INSTITUTE OF TERRESTRIAL ECOLOGY

(NATURAL ENVIRONMENT RESEARCH COUNCIL)

REPORT TO THE NATURE CONSERVANCY COUNCIL

ON

THE INVERTEBRATE FAUNA OF DUNE AND MACHAIR SITES IN SCOTLAND

Vol II Part (4)

The East Coast

Site Dossiers

NCC/NERC Contract No. F3/03/62 : ITE Project No. 469

Monks Wood Experimental Station

Abbots Ripton

Huntingdon

Cambs

February 1979

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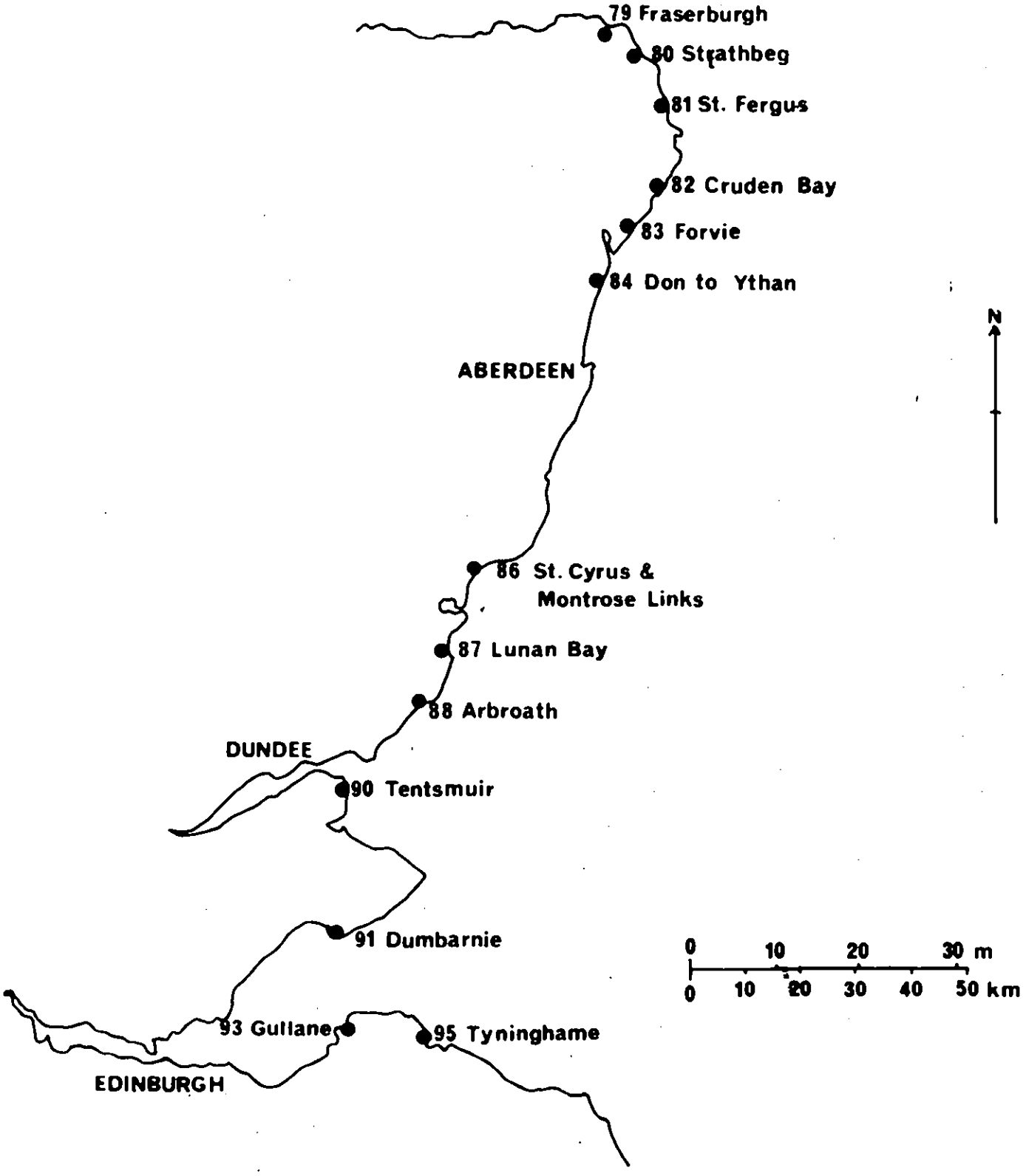
Map 1

East Coast



SITES SURVEYED

The sites selected for survey are listed in Table 1 in numerical order. The numbering and names used for the sites follow those adopted by the personnel of ITE Project 340 "Survey of sand-dune and machair sites in Scotland" in agreement with the Nature Conservancy Council. The geographical position of each site is shown in Map 1. The site reports in this volume are arranged in numerical order, as in Table 1. Each site report has separate page numbers.

Table 1 - List of sites surveyed

Site Number	Site Name	District
79	FRASERBURGH	Banff and Buchan
80	STRATHBEG	Banff and Buchan
81	ST. FERGUS	Banff and Buchan
82	CRUDEN BAY	Banff and Buchan
83	FORVIE	Gordon
84	DON TO YTHAN	Gordon
86	ST. CYRUS AND MONTROSE LINKS	Angus
87	LUNAN BAY	Angus
88	ARBROATH	Angus
90	TENTSMUIR	North-east Fife
91	DUMBARNIE	North-east Fife
93	GULLANE	East Lothian
95	TYNINGHAME	East Lothian

SELECTION OF SITES

Sixteen sites from Kinnairds Head, south, to the English border, on the East Coast, (Numbers 79-84 and 86-95 inclusive) were listed by the Nature Conservancy Council and were covered in the botanical survey made by ITE staff as part of ITE Project 340.

With the exception of Sites 89, 92 and 94, all these sites were included in the survey of invertebrates. Difficulties were experienced with obtaining permission to trap at the three sites omitted from the survey of invertebrates. Barry Links (Site 89) was an army training area. Permission was obtained to visit a small area, but as this was being used as a tented encampment by the army, and also was near houses, it was decided to avoid possible damage to equipment by omitting the site from the survey. Information

obtained through NCC, concerning the ownership of the four sites in East Lothian, was found to be incorrect. Permission to trap at Aberlady (Site 92) and Yellowcraig (Site 94) could not be obtained. Aberlady appeared to be an interesting area of sand dunes, but Yellowcraig was reported to have no proper dune system and to be intensively used by the public for recreation.

The programme of the survey of invertebrates was determined by the estimated functional life of the battery-powered light traps i.e. 7 or 8 nights in midsummer.

The selection of sampling sites was made by the participants of the first field trip - R.G. Snazell and R.A. Plant. Prior to this survey, surveys were made of the Araneae and Coleoptera at Tentsmuir (Site 90). A party of arachnologists, led by Dr E.A.G. Duffey, visited the site in June 1966 and over 140 species of spiders were recorded (Duffey 1968). Dr M.G. Morris collected Coleoptera during visits to Tentsmuir in March 1964 and June 1966.

SAMPLING PERIODS

Sampling was by means of a light trap and eight pitfall traps at each site (for description of this equipment see following section). A single light trap operated for seven nights at each site during sampling periods 1 and 3 only (see Table 2). The pitfall traps operated continuously during all three sampling periods.

Table 2 - Dates of sampling periods

Sites 79, 80 and 81

Sampling period	Dates
(1)	15.6 - 22.6.76
(2)	22.6 - 20.7.76
(3)	20.7 - 27.7.76

Sites 82, 83 and 84

Sampling period	Dates
(1)	16.6 - 23.6.76
(2)	23.6 - 21.7.76
(3)	21.7 - 28.7.76

Sites 86 and 87

Sampling period	Dates
(1)	20.6 - 27.6.76
(2)	27.6 - 24.7.76
(3)	24.7 - 31.7.76

Site 88

Sampling period	Dates
(1)	19.6 - 26.6.76
(2)	26.6 - 24.7.76
(3)	24.7 - 31.7.76

Site 90

Sampling period	Dates
(1)	17.6 - 24.6.76
(2)	24.6 - 22.7.76
(3)	22.7 - 29.7.76

Site 91

Sampling period	Dates
(1)	19.6 - 26.6.76
(2)	26.6 - 22.7.76
(3)	22.7 - 29.7.76

Sites 93 and 95

Sampling period	Dates
(1)	18.6 - 25.6.76
(2)	25.6 - 23.7.76
(3)	23.7 - 30.7.76

DESCRIPTION OF TRAPPING EQUIPMENT

Light trap

The specially designed, portable, ultra-violet light trap was powered by a 12 volt, rechargeable lead/acid battery. The light was automatically controlled by a solar switch set to turn the light on at dusk and off at dawn. The catch of moths was killed inside the trap by vapours from "Mafu" strips and collected only at the end of the sampling period. One light trap was placed at each site.

Pitfall traps

A pitfall trap consisted of a conical plastic beaker of the following approximate internal dimensions: diameter of mouth 75mm, diameter of base 55mm, height 105mm. Three small drainage holes were made 30mm from the mouth of the beaker to facilitate the run-off of any excess rainwater that might acumulate in the trap. Each trap was charged with approximately 10 cl. of commercial grade 1, 2 Ethanediol (Ethylene glycol) as a preservative and killing agent at the beginning of each sampling period. Each pitfall trap was placed in a hole in the ground so that the lip of the beaker was flush with the soil surface. Eight pitfall traps, arranged in pairs were placed at each site. On most sites there were 2 metres between the individual traps of a pair. The pairs of traps were positioned to sample as wide a variety of dune habitat types as was possible.

SITE VEGETATION

The description of the vegetation at each site was made at the time of the site selection, i.e. during the first sampling period in the second half of June. At the end of July, at the time of the second visit, additional species of flowers were recorded. Estimates of the extent of bare ground were made mainly during the first trapping period.

PERSONNEL

ITE Nominated Officer:	Dr M.G. Morris
Project leader:	Dr E.A.G. Duffey
Identification	
Lepidoptera:	M.J.L. Skelton[1]
Coleoptera:Carabidae:	P.E. Jones, J.N. Greatorex-Davies and Dr R.C. Welch
:Hydrophilidae to Scolytidae:	Dr R.C. Welch
Aranaea:	R.G. Snazell
Mollusca:	D. Green[2] and Dr E. Pollard
Diplopoda:	A.J.B. Beaumont[3] and J.G. Blower[4]
Terrestrial Isopoda:	P.T. Harding

Field work

1st Trip:	R.G. Snazell and R.A. Plant
2nd Trip:	R.G. Snazell and M.G. Yates

Site reports

Editor:	P.T. Harding
Description and sitings:	R.A. Plant and R.G. Snazell
Lepidoptera:	J.N. Greatorex-Davies
Coleoptera:Carabidae:	Dr R.C. Welch
:Hydrophilidae to Scolytidae:	Dr R.C. Welch
Aranaea:	R.G. Snazell and Dr E.A.G. Duffey
Mollusca:	P.T. Harding and Dr R.A.D. Cameron(5)
Diplopoda:	P.T. Harding
Terrestrial Isopoda:	P.T. Harding
Additional species:	Dr R.C. Welch
Maps:	R.A. Plant, Miss H.A. Brundle and Miss S. Knight(6)
Data handling:	G.J. Moller and J.N. Greatorex-Davies
General assistance:	Miss H.A. Brundle and R.A. Plant

Pitfall trap catches

Sorting:	R.A. Plant, Miss H.A. Brundle, J.N. Greatorex-Davies, Mrs M.L. King, P.E. Jones and M.G. Yates.
Maintenance of material:	R.A. Plant

Equipment

Equipment supervision:	W.E. Rispin
Light trap manufacture:	T.E. Hughes (Entech Services)(7)
Special adviser on light trap:	J. Heath
Transport of equipment:	P.T. Harding, G.J. Moller and S. Porter(8)
Secretarial assistance:	Mrs D.S. Plant and Mrs G. Sanderson

Notes:

(1): Formerly I.T.E. Staff, resigned.

(2): Sandwich course student, Trent Polytechnic.

(3): Undergraduate student, Manchester University.

(4): Zoology Department, Manchester University.

(5): Department of Extramural Studies, Birmingham University.

(6): Sandwich course student, Luton College of Higher Education.

(7): Entech Services, 46 Mersey View, Liverpool.

(8): Sandwich course student, Brunel University.

ACKNOWLEDGEMENTS

Storage and maintenance facilities for equipment were generously provided by our colleagues at ITE Banchory. Special thanks are due to Dr D. Jenkins for making possible the provision of these facilities.

Our colleagues engaged on ITE Project 340 have given invaluable help with information about sites, maps and data handling.

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3.5 Mollusca (Land snails)
3.6 Diplopoda
3.7 Terrestrial Isopoda
4. ADDITIONAL SPECIES

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APPENDIX

Records were obtained for one additional site included in the list of sites drawn up by the Nature Conservancy Council for the survey as part of ITE Project 340.

Site Number	Site Name	District
92	ABERLADY BAY	East Lothian

SITE 92

ABERLADY BAY

1. Coleoptera

The following species were recorded by Dr M.G. Morris on 20.8.1964:

Apionidae

Apion carduorum, sweeping Cirsium arvense.

A. aethiops, by general sweeping.

A. ervi, sweeping Lathyrus pratensis.

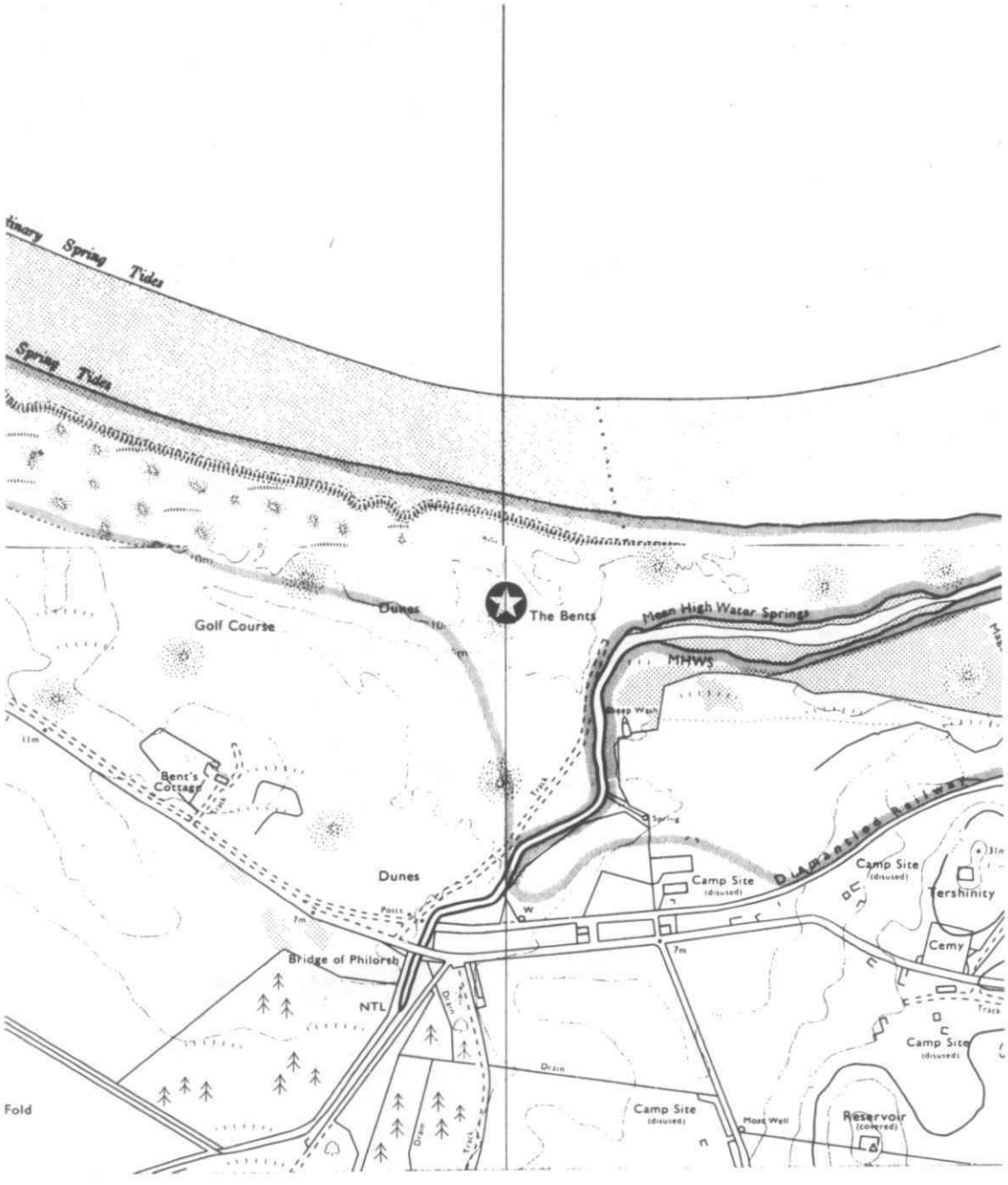
A. ononis, sweeping Ononis repens.

Curculionidae

Ceutorhynchus contractus, by general sweeping.

Site 79 Fraserburgh

Site 79 Fraserburgh



Light trap & pitfall traps

SITE 79

FRASERBURGH

1. DESCRIPTION OF SAMPLED SITE

1.1 Topography

High dunes sloped down, on the landward side, to a large flat area of fixed, grass-covered sand. There were a few, little used paths on the site, and the remains of war-time tank traps and pill-boxes.

1.2 Vegetation

The light trap was placed near pitfall trap pair 1. The vegetation surrounding the pitfall traps had the following composition:

Pair 1: 50% bare ground, mostly Ammophila arenaria with some Senecio sp. and Cirsium sp..

Pair 2: similar to pair 1, but with more Cirsium sp. and some mosses.

Pair 3: 10% bare ground, with A. arenaria, fine grasses, moss, Galium sp. and Lotus corniculatus.

Pair 4: no bare ground. Mostly fine grasses, L. corniculatus and Galium sp..

1.3 Disturbance

There was a golf course in the vicinity of the trapping area, and some public use of the area was apparent.

1.4 Distance from sea

The light trap and pitfall traps were approximately 200 metres from the shore. The pitfall traps were in a transect 75 metres long.

2. SITING OF LIGHT TRAP AND PITFALL TRAPS

2.1 Selection of site

The light trap was placed on the landward side of the yellow dunes, in a small hollow. The pitfall traps ran at a tangent to the north-east of the light trap. The sampling area was chosen because it was out of site of the public from most vantage points.

2.2 Damage or malfunction

The light trap operated from 15 - 22.6.76 and 20 - 27.7.76. It was functional at the end of the first period, but not on

27.7.76 when tested. The pitfall traps were all functional during the whole of each of the three periods 15 - 22.6.76, 22.6. - 20.7.76 and 20 - 27.7.76. A number of small mammals was trapped:

Dates		
22.6. - 20.7.76	2A	2 shrews (Sorex sp.)
	3A	1 shrew (Sorex sp.)
	3B	1 shrew (Sorex sp.)
20 - 27.7.76	1A	2 shrews (Sorex sp.)
	2A	1 shrew (Sorex sp.)
	3A	3 shrews (Sorex sp.)
	3B	1 mouse (Apodemus sp.?)

2.3 Colour slides available

Box 2, 101-106

3. THE FAUNA

3.1 Lepidoptera

	JUNE	JULY	TOTAL
Zygaena filipendulae	0	15	15
Scotopteryx chenopodiata	0	300	300
Epirrhoe alternata	0	2	2
Camptogramma bilineata	0	6	6
Cosmorhoe ocellata	0	2	2
Deilephila porcellus	1	0	1
Spilosoma lubricipeda	2	0	2
Euxoa tritici	0	127	127
Agrotis vestigialis	0	11	11
Agrotis exclamationis	4	0	4
Noctua pronuba	0	13	13
Diarsia mendica	0	1	1
Xestia c-nigrum	0	1	1
Xestia sexstrigata	0	1	1
Hada nana	1	0	1
Cerapteryx graminis	0	2	2
Mythimna impura	0	10	10
Mythimna comma	2	0	2
Rusina ferruginea	3	0	3

	JUNE	JULY	TOTAL
Thalpophila matura	0	38	38
Apamea monoglypha	0	2	2
Apamea sordens	1	0	1
Mesapamea secalis	0	6	6
Luperina testacea	0	74	74
Autographa pulchrina	0	1	1
TOTAL	14	612	626

The total catch was good, but the species list was below average at this site compared with other East Coast and Moray Firth sites. The 25 species recorded are all common and most are polyphagous, feeding on grasses and low growing plants. The most abundant species was a geometrid, Scotopteryx chenopodiata, (48%). It is widespread in the British Isles, but was not taken further west than Site 59 during the survey. The larvae feed on Trifolium repens, Vicia spp. and grasses. Euxoa tritici was also numerous (20%) and occurred commonly at many sites, except those around the Moray Firth.

The only sand dune species taken was Agrotis vestigialis. It was trapped extensively and often commonly at many sites, especially on the North Coast.

Apamea sordens is usually a common species throughout the British Isles but occurred elsewhere only at Sites 87, 88 and 95.

A few species are restricted to a limited range of larval food plants. Zygaena filipendulae is a day flying species whose larvae feed on Lotus corniculatus. Epirrhoe alternata, Cosmorhoe ocellata and Deilephila porcellus feed on Galium spp.. D. porcellus also feeds on Epilobium spp. and Lythrum salicaria.

3.2 Coleoptera : Carabidae

	JUNE	JN/JL	JULY	TOTAL
Carabus problematicus	0	3	0	3
Leistus rufescens	2	13	2	17
Nebria brevicollis	0	1	0	1
Calathus fuscipes	1	40	3	44
Calathus melanocephalus	0	11	2	13
Calathus mollis	2	77	9	88
Amara familiaris	0	2	0	2
Harpalus tardus	0	1	0	1
Badister bipustulatus	0	2	0	2
Metabletus foveatus	0	1	0	1
TOTAL	5	151	16	172

The carabid fauna at this site was dominated by the three species of the genus Calathus. Both C. mollis and C. fuscipes are species of dry, sandy areas; C. mollis is more typical of coastal dunes. The only other xerophilous species, Harpalus tardus and Metabletus foveatus were represented by single specimens. The number of Leistus rufescens, considered the most hygrophilous member of the genus, was unexpectedly high. A single larva of Badister (bipustulatus?) was trapped during the third period.

3.3 Coleoptera : Hydrophilidae to Scolytidae

	JUNE	JN/JL	JULY	TOTAL
Cercyon haemorrhoidalis	0	1	0	1
Megasternum obscurum	3	1	1	5
Leiodes dubia/obesa	3	4	0	7
Ptomophagus subvillosus	0	1	0	1
Choleva oblonga	0	2	0	2
Catops chrysomeloides	0	3	0	3
Catops fuliginosus	3	2	0	5
Catops tristis	3	0	0	3
Nicrophorus investigator	0	0	1	1
Thanatophilus rugosus	0	1	0	1
Micropeplus staphylinoides	0	7	0	7
Anthobium unicolor	0	2	0	2
Stenus clavicornis	0	2	0	2
Stenus subaeneus	0	0	1	1
Gyrohypnus angustatus	2	0	0	2
Xantholinus linearis	2	6	1	9
Quedius boops	0	2	0	2
Quedius tristis	0	1	0	1
Mycetoporus piceolus	0	1	0	1
Mycetoporus lepidus	0	1	0	1
Bolitobius analis	0	1	1	2
Tachyporus atriceps	0	5	0	5
Tachyporus chrysomelinus	1	7	5	13
Tachyporus hypnorum	0	2	6	8
Tachyporus nitidulus	0	7	0	7
Tachyporus obtusus	1	0	0	1
Cypha punctum	0	2	0	2
Aloconota gregaria	3	0	0	3
Geostiba circellaris	1	0	0	1

	JUNE	JN/JL	JULY	TOTAL
Atheta fungi	1	2	2	5
Atheta parvula	0	1	0	1
Atheta atramentaria	0	5	0	5
Serica brunnea	0	22	16	38
Simplocaria semistriata	0	1	0	1
Byrrhus fasciatus	0	3	0	3
Cryptophagus setulosus	0	7	1	8
Atomaria atricapilla	1	3	0	4
Atomaria nitidula	0	3	0	3
Coccidula rufa	0	0	1	1
Corticaria crenulata	0	0	2	2
Corticaria umbilicata	31	56	18	105
Corticarina fuscula	1	6	2	9
Longitarsus succineus	0	0	1	1
Crepidodera ferruginea	1	20	34	55
Chaetocnema hortensis	1	0	0	1
Apion loti	0	22	5	27
Apion dichroum	0	2	0	2
Otiorhynchus atroapterus	2	2	0	4
Otiorhynchus ovatus	0	1	2	3
Philopedon plagiatus	2	1	0	3
Sitona lepidus	0	1	0	1
Sitona lineellus	7	14	3	24
Hypera plantaginis	1	1	0	2
Ceutorhynchus quadridens	0	1	0	1
Miccotrogus picirostris	1	1	0	2
TOTAL	71	236	103	410

The psammophile species Leiodes dubia, Philopedon plagiatus and two species of Otiorhynchus were taken only in very small numbers. Another psammophile Serica brunnea, which does not emerge as an adult until July, was present only in moderate numbers. The most numerous species Corticaria umbilicata, has previously been considered to occur in moss and not to have any particular connection with coastal habitats. Crepidodera ferruginea was present, more commonly in the later sampling periods. It is widely distributed and associated with Urtica spp. and Cirsium spp. as an adult although its larvae feed on the roots of various Gramineae. Apion loti feeds on Lotus corniculatus, which

commonly occurs on sand dunes. Other phytophagous species include A. dichroum, and the two species of Sitona which feed on Trifolium spp., Miccotrogus picirostris which feeds on Lotus corniculatus, Hypera plantaginis on Plantago spp., Longitarsus succineus on various Compositae, Chaetocnema hortensis on Hordeum spp., and Ceutorhynchus quadridens which feeds on Cruciferae.

The specimens of Nicrophorus investigator and Thanatophilus rugosus would have been attracted to carrion as were, in all probability, Ptomophagus subvillosus and the three Catops spp., although these and Choleva oblonga are frequently found in association with the nests and runs of small mammals. Cryptophagus setulosus occurs in the nests of solitary bees.

Cercyon haemorrhoidalis, Atheta atramentaria and Xantholinus linearis are indicative of the presence of dung. Most of the remaining species of Staphylinidae are more commonly associated with a well developed litter layer and decaying vegetable matter.

3.4 Araneae

	JUNE	JN/JL	JULY	TOTAL
Haplodrassus signifer	2	2	0	4
Zelotes pusillus	2	6	0	8
Micaria pulicaria	0	3	0	3
Clubiona diversa	0	1	0	1
Xysticus cristatus	0	2	0	2
Heliophanus flavipes	0	1	0	1
Pardosa palustris	0	1	0	1
Pardosa pullata	18	72	3	93
Pardosa nigriceps	28	40	0	68
Trochosa terricola	0	1	0	1
Arctosa perita	1	1	0	2
Pachygnatha degeeri	1	1	0	2
Walckenaera acuminata	0	1	0	1
Peponocranium ludicrum	1	1	0	2
Pocadicnemis pumila	0	1	1	2
Silometopus incurvatus	4	3	0	7
Evansia merens	0	3	1	4
Tiso vagans	2	0	0	2
Tapinocyba praecox	1	0	0	1
Erigone dentipalpis	0	1	0	1

Erigone arctica	2	2	0	4
Centromerus dilutus	0	1	0	1
Bathyphantes gracilis	0	1	0	1
Lepthyphantes tenuis	7	15	2	24
Lepthyphantes mengei	0	3	3	6
Lepthyphantes ericaeus	2	8	3	13
TOTAL	71	171	13	255

The Haplodrassus, Zelotes and Micaria species are widespread in dry grassy places as in Breckland or on open chalk downs. The Clubiona, Xysticus and Heliophanus species, are all grassland spiders and occur in areas where the vegetation may be quite tall but they are not necessarily associated with dry places.

Pardosa pullata and P. nigriceps are very widespread in herbaceous vegetation of many different types although the latter is more usually found in longer vegetation. Arctosa perita is a species typical of sand dunes and is particularly associated with bare ground on a soft substrate. Pachygnatha degeeri is common in all types of grassland.

Walckenaera acuminata, Peponocranium ludicrum, Pocadicnemis pumila, Tiso vagans, and Tapinocyba praecox are widely distributed grassland spiders occurring particularly where a litter layer has formed. Centromerus dilutus, Bathyphantes gracilis and the Lepthyphantes species are also common but prefer taller vegetation and they sometimes occur in woodland leaf litter.

Erigone arctica is associated with drift material on beaches and saltmarshes, but is not often found further inland than the high spring tide mark. There seems to be some evidence that this species penetrates much further inland on the dunes in Scotland than it does in England. Silometopus incurvatus is a rare, northern, coastal spider in Britain. Evansia merens is also a northern species but is not particularly associated with coastal habitats; it is nearly always found associated with the ants Lasius niger and Formica fusca.

3.5 Mollusca (Land snails)

	JUNE	JN/JL	JULY	TOTAL
Cochlicopa lubricella	4	1	0	5
Vitrina pellucida	0	0	2	2
Oxychilus alliarius	0	2	1	3
Candidula intersecta	7	42	4	53
Cepaea hortensis	7	27	5	39
TOTAL	18	72	12	102

The assemblage of species recorded here was typical of fixed dune areas with little bare ground, on the east coast. Candidula intersecta is believed to have been introduced to the British Isles in Roman times, or later.

3.6 Diplopoda

	JUNE	JN/JL	JULY	TOTAL
Polydesmus inconstans	2	3	0	5
Julus scandinavius	17	9	2	28
Cylindroiulus latestriatus	0	0	1	1
Brachyiulus pusillus	46	22	3	71
Ommatoiulus sabulosus	254	172	37	463
TOTAL	319	206	43	568

Polydesmus inconstans rarely occurs in large numbers but appears to be recorded from a wide variety of habitat types. Julus scandinavius is also recorded from a wide variety of habitat types, but seems to favour sandy soils where a thick litter accumulates. The other species are commonly recorded on sand dunes and in areas of sandy soils. Brachyiulus pusillus is considered to be a soil dwelling species and therefore uncommonly occurs in pitfall traps. Migratory movements of Ommatoiulus sabulosus on sand dunes have been recorded, usually in May and June. Such movements may explain the large number of this species taken during the first trapping period.

3.7 Terrestrial Isopoda

	JUNE	JN/JL	JULY	TOTAL
Porcellio scaber	7	59	6	72

Porcellio scaber is widely recorded on sandy soils.

4. ADDITIONAL SPECIES

4.1 Lepidoptera

The following species were observed in the field during the course of the survey:

Pieridae

Pieris rapae

Lycaenidae

Polyommatus icarus

Nymphalidae

Aglais urticae

Satyridae

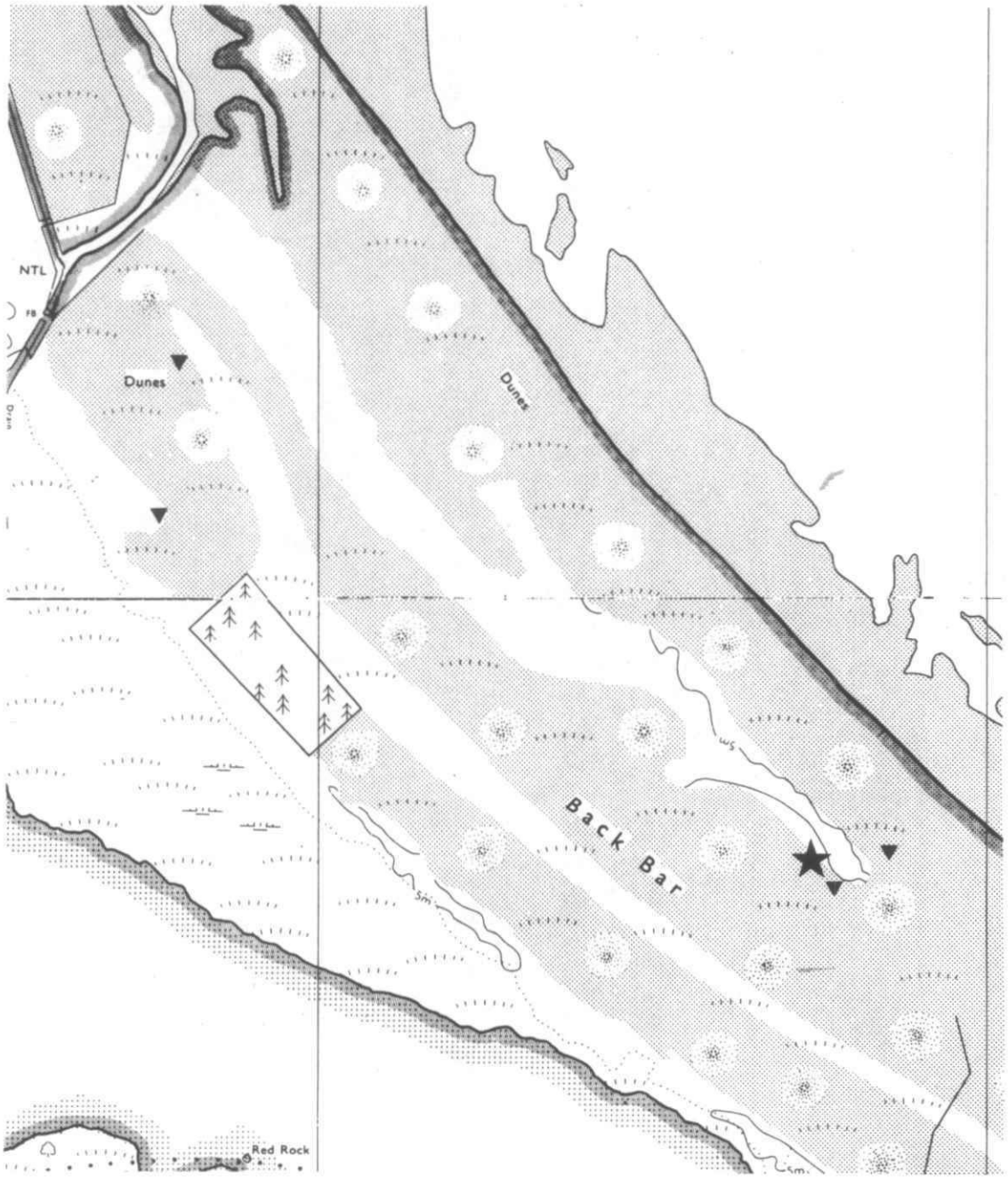
Hipparchia semele

Maniola jurtina

Coenonympha pamphilus

Site 80 Strathbeg

Site 80 Strathbeg



0 500 Metres
0 500 Yards

★ Light trap

▼ Pitfall trap pairs

SITE 80

STRATHBEG

1. DESCRIPTION OF SAMPLED SITE

1.1 Topography

The site consisted of high undulating dunes with an extensive area of flat, sheep grazed, brackish meadow.

1.2 Vegetation

The vegetation surrounding each pair of pitfall traps was described as follows:

Pair 1: 70% bare ground with small tussocks of Ammophila arenaria, occasional plants of Cirsium sp. and some fine grass; there was also some moss (Tortula ruraliformis?).

Pair 2: 10% bare ground, mostly rabbit scrapes with the remaining cover being mostly moss (Rhytidiadelphus triquetrus?) and sparse A. arenaria and Galium sp..

Pair 3: a sward of fine grass with little A. arenaria which was grazed by sheep and rabbits. Galium sp., Viola tricolor, Thymus sp., Campanula rotundifolia and moss were also present, and there was no bare ground.

Pair 4: a turf of fine grasses with some moss, Galium sp., Achillea millefolium, Viola sp. and occasional clumps of A. arenaria, which had been grazed very short by sheep. There was no bare ground.

The light trap was placed near pitfall trap pair 2.

1.3 Disturbance

The meadow area was grazed by sheep and the whole area was obviously subject to some grazing by rabbits. There was very little disturbance from either the sheep or the shepherd and the public appear to have little or no access to the site.

1.4 Distance from the sea

The light trap and pitfall trap pairs were approximately 250 metres from the sea. Pairs 1 and 2 were about 1 kilometre from pairs 3 and 4.

2. SITING OF LIGHT TRAP AND PITFALL TRAPS

2.1 Selection of site

The light trap was placed in "yellow dunes" on the second ridge inland from the sea, immediately inland from the meadow area, just to the north of pitfall trap pair 2. The pitfall trap pairs were each placed in an area of differing vegetation and pairs 1 and 2 were well spaced away from pairs 3 and 4 to give a better cross section of the vegetation types at this site.

The traps were located in positions where it was unlikely that damage could be done to them by sheep. The area in which pair 4 was placed looked as if it had been used at one time as a sheep fold.

2.2 Damage or malfunction

The light trap operated from 15 - 22.6.76 and was still functioning on the last day of the period. It was run from 20 - 27.7.76, but was not functioning on the 27th when tested. The pitfall traps were all functional during the whole of each of the three periods 15 - 22.6.76, 22.6. - 20.7.76 and 20 - 27.7.76. One dead shrew was found in both pitfall traps 1A and 1B on 20.7.76.

2.3 Colour slides available

Box 2, 107-111

3. THE FAUNA

3.1 Lepidoptera

	JUNE	JULY	TOTAL
Scotopteryx chenopodiata	0	2	2
Camptogramma bilineata	0	1	1
Colostygia pectinataria	0	2	2
Deilephila porcellus	1	0	1
Euxoa tritici	0	9	9
Agrotis vestigialis	0	1	1
Noctua pronuba	0	1	1
Noctua comes	0	1	1
Cerapteryx graminis	0	20	20
Mythimna impura	0	2	2
Rusina ferruginea	1	0	1
Thalpophila matura	0	23	23
Apamea monoglypha	0	1	1

	JUNE	JULY	TOTAL
Luperina testacea	0	13	13
Autographa pulchrina	0	1	1
TOTAL	2	77	79

The poorest catch taken at any East Coast or Moray Firth site, both for number of species and of individuals, was made here. The light trap functioned properly for the whole of the first eight day period, but only two specimens of two species were taken. All the species collected were generally abundant elsewhere or at least well represented at most neighbouring sites.

One common sand dune species, Agrotis vestigialis, was taken. It was trapped extensively and often commonly at many sites especially on the North Coast.

Deilephila porcellus feeds only on Galium spp., Epilobium spp. and Lythrum salicaria. The remaining species are considered to be oligophagous.

3.2 Coleoptera : Carabidae

	JUNE	JN/JL	JULY	TOTAL
Carabus problematicus	1	6	2	9
Carabus violaceus	0	0	1	1
Leistus rufescens	1	0	0	1
Nebria brevicollis	0	2	0	2
Notiophilus aquaticus	2	1	2	5
Broscus cephalotes	0	0	1	1
Trechus obtusus	0	0	1	1
Calathus fuscipes	5	192	229	426
Calathus melanocephalus	1	10	6	17
Calathus mollis	1	16	11	28
Amara aenea	2	2	0	4
Amara familiaris	2	3	0	5
Amara tibialis	0	1	0	1
Badister bipustulatus	1	0	0	1
TOTAL	16	233	253	502

The varied carabid fauna at this site was dominated by the three Calathus species, with C. fuscipes being abundant in later samples. The coastal species, Broscus cephalotes together with Amara aenea and

A. tibialis, comprise the more xerophilous element whilst Carabus problematicus is more characteristic of drier heaths and moorland. Two larvae of Notiophilus biguttatus, a species not taken as an adult, were collected in the first sampling period. Seven undetermined Amara sp. larvae were obtained from the later samples.

3.3 Coleoptera : Hydrophilidae to Scolytidae

	JUNE	JN/JL	JULY	TOTAL
Megasternum obscurum	1	0	1	2
Ptenidium nitidum	1	0	0	1
Leiodes dubia/obesa	0	5	2	7
Ptomophagus subvillosus	0	4	0	4
Catops chrysomeloides	0	1	0	1
Stenichus collaris	0	1	0	1
Gyrohypnus angustatus	1	0	0	1
Xantholinus glabratus	0	2	2	4
Xantholinus laevigatus	0	6	2	8
Xantholinus linearis	0	2	0	2
Quedius semiaeneus	0	1	0	1
Mycetoporus splendidus	0	1	1	2
Tachyporus chrysomelinus	0	5	3	8
Tachyporus pusillus	0	2	1	3
Tachinus corticinus	0	2	0	2
Aloconota gregaria	0	8	0	8
Geostiba circellaris	0	1	0	1
Atheta euryptera	0	0	2	2
Atheta fungi	1	0	0	1
Atheta atramentaria	0	0	2	2
Oxypoda brachyptera	3	0	0	3
Oxypoda islandica	1	0	0	1
Aphodius ater	0	1	0	1
Aphodius rufipes	0	0	1	1
Serica brunnea	0	13	6	19
Byrrhus fasciatus	2	4	3	9
Ctenicera cuprea	1	0	0	1
Atomaria atricapilla	1	0	0	1
Nephus redtenbacheri	1	0	0	1
Corticaria umbilicata	1	2	0	3
Longitarsus succineus	0	0	1	1

	JUNE	JN/JL	JULY	TOTAL
Otiorhynchus atroapterus	3	5	5	13
Otiorhynchus ovatus	2	1	0	3
Philopedon plagiatus	5	5	0	10
Sitona lineellus	0	1	0	1
Hypera punctata	0	1	0	1
TOTAL	24	74	32	130

The psammophile species Serica brunnea, Otiorhynchus atroapterus and Philopedon plagiatus were taken in the largest numbers. The last two species are restricted to coast areas, as for the most part is O. ovatus. Quedius semiaeneus, although widely distributed inland, is perhaps more common near the coast, and the Leiodes spp. are associated with a sandy substrate. Hypera punctata and Sitona lineellus feed on Trifolium spp. whilst Aphodius ater, A. rufipes and Atheta atramentaria indicate the presence of dung. A single larva of Ctenicera cuprea was also taken in the third sampling period.

3.4 Araneae

	JUNE	JN/JL	JULY	TOTAL
Drassodes cupreus	1	0	0	1
Haplodrassus signifer	5	18	0	23
Zelotes pusillus	8	18	0	26
Micaria pulicaria	0	1	0	1
Xysticus cristatus	2	6	0	8
Heliophanus flavipes	1	0	0	1
Pardosa palustris	45	63	2	110
Pardosa pullata	17	31	4	52
Pardosa nigriceps	0	1	0	1
Arctosa perita	0	5	0	5
Steatoda phalerata	1	15	4	20
Robertus lividus	0	1	0	1
Pachygnatha degeeri	2	4	0	6
Walckenaera vigilax	0	0	1	1
Hypomma bituberculatum	1	1	0	2
Oedothorax tuberosus	0	1	0	1
Silometopus incurvatus	1	0	0	1
Tiso vagans	15	17	6	38
Erigone dentipalpis	1	7	7	15

	JUNE	JN/JL	JULY	TOTAL
Erigone atra	0	1	2	3
Agyneta subtilis	4	0	0	4
Agyneta cauta	0	1	1	2
TOTAL	104	191	27	322

Drassodes cupreus, Haplodrassus signifer, Zelotes pusillus and Micaria pulicaria are widespread in dry, open grassy or heather areas such as in Breckland, or on open chalk downs and southern heaths. Xysticus cristatus and Heliophanus flavipes are widespread in grassland and on heaths although not necessarily associated with dry conditions, the latter being much more common in the south of Britain than the north. Pardosa palustris and P. pullata, the most common lycosids, are widespread in Britain, preferring short vegetation. The latter is more usually associated with damper situations.

Arctosa perita is always associated with open areas such as sand dunes and sandy heathland.

Steatoda phalerata is widespread but local and is usually associated with dry grassland or heathland. Walckenaera vigilax is considered to be rare, but is recorded over a wide area in Britain. It is usually found in moss and grass in damp places. Hypomma bituberculatum although taken in a variety of habitat types is very often present on sand dunes. Silometopus incurvatus is a rare coastal spider restricted to the north east coasts of England and Scotland. All the remaining species occur commonly in grassland.

3.5 Mollusca (Land snails)

	JUNE	JN/JL	JULY	TOTAL
Cepaea hortensis	4	27	12	43

The catch was poor compared with some other East Coast sites. Cepaea hortensis occurred at many North Coast sites. It is known to occur on many dune systems in Scotland and tends to occur more commonly where grazing pressure is low.

3.6 Diplopoda

	JUNE	JN/JL	JULY	TOTAL
Cylindroiulus latestriatus	1	1	0	2

Cylindroiulus latestriatus is common on sandy coasts throughout Britain.

3.7 Terrestrial Isopoda

	JUNE	JN/JL	JULY	TOTAL
Porcellio scaber	3	11	4	18

Porcellio scaber is found widely on dry sandy soils.

4. ADDITIONAL SPECIES

4.1 Lepidoptera

The following species were observed in the field during the course of the survey:

Pieridae

Pieris brassicae

Lycaenidae

Vanessa atalanta

Aglais urticae

Argynnis aglaja

Satyridae

Hipparchia semele

Maniola jurtina

Coenonympha pamphilus

Site 81 St. Fergus

Site 81 St. Fergus

0 500 Metres

0 500 Yards

★ Light trap

▼ Pitfall trap pairs

SITE 81

ST. FERGUS

1. DESCRIPTION OF SAMPLED SITE

1.1 Topography

The site consisted on a dune ridge with gentle slopes on the seaward and landward sides. There was a flat area of stabilised sand, with a few undulations, inland from the landward slope of the ridge.

1.2 Vegetation

The light trap was placed in an area where tussocky Ammophila arenaria predominated. The vegetation surrounding the pitfall traps consisted of the following:

Pair 1: yellow dunes with A. arenaria and 50% bare ground.

Pair 2: A. arenaria in tussocks, with lichens and 30% bare ground.

Pair 3: A. arenaria and fine grasses with Lotus corniculatus, Cirsium sp. and Campanula rotundifolia. No bare ground.

Pair 4: next to a meadow and mainly composed of fine grasses with some A. arenaria and moss. Also present were Primula veris, L. corniculatus, Cirsium sp., Galium sp. and Achillea millefolium. There was no bare ground.

1.3 Disturbance

A track running along the western edge of the dunes seemed to be fairly well used. A few people were seen walking along the beach.

1.4 Distance from sea

The light trap and pitfall trap pair 1 were approximately 100 metres from the shore. The other pairs of pitfall traps were in a transect running inland from pair 1; thus pairs 2, 3 and 4 were 150, 200 and 250 metres, respectively, from the shore.

2. SITING OF LIGHT TRAP AND PITFALL TRAPS

2.1 Selection of site

The light trap was placed in a fairly steep-sided hollow near the west of the dune ridge, as far as possible, out of sight of the general public. The pitfall traps were placed to sample different areas of vegetation, but as far as possible, in secluded positions.

2.2 Damage or malfunction

The light trap operated from 15 - 22.6.76 and 20 - 27.7.76. The trap was functional at the end of the first period, but was faulty on 27.7.76 when tested. A large number of snails (Cepaea sp.) were found in the light trap of 27.7.76. The pitfall traps operated satisfactorily during the whole of each of the three periods 15 - 22.6.76, 22.6. - 20.7.76 and 20 - 27.7.76. A number of shrews (Sorex sp.) were caught in the pitfall traps: 22.6. - 20.7.76 - trap 1A, 1 shrew; trap 3B, 3 shrews; trap 4B, 1 shrew; 20 - 27.7.76 - trap 1B, 1 shrew.

2.3 Colour slides available

Box 2, 112-119.

3. THE FAUNA

3.1 Lepidoptera

	JUNE	JULY	TOTAL
Xanthorhoe munitata	0	1	1
Scotopteryx chenopodiata	0	10	10
Epirrhoe alternata	0	1	1
Camptogramma bilineata	0	2	2
Cosmorhoe ocellata	0	3	3
Colostygia pectinataria	0	1	1
Perizoma albulata	0	1	1
Hylaea fasciaria	0	1	1
Arctia caja	0	3	3
Spilosoma lubricipeda	3	0	3
Euxoa tritici	0	39	39
Agrotis vestigialis	0	6	6
Agrotis ipsilon	1	0	1
Noctua pronuba	0	15	15
Noctua comes	0	1	1
Lycophotia porphyrea	0	1	1
Xestia sexstrigata	0	2	2
Hada nana	2	0	2
Cerapteryx graminis	0	2	2
Mythimna conigera	0	1	1
Mythimna impura	0	8	8
Amphipyra tragopoginis	0	1	1
Thalpophila matura	0	19	19

	JUNE	JULY	TOTAL
Apamea monoglypha	0	18	18
Apamea lithoxylaea	0	1	1
Mesoligia literosa	0	2	2
Mesapamea secalis	0	10	10
Luperina testacea	0	1	1
Diachrysia chrysitis	0	1	1
TOTAL	6	151	157

Compared with other East Coast and Moray Firth sites the total catch was low, but the species list was average. The trap was functional during the first period but only 6 specimens of 3 species were taken.

Agrotis vestigialis is a common sand dune species and was trapped extensively and often commonly at many sites, especially on the North Coast. Agrotis ipsilon, a common migrant, was trapped elsewhere only at Site 28 in the Hebrides, and Hylaea fasciaria was taken elsewhere only at Sites 69 and 90. The latter species feeds on Pinus sylvestris and occasionally Larix decidua, both of which were apparently absent in the adjacent area.

A few species are restricted to a limited range of larval food plants. Epirrhoe alternata and Cosmorhoe ocellata feed on Galium spp., Perizoma albulata on Rhinanthus minor and Lycophotia porphyrea on Calluna vulgaris and Erica spp..

3.2 Coleoptera : Carabidae

	JUNE	JN/JL	JULY	TOTAL
Carabus problematicus	0	6	5	11
Leistus fulvibarbis	0	1	0	1
Leistus rufescens	1	4	2	7
Nebria brevicollis	0	1	0	1
Notiophilus aquaticus	0	2	2	4
Broscus cephalotes	0	1	0	1
Trechus obtusus	0	0	1	1
Calathus fuscipes	0	2	1	3
Calathus melanocephalus	1	4	0	5
Calathus mollis	3	27	19	49
Amara bifrons	0	1	0	1
Amara familiaris	1	0	0	1
Badister bipustulatus	1	1	0	2
TOTAL	7	50	30	87

The carabid fauna caught at this site was fairly rich in species but the numbers of individuals were low. Calathus mollis which is characteristic of sandy coasts, and Carabus problematicus, a species of heaths and drier moorland, were the most numerous species. Coastal xerophilous species were represented by Broscus cephalotes and Amara bifrons but two hygrophilous species, Leistus rufescens and L. fulvibarbis, were also taken. L. fulvibarbis is more typically found in wooded areas. A total of five larvae of Notiophilus substriatus was recorded during the first two sampling periods. This species was not trapped as an adult at the site.

3.3 Coleoptera : Hydrophilidae to Scolytidae

	JUNE	JN/JL	JULY	TOTAL
Helophorus brevipalpis	0	1	0	1
Cercyon atomarius	2	2	0	4
Cercyon haemorrhoidalis	0	0	1	1
Cercyon melanocephalus	0	0	1	1
Megasternum obscurum	4	10	5	19
Acrotrichus atomaria	1	0	0	1
Leiodes dubia/obesa	0	3	0	3
Agathidium laevigatum	2	0	0	2
Choleva glauca	1	0	0	1
Choleva oblonga	0	1	0	1
Sciodrepoides watsoni	0	2	0	2
Catops chrysomeloides	4	13	0	17
Catops coracinus	0	1	0	1
Catops fuliginosus	10	16	0	26
Catops grandicollis	1	0	0	1
Catops kirbii	1	0	0	1
Catops morio	0	2	1	3
Micropeplus staphylinoides	0	8	6	14
Megarthrus depressus	0	0	1	1
Anotylus tetracarinatus	0	0	2	2
Stenus clavicornis	0	1	0	1
Stenus impressus	0	1	1	2
Stenus picipes	0	1	0	1
Othius myrmecophilus	0	2	0	2
Xantholinus glabratus	0	0	5	5
Xantholinus linearis	2	0	0	2
Philonthus marginatus	0	1	0	1

	JUNE	JN/JL	JULY	TOTAL
Philonthus varius	0	1	0	1
Gabrius osseticus	0	1	0	1
Quedius boops	0	1	0	1
Quedius molochinus	0	1	2	3
Mycetoporus lepidus	0	0	1	1
Mycetoporus splendidus	0	0	1	1
Tachyporus chrysomelinus	1	1	0	2
Tachyporus hypnorum	4	3	0	7
Tachyporus obtusus	0	1	0	1
Tachinus marginellus	2	0	0	2
Tachinus proximus	0	0	1	1
Tachinus signatus	0	4	0	4
Aloconota gregaria	0	8	3	11
Amischa analis	0	1	0	1
Atheta amicula	0	1	0	1
Atheta indubia	0	3	0	3
Atheta fungi	28	21	5	54
Atheta atramentaria	2	3	3	8
Oxypoda spectabilis	0	2	0	2
Oxypoda umbrata	1	0	0	1
Tinotus morion	0	1	0	1
Aleochara lanuginosa	0	1	0	1
Aleochara obscurella	0	0	1	1
Serica brunnea	0	4	3	7
Simplocaria semistrata	1	0	0	1
Rhagonycha femoralis	1	3	0	4
Cryptophagus setulosus	2	3	1	6
Atomaria fuscata	2	0	1	3
Atomaria nitidula	1	1	4	6
Coccidula rufa	0	1	0	1
Corticaria crenulata	0	21	9	30
Corticaria umbilicata	1	7	2	10
Corticarina fuscula	6	0	3	9
Longitarsus succineus	0	0	2	2
Apion carduorum	1	0	0	1
Apion loti	1	3	0	4
Apion dichroum	0	0	1	1
Otiorhynchus atroapterus	1	1	0	2
Sitona lineellus	0	1	0	1
TOTAL	83	164	66	313

A very varied fauna was taken in which a ubiquitous species, Atheta fungi, was the most numerous species. Corticaria crenulata is predominantly a coastal species, which may also apply to C. umbilicata although this last species is thought generally to occur in moss. Aleochara obscurella is restricted to rotting seaweed and carrion on sandy shores, Otiorhynchus atroapterus is a species of sandy coasts and Serica brunnea occurs in sandy areas particualrly on the coast. Leiodes dubia was the only other psammophilic species recorded.

The Catops spp. and Sciodrepoides watsoni are normally associated with carrion although they, and the two Choleva spp. also inhabit the nests and runs of small mammals. Oxypoda spectabilis is usually found in moles' nests and Cryptophagus setulosus occurs in the nests of solitary bees. The three Cercyon spp., Megasternum obscurum, Atheta atramentaria, the Tachinus spp. and Philonthus spp., Tinotus morion, Aleochara lanuginosa, Megarthrus depressus and Anotylus tetracarinatus all frequent dung. Micropeplus staphylinoides and Aloconota gregaria occur in various decaying vegetable material although Fowler (1888) records the latter from seaweed.

A very limited number of phytophagous species was trapped. Apion dichroum and Sitona lineellus feed on Trifolium spp., A. carduorum on thistles and A. loti on Lotus corniculatus.

Helophorus brevipalpis is a water beetle and was probably attracted to the reflective surface of the preservative in the pitfall traps.

3.4 Araneae

	JUNE	JN/JL	JULY	TOTAL
Haplodrassus signifer	1	0	0	1
Zelotes pusillus	0	1	0	1
Micaria pulicaria	0	1	0	1
Clubiona reclusa	1	0	1	2
Clubiona neglecta	0	0	1	1
Clubiona diversa	0	1	0	1
Pardosa palustris	1	0	0	1
Pardosa pullata	8	20	2	30
Pardosa nigriceps	3	3	0	6
Trochosa terricola	0	0	1	1
Arctosa perita	0	4	0	4
Ero furcata	0	2	0	2

	JUNE	JN/JL	JULY	TOTAL
Pachygnatha degeeri	3	1	1	5
Ceratinella brevipes	1	1	0	2
Walckenaera acuminata	1	3	1	5
Walckenaera antica	0	1	0	1
Hypomma bituberculatum	4	2	0	6
Gonatium rubens	0	1	1	2
Pocadicnemis pumila	1	3	0	4
Silometopus incurvatus	1	0	0	1
Tiso vagans	1	2	2	5
Monocephalus fuscipes	1	0	0	1
Erigonella hiemalis	0	1	0	1
Agyneta subtilis	13	8	0	21
Agyneta conigera	2	0	0	2
Centromerita concinna	3	0	0	3
Bathyphantes parvulus	22	38	1	61
Lepthyphantes tenuis	2	0	0	2
Lepthyphantes mengei	0	2	1	3
Lepthyphantes ericaeus	1	1	0	2
TOTAL	70	96	12	178

The most abundant species in the catch at this site was Bathyphantes parvulus. It is frequently taken in longer calcareous grassland but seldom forms a major part of the fauna as it did here and at several other southern East Coast sites.

Haplodrassus signifer, Zelotes pusillus and Micaria pulicaria are characteristic of dry grassland or heathland areas. Clubiona neglecta and Hypomma bituberculatum are most frequently found in fens and marshes but are also often recorded on sand dunes. The most abundantly caught lycosid was Pardosa pullata, a very common spider of open terrain with a slight preference for damper areas. Arctosa perita is restricted to sand dunes and bare sandy heathland.

Silometopus incurvatus is a rare species which is restricted to a few sites on the north eact coast of England and the east coast of Scotland. The remaining species are commonly taken in grassland.

3.5 Mollusca (Land snails)

	JUNE	JN/JL	JULY	TOTAL
Cochlicopa lubricella	2	0	0	2
Vitrina pellucida	0	0	1	1
Oxychilus cellarius	0	1	0	1
Oxychilus alliarius	0	1	0	1
Candidula intersecta	6	5	2	13
Cepaea hortensis	15	50	9	74
TOTAL	23	57	12	92

Cepaea hortensis made up 80.4% of the catch, and in the July trapping period, Cepaea sp. were found in the light trap (sic) in large numbers C. hortensis occurs on many dune systems in Scotland, more commonly where grazing pressure is low. The remaining species are typical of fixed dune areas with bare sand, on the East Coast. Candidula intersecta is believed to have been introduced to the British Isles in Roman times, or later.

3.6 Diplopoda

	JUNE	JN/JL	JULY	TOTAL
Polydesmus angustus	59	283	17	359
Polydesmus inconstans	1	0	0	1
Ophyiulus pilosus	24	42	6	72
Cylindroiulus punctatus	0	1	0	1
Cylindroiulus latestriatus	1	0	1	2
Brachyiulus pusillus	2	13	1	16
TOTAL	87	339	25	451

The fauna caught at this site came mainly from pitfall trap pairs 3 and 4 and probably reflects the closed meadow-like grassland sampled by those traps. Polydesmus angustus is most plentiful in woodland litter but commonly occurs in other forms of thick litter and synanthropically. Ophyiulus pilosus and Brachyiulus pusillus are both considered to be soil-dwelling species.

3.7 Terrestrial Isopoda

	JUNE	JN/JL	JULY	TOTAL
Trichoniscus pusillus	3	3	3	9

Trichoniscus pusillus occurs throughout Britain mainly in damp soil, and has been recorded occasionally on sand dunes.

4. ADDITIONAL SPECIES

4.1 Lepidoptera

The following species were observed in the field during the course of the survey:

Lycaenidae

Polyommatus icarus

Nymphalidae

Vanessa atalanta

Cynthia cardui

Aglais urticae

Satyridae

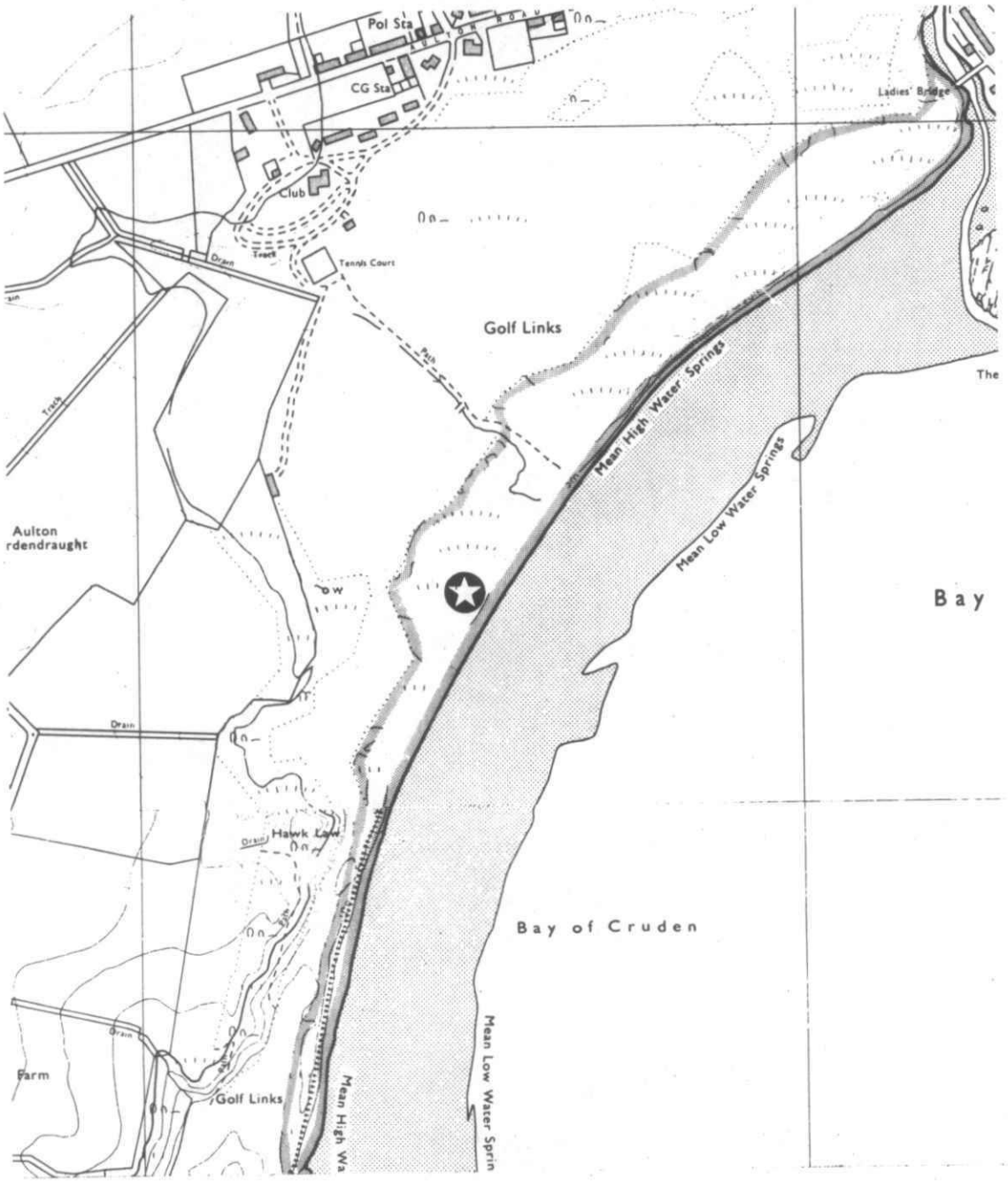
Hipparchia semele

Maniola jurtina

Coenonympha pamphilus

Site 82 Cruden Bay

Site 82 Cruden Bay



Light trap & pitfall traps

SITE 82

CRUDEN BAY

1. DESCRIPTION OF SAMPLED SITE

1.1 Topography

The site consisted of an area of high, steep-sided dunes which, on the landward side, had developed a large flat area of sand, fixed by vegetation. Part of the flat area was used as a golf course.

1.2 Vegetation

The vegetation surrounding the pitfall traps consisted of the following species:

Pair 1: 30% bare ground with Ammophila arenaria, some fine-leaved grasses and Lotus corniculatus.

Pair 2: 10% bare ground with fine grasses, some A. arenaria, L. corniculatus and a little Campanula rotundifolia.

Pair 3: mostly moss, with no bare ground, and some A. arenaria, Galium sp. and Thalictrum minus.

Pair 4: a thick turf of fine grasses with little A. arenaria and some Galium sp., Plantago sp., Centaurea sp., Thalictrum minus and Primula veris.

The light trap was near to and among similar vegetation as pitfall trap pair 4.

1.3 Disturbance

The site was near two villages, Cruden Bay and Port Erroll, but the only obvious public use made of the area was limited to the golf course. The dunes away from the course were probably visited occasionally by golfers looking for lost golf balls.

1.4 Distance from sea

The light trap and pitfall traps were approximately 75 metres from the shore.

2. SITING OF LIGHT TRAP AND PITFALL TRAPS

2.1 Selection of site

The most secluded, suitable location that could be found was in a small but distinct hollow. The light trap was placed in the bottom of

of the hollow, with the pitfall traps grouped around it on the steep slopes.

2.2 Damage or malfunction

The light trap was run from 16 - 23.6.76 and 21 - 28.7.76. It operated satisfactorily for the first period, but was found not to be functional at the end of the second period on 28.7.76 when tested. The pitfall traps were all functional during the whole of each of the three periods 16 - 23.6.76, 23.6. - 21.7.76 and 21 - 28.7.76. A number of traps contained small mammals

16 - 23.6.76	Trap 1A	2 shrews (Sorex sp.)
	Trap 1B	2 shrews (Sorex sp.)
	Trap 2A	2 shrews (Sorex sp.)
	Trap 2B	1 shrew (Sorex sp.)
	Trap 3B	1 vole (species not recorded)
	Trap 4A	1 shrew (Sorex sp.)
	Trap 4B	2 shrews (Sorex sp.)
23.6. - 21.7.76.	Trap 1B	2 shrews (Sorex sp.)
	Trap 2A	4 shrews (Sorex sp.)
	Trap 2B	2 shrews (Sorex sp.)
	Trap 3A	1 shrew (Sorex sp.)
	Trap 3B	1 shrew (Sorex sp.)
	Trap 4A	1 shrew (Sorex sp.)
	Trap 4B	2 shrews (Sorex sp.)
21 - 28.7.76.	Trap 2A	4 shrews (Sorex sp.)
	Trap 2B	3 shrews (Sorex sp.)

2.3 Colour slides available

Box 2, 120-125

3. THE FAUNA

3.1 Lepidoptera

	JUNE	JULY	TOTAL
Hepialus fusconebulosa	2	0	2
Zygaena filipendulae	0	5	5
Scotopteryx chenopodiata	0	88	88
Epirrhoe alternata	0	8	8
Camptogramma bilineata	0	23	23
Cosmorhoe ocellata	0	11	11
Eulithis pyraliata	0	7	7

	JUNE	JULY	TOTAL
Colostygia pectinataria	0	5	5
Arctia caja	0	8	8
Spilosoma lubricipeda	0	1	1
Euxoa tritici	0	237	237
Agrotis vestigialis	0	16	16
Ochropleura plecta	1	0	1
Noctua pronuba	0	195	195
Noctua comes	0	10	10
Lycophotia porphyrea	0	8	8
Diarsia mendica	0	5	5
Xestia c-nigrum	0	14	14
Xestia sexstrigata	0	14	14
Hada nana	3	0	3
Sideridis albicolon	0	6	6
Lacanobia oleracea	0	1	1
Ceramica pisi	35	0	35
Cerapteryx graminis	0	78	78
Mythimna conigera	0	9	9
Mythimna impura	0	51	51
Rusina ferruginea	35	0	35
Thalpophila matura	0	8	8
Apamea monoglypha	0	41	41
Oligia fasciuncula	0	4	4
Mesoligia literosa	0	1	1
Mesapamea secalis	0	33	33
Amphipoea lucens	0	1	1
Diachrysia chrysitis	0	2	2
Autographa gamma	0	1	1
Autographa pulchrina	0	4	4
TOTAL	76	895	971

This site compared favourably with other East Coast and Moray Firth sites with an average species list but a high total catch. Nearly all the species are common in Britain. Two species made up 44% of the catch. Euxoa tritici, which was the most abundant, occurred, often commonly, at many other sites, except those around the Moray Firth. Noctua pronuba was also abundant and was taken at many sites during the survey, but very few were recorded from sites in the Moray Firth.

Two sand dune species occurred. Agrotis vestigialis was trapped extensively and often commonly at many sites, especially on the North Coast. Sideridis albicolon was confined to the East Coast and not taken further north than this site. It does not appear to have been recorded from Scotland in recent years.

Several species are confined to a limited number of larval food plants. Hepialus fusconebulosa which feeds on the roots of Pteridium aquilinum was taken widely at a number of sites. Zygaena filipendulae is a day flying moth whose larvae feed on Lotus corniculatus. Epirrhoe alternata, Cosmorhoe ocellata and Eulithis pyraliata feed on Galium spp.. Lycophotia porphyrea feeds on Calluna vulgaris and Erica spp..

3.2 Coleoptera : Carabidae

	JUNE	JN/JL	JULY	TOTAL
Carabus nemoralis	0	2	0	2
Carabus problematicus	0	3	0	3
Carabus violaceus	0	0	1.	1
Leistus rufescens	0	1	3	4
Nebria brevicollis	0	1	0	1
Stomis pumicatus	0	1	0	1
Pterostichus niger	0	3	0	3
Calathus fuscipes	0	1	0	1
Calathus melanocephalus	3	6	1	10
Calathus mollis	0	3	1	4
Amara aenea	2	0	0	2
Amara familiaris	0	1	0	1
Harpalus latus	0	1	0	1
Badister bipustulatus	1	5	3	9
Dromius linearis	1	0	0	1
TOTAL	7	28	9	44

The catch of carabids was rich in species but few specimens were taken. The most numerous species were Calathus melanocephalus which is common on sand dunes, and a eurytopic species, Badister bipustulatus.

The hygrophilous species Leistus rufescens was as numerous in the catch as C. mollis a xerophilous species. Stomis pumicatus is a relatively less common species and is usually associated with humus-rich soils. This was the only specimen taken during the whole survey. One larval Amara sp. and two larvae of Carabus nemoralis were taken during the first and second trapping periods respectively.

3.3 Coleoptera : Hydrophilidae to Scolytidae

	JUNE	JN/JL	JULY	TOTAL
Helophorus brevipalpis	0	1	3	4
Cercyon atomarius	0	0	7	7
Megasternum obscurum	1	19	18	38
Leiodes dubia/obesa	0	6	1	7
Agathidium atrum	1	0	0	1
Agathidium laevigatum	0	0	2	2
Ptomophagus subvillosus	1	3	0	4
Choleva agilis	4	0	0	4
Choleva glauca	1	0	0	1
Choleva jeanneli	1	0	0	1
Choleva oblonga	0	1	0	1
Sciodrepoides watsoni	0	11	1	12
Catops coracinus	0	0	4	4
Catops fuliginosus	9	14	2	25
Catops morio	0	4	2	6
Nicrophorus investigator	0	0	1	1
Nicrophorus vespilloides	0	10	0	10
Micropeplus staphylinoides	0	14	16	30
Anotylus sculpturatus	1	2	0	3
Stenus impressus	0	1	2	3
Othius angustus	0	1	1	2
Xantholinus linearis	0	2	0	2
Philonthus marginatus	0	1	8	9
Philonthus varians	0	0	1	1
Platydracus stercorarius	0	1	1	2
Quedius molochinus	0	0	1	1
Bolitobius analis	1	0	0	1
Tachyporus chrysomelinus	0	10	2	12
Tachyporus hypnorum	0	0	2	2
Tachinus corticinus	0	2	0	2
Tachinus signatus	0	1	0	1
Aloconota gregaria	1	3	1	5
Amischa analis	0	1	0	1
Geostiba circellaris	4	6	0	10
Atheta amicula	0	1	0	1
Atheta fungi	2	13	10	25
Atheta brunneipennis	4	1	0	5

	JUNE	JN/JL	JULY	TOTAL
Atheta pertyi	0	1	0	1
Atheta atramentaria	0	1	1	2
Drusilla canaliculata	76	892	123	1091
Oxypoda islandica	0	1	0	1
Aleochara lanuginosa	1	0	0	1
Aleochara sparsa	0	0	1	1
Serica brunnea	0	1	1	2
Calyptomerus dubius	0	1	0	1
Byrrhus fasciatus	1	1	0	2
Cryptophagus setulosus	0	1	0	1
Micrambe vini	1	0	0	1
Atomaria atricapilla	1	0	0	1
Atomaria fuscata	1	0	0	1
Atomaria nitidula	0	1	1	2
Scymnus schmidti	0	2	0	2
Corticaria crenulata	0	9	5	14
Corticaria umilicata	2	5	2	9
Crepidodera ferruginea	0	1	2	3
Otiorhynchus ovatus	2	0	0	2
Sitona hispidulus	0	0	1	1
Sitona lepidus	0	1	0	1
Sitona lineellus	0	0	1	1
TOTAL	116	1047	224	1387

The varied coleopterous fauna taken at this site was dominated by the large numbers of both adults and larvae of Drusilla canaliculata. This species is associated in a non-obligatory way with various species of ant and, if present at a given site, is frequently taken in large numbers in pitfall traps. Coastal and/or psammophile species were poorly represented with only Corticaria crenulata, Otiorhynchus ovatus, Serica brunnea and Leiodes dubia/obesa being recorded.

Megasternum obscurum, Atheta fungi and Micropeplus staphylinoides are generally associated with decaying vegetable matter. Megasternum also occurs in dung as do the Philonthus spp. and Tachinus spp., Aleochara lanuginosa, Cercyon atomarius and Anotylus sculpturatus. The Nicrophorus spp. and Catops spp. frequent carrion together with Sciodrepoides watsoni and Platydracus stercorarius. Ptomophagus spp. and Choleva spp. are associated with small mammals, and Cryptophagus

setulosus inhabits bees' nests.

The Sitona spp. feed on Trifolium spp.. Crepidodera ferruginea occurs on Urtica spp. and Cirsium spp., but the larvae probably feed at the roots of various Gramineae. Micrambe vini feeds on Ulex spp. and Sarothamnus scoparius.

The records for Scymus schmidti and Calyptomerus dubius were more northerly than any known localities published to date (see Pope (1973) and Johnson (1966)) but the latter species has since been recorded from Shetland (M.E. Bacchus pers. comm.).

Helophorus brevipalpis is a water beetle probably attracted to the preserving fluid in the pitfall traps. This species often flies considerable distances from open water.

In addition to the large numbers of larval Drusilla canaliculata taken throughout the three trapping periods, small numbers of larval Lathridiidae and Tachyporinae were present in the last two periods.

3.4 Araneae

	JUNE	JN/JL	JULY	TOTAL
Drassodes cupreus	0	1	0	1
Zelotes pusillus	1	1	0	2
Micaria pulicaria	0	1	0	1
Clubiona neglecta	1	2	0	3
Xysticus cristatus	1	0	0	1
Pardosa pullata	5	17	5	27
Pardosa nigriceps	14	26	1	41
Alopecosa pulverulenta	8	4	0	12
Ero furcata	0	1	0	1
Pachygnatha degeeri	2	6	3	11
Walckenaera acuminata	0	1	0	1
Hypomma bituberculatum	1	2	0	3
Pocadicnemis pumila	7	15	1	23
Oedothorax retusus	1	2	0	3
Trichopterna thorelli	2	5	1	8
Cnephalocotes obscurus	0	3	3	6
Tiso vagans	4	12	1	17
Troxochrus scabriculus	1	0	1	2
Troxochrus cirrifrons	0	1	0	1
Tapinocyba praecox	1	0	0	1
Monocephalus fuscipes	3	3	2	8

	JUNE	JN/JL	JULY	TOTAL
Meioneta saxatilis	8	19	2	29
Centromerita concinna	1	1	0	2
Bathyphantes parvulus	48	93	5	146
Lepthyphantes obscurus	0	1	0	1
Lepthyphantes tenuis	0	5	2	7
Lepthyphantes zimmermanni	0	1	0	1
Lepthyphantes mengei	5	18	4	27
Lepthyphantes ericaeus	2	4	0	6
TOTAL	116	245	31	392

The most common species in the catch at this site was Bathyphantes parvulus (37.3%). It is often found in longer calcareous grassland but seldom forms an important part of the fauna as it did here and at several other sites on the southern East Coast. Clubiona neglecta and Hypomma bituberculatum may be taken in a variety of habitat types, particularly fens and marshes, but are often recorded on sand dunes. The most abundant lycosid was Pardosa nigriceps, a common grassland and heathland species with a preference for long vegetation. Arctosa perita is confined to sand dunes and bare sandy heaths. Trichopterna thorelli is a widespread species in moss and wet grassland, but is only common on wet heathland in southern England.

Troxochrus scabriculus and T. cirrifrons are both associated with sand dunes and dry sandy places. The latter is generally less common than the former and the records of it here and at Sites 59 and 75 are the first for Scotland.

An indicator of the long vegetation at this site was the presence of five species of Lepthyphantes. L. obscurus is usually associated with scrub. Cnephalocotes obscurus, although a common species of grassland with a rather northern distribution was taken elsewhere only at Site 83 during this survey. All the other species are common in grassland.

3.5 Mollusca (Land snails)

	JUNE	JN/JL	JULY	TOTAL
Cochlicopa lubricella	7	12	2	21
Nesovitrea hammonis	0	1	0	1
Oxychilus alliarius	5	6	0	11
Candidula intersecta	0	2	0	2
Cepaea hortensis	1	0	0	1
TOTAL	13	21	2	36

The assemblage of species recorded at this site was typical of fixed dune areas with little bare ground, on the East Coast. Nesovitrea hammonis was not recorded elsewhere on the East Coast. Candidula intersecta is believed to have been introduced to the British Isles in Roman times, or later.

3.6 Diplopoda

	JUNE	JN/JL	JULY	TOTAL
Polydesmus inconstans	9	36	0	45
Julus scandinavius	20	58	22	100
TOTAL	29	94	22	145

Both species are usually associated with thick litter layer and neither is particularly common on sand-dunes. Polydesmus inconstans rarely occurs in large numbers.

3.7 Terrestrial Isopoda

	JUNE	JN/JL	JULY	TOTAL
Trichoniscus pusillus	28	32	2	62
Porcellio scaber	1	12	1	14
TOTAL	29	44	3	76

Trichoniscus pusillus occurs throughout Britain, mainly in damp soil, and has been recorded occasionally on sand dunes. Porcellio scaber is widely recorded on sandy soils.

4. ADDITIONAL SPECIES

4.1 Lepidoptera

The following species were observed in the field during the course of the survey:

Satyridae

Maniola jurtina

Geometridae

Odezia atrata

4.2 Siphonaptera : Hystrichopsyllidae

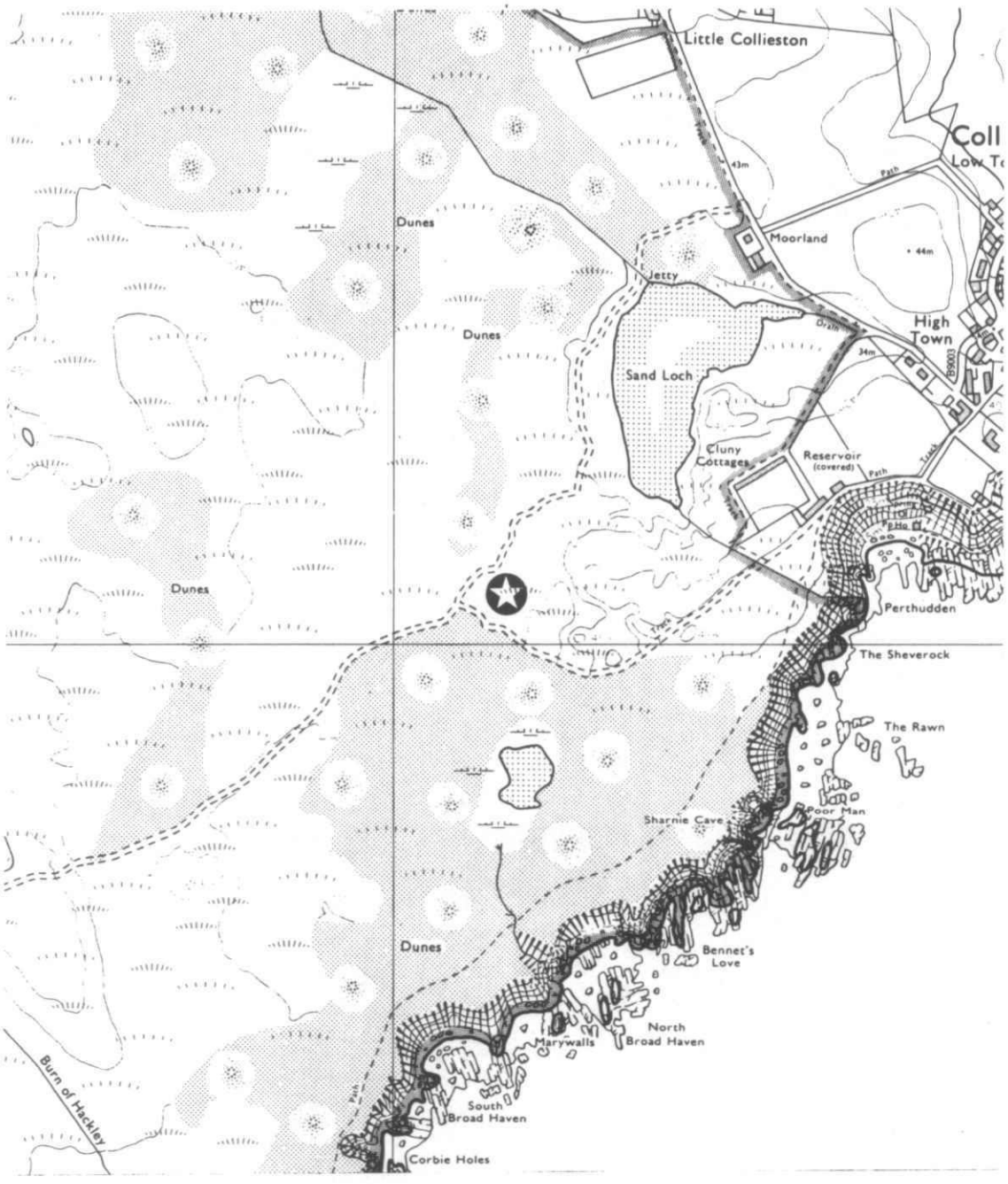
The following species were recorded by Dr R.C. Welch:

Doratopsylla dasycnema dasycnema, 23.6. - 21.7.76 in pitfall traps 1A (1♀), 1B (1♂), 2B (1♂ 1♀), 4B (1♂)
Host - shrews.

Palaeopsylla soricis soricis, 23.6. - 21.7.76 in pitfall traps 1B (2♂), 3A (1♀)
Host - shrews

Site 83 Forvie

Site 83 Forvie



0 500 Metres
0 500 Yards

★ Light trap & pitfall traps

SITE 83

FORVIE

1. DESCRIPTION OF SAMPLED SITE

1.1 Topography

The site consisted of a large dune system including mobile dunes, areas of fixed dunes, and leached areas of dune heath.

1.2 Vegetation

The light trap was placed in an area of open dune heath where the vegetation was dominated by lichens and mosses. The vegetation surrounding the pitfall traps consisted of the following:

Pair 1: 50% bare ground with Ammophila arenaria and moss

Pair 2: a short rabbit grazed turf of fine grasses with 10% bare ground, occasional small clumps of A. arenaria and a small Carex sp.. Also present were Tortula sp., lichens, Galium sp. and Empetrum nigrum.

Pair 3: a thick turf of fine grasses and Salix repens with some Senecio sp. but with no bare ground.

Pair 4: Empetrum nigrum/Calluna vulgaris heath with less than 5% bare ground and with a little A. arenaria and lichens.

1.3 Disturbance

Although tracks through the dunes were observed, there was very little evidence of public pressure on the area sampled.

1.4 Distance from sea

The light trap and pitfall traps were approximately 400 metres from the shore.

2. SITING OF LIGHT TRAP AND PITFALL TRAPS

2.1 Selection of site

An area was chosen at this extensive site which encompassed a wide range of vegetational types. The light trap was in an open area with the pitfall traps grouped around it.

2.2 Damage or malfunction

The light trap was run from 16 - 23.6.76 and 21 - 28.7.76. It was

operating satisfactorily at the end of the first period when tested, but was found not to be functional on 28.7.76. The pitfall traps were all functional during the whole of each of the three periods 16 - 23.6.76, 23.6. - 21.7.76 and 21 - 28.7.76. A shrew (Sorex sp.) was found in trap 4B on 21.7.76 at the end of the second trapping period.

2.3 Colour slides available

Box 2, 126-130

3. THE FAUNA

3.1 Lepidoptera

	JUNE	JULY	TOTAL
Entephria caesiata	0	17	17
Cosmorhoe ocellata	0	9	9
Eulithis testata	0	1	1
Eulithis pyraliata	0	1	1
Colostygia pectinataria	0	23	23
Ematurga atomaria	1	0	1
Arctia caja	0	2	2
Euxoa tritici	0	22	22
Agrotis vestigialis	0	33	33
Noctua pronuba	0	60	60
Noctua comes	0	5	5
Graphiphora augur	0	1	1
Lycophotia porphyrea	0	291	291
Diarsia mendica	0	34	34
Xestia c-nigrum	0	1	1
Xestia triangulum	0	1	1
Hada nana	1	0	1
Ceramica pisi	1	0	1
Mythimna conigera	0	4	4
Mythimna impura	0	6	6
Blepharita adusta	0	1	1
Amphipyra tragopoginis	0	1	1
Rusina ferruginea	3	0	3
Thalpophila matura	0	23	23
Apamea monoglypha	0	31	31
Oligia fasciuncula	0	1	1
Mesapamea secalis	0	4	4

	JUNE	JULY	TOTAL
Luperina testacea	0	1	1
Amphipoea lucens	0	1	1
Celaena leucostigma	0	2	2
Hoplodrina alsines/blanda	0	4	4
Diachrysia chrysitis	0	3	3
Autographa pulchrina	0	3	3
TOTAL	6	586	592

An average catch was taken here compared with other sites on the East Coast and Moray Firth, including a few interesting species usually associated with areas of heath and scrub.

Several species occurred only at this site. Entephria caesiata is a mountain and moorland species which feeds on Calluna vulgaris, Erica spp. and Vaccinium spp.. Ematurga atomaria a day flying moth generally associated with heaths was taken. This species was observed to be plentiful at Site 72 but no specimens were caught in the trap there. The larvae of Eulithis testata feed on trees and shrubs, but will also eat Calluna vulgaris. Graphiphora augur occurred elsewhere only at Site 90 and Xestia triangulum only at Sites 50N and 90. Both species, particularly the latter, are usually found in wooded districts.

Agrotis vestigialis, a common sand dune species was trapped extensively and often commonly at many other sites, especially on the North Coast. Lycophotia porphyrea was the most abundant species and made up 49% of the total catch. It feeds on Calluna vulgaris and Erica spp..

Two specimens of Celaena leucostigma were taken. This species, which was not recorded at any other site, is associated with fens and marshy ground and is known to feed on the stems of Cladium mariscus, Carex acutiformis, Iris pseudacorus and Molinia caerulea.

Two other species are restricted to a limited range of larval food plants; Cosmorhoe ocellata and Eulithis pyraliata, which both feed on Galium spp..

3.2 Coleoptera : Carabidae

	JUNE	JN/JL	JULY	TOTAL
Carabus nemoralis	0	3	0	3
Carabus problematicus	0	3	2	5
Carabus violaceus	1	0	0	1
Nebria salina	2	2	0	4

	JUNE	JN/JL	JULY	TOTAL
Notiophilus aquaticus	0	1	0	1
Trechus obtusus	0	0	1	1
Pterostichus niger	1	0	0	1
Calathus erratus	3	9	17	29
Calathus fuscipes	5	99	92	196
Calathus melanocephalus	2	5	1	8
Calathus mollis	2	11	7	20
Dromius linearis	0	1	0	1
TOTAL	16	134	120	270

The carabid fauna caught at this site was unusual. It included four species of Calathus, with C. fuscipes the most abundant; and three species of Carabus with the open moorland species C. problematicus the most common. The more xerophilous Calathus species, C. mollis and C. erratus were quite numerous. Four larvae of Carabus nemoralis were collected in the last two sampling periods.

In a manuscript list compiled by M. Smith (1977) from his own records, and those of undergraduate students at Aberdeen University, 24 species of Carabidae were recorded. Five of the twelve species trapped during this survey are additions to this list.

3.3 Coleoptera : Hydrophilidae to Scolytidae

	JUNE	JN/JL	JULY	TOTAL
Othius angustus	0	1	0	1
Quedius boops	0	0	1	1
Quedius semiaeneus	1	0	0	1
Tachyporus hypnorum	0	0	1	1
Amischa analis	1	0	0	1
Geostiba circellaris	1	0	0	1
Atheta fungi	0	1	0	1
Atheta atramentaria	0	0	1	1
Drusilla canaliculata	10	55	7	72
Serica brunnea	0	8	5	13
Corticarina fuscula	0	0	1	1
Phyllodecta vulgatissima	1	3	0	4
Longitarsus succineus	0	0	1	1
Apion loti	0	2	0	2
Otiorhynchus atroapterus	0	1	0	1

	JUNE	JN/JL	JULY	TOTAL
Otiorhynchus ovatus	0	2	2	4
Strophosomus sus	0	2	0	2
Philopedon plagiatus	1	3	1	5
Micrelus ericae	0	3	0	3
TOTAL	15	81	20	116

Far fewer species were recorded at this site than at any other East Coast site sampled. Only six of the 19 species collected were known to occur at the site and were included in M. Smith's (1977) list of 78 non-carabid species. Aegialia arenaria, which he reported to occur in vast numbers, did not occur in the pitfall traps. Indeed, only a single specimen of this common psammophile species was trapped during the whole survey, at Site 50N.

Drusilla canaliculata, a species associated with ants in a non-obligate manner, comprised 62% of the adult non-carabid coleopterous fauna, and formed the vast majority of larvae trapped. Psammophile and coastal species, such as Serica brunnea, the Otiorhynchus spp., Philopedon plagiatus and possibly Quedius semiaeneus, make up a further 20%. Of the phytophagous species Phyllodecta vulgatissima, feeds on Salix spp., Micrelus ericae and Strophosomus sus on Erica spp. and Calluna vulgaris. Apion loti feeds on Lotus corniculatus.

3.4 Araneae

	JUNE	JN/JL	JULY	TOTAL
Drassodes cupreus	1	4	0	5
Haplodrassus signifer	1	12	0	13
Zelotes pusillus	0	2	0	2
Micaria pulicaria	0	5	0	5
Clubiona diversa	0	0	1	1
Scotina gracilipes	0	1	2	3
Xysticus cristatus	1	6	2	9
Oxyptila trux	0	1	0	1
Pardosa palustris	38	73	2	113
Pardosa pullata	27	73	14	114
Pardosa nigriceps	8	30	0	38
Alopecosa pulverulenta	1	2	1	4
Trochosa terricola	0	1	0	1
Arctosa perita	0	13	0	13
Steatoda phalerata	0	1	2	3

	JUNE	JN/JL	JULY	TOTAL
Pachygnatha degeeri	2	16	3	21
Walckenaera antica	1	1	0	2
Walckenaera monoceros	0	4	0	4
Walckenaera vigilax	0	1	0	1
Hypomma bituberculatum	2	8	1	11
Gonatium rubens	0	2	0	2
Peponocranium ludicrum	0	3	0	3
Trichopterna thorelli	0	3	0	3
Cnephalocotes obscurus	0	0	1	1
Silometopus incurvatus	0	1	0	1
Erigonella hiemalis	1	1	0	2
Agyneta subtilis	0	1	0	1
Agyneta decora	0	1	0	1
Bathyphantes parvulus	0	2	0	2
TOTAL	83	268	29	380

Drassodes cupreus, Haplodrassus signifer, Zelotes pusillus and Micaria pulicaria are all widespread in dry grassland and heathland. Scotina gracilipes is uncommon but widely distributed in areas of heather.

The lycosids were the most abundant family caught at this site, with Pardosa palustris and P. pullata contributing 59.7% of the total catch. Both species are common in short vegetation and have a slight preference for damp conditions. P. nigriceps, a species with a preference for long vegetation, was also present in some numbers. Arctosa perita is confined to sand dunes and dry sandy places such as burnt heathland.

Steatoda phalerata is widespread but uncommon and is associated with dry grassy and heathery areas. Walckenaera monoceros, a less common species, has been taken in a variety of biotopes including sand dunes. It was not recorded at any other site during this survey. Hypomma bituberculatum, is a common spider of wet places and is also often found on sand dunes. Trichopterna thorelli is widely distributed in damp areas but is only common on wet heathland in southern England. Cnephalocotes obscurus, although a common grassland spider, was taken elsewhere only at Site 82. Silometopus incurvatus is a rare coastal species, only occurring at a few sites on the north east coast of England and the east coast of Scotland. The remaining species are common in grassland.

3.5 Mollusca (Land snails)

No land snails were recorded at this site.

3.6 Diplopoda

No Diplopoda were recorded at this site.

3.7 Terrestrial Isopoda

	JUNE	JN/JL	JULY	TOTAL
Porcellio scaber	0	0	1	1

Porcellio scaber is found widely on dry sandy soils.

4. ADDITIONAL SPECIES

4.1 Neuroptera : Coniopterygidae

The following species was recorded by Dr R.C. Welch:

Conwentzia pineticola, 23.6. - 21.7.76, a single specimen in pitfall trap 4B.

4.2 Lepidoptera : Satyridae

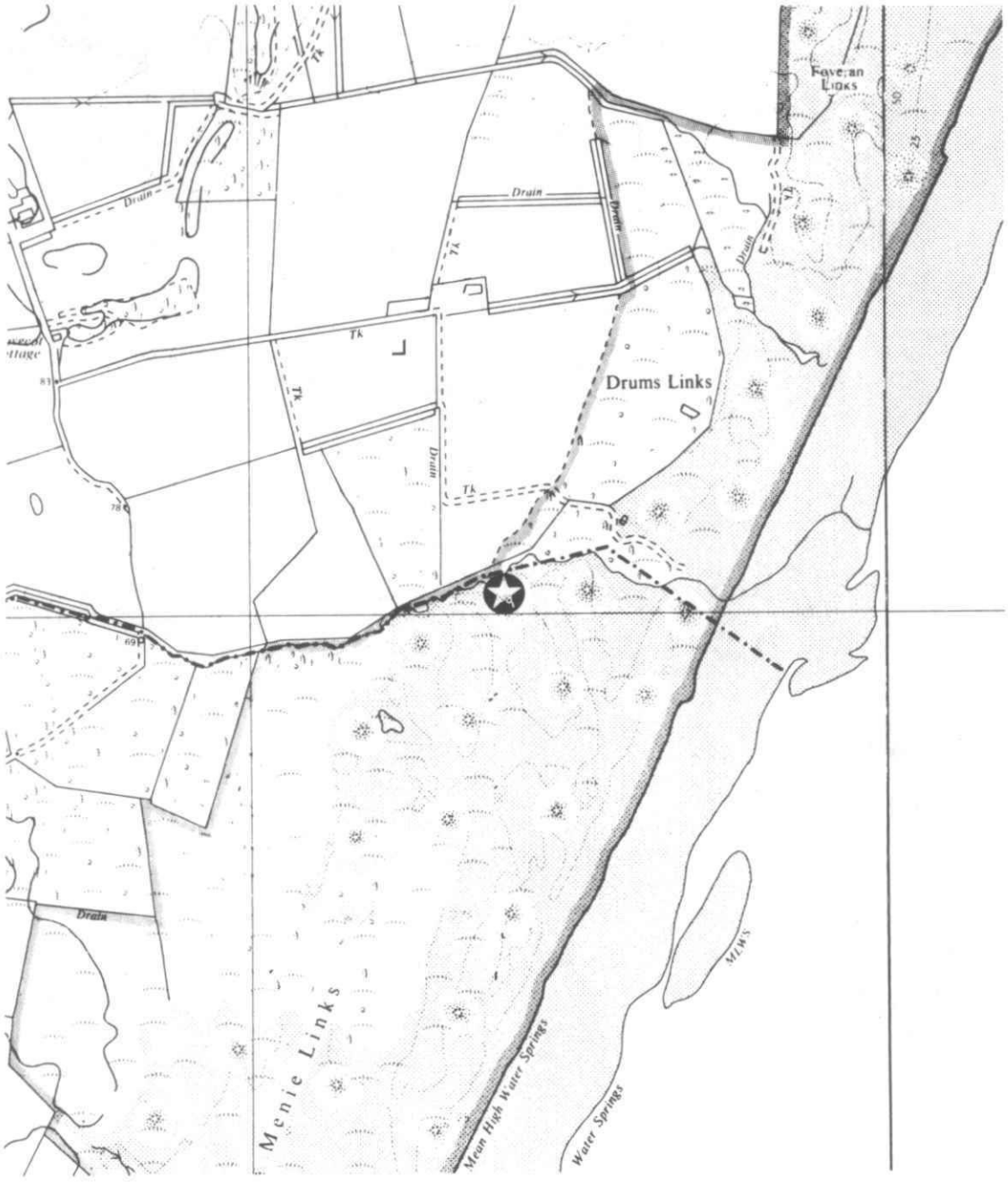
The following species were observed in the field during the course of the survey:

Maniola jurtina

Coenonympha pamphilus

Site 84 Don to Ythan

Site 84 Don to Ythan



0 500 Metres
0 500 Yards

Light trap & pitfall traps

SITE 84

DON TO YTHAN

1. DESCRIPTION OF SAMPLED SITE

1.1 Topography

The sampling area was among the large steep dunes with extensive blow-outs. Meadow land lay to the north west of the sampling area.

1.2 Vegetation

The light trap was placed in an area of Ammophila arenaria, fine grasses and Lotus corniculatus. The vegetation surrounding the pitfall traps consisted of the following:

Pair 1: 70% bare ground with A. arenaria.

Pair 2: 20% bare ground with scattered tussocks of A. arenaria, fine grasses, lichens, L. corniculatus, Viola sp., Empetrum nigrum and a Ulex sp. bush.

Pair 3: 20% bare ground with A. arenaria, fine grasses and a little L. corniculatus.

Pair 4: 10% bare ground in a close grazed turf of fine grasses with sparse A. arenaria, E. nigrum, L. corniculatus and Viola sp..

1.3 Disturbance

The area of pitfall trap pair 4 was clearly grazed by rabbits. There was a small caravan site nearby, but public use of the sampling area appeared to be slight.

1.4 Distance from sea

The light trap and pairs of pitfall traps were approximately 200 metres from the shore.

2. SITING OF LIGHT TRAP AND PITFALL TRAPS

2.1 Selection of site

An area was selected at this extensive site which would enable a number of vegetational types to be sampled. The light trap was placed in a deep, steep-sided, moist hollow.

2.2 Damage or malfunction

The light trap was run from 16 - 23.6.76 and 21 - 28.7.76. It was found not to be functional on 23.6.76 when tested, but was operating satisfactorily

at the end of the last trapping period on 28.7.76. The pitfall traps were all functional during the three trapping periods, 16 - 23.6.76, 23.6. - 21.7.76 and 21 - 28.7.76. A number of small mammals were caught in the following traps:

16 - 23.6.76.	Trap 1A	1 vole
23.6. - 21.7.76.	Trap 1A	1 shrew (Sorex sp.)
	Trap 1B	1 shrew (Sorex sp.)
	Trap 3A	1 shrew (Sorex sp.)
	Trap 3B	1 shrew (Sorex sp.)

2.3 Colour slides available

Box 2, 131-136

3. THE FAUNA

3.1 Lepidoptera

	JUNE	JULY	TOTAL
Hepialus fusconebulosa	1	0	1
Xanthorhoe munitata	0	3	3
Scotopteryx chenopodiata	0	11	11
Scotopteryx luridata	0	4	4
Epirrhoe alternata	0	1	1
Camptogramma bilineata	0	1	1
Cosmorhoe ocellata	0	1	1
Eulithis pyraliata	0	3	3
Colostygia pectinataria	0	4	4
Hydriomena furcata	0	1	1
Perizoma albulata	0	9	9
Arctia caja	0	8	8
Euxoa tritici	0	19	19
Euxoa cursoria	0	2	2
Agrotis vestigialis	0	7	7
Noctua pronuba	0	24	24
Noctua comes	0	3	3
Lycophotia porphyrea	0	8	8
Diarsia mendica	0	4	4
Cerapteryx graminis	0	11	11
Mythimna impura	0	43	43
Rusina ferruginea	2	0	2

	JUNE	JULY	TOTAL
Thalpophila matura	0	14	14
Apamea monoglypha	0	11	11
Oligia fasciuncula	0	1	1
Mesologia literosa	0	1	1
Mesapamea secalis	0	9	9
Diachrysia chrysitis	0	3	3
Autographa pulchrina	0	2	2
TOTAL	3	208	211

The number of species and of specimens taken was rather lower than average compared with other East Coast and Moray Firth sites.

Two sand dune species were taken. Euxoa cursoria occurred at many of the North Coast sites but elsewhere only at the two other East Coast sites, 90 and 95. Agrotis vestigialis a common sand dune species was trapped extensively and often commonly at many sites, particularly on the North Coast.

Apart from sites in the Moray Firth this was the only site where Scotopteryx luridata was trapped; it feeds on Sarothamnus scoparius and Ulex spp.. Hydriomena furcata is a generally common species more often found in hedgerows and wood margins, but it has a smaller form that feeds on Vaccinium spp.. It was taken elsewhere only at Sites 86 and 90.

A number of species are restricted to a limited range of larval food plants. Epirrhoe alternata, Cosmorhoe ocellata and Eulithis pyraliata feed on Galium spp., and Perizoma albulata on Rhinanthus minor. Hepialus fusconebulosa feeds on the roots of Pteridium aquilinum and was taken widely at a number of sites. Lycophotia porphyrea feeds on Calluna vulgaris and Erica spp..

3.2 Coleoptera : Carabidae

	JUNE	JN/JL	JULY	TOTAL
Carabus nemoralis	0	2	1	3
Carabus problematicus	4	9	6	19
Carabus violaceus	0	0	1	1
Leistus rufescens	2	1	0	3
Nebria salina	14	12	0	26
Notiophilus aquaticus	0	3	1	4
Pterostichus niger	0	5	3	8

	JUNE	JN/JL	JULY	TOTAL
Calathus erratus	4	16	1	21
Calathus fuscipes	2	49	41	92
Calathus mollis	0	18	8	26
Amara aenea	2	6	0	8
Amara tibialis	0	1	0	1
Harpalus latus	1	0	0	1
TOTAL	29	122	62	213

Three species of Calathus, more especially C. fuscipes, made up a major element of the catch of carabids at this site. Nebria salina, a species of dry, open country, and Carabus problematicus, which is characteristic of drier moorland and heaths, were both trapped in greater numbers than at any other site during this survey. Amara aenea and A. tibialis are indicative of open sandy areas. In addition to two larval Carabus nemoralis a single larva of Notiophilus palustris was trapped in the first period and one larval N. biguttatus in the middle period. Neither species of Notiophilus was recorded as an adult at this site.

3.3 Coleoptera : Hydrophilidae to Scolytidae

	JUNE	JN/JL	JULY	TOTAL
Acrotrichus atomaria	0	0	1	1
Ptomophagus subvillosus	0	0	1	1
Catops fuliginosus	0	0	1	1
Catops morio	0	2	0	2
Bledius longulus	1	0	0	1
Quedius molochinus	0	2	1	3
Quedius tristis	0	0	1	1
Mycetoporus clavicornis	0	1	0	1
Tachyporus hypnorum	0	0	1	1
Aloconota gregaria	0	1	4	5
Atheta fungi	0	3	1	4
Serica brunnea	0	18	4	22
Byrrhus fasciatus	0	1	0	1
Cryptophagus setulosus	0	2	1	3
Atomaria ruficornis	1	0	0	1
Nephus redtenbacheri	1	0	0	1
Coccinella undecimpunctata	0	1	0	1

	JUNE	JN/JL	JULY	TOTAL
Corticaria crenulata	0	5	2	7
Corticaria umbilicata	4	1	0	5
Corticarina fuscula	1	0	1	2
Longitarsus jacobaeae	0	0	1	1
Crepidodera ferruginea	0	2	0	2
Apion loti	0	1	0	1
Otiorhynchus atroapterus	1	2	1	4
Otiorhynchus ovatus	0	1	0	1
Philopedon plagiatus	4	5	0	9
Sitona lineellus	1	1	0	2
Ceutorhynchus contractus	1	0	0	1
TOTAL	15	49	21	85

The fauna trapped at this site was unusual because very few species of Staphylinidae were recorded and the total number of specimens was by far the lowest to be taken at any East Coast site. The psammophile and coastal species, Serica brunnea, the Otiorhynchus spp., Philopedon plagiatus, Corticaria crenulata, and Bledius longulus made up nearly half of the individuals taken. Coccinella undecimpunctata, although found inland, is often abundant on Ammophila arenaria on coastal dunes.

Longitarsus jacobaeae feeds on Senecio jacobaea, Apion loti on Lotus corniculatus, Sitona lineellus on Trifolium spp. and Ceutorhynchus contractus on various Cruciferae. The larvae of Crepidodera ferruginea require Gramineae whilst the adults occur on Urtica spp. and Cirsium spp.. Cryptophagus setulosus is known to inhabit the nests of solitary bees whilst Ptomophagus subvillosus, the Catops spp. and possibly Acrotrichis atomaria are associated with the nests and runs of small mammals.

3.4 Araneae

	JUNE	JN/JL	JULY	TOTAL
Drassodes cupreus	1	1	1	3
Haplodrassus signifer	1	2	0	3
Zelotes pusillus	0	1	1	2
Micaria pulicaria	0	1	1	2
Xysticus cristatus	3	3	0	6
Pardosa palustris	65	129	5	199
Pardosa pullata	9	31	6	46
Pardosa nigriceps	11	32	1	44

	JUNE	JN/JL	JULY	TOTAL
Alopecosa pulverulenta	0	2	0	2
Trochosa terricola	0	2	0	2
Arctosa perita	0	2	0	2
Pachygnatha degeeri	2	0	0	2
Walckenaera acuminata	1	0	0	1
Walckenaera vigilax	0	1	0	1
Dicymbium nigrum	1	0	0	1
Hypomma bituberculatum	1	9	0	10
Pocadicnemis pumila	4	15	1	20
Trichopterna thorelli	2	1	0	3
Erigone atra	0	0	2	2
Agyneta conigera	0	1	0	1
Agyneta decora	3	0	0	3
Centromerus dilutus	1	0	0	1
Bathyphantes parvulus	13	44	0	57
Lepthyphantes zimmermanni	0	2	0	2
Lepthyphantes mengei	0	0	1	1
TOTAL	118	279	19	416

The most common species in the catch at this site was Pardosa palustris (47.8%). This species and P. pullata are both common in open situations although the former is more local, and have a slight preference for damp conditions. P. nigriceps is associated with longer vegetation. Arctosa perita is restricted to sand dunes and dry sandy places. Drassodes cupreus, Haplodrassus signifer, Zelotes pusillus and Micaria pulicaria are usually found in dry grassland and heathland. Walckenaera vigilax is a widespread though rather uncommon species and is usually associated with areas of damp moss or grass. Hypomma bituberculatum is common in wet places but is also often taken on sand dunes. Trichopterna thorelli is widespread in damp grass and heather areas but is only common on wet heathland in southern England. Bathyphantes parvulus was present in large numbers; it is more typical of long calcareous grassland but is rarely numerous. All the other species are common in grassland.

3.5 Mollusca (Land snails)

No land snails were recorded at this site.

3.6 Diplopoda

	JUNE	JN/JL	JULY	TOTAL
Cylindroiulus latestriatus	2	4	2	8

Cylindroiulus latestriatus is common on sandy coasts throughout Britain.

3.7 Terrestrial Isopoda

	JUNE	JN/JL	JULY	TOTAL
Porcellio scaber	3	6	2	11

Porcellio scaber is widely found on dry sandy soils.

4. ADDITIONAL SPECIES

4.1 Lepidoptera

The following species were observed in the field during the course of the survey:

Pieridae

Pieris rapae

Lycaenidae

Polyommatus icarus

Nymphalidae

Argynnis aglaja

Satyridae

Hipparchia semele

Maniola jurtina

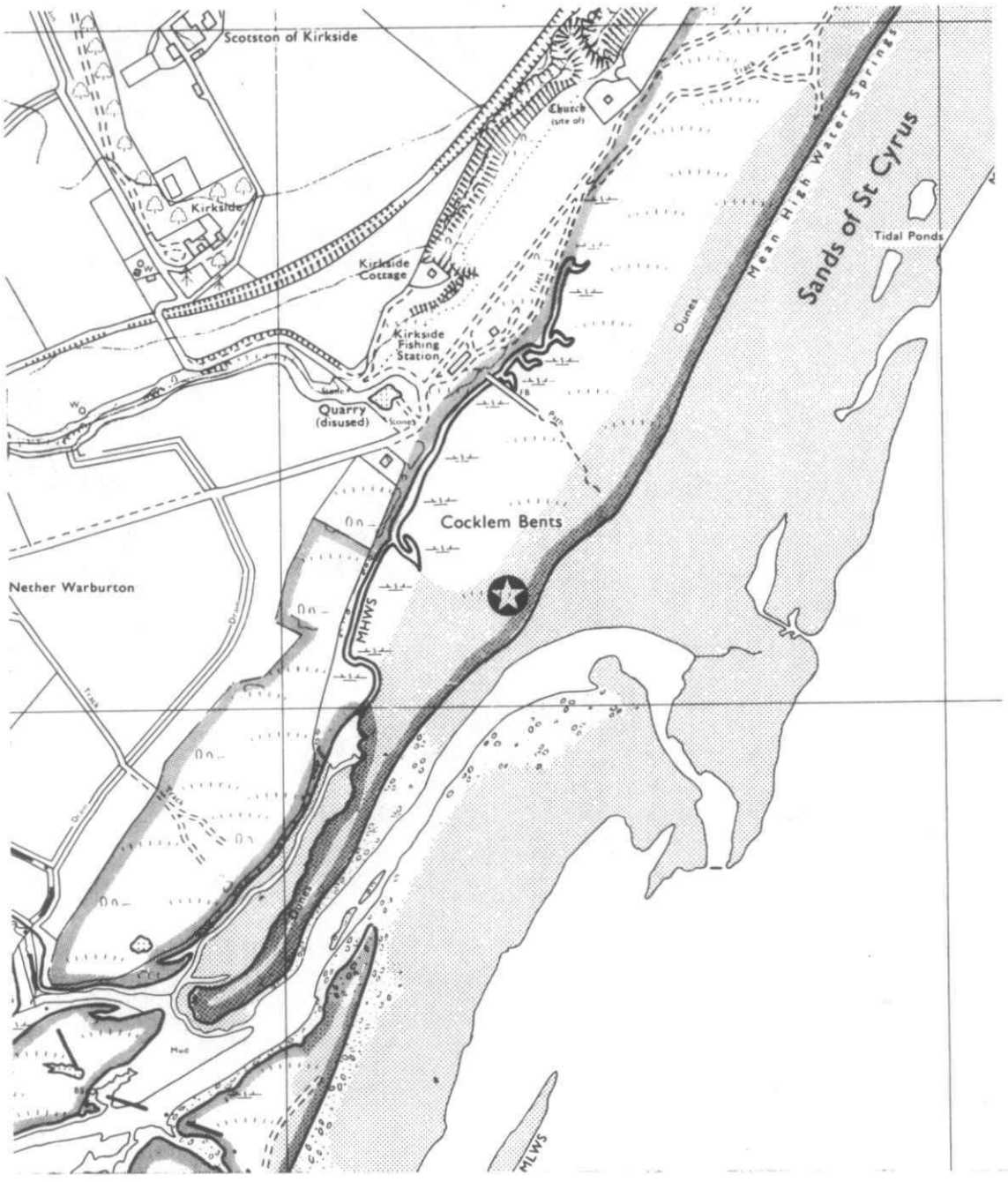
Coenonympha pamphilus

Geometridae

Xanthorhoe montanata

Site 86 St. Cyrus & Montrose Links

Site 86 St. Cyrus and Montrose Links



0 500 Metres

0 500 Yards

Light trap & pitfall traps

SITE 86

ST. CYRUS AND MONTROSE LINKS

1. DESCRIPTION OF SAMPLED SITE

1.1 Topography

The sampling area was located in a narrow line of dunes bordered on the landward side by salt marsh and grassland, with agricultural land immediately inland from the salt marsh and grassland.

1.2 Vegetation

The vegetation surrounding the pitfall traps consisted of the following:

Pair 1: Ammophila arenaria and a little fine grass with 70% bare ground. This was close to an old shore line.

Pair 2: 25% bare ground, A. arenaria, fine grasses, Ononis repens, Cirsium sp. and some Umbelliferae.

Pair 3: less than 10% bare ground; equal proportions of A. arenaria and fine grasses with O. repens, Centaurea nigra and Campanula rotundifolia.

Pair 4: a mixture of coarse and fine grasses forming a thick turf with Galium sp., Achillea millefolium and C. nigra, with no bare ground.

1.3 Disturbance

The area appeared to be fairly well used by the public.

1.4 Distance from sea

The pitfall traps were placed along a 50 metre long transect running inland from pair 1 which was 50 metres from high water mark. The light trap was approximately 80 metres inland from high water mark.

2. SITING OF LIGHT TRAP AND PITFALL TRAPS

2.1 Selection of site

The traps were placed in an area where they would be least visible to the public and where it was possible to sample a wide range of vegetational types.

2.2 Damage or malfunction

The light trap operated from 20 - 27.6.76 and 24 - 31.7.76. The trap

was functional at the end of the first period when tested but on 31.7.76 at the end of the second period it had ceased to operate. The pitfall traps were all functional during the three sampling periods 20 - 27.6.76, 27.6. - 24.7.76 and 24 - 31.7.76. A number of traps contained small mammals:

20 - 27.6.76	Trap 2A	2 shrews (Sorex sp.)
27.6. - 24.7.76	Trap 1A	1 shrew (Sorex sp.)
	Trap 2A	1 shrew (Sorex sp.)
	Trap 2B	3 shrews (Sorex sp.)
	Trap 4A	1 shrew (Sorex sp.)
24 - 31.7.76	Trap 2B	1 shrew (Sorex sp.)

2.3 Colour slides available

Box 2, 137-142.

3. THE FAUNA

3.1 Lepidoptera

	JUNE	JULY	TOTAL
Hepialus fusconebulosa	3	0	3
Macrothylacia rubi	1	0	1
Xanthorhoe montanata	7	0	7
Scotopteryx chenopodiata	0	56	56
Epirrhoe alternata	1	2	3
Camptogramma bilineata	1	0	1
Cosmorhoe ocellata	0	2	2
Eulithis pyraliata	0	10	10
Hydriomena furcata	0	1	1
Perizoma albulata	6	5	11
Eupithecia centauriata	0	1	1
Deilephila porcellus	1	0	1
Cerura vinula	1	0	1
Eilema lurideola	0	1	1
Euxoa tritici	0	5	5
Agrotis vestigialis	0	2	2
Agrotis exclamationis	1	0	1
Agrotis ripae	1	0	1
Noctua pronuba	0	1	1
Noctua comes	0	1	1

	JUNE	JULY	TOTAL
Diarsia mendica	0	1	1
Xestia c-nigrum	0	1	1
Xestia sexstrigata	0	3	3
Hada nana	2	0	2
Sideridis albicolon	2	0	2
Hadena bicruris	6	0	6
Cerapteryx graminis	0	9	9
Mythimna impura	0	5	5
Blepharita adusta	3	0	3
Rusina ferruginea	12	0	12
Thalpophila matura	0	3	3
Apamea monoglypha	0	1	1
Apamea crenata	1	0	1
Oligia fasciuncula	3	0	3
Mesapamea secalis	0	3	3
Photedes elymi	3	2	5
Luperina testacea	0	2	2
Hoplodrina alsines/blanda	0	3	3
Caradrina morpheus	1	0	1
Pyrria umbra	18	0	18
Diachrysia chrysitis	0	2	2
TOTAL	74	122	196

This site produced a species list which was above average but a low total catch compared with other East Coast and Moray Firth sites.

Several sand dune species were taken. Photedes elymi has a scattered distribution in Britain and is restricted to the east coast. It feeds solely on Elymus arenarius which also occurs locally on other parts of the British coast. Agrotis ripae is considered rare in Scotland but was collected at a number of East Coast sites. It feeds mainly on Cakile maritima, Salsola kali and Eryngium maritimum. Sideridis albicolon was restricted to East Coast sites. It does not appear to have been recorded from Scotland in recent years. Agrotis vestigialis is known to be common on sand dunes and was trapped extensively and often commonly at many sites, especially on the North Coast.

A single specimen of Cerura vinula was taken. Although the species is widely distributed and common throughout most of the British Isles and found where there is Populus spp. and Salix spp., it was not taken at

any other site during this survey. Hydriomena furcata is generally common but is more often found in hedgerows and wood margins. A smaller form is known which occurs on moorland areas and feeds on Vaccinium spp.. This species was trapped elsewhere only at Sites 84 and 90.

A number of species are restricted to a limited range of larval food plants. Hepialus fusconebulosa feeds on the roots of Pteridium aquilinum and was trapped widely at a number of sites. Epirrhoe alternata, Cosmorhoe ocellata, Eulithis pyraliata and Deilephila porcellus all feed on Galium spp., the last species also feeds on Epilobium spp. and Lythrum salicaria. Perizoma albulata feeds on Rhinanthus minor, and Pyrrhia umbra on Ononis repens.

3.2 Coleoptera : Carabidae

	JUNE	JN/JL	JULY	TOTAL
Leistus rufescens	3	1	7	11
Notiophilus aquaticus	0	0	2	2
Loricera pilicornis	0	1	0	1
Dyschirius politus	1	0	0	1
Broscus cephalotes	1	15	0	16
Trechus obtusus	0	0	1	1
Pterostichus melanarius	0	0	1	1
Calathus erratus	2	3	6	11
Calathus fuscipes	0	1	1	2
Calathus melanocephalus	1	4	3	8
Calathus mollis	0	17	17	34
Amara aenea	1	0	0	1
Amara plebeja	1	0	0	1
Amara tibialis	0	1	0	1
Dromius linearis	0	0	2	2
Dromius melanocephalus	0	1	1	2
TOTAL	10	44	41	95

This site produced the second largest number of species of Carabidae recorded in the survey although the number of specimens trapped was low. The most abundant species were Calathus mollis and Broscus cephalotes, both species of sandy coasts, whilst Leistus rufescens, the most hygrophilous member of the genus, and C. erratus, characteristic of sparsely vegetated sandy soils, were the only other species to attain a total in double figures. Dyschirius politus, Amara aenea

and A. tibialis are all indicators of a sandy soil. The two species of Dromius usually occur on drier soils including coastal areas where D. melanocephalus is found among tall grasses. Single larval specimens of Pterostichus sp., Notiophilus aquaticus and N. palustris were taken during the second sampling period, and four larvae of Broscus cephalotes were trapped in the third period. These last three species were not recorded as adults from this site.

3.3 Coleoptera : Hydrophilidae to Scolytidae

	JUNE	JN/JL	JULY	TOTAL
Megasternum obscurum	0	2	1	3
Leiodes dubia/obesa	1	1	5	7
Agathidium marginatum	1	0	0	1
Sciodrepoides watsoni	0	16	5	21
Catops fuliginosus	1	0	0	1
Catops morio	0	1	2	3
Nicrophorus investigator	0	0	5	5
Nicrophorus vespilloides	0	3	0	3
Silpha atrata	0	1	0	1
Stenichnus collaris	1	0	0	1
Micropeplus staphylinoides	0	5	3	8
Anotylus rugosus	1	0	0	1
Stenus clavicornis	0	2	0	2
Stenus nanus	0	1	0	1
Xantholinus linearis	1	0	0	1
Philonthus succicola	1	0	0	1
Quedius fuliginosus	1	0	0	1
Quedius molochinus	0	0	1	1
Mycetoporus splendidus	0	0	1	1
Sepedophilus nigripennis	0	10	5	15
Tachyporus chrysomelinus	3	9	33	45
Tachyporus hypnorum	0	0	10	10
Tachinus corticinus	0	1	0	1
Encephalus complicans	1	0	0	1
Aloconota gregaria	0	0	3	3
Amischa analis	0	1	0	1
Atheta amicula	0	1	2	3
Atheta fungi	1	13	10	24
Atheta pertyi	0	0	1	1
Atheta triangulum	0	1	0	1

	JUNE	JN/JL	JULY	TOTAL
Atheta atramentaria	1	0	0	1
Drusilla canaliculata	10	113	38	161
Aleochara bipustulata	0	0	1	1
Serica brunnea	0	14	7	21
Agriotes obscurus	1	1	0	2
Rhagonycha fulva	0	0	1	1
Epuraea aestiva	0	0	1	1
Cryptophagus setulosus	0	0	2	2
Micrambe villosus	0	0	2	2
Atomaria atricapilla	0	3	0	3
Atomaria fuscata	0	0	1	1
Atomaria nitidula	1	0	0	1
Scymnus schmidti	1	0	1	2
Enicmus transversus	0	1	0	1
Corticaria crenulata	1	2	3	6
Corticaria umbilicata	4	18	1	23
Corticarina fuscula	15	82	41	138
Phaedon tumidulus	0	0	2	2
Longitarsus jacobaeae	0	1	2	3
Longitarsus succineus	0	42	22	64
Crepidodera ferruginea	0	13	17	30
Apion loti	1	0	0	1
Apion ononis	0	1	0	1
Otiorhynchus atroapterus	0	1	1	2
Otiorhynchus ovatus	1	4	2	7
Barynotus squamosus	0	0	1	1
Sitona griseus	1	0	0	1
Sitona lepidus	0	1	0	1
Miarus campanulae	1	2	1	4
TOTAL	51	367	234	652

The most numerous species, both as adult and larva, trapped at this site Drusilla canaliculata, is a non-obligate ant associate. Adult Corticarina fuscula was taken in similar numbers and unidentified Lathridiidae, possibly of this species, were the next most numerous larvae in the samples. C. fuscula is a widely distributed species occurring in a great variety of vegetable debris with no particular connection with coastal or sandy regions. Corticaria umbilicata had not previously

been regarded as being a coastal species whilst C. crenulata is known to occur on the coast.

The only psammophile and coastal species, Serica brunnea, Leiodes spp., Otiorhynchus spp., and Sitona griseus were not particularly numerous. Tachyporus chrysomelinus is a predator of aphids and other small invertebrates, particularly on herbaceous plants. Sepedophilus nigripennis is described by Hammond (1973) as "catholic in choice of substratum" but "is frequently taken in relatively dry situations", and has been taken fairly commonly in mosses etc., among fixed dunes on the East Anglian coast. Atheta fungi is a widespread species often abundant in vegetable debris of all kinds.

The Nicrophorus spp. and Catops spp., Sciodrepoides watsoni, Philonthus succicola, Aleochara bipustulata, Anotylus rugosus and possibly Silpha atrata together with some of the Atheta spp. are attracted to carrion. Cryptophagus setulosus and Epuraea aestiva have both been recorded from the nests of bumble bees. Very few host-specific phytophagous species were trapped. The most significant of these is Miarus campanulae which Crowson (1977) recorded as being abundant at St. Cyrus which he believed to be "possibly its northernmost British station". Campanula glomerata was regarded as this weevil's host plant until Morris (1967) showed that it could also breed in C. rotundifolia. The known distribution of M. campanulae in Scotland closely follows that of C. glomerata whereas C. rotundifolia is widespread, suggesting that in Scotland the former species of Campanula may be the sole host. All Apion spp. are phytophagous. A. loti feeds on Lotus corniculatus and A. ononis on Ononis repens. Micrambe villosus feeds on Ulex spp. and Sarothamnus scoparius, whilst Rhagonycha fulva commonly frequents the flowering heads of Umbelliferae. Encephalus complicans is a species inhabiting moss which is easily over-looked and this was the only specimen collected during this survey. The fact that two specimens of Scymus schmidti were trapped is noteworthy because there are few published records of the species for Scotland (see Pope 1973). A single larva attributable to the genus Rhyzobius, presumably R. litura, was taken in the first sampling period. A single larva of Cassida sp. was taken in the middle period. Neither of these were recorded as adults from this site.

3.4 Araneae

	JUNE	JN/JL	JULY	TOTAL
Haplodrassus signifer	1	0	0	1
Zelotes pusillus	0	2	0	2
Clubiona reclusa	0	2	0	2
Xysticus cristatus	4	1	0	5
Oxyptila trux	0	2	0	2
Pardosa pullata	26	34	14	74
Pardosa nigriceps	4	1	0	5
Alopecosa pulverulenta	0	1	0	1
Trochosa terricola	2	4	1	7
Arctosa perita	2	20	0	22
Pachygnatha degeeri	6	2	0	8
Walckenaera acuminata	1	1	0	2
Hypomma bituberculatum	0	2	0	2
Pocadicnemis pumila	1	0	1	2
Oedothorax retusus	5	5	2	12
Trichopterna thorelli	0	1	0	1
Tiso vagans	1	1	2	4
Monocephalus fuscipes	0	1	0	1
Gongylidiellum vivum	0	1	0	1
Erigone atra	0	1	0	1
Meioneta saxatilis	3	5	1	9
Bathyphantes parvulus	32	18	6	56
Lepthyphantes tenuis	0	1	1	2
TOTAL	88	106	28	222

Haplodrassus signifer and Zelotes pusillus are found usually on dry grassland or heathland. Pardosa pullata was the most abundant species in the catch. It is a very common spider of short grass or heather areas with a slight preference for damp situations. Arctosa perita is largely restricted to sand dunes and places such as dry bare heathland. Although Hypomma bituberculatum is most frequent in wet places it is often taken on sand dunes. Trichopterna thorelli is a widespread spider in damp situations but is only common on wet heathland in the south of England. Large numbers of Bathyphantes parvulus were taken at several sites on the East Coast. This spider is often taken in long calcareous grassland but is rarely a major constituent of the fauna. The remaining species are common in grassland.

3.5 Mollusca (Land snails)

	JUNE	JN/JL	JULY	TOTAL
Cochlicopa lubricella	0	3	1	4
Oxychilus alliarius	0	1	0	1
Candidula intersecta	0	3	0	3
Trichia hispida	0	6	0	6
Cepaea nemoralis	3	11	0	14
Cepaea hortensis	14	6	1	21
TOTAL	17	30	2	49

The assemblage of species recorded here was typical of fixed dune areas with some bare ground, on the East Coast. This was the most northerly site at which Cepaea nemoralis was recorded, agreeing well with the known distribution of this species. Candidula intersecta is believed to have been introduced to the British Isles in Roman times, or later.

3.6 Diplopoda

	JUNE	JN/JL	JULY	TOTAL
Julus scandinavius	2	0	0	2
Cylindroiulus latestriatus	0	4	0	4
Ommatoiulus sabulosus	52	65	13	130
TOTAL	54	69	13	136

All three species are known to occur in sand dunes throughout much of Britain, but Julus scandinavius is more usually associated with areas containing deep accumulations of plant litter.

3.7 Terrestrial Isopoda

	JUNE	JN/JL	JULY	TOTAL
Porcellio scaber	30	60	52	142

Porcellio scaber is widely recorded on sandy soils.

4. ADDITIONAL SPECIES

4.1 Lepidoptera

The following species were observed in the field during the course of the survey:

Pieridae

Pieris rapae

Lycaenidae

Polyommatus icarus

Nymphilidae

Aglais urticae

Satyridae

Maniola jurtina

Coenonympha pamphilus

4.2 Diptera : Phoridae

The following species was recorded by Dr R.C. Welch

Aenigmatias lubbocki, 27.6. - 24.7.76, a single wingless female in pitfall trap 4B. This species is described as being parasitic on the ants Formica fusca and F. transkaucasica, but neither has been recorded from eastern Scotland, indeed the latter if only known from Dorset and the New Forest. The only ants trapped at this site were Myrmica ruginodis Nyl., which was locally abundant, and Lasius niger (L.), five specimens of which were taken in pitfall trap 4A during the first trapping period.

4.3 Siphonaptera : Hystrichopsyllidae

The following species was recorded by Dr R.C. Welch

Palaeopsylla soricis soricis, 27.6. - 24.7.76, a single specimen of this shrew flea in pitfall trap 2A. 24 - 31.7.76, one specimen in pitfall trap 2B.

Site 87 Lunan Bay

Site 87 Lunan Bay

0 500 Metres
0 500 Yards

★ Light trap & pitfall traps

SITE 87

LUNAN BAY

1. DESCRIPTION OF SAMPLED SITE

1.1 Topography

The dunes in the sampling area consisted of a single wide ridge with steep sides on both the seaward and landward sides. Inland from the dune ridge was an area of cultivated arable land.

1.2 Vegetation

The light trap was in an area of Ammophila arenaria and coarse grasses. The vegetation surrounding the pitfall traps consisted of the following:

Pair 1: 20% bare ground, A. arenaria, Ononis repens and Plantago sp..

Pair 2: 10% bare ground in a short turf of fine grasses and a little A. arenaria. Some Galium sp. and Centaurea nigra were present.

Pair 3: longer coarse grasses with some A. arenaria, O. repens, Galium sp. and C. nigra, with no bare ground.

Pair 4: a closed, species rich, meadow turf with very little A. arenaria and some Galium sp., O. repens, Senecio sp. and Lotus corniculatus.

1.3 Disturbance

A fairly well worn footpath ran along the top of the dune ridge and the whole area appeared to be used by the public to a limited extent.

1.4 Distance from sea

The traps were approximately 30 metres from the shore.

2. SITING OF LIGHT TRAP AND PITFALL TRAPS

2.1 Selection of site

The sampling site chosen appeared to be the only suitable area on the dunes. The light trap was placed in a distinct small hollow with the pitfall traps on a transect down the slope of a dune.

2.2 Damage or malfunction

The light trap operated from 20 - 27.6.76 and 24 - 31.7.76. The trap was functional at the end of the firwt period when tested, but on 31.7.76, at the end of the second period, it had ceased to operate. The pitfall traps were all

functional during the first and last periods (20 - 27.6.76 and 24 - 31.7.76), but at the end of the middle trapping period (27.6. - 24.7.76) traps 2A and 2B were missing. A number of small mammals were trapped.

20 - 27.6.76	Trap 3B	1 shrew (Sorex sp.)
	Trap 4A	2 shrews (Sorex sp.)
27.6. - 24.7.76	Trap 4A	3 shrews (Sorex sp.)
	Trap 4B	1 shrew (Sorex sp.)

2.3 Colour slides available

Box 2, 143-148.

3. THE FAUNA

3.1 Lepidoptera

	JUNE	JULY	TOTAL
Hepialus lupulinus	4	0	4
Zygaena filipendulae	0	2	2
Xanthorhoe montanata	7	0	7
Scotopteryx chenopodiata	0	65	65
Epirrhoe alternata	2	43	45
Camptogramma bilineata	0	5	5
Cosmorhoe ocellata	0	2	2
Eulithis pyraliata	2	17	19
Cidaria fulvata	0	4	4
Colostygia pectinataria	1	0	1
Perizoma flavofasciata	1	0	1
Eupithecia centauriata	1	1	2
Eupithecia subfuscata	2	0	2
Opisthograptis luteolata	1	0	1
Deilephila porcellus	5	0	5
Pheosia gnoma	0	1	1
Eilema lurideola	0	6	6
Arctia caja	0	19	19
Spilosoma lubricipeda	33	0	33
Euxoa tritici	0	138	138
Agrotis exclamationis	18	1	19
Agrotis ripae	18	0	18
Axylia putris	4	0	4
Ochropleura plecta	1	0	1
Noctua pronuba	0	105	105

	JUNE	JULY	TOTAL
Noctua comes	0	7	7
Noctua janthina	0	2	2
Xestia c-nigrum	0	2	2
Xestia baja	0	1	1
Xestia sexstrigata	0	2	2
Hada nana	1	0	1
Sideridis albicolon	4	0	4
Mamestra brassicae	0	1	1
Lacanobia oleracea	13	0	13
Hecatera bicolorata	2	0	2
Hadena rivularis	1	0	1
Hadena confusa	19	0	19
Hadena bicruris	18	0	18
Mythimna conigera	0	8	8
Mythimna impura	0	89	89
Blepharita adusta	1	0	1
Amphipyra tragopoginis	0	13	13
Rusina ferruginea	7	0	7
Thalpophila matura	0	1	1
Apamea monoglypha	0	47	47
Apamea lithoxylaea	0	21	21
Apamea crenata	3	0	3
Apamea remissa	4	0	4
Apamea sordens	6	0	6
Oligia fasciuncula	3	0	3
Mesoligia literosa	0	1	1
Mesapamea secalis	0	218	218
Photedes elymi	3	13	16
Luperina testacea	0	1	1
Caradrina morpheus	5	0	5
Pyrria umbra	14	0	14
Diachrysia chrysitis	1	4	5
Autographa gamma	1	3	4
Autographa pulchrina	3	3	6
Autographa bractea	0	2	2
TOTAL	209	848	1057

The sixty species recorded for this site made the highest total recorded in the survey. Three species made up 44% of the total catch. Mesapamea secalis was the most abundant, it is generally common throughout the British Isles but was apparently more abundant on the Hebrides. Euxoa tritici and Noctua pronuba were also numerous. Both species were trapped extensively during the survey though Euxoa tritici was not recorded at the Moray Firth sites.

Three sand dune species occurred. Photedes elymi has a scattered distribution in Britain restricted to the east coast. It feeds solely on Elymus arenarius, which also occurs locally on other parts of the British coast. Agrotis ripae is considered to be rare in Scotland, but was collected at several East Coast sites. It feeds mainly on Cakile maritima, Salsola kali and Eryngium maritimum. Sideridis albicolon was restricted to sites on the East Coast; it does not appear to have been recorded from Scotland in recent years.

Three species were taken only at this site. Perizoma flavofasciata which feeds on Silene spp., is perhaps less common in the north of Britain than in the south. Hecatera bicolorata is a southern species stated to be scarce in the north (South 1961); it feeds on Crepis spp.. Hadena rivularis, a generally common species, feeds on Silene spp. and Lychnis flos-cuculi.

Several other species occurred elsewhere on only one or two sites. Hepialus lupulinus, an often abundant grassland species, was taken elsewhere only at Site 88. Xestia baja was taken elsewhere only at Site 90 and is generally found in wooded districts. Pheosia gnoma, a birch feeder, was trapped elsewhere only at Site 90 and Axylia putris only at Site 95. Noctua janthina and Mamestra brassicae were recorded elsewhere only at Sites 53 and 95. Hadena bicruris, which feeds on Silene spp. and Dianthus spp., occurred elsewhere only at Sites 86 and 88.

Several other species are restricted to a narrow range of food plants. Epirrhoe alternata, Cosmorhoe ocellata, Eulithis pyraliata and Deilephila porcellus all feed on Galium spp., the last species also feeds on Epilobium spp. and Lythrum salicaria. Cidaria fulvata feeds on Rosa spp.. Pyrrhia umbra feeds on Ononis repens, and Zygaena filipendulae, a dayflying insect, feeds on Lotus corniculatus.

3.2 Coleoptera : Carabidae

	JUNE	JN/JL	JULY	TOTAL
Leistus rufescens	0	0	2	2
Pterostichus melanarius	0	0	1	1
Pterostichus niger	0	1	0	1
Calathus fuscipes	0	2	11	13
Calathus melanocephalus	1	1	13	15
Calathus mollis	0	4	3	7
Amara familiaris	3	0	0	3
Dromius linearis	0	0	1	1
TOTAL	4	8	31	43

The catch of carabids at this site was poor in all respects. Calathus melanocephalus and C. fuscipes, the only species to exceed single figures, are normally common on sand dunes. It is perhaps unusual that two species of Pterostichus were present. According to Lindroth (1974) both P. melanarius and P. niger frequent soils which are not too dry, the former preferring open country, whilst the latter is commonly found associated with woodlands. A single larva of Notiophilus aquaticus was trapped during the first sampling period.

3.3 Coleoptera : Hydrophilidae to Scolytidae

	JUNE	JN/JL	JULY	TOTAL
Megasternum obscurum	9	0	9	18
Agathidium laevigatum	0	0	8	8
Ptomophagus subvillosus	1	0	0	1
Sciodrepoides watsoni	0	31	0	31
Catops chrysomeloides	3	0	0	3
Catops fuliginosus	3	0	0	3
Micropeplus staphylinoides	1	6	14	21
Lesteva longoelytrata	1	0	0	1
Anotylus tetracarinatus	0	0	1	1
Stenus clavicornis	3	0	1	4
Othius angustus	3	0	0	3
Xantholinus linearis	1	0	0	1
Philonthus marginatus	1	0	0	1
Philonthus tenuicornis	0	0	1	1
Philonthus varius	1	0	0	1
Platydracus stercorarius	0	8	2	10
Quedius molochinus	0	0	5	5

	JUNE	JN/JL	JULY	TOTAL
Bolitobius analis	1	0	0	1
Tachyporus chrysomelinus	1	1	4	6
Tachyporus hyporum	0	1	0	1
Tachinus corticinus	0	9	0	9
Aloconota gregaria	2	6	4	12
Amischa analis	1	0	0	1
Atheta amicula	1	0	0	1
Atheta fungi	9	11	14	34
Drusilla canaliculata	111	342	256	709
Oxypoda brachyptera	1	0	0	1
Aleochara bipustulata	0	0	2	2
Aleochara lanuginosa	1	0	0	1
Serica brunnea	0	1	0	1
Meligethes aeneus	1	0	0	1
Cryptophagus dentatus	0	0	5	5
Cryptophagus setulosus	0	2	6	8
Micrambe villosus	0	0	1	1
Atomaria atricapilla	1	0	0	1
Coccidula rufa	0	0	1	1
Nephus redtenbacheri	1	0	1	2
Enicmus transversus	1	0	1	2
Corticaria crenulata	0	6	2	8
Corticaria umbilicata	10	10	7	27
Corticarina fuscula	1	0	2	3
Typhaea stercorea	0	0	1	1
Longitarsus succineus	0	2	4	6
Crepidodera ferruginea	0	5	9	14
Apion loti	5	1	1	7
Otiorhynchus atroapterus	0	0	1	1
Otiorhynchus ovatus	0	2	4	6
Philopedon plagiatus	5	0	0	5
Mecinus pyraster	1	1	0	2
TOTAL	181	445	367	993

Drusilla canaliculata, a species associated in some non-obligate manner with various ants, dominated the adult and larval Coleoptera and was collected in numbers exceeded only at Site 82. Atheta fungi, Micropeplus staphylinoides and Aloconota gregaria occur in decaying vegetable matter

although the last species has also been recorded from seaweed (Fowler 1888). Corticaria umbilicata frequents moss and may have some affinities towards sandy or coastal areas. Sciodrepoides watsoni, the Catops spp., Megasternum obscurum, Platydracus stercorarius, the Philonthus and Aleochara spp., Anotylus tetracarinatus and Ptomophagus subvillosus are all associated with either carrion or dung or with both.

The psammophile/coastal species were oddly represented on this site. No Leiodes spp. and only a single Serica brunnea were trapped. Modest numbers of Otiorhynchus atroapterus, O. ovatus, Philopedon plagiatus and Corticaria crenulata were collected however.

Among the phytophagous species taken Meligethes aeneus feeds on Cruciferae; Mecinus pyraster occurs on Plantago spp., Apion loti on Lotus corniculatus, Micrambe villosus on Ulex spp. and Sarothamnus scoparius. Longitarsus succineus is polyphagous and Crepidodera ferruginea is associated with Gramineae as a larva and with Urtica spp. and Cirsium spp. as an adult.

Cryptophagus setulosus occurs in the nests of solitary bees and species such as C. dentatus, Typhaea stercorea, Enicmus transversus and Atheta amicula are frequently associated with fungi or moulds. All the catches contained a number of unidentified Chrysomelidae larvae possibly attributable to Crepidodera spp..

3.4 Araneae

	JUNE	JN/JL	JULY	TOTAL
Clubiona neglecta	0	0	1	1
Xysticus cristatus	2	0	0	2
Oxyptilla trux	5	1	0	6
Tibellus maritimus	1	0	0	1
Pardosa pullata	28	18	2	48
Pardosa nigriceps	30	24	7	61
Xerolycosa miniata	4	5	0	9
Alopecosa pulverulenta	2	0	0	2
Trochosa terricola	2	0	0	2
Arctosa perita	3	3	0	6
Hahnia nava	5	1	0	6
Enoplognatha ovata	1	0	0	1
Pachygnatha degeeri	10	3	0	13
Walckenaera acuminata	1	0	0	1
Hypomma bituberculatum	4	0	0	4
Gonatium rubens	1	0	0	1

	JUNE	JN/JL	JULY	TOTAL
Pocadicnemis pumila	41	34	3	78
Trichopterna thorelli	2	1	4	7
Pelecopsis nemoralis	1	0	0	1
Tiso vagans	0	0	1	1
Gongylidiellum vivum	0	0	1	1
Meioneta saxatilis	13	13	0	26
Meioneta beata	0	2	0	2
Centromerus prudens	7	0	0	7
Bathyphantes parvulus	207	128	25	360
Lepthyphantes tenuis	0	0	1	1
Lepthyphantes mengei	1	6	7	14
Linyphia montana	0	1	0	1
TOTAL	371	240	52	663

Clubiona neglecta and Hypomma bituberculatum are both common in fens and marshes but are also often taken on sand dunes. Pardosa nigriceps was the most common lycosid. It climbs readily and would favour the tall field layer type vegetation which predominated. Xerolycosa miniata is a widespread but rather local species confined to sandhills on the coast. This is the most northerly record for the species in Britain. Arctosa perita is restricted to sand dunes and areas such as bare sandy heaths. Enoplognatha ovata, although a very common spider of herbage and low vegetation, was taken elsewhere only at Site 93. Trichopterna thorelli is widespread in damp moss and grass but is only common on wet heathland in southern England. Pelecopsis nemoralis is usually found in woodland. Meioneta beata is usually taken in moss and grass and is fairly widespread but is only common in parts of southern England. Centromerus prudens is often taken in grass, moss or heather and is rather more common in the north of Britain than the south. Bathyphantes parvulus is associated with long calcareous grassland and was taken here in very large numbers (54.3%). This species is seldom such a numerous component of the population. The remaining species are common mainly on heathland.

3.5 Mollusca (Land snails)

	JUNE	JN/JL	JULY	TOTAL
Cochlicopa lubricella	0	1	0	1
Vitrina pellucida	0	1	0	1
Oxychilus cellarius	0	1	0	1

	JUNE	JN/JL	JULY	TOTAL
Oxychilus alliarius	0	1	0	1
Candidula intersecta	1	5	2	8
Cepaea nemoralis	1	2	3	6
Cepaea hortensis	3	2	1	6
TOTAL	5	13	6	24

This was a poor catch in terms of the number of individuals although, together with Site 88, the greatest number of species for an East Coast site was recorded here. The assemblage of species recorded was typical of fixed dune areas with some bare sand, on the East Coast. Candidula intersecta is believed to have been introduced to the British Isles in Roman times, or later.

3.6 Diplopoda

	JUNE	JN/JL	JULY	TOTAL
Julus scandinavius	7	14	2	23
Cylindroiulus punctatus	2	2	0	4
Cylindroiulus latestriatus	1	1	2	4
Ommatoiulus sabulosus	28	34	9	71
TOTAL	38	51	13	102

All the species are known to occur on sand dunes but only Cylidroiulus latestriatus and Ommatoiulus sabulosus are widely recorded in this habitat type in Britain. Julus scandinavius is associated with a well developed litter layer, as is C. punctatus, which is also common in dead wood.

3.7 Terrestrial Isopoda

	JUNE	JN/JL	JULY	TOTAL
Philoscia muscorum	13	10	2	25
Porcellio scaber	6	12	8	26
TOTAL.	19	22	10	51

Philoscia muscorum, although rather locally distributed in Scotland, mainly on the coast and in river valleys, is, like Porcellio scaber, often common in coastal grassland and dune vegetation.

4. ADDITIONAL SPECIES

4.1 Lepidoptera

The following species were observed in the field during the course of

the survey:

Pieridae

Pieris rapae

Lycaenidae

Polyommatus icarus

Nymphalidae

Aglais urticae

Satyridae

Maniola jurtina

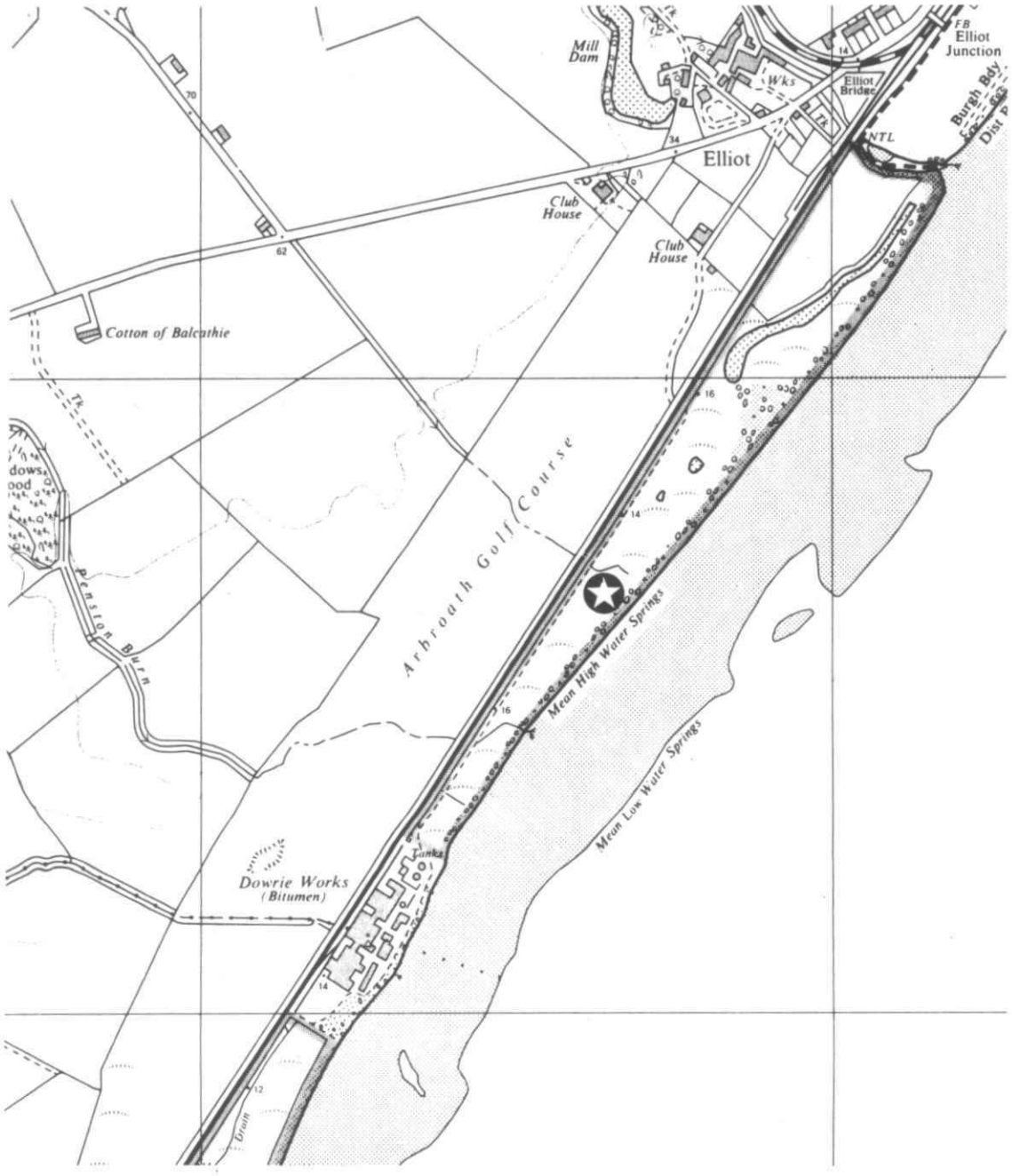
Coenonympha pamphilus

4.2 Pseudoscorpiones

Neobisium muscorum was recorded by P.E. Jones as single female specimens in pitfall traps 2B and 4B on 27.6.76 and trap 3B on 24.7.76.

Site 88 Arbroath

Site 88 Arbroath



Light trap & pitfall traps

SITE 88

ARBROATH

1. DESCRIPTION OF SAMPLED SITE

1.1 Topography

The sampling area was in dune meadow on old, fixed, slightly undulating dunes. It was bordered on the landward side by a railway line and a golf course.

1.2 Vegetation

The light trap was in an area of thick meadow grassland with little Ammophila arenaria. The vegetation surrounding the pitfall traps was as follows:

Pair 1: 20% bare ground, with mostly A. arenaria and a little Centaurea nigra, Senecio sp., Galium sp. and Ononis repens.

Pair 2: tall, coarse grasses with little A. arenaria and no bare ground. Also present were C. nigra, Senecio sp., Galium sp., Achillea millefolium and O. repens.

Pair 3: mainly fine grasses and A. arenaria with no bare ground. Also present were C. nigra, Senecio sp., Galium sp., Achillea millefolium and O. repens.

Pair 4: a turf of fine grasses with very little A. arenaria and no bare ground. Galium sp., O. repens and C. nigra were plentiful and Plantago sp. was also present.

1.3 Disturbance

The golf course nearby provided access to the site, which could also be approached along a roadway. Small footpaths over the dune area were common, the beach appeared to be well used and public use of the site was probably considerable.

1.4 Distance from sea

The traps were approximately 30 metres from the shore.

2. SITING OF LIGHT TRAP AND PITFALL TRAPS

2.1 Selection of site

The light trap was placed in a shallow depression. The pitfall traps were placed to sample a wide variety of the vegetation types present at

the site. All locations were chosen where the traps would be out of sight as much as possible.

2.2 Damage or malfunction

The light trap operated from 19 - 26.6.76 and 24 - 31.7.76. The trap was functional at the end of the first period, but was not operating on 31.7.76, at the end of the second period. With the exception of trap 3A in the first period, which was missing on 26.6.76, all the pitfall traps were functional during the whole of each of the three periods 19 - 26.6.76, 26.6. - 24.7.76 and 24 - 31.7.76. A number of pitfall traps contained small mammals.

19 - 26.6.76	Trap 2A	1 shrew (Sorex sp.)
	Trap 4A	1 shrew (Sorex sp.)
26.6. - 24.7.76	Trap 1A	1 shrew (Sorex sp.)
	Trap 2A	2 shrews (Sorex sp.)
	Trap 2B	1 shrew (Sorex sp.)

2.3 Colour slides available

9 Box 2, 149-153

3. THE FAUNA

3.1 Lepidoptera

	JUNE	JULY	TOTAL
Hepialus lupulinus	0	1	1
Hepialus fusconebulosa	1	0	1
Zygaena filipendulae	0	1	1
Macrothylacia rubi	6	0	6
Xanthorhoe montanata	4	0	4
Scotopteryx chenopodiata	0	8	8
Epirrhoe alternata	1	20	21
Camptogramma bilineata	0	1	1
Cosmorhoe ocellata	0	1	1
Eulithis populata	0	1	1
Eulithis pyraliata	0	21	21
Cidaria fulvata	0	1	1
Perizoma albulata	0	31	31
Eupithecia subfuscata	1	0	1
Semiothisa clathrata	1	0	1
Bupalus piniaria	1	0	1
Deilephila porcellus	3	0	3

	JUNE	JULY	TOTAL
Arctia caja	0	14	14
Spilosoma lubricipeda	15	0	15
Tyria jacobaeae	1	0	1
Euxoa tritici	0	5	5
Agrotis exclamationis	21	2	23
Agrotis ripae	2	0	2
Ochropleura plecta	1	0	1
Noctua pronuba	0	46	46
Noctua comes	0	2	2
Lycophotia porphyrea	0	1	1
Xestia sexstrigata	0	27	27
Xestia xanthographa	0	1	1
Hada nana	29	0	29
Sideridis albicolon	2	0	2
Hadena confusa	1	0	1
Hadena bicruris	2	0	2
Cerapteryx graminis	0	15	15
Mythimna conigera	0	9	9
Mythimna impura	0	12	12
Mythimna comma	4	0	4
Rusina ferruginea	53	0	53
Thalpophila matura	0	48	48
Apamea monoglypha	0	9	9
Apamea remissa	1	0	1
Apamea sordens	5	0	5
Oligia fasciuncula	1	0	1
Mesoligia literosa	0	3	3
Mesapamea secalis	0	3	3
Photedes elymi	0	3	3
Hoplodrina alsines/blanda	0	6	6
Pyrria umbra	2	0	2
Diachrysia chrysitis	0	4	4
Autographa gamma	0	2	2
Autographa bractea	0	1	1
TOTAL	158	299	457

This site produced a very good species list but, compared with other East Coast and Moray Firth sites, the total catch was low.

Three sand dune species were taken. Photedes elymi has a scattered distribution in Britain and is restricted to the east coast. It feeds solely on Elymus arenarius which also occurs locally on other parts of the British coast. Agrotis ripae is a species considered to be rare in Scotland, but was collected at several East Coast sites. It feeds mainly on Cakile maritima, Salsola kali and Eryngium maritimum. Sideridis olbicolon was restricted to sites on the East Coast. It does not appear to have been recorded from Scotland in recent years.

A few species were scarce or absent elsewhere. Semiothisa clathrata was not trapped elsewhere. Hepialus lupulinus, an often abundant grassland species was taken elsewhere only at Site 87 and Eulithis populata only at Site 90, although its food plants Empetrum spp. and Salix spp. occurred at other sites.

Quite a number of species are restricted to a limited range of larval food plants. Hepialus fusconebulosa feeds on the roots of Pteridium aquilinum and was taken widely at a number of sites. Zygaena filipendulae, a day-flying species, feeds on Lotus corniculatus. Epirrhoe alternata Cosmorhoe ocellata, Eulithis pyraliata and Deilephila porcellus all feed on Galium spp.; the last species also feeds on Epilobium spp. and Lythrum salicaria. Bupalus pinaria feeds on the needles of Pinus sylvestris and also on the foliage of some other conifers. Cidaria fulvata feeds on Rosa spp., Perizoma albulata on Rhinanthus minor, and Tyrea jacobaeae on Senecio jacobaea and some other related plants. Lycophotia porphyrea feeds on Calluna vulgaris and Erica spp., Hadena bicruris on Silene spp. and Dianthus spp., and Pyrrhia umbra on Ononis repens.

3.2 Coleoptera : Carabidae

	JUNE	JN/JL	JULY	TOTAL
Leistus rufescens	3	0	0	3
Broscus cephalotes	4	22	17	43
Trechus obtusus	1	0	3	4
Pterostichus strenuus	0	1	0	1
Calathus erratus	1	0	0	1
Calathus melanocephalus	1	4	3	8
Amara tibialis	0	1	0	1
Badister bipustulatus	0	1	0	1
Dromius linearis	1	1	1	3
TOTAL	11	30	24	65

The carabid fauna taken at this site was unusual because the most abundant species was Broscus cephalotes. It is virtually exclusively found in bare sand on the coast. Only at Site 90 was a comparable number of specimens trapped. This was one of only two sites sampled during the survey where no Calathus fuscipes were taken (the other being Site 52).

3.3 Coleoptera : Hydrophilidae to Scolytidae

	JUNE	JN/JL	JULY	TOTAL
Cercyon atomarius	0	0	1	1
Megasternum obscurum	0	3	0	3
Acrotrichus atomaria	2	0	0	2
Leiodes dubia/obesa	0	0	1	1
Agathidium marginatum	1	0	0	1
Ptomophagus subvillosus	1	0	0	1
Nargus velox	2	0	0	2
Sciodrepoides watsoni	1	19	0	20
Catops chrysomeloides	0	3	0	3
Catops fuliginosus	4	5	1	10
Catops morio	3	1	0	4
Micropeplus staphylinoides	0	9	9	18
Metopsia retusa	1	0	0	1
Anotylus sculpturatus	0	1	1	2
Stenus brunnipes	0	0	2	2
Stenus clavicornis	1	1	0	2
Othius angustus	0	3	1	4
Mycetoporus piceolus	16	4	5	25
Bolitobius analis	0	1	0	1
Tachyporus chrysomelinus	4	2	4	10
Tachyporus nitidulus	1	0	0	1
Tachinus corticinus	0	11	0	11
Tachinus laticollis	2	0	0	2
Tachinus marginellus	0	1	0	1
Tachinus signatus	2	5	0	7
Aloconota gregaria	0	4	4	8
Amischa analis	3	0	1	4
Geostiba circellaris	2	0	1	3
Atheta fungi	42	25	17	84
Atheta xanthopus	1	0	0	1

	JUNE	JN/JL	JULY	TOTAL
Drusilla canaliculata	65	115	154	334
Aleochara bipustulata	0	0	2	2
Aleochara sparsa	0	0	2	2
Aphodius villosus	0	1	0	1
Serica brunnea	0	0	15	15
Agriotes obscurus	2	3	0	5
Rhagonycha fulva	0	0	1	1
Meligethes erythropus	0	1	0	1
Cryptophagus setulosus	0	1	0	1
Atomaria nitidula	1	2	0	3
Nephus redtenbacheri	1	0	0	1
Corticaria crenulata	0	2	0	2
Longitarsus succineus	0	0	3	3
Apion loti	1	0	0	1
Apion apricans	0	1	0	1
Otiorhynchus ovatus	0	3	2	5
TOTAL	154	227	227	613

Adults and larvae of Drusilla canaliculata, a non-obligate myrmecophile were the most numerous species in all periods. Atheta fungi, a widespread species occurring in a variety of habitat types containing assorted decaying vegetable matter, was also abundant. The habits of Mycetoporus piceolus are poorly understood but this species, in common with other members of the genus, probably requires fungal mycelia as part of its diet. Micropeplus staphylinoides is associated with decaying vegetable material but Sciodrepoides watsoni, Nargus velox, the Catops spp., Ptomophagus subvillosus and Aleochara sparsa are associated with mammals, either dead, as carrion, or in their runs or nests. Cercyon atomarius, Megasternum obscurum, Anotylus sculpturatus, Aleochara bipustulata and the Tachinus spp. usually occur in dung although some also inhabit carrion and putrifying vegetable matter.

Aphodius (= Heptaulacus) villosus is probably the most outstanding species of Coleoptera recorded during this survey. This is its most northerly known British locality and only the third record for Scotland. The species has been taken at sites with a sandy or chalky soil. Other xerophilous, or coastal species include Serica brunnea, Leiodes spp., Otiorhynchus ovatus and Corticaria crenulata.

Apion loti and Meligethes erythropus feed on Lotus corniculatus, and A. apricans on Trifolium spp.. Cryptophagus setulosus is known to inhabit bumble bee's nests and Rhagonycha fulva visits the flowers of Umbelliferae.

Unidentified Chrysomelidae and Tachyporinae larvae were fairly common in the first two sampling periods.

3.4 Araneae

	JUNE	JN/JL	JULY	TOTAL
Xysticus cristatus	1	1	0	2
Oxyptila trux	2	1	0	3
Pardosa palustris	1	0	0	1
Pardosa pullata	26	55	6	87
Xerolycosa miniata	0	1	0	1
Alopecosa pulverulenta	1	1	0	2
Pachygnatha degeeri	3	6	1	10
Ceratinella brevipes	1	1	0	2
Walckenaera antica	0	1	0	1
Hypomma bituberculatum	2	4	0	6
Pocadicnemis pumila	5	3	0	8
Oedothorax retusus	11	8	0	19
Trichopterna thorelli	1	3	0	4
Tiso vagans	11	11	2	24
Monocephalus fuscipes	0	0	1	1
Gongylidiellum vivum	2	0	0	2
Micrargus herbigradus	1	0	0	1
Meioneta rurestris	7	38	1	46
Meioneta beata	1	5	2	8
Bathyphantes parvulus	60	91	4	155
Bathyphantes nigrinus	1	0	0	1
Lepthyphantes tenuis	3	3	1	7
Lepthyphantes mengei	2	7	2	11
Lepthyphantes ericaeus	3	2	0	5
TOTAL	145	242	20	407

The fact that nearly all the traps at this site were placed in quite long, dense grassland probably accounts for the preponderance of linyphiids and the lack of Gnaphosidae in the catch. Pardosa pullata was the most abundant lycosid. This species is common on open grassland, and has a slight preference for damp conditions. Xerolycosa miniata is a

widespread species and is restricted to coastal sand dunes. Although Hypomma bituberculatum is common in wetlands it is also often found on sand dunes.

Trichopterna thorelli is a scarce but widespread species found in damp grass and moss. It is only common on wet heathland in the south of England. Micrargus herbigradus is a common spider which is often found in damp areas and in woods. During this survey it was taken elsewhere only at Site 62, on the North Coast. Meioneta beata is fairly widespread in grass and moss but is only common in central southern England, its frequent occurrence at sites during this survey is interesting. The most abundant spider in the catch was again Bathyphantes parvulus, a species usually associated with long calcareous grassland but one which seldom forms a major constituent of the population. The remaining species are common found in grassland.

3.5 Mollusca (Land snails)

	JUNE	JN/JL	JULY	TOTAL
Cochlicopa lubricella	1	11	0	12
Vertigo pygmaea	0	2	0	2
Vitrina pellucida	0	1	0	1
Oxychilus alliarius	1	2	0	3
Candidula intersecta	1	12	3	16
Trichia hispida	7	54	13	74
Cepaea hortensis	6	56	4	66
TOTAL	16	138	20	174

The largest catch of individuals taken on the East Coast was recorded at this site and, together with Site 87, it was largest number of species to be recorded at sites on the East Coast. The assemblage of species was fairly typical of fixed dune areas with some damp areas and little bare ground on the East Coast. Vertigo pygmaea was not recorded elsewhere on the East Coast. Candidula intersecta is believed to have been introduced to the British Isles in Roman times, or later.

3.6 Diplopoda

	JUNE	JN/JL	JULY	TOTAL
Polydesmus inconstans	0	4	0	4
Julus scandinavius	14	14	1	29
Ophyiulus pilosus	79	58	3	140
Cylindroiulus latestriatus	2	0	1	3

	JUNE	JN/JL	JULY	TOTAL
Brachyiulus pusillus	0	1	0	1
Ommatoiulus sabulosus	56	140	14	210
TOTAL	151	217	19	387

The catch demonstrated a rich fauna, with six species that are commonly found on dune systems, including Ophyiulus pilosus and Brachyiulus pusillus which are essentially soil dwellers. Polydesmus inconstans and B. pusillus were recorded at few sites in the survey.

3.7 Terrestrial Isopoda

	JUNE	JN/JL	JULY	TOTAL
Porcellio scaber	20	37	25	82

Porcellio scaber is found widely on dry sandy soils.

4. ADDITIONAL SPECIES

4.1 Lepidoptera

The following species were observed in the field during the course of the survey:

Pieridae

Pieris rapae

Lycaenidae

Polyommatus icarus

Nymphalidae

Aglais urticae

Satyridae

Maniola jurtina

Coenonympha pamphilus

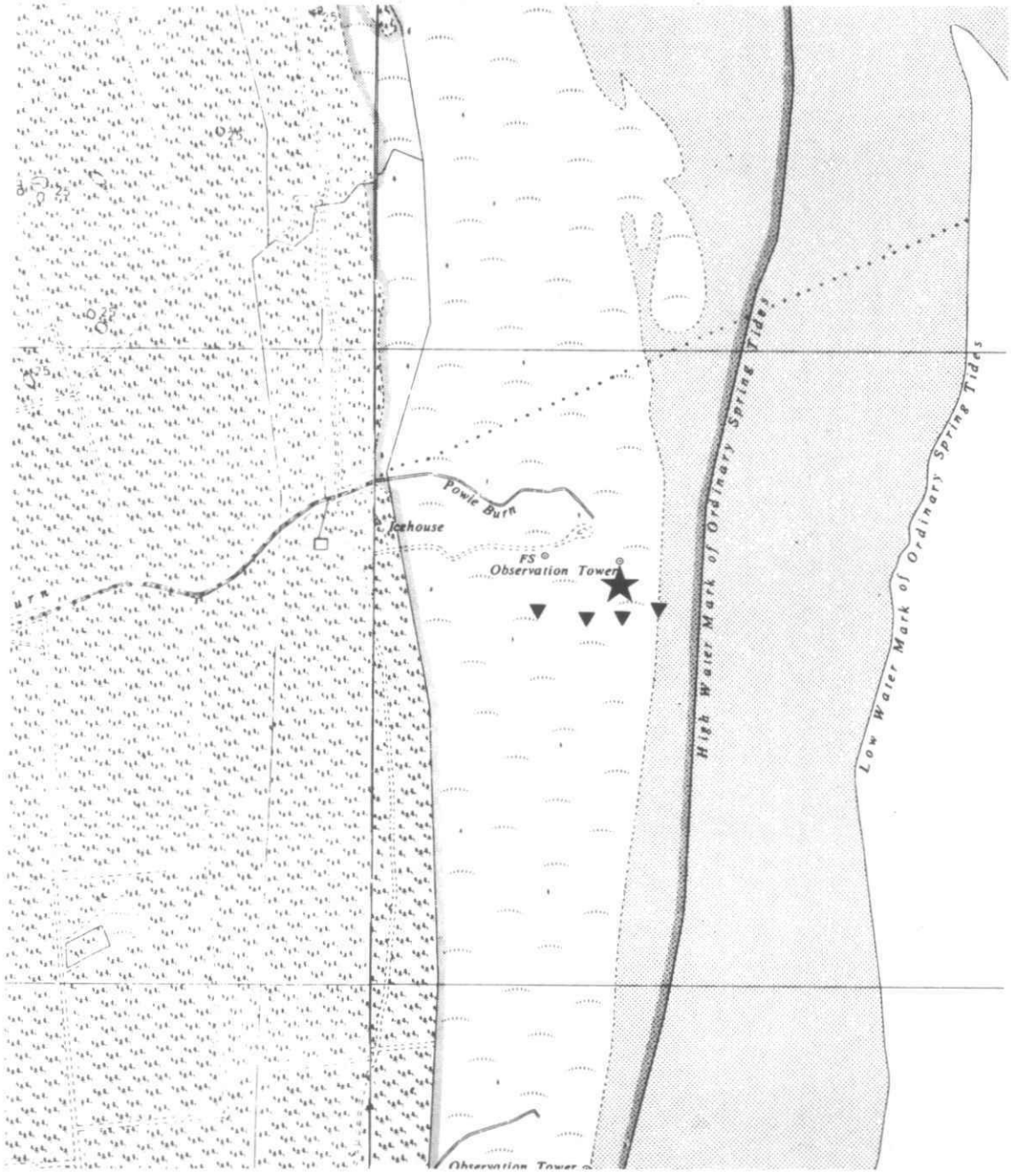
4.2 Siphonaptera : Hystrichopsyllidae

The following species was recorded by Dr R.C. Welch:

Doratopsylla dasycnema dasycnema, 26.6. - 24.7.76, one male in pitfall trap 3B.
Host - shrews.

Site 90 Tentsmuir

Site 90 Tentsmuir



0 500 Metres
0 500 Yards

★ Light trap

▼ Pitfall trap pairs

I.T.E. (N.E.R.C.) Bangor

SITE 90

TENTSMUIR

1. DESCRIPTION OF SAMPLED SITE

1.1 Topography

The site consisted of an extensive dune formation which on the landward side was developing into scrub. Conifer plantations lay along the western boundary of the dune system.

1.2 Vegetation

The light trap was placed in an area of dune heath with some Ammophila arenaria and 30% bare ground. The vegetation surrounding the pitfall traps consisted of the following:

Pair 1: 30% bare ground with A. arenaria and Epilobium sp..

Pair 2: similar to that surrounding pair 1 but with less A. arenaria and with lichen growth in the sward.

Pair 3: 40% bare ground in a lichen covered dune heath with little A. arenaria and Epilobium sp..

Pair 4: birch (Betula sp.) scrub over Salix repens and Tortula sp. with less than 10% bare ground.

1.3 Disturbance

The area was clearly heavily grazed by rabbits, but public pressure was slight.

1.4 Distance from sea

The pitfall traps were placed in a transect running inland at 50 metre intervals from pair 1 which was 100 metres from the shore. Thus pair 4 was 250 metres from the shore. The light trap was near the transect of pitfall traps, approximately 140 metres from the shore.

2. SITING OF LIGHT TRAP AND PITFALL TRAPS

2.1 Selection of site

The light trap was placed in a shallow depression. The sampling area was chosen to include a wide range of types of vegetation.

2.2 Damage or malfunction

The light trap operated from 17 - 24.6.76 and 22 - 29.7.76. The trap was functional during the first period, but had ceased to operate

at the end of the second period when tested. The pitfall traps were all functional during each of the three periods 17 - 24.6.76, 24.6. - 22.7.76 and 22 - 29.7.76. At the end of the first period single shrews (Sorex sp.) were found in traps 1A and 1B, and at the end of the last period, a single shrew was found in trap 1A.

2.3 Colour slides available

Box 2, 154-160

3. THE FAUNA

3.1 Lepidoptera

	JUNE	JULY	TOTAL
Idaea aversata	0	16	16
Camptogramma bilineata	7	6	13
Eulithis populata	0	2	2
Ecliptopera silaceata	2	0	2
Cidaria fulvata	0	1	1
Plemyria rubiginata	0	1	1
Thera obeliscata	7	0	7
Hydriomena fuscata	0	11	11
Hydriomena impluviata	7	0	7
Eupithecia subfuscata	4	5	9
Lomaspilus marginata	1	0	1
Semiothisa liturata	0	4	4
Crocallis elinguaria	0	2	2
Biston betularia	4	0	4
Bupalus piniaria	29	6	35
Campaea margaritata	0	1	1
Hylaea fasciaria	0	11	11
Laothoe populi	2	0	2
Phalera bucephala	1	0	1
Pheosia gnoma	0	5	5
Ptilodon capucina	0	2	2
Arctia caja	0	1	1
Euxoa tritici	0	201	201
Euxoa cursoria	0	8	8
Agrotis vestigialis	0	93	93
Agrotis exclamationis	1	0	1
Agrotis ripae	3	0	3

	JUNE	JULY	TOTAL
Noctua pronuba	2	35	37
Noctua orbona	0	1	1
Noctua comes	0	11	11
Graphiphora augur	0	2	2
Lycophotia porphyrea	0	8	8
Xestia triangulum	0	3	3
Xestia baja	0	1	1
Hada nana	3	0	3
Sideridis albicolon	8	0	8
Lacanobia oleracea	0	1	1
Cerapteryx graminis	0	1	1
Mythimna conigera	0	4	4
Mythimna impura	0	3	3
Mythimna comma	4	0	4
Amphipyra tragopoginis	0	1	1
Rusina ferruginea	2	0	2
Thalpophila matura	0	5	5
Euplexia lucipara	1	0	1
Apamea monoglypha	0	16	16
Apamea remissa	1	0	1
Mesapamea secalis	0	2	2
Photedes elymi	5	0	5
Hoplodrina alsines/blanda	0	6	6
Caradrina morpheus	1	0	1
Colocasia coryli	1	0	1
Diachrysia chrysitis	0	1	1
Autographa gamma	0	1	1
TOTAL	96	478	574

This site produced the second largest species list of the survey but the total number of specimens was only average compared with other East Coast and Moray Firth sites. Euxoa tritici was the most abundant species in the catch. It occurred commonly at many sites except those around the Moray Firth. Nine species were not trapped at any other site during the survey: Ecliptopera silaceata, Plemyria rubiginata, Hydriomena impluviata, Lomaspilus marginata, Crocallis elinguaria, Biston betularia, Phalera bucephala, Noctua orbona and Colocasia coryli.

A high proportion were woodland species. Many of these were geometrids which are generally weaker flyers than other families and suggest the close proximity of deciduous scrub or woodland and pine plantation. Two species indicate the presence of Alnus glutinosa nearby: Hydriomena impluviata and Plemyria rubiginata, the latter also feeds on Betula spp., Prunus spp. and Malus spp.. Phoesia gnoma, which occurred elsewhere only at Site 87, also feeds on Betula spp.. Lomaspilus marginata and Laothoe populi feed on Populus spp. and Salix spp.. Four species, Thera obeliscata, Bupalus piniaria, Semiothisa liturata and Hylaea fasciaria feed on Pinus sylvestris and other conifers. The last species was trapped elsewhere only at Sites 69 and 81. Several other species which are usually associated with woodland feed more indiscriminately on a number of tree and shrub species; these included Hydriomena furcata, Crocallis elinguaria, Biston betularia, Campaea margaritata, Phalera bucephala, Ptilodon capucina, Xestia triangulum, X. baja and Colocasia coryli. Despite the number of woodland species that were taken, many of the other, non-woodland, species were also found commonly at other sites. Some common geometrids recorded from neighbouring sites were absent here, notably those that feed on Galium spp..

Four sand dune species were taken. Photedes elymi has a scattered distribution in Britain and is restricted to the East Coast. It feeds solely on Elymus arenarius which also occurs locally on other parts of the British coast. Agrotis ripae is considered rare in Scotland but was collected at a number of the East Coast sites. It feeds mainly on Cakile maritima, Salsola kali and Eryngium maritimum. Sideridis albicolon was restricted to East Coast sites. It does not appear to have been recorded from Scotland in recent years. Euxoa cursoria occurred at many North Coast sites but elsewhere only at two other East Coast sites.

A few other species are restricted to a limited range of larval food plants. Eulithis populata feeds on Vaccinium spp., Empetrum spp. and Salix spp.. Cidaria fulvata feeds on Rosa spp., and Lycophotia porphyrea on Calluna vulgaris and Erica spp..

3.1 Coleoptera : Carabidae

	JUNE	JN/JL	JULY	TOTAL
Carabus problematicus	0	1	0	1
Leistus rufescens	1	3	0	4
Nebria brevicollis	1	1	0	2

	JUNE	JN/JL	JULY	TOTAL
Nebria salina	0	2	0	2
Notiophilus aquaticus	2	2	2	6
Notiophilus germinyi	0	1	0	1
Dyschirius globosus	3	1	1	5
Broscus cephalotes	6	28	4	38
Pterostichus niger	0	1	0	1
Calathus erratus	8	105	51	164
Calathus fuscipes	0	10	6	16
Calathus melanocephalus	1	5	1	7
Calathus mollis	0	14	4	18
Amara familiaris	1	1	0	2
Amara tibialis	0	2	0	2
Dromius notatus	1	0	0	1
Metabletus foveatus	3	1	1	5
TOTAL	27	178	70	275

A greater number of species of Carabidae was trapped at this site than at any other during the survey. Numbers of the two most abundant species in the catch, Calathus erratus and Broscus cephalotes, were exceeded only at Sites 75 and 88 respectively. Both are characteristic dune species. Other species indicative of sandy soils are Amara tibialis, Dromius notatus and Metabletus foveatus. It is interesting to note the presence of both Nebria brevicollis and N. salina because the latter usually occurs at drier sites than does the eurytopic N. brevicollis. A single larva of Notiophilus substriatus was trapped in the last period, although this species was not recorded as an adult. Two larval Broscus cephalotes were caught in the same period.

3.3 Coleoptera : Hydrophilidae to Scolytidae

	JUNE	JN/JL	JULY	TOTAL
Cercyon haemorrhoidalis	0	1	0	1
Stenichnus collaris	0	0	1	1
Megarthrus depressus	0	1	0	1
Stenus clavicornis	0	1	0	1
Othius angustus	0	1	0	1
Xantholinus laevigatus	2	5	0	7
Xantholinus linearis	1	1	0	2
Philonthus tenuicornis	0	0	1	1
Philonthus varius	0	0	1	1
Quedius tristis	0	2	1	3

	JUNE	JN/JL	JULY	TOTAL
Mycetoporus piceolus	1	0	0	1
Mycetoporus lepidus	0	1	2	3
Tachyporus chrysomelinus	0	1	0	1
Tachyporus hypnorum	0	0	1	1
Aloconota gregaria	0	0	2	2
Atheta atramentaria	1	1	0	2
Drusilla canaliculata	1	0	0	1
Aleochara bipustulata	0	3	2	5
Aegialia sabuleti	0	1	0	1
Serica brunnea	0	3	4	7
Byrrhus fasciatus	0	1	0	1
Dryops ernesti	2	1	0	3
Atomaria atricapilla	1	0	0	1
Coccinella undecimpunctata	0	1	0	1
Chaetocnema concinna	22	18	2	42
Otiorhynchus ovatus	0	3	0	3
Phyllobius pyri	0	1	1	2
Philopedon plagiatus	3	5	0	8
Sitona griseus	4	14	1	19
Sitona lineellus	4	5	0	9
Rhinoncus castor	0	1	0	1
TOTAL	42	72	19	133

The only abundant species in the relatively poor catch at this site was Chaetocnema concinna, which is associated with Chaenopodium spp., Polygonum spp. and Rumex spp.. Rhinoncus castor also feeds on Rumex spp.. Sitona griseus, the second most numerous species, occurs in sandy coastal areas and feeds on Sarothamnus scoparius and Ononis spp.. Other coastal psammophiles include Philopedon plagiatus, Otiorhynchus ovatus, Aegiaria sabuleti, Serica brunnea, and to a lesser extent Coccinella undecimpunctata.

Cercyon haemorrhoidalis, Megarthrus depressus, Atheta atramentaria, Aleochara bipustulata and the Philonthus spp. all are indicative of the presence of dung.

Aegiaria sabuleti a species which Britton (1956) regarded as "local, on sandy coasts and sandy river banks", was recorded only at this site during the survey. Fowler (1890) lists it from the Firth of Tay and as far north as the Moray Firth. A. arenaria was trapped only

at Site 50N, but Smith (1967) recorded it at Tentsmuir and also at Site 83. Other psammophilous Coleoptera recorded by Smith between 1963 and 1967 include Melanimon tibiale, Orthocerus clavicornis and Baeckmanniolus maritimus all of which are rare or very locally distributed in Scotland. This serves to illustrate how rare and more interesting species can be missed during a survey limited to a short period in one year, and which is dependant only upon remote sampling methods.

3.4 Araneae

	JUNE	JN/JL	JULY	TOTAL
Drassodes cupreus	5	6	0	11
Haplodrassus signifer	2	1	0	3
Zelotes pusillus	5	7	3	15
Zelotes electus	2	21	0	23
Micaria pulicaria	0	4	0	4
Clubiona neglecta	0	2	0	2
Cheiracanthium erraticum	1	2	0	3
Xysticus cristatus	0	1	0	1
Xysticus erraticus	1	0	0	1
Oxyptila trux	1	0	0	1
Philodromus cespitum	0	1	0	1
Tibellus oblongus	0	3	0	3
Pardosa monticola	80	59	4	143
Pardosa palustris	2	38	0	40
Pardosa pullata	6	11	3	20
Pardosa nigriceps	11	20	0	31
Xerolycosa miniata	26	76	9	111
Alopecosa pulverulenta	2	0	0	2
Alopecosa accentuata	0	4	0	4
Trochosa terricola	0	1	0	1
Arctosa perita	6	18	2	26
Steatoda phalerata	2	1	0	3
Hypomma bituberculatum	0	1	0	1
Gongylidiellum vivum	1	1	0	2
Agyneta subtilis	0	1	0	1
Meioneta beata	0	1	0	1
Lepthyphantes tenuis	1	1	2	4
TOTAL	154	281	23	458

This National Nature Reserve is one of the best known sites on the Scottish coast for its spider fauna. Over 140 species are known from previous work (Duffey 1968) but during this survey only 27 species were taken, due to the traps being placed in a restricted range of habitat types. The linyphiids accounted for only 2.0% of the catch while the lycosids made up 82.5%, an unusual situation in such a northern area.

Zelotes electus is restricted to sandy areas on the coast but was taken elsewhere only at Site 91 and 93. Clubiona neglecta and Hypomma bituberculatum both occur commonly in wetlands but are also often found on sand dunes. Cheiracanthium erraticum is a fairly common species found on low plants and shrubs. Xysticus erraticus is widespread but uncommon except on chalk grassland and in Breckland, where it can be abundant. Philodromus cespitum was taken only at this site probably due to the close proximity of tall scrub and shrub vegetation. Xerolycosa miniata and Arctosa perita are both restricted to sand dunes although the latter may be found in dry sandy places inland. Steatoda phalerata is found in dry grassy or heathy places and is quite widespread but local. The remaining species are all common in grassland.

3.5 Mollusca (Land snails)

No land snails were recorded at this site.

3.6 Diplopoda

	JUNE	JN/JL	JULY	TOTAL
Cylindroiulus latestriatus	1	4	1	6

Cylindroiulus latestriatus is common on sandy coasts throughout Britain. The results of a survey at this site, described by Cotton and Miller (1974) suggest that this may be the only species to occur on the dunes at Tentsmuir.

3.7 Terrestrial Isopoda

	JUNE	JN/JL	JULY	TOTAL
Porcellio scaber	6	29	4	39

Porcellio scaber is widely found on dry sandy soils. The unpublished results of surveys by P.T. Harding and Dr M.J. Cotton suggest that this may be the only species to occur on the dunes at this site.

4. ADDITIONAL SPECIES

4.1 Lepidoptera

The following species were observed in the field during the course of the survey:

Lycaenidae

Lycaena phlaeas

Nymphalidae

Aglais urticae

Argynnis aglaja

Satyridae

Hipparchia semele

Maniola jurtina

Coenonympha pamphilus

4.2 Coleoptera

The following weevils were recorded by Dr M.G. Morris during 1964 and 1966:

Nemonychidae

Rhinomacer attelaboides, 20 and 21.6.66, beating *Pinus sylvestris*.

Attelabidae

Rhynchites nanus, 16.6.66, beating *Betula* spp..

Apionidae

Apion ulicis, 26.3.64, beating *Ulex europaeus*.

A. frumentarium, 17.6.66, on dune heath.

A. loti, 17.6.66, on dunes.

Curculionidae

Otiorhynchus atroapterus, 16 - 18.6.66, fore dunes.

Phyllobius argentatus, 21.6.66, beating *Betula* spp..

P. maculicornis, 22.6.66, general sweeping.

P. viridiaeris, 22.6.66, general sweeping.

Polydrosus cervinus, 21.6.66, beating *Betula* spp..

Strophosomus melanogrammus, 22.6.66, beating *Pinus* spp..

Cleonus piger, 18.6.66, at roots of *Cirsium arvense*.

Hypera plantaginis, 20.6.66, dune heath.

Anoplus plantaris, 16.6.66, beating *Betula* spp..

Micrelus ericae, 17.6.66, in dune meadow.

Phytobius quadrituberculatus, 18.6.66, on drift line.

Curculio salicivorus, 16.6.66, beating Salix spp..

Rhynchaenus rusci, 18.6.66, on drift line.

Ramphus pulicarius, 18.6.66, on Betula spp..

Site 91 Dumbarnie

Site 91 Dumbarnie

0 500 Metres
0 500 Yards

★ Light trap

▼ Pitfall trap pairs

SITE 11

DUNBARNIE

1. DESCRIPTION OF SAMPLED SITE

1.1 Topography

The site consisted of a fairly flat topped ridge of dunes with a sloping and undulating area on the landward side. The site was bordered by a dismantled railway line which was used as a farm track for access to the agricultural land inland from the course of the railway.

1.2 Vegetation

The light trap was close to pitfall trap pair 1 in an area of Ammophila arenaria, fine grasses and Cirsium sp.. The vegetation surrounding the pitfall traps consisted of the following:

Pair 1: 10% bare ground among Ammophila arenaria and fine grasses with some Galium sp., Lotus corniculatus and Rumex spp.

Pair 2: a thick turf of fine grasses and A. arenaria with Cirsium sp., Plantago sp. and a little Thymus drucei, Lotus corniculatus and Senecio sp.. There was no bare ground.

Pair 3: a turf of fine grasses with a little A. arenaria, much Cirsium sp. and a few Viola sp.. There was no bare ground except rabbit scrapes.

Pair 4: similar to that surrounding pair 3 but with less than 10% bare sand in patches dug by rabbits. Rabbit droppings were plentiful everywhere in the area.

1.3 Disturbance

The site appeared to be disturbed, with rubbish scattered over the area, and public pressure (mainly people shooting) was obvious. The area of pitfall trap pairs 3 and 4 was heavily grazed by rabbits.

1.4 Distance from sea

Pitfall trap pair 1 was on the seaward edge of the dunes and the other traps including the light trap were scattered up to 100 metres inland.

2. SITING OF LIGHT TRAP AND PITFALL TRAPS

2.1 Selection of site

The light trap was placed in a slight hollow in an attempt to keep it

out of sight of people visiting the dunes. The pitfall traps were placed to sample a wide variety of types of vegetation.

2.2 Damage or malfunction

The light trap operated from 19 - 26.6.76 and 22 - 29.7.76. The trap was functional at the end of the first period when tested, but had ceased to operate at the end of the second trapping period. The pitfall traps operated for three periods - 19 - 26.6.76, 26.6. - 22.7.76 and 22 - 24.7.76. At the end of the first period trap 1B was missing and trap 4B had been removed from its hole but appeared to contain a full catch. Trap 1A contained 2 shrews (Sorex sp.). At the end of the middle period trap 4B was found to have been removed and used for target practice, and traps 1A and 2A contained one and two shrews, respectively. During the last period the traps appeared to escape disturbance, but trap 1A contained a single shrew.

2.3 Colour slides available

Box 2, 161-166.

3. THE FAUNA

3.1 Lepidoptera

	JUNE	JULY	TOTAL
Hepialus fusconebulosa	19	0	19
Scotopteryx chenopodiata	0	8	8
Cosmorhoe ocellata	0	1	1
Deilephila porcellus	1	0	1
Arctia caja	0	5	5
Spilosoma lubricipeda	1	0	1
Euxoa tritici	0	1087	1087
Agrotis vestigialis	9	71	80
Agrotis exclamationis	28	0	28
Agrotis ripae	1	0	1
Noctua pronuba	0	149	149
Noctua comes	0	5	5
Lycophotia porphyrea	0	2	2
Xestia sexstrigata	0	1	1
Hada nana	19	0	19
Cerapteryx graminis	0	65	65
Mythimna impura	0	11	11

	JUNE	JULY	TOTAL
Amphipyra tragopoginis	0	2	2
Rusina ferruginea	2	0	2
Thalpophila matura	0	4	4
Apamea monoglypha	0	44	44
Apamea lithoxylaea	0	1	1
Mesoligia literosa	0	2	2
Luperina testacea	0	8	8
Caradrina morpheus	1	0	1
Autographa gamma	0	2	2
TOTAL	81	1468	1549

The number of species trapped was low compared with other localities on the East Coast and Moray Firth but the total catch (1549 specimens) was the highest of the survey. Euxoa tritici, was by far the most abundant species comprising 70% of the total catch. It occurred commonly at many sites except those around the Moray Firth.

Two sand dune species were taken. Agrotis ripae is considered to be rare in Scotland but was collected at a number of East Coast sites. It feeds mainly on Cakile maritima, Salsola kali and Eryngium maritimum. Agrotis vestigialis is known to be common on sand dunes and was trapped extensively and often commonly at many sites, especially on the North Coast.

Several species are restricted to a limited range of larval food plants. Hepialus fusconebulosa feeds on the roots of Pteridium aquilinum and was trapped widely at a number of sites. Cosmorhoe ocellata and Deilephila porcellus feed on Galium spp., the latter species also feeds on Epilobium spp. and Lythrum salicaria. Lycophotia porphyrea feeds on Calluna vulgaris and Erica spp.

3.2 Coleoptera : Carabidae

	JUNE	JN/JL	JULY	TOTAL
Cychrus caraboides	0	1	0	1
Leistus rufescens	1	2	0	3
Stomis pumicatus	0	1	0	1
Calathus fuscipes	0	18	6	24
Calathus melanocephalus	0	1	1	2
Calathus mollis	0	3	2	5
Amara aenea	0	1	0	1
Amara familiaris	0	3	0	3

	JUNE	JN/JL	JULY	TOTAL
Badister bipustulatus	0	1	0	1
Dromius linearis	0	1	0	1
Dromius notatus	0	0	1	1
TOTAL	1	32	10	43

The varied catch of carabids was represented by only a small number of specimens with only Calathus fuscipes attaining double figures. Only C. mollis, Amara aenea, Dromius notatus, and, to a lesser extent, D. linearis are characteristic of sandy coasts, whilst Cychrus caraboides, Stomis pumicatus and Leistus rufescens are more typical of fairly moist habitats.

3.3 Coleoptera : Hydrophilidae to Scolytidae

	JUNE	JN/JL	JULY	TOTAL
Helophorus arvernicus	0	1	0	1
Helophorus brevipalpis	0	3	1	4
Sphaeridium scarabaeoides	0	1	0	1
Cercyon melanocephalus	0	7	0	7
Cryptopleurum minutum	0	1	0	1
Ptenidium punctatum	0	1	0	1
Leiodes dubia/obesa	0	1	0	1
Ptomophagus subvillosus	0	2	0	2
Choleva jeanneli	0	2	0	2
Catops chrysomeloides	0	10	0	10
Catops coracinus	0	1	0	1
Catops fuliginosus	0	2	2	4
Catops morio	0	1	0	1
Catops nigricans	0	1	0	1
Nicrophorus humator	1	0	0	1
Micropeplus staphylinoides	0	4	1	5
Megarthrus depressus	0	2	1	3
Omalium laticolle	0	1	0	1
Anotylus tetracarinatus	1	3	0	4
Oxytelus laqueatus	0	0	1	1
Stenus clavicornis	1	0	0	1
Stenus impressus	1	1	0	2
Othius punctulatus	1	1	0	2
Philonthus tenuicornis	0	7	0	7
Philonthus varians	0	1	0	1

	JUNE	JN/JL	JULY	TOTAL
Platydracus stercorarius	0	0	1	1
Staphylinus globulifer	0	0	1	1
Staphylinus melanarius	0	1	0	1
Quedius picipes	0	1	0	1
Mycetoporus piceolus	1	0	0	1
Tachyporus chrysomelinus	1	1	0	2
Tachyporus hypnorum	0	1	1	2
Tachinus signatus	0	0	1	1
Aloconota gregaria	0	0	2	2
Geostiba circellaris	1	7	0	8
Atheta amicula	0	1	0	1
Atheta fungi	2	2	0	4
Atheta aterrima	0	2	0	2
Atheta pertyi	0	6	0	6
Atheta atramentaria	0	12	1	13
Drusilla canaliculata	21	60	22	103
Oxypoda opaca	0	1	0	1
Tinotus morion	0	5	0	5
Aleochara lanuginosa	0	3	0	3
Serica brunnea	0	42	22	64
Dryops ernesti	0	1	0	1
Rhagonycha fulva	0	1	0	1
Cryptophagus dentatus	0	33	5	38
Cryptophagus setulosus	1	1	0	2
Atomaria atricapilla	0	7	1	8
Atomaria fuscata	1	0	0	1
Atomaria nitidula	1	9	0	10
Coccidula rufa	1	2	0	3
Scymnus schmidti	0	0	1	1
Corticaria crenulata	3	20	8	31
Corticaria umbilicata	1	26	6	33
Corticarina fuscula	4	0	0	4
Longitarsus curtus	0	0	4	4
Longitarsus jacobaeae	0	0	3	3
Longitarsus succineus	4	17	63	84
Crepidodera ferruginea	0	4	0	4
Chaetocnema concinna	1	0	0	1
Otiorhynchus atroapterus	1	2	0	3

	JUNE	JN/JL	JULY	TOTAL
Otiorhynchus ovatus	0	9	8	17
Grypus equiseti	0	1	0	1
TOTAL	49	332	156	537

The varied fauna at this site was only exceeded, in the nuber of species recorded, at Sites 95 and 81. Drusilla canaliculata, a non-obligate myrmecophile, was the most abundant species in the catch - both as adult and larva. Longitarsus succineus is a polyphagous species feeding on a wide range of Compositae. Serica brunnea, Leiodes dubia and the Otiorhynchus spp. and Corticaria spp. are associated with sandy coastal regions. Ptenidium punctatum occurs in strandline seaweed and other decaying vegetable matter on the coast. It is not usually found far above high water mark although a single specimen was taken at Site 95. Cryptophagus dentatus inhabits fungi and moulds on vegetable matter.

L. jacobaeae feeds on Senecio spp.. The larvae of Crepidodera ferruginea feed on grass roots but the adults are associated with Urtica spp. and Cirsium spp., Grypnus equiseti occurs on Equisetum spp. and L. curtus feeds on Pulmonaria spp., Symphytum spp. and Echium spp..

The majority of the remaining species are associated with the presence of dung and/or carrion. Notable exceptions are Cryptophagus setulosus which occurs in bee's nests, Rhagonycha fulva which visits various flowers, especially those of Umbelliferae, and Dryops ernesti which typically inhabits damp muddy areas close to water, and the two Helophorus spp. which are aquatic species.

3.4 Araneae

	JUNE	JN/JL	JULY	TOTAL
Drassodes cupreus	2	2	1	5
Zelotes pusillus	0	2	1	3
Zelotes electus	1	1	0	2
Micaria pulicaria	1	0	0	1
Agroeca proxima	0	0	1	1
Xysticus cristatus	3	3	1	7
Oxyptila trux	3	2	0	5
Euophrys aequipes	0	1	0	1
Pardosa pullata	39	56	14	109
Xerolycosa miniata	0	1	0	1
Alopecosa pulverulenta	6	4	1	11

	JUNE	JN/JL	JULY	TOTAL
Trochosa terricola	0	0	1	1
Ero furcata	1	0	0	1
Enoplognatha thoracica	1	0	0	1
Pachygnatha degeeri	1	0	0	1
Walckenaera acuminata	0	1	0	1
Walckenaera antica	1	1	0	2
Walckenaera vigilax	1	0	0	1
Hypomma bituberculatum	1	1	0	2
Gonatium rubens	0	2	0	2
Pocadicnemis pumila	11	10	1	22
Oedothorax retusus	8	13	0	21
Trichopterna thorelli	2	8	2	12
Tiso vagans	14	22	6	42
Tapinocyba praecox	0	2	0	2
Erigone dentipalpis	0	1	0	1
Agyneta subtilis	1	0	0	1
Agyneta conigera	0	1	0	1
Agyneta cauta	1	0	0	1
Meioneta rurestris	0	2	0	2
Meioneta beata	0	1	0	1
Bathyphantes parvulus	4	11	1	16
Lepthyphantes insignis	0	1	0	1
TOTAL	102	149	30	281

Zelotes electus and Xerolycosa miniata are widespread on the coastal sand dunes of England and Wales but are scarce in Scotland. Euophrys aequipes is a salticid which, although fairly common on dry sandy areas in the south, has been taken infrequently in Scotland. During this survey it was taken elsewhere only at Sites 71 and 93. Enoplognatha thoracica is widespread and fairly common in grassland but occurred elsewhere only at Site 71. Walckenaera vigilax is infrequently taken but is widespread, in grass, moss, and wet places. Hypomma bituberculatum is common in wetlands and is also often found on sand dunes. Trichopterna thorelli is very local in occurrence although it is widespread in Britain. It is only common on wet heathland in the south of England. Meioneta beata is a scarse spider found in moss and grassland, but appears to be common only in central southern England, in particular the New Forest. The most interesting find at this site was the rare

linyphiine Lepthyphantes insignis. All previous records of this species have been from dry grassland in the southern half of England. This occurrence is a new record for Scotland. All the other species are common in grassland.

3.5 Mollusca (Land snails)

	JUNE	JN/JL	JULY	TOTAL
Cochlicopa lubricella	1	0	0	1
Oxychilus alliarius	0	4	0	4
Cepaea nemoralis	5	3	5	13
Cepaea hortensis	0	3	0	3
TOTAL	6	10	5	21

The comparatively poor catch was composed of species commonly found in fixed dune areas.

3.6 Diplopoda

	JUNE	JN/JL	JULY	TOTAL
Julus scandinavius	15	17	3	35
Ophyiulus pilosus	11	9	0	20
Ommatoiulus sabulosus	36	71	24	131
Tachypodoiulus niger	0	1	2	3
TOTAL	62	98	29	189

Ommatoiulus sabulosus and Tachypodoiulus niger are commonly recorded on sand dunes in southern Britain but T. niger was recorded elsewhere only at Site 93. It appears to be absent from much of north-east Scotland. Julus scandinavius and Ophyiulus pilosus occur on some dune systems, usually where the vegetation provides a deep litter layer.

3.7 Terrestrial Isopoda

	JUNE	JN/JL	JULY	TOTAL
Philoscia muscorum	15	11	6	32
Porcellio scaber	52	58	26	136
TOTAL	67	69	32	168

Both species are commonly recorded on sand dunes and in grassland but Philoscia muscorum seems to be restricted to the coast and to river valleys over much of Scotland.

4. ADDITIONAL SPECIES

4.1 Lepidoptera

The following species were observed in the field during the course of the survey:

Pieridae

Pieris rapae

Lycaenidae

Polyommatus icarus

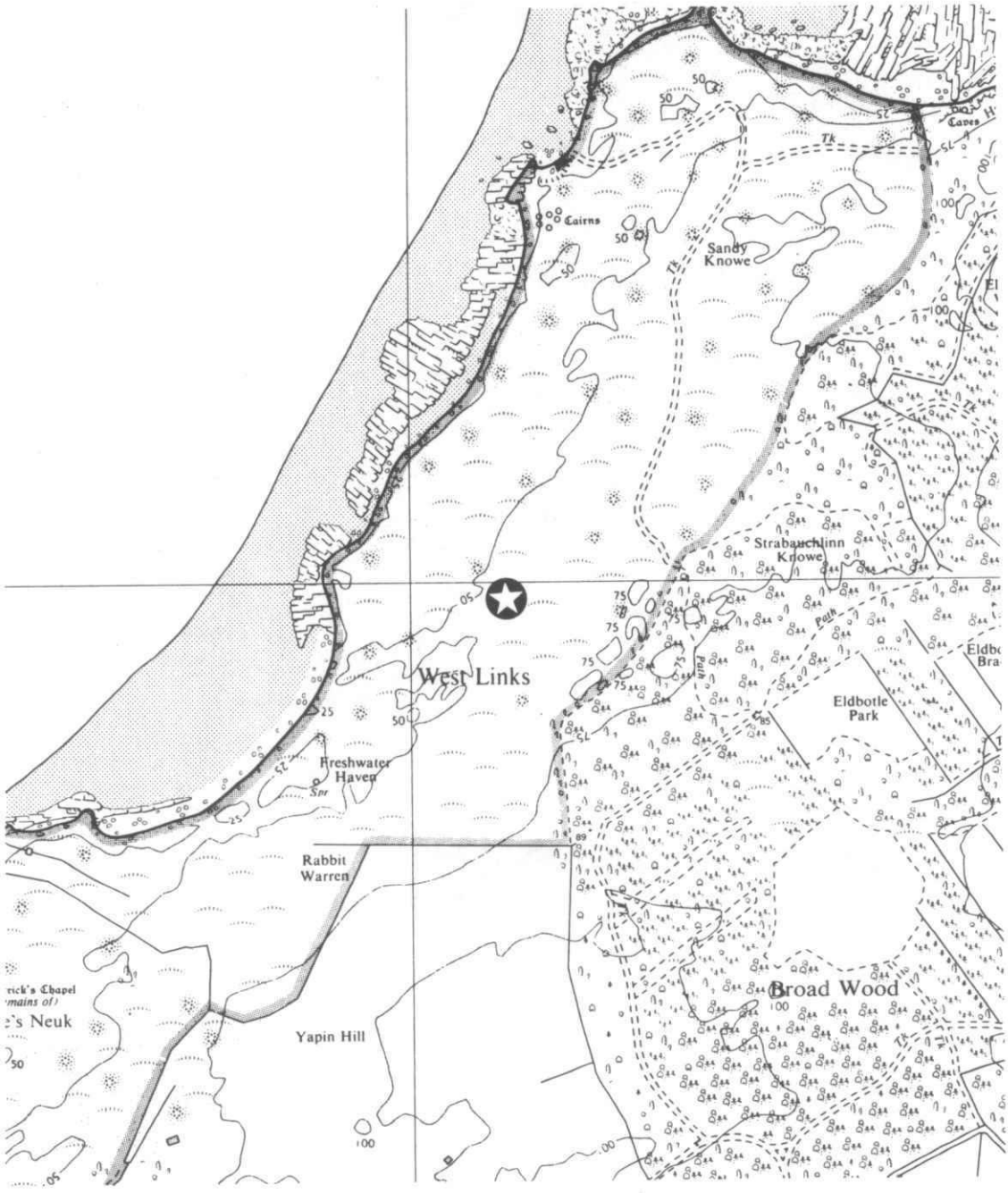
Satyridae

Maniola jurtina

Coenonympha pamphilus

Site 93 Gullane

Site 93 Gullane



0 500 Metres
0 500 Yards

Light trap & pitfall traps

I.T.E. (N.E.R.C.) Bangor

SITE 93

GULLANE

1. DESCRIPTION OF SAMPLED SITE

1.1 Topography

The landward slope of the dunes was very steep and the shore was rocky.

1.2 Vegetation

The vegetation surrounding the pitfall traps consisted of the following:

Pair 1: less than 10% bare ground among mainly Ammophila arenaria and fine grasses with much Senecio sp. and a little Galium sp. and Thymus drucei.

Pair 2: similar to that surrounding pair 1, with no bare ground, more A. arenaria and Cirsium sp..

Pair 3: A. arenaria and fine grasses with Galium sp., Cirsium sp., Senecio sp. and some Lotus corniculatus, with no bare ground.

Pair 4: less than 10% bare ground in A. arenaria and Cirsium sp. with a little fine grass.

The light trap was near, and among similar vegetation, to pitfall trap pair 1.

1.3 Disturbance

The site was near to Muirfield Golf Course, but there was very little evidence of public pressure on the area. There was evidence of light grazing by rabbits and cattle.

1.4 Distance from sea

The light trap and pitfall traps were approximately 200 metres from the shore.

2. SITING OF LIGHT TRAP AND PITFALL TRAPS

2.1 Selection of site

The light trap was placed in a very shallow hollow with the pairs of pitfall traps grouped around it. All the traps were positioned to be out of sight of the general public and the pitfall traps were sited to sample a range of vegetation types.

2.2 Damage or malfunction

The light trap operated from 18 - 25.6.76 and 23 - 30.7.76. The trap was functional at the end of the first period, but at the end of the second period it had ceased to operate due to a mechanical fault. The pitfall traps were all functional throughout the first and middle periods (18 - 25.6.76 and 25.6. - 23.7.76) but traps 1A and 1B were almost certainly disturbed during the last period (23 - 30.7.76) with a result that the catches in these two traps were very small.

A number of small mammals were trapped:

18 - 25.6.76	Trap 2A	1 shrew (Sorex sp.)
	Trap 2B	1 'mouse'.
	Trap 4A	2 shrews (Sorex sp.)
	Trap 4B	1 shrew (Sorex sp.)
25.6. - 23.7.76	Traps 1A, 2A, 2B, 3A, 3B and 4B	1 shrew (Sorex sp.) in each.
23 - 30.7.76	Trap 3B	1 shrew (Sorex sp.)

2.3 Colour slides available

Box 2, 167-170.

3. THE FAUNA

3.1 Lepidoptera

	JUNE	JULY	TOTAL
Idaea aversata	0	1	1
Epirrhoe alternata	0	2	2
Camptogramma bilineata	1	0	1
Cosmorhoe ocellata	0	2	2
Chloroclysta truncata	1	0	1
Cidaria fulvata	0	1	1
Colostygia pectinataria	3	0	3
Eupithecia subfuscata	4	0	4
Peribatodes rhomboidaria	0	1	1
Bupalus piniaria	2	0	2
Deilephila porcellus	3	0	3
Arctia caja	0	1	1
Spilosoma lubricipeda	5	0	5
Tyria jacobaeae	3	0	3
Euxoa tritici	0	87	87

	JUNE	JULY	TOTAL
Agrotis vestigialis	3	4	7
Agrotis clavis	38	0	38
Agrotis exclamationis	20	4	24
Ochropleura plecta	1	0	1
Noctua pronuba	0	59	59
Noctua comes	0	4	4
Diarsia mendica	0	1	1
Xestia sexstrigata	0	8	8
Xestia xanthographa	0	1	1
Hada nana	13	0	13
Cerapteryx graminis	0	13	13
Mythimna conigera	0	1	1
Mythimna ferrago	0	2	2
Mythimna impura	0	26	26
Mythimna pallens	0	9	9
Mythimna comma	17	0	17
Blepharita adusta	2	0	2
Rusina ferruginea	29	0	29
Thalpophila matura	0	60	60
Phlogophora meticulosa	0	1	1
Apamea monoglypha	3	18	21
Oligia strigilis	1	0	1
Oligia fasciuncula	18	2	20
Mesoligia literosa	0	2	2
Mesapamea secalis	0	4	4
Luperina testacea	0	7	7
Hoplodrina alsines/blanda	0	4	4
Autographa gamma	1	0	1
TOTAL	168	325	493

Although nearly all the species recorded are common in Britain the number of species was above average for the East Coast. Euxoa tritici which occurred commonly at many sites except those around the Moray Firth, was the most numerous.

The only sand dune species to occur was Agrotis vestigialis; it was trapped extensively and often commonly at many sites, being most numerous on the North Coast.

Peribatodes rhomboidaria, Phlogophora meticulosa and Oligia strigilis occurred only at this site during the survey. These species are perhaps more often found in woods, hedgerows, parks and gardens. Mythimna pallens is generally common throughout the British Isles but was trapped elsewhere only at Site 95.

A few species are normally associated with scrub and woodland rather than dunes. Peribatodes rhomboidara feeds on a number of shrub species. Chloroclysta truncata was taken elsewhere only at Site 60 and feeds on grasses. Bupalus piniaria feeds on Pinus sylvestris and other conifers.

Several other species are restricted to a limited range of larval food plants. Epirrhoe alternata, Cosmorhoe ocellata and Deilephila porcellus feed on Galium spp., the latter species also feeds on Epilobium spp. and Lythrum salicaria. Tyria jacobaeae feeds chiefly on Senecio jacobaea and occurred elsewhere only at Sites 88 and 95.

3.2 Coleoptera : Carabidae

	JUNE	JN/JL	JULY	TOTAL
Notiophilus aquaticus	0	1	1	2
Dyschirius globosus	1	0	0	1
Pterostichus strenuus	1	0	0	1
Calathus fuscipes	1	26	0	27
Calathus melanocephalus	1	17	2	20
Amara aenea	0	2	0	2
Harpalus tardus	1	1	0	2
Badister bipustulatus	4	0	0	4
Dromius linearis	0	0	1	1
TOTAL	9	47	4	60

A relatively poor catch of carabids was taken here compared with other East Coast sites. It was dominated by Calathus fuscipes and C. melanocephalus. Pterostichus strenuus is an hygrophilous species more usually found in woodlands and on heavier soils. Harpalus tardus, although characteristically found on gravelly or sandy soils, is rare in Scotland and was taken elsewhere only as a singleton at Site 88 during this survey. One first instar larva of Notiophilus biguttatus was trapped during the last period. No adults of this species were caught at this site.

3.3 Coleoptera : Hydrophilidae to Scolytidae

	JUNE	JN/JL	JULY	TOTAL
Megasternum obscurum	3	0	0	3
Leiodes dubia/obesa	1	0	0	1
Sciodrepoides watsoni	0	30	3	33
Catops chrysomeloides	0	1	0	1
Catops coracinus	0	2	0	2
Catops fuliginosus	1	0	1	2
Nicrophorus investigator	0	27	3	30
Nicrophorus vespilloides	0	1	0	1
Thanatophilus rugosus	0	4	0	4
Silpha atrata	0	1	0	1
Stenichnus collaris	1	0	1	2
Stenus brunnipes	1	0	0	1
Stenus clavicornis	1	1	0	2
Stenus impressus	0	0	1	1
Xantholinus laevigatus	0	2	0	2
Xantholinus linearis	0	4	0	4
Philonthus varius	0	3	0	3
Platydracus stercorarius	0	7	3	10
Staphylinus brunnipes	2	5	6	13
Staphylinus melanarius	0	1	0	1
Quedius tristis	0	1	0	1
Sepedophilus marshami	1	0	0	1
Sepedophilus nigripennis	5	2	3	10
Tachyporus chrysomelinus	0	1	0	1
Tachinus corticinus	0	2	1	3
Amischa analis	2	0	0	2
Geostiba circellaris	1	0	0	1
Atheta divisa	0	2	0	2
Atheta fungi	0	2	0	2
Atheta crassicornis	0	1	0	1
Atheta atramentaria	0	1	0	1
Drusilla canaliculata	9	25	10	44
Serica brunnea	0	20	5	25
Calyptomerus dubius	0	0	1	1
Agriotes sputator	1	0	0	1
Rhyzobius litura	0	1	0	1
Scymnus schmidti	0	0	1	1

	JUNE	JN/JL	JULY	TOTAL
Nephus redtenbacheri	1	0	0	1
Corticaria crenulata	0	1	0	1
Corticaria umbilicata	0	1	0	1
Longitarsus jacobaeae	0	0	24	24
Longitarsus succineus	0	1	2	3
Crepidodera ferruginea	2	7	5	14
Apion loti	0	1	1	2
Apion dichroum	1	0	0	1
Otiorhynchus ovatus	3	7	5	15
Philopedon plagiatus	5	1	0	6
Barynotus squamosus	0	1	0	1
Hypera punctata	1	0	0	1
TOTAL	42	167	76	285

A very mixed fauna was taken here with the non-obligate myrmecophile Drusilla canaliculata being the most numerous species. Coastal psammophiles were fairly well represented by Serica brunnea, Otiorhynchus ovatus and Philopedon plagiatus, together with Sepedophilus nigripennis, a species which is often locally common in moss on sand dunes. Single specimens of Leiodes dubia and Corticaria crenulata were also collected. Nicrophorus investigator and Sciodrepoides watsoni were particularly numerous, together with smaller numbers of other carrion frequenting species such as N. vespilloides, Thanatophilus rugosus, the Catops spp., Platydracus stercorarius, and various Atheta spp.. A. divisa is a relatively rare species recorded from a variety of habitats including carrion and the nests of small mammals.

The most numerous phytophagous species were Longitarsus jacobaeae which feeds on Senecio spp. and Crepidodera ferruginea which feeds on Urtica spp. and Cirsium spp., with Apion loti on Lotus corniculatus A. dichroum and Hypera punctata on Trifolium spp. and L. succineus on various Compositae.

The record for Scymnus schmidti from this and other sites on the East Coast (82, 86 and 91) are new. Nephus redtenbacheri has been recorded previously from within the 10km square if not from this site (Pope, 1973).

Small numbers of larval Drusilla canaliculata and Xantholinus spp. were trapped during all three periods, with a few larvae of Philonthus spp. in the first two periods.

3.4 Araneae

	JUNE	JN/JL	JULY	TOTAL
Amaurobius similis	0	0	1	1
Drassodes cupreus	0	1	0	1
Haplodrassus signifer	2	0	0	2
Zelotes pusillus	9	15	1	25
Zelotes electus	2	4	0	6
Micaria pulicaria	0	2	0	2
Clubiona neglecta	0	1	1	2
Xysticus cristatus	2	3	0	5
Oxyptila trux	5	8	0	13
Tibellus maritimus	0	1	0	1
Euophrys aequipes	1	0	0	1
Pardosa palustris	34	73	0	107
Pardosa pullata	40	83	3	126
Pardosa nigriceps	17	59	10	86
Xerolycosa miniata	0	2	0	2
Alopecosa pulverulenta	6	6	0	12
Trochosa terricola	1	8	0	9
Enoplognatha ovata	1	0	0	1
Pachygnatha degeeri	3	1	0	4
Walckenaera acuminata	0	1	0	1
Dismodicus bifrons	0	0	1	1
Peponocranium ludicrum	2	0	0	2
Pocadicnemis pumila	1	1	0	2
Oedothorax retusus	1	1	0	2
Trichopterna thorelli	0	1	0	1
Tiso vagans	2	0	0	2
Monocephalus fuscipes	1	0	1	2
Gongylidiellum vivum	1	1	0	2
Typhocrestus digitatus	1	0	0	1
Erigone dentipalpis	1	9	0	10
Erigone atra	2	1	0	3
Erigone aletris	1	0	0	1
Meioneta rurestris	0	1	0	1
Meioneta beata	5	0	0	5
Bathyphantes parvulus	4	4	0	8
Lepthyphantes tenuis	0	6	0	6
Lepthyphantes mengei	0	0	4	4
Lepthyphantes ericaeus	0	0	1	1
TOTAL	145	293	23	461

The catch at this site was the richest for spiders, with 38 species being recorded. Amaurobius similis is a common and widespread species usually found in holes in walls and under stones. Drassodes cupreus, Haplodrassus signifer, Zelotes pusillus and Micaria pulicaria are all taken in grass and heath habitats, while Zelotes electus is restricted to coastal sand dunes.

Clubiona neglecta, is typically a species of wetlands but is very often found on sand dunes. Tibellus maritimus is a fairly widespread species of coastal dunes in England and also in inland fens and marshes. There are few records for Scotland.

The three Pardosa species recorded, P. palustris, P. pullata and P. nigriceps, together form 69.2% of the total catch. All are common in open grassland, the first two species preferring rather damp conditions and the last, long vegetation. Xerolycosa miniata is restricted to coastal sand dunes.

Trichopterna thorelli is widespread in fairly damp moss and grass but is only common on wet heathland in central southern England. Typhocrestus digitatus is rather local in distribution and is usually associated with dry sandy places, sand dunes and occasionally moorland. Meioneta beata is widespread but only common in parts of the southern half of England. All the other species are common in grassland.

The most interesting find was a single male of what appears to be Erigone aletris, a North American species. However, the taxonomy of this group of Erigone spp. is rather confused and in need of revision, so further study is necessary to be absolutely certain of the identity. Further specimens of this species were taken at this site in 1978.

3.5 Mollusca (Land snails)

	JUNE	JN/JL	JULY	TOTAL
Vallonia costata	0	2	0	2
Oxychilus alliarius	0	13	0	13
Candidula intersecta	0	1	0	1
Cepaea nemoralis	0	4	0	4
Cepaea hortensis	1	1	1	3
TOTAL	1	21	1	23

This was a poor catch composed of species commonly found in fixed dune areas. Vallonia costata is sparsely recorded in Scotland and was not recorded elsewhere on the East Coast. Candidula intersecta is believed

to have been introduced to the British Isles in Roman times, or later.

3.6 Diplopoda

	JUNE	JN/JL	JULY	TOTAL
Polydesmus inconstans	2	1	0	3
Ophyiulus pilosus	7	3	0	10
Cylindroiulus latestriatus	1	1	0	2
Ommatoiulus sabulosus	30	137	9	176
Tachypodoiulus niger	5	13	1	19
TOTAL	45	155	10	210

A comparatively rich fauna was represented in the catch at this site with the most numerous species being Ommatoiulus sabulosus, a species which is typical of sand dunes. Tachypodoiulus niger is also typical of dune systems in southern Britain, but was recorded elsewhere in the survey only at Site 93. Ophyiulus pilosus is essentially a soil-dwelling species. Polydesmus inconstans was recorded at few sites in the survey but Cylindroiulus latestriatus was the most widely recorded species.

3.7 Terrestrial Isopoda

	JUNE	JN/JL	JULY	TOTAL
Philoscia muscorum	14	37	3	54
Porcellio scaber	25	38	10	73
TOTAL	39	75	13	127

Both species are commonly recorded on sand dunes and in grassland but Philoscia muscorum seems to be restricted to the coast and to river valleys over much of Scotland.

4. ADDITIONAL SPECIES

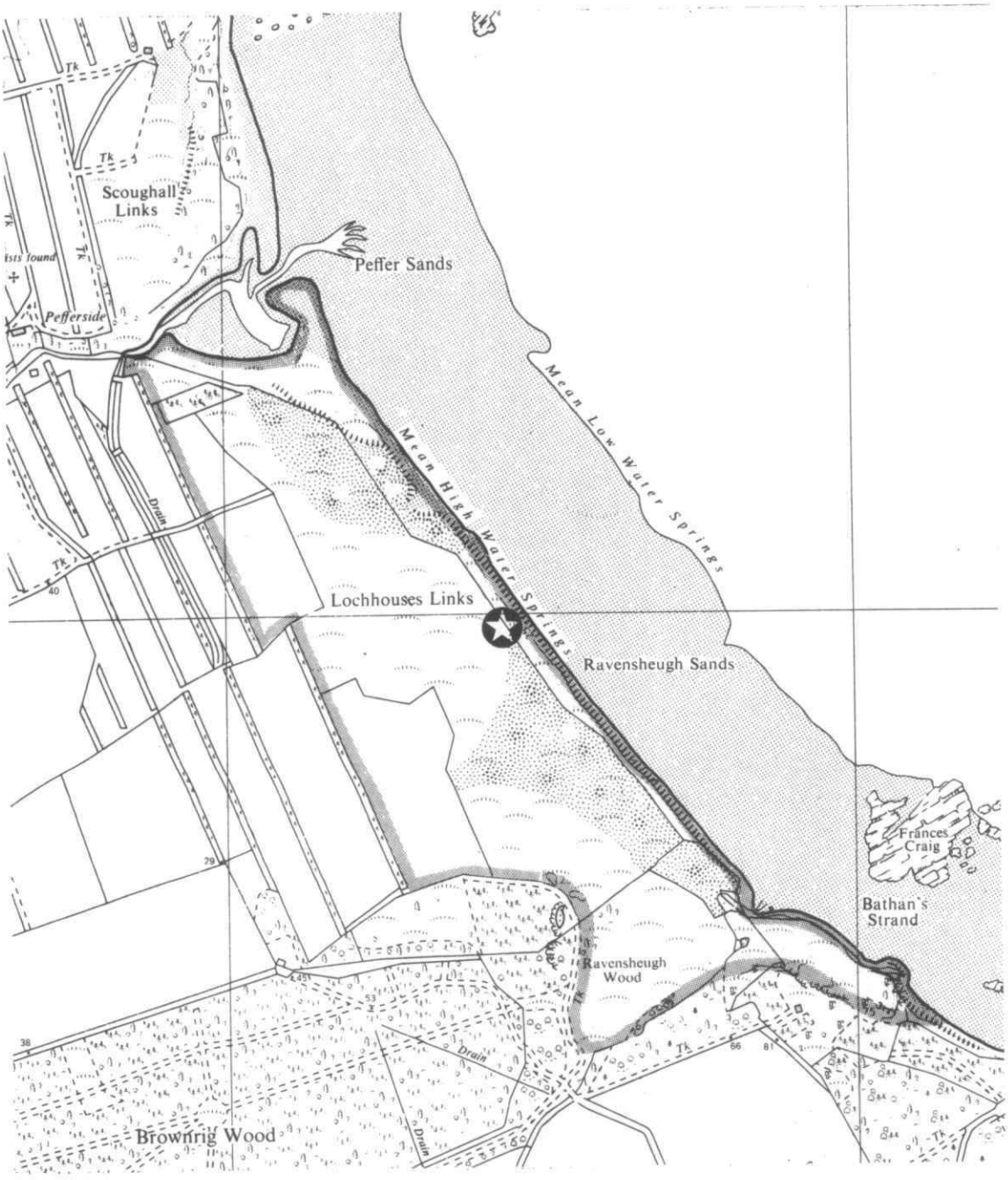
4.1 Lepidoptera : Satyridae

The following species was observed in the field during the course of the survey:

Maniola jurtina

Site 95 Tyninghame

Site 95 Tyninghame



★ Light trap & pitfall traps

SITE 95

TYNINGHAME

1. DESCRIPTION OF SAMPLED SITE

1.1 Topography

The single ridge of dunes was steep-sided on both the landward and seaward sides. The landward slope had recently been re-turfed. There was a large flat area on the landward side of the ridge from which sand and gravel were being excavated.

1.2 Vegetation

Agricultural weeds were very common over the whole area. The vegetation surrounding the pitfall traps consisted of the following:

Pair 1: 50% bare ground with Ammophila arenaria and Cirsium sp..

Pair 2: A. arenaria, Carex sp., Senecio sp. and Cirsium sp. with some Scrophularia sp. and Solanum sp.. There was no bare ground.

Pair 3: A. arenaria, Carex sp., Cirsium sp. and some Senecio sp., fine grasses and Ononis repens, without bare ground.

Pair 4: less than 10% bare ground among mostly A. arenaria and Cirsium sp. with some coarse grass and Urtica dioica, Senecio sp. and Ononis repens.

The light trap was near to pitfall trap pair 2 and among similar vegetation.

1.3 Disturbance

Apart from the nearby extraction of sand and gravel, there were clear signs of public use. In addition rabbit burrows were so numerous in places that the ground surface subsided beneath one's feet.

1.4 Distance from sea

The traps were grouped on the top of the dune ridge about 20 metres from the shore.

2. SITING OF LIGHT TRAP AND PITFALL TRAPS

2.1 Selection of site

The traps were placed in a position which was, as far as possible, out of sight on the general public, and in the area of least disturbed vegetation.

2.2 Damage or malfunction

The light trap operated from 18 - 25.6.76 and 23 - 30.7.76. The trap was functional at the end of the first period, but at the end of the second it had ceased to operate due to a mechanical fault. The pitfall traps were all functional during each of the three periods 18 - 25.6.76, 25.6. - 23.7.76 and 23 - 30.7.76. At the end of the middle period the following traps were found to contain a number of shrews (Sorex sp.): Trap 2A - 1; 3A - 2; 4A - 1; 4B - 1.

2.3 Colour slides available

Box 2, 171 - 174

3. THE FAUNA

3.1 Lepidoptera

	JUNE	JULY	TOTAL
Xanthorhoe montanata	1	0	1
Epirrhoe alternata	5	3	8
Camptogramma bilineata	0	1	1
Thera obeliscata	1	0	1
Eupithecia centauriata	21	1	22
Eupithecia absinthiata/goossensiata	5	0	5
Opisthograptis luteolata	2	0	2
Bupalus piniaria	1	0	1
Laothoe populi	1	0	1
Deilephila porcellus	2	0	2
Arctia caja	0	31	31
Spilosoma lubricipeda	28	0	28
Tyria jacobaeae	1	0	1
Euxoa tritici	0	318	318
Euxoa cursoria	0	5	5
Agrotis vestigialis	11	14	25
Agrotis segetum	22	0	22
Agrotis exclamationis	33	2	35
Agrotis ripae	40	2	42
Axylia putris	3	0	3
Ochropleura plecta	6	0	6
Noctua pronuba	0	87	87
Noctua comes	0	12	12
Noctua janthina	0	1	1

	JUNE	JULY	TOTAL
Lycophotia porphyrea	0	1	1
Xertia c-nigrum	0	3	3
Hada nana	9	0	9
Sideridis albicolon	7	0	7
Mamestra brassicae	1	0	1
Lacanobia oleracea	7	2	9
Ceramica pisi	1	0	1
Cerapteryx graminis	0	3	3
Mythimna conigera	0	5	5
Mythimna impura	0	46	46
Mythimna pallens	1	15	16
Blepharita adusta	1	0	1
Amphipyra tragopoginis	0	7	7
Rusina ferruginea	4	0	4
Thalpophila mature	0	6	6
Apamea monoglypha	1	207	208
Apamea sordens	1	0	1
Mesoligia literosa	0	2	2
Mesapamea secalis	0	33	33
Hoplodrina alsines/blanda	0	2	2
Caradrina morpheus	16	0	16
Pyrrhia umbra	8	0	8
Autographa gamma	0	2	2
Autographa pulchrina	3	0	3
Abrostola triplasia	3	0	3
TOTAL	246	811	1057

This site produced one of the largest species lists and has a high total catch. Two species made up 50% of the catch: Euxoa tritici, the most abundant, also accurred at many other sites except those around the Moray Firth, and was frequently common; Apamea monoglypha was also numerous and was the most widely taken species of the survey.

Serveral sand dune species were taken. Agrotis ripae is considered rare in Scotland but occurred at a number of East Coast sites. Sideridis albicolon was restricted to the East Coast and does not appear to have been recorded in Scotland in recent years. Euxoa cursoria accurred at many North Coast sites but only at two other sites on the East Coast. Agrotis vertigialis is known to be common

on sand dunes and was trapped extensively and often commonly at many sites especially on the North Coast.

A few species were scarce or absent elsewhere. Agrotis segetum, a common species throughout the British Isles, was taken only at this site. Mythimna pallens, another generally common species, occurred elsewhere only at Site 93. Axylia putris was taken elsewhere at Site 87 while Noctua janthina and Mamestra brassicae occurred, in addition, only at Sites 53 and 87.

Several species feed on woody plants. Thera obeliscata and Bupalus piniaria both feed on Pinus sylvestris and some other conifers. Laothoe populi feeds on Populus spp. and Salix spp. and Opisthograptis luteolata on Crataegus spp., Prunus spp. and Sorbus spp..

A number of other species are restricted to a limited range of larval food plants. Epirrhoe alternata and Deilephila porcellus both feed on Galium spp., the latter also feeds on Epilobium spp. and Lythrum salicaria. Tyria jacobaeae and Eupithecia centaureata feed on Senecio jacobaea but both take other plant species. Lycophotia porphyrea feeds on Calluna vulgaris and Erica spp., and Abrostola triplasia on Urtica dioica.

3.2 Coleoptera : Carabidae

	JUNE	JN/JL	JULY	TOTAL
Notiophilus aquaticus	1	0	0	1
Broscus cephalotes	0	2	4	6
Trechus obtusus	0	0	12	12
Bembidion guttula	0	1	0	1
Calathus erratus	2	6	19	27
Calathus fuscipes	1	0	6	7
Calathus melanocephalus	2	3	14	19
Calathus mollis	0	18	18	36
Agonum dorsale	0	0	1	1
Amara aenea	1	0	0	1
Amara bifrons	0	2	8	10
Amara familiaris	0	2	0	2
Bradycellus harpalinus	0	0	1	1
Dromius linearis	0	0	1	1
TOTAL	7	34	84	125

The fairly rich carabid fauna was somewhat uncharacteristic in that Calathus mollis and C. erratus, species more typical of sandy coastal areas, greatly outnumbered C. fuscipes which was frequently the commonest member of the genus trapped. Also unusual are the facts that 67% of the specimens were trapped in the third period, i.e. the last week of July, and that several species exhibit contrasting habitat requirements. Trechus obtusus, a species of moist, shady areas, was caught in similar numbers to Amara bifrons, a xerophilous species of sandy soils and very sparse vegetation. Bembidion guttula is usually found near freshwater or in moist shady situations, whereas Broscus cephalotes is characteristic of barren sandy shores. Single larvae of Amara sp., Badister sp. (bipustulatus ?) and Notiophilus biguttatus were trapped in the three successive periods.

3.3 Coleoptera : Hydrophilidae to Scolytidae

	JUNE	JN/JL	JULY	TOTAL
Helophorus brevipalpis	1	1	0	2
Sphaeridium scarabaeoides	0	1	0	1
Cercyon haemorrhoidalis	0	1	0	1
Cercyon melanocephalus	0	2	0	2
Megasternum obscurum	1	1	0	2
Saprinus aeneus	0	3	0	3
Ptenidium punctatum	1	0	0	1
Agathidium laevigatum	0	1	0	1
Sciodrepoides watsoni	0	6	0	6
Catops chrysomeloides	0	2	0	2
Catops fuliginosus	1	2	0	3
Nicrophorus investigator	0	21	0	21
Megarthrus depressus	1	1	0	2
Anotylus sculpturatus	0	2	0	2
Anotylus tetracarinatus	3	0	0	3
Stenus clavicornis	0	1	1	2
Gyrohypnus angustatus	0	1	0	1
Xantholinus linearis	0	1	0	1
Philonthus cognatus	0	2	0	2
Philonthus marginatus	0	1	0	1
Philonthus tenuicornis	0	1	1	2
Philonthus varians	1	0	0	1
Philonthus varius	3	0	0	3

	JUNE	JN/JL	JULY	TOTAL
Staphylinus brunnipes	0	1	0	1
Quedius molochinus	0	0	1	1
Mycetoporus piceolus	0	1	0	1
Sepedophilus marshami	1	0	0	1
Tachyporus chrysomelinus	2	4	1	7
Tachyporus hypnorum	3	2	1	6
Tachinus laticollis	1	0	0	1
Aloconota gregaria	8	9	3	20
Amischa analis	0	0	1	1
Atheta elongatula	0	3	0	3
Atheta amicula	0	19	2	21
Atheta fungi	6	14	4	24
Atheta aterrima	0	0	6	6
Atheta muscorum	0	9	0	9
Atheta atramentaria	1	5	0	6
Atheta nigripes	0	2	0	2
Drusilla canaliculata	0	3	3	6
Oxypoda brachyptera	0	0	1	1
Oxypoda haemorrhoa	3	13	0	16
Tinotus morion	1	1	0	2
Aleochara bipustulata	8	24	6	38
Aleochara lanuginosa	0	2	0	2
Serica brunnea	0	3	2	5
Agrypnus murinus	0	1	0	1
Rhagonycha fulva	0	2	1	3
Meligethes aeneus	1	0	0	1
Epuraea aestiva	0	1	0	1
Cryptophagus dentatus	0	0	2	2
Cryptophagus setulosus	0	0	1	1
Atomaria atricapilla	15	12	6	33
Atomaria fuscata	1	0	2	3
Atomaria nitidula	1	2	1	4
Coccidula rufa	0	0	1	1
Coccinella septempunctata	0	1	0	1
Coccinella undecimpunctata	0	3	8	11
Aridius bifasciatus	3	3	7	13
Aridius nodifer	0	1	1	2
Enicmus transversus	0	4	0	4

	JUNE	JN/JL	JULY	TOTAL
Corticaria crenulata	0	3	3	6
Corticaria umbilicata	6	27	1	34
Corticarina fuscula	3	0	4	7
Longitarsus jacobaeae	0	30	149	179
Longitarsus luridus	0	4	0	4
Longitarsus succineus	0	0	9	9
Longitarsus suturellus	1	3	0	4
Crepidodera ferruginea	0	14	14	28
Chaetocnema concinna	0	1	0	1
Apion carduorum	0	2	0	2
Otiorhynchus atroapterus	1	0	0	1
Philopedon plagiatus	0	2	0	2
Ceutorhynchus quadridens	1	0	0	1
Hylastinus obscurus	0	1	0	1
TOTAL	79	283	243	605

A far larger number of species was collected here than at any other site during this survey, with Longitarsus jacobaeae, a species feeding on Senecio jacobaea, being the most numerous.

Several species usually associated with moulds, fungi and decaying vegetable matter were well represented in the catch: Atomaria atricapilla (and two other species of Atomaria), Atheta fungi, A. amicula, Aloconota gregaria, Cryptophagus dentatus, and Aridius bifasciatus. The last, an introduced Australian species first recorded in S.E. England in 1949, is now almost ubiquitous in the southern half of England. It was first recorded outdoors in Scotland, near Edinburgh in 1961 (R.A. and E.A. Crowson, 1961), and K. Side (1977) has collected it at Kinaldy Meadow in Fife. This is the only site at which it was recorded during this survey.

Psammophile species present include very small numbers of Serica brunnea, Philopedon plagiatus, Otiorhynchus atroapterus and Corticaria crenulata. Only Coccinella undecimpunctata, a species which also occurs inland, was at all common. Species associated with carrion and dung made up a large element of the fauna, with Nicrophorus investigator and Aleochara bipustulata being the most abundant. Other species included the Philonthus spp., Anotylus spp., several Atheta spp., Tinotus morion, Aleochara lanuginosa, the Cercyon spp., Sphaeridium scarabaeoides, Megasternum obscurum, the Catops spp. and Saprinus aeneus.

The last species was recorded only at this site.

Phytophagous species were well represented with Meligethes aeneus and Ceutorhynchus quadridens which feed on various Cruciferae, Apion carduorum, Longitarsus luridus and possibly Crepidodera ferruginea feeding on thistles, L. suturellus on Senecio spp., L. succineus on various Compositae and Chaetocnema concinna on Chaenopodium spp., Polygonum spp. or Rumex spp..

Cryptophagus setulosus and Epuraea aestiva occur in the nests of bumble bees, and Helophorus brevipalpis is a water beetle. Larval Lathridiidae were trapped during each period, with large numbers in the middle period, together with a single larva of Cassida sp.. Larvae of Drusilla canaliculata occurred in the middle and last periods, but were more numerous in the last.

3.4 Araneae

	JUNE	JN/JL	JULY	TOTAL
Clubiona lutescens	0	1	0	1
Agroeca proxima	0	0	2	2
Xysticus cristatus	17	2	0	19
Oxyptila trux	4	1	0	5
Pardosa monticola	19	13	1	33
Pardosa palustris	2	1	0	3
Pardosa pullata	26	22	5	53
Pardosa nigriceps	11	12	0	23
Arctosa perita	5	5	1	11
Ero furcata	0	0	2	2
Walckenaera acuminata	0	1	0	1
Dicymbium nigrum	0	1	0	1
Pocadicnemis pumila	1	0	0	1
Pocadicnemis juncea	0	4	3	7
Oedothorax retusus	7	5	5	17
Tiso vagans	4	2	4	10
Gongylidiellum vivum	1	0	0	1
Milleriana inerrans	0	3	0	3
Erigone dentipalpis	2	2	23	27
Erigone atra	13	18	40	71
Agyneta decora	0	0	1	1
Centromerita concinna	1	0	0	1
Bathyphantes gracilis	0	2	3	5

	JUNE	JN/JL	JULY	TOTAL
Bathyphantes parvulus	93	33	11	137
Poeciloneta globosa	0	1	1	2
Stemonyphantes lineatus	1	0	0	1
Lepthyphantes obscurus	0	1	0	1
Lepthyphantes tenuis	5	6	13	24
Lepthyphantes cristatus	0	1	0	1
Lepthyphantes ericaeus	2	2	2	6
TOTAL	214	139	117	470

As at many of the southern East Coast sites Bathyphantes parvulus was the most abundant species. This species is usually found in long calcareous grassland but seldom forms a major part of the fauna. Clubiona lutescens is widespread in England but scarce in Scotland. It is usually found in rather damp areas. Arctosa perita is restricted to sand dunes and dry, bare, sandy heaths. Pocadicnemis juncea has only recently been recognised as a separate species from P. pumila and therefore very few records are available. It would seem to be somewhat more southern in distribution compared with P. pumila. Milleriana inerrans is frequently found in sandy areas especially on the coast but also in many inland areas. Poeciloneta globosa is widespread and not uncommon in the north of Britain in open grassland and under stones. During this survey it was not taken elsewhere. Lepthyphantes obscurus is normally associated with shrub or scrub type vegetation rather than grassland. The remaining species are all common in grassland.

3.5 Mollusca (Land snails)

	JUNE	JN/JL	JULY	TOTAL
Columella edentula	0	0	1	1
Oxychilus alliatius	1	0	0	1
Candidula intersecta	3	19	6	28
Trichia hispida	0	3	1	4
Cepaea hortensis	0	1	0	1
TOTAL	4	23	8	35

A comparatively poor catch was taken here, composed mainly of species which are commonly found in fixed dune areas. Columella edentula was recorded elsewhere only at Site 72B in the survey. It is usually associated with woodland. Candidula intersecta is believed to have been introduced to the British Isles in Roman times, or later.

3.6 Diplopoda

	JUNE	JN/JL	JULY	TOTAL
Cylindroiulus punctatus	1	0	0	1
Cylindroiulus latestriatus	6	9	2	17
Ommatoiulus sabulosus	8	19	3	30
TOTAL	15	28	5	48

Cylindroiulus punctatus is usually associated with woodland and dead wood, and can be considered to be somewhat uncommon in dune grassland, but the other species are typical of sandy areas on the coast.

3.7 Terrestrial Isopoda

	JUNE	JN/JL	JULY	TOTAL
Philoscia muscorum	9	8	4	21
Porcellio scaber	8	75	42	125
TOTAL	17	83	46	146

Both species are commonly recorded on sand dunes and in grassland but Philoscia muscorum seems to be restricted to the coast and to river valleys over much of Scotland.

4. ADDITIONAL SPECIES

4.1 Lepidoptera : Satyridae

The following species was observed in the field during the course of the survey:

Maniola jurtina