## **Generic Impact Scoring System GISS**

Excel version of 27.04.2016

## **Supplementary Material**

Nentwig W, Bacher S, Pyšek P, Vilà M, Kumschick S (2016) The Generic Impact Scoring System (GISS): a standardized tool to quantify the impacts of alien species. Environmental Monitoring and Assessment, DOI: 10.1007/s10661-016-5321-4contact mail wolfgang.nentwig@iee.unibe.ch

Taxonomic groups	Main ecosystems	Pathways
Vertebrate	Terrestrial	Release
Invertebrate		Escape
Protozoa	Freshwater	Contaminant with specific commodity
Plant		Stowaway with transport vector
F	A A code of	Continu

ungus	ividillic	Corridor
Bacteria		Others

Introduced as	Impact levels	Confidence level
Ornamental	0	1
Crop plant (including fuel, fibre, stain)	1	2
Pet	2	3
Hunting/fishing	3	
Biocontrol	4	
Others	5	
Unknown		

# BLUE fields are those where some input is expected from you.

## A Species description

Species name	Genus, species, authority
Higher taxonomy	Family and 1-2 further higher taxa
Taxonomic comment	If appropriate, add relevant synonyms. Mention if this is a cryptic species
Taxonomic group	Drop down menu
Main ecosystem	Drop down menu
Area of origin	Usually a continent, river system, ocean, or major biogeographic area. Has to be different from th invaded area, otherwise the species is not alien.
Invaded area	Has to be different from the area of origin, otherwise the species is not alien. You may list invaded areas within Europe and also outside of Europe.
Area assessed	GISS can be applied to all areas, but the area assessed has to be different from the area of origin.
Pathway	Drop down menu
Introduction time	Year or whatever is known
Used as	Drop down menu
Comments	If appropriate, add comments.

## B Impact assessment

1.1 Impacts on plants or vegetation (through mechanisms other than competition, see below)

## List of potential impacts

Impacts can cause changes in reproduction, survival, growth, and abundance of plants in the invaded community. In case of alien plants, their impacts may consist of allelopathy or the release of plant exudates such as oxygen or salt. In case of alien animals, their impacts include herbivory, grazing, bark stripping, antler rubbing, feeding on algae, or uprooting of aquatic macrophytes. The impacts in this category result in restrictions in establishment, pollination, or seed dispersal of native species. The impacts range from population decline to population loss and also include minor changes in the food web. These impacts concern direct species interactions whereas impacts at the ecosystem level are covered by category 1.6. These impacts concern natural and semi-natural environments whereas agricultural and forestry ecosystems are dealt with in category 2.1.

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

- No data available, no impacts known, not detectable or not applicable.
- Minor impacts, only locally or on abundant species.
- Minor impacts, not only locally or on abundant species.
- Medium impacts, large-scale, several species concerned, relevant decline (this includes decrease in species richness or diversity).
- Major small-scale destruction of the vegetation, decrease of species of concern.
- Major large-scale destruction of the vegetation, threat to species of concern, including local extinctions.

Your conclusion		Drop down men
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## Confidence level

What is the overall confidence level of your conclusion with this question? low = 1 medium=2 high=3

Drop down menu

## 1.2 Impacts on animals through predation, parasitism, or intoxication

## List of potential impacts

Your conclusion

Impacts may concern single animal species or a guild, e.g. through predation, parasitism, or intoxication, measurable for example as reductions in reproduction, survival, growth, or abundance. When the alien species is a plant, the impact can be due to changes in food availability or palatability (e.g. fruits, forage or flowers affecting pollinators), and the uptake of secondary plant compounds or toxic compounds by animals. These impacts might act on different levels, ranging from population decline to population loss and they include also minor changes in the food web. These impacts concern direct species interactions whereas impacts on ecosystem level are covered by category 1.6. These impacts concern only free-living animals in the wild whereas animal production is covered by category 2.2.

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

mpact level	
0	No data available, no impacts known, not detectable or not applicable.
1	Minor impacts, only locally or on abundant species.
2	Minor impacts, not only locally or on abundant species.
3	Medium impacts, large-scale, several species concerned, relevant decline (this includes decrease in species richness or diversity).
4	Major small-scale impacts on target species, decrease of species of concern.
5	Major large-scale impacts on target species, threat to species of concern, including local extinctions.
our conclusion	Drop down menu
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	ence level of your conclusion with this question?
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21	
impacts on other spe	ties through competition
ist of potential impacts	
mpacts concern at least o	ne native species, e.g. by competition for nutrients, food, water, space or
other resources, including	competition for pollinators which might affect plant fecundity (i.e. fruit or
	species outcompetes native species due to higher reproduction, resistance,
	isms. In the beginning, these impacts might be inconspicuous and only
ecognizable as slow chan	ge in species abundance but might lead to the local/global
isappearance of a native	species. It includes behavioural changes in outcompeted species and ranges
rom population decline to	
manet donné d'a	
npact description escribe impact in a few l	nes. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.
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mpact level 0	No data available, no impacts known, not detectable or not applicable.
1	Minor impacts, only locally or on abundant species.
2	wind impacts, only locally or on admirant species. Minor impacts, not not locally or on abundant species.
3	Medium impacts, large-scale, several species concerned, relevant decline, including decrease in species richness or diversity.
4	Major small-scale impacts on target species, decrease of species of concern.
5	Major large-scale impacts on target species, decrease or species of concern.  Major large-scale impacts on target species, threat to species of concern, including local extinctions.
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our conclusion	Drop down menu
Confidence level	
	ence level of your conclusion with this question?
ow = 1 medium=2	high=3
our conclusion	Drop down menu
.4 Impacts through tran	mission of diseases or parasites to native species
ist of potential impacts	
	native or alien diseases (viruses, fungi, protozoans or other pathogens) or
arasites, impacts by tran	smission of diseases or parasites to native species.
mpact description	
	nes. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.
npact level	
0	No data available, no impacts known, not detectable or not applicable.
1	Occasional transmission to native species. No impacts on native species detectable.
2	Occasional transmission to native species. Only minor impacts on native species detectable.
3	Regular transmission to native species. Minor population decline in native species.
4	Transmission to native species and/or species of concern, decline of these species but no extinction.
5	Transmission to native species and/or species of concern, serious decline of these species and/or local extinction.
our conclusion	Drop down menu
Confidence level	level of view appropriate with this greation?
What is the overall confidence ow = 1 medium=2	ence level of your conclusion with this question? high=3
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our conclusion	Drop down menu
.5 Impacts through hybr	dization
at of notantial in a	
ist of potential impacts	dization with native species, usually closely related to the alien taxon, leading
	uration with native species, usaing tubery tended to the aimnit axion, reading tunity for reproduction, sterile or fertile hybrid offspring, gradual loss of the
	turing in Februation, seeine in errite rigion of risping, grauta ross of the ss, and/or disappearance of a native species, i.e. extinction.
-,pcc	

impact description
Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

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Impact level	
0	No data available, no impacts known, not detectable or not applicable.
2	Hybridization possible in ornamental breeding or captivity, but not or only rarely in the wild.  Hybridization common in the wild, no hybrid offspring, constraints to normal reproduction.
3	Hybridization common, with sterile offspring.
4	Hybridization common with fertile offspring, growing hybrid populations.
5	Hybridization common with fertile offspring, predominant hybrid populations, increasing loss of the genetic identity of a native species, local extinction of the native species.
Your conclusion	Drop down menu
Confidence level	
	ence level of your conclusion with this question?
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Your conclusion	- Para Assarana
Your conclusion	2 Drop down menu
1.6 Impacts on ecosyster	
1.0 impacts on ecosyster	
List of potential impacts	
	s of an ecosystem, its nutritional status (e.g. changes in nutrient
	ay be caused by nitrogen-fixating symbionts, increased water turbidity or ation of soil or water body properties (e.g. soil moisture, pH, C/N ratio,
	and disturbance regimes (vegetation flammability, changes in hydrology,
	g), changes in ecosystem functions (e.g. pollination or decomposition rates), or
	al changes. Impacts on ecosystems also include modification of successional tions may lead to reduced suitability (e.g. shelter) for native species,
	earance. The application of pesticides to control impacts might
have side effects on non-	target organisms which count as ecosystem impacts here.
Impact description	
	ines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.
Impact level 0	No data available, no impacts known, not detectable or not applicable.
1	Minor impacts, not impacts known, not detectable of not applicable.  Minor impacts, only locally.
2	Minor impacts, not only locally, e.g., impact on a particular ecosystem parameter.
3	Medium impacts, large-scale, damage of sites of conservation importance, relevant ecosystem modifications, impact on several ecosystem properties, pesticide applications needed, relevant changes in species composition.
4	pesticide applications needed, relevant changes in species composition.  Major small-scale effects, damage of sites of conservation importance, major changes in ecosystem services, decrease of species of concern.
	Major large-scale effects, damage of sites of conservation importance, changes in disturbance regimes, threat to species of concern, including local
5	extinctions.
Your conclusion	Drop down menu
Tour conclusion	Diop down mend
Confidence level	
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Your conclusion	Drop down menu
2 Economic impacts	
2.1 Impacts on agricultur	al production
List of potential impacts	
Impacts through damage	to crops, pastures or plantations, but also to horticultural and stored products. Impacts
include competition with	crops by weeds, direct feeding damage (from feeding traces which reduce
	production loss) but also reduced accessibility, usability or marketability
tnrougn contamination ar involve additional costs. a	nd cosmetic changes. Impacts include the need for applying pesticides which Iso by reducing market quality. Impacts usually lead to an economic loss.
Impact description	
Describe impact in a rew i	ines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.
Impact level	
0	No data available, no impacts known, not detectable or not applicable.
1 2	Minor impacts, only locally, negligible economic loss.  Minor impacts, but more wide-spread, minor economic loss.
3	Medium impacts, large-scale or frequently, pesticide application necessary, medium economic loss.
4	Major impacts with high damage, often occurring or with high probability, major economic loss.
5	Major impacts with complete destruction and economic loss.
Your conclusion	Drop down menu
Confidence level	and the state of t
What is the overall confid low = 1 medium=2	ence level of your conclusion with this question? high=3
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Your conclusion	Drop down menu

# 2.2 Impacts on animal production List of potential impacts Impacts through competition with livestock, transmission of diseases or parasites to livestock and predation of livestock, or, more generally, affecting livestock health. Intoxication of livestock through changes in food palatability, secondary plant compounds or toxins, weakening or injuring livestock, e.g., by stinging or biting. Also impacts on livestock environment such as pollution by droppings on farmland which domestic stock are then reluctant to graze. It also includes reduction of livestock accessibility to grazing land. Hybridization with livestock. Impacts include the need for applying pesticides which involve additional costs, also by reducing market quality. Impacts usually lead to an economic loss. This category refers to livestock, poultry, game animals, fisheries and aquaculture. Impact description Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations. Impact level No data available, no impacts known, not detectable or not applicable. Minor impacts, only locally, negligible economic loss. Minor impacts, but more wide-spread, minor economic loss. Medium impacts, large-scale or frequently, pesticide application necessary, medium economic loss. Major impacts with high damage, often occurring or with high probability, major economic loss. Major impacts with complete destruction and economic loss. Your conclusion Drop down menu What is the overall confidence level of your conclusion with this question? low = 1 medium=2 high=3 Drop down menu Your conclusion 2.3 Impacts on forestry production List of potential impacts Impacts on forests or forest products through plant competition, parasitism, diseases, herbivory, effects on tree or forest growth and on seed dispersal. Impacts might affect forest regeneration through browsing on young trees, bark gnawing or stripping and antler rubbing. Damage includes felling trees, defoliating them for nesting material or causing floods. Impacts include the need for $\,$ applying pesticides which involve additional costs, also by reducing market quality. Impacts usually lead to an economic loss. Impact description Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations. No data available, no impacts known, not detectable or not applicable. Minor impacts, only locally, negligible economic loss. Minor impacts, but more wide-spread, minor economic loss. Medium impacts, effects on forest regeneration, large-scale or frequently, pesticide application necessary, medium economic loss. Major impacts with high damage, often occurring or with high probability, major economic loss. Major impacts with complete destruction and economic loss Your conclusion Drop down menu Confidence level What is the overall confidence level of your conclusion with this question? low = 1 medium=2 2.4 Impacts on human infrastructure and administration Impacts include damage to human infrastructure, such as roads and other traffic infrastructure, buildings, dams, docks, fences, electricity cables (e.g., by gnawing or nesting on them) or through pollution (e.g. by droppings). Impacts through root growth, plant cover in open water bodies or digging activities on watersides, roadside embankments and buildings may affect flood defence systems, traffic infrastructure or stability of buildings. Impacts include the need for applying pesticides and performing management and eradication programmes, their development and further administration costs, as well as costs for research and control. Impacts usually lead to an economic loss. Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations. No data available, no impacts known, not detectable or not applicable.

Minor impacts, only locally, negligible economic loss.

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The control co	5	Major impacts with complete destruction and economic loss.
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Conclusions	Your conclusion	Drop down menu
Conclusions		
Conclusions		
Conclusions		
	Conclusions	

Prior to scoring, it has to be decided if all impact categories are of equal value. If deviations from default value = 1 are desired, this can be done here. Provide here a justification of weights different from 1.

Impact		initial	final	
category	weight	scores	scores	confiden
2.1.1 On plants or vegetatio	1	Incomplete	0	0
2.1.2 On animals	1	Incomplete	0	0
2.1.3 Competition	1	Incomplete	0	0
2.1.4 Disease transmission	1	Incomplete	0	0
2.1.5 Hybridization	1	Incomplete	0	2
2.1.6 Ecosystems	1	Incomplete	0	0
2.2.1 Agricultural productio	1 1	Incomplete	0	0
1.1.2 Animal production	1	Incomplete	0	0
2.2.3 Forestry production[2]	1	Incomplete	0	0
2.2.4 Human infrastructure	1	Incomplete	0	0
2.2.5 Human health	1	Incomplete	0	0
2.2.6 Human social life	1	Incomplete	0	0

2 Overall conclusion	
2 Overall Coliciusion	
Impact on environment	
Initial scores	0
final scores	0
confidence	0.33
Impact on economy	
Initial scores	0
final scores	0
confidence	0
Total impact	
Initial scores	0
final scores	0
confidence	0.17

Describe your overall conclusion in a few lines. Mention categories where 5 impact points are reached.

## 3 Assessors and reviewe

It is recommended that the assessments undergo a review process in order to check for completeness and accuracy (i.e. consistency of the assessment). It is also recommended that a small group of assessors discuss their scores to achieve a consensus opinion. Alternatively, the scores of each assessor are documented individually and a mean score is calculated. In this case, statistics on the inter-reviewer agreement such as Cohen's Kappa coefficient are recommended.

Assessor	
Location e-mail	
e-mail	
Date	
Reviewer Location	
e-mail	

## 4 Reference

dd references to the citations you made in this assessment.

du references to the citatio	iis you made in this assessment.
teference 1	
teference 2	
teference 3	

Reference 4					
Reference 5					
Reference 6					
Reference 7					
Reference /					
Reference 8					
Reference 9					
Reference 10					
nererence 10					
Reference 11					
Reference 12					
Reference 13					
Reference 15					
ILI FOR MARINE SPECIES: Agricultural production (2.2.1) and Forestry production (2.2.3), as defined in GISS, are irrelevant for marine species. Hence, their weights should be 0 and the rest of the weights 1.2 so that the total sum remains the same (12) and the results are comparable with those for other environments (ternestrial, freshwater).  Graduation of the results are comparable with those for other environments (ternestrial, freshwater).  The production (2.2.1) and forestry production (2.2.3), as defined in GISS, are irrelevant for marine species. Hence, their weights 1.2 so that the total sum remains the same (12) and the results are comparable with those for other environments (ternestrial, freshwater).					
[2]	al production (2.2.1) and Engels production (2.2.2) 4-5	offined in CISS are irrelevant for marine charles. Manne their waintie should be fi and the root of the welchts 1.2 on that the total sum complex the same (42)	arahla with three for other environments (terrestrial freshwester)		
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GISS Tabelle1 Tabelle2					