

Supplementary material

Appendix 1

Environmental conditions that can create spurious effects on black light trapping of adult Lepidoptera (moths) were very similar between years.

	2004–2005 (11 dates)		2005–2006 (15 dates)		2006–2007 (21 dates)	
	t-statistic	p	t-statistic	p	t-statistic	p
Moonlight	0.79	0.45	0.07	0.94	0.32	0.76
Temp	1.11	0.29	1.26	0.23	0.41	0.71
Rainfall	0.34	0.75	1.53	0.15	0.38	0.71

Appendix 2

Results of ANOVAs testing for structure in Lepidoptera population dynamics from seven hypothetical sources (each row of table), with commas used to separate degrees of freedom (DF) for groups from those for error. Asterisks indicate significance at $p < 0.05$ (not controlling for family-wide error rates). Analyses were performed for each pair of years separately.

Group definition	2004–2005		2005–2006		2006–2007	
	DF	F	DF	F	DF	F
Family	9,63	1.33	9,70	1.34	9,88	1.29
Subfamily	19,49	1.95*	19,53	0.89	22,70	2.06*
Larval season	2,65	3.14*	2,71	0.12	2,82	0.63
Flight season	3,71	2.89*	3,78	0.38	3,96	1.28
Overwinter life stage	2,63	3.14*	2,68	0.04	2,75	0.7
Host category	5,68	0.44	5,74	0.32	5,91	0.69
Preferred host	11,45	0.78	12,48	0.91	12,60	1.35

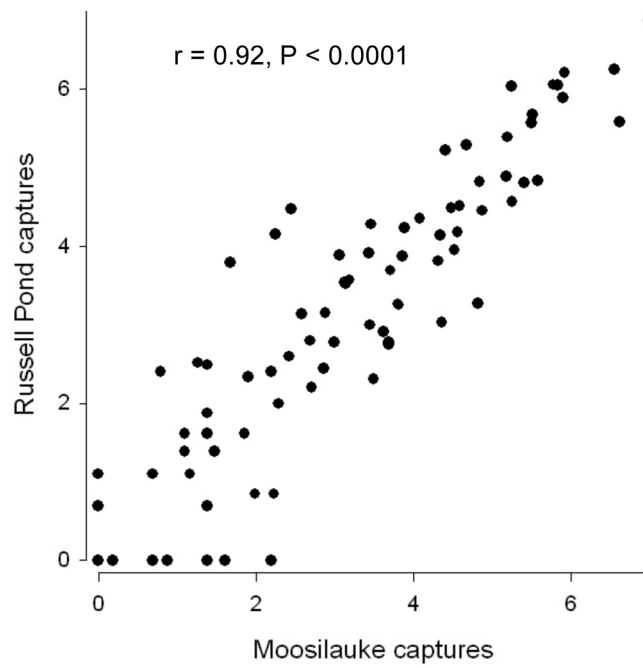
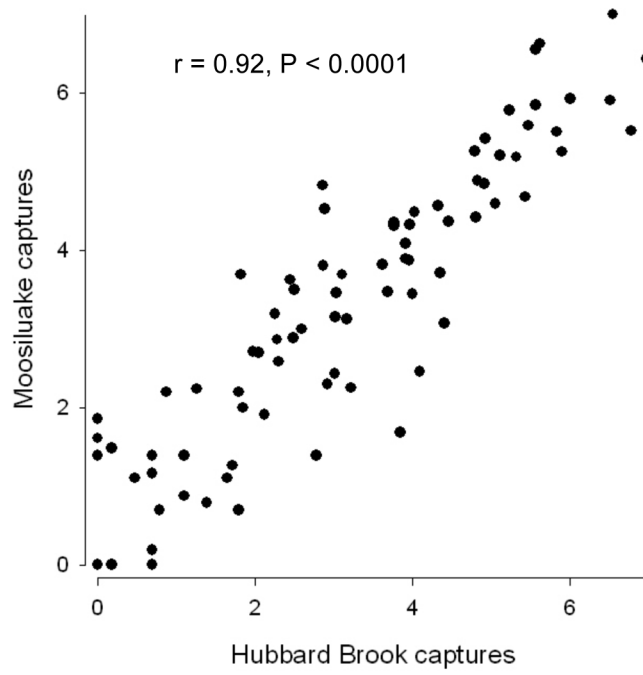
Appendix 3

Correlation among moth abundances [$\text{Ln}(\text{moths} \times \text{trap}^{-1} \times \text{yr}^{-1} + 1)$] captured in black light traps at three sites (HB, MS and RP) across four years (2004–2007). All correlations were significant at a family wide error rate of $\pi = 0.05$, corresponding to a comparison-wise error rate of $\alpha = 0.0001$.

	HB 04	MS 04	RP 04	HB 05	MS 05	RP 05	HB 06	MS 06	RP 06	HB 07	MS 07	RP 07
HB 04	1.00											
MS 04	0.91	1.00										
RP 04	0.94	0.93	1.00									
HB 05	0.74	0.70	0.71	1.00								
MS 05	0.64	0.70	0.65	0.79	1.00							
RP 05	0.74	0.73	0.77	0.84	0.84	1.00						
HB 06	0.73	0.70	0.74	0.79	0.77	0.83	1.00					
MS 06	0.75	0.75	0.73	0.64	0.76	0.70	0.85	1.00				
RP 06	0.72	0.68	0.74	0.62	0.68	0.76	0.86	0.86	1.00			
HB 07	0.75	0.69	0.73	0.75	0.70	0.78	0.90	0.78	0.81	1.00		
MS 07	0.77	0.78	0.79	0.70	0.78	0.79	0.86	0.83	0.82	0.91	1.00	
RP 07	0.77	0.72	0.80	0.70	0.69	0.81	0.87	0.75	0.83	0.92	0.90	1.00

Appendix 4

Comparisons of moth captures from six black light traps deployed at three sites in the White Mountains of New Hampshire, USA. Points represent species (total captures over 4 yr from 2004 to 2007), with abundances expressed in units of $\text{Ln}(\text{moths} \times \text{trap}^{-1} \times 4 \text{ yr}^{-1} + 1)$.



Appendix 5

ANOVA results for moth abundance [$\ln(\text{moths} \times \text{trap}^{-1} \times \text{yr}^{-1} + 1)$] with respect to year, site, Lepidoptera species and trap within site (all sources except year treated as random effects). The variance structure in moth abundance was dominated by variation among species. Contributions from sites, year \times site interactions, and traps locations with sites were minimal. Variation attributable to spp. \times year interactions reflects differential sensitivity of some species to interannual variation (Fig. 2).

Source	DF	MS	F	p	% variance
Year	3	20.07	8.24	<0.0001	–
Site	2	1.27	1.18	0.33	0
Year \times Site	6	0.51	2.52	0.02	0
Spp.	120	33.11	12.86	<0.0001	68
Year \times Spp.	360	2.13	10.51	<0.0001	17
Site \times Spp.	240	0.65	3.20	<0.0001	3
Year \times Site \times Spp.	720	0.20	1.23	0.0007	1
Trap[Site]	3	0.29	1.74	0.16	0
Error	1449	0.17			9

Appendix 6

Species of Lepidoptera collected with black light traps in and near the Hubbard Brook Experimental Forest (species not included in analyses of the community dynamics are listed in gray).^a Abundances reported here are actual captures, and were adjusted prior to analyses such that comparisons of moth abundances between pairs of years were only based on captures from dates that were sampled in both years. Overwinter life stages are either eggs (E), larvae (L) or pupae (P); flight and larval seasons are either early (Ea), early–middle (E–M), middle (M), middle–late (M–L), late (L) or entire (En); host categories are either hardwoods (H), conifers (C), lichens and mosses (L/M), forbs, (Fo), ferns (Fe), fungi (Fu), seeds and flowers (S) or polyphagous (P; any two or more categories).

Family – subfamily – species	Ecological category					Total captures/trap			
	Over-winter life stage	Flight season	Larval season	Host category	Preferred hosts	2004	2005 ^a	2006 ^a	2007
Limacodidae									
Limacodidae									
<i>Lithacodes fasciola</i> Herrich-Schäffer, 1854	L	E–M	L	H	<i>Fagus</i>	9.2	7.7	1.7	13.0
<i>Euclea delphinii</i> Gray, 1832	P	M	L	H	<i>Quercus</i>	0.2	0.0	0.0	0.2
Crambidae									
Pyraustinae									
<i>Pantographa limata</i> Grote & Robinson, 1867	L	M	L	H	<i>Tilia</i>	9.0	1.2	2.1	3.7
<i>Herpetogramma thestealis</i> Walker, 1859		M		H	.	34.8	35.2	96.0	81.2
Drepanidae									
Thyatirinae									
<i>Habrosyne scripta</i> Gossé, 1840		E–M		H	<i>Betula</i>	1.8	2.0	10.2	12.0
<i>Pseudolythina cymatophoroides</i> Guenée, 1852	P	E–M	L	H	<i>Betula</i>	1.2	4.2	13.1	32.6
<i>Euthyatina pudens</i> Guenée, 1852	P	Ea	Ea	H	<i>Cornus</i>			0.0	0.3
Drepaninae									
<i>Drepana arcuata</i> Walker, 1855	P	En	En	H	<i>Betula</i>	30.9	3.5	40.1	252.5
<i>Drepana bilineata</i> Packard, 1864		E–M		H	<i>Betula</i>			0.2	0.5
<i>Oreta rosea</i> Walker, 1855	P	M	L	H	<i>Viburnum</i>	1.8	6.8	4.3	2.3
Geometridae									
Ennominae									
<i>Macaria pustularia</i> Guenée, 1858	E	M–L	Ea	P	<i>Acer</i>	89.5	20.0	57.5	50.2
<i>Macaria fassinotata</i> Walker, 1863	P	E–M	En	C	<i>Tsuga</i>	5.7	0.7	108.1	93.7
<i>Biston betularia</i> Linnaeus, 1758	P	E–M	L	P	<i>Betula</i>	0.0	1.2	4.5	20.4
<i>Eucllaena tigrinaria</i> Guenée, 1857		Ea		H				16.3	14.0
<i>Xanthotype urticaria</i> Swett, 1918	L	E–M		P	<i>Vaccinium</i>	0.2	2.2	1.1	3.0
<i>Pero honestaria</i> Walker, 1860		Ea		P				59.4	93.4

Family – subfamily – species	Ecological category				Total captures/trap				
	Over-winter life stage	Flight season	Larval season	Host category	Preferred hosts	2004	2005 ^a	2006 ^a	2007
<i>Campaea perlata</i> Guenée, 1857	L	En	L	P	<i>Betula</i>	20.3	33.3	145.6	95.8
<i>Ennomos subsignaria</i> Hübner, 1823	E	M	L	H	<i>Acer</i>	21.1	3.0	1.2	2.2
<i>Selenia alciphearia</i> Walker, 1860		Ea		H	<i>Salix</i>			0.5	1.1
<i>Metanema inatomaria</i> Guenée, 1857	P	E–M	En	P	<i>Populus</i>	1.7	0.2	0.9	0.7
<i>Anagoga occiduaria</i> Walker, 1861	P	Ea	L	P	<i>Betula</i>			5.2	4.5
<i>Probole amicarria</i> Herrich-Schäffer, 1855	P	En	En	H				1.5	131.8
<i>Plagodis serinaria</i> Herrich-Schäffer, 1855	P	Ea	L	H	<i>Betula</i>			135.4	134.5
<i>Plagodis kuetzingi</i> Grote, 1876		Ea		H	<i>Fraxinus</i>			5.8	1.5
<i>Plagodis phlogosaria</i> Guenée, 1857	P	E–M	En	H	<i>Betula</i>	7.0	1.7	0.8	12.0
<i>Plagodis alcoalaria</i> Guenée, 1857		Ea		H	<i>Betula</i>			35.5	37.5
<i>Caripeta divisata</i> Walker, 1863	P	M	L	C	<i>Picea</i> and <i>Abies</i>	52.3	31.7	46.7	63.1
<i>Besma endropiaria</i> Grote & Robinson, 1867		Ea	L	H	<i>Acer</i>			393.4	475.8
<i>Lambdina fuscicollaria</i> Guenée, 1857	E	M–L	Ea	P	<i>Picea</i> and <i>Abies</i>	29.7	35.6	94.6	183.0
<i>Neptyia canosaria</i> Walker, 1863	E	M–L		C	<i>Picea</i> and <i>Abies</i>	2.2	5.9	13.5	14.4
<i>Sicya macularia</i> Harris, 1850	E	M	Ea	H	<i>Populus</i>	6.3	0.3	0.0	0.5
<i>Tetracis crocallata</i> Guenée, 1857		Ea	L	H				1.5	0.2
<i>Nematocampa limbata</i> Haworth, 1809	E	M	Ea	P	<i>Picea</i> and <i>Abies</i>	26.2	14.0	7.0	10.8
Larentiinae									
<i>Dystroma truncata</i> Hufnagel, 1767	L	M–L	En	P	<i>Larix</i>	1.4	3.3	0.3	0.0
<i>Dystroma hersiliata</i> Guenée, 1857		E–M		H	<i>Ribes</i>			1.6	3.4
<i>Eulithis explanata</i> Walker, 1862		E–M		H	<i>Vaccinium</i>	0.2	0.2	0.7	0.4
<i>Hydria prunivorata</i> Ferguson, 1955	P	E–M	En	P	<i>Prunus</i>	0.3	1.7	1.6	1.8
<i>Mesoleuca ruficollata</i> Guenée, 1857	P	E–M	L	H	<i>Rubus</i>	0.2	0.0	0.5	1.0
<i>Trichodezia albovitata</i> Guenée, 1857	P	Ea	L	P	<i>Epilobium</i>	0.0	0.0	0.0	0.2
<i>Epirrita autumnata henshawi</i> Swett, 1917	E	L	Ea	P	<i>Picea</i> and <i>Abies</i>	50.3	5.7	6.8	28.7
Lasiocampidae									
Macromphaliinae									
<i>Tolype vellea</i> Stoll, 1791	E	L	Ea	H	<i>Fraxinus</i>	0.0	1.4	0.0	0.7
<i>Tolype laricis</i> Fitch, 1856	E	M–L	Ea	C	<i>Picea</i> and <i>Abies</i>	3.5	1.0	0.5	10.8
Lasiocampinae									
<i>Phyllodesma americana</i> Harris, 1841	E	E–M	L	H	<i>Populus</i>			0.5	4.4
<i>Malacosoma disstria</i> Hübner, 1820	E	M	Ea	H	<i>Acer</i>	389.1	9.8	26.8	35.7

Family – subfamily – species	Ecological category						Total captures/trap			
	Over-winter life stage	Flight season	Larval season	Host category	Preferred hosts		2004	2005 ^a	2006 ^a	2007
<i>Malacosoma americanum</i> Fabricius, 1793	E	M	Ea	H	<i>Prunus</i>		10.7	1.0	1.7	1.9
Saturniidae										
Ceratocampinae										
<i>Dryocampa rubicunda</i> Fabricius, 1793	P	Ea	L	H	<i>Acer</i>		0.3	6.3	65.3	59.7
Saturniinae										
<i>Amtheraea polyphemus</i> Cramer, 1775	P	E–M	L	P	<i>Betula</i>		1.7	0.7	1.9	15.6
<i>Actias luna</i> Linnaeus, 1758	P	E–M	L	H	<i>Betula</i>		0.5	0.7	1.3	10.4
Sphingidae										
Sphinginae										
<i>Ceratonia undulosa</i> Walker, 1856	P	E–M	L	H	<i>Fraxinus</i>		13.2	3.3	5.3	8.0
<i>Smerinthus cerisyi</i> Kirby, 1837	P	Ea	L	H	<i>Populus</i>		0.0	0.2	0.0	0.2
<i>Paonias excaecatus</i> J. E. Smith, 1797	P	E–M	L	H	<i>Betula</i>		9.3	10.8	9.0	13.7
<i>Paonias nyops</i> J. E. Smith, 1797	P	E–M	L	H			0.0	0.0	0.9	1.7
<i>Amorpha juglandis</i> J. E. Smith, 1797	P	Ea	L	H			0.0	0.0	0.5	0.4
<i>Pachysphinx modesta</i> Harris, 1839	P	E–M	L	H	<i>Populus</i>		0.0	0.0	0.8	0.2
Notodontidae										
Pygaerinae										
<i>Clostera alboignea</i> Fitch, 1856	P	En	En	H	<i>Populus</i>			2.2		0.6
Phalerinae										
<i>Nadata gibbosa</i> J. E. Smith, 1797	P	E–M	L	H	<i>Betula</i>		15.3	19.5	23.0	28.4
<i>Peridea basitriens</i> Walker, 1855	L	M	En	H			61.9	9.7	54.4	50.4
<i>Peridea ferruginea</i> Packard, 1864	L	M	L	H	<i>Betula</i>		12.3	4.3	9.1	9.2
Notodontinae										
<i>Hyperaeschra georgica</i> Herrich-Schäffer, 1855	P	E–M	L	H	<i>Quercus</i>		0.2	0.0	2.0	1.3
<i>Pheosia rimosa</i> Packard, 1864	P	M	L	H	<i>Populus</i>		0.2	0.0	0.4	0.5
Nystaleinae										
<i>Symmerista leucitys</i> Frandlemont, 1946	P	E–M	L	H	<i>Quercus</i>		7.1	24.0	41.2	54.0
<i>Dasylophia thyatiroides</i> Walker, 1862	L	E–M	L	H	<i>Fagus</i>		1.3	6.5	41.7	44.0
Heterocampinae										
<i>Macrocampa marthesia</i> Cramer, 1779	L	E–M	En	H	<i>Quercus</i>		38.4	8.2	11.1	51.3
<i>Schizura ipomoeae</i> Doubleday, 1841	L	E–M	En	H	<i>Acer</i>		13.8	8.2	6.8	13.0
<i>Schizura unicornis</i> J. E. Smith, 1797	L	E–M	L	H	<i>Betula</i>		23.3	6.0	19.0	28.7

Family – subfamily – species	Ecological category					Total captures/trap			
	Over-winter life stage	Flight season	Larval season	Host category	Preferred hosts	2004	2005 ^a	2006 ^a	2007
<i>Oligocentria semirufescens</i> Walker, 1865	L	E–M	L	H	<i>Abnus</i>	8.2	1.3	6.5	23.3
Arctiidae									
Lithosiinae									
<i>Hypoprepia fucosa</i> Hübner, 1831	L	M		L/M	<i>Lichens</i>	174.2	85.5	123.9	100.3
<i>Clemensia albata</i> Packard, 1864	L	M	En	L/M	<i>Lichens</i>	42.2	22.0	22.2	21.1
Arctiinae									
<i>Haploa confusa</i> Lyman, 1887	L	M	Ea	P	<i>Populus</i>	1.7	0.7	0.4	0.0
<i>Phragmatobia assimilans</i> Walker, 1855		Ea	L	H				0.8	0.3
<i>Platarctia parthenos</i> Harris, 1850	L	M	En	H	<i>Salix</i>	6.8	0.0	5.7	0.0
<i>Arctia caja americana</i> Harris, 1841	L	M	En	H		0.0	0.7	0.2	0.0
<i>Habysidota tessellaris</i> Smith, 1797	P	M	L	H	<i>Betula</i>	29.8	22.0	53.3	97.2
Lymantriidae									
Lymantriidae									
<i>Lymantria dispar</i> Linnaeus, 1758	E	E–M	Ea	P	<i>Quercus</i>	15.5	0.8	6.0	17.5
Erebidae									
Herminiinae									
<i>Idia americanalis</i> Guenée, 1854	L	En	En	L/M	<i>Lichens</i>	40.0	31.6	13.2	20.6
<i>Idia aemula</i> Hübner, 1813	L	En	En	L/M		0.3	4.1	3.9	1.7
Catocalinae									
<i>Bomolocha baltimoralis</i> Guenée, 1854		En	En	H	<i>Acer</i>	2.1	3.9	25.6	18.2
<i>Parallexia bistrigata</i> Hübner, 1818	P	M	L	H	<i>Acer</i>	32.7	2.0	2.3	7.1
<i>Catocala ilia</i> Cramer, 1776	E	M	Ea	H	<i>Quercus</i>	0.2	0.0	0.0	0.0
<i>Catocala cerogama</i> Guenée, 1852	E	M–L	Ea	H	<i>Tilia</i>	0.0	0.5	1.5	0.7
<i>Catocala relicta</i> Walker, 1858	E	M–L	Ea	H	<i>Populus</i>	0.3	0.2	0.3	0.9
<i>Catocala unijuga</i> Walker, 1858	E	M–L	Ea	H		0.6	0.2	0.0	0.5
<i>Catocala ultronia</i> Hübner, 1823	E	M–L	Ea	H	<i>Prunus</i>	3.6	0.0	0.7	1.7
Noctuidae									
Plusiinae									
<i>Diachrysia balluca</i> Geyer, 1832	L	M		H	<i>Populus</i>	0.2	0.2	0.6	0.0
<i>Eosphoropteryx thyatroides</i> Guenée, 1852	L	M	En	Fo		0.4	0.2	0.2	0.8
<i>Autographa precatonis</i> Guenée, 1852	L	En	En	P		0.0	2.3	2.2	1.0
Acontinae									

Family – subfamily – species	Ecological category						Total captures/trap			
	Over-winter life stage	Flight season	Larval season	Host category	Preferred hosts		2004	2005 ^a	2006 ^a	2007
<i>Syngnapha rectangularis</i> Kirby, 1837	L	M	En	C	<i>Picea</i> and <i>Abies</i>		2.6	0.5	2.3	3.8
Eustrotiinae										
<i>Libacodia muscosula</i> Guenée, 1852		E–M		G					2.4	0.0
<i>Pseudeustrotia carneola</i> Guenée, 1852		E–M	L	Fo				0.0	0.8	0.8
Pantheinae										
<i>Panthea acronyctoides</i> Walker, 1861	P	E–M	L	C	<i>Picea</i> and <i>Abies</i>			0.0	0.7	0.2
<i>Colocasia flavicornis</i> J. B. Smith, 1884	P	Ea	L	H	<i>Fagus</i>				28.2	0.0
Acronictinae										
<i>Charadra deridens</i> Guenée, 1952	P	E–M	L	H	<i>Fagus</i>			1.7	0.5	3.5
<i>Acronicta innotata</i> Guenée, 1852	P	E–M	L	H	<i>Betula</i>		31.0	12.7	25.4	58.4
<i>Acronicta superans</i> Guenée, 1852		E–M		H	<i>Betula</i>				1.4	4.7
Xyleninae										
<i>Harrisimemma trisignata</i> Walker, 1856	P	M	L	H	<i>Viburnum</i>		0.2	0.0	0.0	0.0
<i>Oligia illocata</i> Walker, 1857		L	Ea	H	<i>Abnus</i>		6.5	23.2	0.3	10.3
<i>Papaipema prersii</i> Bird, 1907		L		Fe			0.0	0.3	1.0	0.5
<i>Euplexia benesimilis</i> McDunnough, 1922	P	E–M	L	P	<i>Abnus</i>			21.0	24.8	40.1
<i>Phlogophora periculosa</i> Guenée, 1852	L	M–L	Ea	P			16.5	22.5	23.2	56.3
<i>Enargia decolor</i> Walker, 1858		M–L		H	<i>Populus</i>		0.2	0.4	0.2	0.0
<i>Ipimorpha pleonectusa</i> Grote, 1873	P	M–L	Ea	H	<i>Populus</i>		0.4	0.2	0.3	0.7
<i>Chytonix palliatricula</i> Guenée, 1852	P	E–M	L	Fu				48.3	41.6	39.1
Amphipyriinae										
<i>Callopietria mollissima</i> Guenée, 1852	P	M	L	Fe			11.6	8.7	8.7	23.5
Psaphidinae										
<i>Amphipyra pyramidoides</i> Guenée, 1852	E	M–L	Ea	H	<i>Tilia</i>		41.2	4.6	13.1	16.3
Hadeninae										
<i>Santra bicolorago</i> Guenée, 1852		L	Ea	S			145.7	20.5	72.7	52.4
<i>Copivaleria grotei</i> Morrison, 1874	P	Ea	L	H	<i>Fraxinus</i>				0.0	0.0
<i>Pseudaletia unipuncta</i> Haworth, 1809	L	En	En	P			0.0	4.0	0.3	4.4
Noctuinae										
<i>Morrisonia latex</i> Guenée, 1852	P	Ea	L	H					5.4	29.9
<i>Tricholita signata</i> Walker, 1860		M		Fo			1.4	0.2	0.8	0.8
<i>Feltia jaculifera</i> Guenée, 1852	L	M–L	En	P			0.0	0.2	0.5	0.3

Family – subfamily – species	Ecological category					Total captures/trap			
	Over-winter life stage	Flight season	Larval season	Host category	Preferred hosts	2004	2005 ^a	2006 ^a	2007
<i>Ochropleura plecta</i> Linnaeus, 1761		En	En	Fo		1.8	3.8	4.9	3.9
<i>Noctua pronuba</i> Linnaeus, 1758	L	E-M	En	P			0.2	0.5	0.2
<i>Xestia dolosa</i> Franclemont, 1980		En	En	H	<i>Populus</i>	2.3	5.2	2.3	5.2
<i>Xestia normaniana</i> Grote, 1874		M-L		P			32.3	9.4	95.0
<i>Pseudohormonassa bicarnea</i> Guenée, 1852		M-L		H		0.0	7.5	1.6	5.1
<i>Anomogyna badicollis</i> Grote, 1873		M-L	Ea	C	<i>Pinus</i>	1.4	5.7	5.1	13.2
<i>Anaplectoides prasina</i> Schiffermüller, 1775	L	M-L	En	H		14.6	36.2	14.8	25.8

Appendix 7

References used for natural history information of Lepidoptera species listed in Appendix 6.

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