

ARC
GTD/31/2

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V.1

CLASSIFICATION **CONFIDENTIAL**

GROUP Agricultural Research Centre

SUB-GROUP GENERAL

SUBJECT GOOSE STUDY

ARCHIVE

OFFICER DEALING NECTED FILES

FILE OPENED 12-7-78

FILE CLOSED

Bu	24/7/78	DCS	Bu	24/8	Bu	25/10	Bu	30/1
CS	24/7/78	Mrs. Booth	Bu	24/9	Dec bu	25/10	Dec bu	30/1
R	20		AS Bu	24/9	Bu	25/10	Bu	
ACS	10	1/9	DCS	2	Bu	19/10	Dec bu	25/10
DCI	16		AS	7	AS Bu	19/10	Bu	3/11
igne	C	6/7	Bu	22/3	Pa	-	Dec bu	3/11
to	-	24/9	AS Bu	22/3	DCS	32	Bu	8/11
Pa	-		Bu	12/4	DCS	33		9/11
igne	-	24/10	AS Bu	12/4	AT		Bu	14/11
ACS	-	23/10	Bu	12/5	CS	23/10	Dec bu	15/11
Dep	-	23/10	CS	8	AS	10	Bu	24/11
ACS	-	23/10	AS	9	Pa	-	Dec bu	24/11
Pa	-		igne	7/5	CS	29/10	Bu	25/11
AS	156	27/10	AS	7/5	Pa	-	Dec bu	25/11
Pa	-		Dep	7/5	AS	27/7	Bu	5/12
AS	57	29/11	AS	7/5	Pa	-	Dec bu	7/12
Pa			Pa	AS Bu	CS	42	Bu	16/12
AS	156		Bu	19/6	Bu	23/8	Dec bu	16/12
BO	-		Bu	20/7	Bu	15/9	Bu	23/12
BO	22/1	AS	AS Bu	20/7	DCS bu	15/9	Dec bu	-
AS	159	22/1	igne	23/4	CS	11	Bu	3/1
Pa	-		AS	-	Ag	12	Dec bu	5/1
DCS	160	6/2	Dep	-	Bu	13/10	Bu	20/1
Bu	19/2	✓	AS	-	Ag	20/10	Dec	23/1

Handwritten notes and signatures on the right side of the table, including a large 'V' and '20'.

1.

C.S.

Your minute on (8).

Copies of the report etc. have now been forwarded to Mr Kerr. Papers re-submitted please.



10.4.78

2

YE

You may like to see OMT's Adviser's laconic comments, at Folio 7, on Prof. Gunn's report (Folio 6).

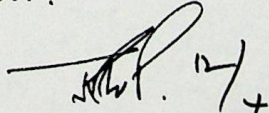
2. Action essentially lies within GTU, though I shall establish what, if any, help GAT can offer if there are difficulties about Dr Gunn's housing at Goose Green.

 12.10.78.

3

C.S.

Thank you.

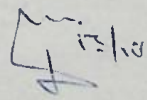
 12/4

4

AS

11. See para 2 of my minute at 2

2. Would you now check with Mr. Kerr whether there is anything that GAT could or should do

 13/10

Note: Question of Dr Summers' housing discussed with Mr C D Kerr and the C.S.
It appears that the FIC cannot give a security of tenure for a longer period than one year. It is felt that no immediate action can be taken by Govt. in this regard.

S.

11.4.78

6

Mr Booth

Pl note (160) for the Housing list. As there is likely to be a need for more than six months it may be as well to copy the letter to the Housing file.

D.R.
19/2

7

C.S.

pps. 26 & 27. There are, I think, only three aspects with which Govt. might become directly involved in due course -

- i. the use of FICs for the aerial transects (-para 6.2).
Once the Islander is in service this should present less of a problem.
- ii. selection of Mr Dennis Middleton for casual employment during Dr Summers' absence on overseas leave (-para 4(c)(2)).
- iii. accommodation in Stanley for Dr Summers and his family early in 1980 (-para 4(a)). From p. 2 I note that Professor Durrell mentioned this matter to you when you met on 1st February. The Housing Committee will thus be aware of the requirement?

✓ Yes.

D.R.
26/2/79

S.

26.2.79

CS,

Mr C D Kerr has asked to see prof. Dunnet's latest report on the Goose Project. The Report is at p. 26 pl.

The earlier report was made available to Mr Kerr (pages 6-9), but it was not classified. The present report is 'Confidential' - I think that generally reports are classified in the first instance and the classification is afterwards lifted. There seems to be nothing in the report which Mr Kerr should not see. He may see it pl?

There is only one reservation which I have - namely, we have not had ODM's Adviser's comments on the report, but I am not sure that we expect them. The second report seems to have been received through Government House and not from ODM. Perhaps we should go back to the Ministry first?

J.
2.5.79

9.

A.S. Yr. & pl.

I see no reason why Mr. C. Kerr should not see the report at this stage. As for the ODM Adviser's comments I suggest we may not get them for some time but perhaps it would do no harm to enquire politely of ODM. as to whether or not the Adviser will be commenting

J.B.
4/V.

10.

A.S. Could you pl. let Miss Burkett know we have received F(36) in case she has not had copies & wishes to see ours.

J.B. 23/V.

J.
4.5.79

copy
forwarded

P. 4.2.

To see pl. Your predecessor suggests
that the matter might be discussed in
ExCo. It is an emotive subject!

12 . 15. 9. 83

A/Des

If the cost of the proposed study is to
be met from the £31m development fund
we can do without it but this file
is too thick for me to wade
through. Verbal briefing and
recommendation plan.

Bef. 29^{ix}

13.

Extract from Minutes of ExCo Meeting No. 14/83
held on Thursday 15 December 1983:

49. FIARDC (Memo 9/4/83)

- vi) Goose Ecologist - A second full time goose
officer was not considered necessary although
Council would welcome the appointment of a
part time PhD student to undertake the Brent
goose investigations if ODA would agree to
fund the appointment from sources other than
the Development Grant.



Ministry of Overseas Development
Eland House Stag Place London SW1E 5DH

Telephone 01-834 2377 ext 127

22/1
175
2

Mrs C Johnson
c/o Chief Secretary
The Secretariat
Port Stanley
Falklands

Your reference

Our reference

CLA 56/239/06

Date

6 March 1978



Dear Chris

I enclose an advance copy of Professor Dunnet's report as it may be of use to you personally.

Apparently he sent it under a covering letter to FCO/WIAD. Our copy came with a comp. slip only so we shall need to up-date him about ODM/FCO organisation! He also sent a copy to the Governor, though this may not have arrived yet. In any case I have now asked Tony Thorne and Bob Waddell for their comments and I will send these off to John Massingham as soon as I get them, together with 5-6 more copies of the report. The enclose copy you can of course leave behind with John.

Mrs M C Rosser

RJR
15.11

Enc

Copy of Report handed to Mr C.D. Kew today.
28.3.78



Ministry of Overseas Development
Eland House Stag Place London SW1E 5DH

Telephone 01-834 2377 ext

John Massingham Esq
Chief Secretary
The Secretariat
Port Stanley
FALKLAND ISLANDS

Your reference

Our reference CLA 56/239/06

Date 21 March 1978

Dear Sir,

GOOSE PROJECT

Chris Johnson will probably have left with you a copy of Professor Dunnet's report. He himself forwarded a copy to the Governor. Our advisers have now had an opportunity to study the report and I attach their detailed comments together with 5 more copies of the report itself which you may wish to pass on to the GTU. Our Animal Health Adviser, who has been concerned with the project since its inception, makes the general observation that "this is indeed a report on work which seems to be developing in an excellent manner well aligned to answer many of the practical points in the current situation".

Yours truly

Mrs M C Rosser

AS
Now pass 3 more copies of Prof. Dunnet's
Report to Mr. Kerr, together with
photocopies of OHA's Adviser's comments.

2. cc. resubmit yps on the new file
that I suggested, so that I can
pass them to HE to see

CU
4/10
7

ENC



Letter to Dr. Kent
Munich to AS
Then R. J. A.
3/1/78

CS

3

GOVERNMENT HOUSE,
FALKLAND ISLANDS.

31 March 1978

Professor G M Dunnet
Department of Zoology
University of Aberdeen
Tillydrone Avenue
ABERDEEN AB9 2TN
SCOTLAND

Thank you for your letter of 28 February, enclosing your interesting and informative report on Dr Summers' goose studies. It was good to know that he has made such a promising start and the recommendations you have made for the future progress of the project will be closely followed up to ensure the best possible use of Dr Summers' services in this important field.

I am grateful you were able to give us so much of your time and I am glad your stay in the Islands was as enjoyable to you as it was valuable to us. My wife and I were delighted to meet you, and we both send you our best regards.

J R W Parker

I take it that a
copy of the report has
been to his home, with
a request he should
follow-up the recommendations

3/1/78

3 April

78

Mr C D Kerr
Grasslands Trials Unit
Stanley

PROFESSOR DUNNET'S REPORT

I was glad that we were able to unearth a copy of Professor Dunnet's Report for you to see before you left on tour. The slightly irregular manner in which it reached us undoubtedly caused some confusion.

2. I see that, in the covering letter that Mrs Rosser sent to Mrs Johnson with the copies of the report, she mentioned that both Tony Thorne and Bob Waddell have been asked for their comments. No doubt we shall be getting these quite soon.

3. Until we get these, there is really not much that we can do, although there are a number of points that you can implement locally. Of all the points made by Professor Dunnet, the one which I presume you have taken immediate action on is the suggestion in paragraph 4(6), that some allocation should be sought in your budget for the Goose Officer to obtain up to six weeks' casual assistance locally.

4. I shall be in touch with you again about all this once we have received the commentary from ODM.

JOHN MASSINGHAM
CHIEF SECRETARY

JB

Report on visit by consultant supervisor to Goose Project,
Falkland Islands, January/February 1978.

G. M. DUNNET, University of Aberdeen.

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1. TERMS OF REFERENCE

To "review progress on the Goose Study which forms part of the Grassland Trials Unit project and to recommend the future programme and requirements."

2. ITINERARY AND DATES

Thursday 26 January, 1978 Aberdeen to London; visit to Mr. A.C.L. Thorne et al., at ODM, Eland House. Evening depart London for Buenos Aires.

Friday 27 January Buenos Aires.

Saturday 28 January Buenos Aires.

Sunday 29 January Buenos Aires to Comodoro Rivadavia.

Monday 30 January Comodoro Rivadavia to Stanley. Arrive Stanley 1230. In afternoon Mr. John Eadie and I spent one and a half hours discussing the general situation of the GTU and its work with the Governor. Evening cocktail party provided by Mr. Campbell Kerr to meet a large number of people including the staff of the GTU.

- Tuesday 31 January Met with Messrs. Kerr and Eadie to discuss and modify our programme. Spent morning in laboratory with Jim McAdam and Steve Whitley and Miss Heather Rogers - all members of the GTU staff. Especially discussed with McAdam the work he is doing as the agronomist, and especially his vegetation mapping. Afternoon flew to Goose Green, met Dr. Summers and spent the afternoon in his Ceritos Arroyo study area. Saw and discussed problems of his breeding study, and saw numerous marked adults and goslings.
- Wednesday 1 February In morning carried out the Bodie Creek road transect and developed tests to check the effective width of these transects to be 250 metres on either side of the track. Afternoon carried out the Laguna Verde road transect, and visited the Old House Pond which was used by shedding geese. Saw numbers of dyed geese but the need for using neck collars of some kind is clear.
- Thursday 2 February In morning carried out aerial transect of Lafonia and Bleaker Island. Afternoon visited the reseeds at the Burntside paddocks and in the Laguna Legna sites towards the San Carlos boundary. Discussed various aspects of measuring activity of geese on different kinds of pastures.
- Friday 3 February In morning went to meet Campbell Kerr, John Eadie and Arthur Monk at the boundary fence between Darwin and San Carlos. Lunch at Darwin House with Brook Hardcastle, Steve Whitley and Tony Blake (the manager of North Arm) as well as Kerr and Eadie, spent the afternoon touring the reseeded paddocks in the immediate vicinity of Darwin. Looked particularly at the problems of geese on small areas of kale and peas grown particularly in support of the dairy.
- Saturday 4 February Spent the morning visiting the reseeding experiments at Orqueta and the difficult two pasture experiment at Brenton Loch. Afternoon drove to Fitzroy (5 people in one landrover) a trip which took $4\frac{1}{2}$ hours. Carried out extensive ground transect en route.
- Sunday 5 February Drove from Fitzroy to Stanley again $4\frac{1}{2}$ hour trip and carried out ground transect en route.
- Monday 6 February Spent the entire day in the laboratories of the GTU discussing the goose programme in detail with Dr. Summers.
- Tuesday 7 February In morning flew from Stanley to Hill Cove with Dr. Summers. Spent the afternoon with Messrs. Kerr and Eadie and also Tim Blake (the manager of Hill Cove) looking at reseeds of various kinds, the two pasture system and goose problems on Hill Cove farm.

Wednesday 8 February Drove with same party from Hill Cove across to Roy Cove from there to Chartres again looking at various kinds of extensive reseedling, some work on experimental management sheep and the goose situation.

Thursday 9 February Spent the morning at Chartres looking at some problems relating to geese damage to dairy paddocks. Flew in the afternoon from Chartres to Stanley. Had dinner at Government House.

Friday 10 February Spent the morning at a review meeting with Dr. Summers, Campbell Kerr and Mr. Eadie to discuss the elements of the goose programme and its integration with the general GTU objectives. Afternoon John Eadie and I discussed the overall problems of the GTU and the goose study and their integration. In the evening met Mr. Ian Strange a local naturalist and conservationist.

Saturday 11 February Spent the morning with Dr. Summers in the GTU laboratories, going over final details of the goose programme.

Sunday 12 February Day off.

Monday 13 February In morning gave radio interview to the local broadcasting service, met the Chief Secretary and his deputy for final comments, visited the GTU laboratory and spent an hour discussing the form of our reports with Mr. Eadie. In afternoon left Stanley for Comodoro Rivadavia and arrived in Buenos Aires about 2200.

Tuesday 14 February Left Buenos Aires in afternoon for Rio and London.

Wednesday 15 February Arrived London approximately 1700 and caught a plane for Aberdeen about one hour later getting home at approximately 2000.

3. ASSESSMENT OF PROGRESS TO DATE

Dr. Summers has been in the Falkland Islands for approximately four months and has made a satisfactory start on all of the main items of the programme.

Survey of the Ecology and Geographical Distribution of Geese in the Falkland Islands.

(a) Ground Transects

Three have been established in the Goose Green area covering a range of habitats including white grass camp, valley greens, and reseeded pastures. Each transect is approximately five miles long and all geese and sheep which occur in a strip 250 metres on either side of the track are recorded, together with the type of pasture on which they are feeding. As far as possible the age, sex and group size of the geese are determined and recorded. Each of these transects is covered once per month and an additional two transects have been designed to extend the area covered and also to add to the types of vegetation.

A modified form of ground transect is carried out whenever possible during long landrover journeys. On those occasions it is not possible to obtain the same detail of age and sex of the birds but it is possible to obtain information on numbers, group size and their distribution in relation to sheep on the different main habitat types. These transects will be carried out whenever the opportunity presents itself.

(b) Aerial Transects

We were able, while I was there, to carry out the first aerial transect. It was most effective to fly at a height of 250 feet above the ground and we felt that the pilot of the FIGAS Beaver was able to maintain this height with acceptable accuracy. The speed over the ground was approximately 100 knots, and on the first transect we obtained data from a strip 165 metres wide, over a total length of 86 kilometres. This was designed, on the basis of the GTU vegetation map, to cover mainly Lafonia, including white grass areas, valley greens, some reseeded pastures and the last part of the flight was over Bleaker Island. Under these conditions it proved possible to detect and identify the geese within the strip and also to count the numbers of sheep there, though the latter tended to be much more disturbed by the aircraft than were the geese. The flight plan covered a pre-determined track which was based on a vegetation map and allowed the definition of the habitats to be pre-determined. A table of the data from this flight is appended.

This/

Summary of data from first aerial transect

2 February 1978

	White grass	Valley Green	Bleaker Island
at 300'			
Km run	14.5	34.5	
Km ²	2.39	5.69	
at 250'			
Km run	6.0	3.75	18.5
Km ²	0.78	0.49	2.41
Geese/Km run	0.09	4.63	
Sheep/Km run	24.58	50.41	
Geese/Km ² 1st half	0.8	28	
2nd half	0	35	98
Sheep/Km ² 1st half	182	337	
2nd half	87	20	86

This aerial transect will be repeated at four key times throughout the year and we designed a second transect to cover a completely different range of habitats in the north-western part of the East Falkland and this too will be carried out four times a year.

The data from these transects will enable, for the first time, estimates to be made of the actual density of geese (and of sheep) on the different habitat types in the Falkland Islands. The satisfactory execution of the transects requires three members of the team to be present: one (Dr. Summers) to observe the geese, one to count the sheep, one up front to identify the habitats and to indicate to the other observers the beginning and end of each section of the transect which is of a particular habitat type.

(c) Breeding biology and social organisation

Observations made by Dr. Summers over the latter part of the breeding season and the late summer have shown clearly that the population of geese consists of breeding pairs which, if successful, remain with their broods of goslings on the breeding grounds at least until early February, and in addition, large groups of birds, presumably young birds which have not yet bred (and certainly containing last year's goslings), and possibly failed breeders, which from December through to early February concentrate at ponds and other sites for their annual moult. The importance of the social organisation of the goose population has therefore been emphasised and it is clearly important to study both components of the population in some depth. There is at least some evidence that the part of the population which is doing most damage may be the non-breeding birds which tend to flock in considerable densities in some of the more vulnerable areas.

Bearing these points in mind Dr. Summers has established a study area in the Ceritos Arroyo near Darwin, in which he caught and marked conspicuously and individually 23 adult females and 19 adult male upland geese which were breeding there, and also 12 adult ruddy-headed (brent) geese whose sexes were not determined. In addition to these breeding adults 83 upland and 15 brent goslings were marked on the breeding grounds. It is planned to double the number of individually marked breeding adults at the beginning of the next breeding season to enable information to be obtained on fidelity to breeding site and to mate and also on the annual survival rate of breeding adults. This may require an extension of the study area in the Arroyos.

About/

About 700 moulting birds were caught, ringed and marked with conspicuous dyes at five different 'shedding' sites on both the East and West Falkland. Useful information was obtained about the age and sex of at least some of these birds confirming that a proportion of them are in their first year. By early February when I was there some of these dyed birds had been identified some distance from the places at which they were marked and Dr. Summers had mounted a publicity campaign in the hope that marked birds would be recorded and reported at the various settlements. This part of the programme in the current season was something of an experiment since techniques had to be developed and good working relations established at various parts of the islands. As a result of this it is now felt that it should be feasible to catch and mark about 2000 shedding geese at six selected sites on the East and West Falkland next season. This should provide an adequate sample to detect the patterns of movement of the geese throughout the islands. It is important to obtain information about the seasonal pattern of distribution and density of both the breeding and the nonbreeding parts of the goose population in relation to different habitats so that a general understanding of population processes can be achieved. From this it should be possible to predict possible population changes which may result from any extensive improvement of pastures which may eventually be achieved in the islands and to make recommendations about management responses to the goose situation.

(d) Identification of pest situations

The work done on the ground and air transects outlined above will enable some assessment to be made of the degree of usage that geese make of both reseeded pastures and pastures which are important in the implementation of the two-pasture system of grazing. As a preliminary to detailed work on situations in which the geese may be serious pests, observations will be made on the amount of food ingested by an average goose per day in both summer and winter. Observations will also be made to correlate the number of goose hours spent on pastures with the abundance of droppings picked up on cleared sample plots after a period of 24 hours. Attempts will be made to ascertain the best sampling procedure and the sample size for such work so that techniques will be available for the intensification of this kind of study at a later time.

This part of the programme will depend on close liaison with the rest of the GTU programme, and the co-ordination of the goose project with the agronomist and the sheep specialist must be the responsibility of the/

the team leader. I strongly recommend discussions involving all members of the team should take place regularly - say once each three months - and that part of their objective should be to identify areas in which it is important that studies of the geese be integrated with other parts of the GTU programme of experiments and extension activities. The precise nature of the work to be done in that situation will become apparent once appropriate discussions have taken place, but each element of the programme should have a formal "project plan" or schedule in which objectives, methods, operational timetable, time scale and criteria for success are defined.

4. GENERAL POINTS

A number of important general points became apparent during my visit.

(a) Base for the Goose Study

Owing to the extreme difficulty and the amount of time involved in travelling extensively over the camp by landrover it is essential that as much as possible of the work should be concentrated at one locality. Dr. Summers's station at Goose Green is ideal from many points of view as geese are abundant there, there is a considerable variety of unimproved and improved pastures within ready reach, and it is possible to carry out aerial transects beginning at Goose Green to cover a wide variety of habitats in the Falklands. The experimental two-pasture system at Brenton Loch is also on the doorstep. I therefore strongly recommend that as far as possible the programme should be concentrated in that area and that everything should be done to ensure security of study areas at the Ceritos to enable his detailed studies of breeding birds to continue over three breeding seasons. I understand that the tenancy of his present house is for a period of 12 months and I would strongly urge that arrangements should be made to ensure his accommodation in Darwin or Goose Green for the duration of the study.

(b) General Assistance

It is clear that when geese are shedding next year a massive effort will be necessary to catch and mark a total of 2000 at six different locations. Some assistance will be required. Dr. Summers was most appreciative of all the assistance that was made available to him this season, and especially to Campbell Kerr for the arrangements he made for him to visit various farms and to get assistance there. However in the forthcoming season it will be necessary to be assured in advance of at least one extra pair of hands and perhaps to be able to employ for a period of four to six weeks casual assistance to enable him to handle and process the large numbers of geese. /

geese. This is a matter for the consideration of the team leader, and it may be necessary to make budgetary allocations for this purpose. A strong case can be made for having a GTU landrover on the West Falkland during the summer to support the marking of shedders, and also to enable ground transects to be carried out without being dependent on farmers for transport as well as accommodation. There are other reasons why GTU would find a landrover based at Fox Bay very useful.

(c) Progress Reports

I think it is important that Dr. Summers be asked to produce progress reports at intervals of about six months, in March and September. These reports should describe progress made, giving summaries of accumulated information and also an outline of the plan of work for the ensuing six months, and should be sent to both the team leader and to the consultant supervisor, both of whom must be kept fully informed about progress and plans.

(d) Timing of the Goose Project

We discussed at length the overall timing of the project, and I learned for the first time that Dr. Summers had been appointed for a period of three years (not four) beginning in July 1977 and therefore terminating in June or July 1980.

I attach an outline timetable of the main activities. The work falls into a number of intensive activities with a very marked concentration during the period October to January or February in each year. It is essential to complete in the first 12 months (which began effectively in October 1977) a complete survey of the seasonal cycle of activities of the geese. This should be repeated as far as possible in the second year, especially at critical periods, but there will be again a very intensive period of activity from September 1979 through to February 1980. I consider it essential that there should be an opportunity for a major review of the work in the middle of 1979 between the two intensive work periods - that is to say sometime between May to August 1979. In my view while the work done in this programme must be relevant to the practical problems, it must be of a high scientific standard, and should at the end of the day be acceptable for publication in reputable scientific journals. Accordingly I strongly recommend, and would seek to insist, that Dr. Summers returns to the U.K. in April/May 1979 for a period which should include at least one month for work in addition to any leave that may be due to him. During this/

this period I would expect him to analyse his data to the point at which he can present an account of his work to an audience of ecologists at the University of Aberdeen. It would also enable him to discuss his plans for the breeding season of 1979-80 before returning. I would like to stress this very strongly indeed, and would point out that this suggestion was made in my earlier proposals for this study.

It should also be possible during his period in this country in 1979 to decide whether or not there was a strong case for continuing the study beyond the three years which are currently authorised. My impression at the moment is that such justification would depend primarily on the way in which the programme of goose work will come to be integrated with the experimental programmes and other observations carried out by the GTU as a unit. I believe that if things go well we should be able, after three years' work, to obtain a substantial amount of information on the general ecology of the geese and to make predictions about their population processes. However it would be possible to bring the programme through to the point where well founded recommendations could be made regarding management decisions.

If the programme is not to be extended beyond the present three year commitment then Dr. Summers should return to the U.K. at the end of March 1980 which would give him three to four months in this country, still on salary, to prepare the work for publication. I think this period would be the minimum. If, on the other hand, the decision is to extend the programme for a further year then Dr. Summers would stay in the Falkland Islands until somewhere about March 1981 and would return to this country again with a period of four months or so for final writing up before the end of his contract.

I cannot stress too highly the need for high quality scientific work in this situation; proper provision must be made for the analyses and interpretation of the data. Quite apart from the need of such work for the project itself the careers of the participants will depend very largely on the publications which will be produced from their work. In my view some of the existing programmes of experiment and of extension work carried out by the GTU are suffering by the thinness with which activities are spread which has precluded the kind of follow-up which is necessary both to understand why some operations are successful and to explain why others are not.

It is important that this report, or some digest of it, should be made available to the team leader of the Grassland Trials Unit.

G. M. Dunnet
27 February, 1978

Advisers' comments on Professor Dunnet's report

Para 3(b) A very interesting approach which must be given every encouragement.

Para 3(c) This paragraph is interesting and important, particularly the last sentence, in view of the change of approach to pasture improvement which is being suggested by Waddell & Eadie. The more costly the pasture improvement programme the more important it will be to manage and conserve the improved pastures.

Para 3(d) This paragraph, too, is important and emphasises the need for liaison with the rest of the GTU programme.

Para 4(a) These recommendations are supported.
(b) and (c)

Para 4(d) The request for Dr Summers to come back to the UK in 1979 is supported though the reason for the timing is not absolutely clear. Importance is attached to the Project review in mid-1979 which, it is felt, should take place in the Falklands, and the next phase of the project considered thereafter.

March 1978

DEV/6

6th April

78

Mr. C. D. Kerr,
Grasslands Trials Unit,
Stanley.

Dear Campbell,

Goose Project

I am forwarding herewith three further copies of Professor Dunnet's report, together with photocopies of ODM's Advisers' comments. Two copies of the report are being retained in this office for reference purposes.

2. The ODM Animal Health Adviser, who has been concerned with the project since its inception, has made the general observation that "this is indeed a report on work which seems to be developing in an excellent manner well aligned to answer many of the practical points in the current situation".

Yours sincerely,

CHIEF SECRETARY

us

DEV 6

FOR NEWSLETTER
14/4/78

(10)

A NOTE FROM RON SUMMERS OF THE GRASSLANDS TRIALS UNIT.

Several hundred geese were colour ringed and dyed when they were shedding on various ponds round the Falkland Islands. The object of this exercise was to find out something about the movements of geese within the Islands. These geese have now left their shedding ponds and several sightings have now been made. If anyone sees a colour marked goose I should be extremely grateful to receive details of the sighting; the date, place, the colour and position of the dye, and the colour of the leg ring if seen. The white panels of the wings were dyed so it is sometimes only possible to see the dye when the bird is in flight. It would be useful to note which of the wing panels was dyed. If any of these geese are shot I should again be grateful for details and the return of the ring. In either case, the informer will receive details about the origin of the goose.

UNIVERSITY OF ABERDEEN

11

G.M. DUNNET

Regius Professor of Natural History

F.G.T. HOLLIDAY

Professor of Zoology



DEPARTMENT OF ZOOLOGY

Tillydrone Avenue

Aberdeen, AB9 2TN

Tel.: 0224-40241

30th June, 1978

Dr. R. W. Summers,
Darwin,
Falkland Islands,
South Atlantic.

Dear Ron,

I have now received your first six monthly report, and have read it through with interest. There are one or two minor points which I might quibble about, but in general it seems to me that the work is proceeding well on the right lines. I think by the time this programme is carried out to cover the full year, you will then have a much stronger factual basis for drawing appropriate conclusions. A minor point on page 4; I am not sure that comparison of biomass itself gives a better indication of the relative food requirements (in terms of ingestion) of geese and sheep than numbers do. Certainly, this point would have to be developed properly in any final document. I was interested in the very complex patterns of wing moult which you are finding in the breeding upland geese, and it occurs to me that comparative information might be available for the Magpie Goose and I will try to dig out appropriate publications and send them off to you. A comment in the passing - I think "monitoring" is a word to be avoided. Nobody knows what it means!

It would have been nice to have had an account of the first (trial) aerial survey in your report, although I understand that you have had difficulties in getting subsequent flights. I don't think any of us doubts the importance of the aerial transects to provide different information from that which you can obtain on your ground transects. At Campbell's request, I have written today to the Chief Secretary expressing concern about the availability of aircraft for this work, and I hope that this situation will improve for us.

I am glad to learn from your letter of 26th May and from Campbell's comments that you have at last persuaded geese to eat pelleted grass. This should be a very great advantage regarding your experiments.

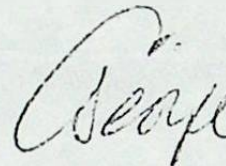
I must confess that I have not yet come to grips with the questions you have asked on the best way of measuring the amount of grass eating from pastures. I have your letter with the tabulated information and I will attempt to deal with this in the next few days, now that I will be at home and free from huge chores for a week or two.

Dr. R. W. Summers

30th June, 1978

With best wishes to you all.

Yours sincerely,



G. M. Dunnet

c.c. Mr. C. D. Kerr, Grasslands Trials Unit
Chief Secretary, Secretariat, Stanley ✓
Mr. A. C. Thorne, Ministry of Overseas Development

GTU/31/2

17 July 1978

13

For one week.

Chief Secretary

Director Civil Aviation

reply sent to Prof. Dunnet
now pa
25/7/78

I attach a letter that I have received from Professor G M Dunnet, one of the guiding spirits of the GTU's Research programme, together with my proposed draft reply. Have you any comments on the latter?

2. I take it than, in due course, you will do what you can to complete the programme of aerial transects.

JOHN MASSINGHAM
CHIEF SECRETARY

JB

UNIVERSITY OF ABERDEEN

12

G.M. DUNNET

Regius Professor of Natural History

F.G.T. HOLLIDAY

Professor of Zoology



DEPARTMENT OF ZOOLOGY

Tillydrone Avenue

Aberdeen, AB9 2TN

Tel.: 0224-40241

30th June, 1978

Mr. J. D. Massingham,
Chief Secretary,
Secretariat,
Stanley,
Falkland Islands,
South Atlantic.

memo to DCA
17.6.78

Dear Mr. Massingham,

I write to ask if there is any way in which you can help to overcome a problem which is, or has been seriously affecting the programmes of the upland goose study. You will know from our research programme and from my recent report, the importance we attach to obtaining data from regular aerial transects of selected parts of the Falkland Islands. These areas have been carefully chosen to cover representative types of country but, and perhaps, even more important, the programme has been timed to co-incide with particular features of the seasonal cycle of goose biology and particular aspects of the sheep vegetation relationship. I gather from both Dr. Summers and Mr. Campbell Kerr, that it has not been possible to carry out the programme we had planned for your autumn owing to, I think, the unavailability of aircraft and pilots or to their priorities lying elsewhere.

I believe that these aerial transects will provide extremely important data to the goose project, data which will have a great deal of practical application and which cannot be obtained in any other way. I would like to make it clear that I regard it as of very great importance to the study and to the GTU. I would, therefore, appreciate it very much if you could use your good offices in any appropriate way to help to ensure that our carefully planned programme of flights can be adhered to - at least as far as weather may permit!

Yours sincerely,

G. M. Dunnet

G. M. Dunnet

copies: Mr. C. D. Kerr, Grasslands Trials Unit
Mr. A. C. Thorne, Ministry of Overseas Development

24 July

78

Professor G M Dunnet
Department of Zoology
Tillydrone Avenue
Aberdeen AB9 2TN
Scotland

(12)
Thank you for your letter of 30 June asking me to use my good offices to ensure that the aerial transects research programme suffers as little as possible from the undoubted problems that have been besetting our Air Service.

2. There have, in fact, been a series of difficulties. First of all our complement of pilots dropped from three to one: then, when we managed to do something about that, we have been reduced to operating one aircraft only. On top of that we have the usual seasonal penalties of bad weather and short flying hours.

3. In such circumstances the Air Service comes under enormous social and political pressures and it has just not proved possible to allocate sufficient air-time for the goose research project despite its acknowledged and well-understood significance for the GTU programme. Naturally the DCA will do what he can to remedy this in due course. But we appreciate that the optimum timing has now been lost.

4. All this is, I imagine, not very reassuring to you or to the research team. The limitations under which our Air Service operates has been our major preoccupation for some considerable time and we have been devoting much of our energies lately to short- and long-term planning for its improvement: something of which ODM are very much aware, for they have been the principal target of our blandishments. Meanwhile, we shall certainly do what we can once we have the two aircraft operating, which, unfortunately, may not be for some time yet.

JOHN MASSINGHAM
CHIEF SECRETARY

cc A L C Thorne Esq
Principal Animal Health Adviser
ODM

Mrs C B Rosser LAD ODM

Mr C D Kerr GTU

EXTRACT FROM M.O.D.'s LETTER OF 8TH AUGUST 1978

Original Letter in GTU/1/1

~~GOOSE~~PROJECT GTU/31/2.

15 As I said at the start of this letter, Professor Dunnet called to see Bob Waddell early in May to discuss this project. The principal conclusions were:

- a) As more basic information emanates from the present research programme the need for the integration of the ~~goose~~ work with other GTU activities becomes more important;

- 2 -

- ✓ b) it is considered that in early 1979 (between January and April) there should be a joint visit to the Falklands by Professor Dunnet and Mr Davies or Mr Eadie in order to evaluate the GTU programme including the ~~goose~~ research exercise. A joint visit will ensure that the ~~goose~~ work is not considered in isolation from the rest of the programme;
- c) if the aforementioned evaluation is approved Dr Summers should return to the UK on leave shortly after this exercise and at the same time carry out the assignments referred to in paragraph 4(d) (ii) of the Dunnet report. Professor Dunnet feels strongly that by having to present his work for discussion with his colleagues in Aberdeen, Dr Summers will automatically maintain the high standard expected of him. Professor Dunnet is, of course, fully aware of the need for our work in the Falklands to be developmental in nature and we see no problem on this score. By the end of their visit to the Falklands in early 1979 the evaluation team will be able to recommend to ODM whether or not the ~~goose~~ programme should be continued. (See also paragraph 19 below).

16 You may be aware that Professor Dunnet has amended Ron Summer's paper and returned it to him for re-presentation, we await the final agreed version.

Agreed to see.

[Signature]
1/9/78

UNIVERSITY OF ABERDEEN

G.M. DUNNET

Regius Professor of Natural History

F.G.T. HOLLIDAY

Professor of Zoology



DEPARTMENT OF ZOOLOGY

Tillydrone Avenue
Aberdeen, AB9 2TN

Tel.: 0224-40241

Your Ref: GTU/31/2

9th August 1978

Mr. J. Massingham,
Chief Secretary.
The Secretariat.
STANLEY,
Falkland Islands, South Atlantic.



Dear Mr. Massingham,

Thank you for your letter of 24th July to Professor Dunnet, who is at present away in Sri Lanka. He will see this on his return at the end of August.

Yours sincerely,

Margaret Reid

M. Reid (Mrs.)

Departmental Administrative Assistant



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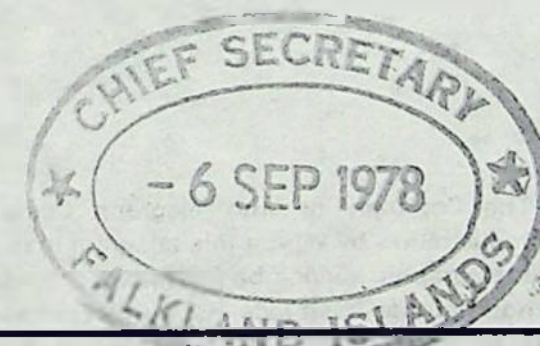
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FALKLAND ISLANDS

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NECKBANDS FOR GEESE GTU. DESPATCHED 25AUG EX FLIGHT RG765
MINISTRANT LDN

COL MODEV231 N0247 11/77 25AUG RG765

Ag C.S.

for GTU

for 18/19

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GOVERNOR



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FALKLAND ISLANDS

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SAME OR FOLLOWING DAY BUENOS AIRES WOULD SUGGEST SEARCHES ARE
INSTIGATED AT BA AND COM RIVADAVIA BUT DID SECRETARIAT NOT RECEIVE
FLIGHT DOCUMENTS
MINISTRANT

COL LTF 275 249 1796088 RG765

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logies to C-10 for action

27 Oct 78



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LTF MINISTRANT LONDON

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NECK BANDS NOW LOCATED BUENOS AIRES MANY THANKS YOUR HELP

GOVERNOR



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28th November, 78.

H.R. Luxton Esq., *AND* R.M. PITALUGA
Chartres.

Dear

GOOSE STUDY TRANSECTS.

Due to the heavy commitments of FICAS and the long periods during which only one aircraft is in work, it has not been possible to fly the scheduled Goose Study Transects during July and October.

2. The suggestion is therefore made that private aircraft should be used for this work, and it is intended to examine the feasibility of their use.

3. The transect extends over two return trips from Darwin -

(a) through J.B. and K.C. to Cape Dolphin;

(b) south through Lafonia towards N.A. out across Bleaker and along the coast of Walker Creek to Darwin.

4. Three observers are required from G.T.U. -

1. Navigator;
2. Goose counter;
3. Sheep counter.

5. The transects are normally flown at 200ft. above ground level, but it is necessary with the use of Private aircraft to increase this height.

6. It is assumed that the present insurance policy taken out by Government will be sufficient to enable such work to be done.

7. It is also assumed that the total length of the transect and the ability of the craft to leave and return to base would necessitate a fuel supply at Darwin, which would be provided by G.T.U.

8. Funds for this work are provided for G.T.U. from U.K. as part of the programme of Technical Assistance.

Could you please indicate whether you would be willing to discuss with DCA/GTU the programme in some detail with a view to completing the project.

Kindest regards,

C.D. WRR.

c.c. Chief Secretary. ✓
D.C.A.
Dev. Officer. ✓

GTU/31/2

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158
23

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FALKLAND ISLANDS
SOUTH ATLANTIC

8th January 1979



C.D. Kerr, Esq.,
G.T.U.,
STANLEY.

Dear Campbell,

GOOSE STUDY TRANSECTS

I refer again to your letter of the 20th November on this subject.

2. As I advised you when we discussed the proposal, shortage of hours on the Salvador aircraft and my own personal time rule me out for this summer, much to my regret.
3. I have discussed the job with Bill Luxton and he is interested in and willing to do it, provided he can be reasonably assured of a prompt 400 hour check being carried out on his aircraft when the time comes, and the need for this will be 4-5 hours sooner if he carries out the transects.
4. The Government insurance is intended primarily for emergency and flying doctor service but a brief telegram to our Brokers would clarify the point.
5. Additional fuel would be required at Darwin as the flight will almost equal if not exceed the usual endurance of these aircraft and unless the wind conditions are very favourable, it might be difficult to fly out of Goose Green with say four hours of fuel and three adult passengers. If the hay has been cut when the transect is done, this will make things easier and I understand some fence alterations have been done in preparation for the Islander.
6. If the visibility is satisfactory, flying at something more than 200' may be an advantage to more accurate counting, as the observers will have more time. Prolonged flying at speeds below 100 mph is not advisable because of engine cooling problems.

I hope the forgoing will be of assistance and that the work can soon be successfully completed for you.

Yours sincerely,

R.M. Pitaluga

R.M. Pitaluga

P.S. Quite o.k. for the visit
in early Feb. Thank you
for your telegram.

R.M.

GTU/31/2

159
24

15th January, 79.

R.M. Pitaluga Esq.,
Manager,
Salvador.



Dear

GOOSE SANDY TRANSECTS.

Thank you for your letter 8th January '79, which was most instructive.

2. It is understood that you will not be able to assist us with the transects this summer due to pressure of work.
3. Bill Lurton is willing to do it if he can be assured of a prompt 400 hr. check on his aircraft, and this I assume will need to be arranged with the D.C.A.
4. Insurance seems not to be a problem.
5. Additional fuel is required at Darwin due to the hours involved in flying the complete transect. I shall take steps for the necessary fuel to be sent to Darwin.
6. I note your point about the flying height. The D.C.A. has advised me that 200 ft. is insufficiently high for a reasonable margin of safety, and we shall adjust the transect width accordingly.

Kindest regards,

C.D. KERR.

c.c. Chief Secretary. ✓
D.C.A.
W.R. Lurton.

67u/31/2

160
25

GRASSLANDS TRIALS UNIT

R + R to
SCS: Prof Dunnet spoke to you
about this, I believe. You
will presumably be v.v.
of interest. I suppose we might be
able to rent a Camp (Dunnet has
for six months)

Stanley

2nd February 1979

John Massingham Esq.,
Chief Secretary,
The Secretariat,
Stanley.



19/2/79

Dear Mr Massingham

GOOSE PROJECT: LOCATION DR. SUMMERS

Having discussed Dr. Summers' progress and programme in detail last week at Darwin, and having had an opportunity to talk about the matter with T. H. Davies (GTU Consultant Supervisor) and C. D. Kerr it now seems appropriate that on his return from leave (September 1979) Dr. Summers should return to his present house at Darwin.

2. His intensive studies during the breeding season (1979/80) must be based there but these will come to a close at the end of January 1980.
3. It seems essential both in relation to the integration of the Goose Project with the GTU programme, and the design of the programme after January 1980, and the necessary close liaison (which requires good communications) that Dr. Summers should be transferred to suitable accommodation in Port Stanley (beginning February 1980).
4. Dr. Summers' present contract expires in July 1980 but if this were to be renewed for a further year Stanley would clearly be the best place for him to be.

Kindest regards,

Yours sincerely,
George Dunnet

G. M. Dunnet

c.c. Mrs. M. Rosser, ODM

Campbell D. Kerr

MEMORANDUM

27

Reference

It is requested that this number and date should be quoted.

Date

From

Chief Secretary



Subject:-

GOOSE STUDY

1. ⁽²⁶⁾ attach the second copy of a report that Professor Turner has submitted to HE.

2. Please go through it carefully to determine what, if any, follow up action may be required.

23/1/79

CONFIDENTIAL

Report on visit by consultant supervisor to Goose Project, Falkland Islands,
January 1979.

G. M. DUNNET, University of Aberdeen.

Contents

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3. Assessment of progress to date	3
4. Future Programme	6

1. TERMS OF REFERENCE

To (a) review progress of the Grasslands Trials Unit Goose Study Project, identify any significant problems and recommend ways of solving them; (b) consider future work under the project and make recommendations accordingly.

2. ITINERARY AND DATES

Monday, 22nd January 1979 - depart Aberdeen 1320; depart London 1935 by Aerolineas Argentinas.

Tuesday, 23rd January - arrive Buenos Aires 1015 local time, overnight in City Hotel.

Wednesday, 24th January - depart Buenos Aires 0740; depart Comodoro Rivadavia 1250, arrive Stanley, Falkland Islands 1315. Met by Campbell Kerr, visited the GTU Laboratory and office had supper at Campbell Kerr's with Mrs. Mary Rosser of ODM and Tom Davies.

Thursday, 25th January - depart Stanley 0930 and arrive Goose Green 0900 (camp time). Spent morning in discussion with Ron Summers and afternoon visited Laguna Verde to look at ringed and collared geese.

Friday, 26th January - at Darwin. Spent morning reading Ron Summers' reports, and visited the Ceritos Arroyos to look at the main study area for breeding birds and the distribution of remaining family parties of geese and moulting birds. In afternoon continued to read the draft of Part 2 of Ron Summers' second six-monthly report. In evening met Peter Maitland of GTU and later had brief discussion with Tom Davies and Campbell Kerr.

Saturday, 27th January - spent morning at Darwin paddocks looking at marked brent and upland geese on the re-seeded pastures. Spent the second half of the morning and all afternoon discussing reports and programmes with Ron Summers.

Sunday, 28th January - very wet and windy day. Spent some time at Salinas Beach looking at birds in general, but also identified about 15 collared upland geese in paddocks near Salinas Beach.

Monday, 29th January - carried out standard ground transect from Goose Green to Orqueta, and an extended ground transect from Orqueta to Egg Harbour where we met up with Tom Davies, Campbell Kerr, Peter Maitland and Alan Miller. From there we went to inspect the large 600-acre rotovated area at Hope Cottage Rincon which the Falkland Islands Company is planning to re-seed with Cocksfoot grass, and within which the GTU is selecting a 50-acre plot for its own treatment using a different seed mixture and more fertiliser. The object was to discuss the problems in selecting the best piece of this area to produce a good demonstration of its capability to produce a good sward. In the evening we had a brief session with Tom Davies.

Tuesday, 30th January - departed Darwin to visit the Brenton Loch experiment with Tom Davies, Campbell Kerr, Peter Maitland and Alan Miller. Looked carefully at the situation regarding the two-pasture system (both control and experimental) and considered proposals for establishing some re-seeded pastures within each of the two systems. We had a long discussion on the objectives and procedures of this experiment and advised on the location of the proposed re-seeds with relation to the likely impact of geese.

After lunch at Darwin House we had a three-hour discussion on the Goose Project. Present were Brook Hardcastle, Alan Miller, Tom Davies, Campbell Kerr, Peter Maitland, Ron Summers and myself. We had a valuable discussion during which the progress of the Goose Study was outlined and discussed. After the meeting Tom Davies and I had an opportunity to discuss the implications of the study and its relationships with the GTU programme in general.

Wednesday, 31st January - spent the morning with Ron Summers discussing the implications of a number of major points which arose during the discussion in the previous afternoon. Later we went to the Salinas Beach area and shot three geese which were feeding on white grass in order to look at the contents of their crops with a view to considering how best to describe the diet of birds feeding in this situation.

Thursday, 1st February - left Darwin at 0900 and flew to Stanley via Salvador and Green Patch. After lunch in Stanley met Mr. Douglas Morrison to discuss Dr. Summers' future programme, especially with regard to his travel arrangements over the next few months and the need for accommodation in Stanley at the end of the next breeding season's work at Darwin.

Later had some detailed discussions with Campbell Kerr especially on the points raised during the afternoon meeting at Darwin to review programme as a whole.

Friday, 2nd February - 0900 gave interview to Mr. Watt of the Falkland Islands Broadcasting service. 1000 met His Excellency the Governor for a discussion on progress and plans. 1100 met the Chief Secretary, Mr. John Massingham, for discussion of progress and future requirements of the Goose Project.

Had lunch with Campbell Kerr who drove me to the airport. Depart Stanley 1430, arrive Buenos Aires 10.30 pm, and on learning that the British Caledonian flight had been delayed decided to attempt to transfer to that flight expected to depart at 0130. After a meal in the City Hotel we went to the international airport at Ezeiza and after some argument eventually took off with British Caledonian Airways at 0230 (Saturday).

Saturday, 3rd February - in transit, British Caledonian Airways.

Sunday, 4th February - arrive London Gatwick 0015. Car to Heathrow and hotel accommodation there (Provided by British Caledonian Airways). 0800 depart London Heathrow for Aberdeen and arrived home at Newburgh at 1000 hours.

3. ASSESSMENT OF PROGRESS TO DATE

In general Dr. Summers has made very good progress on most of the major items of his programme. I will refer to these in detail using the code numbers under which the total programme for the Grassland Trials Unit has now been sub-divided. Since my last visit Dr. Summers has produced his first six-monthly report and Part 1 of his second six-monthly report. I saw in more or less completed draft Part 2 of his second report and commented on it in detail with him. These reports in my view indicate in some detail the progress that has been made and accordingly I will keep my remarks here brief.

6.1 - GROUND TRANSECTS Data on the 4 standard ground transects or counts in natural vegetation are presented in the first and in Part 2 of the second six-monthly report. A complete 12-month coverage of these counts will be completed in February 1979. (Regular counts have also been made weekly or monthly on improved pastures near settlements (Burntside paddocks and Darwin dairy), and out in the camp (Teal Creek and Bodie Creek)). The data have yet to be analysed. The programme will be continued less frequently to provide a second year's cover.

EXTENSIVE GROUND TRANSECTS These also are reported upon in Part 2 of the second six-monthly report. This part of the programme is essentially opportunistic and several sets of data have been obtained covering various areas (W. Falkland, Darwin-Stanley, JB Boundary, and Cape Dolphin) and times of the year, though mainly in the summer owing to difficulties of extended transport by Land Rover during the winter.

6.2 - AERIAL TRANSECTS Only one aerial transect has been carried out in addition to the preliminary transect which we did during my last visit to the Falkland Islands. The same transect over Lafonia to North Arm was carried out again in April and again included Bleaker Island. The data obtained essentially confirm the patterns which we obtained in our first transect but it is a matter of great regret that the planned series of aerial transects has not been achieved. Quite clearly FIGAS has been operating under severe constraints during the last year owing to a shortage of both pilots and aircraft, and it apparently has not been possible to allocate the necessary priority to provide aircraft for this purpose. Mr. Kerr has been investigating the possibility of making use of private aircraft

on the Islands for this purpose and there is a real possibility that this could proceed. The purpose of these aerial transects is to obtain estimates of the density of geese in several habitats in widely different parts of the Falkland Islands and to compare these densities with those of sheep in the same habitats. This is the only way in which we will get information on the overall distribution and abundance of geese in the different habitats and the different locations in the Falkland Islands. I still consider this to be very important information and would emphasise that it can be obtained by no other approach. I therefore recommend that every possible effort be made to achieve during the coming year a set of transects as described in my last report, and in addition a one-off survey to include a number of selected offshore islands on which it is generally held that the geese are very much more dense than anywhere else.

6.3 - BREEDING BIOLOGY The study of breeding biology which was begun in the Cerritos Arroyos last year has been continued during the current southern summer. The information on this is presented in Part 2 of the second report, and last year's aim to double the number of marked breeding birds of both upland and brent geese has been achieved. There are now 87 individually-marked breeding upland geese, and 20 individually-marked brent geese in this area. Detailed information on dispersion and density, laying dates, clutch size, hatching success and fledging success has been obtained. In addition the behaviour of the breeding birds, failed breeders, and family parties and their relationship between these and the flocking non-breeding birds and shedding birds is also understood. Comparison between the 1978/79 situation and the previous breeding season indicates that by and large the geese retain the same mate in consecutive years and breed in the same place, and a minimum survival rate for breeding adults of 75 per cent has been calculated. It may well be that this is a substantial under-estimate (since some marked birds may have been missed, or may have gone elsewhere) and a refined estimate of adult survival rates will be obtained at the end of the 1979/80 breeding season study in the same place. Information is also accumulating on the age at first breeding, since Dr. Summers has been able to establish plumage characteristics to distinguish birds at least throughout their first and possibly also their second year of life.

6.4 - SOCIAL ORGANISATION A substantial amount of information has been obtained during the breeding study referred to above on the social behaviour of breeding adults and their family parties. Much information has also been gathered (as a result of the individually-marked birds) on the composition of feeding flocks in situations remote from breeding sites and especially at shedding areas and on re-seed near settlements. It is now possible to distinguish between family parties and other small assemblages of adult geese and the distribution of these in

different habitats throughout the year is being obtained from the ground transects during which such detailed observations are possible.

The large samples of shedding birds provide valuable data on the age and sex composition of this component of the population; such flocks do not contain current breeders or their broods. Interesting and unusual patterns of moulting have been detected.

MOBILITY Although approximately 700 birds were caught and conspicuously dyed at a number of shedding sites in the summer of 1978/79 very few reports came in of these birds from people in the camp. However, Dr. Summers himself was able to make a number of useful observations of these birds in the Darwin area where he carries out his intensive observations. This summer an additional 1,200 geese were caught at 4 or 5 shedding sites and marked with conspicuous individually-marked collars as well as legrings, and a publicity campaign is being mounted in the hope that these birds will be reported to Dr. Summers whenever they are seen about the Islands. There is a good deal of evidence that some of these marked birds are in fact seen but not reported, and all efforts will be made to encourage observers to pass on the information. If the results of this year's effort are as disappointing as last year's, there would be little point in expending the considerable amount of time, logistic effort and expense required to repeat the operation on an extensive pattern. However (see below) there may be a case for carrying out extensive catching and conspicuous marking of shedding geese in some island situations, and/or in relation to re-seeds.

6.5 - INTAKE STUDIES Details of this part of the programme are presented in Part 1 of the second report. Experiments have been carried out to test the applicability of the indirect method of assessing digestive efficiency which is based on a comparison of the proportion of cell wall material in ingested food and in faecal material. This experiment was carried out using a grass pellet diet with a captive bird and demonstrated that, on this diet with a very high cell wall content of 27 per cent, a digestive efficiency of 26 per cent was obtained. This contrasted with preliminary experiments carried out at Culterty in August 1977 on a diet of fresh grass with a cell wall content of about 19 per cent giving a digestive efficiency of about 35 per cent. Field work has also been carried out on some of the natural greens and on the Yorkshire Fog re-seeds where the cell wall content of the ingested diet can be calculated and the cell wall concentration in the faeces can also be obtained. Values for efficiencies under these conditions are still to be calculated.

In order to estimate the amount of food consumed by geese, their faecal production has been measured in a number of situations during the winter. Data are now available on the amount of goose faeces deposited per m² per day on

different pastures. Work has been carried out at Burntside on reverted Yorkshire Fog re-seeds, on greens at Darwin Dairy, and on mixed Yorkshire Fog and Cocksfoot re-seeds near Darwin Dairy. Faecal production has been correlated with the numbers of geese counted throughout the day on these pastures and a correlation coefficient of about 0.7 has been obtained. However, there are statistical problems in the analyses of these data due especially to the highly skewed distribution of the faecal pellets on the pastures. This will be properly analysed during the summer in Aberdeen.

Counts of geese on pastures have been obtained throughout the day in winter to obtain the diurnal patterns of numbers and grazing behaviour on Darwin, Green, Darwin Dairy and the Burntside paddock. A certain amount of variability is found in these patterns but the upland geese seem more consistent than the brent geese.

The daily intake of food by free-living geese on greens has now been calculated from information on numbers of geese, the length of the grazing day, the number of faecal pellets produced per hour on the paddocks, the production of faecal pellets during the overnight roosting period, and the estimated digestive efficiency. Intake amounts to approximately 250 grammes of grass per day for an upland goose in winter. The estimation of intake will be repeated during February 1979 in the same situations to provide information on seasonal variations. The calculations will be compared with information obtained from the daily intake of captive geese which was carried out in April and which may yet be repeated.

6.6 - COMPETITIVE FACTORS No work has so far been carried out on the direct or potential competition between geese and sheep on particular pastures. Such work clearly will require the participation of an agronomist as well as of the sheep people (little seems to be known of the precise diet of sheep in any of these situations) and this, in my view, should constitute a second phase of the overall programme, carried out in close collaboration with other members of the Grassland Trials Unit.

In concluding this assessment of progress I would like to say that very substantial progress has been made. In all sections other than aerial transects estimates can now be obtained which should be sufficiently precise to enable us to estimate quantitatively the amount of grass that the goose population will be eating, in different situations and seasons. We also have a good understanding of population parameters and of the social organisation and behaviour of the different social components of the goose population.

4. FUTURE PROGRAMME

(a) General timetable

The plan for the coming year remains essentially that recommended in my last

report. Accordingly Dr. Summers, after the completion of the current field season in early March, will return to the United Kingdom for a period of work at the University of Aberdeen and the period of leave to which he will then be entitled. He will return to Darwin by mid-September 1979 and continue his studies there throughout the breeding season until the end of January 1980. At that time he should be transferred to Stanley where the time remaining on his present contract (July 1980) should be spent working up his data, but more importantly planning for the continuation of goose observations as part of the integrated GTU pasture management programme.

The question of an extension of the goose work after July 1980 should be decided during Dr. Summers' stay in the United Kingdom in the middle of 1979 and I strongly recommend that a suitable meeting be arranged for discussion of this topic and for a decision to be taken.

(b) Work in the U.K., summer 1979

While in the U.K. Dr. Summers should spend at least two and a half months working, based at the University of Aberdeen. This work should include:

- (i) The analysis and drafting of the work he has done to date. This will require a good deal of statistical advice on a number of matters, for example the best way to treat highly skewed data from his faecal pellet counts on various pastures, and on the problem of comparing the densities of geese on different habitats in a situation where some habitats are extremely extensive while others are very small, local and patchy. The paper describing his main findings on the general ecology of the goose could be fully drafted during the summer with a view to filling in gaps and adding what we hope will be confirmatory data at the end of the next breeding season.
- (ii) Prepare a small pamphlet, attractively produced and containing accurate information about the ecology of the geese, to be available to the people of the Falkland Islands. This would be very good for public relations but would also indicate to people in general the sort of problems that we have now identified in relation to the geese and would provide them with some facts rather than vague ideas about goose biology.
- (iii) To prepare a paper on the peculiar moulting pattern which he has discovered in upland geese.
- (iv) To draft out, probably in co-authorship with me, a paper on management problems relating to geese. This cannot be finalised at this stage but it would be very useful for Dr. Summers to take back a draft with him for discussion with people in the Falklands.

- (v) If possible to have a discussion with the new leader of the GTU regarding future programmes and the type of goose information that is likely to be required in the integrated work. Consideration should be given to the question of whether there is now a sufficient understanding of goose ecology for relevant necessary observations on geese on pastures to be an appropriate part of a more general field officer working more closely as a member of the Grasslands Trials Unit. There is a distinct possibility that such work could become routine and part-time and would not require a specialist of the calibre of Dr. Summers. At the same time one may find merit in the suggestion that Dr. Summers should have a fourth year with the new team leader during which the practicalities of the ongoing programme can be considered and a less senior field officer could be trained.

(c) Work in Falkland Islands, April-August 1979

During Dr. Summers' spell in the U.K. there will be some need for observations on the goose populations to be continued over the winter period of 1979 in Falkland Islands. These are:

- (1) regular counts of the numbers of geese on the newly-reseeded area at Hope Cottage, Rincon for comparison with the numbers on either a similar area of Rincon which has not been re-seeded or with the distribution of geese on the white grass track which can be used as a transect for such comparisons.
- (2) the regular recording of collared geese (as individuals) on Darwin Paddocks and in the Darwin area throughout the winter.

Each of these operations would require approximately one day's work per month. My recommendation (which I have discussed with Dr. Summers and Mr. Campbell Kerr) is that Mr. Dennis Middleton, a keen and competent amateur ornithologist based at Darwin, might be employed casually for these purposes.

- (3) the re-seeded area at Teal Inlet should also be monitored in the same way as that at Hope Cottage, Rincon. This may be tried out by the GTU staff, for example, Mr. Peter Maitland, again on a one-day-per-month basis.
- (4) All members of the GTU team should be encouraged to look for, identify and record collared geese during their travels around the Islands.

(d) Aspects for further consideration

The following aspects of goose ecology were identified during our afternoon discussion at Darwin House and will certainly require further consideration:

- (1) The assessment of damage to plants by geese. This includes not only their grazing but also the frequency with which they may completely pluck out establishing plants from unconsolidated re-seeds. This work clearly must proceed in close association with the new agronomist.
- (2) Description of the diet of the geese. After some discussion Dr. Summers and I felt that the first priority is to describe the species of plant ingested by geese in different habitats and to be able to estimate the proportion of each type of grass or other food in the diet. We did not think it was necessary at this stage to tackle the much more complex problem of assessing the extent to which the geese may be selective in their choice of vegetation from what is available. The latter question is very much more complex and would involve a large programme of assessment of the vegetation community and its availability to geese. I understand that little is known about the diet of sheep in different habitats in the Falklands and until that is known questions of competitive interaction between sheep and geese on different pastures could not satisfactorily be answered. However, if we knew the diet of the geese in different habitats this would be important information. Dr. Summers is proceeding to get some preliminary data on this by observing birds feeding on known pastures and then collecting them by shooting so that the plant material in the oesophagus can be identified. At this stage we feel that identification to genus of plant is sufficient but this matter may be discussed more effectively with the GTU as a whole.

In this context however, in relation to the new 50-acre re-seeds being planned by GTU in which a species mixture rather than a single species of grass is being sown, the selectivity of the geese may be very important in the establishment of a particular sward. Further consideration may therefore be necessary in the detailed study of the progress of the establishment of swards in these experimental areas.

- (3) The question of using enclosures to enable the effect of geese and sheep to be assessed on these pastures was discussed but my own view is that the statistical problems associated with the variability of performance of vegetation in small plots may make this a very difficult exercise. John Harradine fell into this trap at an earlier stage in the goose investigations.

- (4) A further aspect of the work which has not been touched so far relates to the general belief that geese are very much denser on some of the offshore islands and the idea that they probably colonise the mainland islands from these sources. Bearing in mind that we are asked in our original terms of reference to consider conservation aspects of the geese, we should make some assessment of the densities of geese on these islands, and if they are higher to attempt to understand the reasons for this. It may be that the habitats are quite different or that the geese for some reason are able to maintain higher breeding densities (smaller territories) in these island situations. In that event it could well be that the breeding efficiency of the geese can be impaired and Dr. Summers has some evidence to suggest that this may be so from the very low proportion of first-year birds which he has found in the shedding flocks in some of the more remote parts of the Falkland Islands. I suggest that this aspect of the work should be considered in detail when Dr. Summers is in the U.K. in the summer.

It is perhaps worth putting on record the thought that our attempts to detect and measure dispersal of geese by catching and marking large numbers in shedding flocks may not be very efficient. Dr. Summers now knows that goslings of the year do not shed in their first summer but do so only when they are just over a year old. It is quite possible that the main dispersal of young geese could take place between the time that the family parties are actively broken up by the breeding adults (generally in August and September) and the time that these birds accumulate in shedding areas in December. Accordingly, it may be important to attempt to catch and mark conspicuously, large numbers of goslings on some of these islands. This will itself be logistically a difficult job, especially to obtain the desired large numbers of marked birds.

- (5) The initiative should be taken by the agronomist/sheep husbandry side of the GTU to identify the major problem areas where geese may damage important pastures so that the appropriate plans can be made to obtain relevant and adequate data about the birds.

Bill Summers

9 Feb 1979

26 February

79

Dr R W Summers
Goose Green

visiting
L

I received a call this morning from Professor Juan Daciuk, a zoologist member of the Argentine Scientific team, who told me that he took a particular interest in the work that you are doing since he himself has been working on a similar study on the mainland. He also told me that he is arranging an international ornithological conference in the Argentine in November or December and wondered whether you would be willing to present a paper on your work here. Naturally I was entirely non-committal about this but I did give Professor Daciuk Professor Dunnet's name and address. (I understand that Professor Daciuk has also been in touch with either the British Embassy or the British Council in Buenos Aires, to obtain a list of British ornithological institutions with whom he might get in contact.)

2. Professor Daciuk says that he will be passing to me, in due course, full details of this ornithological conference but, in the meantime, if you felt able to get into contact with him direct, notably when you pass through Buenos Aires shortly, he would be very pleased. He himself lives at La Plata which is, as you doubtless know, about 60 km by train from Buenos Aires. But if you had a chance to call on him he would be delighted. His private address is:

Calle 2 No 877
3 "C"
La Plata

and his official address is:

Facultad de Ciencias Naturales y Museo de La Plata
Paseo del Bosque
La Plata
1900

Regrettably he was not able to give me any telephone numbers.

7th May

79

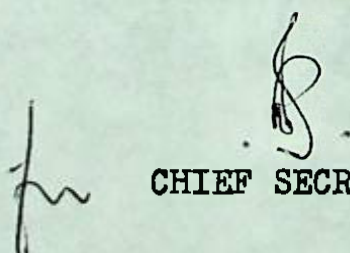
Mr. J. Molloy,
Ministry of Overseas Development,
Eland House,
Stag Place,
Victoria,
London SW1E SDH

Dear John,

Goose Project G.T.U.

We have received two copies of Professor G.M. Dunnet's report on his visit to the Colony in January 1979, and have been wondering whether O.D.M.'s Adviser will be commenting on this occasion, as he did on Professor Dunnet's previous report.

Yours sincerely,


CHIEF SECRETARY

23 July

79

Mr M T Norman
Overseas Development Administration
Eland House
Stag Place
Victoria
LONDON SW1E 5DN

Dear Mr Norman

Goose Project G T U

We do not yet seem to have received any indication as to whether or not Overseas Development Administration Adviser will be commenting on Professor G H Dunnet's report on his visit to the Colony in January 1979 (my letter GTU/31/2 of 7th May to John Molloy refers).

2. I wonder whether you could let me know if we should expect the Adviser's comments.

Yours sincerely



for CHIEF SECRETARY

Application for British Technical Assistance

Provision on an Expert

Government of FALKLAND ISLANDS

1. Type of Appointment **Goose Officer**

2. Number required **One**

3. Authority to whom expert responsible **GTU/ODR**

4. Date required **Early 1981**

5. Duration of appointment **2 Years**

6 (a) Background to and description of project for which expert required, (Please indicate as concisely as possible the general nature of the project, development scheme or training programme etc. stating whether this comes within the Government's development programme. It is important to know whether the application is related to a projected or newly started enterprise, the extension, re-organisation or maintenance of an existing one, and whether it is a one-time or continuing operation. In the case of a feasibility survey the sources of capital to finance the implementation of any recommended scheme should be stated).

To carry out field studies under the auspices of the GTU of Upland and Brent Geese in the Falkland Islands with respect to their relationship to the sheep farming.

**Extension of previous/present work.
(See enclosed booklet).**

(b) Details of any previous application to fill vacancy through United Nations or other source.

(c) (i) Is the vacancy on the regular establishment or a Government Department or other institution?

No

(ii) If so, please state the local salary mean.

N.B. 1. Two copies of this form should be completed for each application;

2. This form should not be used in applying for;

(a) Assistance under the Colombo Plan

(b) for appointments eligible for O.S.A.S. terms.

6 (d) Additional Information for Industrial or Engineering Projects

Please indicate the output or estimated output and number of workers involved in the industrial or engineering concern. If a construction contract is involved particulars should be given, including whether the contract provides for interim operations and/or the training of personnel by the contractors; it should be stated if a contract has been signed and the completion date indicated.

N/A

(e) Additional Information for Education and Training Projects

Please indicate scope of project, status of educational institution involved, and whether it is maintained from public funds or grant-aided, number and nationalities of students involved and their age groups and academic levels. Copies of syllabuses (existing or proposed) should be provided. Information should also be given regarding equipment available (e.g. laboratory facilities etc.)

N/A

(f) Additional Information for Agricultural Projects

Please state what staff and facilities exist and what capital is available for implementing the project, with a brief summary of the data already available.

N/A

(g) Additional Information for Research Projects

Please state what equipment (e.g. laboratory facilities) and data can be made available.

N/A

(h) Any other information which may help in selection of an expert.

N/A

7 (a)	Essential qualifications and experience required.	At least BSc Preferably Second Degree									
(b)	Any additional desirable qualifications. Practical experience in field.	Ability to carry out duties with minimum supervision. Must be flexible.									
(c)	If knowledge of a particular language is essential or desirable, please give details.	N/A									
8.	Age Limits	Late 20's to 40's									
9.	Full details of the duties of the expert, e.g. is he to act as a consultant or to be associated with the management of the project?	To carry out duties as in 6a.									
10.	Associated staff (in appropriate cases please say what provision has been made for supporting staff). Please indicate the level of staff with whom the expert will be working.	<table border="0"> <tr> <td>Agronomists</td> <td></td> <td rowspan="4">All suitably qualified. First & Second Degrees.</td> </tr> <tr> <td>Veterinarian</td> <td>)</td> </tr> <tr> <td>Laboratory Staff</td> <td>)</td> </tr> <tr> <td>Animal Production Experts.</td> <td>)</td> </tr> </table>	Agronomists		All suitably qualified. First & Second Degrees.	Veterinarian	)	Laboratory Staff	)	Animal Production Experts.	)
Agronomists		All suitably qualified. First & Second Degrees.									
Veterinarian	)										
Laboratory Staff	)										
Animal Production Experts.	)										
11.	In the case of continuous projects please give name and particulars of understudy or counterpart who will work with expert and say what arrangements will be made to train a local successor.	None									
TERMS AND CONDITIONS OF APPOINTMENT											
12.	Actual place of employment (and nearest town if appropriate).	Port Stanley, Falkland Islands.									
13 (a)	<u>Quarters</u> Is suitable living accommodation provided?	Yes									
(b)	If so provided, is accommodation furnished or unfurnished?	Furnished									
(c)	Is accommodation suitable for (i) a married man without a family? (ii) a married man with a family?	Depends on person appointed.									
(d)	Where quarters are not provided please give information about the availability of housing or hotel accommodation.	Minimal									

- (e) Can furniture and household requisites be bought locally, and would it be cheaper to buy locally rather than to buy and bring from Britain?

Very Limited

14. Allowances

Usual TC allowances

Please state where appropriate

(a) Daily allowance for food;

(b) Daily allowance for accommodation;

" " "

(c) Daily and nightly subsistence allowance rates when on duty away from headquarters;

" " "

(d) Internal travel allowance rates (or if a car is provided for official journeys?)

" " "

(e) Any other allowances

" " "

15. Will medical and dental treatment and hospital arrangements be provided free for the appointee and his accompanying dependants? If not, please state what assistance, if any, is offered by the Government in this respect.

Free medical treatment

16. Will exemption be granted from payment of customs duties, income and other taxes?

No exemption from Customs duties. Income tax will be payable in UK.

17. What arrangements are there for local leave?

Usual TC leave

Signed

D. Thompson
for Chief Secretary

On behalf of the Government of Falkland Islands

Date

5 Nov 1980

GRASSLANDS TRIALS UNIT

Port Stanley, Falkland Islands, South Atlantic.

(32)

15th May, 1981

Your Ref.

Our Ref. 0080/JAF/rs

G Tu/31/2

F E Baker Esq
Chief Secretary
Secretariat
Stanley



Dear Dick,

GOOSE OFFICER, DR RICHARDSON

I have been informed that the about-to-be appointed Goose Officer will be allocated No 5 Davis St East. Dr Richardson has two young children and it would appear to me that it could be somewhat dangerous if some form of fence was not round the garden.

I have discussed this problem with the Housing Superintendent and it is understood that it will be possible to fence this property.

Since housing in Stanley is scarce and I shall be talking with Dr Richardson in the next couple of weeks, I wish to be able to describe to him in detail the accommodation allocated and to assure him of safety of his children. Should it be necessary the G.T.U. can provide some of the essential fencing materials.

*Regards,
John*

John A Ferguson

cc. D Turner - Housing Superintendent

9th/31/2

33

DCS on file copy

gs 14/

FIFO 002/20

RR ODA

GRS 30

UNCLASSIFIED

FM PORT STANLEY 191515Z MAY 81

TO ROUTINE ODA

TELEGRAM NUMBER MODEV 67 OF 19 M Y

ACTION
COPY

CS
H

21/5

YOUR TELNO MODEV 58: GOOSE ECOLOGIST.

1. CONFIRM RICHARDSON ACCEPTABLE. LETTER TO MUSTARD APPROVING
APPOINTMENT DESPATCHED 13 MAY.

HUNT

NNNN

SENT 201413Z PJ

J.
19. 6. 81
—

~~AS.~~

You will wish to see attached. (35)

Mr Burdett has a copy of DCS has
telephoned ODA to ask whether Dr. Ferguson
has been consulted. A jury about
Richardson who seemed well qualified
but let's hope Dore is acceptable

JB
19/6/81

~~Yes~~ Pe. copy rightly to Miss Barlett who
may wish to consult Dr. Ferguson before - Tel sent.

FOFI 005/18 we accept

JB 18/56

(34)

PP PORT STANLEY

GRS 108

UNCLASSIFIED

8.
19.6.87

A.S. to see
JB 19/56

**ACTION
COPY**

as.
Miss Barlett

del
18/6

FM ODA LONDON 171030Z JUNE 81

TO PRIORITY PORT STANLEY

TELEGRAM NUMBER MODEV 70 OF 17 JUNE

GOOSE ECOLOGIST. MODEV 67 REFERS. RICHARDSON HAS WITHDRAWN.
RESERVE ANDREW DOUSE SINGLE AGED 26. BA 1ST CLASS HONS NATURAL
SCIENCES CORPUS CHRISTY COLLEGE CAMBRIDGE. AND TO BE COMPLETED
THIS MONTH. AT CULTERTY FIELD STATION ABERDEED UNIV. INTER-
VIEWED WELL.

2. VERY CLEARLY SPOKEN. INTELLIGENT, LIKEABLE PERSONALITY,
CALM MANNER. WELL ORIENTATED TO CONDITIONS IN FALKLAND IS.
GOOD REFERENCES. KNOWN TO BE SKILLED IN FIELD AND LABORATORY.
SOUND INTEREST IN RESEARCH. FULL CV FOLLOWS. GRATEFUL FORMAL
ACCEPTANCE BY TELEGRAM ASAP. THANKS.

CARRINGTON

NNNN

MOLT SKIPPING BY UPLAND GEESSE (CHLOEPHAGA PICTA) IN THE FALKLAND ISLANDS

RONALD W. SUMMERS

ma
17/6

Shortly after starting a study of Falkland Upland Geese Chloephaga picta leucoptera I became aware that breeding geese attending their young from November to January did not lose their power of flight, at a time when a large section of the population undergoes flightless molt (shedding). The following study set out to establish if breeders do in fact skip wing molt, and if they do, to determine what happens if pairs breed successfully over a number of years.

METHODS

The study was carried out mainly in the valley of the Ceritos Arroyo near Darwin, East Falkland, between October 1977 and August 1980. The study area and life cycle of the goose have been described elsewhere (Summers in prep.). "Gosling" refers to young between hatching and fledging; "first-year" to geese from fledging (usually in January) to the end of December of that year; older birds are "adult" and can be distinguished from first-year birds on plumage (Summers in prep.). Breeding adult geese were captured by a hand-net when incubating (females only) and defending their goslings, or by bolas (Summers and Middleton in prep.), and individually marked with numbered metal bands or a unique combination of Darvic color bands. Shedding geese and goslings were rounded up and marked with Darvic neckbands or laminated leg bands with numbers engraved on them. Primaries were numbered (one to ten) ascendantly. Two centimetres of the tips of the ninth (longest) primaries of breeding adults were clipped and photographed so that, on recapture in following years, it would be possible to determine if molt had been skipped.

RESULTS

EVIDENCE OF MOLT SKIPPING

One hundred and sixty nine adult Upland Geese, which were capable of flight, were examined at various times through the year and there was no evidence of molt of

primaries, though inner secondaries were sometimes replaced in summer. Usually, the molt of the flight feathers involved the simultaneous loss of all primaries and secondaries, resulting in a period of flightlessness of about 35 days (Summers in prep.). Flightless geese were found from mid-November to early February, with most birds molting in December and January.

It became apparent when trapping full-winged breeding males and females between August and December that there was variation in the state of wear and degree of fading of the primary tips, particularly the outer primaries (Fig. 1, A B C D). All primaries were at least 8 to 12 months old since shedding takes place mainly in December and January. The width of the rachis gives an indication of the length of the tip that has worn away (Fig. 1, D). There was never evidence of more than one generation of primaries in a wing. It seemed unlikely that the observed range in wear was due to individual variation within the year, and this was confirmed by following the histories of banded birds:-

Case 1: female 26 was caught on the nest in October 1978 and the tips of both ninth primaries, ^{which} were in good condition, were clipped (similar to A, Fig. 1). She bred successfully in 1978, and 1979. In August 1980 the ninth primary was still clipped and the other tips now looked worn (eighth in Fig. 1, E). She had therefore skipped the molt in both the 1978-79 and 1979-80 seasons.

Case 2: female 28 was caught on the nest in October 1978 and the ninth primaries, which were worn, were clipped (Fig. 1, C). She lost her young at fledging but did not shed since, in September 1979, she still had clipped ninth primaries. The tips of the eighth primaries did not seem appreciably more worn after an extra year of wear (Fig. 1, F).

Case 3: female 25 was first captured in February 1978 whilst with her mate and fledged young. Her primaries were abraded. She was retrapped on the nest in October 1978 and the tip of the ninth primaries clipped (similar to C, Fig. 1). She bred successfully in this year and again in 1979. Finally, she was recaptured in August 1980; the tips of the ninth primaries were still clipped and the tenth primaries were now very worn (Fig. 1, G). She had therefore skipped the 1979-80 and

1978-79 shedding seasons, and probably the 1977-78 season as well, considering the condition of the tips in 1978.

The rate of wear of the tip of the ninth primary was determined by recapturing birds which were banded whilst shedding. These include one recaptured eleven months after shedding (Fig. 1, H). There was little wear during the first year after shedding and the primaries showing eleven months' wear were very similar to those of breeding adults with the newest primary tips (Fig. 1, A). A male was also recaptured 21 months after shedding (Fig. 1, J). A moderate amount of wear is now apparent after skipping one annual molt. Female 26 skipped two molts (Fig. 1, E) and female 25 three (Fig. 1, G). However other birds were captured where the degree of wear appeared even greater (Fig. 1, D) so it is possible that even more molts may be skipped in some cases.

DIFFERENTIAL WEAR BETWEEN SEXES

In eight cases where both male and female in a pair were captured in the same breeding season, and whose primaries indicated that they had molted within that year, the tips of the male's primaries were always slightly more worn than the female's (Fig. 1, A and B). Breeding males have a different activity pattern (eg. they fight more and do not incubate) so this may account for the different degree of wear between the sexes.

MOLT SKIPPING IN RELATION TO BREEDING SUCCESS

Whether geese skipped or did not skip molt seemed to be determined largely by whether or not the pair raised young. Those pairs which lost their clutch or brood usually left their breeding territories in December and joined nearby molting flocks. Three known failed breeders were sighted or recaptured when molting in these flocks. They included a male whose mate died during incubation, and a male and female from separate pairs whose clutches were lost and not replaced. There were however a few cases of molt-skipping by failed breeders. In all cases it was the male of the pair which shed and the female skipped.

Case 1: male 12 and female 9 lost their brood in December 1978. The female was seen away from the territory with another male on 19 January 1979 but resighted with male 12 on 14 February 1979 when both were back in the territory. It was possible to see with a telescope that her primary tips were worn whilst his were fresh, indicating that he had molted, and she had skipped.

Case 2: male 6 and female 7 lost their clutch in November 1978. The male was caught molting on 5 December 1978 in a shedding flock of about 200 geese, 7 km away, and the female was absent. On 18 January 1979 the female was seen with two other males in the territory but was rejoined by her mate by 14 February 1979.

Case 3: male 23 and female 32 lost their brood in December 1978. On 19 January 1979 the female was seen away from the territory with two other males. However, the pair were back together again and on their territory by 9 March 1979. It is thought that the absence of the male meant that he was shedding since pairs remained united at all other times of the year and from year to year (Summers in prep.).

About half of the breeding pairs in the study area failed to raise any young (Summers in prep.). If this failure rate is typical then there is a good chance for breeding birds to join the shedding flocks one year in two. However, runs of successful seasons are possible so that some pairs may not shed for several years (eg. female 25, see above). There were though, a few cases where successful breeders did molt.

Case 1: two males and a female were found shedding in a large pool in the territory of two of the birds, on 29 January 1978. The other male had bred further up the valley, but the territory owners were not aggressive to him. All had old primaries when initially banded in 1977. The female of the pair was slightly in advance of her mate in the growth of the primaries, and both were more advanced through molt than the male who had joined them. On 17 February 1978 the pair had completed molt and were observed with their fledged family who were not seen in January. The other male was still in the pool on this date, but rejoined his mate and fledged family later in February.

Case 2: another male was also found molting on his territory on 29 January 1978, again in a deep pool on the river. He also had old primaries in 1977. Again he was later seen with his female and fledged young.

Case 3: the only other successful breeding bird found shedding in the breeding valley was a male, who was accompanied by his mate and well-grown goslings on 31 December 1978. They were all found in a stream one metre wide. His molted primaries (Fig. 1, D) and secondaries were on the bank indicating that the family had been there for several days. The female was full-winged and her primaries were only moderately worn.

Case 4: male 24, the mate of female 25, is thought to have molted away from the territory, since he was absent from the family on 18 January and 14 February 1979 and reunited with them by early April. His primaries then appeared new (they were old in November 1978 when he was captured) when seen closely with a telescope in September 1979, indicating that he had shed. Female 25 had skipped the 1978-79 shedding season, as described above.

Neither shedding, nor prolonged absence by one member of the pair, was observed in 19 other pairs who had bred successfully and whose behavior was followed closely.

MOLT SKIPPED BY PRE-BREEDING GESE

Evidence that pre-breeders also skip molting was obtained. A second-year female was recaptured in August 1980 after being ringed as a gosling in December 1978. The condition of the tips of the ninth primaries (Fig. 1, K) indicated that she had never shed. Young geese fledge in January and usually undergo their first molt of the primaries in the December of the year they fledged (at 14 months of age).

MOLT SKIPPING BY OTHER SPECIES OF SHELDGESE

Evidence of molt-skipping was found in two other species of sheldgeese. An adult male and female Ruddy-headed Goose Chloephaga rubidiceps were shot near Darwin in August 1980. Both had the tips of the ninth primaries abraded (Fig. 1, L). These contrasted with another adult which was shot in September 1978 and whose primaries were new.

An adult female Ashy-headed Goose Chloephaga poliocephala was shot near Bariloche, Rio Negro province, Argentina on 23 July 1980. The state of wear of the tips of the ninth primaries (Fig. 1, M) indicate that she had not molted within the last year. Ashy-headed Geese are resident at Bariloche (S. Martin pers. comm.).

DISCUSSION

True geese (Anserini) and shelducks (Tadornini) molt primaries and secondaries simultaneously (Delacour 1954) and sheldgeese (Tadornini) also adopt this strategy. However, the skipping of this molt, sometimes for three consecutive years, is unusual. It has been noticed previously in wildfowl; a Whooper Swan Cygnus cygnus whose primaries were dyed in December 1979 returned to Britain in October 1980, still with dyed primaries (M. Owen pers. comm.).

The gradual impairment of the flight feathers over several years is probably unimportant to Falkland Upland Geese since they do not migrate and undertake only short-distance movements (Summers in prep.) Also they spend little time in flight during the day (Summers in prep.). However, the race which occurs in Argentina and Chile (C. p. picta) undertakes long migrations (Plotnick 1961) so it would be of interest to find out if birds of this race also skip shedding.

A possible advantage in skipping molt of primaries and secondaries is that energy and nutrients are saved. Hanson (1962) identified the flightless molt as the time of greatest nutritional stress for Canada geese (Branta canadensis) and Owen and Ogilvie (1979) found that most Barnacle Geese (Branta leucopsis), except females who nested unsuccessfully, lost weight during wing molt. They thought though, that a decrease in weight during the molt may be advantageous since lighter birds would

have a shorter flightless period. Ankney (1979) found no significant changes in body weight, leg and breast muscle weight between early and late molting Lesser Snow Geese (Chen caerulescens), and interpreted this as indicating lack of nutritional stress during molt. However, the molt need not have to be nutritionally stressful in order for alternative strategies to be selected for. Any saving of energy, however small, may be selected for as long as those birds who skipped did not put themselves at risk in other ways. The size of the saving by not molting flight feathers can be measured. The weight of the primaries and secondaries is 35g, representing 19.4% of the total weight of feathers on an adult female Upland Goose. The net energy cost of molt, bearing in mind the different chemical composition of feathers and the diet, has been estimated at 442 K J/g of feathers in granivorous birds (Kendeigh et al. 1977). Assuming a similar situation in herbivorous birds the extra cost to the Upland Goose would be 15680 K J, or 392 K J/day over the approximately 40 days required to grow new flight feathers. The basal metabolic rate of a female Upland Goose is 694 K J/day (Aschoff and Pohl 1970), so the extra energy required for the growth of flight feathers would play a significant part in the energy budget.

In most pairs of successful breeders both adults skipped molt. However, in cases where one member of a successfully breeding pair molted, it was usually the male (six out of seven cases). Females lose weight during incubation (Summers in prep.), so by skipping molt they can regain their body condition more quickly. Some females which failed breeding also skipped molt. They perhaps lost their clutch late in incubation or when they had goslings, when they had already spent a lot of energy in breeding. Replacement clutches were rare (Summers in prep.) suggesting difficulty in accumulating energy and nutrient reserves quickly. These observations suggest that molt-skipping is more important for the female.

SUMMARY

Adult Falkland Upland Geese Chloephaga picta leucoptera may skip the flightless molt when primaries and secondaries are normally replaced. Successful breeders

usually skip molting, sometimes missing three consecutive molts when they have a run of successful breeding seasons. A small proportion of successful breeders (usually the males) molt on their territories, or leave their family to molt elsewhere and rejoin them after molt. Some failed breeders (females) and pre-breeders also skip molt. Ruddy-headed Geese C. rubidiceps in the Falkland Islands and Ashy-headed Geese C. poliocephala in Argentina also skip molt. It is suggested that molt-skipping has evolved to save energy and nutrients.

ACKNOWLEDGEMENTS

Thanks are extended to Dennis Middleton who drew my attention to molt-skipping and who helped with field work. Susana Martin kindly provided material from Ashy-headed Geese. The study was financed by the Falkland Islands Government and Overseas Development Administration (London) and supervised by Professor G.M. Donnet who also commented on the drafts along with Drs. C. J. Peare and M. Owen.

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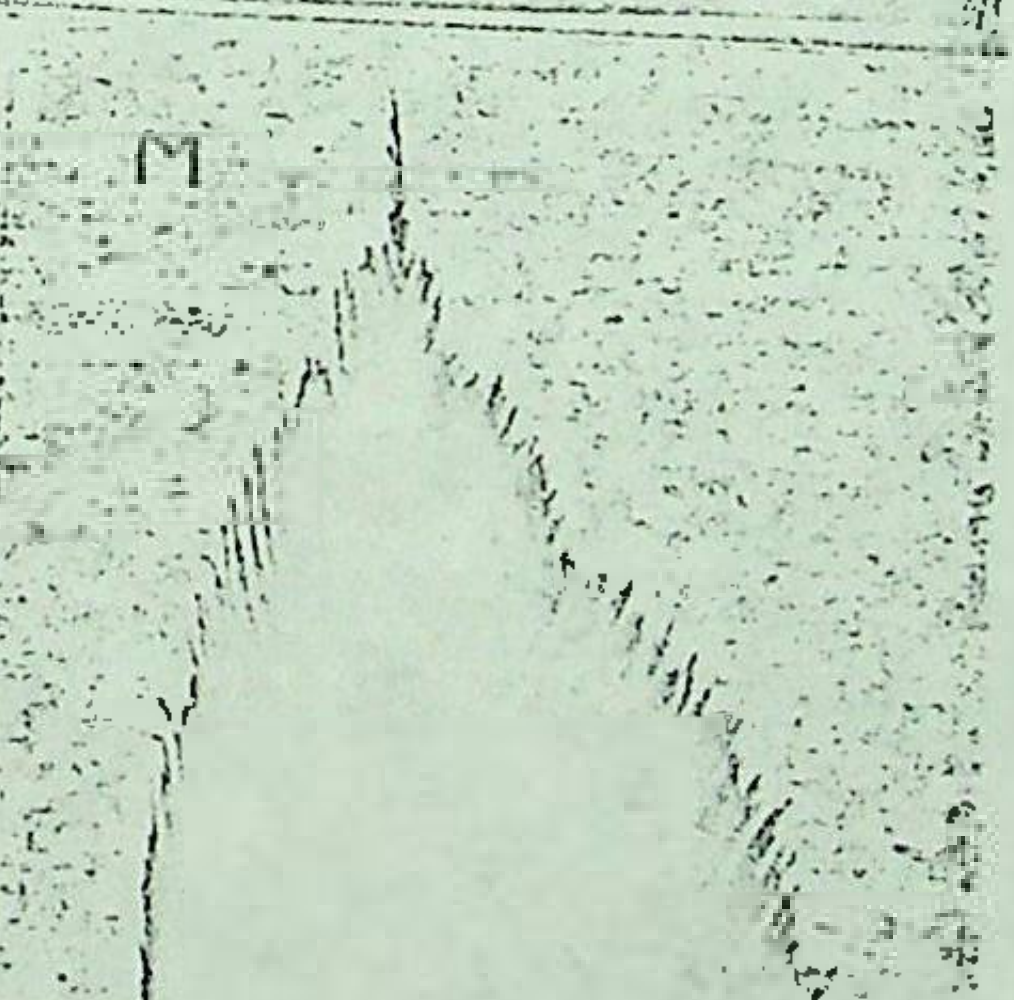
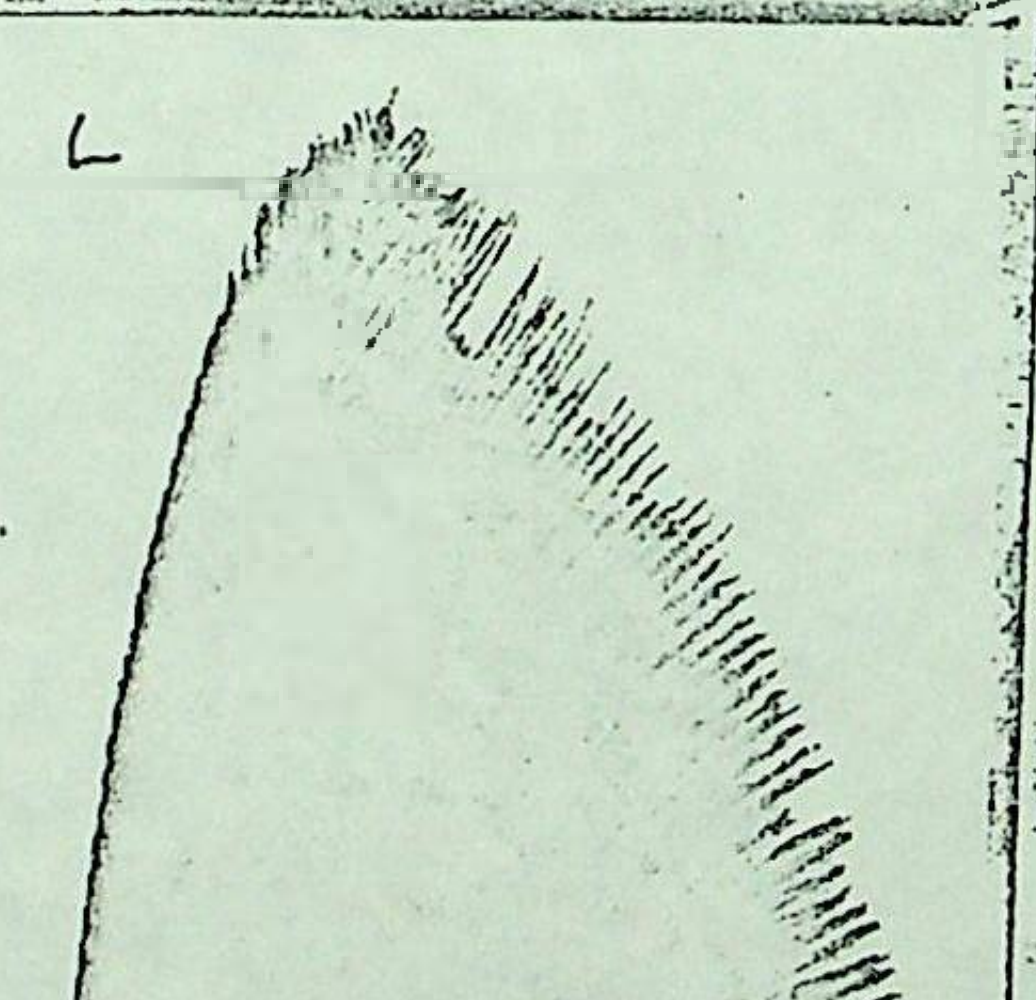
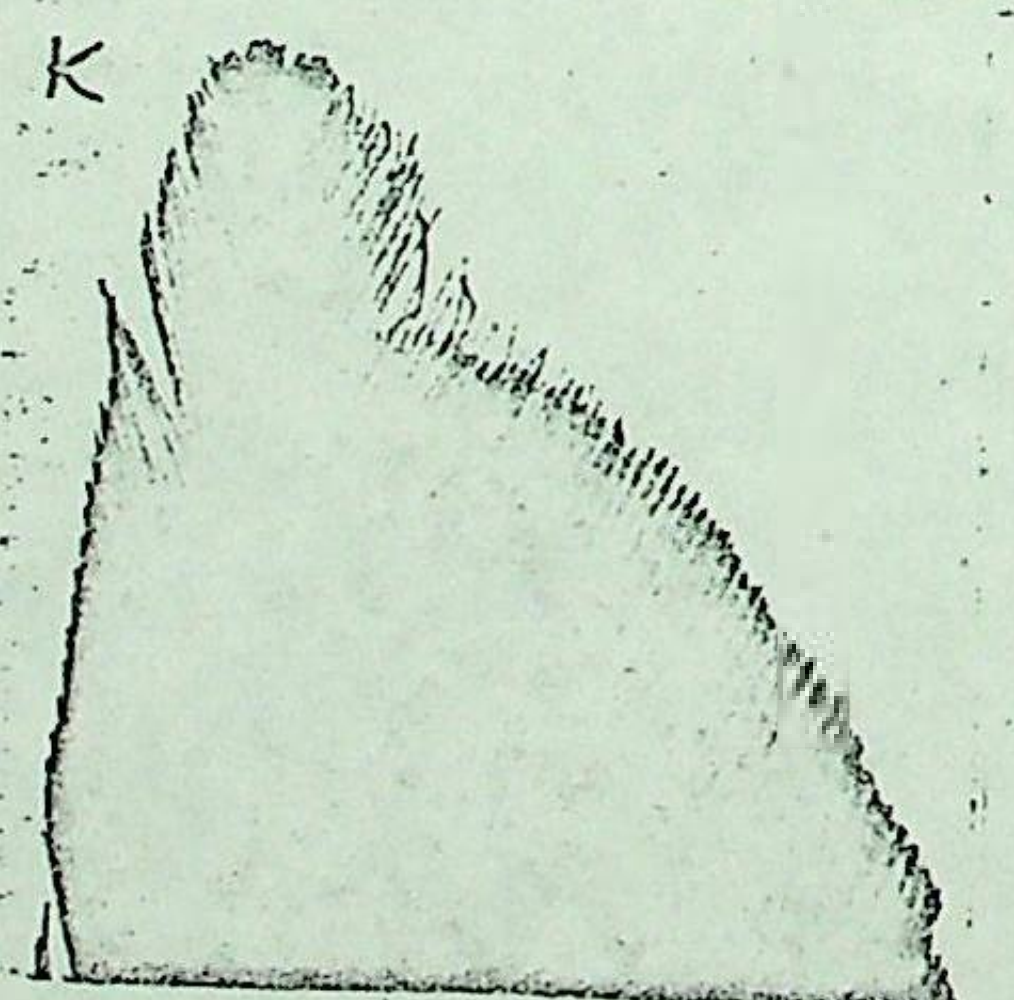
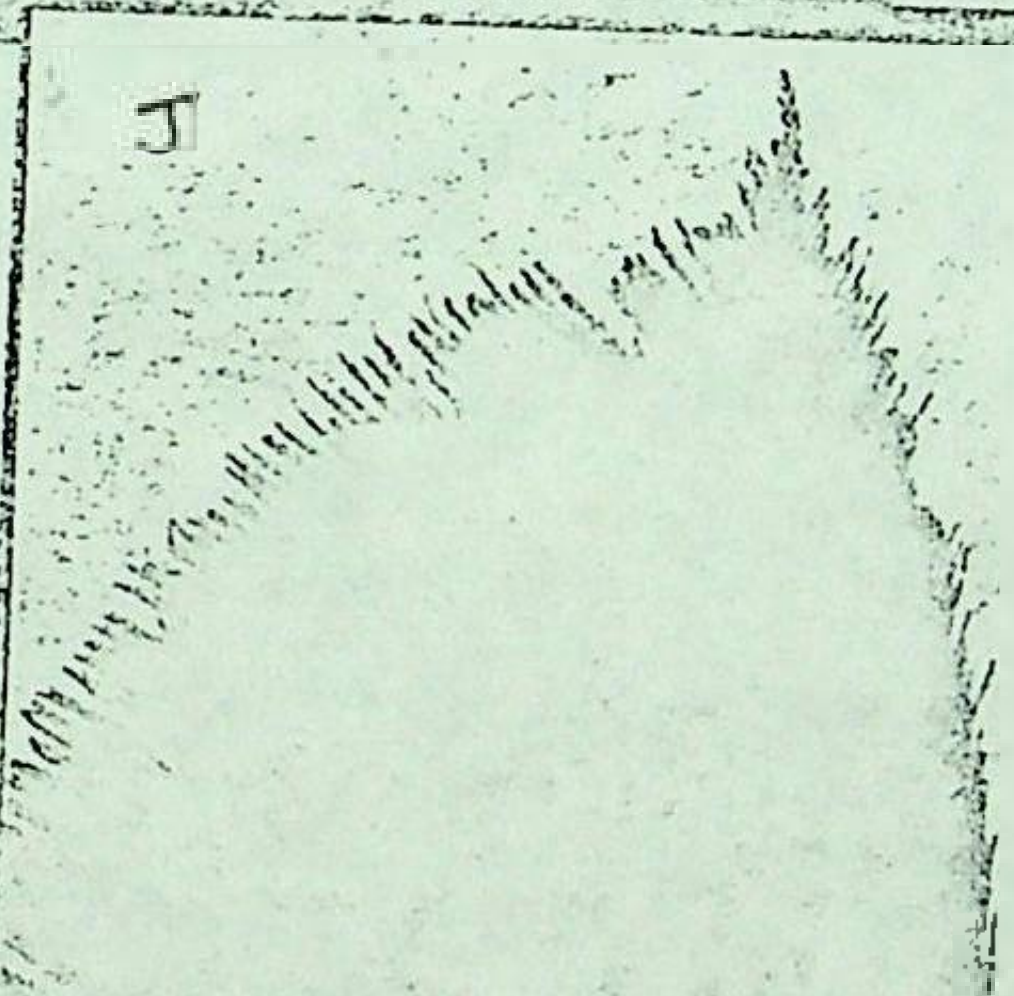
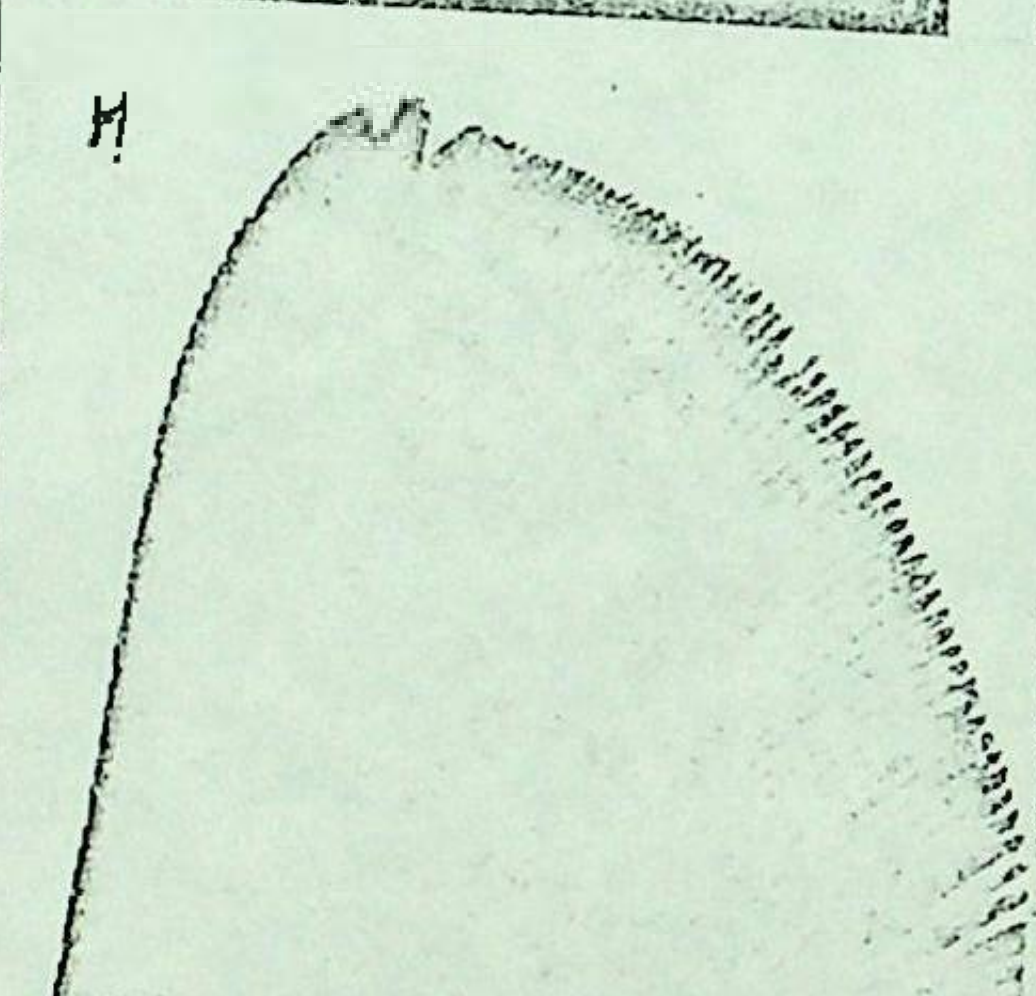
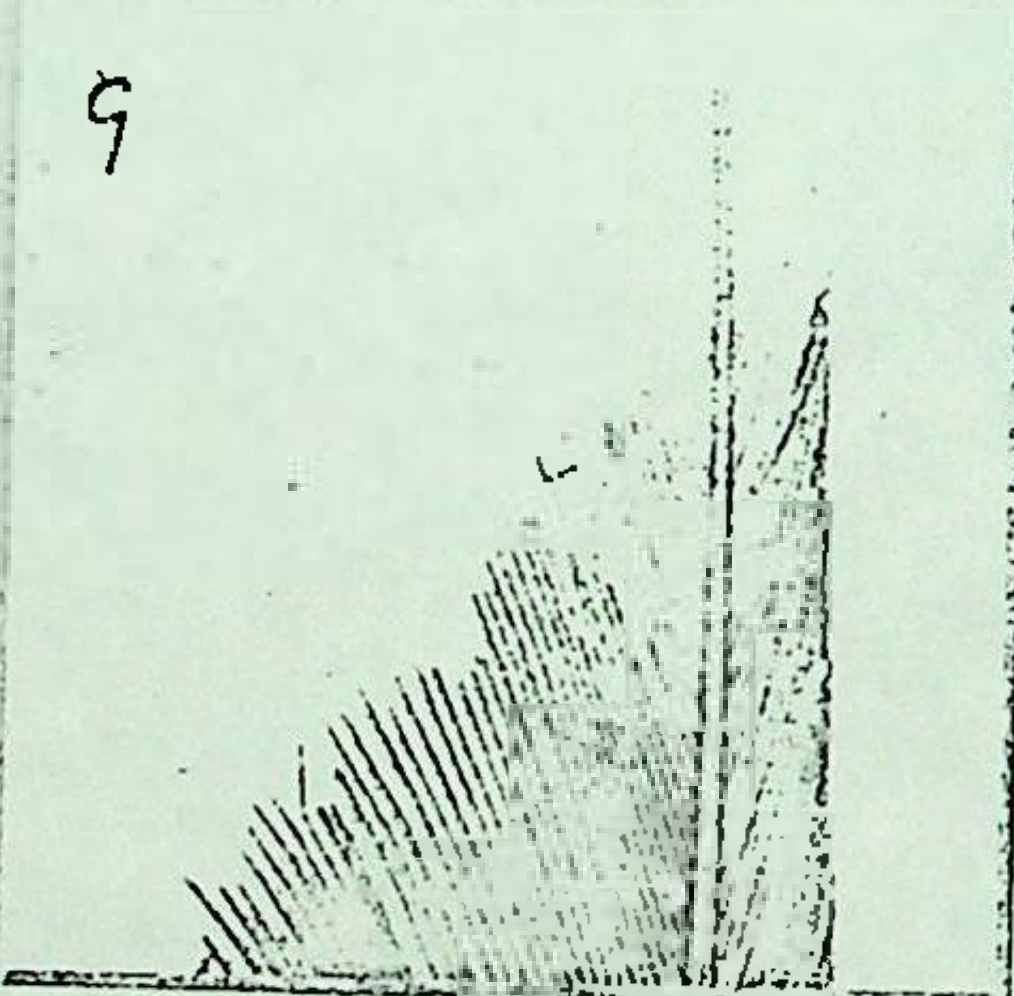
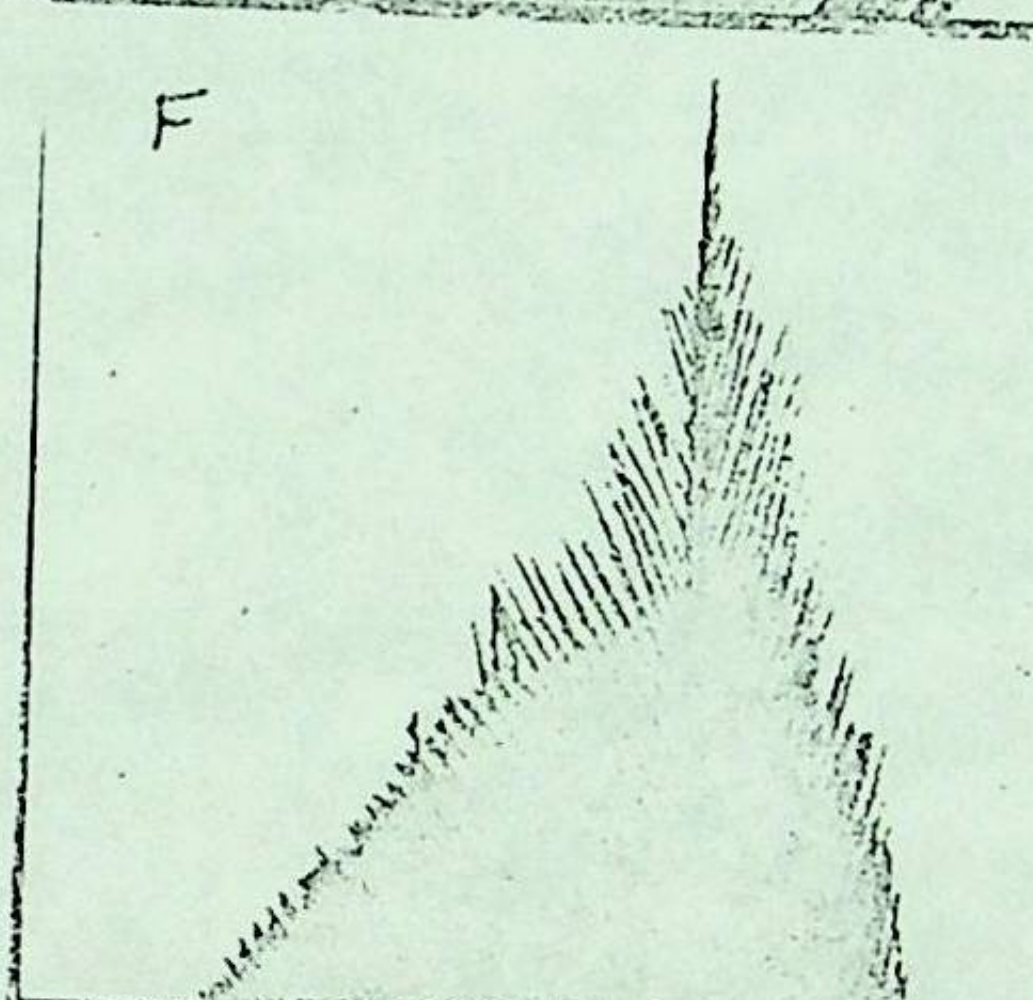
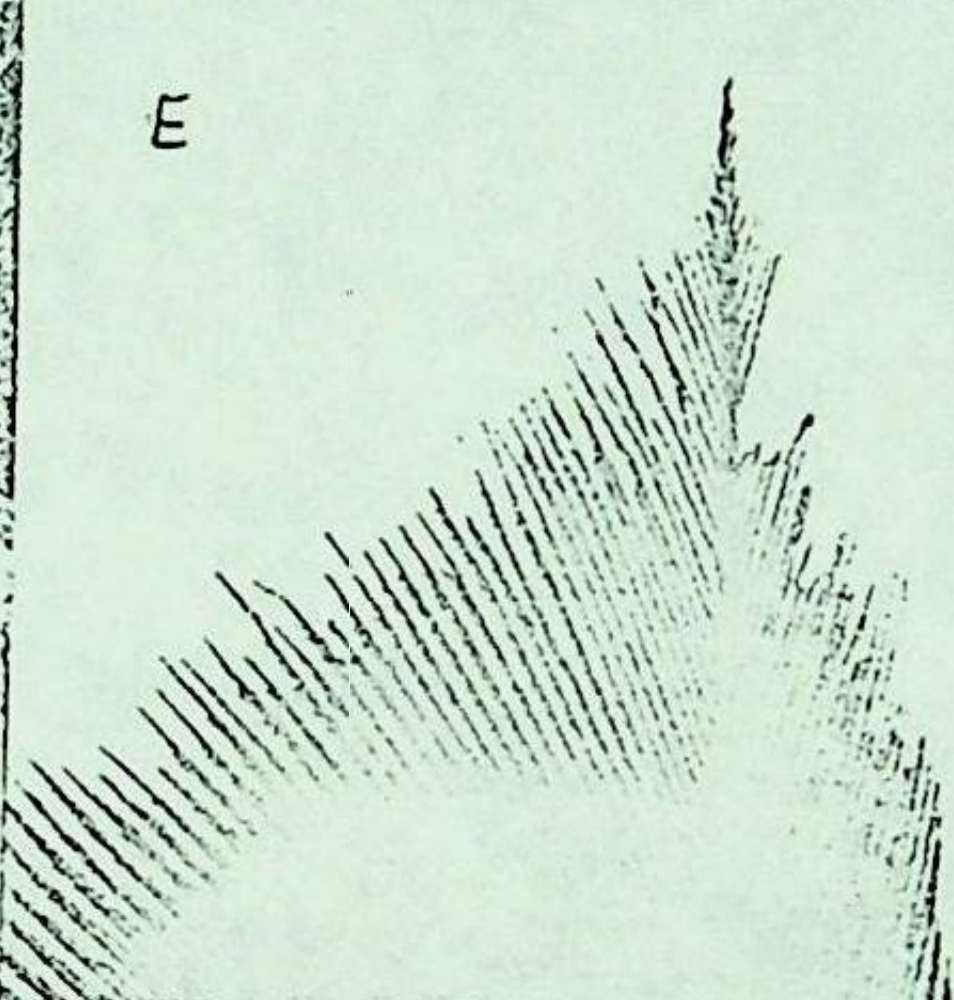
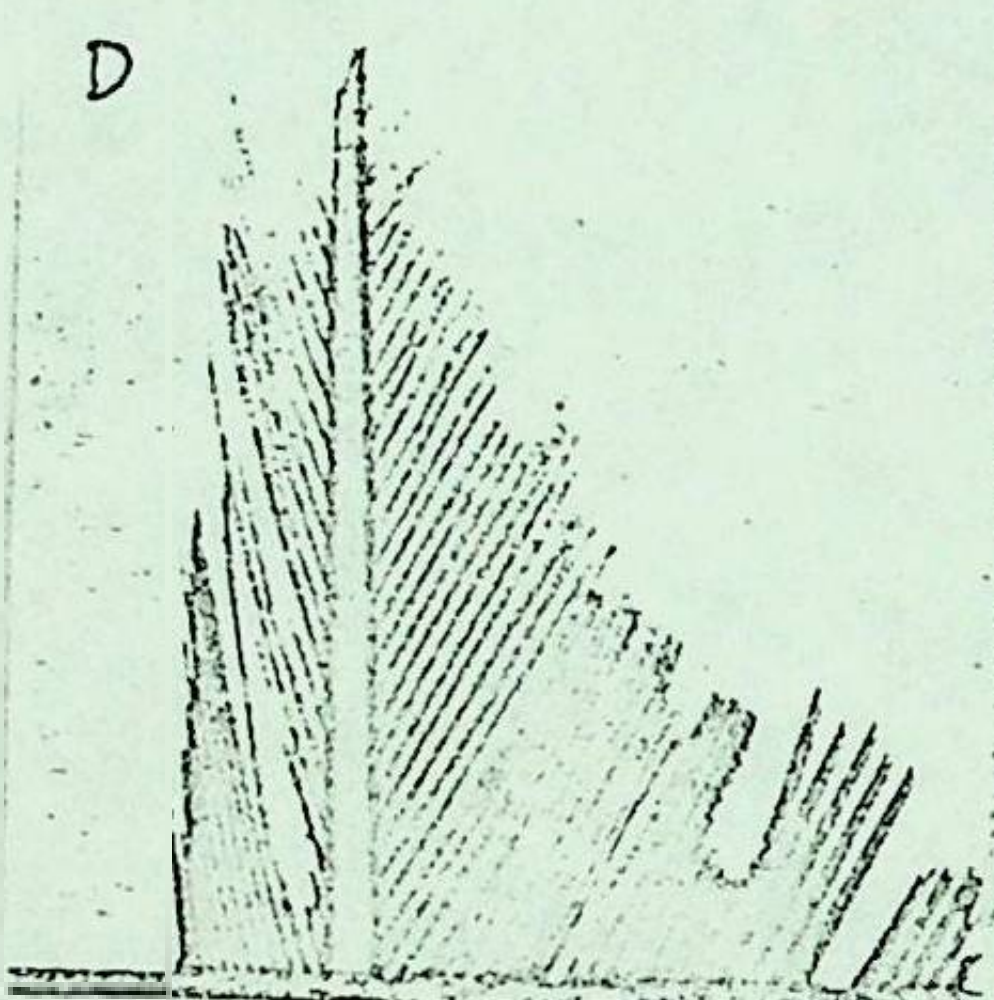
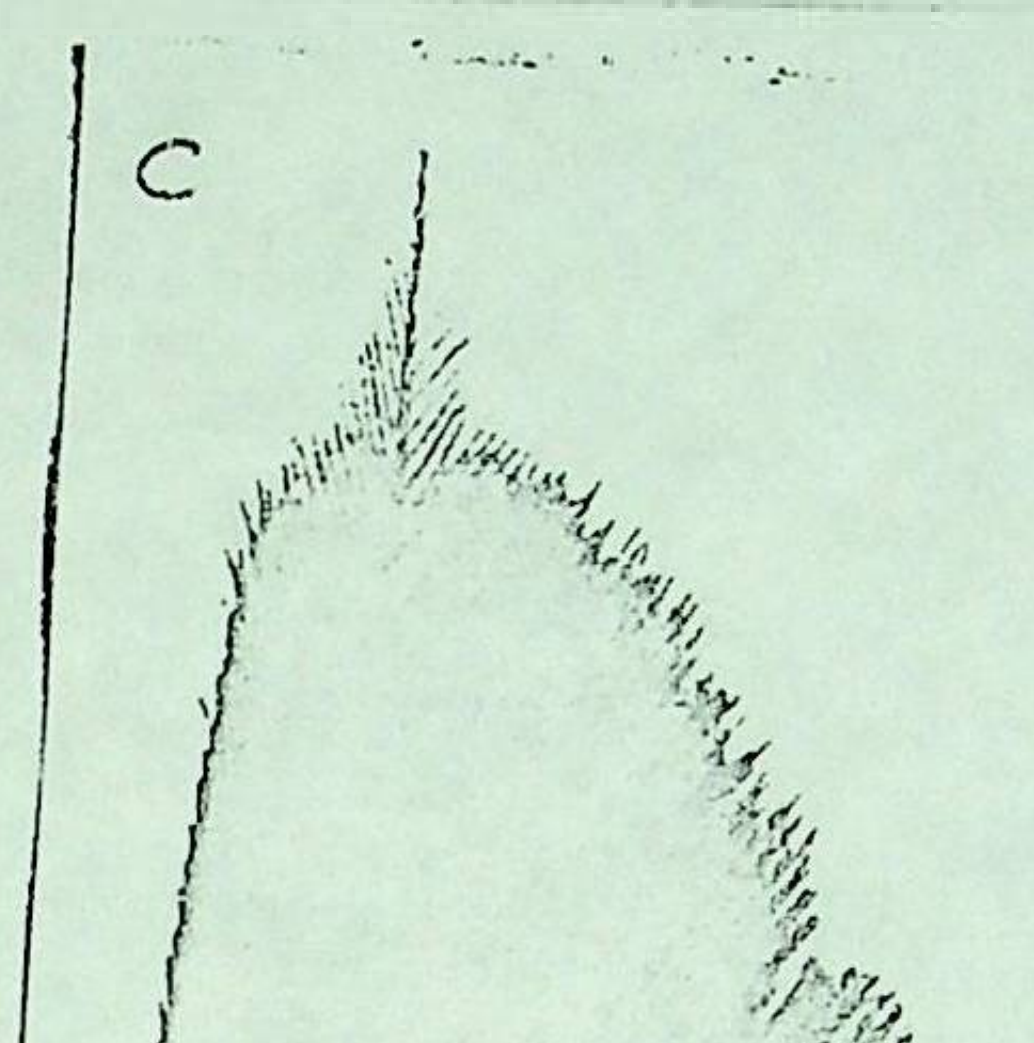
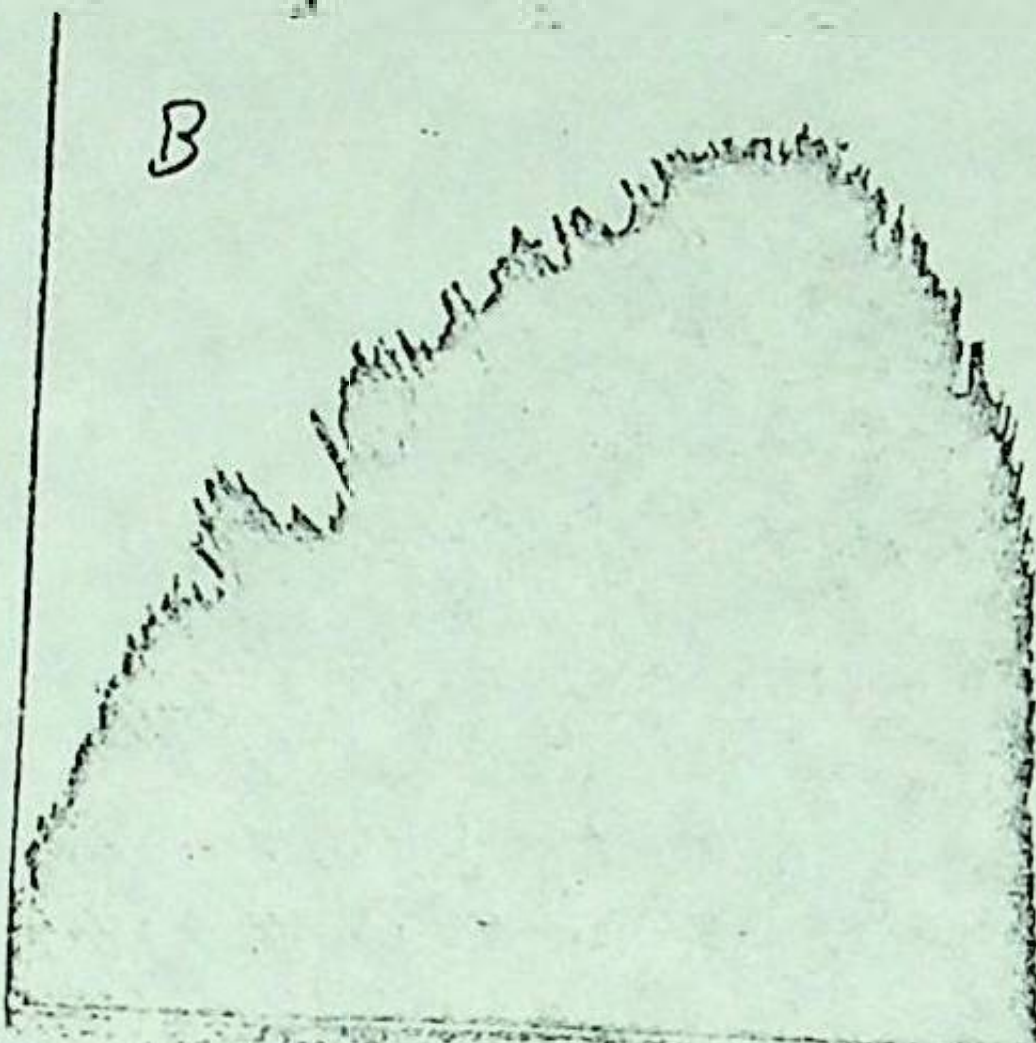
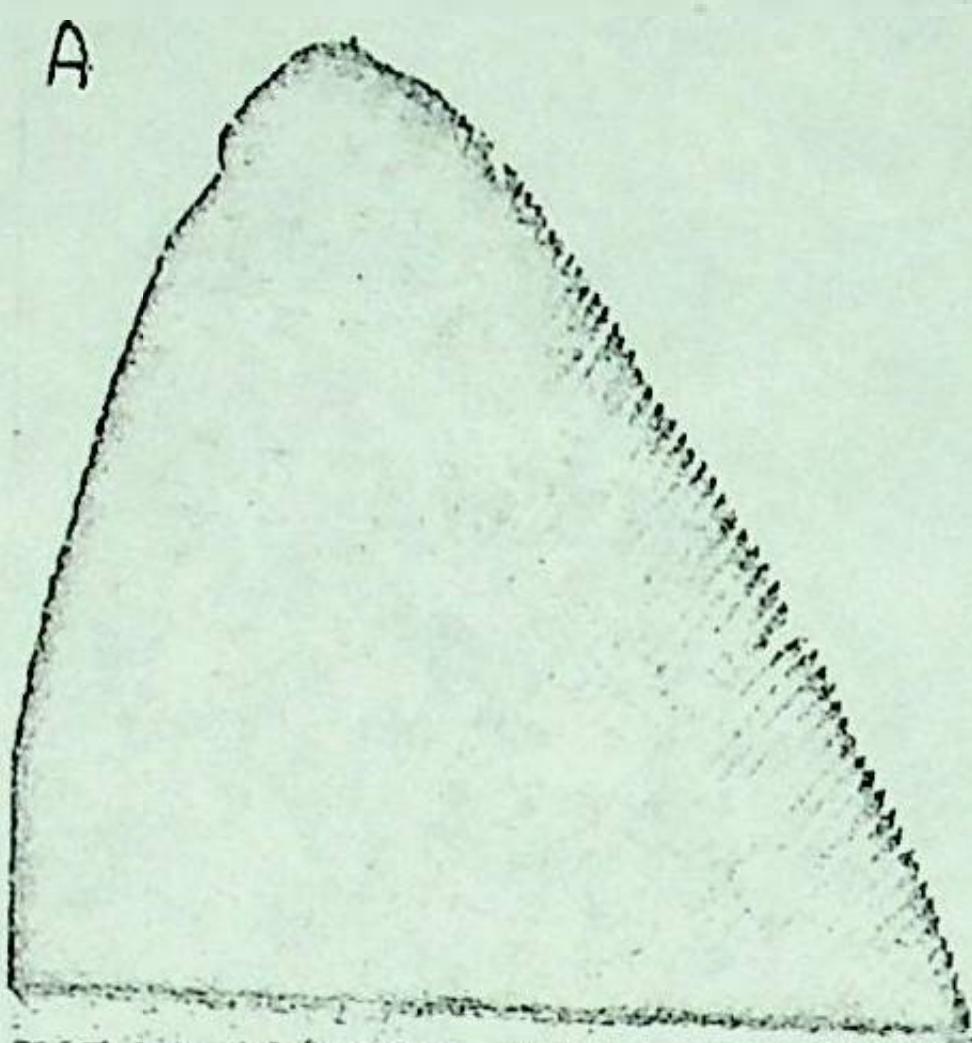
Grassland Trials Unit, Stanley, Falkland Islands. Present address:

Ministry of Agriculture, Fisheries and Food
Worplesdon Laboratory, Tangley Place, Worplesdon,
Guildford, Surrey, England.

LEGEND

Figure 1. Photographs (all to same scale) of the tip of the ninth primary (unless otherwise stated) of adult sheldgoose. All the Upland Geese were breeding adults, unless otherwise stated.

	Species	Sex	Date
A	Upland Goose	♀	August 1980
B	"	♂	November 1978
C	"	♀	October 1978
D	"	♂	December 1978
E	"	♀	August 1980 (8th primary)
F	"	♀	September 1979 (8th primary)
G	"	♀	August 1980 (10 th primary)
H	"	♂	November 1978
J	"	♂	September 1979
K	"	♀	August 1980 (second-year)
L	Ruddy-headed Goose	♂	August 1980
M	Ashy-headed Goose	♀	July 1980



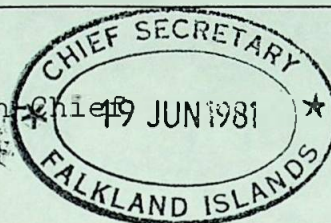


OVERSEAS DEVELOPMENT ADMINISTRATION

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HE Mr R M Hunt CMG
Governor and Commander-in-Chief
Stanley
Falkland Islands



es
For wider circ.
line?
Ref 17/6
Your reference

Our reference CLA 56/208/04

Date 3 June 1981

Dear Governor,

GTU GOOSE STUDY

The final report of Ron Summers, the GTU Goose Officer, will be based on a series of papers which have reached acceptability for publication in scientific journals, and will, therefore, give the main facts without going into fine detail. The report is still in preparation but in the meantime Ron has sent to me papers entitled "The movements of upland and ruddy-headed geese in the Falkland Islands" and "Molt skipping by upland geese in the Falkland Islands" copies of which are enclosed. Ron tells me that these papers have been submitted to journals.

Copies of the papers are being sent to John Ferguson, Nick Bailey and members of the Advisory Committee in the UK.

Yours ever,

J. MOLLOY

Mr Baker GTU/31/2



my telegram dated
16 June re Loose
Ecology post refer's.



with compliments

Ann Currie.

RE / AH364

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SUMMARY RECORD OF A MEETING HELD BY THE UK ADVISORY COMMITTEE
ON THE FALKLAND ISLANDS' AGRICULTURAL RESEARCH AND DEVELOPMENT
CENTRE ON 8 JUNE 1983 AT THE HILL FARM RESEARCH ORGANISATION,
PENICUIK, EDINBURGH.

Present:

Mr A W Peers - Chairman (ODA)	Professor G M Dunnet -
Dr G D Gwyer - ODA	Aberdeen University (Regius
Mr D Lawless - ODA	Professor of Natural History)
	Mr J R Eadie - HFRO (Director)
	Dr R Summers - MAFF
	Dr J Ferguson - FIARDC (Team
	Leader)

The Advisory Committee was meeting for the first time since the cessation of hostilities to consider the work of the FIARDC (formerly known as the GTU). It accepted the Chairman's suggestion that Dr Ferguson be invited to give an oral report on past, present and future activities of the Centre followed by consideration of a paper submitted by Professor Dunnet on the Goose programme and a report prepared by Mr Peers, following his visit to the Falkland Islands in February 1983.

2. In his introductory comments, Dr Ferguson explained that, immediately after the conflict, the Centre had been required to share its premises with a large number of military personnel. In addition, the laboratory had suffered war damage and there had been some loss of property and equipment. This had inevitably affected the work of the Centre and its ability to resume its activities after the war.

3. The team members, comprising Messrs Whitley, Watson, Grieve, Maitland, Dr Douse and Messrs T H and A Davies had worked extremely hard to renovate the buildings. Equipment was gradually being replaced from the UK, along with transport, and the team had been strengthened by the arrival of a laboratory technician, Mr Lennie, who was working in the agronomy section.

4. Mr Grieve had completed his tour recently and Mr Whitley would be finishing his shortly. The major constraints to an expansion

/of the team

of the team and its activities were lack of housing within Stanley itself and the presence of large numbers of unexploded mines around the Camber trial plot. The Centre's animal work had suffered least from the war. Fulsome tribute was paid to the brave and determined way in which team members had responded to the problems that had confronted them.

Animal Production

5. Dr Ferguson reported that physical data on the dry sheep monitoring work at Fitzroy and North Arm had been lost during the war but luckily much of it had already been put on computer at Rothamsted. Arrangements would be made for it to be processed.

6. The war had also interrupted on-going work on the reseeded areas at Port Howard and Fitzroy. The plot at the former had been badly damaged by Argentinian tanks and the team intended to wait until the Spring to consider how best to proceed.

7. Dr Ferguson had been happy with the sheep trials to date. The main reason for these trials was to ensure the "survival of young sheep" and prevent the range of stock loss through death between weaning and shearing. Ultimately, the Centre's objective was to make it possible to hold more stock on the Islands and increase the efficiency of wool production in the Islands. The hogg loss rates were between 5% and 40% because of poor nutritional status, weak animals fell in holes and otherwise got lost at critical periods of the year. It is believed that through improved management of young ewes on reseeded pastures, the weaning percentage could increase from the present 70% - 75% by as much as 8%. Ewes were mated at $2\frac{1}{2}$ years and produced their first lamb at three years. Ewes were culled at 7 or 8 years, by which time they have become infertile. Mortality losses of ewes were about 10% to 12% every year. Ewes that survived would produce 5 or 6 fleeces. There was some deterioration in fleece yields with age of ewe. A ewe surviving to 7 or 8 years would produce about 5 lambs, though in some years they failed to produce a lamb. An average ewe produced 2.08 lambs. The national flock was in static equilibrium. Wethers made up the main wool-producing animals in the flock.

/Young ewes, less

Young ewes, less than 39 kilos at lambing, had only a 50% lambing rate, whereas those above 39 kilos had a lambing rate of 70%. The possibility of bringing ewes to the ram at 1½ years was considered.

8. Trials on young sheep had been encouraging and over a 100 young lambs had been selected at discrete weight groups. One group (fed) had been grazed on a reseed and had shown a weight gain of some 10 kilogrammes over 60 days. The others (unfed) had shown a weight gain of 4 kilogrammes. The two groups would be reunited and their progress monitored into a second season for body weight, survival rate, shearing and wool clip.

9. The Committee endorsed Mr Eadie's comments on the importance of keeping the trials going throughout the animals' lifetime to ensure that there were no 'kick backs'.

10. Mr Whitley, the veterinary officer, had been asked to write a final report which could be used as the basis for further animal work. Further analysis on computer of results to date would be required before taking final decisions on the 1984 programme. On the animal health side, work would continue on parasitic infection. The role of minerals in animal survival and wool growth would also be studied and the Brucella Ovis eradication scheme would continue. Mr Eadie promised to keep FIARDC informed of likely developments over the next 18 months on immunisation following research by one large chemical company into the use of steroids. If successful, their findings could be appropriate for application in the Falkland Islands which could help to raise lambing rates and circumvent nutritional problems. Dr Ferguson noted that ovulation rates were 100%. The lamb crop was 80% to 90% but the weaning rates were only 70%, indicating that ovulation was not necessarily the principal constraint.

11. The Committee was informed that there were no quarantine facilities at present. There were plans to take over the dairy site for this purpose. The Committee was worried by this lack of facilities, particularly in view of recent Press Reports of a 'Noah's Ark', a plan to import a variety of animals on a ship - or

/ships - chartered

ships, chartered by the Crown Agents at the request of the Falkland Islands Appeal. Dr Ferguson provided background on the genesis of the scheme.

12. It was agreed that in the absence of a Government veterinary officer, and with FIARDC's own vet. already fully occupied on the Centre's own business, this scheme could impose immense problems. The importation of goats and sheep, in particular, could well introduce scrapie amongst the existing sheep - no matter how much care was taken - causing irreparable damage. The Committee felt sufficient concern to ask Mr Peers and Mr Lawless to report its reactions to all those involved in the project, recognising that ODA had no effective part or hand in the project itself. This they undertook to do.

Agronomy

13. The field programme was being pursued at a site near Stanley (the Camber) and on farm sites in both East and West Falklands. On the Camber plot, experiments had been undertaken on species and varieties on pasture for reseeding, on seed rates, and on the application of various fertilisers. Although mines had made access difficult, and precluded further expansion in the area, the Camber plots themselves were undamaged. The response to nitrogen had been dramatic and growth results had been most encouraging. The agronomists would carry out further experiments in the Falklands Spring on the applications of nitrogen for the maintenance of swards and would begin new operations in September on a 50 acre plot being made available to the Centre at Garden Point (Fitzroy).

14. Work would also continue on the Whitegrass programme at North Arm and the senior agronomist would be studying the effects of Mr Tony Blake's belief in "hoof and tooth". It was particularly gratifying that Mr Austen Davies was getting to grips with the Whitegrass programme particularly since attempts to obtain a final, detailed report from Miss Burkett on her earlier work had been more or less unsuccessful, although the Committee was given a manuscript version of some recent comments she had prepared.

15. Given the increases in manpower and equipment that had been accepted following the Shackleton Report, the Centre was currently considering a sub-station on West Falkland. Land had been offered at Port Howard and at Fox Bay East for further trial work. The latter might be a more appropriate site, in the light of FIG's plans for a settlement there.

16. In discussion, the Committee agreed that the grass trials must continue. Improved pasture was essential to the future security of sheep farming. It noted the importance to the farmer at the end of the day of the relationship between the high cost of fertiliser (including freight) and the price of the wool clip. It was therefore important to continue investigations into ways of increasing soil fertility by making investigation into the use of legumes which might, in turn, set up 'a nitrogen cycle'. Recent developments at Rothamsted with rhizobia on legumes might prove helpful. Dr Ferguson was advised to make contact with Dr Day of Rothamsted, a leading expert in this area.

17 The Committee was encouraged to learn that the senior agronomist (Mr T Davies) had proved that seeding could be done at much lower levels than previously thought. The cost of grass seed to the farmer was an important factor in his economic planning. The Committee agreed that Dr Gwyer should take the opportunity of his visit to the Islands later in the year to look closely at the economic aspects and implications of the Centre's work.

18. The Committee noted and endorsed the plans for additional sites for further trials. Irrespective of the site ultimately selected on West Falkland, the Committee agreed that an FIARDC programme must be implemented there both to justify its own expansion, in terms of the Shackleton recommendations, and to ensure that proper account was taken in its various trials and experiments of the West Falkland milieu.

Goose Programme

19. Professor Dunnet explained that if the FIARDC was to achieve its objective in improving and developing pastures for sheep production, further studies of geese were needed. The ecology

of the Upland Goose was now better understood and well set out in Dr Summers' main report (circulated) which was commended by the Committee. Further scientific work was not therefore required in this area. What was needed, however - and this would be the main thrust of any future programme - was a greater understanding of the response of geese to reseeded pastures and their effect on the establishment and productivity of these pastures would require both observation and experimentation. Allied to this was a need to try to establish firmly (in the place of current conjecture) the numbers of geese breeding and migrating from the outer to the main islands. Given the international attention from the conservation lobby, a better understanding was also needed of the abundance and ecology of Brent Geese which in turn would improve existing knowledge and understanding of the Upland Geese with which they often associated.

20. Professor Dunnet was confident that the main study programme could, and should, be undertaken by Dr Douse. He would not be able to undertake, at the same time, the studies on Brent Geese and geese in the outer islands. This was, however, something which a PhD student - working to Dr Douse in the Islands and Professor Dunnet in the UK - could undertake over a four-year period.

21. The Committee agreed that the grasslands programme would be incomplete if the interrelationship of geese and reseed was not properly studied. Some questions were raised about using a PhD student to cover the other aspects. Would he be a charge against the £31m development grant? How much would he cost? Was his task an essential adjunct to the central study? How would he fit in with the rest of the FIARDC team? Following discussion, the Committee approved the general outline of Professor Dunnet's paper and confirmed that Mr Douse should carry out the main study programme. It accepted that the additional work proposed was relevant to the main study and that such work would be suitable for a PhD student. Professor Dunnet was requested to provide ODA with an estimate of the costs and the ODA was asked to consider whether any form of funding within the aid programme as a whole, but outside the bilateral grant to the Falkland Islands, could be identified to meet the cost. The Committee noted, in particular, Dr Ferguson's

/warning that because

warning that because of housing and transport constraints in the Islands he could not accept anybody to undertake these additional studies before June 1984. Dr Ferguson was also asked to discuss with Dr Douse making available an area of reseed on which the latter could undertake his observations and experiments.

General FIARDC Matters

22. The Committee discussed Dr Ferguson's proposals to restructure the Centre's manpower basis, once the team had been fully expanded, into distinct animal and agronomic divisions, each with its own facilities. Doubts were expressed and some members suggested that the flexibility inherent in formulating project teams might be more appropriate. It was agreed that Dr Ferguson and Mr Peers would look at this matter again during the latter's visit to the islands at the end of the year.

23. Dr Ferguson asked for assistance in identifying modular buildings that might be appropriate for expanding the Centre's accommodation. £100,000 had been written into the planning budget for the future which had been handed to the ODA. Reference was made in discussion to the wishes of the FIG and to the roles of the ODA and the Crown Agents in this matter. It was agreed that this was something which ODA could pursue separately with Dr Ferguson.

24. Replacement equipment was arriving satisfactorily from the UK.

Advice/Extention

25. Dr Ferguson reported the role which the Centre had been asked to play by the FIG in helping the latter to value the Packe Brothers Farm, prior to its purchase by Government. Advice had also been sought on sub-division and there would be a continuing need for the Centre to assist the Falkland Island Government's agricultural officer in this area as well as providing advice to smallholders. Valuation of land had been based on the value of the business taking due account of the transactions at Roy Cove, Douglas Station and Green Patch. A rough figure of £13 to £14 per sheep stocked had been used.

/26. During the Committee's

26. During the Committee's discussions on sub-division, reference was made to flock sizes of 3,000 head of sheep. It was recognised that the speed of land purchase and subsequent sub-division of land had been a political necessity. However, grave doubts were expressed by some members over the speed of progress and reservations were entered about flock sizes which were likely to be dangerously uneconomic. There was a prospect that potential owners in those cases would go bankrupt. Time was needed to study and apply any lessons to be learned from the previous sub-division exercise (eg Green Patch, Roy Cove).

27. The Committee stressed the importance of trying to slow matters down. It agreed that an agricultural economist ^{must} ~~must~~ be added to the strength of the FIARDC and that this, and all the financial implications of farming sub-divided land (eg economic units, grants, subsidies etc) must be studied and commented on by Dr Gwyer during his visit.

28. Dr Ferguson also reported that most of the enquiries, either commercial or individual, to FIG on potential smallholder operations were being referred to the Centre. These enquiries covered such things as fat lamb production schemes, pigs, poultry, vegetables etc.

29. The Committee took note of Mr Eadies's firm warning that unless steps were taken to approach the farming of sub-divided land and the establishment of smallholdings in a structured and careful fashion, the repercussions could be financially very serious. Everything depended on improved pasture. Indeed, that was the hard core of the Centre's programme but it could take up to 10 years to produce results. It was one thing to try to develop solutions against a background of large-scale farming units; quite another to produce them in relation to disparate small-scale operations.

The Peers' Report

30. Several of the recommendations in the Peers Report had been covered in earlier discussion. It was agreed that the proposed appointment of a sheep husbandry officer, recommended by Mr Peers, afforded an excellent opportunity to establish inter alia a sound breeding programme and that the successful candidate should have a sound genetic background.

31. The Committee took note of possible medical problems which might prevent the appointment of Mr Wathan as FIG's agricultural officer. It agreed that Dr Lowe, the forestry adviser, should visit Mr Eadie before visiting the Falkland Islands in September. The Committee agreed that agro-forestry would be an important element in Dr Lowe's TORs. Trees could be used to lower the cost of fencing (currently £2,800 per mile) as well as shelter belts, in line with the Shackleton Report.

32. The recommendation for automatic weather recorders was noted. It was agreed that Mr Tom Davies would investigate means of processing the data provided by these recorders.

33. The Committee also approved the draft terms of reference, which could now be regarded as final, for the FIARDC - set out in Annex J to Mr Peers' report - provided that the words "general agricultural" were excised from paragraph 2a.

34. Dr Ferguson left the meeting, at the Chairman's request, and the latter informed the Committee of Dr Ferguson's decision to end his appointment in June 1984. The reasons were explained and accepted with great regret. It was agreed that care would be needed to identify a suitable replacement who should be a sheep man.

Any Other Business

35. It was agreed that the Committee would meet again in a year's time sometime in July or August to fit in with the end of Dr Ferguson's assignment and the appointment of his successor.

36. The Chairman informed the Committee that visits to the Centre would be made this year by Messrs Dunnet, Gwyer, Peers and Lowe. He asked Dr Ferguson to ensure that a liaison officer was appointed from the Centre to accompany each of these advisers. It was agreed that Mr Austen Davies would look after the forestry adviser (the latter's terms of reference would be sent to him for information) who was expected to visit in September. Dr Ferguson would look after Dr Gwyer, Mr Tom Davies would take care of Mr Peers and Dr Douse would be the link man for Professor Dunnet.

37. Messrs Peers and Gwyer were due to travel on or about 27 November and Professor Dunnet asked whether arrangements could be made for him to travel on or about 14 November.

38. In connection with Professor Dunnet's visit, the Committee referred to its earlier discussion on the conservation and ecological considerations surrounding the goose programme. It was felt that given the recommendations in the Shackleton Report on environmental, conservation and ecological issues in general, Professor Dunnet should be invited to also consider these issues during his visit. It therefore recommended that Professor Dunnet undertake a visit of up to four weeks in order to:-

- (a) set up the goose programme, as agreed, with Dr Douse;
and
- (b) report on conservation, environmental and related matters in the Falkland Islands.

39. It suggested that appropriate terms of reference be prepared by the ODA's environmental adviser.

40. Professor Dunnet said that he would be willing to undertake this additional task and asked whether arrangements could be made for him to travel to the Islands on or about 14 November. It was agreed that Professor Dunnet would debrief himself to Mr Peers prior to submitting his report on the environmental etc aspects.

THE MOVEMENTS OF UPLAND AND RUDDY-HEADED GEESE IN THE FALKLAND ISLANDS

RONALD W. SUMMERS

ABSTRACT. - Observations and light-trapping were made from 1970-1971 and 1972-1973.

Ruddy-headed Geese nested on the Falkland Islands between 1971 and 1973.

First-year male Upland Geese tended to be sighted further from water areas

than first-year females, who independent of their parents. Second-year

birds were sighted in the same areas as their parents.

THE MOVEMENTS OF UPLAND AND RUDDY-HEADED GEESE IN THE

FALKLAND ISLANDS

of both species were rarely sighted more than 5 km from their nesting areas.

Upland adults moved frequently from their breeding territory during both summer

and autumn. Significantly more long-distance (over 25 km) sightings were

recorded for Ruddy-headed Geese than for Upland Geese, and were mostly

carried out by geese in their second or third year, for both species.

by RONALD W. SUMMERS

Abridged title: MOVEMENTS OF SHELDGESE

THE MOVEMENTS OF UPLAND AND RUDDY-HEADED GESE IN THE FALKLAND ISLANDS

RONALD W. SUMMERS

ABSTRACT. -- Recoveries and sight-records were made from 2700 Upland and 470 Ruddy-headed Geese marked in the Falkland Islands between 1977 and 1980.

First-year male Upland Geese tended to be sighted further from natal areas than first-year females, once independent of their parents. Second-year birds were sighted further from shedding sites than adults. This age-related difference was also found for Ruddy-headed Geese in spring. Breeding adults of both species were rarely sighted more than 5 km from their territories. Upland adults moved furthest from their breeding territory during late summer and autumn. Significantly more long-distance (over 20 km) sightings were recorded for Ruddy-headed Geese compared with Upland Geese, and were mostly carried out by geese in their second or third year, for both species.

STUDY AREA AND METHODS

The study was carried out between October 1977 and August 1980, mostly within a 10 km radius of Darwin settlement, the intensive study area (Fig. 1).

"Moulting" refers to young between hatching and fledging (present in November and December); "First-year" refers to geese from fledging (usually in January) to the end of December of that year; birds older than first-year are "adults," and can be distinguished as plump (December 1978, February 1979), though older year classes were identified if geese were originally marked as gullings or first-years. Adults may be distinguished as "pre-breeders" and "breeders." The latter are those observed on eggs, with gullings or fledges

Upland Chloephaga picta leucoptera and Ruddy-headed Geese C. rubidiceps have been regarded as pests in the Falkland Islands for many years: farmers claim that they compete with sheep for grass. To try to overcome this problem sheep farmers introduced a bounty scheme but the goose population has remained large. The human population is about 1700 and travel on the islands is difficult for there are no roads. Therefore, much of the country is rarely visited and geese in these areas are not molested. Any attempt to reduce the goose population in a given locality by shooting will fail if the geese are sufficiently mobile to fill the small and very scattered gaps created by shooting.

The following study was designed to mark conspicuously Upland and Ruddy-headed Geese in a number of areas in the islands to establish the movements and dispersal patterns of the different sexes and age classes: first-year geese once they become independent of their parents, second-year geese, and adults. Information was collected from an intensive study area where regular searches were made for marked geese, and an extensive area where observations of marked geese were reported by the public.

STUDY AREA AND METHODS

The study was carried out between October 1977 and August 1980, mostly within a 10 km radius of Darwin settlement: the intensive study area (Fig. 1).

"Gosling" refers to young between hatching and fledging (present in November and December); "first-year" refers to geese from fledging (usually in January) to the end of December of that year; birds older than first-year are "adults," and can be distinguished on plumage (Delacour 1954, Summers in prep.), though older year classes were identified if geese were originally marked as goslings or first-years. Adults may be distinguished as "pre-breeders" and "breeders." The latter are those observed on eggs, with goslings or fledged

young. The former, which have yet to attempt breeding can only be distinguished if they are marked birds with a known history. Male and female Upland Geese, but not Ruddy-headed Geese, can be easily distinguished (Delacour 1954).

Goslings and breeding adults were marked only within the intensive study area with a unique combination of Darvic color rings or numbered laminated Darvic leg-bands, which could be read with a telescope. Both species form flocks on ponds or at the sea in order to molt (shed) primaries and secondaries. These flightless geese (shedders) were more conspicuously marked with colored Darvic neck-bands in several localities throughout the islands. The neck-bands which were used in the intensive study area were numbered and/or lettered. All birds were marked between October and January (ie. during the breeding and shedding seasons).

Standard routes were driven in a Landrover each month in search of marked geese in the intensive study area; Goose Green to Bodic Creek Ponds, Goose Green to Orqueta Park, Darwin to Laguna Verde, Darwin to Old House Pond, Darwin dairy, Burntside Paddocks, Ceritos Arroyo and Burntside Pond (Fig. 1). A "sighting" refers to identifying a marked individual at a given site in a given month.

People on farms throughout the Falklands were notified by newspaper and radio of the marking scheme and asked to report details of sightings of neck-banded geese.

RESULTS

1. MOVEMENTS OF FIRST- AND SECOND-YEAR GEESE MARKED AS GOSLINGS

1a. UPLAND GEESE

One-hundred and ninety-five Upland goslings were leg-banded in their parents' territories, within the intensive study area. They remained with their parents for their first eight to nine months of life, so their movements then were the same as those of their parents. They became independent about July/August when their parents chased them off the territories. Data on subsequent

movements were collected from July to April. This period was split into July to December (when they are still in their first year and before the annual molt) and January to April (after the molt and when they are in their second year) (Fig. 2).

First-year males were observed further from their parental territory during the period prior to shedding than after it (Kolmogorov-Smirnov two-sample test (Siegel 1956) $D = 0.67$; $n = 49, 16$; $\chi^2 = 21.7$; 2 df; $p < 0.001$). In contrast, the distribution of sightings of females away from the parental territory showed no difference before and after shedding ($D = 0.17$; $n = 66, 38$; $\chi^2 = 2.8$, 2 df, $p > 0.10$) (Fig. 2).

Sightings of over 6 km were rare within the intensive study area (the maximum possible distance was about 20 km) and only three were recorded outside this area - a female was shot 62 km away when 16 months old, and a pair was shot 49 km away when in their third year.

Sixty-seven goslings were leg-banded on Carcass Island during November 1962 and January 1963 (British Trust for Ornithology records). Four were shot at Roy Cove (32 km away). Three were killed in late April 1963, 5 months after ringing when it was likely that they would still have been with the rest of the family. The fourth was killed when 19 months old.

1b. RUDDY-HEADED GEESE

Seventeen gosling were marked in 1977. Like the Upland Goose they became independent of their parents when about 8 months old. All sightings were made within 6 km of the parental territory, including two birds trapped as shedders at 4-5 and 5-6 km from their natal territory (Fig. 3).

2. MOVEMENTS OF SECOND-YEAR AND ADULT GEESE MARKED AS SHEDDERS

2a. UPLAND GEESE

Shedding flocks occur mainly in December and early January and are composed of first-year birds (becoming second-year on 1st January), pre-breeding adults

and failed breeding adults. Successful breeding adults tend to skip shedding (Summers in prep.). Therefore two age-classes were distinguished for sightings of geese marked as shedders: "second-year" (those marked in the previous calendar year as first-year) and "adult" (pro-breeding and breeding).

Two-thousand five-hundred shedders were marked in a number of localities throughout the islands, 463 in the intensive study area (Appendix I, Figs. 4 & 5). Each year's data were analysed separately because different localities were used each year.

One hundred and twenty six were individually marked at Bodie Creek Pond and Old House Pond in the 1977-78 shedding season. Eighty-five (67%) of these were seen again during 1978 and Figs. 4 and 5 show the spatial and seasonal distribution of sightings. The data were grouped into three times of the year, late summer and autumn (January to April), winter (May to August), and spring and early summer (September to December). They were further grouped into birds seen less than 5 km from the shedding site and those seen over 5 km for χ^2 tests. There was no significant difference in the seasonal distribution of sightings of adult females ($\chi^2 = 0.45$, 2 df, $p > 0.50$), second-year males ($\chi^2 = 4.95$, 2 df, $p > 0.05$) and second-year females ($\chi^2 = 0.33$, 2 df, $p > 0.80$), but a greater proportion of adult males were seen over 5 km from their shedding sites in January to April compared with other times of the year ($\chi^2 = 11.25$, 2 df, $p < 0.01$). When the movements of different age and sex classes were compared it was found that there was no significant differences between either adult males and females ($D = 0.16$; $n = 64, 40$; $p > 0.10$), or second-year males and females ($D = 0.16$; $n = 53, 40$; $p > 0.10$), but that proportionally more second-year birds were sighted at greater distances from the shedding sites than adults ($D = 0.32$; $n = 104, 93$; $p < 0.001$) (Fig. 6).

A further 239 shedding geese were neck-banded in the intensive study area during the 1978-79 season, and 151 of these were seen during January to April 1979 (Fig. 7). Proportionally more second-year males were sighted at greater

distances from the shedding sites, compared with adult males ($D = 0.30$; $n = 60, 59$; $p < 0.01$). No significant differences were found between second-year males and females ($D = 0.26$; $n = 60, 42$; $p > 0.05$), or between second-year and adult females ($D = 0.08$; $n = 44, 42$; $p > 0.1$) (Fig. 7).

Observations within the extensive study area gave information on movements of geese marked outside the intensive study area. They also include records of birds which moved out of the intensive study area. There were 62 sightings of geese at 23 localities over 20 km from the site of marking (Fig. 8). For most of these birds the age was unknown. However, 12 were of known age: 10 marked as "first-year" ($\chi^2 = 2.72$, 1 df, $p > 0.05$) were seen again in their second year (5), third year (4) and fourth year (1). Three females were resighted close to where they were marked after undertaking the long-distance movement. All three travelled to Walker Creek (21 km) shortly after shedding at Bodie Creek Pond and returned within a month of being sighted at Walker Creek.

The longest distance between marking and resighting for an Upland Goose was 75 km.

2b. RUDDY-HEADED GEESE

Four hundred and thirty-seven shedders were marked throughout the islands (Appendix I); 201 within the intensive study area. Eighteen were marked at Old House Pond (Fig. 1) in December 1977 and subsequent sightings were made within 8 km of this pond (Table 1). There was little seasonal change in the distribution of sightings.

One hundred and eighty-two were marked in the intensive study area in the 1978-79 shedding season and 287 sightings involving 136 birds (75% of total marked) were made between January and April 1979 (Figs. 9, 10A). There was no significant difference between the distribution of sightings of adult and second-year birds ($D = 0.11$; $n = 159, 128$; $p > 0.10$). Further sightings were made in September and October 1979 and over this period a greater proportion

of second-years were sighted further from the shedding sites, compared with the adults ($D = 0.37$; $n = 40, 31$; $\chi^2 = 9.56$; 2 df; $p < 0.05$) (Fig. 10 B).

Observations from the extensive study area gave information on the movements of Ruddy-headed Geese marked at other shedding localities, and on the long-distance movements of geese who moved out of the intensive study area (Fig. 11). These include 80 sightings at 29 localities over 20 km from the shedding sites. The 437 marked Ruddy-headed Geese produced more long-distance sightings than the 2500 Upland Geese, suggesting that Ruddy-headed Geese are greater travellers. This difference was tested using the data from birds neck-banded at Cape Dolphin, Manada Pond, and Darwin/Goose Green where Upland and Ruddy-headed Geese were marked within the same shedding seasons (Table 2). For all three localities there were significantly more long-distance sightings of Ruddy-headed Geese ($\chi^2 = 138.6, 15.4$ and 13.2 respectively; 1 df; $p < 0.001$ for all values). The percentage of first-year birds in the Upland and Ruddy-headed Goose flocks at Cape Dolphin and Darwin/Goose Green was slightly higher for Upland Geese (36.8% and 31.4% at Cape Dolphin and 45.9% and 41.1% at Darwin/Goose Green). Therefore, the above difference is unlikely to be due to a difference in the proportion of young birds marked (young birds move further than adults).

The age of most of the Ruddy-headed Geese which were sighted at long distances (over 20 km) was unknown. However, 10 geese (involving 19 sightings) from the intensive study area were individually marked and could be aged. All but one were marked as first-year ($\chi^2 = 8.6$, 1 df, $p < 0.01$). Five of the ten were resighted close to the site of marking after the long-distance movement. However there was no seasonal pattern to the timing of these movements. Some of the long-distance travellers from Cape Dolphin were also aged. The female of a marked pair was seen at Darwin (60 km away) in her second year. Also the male in another pair, where only the male was marked, was seen at Darwin in his second-year.

The longest distance between marking and resighting for a Ruddy-headed Goose was 90 km.

3. MOVEMENTS OF BREEDING ADULTS

3a. UPLAND GEESE

Eighty-seven breeding adults were marked on their territories, 41 in the 1977-78 breeding season and 46 in the 1978-79 season, representing 21 and 27 pairs in which one or both adults were marked. The distances that these pairs were seen from their breeding territories were recorded each month (Table 3). The distribution of sightings during the breeding season (September to December) and main part of the shedding season (December) was significantly different from the distribution in late summer and autumn (January to April) ($D = 0.30$; $n = 119, 89$; $p < 0.001$) when more pairs were seen further from their territories. There were no significant differences either between January to April and May to August (winter) ($D = 0.15$; $n = 119, 34$; $\chi^2 = 2.41$; 2 df; $p > 0.10$), or between May to August and September to December ($D = 0.15$; $n = 89, 34$; $\chi^2 = 2.16$; 2 df; $p > 0.10$).

3b. RUDDY-HEADED GEESE

Twenty breeding adults were marked, representing 13 pairs where one or both birds were marked. They were virtually absent from their breeding territories outside the breeding season (Table 4). There appeared to be little seasonal change in the distribution of sightings outside the breeding season, and the furthest sighting was made at 6-7 km.

DISCUSSION

Most of this study was carried out along selected routes within a 10 km radius of Darwin settlement, thus giving a bias to the dispersion pattern of sightings. However, the comparisons between different ages and sexes within groups of geese marked during the same season are valid. Further, it could be argued that the results are biased towards the shorter movements since the study was

restricted largely to an intensive study area. However, there are reasons to believe that only a small percentage of birds moved greater than 10 km, because: (1) a high percentage of the marked birds were seen again in a relatively small portion of the intensive study area (see Fig. 1); (2) birds marked at one side of the study area were rarely seen at the other side, approximately 20 km away; (3) birds marked in the extensive study area were rarely seen in the intensive study area.

The information collected on the movements can be discussed in relation to the life cycles of the geese. When Upland and Ruddy-headed Geese fledge, they remain with their parents through late summer and autumn. The family parties break-up in winter and early spring, and the first-year geese move to areas not used by breeding adults (Summers in prep.). In their first few months of independence the first-year males move further from their natal area than the females. This sexual difference has been found for several Anatidae, including the Paradise Shelduck Tadorna variegata (a member of the Tadornini) (Williams 1979), though in most bird species it is usually the females which disperse further (Greenwood 1980). Some first-year female Upland Geese pair with adult males shortly after becoming independent of their parents and defend territories close (0-2 km) to their natal area (Summers in prep.). This difference in behavior may partly account for the observed sexual difference in distribution.

Geese shed for the first time at the end of their first year and large numbers were marked along with adults. Therefore, subsequent observations refer to movements from shedding sites rather than from natal areas or territories. For some birds, breeding and shedding takes place on the same pond but others travel 6-7 km to shed (Table 3).

There was a tendency for both second-year Upland and Ruddy-headed Geese to be sighted further from the marking site than adults, within the intensive study area. Also, most of the long-distance movements (over 20 km) recorded

in the extensive study area were carried out by geese in either their second or third year, presumably before they breed for the first time. Upland females can breed for the first time in the spring (September/October) of their second year (Summers in prep.) but this need not apply to all females. The age at first breeding by Upland ganders is thought to be older, and the Ruddy-headed Geese probably follow a similar pattern to the Uplands.

There were several records of young geese who moved out of the intensive study area but returned at a later date. There was no seasonal pattern to these departures and returns so they cannot be regarded as migratory movements. It is a characteristic feature in the life cycles of many birds for the young to move further than the adults and this may be interpreted as a need for the young to gain knowledge of their surroundings (Baker 1978). Alternatively, there may be social pressures which force young birds to emigrate (Wynne-Edwards 1962).

Ruddy-headed Geese are greater travellers than Upland Geese. They are found in fewer localities and exploit a narrower range of habitats (Summers in prep.) so perhaps require knowledge of suitable feeding areas over a greater area compared with Upland Geese.

Once established as breeding adults the geese rarely moved more than a few kilometres from their territory, and tended to return to the breed in the same territory and with the same mate in successive seasons (Summers in prep.). Upland Geese moved furthest from their territories after the breeding season and returned to them through the winter and early spring. Upland Geese breed and raise their families on the territory (Summers in prep.) so their departure in autumn may be in response to depleted food supplies there. Alternatively, these movements may be carried out in order to exploit Diddle-dee Empetrum rubrum berry crops which are locally abundant in autumn. Ruddy-headed Geese seem to follow a similar pattern to the Upland Goose though several pairs were

still absent from their territories in spring (Table 4). They nest later than the Upland Goose (Harradine 1977) so this may account for the difference.

The present methods of goose control in the Falklands are either shooting on particular pastures (eg. reseeded areas) that a farmer wants clear of geese, or rounding-up and killing flocks of shedders. The total population of Ruddy-headed Geese in the Falklands is probably only a few tens of thousands, but relatively few are shot since they are more wary than the Upland Geese. However, approximately 20,000 Upland Geese are killed annually (Summers in prep.) from a population estimated at a few hundred thousands. The annual production (Summers in prep.) is greater than the number killed so that it is unlikely that killing is having a long-term effect on the population. Many geese did not move more than a few kilometres from where they were marked, but this is still much greater than the size of the pastures the farmers wish to protect. Also a proportion of young geese move much greater distances. This mobility makes present attempts at clearing pastures of geese ineffective.

Intensive and continued shooting can bring about local extinction. This was done around Stanley where the human population is high (900). This killing was for food rather than to protect pastures. However, Stanley Common was designated a nature reserve in 1973 and geese are again resident on the Common and can be seen within the town of Stanley itself.

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TABLE 1. Distribution of sightings of unaged Ruddy-headed Geese marked at Old House Pond during December 1977 and observed from February to November 1978.

	Distance from shedding site (km)							
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
Feb.	1							
Mar.	1			1				3
Apr.	2			2				4
May	3							4
June	5							2
July								1
Aug.	2							
Sep.	4		2					2
Oct.	2						3	
Nov.	2						2	

TABLE 2. Number of long-distance sightings of Upland and Ruddy-headed Geese neck-banded from three areas. The expected number was based on the assumption that both species were equally dispersive and likely to be seen.

Locality	Species	Total number neck-banded	Number of sightings over 20 km	Number expected	Number of localities involved
Cape Dolphin	Upland	724	29	62.0	7
	Ruddy-headed	105	42	9.0	13
Manada Pond	Upland	150	5	13.6	3
	Ruddy-headed	81	16	7.4	5
Darwin/Goose Green	Upland	337	11	20.8	6
	Ruddy-headed	182	21	11.2	9

TABLE 3. Distribution of sightings of breeding pairs of Upland Geese (one or both marked) observed from January 1978 to April 1979. Values are percentages of the total number of observations of pairs seen in a given month. Those in brackets were shedding.

Percentage of observations at different distances from the territory (km)									
	No. of observations	On territory	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Jan.	36	72.2	11.1	11.1	2.8			2.8	
Feb.	28	46.4	39.3	7.1		3.6	3.6		
Mar.	33	45.4	27.3	12.1		6.1	3.0	6.1	
Apr.	22	54.6	22.8	4.5	9.1	4.5		4.5	
May	7	57.1	14.3	28.6					
June	9	77.8	11.1	11.1					
July	10	70.0	20.0	10.0					
Aug.	8	75.0	12.5	12.5					
Sep.	14	92.9	7.1						
Oct.	16	87.5	12.5						
Nov.	31	90.3	9.7						
Dec.	28	75.0	7.1	3.6			(7.1)	3.6	(3.6)

TABLE 4. Distribution of sightings of breeding pairs of Ruddy-headed Geese (one or both marked), observed from January 1978 to April 1979.

Number of observations at different distances from the territory (km)							
On territory	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Jan.	3						
Feb.		2		1	1		
Mar.		1	3	1		1	
Apr.		1	1	1	1		
May							
June		2		1			1
July	1						
Aug.		2	2	1			
Sep.	1	1	1	1			
Oct.	3	1					
Nov.	7	1					
Dec.	8				1		

Appendix I Numbers of shedders marked

Farm	Locality	Date	Number of Upland Geese	Number of Ruddy-headed Geese
Darwin/Goocho Green	Old House Pond	28.11.77 + 22.12.77	40	18
"	Bodie Creek Pond	4.12.77	86	1
"	"	6.12.78 + 2. 1.79	81	25
"	"	8.12.79	41	
"	Salinas beach	3.12.78	98	
"	Teal Creek	5.12.78	60	
"	Seccomb Island	20.12.78		89
"	Laguna Verde	20.12.78		68
"	Black Rincon	2.12.79	57	
Johnsons Harbour	Cow Bay	3. 1.78	79	50
"	"	14.12.78	66	
Port Louis	Swan Pond	13.12.78	147	
Port San Carlos	"	25+26.12.78	233	103
"	Sorrel Pond	29.12.78	70	
"	Trypot Pond	28.12.78	162	
"	"	27.12.79	259	2
Hill Cove	Mount Donald Pond	16.12.77	63	
Fox Bay East	Quarantine Point	18.12.77	113	
"	"	14.12.79	108	
Fox Bay West	North Rincon Pond	19.12.77	197	
"	Manada Pond	15.12.79	150	81
Pebble Island	Ship Harbour	11.12.79	314	
"	Farossa Rock Pond	12.12.79	<u>76</u> 2500	<u> </u> 437

LEGENDS TO FIGURES

Figure 1. The intensive study area around Darwin and Goose Green settlements (see rectangle in Fig. 8 for its location within the Falkland Islands). Stipple indicates the areas that were regularly searched for marked birds.

Figure 2. Dispersion of sight-records of first-year and second-year Upland Geese, marked as goslings in 1977 and 1978. Solid lines: after becoming independent of parents in winters 1978 and 1979 and prior to shedding (ie. observed from July-December 1978 and September-October 1979). Dashed lines: after shedding (ie. observed from January-April 1979). Sample sizes are given beside the lines.

Figure 3. Dispersion of sight-records of first-year Ruddy-headed Geese marked as goslings in 1977, and after becoming independent of parents in winter 1978 (ie. observed from July-December 1978). Sample size is given beside the line.

Figure 4. Dispersion of localities of sight-records of Upland Geese marked at Old House Pond (circle) and Bodie Creek Pond (square), around Darwin/Goose Green. More than one sighting was made at many localities.

Figure 5. Dispersion of localities of sight-records of Upland Geese marked at Black Rincon (circle), Teal Creek (square) and Salinas beach (triangle), around Darwin/Goose Green. Long distance movements from these sites and those in Fig. 4 are shown in Fig. 8.

Figure 6. Dispersion of sight-records of second-year and adult Upland Geese marked when shedding at Old House Pond and Bodie Creek Pond in November and December 1977 and observed in 1978. Solid line -- males. Dashed line -- females. Sample sizes are given beside the lines.

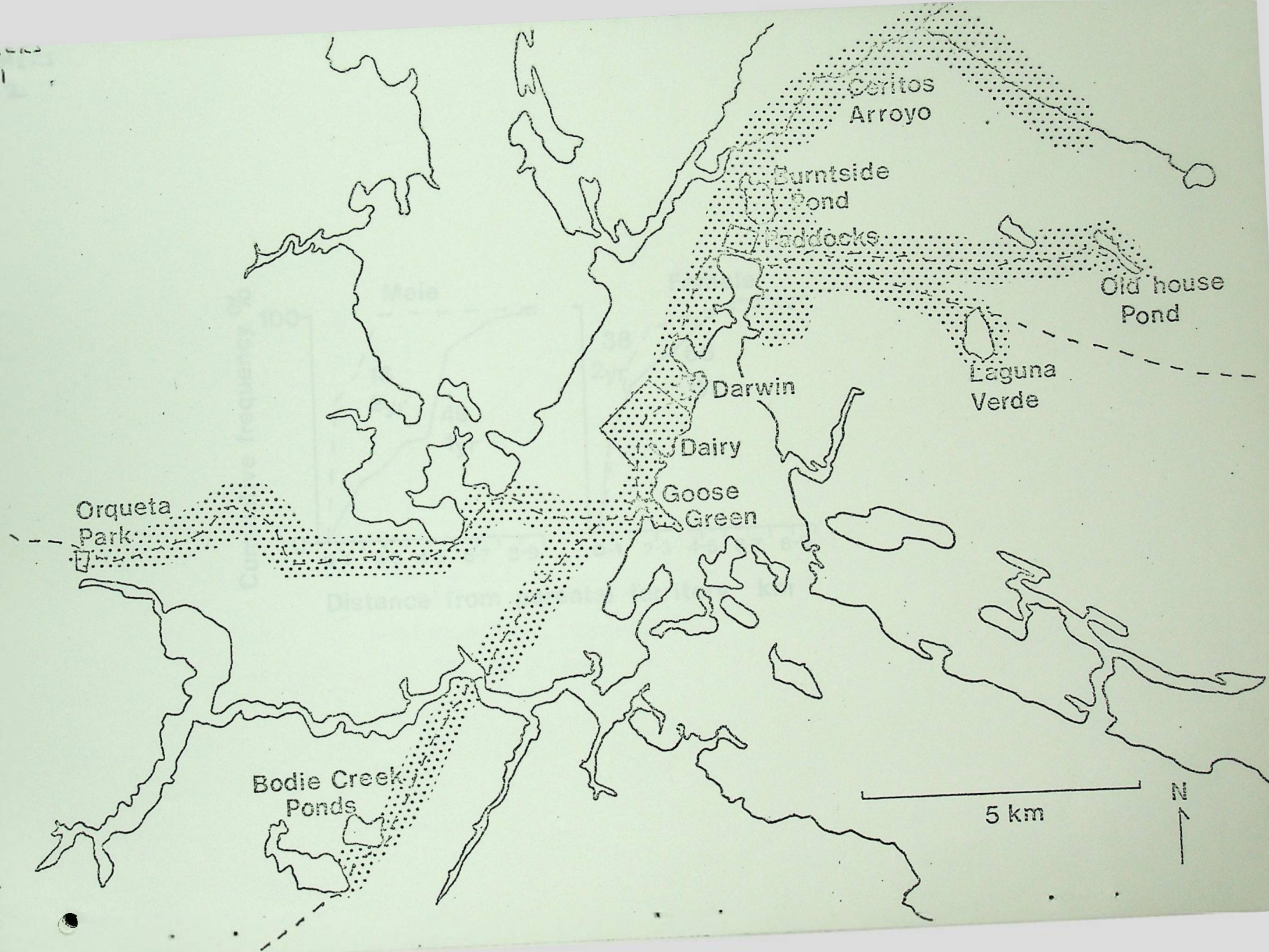
Figure 7. Dispersion of sight-records of second-year and adult Upland Geese marked when shedding in the Darwin/Goose Green area in December 1978 and January 1979 and observed from January to April 1979. Solid lines -- males. Dashed lines-- females. Sample sizes are given beside the lines.

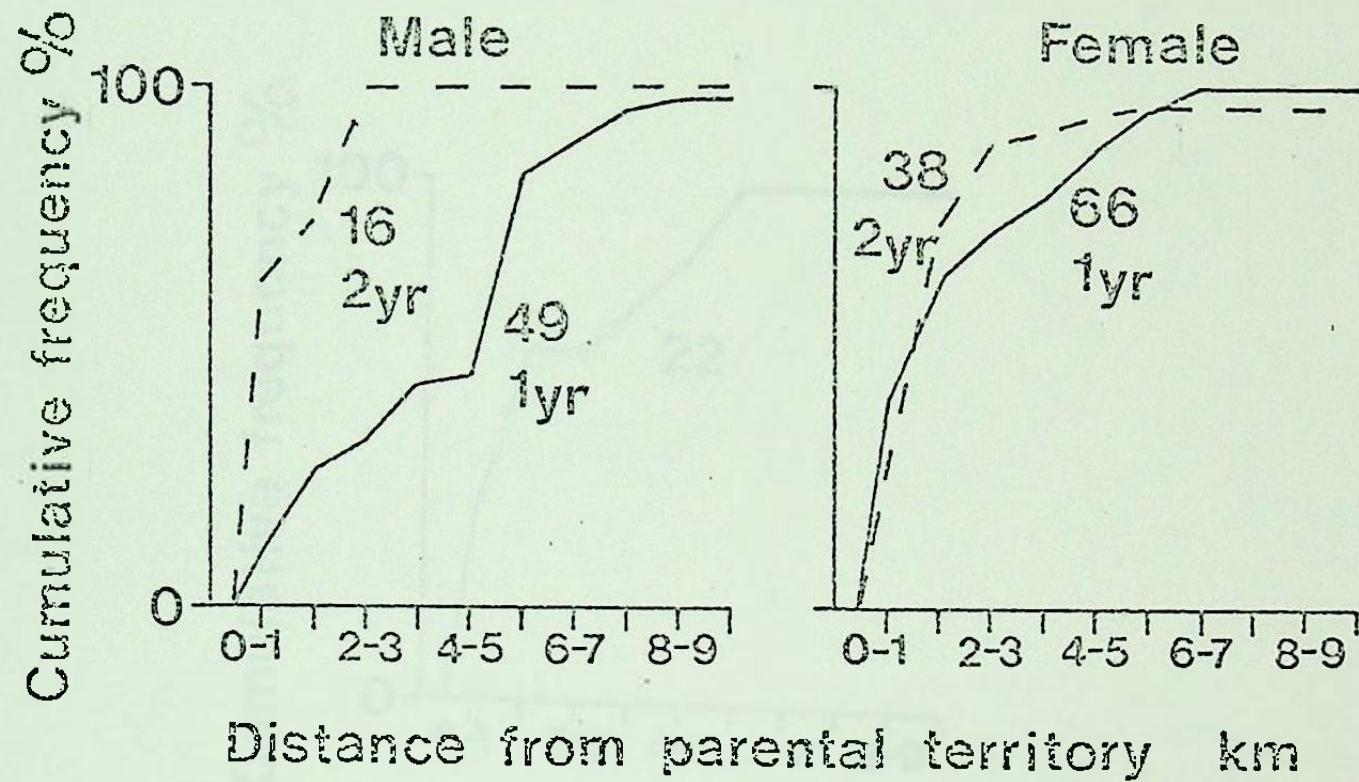
Figure 8. Dispersion of sight-records of Upland Geese marked in the intensive study area (filled squares), Cape Dolphin (filled triangle), Pebble Island (diamond), Manada Pond (circle), Quarantine Point (inverted filled triangle), Cow Bay (open triangle), Swan Pond Port Louis (open square) and Carcass Island (open inverted triangle). Large symbols indicate marking localities. Sightings within the intensive study area are given in Figs. 4 and 5. Numbers refer to months of sightings.

Figure 9. Dispersion of localities of sight-records of Ruddy-headed Geese marked Laguna Verde (circle), Seccomb Island (triangle) and Bodie Creek Pond (square), around Darwin/Goose Green.

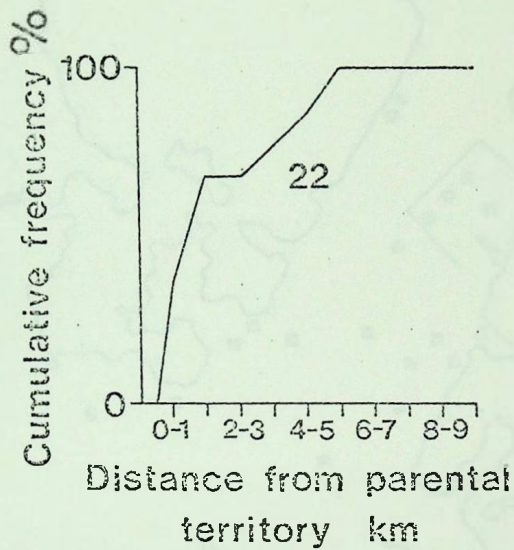
Figure 10. Dispersion of sight-records of second-year (solid line) and adult (dashed line) Ruddy-headed Geese marked when shedding in the Darwin/Goose Green area in December 1978 and January 1979 and observed A from January-April 1979 and B September-October 1979. Sample sizes are given beside the lines.

Figure 11. Dispersion of sight records of Ruddy-headed Geese marked within the intensive study area (square), Cape Dolphin (filled triangle), Manada Pond (circle) and Cow Bay (open triangle). Large symbols indicate marking localities. Additional sightings of Darwin/Goose Green marked birds are given in Fig. 9. Numbers refer to months of sightings.

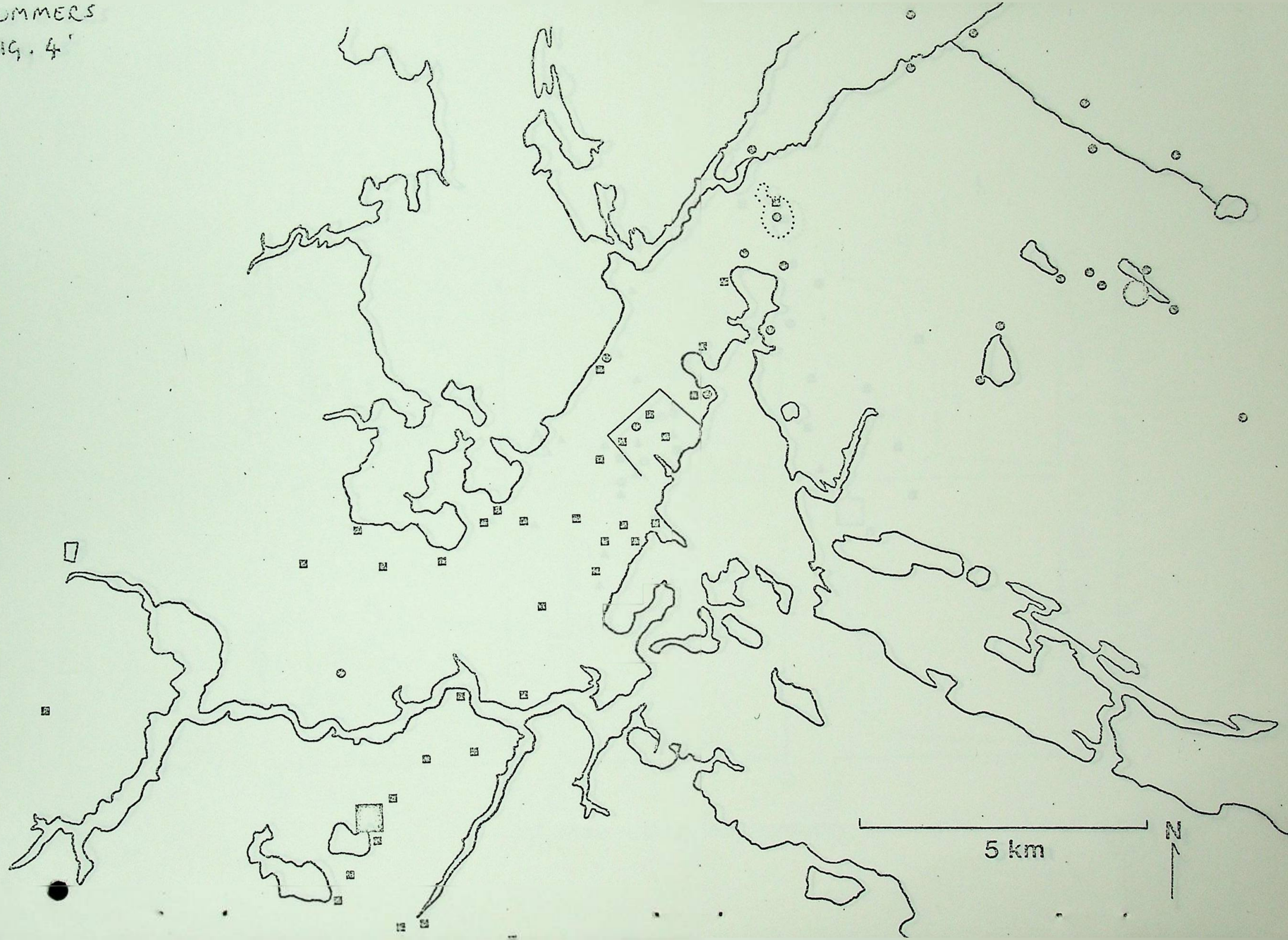




SUMMERS
FIG. 3



SUMMERS
FIG. 4'



SUMMERS
FIG. 5

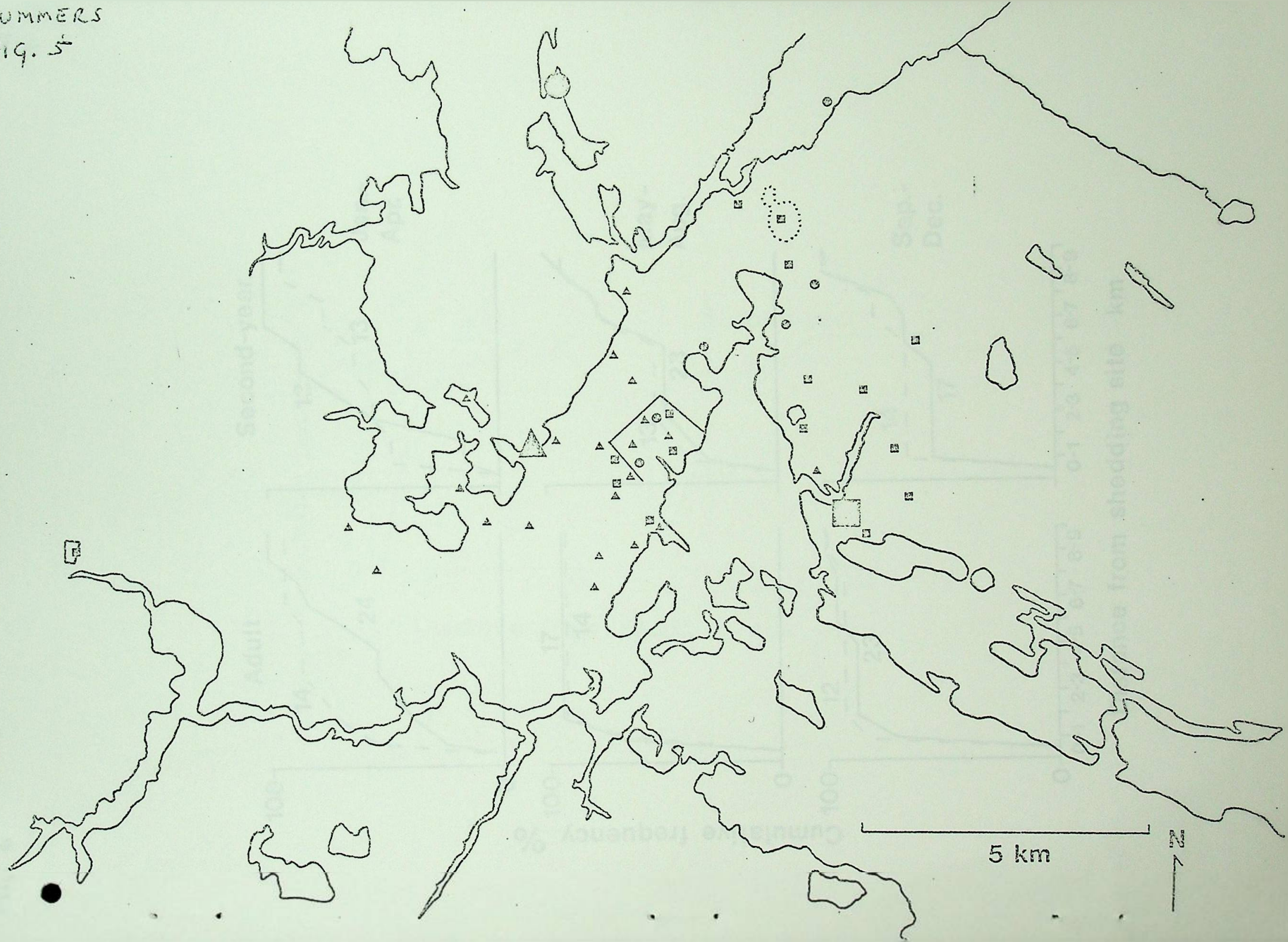
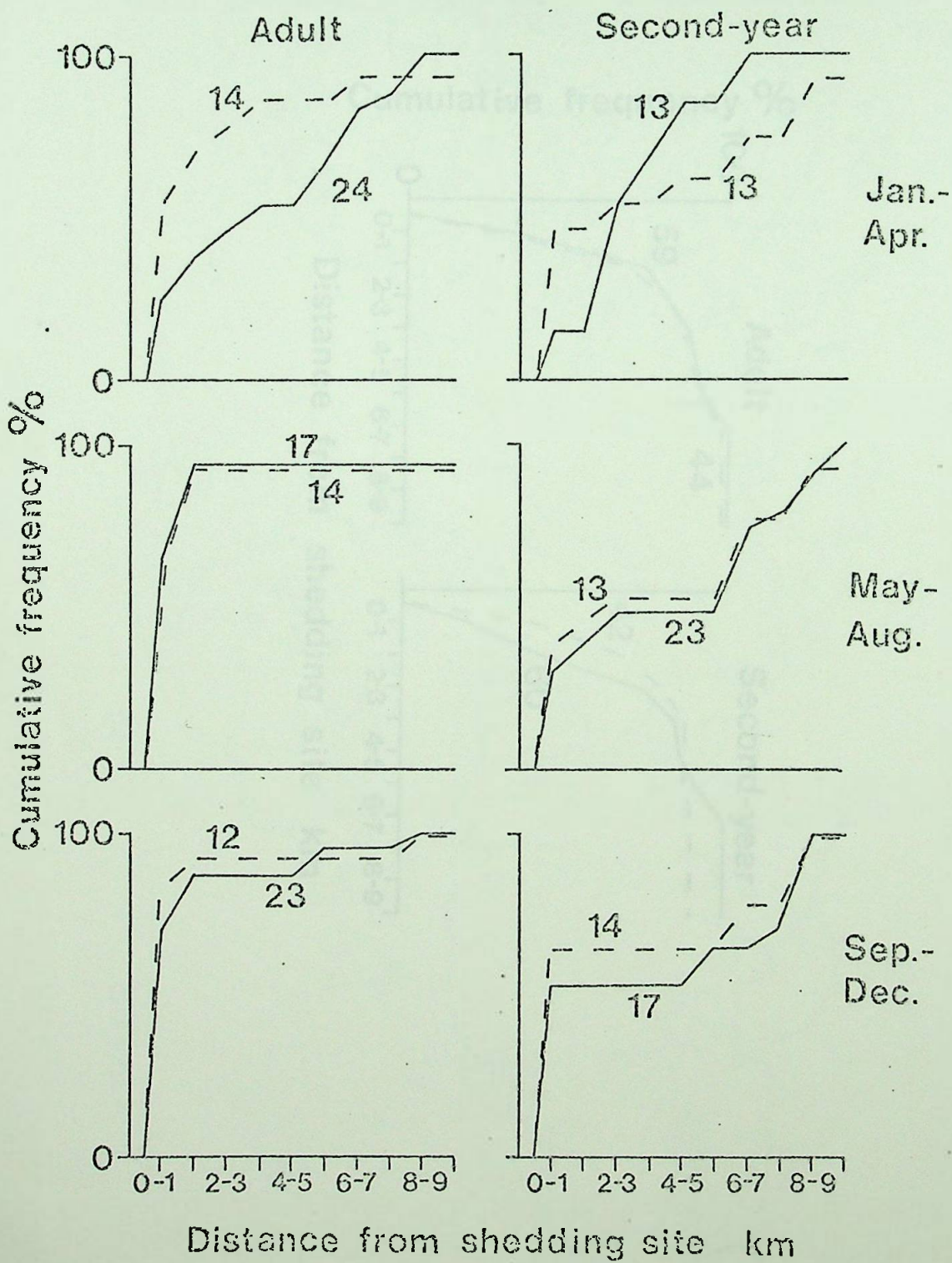


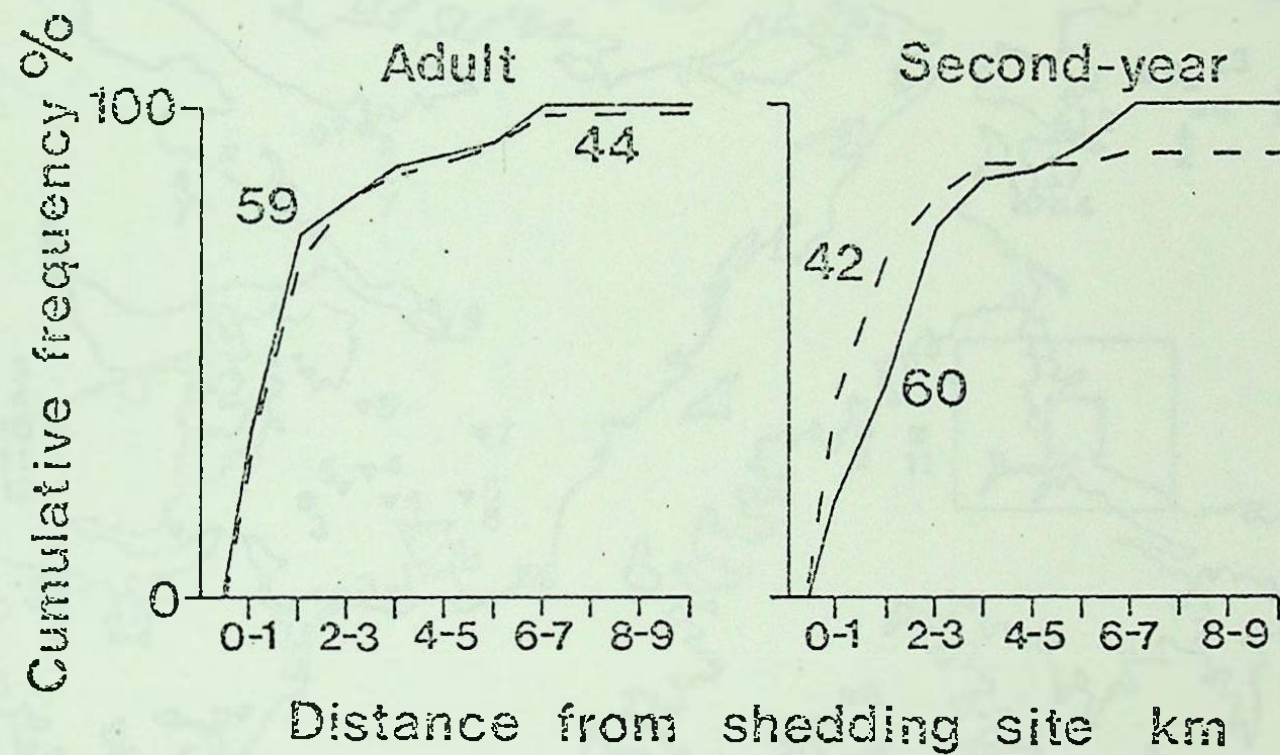
Fig. 6

Summers
Fig. 6



SUMMERS

FIG. 7



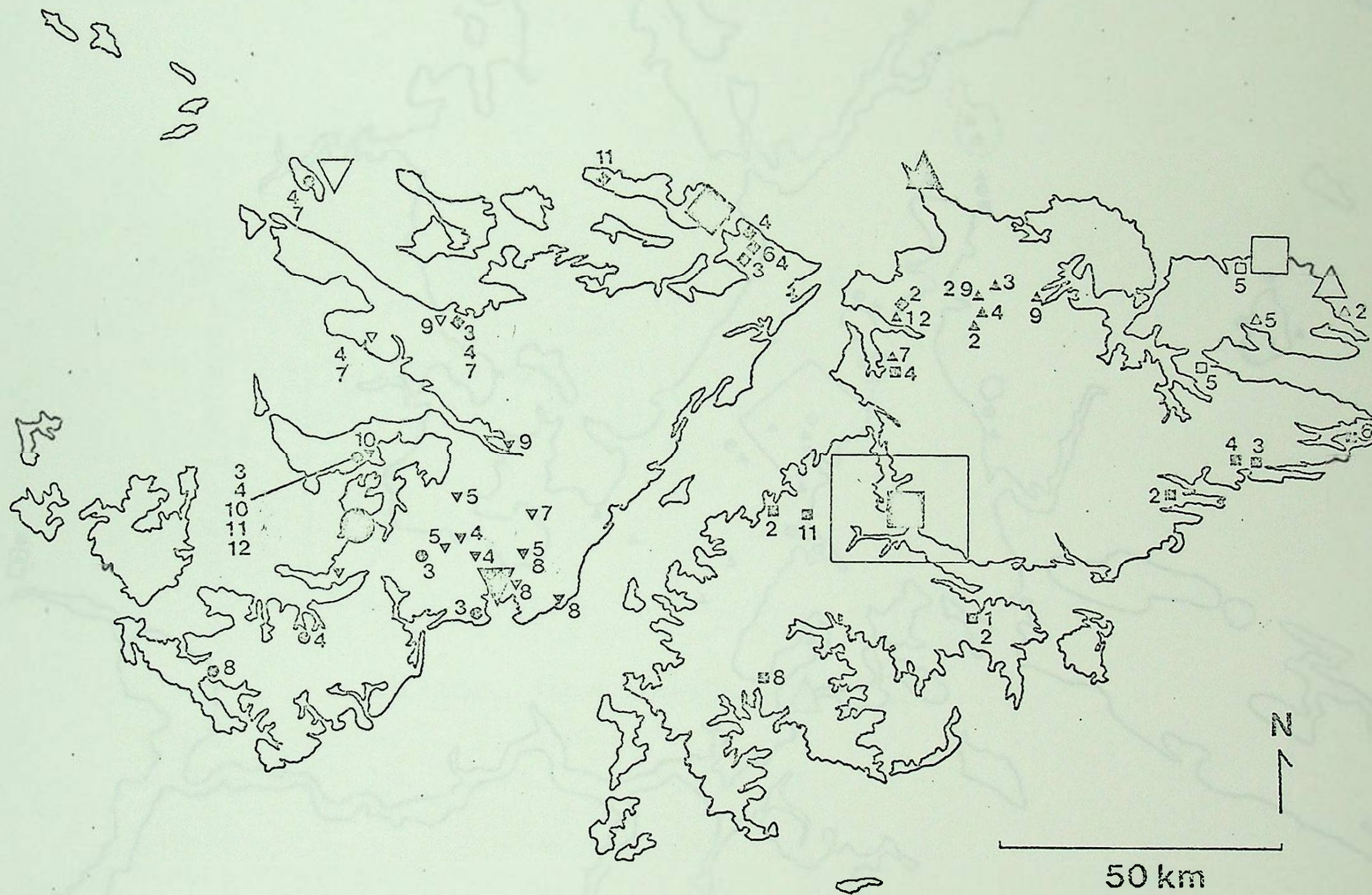
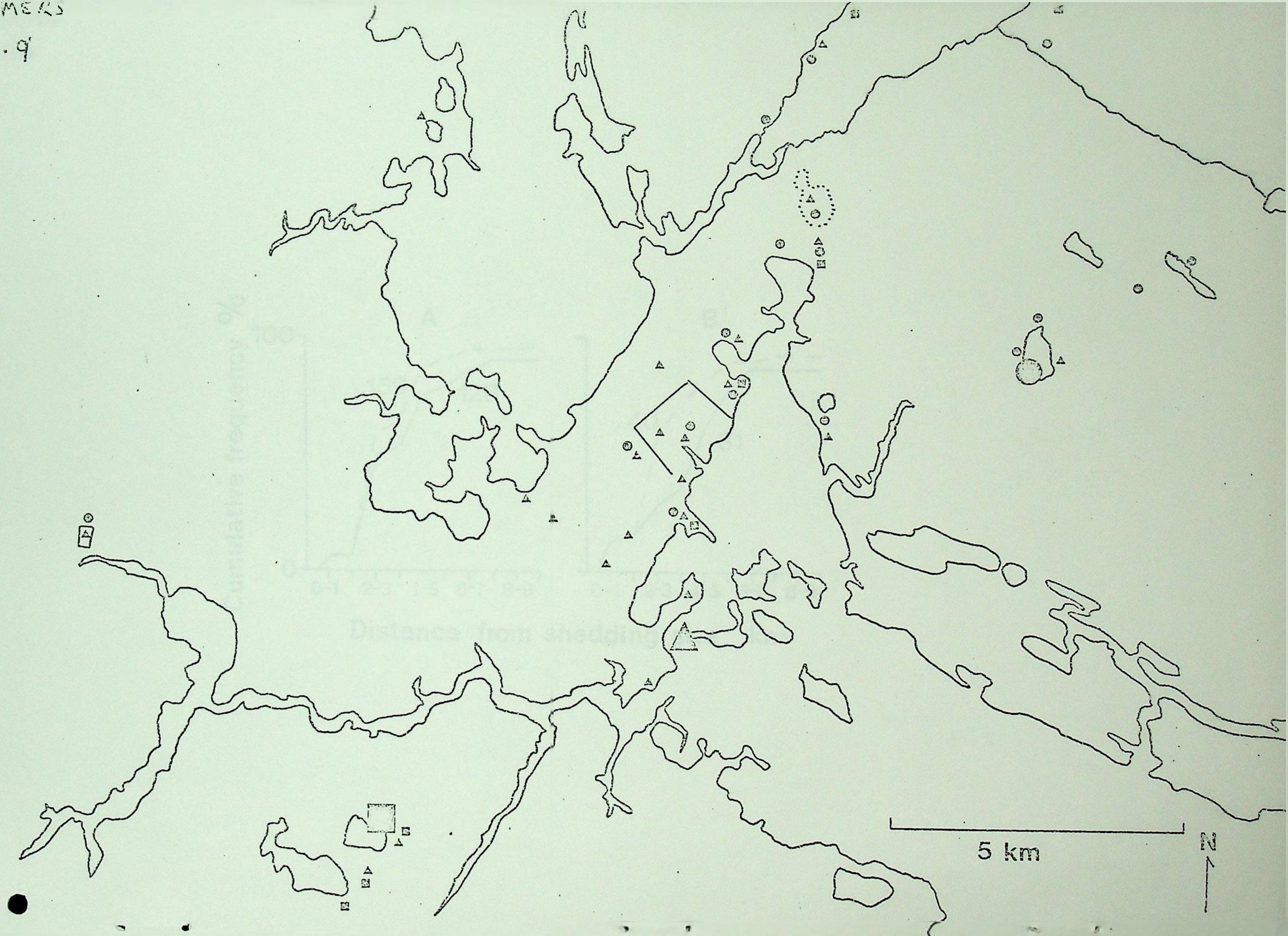
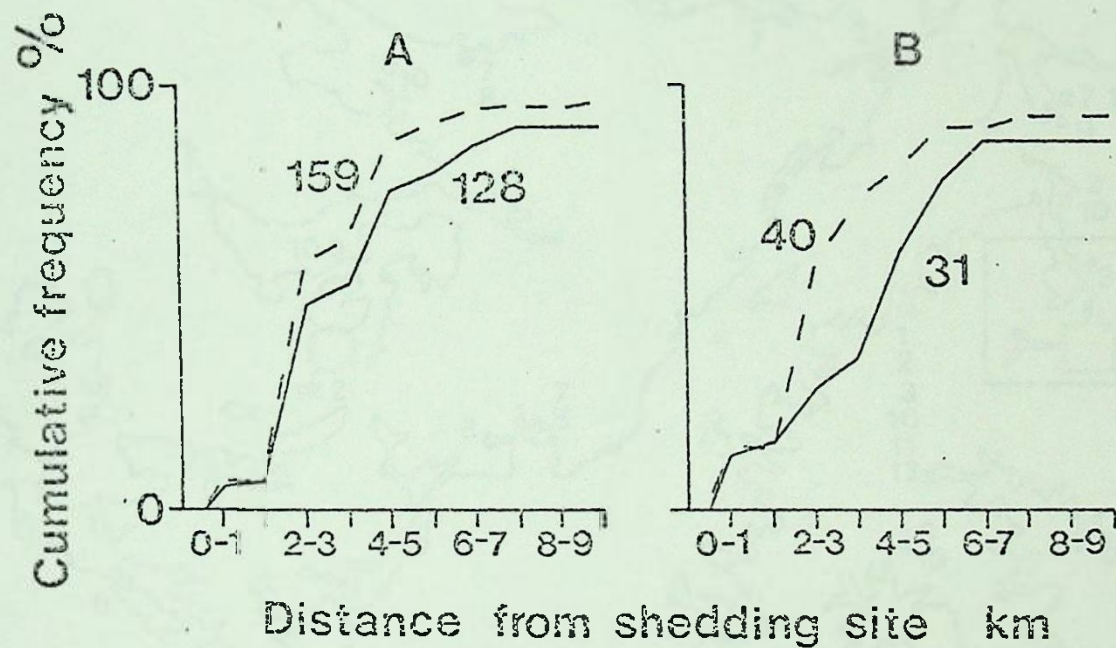
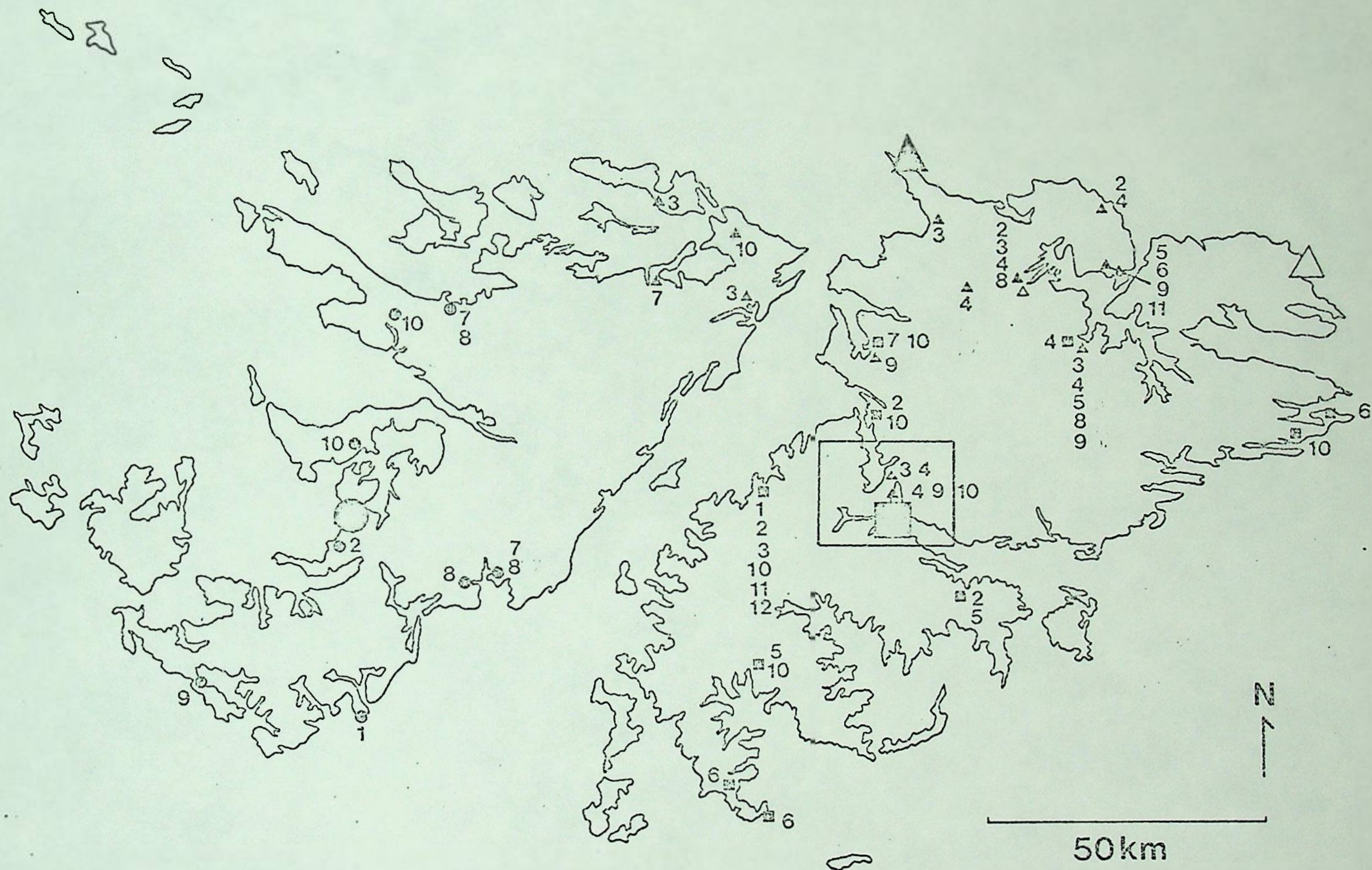


Fig. 9







DCS on file copy
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RR ODA

GRS 29

UNCLASSIFIED

FROM PORT STANLEY 221254Z JUN 1981

TO ROUTINE ODA LONDON

TELEGRAM NUMBER MODEV 85 OF 22 JUNE

CS
Ap
22/6

YOUR MODEV 70: GOOSE ECOLOGIST

1. SUBJECT TO FERGUSON'S AGREEMENT, WE HAVE NO OBJECTION TO THE PROPOSED APPOINTMENT.

2. FERGUSON (GTU LEADER) MAY BE CONTACTED AT 3A LUSSIELAW ROAD EDINBURGH OR MOLLOY, ODA.

HUNT

NNNN

SENT AT 221421Z BKW

Ag DCS

The attached copy was passed to me
by Miss Burdett who has fore-warned Dr. Ferguson
by cable & follow-up letter stressing that
this is SOA opinion, not F.I.G.

FB 22/VII

P.

P.A. on file pl

FB

22.7.81

Fas. I think all Hon. Members of Legisl

The Falkland Islands Sheepowners Association Limited

Telephone No. 263

Telegrams: WOOLGROWERS
PORTSTANLEY

Your Ref.

Our Ref. 24/jtc

BARTON HOUSE

ROSS ROAD

STANLEY

FALKLAND ISLANDS

July 22 1981

The Team Leader,
The Grasslands Trials Unit
Stanley.

Dear Sir,

GOOSE STUDY

I am directed to advise you of the following opinions which were expressed by members at the General Committee Meetings in June 1981.

Firstly that it is the opinion of this Association that the cost of the Survey is out of all proportion to the results obtained, yet money has been provided for further study.

Secondly that although it is appreciated that the study has been carried out with thoroughness, Members wish to point out that their interest is primarily in goose control rather than goose conservation. It would be much appreciated if you can give any indication as to when an answer to this problem can be expected.

Yours faithfully,

J.T. Clement

J.T. Clement, Executive Secretary.



OVERSEAS DEVELOPMENT ADMINISTRATION

Eland House Stag Place London SW1E 5DH

Telephone 01-213: 8259
or Switchboard 01-213:3000

R D Williams Esq
Government House
Port Stanley
Falkland Islands

Your reference

Our reference LCP 59/551/01

Date **22** July 1983

For Reg,

FALKLAND ISLANDS AGRICULTURAL RESEARCH AND DEVELOPMENT CENTRE

In your Modev 269 you approved a visit by Professor Dunnet in November to establish the next stages of the Goose programme and to carry out conservation/environmental studies. This visit was recommended by the FIARDC Advisory Committee which met last month and I now enclose copies of the record of its deliberations.

2. Terms of Reference for both assignments are presently being prepared and will be sent to you shortly for agreement. In this respect, paragraphs 38 and 39 of the record refer.

3. You will note that in paragraphs 20 and 21 reference is made to the introduction of a PHD student to the Goose Project in order to assist Dr Douse with certain elements of the programme. I currently await detailed costings from Professor Dunnet for this form of additional manpower and will then be investigating whether or not these costs can be met from within other headings of the aid programme. If they cannot, we should have to consider meeting these minimal costs from the development grant and in particular the sums earmarked for the ongoing work of FIARDC. It is certainly our view that this sort of input would represent the most cost effective way of proceeding with future work on the Goose Programme. The student selected would not begin work before mid 1984 but in order to enable us to start the identification process it would be helpful if you could let me know fairly quickly whether the idea is acceptable in principle to the FIG. In this respect, you may wish to touch base with John Ferguson. The sort of programme which Dr Douse and the student will undertake is set out in the attached background paper which Professor Dunnet presented to the Committee meeting.

4. I am sending a copy of this letter, without enclosures, to John Ferguson.

Yours age, Jaint.
D Lawless
Falkland Islands Department

ENC

GTu/31/2



22nd July,

81

0138/KB/rs

J T Clement Esq
Executive Secretary
S.O.A.
Stanley

Thank you for your letter of 22 July, 1981 to the Team Leader which I have passed on to John Ferguson who is at present on leave. In addition I have brought the attention of the acting Governor to the contents of your letter.

We expect John Ferguson to return from leave shortly. During his leave he will have had time to discuss forward plans on goose work with Dr Dunnett, the consultant supervisor to the goose studies. He should therefore be in a good position to comment on the opinions expressed by your Members and also answer your question.

Margaret Burkett

cc. J A Ferguson
P E Baker ✓

Reg PC isolate to be a file to A3 DCS

GT4/31/2 TO
DCS



A3 DCS Sorry this is too late for me to
do anything about but I think the
Goose Study proposal needs careful
consideration as some Committee have
strong views on such expenditure
The Hon F E Baker Esq
Chief Secretary
Stanley

GOVERNMENT HOUSE,
STANLEY,
FALKLAND ISLANDS.

8 August 1983

Dear Dick,

I am enclosing a copy of a self-explanatory letter from David Lawless in ODA, together with a record of a meeting of the FIARDC Advisory Committee and a paper setting out proposals for the development of the Goose programme.

I have had a word with John Ferguson about the proposal to send out a PhD student to undertake studies on Brent geese and geese in the outer islands. He is very much in favour of it and points out that it would, in fact, be a very inexpensive way of undertaking research. He points out that the student would not require permanent accommodation in Stanley and Mr & Mrs Douse would be prepared to offer him a room in their house (when they get one larger than 90 Davis Street). He would, of course, spend much of his time out of Stanley.

Although the proposal is that the student should not commence work before mid 1984, ODA need to know fairly soon whether the proposal is acceptable in principle so that they can start the identification process for a suitable candidate. I should accordingly be grateful if you would say whether the appointment of a student is acceptable in principle to FIG.

Yours ever,

Reg-

R D Williams

Regy dictated
F 11/8/83



GTU/31/2 ✓

11 August

83

(41)

R D Williams Esq
Government House

D/O

Thank you for your letter of 8th August enclosing the papers about FIARDC and in particular the development on the goose programme.

2 I am afraid at this late stage all I can do with this is to pass it on to Rex Browning but I think it is a matter on which Councillors would wish to be consulted, especially as some of them have pronounced views on expenditure on the goose programme.



F E Baker
Chief Secretary

PROPOSALS FOR THE DEVELOPMENT OF THE GOOSE PROGRAMME
ON THE FALKLAND ISLANDS

We consider that further studies of geese on the Falkland Islands are necessary for the achievement of the F.I.A.R.D.C. objectives for improving and developing pastures for sheep production.

We know they then!

1. The main thrust of the programme is to understand the responses of Upland Geese to reseeded pastures and their effects on them, particularly in relation to their establishment and productivity.
2. There is considerable conjecture about the numbers of geese breeding in the outer islands and possibly moving to the main islands, and this situation should be studied.
3. There is a need for a better understanding of the abundance and ecology of Brent Geese which differ in several respects from the Upland Geese, and which is attracting international attention from a conservation point of view.

-
1. Detailed studies are required to investigate the effect of Upland Geese on pastures, especially reseeds.

- a) It is important to investigate the effect of geese during the establishment phase of mixed species swards. This will require both observational and experimental work. The observational work will include studies of the distribution and abundance of geese on reseeds, bearing in mind seasonal aspects of the ecology of geese. Geese will be sampled in order to establish the extent to which they actively select different species from the sward. Experimental work will require an area of reseeded pasture, under the complete control of F.I.A.R.D.C., for studies of the effect of geese on the species composition of swards. Short-term experiments using captive birds will be also necessary. This approach will provide a more rigorous test than that which can be achieved from purely observational and more extensive work.
- b) It remains important to establish the effects of geese grazing on the productivity of established reseeds/...

and to determine the proportion of the production taken by the geese and the extent to which they graze selectively. A seasonal pattern has now been detected in the use of reseeded pastures by geese and this must be investigated in relation to the seasonal requirements for improved pastures for sheep, e.g. for ewes at tupping time, for lactating ewes, and probably for weaned lambs during the summer.

Changes in utilization of reseeded pastures by geese in relation to the age of these reseeded pastures are being investigated at Fitzroy and at other F.I.A.R.D.C. sites.

- c) In view of the likely considerable increase in the area of reseeded pasture in the Falkland Islands, it would be desirable to determine the degree of utilization of these by geese. If the goose population in the islands does not increase as a result of the improved feeding conditions on these pastures then the number of geese per acre of reseeded pastures will decline and their impact will become less significant. Though data on this topic will be difficult to interpret, mainly owing to different management practices on established reseeded pastures, a monitoring programme should be established to examine this over the next four years.
- d) It is important to investigate methods of deterring geese from feeding on improved pastures, although it is unlikely that the use of bird scarers or shooting will be practical. Consideration should be given to aspects of management relating to the size and distribution of reseeded pastures and the maintenance of optimum sward height.

2. There has been much speculation about the importance of outlying islands as possible reservoirs from which Upland Geese can establish themselves on the main islands. There are also indications that the breeding density of geese may be much higher on the outer islands and this could lead to a different relationship between geese and pastures in these circumstances. These differences may relate to the habitats on the outer islands in relation to their farming history. It is important now to determine whether or not the situation on outer islands is different from that on the main islands, which is relatively well understood.

3. The relative abundance of Brent and Upland Geese is known to vary from place to place. The Brent Goose is apparently more exclusively associated with natural greens and settlements than the Upland Goose. Very little is known about the ecology of Brent Geese, though they often associate with Upland Geese. A detailed study of Brent Geese on both the mainland and the outer islands will be very valuable for its own sake, and would also improve our understanding of the ecology of Upland Geese. It is important to note that the Brent Goose is identified internationally by conservationists as a species at risk, and the Falkland Islands Foundation has already expressed its concern about its status.

The above proposals clearly lead to an expansion in the goose programme which will be closely linked with other F.I.A.R.D.C. programmes on agronomy and sheep management, and will require additional professional assistance.