

CAPE PEMBROKE PENINSULA  
- vegetation disturbance and soil erosion

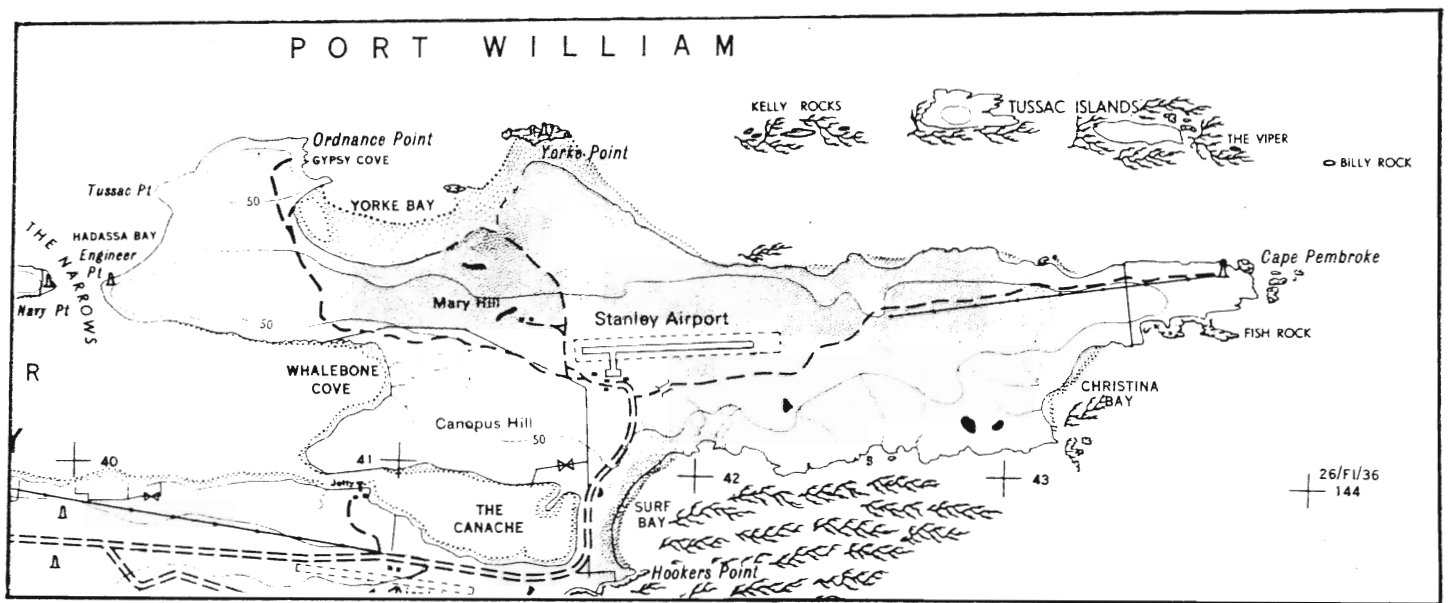
A Report prepared for the Falkland Islands Trust  
by

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## CAPE PEMBROKE PENINSULA - Vegetation disturbance and soil erosion

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Cape Pembroke Peninsula, East Falkland

Note:- Within this report the Cape Pembroke Peninsula may be referred to as "Cape Pembroke" or the "Cape".

## 1. SUMMARY AND RECOMMENDATIONS

Due to its proximity to Stanley it is essential that the Cape Pembroke peninsula is conserved and developed as a multi-use area serving wildlife, tourism, recreation, education and the continued use of the airstrip.

The Cape was first fenced from stock in the 1920's by which time it was reported that approximately 1800 acres [730 hectares] (85% of the total area) were bare of vegetation. This grazing control and a successful programme of planting Marram grass resulted in recovery of the vegetation cover and by 1956 it was estimated that the area of bare ground had reduced to 253 acres [102 hectares] although the original (1920's) estimate was probably high.

Between 1972 and 1976 uncontrolled grazing, a result of fence removal and heavy vehicle traffic associated with the construction of the airfield, led to a considerable amount of damage being done to the vegetation on the Cape. In 1976 it was estimated that 462 acres [186 ha] were denuded of vegetation. Uncontrolled grazing continued unchecked until 1982, further exacerbating the vegetation removal and soil erosion problems. During the conflict and its aftermath, damage to the Cape was intensive and severe on limited areas, with more extensive improvement brought about by the exclusion of stock from the peninsula. At present there is approximately 513 acres [208 ha] of bare ground and windblown sand which demands immediate attention. The removal of the infrastructure associated with RAF Stanley could intensify the problem in certain areas. It is recommended that no further grazing should be allowed on the common for an appreciable number of years.

A programme of replanting Marram grass on the bare sand areas and Tussac grass on the deeper peat areas should be organised and administered by the Falkland Islands Trust which should be given official responsibility for the conservation of wildlife on the Cape. The area should be seen as a valuable educational resource and the Trust and school-teachers should involve pupils from Stanley in the rehabilitation programme.

Revegetation of the bare ground areas would reduce the blown sand problems and generally improve conditions and maintenance at the airport.

By all accounts the vegetation on the Cape was in a worse condition in the early 1920's than it is at present. A successful rehabilitation programme was undertaken then and there is no reason why if the same principles are followed now, similar success would not ensue.

<u>Year</u>	<u>Area of Bare or Eroded Ground</u>		<u>% of Total Area of the Cape</u>
	Acres	(Hectares)	
1956	253	(102.4)	11.9
1976	462	(186.8)	21.8
1983	513	(207.7)	24.2
1983 (roads, buildings etc.)	114	(46.3)	5.4

Table 1 A summary of the change in areas of bare ground on Cape Pembroke Peninsula 1956-1983 (Estimated from Figures 2, 3 and 4)

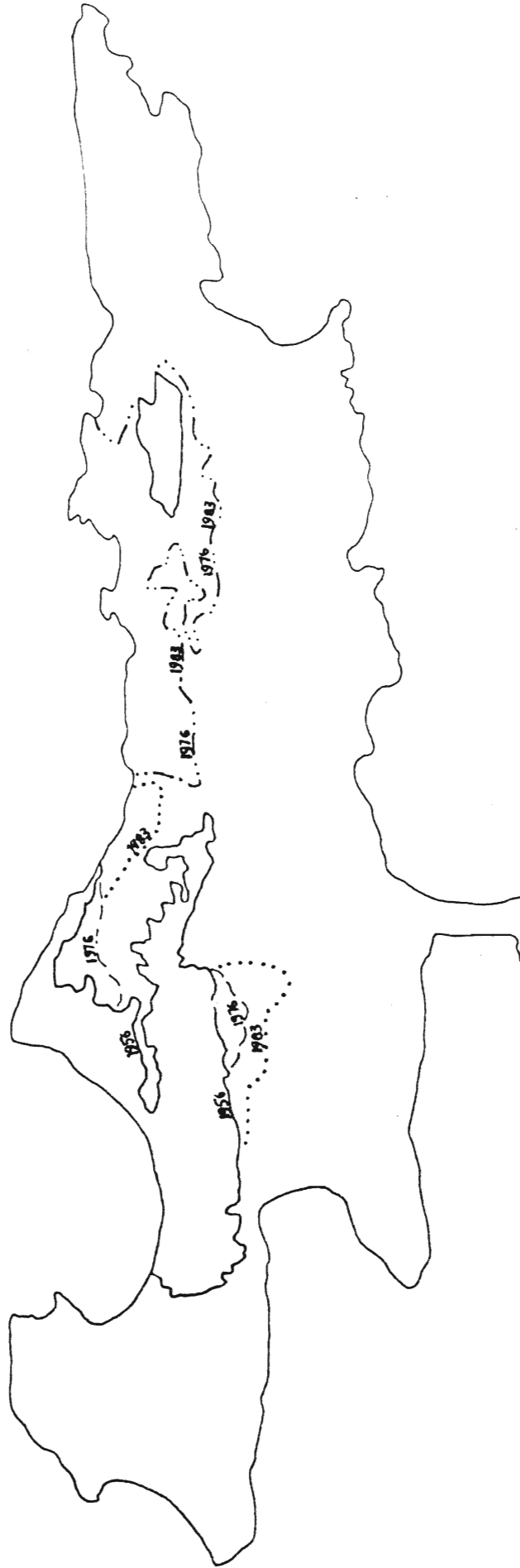


Figure 1 A summary of the main boundary changes in the areas of bare and eroded ground. This figure has been prepared from Figures 2, 3 and 4.

## 2. EARLY HISTORY

There are no documentary accounts of the vegetation on Cape Pembroke before the introduction of livestock in the late 18th and early 19th centuries. It is likely that the western part of the peninsula from Gypsy Cove round to the high ground opposite the Canache was largely as it is at present, dominated by Diddle dee (Empetrum rubrum) and Tall Fern (Blechnum magellanicum) though the northern most end of Hadassa Bay is named "Tussac Point" and most likely did support a stand of tussac grass. The structure and botanical composition of vegetation dominated by Diddledee and Tall Fern tends to be relatively stable, even when grazing pressure is increased. The eastern and southern beach area from Christina Bay around to Surf Bay was almost certainly an area of Tussac grass (Parodiochloa flabellata) (Miller, 1969). The rest of the peninsula was probably a mixture of coastal greens on the damper areas (eg. around Whalebone Bay) and sparse shrub heath on the shallow soils overlying clay in the central area although natural fires may have destroyed a deeper soil cover and more luxuriant vegetation. It is likely that severe grazing pressure on the Cape did not occur until the 1840's when the Colony's capital was moved from Port Louis to its present location at Stanley, 7 km from the Cape.

Grazing control on Cape Pembroke was instigated by Gibbs (the Agricultural Officer) between 1924 and 1927 when the area was fenced from the rest of the Common to allow areas to be reserved for winter grazing. Initially, Gibbs' fencing programme was unpopular, however once the benefits were seen, opposition dissipated. Gibbs' action may have been stimulated by his concern over the state of the Cape at that time. Contemporary accounts indicate that erosion and the resultant problem of blown sand was severe by the early 1920's.

"The Board of Trade Lighthouse at Cape Pembroke was situated in dismal surroundings, and sand, drifting from a source 4 or 5 miles from the lighthouse had destroyed practically all the vegetation on the peninsula and laid waste an area of about 1,800 acres [730 ha]. In addition it had almost buried the first floor of the light-keepers quarters" (Hubbard, 1937).

Planting of Marram grass (Ammophila arenaria) and Lyme grass (Elymus arenarius), locally called 'sand grasses', started in 1925 on part of a 2,000 acre block completely denuded by off-shore sand. Only Marram grass established successfully from this planting (Davies, 1939). There is some contradiction in the reports of Hubbard (1937) who records that "The planting was most successful, and the whole area had [become] covered over by 1937 with sand-binding grasses" and of Davies (1939): "The major part of this peninsula was still bare of vegetation in 1938". In relation to this (1925) planting Davies does, however, record that "the (1925) Marram is reseeding itself extensively among the dunes which have formed as a result of the earlier plantings". It is likely that both these accounts overestimated the area of blown sand and bare ground as the total area of the Cape is only 2120 acres [858 hectares].

In 1937 the Department of Agriculture made further plantings using Marram grass on sandy areas and Tussac grass on the peats augmented by complete stock exclusion during 1937/38 (Davies, 1939).

The area was securely fenced and used as common grazing for the Islanders' cows and horses, being carefully managed so as to provide valuable late summer and winter feed. This stocking pattern, with controlled grazing and removal of stock in the spring, was found to have no detrimental effect on the vegetation cover, and the

encouragement of stock to eat poorer vegetation on the rest of the common-land outside the Cape Pembroke area for certain periods, was having a beneficial effect on the feeding quality and quantity of the vegetation in that area. The area was photographed in 1956 (Fig. 2) at which time the Cape area was considered to be well vegetated, with no reported problems from blown sand. The dunes had become stabilized, and breeding colonies of Gentoo Penguins (Pygoscelis papua) and Magellanic Penguins (Spheniscus magellanicus) had established themselves in parts of the area.

The area of bare ground was estimated from an aerial photograph (Fig. 2) to be 253 acres, [102 hectares] or 11.9% of the total area (Table 1).

### 3. THE MILLER REPORT (1969)

In 1969 His Excellency the Governor asked Mr Sidney Miller to "examine Stanley Common and make a report on the general pasture conditions thereon and the state of the feed". The sections of the Report (Miller, 1969) relevant to Cape Pembroke are recorded in Appendix 1. Miller records that the sandgrass "mounds" were largely grassed over with native fescues and *Agrostis*, confirming that the satisfactory position recorded in the 1956 photograph had persisted until at least 1969. He comments on the generally favourable practice of resting the Cape for long periods during summer (October-June). The large number of cows (20 or so) retained for the use of the 2 or 3 lighthouse keepers attract some comment! Miller recommended some seeding between dunes and experimental planting of Tussac grass along the southern and eastern shore.





500 m  
0 1 km  
SCALE

Figure 2 Cape Pembroke Peninsula in 1956. The area of bare ground is estimated at 102.4 hectares (11.9% of the total area).

#### 4. DISTURBANCE DURING THE 1970'S

In 1972 work commenced on the construction of a 1,250 m long airstrip on the Cape Pembroke peninsula (see Fig. 3), and the vegetation cover was removed over considerable areas. Fences were also removed to allow access for construction vehicles, and the grazing pattern of the area reverted to one of year-round uncontrolled grazing, with stock preferring to remain in the area in spring-time rather than graze the less-attractive pastures outside. As a result, the vegetation in the area did not have an opportunity to recover in the spring-time and this, coupled with the damage done to the vegetation by construction equipment in what is essentially a fragile and unstable ecosystem, led to a reduction in the vegetation cover and a recurrence of the blown-sand problem.

In 1974 William Brown of the University College of North Wales, Department of Agriculture was appointed to advise "... on the more concentrated use, better husbandry, fencing etc. of Stanley's Common Land" .. within the context of a larger study on milk production for Stanley (Brown, 1974). Brown records that the Cape appeared to be in poor condition due to overgrazing in the summer months (Appendix 2). He rightly concluded that the building of the airstrip would not drastically reduce the more valuable grazing areas.

He did not however report on the disruption to fencing accompanying the airport construction or the regular grazing pattern of summer resting which had led to the Cape being in relatively good condition in the later 1960's and early 1970's. It is clear that most of the damage to the vegetation on the Cape was done between 1972 and 1976, ie. during the construction of Cape Pembroke airfield. The lighthouse keepers



500 m  
0 1 km  
SCALE

Figure 3 Cape Pembroke Peninsula in 1976. The area of bare ground is estimated at 186.8 hectares (21.8% of the total area). Note the airstrip which is 950 m long.



500 m 1 km  
SCALE

Figure 4 Cape Pembroke Peninsula in 1983. The area of bare ground is estimated at 207.7 ha (24.2% of the total area). The runway, roads, buildings and associated bare areas are 46.3 ha (5.4% the total area).

had, in 1978, noticed a considerable increase in the quantity of blown sand in the lighthouse buildings, and the airport contractors were experiencing severe problems with blown sand filling drains that served the runway and access roads (McAdam, 1980). The denuded areas expanded rapidly and a comparison of Fig. 2 (taken in 1956) and Fig. 3 (taken in 1976) will give some idea of the extent of the problem. The area of bare ground almost doubled from 102.4 ha (11.9% of total area) in 1956 to 186.8 ha (21.8 % of the area) in 1976 (Table 1). Attention was drawn to the problem on a wider front (McAdam, 1980).

#### 5. DISTURBANCE DURING THE 1980'S

During the late 1970's and early 1980's, inadequate fencing and increased vehicle traffic in and out of the Cape resulted in a continuing deterioration in the vegetation cover and an increase in soil erosion. The situation was temporarily made significantly worse by the conflict in 1982. During the event and over the ensuing redeployment and military establishment period there was a huge increase in vehicle traffic and general war damage (Figs. 5 & 6). The subsequent development of RAF Stanley, the resumption of intensive quarrying and sand extraction, and vehicle passage resulted in the area of bare ground increasing even further from 462 acres [187 ha] (22%) in 1976 to approximately 512 acres [208 ha] (24%) in 1983 (Fig. 4 and Table 1). A summary of the area changed in areas of bare ground is presented in Figure 1 and Table 1.

Between 1982 and 1986 the nature of the damage to the Cape was relatively localised and very intense. Against this most of the area was largely out of bounds to personnel, some areas were fenced off as minefields (Fig. 7) and stock were excluded from the common. Hence, it



Figure 5 Examples of localised, erosion following intensive vehicle activity etc. post 1982.

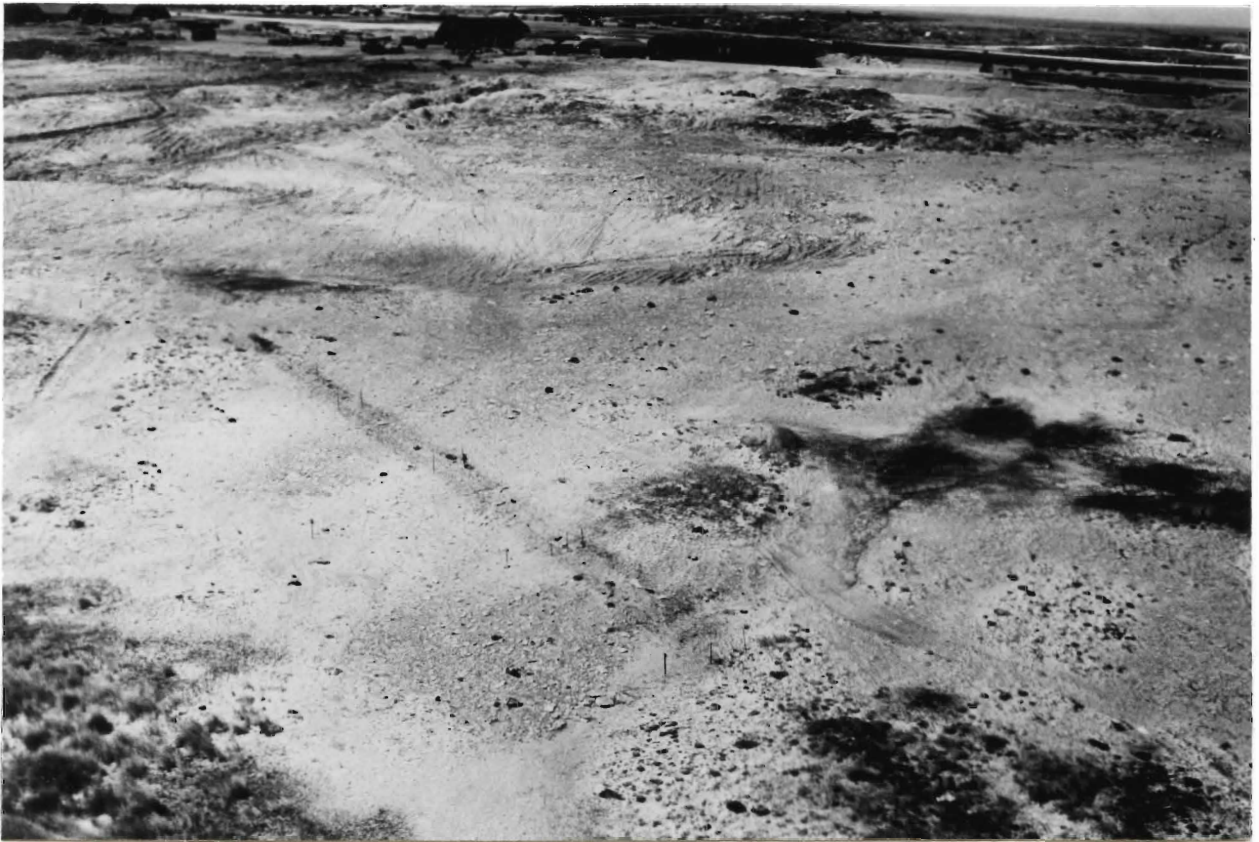


Figure 6 Specific examples of localised erosion and vegetation disturbance on the Cape, post 1982.

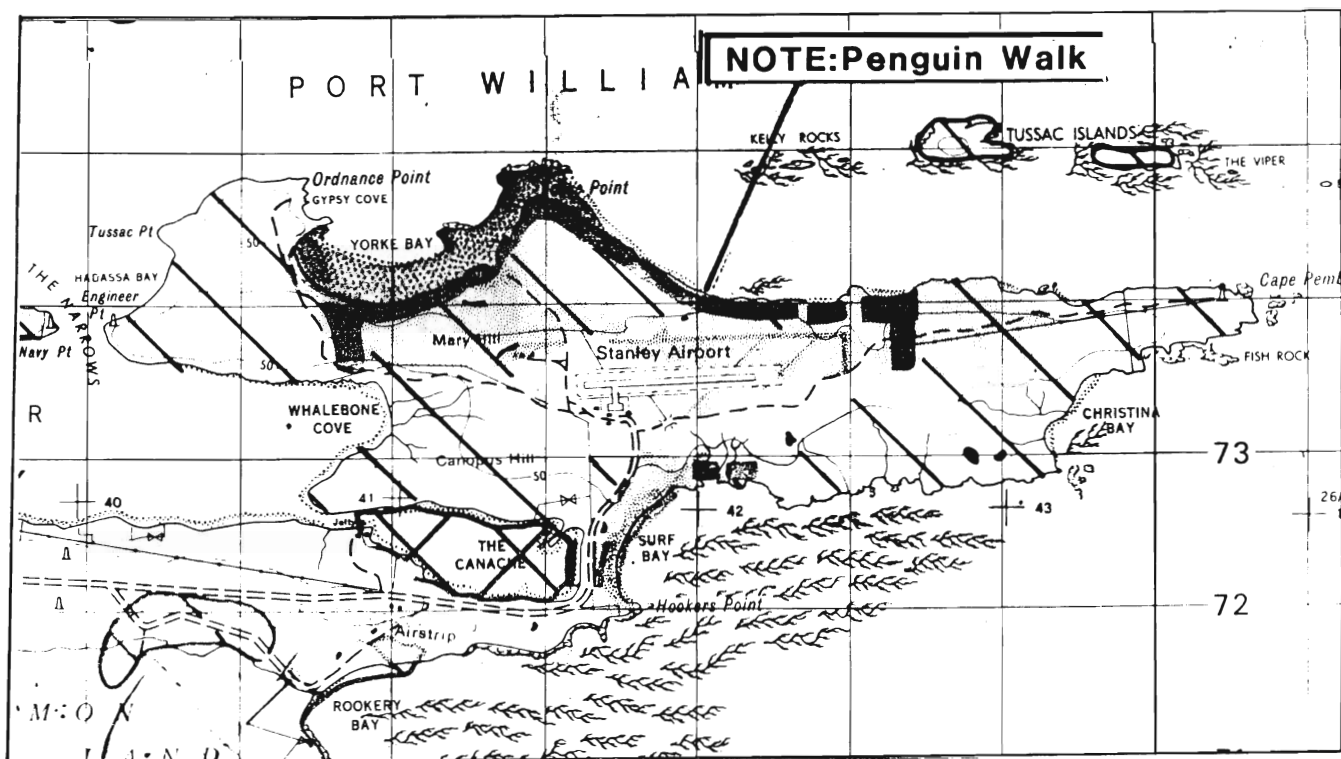


Figure 7 The minefield and area clearance situation at Cape Pembroke (1 May 1986)

- Key
- = (Red) Known minefield areas
  - = (Blue) No evidence of minefields
  - = (Green) Cleared and checked 'safe' areas

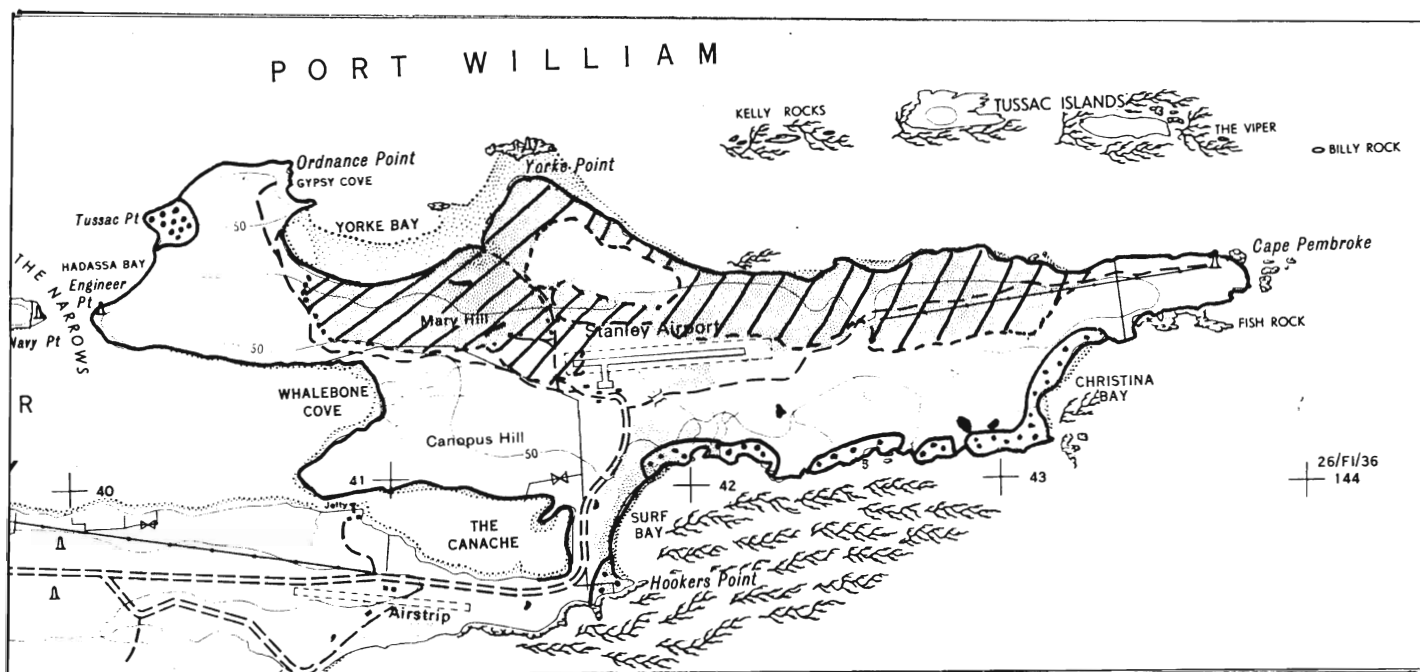


Figure 8 Suggested areas for replanting of Marram grass (hatched) and Tussac grass (dotted). These are only generalised suggestions and more detailed maps and proposals should be drawn up.



could be argued that, on a more extensive scale, the process of rehabilitation of the Cape had begun to occur after the conflict. The building of the new airport at Mount Pleasant and the transfer of military activity and air defence capability to that site has further relieved the pressure on the area. What has been left is however a large area of bare ground and blown sand which demands some immediate attention.

## 6. REMEDIAL MEASURES

The Cape Pembroke peninsula supports one of the most extensive areas of sand-dune ecosystem on the Falkland Islands and because of its proximity to Stanley and the accessibility of breeding bird colonies it has considerable educational, tourist and recreational potential. Such potential will only be realised if some of the damage carried out since 1972 is redressed and the area conserved and developed as a multi-use area serving wildlife, tourism, education and recreation. Such remedial measures as may be taken to achieve this restoration are suggested below. The continued use of the airstrip by FIGAS will have no impact on the conservation status of the area though the bird strike problem will have to be borne in mind, particularly if revegetation plans are implemented.

- a. Although two of the main catalysts of vegetation disturbance, heavy vehicle traffic and uncontrolled grazing have been largely removed, Cape Pembroke should be conserved as a multi-use area serving wildlife, tourism and recreation. The extent of the previous damage is too great and the time span too long for natural regeneration and recovery to occur.

- b. By all contemporary accounts the Cape was in a similar or even worse state in the early 1920's than it is now. Steps were taken then which resulted in the successful recovery of the area and there is no reason why similar steps taken in the near future should not result in success.
- c. All stock should be excluded from the Cape for at least 3-5 years to allow the planting programme outlined below to proceed.
- d. Planting of Marram grass should be carried out (in winter) on the sandy areas indicated in Fig. 8. The guidelines for successful establishment of Marram grass are well known and publicised elsewhere. Marram grass is coarse and unpalatable and is unlikely to attract birds which could present a strike hazard to aircraft. The stabilisation of blown sand should ease maintenance of the airstrip and its associated buildings, drains etc in the long term and hence be of benefit to FIGAS.
- e. The bare clay patches in the centre of the peninsula were already denuded of vegetation in 1956 and have not recolonised naturally. The establishment of vegetation cover on such areas is extremely difficult. Young (1967) achieved some success with lupins and oats as a 'nurse' crop until more natural vegetation cover was established but this would be unsuitable for the Cape Pembroke area. The use of phosphate fertiliser was considered essential. Some note should be taken of the successful plantings of Marram grass on clay (Robinson's Point) by Simon Miller on Keppel Island. If clay is to be revegetated some form of soil conditioner eg. Kelp

Such areas would be most difficult to revegetate and it is strongly advised that other areas of the common be tackled first.

- f. Planting of Tussock grass should proceed around the southern and eastern coasts of the Cape (see Miller, 1969 p. 3, Appendix 1, this report) and possibly at the northern end of Hadassa Bay.
- g. It is recommended that the whole Cape be designated some form of status as a conservation/wildlife area to be administered by the Falkland Islands Trust who would promote its potential to visitors and local residents.
- h. This being so, the Trust should draw up a practical management plan for the area which should include a viable mechanism to implement the various rehabilitation measures suggested above.
- i. The rehabilitation programme should be developed as a series of achievable projects which could be undertaken by Trust members or organised and supervised by the Trust.
- j. Stanley schools should be encouraged to use the area for educational purposes and school children should become acquainted with and participate in the Trust's rehabilitation project programme wherever possible.
- k. The vegetation and wildlife of the Cape should be carefully monitored by the Trust (eg. the vegetation by recording permanent quadrats and regular, infrequent soil sampling) so that the reasons for success or failures in vegetation recovery can be explained.

The lessons from such an exercise would be of value to those planning to revegetate other bare areas in the Falklands.

#### 7. REFERENCES

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#### 8. ACKNOWLEDGEMENTS

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## 9. APPENDIX 1

Sections of the report on Stanley Common (Miller, 1969) relevant to Cape Pembroke Peninsula:-

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"Mr Anderson and I spent some four to five hours in a full inspection of the Peninsula on July 30th. Feed here was very good as it is the practice for the Department to remove all cows from here in October, with one exception to which I will refer later; these cows are moved during the summer and up to about the following June, between the Fairy Cove area on the north side of the harbour, and the main Common. As a result, this long spell gives the Peninsula plenty of time to produce good pasture for the winter. I would however, observe that such a continued long spell is not necessary, and in my opinion it would not affect winter feed value in the Peninsula, and at the same time help to prevent the present 'eaten-out' appearance of the Common, if during the summer the dry cows were allowed into the Peninsula for two to three weeks at a time, after the end of January. I would recommend this because we have observed during the more recent years at Roy Cove, although the native camps which in past years never had a real spell from grazing stock do indeed produce an abundance of feed, this is usually at its maximum by February (stock having been removed October/November). From then on such areas do not produce any more growth, and in fact, benefit by intermittent light grazing for short periods and are still in a first class condition to carry greatly increased (by early standards) stocking right through the winter. It is important to realise that grass needs grazing, under control, if the owner is to obtain the maximum feed value from any particular area. It certainly does not give better feed value if it is allowed to grow well past the height of seed production and so become somewhat rank and therefore less nourishing.

With regard to the Peninsula itself, I think it might well be worthwhile to surface seed on its eastern half amongst the sandgrass mounds, which are themselves largely grassed over with native fescues and agrostis. It should be possible to drag a small drill-type machine amongst these mounds but it would, of course, be probably fatal to make any attempt at proper cultivation as the sand is lying just underneath and once turned over would blow away and leave bare and unproductive ground.

On the western part of the Peninsula, from Gypsy Cove right around to the high ground opposite the Canache, there are probably about three or four hundred acres of waste ground almost entirely composed of large fern and diddledee. Unfortunately however, in the writer's opinion, this area as a whole is far too rough to lend itself to economical cultivation and reseedling. It would require bulldozing first before any tractors and ploughs, or rotavators could do any good at all. There is a small tussock point at the northern end of Hadassa Bay which would almost certainly produce good tussock, but it is too small for this to be an economical proposition.

There is however what must have once upon a time been a large extent of tussock area, before unrestricted stock had access to it and so killed it out on the eastern beach area from Christina Bay around towards Surf Bay. This area would I think be in the neighbourhood of one hundred and fifty to two hundred acres - in fact a sizeable and useful paddock. It would, however, require about one and a half miles of fencing costing about £450 and here it would be necessary to hurry slowly. The writer has been told that in the 1930's, Mr Weir, Stock Adviser, had this largely planted with tussock but with poor success. However, I have been unable to discover whether the planting was extensive or whether in fact it was ever fenced. There is no residue of any previous fencing signs.

I discussed this possible project with Mr Anderson; in fact we made a separate journey there in the Department's landrover so that we could walk all over it and make a more detailed examination. I suggest that the present Department might profitably do some experimental work in the spring when the land had dried out more than at present. This work could be very small and fairly inexpensive. There is plenty of old partly pulled down fencing in the Peninsula which could provide enough material for the Department to put up two or three scattered plots about forty or fifty feet square, sufficient to keep the cows out, and plant these with tussock (there is plenty available) and then wait and see how they developed. If this planting was successful a major paddock could result which would be a very great lift to dairy stock in winter months.

On sheet two of this report I made a brief reference to the current practice of removing all stock from the Peninsula during the summer months, but with one exception. This exception refers to the rather numerous cows that stay in the Peninsula all the year round and are never out because they appear to be the property of the lighthouse keepers. Even Mr Anderson did not seem to know how many there were of these, but all we saw were in very fine condition and I am sure there were more likely over twenty than under that figure. I understand that the lighthouse keepers do kill the occasional beef animal out of these, which meat finds its 'gratis' way to the town - there were certainly several animals there that would be in the beef category. There are, the writer understands, a maximum just now of three and a minimum two persons resident at the lighthouse.

The writer is also aware that Trinity House requires certain obligations from any community that wishes to maintain their lighthouses, and that this includes a supply of milk. But, Trinity House, whatever its agreed requirements, surely cannot demand a minimum of twenty plus milk cows for about two people? From a stockman's viewpoint I would unhesitatingly say that a total of six cows all the year around, properly spaced for calving would be ample. After all many Falkland Island farms allow a maximum of eight cows for married families, right round the year. Furthermore, as I understood from Mr Anderson, the lighthouse personnel use the Government bull to their cows, though whether this is another task for the Department I did not ascertain."

## Summary of Sheet 1-3

The Peninsula This is closed during summer except for the cows owned at the Lighthouse; it would stand some controlled stocking from February to when the spare cows are all wintered there from June to October. Some consideration might be given to regulating and reducing the milking troop at present used by the lighthouse staff.

## APPENDIX 2

Sections of the "Brown Report" on Stanley Common (1974) relevant to Cape Pembroke Peninsula.

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### 1. Stanley Common

1.2 The Common, in certain areas, has a dual function. Firstly, to provide a source of peat for fuel and it seems clear this must have some degree of priority, but inherent in this there are problems of access to the peat cutting areas. Due to the introduction of mechanised transport of the peat and the fact that the peat cutting areas are gradually becoming further away from the town, the use of the existing tracks is difficult during wet weather. The result is that lorries tend to move away from the tracks to other, more apparently dry areas. Secondly, to provide grazing for stock, mainly dairy cows and horses.

1.3 Under unfenced conditions, which at present prevail on the Common, these two functions are to some extent in conflict, although it was observed that cattle made use of cutover peat areas as shelter in periods of higher winds. Nevertheless, the lack of fences allow cows to range for long distances, for example as far as Eliza Cove on the south and the lighthouse on Cape Pembroke Peninsula. Such a situation makes the management of dairy cows, by any standard, very difficult, and this can be exemplified by the claims of one dairyman that he walked up to five miles daily to collect his cows for milking.

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1.10 It is recommended that the first step in the improvement of the grazing on the Common should be:

- (c) In Cape Pembroke Peninsula some fencing could improve the grazing, especially surrounding Rookery Bay. It may be worth while considering planting an area of Tussac grass (*Poa flabellata*) near Rookery Bay since it is understood Tussac grass flourished in this area. Properly managed, Tussac grass can provide valuable winter forage. In general the Peninsula area appeared to be in poor condition (poorer than other areas of the Common) at the time of the visit but this impression may have been created by extra

grazing during the summer months. Since some of this area is to be developed for the new airstrip, it may be more expedient to confine the fenced area to that adjacent to Rookery Bay. It is not the opinion of the consultant that the building of the new airstrip will drastically reduce the more valuable grazing areas.