet Peak, Wiencke Is.	NW								
James Ross Island (nonspecific)	NE								
Jansenn Peak, Wiencke Is.	NW								
Jones Ice Shelf, Graham Land	SW								
Joubin Islands	NW								
Jougla Point, Port Lockroy, Wiencke Island (includes ldgs listed for "Port Lockroy" and "Jougla Point")	NW	27	11	1,769	10	42	5	3,851	4
Jubany STATION, King George Island	SH	3		403					
Killermet Cove, Bryde Is.	NW								
King George Island (nonspecific)	SH					2		179	

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		96-97 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	97-98 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Fish Islands, west coast Graham Land (nonspecific)	SW								
Fort Point, Greenwich Is	SH								
Foyn Harbor	NW								
Frei STATION/Marsh Base, King George Island	SH	5		335					
Fridtjof Sound, Tabarin Peninsula	NE								
Fumarole Bay (Primero de Mayo Bay), Deception Island	SH								
Gabriel de Dastilla STATION, Deception Island	SH								
Galindez Is., Argentine Islands	SW								
Gallows Pt., Gamma Is., Melchior Islands	NW								
Gaston Island (near tip, Reclus peninsula)	NW	1		40					
Georges Point, Rongé Island (incl. landings listed for Rongé Island only)	NW	12	18	673	21	6		655	25
Gibbon Bay, Coronation Is.	SO					1		115	
Gibbs Island (nonspecific)	EI					1		131	
Gin Cove, James Ross Island	NE	1		94					
Gosling Islands, So. Orkneys	SO	1		96					
Goudier Island (restored UK Hut), off Jougla Pt., Port Lockroy (does NOT include LDGs listed for "Port Lockroy" and "Jougla Point")	NW	3		262		6		467	
Gourdin Island	NW					2		207	
Grandidier Channel (nonspecific)	SW								
Greenwich Is. (nonspecific)	SH								
Half Moon Island	SH	35	9	2,258	11	33	7	4,382	3
Hannah Point, Livingston Island	SH	46	4	3,480	2	39	5	3,399	8
Hannah Pt. Vicinity — "Walker Bay" (nonspecific)	SH								
Hanusse Bay	SW								
Heim Glacier, s.e. Arrowsmith Pen. (w. coast Graham Land)	SW								
Heroína Island	NE	1		90					
Heywood Island (vic. Robert Island)	SH								
Holluschickie Bay, James Ross Island	NE	1		91					
Hope Bay (Esperanza STATION)	NE	7	24	710	20	10	20	1,210	16
Hope Bay (Uruguayan Hut/STATION)	NE					1		105	
Horseshoe Island	SW					1		55	
Hovgaard Island	SW	2		203		1		439	
Huemul Is.	NW								
Hydrurga Rocks	NW	7	26	461		4		199	
Intercurrence Island (Gennady Cove), Christiana Islands	NW								
Inverleith Harbor, Anvers Is.	NW								
Jabet Peak, Wiencke Is.	NW								
James Ross Island (nonspecific)	NE								
Jansenn Peak, Wiencke Is.	NW								
Jones Ice Shelf, Graham Land	SW								
Joubin Islands	NW								
Jougla Point, Port Lockroy, Wiencke Island (includes ldgs listed for "Port Lockroy" and "Jougla Point")	NW	58	1	3,212	3	63	1	6,879	1
Jubany STATION, King George Island	SH					3		333	
Killermet Cove, Bryde Is.	NW								
King George Island (nonspecific)	SH	1		55					

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		98-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Fish Islands, west coast Graham Land (nonspecific)	SW	1		95		4		437	
Fort Point, Greenwich Is	SH	2		185		2		185	
Foyn Harbor	NW					4		199	
Frei STATION/Marsh Base, King George Island	SH					41		4,445	
Fridtjof Sound, Tabarin Peninsula	NE								
Fumarole Bay (Primero de Mayo Bay), Deception Island	SH					1		8	
Gabriel de Dastilla STATION, Deception Island	SH	1		80		2		122	
Galindez Is., Argentine Islands	SW								
Gallows Pt., Gamma Is., Melchior Islands	NW								
Gaston Island (near tip, Reclus peninsula)	NW					1		40	
Georges Point, Rongé Island (incl. landings listed for Rongé Island only)	NW	2		135		50		3,173	
Gibbon Bay, Coronation Is.	SO					1		115	
Gibbs Island (nonspecific)	EI	2		270		3		401	
Gin Cove, James Ross Island	NE					2		161	
Gosling Islands, So. Orkneys	SO					2		235	
Goudier Island (restored UK Hut), off Jougla Pt., Port Lockroy (does NOT include LDGs listed for "Port Lockroy" and "Jougla Point")	NW	15	17	1,302	17	25		2,075	
Gourdin Island	NW	4		321		6		528	
Grandidier Channel (nonspecific)	SW								
Greenwich Is. (nonspecific)	SH								
Half Moon Island	SH	33	9	3,931	6	263	7	28,541	3
Hannah Point, Livingston Island	SH	48	5	3,982	5	290	5	24,444	6
Hannah Pt. Vicinity — "Walker Bay" (nonspecific)	SH								
Hanusse Bay	SW					2		148	
Heim Glacier, s.e. Arrowsmith Pen. (w. coast Graham Land)	SW					1		19	
Heroína Island	NE	1		37		2		127	
Heywood Island (vic. Robert Island)	SH					1		102	
Holluschickie Bay, James Ross Island	NE					1		91	
Hope Bay (Esperanza STATION)	NE	9	25	1,031	21	87	19	9,897	15
Hope Bay (Uruguayan Hut/STATION)	NE					1		105	
Horseshoe Island	SW					1		55	
Hovgaard Island	SW	1		7		11		2,153	
Huemul Is.	NW								
Hydrurga Rocks	NW	8		553		25		1,533	
Intercurrence Island (Gennady Cove), Christiana Islands	NW					1		34	
Inverleith Harbor, Anvers Is.	NW								
Jabet Peak, Wiencke Is.	NW								
James Ross Island (nonspecific)	NE	2		181		2		181	
Jansenn Peak, Wiencke Is.	NW								
Jones Ice Shelf, Graham Land	SW								
Joubin Islands	NW								
Jougla Point, Port Lockroy, Wiencke Island (includes ldgs listed for "Port Lockroy" and "Jougla Point")	NW	75	1	7,587	1	350	3	34,189	2
Jubany STATION, King George Island	SH	6		232		27		2,676	
Killermet Cove, Bryde Is.	NW								
King George Island (nonspecific)	SH					3		234	

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		89-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	94-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Fish Islands, west coast Graham Land (nonspecific)	SW	2		229		2		208	
Fort Point, Greenwich Is	SH					2		185	
Foyn Harbor	NW	4		199					
Frei STATION/Marsh Base, King George Island	SH	21	20	2,802	15	20		1,643	
Fridtjof Sound, Tabarin Peninsula	NE								
Fumarole Bay (Primero de Mayo Bay), Deception Island	SH	1		8					
Gabriel de Dastilla STATION, Deception Island	SH					2		122	
Galindez Is., Argentine Islands	SW								
Gallows Pt., Gamma Is., Melchior Islands	NW								
Gaston Island (near tip, Reclus peninsula)	NW					1		40	
Georges Point, Rongé Island (incl. landings listed for Rongé Island only)	NW	11		453		39	24	2,720	25
Gibbon Bay, Coronation Is.	SO					1		115	
Gibbs Island (nonspecific)	EI					3		401	
Gin Cove, James Ross Island	NE					2		161	
Gosling Islands, So. Orkneys	SO	1		139		1		96	
Goudier Island (restored UK Hut), off Jougla Pt., Port Lockroy (does NOT include LDGs listed for "Port Lockroy" and "Jougla Point")	NW					25		2,075	
Gourdin Island	NW					6		528	
Grandidier Channel (nonspecific)	SW								
Greenwich Is. (nonspecific)	SH								
Half Moon Island	SH	75	7	9,732	5	188	7	18,809	4
Hannah Point, Livingston Island	SH	74	8	6,525	10	216	4	17,919	5
Hannah Pt. Vicinity — "Walker Bay" (nonspecific)	SH								
Hanusse Bay	SW	2		148					
Heim Glacier, s.e. Arrowsmith Pen. (w. coast Graham Land)	SW					1		19	
Heroína Island	NE					2		127	
Heywood Island (vic. Robert Island)	SH	1		102					
Holluschickie Bay, James Ross Island	NE					1		91	
Hope Bay (Esperanza STATION)	NE	33	14	4,563	13	54	19	5,334	17
Hope Bay (Uruguayan Hut/STATION)	NE					1		105	
Horseshoe Island	SW					1		55	
Hovgaard Island	SW	3		1,194		8		959	
Huemul Is.	NW								
Hydrurga Rocks	NW	3		165		22		1,368	
Intercurrence Island (Gennady Cove), Christiana Islands	NW					1		34	
Inverleith Harbor, Anvers Is.	NW								
Jabet Peak, Wiencke Is.	NW								
James Ross Island (nonspecific)	NE					2		181	
Jansenn Peak, Wiencke Is.	NW								
Jones Ice Shelf, Graham Land	SW								
Joubin Islands	NW								
Jougla Point, Port Lockroy, Wiencke Island (includes ldgs listed for "Port Lockroy" and "Jougla Point")	NW	85	5	10,891	2	265	3	23,298	2
Jubany STATION, King George Island	SH	15	25	1,708	22	12		968	
Killermet Cove, Bryde Is.	NW								
King George Island (nonspecific)	SH					3		234	

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		99-00 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	00-01 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	
Fish Islands, west coast Graham Land (nonspecific)	SW					2		86	
Fort Point, Greenwich Is	SH	2		131					
Foyn Harbor	NW					3		80	
Frei STATION/Marsh Base, King George Island	SH	3		290		1		6	
Fridtjof Sound, Tabarin Peninsula	NE					2		254	
Fumarole Bay (Primero de Mayo Bay), Deception Island	SH								
Gabriel de Dastilla STATION, Deception Island	SH								
Galindez Is., Argentine Islands	SW					3		17	
Gallows Pt., Gamma Is., Melchior Islands	NW					1		4	
Gaston Island (near tip, Reclus peninsula)	NW								
Georges Point, Rongé Island (incl. landings listed for Rongé Island only)	NW	3		149		4		170	
Gibbon Bay, Coronation Is.	SO								
Gibbs Island (nonspecific)	EI								
Gin Cove, James Ross Island	NE								
Gosling Islands, So. Orkneys	SO								
Goudier Island (restored UK Hut), off Jougla Pt., Port Lockroy (does NOT include LDGs listed for "Port Lockroy" and "Jougla Point")	NW	27	14	2,246	12	29	12	2,575	13
Gourdin Island	NW	4		252		4		197	
Grandidier Channel (nonspecific)	SW								
Greenwich Is. (nonspecific)	SH								
Half Moon Island	SH	46	9	1,454	19	33	11	5,711	3
Hannah Point, Livingston Island	SH	54	6	1,691	16	53	5	4,752	6
Hannah Pt. Vicinity — "Walker Bay" (nonspecific)	SH					1		106	
Hanusse Bay	SW								
Heim Glacier, s.e. Arrowsmith Pen. (w. coast Graham Land)	SW								
Heroína Island	NE	2		85					
Heywood Island (vic. Robert Island)	SH					1		5	
Holluschickie Bay, James Ross Island	NE					1		94	
Hope Bay (Esperanza STATION)	NE	12	24	1,138	24	14	20	1,404	17
Hope Bay (Uruguayan Hut/STATION)	NE								
Horseshoe Island	SW	1		113		1		131	
Hovgaard Island	SW					2		97	
Huemul Is.	NW					10		448	
Hydrurga Rocks	NW	9		501					
Intercurrence Island (Gennady Cove), Christiana Islands	NW	2		89					
Inverleith Harbor, Anvers Is.	NW	1		34					
Jabet Peak, Wiencke Is.	NW					1		7	
James Ross Island (nonspecific)	NE								
Jansenn Peak, Wiencke Is.	NW								
Jones Ice Shelf, Graham Land	SW								
Joubin Islands	NW					1		7	
Jougla Point, Port Lockroy, Wiencke Island (includes ldgs listed for "Port Lockroy" and "Jougla Point")	NW	93	1	9,323	1	94	1	8,675	1
Jubany STATION, King George Island	SH	3		268		1		132	
Killermet Cove, Bryde Is.	NW								
King George Island (nonspecific)	SH								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		01-02 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	02-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Fish Islands, west coast Graham Land (nonspecific)	SW					1		7	
Fort Point, Greenwich Is	SH								
Foyn Harbor	NW	3		159		1		46	
Frei STATION/Marsh Base, King George Island	SH	2		289		3		500	
Fridtjof Sound, Tabarin Peninsula	NE								
Fumarole Bay (Primero de Mayo Bay), Deception Island	SH								
Gabriel de Dastilla STATION, Deception Island	SH	1		101		1		12	
Galindez Is., Argentine Islands	SW								
Gallows Pt., Gamma Is., Melchior Islands	NW								
Gaston Island (near tip, Reclus peninsula)	NW								
Georges Point, Rongé Island (incl. landings listed for Rongé Island only)	NW	1		15		2		273	
Gibbon Bay, Coronation Is.	SO					1		108	
Gibbs Island (nonspecific)	EI	1		69					
Gin Cove, James Ross Island	NE								
Gosling Islands, So. Orkneys	SO								
Goudier Island (restored UK Hut), off Jougla Pt., Port Lockroy (does NOT include LDGs listed for "Port Lockroy" and "Jougla Point")	NW	56	2	4,412	4	79	2	6,928	2
Gourdin Island	NW	2		58		7		638	
Grandidier Channel (nonspecific)	SW	1		60					
Greenwich Is. (nonspecific)	SH					1		6	
Half Moon Island	SH	41	7	5,317	2	38	11	5,413	7
Hannah Point, Livingston Island	SH	37	9	2,927	10	46	8	4,096	9
Hannah Pt. Vicinity — "Walker Bay" (nonspecific)	SH								
Hanusse Bay	SW								
Heim Glacier, s.e. Arrowsmith Pen. (w. coast Graham Land)	SW								
Heroína Island	NE								
Heywood Island (vic. Robert Island)	SH					1		8	
Holluschickie Bay, James Ross Island	NE								
Hope Bay (Esperanza STATION)	NE	12	20	1,323	16	12	26	1,508	21
Hope Bay (Uruguayan Hut/STATION)	NE								
Horseshoe Island	SW								
Hovgaard Island	SW					1		69	
Huemul Is.	NW								
Hydrurga Rocks	NW	8		451		5		381	
Intercurrence Island (Gennady Cove), Christiana Islands	NW								
Inverleith Harbor, Anvers Is.	NW								
Jabet Peak, Wiencke Is.	NW	13	19	861	25				
James Ross Island (nonspecific)	NE								
Jansenn Peak, Wiencke Is.	NW					2		10	
Jones Ice Shelf, Graham Land	SW					1		7	
Joubin Islands	NW								
Jougla Point, Port Lockroy, Wiencke Island (includes ldgs listed for "Port Lockroy" and "Jougla Point")	NW	43	6	4,238	5	63	5	6,575	3
Jubany STATION, King George Island	SH	1		96		6		363	
Killermet Cove, Bryde Is.	NW					1		6	
King George Island (nonspecific)	SH								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		99-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Fish Islands, west coast Graham Land (nonspecific)	SW	3		93		7		530	
Fort Point, Greenwich Is	SH	2		131		4		316	
Foyn Harbor	NW	7		285		11		484	
Frei STATION/Marsh Base, King George Island	SH	9		1,085		50		5,530	
Fridtjof Sound, Tabarin Peninsula	NE	2		254		2		254	
Fumarole Bay (Primero de Mayo Bay), Deception Island	SH					1		8	
Gabriel de Dastilla STATION, Deception Island	SH	2		113		4		235	
Galindez Is., Argentine Islands	SW	3		17		3		17	
Gallows Pt., Gamma Is., Melchior Islands	NW	1		4		1		4	
Gaston Island (near tip, Reclus peninsula)	NW					1		40	
Georges Point, Rongé Island (incl. landings listed for Rongé Island only)	NW	10		607		60		3,780	
Gibbon Bay, Coronation Is.	SO	1		108		2		223	
Gibbs Island (nonspecific)	EI	1		69		4		470	
Gin Cove, James Ross Island	NE					2		161	
Gosling Islands, So. Orkneys	SO					2		235	
Goudier Island (restored UK Hut), off Jougla Pt., Port Lockroy (does NOT include LDGs listed for "Port Lockroy" and "Jougla Point")	NW	191	6	16,161	7	216	14	18,236	15
Gourdin Island	NW	17		1,145		23		1,673	
Grandidier Channel (nonspecific)	SW	1		60		1		60	
Greenwich Is. (nonspecific)	SH	1		6		1		6	
Half Moon Island	SH	158	9	17,895	5	421	7	46,436	4
Hannah Point, Livingston Island	SH	190	7	13,466	10	480	5	37,910	8
Hannah Pt. Vicinity — "Walker Bay" (nonspecific)	SH	1		106		1		106	
Hanusse Bay	SW					2		148	
Heim Glacier, s.e. Arrowsmith Pen. (w. coast Graham Land)	SW					1		19	
Heroína Island	NE	2		85		4		212	
Heywood Island (vic. Robert Island)	SH	2		13		3		115	
Holluschickie Bay, James Ross Island	NE	1		94		2		185	
Hope Bay (Esperanza STATION)	NE	50	23	5,373	16	137	22	15,270	16
Hope Bay (Uruguayan Hut/STATION)	NE					1		105	
Horseshoe Island	SW	2		244		3		299	
Hovgaard Island	SW	3		166		14		2,319	
Huemul Is.	NW	10		448		10		448	
Hydrurga Rocks	NW	22		1,333		47		2,866	
Intercurrence Island (Gennady Cove), Christiana Islands	NW	2		89		3		123	
Inverleith Harbor, Anvers Is.	NW	1		34		1		34	
Jabet Peak, Wiencke Is.	NW	14		868		14		868	
James Ross Island (nonspecific)	NE					2		181	
Jansenn Peak, Wiencke Is.	NW	2		10		2		10	
Jones Ice Shelf, Graham Land	SW	1		7		1		7	
Joubin Islands	NW	1		7		1		7	
Jougla Point, Port Lockroy, Wiencke Island (includes ldgs listed for "Port Lockroy" and "Jougla Point")	NW	293	2	28,811	2	643	2	63,000	2
Jubany STATION, King George Island	SH	11		859		38		3,535	
Killermet Cove, Bryde Is.	NW	1		6		1		6	
King George Island (nonspecific)	SH					3		234	

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE				1st Landing	89-90 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
King Sejong STATION, Maxwell Bay, King George Island	SH	ST	ZOD	91-92				
Kinnes Cove, Suspiros Bay, Joinville Island	NW		ZOD	93-94				
Lagarrigue Cove, Selvick Cove (vic. Orne Harbor)	NW		ZOD	94-95				
Lallemand Fjord	SW		ZOD	98-99				
Laurie Island (nonspecific)	SO	NS	ZOD	94-95				
Leith Cove, Paradise Bay, Graham Land	NW		ZOD	99-00				
Lemaire Channel (non specific)	SW		ZOD HEL SNO	00-01				
Lemaire Is.	NW		ZOD	00-01				
Liége Is.	NW		ZOD	99-00				
Lion Island (east side Anvers Island)	NW		SNO	98-99				
Lion's Rump, King George Island	SH	ASPA	ZOD	89-90	6	12	625	11
Livingston Is. (nonspecific)	SH	NS	ZOD	01-02				
Macaroni Point, Deception Island	SH		ZOD	94-95				
Madder Cliffs, Joinville Is.	NE	ASI	ZOD	00-01				
Marambio Station, Seymour Is. (Argentine STATION)	NE	ASI	ZOD	00-01				
Martel Inlet, Admiralty Bay, King George Island (nonspecific)	SH	NS	ZOD	93-94				
Maxwell Bay, King George Island (nonspecific)	SH	NS	ZOD	91-92				
McCall Point	SW	ASI	ZOD	02-03				
Melchior Islands (nonspecific)	NW	NS ASI	ZOD	89-90	1		100	
Metchnikoff Point, Brabant Island	NW		ZOD	97-98				
Miers Bluff, Livingston Is.	SH		ZOD	00-01				
Mikklesen Harbor	NW	ASI	ZOD	89-90	1		85	
Mikklesen Islands	SW		ZOD	99-00				
Mitchell Cove, Robert Is.	SH	ASI	ZOD	02-03				
Molchanov Beach, Joinville Island	NW		ZOD	93-94				
Monroe Island, Larsen Islands	SO		ZOD	02-03				
Moreaux Island, Flandres Bay	SW	?	ZOD	98-99				
Mt. Demaria, Cape Tuxen	SW		ZOD	00-01				
Mt. Mill, Waddington Bay (w. coast Graham Land)	SW		ZOD	93-94				
Mt. Scott, Girard Bay, Lemaire Channel	SW		ZOD	95-96				
Mt. Shackleton, Graham Land	SW		ZOD	00-01				
Mt. Tennant, Rongé Is.	NW		ZOD	00-01				
Mt. William, Anvers Is.	NW		ZOD	00-01				
Murray Island (off w. coast Graham Land)	NW		ZOD	93-94				
Neko Harbor, Andvord Bay	NW	ASI	ZOD CAM	92-93				
Ohridsky Base	SH		ZOD	02-03				
Orcadas STATION, Iceberg Bay, Laurie Island	SO	ST ASI	ZOD	90-91				
Orne Harbor (w. coast Graham Land)	NW		ZOD CAM CLI	95-96				
Orne Islands	NW	ASI	ZOD	92-93				
Palaver Pt., Two Hummock Is.	NW		ZOD	00-01				
Palmer STATION (old), Arthur Harbor, Anvers Island	NW		ZOD	00-01				
Palmer STATION, Arthur Harbor, Anvers Island	NW	ST	ZOD	89-90	11	2	1,252	2
Paradise Bay (nonspecific)	NW	NS	ZOD HEL CAM	95-96				
Patagonia Bay, Anvers Is.	NW		ZOD	99-00				
Paulet Island	NE	ASI	ZOD SNO	89-90	7	9	772	9

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		90-91 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	91-92 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
King Sejong STATION, Maxwell Bay, King George Island	SH					2		191	
Kinnes Cove, Suspiros Bay, Joinville Island	NW								
Lagarrigue Cove, Selvick Cove (vic. Orne Harbor)	NW								
Lallemand Fjord	SW								
Laurie Island (nonspecific)	SO								
Leith Cove, Paradise Bay, Graham Land	NW								
Lemaire Channel (non specific)	SW								
Lemaire Is.	NW								
Liége Is.	NW								
Lion Island (east side Anvers Island)	NW								
Lion's Rump, King George Island	SH	7	11	772	12	4	22	382	23
Livingston Is. (nonspecific)	SH								
Macaroni Point, Deception Island	SH								
Madder Cliffs, Joinville Is.	NE								
Marambio Station, Seymour Is. (Argentine STATION)	NE								
Martel Inlet, Admiralty Bay, King George Island (nonspecific)	SH								
Maxwell Bay, King George Island (nonspecific)	SH					1		78	
McCall Point	SW								
Melchior Islands (nonspecific)	NW					3	25	249	
Metchnikoff Point, Brabant Island	NW								
Miers Bluff, Livingston Is.	SH								
Mikklesen Harbor	NW					1		72	
Mikklesen Islands	SW								
Mitchell Cove, Robert Is.	SH								
Molchanov Beach, Joinville Island	NW								
Monroe Island, Larsen Islands	SO								
Moreaux Island, Flandres Bay	SW								
Mt. Demaria, Cape Tuxen	SW								
Mt. Mill, Waddington Bay (w. coast Graham Land)	SW								
Mt. Scott, Girard Bay, Lemaire Channel	SW								
Mt. Shackleton, Graham Land	SW								
Mt. Tennant, Rongé Is.	NW								
Mt. William, Anvers Is.	NW								
Murray Island (off w. coast Graham Land)	NW								
Neko Harbor, Andvord Bay	NW								
Ohridsky Base	SH								
Orcadas STATION, Iceberg Bay, Laurie Island	SO	1		36		2		148	
Orne Harbor (w. coast Graham Land)	NW								
Orne Islands	NW								
Palaver Pt., Two Hummock Is.	NW								
Palmer STATION (old), Arthur Harbor, Anvers Island	NW								
Palmer STATION, Arthur Harbor, Anvers Island	NW	9	7	923	10	11	13	1,265	13
Paradise Bay (nonspecific)	NW								
Patagonia Bay, Anvers Is.	NW								
Paulet Island	NE	4	17	240	19	14	9	2,239	7

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		92-93 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	93-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
King Sejong STATION, Maxwell Bay, King George Island	SH					1		180	
Kinnes Cove, Suspiros Bay, Joinville Island	NW					1		71	
Lagarrigue Cove, Selvick Cove (vic. Orne Harbor)	NW								
Lallemand Fjord	SW								
Laurie Island (nonspecific)	SO								
Leith Cove, Paradise Bay, Graham Land	NW								
Lemaire Channel (non specific)	SW								
Lemaire Is.	NW								
Liége Is.	NW								
Lion Island (east side Anvers Island)	NW								
Lion's Rump, King George Island	SH								
Livingston Is. (nonspecific)	SH								
Macaroni Point, Deception Island	SH								
Madder Cliffs, Joinville Is.	NE								
Marambio Station, Seymour Is. (Argentine STATION)	NE								
Martel Inlet, Admiralty Bay, King George Island (nonspecific)	SH					1		78	
Maxwell Bay, King George Island (nonspecific)	SH					2		166	
McCall Point	SW								
Melchior Islands (nonspecific)	NW	1		17		2		203	
Metchnikoff Point, Brabant Island	NW								
Miers Bluff, Livingston Is.	SH								
Mikklesen Harbor	NW	7	20	258					
Mikklesen Islands	SW								
Mitchell Cove, Robert Is.	SH								
Molchanov Beach, Joinville Island	NW					2		65	
Monroe Island, Larsen Islands	SO								
Moreaux Island, Flandres Bay	SW								
Mt. Demaria, Cape Tuxen	SW								
Mt. Mill, Waddington Bay (w. coast Graham Land)	SW					1		16	
Mt. Scott, Girard Bay, Lemaire Channel	SW								
Mt. Shackleton, Graham Land	SW								
Mt. Tennant, Rongé Is.	NW								
Mt. William, Anvers Is.	NW								
Murray Island (off w. coast Graham Land)	NW					1		27	
Neko Harbor, Andvord Bay	NW	8	17	357	21	6	22	275	25
Ohridsky Base	SH								
Orcadas STATION, Iceberg Bay, Laurie Island	SO	1		127		2		152	
Orne Harbor (w. coast Graham Land)	NW								
Orne Islands	NW	2		201		1		54	
Palaver Pt., Two Hummock Is.	NW								
Palmer STATION (old), Arthur Harbor, Anvers Island	NW								
Palmer STATION, Arthur Harbor, Anvers Island	NW	9	14	1,014	11	10	16	1,185	13
Paradise Bay (nonspecific)	NW								
Patagonia Bay, Anvers Is.	NW								
Paulet Island	NE	16	8	1,498	9	18	9	1,664	12

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		94-95 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	95-96 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
King Sejong STATION, Maxwell Bay, King George Island	SH								
Kinnes Cove, Suspiros Bay, Joinville Island	NW								
Lagarrigue Cove, Selvick Cove (vic. Orne Harbor)	NW	1		99					
Lallemand Fjord	SW								
Laurie Island (nonspecific)	SO	1		96		2		201	
Leith Cove, Paradise Bay, Graham Land	NW								
Lemaire Channel (non specific)	SW								
Lemaire Is.	NW								
Liége Is.	NW								
Lion Island (east side Anvers Island)	NW								
Lion's Rump, King George Island	SH								
Livingston Is. (nonspecific)	SH								
Macaroni Point, Deception Island	SH	1		36					
Madder Cliffs, Joinville Is.	NE								
Marambio Station, Seymour Is. (Argentine STATION)	NE								
Martel Inlet, Admiralty Bay, King George Island (nonspecific)	SH								
Maxwell Bay, King George Island (nonspecific)	SH					3		148	
McCall Point	SW								
Melchior Islands (nonspecific)	NW	1		14					
Metchnikoff Point, Brabant Island	NW								
Miers Bluff, Livingston Is.	SH								
Mikklesen Harbor	NW	3		160		2		76	
Mikklesen Islands	SW								
Mitchell Cove, Robert Is.	SH								
Molchanov Beach, Joinville Island	NW	1		24		3		134	
Monroe Island, Larsen Islands	SO								
Moreaux Island, Flandres Bay	SW								
Mt. Demaria, Cape Tuxen	SW								
Mt. Mill, Waddington Bay (w. coast Graham Land)	SW								
Mt. Scott, Girard Bay, Lemaire Channel	SW					1		14	
Mt. Shackleton, Graham Land	SW								
Mt. Tennant, Rongé Is.	NW								
Mt. William, Anvers Is.	NW								
Murray Island (off w. coast Graham Land)	NW								
Neko Harbor, Andvord Bay	NW	12	14	560	23	21	13	963	19
Ohridsky Base	SH								
Orcadas STATION, Iceberg Bay, Laurie Island	SO	3		198		3		203	
Orne Harbor (w. coast Graham Land)	NW					1		30	
Orne Islands	NW	7	25	368		1		42	
Palaver Pt., Two Hummock Is.	NW								
Palmer STATION (old), Arthur Harbor, Anvers Island	NW								
Palmer STATION, Arthur Harbor, Anvers Island	NW	9	19	1,030	14	8	25	724	21
Paradise Bay (nonspecific)	NW					36	8	2,772	8
Patagonia Bay, Anvers Is.	NW								
Paulet Island	NE	30	10	2,819	6	31	9	2,315	10

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		96-97 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	97-98 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
King Sejong STATION, Maxwell Bay, King George Island	SH								
Kinnes Cove, Suspiros Bay, Joinville Island	NW					3		372	
Lagarrigue Cove, Selvick Cove (vic. Orne Harbor)	NW								
Lallemand Fjord	SW								
Laurie Island (nonspecific)	SO	1		98					
Leith Cove, Paradise Bay, Graham Land	NW								
Lemaire Channel (non specific)	SW								
Lemaire Is.	NW								
Liége Is.	NW								
Lion Island (east side Anvers Island)	NW								
Lion's Rump, King George Island	SH								
Livingston Is. (nonspecific)	SH								
Macaroni Point, Deception Island	SH								
Madder Cliffs, Joinville Is.	NE								
Marambio Station, Seymour Is. (Argentine STATION)	NE								
Martel Inlet, Admiralty Bay, King George Island (nonspecific)	SH								
Maxwell Bay, King George Island (nonspecific)	SH					1		70	
McCall Point	SW								
Melchior Islands (nonspecific)	NW	3		118		1		257	
Metchnikoff Point, Brabant Island	NW					1		55	
Miers Bluff, Livingston Is.	SH								
Mikklesen Harbor	NW	1		72		5		341	
Mikklesen Islands	SW								
Mitchell Cove, Robert Is.	SH								
Molchanov Beach, Joinville Island	NW								
Monroe Island, Larsen Islands	SO								
Moreaux Island, Flandres Bay	SW								
Mt. Demaria, Cape Tuxen	SW								
Mt. Mill, Waddington Bay (w. coast Graham Land)	SW								
Mt. Scott, Girard Bay, Lemaire Channel	SW								
Mt. Shackleton, Graham Land	SW								
Mt. Tennant, Rongé Is.	NW								
Mt. William, Anvers Is.	NW								
Murray Island (off w. coast Graham Land)	NW								
Neko Harbor, Andvord Bay	NW	36	8	2,348	9	27	10	1,737	11
Ohridsky Base	SH								
Orcadas STATION, Iceberg Bay, Laurie Island	SO	4		491					
Orne Harbor (w. coast Graham Land)	NW	3		266		1		57	
Orne Islands	NW								
Palaver Pt., Two Hummock Is.	NW								
Palmer STATION (old), Arthur Harbor, Anvers Island	NW								
Palmer STATION, Arthur Harbor, Anvers Island	NW	11	19	979	18	14	16	1,417	13
Paradise Bay (nonspecific)	NW	22	14	1,739	14	15	15	941	19
Patagonia Bay, Anvers Is.	NW								
Paulet Island	NE	31	11	2,808	5	8	23	732	23

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		98-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
King Sejong STATION, Maxwell Bay, King George Island	SH	1		85		4		456	
Kinnes Cove, Suspiros Bay, Joinville Island	NW	1		54		5		497	
Lagarrigue Cove, Selvick Cove (vic. Orne Harbor)	NW					1		99	
Lallemand Fjord	SW	1		59		1		59	
Laurie Island (nonspecific)	SO	3		314		7		709	
Leith Cove, Paradise Bay, Graham Land	NW								
Lemaire Channel (non specific)	SW								
Lemaire Is.	NW								
Liége Is.	NW								
Lion Island (east side Anvers Island)	NW	1		15		1		15	
Lion's Rump, King George Island	SH					17		1,779	
Livingston Is. (nonspecific)	SH								
Macaroni Point, Deception Island	SH					1		36	
Madder Cliffs, Joinville Is.	NE								
Marambio Station, Seymour Is. (Argentine STATION)	NE								
Martel Inlet, Admiralty Bay, King George Island (nonspecific)	SH					1		78	
Maxwell Bay, King George Island (nonspecific)	SH					7		462	
McCall Point	SW								
Melchior Islands (nonspecific)	NW	3		30		15		988	
Metchnikoff Point, Brabant Island	NW	1		2		2		57	
Miers Bluff, Livingston Is.	SH								
Mikklesen Harbor	NW	3		152		23		1,216	
Mikklesen Islands	SW								
Mitchell Cove, Robert Is.	SH								
Molchanov Beach, Joinville Island	NW					6		223	
Monroe Island, Larsen Islands	SO								
Moreaux Island, Flandres Bay	SW	1		70		1		70	
Mt. Demaria, Cape Tuxen	SW								
Mt. Mill, Waddington Bay (w. coast Graham Land)	SW					1		16	
Mt. Scott, Girard Bay, Lemaire Channel	SW					1		14	
Mt. Shackleton, Graham Land	SW								
Mt. Tennant, Rongé Is.	NW								
Mt. William, Anvers Is.	NW								
Murray Island (off w. coast Graham Land)	NW					1		27	
Neko Harbor, Andvord Bay	NW	42	6	3,613	8	152	11	9,853	16
Ohridsky Base	SH								
Orcadas STATION, Iceberg Bay, Laurie Island	SO	4		462		20		1,817	
Orne Harbor (w. coast Graham Land)	NW	1		72		6		425	
Orne Islands	NW					11		665	
Palaver Pt., Two Hummock Is.	NW								
Palmer STATION (old), Arthur Harbor, Anvers Island	NW								
Palmer STATION, Arthur Harbor, Anvers Island	NW	12	22	1,001	22	104	16	10,790	14
Paradise Bay (nonspecific)	NW	15	16	1,529	16	88	18	6,981	18
Patagonia Bay, Anvers Is.	NW								
Paulet Island	NE	37	8	3,722	7	196	9	18,809	10

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		89-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	94-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
King Sejong STATION, Maxwell Bay, King George Island	SH	3		371		1		85	
Kinnes Cove, Suspiros Bay, Joinville Island	NW	1		71		4		426	
Lagarrigue Cove, Selvick Cove (vic. Orne Harbor)	NW					1		99	
Lallemand Fjord	SW					1		59	
Laurie Island (nonspecific)	SO					7		709	
Leith Cove, Paradise Bay, Graham Land	NW								
Lemaire Channel (non specific)	SW								
Lemaire Is.	NW								
Liége Is.	NW								
Lion Island (east side Anvers Island)	NW					1		15	
Lion's Rump, King George Island	SH	17	22	1,779	21				
Livingston Is. (nonspecific)	SH								
Macaroni Point, Deception Island	SH					1		36	
Madder Cliffs, Joinville Is.	NE								
Marambio Station, Seymour Is. (Argentine STATION)	NE								
Martel Inlet, Admiralty Bay, King George Island (nonspecific)	SH	1		78					
Maxwell Bay, King George Island (nonspecific)	SH	3		244		4		218	
McCall Point	SW								
Melchior Islands (nonspecific)	NW	7		569		8		419	
Metchnikoff Point, Brabant Island	NW					2		57	
Miers Bluff, Livingston Is.	SH								
Mikklesen Harbor	NW	9		415		14		801	
Mikklesen Islands	SW								
Mitchell Cove, Robert Is.	SH								
Molchanov Beach, Joinville Island	NW	2		65		4		158	
Monroe Island, Larsen Islands	SO								
Moreaux Island, Flandres Bay	SW					1		70	
Mt. Demaria, Cape Tuxen	SW								
Mt. Mill, Waddington Bay (w. coast Graham Land)	SW	1		16					
Mt. Scott, Girard Bay, Lemaire Channel	SW					1		14	
Mt. Shackleton, Graham Land	SW								
Mt. Tennant, Rongé Is.	NW								
Mt. William, Anvers Is.	NW								
Murray Island (off w. coast Graham Land)	NW	1		27		0		0	
Neko Harbor, Andvord Bay	NW	14		632		138	9	9,221	12
Ohridsky Base	SH								
Orcadas STATION, Iceberg Bay, Laurie Island	SO	6		463		14		1,354	
Orne Harbor (w. coast Graham Land)	NW					6		425	
Orne Islands	NW	3		255		8		410	
Palaver Pt., Two Hummock Is.	NW								
Palmer STATION (old), Arthur Harbor, Anvers Island	NW								
Palmer STATION, Arthur Harbor, Anvers Island	NW	50	12	5,639	12	54	20	5,151	18
Paradise Bay (nonspecific)	NW					88	15	6,981	16
Patagonia Bay, Anvers Is.	NW								
Paulet Island	NE	59	11	6,413	11	137	10	12,396	8

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		99-00 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	00-01 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	
King Sejong STATION, Maxwell Bay, King George Island	SH					1		6	
Kinnes Cove, Suspiros Bay, Joinville Island	NW					1		35	
Lagarrigue Cove, Selvick Cove (vic. Orne Harbor)	NW	1		113					
Lallemand Fjord	SW								
Laurie Island (nonspecific)	SO	1		35					
Leith Cove, Paradise Bay, Graham Land	NW	1		102		1		114	
Lemaire Channel (non specific)	SW					1		38	
Lemaire Is.	NW					1		9	
Liége Is.	NW	1		36					
Lion Island (east side Anvers Island)	NW								
Lion's Rump, King George Island	SH								
Livingston Is. (nonspecific)	SH								
Macaroni Point, Deception Island	SH								
Madder Cliffs, Joinville Is.	NE					1		92	
Marambio Station, Seymour Is. (Argentine STATION)	NE					4		128	
Martel Inlet, Admiralty Bay, King George Island (nonspecific)	SH								
Maxwell Bay, King George Island (nonspecific)	SH								
McCall Point	SW								
Melchior Islands (nonspecific)	NW					2		496	
Metchnikoff Point, Brabant Island	NW								
Miers Bluff, Livingston Is.	SH					1		75	
Mikklesen Harbor	NW	9		548		11	24	956	22
Mikklesen Islands	SW	1		163					
Mitchell Cove, Robert Is.	SH								
Molchanov Beach, Joinville Island	NW					2		6	
Monroe Island, Larsen Islands	SO								
Moreaux Island, Flandres Bay	SW								
Mt. Demaria, Cape Tuxen	SW					1		3	
Mt. Mill, Waddington Bay (w. coast Graham Land)	SW	1		46		1		6	
Mt. Scott, Girard Bay, Lemaire Channel	SW					2		20	
Mt. Shackleton, Graham Land	SW					2		15	
Mt. Tennant, Rongé Is.	NW					1		13	
Mt. William, Anvers Is.	NW					1		2	
Murray Island (off w. coast Graham Land)	NW								
Neko Harbor, Andvord Bay	NW	58	4	4,794	5	51	6	4,383	8
Ohridsky Base	SH								
Orcadas STATION, Iceberg Bay, Laurie Island	SO	12	25	1,388	20	1		43	
Orne Harbor (w. coast Graham Land)	NW	3		151		7		397	
Orne Islands	NW	1		1		1		6	
Palaver Pt., Two Hummock Is.	NW					1		57	
Palmer STATION (old), Arthur Harbor, Anvers Island	NW					2		8	
Palmer STATION, Arthur Harbor, Anvers Island	NW	12		1,233	23	13	21	1,238	18
Paradise Bay (nonspecific)	NW	22	17	1,766	15	15	19	1,058	21
Patagonia Bay, Anvers Is.	NW	1		41					
Paulet Island	NE	49	7	4,230	6	19	16	1,905	15

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		01-02 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	02-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
King Sejong STATION, Maxwell Bay, King George Island	SH					1		49	
Kinnes Cove, Suspiros Bay, Joinville Island	NW	3		249					
Lagarrigue Cove, Selvick Cove (vic. Orne Harbor)	NW								
Lallemand Fjord	SW					1		132	
Laurie Island (nonspecific)	SO								
Leith Cove, Paradise Bay, Graham Land	NW								
Lemaire Channel (non specific)	SW	3		90		1		11	
Lemaire Is.	NW								
Liége Is.	NW								
Lion Island (east side Anvers Island)	NW								
Lion's Rump, King George Island	SH								
Livingston Is. (nonspecific)	SH	1		9		1		83	
Macaroni Point, Deception Island	SH								
Madder Cliffs, Joinville Is.	NE					1		93	
Marambio Station, Seymour Is. (Argentine STATION)	NE								
Martel Inlet, Admiralty Bay, King George Island (nonspecific)	SH								
Maxwell Bay, King George Island (nonspecific)	SH	1		128					
McCall Point	SW					1		50	
Melchior Islands (nonspecific)	NW	1		53		3		137	
Metchnikoff Point, Brabant Island	NW	1		96					
Miers Bluff, Livingston Is.	SH					2		82	
Mikklesen Harbor	NW	12	21	1,025	20	5		330	
Mikklesen Islands	SW								
Mitchell Cove, Robert Is.	SH					2		159	
Molchanov Beach, Joinville Island	NW								
Monroe Island, Larsen Islands	SO					1		165	
Moreaux Island, Flandres Bay	SW								
Mt. Demaria, Cape Tuxen	SW								
Mt. Mill, Waddington Bay (w. coast Graham Land)	SW								
Mt. Scott, Girard Bay, Lemaire Channel	SW					1		6	
Mt. Shackleton, Graham Land	SW								
Mt. Tennant, Rongé Is.	NW								
Mt. William, Anvers Is.	NW								
Murray Island (off w. coast Graham Land)	NW								
Neko Harbor, Andvord Bay	NW	51	4	4,233	6	70	3	5,827	6
Ohridsky Base	SH					2		106	
Orcadas STATION, Iceberg Bay, Laurie Island	SO	7		753		4		389	
Orne Harbor (w. coast Graham Land)	NW	2		226					
Orne Islands	NW					5		257	
Palaver Pt., Two Hummock Is.	NW	1		58					
Palmer STATION (old), Arthur Harbor, Anvers Island	NW	1		8		11		1,355	22
Palmer STATION, Arthur Harbor, Anvers Island	NW	10	25	910	24				
Paradise Bay (nonspecific)	NW	17	13	1,386	15	5		261	
Patagonia Bay, Anvers Is.	NW								
Paulet Island	NE	38	8	3,357	9	21	16	1,916	18

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		99-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
King Sejong STATION, Maxwell Bay, King George Island	SH	2		55		6		511	
Kinnes Cove, Suspiros Bay, Joinville Island	NW	4		284		9		781	
Lagarrigue Cove, Selvick Cove (vic. Orne Harbor)	NW	1		113		2		212	
Lallemand Fjord	SW	1		132		2		191	
Laurie Island (nonspecific)	SO	1		35		8		744	
Leith Cove, Paradise Bay, Graham Land	NW	2		216		2		216	
Lemaire Channel (non specific)	SW	5		139		5		139	
Lemaire Is.	NW	1		9		1		9	
Liége Is.	NW	1		36		1		36	
Lion Island (east side Anvers Island)	NW					1		15	
Lion's Rump, King George Island	SH					17		128	
Livingston Is. (nonspecific)	SH	2		92		2		92	
Macaroni Point, Deception Island	SH					1		36	
Madder Cliffs, Joinville Is.	NE	2		185		2		185	
Marambio Station, Seymour Is. (Argentine STATION)	NE	4		128		4		128	
Martel Inlet, Admiralty Bay, King George Island (nonspecific)	SH					1		78	
Maxwell Bay, King George Island (nonspecific)	SH	1		128		8		590	
McCall Point	SW	1		50		1		50	
Melchior Islands (nonspecific)	NW	6		686		21		1,674	
Metchnikoff Point, Brabant Island	NW	1		96		3		153	
Miers Bluff, Livingston Is.	SH	3		157		3		157	
Mikklesen Harbor	NW	37		2,859		60		4,075	
Mikklesen Islands	SW	1		163		1		163	
Mitchell Cove, Robert Is.	SH	2		159		2		159	
Molchanov Beach, Joinville Island	NW	2		6		8		229	
Monroe Island, Larsen Islands	SO	1		165		1		165	
Moreaux Island, Flandres Bay	SW					1		70	
Mt. Demaria, Cape Tuxen	SW	1		3		1		3	
Mt. Mill, Waddington Bay (w. coast Graham Land)	SW	2		52		3		68	
Mt. Scott, Girard Bay, Lemaire Channel	SW	3		26		4		40	
Mt. Shackleton, Graham Land	SW	2		15		2		15	
Mt. Tennant, Rongé Is.	NW	1		13		1		13	
Mt. William, Anvers Is.	NW	1		2		1		2	
Murray Island (off w. coast Graham Land)	NW					1		27	
Neko Harbor, Andvord Bay	NW	230	3	19,237	4	382	9	29,090	11
Ohridsky Base	SH	2		106		2		106	
Orcadas STATION, Iceberg Bay, Laurie Island	SO	24		2,573		44		4,390	
Orne Harbor (w. coast Graham Land)	NW	12		774		18		1,199	
Orne Islands	NW	7		264		18		929	
Palaver Pt., Two Hummock Is.	NW	2		115		2		115	
Palmer STATION (old), Arthur Harbor, Anvers Island	NW	14		1,371		14		1,371	
Palmer STATION, Arthur Harbor, Anvers Island	NW	35		3,381		139	21	14,171	17
Paradise Bay (nonspecific)	NW	59	18	4,471	22	147	19	11,452	20
Patagonia Bay, Anvers Is.	NW	1		41		1		41	
Paulet Island	NE	127	12	11,408	13	323	10	30,217	10

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE				1st Landing	89-90 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Pendulum Cove, Deception Island	SH	ASI	ZOD	89-90	7	10	587	13
Penguin Island	SH	ASI	ZOD	89-90	3	21	256	23
Penguin Point, Seymour Island	NE	ASI	ZOD	91-92				
Penola Strait (nonspecific)	SW	NS	ZOD HEL	01-02				
Peon Peak, Errera Channel	NW		ZOD	00-01				
Persson Is.	NE	ASI	ZOD	01-02				
Petermann Island	SW	ASI	ZOD	89-90	6	11	761	10
Petrel STATION, Petrel Cove, Dundee Island	NE	ST	ZOD	91-92				
Pitt Islands	SW		ZOD	94-95				
Pitt Point (Victory Glacier)	NE		ZOD	96-97				
Pléneau Island	SW	ASI	ZOD CAM SNO	92-93				
Point Lookout, Elephant Island	EI	ASI	ZOD	89-90	5	15	541	14
Point Martin, So. Orkneys	SO		ZOD	96-97				
Point Thomas, Admiralty Bay, King George Island	SH	ASPA	ZOD	94-95				
Point Wild, Elephant Island	EI	ASI	ZOD	89-90	2	23	265	22
Port Charcot, Booth Island	SW	ASI	ZOD	95-96				
Portal Point, Charlotte Bay	NW	ASI	CAM	90-91				
Potter Cove	SH		ZOD	00-01				
Primavera STATION (near Cierva Cove SSSI), Trinity Pen.	NW	ST	ZOD	92-93				
Prince Gustav Channel (nonspecific)	NE	NS	ZOD	96-97				
Prospect Point, Graham Land	SW	ASI	ZOD	92-93				
Py Point, Doumer Is.	NW	ASI	ZOD	00-01				
Robert Is. (nonspecific)	SH	NS	ZOD	00-01				
Robert Point, Robert Island	SH	ASI	ZOD	95-96				
Rojas Peak, Lemaire Is.	NW		ZOD	02-03				
Rosamel Island	NE		ZOD	90-91				
Rothera STATION, Adelaide Island	SW	ST	ZOD	89-90	1		99	
Rum Cove, James Ross Island	NE	ASI	ZOD	96-97				
Sally Cove, Horseshoe Is.	SW		ZOD	02-03				
San Martin STATION	SW	ST	ZOD	94-95				
Sandefjord Bay, South Orkney Islands	SO		ZOD	02-03				
Sapple Is., South Orkney Islands	SO		ZOD	02-03				
Seymour Island (nonspecific)	NE	NS	ZOD	95-96				
Shingle Cove, Iceberg Bay, Coronation Island	SO		ZOD	89-90	4	17	436	17
Shumskiy Cove, Arrowsmith Peninsula	SW	ASI	ZOD	02-03				
Siffrey Point, Trinity Peninsula	NW	ASI	ZOD	02-03				
Signy Base, So. Orkneys	SO		ZOD	96-97				
Signy Island (nonspecific)	SO	NS	ZOD	89-90	1		145	
Skontrop Cove, Paradise Bay	NW		ZOD	92-93				
Small Island, Christiana Islands	NW		ZOD	95-96				
Snow Hill Island	NE	ASI	ZOD	89-90	2	26	125	
South Bay, Livingston Island	SH		SNO	93-94				
Spigot Peak, vic. Orne Harbor (w. coast Graham Land)	NW		ZOD	93-94				
Spring Point, Brailmont Cove (vic. Sprightly Island, w.coast Graham Land)	NW	ASI	ZOD	95-96				
St. Kliment Ohridsky Station (Bulgarian base), Livingston Is.	SH		ZOD	00-01				
Stonington Island	SW	ASI	ZOD HEL	89-90	1		97	
Suarez Glacier, Paradise Bay	NW		ZOD	96-97				
Takai Peninsula (Takaki Promontory ?)	NW	?	ZOD	96-97				
Tay Head, Joinville Is.	NE	ASI	ZOD	01-02				
Telefon Bay, Deception Island	SH	ASI	ZOD SNO	89-90	6	14	492	15

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		90-91 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	91-92 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Pendulum Cove, Deception Island	SH	10	5	1,215	4	19	6	2,011	8
Penguin Island	SH					1		65	
Penguin Point, Seymour Island	NE					1		86	
Penola Strait (nonspecific)	SW								
Peon Peak, Errera Channel	NW								
Persson Is.	NE								
Petermann Island	SW	11	3	1,084	6	14	11	1,376	11
Petrel STATION, Petrel Cove, Dundee Island	NE					1		144	
Pitt Islands	SW								
Pitt Point (Victory Glacier)	NE								
Pléneau Island	SW								
Point Lookout, Elephant Island	EI	2	25	124	25	5	20	579	21
Point Martin, So. Orkneys	SO								
Point Thomas, Admiralty Bay, King George Island	SH								
Point Wild, Elephant Island	EI	2	23	151	23	2		268	
Port Charcot, Booth Island	SW								
Portal Point, Charlotte Bay	NW	1		93					
Potter Cove	SH								
Primavera STATION (near Cierva Cove SSSI), Trinity Pen.	NW								
Prince Gustav Channel (nonspecific)	NE								
Prospect Point, Graham Land	SW								
Py Point, Doumer Is.	NW								
Robert Is. (nonspecific)	SH								
Robert Point, Robert Island	SH								
Rojas Peak, Lemaire Is.	NW								
Rosamel Island	NE	1		82					
Rothera STATION, Adelaide Island	SW								
Rum Cove, James Ross Island	NE								
Sally Cove, Horseshoe Is.	SW								
San Martin STATION	SW								
Sandefjord Bay, South Orkney Islands	SO								
Sapple Is., South Orkney Islands	SO								
Seymour Island (nonspecific)	NE								
Shingle Cove, Iceberg Bay, Coronation Island	SO	1		38		2		240	
Shumskiy Cove, Arrowsmith Peninsula	SW								
Siffrey Point, Trinity Peninsula	NW								
Signy Base, So. Orkneys	SO								
Signy Island (nonspecific)	SO								
Skontrop Cove, Paradise Bay	NW								
Small Island, Christiana Islands	NW								
Snow Hill Island	NE					1		90	
South Bay, Livingston Island	SH								
Spigot Peak, vic. Orne Harbor (w. coast Graham Land)	NW								
Spring Point, Brailmont Cove (vic. Sprightly Island, w.coast Graham Land)	NW								
St. Kliment Ohridsky Station (Bulgarian base), Livingston Is.	SH								
Stonington Island	SW								
Suarez Glacier, Paradise Bay	NW								
Takai Peninsula (Takaki Promontory ?)	NW								
Tay Head, Joinville Is.	NE								
Telefon Bay, Deception Island	SH	4	16	452	17	6	19	606	20

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		92-93 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	93-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Pendulum Cove, Deception Island	SH	23	2	1,936	2	33	2	3,159	5
Penguin Island	SH	7	19	506	17	13	13	1,166	14
Penguin Point, Seymour Island	NE	1		85		2		129	
Penola Strait (nonspecific)	SW								
Peon Peak, Errera Channel	NW								
Persson Is.	NE								
Petermann Island	SW	14	10	1,376	10	30	6	2,828	8
Petrel STATION, Petrel Cove, Dundee Island	NE					3		98	
Pitt Islands	SW								
Pitt Point (Victory Glacier)	NE								
Pléneau Island	SW	10	13	447	19	6	21	370	24
Point Lookout, Elephant Island	EI	4	25	271		6	19	1,131	16
Point Martin, So. Orkneys	SO								
Point Thomas, Admiralty Bay, King George Island	SH								
Point Wild, Elephant Island	EI	1		95		1		108	
Port Charcot, Booth Island	SW								
Portal Point, Charlotte Bay	NW	8	16	592	16	10	17	781	21
Potter Cove	SH								
Primavera STATION (near Cierva Cove SSSI), Trinity Pen.	NW	4	26	152		6	24	159	
Prince Gustav Channel (nonspecific)	NE								
Prospect Point, Graham Land	SW	3		305	24				
Py Point, Doumer Is.	NW								
Robert Is. (nonspecific)	SH								
Robert Point, Robert Island	SH								
Rojas Peak, Lemaire Is.	NW								
Rosamel Island	NE					1		154	
Rothera STATION, Adelaide Island	SW								
Rum Cove, James Ross Island	NE								
Sally Cove, Horseshoe Is.	SW								
San Martin STATION	SW								
Sandefjord Bay, South Orkney Islands	SO								
Sapple Is., South Orkney Islands	SO								
Seymour Island (nonspecific)	NE								
Shingle Cove, Iceberg Bay, Coronation Island	SO					5	25	991	17
Shumskiy Cove, Arrowsmith Peninsula	SW								
Siffrey Point, Trinity Peninsula	NW								
Signy Base, So. Orkneys	SO								
Signy Island (nonspecific)	SO	2		130					
Skontrop Cove, Paradise Bay	NW	7	21	257					
Small Island, Christiana Islands	NW								
Snow Hill Island	NE								
South Bay, Livingston Island	SH					1		125	
Spigot Peak, vic. Orne Harbor (w. coast Graham Land)	NW					1		33	
Spring Point, Brailmont Cove (vic. Sprightly Island, w.coast Graham Land)	NW								
St. Kliment Ohridsky Station (Bulgarian base), Livingston Is.	SH								
Stonington Island	SW								
Suarez Glacier, Paradise Bay	NW								
Takai Peninsula (Takaki Promontory ?)	NW								
Tay Head, Joinville Is.	NE								
Telefon Bay, Deception Island	SH	1		72		12	15	819	20

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		94-95 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	95-96 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Pendulum Cove, Deception Island	SH	41	6	2,803	7	42	6	3,492	6
Penguin Island	SH	24	12	1,692	11	23	12	1,449	16
Penguin Point, Seymour Island	NE	1		41					
Penola Strait (nonspecific)	SW								
Peon Peak, Errera Channel	NW								
Persson Is.	NE								
Petermann Island	SW	42	5	3,406	3	47	4	3,504	5
Petrel STATION, Petrel Cove, Dundee Island	NE								
Pitt Islands	SW	1		87					
Pitt Point (Victory Glacier)	NE								
Pléneau Island	SW	6		374		20	15	1,333	17
Point Lookout, Elephant Island	EI	9	20	951	15	4		442	
Point Martin, So. Orkneys	SO								
Point Thomas, Admiralty Bay, King George Island	SH	1		38					
Point Wild, Elephant Island	EI	3		185		1		26	
Port Charcot, Booth Island	SW					1		74	
Portal Point, Charlotte Bay	NW	8	22	641	21	14	20	890	20
Potter Cove	SH								
Primavera STATION (near Cierva Cove SSSI), Trinity Pen.	NW	2		63					
Prince Gustav Channel (nonspecific)	NE								
Prospect Point, Graham Land	SW	4		291		2		122	
Py Point, Doumer Is.	NW								
Robert Is. (nonspecific)	SH								
Robert Point, Robert Island	SH					2		118	
Rojas Peak, Lemaire Is.	NW								
Rosamel Island	NE								
Rothera STATION, Adelaide Island	SW	2		243		1		160	
Rum Cove, James Ross Island	NE								
Sally Cove, Horseshoe Is.	SW								
San Martin STATION	SW	1		95					
Sandefjord Bay, South Orkney Islands	SO								
Sapple Is., South Orkney Islands	SO								
Seymour Island (nonspecific)	NE					2		99	
Shingle Cove, Iceberg Bay, Coronation Island	SO	4		368		2		153	
Shumskiy Cove, Arrowsmith Peninsula	SW								
Siffrey Point, Trinity Peninsula	NW								
Signy Base, So. Orkneys	SO								
Signy Island (nonspecific)	SO	1		4					
Skontrop Cove, Paradise Bay	NW								
Small Island, Christiana Islands	NW					1		38	
Snow Hill Island	NE	4		304		2		187	
South Bay, Livingston Island	SH								
Spigot Peak, vic. Orne Harbor (w. coast Graham Land)	NW								
Spring Point, Brailmont Cove (vic. Sprightly Island, w.coast Graham Land)	NW					1		48	
St. Kliment Ohridsky Station (Bulgarian base), Livingston Is.	SH								
Stonington Island	SW	2		197					
Suarez Glacier, Paradise Bay	NW								
Takai Peninsula (Takaki Promontory ?)	NW								
Tay Head, Joinville Is.	NE								
Telefon Bay, Deception Island	SH	5		403		7		543	

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		96-97 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	97-98 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Pendulum Cove, Deception Island	SH	44	5	2,725	6	31	8	3,426	7
Penguin Island	SH	12	17	1,090	17	15	14	1,394	14
Penguin Point, Seymour Island	NE								
Penola Strait (nonspecific)	SW								
Peon Peak, Errera Channel	NW								
Persson Is.	NE								
Petermann Island	SW	34	10	2,576	7	42	4	3,866	6
Petrel STATION, Petrel Cove, Dundee Island	NE								
Pitt Islands	SW								
Pitt Point (Victory Glacier)	NE	1		88					
Pléneau Island	SW	24	12	1,803	12	8	24	548	
Point Lookout, Elephant Island	EI	8	23	818	19	7	27	749	22
Point Martin, So. Orkneys	SO	1		80					
Point Thomas, Admiralty Bay, King George Island	SH								
Point Wild, Elephant Island	EI					2		267	
Port Charcot, Booth Island	SW								
Portal Point, Charlotte Bay	NW	5		370		4		118	
Potter Cove	SH								
Primavera STATION (near Cierva Cove SSSI), Trinity Pen.	NW	2		103					
Prince Gustav Channel (nonspecific)	NE	1		105					
Prospect Point, Graham Land	SW					1		91	
Py Point, Doumer Is.	NW								
Robert Is. (nonspecific)	SH								
Robert Point, Robert Island	SH	1		45		6		383	
Rojas Peak, Lemaire Is.	NW								
Rosamel Island	NE								
Rothera STATION, Adelaide Island	SW								
Rum Cove, James Ross Island	NE	1		80					
Sally Cove, Horseshoe Is.	SW								
San Martin STATION	SW								
Sandefjord Bay, South Orkney Islands	SO								
Sapple Is., South Orkney Islands	SO								
Seymour Island (nonspecific)	NE	1		59					
Shingle Cove, Iceberg Bay, Coronation Island	SO	4		295					
Shumskiy Cove, Arrowsmith Peninsula	SW								
Siffrey Point, Trinity Peninsula	NW								
Signy Base, So. Orkneys	SO	1		42					
Signy Island (nonspecific)	SO								
Skontrop Cove, Paradise Bay	NW					1		90	
Small Island, Christiana Islands	NW								
Snow Hill Island	NE	1		35					
South Bay, Livingston Island	SH								
Spigot Peak, vic. Orne Harbor (w. coast Graham Land)	NW					1		97	
Spring Point, Brailmont Cove (vic. Sprightly Island, w.coast Graham Land)	NW								
St. Kliment Ohridsky Station (Bulgarian base), Livingston Is.	SH								
Stonington Island	SW								
Suarez Glacier, Paradise Bay	NW	1		32		1		49	
Takai Peninsula (Takaki Promontory ?)	NW	1		52					
Tay Head, Joinville Is.	NE								
Telefon Bay, Deception Island	SH	4		282		7	25	566	

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		98-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Pendulum Cove, Deception Island	SH	50	4	4,676	3	300	4	26,030	5
Penguin Island	SH	20	14	1,744	13	118	15	9,362	17
Penguin Point, Seymour Island	NE					5		341	
Penola Strait (nonspecific)	SW								
Peon Peak, Errera Channel	NW								
Persson Is.	NE								
Petermann Island	SW	38	7	3,305	10	278	6	24,082	7
Petrel STATION, Petrel Cove, Dundee Island	NE					4		242	
Pitt Islands	SW					1		87	
Pitt Point (Victory Glacier)	NE					1		88	
Pléneau Island	SW	15	18	682		89	17	5,557	21
Point Lookout, Elephant Island	EI	9	26	983	24	59	23	6,589	19
Point Martin, So. Orkneys	SO					1		80	
Point Thomas, Admiralty Bay, King George Island	SH					1		38	
Point Wild, Elephant Island	EI	1		59		15		1,424	
Port Charcot, Booth Island	SW	2		20		3		94	
Portal Point, Charlotte Bay	NW	6		328		56	25	3,813	
Potter Cove	SH								
Primavera STATION (near Cierva Cove SSSI), Trinity Pen.	NW					14		477	
Prince Gustav Channel (nonspecific)	NE					1		105	
Prospect Point, Graham Land	SW	4		294		14		1,103	
Py Point, Doumer Is.	NW								
Robert Is. (nonspecific)	SH								
Robert Point, Robert Island	SH					9		546	
Rojas Peak, Lemaire Is.	NW								
Rosamel Island	NE					2		236	
Rothera STATION, Adelaide Island	SW					4		502	
Rum Cove, James Ross Island	NE					1		80	
Sally Cove, Horseshoe Is.	SW								
San Martin STATION	SW					1		95	
Sandefjord Bay, South Orkney Islands	SO								
Sapple Is., South Orkney Islands	SO								
Seymour Island (nonspecific)	NE	1		119		4		277	
Shingle Cove, Iceberg Bay, Coronation Island	SO	5		342		27		2,863	
Shumskiy Cove, Arrowsmith Peninsula	SW								
Siffrey Point, Trinity Peninsula	NW								
Signy Base, So. Orkneys	SO					1		42	
Signy Island (nonspecific)	SO					4		279	
Skontrop Cove, Paradise Bay	NW	1		98		9		445	
Small Island, Christiana Islands	NW					1		38	
Snow Hill Island	NE	5		482		15		1,223	
South Bay, Livingston Island	SH					1		125	
Spigot Peak, vic. Orne Harbor (w. coast Graham Land)	NW	1		97		3		227	
Spring Point, Brailmont Cove (vic. Sprightly Island, w.coast Graham Land)	NW					1		48	
St. Kliment Ohridsky Station (Bulgarian base), Livingston Is.	SH								
Stonington Island	SW					3		294	
Suarez Glacier, Paradise Bay	NW					2		81	
Takai Peninsula (Takaki Promontory ?)	NW					1		52	
Tay Head, Joinville Is.	NE								
Telefon Bay, Deception Island	SH	13	21	1,039	20	65	21	5,274	23

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		89-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	94-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Pendulum Cove, Deception Island	SH	92	3	8,908	6	208	5	17,122	6
Penguin Island	SH	24	18	1,993	20	94	14	7,369	15
Penguin Point, Seymour Island	NE	4		300		1		41	
Penola Strait (nonspecific)	SW								
Peon Peak, Errera Channel	NW								
Persson Is.	NE								
Petermann Island	SW	75	6	7,425	8	203	6	16,657	7
Petrel STATION, Petrel Cove, Dundee Island	NE	4		242					
Pitt Islands	SW					1		87	
Pitt Point (Victory Glacier)	NE					1		88	
Pléneau Island	SW	16	24	817		73	17	4,740	19
Point Lookout, Elephant Island	EI	22	19	2,646	17	37	25	3,943	21
Point Martin, So. Orkneys	SO					1		80	
Point Thomas, Admiralty Bay, King George Island	SH					1		38	
Point Wild, Elephant Island	EI	8		887		7		537	
Port Charcot, Booth Island	SW					3		94	
Portal Point, Charlotte Bay	NW	19	21	1,466		37	26	2,347	
Potter Cove	SH								
Primavera STATION (near Cierva Cove SSSI), Trinity Pen.	NW	10		311		4		166	
Prince Gustav Channel (nonspecific)	NE					1		105	
Prospect Point, Graham Land	SW	3		305		11		798	
Py Point, Doumer Is.	NW								
Robert Is. (nonspecific)	SH								
Robert Point, Robert Island	SH					9		546	
Rojas Peak, Lemaire Is.	NW								
Rosamel Island	NE	2		236		0		0	
Rothera STATION, Adelaide Island	SW	1		99		3		403	
Rum Cove, James Ross Island	NE					1		80	
Sally Cove, Horseshoe Is.	SW								
San Martin STATION	SW					1		95	
Sandefjord Bay, South Orkney Islands	SO								
Sapple Is., South Orkney Islands	SO								
Seymour Island (nonspecific)	NE					4		277	
Shingle Cove, Iceberg Bay, Coronation Island	SO	12		1,705	23	15		1,158	
Shumskiy Cove, Arrowsmith Peninsula	SW								
Siffrey Point, Trinity Peninsula	NW								
Signy Base, So. Orkneys	SO					1		42	
Signy Island (nonspecific)	SO	3		275		1		4	
Skontrop Cove, Paradise Bay	NW	7		257		2		188	
Small Island, Christiana Islands	NW					1		38	
Snow Hill Island	NE	3		215		12		1,008	
South Bay, Livingston Island	SH	1		125					
Spigot Peak, vic. Orne Harbor (w. coast Graham Land)	NW	1		33		2		194	
Spring Point, Brailmont Cove (vic. Sprightly Island, w.coast Graham Land)	NW					1		48	
St. Kliment Ohridsky Station (Bulgarian base), Livingston Is.	SH								
Stonington Island	SW	1		97		2		197	
Suarez Glacier, Paradise Bay	NW					2		81	
Takai Peninsula (Takaki Promontory ?)	NW					1		52	
Tay Head, Joinville Is.	NE								
Telefon Bay, Deception Island	SH	29	15	2,441	18	36		2,833	24

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		99-00 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	00-01 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	
Pendulum Cove, Deception Island	SH	57	5	5,300	3	45	7	4,211	9
Penguin Island	SH	17	18	1,515	18	9		740	
Penguin Point, Seymour Island	NE								
Penola Strait (nonspecific)	SW								
Peon Peak, Errera Channel	NW					1		7	
Persson Is.	NE								
Petermann Island	SW	48	8	4,159	7	57	3	4,813	5
Petrel STATION, Petrel Cove, Dundee Island	NE								
Pitt Islands	SW	1		53					
Pitt Point (Victory Glacier)	NE	1		85					
Pléneau Island	SW	14	22	730		26	14	1,680	16
Point Lookout, Elephant Island	EI	11		1,095	25	11	23	1,083	20
Point Martin, So. Orkneys	SO								
Point Thomas, Admiralty Bay, King George Island	SH								
Point Wild, Elephant Island	EI					5		638	
Port Charcot, Booth Island	SW					3		16	
Portal Point, Charlotte Bay	NW	10		487		10		590	
Potter Cove	SH					1		6	
Primavera STATION (near Cierva Cove SSSI), Trinity Pen.	NW								
Prince Gustav Channel (nonspecific)	NE					1		129	
Prospect Point, Graham Land	SW					5		265	
Py Point, Doumer Is.	NW					2		93	
Robert Is. (nonspecific)	SH								
Robert Point, Robert Island	SH	1		56					
Rojas Peak, Lemaire Is.	NW								
Rosamel Island	NE								
Rothera STATION, Adelaide Island	SW	2		194		4		20	
Rum Cove, James Ross Island	NE	2		183					
Sally Cove, Horseshoe Is.	SW								
San Martin STATION	SW					2		226	
Sandefjord Bay, South Orkney Islands	SO								
Sapple Is., South Orkney Islands	SO								
Seymour Island (nonspecific)	NE	1		37					
Shingle Cove, Iceberg Bay, Coronation Island	SO	3		226		3		204	
Shumskiy Cove, Arrowsmith Peninsula	SW								
Siffrey Point, Trinity Peninsula	NW								
Signy Base, So. Orkneys	SO					1		123	
Signy Island (nonspecific)	SO								
Skontrop Cove, Paradise Bay	NW	4		185		9		541	
Small Island, Christiana Islands	NW								
Snow Hill Island	NE	5		442					
South Bay, Livingston Island	SH								
Spigot Peak, vic. Orne Harbor (w. coast Graham Land)	NW	1		87		2		171	
Spring Point, Brailmont Cove (vic. Sprightly Island, w.coast Graham Land)	NW								
St. Kliment Ohridsky Station (Bulgarian base), Livingston Is.	SH					2		13	
Stonington Island	SW					4		346	
Suarez Glacier, Paradise Bay	NW	3		263					
Takai Peninsula (Takaki Promontory ?)	NW								
Tay Head, Joinville Is.	NE								
Telefon Bay, Deception Island	SH	9		634		13	22	937	23

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		01-02 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	02-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Pendulum Cove, Deception Island	SH	47	5	4,994	3	42	10	2,447	13
Penguin Island	SH	11	24	1,009	21	14	21	1,262	23
Penguin Point, Seymour Island	NE	4		413		1		56	
Penola Strait (nonspecific)	SW	2		277					
Peon Peak, Errera Channel	NW								
Persson Is.	NE	1		104					
Petermann Island	SW	10	28	721		66	4	6,311	5
Petrel STATION, Petrel Cove, Dundee Island	NE								
Pitt Islands	SW					1		49	
Pitt Point (Victory Glacier)	NE								
Pléneau Island	SW	11	23	917	23	16	19	1,017	24
Point Lookout, Elephant Island	EI	4		300		10		958	
Point Martin, So. Orkneys	SO								
Point Thomas, Admiralty Bay, King George Island	SH								
Point Wild, Elephant Island	EI	1		92		20	17	1,992	17
Port Charcot, Booth Island	SW	1		8		3		29	
Portal Point, Charlotte Bay	NW	10	29	715		4		284	
Potter Cove	SH								
Primavera STATION (near Cierva Cove SSSI), Trinity Pen.	NW								
Prince Gustav Channel (nonspecific)	NE								
Prospect Point, Graham Land	SW					5		377	
Py Point, Doumer Is.	NW								
Robert Is. (nonspecific)	SH	2		163		1		62	
Robert Point, Robert Island	SH	6		532		4		224	
Rojas Peak, Lemaire Is.	NW					1		3	
Rosamel Island	NE								
Rothera STATION, Adelaide Island	SW					2		110	
Rum Cove, James Ross Island	NE								
Sally Cove, Horseshoe Is.	SW					1		6	
San Martin STATION	SW								
Sandefjord Bay, South Orkney Islands	SO					1		110	
Sapple Is., South Orkney Islands	SO					1		396	
Seymour Island (nonspecific)	NE	1		25		2		82	
Shingle Cove, Iceberg Bay, Coronation Island	SO	8		618		6		413	
Shumskiy Cove, Arrowsmith Peninsula	SW					1		127	
Siffrey Point, Trinity Peninsula	NW					1		124	
Signy Base, So. Orkneys	SO								
Signy Island (nonspecific)	SO					1		111	
Skontrop Cove, Paradise Bay	NW	10	26	822		2		136	
Small Island, Christiana Islands	NW								
Snow Hill Island	NE	16	14	1,589	13	7		516	
South Bay, Livingston Island	SH								
Spigot Peak, vic. Orne Harbor (w. coast Graham Land)	NW	1		92		5		380	
Spring Point, Brailmont Cove (vic. Sprightly Island, w.coast Graham Land)	NW								
St. Kliment Ohridsky Station (Bulgarian base), Livingston Is.	SH								
Stonington Island	SW								
Suarez Glacier, Paradise Bay	NW								
Takai Peninsula (Takaki Promontory ?)	NW								
Tay Head, Joinville Is.	NE	3		301					
Telefon Bay, Deception Island	SH	15	16	1,137	19	13	23	995	25

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		99-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Pendulum Cove, Deception Island	SH	191	5	16,952	6	491	4	42,982	5
Penguin Island	SH	51	21	4,526	21	169	16	13,888	18
Penguin Point, Seymour Island	NE	5		469		10		810	
Penola Strait (nonspecific)	SW	2		277		2		277	
Peon Peak, Errera Channel	NW	1		7		1		7	
Persson Is.	NE	1		104		1		104	
Petermann Island	SW	181	8	16,004	8	459	6	40,086	6
Petrel STATION, Petrel Cove, Dundee Island	NE					4		242	
Pitt Islands	SW	2		102		3		189	
Pitt Point (Victory Glacier)	NE	1		85		2		173	
Pléneau Island	SW	67	16	4,344	23	156	18	9,901	24
Point Lookout, Elephant Island	EI	36		3,436		95	25	10,025	23
Point Martin, So. Orkneys	SO					1		80	
Point Thomas, Admiralty Bay, King George Island	SH					1		38	
Point Wild, Elephant Island	EI	26		2,722		41		4,146	
Port Charcot, Booth Island	SW	7		53		10		147	
Portal Point, Charlotte Bay	NW	34		2,076		90		5,889	
Potter Cove	SH	1		6		1		6	
Primavera STATION (near Cierva Cove SSSI), Trinity Pen.	NW					14		477	
Prince Gustav Channel (nonspecific)	NE	1		129		2		234	
Prospect Point, Graham Land	SW	10		642		24		1,745	
Py Point, Doumer Is.	NW	2		93		2		93	
Robert Is. (nonspecific)	SH	3		225		3		225	
Robert Point, Robert Island	SH	11		812		20		1,358	
Rojas Peak, Lemaire Is.	NW	1		3		1		3	
Rosamel Island	NE					2		236	
Rothera STATION, Adelaide Island	SW	8		324		12		826	
Rum Cove, James Ross Island	NE	2		183		3		263	
Sally Cove, Horseshoe Is.	SW	1		6		1		6	
San Martin STATION	SW	2		226		3		321	
Sandefjord Bay, South Orkney Islands	SO	1		110		1		110	
Sapple Is., South Orkney Islands	SO	1		396		1		396	
Seymour Island (nonspecific)	NE	4		144		8		421	
Shingle Cove, Iceberg Bay, Coronation Island	SO	20		1,461		47		4,324	
Shumskiy Cove, Arrowsmith Peninsula	SW	1		127		1		127	
Siffrey Point, Trinity Peninsula	NW	1		124		1		124	
Signy Base, So. Orkneys	SO	1		123		2		165	
Signy Island (nonspecific)	SO	1		111		5		390	
Skontrop Cove, Paradise Bay	NW	25		1,684		34		2,129	
Small Island, Christiana Islands	NW					1		38	
Snow Hill Island	NE	28		2,547		43		3,770	
South Bay, Livingston Island	SH					1		125	
Spigot Peak, vic. Orne Harbor (w. coast Graham Land)	NW	9		730		12		957	
Spring Point, Brailmont Cove (vic. Sprightly Island, w.coast Graham Land)	NW					1		48	
St. Kliment Ohridsky Station (Bulgarian base), Livingston Is.	SH	2		13		2		13	
Stonington Island	SW	4		346		7		640	
Suarez Glacier, Paradise Bay	NW	3		263		5		344	
Takai Peninsula (Takaki Promontory ?)	NW					1		52	
Tay Head, Joinville Is.	NE	3		301		3		301	
Telefon Bay, Deception Island	SH	50	24	3,703	24	115	23	8,977	25

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE				1st Landing	89-90 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Torgersen Island, Arthur Harbor	NW	ST	ZOD	90-91				
Trinity Island (nonspecific; namesake also at So. Georgia)	NW	NS	ZOD	94-95				
Turret Point, King George Bay, King George Island	SH	ASI	CLI	93-94				
Uruguay Is., Argentine Islands	SW		ZOD	00-01				
Useful Island	NW		ZOD	94-95				
Vega Is. (nonspecific)	NE	NS	ZOD	01-02				
View Point, Duse Bay (Trinity Pen.)	NE	ASI	ZOD	95-96				
Waddington Bay, W. Coast, Graham Land	SW		ZOD	02-03				
Waterboat Point (Gonzales Videla STATION), Paradise Bay	NW	ST ASI	ZOD	89-90	9	5	1,038	5
Whalers Bay, Deception Island	SH	ASI	ZOD	89-90	17	1	1,682	1
Wiencke Is. (nonspecific)	NW	NS	ZOD	01-02				
Wilhelmina Bay	NW		ZOD HEL	98-99				
Winter Island, Argentine Islands	SW		ZOD	98-99				
Yalour Islands	SW	ASI	ZOD	90-91				
Yankee Harbor, Greenwich Island	SH	ASI	ZOD	91-92				
TOTALS					164		17,759	
COUNT of SITES VISITED					35			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		90-91 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	91-92 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Torgersen Island, Arthur Harbor	NW	8	9	788	11	8	17	872	17
Trinity Island (nonspecific; namesake also at So. Georgia)	NW								
Turret Point, King George Bay, King George Island	SH								
Uruguay Is., Argentine Islands	SW								
Useful Island	NW								
Vega Is. (nonspecific)	NE								
View Point, Duse Bay (Trinity Pen.)	NE								
Waddington Bay, W. Coast, Graham Land	SW								
Waterboat Point (Gonzales Videla STATION), Paradise Bay	NW	10	4	1,965	1	15	8	2,398	6
Whalers Bay, Deception Island	SH	13	2	1,496	2	23	3	2,899	2
Wiencke Is. (nonspecific)	NW								
Wilhelmina Bay	NW								
Winter Island, Argentine Islands	SW								
Yalour Islands	SW	1		87		2		177	
Yankee Harbor, Greenwich Island	SH					2		763	18
TOTALS		161		19,001		327		38,828	
COUNT of SITES VISITED		32				44			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		92-93 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	93-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Torgersen Island, Arthur Harbor	NW	8	15	890	12	2		126	
Trinity Island (nonspecific; namesake also at So. Georgia)	NW								
Turret Point, King George Bay, King George Island	SH					1		99	
Uruguay Is., Argentine Islands	SW								
Useful Island	NW								
Vega Is. (nonspecific)	NE								
View Point, Duse Bay (Trinity Pen.)	NE								
Waddington Bay, W. Coast, Graham Land	SW								
Waterboat Point (Gonzales Videla STATION), Paradise Bay	NW	19	6	1,671	4	17	10	3,248	4
Whalers Bay, Deception Island	SH	22	5	1,711	3	37	1	3,480	3
Wiencke Is. (nonspecific)	NW								
Wilhelmina Bay	NW								
Winter Island, Argentine Islands	SW								
Yalour Islands	SW					5	26	378	23
Yankee Harbor, Greenwich Island	SH	2		474	18	3		233	
TOTALS		348		27,789		488		50,035	
COUNT of SITES VISITED		50				64			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		94-95 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	95-96 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Torgersen Island, Arthur Harbor	NW	6		545	24	4		325	
Trinity Island (nonspecific; namesake also at So. Georgia)	NW	2		135					
Turret Point, King George Bay, King George Island	SH	1		146		4		180	
Uruguay Is., Argentine Islands	SW								
Useful Island	NW	1		47					
Vega Is. (nonspecific)	NE								
View Point, Duse Bay (Trinity Pen.)	NE					1		99	
Waddington Bay, W. Coast, Graham Land	SW								
Waterboat Point (Gonzales Videla STATION), Paradise Bay	NW	20	13	1,559	12	14	19	2,384	9
Whalers Bay, Deception Island	SH	66	1	5,241	1	67	1	5,033	2
Wiencke Is. (nonspecific)	NW								
Wilhelmina Bay	NW								
Winter Island, Argentine Islands	SW								
Yalour Islands	SW	2		117		3		104	
Yankee Harbor, Greenwich Island	SH	8	24	544	25	19	17	1,893	12
TOTALS		704		52,610		784		61,345	
COUNT of SITES VISITED		75				71			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		96-97 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	97-98 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Torgersen Island, Arthur Harbor	NW	3		192		9	21	890	20
Trinity Island (nonspecific; namesake also at So. Georgia)	NW								
Turret Point, King George Bay, King George Island	SH	3		185		9	22	858	21
Uruguay Is., Argentine Islands	SW								
Useful Island	NW								
Vega Is. (nonspecific)	NE								
View Point, Duse Bay (Trinity Pen.)	NE	3		207					
Waddington Bay, W. Coast, Graham Land	SW								
Waterboat Point (Gonzales Videla STATION), Paradise Bay	NW	12	16	1,095	16	12	17	2,998	9
Whalers Bay, Deception Island	SH	51	3	3,012	4	60	2	5,344	2
Wiencke Is. (nonspecific)	NW								
Wilhelmina Bay	NW								
Winter Island, Argentine Islands	SW								
Yalour Islands	SW	3		118		3		167	
Yankee Harbor, Greenwich Island	SH	7	25	473		7	26	589	
TOTALS		775		54,286		714		66,387	
COUNT of SITES VISITED		81				71			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		98-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Torgersen Island, Arthur Harbor	NW	9	27	671		57	24	5,299	22
Trinity Island (nonspecific; namesake also at So. Georgia)	NW	1		69		3		204	
Turret Point, King George Bay, King George Island	SH	2		138		20		1,606	
Uruguay Is., Argentine Islands	SW								
Useful Island	NW					1		47	
Vega Is. (nonspecific)	NE								
View Point, Duse Bay (Trinity Pen.)	NE	1		88		5		394	
Waddington Bay, W. Coast, Graham Land	SW								
Waterboat Point (Gonzales Videla STATION), Paradise Bay	NW	20	12	3,379	9	148	13	21,735	9
Whalers Bay, Deception Island	SH	69	2	5,427	2	425	1	35,325	1
Wiencke Is. (nonspecific)	NW								
Wilhelmina Bay	NW	1		51		1		51	
Winter Island, Argentine Islands	SW	2		169		2		169	
Yalour Islands	SW	3		158		22		1,306	
Yankee Harbor, Greenwich Island	SH	12	23	1,045	19	60	22	6,014	20
TOTALS		858		74,772		5,323		462,812	
COUNT of SITES VISITED		85				165			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		89-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	94-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Torgersen Island, Arthur Harbor	NW	26	16	2,676	16	31		2,623	
Trinity Island (nonspecific; namesake also at So. Georgia)	NW					3		204	
Turret Point, King George Bay, King George Island	SH	1		99		19		1,507	
Uruguay Is., Argentine Islands	SW								
Useful Island	NW					1		47	
Vega Is. (nonspecific)	NE								
View Point, Duse Bay (Trinity Pen.)	NE					5		394	
Waddington Bay, W. Coast, Graham Land	SW								
Waterboat Point (Gonzales Videla STATION), Paradise Bay	NW	70	9	10,320	4	78	16	11,415	10
Whalers Bay, Deception Island	SH	112	1	11,268	1	313	1	24,057	1
Wiencke Is. (nonspecific)	NW								
Wilhelmina Bay	NW					1		51	
Winter Island, Argentine Islands	SW					2		169	
Yalour Islands	SW	8		642		14		664	
Yankee Harbor, Greenwich Island	SH	7		1,470	25	53	21	4,544	20
TOTALS		1,488		153,412		3,835		309,400	
COUNT of SITES VISITED		84				148			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		99-00 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	00-01 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	
Torgersen Island, Arthur Harbor	NW	8		693		8		738	
Trinity Island (nonspecific; namesake also at So. Georgia)	NW					1		41	
Turret Point, King George Bay, King George Island	SH	1		89		2		181	
Uruguay Is., Argentine Islands	SW					1		53	
Useful Island	NW	2		193		2		202	
Vega Is. (nonspecific)	NE								
View Point, Duse Bay (Trinity Pen.)	NE	2		138					
Waddington Bay, W. Coast, Graham Land	SW								
Waterboat Point (Gonzales Videla STATION), Paradise Bay	NW	15	19	2,871	10	17	17	3,299	10
Whalers Bay, Deception Island	SH	86	2	7,333	2	79	2	7,065	2
Wiencke Is. (nonspecific)	NW								
Wilhelmina Bay	NW					1		97	
Winter Island, Argentine Islands	SW					11	25	933	24
Yalour Islands	SW	9		496		6		551	
Yankee Harbor, Greenwich Island	SH	12		1,040		9		778	
TOTALS		1,101		87,977		1,055		91,829	
COUNT of SITES VISITED		91				118			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		01-02 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	02-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Torgersen Island, Arthur Harbor	NW	7		515		7		637	
Trinity Island (nonspecific; namesake also at So. Georgia)	NW	1		10					
Turret Point, King George Bay, King George Island	SH	1		61		1		66	
Uruguay Is., Argentine Islands	SW					2		145	
Useful Island	NW								
Vega Is. (nonspecific)	NE	1		72					
View Point, Duse Bay (Trinity Pen.)	NE	2		139		4		212	
Waddington Bay, W. Coast, Graham Land	SW					2		110	
Waterboat Point (Gonzales Videla STATION), Paradise Bay	NW	15	15	4,082	8	13	22	2,961	11
Whalers Bay, Deception Island	SH	76	1	6,972	1	95	1	8,934	1
Wiencke Is. (nonspecific)	NW	1		7					
Wilhelmina Bay	NW	3		243					
Winter Island, Argentine Islands	SW								
Yalour Islands	SW					15	20	976	
Yankee Harbor, Greenwich Island	SH	6		655		25	15	2,175	16
TOTALS		866		78,875		1,161		104,084	
COUNT of SITES VISITED		87				109			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE		99-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
Torgersen Island, Arthur Harbor	NW	30		2,583		87		7,882	
Trinity Island (nonspecific; namesake also at So. Georgia)	NW	2		51		5		255	
Turret Point, King George Bay, King George Island	SH	5		397		25		2,003	
Uruguay Is., Argentine Islands	SW	3		198		3		198	
Useful Island	NW	4		395		5		442	
Vega Is. (nonspecific)	NE	1		72		1		72	
View Point, Duse Bay (Trinity Pen.)	NE	8		489		13		883	
Waddington Bay, W. Coast, Graham Land	SW	2		110		2		110	
Waterboat Point (Gonzales Videla STATION), Paradise Bay	NW	60	17	13,213	11	208	15	34,948	9
Whalers Bay, Deception Island	SH	336	1	30,304	1	761	1	65,629	1
Wiencke Is. (nonspecific)	NW	1		7		1		7	
Wilhelmina Bay	NW	4		340		5		391	
Winter Island, Argentine Islands	SW	11		933		13		1,102	
Yalour Islands	SW	30		2,023		52		3,329	
Yankee Harbor, Greenwich Island	SH	52	20	4,648	20	112	24	10,662	21
TOTALS		4,183		362,765		9,506		823,926	
COUNT of SITES VISITED		197				245			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE				1st Landing	89-90 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
ZODIAC LANDINGS IN ASI STUDY AREA								
Number of zodiac landings, all sites					164			
Number of visitors participating in such landings					17,759			
Average visitors per zodiac landing					108			
SITES EXPERIENCING ZODIAC LANDINGS, BY ASI SUBAREA								
SO					2	5.7%		
EI					2	5.7%		
SH					15	42.9%		
NE					3	8.6%		
NW					7	20.0%		
SW					6	17.1%		
TOTAL, sites experiencing zodiac landings					35			
SITES EXPERIENCING ZODIAC LANDINGS FOR THE FIRST TIME, BY ASI SUBAREA								
SO					2	5.7%		
EI					2	5.7%		
SH					15	42.9%		
NE					3	8.6%		
NW					7	20.0%		
SW					6	17.1%		
TOTAL, sites experiencing zodiac landings for the first time					35			
TOTAL, "known" sites experiencing zodiac landings					35			
PERCENTAGE of all known sites visited in this time frame					100.0%			
PERCENTAGE of seasonal site visits at "new" sites					100.0%			
Number of zodiac landings at new sites					164			
Seasonal PERCENTAGE of zodiac landings at new sites					100.0%			
NUMBER OF SITES VISITED ONLY ONCE BY ZODIAC, BY ASI SUBAREA								
SO					1	11.1%		
EI					0	0.0%		
SH					2	22.2%		
NE					1	11.1%		
NW					2	22.2%		
SW					3	23.1%		
TOTAL, number of sites visited only once					9			
PERCENTAGE of all sites visited only once					25.7%			
NUMBER OF ZODIAC LANDINGS, BY ASI SUBAREA								
SO					5	3.0%		
EI					7	4.3%		
SH					82	50.0%		
NE					10	6.1%		
NW					47	28.7%		
SW					13	0.1%		
TOTAL, number of zodiac landings					164			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	90-91 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	91-92 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
ZODIAC LANDINGS IN ASI STUDY AREA								
Number of zodiac landings, all sites	161				327			
Number of visitors participating in such landings	19,001				38,828			
Average visitors per zodiac landing	118				119			
SITES EXPERIENCING ZODIAC LANDINGS, BY ASI SUBAREA								
SO	3	9.4%			3	6.8%		
EI	2	6.3%			2	4.5%		
SH	12	37.5%			20	45.5%		
NE	3	9.4%			5	11.4%		
NW	7	21.9%			10	22.7%		
SW	5	15.6%			4	9.1%		
TOTAL, sites experiencing zodiac landings	32				44			
SITES EXPERIENCING ZODIAC LANDINGS FOR THE FIRST TIME, BY ASI SUBAREA								
SO	2	28.6%			0	0.0%		
EI	0	0.0%			0	0.0%		
SH	0	0.0%			7	58.3%		
NE	1	14.3%			2	16.7%		
NW	2	28.6%			2	16.7%		
SW	2	28.6%			1	8.3%		
TOTAL, sites experiencing zodiac landings for the first time	7				12			
TOTAL, "known" sites experiencing zodiac landings	42				54			
PERCENTAGE of all known sites visited in this time frame	76.2%				81.5%			
PERCENTAGE of seasonal site visits at "new" sites	21.9%				27.3%			
Number of zodiac landings at new sites	16				23			
Seasonal PERCENTAGE of zodiac landings at new sites	9.9%				7.0%			
NUMBER OF SITES VISITED ONLY ONCE BY ZODIAC, BY ASI SUBAREA								
SO	2	28.6%			0	0.0%		
EI	0	0.0%			0	0.0%		
SH	2	28.6%			4	36.4%		
NE	1	14.3%			3	27.3%		
NW	1	14.3%			3	27.3%		
SW	1	4.8%			1	4.8%		
TOTAL, number of sites visited only once	7				11			
PERCENTAGE of all sites visited only once	16.7%				20.4%			
NUMBER OF ZODIAC LANDINGS, BY ASI SUBAREA								
SO	4	2.5%			6	1.8%		
EI	4	2.5%			7	2.1%		
SH	65	40.4%			161	49.2%		
NE	8	5.0%			26	8.0%		
NW	59	36.6%			106	32.4%		
SW	21	0.1%			21	0.1%		
TOTAL, number of zodiac landings	161				327			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	92-93 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	93-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
ZODIAC LANDINGS IN ASI STUDY AREA								
Number of zodiac landings, all sites	348				488			
Number of visitors participating in such landings	27,789				50,035			
Average visitors per zodiac landing	80				103			
SITES EXPERIENCING ZODIAC LANDINGS, BY ASI SUBAREA								
SO	2	4.0%			4	6.3%		
EI	3	6.0%			3	4.7%		
SH	18	36.0%			21	32.8%		
NE	3	6.0%			6	9.4%		
NW	18	36.0%			22	34.4%		
SW	6	12.0%			8	12.5%		
TOTAL, sites experiencing zodiac landings	50				64			
SITES EXPERIENCING ZODIAC LANDINGS FOR THE FIRST TIME, BY ASI SUBAREA								
SO	0	0.0%			1	6.3%		
EI	1	7.1%			0	0.0%		
SH	2	14.3%			4	25.0%		
NE	0	0.0%			1	6.3%		
NW	9	64.3%			7	43.8%		
SW	2	14.3%			3	18.8%		
TOTAL, sites experiencing zodiac landings for the first time	14				16			
TOTAL, "known" sites experiencing zodiac landings	68				84			
PERCENTAGE of all known sites visited in this time frame	73.5%				76.2%			
PERCENTAGE of seasonal site visits at "new" sites	28.0%				25.0%			
Number of zodiac landings at new sites	51				22			
Seasonal PERCENTAGE of zodiac landings at new sites	14.7%				4.5%			
NUMBER OF SITES VISITED ONLY ONCE BY ZODIAC, BY ASI SUBAREA								
SO	1	7.1%			2	9.1%		
EI	1	7.1%			1	4.5%		
SH	6	42.9%			8	36.4%		
NE	1	7.1%			2	9.1%		
NW	4	28.6%			6	27.3%		
SW	1	2.9%			3	6.3%		
TOTAL, number of sites visited only once	14				22			
PERCENTAGE of all sites visited only once	20.6%				26.2%			
NUMBER OF ZODIAC LANDINGS, BY ASI SUBAREA								
SO	3	0.9%			9	1.8%		
EI	6	1.7%			8	1.6%		
SH	132	37.9%			214	43.9%		
NE	20	5.7%			42	8.6%		
NW	153	44.0%			167	34.2%		
SW	34	0.1%			48	0.1%		
TOTAL, number of zodiac landings	348				488			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	94-95 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	95-96 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
ZODIAC LANDINGS IN ASI STUDY AREA								
Number of zodiac landings, all sites	704				784			
Number of visitors participating in such landings	52,610				61,345			
Average visitors per zodiac landing	75				78			
SITES EXPERIENCING ZODIAC LANDINGS, BY ASI SUBAREA								
SO	6	8.0%			3	4.2%		
EI	3	4.0%			2	2.8%		
SH	23	30.7%			22	31.0%		
NE	6	8.0%			10	14.1%		
NW	22	29.3%			24	33.8%		
SW	15	20.0%			10	14.1%		
TOTAL, sites experiencing zodiac landings	75				71			
SITES EXPERIENCING ZODIAC LANDINGS FOR THE FIRST TIME, BY ASI SUBAREA								
SO	2	9.5%			0	0.0%		
EI	1	4.8%			0	0.0%		
SH	6	28.6%			4	21.1%		
NE	2	9.5%			5	26.3%		
NW	5	23.8%			8	42.1%		
SW	5	23.8%			2	10.5%		
TOTAL, sites experiencing zodiac landings for the first time	21				19			
TOTAL, "known" sites experiencing zodiac landings	105				124			
PERCENTAGE of all known sites visited in this time frame	71.4%				57.3%			
PERCENTAGE of seasonal site visits at "new" sites	28.0%				26.8%			
Number of zodiac landings at new sites	29				75			
Seasonal PERCENTAGE of zodiac landings at new sites	4.1%				9.6%			
NUMBER OF SITES VISITED ONLY ONCE BY ZODIAC, BY ASI SUBAREA								
SO	4	16.7%			0	0.0%		
EI	0	0.0%			1	5.3%		
SH	7	29.2%			4	21.1%		
NE	2	8.3%			3	15.8%		
NW	5	20.8%			7	36.8%		
SW	6	8.3%			4	4.8%		
TOTAL, number of sites visited only once	24				19			
PERCENTAGE of all sites visited only once	22.9%				15.3%			
NUMBER OF ZODIAC LANDINGS, BY ASI SUBAREA								
SO	11	1.6%			7	0.9%		
EI	15	2.1%			5	0.6%		
SH	343	48.7%			351	44.8%		
NE	49	7.0%			67	8.5%		
NW	214	30.4%			271	34.6%		
SW	72	0.1%			83	0.1%		
TOTAL, number of zodiac landings	704				784			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	96-97 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	97-98 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
ZODIAC LANDINGS IN ASI STUDY AREA								
Number of zodiac landings, all sites	775				714			
Number of visitors participating in such landings	54,286				66,387			
Average visitors per zodiac landing	70				93			
SITES EXPERIENCING ZODIAC LANDINGS, BY ASI SUBAREA								
SO	6	7.4%			1	1.4%		
EI	2	2.5%			4	5.6%		
SH	21	25.9%			20	28.2%		
NE	17	21.0%			6	8.5%		
NW	26	32.1%			29	40.8%		
SW	9	11.1%			11	15.5%		
TOTAL, sites experiencing zodiac landings	81				71			
SITES EXPERIENCING ZODIAC LANDINGS FOR THE FIRST TIME, BY ASI SUBAREA								
SO	2	11.1%			1	9.1%		
EI	0	0.0%			1	9.1%		
SH	1	5.6%			0	0.0%		
NE	8	44.4%			1	9.1%		
NW	4	22.2%			5	45.5%		
SW	3	16.7%			3	27.3%		
TOTAL, sites experiencing zodiac landings for the first time	18				11			
TOTAL, "known" sites experiencing zodiac landings	142				153			
PERCENTAGE of all known sites visited in this time frame	57.0%				46.4%			
PERCENTAGE of seasonal site visits at "new" sites	22.2%				15.5%			
Number of zodiac landings at new sites	27				12			
Seasonal PERCENTAGE of zodiac landings at new sites	3.5%				1.7%			
NUMBER OF SITES VISITED ONLY ONCE BY ZODIAC, BY ASI SUBAREA								
SO	4	14.3%			1	4.0%		
EI	1	3.6%			2	8.0%		
SH	4	14.3%			2	8.0%		
NE	9	32.1%			3	12.0%		
NW	7	25.0%			11	44.0%		
SW	3	4.1%			6	7.3%		
TOTAL, number of sites visited only once	28				25			
PERCENTAGE of all sites visited only once	19.7%				16.3%			
NUMBER OF ZODIAC LANDINGS, BY ASI SUBAREA								
SO	12	1.5%			1	0.1%		
EI	9	1.2%			11	1.5%		
SH	310	40.0%			299	41.8%		
NE	80	10.3%			38	5.3%		
NW	290	37.4%			284	39.7%		
SW	74	0.1%			82	0.1%		
TOTAL, number of zodiac landings	775				715			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	98-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
ZODIAC LANDINGS IN ASI STUDY AREA								
Number of zodiac landings, all sites	858				5,322			
Number of visitors participating in such landings	74,772				462,756			
Average visitors per zodiac landing	87				87			
SITES EXPERIENCING ZODIAC LANDINGS, BY ASI SUBAREA								
SO	4	4.7%			10	6.1%		
EI	3	3.5%			5	3.0%		
SH	20	23.5%			40	24.2%		
NE	12	14.1%			26	15.8%		
NW	31	36.5%			53	32.1%		
SW	15	17.6%			31	18.8%		
TOTAL, sites experiencing zodiac landings	85				165			
SITES EXPERIENCING ZODIAC LANDINGS FOR THE FIRST TIME, BY ASI SUBAREA								
SO	0	0.0%						
EI	0	0.0%						
SH	1	8.3%						
NE	3	25.0%						
NW	4	33.3%						
SW	4	33.3%						
TOTAL, sites experiencing zodiac landings for the first time	12							
TOTAL, "known" sites experiencing zodiac landings	165							
PERCENTAGE of all known sites visited in this time frame	51.5%							
PERCENTAGE of seasonal site visits at "new" sites	14.1%							
Number of zodiac landings at new sites	15							
Seasonal PERCENTAGE of zodiac landings at new sites	1.7%							
NUMBER OF SITES VISITED ONLY ONCE BY ZODIAC, BY ASI SUBAREA								
SO	0	0.0%						
EI	1	3.3%						
SH	3	10.0%						
NE	6	20.0%						
NW	13	43.3%						
SW	7	7.3%						
TOTAL, number of sites visited only once	30							
PERCENTAGE of all sites visited only once	18.2%							
NUMBER OF ZODIAC LANDINGS, BY ASI SUBAREA								
SO	15	1.7%			73	1.4%		
EI	12	1.4%			84	1.6%		
SH	344	40.1%			2,301	43.2%		
NE	76	8.9%			416	7.8%		
NW	315	36.7%			1,905	35.8%		
SW	96	0.1%			544	0.1%		
TOTAL, number of zodiac landings	858				5,323			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	89-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	94-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
ZODIAC LANDINGS IN ASI STUDY AREA								
Number of zodiac landings, all sites	1,488				3,835			
Number of visitors participating in such landings	153,412				309,400			
Average visitors per zodiac landing	103				81			
SITES EXPERIENCING ZODIAC LANDINGS, BY ASI SUBAREA								
SO	5	6.0%			10	6.8%		
EI	3	3.6%			4	2.7%		
SH	28	33.3%			32	21.6%		
NE	7	8.3%			25	16.9%		
NW	27	32.1%			48	32.4%		
SW	14	16.7%			29	19.6%		
TOTAL, sites experiencing zodiac landings	84				148			
SITES EXPERIENCING ZODIAC LANDINGS FOR THE FIRST TIME, BY ASI SUBAREA								
SO								
EI								
SH								
NE								
NW								
SW								
TOTAL, sites experiencing zodiac landings for the first time								
TOTAL, "known" sites experiencing zodiac landings								
PERCENTAGE of all known sites visited in this time frame								
PERCENTAGE of seasonal site visits at "new" sites								
Number of zodiac landings at new sites								
Seasonal PERCENTAGE of zodiac landings at new sites								
NUMBER OF SITES VISITED ONLY ONCE BY ZODIAC, BY ASI SUBAREA								
SO								
EI								
SH								
NE								
NW								
SW								
TOTAL, number of sites visited only once								
PERCENTAGE of all sites visited only once								
NUMBER OF ZODIAC LANDINGS, BY ASI SUBAREA								
SO	27	1.8%			46	1.2%		
EI	32	2.2%			52	1.4%		
SH	654	44.0%			1,647	42.9%		
NE	106	7.1%			310	8.1%		
NW	532	35.8%			1,373	35.8%		
SW	137	0.1%			407	0.1%		
TOTAL, number of zodiac landings	1,488				3,835			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	99-00 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	00-01 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing
ZODIAC LANDINGS IN ASI STUDY AREA							
Number of zodiac landings, all sites	1,101				1,055		
Number of visitors participating in such landings	87,977				91,829		
Average visitors per zodiac landing	80				87		
SITES EXPERIENCING ZODIAC LANDINGS, BY ASI SUBAREA							
SO	4	4.4%			3	2.5%	
EI	1	1.1%			2	1.7%	
SH	22	24.2%			25	21.2%	
NE	14	15.4%			12	10.2%	
NW	35	38.5%			46	39.0%	
SW	15	16.5%			30	25.4%	
TOTAL, sites experiencing zodiac landings	91				118		
SITES EXPERIENCING ZODIAC LANDINGS FOR THE FIRST TIME, BY ASI SUBAREA							
SO	0	0.0%			0	0.0%	
EI	0	0.0%			0	0.0%	
SH	0	0.0%			8	22.9%	
NE	2	18.2%			4	11.4%	
NW	6	54.5%			15	42.9%	
SW	3	27.3%			8	22.9%	
TOTAL, sites experiencing zodiac landings for the first time	11				35		
TOTAL, "known" sites experiencing zodiac landings	176				211		
PERCENTAGE of all known sites visited in this time frame	51.7%				55.9%		
PERCENTAGE of seasonal site visits at "new" sites	12.1%				29.7%		
Number of zodiac landings at new sites	16				54		
Seasonal PERCENTAGE of zodiac landings at new sites	1.5%				5.1%		
NUMBER OF SITES VISITED ONLY ONCE BY ZODIAC, BY ASI SUBAREA							
SO	2	7.1%			2	3.9%	
EI	0	0.0%			0	0.0%	
SH	5	17.9%			12	23.5%	
NE	3	10.7%			6	11.8%	
NW	9	32.1%			20	39.2%	
SW	9	8.5%			11	5.7%	
TOTAL, number of sites visited only once	28				51		
PERCENTAGE of all sites visited only once	15.9%				24.2%		
NUMBER OF ZODIAC LANDINGS, BY ASI SUBAREA							
SO	17	1.5%			5	0.5%	
EI	11	1.0%			16	1.5%	
SH	405	36.8%			329	31.2%	
NE	129	11.7%			76	7.2%	
NW	433	39.3%			436	41.3%	
SW	106	0.1%			193	0.2%	
TOTAL, number of zodiac landings	1,101				1,055		

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	01-02 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	02-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
ZODIAC LANDINGS IN ASI STUDY AREA								
Number of zodiac landings, all sites	866				1,161			
Number of visitors participating in such landings	78,875				104,084			
Average visitors per zodiac landing	91				90			
SITES EXPERIENCING ZODIAC LANDINGS, BY ASI SUBAREA								
SO	3	3.4%			9	8.3%		
EI	4	4.6%			2	1.8%		
SH	24	27.6%			30	27.5%		
NE	13	14.9%			15	13.8%		
NW	35	40.2%			31	28.4%		
SW	8	9.2%			22	20.2%		
TOTAL, sites experiencing zodiac landings	87				109			
SITES EXPERIENCING ZODIAC LANDINGS FOR THE FIRST TIME, BY ASI SUBAREA								
SO	1	9.1%			4	17.4%		
EI	0	0.0%			0	0.0%		
SH	2	18.2%			4	17.4%		
NE	4	36.4%			3	13.0%		
NW	2	18.2%			6	26.1%		
SW	2	18.2%			6	26.1%		
TOTAL, sites experiencing zodiac landings for the first time	11				23			
TOTAL, "known" sites experiencing zodiac landings	222				245			
PERCENTAGE of all known sites visited in this time frame	39.2%				44.5%			
PERCENTAGE of seasonal site visits at "new" sites	12.6%				21.1%			
Number of zodiac landings at new sites	14				28			
Seasonal PERCENTAGE of zodiac landings at new sites	1.6%				2.4%			
NUMBER OF SITES VISITED ONLY ONCE BY ZODIAC, BY ASI SUBAREA								
SO	1	3.1%			7	16.3%		
EI	3	9.4%			0	0.0%		
SH	10	31.3%			10	23.3%		
NE	4	12.5%			8	18.6%		
NW	12	37.5%			7	16.3%		
SW	2	6.1%			11	6.5%		
TOTAL, number of sites visited only once	32				43			
PERCENTAGE of all sites visited only once	14.4%				17.6%			
NUMBER OF ZODIAC LANDINGS, BY ASI SUBAREA								
SO	16	1.8%			17	1.5%		
EI	7	0.8%			30	2.6%		
SH	315	36.4%			396	34.1%		
NE	121	14.0%			97	8.4%		
NW	374	43.2%			453	39.0%		
SW	33	0.0%			168	0.2%		
TOTAL, number of zodiac landings	866				1,161			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	99-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
ZODIAC LANDINGS IN ASI STUDY AREA								
Number of zodiac landings, all sites	4,183				9,506			
Number of visitors participating in such landings	362,765				823,926			
Average visitors per zodiac landing	87				87			
SITES EXPERIENCING ZODIAC LANDINGS, BY ASI SUBAREA								
SO	13	6.6%			15	6.1%		
EI	4	2.0%			5	2.0%		
SH	42	21.3%			54	22.0%		
NE	29	14.7%			39	15.9%		
NW	65	33.0%			82	33.5%		
SW	44	22.3%			50	20.4%		
TOTAL, sites experiencing zodiac landings	197				245			
SITES EXPERIENCING ZODIAC LANDINGS FOR THE FIRST TIME, BY ASI SUBAREA								
SO								
EI								
SH								
NE								
NW								
SW								
TOTAL, sites experiencing zodiac landings for the first time								
TOTAL, "known" sites experiencing zodiac landings								
PERCENTAGE of all known sites visited in this time frame								
PERCENTAGE of seasonal site visits at "new" sites								
Number of zodiac landings at new sites								
Seasonal PERCENTAGE of zodiac landings at new sites								
NUMBER OF SITES VISITED ONLY ONCE BY ZODIAC, BY ASI SUBAREA								
SO								
EI								
SH								
NE								
NW								
SW								
TOTAL, number of sites visited only once								
PERCENTAGE of all sites visited only once								
NUMBER OF ZODIAC LANDINGS, BY ASI SUBAREA								
SO	55	1.3%			128	1.3%		
EI	64	1.5%			148	1.6%		
SH	1,445	34.5%			3,746	39.4%		
NE	423	10.1%			839	8.8%		
NW	1,696	40.5%			3,601	37.9%		
SW	500	0.1%			1,044	0.1%		
TOTAL, number of zodiac landings	4,183				9,506			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE				1st Landing	89-90 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
VISITORS PARTICIPATING IN ZODIAC LANDINGS, BY SUBAREA								
SO					581	3.3%		
EI					806	4.5%		
SH					8,499	47.9%		
NE					1,042	5.9%		
NW					5,345	30.1%		
SW					1,486	8.4%		
TOTAL, visitors participating in zodiac landings					17,759			
ZODIAC LANDINGS AND PARTICIPATING VISITORS AT MOST HEAVILY VISITED SITES								
"Top 10" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 10" sites					94			
% ZODIAC LANDINGS @ "Top 10" sites					57.3%			
Total PARTICIPATING VISITORS @ "Top 10" sites					10,322			
% PARTICIPATING VISITORS @ "Top 10" sites					58.1%			
"Top 15" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 15" sites					123			
% ZODIAC LANDINGS @ "Top 15" sites					75.0%			
Total PARTICIPATING VISITORS @ "Top 15" sites					13,362			
% PARTICIPATING VISITORS @ "Top 15" sites					75.2%			
"Top 20" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 20" sites					142			
% ZODIAC LANDINGS @ "Top 20" sites					86.6%			
Total PARTICIPATING VISITORS @ "Top 20" sites					15,395			
% PARTICIPATING VISITORS @ "Top 20" sites					86.7%			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	90-91 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	91-92 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
VISITORS PARTICIPATING IN ZODIAC LANDINGS, BY SUBAREA								
SO	259	1.4%			758	2.0%		
EI	275	1.4%			847	2.2%		
SH	7,826	41.2%			17,955	46.2%		
NE	1,452	7.6%			3,837	9.9%		
NW	7,243	38.1%			13,128	33.8%		
SW	1,946	10.2%			2,303	5.9%		
TOTAL, visitors participating in zodiac landings	19,001				38,828			
ZODIAC LANDINGS AND PARTICIPATING VISITORS AT MOST HEAVILY VISITED SITES								
"Top 10" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 10" sites	101				193			
% ZODIAC LANDINGS @ "Top 10" sites	62.7%				59.0%			
Total PARTICIPATING VISITORS @ "Top 10" sites	11,956				23,741			
% PARTICIPATING VISITORS @ "Top 10" sites	62.9%				61.1%			
"Top 15" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 15" sites	129				250			
% ZODIAC LANDINGS @ "Top 15" sites	80.1%				76.5%			
Total PARTICIPATING VISITORS @ "Top 15" sites	14,941				29,808			
% PARTICIPATING VISITORS @ "Top 15" sites	78.6%				76.8%			
"Top 20" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 20" sites	144				283			
% ZODIAC LANDINGS @ "Top 20" sites	89.4%				86.5%			
Total PARTICIPATING VISITORS @ "Top 20" sites	17,663				33,687			
% PARTICIPATING VISITORS @ "Top 20" sites	93.0%				86.8%			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	92-93 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	93-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
VISITORS PARTICIPATING IN ZODIAC LANDINGS, BY SUBAREA								
SO	257	0.9%			1,458	2.9%		
EI	394	1.4%			1,357	2.7%		
SH	10,904	39.2%			21,891	43.8%		
NE	1,792	6.4%			3,879	7.8%		
NW	11,371	40.9%			16,960	33.9%		
SW	3,071	11.1%			4,490	9.0%		
TOTAL, visitors participating in zodiac landings	27,789				50,035			
ZODIAC LANDINGS AND PARTICIPATING VISITORS AT MOST HEAVILY VISITED SITES								
"Top 10" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 10" sites	197				282			
% ZODIAC LANDINGS @ "Top 10" sites	56.6%				57.8%			
Total PARTICIPATING VISITORS @ "Top 10" sites	16,706				30,111			
% PARTICIPATING VISITORS @ "Top 10" sites	60.1%				60.2%			
"Top 15" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 15" sites	244				353			
% ZODIAC LANDINGS @ "Top 15" sites	70.1%				72.3%			
Total PARTICIPATING VISITORS @ "Top 15" sites	20,312				37,993			
% PARTICIPATING VISITORS @ "Top 15" sites	73.1%				75.9%			
"Top 20" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 20" sites	281				394			
% ZODIAC LANDINGS @ "Top 20" sites	80.7%				80.7%			
Total PARTICIPATING VISITORS @ "Top 20" sites	22,626				42,949			
% PARTICIPATING VISITORS @ "Top 20" sites	81.4%				85.8%			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	94-95 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	95-96 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
VISITORS PARTICIPATING IN ZODIAC LANDINGS, BY SUBAREA								
SO	912	1.7%			557	0.9%		
EI	1,395	2.7%			468	0.8%		
SH	27,130	51.6%			28,108	45.8%		
NE	4,234	8.0%			5,242	8.5%		
NW	13,313	25.3%			21,199	34.6%		
SW	5,626	10.7%			5,771	9.4%		
TOTAL, visitors participating in zodiac landings	52,610				61,345			
ZODIAC LANDINGS AND PARTICIPATING VISITORS AT MOST HEAVILY VISITED SITES								
"Top 10" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 10" sites	416				435			
% ZODIAC LANDINGS @ "Top 10" sites	59.1%				55.5%			
Total PARTICIPATING VISITORS @ "Top 10" sites	30,991				35,823			
% PARTICIPATING VISITORS @ "Top 10" sites	58.9%				58.4%			
"Top 15" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 15" sites	510				543			
% ZODIAC LANDINGS @ "Top 15" sites	72.4%				69.3%			
Total PARTICIPATING VISITORS @ "Top 15" sites	37,478				43,051			
% PARTICIPATING VISITORS @ "Top 15" sites	71.2%				70.2%			
"Top 20" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 20" sites	558				626			
% ZODIAC LANDINGS @ "Top 20" sites	79.3%				79.8%			
Total PARTICIPATING VISITORS @ "Top 20" sites	41,767				50,788			
% PARTICIPATING VISITORS @ "Top 20" sites	79.4%				82.8%			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	96-97 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	97-98 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
VISITORS PARTICIPATING IN ZODIAC LANDINGS, BY SUBAREA								
SO	1,102	2.0%			115	0.2%		
EI	868	1.6%			1,228	1.8%		
SH	21,194	39.0%			27,494	41.4%		
NE	6,198	11.4%			3,416	5.1%		
NW	19,267	35.5%			27,268	41.1%		
SW	5,657	10.4%			6,866	10.3%		
TOTAL, visitors participating in zodiac landings	54,286				66,387			
ZODIAC LANDINGS AND PARTICIPATING VISITORS AT MOST HEAVILY VISITED SITES								
"Top 10" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 10" sites	435				413			
% ZODIAC LANDINGS @ "Top 10" sites	56.1%				57.8%			
Total PARTICIPATING VISITORS @ "Top 10" sites	28,170				39,666			
% PARTICIPATING VISITORS @ "Top 10" sites	51.9%				59.7%			
"Top 15" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 15" sites	548				499			
% ZODIAC LANDINGS @ "Top 15" sites	70.7%				69.8%			
Total PARTICIPATING VISITORS @ "Top 15" sites	37,442				45,881			
% PARTICIPATING VISITORS @ "Top 15" sites	69.0%				69.1%			
"Top 20" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 20" sites	604				557			
% ZODIAC LANDINGS @ "Top 20" sites	77.9%				77.9%			
Total PARTICIPATING VISITORS @ "Top 20" sites	41,832				52,666			
% PARTICIPATING VISITORS @ "Top 20" sites	77.1%				79.3%			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	98-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
VISITORS PARTICIPATING IN ZODIAC LANDINGS, BY SUBAREA								
SO	1,317	1.8%			7,316	1.6%		
EI	1,312	1.8%			8,950	1.9%		
SH	29,886	40.0%			200,887	43.4%		
NE	7,181	9.6%			38,273	8.3%		
NW	28,123	37.6%			163,217	35.3%		
SW	6,953	9.3%			44,169	9.5%		
TOTAL, visitors participating in zodiac landings	74,772				462,812			
ZODIAC LANDINGS AND PARTICIPATING VISITORS AT MOST HEAVILY VISITED SITES								
"Top 10" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 10" sites	478				2,886			
% ZODIAC LANDINGS @ "Top 10" sites	55.7%				54.2%			
Total PARTICIPATING VISITORS @ "Top 10" sites	42,855				256,352			
% PARTICIPATING VISITORS @ "Top 10" sites	57.3%				55.4%			
"Top 15" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 15" sites	577				3,600			
% ZODIAC LANDINGS @ "Top 15" sites	67.2%				67.6%			
Total PARTICIPATING VISITORS @ "Top 15" sites	53,228				320,697			
% PARTICIPATING VISITORS @ "Top 15" sites	71.2%				69.3%			
"Top 20" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 20" sites	649				4,040			
% ZODIAC LANDINGS @ "Top 20" sites	75.6%				75.9%			
Total PARTICIPATING VISITORS @ "Top 20" sites	58,846				359,045			
% PARTICIPATING VISITORS @ "Top 20" sites	78.7%				77.6%			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	89-94 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	94-99 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
VISITORS PARTICIPATING IN ZODIAC LANDINGS, BY SUBAREA								
SO	3,313	2.2%			4,003	1.3%		
EI	3,679	2.4%			5,271	1.7%		
SH	67,075	43.7%			133,812	43.2%		
NE	12,002	7.8%			26,271	8.5%		
NW	54,047	35.2%			109,170	35.3%		
SW	13,296	8.7%			30,873	10.0%		
TOTAL, visitors participating in zodiac landings	153,412				309,400			
ZODIAC LANDINGS AND PARTICIPATING VISITORS AT MOST HEAVILY VISITED SITES								
"Top 10" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 10" sites								
% ZODIAC LANDINGS @ "Top 10" sites								
Total PARTICIPATING VISITORS @ "Top 10" sites								
% PARTICIPATING VISITORS @ "Top 10" sites								
"Top 15" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 15" sites								
% ZODIAC LANDINGS @ "Top 15" sites								
Total PARTICIPATING VISITORS @ "Top 15" sites								
% PARTICIPATING VISITORS @ "Top 15" sites								
"Top 20" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 20" sites								
% ZODIAC LANDINGS @ "Top 20" sites								
Total PARTICIPATING VISITORS @ "Top 20" sites								
% PARTICIPATING VISITORS @ "Top 20" sites								

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	99-00 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	00-01 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing
VISITORS PARTICIPATING IN ZODIAC LANDINGS, BY SUBAREA							
SO	1,753	2.0%			370	0.4%	
EI	1,095	1.2%			1,721	1.9%	
SH	29,145	33.1%			30,594	33.3%	
NE	10,568	12.0%			6,970	7.6%	
NW	37,632	42.8%			38,448	41.9%	
SW	7,784	8.8%			13,726	14.9%	
TOTAL, visitors participating in zodiac landings	87,977				91,829		
ZODIAC LANDINGS AND PARTICIPATING VISITORS AT MOST HEAVILY VISITED SITES							
"Top 10" Sites by LDG							
Total ZODIAC LANDINGS @ "Top 10" sites	596				551		
% ZODIAC LANDINGS @ "Top 10" sites	54.1%				52.2%		
Total PARTICIPATING VISITORS @ "Top 10" sites	46,646				50,055		
% PARTICIPATING VISITORS @ "Top 10" sites	53.0%				54.5%		
"Top 15" Sites by LDG							
Total ZODIAC LANDINGS @ "Top 15" sites	741				689		
% ZODIAC LANDINGS @ "Top 15" sites	67.3%				65.3%		
Total PARTICIPATING VISITORS @ "Top 15" sites	58,400				63,619		
% PARTICIPATING VISITORS @ "Top 15" sites	66.4%				69.3%		
"Top 20" Sites by LDG							
Total ZODIAC LANDINGS @ "Top 20" sites	831				770		
% ZODIAC LANDINGS @ "Top 20" sites	75.5%				73.0%		
Total PARTICIPATING VISITORS @ "Top 20" sites	67,446				72,090		
% PARTICIPATING VISITORS @ "Top 20" sites	76.7%				78.5%		

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	01-02 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	02-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
VISITORS PARTICIPATING IN ZODIAC LANDINGS, BY SUBAREA								
SO	1,480	1.9%			1,949	1.9%		
EI	500	0.6%			2,950	2.8%		
SH	30,401	38.5%			35,474	34.1%		
NE	11,281	14.3%			8,324	8.0%		
NW	32,745	41.5%			42,202	40.5%		
SW	2,468	3.1%			13,185	12.7%		
TOTAL, visitors participating in zodiac landings	78,875				104,084			
ZODIAC LANDINGS AND PARTICIPATING VISITORS AT MOST HEAVILY VISITED SITES								
"Top 10" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 10" sites	470				621			
% ZODIAC LANDINGS @ "Top 10" sites	54.3%				53.5%			
Total PARTICIPATING VISITORS @ "Top 10" sites	42,951				55,989			
% PARTICIPATING VISITORS @ "Top 10" sites	54.5%				53.8%			
"Top 15" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 15" sites	564				773			
% ZODIAC LANDINGS @ "Top 15" sites	65.1%				66.6%			
Total PARTICIPATING VISITORS @ "Top 15" sites	53,914				70,757			
% PARTICIPATING VISITORS @ "Top 15" sites	68.4%				68.0%			
"Top 20" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 20" sites	631				864			
% ZODIAC LANDINGS @ "Top 20" sites	72.9%				74.4%			
Total PARTICIPATING VISITORS @ "Top 20" sites	59,480				73,229			
% PARTICIPATING VISITORS @ "Top 20" sites	75.4%				70.4%			

Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003

SITE	99-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)	89-03 Zodiac Landings	Rank (1-25)	Visitors by Zodiac Landing	Rank (1-25)
VISITORS PARTICIPATING IN ZODIAC LANDINGS, BY SUBAREA								
SO	5,552	1.5%			12,868	1.6%		
EI	6,266	1.7%			15,216	1.8%		
SH	125,614	34.6%			324,850	39.4%		
NE	37,143	10.2%			75,416	9.2%		
NW	151,027	41.6%			314,244	38.1%		
SW	37,163	10.2%			81,332	9.9%		
TOTAL, visitors participating in zodiac landings	362,765				823,926			
ZODIAC LANDINGS AND PARTICIPATING VISITORS AT MOST HEAVILY VISITED SITES								
"Top 10" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 10" sites	2,148				4,956			
% ZODIAC LANDINGS @ "Top 10" sites	51.4%				52.1%			
Total PARTICIPATING VISITORS @ "Top 10" sites	193,836				440,538			
% PARTICIPATING VISITORS @ "Top 10" sites	53.4%				53.5%			
"Top 15" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 15" sites	2,712				6,141			
% ZODIAC LANDINGS @ "Top 15" sites	64.8%				64.6%			
Total PARTICIPATING VISITORS @ "Top 15" sites	239,918				557,093			
% PARTICIPATING VISITORS @ "Top 15" sites	66.1%				67.6%			
"Top 20" Sites by LDG								
Total ZODIAC LANDINGS @ "Top 20" sites	3,008				6,919			
% ZODIAC LANDINGS @ "Top 20" sites	71.9%				72.8%			
Total PARTICIPATING VISITORS @ "Top 20" sites	271,267				615,057			
% PARTICIPATING VISITORS @ "Top 20" sites	74.8%				74.6%			

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Zodiac landings by tourist ships in the Antarctic Peninsula region, 1989–99

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ABSTRACT. This paper examines the location, intensity, and frequency of zodiac landings by passengers on tourist ships in the Antarctic Peninsula region during 10 seasons, 1989/90 through 1998/99. In this period, the number of passengers increased 307%, from 2460 to 10,013. Zodiac landings have occurred at 165 Peninsula region sites, concentrating in the South Shetland Islands and the northwestern part of the Peninsula. From 1989/90 to 1998/99, the number of zodiac landings in the Peninsula region increased 423%, from 164 to 858. The most visited sites are identified, as are sites experiencing increases in the second half of this 10-year period. The 10 and 20 sites experiencing the most zodiac landings each season consistently account for approximately 55% and 75% of that season's landings, respectively. Based on 1998/99 data, sites with high or medium species diversity or with high or moderate sensitivity to potential environmental disturbance account for a significant percentage of landings. Recommendations are presented for improving the assessment of potential environmental impacts at zodiac landing sites, and for improved methods of reporting site visits by the tour operators involved.

Contents

Introduction

Tour ships have been visiting Antarctica for more than 30 years. Most visits occur during the austral summer, between November and February, when conditions allow approaches to the continent's marine fringe. Since its inception, Antarctic tourism has involved bringing visitors ashore to view wildlife or to visit geographical or historical features. This is accomplished by use of inflatable, rubber landing craft known as zodiacs.

Beginning with the 1989/90 Antarctic tour season, the US National Science Foundation Office of Polar Programs (NSF) has collected data on Antarctic tourism, based entirely on site-visit reports submitted by Antarctic tour operators (NSF 1990–99). Both US-based and non-US-based tour operators submit reports to NSF, whether or not they are members of the International Association of Antarctic Tour Operators (IAATO), an industry trade group established to self-monitor tourism activities in the Antarctic.

The NSF compilations list more than 250 sites visited by tourists in the Antarctic Peninsula–Dronning Maud Land–South Georgia–Falklands Islands region. The compilations indicate sites where visitor activities take place, the types of activities taking place, the frequency of such activities, and the number of visiting passengers who are involved. Although yachts have visited Antarctica since 1966 (Rubin 1996), the NSF compilations do not record either visits by individual yachts to tourist sites on the Antarctic Peninsula, or the number of yacht passengers visiting particular sites.

Interest in the potential environmental impacts of tourism and tourist visitation has been spurred by the Protocol on Environmental Protection to the Antarctic Treaty, which entered into force in January 1998. The Protocol deals with governmental and non-governmental activities, including tourism, and intends to ensure that such activities do not have adverse impacts on the Antarctic environment. These impacts may be short- or long-term, immediate or cumulative. Under the Protocol, environmental concerns must be assessed and evaluated in advance, before any human activity may proceed (Naveen 1996).

Recommendation XVIII-1, adopted at the 1994 Antarctic Treaty Consultative Meeting in Kyoto, Japan,

establishes Guidance for Visitors to the Antarctic and Guidance for those Organising and Conducting Tourism and Non-governmental Activities in the Antarctic (ATCPs 1994). The guidance intends that all Antarctic visitors — whether passengers on tour ships or the ship's expedition staff, officers, and crew — be aware of relevant aspects of the Treaty and Protocol, and emphasizes that everyone must comply fully with national laws and regulations applicable to their activities (ATCPs 1994).

Environmental changes may occur naturally, flow from human activities, or result from other direct, consequential, synergistic, and cumulative effects (Benninghoff and Bonner 1985; Abbott and Benninghoff 1990). Because a prime concern of the Protocol is whether environmental changes may occur as a result of visitor use, the authors are guided by the view that overall numbers of visitors and tour ships are less important than:

- *where* visitors make landings;
- *how many* visitors go ashore during zodiac landings (that is, the intensity of use of landing sites); and
- *how frequently* zodiac landings occur

(Benninghoff and Bonner 1985; Abbott and Benninghoff 1990; Trivelpiece 1991; Naveen 1996; Emslie 1997; Naveen 1997a). This paper reviews the landings data in the NSF compilations to ascertain what patterns of use of visitor sites have occurred in the region of the Antarctic Peninsula during the period 1989–99, and analyzes how tourist visitation relates to the characteristics of the sites being visited.

In examining these factors, the authors rely on descriptive information and census data that have been collected between 1994 and 2000 as part of the Antarctic Site Inventory, a long-term monitoring project. Since its inception, the Inventory has used opportunistic ship visits to examine the physical features, flora, and fauna of sites in the Antarctic Peninsula region that are visited by ship-based tourists. A prime objective of the Inventory is to develop baselines that can be used to detect possible changes in the physical and biological variables monitored by the project. Site visits are achieved by placing Inventory researchers aboard expedition tour ships at key census times each austral spring and summer, coinciding with the peak of penguin egg-laying (for appropriate nest censuses) and the peak of penguin chick-crèching (for appropriate chick censuses). Site visits and aerial photo-documentation also are undertaken in cooperation with the Royal Navy ice patrol vessel HMS *Endurance* (Naveen 1996, 1997a).

Methods

To examine zodiac landing patterns, the Antarctic Peninsula region was divided into the six sub-areas adopted by the Inventory (Naveen 1996, 1997a, 1997b; Naveen and others 2000), the designations of which are:

- South Orkneys (SO), including Laurie, Coronation, and Signy islands;
- Elephant Island and nearby islands (EI);
- South Shetland Islands (SH), including Deception, Low, and Smith islands;
- Northeast Antarctic Peninsula (NE), from Cape Dubouzet (63°16'S, 64°00'W) and Joinville Island (63°15'S, 55°45'W) to James Ross Island (64°10'S, 57°45'W);
- Northwest Antarctic Peninsula (NW), from Cape Dubouzet to the northern end of the Lemaire Channel (65°04'S, 63°57'W); and
- Southwest Antarctic Peninsula (SW), from the northern end of the Lemaire Channel to the northern part of Marguerite Bay (68°18'S, 67°11'W).

Throughout this paper, 'zodiac landing' and 'landing' both refer to instances of passengers being carried by zodiacs to a particular site where these passengers actually set foot ashore. 'Visitors' refers to the number of passengers participating in these zodiac landings who set foot ashore.

The data used for this paper excluded from the NSF compilations sites occurring outside of the Antarctic Peninsula region and the visits not involving zodiac landings (that is, zodiac cruises without shore landings, helicopter landings and overflights, scuba and snorkeling, ice walking, and camping). This yielded a total of 165 different sites where visitors made zodiac landings in this region during 1989–99.

Between November 1994 and February 2000, data were collected for the Antarctic Site Inventory regarding the presence or absence of nesting species of penguins and flying birds, wallows of southern elephant seals, and large patches or beds of lichens and mosses at 59 locations (Naveen 1996, 1997a). These include the most heavily visited sites in the Peninsula region— whether calculated by zodiac landings or visitors — in the 10 seasons between 1989/90 and 1998/99. These presence/absence data were used to rank zodiac landing sites according to the number of faunal species and major floral groups recorded, according to whether nests, wallows, and floral groups may be easily accessed by tour ship visitors during a regular zodiac landing.

National Science Foundation data

As noted in Table 1, the annual number of shipborne Antarctic tourists reported to NSF/OPP increased from 2460 in the 1989/90 season to 10,013 in the 1998/99 season, an increase of 307%. Concomitantly, over the same period, the number of zodiac landings increased from 164 to 858, a 423% increase. Virtually all Antarctic zodiac landings occur in the Peninsula region.

Since the 1993/94 season, the number of Antarctic tour ships has increased from 11 to 15. The number of seasonal departures from ports to the Antarctic has ranged from 65 in the 1993/94 season to 102 in the 1998/99 season, reaching a peak of 113 in the 1995/96 season (Fig. 1).

In 1994/95 the Antarctic tourism industry experienced an influx of small capacity vessels, carrying maximum passenger loads of 75 or fewer passengers (see Table 2). During the six seasons from 1993/94 to 1998/99, the number of medium capacity vessels (divided into those carrying 76–100 passengers and those carrying 101–180 passengers) and large capacity vessels (carrying 181 or

Table 1. Antarctic tour ship passengers and zodiac landings, 1989/90 to 1998/99. NA = not available.

Season	Number of tour ship passengers	Landings, Peninsula + Ross Sea	Landings in Ross Sea region	Landings in Peninsula region	Percentage of landings in Peninsula region
89/90	2460	NA	NA	164	NA
90/91	4698	NA	NA	161	NA
91/92	7103	NA	NA	327	NA
92/93	6166	392	44	348	88.8
93/94	7597	494	6	488	98.8
94/95	8090	716	12	704	98.3
95/96	9212	794	10	784	98.7
96/97	7322	814	39	775	95.2
97/98	9473	750	36	714	95.2
98/99	10,013	884	26	858	97.1

more passengers) has remained relatively constant (Table 2).

Considering the entire complement of Antarctic tour ships, there has been a general increase in the number of departures per ship and in zodiac landings per departure during the six seasons from 1993/94 to 1998/99 (Fig. 2). The 1996/97 peak of 8.0 departures per ship was more than two departures per trip higher than the mean of 5.9 departures per ship in 1993/94. However, it is not apparent from visitation data compiled by the NSF whether this increase represents a reduction in average trip length or a lengthening of the Antarctic tour season (NSF 1990–99). In the two most recent seasons analyzed, 1997/98 and 1998/99, the number of departures per ship declined, reaching a mean of 6.8 in the latter season. The number of zodiac landings per departure reached a peak of 8.7 in 1998/99, more than one zodiac landing per departure higher than at the start of the six-season period.

Where landings occur in the Antarctic Peninsula region

Geographical distribution

The distribution of visitor landings has been relatively consistent throughout the 10-season period of this study (Table 3). Most visits were concentrated in the South Shetland Islands (43.2% of all landings) and the northwestern part of the Peninsula (35.9% of all landings). During the decade, there were non-significant increases in visitation to three sub-areas — the northeast Peninsula (7.1% to 7.9%), the northwest Peninsula (35.8% to 36.0%), and the southwest Peninsula (9.2% to 10.6%).

Most visited sites

The 25 sites receiving the greatest number of zodiac landings during the 10 years of this study, along with comparisons to the 'Top 25' rankings in each half of this period, are shown in Table 4.

Nine sites — Aitcho Islands (SH), Baily Head (SH), Hannah Point (SH), Penguin Island (SH), Paulet Island (NE), Cuverville Island (NW), Port Lockroy (NW), Vernadskiy Station (SW), and Pléneau Island (SW) — were ranked among the top 25 sites for both halves of the decade, but ranked higher in the more recent (1994–99) time frame.

Six sites fell out of the top 25 ranking between 1989–94 and 1994–99: Ferraz Station (SH); Frei/Marsh Station (SH); Jubany Station (SH); Lion's Rump, King George

Table 2. Capacities of Antarctic tour ships over six seasons, 1993/94 to 1998/99. Small capacity ships = ≤75 passengers; medium capacity ships subdivided into 76–100 passengers and 101–180 passengers; large capacity ships = ≥181 passengers.

Season	Small ships	Departures	Mean departures	Medium ships (≤100)	Departures	Mean departures
93/94	1	7	7.0	3	20	6.7
94/95	4	27	6.8	2	20	10.0
95/96	6	45	7.5	2	22	11.0
96/97	5	39	7.8	2	22	11.0
97/98	4	31	7.8	2	19	9.5
98/99	4	28	7.0	3	30	10.0
Season	**Medium ships (≥101)**	**Departures**	**Mean departures**	**Large ships**	**Departures**	**Mean departures**
93/94	5	33	6.6	2	5	2.5
94/95	7	45	6.4	1	2	2.0
95/96	6	42	7.0	1	4	4.0
96/97	6	43	7.2	0	0	0.0
97/98	5	36	7.2	2	6	3.0
98/99	7	40	5.7	1	4	4.0

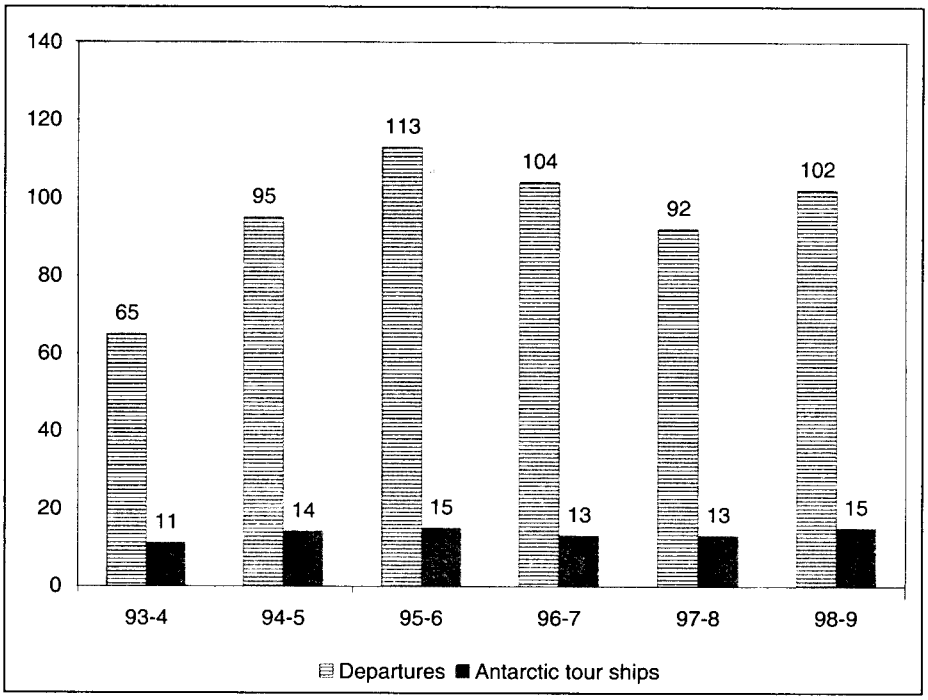

Fig. 1. Overall number of Antarctic tour ships and departures, 1993/94 to 1998/99.

Island (SH); Telefon Bay, Deception Island (SH); and Torgersen Island, Arthur Harbor (NW).

Six sites entered the list of 25 busiest sites, by number of zodiac landings, in the 1994–99 period: Bellingshausen Station (SH); Yankee Harbor, Greenwich Island (SH); Brown Bluff (NE); Georges Point, Rongé Island (NW); Neko Harbor (NW); and Paradise Bay (NW).

The most heavily visited sites in terms of visitors going ashore during zodiac landings are similar (Table 5). Nine sites — Baily Head (SH), Half Moon Island (SH), Hannah Point (SH), Penguin Island (SH), Yankee Harbor (SH), Paulet Island (NE), Cuverville Island (NW), Vernadskiy Station (SW), and Petermann Island (SW) — were ranked in the top 25 for both halves of the decade, but ranked higher in the latter half.

Six sites fell out of the top 25 ranking, by number of visitors, between 1989–94 and 1994–99: Shingle Cove, Coronation Island (SO); Ferraz Station (SH); Frei/Marsh Station (SH); Jubany Station (SH); Lion's Rump, King George Island (SH); and Torgersen Island, Arthur Harbor (NW). And six sites joined the top 25 visitor sites in the 1994–99 period: Aitcho Islands (SH); Brown Bluff (NE); Georges Point, Rongé Island (NW); Neko Harbor (NW); Paradise Bay (NW); and Pléneau Island (SW).

Site recruitment

In each season there are zodiac landings at sites previously unvisited by tourist ships. Assuming the 1989/90 season as the baseline, 130 'new' sites have been added as venues for zodiac landings from the 1990/91 season through the 1998/99 season (Table 6). The rate of 'recruitment' of these new sites reached its peak during the middle of the decade (between 1994–95 and 1996–97), but it is now declining.

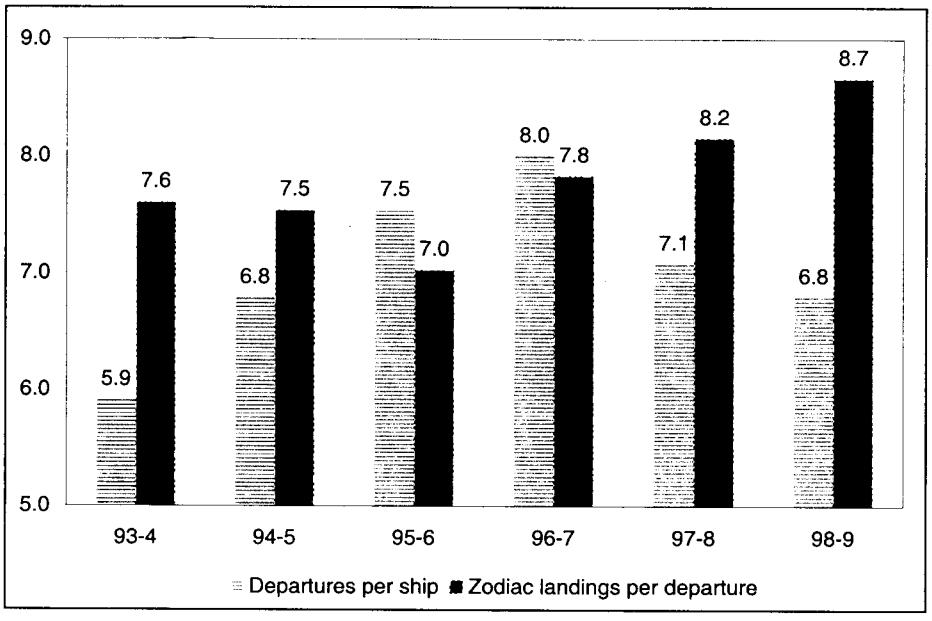

Fig. 2. Departures per Antarctic tour ship, and number of landings per departure, 1993/94 to 1998/99.

Sites visited each season

During the 10 seasons analyzed, the number of known sites 'available' for zodiac landings in the Peninsula region has risen to 165, while the percentage of available sites visited each season has generally declined (Table 7). In the most recent four seasons examined, 1995/96 through 1998/99, there were visits to no more than 57.3% of available sites. In addition, in each season, a large number of sites in the Peninsula region are visited only once. During the 10 seasons, the percentage of available sites visited only once has been no less than

Table 3. Geographical distribution of Antarctic Peninsula region zodiac landings, 1989/90 to 1998/99.

Area	1989–99 landings	Percentage	1989–94 landings	Percentage	1994–99 landings	Percentage
SO	73	1.4	27	1.8	46	1.2
EI	84	1.6	32	2.2	52	1.4
SH	2301	43.2	654	44.0	1647	42.9
NE	409	7.7	106	7.1	303	7.9
NW	1911	35.9	532	35.8	1380	36.0
SW	544	10.2	137	9.2	407	10.6
Total	5322		1488		3835	

21.9% per season. In the last three seasons analyzed, the percentage of sites visited only once has ranged from 34.6% to 36.6%.

Intensity of visitor use

Numbers of landings and visitors

While the number of zodiac landings to the 165 sites in the Peninsula region increased 423% from 1989/90 to 1989/99, the number of visitors participating in zodiac landings at these 165 sites increased 321%, from 17,759 to 74,772 (Table 8).

The trends of the data (Fig. 3) suggest that numbers of landings and visitors, while continuing to rise, are leveling off ($y = 24{,}894 \text{ Ln } (x) + 8680.1$, $R^2 = 0.892$ (for visitors); $y = 339.46 \text{ Ln } (x) + 19.567$, $R^2 = 0.8674$ (for landings). While the number of zodiac landings and participating visitors has increased, the average number of passengers participating in each zodiac landing has declined (Table 9).

Concentration of zodiac landings

Each season, the 10 sites with the most number of landings consistently account for more than 55% of that season's landings and 51% of that season's visitors (Table 10). Similarly, the 20 sites with the most number of landings consistently represent more than 75% of each season's landings and 77% of that season's visitors (Table 10).

Visitation to diverse and environmentally sensitive sites

Visits to the Antarctic Peninsula region are attracted disproportionately to sites with features that may have particular vulnerabilities to heavy visitor traffic, in particular sites with a high/medium diversity of fauna and flora and sites where resident fauna and flora are easily accessed by visitors.

Based on the Antarctic Site Inventory surveys, sites were ranked according to species diversity and potential sensitivity to environmental disturbances (Table 11). Sites

Table 4. Most visited Antarctic Peninsula region sites in a 10-year period, by number of zodiac landings, 1989/90 to 1998/99. * = tie for position.

Site	Area	1989–99 landings	1989–99 rank	1989–94 rank	1994–99 rank
Whalers Bay, Deception Island	SH	425	1	1	1
Cuverville Island	NW	359	2	4	2
Port Lockroy	NW	350	3	5	3
Pendulum Cove, Deception Island	SH	300	4	3	5
Hannah Point, Livingston Island	SH	290	5	8	4
Petermann Island	SW	278	6	6*	6
Half Moon Island	SH	263	7	6*	7
Almirante Brown Station	NW	259	8	2	8
Paulet Island	NE	196	9	11	10
Arctowski Station, King George Island	SH	166	10	10	13
Neko Harbor, Andvord Bay	NW	152	11	–	9
Baily Head (including Rancho Point)	SH	149	12	13	12
Waterboat Point (Gonz. Videla Station)	NW	148	13	9	16
Aitcho Islands	SH	147	14	25*	11
Penguin Island	SH	118	15	18	14
Palmer Station, Arthur Harbor	NW	104	16	12	19*
Pléneau Islands	SW	89	18	23*	17
Paradise Bay (nonspecifically described)	NW	88	17	–	15
Hope Bay (Esperanza Station)	NE	87	19	14	19*
Ak. Vernadskiy (ex-Faraday) Station	SW	72	20	23*	18
Telefon Bay, Deception Island	SH	65	21	15	–
Yankee Harbor, Greenwich Island	SH	60	22	–	21
Point Lookout, Elephant Island	EI	59	23	19	25*
Torgersen Island, Arthur Harbor	NW	57	24	16	–
Portal Point, Charlotte Bay	NW	56	25	21	25*

Table 5. Most visited Antarctic Peninsula region sites in a 10-year period, by number of visitors participating in zodiac landings, 1989/90 to 1998/99.

Site	1989–99 landings	1989–99 rank	1989–94 rank	1994–99 rank
Whalers Bay, Deception Island	35,325	1	1	1
Port Lockroy	34,189	2	2	2
Half Moon Island	28,541	3	5	4
Cuverville Island	27,801	4	7	3
Pendulum Cove, Deception Island	26,030	5	6	6
Hannah Point, Livingston Island	24,444	6	10	5
Petermann Island	24,082	7	8	7
Almirante Brown Station, Paradise Bay	22,381	8	3	9
Waterboat Point (Gonz. Videla Station)	21,735	9	4	10
Paulet Island	18,809	10	11	8
Arctowski Station, King George Island	14,750	11	9	14
Baily Head (including Rancho Point)	12,176	12	14	13
Aitcho Islands	11,219	13	–	11
Palmer Station, Arthur Harbor	10,790	14	12	18
Hope Bay (Esperanza Station)	9897	15	13	17
Neko Harbor, Andvord Bay	9853	16	–	12
Penguin Island	9362	17	20	15
Paradise Bay (nonspecific)	6981	18	–	16
Point Lookout, Elephant Island	6589	19	17	21
Yankee Harbor, Greenwich Island	6014	20	25	20
Pléneau Island	5557	21	–	19
Torgersen Island, Arthur Harbor	5299	22	16	–
Telefon Bay, Deception Island	5274	23	18	24
Ak. Vernadskiy (ex-Faraday) Station	5123	24	24	22
Ferraz Station, King George Island	4890	25	19	–

Table 6. Recruitment of Antarctic Peninsula region zodiac landing sites, 1989/90 to 1998/99.

Season	Zodiac landing sites visited for the first time	Percentage visits during season to 'new' sites
89/90	35	100.0
90/91	7	21.9
91/92	12	27.3
92/93	14	28.0
93/94	16	25.0
94/95	21	28.0
95/96	19	26.8
96/97	18	22.2
97/98	11	15.5
98/99	12	14.1

with 10 or more faunal species or major floral groups were considered as sites with high species diversity; sites with 5–9 faunal species or major floral groups were ranked as having medium species diversity; and sites with 0–4 faunal species were considered to have low species diversity.

Five high diversity sites were identified: Hannah Point (SH), Penguin Island (SH), the Aitcho Islands (SH), Cuverville Island (NW), and Fort Point (SH). Fifteen medium diversity sites were identified: Arctowski Station (SH), Astrolabe Island (NW), Baily Head (SH), Brown Bluff (NE), Half Moon Island (SH), Heroína Island (NE), Port Lockroy (NW), Point Lookout (EI), Orne Island (NW), Paulet Island (NE), Petermann Island (SW), Pléneau Island (SW), Turret Point (SH), Whaler's Bay (SH), and Yankee Harbor (SH). The other 39 sites visited by the

Table 7. Utilization of available and known Antarctic Peninsula region zodiac landing sites, 1989/90 to 1998/99.

Season	Total available zodiac landing sites	Sites visited	Percentage of available sites visited	Sites visited only once	Percentage sites visited only once
89/90	35	35	100.0	9	25.7
90/91	42	32	76.2	7	21.9
91/92	54	44	81.5	12	27.3
92/93	68	50	73.5	16	32.0
93/94	84	64	76.2	23	35.9
94/95	105	75	71.4	24	32.0
95/96	124	71	57.3	20	28.2
96/97	142	81	57.0	28	34.6
97/98	153	71	46.4	26	36.6
98/99	165	85	51.5	30	35.3

Table 8. Visitors participating in Antarctic Peninsula region zodiac landings, 1989/90 to 1998/99. NA = not available.

Season	Visitors participating in landings	Percentage increase/ decrease
89/90	17,759	NA
90/91	19,001	7
91/92	38,828	104
92/93	27,789	-28.4
93/94	50,035	80.1
94/95	52,610	5.2
95/96	61,345	16.6
96/97	54,286	-11.5
97/98	66,387	22.3
98/99	74,772	12.6
1989–99	462,812	321.0

Inventory were recorded as having low species diversity.

During the 1998/99 season, 85 sites in the Peninsula region experienced zodiac visitor landings. The five high diversity sites comprised only 5.9% of sites visited that season, but attracted 18.2% of all zodiac landings and 14.3% of all visitors (Table 12). The 15 medium diversity sites comprised 17.6% of the 85 sites visited, but attracted 39.4% of all zodiac landings and 35.5% of all visitors. Thus sites with high/medium species diversity accounted for approximately 50% of zodiac landings and visitors, an attraction that is highly significant ($\chi^2 = 581, p < .001$ with respect to landings; $\chi^2 = 50{,}698, p < .001$ with respect to visitors), supporting the conventional wisdom that visitors come to the Peninsula to see a diversity of wildlife.

Because of the physical variation in landing sites, species diversity does not necessarily equate to visitors attaining relatively close views of fauna and flora. Using the presence/absence data as a base, the question of whether disproportionate numbers of zodiac landings occur where visitors may attain this close proximity was investigated. For this purpose, sites were ranked according to ease of access to nests (flying birds as well as penguins), elephant seal wallows, and large patches or beds of sensitive flora such as lichens and mosses.

Sites with five or more of these proximity tallies were considered to be highly sensitive to potential disturbances by visitors. Sites with 3–4 proximity tallies were rated moderately sensitive to potential disturbances. And sites with 0–2 proximity tallies were considered to have low sensitivity to potential disturbances.

Four highly sensitive sites were identified: Hannah Point (SH), Penguin Island (SH), the Aitcho Islands (SH), and Turret Point (SH). Nine moderately sensitive sites

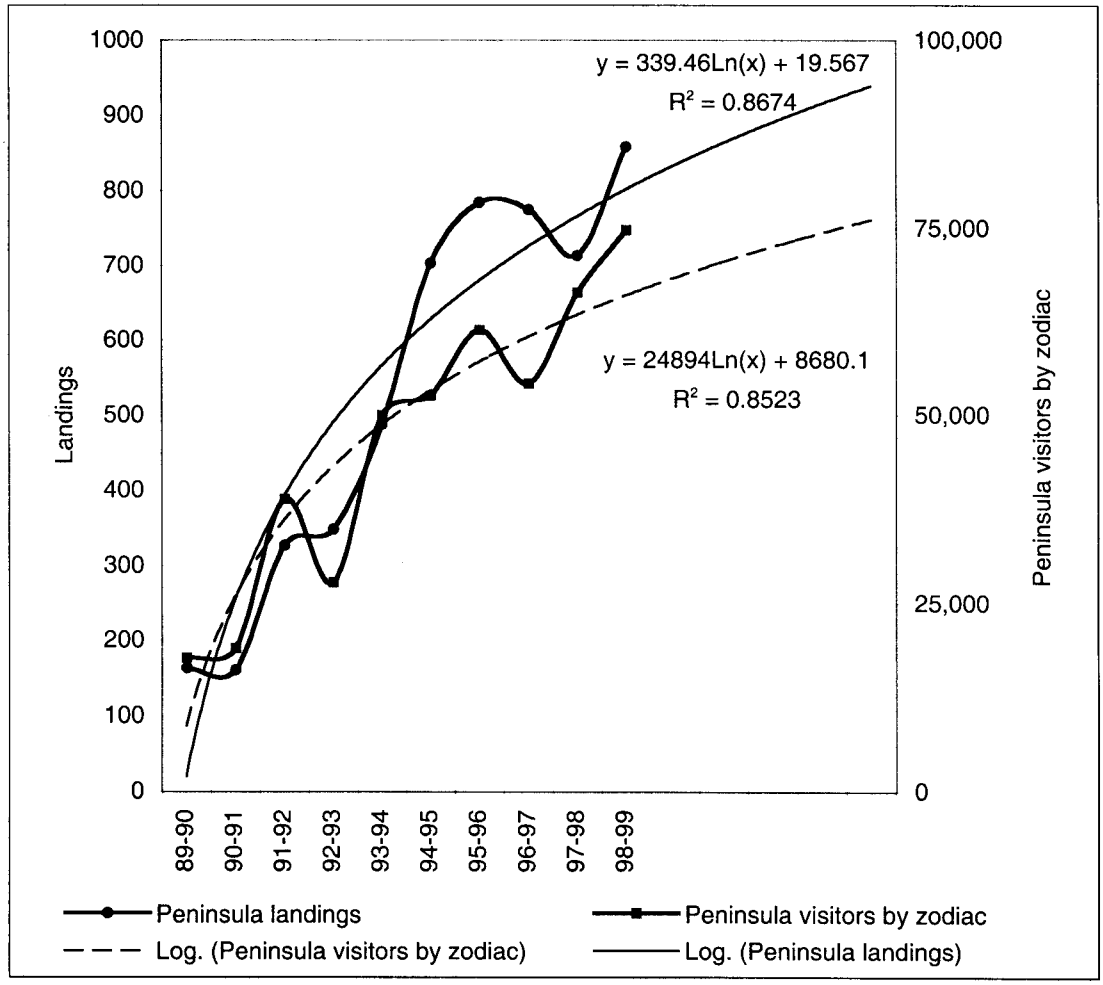

Fig. 3. Zodiac landings and visitor trends in the Antarctic Peninsula region.

Table 9. Mean number of passengers per Antarctic Peninsula region zodiac landing, 1989/90 to 1998/99.

Season	Peninsula region zodiac landings	Passengers participating in landings	Mean passengers per landing
89/90	164	17,759	108.3
90/91	161	19,001	118.0
91/92	327	38,828	118.7
92/93	348	27,789	79.9
93/94	488	50,035	102.5
94/95	704	52,610	74.7
95/96	784	61,345	78.2
96/97	775	54,286	70.0
97/98	714	66,387	93.0
98/99	858	74,772	87.1
Overall (1989–99)	5323	462,812	86.9

were identified: Brown Bluff (NE), Fort Point (SH), Gourdin Island (NW), Orne Island (NW), Paulet Island (NE), Petermann Island (SW), Pléneau Island (SW), Georges Point, Rongé Island (NW), and Waterboat Point (NW). The other 46 sites visited by the Inventory fell into the low category.

In the 1998/99 season, the four sites identified as highly sensitive to potential disturbances by visitors comprised 4.7% of the 85 sites visited, but attracted 11.8% of all zodiac landings and 9.6% of all visitors (Table 12). The nine sites identified as moderately sensitive to potential disturbances by visitors comprised 10.6% of the 85 sites visited that season, but attracted 15.4% of landings and 14.6% of all visitors. Thus sites with high/moderate sensitivity to visitor disturbances by visitors accounted for more than 24% of all zodiac landings and visitors to the Peninsula region, an attraction that is highly significant ($\chi^2 = 124, p < .001$ with respect to landings; $\chi^2 = 11{,}140, p < .001$ with respect to visitors). This also suggests that visitors either come to the Peninsula to see wildlife that is easily accessed, or that the *modus operandi* of zodiac landing procedures and expedition staff guidance makes wildlife easily accessible to visitors.

When the 1998/99 season is analyzed in terms of sites experiencing two or more zodiac visitor landings — eliminating the 30 sites visited only once — it was found that the highly significant attraction to diverse and sensitive sites is maintained. Seventeen sites with high/medium

Table 10. Concentration of visitor activity at the most heavily visited Antarctic Peninsula region sites, by number of zodiac landings, 1989/90 to 1998/99.

Season	Zodiac landings, Peninsula region	Landings at 'top 10' sites by number of landings	Landings at 'top 20' sites by numbers of landings
89/90	164	94	142
90/91	161	101	144
91/92	327	193	283
92/93	348	197	281
93/94	488	282	394
94/95	704	416	558
95/96	784	435	626
96/97	775	435	604
97/98	714	413	557
98/99	858	478	649
Season	**Zodiac visitors, Peninsula region**	**Visitors at 'top 10' sites by number of landings**	**Visitors at 'top 20' sites by number of landings**
89/90	17,759	10,322	15,395
90/91	19,001	11,956	17,663
91/92	38,828	23,741	33,687
92/93	27,789	16,706	22,626
93/94	50,035	30,111	42,949
94/95	52,610	30,991	41,767
95/96	61,345	35,823	50,788
96/97	54,286	28,170	41,832
97/98	66,387	39,666	52,666
98/99	74,772	42,855	58,846

Table 11. Species diversity and environmental sensitivity tallies at 59 sites visited by the Antarctic Site Inventory, 1989–99. Species diversity key (as per counts of species present): ≥10 tallies = high species diversity; 5–9 = medium species diversity; 0–4 = low species diversity. Site sensitivity key (as per counts of on-site penguin/flying bird nests, elephant seal wallows, large patches/beds of lichens and moss that may be accessed easily): ≥5 tallies = high sensitivity to potential disturbances; 3–4 = moderate sensitivity to potential disturbances; 0–2 = low sensitivity to potential disturbances.

Site	Area	Coordinates	Species diversity Tallies		Proximity/ sensitivity tallies	
Aitcho Islands	SH	62°24'S 59°47'W	10	High	6	High
Almirante Brown Station	NW	64°53'S 62°52'W	4	Low	1	Low
Arctowski Station	SH	62°15'S 58°51'W	7	Medium	1	Low
Astrolabe Island	NW	63°17'S 58°40'W	7	Medium	1	Low
Baily Head, Deception Island	SH	62°58'S 60°30'W	5	Medium	2	Low
Bald Head	NE	63°38'S 57°36'W	0	Low	0	Low
B. O'Higgins Station	NW	63°19'S 57°54'W	1	Low	1	Low
Brown Bluff	NE	63°32'S 56°55'W	8	Medium	3	Moderate
Crystal Hill	NE	63°39'S 57°44'W	0	Low	0	Low
Cuverville Island	NW	64°41'S 62°38'W	10	High	1	Low
Danco Island	NW	64°44'S 62°37'W	1	Low	1	Low
Devil Island	NE	63°48'S 57°17'W	4	Low	2	Low
Dorian Bay/Damoy Point	NW	64°49'S 63°30'W	2	Low	2	Low
D'Urville Monument	NE	63°31'S 58°11'W	2	Low	2	Low
Eden Rocks	NE	63°29'S 55°40'W	1	Low	1	Low
Ferraz Station	SH	62°10'S 58°48'W	2	Low	0	Low
Fish Island	SW	66°02'S 65°25'W	2	Low	2	Low
Fort Point, Greenwich Island	SH	62°43'S 59°34'W	10	High	3	Moderate
Foyn Harbor	NW	64°33'S 62°01'W	0	Low	0	Low
Goudier Island	NW	64°50'S 63°30'W	2	Low	2	Low
Gourdin Island	NW	63°12'S 57°18'W	4	Low	4	Moderate
Half Moon Island	SH	62°36'S 59°55'W	8	Medium	2	Low
Hannah Point	SH	62°39'S 60°37'W	12	High	9	High
Heróina Island	NE	63°24'S 54°36'W	7	Medium	2	Low
Hope Bay	NE	63°23'S 57°00'W	1	Low	1	Low
Hydrurga Rocks	NW	64°08'S 61°37'W	4	Low	1	Low
Jonassen Island	NE	63°33'S 56°40'W	3	Low	1	Low
Jubany Station	SH	62°14'S 58°38'W	2	Low	1	Low
Port Lockroy, Wiencke Island	NW	64°49'S 63°30'W	6	Medium	2	Low
Pt. Lookout, Elephant Island	EI	61°17'S 55°13'W	6	Medium	2	Low
Marambio Station	NE	64°13'S 56°38'W	0	Low	0	Low
Melchior Island	NW	64°19'S 62°57'W	0	Low	0	Low
Mikklesen Harbor	NW	63°54'S 60°47'W	1	Low	1	Low
Neko Harbor	NW	64°50'S 62°33'W	3	Low	2	Low
Orcadas Station	SO	60°45'S 44°43'W	3	Low	0	Low
Orne Island	NW	64°40'S 62°40'W	7	Medium	3	Moderate
Paulet Island	NE	63°35'S 55°47'W	8	Medium	3	Moderate
Pendulum Cove	SH	62°56'S 60°36'W	0	Low	0	Low
Penguin Island	SH	62°06'S 57°54'W	10	High	7	High
Petermann Island	NW	65°10'S 64°10'W	7	Medium	4	Moderate
Pléneau Island	SW	65°06'S 64°04'W	8	Medium	3	Moderate
Portal Point	NW	64°30'S 61°46'W	0	Low	0	Low
Pourquoi-pas Island	SW	67°41'S 67°28'W	4	Low	1	Low
Prospect Point	SW	66°01'S 65°21'W	0	Low	0	Low
Robert Point	SH	62°28'S 59°23'W	4	Low	2	Low
Georges Pt., Rongé Island	NW	64°40'S 62°40'W	3	Low	3	Moderate
Rum Cove	NE	64°06'S 58°25'W	0	Low	0	Low
Penguin Pt., Seymour Island	NE	64°19'S 56°43'W	1	Low	1	Low
Snow Hill Island	NE	64°28'S 57°12'W	0	Low	0	Low
Sprightly Island	NW	64°17'S 61°04'W	1	Low	1	Low
Telefon Bay	SH	62°56'S 60°40'W	0	Low	0	Low
Turret Point, King George Is.	SH	62°05'S 57°55'W	9	Medium	5	High
Vernadsky Station	SW	65°15'S 64°10'W	0	Low	0	Low
View Point	NE	63°33'S 57°22'W	0	Low	0	Low
Waterboat Point	NW	64°49'S 62°51'W	3	Low	3	Moderate
Whalers Bay	SH	62°59'S 60°34'W	5	Medium	1	Low
Point Wild, Elephant Island	EI	61°06'S 54°52'W	2	Low	1	Low
Yalour Island	SW	65°14'S 64°10'W	3	Low	1	Low
Yankee Harbor	SH	62°32'S 59°47'W	6	Medium	2	Low

Table 12. Antarctic Peninsula region site diversity and intensity of zodiac landings, and site sensitivity to environmental disturbances and intensity of zodiac landings, 1989–99.

	Number of sites		Landings		Visitors	
High diversity	5	(5.9%)	156	(18.2%)	12,523	(14.3%)
Medium diversity	15	(17.6%)	338	(39.4%)	30,974	(35.5%)
Low diversity	65	(76.5%)	364	(42.4%)	43,798	(50.2%)
Total	85	(100%)	858	(100.0%)	87,295	(100.0%)
	Number of sites		Landings		Visitors	
High sensitivity	4	(4.7%)	101	(11.8%)	8389	(9.6%)
Moderate sensitivity	9	(10.6%)	132	(15.4%)	12,725	(14.6%)
Low sensitivity	72	(84.7%)	625	(72.8%)	66,181	(75.8%)
Total	85	(100.0%)	858	(100.0%)	87,295	(100.0%)

species diversity were visited, representing 30.9% of the 55 sites visited more than once, and accounting for 59.5% of the zodiac landings ($\chi^2 = 320, p < .001$) and 59.7% of the visitors ($\chi^2 = 28{,}271, p < .001$) at these sites. It was also found that 12 sites with high/moderate sensitivity to potential disturbances by visitors were among these 55 sites, representing 21.8% of the sites, and accounting for 28.1% of the zodiac landings ($\chi^2 = 33, p < .001$) and 29.0% of the visitors ($\chi^2 = 2{,}721, p < .001$).

Frequency of visitation

This study also examined how the frequency of zodiac landings may have changed, focusing on the 10 most heavily visited sites, by number of zodiac landings, in the 1998/99 season. Assuming that the shipborne tour season lasts approximately 100 days — November 15 to March 1 — it was discovered that the frequency of zodiac landings in the 1998/99 season was an average of one visit every 2.25 days, compared to an average of one visit every 22.75 days in the 1989/90 season (Table 13). During the peak of each season, certain sites are likely to experience zodiac landings by more than one ship in a single day (NSF 1990–99; R. Naveen, personal observation).

Discussion and recommendations

Tourist visitation to the Antarctic Peninsula region appears likely to continue to grow in the short term. If the current trends continue, visitation would rise to more than 900 landings and in excess of 75,000 visitors by the 2003/04 season (Fig. 3). Despite the recruitment of 130 'new' zodiac landing sites in nine seasons, visitations concentrate at relatively few sites. In the 1998/99 season, the 10 sites with the highest number of zodiac landings account for 55.6% of all the landings in the Peninsula region and 57.3% of all visitors; the 20 sites with the highest number of zodiac landings account for 75.6% of all landings and 71.1% of all visitors (Table 10). In the 1998/99 season, only 51.5% of available sites were visited (85 of 165), and 36.5% of these sites (31 of 85) were visited only once (Table 7).

Zodiac landings may concentrate at relatively few sites, but the composition of this select group has changed in the 10 seasons examined. Eight sites joined the ranks of the 'top 25' in terms of either landings or visitors from the first five seasons in the period (1989/90 to 1993/4) to the second five seasons (1994/95 to 1998/99) (Tables 4, 5). Even with this seasonal concentration of visitor activity, the number of sites experiencing zodiac landings reached a high of 85 in 1998/99 (Table 7).

Based on data for the 1998/99 season, zodiac landings also concentrate at sites with high or medium species diversity or with high or moderate sensitivity to potential environmental disturbance (Table 12). If this visitation trend continues, the question of whether the frequency and intensity of human visitation translates to actual disturbance of resident fauna and flora needs to be explored fully. As noted, the Protocol on Environmental Protection to the Antarctic Treaty is concerned with potential environmental impacts from human activities, including tourism, and irrespective of whether potential impacts may be short-term or long-term, immediate or cumulative (Naveen 1996).

In this regard, therefore, it may be important to compare the exact timing of zodiac landings in the Antarctic Peninsula region with respect to expected breeding chronologies of resident fauna at zodiac landing sites. In the short term, data on the exact length of visitors' time ashore during each zodiac landing presumably may be gleaned from tour operators' site-visit reports. But at present, these data are not a regular feature of the annual NSF compilations. Regarding the biological data, it may take a longer period of time for ongoing or new research initiatives to determine exact breeding chronologies of resident fauna at zodiac landing sites, with which the human visitation chronologies then may be compared.

To avoid extrapolations from other data sets or from unpublished information, it also would be useful to have seasonal tallies and summaries of the number of departures to both the Antarctic Peninsula and the Ross Sea, and the vessel capacities of each Antarctic tour ship reporting to NSF. Further, noting that IAATO strives to coordinate itineraries so 'no more than 100 people are ashore at any one time in any one place' (IAATO 1991), it may be important to know how many 100-passenger groups comprise a single zodiac landing, in the case of medium- or large-capacity vessels that carry more than 100 passengers on a single Antarctic departure.

Table 13. Frequency of zodiac landings at the 10 Antarctic Peninsula region sites with the most number of zodiac landings in 1998/99, with comparison to the 1989/90 season, assuming a 100-day season.

Site	Zodiac landings, 1998/99	Zodiac landings, 1989/90	Frequency of visits (days)	
			1998/99	1989/90
Port Lockroy (incl. Jougla Pt.)	75	7	1.3	14.3
Whalers Bay, Deception Island	69	17	1.4	5.9
Cuverville Island	55	8	1.8	12.5
Pendulum Cove, Deception Island	50	7	2.0	14.3
Hannah Point, Livingston Island	48	3	2.1	33.3
Neko Harbor, Andvord Bay	42	0	2.4	—
Petermann Island	38	6	2.6	16.7
Paulet Island	37	7	2.7	14.3
Half Moon Island	33	10	3.0	10.0
Aitcho Islands	31	2	3.2	50.0
Average number of days between visits			2.25	22.75

A final concern regarding the evaluation and assessment of potential environmental impacts at Peninsula region landing sites relates to yacht visits. As noted, the NSF compilations do not reflect either yacht visits to sites in the Antarctic Peninsula region, or the number of yacht passengers visiting particular sites. IAATO has encouraged yacht operators to join its association (NSF 1990–99), but, as yet, no coordinated mechanism exists to obtain potentially relevant data from the yachting portion of the Antarctic tourism industry.

There are a number of ways that site-visit reporting by tour operators may be improved. Tour operators continue to report sites that cannot be identified precisely as to actual location. This study combines landings data from eight sites (four pairs of two) because they appear to refer to the same location (Baily Head and Rancho Point; Damoy Point and Dorian Bay; Georges Point and Rongé Island; and Port Lockroy and Jougla Point). Of the remaining sites listed in the NSF compilations, 18 refer to broad geographic features or areas known to contain other regularly visited sites: Coronation Island; Laurie Island; Signy Island; Elephant Island; Deception Island; Fildes Peninsula; King George Island; Martel Inlet; Maxwell Bay; Charlotte Bay; Errera Channel, small peak; Melchior Islands; Paradise Bay; James Ross Island; Prince Gustav Channel; Seymour Island; Danger Islands; and Argentine Islands.

As new types of activities are added to the tourism experience in the Antarctic Peninsula region, it also would be helpful if site-visit reports and subsequent NSF compilations precisely noted which new activities are undertaken, where these activities take place, and how many visitors partake in them.

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PART IV

SITE DIVERSITY AND SENSITIVITY TO POTENTIAL ENVIRONMENTAL DISRUPTIONS

PRESENCE, ABSENCE CHECKLISTS

From its inception in 1994, the Antarctic Site Inventory has collected data regarding the presence or absence of nesting species of penguins and flying birds, wallows of southern elephant seals, and large patches or beds of lichens and mosses at all sites visited. Inventory researchers also record whether nests, wallows, and large floral patches/beds may be readily/easily accessed and/or trampled. A master checklist of results is updated from season to season, and is presented in Appendix 6, by Antarctic Site Inventory subarea.

SPECIES DIVERSITY

These presence/absence data are used to rank sites as to their species diversity, based on cumulative tallies of breeding penguins and seabirds recorded, southern elephant seals, and large patches or beds of lichens and mosses. Sites with "high" species diversity tallied 10 or more faunal species or major floral groups. Sites with "medium" species diversity tallied 5-9 faunal species or major floral groups. "Low" diversity sites tallied 0-4 faunal species or major floral groups.

As of the close of the 2002-03 season, five sites with *high species diversity* have been identified: Hannah Point (SH), Penguin Island (SH), the Aitcho Islands (SH), Cuverville Island (NW), and Fort Point (SH).

Seventeen sites with *medium species diversity* have been identified: Arctowski Station (SH), Astrolabe Island (NW), Baily Head (SH), Brown Bluff (NE), False Head (Island) Point (NE), Half Moon Island (SH), Heroína Island (NE), Jougla Point, Mitchell Cove, Robert Island (SH), Port Lockroy (NW), Point Lookout (EI), Orne Island (NW), Paulet Island (NE), Petermann Island (SW), Pléneau Island (SW), Turret Point (SH), Whaler's Bay (SH), and Yankee Harbor (SH).

POTENTIAL SITE SENSITIVITIES

These presence/absence data also are used to rank sites as to their potential sensitivity to disruption by visitors, depending on: (a) the number of penguin and seabird species whose nests visitors may access easily, (b) whether or not visitors may access southern elephant seal wallows easily, and (c) whether or not visitors may access easily and possibly trample large patches or beds of lichens and mosses. Sites with five (5) or more tallies were considered to be "highly" sensitive to potential disturbances by visitors; sites with 3-4 tallies were considered to be "moderately" sensitive; and sites with 0-2 tallies were considered to have "low" sensitivity to potential disturbances.

Four *highly sensitive sites* have been identified: Hannah Point (SH), Penguin Island (SH), the Aitcho Islands (SH), and Turret Point (SH).

Twelve *moderately sensitive sites* have been identified: Booth Island, Port Charcot (SW), Brown Bluff (NE), Detaille Island (SW), Fort Point (SH), Gourdin Island (NW), Neko Harbor (NW), Orne Island (NW), Paulet Island (NE), Petermann Island (SW), Pléneau Island (SW), Georges Point, Rongé Island (NW), and Waterboat Point (NW).

RESTRICTED VISITOR SPACE

Following discussion in the first edition of the *Site Compendium*, Inventory researchers have begun to assess whether a site has restricted visitor space, based on: (a) whether there are only very narrow or, perhaps, non-existent pathways between visitors and nesting penguins; and (b) whether high tides or other landing conditions (e.g. ice caked on shore) crowd penguins or other wildlife onto the landing beach.

Seventeen (17) sites with *restricted visitor space* have been identified: Amphibolite Point (SO), Astrolabe Is. (NW), Brown Bluff (NE), Cuverville Island (NW), Fort Point, Greenwich Is. (SH), Gourdin Island (NW), Half Moon Island (SH), Hannah Point (SH), Heroina Island (NE), Hope Bay/Esperanza Station Vicinity (NE), Hydrurga Rocks (NW), Jougla Point, Port Lockroy (NW), Neko Harbor (NW), Paulet Island (NE), Point Lookout, Elephant Island (EI), Point Wild (EI), and Waterboat Point (NW).

ATTRACTION TO DIVERSE, SENSITIVE SITES

With respect to the 1998-99 season, Antarctic Site Inventory researchers analyzed whether zodiac landings were disproportionately "attracted" to sites exhibited high or medium species diversity, or to sites exhibiting high or moderate sensitivity to potential environmental disruptions (Naveen, et al., 2000, attached as Appendix 7).

It was found that the five sites with *high* species diversity comprised only 5.9% of the 85 sites visited that season, but attracted 18.2% of all landings and 14.3% of all visitors. The fifteen sites with *medium* species diversity comprised 17.7% of sites visited that season, but attracted 39.4% of landings and 35.5% of all visitors. That sites with high/medium species diversity accounted for more than 50% of all Peninsula zodiac landings and visitors is highly significant statistically, and supports conventional wisdom that visitors come to the Peninsula to see a diversity of wildlife.

However, because of the physical variation in landing sites, species diversity does not necessarily equate to visitors' attaining relatively close views of resident fauna and flora. Using the Inventory's presence/absence data as a base, this paper further examined whether disproportionate numbers of zodiac landings occur where visitors may attain this close proximity, relying on the sensitivity ranking of sites noted above. It was assumed that sites are more or less sensitive to potential disturbance according to the number of penguin and seabird species whose nests visitors may access easily, whether or not visitors may access southern elephant seal wallows easily, and whether or not visitors may access easily and possibly trample large patches or beds of lichens and mosses.

In the 1998-99 season, the four sites with high sensitivity to potential disturbances by visitors comprised 4.7% of sites visited that season, but attracted 11.8% of all landings and 9.6% of all visitors. The nine sites with moderate sensitivity to potential disturbances comprised 10.6% of the 85 sites visited that season, but attracted 15.4% of landings and 14.6% of all visitors. That sites with high/moderate sensitivity to potential visitor disturbances accounted for more than 24% of all Peninsula zodiac landings and visitors is also highly significant statistically, and supports the view that visitors come to see wildlife that is easily accessed.

This highly significant attraction was maintained, even when the 30 sites visited only once that season were removed from the analysis. With respect to the 55 Peninsula sites experiencing two or more zodiac visitor landings in the 1998-99 season, the 17 sites with high/medium species accounted for 59.5% of the landings and 59.7% of the visitors, and the 12 sites with high/moderate sensitivity accounted for 28.1% of the landings and 29.0% of the visitors.

POPULATION CHANGES, TRENDS

Part I of the *Site Compendium* notes that an overarching goal of the Antarctic Site Inventory is to establish baselines of site-descriptive information and biological data. Over time, it is intended that these baselines will enable environmental changes to be detected and potential causes for such changes to be examined.

Part II of the *Site Compendium* delineates much of the census data the Antarctic Site Inventory has collected since 1994; however, as emphasized in Part I, caution is appropriate when comparing Inventory-collected data to historical population data compiled in Croxall & Kirkwood (1979), Woehler (1993), and Woehler & Croxall (1996), since these compilations may reflect nest and chick counts obtained at various times, utilizing varying or inconsistent methodologies.

As a result, the focus has been identifying significant trends in data the Inventory has collected, which employs a consistent census methodology.

To date, the Inventory has identified a downward trend in blue-eyed shag populations at five sites where the project has identified nesting shags: the cliffside colonies near Almirante Brown Station, Paradise Bay (NW); Hannah Point, Livingston Island (SH); Jougla Point, Port Lockroy, Wiencke Is. (NW); Petermann Island (SW); and the Orne Islands (NW) (see Naveen, et al., 2000, attached as Appendix 7).

Shag nests in the vicinity of the Almirante Brown Station declined 50%, from 100 to 49, in the 1994-2000 period. Shag nests at the Orne Islands visitor site declined from fifteen nests in November 1994 to zero in December 1999. However, for Petermann Island and Jougla Point, the null hypothesis that the negative slopes of the log-transformed data were the result of chance alone could not be rejected. Declines at the other sites were either highly significant or significant.

The Almirante Brown and Orne Islands colonies are either inaccessible to tourists or receive few tourist visits (Naveen: 1997a, 1999). This suggests that human disturbance is an unlikely cause of such declines. In December 1999 at the Orne Islands site, which has a northwestern-to-southwestern exposure to the Gerlache Strait, one-meter-deep snow was noted on the shags' nesting ledges. At the other three sites (Petermann Island, Jougla Point, Hannah Point), the shag population now may have stabilized or slightly increased since the decline from 1994-1995 levels. Collectively, these declines, observed at different sites throughout the Peninsula, may be indicative of some underlying environmental change and suggest further monitoring.

Regarding the potential effects of visitors on penguin populations, a recent paper (Cobley & Shears, 1999) reflects on Jougla Point, Port Lockroy (NW), which is one of the regular, Antarctic Site Inventory census sites. Jougla Point lies adjacent to the recently restored hut at Goudier Island and both sites are heavily visited. In the 1999-2003 period, Jougla Point ranked second in overall numbers of zodiac landings, and Goudier Island ranked sixth (Appendix 4).

Cobley & Shears examined effects of visitor disturbance on the breeding performance of gentoo penguins during the austral summer of 1996-97 by comparing pairs in experimental areas (visited by 35-55 tourists every 1-2 days) and control colonies (not visited by tourists). They found no differences between the two groups in the proportion of birds that laid, in hatching success, or the proportion of single-chick broods, and that the overall breeding success, based on counts of crèched birds, was similar to other southern populations of gentoo penguins after correcting for mortality between crèching and fledging. Historical data from Goudier Island indicate that this colony established itself in 1985 and has rapidly increased in size since.

Regarding the Jougla Point colony, which the Inventory censuses regularly, Cobley & Shears also note a population increase, but at a slower rate. They conclude that that it is unlikely that disturbance from tourist visits has been a major determinant of gentoo population change at Port Lockroy.

Woehler (1993) reports a gentoo penguin population at Jougla Point of 1,616 N1, deriving from a 1988 census. From 1997-1999,

Antarctic Site Inventory recorded N1 gentoo penguin counts at Jougla Point ranging from 1,405-1,681; during the 2001-02 season, with heavy snow throughout the Northwest Peninsula (NW) subarea, 837 N1 was recorded; in December 2002, 1,556 N1 was recorded.

Appendix 6: SO. ORKNEY, ELEPHANT IS. subareas, site diversity, sensitivity, visitor space

			SPP. DIV	PROX	ENV SENS	ADPE	CHPE	GEPE	MCPE	SOGP	ANFU	PIPE
1	ORCA	Orcadas Stn. Vicinity	3	3	0	1	1					1
2	AMPH	Amphibolite Point	4	6	2	2	2					
3	GIBB	Gibbon Bay	3	3	0		1					
4	WILD	Point Wild	2	3	1		2		1			
5	LOOK	Pt. Lookout	6	8	2		2		1	1		

Source: ASI Data Sheets, 1994-2003

Key:
w/r penguins and flying birds;
1 = present and probably nesting, but nests not readily accessed
2 = confirmed nesting and nests easily accessed
w/r flora;
1 = present
2 = present in large beds/patches accessed, potentially may be trampled
w/r elephant seals;
2 = substantial wallow that is readily accessed

ADPE = Adélie penguin
CHPE = chinstrap penguin
GEPE = gentoo penguin
MCPE = macaroni penguin
SOGP = southern giant petrel
ANFU = Antarctic fulmar
PIPE = pintado petrel
SNPE = snow petrel
BESH = blue-eyed shag
SNSB = snowy sheathbill
WISP BBSP = Wilson's storm-petrel, black-bellied storm-petrel
KEGU = kelp gull
ANTE = Antarctic tern
E SEAL = southern elephant seal wallow
LICH = lichens, spp.
MOSS = moss, spp.
RVS = Is there restricted visitor space?

Appendix 6: SO. ORKNEY, ELEPHANT IS. subareas, site diversity, sensitivity, visitor space

	SNPE	BESH	SNSB	Skua spp.	WISP BBSP	KEGU	ANTE	E SEAL	LICH	MOSS	RVS
ORCA											
AMPH			1						1		YES
GIBB			1		1						
WILD											YES
LOOK	1		1					2			YES

Appendix 6: NORTHEAST subarea, site diversity, sensitivity, visitor space

			SPP. DIV	PROX	ENV SENS	ADPE	CHPE	GEPE	MCPE	SOGP	ANFU	PIPE
1	BALD	Bald Head	0	0	0							
2	BROW	Brown Bluff, Tabarin Pen.	8	11	3	2		2				1
3	BURD	Cape Burd	1	1	0							
4	CRYS	Crystal Hill	0	0	0							
5	DEVI	Devil Is.	4	6	2	2						
6	DURV	D'Urville Monument	2	4	2	2		2				
7	EDEN	Eden Rocks	1	2	1	2						
8	EAGL	Eagle Island	0	0	0							
9	FALS	False Head (Island) Point	5	6	1							
10	HERO	Heróina Is.	7	9	2	2		2				
11	HILL	Camp Hill	0	0	0							
12	HOPE	Hope Bay (Esperanza STN)	1	2	1	2						
13	JADE	Jade Point	0	0	0							
14	JONA	Jonassen Is.	3	4	1			2				
15	MADD	Madder Cliffs, Joinville Is.	4	4	0	1	1					
16	MARA	Marambio STN vic., Seymour Is.	0	0	0							
17	OBEL	Point Obelisk, James Ross Island	2	2	0							
18	PAUL	Paulet Is.	8	11	3	2						
19	PEPO	Penguin Pt., Seymour Is.	1	2	1	2						
20	PERS	Persson Island	2	2	0							
21	RUMC	RumCove	1	1	0							
22	SNOW	Snow Hill Island	0	0	0							
23	TAYH	Tay Head, Joinville Island	4	6	2	2						
24	VIEW	View Point	2	2	0							

Source: ASI Data Sheets, 1994-2003

Key:
w/r penguins and flying birds;
1 = present and probably nesting, but nests not readily accessed
2 = confirmed nesting and nests easily accessed
w/r flora;
1 = present
2 = present in large beds/patches accessed, potentially may be trampled
w/r elephant seals;
2 = substantial wallow that is readily accessed

ADPE = Adélie penguin
CHPE = chinstrap penguin
GEPE = gentoo penguin
MCPE = macaroni penguin
SOGP = southern giant petrel
ANFU = Antarctic fulmar
PIPE = pintado petrel
SNPE = snow petrel
BESH = blue-eyed shag
SNSB = snowy sheathbill
WISP BBSP = Wilson's storm-petrel, black-bellied storm-petrel
KEGU = kelp gull
ANTE = Antarctic tern
E SEAL = southern elephant seal wallow
LICH = lichens, spp.
MOSS = moss, spp.
RVS = Is there restricted visitor space?

Appendix 6: NORTHEAST subarea, site diversity, sensitivity, visitor space

	SNPE	BESH	SNSB	Skua spp.	WISP BBSP	KEGU	ANTE	E SEAL	LICH	MOSS	RVS
BALD											
BROW	1				1	2			1	1	YES
BURD										1	
CRYS											
DEVI				2					1	1	
DURV											
EDEN											
EAGL											
FALS	1			2	1				1	1	
HERO		1	1	1		1			1		YES
HILL											
HOPE											YES
JADE											
JONA						1			1		
MADD			1			1					
MARA											
OBEL									1	1	
PAUL	1	2	2	1	1	1			1		YES
PEPO											
PERS									1	1	
RUMC									1		
SNOW											
TAYH	1						2		1		
VIEW						1			1		

Appendix 6: SOUTH SHETLAND ISLANDS subarea, site diversity, sensitivity, visitor space

			SPP. DIV	PROX	ENV SENS	ADPE	CHPE	GEPE	MCPE	SOGP	ANFU	PIPE
1	AITC	Aitcho Is.	11	20	9		2	2		2		2
2	ARCT	Arctowski Station Vicinity	7	8	1		1	1				
3	BAIL	Baily Head, Deception Is.	5	7	2		2					1
4	FERR	Ferraz STN Vicinity, KGI	2	2	0							
5	FORT	Fort Point, Greenwich Is.	12	15	3		2	2	2		1	1
6	HALF	Half Moon Is.	8	10	2		2					
7	HANN	Hannah Point	12	21	9		2	2	2	2		1
8	JUBA	Jubany STN, KGI	2	3	1							
9	MITC	Mitchell Cove, Robert Island	5	7	2							
10	PEND	Pendulum Cove	0	0	0							
11	PENG	Penguin Is.	10	17	7	2	2			2		
12	ROBE	Robert Point	4	6	2		2					1
13	TELE	Telefon Bay, Deception Is.	0	0	0							
14	TURR	Turret Point, KGI	9	15	6	2	2			2		
15	VAPO	Vapour Col, Deception Is.	1	2	1		2					
16	WHAL	Whalers Bay, Deception Is.	5	6	1							1
17	YANK	Yankee Harbor	6	8	2			2				

Appendix 6: SOUTH SHETLAND ISLANDS subarea, site diversity, sensitivity, visitor space

	SNPE	BESH	SNSB	Skua spp.	WISP BBSP	KEGU	ANTE	E SEAL	LICH	MOSS	RVS
AITC			1	2		2	2	2	1	2	
ARCT				1	1			2	1	1	
BAIL				2					1	1	
FERR							1			1	
FORT		1	1		1	1	1		1	1	
HALF		1	1	1	1	2	1		1		YES
HANN		2	2	2	1	2		2	1		YES
JUBA						1		2			
MITC				2	1		2		1	1	
PEND											
PENG			1	2	1	2	2		1	2	
ROBE						1		2			
TELE											
TURR		1				2	2	2	1	1	
VAPO											
WHAL					1	2	1		1		
YANK			1	2	1				1	1	

Appendix 6: NORTHWEST subarea, site diversity, sensitivity, visitor space

			SPP. DIV	PROX	ENV SENS	ADPE	CHPE	GEPE	MCPE	SOGP	ANFU	PIPE
1	ALMI	Almirante Brown STN vic.	4	5	1			2				
2	ASTR	Astrolabe Is.	7	8	1		2				1	1
3	BERN	Bernardo O'Higgins STN	1	2	1			2				
4	CUVE	Cuverville Is.	10	11	1			2		1		
5	DANC	Danco Is.	1	2	1			2				
6	DORI	Dorian Bay (Damoy Pt.)	2	4	2			2				
7	FOYN	Foyn Harbor, Enterprise Is.	0	0	0							
8	RONG	Georges Pt., Rongé Is.	3	6	3		2	2				
9	GOUR	Gourdin Is.	4	8	4	2	2	2				
10	GOUV	Gouvernøren Harbor	0	0	0							
11	HYDR	Hydrurga Rocks	4	5	1		2					
12	LECO	Lecointe Is.	1	1	0							
13	MELC	Melchior Is.	0	0	0							
14	MIKK	Mikklesen Harbor	1	2	1			2				
15	NEKO	Neko Harbor	4	7	3			2				
16	ORNE	Orne Is.	7	10	3		2					
17	LOCK	Jougla Point, Port Lockroy	6	8	2			2				
18	POPT	Portal Point	0	0	0							
19	PRIE	Priest Island	1	1	0							
20	PYPT	Py Point	2	4	2			2				
21	SIFF	Siffrey Point	3	3	0							
22	SPRI	Sprightly Is. vic., (incl. Spring Pt.)	1	2	1		2					
23	WATE	Waterboat Point	3	6	3		2	2				

Appendix 6: NORTHWEST subarea, site diversity, sensitivity, visitor space

	SNPE	BESH	SNSB	Skua spp.	WISP BBSP	KEGU	ANTE	E SEAL	LICH	MOSS	RVS
ALMI		1	1				1				
ASTR		1	1		1		1				YES
BERN											
CUVE		1	1	1	1	1	1		1	1	
DANC											
DORI				2							
FOYN											
RONG			2								
GOUR				2							YES
GOUV											
HYDR		1			1	1					YES
LECO		1									
MELC											
MIKK											
NEKO				2		2				1	YES
ORNE		2	1	2	1				1	1	
LOCK		2		1		1	1		1		YES
POPT											
PRIE		1									
PYPT				2							
SIFF	1								1	1	
SPRI											
WATE			2								YES

Appendix 6: SOUTHWEST subarea, site diversity, sensitivity, visitor space

			SPP. DIV	PROX	ENV SENS	ADPE	CHPE	GEPE	MCPE	SOGP	ANFU	PIPE
1	BLAI	Blaicklock Island	2	4	2							
2	BOOT	Booth Island	4	7	3	2	2	2				
3	DETA	Detaille Island	4	7	3	2						
4	FISH	Fish Is.	2	4	2	2						
5	MCAL	McCall Point	1	1	0							
6	PETE	Petermann Is.	7	11	4	2		2				
7	PLEN	Pleneau Is.	8	11	3			2				
8	POUR	Pourquoi-pas Is.	4	5	1	2						
9	PROS	Prospect Point	0	0	0							
10	SHUM	Shumskiy Cove	0	0	0							
11	STON	Stonington Island	2	2	0							
12	VERN	Vernadsky Station	0	0	0							
13	YALO	Yalour Is.	3	4	1	2						

Appendix 6: SOUTHWEST subarea, site diversity, sensitivity, visitor space

	SNPE	BESH	SNSB	Skua spp.	WISP BBSP	KEGU	ANTE	E SEAL	LICH	MOSS	RVS
BLAI				2						2	
BOOT						1					
DETA		1		2		2					
FISH		2									YES
MCAL									1		
PETE		2	1	2	1				1		
PLEN		1		2		1	1	2	1	1	
POUR				1					1	1	
PROS											
SHUM											
STON				1			1				
VERN											
YALO									1	1	

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Censuses of penguin, blue-eyed shag, and southern giant petrel populations in the Antarctic Peninsula region, 1994–2000

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ABSTRACT. This paper presents new census data and population estimates for penguins, blue-eyed shags, and southern giant petrels from 26 sites in the Antarctic Peninsula, collected by the Antarctic Site Inventory from 1994 to 2000. For nine sites, population data or estimates are published for the first time. The newly discovered gentoo penguin population of 215 nests at Heroína Island (63°24'S, 54°36'W) represents the easternmost location where this species has been found breeding in the Peninsula. All three pygoscelid penguins — gentoo, Adélie, and chinstrap — were found breeding at Gourdin Island (63°12'S, 57°18'W), the fourth known site where these species nest contiguously in the Peninsula. During the period, significant declines in nesting populations of blue-eyed shag were documented at three northwestern Peninsula locations.

Contents

The Antarctic Site Inventory

From January 1994 to February 2000, under the aegis of the Antarctic Site Inventory project, 287 survey visits were made to 59 locations in the Antarctic Peninsula. A major objective of the Inventory is compiling baseline data and information that may be necessary to detect possible changes in the physical and biological variables monitored and to determine how best to minimize or avoid possible environmental impacts of tourism and non-governmental activities in the Antarctic Peninsula area.

Site visits are achieved by placing Antarctic Site Inventory researchers aboard tour ships at key census times each austral spring and summer, coinciding with the peak of penguin egg-laying (for nest censuses) and the peak of penguin chick crèching (for chick censuses). Site visits and aerial photo documentation also are undertaken in cooperation with the Royal Navy ice patrol vessel HMS *Endurance* (Naveen 1996, 1997a). Data are collected in accordance with the *CEMP standard methods for monitoring studies* (Scientific Committee for the Conservation of Antarctic Marine Living Resources 1997).

The Inventory divides the Antarctic Peninsula into six sub-areas (Fig. 1), the designations of which are:

- South Orkneys (SO), including Laurie, Coronation, and Signy islands;
- Elephant Island and nearby islands (EI);
- South Shetland Islands (SH), including Deception, Low, and Smith islands (Fig. 2);
- Northeast Antarctic Peninsula (NE), from Cape Dubouzet (63°16'S, 64°00'W) and Joinville Island (63°15'S, 55°45'W) to James Ross Island (64°10'S, 57°45'W) (Fig. 3);
- Northwest Antarctic Peninsula (NW), from Cape Dubouzet to the northern end of the Lemaire Channel (65°04'S, 63°57'W) (Fig. 4); and
- Southwest Antarctic Peninsula (SW), from the northern end of the Lemaire Channel to the northern part of Marguerite Bay (68°18'S, 67°11'W) (Fig. 5).

This paper presents new census data and population estimates for penguins, blue-eyed shags, and southern giant petrels from 26 sites in the Antarctic Peninsula, collected from 1994 to 2000. Site locations are noted in Figures 2–5.

Census data

The nest and chick census data listed in Tables 1–6 represent either site-wide censuses and estimates, or censuses and estimates of major colonies at particular sites. The data are formatted according to census codes

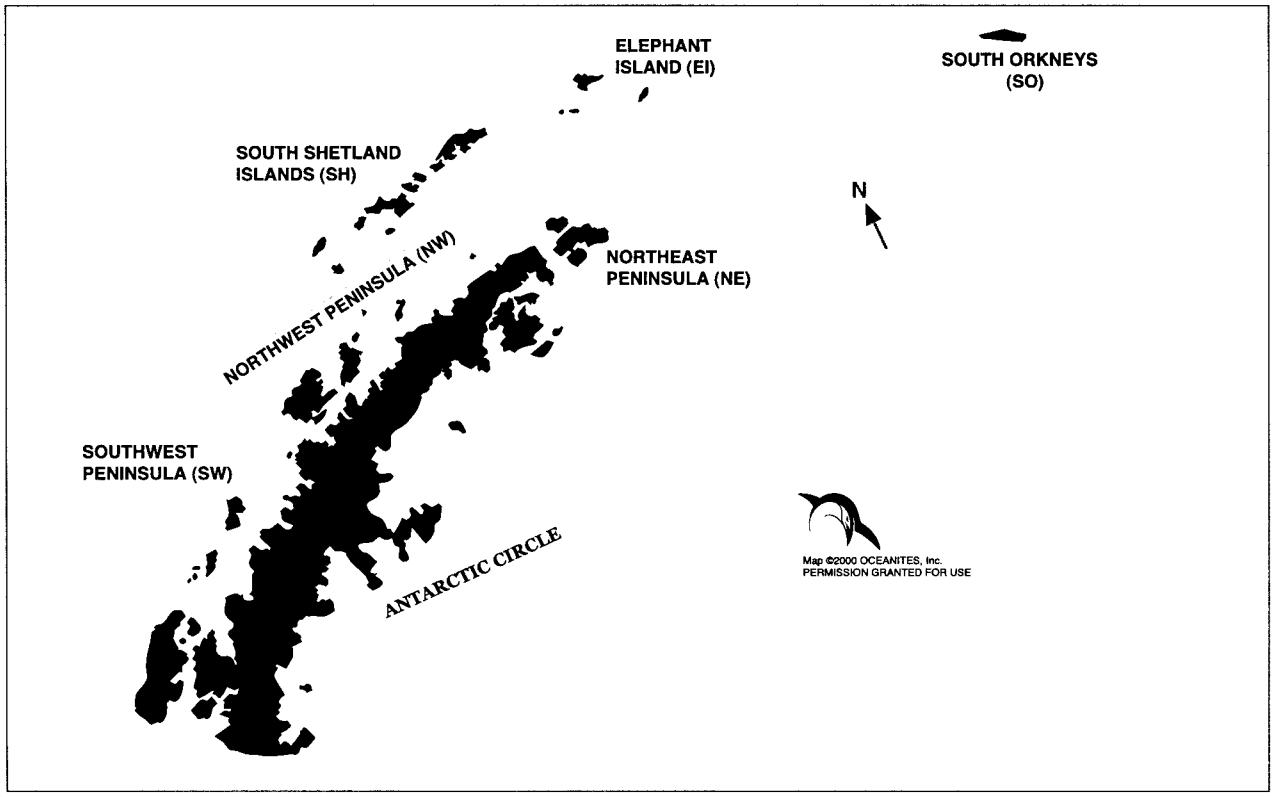

Fig. 1. Map of the Antarctic Peninsula region, indicating the six sub-areas and their abbreviations, as divided by the Antarctic Site Inventory: the South Orkneys, Elephant Island and nearby islands, the South Shetland Islands, the Northeast Antarctic Peninsula, the Northwest Antarctic Peninsula, and the Southwest Antarctic Peninsula.

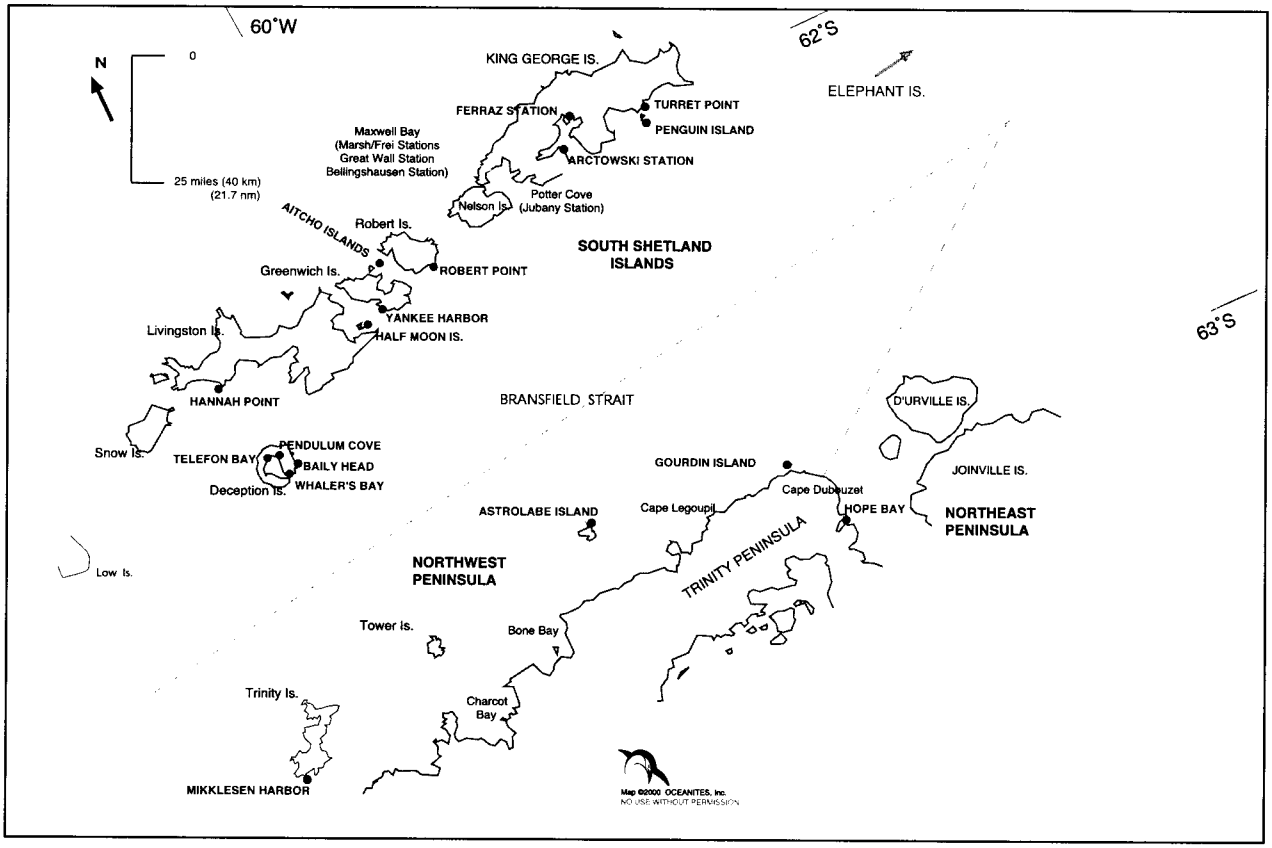

Fig. 2. Map of the South Shetland Islands and parts of the Northwest Antarctic Peninsula region.

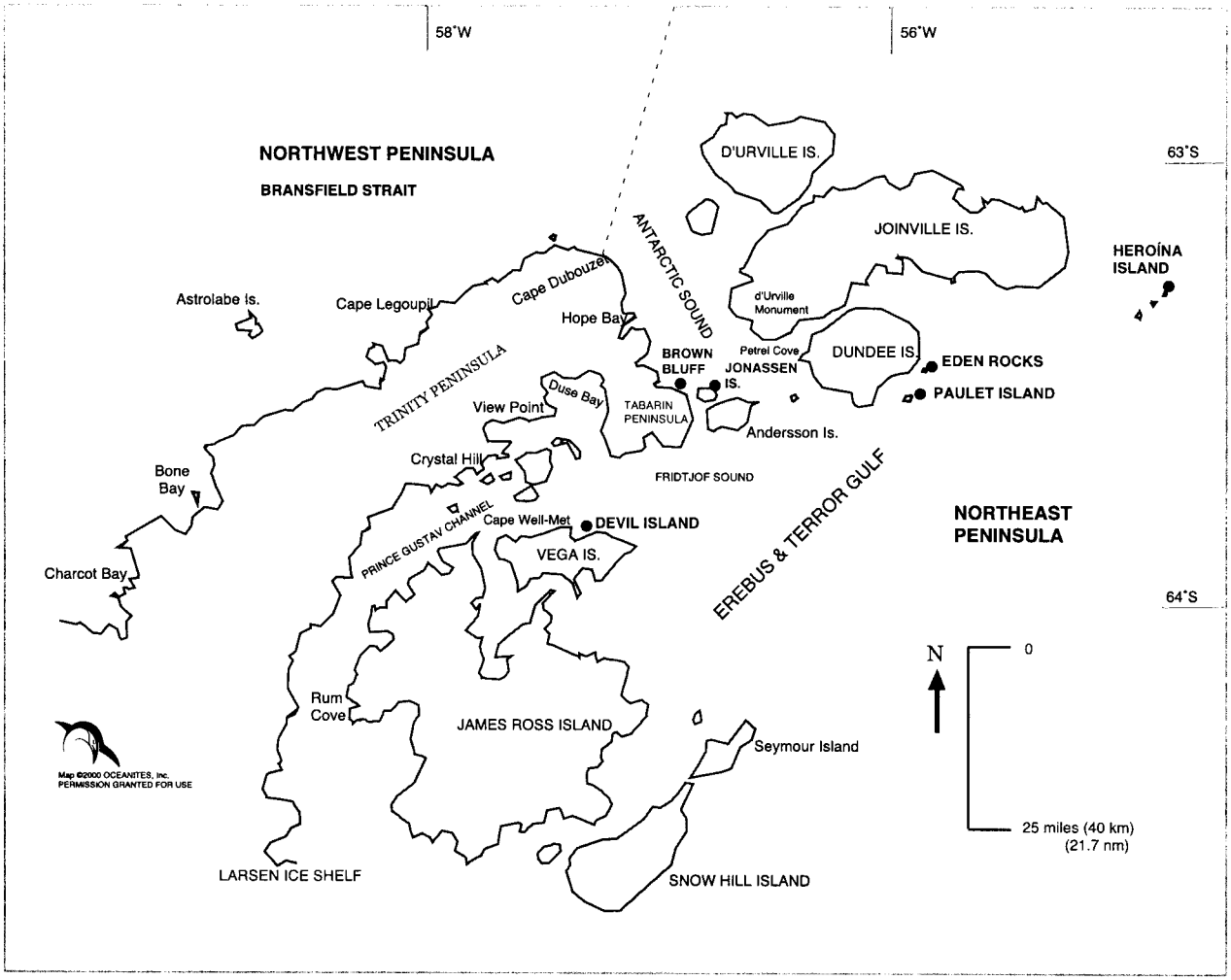

Fig. 3. Map emphasizing the Northeast Antarctic Peninsula region, as defined by the Antarctic Site Inventory.

established in Woehler (1993), which specify the nature and accuracy of each census. For example, an 'N1' census of breeding pairs/nests is the most accurate of nest counts, with pairs/nests individually counted and probably accurate to better than ±5%; a 'C1' census of chicks is the most accurate of chick counts, with chicks individually counted and probably accurate to better than ±5%. Note that chick counts are difficult to interpret, because the census may not have occurred during the peak of chick crèching or because there is variation in annual breeding productivity (crèched chicks per active nest) (Woehler 1993; Scientific Committee for the Conservation of Antarctic Marine Living Resources 1997). N1 and C1 data obtained for the Inventory represent mean values for the months in which the censuses were made.

In attempting to establish baselines at the various locations, the Inventory routinely references the historic penguin nest and chick censuses compiled in Woehler (1993) and updated in Woehler and Croxall (1996). The SCAR Sub-committee on Bird Biology is producing a revision to this data compilation, and the Inventory data presented below have been submitted for incorporation therein.

The historic data yield valuable information about penguin distribution and often reflect more detailed work being done at particular locations, but there is potential difficulty in using these data to assess population trends. These data have been collected over time by a large number of field workers using a variety of methods. As noted, the Inventory follows the *CEMP standard methods*, which requires penguin nest counts during the peak of egg-laying each season and chick censuses during the subsequent peak of chick crèching. Thus, the historic censuses may not be comparable to Inventory data because they were accomplished at various times, in varying fashions, and not necessarily in accordance with the *CEMP standard methods*. The only filter consistently applied to these compiled data relates to the exactitude of the counts themselves (that is, whether they represent actual nest counts or estimates with varying degrees of accuracy). Regarding some of the historic censuses, only the year is listed for a particular nest or chick count. In other instances, it is unclear at which point the census occurred within a particular breeding season. In other cases, where specific dates are ascribed to penguin nest or chick censuses (or where dates may be gleaned from primary source material),

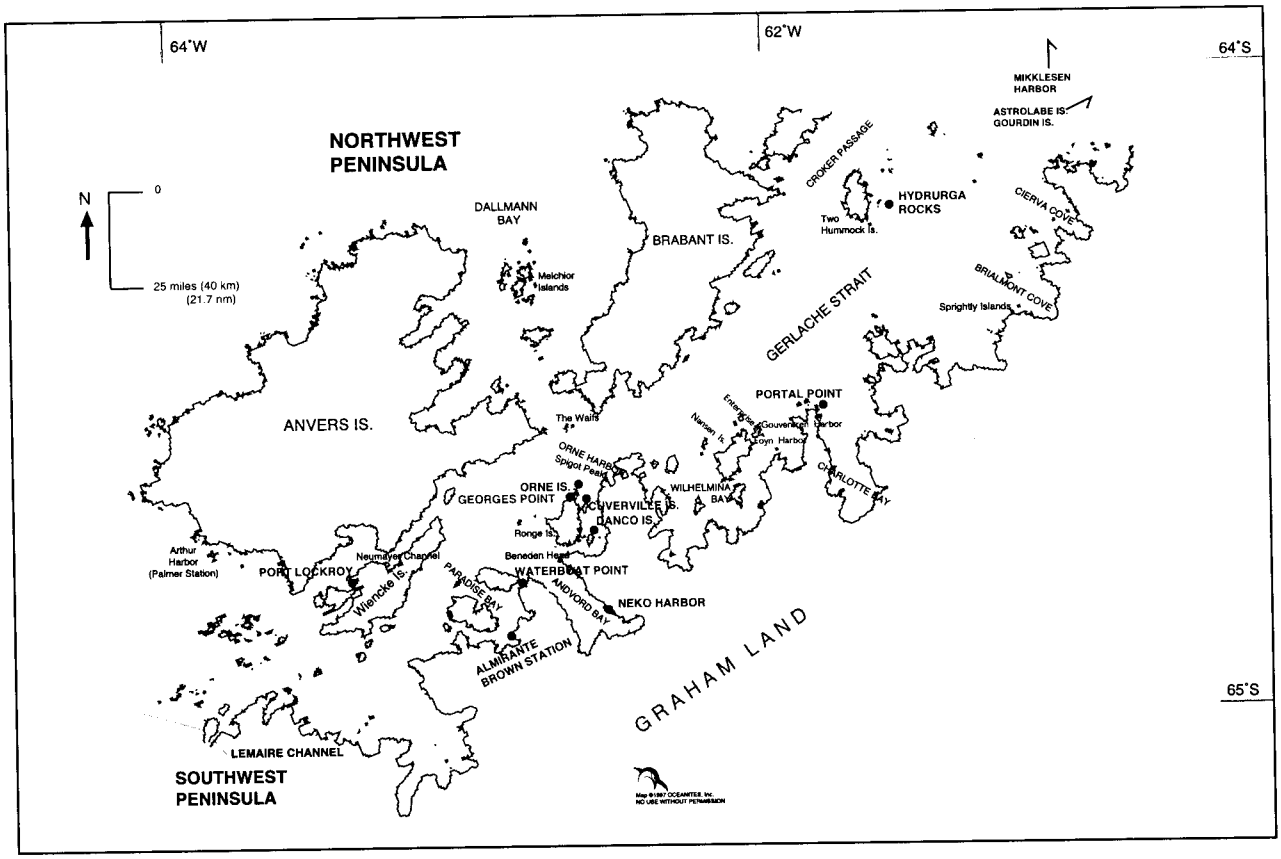

Fig. 4. Map of the Northwest Antarctic Peninsula region, as defined by the Antarctic Site Inventory.

it is unclear how close the censuses were to the peak of either egg-laying or chick crèching in that particular breeding season. See Norman (2000) for a related discussion regarding the difficulties in using historic census data.

Therefore, in the 'Discussion,' the only trends noted are those suggested by comparable data the Inventory has collected. Further, six seasons of Inventory data, in and of themselves, may be insufficient to assess long-term trends and whether any detected changes may be naturally occurring, produced perhaps by human activities, or resulting from other direct, consequential, synergistic, and cumulative effects (Naveen 1997a). With respect to future censusing efforts in the Antarctic Peninsula, whether by the Inventory or other projects, reliance on the *CEMP standard methods* will ensure that all data are fully comparable and, presumably, will enable a greater confidence in assessing and describing trends or variability. At present, in the Peninsula, long-term penguin and seabird projects on the western shore of Admiralty Bay (Site of Special Scientific Interest 8), Arthur Harbor, and Cape Shireff, Livingston Island, fully incorporate these standard, uniform procedures.

Census strategies

Regarding penguins, differences in breeding biology led to the adoption of different Inventory census strategies (Trivelpiece 1991; Williams 1995; Emslie 1997; Naveen 1997b). Chinstrap and Adélie penguins are highly faithful to specific nest sites, and do not tend to abandon regular nest sites and rookeries if there is a breeding failure in a single season. Because of the strong site fidelity of chinstrap and Adélie penguins, nest and chick censuses of discrete colonies and subgroups at a particular site may have long-term relevance, even if all colonies and subgroups at that site cannot be censused. Gentoo penguins do not exhibit the same nest-site fidelity and regularly change nesting locations if there are disturbances. This means that gentoo penguin nest and chick censuses may have long-term relevance only if all gentoo colonies and subgroups at a particular site are censused (Trivelpiece and Trivelpiece 1990; Trivelpiece and others 1990).

Discussion

Tables 1–6 list 45 censuses or population estimates of penguin, blue-eyed shag, and southern giant petrel colonies at 26 sites in the Antarctic Peninsula, collected by the Antarctic Site Inventory from 1994 to 2000. For nine sites, population data or estimates are published for the first time. The following species-specific discussion indicates sites where the Inventory has upgraded the accuracy of historic censuses. For each site, nest and chick census data are presented with the terminology suggested in Woehler (1993).

Adélie penguin

In six field seasons from 1994 to 2000, the Inventory censused or estimated populations at 14 different Adélie penguin breeding sites (Table 1). Data/estimates for seven Adélie penguin colonies in the northeast Peninsula region

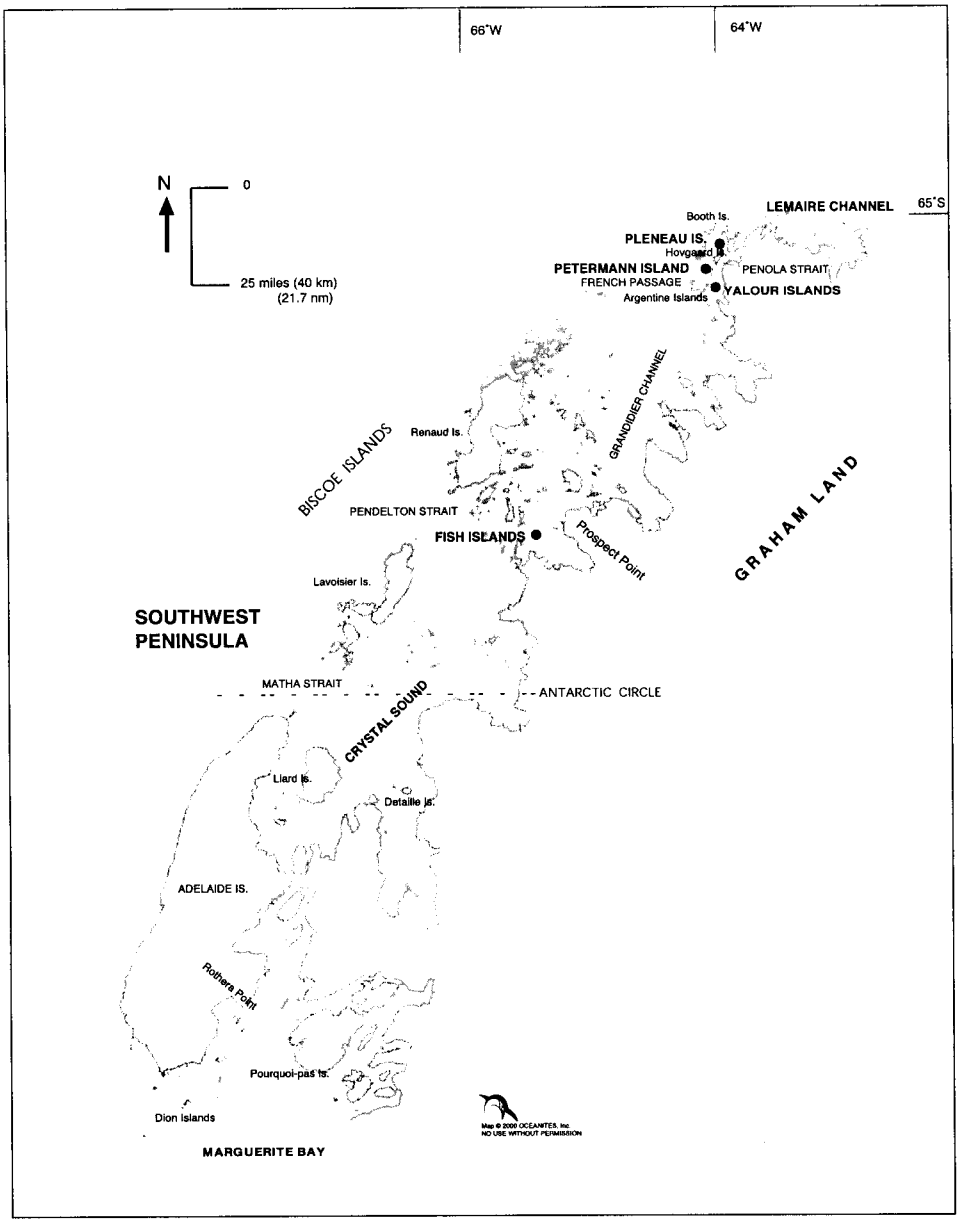

Fig. 5. Map of the Southwest Antarctic Peninsula region, as defined by the Antarctic Site Inventory.

are presented for the first time — Heroína Island, Beagle Island, Darwin Island, Platter Island, Comb Island, Eden Rocks, and Brown Bluff. The Inventory's first nest censuses/estimates at Heroína Island and Eden Rocks add a minimum of 329,364 nests to the known breeding population of Adélie penguins in the Antarctic Peninsula. With respect to historic data compiled in Woehler (1993) and Woehler and Croxall (1996), the Inventory upgraded censuses at four Adélie penguin sites to N1/2 or C1/2 counts — Jonassen Island (NE), Paulet Island (NE), Devil Island (NE), and Gourdin Island (NW). The estimate of 95,000–105,000 breeding pairs at Paulet Island (NE) does not necessarily indicate a population increase. Using a different technique, an estimate was made of 75,000 nests that are relatively contiguous to the historic Nordenskjöld expedition hut on the northwestern tip of the island, compared to an estimate of 60,000 from 1984. Further, 20,000–30,000 nests were estimated in Paulet Island's northeastern and eastern canyons, which are physically separated from the other, on-site Adélie penguins. It is not clear whether or not these canyons were censused/estimated in 1984.

Gentoo penguin

During six field seasons between 1994 and 2000, the Inventory censused or estimated breeding populations at 13 different sites of gentoo penguins (Table 2). Data for three gentoo penguin colonies are presented for the first time — Heroína Island (NE), Brown Bluff (NE), and Fort Point (SH) — and add a minimum of 1064 nests to the known breeding population of gentoos in the Antarctic Peninsula. With respect to historic data compiled in Woehler (1993) and Woehler and Croxall (1996), the Inventory upgraded censuses at four gentoo sites to N1/2 or C1/2 counts — Yankee Harbor (SH), Aitcho Islands (SH), Jonassen Island (NE), and Gourdin Island (NW). The newly discovered Heroína Island population represents the easternmost location where gentoo penguins have been found breeding in the Peninsula.

Chinstrap penguin

In six field seasons from 1994 to 2000, the Inventory censused or estimated breeding populations at seven different chinstrap penguin sites (Table 3). With respect to historic data compiled in Woehler (1993) and Woehler and Croxall (1996), the Inventory upgraded censuses at five chinstrap penguin sites to N1/2 or C1/2 counts — Aitcho Islands (SH), Hannah Point (SH), Hydrurga Rocks (SH), Fort Point (SH), and Gourdin Island (NW).

Macaroni penguin

The census at Fort Point, Greenwich Island (SH), adds a macaroni penguin nesting site not previously reported (Table 4).

Table 1. Antarctic Site Inventory censuses for Adélie penguin (*Pygoscelis adeliae*), 1994–2000. N1 = nests individually counted, accurate to better than ±5%; N2 = nests counted in known area then extrapolated over total colony area, accurate up to 5–10%; N3 = accurate estimate, accurate to 10–15%; N4 = rough estimate, accurate to 25–50%; C1 = chicks individually counted, accurate to better than ±5%; C2 = chicks counted in known area then extrapolated over total area, accurate to 5–10%; C3 = accurate estimate, accurate to 10–15%; A3 = estimates based on counts of total birds or adults individually counted, accurate to 10–15%; EL = extra large, >100,000 breeding pairs; VL = very large, 20,000–99,999 breeding pairs; L = large, 7500–19,999 breeding pairs; M = medium, 1000–7499 breeding pairs; S = small, 100–999 breeding pairs.

Census		Date	Notes
Penguin Island (SH) – 62°06'S, 57°54'W			
1966	N1	Nov 1996	Recent historic census reported in Woehler (1993) = 3114 (N1/3, 1980)
2441	N1	Dec 1997	
Turret Point, King George Island (SH) – 62°05'S, 57°55'W			
1077	N1	Nov 1997	Recent historic census reported in Woehler (1993) = 1918 (N1, 1980)
Heroína Island, Danger Islands group (NE) – 63°24'S, 54°36'W			
285,115–305,165	N2	Dec 1996	This is the first-reported Adélie penguin census for this site; Woehler (1993) notes ≥5 Adélie colonies at Danger Island group, referring to a 1978 survey that did not estimate the Heroína Island population
Beagle Island, Danger Islands group (NE) – 63°25'S, 54°40'W			
VL to EL	N4	Jan 1999	Estimate from aerial photo documentation
Darwin Island, Danger Islands group (NE) – 63°26'S, 54°46'W			
VL to EL	N4	Jan 1999	Estimate from aerial photo documentation
Platter (Plato) Island, Danger Islands group (NE) – 63°26'S, 54°40'W			
L	N4	Jan 1999	Estimate from aerial photo documentation
Comb (Peine) Island, Danger Islands group (NE) – 63°24'S, 54°42'W			
S to M	N4	Jan 1999	Estimate from aerial photo documentation
Eden Rocks (NE) – 63°29'S, 55°40'W			
Western colony			
19,649–20,785	N3	Dec 1996	Western colony only; there are large Adélie colonies on each of the two rocks comprising this site
Eastern colony			
24,600–28,905	N3	Dec 1996	Eastern colony only; there are large Adélie colonies on each of the two rocks comprising this site
Overall			
44,249–49,460	N3	Dec 1996	Total of western and eastern colonies
Brown Bluff, Tabarin Peninsula (NE) – 63°32'S, 56°55'W			
20,000	C3	Jan 1995	
Jonassen Island (NE) – 66°33'S, 56°40'W			
0	C1	Jan 1996	Woehler (1993) lists a 1901 reference to a 'large colony,' which the Inventory did not relocate
Paulet Island (NE) – 63°35'S, 55°27'W			
Northern colony, contiguous to the historic Nordenskjöld expedition hut			
75,000	N2	Jan 1999	An extrapolation from Inventory aerial photo documentation of nests contiguous to the historic Nordenskjöld expedition hut on the northwestern part of the island; recent historic nest censuses reported in Woehler (1993) = 100,000 (A3, 1981) and 60,000 (A3, Nov 1984), the latter apparently referring to nests that are relatively contiguous to the Nordenskjöld expedition hut
Northeastern/eastern canyons			
20,000–30,000	N3	Jan 1999	An extrapolation from Inventory aerial photo documentation of Adélies in the northeastern/eastern canyons, which are physically separated from the colonies contiguous to the Nordenskjöld expedition hut
Overall			
95,000–105,000	N2/3	Jan 1999	Revised estimate for entire island, based on an extrapolation from Inventory aerial photo documentation
Devil Island (NE) – 63°48'S, 57°17'W			
10,320	C2	Jan 1996	Woehler (1993) lists a 1945 reference to a 'large colony' at this site
8501	C1	Jan 2000	

Table 1 continued

Census	Date	Notes
Gourdin Island (NW) – 63°12'S, 57°18'W Northwestern colony		
14,334	N2	Dec 1997	Northwestern end of the island; more nests may be present; Woehler (1993) lists a reference to an Adélie population of 300 nests (N4, 1969)
Petermann Island (SW) – 65°10'S, 64°10'W		
862	N1	Nov 1997	Recent historic censuses reported in Croxall and Kirkwood (1979) and Woehler (1993) = 1540 (N1, Dec 1971) and 1080 (N3, 1988)
1135	C1	Jan 1999	

Table 2. Antarctic Site Inventory censuses for gentoo penguin (*Pygoscelis papua*), 1994–2000. N1 = nests individually counted, accurate to better than ±5%; N2 = nests counted in known area then extrapolated over total colony area, accurate up to 5–10%; N3 = accurate estimate, accurate to 10–15%; N4 = rough estimate, accurate to 25–50%; C1 = chicks individually counted, accurate to better than ±5%.

Census	Date	Notes
Yankee Harbor, Greenwich Island (SH) – 62°32'S, 59°47'W		
4751 N1	Nov 1999	Recent historic census reported in Woehler (1993) = 4000 (N3/4, 1990)
Aitcho Islands visitor site (SH) – 62°24'S, 59°44'W Southern and southeastern end of the island		
1177 N1	Dec 1999	Recent historic census reported in Woehler (1993) = 314 (N3, Jan 1966)
Fort Point, Greenwich Island (SH) – 62°34'S, 59°34'W		
282 N1	Dec 1999	The Inventory census in Dec 1999 totalled 1136 nests of penguin species. Woehler (1993) notes a historic census ascribed fully to chinstrap penguins (1200 nests, N4, 1987)
Hannah Point, Livingston Island (SH) – 62°39'S, 60°37'W		
1123 N1	Dec 1996	Recent historic census reported in Woehler (1993) = 1016 (N1, 1987)
1350 N1	Dec 1997	
Heroína Island, Danger Islands group (NE) – 63°24'S, 54°36'W		
215 N1	Dec 1996	This colony has not been reported previously, and appears to be the easternmost breeding location for gentoos in the Antarctic Peninsula
Brown Bluff, Tabarin Peninsula (NE) – 63°32'S, 56°55'W		
617 N1	Nov 1999	
567 N1	Dec 1999	
Jonassen Island (NE) – 66°33'S, 56°40'W		
233 C1	Jan 1996	Woehler (1993) refers to a 1901 census of 20 nests (N4, 1901)
Gourdin Island (NW) – 63°12'S, 57°18'W Northwestern colony		
568 N2	Dec 1997	Northwest end of the island; more gentoo nests may be present. Woehler (1993) lists a reference to a gentoo population of 50 nests (N3, 1969)
Danco Island (NW) – 64°44'S, 62°37'W		
2300 N2	Nov 1999	Recent historic censuses reported in Woehler (1993) and Woehler and Croxall (1996) = 800 (C1, 1986) and 1637 (N2, 1994)
Jougla Point/Port Lockroy, Wiencke Island (NW) – 64°49'S, 63°30'W		
1595 N1	Nov 1996	Recent historic census reported in Woehler (1993) = 1616 (N1, 1988)
1405 N1	Nov 1997	
1545 N1	Dec 1997	
1437 N1	Nov 1998	
1681 N1	Nov 1999	
1501 N1	Dec 1999	
Neko Harbor (NW) – 64°50'S, 62°33'W		
934 C1	Feb 1996	Recent historic censuses = 214 (N3, 1971; reported in Croxall and Kirkwood 1979); 250 (C1, 1987; reported in Woehler 1993)
625 C1	Jan 1999	
844 N1	Dec 1999	
Pléneau Island (SW) – 65°06'S, 64°04'W		
1577 N1	Nov 1999	Recent historic census reported in Woehler (1993) = 500 (N1, 1982)
Petermann Island (SW) – 65°10'S, 64°10'W		
1224 N1	Dec 1997	Recent historic census reported in Woehler (1993) = 755 (N2, 1988)

Table 3. Antarctic Site Inventory censuses for chinstrap penguin (*Pygoscelis antarctica*), 1994–2000. N1 = nests individually counted, accurate to better than ±5%; N2 = nests counted in known area then extrapolated over total colony area, accurate up to 5–10%; N3 = accurate estimate, accurate to 10–15%; N4 = rough estimate, accurate to 25–50%; C1 = chicks individually counted, accurate to better than ±5%.

Census		Date	Notes
Aitcho Islands visitor site (SH) – 62°24'S, 59°44'W			
Southern and southeastern end of the island			
4608	N2	Nov 1997	Not including chinstrap penguins nesting on site's northern, rocky coast; Inventory censuses occur at the regular zodiac landing site in Aitchos, which is an island located northwest of Cecilia Island, that is officially unnamed on US and British Admiralty nautical charts; Woehler (1993) notes a nesting population of 3500-4000 chinstraps (N4, January 1966) for Cecilia Island, a census originally reported in Croxall and Kirkwood (1979), which, based on site maps in Croxall and Kirkwood (1979), should have been ascribed to this visitor site
Fort Point, Greenwich Island (SH) – 62°34'S, 59°34'W			
853	N1	Dec 1999	Recent historic census reported in Woehler (1993) = 1200 (N4, 1987); the Inventory census in December 1999 totalled 1136 nests of three penguin species
Hannah Point, Livingston Island (SH) – 62°39'S, 60°37'W			
1158	N1	Dec 1996	Recent historic census reported in Woehler (1993) = 1500 (N3, 1987)
1137	N1	Dec 1997	
1061	N1	Dec 1999	
1341	C1	Jan 2000	
Gourdin Island (NW) – 63°12'S, 57°18'W			
Northwestern and eastern colonies			
3282	N2	Dec 1997	Northwestern and eastern ends of the island only; more nesting chinstraps may be present; Woehler (1993) lists a 1969 reference to a 'large colony' of chinstraps. Other Peninsula sites where all three pygoscelid penguins nest contiguously have been designated as Sites of Special Scientific Interest under the Antarctic Treaty: Stranger Point, King George Island; Point Thomas, western shore of Admiralty Bay, King George Island; and Ardley Island
Hydrurga Rocks (NW) – 64°08'S, 61°37'W			
526		Nov 1996	Recent historic nest census reported in Woehler (1993) = 1000 (N4/5, 1986)
Georges Point, Rongé Island (NW) – 64°40'S, 62°39'W			
383	N1	Dec 1996	Recent historic nest censuses reported in Woehler (1993) and Woehler and Croxall (1996) = 300 (N3/4, 1984), 600 (N3, 1988), and 414 (N2, 1994)
327	N1	Nov 1998	
Orne Islands (NW) – 64°39'S, 62°40'W			
342	N1	Dec 1996	Recent historic nest censuses reported in Woehler (1993) and Woehler and Croxall (1996) = 860 (N3, 1987) and 420 (N2, 1994)
370	N1	Nov 1998	
361	N1	Dec 1998	
421	N1	Nov 1999	
332	N1	Dec 1999	
484	C1	Jan 2000	

Blue-eyed shag

Nest counts were obtained sufficient to establish a trend in blue-eyed shag nesting populations at five of 13 sites where the Antarctic Site Inventory has identified nesting shags: the cliffside colonies near Almirante Brown Station, Paradise Bay (NW); Hannah Point, Livingston Island (SH); Jougla Point, Port Lockroy, Wiencke Island (NW); Petermann Island (SW); and the Orne Islands (NW) (Table 5). An analysis of these data for the period January 1994 to January 2000 indicates declines at all of these sites. However, it was not possible to reject the null hypothesis that the negative slopes of the log-transformed data were the result of chance alone for Petermann Island and Jougla Point (Colton 1974: table 5). Declines at the other sites were either highly significant (Almirante Brown, $P < .001$, $r = .9786$, 5 df; Orne Islands, $P < .001$, $r = .9765$, 4 df) or significant (Hannah Point, $P < .05$, $r = .7422$, 6 df). Collectively, nest counts at the Almirante Brown shag colony declined 51%, from 100 to 49, in the 1994–2000 period. Nest counts at the Orne Islands colony went from

Table 4. Antarctic Site Inventory censuses for macaroni penguin (*Eudyptes chrysolophus*), 1994–2000. N1 = nests individually counted, accurate to better than ±5%; N4 = rough estimate, accurate to 25–50%; C1 = chicks individually counted, accurate to better than ±5%.

Census		Date	Notes
Hannah Point, Livingston Island (SH) – 62°39'S, 60°37'W			
8	N1	Nov 1995	Macaronis nested in three of the chinstrap penguin colonies surveyed by the Inventory; recent historic nest census reported in Woehler (1993) = 8 (N1, 1987)
6	N1	Dec 1995	
6	N1	Dec 1996	
6	N1	Dec 1997	
5	N1	Dec 1999	
3	C1	Jan 1995	
4	C1	Jan 1996	
3	C1	Jan 2000	
Fort Point, Greenwich Island (SH) – 62°34'S, 59°34'W			
1	N1	Dec 1999	The Inventory census in December 1999 totalled 1136 nests of three penguin species; Woehler (1993) notes a historic census ascribed fully to chinstrap penguins (1200 nests, N4, 1987)

15 nests in November 1994 to zero in December 1999.

The Almirante Brown and Orne Islands colonies are either inaccessible to tourists or receive few tourist visits (Naveen 1997a), suggesting that human disturbance is an unlikely cause of the decline at these sites. In December 1999 at the Orne Islands site, one-meter-deep snow on the shags' nesting ledges was noted. At the other three sites (Petermann Island, Jougla Point, Hannah Point), the shag population now may have stabilized or slightly increased since the decline from 1994–1995 levels.

Collectively, the declines observed through seven seasons at different sites throughout the Peninsula suggest that blue-eyed shag numbers should be further monitored. These declines may be indicative of some underlying environmental change affecting shag nest success.

Southern giant petrel

The Inventory has begun annual, site-wide censuses of southern giant petrel at three sites in the South Shetland Islands — Aitcho Islands, Penguin Island, and Hannah Point, Livingston Island, which are reported here for the first time (Table 6). All three have assemblages of petrels that may be easily accessed by visiting tourists. While it is too early to suggest any population trends, there is considerable concern regarding potential disturbances to this species, which has an extremely lengthy breeding cycle: a single egg is laid in early November, the incubation period lasts for approximately 60 days (until January), and each season's cohort of chicks — if they survive — will not fledge until 100–130 days after hatching, in March and later (Naveen 1997a, 1997b). Extreme care is necessary because nesting southern giant petrels are easily pushed off their eggs during the nesting season, and eggs may be easily predated by skuas. Once an egg is lost, southern giant petrels are unable to relay and breed successfully that season (Emslie 1996).

Conclusion

Data collected during the first six seasons of Antarctic Site Inventory fieldwork suggest approaches and refinements for all assessment and monitoring initiatives in the Antarctic Peninsula. The most critical of these relates to the comparability of census data, enabling trends to be assessed and described more confidently. As noted, the Inventory attempts to collect data according to the *CEMP standard methods*, a standard methodology followed by other long-term research projects in the Peninsula. If, for example, the Inventory detects a population change at a particular site, comparable data from other nearby sites will enable a determination whether the detected change is a site-specific aberration or an area-wide trend.

The *CEMP standard methods* also mandate that nest censuses be achieved as near as possible to the peak of egg-laying, and chick censuses as near as possible to the peak of chick crèching. Ensuring that data are collected during these mandated periods will enable determinations of breeding success/productivity, annual survival, and recruitment. Further, accurate breeding chronologies at key tourism sites will enable comparisons to the visitation chronology of tourists, perhaps to determine how the timing of visits relates to times within each breeding cycle when eggs or chicks are most vulnerable to disturbance.

The population decline detected at a number of blue-eyed shag breeding sites needs continued attention and investigation. The sites exhibiting highly significant declines are either inaccessible to tourists or receive few tourist visits, which potentially implicates other, natural factors like a changing climate or prey availability/distribution. It is hoped that southern giant petrel censuses initiated at three Peninsula locations will assist future determinations of the status of this species, which is easily disturbed by human visitors.

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Table 5. Antarctic Site Inventory censuses for blue-eyed shag (*Phalacrocorax atriceps*), 1994–2000. N1 = nests individually counted, accurate to better than ±5%; N2 = nests counted in known area then extrapolated over total colony area, accurate up to 5–10%; N3 = accurate estimate, accurate to 10–15%; C1 = chicks individually counted, accurate to better than ±5%.

Census		Date	Notes
Hannah Point, Livingston Island (SH) – 62°39'S, 60°37'W			
10	N1	Dec 1994	
7	N1	Nov 1995	
5	N1	Dec 1995	
5	N1	Dec 1996	
7	N1	Dec 1997	
5	N1	Dec 1998	
7	N1	Dec 1999	
5	N1	Jan 2000	
2	C1	Dec 1999	
8	C1	Jan 2000	
9	C1	Jan 2000	
Paulet Island (NE) – 63°35'S, 55°27'W			
432	N1	Nov 1995	
326	N1	Nov 1996	
360	N1	Dec 1996	
377	N2	Nov 1999	
Orne Islands (NW) – 64°40'S, 62°40'W			
15	N1	Dec 1994	Colony located on southwestern end of the site, and exposed to Gerlache Strait
9	N1	Nov 1995	
5	N1	Dec 1996	
3	N1	Dec 1997	
1	N1	Nov 1998	
1	N1	Dec 1998	
0	N1	Dec 1999	One-meter-deep snow on the shag nesting ledges
0	C1	Jan 2000	
Jougla Point/Port Lockroy, Wiencke Island (NW) – 64°49'S, 63°30'W			
31	N1	Dec 1994	Recent historic censuses include: 60 (N3, Jan 1983; reported in Parmelee 1992); 65 (N1, Dec 1983; reported in Parmelee 1992); 40 (N3, Jan 1984; reported in Parmelee 1992); 60 (N3, Jan 1989; reported in Parmelee 1992); and 43 (N1, Dec 1993; S. Drennan, personal communication)
22	N1	Nov 1995	
25	N1	Jan 1996	
20	N1	Nov 1997	
20	N1	Dec 1997	
22	N1	Nov 1998	
25	N1	Dec 1999	
26	N1	Jan 2000	R. Downie, personal communication
58	C1	Jan 1995	
50	C1	Jan 1996	
33	C1	Feb 1998	N. Milius, personal communication
45	C1	Jan 2000	R. Downie, personal communication
43	C1	Jan 2000	
Cliffs near Almirante Brown Station, Paradise Bay (NW) – 64°53'S, 62°52'W			
Colony #1			
72	N1	Jan 1994	
76	N1	Dec 1994	
60	N1	Nov 1995	
57	N1	Dec 1995	
56	N1	Nov 1996	
53	N1	Dec 1996	
46	N1	Nov 1997	
46	N1	Dec 1997	
43	N1	Jan 2000	
81	C1	Jan 2000	

Table 5 continued

Census		Date	Notes
Colony #2			
18	N1	Jan 1994	
24	N1	Dec 1994	
16	N1	Nov 1995	
14	N1	Dec 1995	
10	N1	Nov 1996	
6	N1	Nov 1997	
8	N1	Dec 1997	
6	N1	Jan 2000	
11	C1	Jan 2000	
Colonies #1 and #2			
90	N1	Jan 1994	
100	N1	Dec 1994	
76	N1	Nov 1995	
71	N1	Dec 1995	
66	N1	Nov 1996	
52	N1	Nov 1997	
54	N1	Dec 1997	
49	N1	Jan 2000	
92	C1	Jan 2000	
Petermann Island (SW) – 65°10'S, 64°10'W			
34	N1	Dec 1994	
27	N1	Nov 1995	
33	N1	Dec 1995	
29	N1	Dec 1996	
29	N1	Jan 1997	
29	N1	Nov 1997	
30	N1	Dec 1997	
67	C1	Jan 1995	
50	C1	Jan 1996	
57	C1	Jan 1999	
46	C1	Jan 2000	

Table 6. Antarctic Site Inventory censuses for southern giant petrel (*Macronectes giganteus*), 1994–2000. N1 = nests individually counted, accurate to better than ±5%.

Census		Date
Penguin Island (SH) – 62°06'S, 57°54'W		
507	N1	Dec 1997
578	N1	Dec 1998
439	N1	Jan 1999
634	N1	Dec 1999
Aitcho Islands visitor site (SH) – 62°24'S, 59°44'W		
81	N1	Jan 1999
108	N1	Dec 1999
Hannah Point, Livingston Island (SH) – 62°39'S, 60°37'W		
117	N1	Dec 1997
110	N1	Jan 1999
126	N1	Dec 1999
111	N1	Jan 2000

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Appendix 8: Peninsula penguin populations

STUDY SUBAREA	ADPE POP (pairs)	%	CHPE POP (pairs)	%	MCPE POP (pairs)	GEPE POP (pairs)	%
SO	218,095	31.5%	595,747	27.2%	23	12,450	15.4%
EI	121	0.0%	448,160	20.5%	7,313	2,600	3.2%
SH	54,042	7.8%	1,069,224	48.8%	144	32,838	40.7%
NE	294,169	42.5%	0	0.0%	0	1,206	1.5%
SW	88,824	12.8%	9	0.0%	0	2,055	2.5%
NW	37,285	5.4%	76,500	3.5%	0	29,496	36.6%
PEN Total	692,536	100.0%	2,189,640	100.0%	7,480	80,645	100.0%
Total Pop	2,465,800		7,490,200		11,841,600	314,000	
PEN %	28.1%		29.2%		0.1%	25.7%	

Source: Woehler, 1993; Woehler & Croxall, 1996

KEY
ADPE = Adélie penguin
CHPE = chinstrap penguin
MCPE = macaroni penguin
GEPE = gentoo penguin
POP (pairs) = minimum number of breeding pairs
SO = South Orkneys
EI = Elephant Island (and nearby islands)
SH = South Shetland Islands
NE = Northeast Antarctic Peninsula, from Cape Dubouzet to James Ross Island
SW = Southwest Antarctic Peninsula, from Lemaire Channel to Marguerite Bay
NW = Northwest Antarctic Peninsula, from Cape Dubouzet to Lemaire Channel

PEN Total = total number of penguins in the ASI study area (the Antarctic Peninsula)
PEN % = percentage of world population found in the ASI study area
Total Pop = minimum number of breeding pairs, world population

PART V

RECOMMENDATIONS

Five recommendations were made in the first edition of the *Site Compendium* (1997), and they are revisited below:

MACRO MONITORING

First, considering the entry into legal force of the 1991 Environmental Protocol to the Antarctic Treaty, it was recommended that Treaty Parties should ensure that a range of visitor sites are censused at 3-5 year intervals. The view was that, under the Protocol, environmental concerns will have to be formally assessed and evaluated in advance before any human activity — including tourism — may proceed. The Protocol's legal mandate thus forces a substantial analysis of real and potential impacts from all human activities in Antarctica, and irrespective of whether such potential impacts may be immediate or cumulative (Naveen, 1996c).

The first edition of the *Site Compendium* observed that costs of effectively monitoring all sites the Inventory has visited is staggering and that a more sensible approach is needed. The Inventory has proved to be a cost-effective means of reaching sites that are heavily visited or particularly sensitive, but still, there is no coordinated effort under Treaty auspices, to ensure that there are Peninsula-wide, Inventory-like censuses at timely intervals.

MICRO MONITORING

Another recommendation noted that some sites may require greater attention than censuses every 3-5 years. Recently published data (Naveen, et al., 2001) and further discussion in this second edition of the *Site Compendium* have identified diverse and sensitive sites that merit focused attention, particularly, those sites exhibiting high/medium species diversity or high/moderate sensitivity to potential environmental disturbance (Naveen, et al., 2001; Appendix 6).

It was further recommended in the first edition that Treaty Parties consider ensuring that biological parameters at a select number of sensitive visitor sites are assessed and monitored annually. The goal should be to provide as clear a view as possible of trends and potential causes. This effort should focus on identifying statistically significant changes in populations and parameters over time, and if possible, to distinguish if appropriate between anthropogenic change and natural fluctuations (Benninghoff & Bonner, 1985; Abbott and Benninghoff, 1990; Trivelpiece, 1991; Naveen, 1996c; Emslie, 1997). A similar suggestion has been advanced in Hofman and Jatko, 2002.

As with monitoring programs established at CCAMLR Ecosystem Monitoring Program sites, the focus should be monitoring a limited range of visitor sites, with appropriate controls (Scientific Committee for the Conservation of Antarctic Marine Living Resources, 1992; Benninghoff & Bonner, 1985; Abbott and Benninghoff, 1990). In this fashion, counts from the less frequently monitored "macro" sites then may be related to the detailed results from selected "micro" sites.

As noted in Part I, beginning in November 2003, the Antarctic Site Inventory will undertake a long-term monitoring and assessment study at Petermann Island. This effort involves a three-person team of researchers being on-site during the respective peaks of penguin egg-laying (for nest counts) and penguin chick-créching (for chick counts), and will not depend on opportunistic logistics from carefully selected expedition ships.

As a result, these long-term data sets will enable more accurate estimates of breeding population size and breeding success of Adélie penguin (*Pygoscelis adeliae*), gentoo penguin (*Pygoscelis papua*), and blue-eyed shag (*Phalacrocorax atriceps*), and allow direct and cumulative impacts at these sites to be detected precisely.

Further, such data, will ensure that the best scientific data and descriptive information are available should Antarctic Treaty Parties determine that site management is necessary and appropriate in the future and contribute to a better understanding of biological processes in the entire Antarctic Peninsula region,

CORRELATION STUDIES

In terms of long-term effort to detect changes and distinguish between natural variability and changes potentially induced by human visitors, the critical data collected by the Inventory will be those related to variable, biological parameters. These must be assessed rigorously from visit-to-visit and season-to-season. Moreover, there will need to be long-term studies that compare ecosystem variability at sites being visited by tourist with ecosystem variability at control sites where tourists are excluded (Trivelpiece, 1991).

To this end, the Inventory has sought to define census colonies at each site and to establish some of these as prospective *control colonies*.

Therefore, it is critical that the biological data are sufficiently rigorous to enable key biological parameters (e.g. productivity and recruitment rates) to be analyzed and compared in future environmental assessment and monitoring programs. In the CCAMLR Standard Methods, productivity refers to the number of chicks per active nest, which requires nests to be counted at the peak of egg-laying and chicks to be counted at the peak of chick-crèching (Scientific Committee for the Conservation of Antarctic Marine Living Resources, 1992). The long-term monitoring study that will commence at Petermann Island is intended to ensure that such rigorous data are collected.

NONSPECIFIC SITE VISIT REPORTING

Site visit reporting continues to be plagued by inexactitude, lost data, and confusion.

In filtering the NSF/OPP visitation compilations to examine zodiac landings, it becomes immediately apparent that many nonspecifically described sites are recorded; for example, "Deception Island," "Paradise Bay," "Elephant Island," "Laurie Island," "small peak, Errera Channel," and the "Argentine Islands." Precise landing sites exist in each of these general vicinities, but which ones, indeed, were visited is unclear.

Also, there are duplicate listings in the NSF/OPP compilations for many sites; for example, Jougla Point and Port Lockroy (but not the newly restored hut and visitor site at nearby Goudier Island), and "Rongé Island" and "Georges Point, Rongé Island." For purposes of the *Site Compendium*, many of these duplicate listings are combined.

Recently, Inventory researchers participated in initial visits to four "new" sites — Camp Hill, False Island Point, Jade Point, and Point Obelisk, which, inexplicably, did not appear in the NSF/OPP compilations, though, to the best of our knowledge, these visits were accurately reported. Perhaps the Point Obelisk visit was recorded, imprecisely, for James Ross Island, and the False Island Point visit, imprecisely, for Vega Island. Nonetheless, all four sites are included in the *Site Compendium*.[1]

The first edition recommended that NSF/OPP and the International Association of Antarctic Tour Operators (IAATO) take steps to remedy this imprecision, but, clearly, this difficulty continues. At present, at least thirty nonspecific sites are listed in the data compilations.

A companion recommendation noted that a goal of projects like the Antarctic Site Inventory is generating accurate breeding chronologies of penguin and flying bird species nesting at various sites. Ultimately, analyses of the potential environmental effects of passenger-visits will need to consider breeding chronologies vis-à-vis the timing and frequency of visits to particular sites.

At present, summary NSF/OPP-compiled data suggest a statistical interval between visits (given in days), though in all likelihood, certain sites are actually visited more than once per day. It is still recommended that future compilations of seasonal visitor statistics set forth, in greater detail, the exact timing of all visits and, concomitantly, the precise intervals between all visits.

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1 As noted in Part I, Inventory researchers have visited sites that are not regular tourism venues (e.g. Eden Rocks, Jonassen Island), and these have been routinely included in the *Site Compendium*.

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