Invazinės ir svetimžemės rūšys Lietuvoje

INVASIVE AND ALIEN SPECIES IN LITHUANIA

Vilnius
2023

Redaktoriai
Zigmantas Gudžinskas, Valerijus Rašomavičius

Autoriai
Zigmantas Gudžinskas, Lukas Petrulaitis, Domas Uogintas, Gintautas Vaitonis, Linas Balčiauskas, Vytautas Rakauskas, Kęstutis Arbačiauskas, Rokas Butkus, Saulius Karalius, Laura Janulaitienė, Valerijus Rašomavičius

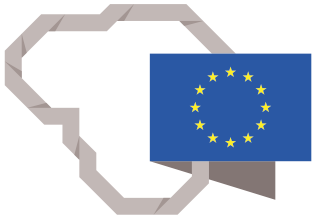
Edited by
Zigmantas Gudžinskas, Valerijus Rašomavičius

Contributors
Zigmantas Gudžinskas, Lukas Petrulaitis, Domas Uogintas, Gintautas Vaitonis, Linas Balčiauskas, Vytautas Rakauskas, Kęstutis Arbačiauskas, Rokas Butkus, Saulius Karalius, Laura Janulaitienė, Valerijus Rašomavičius

Bibliografinė informacija pateikiama Lietuvos integralios bibliotekų informacinės sistemos (LIBIS) portale ibiblioteka.lt

ISBN 978-609-8255-32-4

Leidinyje pateikiami invazinių ir svetimžemių rūšių būklės vertinimo duomenys, gauti 2019–2022 m., įgyvendinant projektą „Invazinių ir svetimžemių rūšių būklės tyrimai Lietuvoje“, kuris buvo finansuojamas iš Europos Sąjungos struktūrinių fondų lėšų pagal 2014–2020 m. Europos Sąjungos fondų investicijų veiksmų programos 5 prioriteto „Aplinkosauga, gamtos išteklių darnus naudojimas ir prisitaikymas prie klimato kaitos“ 05.5.1-APVA-V-018 priemonę „Biologinės įvairovės apsauga“. Projekto įgyvendinančioji institucija – Lietuvos Respublikos aplinkos ministerijos Aplinkos projektų valdymo agentūra. Projekto vykdytojas – Gamtos tyrimų centras.



Kuriame
Lietuvos ateitį

2014–2020 metų
Europos Sąjungos
fondų investicijų
veiksmų programa

This publication reports data on the assessment of the status of invasive and alien species in Lithuania, obtained during the period 2019–2022 within the framework of the project “Investigations of the Status of Invasive and Alien Species in Lithuania”, which was co-financed by the European Union Structural Funds according to the 5th Priority of the Operational Programme for the European Union Funds’ Investments in 2014-2020 “Environment, sustainable use of natural resources and adaptation to climate change” under the measure “Biodiversity protection” (05.5.1 APVA-V-018). The implementing authority of the project is the Environmental Projects Management Agency under the Ministry of Environment of the Republic of Lithuania. The project (Contract No. 05.5.1-APVA-V-018-01-0012) was carried out by the Nature Research Centre.

Turinys

Invazinių ir svetimžemių rūšių būklės vertinimas – naujas biologinės įvairovės tyrimų etapas Lietuvoje

Valerijus Rašomavičius

Invazinių ir svetimžemių rūšių inventorizavimas visoje Lietuvoje, atliktas 2019–2022 m., savo apimtimi, metodais ir gautais rezultatais yra išskirtinis gamtinės įvairovės pažinimo etapas, detaliai užfiksavęs svetimžemių organizmų mastą šalies augalijos ir gyvūnijos pasaulyje.

Darbų tikslas buvo ištirti invazinių ir svetimžemių rūšių būklę šalyje, parengti jų populiacijų būklės, plitimo, grėsmių aprašymus, paplitimo žemėlapius. Pradinį tiriamų objektų (tikslinių rūšių) sąrašą sudarė 100 taksonų (13 žinduolių, 5 žuvų, 9 vėžiagyvių, 11 kitų gyvūnų ir 62 augalų), įrašytų į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių ir Invazinių rūšių Lietuvos Respublikos teritorijoje sąrašus, taip pat grupė Lietuvoje svetimžemių rūšių, kurios, ekspertų nuomone, ateityje galėtų tapti invazinės. Per tyrimų laiką šis objektų sąrašas pasipildė 39 taksonais, kurie 2019 ir 2022 m. buvo naujai įrašyti į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašus.

Tyrimų metodai. *Duomenų bazė.* Pradiniame darbo etape buvo sukurta originali invazinių ir svetimžemių organizmų duomenų bazė (INVA), į kurią įvedama tikslinės rūšies radavietė buvo palydima kiekybine ir kokybine populiacijos dydžio ir būklės, buveinės, gyvenamosios aplinkos, žmogaus veiklos informacija.

Įvertinti ir į duomenų bazę perkelti archyviniai duomenys iš herbariumų ir augalijos duomenų bazių, duomenys, pasklidę mokslinėse ataskaitose ir tyrėjų asmeninių stebėjimų užrašuose, užfiksuoti miškų valstybės kadastre, Europos Sąjungos svarbos buveinių (BIGIS), Lietuvos augalijos (LITVEG) ir kitose specializuotose duomenų bazėse.

GIS technologijos. Įvairiuose tyrimų etapuose buvo panaudos licencinės *ArcGIS online* geografinės informacinės programos: *Survey123* formos – istoriniams duomenims suvesti į duomenų bazę; *Field Maps* – lauko duomenims rinkti ir transliuoti į duomenų bazę; šviesleintė – lauko darbų eigai stebėti, koordinuoti ir kontroliuoti; *ArcGIS Pro* – duomenims analizuoti ir publikuoti.

Lauko tyrimų metodai. Įvairioms sistematinėms grupėms buvo naudojami skirtingi šiuolaikiniai tiesioginių stebėjimų, nuotolinio vaizdų fiksavimo ir piliečių mokslo metodai.

Invazinių žinduolių pagrindiniai lauko tyrimų metodai buvo keliuose žuvusių žinduolių registravimas, stebėjimas kameromis ir gaudymas spąstais, taip pat sumedžiojimo analizė ir žemių naudotojų apklausa (Balčiauskas et al., 2021, 2022).

Vėžiagyvių tyrimams naudoti pasyvūs metodai (gaudymas bučiukais, gaudyklėmis ir viliojimas masalu) ir aktyvūs metodai (nardymas, naktinis objektų stebėjimas).

Žuvims taikyta specializuota žvejyba tinklais ir elektros žūklės įrankiais (Rakauskas et al., 2021).

Invazinių ir svetimžemių augalų lauko tyrimų būdai skyrėsi priklausomai nuo rūšies statuso. Buvo registruojama ir vertinama kiekviena tyrimų metu pastebėta Sąjungai susirūpinimą keliančių invazinių svetimų augalų rūšių populiacija – jeigu ji užimdavo daugiau kaip 100 m^2, būdavo apibrėžiamas jos kontūras, kitais atvejais – kartografuojamas taškas. Sosnovskio barščio masinio paplitimo teritorijose plotams kartografuoti panaudotos bepilotės skraidyklės (dji mavic 2 zoom ir UAV Birdie).

Lietuvoje invazinių augalų rūšių ir potencialiai invazinių rūšių paieška vykdyta geografinių koordinačių gardelės ketvirčiuose, į kuriuos buvo suskirstyta visa šalies teritorija, t. y. registruota bent viena radavietė ir atliktas populiacijos vertinimas kiekvienoje 5x5 km dydžio teritorijoje.

Svarbiausieji rezultatai

Pagrindiniai faktiniai tyrimų rezultatai yra tirtų rūšių paplitimo žemėlapiai ir duomenų bazė, kurioje sukaupta duomenų apie 92 537 radavietes. Kartu su informacija apie vietoves, kuriose tikslinių invazinių rūšių paieška nebuvo sėkminga, duomenų bazėje iš viso yra 108 474 įrašai.

Taksonų paplitimas žemėlapiuose pavaizduotas taškiniu būdu, naudojant geografinių koordinačių gardelę, kurios kraštines sudaro 00°06' šiaurės platumos ir 00°10' rytų ilgumos, o kartografavimo žingsnis yra apie 10 km. Žemėlapio maketas sukurtas, naudojant SRTM GL1 aukščių duomenų bazę ir OpenStreetMap hidrografinius duomenis.

Svarbesni faktiniai inventorizavimo duomenys pateikiami 1–4 lentelėse.

1 lentelėje apibendrinti stambiųjų sistematinių grupių invazinių ir svetimžemių rūšių inventorizavimo rezultatai. Dėl didesnio tyrimų objektų skaičiaus, tyrimų metodikos detalumo ir lauko tyrimų intensyvumo, svetimžemių augalų stebėjimai yra didžiausi apimtimi. Reikėtų atkreipti dėmesį į vandenyje gyvenančių invazinių gyvūnų tyrimų rezultatų išskirtinumą – santykinai daug tirtų vandens telkinių dar yra „švarūs“ nuo svetimų žuvų ar vėžiagyvių.

1 lentelė. Invazinių ir svetimžemių Lietuvoje rūšių inventorizavimo rezultatai pagrindinėse organizmų grupėse (* rūšis ir (arba) gentis)

	Bendras įrašų skaičius	Stebėjimų skaičius	Rūšių skaičius	Gardelės kvadratų, kuriuose stebėtos rūšys, skaičius
Augalai	84596	84596	230*	622
Žinduoliai	11648	4947	6	560
Paukščiai	228	228	2	65
Ropliai	11	11	1	8
Žuvys	8220	359	4	114
Vėžiagyviai	2132	945	7	252
Moliuskai	1639	1451	2	285

2 lentelėje pateikti invazinių ir svetimžemių augalų būklės vertinimo rezultatai. Surinkta duomenų apie daugiau nei 10 procentų Lietuvos induočių floros atstovų.

Kaip galima suprasti iš lentelėje pateiktų įrašų, lauko tyrėjai registravo ir kitas, į projekto tikslinių rūšių grupę neįtrauktas svetimžemių augalų rūšis. Kai kurios iš jų fiksuotos itin dažnai, todėl ateityje gali papildyti Invazinių rūšių Lietuvos Respublikos teritorijoje sąrašą. Pavyzdžiais gali būti tokie medžiai ir krūmai, kaip baltoji tuopa, dygliuotasis šaltalankis, putinalapis pūslenis, baltauogė meškytė, įvairios lanksvos ir alyvos. Iš žolių reikėtų išskirti kompasinę salotą, kuri aptikta beveik trečdalyje tirtų teritorijų.

2 lentelė. Lietuvoje invazinių ir svetimžemių augalų rūšių inventorizavimo rezultatai (* – miškų valstybės kadastro duomenys; pusjuodžiu šriftu išskirtos rūšys, kurių nebuvo projekto tikslinių rūšių sąraše)

Eil. Nr.	Lotyniškas rūšies pavadinimas	Lietuviškas rūšies pavadinimas	Gardelės kvadratų, kuriuose stebėta rūšis, skaičius	Stebėjimų skaičius
1	*Armoracia rusticana* G.Gaertn., B.Mey. & Scherb.	Valgomasis krienas	593	2740
2	*Acer negundo* L.	Uosialapis klevas	576	2998
3	*Erigeron annuus* (L.) Desf	Vienametė šiušelė	574	3116
4	*Parthenocissus quinquefolia* (L.) Planch.	Penkialapis vynvytis	520	1504
5	*Rosa rugosa* Thunb.	Raukšlėtalapis erškėtis	509	1797
6	*Solidago canadensis* L.	Kanadinė rykštenė	500	2139
7	*Reynoutria japonica* Houtt.	Japoninė reinutrė	481	1286
8	*Lupinus polyphyllus* Lindl.	Gausialapis lubinas	479	3751
9	*Helianthus tuberosus* L.	Bulvinė saulėgrąža	458	1195
10	*Cornus sericea* L.	Palaipinė sedula	457	1123
11	*Oenothera biennis* L.	Dvimetė nakviša	454	1130
12	*Asparagus officinalis* L.	Vaistinis smidras	444	949
13	*Rhus typhina* L.	Rūgštusis žagrenis	443	1093
14	*Impatiens parviflora* DC.	Smulkiažiedė sprigė	440	4339
15	*Oenothera rubricaulis* Kleb.	Raudonstiebė nakviša	440	1779
16	*Amelanchier spicata* (Lam.) K.Koch	Varpinė medlieva	408	5306
17	*Robinia pseudoacacia* L.	Baltažiedė robinija	403	959
18	*Rudbeckia laciniata* L.	Plunksnalapė rudbekija	398	843
19	*Larix decidua* Mill.*	Europinis maumedis	397	2387
20	*Sambucus nigra* L.	Juodauogis šeivamedis	392	1119
21	*Euphorbia cyparissias* L.	Siauralapė karpažolė	383	869
22	***Hippophae rhamnoides* L.**	Dygliuotasis šaltalankis	382	1344
23	*Medicago* × *varia* Martyn	Margoji liucerna	375	1069
24	*Echinocystis lobata* (Michx.) Torr. & A.Gray	Dygliavaisis virkštenis	362	1445
25	*Sambucus* sp.*	Šeivamedis	357	5262
26	***Erigeron canadensis* L.**	Kanadinė šiušelė	356	872
27	*Sorbaria sorbifolia* (L.) A.Braun	Šermukšnialapė lanksvūnė	351	716
28	*Solidago gigantea* Aiton	Didžioji rykštenė	347	1306
29	*Vinca minor* L.	Mažoji žiemė	344	700
30	*Populus* sp.*	Tuopa	343	1264

Eil. Nr.	Lotyniškas rūšies pavadinimas	Lietuviškas rūšies pavadinimas	Gardelės kvadratų, kuriuose stebėta rūšis, skaičius	Stebėjimų skaičius
31	*Sambucus racemosa* L.	Raudonuogis šeivamedis	331	816
32	*Rumex confertus* Willd.	Tankiažiedė rūgštynė	324	1439
33	*Rudbeckia hirta* L.	Plaukuotoji rudbekija	321	560
34	*Elodea canadensis* Michx.	Kanadinė elodėja	317	611
35	*Oxalis stricta* L.	Statusis kiškiakopūstis	313	642
36	*Heracleum sosnowskyi* Manden.	Sosnovskio barštis	308	6790
37	*Phedimus spurius* (M.Bieb.) 't Hart	Kaukazinis gargždulis	303	479
38	*Impatiens glandulifera* Royle	Bitinė sprigė	298	2225
39	*Dianthus barbatus* L.	Šiurpinis gvazdikas	293	465
40	***Saponaria officinalis* L. (veislės)**	Vaistinis putoklis	266	541
41	*Sedum album* L.	Baltažiedis šilokas	231	328
42	*Cytisus scoparius* (L.) Link	Šluotinis sausakrūmis	218	961
43	*Quercus rubra* L.	Raudonasis ąžuolas	210	616
44	***Physocarpus opulifolius* (L.) Maxim.**	Putinalapis pūslenis	207	823
45	*Reynoutria sachalinensis* (F.Schmidt) Nakai	Sachalininė reinutrė	206	315
46	*Amaranthus retroflexus* L.	Šiurkštusis burnotis	201	394
47	***Spiraea* sp.**	Lanksva	190	505
48	***Symphoricarpos albus* (L.) S.F.Blake**	Baltauogė meškytė	190	295
49	***Lactuca serriola* L.**	Kompasinė salota	190	248
50	*Prunus serotina* Ehrh.	Vėlyvoji ieva	188	490
51	***Caragana arborescens* Lam.**	Paprastoji karagana	187	370
52	*Bidens frondosa* L.	Ilgakotis lakišius	179	391
53	***Populus alba* L.**	Baltoji tuopa	170	263
54	***Syringa vulgaris* L.**	Paprastoji alyva	165	406
55	*Acer pseudoplatanus* L.	Platanalapis klevas	151	314
56	*Malus toringo* (Siebold) de Vriese	Skiautėtalapė obelis	136	300
57	*Echinops sphaerocephalus* L.	Apskritagalvis bandrenis	135	208
58	*Symphyotrichum lanceolatum* (Willd.) G.L.Nesom	Siauralapis astrūnas	131	243
59	***Acorus calamus* L.**	Balinis ajeras	130	379
60	*Pinus banksiana* Lamb.*	Bankso pušis	127	1539
61	*Epilobium ciliatum* Raf.	Liaukuotastiebė ožkarožė	113	216
62	*Gypsophila paniculata* L.	Muilinė guboja	109	233

Rūšys, aptiktos 99–10 kvadratų: *Symphyotrichum novi-belgii* (L.) G.L.Nesom (97), *Aesculus hippocastanum* L. (96), *Hemerocallis fulva* (L.) L. (96), *Asclepias syriaca* L. (88), *Corispermum pallasii* Steven (82), *Chaenomeles japonica* (Thunb.) Lindl. ex Spach (69), *Lonicera caprifolium* L. (68), *Prunus cerasifera* Ehrh. (59), *Bunias orientalis* L. (58), *Senecio vernalis* Waldst. & Kit. (55), *Eragrostis minor* Host (50), *Dipsacus fullonum* L. (48), *Galega orientalis* Lam. (45), *Malus domestica* Borkh. (36), *Cerastium tomentosum* L. (36), *Amorpha fruticosa* L. (34), *Pinus mugo* Turra (29), *Prunus avium* (L.) L. (29), *Inula helenium* L. (29), *Centaurea montana* L. (28), *Alkekengi officinarum* Moench (27), *Malva alcea* L. (27), *Robinia viscosa* Vent. (27), *Symphyotrichum dumosum* (L.) G.L.Nesom (26), *Fagus sylvatica* L. (24), ×*Sorbaronia* '*Mitschurinii*' (23), *Veronica filiformis* Sm. (23), *Solidago* sp. (21), *Ligustrum vulgare* L. (20), *Abies* sp. (18)*, *Celastrus orbiculatus* Thunb. (18), *Caragana frutex* (L.) K.Koch (18), *Acer tataricum* L. (18), *Lactuca tatarica* (L.) C.A.Mey. (17), *Scilla siberica* Haw. (17), *Aralia elata* (Miq.) Seem. (15), *Erucastrum gallicum* (Willd.) O.E.Schulz (15), *Heliopsis helianthoides* (L.) Sweet (15), *Symphyotrichum* ×*salignum* (Willd.) G.L.Nesom (13), *Hydrangea arborescens* L. (12), *Symphyotrichum novae-angliae* (L.) G.L.Nesom (12), *Symphyotrichum* sp. (11), *Ribes rubrum* L. (10), *Gaillardia* sp. (10), *Viburnum lantana* L. (10)

Be to, reiktų atkreipti dėmesį į tokius, palyginti egzotinius augalus, kurių stebėtos tik pavienės radavietės, bet, keičiantis klimatui, jie gali prisijungti prie nepageidautinų mūsų kraštuose rūšių grupės (įvairūs riešutmedžiai, aralijos, fitolakos, paprastoji portulaka, įvairūs miskantai ir kiti dekoratyviniai migliniai augalai).

Kita vertus, nepavyko taip dažnai aptikti kai kurių augalų, kurie preliminariai buvo įtraukti į potencialiai invazinių rūšių sąrašą – surinkta mažiau nei tikėtasi duomenų apie pavasarinę žilę, apskritalapį sausmedį, rytinę engrą, nestebėta plintanti į gamtines buveines Europos Sąjungai susirūpinimą kelianti šeriuotoji soruolė.

Pirmą kartą šalies invazinių augalų tyrimų istorijoje gauti tikslūs duomenys apie Sąjungai susirūpinimą keliančių invazinių svetimų rūšių paplitimą, užimtus plotus ir populiacijų būklę (3 lentelė). Jie yra itin svarbūs invazinių rūšių stebėsenai organizuoti ir prognozėms sudaryti, kovos strategijai sukurti ir konkrečioms priemonėms taikyti.

3 lentelė. Sąjungai susirūpinimą keliančių invazinių svetimų augalų rūšių inventorizavimo Lietuvoje rezultatai

Lotyniškas rūšies pavadinimas	Lietuviškas rūšies pavadinimas	Gardelės kvadratų, kuriuose stebėta rūšis, skaičius	Radaviečių (taškinių ir plotų) skaičius	Plotų skaičius	Plotas, ha
Heracleum sosnowskyi Manden.	Sosnovskio barštis	308	6790	3543	4916
Impatiens glandulifera Royle	Bitinė sprigė	298	2225	946	518
Asclepias syriaca L.	Sirinis klemalis	88	167	32	2,6
Celastrus orbiculatus Thunb.	Apskritalapis smaugikas	18	28	0	0
Elodea nuttallii (Planch.) H.St. John	Suktalapė elodėja	2	3	0	0
Heracleum mantegazzianum Sommier & Levier	Mantegacio barštis	2	4	4	0,6

Būtina atkreipti dėmesį, kad invazinių augalų užimamas plotas yra labai kaitus dydis. Pradėjus aktyviai naudoti Sosnovskio barščio naikinimo priemones ir mažėjant apleistų žemių, augalo sąžalynų plotai gali mažėti, nors vargu ar tai galima pasakyti apie taškinius stebėjimus. Ir priešingai, vienmečio augalo bitinės sprigės sąžalynai atsiranda vis kitose natūraliose augavietėse.

Invazinės faunos tyrimų rezultatai gerai atspindi jos istoriją, gyvenimo būdo ypatumus ir gamtinės aplinkos antropogenizacijos lygį. Daugiau kaip prieš pusę amžiaus į mūsų geografines platumas patekę žinduoliai (mangutai, kanadinės audinės, pilkosios žiurkės) šiuo metu gyvena visos teritorijos tinkamose buveinėse. Daugėja svetimų paukščių pasirodymo atvejų. Sunkiai pastebimiems vandens gyvūnams – žuvims, vėžiagyviams ir moliuskams, kuriems aptikti reikalingi specializuoti, imlūs laikui ir techniškai brangesni tyrimai, prognozuojamas platesnis paplitimas, nei 4 lentelėje pateikiami duomenys.

4 lentelė. Lietuvoje invazinių ir svetimžemių gyvūnų rūšių inventorizavimo rezultatai

Lotyniškas rūšies pavadinimas	Lietuviškas rūšies pavadinimas	Gardelės kvadratų, kuriuose stebėta rūšis, skaičius	Stebėjimų skaičius
MOLIUSKAI			
Arion vulgaris Moquin-Tandon, 1855	Ispaninis arionas	282	1432
Potamopyrgus antipodarum (J.E.Gray, 1843)	Pietinė vijasraigė	13	19
VĖŽIAGYVIAI			
Faxonius limosus (Rafinesque, 1817)	Rainuotasis vėžys	191	405
Pontogammarus robustoides (Sars, 1894)	Kietašarvė šoniplauka	98	255
Paramysis lacustris (Czerniavsky, 1882)	Ežerinė mizidė	87	172
Pacifastacus leniusculus (Dana, 1852)	Žymėtasis vėžys	22	40
Dikerogammarus haemobaphes (Eichwald, 1841)	Rausvaūsė šoniplauka	18	36
Dikerogammarus villosus (Sowinsky, 1894)	Gauruotoji šoniplauka	13	31
Eriocheir sinensis H.Milne-Edwards, 1853	Apželtkojis krabas	5	6
ŽUVYS			
Neogobius fluviatilis (Pallas, 1814)	Upinis grundalas	53	158
Perccottus glenii Dybowski, 1877	Nuodėgulinis grundalas	44	139
Neogobius melanostomus (Pallas, 1814)	Juodažiotis grundalas	15	47
Pseudorasbora parva (Temminck & Schlegel, 1846)	Rytinis gružlelis	12	15
ROPLIAI			
Trachemys scripta (Thunberg & Schoepff, 1792)	Raštuotasis vėžlys	8	11
PAUKŠČIAI			
Branta canadensis (Linnaeus, 1758)	Kanadinė berniklė	59	205
Psittacula krameri (Scopoli, 1769)	Kramerio papūga	11	23
ŽINDUOLIAI			
Nyctereutes procyonoides (Gray, 1834)	Paprastasis mangutas	525	4055
Neovison vison (Schreber, 1777)	Kanadinė audinė	325	620
Ondatra zibethicus (Linnaeus, 1766)	Ondatra	87	121
Rattus norvegicus (Berkenhout, 1769)	Pilkoji žiurkė	44	94
Procyon lotor (Linnaeus, 1758)	Paprastasis meškėnas	4	55
Myocastor coypus (G.I.Molina, 1782)	Nutrija	2	2

Neabejotina, kad aptartų tyrimų rezultatai kartu išryškina ir žinojimo trūkumus, kurių įvardijimas turėtų padėti suformuluoti naujas šalies biologinės įvairovės tyrimų kryptis.

Invazinių rūšių teisinis reglamentavimas Lietuvoje ir Europos Sąjungoje

Laura Janulaitienė

Invazinių rūšių naudojimas ir plitimas valdomas nacionaliniais Lietuvos Respublikos teisės aktais, Europos Sąjungos visoms valstybėms narėms vienodai taikomu reglamentu ir jo įgyvendinimo reglamentais. Šie teisės aktai sudaromi, atsižvelgiant į Europos Sąjungos Biologinės įvairovės strategijos iki 2030 m. siekį, kad Europos biologinė įvairovė pradėtų atsigauti, kovojant su pagrindiniais jos nykimą įtakojančiais veiksniais, tarp kurių yra ir invazinės svetimos rūšys, kurios kelia grėsmę ekosistemoms, buveinėms, rūšims, žmogaus sveikatai ar ekonomikai. Biologinės įvairovės konvencija ir kiti tarptautiniai susitarimai vis daugiau dėmesio skiria invazinių svetimų rūšių prevencijai ir valdymui, nes dėl pasaulinės prekybos, transporto, turizmo ir klimato kaitos tokių rūšių keliamas pavojus gali dar labiau didėti.

Lietuvoje pagrindinės teisinės nuostatos nustatytos Lietuvos Respublikos laukinių augalų ir grybų įstatyme ir Lietuvos Respublikos laukinės gyvūnijos įstatyme, kurie detalizuojami aplinkos ministro įsakymais. Invazinių rūšių valdymo ir naudojimo reikalavimai nustatyti Invazinių rūšių kontrolės ir naikinimo tvarkos apraše, kuris patvirtintas Lietuvos Respublikos aplinkos ministro 2002 m. liepos 1 d. įsakymu Nr. 352 „Dėl Introdukcijos, reintrodukcijos ir perkėlimo tvarkos aprašo, Invazinių rūšių kontrolės ir naikinimo tvarkos aprašo, Invazinių rūšių kontrolės tarybos sudėties ir nuostatų, Introdukcijos, reintrodukcijos ir perkėlimo programos patvirtinimo“. Šiuo įsakymu yra tvirtinama ir Invazinių rūšių kontrolės tarybos sudėtis bei nuostatai.

Invazinių rūšių kontrolės taryba teikia pasiūlymus Aplinkos ministerijai dėl invazinių rūšių plitimo prevencijos, mokslinių tyrimų ir eksperimentinės plėtros, invazinių rūšių valdymo planų, priemonių ir programų kūrimo ir įgyvendinimo, dėl teisės aktų, susijusių su invazinėmis rūšimis, rengimo, pakeitimo ar papildymo, teikia rekomendacijas, siūlymus ir išvadas dėl laukinių augalų, grybų ir jų hibridų perkėlimo, introdukcijos ir reintrodukcijos, taip pat teikia pasiūlymus dėl invazinių rūšių įvežimo į Lietuvos Respubliką ir jų naudojimo. Šiuo metu Invazinių rūšių kontrolės taryba sudaryta iš Aplinkos apsaugos agentūros, Aplinkos apsaugos departamento prie Aplinkos ministerijos, Gamtos tyrimų centro Botanikos ir Ekologijos institutų, Kauno Tado Ivanausko zoologijos muziejaus, Klaipėdos universiteto Jūros tyrimų instituto, Lietuvos agrarinių ir miškų mokslo centro Žemdirbystės instituto, Lietuvos ornitologų draugijos, Nacionalinės visuomenės sveikatos priežiūros laboratorijos, Valstybinės augalininkystės tarnybos prie Žemės ūkio ministerijos, Valstybinės maisto ir veterinarijos tarnybos, Valstybinės saugomų teritorijų tarnybos prie Aplinkos ministerijos, Vilniaus universiteto Botanikos sodo, Vilniaus universiteto Gyvybės mokslų centro Biomokslų instituto, Vytauto Didžiojo universiteto Botanikos sodo, Žemės ūkio ministerijos Žuvininkystės departamento, Žuvininkystės tarnybos prie Lietuvos Respublikos žemės ūkio ministerijos ir Lietuvos Respublikos aplinkos ministerijos Gamtos apsaugos politikos grupės atstovų.

Pirmasis Lietuvoje naikintinų rūšių sąrašas aplinkos ministro įsakymu buvo patvirtintas 2001 m. Į šį sąrašą buvo įrašyta viena augalų rūšis – Sosnovskio barštis (*Heracleum sosnowskyi*). Dabar į Invazinių rūšių Lietuvos Respublikos teritorijoje sąrašą, patvirtintą Lietuvos Respublikos aplinkos ministro 2004 m. rugpjūčio 16 d. įsakymu Nr. D1-433 „Dėl Invazinių rūšių Lietuvos Respublikos teritorijoje sąrašo patvirtinimo“, įrašytos 35 rūšys, tarp kurių yra 17 gyvūnų rūšių ir 18 augalų rūšių (5 lentelė).

Europos Sąjungoje, siekiant bendro visose valstybėse narėse invazinių svetimų rūšių naudojimo ir plitimo valdymo, 2015 m. sausio 1 d. buvo pradėtas taikyti 2014 m. spalio 22 d. Europos Parlamento ir Tarybos reglamentas (ES) Nr. 1143/2014 dėl invazinių svetimų rūšių introdukcijos ir plitimo prevencijos ir valdymo. Priėmus šį reglamentą, buvo aiškiai apibrėžtos invazinių ir svetimų rūšių sąvokos bei bendri invazinių rūšių valdymo principai, t. y. reglamente nustatomos taisyklės, kuriomis siekiama užkirsti kelią neigiamam tyčinės ir netyčinės invazinių svetimų rūšių introdukcijos ir plitimo Europos Sąjungoje poveikiui biologinei įvairovei, jį kuo labiau sumažinti ir sušvelninti.

Kad teisingai būtų taikomi ir suprantami Lietuvos ir Europos Sąjungos teisės aktai, sąvokos „svetimos rūšys“ ir „invazinės svetimos rūšys“ yra vartojamos, kaip apibrėžta Reglamente (ES) Nr. 1143/2014. Taigi, „svetimos rūšys – gyvi gyvūnų, augalų, grybų arba mikroorganizmų rūšių, porūšių arba žemesnio taksono egzemplioriai, introdukuoti už jų natūralaus paplitimo arealo ribų; šis terminas apima visas tokių rūšių dalis, gametas, sėklas, kiaušinius ar auginius, taip pat visus hibridus ir gyvūnų ar augalų veisles, kurių atstovai gali išgyventi ir toliau daugintis“, o „invazinės svetimos rūšys – svetimos rūšys, kurių introdukcija arba plitimas, kaip nustatyta, kelia grėsmę arba daro neigiamą poveikį biologinei įvairovei ir atitinkamoms ekosistemų funkcijoms“. Šiame reglamente apibrėžtos ir kitos plačiai naudojamos sąvokos.

2015 m. sausio 1 d. įsigaliojus Reglamentui (ES) Nr. 1143/2014, Europos Komisija bendradarbiaudama su Reglamente (ES) Nr. 1143/2014 nustatytu komitetu ir Mokslo forumu, į kuriuos yra paskiriami atstovai iš kiekvienos Europos Sąjungos valstybės narės, 2016 m. liepos 14 d. patvirtino pirmąjį Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašą, kitaip vadinamą Europos Sąjungos invazinių rūšių sąrašu, į kurį buvo įrašytos 37 svetimos gyvūnų ir augalų rūšys (6 lentelė). Šis sąrašas yra nuolat pildomas naujomis rūšimis:

1) 2017 m. liepos 12 d. Komisijos įgyvendinimo reglamentas (ES) 2017/1263, kuriuo atnaujinamas Komisijos įgyvendinimo reglamentu (ES) 2016/1141 pagal Europos Parlamento ir Tarybos reglamentą (ES) Nr. 1143/2014 nustatytas Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašas (OJ L 182, 13.7.2017, p. 37–39) – sąrašas papildytas 12 rūšių;

2) 2019 m. liepos 25 d. Komisijos įgyvendinimo reglamentas (ES) 2019/1262, kuriuo dėl Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašo atnaujinimo iš dalies keičiamas Įgyvendinimo reglamentas (ES) 2016/1141 (OJ L 199, 26.7.2019, p. 1–4) – sąrašas papildytas 17 rūšių;

3) 2022 m. liepos 12 d. Komisijos įgyvendinimo reglamentas (ES) 2022/1203, kuriuo dėl Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašo atnaujinimo iš dalies

5 lentelė. Invazinių rūšių Lietuvos Respublikos teritorijoje sąrašas

Lotyniškas pavadinimas	Lietuviškas pavadinimas	Anksčiau vartoti pavadinimai	Įrašymo į sąrašą data
AUGALAI			
Acer negundo L.	Uosialapis klevas		2004-08-22
Amelanchier spicata (Lam.) K.Koch	Varpinė medlieva		2012-07-01
Bidens frondosa L.	Ilgakotis lakišius		2012-07-01
Cytisus scoparius (L.) Link	Šluotinis sausakrūmis	*Sarothamnus scoparius* (L.) Wimm. ex W.D.J.Koch	2012-07-01
Echinocystis lobata (Michx.) Torr. & A.Gray	Dygliavaisis virkštenis		2012-07-01
Elodea canadensis Michx.	Kanadinė elodėja		2012-07-01
Erigeron annuus (L.) Desf	Vienametė šiušelė	*Stenactis annua* Cass.; *Phalacroloma septentrionale* (Fernald & Wiegand) Tzvelev	2012-07-01
Gypsophila paniculata L.	Muilinė guboja		2012-07-01
Heracleum sosnowskyi Manden.	Sosnovskio barštis		2004-08-22
Impatiens glandulifera Royle	Bitinė sprigė		2014-04-30
Impatiens parviflora DC.	Smulkiažiedė sprigė		2004-08-22
Lupinus polyphyllus Lindl.	Gausialapis lubinas		2004-08-22
Prunus serotina Ehrh.	Vėlyvoji ieva	*Padus serotina* (Ehrh.) Borkh.	2009-11-13
Robinia pseudoacacia L.	Baltažiedė robinija		2009-11-13
Rosa rugosa Thunb.	Raukšlėtalapis erškėtis		2012-07-01
Rumex confertus Willd.	Tankiažiedė rūgštynė		2012-07-01
Solidago canadensis L.	Kanadinė rykštenė	*Solidago altissima* auct.	2012-07-01
Solidago gigantea Aiton	Didžioji rykštenė	*Solidago serotina* Aiton	2012-07-01
GYVŪNAI			
MOLIUSKAI			
Arion vulgaris Moquin-Tandon, 1855	Ispaninis arionas	*Arion lusitanicus* auct.	2014-04-30
Potamopyrgus antipodarum (J.E.Gray, 1843)	Pietinė vijasraigė		2012-07-01
VĖŽIAGYVIAI			
Dikerogammarus villosus (Sowinsky, 1894)	Gauruotoji šoniplauka		2016-12-24
Faxonius limosus (Rafinesque, 1817)	Rainuotasis vėžys	*Orconectes limosus* (Rafinesque, 1817)	2004-08-22
Pacifastacus leniusculus (Dana, 1852)	Žymėtasis vėžys		2004-08-22
Paramysis lacustris (Czerniavsky, 1882)	Ežerinė mizidė		2004-08-22
Pontogammarus robustoides (Sars, 1894)	Kietašarvė šoniplauka		2004-08-22
ŽUVYS			
Neogobius melanostomus (Pallas, 1814)	Juodažiotis grundalas		2004-08-22
Perccottus glenii Dybowski, 1877	Nuodėgulinis grundalas		2004-08-22
ROPLIAI			
Chrysemys picta (Schneider, 1783)	Puošnusis vėžlys		2014-04-30
Trachemys scripta (Schoepff, 1792)	Raštuotasis vėžlys		2014-04-30
PAUKŠČIAI			
Branta canadensis (Linnaeus, 1758)	Kanadinė berniklė		2012-07-01
ŽINDUOLIAI			
Neovison vison (Schreber, 1777)	Kanadinė audinė	*Mustela vison* Schreber, 1777	2004-08-22
Nyctereutes procyonoides (Gray, 1834)	Paprastasis mangutas		2004-08-22
Ondatra zibethicus (Linnaeus, 1766)	Ondatra		2009-11-13
Procyon lotor (Linnaeus, 1758)	Paprastasis meškėnas		2012-07-01
Rattus norvegicus (Berkenhout, 1769)	Pilkoji žiurkė		2012-06-27

keičiamas Įgyvendinimo reglamentas (ES) 2016/1141 – sąrašas papildytas 22 rūšimis. Keturioms rūšims taikomi pereinamieji laikotarpiai: paprastajam fundului (*Fundulus heteroclitus* (Linnaeus, 1766)), salotinei plūdoklei (*Pistia stratiotes* L.) ir lygiajai naguotei (*Xenopus laevis* (Daudin, 1802) apribojimai taikomi nuo 2024 m. rugpjūčio 2 d., apskritalapiui smaugikui (*Celastrus orbiculatus* Thunb.) – nuo 2027 m. rugpjūčio 2 d.

6 lentelė. Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašas

Lotyniškas pavadinimas	Lietuviškas pavadinimas	Anksčiau vartoti pavadinimai	Įrašymo į sąrašą data
AUGALAI			
Acacia saligna (Labill.) H.L.Wendl.	Melsvalapė akacija	*Acacia cyanophylla* Lindl.	2019-08-15
Ailanthus altissima (Mill.) Swingle	Aukštasis ailantas		2019-08-15
Alternanthera philoxeroides (Mart.) Giseb.	Sausalapė alstė		2017-08-02
Andropogon virginicus L.	Virgininis bardzdžius		2019-08-15
Asclepias syriaca L.	Sirinis klemalis		2017-08-02
Baccharis halimifolia L.	Pajūrinė varva		2016-08-03
Cabomba caroliniana Gray	Paprastasis labūstras		2016-08-03
Cardiospermum grandiflorum Sw.	Stambiažiedis širdvis		2019-08-15
Celastrus orbiculatus Thunb.	Apskritalapis smaugikas		2022-08-02
Cortaderia jubata (Lemoine) Stapf	Karčiuotoji kortaderija		2019-08-15
Ehrharta calycina Sm.	Daugiametis strūklas		2019-08-15
Elodea nuttallii (Planch.) H.St.John	Suktalapė elodėja		2017-08-02
Gunnera tinctoria (Molina) Mirb.	Čilinė gunera		2017-08-02
Gymnocoronis spilanthoides DC.	Baltoji kuodulė		2019-08-15
Hakea sericea Schrad. & J.C.Wendl.	Balkšvasis vairokštis		2022-08-02
Heracleum mantegazzianum Sommier & Levier	Mantegacio barštis		2017-08-02
Heracleum persicum Desf. ex Fisch.	Persinis barštis		2016-08-03
Heracleum sosnowskyi Manden.	Sosnovskio barštis		2016-08-03
Humulus scandens (Lour.) Merr.	Japoninis apynys	*Humulus japonicus* Siebold & Zucc.	2019-08-15
Hydrocotyle ranunculoides L.f.	Vėdryninė raistenė		2016-08-03
Impatiens glandulifera Royle	Bitinė sprigė		2017-08-02
Koenigia polystachya (Wall. ex Meisn.) T.M.Schust. & Reveal	Gausiažiedis kasotis	*Aconogonon polystachyum* (Wall. ex Meisn.) M.Král; *Polygonum polystachyum* Wall. ex Meisn.	2022-08-02
Lagarosiphon major (Ridl.) Moss	Didysis vandrūnėlis		2016-08-03
Lespedeza cuneata (Dum.Cours.) G.Don	Šilkinė lespedeza	*Lespedeza juncea* var. *sericea* (Thunb.) Lace & Hauech	2019-08-15
Ludwigia grandiflora (Michx.) Greuter & Burdet	Stambiažiedė liudvigija		2016-08-03
Ludwigia peploides (Kunth) P.H.Raven	Gulsčioji liudvigija		2016-08-03
Lygodium japonicum (Thunb.) Sw.	Japoninis ligodis		2019-08-15
Lysichiton americanus Hultén & H.St.John	Amerikinis dvokūnas		2016-08-03

Lotyniškas pavadinimas	Lietuviškas pavadinimas	Anksčiau vartoti pavadinimai	Įrašymo į sąrašą data
Microstegium vimineum (Trin.) A.Camus	Lanksčioji stypnė		2017-08-02
Myriophyllum aquaticum (Vell.) Verdc.	Stambioji plunksnalapė		2016-08-03
Myriophyllum heterophyllum Michx.	Kaičioji plunksnalapė		2017-08-02
Parthenium hysterophorus L.	Vėlyvoji gvajulė		2016-08-03
Pennisetum setaceum (Forssk.) Chiov.	Šeriuotoji soruolė		2017-08-02
Persicaria perfoliata (L.) H.Gross	Raizgusis rūgtis	*Polygonum perfoliatum* L.	2016-08-03
Pistia stratiotes L.	Salotinė plūdoklė		2022-08-02
Pontederia crassipes Mart.	Paprastoji skiaustmenė	*Eichhornia crassipes* (Mart.) Solms	2016-08-03
Prosopis juliflora (Sw.) DC.	Skėstašakis algarobas	*Neltuma juliflora* (Sw.) Raf.	2019-08-15
Pueraria montana (Lour.) Merr. var. *lobata* (Willd.) Maesen et S.M. Almeida	Kalninės puerarijos skiautėtalapis varietetas		2016-08-03
Salvinia molesta D.Mitch.	Didžioji plūstis	*Salvinia adnata* Desv.	2019-08-15
Triadica sebifera (L.) Small	Taukinis žvakmedis	*Sapium sebiferum* (L.) Roxb.	2019-08-15
DUMBLIAI			
Rugulopteryx okamurae (E.Y.Dawson) I.K.Hwang, W.J.Lee & H.S.Kim	Japoninis šakuolis	*Dilophus okamurae* E.Y.Dawson	2022-08-02
GYVŪNAI			
PLOKŠČIOSIOS KIRMĖLĖS			
Arthurdendyus triangulatus (Dendy, 1896)	Tribriaunis plokščiakirmis		2019-08-15
MOLIUSKAI			
Limnoperna fortunei (Dunker, 1857)	Kininė midija		2022-08-02
VĖŽIAGYVIAI			
Eriocheir sinensis (H. Milne Edwards, 1854)	Apželtkojis krabas		2016-08-03
Faxonius limosus (Rafinesque, 1817)	Rainuotasis vėžys	*Orconectes limosus* (Rafinesque, 1817)	2016-08-03
Faxonius rusticus (Girard, 1852)	Rūdėtasis vėžys	*Orconectes rusticus* (Girard, 1852)	2022-08-02
Orconectes virilis Hagen, 1870	Šiurkštusis vėžys		2016-08-03
Pacifastacus leniusculus (Dana, 1852)	Žymėtasis vėžys		2016-08-03
Procambarus clarkii Girard, 1852	Klarko vėžys		2016-08-03
Procambarus virginalis Lyko, 2017	Marmurinis vėžys	*Procambarus fallax* (Hagen, 1870) f. *virginalis*	2016-08-03
VABZDŽIAI			
Solenopsis geminata (Fabricius, 1804)	Kampuotagalvė ugninė skruzdėlė		2022-08-02
Solenopsis invicta Buren, 1972	Savaninė ugninė skruzdėlė		2022-08-02
Solenopsis richteri Forel, 1909	Juodoji ugninė skruzdėlė		2022-08-02
Vespa velutina nigrithorax Buysson, 1905	Azijinis juodnugaris širšuolas		2016-08-03
Wasmannia auropunctata (Roger, 1863)	Auksataškė skruzdėlė		2022-08-02

Lotyniškas pavadinimas	Lietuviškas pavadinimas	Anksčiau vartoti pavadinimai	Įrašymo į sąrašą data
ŽUVYS			
Ameiurus melas (Rafinesque, 1820)	Juodoji katžuvė		2022-08-02
Channa argus (Cantor, 1842)	Paprastasis žalčiagalvis		2022-08-02
Fundulus heteroclitus (Linnaeus, 1766)	Paprastasis fundulas		2022-08-02
Gambusia affinis (Baird & Girard, 1853)	Paprastoji gambuzija		2022-08-02
Gambusia holbrooki Girard, 1859	Rytinė gambuzija		2022-08-02
Lepomis gibbosus (Linnaeus, 1758)	Paprastasis saulešeris		2019-08-15
Morone americana (Gmelin, 1789)	Sidabrinis dryžasis ešerys		2022-08-02
Perccottus glenii Dybowski, 1877	Nuodėgulinis grundalas		2016-08-03
Plotosus lineatus (Thunberg, 1787)	Dygusis unguriapelekis šamas		2019-08-15
Pseudorasbora parva (Temminck & Schlegel, 1846)	Rytinis gružlelis		2016-08-03
VARLIAGYVIAI			
Lithobates catesbeianus (Shaw, 1802)	Jautinė varlė	*Rana catesbeiana* Shaw, 1802	2016-08-03
Xenopus laevis (Daudin, 1802)	Lygioji naguotė		2022-08-02
ROPLIAI			
Lampropeltis getula (Linnaeus, 1766)	Rytinis karališkasis žaltys		2022-08-02
PAUKŠČIAI			
Acridotheres tristis (Linnaeus, 1766)	Paprastoji maina		2019-08-15
Alopochen aegyptiaca (Linnaeus, 1766)	Egiptinė žąsis	*Alopochen aegyptiacus* (Linnaeus, 1766)	2017-08-02
Corvus splendens Vieillot, 1817	Indinė varna		2016-08-03
Oxyura jamaicensis (Gmelin, 1789)	Baltaskruostė stačiauodegė		2016-08-03
Pycnonotus cafer (Linnaeus, 1766)	Raudonsturplis bulbiulis		2022-08-02
Threskiornis aethiopicus (Latham, 1790)	Šventasis ibis		2016-08-03
ŽINDUOLIAI			
Axis axis (Erxleben, 1777)	Indinis aksis		2022-08-02
Callosciurus erythraeus (Pallas, 1779)	Palaso voverė		2016-08-03
Callosciurus finlaysonii (Horsfield, 1823)	Įvairiaspalvė voverė		2022-08-02
Herpestes auropunctatus (Hodgson, 1836)	Mažoji mangusta	*Urva auropunctata* (Hodgson, 1836); *Urva javanica* auct.	2016-08-03
Muntiacus reevesii (Ogilby, 1839)	Kininis muntjakas		2016-08-03
Myocastor coypus (G.I.Molina, 1782)	Nutrija		2016-08-03
Nasua nasua (Linnaeus, 1766)	Paprastasis koatis		2016-08-03
Nyctereutes procyonoides (Gray, 1834)	Paprastasis mangutas		2017-08-02
Ondatra zibethicus (Linnaeus, 1766)	Ondatra		2017-08-02
Procyon lotor (Linnaeus, 1758)	Paprastasis meškėnas		
Sciurus carolinensis J.F.Gmelin, 1788	Pilkoji voverė		2016-08-03
Sciurus niger Linnaeus, 1758	Juodoji voverė		2016-08-03
Tamias sibiricus (Laxmann, 1769)	Sibirinis burundukas	*Eutamias sibiricus* (Laxmann, 1769)	2016-08-03

Kai kurios rūšys yra įrašytos ir į Invazinių rūšių Lietuvos Respublikos teritorijoje sąrašą, ir į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašą, pavyzdžiui, Sosnovskio barštis, bitinė sprigė, nuodėgulinis grundalas, rainuotasis ir žymėtasis vėžiai, mangutas ir kt. Tokiu atveju taikomos Reglamento (ES) Nr. 1143/2014 nuostatos, kurios perkeltos ir į Laukinių augalų ir grybų įstatymą bei Laukinės gyvūnijos įstatymą.

Gyvybingų invazinių rūšių laikymas, auginimas, veisimas, dauginimas, mainymas, įvežimas, perkėlimas, prekyba ar kitoks jų naudojimas yra draudžiamas, išskyrus atvejus, nurodytus Invazinių rūšių kontrolės ir naikinimo tvarkos apraše. Šiame apraše nustatyti leidimų naudoti invazines rūšis išdavimo, galiojimo sustabdymo, galiojimo sustabdymo panaikinimo, galiojimo panaikinimo, invazinių rūšių sulaikymo, konfiskavimo ir leidimų naudoti invazines rūšis turėtojų veiklos patikrinimų ir kt. reikalavimai.

Leidimai naudoti invazines rūšis reikalingi, ketinant naudoti gyvus gyvūnus, gyvybingus augalus, grybus ir mikroorganizmus bei gyvybingas jų dalis, kai rūšys įrašytos į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašą, išskyrus:

1) asmenims, kurie nekomerciniais tikslais laiko gyvūnus augintinius ir jie yra įrašyti į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašą, šiuos gyvūnus leidžiama laikyti iki natūralios jų mirties ir vežti į Europos Sąjungą, iš jos arba per jos teritoriją, jei gyvūnus turėjo dar prieš įrašant juos į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašą ir gyvūnai yra laikomi uždaroje valdoje ir imtasi visų priemonių, kad jie nesidaugintų ir neištrūktų į laisvę;

2) asmenims, kurie laiko invazines rūšis komerciniais tikslais ir jas įsigijo prieš tas rūšis įrašant į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašą: a) leidžiama ne ilgiau kaip 2 metus nuo konkrečios rūšies įrašymo į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašą laikyti ar vežti tos rūšies gyvus egzempliorius arba galinčias daugintis jų dalis, siekiant juos (jas) parduoti arba perduoti asmenims, kuriems yra išduotas leidimas naudoti invazines rūšis moksliniams tyrimams, *ex-situ* išsaugojimui arba naudoti invazines rūšis medicinos tikslais, kai to reikia siekiant daryti pažangą žmonių sveikatos srityje, jei egzemplioriai laikomi uždaroje valdoje ir vežami uždarame konteineryje, ir jei sudarytos visos sąlygos, kad tie egzemplioriai negalėtų daugintis ar ištrūkti į laisvę, arba tuos egzempliorius sunaikinti nesukeliant kančios, siekiant išeikvoti jų išteklius, vadovaujantis teisės aktų nustatyta tvarka; b) gyvus egzempliorius parduoti arba perduoti asmenims nekomerciniais tikslais leidžiama 1 metus po jų įrašymo į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašą, jei egzemplioriai laikomi uždaroje valdoje ir vežami uždarame konteineryje ir sudarytos visos sąlygos, kad tie egzemplioriai negalėtų daugintis ar ištrūkti į laisvę.

Institucijas, atsakingas už Reglamento (ES) Nr. 1143/2014 nuostatų įgyvendinimą, paskiria ir jų funkcijų pasiskirstymą reglamentuoja Lietuvos Respublikos Vyriausybės 2016 m. gegužės 16 d. nutarimas Nr. 475 „Dėl kompetentingų institucijų, atsakingų už Europos Parlamento ir Tarybos reglamento (ES) Nr. 1143/2014 taikymą, paskyrimo".

Aplinkos ministerijos įgaliota institucija – Aplinkos apsaugos agentūra – išduoda leidimus naudoti invazines rūšis, kurios įrašytos į Sąjungai susirūpinimą keliančių invazinių

svetimų rūšių sąrašą: 1) leidimą naudoti invazines rūšis moksliniams tyrimams, *ex-situ* išsaugojimui arba naudoti invazines rūšis medicinos tikslais, kai to reikia, siekiant daryti pažangą žmonių sveikatos srityje; 2) leidimą naudoti invazines rūšis tikslais, susijusiais su įtikinamais visuomenės interesais, įskaitant socialinio ar ekonominio pobūdžio interesus.

Vadovaujantis Reglamento (ES) Nr. 1143/2014 13 straipsnio 2 dalimi, yra parengti į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašą įrašytų augalų rūšių patekimo kelių ir plitimo valdymo veiksmų planas, patvirtintas Lietuvos Respublikos aplinkos ministro 2022 m. birželio 7 d. įsakymu Nr. D1-171 „Dėl Į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašą įrašytų augalų rūšių patekimo kelių ir plitimo valdymo veiksmų plano patvirtinimo“ ir į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašą įrašytų gyvūnų rūšių patekimo kelių ir plitimo valdymo veiksmų planas, patvirtintas Lietuvos Respublikos aplinkos ministro 2022 m. birželio 7 d. įsakymu Nr. D1-172 „Dėl Į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašą įrašytų gyvūnų rūšių patekimo kelių ir plitimo valdymo veiksmų plano patvirtinimo“. Šie planai nustato veiksmus, kuriuos būtina įgyvendinti, taikant prevencines, kontrolės ir naikinimo priemones ir pasitelkus administracinius pajėgumus užkirsti kelią į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašą įrašytoms augalų rūšims patekti į Lietuvą ir veiksmingai valdyti jau esančių rūšių populiacijas, siekiant efektyviai mažinti jų daromą žalą biologinei įvairovei, ekonomikai ir žmonių sveikatai.

Aplinkos apsaugos departamentas prie Aplinkos ministerijos atsakingas už invazinių rūšių naudojimo kontrolę šalies viduje, o Muitinės departamentas prie Lietuvos Respublikos finansų ministerijos su Valstybine augalininkystės tarnyba prie Žemės ūkio ministerijos ir Valstybine maisto ir veterinarijos tarnyba – pasienyje. Sankcijos už invazinių rūšių neteisėtą naudojimą ir valdymo priemonių nevykdymą nustatytos Lietuvos Respublikos administracinių nusižengimų kodekso 304^2 straipsnyje.

Leidinio struktūra

Pirmajame ir antrajame skyriuose pateikiama informacija apie Lietuvoje aptinkamas augalų ir gyvūnų rūšis, kurios įrašytos į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių sąrašus ir Invazinių rūšių Lietuvos Respublikos teritorijoje sąrašus, taip pat Lietuvoje svetimas potencialiai invazines rūšis.

Taksonai stambiose sistematinėse grupėse išdėstyti abėcėlės tvarka. Vartojami naujausiai priimti taksonų pavadinimai lotynų ir lietuvių kalbomis. Kartais dar vartojamus senesnius taksonų pavadinimus galima rasti 5–6 lentelėse (17–20 p.)

Kiekvieno taksono aprašo pradžioje nurodomas jo statusas ir įrašymo į Sąjungai susirūpinimą keliančių invazinių svetimų rūšių ir Invazinių rūšių Lietuvos Respublikos teritorijoje sąrašus metai.

Tekstinėje aprašo dalyje pateikiami esminiai skiriamieji rūšių morfologiniai požymiai, apibūdinama gyvenamoji aplinka; išaiškinama kilmė ir bendras paplitimas (gimtinė, antropogeninis arealas), aptariamas paplitimas Lietuvoje (atsiradimas, geografinis paplitimas, buveinės); išskiriamos savybės, nuo kurių priklauso rūšių invazyvumas ir įvardijamas poveikis gamtinei aplinkai. Teksto pabaigoje bendrais bruožais aptariama invazinių rūšių kontrolė (prevencija, kovos būdai ir priemonės).

Taksonų paplitimas žemėlapiuose pavaizduotas taškiniu būdu, naudojant geografinių koordinačių gardelę, kurios kraštines sudaro 00°06’ šiaurės platumos ir 00°10’ rytų ilgumos, o kartografavimo žingsnis yra apie 10 km. Grafinis taškų dydis parodo paplitimo dažnumą: ● [1] – rūšis stebėta tik viename gardelės ketvirtyje, ● [2] – dviejuose, ● [3] – trijuose ir ● [4] – visuose gardelės ketvirčiuose.

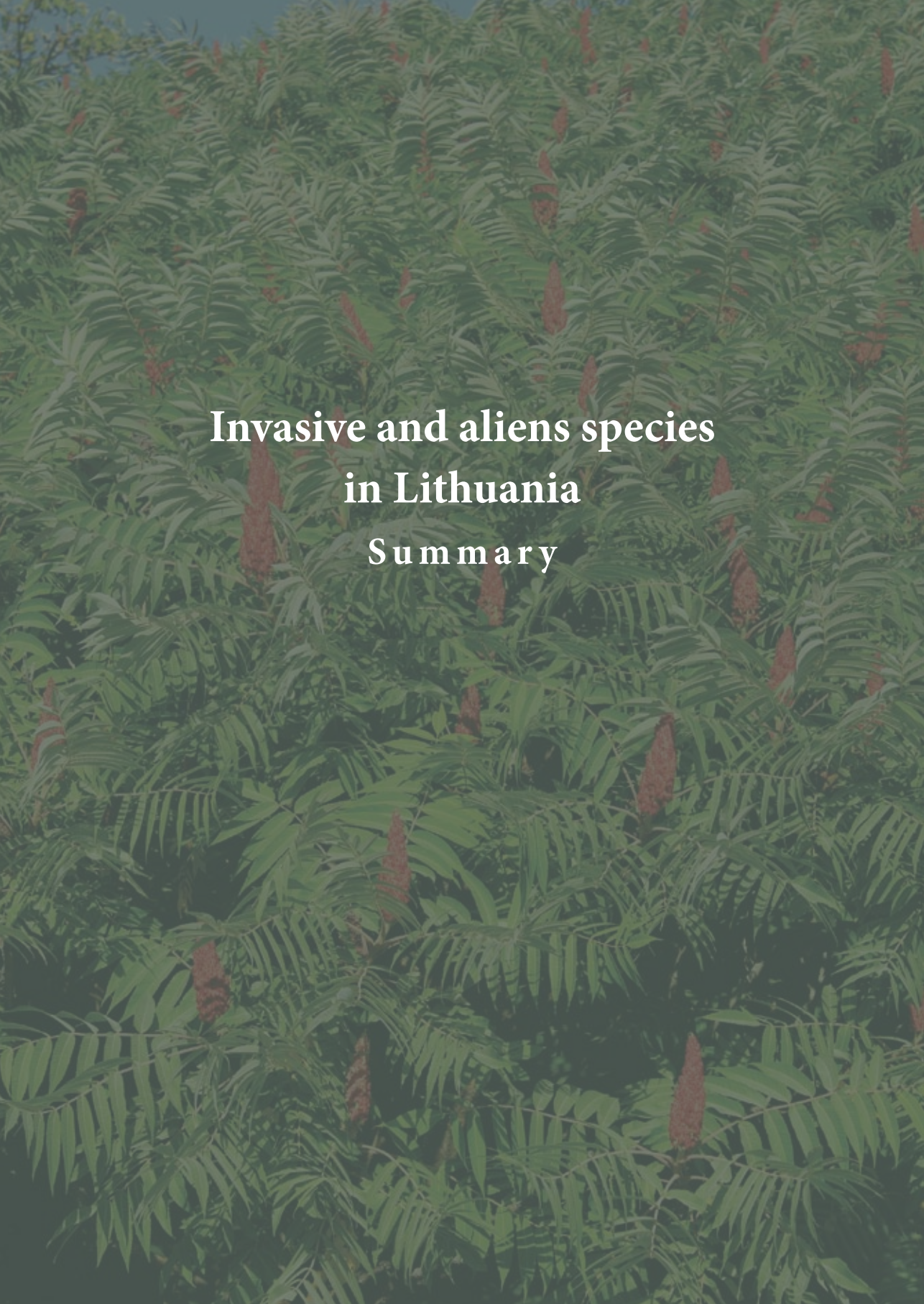
Įdėtos iliustracijos, kuriose stengtasi parodyti bendrą rūšies vaizdą, būdingus požymius ar gyvenamąją aplinką. Nuotraukų autoriai surašyti 311 p.

Aprašo paraštėse grafiškai pavaizduotas kalendorius, kada galima stebėti rūšį gamtoje, ryškiau išskiriant optimaliausius stebėjimui mėnesius arba kada ją yra lengviausia atpažinti.

Ten pat apibendrintai pateikiami gamtinis ir antropogeninis rūšies arealai.

Trečiasis leidinio skyrius skirtas aprašyti Europos Sąjungai susirūpinimą keliančias invazines svetimas augalų ir gyvūnų rūšis, kurios dar nėra aptiktos Lietuvoje.

Leidinio pabaigoje pateikiama trumpa pagrindinės informacijos santrauka anglų kalba, cituotos literatūros sąrašas ir taksonų pavadinimų lotynų ir lietuvių kalbomis rodyklės.



Invasive and aliens species in Lithuania

Summary

Assessment of the status of invasive and alien species - a new chapter in biodiversity research in Lithuania

The survey of invasive and alien species across Lithuania, carried out between 2019 and 2023, is a significant milestone in our knowledge of natural diversity, in terms of its scope, methods, and results, and has provided a detailed record of the magnitude of alien organisms in the country's flora and fauna.

The objective of the project was to investigate the status of invasive and alien species in the country and to prepare descriptions of their state of populations, spread, threats, and distribution maps. The initial list of objects to be studied (target species) consisted of 100 taxa (13 mammals, 5 fish, 9 crustaceans, 11 other animals, and 62 plants) included in the List of Invasive Alien Species of Union concern (Union List) and in the Lithuanian Invasive Species List, as well as a group of species from Lithuania that were considered by the experts to be potentially invasive. During the course of the survey, the list was expanded by 39 taxa, which were newly added to the Union's List in 2019 and 2022.

Research methods. *Database*. In the initial phase of the work, an original database of invasive and alien organisms (INVA) was created, in which the occurrence of the target species was entered and accompanied by quantitative and qualitative information on population size and status, habitat, living environment, and human activities.

Archive data from herbarium and vegetation databases, data scattered in scientific reports and researchers' personal observation notes, data recorded in the State Forest Cadastre, the database of Habitats of European Union Importance (BIGIS), Lithuanian Vegetation Database (LITVEG), and other specialised databases have been evaluated and transferred to the main database.

GIS technologies. ArcGIS Online GIS applications were used at various stages of the research: Survey123 forms for historical data entry into the database; Field Maps for field data collection and translation into the database; Dashboard for monitoring, coordination, and control of fieldwork progress; ArcGIS Pro for data analysis and publication.

Field research methods. Different modern methods of direct observation, remote sensing, and citizen science have been used for different systematic groups. For invasive mammals, the main field survey methods were roadkill recording, camera trapping, and capture trapping, as well as the analysis of hunting bag and land user surveys (Balčiauskas et al., 2021, 2022).

The crustacean surveys used both passive methods (catching with fishing baskets or traps, luring with bait) and active methods (diving, nocturnal observation).

Fish were targeted using specialised netting and electric fishing equipment (Rakauskas et al., 2021).

Field surveys for invasive and alien plants varied depending on the status of the species. Each population of invasive alien plant species in the Union List observed during the surveys was recorded and assessed – if the species covered more than 100 $m^{2,}$ it was contoured, in some other cases, it was mapped as a dot. Unmanned aerial vehicles (UAVs) were used for mapping areas of Sosnowsky's hogweed (*Heracleum sosnowskyi*) distribution (dji mavic 2 zoom and UAV Birdie).

In Lithuania, the search for invasive plant species and potentially invasive species was carried out in geographical coordinate grid quarters into which the entire territory of the country was divided, i.e., at least one site was registered and a population assessment was carried out in each 5×5 km area.

Key results

The main factual results of the surveys are the distribution maps of the species surveyed and the database containing data on 92537 localities. Together with information on sites where the search for target invasive species was unsuccessful, the database contains a total of 108474 records.

The distribution of the taxa is mapped using a point-based grid with a latitude of 00°06' N and longitude of 00°10' E and a mapping step of approximately 10 km. The map layout was created using the SRTM GL1 elevation database and OpenStreetMap hydrographic data.

The key data from the actual inventory are given in Tables 1-4.

Table 1 summarises the results of the inventory of invasive and alien species of large systematic groups. Alien land plant surveys are the largest in volume due to the larger number of survey sites, the detail of the survey methodology, and the intensity of the field surveys. The distinctive feature of the aquatic invasive species survey results should be noted – relatively many of the water bodies surveyed are still 'clean' of alien fish or crustaceans.

Table 2 shows the results of the assessment of the status of invasive and alien plants. Data were collected on more than 10% of Lithuanian vascular plant species.

As can be seen from the records in the table, other alien terrestrial plant species not included in the project's target species group were also recorded by the field surveyors. Some of these species have been recorded with a high frequency and may therefore be added to the list of invasive species in Lithuania in the near future. Examples include trees and shrubs such as white poplar (*Populus alba*), sea buckthorn (*Hippophae rhamnoides*), common ninebark (*Physocarpus opulifolius*), common snowberry (*Symphoricarpos albus*), various steeplebushes (*Spiraea* sp.) and lilacs (*Syringa* sp.). Among the grasses, prickly lettuce (*Lactuca serriola*) should be highlighted, which was found in almost a third of the sites surveyed.

In addition, attention should be paid to comparatively exotic plants that have been observed only sporadically but may become part of a group of species that are undesirable in our region. Such plants include various walnut trees (*Juglans* sp.), Japanese angelica tree (*Aralia elata*), pokeweeds (*Phytollaca* sp.), common purslane (*Portulaca oleracea*), various silver grasses (*Miscanthus* sp.), and other ornamental grasses.

On the other hand, some plants that were preliminarily included in the lists of potentially invasive species in Lithuania were not detected as often as expected – less data were collected on eastern groundsel (*Senecio vernalis*), common honeysuckle (*Lonicera periclymenum*), warty-cabbage (*Bunias orientalis*). The crimson fountain grass (*Pennisetum setaceum*), included in the list of Invasive Alien Species of Union concern was not observed spreading to natural habitats.

For the first time in the history of invasive plant surveys in the country, accurate data on the distribution, area covered, and population status of invasive alien species of concern to the European Union have been obtained (Table 3). This data is crucial for the management and forecasting of invasive species, the development of a control strategy, and the application of specific measures. It should be noted that the dimensions if the area occupied by invasive plants is constantly changing. With the introduction of active eradication measures for Sosnowsky's hogweed (*Heracleum sosnowskyi*) and the decrease of abandoned land, the area of the plant's stands may be decreasing, but this is unlikely to be the case with point observations. In contrast, stands of the annual Himalayan balsam (*Impatiens glandulifera*) are appearing in new natural habitats.

The results of research on invasive fauna provide a good reflection of their history, their habits, and the level of anthropogenization of the natural environment. Mammals that were introduced to our geographical latitudes more than half a century ago (common racoon dog, mongooses, American mink, grey rats) now inhabit suitable habitats throughout the whole territory. Alien bird species are also observed in increasing numbers. Hard-to-find aquatic animals such as fish, crustaceans, and molluscs, which require specialised, time-consuming, and technically more expensive surveys, are predicted to be more widespread than the presented data in Table 4.

There is no doubt that the results of the surveys discussed here also highlight knowledge gaps, the identification of which should help to shape new directions for research on biodiversity in the country.

Legal regulation of invasive species in Lithuania and the European Union

The use and spread of invasive species are governed by the national legislation of the Republic of Lithuania, the Regulation of the European Union, which is applied uniformly to all Member States, and its implementing regulations. This legislation is in line with the European Union's Biodiversity Strategy 2030, which aims to kick-start the recovery of Europe's biodiversity by tackling the main drivers of biodiversity loss, including invasive alien species that threaten ecosystems, habitats, species, human health, or the economy. The Convention on Biological Diversity and other international agreements are increasingly focusing on the prevention and management of invasive alien species as global trade, transport, tourism, and climate change are likely to exacerbate the risks posed by such species.

In Lithuania, the main legal provisions are laid down in the Law on Wild Plants and Fungi of the Republic of Lithuania and the Law on Wild Fauna of the Republic of Lithuania, which are detailed in the decrees of the Minister of Environment. The requirements for the management and use of invasive species are laid down in the Description of the Procedure for the Control and Eradication of Invasive Species, which was approved by the Order of the Minister of the Environment of the Republic of Lithuania No 352 of 1 July 2002 "On the Approval of the Description of the Procedure for the Control and Eradication of Invasive Species, the Composition and Provisions of the Council of Control of Invasive Species, and the Approval of the Programme of the Control of Invasive Species, Reintroduction, and Relocation of Invasive Species". This Order also approves the composition and provisions of the Invasive Species Control Board.

The first list of species to be eradicated in Lithuania was approved by order of the Minister of the Environment in 2001 and included one plant species, *Heracleum sosnowskyi*. Currently, the list of invasive species for the territory of the Republic of Lithuania, approved by Order No D1-433 of the Minister of the Environment of the Republic of Lithuania of 16 August 2004 "On the approval of the list of invasive species on the territory of the Republic of Lithuania", includes 35 species: 17 animal species and 18 plant species.

In the European Union, Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species was introduced on 1 January 2015 with the aim of managing the use and spread of invasive species in a common manner across all Member States. The adoption of this Regulation clearly defines the concepts of invasive and alien species and the general principles of invasive species management, i.e., it lays down rules to prevent, minimise, and mitigate the negative impacts of the deliberate and unintentional introduction and spread of invasive alien species on biodiversity in the EU.

The Department of Environmental Protection under the Ministry of the Environment is responsible for controlling the use of invasive species within the country, while the Customs

Department under the Ministry of Finance of the Republic of Lithuania, together with the State Plant Production Service under the Ministry of Agriculture and the State Food and Veterinary Service, is responsible for controlling the use of invasive species at the border. Sanctions for the illegal use of invasive species and failure to implement management measures are laid down in the Code of Administrative Offences of the Republic of Lithuania.

Publication structure

The first and second chapters of this book provide information on plant and animal species found in Lithuania that are included in the list of Invasive Alien Species of Union concern (Union List) and the List of Invasive Species in the Territory of the Republic of Lithuania, as well as potentially invasive alien species found in Lithuania.

The taxa are arranged alphabetically within large systematic groups. The most recently adopted Latin and Lithuanian names of taxa are used. Older taxon names that are irrelevant, but sometimes still in use, can be found in Tables 5 and 6.

Each taxon's description starts with its status and the year that taxon was included in the Union List and the List of Invasive Species in the Territory of the Republic of Lithuania.

The descriptive text provides the key distinguishing morphological features of the species; describes the habitat; explains the origin and general distribution (native range, anthropogenic range); addresses the distribution in Lithuania (occurrence, geographical distribution, habitats); identifies the traits on which the species depends for its invasiveness; and identifies the impact on the natural environment. The text concludes with a general discussion on the control of invasive species (prevention, control methods and measures).

The distribution of the taxa is mapped using a point-based grid with a latitude of 00°06' N and longitude of 00°10' E and a mapping interval of approximately 10 km. The size of the graphical points indicates the frequency of occurrence: ● [1] – the species was observed in only one quarter of the grid, ● [2] – in two quarters, ● [3] – in three quarters, and ● [4] – in all quarters of the grid.

Illustrations have been included to show the overall view of the species, its characteristics, or its habitat. The authors of the photographs are listed 311 p.

In the textbox, a calendar of when the species can be observed in the wild is shown graphically, highlighting the optimal months for observation or when it is easiest to identify. The natural and anthropogenic ranges of the species are also summarised.

The third section of the publication describes alien plant and animal species of the list of Invasive Alien Species of Union concern that are not yet found in Lithuania.

A summary of key information in English and a list of cited references and indexes of Latin and Lithuanian taxa names are provided at the end of the publication.

Invasive species occurring in Lithuania

PLANTS

Acer negundo

The introduction of *Acer negundo* in Lithuania began in the 1930s. It was first found in the wild in 1963, on the bank of the Šešupė River, in Vilkaviškis district. *Acer negundo* is now widespread throughout Lithuania, and in some areas, it is very abundant, covering large territories. It is most frequent and abundant on the banks of large (e.g., Nemunas, Neris, Šventoji) and medium-sized rivers, along roads and railways, and in the surroundings of towns and settlements. It grows in almost all types of habitats, usually establishing in moist to moderately moist soils. The largest and densest stands, sometimes almost pure, are found along the banks of water bodies, in abandoned grasslands, along transport infrastructure, in wastelands and forest edges, in clearings, on coastal dunes, on the roofs of buildings, and in the crevices of walls. *Acer negundo*, which forms large and dense thickets, has a negative impact on a wide range of habitats but is most damaging to riparian ecosystems. It outcompetes native plants and destroys riparian willow scrub and surrounding grassland habitats. In pure or almost pure *Acer negundo* stands, native species diversity is reduced. This species often invades various infrastructures, making them difficult to maintain.

Amelanchier spicata

There is no detailed information on the introduction of *Amelanchier spicata* in Lithuania, but it is assumed that it was introduced in the first half of the 19th century for its edible fruits, and later it was also cultivated as an ornamental plant. *Amelanchier spicata* was first found in the wild in 1934 in the Vilnius region. Nowadays, it is found all over Lithuania, but its distribution is uneven. *Amelanchier spicata* is frequent and abundant in the south, east, northeast, and west, while it is much rarer elsewhere. It is most often found in moderately moist and dry coniferous and mixed forests, on forest margins, slopes, tree-covered dunes, and roadsides, and less frequently in grasslands and wastelands. The largest and densest thickets are found in pine forests and on the edges of woodlands around towns and settlements. The seeds of this species are distributed by birds that consume its fruits. Dense stands of *Amelanchier spicata*, especially in pine forests, result in changes in native plant communities, soil nutrient composition, and light conditions.

Asclepias syriaca

Asclepias syriaca was introduced to Lithuania as an ornamental and melliferous plant and was quite often cultivated in flowerbeds and near apiaries. It has been confirmed that these plants were already cultivated in the country at the beginning of the 1930s, and first found escaped from cultivation in 1991 in Trakai district, near Lake Verniejus. In Lithuania, *Asclepias syriaca* grows at the edges of forests, in abandoned meadows, near former farmsteads, and very often near apiaries. In a few places, these plants have been found in arable fields. *Asclepias syriaca* is widespread throughout Lithuania but its distribution is very patchy. It is most commonly found, forming the largest stands, in the southern and southeastern parts of the country, while in other regions, it is much less common and usually sparse.

Bidens frondosa

Bidens frondosa was first recorded in Lithuania in 1982 in Kaunas, on the banks of the Nemunas River. It is thought to have spread to Lithuania naturally along the banks of the Nemunas River from Belarus, but in some places, it was introduced with grain directly from North America. This species is now widespread throughout the country but with very variable frequency. It is frequent and abundant in the southern and western parts of the country, while in other areas, it only started spreading intensively in the second decade of the 21st century. *Bidens frondosa* is most often found along the banks of water bodies (rivers, lakes, ponds), in drainage ditches, in swamp forests and other woodlands, in wet cultivated fields, in wastelands, on roadsides, and on railway embankments. Fruits are carried over long distances by water. It infests a wide range of crops, which means it can be spread with agricultural production and by agricultural machinery. *Bidens frondosa* is less demanding than native *Bidens* in terms of habitat soil moisture and therefore grows well in relatively dry areas (roadsides, railway crossings, etc.). The species forms fast-growing and relatively dense stands on muddy riverbanks and has a negative impact on dwarf pioneer plant communities and muddy riparian habitats.

Celastrus orbiculatus

In Lithuania, *Celastrus orbiculatus* was introduced into ornamental plantations in the first half of the 20th century. It was first found spreading in the wild in scrubland near Palanga Airport in 2014. The study of the age of the populations based on annual wood rings showed that the plants started spreading into forests around 1987. Nowadays, *Celastrus orbiculatus* can be found in almost the whole territory of the country and is relatively rare for now. It grows in coniferous and mixed forests, forest edges, and scrub, sometimes under power lines, on dry slopes, grasslands, and roadsides. In some places, it forms quite large and dense thickets. The spread of *Celastrus orbiculatus* throughout the country has been mainly influenced by its cultivation in ornamental plantations. The seeds can be spread by birds and humans (with garden waste) and; therefore, the species occurs not only around towns and settlements but also in quite remote areas.

Cytisus scoparius

Cytisus scoparius was first recorded in Lithuania in the late 19th century in the vicinity of Priekulė, Klaipėda district. Since the mid-20th century, while these plants have been cultivated in ornamental plantations, mostly they have been sown at the edges of forests, in quarterly clearings, in order to increase the fodder base for game animals. At some point, *Cytisus scoparius* became naturalised and began to spread rapidly in light forests and in grasslands, sands, and dunes. Sometimes it grows on railways, roadsides, or in other anthropogenic habitats. The species is now widespread throughout Lithuania but with varying frequency and abundance. In the southern and eastern parts of the country and in the Curonian Spit, where dry pine forests predominate, the species is common and very abundant. In other parts of the country, *Cytisus scoparius* is rare, particularly in regions with fertile soils. It is most common in sparse pine forests, dune forests, forest roadsides, and sandy grasslands. It often forms large and dense thickets and outcompetes herbaceous plants. Due to symbiosis with bacteria, *Cytisus scoparius* enriches the soil with nitrogen compounds, leading to the loss of sand species and the proliferation of nitrogen-loving plants that eventually destroy plant communities and alter biodiversity.

Echinocystis lobata

Echinocystis lobata is assumed to have been introduced as an ornamental plant in Lithuania in the second half of the 20th century. It was first found in the wild in 1987 and has since spread extensively. The species is now widespread throughout the country, although its distribution is uneven. It is much more common and abundant in the southern part of the country, while it is rarer and less abundant in the northern regions. *Echinocystis lobata* is most often found on the banks of rivers and streams, less frequently on lakeshores, reedbeds, forest edges, grasslands, and various anthropogenic habitats, and increasingly in cultivated fields in spring cereal crops. It has been observed that the abundance of this species decreases every few years but then increases significantly again. This phenomenon is attributed to the late spring frosts, which destroy a large proportion of the seedlings that have already emerged by that time. The dense thickets of *Echinocystis lobata* overwhelm the native herbaceous plants and prevent the growth of willows. This reduces plant diversity and, thus, the diversity of all organisms in the habitat. Tree branches, on which *Echinocystis lobata* tangles form, break off more easily in storms or freshets, and sometimes even the whole tree breaks or collapses under the weight.

Elodea canadensis

Elodea canadensis was first recorded in Lithuania in 1884 in Druskininkai, in the Ratnyčia River. Since then, the species has become fully naturalised and widespread in the country and can now be found in most of the water bodies suitable for its growth. The phase of intensive invasion of *Elodea canadensis* is believed to have ended. This species is most abundant in shallow streams, drainage ditches, shallow parts of rivers and lakes, ponds, peat, and bogs, while in deeper areas and in rivers with high flows, it is usually sparse. It grows best in nutrient-rich and relatively clear water. The abundance of *Elodea canadensis* varies from year to year, even in the same body of water. In dry summers, when the water level drops and the water becomes warmer, *Elodea canadensis* beds are denser and larger than in rainy or cool summers. The exact impact of this species on aquatic ecosystems is poorly understood. It is known that *Elodea canadensis* stands outcompete native small aquatic plants, particularly those adapted to shallow water.

Elodea nuttallii

Elodea nuttallii is thought to have spread to Lithuania by water or by birds from adjacent countries, probably from Poland or Belarus. Two localities of this species are now known in the Nemunas River in southern Lithuania. These populations were detected in 2020 and 2021. *Elodea nuttallii* grows in backstreams with very low currents and in the coastal zone on sandy mud. This species could also be growing in other parts of Lithuania as it is cultivated in aquaria and may be intentionally or accidentally discharged into water bodies, thus becoming established. In Lithuania, *Elodea nuttallii* is still in its initial stages of spread, but control of existing populations should be initiated immediately in order to avoid possible large-scale invasion.

Erigeron annuus

In Lithuania, *Erigeron annuus* was occasionally cultivated in flower gardens as early as the beginning of the 20th century and was first found growing in the wild in Kaunas in 1931 and soon afterwards in Vilnius. The species was rare in Lithuania until the early 1980s, when it

began to spread extremely rapidly. It is now very common throughout the country and even very abundant in the southern and eastern regions. It grows in a wide range of habitats but is most often found in wastelands, barrens, grasslands, pastures, and roadsides. In abandoned grasslands, fallow lands, and wastelands it sometimes becomes the dominant plant. *Erigeron annuus* is quite common in forests, especially in coppice areas, forest roadsides, young woodland, and scrub, although it is not as abundant as in grasslands. The invasiveness of *Erigeron annuus* is determined by its very intensive reproduction by seeds, which are easily dispersed by wind. There are no detailed studies on the impact of this species on the diversity of plant communities, but it can be assumed that it may outcompete many native plants and reduce local biodiversity. When abundant in grassland, *Erigeron annuus* reduces forage value.

Gypsophila paniculata

Gypsophila paniculata was purposefully introduced in the first half of the 19th century to stabilise sand dunes on the seashore of Lithuania. The species is now widespread in Baltic Sea coastal dunes and adjacent habitats, forming large and dense stands in some places, particularly in grey and white dune habitats and at the edges of forests. It is less common in sparse pine forests, roadsides, and dry grasslands. *Gypsophila paniculata* is rare in other parts of Lithuania, but its spread has been observed, especially in southern regions It forms thickets of various sizes around cemeteries, in the surroundings of settlements, as well as in sandy areas, forest edges, and dry grasslands. *Gypsophila paniculata* has the greatest impact on sandy habitats and their biodiversity. It easily outcompetes most native dune and sand plants, and the resulting thickets significantly alter habitat conditions. Habitats dominated by *Gypsophila paniculata* are almost devoid of open sandy areas, they feature an accumulation of plant debris and the formation of a cover of mosses characteristic of forests. In such habitats not only is the diversity of plants specific to sandy areas reduced but also the diversity of other organisms.

Heracleum mantegazzianum

In Lithuania, *Heracleum mantegazzianum* was found for the first time in 2020 in Joniškis district, Bertaučiai village. The second population of this species was recorded in 2022 in Akmenė district. It is reported that in Joniškis district *Heracleum mantegazzianum* was introduced for ornamental purposes at the end of the 20th century. At the beginning of the 21st century, after the abandonment of a homestead, it began to spread to the surrounding areas. So far, this species occupies a small area in Lithuania, approximately 0.5 ha, but it may be more widespread in northern regions. It grows in wastelands, on the edges of scrub and woodlands, on roadsides, and in abandoned grasslands. The most important factors influencing the spread and invasion of *Heracleum mantegazzianum* are its long history of cultivation in ornamental plantations and its deliberate distribution. Further rapid spread is heavily influenced by high seed production. Seeds are spread by wind, water, and humans (mainly through transport and soil movement).

Heracleum sosnowskyi

In Lithuania, *Heracleum sosnowskyi* was introduced in the 1950s, and its potential for use as animal feed was studied. In the early 1970s, production trials were carried out on farms in the regions of Kaunas, Švenčionys, and Vilnius, and it became popular among gardeners and beekeepers as an ornamental and melliferous plant. A decade later, the plant began to spread

uncontrollably. *Heracleum sosnowskyi* is now widespread throughout Lithuania, although it is not uniformly distributed. It has the largest stands and occupies the largest areas in southern, central, eastern, and northwestern Lithuania, while in other parts, it is rarer and less abundant. It grows in various anthropogenic habitats, fallow lands, meadows, forest margins, water banks, scrublands, springs, and sometimes wetlands. Dense and pure stands of *Heracleum sosnowskyi*, which are highly competitive, completely change the species composition and structure of communities. Grassland habitats are the most affected by the *Heracleum sosnowskyi* invasion.

Impatiens glandulifera

In Lithuania, as in other Baltic countries, *Impatiens glandulifera* was introduced for ornamental purposes at the end of the 19th century. This species was first found in Lithuania in Prienai district, Jieznas, on the site of a former garden, in 1959. Nowadays, *Impatiens glandulifera* is widespread throughout Lithuania, but its distribution is uneven. In the central part of the country, it is common and very abundant, while elsewhere, it is slightly rarer and less abundant. *Impatiens glandulifera* has been spreading rapidly over the last two decades and occupies a wide range of habitats. It is most common along river and lake banks, in wet forests, forest edges, moist grasslands, on the edges of marshes, in ditches, and in various anthropogenic habitats. The largest and densest stands are found on riverbanks, in tall herb communities, in alder woodlands, and in woodland clearings. The spread of *Impatiens glandulifera* has been largely influenced by the fact that it was often cultivated in gardens in the second half of the 20th century. The seeds of these plants were transported to natural habitats, either through waste, soil movement, or other factors, and began to spread uncontrollably.

Impatiens parviflora

Impatiens parviflora is assumed to have been first cultivated in the collections of Vilnius University Botanical Garden, and the first record of the species spreading from the collections into the wild was made in 1934 in Vingis, Vilnius. Until the 1970s, the species was rare, found only in and around towns and cities, and then began to spread rapidly in forests and other habitats. *Impatiens parviflora* is now widespread throughout the country, but its distribution is uneven. It is very common and abundant in the southern part of Lithuania, slightly rarer in the northern regions and rare in the Samogitian uplands. It grows in temperate and humid mixed and deciduous forests, spruce forests (less frequently in pine forests), in riparian scrub and herb communities, in wastelands, and in gardens. In forests, *Impatiens parviflora* outcompetes native herbaceous plants and often dominates the herb layer. The impact of this invasive species on plant communities and biodiversity is poorly understood.

Lupinus polyphyllus

Lupinus polyphyllus was introduced to Lithuania as an ornamental plant and was first found spreading in the wild in 1931 in the vicinity of Kaunas. *Lupinus polyphyllus* was later introduced into forests, forest glades, and sandy areas to improve the soil, increase the forage base for game animals, and stop erosion. The species is now widespread throughout the country, but its distribution is uneven. *Lupinus polyphyllus* is very common and very abundant in the southern and eastern parts of Lithuania, as well as in the Samogitian Uplands, while it is rarer and less abundant in other parts. It grows in dry and moderately moist, rarely moist meadows and is also frequently found in forest edges, pine forests, and mixed forests, especially along

forest roadsides and in quarterly clearings. It is common in a wide range of anthropogenic habitats, particularly abundant in abandoned grasslands, roadsides, and wastelands, where it often becomes the dominant plant. *Lupinus polyphyllus* is a strong competitor with other herbaceous plants, and in dense stands, it outcompetes most native species, especially in dry and moderately moist grasslands and forest edge habitats.

Prunus serotina

There is no precise information on the exact date when *Prunus serotina* was introduced in Lithuania. It is assumed that the earliest planting took place in the western part of the country at the end of the 19th or beginning of the 20th century. *Prunus serotina* was quite often cultivated in urban and village gardens. The first record of this species spreading in forests in Lithuania was made in 1976 in Pagėgiai municipality, in what is now Rambynas Regional Park. The species is now most common in the southern and southeastern regions and is much rarer elsewhere. It grows most abundantly and forms large stands in light pine forests, forest edges, clearings, roadsides, scrubland, and wastelands. In dense *Prunus serotina* thickets or in forests where it dominates the shrub layer, the diversity of grasses and mosses is reduced, and native trees and shrubs cannot regenerate. The fallen leaves of these plants have been reported to have a negative impact on soil invertebrates. The impact of *Prunus serotina* on communities and habitats in Lithuania has not been studied in detail.

Robinia pseudoacacia

There is no precise data on when *Robinia pseudoacacia* was introduced in Lithuania, but it is known that at the end of the 19th century, it was still very rarely cultivated in East Prussia. The species was most widely planted in Lithuanian gardens and forests in the second half of the 20th century. *Robinia pseudoacacia* was first found in 1958, growing wild in a forest near Bačkonys Park in Kaišiadorys district. Nowadays, it is widespread all over Lithuania. It is quite rare only in the Samogitian Uplands. *Robinia pseudoacacia* is particularly common and abundant in the southern part of the country and the Curonian Spit. It is most often found in variously sized thickets on forest edges, anthropogenic stands, light coniferous woodlands, riverbanks, sands, coastal dunes, wastelands, and roadsides. In dense stands of *Robinia pseudoacacia*, the species composition changes: an increase in nitrophilous plants occurs, followed by a decrease in total species diversity.

Rosa rugosa

Rosa rugosa is thought to have been introduced in Lithuania at the end of the 19th or beginning of the 20th century. *Rosa rugosa* was first found in 1937 by P. Snarskis, growing wild in Utena district, in a forest near Saldutiškis. The most extensive spread in Lithuania took place in the second half of the 20th century when *Rosa rugosa* was used for planting slopes and consolidating coastal sands. It is now widespread throughout the country, particularly common in the southeast and west, and somewhat rarer and less abundant in the north. It grows in a wide range of habitats but is most often found on dry slopes, grasslands, woodland edges, roadsides, and wastelands. It is particularly common and abundant on the white and grey dunes of the Baltic Sea coast. *Rosa rugosa* adversely affects native plants and animals and significantly reduces the diversity of native species. Beaches with *Rosa rugosa* reduce the area available for recreation and increase anthropogenic impacts on uninvaded coastal beaches and dune habitats.

Rumex confertus

Rumex confertus was introduced to Lithuania accidentally, probably with grain or seeds of grasses. The species was first recorded in the country in the early 1930s at several locations in and around Kaunas, growing in meadows and pastures and later in Alytus. *Rumex confertus* is now widespread throughout the country, but its distribution is uneven. It is common in the southern and southwestern parts of Lithuania but still quite rare in the northern regions. *Rumex confertus* is most frequent and abundant in the grasslands of the Nemunas River valley below Kaunas. In some areas, it has become a dominant plant in moderately moist, fertile soils. In Lithuania, *Rumex confertus* grows in natural and cultivated meadows and pastures, on riverbanks, along roads and railways, in fallow fields, arable lands, wastelands, and occasionally in forest glades. The spread of *Rumex confertus* is thought to have been largely due to the sowing of forage grasses contaminated with seeds of this alien plant. The seeds of *Rumex confertus* were spread by water along riverbanks.

Solidago canadensis

There are no available data on the introduction of *Solidago canadensis* in Lithuania, but it is assumed that it was introduced into flower gardens only at the very end of the 19th or beginning of the 20th century. *Solidago canadensis* was first found in the wild by V. Motiekaitytė in 1983 in Radviliškis, spreading on the slope of a railway embankment. *Solidago canadensis* began to spread most rapidly in the 1990s. Now widespread throughout the country, it is one of the most common and abundant invasive plants. It grows in moderately moist and dry soils, in open areas, and less frequently in forests. It usually colonises and forms its largest stands in abandoned grasslands, fallow lands, wastelands, roadsides, forest edges, on the banks of watercourses, and in logging sites. Often *Solidago canadensis* forms dense stands and becomes the dominant plant, outcompeting most native grassland plants. *Solidago canadensis* threatens the stability of the native *Solidago virgaurea* populations as it hybridises with it quite frequently.

Solidago gigantea

There is no precise information about the introduction of *Solidago gigantea* in Lithuania, but it is assumed that cultivation of this species began in the second half of the 19th century in the western part of the country, around the same time as in East Prussia. *Solidago gigantea* was found in natural habitats for the first time in 1977, in Jurbarkas district, in the vicinity of Girdžiai village, on the slopes of the Mituva River. The species is now widespread throughout the country, but its spread is not uniform. *Solidago gigantea* is frequent and abundant in the southern part of the country, while it is much rarer in the northern areas. It grows in a wide range of habitats, mostly in moist or even wet soil, but it also grows in dry sandy or sandy loam soil. It is most often found in grasslands, along the banks of watercourses, on the edges of shrubs, on the fringes of forests, in wastelands, roadsides, ditches, and occasionally in reedbeds and the edges of mires. Very often, it forms dense and pure stands. In medium-density stands of *Solidago gigantea*, the diversity of plant species is reduced by a factor of 2 to 4, and a thick layer of long, non-decaying stems is formed. Sometimes *Solidago gigantea* interbreeds with the native *Solidago virgaurea*.

ANIMALS

MOLLUSCS

Arion vulgaris

During the first recording of *Arion vulgaris* in Lithuania in 2012, it was misidentified as *Arion lusitanicus*. It was recorded for the first time in Kaunas city. It is assumed that eggs or several adults were introduced with plant material or planting substrate. The latter is considered to be the main dispersion vector in Lithuania. Currently, this species is present in most parts of the country, with only several records in the northern regions. Typically, *Arion vulgaris* occupies anthropogenically affected urban or suburban territories where ornamental plants are present or where green waste is abundant.

Potamopyrgus antipodarum

Potamopyrgus antipodarum is one of the most widespread invasive animals in Lithuania. In the country's inland waters, the species was first recorded in the Curonian Lagoon in 1954. Currently, it is present in more than 30 various water bodies across the whole country, including water reservoirs, lakes, and rivers. In most cases, *Potamopyrgus antipodarum* was recorded on sand or cobble substrates. The highest individual density of 20,000 individuals per m^2 was estimated in Lithuanian ecosystems. The distribution pattern, when *Potamopyrgus antipodarum* was first recorded in distant sites with intense water recreation activities, suggests water vehicle transportation as a main dispersion vector for this species in Lithuania.

CRUSTACEANS

Dikerogammarus villosus

Dikerogammarus villosus was recorded for the first time in Lithuanian waters in 2015 in the mouths of the Šventoji River, emptying into the Baltic Sea and in the northern part of the Curonian Lagoon. It is considered that the species invaded from Polish water via shipping, most likely through hull fouling. *Dikerogammarus villosus* is now spread along the Baltic Sea coast and within the Curonian Lagoon. Its expansion upstream in the Nemunas River may be expected. The species occurs in shallow, slowly flowing, or well wind-stirred waters and prefers hard-bottom substrates.

Faxonius limosus

Faxonius limosus, naturally occurring and widespread in eastern North America, was introduced to Europe in 1890 and first observed in Lithuania in 1994. *Faxonius limosus* spreads rapidly on its own, and due to illegal introductions, it is currently spread throughout Lithuania. Once in a water body, it forms a very large population after 2–4 years, but later, most of the population dies out due to diseases. So far, not a single water body has been found in Lithuania in which *Faxonius limosus* has completely disappeared. Once it enters the water body, effective methods of combat are unknown; therefore, prevention of invasion by educating the public is especially important.

Pacifastacus leniusculus

Pacifastacus leniusculus is common in western North America. It lives in freshwater and can also be found in low-salinity coastal waters. It was introduced to Europe in 1960

and to Lithuania in 1972. In Lithuania, it is mostly distributed in the eastern part, and larger populations form in rivers. More than 40 populations of *Pacifastacus leniusculus* are currently known. The main reason for the spread is illegal introductions. After entering the water body, effective methods of combat are unknown; therefore, prevention of invasion by educating the public is especially important.

Paramysis lacustris

Paramysis lacustris was intentionally introduced from Ukrainian water reservoirs to the Kaunas Water Reservoir located on the Nemunas River during 1960–1961 for fish fodder resource improvement. It later spread across Lithuanian waters due to secondary natural dispersal and deliberate introductions. The species is now widespread throughout the country and occurs in the whole Lithuanian part of the Nemunas River, including the lower reaches of its main tributaries, in the Curonian Lagoon, in Elektrėnai and Antalieptė water reservoirs, and in 16, mostly large, lakes. *Paramysis lacustris* attains high population densities in shallow, slowly flowing, or well wind-stirred waters and prefers sandy or muddy bottoms.

Pontogammarus robustoides

Pontogammarus robustoides was intentionally introduced from Ukrainian water reservoirs to the Kaunas Water Reservoir located on the Nemunas River during 1960–1961 for fish fodder resource improvement. It spread across Lithuanian waters due to deliberate, sometimes illegal introductions and secondary natural dispersal. The species is now the most widespread alien amphipod in Lithuanian waters and occurs in the Nemunas River downstream from the inflow of the Merkys River, in the lower or even middle reaches of the Nemunas River tributaries, in the Curonian Lagoon, in Elektrėnai and Antalieptė water reservoirs, and in no less than 18, mostly large, lakes. The species attains high population densities in shallow, slowly flowing, or well wind-stirred waters, and it may dwell on various bottom substrates with the highest abundances seen in macrophyte overgrowths.

FISHES

Neogobius melanostomus

Neogobius melanostomus naturally spread into Lithuanian coastal waters from neighbouring countries in 2002. Since then, the species has been annually observed in the coastal areas of the Baltic Sea and Curonian Lagoon. Today it is a common species in these waters. *Neogobius melanostomus* is a bottom-dwelling fish. It is typically found near stony bottoms, marine structures (piers, wharves) and sunken objects, and among mussel beds. A remarkable decrease in blue mussel has been reported from Lithuanian coastal waters after the establishment of *Neogobius melanostomus*. Such a sudden decrease in mussels provoked a rapid decline in the numbers of wintering *Clangula hyemalis* on the Lithuanian Baltic coast.

Perccottus glenii

The first few individuals of *Perccottus glenii* were caught in Lake Bevardis near Vilnius in 1985. The introduction of this species originated from ornamental fishkeeping. Later, it was translocated further within the country. The recent species distribution covers all

regions of Lithuania. Large *Perccottus glenii* populations are typically associated with degraded, hyper-eutrophic ecosystems with atypical fish assemblages comprising 1–3 species. In some waters, *Perccottus glenii* forms mono-species fish assemblages. The species is not able to establish and expand in environments with good ecological status and balanced fish assemblage. Viable populations are found in small (< 10 ha), shallow lentic water bodies with a thick sediment (sapropel) layer and a littoral zone densely overgrown with macrophytes. Most of these sites are subjected to irregular oxygen depletion events during prolonged ice cover. Once *Perccottus glenii* is established, the diversity of water macroinvertebrates, amphibians, reptiles, and fishes usually become depleted.

REPTILES

Trachemys scripta

Only solitary individuals of *Trachemys scripta* have been recorded in Lithuania so far. Most are believed to have been released intentionally by humans. From 2015–2022, *Trachemys scripta* was recorded in the wild in the districts of Joniškis, Ukmergė, Plungė, Kelme, Kazlų, and Rūda, as well as in the cities of Kaunas and Vilnius. In Lithuania, it overwinters, but to date, there are no data on breeding in the wild. In Europe, *Trachemys scripta* competes with the native *Emys orbicularis* and, in many places, has endangered it.

BIRDS

Branta canadensis

This species was recorded for the first time in Lithuania in 1981. Since 2005, the number of sightings has grown significantly, with a maximum of 375 recorded birds in 2022. Most sightings have been concentrated on the seashore and on the meadows of the Nemunas River estuary in the western part of Lithuania. During spring migrations, rather large numbers of *Branta canadensis* have been seen in the mixed flocks of other geese species or separately. To date, very few birds have been observed during summertime, and no breeding cases are known.

MAMMALS

Neovison vison

Neovison vison was brought to Lithuania in 1930 for farming purposes. After 1940, it immigrated to the western part of the country from neighbouring regions, and in 1950–1953 it was released into the wild in east Lithuania. By 1985, the species had occupied the rest of the territory. 64% of water investigated bodies were inhabited between 2020 and 2021. There is an estimated number of about 10,000 individuals, with an annual hunting bag of less than 100 individuals. *Neovison vison* inhabits all types of water bodies, preferring riverbanks with lush vegetation, reedbeds, and marshes.

Nyctereutes procyonoides

Nyctereutes procyonoides entered Lithuania from Belarus and Latvia and was first registered in 1948, spreading across the country by 1960. Numbers in the last five years are estimated at 12,000–20,000 individuals, with an annual hunting bag of 1,300–3,700 and annual

road kills at 3,000–13,000 individuals. Widespread throughout the territory of Lithuania, *Nyctereutes procyonoides* is least abundant in the southern part of the country. Favoured habitats are meadows, moist deciduous and mixed forests with lush undergrowth, river valleys, and wetlands. This species has adapted to survive in urbanised areas, even in cities.

Ondatra zibethicus

Ondatra zibethicus migrated to the Nemunas Delta from the Kaliningrad region in 1951 and was introduced in 1954. Sporadic throughout the country, it is less common in the northern and western parts. It inhabits water bodies with abundant grassy vegetation, including lakes, meanders of slow-flowing rivers, ditches, ponds, oxbows, lakes, and wetlands. Numbers have sharply declined since the 1990s. In 2020–2022 there were about 2000 individuals; the annual hunting bag is less than 100 individuals.

Procyon lotor

Procyon lotor has been recorded sporadically in Lithuania since 2010 in the Rokiškis, Šilutė, Varėna, and Kazlų Rūda districts, with a permanent population in the Curonian Spit. Species abundance and distribution are unknown due to cryptic behaviour and external similarity to the raccoon dog. Outside the Curonian Spit, only 6 individuals are known to have been hunted in 2020–2021. Habitat distribution in Lithuania is unknown.

Rattus norvegicus

The time and vector of the *Rattus norvegicus* invasion in Lithuania are unknown. The species was not found in northeastern districts until around 1960. Since 1980 it has been distributed throughout the country. The population size is unknown. In Lithuania, *Rattus norvegicus* is a commensal species living in proximity to humans. It occupies any habitats where it can find food and shelter, including cellars, sheds, farms, garbage dumps, sewers, harbours, and product storage facilities. It is sparsely distributed in fields and forests.

Potentially invasive alien species in Lithuania

PLANTS

Acer pseudoplanus

In the western part of the country, *Acer pseudoplanus* has been cultivated since around the end of the 19th century. It was introduced into forests and is now widespread in various habitats. It was first recorded as self-propagating in 1950 in western Lithuania, near Pagėgiai. *Acer pseudoplanus* is mostly found around major cities. In western Lithuania, it grows abundantly in forests, where pure stands formed by this tree can be found. The species occurs in a variety of habitats, but mostly in broad-leaved forests, young forests, and coastal forest habitats. It is frequent in small anthropogenic deciduous or coniferous woodlands, grasslands, and roadside tree belts. Dense and homogeneous thickets may outcompete native shrubs and herbaceous plants, preventing the recovery of characteristic forest communities in such areas.

Amaranthus retroflexus

Amaranthus retroflexus was first found in 1885–1886 in southwestern Lithuania in Pilviškiai, Gelgaudiškis, and Pažaislis. Nowadays, it is quite a common weed in traditionally used vegetable gardens, growing abundantly on plots of fertile soils and in industrial potato, vegetable, or maize fields. It is common near railways and occurs in other anthropogenic habitats such as landfills, industrial yards, and fresh road verges. *Amaranthus retroflexus*, which grows intensively and forms a dense cover, outcompetes late vegetables and maize crops and significantly reduces their yield. This species is highly resistant to most herbicides and can grow in heavily contaminated soils.

Amorpha fruticosa

Amorpha fruticosa was introduced in Lithuania at the end of the 19th or beginning of the 20th century, but until the middle of the 20th century, it was rare in ornamental plantations. It was cultivated in botanical gardens and amateur collections. Escaped *Amorpha fruticosa* was first recorded in 2013, in Ukmergė district, Šaltupys forest, in a spruce coppice. This species is now quite rare in Lithuania, but populations have been found in all parts of the country except the Samogitian Highlands. In many places, it forms thickets of various sizes, while shrubs growing singly or in small groups are less common. *Amorpha fruticosa* grows in forest edges, clearings, sparse pine forests, forest glades, grasslands, slopes, under power lines, and on sands. *Amorpha fruticosa* has a major negative impact on natural grasslands and pastures, especially in river valleys.

Armoracia rusticana

The cultivation of *Armoracia rusticana* began in central and western Europe around the middle of the 15th century and became more widespread in kitchen gardens in the 16th century. It is used as a food seasoning or in folk medicine. There is no precise knowledge of when *Armoracia rusticana* was introduced into the present territory of Lithuania. It can be assumed that it was introduced around the 16th century, and by the end of the 18th century, the species had been found growing in the wastelands. *Armoracia rusticana* has always been cultivated for subsistence on farm plots but rarely on larger plots for industrial use. Nowadays, it is common

throughout the country on farmsteads, in vegetable gardens, on roadside verges, on railway embankments, in meadows with moderate humidity, and on hillsides. It prefers fertile soils. Impacts on native plants and habitats are not expected to be significant as *Armoracia rusticana* is most widespread in territories that have been modified by humans. It does not form large stands in natural habitats but may compete with native plant species in favourable habitats.

Bunias orientalis

Bunias orientalis may have been accidentally introduced to Lithuania, as well as to other Baltic countries, in the late 18th century. *Bunias orientalis* was first found in 1885 in Klaipėda, near the northern pier. It is possible that the seeds of this plant may have been introduced with cereals or grass seeds. This species is now widespread throughout Lithuania, but with varying frequency and abundance. It is frequently found in grasslands and on slopes near railways, in various wastelands in and around towns and cities, and less frequently in river valleys and natural and cultivated grasslands. It can be assumed that the intensive phase of the spread of the species has ended, and populations have stabilised. *Bunias orientalis* is a strong competitor and has a major impact on grassland communities. If dense stands of the plant form, the diversity of native plants is significantly reduced.

Chaenomeles japonica

In Lithuania, *Chaenomeles japonica* was introduced as an ornamental and fruiting shrub in the late 19th or early 20th century. Escaped *Chaenomeles japonica* was first recorded in the country in 1990 in the vicinity of Mickūnai, Vilnius district. It is slightly more common in the southern and southeastern parts of Lithuania, occurring near the country's major cities, Vilnius and Kaunas, but rare elsewhere. *Chaenomeles japonica* usually grows in wastelands, as well as in places where people dispose of garden and vegetable waste. It occurs in warm-slope scrub and grassland communities, in well-flooded undergrowth, in open pine forests, and on dunes. In southern Lithuania, it often grows in moderately moist and dry anthropogenic grassland habitats. The impact of *Chaenomeles japonica* on plant communities in Lithuania has not been studied.

Cornus sericea

Cornus sericea has been cultivated in ornamental plantations in Lithuania since the second half of the 19th century and was first found in the wild in 1997. *Cornus sericea* was used to form road protection belts and to reinforce slopes. It requires moist and fertile soils and is therefore commonly found in forest edges, water banks, wet forests, and anthropogenic habitats. *Cornus sericea* is now widespread throughout the country and is particularly frequent in central Lithuania. The most abundant stands are found in moist alluvial forests, especially in black alder stands. Established in moist habitats, it grows on the banks of water bodies, in forests, and in ravines between hills. *Cornus sericea* endures short- and long-term flooding but cannot tolerate completely dry habitats. In forests and woodlands where *Cornus sericea* dominates, tree seedlings do not survive, and in open areas, the herbs disappear completely, preventing the natural development of communities.

Dianthus barbatus

Dianthus barbatus is a widely cultivated ornamental plant in Lithuania. It is cultivated in all regions and is most frequently found in the northern and eastern parts of the country, and to

a lesser extent, in the western and southwestern regions. The first record of *Dianthus barbatus* growing in a forest in Lithuania was made in 1958 by R. Jankevičienė, in Šakiai district, in the vicinity of Kiduļiai. It grows in dry meadows, undergrowth, and roadsides. Very often this species is found in various habitats around cemeteries, old manors, and parks. Quite often, it is found in forests around settlements and gardens. Frequently, it grows in forests, where it blooms sparsely but forms quite large stands consisting mainly of non-flowering shoots. The impact of *Dianthus barbatus* on native plant diversity, communities, and habitats has not been studied. When growing solitary, this species does not cause damage to native plants, but sometimes, in taller habitats, it forms dense stands of non-flowering shoots that shade out native plants.

Echinops sphaerocephalus

Echinops sphaerocephalus is a melliferous plant and is often found around apiaries. It was possibly introduced to Lithuania as a honey plant. This species was first found in Lithuania in 1948 by P. Snarskis in Vilnius, on the slope of the Vilnia River near Markučiai. It is cultivated as an ornamental plant, used for dry bouquets, and is therefore widespread in many places around homesteads. Beekeepers sow *Echinops sphaerocephalus* at the edges of forests or along apiaries, which is why there are cases of the plant spreading from cultivated sites. In Lithuania, it is found in almost all regions, but its distribution is uneven. It is very common in the southwest and south, quite common in the east, and rare elsewhere. Small, isolated stands are found in large parts of the country, but there are places where the plant is spread over several or several dozen acres. It is mostly found in dry anthropogenic habitats (roadsides, wastelands, along cultivated fields), in undergrowth, and very rarely in wet meadows. It grows best in calcareous soils. *Echinops sphaerocephalus* sometimes forms dense thickets and competes with nearby native plants.

Euphorbia cyparissias

Euphorbia cyparissias was first found in Lithuania in 1883 in Palanga. It was cultivated in village gardens, cemeteries, and urban flowerbeds, from which it spread into anthropogenic and natural habitats. Nowadays, *Euphorbia cyparissias* can be found almost all over the country, especially in southern and eastern Lithuania. It is found in the open and warm environments of almost all cemeteries and in surrounding pine forests, on the slopes of railway and road embankments, in various urban habitats, in sand and gravel pits, and in sparse woodlands. In Lithuania, there is no research-based information on the impact of the species on its natural environment. The plant prefers open, sunny habitats and light soils and therefore has the potential to change the composition and structure of communities in sandy areas and open forests (e.g., pine stands).

Helianthus tuberosus

In Lithuania, *Helianthus tuberosus* became more widely cultivated in the second half of the 20th century for its edible tubers, before which it was rarely cultivated in botanical gardens and amateur collections. Escaped *Helianthus tuberosus* was first found in 1988 in Utena, Aukštakalnis, in a wasteland next to a road. *Helianthus tuberosus* is now widespread throughout Lithuania. It is especially abundant and frequent in the southern, southeastern, and western parts of the country. It grows in grasslands, on forest edges, roadsides, wastelands, on the banks of water reservoirs, and in scrublands. It forms the largest and densest stands in sunny habitats but persists for a long time in shrubland and woodlands. In Lithuania, *Helianthus*

tuberosus produces seeds, but it is not known to what extent they contribute to its further spread. The species diversity in established *Helianthus tuberosus* stands is greatly reduced, with only isolated, competition-tolerant plants remaining.

Lonicera caprifolium

Lonicera caprifolium has been cultivated in ornamental plantations in the country since the 19th century. R. Jankevičienė discovered the plant spreading in natural habitats for the first time in 1974 in Giruliai, in the vicinity of Klaipėda. Research has shown that this plant is uncommon but has been found in almost all regions of the country. *Lonicera caprifolium* is most abundant in Vilnius city and Vilnius region, as it is often cultivated in garden communities and spreads to nearby natural or semi-natural communities such as the edges of various forests. It has been observed in alluvial forests and spreads in anthropogenic mesophytes and in dry grasslands. It occurs in large stands in natural habitats and is a potential invasive species. Areas adjacent to gardens and settlements are at greatest risk of invasion. Individual plants do not have a significant impact on native communities, but the formation of thickets in communities reduces the diversity of native species.

Malus toringo

Malus toringo was introduced in Lithuania in the second half of the 20th century, and for a long time, it was rarely cultivated in ornamental gardens; however, it was sometimes planted in forests to provide more food for birds. *Malus toringo* was first found by A. Lekavičius spreading wild in Lithuania in 1970 in Punia Forest, a pine forest in Alytus district. It is now found throughout the country, but its distribution is uneven. It is particularly common and abundant in the southern part of Lithuania, around major cities, and in the coastal region. Elsewhere, it is still rare, while in the northeastern part of the country, it has not yet been found. *Malus toringo* has now reached a stage of intensive spread in Lithuania. It grows in forests, especially in open pine woodlands, forest edges, logging sites, dry grasslands, sands, slopes, often under power lines, and on roadsides. There has been little research on the impact of *Malus toringus* on natural habitats and biodiversity, but large and dense stands of this species have a negative impact on natural habitats.

Medicago ×varia

In Lithuania, *Medicago ×varia* was probably accidentally introduced at the end of the 19th century. The species was first found in Klaipėda in 1884. Later, it began to spread in the country as a result of hybridisation between *Medicago sativa* grown for fodder and the native *Medicago falcata*. Distribution of *Medicago ×varia* is uneven across the country. It is very common and abundant in the lowlands of central Lithuania, quite rare but locally very abundant in the southern and eastern parts of the country, and rare in Samogitia. It usually grows on roadsides, along railways, and on the slopes of drainage ditches. Often *Medicago ×varia* is abundant in dry and moderately humid anthropogenic communities and frequently occurs in natural steppe grassland communities. This hybrid poses the greatest threat to the stability of local populations of *Medicago falcata*.

Oenothera biennis

It is likely that *Oenothera biennis* was accidentally introduced to Lithuania from southern Europe with cereals or other commodities. The first records of *Oenothera biennis* growing in the

wild were published at the end of the 18th century. The species is now distributed throughout Lithuania. It is particularly common in the southern and southwestern parts of the country and much rarer in the northern part. It is most abundant in habitats with disturbed soil: coastal and continental sands, slopes, foothills, deserts, fallow lands and their margins, roadsides, railway embankments, and cemeteries. *Oenothera biennis* declines in abundance when the habitat is covered with turf and when there is no open soil but increases when the soil is disturbed. In Lithuania, this species is a major threat to coastal and continental sandy habitats.

Oenothera rubricaulis

Oenothera rubricaulis was first found in the present territory of Lithuania in 1871 in Klaipėda. It is thought that it may have been introduced to Lithuania accidentally in ship ballast soil. *Oenothera rubricaulis* grows in sandy soils and is therefore commonly found in fallow fields, field margins, sand dunes, dunes, wastelands, roadsides, and railway embankments. It is quite common throughout Lithuania but is most abundant in the southern and southwestern parts of the country, where sandy soils predominate. Rare until the end of the 1960s, *Oenothera rubricaulis* started to spread intensively in the 1980s. The species remains quite rare in the northern part of Lithuania, where intensively cultivated fields prevail. The impact of this species on native plant diversity has not been studied. In sandy habitats dominated by low-competitive dwarf plants, *Oenothera rubricaulis* may outcompete them. The seeds in the soil remain viable for several decades.

Oxalis stricta

Oxalis stricta is thought to have been introduced to Lithuania accidentally with seedlings or seeds of ornamental plants. It was first recorded as a weed in the country in 1910 in Anykščiai. *Oxalis stricta* is now widespread throughout the country, but its distribution is not uniform. In some regions, it is common or very common, while in others, it is quite rare. *Oxalis stricta* is most often found in various anthropogenic habitats, such as backyards, wastelands, near buildings, along paths, between paving stones, and around cemeteries. It is also often present on paths and roads in forests, in clearings, and along roadsides, and is frequently found in deciduous and mixed forests. Dense stands are rare, but individuals are scattered over a wide area. Plants with purple leaves (*Oxalis stricta* var. *rufa*) have also spread with ornamental plants from nurseries. It is a weed that is difficult to eradicate in gardens and flowerbeds, and the impact on natural habitats and local biodiversity has not been investigated. *Oxalis stricta* may have a negative impact on deciduous forest communities.

Parthenocissus quinquefolia

There are no precise data on the introduction of *Parthenocissus quinquefolia* in Lithuania, but it is believed it has been cultivated in ornamental plantings since the late 19th or early 20th century. The first record of this species spreading outside of plantations in Lithuania was in 1988 in Vilnius, on the slope of a railway embankment. *Parthenocissus quinquefolia* is now found almost everywhere in the country and is particularly common and abundant around major cities. It is much less common in the Samogitian uplands. It grows in a wide range of habitat types: natural western taiga pine forests, alluvial forests, riparian scrub and woodland, anthropogenic woodland, roadsides, and moderately moist and dry grassland. Stems creeping over the ground and forming continuous thickets overshadow almost all native plants and

reduce the diversity of herbaceous plants. They can form large tangles in the tree canopy, which not only reduces the amount of light available but also greatly increases the risk of windthrows and windbreaks.

Phedimus spurius

In Lithuania, *Phedimus spurius* is cultivated as an ornamental groundcover in flowerbeds and cemeteries and is now being used as a roof plant. *Phedimus spurius* was first found in Lithuania in Druskininkai in 1947 by P. Snarskis. It is most common in the southern and eastern parts of Lithuania but found throughout the country. It is only slightly rarer in the northern and southern parts of the Samogitian Upland, as well as in Suvalkija. The species grows best in slightly acidic soils and dry and sandy areas. Under favourable conditions, it forms pure or nearly pure stands covering large areas. *Phedimus spurius* is long-lived, and the resulting stands can last for several decades. When dense stands form, *Phedimus spurius* outcompetes native, usually weakly competitive, sand plants. As it does not tolerate competition from taller plants well, in other habitats, *Phedimus spurius* is usually sparse and does not cause significant damage.

Pinus banksiana

Pinus banksiana was introduced to Lithuania in the early 20th century as a more resistant species than *Pinus sylvestris*. As a result, it has been used for planting in sandy areas and for reinforcing dunes. After a certain time, when the soil stabilised, mature *Pinus banksiana* were cut down, but in some places, they were left uncut. The species was found spreading for the first time in Lithuania in 1990 in the vicinity of Aukštadvaris, Trakai district. It is common in the southern part of Lithuania but rare in the eastern and western regions of the country. *Pinus banksiana* is most abundant in southern and southeastern Lithuania, where forest plantations have been established and where it has been planted to stabilise dunes. In other parts of the country, *Pinus banksiana* occurs in small groups or as single trees. It is rarely cultivated in ornamental plantations.

Quercus rubra

Quercus rubra was introduced in Lithuania at the end of the 19th century. It is assumed that it was first introduced in the western part of the country, which was then part of East Prussia. Later, it was planted in parks and urban green areas and continues to be planted in forests to this day. The first discovery of spreading *Quercus rubra* was made by R. Jankevičienė in 1971 in the Botanical Reserve of Begėdžiai, Šilutė district. *Quercus rubra* is now found throughout Lithuania, but its distribution is uneven. It is quite common in the southern and western parts of the country but quite rare in the northern regions. In some forests, *Quercus rubra* is very abundant or dominant. It grows in forests, often in sunny areas, on moderately moist, fertile soil. It is now quite common, especially in the southern and western parts of the country, in pine forests on sandy soils. The spread of *Quercus rubra* in natural habitats is the result of a large number of plantings in forests and ornamental plantations, as well as the dispersal of its acorns by birds and small mammals.

Reynoutria japonica

In Lithuania, *Reynoutria japonica* was introduced at the end of the 19th century as a large-leaved, fast-growing, and undemanding plant. A large stand of this species was first found in

Lithuania in 1935 by P. Snarskis on the shores of the Curonian Lagoon. The species is now widespread throughout the country. It is especially abundant around the major cities of Vilnius, Kaunas, and Klaipėda, and somewhat less common in Samogitia and the northeastern part of Lithuania. It grows in woodlands, shrublands, and open habitats. It frequently spreads from abandoned farmsteads into adjacent anthropogenic grasslands of varying humidity. *Reynoutria japonica* is often found on roadsides, wastelands, the banks of watercourses, forest edges, and scrubland. Its roots cause damage to infrastructure, such as building foundations, walls, roads, dams, pipelines, and drainage systems. In Lithuania, *Reynoutria japonica* mostly spread through discarded garden waste and it is now commonly dispersed through the movement of soil contaminated with rhizomes used for land reclamation.

Reynoutria sachalinensis

There are no data on the introduction of *Reynoutria sachalinensis* in Lithuania, but in 1946, P. Snarskis found it growing in the wild in Verkiai, Vilnius, on the slope of a stream. A large thicket has survived to this day. *Reynoutria sachalinensis* is widespread in Lithuania but rarer than *Reynoutria japonica*. It is mostly found around towns and settlements but can also be found in remote areas. *Reynoutria sachalinensis* is cultivated in parks and gardens while self-propagating plants are found in forests, wastelands, along the banks of watercourses, along roadsides, and around old farmsteads. In Lithuania, the species is now mostly spread in soil used for land reclamation, which is contaminated with the rhizomes of these plants.

Rhus typhina

Rhus typhina was first recorded in Lithuania in 1998 in Šakiai district, in the environs of Sudargas, on a slope near the Nemunas River. The species has now been found to be widespread throughout Lithuania. It is relatively common in the southern, eastern, and central parts of the country but slightly rarer in the northern regions. It is particularly common around towns and settlements. *Rhus typhina* is most often found in anthropogenic habitats such as wastelands, shrublands and woodlands near farmsteads, roadsides, temperate wet and dry grasslands, and less often in remote forests, river valleys, and on the banks of water bodies. It spreads from former plantations or grows from root parts discarded with green garden waste. In habitats with dense *Rhus typhina* thickets, species diversity is greatly reduced, and the structure of the habitat changes. Grassland habitats are particularly rapidly degraded, with almost all herbaceous plants disappearing in *Rhus typhina* stands.

Rudbeckia hirta

Rudbeckia hirta was introduced into ornamental gardens in Lithuania in the middle of the 20th century. The first wild occurrence of this species was recorded in 1988 in the vicinity of Mickūnai, Vilnius region. Nowadays, *Rudbeckia hirta* is most widespread in southern and southeastern Lithuania, while individual plants can be found throughout the country. It forms abundant stands in dry habitats with predominantly water-permeable soils. *Rudbeckia hirta* is most often found in dry grasslands, roadsides, wastelands, and forest edges. It is particularly frequent in habitats around cemeteries, such as grasslands and slopes, and occurs in anthropogenic habitats, such as landfills and quarries.

Rudbeckia laciniata

Rudbeckia laciniata is one of the oldest ornamental plants in Lithuania. It was first found in natural habitats in the country in 1897, in the vicinity of Smalininkai. The species is common throughout Lithuania but somewhat rarer in the northern part of the country. *Rudbeckia laciniata* prefers moist soil but grows well in moderately moist soil. It is found in abandoned meadows, forest edges, along forest roads and the edges of drainage ditches, on farmsteads, along settlements, and less frequently, on the banks of rivers and streams.

Sambucus nigra

Sambucus nigra was introduced in Lithuania in the 17th century, as in the other Baltic countries, but it is possible that monasteries and manor gardens may have started growing it earlier. Information on the spread of the species in the wild in Lithuania is scarce, but it is known to have been rare in the early 19th century. *Sambucus nigra* is now widespread throughout the country, but its distribution is uneven. It is common and relatively abundant in regions where fertile soils predominate, while in the southeast and east, it is rather rare and scarce. It grows in riparian scrub, moist forests, forest edges, and various anthropogenic habitats. It is most often found on farmsteads, near abandoned buildings, around old villages, near settlements, and around power line pylons. It sometimes forms thickets but often grows together with other shrubs and trees. In forests and woodland edges where *Sambucus nigra* is abundant, the herbaceous layer is dominated by tall nitrogen-loving plants. The presence of *Sambucus nigra* in sparse pine forests accelerates soil eutrophication and causes significant changes in plant communities and habitats.

Sambucus racemosa

There is no definitive data on when the cultivation of *Sambucus racemosa* started in Lithuania. It is known that it began to spread in East Prussia in the middle of the 19th century and was still quite rare at the end of the century. *Sambucus racemosa* was first found in Lithuania in 1885 in Druskininkai, at the mouth of the Ratnyčia River. Almost at the same time, it was found in the present-day Šakiai region near Gelgaudiškis. Nowadays, the species is widespread throughout Lithuania, but its distribution is uneven. It is common in the southern and eastern regions, and in some northern parts of the country but scarce or rare elsewhere. *Sambucus racemosa* grows in a variety of forests, more often in mixed pine forests, coppice forests, and riparian scrub. It is quite common in anthropogenic habitats, especially on roadsides, along railways, and around abandoned buildings. The impact on plant communities and habitats in Lithuania has not been studied, but it has been observed that when *Sambucus racemosa* becomes established in pine forests, nitrophilous plants start to increase in communities.

Sedum album

Sedum album has been cultivated in ornamental plantations in Lithuania since the mid-20th century. It has been particularly common in cemeteries because it is drought-resistant, fast-growing, and covers open areas of land. The species was first found growing wild in 1988 in a pine forest in Šalčininkai district in the vicinity of Tetėnai. *Sedum album* occurs throughout Lithuania but is most common in the northern, eastern, and southern parts of the country. It usually forms small stands and rarely occupies large areas of slopes or sandy areas. Nowadays, it is mostly found around cemeteries, in dry meadows, on slopes, forest edges, sandy areas, and in various anthropogenic habitats (roadsides, fences, between pavement tiles). *Sedum album*

has now been observed to be spreading rapidly in lawns as mowers shred and spread the viable plant parts over large areas.

Sorbaria sorbifolia

Sorbaria sorbifolia was introduced in Lithuania at the beginning of the 19th century in the Botanical Garden of Vilnius University. From the botanical garden, the species apparently spread quickly to ornamental plantations and later to natural habitats. *Sorbaria sorbifolia* was first observed in 1890 in Vilnius, on the Hill of Crosses. Nowadays, the species is common in Lithuania, but its distribution is uneven. In the southeastern part of the country, the plant is quite common and abundant, while in the western part, it is much rarer and less abundant. It forms large stands in sunny places, usually on the edges of forests, in open woodlands, on roadsides, and near cemeteries. Very often, this species forms dense stands of varying sizes, which can cover the entire area of a disused graveyard. The thickets are formed by long rhizomes from which many new stems grow. In such stands of *Sorbaria sorbifolia*, there is little growth of other species, species diversity is greatly reduced, and habitats are degraded.

Symphyotrichum lanceolatum

In Lithuania, *Symphyotrichum lanceolatum* has been cultivated in cemeteries and flowerbeds for quite some time. In natural habitats, it was first discovered in the country in 1948 by D. Apalia in Šilutė district, Paleičiai. Nowadays, it grows abundantly in northern and eastern Lithuania, and solitary populations occur throughout the country. *Symphyotrichum lanceolatum* is particularly abundant along the rivers Širvinta, Musė, and Nemunėlis. It is found in semi-anthropogenic habitats (roadsides, backyards), as the seeds germinate best in disturbed, open soil. It also grows in abandoned grasslands, forest edges, and on the banks of water bodies. *Symphyotrichum lanceolatum* forms dense thickets and completely outcompetes native plants.

Symphyotrichum novi-belgii

Symphyotrichum novi-belgii is the most common species of this genus grown in Lithuanian horticulture. It was first found in a natural habitat by D. Žukienė in 1953 in Širvintos, on the bank of a river. This species is quite often found in the southeastern, eastern, and northeastern parts of Lithuania. It is rare or absent in central Samogitia and Suvalkija. *Symphyotrichum novi-belgii* usually occurs in abandoned grasslands, forest edges, riverbanks, and floodplains, and less frequently in wastelands and landfills. It is mostly dispersed by humans in garden waste deposited on the banks of watercourses, roadsides, forest edges, and wastelands. The species produces long rhizomes, resulting in dense thickets, outcompeting most native herbaceous plants.

Vinca minor

In Lithuania, *Vinca minor* was introduced in the 17th century in the Klaipėda region, and by the end of the 19th century, it was found established in the forests around Viešvilė, in the present-day Jurbarkas district. *Vinca minor* is now found in many parts of the country. It is most common around cemeteries and in adjacent woodlands. It persists for a long time in the grasslands of abandoned farmsteads and can be found near gardens and in suburban woodlands. The evergreen leathery leaves of *Vinca minor* almost completely cover the ground and create an unfavourable environment for other plants. The fallen leaves form a continuous

cover on the soil surface, further reducing the potential for native plants to establish. Because *Vinca minor* grows well in both sunny and shady places, it is not dependent on soil and tolerates a lack of moisture. Its stands form a grass and shrub canopy that is completely uncharacteristic of hemiboreal coniferous forest communities.

ANIMALS

CRUSTACEANS

Dikerogammarus haemobaphes

Dikerogammarus haemobaphes was first recorded in Lithuania in 2019 in the Nemunas River near Druskininkai. It is presumed to have naturally spread into Lithuanian waters from Poland via the left tributaries of this river. *Dikerogammarus haemobaphes* is now distributed throughout the Nemunas River above the Kaunas Water Reservoir and may spread downstream along this river into the Curonian Lagoon in the future. It usually settles in shallow flowing water bodies with hard bottom substrate (stones, pebbles, submerged wood, anthropogenic structures, mollusc colonies, or shell debris). It may inhabit lakes and brackish water bodies.

Eriocheir sinensis

Eriocheir sinensis is naturally distributed in East Asia, in the Yellow and East China Seas. It was first observed in Europe in 1912 and in Lithuania in 1934. An adult *Eriocheir sinensis* usually lives in fresh or brackish water, but it needs salt water to reproduce. In Lithuania, individual crabs are caught on the coast of the Baltic Sea and in the Curonian Lagoon. Since *Eriocheir sinensis* does not form stable populations, special combat measures are currently not necessary.

FISHES

Neogobius fluviatilis

Neogobius fluviatilis naturally spread into Lithuanian inland waters from the neighbouring territory of the Belarus in 2015. Since then, the species has been annually observed in the Neris River, forming a self-sustainable population. Today it is widespread in the Nemunas River and its large tributaries. There is no doubt that *Neogobius fluviatilis* will inhabit the whole Nemunas River basin in the nearest future. It usually dwells in habitats with a mixed-type bottom (sand and mud with some gravel and aquatic macrophytes) and in slower water currents. Such habitats are known to be typical for *Neogobius fluviatilis* in Lithuania. To date, there is no evidence of any negative impact of this species on local ecosystems in Lithuanian waters.

BIRDS

Psittacula krameria

The first sighting of Psittacula krameria in the western part of Lithuania was recorded in 2002. To date, there have been about 25 known Psittacula krameria sightings in various parts of the country, with the majority observed in Vilnius city. There also have been sightings of a few successful wintering cases. During colder winters, this species is capable of surviving at temperatures of about -20 °C. As winters become milder due to climate change, the number of Psittacula krameria in Lithuania is predicted to grow.

Invasive non-native species of Community concern not detected in Lithuania

The chapter describes invasive alien species of Union concern that have not yet been recorded in the wild in Lithuania. A brief morphological and biological characteristic of each species, their origin, and current global distribution are provided, with particular emphasis on regions adjacent to Lithuania. Possible or probable routes of introduction of these species into Lithuania and their environmental impact are also discussed. The possibilities of naturalisation and spread of species not yet recorded in Lithuania are examined.

Vectors, prevention, control, and eradication of alien and invasive species

Alien organisms are organisms that have been introduced into new territories as a result of human activities and are found in nature. Although many organisms found in artificial environments (flower gardens, cultivated fields, farms, botanical gardens, and zoos) are introduced from other countries, they are not considered to be alien until they are introduced into nature. It should be added that alien plants are divided into two large groups: archaeophytes and neophytes. Archaeophytes are those plants that were introduced to an area after human settlement or later, usually before 1500, while neophytes are those introduced after 1500.

Alien organisms entering new areas are often initially rare and populations are small, but some of them adapt to the new environmental conditions, reproduce, and form long-term populations. If the alien organisms do not form long-lasting populations that can persist without human intervention, they are known as non-established. If permanent populations do form, they are called established or naturalised. Among all alien species, it is usually a relatively small proportion that become naturalised, while others disappear or persist only because they are introduced again and again from cultivation sites, are brought in with a variety of commodities, or are introduced by natural factors or by their spontaneous dispersal into an area. Some alien species that have naturalised are highly adaptable to environmental conditions, spreading uncontrollably, taking over a wide range of habitats, and causing significant environmental, economic, and (or) human health damage. Such organisms are known as invasive.

Alien organisms belonging to different taxonomic and ecological groups do not establish in new areas at the same rate. Some may take several decades to naturalise, but there are others that naturalise rapidly and spread over large areas very quickly. This depends on the biological and ecological characteristics of the organisms considered, on the ecological status of the new area, on the economic activities in the area, and even on human traditions and habits.

Some alien organisms are introduced to new areas accidentally while others are brought by humans intentionally for cultivation or breeding and for a particular benefit (for food, timber, technical purposes, beauty, or other reasons). Accidentally introduced organisms are those that people did not intend to transfer, but nevertheless came with various commodities, cargo, vehicles, or other means of transport. Some organisms are introduced to new areas by natural agents (water, wind, animals) or through spontaneous migration from other regions where they are alien, i.e., they have already been introduced through human activities.

For a long time, the number of alien species has been increasing in many European countries, including Lithuania due to the accidental introduction of organisms into new

territories with various contaminated commodities. For example, most alien land plants were introduced in the 20th century with imported grain and, to a lesser extent, other agricultural products. From the late 20th century to the present, the number of newly discovered alien species, including invasive species, has been increasing due to the spread of organisms outside of artificial environments that were previously purposefully introduced. Most alien plants newly found in Lithuania are ornamental plants that were introduced at various times and have now escaped and started to spread.

Animals from captivity are introduced into the environment after escaping from farms, while others are purposefully released simply to get rid of obsolete pets. Plants from cultivation sites usually spread by themselves as their seeds are carried by wind, water, and animals, but humans are still very often involved. Plants grown under artificial conditions, and which have become abundant are discarded, or parts of them are discarded, and new individuals grow from roots, rhizomes, seeds, or other parts, which are then free to multiply and spread. Plants and some animals are much more readily adapted to new conditions when they are deliberately introduced, grown, and bred under artificial conditions. Often, such organisms come from regions with similar environmental conditions. They also spend the first stages of adaptation under the care and protection of humans, during which the selection of the best adapted individuals to the new environment takes place. As a result, alien organisms that are deliberately introduced spread more widely and are more likely to become invasive than those that are accidentally introduced to new areas.

Some alien organisms spread to new areas spontaneously from regions where they are already established or have even become invasive. Aquatic organisms are the fastest to spread naturally, as well as fast-moving animals (mammals, birds) and plants dispersed by wind, birds, and water. It is difficult, and sometimes almost impossible, to prevent the dispersal of plants and animals that spread naturally from other areas because wind, water, birds, and other animals do not recognise national borders. Their spread is usually stopped only by natural barriers, especially climatic conditions.

It could be argued that no two alien species have the same pathways to new territories and the same subsequent spread. However, to prevent the introduction of new alien and invasive species, it is important to bear in mind that no live plant parts or animals may be brought in from other countries. It is particularly important to effectively manage and dispose of plant waste from gardens, flowerbeds, and other green spaces. Care must be taken to ensure that alien plants do not produce seeds that can be carried by wind, water, birds, or other natural agents. The risk of invasions is extremely high when alien plants or animals are introduced into open water bodies and their shores. Even plants, fish, molluscs, and other organisms grown in aquaria are potentially dangerous and must never be introduced into water bodies. Preventing the spread of alien organisms and the damage they cause is much easier than trying to control their spread and repair the damage they have already caused to the environment, the economy, and human health.

The spread of alien organisms that can cause environmental, economic, or human health damage can be controlled through an effective system of prevention measures. It must

be stressed that it is always more cost-effective to apply preventive measures and to keep dangerous organisms from entering new areas than to control or eradicate invasive organisms that are already established. The main objective of prevention is to combat the targeted introduction, multiplication, and spread of organisms that have already become invasive in other countries. Prevention measures are less effective in cases where alien organisms have been introduced, established, and become invasive, but even then, prevention measures must be taken to stop these organisms from spreading in a targeted manner and causing further environmental damage.

If invasive organisms have been introduced into an area despite all prevention measures, the control and eradication of their populations must be carried out immediately. The primary objective of invasive organism control is to prevent their multiplication and further spread. Sometimes it is not possible to eradicate all the individuals of a very widespread species in a short period of time. Instead of eradication, the only action that can be taken is to control the populations to minimise the damage caused by these organisms.

Eradication is the most difficult and costly way to combat invasive organisms. The methods and means of eradication often vary considerably from species to species, depending on the biological and ecological characteristics of the invasive organism. There are many methods of eradication and new, more effective eradication methods are constantly being developed as well as the search for the least environmentally damaging eradication measures. When eradication measures are taken, in each case, it is essential to choose a measure that will only affect the species to be eradicated and that will not harm the environment or will cause as little harm as possible.

To effectively control or eradicate a population of an invasive species, especially if it covers a large area, a well-designed eradication action plan is required. Population control and eradication action plans should be prepared by a specialist with knowledge of the ecology and biology of the invasive species concerned. The specialist must be able to select the most appropriate and least environmentally damaging eradication method for each area or a combination of eradication methods.

Despite the wealth of information available on the prevention, control, and eradication of alien and invasive species, there is still little public knowledge or understanding of the risks posed by invasive species, or outright denial of those risks. It is a great pity that there are some professionals in certain fields, who have a duty of care to the environment, who agitate with all their might against the control and eradication of the spread of alien species, and who continue to promote the introduction of alien organisms and organisms recognised as legally invasive in natural habitats, claiming that this increases biodiversity. Legislation alone is not enough to avoid the risks posed by alien and invasive organisms. Government officials, experts from various scientific and economic sectors, members of non-governmental organisations, and, most importantly, society as a whole need to join forces.

Literatūra

Aboul-Enein A.M., Al-Abd A.M., Shalaby E.A., Abul-Ela F., Nasr-Allah A.A., Mahmoud A.M., El-Shemy H.A., 2011. *Eichhornia crassipes* (Mart) Solms: From water parasite to potential medicinal remedy. – Plant Signaling & Behavior, 6(6): 834–836.

Abromeit J., Jentzsch A., Vogel G., 1898. Flora von Ost- und Westpreussen. Berlin.

Alberternst B., Nawrath S., 2002. *Lysichiton americanus* Hultén and St. John new to Continental Europe. Is there a chance for control in the early phase of naturalisation? – Neobiota, 1: 91–99.

Allred B.W., Fuhlendorf S.D., Monaco T.A., Will R.E., 2010. Morphological and physiological traits in the success of the invasive plant *Lespedeza cuneata*. – Biological Invasions, 12(4): 739–749.

Alm T., 2013. Ethnobotany of *Heracleum persicum* Desf. ex Fisch., an invasive species in Norway, or how plant names, uses, and other traditions evolve. – Journal of Ethnobiology and Ethnomedicine, 9: 42.

Aloise G., Bertolino S., 2005. Free-ranging population of the Finlayson's squirrel *Callosciurus finlaysonii* (Horsfield, 1824) (Rodentia, Sciuridae) in South Italy. – Hystrix. Italian Journal of Mammalogy, 16: 70–74.

Arbačiauskas K., 2002. Ponto-Caspian amphipods and mysids in the inland waters of Lithuania: history of introduction, current distribution and relations with native malacostracans. – In: Leppäkoski E., Gollasch S., Olenin S. (eds), Invasive Aquatic Species of Europe. Distribution, Impacts and Management: 104–115. Dordrecht.

Arbačiauskas K., Gumuliauskaitė S., 2007. Invasion of the Baltic Sea basin by the Ponto-Caspian amphipod *Pontogammarus robustoides* and its ecological impact. – In: Gherardi F. (ed.) Biological Invaders in Inland Waters: Profiles, Distribution and Threats, Invading Nature. Springer Series in Invasion Ecology, 2: 463–477. Berlin.

Arbačiauskas K., Rakauskas V., Virbickas T., 2010. Initial and long-term consequences of attempts to improve fish-food resources in Lithuanian waters by introducing alien peracaridan species: a retrospective overview. – Journal of Applied Ichthyology, 26: 28–37.

Arbačiauskas K., Šidagytė E., Šniaukštaitė V., Lesutienė J., 2017. Range expansion of Ponto-Caspian peracaridan crustaceans in the Baltic Sea basin and its aftermath: lessons from Lithuania. – Aquatic Ecosystem Health & Management, 20(4): 393–401.

Arbačiauskas K., Višinskienė G., Smilgevičienė S., Rakauskas V., 2011. Non-indigenous macroinvertebrate species in Lithuanian fresh waters, Part 1: Distributions, dispersal and future. – Knowledge and Management of Aquatic Ecosystems, 402: 12.

Bacevičius E., Gasiūnaitė Z.R., 2008. Two crab species – Chinese mitten crab (*Eriocheir sinensis* Edw.) and mud crab (*Rhithropanopeus harrisii* (Gould) ssp. *tridentatus* (Maitland)) in the Lithuanian coastal waters, Baltic Sea. – Transitional Waters Bulletin, 2: 63–68.

Badalamenti E., Barone E., Pasta S., Sala G., Lamantia T., 2012. *Ailanthus altissima* (Mill.) Swingle (Simaroubaceae) in Sicily and historical facts about its introduction in Italy. – Naturalista Siciliano, 36(1): 117–164.

Balčiauskas L., Stratford J., Balčiauskienė L., Kučas A., 2021. Roadkills as a method to monitor raccoon dog populations. – Animals, 11(11): 3147.

Balčiauskas L., Stratford J., Kučas A., Balčiauskienė L., 2022. Factors affecting roadkills of aemi-aquatic mammals. – Biology, 11(5): 748.

Balčiauskas L., Trakimas G., Juškaitis R., Ulevičius A., Balčiauskienė L., 1999. Lietuvos žinduolių, varliagyvių ir roplių atlasas. Antrasis papildytas leidimas. Vilnius.

Bartoszewicz M., 2006. NOBANIS. Invasive alien species fact sheet – *Procyon lotor*. – Online Database of the North European and Baltic Network on Invasive Alien Species. www.nobanis.org.

Bertolino S., 2008. Introduction of the American grey squirrel (*Sciurus carolinensis*) in Europe: a case study in biological invasion. – Current Science, 95(7): 903–906.

Bertolino S., Cordero di Montezemolo N., Preatoni D.G., 2014. A grey future for Europe: *Sciurus carolinensis* is replacing native red squirrels in Italy. – Biological Invasions, 16: 53–62.

Bleeker W., Schmitz U., Ristow, M., 2007. Interspecific hybridisation between alien and native plant species in Germany and its consequences for native biodiversity. – Biological Conservation, 137(2): 248–253.

Bohn K.K., Minogue P.J., Pieterson E.C., 2011. Control of invasive Japanese climbing fern (*Lygodium japonicum*) and response of native ground cover during restoration of a disturbed longleaf pine ecosystem. – Ecological Restoration, 29(4): 346–356.

Boonkhaw P., Prayoon U., Kanchanasaka B., Hayashi F., Tamura N., 2017. Colour polymorphism and genetic relationships among twelve subspecies of *Callosciurus finlaysonii* in Thailand. – Mammalian Biology, 85: 6–13.

Booy O., Cock M., Eckstein L., Hansen S.O., Hattendorf J., Hüls J., Jahodová Š., Krinke L., Maravcová L. Müllerová J., Nentwig W., Nielsen C., Otte A., Pergl J., Perglová I., Priekule I., Pyšek P., Ravn H.P., Thiele J., Trybush S., Wittenberg R., 2005. The giant hogweed best practice manual: guidelines for the management and control of invasive weeds in Europe. København.

Branquart E., Vanderhoeven S., van Landuyt V., van Rossum F., Verloove F., 2010. Harmonia database: *Aster novi-belgii* L. – https://ias.biodiversity.be/species/show/135 [accessed on 19 January 2023].

Brundu G., Aksoy N., Brunel S., Elias P., Fried G., 2011. Rapid surveys for inventorying alien plants in the Black Sea region of Turkey. – EPPO Bulletin, 41: 208–216.

Burba A., 2010. The dispersal of the invasive spinycheek crayfish, *Orconectes limosus*, throughout Lithuanian waters. – Freshwater Crayfish, 17: 67–72.

Butkus R., Rakauskas V., 2020. Experimental evidence that the invasive snail *Potamopyrgus antipodarum* (Gray, 1843) survives passage through the digestive tract of common riverine fish. – Management of Biological Invasions, 11(1): 96–104.

Butkus R., Šidagytė E., Arbačiauskas K., 2012. Two morphotypes of the New Zealand mud snail *Potamopyrgus antipodarum* (J.E. Gray, 1843) (Mollusca: Hydrobiidae) invade Lithuanian lakes. – Aquatic Invasions, 7(2): 211–218.

Butkus R., Šidagytė E., Rakauskas V., Arbačiauskas K., 2014. Distribution and current status of non-indigenous mollusc species in Lithuanian inland waters. – Aquatic Invasions, 9(1): 95–103.

Butkus R., Vaitonis G., 2019. New records and distribution patterns of the invasive snail *Potamopyrgus antipodarum* (Gray, 1843) in Lithuanian inland waters. – BioInvasions Records, 8(4): 804–812.

Butkuvienė J., Kamaitytė-Bukelskienė L., Naugžemys D., Patamsytė J., Sinkevičienė Z., 2022. First records and molecular confirmation of invasive species *Elodea nuttallii* (Planch.) H. St. John, 1920 in Lithuania. – BioInvasions Records, 11(4): 1019–1030.

Butler T.J., Stritzke J.F., Redmon L.A., Goad C.L., 2002. Broomsedge (*Andropogon virginicus)* response to herbicides and burning. – Weed Technology, 16(1): 18–22.

Caño L., Campos J.A., García-Margo D., Herrera M., 2014. Invasiveness and impact of the non-native shrub *Baccharis halimifolia* in sea rush marshes: fine-scale stress heterogeneity matters. – Biological Invasions, 16: 2063–2077.

Caudullo G., Welk E., San-Miguel-Ayanz J., 2017. Chorological maps for the main European woody species. – Data in Brief, 12: 662–666.

Charles-Dominique T., Edelin C., Bouchard A., 2010. Architectural strategies of *Cornus sericea*, a native but invasive shrub of Southern Quebec, Canada, under an open or a closed canopy. – Annals of Botany, 105: 205–220.

Copilas-Ciocianu D., Šidagytė-Copilas E., 2022. A substantial range expansion of alien Ponto-Caspian amphipods along the eastern Baltic Sea coast. – Oceanologia, 64(1): 227–232.

Copp G.H., Fox M.G., Kováč V., 2002. Growth, morphology and life history traits of a coolwater European population of pumpkinseed *Lepomis gibbosus*. – Archiv für Hydrobiologie, 155: 585–614.

Cukerzis J., 1979. On acclimatization of *Pacifastacus leniusculus* Dana in an isolated lake. – Freshwater Crayfish, 4: 445–450.

Dandelot S., Robles C., Pech N., Cazaubon A., Verlaque R., 2008. Allelopathic potential of two invasive alien *Ludwigia* spp. – Aquatic Botany, 88(4): 311–316.

Daujotas M., 1958. Lietuvos pajūrio smėlynų apželdinimas. Vilnius.

Dietz H., Fischer M., Schmid B., 1999. Demographic and genetic invasion history of a 9-year-old roadside population of *Bunias orientalis* L. (Brassicaceae) – Oecologia, 120: 225–234.

Dobravolskaitė R., Gudžinskas Z., 2011. Alien plant invasion to forests in the vicinity of communal gardens. – Botanica Lithuanica, 17(2–3): 73–84.

Drymmer K., 1887. Sprawozdanie z wycieczki botanicznej odbytej w nadniemeński okolice powiatu władysławowskiego, maryjampolskiego i wyłkowyskiego. – Pamietnik Fizjograficzny, 7(3): 60–93.

Faulkner J.L., Clebsch E.E.C., Sanders W.L., 1989. Use of prescribed burning for managing natural and historic resources in Chickamauga and Chattanooga National Military Park, USA. – Environmental Management, 13: 603–612.

Follak S., Bakacsy L., Essl F., Hochfellner L., Lapin K., Schwarz M., Tokarska-Guzik B., Wołkowycki D., 2021. Monograph of invasive plants in Europe N°6: *Asclepias syriaca* L. – Botany Letters, 168(3): 422–451.

Francírková T., 2001. Contribution of the invasive ecology of *Rudbeckia laciniata* in the Czech Republic. – In: Brundu G., Brock. J., Camarda I., Wade M. (eds), Plant Invasions: Species Ecology and Ecosystem Management: 89–98. Leiden.

Fried G., Caño L., Brunel S., Beteta E., Charpentier A., Herrera M., Starfinger U., Panetta F.D., 2016. Monographs on invasive plants in Europe: *Baccharis halimifolia* L. – Botany Letters, 163: 127–153.

Fröberg L., 2010. *Heracleum* L. – In: Flora Nordica (Thymelaeaceae to Apiaceae), 6: 224–234. Stockholm.

Galanidi M., Turan C., Oztürk B., Zenetos A., 2019. Europen Union (EU) risk assessment of *Plotosus lineatus* (Thunberg, 1787); a summary and information update. – Journal of Black Sea and Mediterranean Environment, 25: 210–231.

Gasiūnas I., 1959. Kormovoj zoomakrobentos zaliva Kuršių marios. – In: Jankevičius K. (ed), Kuršių marios: 191–291. Vilnius.

Gasiūnas I., 1972. Enrichment of fodder basis of water bodies of Lithuania by acclimatized crustaceans-like organisms from the Caspian Sea complex. – In: Maniukas J., Virbickas J. (eds), On the breeding of fish and crustacean-like organisms in the water bodies of Lithuania: 57–68. Vilnius.

Genovesi P., 2000. Guidelines for Eradication of Terrestrial Vertebrates: a European Contribution to the Invasive Alien Species Issue. Strasbourg.

Genovesi P., 2005. Eradications of invasive alien species in Europe: a review. – Biological Invasions, 7: 127–133.

Genovesi P., Shine C., 2004. European strategy on Invasive alien species. – Nature and Environment, 137: 1–67.

Gildenhuys E., Ellis A.G., Carroll S., Le Roux J.J., 2013. The ecology, biogeography, history and future if two globally important weeds: *Cardiospermum halicacabum* Linn. and *C. grandiflorum* SW. – Neobiota, 19: 45–65.

Gioria M., Osborne B., 2009. The impact of *Gunnera tinctoria* (Molina) Mirbel invasions on soil seed bank communities. – Journal of Plant Ecology, 2(3): 153–167.

Giulio S., Pinna L.C., Carboni M., Marzialetti F., Acosta A.T.R., 2021. Invasion success on European coastal dunes. – Plant Sociology, 58: 29–39.

Gnanavel I., 2013. *Parthenium hysterophorus* L.: A major threat to natural and agroeco-systems in India. – Science International, 1(5): 124–131.

Grabowska J., Grabowski M., Kostecka A., 2009. Diet and feeding habits of monkey goby (*Neogobius fluviatilis*) in a newly invaded area. – Biological Invasions, 11(9): 2161–2170.

Granereau G., Verloove F., 2010. Une poacée invasive nouvelle pour la France: *Andropogon virginicus* (Andropogoneae, Poaceae). Bulletin de la Société Linnéenne de Bordeaux 145: 417–421.

Gudžinskas Z., 1997. Conspectus of alien plant species of Lithuania. 4. Asteraceae. – Botanica Lithuanica, 3(4): 335–366.

Gudžinskas Z., 1998a. Conspectus of alien plant species of Lithuania. 7. Apiaceae, Asclepiadaceae, Caprifoliaceae, Dipsacaceae, Oleaceae, Sambucaceae, Valerianaceae, and Viburnaceae. – Botanica Lithuanica, 4(3): 249–265.

Gudžinskas Z., 1998b. Conspectus of alien plant species of Lithuania. 8. Aceraceae, Balsaminaceae, Elaeagnaceae, Geraniaceae, Hippocastanaceae, Linaceae, Lythraceae, Onagraceae, Oxalidaceae, Rutaceae, and Vitaceae. – Botanica Lithuanica, 4(4): 363–377.

Gudžinskas Z., 1999a. Conspectus of alien plant species of Lithuania. 9. Cannabaceae, Cucurbitaceae, Euphorbiaceae, Malvaceae, Moraceae, Resedaceae, and Tiliaceae. – Botanica Lithuanica, 5(1): 13–25.

Gudžinskas Z., 1999b. Conspectus of alien plant species of Lithuania. 10. Fabaceae. – Botanica Lithuanica, 5(2): 103–114.

Gudžinskas Z., 1999c. Conspectus of alien plant species of Lithuania. 11. Aristolochiaceae, Caryophyllaceae, Fumariaceae, Nyctaginaceae, Papaveraceae, Portulacaceae, and Ranunculaceae. – Botanica Lithuanica, 5(3): 203–218.

Gudžinskas Z., 1999d. Conspectus of alien plant species of Lithuania. 12. Amaranthaceae and Polygonaceae. – Botanica Lithuanica, 5(4): 313–326.

Gudžinskas Z., 2000a. Conspectus of alien plant species of Lithuania. 14. Crassulaceae, Fagaceae, Grossulariaceae, Juglandaceae, Saxifragaceae, and Violaceae. – Botanica Lithuanica, 6(2): 115–127.

Gudžinskas Z., 2000b. Conspectus of alien plant species of Lithuania. 15. Azollaceae, Pinaceae, and Salicaceae. – Botanica Lithuanica, 6(3): 235–242.

Gudžinskas Z., 2000c. Conspectus of alien plant species of Lithuania. 16. Rosaceae. – Botanica Lithuanica, 6(4): 345–365.

Gudžinskas Z., 2018. Additions and corrections to the list of alien plant species of Lithuania. – Botanica, 24(1): 26–36.

Gudžinskas Z., Kazlauskas M., 2022. The first record of *Heracleum mantegazzianum* Sommier & Levier (Apiaceae) in Lithuania. – BioInvasions Records, 11(2): 320–329.

Gudžinskas Z., Kazlauskas M., Pilāte D., Balalaikins M., Pilāts M., Šaulys A., Šaulienė I., Šukienė L., 2014. Lietuvos ir Latvijos pasienio regiono invaziniai organizmai. Vilnius.

Gudžinskas Z., Lančickas R., 2007. Pavojingo svetimžemio augalo Sosnovskio barščio (*Heracleum sosnowskyi*) invazijos stabdymo ir naikinimo problemos Lietuvoje. – Vadyba. Mokslo tiriamieji darbai, 2(11): 91–95.

Gudžinskas Z., Petrulaitis L., 2021. New alien taxa of the genus *Cornus* (Cornaceae) recorded in Lithuania and Latvia. – Botanica, 27(2): 160–169.

Gudžinskas Z., Petrulaitis L., Taura L., 2021. *Asclepias syriaca* L. (Apocynaceae) and its invasiveness in the southern part of the Boreal region of Europe – evidence from Lithuania. – BioInvasions Records, 10(2): 436–452.

Gudžinskas Z., Petrulaitis L., Žalneravičius E., 2017. New woody alien plant species recorded in Lithuania. – Botanica Lithuanica, 23(2): 153–168.

Gudžinskas Z., Petrulaitis L., Žalneravičius E., 2020. Emerging invasion threat of the liana *Celastrus orbiculatus* (Celastraceae) in Europe. – NeoBiota, 56: 1–25.

Gudžinskas Z., Sinkevičienė Z., 1995. Distribution, biology and naturalization of *Impatiens glandulifera* Royle (Balsaminaceae) in Lithuania. – Botanica Lithuanica, 1: 21–33.

Gudžinskas Z., Taura L., 2022. Do reproductive traits of invasive populations of Scotch broom, *Cytisus scoparius* (Fabaceae), outperform native populations? – Plants, 11(16): 2158.

Gudžinskas Z., Žalneravičius E., 2015: Notes on alien plant species *Amorpha fruticosa* new to Lithuania. – Botanica Lithuanica, 21(2): 160–165.

Gudžinskas Z., Žalneravičius E., 2016. *Solidago ×snarskisii* nothosp. nov. (Asteraceae) from Lithuania and its position in the infrageneric classification of the genus. – Phytotaxa, 253(2): 147–155.

Gudžinskas Z., Žalneravičius E., 2018: Seedling dynamics and population structure of invasive *Heracleum sosnowskyi* (Apiaceae) in Lithuania. – Annales Botanici Fennici, 55(4–6): 309–320.

Guo X., Ma J. Y., Liu L., Li M.Y., Wang H., Sun Y.K., Wang T., Wang K.L., Meyerson, L.A., 2023. Effects of salt stress on interspecific competition between an invasive alien plant *Oenothera biennis* and three native species. – Frontiers in Plant Science, 14: 979.

Hallstan S., 2005: Global warming opens the door for invasive macrophytes in Swedish lakes and streams. Uppsala.

Hatteland B.A., Roth S., Andersen A., Kaasa K., Støa B., Solhøy T., 2013. Distribution and spread of the invasive slug *Arion vulgaris* Moquin-Tandon in Norway. – Fauna Norvegica 32: 13–26.

Helmisaari H., 2010. NOBANIS – Invasive alien species fact sheet – *Impatiens glandulifera*. Online Database of the European Network on Invasive Alien Species. www.nobanis.org

Houseman G.R., Foster B.L., Brassil C.E., 2014. Propagule pressure-invasibility relationships: testing the influence of soil fertility and disturbance with *Lespedeza cuneata*. – Oecologia, 174(2): 511–520.

Hryniewiecki B., 1933. Tentamen Florae Lithuaniae. Warszawa.

Hulme P., 2003. Biological invasions: winning the science battles but losing the conservation was? – Oryx, 37: 178–193.

Hulme-Beaman A., Orton D., Cucchi T., 2021. The origins of the domesticate brown rat (*Rattus norvegicus*) and its pathways to domestication. – Animal Frontiers, 11(3): 78–86.

Hussner A., 2012. Alien aquatic plant species in European countries. – Weed Research, 52: 297–306.

Iamonico D., Pino S., 2015: Taxonomic revision of the genus *Alternanthera* (Amaranthaceae) in Italy. – Plant Biosystems, 150(2): 333–342.

Isermann M., 2008. Effects of *Rosa rugosa* invasion in different coastal dune vegetation types. – In: Tokarska-Guzik B., Brock J. H., Brundu G., Child L., Daehler C. C., Pyšek P. (eds), Plant invasions. Human perception, ecological impacts and management: 289–306. Leiden.

Jahodová Š., Trybush S., Pyšek P., Wade M., Karp A., 2007: Invasive species of *Heracleum* in Europe: an insight into genetic relationships and invasion history. – Diversity and Distributions, 13(1): 99–114.

Jasprica N., Lasić A., Hafner D., Bratoš Cetinić A., 2017. European invasion in progress: *Myriophyllum heterophyllum* Michx. (Haloragaceae) in Croatia. – Natura Croatica, 26(1): 99–103.

Jedlička J., Prach K. 2006. A comparison of two North American asters invading in central Europe. – Flora, 201: 652–657.

Jędrzejczak E., Klichowska E., Nobis M., 2022. Effect of *Rudbeckia laciniata* invasion on soil seed banks of different types of meadow communities. – Scientific Reports, 12: 10965.

Jensen K.R., 2010. NOBANIS. Identification key to marine invasive species in Nordic waters. Invasive alien species fact sheet – *Potamopyrgus antipodarum*. Online Database of the European Network on Invasive Alien Species. www.nobanis.org.

Jundziłł S.B., 1791. Opisanie roślin w Prowincyi W. X. Litewskiego. Wilno.

Jusys V., Karalius S., Raudonikis L., 2017. Nauji ir reti paukščiai Lietuvoje. Vilnius.

Kabuce N., Priede N., 2006. NOBANIS – Invasive alien species fact sheet – *Sambucus nigra*. Online Database of the European Network on Invasive Alien Species. www.nobanis.org.

Kornis M.S., Mercado-Silva N., Vander Zanden M.J., 2012. Twenty years of invasion: a review of round goby *Neogobius melanostomus* biology, spread and ecological implications. – Journal of Fish Biology, 80: 235–285.

Kottelat M., Freyhof J., 2007. Hanbook of European freshwater fishes. Switzerland.

Kouba A., Buřič M., Petrusek A., 2015. Crayfish species in Europe. – In: Kozák P., Ďuriš Z., Petrusek A., Buřič M., Horká I., Kouba A., Kozubíková E., Policar T., Crayfish Biology and Culture: 79–163. České Budějovice.

Kowarik I., 1995. Time lags in biological invasions with regard to the success and failure of alien species. – In: Pyšek P., Prach K., Rejmánek M., Wade,M. (eds), Plant Invasions: General Aspects and Special Problems: 15–38. Amsterdam.

Kozlowski J., 2000a. Distribution and places of occurrence of the slug *Arion lusitanicus* Mabille (Gastropoda: Pulmonata: Arionidae). – Bulletin of Polish Academy of Sciences, Biological Sciences, 48: 309–415.

Kozlowski J., 2000b. Reproduction of *Arion lusitanicus* Mabille, 1868 (Gastropoda: Pulmonata: Arionidae) introduced in Poland. – Folia Malacologica, 8: 87–94.

Kriticos D.J., Brunel S., 2016. Assessing and managing the current and future pest risk from water hyacinth, (*Eichhornia crassipes*), an invasive aquatic plant threatening the environment and water security. – PLoS ONE, 11(8): 2–18.

Kuprevičius J., 1931. Medžiaga Kauno apylinkių florai (žieduočiams ir sporuočių induočiams) tirti. – Kosmos, 1931(1): 236–295.

Kurtto A., 1996. *Impatiens glandulifera* (Balsaminaceae) as an ornamental and escape in Finland, with notes on the other Nordic countries. – Acta Universitatis Upsaliensis, Symbolae Botanicae Upsalienses, 31(3): 221–228.

Lafontaine T. de, Sévigny J.-M., Calvé R., Verreault G., Despatie S.-P., Veilleux E., 2008. Chinese mitten crabs (*Eriocheir sinensis*) in the St. Lawrence River and Estuary, Canada: new records and risk of invasion. – Aquatic Invasions 3(2): 153–163.

Lanta V., Liancourt P., Altman J. Černý T., Dvorský M., Fibich P., Götzenberger L., Hornych O., Miklín J., Petřík P., Pyšek P., Čížek L., Doležal K., 2022. Determinants of invasion by single versus multiple plant species in temperate lowland forests. – Biological Invasions, 24: 2513–2528.

Łapczyński K., 1884. Wycieczka na Litvę i nad Baltyk. – Pamętnik Fizyograficzny, 4: 171–227.

Lavoie C., 2017. The impact of invasive knotweed species (*Reynoutria* spp.) on the environment: review and research perspectives. – Biological Invasions, 19: 2319–2337.

Lavoie L., Sirois L., 1998. Vegetation changes caused by recent fires in the northern boreal forest of eastern Canada. – Journal of Vegetation Science, 9(4): 483–492.

Lemmens P., Mergay J., Vanhove T., De Meester L., Declerck S.A.J., 2015. Suppression of invasive topmouth gudgeon *Pseudorasbora parva* by native pike *Esox lucius* in ponds. – Aquatic Conservation: Marine and Freshwater Ecosystems, 25: 41–48.

Lurz W.W., 2013. *Callosciurus erythraeus* (Rodentia: Sciuridae). – Mammalian Species, 45 (902): 60–74.

Martin F.-M., Dommanget F., Evette A., 2020a. Improving the management of Japanese knotweed s.l.: a response to Jones and colleagues. – NeoBiota, 63: 147–153.

Martin F.-M., Dommanget F., Lavallée F., Evette A., 2020b. Clonal growth strategies of *Reynoutria japonica* in response to light, shade, and mowing, and perspectives for management. – NeoBiota, 56: 89–110.

Massalski W., 1885. Skic klimatu i jawnokwiatowej flory Druskienik. – Pamiętnik Fizyograficznyj, 5(4): 3–54.

Matthews J., Beringen R., Lamers L.P.M., Odé B., Pot R., van der Velde G., van Valkenburg J.L.C.H., Verbrugge L.N.H., Leuven R.S.E.W., 2013. Risk analysis of the non-native Fanwort (*Cabomba caroliniana*) in the Netherlands. – Radboud.

Maundu P., Kibet S., Morimoto Y., Imbumi M., Adekar R., 2009. Impact of *Prosopis juliflora* on Kenya's semi-arid and arid ecosystems and local livelihoods. – Biodiversity, 10(2–3): 33.

Mihulka S., Pyšek P., 2001. Invasion history of *Oenothera* congeners in Europe: a comparative study of spreading rates in the last 200 years. – Journal of Biogeography, 28(5): 597–609.

Minchin D., Arbačiauskas K., Daunys D., Ezhova E., Grudule N., Kotta J., Molchanova N, Olenin S., Višinskienė G., Strake S., 2019. Rapid expansion and facilitating factors of the Ponto-Caspian invader *Dikerogammarus villosus* within the eastern Baltic Sea. – Aquatic Invasions 14(2): 165–181.

Minogue P.J., Bohn K.K., Osiecka A., Lauer D.K., 2010. Japanese climbing fern (*Lygodium japonicum*) management in Florida's Apalachicola bottomland hardwood forests. – Invasive Plant Science and Management, 3(3): 246–252.

Mitchell D., Tur N., 1975. The rate of growth of *Salvinia molesta* (*S. auriculata* auct.) in laboratory and natural conditions. – Journal of Applied Ecology, 12: 213–225.

Mitich L.W., 2000. Intriguing world of weeds. Kudzu *Pueraria lobata* (Willd.) Ohwi. – Weed Technology, 14: 231–235.

Moravcová L., Pyšek P., Jarošík, V., Havlíčková V., Zákravský P., 2010. Reproductive characteristics of neophytes in the Czech Republic: Traits of invasive and non-invasive species. – Preslia, 82: 365–390.

Muller F., Rome Q., Perrard A., Villemant C., 2013. The Asian hornet in Europe: how far will it go? – Insectes, 169: 3–6.

Navasaitis M., 2008. Dendrologija. Vilnius.

Nehring S., Kolthoff D., 2011. The invasive water primrose *Ludwigia grandiflora* (Michaux) Greuter & Burdet (Spermatophyta: Onagraceae) in Germany: First record and ecological risk assessment. – Aquatic Invasions, 6(1): 83–89.

Noyes R., Baker R., Mai B., 2007. Mendelian segregation for two-factor apomixis in *Erigeron annuus* (Asteraceae). – Heredity, 98: 92–98.

Obratov-Petković D., Bjedov I., Nešić M., Belanović Simić S., Đunisijević-Bojović D., Skočajić D., 2016. Impact of invasive *Aster lanceolatus* populations on soil and flora in urban sites. – Polish Journal of Ecology, 64(2): 289–295.

Petřík P., Dostálek J., Neuhäuslová Z., 2009. Combining numerical and traditional approaches to classify *Echinops sphaerocephalus* invaded communities in the Czech Republic. –Phytocoenologia, 39(2): 253–264.

Poschlod P., Kiefer S., Trankle U., Fischer S., Bonn S., 1998. Plant species richness in calcareous grasslands as affected by dispersability in space and time. – Applied Vegetation Science, 1(1): 75–90.

Pritchard T., 1959. The cytotaxonomy of the weedy species *Euphorbia cyparissias* L. and *Euphorbia esula* L. – Recent Advances in Botany, 1: 866–870.

Putman R., Moorem N., 1998. Impact of deer in lowland Britain on agriculture, forestry and conservation habitats. – Mammal Review, 28: 141–164.

Quinteiro J., Rodríguez-Castro J., Iglesias-Piñeiro J., Rey-Méndez M., 2005. Phylogeny of slug species of the genus *Arion*: evidence of monophyly of Iberian endemics and of the existence of relict species in Pyrenean refuges. – Journal of Zoological Systematics and Evolutionary Research, 43: 139–148.

Rahlao S.J., Milton S.J., Esler K.J., Wilgen B., Barnard P., 2009: Effects of invasion of fire-free arid shrublands by a fire-promoting invasive alien grass (*Pennisetum setaceum*) in South Africa. – Austral Ecology, 34(8): 920–928.

Rakauskas V., Bacevičius E., Pūtys Ž., Ložys L., Arbačiauskas K., 2008. Expansion, feeding and parasites of the round goby, *Neogobius melanostomus* (Pallas, 1814), a recent invader in the Curonian Lagoon, Lithuania. – Acta Zoologica Lituanica, 18(3): 180–190.

Rakauskas V., Šidagytė E., Butkus R., Garbaras A., 2018. Effect of the invasive New Zealand mud snail (*Potamopyrgus antipodarum*) on the littoral macroinvertebrate community in a temperate mesotrophic lake. – Marine and Freshwater Research, 69(1): 155–166.

Rakauskas V., Stakėnas S., Virbickas T., Bukelskis E., 2016. Non-indigenous fish in the northern branch of the central European invasion corridor. – Reviews in fish biology and fisheries, 26(3): 491–508.

Rakauskas V., Virbickas T., Skrupskelis K., Kesminas V., 2018. Delayed expansion of Ponto-Caspian gobies (Pisces, Gobiidae, Benthophilinae) in the Nemunas River drainage basin, the northern branch of the central European invasion corridor. – BioInvasions Records, 7(2): 143–152.

Rakauskas V., Virbickas T., Stakėnas S., Steponėnas A., 2019. The use of native piscivorous fishes for the eradication of the invasive Chinese Sleeper, *Perccottus glenii*. – Knowledge and Management of Aquatic Ecosystems, 420: 21.

Rakauskas V., Virbickas T., Steponėnas A., 2021. Several decades of the two invasive fish species (*Perccottus glenii, Pseudorasbora parva*) of European concern in Lithuanian inland waters; from first appearance to current state. – Journal of Vertebrate Biology, 70(4): 21048.

Regelis K., 1936: *Rumex confertus* Willd. – Lietuvos universiteto Matematikos-gamtos fakulteto darbai, 11: 83–98.

Reshetnikov A.N., Ficetola G.F., 2011. Potential range of the invasive fish rotan (*Perccottus glenii*) in the Holarctic. – Biological Invasions, 13: 2967–2980.

Richardson D.M., Pyšek P., 2006. Plant invasions: merging the concepts of species invasiveness and community invasibility. – Progress in Physical Goegraphy, 30: 409–431.

Richardson D.M., Pyšek P., Rejmánek M., Barbour M.G., Panetta F.D., West C.J., 2000. Naturalization and invasion of alien plants: concepts and definitions. – Diversity and Distributions, 6: 93–107.

Richardson R., Marshall M., Uhlig R., Zandstra B., 2009. Virginia creeper (*Parthenocissus quinquefolia*) and wild grape (*Vitis* spp.) control in Fraser fir. – Weed Technology, 23(1): 184–187.

Rijal D.P., Falahati-Anbaran M., Alm T., Alsos I.G., 2014: Microsatellite markers for *Heracleum persicum* (Apiaceae) and allied taxa: application of next-generation sequencing to develop. – In: Genetic Resources for Invasive Species Management: 1–10. Trondheim.

Rome Q., Perrard A., Muller F., Villemant C., 2011. Monitoring and control modalities of a honeybee predator, the yellow-legged hornet *Vespa velutina nigrithorax* (Hymenoptera: Vespidae). – Aliens: The Invasive Species Bulletin, 31: 7–15.

Rostański K., Gudžinskas Z., 2005. The chorology and distribution of *Oenothera* L. in Lithuania. – In: Biodiversity in Relation to Vegetation Zones in Europe: 31–40. Łódź.

Ruaux B., Greulich S., Haury J., Berton J.P., 2009. Sexual reproduction of two alien invasive *Ludwigia* (Onagraceae) on the middle Loire River, France. – Aquatic Botany, 90(2): 143–148.

Sabour S., Azimi T., Nasser A., Hadi N., Mohsenzadeh A., Shariati A., 2022. A global overview of the most important zoonotic bacteria pathogens transmitted from *Rattus norvegicus* to humans in urban environments. – Infectious Medicine, 1(3): 192–207.

Sărăţeanu V., 2010. Assessing the influence of *Amorpha fruticosa* L. invasive shrub species on some grassland vegetation types from Western Romania. – Research Journal of Agricultural Science, 42(1): 536–540.

Schooler S., Julien M., Walsh G.C., 2006. Predicting the response of *Cabomba caroliniana* populations to biological control agent damage. – Australian Journal of Entomology, 45(4): 327–330.

Shen J., Shen M., Wang X., Lu Y., 2005: Effect of environmental factors on shoot emergence and vegetative growth of alligatorweed (*Alternanthera philoxeroides*). – Weed Sciences, 53(4): 471–478.

Šidagytė E., Razlutskij V., Alekhnovich A., Rybakovas A., Moroz M., Šniaukštaitė V., Vaitonis G., Arbačiauskas K., 2017a. Predatory diet and potential effects of *Orconectes limosus* on river macroinvertebrate assemblages of the southeastern Baltic Sea basin: implications for ecological assessment. – Aquatic Invasions, 12(4): 523–540.

Šidagytė E., Solovjova S., Šniaukštaitė V., Šiaulys A., Olenin S., Arbačiauskas K., 2017b. The killer shrimp *Dikerogammarus villosus* (Crustacea, Amphipoda) invades Lithuanian waters, South-Eastern Baltic Sea. – Oceanologia, 59(1): 85–91.

Snarskis P., 1954. Vadovas Lietuvos TSR augalams pažinti. Vilnius

Song U.R., 2017. Temperature-dependent performance of competitive native and alien invasive plant species. – Acta Oecologica, 84: 8–14.

Stalažs A., 2021. ×*Sorbaronia mitschurinii*: from an artificially created species to an invasion in Europe: repeating the fate of invasive *Amelanchier* ×*spicata*, a review. – Journal of Plant Research, 134: 497–507.

Stanek M., Piechnik Ł., Stefanowicz A.M., 2020. Invasive red oak (*Quercus rubra* L.) modifies soil physicochemical propertiesand forest understory vegetation. – Forest Ecology and Management, 472: 118253.

Starfinger U., 2010. NOBANIS – Invasive alien species fact sheet – *Prunus serotina*. Online Database of the European Network on Invasive Alien Species. www.nobanis.org.

Sterud E., Jørgensen A., 2006. Pumpkinseed *Lepomis gibbosus* (Linnaeus, 1758) (Centrarchidae) and associated parasites introduced to Norway. – Aquatic Invasions, 1(4): 278–280.

Strgulc Krajšek S., Bačič E., Čoko U., Dolenc Koce J., 2020. Disposal methods for selected invasive plant species used as ornamental garden plants. – Management of Biological Invasions, 11(2): 293–305.

Tan K., Radloff S.E., Li J.J., Hepburn H.R., Yang M.X., Zhang L.J., Neumann P., 2007. Bee-hawking by the wasp, *Vespa velutina*, on the honeybees *Apis cerana* and *A. mellifera*. – Naturwissenschaften, 94(6): 469–472.

Taugbøl T., Johnsen S.I., 2006. NOBANIS. Invasive alien species fact sheet. – *Pacifastacus leniusculu*s. Online Database of the European Network on Invasive Alien Species. www.nobanis.org.

Taura L., Gudžinskas Z., 2020. Life stages and demography of invasive shrub *Cytisus scoparius* (Fabaceae) in Lithuania. – Botanica, 26(1): 1–14.

Tedeschi L., Biancolini D., Capinha C., Rondinini C., Essl F., 2022. Introduction, spread, and impacts of invasive alien mammal species in Europe. – Mammal Review, 52(2): 252–266.

Telewski F.W, Zeevaart J.A.D., 2002. The 120-yr period for Dr. Beal's seed viability experiment. – American Journal of Botany, 89: 1285–1288.

Thijs K.W., Brys R., Verboven H.A.F., Hermy M., 2012. The influence of an invasive plant species on the pollination success and reproductive output of three riparian plant species. – Biological Invasions, 14: 355–365.

Thurid O., Brandis D., 2011. First evidence of *Eriocheir sinensis* reproduction from Schleswig–Holstein, Northern Germany, western Baltic Sea. – Aquatic Invasions, 6(1): S65–S69.

Tokarska-Guzik B., 2005. The Establishment and Spread of Alien Plant Species (Kenophytes) in the Flora of Poland. Katowice.

Traveset A., 1998. Effect of seed passage through vertebrate frugivores' guts on germination: a review. – Perspectives in Plant Ecology, Evolution and Systematics, 1(2): 151–190.

Trzebiński J., 1911: Przyczynek do znajomości flory gub. Kowieńskiej (powiaty Wilkomierski i Jezioroski). – Rocznik Towarzystwa Przyjacól Nauk w Wilnie (1910), 4: 1–48,

Turan C., Gürlek M., Dağhan H., Demirhan S.A., Karan S., 2020. First clinical case of the venomous Lessepsian migrant fish *Plotosus lineatus* in Iskenderun Bay, the Northeastern Mediterranean Sea. – *Natural and Engineering Sciences*, 5(1): 50–53.

Vanderhoeven S., Dassonville N., Chapuis-Lardy L., Hayez M., Meerts P., 2006. Impact of the invasive alien plant *Solidago gigantea* on primary productivity, plant nutrient content and soil mineral nutrient concentrations. – Plant Soil, 286: 259–268.

Virbickas J., 2000. Lietuvos žuvys. *Vilnius.*

Vivian-Smith G., Hinchliffe D., Weber J., 2005. Fecundity and germination of the invasive aquatic plant, Senegal tea (*Gymnocoronis spilanthoides* (D. Don) DC.). – Plant Protection Quarterly, 20(4): 145–147.

Weber E., 1998. The dynamics of plant invasions: a case study of three exotic goldenrod species (Solidago L.) in Europe. – Journal of Biogeography, 25: 147–154.

Weidema I., 2006. NOBANIS – Invasive alien species fact sheet – *Rosa rugosa*. – Online Database of the North European and Baltic Network on Invasive Alien Species. www.nobanis.org.

Weidema I., Buchwald E., 2010. NOBANIS – Invasive alien species fact sheet – *Acer pseudoplatanus*. – Online Database of the North European and Baltic Network on Invasive Alien Species. www.nobanis.org.

Wieseler S., 2005. Factsheet black locust. Plant Conservation Alliance's Alien Plant Working Group. Weeds Gone Wild: Alien Plant Invaders of Natural Areas. Leiden.

Wilsey B., Stirling G., 2007. Species richness and evenness respond in a different manner to propagule density in developing prairie microcosm communities. – Plant Ecology, 190: 259–273.

Wiśniewski P., 1934. Nienotowane stanowiska kilku rzadszych krajowych i sawleczonych roślin w Wileńszyznie. – Acta Societatis Botanicorum Poloniae, 11: 207–211.

Wiśniewski P., 1938. Materiały do rozmiesczenia rzadkszych roślin w Wileńszyznie. – Prace Towarzystwa Przyjacól Nauk w Wilnie, 12: 235–243.

Witkowski A., 2011: NOBANIS. Invasive alien species fact sheet. *Pseudorasbora parva*. – Online Database of the European Network on Invasive Alien Species. www.nobanis.org.

Yelenik S.G., Stock W.D., Richardson D.M., 2004. Ecosystem level impacts of invasive *Acacia saligna* in the South African fynbos. – Restoration Ecology, 12(1): 44–51.

Zajac K.S., Gawel M., Filipiak A., Kramarz P., 2017. *Arion vulgaris* Moquin-Tandon, 1855 – the aetiology of an invasive species. – Folia Malacologica, 25: 81–93.

Zhang Z., Jiang C., Zhang J., Zhang H., Shi L., 2009. Ecophysiological evaluation of the potential invasiveness of *Rhus typhina* in its non-native habitats, – Tree Physiology, 29(11): 1307–1316.

Padėka

Projektas „Invazinių ir svetimžemių rūšių būklės tyrimai Lietuvoje“ sėkmingai baigėsi.

Dėkojame ekspertams, kurie lauko tyrimų metu rinko duomenis, kūrė ir pildė duomenų bazę, rengė teisinius dokumentus, ruošė ir darė pranešimus, rašė publikacijų tekstus. Mūsų buvo daug:
Kęstutis Arbačiauskas, Danas Augutis, Linas Balčiauskas, Laima Balčiauskienė, Arūnas Balsevičius, Laima Baltrūnaitė, Rokas Butkus, Denis Copilaş-Ciocianu, Vytautas Česnaitis, Justas Dainys, Vaidas Greičius, Milda Gudmonė, Zigmantas Gudžinskas, Marius Jasiulionis, Gerda Jašinskaitė, Donatas Kaltauskas, Monika Kalvaitienė, Saulius Karalius, Darius Kavšinas, Martynas Kazlauskas, Vytautas Kesminas, Mindaugas Kirstukas, Austėja Kuzmaitė, Agnė Bagušinskaitė, Vita Monkuvienė, Eglė Norkevičienė, Kęstutis Obelevičius, Gerardas Paškevičius, Lukas Petrulaitis, Žilvinas Pūtys, Vytautas Rakauskas, Mindaugas Rasimavičius, Ieva Savickaitė, Edgaras Sidabras, Daumantas Sirvydis, Kęstutis Skrupskelis, Saulius Stakėnas, Andrius Steponėnas, Vitalijus Stirkė, Vaclovas Stukonis, Eglė Šidagytė-Copilas, Viltė Šimanskaitė, Laurynas Taura, Domas Uogintas, Gintautas Vaitonis, Linas Vaitonis, Tomas Virbickas, Vytautas Višinskas, Egidijus Žalneravičius.

Dėkojame už administracinį darbą, patarimus ir pagalbą Jurgai Šilinskaitei, Polinai Urbonavičienei, Indrei Vaičiūnei, Jolantai Lileikienei, Laurai Janulaitienei, Kristinai Jankauskaitei, Romai Jagminaitei ir Mariel McCormack.

Projekto vadovas
Valerijus Rašomavičius

Lotyniškų pavadinimų rodyklė

Lietuviškų pavadinimų rodyklė

Nuotraukų autoriai

Kęstutis Arbačiauskas: p. 77 (2), 85 (1–2), 87 (1–2), 181 (2); Linas Balčiauskas: p. 99 (3), 101 (3), 103 (3); Rokas Butkus: p. 73 (1–3), 75 (1–3); Denis Copilaș-Ciocianu: p. 77 (1), 181 (1); Marius Čepulis: p. 185 (1); Justas Dainys: p. 81 (1); 83 (1), 89 (1), 91 (1), 93 (1), 183 (1); Zigmantas Gudžinskas: p. 24–25, 27 (1–3), 29 (1–3), 31 (1–3), 33 (1–3), 35 (1–3), 37 (1–3), 39 (1–3), 41 (1–3), 45 (1–3), 47 (1–3), 49 (1–3), 51 (1–3), 53 (1–3), 55 (1–2), 57 (1–2), 59 (1–3), 61 (1–3), 63 (1–3), 65 (1–3), 67 (1–3), 69 (1–3), 97 (2–3), 108–109, 111 (1–2), 113 (1–2), 115 (1–2), 117 (1–3), 119 (1–3), 121 (1–3), 123 (1–3), 125 (1–3), 127 (1–3), 129 (1–2), 131 (1–3), 133 (1–3), 135 (1–3), 137 (1–3), 139 (1–3), 141 (1–2), 143 (1–2), 145 (1–3), 147 (1–3), 149 (1–3), 151 (1–3), 153 (1–2), 155 (1–3), 157 (1–3), 159 (1–3), 161 (1–3), 163 (1–3), 165 (1–3), 167 (1–3), 169 (1–3), 171 (1–3), 173 (1–3), 175 (1–3), 177 (1–3), 186–187, 188, 197, 206, 207, 214, 216, 220, 245, 257, 258; Marius Jasiulionis: p. 105 (3); Saulius Karalius: p. 97 (1); Kęstutis Obelevičius: p. 189; Lukas Petrulaitis: p. 211; Selemonas Paltanavičius: 99 (1–2), 105 (1–2), 107 (1), 178–179, 185 (2), 246, 250; Žilvinas Putys: p. 79 (1); Vytautas Rakauskas: p. 89 (1), 91 (2–3), 93 (2), 183 (3); Zofija Sinkevičienė: p. 43 (2); Andrius Steponėnas: p. 89 (3), 183 (2); Vitalijus Stirkė: p. 101 (1–2), 103 (1–2), 107 (2); Gintautas Vaitonis: p. 70–71, 79 (2–3), 81 (2–3), 83 (2–3), 95 (2–3); Tim Zurowski: p. 91 (1), 95 (1).

Nuotraukos iš atviros prieigos šaltinių

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INVAZINĖS IR SVETIMŽEMĖS RŪŠYS LIETUVOJE

Redaktoriai Zigmantas Gudžinskas, Valerijus Rašomavičius

Lietuvišką tekstą redagavo Roma Jagminaitė
Anglišką tekstą redagavo Mariel McCormack

2023-08-14. 70×100/16. 22,25 sąl. sp. l. Tiražas 3000 egz.
Išleido Gamtos tyrimų centras, Akademijos g. 2, 08412 Vilnius http://www.gamtostyrimai.lt
Spausdino UAB „Petro ofsetas“, Naujoji Riovonių g. 25C, 03153 Vilnius