

British Antarctic Territory and Wider Southern Ocean Underwater Cultural Heritage Desk-Based Assessment

Prepared by MAST



For the Government of the British Antarctic Territory

February 2020



Maritime Archaeology Sea Trust

Registered address: 22 Wycombe End, Beaconsfield, Buckinghamshire HP9 1NB

MAST is a company limited by guarantee in England and Wales number 07455580 and registered charity 1140497. Website: www.thisismast.org

British Antarctic Territory and Wider Southern Ocean Underwater Cultural Heritage Desk-
Based Assessment

CONTENTS

EXECUTIVE SUMMARY	5
1 INTRODUCTION.....	6
2 STUDY AREA.....	7
3 PROJECT OBJECTIVES	12
4 HISTORICAL CONTEXT	13
5 CONCLUSIONS AND RECOMMENDATIONS.....	47
6 REFERENCES.....	51
7 APPENDIX ONE: HISTORIC SITES AND MONUMENTS	54
8 APPENDIX TWO: STUDY AREAS AND TIMELINES.....	56
9 APPENDIX THREE: WRECKS DATABASE.....	57
10 APPENDIX FOUR: BRITISH ANTARCTIC SURVEY HISTORICAL DATABASE FOR SOUTH GEORGIA.....	58
11 APPENDIX FIVE: ANTARCTIC TREATY – REGISTERED HISTORIC SITES AND MONUMENTS IN ANTARCTICA	59

Front cover image: Karrakatta, beached on Husvik, South Georgia, 1959

List of Figures

FIGURE 1: MAP SHOWING PRINCIPAL TERRITORIES IN THE STUDY AREA	8
FIGURE 2: SOUTH GEORGIA AND THE SOUTH SANDWICH ISLANDS. EXCLUSIVE ECONOMIC ZONE SHOWING SITES IN THE STUDY AREA..	9
FIGURE 3: BRITISH ANTARCTIC TERRITORY AND SOUTH SHETLAND ISLANDS.....	9
FIGURE 4: ANTARCTIC MAINLAND SHOWING REGISTERED HISTORIC SITES AND WRECK SITES IDENTIFIED IN THE STUDY AREA.....	10
FIGURE 5: SOUTH GEORGIA SITES 1780-1892.....	16
FIGURE 6: SOUTH SHETLAND ISLAND SITES 1780-1892.....	16
FIGURE 7: SEALER LOSSES BY REGION 1790-1900.....	20
FIGURE 8: SOUTH GEORGIA SITES 1893-1918.....	22
FIGURE 9: SOUTH SHETLAND ISLAND SITES 1893-1918.....	23
FIGURE 10: ALL STUDY AREA SITES 1893-1918.....	23
FIGURE 11: WHALING STATION LOCATIONS	26
FIGURE 12: SOUTH GEORGIA SITES 1919-45.....	30
FIGURE 13: ALL SITES 1919-45	30
FIGURE 14: SOUTH GEORGIA SITES 1945-58.....	35
FIGURE 15: ALL SITES 1945-58	35
FIGURE 16: SOUTH GEORGIA SITES 1959-87.....	37
FIGURE 17: ALL SITES 1959-87	38
FIGURE 18: ALL SITES 1988-2019	41
FIGURE 19: PRINCE OLAV HARBOUR AND THE HULK BRUTUS AS RECORDED IN AN ADMIRALTY CHART IN 1930	42
FIGURE 20: UNDATED SITES	46
FIGURE 21: WRECKS BY LOCATION	48
FIGURE 22: WRECKS BY FUNCTION	49
FIGURE 23: WRECKS BY NATIONALITY	50
FIGURE 24: MAP SHOWING HISTORIC SITES REGISTERED IN SOUTH GEORGIA	54
FIGURE 25: MAP SHOWING HISTORIC MONUMENTS REGISTERED UNDER THE ANTARCTIC TREATY	55

Title	British Antarctic Territory and Wider Southern Ocean Underwater Cultural Heritage Desk-Based Assessment
Authors	Giles Richardson, MAST Senior Archaeologist
Quality Assurance	Jessica Berry, MAST CEO
Original Date	07/02/20
Reviser	Jessica Berry
Date of Last Revision	26/02/20
Version	
Status	
Summary of Changes	
Circulation	
Required Action	
File Name/location	
Approval	

EXECUTIVE SUMMARY

The Maritime Archaeology Sea Trust (MAST) was commissioned by the Government of the British Antarctic Territory in 2019 to undertake a review of significant underwater cultural heritage (UCH) sites in the British Antarctic Territory (BAT) and across the Southern Ocean.

This report examines the maritime history of the Antarctica and the islands located in the Southern Ocean and its potential impact on underwater cultural heritage, particularly focusing on South Georgia and the BAT.

These territories were among the last on Earth to be visited by humans, being discovered progressively from 1675 until the early years of the 20th century.

Antarctic maritime history comprises successive eras of exploitation. Sporadic early voyages of exploration gave way to a late 18th century boom in commercially driven sealing. Hundreds of ships and crews set up seasonal camps and hunted seal colonies from island to island ever deeper into Antarctic waters. Although transient in nature, the seal hunts can be traced into the mid 19th century through ethereal remains such as abandoned camps and shipwrecks, few of which have been found. Sealing was succeeded in the 20th century by industrial scale commercial whaling, notably in South Georgia. The extensive infrastructure required largely remains intact, and abandoned whaling stations are a major aspect of the heritage and tourism industry on the island today. Further south, the turn of the 20th century also marked the peak of the so-called “Heroic Age” of Antarctic exploration, when state sponsored expeditions led by Scott, Shackleton and others pushed deeper into the Antarctic towards the South Pole. The remains of their camps and graves also mark the landscape.

Later 20th century history is marked by a major international presence on the Antarctic continent and the transition from nomadic ship-based expeditions to the creation of permanent camps. South Georgia was an important target during the Falklands War in 1982, the contested history of this island contrasting with the more peaceful transition of Antarctic territorial claims to the Treaty System that supports increasing numbers of scientific and touristic visits, an era that has lasted until the present.

1 INTRODUCTION

- 1.1.1 The Maritime Archaeology Sea Trust (MAST) was commissioned by the Government of the British Antarctic Territory (BAT) in 2019 to undertake a review of potentially significant Underwater Cultural Heritage (UCH) sites in the BAT and across the Southern Ocean. Split over two stages, the first stage - which this report covers - is looking at the history of navigation of the Southern Ocean. It will inform a clear and broad chronology which will assist and justify which additional specific sources to consult and will more closely examine the losses.
- 1.1.2 In order to assess the potential for archaeological remains within the proposed study area, information was collated from a collection of primary and secondary resources and national data deposits.

2 STUDY AREA

2.1.1 The study area includes the following principal areas:

1. South Georgia and the South Sandwich Islands (British Overseas Territory)
2. Antarctica, comprising:
 - a. South Orkney Islands (British Antarctic Territory)
 - b. South Shetland Islands (British Antarctic Territory)
 - c. Antarctic Peninsula (Graham Land) (British Antarctic Territory)
 - d. Ronne Ice Shelf (Weddell Sea), Coats Land, Queen Elizabeth Land (British Antarctic Territory)
 - e. Other Antarctic Territories

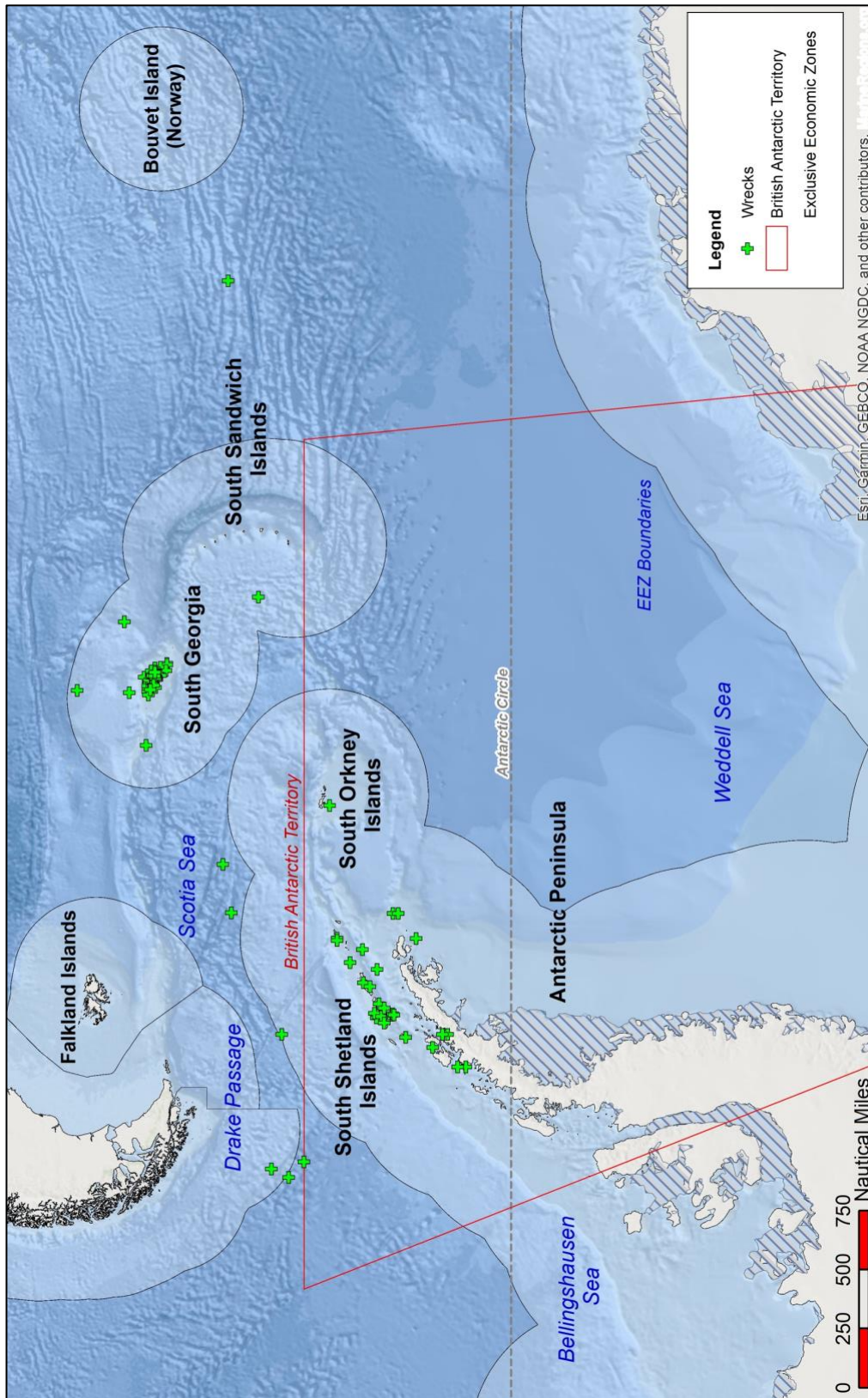


Figure 1: Map showing principal territories in the study area

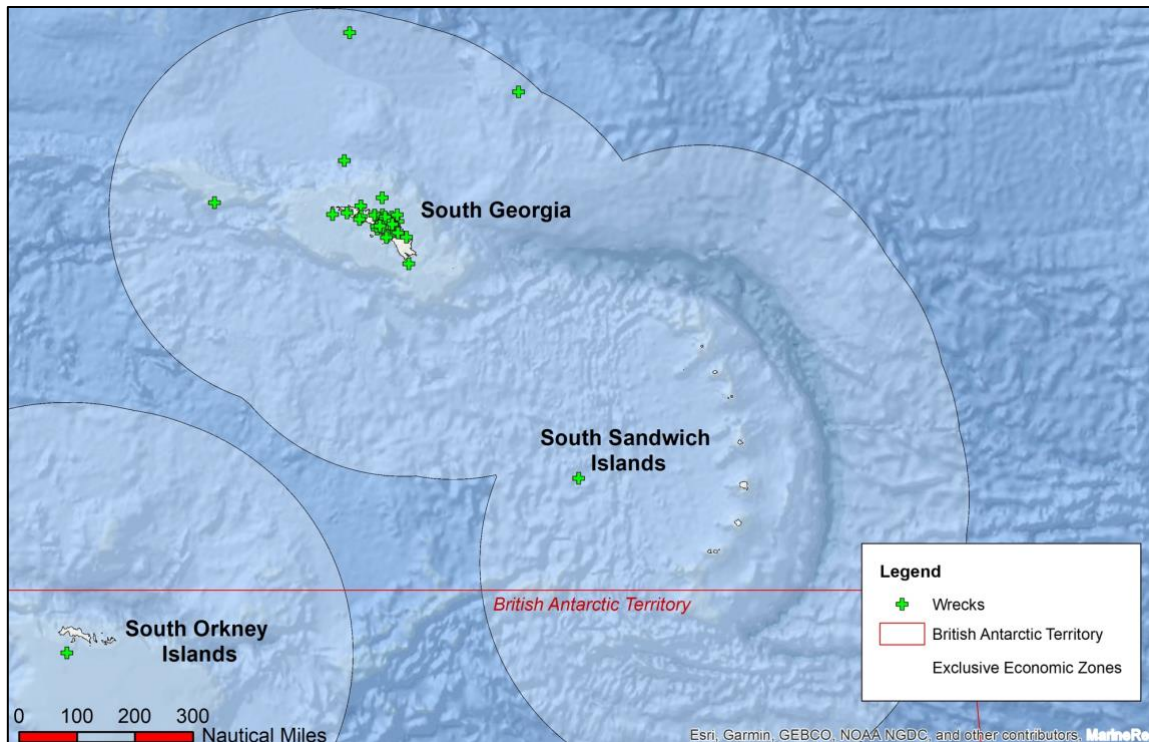


Figure 2: South Georgia and the South Sandwich Islands. Exclusive Economic Zone showing sites in the study area.

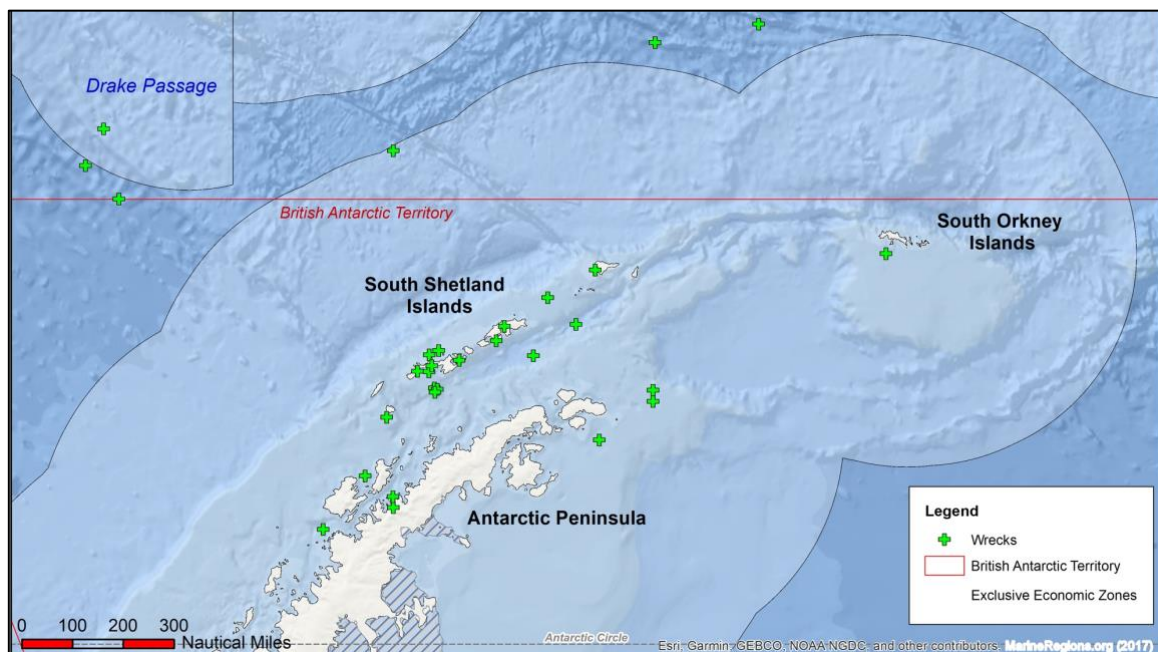


Figure 3: British Antarctic Territory and South Shetland Islands

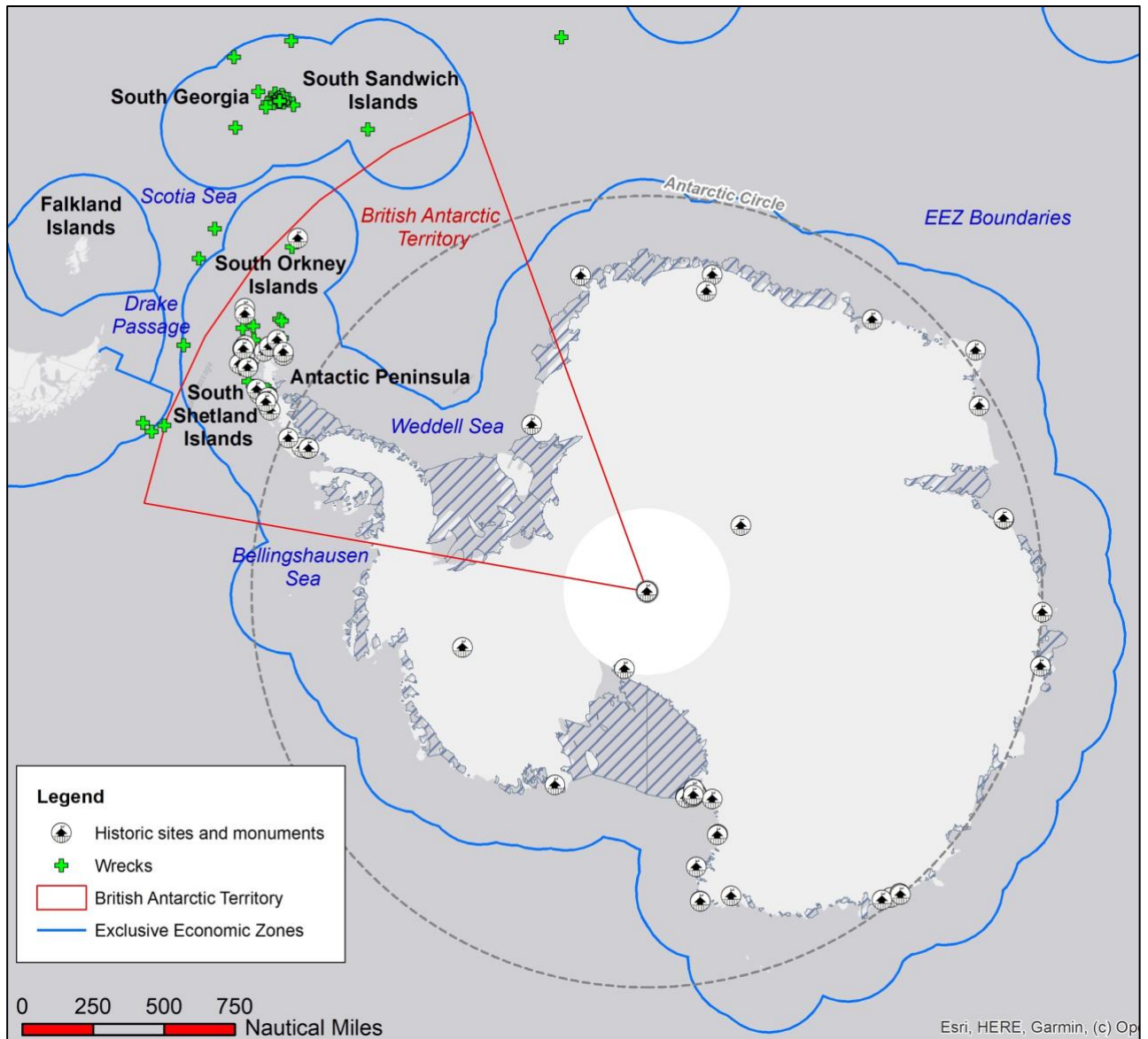


Figure 4: Antarctic Mainland Showing Registered Historic Sites and Wreck Sites Identified in the Study Area

2.1.2 For the purpose of historical and archaeological searches, the study area comprised two principal locations: South Georgia and the South Sandwich Islands, and the continent of Antarctica. The former considered activity within 200 nautical miles of South Georgia and the South Sandwich Islands, while the latter examined all activity south of 60°0'S latitude or which occurred within 200 nautical miles of the British Antarctic Territory. This follows the internationally accepted definition of Antarctica adopted by the Antarctic Treaty System. Island territories in the Southern Ocean that are not part of the British Antarctic Territory or subject to the Antarctic Treaty system were excluded. Due to the close historical relationship between the Falkland Islands and South Georgia,



some historical and archaeological information from the former is considered in this report when it can shed light on material in the study area.

3 **PROJECT OBJECTIVES**

- 3.1.1 MAST's intention is to review potentially significant UCH sites in the BAT and across the Southern Ocean.
- 3.1.2 Split over two stages, the first stage - which this report covers - considers the history of navigation of the Southern Ocean.
- 3.1.3 It will inform a clear and broad chronology which will assist and justify which additional specific sources to consult and more closely examine the losses.

4 HISTORICAL CONTEXT

Pre-Colombian (Before 1492)

- 4.1.1 Various seafaring civilisations and explorers are linked to reports of early voyages into the deep Southern Oceans, that is territory South of 60°0'S latitude. Perhaps the earliest is the semi-mythical 7th century Polynesian navigator Ui-te-Rangiora, who claimed to have led a fleet so far south the sea became “frozen white” and “grew rocks” (Percy Smith 1904: 129). Firm evidence for these voyages is lacking.
- 4.1.2 It has been suggested that some artefacts found on the Falklands and South Shetlands Islands could pre-date the arrival of western sailors. Exponents of this theory point to the possibility of occupation by early seafarers ‘island-hopping’ from South America. Discoveries indicating indigenous people’s presence include a Fuegian Indian harpoon-spear found at Pebble Island, West Falkland, a Fuegian canoe found on Bleaker island, East Falkland (Hattersley-Smith 1983: 605) and stone artefacts recovered from seabed surveys in the South Shetland Islands in 1982 (Chile 1982: 18). Alternatively, Charles Darwin’s 1834 observation that canoes were among driftwood washed up on Falklands beaches has been highlighted as evidence cultural material could have accumulated on these shores by natural means, presumably having come from Tierra del Fuego (Buckland & Edwards 1997:599).
- 4.1.3 The early dating of this material is disputed, and the South Shetland finds may have been planted (Griffiths 2007: 344-5). The finds that have been scientifically analysed are of 19th century origin, which indicates indigenous peoples may have lived and worked alongside contemporary sealers but does not prove they predated them. The oldest known human remains found in Antarctica are of a young woman found on Livingston Island. Analysis indicates she was of Amerindian (Chilean) heritage and died between 1819 and 1825. It is suggested that she may have been a local guide employed by sealers during the first voyages to the region (Stehberg & Lucero 1995a, 1995b, Zarankin & Salerno 2017:4).
- 4.1.4 While not conclusive, the discovery of such material indicates that older evidence could survive were it present in the Antarctic environment. Any material discovered from this era could be culturally and politically sensitive, and care should be taken when planning recovery or mitigation work.

European Exploration and Colonisation (1492-1780)

Historic Chronology

- 4.1.5 What exactly existed south of the known world was the subject of speculation and rumour among European seafarers for centuries. Suggestions of uncharted lands and a great southern civilisation appear in literature throughout this period (Zarankin & Salerno 2017:1). Voyages of discovery round Cape Horn from 1615 confirmed for the first time the existence of the Southern Ocean. However initial discoveries south of the Cape were accidental and sporadic (Mill 1911: 962).
- 4.1.6 The Falklands were the first major island group to be encountered. Dutchman Sebald de Weert's account of visiting the "Sebald" Islands in 1600 is the earliest with a position accurate enough to confirm he was referring to these islands (Southby-Tailyour 1985: 3). In 1643, a Dutch expedition to Valdivia was pushed south by prevailing winds far enough to sight icebergs, although the exact position they reached is unknown (Headland 1989: 60). In April 1675 Anthony de la Roché, a London-based merchant accidentally discovered the islands of South Georgia when his ship was taken off course by strong winds and currents after rounding Cape Horn. Without knowing their location, the crew anchored in a bay on the southern tip of the island for 14 days until the weather improved (Burton 2013: 4, Cameron 1974: 26). Historians assess the bay they sheltered in was probably Drygalski Fjord (Headland 1982: 22). However, there is no account of anyone attempting to go ashore or explore the island. A generation later in 1756 *León*, a Spanish vessel under charter to French merchants was driven to the island in similar circumstances, describing it as "full of mountains of frightful aspect". The crew named it Ile de St. Pierre, after the Feast of St. Peter which fell on the 1st July (Burton 2013: 4). Like de la Roché's crew they also did not go ashore.
- 4.1.7 Interest in the Southern Ocean increased through the 18th century with major expeditions reaching other remote islands including Bouvet (1739) and Kerguelen (1771-2) (Headland 1989: 69-74, Cameron 1974: 29-33). France established a colony at Port St. Louis, on East Falkland's Berkeley Sound coast in 1764, and British sailors claimed and settled Port Egmont on West Falkland the following year (Southby-Tailyour 1985: 3). The Falkland Islands rapidly became an important waypoint for ships sailing around Cape Horn.
- 4.1.8 Against this background, James Cook's famous second voyage of 1773-75 in the *Resolution* and the *Adventure* was launched as the first 'Antarctic' expedition, the mission seeking to document and claim as much of the new Southern Ocean territories as possible (Basberg 2004: 28). The first to cross the Antarctic Circle on January 17th 1773, the ships circumnavigated Antarctica, and have been calculated as having come within 80 miles of the mainland without actually sighting it (Cameron 1974: 46) Cook

then sought out the land encountered by de la Roché almost exactly a century earlier, finding it on 14th January 1775. After sailing around the western coast, the expedition went ashore at a place Cook named Possession Bay. This was probably modern Prince Olav Harbour (Burton 2013: 4). The expedition continued along the coast, believing they might have finally found the Antarctic mainland. However, once they rounded the northern-most cape and realised the land was in fact an island, the cape was named “Disappointment” and the land “the Isle of Georgia” (Basberg 2004: 28). The expedition also discovered and named the southern eight of the Sandwich Islands in 1775 (Headland 1989:140).

- 4.1.9 European expansion into the region wasn’t without tensions. Spanish forces took over the French colony in 1767 and expelled the British garrison at Port Egmont in 1770. The resulting Falkland Crisis threatened to bring the two nations to war (Southby-Tailyour 1985: 3). A diplomatic agreement in January 1771 allowed the settlement a short revival but mounting economic and military pressures forced the overstretched British government to voluntarily withdraw from overseas settlements, including the Falklands, in 1776 (Headland 1989: 73). The Spanish followed in 1811 due to unrest in their mainland colonies, acts which temporarily eliminated state-sponsored activities in the Southern Ocean (Southby-Tailyour 1985: 3, Headland 1989: 102).

Archaeology

- 4.1.10 No wrecks are recorded in the study area in this period. Possession Bay and Prince Olav Harbour are listed in the British Antarctic Survey (BAS) database of historic sites for South Georgia due to their association with Captain Cook¹. Archaeological sites related to Cook’s visit may exist on South Georgia and the Sandwich Islands, but evidence is yet to be located. There may have been other fleeting visits in the same period, and the possibility of undocumented wreck events or temporary camps cannot be discounted.

¹ See Appendix 5.

Sealing Period 1780-1892

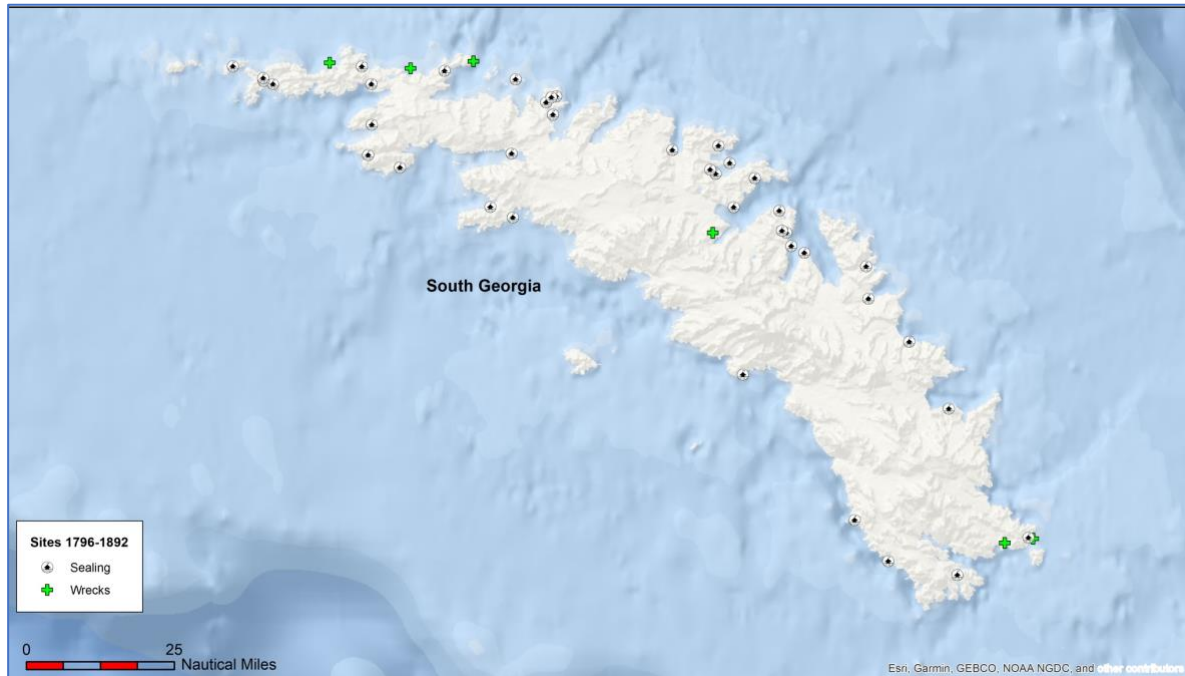


Figure 5: South Georgia Sites 1780-1892

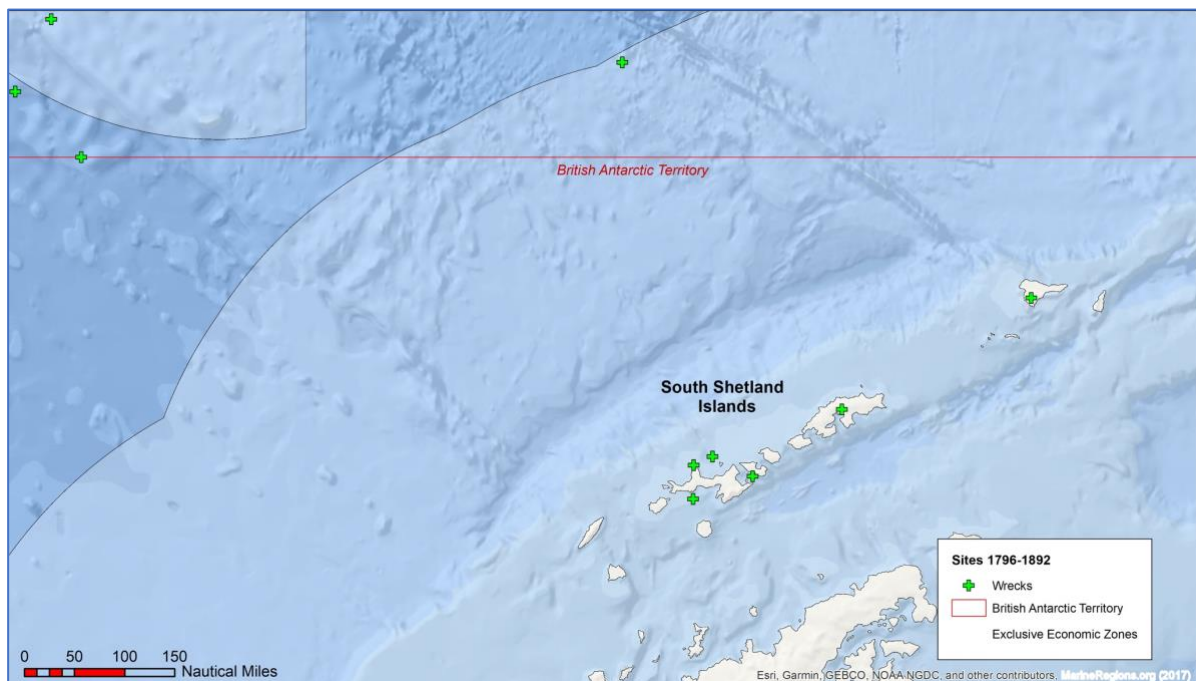


Figure 6: South Shetland Island Sites 1780-1892

Historic Chronology

- 4.1.11 The hunting of seals for their furs and oil had a long tradition in the Northern Hemisphere. Seal products were lucrative commodities that encouraged rapid exploitation anywhere significant populations could be found (Basberg 2004: 29). Documentary sources for the early Southern Ocean trade are very limited, sealers being understandably protective about their valuable hunting grounds (Headland 1989:28, Pearson 2010: 58) but surviving log-books and accounts have allowed scholars to reconstruct a sense of the scale and economy of this industry in this period. Headland has recorded over 1,500 historic sealing voyages in Antarctic waters. Of these approximately 10% (144) included visits to South Georgia (Headland 1989: 41-3). The recorded voyages are dominated by American and British vessels, but it is possible other nations were involved. Demand was principally from America and Europe, and later also from China (Basberg 2004: 29).
- 4.1.12 British sealers operated in the Falkland Islands from at least 1766 until their expulsion by the Spanish in 1780 (Basberg 2004:29). The need for new hunting grounds and the possibility of lucrative catches in the lands explored by Cook encouraged the trade to gradually look south. The first recorded sealing voyage to South Georgia was made by the *Lord Hawkesbury* in 1786 (Burton 2013: 8). Other vessels rapidly followed, and the islands experienced their first peak in sealing by the 1791 season, when at least 102 vessels were engaged in sealing in the Southern Ocean (Headland 1989:79-80).
- 4.1.13 Four wrecks of sealers are recorded on South Georgia between 1796 and 1801 indicating both the increased volume of shipping and the treacherous nature of a trade conducted in such remote locations². Although the Revolutionary and Napoleonic Wars (1792-1815) did not directly impact the islands, some sealers were well armed and carried letters of marque, allowing them to act as privateers³. Seizing hostile vessels would have been a potentially lucrative alternative source of income. At least one American ship was seized by British sealers in the Falklands during the war of 1812⁴, but there is no evidence of similar actions further south.
- 4.1.14 The number of ships competing for seals was not sustainable. Each vessel was capable of killing thousands of seals per voyage (Headland 1989: 41). The American sealer *Aspasia* of New York reporting a record catch of 57,000 in 1800, and contemporary estimates suggest over 1,200,000 fur seal skins were collected from South Georgia

² See Appendix 3.

³ The *Earl Spencer*, wrecked on South Georgia in 1801 carried 14x 12 pounder guns and 6x 6 pounder guns at the time of her loss, armament equivalent to a sixth-rate frigate (Lloyds List 4230, See Appendix 3).

⁴ The *Nanina*, seized by survivors of the *Isabella* after rescuing them in April 1813 (Headland 1989: 103).

during this period (Dickinson 2007: 67). By 1802 seal numbers were so depleted that South Georgia was temporarily abandoned by sealers (Headland 1989: 41). Three further recorded wrecks between 1815 and 1817 indicates seal numbers were recovering enough for renewed interest in the island (Appendix 3), and trade is known to have peaked again between 1818 and 1819, although at a much smaller scale. Only five to ten vessels are recorded visiting each year during this second wave of sealing (Basberg 2004: 29).

- 4.1.15 The collapse of South Georgia's seal population encouraged the exploration and exploitation of even more remote areas. The first commercial visit to the South Sandwich Islands was made in 1818 by the *Anne* (Headland 1989: 110), and the first to the South Shetlands was on Christmas Day 1819 (Herring 1820: 674). William Smith of the *Williams* had first sighted the South Shetlands in February 1819 when he was blown off course rounding the Cape Horn. Realising the value of his discovery he returned three more times the same year, claiming the islands for Britain (Jones 1985: 9, Campbell 2000: 3). His fourth voyage was a charter by the Royal Navy to survey the islands and included senior naval officer Edward Bransfield (Dickinson 2007: 70). At the same time the Russian Exploring Expedition led by Thaddeus von Bellingshausen was retracing Cook's journey, circumnavigating Antarctica south of his predecessor's route (Cameron 1974: 75-9). Bellingshausen discovered the northern three Sandwich Islands in 1819 and both parties reached the Antarctic mainland in late January 1820, although it is a matter of dispute who was the first to do so (Cameron 1974: 82, Stephenson 2011)
- 4.1.16 The South Shetlands proved to be very rich sealing grounds, being visited by more than 60 vessels in 1820, only a year after their discovery (Headland 1989: 112). Dickinson has estimated that the 1820-21 Summer season in the islands alone claimed 500,000 fur-seal skins (Dickinson 2007: 72). This changing focus can again be traced by the shipwreck record (Figure 7). Six sealers and two ships' boats were lost in four months amongst the South Shetlands and Desolation Island between December 1820 and March 1821 (Appendix 3). The following year James Weddell's second sealing voyage found the islands crowded with 45 ships (Headland 1989: 112). He led his expedition further east, sighting the South Orkneys just days after their discovery by another party of British and American sealers led by Nathaniel Brown Palmer and George Powell (Cameron 1974: 88)
- 4.1.17 The South Shetlands' exploitation was as intensive as South Georgia's had been, and the seal population was effectively wiped out by 1823, just three years after their discovery (Dickinson 2007: 72). Once again, the sealers were forced further south onto the newly discovered South Orkneys and along the Antarctic mainland itself. Notable expeditions here included those by the *Enderby Brothers* company that discovered

Enderby Land, Graham Land and the Sabrina Coast during the 1830s, with the loss of one ship (Stephenson 2011). Other sub-Antarctic islands outside the scope of this report experienced peaks in the 1840s including Iles Crozet and Prince Edward Island, and in the 1850-60s including Iles Kerguelen (Basberg 2004: 29).

- 4.1.18 South Georgia experienced a third sealing peak in the 1870s, and the South Shetlands a second between 1871 and 1875, when 33,000 seals were killed, but interest did not reach earlier peaks with fewer than five vessels visiting each location each year (Basberg 2004: 29, Dickinson 2007: 76, Pearson 2010: 58). British vessels had largely abandoned Antarctic waters in the 1850s, and most activity was now American (Basberg 2004: 29). Sporadic wrecks continued however, with four losses recorded in the South Shetlands between 1845 and 1877 and one on the Antarctic Peninsula. Unidentified wreckage found on the north coast of South Georgia in 1877 may be a contemporary loss, or an earlier incident discovered by new visitors (Appendix 3).
- 4.1.19 In 1881, British legislation limited the seal hunting season from October to April in order to preserve declining stocks (Basberg 2004:29, but the restrictions were almost too late. In 1892 reports indicated fur seals in the region were near extinction, the sealer *Sarah W Hunt* reporting catching just 41 seals in the South Shetlands (Dickinson 2007: 69), although occasional sealing vessels visited South Georgia as late as 1912 (Basberg 2004: 35).
- 4.1.20 With the sealing trade in decline, private enterprise in the Southern Ocean gradually gave way to nationally sponsored exploration-focused expeditions that pushed deeper into the Antarctic continent and mapped thousands of miles of coastline. Initially dominated by British and American efforts, others included French and German teams (Basberg 2008: 4, Appendix 2).
- 4.1.21 Increasing numbers of ships and trading voyages around Cape Horn in the latter part of the 19th century resulted in more merchant vessels getting into difficulty in the Southern Ocean. Most losses occurred near the South American coast, but one clipper ship and three iron sailing ships are reported lost in the study area between 1858 and 1891 or went missing close by (Appendix 3). Of these, two were crippled by icebergs, one was lost to fire and one was abandoned in a storm (Wrecksite.EU).
- 4.1.22 Technology was also changing. The British Naval Expedition of 1839-1842 under Sir James Clark Ross using *Erebus* and *Terror* was the last major all-sail polar voyage. Thirty years later in 1872 HMS *Challenger* became the first steam vessel to cross the Antarctic circle as part of a global investigation programme that circumnavigated the Earth (Stephenson 2011). A year later the German sealing and exploration vessel *Gronland* was the first to reach the Antarctic coast, and in 1876 the Newfoundland sealer *Walrus* (the former Philomel-class gunboat HMS *Landrail*) became the first

steam vessel to be lost in the Antarctic when she was wrecked on Black Island (Appendix 3).

Archaeology

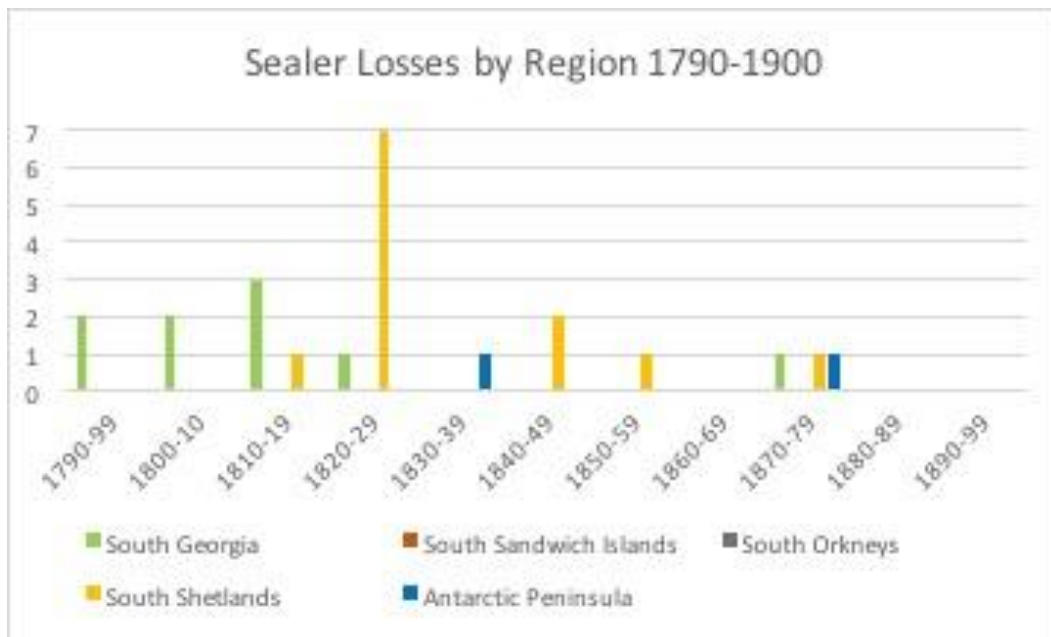


Figure 7: Sealer Losses by Region 1790-1900

- 4.1.23 At the peak of the trade in the 1820s temporary camps appear to have been commonplace, with crews living on shore and processing seal carcasses as close as possible to the hunting grounds, moving on when seals could no longer be caught (Zarankin & Senatore 1996: 630). Records suggest shore parties could operate quite independently of their ships, sometimes overwintering in productive areas before being recovered (Pearson 2010: 58).
- 4.1.24 Archaeological excavations in the South Shetlands have identified over 50 sealing sites and shed light on the experience of those living in such camps (Pearson & Stehberg 2006, Pearson et al. 2008). Shelters vary in quality of construction, from stone houses with separate personal and communal spaces to natural caves (Pearson 2010: 58). Locally sourced materials, including ubiquitous seal bones dominate artefact assemblages, although metalwork, glass and textiles also survive (Zarankin & Salerno 2017: 5-7). Equipment including ‘try-pots’ (large copper vessels for melting seal oil on ships and on shore), have been found within the remains of sealing camps on some South Georgian sites including Elshul, Nilse Hullet and Ocean Harbour (Neil 2019: 1). These are perhaps the most evocative sealing artefacts and some examples have been left in-situ at these sites by recent excavations.

- 4.1.25 Other South Georgian sites may be less well preserved than those in more remote areas due to disturbance by later development. For example, the 20th century whaling settlement at Grytviken was named after the abandoned try-pots found there by the Swedish Antarctic Expedition in 1902. One of those has the makers stamp “Johnson and Sons, Wapping Dock London” and is preserved at the South Georgia Museum (SGHT.1992.3.010). In total 40 confirmed or possible sealing sites are recorded in the BAS heritage database for South Georgia, but very few have been investigated archaeologically (Neil 2019: 1).
- 4.1.26 At least 23 sealing vessels are known to have been wrecked in the study area. Three historical losses⁵ and two possible 19th century wrecks are included in the BAS database and one additional site is an historic monument in Antarctica but no sites are recorded in the UK Hydrographic Office (UKHO) database, and none have been subject to archaeological investigation in the study area. Wreck material is likely to be well preserved in-situ and some has been found. The figurehead of *Regulator*, wrecked 1799, was found in Right Whale Bay in the 1972. The artefact has since been lost (Burton 2013: 31). In 1998 wreckage from the *Charles Shearer*, lost 1877, was found at Stinker Point, Elephant Island (wrecksite.EU) and registered as an Historic Monument under the Antarctic Treaty⁶.
- 4.1.27 Shipwrecked crews were often rescued by other passing ships, but survivors in remote areas had to make camp for months or even years before rescue (Headland 1989: 117). Although historically documented, none of these survivors’ camps have been investigated. Archaeologically they may appear different to normal hunting camps. Others were not as fortunate and records of deaths among sealing crews are common (Headland 1989). Known grave sites are included in historic monument registers⁷, while archaeological investigations have found individuals buried in unmarked graves close to abandoned camps, which must have been commonplace (Stehberg & Lucero 1995a, Zarankin & Salerno 1996).
- 4.1.28 The oldest known human remains found in Antarctica are the skeletal remains of a young woman found by a camp on Livingston Island. Analysis indicates she was of Amerindian (Chilean) heritage and died between 1819 and 1825. It is suggested that she may have been a local guide employed by sealers during the first peak years of the South Shetlands sealing trade (Stehberg & Lucero 1995a, 1995b, Campbell 2000: 4, Zarankin & Salerno 2017).

⁵ See Appendix 4 - No.3: *Lovely Nancy* 1815, No. 13: *Shallop* 1815 and No.16: *Admiral Colpoys* 1817

⁶ See Appendix 5

⁷ E.g. Frank Cabriel, steward from American sealer *Francis Allan*, buried at Ocean Harbour, South Georgia on 14th October 1820. (Headland 1989: 116), three grave markers are preserved in the South Georgia Museum (SGHT.1995.1.218 & 219, 1998.5.284)

- 4.1.29 A notable shipwreck from this period that may also have occurred on Livingstone Island was the *San Telmo*, a Spanish 74-gun ship of the line, commanded by Captain Joaquin de Toldeo y Parra. Flagship of a Spanish naval squadron sent to reinforce colonial forces in Peru in 1819, the *San Telmo* was damaged by a storm in Drake Passage on 4th September. Dismasted and rudderless, the ship was taken in tow by an escort, the *Primerosa-Mariana*, but the towing hawser parted and the vessels lost contact (Headland 1989: 112, Stewart 2014: 133).
- 4.1.30 The following year Smith and Bransfield's sealing expedition to the South Shetland islands found wreckage on Livingstone Island. Robert Fildes, master of brig *Cora*, reported finding "half an anchor stock of a 74 iron hooped and copper bolted, stud-sail booms and other spars" on half-moon beach, Sherriff Cove. The anchor stock was recovered by Smith who intended to use it to make a coffin (PRO ADM 55/143, Stewart 2014: 133). Assuming the wreck sank nearby, any survivors from the *San Telmo's* complement of 644 officers, soldiers and seamen would have been the first humans to set foot in the Antarctic, and the wreck remains well-known in Spanish publications (Zarankin & Salerno 2017: 4). The site has not been definitively found, although two remote sensing expeditions in the 1990s claimed to have located several wreck targets in the area (Martin-Bueno 1995, 1996a, 1996b). The results have been published in outline only (Zarankin & Salerno 2017: 4). Two teams advertised new expeditions to locate the wreck in 2018-19, with no further updates since (Maritime Herald 2018).

The Heroic Age (Whaling and Continental Penetration 1893-1918)

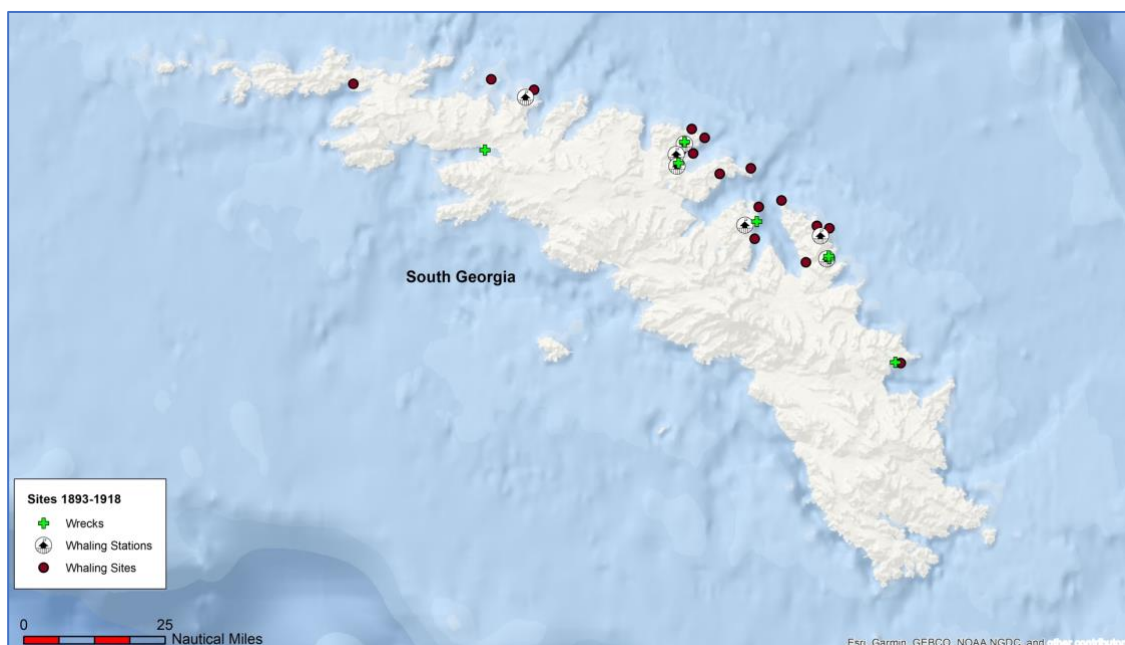


Figure 8: South Georgia Sites 1893-1918

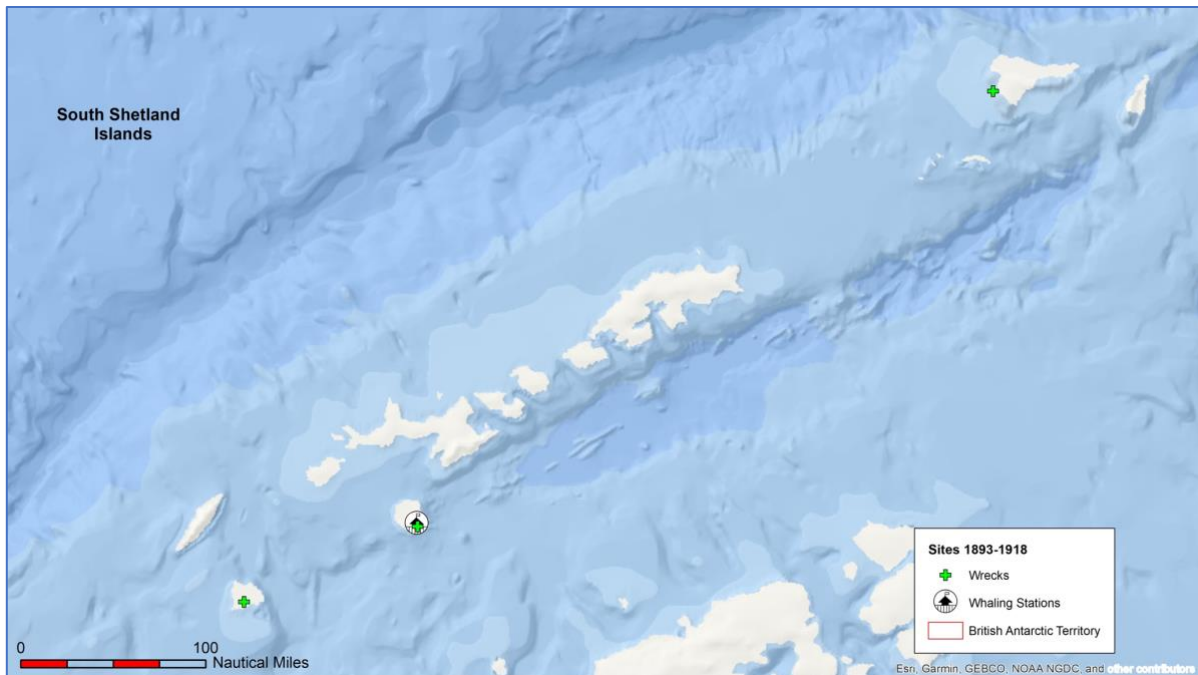


Figure 9: South Shetland Island Sites 1893-1918

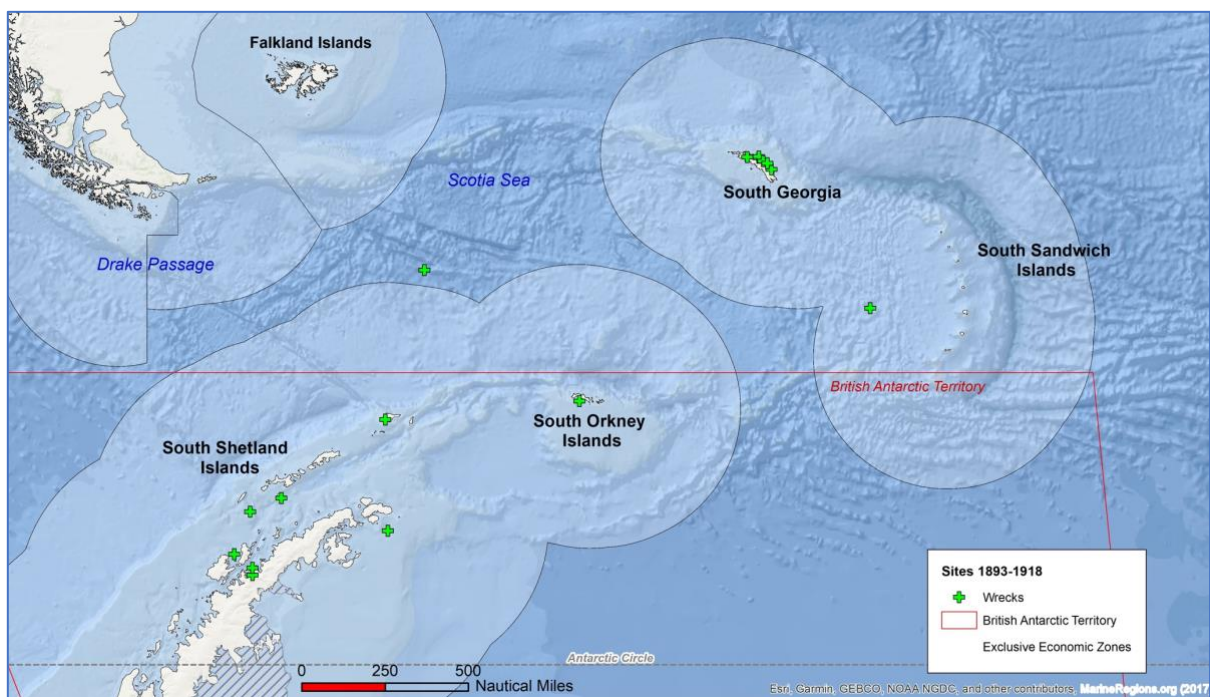


Figure 10: All Study Area Sites 1893-1918

Historic Chronology

Whaling

- 4.1.31 Like sealing, the global whaling industry had flourished during the 19th century with hunting focused on the smaller species of right and sperm whales in the Arctic, Atlantic and Pacific. New methods developed in Norway from the 1860s used modern technology including steam-powered whale catcher vessels, explosive grenade-harpoon cannon and permanent shore bases. This approach allowed whalers to target the largest species such as blue, fin, humpback and sei whales, and like the sealing industry before it, intensive hunting in the 1880s rapidly depleted these whale numbers in the North, forcing the industry to look for new hunting grounds (Basberg 2004: 30).
- 4.1.32 The first exploratory whaling expedition to Antarctica was Scottish, sailing from Dundee in 1892 with four ships and discovering Dundee Island (Basberg 2004: 3). The same season a Norwegian expedition led by Carl Anton Larsen on board the *Jason* explored Erebus and Terror Gulf and discovered the Foyn Coast (Stephenson 2011). Larsen returned with three ships the following year and pushed South into the Weddell Sea, discovering the King Oscar Coast, Foyn's Land, and Robertston and Christensen Islands (Stephenson 2011). The expedition also visited South Georgia, harpooning the first whale there (Burton 2013: 10). Separately the Norwegian vessel *Antarctic* led an expedition into the Ross Sea the same year. These expeditions had all been looking for right whales (*E.australis*) and used converted sealing ships, the long voyage to Antarctica being considered too risky for the smaller steam whalers to undertake. Right whales were not seen in viable numbers, only the larger species were, prompting a short hiatus in interest (Basberg 2004: 31).
- 4.1.33 Larsen returned to South Georgia a decade later in 1902, this time captaining the *Antarctic* as part of a Swedish scientific expedition under Nils Otto Nordenskjöld. The ship spent two months on the island, largely in Cumberland Bay where Larsen saw the potential for a permanent base that could support hunting of the numerous large whale species he had seen offshore (Burton 2013: 6). The *Antarctic* moved on into the Weddell Sea, where it was crushed by ice and sank on 12th February 1903. The actions of the expedition after this incident have become one of the epic stories of Antarctic survival (Stephenson 2011). Larsen, undeterred by this experience, founded the Argentinian backed *Compañía Argentina de Pesca* and returned to South Georgia the next year to establish a permanent whaling station at Grytviken in 1904, beginning the era of Southern Ocean whaling (Bannister 1964: 209).
- 4.1.34 The establishment of Grytviken coincided with the banning of whaling on the northern coast of Norway in 1904, forcing whalers based there to seek out new whaling grounds

throughout the northern and southern hemispheres. The Southern Ocean attracted the highest number of whalers (Basberg 2004: 31).

- 4.1.35 Larsen was followed by his former employer Chr. Christensen, who brought the floating factory ship *Gobernador Bories* to the South Shetlands in autumn 1905. Three more Norwegian and Newfoundland factory ships followed in 1907. This would become the predominant form of whaling operation in these islands, utilising the harbour at Deception Island and Admiralty Bay on King George Island (Basberg 2004: 32). Factory Ships were also briefly based in the South Orkney Islands between 1911 and 1915 (Admiralty 2019: 216).
- 4.1.36 From 1907 two further companies *Tønsberg Hvalfangeri* and *Sadefjord Hvalfangerselskab* based factory ships at Husvik, Stromness and Godthul. A second shore station was established at Ocean Harbour in 1909 by *A/S Ocean*, managed by Larsen's brother Lauritz. The third was established by Scottish company Chr. Salvesen Ltd. at Leith Harbour in 1910. Husvik was established as the fourth station in 1910 and Stromness as the fifth in 1913. The final station on South Georgia was opened in 1916 at Prince Olav Harbour in Possession Bay by the South African company *Southern Whaling and Sealing Co.* In the South Shetlands, the Norwegian whaling station New Sandefjord was established at Whalers Bay on Deception Island in 1912. Godthul Bay continued to be used as a base by factory ships until 1929 and acquired basic infrastructure to support them, but never became a full shore station (Bannister 1964: 208, Basberg 2004: 33, Hart 2006: 66, 104, Purcell Miller Tritton 2011:16).
- 4.1.37 The shore station system was immediately successful and profitable. 3516 whales were killed off South Georgia in 1909-10, and a further 1997 killed in the South Shetlands (Basberg 2004: 35). The stations expanded rapidly. The first generation of factory ships and whale catchers were replaced with larger, more powerful and efficient vessels. Only the Ocean Harbour station had a short operational life. Its owner's merger with *Sadefjord Hvalfangerselskab* saw it close in 1920. The site was dismantled, and equipment moved to Stromness (Bannister 1964: 208, Basberg 2004: 35).
- 4.1.38 The first census conducted on South Georgia on 31 December 1909 recorded a total population of 720, including three females and one child. Of these, 579 were Norwegian, 58 Swedes, 32 Britons, and 51 other European nationalities. In the 1912–13 season, 12 floating factories and 27 whale catcher boats were registered at New Sandefjord (Hart 2006: 81).

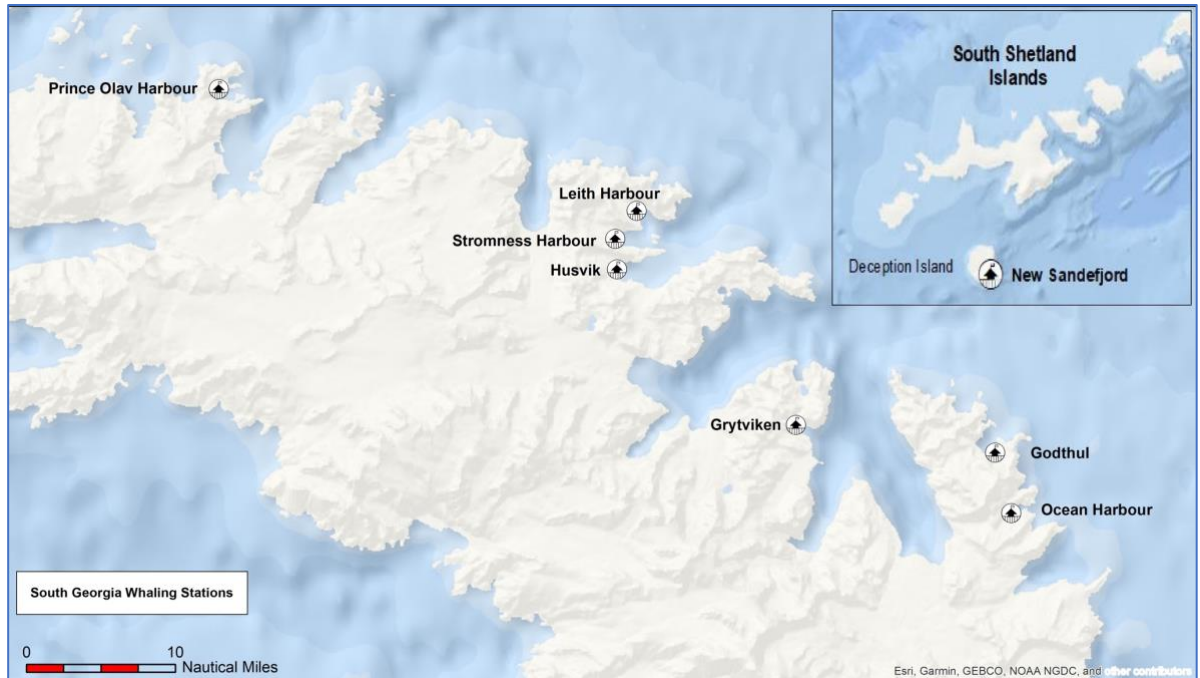


Figure 11: Whaling Station Locations

	Established	Closed
Grytviken	1904/05	1964/65
Ocean Harbour	1909/10	1919/20
Leith Harbour	1910/11	1965/66
Husvik Harbour	1910/11 (1907-10 Factory Ships)	(Closed 1931-1945) 1960/61
New Sandefjord (South Shetland Islands)	1912/13	1930/31
Stromness Harbour	1913/14 (1907-13 Factory Ships)	1930/31 (Ship Repair Yard 1931-1961)
Prince Olav Harbour	1916/17 (1911-13 Factory Ships)	1930/31
Godthul Bay	(1908 – 1929 Factory Ship Support Only)	

Table 1: Whaling Station Chronology

4.1.39 The success of Norwegian whaling industry motivated Norway, fresh from independence from Sweden in 1905, to pursue territorial expansion and diplomatic enquires were made to the British Government about the status of the Antarctic territories. In response, the Government issued the 1908 Letters Patent that formally incorporated all British possessions in the South Atlantic into the British Falkland Island Dependencies. These now consisted of South Georgia, the South Orkneys, the South Shetlands, the Sandwich Islands (formally annexed by the Patent), and Graham's Land. The Letters Patent were modified in 1917, applying the updated 'sector principles' with sovereign territories extending out from the South Pole. The Letters Patent also established a permanent local administration in Grytviken, and a Magistrate was appointed from 1909 to manage the whaling industry. From 1912 a magistrate's residence was built at King Edward Point, and it gradually developed into a settlement housing government staff and their families (Bannister 1964: 208, Basberg 2004: 34).

Exploration

4.1.40 Whaling activity established itself alongside the more famous era of Antarctic exploration that has come to be known as the *Heroic Age*. Numerous competitive scientific and exploring expeditions attempted to learn more about the unique landscape or push deeper into the continent in pursuit of national glory. These expeditions and the famous names associated with them are known for their failures as much as their successes (Zarankin & Salerno 2017: 2).

4.1.41 The Belgian Antarctic Expedition of 1897-99 became the first to be icebound and the first to overwinter so far south when their ship the *Belgica* was trapped for over a year between 2nd March 1898 and 14th March 1899 (Cameron 1974: 135-46). The same year the British Antarctic Expedition ('Southern Cross') was the first to deliberately overwinter, constructing prefabricated huts and using sledges dogs, primus stoves and kayaks for the first time (Stephenson 2011). The German expedition aboard the *Gauss* was also trapped by ice for over a year from February 1902 to March 1903, eventually using hot ashes to melt the ice (Cameron 1974: 146). A month before *Gauss* freed herself, Larsen's *Antarctic* became the first to be crushed and sunk by ice, although remarkably the expedition survived (Stephenson 2011). A French expedition to the Arctic was diverted South to rescue the *Antarctic* party. Also on the continent this year was the British 'Discovery' expedition led by Robert Falcon Scott and accompanied by the ships *Discovery*, *Morning* and *Terra Nova* (Cameron 1974: 146-60). Further

⁸ The dependencies comprised "all islands and territories whatsoever between the 20th degree of west longitude and the 50th degree of west longitude which are situated south of the 50th parallel of south latitude; and all islands and territories whatsoever between the 50th degree of west longitude and the 80th degree of west longitude which are situated south of the 58th parallel of south latitude".

offshore a Scottish expedition led by William Speirs Bruce accurately surveyed the South Orkneys for the first time and established a meteorological station. This was sold to the Argentinian Government upon his departure in 1904 and in 2020 remains the oldest continuously occupied station in Antarctica (Appendix 5).

- 4.1.42 Later notable expeditions include the British ‘Nimrod’ led by Ernest Shackleton that came within 97 miles of the South pole in January 1909, climbed Mount Erebus and was the first to use a motor vehicle (Stephenson 2011). The Norwegian Expedition led by Roald Amundsen finally achieved the coveted South Pole objective on December 14th 1911, beating Scott’s ‘Terra Nova’ expedition by a month, the latter expedition’s members tragically perishing on their return (Cameron 1974: 146-60). Almost as disastrous was the British Imperial Trans-Antarctic Expedition led by Sir Ernest Shackleton. Initially planned as two parties crossing the continent, one aimed to set off from the Ross Sea with *Aurora*, the second from the Weddell Sea with *Endurance*. The *Endurance* became trapped in ice from February 2nd 1915. Having drifted 573 miles over 9 months, the ship finally sank on January 21st 1915. The crew were forced to march to Elephant Island, arriving April 14th 1916, when Shackleton piloted a small party on a single open boat to get help. Arriving at South Georgia on May 10th, Shackleton and his companions finally arrived at the managers house at the Stromness whaling station on May 20th 1916. The Elephant Island party was finally rescued on August 30th 1916. The *Aurora* fared little better, being also trapped in ice for 10 months until Shackleton relieved the party on January 10th 1917 (Cameron 1974: 146-60).

Archaeology

- 4.1.43 The archaeological potential of the whaling stations will be considered more thoroughly in section 0 below, but it is appropriate here to mention the *Bayard*, an iron barque built 1864 that had a long seagoing career before being brought to Ocean Harbour to serve as a coal storage hulk in 1911. The vessel was not employed in this role for long, breaking her moorings in June that year, running aground across the bay, and being abandoned where she lay (Burton 2013: 22). The hulk appears to have been ignored when the station was dismantled in 1920 and has become a well-known landmark with masts and deck intact. The ship is one of an assemblage of several mid-Victorian sailing vessels that remain in remarkably good condition on the island.
- 4.1.44 Three early losses are recorded among South Georgia’s whaling vessels between 1906-11, including the whale factory ship *Fridtjof Nansen*, built 1885. A further five wrecks occurred in 1916, including the sailing ship *Argos* which went missing off South Georgia in May (Appendix 3). Whalers returning to Prince Olav Harbour the next winter found evidence survivors of the wreck had tried to shelter at the unmanned station. One body was found at the site (Headland 1984: 114). Apart from the whale catcher *Fortuna*, (the first whalecatcher to operate in South Georgia), now a scattered foreshore site, the

condition of the other wrecks is unknown and no archaeological work has been undertaken on them. In the South Shetlands three wrecks are recorded. The whale catcher *Ravn* is a chartered wreck at Deception Island having sunk there in 1908, the factory ship *Guvernoren* was destroyed by fire at Oddharbour and the factory ship *Pisagua*, formerly a four-masted iron barque was wrecked on Low Island in 1913. Another iron barque *Havfruen*, built 1885 was also employed in the whaling industry and was lost in deep water off the South Sandwich Islands having hit an iceberg while undertow in 1911. Two whale catchers were also lost on the Antarctic peninsula itself. Finally the whale factory ship *Tioga*, built 1890, was wrecked at Coronation Island, South Orkneys in 1913 and survives as a semi-submerged site (Appendix 3). The *Fridtjof Nansen*, *Guvernoren*, *Pisagua*, and *Tioga* represent important early examples of large whale factory ships that had been converted for the role from older vessels. The *Guvernoren* is known to remain in good condition (Admiralty 2019: 312).

- 4.1.45 In the Antarctic, the wrecks of the exploration ships *Antarctic*, lost 1903, and *Endurance*, lost 1915 (Appendix 3), represent archaeological sites of international importance, connected to significant personalities and events in the history of Antarctic exploration. Neither site has been definitively located. The *Endurance* was the subject of an unsuccessful search expedition during the 2018/19 season that used a long-range autonomous underwater vehicle (AUV). The AUV was lost and may also lie close to the *Endurance* site (Dixon 2019).
- 4.1.46 The expeditions mounted during this period were the first to construct bases on the Antarctic mainland, and the remains of these camps are now a major focus of heritage management and conservation efforts. These include Borchgrevink's Huts at Cape Adare, constructed by the Southern Cross Expedition in 1899. The two huts on this site are the oldest surviving buildings in Antarctica. Shackleton's Hut at Cape Royds was constructed by the Nimrod Expedition in 1908 and conserved in 2004-8. Terra Nova Hut at Cape Evans was constructed by the Terra Nova Expedition in 1911 and conserved in 2008-15. The grave of Capt. Robert Falcon Scott, Edward Wilson and Henry Bowers survives as a cairn erected over the collapsed remains of the tent they perished in. Edgar Evans and Lawrence Oates bodies were never found and may remain in-situ. Other sites on the mainland are outside the scope of this study (Appendix 5).

The Whaling Period 1919-1945

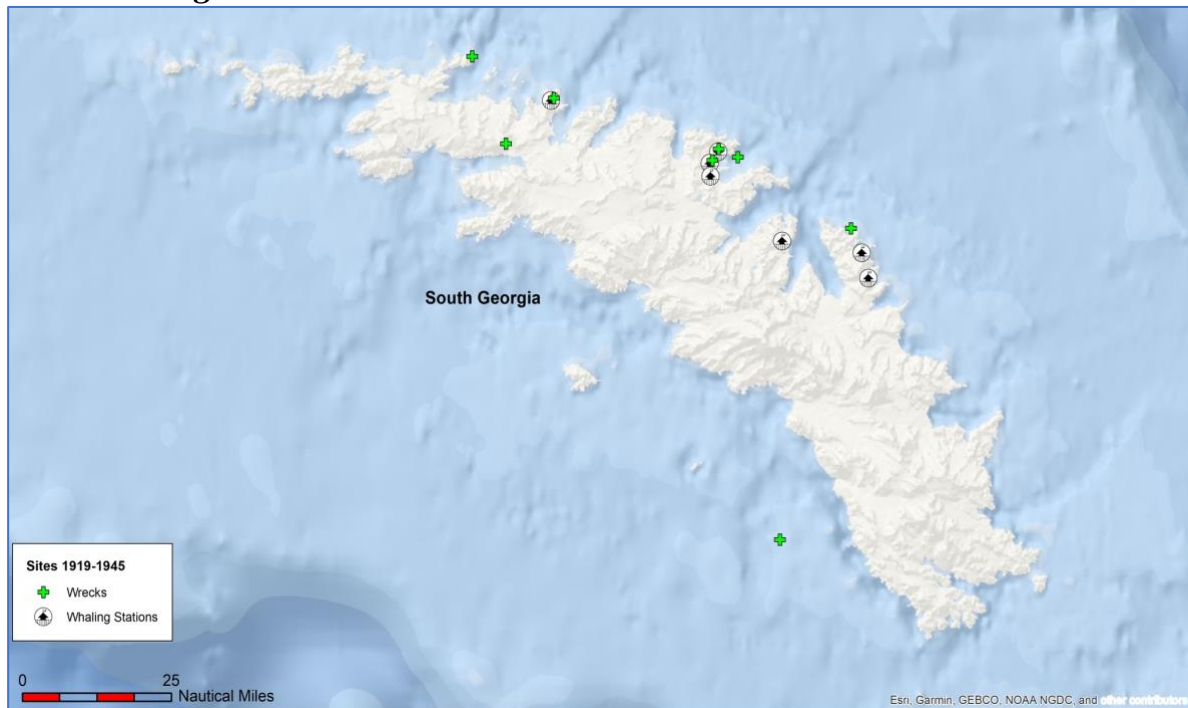


Figure 12: South Georgia Sites 1919-45

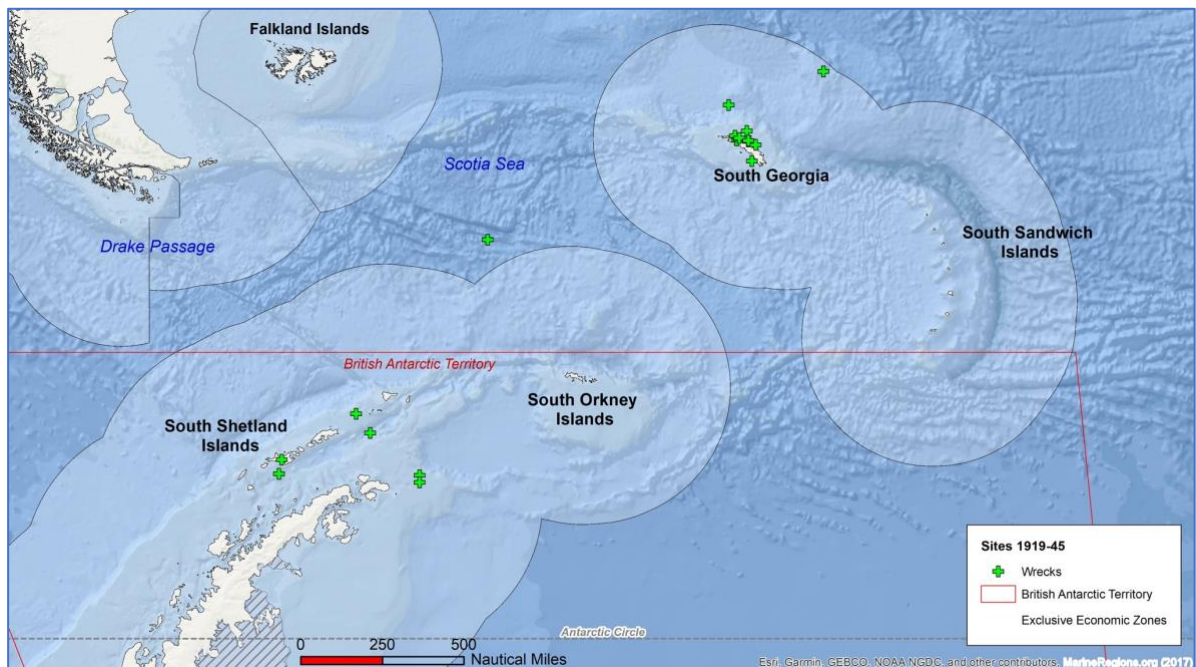


Figure 13: All Sites 1919-45

Historic Chronology

Whaling

- 4.1.47 The 1920s are considered the heyday of South Georgia and South Shetland whaling with whale oil production expanding after the wartime hiatus. By 1921 the population of the shore stations had risen to 1337 residents and a peak of 7,825 whales were killed during the 1925/26 season (Basberg 2004: 35). However declining populations and government restrictions once again encouraged exploration into new areas. Larsen changed focus from South Georgia in 1923, taking a factory ship and whale catches into the Ross Sea, where he died in 1924 (Basberg 2004: 36).
- 4.1.48 The whalers based at the shore stations knew there was still a great abundance of whalers offshore, but they were limited by the distance a dead whale could be towed back to shore for processing. Rapid putrefication of whale oil limited journeys to less than 24 hours. Factory ships that could process whales floating alongside the vessel were similarly limited to the sheltered waters of the South Shetland Island harbours and the Ross Sea and could not operate in open ocean (Burton 2013: 12). The technological breakthrough was a stern slipway that allowed whale carcasses to be hauled inside the factory ship and processed onboard. This was first fitted to the factory ship *Lancing* in 1925 and other conversions quickly followed. The first purpose-built factory ships were launched in 1928 (Basberg 2004: 36-37). Whalers now had the means to operate independently offshore, free of British licenses. This new phase has been labelled “pelagic whaling” (Burton 2013: 10).
- 4.1.49 The new factory ships were a challenge to shore-based whaling. During the 1930/31 season a single vessel (*Kosmos*) produced more whale oil than all five South Georgian stations combined. The stations responded by diversifying into whale meal that required more space to process, and a renewed interest in sealing for oil which gradually contributed up to 20% of production (Basberg 2004: 37).
- 4.1.50 The world-wide economic decline of the 1930s also hit the industry hard. Many of the older factory ships were scrapped and companies went out of business. By 1931 the population of the shore stations halved to 709. Prince Olav Harbour closed permanently in 1931, Husvik closed from 1931-45, and Stromness Harbour continued only as a ship repair yard for Leith. New Sandefjord also closed on Deception Island, leaving just Grytviken and Leith as the remaining shore whaling stations in the Antarctic. At sea Japanese and German factory ships challenged what had been a prevailing British and Norwegian hegemony (Bannister 1964: 209, Basberg 2004: 37).

Exploration

- 4.1.51 The most notable of the numerous inter-war expeditions was the Shackleton-Rowett Antarctic Expedition led by Shackleton, who unexpectedly died at South Georgia on 5th January 1922. His body was transferred to South America before being returned and buried in the Grytviken cemetery (Cameron 1974: 190-204). In 2011 the ashes of Frank Wild, Shackleton's second-in-command and a major figure in Antarctic exploration in his own right, was interred beside Shackleton's grave.
- 4.1.52 Numerous American expeditions established major bases on the Antarctic Continent, including Little America I, II and III. A Fokker Super Universal became the first of several aircraft to be lost in accidents during this period. The United States Antarctic Service Expedition (BAE III) led by Richard E. Byrd between 1939 and 1941 became the largest expedition to date. The expedition team tested the 'Snowcruiser' a gigantic vehicle that ran on oversized tires. The vehicle was not a success, managing to travel only 92 miles (in reverse for better traction) but two converted military vehicles that were also employed (a M2A2 light tank and T3E4 Gun Carrier) proved successful. All three vehicles were left at the expeditions end are believed to remain in-situ (Cameron 1974: 204-237, Stephenson 2011).
- 4.1.53 The German New Schwabenland Expedition during the 1938/39 season was the first to employ aircraft catapulted from a ship for exploration. These were used to drop aluminium darts with swastikas to claim territory in areas including Queen Maud Land (Stephenson 2011).

Military Operations 1939-45

- 4.1.54 The commencement of hostilities in 1939 severely impacted whaling operations. Most of the factory ships were withdrawn and requisitioned as auxiliaries by both Axis and Allied forces, many later being sunk (Purcell Miller Tritton 2011:17). Single four-inch gun emplacements were installed by British Forces at both Leith Harbour and Grytviken, although neither was employed in action (Basberg 2004: 184-6).
- 4.1.55 From January 1941 the German commerce raider *Penguin* began carrying out patrols against the allied whaling fleets. This was immediately successful and the Norwegian vessels *Solglimt*, *Pelagos*, and *Ole Wegger* were captured (warsailors.com). In response the British armed merchant cruiser *Queen of Bermuda* carried out protective patrols in the region. Her crew destroyed stocks of coal and fuel at the abandoned New Sandefjord station on Deception Island to prevent their use by the Germans. Taking advantage of hostilities, the naval vessel *ARA Primero de Mayo* later raised the Argentinian flag on Deception, Melchior and the Winter Islands and the Palmer Archipelago. The Argentinian Government subsequently declared all territory south of 60.S latitude

annexed. In response HMS *Carnarvon Castle* replaced the Argentinian flags with British flags and a tit-for-tat ensued for several months (Appendix 2) In order to strengthen British territorial claims in the region a special expedition, Operation Tabarin, was launched in 1943. For the rest of the war a substantial team established scientific bases on Deception Island and on the Antarctic mainland (Stephenson 2011).

Archaeology

- 4.1.56 A peak in whaling in 1920s South Georgia is confirmed by an increase in the number of whaling related losses. Six wrecks are recorded during the decade and just two in the 1930s, perhaps reflecting the economic decline. Three whalers were lost in the South Shetlands in the 1920s, and three losses occurred in the 1930s, including a factory ship lost to fire and two whale catchers crushed by ice. There are no known wartime losses in the study area (Appendix 3).
- 4.1.57 Numerous elderly vessels were brought to South Georgia to support whaling activities and many were simply abandoned there when they were of no further use (Headland 1984: 118). These remain in-situ today in various states of preservation and represent a large proportion of the assemblage of historic vessels on the island. At Prince Olav Harbour the *Brutus*, a full rig steel hulled ship built in 1883, was used as a coal hulk from 1918. After the station's closure in 1931 the vessel was abandoned and later ran aground (Headland 1984: 125). It remains in good condition today with the stern partially submerged. Another Victorian vessel with a similar fate was the *James Turpie*, a steam ship built in 1881. Moored at Leith as a coaling hulk in 1910 it was employed into the 1920s and then abandoned. She finally sank alongside the jetty in 1946 and her hull remains partially submerged today (Burton 2013: 20).
- 4.1.58 The first maritime aircraft crash in Antarctica occurred on Boxing Day 1929 when the De Havilland DH.60M Moth aircraft used by the factory ship *Kosmos* to spot whales was reported missing. The wreck has not been found and may lie in deep water off South Georgia (Appendix 2).
- 4.1.59 The M2A2 and T3E4 left behind by BAE III in 1941 remain intact and are visible today. The Snowcruiser was revisited during operation Highjump in 1946 before being abandoned for a decade. Rediscovered in 1958 it required excavating from under several feet of snow cover but was found to be in excellent condition. Its current location is unknown. It is speculated that it either remains buried or has fallen into the Southern Ocean as the ice beneath it shifted. It may therefore be a maritime or terrestrial site (Appendix 2).

- 4.1.60 The wartime gun emplacements installed at Leith Harbour and Grytviken are both well preserved and retain their four-inch guns as well as associated storage magazines and accommodation (Basberg 2004; 185).

Permanent Stations (1945-1958)

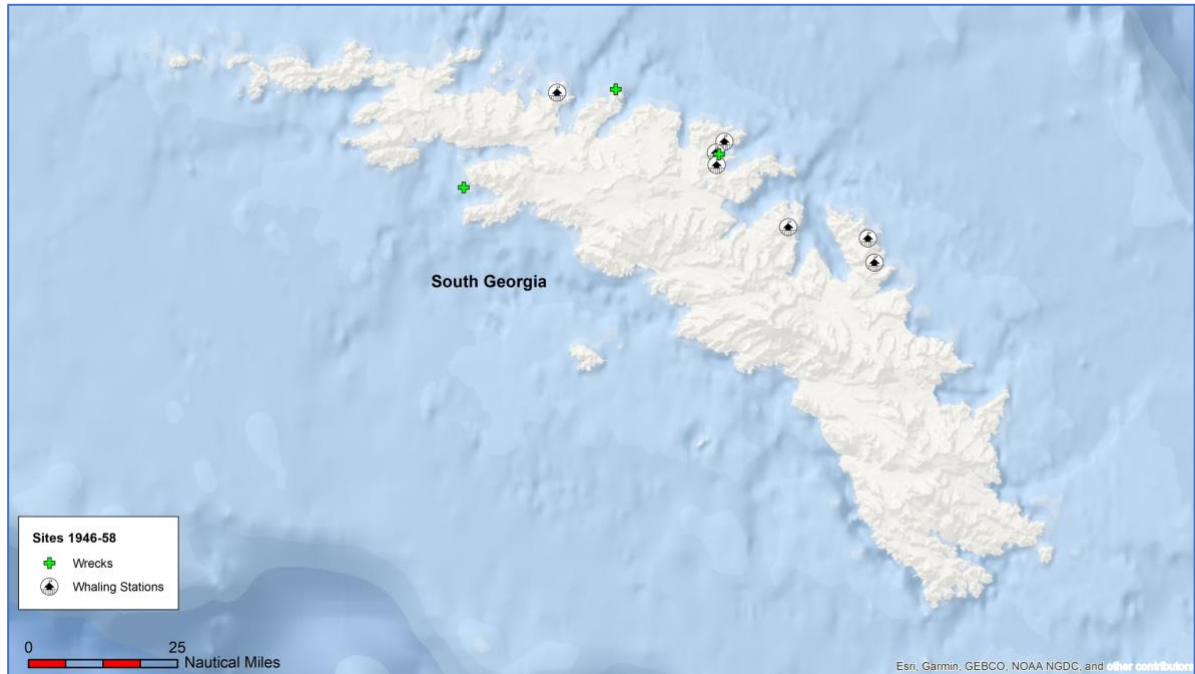


Figure 14: South Georgia Sites 1945-58

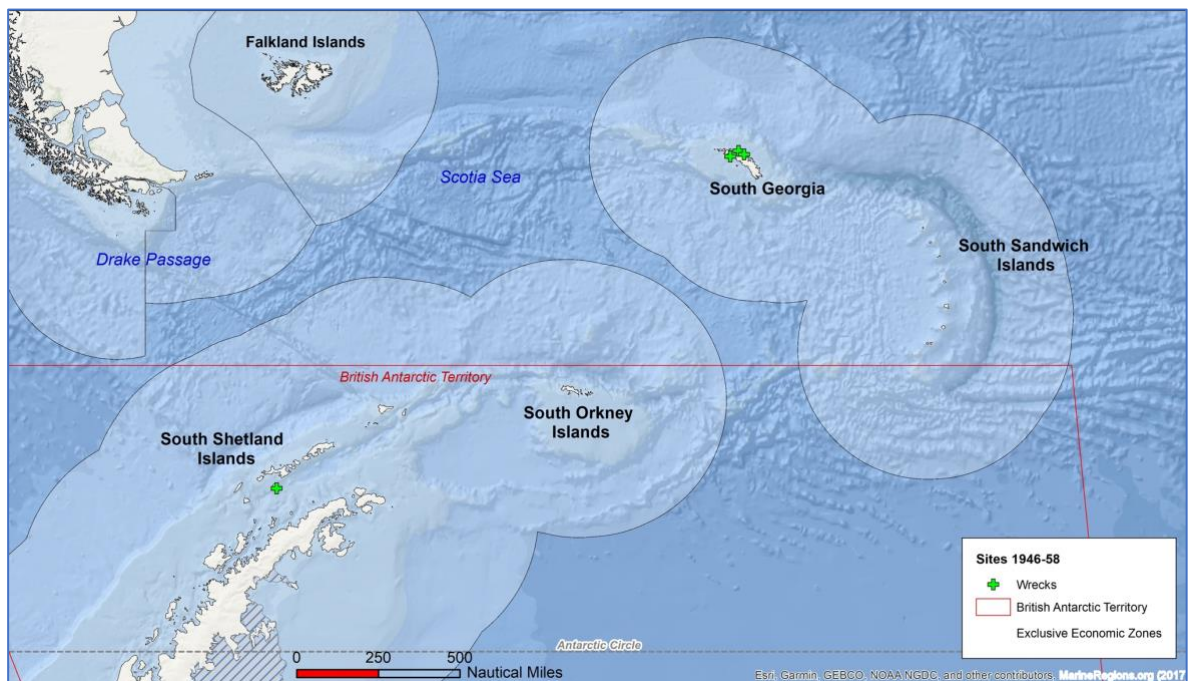


Figure 15: All Sites 1945-58

Historic Chronology

- 4.1.61 The cessation of hostilities led to a temporary post-war resurgence of whaling on South Georgia. Husvik station reopened and numerous nations started launching new whaling fleets which rapidly moved into the region. However, the industry was no longer unregulated as the International Whaling Commission, founded in 1946, began setting quotas (Basberg 2004: 38).
- 4.1.62 Post war Antarctic activity was also resurgent. During the 1946/47 season the US Navy Antarctic Developments Project (Operation Highjump) brought 4,700 men to the mainland, a force larger than all past Antarctic expeditions put together. This operation saw the first use of helicopters and icebreaking ships. The first aircraft flew over the South Pole in February 1947 and 33 aircraft were employed to discover 350,000 square miles of land, with 60% of the Antarctic coastline photographed (Stephenson 2011). From 1955 all US Antarctic operations adopted the code name 'Deep Freeze'. Deep Freeze I and II established several additional new bases and built Williams Field airbase, enabling the first flights to Antarctic from another continent. 1955 also saw the first Soviet Antarctic Expedition, operations which continued annually until the end of the Cold War (Stephenson 2011, Camerpn 1974: 237-43).
- 4.1.63 This period ends with the International Geophysical Year which was held in 1957 and was a truly international effort involving 12 countries operating in Antarctica. More than 40 stations were established which in turn supported numerous research projects and expeditions (Stephenson 2011).
- 4.1.64 Tensions increased between Argentina and British Forces during the 1950s, including an incident on Deception Island in 1952 when Royal Marines were used to expel Argentinian sailors from an outpost. This activity as well as territorial issues arising from the multiple new research stations in Antarctica led directly to the development of the Antarctic Treaty between 1959 and 1961.

Archaeology

- 4.1.65 The immediate post-war period is marked by just two recorded wrecks of whale catchers on South Georgia in 1950 and 1951. A third whale catcher was wrecked on Deception island in 1956 (Appendix 3). It was reported at the time that the vessel ran aground while taking evasive action to avoid an Argentinian naval vessel travelling in the opposite direction through the narrow strait. It is unclear if this was an accident or a deliberate act by the Argentinian crew (UKHO). The wreck is reported to lie to close to that of the earlier *Ravn*. A further six redundant whaling vessels scuttled off Stromness Bay will be discussed in section 4.1.86 below.

4.1.66 The increased tempo of military supported projects led to a dramatic increase in aircraft accidents. Ten US military aircraft and five Soviet aircraft were lost during this period, as well as one from the Royal Canadian Air Force, one from the Belgian Army and one civilian (Appendix 2). Several of these are known to have been lost at sea or to have sunk, including a Consolidated PBY Catalina in 1947, a De Havilland Canada UC-1 Otter (DHC-3) in 1955, and a Lisunov Li-2V in 1958. Two Antonov An-2T's were lost in shallow water in 1958 and are still visible in recent aerial photographs (Appendix 2). Other crash sites have been searched for including a Martin PBM-5 Mariner which crashed on Thurston Island in 1946 killing three crew. The wreckage has not yet been found despite searches in 2004 and 2007 (aviation-safety.net). Many survivors of air crashes faced difficult journeys to safety. The crew of an Auster J/1 Autocrat which crashed at Marguerite Bay, Grahamland in September 1947 were forced to remove the belly fuel tank and convert it into a sled for an attempted trek back to camp. They were rescued by US Navy aircraft after ten days having travelled 60 miles across the ice (aviation-safety.net).

Treaty Period and the Falklands War (1959-87)

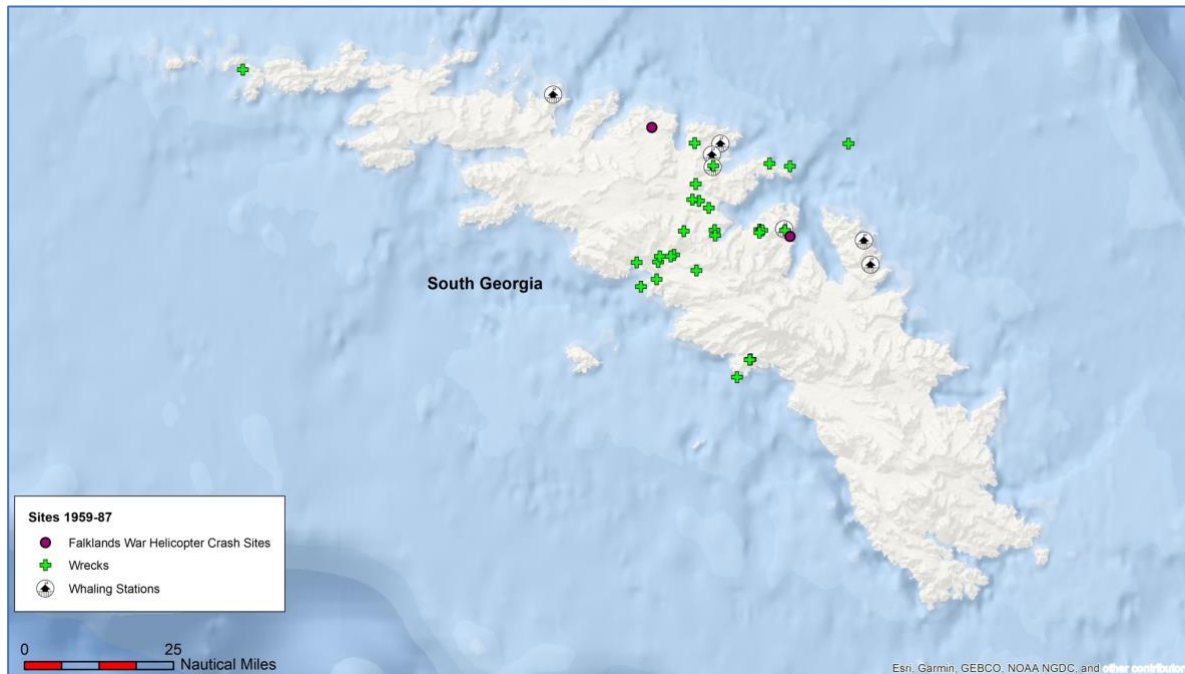


Figure 16: South Georgia Sites 1959-87

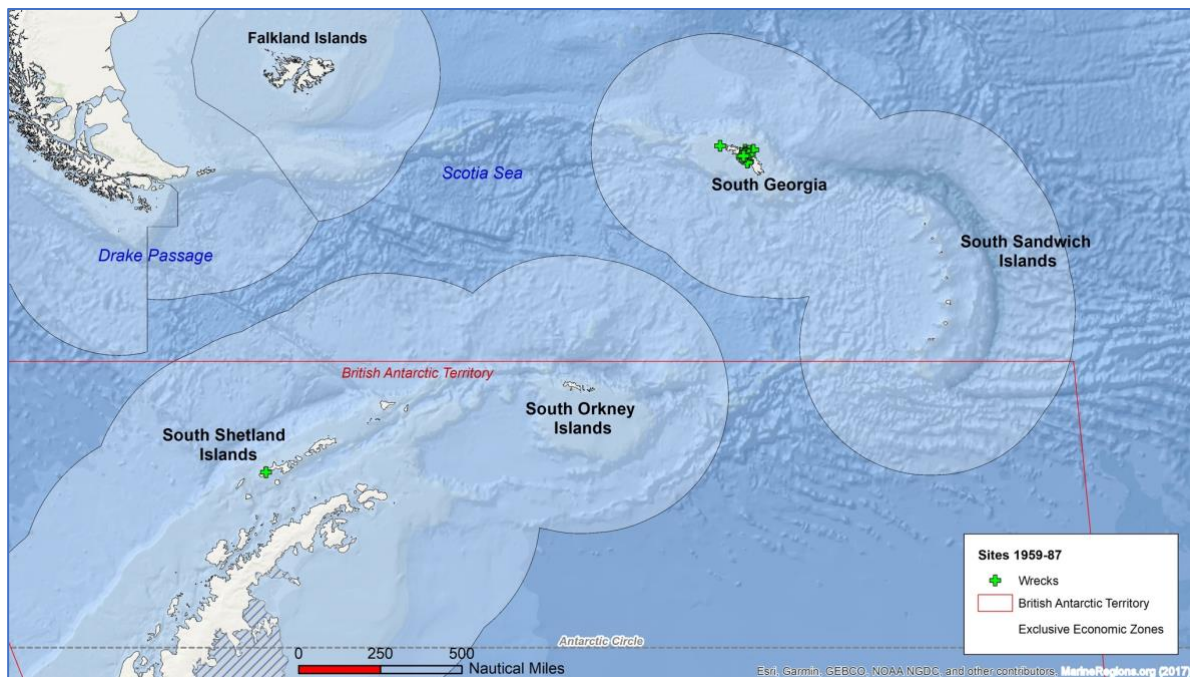


Figure 17: All Sites 1959-87

Historic Chronology

- 4.1.67 Reduced whale catches caused by quotas and overfishing impacted profitability and most whaling nations ultimately ended their Antarctic operations in the early to mid 1960s. Both Grytviken and Leith were leased to Japanese companies in 1963, but these last stations closed in 1964 and 1965 respectively, with the last caretaker staff leaving in 1971, ending the era of South Georgian whaling (Basberg 2004: 39, Purcell Miller Tritton 2011:17, Burton 2013: 11).
- 4.1.68 The end of this industry coincided with the beginning of an Antarctic offshore commercial fisheries industry, although the timing is coincidental. From about 1970 an increasing number of Soviet and Eastern European vessels operated on the South Georgian continental shelf, occasionally using the island facilities (Basberg 2004: 41). Later other nations also supported Antarctic fishing fleets. Since 1982 the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) has managed Southern Ocean fishing with nation states regulating activity within their respective EEZs (Burton 2013:18).
- 4.1.69 From 1967 the British Magistrate and administration staff were replaced at King Edward Point by the British Antarctic Survey (BAS). BAS extended its activities on South Georgia, developing the island to serve the needs of scientific work. Various huts were erected and Bird Island was re-opened as a permanent research station in 1972. Several vessels were operated by BAS in the region for scientific purposes including

RRS *John Biscoe* (1956) and *Bransfield* (1970), while the Royal Navy launched HMS *Endurance* (1968) as an ice-patrol vessel (Basberg 2004: 41).

- 4.1.70 The first dedicated Antarctic cruise ship *Lindblad Explorer* visited South Georgia in 1972. Visitors had previously been able to obtain tickets on vessels operating regular mail and cargo services from the Falklands, but tourist numbers significantly increased with the introduction of cruise ship visits. The same period saw private yachts visiting Antarctica in increasing numbers. The first to reach South Georgia was *Mischief* in 1967 (Basberg 2004: 47). On the 20th November 1979 Air New Zealand Flight 901, a scheduled Antarctic sightseeing flight, crashed into Mount Erebus, Ross Island, killing all 257 onboard. The remains of those killed were subsequently recovered but the wreckage of the aircraft itself was left in-situ (aviation-safety.net).

Falklands War 1982

- 4.1.71 As mentioned above, Argentina had sporadically challenged British sovereignty of the South Ocean territories throughout the 20th century. In November 1976 Argentinian naval forces covertly established the Corbeta Uruguay military outpost on Thule, part of the South Sandwich Islands. The British Government protested diplomatically but initially did not attempt to remove the outpost by force (Barker 1997).
- 4.1.72 On the 19th March 1982 a party of Argentinian scrap metal merchants landed at Leith covertly supported by 10 naval commandos from *ARA Bahia Buen Suceso* in a plan known as "Operation Alpha". The declared intention of dismantling the abandoned whaling station, for which permissions had been granted, was subverted when the Argentinian flag was raised. In response the British government demanded the lowering of the flag and the withdrawal of the Argentinian party. On 22nd March the *Buen Suceso* departed but the Argentinian force remained. Wary of the undefended nature of South Georgia, HMS *Endurance* then landed 22 Royal Marines at Grytviken, who began to reinforce the area around the British Antarctic Survey buildings on King Edward Point. A few days later on 25th March the *ARA Bahía Paraíso* landed a further 32 naval commandos at Leith that it had transferred from the Corbeta Uruguay outpost (Basberg 2004: 44-45).
- 4.1.73 On 2nd April open hostilities commenced when Argentinian forces invaded the Falkland Islands. The following day the *ARA Guerrico* and *ARA Bahía Paraíso* attempted to assault the Royal Marine positions by landing 10 naval commandos and 40 marines at Grytviken via an Alouette 3 and a Puma helicopter. The Puma was shot down by small arms fire, killing two onboard. While attempting to provide close fire support the *Guerrico* was heavily damaged by shore fire from the British forces. The ship's 20mm, 40mm and 100mm guns were jammed, the Exocet launcher was destroyed and one

crew member killed. The British forces subsequently surrendered having suffered no casualties (Barker 1997).

- 4.1.74 Over the following month a garrison of 55 Argentinian marines was established on the island, however they largely remained at Leith and Grytviken, allowing BAS Wildlife film maker Cindy Buxton and her assistant to remain undetected in the interior of the island. Two British helicopters were lost supporting special forces operations on the island (Barker 1997).
- 4.1.75 On the 25th April the submarine *ARA Santa Fe* landed reinforcements at Grytviken. On withdrawal from the harbour it was attacked on the surface by Royal Navy Wessex, Lynx and Wasp helicopters. The submarine suffered critical damage and was subsequently abandoned alongside Grytviken pier (Headland 1984: 121). Following up this attack a helicopter assault by an improvised group of Special Forces and Royal Marines forced the Argentinian garrison at Grytviken to surrender. The Leith garrison surrendered the following day, ending hostilities on the island (Barker 1997).
- 4.1.76 However, it wasn't until 20th June 1982 that the Corbeta Uruguay garrison on Thule surrendered. The outpost was then left unmanned until December that year, when HMS *Hecate* discovered the Union Flag left flying over the site by British forces had been illicitly replaced by an Argentinian flag. The outpost buildings were then destroyed to discourage further activity (Barker 1997).

Archaeology

- 4.1.77 Only one shipwreck event is recorded at South Georgia during the 1960s – a Royal Navy cutter attached to the survey ship HMS *Owen* (Appendix 3). The short Falklands conflict left permanent scars on the South Georgian landscape. Battle damage to the stations is discussed below. The wreck of the *Santa Fe*, the most important enemy vessel to fall into British hands during the war, was finally refloated on 10th February 1985 and scuttled in deep water offshore. The exact location of the wreck is not precisely known (UKHO). Another captured Argentinian vessel, the *Fenix* landing craft, was left abandoned and partially sunk at King Edward Point. Its remains lie on the foreshore today (Appendix 3). The wreckage of two British and one Argentinian helicopters also remain on the island and are included in the BAS heritage database. An Argentine naval tug was wrecked on the South Shetlands in 1976 during the period of tension leading up to the conflict and this wreck also remains in-situ (Appendix 3).

Regulatory Period (1988-Present)

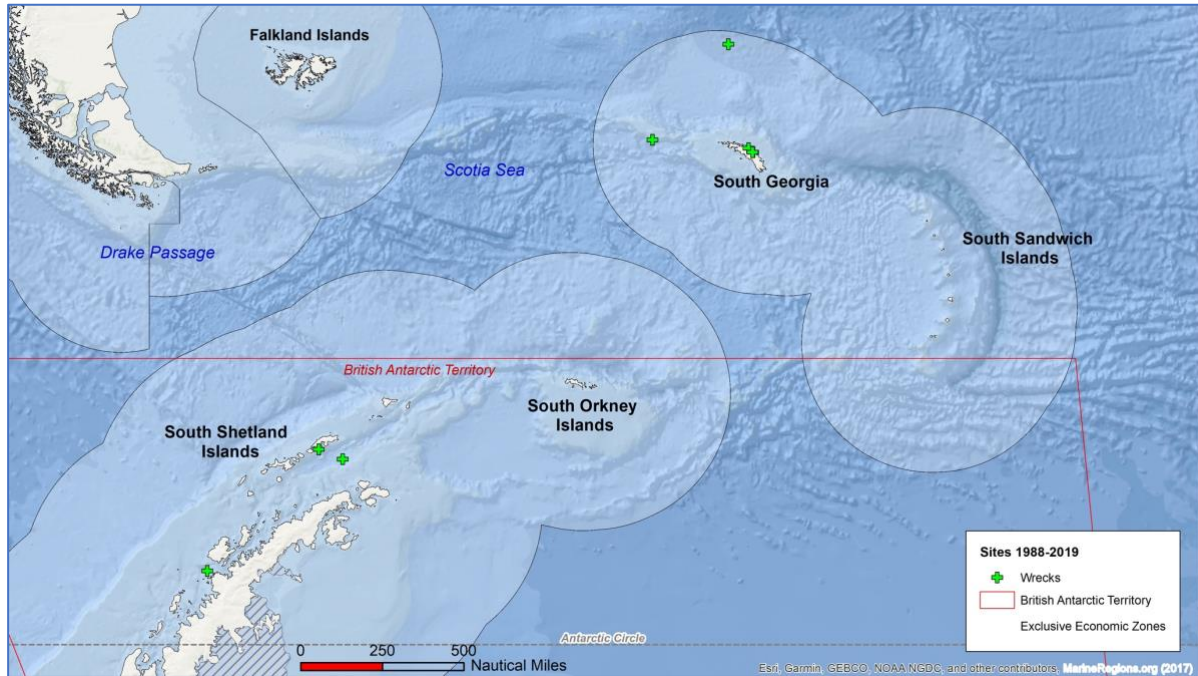


Figure 18: All Sites 1988-2019

Historic Chronology

- 4.1.78 In 1987 the iceberg B-9 carried away the remnants of the US bases Little America I, II and III, built between the 1920s and 1940s. Their remains are likely to have dispersed and sunk as the iceberg broke up. In 2001 an environmental survey of the seabed near McMurdo Station in the Ross Sea revealed 15 sunken vehicles, 26 lost shipping containers, 603 fuel drums and 1,000 smaller items dumped in a 20 hectare area, an indication of the cultural impact of 50 years of human occupation at an Antarctic station (Lilley 2001).
- 4.1.79 In January 1989 the Argentinian Navy transport ship *ARA Bahia Paraíso*, survivor of the Falklands conflict, ran aground off the South Shetland Islands and subsequently capsized. Two Agusta/Sikorsky ASH-3D Sea King helicopters were also lost on board. The wreck was drained of fuel and oils but remains partially exposed in shallow water. Three fishing boats have sunk at South Georgia since 1988 and one in the South Shetlands. In 2007 the original polar cruise ship *Lindbald Explorer* (now renamed *MV Explorer*) was damaged by ice and sank close to the Shetland Islands. In 2012 *MV Mar Sem Fim*, an expedition charter yacht was crushed by ice nearby (Appendix 3).

Archaeology of whaling stations 1904-Present

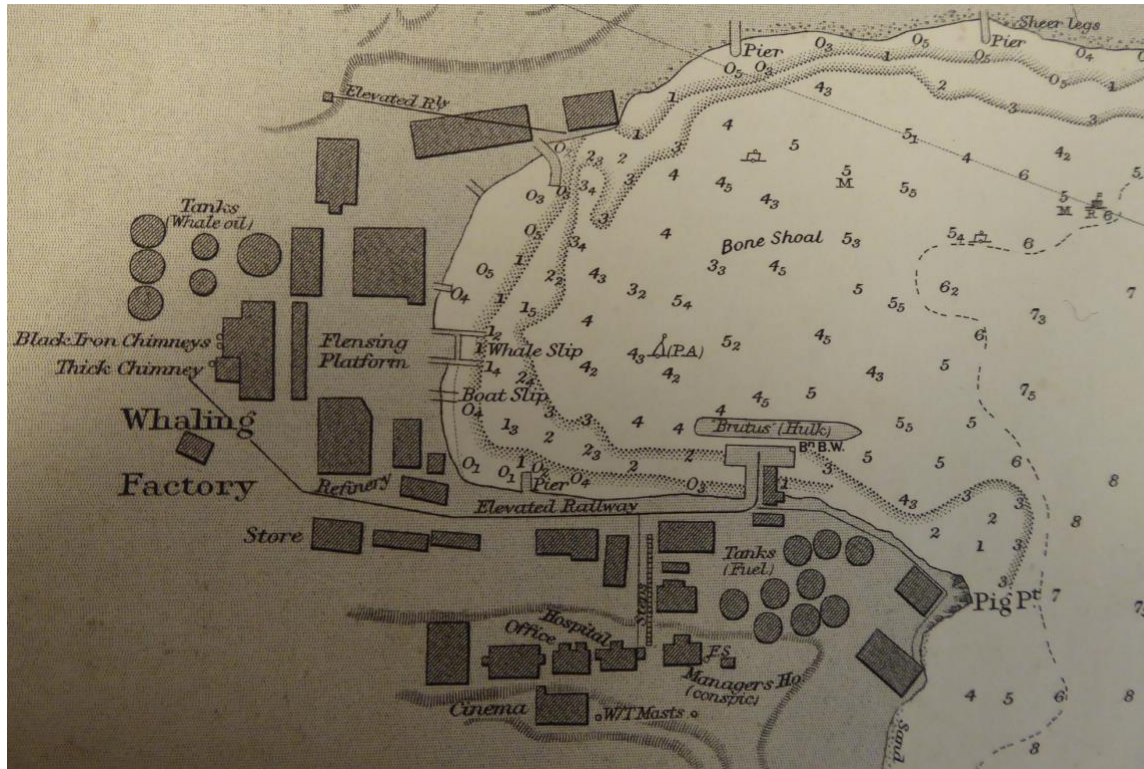


Figure 19: Prince Olav Harbour and the Hulk Brutus as recorded in an Admiralty Chart in 1930

4.1.80 The whaling stations represent complex multi-period settlement sites combining industrial production facilities, accommodation, communal spaces (churches, graveyards and cinemas), peripheral infrastructure (dams, waste dumping areas), dock facilities, large inter-tidal hulks, abandoned small craft and submerged wrecks. Although considered together as a holistic group, each site is unique, developed in response to its surrounding environment, function and history. The sites range in preservation from buried archaeological remains (Prince Olav Harbour) to near-intact sites (Grytviken). The terrestrial aspects of the stations are relatively well studied, having been surveyed and undergone various levels of preservation since the 1970s. They are now considered the core element of South Georgia's maritime heritage (Basberg 2004:50).

Site Formation Processes

- 4.1.81 When the whalers left South Georgia in the 1960s the shore stations were left largely intact. The future of whaling was uncertain and it was possible the sites could be reactivated, so equipment and stores were retained. Until 1971 the caretakers at Leith and Grytviken carried out maintenance on buildings and machinery. Once they were withdrawn deterioration at the whaling stations started immediately. The severe weather conditions were not conducive to preservation, with extremely strong winds, rain and heavy winter snowfall allowing rapid decay and some structures collapsed over time. Husvik additionally suffered regular flooding from snowmelt (Basberg 2004: 42).
- 4.1.82 The stations were also gradually stripped of valuable artefacts by visitors as souvenirs or for resale. Maritime equipment known to have been taken include chronometers, binoculars, compasses and brass portholes from the ships (Basberg 2004: 42). Over time stores and messes were emptied so that only non-portable equipment was left. Deliberate vandalism further damaged the sites, as did wildlife which often took up residence in accessible houses and stores (Basberg 2004: 42). Recognising this BAS continued monitoring the sites and from 1970 carried out some remedial preservation and rescue work on key structures, including the church, library and cemetery at Grytviken. Under the leadership of Bob Headland paper archives were collected from the stations and deposited at Cambridge and Edinburgh (Basberg 2004: 42, Purcell Miller Tritton 2011:18).
- 4.1.83 The economic value of the huge amounts of metal contained in the stations was not forgotten. In 1978 the whaling company Chr. Salvsen of Leith, Scotland had acquired all the stations, and signed a contract with Argentinian businessman Constantino Davidoff to allow the sale and removal of material from all sites except Grytviken (which was the most viable for reactivation) (Basberg 2004: 43). This action, as discussed above, led indirectly to the Falklands War. Due to the conflict Davidoff was unable to remove any material from South Georgia, but his workers did move significant pieces of equipment and quantities of machine parts from the buildings in Leith, storing them on the *Catchier* pier where they remain in piles today (Purcell Miller Tritton 2011: 25). Some whaling station buildings were damaged by small arms fire during the fighting. Post war garrisons caused more extensive damage by using the stations as small arms and artillery targets. Among the casualties of this action was the bark *Louise*, discussed below.
- 4.1.84 The 1982 conflict awakened international attention to the value of the cultural heritage of South Georgia, with interest from the UK, Norway and the US. The South Georgia Whaling Museum was established in 1992 at Grytviken and the South Georgia Museum Trust was established by the Falklands Government. A gradual change in attitude towards the value of the islands industrial heritage saw the beginning of preservation

efforts focused on the whaling stations themselves. To encompass wider aspects of South Georgia heritage the museum was renamed The South Georgia Museum in 1999 (Basberg 2004: 48, Purcell Miller Tritton 2011:18). Concerns about asbestos saw a major environmental clean-up programme at Grytviken during the 2003/4 season. The work proved controversial as several of the largest whaling station buildings were demolished, leaving the machinery they contained exposed to the elements in an approach reminiscent of an “open-air museum” (Basberg 2004: 52-3, Purcell Miller Tritton 2011:10,21, Hacquebord & Avango 2016: 440). At present the remaining whaling stations have been allowed to decay naturally in a form of “passive preservation” (Basberg 2004: 53) On King Edward Point Discovery House was restored by BAS in 2000, while some later buildings were removed. In total 24 terrestrial whaling or whaling related sites are recorded in the BAS heritage database for South Georgia.

- 4.1.85 The remains of New Sandefjord on Deception Island also remain after its abandonment in 1931, although reportedly in poor condition. Biscoe House, the main timber building stands as a ruin having been badly damaged by a volcanic eruption in 1969. Large equipment such as boilers and tanks remain in-situ. The cemetery, known to hold 45 graves was also buried by several metres of sand after the 1969 eruption. Recent visitors have described wooden crosses and coffins exposed by this event. More modern structures on the abandoned airstrip include a building used by the Falkland Islands and Dependencies Aerial Survey Expedition from 1955-57 and corrugated-steel aircraft hanger built 1962 (Appendix 5).

Maritime Assemblages

- 4.1.86 As the whaling fleets were withdrawn it proved unviable to relocate many of the specialist whale catching ships. Instead between 1953 and 1963, 10 whalers were deliberately sunk outside South Georgian harbours (Burton 2013: 1). Seven other whalers and support vessels laid up at Leith harbour in 1964 sank due to the weight of snow accumulated on their decks, and a further decommissioned whaler was wrecked after breaking from its moorings in 1968 (Hart 2006: 298, Appendix 3). Five large multi-beam targets located in 2013 probably represent some of the whalers scuttled in Stromness Bay (UKHO).
- 4.1.87 Other vessels were simply left at the docksides. Three floating docks, one assembled at Grytviken in 1928 and two at Stromness, were allowed to sink at their moorings and remain sunk or semi-submerged today (Burton 2013: 28). The most elderly ships including *Albatros* (built 1921) *Petrel* (1928) and *Dias* (1906) were retained at Grytviken, possibly out of respect of their potential historic value. This is suggested by the terms of the 1978 scrap deal between Chr. Salvsen and Davidoff which specifically

protected the whale catcher *Karrakatta* (built 1912) stored on a slipway at Husvik, since the director of Salvsen believed it should be preserved due to its “archaeological” and “historic” value (Elliot 1998: 170).

- 4.1.88 After 1971 *Petrel*, *Dias* and *Albatross* sank at their moorings with their decks semi-submerged. During the environmental clean-up operation of 2003/4 these hulks were re-floated, emptied of fuel and then beached higher up the shore to slow the rate of degradation (Basberg 2004: 53). *Karrakatta* was surveyed in 2011 and found to be good condition (Purcell Miller Tritton 2011: 33). These four vessels are now well-known and there is international interest in their preservation, although ongoing decay remains a serious threat (Robinson & Hart 2003: 335, Kendall, Farrell & Wallace 1997).
- 4.1.89 The Falklands War had some impact on the preserved vessels in South Georgia. In 1987 the *Louise* was hit during target practice and destroyed in the ensuing fire. The wooden bark, built in Maine in 1869 had been used at Grytviken as a coaling hulk and later as a mooring hulk. With masts still standing it had been considered the best-preserved example in the world of a Down-Easter (Headland 1984: 122). Only her semi-submerged lower hull remains in situ today.
- 4.1.90 On Deception Island numerous small flensing boats and water barges lie buried to their gunwales on the beach (Appendix 5). As well as the historic wrecks vessels discussed above, one unidentified wreck is listed in the UKHO archive in the bay a short distance off the beach.
- 4.1.91 Together this assemblage of sunken and abandoned vessels represents the world’s most complete dataset of whalers, although little work has been attempted on these to date. This study has identified 56 whaling vessels as wrecks or abandoned vessels in the study area. Of these 18 are recorded in the BAS heritage database for South Georgia, and 16 are also included in the UKHO database as known sites. Some Royal Navy supported diving inspections have taken place on shallow water wrecks in the main harbours, but the focus was on navigational safety, not archaeology.

Undated Sites

- 4.1.92 A small number of undated wreck sites and abandoned vessels are known in the study area. The majority of these are likely to be associated with the whaling stations, although two early reports of unidentified wrecks in South Georgia may represent sealers.

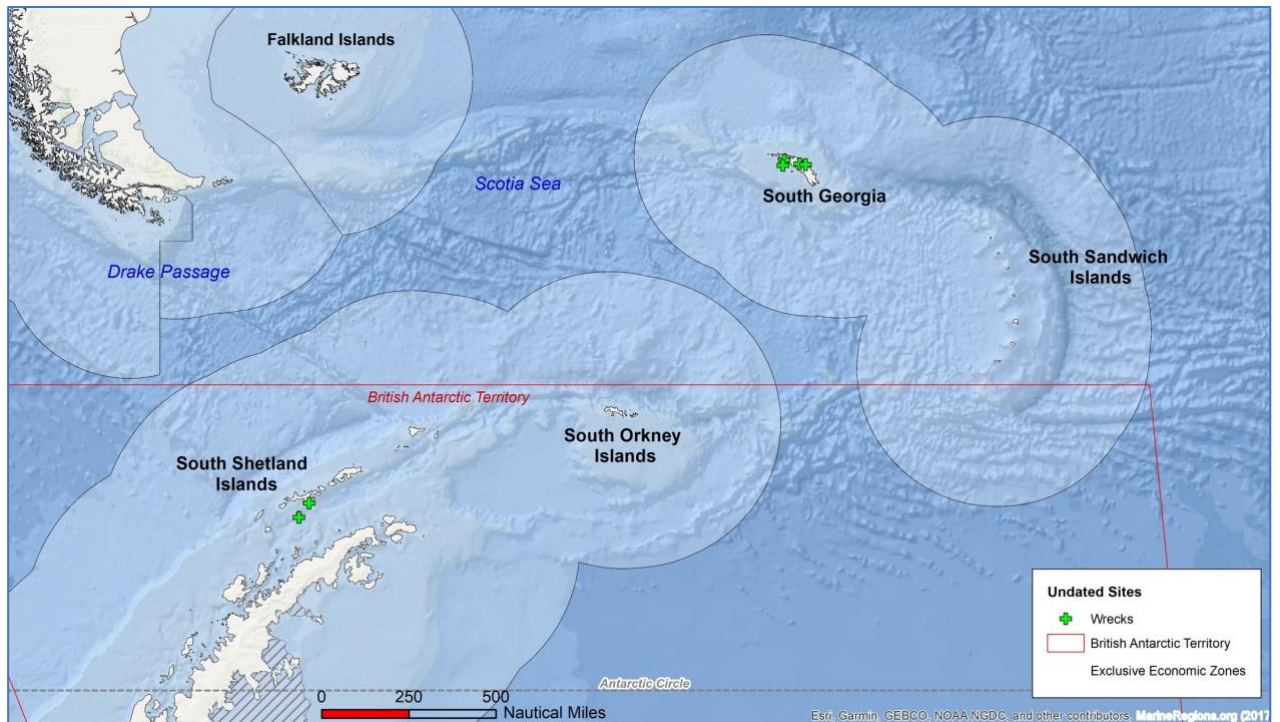


Figure 20: Undated Sites

5 CONCLUSIONS AND RECOMMENDATIONS

- 5.1.1 This report has considered all known historic losses that have occurred within the study area and the small number of wrecks physically identified. It is highly likely more sites exist as not every wreck event was recorded, particularly in the early periods, and some vessels, such as those driven off-course while passing Cape Horn, may have been lost far from their last recorded position. The discovery of shipwrecks is usually the result of commercial fishing activity, recreational SCUBA diving, or commercial development such as port and harbour construction or aggregate dredging. Sites are rarely deliberately found by searches. The lack of these activities in the study area increases the likelihood of the existence of unknown sites. Effectively it means that those sites simply have not been discovered – their non-appearance can by no means be seen as a lack of shipping loss but rather lack of activity by those that find them. This should be taken into consideration when planning further work or mitigating activities that might impact on underwater heritage.
- 5.1.2 It is also important to note as soon as a new wreck is discovered the likelihood of its looting is exceptionally high. This is evidenced by looting of the Battle of Jutland sites whose positions have been located.
- 5.1.3 Stage two of this work will detail the condition and significance of the individual wrecks and maritime sites and positions, if known.
- 5.1.4 This stage one report demonstrates that the first seafarers to reach territories in the Southern Ocean were explorers or merchants driven off-course when rounding Cape Horn in the 17th and 18th centuries. They were the first to see South Georgia and the South Sandwich Islands, but all were temporary visitors who have left no known archaeological impact. From 1786 seal hunters arrived in South Georgia in large numbers and established a seasonal or semi-permanent presence that peaked in the early 19th century but continued into the early 20th century.
- 5.1.5 Overexploitation and competition for seals drove the sealers to discover new territories including the South Orkneys and the South Shetlands, with the focus of their activity shifting rapidly with each discovery. Their presence is attested by the remains of temporary camps which have been identified across South Georgia and the South Shetlands. Although numerous losses are recorded historically, no wrecks of sealers have been archaeologically identified.
- 5.1.6 Scientific voyages of exploration continued throughout the 19th century but peaked between 1893 and 1918, the endeavours of competing expeditions becoming known as the Heroic Age. The successes and failures of these expeditions have defined the public sense of Antarctic activities, eclipsing the far more numerous commercial ventures to

the region, and their material legacies have received more historical attention as a result (Figure 22).

- 5.1.7 From 1906 until the 1960s whaling activities dominated Southern Ocean seafaring. The large shore stations built to support this industry remain the most visible and significant aspects of maritime heritage in the region. The number of whalers and support vessels lost far eclipses all other types of wreck in the region (Figure 22Figure 21).
- 5.1.8 The Falklands War had a defining impact culturally and historically on South Georgia, but its material and archaeological legacy is quite limited. With the decline of the whaling industry other activities have become more prominent including scientific research, tourism and fishing. Each of these have also left their own material mark on the Antarctic landscape.

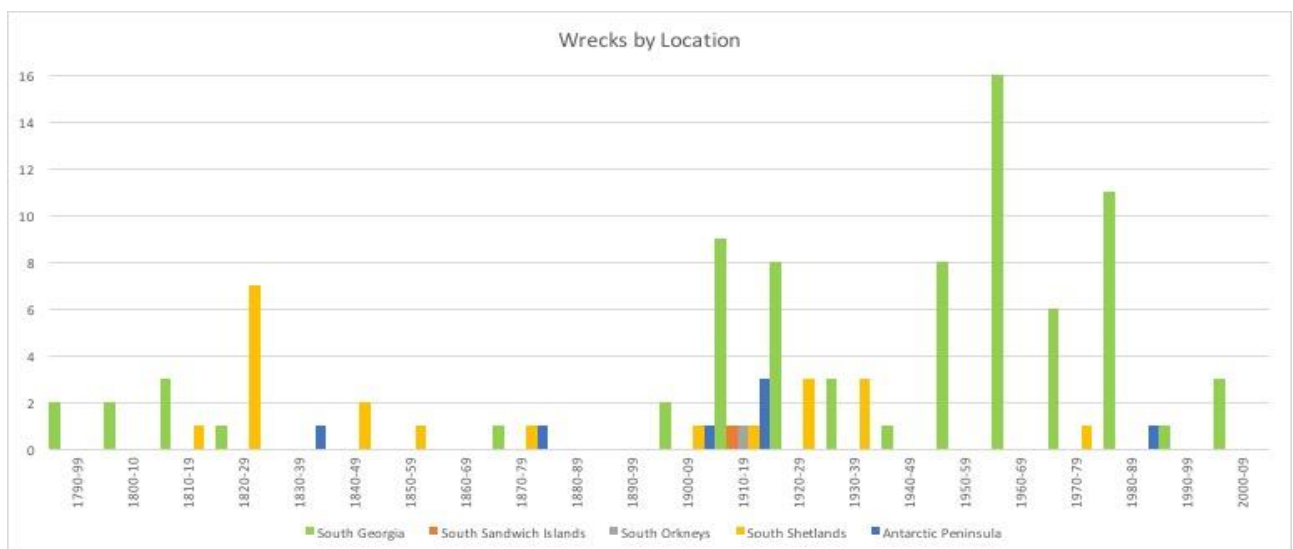


Figure 21: Wrecks by Location

- 5.1.9 The vast majority of wrecks identified in all periods except the 1820s are located in South Georgia, attesting to the predominance of the island as a hub in regional seafaring. Only the South Shetlands, during the first peak in sealing, experienced more losses. Shipping losses on the Antarctic continent have been modest, with just seven recorded wrecks. The South Orkneys and South Sandwich Islands each only have one wreck recorded. It is likely more unrecorded sites exist at these locations.



Figure 22: Wrecks by Function

- 5.1.10 The successive eras of Southern Ocean exploitation are evident in the near exclusive loss of sealers in the 19th century, the large numbers of whaler losses in the 20th century, and the predominance of fishing and other activities in recent decades. The slow decline of sealing in the later 19th century indicates a significant reduction in regional seafaring activity before the arrival of the whalers.
- 5.1.11 The impact of the mass scuttling and abandonment of vessels at the end of the whaling period in the 1950s and 1960s is very evident. A small peak of military losses during the Falklands War can be seen against the background of occasional military losses in support of exploration and scientific work. Only three dedicated exploration vessels have been lost, two during the Heroic Age and one more recently.



Figure 23: Wrecks by Nationality

- 5.1.12 British owned or flagged vessels dominate the early sealing period, with American vessels the only other significant nationality. The ownership of later 19th century sealers is less certain. Norwegian owned whaling vessels are the most common losses in the 19th century, with British owned losses also evident.
- 5.1.13 The spike in British losses in the 1960s are the large numbers of scuttled or abandoned whaling vessels. Many of these were originally Norwegian but ownership briefly passed to British companies when the stations were sold. Argentinian flagged vessels are evident in the early decades of whaling and military losses leading to the Falklands War. More recent losses are more diverse, reflecting varied interests in commercial fishing and flag states, and include Brazil, South Korea and Namibia.

6 REFERENCES

- Admiralty (2019) *Sailing Directions: Antarctic Pilot*. 9th Edition. UK Hydrographic Office, Taunton.
- Bannister, J.L. (1964) *Whaling Stations in South Georgia*. Polar Record. 12 (77) 207-209
- Basberg, B.L. (2004) *The Shore Whaling Stations at South Georgia: A Study in Antarctic Industrial Archaeology*. Novus Forlag
- Basberg, B.L. (2008) *Antarctic Tourism and the Maritime Heritage*. Norwegian School of Economics and Business Administration Discussion Paper 20
- Barker, N. (1997) *Beyond Endurance. An Epic of Whitehall and the South Atlantic*. Leo Cooper, London.
- Buckland, P.C & Edwards, K.J. (1998). *Palaeoecological Evidence for Possible Pre-European Settlement in the Falkland Islands*. Journal of Archaeological Science. Elsevier. 25 (6): 599–602
- Burton, R. (2013) *The Maritime History of South Georgia*. The South Georgia Heritage Trust.
- Cameron, I. (1974) *Antarctica: The Last Continent*. Cassell & Company, London.
- Campbell, R.J. (2000) *The Discovery of the South Shetland Islands: The Voyages of the Brig Williams 1819-20*. The Hakluyt Society, London
- Instituto Antartico Chileno. (1982) *Posible presencia de aborígenes en la Antártica*. Boletín Antártico Chileno. 1(1):18.
- Dickinson, A.B. (2007) *Seal Fisheries of the Falkland Islands and Dependencies: An Historical Review*. Oxford University Press, Oxford
- Dixon, E. (2019) *Antarctic Expedition to Find Shackleton's Lost Endurance Loses its own Submarine to the Ice*. CNN. 15th February 2019
- Elliot, G. (1998) *A Whaling Enterprise. Salvesen in the Antarctic*. Michael Russell, Norwich.
- Griffiths, T. (2007) *Slicing the Silence: Voyaging to Antarctica*. Harvard University Press, Cambridge.
- Hacquebord, L. & Avango, D. (2016) *Industrial Heritage Sites in Spitsbergen (Svalbard), South Georgia and the Antarctic Peninsula: Sources of Historical Information*. Polar Science 10: 433-440
- Hart, I.B. (2006) *Whaling in the Falkland Island Dependencies 1904-1931: A History of Shore and Bay-Based Whaling in the Antarctic*. Pequena

- Hattersley-Smith, G. (1983) *Fuegian Indians in the Falkland Islands*. Polar Record 21 (135): 605-606. Cambridge University Press, Cambridge
- Headland, R.K. (1982) *The Island of South Georgia*. Cambridge University Press, Cambridge
- Headland, R. K. (1984) *Wrecks, hulks and other vessel remains at South Georgia, Falkland Islands Dependencies*. Cambridge: British Antarctic Survey Bulletin, 65; 109-126
- Headland, R. K. (1989) *A Chronology of Antarctic Exploration*. Bernard Quaritch, London
- Herring, Capt. (1820) *An Important Discovery*. The Imperial Magazine. II (18): 674-5. Caxton Press, London.
- Jones, A.G.E. (1985) *British Sealing on New South Shetland 1819-1826: Part I*. The Great Circle. 7 (1), 9-22
- Kendall, H.W., Farrell, R.W. & Wallace, R.W. (1997) *The Whale Catcher Petrel. An Assessment of Recovery and Stabilization*. Report prepared for the South Georgia Whaling Museum, The Falkland Island Trust and the Government of South Georgia.
- Lilley, R. (2001) *Antarctic Sea Floor Contaminated by Human Waste Near Base*. Global Circle
- Maritime Herald (2018) *Death on the Ice: The Forgotten Spaniards Who Discovered Antarctica*. Maritime Herald 6th August 2018.
- Martín-Bueno, M. (1995) *Proyecto de San Telmo*. In Informe sobre las actividades científicas de España en Antártica durante la campaña 1993–94. Madrid: Comisión Interministerial de Ciencia y Tecnología. 249–265.
- Martín-Bueno, M. (1996a) *Arqueología Antártica: El Proyecto San Telmo y el Descubrimiento de la Terra Australis Antartica*. In Actas del V Simposio de Estudios Antárticos. Madrid: Comisión Interministerial de Ciencia y Tecnología. 421–428.
- Martín-Bueno, M. (1996b) *Proyecto de San Telmo: Arqueología Terrestre y Subacuática en Isla Livingston e Islas Desolación (Antártica)*. In Informe sobre las actividades científicas de España en Antártica durante la campaña 1994–95. Madrid: Comisión Interministerial de Ciencia y Tecnología. 173–179
- Mill, H.R. (1911) *Polar Regions and Antarctic Region*. In Chisholm, H. (ed.) Encyclopaedia Britannica (11th Ed.). Cambridge University Press, Cambridge
- Neil, A. (2019) *Sealing Archaeology Expedition Report*. South Georgia Heritage Trust.
- Pearson, M. & Stehberg, R. (2006) *Nineteenth Century Sealing Sites on Rugged Island, South Shetland Islands*. Polar Record 42 (233): 335-347

- Pearson, M., Stehberg, R., Zarankin, A., Senatore, M.X., Gatica, C. (2008) *Sealer's Sledge Excavated on Livingston Island, South Shetland Islands*. Polar Record 44 (4): 362-364
- Pearson, M., Stehberg, R., Zarankin, A., Senatore, M.X., Gatica, C. (2010) *Conserving the Oldest Historic sites in the Antarctic: the Challenges in Managing the Sealing Sites in the South Shetland Islands*. Polar Record 46 (236): 57-64.
- Percy Smith, S. (1904) *Hawaiki: The Original Home of the Maori, With a Sketch of Polynesian History*. Whitcombe and Tombs, Christchurch
- Purcell Miller Tritton. (2011) *Inspection of the Disused Shore-Based Whaling Stations for The Government of South Georgia and the South Sandwich Islands*. Unpublished Survey Report
- Robinson, R. & Hart, I. B. (2003) *Viola/Dias: The Working Life and Contexts of the Steam Trawler/Whaler and Sealer*. Mariner's Mirror 89 (3) 325-338
- Southby-Tailyour, E. (1985) *Falkland Islands Shores*. Adlard Coles Nautical
- Stehberg, R. & Lucero, V. (1995)a. *Contexto Arqueológico del Hallazgo de Restos Humanos en Cabo Shirref, Isla Livingston*. Serie Científica del Instituto Antártico Chileno 45: 59–66.
- Stehberg, R. & Lucero, V. (1995) *Arqueología Histórica de la Isla Desolación: Evidencias de Coexistencia entre Cazadores de Lobo de Origen Europeo y Aborígenes del Extremo Sur Americano, en la Segunda Década del Siglo Pasado*. Serie Científica del Instituto Antártico Chileno 45: 67–88.
- Stephenson, R.B. (2011) *Historical Timeline of Antarctic Exploration*. The Antarctic Circle
- Stewart, H. (2014) *New Antecedents on the Discovery of the South Shetland Islands: the Journal of Midshipman Charles W. Poynter 1819-20*. Estudios Hemisferico y Polares. 5 (2) 132-139.
- Warsailors.com *Norwegian Victims of Pinguin*. www.warsailors.com. Retrieved 20 February 2020.
- Zarankin, A. & Senatore, M.X. (1996) *Ocupacion Humana en Tierras Antarticas. Un Aproximacion Arqueologica*. Soplando el Viento. Actas de las Terceras Jornadas de Arqueologia de la Patagonia. 3: 629-644
- Zarankin, A. & Salerno, M. (2017) *Antarctic Archaeology: Discussing the History of the Southernmost End of the World*. In Symonds, J. & Herva, V-P. (eds.) *The Oxford Handbook of Historical Archaeology*. Oxford University Press, Oxford

7 APPENDIX ONE: HISTORIC SITES AND MONUMENTS

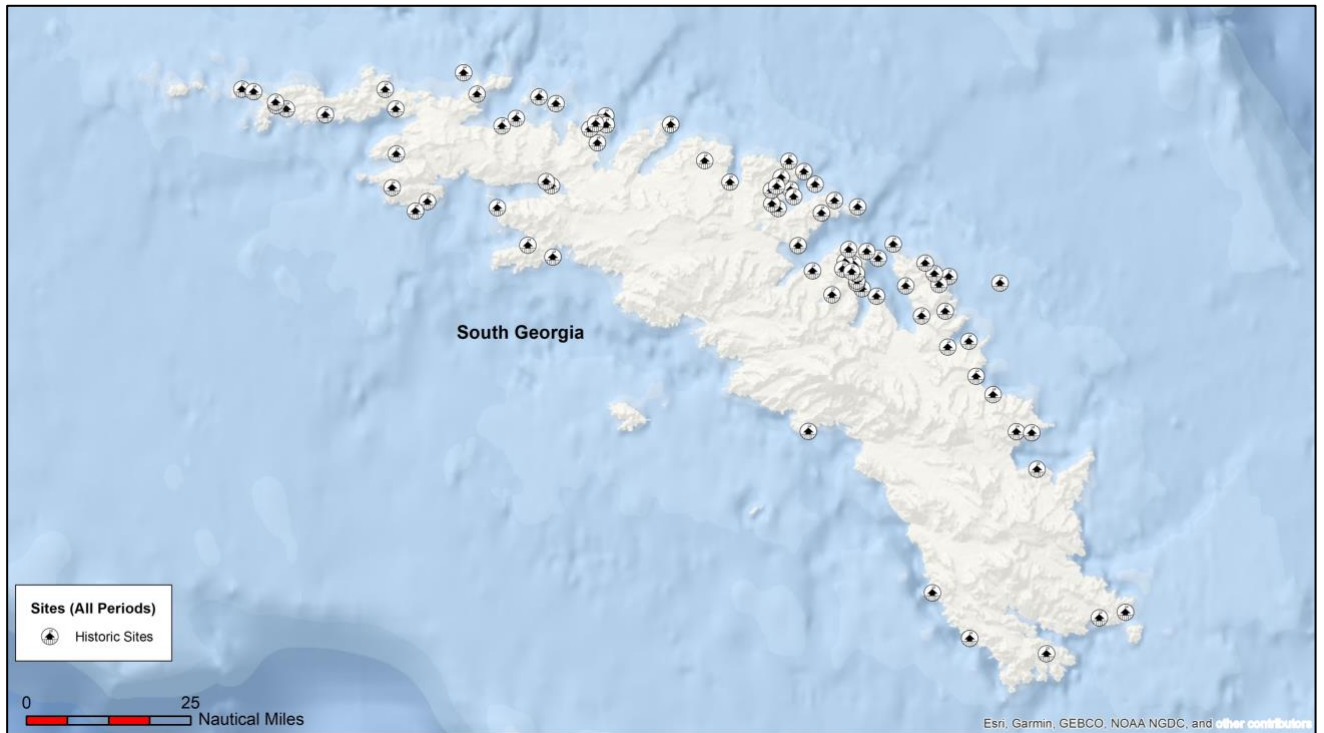


Figure 24: Map showing historic sites registered in South Georgia

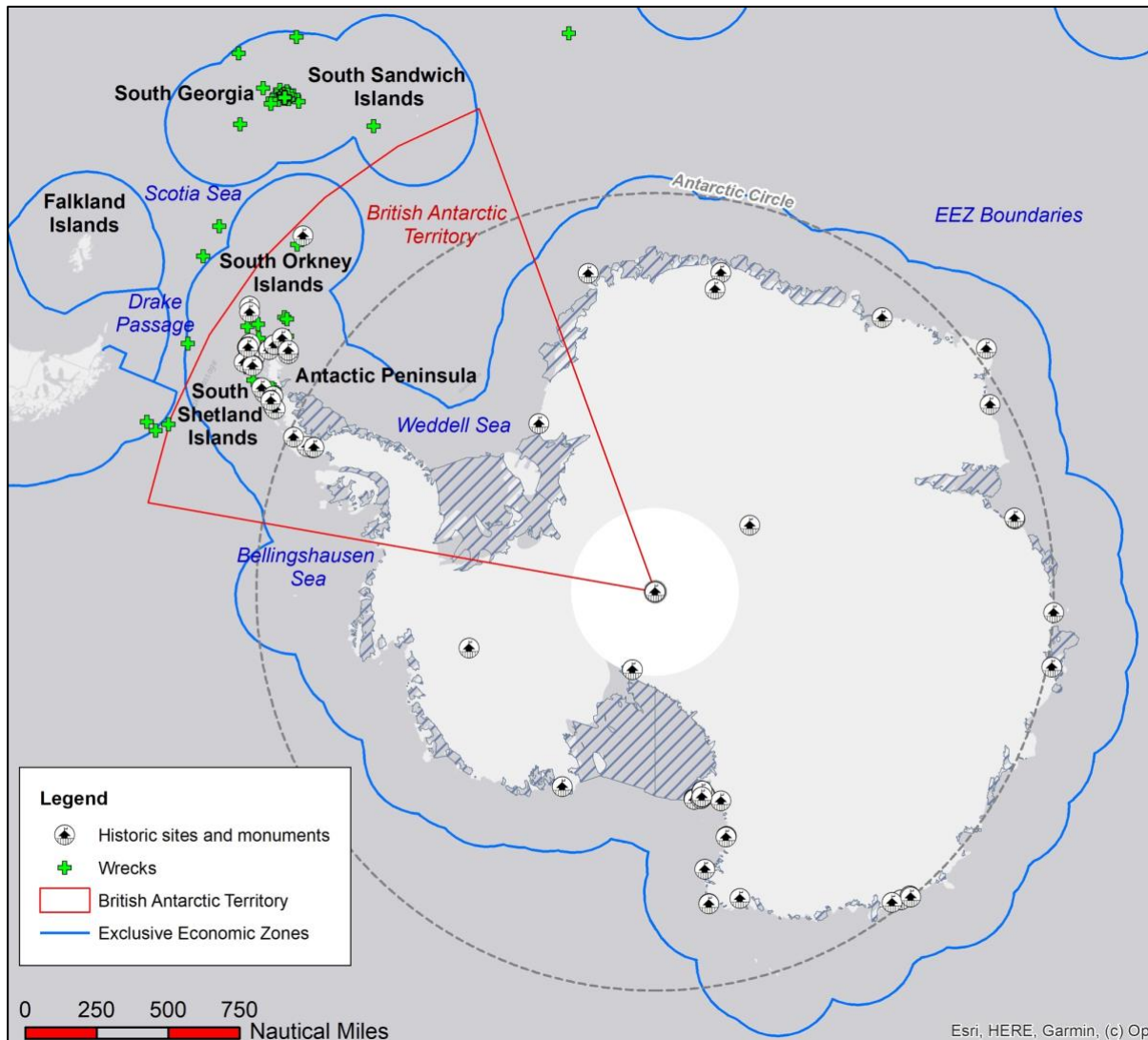


Figure 25: Map showing Historic Monuments Registered under the Antarctic Treaty

8 **APPENDIX TWO: STUDY AREAS AND TIMELINES**

See separate document

9 **APPENDIX THREE: WRECKS DATABASE**

See separate document

10 **APPENDIX FOUR: BRITISH ANTARCTIC SURVEY HISTORICAL
DATABASE FOR SOUTH GEORGIA**

See separate document

11 **APPENDIX FIVE: ANTARCTIC TREATY – REGISTERED
HISTORIC SITES AND MONUMENTS IN ANTARCTICA**

See separate document