Appendix A

Harmonia^{+PL} – procedure for negative impact risk assessment for invasive alien species and potentially invasive alien species in Poland

QUESTIONNAIRE

A0 | Context

Questions from this module identify the assessor and the biological, geographical & social context of the assessment.

a01. Name(s) of the assessor(s):

first name and family name

1. Zygmunt Dajdok
2. Marcin Nobis – external expert
3. Barbara Sudnik-Wójcikowska

acomm01. Comments:

	degree	affiliation	assessment date
(1)	dr	Department of Botany, Institute of Environmental Biology, University of Wrocław	27-06-2018
(2)	dr hab.	Institute of Botany, Jagiellonian University, Kraków	15-01-2018
(3)	dr hab.	Department of Plant Ecology and Environmental Conservation, Faculty of Biology, University of Warsaw; Biological and Chemical Research Centre, University of Warsaw	17-05-2018

a02. Name(s) of ***the species*** under assessment:

Polish name: Miłka połabska

Latin name: ***Eragrostis albensis*** H. Scholz

English name: Elbe love grass

Współfinansowano w ramach projektu nr POIS.02.04.00-00-0100/16 pn. *Opracowanie zasad kontroli i zwalczania inwazyjnych gatunków obcych wraz z przeprowadzeniem pilotażowych działań i edukacją społeczną* ze środków Unii Europejskiej w ramach Programu Infrastruktura i Środowisko 2014-2020

acomm02. Comments:

According to "The Plant List" database (2013 – B) the name *Eragrostis albensis* Scholz is a synonym, and the accepted name for this taxon is *E. multicaulis* Steud. Until the publication of the results of detailed genetic tests, the current taxonomic classification should be considered provisional, which, however, does not affect the assessment of the taxon's impact on river valley ecosystems adopted in this report.

Polish name (synonym I)	Polish name (synonym II)
–	–
Latin name (synonym I)	Latin name (synonym II)
–	–
English name (synonym I)	English name (synonym II)
–	–

a03. **Area** under assessment:

Poland

acomm03. Comments:

–

a04. **Status** of *the species* in Poland. *The species* is:

	native to Poland
	alien, absent from Poland
	alien, present in Poland only in cultivation or captivity
	alien, present in Poland in the environment, not established
X	alien, present in Poland in the environment, established

aconf01. Answer provided with a

low	medium	high	level of confidence
		X	

acomm04. Comments:

*Eragrostis albensi*s is well-established in Poland, although it is a plant species relatively recently discovered in the country. It was first reported in the 1990s from the Vistula and Odra valleys (Sudnik-Wójcikowska and Guzik 1996 – P), however under the name *Eragrostis pilosa* (L.) P. Beauv. Further revision showed that most herbarium specimens recorded on sites by the Vistula river in the 1960s were previously classified as other *Eragrostis* taxa, including *E. albensis* (Guzik and Sudnik Wójcikowska 2005 – P).

*Eragrostis albensi*s is considered by some researchers to be a Central European neo-endemite, a young taxon arisen in central Europe during the last geological period (Scholz 1996 – P), but it is more likely that it came to Poland from central Asia (Nobis and Nobis 2015 – P). Its distribution, taxonomic status and origin have to be investigated further. *Eragrostis albensi*s owes its wide distribution to human activity. It was probably introduced to Poland via several routes, among which rail transport was probably the most important. The seeds of this species could have been accidentally introduced into the areas of railway stations near bridges on rivers. From there they migrated to riparian habitats, and further, with sand excavated from the valleys and spilled on roads in the winter (for de-icing), they were transferred to anthropogenic habitats, where the species also spread. It is possible, however, that *E. albensi*s had spread simultaneously in both these habitats, being repeatedly introduced from river valleys to anthropogenic habitats (outside the valleys), and vice versa (Nobis and Nobis 2015 – P).

At present *E. albensi*s occupies the banks of large rivers (mainly the Vistula, Odra, Bug and San) that are exposed during dry and warm summers, as well as anthropogenic habitats, where it spreads rapidly (Guzik and Sudnik-Wójcikowska 2005, Michalewska and Nobis 2005, Nobis and Nobis 2006, 2010 – P).

If we assume, consistently with The Plant List, that *E. albensis* is a synonym of *E. multicaulis*, then another hypothesis cannot be ruled out. This refers to the identified role of botanical

gardens in the spreading of *E. multicaulis* (with soil and plants exchanged between these gardens). Sites of *E. multicaulis* in some gardens survive to this day. It is surprising, however, that these plants probably do not get out of the gardens in to the nature habitats (Guzik and Sudnik-Wójcikowska 1994, Galera and Sudnik-Wójcikowska 2004 – P). Further research within the group of *Eragrostis pilosa* s.l. is necessary to explain genetic differences between the invasive *E. albensis* and *E. multicaulis* s.l., i.e. the taxon occurring in Poland in the area of botanical gardens.

a05. The impact of *the species* on major domains. *The species* may have an impact on:

X	the environmental domain
	the cultivated plants domain
	the domesticated animals domain
X	the human domain
X	the other domains

acomm05. Comments:

Eragrostis albensis prefers periodically humid natural and anthropogenic habitats. It is an anemophilic plant. Its seeds are dispersed by wind, water or accidentally by humans (with soil). *Eragrostis albensis* flowers and produces seeds in the second half of the summer.

Facts on the biology and ecology of *E. albensis* indicate that this plant mainly has an impact on the environmental domain. The occurrence of this species in various plant communities shows that it forms the largest populations and thus has potentially the greatest impact on communities that include annual species (therophytes), developing on river banks exposed when the water level is low, and in such places it may have a high cover rate and displace native communities (Nobis 2010-2018 – N); it also grows on gravel and sand deposited at a small distance from river beds (Krumbiegel 2002 – P).

Pollen produced by *E. albensis* during florescence may cause allergies in people sensitive to grass pollen. *E. albensis* may also play a more significant role in floodplain meadows, on sites where river sand was deposited, because of competition with plants that have higher feed value. Because *E. albensis* can colonize anthropogenic habitats, such as roadsides, railway lines and trampled areas, including squares and sidewalks (Michalewska and Nobis 2005, Guzik 2011 – P), it may to some extent increase the costs of maintenance (weeding) of such areas. However, it should be noted that the size of *E. albensis* populations in anthropogenic habitats fluctuates from year to year (Sudnik-Wójcikowska 2000-2018 – N; observations from Warsaw).

A1 | Introduction

Questions from this module assess the risk for *the species* to overcome geographical barriers and – if applicable – subsequent barriers of captivity or cultivation. This leads to *introduction*, defined as the entry of *the organism* to within the limits of *the area* and subsequently into the wild.

a06. The probability for ***the species*** to expand into Poland's natural environments, **as a result of self-propelled expansion** after its earlier introduction outside of the Polish territory is:

	low
	medium
X	high

aconf02. Answer provided with a

low	medium	high	level of confidence
		X	

acomm06. Comments:

Eragrostis albensis is an annual grass that usually grows on the banks of flowing and standing waters, as well as in anthropogenic habitats in urban areas. It has been reported from Germany (Scholz 1996 – P), the Netherlands (Guzik and Sudnik-Wójcikowska 2005 – P),

Austria (Hohla 2006, Hohla and Kleesadle 2006 – P), the Czech Republic (Spryňar and Kubát 2004 – P), Slovakia (Medvecká et al. 2012 – P), Poland (Guzik and Sudnik-Wójcikowska 1996, Michalewska and Nobis 2005 – P, Nobis 2010-2018 – N), Belarus, Ukraine and the European part of Russia (Seregin 2012 – P). The probability of further self-propelled expansion to Poland (e.g. via the valleys of the San or Bug rivers) and along roadsides (by vehicles) without human assistance seems to be high.

Seeds of *E. albensis* are mainly dispersed by water and wind. Considering the rapid dispersal of this species in the middle section of the Odra valley (Kącki and Szczęśniak 2009 – P) as well as on the anthropogenic habitats in southern Poland (Michalewska and Nobis 2005, Wróbel i Nobis 2017 – P) it should be assumed that seeds have a high capacity for dispersal over long distances. In addition, the large number of individuals of this species in patches of vegetation (e.g. Guzik and Sudnik-Wójcikowska 2005 – P) indicates that periodically exposed river banks are optimal habitats for *E. albensis*. Diaspores of *E. albensis* are dispersed by wind and water during the growing season (Michalewska and Nobis 2005 – P), but during cold winters light seeds may also be dispersed on the surface of ice covering rivers. Dispersal of seeds of this species by animals is also possible, e.g. by cattle grazing on floodplains occupied by *E. albensis,* e.g. in the middle section of the Odra river (Dajdok and Wuczyński 2013 – A).

a07. The probability for *the species* to be introduced into Poland's natural environments by **unintentional human actions** is:

	low
	medium
X	high

aconf03.	Answer provided with a	low	medium	high **X**	level of confidence

acomm07. Comments:

Eragrostis albensis is not an ornamental species, nor does it have other characteristics of useful plants. Therefore, its introduction by human actions is mainly accidental and may involve both the random dispersal of seeds, e.g. on the footwear or clothing of people visiting riverside areas (e.g. anglers), or works related to the transportation of material (e.g. river sand or gravel) during stabilization of river banks, meander spurs or flood embankments. The seeds of *E. albensis* could also have been transported to urban areas with sand (Guzik and Sudnik-Wójcikowska 2005, Michalewska and Nobis 2005, Guzik 2011 – P), but the opposite direction of dispersal is also possible (Michalewska and Nobis 2005 – P). In addition, the probability of further spontaneous invasion of the species into Poland along roads, without intentional human actions, seems high (Michalewska and Nobis 2005 – P, Nobis 2010-2018 – N).

a08. The probability for *the species* to be introduced into Poland's natural environments by **intentional human actions** is:

	low
	medium
X	high

aconf04.	Answer provided with a	low	medium	high **X**	level of confidence

acomm08. Comments:

Cases of intentional introduction of *Eragrostis albensis* into the natural environment have not been reported – this species is not an ornamental plant, nor does it have other characteristics of useful plants.

Although the probability of *E. albensis* being introduced into Poland's natural environment due to intentional human actions is low, the *Harmonia*$^{+PL}$ Procedure of negative impact risk assessment for invasive alien species and potentially invasive alien species in Poland

	indicates that for species already established in Poland answers should be: high probability and high level of confidence.

A2 | Establishment

Questions from this module assess the likelihood for *the species* to overcome survival and reproduction barriers. This leads to *establishment*, defined as the growth of a population to sufficient levels such that natural extinction within *the area* becomes highly unlikely.

a09. Poland provides **climate** that is:

	non-optimal
	sub-optimal
X	optimal for establishment of *the species*

aconf05.	Answer provided with a	low	medium	high **X**	level of confidence

acomm09. Comments:

In the 1990s *Eragrostis albensis* was classified as a neoendemite of Central Europe (Scholz 1996 – P) spreading, e.g. by the Elbe river, which through rapid speciation evolved from an eastern biotype similar to *Eragrostis pilosa* (Krumbiegel 2002 – P). Other authors claim that this species is native to Asia (Špryňar and Kubát 2004 – P), and was accidentally introduced into Europe from the eastern regions of Russia. If we assume the hypothesis about the neoendemic origin of the native species for Central Europe, it should be noted that the entire area of Poland shows 94-100% climatic similarity to the regions where the species is already spreading (Germany, the Czech Republic, Slovakia). However, if *E. albensis* is native to Asia, it grows there (Central Asia) in a temperate climate. The similarity between the climate of Poland and the climate of the natural range of the species is quite high, which means that the climatic requirements of the species are met in Poland. This is supported by the fact that the species is well-established and spreads both in natural and anthropogenic habitats (Guzik and Sudnik-Wójcikowska 2005, Michalewska and Nobis 2005 – P, Nobis 2010-2018 – N).

a10. Poland provides **habitat** that is

	non-optimal
	sub-optimal
X	optimal for establishment of *the species*

aconf06.	Answer provided with a	low	medium	high **X**	level of confidence

acomm10. Comments:

Because of these alternative hypotheses on the origin of the species, it is difficult to compare the habitats in the primary range of the species with those in Poland. However, considering the rate of dispersal of the taxon in recent years and its large share in riverside plant communities, it can be stated that the valleys of the Odra, Vistula and other large rivers of Poland, as well as anthropogenic habitats (Nobis 2010-2018 – N, Nobis and Nobis 2015 – P), provide similar conditions to those presumed to be optimal in the Elbe valley, where the species has spread quickly over long distances (Krumbiegel 2002 – P). Despite the aforementioned doubts, in accordance with the procedure for assessing the risk of negative impact of invasive and potentially invasive alien species in Poland (*Harmonia*$^{+PL}$ protocol), it should be assumed for species that are already established in Poland, that the existing habitat conditions in the country are optimal for *E. albensis*, with a high level of confidence.

A3 | Spread

Questions from this module assess the risk of *the species* to overcoming dispersal barriers and (new) environmental barriers within Poland. This would lead to spread, in which vacant patches of suitable habitat become increasingly occupied from (an) already-established population(s) within Poland.

Note that spread is considered to be different from range expansions that stem from new introductions (covered by the Introduction module).

a11. The capacity of *the species* to disperse within Poland by natural means, **with no human assistance**, is:

	very low
	low
	medium
	high
X	very high

aconf07.	Answer provided with a	low	medium	high **X**	level of confidence

acomm11. Comments:

Dispersion from a single source (data type A).
The current spread of the species in natural habitats (Sudnik-Wójcikowska and Guzik 1996, Guzik and Sudnik-Wójcikowska 2005, Kącki and Szczęśniak 2009 – P) and anthropogenic habitats (Nobis and Nobis 2010, Guzik 2011, Wróbel and Nobis 2017 – P) indicates a strong capacity of *Eragrostis albensis* for spontaneous dispersal. The species is dispersed to new areas mainly by water (hydrochory) and wind (anemochory). Because in the Elbe valley this species was first found in 1992, and three years later its range covered hundreds of kilometres (Krumbiegel 2002 – P), it should be assumed that the scale of dispersal of the species from a single source (data type A) is very high (above 50 km/year), and because of this *E. albensis* is classified as a species with a very high capacity to disperse without human assistance.

a12. The frequency of the dispersal of *the species* within Poland by **human actions** is:

	low
X	medium
	high

aconf08.	Answer provided with a	low	medium	high **X**	level of confidence

acomm12. Comments:

Cases of dispersal of *Eragrostis albensis* within Poland by intentional human actions have not been reported. The species can be accidentally dispersed in natural habitats by people visiting riverside areas (e.g. anglers) or in anthropogenic habitats – along railway tracks or roads and within built-up areas. In the latter case, seeds of *E. albensis* are most likely dispersed as a result of activities related to construction and the transportation of sand or gravel from river valleys, as well as the transportation of soil within urban areas (Guzik and Sudnik-Wójcikowska 2005, Michalewska and Nobis 2005, Guzik 2011 – P).

A4a | Impact on the environmental domain

Questions from this module qualify the consequences of *the species* on wild animals and plants, habitats and ecosystems.

Impacts are linked to the conservation concern of targets. Native species that are of conservation concern refer to keystone species, protected and/or threatened species. See, for example, Red Lists, protected species lists, or Annex II of the 92/43/EWG Directive. Ecosystems that are of conservation concern refer to natural systems that

are the habitat of many threatened species. These include natural forests, dry grasslands, natural rock outcrops, sand dunes, heathlands, peat bogs, marshes, rivers & ponds that have natural banks, and estuaries (Annex I of the 92/43/EWG Directive).

Native species population declines are considered at a local scale: limited decline is considered as a (mere) drop in numbers; severe decline is considered as (near) extinction. Similarly, limited ecosystem change is considered as transient and easily reversible; severe change is considered as persistent and hardly reversible.

a13. The effect of *the species* on native species, through **predation, parasitism or herbivory is**:

X	inapplicable
	low
	medium
	high

aconf09.	Answer provided with a	low	medium	high	level of confidence

acomm13. Comments:

Eragrostis albensis is a herbaceous autotrophic plant species.

a14. The effect of *the species* on native species, through **competition** is:

	low
	medium
X	high

aconf10.	Answer provided with a	low	medium **X**	high	level of confidence

acomm14. Comments:

Eragrostis albensis is an annual species, and its distribution is limited by light, which is why only single specimens of this species occur in perennial plant communities (Krumbiegel 2002 – P). Optimal conditions for the development of the species are on periodically exposed river banks and shores. Because it can form clumps of up to 30-40 cm in diameter, creates high density in patches of vegetation, and forms multiple tillers for most of the growing season, it may suppress other annual species (therophytes) and thus reduce their populations. This applies especially to annual plants from the classes of *Bidentetea tripartitii* and *Isoëto-Nanojuncetea*, because *E. albensis* can displace them from their habitats, as reported from field studies carried out in the valleys of the Vistula, San and Odra rivers in 2014-2017 (Nobis 2010-2018 – N). *E. albensis* can displace mainly native plant species that reach a small size, including species of special concern, such as *Dichostylis micheliana* and the creeping slitwort *Lindernia procumbens* (Kącki and Szczęśniak 2009 – P), or the strapwort *Corrigiola litoralis* (Jackowiak et al. 2014 – P). Current data regarding this process do not allow for clear conclusions on the reversibility of changes, but the monitoring of affected sites is strongly advised.

a15. The effect of *the species* on native species, through **interbreeding** is:

X	no / very low
	low
	medium
	high
	very high

aconf11.	Answer provided with a	low	medium	high **X**	level of confidence

acomm15. Comments:

Hybridisation cases between *Eragrostis albensis* with native plant species have not been documented.

a16. The effect of *the species* on native species by **hosting pathogens or parasites** that are harmful to them is:

X	very low
	low
	medium
	high
	very high

aconf12.	Answer provided with a	low	medium	high **X**	level of confidence

acomm16. Comments:

Hosting of pathogens or parasites by *Eragrostis albensis* has not been reported.

a17. The effect of *the species* on ecosystem integrity, by **affecting its abiotic properties** is:

X	low
	medium
	high

aconf13.	Answer provided with a	low	medium	high **X**	level of confidence

acomm17. Comments:

The species has no negative effect on abiotic properties of its ecosystem.

a18. The effect of *the species* on ecosystem integrity, by **affecting its biotic properties** is:

	low
	medium
X	high

aconf14.	Answer provided with a	low	medium **X**	high	level of confidence

acomm18. Comments:

Eragrostis albensis has a high effect on ecosystem integrity by disturbing its biotic properties. *E. albensis* can form compact phytocoenoses with high density of its population. Large populations of *E. albensis* have been reported, e.g. from the Odra valley (Krumbiegel 2002, Kącki and Szczęśniak 2009, Dajdok and Wuczyński 2013 – A, Kobierski and Ryś 2016 – P, Nobis 2010-2018 – N) and Vistula valley (Sudnik-Wójcikowska i Guzik 1996 – P, Nobis 2010-2018 – N). No other plants were observed in the areas completely dominated by this species, which may indicate the influence of *E. albensis* on communities formed by annual therophytes, especially those important for habitats of special concern, such as oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoëto-Nanojuncetea* (code 3130) and rivers with muddy banks (code 3270). Elimination of other species through competition for space and habitat resources may result in the loss of both the spatial and temporal continuity of certain species (including those classified as rare and/or endangered) at a given site, and consequently decrease their cover rate and range. In addition, the formation of compact turf on river banks exposed during low-flow periods disables the germination of seeds or growth of seedlings produced by plants dispersed via river water and not present elsewhere, and consequently such habitats may lose their function of specific migration corridors for these species. *E. albensis* shows low tolerance to competitive pressure from perennials, which over a long time displace it from the occupied habitats. This has been frequently reported, e.g. from anthropogenic habitats (Nobis 2010-2018 – N).

A4b | Impact on the cultivated plants domain

Questions from this module qualify the consequences of *the species* for cultivated plants (e.g. crops, pastures, horticultural stock).

For the questions from this module, consequence is considered 'low' when presence of *the species* in (or on) a population of target plants is sporadic and/or causes little damage. Harm is considered 'medium' when *the organism's* development causes local yield (or plant) losses below 20%, and 'high' when losses range >20%.

a19. The effect of *the species* on cultivated plant targets through **herbivory or parasitism** is:

	inapplicable
X	very low
	low
	medium
	high
	very high

aconf15.	Answer provided with a	low	medium	high **X**	level of confidence

acomm19. Comments:

Eragrostis albensis is a non-parasitic plant and does not affect cultivated plants.

a20. The effect of *the species* on cultivated plant targets through **competition** is:

	inapplicable
X	very low
	low
	medium
	high
	very high

aconf16.	Answer provided with a	low	medium	high **X**	level of confidence

acomm20. Comments:

Cases of *Eragrostis albensis* invading cultivated plant areas and competing with them have not been documented. However, *E. albensis* invades, for example, floodplain meadows of the *Agropyro-Rumicion crispi* alliance which may be used as pastures. Because of its limited competitive potential with perennial plants on tufty sites, *E. albensis* does not play a major role in this type of vegetation; however, on sandy deposits, where the species may tolerate negative periodic changes in humidity, it may play a greater role as a result of competition with fodder plants.

a21. The effect of *the species* on cultivated plant targets through **interbreeding** with related species, including the plants themselves is:

	inapplicable
X	no / very low
	low
	medium
	high
	very high

aconf17.	Answer provided with a	low	medium	high **X**	level of confidence

acomm21.	Comments: In gardens sometimes is being cultivated Purple love grass *Eragrostis spectabilis*. Hybridisation cases of *Eragrostis albensis* with cultivated species have not been documented, but its hybridisation with other cultivated love grasses cannot be excluded.

a22. The effect of *the species* on cultivated plant targets by **affecting the cultivation system's integrity** is:

X	very low
	low
	medium
	high
	very high

aconf18.	Answer provided with a	low	medium	high **X**	level of confidence

acomm22.	Comments: Because of its late flowering and fruiting, it does not compete with cultivated plants. However, *E. albensis* may have some effect on pastures that occupy floodplains, and on drier sandy sites it can have a greater cover rate within locally developing patches of vegetation.

a23. The effect of *the species* on cultivated plant targets by hosting **pathogens or parasites** that are harmful to them is:

X	very low
	low
	medium
	high
	very high

aconf19.	Answer provided with a	low	medium **X**	high	level of confidence

acomm23.	Comments: *Eragrostis albensis* is not hosting pathogens or parasites that are harmful to other plant species.

A4c | Impact on the domesticated animals domain

Questions from this module qualify the consequences of *the organism* on domesticated animals (e.g. production animals, companion animals). It deals with both the well-being of individual animals and the productivity of animal populations.

a24. The effect of *the species* on individual animal health or animal production, through **predation or parasitism** is:

X	inapplicable
	very low
	low
	medium
	high
	very high

aconf20.	Answer provided with a	low	medium	high	level of confidence

acomm24.	Comments: *Eragrostis albensis* is a herbaceous autotrophic plant species.

a25. The effect of *the species* on individual animal health or animal production, by having properties that are hazardous upon **contact**, is:

X	very low
	low
	medium
	high
	very high

aconf21.	Answer provided with a	low	medium	high **X**	level of confidence

acomm25. Comments:

Eragrostis albensis has no properties that are hazardous upon contact with production animals.

a26. The effect of *the species* on individual animal health or animal production, by hosting **pathogens or parasites** that are harmful to them, is:

X	inapplicable
	very low
	low
	medium
	high
	very high

aconf22.	Answer provided with a	low	medium	high	level of confidence

acomm26. Comments:

Eragrostis albensis is a plant species and does not transmit pathogens that are harmful to animals

A4d | Impact on the human domain

Questions from this module qualify the consequences of *the organism* on humans. It deals with human health, being defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (definition adopted from the World Health Organization).

a27. The effect of *the species* on human health through **parasitism** is:

X	inapplicable
	very low
	low
	medium
	high
	vert high

aconf23.	Answer provided with a	low	medium	high	level of confidence

acomm27. Comments:

Eragrostis albensis is a herbaceous autotrophic plant species.

a28. The effect of *the species* on human health, by having properties that are hazardous upon **contact**, is:

	very low
X	low
	medium

	high
	very high

aconf24.	Answer provided with a	low	medium **X**	high	level of confidence

acomm28.	Comments: Contact with *Eragrostis albensis* is not harmful to humans. Pollen of this grass may create a potential hazard during the flowering period, but cases of allergy to the pollen of *E. albensis* have not been reported.

a29. The effect of *the species* on human health, by hosting **pathogens or parasites** that are harmful to humans, is:

X	inapplicable
	very low
	low
	medium
	high
	very high

aconf25.	Answer provided with a	low	medium	high	level of confidence

acomm29.	Comments: *Eragrostis albensis* is a herbaceous plant and does not host pathogens or parasites that are harmful to humans.

A4e | Impact on other domains

Questions from this module qualify the consequences of *the species* on targets not considered in modules A4a-d.

a30. The effect of *the species* on causing damage to **infrastructure** is:

	very low
X	low
	medium
	high
	very high

aconf26.	Answer provided with a	low	medium	high **X**	level of confidence

acomm30.	Comments: In urban areas *Eragrostis albensis* can colonize, e.g. roadsides, gaps between flagstones or on other paved surfaces (Guzik 2011 – P), and this may create additional costs associated with the eradication of plants.

A5a | Impact on ecosystem services

Questions from this module qualify the consequences of *the organism* on ecosystem services. Ecosystem services are classified according to the Common International Classification of Ecosystem Services, which also includes many examples (CICES Version 4.3). Note that the answers to these questions are not used in the calculation of the overall risk score (which deals with ecosystems in a different way), but can be considered when decisions are made about management of *the species*.

a31. The effect of *the species* on **provisioning services** is:

	significantly negative
X	moderately negative
	neutral
	moderately positive
	significantly positive

aconf27.	Answer provided with a	low	medium **X**	high	level of confidence

acomm31. Comments:

The high cover rate of *Eragrostis albensis* on periodically exposed river banks leads to a change in plant communities – patches with a diverse (mixed) species composition, including anemophilic and entomophilic species, transform into those dominated by anemophilic species. This may have (on a larger scale) negative consequences for some organisms, especially insects on account of possible reduction of nutritional stores (of nectar and pollen). Detailed studies are necessary in this area.

a32. The effect of *the species* on **regulation and maintenance services** is:

	significantly negative
	moderately negative
X	neutral
	moderately positive
	significantly positive

aconf28.	Answer provided with a	low	medium **X**	high	level of confidence

acomm32. Comments:

Eragrostis albensis is tolerant to shortage of water and grows well on sandy and gravelly riverside deposits, where it stabilizes the soil (limits erosion), but also restricts the ecological niche for species that require habitats with an unstable substrate.

a33. The effect of *the species* on **cultural services** is:

	significantly negative
	moderately negative
X	neutral
	moderately positive
	significantly positive

aconf29.	Answer provided with a	low	medium	high **X**	level of confidence

acomm33. Comments:

Effects of *Eragrostis albensis* on cultural services have not been reported.

A5b | Effect of climate change on the risk assessment of the negative impact of *the species*

Below, each of the *Harmonia*$^{+PL}$ modules is revisited under the premise of the future climate. The proposed time horizon is the mid-21st century. We suggest taking into account the reports of the Intergovernmental Panel on Climate Change. Specifically, the expected changes in atmospheric variables listed in its 2013 report on the physical science basis may be used for this purpose. The global temperature is expected to rise by 1 to 2°C by 2046-2065.

Note that the answers to these questions are not used in the calculation of the overall risk score, but can be but can be considered when decisions are made about management of *the species*.

a34. INTRODUCTION – Due to climate change, the probability for *the species* to overcome geographical barriers and – if applicable – subsequent barriers of captivity or cultivation in Poland will:

	decrease significantly
	decrease moderately
	not change
X	increase moderately
	increase significantly

aconf30.	Answer provided with a	low	medium **X**	high	level of confidence

acomm34. Comments:

The forecasted climate changes includes, apart from an increase in the mean annual temperature, also periodic increases in precipitation and the risk of floods. Periodic floods and the deposition of sand on the riverbanks, and thus periodically emerging conditions for pioneer species, may promote the formation of new optimal habitats for *Eragrostis albensis* and increase by many times the chances for the dispersal of its seeds by water. In addition, the species is tolerant to shortage of water in the substrate, and in dry seasons and an increase in temperature *E. albensis* on dry habitats will have a better chance for survival (more competitive) than native species.

a35. ESTABLISHMENT – Due to climate change, the probability for *the species* to overcome barriers that have prevented its survival and reproduction in Poland will:

	decrease significantly
	decrease moderately
	not change
X	increase moderately
	increase significantly

aconf31.	Answer provided with a	low	medium **X**	high	level of confidence

acomm35. Comments:

Eragrostis albensis is established in Poland. It can be assumed that in the Polish lowlands there are no climatic or other environmental barriers that the species may overcome after climate change. *Eragrostis albensis* may increase its range in mountain areas. For example, *E. albensis* was reported from anthropogenic habitats in the Carpathians and their foothills (Nobis and Nobis 2015 – P), but it may colonize gravel beds of streams in the future.

a36. SPREAD – Due to climate change, the probability for *the species* to overcome barriers that have prevented its spread in Poland will:

	decrease significantly
	decrease moderately
	not change
X	increase moderately
	increase significantly

aconf32.	Answer provided with a	low	medium **X**	high	level of confidence

acomm36. Comments:

Eragrostis albensis has been mainly reported from the eastern, southern, central and western regions of Poland, where it occupies the Odra, Vistula, San and Bug valleys, as well as anthropogenic habitats. Its lightweight seeds are usually dispersed by water and wind.

	The forecasted climatic changes, may in the future be a factor promoting the spread of this species to optimal habitats located outside the areas occupied today.

a37. IMPACT ON THE ENVIRONMENTAL DOMAIN – Due to climate change, the consequences of *the species* on wild animals and plants, habitats and ecosystems in Poland will:

	decrease significantly
	decrease moderately
X	not change
	increase moderately
	increase significantly

aconf33.	Answer provided with a	low	medium	high **X**	level of confidence

acomm37. Comments:

The effect of *Eragrostis albensis* on the natural environment of Poland will not change as a result of the forecasted climate warming. If climate warming is associated with a drop in the water level in rivers, a new exposed areas, mainly sandy and silty patches, can be quickly colonize by the species. However, *E. albensis* is outcompeted by tall perennials that dominate in herbaceous communities overgrowing flooded areas directly adjacent to river valleys. If the water level in rivers drops, these herbaceous plant communities will move slightly towards the valley, and displace *Eragrostis albensis*, which is an annual species. Therefore, climate change is unlikely to change the impact of *E. albensis* on plants, habitats and ecosystems.

a38. IMPACT ON THE CULTIVATED PLANTS DOMAIN – Due to climate change, the consequences of *the species* on cultivated plants and plant domain in Poland will:

	decrease significantly
	decrease moderately
X	not change
	increase moderately
	increase significantly

aconf34.	Answer provided with a	low	medium	high **X**	level of confidence

acomm38. Comments:

Climatic changes, mainly an increase in the mean annual temperature, do not change the current impact of *Eragrostis albensis* on cultivated plants and plant domain in Poland.

a39. IMPACT ON THE DOMESTICATED ANIMALS DOMAIN – Due to climate change, the consequences of *the species* on domesticated animals and animal production in Poland will:

	decrease significantly
	decrease moderately
X	not change
	increase moderately
	increase significantly

aconf35.	Answer provided with a	low	medium **X**	high	level of confidence

acomm39. Comments:

The direct impact of *Eragrostis albensis* on animals, including production animals, is unknown, so it is difficult to predict whether significant changes will occur in this area. *Eragrostis albensis* may have an indirect impact on the yield of fodder from pastures, where competition from the perennial grasses will be reduced during periods of drought and at temperatures higher than today.

a40. IMPACT ON THE HUMAN DOMAIN – Due to climate change, the consequences of *the species* on human in Poland will:

	decrease significantly
	decrease moderately
	not change
X	increase moderately
	increase significantly

aconf36.	Answer provided with a	low	medium **X**	high	level of confidence

acomm40. Comments:

The temperature rise may be favorable for faster spread of *Eragrostis albensis*, and to intensify the impact on people allergic to the pollen produced by this grass species.

a41. IMPACT ON OTHER DOMAINS – Due to climate change, the consequences of *the species* on other domains in Poland will:

	decrease significantly
	decrease moderately
	not change
X	increase moderately
	increase significantly

aconf37.	Answer provided with a	low	medium **X**	high	level of confidence

acomm41. Comments:

Eragrostis albensis is resistant to shortage of water and strong insolation, so it can be assumed that if this species spreads further in urban areas, its impact on areas no longer suitable for the growth of other plants may increase. This may concern, e.g. squares, paved areas, roadsides for which additional costs for their care and maintenance will have to be ensured.

Summary

Module	Score	Confidence
Introduction (questions: a06-a08)	1.00	1.00
Establishment (questions: a09-a10)	1.00	1.00
Spread (questions: a11-a12)	0.75	1.00
Environmental impact (questions: a13-a18)	0.40	0.80
Cultivated plants impact (questions: a19-a23)	0.00	0.90
Domesticated animals impact (questions: a24-a26)	0.00	1.00
Human impact (questions: a27-a29)	0.25	0.50
Other impact (questions: a30)	0.25	1.00
Invasion (questions: a06-a12)	0.92	1.00
Impact (questions: a13-a30)	0.40	0.84
Overall risk score	0.37	
Category of invasiveness	potentially invasive alien species	

A6 | Comments

This assessment is based on information available at the time of its completion. It has to be taken into account. However, that biological invasions are, by definition, very dynamic and unpredictable. This unpredictability includes assessing the consequences of introductions of new alien species and detecting their negative impact. As a result, the assessment of the species may change in time. For this reason it is recommended that it regularly repeated.

acomm42.	Comments: *Eragrostis albensis* is one of the alien species that currently begins to play an important role in natural and semi-natural ecosystems, including river valleys, as well as in anthropogenic habitats within urban areas. Its impact on the natural environment mostly concerns species and communities that occupy periodically exposed river banks. These communities belong to habitats of special concern (including 3130 and 3270). Several native species of vascular plants, classified as rare or threatened with extinction on the national scale, are associated with these habitats. Considering the rapid spread of *Eragrostis albensis*, as well as the size of its populations (especially large populations are known, e.g. from the Elbe, Odra and Vistula valleys), it can be assumed that the effects of the spread of this species may be serious for the ecosystems of river valleys, or at least for some of their sections. In this assessment *Eragrostis albensis* was classified as a potentially invasive alien species (score 0.40), with high dynamics of the spread and colonization of new sites. The real effects of the presence of *Eragrostis albensis*, however, require long-term regular research, including collection of data from permanent study sites where the species is already present, as well as those where it has not yet been recorded.

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