

ENVIRONMENTAL INSPECTION REPORT OF GOUGH ISLAND WILDLIFE RESERVE
SEPTEMBER - OCTOBER 1998.

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SUMMARY OF FINDINGS AND RECOMMENDATIONS

The relief voyage to Gough Island and Tristan da Cunha occurred between 3 September and 12 October 1998. Despite problems with fishing from the vessel, ship- and shore-based activities proceeded smoothly. The main finding during the inspection was the discovery of *Sagina* sp., a new and potentially serious alien plant on the island. It is currently restricted to the logistic zone, and every effort should be taken to remove it before it spreads. The most likely source of propagules is from Marion Island, emphasising the need to limit use of equipment (containers, tools, clothing, etc.) between Marion and Gough Island.

A. Preventative measures against introduction of aliens

1. Documentation should be handed out to every voyage participant well before embarking, informing them about environmental issues and their duties in preventing the importation of aliens to the island.
2. Measures should be implemented at the PWD store to:
 - a) Eradicate the weeds within the working area.
 - b) Clean containers and equipment before being packed for sending to the island.
 - c) Use only metal containers (not wooden ones).
 - d) Prevent containers from being used interchangeably (i.e. only Gough containers for Gough).
 - e) Remove items attractive to rodents (e.g. old bed-mattresses) from the PWD store.
3. Rodent prevention methods should be improved by:
 - a) Attaching ratguards to the ship side of mooring lines when docked in port.
 - b) Replace old ratguards with new, more efficient ones, and/or use alternative prevention methods.
 - c) Examining the likelihood of rodent transfer between Tristan and Gough.
4. Precautions against propagule transfer to Gough should be taken by:
 - a) Containers used for Gough Island must be thoroughly cleaned immediately before packing, and containers from Marion Island cannot be re-used on Gough Island, given the likelihood that this was the vector for the introduction of *Sagina* to Gough.
 - b) Implementing standardized procedures on board the supply vessel and on Gough Island for the prevention of propagule transfer by persons and potential carriers coming on board or ashore from other territories.
 - c) Enforcing the regulations where contraventions have taken place.
 - d) Evaluating the durability of fresh produce under the storage conditions on the supply vessel and on Gough Island, and supplies being removed from the ship surplus.
5. Action against aliens on Gough
 - a) Where insect infestations occur in food stores, these should be noted and samples kept in appropriate storage (e.g. freezer or relevant preservative), and the remainder incinerated.
 - b) That control of alien plants remains an obligation for team members under appropriate guidelines.

B. Maintenance of areas

The following actions would improve safety and slow the deterioration of paths:

- a) Appropriate ropes and ladders should continue to be supplied in adequate amounts.
- b) All trips outside the logistic zone be recorded for analysis of use and impacts on paths.

C. Operations in the logistic zone

1. Towards more efficient waste control :

- a) The installation of the proposed incinerator be made a priority.
- b) A food macerator be installed on the island.
- c) Guidelines for a standardized method of waste disposal be issued to all visitors.

2. Towards improving and preventing fuel spillages:

- a) Alterations to the current fuel coupling system must be made a priority.
- b) Contingency plans should be implemented as follows:
 - (i) Suitable dispersant be supplied to the island in adequate amounts.
 - (ii) Additional equipment should be available and used before commencing operations to secure or repair weak points (e.g. securing bends in the fuel hose with slings and having spare parts available for the coupling joint).
- c) Leaking valves at the diesel tanks be repaired to prevent overflow of fuel.

D. Implementing management regulations:

1. Rules regarding fishing in the Tristan-Gough EEZ be addressed by informing every participant, in writing, of these regulations well in advance of departure. Voyage participants must confirm acceptance of the rules in writing, and be held accountable to these rules by the DEA&T voyage co-ordinator.
2. Requirements relating to the entry of the Wildlife Reserve should be made more obvious by:
 - a) Erecting appropriate signs at entry points on the Island.
 - b) The production of a "Visitors guide to the Gough Island Wildlife Reserve", for the distribution to relevant visitors and associated operators in the EEZ.

E. Improving conservation awareness among expedition members

Knowledge about the functioning of the islands ecosystem needs to be enhanced, and specific research undertaken to address problems such as checking & controlling alien species, preventing degradation to the environment, etc. To achieve these goals:

- a) More literature should be supplied in the permanent library at Gough (e.g. all the publications listed in the MP/GIWR, plus identification guides for weeds as well as native plants).
- b) Research should be promoted on Gough (as per the MP/GIWR).
- c) One member of the expedition team should be appointed as Conservation Officer, and made responsible for environmental matters throughout the year. This requires that the incumbent should have appropriate training in the relevant conservation issues.
- d) The appointment of an expedition Conservation Officer should not be seen as supplanting the need for an environmental inspector during the takeover.

INFORMATION AND INSPECTIONS CARRIED OUT BEFORE DEPARTURE FROM CAPE TOWN

Administration and preparatory documentation

In terms of the conservation objectives in the Management Plan for the Gough Island Wildlife Reserve (MP/GIWR) relating to the prevention of human-induced introductions of alien organisms to Gough Island, I liaised with the voyage co-ordinator of the Department of Environmental Affairs and Tourism (DEA&T), Mr. K. Booyse. On the question of information dissemination to participants regarding precautions they are expected to take before departing, I was assured that team members were advised verbally during their training about this issue, but that no document specific to Gough had been drawn up for distribution to other participants. However, a document existed in this regard for the Marion Island Special Nature Reserve, which I suggested addresses the same objects as those in the MP/GIWR and could be adapted for distribution to all Gough voyage participants. This was duly done (see attached) and although not all participants appeared to have received a copy, this action is commendable given the short notice. I **recommend** that it become standard practice to issue each participant (including the Ship's personnel and Tristan Passengers) with this or similar documentation.

I also attended the information presentation given by the group leader of the Weather Bureau, Mr. J. van der Merwe to the new resident team members. This included an information sheet handed out (see extracts attached) relating amongst other things to conservation and management matters, as well as the consequences applicable to any persons breaking the rules. Peter Ryan presented a further briefing on environmental matters for the new team and leaders of takeover groups in Cape Town.

Warehouse inspections

Inspections were carried out at the island stores of the Public Works Department (PWD) in Wingfield and those of the Department of Environment Affairs and Tourism (DEA&T) in Paarden Eiland.

PWD Wingfield

At Wingfield the problem of weeds growing in cracks of the concrete apron outside the island store (a problem identified by previous Conservation Officers: N. Wace in 1995, J. Roux in 1996 and O. Huyser in 1997) had obviously still not been solved. Weeds were proliferating both inside and outside of the fenced area, and a whole bushel of freshly pulled out grass (roots, and all) was found lying next to one of the crates being packed for Gough Island inside the shed. On enquiry, Mr. D. Hendrikse said this was brought in by the forklift from outside. In view of the fact that the forklift is used to place items into crates going to both Gough and Marion Island, and the fact that these crates are apparently not cleaned or disinfected between inter-island use (per S. Oosthuizen) and the current finding on the Gough Island container landing platform of a highly invasive alien plant (*Sagina procumbens*) known also to have spread all over Marion Island, I **recommend** that the eradication of all weeds within the working area of the PWD store be given serious and urgent attention. Furthermore, I **recommend** that cleaning of crates and containers should be carried out shortly before packing for transport to any of the Islands.

Most equipment had already been crated, but three wooden containers inside the shed were still open. These, as well as those inspected on opening at Gough, appeared clean and free of any obvious plants or animals (bearing in mind that minute seeds falling into cracks and holes or equipment would not be visible to the naked eye). However, one crate (marked B7 Wingfield) containing a large machine was inspected on opening at Gough and found to contain many spider webs in the corners and amongst the packing paper, together with a live spider. The specimen was removed and returned to Pretoria, where it was identified as a cosmopolitan invasive "Daddy-long-legs" *Smeringopus* (Pholcidae). It was an immature and thus could not be identified to species level. On enquiring about the use of wooden crates instead of the standard metal containers, Mr. Hendrikse replied that the wooden ones had been used for the construction of the Antarctic Base (SANAE), and found to be robust and less expensive than the metal containers. On

enquiring about the treatment of the pressed wood used to make these crates, he assured me that the standard anti-woodborer treatment would have been applied. The crates were painted with blue enamel on the outside, but no coating on the inside. Joints and any holes or chips are therefore not sealed inside. The crates are closed by means of a series of screws through a wooden lid, which therefore leave open holes on the upper rim of the container and through the lid once opened.

Given that : 1) the various openings (including a series of oblong slits on the outside and added chipping through damage after repeated handling) provide additional areas for harbouring alien propagules (seeds, eggs, insects, fungi, etc.), 2) no systematic cleaning procedures are carried out, and 3) the presence of alien species reaching Gough, I consider the use of the wooden containers a disadvantage for Gough and Marion Islands and **recommend** that the use of metal containers be retained. **Furthermore**, that the containers used for Gough should not be used elsewhere. I also **suggest** that the fumigation of machinery should be carried out as recommended by N. Wace in his report of 1995, especially where machinery is used interchangeably with Marion Island and other places known to harbour invasives (see section on alien plants).

Baited rodent traps were in place inside the shed and there were no signs of any rodent activity, and the property was confirmed as such per the attached certificate (see "Pestokil" dated 21 August 1998). However, I noted old (previously mouse infested) mattresses stored in the shed, that had been removed from Marion Island earlier in the year. As these provide attractive nesting areas for rodents, I **recommended** that they be disposed of as a precaution against harbouring new infestations.

DEA&T Paarden Eiland

At the Paarden Eiland stores there were no obvious signs of any rodent activity and proof of an appropriate inspection was handed to me (see attached certificate dated 25 August 1998). Clothes and bedding, both new and re-cycled, were being issued to voyage participants at the time of my inspection. On enquiring about the cleanliness of re-issued items, I was given the attached list of recycled items and the treatments applied to them. I carried out spot-checks which revealed no propagules attached to any of the items.

The food for the island had all been packed into metal containers. On arrival at Gough, the containers were found to be clean inside, free of any food spillages or obvious plants or animals. Food was packed in the standard metal tins, but for the first time, these were not crated in wooden "kos-kassies". New metal shelving stands were erected inside the Gough Island food store on which the tins were stacked.

Supply vessel

The voyage of the *SA Agulhas* to Gough and Tristan da Cunha took place between 3 September (departed 16h00) and 12 October 1998 (arrival 07h00). Prior to departure, I inspected the *SA Agulhas* for anti-rat measures taken, cleanliness, and cargo that was being loaded.

Rat prevention measures

On every visit to the ship, metal rat guards were in place on all mooring lines. However, on one visit, the *SA Agulhas* had a ship berthed next to her in such a way that the stern lines of the *Agulhas* crossed under the bow lines of the ship alongside. Because of the tidal rise and fall, the inevitable tightening and slackening of the lines led to the ropes of both vessels touching each other. At this time, the rat-guards on the *Agulhas* were attached on the shore side of the crossing point (viz. just beyond the tyres along the dock wall), and the neighbouring vessel had none attached to its securing lines. Therefore, rodents could gain access to the *Agulhas* via the unguarded lines of the neighbouring vessel. To prevent this, I **recommend** that ratguards be attached on the ship side of the securing lines.

Two new rat-guards were being used. These had metal spikes bending out in front of the metal shield as an extra preventative measure, and were a marked improvement over the old guards, many of which fail

to close properly (as pointed out by previous inspectors). I **recommend** that all old rat-guards be replaced with this new type. The Captain of the *Agulhas* suggested augmenting the use of metal guards by replacing the current orange mooring lines with white lines (apparently rats do not cross white surfaces). N. Wace (Environmental Inspection Report 1995) also suggested looking into possible alternatives such as painting rat-repellent substances onto the lines. I questioned the absence of preventative measures on either the gang-plank with its security rope-netting (that provides 24 hour access to the vessel), or any ship to shore pipes and connections (such as fuel, water or other lines). Mr. G. Hagemann (harbour/cargo control) replied that rats do not go on gang-planks.

On the question of the ship being rodent free, Mr G. Haywood (chief mate) confirmed that the ship was inspected and certified rodents free (as per attached certificate of the Port Health Officer dated 26 August 1998). He mentioned that while the ship leaves Cape Town rodent free, it is said to return with mice. This implies that rodents are possibly transferred onto the ship via back-loaded cargo from either Gough or Tristan da Cunha. In view of the fact that Tristan has rats, and cargo is transferred between Tristan and the ship before arrival at Gough Island, I **suggest** that this avenue of transfer should be checked.

Cleanliness

No obvious signs of any foreign plant or animal material was found during any of the inspections of the ships hold, decks or cargo loaded. Cargo was generally sealed in containers, or transferred directly from an enclosed vehicles (such as the frozen produce) except for the fresh fruit and vegetables that arrived on the back of an open lorry, and a motor vehicle that was driven to the docks and hoisted onto the ship without spray-cleaning the wheels. In view of the precautionary measures in place to avoid transferral of alien species (especially plant propagules adhering to the tread of footwear and helicopter/vehicle tyres), I **recommend** that authorities not aware of this measure, should be informed.

INSPECTIONS AND ISSUES ADDRESSED AT SEA

I gave a presentation on conservation matters to which all passengers and island-based personnel were invited. I also inspected all fresh produce on board ship, checked for the presence of plant or animal propagules, examined waste disposal practices and dealt with the thorny issue of fishing of Tristan and Gough.

Presentation

A slide talk was presented to all on board en route to Gough Island. This focused on issues pertaining to conservation at sea, within the Tristan da Cunha Dependency and specifically on Gough Island as outlined by the MP/GIWR. For reference purposes and to provide further information, guidelines for conduct at the islands were drawn up and circulated (see attached), and a photocopy of the MP/GIWR was made and left in the ship's library. Although the talk was given twice to accommodate the attendance of as many people as possible, certain group members (noticeably from PWD) did not attend.

Waste disposal

Jonathan Warren assured me that the MARPOL procedures were being instituted and followed. No dumping of persistent waste was seen during the journey. However the question of excess bilge sludge is one that does not seem to have been solved. Although the *SA Agulhas* has a return system that enables bilge sludge to be collected and returned to port, it appears to have a limited capacity, especially if the voyage is a long one. How the fishing vessels operating in the Marine Wildlife Reserve deal with this problem was not established.

Fresh produce

Before arriving at Tristan da Cunha, I inspected all the storage places containing fresh produce. In the kitchen, the cool room contained fresh fruit and vegetables for consumption on the ship as well as some items for Tristan da Cunha, and the pantry held vegetables for consumption on the ship (see * below). The No. 2. hold contained a 2x2 m open crate of live nursery plants (*Bougainvillea*, apple trees and other plants) destined for Tristan, and two cool rooms contained fresh fruit and vegetables and eggs for Tristan and Gough. Potatoes and onions for Gough Island were stored in the No. 3 hold.

The fresh produce for consumption on the ship comprised the following :

<u>VEGETABLES</u>		<u>FRUIT</u>
#Hubbard squash*	Carrots	Oranges
#Cabbage	Tomatoes	Paw-paws (papaya)
#Sweet-potato's	Garlic	Pineapples
#GreenPeppers	Cucumbers	Lemons
#Radishes	GemSquash	Apples
#Celery	*Onions	Pears
#Leeks	*Potatoes	Naartjies (Tangerines)
#Parsley	*Pumpkin	Bananas
#Lettuce		Grapefruit
#Ginger		#Avocado's
# Mielies (corn cobs: mostly de-leafed and packed on polystyrene & cling-wrapped)		
# Turnips (these were apparently packaged, but had already been used up at time of inspection)		

items were not amongst the Gough Island supply listed below.

* items stored in the kitchen pantry together with other dried & tinned produce. On inspecting this pantry, Hubbard squash were found to have rotted within the 4 days since departure from Cape Town, and a stack of onion bags (left over from the last Marion Island trip four months back) was found to be sprouting shoots through the mesh bags. The Chief Steward assured me that this room was regularly checked and sprayed for insects. To minimise the attraction and breeding of undesirables (such as flies and cockroaches that were seen in the kitchen on the return journey from Gough), I **suggest** that such produce known not to last well on sea-voyages, be replaced by other items, and that left-over fresh produce be removed after every trip.

Animal and plant presence

A sample of the various fresh produce (viz. a cabbage, onion, pineapple [with green top], parsley, celery, radish [with green top], leak, and lettuce) was examined for any signs of alien invertebrates or fungus. Of these, the onion had typical signs of mould beneath the fist few layers of skin, and the cabbage was found to harbour a thrips and a fly. No other invertebrates were found on the way to Gough. However, on the return journey, three types of insect were seen (a cockroach running in the kitchen, a small moth flying in the passenger lounge, and a fly in the area of the ships upper-air office).

Precautions against transfer of alien propagules

On enquiring about procedures in place to avoid the transfer of alien propagules from Tristan, Nightingale, Inaccessible and passing ships⁺ to Gough, I was advised that the helicopter is sprayed down on the ship's flight deck after each transfer operation has ended. This was observed after transfers had taken place between Tristan and the *Agulhas* en route to Gough, although helicopter wheels were only sprayed from

the top (not where they touch the ships deck) without the use of any brush, and the inside (where passengers had been seated) was not cleaned. There were no standard procedures for cleaning of footwear of visitors (including helicopter pilots and personnel) returning to the *Agulhas* or landing at Gough⁺.

I attempted to spray the shoe-soles of people returning from Tristan via helicopter with the fresh water hose, but this was found to be unsatisfactory. Thereafter, a bucket filled with water and a scrubbing brush was used at the rope ladder entry point of the *Agulhas* by persons transferred via small boats. However, this practice was not exercised by Tristanians boarding the *Agulhas* for the purpose of loading cargo, nor could the implementation thereof be checked by myself at all occasions (e.g. while I was engaged on Tristan), although I was assured by Mr. Haywood that the decks would be cleaned on departure from Tristan. Once based at Gough, I could no longer monitor the procedures followed. However, I did become aware of a transgression that involved the un-permitted landing of helicopter personnel into the conservation zone (viz. at The Glen), without the necessary precautions of propagule prevention. This took place on 28 September, after several inter-island landings had taken place (at Tristan, Nightingale, and the logistic zone on Gough). Transfer occurred by means of a small boat from the *Agulhas* for purely recreational reasons. Considering that the prevention of human-induced introductions of alien organisms is one of the key management objectives in the Gough Island Management Plan (section 5.11), I consider the above scenario to be an area that requires urgent addressing, which is underlined by the finding of the recently introduced alien plant (*Sagina*). I **recommend** that urgent attention be given to the implementation of a standardized procedure for the prevention of propagule transfer, applicable on the Gough supply vessel and on Gough Island. (e.g. a large bucket/tub of water with appropriate disinfectant and a scrubbing brush that could be placed at relevant entry points)⁺⁺. Persons responsible could possibly be the ship's staff serving the rope ladder entrance, helicopter personnel attending the flight deck, and the DEA&T Officer in Charge on Gough. Furthermore, I **recommend** that measures be implemented in cases where contravention's jeopardising this objective have taken place (such as the above landing).

[⁺ In the event of an emergency, persons from any ships at sea may be granted permission to land at Gough. In such cases it would be paramount not only to clean soles of shoes, but also check clothing for adhesive propagules and any equipment/parcels for alien imports.

[⁺⁺ In the case of persons landing from foreign vessels (being any vessel other than the Gough supply vessel), a more rigorous procedure would be expected. For example, an alternative to the 'bucket and search clothing method' may in such cases be to issue landing persons with clean boots and an overall when they set foot on the island, in exchange for theirs, which would need to be sealed in a bag until they depart.]

Fishing

No fishing was observed to have taken place from the *SA Agulhas* during the trip between Cape Town and Gough Island, and up until the arrival of the *Agulhas* at Tristan da Cunha on 9 September, no permit had been requested or issued to allow fishing within the Tristan Exclusive Economic Zone (EEZ). In the planning meeting with the Captain and relevant ship and personnel leaders before arrival at Tristan, Mr. K. Booyse stated that there was to be no fishing. However, after arrival at Tristan, this ruling appeared to be unclear amongst the voyage participants and the ship's crew. This became evident when I was approached by various members, some of whom claimed to have been informed by officials in Cape Town that fishing was allowed, while others requested that I organise a fishing permit from the Tristan Administrator Mr. Brian Baldwin. I subsequently visited Mr. Baldwin on 10 September, and he granted a permit (see attached). Notices of the most relevant conditions were circulated and displayed to all aboard the *Agulhas* and on Gough Island (see attached). Since the conditions stated that no fish caught within 12 nautical miles of Gough would be allowed out of that zone, but gifts are often returned to South Africa in the form of fish

received by passengers and crew from the Tristanians, an inventory of all 'legal' fish entering the zone was made both after departure from Tristan but before arriving at Gough, as well as after leaving Gough but before returning to Tristan. On the return inspection, a few additional gifts had been received from the fishing vessel *Kelso*, and two minor items of fish left for consumption on the ship voyage were found. While anchored at Tristan (5 October) illegal fishing occurred by passengers. After requesting the activity to be halted and the fish removed, no other incidence of unpermitted fishing was seen.

From my discussions both prior to the voyage and subsequent to the incidents during the voyage, it is clear that fishing is a major attraction to participants on trips into the Tristan EEZ, and that transgressions to the rules are an ongoing issue. The reason for the continuous transgressions appear to be based on inadequacies in addressing the rules and the perpetrators.

Regarding the rules applicable to the specific voyages, it appears that: a) the method of informing participants is inadequate (e.g. verbal notification) and b) the time of advising participants is inadequate (viz. en route, a day before arrival at Tristan). Where rules have been broken, it appears that offenders do not get penalised for their misconduct. Given that it is impossible to ensure that verbal notifications reach all personnel, I **recommend** that a written copy of the applicable rules be handed out to every voyage participant by their respective employers well in advance to leaving on the ship and that a relevant section be signed and returned to the employer and ultimately DEA&T as proof of the participant's awareness of the rules. Furthermore, since there appears to be no incentive to prevent individuals from transgressions, I **suggest** that the rules handed out include details of penalties for transgressions.

GOUGH ISLAND METEOROLOGICAL STATION

Food

Fresh produce offloaded at Gough this take over comprised the following:

<u>VEGETABLES</u>		<u>FRUIT</u>	
Carrots (top-less)	11 x 10kg packets	Apples	11 boxes
Potatoes (washed)	43 x 10kg pockets	Bananas	11 20kg boxes
Tomatoes (green)	22 x 6.4kg boxes	Grapefruit	11 pockets
Garlic	7 x 1kg bags	Lemons	3 pockets
Onions	22 x 10kg pockets	Naartjies	3 cases
GemSquash	11 x 12.5kg pockets	Oranges	22 pockets
Pumpkin	7 x 10kg pockets	Pears	11 boxes
Babymarrow	11 x 10kg bozes	Pineapples	11 boxes
Cucumbers	4 x 14kg boxes	PawPaw	11

These items are the same as were supplied in 1997, with the addition of bananas, naartjies, pineapples and paw paws. Many tomatoes, bananas and pears had gone rotten before the end of the take-over period. Since these are known to have a particularly restricted life-span, it may be more economical to reduce the quantities supplied and substitute these with the equivalent in dried produce or alternative items. This would also reduce the problems associated excessive waste disposal at the Gough Base (see section on wastes). I therefore **recommend** that DEA&T investigate this matter, and consult with the relevant parties (e.g. team-members and take-over chefs can identify items that have gone off, and stock-taking can identify quantities consumed). However, it is worth noting that DEA&T has stopped sending any fresh fruit and vegetables ashore at Marion Island, and a similar policy should be considered for Gough Island.

Only boneless chicken meat and oil-dipped eggs were brought ashore at Gough Island. Neither had been irradiated. No turkey was purchased as no de-boned ones were available. Due to storage problems

(various frozen items had virtually defrosted), only a limited amount of the chicken supplied to the island was retained, and most of this was processed during the take-over. Ice-cream melted and was flown back to the ship. However, en route from the freezer area via Joe Roos to the *Agulhas* much of the liquid ice-cream and possibly a few of the container lids were lost over land and sea.

All unused food that had been supplied to the island prior to 1997 was removed during this take-over. This included items whose "use-by" dates had expired or where infestations were suspected. (see list appended). Of these items, I inspected all the cereals and flour, and some of the other dried products, and found one item infested with insects. This was the Hi-fibre bran cereal issued in 1996, which contained high infestations of live Anobiidae weevils (in all stages of development) and some psocid book-lice. Samples of the infestations were taken back to South Africa for identification, and the remainder incinerated. Infestations noted in the past year by the outgoing team members were notably from cereals (especially Hi-fibre bran), pasta and flour used in the pantry, although no specific details or specimens had been collected for verification. During this take-over various bars of chocolate issued to the outgoing team a year previously were found to be infested with anobiid beetles. The contaminated bars were notably Cadbury's Whole Nut and Fruit & Nut bars.

I **recommend** that infested food items should be identified by personnel on the island and a record kept so that hi-risk items (such as the hi-fibre bran) can be discontinued. Infested foodstuffs should either be stored in a freezer for return to South Africa, or incinerated as soon as possible. Where infestations can be removed or isolated, they should be kept in a freezer for return to South Africa.

Aliens

Plants: The most important finding was the discovery of *Sagina* sp. (probably *procumbens*), a species not previously recorded from Gough Island. Its presence was immediately apparent on arrival at the Base on 11 September, when an inspection of the area around the crane revealed numerous well developed plants on and around the cement platform. It is unlikely that these plants would have been overlooked by previous inspectors (notably Dr N. Wace in 1996). Subsequent searches located the plant at two areas within the Base area: at the landing area near the crane and below the fuel staging tank at "Joe Roos". In the crane area it has spread over the cement platform, including the cement sections of the path up to Gough House (both at the bottom of the catwalk opposite the power shack and in the top bend near the inflammables store) as well as the grassed area on the sea-side of the foodstore and crane. At "Joe Roos" *Sagina* was found on the rocks where a ladder leads down to the fuel coupling point.

Verification of the identity of *Sagina* was obtained by sending samples taken back to South Africa (under permit) to Dr. Niek Gremmen in the Netherlands. Dr Gremmen is an authority on the problem of this particular plant and its infestation on sub-Antarctic Marion and Prince Edward Islands. He confirmed the identity as *Sagina* sp. and offered guidelines for immediate control of the weed (see attached e-mails of 1 and 26 October). *Sagina* was not found elsewhere in the vicinity of the Base or at any other sites visited (Seal Beach, Swemgat, Tumbledown Beach, Snoekgat, Admirals, The Glen, Tafelkoppie, and South Peak), further suggesting that it arrived recently at the island. Given the location of the infestation (primarily at the cargo handling point at the crane), the abundance of the species at Marion Island coupled with its absence from Tirstan, re-use of containers or movement of other equipment (including clothing) from Marion on Gough seems the most likely vector for the introduction. I **recommend** that containers used at Marion Island not be used at Gough in future, and that extra caution be taken to clean all equipment immediately prior to departure to Gough.

Sagina is an aggressive invasive and if left unchecked it will spread throughout the island, carried by people and birds. Although not flowering during the inspection, plants have subsequently flowered (see attached e-mails). It is **essential** that every effort be made to remove *Sagina* from the island before it spreads. Initial steps have already been taken, following the advice of Dr. Gremmen (see attached e-mails

and p. 2 of the attached "Conservation & Monitoring Programs"), but a thorough investigation of the problem and appropriate control measures should take place during the 1999 relief voyage to Gough.

Of the plants previously introduced and thought to be eradicated (*Conyza floribunda*, *Senecio burchllii* and *Verbena officinalis*), one large and well established bush of *Verbena officinalis* was found growing in Skivvygat. In the past year this plant had been noticed growing there, but nowhere else on the island. After identifying it as a *Verbena* spp., I pointed it out to the new team and then removed it. A large part of the removed bush was dried and specimens left in the island laboratory as an identification guide. Some dried specimens were also returned to South Africa and sent to Dr. Gremmen in the Netherlands who confirmed their identity (see attached). The remainder was incinerated.

Of the alien plants known to occur around the base (thistles *Sonchus oleraceus* and *S. asper*, potatoes *Solanum tuberosum*, the dock *Rumex obtusifolius*, and *Plantago lanceolata* and *P. major*), efforts were made in the past year to try and prevent the spreading of propagules out of the Base area by weeding and washing boots before going on walks. Weeding mainly involved *Sonchus* and *Solanum* as *R. obtusifolius* was found to be too widespread to control. The *Plantago* species were not weeded because their identity was not known to the old team (cf. point 5 of Sarine Lategan's report). A display of the most prominent aliens and indigenous species was mounted in the Base to facilitate identification, as no other reference material existed on the island.

Despite these efforts, *Sonchus* is widespread in the coastal belt between Admirals and Sealers Beach. Because of the apparent spreading of the *Sonchus* despite the continued efforts to eradicate them, the obligation of weeding as per the MP/GIWR has become a more difficult and hazardous task (where these are on steep or unstable cliffs). *Solanum*, on the other hand, seem to be in check (none were seen since the last plants were removed by members of Gough 43 at the crane and courtyard areas). *R. obtusifolius* is widespread over the entire island. *P. major* was seen at the Glen and in the Base area (mainly around the satellite dish on the path to Snoek Gat and at the burner next to Skivvygat), but *P. lanceolata* was not seen (although plants that were not in flower could have been mistaken for *P. major*).

Invertebrates: Because of incomplete information on the invertebrate fauna on Gough, an in-depth survey is required to assess the situation with regards to alien and indigenous invertebrates present. This is a major task, and has been identified as a key area for future research. An initial collection of invertebrates was made under permit (see attached) by randomly collecting specimens from different habitats. Samples were returned to South Africa for identification by taxonomic experts.

Other observations: No other alien or vagrant species were observed during the take-over. However, a Yellowbilled Egret *Egretta intermedia* was sighted on 23 April 1998, and subsequently found dead a day later just 50m from the Base on the track to Seal Beach. This specimen was collected and kept frozen along with other specimens that had either died for unknown reasons or where there was a query that required expert advice. Various bird remains were returned to the Percy FitzPatrick Institute, University of Cape Town, for identification (see Appendix).

Paths

The condition of footpaths to Seal Beach, Swemgat, Tumbledown Beach, Snoekgat, Admirals, Tafelkoppie, and South Peak were investigated and found to be in basically the same condition as reported on by S. Lategan, and her recommendations are supported (see attached Gough Island Environmental Report). I was not able to inspect all paths, ropes and ladders. Glen Roberts (G43) reported that the route to The Glen had become dangerous to walk as the old path along the ridge down from South Peak had a section that slipped away, and a detour through the dense vegetation was difficult to navigate. The coastal routes are supposedly also problematic as ropes that had previously been available in various areas had either been removed or are not strong enough to hold a large weight. In view of this

and the fact that there are known to be other areas where ropes have existed, but not been inspected for some time, I **recommend** that not only should the appropriate number of ropes and ladders be supplied for the areas suggested by S. Lategan, but that a number of additional ones be supplied. This will allow for the replacing or repairing of the ropes and or ladders that have not been inspected or reported on, as well as placing ropes or ladders in areas where regeneration of deteriorating paths would benefit.

In considering new rope-ladders, attention should be given to the size of the step interval (e.g. intervals should not be too large for people with short legs), and the material used to make rope ladders (wood tends to become very slippery as planks provide an ideal medium for accumulation of soil material and fungal/algal growth, which also speeds the rotting process).

Because the impacts of trampling and rates of path regeneration are unknown, I **recommend** that a record of all trips made outside the logistic zone be kept. The information recorded should include the dates of departure and return, the number of people and the route taken. It is standard practice to record this information in advance of a trip for safety reasons, so keeping a long-term record of actual trips (not just planned routes and durations) should be fairly simple. The current team (G44) has been requested to report these data to the Conservation Officer during the 1999 relief.

Peat slips

The status of the 1996 peat slip at the Base generator shack was reported on by Miss. S. Lategan (G43) in her Environmental Report, as was a new slip in the tributary of the "Swemgat" river (see attached). The situation of the Base slip was specifically investigated by Mr. J. Looke during the take-over period. He will submit a full report on his findings. The condition of the new slip was examined at from a distance, and found to follow an apparent "normal" succession, being on a slope out of the way of any pathway, so that human impact was not noticeable, nor the invasion of alien plants.

Incinerator

The larger, more efficient diesel incinerator scheduled to replace the current one (Huyser 1997) was not installed during this take-over. As the current burner is inadequate for burning certain waste items, such as poultry, female sanitary items and certain weeds (e.g. *Sagina*), I **recommend** that an appropriate incinerator (presumably the scheduled one) be installed as soon as possible.

Solid and liquid wastes and pollutants

The past year's waste products were separated and disposed of according to the methods described by O. Huyser (1997 Inspection Report). These were slightly amended during take-over with regards to food waste. The method of poultry disposal was changed (from being incinerated to being frozen for return to South Africa), and a further category of separation was introduced with the collection of waste cooking oil for return to South Africa. This was done primarily because of the insufficient capacity of the current incinerator (see above), coupled with the fact that poultry products supplied to the island were not irradiated.

An inspection of the "Skivvygat", where wastes are discarded, revealed that wastes accumulate in a large rock pool rather than entering directly into the sea. The pool presumably is flushed by heavy rains or large seas, but in the interim the pool is heavily polluted and provides a breeding site for pests such as calliphorid flies. Although the accumulation of food wastes will be less during the year when there are only six people on the island, the new team was asked to chop large items up before disposal. Having introduced these refinements, waste disposal now essentially follows the categories and methods listed in the "Guidelines for conduct at the islands" (see attached) which are the currently accepted methods employed at Marion Island. Because of the interchangeable island operations and work-force and related conservation issues, I **propose** that this method be kept (or amended over time) to maintain a uniform standard between Gough and Marion. I also **recommend** that a macerator be supplied to the island, as this

would reduce the impact that occurs during such as take-overs and would be in keeping with the regulations of the MP/GIWR (Section 5.13.1).

No hydrogen was produced by the meteorological station during the past year. The need for on-site hydrogen production is being reviewed by Mr. J. van der Merwe of the South African Weather Bureau. The two crates of weathered aluminium chips supplied to produce hydrogen are being stored on the platform at the crane point and are scheduled for removal to South Africa during the next take-over (J. van der Merwe, pers. comm.).

Upper air dome

The dome housing the buoy satellite tracking equipment currently stationed on the roof of the upper-air office has, for technical reasons, to be re-positioned within close vicinity of its current location. In order for this to be done without additional impact on the environment, the roofed area covering the outside passage between the upper-air office and the main accommodation block was suggested. This was inspected by both myself and Mr. J. Lexow (PWD engineer) and found to be the most suitable site (rather than a separate structure next to the building). Details on the envisaged plan will be supplied in a report from the Weather Bureau requesting permission for this modification.

Helicopter landing platform

The steel helipad was completed during this take-over, built over the old wooden structure, which was left in place. Apart from a half meter square hole in the wooden structure around a steel pylon of the new helipad, no areas of polystyrene or other material underlying the wooden helipad were exposed. The wooden structure still appeared firm after several tons of steel grids had been placed on it, and there were no obvious signs of rot. The area alongside the platform used the previous year for depositing construction material showed no signs of any alien invasion or other long-term damage, and was used for this purpose again during the current take-over. On completion of the helipad, this area was cleared, and only surface damage was done to the predominantly bracken (*Histiopteris*) vegetation.

Fuel pumping

On the third day after arrival at Gough, fuel was pumped under ideal weather conditions. The fuel hose had been pressure-tested beforehand (K. Booysse, pers. comm.) as recommended by O. Huyser (1997). A total of 52 000 litres was transferred ashore from the *Agulhas*, being only about a third of the amount transferred the previous year. The reduction in fuel requirements results from more efficient generators. The fuel transfer took place without any major spills, but the coupling point at Joe Roos presented problems, resulting in two small spills of approximately 10 to 15 litres contaminating the rock pools in the vicinity. In addition, slight leakages were observed dripping from the overflow pipes of the diesel tanks (especially the second tank to the right of the crane's engine room).

The spillages in the area at the coupling point were treated with five litres of chemical dispersant and the pools subsequently flushed with clear water. The largest pool could not be flushed, but all the residues floating on the surface were removed, and the area was monitored throughout the rest of the take-over period. Although invertebrates and algae exposed to the diesel were killed, no further harm was observed. Insects had recolonised the pools, and algal growth appeared to regenerate, by the end of the take-over period. The dispersant used was "Chemserve OSE-750" (see specifications attached), which I requested and received immediately from the *SA Agulhas*, as no equivalent was available on the island. Because of its apparent success in the situation, and because no contingency plan (such as an oil dispersant) was available on the island, I requested and received a further 25 litres of the dispersant from the *Agulhas* as a precautionary reserve for the island's use in the event that any other unforeseen incident of fuel spillage should require remedial action during the following year.

The cause of the problem at the coupling point has been repeatedly observed and reported by previous inspectors (e.g. Wace 1996, Huyser 1997), and apparently investigated (K. Booyse, pers. comm.). A plan to alter the angle of the junction point at the coupling is envisaged, which would reduce the strain at that point. Improved ways of securing the ship's pipeline over the rocks (to prevent it from shearing and pulling on the coupling) also are areas under investigation. While this may involve a possible large alteration to the current system, I **recommend** that this be treated as a priority, and whether or not this can be implemented before the next fuel transfer, I **recommend** that a contingency plan be put in place that addresses these and other possible problems (e.g. prior to commencing the pumping operation, the coupling and clamp fastening the hose to the coupling should be checked and spare ones made available at the land based point; suitable ropes or slings should be available and used to secure the coupling to the junction box and to secure the hose to rocks to reduce bending and alleviate the stress on the coupling joint; a suitable container and/or absorbent mat should be placed under the known risk area [the weak coupling point] to catch any spillage; sufficient dispersant be supplied to the island to treat a serious oil spill.).

The overflow at the diesel tanks was apparently caused by the inlet valves at the taps which leaked under the pressure (J. Kwalepe, Gough 43, pers. comm.). A collecting tray placed under the leak caught a few litres. To rectify these weak pressure points, I **suggest** that the problem areas (valves?) be checked before the next pumping operation.

Marine issues

In the past year, Members of G43 were in regular contact with Tristan da Cunha and the fishing vessel *Kelso*, and thus were able to communicate observations of poachers and other marine issues. Team members collected beach debris wherever it was accessible and where possible they transported it back to the Base (see Environmental Report by S. Lategan). All the items collected, including those I found during the take over period, were inspected and listed (see Appendix), and then returned to South Africa via the waste disposal system. Although the findings were limited to the areas accessible by foot, and do not include the high densities found on the western beaches, it is a commendable effort towards reducing pollution in the area. The G43 team reported catching one only Snoek for the table during the past year, although Jacopever were frequently caught and released.

Research and monitoring activities

In keeping with the monitoring of events pertaining to both the indigenous and alien flora and fauna, the new Gough team was introduced to the various long-term monitoring. Team members volunteered to carry out these various monitoring projects and Mrs Belinda Enslin was designated the unofficial Conservation Officer for the following year.

The long term programs entailed the following:

Albatross: The long-term monitoring on the breeding dynamics of the Atlantic Yellow-nosed Albatross *Thalassarche chlororhynchos* west of the Base continued. The project work was handed over to Mr David Sapeke and Mrs B. Enslin of the Gough 44 team, who will further liaise with the project coordinator Mr J. Cooper (or Mr O. Huyser) at the University of Cape Town. The monitoring of the Tristan Albatross *Diomedea [exulans] dabbenena* at Goneydale and Tafelkoppie continued, with the work being conducted by Mr & Mrs. D. & B. Enslin. In connection with the work carried out in the previous year, Miss S. Lategan reported on some logistic problems with a request for the supply of appropriate field equipment (suitable tents and the possibility of a depot with essential equipment and provision in the Goneydale area). I support the recommendation that the feasibility of a depot be considered and that the suitability of the equipment supplied be evaluated (see points 2a, b & c in Miss.Lategan's report).

Seals: The long-term programme involving the weighing of Subantarctic Fur-seal *Arctocephalus tropicalis* pups and observations on the Southern Elephant Seals *Mirounga leonina* was taken on by the male team members of Gough 44, Mr. D. Enslin, Mr. J. Greyling and Mr. D. Sapeke, who will liaise with Dr. Marthan Bester of the University of Pretoria.

Whales and Dolphins: To aid in supplying information on sightings of whales and dolphins around Gough Island, the Administrator Mr. B. Baldwin provided the G44 team with a record sheet and accompanying identification characteristics, and encouraged the team to partake in supplying the relevant information when a sighting was made.

Miscellaneous observations: These include sightings of vagrant or alien species, oiled or entangled birds or seals, foreign objects found on beaches or in bird-nests and other notable events such as oil-spills, as outlined in the Conservation Monitoring hand-out (Appendix). Miss Lategan reported mass mortality of Sooty Albatross chicks in colony at Snoekgat during 1998 (see Environmental Report attached).

Educational aspects

Apart from the talks given both on the ship and at the take-over ceremony, group leaders, team members and individual participants were advised in matters of conservation where deemed necessary or where they showed an interest. Because of the apparent lack of information available (in the form of literature, reference collections, and guidelines), an effort was made to compile as much of the most pertinent information as was possible in the limited time available, and leave this on the island for future use. This consisted of copies of papers on pertinent biological and conservation subjects, a very basic plant and invertebrate reference collection, and handouts compiled as guidelines.

A list of the literature supplied as well as that present on the island was compiled (Appendix). The references to the vegetation on the island consist of photocopies of all the plant species listed in MP/GIWR (made from previously collected and identified specimens lodged at the National Botanical Institute and Bolus Herbaria), as well as specimens that I pressed and dried during the take-over (being the most important alien species to be controlled, as well as species obtained while sampling various habitats for invertebrates). Only a few invertebrate specimens were left on the island, as the main collection had first to be returned to South Africa for identification.

Guidelines for conduct and monitoring were prepared for G44 team members (Appendix). The need for written instructions and guidelines for team members was apparent from chatting to old team members and other relief personnel, and has been pointed out by O. Huyser (1997 Inspection Report) and by S. Lategan in her Environmental Report (attached). Issues mentioned include more information on methods of waste removal, fieldwork, the authority of the Conservation Officer, and lack of literature. I **recommend** that written rules (e.g. on matters of fishing, waste disposal, etc.) be given to all voyage participants before leaving South Africa and that more literature be made available at the island and in the ship's permanent library. There was no copy of the Gough Management Plan in either libraries, although various participants such as the Conservation Officer, voyage Co-ordinator and team leaders are in possession of the document during the take-over period.

In addition, I **suggest** that signs should be erected at entry points to the logistic zone (helicopter landing platform and crane), at entry points to scientific research areas and easily accessible conservation zones (such as The Glen) as stipulated in the MP/GIWR section 5.22.1. These should proclaim the island a Wildlife Reserve and indicate that permits are required to enter the Reserve. A "Visitor's guide to the Gough Island Wildlife Reserve" should be written and supplied to all visitors (as stipulated in the MP/GIWR section 5.22.1). As this would be able to address virtually all the issues necessary for visitors and operators within the reserve to be familiar with (including companies engaged in fishing and running the logistic and organisational aspects), I strongly **recommend** that this be undertaken.

ACKNOWLEDGEMENTS

My thanks go to Peter Ryan (Secretary of the Gough Island Wildlife Reserve Advisory Committee) for inviting me to undertake this inspection, assisting with arrangements and inspections, providing facilities in Cape Town as well as materials for educational use, and contributing to the library on Gough Island. Prof. Steven Chown (Department of Zoology and Entomology, University of Pretoria) allowed me to undertake the inspection within the constraints of my commitments to him and the Department, provided equipment and advice essential for the invertebrate sampling, and commented on a draft of this report. I am also most grateful to Dr Niek Gremmen (Bureau Data-Analyse Ecologie, Netherlands) for providing identifications of *Sagina* and other plant species together with advice on control measures, as well as Mr Willem Steinberg (Weather Bureau) and Mr Teuynis van Wyk (Gough 43) for assisting with their video and computer equipment used to send plant images for identification purposes. Captain Nick du Plessis and Mr Mike Saunders (both of the fishing vessel *Kelso*) assisted with transport to The Glen for an inspection of aliens. Mr Onno Huyser (FitzPatrick Institute, University of Cape Town) advised on albatross monitoring work. I am also grateful to Mr Kobus Booyse (DEA&T voyage co-ordinator) and Miss Alma Human (assistant co-ordinator) and Mr Brian Baldwin (Administrator of Tristan da Cunha) for their assistance and co-operation. And while I cannot list individually all the members whose support both active and behind the scenes I have appreciated, I would collectively like to express my thanks to all members of the relief voyage, both on the ship and on Gough Island that appreciated and respected the privilege of visiting the islands and the concessions made for fishing. Special thanks go to members of the Gough 43 & 44 teams and group leaders: Mr Gary Hardenberg (Public Works Department) and Mr Johann van der Merwe (SA Weather Bureau, Pretoria).

APPENDICES

PHOTOGRAPHS

Stern lines of the *SA Agulhas* cross under the bow lines of an un-rat-guarded vessel alongside. Note that the rat-guards on the *SA Agulhas*'s lines are attached on the shore side of the crossing point.

DOCUMENTATION

Page length

Environmental information ...and precautions to be taken (adapted from D. Nel)	
Gough Island Weather Station...Administration and General rules (SA Weather Bureau)	
Slide talk presentation to all on board <i>SA Agulhas</i> en route to Gough Island (C. Hänel)	3 pp
Guidelines for conduct at Gough Island (C. Hänel)	5 pp
Food items returned to South Africa	1 p
Gough Island Environmental Report: 1997/8 (S. Lategan)	
<i>Sagina</i> feedback - correspondence (N. Gremmen, C.Hänel and G44 team)	4 pp
Conservation & Monitoring guidelines for G44 (C.Hänel)	4 pp
Bird specimens removed from Gough	1 p
"Chemserve OSE-750" Specifications	1 p
Beach Debris Collected	1 p
Literature Available on Gough	2 pp

CERTIFICATES

De-ratting exemption certificate - <i>SA Agulhas</i>	26 August 1998
Rodent Clearance - PWD Wingfield	21 August 1998
Extermination certificate for rodents - DEA&T Paarden Island	25 August 1998
Dry-cleaning of protective clothing & bedding - DEA&T Paarden Eiland	1 8.98 - 31.7.99

PERMITS

Appointment of temporary Conservation Officers for monitoring of fish caught
 Fishing conditions at Gough Island
 Collecting permit
 Export permit

SLIDE TALK PRESENTATION TO ALL ON BOARD THE *SA AGULHAS* EN ROUTE TO GOUGH ISLAND

Presented 7 September 1998 by C. Hänel

Gough Island is one of a group of islands that form part of the Dependency of Tristan da Cunha and therefore falls under the administration of Tristan da Cunha Government.

“Being one of the most spectacularly beautiful and least disturbed of the temperate islands in the Southern Hemisphere”, with species that exist nowhere else in the world, Gough and its surrounding waters were proclaimed a Wildlife Reserve more than 20 years ago (in 1976), and more recently, a World Heritage Site, that warrants special protection.

Being in the southern Ocean, subjected to some severe weather conditions, the island is a fragile system that can easily be disturbed -

One of the biggest threats to such a sensitive environment is the harm that can be done by: **INTRODUCING FOREIGN THINGS** -> like, **plants, animals, insects, disease**, that can take over and change or destroy the local stuff there

-> or causing **pollution**, - be it the plastic that blows overboard and kills off a bird that may swallow it or seal that may get trapped into it or what ever.....

OR

TAKING THINGS FROM THE AREA -> be it the wood from one of the only trees on Gough for a braai, or some artefact as souvenir that in fact is part of the cultural history, or taking out too many fish, the most endangered ones, or what ever.....

Very often this sort of harm can happen unintentionally, by way of ignorance how a system works or lack of being uninformed. So for instance if we go walk-about in our newly issued clothing on some foreign soil, and then, not thinking that seeds may have stuck to one's boots or stuck to one's jackets etc., next go to Gough, one can be the carrier or importer of aliens such as plants that can start growing there, or, bring our favourite food along because we now know we may be on the Island for a long time without it, (like fresh fruit and vegetables, that of course have many little insects often not visible to the eye - especially if only in the egg stages, but that can cause major problems if introduced to a system that cannot cope with it) or in the same way diseases can be introduced (like New-Castle disease that we have in South-Africa, that can kill birds if infected)

Luckily we have come a long way, having undertaken research and learnt from previous mistakes, and drawn up guidelines by which to be informed and policies that need to be adhered to.

In this regard Gough has a Management Plan by which all visitors, entering the territory must abide.

And that is essentially what I am here for - in the interest of the conservation of the island, the safety of visitors to the island and that both can go about their existence / or jobs in a way that is not or least harmful to either - by seeing that the rules set out to provide this, are followed.

Also, to monitor things. A lot still needs to be learnt about the ecosystem of the island and how it functions, and towards this end, some long term studies were set up some years back that I will following up, including the albatrosses, the situation with regards to aliens (particularly plants), and looking at the insects.

At the end of the day, I will then be a “reporter” on all these conservation issues (that includes any suggestions, comments anyone may wish to voice that could potentially improve or point out any drawbacks in the working relationship with the environment....)

So apart from being here to introduce myself and what I expect to see (or not to see), to point out the do’s and don’ts, I hope to give and show you with a few pictures some of the reasons why these policies are necessary, or rather what effects any one of you can have on the environment by not adhering to them -

First to the rules:

I believe all participants on this cruise have already been handed out environmental information about Gough Island and precautions to be taken against introducing alien species onto the Island {viz. pamphlet given to all SANAP Participants from DEA&T } Please, especially for those visitors going ashore on Tristan da Cunha and then on to Gough Island, I want to re-emphasize the need for you to have to check all your clothes and shoes for any adhering material, seeds, mud, etc. and that you make sure your boots are hosed down on deck once you re-board the *Agulhas* from Tristan.

The regulations and policies are all set out in the Management Plan for the Gough Island Wildlife Reserve [MP-GIWR], published by the Government of Tristan da Cunha, (copies of which are also held in the permanent library on Gough Island and aboard the *SA Agulhas*, the by the Gough Island Team-leader, take-over Co-ordinators of the DEA&T, the Conservation Officer, The Tristan da Cunha Administrator, and others), as well as those since amended and adopted by the administration.

{point out the fact that the document was printed in 1994 since when many suggestions in it have been adopted and amendments made - like the territorial waters limit and 200 nm EEZ. Also the fact that the Administrator of Tristan will be joining the voyage to Gough, so can be asked on issues not clear in the Management Plan}

The management regulations apply to All visitors entering the Tristan da Cunha territorial waters - be it those that are going to be on the ship while in the territorial waters or those on the Island - and I urge you to adhere to them.

To try and make it a little easier, I have drawn up some of points most immediately applicable, or about which questions are most frequently asked or to assist you (or your group) in planning your tasks to incorporate the ways by which to go about them

I would like everyone to please take a copy, and I will briefly go over the points, and again - if anyone has any questions, now or later, please feel free to ask.

SLIDES SHOWN:

To show what effects pollution through negligence or certain activities can cause:

1. Fur seal darted to remove strapping from around it’s neck.

(Photo: M. Bester)

2. African (Jackass) Penguin “gagged” by rubber band. (D. Nel)
3. Drowned Albatross hooked by Long-line fishing. (P. Ryan)
4. Giant Petrel hooked and entwined in fishing line of long-liner. (D. Nel)
5. Dissected White-chin Petrel revealing death by ingestion of fishing hook (D. Nel)
6. Types and sizes of fishing hooks from Long-line fishing found next to Albatross nest. (C. Hänel)
7. Gough Base with lights shining out of door and windows not blacked out after dark in the early days (1960^{ties}) before awareness of effects on night birds. (J. v/d Merwe)
8. “Bird-strike” - Prions outside at building where light (J. v/d Merwe)
9. “Bird-strike” - Prions outside on corrugated iron roof/met station. (J. v/d Merwe)
10. “Bird-strike” - Prions inside building. (J. v/d Merwe)
11. A bird kill (after birdstrike?) (P. Ryan)
12. Rail drinking out of a cup left outside (DO NOT FEED THE BIRDS / ANIMALS) (J. v/d Merwe)
13. Sheep with hay-bales at Marion Island (Import of alien grass) (Anon - copy C. Hänel)
14. Area where sheep and hay-bales were 20 years later - shows growth of alien grass there. (C. Hänel)
15. Shot of alien grass *Agrostis stolonifera* growing along river at Marion Island. (C. Hänel)
16. Hut built on cement slab on ground at Gough (inappropriate building methods) with introduced plants growing around it (P. Ryan)
17. Hut built subsequently on poles (appropriate building) - no alien grass (P. Ryan)
18. Kerguelen cabbage seed-head eaten off by mouse (impact of rodent introduction) (C. Hänel)
19. Dead Kerguelen cabbage affected by fungus (impact of micro-organisms) (C. Hänel)
20. Diamond backed moth (alien insect) (C. Hänel)
21. Leaf of Kerguelen cabbage on which +/- 7 larvae of diamond-backed moth eating (impact of small insect on vegetation of sub-Antarctic) (C. Hänel)
22. Painted lady butterfly (for new Gough team in case sighted) (C. Hänel)
23. Bad weather conditions at Gough. (Elements of environ /Safety of persons) (P. Ryan)
24. Damage to Upper air building on Gough in 1992 (don’t leave objects lying around that can become pollutants by blowing away) (P. Ryan)
25. Elephant seals on Gough (rare - enjoy, but do not disturb as are declining) (P. Ryan)
26. A stream in greenery on Gough - enjoy (J. v/d Merwe)
27. View of Gough - (A world Heritage Site - enjoy the privilege) (P. Ryan)

GUIDELINES FOR CONDUCT AT GOUGH ISLAND

As per the Management Plan for the Gough Island Wildlife Reserve

Drawn up by C. Hänel, 7 September 1998

Gough Island is one of a group of islands that form part of the Dependency of Tristan da Cunha, a Dependent Territory of the United Kingdom. It falls under the administration of Tristan da Cunha, through the Administrator and Island Council of Tristan da Cunha.

Being one of the most spectacularly beautiful and least disturbed of the temperate islands in the Southern Hemisphere, with species that exist nowhere else in the world, Gough and its surrounding waters were proclaimed a Wildlife Reserve more than 20 years ago (in 1976), and more recently, declared a World Heritage Site, under which status it is protected and managed.

Accordingly all visitors should familiarise themselves with, and adhere to the regulations and policies set out in the Management Plan for the Gough Island Wildlife Reserve [MP-GIWR], published by the Government of Tristan da Cunha, (copies of which are also held in the permanent library on Gough Island and aboard the *SA Agulhas*, the by the Gough Island Team-leader, take-over Co-ordinators of the Department of Environment Affairs and Tourism, the Conservation Officer, The Tristan da Cunha Administrator, and others), as well as those since amended and adopted by the administration.

NOTE: *The guidelines set out below only cover some of the most frequently asked questions and essential points to assist visitors in adhering to the required regulations while in the Gough Island territory (i.e. both on board the SA Agulhas and on Gough Island).*

CODE OF CONDUCT

“The guiding principle is that all visitors to the Gough Island Wildlife Reserve must cause as little disturbance to the indigenous biota and natural environment as possible. To this end, the prescriptions of relevant ordinances and orders of the Tristan da Cunha Government and current concessions and leases must be followed and lawful orders of the Administrator and Conservation and Sea fishery Officers obeyed and advice received from Gough Island Wildlife Reserve Advisory Committee (GIWRAC) followed” (see p. 35, point 5.10 and refer to details in Appendix 2 of the MP-GIWR).

“The general principle is that no material other than human wastes may be left behind by visitors, and that the biota and geological samples may not be collected or unduly disturbed*, except for *bona fide* scientific and conservation purposes under permit” (see p. 32 Section 5.4.4 & details in Appendix 2 of the MP-GIWR).

[*Disturbance includes handling and the temporary moving or the defacing in any way of any artefacts, geological structures, animals, plants, etc.) for photographic or for any other purposes. (also referred to on p 32, 5.5 & details in Appendix 2 of the MP-GIWR)]

Important: If you see/find anything you may think unusual or feel the conservation officer should know about, do not collect it under the excuse that you want to bring it to the attention of the conservation officer. Even the Conservation Officer needs a collecting permit, and even if such a permit has been granted, it is not for indiscriminate collecting. If you feel there is something the conservation officer should see or would like to know about, call him/or her to the site. Failing that, take a photograph, or make notes.

The one exception with regards the animals are the mice! They are alien invaders and you may collect these and even kill them (humanely) - in fact you are encouraged to do so in the base area.

WASTE : DISPOSAL AND CARE

For the protection of the islands' environment, as well as for aesthetic, practical and health and safety reasons, it is important that all visitors abide by the guidelines and regulations for waste disposal set out in the Management Plan for the Gough Island Wildlife Reserve. The details set out below will assist visitors in doing so and provide some tips and background on how to minimise threats to the environment posed by waste.

Note:

- **Care should be taken not to let non-waste items become a hazard.** For example, sudden strong gusts of wind often blow unsecured items away. Not only could this cause the death of animals (*e.g.*, if plastic items are blown to sea and ingested by birds, or if seals become girdled by netting or unused plastic strapping), but it could be a serious setback to the person concerned (*e.g.*, if an orientation map blows away during a field excursion, someone unfamiliar with the area or terrain can end up in trouble). The wind tends to worry away at all items left outside, and even reasonably secure items can eventually be torn to shreds or be blown away. All of these items immediately become waste.

LITTERING - is prohibited anywhere in the Wildlife reserve - (p. 39, Section 5.13.1)

This includes (but is not restricted to) the following typical items :-

Food wrappers, crown corks, beverage can tabs, cigarette ends, spent matches, nails or other small items of construction and maintenance equipment. **Cigarette ends** (or "butts") are frequently overlooked. Please do not throw cigarette "butts" into the ocean or anywhere other than an appropriate disposal/collection sites. Avoid discarding spent matches and cigarette ends overboard or anywhere ashore within the Wildlife Reserve. To this end, visitors should try and confine smoking to designated areas within the meteorological station.

SHIPS WITHIN THE WILDLIFE RESERVE:

Ships operating within the reserve are subject to the same controls on solid waste disposal as apply to the Meteorological station on Gough. Both the UK and South Africa are signatories to the International Convention for the Prevention of Pollution from Ships (MARPOL), Annex V of which bans the dumping of persistent solid wastes (plastics, etc.) anywhere at sea, and places limits on the disposal of food and other wastes close inshore. No poultry produce may be dumped in the marine zone.

Waste is separated into the following categories:

- **FOOD WASTES**

- 1) Food *Excluding* oil and all poultry products.
- 2) OIL All cooking, salad and other household oil.
- 3) POULTRY Any poultry products *including* eggs, egg-shells, bones, and meat.

- **BURNABLES**

All non-toxic items that can be burnt. (*e.g.*, paper, wood and natural fabrics).

- **ARTICLES TO BE CRATED FOR RETURN TO SOUTH AFRICA**

- 5) PLASTICS All types of plastics, rubber, foam, polystyrene, nylon, film, cigarette butts, etc.
- 6) GLASS
 - a. All recyclable glass
 - b. Light bulbs and toxic glass

- 7) METAL
 - a. All cans from food and beverages, metal lids, aluminium foil, etc.
 - b. Industrial steel, hardware, etc.
- 8) CHEMICALS
 - a. All chemicals (incl. photographic waste), aerosols, paints, etc.
 - b. Industrial oils and fuels, gas-bottles, etc.
- 9) HAZARDOUS Batteries, radio-active waste, medical waste, etc.
- 10) SPECIFIED FOOD WASTES (domestic oils and poultry wastes, as specified above)

At Gough base, Waste is processed (or “disposed of”) on a regular basis as follows:

- **FOOD WASTES**

1. All food (*excluding* poultry and oil) is discharged directly into the ocean from a site at Gough base (Skivvygat). This is done *after dark*, to avoid scavenging birds (e.g. giant petrels and skuas).
2. Domestic oil is collected in 10 or 20 litre containers, and stored for shipment back to South Africa. (Oil-residues thrown into the sea spread a thin film on the water that contaminate marine life (e.g. birds whose feathers become water-logged, etc.)
3. All poultry waste is collected in tins (or other sturdy, mouse-proof containers). The tins are clearly marked, sealed and frozen. These tins are returned frozen to South Africa.

- **BURNABLES**

4. All burnables are burnt outside in an incinerator, that must be kept closed to prevent garbage or burning residues from blowing out. An open grating is also used for large objects that do not fit into the incinerator, but should only be used if wind is not strong enough to blow material out. The ashes must be collected and stored in a dry condition in sealed containers for annual removal from the Wildlife Reserve.

- **ARTICLES TO BE CRATED FOR RETURN TO SOUTH AFRICA**

5. Plastics are compressed and bagged, and stored in the orange mini-shipping containers set aside for this purpose. These mini-containers are then returned to South Africa.
6. Glass is crushed manually (safety glasses must be worn and the necessary precautions taken). The glass is then sealed in tins, which are crated and stored in the appropriate mini-shipping container for shipment back to South Africa.
- 7a. Metal cans are compressed (using a crushing machine) and stored in the relevant mini shipping container to be shipped back to South Africa.
- 7b. Leaking or rusted drums, paint-tins and other large metal items are crushed manually and containerised together with other large or heavy metal waste, to be returned to South Africa for re-cycling.
- 8a. Chemicals are first sorted so that dangerous reactions between chemicals do not take place. These chemicals (such as the liquid waste from film processing, and laboratory alcohol etc.) are stored in 10 or 20 litre, clearly-marked plastic drums, and are containerised for shipment back to South Africa. Under no circumstances should chemicals be disposed of through the plumbing system. This system discharges directly into the sea.

8b. Generator oil, diesel, and other fuel waste is stored in 200 litre drums, which are shipped back to South Africa.

9. Hazardous waste is stored in appropriate and clearly marked containers and is returned to South Africa.

2. Domestic oil (see above under FOOD WASTE)

3. All poultry waste (see above under FOOD WASTE)

ANIMALS

- **After dark, curtains and blinds must be drawn to prevent light from shining out of windows.**

All windows at the meteorological station and portholes and open doorways on visiting vessels must have effective blackout blinds which must be closed during the hours of darkness. For this reason it is important always to carry a torch with you at night. Blackout precautions are particularly important on misty nights, as night active birds (“nightbirds”) are more prone to be disoriented by artificial light sources, and thus fly into these and thereby inevitably into structures which results in many being injured or stunned. Crevices, including open lifeboats, where birds can become lodged aboard vessels must be covered to avoid them trapping seabirds.

- **Treatment of injured or ailing animals**

Where “nightbirds” have been stunned or trapped in or under buildings or aboard vessels, they should only be released at night, away from lights.

Birds found sick or injured should preferably be left alone to be killed by sub-Antarctic Skuas, or killed humanely if seriously injured or dying.

Where nature is prevented from taking its natural course due to human intervention (such as when seals or birds become entangled in plastic strapping, or oiled due to spills etc.), assistance to these animals can be provided, but this should be done preferably in consultation with the Conservation Officer or a biologist who is familiar with the reactions of the species in question.

- **No food (drink or cigarettes) should be given to or left for any animals** (ref. p. 35)

No feeding scraps to birds or leaving scraps on your plate where they can be scavenged by birds. During take-over, things like fresh goods off-loaded should not be left unguarded or uncovered. Remember to that mice can get through the smallest cracks in crates and are amazingly active at night.

- **Approaches to animals should follow the guidelines set out in the Management Plan for certain species, and for all other species should be in a manner that causes least noise and interference**

Eggs, chicks or pups deserted by parents fleeing are left vulnerable to predators that are always waiting for a meal; penguins often trample their own eggs in excited distress, or seal pups can be squashed to death by defending bulls. While all the animals indigenous to the Islands are vulnerable to disturbance, particularly during their breeding cycles.

PLANTS

To minimise dispersing seeds and plant material (which cling to clothing and footwear), and to prevent the effects of trampling, constructed paths (i.e. cat-walks around the Gough base area) should be used and where routes have been established, these should be followed.

DEMARCATED AREAS / RESEARCH ZONES

Where areas have been marked or designated as research zones or studies areas (such as the Albatross sites near the base and other specific areas) please do not enter or disturb these.

HISTORICAL SITES and ARTEFACTS

The collection and disturbance** of historical sites and artefacts are not allowed (further details on p. 32, section 5.5 & Appendix 4)

**Disturbance includes handling and the temporary moving or the defacing in any way of any artefacts, geological structures, animals, plants, etc.) for photographic or for any other purposes (also referred to above and on p. 32, 5.5).

MARINE ZONE/FISHING (see p.30, section 5.4.2 & Appendices 3a, 3b, 3c of the MP-GIWR)

Commercial fishing is not allowed.

Non-commercial and recreational fishing for fin fish is only allowed after written approval of the Administrator has been obtained. Such permission is granted only to the use of rod and hand line methods of catching, and for the **sole purpose of immediate consumption**. Catching of fish for use as bait or freezing for the purposes of eventual removal from the Wildlife Reserve is not allowed.

Current operable minimum size limits must be adhered to.

FIRES

To avoid the risk of vegetation and peat fires, no fires are permitted anywhere ashore at Gough Island away from designated sites in the logistic zone.

There is a designated barbecue site and the incinerators for the burnable refuse.

Fires must be attended at all times

And care must be taken by persons smoking as pointed out above.

WALKS

The guiding principle is to stick to established routes and paths. On the uplands walk along ridges rather than across slopes to reduce erosion. Record all trips outside the logistic zone so that there is a record of relative usage of different routes.

FOOD ITEMS RETURNED SEPTEMBER 1998 FROM GOUGH TO SOUTH AFRICA

Quantity ⁺	Item	Reference [@]	Reason	Issue date
1	Dried onions		*	1996
3	Bubbles chips		*	1996
1	Skim milk	[F 720]	*	1996
1	Sultanas & raw almonds	[F 865]	*	1996
1	Sauce powder (Maggi basic white)	*	?	
2	Flour - Crushed wheat	[F 741]	*	1996
6	- White & brown	[F 735, F737, F736]	*	1996
1	Cereals -Cornflakes	[F 781]	*	1996
2	- Hi-fibre bran	[F 781]	#	1996
1	- Shredded wheat	[F 797]	⊙	1995
4?	Rusks - Plain	[F 661, F664]	⊙	1995
2	Oros - Lemos 750 ml		⊙	?
3?	Beetroot - in glasses	[F 915, 911]	⊙	1995
8?	Unknown	[F 914, 913, 666, 667] [F663, 668, 660, 858]	⊙	1995
??	Mouldy cheese			
5?	Various food items (flour, spaghetti, macaroni & dried fruit)		⊙	1995 & newer

+ No. of kos-kassies

@ Marked on kos-kassie by DEA&T according to store packing list

* Too much stock - still fine for consumption

Contaminated with insects

⊙ Old stock

ALIEN PLANT IDENTIFICATIONS - e-mail communications**From Dr. N. Gremmen**

Mon, 26 Oct 1998

Hi Christine,

I got your plants. Yes, you collected *Sagina*. The specimens from the concrete area are *Sagina*. I think it's *procumbens*, but will ask confirmation of my id from our national herbarium. The absence of flowers and fruits make identification harder. The Snoek Gat specimen is not *Sagina*. It is not a dicot at all. I've never seen it before, but will try and find out what it is. But there is not a chance of it being *Sagina*. The Verbena specimen is *Verbena officinalis*.

The most important thing for now is the *Sagina* at the concrete area. What can be done most easily, and without much damage to anything else is pulling it up, or digging it out with a knife or something. If that does not work, or is too tedious, the plants could be sprinkled liberally with diesel or some other fuel, and burned. However, this will most likely damage the concrete. Herbicides may also be easy, but if the plants are easily removed in any other way, I would refrain from their use in an area like Gough. They really should be a last resort, when the choice is between having herbicides in your island system and having another alien. For now less noxious methods seem feasible. The main problem may be getting people who are able to identify the *Sagina*, and differentiate it from other small green plants. But as you did not find it anywhere else, maybe it really is restricted to the concrete slab (despite the helicopter downwash being the ideal method to make sure any alien propagules are given a good start at being pushed into the surrounding native vegetation).

Keep well,

Niek

From Dr. N. Gremmen

Thursday, 01 Oct 1998

Hi Chris,

It sounds as if the team is really involved in trying to get rid of aliens, and that is a good thing. I agree with *Sagina* being the no 1 priority to eradicate. After that, try and get rid of whatever you can.

***Sagina*:** Seeds may last long (the literature does not specify the time, but it can easily be several years) in the soil. But if you can manage to get rid of the plants, the seeds will not disperse so much, as they will be in the soil. Then the team can keep a watch to see if any new plants come up, and pull them out before they flower and set seed. I don't think *Sagina* will readily re-grow from pieces of roots left in the soil (like *Rumex acetosella* does). So if there is a possibility of keeping a continual watch, it is well possible to get rid of *Sagina* (if you can get at all areas where it grows). If it turns out that plants repeatedly keep re-growing, the idea of burning them in situ is a good one. Gas torch or paraffin torch will both work well. After burning the spot care should, as you said, be taken to avoid peat fires. But this is easily done: people can make sure there is no fire left in the peat, throw a few buckets of water over it.

Plantago and ***Rumex*** can be removed by cutting the tap-roots as deep as possible, using the ecologists all purpose bread knife, or something similar (an old chisel, or a piece of iron sharpened at the end (not like a knife, but like a chisel). Then you will not pull up a large piece of soil with roots, but only the central root, and thus the soil will not be disturbed too much. If you cut the roots some 20 - 30 cm deep, or even deeper with large *Rumex* plants) most plants will not come up again.

If the ***Sonchus*** species are producing viable seed, removing these species will be impossible. The seeds are adapted to dispersal by wind, and will cover large distances in a very short time. However, if they are restricted in area for some reason, pulling them up will make sense.

Yes, ***Lactuca*** can easily be confused with ***Sonchus***, especially vegetatively. *Lactuca* leaves are prickly on the underside of the white main veins. This distinguishes them from *Sonchus* leaves. Again, use the bread-knife or something to cut the tap-root if it is not feasible to pull up the whole root-system.

Keep well,

Niek

From C. Hanel to Gough 44 team (copy to PG Ryan)

Thursday, 5 Nov 1998

I wonder how your garden and fellow inhabitants are growing. In this regard I wanted to send you feedback on the findings about *Sagina* - but I was glad to see that you have not been left in the dark by those in whose hands the matter now lies. Peter Ryan apparently sent you a copy of the findings he passed on to Brian regarding the positive I.D of *Sagina* (interesting is that when I got back to Tristan, I made a point of looking for any signs of it occurring there - and I could not see it - which rules out transfer from that place) So there you have it - and to combat the spreading, lies in your hands! As you can see - or may have read - it is a worry - so if you get any visitors coming on land - I suggest you have a little bucket of water with STRONG disinfectant at the landing spot - so that you can at least scrub the soles of their footwear - just in case of that (or anything else!). What further measures are going to be implemented now lies in the hands of the GIWRAC, and I am sure you will hear in due course - but as you are the one's that can handle it - and know what you have at hand and how things react - your advice and suggestions will of course be invaluable!!!! Luckily the *Sagina* has not flowered, so spreading by seed is not such a big problem - yet.... Oh, and the big bush removed from skivi-gat - a part of which I left in the lab - is *Verbena* - another alien weed not wanted! So look out in case you do see anything similar anywhere else - or re-growing in the same spot! (Johan, you now know how to assist a willing person into abailing to get at difficult spots...) If you do remove anything - please just keep it - (press it in a folder of paper between at least two or more sheets of that grey blotting-paper (left in the lab where the chemical bottles (were....?) and put some weight on it and let it dry in the drying room. Just remember to add a note with the date and place where you found it and any description of relevance (such as flower colour if present, or texture of the leaves etc.) as these are features that fade or become unrecognisable once dried, and can help with i.d.

with very best wishes to you and the island

Chris

From Gough 44 (Belinda Enslin): Gough News Letter - Oct 98

Dear Chris,

Thxs for the letter. I have the following feedback for you regarding the *Sagina*. Upon inspection of the area around the Crane Point I have found the following: The *Sagina* on the Concrete doesn't stop there. I found from the Concrete slab, (with the Food Store at your back) the *Sagina* continues down onto the grass and down the slopes. You would not have seen this as all the crates were there. I have confirmed this with Johan and Didi and they agree that it must be *Sagina*. I took some back to base and confirmed this with your samples. It looks the same,(not the soft fluffy moss). If you walk there, on the grass looking out to sea, it is a mess. When they built the Concrete years ago they just "dumped" bags and bags and bags and bags full of "river sand" at the edge of the Concrete and beyond. The grass must have covered most of it before, but is starting to be exposed now. On the plastic bags are written " fertilizer", but it looks like soft river sand. Most of the bags exposed are broken and exposing this sand. The *Sagina* absolutely loves the stuff. wherever there is the sand it grows like wild fire. It is totally intermingled with the grass and it is overgrowing the soft mosses. It is impossible to weed, as it is in the entire area. The Thistle also love the sand. Isn't it possible that those bags contents are the source of the *Sagina*????? Or maybe the *Sagina* just thrives in the moist soft sand????? As I've said the *Sagina* loves it. Your thoughts on this would be greatly appreciated. We managed to eradicate all the *Sagina* on the Concrete Slab with Diesel alone. It dies in a couple of days once Diesel is poured on it. No evidence of damage to the concrete was noticed. We couldn't burn it, it doesn't want to ignite.

From C. Hanel to Gough 44 team (copy to PG Ryan)

.....on the *Sagina* news. Thanks so much for the feedback!!! I am so very very pleased to hear how you have not only taken an interest to check on things, but have put so much effort into trying what you could to eradicate the stuff - and seemingly have gone a long way in doing so!! This is excellent news and I will also pass it on to Peter and Niek - You are the ones that can make or brake *Sagina*'s invasion! And your actions and feedback will be what will help in the decision making process on what to do in the future - I can't tell you how pleased I am to hear your news and how keenly I am following your actions! And although the decision making now lie in the hands of the GIWAC, I would really like to encourage you in your efforts, because of course, it could take a while before everything has been evaluated and so on (I have not even finished my report yet), and in the mean time it is speedily becoming summer and these plants could be starting to produce flowers - and while it is incredibly fortunate that they appear not to have done so yet, it would of course be best to nip them in the bud - LITERALLY! The fact that you seem to have eradicated those on the concrete slab is already the best starting point, as it is obviously the area that people would walk on and so could spread it. Watch the slab - and see if it re-grows (of course it could get imported from the grass patch too), but also check the cat walk all the way up - I had tried to pull out what I could between cracks in the cement path up to where it becomes grids, but know that I just could not get all the root material out. So although it may still look as if there is nothing there - I suspect it will start there again. In fact, if the diesel is so effective and low in impact, you may want to pour a teeny bit between those concrete seems, in order for the root material left behind not to even get a chance to strengthen and then pop up. And yes, I can well imagine that burning was a problem, as I tried to burn those samples I had dried in the drying oven for over a week, and still the inferno in the burner did not manage to ignite those that were not 100% dry. But also check the little cement catwalk patch at the top of the catwalk bend (as one goes past the inflammable store to the Stevenson screen). I also found some small plants there, although that is the furthest that I found it. Individual *Sagina* plants are a little hard to

recognise, as they do look like one of those sedge- like plants starting off in miniature. However, in this case, where it would be in a crack in the concrete pathway, I would say, if in doubt, pull it out.

As a matter of interest, what happens to the plants once they die off from the diesel? Many of the patches on the concrete slab were in fact loose "pads" - If there are dead diesel patches that are easily removable, I would suggest trying to burn these. As for the rest - yes - I saw that the *Sagina* was all round the concrete slab to - especially down the sides and on the grass patch where the steps go down to the crane. I presume the sand-bags you are talking about are to the left of that? And while I believe *Sagina* would thrive well on sand, I doubt that those bags of sand will have imported it. Because the sand bags are very old, and the *Sagina*, appears to be a very recent introduction. (the fact that none of the plants seem to have set any seed yet, and none of the previous Conservation officers found it) I would suspect that it probably invaded there. My feeling is however, that the area is already messed up so killing the *Sagina* off on top with some diesel would not be to impacting (especially if the plastic is still underneath, which would aid in hindering any leaching of diesel much further). You may want to try a tiny little patch first. If it is an area where birds etc. forage - you should though probably cover the diesel treated areas (e.g. with some black plastic bags well secured, or some heavy metal sheet or something, just to keep any animals from foraging or getting contaminated there, until the plants are dead and you may easily be able to remove them or they pose no harm anymore). Alternatively, if it is an area where you tend to walk (the little path where the Metkassies go to take their water temp?) it may be a good idea to stake off the area with poles and string or something (If you can't find suitable scrap wood in your work-shop - Johan? - then I am sure there should be enough stakes to spare from the Yellow nosed colony). This would be a good idea anyway - I don't know to what extent this may help prevent birds from transporting it further - but it should not do much harm. The rock cliff at Joe Roos should also be fine in terms of putting some diesel on those plants. What would also be really really useful, would be if amongst you, you could document all this on film - viz. before and after with treatment pictures in between etc. - take extra pics! This will be useful for future teams, the Conservation Officers, GIWRAC, Niek, etc. etc.

Keep up the good work and enthusiasm!!!

I will stay in touch. All the very best and THANKS

Chris

CONSERVATION & MONITORING PROGRAMS

for Gough 44 team members

As visitors to the Gough Island World Heritage site, each person is obliged to carry out their duties and stay in accordance with the policies set out in the Management Plan for the Gough Island Wildlife Reserve.

EACH TEAM MEMBER MUST THEREFORE BE FAMILIAR WITH THE CONTENTS OF THIS DOCUMENT

It should be noted that this document has been and is continuously updated by means of recommendations made by Gough Island Wildlife Reserve Advisory Committee (GIWRAC), the Take-over Conservation Officer, and others. Input from team-members that have access to observations and experience of the Island over a full year are also a valuable contribution and suggestions made by them, welcome. Accordingly, the monitoring and noting of events within the Wildlife Reserve is an integral part of the teams activities on the Island. Towards this, the following programs have been set up:

MONITORING AND CONTROL OF ALIEN SPECIES:

Always make notes: Date & place where seen; some information on “object or item” [if animal, record its activity; if dead or alive; if ringed or tagged (in which case note position and type of ring or tag (e.g. metal or colour) even if marking cannot be read); what it may have been doing, etc.], and your name or that of the finder/ observer [this often proves useful in case of further enquiries or acknowledgements, etc.]

Take pictures: Photographs or video footage is useful for identification purposes where specimens cannot be collected.

ANIMALS :

Vagrants: (= visitors or stray's that are not know to breed on the Island or to occur in this area)

Birds:

Any birds found freshly dead around the base area in good condition should be collected and placed in individual plastic bags and stored in the deep-freezer in the laboratory together with details noted.

Invertebrates:

Any creepy crawlies found emerging out of stored food (especially dried products such as cereals, flour, pasta, etc. etc.), should be killed (i.e. placed in a sealed container and fumigated. e.g. with doom). A sample specimen (or two of the same kind) should be placed in a sealed container (such as a plastic film-spool canister) with a label, and stored in the laboratories freezer. (If laboratory alcohol is available, soft-bodied invertebrates [such as larvae, or “worms”] should be kept in enough liquid to cover the specimen, with a label in *pencil*, and stored on a shelf). The rest must be incinerated as soon as possible.

Sightings of any unusual of invertebrate occurrences should be noted (e.g. any butterflies (such as the painted lady) and moths (particularly very large ones), dragon flies etc.). If these are seen, try and catch a sample for proof and identification purposes.

Mammals:

- Whales & Dolphins:** These are known to occur within sight of the Island. Sightings should be noted on the record sheet provided by the Tristan da Cunha Administrator, Brian Baldwin. The type of information required is set out on the Record sheet, with accompanying guide of identifying characteristics.
- Seals :** Note any sighting of seals *other than* the Elephant and Fur seals known to occur at Gough Island and report these to Dr. Marthan Bester.
- Mice :** Are alien and should be killed. *DO NOT FEED THE BIRDS WITH DEAD MICE!* (especially if these have been killed using poisonous fumes or bait!)
- Rats:** Are not known to occur on the Island. If one is sighted, try and catch it immediately, and keep in laboratory freezer with details (as for dead birds above), and notify Peter Ryan, John Cooper, or the outgoing Conservation Officer as soon as possible.
- NOTE: The mice on Gough are exceptionally large, so be sure not to confuse these with rats.

PLANTS:

A number of fast spreading alien plants are known to be particularly abundant around the base area. To minimise and avoid these spreading, precautionary measures [1-3] must please be conscientiously adhered to (and applied to any visitors stepping on land at Gough Island), and active eradication carried out according to [4] below:

1. Before commencing on any walks outside of the base area, footwear (inside and out) must be freed of any attaching mud and plant material and items worn or taken with should be free of any such alien propagules.
2. Peat-slips (especially new ones) should be avoided.
3. Stick to catwalks & paths. (Where paths have become eroded or too degraded or dangerous to use, stick to what ever detour has been designated).
4. Active eradication of the listed weeds should be carried out by physical removal as follows:
Plants should be pulled out (with roots) and incinerated (if out in the field, plants must be returned to the base). Do *not* make fires in the field to burn these!! (note danger of peat fires & regulations in the Management Plan). Where whole plants cannot be removed, but are close to flowering stage, try and remove the buds, flowers or seed-heads and incinerate these.

Record & report any new alien plants (to Peter Ryan, John Cooper or the Conservation Officer).

If possible, take video footage and e-mail the image.

MONITORING AND CONTROL OF INDIGENOUS SPECIES:**Seabirds:**

Two long-term study colonies have been set up by the FitzPatrick Institute, University of Cape Town, under the guidance of John Cooper. These involve the Yellow-nosed Albatross colony close to base towards Sealers Beach, and the Wandering Albatrosses up at Tafelkop and Goneydale. (see guidelines on "Seabird monitoring at Gough Island" as set out by John Cooper, together with the key to ageing and sexing birds according to their plumage types published in Notornis Vol. XIV).

One person from the team will be designated the responsibility to co-ordinate and carry out monitoring and recording thereof.

Seals:

Seal monitoring falls under the guidance and instruction of Dr Marthan Bester.

Jimmy Glass (Tristan's Chief Islander and Sea-fisheries Inspector) has expressed interest in any finding that team members may make on the diet of the Fur-seals. In this regard, pellets (things regurgitated by the fur seals) can reveal a lot of information. Should any team member be aware of a seals pellet, try and collect a sample or note its colour (& where possible, contents) e.g. if it is evidently made up of crayfish shells or other matter.

Other :

- Any oiled or entangled birds or seals should be recorded. If feasible, attempt to remove entanglements from birds (seals are dangerous!!), and keep any removed hooks, line, or strapping with appropriate notes. To clean oiled birds, contact John Cooper, Peter Ryan or the Outgoing Conservation Officer for advice.
- Any foreign object found (such as fishing hooks, lines or plastic etc., especially at bird nests) should be recorded and where possible, retained and labelled accordingly.
- Beach-debris. Any items seen should be recorded (noting type of object, how many, approx. size (e.g. 2 l Coke bottle, or 10 litre drum etc.) and what it appears to be made of (plastic or metal etc.), where seen (locality and area - e.g. at Sealers beach - in bay or on beach etc.). Where these can be reached, note any writing, labels etc., and either retrieve and bring the items back to the base (where they should be labelled and kept in the Laboratory), or mark each item with a water-proof pen (viz. date seen) so that they can be recognised if spotted at another locality. For further information or advice, contact Deon Nel.
- Illegal fishing activities (any sightings, radio contact or signals) should be noted, and reported.
- Oil spills. Should any oil-spills contaminate the environment (such as can occur during transfer of fuel from ship to shore, or illegal cleaning of bilge's from passing vessels etc., report & record these, and where possible, clean the affected areas (e.g. by using an appropriate dispersant - such as *Chemserve OSE-750*, stored in the Chemical store in a blue 25 l drum of which was or collecting oil in drums, etc.).
- Keep lists on which all walks are recorded (to log the amount of use of various paths).

LIST OF PLANTS TO WEED

For identification, see display boards mounted in the passage between the drying room and the radio room, and photocopies of specimens left in laboratory

KEEP RECORDS OF ALL PLANTS REMOVED OUTSIDE THE LOGISTIC ZONE AND REPORT TO CONSERVATION OFFICER

- SAGINA** (*Sagina* sp. = Low carpet-like growth - similar looking to moss, but forms dense root mat)
Not recorded before, but apparent on the cement slab and area at the crane, as well as on the rocks where the ladder goes down to the fuel junction box down on the rocks at "Joe Roos".
Please check for it in other areas and note where it is found and removed.
- THISTLES** (2 types: *Sonchus oleraceus* & *S.asper* = dandelion type plants with yellow flowers)
Found especially all around base and short walks away from base.
- PLANTAGO** (2 types: *Plantago lanceolata* & *P.major* = flat, strap-like leaves with parallel veins)
Found next to the satellite dish, at beginning of path from upper-air towards Snoek-gat
- POTATOES** (*Solanum tuberosum*) - may be locally extinct, but check ladder area at Waterfall Point
- SENECIO** (*Senecio burchellii*) also known as Molteno disease Senecio - a daisy shrub
May be extinct. Check the site of the upper magnetometer hut.
- FLEABANE** (*Conyza floribunda*) also known as "Kleinskraalhans" - commons SA wees with softleaves with serrated edges. Check the site of the upper magnetometer hut.
- VERBENA** (*Verbena officinalis*) shrub with square stem and purple flowers. One plant removed from next to the skivvy gat chute.
- RUMEX** There are three types. The introduced *Rumex obtusifolius*, the most obvious species around the Base with its rosette of long, pointed, rather lax leaves and long flowering stalk, occurs all along the cat-walk down to crane, but is widespread over Island. It should be tackled along paths around the Base to prevent it being spread further by base personnel.

BIOLOGICAL SPECIMENS

Found on Gough during Nov. 1997 - Sept. 1998

Returned to Percy FitzPatrick Institute, University Cape Town

1 x Gough Island Moorhen *Gallinula comeri* [Found dead at back of kitchen, 09.07.98]

1 x Yellowbilled Egret *Egretta intermedia* (?) [Seen alive on 23.4.98, then found dead 29.4.98 50m along track to Seal beach]

1 x Subantarctic Skua *Catharacta antarctica* [From previous year? no date or details]

1 x Petrel chick? [Golden Highway - 24.11.96]

1 x Albatross skull/beak [unmarked - prior to 1997/98 team]

1 x Egg of Yellow-nosed Albatross [from abandoned nest # 162 29.12.96]

1 x Egg of night bird [Grondverskuiwing punt - 27.12 96]

1 x Pellet? [Tumbledown beach - 15.01.97]

2 x Pellets? [Admirals - 23.01.97]

“Chemserve OSE-750”

Oil spill dispersant.

Description: Chemserve OSE-750 is a low toxicity oil spill dispersant designed to disperse oil slicks at sea and to remove oil from contaminated beaches and rocks. The product complies with the Warren Spring Laboratory requirements.

Directions: Chemserve OSE-750 is sprayed, undiluted onto the oil slick and then thoroughly agitated by means of barge boards, water jets, ship's propeller or wave action. For oil on beaches or rocks, spray Chemserve OSE-750 onto the contaminated surfaces and wash off with water using high pressure spray equipment or allow the wave action to emulsify the oil deposit. The amount of Chemserve OSE-750 required to disperse any given oil depends on its nature and condition. Aged oils and heavy fuel oils require more dispersant than crude oil.

Specifications: Appearance - clear, light brown liquid S.G. at 25 ° - 0.80± 0.01 Flash point - 100 ° C

Hazardous Ingredients: Hydrocarbon solvent.

Safety precautions: Store in a cool area away from direct sunlight and other heat or ignition sources. Use in a well ventilated area. Wear goggles, gloves and apron. Absorb excess with absorbent clay or sand and wash the residue to effluent with large amounts of water.

First Aid: remove patient to fresh air and wash contaminated areas well with large amounts of water. If ingested, allow patient to drink milk or water but do not induce vomiting. Consult a doctor immediately.

BEACH DEBRIS (Collected between November 1997 & September 1998)JOE ROOS Feb. 1998

1 x 50mm diameter white plastic bottle: "NTZ Nasal spray antihistaminic antiseptic, Johannesburg"
 1 x short piece of orange rope (300 mm long x 10 mm diam.)
 Bundle of fishing line (hand-line?)

SEAL BEACH 21 May 98

2 x Yellow insulation foam (300 x 140 mm triangular x 120 thick; 120 x 65 triangular x 30 thick)
 2 x white polystyrene (1 x round with hole in centre (fishing net float?) 80mm diam. x 40mm thick)
 (1x 70 mm long x 30 thick)

SEAL BEACH 19 Jul. 1998

1 x polystyrene (±170 mm square x 65 mm thick) 1 x clear blue plastic water bottle (750 ml?)

TUMBLEDOWN 20 Jul 1998

1 x Grey hard-plastic boy (± 650 mm circum.)
 1/2 x hard orange plastic boy (300 mm diam.)
 1 x Yellow plastic bottle (3 litre ? detergent type?)
 1 x white solid plastic shuttle (190 mm x 60mm with groove along middle and two holes on
 either end = drift net float)

Left high up on beach: 2 x buoys (1 x plastic, 1 x aluminium)

ADMIRALS (main beach) 16 Aug 1998

2 x clear plastic smooth-walled water-bottles (2 litre)
 1 x clear plastic bottle with grooves on bottom half
 White lid has green writing: E(O DE LOSANDES (750 ml oil bottle)
 1 x orange plastic flare container of type used in past at the Base (285 mm long -)
 1 x white plastic hollow pipe-like gadget - broken off one side (230 mm long x 110 circum)
 Has indentations as for hand-grip at base and grooved above
 1x 750 ml white plastic bottle with blue writing: "Sanex jabon liquido Dermoprotector hidratante.
 Protégé de contagios..."

Left on the beach: 1 Crayfish net; 4 x buoys (3x plastic, 1 x aluminium)

THE GLEN 19 Aug. 1998 (Debris left there as it could not be taken back to Base)

3 x Plastic Buoys	1 x aluminium buoy
2 x Trawler Buoys with rope	Big pile of rope
4 x 1 litre water bottles	1.5 Containers (5 litre?)
1 x small plastic bottle	2 x small polystyrene (1 round, 1 square)
1 x alum. Spade, no handle	1 x left slop (<i>not</i> the partner of the below one)
1 x right slop	

SEALERS BEACH 28 Sep. 1998

2 x polystyrene (1 x 120mm x 140 x 60 square & 1 x 75 x 120 with barnacles)
 1 x yellow plastic bottle with green lid (750 ml dish-washing liquid - of which still inside?)
 1 x hose clamp (large aluminium)

THE GLEN 29 Sep. 1998

1 x green plastic bottle (2l)

1 x square plastic with tubes on both ends (a medical drip type thing?) (45 x 100 mm plus ends)

1 x hard plastic net float? (torpedo shaped with hole through centre (110 mm long x 190 circum.))

LITERATURE AVAILABLE AT GOUGH:

Compiled September 1998 by C. Hänel

SCIENTIFIC & GOUGH NEWS LETTERS (*ORIGINAL COPIES IN THE PERMANENT LIBRARY*)**South African Journal of Antarctic Research**

1972:2; 1973:3

1976:6 Giant-petrels in the south Atlantic : new data from Gough Island.
Notes on seabirds at Gough Island.

1976: Suppl. 1

1977: 7 Bird ringing at Tristan da Cunha and Gough Islands 1937 -1977.

1987: 17 (1 & 2)

1988: 18 (1) Bird ringing at Gough Islands 1982 -1987; with an analysis of
movements of Wandering Albatrosses.

1988: 18 (2)

1989: 19 (1) Marine and fluvial terraces and colluvial fans reflecting quaternary
climatic changes, Gough island, south Atlantic.

1989: 19 (2)

SASCAR Newsletter

1987: 28

1988: 30 Shore-based research conducted on Gough and Inaccessible Islands.

1988: 31, 33

1989: 34 Right Whale survey : Tristan da Cunha and Gough Island, October 1988.

1989: 35

SCAR Bulletin

1988: 88, 89, 90, 91

1989: 92

SCAR Reports

1988 Jan. No.3

South African National Scientific Programmes Report

1986: 128. Historical sites at the Prince Edward Islands. Cooper J, and Avery, G.

1986: 132 SIBEX - 11: Report of the South African study in the sector (48 - 64°E) of the Southern
ocean

1987: 134 South African Southern ocean Research Programme. SASCAR

Gough Island Seal Research - 1975 - 1995 A collection of scientific papers by Marthan
Bester, Dept. Zoology & Entomology, University of Pretoria, South Africa**Department of Transport Newsletters**

1973: 288, 292

1974: 304, 305, 307, 309

1975: 310, 311, 312, 313, 314, 315

1976: 332, 333

1977: 335, 336, 337, 339

1979: 364, 369

1980: 370, 371, 372, 375

FAXCOPIES OF LITERATURE CONTRIBUTED TO THE GOUGH ISLAND COLLECTION*(note the temporary quality of the paper will not allow for these copies to last)*

- BRUITENBACH, G.J. 1986. Dispersal : the case of the missing ant and the introduced mouse. *S. Afr. J. Bot.* 52: 463-466.
- CHEVALLIER, L. 1987. Tectonic and structural evolution of Gough volcano: a volcanological model. *J. Volcanol. Geotherm. Res.* 33: 325-336.
- GARDNER, H., KERRY, K., & RIDDLE, M. 1997. Poultry virus infection in Antarctic penguins. *Nature* Vol. 387 : 245.
- HEANEY, J.B. & HOLDGATE, M.W. 1957. The Gough Island Scientific Survey. *Geogr. J.* 123: 20-30.
- HOLDGATE, M.W. 1957. Gough Island. *Geogr. Mag.* 29: 423-435.
- HOLDGATE, M.W. 1960. The fauna of the mid-Atlantic islands. *Proc. Roy. Soc., Lond.* B152: 550-567.
- LE MAITRE, R.W. 1960. The geology of Gough Island, S. Atlantic. *Overseas Geol. & Min. Resources* 7: 371-380.
- MAUND, J.G., REX, D.C., LE ROEX, A.P. & REID, D.L. 1988. Volcanism on Gough Island: a revised stratigraphy. *Geol. Mag.* 125: 175-181.
- OLLIER, C.D. 1984. Geomorphology of South Atlantic volcanic islands Part II: Gough Island. *Z. Geomorph. N. F.* 28: 393-404.
- RECHINGER FIL. K.H. Monograph of the genus *Rumex* in Africa. *Botaniska Notiser* suppl. Vol. 3:3 Pp 3- 9; 84-87.
- ROUX, J.P., RYAN, P.G., MILTON, S.J., & MOLONEY, C.L. 1992. Vegetation and checklist of Inaccessible Island, central south Atlantic ocean, with notes on Nightingale Island. *Bothalia* 22, 93-109.
- RYAN, P.G. 1987. The Incidence and characteristics of Plastic particles ingested by seabirds. *Mar. Environ. Res.* 23 175-206.
- RYAN, P.G. 1987. The origin and fate of artefacts stranded on Islands in the African sector of the Southern Ocean. *Environ. Conserv.* 14 (4) 341-346.
- RYAN, P.G. 1993. The ecological consequences of an exceptional rainfall event at Gough Island. *S. Afr. J. Sci.* 89: 309-311.
- RYAN, P.G. & BOIX-HINZEN, C. 1998. Tuna longline fisheries off southern Africa: the need to limit seabirds bycatch. *SA. Jnl. Sci.* 94 , 179- 181.
- RYAN, P.G. & WATKINS, B.P. 1988. Accumulation of stranded plastic objects and other artefacts at Inaccessible Island.
- WACE, N. M. 1961. The vegetation of Gough Island. *Ecol. Monogr.* 31: 337-367.
- WACE, N. M. 1986. The arrival, establishment and control of alien plants on Gough Island. *S. Afr. J. Antact. Res.* 16:95-101.
- WEIMERSKIRCH, H., BROTHERS, N. & JOUVENTIN, P. 1997 (?) Population dynamics of Wandering Albatross *Diomedea exulans* and Amsterdam albatross / *D. amsterdamensis* in the Indian ocean and their relationships with long-line fisheries: conservation implications. *Biological Conservation* 9 257-270.

Chapters on : Family DEOMEDEIDAE albatrosses*Diomedea exulans* Wandering Albatross (p 265 - 280)*Phoebetria fusca* Sooty Albatross (p 339 -345)*Diomedea chlororhynchos* Yellow-nosed Albatross (p323 -329) Plumage types (Notornis Vol. XIV) (p54,56)

BOOKS IN THE LIBRARY AT GOUGH ISLAND BASE:

Animals of the Antarctic	Stonehouse B.	3622711
Birds of the Antarctic	Watson G.E.	2198
Birds of the Antarctic	Wilson E.	3621946
Captain Scott and the Antarctic Tragedy		
Cloud types for Observers		
Cosmopolitan World Atlas	Rand McNally	3620247
Diary of the Terra Nova Expedition	Wilson E.	3622974
Edward Wilson of the Antarctic	Seaver G.	3622231
Explorers of the Arctic and Antarctic	Dolan E.F. (Jr.)	3624641
Field Guide to the Birds of the S.A Sea Shore	Broekhuysen G.S.	1457
Fishes of the Southern Ocean	Gon O.	16347
Guinness Book of Records 1979		61221602
Habitat Selection	Bester M.M.	2525
HAT	Odendaal en kie	A533612
Heroes of Polar Expeditions	Andrist R.	3624640
Marion and Prince Edward Islands	Van Zinderen E.M	
Meteorology of the Antarctic	Van Rooy M.P.	13915
Newman se vogels van S.A		6058
Newmans Birds of S.A.		6059
Of Whales and Men	Robertson R.B.	3622862
Penguins	Stonehouse B.	3622222
Photography on Expeditions	John D.H.O	3622521
Polar Deserts	Herbert W.	3622405
Roberts Birds of S.A		1585340
South	Shackleton E.	4256
The Sea Fishes of Southern Africa	Smith K.B.	3620412
The Antarctic	King H.G.R	3621950
The Snow People	Herbert M.	3622513
The Concise Oxford Dictionary		
The White Desert	Geaver	3623926
The Worst Journey in the World	Cherry-Garrard	3622712
The Last Explorer	Hoyt E.P.	3622873
The Fascinating Secrets of Oceans and Islands	Readers Digest	61008330
The Polar World	Baird P. O.	3623927
The Whale	Mathews L. H.	3621947
The Encyclopedia of Electronics	Susskind C.	3013802
Tweetalige Woordeboek - x3	Bosman en kie	3620861

(een sonder nommer)		6005
Verklarende Afrikaanse Woordeboek	Kritzinger	
Voyage towards the South Pole	Cook	3623808
To the Ends of the earth	Fiennes R.	4515
Systematic Political Geography	De Blij H.J.	3620420
Arctic and Antarctic	Sugden D.	4232
The Handbook of Australian Seabirds	Serventy D.	2107
The step-by-step Darkroom Course	Kilpatrick D.	
Mountains in the Sea	Holgate M.	14462
Meteorology	Geddes A. E. M.	12828
The Norwegian with Scott	Gran T.	4765
The Abbey Dictionary		
Creative Darkroom Techniques	Kodak	
Seals of the World	King J. E.	3622752
Diary of the Discovery Expedition	Wilson E.	3621916
Glossary of Meteorology	Huschke R. E.	17099
Organisasie en Werkzaamhede	Dfept. Van Vervoer	
Atlas	Collins-Longmans	
Photographing Nature	Time Life	3228
The Sea	Life	3621172
Guinness Book of Records	1991	
Seas of the World	Maxwell G.	3622406
The Encyclopedia of S.A.	Rosenthal E.	3620408
Enlarging. The Technique of the Positive.	Jacobsen C.I.	
The Poles	Life	3621173
Data Report of Marion	Duncombe-Rae	
Photography	Spillman R.	
Illustrated Encyclopedia of Facts	Norris	
Developing. The Negative Technique.	Jacobsen C.	
Volcanoes	llicr C.	
The Sea Hunters	Stackpole E.	3623930
International Cloud Atlas	WMO	15060 2072, 2073
Weerburo Wolkatlas x2. (Dieselfde Nr.)	Dept. Van Vervoer	12835
Observers Handbook	Met. Office	4331
Engels/Afrikaanse Woordeboek	Eugene	6057
Antarctica: Great Stories from the Frozen Continent		5388
Atlas of the World	Readers Digest	6051

