

## Supplementary Material

### Appendix 1 - An example of a survey released to the respondents.

#### 1 *Definitions of key forestry terms:*

- clearcutting
- standard (retained tree)
- coppice
- coppice-with-standards
- forest of seed origin
- rotation
- shelterwood system
- age class

#### 2 *Questions:*

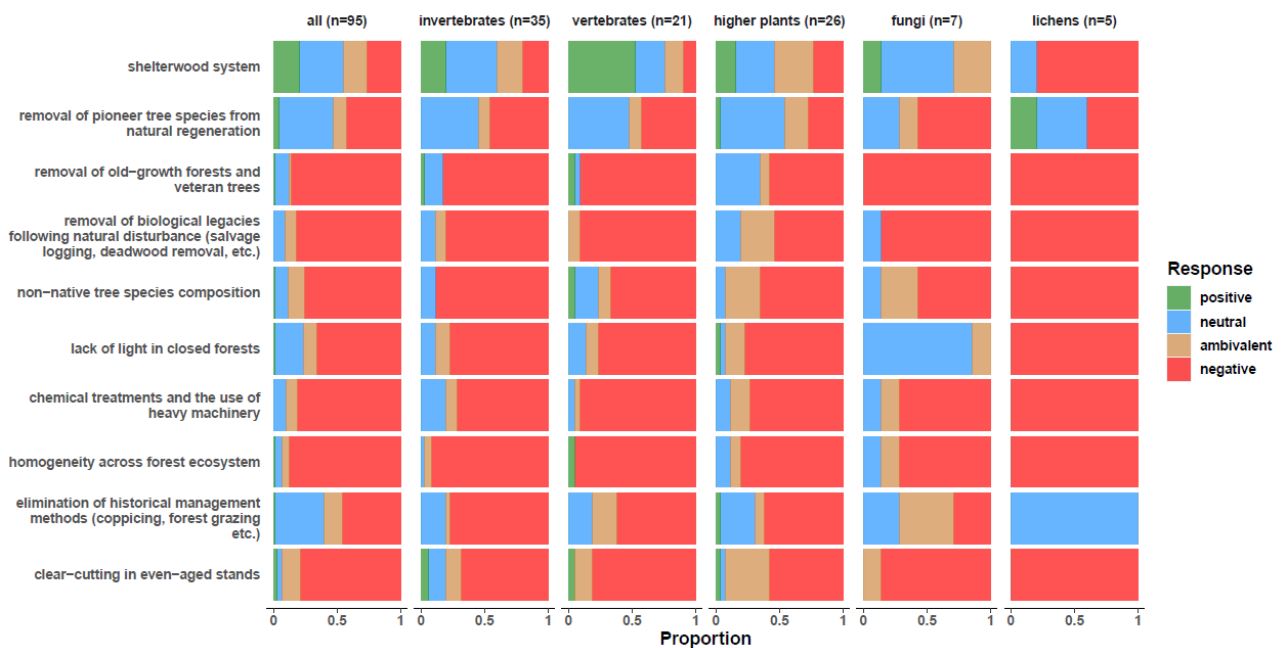
- 2.1 Please state your name and specialisation.
- 2.2 Please state the forest functional group/taxonomical group/taxa which you consider as the survey subject. If you specialise in more groups or species, choose the most endangered species or complete the survey individually for each species.
- 2.3 Please state whether (in general) forest management in the Czech Republic threatens, supports or remains neutral towards the group/taxa of your choice (choose one).
- 2.4 Please specify whether the following forest management aspects have a positive, neutral, ambivalent or negative effect on group/taxa of your choice:
  - 1.a non-native tree species composition
  - 1.b clear-cutting in even-aged stands
  - 1.c shelterwood system
  - 1.d the removal of biological legacies following natural disturbance (salvage logging, deadwood removal, etc.)
  - 1.e the removal of old-growth forests and veteran trees
  - 1.f chemical treatments and the use of heavy machinery
  - 1.g the lack of light in closed forests
  - 1.h the removal of naturally regenerated pioneer tree species
  - 1.i homogeneity across forest ecosystem
  - 1.j the elimination of historical management methods (coppicing, forest grazing etc.)
- 2.5 Please assess whether the following habitats are key, usable, unusable or unexplored in relation to the group/taxa of your choice:
  - a.a mature stands
  - a.b young stands
  - a.c open forest
  - a.d closed-canopy forest
  - a.e unstocked area in a forest
  - a.f water-logged areas
  - a.g sun-exposed old trees
  - a.h shaded old trees
  - a.i large deadwood
  - a.j thin deadwood
  - a.k sun-exposed deadwood
  - a.l shaded deadwood
  - a.m standing deadwood
  - a.n lying deadwood
  - a.o mixed species stand
  - a.p monoculture
  - a.q primary or unmanaged forests
  - a.r clear-cut area or gap
  - a.s forest edge
  - a.t coppice

- a.u coppice-with-standards
  - a.v forest of seed origin
  - a.w forest of complex structure
  - a.x forest of simple structure
- 2.6 Please assess whether the following forest management tools are key, suitable, unsuitable, harmful, ambivalent, unexplored in relation to biodiversity protection; i.e. the creation and conservation of habitat suitable for the group/taxa of your choice:
- 1.a current tree species composition preservation
  - 1.b near to natural tree species composition
  - 1.c introduced tree species exclusion
  - 1.d clear-cutting system
  - 1.e selection system
  - 1.f extended rotation length
  - 1.g coppicing
  - 1.h forest grazing
  - 1.i large unmanaged reserve
  - 1.j small unmanaged reserve
  - 1.k large managed reserve
  - 1.l small managed reserve
  - 1.m microreserves and stepping stones (e.g. single veteran trees)
  - 1.n retention of small-scale natural disturbances
  - 1.o retention of large-scale natural disturbances
  - 1.p natural disturbance emulation
  - 1.q long-term retention of individual microhabitat trees
  - 1.r long-term retention of microhabitat tree groups
  - 1.s long-term retention of entire forest stands
  - 1.t mosaic and diversity
  - 1.u habitat connectivity
  - 1.v stocking reduction
  - 1.w high stumps retention
- 2.7 Please select the most suitable conception for the group/taxa of your choice:
- 1.a segregation
  - 1.b integration
  - 1.c combination of both
- 2.8 What protection concept is more suitable for the group/taxa of your choice:
- 1.a active management
  - 1.b minimal intervention
- 2.9 Can the group/taxa of your choice be considered as an umbrella species for another biota? If yes, please specify.
- 2.10 Please specify if you have any feedback or comments.

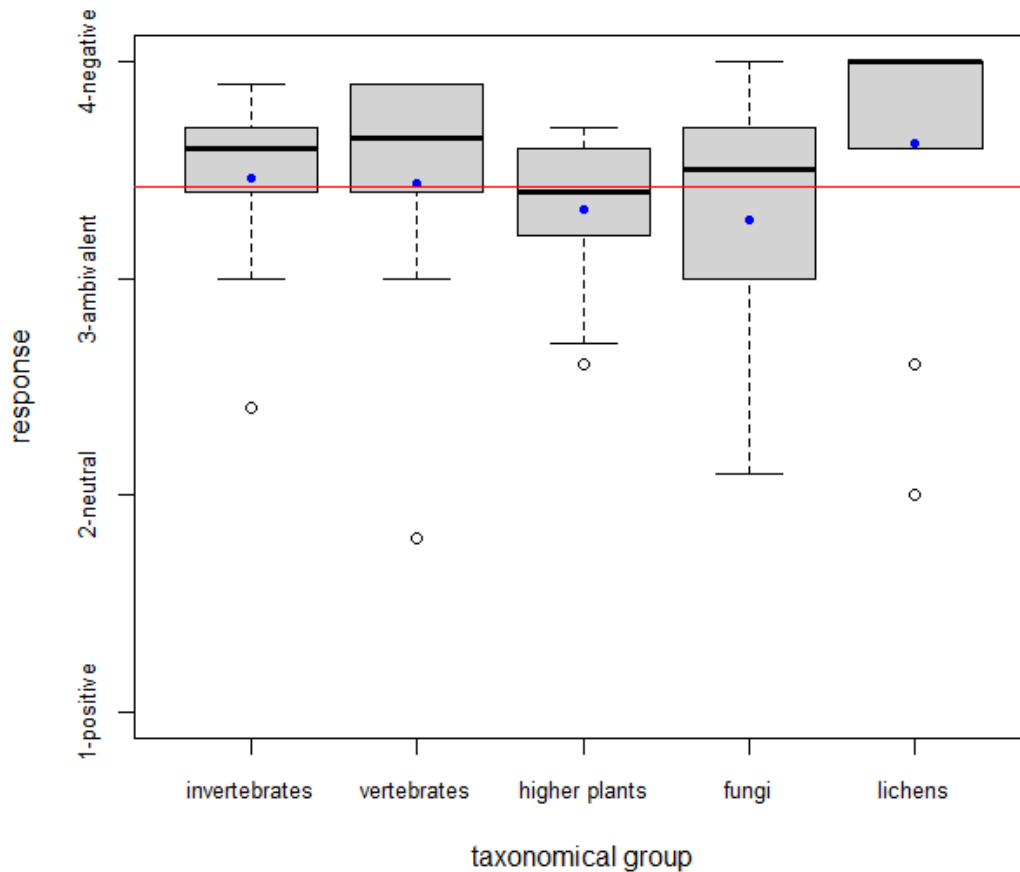
## Appendix 2 - A short description of the management tools.

- a **current tree species composition preservation** – *the preservation of current tree species composition, which has been substantially changed compared to the natural tree species composition in the Czech Republic (thanks to the long-term grant support and commercial species planting; especially Norway spruce and Scots pine)*
- b **near to natural tree species composition** – *targeted conversion to (potential) natural tree composition using a wide range of native tree species*
- c **introduced tree species exclusion** – *elimination of natural regeneration of non-native introduced tree species; in the Czech Republic especially *Pseudotsuga menziesii*, *Quercus rubra* and *Abies grandis**
- d **clear-cutting system** – *clearcutting and biomass removal followed by artificial regeneration*
- e **selection system** – *single tree or group tree selection with the use of natural regeneration with the absence of clear-cutting*
- f **extended rotation length** – *prolongation of the interval between final harvestings in a given stand primarily to enable the development of old-growth forest characteristics*
- g **coppicing** – *vegetative regeneration of trees with a good stump sprouting potential on a short rotation; historically a very widespread type of forest management, which has been almost abandoned with the practice of modern forestry*
- h **forest grazing** – *grazing of farm animals leading to an open sparse grazing forest of low stocking; historically a very widespread type of forest management, which has been almost abandoned with the practice of modern forestry; it is currently prohibited in the Czech commercial forests*
- i **large unmanaged reserve** – *an area of at least hundreds of hectares with a minimal human intervention (typically in the National Parks)*
- j **small unmanaged reserve** – *an area of several up to tens of hectares with a minimal human intervention*
- k **large managed reserve** – *an area of at least hundreds of hectares with an active conservation management*
- l **small managed reserve** – *an area of several up to tens of hectares with an active conservation management*
- m **microreserves and stepping stones** – *local structural elements and individual forest stands intentionally protected within commercial forests (typically habitat trees, stands with high biodiversity or coarse woody debris)*
- n **retention of small-scale natural disturbances** – *a small-scale retention of biological legacies created by natural disturbances without the application of salvage logging (i.e. groups of dead or uprooted trees)*
- o **retention of large-scale natural disturbances** – *a large-scale preservation of biological legacies created by natural disturbances without the application of salvage logging; for instance, as a part of non-intervention areas in National Parks*
- p **natural disturbance emulation** – *forest management mimicking an appropriate regime and effects of natural disturbances in the given environment by means of specialised type and interval of harvesting and retention of specific structural elements used to enhance vertical and horizontal variability of the forest stand structure*
- q **long-term retention of individual microhabitat trees** – *retention of individual trees with microhabitats (for example with cavities) to subsequently decay and form deadwood*
- r **long-term retention of microhabitat tree groups** – *retention of tree groups containing microhabitats (for example with cavities) to decay and subsequently form deadwood*
- s **long-term retention of entire forest stands** – *retention of entire forest stands containing microhabitats to survive, decay and regenerate*
- t **mosaic and diversity** – *efforts to create diversity of the environment and structural complexity of the forest*
- u **habitat connectivity** – *efforts to reduce habitat isolation within the landscape*
- v **stocking reduction** – *establishing an open forest with reduced stocking*
- w **high stumps retention** – *deliberate retention of high stumps in order to support deadwood creation*

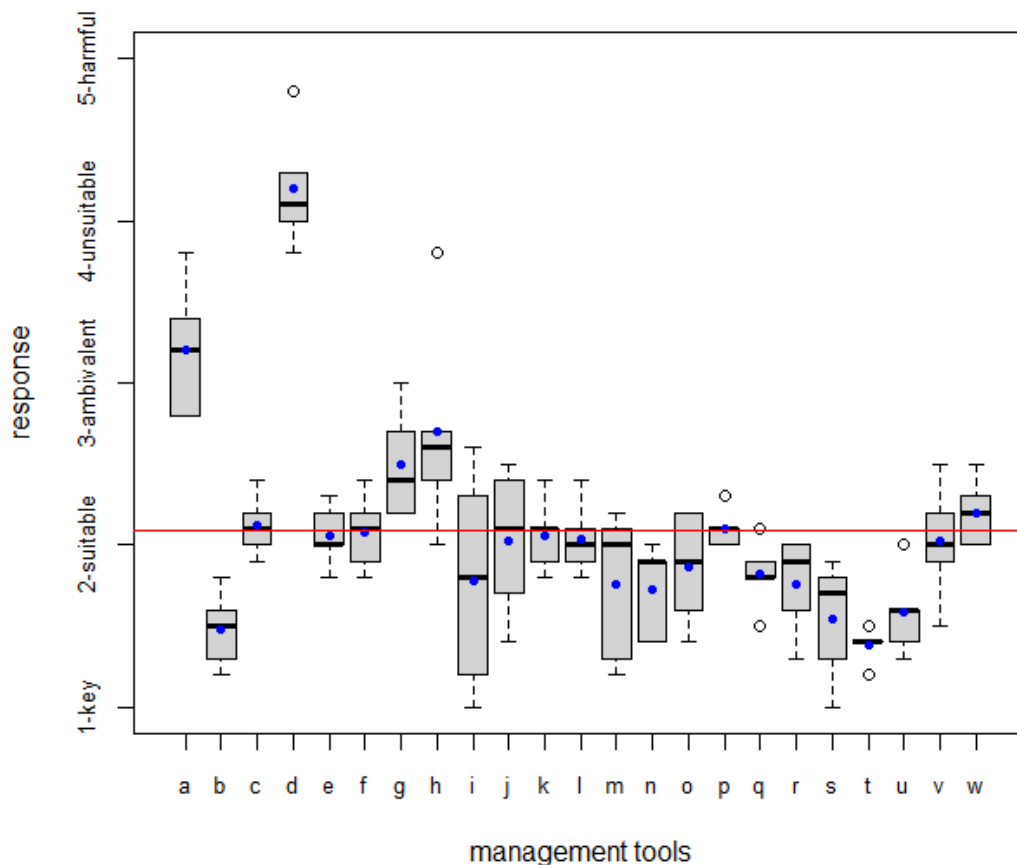
**Fig. S1** - Frequency of responses evaluating particular factors of forest management in terms of their influence on species (scale: positive, neutral, ambivalent, negative). The complete set of all responses as well as the responses for individual taxonomic groups are presented. The total numbers of responses vary amongst taxonomic groups. The group “all” shows the mean values of the proportions for the answers obtained within individual taxonomic groups.



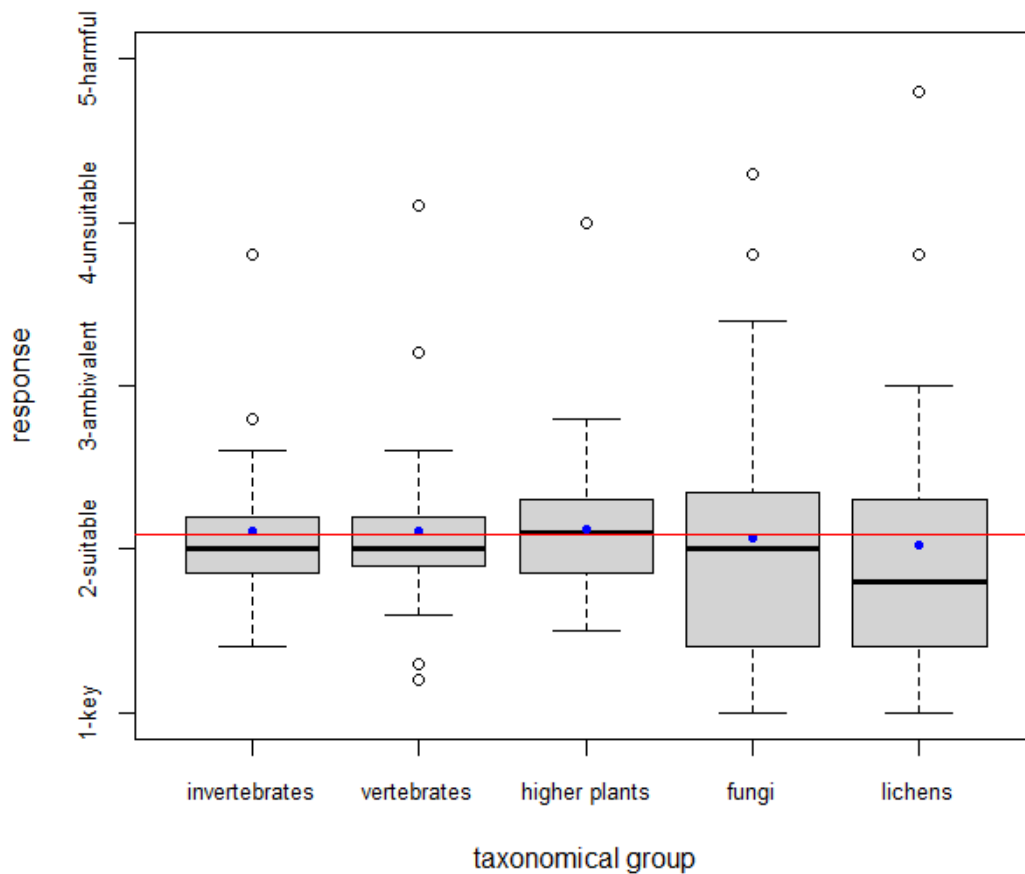
**Fig. S2** - Boxplots showing the markings of forest management factors by the survey respondents according to individual taxonomic groups. The marks (y-axis) are based on the following scale: 1 - positive, 2 - neutral, 3 - ambivalent and 4 - negative. The boxplots were created from the weighted averages of marks assigned to individual factors divided according to taxonomic groups (x-axis). The blue points represent the mean values and the red line shows the overall mean mark.



**Fig. S3** - Boxplots showing the markings of forest management factors by the survey respondents. The marks (y-axis) are based on the following scale: 1 – key, 2 – suitable, 3 – ambivalent, 4 – unsuitable and 5 - harmful. The boxplots were created from the weighted averages of marks assigned to taxonomic groups and grouped according to their affiliation to individual factors. Factors (x-axis) are coded as follows: a) current tree species composition preservation, b) near to natural tree species composition, c) introduced tree species exclusion, d) clear-cutting system, e) selection system, f) extended rotation length, g) coppicing, h) forest grazing, i) large unmanaged reserve, j) small unmanaged reserve, k) large managed reserve, l) small managed reserve, m) micro-reserves and stepping stones (e.g. single veteran trees), n) retention of small-scale natural disturbances, o) retention of large-scale natural disturbances, p) natural disturbance emulation, q) long-term retention of individual microhabitat trees, r) long-term retention of microhabitat tree groups, s) long-term retention of entire forest stands, t) mosaic and diversity, u) habitat connectivity, v) stocking reduction, w) high stumps retention. The blue points represent the mean values and the red line shows the overall mean mark.



**Fig. S4** - Boxplots showing the markings of forest management factors by the survey respondents according to individual taxonomic groups. The marks (y-axis) are based on the following scale: 1 – key, 2 – suitable, 3 – ambivalent, 4 – unsuitable and 5 - harmful. The boxplots are created from the weighted averages of marks assigned to individual factors divided according to taxonomic groups (x-axis). The blue points represent the mean values and the red line shows the overall mean mark.



**Tab. S1** - The list of contacted institutions where the survey was distributed.

|    |  |   |
|----|--|---|
| 1  |  | Charles University, Faculty of Science  |
| 2  |  | Masaryk University, Faculty of Science  |
| 3  | University departments   | University of South Bohemia in České Budějovice, Faculty of Science   |
| 4  |  | Palacký University Olomouc, Faculty of Science  |
| 5  |  | University of Ostrava, Faculty of Science   |
| 6  |  | Czech University of Life Sciences Prague, Faculty of environmental Sciences                                       |
| 7  |  | Czech University of Life Sciences Prague, Faculty of Forestry and Wood Sciences                                   |
| 8  |  | Mendel University in Brno, Faculty of Forestry and Wood Technology  |
| 9  |  | Department of Zoology, Fisheries, Hydrobiology and Apiculture, Faculty of AgriSciences, Mendel University in Brno |
| 10 |  | Czech Academy of Sciences   |
| 11 | Institute of Botany of the Czech Academy of Sciences             |   |
| 12 | Institute of Vertebrate Biology of the Czech Academy of Sciences |   |
| 13 |  | Biology Centre of the Czech Academy of Sciences   |
| 14 | Research institutes  | Forestry and Game Management Research Institute   |
| 15 |  | Plant Diversity Analysis and Synthesis Centre   |
| 16 |  | Forest Management Institute   |
| 17 |  | The Silva Tarouca Research Institute for Landscape and Ornamental Gardening (RILOG)                               |
| 18 | Professional and scientific societies                            | The Czech Society for Ecology   |
| 19 |  | Czech Society for Ornithology   |
| 20 |  | Czech Society for Mycology  |
| 21 |  | Czech Scientific Society for Mycology   |
| 22 |  | Czech Bat Conservation Society  |
| 23 |  | Czech Herpetological Society  |
| 24 |  | Czech Society for Botany  |
| 25 |  | Pro Silva Bohemica  |
| 26 |  | Czech Union for Nature Conservation   |
| 27 | Natural history museums  | National Museum   |
| 28 |  | Museum of South Bohemia in České Budějovice   |
| 29 |  | Museum of West Bohemia  |
| 30 |  | Museum of North Bohemia   |
| 31 |  | Museum of Vysočina in Jihlava   |
| 32 |  | Ostrava Museum  |
| 33 |  | Moravian Museum   |
| 34 |  | Museum of Eastern Bohemia in Hradec Králové   |
| 35 | Admin  | Nature Conservation Agency of the Czech Republic  |
| 36 |  | Šumava National Park and Protected Landscape Area (PLA) Administration  |



|    |   |
|----|---|
| 37 | The Giant Mountains National Park Administration        |
| 38 | The Bohemian Switzerland National Park Administration   |
| 39 | Podyjí National Park Administration                     |
| 40 | The Beskids Mountains PLA Administration                |
| 41 | The White Carpathians Mountains PLA Administration      |
| 42 | The Blaník Hill PLA Administration                      |
| 43 | The Blanský Forest Mountains PLA Administration         |
| 44 | The Brdy Highlands PLA Administration                   |
| 45 | The Broumov Region PLA Administration                   |
| 46 | The Bohemian Mittelgebirge Hills PLA Administration     |
| 47 | The Bohemian Karst PLA Administration                   |
| 48 | The Český les Mountains PLA Administration              |
| 49 | The Bohemian Paradise PLA Administration                |
| 50 | The Jeseníky Mountains PLA Administration               |
| 51 | The Jizera Mountains PLA Administration                 |
| 52 | The Kokoříň Region - Mácha's Country PLA Administration |
| 53 | The Křivoklát Region PLA Administration                 |
| 54 | The Elbe Sandstones PLA Administration                  |
| 55 | The Litovel Morava River Basin PLA Administration       |
| 56 | The Lužice Mountains PLA Administration                 |
| 57 | The Moravian Karst PLA Administration                   |
| 58 | The Eagle Mountains PLA Administration                  |
| 59 | The Pavlov Hills PLA Administration                     |
| 60 | The Odra River Basin PLA Administration                 |
| 61 | The Slavkov Forest Mountains PLA Administration         |
| 62 | The Třeboň Basin PLA Administration                     |
| 63 | The Žďárské vrchy Hills PLA Administration              |
| 64 | The Iron Mountains PLA Administration                   |

**Tab. S2** - The list of evaluated species and species groups.

| Basic taxonomical group           | Partial group  | Concrete response   |
|-----------------------------------|--|---|
| Higher plants                     | Vascular plants  | forest wetland vegetation, e.g. <i>Menyanthes trifoliata</i>        |
|                                   |  | sandwort vegetation of pine stands, <i>Minuartia Smejkalii</i>      |
|                                   |  | herb layer  |
|                                   |  | thermophilic vegetation of open forests                             |
|                                   |  | flora of Central Europe   |
|                                   |  | vascular plants   |
|                                   |  | vascular plants   |
|                                   |  | genus <i>Gnaphalium</i>   |
|                                   |  | thermophilic and heliophilous plant species of lowland open forests |
|                                   |  | <i>Adenophora liliipholia</i>                                       |
|                                   |  | plant species of lowland open forests                               |
|                                   |  | psammophytes  |
|                                   |  | plant species of peaty forests                                      |
|                                   | semi-thermophilic and thermophilic vascular plants                     |   |
|                                   | terrestrial orchids  |   |
| thermophilic forest plant species |  |   |
| higher plants in general          |  |   |
| Woody species                     | genus <i>Sorbus</i>  |   |
|                                   | genus <i>Sorbus</i> except <i>S. domestica</i> and <i>S. aucuparia</i> |   |
|                                   | <i>Pinus uncinata ssp. uliginosa</i>                                   |   |
|                                   | species of fossil pollen   |   |
|                                   | <i>Chimaphila umbellata</i>  |   |
| Mosses                            | epiphytic and epixylic mosses  |   |
|                                   | epixylic mosses  |   |
|                                   | <i>Dicranum viride</i>   |   |
| Fungi                             | mosses in general, especially the epiphytic and epixylic ones          |   |
|                                   | fungi  |   |
|                                   | wood inhabiting fungi  |   |
|                                   | macromycetes   |   |
|                                   | macromycetes   |   |
|                                   | lignicolous macromycetes   |   |
|                                   | ectomycorrhizal and lignicolous fungi                                  |   |
| ectomycorrhizal fungi             |  |   |
| Lichens                           | lichens  |   |
|                                   | lichens  |   |
|                                   | epiphytic lichens  |   |
|                                   | epiphytic lichens of vital trees and deadwood                          |   |
|                                   | primeval forest epiphytic lichens                                      |   |
| Invertebrates                     | Spiders  |   |
|                                   | Insects  |   |
|                                   |  | <i>Araneae</i>  |
|                                   |  | <i>Araneae</i> , in part  |
|                                   |  | insects of open forests   |
|                                   |  | saproxyllic insects   |
|                                   |  | saproxyllic insects societies and succession                        |
|                                   |  | <i>Hymenoptera</i> , <i>Symphyta</i>                                |
|                                   |  | tree inhabiting ants  |
|                                   |  | <i>Formicidae</i>   |
|                                   |  | <i>Formicidae</i>   |
|                                   |  | <i>Syrphidae</i>  |

| Basic taxonomical group | Partial group | Concrete response   |   |
|-------------------------|---------------|---|---|
|                         |               | <i>Heteroptera</i>  |   |
|                         |               | <i>Cicadidae</i>  |   |
|                         |               | <i>Odonata</i>  |   |
|                         |               | <i>Carabidae</i>  |   |
|                         |               | saproxylic beetles  |   |
|                         |               | saproxylic beetles  |   |
|                         |               | endangered saproxylic beetles   |   |
|                         |               | endangered saproxylic beetles of broadleaved forests                          |   |
|                         |               | saproxylic beetles of lower altitude  |   |
|                         |               | saproxylic beetles of higher altitude   |   |
|                         |               | <i>Buprestidae</i>  |   |
|                         |               | <i>Trogossitidae</i>  |   |
|                         |               | <i>Trogossitidae</i>  |   |
|                         |               | <i>Curculionoidea</i>   |   |
|                         |               | <i>Lepidoptera</i>  |   |
|                         |               | <i>Lepidoptera</i> in relation with forest disturbances                       |   |
|                         |               | <i>Scardia boletella</i>  |   |
|                         |               | <i>Gastropacha populifolia</i>  |   |
|                         |               | <i>Lopinga achine</i>   |   |
|                         |               | <i>Parnassius mnemosyne</i>   |   |
|                         |               | <i>Satyrium ilicis</i> , <i>Jodia croceago</i>                                |   |
|                         |               | <i>Boloria euphrosyne</i> , <i>Hamearis lucina</i> , <i>Limenitis camilla</i> |   |
|                         |               | <i>Hipparchia fagi</i>  |   |
|                         |               | <i>Venusia blomeri</i>  |   |
|                         | Molluscs      | terrestrial molluscs  |   |
| Vertebrates             | Mammals       | <i>Rodentia</i>   |   |
|                         |               | <i>Castor fiber</i>   |   |
|                         |               | <i>Chiroptera</i>   |   |
|                         |               |   | bats  |
|                         | Birds         |   | birds   |
|                         |               |   | birds   |
|                         |               |   | birds   |
|                         |               |   | forest birds and mammals                        |
|                         |               |   | forest birds, especially owls and songbirds     |
|                         |               |   | forest birds of the Beskids Mountains           |
|                         |               |   | <i>Tetrao urogallus</i>                         |
|                         |               |   | <i>Tetrao urogallus</i> , <i>Bonasa bonasia</i> |
|                         |               |   | <i>Haliaeetus albicilla</i>                     |
|                         |               |   | forest owls                                     |
|                         |               | forest gallinaceous   |   |
| Reptilian and Amphibian |               | amphibian   |   |
|                         |               | amphibian   |   |
|                         |               | reptilian and amphibian   |   |
|                         |               | <i>Salamandra salamandra</i>  |   |
|                         |               | reptilian   |   |
|                         |               | <i>Zamenis longissimus</i>  |   |
| Without specification   |               | nature in general   |   |