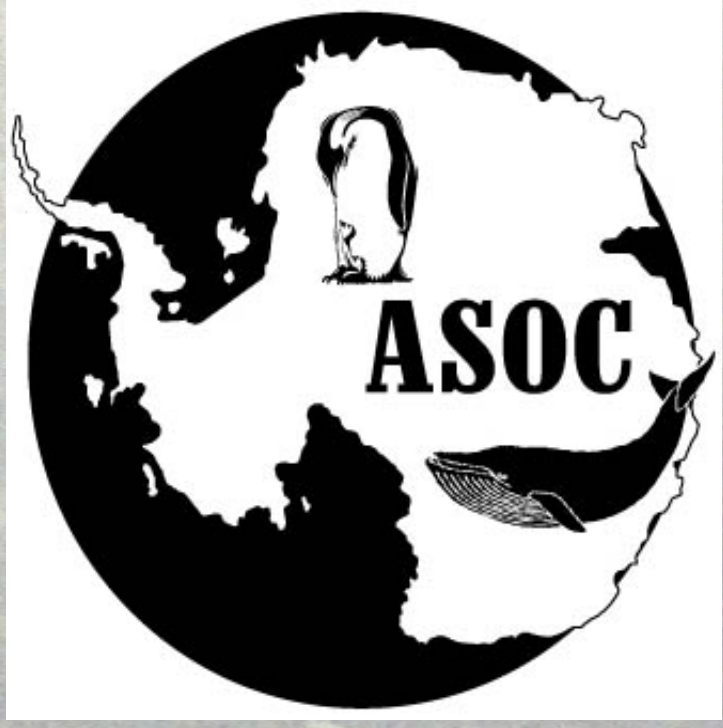


# TOURISM AND THE HUMAN FOOTPRINT AT DECEPTION ISLAND, SOUTH SHETLAND ISLANDS, ANTARCTICA



R.M. Roura<sup>1</sup>, M. dos Santos Afonso<sup>2</sup>, C.M. Pérez Muñoz<sup>1</sup>, T. Tin<sup>1</sup>  
<sup>1</sup> - The Antarctic and Southern Ocean Coalition (ASOC)  
<sup>2</sup> - Instituto de Química Física de los Materiales, Medio Ambiente y Energía (INQUIMAE), University of Buenos Aires, Argentina



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## Introduction

Deception Island in the South Shetland Islands is a ring-shaped island about 12km in diameter, with a narrow entrance into Port Foster, a central landlocked harbour (a flooded volcanic caldera). Activities in the island have included sealing (1820s), industrial whale processing (1912-1931), scientific base operations (from 1943), and tourism (from 1958). Deception Island is managed internationally as an Antarctic Specially Managed Area (ASMA) since 2005.

In February 2002 the human footprint was examined around the island with an emphasis on sites of past and current activity. A range of methods was employed. This poster reports on the concentration and distribution of hydrocarbons on sites of past and current activity around Port Foster and elsewhere.

## Methodology

Sub-surface (0-2cm) 100cm<sup>3</sup> sediment samples, including duplicates and control samples, were collected in the intertidal zone around the sandy-gravel beaches that surround most of Port Foster, and at other locations in the island. Sampling methods followed the recommendations of the Antarctic Environmental Monitoring Handbook (GREG 2000).

Hydrocarbon extraction with fluorocarbon-113 (CFC-113) was carried out on 2 grams of sediment with three successive sonication extractions according to EPA 3550 procedures. The determination of total hydrocarbon content was carried out by absorption on extracts in 2930 cm<sup>-1</sup>, with calibration with patrons following procedures EPA N 418.1.

## Results

Detectable hydrocarbon concentrations were found in all samples. The highest hydrocarbon concentrations, with some hydrocarbon concentrations above 400 mg kg<sup>-1</sup>, were found in samples collected in the N of Port Foster at Telefon Bay, Stancombe Bay, and Pendulum Cove. Hydrocarbon concentrations with some values above 200 mg kg<sup>-1</sup> were also found in the SE of Port Foster at Whalers Bay.

Samples at Telefon Bay, Pendulum Cove, and Baily Head contained hydrocarbons associated to marine diesel. Synthetic hydrocarbons were identified in some locations:

- **DIOP: Di-isooctyl phthalate**, was identified in eight locations around Neptune's Bellows, Whalers Bay, and elsewhere around Port Foster;
- **DEHP: Di-2-ethylhexyl phthalate** was identified in five locations at Baily Head on the Bransfield Strait, and the NW part of Port Foster;
- **BZ-SULFO: Benzene sulfonamide** was identified in one location at the W of Port Foster; and
- **BPA: bisphenol-A** was identified in two sites at Whalers Bay.

These substances are used in the plastics industry, and in the production of resins and elastomers.

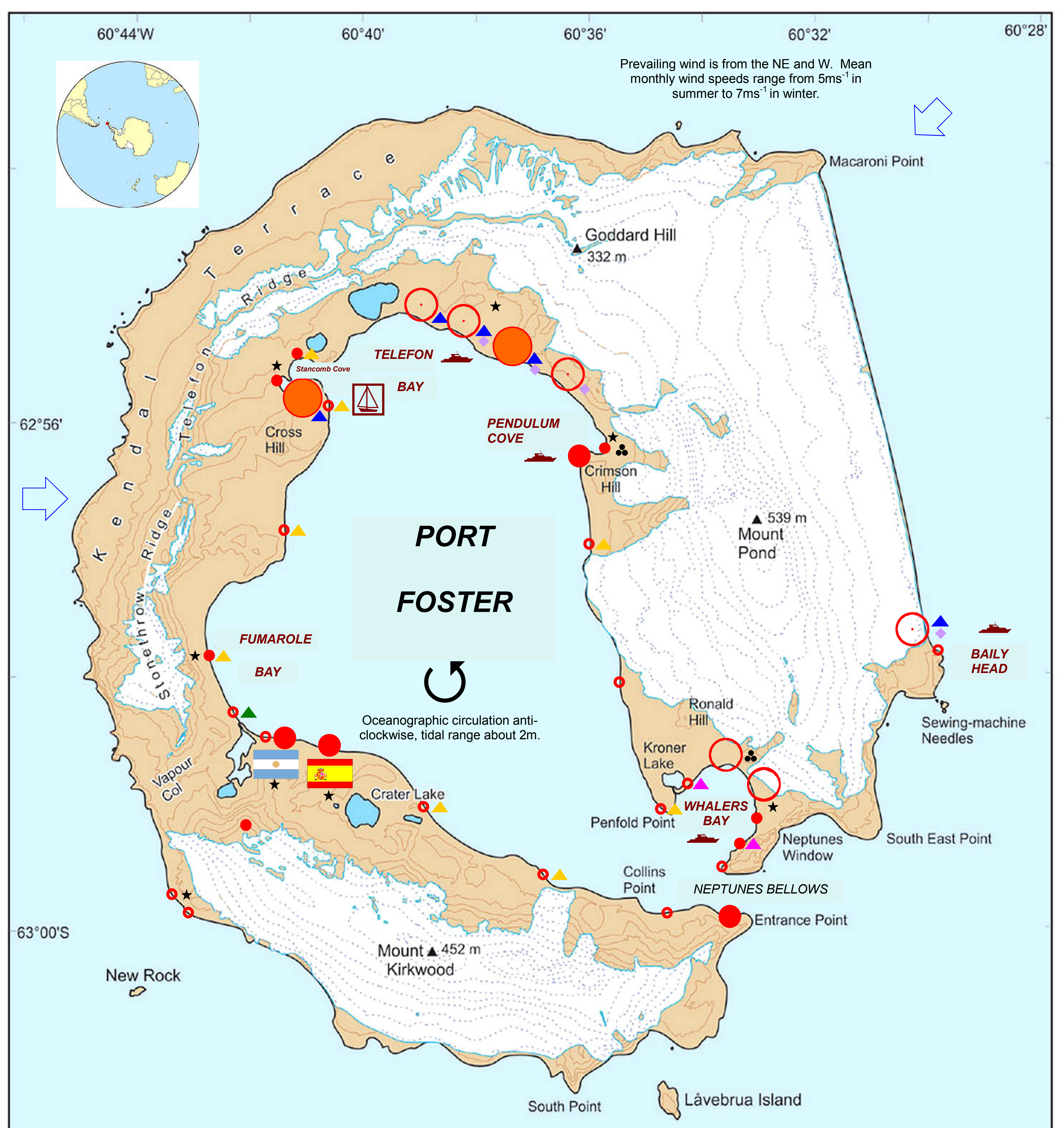
## Discussion

Hydrocarbons at Deception Island could have originated in past or present activities as well as natural sources. Considerable research-related shipping takes place within Port Foster. There are several possible land-based sources of hydrocarbons. Both areas in the N and SE of Port Foster where hydrocarbon concentrations are higher correspond, in part, to areas of past land-based activity (primarily whale processing and base activity) as well as ongoing land-based activity (research and tourism). The synthetic hydrocarbons detected during sampling may have resulted from the use of inflatable tenders associated with shipping activities.

For the past decade Deception Island has been one of the most visited destinations in Antarctica. More than 20,000 tourists landed there in 2006-07. Currently tourism is the largest activity in the island in terms of numbers of people and ships. Given the relatively high hydrocarbon concentrations at tourism landing sites, and notwithstanding other possible sources of hydrocarbons, tourism is likely to be a contributor to the human footprint on the island. The actual and potential risks of tourism-related hydrocarbon contamination are underscored by the November 2006 grounding of the M/V *Lyblov Orlova*, and the January 2007 grounding of the M/V *Nordkapp*, which resulted in the spillage of an unknown amount of marine diesel at Port Foster.

## Conclusions

Hydrocarbons were identified around Port Foster's intertidal zone. Some of these are likely to originate in contemporary rather than historic sources. The level of shipping activity inside Port Foster is growing rapidly, risking environmental pollution resulting from routine activities as well as accidents. Regular and effective monitoring needs to be put into place to allow assessment of the impacts of ongoing activities at Deception Island, in accordance the 1991 Protocol of Environmental Protection to the Antarctic Treaty, Art. 3(2)(d). Information gathered during monitoring will help to inform decisions about the management of the Deception Island. In addition, precautionary measures should be taken as appropriate.



Kilometers  
0 1 2 3 4  
UTM Projection WGS-84 zone 20

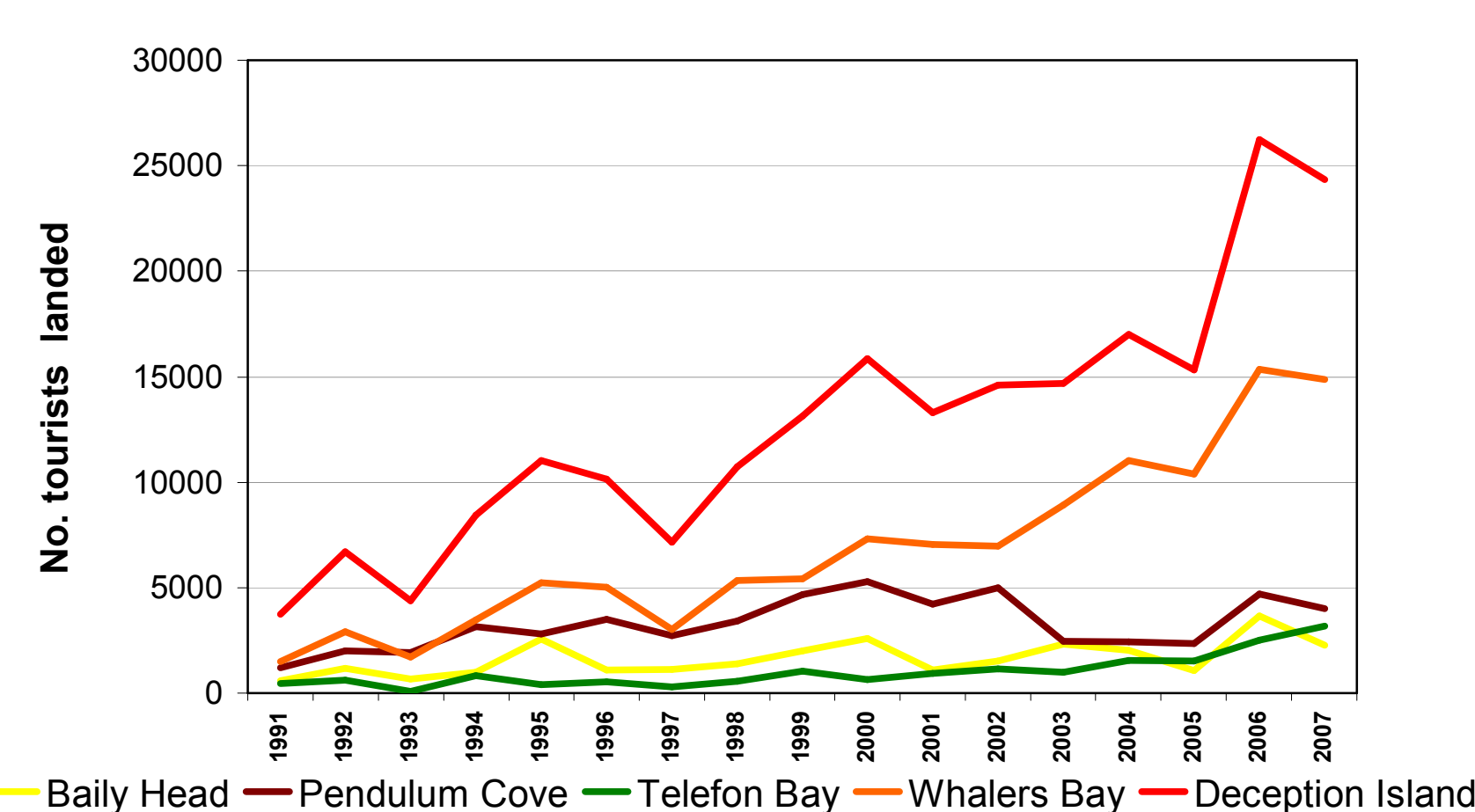
## KEY

- Total Hydrocarbon Concentration**
- > 500 mg kg<sup>-1</sup>
  - 201—500 mg kg<sup>-1</sup>
  - 101—200 mg kg<sup>-1</sup>
  - 51—100 mg kg<sup>-1</sup>
  - < 50 mg kg<sup>-1</sup>

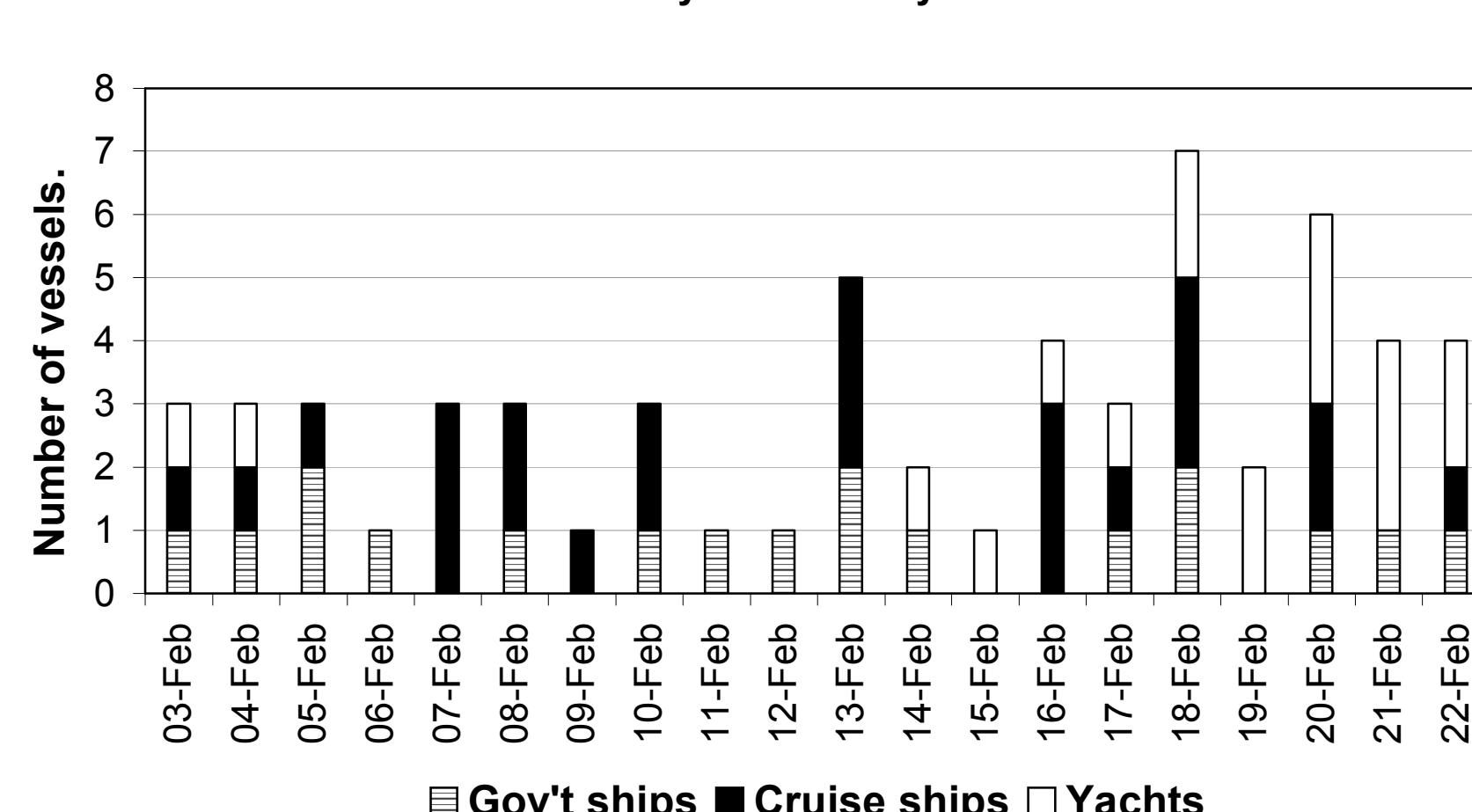
- Synthetic hydrocarbons**
- ▲ DIOP
  - ▲ DEHP
  - ▲ BZ-SULFO
  - ▲ BPA
- Marine diesel**
- ◆

- Activity sites**
- Base Decepción
  - Base Gabriel de Castilla
  - ★ Research site
  - Historic remains
  - Tourism landing site
  - Sailing vessel anchoring

Tourism landings at Deception Island 1990-91 to 2006-07  
(Data: www.iaato.org)



Number and type of vessels at Deception Island  
3 February - 22 February 2002



## ASOC

The Antarctic and Southern Ocean Coalition (ASOC) is a global coalition of environmental Non-Governmental Organizations established in 1978. ASOC works to ensure the long-term protection of Antarctica and the Southern Ocean. ASOC is supported entirely from individual supporters, dues from its members, and grants from foundations. ASOC attends regularly as an expert organisation Antarctic Treaty Consultative Meetings and other meetings of the Antarctic Treaty System. Since 2001 ASOC has participated as an expert organisation in the work of the Deception Island Management Group.



## Contact

Ricardo Roura  
ricardo.roura@worldonline.nl  
+31 20 683 8133

**Illustrations:** Maps from www.deceptionisland.aq. Photograph: Tourists at the historic whaling factory at Whalers Bay. © R. Roura 2002. Graphs by Roura and Tin (2008) (left) and Roura and Pérez-Muñoz (2002) (right).  
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