UNIWERSYTET ŚLĄSKI
W KATOWICACH

INSTYTUT OCHRONY PRZYRODY PAN

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. Alina Urbisz
2. Katarzyna Bzdęga
3. Barbara Tokarska-Guzik

acomm01. Comments:

	degree	affiliation	assessment date
(1)	dr hab.	Faculty of Biology and Environmental Protection, University of Silesia in Katowice	21-01-2018
(2)	dr	Faculty of Biology and Environmental Protection, University of Silesia in Katowice	25-01-2018
(3)	prof. dr hab.	Faculty of Biology and Environmental Protection, University of Silesia in Katowice	31-01-2018

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

Polish name: Rdestowiec sachaliński

Latin name: ***Reynoutria sachalinensis*** (F. Schmidt) Nakai

English name: Giant knotweed

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acomm02.	Comments:

The Latin and Polish names are given according to the Flowering plants and pteridophytes of Poland. A checklist (Mirek et al. 2002 – P). In addition to the synonyms given below, the species is also described as: *Reynoutria brachyphylla* (Honda) Nakai, *Tiniaria sachalinensis* (F. Schmidt) Janch or *Pleuropterus sachalinensis* (Frdr. Schmidt Petrop.) H. Gross (The Plant List 2013 – B). The taxonomic affiliation and nomenclature of species commonly referred to as knotweeds has been subject to many changes depending on the state of knowledge and authors' approach (Schuster et al. 2011, 2015 – P). At the moment, due to the similarity of morphological, biological, and ecological features, as well as the resulting threats, invasive species of the *Reynoutria* (= *Fallopia*) genus occurring in Europe, including Poland, include: *R. sachalinensis*, *R. japonica* and their hybrid *R. ×bohemica* and are present in most contemporary publications included as one group under the name *Reynoutria spp*., *Fallopia spp*. or the *Fallopia* complex (e.g., Tiébré et al. 2007, Lamberti-Raverot et al. 2017 – P). The name Japanese knotweed s.l. is also often found – Asian (Japanese) knotweeds, which now includes all taxa (parent and hybrid species) along with hybrids resulting from back crosses and crosses with other related species, including *Fallopia baldschuanica* (Bailey and Wisskirchen 2006, Bailey et al. 2009 – P).

Polish name (synonym I) Fallopia sachalińska	Polish name (synonym II) Rdestówka sachalińska
Latin name (synonym I) *Fallopia sachalinensis*	Latin name (synonym II) *Reynoutria sachalinensis*
English name (synonym I) Sakhalin knotweed	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 **X**	level of confidence

acomm04.	Comments:

Reynoutria sachalinensis, giant knotweed, similar to two other species: *R. japonica* and *R. ×bohemica*, has the status of an invasive kenophyte in Poland (Tokarska-Guzik 2005 – P). In 2012, it was included in the group of alien, established and invasive species (Tokarska-Guzik et al. 2012 – P, Tokarska-Guzik et al. 2015b – I, Tokarska-Guzik et al. 2017 – P). *Reynoutria sachalinensis* is present in sites dispersed throughout all Poland. Their largest concentration, similarly to the two other knotweeds, is located in the southern part of the country, where the more varied topography associated with the presence of a dense river network promotes greater densities of those habitat patches which constitute the knotweed invasion areas (Tokarska-Guzik et al. 2015b – I). The latest data confirms the presence of giant knotweed at about 1,000 sites (Tokarska-Guzik et al. 2015b – I). Giant knotweed is also found in many places of past and current cultivation, e.g. in historic manor parks, city and home gardens, in cemeteries (Tokarska-Guzik et al. 2015b – I).

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

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

acomm05. Comments:

Reynoutria sachalinensis, like *R. japonica* and *R. ×bohemica*, poses a serious threat to the natural environment (Tokarska-Guzik et al. 2012 – P, Tokarska-Guzik et al. 2015b – I, Tokarska-Guzik and in 2017 – P), contributing to the depletion of species richness due to the formation of dense, single-species patches in the habitats of riparian forests, willow scrub and stands of riparian herbaceous plants. The plants compete effectively with native plant species, preventing them from regenerating (Toews 2012, Parepa et al. 2013, Chmura et al. 2015, Duqette et al. 2015 – P, Tokarska-Guzik et al. 2015b – I). Due to the development of large leaves and their dense arrangement on a zigzag stalk, giant knotweed significantly limits access to light for native species (Dommanget et al. 2013 – P), as well as preventing germination of their seeds due to the formation of a thick, slowly decaying layer of necrotic tissue formed by fallen leaves and stems (Gioria i Osborne 2010, Moravcová et al. 2011 – P). Like other knotweeds, it changes the physical and chemical properties of the soil and affects the activity of soil microorganisms (Dassonville et al. 2011, Bardon et al. 2014, 2016, Salles and Mallon 2014 – P); it also demonstrates allelopathic effects, inhibiting the growth of other plant species (Vrchotová and Šerá 2008, Murrell et al. 2011, Parepa et al. 2013, Heděnec et al. 2014 – P); it might also have an negative impact on domesticated animals (CABI 2018 – B). Sachalin knotweed can negatively influence crop plants among others by growing over farmland which becomes inappropriate for cultivation (Onete i in. 2015 – P, Bzdęga 2017 – A); can also a negative affect animal breeding. Although no diseases have been found in animals, cattle fed with giant knotweed exhibited transient anorexia and hypothermia (CABI 2018 – B). Knotweed is also a threat in river valleys, violating flood protection, including hydrotechnical constructions, and dead matter left from both the above-ground and underground parts disrupts water flow (Tokarska-Guzik et al. 2015b – I). Moreover, dense patches of knotweed may impede access to recreational areas, river banks, etc., while the presence of tall plants along roads may reduce visibility and cause a threat to road safety (Bzdęga and Tokarska-Guzik 2006-2017 – A).

Species of the *Reynoutria* genus, including *R. sachalinensis*, due to the high invasiveness associated with their spread and the threat to plant and animal diversity, also to valuable natural areas, have been recognized in many countries as undesirable and requiring actions that limit and/or eliminate their presence (Child and Wade 2000 – P). The lack of such actions may promote further invasion of knotweeds and cause its intensification. However, it should be noted that control costs are high and with limited effects (Tokarska-Guzik et al. 2015b – I).

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 X	level of confidence

acomm06. Comments:

Giant knotweed was brought to Europe probably around 1863 as an ornamental plant (Sukopp and Starfinger 1995 – P). It is difficult to unequivocally state whether the species was introduced into Europe through the Botanical Garden in St. Petersburg, where it was brought for cultivation in 1864, or from Kew, where it has been grown since 1860 (Bailey and Conolly 2000 – P). The first sites from the wild of this species were described in 1869 from Germany and the Czech Republic (Hegi 1910/1912, Pyšek and Prach 1993 – P). In Poland, this species was recorded for the first time at the beginning of the 20th century, in the western and northern parts of the country (Tokarska-Guzik 2005 – P). It can be assumed that the first "wild" positions originate from the cultivation of this species in contemporary Germany (plants of this species were planted in gardens but also in forests, where they were used to mask hunting towers).

The species can still migrate into Poland from the border areas with the Czech Republic and Germany along river valleys, through rhizome dispersion with water, especially during river flooding (Pysek and Prach 1993, Duqette et al. 2015 – P, Tokarska-Guzik 2006-2017 – A). Because the plant is characterized by its high regeneration capabilities, even from small fragments of rhizomes, and occurs quite frequently in neighbouring countries to Poland (e.g. in the upper Oder River valley in Czech Republic), the probability of self-expansion is high.

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:

As in case of *R. japonica* and *R. ×bohemica*, *R. sachalinensis* seeds can be introduced to new areas due to unintended human activities (Tokarska-Guzik et al. 2015a – I). The main method of introduction in this case is the transportation of "contaminated" soil over long distances (also with contaminated machines and equipment) and then its use in other places, e.g. in river valleys during works related to the strengthening of banks, during construction works related to e.g. the construction of roads, parking lots, or clearing or deepening of drainage ditches (Alberternst and Böhmer 2011 – B, Tokarska-Guzik et al. 2015a and b – I, Bzdęga and Tokarska-Guzik 2006-2017 – A). There is also a likelihood for seeds to be brought along with road and rail transport, but this path does not play a significant role in knotweed spread.

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:

Due to its decorative qualities (the form and size of the plants, the striking inflorescences and fruits), giant knotweed can increase the attractiveness of unused lands in the urban environment. Together with other knotweed species, giant knotweed belongs to the group

	of biomass (energy) production plants; all taxa (two species and the hybrid) have been recommended as plants for honey production, their functional advantages are well-known, above all as plants used in herbalism. These properties may contribute to their intentional spread. Recently, interest in these species has been increasing again. However, due to the threat they pose (Anioł-Kwiatkowska and Śliwiński 2009, Tokarska-Guzik et al. 2015b – I), their cultivation is strictly forbidden throughout the country (Ordinance of the Minister of the Environment of September 9, 2011 – I). However, knotweed grows in many places of past and present cultivation (antique court parks, municipal and backyard gardens, cemeteries), from where it can "escape" as a result of improper care actions, e.g. depositing plant fragments outside the cultivation area (Tokarska-Guzik et al. 2015b – I).

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: Giant knotweed occurs naturally along ravines and watercourses in the Sakhalin mountain areas, southern Kuril Islands, Japan (northern Hokkaido and part of western Honshu) and on the isolated Ulleungdo Island between Japan and Korea (Bailey and Conolly 2000, Balough 2008 – P). In its homeland, giant knotweed occurs in regions where the average annual temperature is 4-8 ° C, and the average annual rainfall level ranges from 500 mm to over 1,000 mm (Yuasa et al. 1995 – P). Within the limits of the natural range, its positions are located at an elevation from sea level to 1 050 m above sea level. (Miyawaki 1989 – P). The secondary range of *R. sachalinensis* giant knotweed includes Europe, New Zealand and Australia, as well as South Africa. The species is also present in North America, in Canada and in most US states (Tokarska-Guzik et al. 2015b – I and literature cited therein), and in 2000 it was also reported in India (Balogh 2008 – P), however, there, it has been recorded so far only at a limited number of sites. In Europe, the sites of this species are dispersed throughout the continent (it is locally frequent). Over recent years, it has also been confirmed in countries of the Mediterranean region (Strgulc-Krajšek and Yogan 2011, Širka et al. 2013 – P), in addition, it has also spread in a northerly direction (Wąsowicz et al. 2013 – P). The current range on the European continent covers an area between 45° and 65° north latitude. The similarity between the Polish climate and the climate of both the natural and secondary giant knotweed range is 94-100%, meaning that the climate requirements of the species are optimally met in Poland. Data on the distribution and spread of the species in Poland and Europe, and features related to its biology and ecology, clearly indicate the high tolerance and ease of adaptation of the plant to various climatic and habitat conditions (Tokarska-Guzik et al. 2015a – I). *Reynoutria sachalinensis* demonstrates tolerance to temperature, drought, salinity and periodic floods. The above-ground parts of the plants are sensitive to low temperatures, whereas rhizomes can survive temperatures of minus 40°C (CABI 2018 – B). However, climatic conditions in Europe may be the reason for the relatively rare cases of finding seedlings in nature: winters that are excessively wet and not cold enough, during which most of the seeds rot in the ground (Bailey et al. 2009 – P). It has also been shown

	that other factors may affect seedling plants: spring coming too late, droughts in the summer or early autumn frosts (Beerling et al. 1994 – P). It has been confirmed that too little water causes complete dieback of the seedlings, and that a temperature of -5°C present for 2 days eliminates half of them (Funkenberg et al. 2012 – P). For the survival of seedlings in natural conditions, their access to light and water is important (Forman and Kesseli 2003 – P).

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: *Reynoutria sachalinensis* is highly tolerant of environmental conditions and its preferences with respect to soil requirements and soil pH are similar to those of *R. japonica* (CABI 2018 – B). It copes with different types of soil (mulls, loams, sands, those with a calcareous base) and a diversity of pH from acid to moderately alkaline. In its natural range, it grows along ravines and mountain watercourses, and is also present on forest edges, on mountain landslides and coastal cliffs. Similarly to *R. japonica*, it is a pioneer species on slopes covered with volcanic lava (Bailey and Conolly 2000, Bailey 2003 – P). In the secondary range, however, the species is rarer than *R. japonica*; in addition, its vertical range is more limited (it does not exceed 900 m above sea level) (Balogh 2008 – P). It is most often listed in the areas of former land estates, gardens and parks, on river banks, on the edges of forests and undergrowth, and also on wastelands, roadsides and ditches (Tokarska-Guzik et al. 2009 – P, Tokarska-Guzik et al. 2015b – I).

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
X	high
	very high

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

acomm11.	Comments: *Reynoutria sachalinensis* giant knotweed is a perennial polycarpic plant reproducing sexually (flowering and fruiting many times during its lifetime), with a large capacity for simultaneous vegetative reproduction. The effectiveness of its spread depends on the amount of seeds and vegetative parts that may initiate the development of the next generation, and include the type and intensity of the anthropogenic factors promoting colonization of new places. Within the secondary range, giant knotweed reproduce primarily vegetatively, through the growth and regeneration of rhizomes and shoots (Child and Wade 1999, Shaw and Seiger 2002 – P, Tokarska-Guzik et al. 2015b – I, Tokarska-Guzik

et al. 2017 – P and literature quoted therein). Under favourable conditions, sexual reproduction is possible and, it has been confirmed, depends on the share in local populations of the types of individuals capable of forming seeds (the knotweeds are dioecious, i.e. hermaphroditic flowers, and female (male-sterile) flowers are formed on separate plants). Such situations are encountered in Poland; sexual propagation also occurs in the so-called mixed populations in which two species - *R. sachalinensis* giant knotweed and *R. japonica* Japanese knotweed grow side by side. In the latter case, hybrid seeds (*R. ×bohemica*) are produced most often (Tokarska-Guzik et al. 2015b – I, Tokarska-Guzik et al. 2017 – P).

Dispersion from a single source (type A data). Winged fruits falling near the mother plants can be moved to new areas by wind (so–called anemochory) and water (so–called hydrochory). The results obtained so far indicate the possibility of the spread of seeds to a distance of up to 16 m away from the parent population (Tiébré et al. 2007 – P). Rhizomes can grow up to a few metres away from the mother plant (giant knotweed forms shorter underground systems compared with Japanese knotweed). Propagation over large distances is performed via water (especially via flood waters). Both seeds and vegetative diaspores can be distributed in this way. The major dissemination vector is the fragmentation and dispersion of rhizomes with water (Duqette et al. 2015 – P, Tokarska-Guzik et al. 2015b – I), which can then colonize new sections of watercourse effectively. It is worth noting that in comparison with other taxa of this type occurring in Poland, the giant knotweed is characterized by the least regrowth capabilities from underground shoots (segments of rhizomes are shorter compared with those of the remaining knotweed species; Tokarska-Guzik et al. 2017 – P), which is reflected in giant knotweed having the smallest number of knotweed sites in Europe (Mandak et al. 2004, Parepa et al. 2013 – P).

Population expansion (type B data). There is no precise data allowing the estimation of giant knotweed spread in Poland. Indirect conclusions can be drawn on the subject of migration and its pace, based on the increasing number of sites, but it should be taken into account that the results obtained so far mainly reflect the state of the distribution study (Tokarska-Guzik et al. 2015b – I). Giant knotweed was first recognized outside cultivation at the beginning of the 20th century, in the south of the Poland of today (Sudeten mountains, Szklarska Poręba) and in Pomerania (Tokarska-Guzik 2005 – P). The rate of spread of this species is slower compared with that of *R. japonica*, as before 1950 it was recorded outside cultivation at 16 sites, and in the next fifty years this number increased to nearly 500 (Tokarska-Guzik 2005 – P). The latest data confirms the presence of this species at about 1,000 sites (Tokarska-Guzik et al. 2015b – I). Both the biological attributes of the species and the pace/tempo of the expansion of its population point to the high capacity of the species for spread in Poland without human assistance and simultaneously to the smaller capacity compared with Japanese and Bohemian knotweeds (which are assessed as having a very high capacity for dispersal).

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

	low
	medium
X	high

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

acomm12. Comments:

Conscious introduction of invasive knotweeds, including *Reynoutria sachalinensis*, into the natural environment is prohibited by law (Regulation of the Minister of the Environment of 9 September 2011 on the list of plants and animals of alien species that could be a threat to native species or natural habitats in case of their release into the natural environment, Regulation 2011 – P, Tokarska-Guzik et al. 2015b – I), however, due to the decorative qualities of the plant (including large decorative leaves, late blooming), it is not possible to exclude the intentional introduction of the species by humans, especially in the urban environment (home gardens, wastelands), from where it can spread to adjacent areas

	spontaneously. It is possible that giant knotweed could be introduced consciously in order to use its biomass for energy purposes (Hutla et al. 2005, Lisowski et al. 2008, Cyrankowski et al. 2011 – P, CABI 2018 – B). The importance of two main cultivars should be emphasized here: *Fallopia sachalinensis* IGNISCUM Candy® and *Fallopia sachalinensis* IGNISCUM Basic®, which are mainly subject to studies on crop optimization for obtaining the largest biomass as well as for other products obtained from them (Veste et al. 2011 – I, Lebzien et al. 2012, Mantovani et al. 2014, Koning et al. 2015 – P). Although cultivars are not commercially available, information with the name of these varieties may trigger interest among potential customers (Szkółka roślin ozdobnych 2018 – I). In addition, the ability of the knotweeds to accumulate heavy metals in the above-ground parts, while producing a huge amount of biomass, provides the possibility of including them as plants useful in the re-cultivation and phytoremediation of post-industrial areas and areas contaminated with heavy metals (Nishizono et al. 1989, Berchová-Bimova 2014 – I, Tokarska-Guzik et al. 2015b – I, CABI 2018 – B). There is also an increasing interest in growing the plants due to the possibility of their use in herbal medicine. For example, in 2014, RDOŚ in Bydgoszcz gave permission for the cultivation of giant knotweed for pharmacological purposes. Quite frequent giant knotweed presence in many regions of the country, on various habitat types, creates a high probability for further species spread during various types of earthworks (e.g. construction of roads, power lines) and regulatory works (regulation of river channels, strengthening flood embankments), along with the soil, water, with equipment being used (including in winter, when snow ploughs are used for snow removal). The frequency of spread is also influenced by improperly performed treatments for the elimination and utilization of both above-ground and underground parts of plants.

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: The species is a non-parasitic plant, it does not cause this type of interactions.

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

	low
	medium
X	high

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

acomm14. Comments:

Giant knotweed, like the other two knotweed plants present in Poland, effectively competes with native plant species, often preventing them from growing and regenerating (Tokarska-Guzik et al. 2009, Toews 2012, Parepa et al. 2013, Chmura et al. 2015, Duqette et al. 2015 – P, Tokarska-Guzik et al. 2015b – I, 2017 – P). It significantly limits access to light for native species due to the dense setting of the large leaves on the stems (Dommanget et al. 2013 – P). Plants are characterized by a fast growth rate – 4-5 cm per day and an extremely high leaf surface – higher than those recorded for shady forests; biomass production reaches 259.2 t/ha (CABI 2018 – B and literature cited therein). These giant knotweed features limit or even prevent the germination of seedlings of many native plant species, because giant knotweed forms a thick and slowly decaying layer of fallen leaves and stems. This litter limits the development of species appropriate for the habitat (Gioria and Osborne 2010, Moravcová et al. 2011 – P, Tokarska-Guzik et al. 2015b – I). However, it should be emphasized that this effect is evident in those sites with a mass knotweed presence. With a smaller or sparser population, spring geophytes (plants growing in the forest undergrowth that bloom and bear fruit in the spring before leaves on trees are present) are able to complete their life cycle (Tokarska-Guzik et al. 2006 – P). It has been demonstrated experimentally that a greater inhibitory allelopathic effect limiting the germination of seeds of others plant characterizes extracts from the above-ground knotweed parts, compared with extracts from the rhizomes (Vrchotová and Šerá 2008 – P). Undesirable interactions include the penetration of the species into protected areas. The presence of giant knotweed has been found in 7 Polish national parks so far (Bomanowska et al. 2014 – P, Tokarska-Guzik et al. 2015b – I). Knotweed presence, including giant knotweed, in riparian habitats can lead to a reduction in the abundance and richness of invertebrates. Invasion on a large scale by all species of knotweed can seriously affect biodiversity and decrease the quality of riparian ecosystems for amphibians, reptiles, birds and mammals, the main food of which includes invertebrates (arthropods) (Marigo and Pautou 1998, Maerz et al. 2005, Kappes et al. 2007, Gerber et al. 2008, Skubała 2012 – P).

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:

Reynoutria sachalinensis interbreeds only with the other two invasive species of the *Reynoutria* genus present in Poland: *R. japonica* and *R. ×bohemica*, creating swarms of hybrids. It is necessary to emphasize the role of giant knotweed as a pollen donor, which may pollinate flowers of *R. japonica* Japanese knotweed, and as a result lead to the formation of seeds demonstrating hybrid character (*R. ×bohemica*). *Reynoutria (Fallopia) ×bohemica × Reynoutria (Fallopia) sachalinensis* hybrid is also known from the secondary range, as the result of a backcross that was found in Wales (Bailey 2003 – P). In Poland, there are no native species with which the giant knotweed could interbreed.

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

	very low
X	low
	medium

	high
	very high

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

acomm16. Comments:

The presence of many natural enemies has been recorded for *Reynoutria sachalinensis* in the native range, as opposed to very few being found in the secondary range (CABI 2018 – B). *Gallerucida nigromaculata* (= *G. bifasciata*) originating from Japan and feeding on the leaves is a natural enemy for the species, another one is *Aphalara itadori* Japanese knotweed psyllid, feeding on the leaves and shoots of both *R. sachalinensis* and *R. japonica*. Among the fungal pathogens, mention has to be made of *Mycosphaerella polygoni-cuspidati*, which infests the plant leaves and is specific to species of *Reynoutria*, as well as *Puccinia polygoni-amphibii var. torariae* – a fungus from the *Basidiomycota* division that infests *R. sachalinensis* and *R. japonica* leaves, as well as those of species of the *Geranium* genus (Walker 2010 – P, CABI 2018 – B). However, there are no more detailed data on the transmission of pathogens or parasites to native species.

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

	low
	medium
X	high

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

acomm17. Comments:

Reynoutria sachalinensis, like other invasive knotweed species, causes changes in the physical and chemical properties of the soil, and thus the activity of soil microorganisms (Dassonville et al. 2011, Bardon et al. 2014, 2016 – P, Tokarska-Guzik et al. 2015b – I). It has been demonstrated that knotweeds can directly regulate the amount of the available nitrogen resource by inhibiting the process of biological denitrification by soil bacteria, which leads to the accumulation of nitrate resources in the soil and thus enables plants to grow their biomass intensely to facilitate effective invasion (Salles and Mallon 2014 – P). Invasion of the species is accompanied by a significant increase in biomass both on and below the ground surface, which in turn may lead to changes over the course of the biogeochemical cycle, as well as cycle of water and its availability. The dangerous effects of the river and stream banks being dominated by all knotweed species includes the uprooting of large patches of these plants during rapid floods which contributes to the erosion of embankments (Bergstrom et al. 2008 – P). Effects also include the accumulation of a large volume of biomass on hydrotechnical equipment, which may lead to damage to their structure, as well as being the cause of local submersions and floods (Tokarska-Guzik et al. 2015b – I).

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	high **X**	level of confidence

acomm18. Comments:

Reynoutria sachalinensis forms dense patches and results in the shading of native plant species, effectively inhibiting their development. Allelopathic chemical substances produced by the plants inhibit the germination and growth of other plants (Vrchotová and Šerá 2008 – P, Tokarska-Guzik et al. 2015b – I). Giant knotweed certainly affects the

	integrity of the ecosystem by disrupting water flow, changing soil properties and erosion processes, limiting the light access for many native species, reducing biological diversity, and remodelling phytocoenoses. The species has negative effect on Natura 2000 natural habitats, including mainly: alpine rivers and their ligneous vegetation with *Salix elaeagnos* (3240), Alpine rivers and their ligneous vegetation with *Myricaria germanica* (3230), hydrophilous tall herb fringe communities of plains and of montane to alpine zones (6430), alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Pandion*, *Alnion incanae*, *Salicion albae*) (91E0), riparian mixed forests of *Quercus robur*, *Ulmus laevis* and *Ulmus minor*, *Fraxinus excelsior* or *Fraxinus angustifolia*, along major rivers (*Ulmenion minoris*) (91F0) (Tokarska-Guzik et al. 2015b – I, Tokarska-Guzik et al. 2017 – P). Due to its large size and rapid growth in the initial period of the vegetation season, giant knotweed significantly reduces the number of native species where it is present. Dense populations significantly transform the native soil seed bank (Bzdęga and Tokarska-Guzik 2006-2017 – A). This manifests itself in the depletion of the species composition typical for the specific community. In its natural range its flowers attract bees due to the presence of nectaries, which has been observed in Europe (CABI 2018 – B); this fact may partially influence competition with native plants for pollinators (giant knotweed blooms relatively late).

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: The species is a non-parasitic plant.

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

	inapplicable
	very low
X	low
	medium
	high
	very high

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

acomm20.	Comments: Invasive knotweeds can negatively affect crops, e.g. by growing over arable fields that then become unsuitable for cultivation (Onete et al. 2015 – P, Bzdęga 2017 – A). Inhibition of the germination of white mustard seeds has been shown experimentally caused by the

	allelopathic effect of the knotweeds (Vrchotová and Šerá 2008 – P); seeds of white mustard are used for sowing popular stubble crops because its cultivation positively affects the soil phytosanitary status and physical properties of the soil (mustard forms deep roots).The allelopathic inhibitory effect of the species on the growth of lettuce seedlings is also known (Inoue et al. 1992 – P). The same inhibitory effect of an extract from the species has been also demonstrated in the case of *Sphaerotheca fuliginea* powdery mildew attacking cucurbits such as cucumber (Konstantinidou-Doltsinis and Schmit 1998 – P).

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:

Reynoutria sachalinensis may indirectly affect the condition and yield of crop plants by hybridizing with the closely related *R. japonica*, forming self-sustainable and even more invasive *R.* ×*bohemica* hybrid populations (CABI 2018 – B). Backcrosses of the hybrids with the parental species are also observed, including with *R. sachalinensis* (so-called introgression) (Bailey et al. 2009, Bailey 2013, Strgulc and Dolenc 2015 – P, Bzdęga and Tokarska-Guzik 2006-2017 – A). Japanese knotweed and giant knotweed, as with the hybrids formed with their involvement, may adversely affect crop plants, e.g. by growing over arable fields and meadows which become unsuitable for cultivation (Onete et al. 2015 – P). However, giant knotweed does not interbreed with plants commonly cultivated in Poland.

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

	very low
	low
X	medium
	high
	very high

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

acomm22. Comments:

The presence of giant knotweed limits the agricultural use of lands (Tokarska-Guzik et al. 2009, Onete et al. 2015 – P, Bzdęga and Tokarska-Guzik 2006-2017 – A). Species of the *Reynoutria* genus are more and more frequent on uncultivated lands, and more abundant in crops, e.g. in Switzerland (Bohren 2011 – P).

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: There is insufficient data on the effect of the species on crops associated with the fact that it is a host or vector of pathogens and parasites harmful to these plants.

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: The species is a plant.

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

	very low
X	low
	medium
	high
	very high

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

acomm25.	Comments: Dry and sharply-broken shoots of *Reynoutria sachalinensis*, as with *R. japonica*, can cause cuts to grazing animals such as sheep (Kirpluk 2016 – P). No adverse effects were found in cattle, although animals feeding on giant knotweed demonstrated temporary anorexia and hypothermia (CABI 2018 – B).

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: The species is a plant. Plants are not hosts nor vectors of animal parasites/pathogens.

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: The species is not a parasitic organism.

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

X	very low
	low
	medium
	high
	very high

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

acomm28.	Comments: *Reynoutria sachalinensis* does not adversely affect human health (Alberternst and Böhmer 2011 – B, Tokarska-Guzik et al. 2015b – I).

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: The species is a plant. Plants are not hosts or vectors of human parasites/pathogens.

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
	low
	medium
	high
X	very high

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

acomm30. Comments:

In areas with housing and economic infrastructure, damage is caused mainly by the growing rhizomes of invasive knotweed (Wise Knotweed 2018 – I). By penetrating the ground (intensive annual growth), species of the *Reynoutria* genus can damage building foundations and walls, drainage canal walls, road surfaces, pedestrian walkways and car parks (Alberternst and Böhmer 2011 – B, Tokarska-Guzik et al. 2015a, 2015b – P). Like the other two species, the species is a threat in river valleys, violating flood protection and hydrotechnical constructions. Dead material remaining on the above-ground surfaces and underground parts hinders water flow. Economic damage is also identified by GDDKiA Branch services, with mention made of the following: limiting visibility on road curves, reducing the accessibility of the area, water flow or road sign obstruction (Tokarska-Guzik et al. 2015b – I, Bzdęga and Tokarska-Guzik 2006-2017 – A).

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
	moderately negative
	neutral
X	moderately positive
	significantly positive

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

acomm31. Comments:

Giant knotweed presence can be perceived as beneficial, e.g. by owners of apiaries due to the melliferous properties of the plant and its relatively late flowering providing benefits to bees in late summer. In addition, the species has been recognized as an energy plant (Hutla et al. 2005, Lisowski et al. 2008, Cyrankowski et al. 2011 – P, CABI 2018 – B), which is able to produce up to 68.2-66.5 t dry matter per ha (Stepanova and Rassokhina 1981 – P). In particular, the role of two species cultivars is emphasized here: *Fallopia sachalinensis* IGNISCUM Candy® and *Fallopia sachalinensis* IGNISCUM Basic®, which are mainly used in studies on crop optimization in order to obtain the greatest possible biomass, as well as products obtained from it (Veste et al. 2011 - I, Lebzien et al. 2012, Mantovani et al. 2014, Koning et al. 2015 – P). The presence of Japanese knotweed limits the agricultural use of

	land (Onete et al. 2015 – P, Bzdęga 2017 – A). Knotweed shoots are also used in floristry (flowering). In addition, *Reynoutria sachalinensis* contains compounds that are useful in the control of certain microorganisms. An examples of such a product is Milsana™ sold since 1990, which contains the afore-mentioned substances and which has proved effective in combating microbial diseases in some crops (Metcalfe and Wale 1997, Trottin-Caudalet et al. 2003 – P). Giant knotweed, like other species, is used in herbal medicine. It contains many biologically active compounds, including resveratrol – a chemical compound belonging to the antioxidant group (Chen et al. 2013, Peng et al. 2013 – P). To sum up one can acknowledge that the influence of the species on provisioning services is moderately positive.

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

X	significantly negative
	moderately negative
	neutral
	moderately positive
	significantly positive

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

acomm32.	Comments: *Reynoutria sachalinensis*, similar to other invasive species of knotweed, has a negative effect on regulatory services through, for example, changes in physical and chemical properties of soil, and thus soil microorganisms (Dassonville et al. 2011, Bardon et al. 2014, 2016 – P, Tokarska-Guzik et al. 2015b – I) and inhibition of the process of biological denitrification of soil bacteria, which promotes the intensive growth of knotweed biomass, facilitating effective invasion (Salles and Mallon 2014 – P). Mass occurrence of giant knotweed may lead to a change in the productivity of ecosystems of riparian forests and neighbouring water habitats, due to the displacement of native species, changes in species composition and ecosystem structure, and nutrient resources due to the large production of necrotic mass (litter) (CABI 2018 – B). In addition, these plants erode river banks and streams (Bergstrom et al. 2008 – P), and may also damage the construction of flood embankments, which is the cause of local and wider flooding (Tokarska-Guzik et al. 2015b – I). Allelopathic chemical compounds produced by *R. sachalinensis* inhibit the seed germination and growth of other plants (Vrchotová and Šerá 2008, Tokarska-Guzik et al. 2015b – I).

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: *Reynoutria sachalinensis* forms compact, homogeneous and extensive patches, often occupying large spaces, including in recreational and tourist areas, in parks, on the banks of rivers and in the vicinity of water reservoirs, limiting access to water (Tokarska-Guzik et al. 2006 – P, Bzdęga 2017 – A). The presence of tall plants along roads may reduce visibility and cause a threat to road safety (Tokarska-Guzik et al. 2015b – I). Knotweeds have a negative effect not only on infrastructure, but also on religious sites, for example in cemeteries (Wise Knotweed 2008 - I). Where it occurs more abundantly, it may spoil the aesthetic

	experience, especially in the autumn, with leaves are subject to necrosis and eventually fall. At the same time, the plant has decorative and utility values. It is an attractive plant, the shoots of which resemble bamboo, hence it is still kept in gardens. The stems and seedlings of giant knotweed are used in floristry, where caution is recommended with regard to the use of fresh material, due to the possibility of creating potential new introductions (Tokarska-Guzik et al. 2015b – I, Bzdęga and Tokarska-Guzik 2006-2017 – A). To sum up it, has been recognised, that the negative and positive influence of the species for cultural services is neutral.

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
X	not change
	increase moderately
	increase significantly

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

acomm34.	Comments: Assuming that in the future the temperature will increase by 1-2°C, the probability is, that *Reynoutria sachalinensis* will overcome subsequent barriers related to its occurrence in Poland, which will not change. The range of *R. sachalinensis* tolerance with regard to preferred climatic parameters is given by CABI (2018 – B). However, there are reports that in case of *R. sachalinensis*, similar to *R. japonica*, one should not expect a significant extension of the limits of their distribution in the secondary range – unless there are climate changes, however, an increase in frequency is more likely (Balogh 2008 – P).

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
X	not change
	increase moderately
	increase significantly

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

acomm35.	Comments: Assuming that in the future the temperature will increase by 1–2°C, the probability that *Reynoutria sachalinensis* will overcome additional barriers related to subsistence and

	reproduction in Poland will not change. *Reynoutria sachalinensis* demonstrates a tolerance for a range of temperatures, for drought, salinity and periodic inundation with water. Overground parts of the plant are sensitive to low temperatures, however the rhizomes can survive a temperature of minus 40 °C (CABI 2018 - B).

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
X	not change
	increase moderately
	increase significantly

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

acomm36.	Comments: Assuming that in the future the temperature will increase by 1-2°C, the probability that the *Reynoutria sachalinensis* will break existing barriers - which so far have prevented it from spreading in Poland - will not change. *Reynoutria sachalinensis* demonstrates a tolerance for a range of temperature, for drought, salinity and periodic inundation with waters. Overground parts of the plant are sensitive to low temperatures, however the rhizomes can survive a temperature of minus 40 °C (CABI 2018 - B).

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 X	high	level of confidence

acomm37.	Comments: It is assumed that due to climate change the effect of *Reynoutria sachalinensis* on wild plants and animals - as well as habitats and ecosystems in Poland - will not change. *Reynoutria sachalinensis* demonstrates a tolerance for a range of temperature, for drought, salinity and periodic inundation with water. Overground parts of the plant are sensitive to low temperatures, however the rhizomes can survive a temperature of minus 40 °C (CABI 2018 - B).

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 X	high	level of confidence

acomm38.	Comments: It is assumed that due to climate change the effect of *Reynoutria sachalinensis* on crops or plant production in Poland will not change. *Reynoutria sachalinensis* demonstrates a tolerance for a range of temperature, for drought, salinity and periodic inundation with

	waters. Overground parts of the plant are sensitive to low temperatures, however the rhizomes can survive a temperature of minus 40 °C (CABI 2018 - B).

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: It is assumed that due to climate change, the effect of *Reynoutria sachalinensis* on livestock and household animals as well as animal production in Poland will not change. *Reynoutria sachalinensis* demonstrates the a tolerance for a range of temperature, for drought, salinity and periodic inundation with waters. Overground parts of the plant are sensitive to low temperatures, however the rhizomes can survive a temperature of minus 40 °C (CABI 2018 - B).

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

	decrease significantly
	decrease moderately
X	not change
	increase moderately
	increase significantly

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

acomm40.	Comments: It is assumed that due to climate change the effect of the *Reynoutria sachalinensis* on people in Poland will not change. *Reynoutria sachalinensis* demonstrates a tolerance for a range of temperature, for drought, salinity and periodic inundation with water. Overground parts of the plant are sensitive to low temperatures, however the rhizomes can survive a temperature of minus 40 °C (CABI 2018 - B).

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

	decrease significantly
	decrease moderately
X	not change
	increase moderately
	increase significantly

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

acomm41.	Comments: It is assumed that due to climate change the effect of *Reynoutria sachalinensis* on other objects in Poland will not change. *Reynoutria sachalinensis* demonstrates a tolerance for a range of temperature, for drought, salinity and periodic inundation with waters. Overground parts of the plant are sensitive to low temperatures, however the rhizomes can survive a temperature of minus 40 °C (CABI 2018 - B).

Summary

Module	Score	Confidence
Introduction (questions: a06-a08)	1.00	1.00
Establishment (questions: a09-a10)	1.00	1.00
Spread (questions: a11-a12)	0.88	1.00
Environmental impact (questions: a13-a18)	0.65	0.80
Cultivated plants impact (questions: a19-a23)	0.15	0.80
Domesticated animals impact (questions: a24-a26)	0.25	1.00
Human impact (questions: a27-a29)	0.00	1.00
Other impact (questions: a30)	1.00	1.00
Invasion (questions: a06-a12)	0.96	1.00
Negative impact (questions: a13-a30)	1.00	0.92
Overall risk score	0.96	
Category of invasiveness	very 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: The assessment of the degree of *Reynoutria sachalinensis* invasiveness performed in the case of Poland confirms its status as a "very invasive alien species". The maximum score (1.0) was obtained in the module 'Impact on other objects' (a30). The score for the 'Environmental impact' module (questions a13 – a18) amounted to 0.65, which entitles us to place the species in the "high" impact category (0.61–-0.80). At the same time, the species scored zero in the 'Human impact' module (questions: a27-a29), and had low scores in modules: 'Cultivated plants impact' (0.15, questions: a19-a23) and 'Domesticated animal impact' (0.25, questions: a24-a26). The obtained result is analogous to that of *Reynoutria japonica* Japanese knotweed, but the assessment of the invasion process is slightly lower (0.96, question, a06-a12), due to the slower spread rate of the species and its current distribution (significantly fewer sites). Due to the fact that this species is widespread in Poland and presents great ability to spread, and that the current methods of elimination are characterized by low effectiveness at high costs, actions to limit the negative effect of the species on valuable natural areas and further studies leading to the development of more effective methods of combating should be recommended.

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