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Red list of vascular plants of the Lublin Region

SUMMARY

The aim of this study is to present the updated list of rare and threatened vascular plant species in the Lublin province. The threatened species categories are presented according to the IUCN criteria. The regional list contains 408 species (that makes up 25% of the Lublin Region flora); 56 of which are considered critically endangered, 81 represent endangered species, 51 belong to the category of vulnerable species, and 49 are near threatened species, respectively. The presence of 37 species has not been confirmed and therefore they are listed as regionally extinct (RE). Of the total number of species, 134 are rare, but because the data about those species is insufficient, they have been classified as DD category (data deficient). The species of the genera: *Alchemilla, Callitriche, Hieracium, Oenothera, Rosa, Rubus* and *Taraxacum* have not been evaluated (NE category). Other species – those whose occurrence is doubtful and all neophytes were defined as not applicable (NA). The endangered taxa occur mostly in dry grasslands, deciduous forests, wetlands, and calcareous weed communities of cereal crops.

Keywords: vascular plants, red list, Lublin province

STRESZCZENIE

Celem pracy jest przedstawienie aktualnej listy rzadkich i zagrożonych gatunków roślin naczyniowych na terenie województwa lubelskiego. Kategorie zagrożenia przypisywano zgodnie z kryteriami IUNC. Na regionalnej czerwonej liście zagrożonych roślin naczyniowych znalazło się 408 gatunków (co stanowi 25% flory Lubelszczyzny), w tym 56 uznano za krytycznie zagrożone, 81 za zagrożone, 51 za narażone, 49 za bliskie zagrożeniu. Nie potwierdzono występowania w regionie

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37 gatunków i przypisano im kategorię RE – regionalnie wymarłe. Natomiast 134 gatunków uznano za rzadkie, lecz brak jest wystarczających danych, by jednoznacznie przypisać im kategorię zagrożenia (DD). Ocenie nie poddano (kategoria NE) gatunków z rodzajów: *Alchemilla*, *Callitriche*, *Hieracium, Oenothera, Rosa, Rubus* i *Taraxacum*, natomiast gatunki, których występowanie w tym regionie jest wątpliwe oraz wszystkie kenofity, nie zostały zakwalifikowane do oceny (kategoria NA). Najbardziej zagrożone w regionie są gatunki związane z murawami kserotermicznymi, lasami liściastymi, torfowiskami oraz zbiorowiskami chwastów upraw zbożowych na podłożu wapiennym.

Słowa kluczowe: czerwona lista, rośliny naczyniowe, województwo lubelskie

INTRODUCTION

An increased rate of species extinction was observed in the second half of the 20th century (45). In order to spotlight this process, the first so-called "red lists" were prepared, which contained the record of endangered species. Between the 1970s and the 1980s, preliminary lists of endangered species were compiled in Poland (14) and in 1986 the first red list of endangered plants of Poland was published (48). One of the first red list of plants in certain regions located within the Lublin province (Lublin Upland, Western Volhynia, Roztocze, Western Polesie and the area of the former Chełm province) was prepared in the 1990s by Kucharczyk & Wójciak (26, 27). Other lists of rare species of the Western Polesie (25) and of the South Podlachian Lowland (9) have appeared later. Dynamics of the natural processes and an increasing scientific knowledge cause the red lists to be outdated in a short period of time and therefore new, updated lists need to be prepared periodically. This is why a new red list of plants of Poland (32) and a red list of plants of the Lublin province (23) were published subsequently. The aim of this study is to present an updated list of rare and threatened vascular plant species of the Lublin province.

MATERIALS AND METHODS

The list covered the area located within the borders of the administrative division of the Lublin province. This area is very diverse in respect of geological structure, geomorphological features, types of soil and in consequence of its flora and vegetation. It includes parts of three physico-geographical megaregions (19) and two (40) to three (28) geobotanical divisions (Fig. 1).

All native vascular plant species of Poland and the archaeophytes were included in the analysis. Some taxa, important in the sense of nature conservation, were listed in the rank of subspecies. The information either on the occurrence or on population dynamics of certain species were obtained from literature (8, 21, 22, 47, 10, 2, 33, 6, 43, 44, 20, 5, 30, 35, 36, 39, 41,42, 15, 16, 17, 46, 3,18) and from long lasting field observations and excursions conducted by scientists and amateurs alike. Because of insufficient data, species from genera: *Alchemilla*, *Callitriche*, *Hieracium*, *Oenothera*, *Rosa*, *Rubus* and *Taraxacum* (with few exceptions) were not evaluated and they received NE category. The previously reported species of questionable occurrence, together with all neophytes were defined as not applicable (NA) and were not included into the list. The list of questionable taxa was given separately.

The threat categories were given according to the IUCN criteria (11, 12, 13). Information about protection status in Poland (38) and the cause of species protection were provided for every species. Species names were given according to the vascular plant list of Poland (31) and in case of *Bolboschoenus* – according to Hroudová et al. (10). The syntaxonomical affiliation was given according to Matuszkiewicz (29). The species list follows the alphabetical order.

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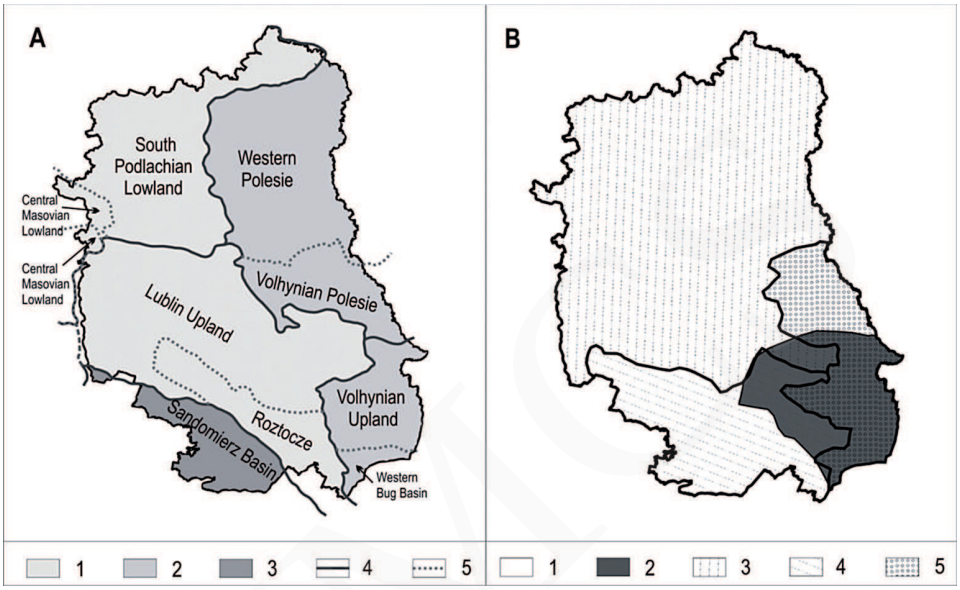


Fig. 1. The situation of the Lublin province.

A – Physico-geographical regionalization of Poland (19): 1 – non-Alpine Central Europe, 2 – East European Plain, 3 – Carpathian Region, 4 – borders of province, 5 – borders of macroregions; B – gobotanical division: 1 – Baltic Divide (40), 2 – Forest-Steppe Divide (40), 3 – Masovian-Polesie Divide (28), 4 – South Poland Uplands Divide (28), 5 – Volhynian Divide (28)

RESULTS

There are approx. 2,500 vascular plant species in Poland (1, 32), from which about 1,600 have been reported from the Lublin Region (8). Of this number, 408 species are listed in this paper. One third of them (134) are species of the DD (data deficient) category. Among these species are the ones which either were reported from single locations in the past and have not been found later (but there is still a chance for them to be rediscovered) or the ones that are indistinguishable or challenging to be identified in the field so that their population size and the number of localities are impossible to be estimated precisely. The following numbers of species represent one of the categories: critically endangered (CR) – 56 species, endangered (EN) – 81 species, vulnerable (VU) – 51 species, and near threatened (NT) – 49 species. The occurrence of 37 species has not been confirmed and therefore they are listed as regionally extinct (RE). The species list is presented in Tab. 1.

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Tab. 1. The list of endangered vascular species of the Lublin province

No.	Latin name	Law protection	Criteria[4]	Category
1	*Achillea setacea* WALDST. & KIT.		C2a(i)	CR
2	*Aconitum moldavicum* HACQ.	s	B2ab(iii);C2a(i)	EN
3	*Aconitum variegatum* L.	c	B2ab(iii);C2a(i)	EN
4	*Adenophora liliifolia* (L.) BESSER	s	C2a(i)	CR
5	* *Adonis aestivalis* L.		B2ab(iii,iv)	NT
6	* *Adonis flammea* JACQ.		B2ab(iii);C2a(i)	CR
7	*Adonis vernalis* L.	s	B2ab(iii,iv)	VU
8	* *Agrostemma githago* L.		A1ac; B2ab(iii)	NT
9	* *Ajuga chamaepitys* (L.) SCHREB.		C2a(i)	CR
10	*Ajuga chia* SCHREB.			RE
11	*Ajuga pyramidalis* L.			DD
12	*Aldrovanda vesiculosa* L.	s	B2ab(iii)	VU
13	*Alisma gramineum* LEJ.		B2ab(iii)	EN
14	*Allium montanum* F. W. SCHMIDT		B2ab(iii,iv)	EN
15	* *Allium rotundum* L.		C2a(i)	CR
16	*Allium ursinum* L.	c	B2ab(iii)	EN
17	*Allium victorialis* L.		C2a(i)	VU
18	*Alyssum montanum* L.		B2ab(iii)	VU
19	* *Anagallis foemina* MILL.		B2ab(iii,iv)	NT
20	*Androsace septentrionalis* L.		B2ab(iii,iv)	EN
21	*Anthriscus nitida* (WAHLENB.) HAZSL.			DD
22	*Aposeris foetida* (L.) LESS.			DD
23	*Asperula cynanchica* L.		B2ab(iii,iv)	NT
24	*Asperula tinctoria* L.		B2ab(iii,iv)	NT
25	*Asplenium viride* HUDS.		B2ab(iv)	EN
26	*Astragalus arenarius* L.			DD
27	*Astragalus danicus* RETZ.			RE
28	*Astragalus onobrychis* L.		C2a(i)	EN
29	*Atropa belladonna* L.	c	B2ab(iv)	NT
30	* *Avena strigosa* SCHREB.			DD
31	*Avenula pratensis* (L.) DUMORT.			DD
32	*Barbarea stricta* ANDRZ.			DD
33	*Batrachium baudotii* (GORD.) BOSCH	s	B2a	CR
34	*Batrachium fluitans* (LAM.) WIMM.	c		RE
35	*Betula humilis* SCHRANK	s	B2ab(iii,iv)	NT
36	* *Bromus arvensis* L.			DD

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37	*Blechnum spicant* (L.) ROTH	c	C2a(i)	CR
38	*Bothriochloa ischaemum* (L.) KENG			DD
39	*Botrychium lunaria* (L.) SW.	s	B2ab(iii,iv)	NT
40	*Botrychium matricariifolium* (RETZ.) A. BRAUN ex W. D. J. KOCH	s	B2ab(iii)	EN
41	*Botrychium multifidum* (S. G. GMEL.) RUPR.	s	B2ab(iii)	CR
42	*Bromus benekenii* (LANGE) TRIMEN			DD
43	*Bromus commutatus* SCHRAD.			DD
44	*Bromus racemosus* L.			DD
45	*Bolboschoenus maritimus* (L.) PALLA s.s.		B2ab(iii,iv)	EN
46	*Bolboschoenus yagara* (OHWI) Y. C. YANG & M. ZHAN			DD
47	* *Bupleurum rotundifolium* L.		B2ab(iv)	CR
48	*Calamagrostis pseudophragmites* (HALLER F.) KOELER			DD
49	*Caldesia parnassifolia* (L.) PARL.	s	B2ab(iii)	CR
50	* *Camelina microcarpa* subsp. *sylvestris* (Wallr.) Hittonen			DD
51	*Campanula cervicaria* L.		B2ab(iv)	VU
52	*Campanula latifolia* L.	c	B2ab(iv)	EN
53	*Cardamine flexuosa* WITH.			DD
54	* *Carduus nutans* L.		D	EN
55	*Carex arenaria* L.	c	B2ab(iii)	EN
56	*Carex atherodes* SPRENG.		B2ab(iii)	EN
57	*Carex bohemica* SCHREB.		B2ab(iii)	EN
58	*Carex buekii* WIMM.			DD
59	*Carex buxbaumii* WAHLENB.	s	B2ab(iii,iv)	EN
60	*Carex chordorrhiza* L.	s	B2ab(iii,iv)	VU
61	*Carex demissa* HORNEM.			DD
62	*Carex dioica* L.	c	B2ab(iii,iv)	EN
63	*Carex hartmanii* CAJANDER			DD
64	*Carex heleonastes* EHRH. in L. F.	s		RE
65	*Carex hostiana* DC.		B2ab(iii)	VU
66	*Carex loliacea* L.	s		DD
67	*Carex melanostachya* M. BIEB. ex WILLD.			RE
68	*Carex strigosa* HUDS.		C2a(i)	CR
69	*Carex supina* WAHLENB.	s	B2ab(iii,iv)	EN
70	*Carex transsilvanica* SCHUR		B2ab(iii,iv)	VU
71	*Carex umbrosa* HOST		B2ab(iii,iv)	NT

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72	*Carlina acaulis* L.	c	C2a(i)	CR
73	*Carlina onopordifolia* BESSER	s	B2ab(iii)	EN
74	* *Caucalis platycarpos* L.		B2ab(iii,iv)	CR
75	*Centaurea oxylepis* (Wimm. & Grab.) Hayek		B2ab(iii)	EN
76	*Centaurea phrygia* L.			DD
77	*Centunculus minimus* L.			DD
78	*Cephalanthera longifolia* (L.) FRITSCH	s	C2a(i)	EN
79	*Cephalanthera rubra* (L.) RICH.	s	C2a(i)	EN
80	*Cerastium glutinosum* F. W. SCHULTZ			DD
81	*Cerastium macrocarpum* SCHUR em. GARTNER			DD
82	*Cerastium pumilum* CURTIS s. s.			DD
83	*Cerasus fruticosa* PALL.	c	B2ab(iii,iv)	NT
84	*Ceratophyllum submersum* L.		B2ac(iii,iv)	NT
85	*Chamaecytisus albus* (HACQ.) ROTHM.	s	B2ab(iii)	CR
86	*Chamaedaphne calyculata* (L.) MOENCH	s	C2a(i)	CR
87	* *Chrysanthemum segetum* L.			DD
88	*Circaea intermedia* EHRH.		B2ab(iii)	NT
89	*Cirsium decussatum* JANKA	c		RE
90	*Cirsium pannonicum* (L. F.) LINK	c	B2ab(iii,iv)	VU
91	*Cladium mariscus* (L.) POHL	s	B2ab(iii,iv)	VU
92	*Coeloglossum viride* (L.) HARTM.	s		RE
93	*Colchicum autumnale* L.		B2ab(iii,iv)	EN
94	* *Conringia orientalis* (L.) DUMORT.		B2ab(iv); C2a(i)	EN
95	*Corallorhiza trifida* CHÂTEL.	s		RE
96	*Corydalis intermedia* (L.) MÉRAT		B2ab(iii,iv)	EN
97	*Crepis praemorsa* (L.) TAUSCH		B2ab(iii,iv); C2a(i)	VU
98	*Crepis rhoeadifolia* M. BIEB.			DD
99	* *Cuscuta epilinum* WEIHE ex BOENN.			RE
100	*Cyperus flavescens* L.		B2ab(iii,iv)	CR
101	*Cypripedium calceolus* L.	s	B2ab(iii,v)	NT
102	*Dactylorhiza fuchsii* (DRUCE) SOÓ		B2ab(iii,iv)	VU
103	*Dactylorhiza incarnata* (L.) Soó subsp. *ochroleuca* (Boll) Hunt et Summ.	c	B2ab(iii,iv)	EN
104	*Daphne cneorum* L.	s		RE
105	*Dianthus arenarius* L.	c	B2ab(iii,iv)	VU
106	*Dianthus armeria* L.	s		DD

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107	*Dianthus superbus* L. s. s.	s	B2ab(iii,iv)	NT
108	*Diphasiastrum tristachyum* (Pursh) Holub	s		DD
109	*Diphasiastrum zeilleri* (ROUY) HOLUB	s		DD
110	*Dipsacus laciniatus* L.			DD
111	*Draba nemorosa* L.			DD
112	*Dracocephalum ruyschiana* L.	s		RE
113	*Drosera anglica* HUDS.	s	B2ab(iii,iv)	EN
114	*Drosera intermedia* HAYNE	s	C2a(i)	EN
115	*Drosera rotundifoli*a L.	s	B2ab(iii,iv)	NT
116	*Echium russicum* J. F. GMEL.	s	D	CR
117	*Elatine alsinastrum* L.	c	B2ab(iii)c(ii,iii,iv)	VU
118	*Elatine hexandra* (LAPIERRE) DC.	c		RE
119	*Elatine hydropiper* L. em. OEDER	c	B1ac(iv)+2ac(iv)	CR
120	*Elatine triandra* SCHKUHR	c	B1ac(iv)+2ac(iv)	CR
121	*Eleocharis mamillata* (H. Lindb.) H. Lindb. ex Dörfl. s. s.			DD
122	*Eleocharis ovata* (ROTH) ROEM. & SCHULT.		C2a(i)	NT
123	*Eleocharis quinqueflora* (HARTMANN) O. SCHWARZ		B2ab(iii,iv)	VU
124	*Elymus hispidus* (Opiz) Melderis subsp. *barbulatus* (Schur) Melderis		B2ab(iii,iv)	EN
125	*Epipactis albensis* NOVÁKOVÁ & RYDLO	s	D	CR
126	*Epipactis atrorubens* (HOFFM.) BESSER	c	C2a(i)	CR
127	*Epipogium aphyllum* SW.	s	D	CR
128	*Equisetum telmateia* EHRH.		B2ab(iv)	CR
129	*Eriophorum gracile* W. D. J. KOCH	s	B2ab(iii,iv)	EN
130	*Erysimum odoratum* EHRH.		C2a(i)	CR
131	*Euphorbia dulcis* L.			DD
132	*Euphorbia palustris* L.		C2a(i)	VU
133	*Euphorbia villosa* WALDST. & KIT. ex WILLD.		C2a(i)	VU
134	*Euphrasia nemorosa* (PERS.) WALLR.			DD
135	*Festuca duvalii* (St. Yves) Stohr			DD
136	*Festuca guestphalica* Boenn. ex Rchb.			DD
137	*Festuca macutrensis* ZAPAŁ.		C2a(i)	EN
138	*Festuca pallens* Host.	s		DD
139	*Festuca polesica* ZAPAŁ.			DD

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140	*Festuca pseudovina* Hack. ex Wieseb.			DD
141	*Festuca tenuifolia* SIBTH.		B2ab(iii)	EN
142	*Festuca valesiaca* Schleich. ex Gaudin			RE
143	*Filago vulgaris* LAM.			DD
144	* *Fumaria rostellata* KNAF			DD
145	*Gagea arvensis* (PERS.) DUMORT.	c		DD
146	*Galanthus nivalis* L.	c	B2ab(iii)	NT
147	*Galium rotundifolium* L.		B2ab(iii)	EN
148	* *Galium tricornutum* DANDY		B2ab(iii,iv)	CR
149	*Genista germanic*a L.		B2ab(iv)	VU
150	*Genista pilosa* L.		B2ab(iv)	CR
151	*Gentiana cruciata* L.	s	B2ab(iii); C2a(i)	NT
152	*Gentianella amarella* (L.) BÖRNER	s	B2ab(iii,iv)c(iv)	VU
153	*Gentianella ciliata* (L.) BORKH.	c	B2ab(iii)	VU
154	*Gentianella lutescens* (VELEN.) HOLUB	c	B2ab(iii)	EN
155	*Gentianella uliginosa* (Willd.) Börner	s	B2ab(iii,iv)	EN
156	*Geranium phaeum* L.		B2ab(iv)	NT
157	*Geum aleppicum* JACQ.			DD
158	*Gladiolus imbricatus* L.	s	C2a(i)	VU
159	*Glechoma hirsuta* WALDST. & KIT.			DD
160	*Glyceria declinata* BRÉB.			DD
161	*Glyceria nemoralis* (R. UECHTR.) R. UECHTR. & KÖRN.			DD
162	*Gnaphalium luteo-album* L.			DD
163	*Goodyera repens* (L.) R. BR.	s	C2a(i)	CR
164	*Gratiola officinalis* L.		B2ab(iii,iv)	EN
165	*Gymnadenia conopsea* (L.) R. Br. subsp. *conopsea*	s	C2a(i)	VU
166	*Gymnadenia conopsea* (L.) R. Br. subsp. *densiflora* (Wahlenb.) K. Richt.	s	C2a(i)	EN
167	*Gypsophila paniculata* L.	c	B2ab(iii)	CR
168	*Hacquetia epipactis* (SCOP.) DC.	s	C2a(i)	EN
169	*Hammarbya paludosa* (L.) KUNTZE	s	C2a(i);	CR
170	*Herminium monorchis* (L.) R. BR.	s		RE
171	*Hieracium echioides* LUMN.		B2ab(iii,iv)	EN
172	*Hierochloë odorata* (L.) P. BEAUV.	c	B2ab(iii,iv)	EN
173	*Hordelymus europaeus* (L.) JESS. ex HARZ			DD
174	* *Hyoscyamus niger* L.			DD

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175	*Hypericum elegans* STEPHAN ex WILLD.	s	C2a(i)	CR
176	*Hypericum hirsutum* L.		C2a(i)	CR
177	*Hypericum montanum* L.			DD
178	*Hypochoeris maculata* L.			DD
179	*Illecebrum verticillatum* L.			DD
180	*Inula conyza* DC. [1]		C2a(i)	CR
181	*Inula hirta* L.		C2a(i)	CR
182	*Iris aphylla* L.	s	B2ab(iii); C2a(i)	EN
183	*Iris sibirica* L.	s	B2ab(iii)	NT
184	*Isoëtes lacustris* L.	s		RE
185	*Isolepis setacea* (L.) R. BR.		B2ab(iii,iv)	VU
186	*Isolepis supina* (L.) R. BR.		B2b(iii)c(iii,iv)	VU
187	*Jovibarba sobolifera* (SIMS) OPIZ		B2ab(iii,iv)	EN
188	*Juncus atratus* KROCK.		C2a(i)	VU
189	*Juncus capitatus* WEIGEL			DD
190	*Juncus filiformis* L.			DD
191	*Juncus ranarius* J. O. E. Perrier & Songeon			DD
192	*Juncus tenageia* EHRH.		B1ac(iv)+2ac(iv)	CR
193	* *Kickxia elatine* (L.) DUMORT.			RE
194	*Kochia laniflora* (S. G. GMEL.) BORBÁS			DD
195	*Koeleria grandis* BESSER ex GORSKI			DD
196	* *Lamium moluccellifolium* FR.			DD
197	*Laserpitium latifolium* L.		B2ab(iii,iv)	VU
198	*Lathyrus laevigatus* (WALDST. & KIT.) GREN.	c	C2a(i)	NT
199	*Lathyrus latifolius* L.	s		DD
200	*Libanotis pyrenaica* (L.) BOURG.		B2ab(iii,iv)	VU
201	*Libanotis sibirica* (L.) W. D. J. KOCH		B2ab(iii,iv)	EN
202	*Ligularia sibirica* (L.) CASS.	s	C2a(i); D	CR
203	*Linnaea borealis* L.	c	B2ab(iii,iv)	VU
204	*Linosyris vulgaris* CASS.	s	B2ab(iii,iv)	EN
205	*Linum flavum* L.	s	B2ab(iii,iv)	VU
206	*Linum hirsutum* L.[2]	s	C2a(i)	EN
207	*Liparis loeselii* (L.) RICH.	s	B2ab(iii,iv)	VU
208	*Littorella uniflora* (L.) ASCH.	s		RE
209	* *Lolium remotum* SCHRANK			DD
210	* *Lolium temulentum* L.			DD

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211	*Lotus tenuis* WALDST. & KIT. ex WILLD.			DD
212	*Lycopodiella inundata* (L.) HOLUB	s	B2ab(iii,iv)	EN
213	*Lycopus exaltatus* L.			DD
214	*Lysimachia nemorum* L.		B2ab(iii)	EN
215	*Lythrum hyssopifolia* L.	s	B2b(iii)c(iii,iv)	NT
216	*Malaxis monophyllos* (L.) SW.	s		RE
217	* *Malva crispa* L.			DD
218	*Matteucia struthiopteris* (L.) TOD.	c	B2ab(iv)	EN
219	*Melampyrum cristatum* L.	s	B2ab(iii,iv)	EN
220	*Melampyrum polonicum* (P. BEAUV.) SOÓ			DD
221	*Melica uniflora* RETZ.			RE
222	*Mentha pulegium* L.			DD
223	*Moneses uniflora* (L.) A. GRAY	c	B2ab(iv)	EN
224	*Muscari comosum* (L.) MILL.	s	B2ab(iii,v)	NT
225	*Myosotis discolor* PERS.			DD
226	*Myosotis ramosissima* ROCHEL			DD
227	*Myosotis sparsiflora* POHL			DD
228	*Myosotis sylvatica* EHRH. ex HOFFM.			DD
229	*Myricaria germanica* (L.) DESV.	c		DD
230	*Myriophyllum alterniflorum* DC.		B2ac(iv)	EN
231	*Najas minor* ALL.	s	B2ab(iii,iv)	NT
232	*Neottianthe cucullata* (L.) SCHLTR.			RE
233	*Nepeta pannonica* L.		C2a(i)	CR
234	* *Nigella arvensis* L.			RE
235	*Nonea pulla* (L.) DC.		B2ab(iii,iv)	NT
236	*Nymphaea candida* C. PRESL	c	B2ab(iii,iv)	NT
237	*Nymphoides peltata* (S. G. GMEL.) KUNTZE	s		RE
238	* *Odontites verna* (BELLARDI) DUMORT.			DD
239	*Omphalodes scorpioides* (HAENKE) SCHRANK			DD
240	*Onobrychis arenaria* (KIT.) DC.			DD
241	*Ophrys insectifera* L.	s	C2a(i)	CR
242	*Orchis coriophora* L.	s		RE
243	*Orchis mascula* (L.) L.	s		DD
244	*Orchis militaris* L.	s	B2ab(iii)	NT
245	*Orchis morio* L.	s	B2ab(iii,iv)	EN
246	*Orchis purpurea* HUDS.	s	B2ab(iii)	EN

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247	*Orchis tridentata* Scop.	s		RE
248	*Orchis ustulata* L.	s		DD
249	*Oreopteris limbosperma* (BELLARDI ex ALL.) HOLUB			DD
250	*Ornithogalum collinum* GUSS.	s	C2a(i)	CR
251	*Ornithogalum umbellatum* L.		C2a(i)	EN
252	*Orobanche alba* subsp. *major* (Celak.) Zazvorka	c	C2a(i)	VU
253	*Orobanche alsatica* KIRSCHL.		C2a(i)	EN
254	* *Orobanche arenaria* BORKH.	c	C2a(i)	CR
255	*Orobanche caryophyllacea* SM.	c	C2a(i)	VU
256	* *Orobanche coerulescens* STEPHAN ex WILLD.		C2a(i)	CR
257	*Orobanche elatior* SUTTON	c	C2a(i)	NT
258	*Orobanche kochii* F. W. Schultz	c	C2a(i)	NT
259	*Orobanche lutea* BAUMG.	c	C2a(i)	NT
260	*Orobanche pallidiflora* WIMM. & GRAB.		B2ab(iii,iv)	EN
261	*Orobanche picridis* F. W. SCHULTZ	c	B2ab(iii)	VU
262	*Orobanche purpurea* JACQ.	c	B2ab(iii)	RE
263	*Orthanta lutea* (L.) A. KERN. ex WETTST.			DD
264	*Osmunda regalis* L.	s	C2a(i)	CR
265	*Oxycoccus microcarpus* TURCZ. ex RUPR.		B2ab(iii)	CR
266	*Oxytropis pilosa* (L.) DC.	s		RE
267	* *Parietaria officinalis* L.		B2ab(iii,iv)	EN
268	*Pedicularis palustris* L.	c	B2ab(iii,iv)	VU
269	*Pedicularis sceptrum-carolinum* L.	s	B2b(iii,iv)c(iv)	EN
270	*Pedicularis sylvatica* L.	c	C2a(i)	CR
271	*Peucedanum alsaticum* L.		B2ab(iii)	EN
272	*Phyllitis scolopendrium* (L.) NEWMAN			RE
273	*Phyteuma orbiculare* L.	c	B2b(iii)c(iv)	NT
274	*Pinguicula vulgaris* L. subsp. *bicolor* (Woł.) Á. Löve & D. Löve	s	B2ab(iii)	NT
275	*Pleurospermum austriacum* (L.) HOFFM.			DD
276	*Poa bulbosa* L.			DD
277	*Polemonium coeruleum* L.	s	C2a(i)	EN
278	* *Polycnemum arvense* L.			DD
279	*Polygala amara* L. subsp. *brachyptera* (Chodat) Hayek		C2a(i)	EN
280	*Polygala oxyptera* RCHB.		B2ab(iii)	VU

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281	*Polygonatum verticillatum* (L.) ALL.		B2ab(iv)	EN
282	*Polystichum aculeatum* (L.) ROTH	s	B2ab(iv)	NT
283	*Polystichum braunii* (SPENN.) FÉE	s	B2ab(iv)	VU
284	*Polystichum lonchitis* (L.) ROTH	s		RE
285	*Potamogeton alpinus* BALB.			DD
286	*Potamogeton berchtoldi* Fieber		B2ab(iii)	EN
287	*Potamogeton compressus* L.			DD
288	*Potamogeton friesii* RUPR.		B2ab(iii)	CR
289	*Potamogeton nodosus* POIR.			DD
290	*Potamogeton obtusifolius* MERT. & W. D. J. KOCH			DD
291	*Potamogeton polygonifolius* POURR.			DD
292	*Potamogeton praelongus* WULFEN			DD
293	*Potamogeton rutilus* WOLFG.		B2ab(iii)	EN
294	*Potentilla anglica* LAICHARD.			DD
295	*Potentilla inclinata* VILL.			DD
296	*Potentilla recta* L.		B2ab(iii,iv)	VU
297	*Potentilla rupestris* L.	s		DD
298	*Prenanthes purpurea* L.			RE
299	*Primula elatior* (L.) HILL	c	B2ab(iii,iv)	VU
300	*Primula vulgaris* HUDS.[3]	s	D	CR
301	*Pulicaria vulgaris* GAERTN.			DD
302	*Pulmonaria angustifolia* L.		B2ab(iii,iv)	NT
303	*Pulmonaria mollis* WULFEN ex A. KERN.		B2ab(iii,iv)	EN
304	*Pulsatilla patens* (L.) MILL.	s		RE
305	*Pulsatilla pratensis* (L.) MILL.		C2a(i)	VU
306	* *Ranunculus arvensis* L.			RE
307	*Rhinanthus borbasii* (DÖRFL.) SOÓ			DD
308	*Rhynchospora fusca* (L.) W. T. AITON	s	B1ac(iii)+2ac(iii); C2a(i)	CR
309	*Rosa gallica* L.	s	B2ab(iii,iv)	VU
310	*Rumex aquaticus* L.			DD
311	*Rumex palustris* SM.			DD
312	*Rumex ucranicus* BESSER ex SPRENG.			DD
313	*Salix lapponum* L.	s	B2ab(iii,iv)	EN
314	*Salix myrtilloides* L.	s	B2ab(iii,iv)	EN
315	*Salix starkeana* WILLD.			DD
316	*Salsola kali* subsp. *ruthenica* (ILJIN) SOÓ			DD
317	*Salvia glutinosa* L.		B2ab(iv)	EN

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318	* *Salvia nemorosa* L.[1]		B2ab(iii)	EN
319	*Sanguisorba muricata* (Spach) Gremli			DD
320	*Saxifraga hirculus* L.	s		RE
321	*Scabiosa canescens* WALDST. & KIT.			RE
322	*Scabiosa columbaria* L. s. s.			RE
323	* *Scandix pecten-veneris* L.			RE
324	*Scheuchzeria palustris* L.	s	B2ab(iv)	NT
325	*Schoenoplectus mucronatus* L.	s	B1ac(iv)+2ac(iv); C2b	CR
326	*Schoenus ferrugineus* L.	s	B2b(iii,iv); C2a(i)	NT
327	*Schoenus nigricans* L.	s	B2ab(iv)	CR
328	*Scilla bifolia* L.	c	B2ab(iii)	EN
329	*Scleranthus polycarpos* L.			DD
330	* *Sclerochloa dura* (L.) P. BEAUV.			DD
331	*Scolochloa festucacea* (WILLD.) LINK			DD
332	*Scopolia carniolica* JACQ.			EN
333	*Scorzonera purpurea* L.	s	C2a(i)	CR
334	*Scrophularia scopolii* HOPPE			DD
335	*Scutellaria hastifolia* L.		B2ab(iii)	NT
336	*Sedum reflexum* L.			DD
337	*Senecio aurantiacus* (HOPPE) LESS.			DD
338	*Senecio barbaraeifolius* (Krock.) Wimm. & Grab.			DD
339	*Senecio carniolicus* WILLD.			DD
340	*Senecio congestus* (R. BR.) DC.		B2ab(iii,iv)	EN
341	*Senecio erucifolius* L.		B2ab(iii,iv)	NT
342	*Senecio integrifolius* (L.) CLAIRV.		C2a(i)	CR
343	*Senecio macrophyllus* M. BIEB.		C2a(i)	EN
344	*Senecio ovatus* (P. Gaertn., B. Mey. & Scherb.) Willd.			DD
345	*Senecio paludosus* L.		B2ab(iii,iv)	NT
346	*Senecio rivularis* (WALDST. & KIT.) DC.		B2ab(iii,iv); C2a(i)	EN
347	*Silaum silaus* (L.) SCHINZ & THELL.			DD
348	*Silene borysthenica* (GRUNER) WALTERS			DD
349	*Silene chlorantha* (Willd) Ehrh.			DD
350	* *Silene gallica* L.			DD
351	*Silene lithuanica* ZAPAŁ.	s	B2ab(iii,iv)	NT
352	*Silene tatarica* (L.) PERS.		B2ab(iii,iv)	NT

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353	*Sparganium minimum* WALLR.		C2a(i)	NT
354	*Sparganium neglectum* BEEBY			DD
355	*Stachys alpina* L.			DD
356	*Stachys germanica* L.		B2ab(iii,iv)	VU
357	*Staphylea pinnata* L.	s	C2a(i)	CR
358	*Stellaria crassifolia* EHRH.			DD
359	*Stellaria longifolia* MUHL. ex WILLD.			DD
360	*Stipa capillat*a L.	s	B2ab(iii,iv)	CR
361	*Stipa joannis* ČELAK. s. s.	s	D	CR
362	*Succisella inflexa* (KLUK) BECK	s	B2ab(iii)	NT
363	*Swertia perennis* L.	s	B2ab(iii)	EN
364	*Symphytum tuberosum* L.		B2ab(iii)	VU
365	*Tanacetum corymbosum* (L.) SCH. BIP.		B2ab(iii,iv); C2a(i)	VU
366	*Thalictrum simplex* L.		B2ab(iii,iv)	VU
367	*Thesium alpinum* L.	s	C2a(ii)	CR
368	*Thesium ebracteatum* HAYNE	s	B2ab(iii,iv)	EN
369	*Thymelaea passerina* (L.) COSS. & GERM.		B2ab(iii,iv)	NT
370	*Thymus austriacus* BERNH.			RE
371	*Thymus glabrescens* WILLD.		B2ab(iii)	EN
372	*Thymus kosteleckyanus* OPIZ		B2ab(iii)	CR
373	*Thymus marschallianus* WILLD.		B2ab(iii)	NT
374	*Tofieldia calyculata* (L.) WAHLENB.	s	B2ab(iii)	VU
375	*Trifolium lupinaster* L.			DD
376	*Trifolium rubens* L.		B2ab(iii,iv)	VU
377	*Trollius europaeus* L. s. s.	s	A1c; B2ab(iii,iv)	VU
378	*Utricularia australis* R. BR.	s		DD
379	*Utricularia intermedia* HAYNE	s	B2ab(iii,iv)	VU
380	*Utricularia minor* L.	s	C2a(i)	NT
381	*Utricularia ochroleuca* R. W. HARTM.	s		DD
382	* *Vaccaria hispanica* (MILL.) RAUSCHERT			RE
383	*Valeriana angustifolia* Tausch		B2ab(iii,iv)	NT
384	*Valeriana dioica* L.			DD
385	*Valeriana tripteris* L.		B2ab(iii,iv)	EN
386	* *Valerianella rimosa* BASTARD			DD
387	*Veratrum album* L. s. s.	s		DD
388	*Veratrum nigrum* L.	s	B2ab(iii); C2a(i)	EN
389	*Verbascum blattaria* L.			DD
390	* *Verbena officinalis* L.			DD

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391	*Veronica anagalloides* GUSS.			DD
392	*Veronica austriaca* L.		B2ab(iii,iv)	NT
393	*Veronica catenata* PENNELL			DD
394	*Veronica montana* L.			DD
395	* *Veronica opaca* FR.			DD
396	*Veronica paniculata* L.	s	B2ab(iii,iv)	EN
397	*Veronica prostrata* L.		B2ab(iii,iv); C2a(i)	CR
398	*Veronica teucrium* L.		B2ab(iii,iv)	NT
399	*Vicia lathyroides* L.			DD
400	*Vicia pisiformis* L.		C2a(i)	CR
401	*Viola collina* BESSER			DD
402	*Viola elatior* FR.		B2ab(iii,iv)	EN
403	*Viola epipsila* LEDEB.	s		DD
404	*Viola rupestris* F. W. SCHMIDT		B2ab(iii,iv)	VU
405	*Viola stagnina* KIT.	s	B2ab(iii)	VU
406	*Viola uliginosa* BESSER	s	B2ab(iii)	NT
407	*Virga pilosa* (L.) HILL		C2a(i)	EN
408	*Zannichellia palustris* L.			DD

Explanations: Threat categories: CR – critically endangered, EN – endangered, VU – vulnerable, NT – near threatened, DD – data deficient, legal protection: s – strictly protected, c – partially protected, * – archaeophytes, 1 – uncertain status of the locality (47), 2 – exists in site where it was introduced in Dobre (7) and Kolonia Żuków (Wojciechowski, oral communication in 2016), 3 – only a few individuals grow in site where it was introduced in Łańcuchów (24), 4 – explanations see Appendix 1.

The species given the NA (non-applicable) category, except for neophytes, are as follows: *Sparganium neglectum* BEEBY, *Senecio carniolicus* WILLD., *Alopecurus arundinaceus* POIR. in LAM., *Arenaria graminifolia* SCHRAD., *Arnica montana* L., *Apium repens* (JACQ.) LAG., *Bupleurum falcatum* L., *Bupleurum longifolium* L., *Carduus personata* (L.) JACQ., *Carex disperma* DEWEY, *Carex divulsa* STOKES, *Carex punctata* GAUDIN, *Cirsium acaule* SCOP., *Cirsium erisithales* (JACQ.) SCOP., *Conioselinum tataricum* HOFFM., *Cotoneaster integerrimus* MEDIK., *Cotoneaster niger* (THUNB.) FR., *Dentaria enneaphyllos* L., *Festuca heterophylla* LAM., *Galium sylvaticum* L., *Gentiana asclepiadea* L., *Hydrilla verticillata* (L. F.) ROYLE, *Juncus acutiflorus* EHRH. ex HOFFM., *Juncus gerardi* LOISEL, *Knautia dipsacifolia* KREUTZER, *Lathyrus montanus* BERNH., *Lathyrus pannonicus* (JACQ.) GARCKE, *Lathyrus pisiformis* L., *Listera cordata* (L.) R. BR., *Luronium natans* (L.) RA, *Najas flexilis* (WILLD.) ROSTK. & W. L. E. SCHMIDT, *Potamogeton filiformis* PERS., *Potentilla crantzii* (CRANTZ) BECK ex FRITSCH, *Reseda phyteuma* L., *Solanum alatum* MOENCH, *Symphytum cordatum* WALDST. & KIT. ex WILLD., *Tetragonolobus*

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maritimus (L.) ROTH, *Trifolium ochroleucon* HUDS., *Trifolium spadiceum* L. One species, namely *Pinguicula vulgaris* L. subsp. *vulgaris* was not confirmed because in all of the populations of the Lublin province its subspecies: *bicolor* only grows. The species occurring in the Lublin Region, but not included in the list (and the species not given the NA/NE category) were taken under consideration and recognized as not threatened, therefore classified as LC (least concern).

CONCLUSION

The highest number of rare and endangered plant species occurs in calcareous dry grasslands of *Festuco-Brometea*, especially the ones that have developed on loess slopes of the *Festuco-Stipion* alliance (Tab. 2). Other large groups of species included in the list are these occurring in deciduous forests – especially of the *Potentillo albae-Quercion petraeae* and wetlands (*Scheuchzerio-Caricetea nigrae*, *Oxyccoco–Sphagnetea*), meadows (*Molinion caeruleae*) and calcareous weed communities of cereal crops (*Caucalidion lappulae*).

Tab. 2. The share of endangered species in separate synecological groups.

Synecological group	RE	CR	EN	VU	NT	DD	Σ
Festuco-Brometea, Trifolio-Geranietea sanguinei, Rhamno-Prunetea	9	21	24	21	14	23	112
Querco-Fagetea	4	7	16	5	9	18	59
Scheuchzerio-Caricetea nigrae, Oxyccoco-Sphagnetea	3	6	10	7	6	5	37
Molinio-Arrhenatheretea	3	-	8	7	4	10	32
Stellarietea mediae	7	6	1	-	5	14	33
Koelerio glaucae-Corynephoretea canescentis, Nardo-Callunetea	1	2	3	3	3	9	21
Bidentetea tripartiti, Isoëto-Nanojuncetea	1	4	2	3	2	10	22
Potametea, Utricularietea intermedio-minoris, Littorelletea uniflorae	4	3	3	2	3	9	24
Vaccinio-Piceetea	4	3	2	2	-	4	15
Phragmitetea	1	-	3	1	1	6	12
Alnetea glutinosae, Salicetea purpureae	-	1	1	-	-	5	7
Artemisietea vulgaris, Epilobietea angustifolii	-	1	1	-	-	6	8
Others	-	2	7	-	2	15	26
Together	37	56	81	51	49	134	408

A large number of DD-group species indicates that the flora of the Lublin province has insufficiently been explored and studied. Moreover, not all the re-

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gions and habitats are equally well recognized. The regions that were sufficiently explored are: Lublin Upland, Volhynian Upland, Volhynian Polesie, Sandomierz Basin in contrast to the South Podlachian Lowland and northern parts of the Western Polesie. The well known habitats are: calcareous fens, dry grasslands. There is still a gap of knowledge about riparian and aquatic plant communities (with the exception of the Bug river valley and the Łęczna-Włodawa Plain, which are parts of the Western Polesie), forests (except these of the Roztocze region), marsh communities, and communities of ruderal and segetal plants species. This might be a source of disproportion in numbers of endangered species in respective synecological groups. Many new species have been found since 2006, and among them, some previously considered lost or extinct. These new species in the region are: *Carex atherodes* (Krawczyk, Michalczuk unpublished data), *Carex strigosa* (Wójciak unpublished data), *Isolepis supina* (30), *Schoenoplectus mucronatus* (Michalczuk unpublished data), *Orobanche pallidiflora* (34), *Orobanche arenaria* (35), *Elatine triandra* (Michalczuk, Krawczyk unpublished data), *Bolboschoenus maritimus* s.s. (Krawczyk, Michalczuk unpublished data), *Bolboschoenus planiculmis* (Krawczyk, Michalczuk unpublished data), *Potamogeton berchtoldii* (Lorens unpublished data), *Viola uliginosa* (20). Rediscovered species are: *Adonis flammea* (Michalczuk unpublished data), *Botrychium matricarifolium* (Radliński unpublished data), *Botrychium multifidum* (Radliński unpublished data), *Elatine hydropiper* (Michalczuk, Krawczyk unpublished data), *Elatine alsinastrum* (37), *Alisma gramineum* (Michalczuk, Krawczyk unpublished data), *Caldesia parnassifolia* (3), *Epipogium aphyllum* (5), *Thesium alpinum* (5), *Oxycoccus microcarpus* (Michalczuk unpublished data), *Carex bohemica* (Michalczuk unpublished data), *Valeriana tripteris* (Radliński unpublished data).

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Appendix 1. Criteria of threats category according to IUCN (2010)

Use any of the criteria A–E	Critically Endangered	Endangered	Vulnerable
A. Population reduction	Declines measured over the longer of 10 years or 3 generations		
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%
A1. Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible **AND** understood **AND** have ceased, based on and specifying any of the following: **(a)** direct observation **(b)** an index of abundance appropriate to the taxon **(c)** a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality **(d)** actual or potential levels of exploitation **(e)** effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.			
A2. Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased **OR** may not be understood **OR** may not be reversible, based on (a) to (e) under A1.			
A3. Population reduction projected or suspected to be met in the future (up to a maximum of 100 years) based on (b) to (e) under A1.			
A4. An observed, estimated, inferred, projected or suspected population reduction (up to a maximum of 100 years) where the time period must include both the past and the future, and where the causes of reduction may not have ceased **OR** may not be understood **OR** may not be reversible, based on (a) to (e) under A1.			
B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)			
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following:			
(a) Severely fragmented, **OR** Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** area, extent and/or quality of habitat; **(iv)** number of locations or subpopulations; **(v)** number of mature individuals.			
(c) Extreme fluctuations in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** number of locations or subpopulations; **(iv)** number of mature individuals.			
C. Small population size and decline			
Number of mature individuals	< 250	< 2,500	< 10,000
AND either C1 or C2:			
C1. An estimated continuing decline of at least: (up to a max. of 100 years in future)	25% in 3 years or 1 generation	20% in 5 years or 2 generations	10% in 10 years or 3 generations
C2. A continuing decline **AND** (a) and/or (b):			
(a i) Number of mature individuals in each subpopulation: **or**	< 50	< 250	< 1,000
(a ii) % individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals.			
D. Very small or restricted population			
Either: Number of mature individuals	< 50	< 250	**D1.** < 1,000
			AND/OR
VU D2. Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.			**D2.** typically: AOO < 20 km² or number of locations ≤ 5
E. Quantitative Analysis			
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations (100 years max.)	≥ 20% in 20 years or 5 generations (100 years max.)	≥ 10% in 100 years