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## The moth assemblage of Mugdock Country Park, Stirlingshire (vc86)

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### ABSTRACT

Moth records derived from an extensive programme of trapping between 2003 and 2013 together with field records and older data-sets have been combined in an assessment of the moth assemblage of Mugdock Country Park. Of the 320 species recorded, six are nationally scarce. Other species are present that have dramatically declined in their UK-wide abundance.

### INTRODUCTION

Mugdock Country Park is located in open countryside approximately 16km (10 miles) north of Glasgow and 1.5km south of the western end of the Campsie Fells. It is located within and managed by the regions of Stirling Council and East Dunbartonshire Council but is entirely within the biological recording area of vice county 86, Stirlingshire. The park covers approximately 260ha and overlies a mainly Carboniferous geology of igneous basaltic lava, tuffs and dykes, sedimentary conglomerates and some calciferous sandstone. Although some rock is exposed, most is covered by deposits of boulder clay dating from the last ice age.

A wide range of habitats within the park include mixed woodland, grassland, heath, mire, swamp and open water. Of these, the approximately 80ha of Mugdock Wood is a site of special scientific interest (SSSI) and comprises a mosaic of steep south-facing hillside dominated by oak (*Quercus sp.*); shallower slopes of more mixed deciduous woodland with open areas of bracken (*Pteridium aquilinum*) and blackthorn (*Prunus spinosa*) and lower poorly drained areas of alder (*Alnus glutinosa*) and birch (*Betula pubescens* and *B. pendula*). Heathland habitat is a feature of the undulating plateaux of Drumclog Muir. Here heather (*Calluna vulgaris*), bilberry (*Vaccinium myrtillus*) and birch dominates dryer areas while scrub willow (*Salix sp.*) and wet heath vegetation is found in hollows and where the muir slopes down to the Allander Water. The depression that contains Mugdock Loch is flanked by fen and marshy ground while grassland in the park ranges from neutral semi-improved pasture to the unimproved damp and acidic grasslands of Peitch's Moor that are in part dominated by tussock grass (*Deschampsia cespitosa*), rush (*Juncus sp.*) and willow scrub.

In such a botanically rich and varied area it is to be expected that the moth assemblage would be rich and this paper presents a compilation of the results of 11 years of regular moth trapping and field recording plus some older data-sets.

### METHODS

Moth traps were run in various parts of the park from 2003 until the present. Because of the security that it provides and the availability of mains electricity, the most regular trapping site, with a 125w Robinson-type MV trap, has been the machinery pound at the park centre (NS548779). Regular trapping, with a 125w Skinner-type MV trap, has also been conducted in the oak-dominated upper slopes of Mugdock Wood using a mains electricity supply generously provided by Keith and Annie Hutton at Kyber Cottage. Some trapping with battery powered Heath actinic traps has been conducted at other sites, particularly in the poorly drained areas of Mugdock Wood that are dominated by multi-stemmed alders. Because of security concerns, moth traps have seldom been run on open grassland or the heaths of Drumclog Muir and moth records from these habitats largely depend on field observation.

### RESULTS

Appendix 1 lists 320 moth species recorded in Mugdock Country Park up to December 2013. There are approximately 2500 species of British moths and, although of little scientific merit, it has been a convention for over 100 years to divide them into the macro moths and micro moths. The micro moths comprise approximately 1600 species in those families where most species are small. Until recently they have been relatively poorly covered by identification guides and the difficulty in their identification means that they have often received less attention than the macro moths. Thus, micro moths comprise only 71 species of the 320 recorded in the Mugdock Country Park and they are without doubt significantly under-recorded. Including rare immigrants approximately 900 species of macro moth have been recorded in the UK so the 249 macro species recorded in the park comprise approximately 28% of the British total.

The "individuals recorded" column of Appendix 1 lists the number of individuals of each species known to have been recorded. For some species

recorded during field observations this number will be an under-estimate as not all recorders have collected quantitative data. The status column in Appendix 1 indicates the UK national status of each moth species as defined by the Joint Nature Conservation Committee. The categories are as follows but not all of them are represented in this Mugdock sample:

- Red Data Book species (RDB) - species known from 15 or less 10km squares in the UK.
- Proposed RDB (pRDB) - proposed for inclusion in the next Red Data Book listing because current information indicates that the species meets the criteria.
- Nationally Scarce A (Na) - species recorded from 16-30 10km squares since January 1980.
- Nationally Scarce B (Nb) - species recorded from 30-100 10km squares since January 1980.
- Local - species recorded from 100-300 10km squares since January 1980.
- Common - species recorded from over 300 10km squares since January 1980
- Uncommon on introduced food-plant.
- Immigrant.
- Rare immigrant.
- Import.

A small number of macro moths cannot be unambiguously identified without dissection of their genitalia. These include the November moth aggregate comprising November moth (*Epirrita dilutata*), pale November moth (*Epirrita christyi*) and autumnal moth (*Epirrita autumnata*); the marbled minor aggregate comprising the marbled minor (*Oligia strigilis*), tawny marbled minor (*Oligia latruncula*) and rufous minor (*Oligia versicolor*); the common and lesser common rustic (*Mesapamea secalis* and *M. didyma*) and the ear moths (*Amphipoea sp.*). In each case these moths are identified at species level in Appendix 1 where their genitalia have been examined otherwise they are listed as an aggregate.

## DISCUSSION

### Nationally scarce moths recorded in Mugdock Country Park

Of the 320 moth species recorded in the park, three are classified as Nationally Scarce A, three as Nationally Scarce B and 48 as Local in their UK-wide occurrence. Those classed as nationally scarce are:

***Biselachista trapeziella* – Nationally Scarce A** – recorded once as a larvae in Mugdock Wood in 1983. It is desirable to discover more about the occurrence of this rare moth in the area.

***Donacaula mucronellus* – Nationally scarce B** – a moth of marshes, fens and reedy ditches that is also

recorded on Loch Lomondside and in the Aberfoyle area.

**Barred carpet (*Perizoma taeniata*) – Nationally Scarce A** - The barred carpet is a rare moth of damp, shaded woodland often associated with basic rocks. It was first discovered in the region above a damp wooded gully in Lennoxton. The capture of further examples near the Visitor Centre of Mugdock Country Park on the 23<sup>rd</sup> July and 10<sup>th</sup> of August, 2013 was a considerable surprise but there was suitable habitat nearby.

**Pretty pinion (*Perizoma blandiata*) – Nationally Scarce B** – The resident sub-species *blandiata* is mainly found in Scotland from the central belt northwards.

**Great brocade (*Eurois occulta*) – Nationally scarce A** - The great brocade (*Eurois occulta*) occurs in the UK in two forms. The typical grey form occurs as a scarce immigrant from Scandinavia, the Netherlands and northern Germany and the most recent definite record of this form in the region was in Mugdock Country Park in 2005. There is however a second, essentially black form of this moth (form *passetii*) which is resident in boggy areas of the western and central highlands of Scotland where it feeds on bog myrtle (*Myrica gale*). In central Scotland, it breeds in Flanders Moss (Knowler, 2012a) and probably in Glen Dubh, Glen Finglass and other suitable habitats. A 2004 record from Mugdock Country Park was rather worn but probably a wandering individual of this form.

**Saxon (*Hyppa rectilinea*) – Nationally Scarce B** – A northern species of open woodland and upland marshes.

### Moths of Mugdock Country Park that have dramatically declined in their UK abundance

Fox *et al.* (2013) analysed forty years of data from the UK-wide network of Rothamsted light traps during the period 1968 to 2007. They examined the data for 337 species of common larger moths and showed that 61% had declined in abundance by over 75% over the forty years. Nineteen of these are found in Mugdock Country Park and they are listed in Appendix 2 in order of the percentage change in their UK abundance. International Union for Conservation of Nature (IUCN) categories are based on rate of decline.

### Moth species moving north into Central Scotland perhaps because of climate warming

Regular moth trapping has allowed the documentation of moth species moving north into central Scotland, perhaps in response to climate warming. Since 2000 eleven species have been recorded in vc86 (Stirlingshire) for the first time and their movement has been followed from northern England to central Scotland in most cases but not always via southern Scotland (Knowler and Mitchell, 2004, Knowler 2005, Leverton and Palmer, 2009; Knowler 2012b, Knowler 2013). Six of these species have been recorded in Mugdock Country

Park, namely: *Ypsolopha sequella*, oak tree pug (*Eupithecia dodoneata*), red-necked footman (*Atolmis rubricollis*), pale pinion (*Lithophane hepatica*), copper underwing (*Amphipyra pyramidea*) and slender brindle (*Apamea scolopacina*).

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#### Appendix 1. Moth species recorded in Mugdock Country Park.

Taxon	Vernacular	Individuals Recorded	First Recorded	Last Recorded	UK Status
<i>Eriocrania semipurpurella</i>		2	2005	2006	Common
<i>Hepialus humuli</i>	Ghost Moth	1	2009	2009	Common
<i>Hepialus hecta</i>	Gold Swift	6	1983	2013	Local
<i>Hepialus fusconebulosa</i>	Map-winged Swift	46	2003	2013	Local
<i>Stigmella sorbi</i>		0	1983	1983	Common
<i>Stigmella hemargyrella</i>		5	2005	2005	Common
<i>Incurvaria pectinea</i>		0	1983	1983	Local
<i>Zygaena filipendulae</i>	Six-spot Burnet	1	2001	2001	Common
<i>Diplodoma herminata</i>		1	1983	1983	
<i>Phyllonorycter harrisella</i>		0	1983	1983	Common
<i>Phyllonorycter leucographella</i>	Firethorn Leaf Miner	3	2004	2004	Common
<i>Phyllonorycter maestingella</i>		5	2005	2005	Common
<i>Anthophila fabriciana</i>		1	2008	2008	Common
<i>Glyphipterix simplicella</i>	Cocksfoot Moth	0	2010	2010	Common
<i>Glyphipterix thrasonella</i>		0	1983	1983	Common
<i>Argyresthia brockeella</i>		1	2006	2006	Common
<i>Argyresthia conjugella</i>	Apple Fruit Moth	2	2005	2005	Common
<i>Yponomeuta evonymella</i>	Bird-cherry Ermine	338	1983	2011	Common
<i>Prays fraxinella</i>	Ash Bud Moth	1	2005	2005	Common
<i>Ypsolopha nemorella</i>		0	1983	1983	Local
<i>Ypsolopha dentella</i>	Honeysuckle Moth	1	2011	2011	Common
<i>Ypsolopha parenthesella</i>		2	1983	2005	Common
<i>Ypsolopha sequella</i>		10	2005	2013	Common

<i>Plutella xylostella</i>	Diamond-back Moth	2	2006	2006	Migrant
<i>Coleophora serratella</i>		0	1983	1983	Common
<i>Coleophora alticolella</i>		0	1983	1983	Common
<i>Biselachista trapeziella</i>		0	1983	1983	Nationally Scarce A
<i>Diurnea fagella</i>		23	2005	2013	Common
<i>Semioscopis avellanella</i>		1	2005	2005	Local
<i>Agonopterix ciliella</i>		1	2005	2005	Common
<i>Agonopterix ocellana</i>		4	2008	2013	Common
<i>Carpatolechia notatella</i>		1	1905	1905	Local
<i>Carpatolechia proximella</i>		3	1875	1983	Common
<i>Hypatima rhomboidella</i>		2	2013	2013	Common
<i>Blastobasis lacticolella</i>		5	2006	2006	Common
<i>Mompha locupletella</i>		0	1983	1983	Local
<i>Pandemis cerasana</i>	Barred Fruit-tree Tortrix	12	2006	2012	Common
<i>Pandemis cinnamomeana</i>		2	2012	2013	Common
<i>Pandemis heparana</i>	Dark Fruit-tree Tortrix	3	2005	2005	Common
<i>Clepsis spectrana</i>	Cyclamen Tortrix	1	2005	2005	Common
<i>Capua vulgana</i>		0	1983	1983	Common
<i>Eulia ministrana</i>		3	2006	2006	Common
<i>Tortrix viridana</i>	Green Oak Tortrix	5	2005	2005	Common
<i>Acleris laterana</i>		4	2008	2008	Common
<i>Acleris sparsana</i>		1	2013	2013	Common
<i>Acleris literana</i>		1	2005	2005	Local
<i>Acleris emargana</i>		1	2008	2008	Common
<i>Celypha lacunana</i>		0	1983	1983	Common
<i>Apotomis turbidana</i>		5	2005	2012	Common
<i>Apotomis betuleana</i>		10	2005	2005	Common
<i>Bactra lancealana</i>		0	1983	1983	Common
<i>Epinotia brunnichana</i>		2	2013	2013	Common
<i>Cydia ulicetana</i>		1	2006	2006	Common
<i>Dichrorampha montanana</i>		0	1983	1983	Local
<i>Alucita hexadactyla</i>	Twenty-plume Moth	1	2010	2010	Common
<i>Crambus pascuella</i>		6	2005	2005	Common
<i>Crambus lathoniellus</i>		2	2004	2005	Common
<i>Agriphila selasella</i>		1	2010	2010	Local
<i>Agriphila tristella</i>		5	2005	2005	Common
<i>Catoptria pinella</i>		2	2004	2005	Common
<i>Donacaula mucronellus</i>		1	2005	2005	Nationally Scarce B
<i>Scoparia ambigualis</i>		546	1983	2012	Common
<i>Elophila nymphaeata</i>	Brown China-mark Beautiful China-mark	5	2004	2011	Common
<i>Nymphula stagnata</i>		3	2006	2009	Local
<i>Eurrhyncha hortulata</i>	Small Magpie	1	2013	2013	Common
<i>Opsitotys fuscalis</i>		2	2005	2005	Local
<i>Udea lutealis</i>		3	2005	2010	Common
<i>Udea olivalis</i>		11	2005	2013	Common
<i>Pleuroptya ruralis</i>	Mother of Pearl	68	2004	2013	Common
<i>Trachycera advenella</i>		4	2005	2009	Common
<i>Poecilocampa populi</i>	December Moth	12	2003	2011	Common
<i>Euthrix potatoria</i>	Drinker	68	2003	2013	Common
<i>Saturnia pavonia</i>	Emperor Moth	10	1975	2012	Common
<i>Drepana falcataria</i>	Pebble Hook-tip	8	2003	2013	Common

<i>Thyatira batis</i>	Peach Blossom	2	2003	2004	Common
<i>Ochropacha duplaris</i>	Common Lutestring	43	2003	2013	Common
<i>Achlya flavicornis</i>	Yellow Horned	196	2003	2013	Common
<i>Archiearis parthenias</i>	Orange Underwing	5	2008	2012	Local
<i>Alsophila aescularia</i>	March Moth	67	2003	2012	Common
<i>Geometra papilionaria</i>	Large Emerald	23	2003	2013	Common
<i>Scopula ternata</i>	Smoky Wave	2	2008	2009	Local
	Small Fan-footed				
<i>Idaea biselata</i>	Wave	46	2003	2013	Common
<i>Idaea aversata</i>	Riband Wave	118	1975	2013	Common
<i>Xanthorhoe designata</i>	Flame Carpet	52	1975	2013	Common
	Dark-barred Twin-				
<i>Xanthorhoe ferrugata</i>	spot Carpet	19	1961	2012	Common
<i>Xanthorhoe montanata</i>	Silver-ground Carpet	83	1975	2013	Common
<i>Xanthorhoe fluctuata</i>	Garden Carpet	6	2012	2012	Common
<i>Scotopteryx</i>					
<i>chenopodiata</i>	Shaded Broad-bar	5	2005	2013	Common
<i>Epirrhoe alternata</i>	Common Carpet	18	1961	2013	Common
<i>Anticlea badiata</i>	Shoulder Stripe	3	2010	2011	Common
<i>Anticlea derivata</i>	Streamer	3	2010	2011	Common
<i>Lampropteryx</i>					
<i>suffumata</i>	Water Carpet	52	2003	2013	Common
<i>Cosmorhoe ocellata</i>	Purple Bar	35	2003	2013	Common
	Striped Twin-spot				
<i>Nebula salicata</i>	Carpet	1	2012	2012	Common
<i>Eulithis testata</i>	Chevron	1	1975	2004	Common
<i>Eulithis populata</i>	Northern Spinach	23	1975	2013	Common
<i>Eulithis pyraliata</i>	Barred Straw	70	2003	2013	Common
<i>Ecliptopera silaceata</i>	Small Phoenix	52	2003	2013	Common
<i>Chloroclysta siterata</i>	Red-green Carpet	103	2003	2013	Common
	Autumn Green				
<i>Chloroclysta miata</i>	Carpet	28	2003	2013	Local
<i>Chloroclysta citrata</i>	Dark Marbled Carpet	45	2003	2013	Common
	Common Marbled				
<i>Chloroclysta truncata</i>	Carpet	216	2003	2013	Common
<i>Cidaria fulvata</i>	Barred Yellow	2	2003	2013	Common
<i>Thera firmata</i>	Pine Carpet	17	2004	2013	Common
<i>Thera obeliscata</i>	Grey Pine Carpet	204	2003	2013	Common
<i>Thera britannica</i>	Spruce Carpet	196	2004	2013	Common
	Broken-barred				
<i>Electrophaes corylata</i>	Carpet	21	2006	2013	Common
<i>Colostygia</i>					
<i>multistrigaria</i>	Mottled Grey	117	2004	2013	Common
<i>Colostygia pectinataria</i>	Green Carpet	87	1975	2013	Common
<i>Hydriomena furcata</i>	July Highflyer	221	1975	2013	Common
<i>Hydriomena impluviata</i>	May Highflyer	2	2006	2006	Common
<i>Epirrita dilutata</i>	November Moth	33	2004	2013	Common
<i>Epirrita christyi</i>	Pale November Moth	8	2005	2009	Common
<i>Epirrita autumnata</i>	Autumnal Moth	22	2004	2009	Common
	Small Autumnal				
<i>Epirrita filigrammaria</i>	Moth	3	2003	2003	Common
<i>Epirrita agg.</i>	November Moth agg.	113	2005	2009	Common
<i>Operophtera brumata</i>	Winter Moth	12	2003	2007	Common
	Northern Winter				
<i>Operophtera fagata</i>	Moth	1	2003	2003	Common
<i>Perizoma taeniata</i>	Barred Carpet	2	2013	2013	Nationally Scarce A
<i>Perizoma affinitata</i>	Rivulet	4	2005	2012	Common

<i>Perizoma alchemillata</i>	Small Rivulet	20	2003	2013	Common
<i>Perizoma blandiata</i>	Pretty Pinion	1	2004	2004	Nationally Scarce B
<i>Perizoma albulata</i>	Grass Rivulet	5	2003	2005	Local
<i>Perizoma flavofasciata</i>	Sandy Carpet	1	2012	2012	Common
<i>Perizoma didymata</i>	Twin-spot Carpet	2	1975	2003	Common
<i>Eupithecia tenuiata</i>	Slender Pug	1	2011	2011	Common
<i>Eupithecia pulchellata</i>	Foxglove Pug	17	2004	2013	Common
<i>Eupithecia exiguata</i>	Mottled Pug	1	2013	2013	Common
<i>Eupithecia absinthiata</i>	Wormwood Pug	3	2005	2007	Common
<i>E. absinthiata f. goossensiata</i>	Ling Pug	2	2005	2013	Local
<i>Eupithecia vulgata</i>	Common Pug	8	2007	2012	Common
<i>Eupithecia subfuscata</i>	Grey Pug	4	2004	2011	Common
<i>Eupithecia icterata</i>	Tawny Speckled Pug	10	2003	2013	Common
<i>Eupithecia indigata</i>	Ochreous Pug	5	2005	2011	Common
<i>Eupithecia nanata</i>	Narrow-winged Pug	2	2005	2006	Common
<i>Eupithecia virgaureata</i>	Golden-rod Pug	1	2010	2010	Local
<i>Eupithecia abbreviata</i>	Brindled Pug	139	2003	2013	Common
<i>Eupithecia dodoneata</i>	Oak-tree Pug	2	2010	2013	Common
<i>Eupithecia lariciata</i>	Larch Pug	4	2004	2012	Common
<i>Eupithecia tantillaria</i>	Dwarf Pug	14	2004	2011	Common
<i>Chloroclystis v-ata</i>	V-Pug	7	2003	2013	Common
<i>Pasiphila rectangulata</i>	Green Pug	31	2005	2006	Common
<i>Gymnoscelis rufifasciata</i>	Double-striped Pug	5	2003	2005	Common
<i>Chesias legatella</i>	Streak	14	2004	2013	Common
<i>Aplocera plagiata</i>	Treble-bar	1	2003	2003	Common
<i>Odezia atrata</i>	Chimney Sweeper	1	1975	2003	Common
<i>Venusia cambrica</i>	Welsh Wave	129	2003	2013	Local
<i>Euchoeca nebulata</i>	Dingy Shell	1	2004	2004	Local
<i>Hydrelia flammeolaria</i>	Small Yellow Wave	4	2003	2007	Common
<i>Lobophora halterata</i>	Seraphim	3	2006	2011	Local
<i>Trichopteryx carpinata</i>	Early Tooth-striped Yellow-barred	117	2003	2013	Common
<i>Acasis viretata</i>	Brindle	5	2011	2013	Local
<i>Lomaspilis marginata</i>	Clouded Border	127	1975	2013	Common
<i>Macaria liturata</i>	Tawny-barred Angle	1	2005	2005	Common
<i>Chiasmia clathrata</i>	Latticed Heath	5	1991	2010	Common
<i>Petrophora chlorosata</i>	Brown Silver-line	197	1961	2013	Common
<i>Plagodis dolabraria</i>	Scorched Wing	26	2003	2012	Local
<i>Opisthograptis luteolata</i>	Brimstone Moth	156	2003	2013	Common
<i>Pseudopanthera macularia</i>	Speckled Yellow Canary-shouldered	1	2003	2003	Common
<i>Ennomos alniaria</i>	Thorn	16	2004	2013	Common
<i>Selenia dentaria</i>	Early Thorn	52	2003	2013	Common
<i>Odontopera bidentata</i>	Scalloped Hazel	54	2003	2013	Common
<i>Crocallis elinguaris</i>	Scalloped Oak	1	2006	2006	Common
<i>Ourapteryx sambucaria</i>	Swallow-tailed Moth	4	2005	2013	Common
<i>Colotois pennaria</i>	Feathered Thorn	75	2004	2013	Common
<i>Phigalia pilosaria</i>	Pale Brindled Beauty	63	2004	2009	Common
<i>Biston strataria</i>	Oak Beauty	63	2004	2011	Common
<i>Biston betularia</i>	Peppered Moth	32	2003	2013	Common
<i>Agriopis aurantiaria</i>	Scarce Umber	33	1983	2010	Common
<i>Agriopis marginaria</i>	Dotted Border	9	2004	2012	Common
<i>Erannis defoliaria</i>	Mottled Umber	25	1983	2010	Common

<i>Deileptenia ribeata</i>	Satin Beauty	4	2003	2005	Common
<i>Alcis repandata</i>	Mottled Beauty	86	2003	2013	Common
<i>Alcis jubata</i>	Dotted Carpet	15	2006	2013	Local
<i>Ectropis bistortata</i>	Engrailed	108	2003	2013	Common
<i>Ematurga atomaria</i>	Common Heath	13	2004	2011	Common
<i>Bupalus piniaria</i>	Bordered White	7	2006	2011	Common
	Common White				
<i>Cabera pusaria</i>	Wave	65	1975	2013	Common
<i>Cabera exanthemata</i>	Common Wave	25	1975	2013	Common
<i>Lomographa temerata</i>	Clouded Silver	12	2003	2010	Common
<i>Campaea margaritata</i>	Light Emerald	258	1975	2013	Common
<i>Hylaea fasciaria</i>	Barred Red	24	2003	2013	Common
<i>Laothoe populi</i>	Poplar Hawk-moth	62	2003	2013	Common
<i>Deilephila elpenor</i>	Elephant Hawk-moth	16	2004	2013	Common
	Small Elephant				
<i>Deilephila porcellus</i>	Hawk-moth	10	2004	2011	Local
<i>Phalera bucephala</i>	Buff-tip	10	2003	2011	Common
<i>Notodonta dromedarius</i>	Iron Prominent	5	2003	2007	Common
<i>Notodonta ziczac</i>	Pebble Prominent	15	2004	2013	Common
	Lesser Swallow				
<i>Pheosia gnoma</i>	Prominent	136	2003	2013	Common
<i>Pheosia tremula</i>	Swallow Prominent	1	2011	2011	Common
<i>Ptilodon capucina</i>	Coxcomb Prominent	43	2003	2013	Common
<i>Odontosia carmelita</i>	Scarce Prominent	34	2003	2011	Local
<i>Pterostoma palpina</i>	Pale Prominent	1	2013	2013	Common
	Lunar Marbled				
<i>Drymonia ruficornis</i>	Brown	6	2003	2007	Common
<i>Orgyia antiqua</i>	Vapourer	0	1975	1975	Common
<i>Nudaria mundana</i>	Muslin Footman	10	2005	2013	Local
<i>Atolmis rubricollis</i>	Red-necked Footman	3	2006	2006	Local
<i>Arctia caja</i>	Garden Tiger	9	2003	2013	Common
<i>Diacrisia sannio</i>	Clouded Buff	1	2009	2009	Local
<i>Spilosoma lubricipeda</i>	White Ermine	125	1996	2013	Common
<i>Nola confusalis</i>	Least Black Arches	42	2004	2013	Local
<i>Agrotis segetum</i>	Turnip Moth	1	2006	2006	Common
<i>Agrotis exclamationis</i>	Heart and Dart	3	2006	2012	Common
<i>Agrotis ipsilon</i>	Dark Sword-grass	2	2005	2006	Migrant
<i>Axylia putris</i>	Flame	1	2004	2004	Common
<i>Ochropleura plecta</i>	Flame Shoulder	50	2003	2013	Common
	Large Yellow				
<i>Noctua pronuba</i>	Underwing	915	1975	2013	Common
	Lesser Yellow				
<i>Noctua comes</i>	Underwing	180	2003	2013	Common
	Broad-bordered				
<i>Noctua fimbriata</i>	Yellow Underwing	48	2003	2011	Common
	Lesser Broad-bordered Yellow				
<i>Noctua janthe</i>	Underwing	112	2003	2013	Common
<i>Graphiphora augur</i>	Double Dart	1	2010	2010	Common
<i>Eugnorisma glareosa</i>	Autumnal Rustic	120	2004	2013	Common
<i>Lycophotia porphyrea</i>	True Lover's Knot	112	2003	2013	Common
<i>Diarsia mendica</i>	Ingrailed Clay	254	2005	2013	Common
<i>Diarsia dahlii</i>	Barred Chestnut	92	2003	2013	Local
<i>Diarsia brunnea</i>	Purple Clay	69	2004	2013	Common
<i>Diarsia rubi</i>	Small Square-spot	31	2003	2013	Common
	Setaceous Hebrew				
<i>Xestia c-nigrum</i>	Character	1	2013	2013	Common

<i>Xestia ditrapezium</i>	Triple-spotted Clay	1	2010	2010	Local
<i>Xestia triangulum</i>	Double Square-spot	41	2004	2013	Common
<i>Xestia baja</i>	Dotted Clay	551	2003	2013	Common
<i>Xestia castanea</i>	Neglected Rustic	8	2004	2008	Local
<i>Xestia sexstrigata</i>	Six-striped Rustic	29	2003	2013	Common
<i>Xestia xanthographa</i>	Square-spot Rustic	159	2003	2013	Common
<i>Eurois occulta</i>	Great Brocade	2	2004	2005	Nationally Scarce A
<i>Anaplectoides prasina</i>	Green Arches	46	2003	2013	Common
<i>Cerastis rubricosa</i>	Red Chestnut	65	2003	2013	Common
<i>Hada plebeja</i>	Shears	5	2006	2012	Common
<i>Polia nebulosa</i>	Grey Arches	10	2004	2013	Common
<i>Mamestra brassicae</i>	Cabbage Moth	1	2003	2003	Common
<i>Lacanobia thalassina</i>	Pale-shouldered Brocade	42	2003	2013	Common
<i>Lacanobia oleracea</i>	Bright-line Brown- eye	7	2004	2010	Common
<i>Papestra biren</i>	Glaucous Shears	4	2003	2012	Local
<i>Melanchra pisi</i>	Broom Moth	1	2005	2005	Common
<i>Hadena rivularis</i>	Campion	3	2003	2013	Common
<i>Cerapteryx graminis</i>	Antler Moth	43	1975	2013	Common
<i>Panolis flammea</i>	Pine Beauty	3	2005	2005	Common
<i>Orthosia cruda</i>	Small Quaker	226	2003	2012	Common
<i>Orthosia gracilis</i>	Powdered Quaker	2	2010	2010	Common
<i>Orthosia cerasi</i>	Common Quaker	581	2003	2013	Common
<i>Orthosia incerta</i>	Clouded Drab	523	2004	2013	Common
<i>Orthosia munda</i>	Twin-spotted Quaker	180	2004	2012	Common
<i>Orthosia gothica</i>	Hebrew Character Brown-line Bright	978	2003	2013	Common
<i>Mythimna conigera</i>	Eye	2	2006	2013	Common
<i>Mythimna ferrago</i>	Clay	22	2003	2012	Common
<i>Mythimna impura</i>	Smoky Wainscot	158	1975	2013	Common
<i>Mythimna comma</i>	Shoulder-striped Wainscot	6	2006	2011	Common
<i>Brachylochia viminalis</i>	Minor Shoulder-knot	151	2003	2013	Common
<i>Dasypolia templi</i>	Brindled Ochre	1	2011	2011	Local
<i>Aporophyla nigra</i>	Black Rustic	24	2003	2013	Common
<i>Lithophane hepatica</i>	Pale Pinion	1	2011	2011	Local
<i>Xylena vetusta</i>	Red Sword-grass	5	2004	2011	Local
<i>Xylocampa areola</i>	Early Grey	22	2003	2011	Common
<i>Allophyes oxyacanthae</i>	Green-brindled Crescent	33	2004	2011	Common
<i>Dichonia aprilina</i>	Merveille du Jour	10	2003	2013	Common
<i>Dryobotodes eremita</i>	Brindled Green	7	2004	2005	Common
<i>Blepharita adusta</i>	Dark Brocade	4	2009	2013	Common
<i>Eupsilia transversa</i>	Satellite	14	2005	2011	Common
<i>Conistra vaccinii</i>	Chestnut	174	2003	2013	Common
<i>Agrochola circellaris</i>	Brick	5	2004	2011	Common
<i>Agrochola lota</i>	Red-line Quaker	139	2003	2013	Common
<i>Agrochola macilenta</i>	Yellow-line Quaker	103	2004	2013	Common
<i>Agrochola helvola</i>	Flounced Chestnut	8	2003	2013	Common
<i>Parastichtis suspecta</i>	Suspected Centre-barred	9	2010	2011	Local
<i>Atethmia centrago</i>	Sallow	4	2005	2005	Common
<i>Xanthia citrigo</i>	Orange Sallow	1	2004	2004	Common
<i>Xanthia togata</i>	Pink-barred Sallow	43	2004	2013	Common
<i>Xanthia ictertia</i>	Sallow	83	1975	2013	Common



<i>Acronicta psi</i>	Grey Dagger	4	2005	2005	Common
<i>Acronicta rumicis</i>	Knot Grass	1	1975	2009	Common
<i>Craniophora ligustri</i>	Coronet	3	2005	2007	Local
<i>Cryphia domestica</i>	Marbled Beauty	4	2003	2005	Common
<i>Amphipyra pyramidea</i>	Copper Underwing	1	2010	2010	Common
	Svensson's Copper				
<i>Amphipyra berbera</i>	Underwing	2	2010	2010	Common
<i>Rusina ferruginea</i>	Brown Rustic	105	2003	2012	Common
<i>Euplexia lucipara</i>	Small Angle Shades	19	2003	2013	Common
<i>Phlogophora meticulosa</i>	Angle Shades	27	2003	2009	Common
<i>Cosmia trapezina</i>	Dun-bar	78	2003	2013	Common
<i>Hyppa rectilinea</i>	Saxon	5	2004	2011	Nationally Scarce B
<i>Apamea monoglypha</i>	Dark Arches	249	2003	2013	Common
	Clouded-bordered				
<i>Apamea crenata</i>	Brindle	63	2003	2013	Common
<i>Apamea remissa</i>	Dusky Brocade	27	2003	2013	Common
<i>Apamea sordens</i>	Rustic Shoulder-knot	24	1983	2012	Common
<i>Apamea scolopacina</i>	Slender Brindle	86	2004	2013	Local
<i>Oligia strigilis agg.</i>	Marbled Minor agg.	189	2003	2013	
<i>Oligia versicolor</i>	Rufous Minor	9	2005	2012	Local
	Tawny Marbled				
<i>Oligia latruncula</i>	Minor	3	2004	2008	Common
<i>Oligia fasciuncula</i>	Middle-barred Minor	73	2003	2013	Common
<i>Mesapamea secalis</i>	Common Rustic	4	2005	2009	Common
	Lesser Common				
<i>Mesapamea didyma</i>	Rustic	8	2004	2010	Common
<i>Mesapamea secalis agg.</i>	Common Rustic agg.	81	1975	2013	
<i>Photodes minima</i>	Small Dotted Buff	32	1975	2011	Common
<i>Chortodes pygmina</i>	Small Wainscot	40	2004	2013	Common
<i>Luperina testacea</i>	Flounced Rustic	1	2005	2005	Common
<i>Amphipoea lucens</i>	Large Ear	23	2004	2013	Local
<i>Amphipoea crinanensis</i>	Crinan Ear	2	2005	2013	Local
<i>Amphipoea oculea agg.</i>	Ear Moth agg.	11	2004	2013	
<i>Hydraecia micacea</i>	Rosy Rustic	35	2003	2013	Common
<i>Gortyna flavago</i>	Frosted Orange	13	2003	2013	Common
<i>Celaena haworthii</i>	Haworth's Minor	3	2009	2010	Local
<i>Celaena leucostigma</i>	Crescent	5	2008	2013	Local
<i>Nonagria typhae</i>	Bulrush Wainscot	1	2008	2008	Common
<i>Hoplodrina blanda</i>	Rustic	4	2004	2010	Common
<i>Caradrina morpheus</i>	Mottled Rustic	2	2004	2007	Common
<i>Paradrina clavipalpis</i>	Pale Mottled Willow	1	2005	2005	Common
<i>Pseudoips prasinana</i>	Green Silver-lines	3	2005	2006	Common
<i>Nycteola revayana</i>	Oak Nycteoline	1	2011	2011	Local
<i>Colocasia coryli</i>	Nut-tree Tussock	140	2003	2013	Common
<i>Diachrysa chrysitis</i>	Burnished Brass	79	2003	2013	Common
<i>Plusia festucae</i>	Gold Spot	10	2003	2007	Common
<i>Plusia putnami</i>	Lempke's Gold Spot	10	2011	2013	Local
<i>Autographa gamma</i>	Silver Y	62	1975	2013	Migrant
<i>Autographa pulchrina</i>	Beautiful Golden Y	164	2003	2013	Common
<i>Autographa jota</i>	Plain Golden Y	21	2003	2011	Common
<i>Autographa bractea</i>	Gold Spangle	74	2003	2013	Common
<i>Abrostola triplasia</i>	Dark Spectacle	3	2003	2003	Common
<i>Abrostola tripartita</i>	Spectacle	22	2004	2013	Common
<i>Callistege mi</i>	Mother Shipton	3	1961	2006	Common
<i>Scoliopteryx libatrix</i>	Herald	3	2004	2006	Common

<i>Rivula sericealis</i>	Straw Dot	29	2004	2013	Common
<i>Hypena proboscidalis</i>	Snout	97	1975	2013	Common
<i>Schrankia costae</i>	Pinion-streaked Snout	11	2004	2008	Local
<i>Zanclognatha tarsipennalis</i>	Fan-foot	1	2008	2008	Common
<i>Herminia grisealis</i>	Small Fan-foot	14	2004	2012	Common

**Appendix 2.** Moths found in Mugdock Country Park that have declined in their UK-wide abundance by 75% or more between 1968 and 2007.

English Name	Scientific Name	UK-wide percentage change over 40 years	IUCN Category
Double Dart	<i>Graphiphora augur</i>	-98	Endangered
Flounced Chestnut	<i>Agrochola helvola</i>	-94	Endangered
Brindled Ochre	<i>Dasypolia templi</i>	-94	Endangered
Autumnal Rustic	<i>Eugnorisma glareosa</i>	-92	Endangered
Garden Tiger	<i>Arctia caja</i>	--92	Endangered
Haworth's Minor	<i>Celaena haworthii</i>	-92	Endangered
Dark-barred Twin-spot Carpet	<i>Xanthorhoe ferrugata</i>	-91	Endangered
Small square-spot	<i>Diarsia rubi</i>	-87	Vulnerable
Rosy Rustic	<i>Hydraecia micacea</i>	-87	Vulnerable
Sallow	<i>Xanthia iceritia</i>	-85	Vulnerable
Broom Moth	<i>Melanchra pisi</i>	-84	Vulnerable
Mottled Rustic	<i>Caradrina morpheus</i>	-84	Vulnerable
Green Brindled Crescent	<i>Allophyes oxyacanthae</i>	-81	Vulnerable
Small autumnal Moth	<i>Epirrita filigrammaria</i>	-81	Vulnerable
Rustic	<i>Hoplodrina blanda</i>	-78	Vulnerable
Heart and Dart	<i>Agrotis exclamationis</i>	-76	Vulnerable
Knot Grass	<i>Acronicta rumicis</i>	-75	Vulnerable
Black Rustic	<i>Aporophyla nigra</i>	-75	Vulnerable
Garden carpet	<i>Xanthorhoe fluctuata</i>	-75	Vulnerable



Mugdock Country Park. Portrays the Battle of Loudon Hill. Muiravonside Country Park. A perfect stand-in for Selkirk Forest. Old St Bride's Church. A mausoleum to the Black Douglas. Pinkston Watersports Centre. Appears as a waterfall in Outlaw King. Portencross Castle. As you carry along the scenic A86, which leads eventually to Spean Bridge and Fort William, look out for the imposing Ardverikie House. Loch Lomond. Luss, G83 8PA. Visit website. As the old song goes "take the high road" or the "low road" to the "Bonnie, Bonnie Banks of Loch Lomond", one of Scotland's most iconic places and the largest body of freshwater in Great Britain. This vast loch is easily accessed by train from the centre of Glasgow and a number of cruise boats tour the loch's beautiful islands.