

Intertidal and Subtidal Benthic Seaweed Diversity of South Georgia

Report for the South Georgia Heritage Trust and Joint Nature Conservation Committee


Survey September 2011



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Executive Summary

South Georgia is a highly isolated island with its marine life influenced by the circumpolar currents. The local seaweed communities have been researched sporadically over the last two centuries with most species collections and records documented for a limited number of sites within easy access. Despite the harsh conditions of the shallow marine environment of South Georgia a unique and diverse array of algal flora has become well established resulting in a high level of endemism.

Current levels of seaweed species diversity were achieved along the north coast of South Georgia surveying 15 sites in 19 locations including both intertidal and subtidal habitats. In total 72 species were recorded, 8 Chlorophyta, 19 Phaeophyta and 45 Rhodophyta. Of these species 24 were new records for South Georgia, one of which may even be a new record for the Antarctic/sub-Antarctic. Historic seaweed studies recorded 103 species with a new total for the island of 127 seaweed species. Additional records of seaweed to the area included both endemic and cosmopolitan species. At this stage it is unknown as to the origin of such species, whether they have been present on South Georgia for long periods of time or if they are indeed recent additions to the seaweed flora. It may be speculated that many have failed to be recorded due to the nature of South Georgia, its sheer isolation and inaccessible coastline. However given the increased levels of tourism, human activity and transportation it is equally plausible that many have been introduced in more recent years. There are still a number of species yet to be identified and indeed collected from these remote places but continued research is imperative to enable accurate baseline data from which to monitor future changes in species composition and distributional shifts particularly in light of climate changes.

Acknowledgments

Much thanks goes to the South Georgia Heritage Trust and Joint Nature Conservation Committee for their support in this project. Taxonomic assistance was also offered by Professor Margaret Clayton of Monash University, Melbourne, Australia, who provided a valuable insight to some of the endemic species of the Antarctic. Gratitude also goes to Ali Massey of the King Edward Point research station who assisted with intertidal surveys. Additional support came from the British Antarctic Survey, the Government of South Georgia and South Sandwich Islands, the Falkland Island Fisheries Department and a Darwin Initiative (DEFRA) grant.

Introduction

South Georgia is an isolated island in the Southern Ocean and is the second largest of the circum-Antarctic islands. It is the Circumpolar Antarctic Current that dominates the area placing significant influence over the benthic flora (Luning, 1990) whereby;

1. The prevailing ocean current has greater significance for the distribution of seaweeds;
2. The seaweed floras inhabiting the temperate and Polar Regions show a more pronounced geographical isolation.



Figure 1. South Georgia's northern coastline at the entrance of Cumberland East Bay.

To date, biological exploration of this island has been limited to a few bays on the more sheltered north east coast with most seaweed surveys conducted primarily within the intertidal. As a consequence, the algal flora, particularly of the shallow sublittoral, has remained little known.

The first documented studies of Antarctic seaweed began in the 19th century by Reinsch (1888, 1890) based on material collected by the 1882-1883 German International Polar Year Expedition. These research studies were continued in the early 20th century by Gain (1912), Skottsberg (1907, 1921, and 1923) and Kylin (Kylin and Skottsberg, 1919) who produced important accounts of the taxonomy and biogeography of these cold water seaweeds. Subsequent qualitative studies include those of Nueshul (1965), Delepine (1966), Zaneveld (1966, 1968), Lamb and Zimmermann (1976) and the valuable work of Papenfuss (1964) who catalogued the work of Skottsberg, Reinsch, Hariot and Kylin. The most recent accounts of seaweed diversity in the Antarctic are those of John et al (1994) and Wiencke and Clayton (2002) producing the most comprehensive species lists of South Georgia to date. It is from a collection of these studies that a historical species list of South Georgia can be compiled and used as both a reference and comparison within the current study. However many of these still remain littoral with most sublittoral collections achieved through dredging.

Although the work of Wiencke and Clayton (2002) does not solely focus on the seaweed diversity and distribution within South Georgia, their accounts provide a detailed insight into seaweeds of the Antarctic and a valuable source of species descriptions. It is estimated through historical literature that approximately 130 species of seaweed exist in the Antarctic (Wiencke and Clayton, 2002); these levels of diversity are considered low in comparison to temperate and tropical waters and up to a third of this total comprises endemic species, suggesting a rather unique flora for this area. A similar finding was reported by Papenfuss (1964) who suggested that out of 550 species of seaweed recorded from both the Antarctic and subantarctic regions 250 were endemic. It is the sheer isolation of the Antarctic and strong effects of Antarctic circumpolar currents on the dispersal of seaweed propagules that has contributed to this level of endemism (Luning, 1990). However, there are equally a number of cosmopolitan species, up to 20, that are suspected invaders from temperate waters such as *Scytosiphon lomentaria*, *Petalonia fascia*, *Ulothrix speciosa*, and *Ulva lactuca*. Many of these species are thought to have been transferred via shipping activity (Wiencke and Clayton, 2002).