1 **Effects of management on ambrosia beetles and their antagonists in European beech forests**

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15 Running head: Ambrosia beetles and forest management

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19 **Abstract**

20 Land-use intensification has been shown to negatively affect biodiversity and ecosystem
21 functioning. Because higher trophic levels are expected to suffer most strongly from intensification,
22 negative consequences for ecosystem services, such as biological pest control by natural enemies,
23 are likely. In European beech forests ambrosia beetles are common secondary pests of freshly cut
24 wood and stored timber, but they may also infest living trees that are highly stressed.
25 We examined whether forest management intensity, ranging from unmanaged beech forests to non-
26 natural conifer plantations, affects the abundance, attack rate, and breeding success of ambrosia
27 beetles across three regions of Germany. We applied pheromone trapping to estimate the abundance
28 of ambrosia beetles and exposed experimental beech logs to measure infestation rates and breeding
29 success.

30 In general, we found decreasing abundance and attack probability by ambrosia beetles with
31 increasing management intensity, which is most likely related to the availability of suitable breeding
32 substrate. However, the abundance of the invasive species *Xylosandrus germanus* increased with
33 increasing management intensity in one region, where high management intensity was represented
34 by pine forests; the drier and warmer conditions in this forest type most likely increased population
35 densities. Breeding success of *Trypodendron domesticum* increased with increasing management
36 intensity, suggesting less effective pest control by natural antagonists, in particular by specialised
37 parasitoids, at high management intensities.

38 We conclude that the availability of breeding substrate, in combination with microclimate
39 and antagonist effectiveness, shape ambrosia beetle populations in Central European forests. Forest
40 management strategies should thus reduce the availability of breeding substrate in production
41 forests, in particular where microclimatic conditions are favourable for beetle reproduction (i.e.
42 warm, moist). Moreover, unmanaged forest patches should be maintained to promote parasitoid
43 abundance and thus to mitigate negative effects of climate change, such as increasing drought stress
44 of trees.

45

46 **Keywords:** ambrosia beetles; bark beetles; Biodiversity Exploratories; forest management practice;
47 land-use intensity; parasitoid; pest control; pest species

48

49 **1 Introduction**

50 Land use has frequently been shown to negatively affect organismic diversity and is considered a
 51 main driver of current biodiversity loss (Sala *et al.*, 2000). Negative consequences of a loss in
 52 biodiversity due to increasing land use for ecosystem functions and services are likely, but they are
 53 less well studied, in particular in forests. At the global scale, forests provide many ecosystem
 54 services that are of high economic, as well as ecological and recreational, value. Among these
 55 services, provision of timber for various purposes (provisioning service) and pest control
 56 (regulating service) ensure the sustainable economic value of forests and are relevant in many forest
 57 ecosystems (Millennium Ecosystem Assessment, 2005).

58 While effects of land use on potential pest species are well studied in agricultural systems
 59 (Chaplin-Kramer *et al.*, 2011), responses of potential pest species to forest management are less
 60 clear. It is clear that forest management can significantly affect potential pest species and therefore
 61 forest health (Jactel *et al.*, 2009). However, no or little effect of forest management on pest
 62 abundance and damage has been observed in non-outbreak situations, e.g. for the spruce bark beetle
 63 *Ips typographus* (Linnaeus, 1758) in Poland (Hilszczanski *et al.*, 2007). On the one hand, higher
 64 trophic levels, i.e. predators and parasitoids, are expected to suffer the most from management
 65 intensification because they build up small populations and are thus more vulnerable to local
 66 extinctions (Didham *et al.*, 1998). On the other hand, predator and parasitoid diversity are often
 67 positively associated with increased herbivore suppression (e.g. Snyder *et al.*, 2006). Therefore,
 68 increased forest management activity may increase pest species abundance as a result of less
 69 effective control by natural enemies. However, results of previous studies on the response of natural
 70 enemies and predation or parasitisation rates have been inconsistent. While Martikainen *et al.*
 71 (1999) observed a higher abundance of antagonists with a higher abundance of bark beetles in
 72 boreal forests, Hilszczanski *et al.* (2007) did not find differences in the abundance of natural
 73 enemies of the economically important spruce bark beetle *I. typographus* between managed and

74 unmanaged forests in Poland. Similarly, Gossner et al. (2014b) did not find differences in parasitoid
75 abundance of herbivores between unmanaged and differently managed beech forests.

76 Effects of forest management on pest species and their antagonists might also be mediated
77 by changes in forest structure. In boreal forests, for example, the abundance of bark beetles was
78 found to be most strongly (and positively) correlated with the amount of recent dead wood
79 (Martikainen *et al.*, 1999). Parasitoid assemblages were found to depend on a high diversity of dead
80 wood habitats (Hilszczanski *et al.*, 2005). A higher abundance of bark beetle predators of the genus
81 *Thanasimus* appeared to be favoured by forest gaps and thus by decreased canopy cover
82 (Hilszczanski *et al.*, 2007). Top-down control of forest pests may exert an even greater influence on
83 insect herbivores than resource availability (Vidal and Murphy, 2018). There is at least some
84 indication that management changes can affect the relative importance of bottom-up and top-down
85 effects (Klapwijk *et al.*, 2016). More detailed knowledge on the consequences of forest
86 management for potential forest pest species and their interaction with other organisms is urgently
87 needed, not least because the sustainable provision of wood will be increasingly challenged by
88 growing risks to forest health under climate change (Kausrud *et al.*, 2012).

89 European beech forests (*Fagus sylvatica* L.) would naturally dominate Central European
90 landscapes (Zerbe, 2002). Beech is infested by relatively few herbivore species (Brändle and
91 Brandl, 2001), and large-scale outbreaks are rare. Nevertheless, a few species are economically
92 relevant, in particular because they decrease wood quality (Grégoire *et al.*, 2015). Among the bark
93 beetles, ambrosia beetles are an example of such destructive species; they infest freshly harvested
94 wood and thus reduce timber quality (Vega and Hofstetter, 2015). Regarding *Trypodendron*
95 *domesticum* (Linnaeus, 1758) in particular, infestations of weakened trees, in combination with
96 European beech bark disease (EBBD), and of apparently healthy, but in fact highly stressed, trees
97 have been reported during the last 15 to 20 years, and this fundamentally new type of damage poses
98 a threat to the beech-dominated ecosystems of Central Europe (Petercord, 2006). If and how forest
99 management affects the abundance and attack rate of ambrosia beetles associated with beech and

the interactions of these beetles with their natural enemies is largely unknown. The aim of the present study was to determine the relationship between forest management intensity, the abundance and attack rate of ambrosia beetles, i.e. native *T. domesticum*, native *Xyleborus* spp. and the invasive pest *Xylosandrus germanus* (Blandford, 1894) (Hulcr *et al.*, 2017), and their control by natural antagonists.

Specifically, we hypothesised that increasing management intensity results in (1) increased abundance and attack rates of ambrosia beetles and (2) less effective biological control of ambrosia beetles by natural antagonists. Further, we hypothesised that (3) management effects on beetles and their natural enemies are mediated by management-induced structural alterations such as vertical stand layering, tree diversity, the amount of suitable breeding substrate in the surroundings, regeneration density, and canopy openness.

2 Materials and Methods

2.1 Study area and sites

The study was conducted in three regions in Germany (<http://www.biodiversity-exploratories.de>; Fischer *et al.*, 2010): Schorfheide-Chorin in the north-east, the Hainich region in the centre and the Schwäbische Alb in the south-west (Fischer *et al.* 2010) (henceforth: Schorfheide, Hainich, Alb). In our study 50 experimental forest plots (EP), each 100 m x 100 m in area, were selected in each of the three regions using a stratified random design (Fischer *et al.* 2010). The forests covered the regional range of main forest types, comprising unmanaged (abandoned for the last 20–70 years) and managed uneven-aged (only Hainich) and even-aged stands (including different developmental stages) dominated by European beech (*F. sylvatica*). Additionally, even-aged oak forests (*Quercus petraea* (Mattuschka) Liebl.; only Schorfheide) and managed coniferous forests, dominated by either Norway spruce (*Picea abies* (L.) H. Karst.; Alb, Hainich) or Scots pine (*Pinus sylvestris* L.; Schorfheide), were included. The number of plots of each forest type sampled in each region is given in Table S1-1 (Supplement S1). In 2011 a selection of plots in Hainich were resampled.

126

127 **2.2 Forest management intensity**

128 To quantify management intensity of the studied forests, we used the quantitative forest
129 management intensity index (ForMI) proposed by Kahl and Bauhus (2014). This index comprises
130 three indicators: (1) the proportion of wood volume removed by harvesting; (2) the proportion of
131 non-native tree species of the total standing, recently harvested and dead wood volume; and (3) the
132 proportion of dead wood volume that originated from harvesting activities. The index is scaled
133 continuously from 0 (no management) to 3 (very intensive management).

134

135 **2.3 Large-scale beetle sampling using pheromones**

136 **2.3.1 Pheromone trapping**

137 We focused on the group of ambrosia beetles because they are important in Central Europe and can
138 be monitored using traps baited with pheromone or ethanol (Lieutier *et al.*, 2007; Bussler *et al.*,
139 2011). Preliminary studies in two managed and two unmanaged stands conducted in 2009 showed
140 that, among the individuals caught by pheromone and ethanol baited traps, 63–77% (mean $\pm$ 1 SE =
141 67 ± 3) of the individuals belong to the tribes Xyloterini and Xyleborini (genera *Anisandrus*,
142 *Trypodendron* and *Xylosandrus*).

143 To estimate the abundance of ambrosia beetles and their antagonists, we used modified
144 bottle-traps protected from rain by a roof and baited with lineatin and ethanol (Supplement S2). In
145 late February 2010, two traps were installed at a distance of 2 m at one randomly selected corner of
146 each 1 ha experimental plot in all three regions (total 150 plots). The traps were set up so they faced
147 the main wind direction, one to the north and one to the east. In 2011, 34 traps were reinstalled in
148 the Hainich region in late February to test for consistency of management effects between years.
149 The traps were emptied every one to two weeks during the main flight period, until about July, and
150 every four weeks afterwards until flight activity dropped to a low level, no later than the end of

151 September. All catches were preserved in 70% ethanol. The protocol of species identification is
152 given in Supplement S3.

153

154 2.3.2 Target pest species

155 Previous analyses showed that, among species in the genus *Trypodendron*, high abundances of the
156 hardwood-associated species *T. domesticum* and the softwood-associated species *Trypodendron*
157 *lineatum* (Olivier, 1795) occurred at the sample sites, with the latter preferring conifers. Among the
158 ambrosia beetles of the tribe Xyleborini, the native *Anisandrus dispar* (Fabricius, 1792) and the
159 invasive (since the 1950s; Groschke, 1952; Kirkendall and Faccoli, 2010) *X. germanus* occurred in
160 large numbers. We thus focused on the hardwood-associated species *T. domesticum*, *A. dispar* and
161 *X. germanus* in this study (for details see Supplement S3).

162

163 2.3.3 Ambrosia beetle natural enemies

164 Antagonists of bark and ambrosia beetles from many different taxonomic orders and families are
165 known (Kenis *et al.*, 2004; Wegensteiner *et al.*, 2015). Here, we focused on predatory beetles and
166 parasitoids (Hymenoptera: Apocrita) (Wegensteiner *et al.*, 2015) (for details see Supplement S3).

167

168 2.4 Experimental analysis of attack rates and interactions with natural enemies

169 For analysing the attack rate of ambrosia beetles, beech logs were exposed in two experiments: the
170 **Ambrosia Beetle Experiment (AmbroBEx)** and the **Biodiversity Exploratories Longterm**
171 **Deadwood Experiment (BELongDead)** (Supplement S2, Gossner *et al.*, 2016; Kahl *et al.*, 2017).
172 Briefly, in **AmbroBEx**, logs of two different sizes, i.e. 100 cm long and 20 cm in diameter ('large'
173 logs) and 60 cm long and 30 cm in diameter ('small logs'), were exposed in the Hainich region
174 between mid-February and mid-March 2010. In each of 30 forest plots, we also used three beech
175 logs 4 m long and 23–46 cm in diameter from the **BELongDead** experiment. We classified entrance
176 holes by whether they were from *T. domesticum* or *X. germanus* (Supplement S2).

177

178 **2.5 Breeding success of *T. domesticum***

179 Breeding-system eclectors were installed on AmbroBEx and BELongDead logs with entrance holes
180 to *T. domesticum* galleries suitable for eclector installation, i.e. not pointing directly towards the
181 ground, to collect all emerging individuals of *T. domesticum* and its antagonists (Fig. S2-1 C and D
182 in Supplement 2). We quantified breeding success of *T. domesticum* as the number of emerged
183 progeny and assessed mortality by using information from the literature on the number of bark
184 beetle eggs or larvae consumed by an individual predator (for details see Supplement S3).

185

186 **2.6 Management-dependent changes in forest structure parameters**

187 We assessed potential covariates at three different scales: individual log, subplot and plot.

188 *Log-based covariates:* We assessed the bark-free area on all logs (AmbroBEx, BELongDead)

189 because damaged bark increases dehydration. For AmbroBEx logs, we additionally recorded the
190 bark texture using four categories, from smooth to rough, to consider the general suitability for
191 gallery starting points.

192 *Subplot-based covariates:* Within a 50-m circle around each trap we assessed the following three

193 variables: (1) breeding resource availability, measured as the amount of dead wood in a stage

194 suitable for ambrosia beetles, i.e. fresh dead wood, using five categories: 1 = no dead wood, 2 = ≤ 3

195 $\text{m}^3 \text{ha}^{-1}$, 3 = $3 < x \leq 6 \text{ m}^3 \text{ha}^{-1}$, 4 = $6 < x \leq 10 \text{ m}^3 \text{ha}^{-1}$, and 5 = $> 10 \text{ m}^3 \text{ha}^{-1}$; (2) canopy closure, an

196 indicator for microclimatic conditions due to warming of dead wood logs by sunlight, was assessed

197 as the estimated proportion of the sky covered by vegetation when looking straight up from the

198 traps' location at 1 m above the ground; (3) the density of vegetation, such as seedlings and young

199 trees, projecting within 3–5 m of the direct flight corridor to the traps was recorded using three

200 categories; 'open', 'medium' and 'dense'.

201 *Plot-based covariates:* We considered (1) the main tree type, i.e. coniferous or broad-leaved forest,

202 and (2) the forest structure, i.e. even-aged, uneven-aged or unmanaged, as classified in the forest

203 inventory (Hessenmöller *et al.*, 2011). We additionally assessed (3) the Shannon-diversity of the
204 tree layer assessed within a 20 m x 20 m core area (Boch *et al.*, 2013).

205

206 **2.7 Data analyses**

207 For statistical analyses we used generalized linear models (GLM) and generalized linear mixed
208 effects models (GLMM) in R version 3.1.2 (R Core Team, 2014). For count data we used the
209 “glmmadmb” function from the R package *glmmADMB* (Fournier *et al.*, 2012; Skaug *et al.*, 2015),
210 and for binomial data (attack rates, breeding success) we used the “glm” and “glmer” functions
211 from the package *lme4* (Bates *et al.*, 2015). When building the full models based on count data, we
212 first checked for overdispersion by calculating the ratio of the sum of squared Pearson residuals
213 (SSQ residuals) to the residual degrees of freedom and by comparing the Poisson error distribution
214 with the negative-binomial error distribution using a likelihood ratio test (lmtest package; Zeileis
215 and Hothorn, 2002). A model without overdispersion has a ratio close to or greater than one. When
216 the likelihood ratio test showed a significant difference, a negative-binomial model was used. Any
217 remaining overdispersion was accounted for by including observation-level random effects (Jamil *et al.*,
218 2013). When the frequency plot of the data suggested zero-inflation, we compared models with
219 and without the built-in correction for zero-inflation with the “glmmadmb” function. To find the
220 minimal adequate model and determine a given term’s p-value, we applied manual backward
221 selection by performing single-term deletion with the “drop1” function. A term was considered
222 significant when its Chi²-statistic p-value was <0.05. The term furthest from this criterion was
223 excluded in the next step.

224 For categorical variables, we performed a *post-hoc* Tukey test with the “glht” function from
225 the *multcomp* package (Hothorn *et al.*, 2008) to identify significant pairwise differences. Details on
226 the different models can be found in Supplement S4.

227

228 **3 Results**

229 3.1 Abundance of ambrosia beetles and their antagonists

230 In total 83% of the individuals caught in the pheromone traps were ambrosia beetles and <1% were
231 potential natural enemies. *Trypodendron domesticum*, *T. lineatum*, *X. germanus* and *A. dispar* were
232 by far the most abundant species (Supplement S5). The overall abundance of ambrosia beetles
233 decreased with increasing management intensity, but only in Hainich and Schorfheide (quasipoisson
234 GLM: ForMI $\times$ region: $F_{2,144} = 16.417$, $p < 0.001$). No effect was observed in Alb.

235 The abundance of antagonists increased with increasing management intensity, with only a
236 weak interaction with region, reflecting the stronger effect in Schorfheide compared with in the
237 other regions (quasipoisson GLM: ForMI $\times$ region: $F_{2,144} = 2.9889$, $p = 0.054$, Figure S5-1).

238 The abundance of *T. domesticum* (model 1) varied between regions in 2010 and was highest
239 in Hainich and lowest in Schorfheide (Tukey *post-hoc* test: $p < 0.001$ for all pairwise tests). It
240 consistently decreased with increasing management intensity (Fig. 1, Table 1a). More individuals
241 were found in categories with larger amounts of dead wood (Table 1a; Tukey *post-hoc* test: $p < 0.05$
242 for Cat. 3 & 4 > Cat. 1) and the number of antagonists was positively related to the number of *T.*
243 *domesticum* individuals. No other covariates were significant.

244 The abundance of *X. germanus* (model 2) showed contrasting responses to management
245 intensity in the different regions (significant interaction between ForMI and region; Fig. 1, Table
246 1a): while abundance decreased with increasing management intensity in Hainich, it increased in
247 Schorfheide. In Alb, abundance was generally low. Regarding covariates, abundance showed a
248 hump-shaped relationship in response to dead wood amount, with the highest values corresponding
249 to plots with moderate dead wood amounts. Abundance was higher in plots dominated by broad-
250 leaved trees than in plots dominated by conifers (Main tree type; Table 1a).

251 The results for *A. dispar* (model 3) were similar to those for *X. germanus*, with abundance
252 being positively affected by management intensity in Hainich and negatively affected in
253 Schorfheide (Fig. 1, Table 1a). Abundance in Alb was generally low, with abundance of *A. dispar*
254 being higher in plots dominated by broad-leaved trees than in plots dominated by conifers (Main

255 tree type; Table 1a). While the number of antagonists was positively related to the number of *X.*
256 *germanus* individuals, it was negatively related to the number of *A. dispar* individuals.

257 Regarding antagonists, only the abundances of *Rhizophagus depressus* and *Thanasimus*
258 *formicarius* were affected by management intensity, but responses depended on the region
259 (significant interaction between ForMI and region; Table 1b). The abundance of *R. depressus*
260 increased with increasing management intensity in all regions, but the slope of this relationship
261 increased from Alb to Hainich to Schorfheide (data not shown). For *T. formicarius* increasing
262 abundance with increasing management intensity was found only in Schorfheide; no effect was
263 found in the other regions. With respect to the covariates, dead wood negatively affected the two
264 *Rhizophagus* species, the density of the regeneration negatively affected all antagonist species, and
265 the abundance of *R. depressus* and of *T. formicarius* was higher in coniferous compared with in
266 broad-leaved forests.

267 In Hainich, where trapping was performed in two years, results from 2011 were consistent with
268 those from 2010 (Supplement S6). The phenology of the ambrosia beetles is shown in Supplement
269 S7.

270

271

272 **Figure 1:** Response of bark beetle abundance (A: *Trypodendron domesticum*, B: *Xylosandrus*

273 *germanus*, C: *Anisandrus dispar*) to forest management intensity in the three study regions in

274 Germany, based on pheromone trap samples from the year 2010. Regression lines are predictions

275 from GLMMs (for model details see Table 1).

276

277 **Table 1:** Effects of forest management intensity (ForMI), its interaction with region, and covariates
278 assessed at different spatial scales on the abundance of ambrosia beetles (a) and their antagonists
279 (b). Note that the apocrit *Perniphora robusta* was too rare to be analysed. Results of the abundance
280 model based on a negative binomial GLMM, minimal models, and the terms dropped during the
281 optimisation test by backward selection (based on the p-value of a likelihood-ratio test) are shown.
282 Df = degrees of freedom; L = statistic value; p = significance level; ED = effect direction, $\uparrow/\downarrow$ =
283 positive/negative, $\cap$ = hump-shaped; DO = order in which the terms were dropped from the model.
284 FS = *Fagus sylvatica*, CO = conifers.

(a)

Species abundance	<i>Trypodendron domesticum</i>					<i>Xylosandrus germanus</i>					<i>Anisandrus dispar</i>				
	Df	L	p	ED	DO	Df	L	p	ED	DO	Df	L	p	ED	DO
ForMI	1	45.84	<0.001	$\downarrow$				*					*		
Region	2	15.06	<0.001					*					*		
ForMI $\times$ Region	2	0.24	0.890		(1)	2	1.968	<0.001			2	6.156	0.046		
Abundance antagonists	1	9.68	0.002	$\uparrow$		1	10.492	0.001	$\uparrow$		1	10.178	0.001	$\downarrow$	
Dead wood	4	13.12	0.011	$\uparrow$		4	17.358	0.002	$\cap$		4	4.296	0.370		(3)
Canopy closure	1	1.72	0.190		(3)	1	0.070	0.790		(1)	1	0.244	0.620		(2)
Density of regeneration	2	3.96	0.140		(5)	2	0.658	0.720		(2)	2	0.980	0.610		(1)
Tree diversity	1	1.70	0.190		(4)	1	1.992	0.160		(3)	1	2.292	0.130		(4)
Main tree type	1	1.52	0.220		(2)	1	4.122	0.042	FS > CO		1	26.908	<0.001	FS > CO	
Random factor	Region					Region					Region, Observation				

(b)

Species abundance	<i>Rhizophagus bipustulatus</i>					<i>Rhizophagus depressus</i>					<i>Thanasimus formicarius</i>				
	Df	L	p	ED	DO	Df	L	p	ED	DO	Df	L	p	ED	DO
ForMI	1	0.274	0.600		(2)						1				
Region	2	11.772	0.003								2				
ForMI $\times$ Region	2	1.096	0.570		(1)	2	8.852	0.010			2	8.684	0.010		
Abundance <i>T. domesticum</i>	1	21.858	<0.001	$\uparrow$		1	0.008	0.930		(1)	1	0.736	0.390		(3)
Dead wood	4	10.874	0.030	$\downarrow$		4	13.890	0.007	$\downarrow$		4	7.302	0.120		(4)
Canopy closure	1	0.976	0.320		(4)	1	1.062	0.300		(3)	1	0.004	0.940		(1)
Density of regeneration	2	15.952	<0.001	$\downarrow$		2	39.100	<0.001	$\downarrow$		2	17.304	<0.001	$\downarrow$	
Tree diversity	1	5.436	0.020	$\downarrow$		1	0.144	0.700		(2)	1	0.154	0.690		(2)

Main tree type	1	0.574	0.440	(3)	1	82.230	<0.001	FS < CO	1	14.588	<0.001	FS < CO
Random factor	Region, Observation				Region				Region, Observation			

* output from backward selection only for interaction of terms

3.2 Attack rates

Results on attack rates (per log) are given here; results for attack density (per m²) were consistent with these findings and are given in Supplement S8. For the AmbroBEx-logs, 27 of the 50 large logs (54%) and 39 of the 50 small logs (78%) were attacked by *T. domesticum*. The probability that an AmbroBEx-log will be attacked by *T. domesticum* was determined with respect to management intensity only; it dropped from about 52% in unmanaged forests to about 10% in forests with the highest management intensities (Fig. 2, Table 2). Regarding the BELongDead-logs, 71 (80%) were attacked by *T. domesticum*.

Figure 2: Probability that an AmbroBEx-log will be attacked by (A) *Trypodendron domesticum* or (B) *Xylosandrus germanus*. The regression line shows the predictions from a logistic generalised linear model (for model details see Table 2).

Table 2: Effects of forest management intensity (ForMI), its interaction with region, and covariates assessed at different spatial scales on the attack rate of ambrosia beetles on experimentally exposed logs. We used a binomial GLM to assess probability. Minimal models and the terms dropped during the optimisation test by backward selection (based on the p-value of a likelihood ratio test) are given. Df = degrees of freedom; L = statistic value; p = significance level; ED = effect direction, only given for continuous terms; ↑/↓ = positive/negative correlation with attack rate; DO = order in which the terms were dropped from the model.

	Model 4 <i>Trypodendron domesticum</i>					Model 6 <i>Xylosandrus germanus</i>				
	Df	L	p	ED	DO	Df	L	p	ED	DO
Abundance in traps	1	2.725	0.099		(7)	1	23.519	<0.001	↑	
ForMI	1	6.336	0.012	↓		1	2.489	0.114	↓	
Dead wood	4	7.561	0.11		(6)	4	6.358	0.174		
Canopy closure	1	0.144	0.70		(3)	1	2.077	0.149		
Tree diversity			§					§		
Density of regeneration	2	0.471	0.79		(1)	2	3.537	0.171		
Main tree type	1	1.142	0.29		(5)	1	0.540	0.462		
Bark free area	1	1.599	0.21		(8)	1	0.379	0.538		(3)
Bark texture	3	2.157	0.54		(4)	3	4.022	0.259		
Beetle diversity	1	0.305	0.58		(2)	1	0.007	0.934		(1)
Log class			NA [§]			1	0.325	0.569		(2)
Random factor	none (binomial GLM)					none (binomial GLM)				

§ this factor had the highest p-value in single linear models and was therefore excluded prior to analyses to avoid overfitting

[§] only the 100 cm x 20 cm logs were included in this model

A probability model for *X. germanus* showed a decrease in attack probability with increasing management intensity (Fig. 2, Table 2). As the abundance of *X. germanus* was highly correlated with the attack probability and with ForMI in Hainich, attack probability was only significant when abundance was excluded from the model. Other covariates had no significant effect on attack rate. With respect to the BELongDead-logs, 83 (92%) were attacked by *Xyleborini*.

3.3 Breeding success

320 A total of 230 breeding systems of *T. domesticum* were sampled (Supplement S9 & S10). The main
321 period of emergence in 2011 was from February to April, when 97.2% of the sampled *T.*
322 *domesticum* emerged from the breeding systems (total N=750; Fig S7-2 in Supplement 7). On
323 average only 3.39 ± 0.45 (range: 0–35) individuals emerged per breeding system. Regarding
324 emerging antagonists, a total of 95 predatory beetles (mean $\pm$ 1 SE: 0.34 ± 0.12 ; range: 0–21) and
325 104 parasitoids (mean $\pm$ 1 SE: 0.46 ± 0.15 ; range: 0–20) were caught.

326 The number of antagonists that emerged was negatively affected by management intensity (Df=1,
327 221; L=6.174; p=0.015). The main antagonist observed, *Perniphora robusta*, exclusively emerged
328 from breeding systems in unmanaged plots. The number of emerged antagonists was higher in
329 breeding systems where the eclector was installed later (20 weeks after the gallery was discovered;
330 Df=1,221; L=5.354; p=0.021). Mortality of *T. domesticum*, measured as the ratio of consumed to
331 emerged beetles, was significantly negatively affected by management intensity (Figure 3;
332 Df=1,166; L=264.84; p<0.001).

333

334

335

336 **Figure 3:** Mortality rate of *Trypodendron domesticum* as a function of management intensity. The
 337 dotted regression line shows the predictions from a binomial generalised linear mixed effects
 338 model. N=169 breeding system eclectors in 18 plots.

339 **4 Discussion**

340 Our large-scale study on ambrosia beetles in Central European forests revealed significant effects of
341 management intensity on their overall abundance, attack probability and density, and breeding
342 success. The pheromone traps were very effective in catching ambrosia beetles and the aggregation
343 pheromone Lineatin also clearly attracted several antagonist species, supporting results from
344 previous studies (Kenis *et al.*, 2004). The insects are attracted from the area near the traps, and it
345 can thus be assumed that more sampled individuals reflects more individuals in the surrounding
346 area (Grégoire *et al.*, 2001).

347

348 ***4.1 Effects of management intensity on abundance and attack probability of pest species***

349 Increasing management intensity consistently decreased abundance and attack probability of *T.*
350 *domesticum* across all regions and years, suggesting a general relationship between these variables.
351 This is in contrast to our expectation that beetle abundance, and thus the probability that a log will
352 be attacked, rises with increasing management intensity, owing to greater availability of fresh dead
353 wood at higher management intensities because of more frequent harvesting operations (Schlyter
354 and Lundgren, 1993). In our study, however, the availability of dead wood suitable for ambrosia
355 beetles decreased with increasing management intensity (Fig. S11-1 in Supplement 11), and this
356 unexpected relationship is the most likely explanation for our finding. This interpretation is
357 supported by the observed positive effect of dead wood availability on the abundance and attack
358 density of *T. domesticum*. Other studies have provided inconsistent results. Martikainen *et al.*
359 (1996), for example, did not find a difference in overall bark beetle abundance between less
360 intensively managed Russian and intensively managed Finnish Karelia. However, in line with our
361 results they observed a difference in species composition, with a lower abundance of the broad-leaf
362 specialist *Trypodendron signatum* in the less intensively managed forests.

363

364 The negative relationship between management intensity and abundance in our study might
365 have been strengthened by the fact that *T. domesticum* prefers broad-leaved trees for breeding
366 (Byers, 1992). However, the lack of a significant contrast between broad-leaved and coniferous
367 forests suggests that a difference in available breeding substrate related to management intensity is
368 the key driver. In the unmanaged forests studied here, management ceased relatively recently (20-
369 70 years ago) and thus available dead wood is still dominated by early decay stages; it can be
370 expected that dead wood amount will further increase with time, but mostly because of an increase
371 of later decay stages, resulting in a more even distribution of dead wood decay stages (Morrissey *et*
372 *al.*, 2014; Larrieu *et al.*, 2019). Consequently, suitable breeding substrate and thus abundance of *T.*
373 *domesticum* is not expected to increase substantially with time.

374 Regarding Xyleborini, the response to management intensity was less consistent across the
375 regions in our study. The response was weak overall for the native species *A. dispar*, which
376 preferentially attacks a wide range of broad-leaved trees and rarely attacks conifers (Lieutier *et al.*,
377 2007). For the invasive species *X. germanus*, which primarily attacks hardwood trees and has a
378 wide range of host species (Weber and McPherson, 1983), the relationship differed between
379 Hainich (negative) and Schorfheide (positive). The generally wider host range of Xyleborini
380 compared to that of *Trypodendron* might explain the weak relationship between *A. dispar*
381 abundance and management intensity, in that a change in tree species composition along the
382 management intensity gradient might be less important. However, Xyleborini prefer broad-leaved
383 trees over conifers as hosts (Lieutier *et al.*, 2007), and therefore the dominating tree type of a stand
384 (broad-leaved vs. coniferous) might be more important than management intensity itself, as
385 indicated by a significant effect of the main tree species in our models. The contrasting pattern in
386 the invasive species *X. germanus* is surprising and might be explained by different effects of the
387 two conifer species studied in the two regions, spruce in Hainich and pine in Schorfheide. Pine
388 forests are much more open than spruce or beech forests, and the microclimate might thus be
389 favourable for the development of *X. germanus*. This species has been shown to be able to attack

390 apparently healthy, but in fact highly stressed, trees (Ranger *et al.*, 2015) and thus might become an
391 increasing threat under climate change. The reason for this attraction may be that stressed trees emit
392 ethanol, and Xyleborini (*Anisandrus*, *Xyleborus*, *Xylosandrus*) beetles have fungal symbionts that
393 need ethanol within the wood to grow and outcompete other fungi (Ranger *et al.*, 2018).

394

395 ***4.2 Effects of management intensity on antagonists and pest control***

396 With increasing abundance of *T. domesticum* and *X. germanus* in the pheromone traps, the
397 abundance of their natural enemies also increased. This positive relationship might be explained by
398 bottom-up effects: higher habitat availability (suitable dead wood) leads to higher prey density,
399 which in turn supports a larger number of predators and parasitoids. It could, however, also be
400 explained by a common response of pests and antagonists to management intensity or by a
401 combination of both factors. As predators have lower population densities than their prey, they
402 might be more sensitive to changes that accompany shifts in management intensity, such as changes
403 in the abundance of alternative prey for the obligate (*T. formicarius*) and facultative (*Rhizophagus*-
404 species) bark beetle predators. Nuorteva (1956), for instance, suggested that natural forests harbour
405 larger populations of predators and parasitoids because of the high abundance of secondary bark
406 beetles as alternative prey. For *T. domesticum*, this positive prey–predator relationship could be
407 explained mainly by the behaviour of *R. bipustulatus*, which did not respond to differences in
408 management intensity. This suggests a bottom-up effect of *T. domesticum* abundance on *R.*
409 *bipustulatus* abundance. For *X. germanus*, a common response to management intensity is more
410 likely because it, as well as its predators *R. depressus* and *T. formicarius*, was strongly positively
411 affected by higher management intensity in Schorfheide. However, a contrasting response of prey
412 and predator was observed in Hainich, indicating that mechanisms might vary among regions. In
413 contrast, *A. dispar* abundance was negatively related to antagonist abundance, suggesting that top-
414 down forces are more important for this bark beetle species.

415 Although the abundances of *T. domesticum* and its antagonists were positively affected by
416 increasing management intensity at the forest stand scale, the number of emerging *T. domesticum*
417 progeny was not affected by management intensity. In contrast, mortality by natural enemies was
418 negatively affected by increasing management intensity at the breeding system scale. This suggests
419 less effective top-down control of *T. domesticum* with increasing management intensity. Our
420 method for assessing mortality, by using data on predators' consumption rates from the literature,
421 might have underestimated the overall mortality of the beetles. Dissecting the wood logs at the end
422 of the experiment might have resulted in more accurate information on mortality, by making it
423 possible to analyse pupal cocoons to quantify parasitism, to count cephalic capsules as a measure of
424 consumed larvae and thus predation, and to quantify additional mortality factors, such as density-
425 related intra-specific competition, entomopathogenic fungi, nematodes and mites, and climatic
426 factors (e.g. excessive moisture). Although we assume that the method used in this study yielded
427 reasonable estimates of the relative mortality rates between breeding systems, this needs further
428 investigations.

429 The most important antagonist was the parasitoid *P. robusta*, which is more strongly
430 specialised on *Trypodendron* species than the predators caught by pheromone traps (Wegensteiner
431 *et al.*, 2015). It showed overall low densities in managed forests, and we did not observe it attacking
432 any of the individuals breeding in the experimental logs (Table S6-2; no individual emerged from
433 breeding systems in managed forests). In general, parasitoids need to feed on nectar and pollen in
434 order to reconstitute their egg load (Raffa *et al.*, 2015). However, Führer (1975) suggested that
435 female imagines of *P. robusta* can survive in managed forests without food sources, owing to a
436 potential independence of imaginal nutrient uptake. In any case, our results indicate that potential
437 food resources (e.g. honeydew of the common aphid *Phyllaphis fagi*) are sufficiently available in
438 the managed beech forests studied here (Gossner *et al.*, 2014a) and that other unknown factors, e.g.
439 those related to differences in stand structure and limited connectivity among forest patches (Raffa
440 *et al.*, 2015), restrict the occurrence of *P. robusta* almost entirely to unmanaged forests.

441

442 **5 Conclusions**

443 The conclusions and generalisations that can be drawn from our findings are limited because there
444 are many interacting variables at our forest sites. We tried to control for this in our models, but
445 some factors could not be disentangled. For instance, it is not clear whether the different tree
446 species composition or the warmer climate caused the positive management effects on the abundance
447 of *X. germanus* in one region. Future experiments should be designed to control for these different
448 factors, e.g. by applying different harvest intensities to even-aged timber-stage beech forests and by
449 simultaneously controlling the amount of dead wood in a stage suitable for breeding. Nevertheless,
450 some general conclusions can be derived from our study.

451 Our large-scale study on the effects of management intensity on ambrosia beetles
452 demonstrates that different mechanisms are prominent for different species and at different scales.
453 For *T. domesticum*, greater availability of suitable breeding substrate at the forest stand scale, e.g.
454 after wind throws, seems to promote higher population densities and attack rates. This might lead to
455 a greater risk of pest outbreaks in managed forests where pest control is reduced at the breeding
456 system scale owing to a lack of specialised parasitoids and reduced beetle predator populations
457 because of reduced host diversity. Our results are less conclusive for *Xyleborus* species, as no
458 analyses of breeding success were conducted. The analyses of abundances and attack rates,
459 however, suggest that top-down control is important in *A. dispar*, while region-specific factors seem
460 to drive the abundance of *X. germanus*.

461 In Central Europe, broad-leaved tree species are already showing signs of increasing
462 drought effects due to climate change. Moreover, there have been a few examples of outbreaks of *T.*
463 *domesticum* and *Xyleborini* species after wind throws in managed forests following warm and dry
464 years with increasingly stressed trees, resulting in the attack of apparently healthy trees (Kühnholz
465 *et al.*, 2001). Whether climate change will lead to increased damage of trees, in particular in
466 managed forests, by the studied ambrosia beetles should be evaluated in the coming years.

467

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470

471 **Authors' Contributions**

472 MMG and WWW developed the idea of the experiment. KF and MMG conducted and organised
473 the field and lab work, performed the analyses and wrote the first draft. MMG and WWW finalised
474 the manuscript.

475

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493

494 **Data availability**

495 After an embargo period, all data will be made publicly available at [https://www.bexis.uni-](https://www.bexis.uni-jena.de/PublicData/PublicData.aspx)
496 [jena.de/PublicData/PublicData.aspx](https://www.bexis.uni-jena.de/PublicData/PublicData.aspx). (IDs: 24106).

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640

Supplementary Material

Effects of management on ambrosia beetles and their antagonists in European beech forests

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Supplement S1 Details on study sites

The study was conducted within the framework of the long-term and large-scale Biodiversity Exploratories project, a multi-disciplinary research network for functional biodiversity research located in three regions across Germany (<http://www.biodiversity-exploratories.de>; Fischer *et al.* 2010). The three regions differ in climatic conditions and forest history. With an annual precipitation of about 520–580 mm, Schorfheide-Chorin is one of the driest parts of Germany. Most of the region is covered by forests of Scots pine (*Pinus sylvestris*; 39%), European beech (*Fagus sylvatica*; 12%), and sessile oak (*Quercus petraea*; 9%). Hainich-Dün is one of the largest continuous forest areas in Germany and is dominated by broad-leaved trees; conifers, in particular Norway spruce (*Picea abies*), comprise only 12% of the forest. The Schwäbische Alb is a highly fragmented, mixed forest landscape dominated by *Fagus sylvatica* (46%) and *Picea abies* (24%).

Table S1-1: Overview of the number of plots sampled in each region (total 149 plots), separated by forest management type and developmental stage. Small experimental logs were exposed in Hainich-Dün only (total 50 plots) and large experimental logs were exposed on a selection of plots in all three regions (total 30 plots), given in brackets.

Region		Schwäbische Alb*		Hainich-Dün**				Schorfheide-Chorin	
Year		2010		2010		2011		2010	
		N	ForMI±SE	N	ForMI±SE	N	ForMI±SE	N	ForMI±SE
Beech unmanaged		5	0.63±0.18	13	0.25±0.08	6	0.2±0.10	6	0.25±0.09
		(3)	(0.50±0.30)	(3)	(0.35±0.18)			(3)	(0.31±0.17)
Beech uneven-aged		/	/	13	1.02±0.07	9	1±0.10	/	/
				(3)	(1.04±0.17)				
Beech age class	Thicket	7	1.92±0.31	5	1.81±0.04	2	1.77±0.12	/	/
				(1)	(1.89)				
	Pole wood	7	1.54±0.21	4	1.06±0.11	4	1.06±0.11	/	/
Oak age class		(1)	(1.56)						
	Timber	18	1.11±0.08	11	0.97±0.06	9	0.96±0.08	15	0.97±0.07
		(2)	(1.06±0.12)	(2)	(0.85±0.10)			(3)	(1.05±0.36)
Conifer age class***		/	/	/	/	0	/	7	0.83±0.10
Conifer age class***									
	Pole wood	/	/	/	/	0	/	4	2.11±0.10
								(1)	(1.90)
Conifer age class***	Timber	12	2.11±0.08	4	1.9±0.22	4	1.9±0.22	18	1.69±0.06
		(3)	(2.14±0.17)	(3)	(1.79±0.26)			(2)	(1.63±0.14)
Total		49	1.48±0.10	50	0.96±0.08	34	1.01±0.10	50	1.18±0.08

* pheromone trap installation not possible in one even-aged managed beech plot

** small experimental logs were exposed in all 50 plots during 2010 and 2011

*** Norway spruce (*Picea abies*) plots were studied in Schwäbische Alb and Hainich-Dün and Scots pine (*Pinus sylvestris*) plots were studied in Schorfheide-Chorin

ForMI: Forest Management Intensity according to Kahl & Bauhus (2014)

Supplement S2 Experimental details

Figure S2-1: A) Schematic illustration of the bottle trap; B) bottle trap in the field with catches in the collecting jar; C and D) installed eclectors in the field; E) schematic illustration of one eclector.

S2.1 Sampling of beetles and antagonists

To estimate the abundance of ambrosia beetles and their antagonists we used modified bottle traps that were protected from the rain by a roof and baited with lineatin and ethanol (see Grégoire *et al.* 2001; Supplement Fig. S2-1 A-B). The traps were baited with half a lineatin stick (Contech Enterprises, 7572 Progress Way, Delta, B.C. Canada, V4G 1E9) and with 100 ml of a mixture of 96% ethanol (99 parts) denatured with one part petroleum ether. The latter was exposed in a jar that was connected to the trap by a tube with a mesh that prevented insects from entering. The collecting jar was filled with 100 ml of 70% ethanol to preserve the catches. The combination of lineatin and ethanol has been suggested as suitable for representative sampling of ambrosia beetles (*Trypodendron*, Xyleborini) and their antagonists (Grégoire *et al.* 2001; Bader 2004).

S2.2 Details of attack rate study

In **AmbroBEx**, logs of two different sizes, i.e. 100 cm long and 20 cm in diameter ('large logs') and 60 cm long and 30 cm in diameter ('small logs'), were exposed in the Hainich-Dün region between mid-February and mid-March 2010. One log of each size class was exposed close to the pheromone trap on each of 50 plots and the cut surface was coated with liquid wax to prevent the wood from drying too fast. Logs came from canopy branches cut during harvesting activities in one stand of Langula forest in November 2009. All logs were stored as 3-m-long logs at the forest site before being transferred to the forest plots. Size classes and harvesting time were selected based on the results of a preliminary study in 2009 in which a range of differently sized logs from two harvesting times were exposed. Decision criteria were attractiveness to ambrosia beetles and manageability of logs, as they needed to be carried manually a distance of up to 3 km to the forest plots.

Additionally, we used beech logs from the **BELongDead** experiment, which focuses on management effects on dead wood decomposition of 13 different tree species (for details see Gossner *et al.* 2016). All logs were harvested in the Hainich-Dün region in winter 2008/2009. On

each of 30 plots (Schwäbische Alb: 9, Hainich-Dün: 12, Schorfheide-Chorin: 9) three beech logs 4 m long and 23–46 cm in diameter, located 100 m apart within each plot, were studied.

We used both the AmbroBEx-logs and the BELongDead-logs to monitor attack rates of particular pest species. We classified two different types of entrance holes: (1) galleries with large entrance holes, about 1.2 mm in diameter, with perpendicular tunnels and wooden frass, corresponding to *Trypodendron domesticum*; and (2) galleries with smaller entrance holes, about 0.8 mm in diameter, with wooden frass, corresponding to *Xylosandrus germanus*. AmbroBEx-logs were checked every time pheromone traps were emptied, and BELongDead-logs were checked on a randomly marked 1 m section on the upper half of the log at the end of May/beginning of June 2010 and at the beginning of September 2010 in all three regions and in the Hainich-Dün additionally in August 2011 and May 2012. The position of entrance holes and the causal species were recorded, and holes were marked with coloured drawing pins to avoid double-counting during the next inspection.

To verify our entrance hole assignment to certain species, we took samples of a few individuals from the entrance holes from logs in Hainich-Dün.

S2.3 Details on breeding-system eclectors

For eclector installation we used both AmbroBEx-logs and BELongDead-logs. Eclectors on AmbroBEx-logs were installed in two groups: the first group was installed four weeks after we discovered the gallery, and the second group was installed after about a 20-week interval. Eclectors on BELongDead-logs were all installed at the beginning of August 2010. Galleries that looked inhabited, detected by fresh frass outside, a cleaned-out entry, a beetle in the entry, or a lid of clotted frass on the entry, were preferred for sampling.

Over each entrance hole a small metal tube (1 cm in diameter) was fixed 1 cm deep into the wood and a collecting jar, with a hole covered by gauze to allow for air circulation, was attached to the metal tube connected by a flexible plastic tube.

The eclectors were checked for catches each time the plot was visited. Catches were preserved in 70% ethanol and determined by taxonomic experts. The integrity of the eclectors was checked each time they were visited. Eclectors could be disabled by improper attachment to the metal tube, resulting from sunlight exposure or raccoon activity, resulting in fallen off eclectors and destroyed or missing components. We restored disabled eclectors, but loose metal tubes were not reattached and sampling of the gallery was terminated. Eclectors with one damaging incident during early spring, the main emergence period, or more than one incident in the remaining sampling time were excluded from the analyses.

1 Supplement S3 Studied species and attraction of species to different components of bark 2 beetle pheromone traps

4 S3.1 Identification procedure

5 All samples were sorted by students to the order or suborder level, or to a lower taxonomic level
6 after identification training (see below).

7 Students separated the beetles in the samples into *T. domesticum*, other *Trypodendron* spp.,
8 and other beetles, which were then identified to the species level by a specialist. Other beetles were
9 identified to the species level by a specialist (Eric Anton, Jena). Students also separated
10 Hymenoptera from the samples, and they were then further identified by specialists (Eric Anton
11 with the help of other specialists). Antagonists were identified with information from the literature.
12 Almost all beetles, but only one species of Apocrita (*Perniphora robusta* Ruschka, 1923), could be
13 classified to the species level. Thus, we analysed the abundance of Apocrita antagonists based on
14 species-level data and by including all individuals sampled from families with known antagonists as
15 potential antagonists, i.e. Bethyridae, Braconidae, Eulophidae, Eupelmidae, Eurytomidae,
16 Pteromalidae, Torymidae and Trichogammatidae. The taxonomy follows the current Fauna
17 Europaea nomenclature (de Jong *et al.* 2014; Alonso-Zarazaga 2015; Audisio 2015; Mitroiu 2015;
18 van Achterberg 2015). Of the beetle species, we included the most abundant antagonists, i.e.
19 *Thanasimus formicarius* (Linnaeus, 1758), a well-known generalist predator of bark beetles;
20 *Rhizophagus bipustulatus* (Fabricius, 1792), the dominant antagonist we extracted from *T.*
21 *domesticum* breeding systems; and *Rhizophagus depressus* (Fabricius, 1793), a proven antagonist of
22 *T. domesticum*.

23 We tested the reliability of the classification of our target species by conducting an
24 experiment on the attraction of potential antagonists to the aggregation pheromone lineatin and to
25 ethanol (see below). In doing so we demonstrated that *Perniphora robusta*, among Apocrita,
26 *Rhizophagus* species and *Thanasimus formicarius* are attracted to lineatin.

27 **S3.2 Studied bark beetles**

28 Genus *Trypodendron*

29 Within this group we selected the most abundant species in beech forests of the three regions as
30 target species, based on the results of a preliminary study using traps baited with pheromone and
31 ethanol. Within the genus *Trypodendron*, high abundances of the hardwood-associated species
32 *Trypodendron domesticum* (Linnaeus, 1758) and the softwood-associated species *T. lineatum*
33 (Olivier, 1795) occurred at the sample sites, with the latter species preferring conifers. Two other
34 species, *T. signatum* (Fabricius, 1787) and *T. leave* (Eggers, 1939), occurred at low densities.
35 Hence, we focused on *T. domesticum*.

36 37 *Trypodendron domesticum* (Linnaeus, 1758)

38 The European hardwood or broad-leaved ambrosia beetle *Trypodendron domesticum* is a secondary
39 pest of fresh dead wood of broad-leaved trees, such as European beech (*Fagus sylvatica* L.), oak
40 (*Quercus* spp. L.), and birch (*Betula* spp. L.) (Byers 1992). It has economic importance as a
41 technical pest, as the females excavate galleries about 10 cm deep into the wood and introduce the
42 ambrosia fungus *Ambrosiella ferruginea* (Sauvard 2007) into their tunnels for nourishment (Batra
43 1963), which causes dark staining (Engels *et al.* 2010). Thus, a beetle attack severely reduces the
44 value of the wood.

45 For host finding, *T. domesticum* uses primary and secondary cues. Primary signals are
46 ethanol emitted by the metabolism of microorganisms, which indicates stress of a dying tree
47 (Graham 1968; Moeck 1970), and the colour and shape of the tree (Kerck 1978). Conifer volatiles
48 act as a repellent (Klimetzek, Vité & Mori 1980; Byers 1992). The secondary signal is the genus-
49 specific aggregation pheromone lineatin produced by the females (Klimetzek & Vité 1981), which
50 attracts both sexes (Kerck 1978; Klimetzek & Vité 1981). When males are present, the amount of
51 lineatin produced by the females is reduced (Nijholt 1970; Nijholt 1973; Klimetzek *et al.* 1981).
52 Swarming starts in February when the temperature rises above 9.5°C (Petercord 2006). Flight

activity shows two or more peaks until end of June when it levels off (Gaubicher, De Proft & Grégoire 2003; Petercord 2006). The life cycle of *T. domesticum* is presumably similar to that of *T. lineatum*, with a six- to eight-week larval development from egg deposition to hatching (Parini & Petercord 2006). Imaginal diapause lasts three to four months and is regulated by low temperature (Paiva & Vité 1982).

Trypodendron domesticum has a staggered development, with offspring beetles and young larvae present in the galleries (Eichhorn & Graf 1974). There might occasionally be a second generation, but usually *T. domesticum* is considered to be univoltine in Central Europe. The brood is nursed by both parent beetles until pupation (Gaubicher, De Proft & Grégoire 2003). Most of the offspring overwinter inside the galleries (Eichhorn & Graf 1974), and some overwinter in the soil or leaf litter (Parini & Petercord 2006).

64

Tribe Xyleborini

Among the ambrosia beetles of the tribe Xyleborini, we caught the native *Anisandrus dispar* (Fabricius, 1792) and the invasive (since the 1950s; Groschke 1952; Kirkendall & Faccoli 2010) *Xylosandrus germanus* (Blandford, 1894) in large numbers. The related species *Xyleborinus saxesenii* (Ratzeburg, 1837), *Xyleborus monographus* (Fabricius, 1792) and *Xyleborus dryographus* (Ratzeburg, 1837), the alien *Cyclorhipidion bodoanus* (Reitter, 1913) (since the 1960's; Kirkendall & Faccoli 2010), and the invasive (since the 1980s; Kirkendall & Faccoli 2010) *Xyleborinus alni* (Nijima, 1909), occurred locally and in relatively small numbers. Hence, we focused on the native species *Anisandrus dispar* and the invasive species *Xylosandrus germanus*.

74

Xylosandrus germanus (Blandford, 1894)

The alnus ambrosia beetle, or black stem borer, *Xylosandrus germanus* is an invasive pest (Groschke 1953) that primarily attacks hardwoods (Koch 1989-1992) but has a wide range of host species (Weber & McPherson 1983b). It has been reported that it favours roots and branches in

79 moist conditions (Hoffmann 1941; Kaneko, Tamaki & Takagi 1965) of both living and dead trees.
80 The females excavate the galleries a few centimetres deep into in the sapwood; the galleries consist
81 of an entrance tunnel, a main chamber and larval tunnels where the ambrosia fungus *Ambrosiella*
82 *hartigii* (Sauvard 2007) is cultivated as nourishment for the adults and larvae (Biedermann, Klepzig
83 & Taborsky 2009). The females are attracted to the hosts by stress-related tree volatiles like ethanol,
84 methanol and conophthorin (Klimetzek *et al.* 1986; Dodds & Miller 2010; Ranger *et al.* 2010), with
85 ethanol being the strongest attractant (Ranger *et al.* 2010; VanDerLaan & Ginzel 2013). Swarming
86 and subsequent attacks start at 20°C maximum daily temperature (Reding *et al.* 2013).
87 Two generations are produced a year and overwintering takes place in the galleries (Weber &
88 McPherson 1983a). Males are flightless and serve for mating within the nest, resulting in up to 97%
89 sibling-matings (Keller *et al.* 2011) and an average sex ratio of 10 females to 1 male (Weber &
90 McPherson 1983a).

91

92 *Anisandrus dispar* (Fabricius, 1792)

93 The biology of pear blight beetle *Anisandrus dispar* is similar to that of *Xylosandrus germanus*.
94 *Anisandrus dispar* is reported to be univoltine (Mani, Remund & Schwaller 1992) and is extremely
95 polyphagous (Sauvard 2007), with a preference for broad-leaved tree species (Lieutier *et al.* 2007).
96 Like *T. domesticum*, *Anisandrus dispar* is repelled by monoterpenes and verbenones from conifer
97 trees. French and Roeper (2009) report a sex ratio of two-times to eight-times more females than
98 males. Mating takes place in the maternal gallery during maturation, mainly between siblings
99 (Sauvard 2007). The mated females disperse alone to find new breeding sites, where they bore their
100 galleries and leave the wingless males behind. The larvae feed on the mycelium of the cultivated
101 ambrosia fungus *Ambrosiella hartigii* (Sauvard 2007) and need ambrosia for pupation. Ambrosia
102 production might be partly induced by a secretory product (French & Roeper 1972).

103

104 **S3.3 Bark beetle antagonists**

105 *Coleoptera*

106 *Rhizophagidae*: *Rhizophagus bipustulatus* (Fabricius, 1792), *R. depressus* (Fabricius, 1793), *R.*
107 *dispar* (Paykull, 1800), *R. nitidulus* (Fabricius, 1798) and *R. parvulus* (Paykull, 1800).

108 Many of the root-eating beetles from the genus *Rhizophagus* are facultative predators. They prey on
109 various xylophagous insects, mostly bark beetle and their excrements, but also feed on hyphae of
110 fungi (Koch 1989-1992). They are attracted by both their prey's pheromones and host-volatile
111 ethanol (Byers 1992), and they are able to detect and colonise a high proportion of bark beetle
112 broods (van Averbek & Grégoire 1995). In consumption experiments a single *R. ferrugineus*
113 consumed 79 eggs of a *Hylastes* species (Hanson 1937), and one larva of *R. depressus* consumed 14
114 prey larvae during its development period (Herard & Mercadier 1996) (see also Kenis, Wermelinger
115 & Grégoire 2004). Schroeder (1996) reported a reduction of *Tomicus piniperda* offspring by 41%
116 when reared in a cage with *R. depressus* compared with numbers observed when it was reared
117 alone. We used 14 larvae as the consumption rate for *Rhizophagus* in our study.

118

119 *Cleridae*: *Thanasimus formicarius* (L. 1758) *Thanasimus formicarius* occurs in conifer and in mixed
120 conifer–broad-leaved forests, forest edges and gardens (Koch 1989-1992). Species of the genus
121 *Thanasimus* are the most efficient coleopteran predator of bark beetles (Wegensteiner, Wermelinger
122 & Herrmann 2015). Experimental studies have shown that *T. formicarius* can reduce the size of
123 *Tomicus piniperda* (Linnaeus, 1758) broods by 81% (Schroeder 1996) and those of *Ips typographus*
124 (Linnaeus, 1758) by 18%. Both adults and larvae prey on bark beetles (Person 1940; Gauss 1954;
125 Reeve, Ayres & Jr. 1995; Hui & Bakke 2012). The consumption rate of adults can greatly exceed
126 the consumption rate of larval bark beetles by larval clerids (Reeve, Ayres & Jr. 1995; Aukema &
127 Raffa 2002). *Thanasimus formicarius* consumes approximately 50 (44–57) prey larvae during its
128 larval development (Mills 1985; Dippel *et al.* 1997). It is estimated that they kill between 57 and
129 627 prey larvae per 1000 cm² (Kenis, Wermelinger & Grégoire 2004). *Thanasimus formicarius* is
130 described as a generalist. Gauss (1954) lists more than 20 species of bark beetle as prey for *T.*

131 *formicarius*. They respond to prey pheromones and host-tree volatiles and are able to discriminate
132 between different prey species (Bakke & Kvamme 1981; Tømmeras 1985). They feed on alighting
133 bark beetles and oviposit in bark crevices near bark beetle entrance holes (Aukema & Raffa 2002).
134 *Thanasimus formicarius* is active very early in the season (Stephen & Dahlsten 1976; Herard &
135 Mercadier 1996; Lawson, Furuta & Katagiri 1997). In Central Europe, oviposition begins in early
136 April and continues until late August (Gauss 1954). *Thanasimus* species are highly fecund,
137 producing 100–300 eggs per female (Thatcher & Pickard 1966; Dippel *et al.* 1997). Following
138 hatching, larvae enter bark beetle galleries and forage on immature stages. The larval period of *T.*
139 *formicarius* lasts 30–60 days (Person 1940). Once mature, the majority of larvae bore out of the
140 bark, crawl down to the base of the tree, and pupate in bark near the ground or in the soil, although
141 some larvae pupate in the outer bark near their development site. The majority of the population
142 emerges in the summer of the same year, while the remaining individuals (5–20% for *T.*
143 *formicarius*) overwinter as prepupae in the bark and emerge the following spring or even later
144 (Person 1940; Reeve 1997). Adult *T. formicarius* live for 4–10 months and the entire life cycle
145 takes one year (Gauss 1954), or two years in Scandinavia (Schroeder 1999). We used 47 larvae as
146 the consumption rate for *Thansimus formicarius* in our study.

147

148 Hymenoptera

149 Pteromalidae: *Perniphora robusta* Ruschka 1923

150 Most of the bark beetle parasitoids belong to the family Pteromalidae (Wermelinger 2002), and
151 *Perniphora robusta* is a proven ectoparasitic parasitoid of *Trypodendron* spp. (Eichhorn & Graf
152 1974; Führer 1975).

153 Führer (1975) found that female imagines are able to mature some eggs without eating and that
154 offering honeydew doubled their lifespan and significantly increased the number of mature eggs
155 produced. Führer (1975) concluded that this potential independence of imaginal uptake of nutrients

156 ensures survival in managed forests without food sources. One source of honeydew is the common
157 aphid *Phyllaphis fagi*, found in beech forests.

158 *Perniphora robusta* has a univoltine lifecycle with a synchronised development linked especially to
159 *T. lineatum* (Eichhorn & Graf 1974). The adults emerge and search for hosts in late May when the
160 host larvae are in their middle to late stages. In late June larvae of *P. robusta* are completely
161 developed and go into dormancy until late March of the following year to pupate in early May.

162 Parasitisation of *T. domesticum* broods is almost complete when the female parasitoid enters the
163 gallery in the appropriate time window.

164 **S3.4 Experiment: Attraction of species to different components of bark beetle pheromone**
165 **traps**

166 **Table S3-1:** List of species sampled during an experiment on the attraction of potential antagonists
167 to the aggregation pheromone lineatin and to ethanol. We conducted a comparison of pheromone
168 traps treated with (1) lineatin and ethanol, (2) only ethanol and (3) water, to disentangle the
169 attraction of insects to one of the attractants.

Species	Pheromone trap†	Control trap ethanol‡	Control trap water‡
Coleoptera			
<u>Anobiidae</u>			
<i>Anobium costatum</i> Arrag., 1830	12	14	7
<i>Anobium fulvicorne</i> Sturm, 1837	1	0	0
<i>Dorcatoma robusta</i> Strand, 1938	1	0	0
<i>Hedobia imperialis</i> (L., 1767)	2	2	0
<i>Ptilinus pectinicornis</i> (L., 1758)	3	1	1
<i>Ptinus fur</i> (L., 1758)	1	0	0
<i>Xestobium plumbeum</i> (Ill., 1801)	2	1	2
<u>Anthribidae</u>			
<i>Anthribus albinus</i> (L., 1758)	1	2	1
<u>Attelabidae</u>			
<i>Lasiorhynchites olivaceus</i> (Gyll., 1833)	0	0	1
<u>Biphyllidae</u>			
<i>Diplocoelus fagi</i> Guer., 1844	4	0	0
<u>Brachypteridae</u>			
<i>Brachypterus urticae</i> (F., 1792)	0	0	1
<u>Cantharidae</u>			
<i>Cantharis decipiens</i> Baudi, 1871	1	1	0
<i>Cantharis nigricans</i> (Müll., 1776)	1	0	0
<i>Podistra rufotestacea</i> (Letzner 1845)	3	5	0
<i>Malthodes</i> spp.	4	0	1
<i>Rhagonycha lignosa</i> (Müll., 1764)	6	3	2
<i>Rhagonycha translucida</i> (Kryn., 1832)	0	1	0
<u>Carabidae</u>			
<i>Acupalpus meridianus</i> (L., 1761)	0	1	0
<i>Amara familiaris</i> (Duft., 1812)	1	0	0
<i>Amara similata</i> (Gyll., 1810)	0	1	0
<i>Bembidion lampros</i> (Hbst., 1784)	0	0	1
<i>Harpalus laevipes</i> Zett., 1828	0	0	1
<i>Loricera pilicornis</i> (F., 1775)	0	1	0

Species	Pheromone trap†	Control trap ethanol‡	Control trap water‡
<i>Trechus quadristriatus</i> (Schrk., 1781)	2	0	0
<u>Cerambycidae</u>			
<i>Alosterna tabacicolor</i> (DeGeer, 1775)	4	1	0
<i>Anaglyptus mysticus</i> (L., 1758)	1	0	0
<i>Grammoptera ruficornis</i> (F., 1781)	6	4	0
<i>Leiopus nebulosus</i> (L., 1758)	1	0	0
<i>Rhagium mordax</i> (DeGeer, 1775)	5	0	0
<i>Stenostola dubia</i> (Laich., 1784)	2	2	0
<u>Cerylonidae</u>			
<i>Cerylon fagi</i> Bris., 1867	1	0	1
<i>Cerylon ferrugineum</i> Steph., 1830	15	5	3
<i>Cerylon histeroides</i> (F., 1792)	0	1	0
<u>Chrysomelidae</u>			
<i>Oulema gallaeciana</i> (Heyden, 1870)	2	0	0
<i>Phyllotreta vittula</i> (Redt., 1849)	1	1	0
<u>Ciidae</u>			
<i>Cis boleti</i> (Scop., 1763)	4	5	1
<i>Cis fagi</i> Walth., 1839	1	0	0
<i>Cis glabratus</i> Mell., 1848	0	0	1
<i>Cis nitidus</i> (F., 1792)	1	0	0
<i>Ennearthron cornutum</i> (Gyll., 1827)	0	1	0
<i>Orthocis festivus</i> (Panz., 1793)	2	0	1
<u>Clambidae</u>			
<i>Clambus pubescens</i> Redt., 1849	1	0	0
<u>Cleridae</u>			
<i>Thanasimus formicarius</i> (L., 1758)	65	0	0
<i>Tillus elongatus</i> (L., 1758)	1	2	1
<u>Coccinellidae</u>			
<i>Adalia decempunctata</i> (L., 1758)	1	0	0
<i>Coccinella septempunctata</i> L., 1758	1	0	1
<u>Corylophidae</u>			
<i>Orthoperus punctatus</i> Wank., 1865	1	1	0
<i>Sericoderus lateralis</i> (Gyll., 1827)	1	0	0
<u>Cryptophagidae</u>			
<i>Atomaria analis</i> Er., 1846	1	0	0
<i>Atomaria atrata</i> Rtt., 1875	0	2	0
<i>Atomaria atricapilla</i> Steph., 1830	4	0	1
<i>Atomaria basalis</i> Er., 1846	2	0	0
<i>Atomaria diluta</i> Er., 1846	3	0	0
<i>Atomaria fuscata</i> (Schönh., 1808)	0	1	0
<i>Atomaria linearis</i> Steph., 1830	1	0	1

Species	Pheromone trap†	Control trap ethanol‡	Control trap water‡
<i>Atomaria nigrirostris</i> Steph., 1830	1	0	0
<i>Atomaria pulchra</i> Er., 1846	1	5	0
<i>Atomaria testacea</i> Steph., 1830	0	0	2
<i>Cryptophagus dentatus</i> (Hbst., 1793)	10	9	0
<i>Cryptophagus dentatus</i> -Complex	23	10	3
<i>Cryptophagus intermedius</i> Bruce, 1934	2	6	0
<i>Cryptophagus pilosus</i> Gyll., 1827	1	0	0
<i>Cryptophagus postpositus</i> Sahlb., 1903	0	1	0
<i>Micrambe abietis</i> (Payk., 1798)	1	0	0
<u>Cucujidae</u>			
<i>Pediacus depressus</i> (Hbst., 1797)	1	1	0
<u>Curculionidae</u>			
<i>Acalles camelus</i> (F., 1792)	1	0	0
<i>Ceutorhynchus obstructus</i> (Marsh., 1802)	3	1	1
<i>Cryphalus abietis</i> (Ratz., 1837)	1	0	0
<i>Crypturgus cinereus</i> (Hbst., 1793)	4	1	0
<i>Crypturgus hispidulus</i> Thoms., 1870	1	0	1
<i>Curculio venosus</i> (Grav., 1807)	1	2	0
<i>Cyclorhipidion bodoanus</i> (Rtt., 1913)	1	3	0
<i>Dryocoetes autographus</i> (Ratz., 1837)	1	0	0
<i>Dryocoetes villosus</i> (F., 1792)	1	0	0
<i>Ernoporicus fagi</i> (F., 1778)	50	7	6
<i>Hylastes cunicularius</i> Er., 1836	0	1	0
<i>Hypera ononidis</i> (Chevr., 1863)	1	0	0
<i>Leperisinus fraxini</i> (Panz., 1799)	14	4	4
<i>Phyllobius argentatus</i> (L., 1758)	13	6	7
<i>Pityogenes chalcographus</i> (L., 1761)	1	0	0
<i>Polydrusus mollis</i> (Ström, 1768)	0	1	0
<i>Polydrusus pterygomalis</i> Boh., 1840	2	2	2
<i>Polydrusus undatus</i> (F., 1781)	8	2	1
<i>Polygraphus grandiclava</i> Thoms., 1886	1	0	0
<i>Rhamphus oxyacanthae</i> (Marsh., 1802)	1	0	0
<i>Rhamphus pulicarius</i> (Hbst., 1795)	0	1	0
<i>Rhynchaenus fagi</i> (L., 1758)	2	4	0
<i>Scolytus carpini</i> (Ratz., 1837)	1	0	0
<i>Scolytus ratzeburgi</i> Janson, 1856	0	0	1
<i>Stereonychus fraxini</i> (DeGeer, 1775)	1	0	0
<i>Taphrorychus bicolor</i> (Hbst., 1793)	6	2	4
<i>Trypodendron domesticum</i> L., 1758	35503	448	30
<i>Trypodendron laeve</i> Eggers, 1939	1	0	0
<i>Trypodendron lineatum</i> (Olivier, 1795)	242	1	0

Species	Pheromone trap†	Control trap ethanol‡	Control trap water‡
<i>Trypodendron signatum</i> (Fabricius 1787)	910	8	1
<i>Anisandrus dispar</i> (F., 1792)	1606	1068	5
<i>Xylosandrus germanus</i> (Blandf., 1894)	4170	2989	81
<i>Xyleborus saxeseni</i> (Ratz., 1837)	50	17	0
<u>Elateridae</u>			
<i>Agriotes acuminatus</i> (Steph., 1830)	6	1	2
<i>Agriotes pallidulus</i> (Ill., 1807)	6	0	1
<i>Agriotes pilosellus</i> (Schönh., 1817)	1	0	0
<i>Ampedus pomorum</i> (Hbst., 1784)	1	0	0
<i>Athous haemorrhoidalis</i> (F., 1801)	3	3	6
<i>Athous subfuscus</i> (Müll., 1767)	9	5	8
<i>Athous vittatus</i> (F., 1792)	28	17	19
<i>Dalopius marginatus</i> (L., 1758)	7	4	6
<i>Denticollis linearis</i> (L., 1758)	22	2	3
<i>Denticollis rubens</i> Pill.Mitt., 1783	2	0	1
<i>Hemicrepidius hirtus</i> (Hbst., 1784)	4	5	2
<i>Hypoganus inunctus</i> (Lacord., 1835)	1	0	1
<i>Limonius minutus</i> (L., 1758)	1	0	0
<i>Melanotus castanipes</i> (Payk., 1800)	6	1	2
<u>Erotylidae</u>			
<i>Dacne bipustulata</i> (Thunb., 1781)	1	0	0
<i>Triplax russica</i> (L., 1758)	5	2	0
<u>Eucnemidae</u>			
<i>Hylis foveicollis</i> (Thoms., 1874)	3	1	1
<u>Histeridae</u>			
<i>Abraeus granulum</i> Er., 1839	1	0	0
<i>Gnathoncus buyssoni</i> Auzat, 1917	0	1	0
<i>Margarinotus striola</i> (Sahlb., 1819)	1	1	0
<i>Paromalus flavicornis</i> (Hbst., 1792)	1	0	0
<i>Paromalus parallelepipedus</i> (Hbst., 1792)	0	1	0
<i>Plegaderus caesus</i> (Hbst., 1792)	1	0	0
<i>Plegaderus dissectus</i> Er., 1839	1	2	0
<i>Plegaderus vulneratus</i> (Panz., 1797)	2	1	0
<u>Hydrophilidae</u>			
<i>Megasternum obscurum</i> (Marsh., 1802)	2	0	1
<u>Laemophloeidae</u>			
<i>Cryptolestes ferrugineus</i> (Steph., 1831)	1	0	0
<i>Placonotus testaceus</i> (F., 1787)	1	0	0
<u>Lampyridae</u>			
<i>Lamprohiza splendidula</i> (L., 1767)	12	7	3
<u>Latridiidae</u>			

Species	Pheromone trap†	Control trap ethanol‡	Control trap water‡
<i>Cartodere nodifer</i> (Westw., 1839)	123	104	9
<i>Corticaria elongata</i> (Gyll., 1827)	1	0	0
<i>Corticarina similata</i> (Gyll., 1827)	87	67	14
<i>Corticinara gibbosa</i> (Hbst., 1793)	216	157	62
<i>Enicmus brevicornis</i> (Mannh., 1844)	1	0	0
<i>Enicmus histrio</i> JoyTomlin, 1910	3	2	0
<i>Enicmus rugosus</i> (Hbst., 1793)	2	4	2
<i>Enicmus testaceus</i> (Steph., 1830)	4	3	3
<i>Enicmus transversus</i> (Ol., 1790)	3	2	1
<i>Latridius anthracinus</i> (Mannh., 1844)	1	0	0
<i>Latridius minutus</i> (L., 1767)	2	0	0
<i>Stephostethus alternans</i> (Mannh., 1844)	9	6	6
<i>Stephostethus angusticollis</i> (Gyll., 1827)	8	3	1
<u>Leiodidae</u>			
<i>Agathidium confusum</i> Bris., 1863	6	5	1
<i>Agathidium nigripenne</i> (F., 1792)	21	11	0
<i>Agathidium seminulum</i> (L., 1758)	2	0	0
<i>Agathidium varians</i> (Beck, 1817)	15	8	2
<i>Amphicyllis globus</i> (F., 1792)	1	0	0
<i>Catops coracinus</i> Kelln., 1846	1	0	0
<i>Catops fuliginosus</i> Er., 1837	1	0	0
<i>Choleva cisteloides</i> (Fröl., 1799)	1	1	0
<i>Colenis immunda</i> (Sturm, 1807)	1	0	0
<i>Colon brunneum</i> (Latr., 1807)	1	0	0
<i>Leiodes dubia</i> (Kug., 1794)	1	0	0
<i>Leiodes flavicornis</i> (Bris., 1883)	1	0	0
<i>Leiodes oblonga</i> (Er., 1845)	1	0	0
<i>Leiodes polita</i> (Marsh., 1802)	0	1	0
<i>Nargus velox</i> (Spence, 1815)	1	0	0
<u>Lycidae</u>			
<i>Dictyopectera aurora</i> (Herbst 1874)	0	1	0
<i>Platycis cosnardi</i> (Chevr., 1829)	1	0	0
<u>Lymexylidae</u>			
<i>Hylecoetus dermestoides</i> (L., 1761)	8	10	0
<u>Melandryidae</u>			
<i>Hallomenus binotatus</i> (Quensel, 1790)	0	0	1
<i>Melandrya caraboides</i> (L., 1761)	1	0	0
<i>Orchesia minor</i> Walk., 1837	0	0	1
<i>Orchesia undulata</i> Kr., 1853	0	1	1
<u>Melyridae</u>			
<i>Dasytes caeruleus</i> (De Geer 1774)	2	0	2

Species	Pheromone trap†	Control trap ethanol‡	Control trap water‡
<i>Dasytes plumbeus</i> (Müll., 1776)	3	1	2
<i>Malachius bipustulatus</i> (L., 1758)	2	1	2
<u>Monotomidae</u>			
<i>Rhizophagus bipustulatus</i> (F., 1792)	89	15	3
<i>Rhizophagus depressus</i> (F., 1792)	2	4	0
<i>Rhizophagus dispar</i> (Payk., 1800)	24	0	0
<i>Rhizophagus nitidulus</i> (F., 1798)	35	0	0
<i>Rhizophagus parvulus</i> (Payk., 1800)	2	0	0
<i>Rhizophagus perforatus</i> Er., 1845	4	3	0
<u>Mordellidae</u>			
<i>Mordellochroa abdominalis</i> (F., 1775)	1	0	0
<i>Tomoxia bucephala</i> Costa, 1854	1	0	0
<u>Mycetophagidae</u>			
<i>Litargus connexus</i> (Fourcr., 1785)	24	4	0
<i>Mycetophagus atomarius</i> (F., 1792)	1	3	0
<i>Mycetophagus piceus</i> (F., 1792)	7	0	0
<i>Mycetophagus quadripustulatus</i> (L., 1761)	4	0	0
<i>Triphyllus bicolor</i> (F., 1792)	1	0	0
<u>Nitidulidae</u>			
<i>Epuraea longula</i> Er., 1845	1	1	2
<i>Epuraea marseuli</i> Rtt., 1872	2	2	0
<i>Epuraea melanocephala</i> (Marsh., 1802)	111	22	15
<i>Epuraea neglecta</i> (Heer, 1841)	1	0	0
<i>Epuraea pygmaea</i> (Gyll., 1808)	2	1	0
<i>Epuraea terminalis</i> (Mannh., 1843)	1	0	1
<i>Epuraea unicolor</i> (Ol., 1790)	2	3	1
<i>Epuraea variegata</i> (Hbst., 1793)	2	3	0
<i>Glischrochilus hortensis</i> (Fourcr., 1785)	9	8	0
<i>Glischrochilus quadriguttatus</i> (F., 1776)	1	1	1
<i>Glischrochilus quadripunctatus</i> (L., 1758)	0	1	0
<i>Glischrochilus quadrisignatus</i> (Say, 1835)	2	0	0
<i>Meligethes aeneus</i> (F., 1775)	254	46	52
<i>Meligethes fulvipes</i> Bris., 1863	0	1	0
<i>Meligethes subaeneus</i> Sturm, 1845	1	0	0
<i>Soronia grisea</i> (L., 1758)	1	0	0
<u>Phalacridae</u>			
<i>Olibrus flavicornis</i> (Sturm, 1807)	1	0	0
<u>Ptiliidae</u>			
<i>Acrotrichis intermedia</i> (Gillm., 1845)	5	2	1

Species	Pheromone trap†	Control trap ethanol‡	Control trap water‡
<i>Acrotrichis sitkaensis</i> (Motsch., 1845)	4	0	1
<i>Acrotrichis</i> spp.	5	0	1
<i>Baeocrara variolosa</i> (Muls.Rey, 1867)	3	2	2
<i>Nephanes titan</i> (Newm., 1834)	2	0	0
<i>Oligella foveolata</i> (Allib., 1844)	1	0	0
<i>Ptenidium gressneri</i> Er., 1845	1	0	0
<i>Ptenidium pusillum</i> (Gyll., 1808)	2	0	1
<i>Pteryx suturalis</i> (Heer, 1841)	2	3	0
<i>Ptinella aptera</i> (Guer., 1839)	0	1	0
<i>Ptinella limbata</i> (Heer, 1841)	2	2	0
<i>Ptinella tenella</i> (Er., 1845)	1	0	0
<u>Pyrochroidae</u>			
<i>Pyrochroa coccinea</i> (L., 1761)	1	0	1
<i>Schizotus pectinicornis</i> (L., 1758)	0	3	0
<u>Salpingidae</u>			
<i>Rabocerus foveolatus</i> (Ljungh, 1823)	1	2	0
<i>Salpingus planirostris</i> (Fabricius, 1787)	97	60	0
<i>Salpingus ruficollis</i> (L., 1761)	37	22	3
<i>Vincenzellus ruficollis</i> (Panz., 1794)	6	7	0
<u>Scarabaeidae</u>			
<i>Aphodius depressus</i> (Kug., 1792)	8	2	4
<i>Aphodius granarius</i> (L., 1767)	0	0	1
<i>Aphodius prodromus</i> (Brahm, 1790)	1	1	1
<i>Aphodius rufipes</i> (L., 1758)	2	0	1
<i>Aphodius rufus</i> (Moll., 1782)	0	1	0
<i>Aphodius sticticus</i> (Panz., 1798)	5	2	3
<i>Aphodius zenkeri</i> Germ., 1813	2	1	0
<u>Scirtidae</u>			
<i>Prionocyphon serricornis</i> (Müll., 1821)	0	2	0
<u>Scraptiidae</u>			
<i>Anaspis frontalis</i> (L., 1758)	2	0	0
<i>Anaspis rufilabris</i> (Gyll., 1827)	3	2	1
<i>Anaspis</i> spp.	0	0	2
<i>Anaspis thoracica</i> (L., 1758)	0	1	0
<u>Scydmaenidae</u>			
<i>Microscydmus nanus</i> (Schaum, 1844)	4	0	1
<i>Neuraphes elongatulus</i> (Müll.Kunze, 1822)	0	1	1
<i>Neuraphes rubicundus</i> (Schaum, 1841)	0	0	1
<i>Neuraphes ruthenus</i> Mach., 1925	1	0	0
<i>Stenichmus collaris</i> (Müll.Kunze, 1822)	0	0	1

Species	Pheromone trap†	Control trap ethanol‡	Control trap water‡
<i>Stenichnus scutellaris</i> (Müll.Kunze, 1822)	1	1	0
<u>Silphidae</u>			
<i>Nicrophorus vespilloides</i> Herbst, 1783	0	0	1
<i>Oiceoptoma thoracica</i> (L., 1758)	1	1	0
<u>Silvanidae</u>			
<i>Silvanus bidentatus</i> (F., 1792)	1	0	0
<u>Sphindidae</u>			
<i>Aspidiphorus orbiculatus</i> (Gyll., 1808)	1	1	0
<u>Staphylinidae</u>			
<i>Acrulia inflata</i> (Gyll., 1813)	0	1	0
<i>Agaricochara latissima</i> (Steph., 1832)	2	8	2
<i>Aleochara albobovillosa</i> Bernh., 1901	1	0	0
<i>Aleochara bipustulata</i> (L., 1761)	0	1	0
<i>Aleochara sparsa</i> Heer, 1839	13	8	0
<i>Aleochara stichai</i> Likovsky, 1965	5	1	0
<i>Aleuonota rufotestacea</i> (Kr., 1856)	1	0	0
<i>Aloconota gregaria</i> (Er., 1839)	2	0	0
<i>Amischa analis</i> (Grav., 1802)	5	1	1
<i>Amischa bifoveolata</i> (Mannh., 1830)	1	0	0
<i>Amischa decipiens</i> (Shp., 1869)	0	0	1
<i>Anomognathus cuspidatus</i> (Er., 1839)	2	0	1
<i>Anotylus mutator</i> (Lohse, 1963)	5	1	0
<i>Anotylus mutator/sculpturatus</i>	3	0	0
<i>Anotylus sculpturatus</i> (Grav., 1806)	1	0	0
<i>Anotylus tetracarinatus</i> (Block, 1799)	1	0	1
<i>Anthophagus angusticollis</i> (Mannh., 1830)	14	6	0
<i>Atheta aegra</i> (Heer, 1841)	0	2	0
<i>Atheta aeneipennis</i> Thoms., 1856	0	0	1
<i>Atheta crassicornis</i> (F., 1792)	0	2	0
<i>Atheta elongatula</i> (Grav., 1802)	0	1	0
<i>Atheta fungi</i> (Grav., 1806)	8	2	5
<i>Atheta harwoodi</i> Will., 1930	1	0	0
<i>Atheta nigricornis</i> (Thoms., 1852)	48	31	0
<i>Atheta subtilis</i> (Scriba, 1866)	1	0	1
<i>Atheta triangulum</i> (Kr., 1856)	1	0	1
<i>Autalia longicornis</i> Scheerp., 1947	0	0	1
<i>Bibloporus bicolor</i> (Denny, 1825)	11	8	1
<i>Bibloporus minutus</i> Raffr., 1914	0	1	1
<i>Bisnius fimetarius</i> (Grav., 1802)	1	0	0
<i>Bythinus burrellii</i> Denny, 1825	2	2	0

Species	Pheromone trap†	Control trap ethanol‡	Control trap water‡
<i>Callicerus rigidicornis</i> (Er., 1839)	1	0	0
<i>Carphacis striatus</i> (Ol., 1794)	1	0	0
<i>Coprophilus striatulus</i> (F., 1792)	4	2	0
<i>Cypha longicornis</i> (Payk., 1800)	1	0	0
<i>Euplectus brunneus</i> (Grimm., 1841)	1	0	0
<i>Euplectus fauveli</i> Guillb., 1888	2	2	0
<i>Euplectus nanus</i> (Reichb., 1816)	0	1	0
<i>Euplectus punctatus</i> Muls., 1861	1	0	0
<i>Euryusa castanoptera</i> Kr., 1856	22	2	0
<i>Eusphalerum atrum</i> (Heer, 1838)	0	1	0
<i>Eusphalerum limbatum</i> (Er., 1840)	0	1	0
<i>Eusphalerum luteum</i> (Marsh., 1802)	2	1	0
<i>Eusphalerum semicoleoptratum</i> (Panzer, 1795)	2	0	1
<i>Eusphalerum sorbi</i> (Gyll., 1810)	0	1	1
<i>Gyrophæna minima</i> Er., 1837	0	1	0
<i>Habrocerus capillaricornis</i> (Grav., 1806)	0	2	0
<i>Hapalaræa pygmaea</i> (Payk., 1800)	3	2	0
<i>Haploglossa villosula</i> (Steph., 1832)	1	1	1
<i>Homalota plana</i> (Gyll., 1810)	3	0	0
<i>Ischnoglossa obscura</i> Wunderle, 1990	1	0	0
<i>Leptoplectus spinolæ</i> (Aubé, 1844)	0	1	0
<i>Leptusa fumida</i> (Er., 1839)	3	4	0
<i>Leptusa pulchella</i> (Mannh., 1830)	8	16	1
<i>Leptusa ruficollis</i> (Er., 1839)	1	0	0
<i>Lesteva longoelytrata</i> (Goeze, 1777)	8	4	5
<i>Liogluta microptera</i> (Thoms., 1867)	1	0	0
<i>Lordithon lunulatus</i> (L., 1761)	1	0	0
<i>Megaloscapa punctipennis</i> (Kr., 1856)	0	2	0
<i>Mycetoporus reichei</i> Pand., 1869	1	0	0
<i>Nudobius lentus</i> (Grav., 1806)	0	1	0
<i>Ocalea rivularis</i> Mill., 1851	3	0	1
<i>Omalium caesum</i> Grav., 1806	2	0	1
<i>Omalium rivulare</i> (Payk., 1789)	1	3	1
<i>Oxypoda acuminata</i> (Steph., 1832)	2	0	2
<i>Oxypoda alternans</i> (Grav., 1802)	0	0	1
<i>Oxypoda brevicornis</i> (Steph., 1832)	1	0	0
<i>Oxypoda vittata</i> Märk., 1842	1	0	0
<i>Philonthus decorus</i> (Grav., 1802)	1	0	0
<i>Philonthus rotundicollis</i> (Menetr., 1832)	0	1	0
<i>Philonthus tenuicornis</i> Rey, 1853	0	0	1
<i>Phloeopora corticalis</i> (Grav., 1802)	3	2	0

Species	Pheromone trap†	Control trap ethanol‡	Control trap water‡
<i>Phloeostiba lapponica</i> (Zetterstedt, 1838)	1	0	0
<i>Phloeostiba plana</i> (Payk., 1792)	3	4	0
<i>Phyllodrepa ioptera</i> (Steph., 1834)	0	3	0
<i>Phyllodrepoidea crenata</i> (Grav., 1802)	1	4	0
<i>Placusa atrata</i> (Mannh., 1831)	1	0	0
<i>Placusa pumilio</i> (Grav., 1802)	46	17	0
<i>Placusa tachyporoides</i> (Waltl, 1838)	246	132	1
<i>Plataraea brunnea</i> (F., 1798)	1	0	0
<i>Plectophloeus fischeri</i> (Aube, 1833)	1	0	0
<i>Plectophloeus nubigena</i> (Rtt., 1876)	1	2	0
<i>Proteinus brachypterus</i> (F., 1792)	1	0	0
<i>Quedius cinctus</i> (Payk., 1790)	0	0	1
<i>Quedius cruentus</i> (Ol., 1795)	4	0	0
<i>Quedius mesomelinus</i> (Marsh., 1802)	3	0	0
<i>Rugilus rufipes</i> (Germ., 1836)	1	0	1
<i>Scaphidium quadrimaculatum</i> Ol., 1790	0	1	0
<i>Scaphisoma agaricinum</i> (L., 1758)	0	2	0
<i>Siagonium humerale</i> Germ., 1817	4	3	0
<i>Stenus clavicornis</i> (Scop., 1763)	1	0	0
<i>Stenus fossulatus</i> Er., 1840	0	1	0
<i>Tachyporus chrysomelinus</i> (L., 1758)	1	0	0
<i>Tachyporus hypnorum</i> (F., 1775)	1	1	0
<i>Trimium brevicorne</i> (Reichb., 1816)	1	0	0
<i>Xylostiba monilicornis</i> (Gyll., 1810)	2	2	0
<u>Tenebrionidae</u>			
<i>Bolitophagus reticulatus</i> (L., 1767)	4	0	0
<u>Tetratomidae</u>			
<i>Tetratoma ancora</i> F., 1790	10	2	3
<u>Throscidae</u>			
<i>Trixagus carinifrons</i> Bonv., 1859	1	1	1
<i>Trixagus dermestoides</i> (L., 1767)	0	1	0
<u>Trogossitidae</u>			
<i>Nemosoma elongatum</i> (L., 1761)	7	5	2
Apocrita			
<u>Andrenidae</u>			
<i>Andrena</i> spp.	4	2	2
<u>Aphelinidae</u>			
Aphelinidae spp.	1		
<u>Apidae</u>			
<i>Bombus pratorum</i>	1		

Species	Pheromone trap†	Control trap ethanol‡	Control trap water‡
<u>Braconidae</u>			
Braconidae spp.	5	9	3
<u>Ceraphronidae</u>			
<i>Aphanogmus</i> spp.	13	9	
<i>Ceraphron clavatus</i>	2		
<i>Ceraphron pristomicrops</i>	1		
<i>Ceraphron serraticornis</i>	8		
<i>Ceraphron</i> spp.	2	1	1
<i>Synarsis pulla</i>			1
<u>Diapriidae</u>			
<i>Aclista atriceps</i>	1		
<i>Aclista cantiana</i>			1
<i>Aclista mycale</i>	1		
<i>Aclista rufopetiolata</i>	1		
<i>Aclista scutellaris</i>	1		
<i>Aclista</i> spp.	1		
<i>Aneurhynchus pentatomus</i>		1	
<i>Basalys (Loxotropa) badeniensis</i>	2	2	1
<i>Basalys abrupta</i>	2		
<i>Basalys crassiceps</i>	1		2
<i>Basalys crassiclava</i>	4	3	
<i>Basalys crassicornis</i>	1		
<i>Basalys longipennis</i>		1	
<i>Basalys pedisequa</i>	3		
<i>Basalys</i> spp.			1
<i>Basalys stramineipes</i>		1	
<i>Belyta quadridens</i>	1		
<i>Miota macrocera</i>		1	
<i>Monelata solida</i>	7		
<i>Pantoclis similis</i>	1		
<i>Pantoclis</i> spp.	2		
<i>Paramesius brachypterus</i>	1		
<i>Phaenopria major</i>	1		
<i>Phaenopria</i> spp.			1
<i>Spilomicrus nigripes</i>	2	1	1
<i>Spilomicrus stigmatalis</i>	1		
<i>Trichopria aequata</i>	2	1	
<i>Trichopria aptera</i>	1		
<i>Trichopria fuliginosa</i>	3		
<i>Trichopria hyalinipennis</i>	1		
<i>Zygota subaptera</i>	2		

Species	Pheromone trap†	Control trap ethanol‡	Control trap water‡
<u>Dryinidae</u>			
<i>Aphelopus melaleucus</i>	1		
<i>Aphelopus serratus</i>	1		
<u>Encyrtidae</u>			
Encyrtidae spp.	1	2	1
<u>Eucoilidae</u>			
<i>Trybliographa gracilicornis</i>		1	
<u>Eulophidae</u>			
Entedoninae spp.	1		1
Eulophidae spp.	1		
Tetrastichinae spp.	2	1	1
<i>Tetrastichus</i> spp.	5	2	1
<u>Eurytomidae</u>			
<i>Eurytoma</i> spp.	1		
<u>Figitidae</u>			
<i>Melanips opacus</i>			1
<u>Ichneumonidae</u>			
Ichneumonidae spp.	19	5	3
<u>Megaspilidae</u>			
<i>Conostigmus dimidiatus</i>	1		
<i>Conostigmus fasciatipennis</i>		1	
<i>Conostigmus</i> spp.	2		
<i>Lagynodes pallidus</i>	7	3	2
<u>Mymaridae</u>			
Mymaridae spp.	34	16	3
<u>Platygastridae</u>			
<i>Amblyaspis nodicornis</i>	3	2	1
<i>Amblyaspis roboris</i>	1		
<i>Amblyaspis</i> spp.	1	2	
<i>Amblyaspis tritici</i>	6		1
<i>Inostemma boscii</i>	1		
<i>Inostemma</i> spp.			1
<i>Leptacis lignicola</i>	6		
<i>Leptacis</i> spp.	30	1	
<i>Piestopleura</i> spp.	1		
<i>Platygaster</i> spp.	4	5	3
<i>Prosactogaster</i> spp.	11	21	15
<i>Prosactogaster/Platygaster</i> spp.	3	3	
<i>Synopeas craterus</i>		1	
<i>Synopeas</i> spp.	2	1	
<i>Trichacis</i> spp.		1	

Species	Pheromone trap†	Control trap ethanol‡	Control trap water‡
<u>Pompilidae</u>			
<i>Dipogon subintermedius</i>			1
<i>Priocnemis</i> spp.	1		
<u>Proctotrupidae</u>			
<i>Cryptoserpus aculeator</i>	1		
<i>Exallonyx brevimala</i>		1	
<i>Exallonyx confusus</i>	1		
<i>Exallonyx quadriceps</i>		1	
<u>Pteromalidae</u>			
<i>Gastrancistrus</i> spp.	15	4	7
<i>Perniphora robusta</i>	46		
<i>Trichomalus</i> spp.	1		
<u>Scelionidae</u>			
<i>Amitus longicornis</i>		1	
<i>Baeus seminulum</i>			1
<i>Idris flavicornis</i>	1		
<i>Telenomus</i> spp.	1		
<u>Trichogrammatidae</u>			
<i>Trichogramma</i> spp.	4	1	
Trichogrammatidae spp.	1		
<u>Vespidae</u>			
<i>Dolichovespula norwegica</i>		1	
<i>Dolichovespula saxonica</i>			1
<i>Symmorphus gracilis</i>	1		

†: twin-trap

‡: single trap

174 **Supplement S4 Details on the statistical models used**

175 ***S4.1 Abundance-based model***

176 To analyse the drivers of the abundance of ambrosia beetle (*T. domesticum*, *X. germanus*, and *A.*
177 *dispar*) and their antagonists (*R. bipustulatus*, *R. depressus*, *T. formicarius*) we used data from 2010
178 and included forest management intensity (ForMI) and its interaction with region as main
179 predictors. As covariates, the abundance of antagonists (response: bark beetle abundance), the
180 abundance of *T. domesticum* (response: bark beetle antagonists), and variables assessed at the plot
181 and subplot-scales (see main article) were used. The between-year stability of effects was analysed
182 by fitting an additional model for the Hainich-Dün region with data for 2010 and 2011 (see
183 Supplement S6). Negative-binomial GLMMs were used for analysing abundance of *T. domesticum*
184 (model 1) and abundance of *Xylosandrus germanus* (model 2), with region as random factor, and
185 abundance of *Anisandrus dispar* (model 3), with region and observation as random factors, fitted as:
186 $\sim \text{region} \times \text{ForMI} + \text{abundance of antagonists} + \text{canopy closure} + \text{dead wood} + \text{tree diversity} + \text{main}$
187 $\text{tree type} + \text{density of regeneration} + (1 \mid \text{region}) [+ (1 \mid \text{observation})]$; only for *Anisandrus dispar*
188

189 ***S4.2 Attack-based model***

190 The attack of logs was analysed separately for *T. domesticum* and *Xylosandrus germanus*. For the
191 analysis of *T. domesticum* attacks on the AmbroBEx-logs, we pooled the data from both 2010 and
192 2011 by summing up the attacks on each log. In 2012, decay of most logs reached a decomposition
193 stage in which they become unattractive for *Trypodendron*. Thus, we omitted the very few attacks
194 from this year from the analyses. *Xylosandrus germanus* attacks were analyzed for 2010 only, as
195 they occurred almost exclusively in that year. We fitted three models with attacks as the response
196 variable and ForMI as the main predictor, along with the abundance of the respective species and
197 total beetle Shannon-diversity from the pheromone traps, and plot, subplot and log-level
198 measurements were included as covariates. To account for differences in the sampled area, we
199 included the log surface area as an offset in the count models, which resulted in attack densities. We

200 used a binomial GLMM to model the attack probability of *T. domesticum* (model 4; no random
201 factor because only the 100 cm x 20 cm log was used) and *Xylosandrus germanus* (model 6; plot as
202 random factor), with log infested or not infested as the response variable. We used negative-
203 binomial GLMMs to model the abundance of *T. domesticum* (model 5; plot as random factor) and
204 *Xylosandrus germanus* (model 7; plot as random factor):

205 ~ ForMI + bark beetle species abundance + beetle diversity + canopy closure + dead wood + main
206 tree type + density of regeneration + bark texture + bark free area + log class + (1 | plot)

207 Owing to the high proportion of attacked BELongDead-logs, the models for attack rate did
208 not converge. For the analyses of the attack density for *T. domesticum* and *Xylosandrus germanus*
209 we used the data from 2010 from all three regions. The number of entrance holes was used as the
210 response variable, ForMI and its interaction with region were used as the main predictor variables,
211 and plot, subplot and log-level measurements were included as covariates. Plot within region was
212 included as a nested random factor. Negative-binomial GLMMs were used for *T. domesticum*
213 (model 8) and *Xylosandrus germanus* (model 9):

214 ~ ForMI × region + bark beetle species abundance + canopy closure + dead wood + main tree type
215 + tree diversity + bark free area + (1 | region/plot)

216

217 ***S4.3 Breeding success***

218 To analyse the effects of management on breeding success of *T. domesticum*, we first tested the
219 emerged progeny and all emerged antagonists in two separate models. ForMI was included as the
220 main predictor variable, along with subplot and log-level covariates. We included only data from
221 AmbroBEx-logs because the time between gallery creation and eclector installation was only
222 known for these logs. We used the following negative-binomial GLMMs, with plot as random
223 factor (model 10):

224 *T. domesticum* progeny ~ ForMI + canopy coverage + date of gallery creation + time between
225 gallery creation and eclector installation + (1 | plot)

226 Secondly, we tested the mortality of *T. domesticum* and thus breeding success by using
227 information from the literature on the number of bark beetle eggs or larvae consumed by one
228 predator (*Thanasimum*: 47, *Rhizophagus*: 14) or parasitoid (1) (see Supplement S2). Here we
229 combined AmbroBEx-logs and BELongDead-logs but included only eclectors where at least one
230 individual of either *T. domesticum* or antagonists emerged. The final data set consisted of 169
231 eclectors. In this binomial GLMM we included *T. domesticum* mortality as the response variable,
232 management intensity as the predictor, and log as a random factor (model 11):
233 cbind (*T. domesticum* consumed, *T. domesticum* emerged) ~ ForMI + (1 | log)
234

235 **Supplement S5 Overview of species caught by pheromone traps**

236 In total, 83% of the individuals caught in the pheromone traps were ambrosia beetles and <1% were
237 potential natural enemies (Table S5-1). Among ambrosia beetles, *T. domesticum* was most abundant
238 in the pheromone traps in 2010 and 2011, with a total of 467,001 sampled individuals (83.3% of
239 that genus); 80,118 individuals (14.3%) of the non-target softwood-associated species *T. lineatum*
240 were caught, and *T. signatum* and *T. laeve* contributed 11,653 (2.1%) and 1,899 (0.3%) individuals,
241 respectively. For Xyleborini, two species were represented with almost equal abundance:
242 *Xylosandrus germanus* with 49,522 (45.7%) and *Anisandrus dispar* with 48,505 (44.7%)
243 individuals. With 10,221 (9.4%) individuals, *Xyleborus saxeseni* was much less abundant, and from
244 *Xyleborus monographus*, *Xyleborus dryographus*, *Xyleborus alni*, and *Cyclorhipidion bodoanus*
245 only 195 (0.2%) individuals were sampled in total (for details on the abundance of sampled
246 Coleoptera and Apocrita see Tables S5-1 to S5-3).

247 **Table S5-1:** Overview of the number of plots, organised by forest management type, and the average abundance (mean $\pm$ SE) per plot of target species,
248 i.e. *Trypodendron* spp. and Xyleborini, and their most abundant possible antagonists from pheromone traps.

Region (Year)	Schwäbische Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree type	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanaged	Even-aged	Even-aged	Unmanaged	Uneven-aged	Even-aged	Even-aged	Unmanaged	Even-aged	Even-aged	Even-aged
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
Coleoptera – target pest species											
<i>Trypodendron domesticum</i> (L. 1758)	1202.8 $\pm$ 385.8	1258.1 $\pm$ 160.3	447.2 $\pm$ 84	6413.2 $\pm$ 727.9/ 9236.3 $\pm$ 511.5	2520.7 $\pm$ 397.7/ 6049.3 $\pm$ 799.4	2479.8 $\pm$ 451.6/ 5318.8 $\pm$ 1035	2164.8 $\pm$ 553.7/ 4413.5 $\pm$ 1152.3	1447.7 $\pm$ 334.6	831.5 $\pm$ 163.7	801.4 $\pm$ 117.3	335.6 $\pm$ 64.6
<i>Trypodendron leave</i> Eggers 1939	17.4 $\pm$ 10.3	15.1 $\pm$ 4	52.3 $\pm$ 13.8	5.2 $\pm$ 0.9/ 0 $\pm$ 0	7.3 $\pm$ 3.7/ 0.4 $\pm$ 0.2	5.1 $\pm$ 1.4/ 0.2 $\pm$ 0.1	82.3 $\pm$ 18.9/ 1.5 $\pm$ 0.6	0.2 $\pm$ 0.2	0.2 $\pm$ 0.1	0.1 $\pm$ 0.1	4.1 $\pm$ 1.4
<i>Trypodendron lineatum</i> (Oliv. 1795)	1407.8 $\pm$ 564.1	479.7 $\pm$ 91.3	3169.3 $\pm$ 418.6	32.9 $\pm$ 4.3/ 11 $\pm$ 1.3	32.1 $\pm$ 4.6/ 12.1 $\pm$ 2.2	60.1 $\pm$ 20/ 31.1 $\pm$ 10.2	1011.8 $\pm$ 266.1/ 913.3 $\pm$ 409.3	33 $\pm$ 8.8	25.1 $\pm$ 7.1	51 $\pm$ 14.8	380.9 $\pm$ 72.5
<i>Trypodendron signatum</i> (F. 1787)	36.8 $\pm$ 11.2	53 $\pm$ 15	54.6 $\pm$ 17.4	102.4 $\pm$ 17.3/ 84.3 $\pm$ 27.3	74.4 $\pm$ 24.6/ 136.8 $\pm$ 40.9	36.4 $\pm$ 6.4/ 53.5 $\pm$ 16.5	95 $\pm$ 31.8/ 51.3 $\pm$ 31.2	69.2 $\pm$ 16	60.7 $\pm$ 12.5	107.3 $\pm$ 22.4	41 $\pm$ 9.6
<i>Anisandrus dispar</i> (F. 1792)	36.8 $\pm$ 13	78 $\pm$ 9.3	5.1 $\pm$ 0.6	84.5 $\pm$ 10.6/ 47.8 $\pm$ 13.1	156 $\pm$ 60.5/ 258.3 $\pm$ 51.5	214 $\pm$ 27.5/ 320.3 $\pm$ 68.8	66 $\pm$ 14.1/ 83.5 $\pm$ 22.4	693 $\pm$ 112.6	952.6 $\pm$ 151	992.7 $\pm$ 207.5	273.6 $\pm$ 47.6
<i>Xylosandrus germanus</i> (Blandf. 1894)	2 $\pm$ 1.1	30.1 $\pm$ 17.7	7.7 $\pm$ 7.2	602.8 $\pm$ 93.7/ 965.7 $\pm$ 220.7	334.5 $\pm$ 116.6/ 793.9 $\pm$ 363.5	196.9 $\pm$ 124.9/ 467.7 $\pm$ 201.1	11.3 $\pm$ 10.9/ 19 $\pm$ 15.7	182.7 $\pm$ 42.8	417.7 $\pm$ 90.8	207.7 $\pm$ 37	296 $\pm$ 90.8
<i>Xyleborinus saxesenii</i> (Ratz. 1837)	1 $\pm$ 0.3	1.4 $\pm$ 0.3	0.1 $\pm$ 0.1	17.7 $\pm$ 8.9/ 5.5 $\pm$ 3.4	22.7 $\pm$ 9.8/ 4.7 $\pm$ 1.7	32.3 $\pm$ 9.1/ 12.6 $\pm$ 3.5	5.5 $\pm$ 1.2/ 4 $\pm$ 1.6	92.5 $\pm$ 18.3	245.1 $\pm$ 53.9	323.3 $\pm$ 112.3	100.8 $\pm$ 15.7
Xyleborini spp.	0 $\pm$ 0	0 $\pm$ 0	0 $\pm$ 0	0 $\pm$ 0/ 0 $\pm$ 0	0 $\pm$ 0/ 0 $\pm$ 0	0 $\pm$ 0/ 0 $\pm$ 0	0 $\pm$ 0/ 0 $\pm$ 0	1.7 $\pm$ 1.3	1.3 $\pm$ 0.7	2.4 $\pm$ 1.7	0.5 $\pm$ 0.3
Coleoptera – antagonists											
<i>Rhizophagus depressus</i> (F. 1792)	7.2 $\pm$ 4.2	2.2 $\pm$ 0.6	45.4 $\pm$ 17.5	2.1 $\pm$ 0.3/ 1.2 $\pm$ 0.5	1.3 $\pm$ 0.5/ 0.1 $\pm$ 0.1	2.9 $\pm$ 0.9/ 0.9 $\pm$ 0.3	111.8 $\pm$ 35.7/ 78.3 $\pm$ 41.6	4.2 $\pm$ 1	4.3 $\pm$ 1.5	16.4 $\pm$ 4.9	108.1 $\pm$ 16.1
<i>Thanasimus formicarius</i> (L. 1758)	14.6 $\pm$ 5.3	10.8 $\pm$ 1.6	14.3 $\pm$ 2.6	4.9 $\pm$ 1.2/ 4.3 $\pm$ 1.6	5.1 $\pm$ 1.4/ 6.2 $\pm$ 1.1	8.2 $\pm$ 1/ 10.9 $\pm$ 1.8	17.8 $\pm$ 6.2/ 44.8 $\pm$ 10.5	33.2 $\pm$ 9.4	24.9 $\pm$ 3.6	34.7 $\pm$ 8.3	90.7 $\pm$ 8.7
<i>Rhizophagus bipustulatus</i> (F. 1792)	5 $\pm$ 1.7	12.6 $\pm$ 4.6	13.7 $\pm$ 3.8	12.6 $\pm$ 2.1/ 3.4 $\pm$ 1/ 5.4 $\pm$ 1.6/ 4 $\pm$ 0.6/ 3 $\pm$ 1.3	3.4 $\pm$ 1/ 5.4 $\pm$ 1.6/ 4 $\pm$ 0.6/ 3 $\pm$ 0.8	5.4 $\pm$ 1.6/ 4 $\pm$ 0.6/ 3 $\pm$ 0.8	4 $\pm$ 0.6/ 3 $\pm$ 0.8	3 $\pm$ 1.3	3 $\pm$ 0.8	4 $\pm$ 1.5	2.3 $\pm$ 0.5

				15.2±4.5	2.6±0.9	6±2.2	2.5±0.9				
Apocrita antagonists											
<i>Perniphora robusta</i>	2	8	0	17/52	7/15	16/17	1/9	1	1	1	1

249 **Table S5-2:** Complete list of Coleoptera species and their abundances from pheromone traps, separated by management type and main tree type.
250 Species are grouped by family and presented in alphabetical order.

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<u>Aderidae</u>											
<i>Anidorus nigrinus</i> (Germ., 1831)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	2
<i>Euglenes pygmaeus</i> (DeGeer, 1774)	0	0	0	0/0	0/0	0/0	1/0	0	1	0	3
<u>Anobiidae</u>											
<i>Anobium costatum</i> Arrag., 1830	4	25	0	44/26	29/10	12/12	1/0	35	10	3	3
<i>Anobium fulvicorne</i> Sturm, 1837	0	0	0	1/1	0/0	0/0	0/0	0	0	4	0
<i>Anobium nitidum</i> F., 1792	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Dorcatoma dresdensis</i> Hbst., 1792	0	2	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Dorcatoma robusta</i> Strand, 1938	0	0	0	0/0	0/0	0/1	0/0	2	1	0	0
<i>Dorcatoma substriata</i> Hummel, 1829	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Dryophilus pusillus</i> (Gyll., 1808)	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Ernobius abietinus</i> (Gyll., 1808)	1	0	1	0/0	0/0	0/0	1/0	0	0	0	0
<i>Ernobius abietis</i> (F., 1792)	0	1	3	0/0	0/0	0/0	2/0	0	0	0	0
<i>Ernobius longicornis</i> (Sturm, 1837)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Ernobius mollis</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Hedobia imperialis</i> (L., 1767)	0	3	0	0/1	1/2	1/1	1/0	0	0	1	0
<i>Ptilinus pectinicornis</i> (L., 1758)	0	20	1	16/1	3/3	10/5	3/2	0	4	0	0
<i>Ptinus coarcticollis</i> Sturm., 1837	0	0	0	0/0	0/0	0/0	0/0	0	0	0	6
<i>Ptinus fur</i> (L., 1758)	0	1	0	1/2	0/0	0/3	0/0	0	1	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Even - Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Ptinus rufipes</i> Ol., 1790	0	0	0	0/0	0/0	0/0	0/0	0	0	33	0
<i>Ptinus subpilosus</i> Sturm, 1837	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Xestobium plumbeum</i> (Ill., 1801)	0	3	0	3/3	1/4	4/3	0/0	18	20	1	7
<i>Xestobium rufovillosum</i> (DeGeer, 1774)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<u>Anthicidae</u>											
<i>Notoxus monoceros</i> (L., 1761)	0	0	0	0/0	0/0	0/0	0/0	1	1	2	4
<u>Anthribidae</u>											
<i>Anthribus albinus</i> (L., 1758)	1	5	0	4/1	2/2	8/11	1/0	5	29	3	26
<i>Brachytarsus nebulosus</i> (Forst., 1771)	0	0	0	0/0	0/0	0/0	1/1	2	0	2	14
<i>Choragus sheppardi</i> Kirby, 1818	0	0	0	1/0	1/0	0/0	0/0	0	0	0	0
<i>Dissoleucas niveirostris</i> (F., 1798)	0	0	0	0/1	0/0	0/0	0/0	1	1	0	1
<u>Attelabidae</u>											
<i>Apoderus coryli</i> (L., 1758)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Byctiscus betulae</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Caenorhinus aequatus</i> (L., 1767)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	1
<i>Deporaus betulae</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Deporaus tristis</i> (F., 1794)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Lasiorhynchites olivaceus</i> (Gyll., 1833)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<u>Biphyllidae</u>											
<i>Diplocoelus fagi</i> Guer., 1844	1	17	3	37/7	4/0	9/6	0/1	9	12	4	11
<u>Brachypteridae</u>											
										0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Brachypterus urticae</i> (F., 1792)	0	2	1	0/0	0/0	0/0	0/0	0	2	1	2
<i>Heterhelus scutellaris</i> (Heer, 1841)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<u>Brentidae</u>											
<i>Eutrichapion viciae</i> (Payk., 1800)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Ischnopterapion virens</i> (Hbst., 1797)	0	3	0	0/0	1/0	0/0	0/1	0	0	0	0
<i>Oxystoma cerdo</i> (Gerst., 1854)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Oxystoma cracca</i> (L., 1767)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Oxystoma ochropus</i> (Germ., 1818)	0	0	0	0/0	0/0	0/0	0/2	0	0	0	0
<i>Perapion curtirostre</i> (Germ., 1817)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Protapion apricans</i> (Hbst., 1797)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Protapion fulvipes</i> (Fourcr., 1785)	0	0	0	0/0	1/0	0/0	0/0	3	0	0	2
<u>Byrrhidae</u>											
<i>Byrrhus pilula</i> (L., 1758)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Byturus ochraceus</i> (Scriba, 1790)	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Byturus tomentosus</i> (DeGeer, 1774)	0	3	40	1/0	0/0	16/1	1/2	0	11	7	9
<u>Cantharidae</u>											
<i>Cantharis decipiens</i> Baudi, 1871	0	1	0	0/0	3/1	4/2	0/0	0	0	0	0
<i>Cantharis fusca</i> L., 1758	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Cantharis nigricans</i> (Müll., 1776)	0	0	0	0/0	1/1	4/0	0/1	1	5	7	3
<i>Cantharis pellucida</i> F., 1792	0	0	0	0/0	0/6	0/5	0/2	0	2	0	2
<i>Malthinus facialis</i> Thoms., 1864	0	0	0	0/0	0/0	1/1	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Malthinus fasciatus</i> (Ol., 1790)	0	0	0	0/0	0/0	2/0	2/0	0	0	0	0
<i>Malthinus frontalis</i> (Marsh., 1802)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Malthinus punctatus</i> (Fourcr., 1785)	0	0	0	0/0	0/0	0/20	0/0	0	0	1	1
<i>Malthinus</i> spec.	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Malthodes crassicornis</i> (Mäckl., 1846)	0	0	0	0/0	0/0	0/2	0/0	0	0	0	1
<i>Malthodes lobatus</i> Kiesw., 1852	0	0	0	0/0	1/0	0/0	2/0	0	0	0	0
<i>Malthodes marginatus</i> (Latr., 1806)	0	1	1	0/0	0/0	0/0	1/0	0	0	1	0
<i>Malthodes spathifer</i> Kiesw., 1852	0	0	0	1/2	2/1	2/1	0/0	0	1	0	0
<i>Malthodes</i> spec. Kiesenwetter, 1852	0	0	1	1/4	0/0	1/3	0/0	1	1	2	3
<i>Metacantharis clypeata</i> (Ill., 1798)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Metacantharis discoidea</i> (Ahr., 1812)	1	0	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Podabrus alpinus</i> (Payk., 1798)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Podistra rufotestacea</i> (Letzner 1845)	0	4	0	1/0	6/9	3/6	1/4	0	0	0	0
<i>Rhagonycha atra</i> (L., 1767)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Rhagonycha fulva</i> (Scop., 1763)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Rhagonycha lignosa</i> (Müll., 1764)	3	5	1	7/5	9/13	12/10	2/3	0	1	1	10
<i>Rhagonycha limbata</i> Thoms., 1864	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Rhagonycha translucida</i> (Kryn., 1832)	0	2	0	3/0	1/3	0/7	0/0	0	0	0	0
<u>Carabidae</u>											
<i>Agonum fuliginosum</i> (Panz., 1809)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Amara communis</i> (Panz., 1797)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Amara convexior</i> Steph., 1828	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Amara curta</i> Dej., 1828	0	0	0	0/0	0/0	0/0	0/0	1	0	0	0
<i>Amara familiaris</i> (Duft., 1812)	0	1	0	0/0	1/0	2/2	0/0	1	1	1	2
<i>Amara montivaga</i> Sturm, 1825	0	0	0	0/1	0/0	0/0	0/0	0	0	0	0
<i>Amara ovata</i> (F., 1792)	0	1	0	1/0	1/0	0/0	0/0	0	0	0	1
<i>Amara plebeja</i> (Gyll., 1810)	0	1	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Anisodactylus binotatus</i> (F., 1787)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Anthracus consputus</i> (Duft., 1812)	0	0	0	0/0	0/0	0/0	0/0	0	1	1	1
<i>Asaphidion curtum</i> (Heyd., 1870)	0	0	0	0/0	2/0	0/0	0/0	0	0	0	0
<i>Asaphidion flavipes</i> (L., 1761)	0	0	0	0/0	1/0	0/0	0/0	0	1	0	1
<i>Bembidion deletum</i> Serv., 1821	1	3	1	0/2	3/0	2/2	0/0	0	0	0	0
<i>Bembidion guttula</i> (F., 1792)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Bembidion lampros</i> (Hbst., 1784)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Bembidion lunulatum</i> (Fourcr., 1785)	0	0	0	0/0	0/0	0/0	2/0	0	0	0	0
<i>Bembidion quadrimaculatum</i> (L., 1761)	0	0	0	0/0	1/0	0/0	0/0	0	1	0	1
<i>Calathus cinctus</i> (Motsch., 1850)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Dromius agilis</i> (F., 1787)	0	1	1	0/0	0/0	0/0	0/1	0	0	0	0
<i>Harpalus distinguendus</i> (Duft., 1812)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	2
<i>Harpalus griseus</i> (Panz., 1797)	0	0	0	0/0	0/0	0/0	0/0	0	1	3	1
<i>Harpalus laevipes</i> Zett., 1828	0	1	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Harpalus latus</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanag- ed	Even- Aged	Even- Aged	Unmanag- ed	Uneven- Aged	Even-Aged	Even- Aged	Unmanag- ed	Even- Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Harpalus rufipes</i> (DeGeer, 1774)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Loricera pilicornis</i> (F., 1775)	0	2	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Notiophilus palustris</i> (Duft., 1812)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Trechus quadristriatus</i> (Schrk., 1781)	1	3	0	1/0	2/0	1/3	0/0	0	0	0	0
<i>Trichotichnus laevicollis</i> (Duft., 1812)	0	2	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Trichotichnus nitens</i> (Heer, 1838)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<u>Cerambycidae</u>											
<i>Alosterna tabacicolor</i> (DeGeer, 1775)	1	2	0	2/3	0/0	6/4	1/0	1	2	0	3
<i>Anaglyptus mysticus</i> (L., 1758)	0	0	0	0/1	0/1	0/2	0/0	0	0	0	0
<i>Anastrangalia sanguinolenta</i> (L., 1761)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Arhopalus rusticus</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Clytus arietis</i> (L., 1758)	0	1	0	0/0	2/4	1/2	0/0	3	4	3	2
<i>Cortodera femorata</i> (F., 1787)	0	0	0	0/0	0/0	0/0	0/0	1	1	3	1
<i>Corymbia rubra</i> (L., 1758)	0	0	1	0/0	0/0	0/0	0/1	0	0	0	3
<i>Glaphyra umbellatarum</i> (Schreber 1759)	1	0	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Grammoptera ruficornis</i> (F., 1781)	0	6	2	6/6	9/13	9/16	2/7	1	7	5	5
<i>Grammoptera ustulata</i> (Schall., 1783)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Leiopus linnei</i> Wallin et al., 2009	0	0	0	0/0	0/2	0/3	0/0	0	0	0	0
<i>Leiopus nebulosus</i> (L., 1758)	0	6	0	2/1	5/3	3/5	0/0	0	0	0	0
<i>Leptura maculata</i> (Poda, 1761)	0	0	0	1/0	3/1	0/0	0/0	1	14	2	7
<i>Leptura quadrfasciata</i> (L., 1758)	0	0	0	0/0	1/1	4/1	0/0	1	15	3	5

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Mesosa nebulosa</i> (F., 1781)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Obrium brunneum</i> (F., 1792)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Phymatodes alni</i> (L., 1767)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Plagionotus detritus</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Pogonocherus hispidulus</i> (Pill.Mitt., 1783)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Pogonocherus hispidus</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Rhagium inquisitor</i> (L., 1758)	0	0	0	0/0	0/0	0/0	2/0	0	0	0	28
<i>Rhagium mordax</i> (DeGeer, 1775)	0	0	0	0/0	0/8	0/8	0/0	1	6	3	2
<i>Rhagium sycophanta</i> (Schrk., 1781)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Spondylis buprestoides</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	7
<i>Stenostola dubia</i> (Laich., 1784)	0	0	0	3/1	0/4	2/0	0/1	0	0	0	0
<i>Stenostola ferrea</i> (Schrk., 1776)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Stenurella bifasciata</i> (Müll., 1776)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Stenurella melanura</i> (L., 1758)	0	1	0	0/0	0/0	1/0	0/0	0	2	0	11
<i>Tetropium castaneum</i> (L., 1758)	0	0	0	0/0	0/0	0/0	1/1	0	0	0	0
<i>Xylotrechus antilope</i> (Schönh., 1817)	0	0	0	0/0	0/0	0/0	0/0	0	1	1	1
<u>Cerylonidae</u>											
<i>Cerylon evanescens</i> Rtt., 1876	0	0	0	0/0	0/0	0/0	0/0	0	5	0	4
<i>Cerylon fagi</i> Bris., 1867	4	12	3	1/0	1/1	2/1	1/0	2	2	2	3
<i>Cerylon ferrugineum</i> Steph., 1830	14	31	18	13/6	8/3	27/20	3/6	3	9	8	6
<i>Cerylon histeroides</i> (F., 1792)	2	4	10	1/0	0/0	2/1	0/3	1	16	3	18

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<u>Chrysomelidae</u>											
<i>Altica spec.</i> Muller, 1764	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Aphthona atrocaerulea</i> (Steph., 1831)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Aphthona venustula</i> (Kutsch., 1861)	0	1	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Cassida rubiginosa</i> Müll., 1776	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Chaetocnema concinna</i> (Marsh., 1802)	0	1	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Chaetocnema laevicollis</i> (Thoms., 1866)	0	0	0	0/0	0/0	1/1	0/0	0	0	0	0
<i>Crepidodera aurata</i> (Marsh., 1802)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Goniocnema decemnotata</i> (Marsh., 1802)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Hermaeophaga mercurialis</i> (F., 1792)	0	0	0	0/0	1/0	4/4	0/0	0	0	0	0
<i>Longitarsus ganglbaueri</i> Hktr., 1912	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Longitarsus kutscherae</i> Rye, 1872	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Longitarsus melanocephalus</i> (DeGeer, 1775)	0	2	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Longitarsus pratensis</i> (Panz., 1794)	0	0	0	0/0	1/0	1/0	0/0	0	0	0	0
<i>Longitarsus pulmonariae</i> Weise, 1893	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Longitarsus succineus</i> (Foudr., 1860)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Luperus luperus</i> (Sulzer, 1776)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Oulema duftschmidi</i> (Redt., 1874)	0	0	0	1/0	0/0	2/0	0/0	0	0	0	2
<i>Oulema duftschmidi/melanopus</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Oulema gallaeciana</i> (Heyden, 1870)	1	2	0	4/0	3/0	2/4	0/0	0	0	0	0
<i>Oulema melanopus</i> (L., 1758)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Phyllotreta nigripes</i> (F., 1775)	0	0	0	1/0	1/0	1/0	0/0	0	0	0	0
<i>Phyllotreta vittula</i> (Redt., 1849)	0	0	0	0/1	0/0	1/1	0/1	0	0	0	0
<i>Pyrrhalta viburni</i> (Payk., 1799)	0	1	0	0/0	0/0	0/0	0/0	0	1	0	0
<u>Ciidae</u>											
<i>Cis bidentatus</i> (Ol., 1790)	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Cis boleti</i> (Scop., 1763)	0	19	3	1/3	7/12	7/9	3/1	0	9	0	4
<i>Cis dentatus</i> Mell., 1848	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Cis fagi</i> Walzl, 1839	0	0	0	1/1	0/0	0/0	0/0	1	7	2	1
<i>Cis hispidus</i> (Payk., 1798)	0	2	0	0/0	0/1	0/0	1/0	0	2	1	0
<i>Cis lineatocribratus</i> Mell., 1848	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Cis micans</i> (F., 1792)	0	0	0	0/0	0/0	0/1	0/0	0	1	0	1
<i>Cis nitidus</i> (F., 1792)	0	1	1	1/1	1/0	1/0	0/0	0	2	0	0
<i>Cis punctulatus</i> Gyll., 1827	0	0	0	0/0	0/0	0/0	0/0	0	1	1	1
<i>Cis setiger</i> Mell., 1848	0	0	0	0/1	0/0	0/0	0/0	0	0	0	0
<i>Ennearthron cornutum</i> (Gyll., 1827)	0	1	0	4/0	1/0	1/2	0/1	0	3	0	1
<i>Octotemnus glabriculus</i> (Gyll., 1827)	0	2	3	1/0	0/1	4/0	0/3	0	0	1	0
<i>Orthocis alni</i> (Gyll., 1813)	0	0	0	0/1	0/0	2/1	0/1	0	3	0	0
<i>Orthocis festivus</i> (Panz., 1793)	1	7	6	2/1	1/0	2/1	1/1	1	8	0	14
<i>Rhopalodontus perforatus</i> (Gyll., 1813)	0	0	0	0/0	0/0	1/0	0/0	1	0	1	0
<i>Sulcacis affinis</i> (Gyll., 1827)	1	0	0	0/0	0/1	1/1	0/0	1	4	0	17
<i>Sulcacis bicornis</i> (Mell., 1848)	0	0	0	0/0	0/0	0/0	0/0	0	2	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Sulcacis fronticornis</i> (Panz., 1809)	0	2	0	0/0	0/2	3/0	0/2	0	1	0	1
<u>Clambidae</u>											
<i>Clambus armadillo</i> (DeGeer, 1774)	0	0	1	0/0	0/1	0/0	0/0	0	0	0	0
<i>Clambus gibbulus</i> (Lec., 1850)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Clambus pubescens</i> Redt., 1849	0	0	0	0/0	0/0	0/1	0/0	0	1	0	0
<i>Clambus punctulum</i> (Beck, 1817)	0	1	0	1/0	0/0	0/0	0/0	0	2	0	0
<u>Cleridae</u>											
<i>Opilo mollis</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Thanasimus femoralis</i> (Brahm, 1797)	0	6	9	0/0	0/0	5/2	28/25	0	0	0	3
<i>Thanasimus formicarius</i> (L., 1758)	73	345	172	64/26	66/56	163/164	71/179	199	374	243	1996
<i>Tillus elongatus</i> (L., 1758)	0	1	0	3/1	0/1	3/0	0/0	3	3	0	0
<u>Coccinellidae</u>											
<i>Adalia decempunctata</i> (L., 1758)	0	1	0	0/0	2/1	1/0	0/0	1	0	2	0
<i>Anatis ocellata</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Chilocorus renipustulatus</i> (Scriba, 1850)	1	3	0	1/0	0/0	1/0	0/0	0	0	0	0
<i>Coccinella septempunctata</i> L., 1758	0	1	0	5/0	4/0	1/3	1/1	1	1	3	5
<i>Exochomus quadripustulatus</i> (L., 1758)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Halysia sedecimguttata</i> (L., 1758)	0	0	0	0/0	0/0	0/0	1/2	0	0	0	0
<i>Propylea quatuordecimpunctata</i> (L., 1758)	0	3	0	1/0	1/0	1/0	1/0	0	0	0	2
<i>Scymnus abietis</i> (Payk., 1798)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Scymnus frontalis</i> (F., 1787)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Even - Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Scymnus suturalis</i> Thunb., 1795	0	0	0	0/0	0/0	0/0	0/0	0	0	0	10
<i>Stethorus punctillum</i> Weise, 1891	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Tytthaspis sedecimpunctata</i> (L., 1761)	0	0	0	0/0	0/0	0/0	0/0	1	0	0	0
<u>Colydiidae</u>											
<i>Bitoma crenata</i> (F., 1775)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	3
<i>Cicones undatus</i> (Guer., 1844)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Colydium elongatum</i> (F., 1787)	0	0	0	0/0	0/0	0/0	0/0	0	2	0	0
<i>Pycnomerus terebrans</i> (Ol., 1790)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Synchita humeralis</i> (F., 1792)	0	0	0	0/0	0/0	0/0	0/0	2	34	53	7
<u>Corylophidae</u>											
<i>Orthoperus atomus</i> (Gyll., 1808)	0	1	0	0/0	0/0	0/1	0/0	1	0	1	3
<i>Orthoperus corticalis</i> (Redt., 1849)	0	1	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Orthoperus nigrescens</i> Steph., 1829	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Orthoperus punctatus</i> Wank., 1865	1	2	2	0/1	1/1	1/1	2/1	4	4	1	2
<i>Sacium pusillum</i> (Gyll., 1810)	0	0	0	0/0	0/0	0/0	0/0	0	2	1	3
<i>Sericoderus lateralis</i> (Gyll., 1827)	0	0	0	2/4	3/1	4/0	0/1	0	1	0	1
<u>Cryptophagidae</u>											
<i>Atomaria alpina</i> Heer, 1841	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Atomaria analis</i> Er., 1846	0	0	1	0/0	3/0	4/4	2/0	0	0	0	0
<i>Atomaria atra</i> (Hbst., 1793)	0	0	0	0/0	0/0	0/0	0/0	0	1	1	2
<i>Atomaria atrata</i> Rtt., 1875	0	0	0	2/1	2/2	0/0	0/1	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Atomaria atricapilla</i> Steph., 1830	0	0	2	0/2	5/5	0/2	2/3	0	0	0	0
<i>Atomaria basalis</i> Er., 1846	0	0	0	0/0	0/1	0/1	0/0	0	0	0	0
<i>Atomaria bella</i> Rtt., 1875	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Atomaria diluta</i> Er., 1846	0	8	0	2/0	0/5	12/3	1/2	0	0	0	0
<i>Atomaria fuscata</i> (Schönh., 1808)	0	0	0	1/0	2/1	3/0	0/1	0	0	0	2
<i>Atomaria gutta</i> Newm., 1834	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Atomaria lewisi</i> Rtt., 1877	0	0	0	0/0	0/0	0/1	1/0	0	1	0	0
<i>Atomaria linearis</i> Steph., 1830	0	0	0	2/0	0/4	1/3	1/1	0	0	0	0
<i>Atomaria lohsei</i> Johns.Strand, 1968	0	0	0	0/0	0/0	0/0	0/0	0	0	0	8
<i>Atomaria nigrirostris</i> Steph., 1830	0	0	0	0/0	5/1	3/1	0/3	1	2	0	0
<i>Atomaria nigriventris</i> Steph., 1830	0	0	0	0/0	0/0	0/2	0/0	0	0	0	0
<i>Atomaria ornata</i> Heer, 1841	1	10	5	0/0	0/0	1/0	3/3	0	0	0	0
<i>Atomaria pulchra</i> Er., 1846	2	3	7	14/2	1/0	2/0	0/0	0	0	0	1
<i>Atomaria puncticollis</i> Thoms., 1868	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Atomaria punctithorax</i> Rtt., 1887	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Atomaria rubida</i> Rtt., 1875	2	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Atomaria testacea</i> Steph., 1830	0	0	0	0/1	1/0	1/0	0/2	0	0	0	0
<i>Atomaria turgida</i> Er., 1846	10	9	27	0/0	1/1	0/0	7/29	0	1	1	2
<i>Atomaria umbrina</i> (Gyll., 1827)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Caenoscelis ferruginea</i> (Sahlb., 1820)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Caenoscelis subdeplanata</i> Bris., 1882	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Cryptophagus badius</i> Sturm, 1845	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Cryptophagus dentatus</i> (Hbst., 1793)	0	17	5	10/7	5/9	14/13	2/4	16	28	14	37
<i>Cryptophagus dentatus</i> -complex	9	31	10	51/23	17/10	37/34	11/16	23	30	14	39
<i>Cryptophagus distinguendus</i> Sturm, 1845	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Cryptophagus dorsalis</i> Sahlb., 1834	0	0	0	0/0	0/0	0/0	0/1	0	0	0	1
<i>Cryptophagus intermedius</i> Bruce, 1934	1	14	1	17/2	9/2	19/8	1/3	0	1	1	1
<i>Cryptophagus micaceus</i> Rey, 1889	0	0	0	0/1	0/1	0/0	0/0	0	0	0	0
<i>Cryptophagus pallidus</i> Sturm, 1845	0	1	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Cryptophagus parallelus</i> Bris., 1863	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Cryptophagus pilosus</i> Gyll., 1827	1	1	0	1/0	29/5	10/38	0/0	0	10	3	3
<i>Cryptophagus postpositus</i> Sahlb., 1903	0	0	0	0/0	1/0	1/0	0/0	1	7	0	1
<i>Cryptophagus pseudodentatus</i> Bruce, 1934	0	1	0	1/0	0/0	1/0	0/0	0	0	0	0
<i>Cryptophagus pubescens</i> Sturm, 1845	0	0	2	1/0	2/2	2/0	2/0	0	2	0	1
<i>Cryptophagus saginatus</i> Sturm, 1845	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Micrambe abietis</i> (Payk., 1798)	14	2	11	0/1	0/0	0/0	4/9	0	0	0	0
<i>Pteryngium crenatum</i> (F., 1798)	0	3	2	0/0	0/0	0/0	0/1	1	0	0	0
<u>Cucujidae</u>											
<i>Pediacus depressus</i> (Hbst., 1797)	0	0	0	0/1	0/0	0/0	0/0	0	0	0	2
<u>Curculionidae</u>											
<i>Acalles camelus</i> (F., 1792)	0	1	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Anthonomus phyllocola</i> (Hbst., 1795)	1	0	0	0/0	0/0	0/0	0/1	0	0	0	1

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Anthonomus rubi</i> (Hbst., 1795)	0	0	1	0/0	0/0	0/0	0/0	0	1	1	1
<i>Barynotus moerens</i> (F., 1792)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Barypeithes pellucidus</i> (Boh., 1834)	0	0	2	0/0	0/0	0/0	0/0	0	0	0	0
<i>Brachonyx pineti</i> (Payk., 1792)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	7
<i>Brachyderes incanus</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Ceutorhynchus erysimi</i> (F., 1787)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Ceutorhynchus obstructus</i> (Marsh., 1802)	0	1	0	0/1	0/3	10/3	1/1	12	2	4	15
<i>Ceutorhynchus pallidactylus</i> (Marsh., 1802)	0	0	0	0/0	0/0	4/0	0/2	2	0	1	0
<i>Ceutorhynchus roberti</i> Gyll., 1837	0	0	0	0/0	1/0	1/0	0/1	0	0	0	0
<i>Cionus alauda</i> (Hbst., 1784)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Cionus tuberculosus</i> (Scop., 1763)	0	0	1	0/0	0/0	1/0	0/0	0	0	0	0
<i>Cryphalus abietis</i> (Ratz., 1837)	7	22	20	0/1	3/15	1/69	4/9	0	1	0	1
<i>Crypturgus cinereus</i> (Hbst., 1793)	1	1	3	1/0	0/0	2/4	55/72	0	0	0	0
<i>Crypturgus hispidulus</i> Thoms., 1870	10	19	25	0/0	0/0	4/1	19/14	1	0	1	5
<i>Curculio pyrrhoceras</i> Marsh., 1802	0	0	0	0/0	0/0	1/0	1/2	0	0	1	0
<i>Curculio venosus</i> (Grav., 1807)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Cyclorhipidion bodoanus</i> (Rtt., 1913)	0	0	0	0/1	0/0	9/2	0/4	0	2	0	0
<i>Dryocoetes autographus</i> (Ratz., 1837)	25	54	133	1/1	0/0	4/1	14/5	3	2	0	3
<i>Dryocoetes villosus</i> (F., 1792)	0	0	0	10/0	0/0	0/1	0/0	7	12	13	6
<i>Ernoporicus fagi</i> (F., 1778)	0	22	0	28/50	17/29	35/43	0/5	60	28	2	8
<i>Ernoporus tiliae</i> (Panz., 1793)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Gnathotrichus materiarius</i> (Fitch, 1855)	0	0	3	0/0	0/0	0/0	0/1	0	0	0	4
<i>Hylastes ater</i> (Payk., 1800)	0	0	0	0/0	0/0	0/0	0/0	0	0	2	32
<i>Hylastes attenuatus</i> Er., 1836	1	0	0	0/0	0/0	0/0	1/0	0	0	1	5
<i>Hylastes cunicularius</i> Er., 1836	2	27	240	0/0	0/0	3/2	99/40	1	0	2	2
<i>Hylastes opacus</i> Er., 1836	0	0	0	0/0	0/0	0/0	0/0	0	2	0	26
<i>Hylesinus crenatus</i> (F., 1787)	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Hylesinus oleiperda</i> (F., 1792)	0	1	0	0/0	0/0	0/0	0/0	1	0	0	0
<i>Hylobius abietis</i> (L., 1758)	0	0	0	0/0	0/0	0/0	1/0	0	0	0	3
<i>Hylurgops palliatus</i> (Gyll., 1813)	21	64	583	0/0	1/0	2/3	155/383	3	9	2	845
<i>Hypera nigrirostris</i> (F., 1775)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	1
<i>Hypera ononidis</i> (Chevr., 1863)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Hypera postica</i> (Gyll., 1813)	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Hypera viciae</i> (Gyll., 1813)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Hypera zoilus</i> (Scop., 1763)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Ips typographus</i> (L., 1758)	0	0	1	0/0	0/0	0/0	1/2	0	0	0	0
<i>Leperisinus fraxini</i> (Panz., 1799)	32	244	6	8/1	18/33	107/133	5/4	2	0	0	1
<i>Magdalis duplicata</i> Germ., 1819	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Magdalis exarata</i> (Bris., 1862)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Magdalis phlegmatica</i> (Hbst., 1797)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Magdalis ruficornis</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Miarus ajugae</i> (Hbst., 1795)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Neosirocalus floralis</i> (Payk., 1792)	0	0	0	0/0	1/0	0/0	1/1	0	0	0	0
<i>Orthotomicus laricis</i> (F., 1792)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Phthorophloeus spinulosus</i> Rey, 1883	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Phyllobius arborator</i> (Hbst., 1797)	0	0	2	0/0	0/0	0/0	1/0	0	0	0	2
<i>Phyllobius argentatus</i> (L., 1758)	1	2	0	4/8	4/18	3/3	0/0	2	3	2	0
<i>Phyllobius betulinus</i> (Bechst. Scharf., 1805)	0	0	0	0/0	0/3	0/6	0/0	0	0	0	0
<i>Phyllobius calcaratus</i> (F., 1792)	0	0	0	3/0	0/0	0/0	0/4	0	0	0	0
<i>Phyllobius maculicornis</i> Germ., 1824	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Phyllobius oblongus</i> (L., 1758)	0	3	0	0/0	0/0	1/3	0/0	0	0	0	0
<i>Pityogenes bidentatus</i> (Hbst., 1783)	0	0	0	0/0	0/0	0/0	0/1	0	0	1	38
<i>Pityogenes chalcographus</i> (L., 1761)	56	13	12	0/0	0/0	1/1	2/9	0	0	0	2
<i>Pityogenes trepanatus</i> (Nördl., 1848)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Pityophthorus lichtensteini</i> (Ratz., 1837)	0	0	0	0/0	0/0	0/0	0/2	0	0	0	21
<i>Pityophthorus pityographus</i> (Ratz., 1837)	2	3	1	0/0	0/0	0/0	1/0	0	0	0	3
<i>Platypus cylindrus</i> (F., 1792)	0	0	0	0/0	0/0	0/0	0/0	1	1	1	0
<i>Polydrusus impar</i> Goz., 1882	0	1	2	0/0	0/1	0/1	0/0	0	0	0	0
<i>Polydrusus mollis</i> (Ström, 1768)	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Polydrusus pallidus</i> Gyll., 1834	2	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Polydrusus pilosus</i> Gredl., 1866	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Polydrusus pterygomalis</i> Boh., 1840	2	6	0	6/0	2/1	1/5	0/2	0	0	0	0
<i>Polydrusus sericeus</i> (Schall., 1783)	0	0	0	2/0	0/0	1/2	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Polydrusus undatus</i> (F., 1781)	0	2	0	0/3	3/4	4/12	0/0	1	0	0	0
<i>Polygraphus grandiclava</i> Thoms., 1886	0	0	0	0/1	1/0	0/0	0/0	0	0	0	0
<i>Rhamphus oxyacanthae</i> (Marsh., 1802)	0	0	0	0/0	0/0	0/1	0/1	0	0	0	0
<i>Rhamphus pulicarius</i> (Hbst., 1795)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Rhynchaenus fagi</i> (L., 1758)	20	93	13	4/0	10/5	7/6	0/0	1	0	0	1
<i>Rhyncolus elongatus</i> (Gyll., 1827)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Sciaphilus asperatus</i> (Bonsd., 1785)	0	0	0	0/0	0/0	0/0	1/1	0	0	0	0
<i>Scolytus carpini</i> (Ratz., 1837)	0	0	0	0/1	0/0	0/0	0/0	0	0	2	0
<i>Scolytus intricatus</i> (Ratz., 1837)	0	0	0	0/0	0/0	0/0	0/0	6	6	2	0
<i>Sitona griseus</i> (F., 1775)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Sitona hispidulus</i> (F., 1777)	0	1	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Sitona lineatus</i> (L., 1758)	0	0	0	0/0	1/0	1/0	0/0	0	0	0	0
<i>Stereonychus fraxini</i> (DeGeer, 1775)	0	0	0	0/0	0/0	1/2	0/0	0	0	0	0
<i>Strophosoma capitatum</i> (DeGeer, 1775)	0	0	0	0/0	0/0	0/0	0/0	5	13	3	15
<i>Strophosoma melanogrammum</i> (Forst., 1771)	0	0	0	0/0	2/1	2/3	0/0	0	0	0	0
<i>Tanysphyrus lemnae</i> (Payk., 1792)	0	0	0	0/0	0/0	0/0	0/0	0	2	0	0
<i>Taphrorychus bicolor</i> (Hbst., 1793)	0	11	1	6/8	4/5	10/13	3/0	14	14	0	6
<i>Tomicus piniperda</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	1	3	127
<i>Tropiphorus elevatus</i> (Hbst., 1795)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Trypodendron domesticum</i> (L., 1758)	4026 6014	0	5366	83372/552 22	32769/544 18	49595/795 20	8659/176 54	1247 8686	2	5610	7384
<i>Trypodendron laeve</i> Eggers, 1939	87	483	628	67/0	95/4	102/3	329/6	1	3	1	90

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanag ed	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Trypodendron lineatum</i> (Ol., 1795)	7039	1535 0	3803 2	428/66	417/108	1202/466	4047/365 3	198	376	357	8379
<i>Trypodendron signatum</i> (F., 1787)	184	1697	655	1331/505	967/1225	727/798	380/205	415	911	751	902
<i>Trypophloeus rybinskii</i> Rtt., 1894	0	0	0	0/0	0/0	0/0	0/0	0	0	0	2
<i>Tychius picirostris</i> (F., 1787)	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Xyleborus alni</i> Nijjima, 1909	0	0	0	0/0	0/0	0/1	0/0	3	5	1	1
<i>Anisandrus dispar</i> (F., 1792)	184	2496	61	1099/249	2028/1998	4279/4097	264/334	4158	1428 9	6949	6020
<i>Xyleborus dryographus</i> (Ratz., 1837)	0	0	0	0/0	0/0	0/0	0/0	0	10	2	4
<i>Xylosandrus germanus</i> (Blandf., 1894)	10	963	92	7837/4272	4349/7113	3938/5499	45/76	1096	6266	1454	6512
<i>Xyleborus monographus</i> (F., 1792)	0	0	0	0/0	0/0	0/0	0/0	28	44	48	30
<i>Xyleborus saxeseni</i> (Ratz., 1837)	5	46	1	230/31	295/42	646/174	22/16	555	3677	2263	2218
<i>Xylechinus pilosus</i> (Ratz., 1837)	0	0	15	0/0	0/0	0/0	4/0	0	0	0	1
<i>Xylocleptes bispinus</i> (Duft., 1825)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<u>Dermestidae</u>											
<i>Megatoma undata</i> (L., 1758)	0	1	0	0/1	1/0	1/0	0/0	2	2	0	0
<u>Derodontidae</u>											
<i>Laricobius erichsoni</i> Rosenh., 1846	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<u>Drilidae</u>											
<i>Drilus concolor</i> Ahr., 1812	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<u>Dytiscidae</u>											
<i>Agabus bipustulatus</i> (L., 1767)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Hydporus discretus</i> Fairm.Bris., 1859	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Hydporus ferrugineus</i> Steph., 1828	0	0	0	0/1	0/0	0/0	0/0	0	0	0	0
<u>Elateridae</u>											
<i>Agriotes acuminatus</i> (Steph., 1830)	0	9	0	10/2	2/8	13/9	3/1	0	0	1	0
<i>Agriotes lineatus</i> (L., 1767)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Agriotes pallidulus</i> (Ill., 1807)	0	0	0	26/10	9/0	24/2	0/0	0	0	0	0
<i>Agriotes pilosellus</i> (Schönh., 1817)	0	0	0	0/1	0/4	0/0	0/0	0	0	0	0
<i>Agriotes sputator</i> (L., 1758)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Ampedus balteatus</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	40
<i>Ampedus elongatulus</i> (F., 1787)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	6
<i>Ampedus pomonae</i> (Steph., 1830)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Ampedus pomorum</i> (Hbst., 1784)	0	1	0	0/1	2/0	0/0	1/1	0	2	5	4
<i>Ampedus sanguineus</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	4
<i>Anostirus purpureus</i> (Poda, 1761)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Athous bicolor</i> (Goeze, 1777)	0	0	0	0/0	1/0	1/0	0/0	0	0	0	0
<i>Athous haemorrhoidalis</i> (F., 1801)	3	20	1	1/0	1/4	2/4	1/2	0	0	0	18
<i>Athous subfuscus</i> (Müll., 1767)	9	26	29	5/5	9/10	12/18	6/11	10	19	10	88
<i>Athous vittatus</i> (F., 1792)	3	45	9	12/51	14/35	23/47	4/9	0	0	3	1
<i>Calambus bipustulatus</i> (L., 1767)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Cardiophorus ruficollis</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Cidnopus aeruginosus</i> (Ol., 1790)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	2

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Dalopius marginatus</i> (L., 1758)	2	19	4	2/2	3/5	12/23	7/6	38	79	25	151
<i>Denticollis linearis</i> (L., 1758)	1	14	4	7/6	5/7	6/23	1/1	2	13	2	2
<i>Denticollis rubens</i> Pill.Mitt., 1783	0	2	8	4/2	0/3	2/3	0/0	0	0	0	0
<i>Dicronychus cinereus</i> (Hbst., 1784)	0	0	0	0/0	0/0	0/0	0/0	0	1	1	2
<i>Ectinus aterrimus</i> (L., 1761)	0	0	0	0/0	0/0	0/2	0/0	95	49	12	46
<i>Hemicrepidius hirtus</i> (Hbst., 1784)	0	3	0	8/5	8/1	14/3	0/1	0	0	0	0
<i>Hemicrepidius niger</i> (L., 1758)	0	0	0	0/0	0/3	0/2	0/0	0	0	0	0
<i>Hypoganus inunctus</i> (Lacord., 1835)	0	0	0	0/1	0/0	0/0	0/0	0	0	1	0
<i>Kibunea minuta</i> (L., 1758)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Limonius minutus</i> (L., 1758)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Melanotus castanipes</i> (Payk., 1800)	1	5	2	3/5	1/3	5/1	0/8	0	1	0	1
<i>Melanotus rufipes</i> (Hbst., 1784)	0	0	0	0/0	0/0	0/3	0/0	1	2	2	30
<i>Prosternon tessellatum</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	18
<i>Selatosomus aeneus</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Sericus brunneus</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	10
<i>Stenagostus rhombeus</i> (Ol., 1790)	0	0	0	0/0	0/0	0/0	0/0	3	1	0	2
<u>Endomychidae</u>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Endomychus coccineus</i> (L., 1758)	0	0	0	0/1	0/0	0/0	0/0	0	1	0	0
<i>Mycetina cruciata</i> (Schall., 1783)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	6
<u>Erotylidae</u>											
<i>Dacne bipustulata</i> (Thunb., 1781)	0	0	0	0/1	0/0	1/0	0/0	0	0	0	1

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanag- ed	Even- Aged	Even- Aged	Unmanage- d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag- ed	Even- Aged	Age d	Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Triplax aenea</i> (Schall., 1783)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Triplax lepida</i> (Fald., 1835)	0	0	0	0/0	0/0	0/0	0/0	1	0	0	3
<i>Triplax russica</i> (L., 1758)	2	9	0	3/5	6/4	2/2	0/0	0	0	1	7
<i>Tritoma bipustulata</i> F., 1775	0	0	0	0/0	0/1	3/0	0/0	0	4	0	9
<u>Eucnemidae</u>											
<i>Dirhagus pygmaeus</i> (F., 1792)	0	0	0	0/0	0/0	0/0	0/0	2	1	4	0
<i>Hylis cariniceps</i> Rtt., 1902	1	2	0	0/0	0/0	0/0	0/0	15	10	10	23
<i>Hylis foveicollis</i> (Thoms., 1874)	0	7	8	13/1	0/1	9/6	8/2	2	8	8	10
<i>Hylis olexai</i> Palm, 1955	0	0	0	0/0	0/0	1/0	0/1	0	2	0	3
<i>Melasis buprestoides</i> (L., 1761)	0	0	0	0/0	0/0	0/0	0/0	0	2	1	2
<u>Geotrupinae</u>											
<i>Typhaeus typhoeus</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	2	0	0
<u>Helophoridae</u>											
<i>Helophorus brevipalpis</i> Bedel, 1881	0	0	0	0/0	0/0	1/1	0/0	0	0	0	0
<u>Histeridae</u>											
<i>Abraeus granulum</i> Er., 1839	0	3	0	0/1	0/0	0/0	1/1	0	0	0	0
<i>Abraeus perpusillus</i> (Marsh., 1802)	0	1	0	0/0	0/0	0/0	0/0	0	1	1	1
<i>Aeletes atomarius</i> (Aube, 1842)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Dendrophilus pygmaeus</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Gnathoncus buyssoni</i> Auzat, 1917	0	2	0	0/0	0/0	3/0	0/0	0	1	0	1
<i>Margarinotus ignobilis</i> (Mars., 1854)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Margarinotus marginatus</i> (Er., 1834)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Margarinotus purpurascens</i> (Hbst., 1792)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Margarinotus striola</i> (Sahlb., 1819)	0	0	0	0/1	0/0	1/0	0/0	0	0	0	1
<i>Margarinotus ventralis</i> (Mars., 1854)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Paromalus flavicornis</i> (Hbst., 1792)	0	0	0	7/1	0/0	1/0	0/0	3	7	3	2
<i>Paromalus parallelepipedus</i> (Hbst., 1792)	0	0	0	4/1	0/0	0/0	1/0	3	7	6	58
<i>Platysoma compressum</i> (Hbst., 1783)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Platysoma lineare</i> (Er., 1834)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	4
<i>Plegaderus caesus</i> (Hbst., 1792)	0	0	0	0/1	0/0	0/0	0/1	0	2	0	2
<i>Plegaderus dissectus</i> Er., 1839	0	0	0	1/1	1/1	1/0	1/1	4	16	4	5
<i>Plegaderus vulneratus</i> (Panz., 1797)	0	6	32	4/2	0/0	2/1	17/19	3	3	4	40
<u>Hydraenidae</u>											
<i>Hydraena palustris</i> Er., 1837	0	0	0	0/0	0/0	0/0	0/0	1	0	0	0
<u>Hydrophilidae</u>											
<i>Cercyon impressus</i> (Sturm, 1807)	0	0	0	0/0	0/0	0/0	0/1	0	0	0	1
<i>Cercyon lateralis</i> (Marsh., 1802)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Cercyon melanocephalus</i> (L., 1758)	1	0	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Cercyon pygmaeus</i> (Ill., 1801)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Cercyon sternalis</i> Shp., 1918	0	0	0	0/0	0/0	0/0	0/0	0	3	0	0
<i>Cryptopleurum minutum</i> (F., 1775)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Cymbiodyta marginella</i> (F., 1792)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanag- ed	Even- Aged	Even- Aged	Unmanage- d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag- ed	Even- Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Enochrus quadripunctatus</i> (Hbst., 1797)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Hydrobius fuscipes</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	2	0	0
<i>Megasternum obscurum</i> (Marsh., 1802)	4	34	15	2/1	2/1	3/4	1/2	0	0	0	1
<u>Laemophloeidae</u>											
<i>Cryptolestes corticinus</i> (Er., 1846)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Cryptolestes duplicatus</i> (Waltl, 1839)	0	2	0	2/0	1/0	1/0	1/0	2	16	6	24
<i>Cryptolestes ferrugineus</i> (Steph., 1831)	0	0	0	0/0	0/0	5/1	3/1	1	0	0	1
<i>Laemophloeus monilis</i> (F., 1787)	1	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Leptophloeus alternans</i> (Er., 1846)	0	2	0	0/0	0/0	0/0	1/0	0	0	0	3
<i>Placonotus testaceus</i> (F., 1787)	0	1	0	2/0	0/0	2/1	0/0	1	15	4	13
<u>Lampyridae</u>											
<i>Lamprohiza splendidula</i> (L., 1767)	0	0	0	3/3	11/8	6/16	0/4	0	0	0	0
<u>Latridiidae</u>											
<i>Cartodere constricta</i> (Gyll., 1827)	0	0	0	1/0	0/0	0/0	1/0	0	0	0	0
<i>Cartodere nodifer</i> (Westw., 1839)	4	53	13	123/152	70/135	67/108	9/22	1	12	2	12
<i>Corticaria abietorum</i> Motsch., 1867	0	3	6	0/0	0/0	0/0	0/0	0	0	0	0
<i>Corticaria elongata</i> (Gyll., 1827)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Corticaria fulva</i> (Com., 1837)	0	0	0	0/0	0/0	0/0	0/0	1	0	0	0
<i>Corticaria inconspicua</i> Woll., 1860	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Corticaria polypori</i> Sahlb., 1900	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Corticarina fuscula</i> (Gyll., 1827)	1	0	0	1/1	0/0	0/1	1/1	8	33	14	10

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Corticarina obfuscata</i> Strand, 1937	0	0	2	0/0	0/0	0/0	0/0	0	0	0	0
<i>Corticarina similata</i> (Gyll., 1827)	1	0	1	1/62	4/61	2/49	1/19	2	1	2	2
<i>Corticicara gibbosa</i> (Hbst., 1793)	1	30	2	137/119	161/267	151/317	4/13	30	113	90	98
<i>Enicmus atriceps</i> Hansen, 1962	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Enicmus brevicornis</i> (Mannh., 1844)	0	2	0	3/1	4/1	8/0	0/0	7	5	1	2
<i>Enicmus fungicola</i> Thoms., 1868	0	0	0	1/0	0/0	1/0	0/3	1	2	1	2
<i>Enicmus histrio</i> JoyTomlin, 1910	0	0	0	2/1	3/1	1/4	1/0	0	0	0	1
<i>Enicmus rugosus</i> (Hbst., 1793)	3	3	2	4/2	2/3	6/10	1/2	2	5	3	12
<i>Enicmus testaceus</i> (Steph., 1830)	0	0	0	0/3	0/0	0/1	0/0	0	1	0	1
<i>Enicmus transversus</i> (Ol., 1790)	0	0	0	2/0	2/2	1/7	0/5	2	0	0	0
<i>Latridius anthracinus</i> (Mannh., 1844)	0	0	0	6/1	1/2	4/3	2/1	0	0	0	0
<i>Latridius consimilis</i> (Mannh., 1844)	1	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Latridius hirtus</i> (Gyll., 1827)	0	0	0	0/1	0/0	1/0	0/0	0	1	0	2
<i>Latridius minutus</i> (L., 1767)	0	0	0	0/1	0/1	0/0	0/0	0	0	0	0
<i>Latridius minutus</i> -group	0	0	0	0/0	0/0	0/0	0/0	29	56	17	47
<i>Latridius pseudominutus</i> (Strand, 1958)	0	0	0	0/0	0/0	0/0	0/0	5	38	10	39
<i>Stephostethus alternans</i> (Mannh., 1844)	1	11	5	4/4	6/13	22/24	0/3	2	16	0	3
<i>Stephostethus angusticollis</i> (Gyll., 1827)	4	4	0	12/9	13/3	15/13	0/1	0	1	0	1
<i>Stephostethus lardarius</i> (DeGeer, 1775)	0	0	0	0/0	0/0	1/0	1/0	0	0	0	0
<i>Stephostethus pandellei</i> (Bris., 1863)	0	2	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Stephostethus rugicollis</i> (Ol., 1790)	1	0	2	0/0	0/1	0/0	0/5	0	1	1	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<u>Leiodidae</u>											
<i>Agathidium badium</i> Er., 1845	0	1	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Agathidium bescidicum</i> Rtt., 1884	0	0	0	0/0	0/0	0/0	0/0	2	2	1	1
<i>Agathidium confusum</i> Bris., 1863	1	5	6	0/11	1/1	0/6	0/4	0	2	1	1
<i>Agathidium mandibulare</i> Sturm, 1807	1	2	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Agathidium nigripenne</i> (F., 1792)	0	24	15	17/35	6/7	15/22	9/9	0	0	2	4
<i>Agathidium rotundatum</i> (Gyll., 1827)	0	0	0	0/0	0/0	1/0	1/0	0	1	0	2
<i>Agathidium seminulum</i> (L., 1758)	1	13	5	1/0	2/1	1/6	0/4	0	1	0	7
<i>Agathidium varians</i> (Beck, 1817)	5	18	3	21/20	5/5	5/9	1/7	1	10	2	8
<i>Amphicyllis globiformis</i> (Sahlb., 1833)	0	0	1	0/0	0/0	2/0	0/0	0	0	0	0
<i>Amphicyllis globus</i> (F., 1792)	1	2	1	0/0	1/0	2/2	1/1	2	2	1	3
<i>Anisotoma humeralis</i> (F., 1792)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Anisotoma orbicularis</i> (Hbst., 1792)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Catops coracinus</i> Kelln., 1846	0	1	0	0/0	0/1	0/1	0/0	0	0	0	0
<i>Catops fuliginosus</i> Er., 1837	1	1	0	0/0	0/1	1/0	0/0	0	0	0	0
<i>Catops longulus</i> Kelln., 1846	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Catops nigricans</i> (Spence, 1815)	0	0	0	0/0	0/0	0/0	0/0	1	0	1	1
<i>Catops nigricantoides</i> Rtt., 1901	1	0	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Catops picipes</i> (F., 1792)	0	1	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Catops subfuscus</i> Kelln., 1846	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Catops tristis</i> (Panz., 1793)	0	0	1	0/0	0/0	2/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Choleva angustata</i> (F., 1781)	1	0	0	0/0	0/0	0/0	0/0	1	0	0	3
<i>Choleva cisteloides</i> (Fröhl., 1799)	0	20	5	7/1	5/0	5/1	7/1	0	0	0	0
<i>Choleva glauca</i> Britt., 1918	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Choleva nivalis</i> (Kr., 1856)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Colenis immunda</i> (Sturm, 1807)	0	2	0	0/0	2/0	3/2	0/0	0	0	0	0
<i>Colon affine</i> Sturm, 1839	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Colon angulare</i> Er., 1837	1	0	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Colon armipes</i> Kr., 1854	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Colon brunneum</i> (Latr., 1807)	1	0	0	0/1	0/0	0/1	0/1	0	0	0	0
<i>Colon dentipes</i> (Sahlb., 1822)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Colon latum</i> Kr., 1850	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Colon spec.</i> Hbst., 1797	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Colon zebei</i> Kr., 1854	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Leiodes carpathica</i> Ganglb., 1896	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Leiodes cinnamomea</i> (Panz., 1793)	0	0	0	0/0	0/0	1/1	0/0	0	0	0	0
<i>Leiodes dubia</i> (Kug., 1794)	1	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Leiodes flavescens</i> (Schm., 1841)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Leiodes flavicornis</i> (Bris., 1883)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Leiodes oblonga</i> (Er., 1845)	0	1	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Leiodes polita</i> (Marsh., 1802)	0	0	0	0/0	0/0	1/0	1/0	0	0	0	0
<i>Leiodes spec.</i> Latr., 1796	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Leiodes strigipenne</i> Daffner, 1983	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Liodopria serricornis</i> (Gyll., 1813)	0	0	0	0/0	0/0	2/0	0/0	0	0	0	0
<i>Nargus velox</i> (Spence, 1815)	0	0	0	0/1	0/0	0/0	0/0	0	1	0	1
<i>Nargus wilkini</i> (Spence, 1815)	0	0	0	0/0	0/0	0/0	0/0	0	2	0	3
<i>Ptomaphagus subvillosus</i> (Goeze, 1777)	0	0	2	1/0	1/0	0/0	0/0	0	0	0	0
<i>Sciodrepoides watsoni</i> (Spence, 1815)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Triarthron maerkelii</i> Märk., 1840	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<u>Lucanidae</u>											
<i>Aesalus scarabaeoides</i> (Panz., 1794)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Platycerus caraboides</i> (L., 1758)	0	4	0	1/0	2/0	7/1	0/0	5	14	1	2
<i>Sinodendron cylindricum</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	1	0	0	0
<u>Lycidae</u>											
<i>Dictyoptera aurora</i> (Hbst., 1784)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	4
<i>Lopherus rubens</i> (Gyll., 1817)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Platycis cosnardi</i> (Chevr., 1829)	1	3	1	0/0	0/0	0/1	0/0	0	0	0	0
<i>Platycis minutus</i> (F., 1787)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Pyropterus nigroruber</i> (DeGeer, 1774)	0	3	3	0/0	1/0	0/0	0/0	0	1	0	11
<u>Lymexylidae</u>											
<i>Hylecoetus dermestoides</i> (L., 1761)	18	114	79	11/6	10/7	44/26	27/7	11	38	21	56
<u>Melandryidae</u>											
<i>Abdera affinis</i> (Payk., 1799)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanag- ed	Even- Aged	Even- Aged	Unmanage- d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag- ed	Even- Aged	Age d	Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Conopalpus testaceus</i> (Ol., 1790)	0	0	0	0/0	1/0	1/0	0/0	0	1	0	0
<i>Hallomenus binotatus</i> (Quensel, 1790)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Melandrya barbata</i> (F., 1792)	0	0	0	0/0	0/0	0/0	0/0	2	0	0	0
<i>Melandrya caraboides</i> (L., 1761)	0	1	0	0/0	0/1	1/1	1/0	0	0	0	0
<i>Orchesia fasciata</i> (Ill., 1798)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Orchesia micans</i> (Panz., 1794)	0	0	0	0/1	0/0	0/0	0/0	0	0	0	1
<i>Orchesia minor</i> Walk., 1837	0	6	0	1/1	0/0	3/1	0/0	0	0	0	0
<i>Orchesia undulata</i> Kr., 1853	0	1	0	0/0	1/2	2/3	0/0	0	1	1	2
<i>Osphya bipunctata</i> (F., 1775)	0	0	0	0/0	0/0	0/0	0/0	1	3	0	1
<i>Phloiotrya rufipes</i> (Gyll., 1810)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Serropalpus barbatus</i> (Schall., 1783)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Xylita laevigata</i> (Hell., 1786)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<u>Melyridae</u>											
<i>Dasytes aeratus</i> Steph., 1830	0	0	0	0/0	0/0	0/0	0/0	0	0	0	2
<i>Dasytes caeruleus</i> (De Geer 1774)	0	0	1	0/1	0/2	1/1	0/2	6	9	1	5
<i>Dasytes plumbeus</i> (Müll., 1776)	1	2	1	13/0	3/1	8/11	11/1	5	4	3	16
<i>Malachius bipustulatus</i> (L., 1758)	0	0	0	2/2	0/2	0/0	0/0	0	3	4	0
<u>Monotomidae</u>											
<i>Monotoma conicicollis</i> Aubé, 1837	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Monotoma longicollis</i> (Gyll., 1827)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Rhizophagus bipustulatus</i> (F., 1792)	25	403	164	164/79	44/23	108/84	16/10	18	45	28	50

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Rhizophagus cribratus</i> Gyll., 1827	2	2	0	0/0	0/0	0/0	0/1	0	3	0	0
<i>Rhizophagus depressus</i> (F., 1792)	36	70	545	27/5	17/0	58/13	447/313	25	65	115	2379
<i>Rhizophagus dispar</i> (Payk., 1800)	11	176	66	45/23	17/44	18/135	4/34	31	127	56	147
<i>Rhizophagus ferrugineus</i> (Payk., 1800)	1	0	4	0/0	0/2	0/0	1/1	0	0	1	2
<i>Rhizophagus grandis</i> Gyll., 1827	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Rhizophagus nitidulus</i> (F., 1798)	15	128	75	13/21	27/15	33/50	7/5	3	27	11	12
<i>Rhizophagus parvulus</i> (Payk., 1800)	0	0	0	2/3	1/2	6/1	0/0	10	5	7	62
<i>Rhizophagus perforatus</i> Er., 1845	1	10	1	2/1	4/3	6/7	2/3	0	1	0	0
<u>Mordellidae</u>											
<i>Mordella aculeata</i> L., 1758	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Mordellistena humeralis</i> (L., 1758)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Mordellistena neuwaldeggiana</i> (Panz., 1796)	0	0	0	0/0	0/0	0/0	0/0	0	2	3	0
<i>Mordellistena spec.</i> Costa, 1854	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Mordellistena variegata</i> (F., 1798)	0	0	0	2/1	3/2	3/1	0/0	1	1	1	0
<i>Mordellochroa abdominalis</i> (F., 1775)	0	0	0	0/0	1/1	1/1	0/2	0	4	0	0
<i>Tomoxia bucephala</i> Costa, 1854	0	0	0	0/0	3/3	5/1	1/0	0	9	1	3
<u>Mycetophagidae</u>											
<i>Litargus balteatus</i> Lec., 1856	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Litargus connexus</i> (Fourcr., 1785)	1	31	0	97/35	12/4	32/23	7/1	134	349	185	191
<i>Mycetophagus atomarius</i> (F., 1792)	0	0	0	2/1	0/4	2/3	0/0	0	1	1	1
<i>Mycetophagus fulvicollis</i> F., 1792	0	0	0	0/0	0/0	0/0	0/0	1	1	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Mycetophagus multipunctatus</i> F., 1792	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Mycetophagus piceus</i> (F., 1792)	0	0	0	7/10	0/0	2/5	0/0	0	5	2	0
<i>Mycetophagus quadriguttatus</i> Müll., 1821	0	1	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Mycetophagus quadripustulatus</i> (L., 1761)	0	0	0	5/6	3/1	1/4	0/0	0	0	0	2
<i>Triphyllus bicolor</i> (F., 1792)	0	0	0	1/0	0/0	0/1	0/0	0	0	0	0
<u>Nemonychidae</u>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Cimberis attelaboides</i> (F., 1787)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<u>Nitidulidae</u>											
<i>Amphotis marginata</i> (F., 1781)	0	0	0	0/0	0/0	0/0	0/1	0	0	0	1
<i>Carpophilus sexpustulatus</i> (F., 1791)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Cryptarcha strigata</i> (F., 1787)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	1
<i>Cryptarcha undata</i> (Ol., 1790)	0	0	0	0/0	0/0	0/0	0/0	0	2	4	0
<i>Cychramus luteus</i> (F., 1787)	4	10	27	1/0	0/0	1/0	0/0	0	0	0	1
<i>Cychramus variegatus</i> (Hbst., 1792)	0	4	15	0/0	0/0	0/0	0/0	0	0	0	0
<i>Epuraea aestiva</i> (L., 1758)	0	3	2	0/0	2/0	0/2	0/0	1	3	2	2
<i>Epuraea angustula</i> Sturm, 1844	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Epuraea biguttata</i> (Thunb., 1784)	0	0	0	0/0	0/0	0/0	0/0	1	0	0	2
<i>Epuraea longula</i> Er., 1845	0	2	1	2/0	3/0	3/1	0/1	1	0	1	2
<i>Epuraea marseuli</i> Rtt., 1872	0	6	15	5/1	1/1	1/1	3/2	0	0	1	11
<i>Epuraea melanocephala</i> (Marsh., 1802)	0	30	13	50/135	9/8	18/56	7/14	0	1	0	0
<i>Epuraea melina</i> Er., 1843	0	0	0	0/0	0/0	2/0	0/1	0	0	0	1

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Epuraea neglecta</i> (Heer, 1841)	0	0	0	0/0	0/0	1/1	0/0	0	1	0	0
<i>Epuraea ocularis</i> Fairm., 1849	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Epuraea pallescens</i> (Steph., 1832)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Epuraea pygmaea</i> (Gyll., 1808)	22	21	120	1/1	0/1	0/2	11/8	0	1	1	2
<i>Epuraea rufomarginata</i> (Steph., 1830)	0	0	0	0/0	0/0	0/0	0/0	1	0	0	1
<i>Epuraea silacea</i> (Hbst., 1784)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	1
<i>Epuraea terminalis</i> (Mannh., 1843)	0	0	2	2/1	1/0	0/2	0/2	0	0	0	0
<i>Epuraea unicolor</i> (Ol., 1790)	3	3	2	4/6	2/4	2/1	3/8	0	7	9	17
<i>Epuraea variegata</i> (Hbst., 1793)	7	12	3	3/1	1/0	2/3	2/6	0	0	0	1
<i>Glischrochilus hortensis</i> (Fourcr., 1785)	0	1	0	14/8	3/12	8/7	1/2	1	0	0	1
<i>Glischrochilus quadriguttatus</i> (F., 1776)	0	1	0	4/2	0/0	0/0	0/0	0	6	1	1
<i>Glischrochilus quadripunctatus</i> (L., 1758)	0	7	3	0/0	0/0	0/1	0/0	4	5	6	94
<i>Glischrochilus quadrisignatus</i> (Say, 1835)	0	0	0	0/2	0/0	1/0	0/0	1	0	0	0
<i>Meligethes aeneus</i> (F., 1775)	5	37	54	88/208	48/109	50/161	16/77	36	36	52	47
<i>Meligethes brunnicornis</i> Sturm, 1845	0	0	0	0/0	1/0	0/1	0/0	0	0	0	0
<i>Meligethes caudatus</i> Guillebeau, 1897	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Meligethes coracinus</i> Sturm, 1845	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Meligethes denticulatus</i> (Heer, 1841)	0	0	2	0/0	0/0	0/0	2/0	0	0	0	0
<i>Meligethes ochropus</i> Sturm, 1845	0	0	0	0/0	0/0	0/0	0/0	0	0	0	2
<i>Meligethes ovatus</i> Sturm, 1845	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Meligethes subaeneus</i> Sturm, 1845	0	1	0	0/0	0/0	2/1	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Omosita depressa</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Omosita discoidea</i> (F., 1775)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Pityophagus ferrugineus</i> (L., 1761)	0	1	4	0/0	0/0	0/1	2/1	1	0	0	2
<i>Pocadius adustus</i> Rtt., 1888	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Soronia grisea</i> (L., 1758)	0	0	0	0/2	0/0	0/0	1/1	0	0	0	0
<i>Thalycra fervida</i> (Ol., 1790)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<u>Nosodendridae</u>											
<i>Nosodendron fasciculare</i> (Ol., 1790)	0	0	0	1/0	0/0	0/0	0/0	0	0	1	1
<u>Omalisidae</u>											
<i>Omalisus fontisbellaquaei</i> Fourcr., 1785	0	0	0	0/0	0/1	4/1	0/0	0	0	0	0
<u>Orsodacnidae</u>											
<i>Orsodacne cerasi</i> (L., 1758)	0	0	1	0/0	0/0	0/1	0/1	0	0	0	0
<u>Phalacridae</u>											
<i>Olibrus flavicornis</i> (Sturm, 1807)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<u>Phloeostichidae</u>											
<i>Phloeostichus denticollis</i> Redt., 1842	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<u>Phloiophilidae</u>											
<i>Phloiophilus edwardsii</i> Steph., 1830	0	0	0	0/1	1/0	1/0	0/0	0	0	0	0
<u>Ptiliidae</u>											
<i>Acrotrichis brevipennis</i> (Er., 1845)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Acrotrichis fascicularis</i> (Hbst., 1792)	0	4	1	1/0	0/0	0/2	0/1	1	0	1	1

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Acrotrichis grandicollis</i> (Mannh., 1844)	0	1	0	1/0	1/0	0/0	0/0	0	0	0	1
<i>Acrotrichis insularis</i> (Maekl., 1852)	0	0	0	0/0	1/0	1/1	0/0	0	0	0	0
<i>Acrotrichis intermedia</i> (Gillm., 1845)	55	58	139	0/3	4/4	0/2	3/3	0	9	4	10
<i>Acrotrichis montandoni</i> (Allib., 1844)	1	0	0	0/0	0/0	0/0	0/0	1	0	0	0
<i>Acrotrichis rosskotheni</i> Sundt, 1971	1	1	0	3/0	2/0	1/0	3/0	0	0	0	0
<i>Acrotrichis rugulosa</i> Rossk., 1935	0	0	0	1/0	0/0	1/0	0/0	0	0	0	0
<i>Acrotrichis sericans</i> (Heer, 1841)	0	2	0	0/0	2/0	0/0	0/0	0	0	0	0
<i>Acrotrichis sitkaensis</i> (Motsch., 1845)	5	4	9	3/6	0/0	3/4	5/7	1	1	1	0
<i>Acrotrichis spec.</i> Motsch., 1848	32	40	85	0/2	2/4	1/3	0/8	3	8	6	4
<i>Baeocrara variolosa</i> (Muls.Rey, 1867)	7	25	62	0/1	0/2	1/5	50/15	4	16	5	6
<i>Euryptilium saxonicum</i> (Gillm., 1845)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Microptilium palustre</i> Kuntzen, 1914	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Nephanes titan</i> (Newm., 1834)	0	0	0	0/0	0/0	0/2	0/0	0	1	2	0
<i>Nossidium pilosellum</i> (Marsh., 1802)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Oligella foveolata</i> (Allib., 1844)	0	0	0	0/1	0/0	0/0	0/0	0	0	0	0
<i>Ptenidium gressneri</i> Er., 1845	0	0	0	1/0	0/0	0/1	0/0	0	0	0	0
<i>Ptenidium laevigatum</i> Er., 1845	1	0	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Ptenidium nitidum</i> (Heer, 1841)	0	0	0	0/0	0/0	0/0	0/0	0	6	1	3
<i>Ptenidium pusillum</i> (Gyll., 1808)	0	0	0	0/0	1/1	0/2	4/0	0	1	0	0
<i>Ptenidium turgidum</i> Thoms., 1855	0	0	0	0/0	0/0	0/0	0/0	1	2	0	1
<i>Pteryx suturalis</i> (Heer, 1841)	0	2	12	0/3	2/0	3/1	0/2	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Ptiliolum spencei/fuscum</i>	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Ptinella aptera</i> (Guer., 1839)	0	2	4	0/0	1/1	2/0	1/0	2	1	1	7
<i>Ptinella limbata</i> (Heer, 1841)	2	2	2	0/1	0/0	1/2	0/4	0	0	0	0
<i>Ptinella tenella</i> (Er., 1845)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Smicrus filicornis</i> (Fairm.Lab., 1855)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<u>Pyrochroidae</u>											
<i>Pyrochroa coccinea</i> (L., 1761)	0	0	0	0/1	0/3	1/0	0/0	0	0	0	1
<i>Pyrochroa serraticornis</i> (Scop., 1763)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Schizotus pectinicornis</i> (L., 1758)	0	1	2	1/0	0/5	4/4	0/1	0	2	3	3
<u>Pythidae</u>											
<i>Pytho depressus</i> (L., 1767)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	4
<u>Salpingidae</u>											
<i>Lissodema denticolle</i> (Gyll., 1813)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Rabocerus foveolatus</i> (Ljungh, 1823)	1	34	0	2/1	1/1	4/5	0/0	0	0	0	0
<i>Rabocerus gabrieli</i> (Gerh., 1901)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Salpingus planirostris</i> (F., 1787)	7	201	28	144/77	122/85	196/180	25/15	41	81	42	103
<i>Salpingus ruficollis</i> (L., 1761)	5	62	26	60/57	23/34	44/35	4/10	17	20	17	37
<i>Sphaeriestes aeratus</i> (Muls., 1859)	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Sphaeriestes castaneus</i> (Panz., 1796)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	14
<i>Vincenzellus ruficollis</i> (Panz., 1794)	0	5	1	2/7	1/1	7/10	1/0	2	9	0	10
<u>Scarabaeidae</u>											

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Even - Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Aphodius ater</i> (DeGeer, 1774)	0	1	0	0/0	0/1	0/1	0/1	1	0	0	2
<i>Aphodius coenosus</i> (Panz., 1798)	0	0	0	0/0	0/0	0/0	0/0	0	4	13	8
<i>Aphodius convexus</i> (Er., 1848)	0	0	0	0/0	2/0	0/0	0/0	0	0	0	0
<i>Aphodius corvinus</i> Er., 1848	1	0	0	0/0	0/0	3/0	0/1	0	0	0	0
<i>Aphodius depressus</i> (Kug., 1792)	0	12	4	5/6	12/14	12/12	1/2	1	2	4	4
<i>Aphodius distinctus</i> (Müll., 1776)	0	0	0	0/0	0/0	0/0	0/0	8	14	11	9
<i>Aphodius fasciatus</i> (Ol., 1789)	0	0	0	0/1	1/1	3/1	0/0	0	0	0	10
<i>Aphodius fimetarius</i> (L., 1758)	0	2	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Aphodius ictericus</i> (Laich., 1781)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Aphodius luridus</i> (F., 1775)	0	0	0	0/0	0/0	0/1	0/0	0	0	1	0
<i>Aphodius maculatus</i> Sturm, 1800	1	5	0	1/0	3/3	3/2	0/2	0	0	0	0
<i>Aphodius prodromus</i> (Brahm, 1790)	5	19	2	0/1	2/2	9/3	0/0	1	3	8	5
<i>Aphodius pusillus</i> (Hbst., 1789)	0	0	0	0/0	0/0	1/0	0/0	0	1	1	0
<i>Aphodius rufipes</i> (L., 1758)	0	1	2	0/3	2/4	1/1	0/0	0	1	1	2
<i>Aphodius rufus</i> (Moll., 1782)	0	0	1	0/0	1/1	0/0	0/1	0	0	0	0
<i>Aphodius sphacelatus</i> (Panz., 1798)	0	0	0	0/0	0/1	0/0	0/0	1	1	0	0

*Aphodius
sticticus* (Panz.,
1798)

4

12

4 3/4 10/6 11/7 4/26 4/18 18 , 181

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanaged	Even-Aged	Even-Aged	Unmanaged	Uneven-Aged	Even-Aged	Even-Aged	Unmanaged	Even-Aged	-	-
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Even - Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22

<i>Serica brunnea</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	1	22	11	4
<u>Scirtidae</u>											
<i>Cyphon hiliaris</i> Nyh., 1944	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Cyphon laevipennis</i> Tourn., 1868	0	0	0	0/0	0/0	0/0	0/0	1	3	1	0
<i>Cyphon ochraceus</i> Steph., 1830	0	0	0	0/0	0/0	0/0	0/0	1	0	0	0
<i>Cyphon padi</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	3	0	2	0
<i>Cyphon palustris</i> Thoms., 1855	0	0	0	0/0	0/0	0/0	0/0	1	0	0	0
<i>Cyphon pubescens</i> (F., 1792)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Cyphon variabilis</i> (Thunb., 1787)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Microcara testacea</i> (L., 1767)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Prionocyphon serricornis</i> (Müll., 1821)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<u>Scaptiidae</u>											
<i>Anaspis flava</i> (L., 1758)	0	0	0	2/0	0/0	0/0	0/0	0	1	1	1
<i>Anaspis frontalis</i> (L., 1758)	0	0	0	0/2	0/0	0/1	0/0	2	8	6	34

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Anaspis ruficollis</i> (F., 1792)	0	0	0	0/0	0/0	0/0	0/0	1	1	2	6
<i>Anaspis rufilabris</i> (Gyll., 1827)	1	6	6	2/5	6/2	3/8	7/5	6	2	6	21
<i>Anaspis</i> spec. Geoff., 1762	0	2	1	0/1	0/0	0/0	0/0	0	0	0	0
<i>Anaspis thoracica</i> (L., 1758)	0	0	0	1/0	0/0	0/0	0/0	3	8	9	16
<i>Cyrtanaspis phalerata</i> (Germ., 1831)	0	0	5	0/0	0/0	0/0	0/1	0	0	0	0
<u>Scydmaenidae</u>											
<i>Euconnus claviger</i> (Müll.Kunze, 1822)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Euconnus denticornis</i> (Müll.Kunze, 1822)	0	0	0	0/0	0/0	0/0	0/0	1	0	0	0
<i>Euconnus hirticollis</i> (Ill., 1798)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Microscydus minimus</i> (Chaud., 1845)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	1
<i>Microscydus nanus</i> (Schaum, 1844)	3	19	13	1/1	0/2	8/5	0/1	0	0	0	0
<i>Neuraphes angulatus</i> (Müll.Kunze, 1822)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Neuraphes carinatus</i> (Muls., 1861)	0	1	1	0/0	0/1	2/0	0/0	1	4	3	18
<i>Neuraphes elongatulus</i> (Müll.Kunze, 1822)	2	6	2	2/0	3/1	8/3	3/3	0	0	0	0
<i>Neuraphes plicicollis</i> Rtt., 1879	0	2	0	2/0	0/0	1/0	0/0	0	0	0	0
<i>Neuraphes rubicundus</i> (Schaum, 1841)	2	0	1	3/2	2/2	4/1	4/1	0	0	0	0
<i>Neuraphes ruthenus</i> Mach., 1925	0	0	0	0/0	1/1	0/1	0/0	0	0	0	1
<i>Scydmorephes helvolus</i> (Schaum, 1844)	1	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Stenichnus bicolor</i> (Denny, 1825)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Stenichnus collaris</i> (Müll.Kunze, 1822)	1	0	0	0/0	0/0	3/0	0/0	0	1	0	2
<i>Stenichnus godarti</i> (Latr., 1806)	0	0	0	0/0	0/0	1/0	0/0	0	9	5	4

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Even - Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Stenichnus scutellaris</i> (Müll.Kunze, 1822)	0	0	0	0/0	0/0	0/1	0/0	1	12	1	24
<u>Silphidae</u>											
<i>Dendroxena quadrimaculata</i> (Scop., 1772)	0	0	0	0/0	0/0	0/0	0/0	1	1	3	0
<i>Nicrophorus vespilloides</i> (Hbst., 1783)	0	1	0	0/0	1/0	1/0	0/0	0	0	0	0
<i>Oiceoptoma thoracica</i> (L., 1758)	0	0	0	2/0	0/0	1/1	0/2	0	0	0	0
<i>Phosphuga atrata</i> (L., 1758)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Thanatophilus sinuatus</i> (F., 1775)	0	0	0	0/0	0/0	1/0	0/0	0	1	0	0
<u>Silvanidae</u>											
<i>Ahasverus advena</i> (Waltl, 1834)	0	0	1	0/0	0/1	2/0	0/1	1	0	1	1
<i>Silvanoprus fagi</i> (Guer., 1844)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Silvanus bidentatus</i> (F., 1792)	0	3	10	6/1	2/1	2/0	0/1	1	6	6	11
<i>Silvanus unidentatus</i> (F., 1792)	0	0	0	0/0	0/0	0/0	0/0	1	0	1	0
<i>Uleiota planata</i> (L., 1761)	0	0	0	1/0	0/0	2/0	1/0	1	2	2	1
<u>Sphindidae</u>											
<i>Aspidiphorus orbiculatus</i> (Gyll., 1808)	0	0	1	0/0	0/0	0/1	0/0	0	2	0	2
<i>Sphindus dubius</i> (Gyll., 1808)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<u>Staphylinidae</u>											
<i>Acrotona muscorum</i> (Bris., 1860)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	1
<i>Acrotona parens</i> (Muls.Rey, 1852)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Acrotona parvula</i> (Mannh., 1831)	0	0	0	0/0	0/0	0/0	0/0	0	2	0	0
<i>Acrotona pygmaea</i> (Grav., 1802)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Acrotona sylvicola</i> (Kr., 1856)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	1
<i>Acrulia inflata</i> (Gyll., 1813)	0	1	2	0/0	0/0	0/0	0/0	0	0	0	0
<i>Agaricochara latissima</i> (Steph., 1832)	1	1	1	2/2	3/2	16/6	5/4	0	0	0	0
<i>Alaobia scapularis</i> (Sahlb., 1831)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	1
<i>Aleochara albovillosa</i> Bernh., 1901	0	0	0	0/1	0/0	0/0	0/0	0	0	0	0
<i>Aleochara bipustulata</i> (L., 1761)	0	1	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Aleochara brevipennis</i> Grav., 1806	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Aleochara laevigata</i> Gyll., 1810	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Aleochara lanuginosa</i> Grav., 1802	0	0	1	0/0	1/0	0/0	0/0	0	0	0	2
<i>Aleochara ruficornis</i> Grav., 1802	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Aleochara sparsa</i> Heer, 1839	3	29	17	28/2	43/26	58/56	29/15	4	6	8	19
<i>Aleochara spissicornis</i> Er., 1839	0	2	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Aleochara stichai</i> Likovsky, 1965	0	0	0	3/3	1/3	12/5	1/8	0	0	0	0
<i>Aleuonota rufotestacea</i> (Kr., 1856)	0	3	0	0/0	0/2	1/1	0/1	0	0	0	1
<i>Aloconota gregaria</i> (Er., 1839)	0	6	1	6/3	1/2	7/3	3/0	1	1	1	2
<i>Aloconota insecta</i> (Thoms., 1856)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Aloconota planifrons</i> (Wtrh., 1864)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Amischa analis</i> (Grav., 1802)	1	7	0	1/0	1/2	4/9	3/5	1	3	2	1
<i>Amischa cavifrons</i> (Mannh., 1830)	0	0	0	0/0	0/0	0/2	0/1	0	0	0	0
<i>Amischa decipiens</i> (Shp., 1869)	0	0	0	3/0	2/0	5/0	0/0	0	0	0	0
<i>Amischa nigrofusca</i> (Steph., 1832)	0	0	0	0/0	0/0	1/1	1/0	0	0	0	1

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Amphichroum canaliculatum</i> (Er., 1840)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Anomognathus cuspidatus</i> (Er., 1839)	0	11	3	0/0	2/1	2/6	0/0	0	3	0	3
<i>Anotylus clypeonitens</i> (Pand., 1867)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Anotylus hamatus</i> (Fairm.Lab., 1856)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Anotylus insecatus</i> (Grav., 1806)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	1
<i>Anotylus inustus</i> (Grav., 1806)	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Anotylus mutator</i> (Lohse, 1963)	1	0	1	1/5	4/5	7/4	0/0	0	0	0	0
<i>Anotylus mutator/sculpturatus</i>	2	4	3	0/5	0/8	0/6	0/3	0	0	2	0
<i>Anotylus rugosus</i> (F., 1775)	0	2	0	0/0	0/0	3/0	0/0	0	3	3	0
<i>Anotylus saulcyi</i> (Pand., 1867)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Anotylus sculpturatus</i> (Grav., 1806)	0	2	1	1/0	0/4	0/2	0/0	0	0	0	2
<i>Anotylus spec.</i> Thoms., 1859	0	0	0	0/0	0/3	0/3	0/0	0	0	0	0
<i>Anotylus tetracarınatus</i> (Block, 1799)	0	1	0	1/1	0/0	1/0	1/0	1	5	4	3
<i>Anthobium atrocephalum</i> (Gyll., 1827)	0	0	0	0/0	0/0	0/0	0/0	1	2	0	5
<i>Anthobium melanocephalum</i> (Ill., 1794)	0	0	0	0/0	0/0	3/0	0/0	0	0	0	0
<i>Anthobium unicolor</i> (Marsh., 1802)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	2
<i>Anthophagus angusticollis</i> (Mannh., 1830)	1	10	1	7/4	9/13	11/21	0/1	0	0	0	0
<i>Atheta aegra</i> (Heer, 1841)	0	0	0	1/0	2/1	2/0	0/0	0	0	0	0
<i>Atheta aeneipennis</i> Thoms., 1856	0	3	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Atheta amacula</i> (Steph., 1832)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Atheta aquatilis</i> (Thoms., 1867)	1	0	0	0/0	0/0	0/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Atheta atramentaria</i> (Gyll., 1810)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Atheta boreella</i> Brundin, 1948	0	0	0	0/0	0/0	0/0	0/0	0	0	0	3
<i>Atheta castanoptera</i> (Mannh., 1831)	0	0	1	0/0	0/0	0/0	0/1	0	0	0	0
<i>Atheta cauta</i> (Er., 1837)	0	0	0	1/0	0/0	1/0	0/0	0	0	0	0
<i>Atheta celata</i> (Er., 1837)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	2
<i>Atheta corvina</i> (Thoms., 1856)	0	0	0	0/0	0/0	0/0	0/1	0	0	1	0
<i>Atheta crassicornis</i> (F., 1792)	3	5	0	2/2	6/7	3/15	1/0	1	0	1	1
<i>Atheta debilis</i> (Er., 1837)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Atheta elongatula</i> (Grav., 1802)	0	5	4	0/0	2/0	0/1	0/0	1	0	1	1
<i>Atheta fungi</i> (Grav., 1806)	2	2	4	6/3	2/4	4/2	3/1	1	7	1	4
<i>Atheta fungicola</i> (Thoms., 1852)	0	1	0	0/0	1/0	0/1	0/0	0	0	0	0
<i>Atheta gagatina</i> (Baudi, 1848)	0	0	0	0/0	1/0	0/0	0/0	0	0	0	2
<i>Atheta griepi</i> Scheerp., 1951	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Atheta hansseni</i> Strand, 1943	0	0	0	0/0	0/0	4/0	0/0	0	0	0	0
<i>Atheta harwoodi</i> Will., 1930	0	2	0	0/1	0/0	0/2	0/0	0	2	0	2
<i>Atheta hypnorum</i> (Kiesw., 1850)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Atheta indubia</i> (Shp., 1869)	0	1	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Atheta inquinula</i> (Grav., 1802)	0	0	0	0/0	1/0	0/0	0/0	1	0	0	0
<i>Atheta kochi</i> Roub., 1937	0	0	0	0/0	0/0	2/0	0/0	0	0	0	0
<i>Atheta laevana</i> (Muls.Rey, 1852)	0	0	1	1/0	0/0	2/0	0/0	0	0	0	0
<i>Atheta laticollis</i> (Steph., 1832)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Atheta longicornis</i> (Grav., 1802)	0	0	0	0/1	0/0	0/0	0/0	0	0	0	0
<i>Atheta marcida</i> (Er., 1837)	0	0	0	0/0	0/0	1/0	0/1	0	2	0	1
<i>Atheta monticola</i> (Thoms., 1852)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Atheta myrmecobia</i> (Kr., 1856)	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Atheta negligens</i> (Muls.Rey, 1873)	0	0	1	0/0	0/0	0/0	0/1	0	0	0	0
<i>Atheta nigricornis</i> (Thoms., 1852)	12	174	66	173/54	60/46	121/152	10/22	4	8	5	12
<i>Atheta oblita</i> (Er., 1839)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Atheta orbata</i> (Er., 1837)	0	0	0	2/0	0/0	1/0	0/1	2	0	0	4
<i>Atheta palleola</i> (Er., 1837)	0	0	1	0/0	1/0	1/0	2/1	0	0	0	0
<i>Atheta pallidicornis</i> (Thoms., 1856)	1	0	0	0/0	1/0	1/1	0/0	0	0	0	0
<i>Atheta palustris</i> (Kiesw., 1844)	0	1	1	0/0	0/0	0/0	0/0	2	1	0	1
<i>Atheta parca</i> (Muls.Rey, 1873)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Atheta picipes</i> (Thoms., 1856)	0	4	5	2/0	0/0	1/0	1/2	0	0	0	0
<i>Atheta pittionii</i> Scheerp., 1950	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Atheta ravilla</i> (Er., 1839)	0	0	0	0/0	0/0	0/0	0/0	1	1	0	0
<i>Atheta sequanica</i> (Bris., 1859)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Atheta sodalis</i> (Er., 1837)	0	0	2	0/0	0/0	1/0	0/1	0	4	0	2
<i>Atheta subtilis</i> (Scriba, 1866)	0	2	1	0/1	0/0	0/1	0/0	0	0	0	0
<i>Atheta triangulum</i> (Kr., 1856)	0	1	0	0/1	3/3	0/3	0/0	0	0	0	0
<i>Atheta volans</i> (Scriba, 1859)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Atrecus affinis</i> (Payk., 1789)	0	2	1	0/0	1/0	0/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Autalia rivularis</i> (Grav., 1802)	0	1	0	0/0	0/0	1/0	0/0	1	0	0	0
<i>Batrises adnexus</i> (Hampe, 1863)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	3
<i>Biblopectus ambiguus</i> (Reichb., 1816)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Biblopectus tenebrosus</i> (Rtt., 1880)	0	0	0	0/0	0/0	0/0	0/0	1	1	1	0
<i>Bibloporus bicolor</i> (Denny, 1825)	34	50	35	6/13	5/2	10/10	10/11	1	6	3	7
<i>Bibloporus minutus</i> Raffr., 1914	0	0	0	4/3	0/3	3/1	3/4	8	27	12	24
<i>Bibloporus spec.</i> Thoms., 1859	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Bisnius fimetarius</i> (Grav., 1802)	6	5	2	4/0	1/1	3/3	2/2	3	2	3	2
<i>Bisnius pseudoparcus</i> (Brunner, 1976)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Bolitobius castaneus</i> (Steph., 1832)	0	0	0	2/1	0/0	1/0	0/0	0	0	0	0
<i>Bolitobius cingulata</i> (Mannh., 1830)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Bolitochara lucida</i> (Grav., 1802)	0	2	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Bolitochara mulsanti</i> Shp., 1875	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Bolitochara obliqua</i> Er., 1837	2	4	1	4/1	0/0	1/0	0/0	0	1	0	0
<i>Brachygluta sinuata</i> (Aube, 1833)	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Bryophacis crassicornis</i> (Maekl., 1847)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Bryoporus cernuus</i> (Grav., 1806)	0	0	0	0/0	1/0	0/0	0/0	0	0	0	1
<i>Bythinus burrellii</i> Denny, 1825	2	3	6	0/0	2/0	1/3	0/1	0	0	0	0
<i>Callicerus obscurus</i> Grav., 1802	0	0	0	0/0	1/0	0/0	1/0	0	0	0	0
<i>Callicerus rigidicornis</i> (Er., 1839)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Carpelimus corticinus</i> (Grav., 1806)	0	7	0	0/0	0/0	0/0	0/0	1	2	1	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Carpelimus gracilis</i> (Mannh., 1830)	0	0	0	0/0	0/0	0/1	2/0	0	0	0	0
<i>Carpelimus impressus</i> (Boisd.Lacord., 1835)	0	0	0	0/0	0/0	0/0	0/0	1	0	0	0
<i>Carphacis striatus</i> (Ol., 1794)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	1
<i>Coprophilus striatulus</i> (F., 1792)	0	2	0	0/1	7/8	3/6	0/3	0	2	0	1
<i>Coryphium angusticolle</i> Steph., 1834	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Cypha longicornis</i> (Payk., 1800)	0	0	0	0/0	1/0	0/2	0/0	0	1	0	1
<i>Cypha seminulum</i> (Er., 1839)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Cyphea curtula</i> (Er., 1837)	0	0	0	1/0	0/0	2/0	0/1	0	0	0	0
<i>Dadobia immersa</i> (Er., 1837)	1	3	8	0/0	1/0	1/0	2/0	1	1	1	7
<i>Dinaraea aequata</i> (Er., 1837)	0	2	0	0/0	1/1	2/0	0/1	0	0	0	0
<i>Dinaraea angustula</i> (Gyll., 1810)	0	0	0	0/0	1/0	1/0	0/0	0	0	1	0
<i>Dinaraea linearis</i> (Grav., 1802)	0	2	0	0/0	0/0	0/1	0/0	0	0	1	0
<i>Dropephylla linearis</i> (Zetterst., 1828)	1	2	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Enalodroma hepatica</i> (Er., 1839)	0	0	0	0/0	0/0	0/0	0/0	1	0	0	1
<i>Euplectus bescidicus</i> Rtt., 1881	0	1	0	0/0	0/0	0/1	0/1	0	2	0	0
<i>Euplectus brunneus</i> (Grimm., 1841)	0	0	2	1/0	0/0	1/1	0/0	0	1	0	0
<i>Euplectus decipiens</i> Raffr., 1910	0	2	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Euplectus fauveli</i> Guillb., 1888	0	1	2	3/1	1/2	0/2	4/3	1	0	0	0
<i>Euplectus infirmus</i> Raffr., 1910	0	0	0	0/0	0/0	0/0	0/0	0	0	0	2
<i>Euplectus karstenii</i> (Reichb., 1816)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Euplectus nanus</i> (Reichb., 1816)	0	0	0	0/0	0/2	0/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Euplectus punctatus</i> Muls., 1861	0	0	0	0/1	0/0	0/1	0/1	1	0	0	0
<i>Euplectus signatus</i> (Reichb., 1816)	0	0	0	1/0	0/0	0/0	0/0	0	5	2	0
<i>Euryusa castanoptera</i> Kr., 1856	15	57	16	25/29	2/4	10/9	6/2	3	73	29	28
<i>Euryusa optabilis</i> Heer, 1839	0	0	0	0/0	0/0	0/0	0/0	0	0	0	2
<i>Eusphalerum abdominale</i> (Grav., 1806)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Eusphalerum atrum</i> (Heer, 1838)	0	0	0	1/0	1/0	0/0	0/0	0	0	0	0
<i>Eusphalerum limbatum</i> (Er., 1840)	1	7	1	0/0	2/1	3/3	0/0	0	0	0	0
<i>Eusphalerum longipenne</i> (Er., 1839)	0	0	3	0/0	0/0	0/0	0/0	0	0	0	0
<i>Eusphalerum luteum</i> (Marsh., 1802)	0	1	0	0/1	1/1	1/6	0/1	0	0	0	0
<i>Eusphalerum minutum</i> (F., 1792)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Eusphalerum rectangulum</i> (Fauv., 1869)	0	0	0	0/0	0/0	1/1	0/0	0	0	0	0
<i>Eusphalerum semicoleopratum</i> (Panz., 1795)	1	3	1	5/1	2/1	20/8	1/0	0	0	0	0
<i>Eusphalerum signatum</i> (Märk., 1857)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Eusphalerum sorbi</i> (Gyll., 1810)	1	8	2	0/1	2/1	3/3	0/0	0	0	0	0
<i>Eusphalerum stramineum</i> (Kr., 1857)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Eusphalerum tenenbaumi</i> (Bernh., 1932)	0	2	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Gabrius appendiculatus</i> Sharp, 1910	0	10	6	0/1	0/1	0/0	0/0	1	1	0	1
<i>Gabrius astutoides</i> (Strand, 1946)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Gabrius breviventer</i> (Sperk, 1835)	0	3	4	0/0	0/0	0/0	0/0	2	4	1	0
<i>Gabrius femoralis</i> (Hochh., 1851)	0	2	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Gabrius spec.</i> Steph., 1829	0	3	0	0/0	0/0	0/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Gabrius splendidulus</i> (Grav., 1802)	1	17	5	0/0	0/1	7/4	1/1	0	3	1	2
<i>Geostiba circellaris</i> (Grav., 1806)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Gyrophypnus angustatus</i> Steph., 1833	0	0	0	0/0	0/0	0/0	0/0	2	3	2	1
<i>Gyrophypnus fracticornis</i> (Müll., 1776)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	1
<i>Gyrophphaena boleti</i> (L., 1758)	1	1	0	0/0	0/0	0/0	1/1	0	0	0	0
<i>Gyrophphaena fasciata</i> (Marsh., 1802)	0	0	0	0/0	0/0	0/0	0/0	0	2	0	0
<i>Gyrophphaena gentilis</i> Er., 1839	0	1	0	0/0	0/0	0/0	0/0	0	1	0	1
<i>Gyrophphaena joyioides</i> Wüsth., 1937	0	0	0	0/0	0/0	0/0	0/0	0	5	0	0
<i>Gyrophphaena manca</i> Er., 1839	1	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Gyrophphaena minima</i> Er., 1837	0	0	0	0/0	0/0	0/0	0/0	0	4	0	0
<i>Gyrophphaena munsteri</i> Strand, 1935	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Gyrophphaena nana</i> (Payk., 1800)	0	0	0	0/0	0/0	0/0	0/0	1	0	0	0
<i>Gyrophphaena poweri</i> Crotch, 1866	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Gyrophphaena strictula</i> Er., 1839	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Habrocercus capillaricornis</i> (Grav., 1806)	4	8	7	1/0	3/0	2/0	1/0	3	7	0	6
<i>Hapalaraea pygmaea</i> (Payk., 1800)	0	0	0	5/2	1/2	1/0	0/0	1	0	0	0
<i>Haploglossa nidicola</i> (Fairm., 1852)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Haploglossa villosula</i> (Steph., 1832)	0	0	0	1/0	0/0	0/2	0/2	0	1	0	0
<i>Holobus apicatus</i> (Er., 1837)	0	0	0	2/0	0/0	1/3	1/0	0	0	0	0
<i>Holobus flavicornis</i> (Boisd.Lac., 1835)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	3
<i>Homalota plana</i> (Gyll., 1810)	1	18	3	9/2	0/0	1/1	1/1	0	2	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Homoeusa acuminata</i> (Märk., 1842)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Hypnogyra angularis</i> (Ganglb., 1895)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Hypnogyra glaber</i> (Nordmann, 1837)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Hypopycna rufula</i> (Er., 1840)	0	1	0	1/0	0/0	2/3	0/0	0	0	0	0
<i>Ischnoglossa elegantula</i> (Mannh., 1830)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Ischnoglossa obscura</i> Wunderle, 1990	1	1	0	0/1	0/0	0/0	0/0	0	0	0	0
<i>Ischnoglossa prolixa</i> (Grav., 1802)	0	2	0	0/0	0/0	0/0	0/0	0	0	1	1
<i>Ischnosoma splendidum</i> (Grav., 1806)	0	0	0	0/0	0/0	6/2	1/0	2	0	1	2
<i>Ityocara rubens</i> (Er., 1837)	0	0	0	0/1	1/0	0/0	1/0	0	0	0	0
<i>Lathrobium fulvipenne</i> (Grav., 1806)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Lathrobium geminum</i> Kraatz, 1857	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Leptoplectus spinolae</i> (Aubé, 1844)	0	0	0	0/0	0/0	1/0	0/1	0	0	0	0
<i>Leptusa fumida</i> (Er., 1839)	0	0	0	6/9	7/3	5/9	0/2	0	1	0	3
<i>Leptusa pulchella</i> (Mannh., 1830)	23	79	102	5/7	8/10	23/34	8/11	4	22	2	7
<i>Leptusa ruficollis</i> (Er., 1839)	0	6	0	1/1	0/1	1/0	0/1	1	3	0	0
<i>Lesteva longoelytrata</i> (Goeze, 1777)	0	4	15	4/5	5/13	10/16	10/8	0	1	1	1
<i>Liogluta alpestris</i> (Heer, 1839)	0	1	0	2/0	0/0	2/1	0/1	0	0	0	1
<i>Liogluta longiuscula</i> (Grav., 1802)	0	3	1	0/0	1/0	3/1	0/0	0	0	0	0
<i>Liogluta microptera</i> (Thoms., 1867)	0	4	3	3/6	0/0	0/0	0/1	1	0	0	2
<i>Lomechusa emarginata</i> (Payk., 1789)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Lordithon lunulatus</i> (L., 1761)	0	1	0	1/1	0/0	2/0	0/2	2	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Megaloscapa punctipennis</i> (Kr., 1856)	0	0	0	1/1	3/0	1/0	0/0	0	0	0	0
<i>Megarthus depressus</i> (Payk., 1789)	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Megarthus prosseni</i> Schatzm., 1904	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Meotica capitalis</i> (Muls.Rey, 1873)	0	0	0	0/0	0/0	0/0	0/0	2	2	0	2
<i>Meotica exillima</i> Shp., 1915	0	0	0	0/0	0/0	0/0	0/0	0	1	0	1
<i>Mycetoporus baudueri</i> Muls.Rey, 1875	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Mycetoporus brucki</i> (Pand., 1869)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Mycetoporus eppelsheimianus</i> Fagel, 1965	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Mycetoporus glaber</i> (Sperk, 1835)	0	0	0	0/0	0/0	0/0	0/0	1	0	0	0
<i>Mycetoporus lepidus</i> (Grav., 1802)	0	0	0	0/0	0/2	0/0	0/1	2	2	1	6
<i>Mycetoporus longulus</i> Mannh., 1830	1	1	0	0/0	1/0	0/0	0/0	0	0	1	0
<i>Mycetoporus niger</i> Fairm.Lab., 1856	0	1	2	0/0	0/0	1/0	1/0	0	0	0	0
<i>Mycetoporus punctus</i> (Gyll., 1810)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Mycetoporus reichei</i> Pand., 1869	0	2	6	0/1	0/0	0/0	0/2	0	0	0	0
<i>Myllaena intermedia</i> Er., 1837	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Nudobius lentus</i> (Grav., 1806)	0	3	0	1/0	0/0	8/2	2/0	0	0	0	3
<i>Ocalea badia</i> Er., 1837	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Ocalea picata</i> Ocalea picata	0	0	0	0/0	0/2	0/0	0/0	0	0	0	0
<i>Ocalea rivularis</i> Mill., 1851	1	2	0	19/8	5/1	2/0	0/0	0	0	0	0
<i>Ocyusa maura</i> (Er., 1837)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	1
<i>Oligota granaria</i> Er., 1837	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Oligota pumilio</i> Kiesw., 1858	0	0	0	0/0	0/0	0/0	0/0	1	0	0	1
<i>Oligota pusillima</i> (Grav., 1806)	0	0	0	1/0	0/0	0/0	0/0	2	0	2	0
<i>Omalium caesum</i> Grav., 1806	2	2	3	0/5	0/1	1/2	2/1	2	0	2	2
<i>Omalium oxyacanthae</i> Grav., 1806	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Omalium rivulare</i> (Payk., 1789)	0	11	1	1/2	3/7	3/3	0/1	2	0	0	2
<i>Omalium rugatum</i> Muls.Rey, 1880	0	2	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Omalium septentrionis</i> Thoms., 1856	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Omalium validum</i> Kr., 1858	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Ontholestes haroldi</i> (Epph., 1884)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Ontholestes murinus</i> (L., 1758)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Oxypoda acuminata</i> (Steph., 1832)	0	4	3	2/3	1/1	0/1	0/1	0	1	0	0
<i>Oxypoda alternans</i> (Grav., 1802)	1	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Oxypoda brachyptera</i> (Steph., 1832)	0	0	0	0/0	0/0	1/0	0/0	1	2	1	10
<i>Oxypoda brevicornis</i> (Steph., 1832)	0	7	8	1/0	1/0	2/4	0/1	0	3	2	1
<i>Oxypoda flavicornis</i> Kr., 1856	1	3	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Oxypoda formiceticola</i> Märk., 1841	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Oxypoda longipes</i> Muls.Rey, 1861	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Oxypoda opaca</i> (Grav., 1802)	0	0	0	1/1	1/0	3/3	0/0	0	2	0	1
<i>Oxypoda tarda</i> Shp., 1871	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Oxypoda vicina</i> Kr., 1856	0	0	1	0/1	0/0	0/0	0/0	0	0	0	0
<i>Oxypoda vittata</i> Märk., 1842	0	0	1	1/1	0/0	0/1	0/0	1	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Oxyporus maxillosus</i> F., 1792	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Oxytelus migrator</i> Fauv., 1904	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Oxytelus piceus</i> (L., 1767)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Parocyusa longitarsis</i> (Er., 1837)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Philonthus atratus</i> (Grav., 1802)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Philonthus carbonarius</i> (Grav., 1810)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Philonthus cognatus</i> Steph., 1832	0	2	0	1/0	0/0	1/1	0/1	1	4	1	3
<i>Philonthus debilis</i> (Grav., 1802)	1	0	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Philonthus decorus</i> (Grav., 1802)	0	6	3	0/1	0/0	0/0	0/0	0	0	0	0
<i>Philonthus fimetarius</i> (Grav., 1802)	0	0	0	0/0	0/2	0/0	0/0	0	0	0	0
<i>Philonthus fumarius</i> (Grav., 1806)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Philonthus laevicollis</i> (Boisd.Lac., 1835)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Philonthus laminatus</i> (Creutz., 1799)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Philonthus mannerheimi</i> Fauv., 1869	0	0	0	0/0	0/0	0/0	0/0	0	0	3	0
<i>Philonthus marginatus</i> (Ström, 1768)	0	0	0	0/0	1/0	0/0	0/1	0	0	0	0
<i>Philonthus rotundicollis</i> (Menetr., 1832)	0	0	0	0/0	1/0	0/1	0/0	0	0	0	0
<i>Philonthus splendens</i> (F., 1792)	1	0	0	0/0	0/0	1/0	0/0	1	2	0	1
<i>Philonthus succicola</i> Thoms., 1860	1	1	0	0/0	1/0	0/0	0/0	0	1	1	0
<i>Philonthus tenuicornis</i> Rey, 1853	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Philonthus varians</i> (Payk., 1789)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Phloeocharis subtilissima</i> Mannh., 1830	1	2	1	0/1	0/0	0/1	0/1	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Phloeonomus punctipennis</i> Thoms., 1867	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Phloeopora bernhaueri</i> Lohse, 1984	0	6	2	4/0	1/0	3/0	0/0	1	4	4	4
<i>Phloeopora corticalis</i> (Grav., 1802)	4	8	5	11/4	6/2	14/2	4/0	5	14	2	18
<i>Phloeopora scribae</i> (Epph., 1884)	0	1	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Phloeopora testacea</i> (Mannh., 1830)	0	1	3	8/0	1/0	1/0	1/1	0	0	1	6
<i>Phloeostiba lapponica</i> (Zetterst., 1838)	0	1	0	0/1	0/1	2/1	0/0	1	2	3	71
<i>Phloeostiba plana</i> (Payk., 1792)	0	12	3	9/3	4/3	11/9	6/4	4	3	2	13
<i>Phyllodrepa floralis</i> (Payk., 1789)	0	0	0	0/0	0/0	2/0	0/0	1	0	0	1
<i>Phyllodrepa ioptera</i> (Steph., 1834)	0	0	0	0/0	1/0	0/2	0/0	0	0	0	0
<i>Phyllodrepa melanocephala</i> (F., 1787)	0	1	0	7/0	11/0	3/0	0/0	0	0	0	0
<i>Phyllodrepa nigra</i> (Grav., 1806)	1	9	9	1/5	0/2	2/5	7/12	0	0	0	2
<i>Phyllodrepa puberula</i> Bernh., 1903	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Phyllodrepoidea crenata</i> (Grav., 1802)	0	0	0	1/2	0/0	0/0	0/0	0	0	0	0
<i>Placusa atrata</i> (Mannh., 1831)	4	21	15	9/4	2/10	7/6	7/9	7	17	23	57
<i>Placusa depressa</i> Maekl., 1845	0	5	3	9/1	6/1	5/3	10/1	1	4	0	9
<i>Placusa incompleta</i> Sjöb., 1934	0	3	3	0/0	0/0	0/0	0/0	0	0	0	0
<i>Placusa pumilio</i> (Grav., 1802)	0	2	1	65/60	29/11	23/16	3/2	2	7	0	14
<i>Placusa tachyporoides</i> (Waltl, 1838)	12	152	74	199/242	83/159	140/237	33/91	10	42	19	183
<i>Plataraea brunnea</i> (F., 1798)	0	1	0	0/0	0/0	2/1	0/3	0	0	0	0
<i>Plataraea elegans</i> (Benick, 1934)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Platystethus arenarius</i> (Fourcr., 1785)	0	0	0	1/0	0/0	2/0	0/0	0	0	0	1

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Platystethus nitens</i> (Sahlb., 1832)	0	2	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Plectophloeus fischeri</i> (Aube, 1833)	1	4	7	1/0	0/0	0/1	1/0	0	0	0	0
<i>Plectophloeus nubigena</i> (Rtt., 1876)	0	1	0	0/0	0/0	0/4	1/3	0	1	0	3
<i>Proteinus brachypterus</i> (F., 1792)	2	3	17	1/0	0/0	1/1	0/1	0	1	0	0
<i>Proteinus crenulatus</i> Pand., 1867	0	0	3	0/0	0/0	0/0	0/0	0	0	0	0
<i>Proteinus ovalis</i> Steph., 1834	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Quedius cinctus</i> (Payk., 1790)	2	14	9	2/0	1/0	1/0	2/0	1	0	0	0
<i>Quedius cruentus</i> (Ol., 1795)	0	2	4	1/2	5/1	15/3	7/2	1	2	0	13
<i>Quedius curtipennis</i> Bernh., 1908	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Quedius fuliginosus</i> (Grav., 1802)	0	2	1	0/0	0/0	0/0	1/0	0	0	1	0
<i>Quedius fumatus</i> (Steph., 1833)	2	8	7	0/1	0/0	2/2	0/2	0	2	0	1
<i>Quedius humeralis</i> Steph., 1832	0	1	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Quedius lateralis</i> (Grav., 1802)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Quedius lucidulus</i> Er., 1839	2	18	15	0/1	0/1	0/2	1/0	0	1	0	3
<i>Quedius maurus</i> (Sahlb., 1830)	0	1	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Quedius mesomelinus</i> (Marsh., 1802)	2	22	12	3/2	4/1	7/9	4/6	0	0	0	1
<i>Quedius nigriceps</i> Kr., 1857	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Quedius suturalis</i> Kiesw., 1847	0	1	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Quedius xanthopus</i> Er., 1839	0	0	1	1/0	0/0	0/0	0/0	1	1	0	0
<i>Rhopalocerina clavigera</i> (Scriba, 1859)	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Rugilus mixtus</i> (Lohse, 1956)	2	5	3	0/0	0/0	0/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	Age d	Even - Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Rugilus orbiculatus</i> (Payk., 1789)	0	2	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Rugilus rufipes</i> (Germ., 1836)	2	2	1	0/1	2/1	2/0	0/1	0	0	0	5
<i>Scaphidium quadrimaculatum</i> Ol., 1790	0	0	0	1/0	0/0	0/0	0/0	0	0	0	1
<i>Scaphisoma agaricinum</i> (L., 1758)	1	2	0	0/0	1/0	3/1	0/1	1	32	6	35
<i>Scaphisoma assimile</i> Er., 1845	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Scaphisoma balcanicum</i> Taman., 1954	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Scaphisoma boleti</i> (Panz., 1793)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Schistoglossa curtipennis</i> (Shp., 1869)	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Scopaeus minutus</i> Er., 1840	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Sepedophilus bipunctatus</i> (Grav., 1802)	0	0	0	0/0	1/0	1/0	0/0	1	0	0	0
<i>Sepedophilus immaculatus</i> (Steph., 1832)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Sepedophilus littoreus</i> (L., 1758)	0	1	2	0/0	0/0	0/0	0/0	1	0	2	0
<i>Sepedophilus marshami</i> (Steph., 1832)	0	0	0	0/0	0/0	0/0	0/0	1	1	1	0
<i>Sepedophilus testaceus</i> (F., 1792)	0	0	1	0/0	0/0	0/0	0/0	0	1	0	3
<i>Siagonium humerale</i> Germ., 1817	0	0	0	33/7	0/0	0/0	0/0	0	0	0	0
<i>Stenus argus</i> Grav., 1806	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Stenus boops</i> Ljungh, 1804	0	0	0	0/0	0/0	0/0	0/0	0	1	0	0
<i>Stenus clavicornis</i> (Scop., 1763)	0	0	0	0/1	0/0	0/0	0/0	0	0	0	0
<i>Stenus fossulatus</i> Er., 1840	0	0	1	0/0	0/0	1/0	0/0	0	0	0	0
<i>Syntomium aeneum</i> (Müll., 1821)	0	0	1	0/0	1/1	0/0	0/0	0	0	0	0
<i>Tachinus humeralis</i> Grav., 1802	0	0	0	0/0	0/0	0/0	0/0	1	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beec h	Spruc e	Beech	Beech	Beech	Spruce	Beech	Beec h	Oak	Pine
Management type	Unmanag ed	Even - Aged	Even- Aged	Unmanage d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag ed	Even - Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Tachinus laticollis</i> Grav., 1802	1	1	3	1/0	0/0	0/1	2/0	1	0	0	1
<i>Tachinus lignorum</i> (L., 1758)	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Tachinus pallipes</i> Grav., 1806	1	2	8	0/0	0/0	0/1	1/6	0	0	0	1
<i>Tachinus rufipes</i> (L., 1758)	1	7	5	1/0	1/0	1/0	0/0	0	0	2	1
<i>Tachinus signatus</i> Grav., 1802	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Tachinus subterraneus</i> (L., 1758)	0	1	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Tachyporus chrysomelinus</i> (L., 1758)	0	1	0	0/0	0/0	0/1	0/0	0	1	1	0
<i>Tachyporus dispar</i> (Payk., 1789)	1	0	0	0/0	0/0	2/0	0/0	0	1	1	0
<i>Tachyporus hypnorum</i> (F., 1775)	0	1	1	1/0	2/0	1/2	0/1	1	11	3	4
<i>Tachyporus nitidulus</i> (F., 1781)	0	0	0	0/0	1/1	1/0	0/0	0	0	0	0
<i>Tachyporus obtusus</i> (L., 1767)	2	0	0	0/0	0/0	2/2	0/0	0	1	0	0
<i>Tachyporus pulchellus</i> Mannh., 1841	0	0	0	0/0	0/0	0/0	0/0	1	0	2	0
<i>Tachyporus solutus</i> Er., 1839	0	0	1	0/0	0/0	0/0	0/0	0	1	0	0
<i>Tasgius morsitans</i> (Rossi, 1790)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Thamiaraea cinnamomea</i> (Grav., 1802)	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Tinotus morion</i> (Grav., 1802)	0	0	0	0/0	0/0	1/0	0/0	0	0	0	1
<i>Trichophya pilicornis</i> (Gyll., 1810)	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Trimium brevicorne</i> (Reichb., 1816)	1	0	2	0/0	1/0	0/1	0/0	0	1	1	1
<i>Tychus niger</i> (Payk., 1800)	0	0	1	0/0	0/1	0/0	1/1	0	0	0	0
<i>Tyrus mucronatus</i> (Panz., 1803)	0	0	0	0/0	0/0	0/0	0/0	0	4	1	22
<i>Velleius dilatatus</i> (F., 1787)	0	0	0	0/0	0/0	0/0	0/0	1	0	2	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanag- ed	Even- Aged	Even- Aged	Unmanag- ed	Uneven- Aged	Even-Aged	Even- Aged	Unmanag- ed	Even- Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Xantholinus linearis</i> (Ol., 1795)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Xantholinus longiventris</i> Heer, 1839	0	1	0	0/0	0/0	1/1	0/0	3	2	2	4
<i>Xylostiba bosnica</i> (Bernh., 1902)	0	0	1	0/0	0/0	0/0	0/1	0	0	0	1
<i>Xylostiba monilicornis</i> (Gyll., 1810)	1	0	0	5/1	1/3	1/0	0/1	0	0	0	0
<i>Zyras cognatus</i> (Märk., 1842)	0	1	0	0/0	0/0	0/1	0/0	0	0	0	1
<i>Zyras haworthi</i> (Steph., 1832)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Zyras humeralis</i> (Grav., 1802)	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Zyras lugens</i> (Grav., 1802)	0	1	0	0/0	0/0	0/0	0/0	1	0	1	1
<u>Tenebrionidae</u>											
<i>Bolitophagus reticulatus</i> (L., 1767)	0	0	0	2/4	0/2	4/11	0/3	2	8	0	12
<i>Corticeus unicolor</i> (Pill. Mitt., 1783)	0	0	0	1/0	1/0	0/0	1/0	1	0	0	1
<i>Lagria hirta</i> (L., 1758)	0	1	0	1/0	0/0	0/0	0/0	0	1	0	6
<i>Mycetochara linearis</i> (Ill., 1794)	0	0	0	0/0	2/0	2/1	0/0	1	0	0	0
<i>Scaphidema metallicum</i> (F., 1792)	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<u>Tetratomidae</u>											
<i>Tetratoma ancora</i> F., 1790	0	2	1	32/26	4/3	8/4	0/0	0	0	0	0
<u>Throscidae</u>											
<i>Aulonothroscus brevicollis</i> Bonv., 1859	0	2	0	2/0	0/0	1/0	0/2	1	0	0	9
<i>Trixagus carinifrons</i> Bonv., 1859	0	3	5	8/2	42/7	8/3	31/48	0	5	1	70
<i>Trixagus dermestoides</i> (L., 1767)	0	0	2	1/0	1/2	2/1	15/6	4	8	2	31
<i>Trixagus meybohmi</i> Leseigneur, 2005	0	0	0	0/0	0/3	0/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management type	Unmanag- ed	Even- Aged	Even- Aged	Unmanage- d	Uneven- Aged	Even-Aged	Even- Aged	Unmanag- ed	Even- Aged	- Age d	- Age d
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Triaxagus spec.</i> Kug., 1794	0	0	0	0/0	0/4	0/0	0/0	0	0	0	0
<u>Trogidae</u>											
<i>Trox sabulosus</i> (L., 1758)	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Trox scaber</i> (L., 1767)	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<u>Trogossitidae</u>											
<i>Nemosoma elongatum</i> (L., 1761)	0	2	1	11/10	0/0	3/4	0/1	2	2	3	6

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Table S5-3: Complete list of Apocrita species and their abundances from pheromone traps, separated by management type and main tree type. Species are grouped by family and presented in alphabetical order.

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main Tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management Type	Unmanaged	Even-Aged	Even-Aged	Unmanaged	Uneven-Aged	Even-Aged	Even-Aged	Unmanaged	Even-Aged	Even-Aged	Even-Aged
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<u>Andrenidae</u>											
<i>Andrena bicolor</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Andrena haemorrhoa</i>	0	0	0	0/0	0/0	0/1	0/0	0	0	0	2
<i>Andrena helvola</i>	0	9	0	0/3	0/0	0/0	0/0	0	0	0	0
<i>Andrena helvola/varians</i>	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Andrena minutula</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	0
<i>Andrena nitidiuscula</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Andrena ruficrus</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Andrena spec.</i>	0	0	0	4/4	6/0	31/2	0/0	0	0	2	4
<i>Andrena varians</i>	0	0	0	1/0	0/0	1/0	0/0	0	0	0	0
<i>Andrena varians/helvola</i>	0	0	0	1/0	0/0	2/0	0/0	1	1	0	0
<u>Aphelinidae</u>											
Aphelinidae spec.	0	0	0	0/0	1/0	0/1	1/0	1	1	0	0
<i>Aphelinus spec.</i>	0	0	0	0/0	0/1	0/0	0/1	0	0	0	0
<i>Encarsia spec.</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Eretmocerus mundus</i>	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Eretmocerus spec.</i>	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<u>Apidae</u>											
<i>Bombus pratorum</i>	0	0	0	0/1	1/0	1/0	0/0	0	0	0	0
<i>Bombus spec.</i>	0	0	0	1/0	0/0	1/0	0/0	1	1	0	4
<u>Bethylidae</u>											
<i>Cephalonomia formiciformis</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Cephalonomia tarsalis/hammi</i>	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<u>Braconidae</u>											
<i>Alysiinae spec.</i>	0	1	0	5/0	4/0	3/0	0/2	0	0	0	0
Braconidae spec.	0	2	2	8/6	5/2	6/10	6/8	1	1	8	6
<i>Chelonus spec.</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	0
<i>Earinus gloriatorius/elator</i>	0	0	0	53/0	12/0	10/0	0/0	140	140	15	7

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main Tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management Type	Unmanaged	Even-Aged	Even-Aged	Unmanaged	Uneven-Aged	Even-Aged	Even-Aged	Unmanaged	Even-Aged	Even-Aged	Even-Aged
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Earinus</i> spec.	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Histeromerus mystacinus</i>	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Ichneutes reunitor</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Leiophron</i> spec.	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Rogas</i> spec.	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Spathius rubidus</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<u>Ceraphronidae</u>											
<i>Aphanogmus</i> spec.	7	6	2	1/6	5/2	11/19	6/39	7	7	2	13
<i>Aphanogmus steinitzi</i>	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Ceraphron clavatus</i>	0	0	0	0/0	2/0	0/2	0/0	0	0	0	0
<i>Ceraphron pedes</i>	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Ceraphron pristomicrops</i>	0	0	0	0/0	12/2	0/1	0/0	0	0	0	0
<i>Ceraphron serraticornis</i>	0	0	0	1/18	0/0	0/0	0/0	0	0	0	0
<i>Ceraphron</i> spec.	1	1	1	4/0	9/2	15/7	3/6	6	6	1	5
Ceraphronidae spec.	0	0	0	0/0	0/0	0/0	0/0	1	1	0	0
<i>Synarsis pulla</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<u>Chrysididae</u>											
<i>Chrysis ignita</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	2
<u>Crabronidae</u>											
<i>Crossocerus heydeni</i>	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Mellinus crabroneus</i>	0	0	0	0/0	0/0	0/0	0/0	2	2	0	0
<u>Cynipidae</u>											
<i>Andricus quercuscalicis</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Andricus seminationis</i>	0	0	0	0/0	1/0	1/0	0/0	0	0	0	0
<i>Andricus solitarius</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	1
<i>Andricus</i> spec.	0	0	0	1/0	0/0	2/0	0/1	1	1	2	0
Cynipinae spec.	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Cynips divisa</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	2	0
<u>Diapriidae</u>											
<i>Aclista atriceps</i>	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Aclista elevata</i>	0	0	0	3/0	1/0	1/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main Tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management Type	Unmanaged	Even-Aged	Even-Aged	Unmanaged	Uneven-Aged	Even-Aged	Even-Aged	Unmanaged	Even-Aged	Even-Aged	Even-Aged
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Aclista evadne</i>	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Aclista mycale</i>	0	0	0	0/1	0/0	0/0	0/0	0	0	0	0
<i>Aclista parvula</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	0
<i>Aclista prolongata</i>	0	0	1	0/0	1/0	0/0	0/0	0	0	1	1
<i>Aclista rufopetiolata</i>	0	0	0	1/0	0/0	1/1	1/0	0	0	1	0
<i>Aclista scutellaris</i>	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Aclista spec.</i>	0	0	1	0/0	0/1	0/1	0/0	0	0	0	0
<i>Acropiesta flaviventris</i>	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Acropiesta sciarivora</i>	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Basalys (Loxotropa) badeniensis</i>	0	0	0	0/0	0/0	0/2	0/0	0	0	0	0
<i>Basalys abrupta</i>	0	0	3	2/0	3/1	6/1	0/0	0	0	0	0
<i>Basalys ciliaris</i>	0	0	0	0/0	0/0	1/0	1/0	0	0	0	0
<i>Basalys collaris</i>	0	1	0	0/0	0/0	0/0	0/0	3	3	0	2
<i>Basalys crassiceps</i>	0	1	0	0/0	0/1	5/0	0/0	0	0	0	0
<i>Basalys crassiclava</i>	0	0	0	1/0	0/3	1/1	0/0	0	0	0	1
<i>Basalys crassicornis</i>	0	0	0	0/0	0/6	0/1	0/1	0	0	0	0
<i>Basalys cymocles</i>	0	0	0	0/1	0/0	3/0	0/0	0	0	0	0
<i>Basalys exigua</i>	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Basalys longipennis</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	0
<i>Basalys parva</i>	0	0	0	1/3	0/0	0/0	0/1	0	0	0	1
<i>Basalys pedisequa</i>	0	0	0	5/2	2/2	3/1	0/0	0	0	0	0
<i>Basalys scotica</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Basalys tuberculatus</i>	0	0	0	0/1	0/0	0/0	0/0	0	0	0	0
<i>Belyta depressa</i>	0	0	0	1/0	1/0	0/0	1/0	1	1	0	1
<i>Belyta forticornis</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Belyta moniliata</i>	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Belyta quadridens</i>	0	0	0	0/0	1/1	0/0	0/2	0	0	0	0
<i>Belyta rugosicollis</i>	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Belyta spec.</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Cinetus cameroni</i>	0	0	0	0/0	1/0	1/0	0/0	0	0	3	0
<i>Cinetus iridipennis</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main Tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management Type	Unmanaged	Even-Aged	Even-Aged	Unmanaged	Uneven-Aged	Even-Aged	Even-Aged	Unmanaged	Even-Aged	Even-Aged	Even-Aged
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Entomacis bipunctata</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Entomacis perplexa</i>	0	0	0	1/0	1/0	1/0	1/0	0	0	0	4
<i>Ismarus flavicornis</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Lyteba bisulcata</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Lyteba spec.</i>	0	0	0	2/0	6/0	1/0	0/0	0	0	0	0
<i>Miota fungorum</i>	0	0	0	1/0	0/0	0/0	0/0	2	2	0	0
<i>Miota monilicornis</i>	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Monelata solida</i>	2	0	0	1/5	6/12	2/1	0/0	3	3	1	0
<i>Opazon apertum</i>	0	0	0	0/0	0/0	1/0	0/0	4	4	0	1
<i>Opazon parvulum</i>	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Pantoclis longipennis</i>	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Pantoclis similis</i>	0	0	0	0/1	0/0	1/0	0/0	0	0	0	1
<i>Pantoclis spec.</i>	1	2	0	0/2	0/0	0/0	0/0	0	0	0	0
<i>Pantoclis striola</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Pantoclis subatricornis</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	1
<i>Pantoclis sulcata</i>	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Pantoclis trisulcata</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Pantolyta fuscicornis</i>	0	0	0	0/0	1/0	0/0	1/0	0	0	0	0
<i>Pantolyta pallida</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Pantolyta semirufa</i>	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Pantolyta sulcata</i>	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Paramesius brachypterus</i>	0	0	0	2/0	1/1	1/0	0/0	0	0	1	0
<i>Paramesius elongatus</i>	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Paramesius spec.</i>	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Paroxylabis semirufa</i>	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Phaenopria major</i>	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Psilus caecutiens</i>	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Psilus inaequalifrons</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Spilomicrus bipunctatus</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Spilomicrus formosus</i>	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Spilomicrus hemipterus</i>	0	0	0	0/0	0/0	1/0	0/0	7	7	1	7

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main Tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management Type	Unmanaged	Even-Aged	Even-Aged	Unmanaged	Uneven-Aged	Even-Aged	Even-Aged	Unmanaged	Even-Aged	Even-Aged	Even-Aged
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Spilomicrus nigripes</i>	0	0	0	0/0	0/1	0/2	0/0	0	0	0	0
<i>Spilomicrus stigmatalis</i>	1	1	0	3/2	3/0	5/1	0/0	11	11	0	0
<i>Synacra brachialis</i>	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Synbelyta fuscipennis</i>	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Trichopria aequata</i>	0	9	1	19/2	6/0	16/2	1/0	3	3	2	1
<i>Trichopria aptera</i>	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Trichopria cameroni</i>	0	0	0	0/0	0/0	1/0	1/0	0	0	0	0
<i>Trichopria fuliginosa</i>	0	0	0	0/0	0/3	0/2	0/0	0	0	0	0
<i>Trichopria hyalinipennis</i>	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Trichopria inermis</i>	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<i>Trichopria longicornis</i>	0	0	1	0/0	0/0	0/0	0/0	1	1	0	0
<i>Trichopria oxygaster</i>	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Trichopria sociabilis</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Zygota caecutiens</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Zygota claviscapa</i>	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Zygota excisipes</i>	0	0	0	0/0	1/0	1/0	0/0	0	0	0	0
<i>Zygota macroneura</i>	0	2	0	4/0	0/0	2/0	1/0	0	0	0	0
<i>Zygota ruficornis</i>	0	2	0	3/1	4/0	5/0	0/0	0	0	0	0
<i>Zygota spec.</i>	0	0	0	0/0	0/0	0/2	0/0	0	0	0	0
<i>Zygota striata</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	1
<i>Zygota subaptera</i>	0	0	0	1/0	2/1	2/2	0/0	0	0	0	0
<u>Dryinidae</u>											
<i>Aphelopus atratus</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Aphelopus melaleucus</i>	0	0	0	1/0	3/0	1/2	0/0	1	1	0	0
<i>Aphelopus serratus</i>	0	0	0	0/0	1/0	0/1	0/0	0	0	0	0
<u>Encyrtidae</u>											
<i>Bothriothorax spec.</i>	0	0	0	0/0	1/0	0/0	1/3	0	0	0	0
Encyrtidae spec.	0	0	0	0/1	1/1	2/2	0/13	0	0	0	2
<u>Eucoilidae</u>											
<i>Glauraspida microptera</i>	0	0	0	0/0	1/0	7/0	1/0	0	0	0	0
<i>Kleidotoma spec.</i>	0	0	0	0/0	1/0	0/0	0/0	0	0	0	1

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main Tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management Type	Unmanaged	Even-Aged	Even-Aged	Unmanaged	Uneven-Aged	Even-Aged	Even-Aged	Unmanaged	Even-Aged	Even-Aged	Even-Aged
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Kleidotoma tomentosa</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Mirandicola sericea</i>	0	0	0	0/0	1/0	2/0	0/0	0	0	0	0
<i>Trybliographa spec.</i>	0	0	0	0/0	1/0	0/0	0/0	0	0	0	0
<u>Eulophidae</u>											
<i>Cirrospilus spec.</i>	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Derostenus gemmeus/punctiscuta</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	0
<i>Entedoninae spec.</i>	0	0	0	0/1	1/0	1/0	0/0	0	0	0	0
<i>Eulophidae spec.</i>	0	0	0	3/1	2/0	2/1	0/0	1	1	6	1
<i>Tetrastichinae spec.</i>	0	0	0	0/3	0/0	0/2	0/0	0	0	0	0
<i>Tetrastichus spec.</i>	0	0	0	0/7	0/0	0/1	0/0	0	0	0	0
<u>Eupelmidae</u>											
<i>Eupelmidae spec.</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	3	0
<u>Eurytomidae</u>											
<i>Eurytoma (Ipideurytoma) spessivtsevi</i>	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Eurytoma spec.</i>	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<u>Evaniidae</u>											
<i>Brachygaster minuta</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<u>Figitidae</u>											
<i>Figites anthomyiarum</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	0
<i>Melanips opacus</i>	0	1	0	0/0	0/0	0/0	1/0	0	0	1	1
<u>Halictidae</u>											
<i>Lasioglossum calceatum</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Lasioglossum puncticolle</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Lasioglossum spec.</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<u>Ichneumonidae</u>											
<i>Ichneumonidae spec.</i>	0	12	34	24/18	16/14	44/14	92/14	52	52	76	23
<i>Zatypoda albicoxa</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<u>Megaspilidae</u>											
<i>Conostigmus cursitans</i>	0	0	0	0/0	0/0	2/0	0/0	0	0	0	0
<i>Conostigmus dimidiatus</i>	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Conostigmus fasciatipennis</i>	0	0	0	0/0	1/0	0/1	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main Tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management Type	Unmanaged	Even-Aged	Even-Aged	Unmanaged	Uneven-Aged	Even-Aged	Even-Aged	Unmanaged	Even-Aged	Even-Aged	Even-Aged
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Conostigmus levifrons</i>	0	0	0	0/0	0/0	2/0	0/0	0	0	0	0
<i>Conostigmus</i> spec.	0	1	0	0/1	1/3	6/2	1/3	3	3	0	2
<i>Dendrocerus aphidum</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Dendrocerus carpenteri</i>	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Dendrocerus flavipes</i>	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Dendrocerus laevis</i>	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Dendrocerus ramicornis</i>	0	0	0	0/0	1/0	0/0	1/0	0	0	0	0
<i>Dendrocerus remaudierei</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	0
<i>Dendrocerus</i> spec.	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Lagynodes acuticornis</i>	0	0	0	0/0	0/0	1/0	0/0	0	0	0	1
<i>Lagynodes pallidus</i>	0	6	4	2/1	13/6	8/10	1/3	1	1	1	5
<u>Mymaridae</u>											
<i>Alaptus</i> spec.	0	1	0	0/1	0/0	0/7	0/7	0	0	0	0
<i>Anaphes</i> spec.	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Camptoptera</i> spec.	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
Mymaridae spec.	0	2	1	0/14	3/7	5/26	2/6	3	3	2	5
<u>Mymarommatidae</u>											
<i>Palaeomymar anomalum</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<u>Perilampidae</u>											
<i>Perilampus</i> spec.	0	0	0	0/0	0/0	0/0	0/0	0	0	3	0
<u>Platygastridae</u>											
<i>Amblyaspis nodicornis</i>	0	0	0	0/2	0/3	0/3	0/0	0	0	0	0
<i>Amblyaspis roboris</i>	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Amblyaspis</i> spec.	0	2	0	5/0	10/1	12/0	1/2	5	5	3	14
<i>Amblyaspis tritici</i>	0	0	0	0/0	0/1	0/6	0/0	0	0	0	0
<i>Fidiobia</i> cf. <i>polita</i>	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Fidiobia</i> spec.	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Inostemma boscii</i>	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<i>Inostemma menippus</i>	0	0	0	0/1	0/0	0/0	0/0	0	0	0	0
<i>Inostemma</i> spec.	2	3	0	0/0	0/0	1/1	0/0	0	0	3	1
<i>Iphitrachelus</i> lar	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main Tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management Type	Unmanaged	Even-Aged	Even-Aged	Unmanaged	Uneven-Aged	Even-Aged	Even-Aged	Unmanaged	Even-Aged	Even-Aged	Even-Aged
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Isostasius punctiger</i>	0	0	1	1/0	0/0	0/0	0/0	0	0	0	0
<i>Leptacis lignicola</i>	0	0	0	0/3	0/3	0/0	0/0	0	0	0	0
<i>Leptacis spec.</i>	1	0	3	3/9	10/2	21/26	6/3	3	3	12	5
<i>Leptacis tipulae</i>	0	2	0	0/0	0/11	0/4	0/5	0	0	0	0
<i>Metaclisis areolatus</i>	0	0	0	0/1	0/0	2/0	0/1	0	0	0	1
<i>Piestopleura catilla</i>	0	0	0	0/1	0/0	0/0	0/0	0	0	0	0
<i>Piestopleura spec.</i>	0	0	0	0/0	0/0	1/1	0/1	0	0	0	0
<i>Platygaster spec.</i>	2	5	4	5/7	10/10	18/5	4/17	29	29	4	19
<i>Platygaster/Prosactogaster spec.</i>	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Platygasteridae spec.</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Platystasius transversus</i>	0	1	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Prosactogaster spec.</i>	0	0	0	1/19	1/4	0/5	1/0	0	0	0	0
<i>Prosactogaster/Platygaster spec.</i>	0	0	0	0/3	0/0	0/0	0/0	0	0	0	0
<i>Synopeas craterus</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	1
<i>Synopeas spec.</i>	0	0	0	13/2	3/0	10/0	2/1	13	13	235	17
<i>Trichacis spec.</i>	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<u>Pompilidae</u>											
<i>Dipogon subintermedius</i>	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Priocnemis fennica</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	1	0
<i>Priocnemis gracilis</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	2	0
<i>Priocnemis pertubator</i>	0	0	0	0/0	0/0	2/0	0/0	3	3	0	3
<i>Priocnemis spec.</i>	0	0	0	0/0	0/0	0/1	0/0	0	0	0	0
<u>Proctotrupidae</u>											
<i>Brachyserphus parvulus</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	0
<i>Cryptoserphus flavipes</i>	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Cryptoserphus aculeator</i>	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Disogmus areolator</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	0	0
<i>Exallonyx confusus</i>	0	0	0	0/1	2/1	1/1	0/0	0	0	0	0
<i>Exallonyx pallidistigma</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Exallonyx quadriceps</i>	0	0	0	1/1	0/0	0/0	0/0	0	0	0	0
<i>Phaenoserphus viator</i>	0	0	0	0/0	0/0	0/0	0/0	1	1	1	1

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main Tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management Type	Unmanaged	Even-Aged	Even-Aged	Unmanaged	Uneven-Aged	Even-Aged	Even-Aged	Unmanaged	Even-Aged	Even-Aged	Even-Aged
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Phaneroserphus calcar</i>	0	0	0	0/0	0/0	1/0	0/0	1	1	0	0
<u>Pteromalidae</u>											
<i>Atrichomalus triannellatus</i>	0	0	0	0/0	0/0	0/0	0/0	0	0	2	0
<i>Callitula</i> spec.	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Erdoesia tessellata</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Gastrancistrus</i> spec.	0	0	0	0/25	0/3	0/1	0/0	0	0	0	0
<i>Holcaeus</i> spec.	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Homoporus</i> spec.	0	0	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Macroglenes</i> spec.	0	0	0	1/0	0/0	1/0	0/0	0	0	0	0
<i>Pachyneuron</i> spec.	0	0	0	0/0	0/0	1/1	0/0	0	0	0	0
<i>Perniphora robusta</i>	2	8	0	17/52	7/15	16/17	1/9	1	1	1	1
<i>Sphegigaster pallicornis</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Termolampa pinicola</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	1
<i>Trichomalus</i> spec.	0	0	0	0/0	1/2	9/9	1/1	1	1	3	1
<u>Scelionidae</u>											
<i>Amitus longicornis</i>	0	0	0	0/0	0/0	0/2	0/0	0	0	0	0
<i>Baeus seminulum</i>	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Idris flavicornis</i>	0	1	0	0/0	0/0	1/1	0/0	0	0	0	0
<i>Scelio fulvipes</i>	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Telenomus angustatus</i>	0	0	0	0/0	0/0	0/0	0/1	0	0	0	1
<i>Telenomus cf. laricis</i>	1	0	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Telenomus dalmanni</i>	0	0	0	0/0	0/0	0/1	0/1	0	0	0	0
<i>Telenomus laricis</i>	0	0	0	0/0	0/1	0/0	0/1	0	0	0	0
<i>Telenomus nitidulus</i>	0	0	0	1/0	0/0	0/0	0/0	0	0	0	0
<i>Telenomus othus</i>	0	0	0	0/0	0/0	1/0	0/0	0	0	0	0
<i>Telenomus punctatissimus</i>	0	1	0	0/0	0/0	0/0	0/0	0	0	0	0
<i>Telenomus</i> spec.	0	1	0	0/2	0/1	0/0	1/3	2	2	1	0
<i>Trimorus nigerrimus</i>	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Trimorus pedestris</i>	0	0	1	0/0	0/0	0/0	0/0	0	0	0	0
<i>Trimorus</i> spec.	0	0	3	1/0	0/0	0/0	0/1	2	2	1	1
<u>Torymidae</u>											

Region (Year)	Schwäbische-Alb (2010)			Hainich-Dün (2010/2011)				Schorfheide-Chorin (2010)			
Main Tree	Beech	Beech	Spruce	Beech	Beech	Beech	Spruce	Beech	Beech	Oak	Pine
Management Type	Unmanaged	Even-Aged	Even-Aged	Unmanaged	Uneven-Aged	Even-Aged	Even-Aged	Unmanaged	Even-Aged	Even-Aged	Even-Aged
N	5	32	12	13/6	13/9	20/15	4/4	6	15	7	22
<i>Megastigmus</i> spec.	0	0	0	0/0	0/0	0/0	0/1	0	0	0	0
<i>Torymus</i> spec.	0	0	0	0/0	0/0	0/0	0/0	0	0	0	1
<u>Trichogrammatidae</u>											
<i>Trichogramma</i> spec.	0	0	0	0/2	0/2	1/3	0/0	0	0	0	0
Trichogrammatidae spec.	0	0	0	0/0	0/0	0/1	0/0	0	0	0	1
<u>Vespidae</u>											
<i>Dolichovespula media</i>	0	0	0	0/0	0/0	0/0	1/0	0	0	0	0
<i>Dolichovespula saxonica</i>	0	0	0	0/1	0/0	0/0	0/0	0	0	0	0
<i>Symmorphus gracilis</i>	0	0	0	0/0	0/1	0/0	0/0	0	0	0	0
<i>Vespula vulgaris</i>	0	0	0	0/1	0/0	0/1	0/0	0	0	0	0

254 **Supplement S6: Temporal variability of abundance patterns**

255 To test for annual variation in forest management effects, we sampled a subset of 35 plots in the Hainich-Dün region with pheromone traps in 2011.

256 We found no interaction effect between year and management intensity (Table S6-1), which suggests that observed effects are independent from

257 sampling year.

258 **Table S6-1:** Effects of year and its interaction with forest management intensity (ForMI) and other covariates assessed at different spatial scales on the

259 abundance of ambrosia beetles. Negative binomial GLMMs were performed; minimal models and the terms dropped during the optimisation test by

260 backward selection on the negative binomial GLMM, based on the p-value of a likelihood-ratio test, are shown. Df = degrees of freedom; L = statistic

261 value; p = significance level; ED = effect direction for continuous terms: ↑/↓ = positive/negative correlation with abundance and results of Tukey

262 contrasts (function glht) for factors; DO = order in which the terms were dropped from the model.

Species Abundance	<i>Trypodendron domesticum</i>					<i>Xylosandrus germanus</i>					<i>Anisandrus dispar</i>				
	Df	L	p	ED	DO	Df	L	p	ED	DO	Df	L	p	ED	DO
ForMI	1	22.336	<0.001	↓		1	3.228	0.072	↓		1	1.666	0.197		(6)
Year		30.082	<0.001	2011>2010		1	11.592	<0,001	2011>2010		1	16.400	<0.001	2011>2010	
ForMI * Year	1	0.040	0.841		(1)	1	0.358	0.550		(1)	1	0.780	0.377		(1)
Dead wood	4	4.582	0.333		(2)	4	11.634	0.020	5<3		4	1.578	0.813		(2)
Canopy closure	1	0.304	0.581		(5)	1	0.586	0.444		(5)	1	6.136	0.013	↓	
Forest structure	2	0.890	0.641		(4)	2	1.062	0.588		(3)	2	3.798	0.150		(5)
Density of regeneration	2	9.338	0.009	open>medium, dense		2	0.282	0.868		(2)	2	0.380	0.826		(3)
Tree diversity	1	0.586	0.443		(6)	1	0.390	0.532		(4)	1	0.012	0.912		(4)
Main tree type	1	5.072	0.024	spruce>beech		1	5.318	0.021	spruce<beech			9.294	0.002	spruce<beech	
Latitude	1	0.070	0.791		(3)	1	8.822	0.003	↓			8.662	0.003	↑	
Abundance antagonists	1	2.308	0.129			1	1.084	0.298		(6)		32.810	<0.001	↓	
Random factor	Plot					Plot					Plot				

263

Supplement 7: Phenology of *Trypodendron domesticum* and studied Xyleborini

Figure S7-1: Mean abundance of *Xylosandrus germanus* and *Anisandrus dispar* sampled by pheromone traps (N=50) and attack density (per m²) of AmbroBEx-logs (N=50) by Xyleborini in chronological sequence. The total numbers found in the Hainich-Dün region in 2010 are shown.

Figure S7-2: Mean abundance of *Trypodendron domesticum* sampled by pheromone traps (N=50), attack density (per m²) of AmbroBEx-logs (N=50) by *T. domesticum*, and emerged *T. domesticum* sampled by eclectors (number varies). The mean numbers found in the Hainich-Dün region in 2010 are shown.

Supplement S8: Results on attack density

For the AmbroBEx-logs, the attack density of *Trypodendron domesticum* was 54.0 ± 14.3 entrance holes per m^2 in the large logs (median: 1.4, range: 0–393.3) and 0.8 ± 0.3 entrance holes per m^2 in the small logs (median: 0, range 0–12). The attack density of large logs (small logs were excluded from further analysis) was not affected by management intensity. It was higher when the bark was structured to some degree and when there was a moderate level of dead wood in the surrounding area (hump-shaped relationship) (Table 3).

Distinguishing between entrance holes from *Xylosandrus germanus* and *Anisandrus dispar* turned out to be difficult in the field, but a comparison of flight phenology of the species with the occurrence of attacks on AmbroBEx-logs revealed congruence between the number of *Xyleborus* attacks and *Xyleborus germanus* abundance; we thus assumed that all attacks were carried out by this species (Fig. S7-1 in Supplement 7). Attack densities on the large AmbroBEx-logs ranged from 0 to 759.2 entrance holes per m^2 (mean $\pm$ SE: 144.8 ± 29.3 , median: 41.1), with no attacks observed on 8 logs (16%). For the small AmbroBEx-logs, attack densities ranged from 0 to 713.6 entrance holes per m^2 (mean $\pm$ SE: 92.5 ± 23.5 , median: 23.2), with no attacks observed on 12 logs (24%).

For the BELongDead-logs, attack density was 40.8 ± 5.5 entrance holes per m^2 (median: 17.5, range 0–240). Attack density was only affected by region, with lower hole densities found in the Schorfheide-Chorin region than in the other two regions.

Because BELongDead-logs were checked only twice, a comparison with flight phenology was not possible. Therefore, we defined one model to predict Xyleborini attacks and used the abundance of both *Xylosandrus germanus* and *Anisandrus dispar* as predictors. The Xyleborini attack densities in 2010 ranged from 0 to 940.5 entrance holes per m^2 (mean $\pm$ SE: 108.2 ± 17.7 , median: 51.4), and 7 of the 89 logs (8%) did not have entrance holes. Forest management intensity (ForMI) did not have a significant effect on attack density (Table S8). Region influenced attack density, with the highest densities occurring in Schorfheide-Chorin.

303 In Hainich-Dün and Schorfheide-Chorin, attack densities increased with increasing abundance
304 of *Xylosandrus germanus*, whereas in Schwäbische Alb this relationship was strongly
305 negative. The abundance of *Anisandrus dispar* did not influence attack density. Logs in
306 broad-leaved forests were attacked more frequently than those in coniferous forests, and the
307 presence of a closed canopy reduced attack density. Other covariates did not have a
308 significant effect on attack density.
309

310 **Table S8:** Effects of forest management intensity (ForMI), its interaction with region, and covariates assessed at different spatial scales on the
 311 attack density of ambrosia beetles on experimentally exposed logs. We used a negative-binomial GLM for abundance model 5 and a negative-
 312 binomial GLMM for abundance models 7–9. Minimal models and the terms dropped during the optimisation test by backward selection (based on
 313 the p-value of a likelihood ratio test) are given. Df = degrees of freedom; L = statistic value; p = significance level; ED = effect direction (only given
 314 for continuous terms) where ↑/↓ = positive/negative correlation with attack density and ∩ = hump-shaped relationship; DO = order in which the
 315 terms were dropped from the model.

	AmbroBEx-logs										BELongDead-logs									
	Model 5					Model 7					Model 8					Model 9				
	<i>Trypodendron domesticum</i>					<i>Xylosandrus germanus</i>					<i>Trypodendron domesticum</i>					Xyleborini				
	Df	L	p	ED	DO	Df	L	p	ED	DO	Df	L	p	ED	DO	Df	L	p	ED	D O
Abundance in traps	1	1.666	0.20		(4)	1	23.554	<0.001	↑		1	1.888	0.17		(4)	†: 1	25.598	<0.001	↑	
ForMI	1	4.910	0.027	↓		1	8.508	0.004	↓				#			‡: 1	1.422	0.23		(2)
Region			NA*					NA*					#			1	1.972	0.16		(6)
ForMI x Region			NA*					NA*			2	11.530	0.003			2	5.308	0.07		(4)
Dead wood	4	19.700	<0.001	∩		4	2.848	0.58		(5)	4	13.624	0.008	∩		4	6.468	0.17		(5)
Canopy closure	1	0.040	0.84		(2)	1	0.028	0.87		(2)	1	1.894	0.17		(5)	1	4.788	0.03	↑	
Tree diversity			§					§			1	0.506	0.48		(1)	1	0.250	0.62		(1)
Density of regeneration	2	0.248	0.88		(1)	2	0.968	0.62		(4)			NA [£]					NA [£]		
Main tree type	1	1.180	0.28		(6)	1	1.868	0.17		(6)	1	0.366	0.55		(2)	1	16.444	<0.001		
Bark free area	1	0.562	0.45		(3)	1	0.114	0.74		(3)	1	1.256	0.26		(3)	1	1.586	0.21		(3)
Bark texture	3	10.252	0.016			3	5.850	0.12		(7)			NA [£]					NA [£]		
Beetle diversity	1	2.352	0.12		(5)	1	0.018	0.89		(1)			NA [£]					NA [£]		
Log class			NA [§]			1	16.024	<0.001					NA ⁺					NA ⁺		
Random factor			Plot					Plot					Region/Plot					Region/Plot		

†: *Xylosandrus germanus*
 ‡: *Anisandrus dispar*
 * AmbroBEx-logs were only exposed in the Hainich-Dün region, single level, or omitted based on expected relevancy
 § this factor showed the highest p-value in single linear models and was therefore excluded prior to analyses to avoid overfitting
 § only the 100 cm x 20 cm logs were included in this model
 # single factors were not tested because of a significant interaction
 £ this variable was not assessed in BELongDead
 + only one log class was studied in BELongDead

Supplement S9: Results of breeding success of *Trypodendron domesticum*

The 230 breeding systems of *T. domesticum* were sampled (on a total of 17 AmbroBEx-logs (small logs: 6; large logs: 11) on 17 plots (for 3D-models of galleries based on CT-scans, see Figs. S8-1 & S8-2). Two of the eclectors were damaged by raccoons and four breeding systems were connected to other galleries (see Fig. S8-2), these systems were excluded from the analyses, resulting in a total of 224 breeding systems (small logs: 14; large logs 210). The number of sampled breeding systems per log was 2.5 ± 0.7 (mean $\pm$ SE) and 19.5 ± 5.6 , respectively. The distribution of the 17 sampled logs was slightly shifted towards lower intensity plots, with a mean ($\pm$ SE) ForMI of 0.78 ± 0.14 (range 0–1.80), compared with the distribution of all 100 logs (mean $\pm$ SE: 0.96 ± 0.08 ; range 0–2.25). On the BELongDead-logs another 83 eclectors were installed and showed no damage.

The number of emerged *T. domesticum* and antagonists varied greatly among breeding systems, with many eclectors showing no or few catches and some eclectors showing many catches. From all emerged *T. domesticum* (mean $\pm$ SE: 3.39 ± 0.45 ; range: 0–35) we subtracted 156 individuals, two per gallery but no more than were present, that were considered to be parent beetles, leaving the presumed progeny. The number of *T. domesticum* progeny emerging per breeding system was affected neither by management intensity nor by canopy cover and did not differ between the two time periods after attack discovery when the eclectors were installed (all variables were dropped during backward selection). Of the tested covariates, only the date when the gallery was first discovered, i.e. time of infestation, affected the number of *T. domesticum* progeny, with more progeny occurring in galleries that were established earlier (Df=1,221; L=16.290; $p<0.001$).

The parasitoid *Perniphora robusta* is more strongly specialised on *Trypodendron* species than the predators caught by pheromone traps (Wegensteiner, Wermelinger & Herrmann 2015). This suggests that, at the breeding system scale, the control of *T. domesticum* by antagonists decreases with increasing management intensity, with its most

important antagonist showing overall low densities in managed forests (Table S6-2; no individual emerged from breeding systems in managed forests). In general, parasitoids need to feed on nectar and pollen in order to reconstitute their egg load (Raffa, Grégoire & Staffan Lindgren 2015). However, Führer (1975) suggested that female imagines of *P. robusta* can survive in managed forests without food sources, owing to a potential independence of imaginal nutrient uptake. In any case, our results indicate that potential food resources (e.g. honeydew of the common aphid *Phyllaphis fagi*) are sufficiently available in the studied managed beech forest (Gossner *et al.* 2014) and that other unknown factors, e.g. related to differences in stand structure and limited connectivity among forest patches (Raffa, Grégoire & Staffan Lindgren 2015), restrict the occurrence of *P. robusta* almost entirely to unmanaged forests.

359 **Supplement S10: Examples of *Trypodendron domesticum* galleries based on Computer**
360 **Tomography**

361
362 **Figure S10-1:** 3D-model of a 100 cm x 20 cm log from the Hainich region; A–C show
363 transparent bark and galleries of *T. domesticum* and others; A) sampled galleries (the red
364 bulky part at the surface shows the hole remaining after the metal tube was removed), B)
365 galleries with larval chambers (excluding sampled galleries), C) incomplete galleries and
366 galleries of other species, D) outer appearance of log.
367

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370 **Figure S10-2:** Characteristic shapes of galleries with one (A), two (B), and three (C) adult
371 galleries, all with larval chambers; galleries in red were sampled with eclectors and galleries
372 in green were not sampled. The red bulky part at the surface shows the hole remaining after
373 the metal tube was removed. (D) The 3D reconstruction of the galleries reveals connections
374 between the galleries, with possible exchange of insects. No individuals were sampled from
375 the eclector attached to the red gallery on the right side; the individuals probably escaped
376 through the green gallery.

377

378

Supplement S11: Relationship between management intensity and dead wood

The availability of fresh dead wood suitable for ambrosia beetles decreased with management intensity (Fig. S11-1).

Figure S11-1: Amount of dead wood as a function of management intensity. The amount of dead wood in a suitable stage for ambrosia beetles was measured in five categories: 1= no dead wood, 2 = $\leq 3 \text{ m}^3 \text{ ha}^{-1}$, 3 = $3 < x \leq 6 \text{ m}^3 \text{ ha}^{-1}$, 4 = $6 < x \leq 10 \text{ m}^3 \text{ ha}^{-1}$, and 5 = $> 10 \text{ m}^3 \text{ ha}^{-1}$.

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